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INTRODUCTION

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BODY CODE PLATES

DESCRIPTION

LOCATION AND DECODING

The Body Code Plate (Fig. 1) is located in the engine compartment on the battery tray front side (Fig. 2). There are seven lines of information on the body code plate. Lines 4, 5, 6, and 7 are not used to define service information. Information reads from left to right, starting with line 3 in the center of the plate to line 1 at the bottom of the plate.

BODY CODE PLATE LINE 3

DIGITS 1, 2, AND 3

Paint procedure

DIGIT 4

Open Space

DIGITS 5 THROUGH 7

Primary Paint (Refer to 23 - BODY/PAINT - SPECIFICATIONS).

DIGIT 8 AND 9

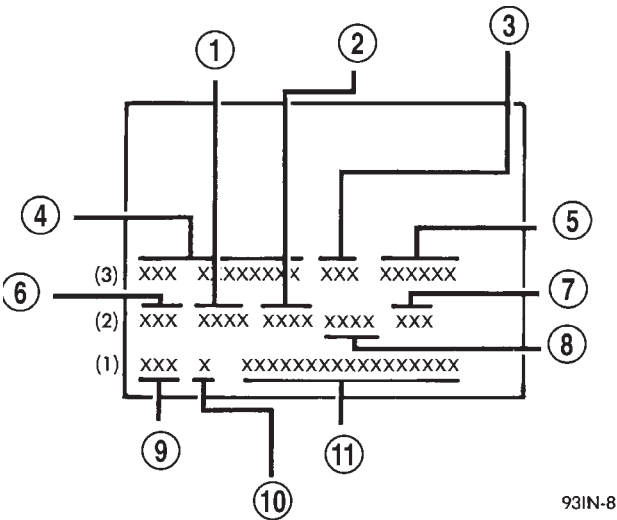
Open Space

DIGITS 10 THROUGH 12

Secondary Paint

DIGIT 13 AND 14

Open Space



93IN-8

Fig. 1 BODY CODE PLATE

- 1 - PRIMARY PAINT
- 2 - SECONDARY PAINT
- 3 - VINYL ROOF
- 4 - VEHICLE ORDER NUMBER
- 5 - CAR LINE SHELL
- 6 - PAINT PROCEDURE
- 7 - ENGINE
- 8 - TRIM
- 9 - TRANSMISSION
- 10 - MARKET
- 11 - VIN

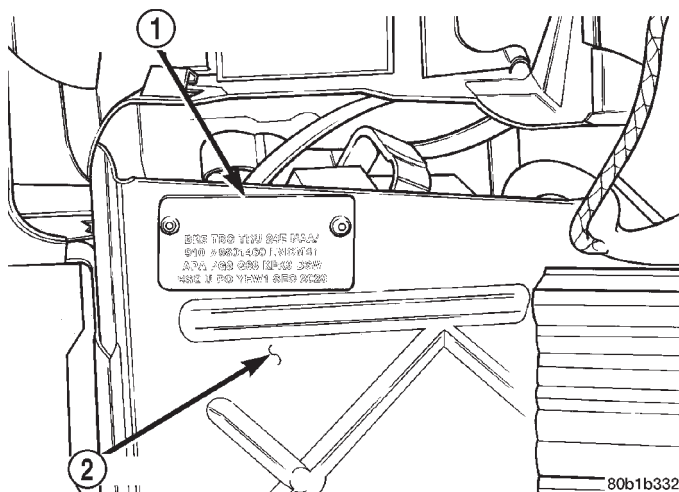
DIGITS 15 THROUGH 18

Interior Trim Code

DIGIT 19

Open Space

BODY CODE PLATES (Continued)

**Fig. 2 BODY CODE PLATE LOCATION**

- 1 - BODY COPY PLATE
2 - BATTERY TRAY

DIGITS 20, 21, AND 22**Engine Code**

- EER = 2.7 L, Six Cylinder, 24 Valve, DOHC, Gasoline, Aluminum Block (MPI)
- EGG = 3.5 L, Six Cylinder, 24 Valve, SOHC, High Output, Gasoline, Aluminum Block (MPI)
- EGK = 3.5 L, Six Cylinder, 24 Valve, SOHC, High Output, Gasoline, Aluminum Block (MPI)
- EGJ = 3.5 L, Six Cylinder, 24 Valve, SOHC, High Output, Gasoline, Aluminum Block
- EGC = 3.5 L, Six Cylinder, 24 Valve, SOHC, Magnum, Gasoline, Aluminum Block

DIGIT 23

Open Space

BODY CODE PLATE – LINE 2**DIGITS 1 THROUGH 12**

Vehicle Order Number

DIGITS 13, THROUGH 15

Vinyl Roof Code

DIGITS 16 AND 17

Open space

DIGITS 18 AND 19

- Vehicle Shell Line
- LH

DIGITS 20**Carline**

- C = Chrysler
- D = Dodge
- Y = Chrysler

DIGIT 21**Price Class**

- E = Economy
- H = High Line
- L = Low Line
- M = Mid Line
- P = Premium
- S = Special/Sport
- X = Performance Image

DIGITS 22 AND 23**Body Type**

- 41 = Four Door Sedan

BODY CODE PLATE LINE 1**DIGITS 1, 2, AND 3****Transaxle Codes**

- DGX = 42LE 4-Speed Electronic Automatic Transaxle

DIGIT 4

Open Space

DIGIT 5**Market Code**

- C = Canada
- B = International
- M = Mexico
- U = United States

DIGIT 6

Open Space

DIGITS 7 THROUGH 23**Vehicle Identification Number**

- (Refer to VEHICLE DATA/VEHICLE INFORMATION/VEHICLE IDENTIFICATION NUMBER - DESCRIPTION) for proper breakdown of VIN code.

IF TWO BODY CODE PLATES ARE REQUIRED

The last code shown on either plate will be followed by END. When two plates are required, the last code space on the first plate will indicate (CTD)

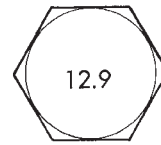
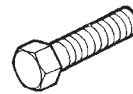
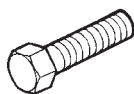
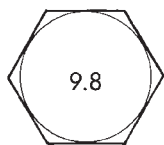
When a second plate is required, the first four spaces of each line will not be used due to overlap of the plates.

FASTENER IDENTIFICATION

DESCRIPTION

The SAE bolt strength grades range from grade 2 to grade 8. The higher the grade number, the greater the bolt strength. Identification is determined by the line marks on the top of each bolt head. The actual bolt strength grade corresponds to the number of line marks plus 2. The most commonly used metric bolt strength classes are 9.8 and 10.9. The metric strength class identification number is imprinted on the head of the bolt. The higher the class number, the greater the bolt strength. Some metric nuts are imprinted with a single-digit strength class on the nut face. Refer to the Fastener Identification and Fastener Strength Charts (Fig. 3) and (Fig. 4).

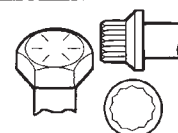
FASTENER IDENTIFICATION (Continued)

Bolt Markings and Torque - Metric**Commercial Steel Class****9.8****10.9****12.9****Bolt Head Markings**

Body Size	Torque				Torque				Torque				
	Cast Iron		Aluminum		Cast Iron		Aluminum		Cast Iron		Aluminum		
	Diam. mm	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
6	9	5	7	4	14	9	11	7	14	9	11	7	
7	14	9	11	7	18	14	14	11	23	18	18	14	
8	25	18	18	14	32	23	25	18	36	27	28	21	
10	40	30	30	25	60	45	45	35	70	50	55	40	
12	70	55	55	40	105	75	80	60	125	95	100	75	
14	115	85	90	65	160	120	125	95	195	145	150	110	
16	180	130	140	100	240	175	190	135	290	210	220	165	
18	230	170	180	135	320	240	250	185	400	290	310	230	

Bolt Markings and Torque Values - U.S. Customary**SAE Grade Number****5****8****Bolt Head Markings**

These are all SAE Grade 5 (3) line


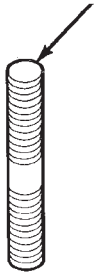


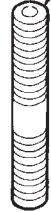



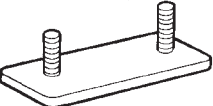

**Bolt Torque - Grade 5 Bolt****Bolt Torque - Grade 8 Bolt**

Body Size	Cast Iron		Aluminum		Cast Iron		Aluminum	
	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1/4 - 20	9	7	8	6	15	11	12	9
- 28	12	9	9	7	18	13	14	10
5/16 - 18	20	15	16	12	30	22	24	18
- 24	23	17	19	14	33	24	25	19
3/8 - 16	40	30	25	20	55	40	40	30
- 24	40	30	35	25	60	45	45	35
7/16 - 14	60	45	45	35	90	65	65	50
- 20	65	50	55	40	95	70	75	55
1/2 - 13	95	70	75	55	130	95	100	75
- 20	100	75	80	60	150	110	120	90
9/16 - 12	135	100	110	80	190	140	150	110
- 18	150	110	115	85	210	155	170	125
5/8 - 11	180	135	150	110	255	190	205	150
- 18	210	155	160	120	290	215	230	170
3/4 - 10	325	240	255	190	460	340	365	270
- 16	365	270	285	210	515	380	410	300
7/8 - 9	490	360	380	280	745	550	600	440
- 14	530	390	420	310	825	610	660	490
1 - 8	720	530	570	420	1100	820	890	660
- 14	800	590	650	480	1200	890	960	710

Fig. 3 FASTENER IDENTIFICATION

FASTENER IDENTIFICATION (Continued)

HOW TO DETERMINE BOLT STRENGTH

	Mark	Class		Mark	Class
Hexagon head bolt	 <p>4 — 4T 5 — 5T 6 — 6T 7 — 7T 8 — 8T 9 — 9T 10 — 10T 11 — 11T</p>		Stud bolt	 <p>4T</p>	
	 <p>No mark</p>	4T			
Hexagon flange bolt w/washer hexagon bolt	 <p>No mark</p>	4T		 <p>6T</p>	
Hexagon head bolt	 <p>Two protruding lines</p>	5T			
Hexagon flange bolt w/washer hexagon bolt	 <p>Two protruding lines</p>	6T	Welded bolt		
Hexagon head bolt	 <p>Three protruding lines</p>	7T		 <p>4T</p>	
Hexagon head bolt	 <p>Four protruding lines</p>	8T			

95IN-4

Fig. 4 FASTENER STRENGTH

FASTENER USAGE

DESCRIPTION

DESCRIPTION - FASTENER USAGE

WARNING: USE OF AN INCORRECT FASTENER MAY RESULT IN COMPONENT DAMAGE OR PERSONAL INJURY.

Fasteners and torque specifications references in this Service Manual are identified in metric and SAE format.

During any maintenance or repair procedures, it is important to salvage all fasteners (nuts, bolts, etc.) for reassembly. If the fastener is not salvageable, a fastener of equivalent specification must be used.

























DESCRIPTION - THREADED HOLE REPAIR

Most stripped threaded holes can be repaired using a Helicoil®. Follow the vehicle or Helicoil® recommendations for application and repair procedures.

INTERNATIONAL VEHICLE CONTROL & DISPLAY SYMBOLS

DESCRIPTION

The graphic symbols illustrated in the following International Control and Display Symbols Chart (Fig. 5) are used to identify various instrument controls. The symbols correspond to the controls and displays that are located on the instrument panel.

					
1	2	3	4	5	6
					
7	8	9	10	11	12
					
13	14	15	16	17	18
					
19	20	21	22	23	24

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Fig. 5 INTERNATIONAL CONTROL AND DISPLAY SYMBOLS

1	High Beam	13	Rear Window Washer
2	Fog Lamps	14	Fuel
3	Headlamp, Parking Lamps, Panel Lamps	15	Engine Coolant Temperature
4	Turn Warning	16	Battery Charging Condition
5	Hazard Warning	17	Engine Oil
6	Windshield Washer	18	Seat Belt
7	Windshield Wiper	19	Brake Failure
8	Windshield Wiper and Washer	20	Parking Brake
9	Windscreen Demisting and Defrosting	21	Front Hood
10	Ventilating Fan	22	Rear hood (Decklid)
11	Rear Window Defogger	23	Horn
12	Rear Window Wiper	24	Lighter

METRIC SYSTEM

DESCRIPTION

The metric system is based on quantities of one, ten, one hundred, one thousand and one million.

The following chart will assist in converting metric units to equivalent English and SAE units, or vise versa.

CONVERSION FORMULAS AND EQUIVALENT VALUES

MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
in-lbs	x 0.11298	= Newton Meters (N·m)	N·m	x 8.851	= in-lbs
ft-lbs	x 1.3558	= Newton Meters (N·m)	N·m	x 0.7376	= ft-lbs
Inches Hg (60° F)	x 3.377	= Kilopascals (kPa)	kPa	x 0.2961	= Inches Hg
psi	x 6.895	= Kilopascals (kPa)	kPa	x 0.145	= psi
Inches	x 25.4	= Millimeters (mm)	mm	x 0.03937	= Inches
Feet	x 0.3048	= Meters (M)	M	x 3.281	= Feet
Yards	x 0.9144	= Meters	M	x 1.0936	= Yards
mph	x 1.6093	= Kilometers/Hr. (Km/h)	Km/h	x 0.6214	= mph
Feet/Sec	x 0.3048	= Meters/Sec (M/S)	M/S	x 3.281	= Feet/Sec
mph	x 0.4470	= Meters/Sec (M/S)	M/S	x 2.237	= mph
Kilometers/Hr. (Km/h)	x 0.27778	= Meters/Sec (M/S)	M/S	x 3.600	Kilometers/Hr. (Km/h)

COMMON METRIC EQUIVALENTS

1 inch = 25 Millimeters	1 Cubic Inch = 16 Cubic Centimeters
1 Foot = 0.3 Meter	1 Cubic Foot = 0.03 Cubic Meter
1 Yard = 0.9 Meter	1 Cubic Yard = 0.8 Cubic Meter
1 Mile = 1.6 Kilometers	

Refer to the Metric Conversion Chart to convert torque values listed in metric Newton- meters (N·m). Also, use the chart to convert between millimeters (mm) and inches (in.) (Fig. 6).

METRIC SYSTEM (Continued)

in-lbs to N•m

N•m to in-lbs

in- lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb	N•m	in-lb
2	.2260	42	4.7453	82	9.2646	122	13.7839	162	18.3032	.2	1.7702	4.2	37.1747	8.2	72.5792	12.2	107.9837	16.2	143.3882
4	.4519	44	4.9713	84	9.4906	124	14.0099	164	18.5292	.4	3.5404	4.4	38.9449	8.4	74.3494	12.4	109.7539	16.4	145.1584
6	.6779	46	5.1972	86	9.7165	126	14.2359	166	18.7552	.6	5.3107	4.6	40.7152	8.6	76.1197	12.6	111.5242	16.6	146.9287
8	.9039	48	5.4232	88	9.9425	128	14.4618	168	18.9811	.8	7.0809	4.8	42.4854	8.8	77.8899	12.8	113.2944	16.8	148.6989
10	1.1298	50	5.6492	90	10.1685	130	14.6878	170	19.2071	1	8.8511	5	44.2556	9	79.6601	13	115.0646	17	150.4691
12	1.3558	52	5.8751	92	10.3944	132	14.9138	172	19.4331	1.2	10.6213	5.2	46.0258	9.2	81.4303	13.2	116.8348	17.2	152.2393
14	1.5818	54	6.1011	94	10.6204	134	15.1397	174	19.6590	1.4	12.3916	5.4	47.7961	9.4	83.2006	13.4	118.6051	17.4	154.0096
16	1.8077	56	6.3270	96	10.8464	136	15.3657	176	19.8850	1.6	14.1618	5.6	49.5663	9.6	84.9708	13.6	120.3753	17.6	155.7798
18	2.0337	58	6.5530	98	11.0723	138	15.5917	178	20.1110	1.8	15.9320	5.8	51.3365	9.8	86.7410	13.8	122.1455	17.8	157.5500
20	2.2597	60	6.7790	100	11.2983	140	15.8176	180	20.3369	2	17.7022	6	53.1067	10	88.5112	14	123.9157	18	159.3202
22	2.4856	62	7.0049	102	11.5243	142	16.0436	182	20.5629	2.2	19.4725	6.2	54.8770	10.2	90.2815	14.2	125.6860	18.5	163.7458
24	2.7116	64	7.2309	104	11.7502	144	16.2696	184	20.7889	2.4	21.2427	6.4	56.6472	10.4	92.0517	14.4	127.4562	19	168.1714
26	2.9376	66	7.4569	106	11.9762	146	16.4955	186	21.0148	2.6	23.0129	6.6	58.4174	10.6	93.8219	14.6	129.2264	19.5	172.5970
28	3.1635	68	7.6828	108	12.2022	148	16.7215	188	21.2408	2.8	24.7831	6.8	60.1876	10.8	95.5921	14.8	130.9966	20	177.0225
30	3.3895	70	7.9088	110	12.4281	150	16.9475	190	21.4668	3	26.5534	7	61.9579	11	97.3624	15	132.7669	20.5	181.4480
32	3.6155	72	8.1348	112	12.6541	152	17.1734	192	21.6927	3.2	28.3236	7.2	63.7281	11.2	99.1326	15.2	134.5371	21	185.8736
34	3.8414	74	8.3607	114	12.8801	154	17.3994	194	21.9187	3.4	30.0938	7.4	65.4983	11.4	100.9028	15.4	136.3073	22	194.7247
36	4.0674	76	8.5867	116	13.1060	156	17.6253	196	22.1447	3.6	31.8640	7.6	67.2685	11.6	102.6730	15.6	138.0775	23	203.5759
38	4.2934	78	8.8127	118	13.3320	158	17.8513	198	22.3706	3.8	33.6342	7.8	69.0388	11.8	104.4433	15.8	139.8478	24	212.4270
40	4.5193	80	9.0386	120	13.5580	160	18.0773	200	22.5966	4	35.4045	8	70.8090	12	106.2135	16	141.6180	25	221.2781

ft-lbs to N•m

N•m to ft-lbs

ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	
1	1.3558	21	28.4722	41	55.5885	61	82.7049	81	109.8212	1	.7376	21	15.9888	41	30.2400	61	44.9913	81	59.7425
2	2.7116	22	29.8280	42	56.9444	62	84.0607	82	111.1770	2	1.4751	22	16.2264	42	30.9776	62	45.7289	82	60.4801
3	4.0675	23	31.1838	43	58.3002	63	85.4165	83	112.5328	3	2.2127	23	16.9639	43	31.7152	63	46.4664	83	61.2177
4	5.4233	24	32.5396	44	59.6560	64	86.7723	84	113.8888	4	2.9502	24	17.7015	44	32.4527	64	47.2040	84	61.9552
5	6.7791	25	33.8954	45	61.0118	65	88.1281	85	115.2446	5	3.6878	25	18.4391	45	33.1903	65	47.9415	85	62.6928
6	8.1349	26	35.2513	46	62.3676	66	89.4840	86	116.6004	6	4.4254	26	19.1766	46	33.9279	66	48.6791	86	63.4303
7	9.4907	27	36.6071	47	63.7234	67	90.8398	87	117.9562	7	5.1629	27	19.9142	47	34.6654	67	49.4167	87	64.1679
8	10.8465	28	37.9629	48	65.0793	68	92.1956	88	119.3120	8	5.9005	28	20.6517	48	35.4030	68	50.1542	88	64.9545
9	12.2024	29	39.3187	49	66.4351	69	93.5514	89	120.6678	9	6.6381	29	21.3893	49	36.1405	69	50.8918	89	65.6430
10	13.5582	30	40.6745	50	67.7909	70	94.9073	90	122.0236	10	7.3756	30	22.1269	50	36.8781	70	51.6293	90	66.3806
11	14.9140	31	42.0304	51	69.1467	71	96.2631	91	123.3794	11	8.1132	31	22.8644	51	37.6157	71	52.3669	91	67.1181
12	16.2698	32	43.3862	52	70.5025	72	97.6189	92	124.7352	12	8.8507	32	23.6020	52	38.3532	72	53.1045	92	67.8557
13	17.6256	33	44.7420	53	71.8583	73	98.9747	93	126.0910	13	9.5883	33	24.3395	53	39.0908	73	53.8420	93	68.5933
14	18.9815	34	46.0978	54	73.2142	74	100.3316	94	127.4468	14	10.3259	34	25.0771	54	39.8284	74	54.5720	94	69.3308
15	20.3373	35	47.4536	55	74.5700	75	101.6862	95	128.8026	15	11.0634	35	25.8147	55	40.5659	75	55.3172	95	70.0684
16	21.6931	36	48.8094	56	75.9258	76	103.0422	96	130.1586	16	11.8010	36	26.5522	56	41.3035	76	56.0547	96	70.8060
17	23.0489	37	50.1653	57	77.2816	77	104.3980	97	131.5144	17	12.5386	37	27.2898	57	42.0410	77	56.7923	97	71.5435
18	24.4047	38	51.5211	58	78.6374	78	105.7538	98	132.8702	18	13.2761	38	28.0274	58	42.7786	78	57.5298	98	72.2811
19	25.7605	39	52.8769	59	79.9933	79	107.1196	99	134.2260	19	14.0137	39	28.7649	59	43.5162	79	58.2674	99	73.0187
20	27.1164	40	54.2327	60	81.3491	80	108.4654	100	135.5820	20	14.7512	40	29.5025	60	44.2537	80	59.0050	100	73.7562

in. to mm

mm to in.

in.	mm	in.	mm	in.	mm	in.	mm	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.		
.01	.254	.21	5.334	.41	10.414	.61	15.494	.81	20.574	.01	.00039	.21	.00827	.41	.01614	.61	.02402	.81	.03189
.02	.508	.22	5.588	.42	10.668	.62	15.748	.82	20.828	.02	.00079	.22	.00866	.42	.01654	.62	.02441	.82	.03228
.03	.762	.23	5.842	.43	10.922	.63	16.002	.83	21.082	.03	.00118	.23	.00906	.43	.01693	.63	.02480	.83	.03268
.04	1.016	.24	6.096	.44	11.176	.64	16.256	.84	21.336	.04	.00157	.24	.00945	.44	.01732	.64	.02520	.84	.03307
.05	1.270	.25	6.350	.45	11.430	.65	16.510	.85	21.590	.05	.00197	.25	.00984	.45	.01772	.65	.02559	.85	.03346
.06	1.524	.26	6.604	.46	11.684	.66	16.764	.86	21.844	.06	.00236	.26	.01024	.46	.01811	.66	.02598	.86	.03386
.07	1.778	.27	6.858	.47	11.938	.67	17.018	.87	22.098	.07	.00276	.27	.01063	.47	.01850	.67	.02638	.87	.03425
.08	2.032	.28	7.112	.48	12.192	.68	17.272	.88	22.352	.08	.00315	.28	.01102	.48	.01890	.68	.02677	.88	.03465
.09	2.286	.29	7.366	.49	12.446	.69	17.526	.89	22.606	.09	.00354	.29	.01142	.49	.01929	.69	.02717	.89	.03504
.10	2.540	.30	7.620	.50	12.700	.70	17.780	.90	22.860	.10	.00394	.30	.01181	.50	.01969	.70	.02756	.90	.03543
.11	2.794	.31	7.874	.51	12.954	.71	18.034	.91	23.114	.11	.00433	.31	.01220	.51	.02008	.71	.02795	.91	.03583
.12	3.048	.32	8.128	.52	13.208	.72	18.288	.92	23.368	.12	.00472	.32	.01260	.52	.02047	.72	.02835	.92	.03622
.13	3.302	.33	8.382	.53	13.462	.73	18.542	.93	23.622	.13	.00512	.33	.01299	.53	.02087	.73	.02874	.93	.03661
.14	3.556	.34	8.636	.54	13.716	.74	18.796	.94	23.876	.14	.00551	.34	.01339	.54	.02126	.74	.02913	.94	.03701
.15	3.810	.35	8.890	.55	13.970	.75	19.050	.95	24.130	.15	.00591	.35	.01378	.55	.02165	.75	.02953	.95	.03740
.16	4.064	.36	9.144	.56	14.224	.76	19.304	.96	24.384	.16	.00630	.36	.01417	.56	.02205	.76	.02992	.96	.03780
.17	3.318	.37	9.398	.57	14.478	.77	19.558	.97	24.638	.17	.00669	.37	.01457	.57	.02244	.77	.03032	.97	.03819
.18	4.572	.38	9.652	.58	14.732	.78	19.812	.98	24.892	.18	.00709	.38	.01496	.58	.02283	.78	.03071	.98	.03858
.19	4.826	.39	9.906	.59	14.986	.79	20.066	.99	25.146	.19	.00748	.39	.01535	.59	.02323	.79	.03110	.99	.03898
.20	5.080	.40	10.160	.60	15.240	.80	20.320	1.00	25.400	.20	.00787	.40	.01575	.60	.02362	.80	.03150	1.00	.03937

TORQUE REFERENCES

tions Chart for torque references not listed in the individual torque charts (Fig. 7).

DESCRIPTION

Individual Torque Charts appear within many or the Groups. Refer to the Standard Torque Specifica-

SPECIFIED TORQUE FOR STANDARD BOLTS

Class	Diameter mm	Pitch mm	Specified torque					
			Hexagon head bolt			Hexagon flange bolt		
			N•m	kgf-cm	ft-lbf	N•m	kgf-cm	ft-lbf
4T	6	1	5	55	48 in.-lbf	6	60	52 in.-lbf
	8	1.25	12.5	130	9	14	145	10
	10	1.25	26	260	19	29	290	21
	12	1.25	47	480	35	53	540	39
	14	1.5	74	760	55	84	850	61
	16	1.5	115	1,150	83	—	—	—
5T	6	1	6.5	65	56 in.-lbf	7.5	75	65 in.-lbf
	8	1.25	15.5	160	12	17.5	175	13
	10	1.25	32	330	24	36	360	26
	12	1.25	59	600	43	65	670	48
	14	1.5	91	930	67	100	1,050	76
	16	1.5	140	1,400	101	—	—	—
6T	6	1	8	80	69 in.-lbf	9	90	78 in.-lbf
	8	1.25	19	195	14	21	210	15
	10	1.25	39	400	29	44	440	32
	12	1.25	71	730	53	80	810	59
	14	1.5	110	1,100	80	125	1,250	90
	16	1.5	170	1,750	127	—	—	—
7T	6	1	10.5	110	8	12	120	9
	8	1.25	25	260	19	28	290	21
	10	1.25	52	530	38	58	590	43
	12	1.25	95	970	70	105	1,050	76
	14	1.5	145	1,500	108	165	1,700	123
	16	1.5	230	2,300	166	—	—	—
8T	8	1.25	29	300	22	33	330	24
	10	1.25	61	620	45	68	690	50
	12	1.25	110	1,100	80	120	1,250	90
9T	8	1.25	34	340	25	37	380	27
	10	1.25	70	710	51	78	790	57
	12	1.25	125	1,300	94	140	1,450	105
10T	8	1.25	38	390	28	42	430	31
	10	1.25	78	800	58	88	890	64
	12	1.25	140	1,450	105	155	1,600	116
11T	8	1.25	42	430	31	47	480	35
	10	1.25	87	890	64	97	990	72
	12	1.25	155	1,600	116	175	1,800	130

Fig. 7 TORQUE SPECIFICATIONS

VEHICLE IDENTIFICATION NUMBER

DESCRIPTION

The Vehicle Identification Number (VIN) is located on the upper left corner of the upper plenum, near the left windshield pillar (Fig. 8). The VIN consists of 17 characters in a combination of letters and numbers that provide specific information about the vehicle. Refer to VIN Code Breakdown table for decoding information.

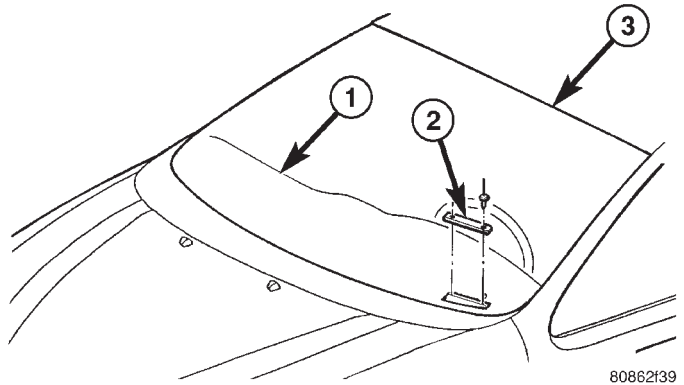


Fig. 8 VEHICLE IDENTIFICATION NUMBER (VIN PLATE)

- 1 - INSTRUMENT PANEL
- 2 - V.I.N.
- 3 - WINDSHIELD OPENING

VIN CODE BREAKDOWN CHART

POSITION	INTERPRETATION	CODE = DESCRIPTION
1	Country of Origin	2 = Built in Canada by DaimlerChrysler Canada Inc.
2	Make	B = Dodge C = Chrysler
3	Vehicle Type	3 = Passenger Car
4	Passenger Safety	A = Restraint System - Active Driver and Side Airbags H = Restraint System - Active Driver and Passenger Airbags
5	Car Line	D = Intrepid (U.S.A. & Mexico) E = 300M H = Intrepid (Canada)
6	Series	3 = Medium 4 = High Line 5 = Premium 6 = Sport 7 = Special
7	Body Style	6 = 4 Door Sedan
8	Engine	G = 3.5L V6 Cyl 24 Valve SOHC (MPI) K = 3.5L V6 Cyl 24 valve (MPI) M = 3.5L V6 Cyl 24 valve SOHC R = 2.7L V6 Cyl 24 Valve DOHC (MPI) V = 3.5L V6 Cyl 24 Valve SOHC
9	Check Digit	See explanation in this section.
10	Model Year	2 = 2002
11	Assembly Plant	H = Bramalea Assembly
12 through 17	Sequence Number	Six digit number assigned by assembly plant

VEHICLE IDENTIFICATION NUMBER (Continued)

VIN CHECK DIGIT

DESCRIPTION

To protect the consumer from theft and possible fraud the manufacturer is required to include a Check Digit at the ninth position of the Vehicle Identification Number. The check digit is used by the manufacturer and government agencies to verify the authenticity of the vehicle and official documentation. The formula to use the check digit is not released to the general public.

VEHICLE SAFETY CERTIFICATION LABEL

DESCRIPTION


A vehicle safety certification label is attached to the rear shutface of the driver's door (Fig. 9). This label indicates date of manufacture (month and year), Gross Vehicle Weight Rating (GVWR), Gross Axle Weight Rating (GAWR) front, Gross Axle Weight Rating (GAWR) rear and the Vehicle Identification Number (VIN). The Month, Day and Hour of manufacture is also included.

All communications or inquiries regarding the vehicle should include the Month-Day-Hour and Vehicle Identification Number.

MFD BY	DAIMLER CHRYSLER CORPORATION	DATE OF MFR	1-96 C	GVWR	2268 KG (05000 LB)
GAWR FRONT	WITH TIRES	RIMS AT	COLD		
1203 KG (2650 LB)	P195/75R14	14 X 5.5	380 KPA(35 PSI)		
GAWR REAR	WITH TIRES	RIMS AT	COLD		
1225 KG (2700 LB)	P195/75R14	14 X 5.5	380 KPA(35 PSI)		

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

VIN: XXXXXXXXXXXXXXXX TYPE: SINGLE X DUAL



MDH: 010615 021 PAINT:POP VEHICLE MADE IN CANADA TRIM:C5C3 4648505

Fig. 9 VEHICLE SAFETY CERTIFICATION LABEL - TYPICAL

E-MARK LABEL

DESCRIPTION

An E-mark Label (Fig. 10) is located on the rear shut face of the driver's door. The label contains the following information:

- Date of Manufacture
- Month-Day-Hour (MDH)
- Vehicle Identification Number (VIN)
- Country Codes
- Regulation Number
- Regulation Amendment Number
- Approval Number

Date of Manufacture: 05-95 MDH: 052915
VIN: XXXXXXXXXXXXXXXX

E4	21	0195002	E11	13	063098
	26	0195001		14	030169
E5	10	010035	E11	17	040212
	11	020011		39	00155
	18	010010		44	0244038
	28	010016		51	011082
	46	010019		79	00155
	85	000044			
E11	12	030263	E11	48	005003

1

2

4

3

Fig. 10 E-MARK LABEL

- 1 - COUNTRY CODE
- 2 - REGULATION NUMBER
- 3 - APPROVAL NUMBER
- 4 - AMENDMENT NUMBER

VECI LABEL

DESCRIPTION

All models have a Vehicle Emission Control Information (VECI) Label. Chrysler permanently attaches the label in the engine compartment. It cannot be removed without defacing information and destroying the label.

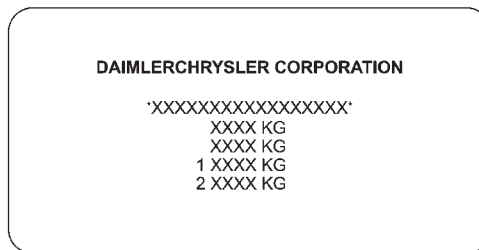
The label contains the vehicle's emission specifications and vacuum hose routings. All hoses must be connected and routed according to the label.

MANUFACTURE PLATE

DESCRIPTION

The Manufacturer Plate (Fig. 11) is located in the engine compartment on the passenger side rear corner of the hood. The plate contains five lines of information:

1. Vehicle Identification Number (VIN)
2. Gross Vehicle Mass (GVM)
3. Gross Train Mass (GTM)
4. Gross Front Axle Rating (GFAR)
5. Gross Rear Axle Rating (GRAR)



80bf3788

Fig. 11 MANUFACTURER PLATE

LUBRICATION & MAINTENANCE

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LUBRICATION & MAINTENANCE







SPECIFICATIONS - FLUID CAPACITIES

DESCRIPTION	SPECIFICATION
Fuel Tank	64 L (17 gal.)
Engine Oil*	4.7 L (5.0 qts.)
Cooling System**	8.9 L (9.4 qts.)
Automatic Transaxle - Estimated Service Fill	4.3 L (4.5 qts.)
Automatic Transaxle - Overhaul Fill Capacity with Torque Converter Empty	8.8 L (9.3 qts.)
Differential	0.74 L (0.78 qts.)
*(includes filter)	
**(includes heater and recovery/reserve bottle)	

INTERNATIONAL SYMBOLS

DESCRIPTION

DaimlerChrysler Corporation uses international symbols to identify engine compartment lubricant and fluid inspection and fill locations (Fig. 1).

	ENGINE OIL		BRAKE FLUID
	AUTOMATIC TRANSMISSION FLUID		POWER STEERING FLUID
	ENGINE COOLANT		WINDSHIELD WASHER FLUID

8097ddbdl

Fig. 1 INTERNATIONAL SYMBOLS

FLUID TYPES

DESCRIPTION

DESCRIPTION - ENGINE OIL AND LUBRICANTS

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

When service is required, DaimlerChrysler Corporation recommends that only Mopar® brand parts, lubricants and chemicals be used. Mopar® provides the best engineered products for servicing DaimlerChrysler Corporation vehicles.

Only lubricants bearing designations defined by the following organization should be used.

- Society of Automotive Engineers (SAE)
- American Petroleum Institute (API)
- National Lubricating Grease Institute (NLGI)

API SERVICE GRADE CERTIFIED

Use an engine oil that is API Certified. MOPAR® provides engine oils, meeting Material Standard MS-6395, that meet or exceed this requirement.

SAE VISCOSITY

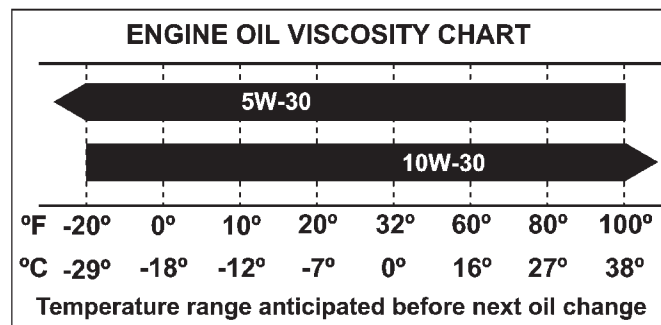
An SAE viscosity grade is used to specify the viscosity of engine oil. Use only engine oils with multiple viscosities such as 5W-30 or 10W-30. These are specified with a dual SAE viscosity grade which indicates the cold-to-hot temperature viscosity range. Select an engine oil that is best suited to your particular temperature range and variation (Fig. 2).

ENERGY CONSERVING OIL

An Energy Conserving type oil is recommended for gasoline engines. The designation of ENERGY CONSERVING is located on the label of an engine oil container.

CONTAINER IDENTIFICATION

Standard engine oil identification notations have been adopted to aid in the proper selection of engine oil. The identifying notations are located on the front



80990199

Fig. 2 TEMPERATURE/ENGINE OIL VISCOSITY

label of engine oil plastic bottles and the top of engine oil cans (Fig. 3).

This symbol means that the oil has been certified by the American Petroleum Institute (API). DaimlerChrysler only recommend API Certified engine oils that meet the requirements of Material Standard MS-6395. Use Mopar or an equivalent oil meeting the specification MS-6395.



9400-9

Fig. 3 API SYMBOL

GEAR LUBRICANTS

SAE ratings also apply to multigrade gear lubricants. In addition, API classification defines the lubricants usage. Such as API GL-5 and SAE 75W-90.

LUBRICANTS AND GREASES

Lubricating grease is rated for quality and usage by the NLGI. All approved products have the NLGI symbol (Fig. 4) on the label. At the bottom NLGI symbol is the usage and quality identification letters. Wheel bearing lubricant is identified by the letter "G". Chassis lubricant is identified by the latter "L". The letter following the usage letter indicates the quality of the lubricant. The following symbols indicate the highest quality.

SPECIALIZED LUBRICANTS AND OILS

Some maintenance or repair procedures may require the use of specialized lubricants or oils. Consult the appropriate sections in this manual for the correct application of these lubricants.

FLUID TYPES (Continued)

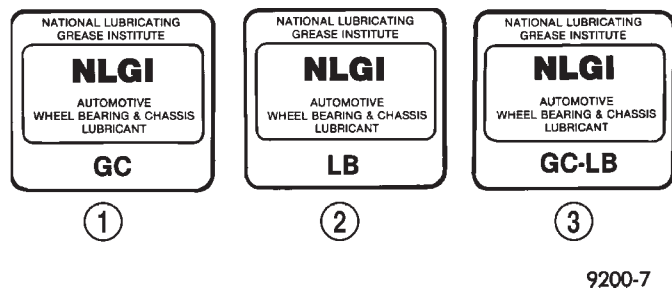


Fig. 4 NLGI SYMBOL

- 1 - WHEEL BEARINGS
- 2 - CHASSIS LUBRICATION
- 3 - CHASSIS AND WHEEL BEARINGS

DESCRIPTION - ENGINE COOLANT

WARNING: ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. IF SWALLOWED, DRINK TWO GLASSES OF WATER AND INDUCE VOMITING. IF INHALED, MOVE TO FRESH AIR AREA. SEEK MEDICAL ATTENTION IMMEDIATELY. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL. KEEP OUT OF REACH OF CHILDREN. DISPOSE OF GLYCOL BASE COOLANT PROPERLY, CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT OPERATING TEMPERATURE OR HOT UNDER PRESSURE, PERSONAL INJURY CAN RESULT. AVOID RADIATOR COOLING FAN WHEN ENGINE COMPARTMENT RELATED SERVICE IS PERFORMED, PERSONAL INJURY CAN RESULT.

CAUTION: Use of Propylene Glycol based coolants is not recommended, as they provide less freeze protection and less boiling protection.

The cooling system is designed around the coolant. The coolant must accept heat from engine metal, in the cylinder head area near the exhaust valves and engine block. Then coolant carries the heat to the radiator where the tube/fin radiator can transfer the heat to the air.

The use of aluminum cylinder blocks, cylinder heads, and water pumps requires special corrosion protection. Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769), or the equivalent ethylene glycol base coolant with hybrid organic corrosion inhibitors (called HOAT, for Hybrid Organic Additive Technology) is recommended. This coolant offers the best engine cooling without corrosion when mixed with 50% Ethylene Glycol and 50% distilled

water to obtain a freeze point of -37°C (-35°F). If it loses color or becomes contaminated, drain, flush, and replace with fresh properly mixed coolant solution.

The green coolant **MUST NOT BE MIXED** with the orange or magenta coolants. When replacing coolant the complete system flush must be performed before using the replacement coolant.

CAUTION: Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) may not be mixed with any other type of antifreeze. Doing so will reduce the corrosion protection and may result in premature water pump seal failure. If non-HOAT coolant is introduced into the cooling system in an emergency, it should be replaced with the specified coolant as soon as possible.

DESCRIPTION - AUTOMATIC TRANSMISSION FLUID

NOTE: Refer to the maintenance schedules for the recommended maintenance (fluid/filter change) intervals for this transaxle.

NOTE: For fluid level checking procedures, (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/FLUID - STANDARD PROCEDURE).

NOTE: The 42LE transaxle has separate transmission and differential oil sumps, each requiring different fluids.

TRANSMISSION FLUID

Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602) is required in this transaxle. Substitute fluids can induce torque converter clutch shudder.

Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602) when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** ATF+4 also has a unique odor that may change with age. Consequently, **odor and color cannot be used to indicate the fluid condition or the need for a fluid change.**

FLUID ADDITIVES

DaimlerChrysler strongly recommends against the addition of any fluids to the transmission, other than those automatic transmission fluids listed above.

FLUID TYPES (Continued)

Exceptions to this policy are the use of special dyes to aid in detecting fluid leaks.

Various “special” additives and supplements exist that claim to improve shift feel and/or quality. These additives and others also claim to improve converter clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler and these additives **must not be used**. The use of transmission “sealers” should also be avoided, since they may adversely affect the integrity of transmission seals.

DESCRIPTION - FUEL REQUIREMENTS

Your engine is designed to meet all emissions regulations and provide excellent fuel economy and performance when using high quality unleaded gasoline having an octane rating of 87. The uses of midgrade, octane rating of 89, gasoline is recommended for the 3.5L H.O. engine. The use of premium gasoline is not recommended. The use of premium gasoline will provide no benefit over high quality regular gasoline, and in some circumstances may result in poorer performance.

Light spark knock at low engine speeds is not harmful to your engine. However, continued heavy spark knock at high speeds can cause damage and immediate service is required. Engine damage resulting from operation with a heavy spark knock may not be covered by the new vehicle warranty.

Poor quality gasoline can cause problems such as hard starting, stalling and hesitations. If you experience these symptoms, try another brand of gasoline before considering service for the vehicle.

Over 40 auto manufacturers world-wide have issued and endorsed consistent gasoline specifications (the Worldwide Fuel Charter, WWFC) to define fuel properties necessary to deliver enhanced emissions, performance and durability for your vehicle. We recommend the use of gasolines that meet the WWFC specifications if they are available.

REFORMULATED GASOLINE

Many areas of the country require the use of cleaner burning gasoline referred to as “reformulated” gasoline. Reformulated gasoline contain oxygenates, and are specifically blended to reduce vehicle emissions and improve air quality.

We strongly support the use of reformulated gasoline. Properly blended reformulated gasoline will provide excellent performance and durability for the engine and fuel system components.

GASOLINE/OXYGENATE BLENDS

Some fuel suppliers blend unleaded gasoline with oxygenates such as 10% ethanol, MTBE, and ETBE. Oxygenates are required in some areas of the country during the winter months to reduce carbon monoxide emissions. Fuels blended with these oxygenates may be used in your vehicle.

CAUTION: DO NOT use gasoline containing METHANOL. Gasoline containing methanol may damage critical fuel system components.

MMT IN GASOLINE

MMT is a manganese-containing metallic additive that is blended into some gasoline to increase octane. Gasoline blended with MMT provide no performance advantage beyond gasoline of the same octane number without MMT. Gasoline blended with MMT reduce spark plug life and reduce emission system performance in some vehicles. We recommend that gasoline free of MMT be used in your vehicle. The MMT content of gasoline may not be indicated on the gasoline pump; therefore, you should ask your gasoline retailer whether or not his/her gasoline contains MMT.

It is even more important to look for gasoline without MMT in Canada because MMT can be used at levels higher than allowed in the United States. MMT is prohibited in Federal and California reformulated gasoline.

SULFUR IN GASOLINE

If you live in the northeast United States, your vehicle may have been designed to meet California low emission standards with Cleaner-Burning California reformulated gasoline with low sulfur. If such fuels are not available in states adopting California emission standards, your vehicles will operate satisfactorily on fuels meeting federal specifications, but emission control system performance may be adversely affected. Gasoline sold outside of California is permitted to have higher sulfur levels which may affect the performance of the vehicle's catalytic converter. This may cause the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon light to illuminate. We recommend that you try a different brand of unleaded gasoline having lower sulfur to determine if the problem is fuel related prior to returning your vehicle to an authorized dealer for service.

CAUTION: If the Malfunction Indicator Lamp (MIL), Check Engine or Service Engine Soon light is flashing, immediate service is required; see on-board diagnostics system section.

FLUID TYPES (Continued)

MATERIALS ADDED TO FUEL

All gasoline sold in the United States and Canada are required to contain effective detergent additives. Use of additional detergents or other additives is not needed under normal conditions.

FUEL SYSTEM CAUTIONS

CAUTION: Follow these guidelines to maintain your vehicle's performance:

- The use of leaded gas is prohibited by Federal law. Using leaded gasoline can impair engine performance, damage the emission control system, and could result in loss of warranty coverage.
- An out-of-tune engine, or certain fuel or ignition malfunctions, can cause the catalytic converter to overheat. If you notice a pungent burning odor or some light smoke, your engine may be out of tune or malfunctioning and may require immediate service. Contact your dealer for service assistance.
- When pulling a heavy load or driving a fully loaded vehicle when the humidity is low and the temperature is high, use a premium unleaded fuel to help prevent spark knock. If spark knock persists, lighten the load, or engine piston damage may result.
- The use of fuel additives which are now being sold as octane enhancers is not recommended. Most of these products contain high concentrations of methanol. Fuel system damage or vehicle performance problems resulting from the use of such fuels or additives is not the responsibility of DaimlerChrysler Corporation and may not be covered under the new vehicle warranty.

NOTE: Intentional tampering with emissions control systems can result in civil penalties being assessed against you.

DESCRIPTION - DIFFERENTIAL LUBRICANT

NOTE: Refer to the Owner's Manual for the recommended differential lubricant change intervals for this transaxle.

NOTE: Refer to 42LE TRANSAXLE SERVICE PROCEDURES for fluid level checking procedures.

NOTE: The 42LE transaxle has separate transmission and differential oil sumps, each requiring different fluids.

42LE DIFFERENTIAL LUBRICANT

The differential sump should be filled with Mopar® 75W-90 hypoid gear lubricant. Synthetic gear lubricants should be avoided.

FLUID ADDITIVES

DaimlerChrysler strongly recommends against the addition of any fluids to the transmission, other than those lubricants listed above. Exceptions to this policy are the use of special dyes to aid in detecting fluid leaks.

Various "special" additives and supplements exist that claim to improve shift feel and/or quality. These additives and others also claim to improve converter clutch operation and inhibit overheating, oxidation, varnish, and sludge. These claims have not been supported to the satisfaction of DaimlerChrysler and these additives **must not be used**. The use of transmission "sealers" should also be avoided, since they may adversely affect the integrity of transmission seals.

FLUID FILL/CHECK LOCATIONS

DESCRIPTION

The fluid check/fill point locations are located in each applicable service manual section.

LUBRICATION POINTS

DESCRIPTION

Lubrication point locations are located in each applicable Sections.

MAINTENANCE SCHEDULES

DESCRIPTION

"Maintenance Schedule Information not included in this section, is located in the appropriate Owner's Manual."

HOISTING

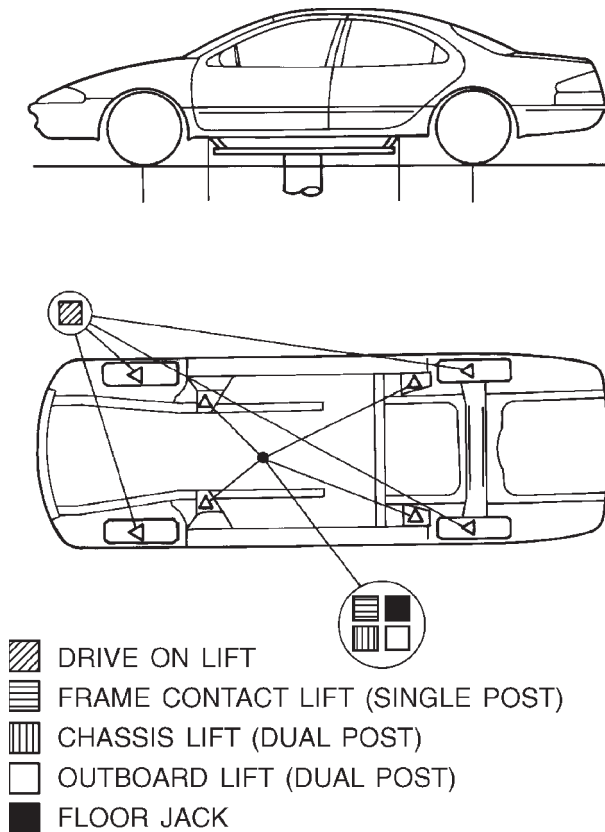
STANDARD PROCEDURE - HOISTING

Refer to Owner's Manual provided with vehicle for proper emergency jacking procedures.

WARNING: THE HOISTING AND JACK LIFTING POINTS PROVIDED ARE FOR A COMPLETE VEHICLE. WHEN THE ENGINE OR REAR SUSPENSION IS REMOVED FROM A VEHICLE, THE CENTER OF GRAVITY IS ALTERED MAKING SOME HOISTING CONDITIONS UNSTABLE. PROPERLY SUPPORT OR SECURE VEHICLE TO HOISTING DEVICE WHEN THESE CONDITIONS EXIST.

CAUTION: Do not position hoisting device on suspension components, damage to vehicle can result.

For proper hoisting and jacking points, refer to (Fig. 5).



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Fig. 5 HOISTING AND JACKING POINTS

JUMP STARTING

STANDARD PROCEDURE - JUMP STARTING

WARNING:

REVIEW ALL SAFETY PRECAUTIONS AND WARNINGS.

DO NOT JUMP START A FROZEN BATTERY, PERSONAL INJURY CAN RESULT.

DO NOT JUMP START WHEN MAINTENANCE FREE BATTERY INDICATOR DOT IS YELLOW OR BRIGHT COLOR.

A BATTERY GENERATES HYDROGEN GAS WHICH IS FLAMMABLE AND EXPLOSIVE. KEEP OPEN FLAME OR SPARKS AWAY FROM THE BATTERY.

DO NOT ALLOW JUMPER CABLE CLAMPS TO TOUCH EACH OTHER WHEN CONNECTED TO A BOOSTER SOURCE. ,

DO NOT ALLOW BATTERY VOLTAGE TO EXCEED 16 VOLTS.

TAKE CARE TO AVOID THE RADIATOR COOLING FAN WHENEVER THE HOOD IS RAISED. THE FAN CAN START AT ANYTIME THE IGNITION SWITCH IS ON. YOU CAN BE HURT BY THE FAN.

BATTERY FLUID IS A CORROSIVE ACID SOLUTION: DO NOT ALLOW BATTERY FLUID TO CONTACT EYES, SKIN, OR CLOTHING. IF ACID SPLASHES IN EYES OR ON SKIN, FLUSH THE CONTAMINATED AREA IMMEDIATELY WITH LARGE QUANTITIES OF WATER.

CAUTION:

Do not attempt to push or tow the vehicle to start it. The vehicle cannot be started this way. Pushing with another vehicle may damage the transaxle or the rear of the vehicle.

If the vehicle has a discharged battery, booster cables may be used to obtain a start from another vehicle. This type of start can be dangerous if done improperly, so follow the procedure carefully.

NOTE:

The battery is stored in a compartment in front of the tire in the right front fender and is accessible through the engine compartment.

TO JUMP START A DISABLED VEHICLE:

If the indicator is dark or shows a green dot, proceed as follows:

(1) Wear eye protection and remove metallic jewelry worn on hands or wrists to avoid injury by accidental arcing of battery current.

JUMP STARTING (Continued)

(2) When using another vehicle as a booster source, park the booster vehicle within cable reach without allow vehicles to touch.

(3) Turn off all accessories, set the parking brake, place the automatic transmission in PARK, and turn the ignition OFF in both vehicles.

(4) Connect one end of the positive jumper cable to the positive jump start attachment of the booster battery. Connect the other end of the cable to the positive jump start attachment of the discharged battery (Fig. 6).

(5) Connect one end of the negative jumper cable to the negative jump start attachment of the booster battery. Connect the other end of the cable to the negative jump start attachment of the discharged battery (Fig. 7). Ensure that the jump cable clamps have good connections.

(6) Start the engine in the vehicle which has the booster battery, let the engine idle a few minutes, then start the engine in the vehicle with the discharged battery.

CAUTION: Do not crank starter motor on disabled vehicle for more than 15 seconds, starter will over-heat and could fail.

(7) When removing the jumper cables:

- Disconnect jumper cable negative clamp from the disabled vehicle.
- Disconnect the jumper cable negative clamp from the booster battery start attachment.
- Disconnect jumper cable positive clamp from disabled battery start attachment.
- Disconnect jumper cable positive clamp from booster battery start attachment.

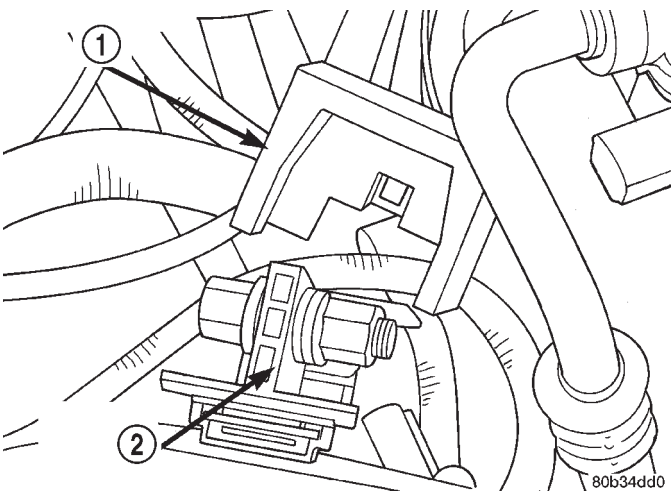


Fig. 6 POSITIVE JUMPER START ATTACHMENT

- 1 - ATTACHMENT CAP
2 - JUMPER START ATTACHMENT

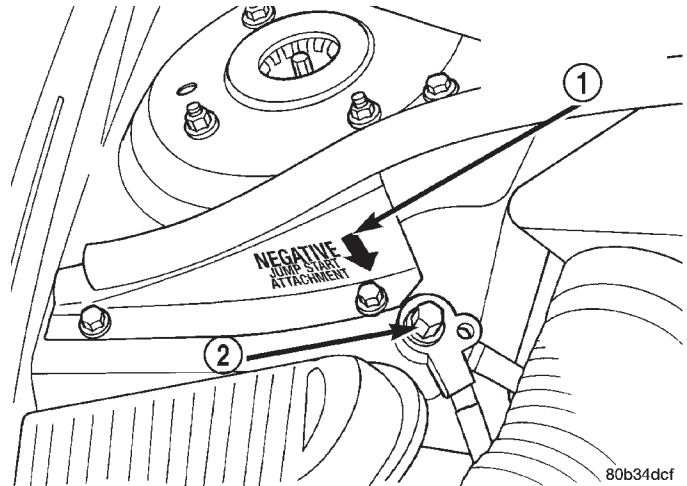


Fig. 7 NEGATIVE JUMPER START ATTACHMENT

- 1 - NEGATIVE JUMPER START ATTACHMENT
2 - ATTACHMENT

TOWING

STANDARD PROCEDURE - TOWING

WARNING:

- Do NOT tow vehicle with front wheels on the ground. The transaxle can be damaged.
- Secure loose and protruding parts from a disabled vehicle.
- Always use a safety chain system that is independent of the lifting and towing equipment.
- Do not allow any of the towing equipment to contact the fuel tank of the vehicle being towed.
- Do not go under the vehicle while it is lifted by the towing equipment.
- Do not allow passengers to ride in a vehicle being towed.
- Always observe all state and local laws pertaining to warning signals, night illumination, speed, etc.
- Do not attempt a towing operation that could jeopardize the operator, bystanders or other motorists.
- Do not exceed a towing speed of 48 km/h (30 mph).
- Avoid towing distances of more than 24 km (15 miles), whenever possible.
- Never attach tow chains or a tow sling to the bumper, steering linkage, or constant velocity joints.

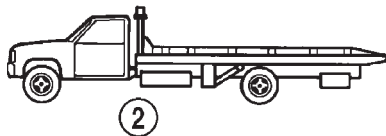
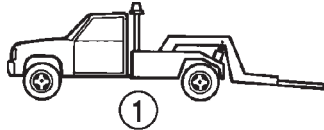
RECOMMENDED TOWING EQUIPMENT

To avoid damage to bumper fascia and air dams use of a wheel lift or flat bed towing device (Fig. 8) is recommended. When using a wheel lift towing device,

TOWING (Continued)

be sure the rear end of disabled vehicle has at least 100 mm (4 inches) ground clearance. If minimum ground clearance cannot be reached, use a towing dolly. If a flat bed device is used, the approach angle should not exceed :

- 13 degrees for Intrepid
- 12 degrees for Concorde and 300M
- Additional ramping may be required.



9100-17

Fig. 8 RECOMMENDED TOWING DEVICES

- 1 - WHEEL LIFT
2 - FLAT BED

GROUND CLEARANCE

CAUTION: If vehicle is towed with wheels removed, install lug nuts to retain brake drums or rotors.

A towed vehicle should be raised until lifted wheels are a minimum 100 mm (4 in) from the ground. Be sure there is adequate ground clearance at the opposite end of the vehicle, especially when towing over rough terrain or steep rises in the road. If necessary, remove the wheels from the lifted end of the vehicle and lower the vehicle closer to the ground, to increase the ground clearance at the opposite end of the vehicle. Install lug nuts on wheel attaching studs to retain braking discs.

TIE DOWN LOCATIONS FOR FLAT BED TOWING

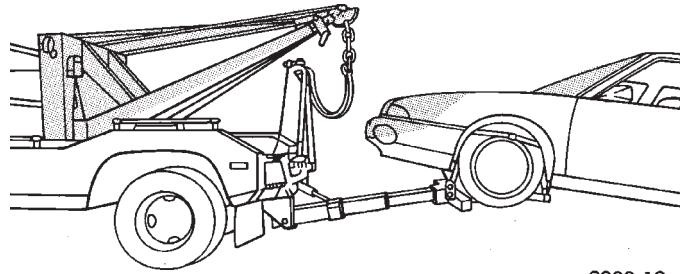
There are two reinforced elongated holes on each side of the vehicle designed to serve as hold down locations. These locations can safely hold the vehicle to the towing device using T or R hooks.

- Bottom of the forward torque box between the front frame rail and the rocker panel.
- Bottom of the rearward torque box forward of the rear wheel.

FRONT TOWING PROCEDURES

CAUTION: Do Not tow vehicle from the front with sling type towing device. Damage to bumper fascia will result.

Always tow vehicle with front wheels off the ground as shown (Fig. 9).



9300-12

Fig. 9 TOWING

Use a flat bed towing device when wheel lift towing device is not available.

REAR TOWING PROCEDURES

CAUTION: Do not tow vehicle with the rear end lifted.

If damage to the vehicle prevents front towing, use a flat bed towing device.

CAUTION: Do not push the vehicle with another vehicle as damage to the bumper fascia and trans-axle can result.

GROUND CLEARANCE

CAUTION: If vehicle is towed with wheels removed, install lug nuts to retain brake drums or rotors.

A towed vehicle should be raised until lifted wheels are a minimum 100 mm (4 in) from the ground. Be sure there is adequate ground clearance at the opposite end of the vehicle, especially when towing over rough terrain or steep rises in the road. If necessary, remove the wheels from the lifted end of the vehicle and lower the vehicle closer to the ground, to increase the ground clearance at the opposite end of the vehicle. Install lug nuts on wheel attaching studs to retain braking discs.

TIE DOWN LOCATIONS FOR FLAT BED TOWING

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SUSPENSION

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FRONT SUSPENSION

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FRONT SUSPENSION

DESCRIPTION - FRONT SUSPENSION

This vehicle uses a MacPherson strut type front suspension design (Fig. 1).

The front suspension includes the following components:

- Strut assembly
- Steering knuckle
- Hub and bearing
- Lower control arm and ball joint
- Tension strut
- Stabilizer bar

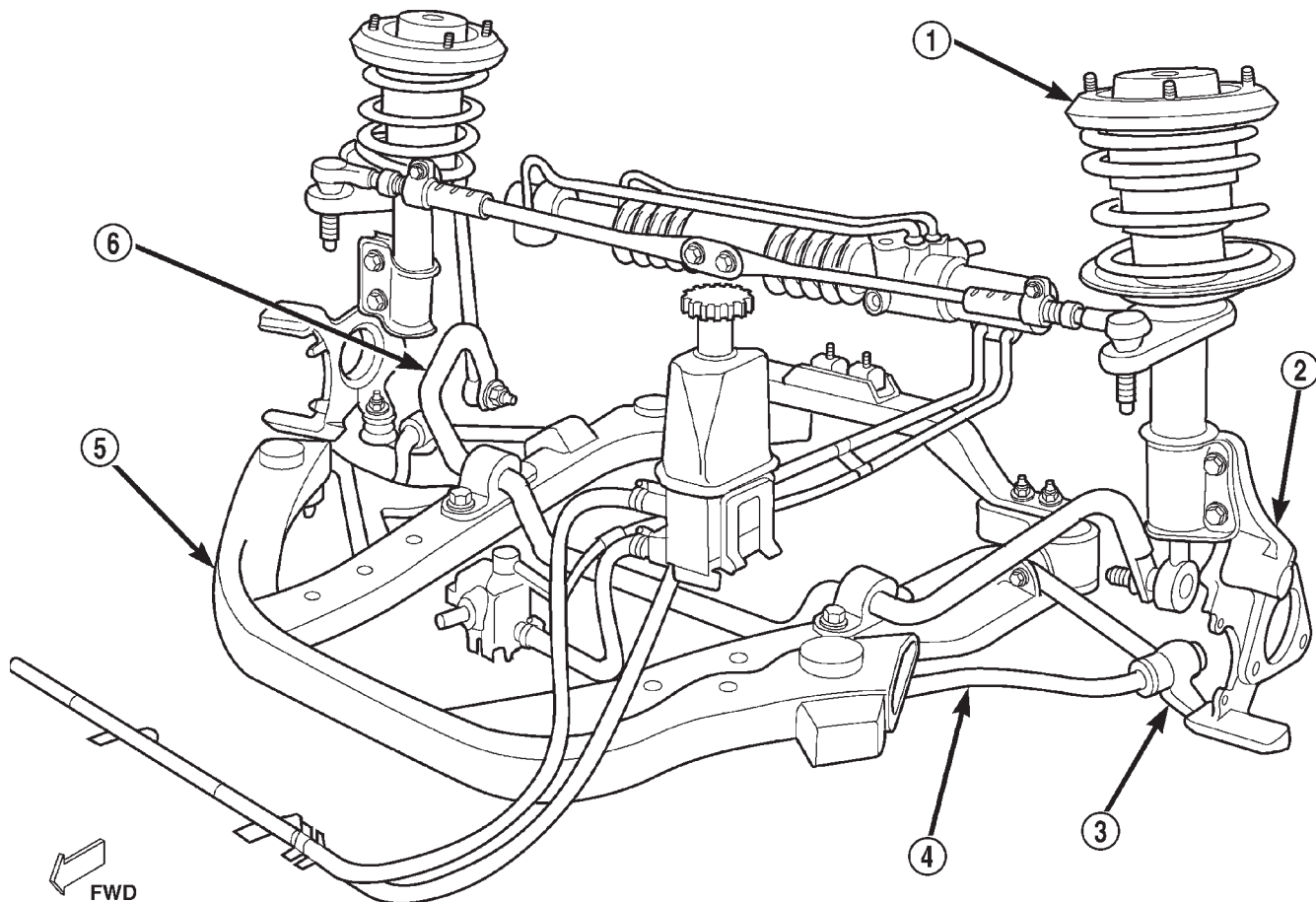
OPERATION - FRONT SUSPENSION

The front suspension allows each front wheel on a vehicle to adapt to different road surfaces and condi-

tions without affecting the control of the vehicle. Each side of the front suspension is allowed to move independently from the other. Both sides of the front suspension are allowed to pivot so the vehicle can be steered in the direction preferred. Steering of the vehicle is provided through a rack and pinion steering gear that is connected to a fixed steering arm on each front strut.

WARNING

WARNING: DO NOT REMOVE THE STRUT ASSEMBLY'S SHAFT NUT AT ANY TIME UNLESS THE COIL SPRING HAS BEEN PROPERLY COMPRESSED FOLLOWING THE PROCEDURE LISTED IN STRUT ASSEMBLY DISASSEMBLY OR ASSEMBLY IN THIS SECTION.



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Fig. 1 Front Suspension

- 1 - STRUT ASSEMBLY
- 2 - STEERING KNUCKLE
- 3 - LOWER CONTROL ARM
- 4 - TENSION STRUT

- 5 - ENGINE CRADLE CROSSMEMBER
- 6 - STABILIZER BAR

FRONT SUSPENSION (Continued)

CAUTION

CAUTION: Only frame contact hoisting equipment can be used on this vehicle. All vehicles have a fully independent rear suspension. The vehicles cannot be hoisted using equipment designed to lift a vehicle by the rear axle. If this type of hoisting equipment is used, damage to rear suspension components will occur.

CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the tire/wheel assembly needs to be reinstalled in the same location it is removed from or the TPM System (sensors) will need to be retrained. Mark each tire/wheel assembly indicating location, prior to its removal. If the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

CAUTION: At no time when servicing a vehicle, can a sheet metal screw, bolt or other metal fastener be installed in the shock tower to take the place of an original plastic clip. Also, NO holes can be drilled into the front shock tower in the area shown (Fig. 2), for the installation of any metal fasteners into the shock tower. Because of the minimum clearance in this area, installation of metal fasteners could damage the coil spring coating and lead to a corrosion failure of the spring.

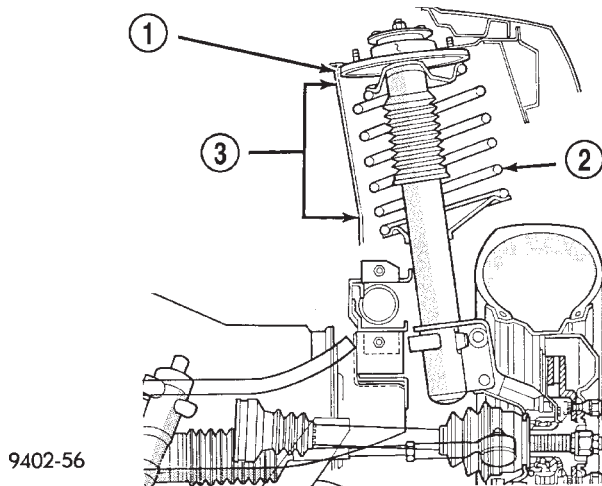


Fig. 2 Strut Tower To Coil Spring Minimum Clearance Area (Typical)

1 - SHOCK TOWER

2 - COIL SPRING

3 - NO SHEET METAL SCREWS, BOLTS, OR ANY OTHER METAL FASTENERS ARE TO BE INSTALLED INTO SHOCK TOWER IN THIS AREA. ALSO, NO HOLES ARE TO BE DRILLED INTO SHOCK TOWER IN THIS SAME AREA.

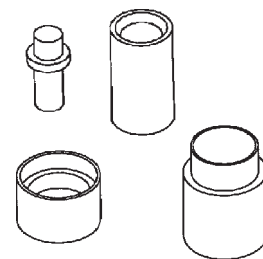
SPECIFICATIONS

FRONT SUSPENSION FASTENER TORQUE

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Ball Joint Pinch Bolt Nut	55	40	—
Hub And Bearing Mounting Bolts	110	81	—
Hub And Bearing Axle Hub Nut	142	105	—
Lower Control Arm Pivot Bolt	142	105	—
Stabilizer Bar Bushing Retainer Bolts	61	45	—
Stabilizer Bar Link Lower Nut	88	65	—
Stabilizer Bar Link Upper Nut	95	70	—
Strut Body Tower Mounting Nuts	37	28	—
Strut Clevis-to-Knuckle Nuts	203	150	—
Strut Shaft Nut	95	70	—
Tie Rod Adjuster Pinch Bolt	38	28	—
Tie Rod Steering Arm Nut	37	27	—
Tension Strut Mounting Nut	130	95	—
Wheel Mounting (Lug) Nuts	135	100	—

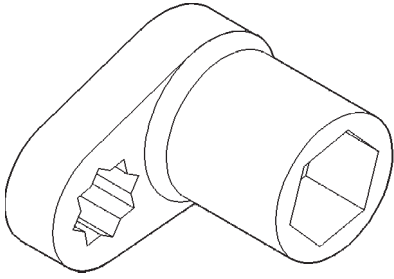
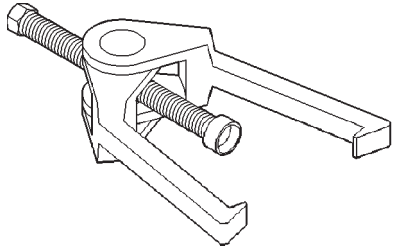
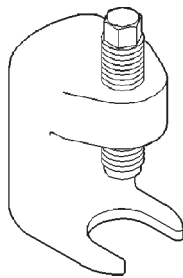
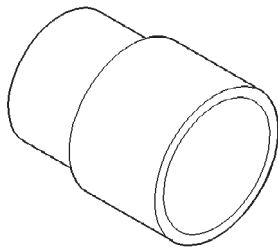
SPECIAL TOOLS

FRONT SUSPENSION



**Remover/Installer Lower Control Arm Bushings
6644**

FRONT SUSPENSION (Continued)

**Socket/Wrench Front Strut Nut 6864****Puller C-3894A****Remover C-4150A****Installer MB-990799**

HUB / BEARING

DESCRIPTION

The front wheel bearing and front wheel hub of this vehicle are a hub and bearing unit type assembly. This unit combines the front wheel mounting hub (flange) and the front wheel bearing into a sealed one piece unit. The hub and bearing is mounted to the center of the steering knuckle and is retained by three mounting bolts accessible from the rear of the steering knuckle. The hub flange has five wheel mounting studs.

The wheel mounting studs used to mount the tire and wheel to the vehicle are the only replaceable components of the hub and bearing assembly. Otherwise, the hub and bearing is serviced only as a complete assembly.

OPERATION

The hub and bearing has internal bearings that allow the hub to rotate with the driveshaft and tire and wheel. The five wheel mounting studs mount the tire and wheel, and brake rotor to the vehicle.

DIAGNOSIS AND TESTING - HUB AND BEARING (FRONT)

The front hub bearing is designed for the life of the vehicle and requires no type of periodic maintenance. The following procedure may be used for diagnosing the condition of the front hub bearing.

With the wheel, disc brake caliper, and brake rotor removed, rotate the wheel hub. Any roughness or resistance to rotation may indicate dirt intrusion or a failed hub bearing. If the hub bearing exhibits any of these conditions during diagnosis, the hub and bearing will require replacement. The bearing is not serviceable.

Damaged bearing seals and the resulting excessive grease loss may also require bearing replacement. Moderate grease weepage from the hub bearing is considered normal and should not require replacement of the hub and bearing.

To check for excessive hub runout, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

REMOVAL - HUB AND BEARING (FRONT)

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the front wheel and tire assembly from the vehicle.

HUB / BEARING (Continued)

(3) Remove the 2 guide pin bolts mounting the caliper assembly to the steering knuckle (Fig. 3). Remove the caliper from the front steering knuckle. Refer to Disc Brake Caliper in Brakes.

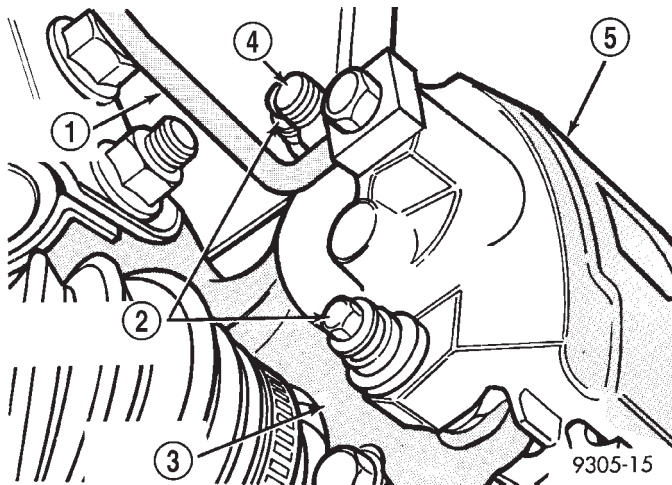


Fig. 3 Disc Brake Caliper Mounting

- 1 - BRAKE LINE
- 2 - CALIPER GUIDE PIN BOLTS
- 3 - STEERING KNUCKLE
- 4 - BLEEDER SCREW
- 5 - CALIPER ASSEMBLY

(4) Remove rotor from hub by pulling it straight off wheel mounting studs (Fig. 4).

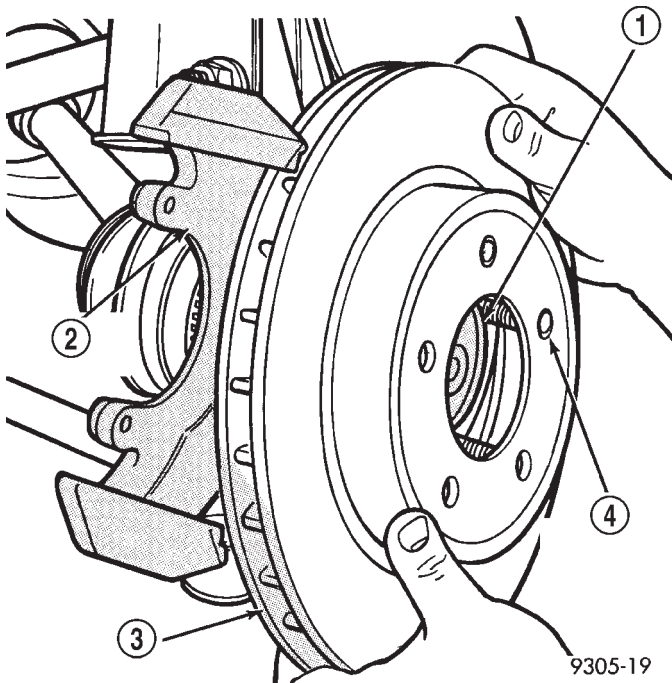


Fig. 4 Removing Rotor

- 1 - HUB
- 2 - STEERING KNUCKLE
- 3 - BRAKE ROTOR (DISC)
- 4 - WHEEL MOUNTING STUD

(5) Remove the hub and bearing retaining nut (Fig. 5).

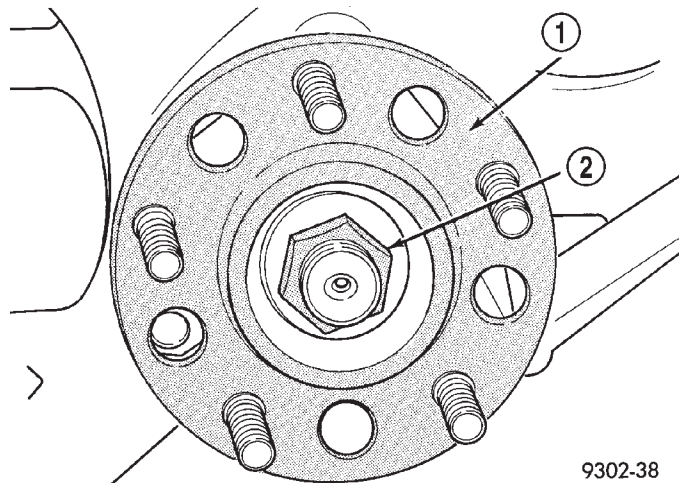


Fig. 5 Hub And Bearing Retaining Nut

- 1 - HUB/BEARING ASSEMBLY
- 2 - NUT

(6) Remove the 3 hub and bearing to steering knuckle attaching bolts (Fig. 6).

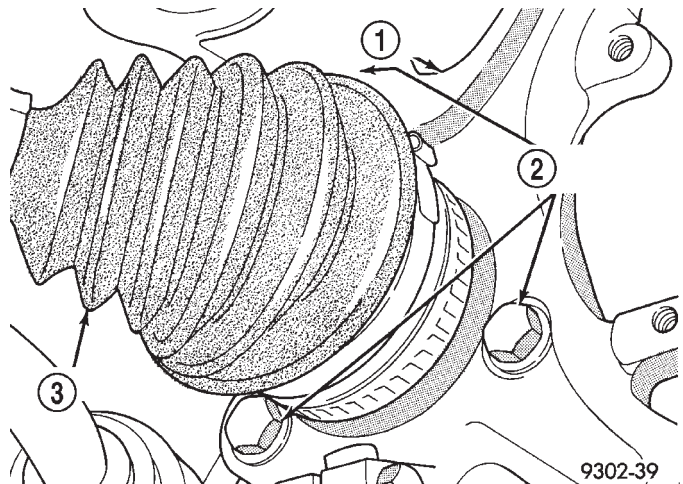


Fig. 6 Hub And Bearing Assembly Retaining Bolts

- 1 - STEERING KNUCKLE
- 2 - HUB/BEARING ATTACHING BOLTS
- 3 - HALF SHAFT

CAUTION: When removing hub and bearing assembly from steering knuckle, be careful not to damage the flinger disc (Fig. 9) on hub and bearing assembly. If flinger disc becomes damaged, hub and bearing assembly **MUST** not be used and **MUST** be replaced with a new hub and bearing assembly.

(7) Remove hub and bearing assembly from steering knuckle by sliding it straight out of steering knuckle and off end of stub axle (Fig. 7). If hub and

HUB / BEARING (Continued)

bearing assembly will not slide out of knuckle, insert a pry bar between hub and bearing assembly and steering knuckle (Fig. 8) and gently pry hub and bearing from knuckle. If stub shaft is frozen to hub and bearing assembly, tap end of stub shaft with soft face hammer to free it from hub and bearing spline.

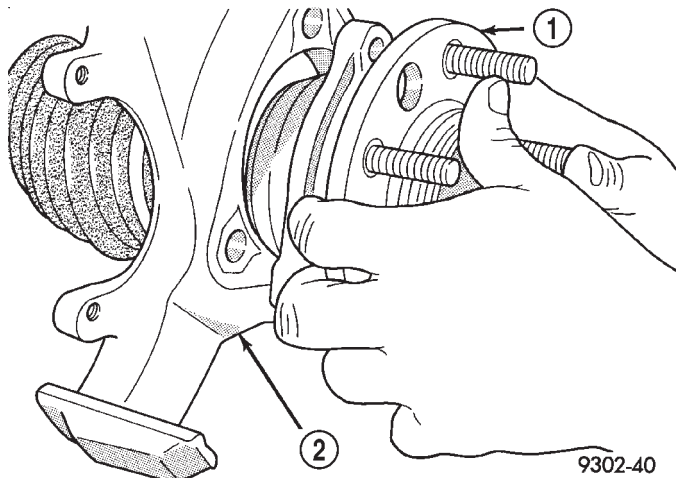


Fig. 7 Hub And Bearing Removal And Installation

- 1 - HUB/BEARING ASSEMBLY
- 2 - STEERING KNUCKLE

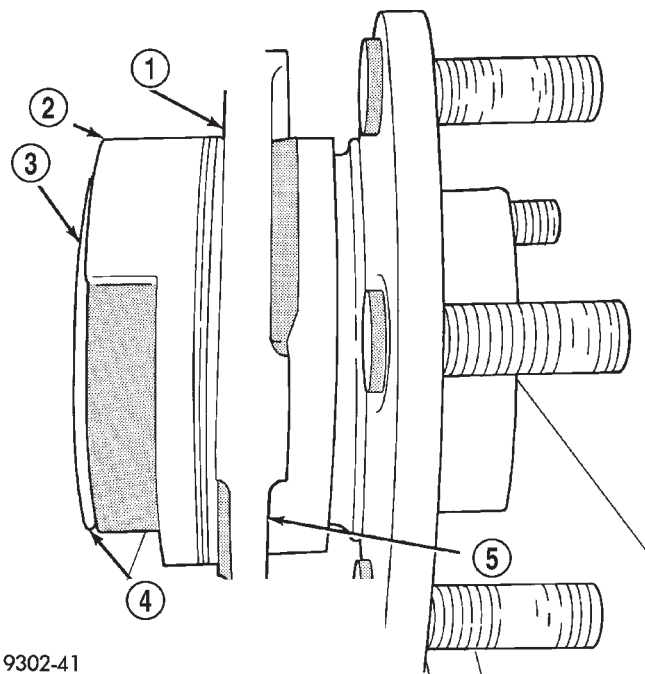


Fig. 9 Hub And Bearing Assembly Seal

- 1 - SEAL CAN MUST REMAIN TIGHT AGAINST HUB AND BEARING ASSEMBLY HERE
- 2 - SEAL
- 3 - FLINGER
- 4 - DO NOT ALLOW FLINGER TO BE BENT OR DAMAGED DURING REMOVAL OF HUB/BEARING OR C/V JOINT
- 5 - HUB/BEARING ASSEMBLY

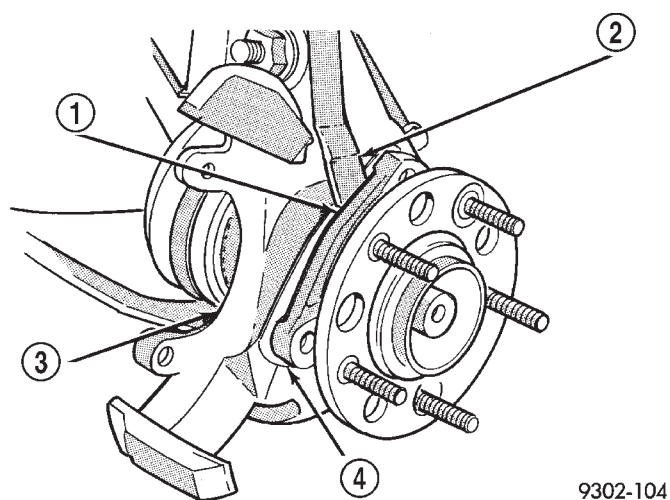


Fig. 8 Prying Hub And

- 1 - INSERT PRY BAR HERE
- 2 - PRY BAR
- 3 - KNUCKLE
- 4 - HUB/BEARING ASSEMBLY

CAUTION: If metal seal (Fig. 9) on hub and bearing assembly is seized to steering knuckle and becomes dislodged on hub and bearing assembly during bearing removal. The hub and bearing assembly **MUST** not be reused and **MUST** be replaced with a new hub and bearing assembly.

INSTALLATION - HUB AND BEARING (FRONT)

CAUTION: Hub and bearing assembly mounting surfaces on steering knuckle and driveshaft (Fig. 10) must be smooth and completely free of foreign material or nicks.

CAUTION: When installing hub and bearing assembly into steering knuckle, be careful not to damage the flinger disc (Fig. 9) on hub and bearing assembly. If flinger disc becomes damaged, hub and bearing assembly **MUST** not be used and **MUST** be replaced with a new hub and bearing assembly.

(1) Install hub and bearing assembly onto stub shaft and into steering knuckle until squarely seated on face of steering knuckle

(2) Install the 3 hub and bearing assembly to steering knuckle attaching bolts (Fig. 6). Equally tighten all 3 mounting bolts until hub and bearing assembly is squarely seated against front of steering knuckle. Then tighten the 3 hub and bearing assembly mounting bolts to a torque of 110 N·m (80 ft. lbs.)

HUB / BEARING (Continued)

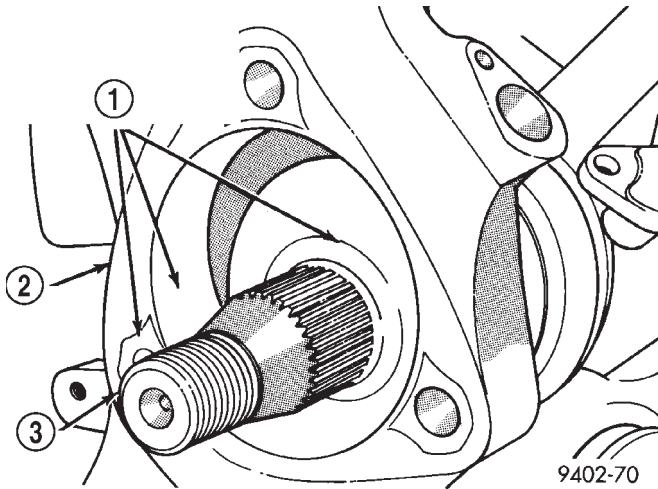


Fig. 10 Hub And Bearing Mounting Surfaces

- 1 - BE SURE THESE SURFACES ARE CLEAN AND FREE OF KNICKS BEFORE INSTALLING BEARINGS
- 2 - STEERING KNUCKLE
- 3 - STUB AXLE

CAUTION: The hub and bearing axle retaining nut (Fig. 5) is a prevailing torque nut and cannot be reused. A **NEW** retaining nut **MUST** be used when assembled.

(3) Install a **NEW** hub and bearing axle retaining nut on the stub shaft (Fig. 5). **Do not torque the hub nut at this time.**

(4) Install the brake rotor on the hub and bearing assembly (Fig. 4).

(5) Install front brake caliper back over braking disc and align with caliper mounting holes on steering knuckle and install the caliper to steering knuckle guide pin bolts (Fig. 3). Refer to Disc Brake Caliper in Brakes.

(6) With vehicle brakes applied, tighten the hub and bearing axle retaining nut to 142 N·m (105 ft. lbs.).

(7) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(8) Lower the vehicle to the ground.

(9) Check the wheel alignment toe setting on the vehicle and reset if not within specifications.

KNUCKLE

DESCRIPTION - STEERING KNUCKLE

The steering knuckle is a single casting with legs machined for attachment to the front strut assembly and lower control arm ball joint (Fig. 1). The steering knuckle also has machined abutments on the casting to support and align the front brake caliper. The knuckle also holds the hub and bearing, and supports the driveshaft. The hub and bearing is positioned through the center of the knuckle. The driveshaft outer constant velocity (C/V) stub shaft is splined to the center of the hub.

OPERATION - STEERING KNUCKLE

The steering knuckle provides for steering control of the vehicle, supports the brake caliper and absorbs the loads exerted during vehicle braking. It also supports the front (driving) hub and bearing and driveshaft stub axle assembly.

The steering knuckle pivots with the strut assembly on the lower control arm ball joint, allowing the vehicle to be steered.

DIAGNOSIS AND TESTING - STEERING KNUCKLE

The steering knuckle (Fig. 11) is not a serviceable component. Do not attempt to straighten or repair the knuckle in any way. If it is determined that the knuckle is bent or damaged, replace the knuckle.

REMOVAL - STEERING KNUCKLE

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in the Lubrication and Maintenance section.

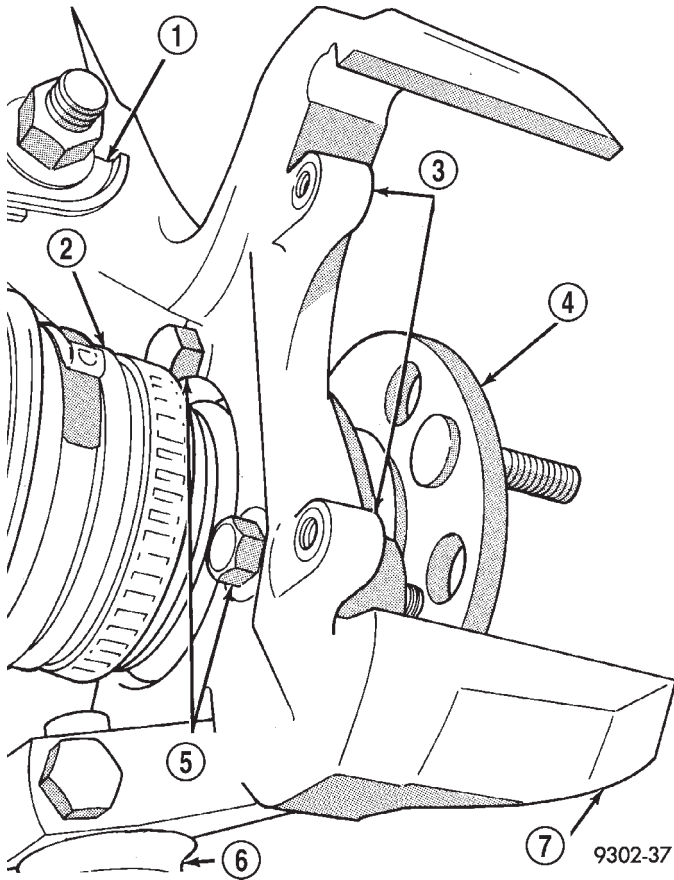
(2) Remove the front wheel and tire assembly from the vehicle.

(3) Remove the front caliper assembly from the front steering knuckle assembly (Fig. 12). Refer to Front Disc Brake Service in the Brake Section of this service manual for caliper removal procedure.

(4) Remove front rotor from hub (Fig. 13).

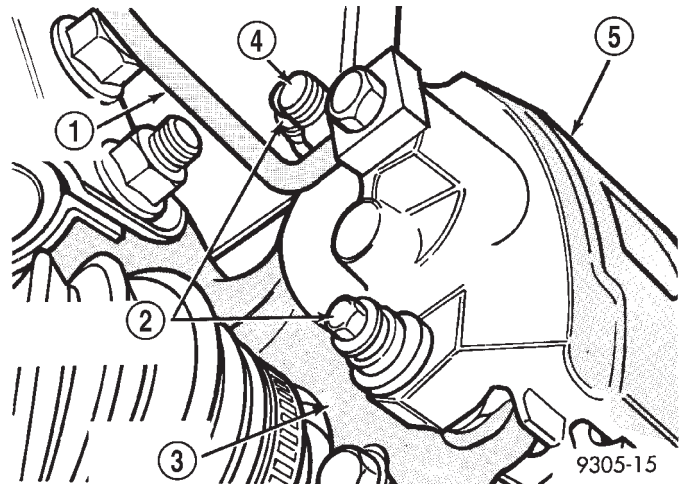
(5) Remove screw attaching wheel speed sensor head to steering knuckle. **Speed sensor head should be removed from steering knuckle, to avoid damage to speed sensor by outer C/V joint when hub and bearing is removed.**

KNUCKLE (Continued)

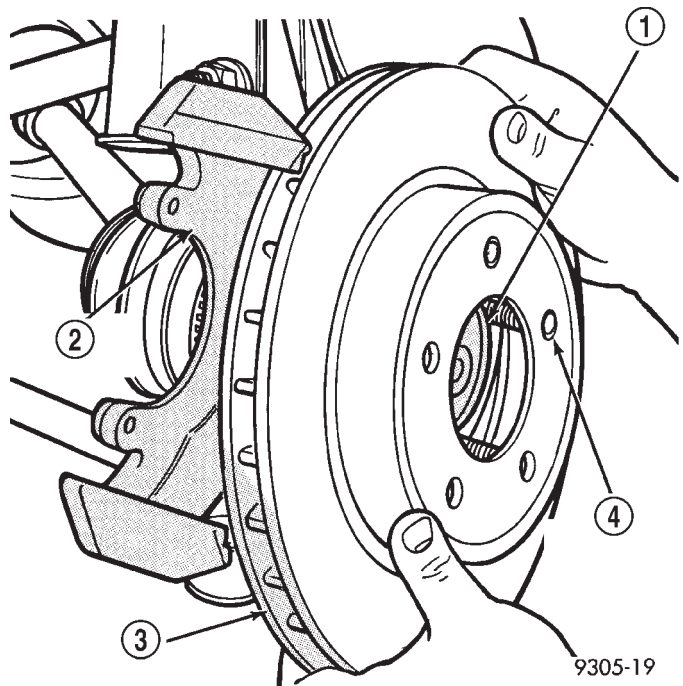
**Fig. 11 Steering Knuckle**

- 1 - STRUT ASSEMBLY
- 2 - STUB AXLE
- 3 - BRAKE CALIPER MOUNTING BOSSSES
- 4 - HUB/BEARING ASSEMBLY
- 5 - HUB/BEARING ATTACHING BOLTS
- 6 - LOWER CONTROL ARM
- 7 - FRONT KNUCKLE ASSEMBLY

(6) Carefully, remove sensor head from steering knuckle. If the sensor has seized, due to corrosion, **DO NOT USE PLIERS ON SENSOR HEAD.** Use a hammer and punch (Fig. 14) to tap edge of sensor ear, rocking sensor side to side until free.

**Fig. 12 Disc Brake Caliper Mounting**

- 1 - BRAKE LINE
- 2 - CALIPER GUIDE PIN BOLTS
- 3 - STEERING KNUCKLE
- 4 - BLEEDER SCREW
- 5 - CALIPER ASSEMBLY

**Fig. 13 Brake Rotor**

- 1 - HUB
- 2 - STEERING KNUCKLE
- 3 - BRAKE ROTOR (DISC)
- 4 - WHEEL MOUNTING STUD

KNUCKLE (Continued)

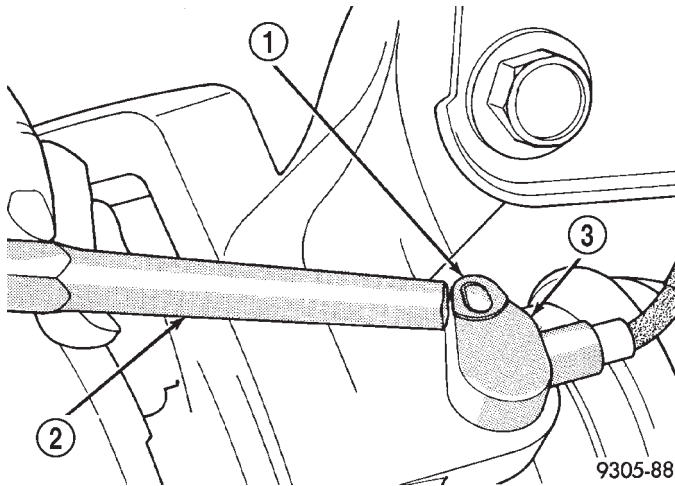


Fig. 14 Speed Sensor Head Removal

- 1 - SENSOR EAR
- 2 - PUNCH
- 3 - SPEED SENSOR HEAD

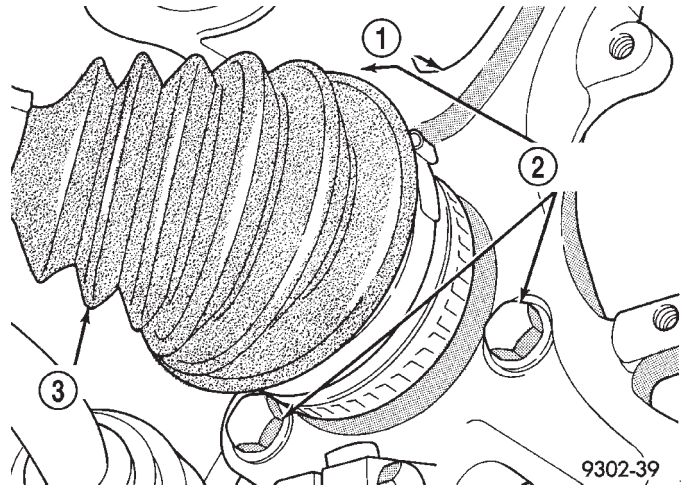


Fig. 16 Hub And Bearing Retaining Bolts

- 1 - STEERING KNUCKLE
- 2 - HUB/BEARING ATTACHING BOLTS
- 3 - HALF SHAFT

(7) Remove the hub and bearing to stub axle retaining nut (Fig. 15).

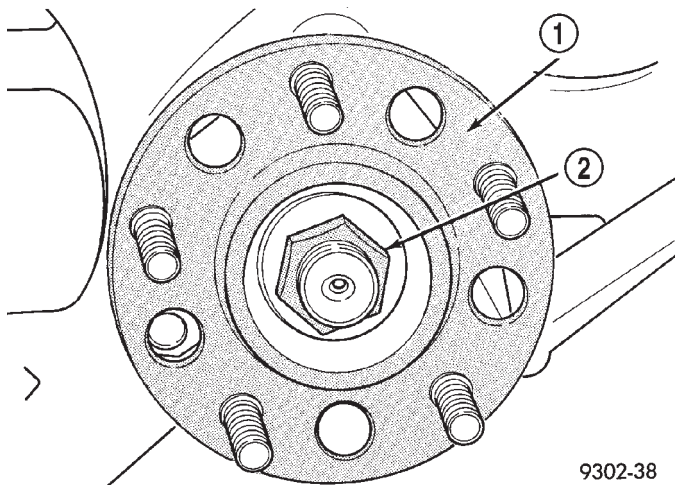


Fig. 15 Hub And Bearing Retaining Nut

- 1 - HUB/BEARING ASSEMBLY
- 2 - NUT

(8) Remove the 3 steering knuckle to hub and bearing assembly attaching bolts (Fig. 16).

CAUTION: If metal seal (Fig. 17) on hub and bearing assembly is seized to steering knuckle and becomes dislodged on hub and bearing assembly during bearing removal the hub and bearing assembly **MUST** not be reused and **MUST** be replaced with a new hub and bearing assembly. Also if flinger disc (Fig. 17) becomes damaged (bent or dented) during removal, hub and bearing assembly must be replaced with a new hub and bearing assembly.

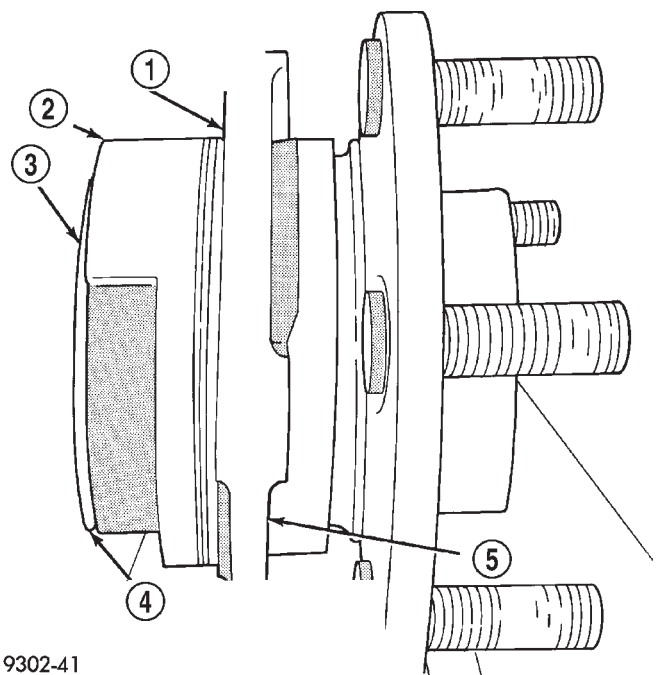


Fig. 17 Hub And Bearing Assembly Seal

- 1 - SEAL CAN MUST REMAIN TIGHT AGAINST HUB AND BEARING ASSEMBLY HERE
- 2 - SEAL
- 3 - FLINGER
- 4 - DO NOT ALLOW FLINGER TO BE BENT OR DAMAGED DURING REMOVAL OF HUB/BEARING OR C/V JOINT
- 5 - HUB/BEARING ASSEMBLY

(9) Remove hub and bearing assembly from steering knuckle. It is removed by sliding it straight out of steering knuckle and off end of stub axle (Fig. 18). If hub and bearing assembly will not slide out of knuckle, insert a pry bar between hub and bearing

KNUCKLE (Continued)

assembly and steering knuckle (Fig. 19) and gently pry hub and bearing from knuckle. If stub shaft is frozen to hub and bearing assembly tap end of stub shaft with soft face hammer to free it from hub and bearing spline.

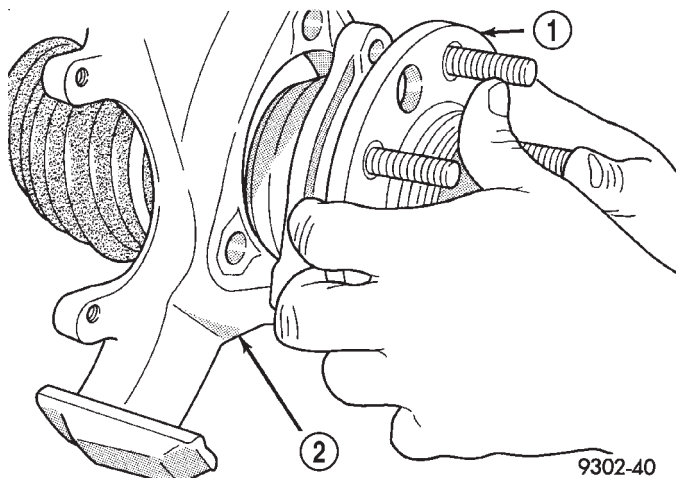


Fig. 18 Hub And Bearing

- 1 - HUB/BEARING ASSEMBLY
- 2 - STEERING KNUCKLE

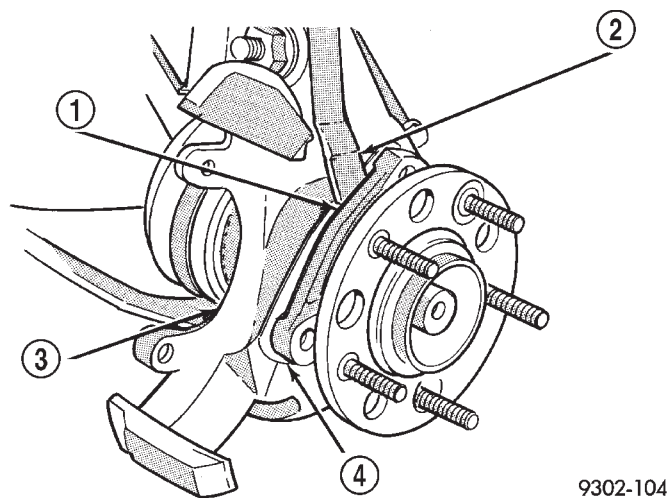


Fig. 19 Prying Hub And Bearing Assembly From Steering Knuckle

- 1 - INSERT PRY BAR HERE
- 2 - PRY BAR
- 3 - KNUCKLE
- 4 - HUB/BEARING ASSEMBLY

(10) Remove the ball joint stud to steering knuckle attaching nut and bolt (Fig. 20).

CAUTION: When lower control arm is separated from steering knuckle, do not let ball joint seal hit up against steering knuckle. If ball joint seal hits steering knuckle, seal damage may occur. If ball joint seal becomes torn, replace seal before assembling lower control arm to knuckle.

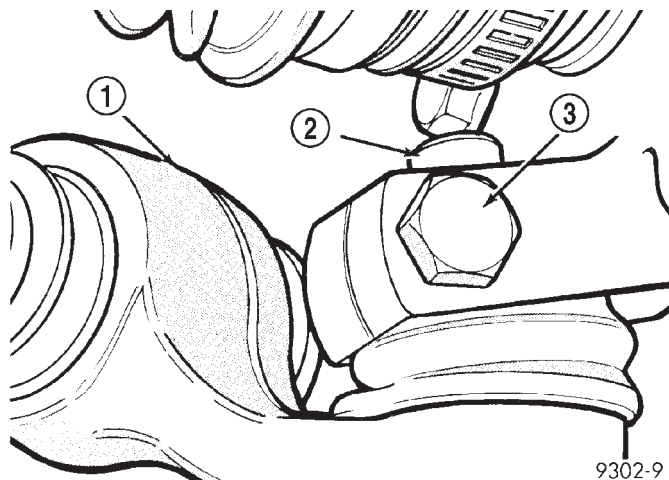


Fig. 20 Control Arm To Steering Knuckle Attachment

- 1 - LOWER CONTROL ARM
- 2 - BALL JOINT STUD
- 3 - CLAMP NUT AND BOLT

(11) Carefully insert a pry bar between lower control arm and steering knuckle (Fig. 21). Push down on pry bar to separate ball joint stud from steering knuckle (Fig. 21).

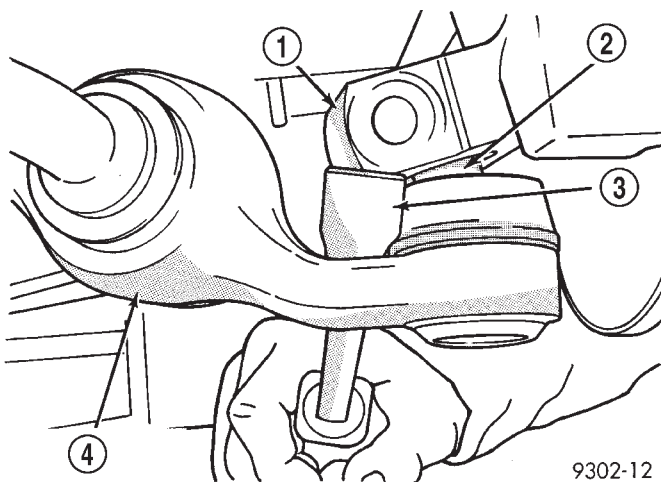


Fig. 21 Separating Ball Joint From Steering Knuckle

- 1 - STEERING KNUCKLE
- 2 - BALL JOINT STUD
- 3 - PRY BAR
- 4 - LOWER CONTROL ARM

CAUTION: The strut assembly to steering knuckle bolts are serrated where they go through strut assembly and steering knuckle. When removing bolts, turn nuts off bolts **DO NOT TURN BOLTS IN STEERING KNUCKLE**. If bolts are turned damage to steering knuckle will result.

KNUCKLE (Continued)

(12) Remove the strut assembly to steering knuckle attaching bolts (Fig. 22).

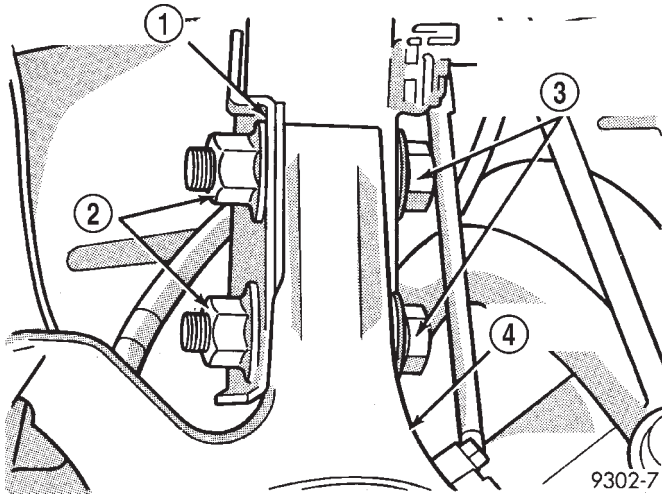


Fig. 22 Strut To Steering Knuckle Attaching Bolts

- 1 - STRUT ASSEMBLY
- 2 - NUTS
- 3 - STRUT ASSEMBLY TO STEERING KNUCKLE ATTACHING BOLTS
- 4 - STEERING KNUCKLE

(13) Remove the steering knuckle from the vehicle.

INSTALLATION - STEERING KNUCKLE

(1) Install steering knuckle on ball joint stud. Install steering knuckle to lower ball joint attaching bolt and nut into steering knuckle (Fig. 20). Tighten the attaching bolt to a torque of 55 N·m (40 ft. lbs.).

(2) Position steering knuckle into strut assembly.

CAUTION: The strut assembly to steering knuckle bolts are serrated where they go through strut assembly and steering knuckle. When installing bolts, turn nuts onto bolts **DO NOT TURN BOLTS IN STEERING KNUCKLE**. If bolts are turned damage to steering knuckle will result.

(3) Install the strut assembly to steering knuckle attaching bolts (Fig. 22). Install nuts on attaching bolts (Fig. 22). Tighten the strut clevis to steering knuckle attaching bolt nuts to a torque of 203 N·m (150 ft. lbs.).

CAUTION: Hub and bearing assembly mounting surfaces on steering knuckle and halfshaft (Fig. 23) must be smooth and completely free of foreign material or nicks.

CAUTION: When installing hub and bearing assembly into steering knuckle, be careful not to damage the flinger disc (Fig. 17) on hub and bearing assembly. If flinger disc becomes damaged, hub and bear-

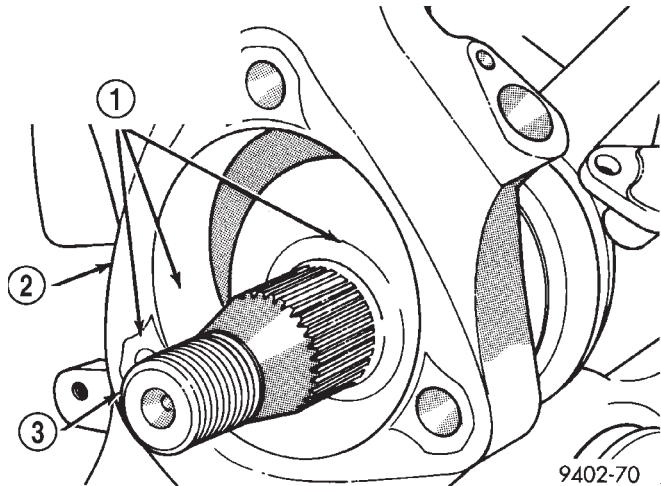


Fig. 23 Hub And Bearing Assembly Mounting Surfaces

- 1 - BE SURE THESE SURFACES ARE CLEAN AND FREE OF KNICKS BEFORE INSTALLING BEARINGS
- 2 - STEERING KNUCKLE
- 3 - STUB AXLE

ing assembly **MUST not be used and MUST be replaced with a new hub and bearing assembly.**

(4) Install hub and bearing assembly onto stub shaft and into steering knuckle until squarely seated on face of steering knuckle.

(5) Install the 3 steering knuckle to hub and bearing assembly attaching bolts (Fig. 16). Equally tighten all 3 mounting bolts until hub and bearing assembly is squarely seated against front of steering knuckle. Then tighten all 3 hub and bearing assembly mounting bolts to a torque of 110 N·m (80 ft. lbs.).

CAUTION: The hub and bearing axle retaining nut (Fig. 15) is a prevailing torque nut and cannot be reused. A **NEW** retaining nut **MUST** be used.

(6) Install a **NEW** hub and bearing axle retaining nut on the stub shaft (Fig. 15). **Do not torque the hub nut at this time.**

(7) Coat speed sensor head with High Temperature Multipurpose E.P. Grease before installing into the steering knuckle. Install speed sensor head into steering knuckle. Install screw and tighten to a torque of 7 N·m (60 in. lbs.).

(8) Install the brake rotor back on the hub and bearing assembly (Fig. 13).

(9) Install front brake caliper on steering knuckle. Refer to Disc Brake Caliper in Brakes. Install the caliper to steering knuckle attaching bolts (Fig. 12) and tighten them to a torque of 22 N·m (192 in. lbs.).

(10) Apply the brakes, then tighten the axle retaining nut to a torque of 142 N·m (105 ft. lbs.).

(11) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper

KNUCKLE (Continued)

sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(12) Lower vehicle to the ground.

LOWER BALL JOINT

DESCRIPTION

The ball joint is an integral part of the control arm and has a non-tapered stud with a notch for clamp (pinch) bolt installation. The stud is clamped and locked into the steering knuckle leg using a clamp (pinch) bolt.

The ball joint used in the lower control arm of this vehicle is a sealed-for-life ball joint and requires no maintenance lubrication. The ball joint cannot be serviced separately from the lower control arm. If the ball joint is determined to be defective it will require replacement of the complete lower control arm. Refer to DIAGNOSIS AND TESTING in this section for proper testing of the ball joint.

NOTE: The ball joint does not require any type of additional lubrication for the life of the vehicle. No attempt should be made to ever add any lubrication to the lower ball joint.

OPERATION

The ball joint is a pivotal joint on the lower control arm that allows the knuckle to move up and down, and turn with ease.

DIAGNOSIS AND TESTING - BALL JOINT

Raise front of vehicle using jack stands or a frame contact hoist until front suspension is in full rebound and tires are not in contact with the ground. Grasp tire at top and bottom, and apply in and out force on the wheel and tire. While applying force to the tire, look for any movement between the lower ball joint and lower control arm. If any movement is evident, the lower ball joint is worn and the lower control arm requires replacement. The ball joint is not serviced separately.

LOWER CONTROL ARM

DESCRIPTION

The lower control arm is a steel forging with 2 rubber bushings and a ball joint (Fig. 1). The bushing isolating the lower control arm from the front cradle/crossmember is a metal encased pivot bushing. The bushing isolating the lower control arm from the tension strut is a solid rubber bushing. The lower control arm is bolted to the cradle/crossmember using a bolt

through the center of the pivot bushing. The tension strut is fastened through the center of the tension strut bushing and lower control arm. The lower control arm ball joint connects to the steering knuckle.

OPERATION

The lower control arm supports the lower end of the steering knuckle and allows for the up and down movement of the suspension during the jounce and rebound travel.

DIAGNOSIS AND TESTING - LOWER CONTROL ARM

Inspect the lower control arm for signs of damage from contact with the ground or road debris. If the lower control arm shows any sign of damage, inspect the lower control arm to see if it is bent.

The only serviceable components of the lower control arm are the pivot bushing and the tension strut bushing. The lower control arm is serviced as a complete assembly otherwise. **Do not attempt to repair or straighten a broken or bent lower control arm. It must be replaced.**

REMOVAL - LOWER CONTROL ARM

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the wheel and tire assembly from the vehicle.

(3) Remove the ball joint stud to steering knuckle attaching nut and bolt (Fig. 24).

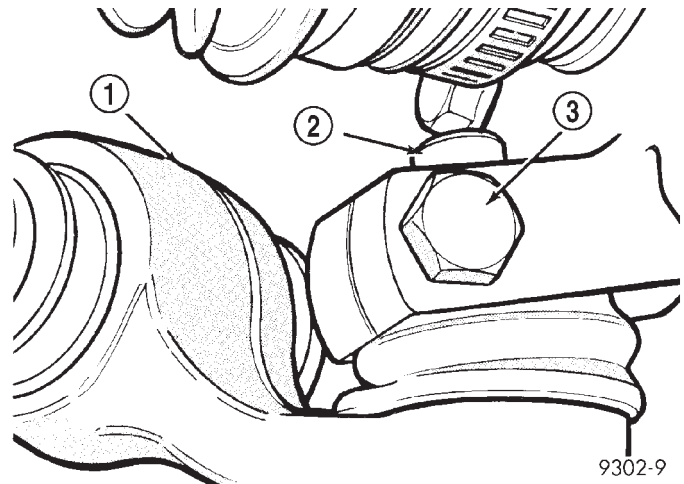


Fig. 24 Control Arm To Steering Knuckle

- 1 - LOWER CONTROL ARM
- 2 - BALL JOINT STUD
- 3 - CLAMP NUT AND BOLT

CAUTION: Pulling steering knuckle out from vehicle after releasing from ball joint can separate inner C/V joint. See Driveshafts.

LOWER CONTROL ARM (Continued)

CAUTION: When lower control arm is separated from steering knuckle, do not let ball joint seal hit up against steering knuckle. If ball joint seal hits steering knuckle, seal damage may occur. If ball joint seal becomes torn, replace seal before assembling lower control arm to knuckle.

(4) Carefully insert a pry bar between lower control arm and steering knuckle (Fig. 25). Push down on pry bar to separate ball joint stud from steering knuckle (Fig. 25).

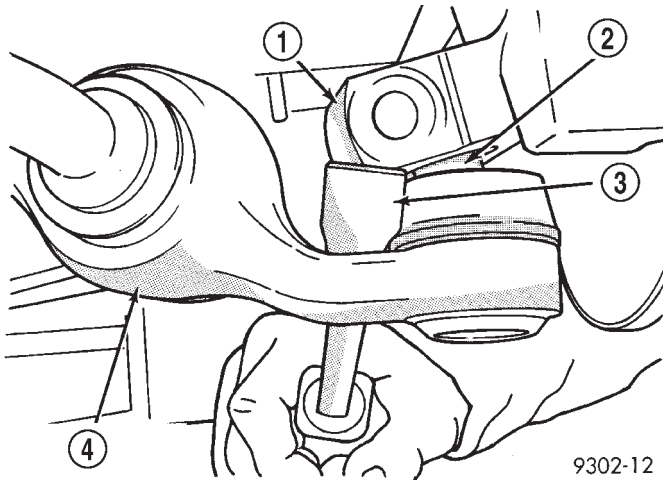


Fig. 25 Separating Ball Joint From Steering Knuckle

- 1 - STEERING KNUCKLE
- 2 - BALL JOINT STUD
- 3 - PRY BAR
- 4 - LOWER CONTROL ARM

(5) Remove tension strut to cradle attaching nut and washer from end of tension strut (Fig. 26). When removing tension strut nut, keep strut from turning by holding tension strut at flat using an open end wrench (Fig. 26). **Discard tension strut to cradle retaining nut. A NEW tension strut to cradle nut must be used when installing tension strut.**

(6) Loosen and remove lower control arm pivot bushing to cradle assembly pivot bolt (Fig. 27).

(7) Remove lower control arm and tension strut from the cradle as an assembly. Remove them from cradle by first removing pivot bushing end from cradle and then sliding tension strut out of isolator bushing (Fig. 28) (Fig. 29).

(8) Remove tension strut to control arm retaining nut and washer from end of tension strut (Fig. 29). While removing nut, keep strut from turning by holding tension strut at flat using an open end wrench. **Discard the retaining nut. A NEW nut must be used when installing tension strut.**

(9) Separate the tension strut from the lower control arm.

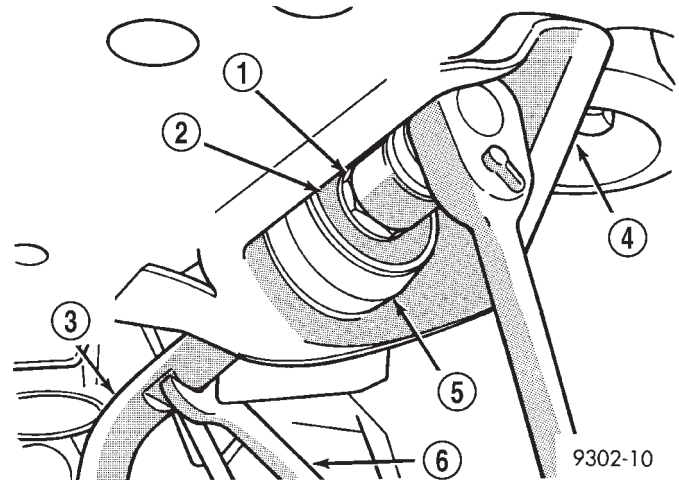


Fig. 26 Tension Strut To Cradle Mounting

- 1 - NUT
- 2 - WASHER
- 3 - TENSION STRUT
- 4 - CRADLE ASSEMBLY
- 5 - ISOLATOR BUSHING
- 6 - FLAT

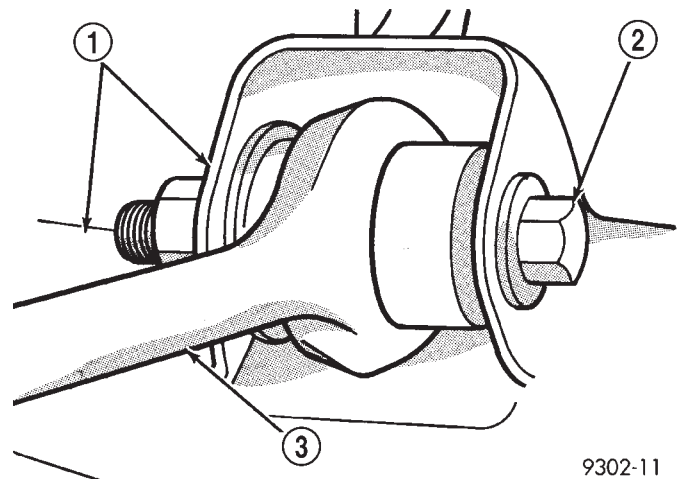


Fig. 27 Lower Control Arm Pivot Bolt

- 1 - CRADLE ASSEMBLY
- 2 - PIVOT BOLT
- 3 - LOWER CONTROL ARM

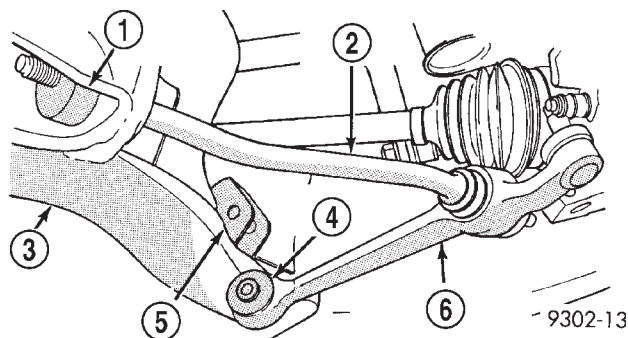
DISASSEMBLY

DISASSEMBLY - LOWER CONTROL ARM (PIVOT BUSHING)

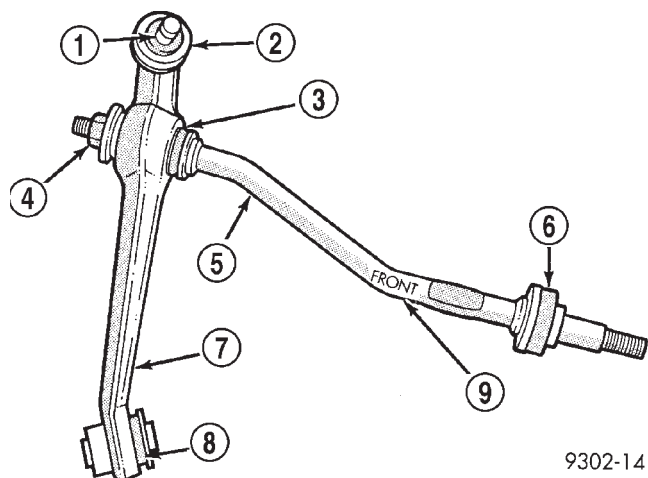
(1) Remove lower control arm and tension strut as an assembly from the vehicle.

(2) Separate the tension strut from the lower control arm assembly.

LOWER CONTROL ARM (Continued)

**Fig. 28 Lower Control Arm Removal/Installation**

- 1 - ISOLATOR BUSHING
- 2 - TENSION STRUT
- 3 - CRADLE
- 4 - PIVOT BUSHING
- 5 - LOWER CONTROL ARM BRACKET
- 6 - LOWER CONTROL ARM

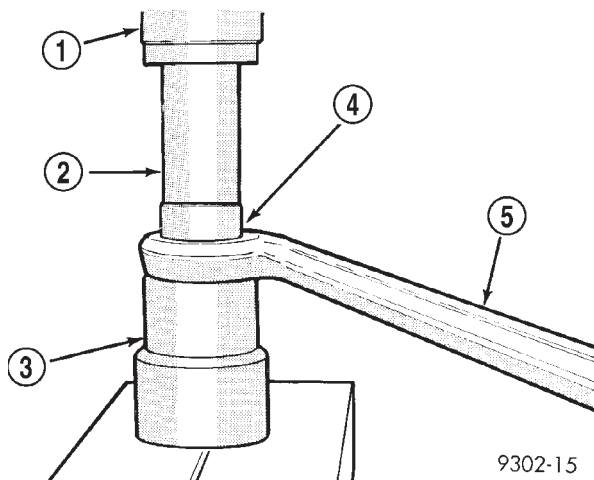
**Fig. 29 Lower Control Arm And Tension Strut**

- 1 - BALL JOINT STUD
- 2 - BALL JOINT SEAL
- 3 - LOWER CONTROL ARM TENSION STRUT BUSHING
- 4 - NUT
- 5 - TENSION STRUT
- 6 - TENSION STRUT TO CRADLE ISOLATOR BUSHING
- 7 - LOWER CONTROL ARM
- 8 - LOWER CONTROL ARM PIVOT BUSHING
- 9 - WORD "FRONT" STAMPED IN CONTROL ARM HERE

(3) Position lower control arm in arbor press with large end of pivot bushing inside Receiver, Special Tool MB-990799, as shown (Fig. 30). Position Remover, Special Tool 6644-2, on top of pivot bushing (Fig. 30).

(4) Using the arbor press, press the lower control arm pivot bushing out of lower control arm.

(5) Remove the pressed out lower control arm pivot bushing from the Receiver and discard.

**Fig. 30 Lower Control Arm Pivot Bushing**

- 1 - ARBOR PRESS RAM
- 2 - SPECIAL TOOL 6644-2
- 3 - SPECIAL TOOL MB990799
- 4 - PIVOT BUSHING
- 5 - LOWER CONTROL ARM

DISASSEMBLY - LOWER CONTROL ARM (TENSION STRUT BUSHING)

(1) Remove lower control arm and tension strut as an assembly from the vehicle. See Lower Control Arm/Removal in this section.

(2) Separate the tension strut from the lower control arm assembly.

(3) Position lower control arm in arbor press with tension strut bushing inside Receiver, Special Tool MB-990799, as shown (Fig. 31). Position Remover, Special Tool 6644-4, on top of tension strut bushing (Fig. 31).

(4) Lower the arbor press ram, pressing Remover, Special Tool 6644-4, down through the tension strut bushing until the arbor press can push it no farther. This action will cut the bushing into two pieces.

(5) Remove lower control arm from arbor press. Remove pieces of tension strut and Remover, Special Tool 6644-4, from lower control arm.

ASSEMBLY**ASSEMBLY - LOWER CONTROL ARM (PIVOT BUSHING)**

(1) Position the lower control arm so it is supported by Receiver, Special Tool MB-990799, as shown (Fig. 32).

(2) Place new pivot bushing in lower control arm so it is square with the bushing hole. Position Installer, Special Tool 6644-1, on top of pivot bushing, with pivot bushing setting in recessed area of Installer (Fig. 32).

LOWER CONTROL ARM (Continued)

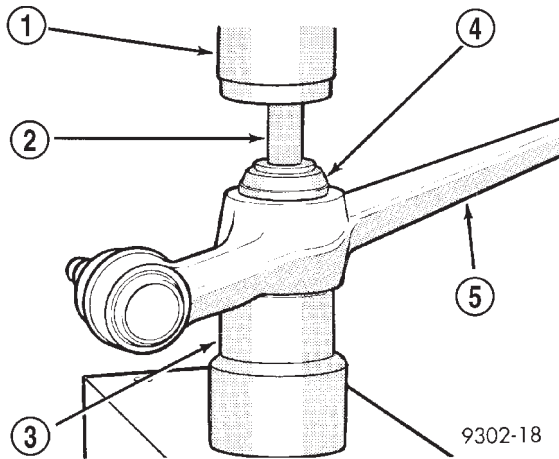


Fig. 31 Removing Lower Control Arm Tension Strut Bushing

- 1 - ARBOR PRESS RAM
- 2 - SPECIAL TOOL 6644-4
- 3 - SPECIAL TOOL MB990799
- 4 - TENSION STRUT BUSHING
- 5 - LOWER CONTROL ARM

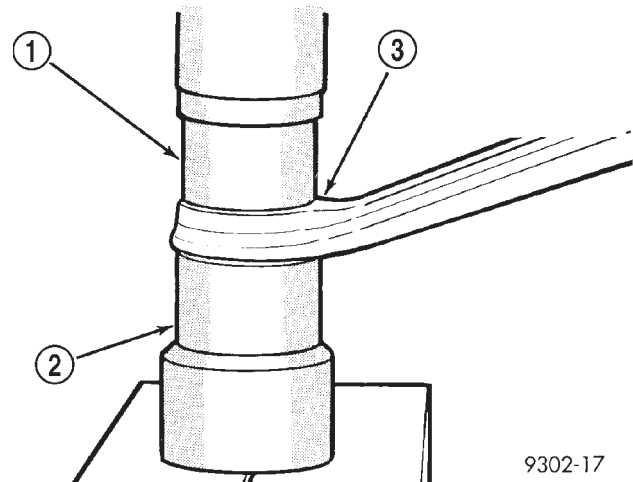


Fig. 33 Pivot Bushing

- 1 - SPECIAL TOOL 6644-1
- 2 - SPECIAL TOOL MB990799
- 3 - PRESS PIVOT BUSHING INTO LOWER CONTROL ARM UNTIL INSTALLER TOUCHES THIS SURFACE OF CONTROL ARM

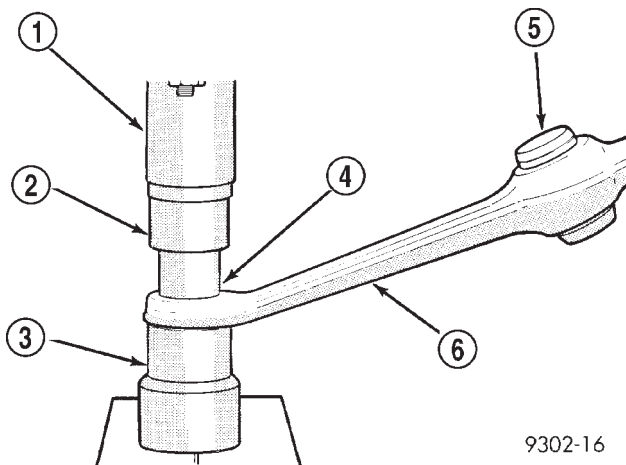


Fig. 32 Installing Lower Control Arm Pivot Bushing

- 1 - ARBOR PRESS RAM
- 2 - SPECIAL TOOL 6644-1
- 3 - SPECIAL TOOL MB990799
- 4 - PIVOT BUSHING
- 5 - TENSION STRUT BUSHING
- 6 - LOWER CONTROL ARM

(3) Press pivot bushing into lower control arm until Installer, Special Tool 6644-1, squarely bottoms against surface of lower control arm (Fig. 33). At that point, the bushing is installed to the correct position in control arm.

(4) Attach tension strut to lower control arm and install on car as an assembly. See Lower Control Arm/Installation.

ASSEMBLY - LOWER CONTROL ARM (TENSION STRUT BUSHING)

(1) Thoroughly lubricate the replacement tension strut bushing, lower control arm and Installer, Special Tool 6644-3, using Mopar® Rubber Bushing Installation Lube, or an equivalent.

(2) By hand, install tension strut bushing into large end of Installer, Special Tool 6644-3. Press bushing into installer as far as it will go by hand.

(3) Position lower control arm in arbor press, so tension strut hole in lower control arm is centered on Receiver, Special Tool MB-990799 (Fig. 34). Position Installer, Special Tool 6644-3 (with previously installed bushing) inside of tension strut bushing hole in lower control arm (Fig. 34). Position Installer, Special Tool 6644-2 on top of tension strut bushing (Fig. 34).

(4) Using the arbor press, press the tension strut bushing into the lower control arm. As the bushing is being pressed into the control arm a pop noise will be heard. When the pop is heard, Installer, Special Tool 6644-3, will move slightly up off the control arm. At this time, remove the control arm assembly from the arbor press and pull Special Tool 6644-3 off the tension strut bushing in the control arm. Tension strut bushing is now installed.

(5) Attach tension strut to lower control arm and install lower control arm and tension strut as an assembly back on the vehicle. See Lower Control Arm/Installation.

LOWER CONTROL ARM (Continued)

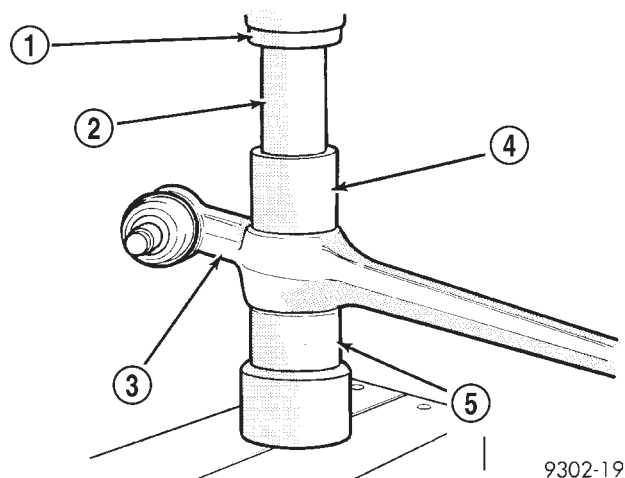


Fig. 34 Installing Tension Strut Bushing Into Lower Control Arm

- 1 - ARBOR PRESS
- 2 - SPECIAL TOOL 6644-2
- 3 - LOWER CONTROL ARM
- 4 - SPECIAL TOOL 6644-3
- 5 - SPECIAL TOOL MB990799

INSTALLATION - LOWER CONTROL ARM

(1) Position tension strut in lower control arm as shown (Fig. 35). Make sure the word FRONT which is stamped in tension strut, is positioned away from control arm.

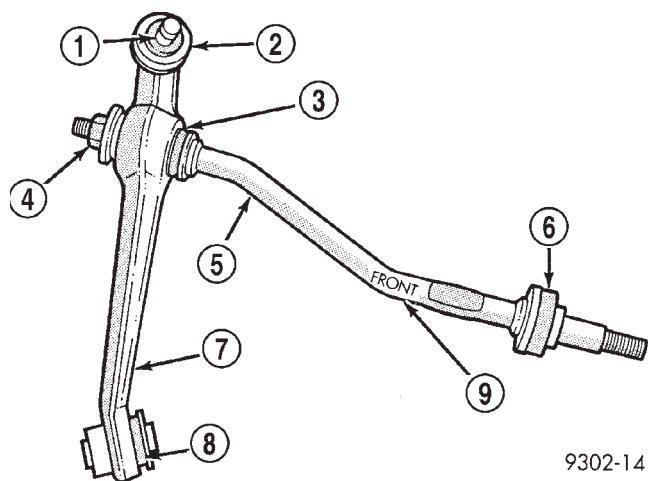


Fig. 35 Lower Control Arm And Tension Strut

- 1 - BALL JOINT STUD
- 2 - BALL JOINT SEAL
- 3 - LOWER CONTROL ARM TENSION STRUT BUSHING
- 4 - NUT
- 5 - TENSION STRUT
- 6 - TENSION STRUT TO CRADLE ISOLATOR BUSHING
- 7 - LOWER CONTROL ARM
- 8 - LOWER CONTROL ARM PIVOT BUSHING
- 9 - WORD "FRONT" STAMPED IN CONTROL ARM HERE

(2) Install the washer and a **NEW** retaining nut on the end of the tension strut at the control arm. Place an open end wrench on flat of tension strut to keep it from turning tension whilst tightening retaining nut. Tighten retaining nut to a torque of 130 N·m (95 ft. lbs.).

(3) Install the lower control arm and tension strut assembly on the engine/suspension cradle in the following manner. Install tension strut and isolator bushing end into cradle first, then install lower control arm pivot bushing end into bracket on cradle (Fig. 28).

(4) Install the lower control arm to cradle bracket attaching pivot bolt and nut (Fig. 27). **Do not tighten the lower control arm to cradle bracket attaching bolt at this time.**

(5) Install washer on end of tension strut (Fig. 26). Install a **NEW** tension strut to cradle bracket nut, on tension strut (Fig. 26). Tighten the tension strut to cradle bracket retaining nut to a torque of 130 N·m (95 ft. lbs.). When torquing tension strut nut, keep tension strut from turning by holding tension strut at flat using an open end wrench (Fig. 26).

CAUTION: Pulling steering knuckle out from vehicle after releasing from ball joint can separate inner C/V joint. See Driveshafts.

CAUTION: When ball joint stud is installed into steering knuckle, do not let ball joint seal hit up against steering knuckle. If ball joint seal hits steering knuckle, seal damage may occur. If ball joint seal becomes torn, replace seal before assembling lower control arm to knuckle.

(6) Install lower ball joint stud into steering knuckle. Install steering knuckle to lower ball joint stud, clamp bolt and nut into steering knuckle (Fig. 24). Tighten the clamping bolt to a torque of 55 N·m (40 ft. lbs.).

(7) Install the wheel and tire assembly.

(8) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(9) Lower vehicle so the suspension is supporting vehicles weight (control arm at design height). Tighten the lower control arm pivot bushing to cradle bracket attaching bolt (Fig. 27) to a torque of 142 N·m (105 ft. lbs.).

STABILIZER BAR

DESCRIPTION

The stabilizer bar interconnects both front struts of the vehicle and is attached to the front cradle/crossmember (Fig. 1) .

Attachment of the stabilizer bar to the front cradle/crossmember is through 2 rubber-isolator cushion bushings and retainers. A double ball jointed stabilizer bar link is used to attach each end of the stabilizer bar to the front strut assemblies. All parts of the stabilizer bar are replaceable as individual components.

The stabilizer bar to front cradle cushion bushings are slit for easy removal and installation. The slit must be positioned toward the front of the vehicle when the stabilizer bar is installed.

OPERATION

Jounce and rebound movements affecting one wheel are partially transmitted to the opposite wheel of the vehicle through the stabilizer bar. This helps to minimize the body roll of the vehicle during suspension movement.

DIAGNOSIS AND TESTING - STABILIZER BAR (FRONT)

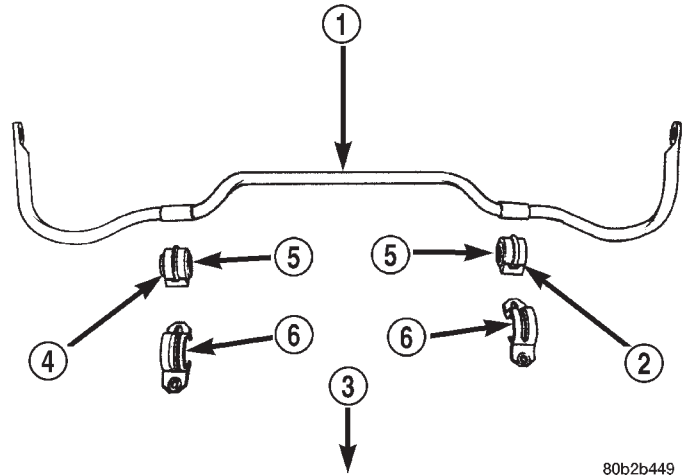
Inspect for broken or distorted retainers and bushings. If bushing replacement is required, bushing can be removed by opening slit in bushing and removing bushing from around stabilizer bar. The stabilizer bar to cradle assembly bushings, should be positioned on stabilizer bar, so slit in bushing is positioned toward the front of the vehicle when the stabilizer bar is installed (Fig. 36).

REMOVAL - STABILIZER BAR (FRONT)

(1) Remove the 4 strut assembly upper mount to strut tower mounting nut and washer assemblies securing the right front strut in place (Fig. 37).

(2) Raise vehicle on jack stands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

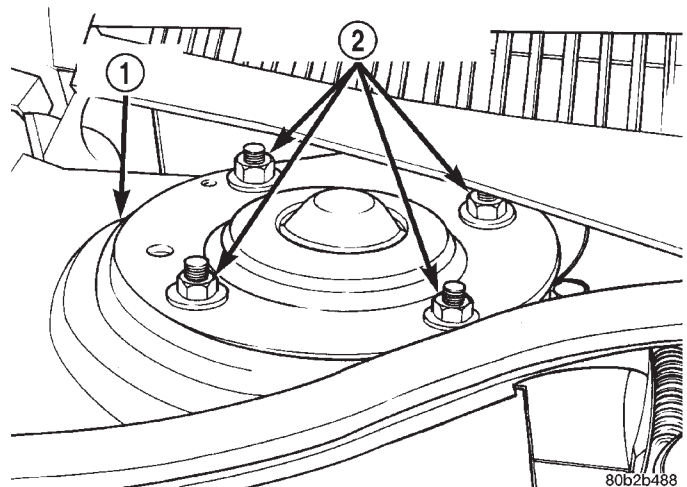
(3) Remove right front wheel and tire assembly from the vehicle.



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Fig. 36 Stabilizer

- 1 - STABILIZER BAR
- 2 - SLIT
- 3 - FRONT OF CAR
- 4 - SLIT
- 5 - ISOLATOR BUSHINGS
- 6 - RETAINERS



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Fig. 37 Strut Assembly Upper Mounting

- 1 - SHOCK TOWER
- 2 - STRUT ASSEMBLY MOUNTING NUTS

STABILIZER BAR (Continued)

(4) Remove the right stabilizer bar link nut at the strut assembly. Remove the link from the strut assembly (Fig. 38).

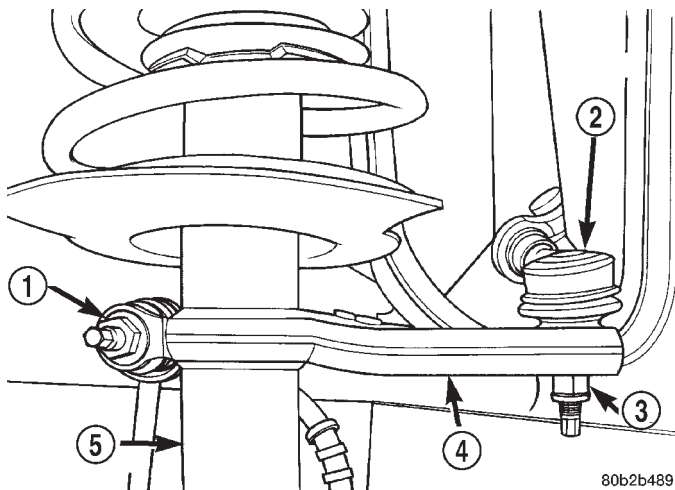


Fig. 38 Stabilizer Bar Link At Strut

- 1 - NUT
- 2 - OUTER TIE ROD
- 3 - NUT
- 4 - STEERING ARM
- 5 - STRUT ASSEMBLY

(5) Remove the left stabilizer bar link nut at the stabilizer bar (Fig. 39). Remove the link from the stabilizer bar.

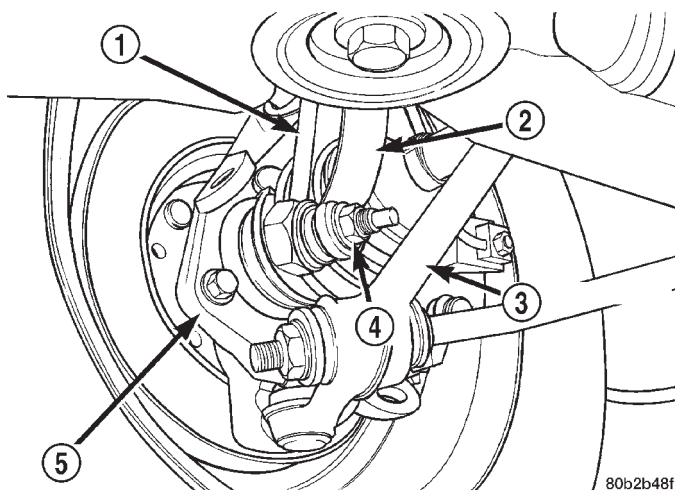
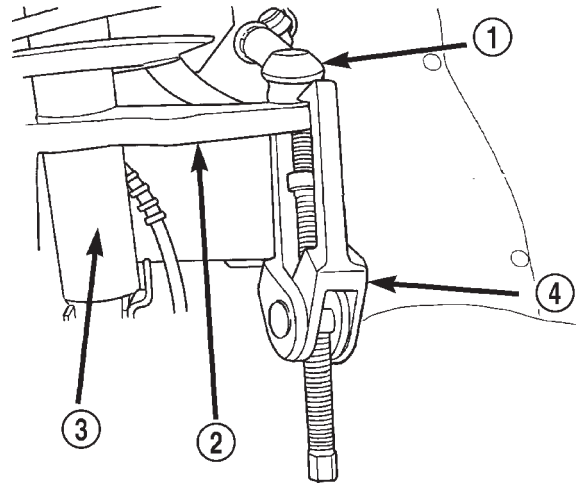


Fig. 39 Stabilizer Bar At Left Link

- 1 - LINK
- 2 - STABILIZER BAR
- 3 - LOWER ARM
- 4 - NUT
- 5 - KNUCKLE

(6) Loosen, but do not remove, the right outer tie rod end to strut arm attaching nut. Release right outer tie rod end from right strut steering arm using

Puller, Special Tool C-3894A (Fig. 40), then remove nut and tie rod from the steering arm.

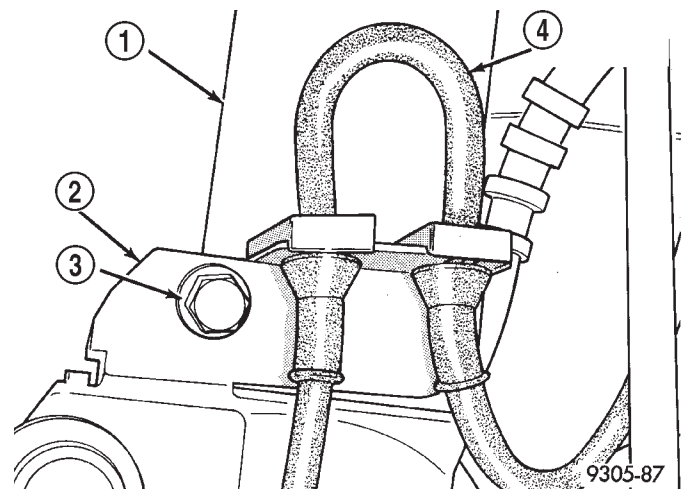


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Fig. 40 Removing Outer Tie Rod From Steering Arm

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - C-3894A

(7) If vehicle is equipped with antilock brakes, remove the speed sensor cable routing bracket from the strut assembly (Fig. 41).



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Fig. 41 Speed Sensor Cable Routing Bracket

- 1 - STRUT ASSEMBLY
- 2 - ROUTING BRACKET
- 3 - SCREW
- 4 - SPEED SENSOR CABLE

CAUTION: The strut assembly to steering knuckle bolts are serrated were they go through strut assembly and steering knuckle. When removing bolts, turn nuts off bolts **DO NOT TURN BOLTS IN STEERING KNUCKLE**. If bolts are turned damage to steering knuckle will result.

STABILIZER BAR (Continued)

(8) Remove the 2 strut assembly to steering knuckle attaching bolts (Fig. 42).

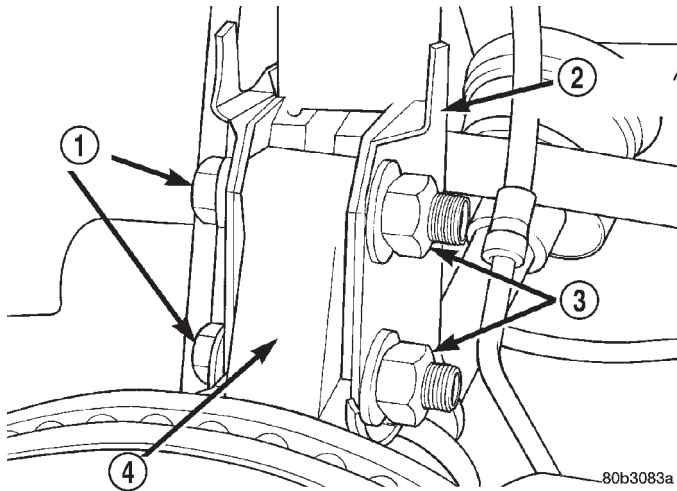


Fig. 42 Strut Assembly To Steering Knuckle Attaching Bolts

- 1 - BOLTS
- 2 - STRUT ASSEMBLY
- 3 - NUTS
- 4 - KNUCKLE

(9) Remove right front strut assembly from vehicle.

(10) Remove the nine bolts securing the structural collar to the engine oil pan and transaxle (Fig. 43).

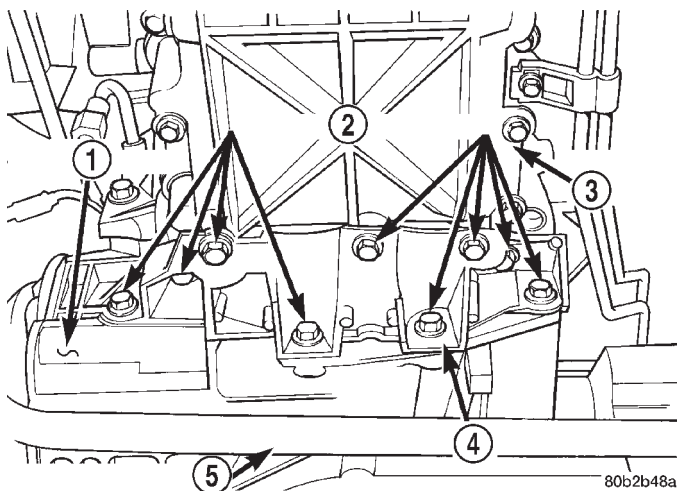


Fig. 43 Structural Collar

- 1 - TRANSAXLE
- 2 - MOUNTING BOLTS
- 3 - ENGINE OIL PAN
- 4 - STRUCTURAL COLLAR
- 5 - STABILIZER BAR

(11) Remove the 4 nuts attaching the engine motor mounts to the cradle assembly (Fig. 44).

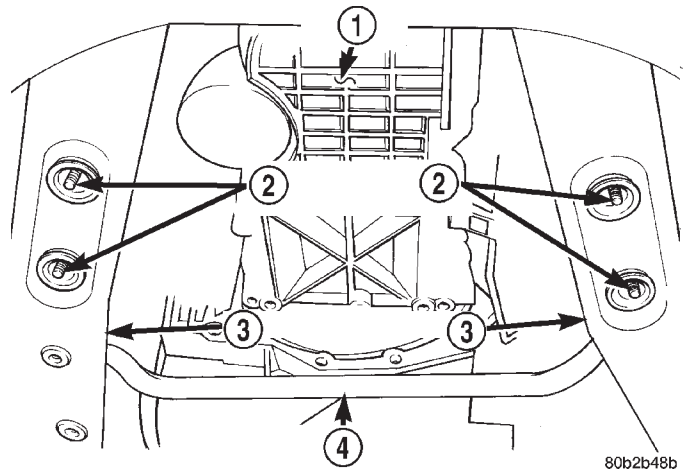


Fig. 44 Motor Mount To Cradle Assembly Attachment

- 1 - ENGINE OIL PAN
- 2 - MOTOR MOUNT ATTACHING NUTS
- 3 - CRADLE ASSEMBLY
- 4 - STABILIZER BAR

(12) Remove the bolts attaching each of the 2 stabilizer bushing retainers to the cradle assembly (Fig. 45).

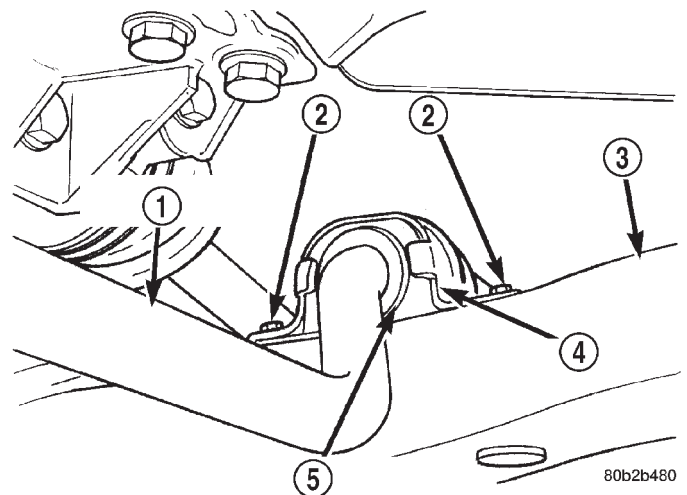


Fig. 45 Stabilizer Bar Isolator Bushing Attachment To Cradle

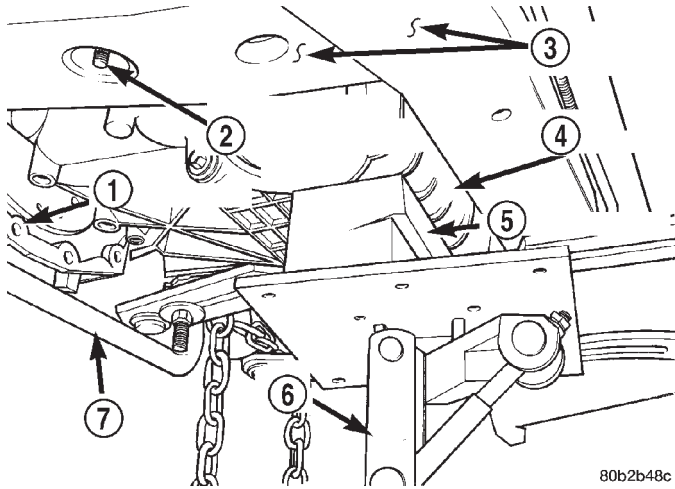
- 1 - STABILIZER BAR
- 2 - ATTACHING BOLTS
- 3 - CRADLE
- 4 - BUSHING RETAINER
- 5 - ISOLATOR BUSHING

(13) Remove both stabilizer bar isolator bushing retainers and bushings from stabilizer bar (Fig. 45).

(14) Position a transmission jack under the body of the engine oil pan (Fig. 46). Use a wood block as a buffer between the jack and the engine oil pan in order to avoid damage to the pan (Fig. 46). Carefully raise

STABILIZER BAR (Continued)

the jack until the motor mounts clear the cradle assembly. It may be necessary to raise the jack further.



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Fig. 46 Jack Positioning Below Engine Oil Pan

- 1 - TRANSAXLE
- 2 - RIGHT FRONT MOTOR MOUNT STUD
- 3 - CRADLE ASSEMBLY
- 4 - ENGINE OIL PAN
- 5 - WOOD BLOCK
- 6 - JACK
- 7 - STABILIZER BAR

(15) Remove the stabilizer bar out the right side by rotating it, taking advantage of the removed structural collar area between the engine and transaxle assembly. Remove the stabilizer bar out the right wheel opening by routing it in front of the right halfshaft then behind the right knuckle (Fig. 47).

CAUTION: Be careful not to pull knuckle outward, thus stretching halfshaft and possibly separating inner C/V joint. See Driveshafts. Keep knuckle in upright position.

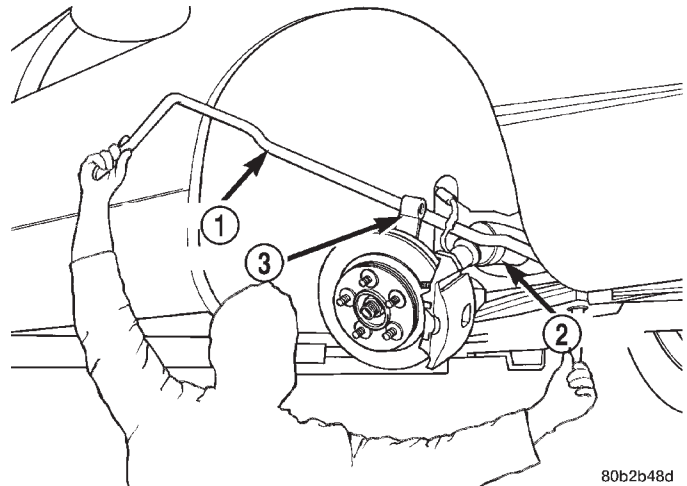
INSTALLATION - STABILIZER BAR (FRONT)

(1) Install stabilizer bar by reversing the manner in which it was removed (Fig. 47). Rotate the bar the opposite direction used when removed and move it into mounting position.

CAUTION: Be careful not to pull knuckle outward, thus stretching halfshaft and possibly separating inner C/V joint. See Driveshafts. Keep knuckle in upright position.

(2) Lower the jack supporting the engine, guiding the motor mount studs into place in the cradle assembly (Fig. 46).

(3) Install the 4 engine motor mount to cradle assembly attaching nuts (Fig. 44). Tighten the 4 nuts to a torque of 61 N·m (45 ft. lbs).



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Fig. 47 Stabilizer Bar Removal/Installation

- 1 - STABILIZER BAR
- 2 - HALFSHAFT
- 3 - KNUCKLE

(4) Install the structural collar to the engine oil pan and the transaxle. The structural collar should be installed using the following sequence:

- Position collar onto engine oil pan and transaxle (Fig. 43).
- Install the 2 center collar bolts to oil pan bolts. Tighten bolts initially to 3 N·m (30 in. lbs).
- Install collar to transmission bolts and tighten to 61 N·m (45 ft. lbs).
- Install the remaining collar to engine oil pan bolts, starting with the center bolts and working outwards, tighten collar to oil pan bolts to 61 N·m (45 ft. lbs).

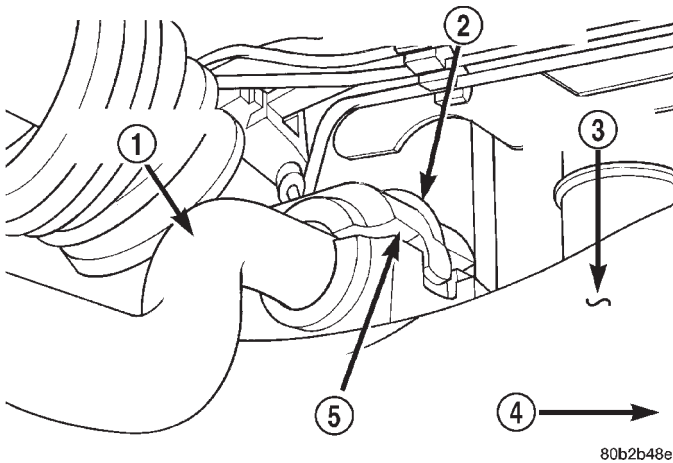
(5) Install stabilizer bar isolator bushings onto stabilizer bar with slits facing forward and flat side facing downward. **The stabilizer bar to cradle assembly bushings must be positioned on the stabilizer bar so the slit in the bushing is positioned toward front of vehicle** (Fig. 48).

(6) Install the isolator bushing retainers onto the stabilizer bar isolator bushings (Fig. 45).

CAUTION: When stabilizer bar is installed, position stabilizer bar so lower part of stabilizer bar is centered in the middle of the cradle assembly. Failure to do this may cause stabilizer bar to come in contact with other suspension components.

(7) Align the stabilizer bar bushing retainers with the mounting holes in the cradle assembly. Install and tighten the 4 stabilizer bar bushing retainer to cradle assembly attaching bolts to 61 N·m (45 ft. lbs.). (Fig. 45).

STABILIZER BAR (Continued)

**Fig. 48 Stabilizer Bar Isolator Bushing**

- 1 - STABILIZER BAR
- 2 - STABILIZER BAR ISOLATOR BUSHING
- 3 - CRADLE ASSEMBLY
- 4 - FRONT OF CAR
- 5 - SLIT

(8) Install left side stabilizer bar attaching link to left end of stabilizer bar (Fig. 39). Install attaching nut and tighten to 95 N·m (70 ft. lbs.).

(9) Install right front strut assembly into shock tower. Install the 4 strut assembly upper mount to shock tower attaching nuts (Fig. 37). Tighten the 4 strut mount to strut tower attaching nuts to a torque of 45 N·m (33 ft. lbs.) torque.

(10) Position steering knuckle into strut assembly.

CAUTION: The strut assembly to steering knuckle bolts are serrated were they go through strut assembly and steering knuckle. When installing bolts, turn nuts onto bolts **DO NOT TURN BOLTS IN STEERING KNUCKLE**. If bolts are turned damage to steering knuckle will result.

(11) Install the strut assembly to steering knuckle attaching bolts (Fig. 42). Install nuts on attaching bolts. Tighten the strut assembly to steering knuckle attaching bolt nuts to a torque of 203 N·m (150 ft. lbs.).

(12) If the vehicle is equipped with antilock brakes. Install the front speed sensor cable routing bracket onto the front strut assembly (Fig. 41).

(13) Install outer tie rod on strut assembly. Install tie rod attaching nut (Fig. 38). Tighten the tie rod attaching nut to a torque of 37 N·m (27 ft. lbs.).

(14) Install stabilizer bar link on strut (Fig. 38). Tighten the stabilizer link attaching nut to a torque of 95 N·m (70 ft. lbs.).

(15) Install the right front wheel and tire assembly.

(16) Tighten the wheel mounting nuts in proper sequence until all nuts are torqued to half specification. Repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

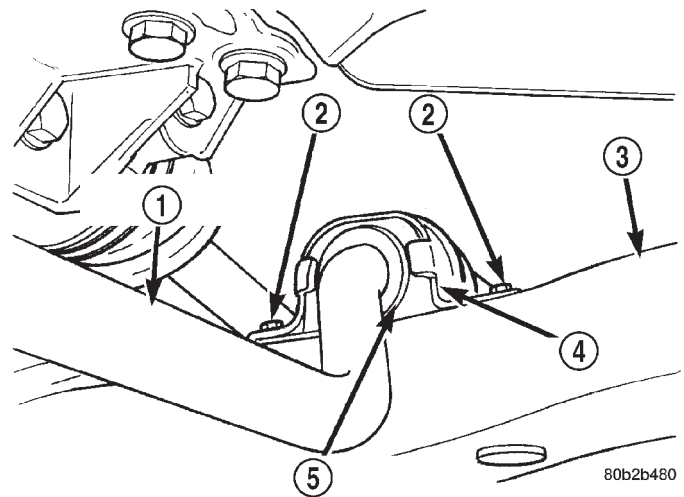
(17) Lower vehicle to the ground.

STABILIZER BAR BUSHINGS

REMOVAL - STABILIZER BAR BUSHING (FRONT)

(1) Raise vehicle on jack stands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the 2 bolts attaching each of the 2 stabilizer bushing retainers and bushings to the cradle assembly (Fig. 49).

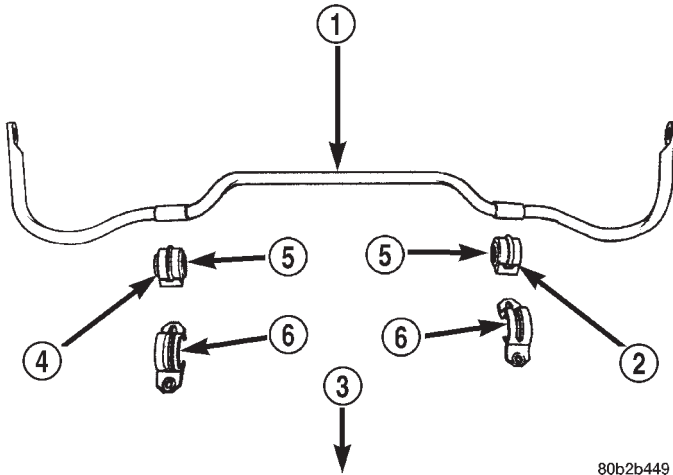
**Fig. 49 Stabilizer Bar Isolator Bushing Attachment To Cradle**

- 1 - STABILIZER BAR
- 2 - ATTACHING BOLTS
- 3 - CRADLE
- 4 - BUSHING RETAINER
- 5 - ISOLATOR BUSHING

(3) Remove the stabilizer bar isolator bushing retainers from the isolator bushings.

(4) Inspect for broken or distorted retainers and bushings. If bushing replacement is required, the bushing can be removed by opening the slit in the bushing and removing the bushing from around stabilizer bar. **The stabilizer bar to cradle assembly bushings must be positioned on the stabilizer bar so the slit in the bushing is positioned toward front of vehicle** (Fig. 50).

STABILIZER BAR BUSHINGS (Continued)



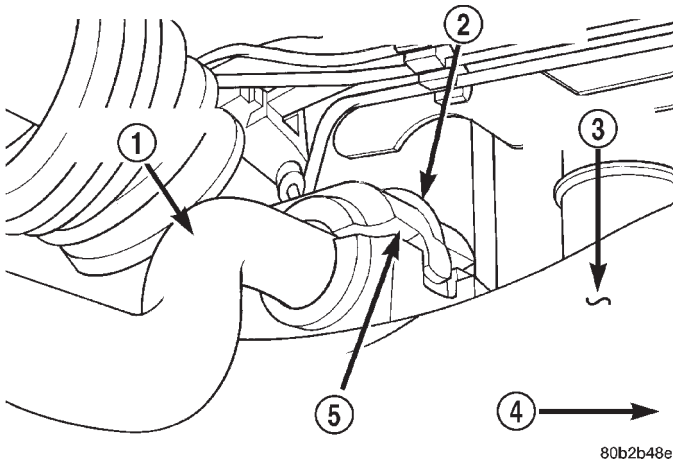
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Fig. 50 Stabilizer

- 1 - STABILIZER BAR
- 2 - SLIT
- 3 - FRONT OF CAR
- 4 - SLIT
- 5 - ISOLATOR BUSHINGS
- 6 - RETAINERS

INSTALLATION - STABILIZER BAR BUSHING (FRONT)

(1) Install bushings onto stabilizer bar with slits facing forward and flat side facing downward. **The stabilizer bar to cradle assembly bushings must be positioned on the stabilizer bar so the slit in the bushing is positioned toward front of vehicle** (Fig. 51).



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Fig. 51 Stabilizer Bar Isolator Bushing

- 1 - STABILIZER BAR
- 2 - STABILIZER BAR ISOLATOR BUSHING
- 3 - CRADLE ASSEMBLY
- 4 - FRONT OF CAR
- 5 - SLIT

(2) Install the isolator bushing retainers back onto the stabilizer bar isolator bushings.

CAUTION: When stabilizer bar is installed. Position stabilizer bar, so lower part of stabilizer bar is centered in the middle of the cradle assembly. Failure to do this may cause stabilizer bar to come in contact with other suspension components.

(3) Align the stabilizer bar bushing retainers with the mounting holes in the cradle assembly (Fig. 49).

(4) Install and torque the 4 stabilizer bar bushing retainer to cradle assembly attaching bolts (2 each retainer) to 61 N·m (45 ft. lbs.).

(5) Lower vehicle to the ground.

STRUT**DESCRIPTION - STRUT ASSEMBLY (FRONT)**

The front strut and suspension of the vehicle is supported by coil springs positioned around the struts (Fig. 1). The springs are contained between an upper seat, located just below the upper strut mount and a lower spring seat on the strut housing. A steering arm is permanently attached to each strut making it side specific.

The top of each strut assembly is bolted to the upper fender reinforcement (strut tower) through a rubber isolated mount.

The bottom of the strut assembly attaches to the top of the steering knuckle with two serrated through-bolts and prevailing torque nuts.

Coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service.

The components of the strut assembly listed below are serviceable if found to be defective (Fig. 52):

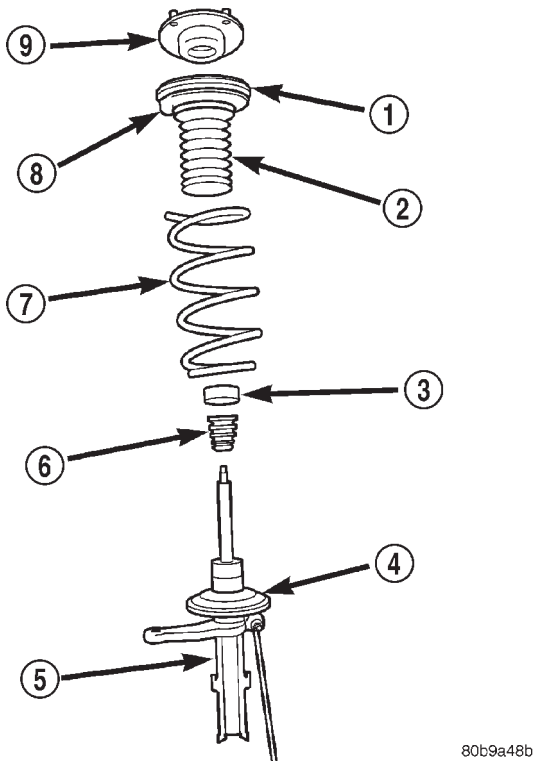
- Strut shaft retainer nut
- Upper mount
- Seat and bearing
- Dust shield
- Jounce bumper
- Jounce bumper cup
- Coil spring
- Upper spring isolator
- Lower spring isolator
- Strut

OPERATION - STRUT ASSEMBLY (FRONT)

The strut assembly cushions the ride of the vehicle, controlling vibration, jounce and rebound of the suspension.

The coil spring controls ride quality and maintains proper ride height.

STRUT (Continued)


Fig. 52 Strut Assembly Components

- 1 - SEAT AND BEARING
- 2 - DUST SHIELD
- 3 - CUP
- 4 - LOWER SPRING ISOLATOR
- 5 - STRUT
- 6 - JOUNCE BUMPER
- 7 - COIL SPRING
- 8 - UPPER SPRING ISOLATOR
- 9 - UPPER MOUNT

The spring isolators isolate the coil spring at the top and bottom from coming into metal-to-metal contact with the upper mounting seat and the strut.

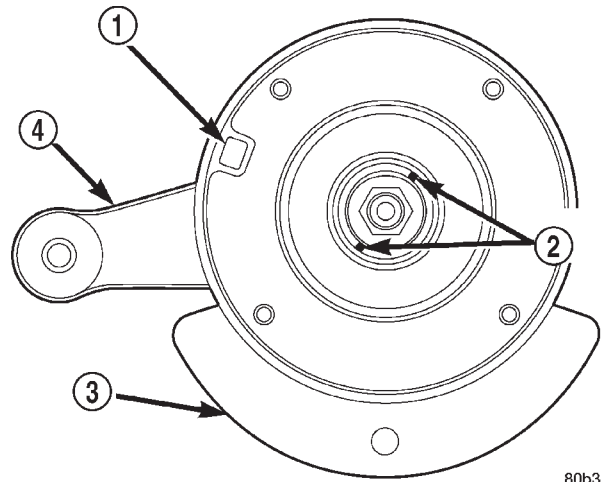
The jounce bumper limits suspension travel and metal-to-metal contact under full jounce condition.

The strut dampens jounce and rebound motions of the coil spring and suspension.

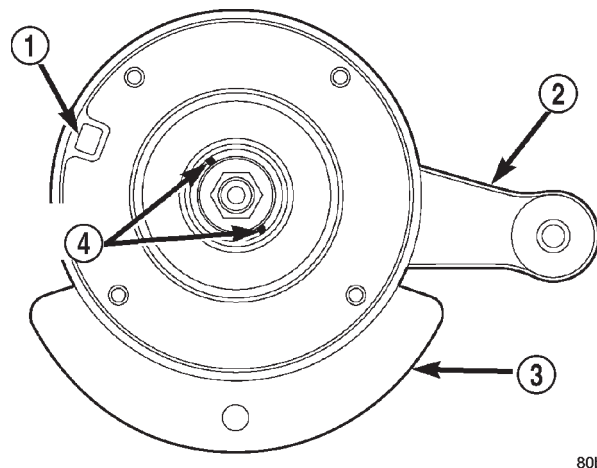
DIAGNOSIS AND TESTING - STRUT ASSEMBLY (FRONT)

- (1) Inspect for damaged or broken coil springs.
- (2) Inspect for torn or damaged strut assembly dust boots.
- (3) Lift dust boot and inspect strut assembly for evidence of fluid running from the upper end of fluid reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off lower end of unit). A slight amount of seepage between the strut rod and strut shaft seal is not unusual and does not affect performance of the strut assembly. Also inspect jounce bumpers for signs of damage or deterioration.

(4) Inspect the upper strut mount assembly. Make sure the correct mount is on the correct side of the vehicle. Looking down at the top of the upper mount, 2 tabs can be seen, (Fig. 53) and (Fig. 54), down inside the mount center well. The positioning of these tabs is critical to vehicle ride and sound. **DO NOT install a right mount on the left front strut or a left mount on a right front strut.** If the strut is off the vehicle, a rectangular hole can be seen on the edge of the mount mounting surface (Fig. 53) and (Fig. 54). This is always in the 10 o'clock position when observing rubber tab positioning, whether a left or right mount is being observed.


Fig. 53 Left Front Strut Upper Mount

- 1 - NOTCH
- 2 - RUBBER TABS
- 3 - OUTBOARD STRUT COIL SPRING SEAT
- 4 - STEERING ARM


Fig. 54 Right Front Strut Upper Mount

- 1 - NOTCH
- 2 - STEERING ARM
- 3 - OUTBOARD STRUT COIL SPRING SEAT
- 4 - RUBBER TABS

STRUT (Continued)

Coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service. Be sure that the springs meet the correct load rating for the vehicle and its specific options.

REMOVAL - STRUT ASSEMBLY (FRONT)

WARNING: DO NOT REMOVE THE STRUT ASSEMBLY'S SHAFT NUT AT ANY TIME UNLESS THE COIL SPRING HAS BEEN PROPERLY COMPRESSED FOLLOWING THE PROCEDURE LISTED IN STRUT ASSEMBLY DISASSEMBLY IN THIS SECTION.

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove front tire and wheel assembly from the vehicle.

(3) Remove the stabilizer bar link nut at the strut assembly. Remove the link from the strut assembly (Fig. 55).

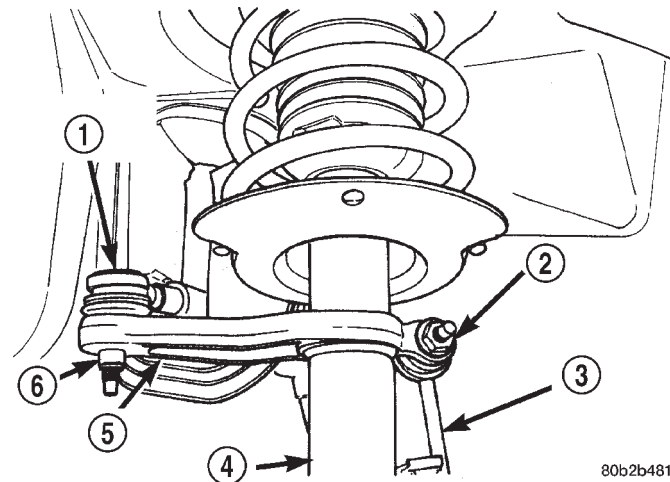


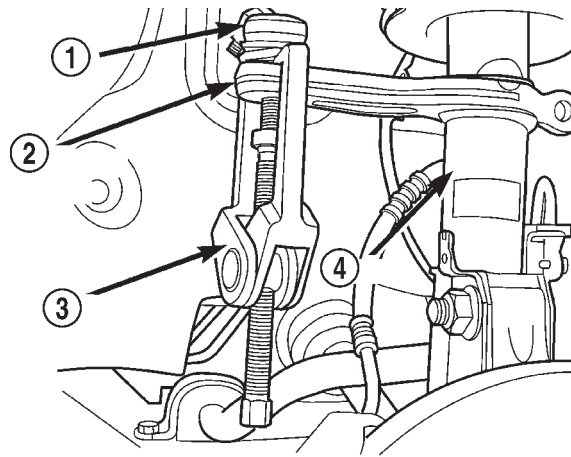
Fig. 55 Stabilizer Bar Link At Strut

- 1 - OUTER TIE ROD
- 2 - NUT
- 3 - STABILIZER BAR ATTACHING LINK
- 4 - STRUT ASSEMBLY
- 5 - STEERING ARM
- 6 - NUT

(4) Loosen, but do not remove, the outer tie rod end to strut arm attaching nut (Fig. 56). Release outer tie rod end from steering arm using Puller, Special Tool C-3894A (Fig. 56), then remove nut and tie rod from the steering arm.

(5) If vehicle is equipped with antilock brakes, remove the speed sensor cable routing bracket from the strut assembly (Fig. 57).

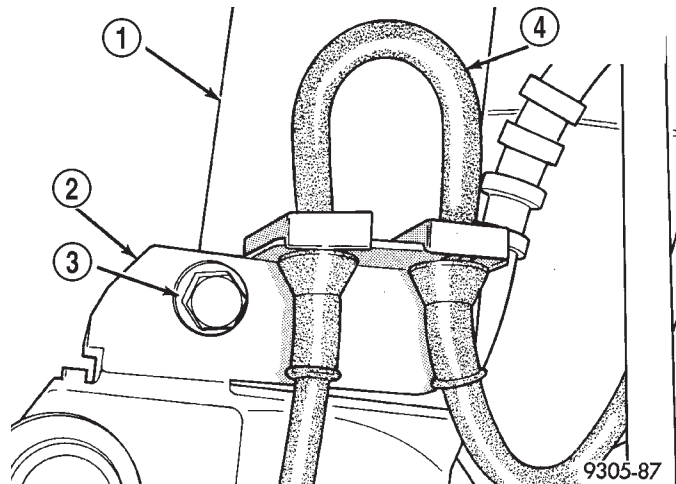
(6) Remove the 2 guide pin bolts mounting the caliper assembly to the steering knuckle (Fig. 58).



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Fig. 56 Removing Outer Tie Rod From Steering Arm

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - SPECIAL TOOL C-3894A
- 4 - STRUT



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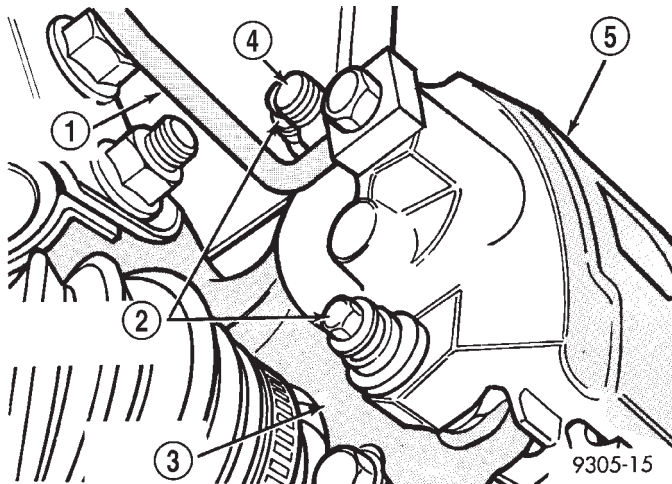
Fig. 57 Speed Sensor Cable Routing Bracket

- 1 - STRUT ASSEMBLY
- 2 - ROUTING BRACKET
- 3 - SCREW
- 4 - SPEED SENSOR CABLE

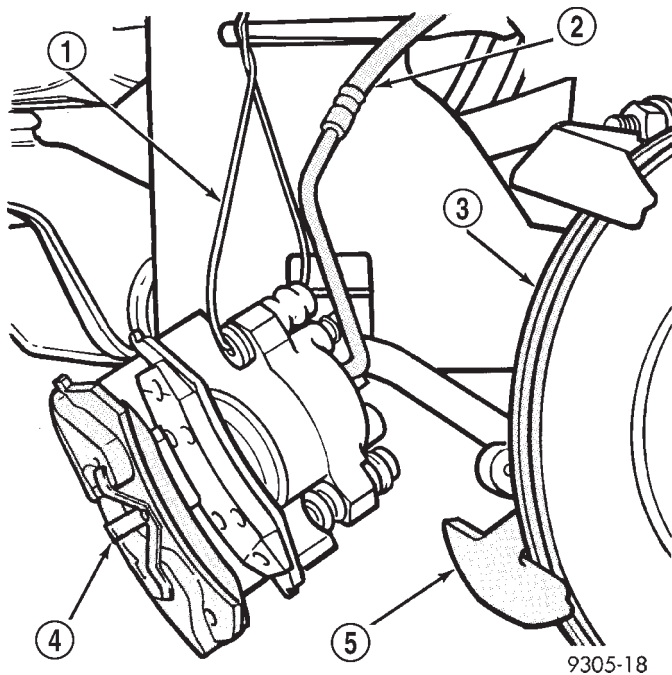
(7) Remove brake caliper assembly from steering knuckle and brake rotor. Refer to the Brakes. Support caliper assembly by hanging it from frame of vehicle with wire or some other method (Fig. 59). Do not let caliper assembly hang by brake hose.

(8) Remove brake rotor from hub.

STRUT (Continued)

**Fig. 58 Caliper Guide Pin Bolts**

- 1 - BRAKE LINE
- 2 - CALIPER GUIDE PIN BOLTS
- 3 - STEERING KNUCKLE
- 4 - BLEEDER SCREW
- 5 - CALIPER ASSEMBLY

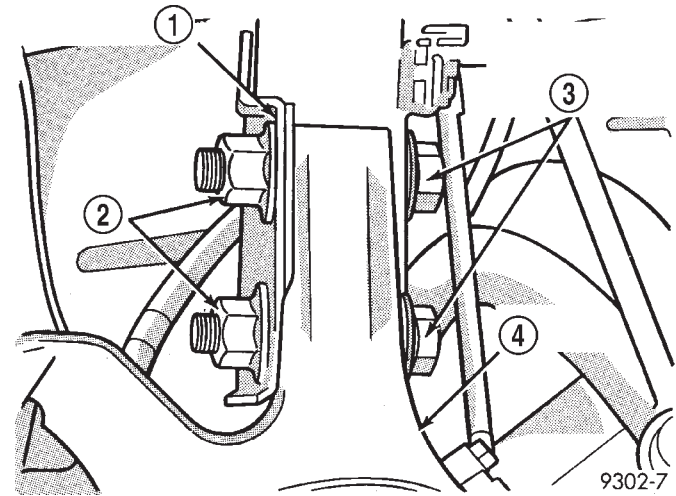
**Fig. 59 Caliper Supported**

- 1 - WIRE HANGER
- 2 - FLEXIBLE BRAKE HOSE
- 3 - BRAKING DISC
- 4 - CALIPER ASSEMBLY
- 5 - STEERING KNUCKLE

CAUTION: The strut assembly to steering knuckle bolts are serrated were they go through strut assembly and steering knuckle. When removing bolts, turn nuts off bolts **DO NOT TURN BOLTS IN**

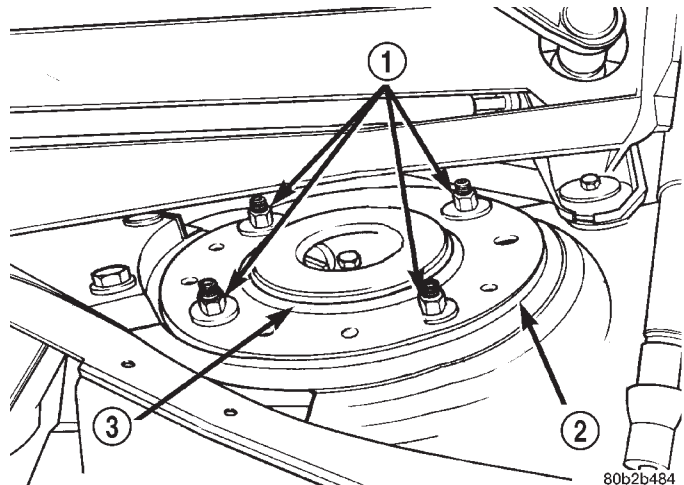
STEERING KNUCKLE. If bolts are turned damage to steering knuckle will result.

(9) Remove the 2 strut assembly to steering knuckle attaching bolts (Fig. 60).

**Fig. 60 Strut To Steering Knuckle Attaching Bolts**

- 1 - STRUT ASSEMBLY
- 2 - NUTS
- 3 - STRUT ASSEMBLY TO STEERING KNUCKLE ATTACHING BOLTS
- 4 - STEERING KNUCKLE

(10) Remove the 4 strut assembly upper mount to strut tower mounting nut and washer assemblies (Fig. 61).

**Fig. 61 Strut Assembly Mounting**

- 1 - STRUT ASSEMBLY MOUNTING NUTS
- 2 - SHOCK TOWER
- 3 - STRUT MOUNT

(11) Remove the strut assembly from the vehicle.

(12) For disassembly of the strut assembly, refer to Disassembly.

STRUT (Continued)

DISASSEMBLY - STRUT ASSEMBLY (FRONT)

The Strut assembly must be removed from the vehicle for it to be disassembled and assembled. Refer to Removal in this section.

For the disassembly and assembly of the strut assembly, use strut spring compressor, Pentastar Service Equipment (PSE) tool W-7200, or the equivalent, to compress the coil spring. Follow the manufacturer's instructions closely.

WARNING: DO NOT REMOVE THE STRUT ASSEMBLY'S SHAFT NUT AT ANY TIME UNLESS THE COIL SPRING HAS BEEN PROPERLY COMPRESSED FOLLOWING THE PROCEDURE LISTED HERE.

(1) If both struts are being serviced at the same time, mark the coil spring and strut assembly according to which side of the vehicle the strut was removed from, and which strut the coil spring was removed from.

(2) Position the strut assembly in the strut coil spring compressor following the manufacturers instructions (Fig. 62). The strut clevis bracket should be positioned outward. It will be necessary to turn the strut assembly so the steering arm will clear the compressor arm. Position the upper and lower hooks on the coil spring, then place a clamp on the lower end of the coil spring, so the strut is held in place once the strut shaft nut is removed (Fig. 62).

WARNING: DO NOT REMOVE THE STRUT SHAFT NUT BEFORE THE COIL SPRING IS COMPRESSED. THE COIL SPRING IS HELD UNDER PRESSURE AND MUST BE COMPRESSED, REMOVING SPRING TENSION FROM THE UPPER MOUNT AND PIVOT BEARING, BEFORE THE SHAFT NUT IS REMOVED.

(3) Compress the coil spring until all coil spring tension is removed from the upper mount.

(4) Install Strut Nut Socket, Special Tool 6864, on the strut shaft retaining nut (Fig. 63). Next, install a socket on the hex on the end of the strut shaft. While holding the strut shaft from turning, remove the nut from the strut shaft.

(5) Remove the upper mount from the strut shaft.

(6) Remove the clamp from the bottom of the coil spring and remove the strut out through the bottom of the coil spring.

NOTE: If the seat and bearing, upper spring isolator, dust boot, or coil spring need to be serviced, proceed with the next step, otherwise, proceed with step 9.

NOTE: Before removal of the seat and bearing from the spring, note the flat on the inboard side of the

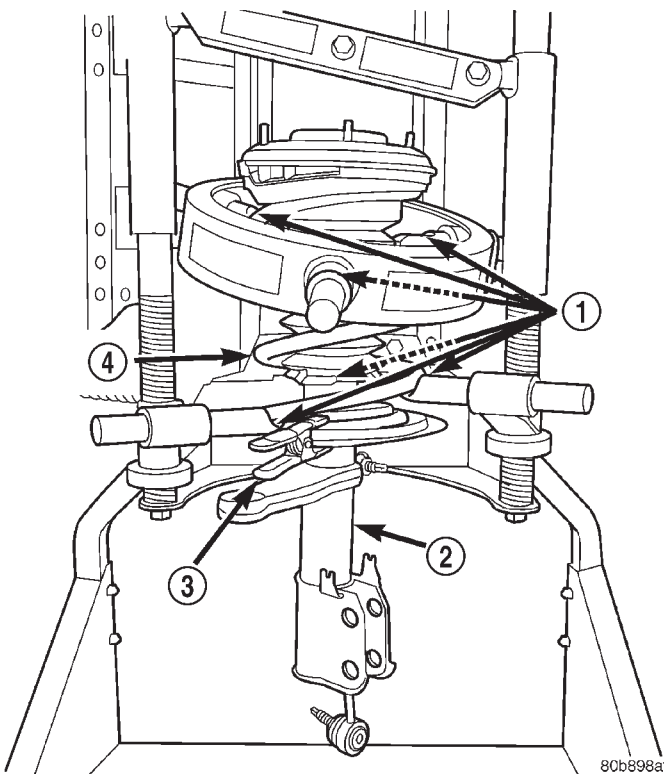


Fig. 62 Strut Assembly In Compressor

- 1 - HOOKS
- 2 - STRUT ASSEMBLY
- 3 - CLAMP
- 4 - COIL SPRING

seat and bearing outer perimeter. This must align with the inboard side of the strut (or rear of the clevis bracket) on reassembly. Also note the coil spring ending at the stop built into the seat and upper isolator.

(7) Remove the seat and bearing, upper spring isolator and dust shield as an assembly from the top of the coil spring by pulling them straight up. They can be separated once removed from the vehicle. The jounce bumper cup may also come off when the assembly is removed. Check inside the dust shield.

NOTE: Before releasing the tension on the coil spring, note the position of the coil end on the upper end of the coil spring. When reinstalled, it must be positioned in the same spot for proper alignment of the seat and bearing, and the strut.

(8) Release the tension from the coil spring by backing off the compressor drive fully. Push back the compressor hooks and remove the coil spring.

(9) Remove the jounce bumper cup and jounce bumper from the strut shaft by pulling each straight up and off the strut shaft (Fig. 64). If the jounce

STRUT (Continued)

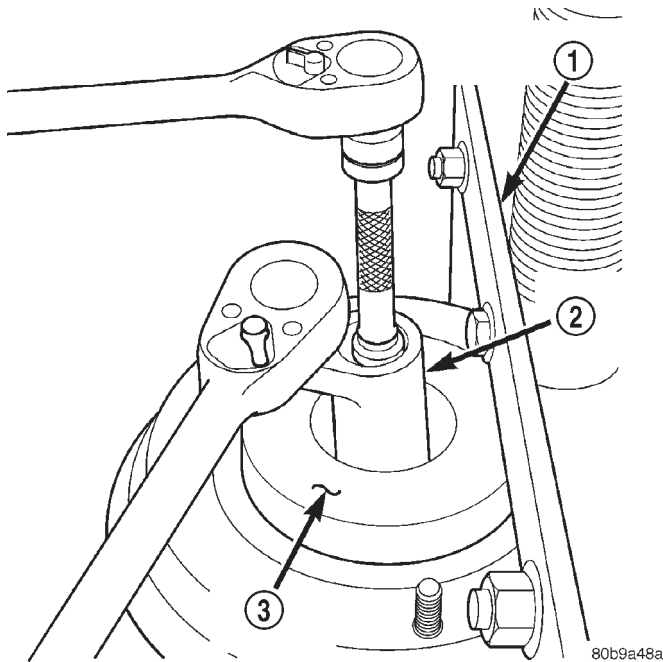


Fig. 63 Shaft Nut Removal/Installation

- 1 - SPRING COMPRESSOR
- 2 - SPECIAL TOOL 6864
- 3 - UPPER MOUNT

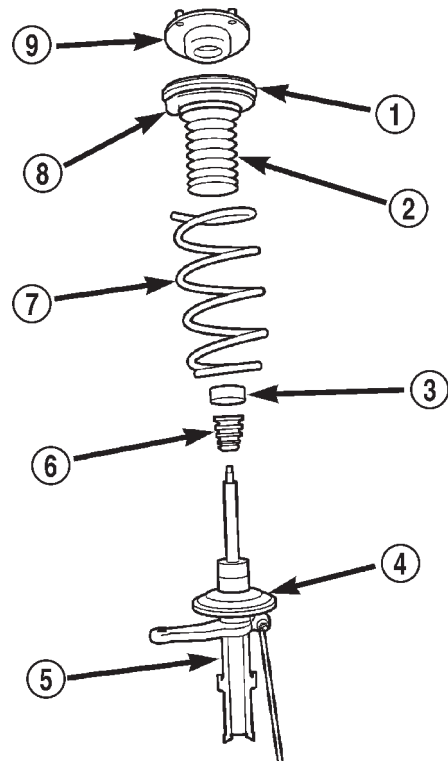


Fig. 64 Strut Assembly Components

- 1 - SEAT AND BEARING
- 2 - DUST SHIELD
- 3 - CUP
- 4 - LOWER SPRING ISOLATOR
- 5 - STRUT
- 6 - JOUNCE BUMPER
- 7 - COIL SPRING
- 8 - UPPER SPRING ISOLATOR
- 9 - UPPER MOUNT

bumper cup is not present, check inside the dust shield. It may have stayed inside the dust shield.

(10) Remove the lower spring isolator from the lower spring seat on the strut (Fig. 65).

(11) Inspect the strut assembly components for the following and replace as necessary:

- Inspect the strut for any condition of shaft binding over the full stroke of the shaft.
- Inspect the jounce bumper for cracks and signs of deterioration.
- Check the upper mount for cracks and distortion and its retaining studs for any sign of damage.
- Check the upper seat and bearing for cracks and distortion.
- Check for binding of the seat and bearing pivot bearing.
- Inspect the dust shield for rips and deterioration.
- Inspect the upper and lower spring isolators for material deterioration.
- Inspect the coil spring for any sign of damage to the coating.

ASSEMBLY - STRUT ASSEMBLY (FRONT)

For the disassembly and assembly of the strut assembly, use strut spring compressor, Pentastar Service Equipment (PSE) tool W-7200, or the equivalent, to compress the coil spring. Follow the manufacturer's instructions closely.

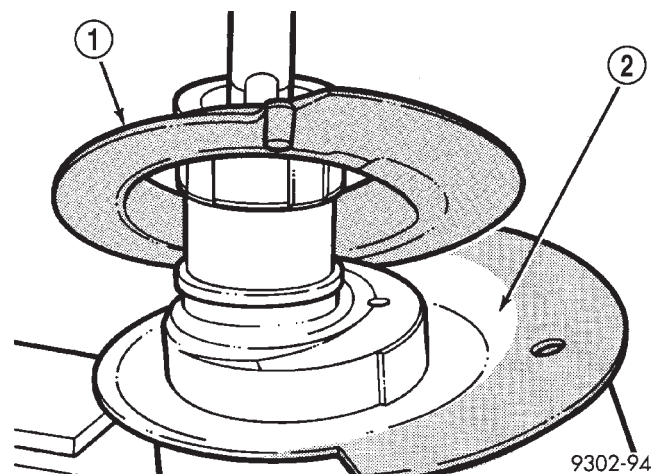


Fig. 65 Lower Spring Isolator

- 1 - LOWER SPRING ISOLATOR
- 2 - LOWER SPRING SEAT

STRUT (Continued)

NOTE: If the coil spring has been removed from the spring compressor, proceed with the next step, otherwise, proceed with step 5.

(1) Place the coil spring in the compressor following the manufacturers instructions (Fig. 62). Before compressing the spring, rotate the spring to the position noted in the note between steps 7 and 8.

(2) If disassembled, reinstall the upper spring isolator and dust shield on seat and bearing. Match the step in the isolator with the step in the seat and bearing.

(3) Install the seat and bearing (with dust shield attached) on top of the coil spring. Position the step built into the seat and upper spring isolator against the coil end of the coil spring.

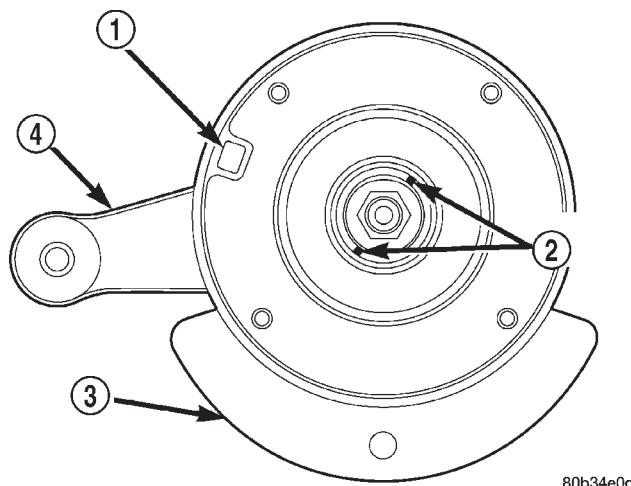
(4) Install the lower spring isolator on the lower spring seat of the strut (Fig. 65). The tabs on the isolator will align it on the strut spring seat. They straddle the expanded area of the lower spring seat on the strut.

(5) Install the jounce bumper on the strut shaft. The jounce bumper is to be installed with the smaller end pointing downward toward the lower seat (Fig. 64).

(6) Install the jounce bumper cup (Fig. 64) on the strut shaft. The cupped side goes on first.

(7) Install the strut through the bottom of the coil spring until the lower spring seat contacts the lower end of the coil spring. The inboard side of the strut (or rear of the clevis bracket) should align with the flat on the inboard side of the seat and bearing outer perimeter. Install the clamp on the lower end of the coil spring and strut, so the strut is held in place (Fig. 62).

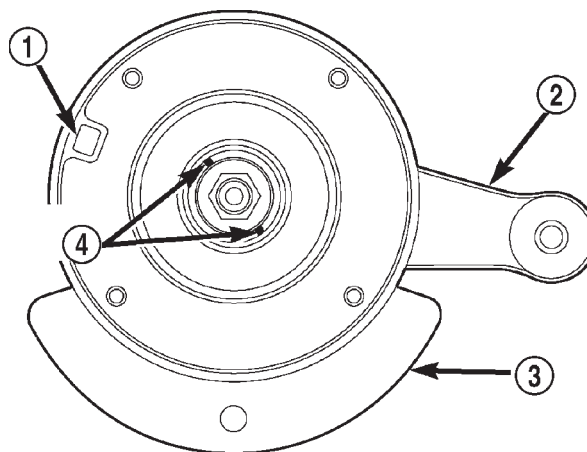
CAUTION: Before installing the upper mount, make sure the correct upper mount is being installed on the strut. **DO NOT** install a right mount on a left front strut or a left mount on a right front strut. Incorrect mount installation may cause poor vehicle ride and steering feel, and excessive front end noise. A lead or drift condition may also be the result. Left and right mounts look similar, but are different from one another. Looking down at the top of the upper mount, 2 tabs can be seen, (Fig. 66) and (Fig. 67), down inside the mount center well. A rectangular hole can be seen on the edge of the mount mounting surface (Fig. 66) and (Fig. 67). This is always in the 10 o'clock position when observing rubber tab positioning, whether a left or right mount is being observed. Once this hole is located in the 10 o'clock position, the tabs should be in the positions as shown (Fig. 66) and (Fig. 67). The right upper mount should also have a white dot painted on its mounting face.



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Fig. 66 Left

- 1 - NOTCH
- 2 - RUBBER TABS
- 3 - OUTBOARD STRUT COIL SPRING SEAT
- 4 - STEERING ARM



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Fig. 67 Right Front Strut Upper Mount

- 1 - NOTCH
- 2 - STEERING ARM
- 3 - OUTBOARD STRUT COIL SPRING SEAT
- 4 - RUBBER TABS

(8) Install the strut upper mount over the strut shaft and onto the top of the seat and bearing. Loosely install the retaining nut on the strut shaft.

(9) Install Strut Nut Socket (on the end of a torque wrench), Special Tool 6864, on the strut shaft retaining nut (Fig. 63). Next, install a socket on the hex on the end of the strut shaft. While holding the strut shaft from turning, tighten the strut shaft retaining nut to a torque of 94 N·m (70 ft. lbs.).

(10) Slowly release the tension from the coil spring by backing off the compressor drive fully. As the tension is relieved, make sure the upper mount and seat

STRUT (Continued)

and bearing align properly. Verify the upper mount does not bind.

(11) Remove the clamp from the lower end of the coil spring and strut. Push back the spring compressor upper and lower hooks, then remove the strut assembly from the spring compressor.

(12) Install the strut assembly on the vehicle. Refer to INSTALLATION in this section.

INSTALLATION - STRUT ASSEMBLY (FRONT)

(1) Install front strut assembly into shock tower. Install the 4 strut assembly upper mount to shock tower attaching nuts (Fig. 61). Tighten the 4 strut mount to strut tower attaching nuts to a torque of 37 N·m (28 ft. lbs.) torque.

(2) Position steering knuckle into strut assembly.

CAUTION: The strut assembly to steering knuckle bolts are serrated were they go through strut assembly and steering knuckle. When installing bolts, turn nuts onto bolts **DO NOT TURN BOLTS IN STEERING KNUCKLE**. If bolts are turned damage to steering knuckle will result.

(3) Install the strut assembly to steering knuckle attaching bolts (Fig. 60). Install nuts on attaching bolts. Tighten the strut assembly clevis to steering knuckle attaching bolt nuts to a torque of 203 N·m (150 ft. lbs.).

(4) Install braking disc back on front hub and bearing assembly. Install front brake caliper assembly on steering knuckle. Install the 2 caliper assembly to steering knuckle attaching bolts (Fig. 58). Tighten the caliper assembly guide pin bolts to a torque of 19 N·m (192 in. lbs.).

(5) If the vehicle is equipped with antilock brakes. Install the front speed sensor cable routing bracket onto the front strut assembly (Fig. 57).

(6) Install outer tie rod on strut assembly. Install tie rod attaching nut. Tighten the tie rod attaching nut to a torque of 37 N·m (27 ft. lbs.).

(7) Install stabilizer bar link on strut (Fig. 55). Tighten the stabilizer link attaching nut to a torque of 95 N·m (70 ft. lbs.).

(8) Install the wheel and tire assembly.

(9) Tighten the wheel mounting nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(10) Lower vehicle.

TENSION STRUT**DESCRIPTION**

This vehicle uses a steel tension strut on each side of the vehicle's front suspension, between the lower control arm and front suspension cradle/crossmember (Fig. 1) . The strut has rubber isolator bushings, retainer washers and nuts at each end where it mounts.

OPERATION

The tension strut controls longitudinal (fore-and-aft) movement of each front wheel and the front suspension. Controlling the longitudinal movement helps reduce harshness when the wheel hits sudden irregularities in the road surface.

The tension strut's rubber isolator bushings isolate suspension noise from the body of the vehicle.

REMOVAL - TENSION STRUT

The tension strut is removed from the vehicle with the lower control arm, then separated. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL)

INSTALLATION - TENSION STRUT

The tension strut is attached to the lower control arm, then the two are installed together. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION)

TENSION STRUT CRADLE BUSHING

REMOVAL - TENSION STRUT CRADLE BUSHING

(1) Remove lower control arm and tension strut as an assembly from the vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - REMOVAL)

(2) Remove the tension strut cradle bushing half and sleeve from the tension strut (Fig. 68).

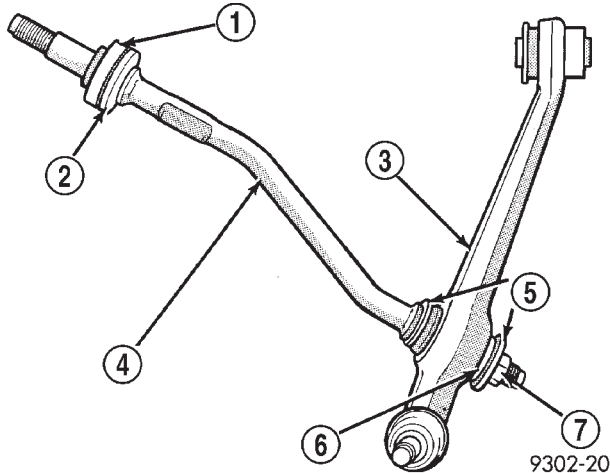


Fig. 68 Bushing Installed On Tension Strut

- 1 - TENSION STRUT TO CRADLE BUSHING
- 2 - RETAINING WASHER
- 3 - LOWER CONTROL ARM
- 4 - TENSION STRUT
- 5 - RETAINING WASHERS
- 6 - TENSION STRUT TO LOWER CONTROL ARM BUSHING
- 7 - NUT

(3) Remove the remaining tension strut cradle bushing half from the engine cradle assembly (Fig. 69).

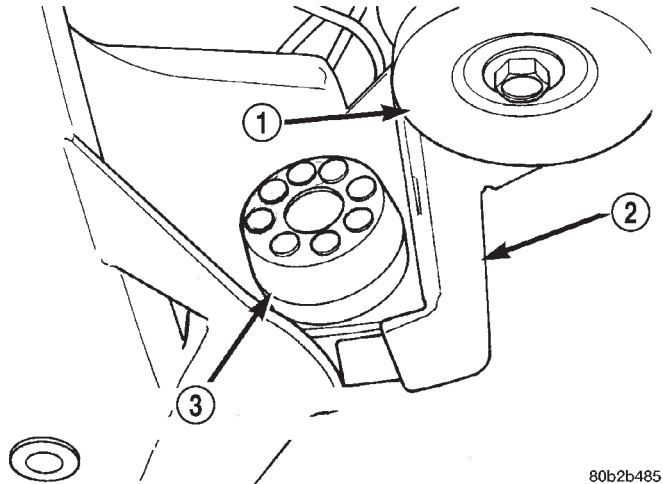


Fig. 69 Bushing In Cradle

- 1 - CRADLE ISOLATOR BUSHING
- 2 - CRADLE
- 3 - TENSION STRUT TO CRADLE ISOLATOR BUSHING

INSTALLATION - TENSION STRUT CRADLE BUSHING

(1) Install tension strut cradle isolator bushing half into front side of cradle mounting hole, until squarely seated against cradle (Fig. 69).

(2) Install isolator bushing half on tension strut until it is seated against retaining washer as shown (Fig. 68).

(3) Reinstall the tension strut and lower control arm as an assembly back in the vehicle. (Refer to 2 - SUSPENSION/FRONT/LOWER CONTROL ARM - INSTALLATION)

REAR SUSPENSION

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REAR SUSPENSION

DESCRIPTION - REAR SUSPENSION

The rear suspension used on this vehicle is a fully independent rear suspension (Fig. 1).

Each side of the rear suspension consists of these major components:

- Strut assembly
- Spindle
- Hub and bearing
- Two lateral links
- Trailing arm
- Stabilizer bar

OPERATION - REAR SUSPENSION

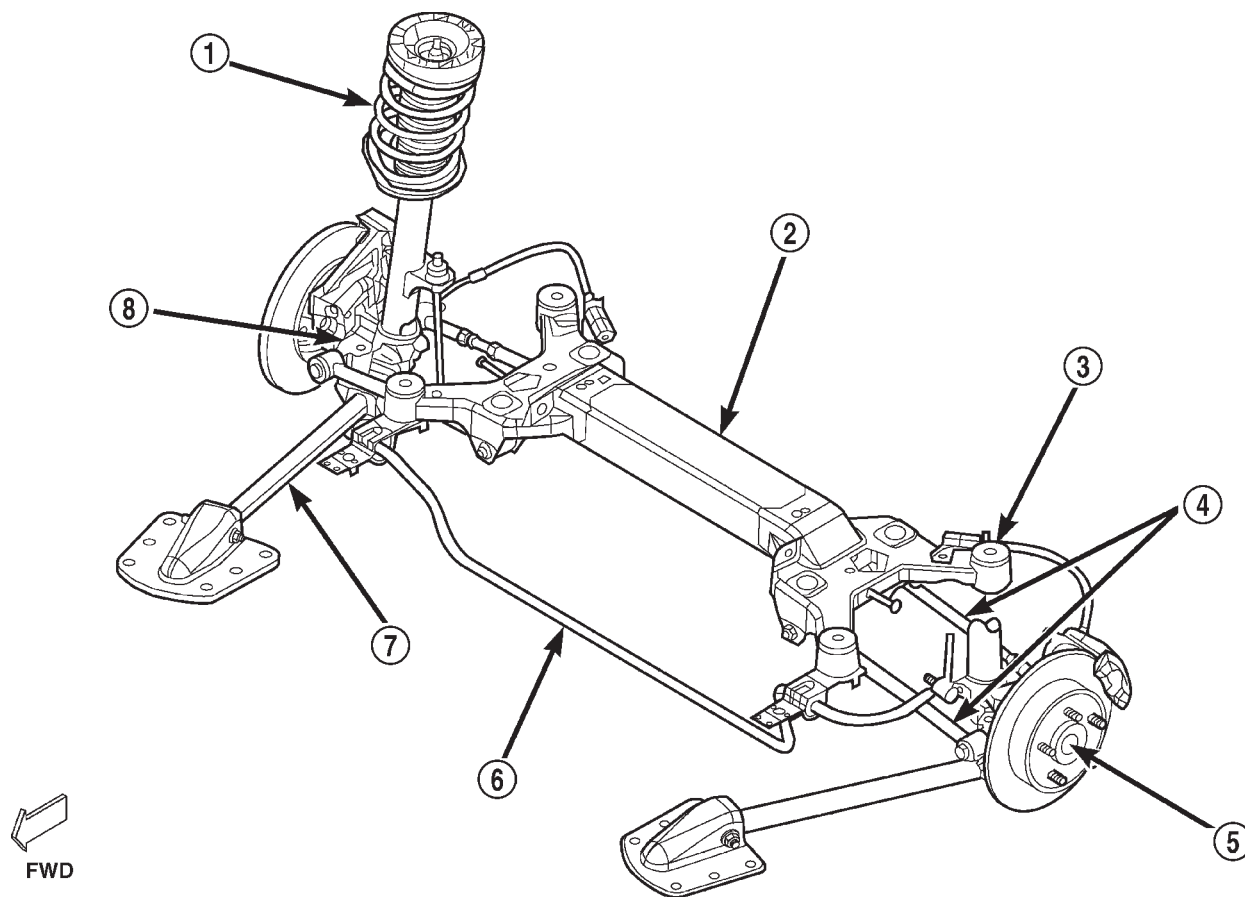
The rear suspension allows each rear wheel on the vehicle to adapt to different road surfaces and conditions without affecting the control of the vehicle. Each side of the suspension is allowed to move independently from the other.

CAUTION

CAUTION: Only frame contact or wheel lift hoisting equipment can be used on vehicles having a fully independent rear suspension. Vehicles with independent rear suspension can not be hoisted using equipment designed to lift a vehicle by the rear axle. If this type of hoisting equipment is used damage to rear suspension components will occur.

CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the tire/wheel assembly needs to be reinstalled in the same location it is removed from or the TPM System (sensors) will need to be retrained. Mark each tire/wheel assembly indicating location, prior to its removal. If the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

REAR SUSPENSION (Continued)



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Fig. 1 Rear Suspension

- | | |
|---|--------------------|
| 1 - STRUT ASSEMBLY | 6 - STABILIZER BAR |
| 2 - REAR SUSPENSION CROSSMEMBER | 7 - TRAILING ARM |
| 3 - REAR SUSPENSION CROSSMEMBER BUSHING | 8 - SPINDLE |
| 4 - LATERAL LINKS | |
| 5 - HUB AND BEARING | |

CAUTION:: If a rear suspension component becomes bent, damaged or fails, no attempt should be made to straighten or repair it. Always replace with a new component.

REAR SUSPENSION (Continued)

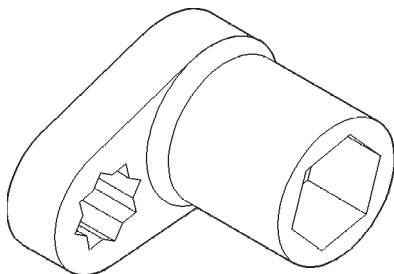
SPECIFICATIONS

REAR SUSPENSION FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Hub And Bearing Spindle Retaining Nut	168	124	—
Lateral Link Jam Nut	88	65	—
Lateral Link Spindle Nut	135	100	—
Lateral Link Crossmember Nut	95	70	—
Spindle Brake Hose Bracket Bolt	23	17	204
Spindle Caliper Adapter Bolts	115	85	—
Spindle Mounting Bolts	109	80	—
Spindle-To-Strut Pinch Bolt	53	40	—
Stabilizer Bar Bushing Retainer Bolts	40	30	—
Stabilizer Bar Link Lower Nut	95	70	—
Stabilizer Bar Link Upper Nut	23	17	204
Strut Body Tower Mounting Nuts	25	19	220
Strut Shaft Nut	75	55	—
Suspension Crossmember Mounting Bolts	100	75	—
Trailing Arm Attaching Nuts	100	75	—
Trailing Arm Bracket-To-Body Bolts	60	45	—
Trailing Arm Bracket-To-Spindle Bolts	110	81	—
Wheel Mounting (Lug) Nuts	135	100	—

SPECIAL TOOLS

REAR SUSPENSION

**Socket Strut Shaft Nut 6864**

HUB / BEARING

DESCRIPTION

The rear wheel bearing and rear wheel hub of this vehicle are a one piece sealed unit or hub and bearing unit type assembly. The hub and bearing is mounted to the center of the spindle using a retaining nut (Fig. 1) . It has five wheel mounting studs on the hub flange.

The wheel mounting studs used to mount the tire and wheel to the vehicle are the only replaceable components of the hub and bearing assembly. Otherwise, the hub and bearing is serviced only as a complete assembly.

CAUTION: If a vehicle is equipped with antilock brakes, the tone wheel for the rear wheel speed sensor is pressed onto the hub and bearing.

OPERATION

The hub and bearing has internal bearings that allow the hub to rotate with the tire and wheel. The five wheel mounting studs mount the tire and wheel, and disc brake rotor to the vehicle.

DIAGNOSIS AND TESTING - HUB AND BEARING (REAR)

The rear hub and bearing assembly is designed for the life of the vehicle and should require no maintenance. The following procedure may be used for evaluation of bearing condition.

With wheel and brake drum removed, rotate flanged outer ring of hub. Excessive roughness, lateral play or resistance to rotation may indicate dirt intrusion or bearing failure. If the rear wheel bearings exhibit these conditions during inspection, the hub and bearing assembly should be replaced.

Damaged bearing seals and resulting excessive grease loss may also require bearing replacement. Moderate grease loss from bearing is considered normal and should not require replacement of the hub and bearing assembly.

REMOVAL - HUB AND BEARING (REAR)

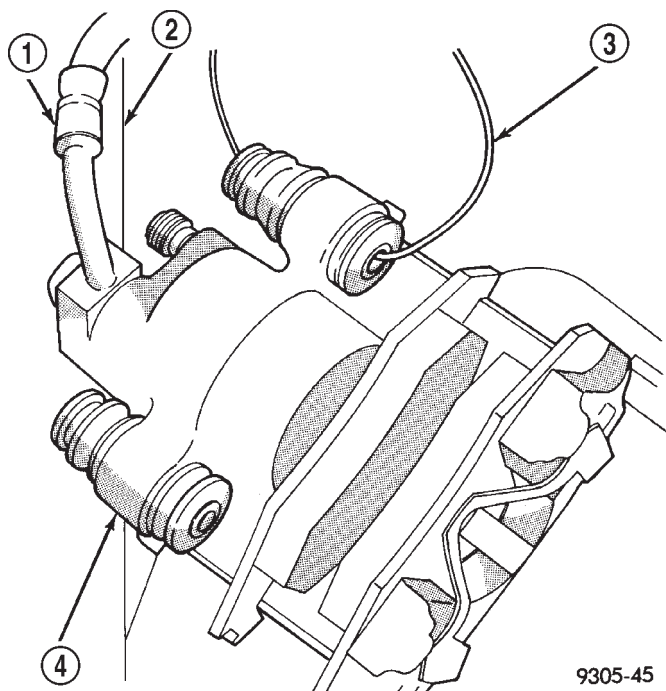
(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the rear wheel and tire assembly from the vehicle.

(3) Remove the rear caliper assembly from the adapter. Refer to Disc Brake Caliper in Brakes. After removing caliper assembly, store caliper by hanging it from frame of vehicle (Fig. 2). Do not let weight of rear caliper assembly hang from flexible brake hose.

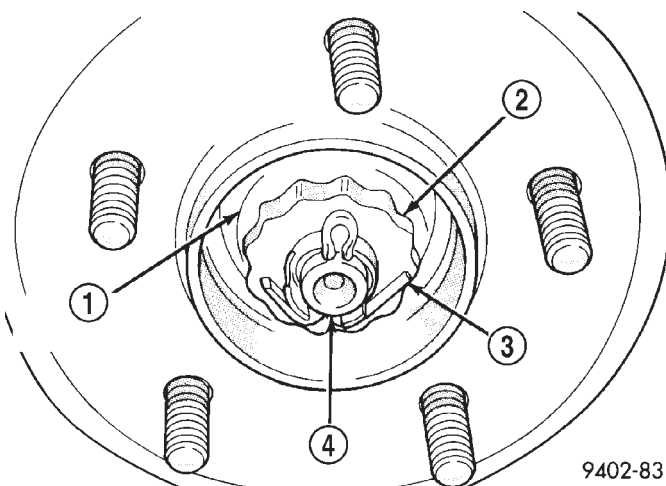
(4) Remove rear brake rotor from hub.

HUB / BEARING (Continued)

**Fig. 2 Storing Caliper**

- 1 - FLEX HOSE
- 2 - STRUT
- 3 - WIRE HANGER
- 4 - CALIPER ASSEMBLY

(5) Remove rear hub and bearing assembly cotter pin and nut retainer (Fig. 3). Remove the hub and bearing retaining nut and washer from the spindle (Fig. 3). Remove hub and bearing assembly from spindle.

**Fig. 3 Hub And Bearing Retaining Nut and Washer**

- 1 - HUB RETAINING NUT
- 2 - NUT RETAINER
- 3 - COTTER PIN
- 4 - SPINDLE

INSTALLATION - HUB AND BEARING (REAR)

(1) Install the rear hub and bearing assembly on the rear spindle. Install hub and bearing assembly retaining washer and nut on spindle (Fig. 3). Tighten the hub and bearing retaining nut to a torque of 168 N·m (124 ft. lbs.). Install the nut retainer and cotter pin.

(2) Install the rear brake rotor on the hub.

(3) Carefully place rear brake caliper over rotor and install on adapter. Refer to Disc Brake Caliper in Brakes.

(4) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(5) Lower vehicle to the ground.

LATERAL LINK**DESCRIPTION**

There are two tubular lateral links on each side of the rear suspension (Fig. 1). The lateral links have rubber isolator bushings at each end. They are attached to the rear suspension crossmember, and the spindle using a bolt and nut assembly at each end. The rear lateral link incorporates a threaded wheel alignment toe adjustment sleeve.

OPERATION

The lateral movement of the rear spindle is controlled by the lateral links connecting the front and rear centerline of the spindle to the rear suspension crossmember. The threaded adjustment sleeve of the rear link allows for setting rear wheel alignment toe adjustment.

DIAGNOSIS AND TESTING - LATERAL LINKS

Inspect the lateral link isolator bushings and sleeves for signs of damage or deterioration. If the lateral link isolator bushings or sleeves are damaged or are deteriorated, replacement of the lateral link assembly will be required. The isolator bushings are not serviceable as a separate component of the lateral link assembly.

Inspect the lateral links for signs of contact with the ground or road debris which has bent or caused other damage to the lateral link assembly. If the lateral link is bent or damaged, the lateral link will require replacement. **Do not attempt to repair or straighten a lateral link.**

REMOVAL - LATERAL LINKS

The left forward lateral link requires a more involved removal and installation procedure in order

LATERAL LINK (Continued)

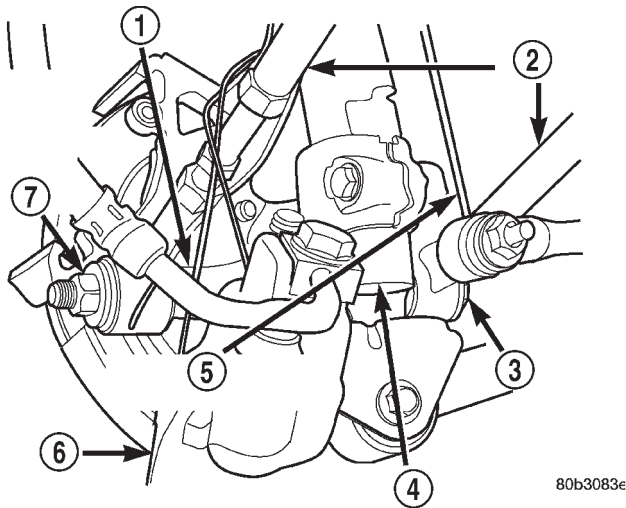
to remove the attaching bolt at the crossmember. See separate procedures below for the proper lateral link service procedure.

LEFT FORWARD LATERAL LINK

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove left rear wheel and tire assembly from the vehicle.

(3) Remove the nut and bolt attaching the left lateral links to the spindle (Fig. 4).



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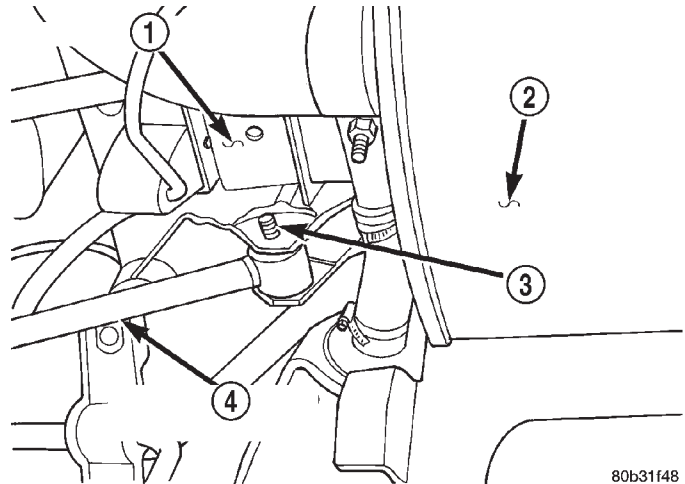
Fig. 4 Lateral Link Attachment To Spindle

- 1 - SPINDLE
- 2 - LATERAL LINKS
- 3 - LATERAL LINK ATTACHING BOLT HEAD
- 4 - STRUT ASSEMBLY
- 5 - STABILIZER BAR ATTACHING LINK
- 6 - BRAKE CALIPER
- 7 - LATERAL LINK ATTACHING BOLT NUT

(4) Remove the nut attaching the left forward lateral link to the rear suspension crossmember. **The bolt for the left front lateral link may not be removed at this time. Remove the nut only. Once the crossmember is lowered, the bolt can be easily removed.** Notice the forward link attaching bolt faces rearward.

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 5) to prevent damage to the fuel tank and or fuel tubes. Also, the left rear lateral arm attaching bolt to the crossmember is to be installed pointing forward to prevent possible damage to the fuel filler tube.

(5) Remove the screw securing the brake tubes to the left stabilizer bar isolator bushing retainer.



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Fig. 5 Lateral Link Attachment To Crossmember

- 1 - CROSSMEMBER
- 2 - EXHAUST MUFFLER
- 3 - ATTACHING BOLT
- 4 - LEFT FORWARD LATERAL LINK

(6) Remove the 4 bolts attaching both stabilizer bar isolator bushing retainers to the frame rails (the 2 rearward attaching bolts also attach the front corners of the rear suspension crossmember in place). Allow the stabilizer bar to hang down out of the way.

(7) Remove the screw securing the fuel filler neck to the left frame rail.

(8) Position a transmission jack under the fuel tank.

(9) Remove the attaching bolts securing both fuel tank mounting straps. First, remove the right , then the left attaching bolt. Allow the straps to hang down.

(10) Lower the transmission jack and fuel tank just enough to allow for removal of the lateral link attaching bolt at the crossmember.

(11) Remove the left forward lateral link from the crossmember.

LEFT REAR AND BOTH RIGHT LATERAL LINKS

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove rear wheel and tire assembly from the vehicle.

(3) Remove the nut and bolt attaching the left lateral links to the spindle (Fig. 4).

(4) Remove the nut and bolt attaching the lateral link to the rear suspension crossmember. Note the direction in which the lateral arm attaching bolt is installed.

LATERAL LINK (Continued)

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 5) to prevent damage to the fuel tank and or fuel tubes. Also, the left rear lateral arm attaching bolt to the crossmember is to be installed pointing forward to prevent possible damage to the fuel filler tube.

- (5) Remove the lateral link from the crossmember.

INSTALLATION - LATERAL LINKS

The left forward lateral link requires a more involved removal and installation procedure in order to remove the attaching bolt at the crossmember. See separate procedures below for the proper lateral link service procedure.

LEFT FORWARD LATERAL LINK

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 5) to prevent damage to the fuel tank and or fuel tubes. Also, the left rear lateral arm attaching bolt to the crossmember is to be installed pointing forward to prevent possible damage to the fuel filler tube.

- (1) Attach the left forward lateral link to crossmember. Install mounting bolt through the front of the crossmember mount towards the rear. Install the lateral link attaching nut, but DO NOT fully tighten at this time.

CAUTION: Tightening the lateral link attaching bolt at this point will cause the bushing to contort when the vehicle is at curb riding height, thus contributing to premature failure of the lateral link bushings.

- (2) Raise the fuel tank up into mounting position.
- (3) Reattach the fuel tank straps, securing the fuel tank in place.
- (4) Remove transmission jack supporting the fuel tank.
- (5) Reinstall the fuel filler neck attaching screw and secure the fuel filler neck to the left frame rail.
- (6) Install the 4 bolts attaching both stabilizer bar isolator bushing retainers to the frame rails (the 2 rearward attaching bolts attach the front corners of the rear suspension crossmember in place). Tighten the forward stabilizer bar isolator bushing retainer attaching bolts to 40 N·m (30 ft. lbs.). Tighten the 2 rearward stabilizer bar isolator bushing retainer attaching bolts (which also serve as the front crossmember attaching bolts) to 100 N·m (75 ft. lbs.).
- (7) Install the screw securing the brake tubes to the left stabilizer bar isolator bushing retainer.

- (8) Install the lateral links on the spindle. Install, but DO NOT fully tighten the attaching bolt and nut at this time (Fig. 4).

CAUTION: Tightening the lateral link attaching bolt at this point will cause the bushing to contort when the vehicle is at curb riding height, thus contributing to premature failure of the lateral link bushings.

- (9) Install rear wheel and tire assembly on vehicle.
- (10) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).
- (11) Lower vehicle to the ground.
- (12) Tighten lateral arm to crossmember attaching bolt 95 N·m (70 ft. lbs.).
- (13) Tighten lateral arm to spindle attaching bolt 135 N·m (100 ft. lbs.).
- (14) Check and reset rear wheel toe to specifications if required.

LEFT REAR AND BOTH RIGHT LATERAL LINKS

- (1) Attach the lateral link to crossmember. Rear lateral link attachment bolts should be installed from the rear and point forward. Forward lateral link attachment bolts should be installed from the front and point rearward.

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 5) to prevent damage to the fuel tank and or fuel tubes. Also, the left rear lateral arm attaching bolt to the crossmember is to be installed pointing forward to prevent possible damage to the fuel filler tube.

- (2) Install the attaching nut, but DO NOT tighten at this time.

CAUTION: Tightening the lateral link attaching bolt at this point will cause the bushing to contort when the vehicle is at curb riding height, thus contributing to premature failure of the lateral link bushings.

- (3) Install the lateral links on the spindle. Install, but DO NOT fully tighten the attaching bolt and nut at this time (Fig. 4).
- (4) Install rear wheel and tire assembly on vehicle.
- (5) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).
- (6) Lower vehicle to the ground.
- (7) Tighten lateral arm to crossmember attaching bolt and nut to 95 N·m (70 ft. lbs.).

LATERAL LINK (Continued)

(8) Tighten lateral arm to spindle attaching bolt and nut to 135 N·m (100 ft. lbs.).

(9) Check and reset rear wheel toe to specifications if required.

SPINDLE

DESCRIPTION

A forged rear spindle is mounted to each side of the rear suspension (Fig. 1). The top attaches to the rear strut assembly. Two lateral links leading from the rear suspension crossmember are mounted to the forward and rearward ends of the spindle centerline. A trailing arm leading from the frame rail connects to the bottom of the spindle.

OPERATION

The spindle moves up and down with the tire and wheel under jounce and rebound conditions. The lateral links control lateral movement of the spindle while the trailing arm controls fore-and-aft movement.

The spindle acts as a mount for the rear hub and bearing, tire and wheel, and rear brakes.

DIAGNOSIS AND TESTING - SPINDLE

The rear suspension spindle is not a repairable component of the rear suspension. If it is determined that the spindle is broken or bent when servicing the vehicle, no attempt is to be made to repair or to straighten the spindle. **THE SPINDLE MUST BE REPLACED IF FOUND TO BE DAMAGED IN ANY WAY.**

REMOVAL - SPINDLE

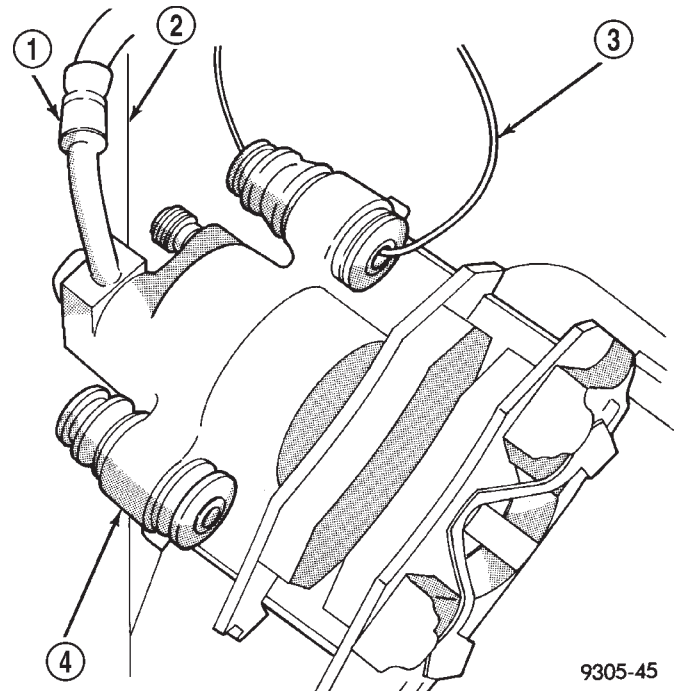
(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the rear wheel and tire assembly from the vehicle.

(3) Remove the rear caliper assembly from the adapter. Refer to Brakes/Disc Brake Caliper. After removing caliper assembly store caliper by hanging it from frame of vehicle (Fig. 6). Do not let weight of rear caliper assembly hang from flexible brake hose. If vehicle is equipped with rear drum brakes, remove the brake flex hose bracket from the support plate and wheel cylinder.

(4) Remove rear braking disc from hub.

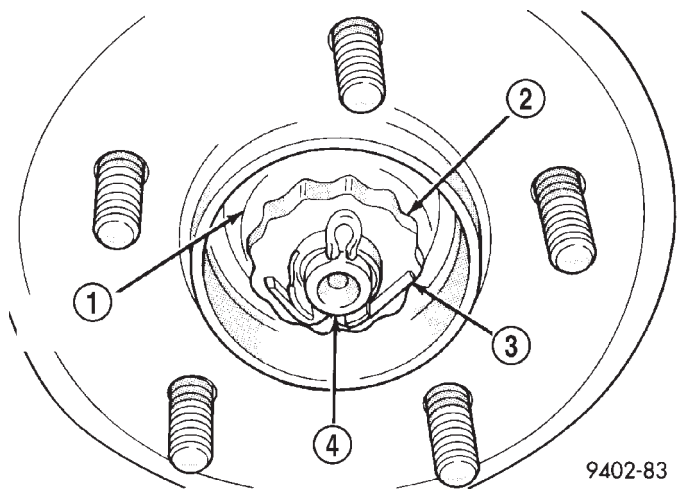
(5) Remove rear hub and bearing assembly cotter pin and nut retainer (Fig. 7). Remove the hub and bearing retaining nut and washer from the spindle (Fig. 7). Then remove hub and bearing assembly from spindle.



9305-45

Fig. 6 Storing Caliper

- 1 - FLEX HOSE
- 2 - STRUT
- 3 - WIRE HANGER
- 4 - CALIPER ASSEMBLY



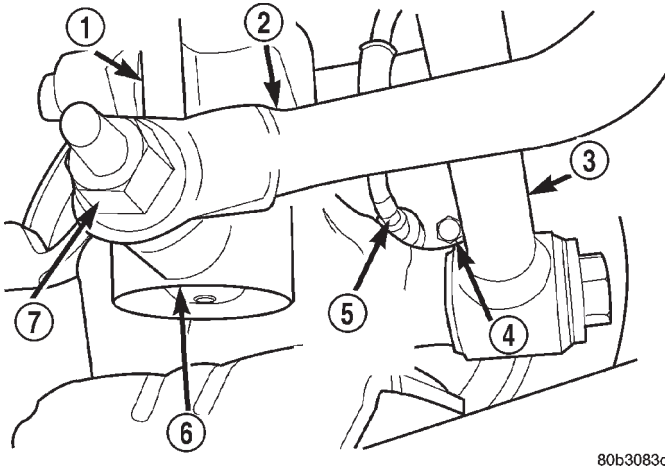
9402-83

Fig. 7 Hub And Bearing Retaining Nut and Washer

- 1 - HUB RETAINING NUT
- 2 - NUT RETAINER
- 3 - COTTER PIN
- 4 - SPINDLE

(6) If vehicle is equipped with antilock brakes, remove the speed sensor head from the rear disc brake adapter (Fig. 8).

SPINDLE (Continued)

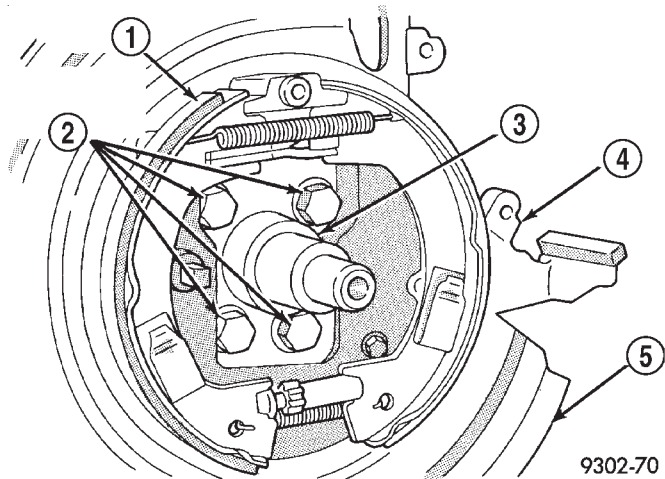


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Fig. 8 Speed Sensor Head

- 1 - STABILIZER BAR LINK
- 2 - STABILIZER BAR
- 3 - LATERAL LINK
- 4 - BOLT
- 5 - WHEEL SPEED SENSOR
- 6 - STRUT ASSEMBLY
- 7 - NUT

(7) Remove the 4 bolts attaching the disc brake adapter to the rear spindle (Fig. 9). Then remove the adapter, disc shield, park brake shoes and park brake cable as an assembly from the spindle.



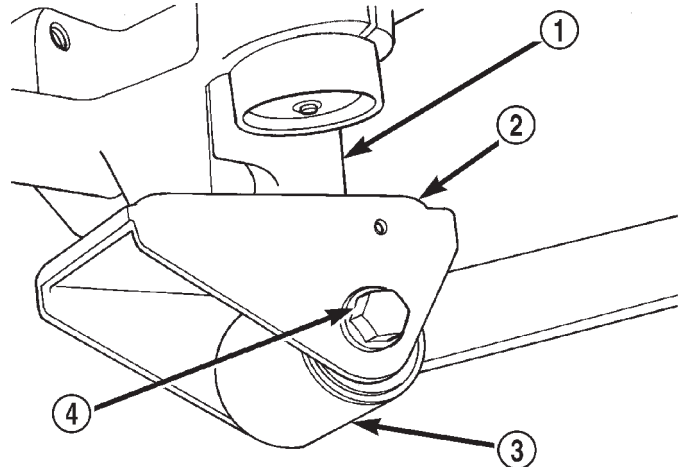
9302-70

Fig. 9 Disc Brake Adapter Mounting

- 1 - PARK BRAKE SHOES
- 2 - ADAPTER MOUNTING BOLTS
- 3 - SPINDLE
- 4 - ADAPTER
- 5 - DISC SHIELD

(8) Remove the bolt attaching the trailing arm to the bracket on the bottom of the spindle (Fig. 10).

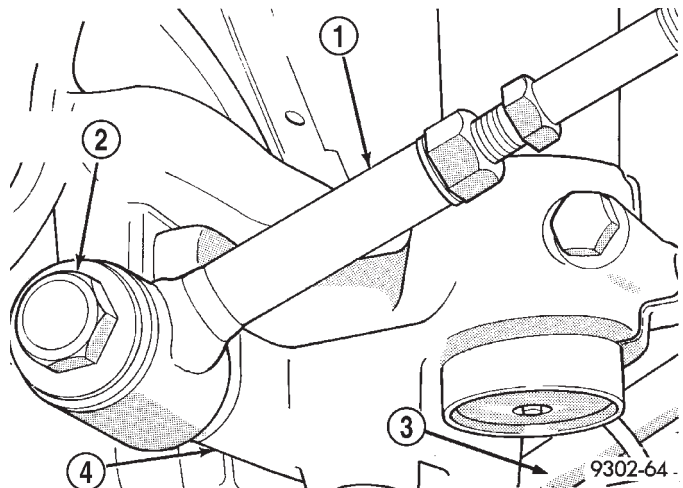
(9) Remove the bolt (Fig. 11) attaching the lateral links to the spindle.



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Fig. 10 Trailing Arm To Bracket Bolt

- 1 - SPINDLE
- 2 - TRAILING ARM BRACKET
- 3 - TRAILING ARM
- 4 - BOLT



9302-64

Fig. 11 Lateral Links To Spindle Attaching Bolt

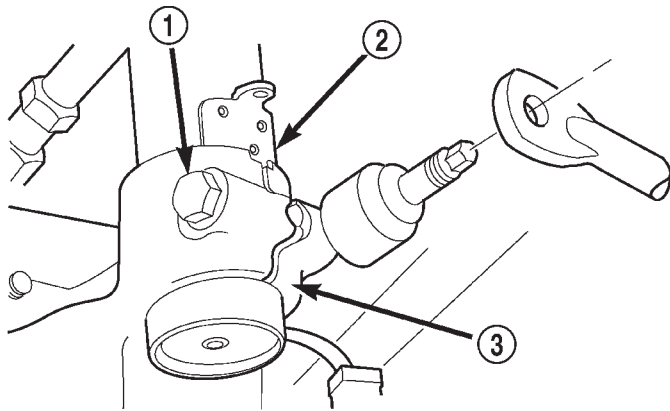
- 1 - REAR LATERAL LINK
- 2 - LATERAL LINKS ATTACHING BOLT
- 3 - FRONT LATERAL LINK
- 4 - SPINDLE

(10) Remove the pinch bolt from the spindle (Fig. 12).

CAUTION: When inserting center punch into rear spindle, use care so point of center punch does not puncture strut assembly.

(11) Insert a center punch into the hole on the spindle (Fig. 13). Center punch must be tapped into the hole in the spindle until jammed into place. This will spread the spindle casting allowing it to be removed from strut assembly.

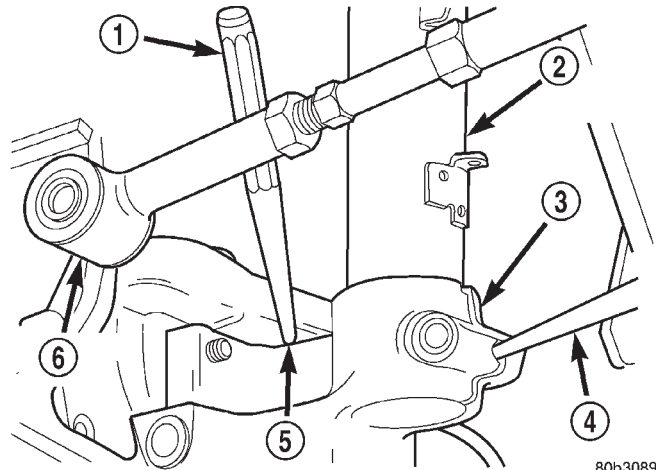
SPINDLE (Continued)



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Fig. 12 Spindle Pinch Bolt

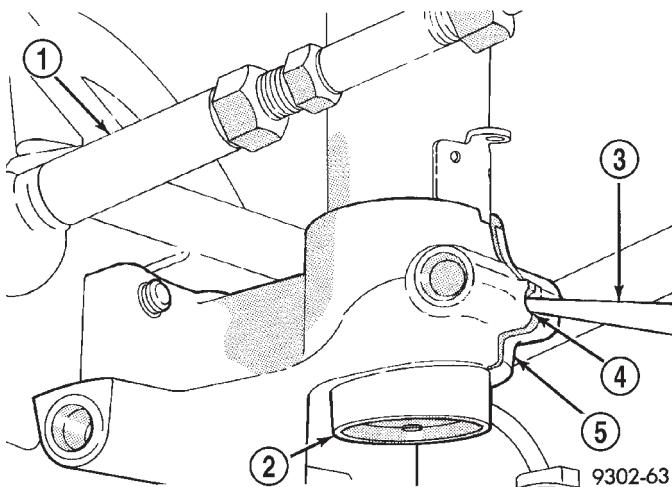
- 1 - PINCH BOLT
- 2 - STRUT ASSEMBLY
- 3 - REAR SPINDLE



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Fig. 14 Removing Spindle From Strut

- 1 - BRASS DRIFT PUNCH
- 2 - STRUT ASSEMBLY
- 3 - SPINDLE
- 4 - CENTER PUNCH
- 5 - HIT SPINDLE HERE
- 6 - LATERAL LINK



9302-63

Fig. 13 Center Punch Inserted In Spindle

- 1 - LATERAL LINK
- 2 - STRUT ASSEMBLY
- 3 - CENTER PUNCH
- 4 - HOLE
- 5 - SPINDLE

(12) Using a hammer and a brass drift punch, tap on top surface of spindle (Fig. 14), driving it off the end of the strut assembly.

INSTALLATION - SPINDLE

(1) Install the spindle on the strut assembly. Push or tap spindle assembly onto strut until notch in spindle is tightly seated against locating tap on strut assembly (Fig. 12). Then remove center punch from hole in spindle. Install the pinch bolt in the spindle (Fig. 12). Tighten the pinch bolt to a torque of 53 N·m (40 ft. lbs.).

(2) Install the lateral links on the spindle (Fig. 11). Install, but do not fully tighten attaching bolt at this time.

(3) Install bolt attaching trailing arm to trailing arm bracket on bottom of spindle (Fig. 10). Do not fully tighten attaching bolt at this time.

(4) Install the disc brake adapter back on the spindle. Install the 4 bolts attaching the disc brake adapter to the rear spindle (Fig. 9). Tighten the disc brake adapter mounting bolts to a torque of 115 N·m (85 ft. lbs.).

(5) If vehicle is equipped with antilock brakes, install the speed sensor head into the rear disc brake adapter (Fig. 8). Tighten the speed sensor head attaching bolt to a torque of 7 N·m (60 in. lbs.).

(6) Install the rear hub and bearing assembly on the rear spindle. Install hub and bearing assembly retaining washer and nut on spindle (Fig. 7). Tighten the hub and bearing retaining nut to a torque of 168 N·m (124 ft. lbs.).

(7) Install the rear brake disc on the hub.

(8) Carefully place rear brake caliper over rotor and install on adapter. Tighten the caliper assembly to adapter mounting bolts to a torque of 22 N·m (192 in. lbs.). Refer to Rear Disc Brakes in Group 5 Brakes in this service manual for required caliper installation procedure.

(9) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(10) Lower vehicle to the ground.

SPINDLE (Continued)

(11) Tighten the lateral links to spindle attaching bolt to a torque of 135 N·m (100 ft. lbs.).

(12) Tighten the trailing arm to spindle bracket attaching bolt to a torque of 100 N·m (75 ft. lbs.).

(13) Check and reset rear wheel toe to specifications if required. Refer to Wheel Alignment.

STABILIZER BAR

DESCRIPTION

The stabilizer bar interconnects both rear strut assemblies and is attached to the rear frame rails of the vehicle (Fig. 1).

Attachment of the stabilizer bar to the rear frame rails of the vehicle is through 2 rubber-isolator bushings and bushing retainers. Stabilizer bar to strut assembly attachment is done utilizing a rubber-isolated stabilizer bar attaching link. All parts of the stabilizer bar are replaceable as individual components.

The stabilizer bar to frame rail bushings are slit for easy removal and installation. The slit must be positioned toward the front of the vehicle when the stabilizer bar is installed.

OPERATION

Jounce and rebound movements affecting one wheel are partially transmitted to the opposite wheel of the vehicle through the stabilizer bar. This helps to minimize the body roll of the vehicle during suspension movement.

DIAGNOSIS AND TESTING - STABILIZER BAR (REAR)

Inspect the stabilizer bar for damage or bending. Inspect for broken or distorted stabilizer bar bushings, bushing retainers, and worn or damaged stabilizer bar to strut attaching links. Verify all fastener bolts are properly tightened.

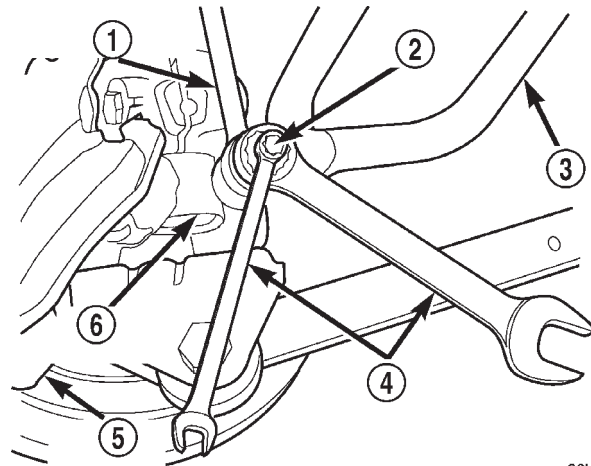
Inspect the bushings and sleeves on the stabilizer bar links for damage or deterioration. Inspect the links lower ball stud for excessive looseness and damage. Inspect the stabilizer bar link to ensure it is not bent or broken. If any of these conditions are present when inspecting the links, replace the stabilizer bar links as required.

REMOVAL - STABILIZER BAR (REAR)

(1) Raise vehicle on jack stands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Install a thin wrench on the hex of the attaching link stud to keep the stud from turning in the link. Next, remove the nut from the stabilizer bar to strut assembly attaching link stud at the stabilizer

bar (Fig. 15). Remove the link from the stabilizer bar. Repeat this procedure on the other side of the vehicle for the other attaching link.

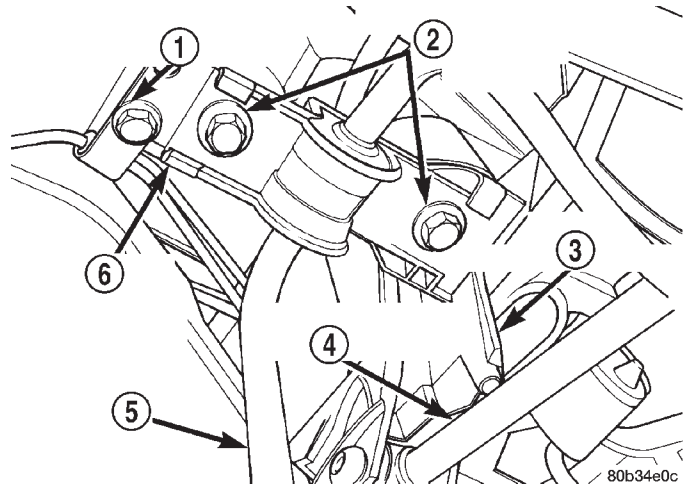


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Fig. 15 Link Attachment To Stabilizer Bar

- 1 - STABILIZER BAR ATTACHING LINK
- 2 - LINK STUD
- 3 - STABILIZER BAR
- 4 - WRENCHES
- 5 - BRAKE CALIPER
- 6 - STRUT ASSEMBLY

(3) Remove the screw securing the brake tubes to the left stabilizer bar isolator bushing retainer (Fig. 16).



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Fig. 16 Bushing Retainer Attachment

- 1 - BRAKE TUBE ROUTING BRACKET SCREW
- 2 - BUSHING RETAINER ATTACHING BOLTS
- 3 - REAR CROSSMEMBER
- 4 - LEFT FORWARD LATERAL LINK
- 5 - STABILIZER BAR
- 6 - BUSHING RETAINER ASSEMBLY

(4) Remove the 2 bolts attaching each of the 2 stabilizer bar isolator bushing retainers to the frame

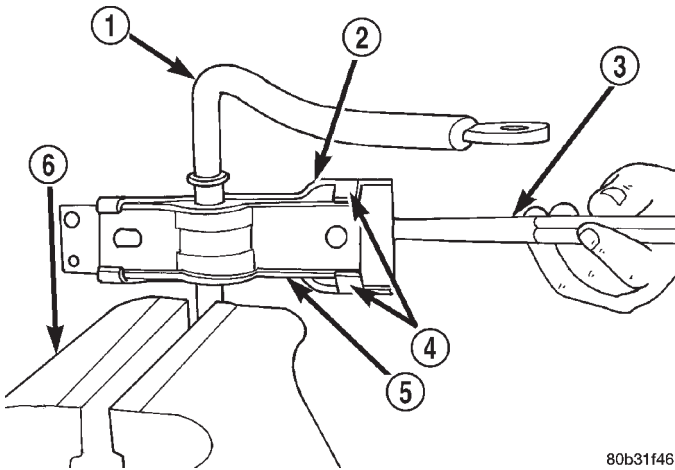
STABILIZER BAR (Continued)

rails (Fig. 16) (the 2 rearward attaching bolts also attach the front corners of the rear suspension cross-member in place). Remove the stabilizer bar from the vehicle.

(5) Mount the stabilizer bar in a soft jawed vise with one of the two bushings mount just above the vise jaws.

(6) Carefully pry back the retainer tabs on the wider end of the upper bushing retainer away from the lower half.

(7) Using a hammer and a brass drift punch, tap the upper half of the bushing retainer assembly forward, off of the lower half and bushing (Fig. 17).



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Fig. 17 Bushing Retainer Removal

- 1 - STABILIZER BAR
- 2 - UPPER RETAINER HALF
- 3 - BRASS DRIFT PUNCH
- 4 - RELEASED RETAINER TABS
- 5 - LOWER RETAINER HALF
- 6 - SOFT JAWED VISE

(8) Remove the lower half of the bushing retainer from the bushing.

(9) Remove the bushing from the stabilizer bar. **Make note that the slit in the bushing points toward the front of the vehicle.**

(10) Remove the stabilizer bar from the vise, and repeat the preceding 5 steps to remove the second bushing from the other side of the stabilizer bar.

INSTALLATION - STABILIZER BAR (REAR)

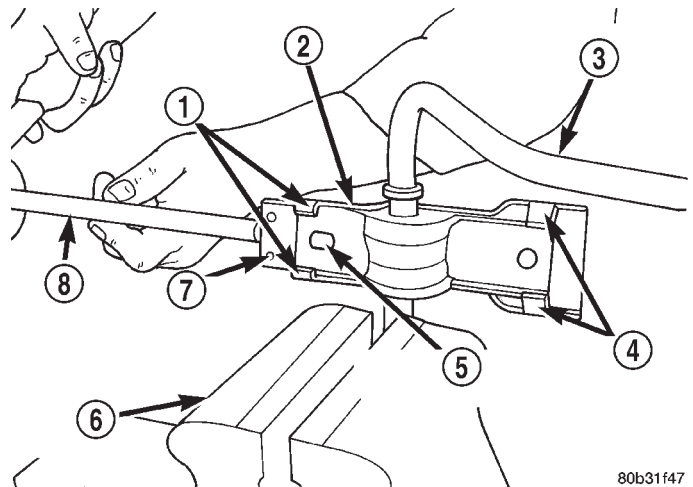
NOTE: Inspect the bushings and retainers for cracks and distortion. If any signs appear, these pieces should be replaced.

(1) Install the bushings onto the stabilizer bar. **Make sure that the slit in the bushing points toward the front of the vehicle.**

(2) Mount the stabilizer bar in the soft jawed vise with the bushing just above the top of the vise jaws.

(3) Install the lower half of the retainer onto the bushing with the elongated mounting hole towards the front of the vehicle.

(4) Install the upper half of the retainer onto the lower half. This is done by tapping the upper half, starting with the large end, onto the lower half with a hammer and brass drift punch (Fig. 18). Tap the upper retainer half on until the mounting holes line up with the ones in the lower half.



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Fig. 18 Bushing Retainer Installation

- 1 - RETAINER TABS
- 2 - LOWER RETAINER HALF
- 3 - STABILIZER BAR
- 4 - RETAINER TABS
- 5 - ELONGATED MOUNTING HOLE
- 6 - SOFT JAWED VISE
- 7 - UPPER RETAINER HALF
- 8 - BRASS DRIFT PUNCH

(5) Using a pair of pliers, bend the retainer tabs on the upper retainer half around the lower retainer half, securing the two halves together.

(6) Remove the stabilizer bar from the vise, and repeat the preceding 5 steps to install the second bushing and retainer on the other side of the stabilizer bar.

(7) Position the rear stabilizer bar in position between the frame rails. Install the 4 bolts attaching both stabilizer bar isolator bushing retainers to the frame rails (Fig. 16) (the 2 rearward attaching bolts attach the front corners of the rear suspension cross-member in place). Tighten the forward stabilizer bar isolator bushing retainer attaching bolts to 40 N·m (30 ft. lbs.). Tighten the 2 rearward stabilizer bar isolator bushing retainer attaching bolts (which also serve as the forward rear crossmember attaching bolts) to 100 N·m (75 ft. lbs.).

(8) Install the screw securing the brake tubes to the left stabilizer bar isolator bushing retainer (Fig. 16).

STABILIZER BAR (Continued)

(9) Install both stabilizer bar attaching links onto stabilizer bar (Fig. 15). Install both stabilizer link to stabilizer bar attaching nuts (Fig. 15). Tighten the stabilizer link to stabilizer bar attaching nuts to a torque of 95 N·m (70 ft. lbs.) using a crow foot wrench and torque wrench in place of the wrench on the attaching nut. **Be sure to use a wrench to hold the link stud in place while tightening each attaching nut.**

(10) Lower vehicle to the ground.

STRUT

DESCRIPTION - STRUT ASSEMBLY (REAR)

The rear strut assemblies support the weight of the vehicle using coil springs positioned around the struts (Fig. 1). The coil springs are contained between the upper mount of the strut assembly and a lower spring seat on the body of the strut assembly.

The top of each strut assembly is bolted to the top of the inner fender through the rubber isolated upper mount.

The bottom of the strut assembly attaches to the spindle. Strut attachment to the spindle is accomplished using a split collar on the rear spindle. The collar uses a pinch bolt to retain the spindle to the strut.

The rear coil springs are rated separately for each corner or side of the vehicle depending on optional equipment and type of vehicle service. Coil springs come in a various rates; be sure the correct spring is in use.

The components of the strut assembly listed below are serviceable if found to be defective (Fig. 19).

- Strut shaft retainer nut
- Upper mount
- Dust shield
- Jounce bumper
- Coil spring
- Upper spring isolator
- Lower spring isolator
- Strut (damper)

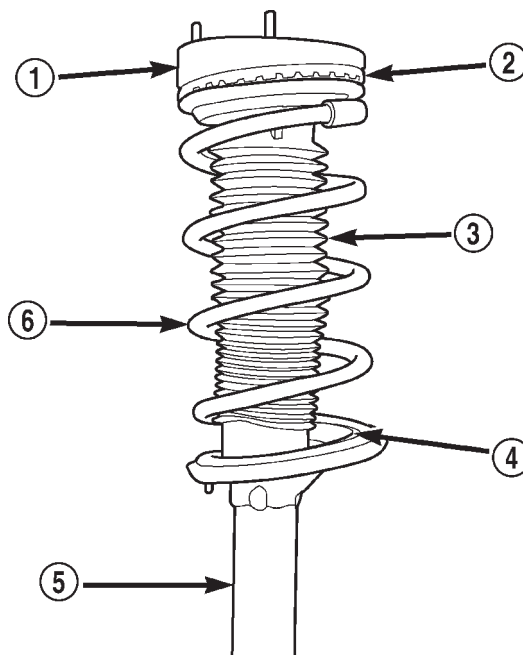
OPERATION - STRUT ASSEMBLY (REAR)

The rear strut assemblies support the weight of the vehicle. They cushion the ride of the vehicle, controlling vibration, jounce and rebound of the suspension.

The coil spring controls ride quality and maintains ride height.

The jounce bumper limits suspension travel and metal-to-metal contact under full jounce.

The strut dampens jounce and rebound motions of the coil spring and suspension.



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Fig. 19 Strut Assembly

- 1 - UPPER STRUT MOUNT
- 2 - UPPER SPRING ISOLATOR
- 3 - DUST BOOT
- 4 - LOWER SPRING ISOLATOR
- 5 - STRUT ASSEMBLY
- 6 - COIL SPRING

DIAGNOSIS AND TESTING - STRUT ASSEMBLY (REAR)

(1) Inspect for damaged or broken coil springs (Fig. 19).

(2) Inspect for torn or damaged strut assembly dust boots (Fig. 19).

(3) Inspect for damaged upper and lower spring isolators (Fig. 19).

(4) Lift dust boot and inspect strut assembly for evidence of fluid running from the upper end of fluid reservoir. (Actual leakage will be a stream of fluid running down the side and dripping off lower end of unit). A slight amount of seepage between the strut rod and strut shaft seal is not unusual and does not affect performance of the strut assembly. Also inspect jounce bumpers inside dust boot for signs of damage or deterioration.

(5) Verify correct struts and coil springs are installed on vehicle.

Coil springs are rated separately for each side of vehicle depending on optional equipment and type of service.

STRUT (Continued)

NOTE: If the coils springs require replacement, be sure that the springs being replaced, are replaced with springs meeting the correct load and spring rate for the vehicle.

Replacement of the coil spring requires removal and disassembly of the strut assembly. (Refer to 2 - SUSPENSION/REAR/STRUT - REMOVAL)

REMOVAL - STRUT ASSEMBLY (REAR)

NOTE: When removing rear strut assembly from vehicle, access to the 3 rear strut assembly-to-strut tower attaching nuts is through the passenger compartment of the vehicle.

- (1) Remove the rear seat cushion from the interior of the car. Refer to Body/Seats.
- (2) Remove the rear seat back assembly. Refer to Body/Seats.
- (3) Remove both upper quarter trim panels from the rear of the vehicle interior. Refer to Body/Interior.
- (4) Remove both lower quarter trim panels from the rear of the vehicle interior. Refer to Body/Interior.
- (5) Remove the rear parcel shelf trim panel from the vehicle interior. Refer to Body/Interior.

NOTE: The speaker should be removed from the vehicle with the mounting plate attached

- (6) Remove the 4 screws securing the rear speaker and mounting plate in place for the side of the vehicle requiring repair. Unplug the wiring from the speaker, then remove the speaker and mounting plate from the vehicle.

- (7) Raise vehicle on jack stands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

- (8) Remove the rear wheel and tire assembly from the vehicle.

- (9) Remove the rear caliper assembly from the adapter. Refer to Brakes/Disc Brake Caliper. After removing the caliper assembly, store the caliper by hanging it from the underside of the vehicle (Fig. 20). Do not let the rear caliper assembly hang by flexible brake hose.

- (10) If loose on wheel mounting studs, remove rear brake rotor from hub.

- (11) If the vehicle is equipped with antilock brakes, remove the wheel speed sensor from the disc brake caliper adapter by removing the bolt, then the sensor (Fig. 21).

- (12) Remove the lateral links from the spindle (Fig. 22). This requires the removal of one long bolt attaching both links to the spindle (Fig. 22).

- (13) Install a thin wrench on the hex of the stabilizer bar attaching link stud to keep the stud from

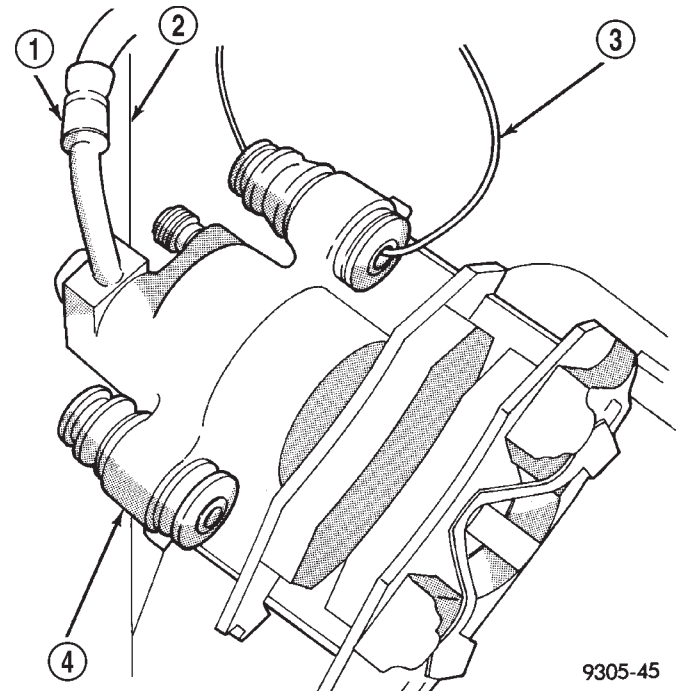


Fig. 20 Storing Rear Caliper

- 1 - FLEX HOSE
- 2 - STRUT
- 3 - WIRE HANGER
- 4 - CALIPER ASSEMBLY

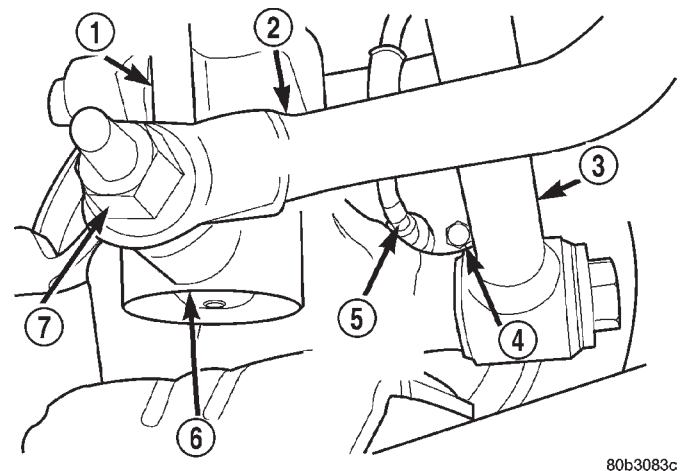
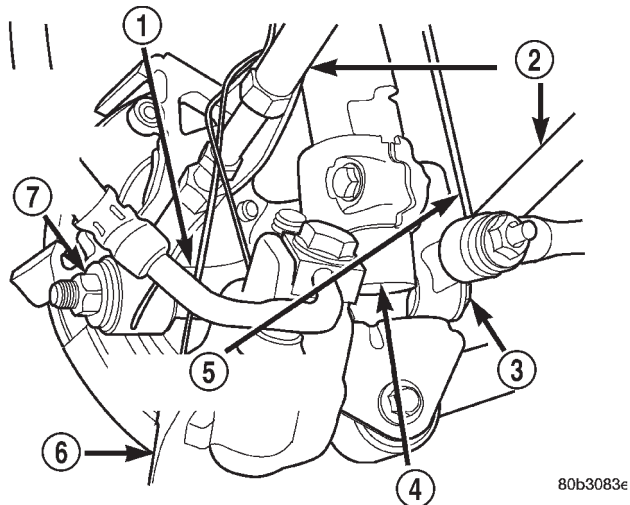


Fig. 21 Wheel Speed Sensor At Adapter

- 1 - STABILIZER BAR LINK
- 2 - STABILIZER BAR
- 3 - LATERAL LINK
- 4 - BOLT
- 5 - WHEEL SPEED SENSOR
- 6 - STRUT ASSEMBLY
- 7 - NUT

turning in the link. Next, remove the nut from the stabilizer bar attaching link stud at the stabilizer bar (Fig. 23). Remove the link from the stabilizer bar.

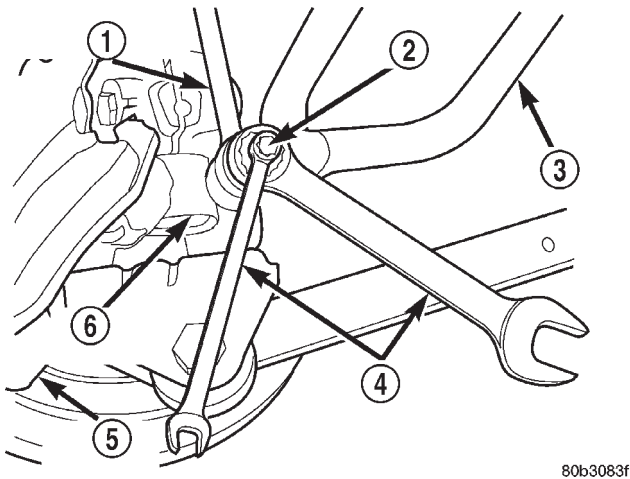
STRUT (Continued)



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Fig. 22 Lateral Links To Spindle Attachment

- 1 - SPINDLE
- 2 - LATERAL LINKS
- 3 - LATERAL LINK ATTACHING BOLT HEAD
- 4 - STRUT ASSEMBLY
- 5 - STABILIZER BAR ATTACHING LINK
- 6 - BRAKE CALIPER
- 7 - LATERAL LINK ATTACHING BOLT NUT



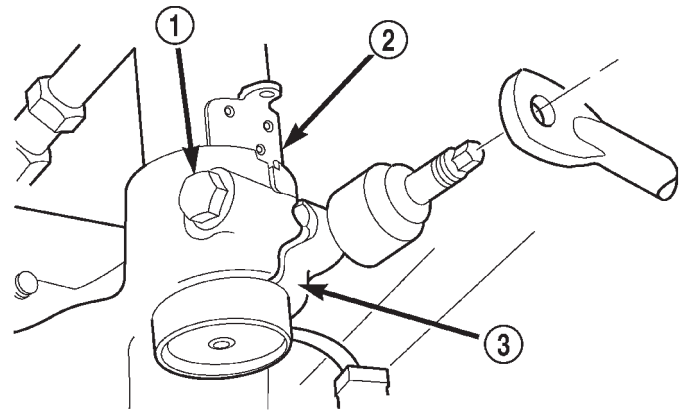
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Fig. 23 Link Attachment To Stabilizer Bar

- 1 - STABILIZER BAR ATTACHING LINK
- 2 - LINK STUD
- 3 - STABILIZER BAR
- 4 - WRENCHES
- 5 - BRAKE CALIPER
- 6 - STRUT ASSEMBLY

(14) Loosen and fully remove, the rear spindle to strut assembly pinch bolt (Fig. 24).

CAUTION: When inserting center punch into rear spindle, use care so point of center punch does not puncture strut assembly.

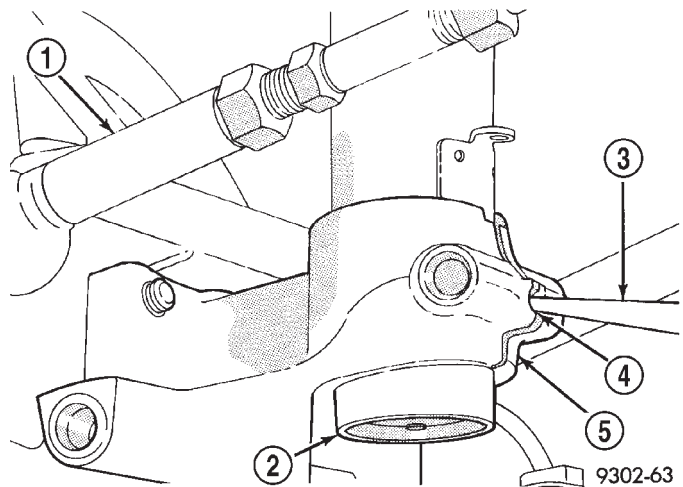


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Fig. 24 Spindle To Strut Attachment

- 1 - PINCH BOLT
- 2 - STRUT ASSEMBLY
- 3 - REAR SPINDLE

(15) Insert a center punch into the hole on the spindle (Fig. 25). Center punch must be tapped into spindle until jammed into hole. This will spread spindle casting allowing it to be removed from strut assembly.



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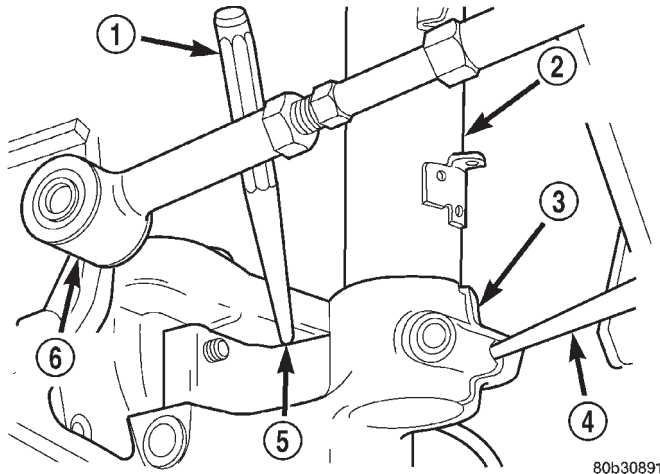
Fig. 25 Center Punch Installed In Spindle

- 1 - LATERAL LINK
- 2 - STRUT ASSEMBLY
- 3 - CENTER PUNCH
- 4 - HOLE
- 5 - SPINDLE

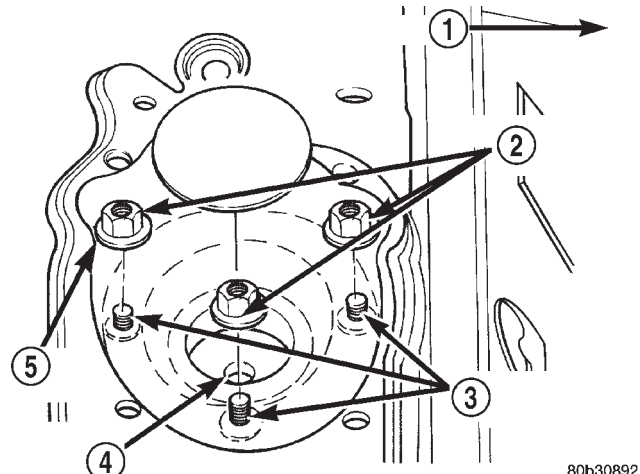
(16) Using a hammer and a brass drift punch, tap on top surface of spindle driving it down and off the end of the strut assembly (Fig. 26).

(17) Let the rear spindle and assembled components hang from the trailing arm while the strut assembly is out of the vehicle.

STRUT (Continued)

**Fig. 26 Removing Spindle From Strut Assembly**

- 1 - BRASS DRIFT PUNCH
- 2 - STRUT ASSEMBLY
- 3 - SPINDLE
- 4 - CENTER PUNCH
- 5 - HIT SPINDLE HERE
- 6 - LATERAL LINK

**Fig. 27 Strut Assembly Attaching Nuts**

- 1 - FRONT OF CAR
- 2 - ATTACHING NUTS
- 3 - MOUNTING STUDS
- 4 - STRUT ASSEMBLY
- 5 - SPEAKER OPENING

(18) Lower vehicle enough to access rear passenger compartment.

NOTE: When removing rear strut assembly from vehicle, access to the 3 rear strut assembly-to-strut tower attaching nuts is through the passenger compartment of the vehicle.

(19) Mark the location of the 3 strut assembly-to-rear strut tower attaching nuts (Fig. 27).

(20) Remove the 3 strut assembly-to-rear strut tower attaching nuts (Fig. 27), then remove strut assembly from vehicle.

(21) Remove the nut, washers and rubber isolators securing the stabilizer bar link to the strut.

(22) For disassembly of the strut assembly, refer to Disassembly.

DISASSEMBLY - STRUT ASSEMBLY (REAR)

The Strut assembly must be removed from the vehicle for it to be disassembled and assembled. Refer to Removal.

(1) If both struts are being serviced at the same time, mark the coil spring and strut assembly according to which side of the vehicle the strut was removed from, and which strut the coil spring was removed from.

WARNING: DO NOT INSTALL THE COIL SPRING COMPRESSOR HOOKS ON THE COIL SPRING IN AN AREA OF THE SPRING COVERED BY A SLEEVE. IF THE SLEEVE MOVES WHEN COMPRESSING THE SPRING, THE SPRING COULD MOVE RESULTING IN PERSONAL INJURY.

CAUTION: When installing the spring compressor's hooks on the coil spring, do not position the hooks of the spring compressor on the sleeve of the coil spring. Positioning the spring compressor on the sleeve could cause the sleeve to dislodge from the coil spring when it is compressed. This would result in the required replacement of the coil spring.

(2) Position the strut assembly in the strut coil spring compressor following the manufacturers instructions. Position the strut assembly so the out-board side of the strut is outward away from the compressor. Grasp the upper and lower coils of the spring with the upper and lower hooks of the compressor. Place a clamp on the lower end of the coil spring, so the strut is held in place once the strut shaft nut is removed. Compress the coil spring until all load is removed from the upper strut mount.

(3) Install Strut Shaft Socket, Special Tool 6864, on the strut shaft nut. Use a deep well socket inserted into the opening of tool 6864 to keep strut shaft from turning. With the spring compressed, remove the nut from the strut shaft.

(4) Remove the strut upper mount assembly, upper spring isolator, dust shield, and jounce bumper. The jounce bumper should come off with the dust shield. The dust shield and upper spring isolator can be removed from the upper mount if necessary.

(5) Remove the clamp and remove the strut out from the bottom of the coil spring.

(6) Remove the lower spring isolator from the strut coil spring seat.

(7) Inspect the strut assembly components for the following and replace as necessary:

STRUT (Continued)

- Inspect the strut for any condition of shaft binding over the full stroke of the shaft.
- Inspect the strut shaft for loss of charge.
- Inspect the jounce bumper for cracks and signs of deterioration.
- Check the upper mount for cracks and distortion and its retaining studs for any sign of damage.
- Inspect the dust shield for rips and deterioration.
- Inspect the upper and lower spring isolators for material deterioration.
- Inspect the coil spring for any sign of damage to the coating.

NOTE: Before releasing the tension on the coil spring, note the position of the coil end on the upper end of the coil spring. When reinstalled, position it in the same spot for ease of alignment of the upper mount, coil spring and the strut.

(8) If the coil spring needs to be removed from the compressor, release the tension from the coil spring by backing off the compressor drive fully. Push back the compressor hooks and remove the coil spring.

ASSEMBLY - STRUT ASSEMBLY (REAR)

WARNING: DO NOT INSTALL THE COIL SPRING COMPRESSOR HOOKS ON THE COIL SPRING IN AN AREA OF THE SPRING COVERED BY A SLEEVE. IF THE SLEEVE MOVES WHEN COMpressing THE SPRING, THE SPRING COULD MOVE RESULTING IN PERSONAL INJURY.

CAUTION: Positioning the spring compressor hooks on the coil spring sleeve could cause the sleeve to dislodge from the coil spring when it is compressed. A dislodged sleeve requires replacement of the coil spring.

NOTE: Make sure all components are free of dirt and debris before assembly, especially around the mounting surfaces.

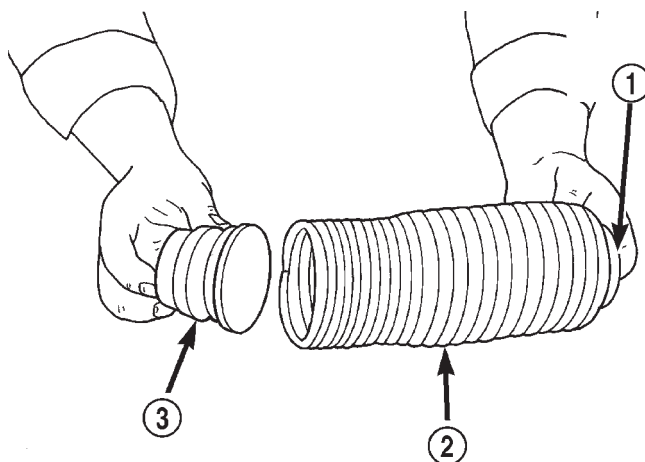
NOTE: If the coil spring has been removed from the spring compressor, proceed with the next step, otherwise, proceed with step 2.

(1) Place the coil spring in the compressor following the manufacturer's instructions. The coil spring must be installed so the sleeve on the spring is towards the upper end of assembly. Before compressing the spring, rotate the spring to the position noted in disassembly for ease of strut assembly components.

(2) Install the lower spring isolator on strut matching the step in the isolator to the step in the strut lower spring seat.

(3) Install the strut through the bottom of the coil spring until the lower spring seat contacts the lower end of the coil spring. Align the lower coil spring end with the step in the strut lower spring seat. Install the clamp on the lower end of the coil spring and strut, so the strut is held in place.

(4) Install the jounce bumper into the dust shield from the bottom (Fig. 28). The jounce bumper should snap into position at the top end of the dust shield.



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Fig. 28 Jounce Bumper Installed Into Dust Shield

1 - TOP OF DUST SHIELD

2 - DUST SHIELD

3 - JOUNCE BUMPER

(5) Install the dust shield and jounce bumper into position in bottom of upper strut mount. Dust shield should snap into position. Once correctly installed, the dust boot should be able to be rotated within the mount without coming loose.

(6) Install the upper strut mount, dust shield and jounce bumper onto the strut shaft. Position the mount so its center rear mounting stud is aligned with the stabilizer bar attaching link bracket that is on the inboard side of the strut.

(7) Install the upper strut mount to strut shaft nut on the strut shaft. Install Strut Shaft Socket, Special Tool 6864, on strut shaft nut. Use a deep well socket inserted into the opening of tool 6864 to keep strut shaft from turning. Tighten the strut shaft nut to a torque of 75 N·m (55 ft. lbs.).

(8) Slowly release the tension from the coil spring by backing off the compressor drive fully. As the tension is relieved, make sure the upper mount, spring, and strut align properly.

(9) Remove the clamp from the lower end of the coil spring and strut. Push back the spring compressor upper and lower hooks, then remove the strut assembly from the spring compressor.

(10) Install the strut assembly back into the vehicle. Refer to Installation.

STRUT (Continued)

INSTALLATION - STRUT ASSEMBLY (REAR)

(1) Install the nut, washers, and rubber isolators securing the stabilizer bar attaching link to the strut.

(2) Position the strut assembly back in the vehicle with the 3 studs on the strut mount through the holes in the strut tower. Install the 3 strut mount to body attaching nuts onto mounting studs (Fig. 27). Tighten the 3 strut mount attaching nuts to a torque of 25 N·m (19 ft. lbs.).

(3) Raise vehicle back up to working height for reconnecting lower strut.

(4) Install spindle onto bottom of the strut assembly. Push or tap spindle assembly onto lower end of strut, until notch in spindle is tightly seated against locating tab on strut assembly (Fig. 29). Then remove center punch from hole in spindle. Install spindle to strut assembly pinch bolt into spindle (Fig. 29). Tighten spindle to strut assembly pinch bolt to 53 N·m (40 ft. lbs.).

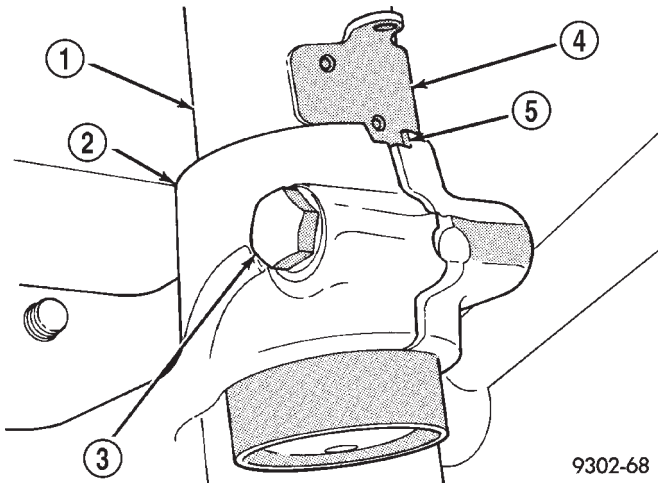


Fig. 29 Spindle Attachment To Strut

- 1 - STRUT ASSEMBLY
- 2 - SPINDLE
- 3 - PINCH BOLT
- 4 - LOCATING TAB
- 5 - NOTCH

(5) Install the lateral links on the spindle (Fig. 22). Install, but **DO NOT** fully tighten lateral links to spindle attaching bolt at this time.

CAUTION: Tightening lateral link attaching bolt to spindle at this time will contort the bushing at curb height and lead to bushing failure. This bolt is to be tightened only when the vehicle is at curb riding height.

(6) Install stabilizer bar link onto stabilizer bar (Fig. 23). Install stabilizer link to stabilizer bar attaching nut (Fig. 23). Tighten the stabilizer link to stabilizer bar attaching nut to a torque of 95 N·m (70

ft. lbs.) using a crow foot wrench and torque wrench in place of the wrench on the attaching nut. **Be sure to use a wrench to hold the link stud in place while tightening attaching nut.**

(7) Install rear wheel speed sensor into brake caliper adapter. Install head attaching bolt (Fig. 21) and tighten to 7 N·m (60 in. lbs.).

(8) Install rear braking disc on hub. Carefully install rear brake caliper over braking disc and install on adapter. Tighten rear caliper assembly to adapter mounting bolts to 22 N·m (192 in. lbs.).

(9) Install wheel and tire assembly on vehicle. Then torque all wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat tightening sequence to full specified torque of 129 N·m (95 ft. lbs.).

(10) Lower vehicle to the ground.

(11) With the weight of the vehicle on the tires, tighten lateral link to spindle attaching bolt to 135 N·m (100 ft. lbs.).

(12) Reconnect the radio speaker wiring to the rear speaker. Install rear radio speaker and mounting bracket using 4 screws.

(13) Install both lower quarter and upper quarter trim panels Refer to Body/Interior.

(14) Install the rear seat back, and seat cushion. Refer to Body/Seats.

(15) Check and reset rear wheel toe to specifications if required. Refer to Wheel Alignment.

TRAILING ARM/LINK

DESCRIPTION - TRAILING ARM

There is one trailing arm on each side of the vehicle (Fig. 1). It spans from the spindle forward to the frame rail and rear torque box. The trailing arm attaches to the rear spindle through a bracket which is bolted to the bottom of the spindle. The trailing arm attaches to the body using a bracket attached to the frame rail and rear torque box. The trailing arm has rubber isolator bushings at each end to isolate suspension noise from the body of the vehicle.

OPERATION - TRAILING ARM

The purpose of the trailing arm is to control the fore-and-aft movement of the spindle.

DIAGNOSIS AND TESTING - TRAILING ARM

Inspect the trailing arm and trailing arm bushings for signs of deterioration and or damage. If the trailing arm bushings are deteriorated or the trailing arm is damaged in any way, replacement of the trailing arm will be required.

Inspect the trailing arm for signs of contact with the ground or road debris which has bent or caused

TRAILING ARM/LINK (Continued)

other damage to the trailing arm. If the trailing arm is bent or damaged the trailing arm will require replacement. **Do not attempt to repair or straighten a trailing arm.**

REMOVAL - TRAILING ARM

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the rear wheel and tire assembly from the vehicle.

(3) Remove the bolt attaching the trailing arm to the bracket on the bottom of the spindle (Fig. 30).

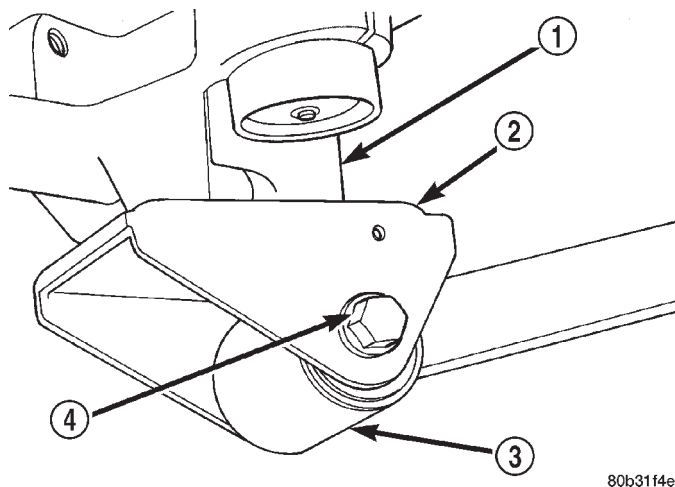


Fig. 30 Trailing Arm To Bracket Bolt

- 1 - SPINDLE
- 2 - TRAILING ARM BRACKET
- 3 - TRAILING ARM
- 4 - BOLT

(4) Remove the 4 bolts attaching the arm forward mounting bracket to the frame rail and rear torque box (Fig. 31).

(5) Remove the trailing arm and forward mounting bracket from vehicle.

(6) Remove the bolt attaching the trailing arm to the mounting bracket.

INSTALLATION - TRAILING ARM

CAUTION: When the trailing arm is installed to its mounting bracket, it is important to set an offset angle of 5 degrees before tightening the attaching bolt. Otherwise, the bushing will be contorted when the vehicle is at normal riding height. This angle cannot be set once the trailing arm and bracket are installed on the vehicle.

(1) Install the trailing arm to the mounting bracket so the length-wise opening in the arm points downward. Align the plane of the arm at a 5 degree

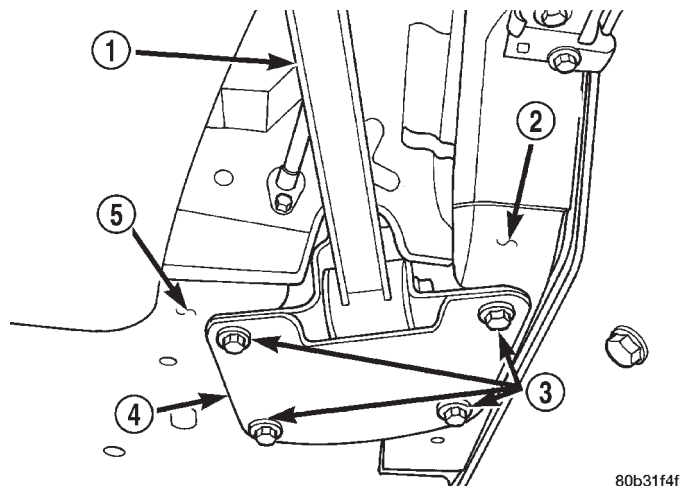


Fig. 31 Mounting Bracket Attachment

- 1 - TRAILING ARM
- 2 - FRAME RAIL
- 3 - ATTACHING BOLTS
- 4 - MOUNTING BRACKET
- 5 - TORQUE BOX

angle to the mounting bracket, mounting surface (to the vehicle) (Fig. 32). This can be accomplished by using a simple magnetic base protractor (Fig. 32). Verify the mounting bracket is level, then rotate the trailing arm until 5 degrees is measured (Fig. 32). **This angle is important to set, so the bushing is not contorted when the vehicle is at normal riding height.. Tighten the attaching bolt and nut to a torque of 100 N·m (75 ft. lbs.). This bolt cannot be tightened once mounted on the vehicle.**

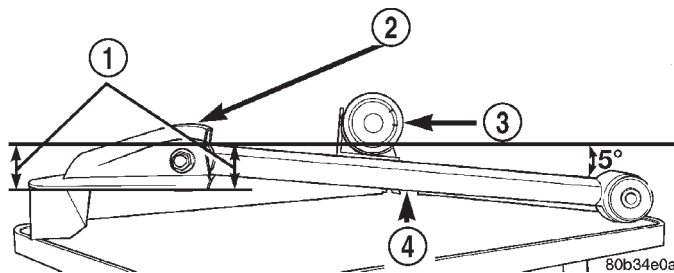


Fig. 32 Trailing Arm Mounting Angle

- 1 - EQUAL DISTANCES
- 2 - MOUNTING BRACKET
- 3 - PROTRACTOR
- 4 - TRAILING ARM

(2) Position the trailing arm and forward mounting bracket into the vehicle. Attach to frame rail and torque box with the 4 attaching bolts (Fig. 31). Tighten the attaching bolts to 60 N·m (45 ft. lbs.).

(3) Install bolt attaching trailing arm to trailing arm bracket on bottom of spindle (Fig. 30). Do not fully tighten attaching bolt at this time.

TRAILING ARM/LINK (Continued)

(4) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(5) Lower vehicle to the ground.

(6) Tighten the trailing arm to spindle bracket attaching bolt to a torque of 100 N·m (75 ft. lbs.).

(7) Check and reset rear wheel toe to specifications if required. Refer to Wheel Alignment.

WHEEL ALIGNMENT

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WHEEL ALIGNMENT

DESCRIPTION - WHEEL ALIGNMENT

Vehicle wheel alignment is the positioning of all interrelated front and rear suspension angles. These angles affect the handling and steering of the vehicle when it is in motion. Proper wheel alignment is essential for efficient steering, good directional stability, and proper tire wear.

The method of checking a vehicle's front and rear wheel alignment varies depending on the manufacturer and type of equipment used. The manufacturer's instructions should always be followed to ensure accuracy of the alignment, except when DaimlerChrysler Corporation's wheel alignment specifications differ.

On this vehicle, the suspension angles that can be adjusted are as follows:

Front

- Camber
- Toe

Rear

- Toe

Check the wheel alignment and make all wheel alignment adjustments with the vehicle standing at its proper curb height specification. Curb height is the normal riding height of the vehicle. It is measured from a certain point on the vehicle to the ground or a designated area while the vehicle is sitting on a flat, level surface. Refer to Curb Height Measurement in this section for additional information.

Typical wheel alignment angles and measurements are described in the following paragraphs.

CAMBER

Camber is the inward or outward tilt of the top of the tire and wheel assembly (Fig. 1). Camber is measured in degrees of angle relative to a true vertical line. Camber is a tire wearing angle.

- Excessive negative camber will cause tread wear at the inside of the tire.
- Excessive positive camber will cause tread wear on the outside of the tire.

CROSS CAMBER

Cross camber is the difference between left and right camber. To achieve the cross camber reading, subtract the right side camber reading from the left. For example, if the left camber is +0.3° and the right camber is 0.0°, the cross camber would be +0.3°.

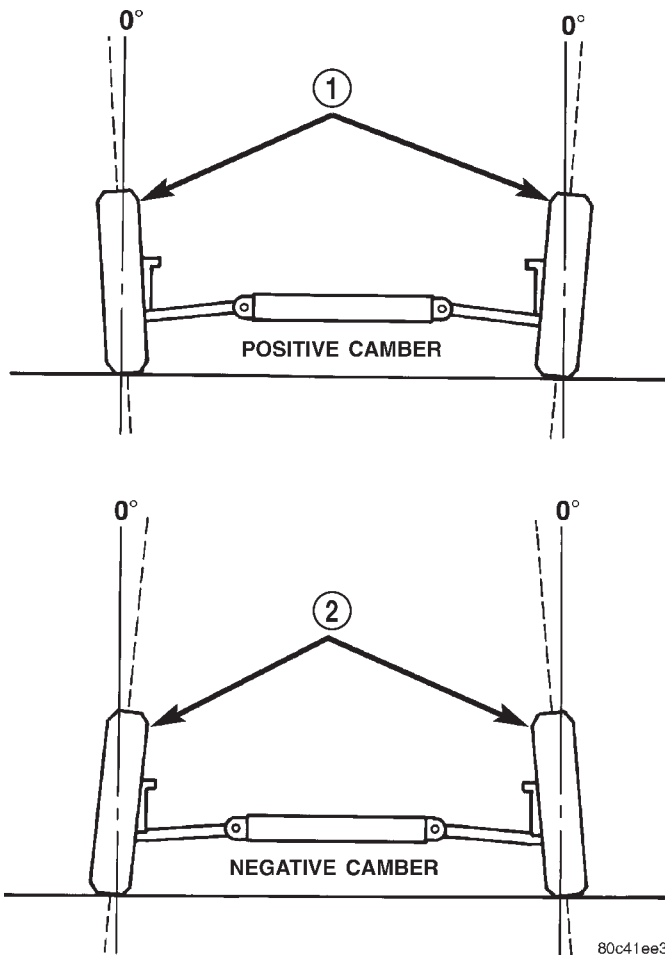
CASTER

Caster is the forward or rearward tilt of the steering knuckle in reference to the position of the upper and lower ball joints. Caster is measured in degrees of angle relative to a true vertical center line. This line is viewed from the side of the tire and wheel assembly (Fig. 2).

- Forward tilt (upper ball joint ahead of lower) results in a negative caster angle.
- Rearward tilt (upper ball joint trailing lower) results in a positive caster angle.

Although caster does not affect tire wear, a caster imbalance between the two front wheels may cause the vehicle to lead to the side with the least positive caster.

WHEEL ALIGNMENT (Continued)

**Fig. 1 Camber**

- 1 - WHEELS TILTED OUT AT TOP
2 - WHEELS TILTED IN AT TOP

CROSS CASTER

Cross caster is the difference between left and right caster.

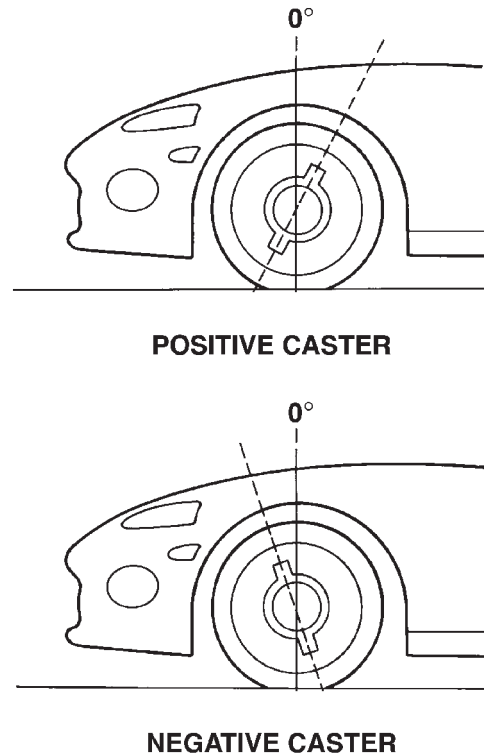
TOE

Toe is the inward or outward angle of the wheels as viewed from above the vehicle (Fig. 3).

- Toe-in is produced when the front edges of the wheels on the same axle are closer together than the rear edges.
- Toe-out is produced when the front edges of the wheels on the same axle are farther apart than the rear edges.

Toe-in and toe-out can occur at the front wheels and the rear wheels.

Toe is measured in degrees or inches. The measurement identifies the amount that the front of the wheels point inward (toe-in) or outward (toe-out). Toe is measured at the spindle height. Zero toe means the front and rear edges of the wheels on the same axle are equally distant.

**Fig. 2 Caster**

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TOE-OUT ON TURNS

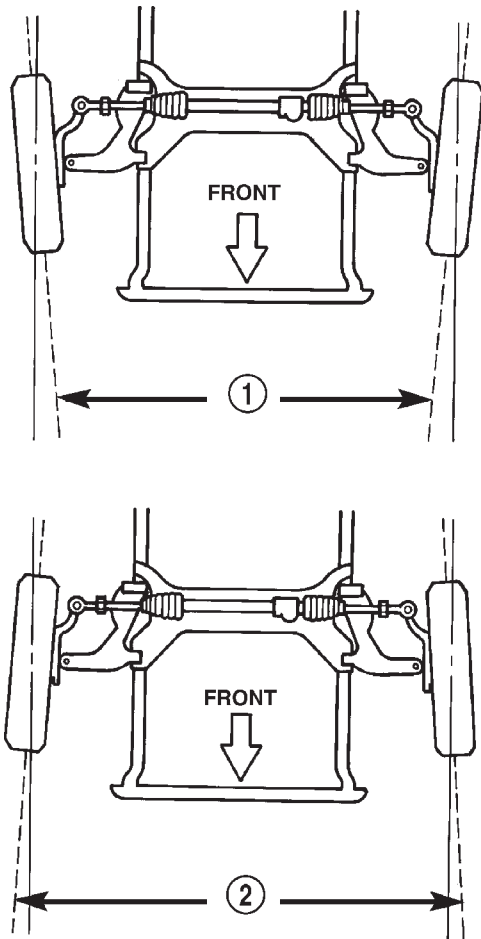
Toe-out on turns is the relative positioning of the front wheels while steering through a turn (Fig. 4). This compensates for each front wheel's turning radius. As the vehicle encounters a turn, the out-board wheel must travel in a larger radius circle than the inboard wheel. The steering system is designed to make each wheel follow its particular radius circle. To accomplish this, the front wheels must progressively toe outward as the steering is turned from center. This eliminates tire scrubbing and undue tire wear when steering a vehicle through a turn.

DYNAMIC TOE PATTERN

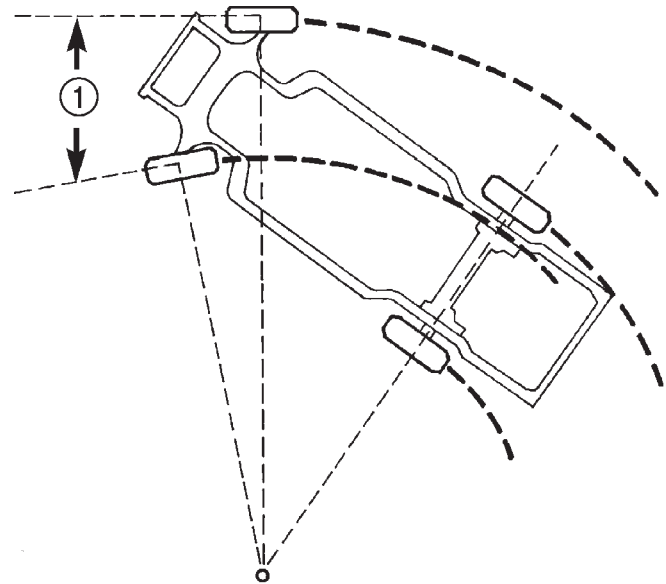
Dynamic toe pattern is the inward and outward toe movement of the front and rear tires through the suspension's jounce and rebound travel. As the vehicle's suspension moves up and down, the toe pattern varies. Toe pattern is critical in controlling the directional stability of the vehicle while in motion. Front and rear dynamic toe pattern is preset by the factory at the time the vehicle is assembled.

It is not necessary to check or adjust front or rear dynamic toe pattern when doing a normal wheel alignment. The only time dynamic toe pattern needs to be checked or adjusted is if the frame of the vehicle has been damaged.

WHEEL ALIGNMENT (Continued)

**Fig. 3 Toe**

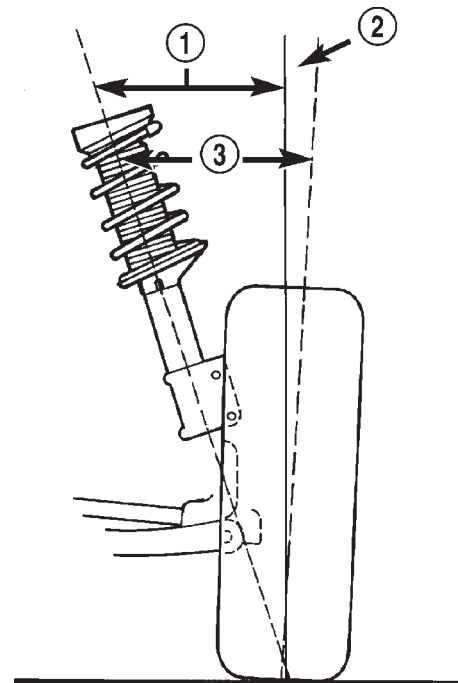
- 1 - TOE-IN
2 - TOE-OUT



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Fig. 4 Toe-Out On Turns

- 1 - TOE-OUT ON TURNS



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Fig. 5 S.A.I. and I.A.

- 1 - S.A.I.
2 - CAMBER
3 - I.A.

STEERING AXIS INCLINATION (S. A. I.)

Steering axis inclination is the angle between a true vertical line starting at the center of the tire at the road contact point and a line drawn through the center of the upper ball joint (or strut) and the lower ball joint (Fig. 5). S.A.I. is built into the vehicle and is not an adjustable angle. If S.A.I. is not within specifications, a bent or damaged suspension component may be the cause.

INCLUDED ANGLE (I. A.)

Included angle is the sum of the S.A.I. angle plus or minus the camber angle, depending on whether or not the wheel has positive or negative camber (Fig. 5). If camber is positive, add the camber angle to the S.A.I. angle. If camber is negative, subtract the camber angle from the S.A.I. angle. Included angle is not adjustable, but can be used to diagnose a frame misalignment or bent suspension component (spindle, strut).

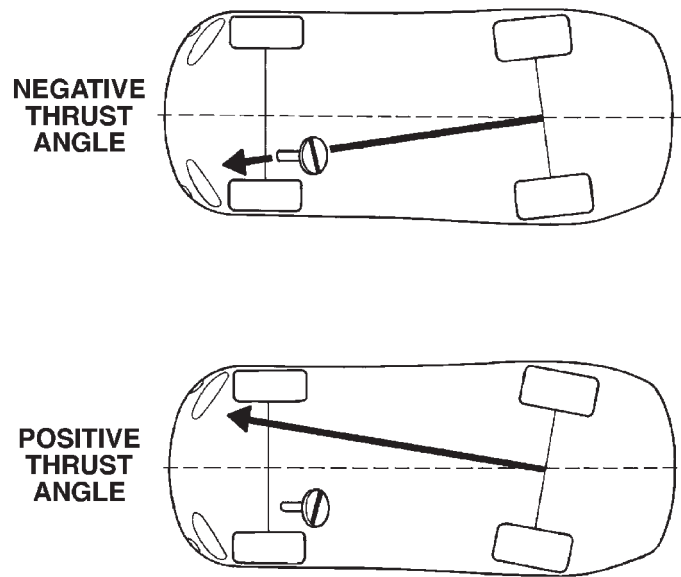
WHEEL ALIGNMENT (Continued)

THRUST ANGLE

Thrust angle is the averaged direction the rear wheels are pointing in relation to the vehicle's center line (Fig. 6). The presence of negative or positive thrust angle causes the rear tires to track improperly to the left or right of the front tires (dog tracking).

- Negative thrust angle means the rear tires are tracking to the left of the front tires.
- Positive thrust angle means the rear tires are tracking to the right of the front tires.

Improper tracking can cause undue tire wear, a lead or pull and a crooked steering wheel. Excessive thrust angle can usually be corrected by adjusting the rear wheel toe so that each wheel has one-half of the total toe measurement.



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Fig. 6 Thrust Angle

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - SUSPENSION AND STEERING

CONDITION	POSSIBLE CAUSES	CORRECTION
Front End Whine On Turns	<ol style="list-style-type: none"> 1. Defective wheel bearing 2. Incorrect wheel alignment 3. Worn tires 	<ol style="list-style-type: none"> 1. Replace wheel bearing 2. Check and reset wheel alignment 3. Replace tires
Front End Growl Or Grinding On Turns	<ol style="list-style-type: none"> 1. Defective wheel bearing 2. Engine mount grounding 3. Worn or broken C/V joint 4. Loose wheel lug nuts 5. Incorrect wheel alignment 6. Worn tires 7. Front strut pin in upper strut mount 	<ol style="list-style-type: none"> 1. Replace wheel bearing 2. Check for motor mount hitting frame rail and reposition engine as required 3. Replace C/V joint 4. Verify wheel lug nut torque 5. Check and reset wheel alignment 6. Replace tires 7. Replace the front strut upper mount and bearing

WHEEL ALIGNMENT (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
Front End Clunk Or Snap On Turns	<ol style="list-style-type: none"> 1. Loose lug nuts 2. Worn or broken C/V joint 3. Worn or loose tie rod 4. Worn or loose ball joint 5. Worn/loose control arm bushing 6. Loose stabilizer bar. 7. Loose strut mount to body attachment 8. Loose crossmember bolts 	<ol style="list-style-type: none"> 1. Verify wheel lug nut torque 2. Replace C/V joint 3. Tighten or replace tie rod end 4. Tighten or replace ball joint 5. Replace control arm bushing 6. Tighten stabilizer bar to specified torque 7. Tighten strut attachment to specified torque 8. Tighten crossmember bolts to specified torque
Front End Whine With Vehicle Going Straight At A Constant Speed	<ol style="list-style-type: none"> 1. Defective wheel bearing 2. Incorrect wheel alignment 3. Worn tires 4. Worn or defective transaxle gears or bearings 	<ol style="list-style-type: none"> 1. Replace wheel bearing 2. Check and reset wheel alignment 3. Replace tires 4. Replace transaxle gears or bearings
Front End Growl Or Grinding With Vehicle Going Straight At A Constant Speed	<ol style="list-style-type: none"> 1. Engine mount grounding 2. Worn or broken C/V joint 	<ol style="list-style-type: none"> 1. Reposition engine as required 2. Replace C/V joint
Front End Whine When Accelerating Or Decelerating	<ol style="list-style-type: none"> 1. Worn or defective transaxle gears or bearings 	<ol style="list-style-type: none"> 1. Replace transaxle gears or bearings
Front End Clunk When Accelerating Or Decelerating	<ol style="list-style-type: none"> 1. Worn or broken engine mount 2. Worn or defective transaxle gears or bearings 3. Loose lug nuts 4. Worn or broken C/V joint 5. Worn or loose ball joint 6. Worn or loose control arm bushing 7. Loose crossmember bolts 8. Worn tie rod end 	<ol style="list-style-type: none"> 1. Replace engine mount 2. Replace transaxle gears or bearings 3. Verify wheel lug nut torque 4. Replace C/V joint 5. Tighten or replace ball joint 6. Replace control arm bushing 7. Tighten crossmember bolts to specified torque 8. Replace tie rod end

WHEEL ALIGNMENT (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
Road Wander	<ol style="list-style-type: none"> 1. Incorrect tire pressure 2. Incorrect front or rear wheel toe 3. Worn wheel bearings 4. Worn control arm bushings 5. Excessive friction in steering gear 6. Excessive friction in steering shaft coupling 7. Excessive friction in strut upper bearing 	<ol style="list-style-type: none"> 1. Inflate tires to recommended pressure 2. Check and reset wheel toe 3. Replace wheel bearing 4. Replace control arm bushing 5. Replace steering gear 6. Replace steering coupler 7. Replace strut bearing
Lateral Pull	<ol style="list-style-type: none"> 1. Unequal tire pressure 2. Radial tire lead 3. Incorrect front wheel camber 4. Power steering gear imbalance 5. Wheel braking 	<ol style="list-style-type: none"> 1. Inflate all tires to recommended pressure 2. Perform lead correction procedure 3. Check and reset front wheel camber 4. Replace power steering gear 5. Correct braking condition causing lateral pull
Excessive Steering Free Play	<ol style="list-style-type: none"> 1. Worn or loose tie rod ends 2. Loose steering gear mounting bolts 3. Worn steering gear 4. Loose or worn steering shaft coupler 	<ol style="list-style-type: none"> 1. Replace or tighten tie rod ends 2. Tighten steering gear bolts to specified torque 3. Replace Steering Gear 4. Replace steering shaft coupler
Excessive Steering Effort	<ol style="list-style-type: none"> 1. Low tire pressure 2. Low power steering fluid level 3. Loose power steering pump drive belt 4. Lack of lubricant in ball joints 5. Steering gear malfunction 6. Lack of lubricant in steering coupler 	<ol style="list-style-type: none"> 1. Inflate all tires to recommended pressure 2. Fill power steering fluid reservoir to correct level 3. Correctly adjust power steering pump drive belt 4. Lubricate or replace ball joints 5. Replace steering gear 6. Replace steering coupler

DIAGNOSIS AND TESTING - VEHICLE LEAD/PULL

To assure correct diagnosis, it is important to follow the steps outlined below in the order shown. Road test the vehicle before and after each step to verify that the lead condition has been corrected. When evaluating a vehicle, always drive the same road in both directions to get a feel for the effect of road crown and cross wind. A neutral vehicle will exhibit a small amount of drift on both right and left crowned roads (normal crown sensitivity). A vehicle with pronounced lead/pull may have one or more of the following conditions:

(1) **UNEQUAL TIRE PRESSURE.** Adjust tire pressure to the pressure stated on door placard. Make sure the tire pressure is equal on all four tires and evaluate the car. Also verify that the tire size and type are correct and match each other. If the car still has a lead condition go to step (2).

(2) **TIRE CONICITY.** Excessive tire conicity is one of the more frequent causes of vehicle lead. Cross-switch the front tires and evaluate the car. If the car still leads in the same direction or gets worse, return the front tires to their original position, then go to step (3).

(3) **SUSPENSION ALIGNMENT.** Check and record the wheel alignment settings including caster. Non-

WHEEL ALIGNMENT (Continued)

symmetrical front caster or camber can sometimes cause a lead condition or can be used to fix a lead condition. To bias the front suspension caster and camber alignment settings to correct or minimize a lead condition, perform the Vehicle Lead/Pull Alignment Bias repair procedure (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE). If the car still leads after the alignment bias procedure, go to step (4) or (5) accordingly.

(4) **STEERING GEAR VALVE IMBALANCE.** Steering gear valve imbalance can sometimes cause a vehicle lead. Although there is no quick test or measurement that can be performed to verify a good or bad steering gear valve, generally the steering efforts will feel much lighter in the lead direction and heavier in the opposite direction with an unbalanced valve. Replace the steering gear only as a "last resort" to solve the problem. To replace the steering gear, (Refer to 19 - STEERING/GEAR - REMOVAL).

STANDARD PROCEDURE

STANDARD PROCEDURE - VEHICLE LEAD/PULL ALIGNMENT BIAS

This procedure is designed to be used in conjunction with Diagnosis And Testing - Vehicle Lead/Pull (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - DIAGNOSIS AND TESTING).

Proceed with the Caster Bias procedure before attempting the Camber Bias procedure.

CASTER BIAS

On a vehicle that leads left, create more caster on the left than on the right. On a right lead vehicle, the procedure is opposite. Try to get at least 0.8 degree of cross caster, but do not exceed the maximum specification of 1.0 degree.

(1) Loosen the four engine cradle to frame bolts. Rotate the cradle forward on the side that you need to increase the caster.

(2) Tighten the engine cradle to frame bolts to 163 N·m (120 ft. lbs.).

(3) Center the steering wheel and set toe (toe must be reset before doing another caster sweep to ensure accuracy).

(4) Verify that the lead is corrected. If vehicle still leads, continue with the Camber Bias procedure.

CAMBER BIAS

On a vehicle that leads left, create either more negative camber on the left or more positive camber on the right. On a right lead vehicle, the procedure is opposite. To minimize uneven tire wear, try to achieve the same amount of camber bias on each side. For example, if the car leads left, compensate

by setting the front left camber to -0.3 degrees and front right camber to +0.3 degrees. Do not exceed cross camber maximum specification of 0.7 degree, or individual camber specification of -0.6 to +0.6 degrees.

(1) Raise the front of the vehicle until the front suspension is not supporting the weight of the vehicle and tires are clearing the floor. Remove the preferred wheel and tire assembly.

(2) Remove one of the strut clevis to knuckle bolts and loosely assemble a reduced shank bolt and nut (Available through the Mopar® Parts system) in its place. Loosen the other strut clevis to knuckle bolt to provide for adjustment. In severe cases where a wide range of adjustment is required, two reduced shank bolts should be used per knuckle. Repeat the procedure to the other side strut clevis as necessary.

(3) Install the wheel and tire assembly. Lower the vehicle until the full weight of the vehicle is resting on the suspension.

(4) Adjust the front camber to the preferred setting by physically pushing in or pulling out the top of the wheel and tire assembly as required. When the camber is correct, tighten both strut clevis to knuckle bolts to 203 N·m (150 ft. lbs.). Set front toe to specifications.

STANDARD PROCEDURE - WHEEL ALIGNMENT

PRE-WHEEL ALIGNMENT INSPECTION

Before any attempt is made to change or correct the wheel alignment, the following inspection and necessary corrections must be made to ensure proper alignment.

(1) Verify that the fuel tank is full of fuel. If the tank is not full, the reduction in weight will affect the curb height of the vehicle and the alignment angles.

(2) The passenger and luggage compartments of the vehicle should be free of any load that is not factory equipment.

(3) Check the tires on the vehicle. All tires must be the same size and in good condition with approximately the same amount of tread wear. Inflate all the tires to the recommended air pressure.

(4) Check the front wheel and tire assemblies for excessive radial runout.

(5) Inspect lower ball joints and all steering linkage for looseness, binding, wear or damage. Repair as necessary.

(6) Check suspension fasteners for proper torque and retighten as necessary.

(7) Inspect all suspension component rubber bushings for signs of wear or deterioration. Replace any faulty bushings or components before aligning the vehicle.

WHEEL ALIGNMENT (Continued)

(8) Check the vehicle's curb height to verify it is within specifications. Refer to Curb Height Measurement.

WHEEL ALIGNMENT SETUP

- (1) Position the vehicle on an alignment rack.
- (2) Install all required alignment equipment on the vehicle, per the alignment equipment manufacturer's instructions. On this vehicle, a four-wheel alignment is recommended.

NOTE: Prior to reading the vehicle's alignment readouts, the front and rear of vehicle should be jounced. Induce jounce (rear first, then front) by grasping the center of the bumper and jouncing each end of vehicle an equal number of times. The bumper should always be released when vehicle is at the bottom of the jounce cycle.

(3) Read the vehicle's current front and rear alignment settings. Compare the vehicle's current alignment settings to the vehicle specifications for camber, caster and toe-in. Refer to Specifications.

(4) If the rear alignment is out of specification, adjust it first, before proceeding to the front. Rear camber and caster are not adjustable. If rear camber is out of specification, check for damaged or bent rear suspension components.

REAR WHEEL TOE ADJUSTMENT

(1) Loosen lateral link, adjustment link jam nuts (Fig. 7). Rotate adjustment links as required to set rear wheel Toe to specifications. **Do not exceed the maximum length dimensions of the lateral links shown in (Fig. 8). Both dimensions must be checked to ensure they do not exceed maximums allowed.**

CAUTION: When setting rear toe-in on vehicle, the maximum lengths of the adjustable lateral link at the locations shown in (Fig. 8) must not be exceeded. If these maximum lengths are exceeded, inadequate retention of adjustment link to the inner and outer link may result. Ensure that the adjustment sleeve jam nuts are torqued to the required specifications when the Toe setting procedure is completed.

(2) Tighten lateral link, adjustment link lock-nuts to 88 N·m (65 ft. lbs.) torque.

(3) Proceed to set the front wheel alignment. If front camber and caster readings are within required specifications, proceed to Front Wheel Toe Adjustment. If not, refer to the following procedure to correct camber.

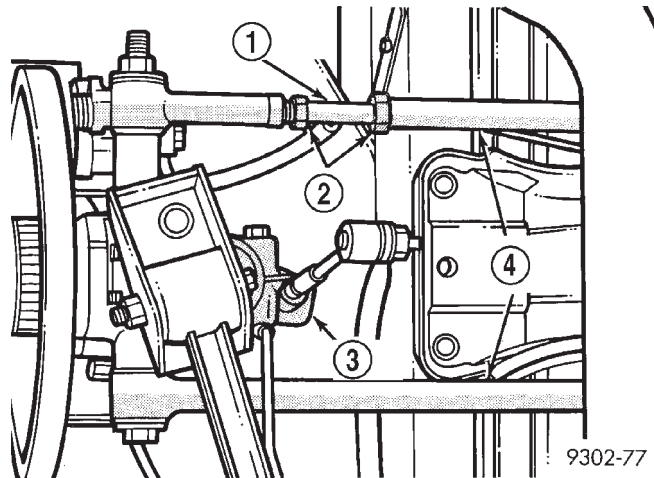
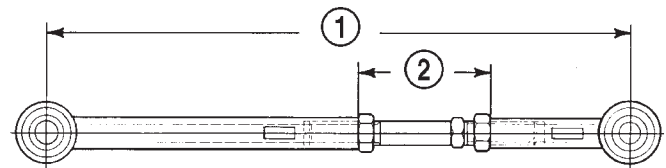


Fig. 7 Rear Wheel Toe Adjustment

- 1 - ADJUSTMENT LINK
- 2 - JAM NUTS
- 3 - SPINDLE
- 4 - LATERAL LINKS



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Fig. 8 Lateral Link Maximum Length Dimensions

- 1 - 380mm (MAX)
- 2 - 90mm (MAX)

CAMBER AND CASTER

Front wheel Camber and Caster settings on this vehicle are determined at the time the vehicle is designed. This is done by determining the precise mounting location of the vehicle's suspension components throughout the design and assembly processes of the vehicle. This is called a Net-Build vehicle and results in no normal requirement for adjustment of the Camber and Caster after a vehicle is built, or when servicing the suspension components. Thus, Camber and Caster are not normally considered an adjustable specification when performing an alignment on this vehicle. Though Camber and Caster are not adjustable, they should be checked during the alignment procedure to ensure they meet the manufacturers specifications.

WHEEL ALIGNMENT (Continued)

If camber and caster do not meet required specifications, the vehicle's suspension components should be inspected for any signs of damage or bending. **This inspection must be done before performing the camber setting procedure.**

If a vehicle has a drift or lead condition, the front camber can be adjusted using the following camber adjustment procedure. For diagnosis of a lead/pull condition, (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - DIAGNOSIS AND TESTING).

CAUTION: Do not attempt to adjust the vehicle's Caster or Camber by heating, bending or modifying the vehicle's front suspension components.

FRONT CAMBER ADJUSTMENT

There are camber adjustment bolts and nuts available to allow front suspension camber adjustment in the event the vehicle pulls even though the camber is within specifications. This procedure involves replacing the original strut clevis to knuckle attachment bolts with special undersized bolts.

(1) Raise the front of vehicle by the frame until the tires are not supporting the weight of the vehicle.

(2) Remove the tire and wheel assembly from the location on the vehicle requiring camber adjustment.

CAUTION: When removing the strut to knuckle bolts from the strut clevis bracket, do not allow knuckle to pull away, putting a strain on the brake flex hose.

CAUTION: The bolts attaching the strut to the steering knuckle are serrated in the area where they go through the steering knuckle and strut. When removing, do not turn the bolts in the steering knuckle. If bolts are turned in the steering knuckle, damage to the steering knuckle will result.

(3) Remove the nuts from the bolts attaching the strut to the knuckle (Fig. 9). Tap the bolts out of the knuckle.

(4) Loosely install the camber adjustment bolts and nuts attaching the strut to the steering knuckle. The bolts should be installed so the nuts are towards the front of the vehicle.

(5) Install the tire and wheel assembly.

(6) If necessary, repeat steps 2 through 5 to the other side of the vehicle.

(7) Lower the vehicle.

(8) Jounce the front and rear of vehicle.

(9) Adjust the front camber to the preferred setting by pushing in or pulling outward on the top of the wheel and tire as required. When camber is correct, tighten the upper and lower strut to knuckle camber adjustment bolts to a torque of 203 N·m (150 ft. lbs.).

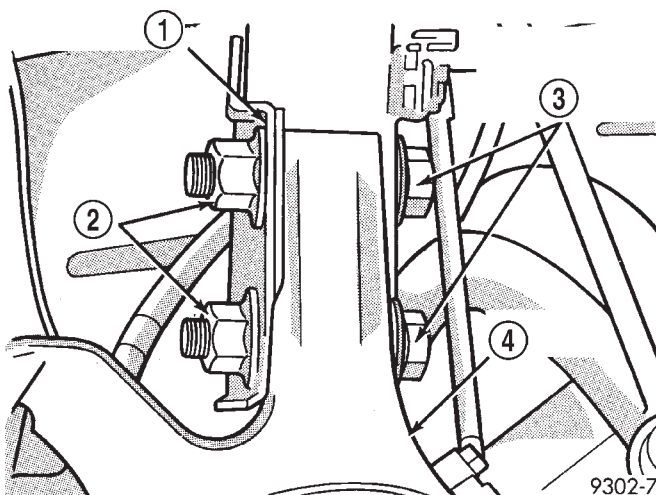


Fig. 9 Strut To Steering Knuckle Attaching Bolts

- 1 - STRUT ASSEMBLY
- 2 - NUTS
- 3 - STRUT ASSEMBLY TO STEERING KNUCKLE ATTACHING BOLTS
- 4 - STEERING KNUCKLE

(10) Proceed to Front Wheel Toe Adjustment and adjust front wheel toe as necessary.

FRONT WHEEL TOE ADJUSTMENT

(1) Center steering wheel and hold it in place using a steering wheel clamp.

(2) Loosen the tie rod adjustment pinch bolt. Rotate the adjustment sleeve to align toe to specifications (Fig. 10).

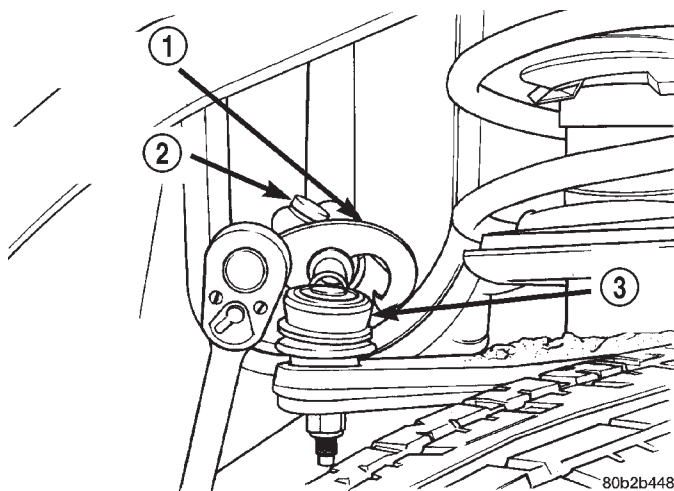
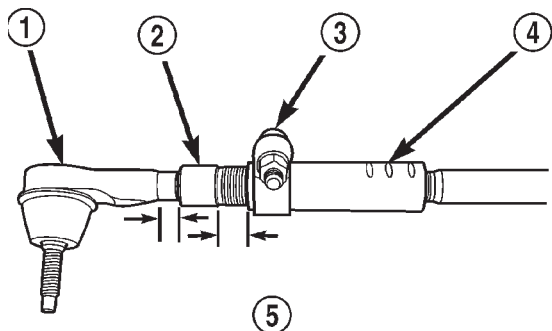


Fig. 10 Front Wheel Toe Adjustment Location

- 1 - ADJUSTMENT TOOL
- 2 - ADJUSTMENT PINCH BOLT
- 3 - TIE ROD END

WHEEL ALIGNMENT (Continued)

CAUTION: When setting toe on vehicle, the maximum dimension of exposed threads allowed on inner and outer tie rod cannot exceed the distance shown (Fig. 11). If the maximum distance is exceeded, inadequate retention of either inner or outer tie rod may result. Ensure that adjustment pinch bolt is torqued to required specification when Toe setting procedure is completed.



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Fig. 11 Tie Rod Thread Engagement Requirements

- 1 - OUTER TIE ROD
- 2 - ADJUSTER
- 3 - PINCH BOLT
- 4 - INNER TIE ROD
- 5 - ALLOWABLE THREADS EXPOSED ON OUTER TIE ROD AND ADJUSTER IS A MAXIMUM OF 20 MILLIMETERS. REFER TO AREA INDICATED ABOVE ON THE OUTER TIE ROD AND ADJUSTER.

CAUTION: When torquing adjustment pinch bolt, the following procedure must be followed to ensure adequate retention of the adjustment sleeve. Not following this procedure, could result in the Toe Setting Adjustment changing and/or loosening of the inner or outer tie rod ends.

NOTE: Use an appropriate tool on neck area of outer tie rod to maintain the correct perpendicular orientation of the tie rod end stud within the tie rod end.

(3) After completion of toe adjustment procedure, tighten tie rod pinch bolt (Fig. 11) to a torque of 38 N·m (28 ft. lbs.).

(1) Road test the vehicle after the initial wheel alignment has been performed. If vehicle still drifts or leads, repeat the front wheel alignment procedure and adjust the camber to bias the cross camber setting opposite of the direction in which the vehicle has the tendency to lead. For example, if the vehicle leads left, compensate by setting left front camber to 0.0° and right front camber up to +0.6°, allowing both sides to remain within camber specifications. The cross camber is still at 0.6° which is within the allowed alignment specification.

STANDARD PROCEDURE - CURB HEIGHT MEASUREMENT

The wheel alignment is to be checked and all alignment adjustments made with the vehicle at its required curb height specification.

Vehicle height is to be checked with the vehicle on a flat, level surface, preferably a vehicle alignment rack. The tires are to be inflated to the recommended pressure. All tires are to be the same size as standard equipment. Vehicle height is checked with the fuel tank full of fuel, and no passenger or luggage compartment load.

Vehicle height is not adjustable. If measurement is not within specifications, inspect vehicle for bent or weak suspension components. Compare parts tag on suspect coil spring(s) to parts book and vehicle sales code, checking for a match. Once removed from vehicle, compare coil spring height to a correct new or known good coil spring. The heights should vary if the suspect spring is weak.

(1) Measure from the inboard edge of the wheel opening fender lip directly above the wheel center (spindle), to the floor or alignment rack surface.

(2) When measuring, maximum left-to-right differential is not to exceed 20 mm (0.79 in.).

(3) Compare measurements to specifications listed in the following chart.

CURB HEIGHT SPECIFICATIONS

VEHICLE	FRONT	REAR
CONCORDE/LHS/300M	739 mm ± 20 mm	754 mm ± 20 mm
	29.09 in. ± 0.79 in.	29.68 in. ± 0.79 in.
INTREPID	729 mm ± 20 mm	735 mm ± 20 mm
	28.70 in. ± 0.79 in.	28.93 in. ± 0.79 in.

WHEEL ALIGNMENT (Continued)

SPECIFICATIONS

WHEEL ALIGNMENT

NOTE: All wheel alignments are to be set with the vehicle at curb height. Refer to CURB HEIGHT MEASUREMENT.

NOTE: All specifications are given in degrees.

FRONT WHEEL ALIGNMENT	PREFERRED SETTING	ACCEPTABLE RANGE
CAMBER	0.00°	-0.60° to +0.60°
Cross Camber (Maximum Side-To-Side Difference)	0.00°	0.70°
CASTER	+3.00°	+2.00° to +4.00°
Cross Caster (Maximum Side-To-Side Difference)	0.00°	1.00°
TOTAL TOE*	0.00°	-0.20° to +0.20°
REAR WHEEL ALIGNMENT	PREFERRED SETTING	ACCEPTABLE RANGE
CAMBER	-0.20°	-0.70° to +0.30°
TOTAL TOE*	+0.10°	-0.20° to +0.40°
THRUST ANGLE	0.00°	-0.15° to +0.15°
NOTE: *TOTAL TOE is the sum of both the left and right wheel toe settings. TOTAL TOE must be equally split between each front wheel to ensure the steering wheel is centered after setting toe. Positive (+) is Toe-in, Negative (-) is Toe-out.		

DRIVELINE

HALFSHAFT

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HALFSHAFT

DESCRIPTION

The front halfshaft assemblies are flexible assemblies consisting of an inner and outer flexible joint connected by an solid shaft (Fig. 1) (Fig. 2). Trans-axle packaging and location requires the use of unequal length halfshafts, with the left shaft being longer than the right.

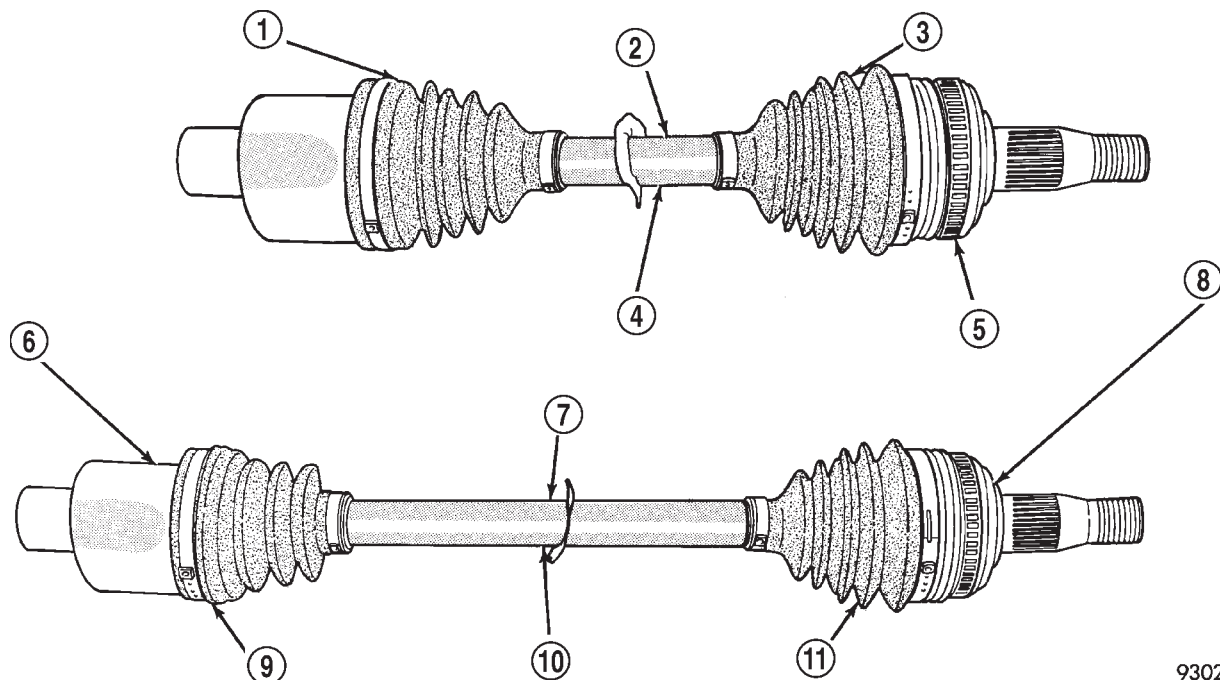
The inner joints are of a tripod design (Fig. 2), and allow for axial and angular movement to accommodate for shifting of powertrain and suspension components. The inner joints incorporate a female spline which install over the transaxle stub shafts.

The outer joints are of a Rzeppa design (Fig. 2), and only offer angular flexibility. The outer joints incorporate a male spline, which connect to the wheel hub/bearing. The outer joint is fastened to the hub to ensure that there is no axial movement (end-play).

Both inner and outer joints utilize flexible “boots” (Fig. 1) (Fig. 2) which maintain grease within the joints, protect the joints from the environment/elements, and facilitate the axial and angular movement of the joints. The inner joint boots are constructed of silicone rubber. The outer boots are made of Hytrel plastic.

NOTE: When halfshaft boots are replaced be sure boots of the correct material are used.

HALFSHAFT (Continued)



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Fig. 1 Front Halfshaft Assemblies

- 1 - INNER BOOT
- 2 - INTERCONNECTING SHAFT
- 3 - OUTER BOOT
- 4 - RIGHT HALF SHAFT
- 5 - TONE WHEEL
(WHEN EQUIPPED WITH ABS)
- 6 - INNER TRIPOD JOINT

- 7 - INTERCONNECTING SHAFT
- 8 - OUTER RZEPPA JOINT
- 9 - INNER BOOT
- 10 - LEFT HALF SHAFT
- 11 - OUTER BOOT

OPERATION

Halfshaft assemblies are designed to transmit power from the transaxle to the front wheels, while allowing for powertrain and suspension flex.

DIAGNOSIS AND TESTING - DRIVELINE**HALFSHAFT VISUAL INSPECTION**

(1) Check for grease in the vicinity of the inboard tripod joint and outboard C/V joint; this is a sign of inner or outer joint seal boot or seal boot clamp damage.

(2) A light film of grease may appear on the inner tripod joint seal boot; this is considered normal and should not require replacement of the seal boot. All inner tripod joint seal boots are made of silicone rubber; which will allow the weeping (sweating) of the joint lubricant to pass through it while in operation.

NOISE AND/OR VIBRATION IN TURNS

A clicking noise and/or a vibration in turns could be caused by one of the following conditions:

(1) Damaged outer C/V or inner tripod joint seal boot or seal boot clamps. This will result in the loss

and/or contamination of the joint grease, resulting in inadequate lubrication of the joint.

(2) Noise may also be caused by another component of the vehicle coming in contact with the halfshafts.

CLUNKING NOISE DURING ACCELERATION

This noise may be a result of one of the following conditions:

(1) A torn seal boot on the inner or outer joint of the halfshaft assembly.

(2) A loose or missing clamp on the inner or outer joint of the halfshaft assembly.

(3) A damaged or worn halfshaft C/V joint.

SHUDDER OR VIBRATION DURING ACCELERATION

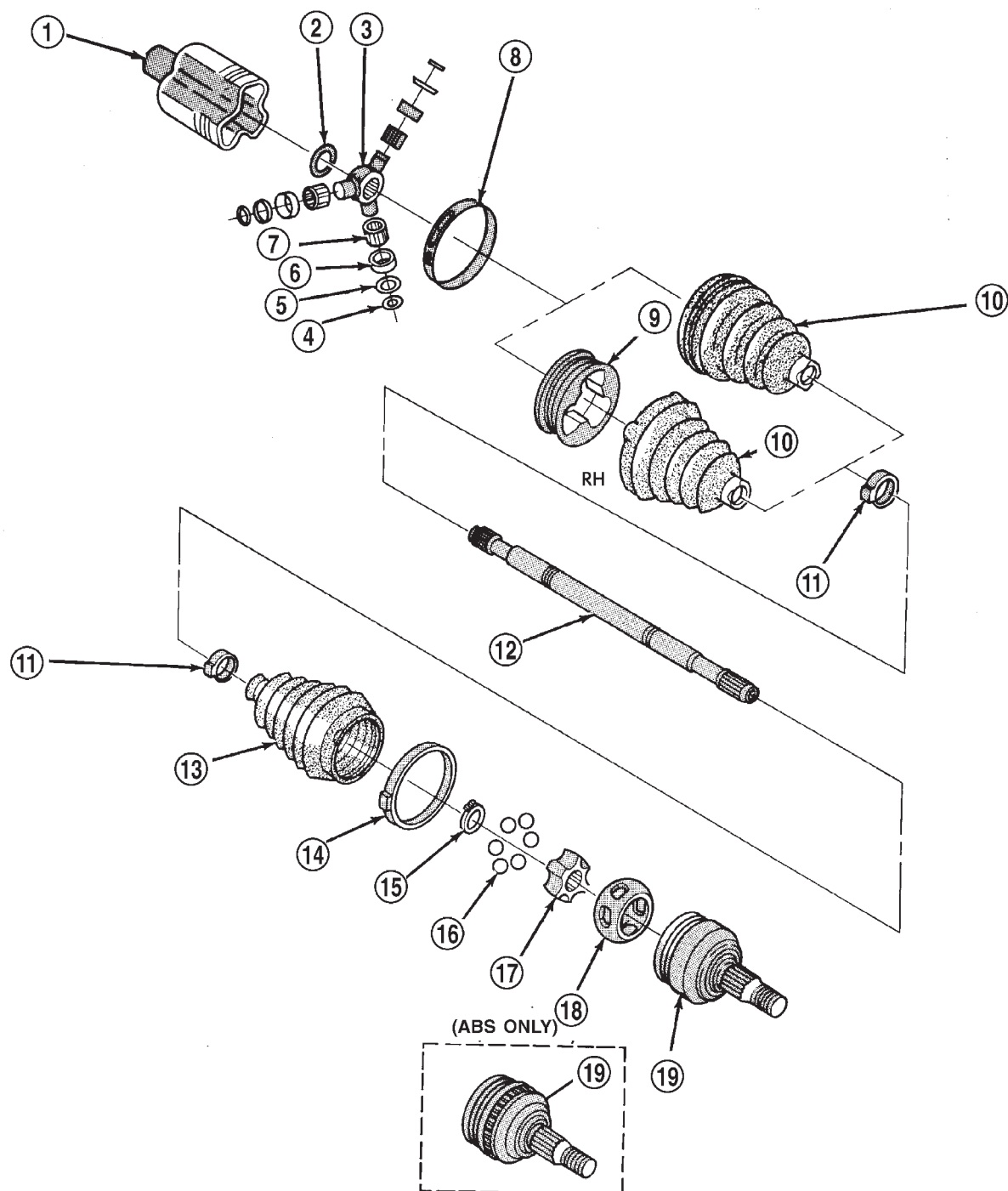
This problem could be a result of:

(1) A worn or damaged halfshaft inner tripod joint.

(2) A sticking tripod joint spider assembly (inner tripod joint only).

(3) Improper wheel alignment. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

HALFSHAFT (Continued)

**Fig. 2 Halfshaft Component Identification**

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- 1 - HOUSING ASM, RETAINER
- 2 - RING, SPACER
- 3 - SPIDER, TRIPOD JOINT
- 4 - RING, RETAINING
- 5 - RETAINER, BALL & ROLLER
- 6 - BALL, TRIPOD JOINT
- 7 - ROLLER, NEEDLE
- 8 - CLAMP, SEAL RETAINING
- 9 - BUSHING, TRILOBAL TRIPOD
- 10 - SEAL, DRIVE AXLE INBOARD

- 11 - CLAMP, SEAL RETAINING
- 12 - SHAFT, AXLE (RH SHOWN, LH SIMILAR)
- 13 - SEAL, DRIVE AXLE OUTBOARD
- 14 - CLAMP, SEAL RETAINING
- 15 - RING, RACE RETAINING
- 16 - BALL, CHROME ALLOY
- 17 - RACE, C/V JOINT INNER
- 18 - CAGE, C/V JOINT
- 19 - RACE, C/V JOINT OUTER

HALFSHAFT (Continued)

VIBRATION AT HIGHWAY SPEEDS

This problem could be a result of:

- (1) Foreign material (mud, snow, etc.) packed on the backside of the wheel(s).
- (2) Out of balance front tires or wheels. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)
- (3) Improper tire and/or wheel runout. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

REMOVAL

- (1) Raise vehicle on jackstands or centered on a frame contact type hoist.
- (2) Remove the front wheel and tire assembly from the vehicle.
- (3) Remove the front caliper assembly from the front steering knuckle assembly (Fig. 3).

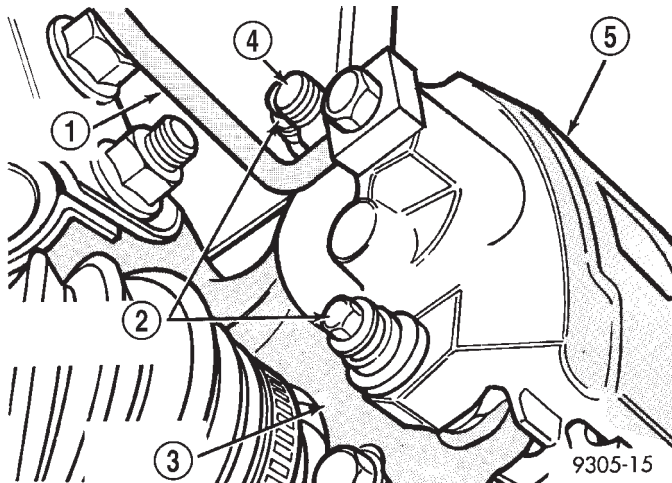


Fig. 3 Disc Brake Caliper Mounting

- 1 - BRAKE LINE
- 2 - CALIPER GUIDE PIN BOLTS
- 3 - STEERING KNUCKLE
- 4 - BLEEDER SCREW
- 5 - CALIPER ASSEMBLY

(4) Remove front braking disk (rotor) from hub, by pulling it straight off wheel mounting studs (Fig. 4).

(5) Remove the speed sensor cable routing bracket from the strut assembly (Fig. 5).

(6) Remove the hub and bearing-to-stub axle retaining nut (Fig. 6).

(7) Dislodge inner tripod joint from stub shaft retaining snap ring on transaxle assembly (Fig. 7). Inner tripod joint is dislodged from stub shaft retaining snap ring, by inserting a pry bar between trans-axle case and inner tripod joint and prying on tripod joint. **Only disengage the inner tripod joint from the retaining snap ring. Do not attempt to remove the inner tripod joint from the transmission stub shaft at this time.**

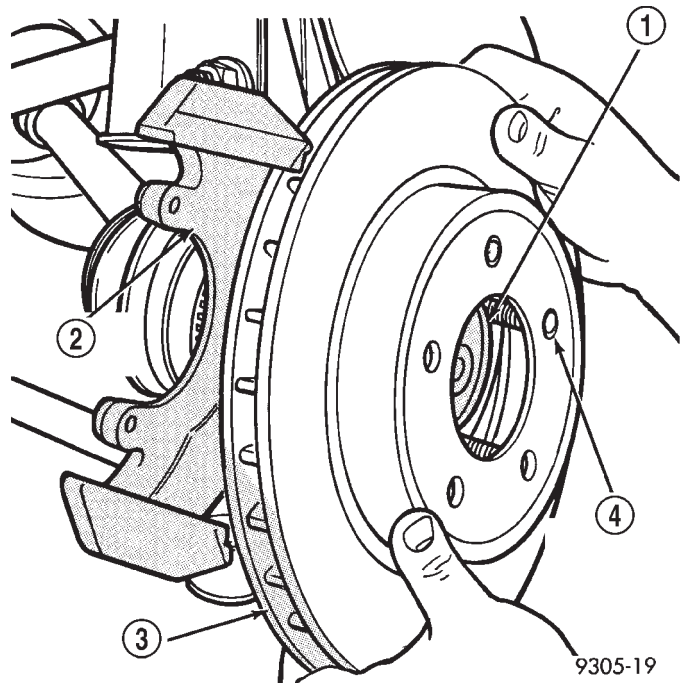


Fig. 4 Removing Braking Disc

- 1 - HUB
- 2 - STEERING KNUCKLE
- 3 - BRAKE ROTOR (DISC)
- 4 - WHEEL MOUNTING STUD

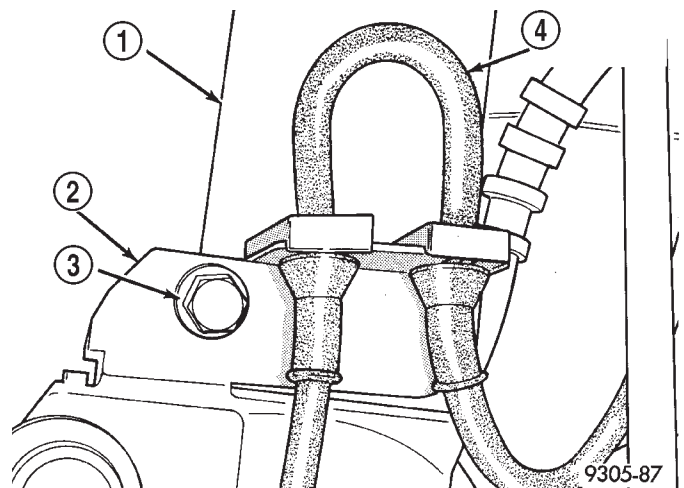
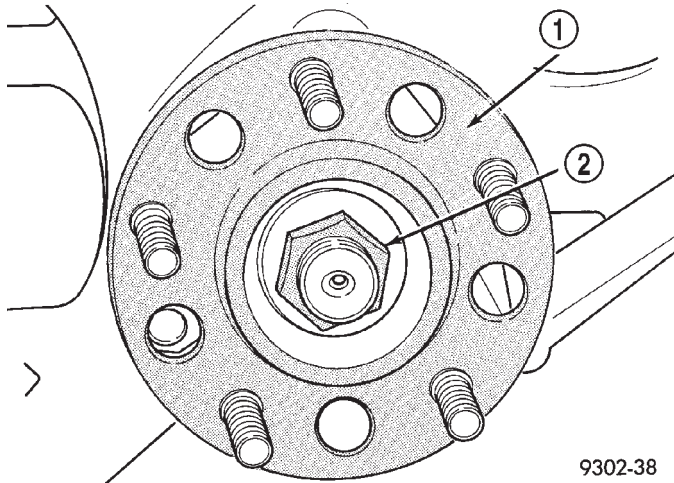


Fig. 5 Speed Sensor Cable Routing Bracket

- 1 - STRUT ASSEMBLY
- 2 - ROUTING BRACKET
- 3 - SCREW
- 4 - SPEED SENSOR CABLE

CAUTION: The strut assembly to steering knuckle bolts are serrated where they go through strut assembly and steering knuckle. When removing bolts, turn nuts off bolts. **DO NOT TURN BOLTS IN STEERING KNUCKLE.** If bolts are turned, damage to steering knuckle will result.

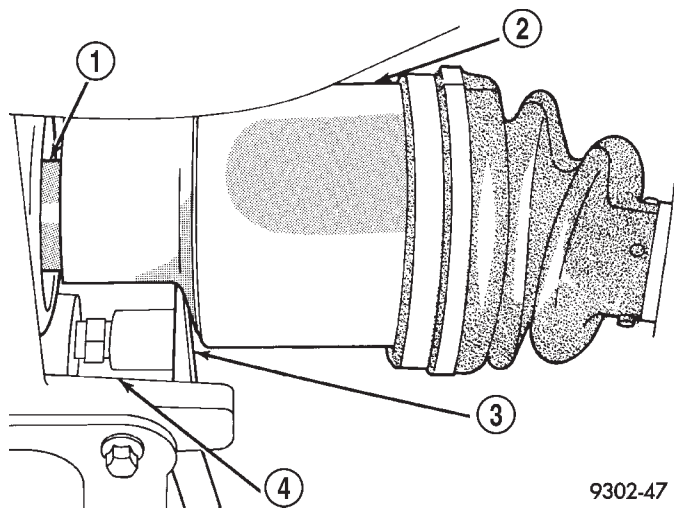
HALFSHAFT (Continued)



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Fig. 6 Hub And Bearing To Stub Axle Retaining Nut

- 1 - HUB/BEARING ASSEMBLY
- 2 - NUT



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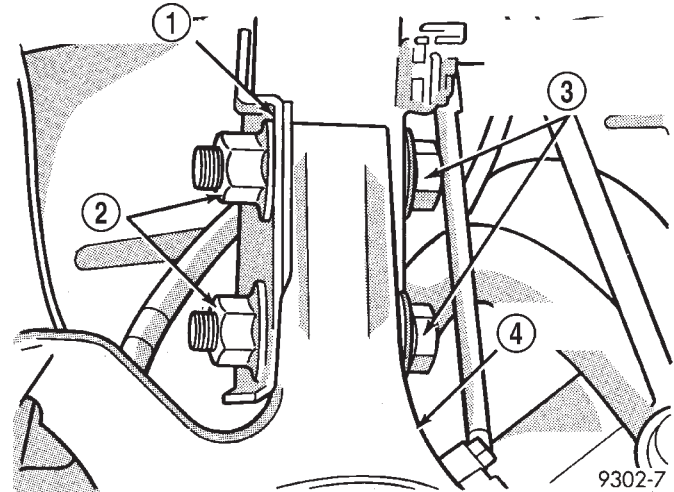
Fig. 7 Inner Tripod Joint Removal from Stub Shaft

- 1 - TRANSMISSION STUB SHAFT
- 2 - INNER TRIPOD JOINT
- 3 - PRY BAR
- 4 - TRANSAXLE

(8) Remove the strut assembly to steering knuckle attaching bolts (Fig. 8).

(9) Remove the top of the steering knuckle from the strut assembly.

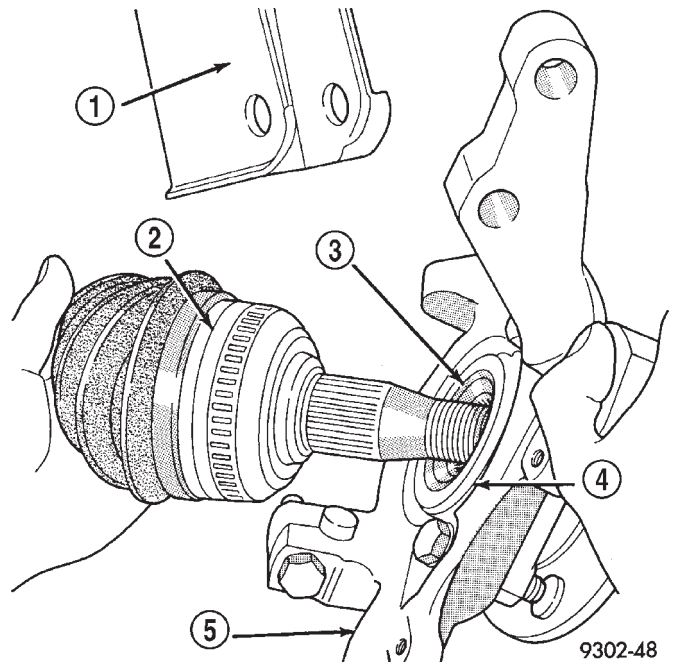
(10) Hold outer C/V joint assembly with one hand. Grasp steering knuckle with other and rotate it out and to the rear of the vehicle, until outer C/V joint clears hub and bearing assembly (Fig. 9).



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Fig. 8 Strut Assembly To Steering Knuckle Attaching Bolts

- 1 - STRUT ASSEMBLY
- 2 - NUTS
- 3 - STRUT ASSEMBLY TO STEERING KNUCKLE ATTACHING BOLTS
- 4 - STEERING KNUCKLE



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Fig. 9 Outer C/V Joint Removal From Hub and Bearing

- 1 - STRUT ASSEMBLY
- 2 - OUTER C/V JOINT
- 3 - HUB/BEARING ASSEMBLY
- 4 - FLINGER DISK
- 5 - STEERING KNUCKLE

HALFSHAFT (Continued)

(11) Remove driveshaft inner tripod joint from transaxle stub shaft. **When removing driveshaft, do not pull on interconnecting shaft to remove inner tripod joint from stub shaft. Removal in this manner will separate the spider assembly from the tripod joint housing.** Grasp inner tripod joint (Fig. 10) and interconnecting shaft and pull on both pieces at the same time.

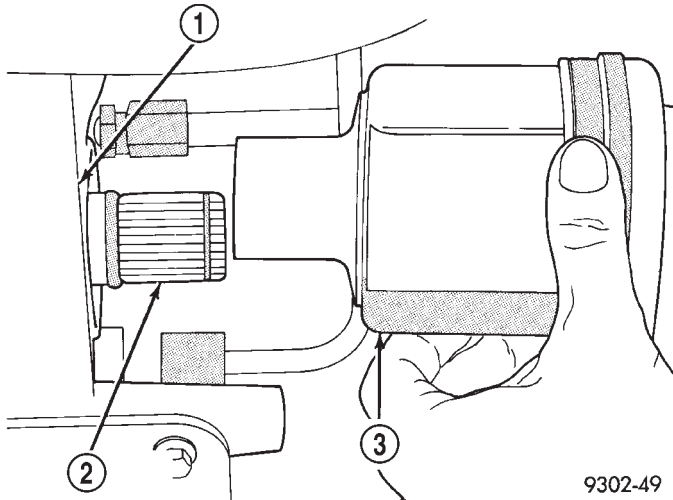


Fig. 10 Inner Tripod Joint Removal From Stub Shaft

- 1 - TRANSAXLE
- 2 - TRANSMISSION STUB SHAFT
- 3 - INNER TRIPOD JOINT

INSTALLATION

CAUTION: The inboard tripod joint retaining circlip and O-ring seal (Fig. 11) on the transaxle stub shaft are not re-usable. Whenever the inboard tripod joint is removed from the stub shaft, the retaining circlip and O-ring seal **MUST BE REPLACED**. The retaining circlip and O-ring seal is included in all service kits requiring removal of the inboard tripod joint from the stub shaft.

(1) Replace O-ring seal and tripod joint retaining circlip (Fig. 11) on the transaxle stub shaft.

(2) Evenly apply a bead of grease, such as Mopar Multi-Purpose Lubricant or an equivalent, around spline of inner tripod joint (Fig. 12) where the O-ring seats against tripod joint. This will spread grease onto stub shaft during tripod joint installation preventing corrosion and help to seal the O-ring.

(3) Install driveshaft through hole in splash shield. Grasp inner tripod joint in one hand and interconnecting shaft in the other. Align inner tripod joint spline with stub shaft spline on transaxle (Fig. 13). Use a rocking motion with the inner tripod joint, to get it past the circlip on the transaxle stub shaft.

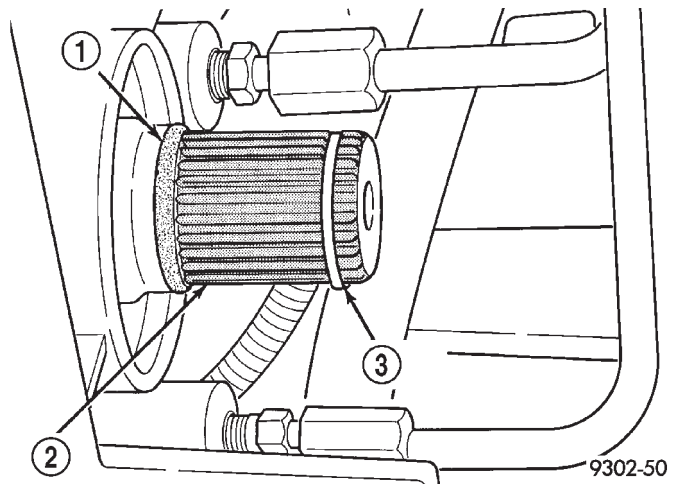
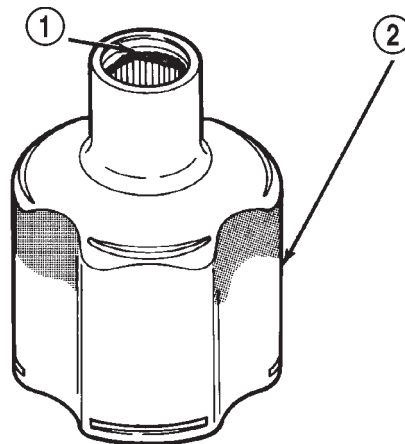


Fig. 11 Tripod Joint Retaining Circlip And O-Ring Seal

- 1 - O-RING SEAL
- 2 - STUB SHAFT
- 3 - RETAINING CIR CLIP



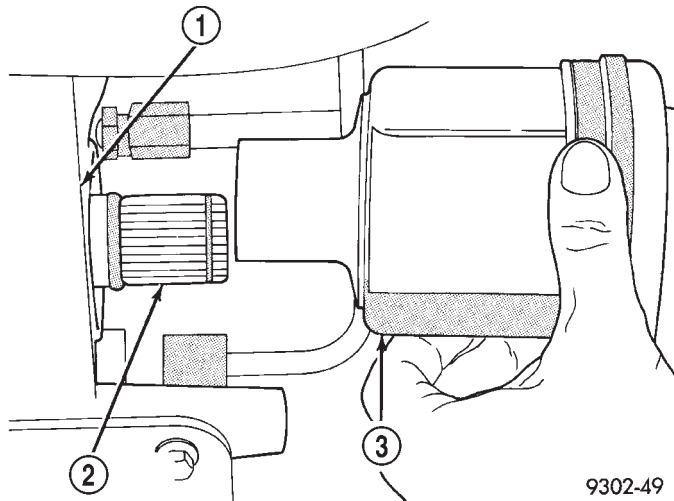
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Fig. 12 Grease Applied To Inner Tripod Joint Housing Spline

- 1 - APPLY 1 MILLILITER BEAD OF GREASE HERE
- 2 - INNER TRIPOD JOINT HOUSING

(4) Continue pushing tripod joint onto transaxle stub shaft until it stops moving. The O-ring seal on the stub should not be visible when inner tripod joint is fully installed on stub shaft. **To check that inner tripod joint retaining circlip is locked into tripod joint, grasp inner tripod joint and pull on it by hand. If circlip is locked into tripod joint, tripod joint will not move on stub shaft.**

HALFSHAFT (Continued)

**Fig. 13 Inner Tripod Joint Installation On Stub Shaft**

- 1 - TRANSAXLE
- 2 - TRANSMISSION STUB SHAFT
- 3 - INNER TRIPOD JOINT

CAUTION: When installing outer C/V joint into the hub and bearing assembly, do not allow the flinger disk on hub and bearing assembly to become damaged. Damage to the flinger disk can cause dirt and water intrusion into bearing and premature bearing failure.

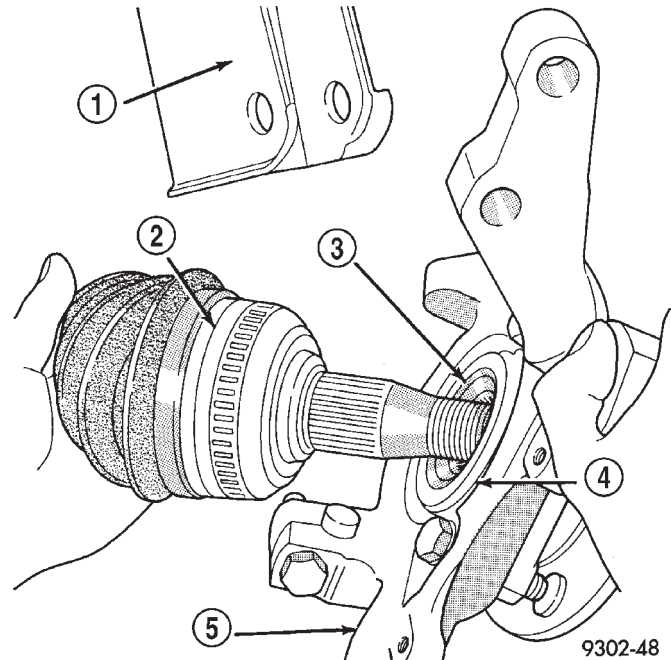
(5) Hold outer C/V joint assembly with one hand. Grasp steering knuckle with other hand and rotate it out and to the rear of the vehicle. Install outer C/V joint into the hub and bearing assembly (Fig. 14).

(6) Install the top of the steering knuckle into the strut assembly. Align the steering knuckle to strut assembly mounting holes.

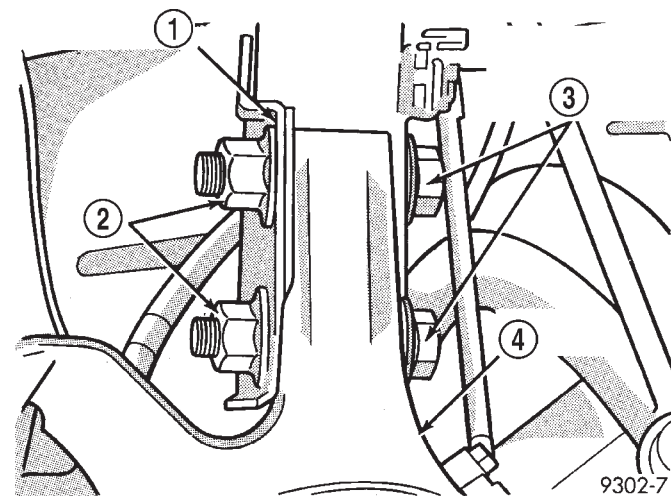
CAUTION: The strut assembly to steering knuckle bolts are serrated where they go through strut assembly and steering knuckle. When installing bolts, turn nuts onto bolts. **DO NOT TURN BOLTS IN STEERING KNUCKLE.** If bolts are turned, damage to steering knuckle will result.

(7) Install the strut assembly to steering knuckle attaching bolts. Install nuts on attaching bolts (Fig. 15). Tighten the strut assembly to steering knuckle bolt nuts to 210 N·m (155 ft. lbs.). **TURN NUTS ON BOLTS. DO NOT TURN BOLTS.**

CAUTION: The hub and bearing assembly to stub shaft retaining nut is a prevailing torque nut and can not be re-used. A **NEW** retaining nut **MUST** be used when assembled.

**Fig. 14 Outer C/V Joint Installation Into Hub and Bearing**

- 1 - STRUT ASSEMBLY
- 2 - OUTER C/V JOINT
- 3 - HUB/BEARING ASSEMBLY
- 4 - FLINGER DISK
- 5 - STEERING KNUCKLE

**Fig. 15 Strut Assembly to Steering Knuckle Attaching Bolts**

- 1 - STRUT ASSEMBLY
- 2 - NUTS
- 3 - STRUT ASSEMBLY TO STEERING KNUCKLE ATTACHING BOLTS
- 4 - STEERING KNUCKLE

HALFSHAFT (Continued)

(8) Install a **NEW** retaining nut (Fig. 16). **Tighten, but do not torque the hub nut at this time.**

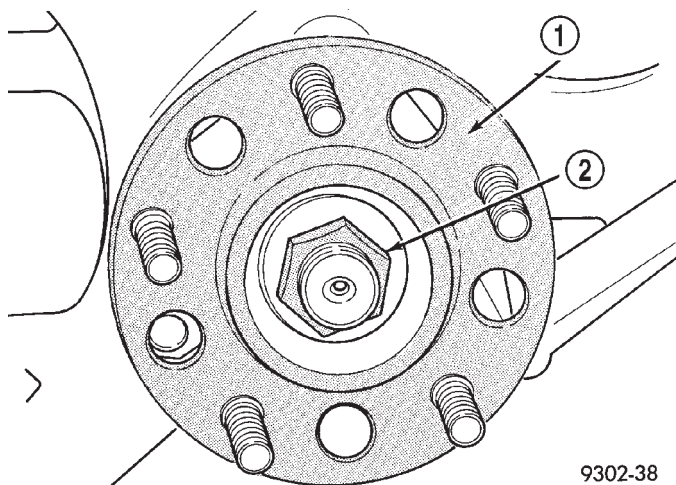


Fig. 16 Hub And Bearing To Stub Axle Retaining Nut

- 1 - HUB/BEARING ASSEMBLY
2 - NUT

(9) Install speed sensor cable routing bracket on front strut assembly. Install and securely tighten routing bracket screw.

(10) Install the braking disk on the hub and bearing assembly (Fig. 17).

(11) Install front brake caliper over braking disc and align with caliper mounting holes on steering knuckle (Fig. 18). Install the caliper to steering knuckle bolts. Tighten bolts to 22 N·m (192 in. lbs.).

(12) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence (Fig. 19), until all nuts are tightened to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(13) Lower vehicle to the ground.

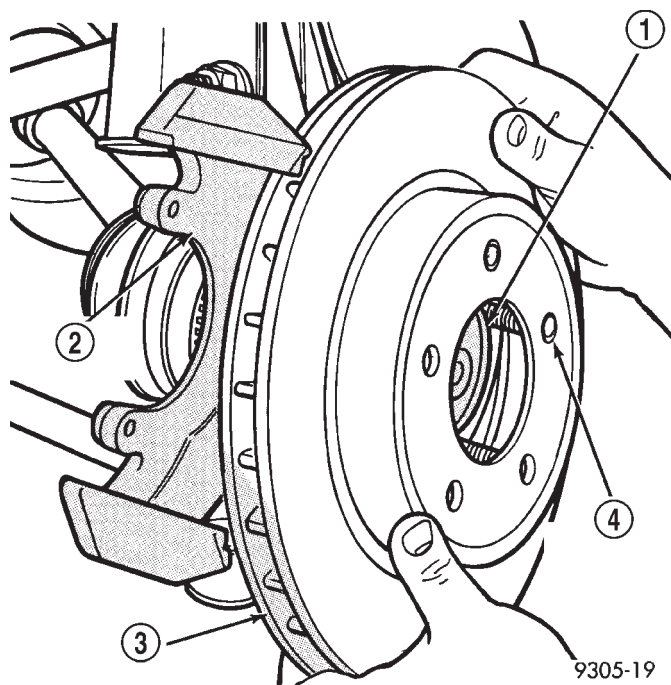


Fig. 17 Installing Brake Rotor

- 1 - HUB
2 - STEERING KNUCKLE
3 - BRAKE ROTOR (DISC)
4 - WHEEL MOUNTING STUD

CAUTION: When tightening hub and bearing assembly to stub shaft retaining nut, do not exceed the maximum torque of 142 N·m (105 ft. lbs.). If the maximum torque is exceeded this may result in a failure of the driveshaft.

(14) Apply the vehicle's brakes to keep vehicle from moving. Tighten the **NEW** stub shaft to hub and bearing assembly retaining nut to 142 N·m (105 ft. lbs.) (Fig. 20).

SPECIFICATIONS

TORQUE

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Bolt, Caliper-to-Knuckle	22		192
Bolt, Knuckle-to-Strut	210	155	
Nut, Front Wheel Lug	135	100	
Nut, Halfshaft	142	105	
Nut, Tie Rod End-to-Knuckle	37	27	

HALFSHAFT (Continued)

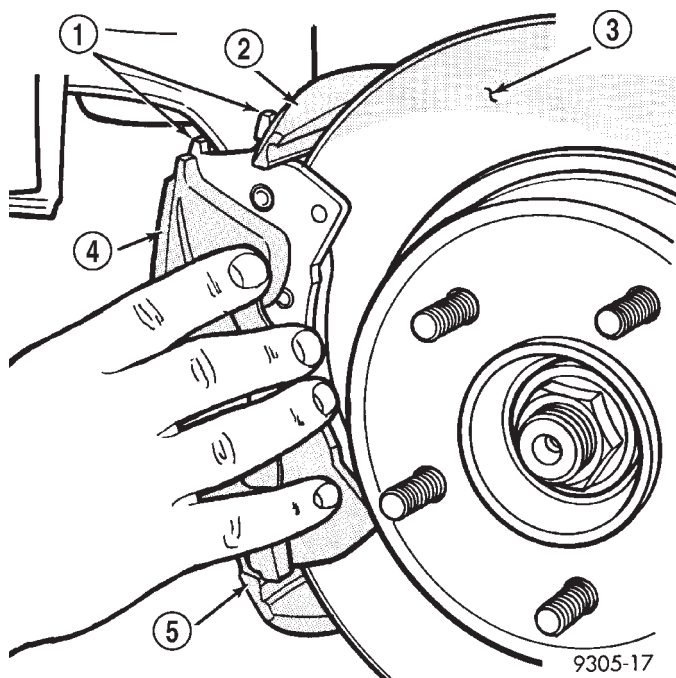


Fig. 18 Disc Brake Caliper Mounting

- 1 - BRAKE SHOES
- 2 - STEERING KNUCKLE
- 3 - BRAKING DISC
- 4 - CALIPER ASSEMBLY
- 5 - MACHINED ABUTMENT

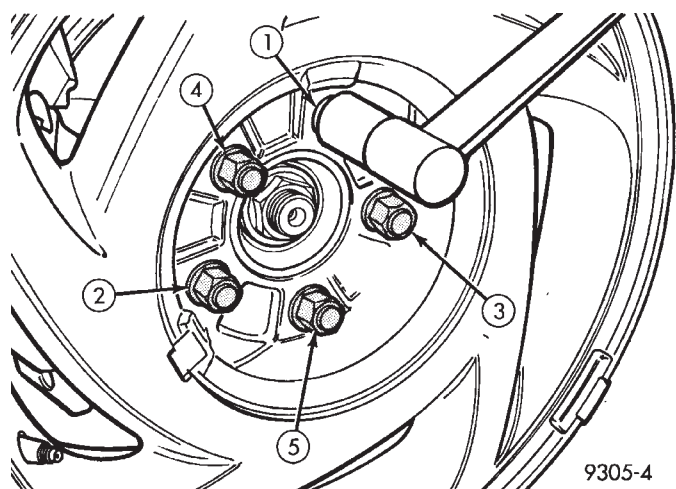


Fig. 19 Tightening Wheel Nuts

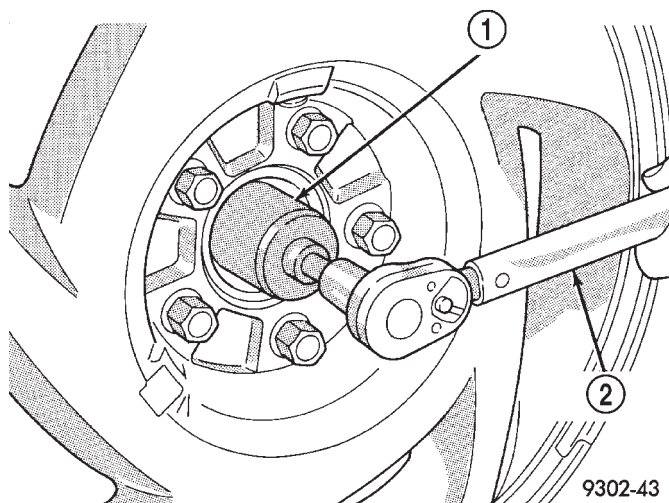
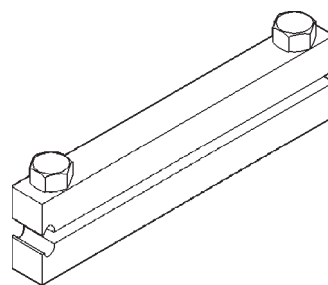


Fig. 20 Tighten Hub And Bearing Retaining Nut

- 1 - HUB/BEARING
- 2 - TORQUE WRENCH

SPECIAL TOOLS

DRIVELINE



Boot Clamp Installer C-4975A

CV BOOT-INNER

REMOVAL

To remove sealing boots from halfshafts for replacement, the halfshaft assemblies must be removed from the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL) (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

(1) Remove the halfshaft requiring boot replacement from the vehicle.

(2) Remove large boot clamp which retains inner tripod joint sealing boot to tripod joint housing (Fig. 21) and discard. Remove small clamp which retains inner tripod joint sealing boot to interconnecting shaft and discard. Remove the sealing boot from the tripod housing and slide it down the interconnecting shaft.

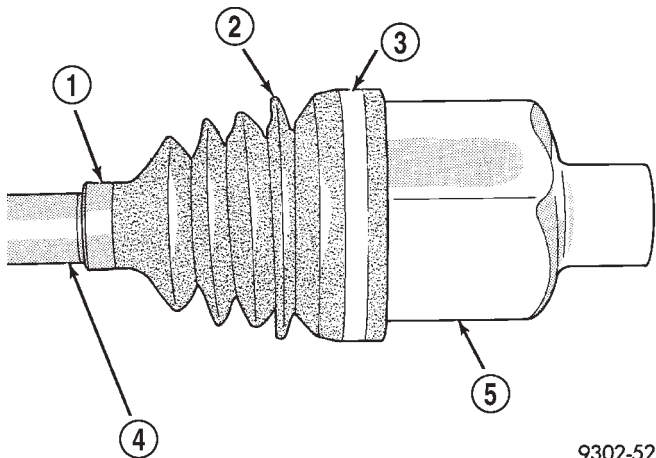


Fig. 21 Inner Tripod Joint Sealing Boot Clamps

- 1 - SMALL CLAMP
- 2 - SEALING BOOT
- 3 - LARGE CLAMP
- 4 - INTERCONNECTING SHAFT
- 5 - INNER TRIPOD JOINT

CAUTION: When removing the spider joint from the tripod joint housing. Hold the rollers in place on the spider trunions to prevent the rollers and needle bearings from falling away.

(3) Slide the interconnecting shaft and spider assembly out of the tripod joint housing (Fig. 22).

(4) Remove snap ring which retains spider assembly to interconnecting shaft (Fig. 23). Then remove the spider assembly from interconnecting shaft. If spider assembly will not come off interconnecting shaft by hand, it can be removed by tapping the end of the spider body with a brass drift. **Do not hit the outer tripod bearings in an attempt to remove spider assembly from interconnecting shaft.**

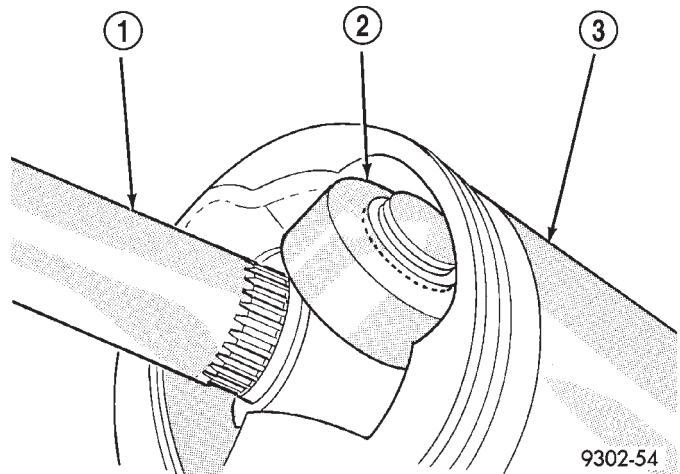


Fig. 22 Spider Joint Assembly Removal From Housing

- 1 - INTERCONNECTING SHAFT
- 2 - SPIDER ASSEMBLY
- 3 - TRIPOD JOINT HOUSING

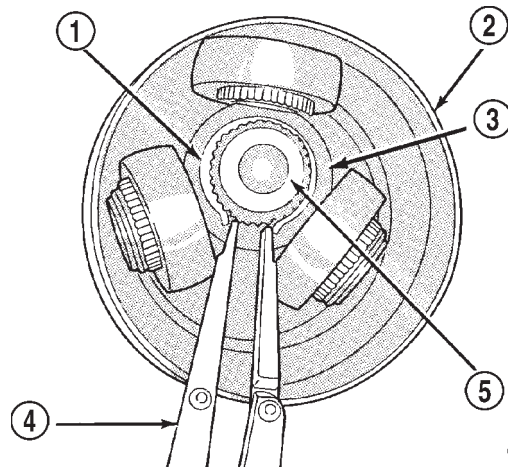


Fig. 23 Spider Assembly Retaining Snap Ring

- 1 - SNAP RING
- 2 - SEALING BOOT
- 3 - SPIDER ASSEMBLY
- 4 - SNAP RING PLIERS
- 5 - INTERCONNECTING SHAFT

(5) Slide failed sealing boot off the interconnecting shaft.

(6) Thoroughly clean and inspect spider assembly, tripod joint housing and interconnecting shaft for any signs of excessive wear. **If any parts show signs of excessive wear, the halfshaft assembly will require replacement. Component parts of the assemblies are not serviceable.**

CV BOOT-INNER (Continued)

INSTALLATION

NOTE: The inner tripod joint sealing boots are made of silicone rubber which is soft and pliable. The replacement sealing boot **MUST BE** the same type of material as the sealing boot which was removed.

(1) Slide inner tripod joint seal boot retaining clamp, onto interconnecting shaft. Then slide replacement inner tripod joint sealing boot onto the interconnecting shaft. **Inner tripod joint seal boot MUST be positioned on interconnecting shaft, so only the thinnest (sight) groove on interconnecting shaft is visible (Fig. 24).**

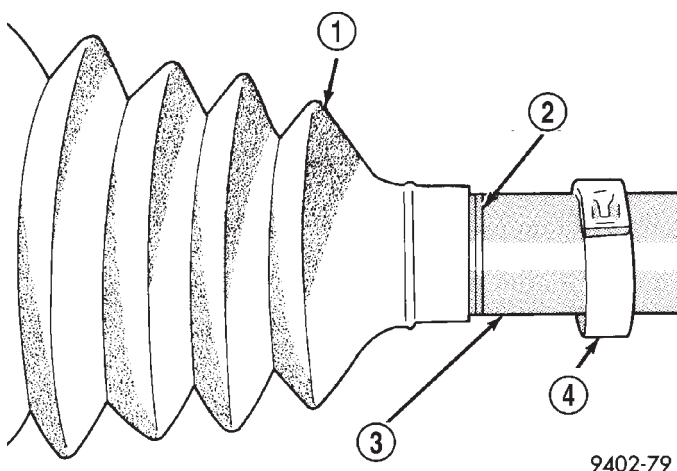


Fig. 24 Seal Boot Correctly Positioned On Interconnecting Shaft

- 1 - SEALING BOOT
- 2 - INTERCONNECTING SHAFT THINNEST GROOVE
- 3 - INTERCONNECTING SHAFT
- 4 - BOOT CLAMP

(2) Install the spider assembly onto the interconnecting shaft. Spider assembly must be installed on interconnecting shaft far enough to fully install the retaining snap ring. If spider assembly will not fully install on interconnecting shaft by hand, it can be installed by tapping the spider body with a brass drift. **Do not hit the outer tripod bearings in an attempt to install spider assembly on interconnecting shaft.**

(3) Install the spider assembly to interconnecting shaft retaining snap ring into groove on end of interconnecting shaft (Fig. 25). Verify the snap ring is fully seated into groove on interconnecting shaft.

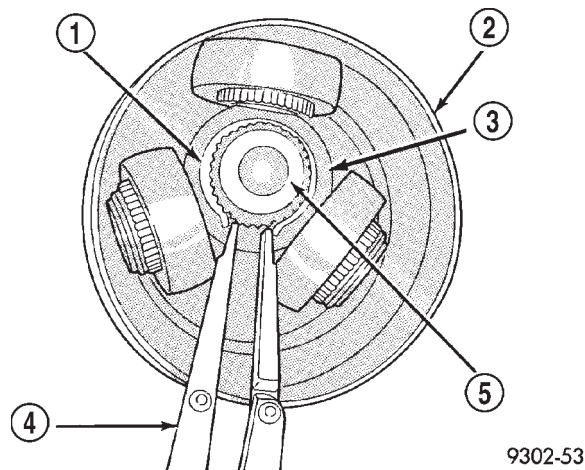


Fig. 25 Spider Assembly Retaining Snap Ring

- 1 - SNAP RING
- 2 - SEALING BOOT
- 3 - SPIDER ASSEMBLY
- 4 - SNAP RING PLIERS
- 5 - INTERCONNECTING SHAFT

(4) Distribute 1/2 the amount of grease provided in the seal boot service package (**DO NOT USE ANY OTHER TYPE OF GREASE**) into tripod housing. Put the remaining amount into the sealing boot.

(5) Slide the spider assembly and the interconnecting shaft into the tripod joint housing (Fig. 26).

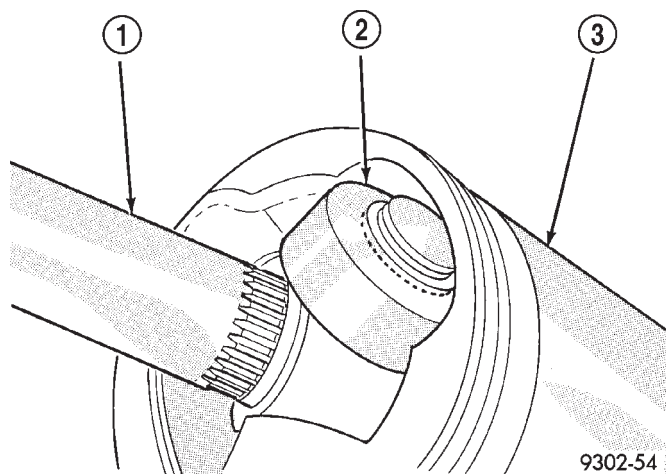


Fig. 26 Spider Assembly Installed in Housing

- 1 - INTERCONNECTING SHAFT
- 2 - SPIDER ASSEMBLY
- 3 - TRIPOD JOINT HOUSING

(6) Install inner tripod joint seal boot to interconnecting shaft clamp evenly on sealing boot.

CV BOOT-INNER (Continued)

(7) Clamp sealing boot onto interconnecting shaft using Crimper, Special Tool C-4975 and the following procedure. Place crimping tool C-4975 over bridge of clamp (Fig. 27). Tighten nut on crimping tool C-4975 until jaws on tool are closed completely together, face to face (Fig. 28).

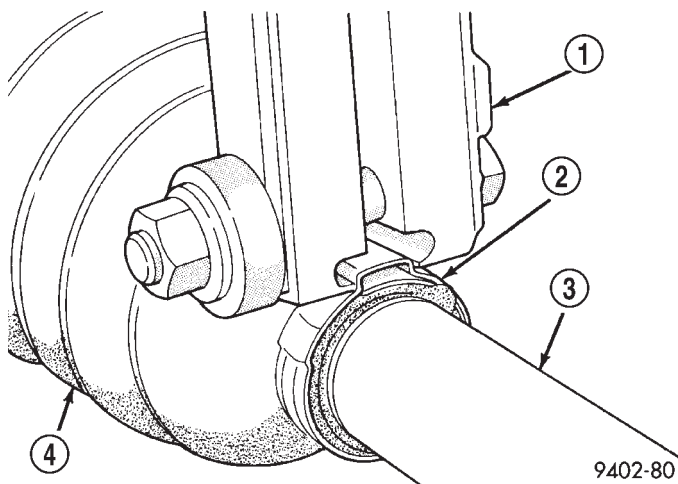


Fig. 27 Crimping Tool Installed On Sealing Boot Clamp

- 1 - SPECIAL TOOL C-4975
- 2 - SEALING BOOT CLAMP
- 3 - INTERCONNECTING SHAFT
- 4 - SEALING BOOT

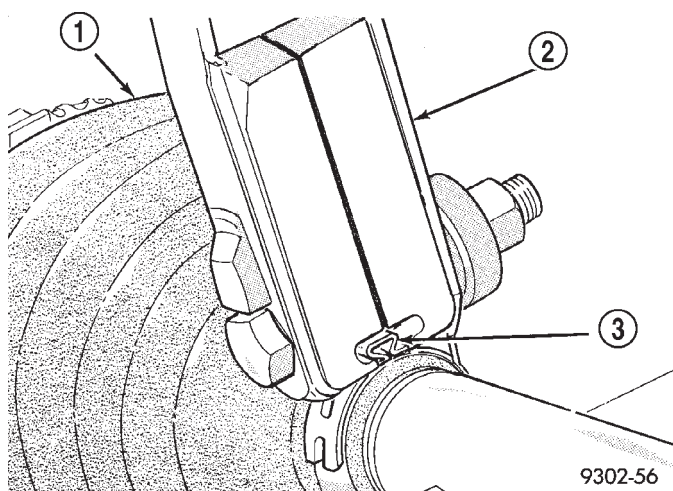


Fig. 28 Sealing Boot Retaining Clamp Installed

- 1 - SEALING BOOT
- 2 - SPECIAL TOOL C-4975
- 3 - CLAMP BRIDGE

CAUTION: Seal must not be dimpled, stretched or out of shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

(8) Position the sealing boot into the tripod housing retaining groove (Fig. 29). Install seal boot retaining clamp evenly on sealing boot.

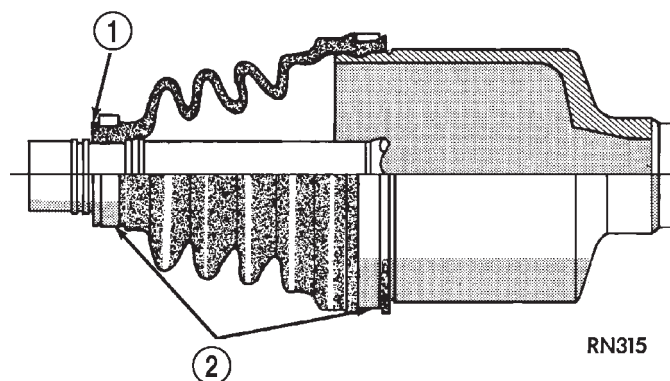


Fig. 29 Boot and Clamp Positioning

- 1 - POSITION ON FLAT BETWEEN LOCATING SHOULDERS
- 2 - CLAMPS

(9) Clamp sealing boot onto tripod housing using Crimper, Special Tool C-4975 and the following procedure. Place crimping tool C-4975 over bridge of clamp. Tighten nut on crimping tool C-4975 until jaws on tool are closed completely together, face to face.

(10) Install the halfshaft back into the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

CV BOOT-OUTER

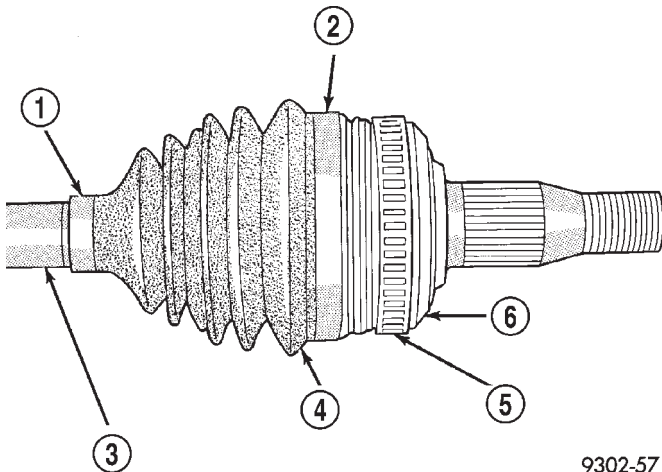
REMOVAL

To remove sealing boots from halfshafts for replacement, the halfshaft assemblies must be removed from the vehicle.

(1) Remove the halfshaft requiring boot replacement from the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - REMOVAL) (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

(2) Remove large boot clamp, retaining C/V joint sealing boot, to C/V joint housing (Fig. 30) and discard. Remove small clamp which retains outer C/V joint sealing boot to interconnecting shaft and discard. Remove sealing boot from outer C/V joint housing and slide it down interconnecting shaft.

CV BOOT-OUTER (Continued)

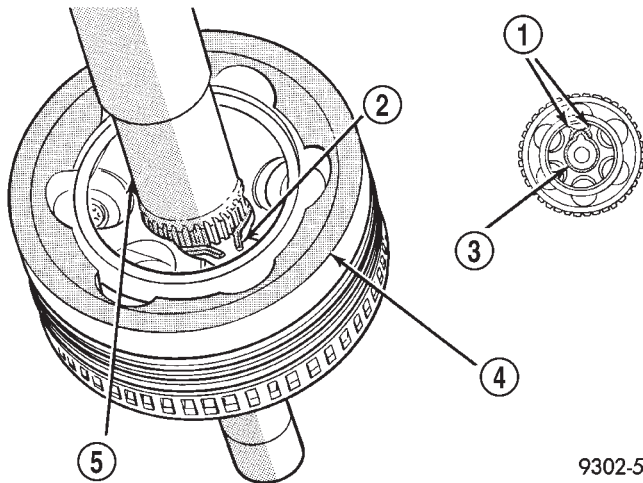


9302-57

Fig. 30 Outer C/V Joint Seal Boot Clamps

- 1 - SMALL CLAMP
- 2 - LARGE CLAMP
- 3 - INTERCONNECTING SHAFT
- 4 - SEALING BOOT
- 5 - TONE WHEEL (ABS ONLY)
- 6 - OUTER C/V JOINT HOUSING

(3) Wipe away grease to expose outer C/V joint to interconnecting shaft retaining ring. Spread ears apart on C/V joint assembly to interconnecting shaft retaining snap ring (Fig. 31). Slide outer C/V joint assembly off end of interconnecting shaft.



9302-58

Fig. 31 Outer C/V Joint Removal From Interconnecting Shaft

- 1 - SPREAD RETAINING RING EARS AND PULL JOINT OFF SHAFT
- 2 - RETAINING SNAP RING
- 3 - RETAINING RING
- 4 - OUTER C/V JOINT ASSEMBLY
- 5 - INTERCONNECTING SHAFT

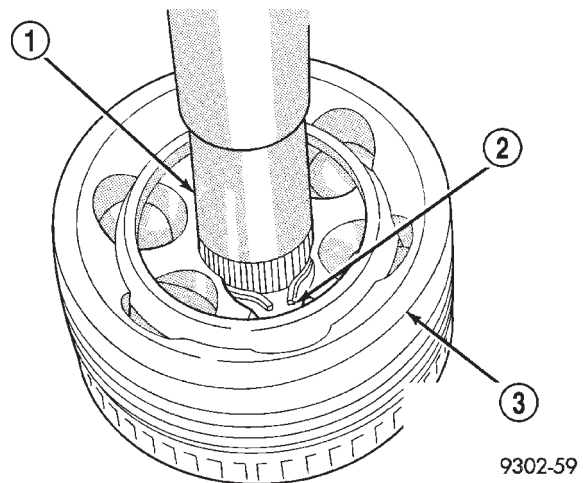
(4) Slide failed sealing boot off interconnecting shaft.

(5) Thoroughly clean and inspect outer C/V joint assembly and interconnecting joint for any signs of excessive wear. **If any parts show signs of excessive wear, the halfshaft assembly will require replacement. Component parts of the halfshaft assemblies are not serviceable.**

INSTALLATION

(1) Slide a new seal boot to interconnecting shaft retaining clamp, onto the interconnecting shaft. Then slide the replacement outer C/V joint assembly sealing boot onto the interconnecting shaft.

(2) Install outer C/V joint assembly onto interconnecting shaft. Joint is installed on interconnecting shaft, by pushing interconnecting shaft into outer C/V joint, until retaining snap ring is seated in groove on interconnecting shaft (Fig. 32). Verify the snap ring is fully seated into groove on interconnecting shaft.



9302-59

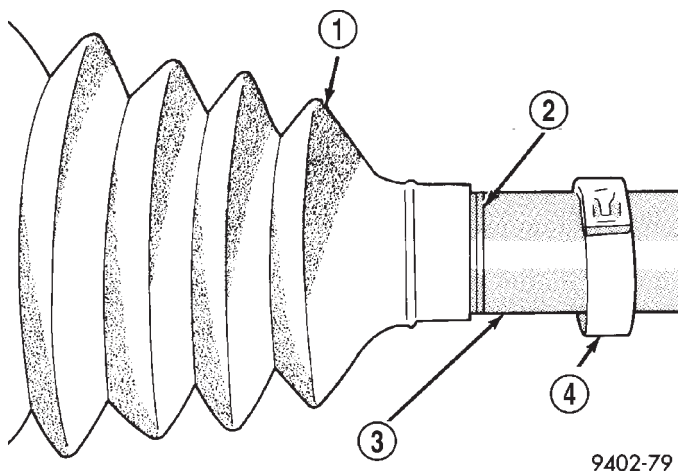
Fig. 32 Outer C/V Joint Installed On Interconnecting Shaft

- 1 - INTERCONNECTING SHAFT
- 2 - RETAINING SNAP RING
- 3 - OUTER C/V JOINT ASSEMBLY

(3) Distribute 1/2 the amount of grease provided in seal boot service package (DO NOT USE ANY OTHER TYPE OF GREASE) into outer C/V joint assembly housing. Put the remaining amount into the sealing boot.

CV BOOT-OUTER (Continued)

(4) Install outer C/V joint seal boot retaining clamp, onto interconnecting shaft. Install replacement outer C/V joint sealing boot onto interconnecting shaft. **Outer C/V joint seal boot MUST be positioned on interconnecting shaft, so only the thinnest (sight) groove on interconnecting shaft is visible (Fig. 33).**



9402-79

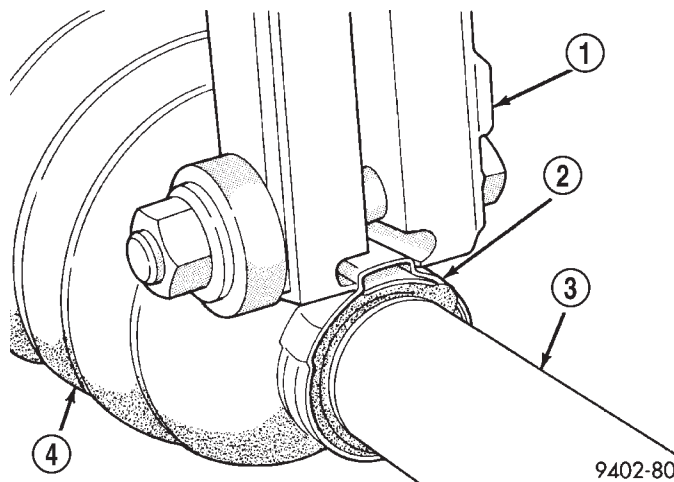
Fig. 33 Seal Boot Correctly Positioned On Interconnecting Shaft

- 1 - SEALING BOOT
- 2 - INTERCONNECTING SHAFT THINNEST GROOVE
- 3 - INTERCONNECTING SHAFT
- 4 - BOOT CLAMP

(5) Clamp sealing boot on interconnecting shaft using Crimper, Special Tool C-4975 and the following procedure. Place crimping tool C-4975 over bridge of clamp (Fig. 34). Tighten nut on crimping tool C-4975 until jaws on tool are closed completely together, face to face (Fig. 35).

CAUTION: Seal must not be dimpled, stretched or out of shape in any way. If seal is NOT shaped correctly, equalize pressure in seal and shape it by hand.

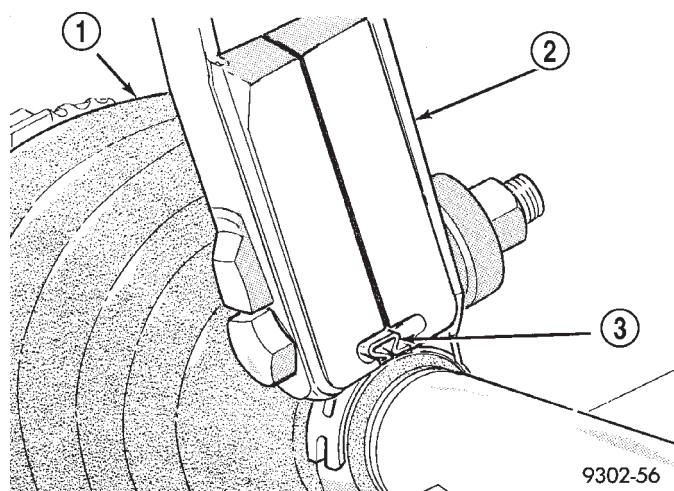
(6) Position outer C/V joint seal boot, into boot retaining groove on outer C/V joint housing. Install seal boot to outer C/V joint retaining clamp evenly on sealing boot.



9402-80

Fig. 34 Crimping Tool Installed On Sealing Boot Clamp

- 1 - SPECIAL TOOL C-4975
- 2 - SEALING BOOT CLAMP
- 3 - INTERCONNECTING SHAFT
- 4 - SEALING BOOT



9302-56

Fig. 35 Sealing Boot Retaining Clamp Installed

- 1 - SEALING BOOT
- 2 - SPECIAL TOOL C-4975
- 3 - CLAMP BRIDGE

CV BOOT-OUTER (Continued)

(7) Clamp sealing boot onto outer C/V joint housing using Crimper, Special Tool C-4975 and the following procedure. Place crimping tool C-4975 over bridge of clamp (Fig. 36). Tighten nut on crimping tool C-4975 until jaws on tool are closed completely together, face to face (Fig. 37).

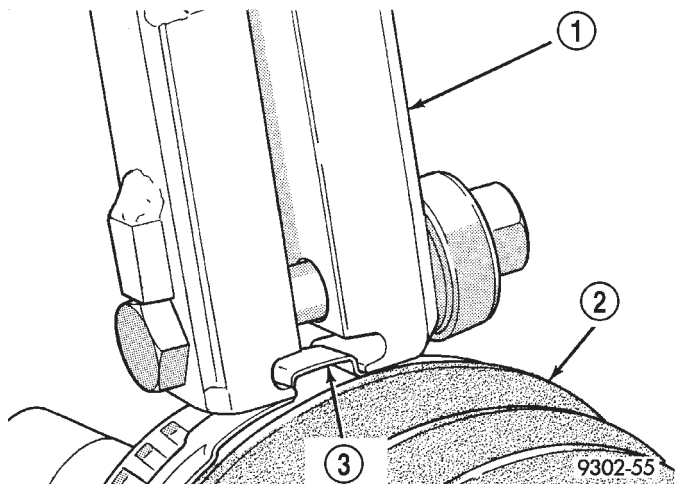


Fig. 36 Crimping Tool Installed On Sealing Boot Clamp

- 1 - SPECIAL TOOL C-4975
- 2 - SEALING BOOT
- 3 - CLAMP BRIDGE

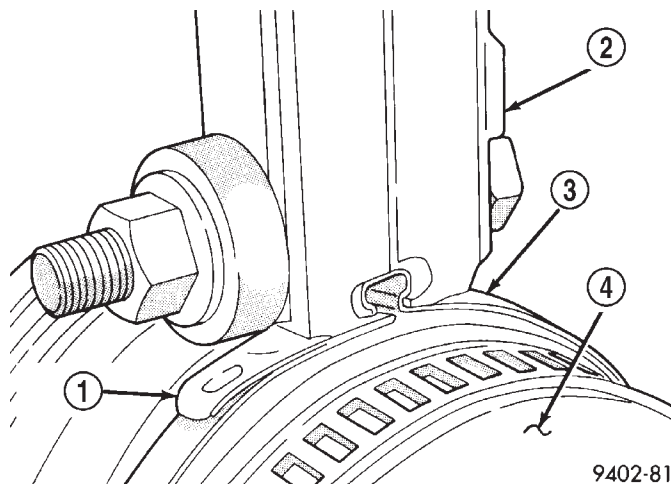


Fig. 37 Sealing Boot Retaining Clamp Installed

- 1 - BOOT CLAMP
- 2 - SPECIAL TOOL C-4975
- 3 - SEALING BOOT
- 4 - OUTER C/V JOINT

(8) Install the driveshaft requiring boot replacement back on the vehicle. (Refer to 3 - DIFFERENTIAL & DRIVELINE/HALF SHAFT - INSTALLATION)

BRAKES

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BRAKES - BASE BRAKE SYSTEM

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BRAKES - BASE BRAKE SYSTEM

DESCRIPTION - BASE BRAKES

The base brake system consists of the following components:

- Brake pedal
- Master cylinder
- Power brake booster
- Brake tubes and hoses
- Proportioning valves (2)
- Disc brakes (front and rear)
- Brake lamp switch
- Brake fluid level switch
- Parking brake

All brakes are power assist type through the use of a vacuum operated power brake booster.

The hydraulic brake system is diagonally split on both the non-antilock and antilock braking systems. This means the left front and right rear brakes are on one hydraulic circuit from the master cylinder and the right front and left rear are on the other.

Front disc brakes control the braking of the front wheels; rear braking is controlled by rear disc brakes.

Vehicles equipped with the optional antilock brake system (ABS) (with and without traction control) use a system designated Mark 20i. This system shares most base brake hardware used on vehicles without ABS. All components differing from the base brake

BRAKES - BASE BRAKE SYSTEM (Continued)

hardware are described in detail in the Antilock Brake System section.

The parking brake on this vehicle is pedal-operated.

For more information on the description of any individual base brake component, refer to that component elsewhere in this section. For information on the brake lamp switch, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/BRAKE LAMP SWITCH - DESCRIPTION)

OPERATION - BASE BRAKES

When a vehicle needs to be stopped, the driver applies the brake pedal. The brake pedal pushes the input rod of the power brake booster into the booster. The booster uses vacuum to ease pedal effort as force is transferred through the booster to the master cylinder. The booster's output rod pushes in the master cylinder's primary and secondary pistons applying hydraulic pressure through the chassis brake tubes, junction block, and proportioning valves to the brakes at each tire and wheel assembly.

The pedal-operated parking brake operates in the following manner. When applied, the parking brake lever pulls on cables that actuate parking brake shoes at each rear wheel.

For more information on the operation of any individual base brake component, refer to that component elsewhere in this section.

WARNING

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

CAUTION

CAUTION: Use only Mopar® brake fluid or an equivalent from a tightly sealed container. Brake fluid must conform to DOT 3 specifications. Do not use petroleum-based fluid because seal damage in the brake system will result.

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surfaces, wash it off immediately with water.

CAUTION: Never use gasoline, kerosene, alcohol, motor oil, transmission fluid, or any fluid containing mineral oil to clean system components. These fluids damage rubber cups and seals.

CAUTION: During service procedures, grease or any other foreign material must be kept off the caliper assembly, brake linings, brake rotor and external surfaces of the hub.

CAUTION: When handling the brake rotor and caliper, be careful to avoid damaging the brake rotor and caliper, and scratching or nicking the brake shoe lining.

CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the tire/wheel assembly needs to be reinstalled in the same location it is removed from or the TPM System (sensors) will need to be retrained. Mark each tire/wheel assembly indicating location, prior to its removal. If the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

STANDARD PROCEDURE - BASE BRAKE BLEEDING

CAUTION: Before removing the master cylinder cover, wipe it clean to prevent dirt and other foreign matter from dropping into the master cylinder.

CAUTION: Use only Mopar® brake fluid or an equivalent from a fresh, tightly sealed container. Brake fluid must conform to DOT 3 specifications.

BRAKES - BASE BRAKE SYSTEM (Continued)

NOTE: For bleeding this vehicles antilock brake hydraulic system, Refer to Antilock Brake System Bleeding.

NOTE: Do not pump the brake pedal at any time while having a bleeder screw open during the bleeding process. This will only increase the amount of air in the system and make additional bleeding necessary.

NOTE: Do not allow the master cylinder reservoir to run out of brake fluid while bleeding the system. An empty reservoir will allow additional air into the brake system. Check the fluid level frequently and add fluid as needed.

The following wheel circuit sequence for bleeding the brake hydraulic system should be used to ensure adequate removal of all trapped air from the brake hydraulic system.

- Left rear wheel
- Right front wheel
- Right rear wheel
- Left front wheel

The base brake system can be bled using the pressure method or the manual method. Both methods are presented in this text.

PRESSURE BLEEDING METHOD

NOTE: Follow pressure bleeder manufacturer's instructions for use of pressure bleeding equipment.

(1) Remove filler cap from the top of fluid reservoir on master cylinder.

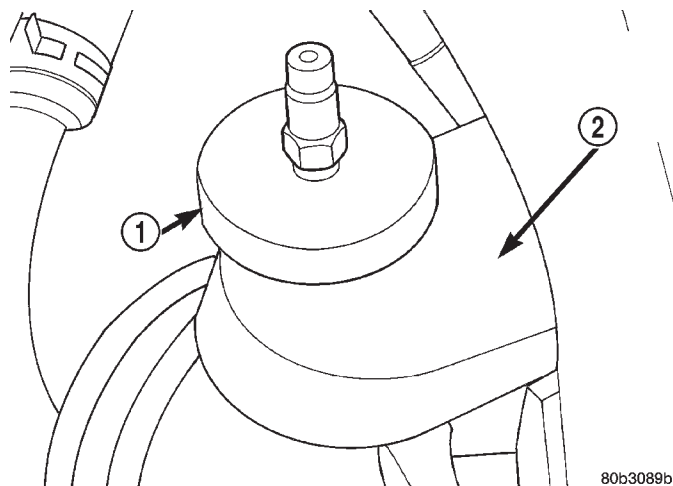
(2) Install Adapter, Special Tool 8224, in the caps place on the reservoir (Fig. 1).

(3) Attach Bleeder Tank, Special Tool C-3496-B, or equivalent, to Special Tool 8224. Pressurize the system following the pressure bleeder manufacturer's instructions.

(4) Remove rubber dust caps from all 4 bleeder screws.

(5) Starting at the first wheel circuit as listed earlier, attach a clear hose to the bleeder screw at that wheels brake caliper or wheel cylinder and feed the other end of hose into a clear jar containing enough fresh brake fluid to submerge the end of the hose (Fig. 2).

CAUTION: Open the bleeder screw at least one full turn when instructed. Some air may be trapped in the brake lines or valves far upstream, as far as ten feet or more from the bleeder screw (Fig. 3). If the bleeder screw is not opened sufficiently, fluid flow

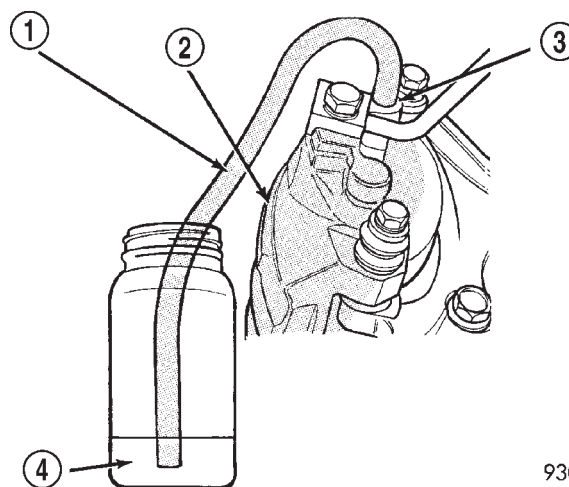


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Fig. 1 Pressure Bleeding Adapter Mounted On Fluid Reservoir

1 - SPECIAL TOOL 8224

2 - MASTER CYLINDER FLUID RESERVOIR



9305-3

Fig. 2 Proper Method for Purging Air From Brake

1 - CLEAR HOSE

2 - BRAKE CALIPER

3 - BLEEDER SCREW

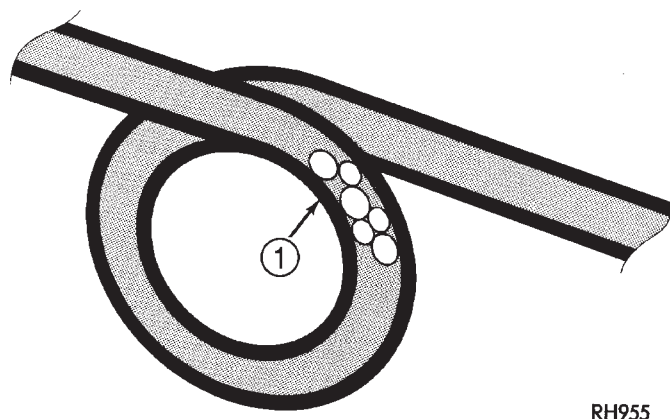
4 - CLEAN BRAKE FLUID

is restricted causing a slow, weak fluid discharge. This will NOT get all the air out. Therefore, it is essential to open the bleeder screw at least one full turn to allow a fast, large volume discharge of brake fluid.

(6) Open bleeder screw (Fig. 2) at least one full turn or more to obtain an adequate flow of brake fluid.

(7) After 4 to 8 ounces of brake fluid has been bled through the brake hydraulic circuit, and an air-free flow (no bubbles) is maintained in the clear plastic hose and jar, close the bleeder screw.

BRAKES - BASE BRAKE SYSTEM (Continued)

**Fig. 3 Trapped Air in Brake Line**

1 - TRAPPED AIR

(8) Bleed the remaining wheel circuits in the same manner until all air is removed from the brake hydraulic system.

(9) Check brake pedal travel. If pedal travel is excessive or has not improved, some air may still be trapped in the hydraulic system. Rebleed the brake system as necessary.

(10) Reinstall all 4 bleeder screw dust caps.

(11) Test drive vehicle to ensure brakes are operating properly and pedal feel is correct.

MANUAL BLEEDING METHOD

NOTE: To bleed the base brake system manually, an assistants help is required.

(1) Remove rubber duct caps from all 4 bleeder screws.

(2) Attach a clear hose to the bleeder screw at one wheel and feed the other end of the hose into a clear jar containing fresh brake fluid (Fig. 2).

(3) Have an assistant pump the brake pedal three or four times and hold it down before the bleeder screw is opened.

CAUTION: Open the bleeder screw at least one full turn when instructed. Some air may be trapped in the brake lines or valves far upstream, as far as ten feet or more from the bleeder screw (Fig. 3). If the bleeder screw is not opened sufficiently, fluid flow is restricted causing a slow, weak fluid discharge. This will NOT get all the air out. Therefore, it is essential to open the bleeder screw at least one full turn to allow a fast, large volume discharge of brake fluid.

(4) While the pedal is being held down, open the bleeder screw at least 1 full turn. When the bleeder screw opens the brake pedal will drop all the way to

the floor. Continue to hold the pedal all the way down.

(5) Once the brake pedal has dropped, close the bleeder screw. The pedal can then be released.

(6) Repeat steps (1) through (5) until all trapped air is removed from that wheel circuit (usually four or five times). This should pass a sufficient amount of fluid to expel all the trapped air from the brakes hydraulic system. Be sure to monitor brake fluid level in master cylinder fluid reservoir, to ensure it stays at a proper level. This will ensure air does not reenter brake hydraulic system through master cylinder.

NOTE: Monitor the brake fluid level in the fluid reservoir periodically to make sure it does not go too low. This will ensure that air does not reenter the brake hydraulic system.

(7) Bleed the remaining wheel circuits in the same manner until all air is removed from the brake hydraulic system.

(8) Check brake pedal travel. If pedal travel is excessive or has not improved, some air may still be trapped in the hydraulic system. Rebleed the brake system as necessary.

(9) Reinstall all 4 bleeder screw dust caps.

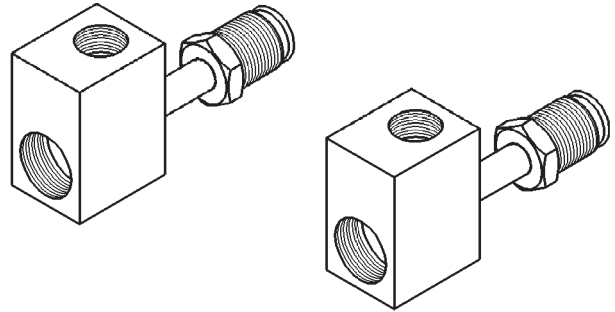
(10) Test drive vehicle to ensure brakes are operating properly and pedal feel is correct.

SPECIFICATIONS**BRAKE COMPONENTS**

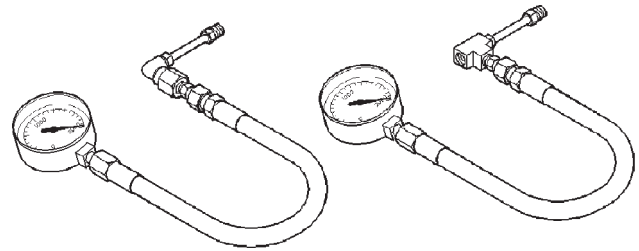
DESCRIPTION	SPECIFICATION
Brake Hydraulic System	Dual Circuit - Diagonally Split
Brake Pedal Ratio	3.44:1
Brake Tube Fitting Type	ISO Flares
Master Cylinder Type - with ABS	Center Valve (Port)
Master Cylinder Type - without ABS	Vent Port
Master Cylinder Bore/Stroke	23.8 mm x 39.4 mm (0.937 in. x 1.55 in.)
Master Cylinder Split	50/50
Master Cylinder Outlet Port Primary Tube Nut Thread	M-12
Master Cylinder Outlet Port Secondary Tube Nut Thread - W/ABS	M-10

BRAKES - BASE BRAKE SYSTEM (Continued)

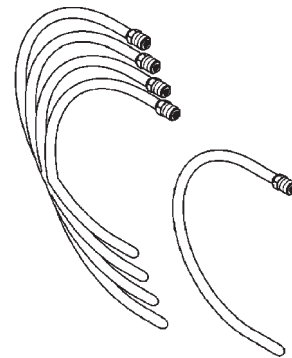
DESCRIPTION	SPECIFICATION
Master Cylinder Outlet Port Secondary Tube Nut Thread - W/O ABS	M-12
Power Brake Booster Type	205 mm Vacuum Assist
Power Brake Booster Boost	4690 At 20 inches Manifold Vacuum

*Adapters, Brake Pressure Test 8187*

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Brake Hose Intermediate Bracket Bolt	12	—	105
Caliper Banjo Bolt	48	35	—
Caliper Bleeder Screw	15	—	125
Caliper Guide Pin Bolts	22	16	192
Junction Block Support Bracket Bolts	26	19	230
Master Cylinder Mounting Nuts	28	21	250
Parking Brake Lever Mounting Bolts	28	21	250
Power Brake Booster Mounting Nuts	28	21	250
Tube Nuts	17	—	145
Wheel Mounting (Lug) Nuts	135	100	—

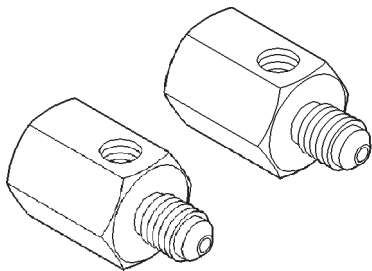
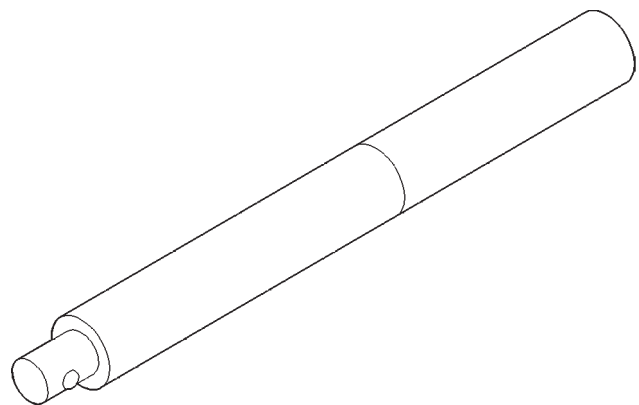


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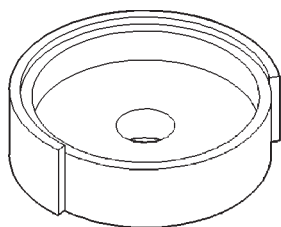
Gauge Set C-4007-A*Tubes, Master Cylinder Bleed 8358*

SPECIAL TOOLS

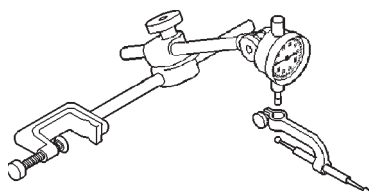
BASE BRAKE SYSTEM

*Adapters, Brake Pressure Test 6892**Handle, Universal C-4171*

BRAKES - BASE BRAKE SYSTEM (Continued)



8011d811

Installer, Dust Boot C-4689

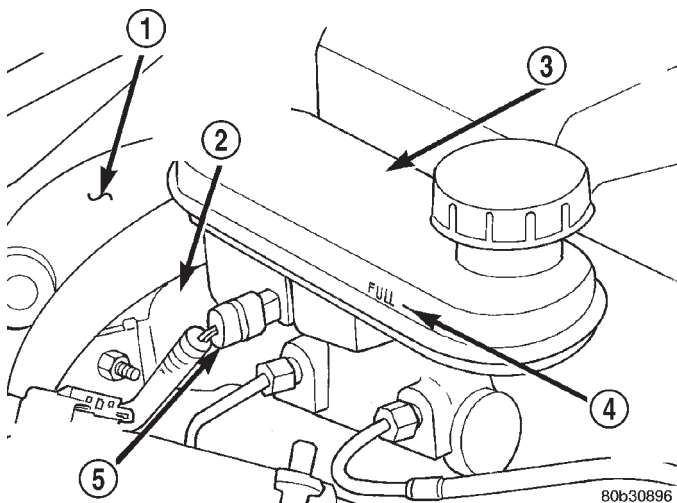
8011d42b

Dial Indicator C-3339

BRAKE FLUID LEVEL SWITCH

DESCRIPTION

The brake fluid level switch used on this vehicle's master cylinder is internal to the master cylinder fluid reservoir (Fig. 4). The vehicle wiring harness has a connector which plugs directly into the brake fluid reservoir.



80b30896

Fig. 4 Master Cylinder

- 1 - BOOSTER
- 2 - MASTER CYLINDER
- 3 - MASTER CYLINDER FLUID RESERVOIR
- 4 - FLUID LEVEL FULL MARK
- 5 - FLUID LEVEL SWITCH

The brake fluid level switch in the brake fluid reservoir is not a repairable item. If the switch is found to be defective the entire brake fluid reservoir must be replaced.

OPERATION

The purpose of the brake fluid level switch is to provide the driver with early warning that brake fluid in the master cylinder is below a normal level.

As the fluid drops below the designed level, the switch closes completing the red BRAKE warning indicator lamp circuit. This will illuminate the red BRAKE warning indicator lamp located in the instrument cluster. At this time, the master cylinder fluid reservoir should be checked and filled to the full mark with DOT 3 brake fluid. **If the brake fluid level has dropped in the brake fluid reservoir, the entire brake hydraulic system should be checked for evidence of a leak.**

HYDRAULIC/MECHANICAL

DESCRIPTION

DESCRIPTION - FRONT DISC BRAKES

The front disc brake assembly used on this vehicle consists of the following components:

- Disc brake caliper
- Brake Shoes (pads/linings)
- Caliper abutment rail shims
- Brake Rotor

The floating double pin single piston calipers (Fig. 5) used on this vehicle are mounted directly to the steering knuckles and use no adapter. The caliper is mounted to the steering knuckle using bushings, sleeves and two thru-bolts which thread directly into the steering knuckle (Fig. 6).

The caliper is a one piece casting with the inboard side containing a single piston cylinder bore. The front disc brake caliper phenolic piston is 60 mm (2.36 inch) in diameter.

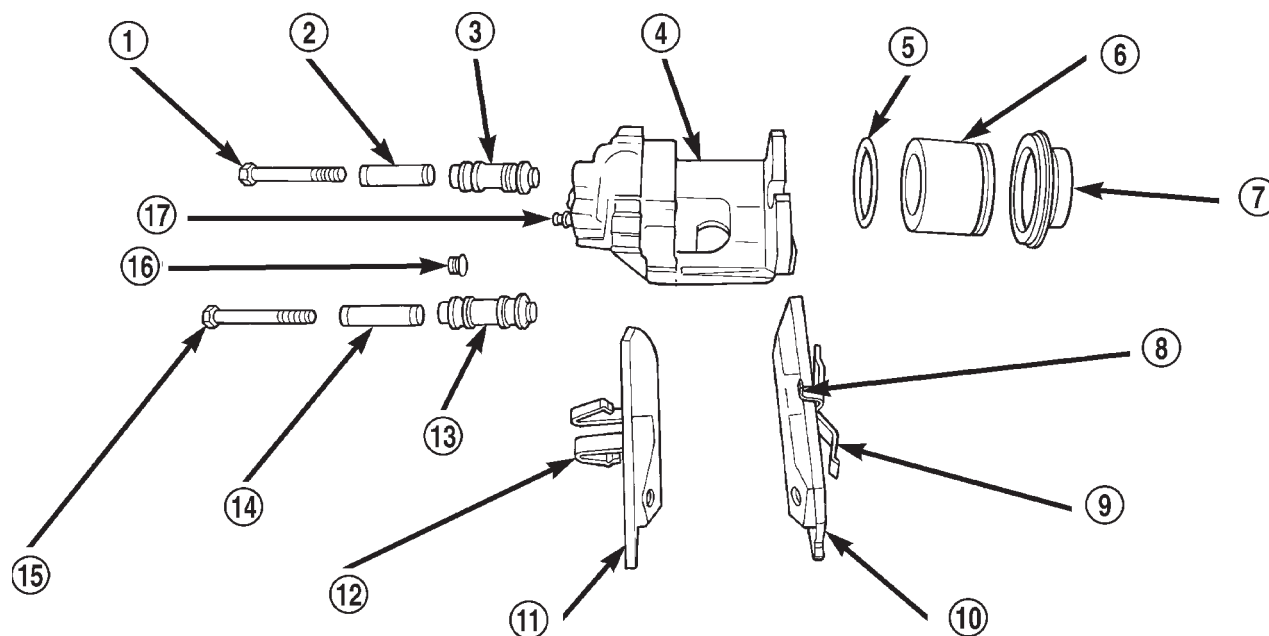
There are two brake shoes (pads) mounted to the brake caliper (Fig. 5). One brake shoe mounts on each side of a brake rotor. The brake shoe lining material used has been specifically formulated to meet the braking requirements of the vehicle. An audible wear indicator is mounted on the outboard brake shoe.

Rail shims are mounted above and below the brake pads (when installed) on the machined caliper abutment rails of the knuckle.

The brake rotor is mounted on the hub and bearing. The rotor is made of iron and is vented to help cool it during brake applications.

Vehicles equipped with standard four-wheel-disc brakes utilize a conventional internally-vented hat style rotor. Internally-vented refers to the fact that the inner most diameter of the braking disc vents to the rear of the rotor (Fig. 7).

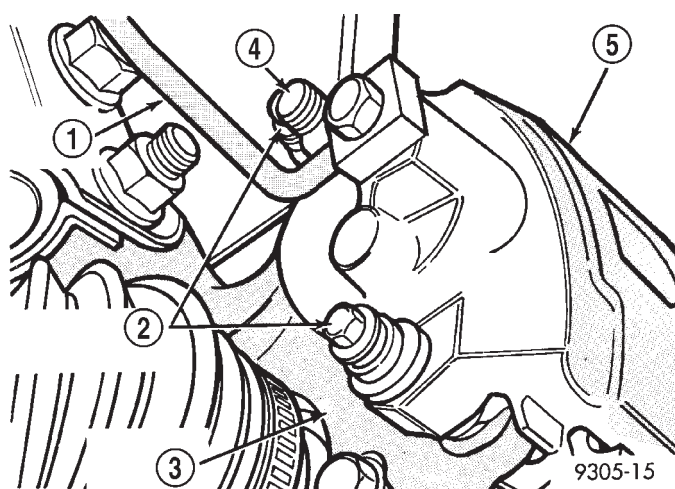
HYDRAULIC/MECHANICAL (Continued)

**Fig. 5 Front Disc Brake Caliper Assembly**

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- 1 - GUIDE PIN BOLT
- 2 - SLEEVE
- 3 - BUSHING
- 4 - CALIPER
- 5 - PISTON SEAL
- 6 - PISTON
- 7 - DUST SEAL
- 8 - WEAR INDICATOR
- 9 - ANTI-RATTLE CLIP

- 10 - OUTBOARD BRAKE SHOE
- 11 - INBOARD BRAKE SHOE
- 12 - ANTI-RATTLE CLIP
- 13 - BUSHING
- 14 - SLEEVE
- 15 - GUIDE PIN BOLT
- 16 - CAP
- 17 - BLEEDER SCREW

**Fig. 6 Disc Brake Caliper Mounting**

- 1 - BRAKE LINE
- 2 - CALIPER GUIDE PIN BOLTS
- 3 - STEERING KNUCKLE
- 4 - BLEEDER SCREW
- 5 - CALIPER ASSEMBLY

Vehicles equipped with performance four-wheel-disc brakes utilize an inverted-hat style rotor. This rotor is externally vented meaning the inner most diameter of the braking disc vents to the front (or face) of the rotor (Fig. 7).

Although there are two different style brake rotors depending on brake packages, they are serviced in the same manner.

DESCRIPTION - REAR DISC BRAKES

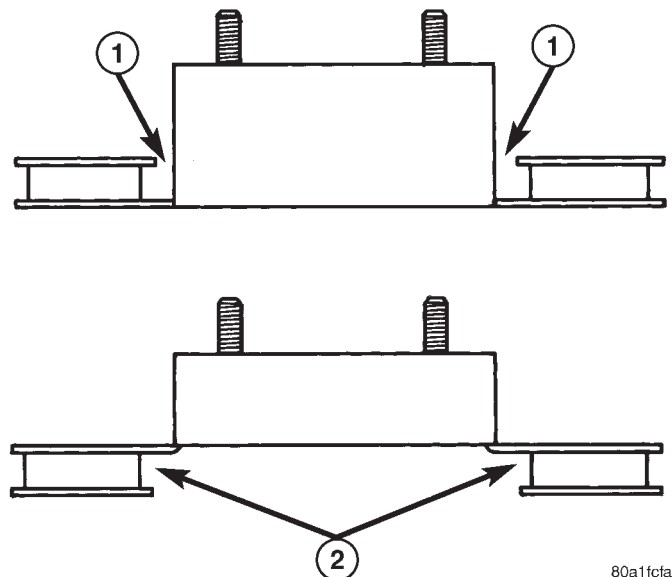
The rear disc brakes are similar to front disc brakes, however, there are several distinctive features that require different service procedures. This single piston, floating caliper rear disc brake assembly includes (Fig. 8):

- Disc brake caliper
- Brake shoes (pads/linings)
- Brake rotor
- Disc brake caliper adapter

This vehicle is equipped with a caliper assembly that has a 36 mm (1.42 in.) piston.

The caliper assembly on all applications floats on rubber bushings using internal metal sleeves which

HYDRAULIC/MECHANICAL (Continued)



80a1fcta

**Fig. 7 Externally And Internally Vented Rotors
(Cross-Sectional View)**

- 1 - EXTERNAL VENTS
- 2 - INTERNAL VENTS

are attached to the adapter using threaded guide pin bolts (Fig. 8).

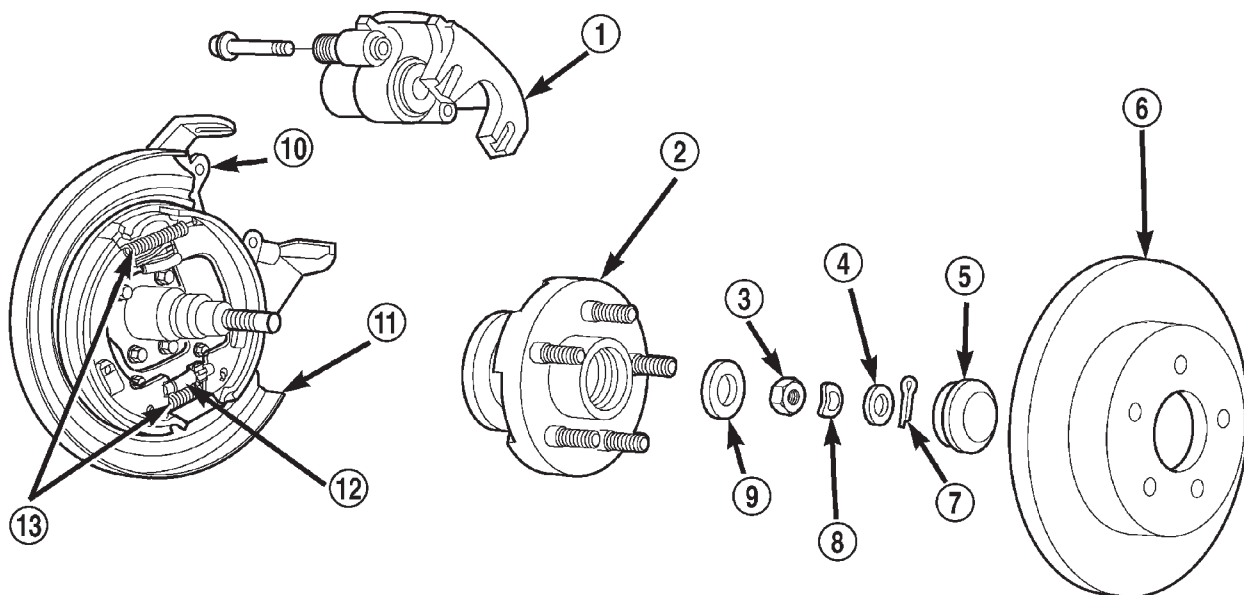
The adapter and disc shield are mounted to the rear suspension knuckles of vehicle. The adapter is used to mount the brake shoes and actuating cables for the parking brake system. The adapter also mounts the rear caliper assembly to the vehicle. The adapter has two machined abutments which are used to position and align the caliper and brake shoes for movement inboard and outboard.

This vehicle uses a 14 inch solid non-vented rear disc brake rotor (Fig. 8). It is a drum-in-hat style. It serves a dual purpose. The braking disc area of the rotor functions as a normal brake rotor for disc brakes. The center section of the rotor has a built-in brake drum that is used by the parking brakes. Refer to Parking Brake for more information.

OPERATION

OPERATION - FRONT DISC BRAKES

Two machined abutments on the steering knuckle (Fig. 6) position and align the caliper fore-and-aft. The guide pin bolts, sleeves, and bushings control the side-to-side movement of the caliper.



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Fig. 8 Rear Disc Brake Assembly

- 1 - CALIPER
- 2 - HUB AND BEARING
- 3 - NUT
- 4 - NUT LOCK
- 5 - DUST CAP
- 6 - ROTOR (DISC)
- 7 - COTTER PIN

- 8 - ANTI-RATTLE WASHER
- 9 - WASHER
- 10 - ADAPTER
- 11 - DISC SHIELD
- 12 - ADJUSTER
- 13 - RETURN SPRINGS

HYDRAULIC/MECHANICAL (Continued)

Although there are different disc brake systems available, they operate and are serviced in the same manner.

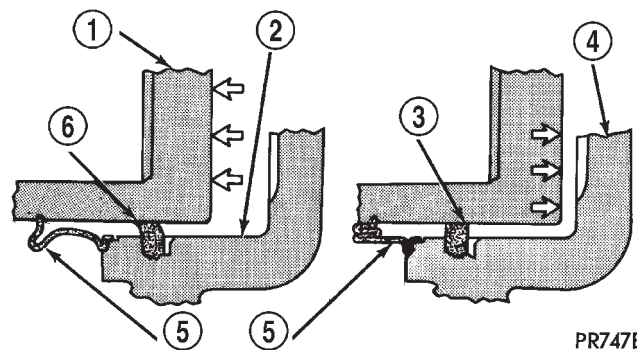
A square-cut rubber piston seal is located in a machined groove in the cylinder bore. This provides a hydraulic seal between the piston and the cylinder wall (Fig. 9). The piston seal is designed to pull the piston back into the bore of the caliper when the brake pedal is released. This, along with the brake shoe retractor clips, maintains the proper brake shoe to rotor clearance.

A molded rubber dust boot is installed in a groove in the cylinder bore and the piston, keeping contamination from the cylinder wall and the piston (Fig. 9).

The brake shoe lining material rides against the brake rotors braking surface. When the brakes are applied, the shoes apply pressure against the rotor, thus slowing the vehicle.

As brake shoe linings wear, master cylinder reservoir brake fluid level will go down. If brake fluid has been added to the reservoir, overflow may occur if the piston is pushed back into the recessed position.

An audible wear indicator (Fig. 5) is mounted on the outboard pad of the front disc brake assemblies. Upon contact with the brake rotor, this indicator emits a sound, signaling that brake shoes may need inspection or replacement.



PR747B

Fig. 9 Piston Seal Function for Automatic Adjustment Of Front Brakes

- 1 - PISTON
- 2 - CYLINDER BORE
- 3 - PISTON SEAL BRAKE PRESSURE OFF
- 4 - CALIPER HOUSING
- 5 - DUST BOOT
- 6 - PISTON SEAL BRAKE PRESSURE ON

OPERATION - REAR DISC BRAKES

Rear disc brakes operate similarly to front disc brakes. Refer to Front Disc Brakes for additional information.

DIAGNOSIS AND TESTING - BASE BRAKE SYSTEM

NOTE: There are three diagnosis charts following that cover the **RED BRAKE WARNING LAMP**, **BRAKE NOISE** and **OTHER BRAKE CONDITIONS**.

RED BRAKE WARNING LAMP

CONDITION	POSSIBLE CAUSES	CORRECTION
RED BRAKE WARNING LAMP ON	<ul style="list-style-type: none"> 1. Parking brake lever not fully released. 2. Parking brake warning lamp switch on parking brake lever. 3. Brake fluid level low in reservoir. 4. Brake fluid level switch. 5. Mechanical instrument cluster (MIC) problem. 	<ul style="list-style-type: none"> 1. Release parking brake lever. 2. Inspect and replace switch as necessary. 3. Fill reservoir. Check entire system for leaks. Repair or replace as required. 4. Disconnect switch wiring connector. If lamp goes out, replace switch. 5. Refer to Chassis Diagnostic Procedures manual.

HYDRAULIC/MECHANICAL (Continued)

BRAKE NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
DISC BRAKE CHIRP	1. Excessive brake rotor runout. 2. Lack of lubricant on brake caliper slides.	1. Follow brake rotor diagnosis and testing. Correct as necessary. 2. Lubricate brake caliper slides.
DISC BRAKE RATTLE OR CLUNK	1. Broken or missing anti-rattle spring clips or rail shims on shoes. 2. Caliper guide pins loose.	1. Replace brake shoes, spring clips or rail shims as applicable. 2. Tighten guide pins.
DISC BRAKE SQUEAK AT LOW SPEED (WHILE APPLYING LIGHT BRAKE PEDAL EFFORT)	1. Brake shoe linings.	1. Replace brake shoes.
SCRAPING (METAL-TO-METAL).	1. Foreign object interference with brakes. 2. Brake shoes worn out.	1. Inspect brakes and remove foreign object. 2. Replace brake shoes. Inspect rotors. Reface or replace as necessary.

OTHER BRAKE CONDITIONS

CONDITION	POSSIBLE CAUSES	CORRECTION
BRAKES CHATTER	1. Disc brake rotor has excessive thickness variation.	1. Isolate condition as rear or front. Reface or replace brake rotors as necessary.
BRAKES DRAG (FRONT OR ALL)	1. Contaminated brake fluid. 2. Binding caliper pins or bushings. 3. Binding master cylinder. 4. Binding brake pedal.	1. Check for swollen seals. Replace all system components containing rubber. 2. Replace pins and bushings 3. Replace master cylinder. 4. Replace brake pedal.
BRAKES DRAG (REAR ONLY)	1. Parking brake cables binding or froze up. 2. Parking brake cable return spring not returning shoes. 3. Obstruction inside the center console preventing full return of the parking brake cables.	1. Check cable routing. Replace cables as necessary. 2. Replace cables as necessary. 3. Remove console and remove obstruction.
BRAKES GRAB	1. Contaminated brake shoe linings. 2. Improper power brake booster assist.	1. Inspect and clean, or replace shoes. Repair source of contamination. 2. Refer to Power Brake Booster in the diagnosis and testing section.
EXCESSIVE PEDAL EFFORT	1. Obstruction of brake pedal. 2. Low power brake booster assist. 3. Glazed brake linings.	1. Inspect, remove or move obstruction. 2. Refer to power brake booster in the diagnosis and testing section. 3. Reface or replace brake rotors as necessary. Replace brake shoes.

HYDRAULIC/MECHANICAL (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	4. Brake shoe lining transfer to brake rotor.	4. Reface or replace brake rotors as necessary. Replace brake shoes.
EXCESSIVE PEDAL TRAVEL (VEHICLE STOPS OK)	1. Air in brake lines.	1. Bleed brakes.
EXCESSIVE PEDAL TRAVEL (PEDAL GOES TO FLOOR - CAN'T SKID WHEELS)	1. Power brake booster runout (vacuum assist).	1. Check booster vacuum hose and engine tune for adequate vacuum supply. Refer to power brake booster in the diagnosis and testing section.
EXCESSIVE PEDAL TRAVEL (ONE FRONT WHEEL LOCKS UP DURING HARD BRAKING)	1. One of the two hydraulic circuits to the front brakes is malfunctioning.	1. Inspect system for leaks. Check master cylinder for internal malfunction.
PEDAL PULSATES/SURGES DURING BRAKING	1. Disc brake rotor has excessive thickness variation.	1. Isolate condition as rear or front. Reface or replace brake rotors as necessary.
PEDAL IS SPONGY	1. Air in brake lines. 2. Power brake booster runout (vacuum assist).	1. Bleed brakes. 2. Check booster vacuum hose and engine tune for adequate vacuum supply. Refer to power brake booster in the diagnosis and testing section.
PREMATURE REAR WHEEL LOCKUP	1. Contaminated brake shoe linings. 2. Inoperative proportioning valve. 3. Improper power brake booster assist.	1. Inspect and clean, or replace shoes. Repair source of contamination. 2. Test proportioning valves following procedure listed in diagnosis and testing section. Replace valves as necessary. 3. Refer to power brake booster in the diagnosis and testing section.
STOP LAMPS STAY ON	1. Brake lamp switch out of adjustment. 2. Brake pedal binding. 3. Obstruction in pedal linkage. 4. Power Brake Booster not allowing pedal to return completely.	1. Adjust brake lamp switch. 2. Inspect and replace as necessary. 3. Remove obstruction. 4. Replace power brake booster.
VEHICLE PULLS TO RIGHT OR LEFT ON BRAKING	1. Frozen brake caliper piston. 2. Contaminated brake shoe lining. 3. Pinched brake lines. 4. Leaking piston seal. 5. Suspension problem.	1. Replace frozen piston or caliper. Bleed brakes. 2. Inspect and clean, or replace shoes. Repair source of contamination. 3. Replace pinched line. 4. Replace piston seal or brake caliper. 5. Refer to the Suspension group.
PARKING BRAKE - EXCESSIVE LEVER TRAVEL	1. Rear parking brake shoes out of adjustment.	1. Adjust rear parking brake shoes.

BRAKE LINES

DESCRIPTION - BRAKE TUBES AND HOSES

The chassis brake tubes are steel with a corrosion resistant coating applied to the external surfaces. The flex hoses are made of reinforced rubber.

All available brake systems on this vehicle use the same type of brake line fittings and tubing flares. The brake line fittings used are double-wall ISO style tubing flares and fittings at all tubing joint locations. Only the outlets of the proportioning valves and the rear flex hoses threading into them have non-ISO style flares (ABS and early production Non-ABS vehicles only). They utilize double-inverted style flares. Refer to (Fig. 10) for specific joint locations and tube fitting size.

Brake hose connections at disc brake calipers are made using banjo fittings permanently attached to the end of the hose. Banjo bolts with internal passageways for fluid flow connect the hose to the caliper. Copper washers are used to seal the banjo

fittings and bolts at the caliper and must be replaced when the connection is broken.

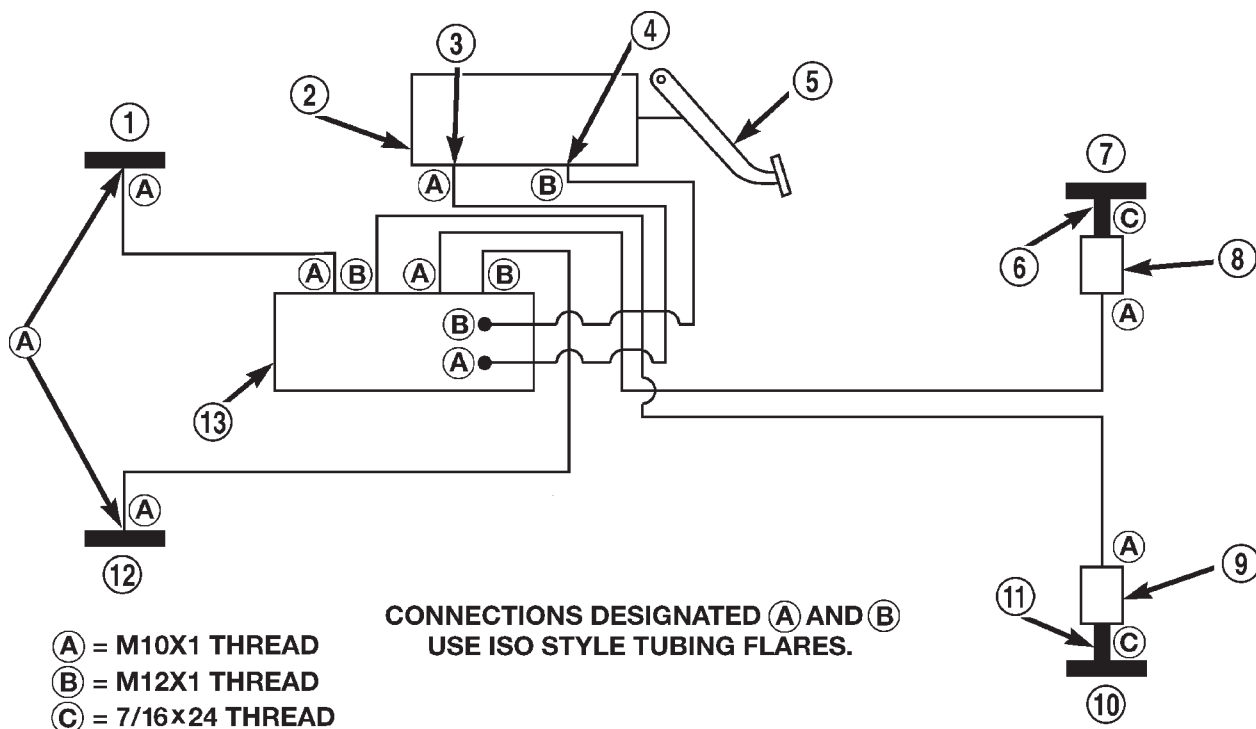
OPERATION - BRAKE TUBES AND HOSES

The purpose of the chassis brake tubes and flex hoses is to transfer the pressurized brake fluid developed by the master cylinder to the wheel brakes of the vehicle. The flex hoses are made of rubber to allow for the movement of the vehicle's steering and suspension.

STANDARD PROCEDURE - BRAKE TUBE REPAIR

CAUTION: This procedure applies to non-nylon-coated brake tubes only. Do not attempt to repair nylon-coated brake tubes using this procedure.

All available brake systems on this vehicle use **ISO Style Tubing Flares** (Fig. 11) at all chassis brake tube connections. **Only the connection between**



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Fig. 10 Brake Tube Nut Thread Sizes And Tube Routing

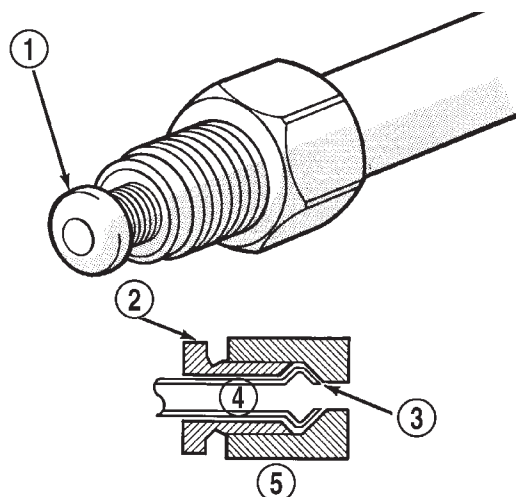
- 1 - HOSE END RT. FRONT
- 2 - MASTER CYLINDER
- 3 - SECONDARY PORT
- 4 - PRIMARY PORT
- 5 - BRAKE PEDAL
- 6 - HOSE
- 7 - HOSE END RT. REAR

- 8 - PROPORTIONING VALVE *
- 9 - PROPORTIONING VALVE *
- 10 - HOSE END LT. REAR
- 11 - HOSE
- 12 - HOSE END LT. FRONT
- 13 - HYDRAULIC CONTROL UNIT/JUNCTION BLOCK

* ABS & Early Production Non-ABS Vehicles Only

BRAKE LINES (Continued)

the rear proportioning valve and flex hose uses a SAE double inverted flare.



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Fig. 11 I.S.O. Style Tubing Flare And Fitting Connection

- 1 - ISO STYLE TUBING FLARE
- 2 - ISO FLARE TUBE NUT
- 3 - SEAT
- 4 - TUBE
- 5 - ISO-FLARE (METRIC)

Only double wall 4.75 mm (3/16 in.) steel tubing should be used for replacement of the chassis brake tubes.

NOTE: The chassis brake tubes used on this vehicle are coated with a zinc alloy and aluminum rich coating referred to as Prokote 2000. If a chassis brake tube requires replacement, only brake tubing with the same coating should be used as a service replacement.

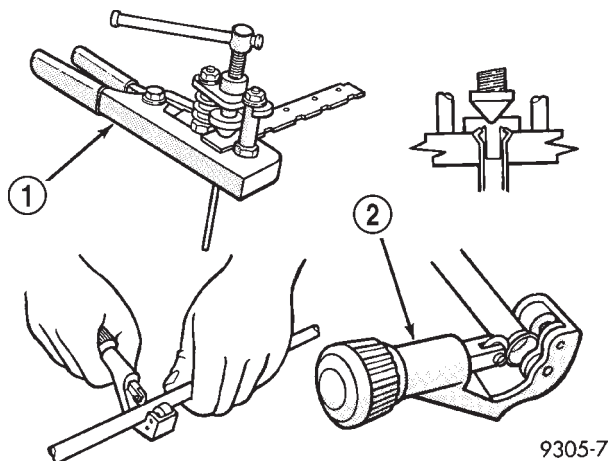
CAUTION: Always use the proper type flaring tool and procedure when flaring brake tubes to ensure the integrity of the vehicle's hydraulic brake system.

(1) Using Tubing Cutter, Special Tool C-3478-A or equivalent, cut off damaged seat on tubing (Fig. 12).

(2) Ream out any burrs or rough edges showing on inside of tubing. This will make the ends of tubing square (Fig. 13) and ensure better seating of flared end tubing.

(3) Place a tube nut on tubing before the flare is made.

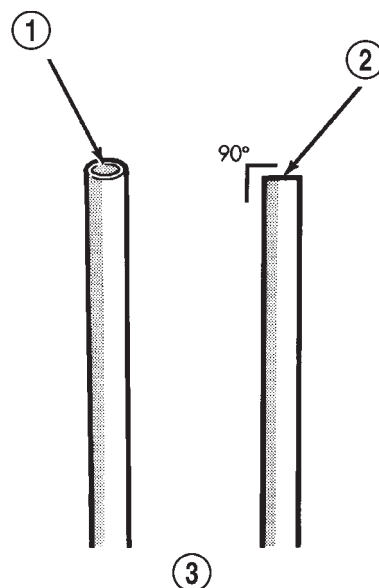
CAUTION: All ISO style tubing flares are of metric dimensions. When performing any service procedures on a vehicle using ISO style tubing flares,



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Fig. 12 Cutting and Flaring of Brake

- 1 - SPECIAL TOOL TFM428
- 2 - SPECIAL TOOL C3478A



9205-175

Fig. 13 Tube End Properly Prepared For Flaring

- 1 - BE SURE ALL BURRS ARE REMOVED FROM INSIDE OF TUBING
- 2 - BE SURE END OF TUBING IS SQUARE BEFORE FLARING TUBE
- 3 - HYDRAULIC BRAKE LINE TUBING

metric size tubing of 4.75 mm MUST be used with metric ISO tube flaring equipment.

To create a (metric) ISO style tubing flare, use Snap-On Flaring Tool TFM-428 (Fig. 12) or equivalent. See (Fig. 14) and proceed with the steps listed below. **Be sure to place the tubing nut on tube before proceeding to flare the tubing.**

(4) Carefully prepare the end of the tubing to be flared. Be sure the end of the tubing is square and

BRAKE LINES (Continued)

all burrs on the inside of the tubing are removed (Fig. 13). **This preparation is essential to obtain the correct form of a (metric) ISO tubing flare.**

(5) Open the jaws of the Flaring Tool. Align the jaws of the flaring tool around the tubing. Close the jaws of the Flaring Tool around the tubing, but do not lock the tubing in place.

(6) Position tubing in jaws of the Flaring Tool so that it is flush with top surface of flaring tool bar assembly (Fig. 14).

(7) Install the correct size adaptor for the brake tubing being flared, on the feed screw of the yoke assembly. Center the yoke and adapter over the end of the tubing. Apply lubricant to the adapter area that contacts the brake tubing. Make sure the adapter pilot is fully inserted in the end of the brake tubing. Tighten screw on yoke assembly until the adaptor has seated squarely on the surface of the bar assembly (Fig. 14). This process will properly create a metric ISO tubing flare.

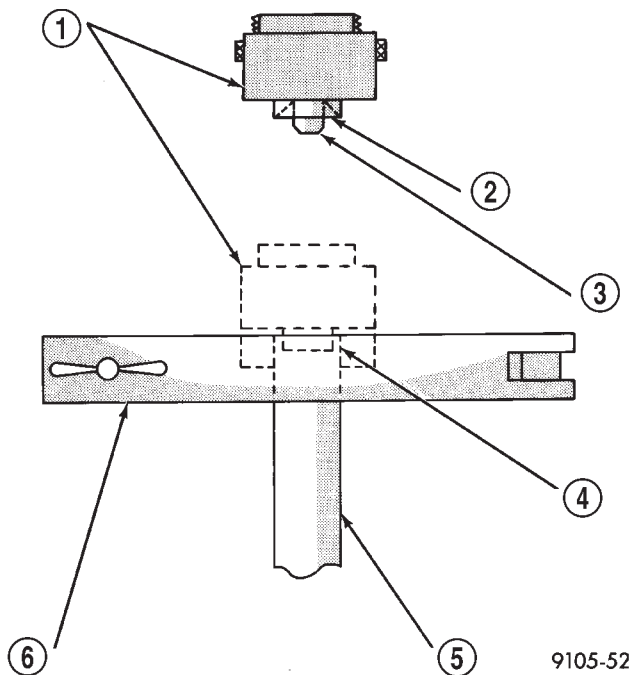


Fig. 14 ISO Tubing Flare Tool

- 1 - ADAPTER
- 2 - LUBRICATE HERE
- 3 - PILOT
- 4 - FLUSH WITH BAR
- 5 - TUBING
- 6 - BAR ASSEMBLY

INSPECTION - BRAKE TUBES AND HOSES

Flexible rubber hose is used at both front and rear brakes. Inspection of brake hoses should be performed whenever the brake system is serviced and every 7,500 miles or 12 months, whichever comes first (every engine oil change). Inspect hydraulic

brake hoses for severe surface cracking, scuffing, worn spots or physical damage. If the fabric casing of the rubber hose becomes exposed due to cracks or abrasions in the rubber hose cover, the hose should be replaced immediately. Eventual deterioration of the hose can take place with possible burst failure. Faulty installation can cause twisting, resulting in wheel, tire, or chassis interference.

The steel brake tubing should be inspected periodically for evidence of corrosion, physical damage or contact with moving or hot components of the vehicle.

BRAKE PADS/SHOES - FRONT

REMOVAL

REMOVAL - FRONT DISC BRAKE SHOES

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove front wheel and tire assemblies from vehicle.

(3) Remove the two caliper guide pin bolts (Fig. 15).

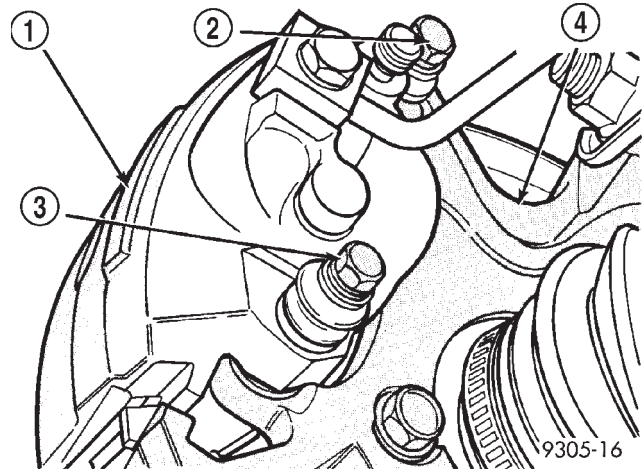


Fig. 15 Caliper Guide Pin Bolts

- 1 - CALIPER ASSEMBLY
- 2 - GUIDE PIN BOLT
- 3 - GUIDE PIN BOLT
- 4 - STEERING KNUCKLE

NOTE: Note the positioning of the two rail shims between the knuckle's machined abutments and the brake shoes.

(4) Remove caliper assembly from steering knuckle. Proceed by first rotating top of caliper away from steering knuckle, then lifting caliper off bottom

BRAKE PADS/SHOES - FRONT (Continued)

machined abutment on steering knuckle (Fig. 16). Take care not to lose the two rail shims.

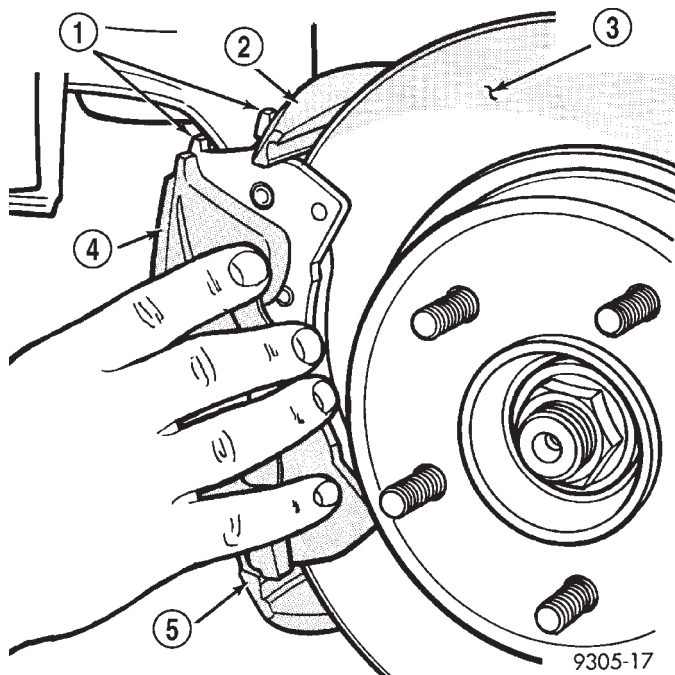


Fig. 16 Caliper Removal/Installation

- 1 - BRAKE SHOES
- 2 - STEERING KNUCKLE
- 3 - BRAKING DISC
- 4 - CALIPER ASSEMBLY
- 5 - MACHINED ABUTMENT

(5) Hang the caliper off to the side using wire or bungee cord (Fig. 17). Do not allow the caliper to be supported by the flexible brake hose. Damage to the flexible brake hose may result.

(6) Remove outboard brake shoe by prying the shoe retaining clip over raised area on caliper. Then slide the brake shoe off the caliper (Fig. 18).

(7) Pull inboard brake shoe away from piston until retaining clip is free from cavity in piston (Fig. 19).

(8) Repeat steps (3) through (7) on opposite side of vehicle to remove that side's brake shoes.

REMOVAL - FRONT DISC BRAKE SHOES (EXPORT)

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove both front wheel and tire assemblies from vehicle.

(3) Remove the two caliper guide pin bolts (Fig. 15).

(4) Remove caliper assembly from steering knuckle. Proceed by first rotating top of caliper away from steering knuckle and then lifting caliper off bot-

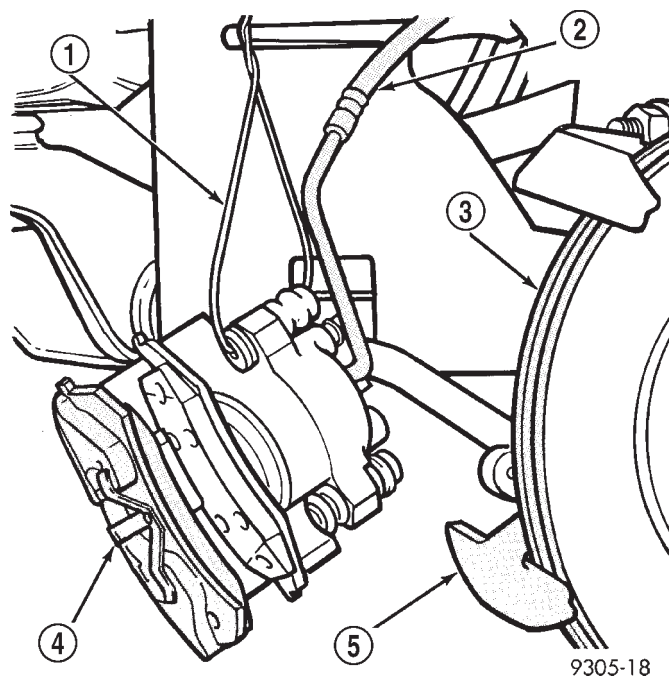


Fig. 17 Supported Caliper

- 1 - WIRE HANGER
- 2 - FLEXIBLE BRAKE HOSE
- 3 - BRAKING DISC
- 4 - CALIPER ASSEMBLY
- 5 - STEERING KNUCKLE

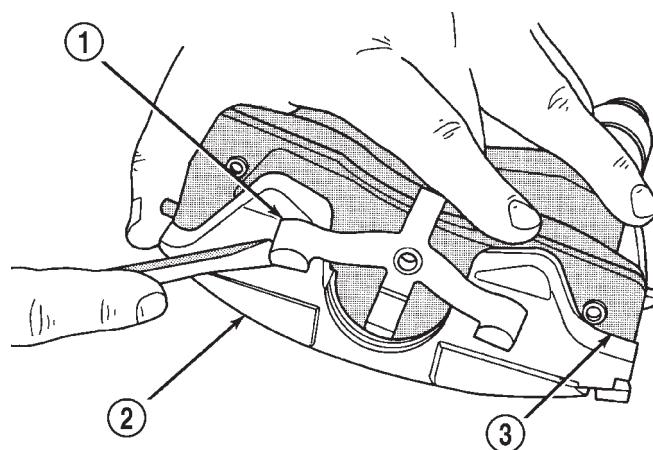


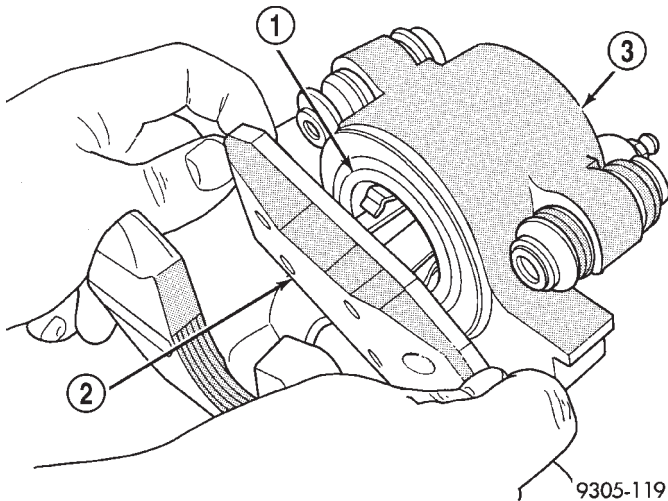
Fig. 18 Removing Outboard Brake Shoe

- 1 - RETAINING CLIP
- 2 - CALIPER ASSEMBLY
- 3 - BRAKE SHOE

tom machined abutment on steering knuckle (Fig. 16).

(5) Hang the caliper off to the side using wire or bungee cord (Fig. 17). Do not allow the caliper to be supported by the flexible brake hose. Damage to the flexible brake hose may result.

BRAKE PADS/SHOES - FRONT (Continued)

**Fig. 19 Inboard Brake Shoe**

- 1 - PISTON
2 - BRAKE SHOE
3 - CALIPER ASSEMBLY

(6) Remove outboard brake shoe by prying the shoe retaining clip over raised area on caliper. Then slide the brake shoe off the caliper (Fig. 18).

(7) Pull inboard brake shoe away from piston until retaining clip is free from cavity in piston (Fig. 19).

(8) Repeat steps (3) through (7) on opposite side of vehicle to remove that side's brake shoes.

CLEANING - DISC BRAKE SHOES

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

INSPECTION - DISC BRAKE SHOES

Visually inspect brake shoes (pads) for uneven lining wear. Also inspect for excessive lining deterioration. Check the clearance between the tips of the wear indicators on the shoes (if equipped) and the brake rotors.

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the disc brake shoes from the calipers.

Measure each brake shoe. The combined brake shoe and its lining material thickness should be measured at its thinnest point.

- For front disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.95 mm (5/16 inch), they should be replaced.

- For rear disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.0 mm (9/32 inch), they should be replaced.

- Typically, if front shoes are worn out, both fronts and rears need to be replaced. Make sure to check rears.

Replace **both** disc brake shoes (inboard and outboard) on each caliper. It is necessary to replace the shoes on the opposite side of the vehicle as well as the shoes failing inspection.

If the brake shoe assemblies do not require replacement, be sure to reinstall the brake shoes in the original position they were removed from.

INSTALLATION**INSTALLATION - FRONT DISC BRAKE SHOES**

(1) Completely retract caliper piston back into piston bore of caliper assembly.

(2) Lubricate both steering knuckle abutments with a liberal amount of Mopar® Brake Grease For Caliper Slides Lubricant, or equivalent.

(3) Remove the protective paper from the noise suppression gasket on both the inner and outer brake shoe assemblies (if equipped).

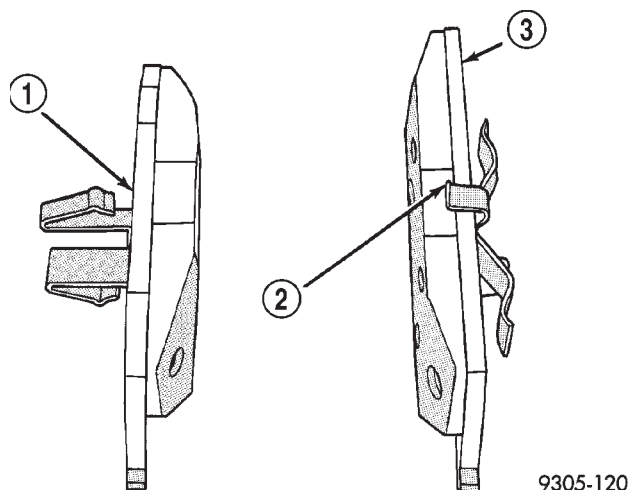
NOTE: The inboard and outboard brake shoes are not common, refer to (Fig. 20) for inboard and outboard brake shoe assembly identification.

NOTE: When installing inboard brake shoe into caliper piston, be sure brake shoe is positioned squarely against the face of the caliper piston.

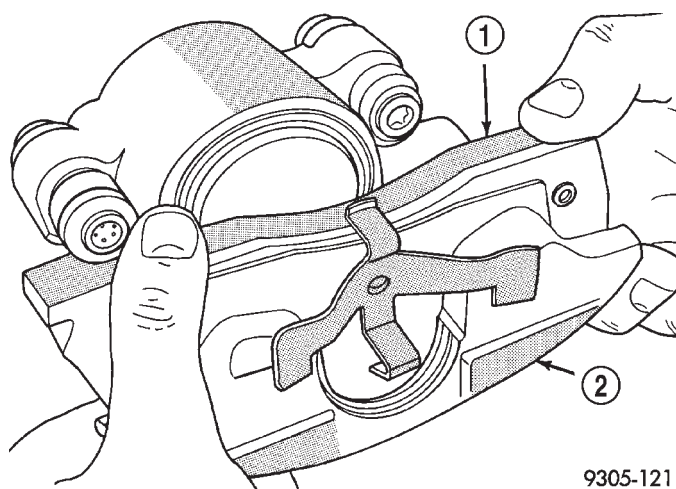
(4) Install the new inboard brake shoe assembly into the caliper piston by firmly pressing it into bore of caliper piston with thumbs (Fig. 19).

(5) Slide the new outboard brake shoe assembly onto the caliper assembly (Fig. 21).

BRAKE PADS/SHOES - FRONT (Continued)

**Fig. 20 Inboard And Outboard Shoes**

- 1 - INBOARD BRAKE SHOE
- 2 - WEAR INDICATOR
- 3 - OUTBOARD BRAKE SHOE

**Fig. 21 Installing Outboard Brake Shoe Assembly**

- 1 - BRAKE SHOE ASSEMBLY
- 2 - BRAKE CALIPER

(6) Install one rail shim on each machined abutment where it will contact the brake shoes. Make sure the alignment tabs on the shims are positioned toward the abutments.

(7) Carefully position caliper and brake shoes over rotor by reversing the removal procedure (Fig. 16).

CAUTION: When being installed, extreme caution should be taken not to crosstread the caliper guide pin bolts.

(8) Install the caliper guide pin bolts (Fig. 15). Tighten guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(9) Repeat the preceding steps on the opposite side of the vehicle, installing the brake shoes on that side of the vehicle.

(10) Install the wheel and tire assemblies.

(11) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(12) Lower vehicle.

CAUTION: After performing any service to the vehicle brake system, be sure to obtain a firm brake pedal before moving vehicle.

(13) Pump the brake pedal several times to ensure the vehicle has a firm brake pedal to adequately stop vehicle.

(14) Check and adjust the brake fluid level as necessary.

(15) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

INSTALLATION - FRONT DISC BRAKE SHOES (EXPORT)

(1) Completely retract caliper piston back into piston bore of caliper assembly.

(2) Lubricate both steering knuckle abutments with a liberal amount of Mopar® Brake Grease For Caliper Slides Lubricant, or equivalent.

(3) Remove the protective paper from the noise suppression gasket on both the inner and outer brake shoe assemblies (if equipped).

NOTE: The inboard and outboard brake shoes are not common, refer to (Fig. 20) for inboard and outboard brake shoe assembly identification.

NOTE: When installing inboard brake shoe into caliper piston, be sure brake shoe is positioned squarely against the face of the caliper piston.

(4) Install the new inboard brake shoe assembly into the caliper piston by firmly pressing it into bore of caliper piston with thumbs (Fig. 19).

(5) Slide the new outboard brake shoe assembly onto the caliper assembly (Fig. 21).

(6) Carefully position caliper and brake shoes over rotor by reversing the removal procedure (Fig. 16).

CAUTION: When being installed, extreme caution should be taken not to crosstread the caliper guide pin bolts.

BRAKE PADS/SHOES - FRONT (Continued)

(7) Install the caliper guide pin bolts (Fig. 15). Tighten guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(8) Repeat the preceding steps on the opposite side of the vehicle, installing the brake shoes on that side of the vehicle.

(9) Install the wheel and tire assemblies.

(10) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(11) Lower vehicle.

CAUTION: After performing any service to the vehicle brake system, be sure to obtain a firm brake pedal before moving vehicle.

(12) Pump the brake pedal several times to ensure the vehicle has a firm brake pedal to adequately stop vehicle.

(13) Check and adjust the brake fluid level as necessary.

(14) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

BRAKE PADS/SHOES - REAR

REMOVAL - REAR DISC BRAKE SHOES

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance section of this manual.

(2) Remove rear wheel and tire assemblies from vehicle.

(3) Remove the 2 caliper assembly to adapter guide pin bolts (Fig. 22).

(4) Remove caliper from adapter using the following procedure. First rotate top of caliper away from adapter. Then lift caliper assembly off bottom abutment of adapter to remove it from the vehicle (Fig. 23).

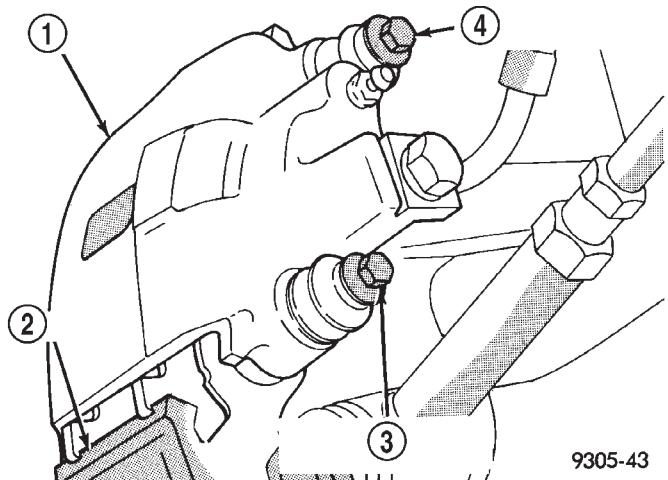


Fig. 22 Caliper Guide Pin Bolts

- 1 - CALIPER ASSEMBLY
- 2 - ADAPTER
- 3 - CALIPER ASSEMBLY ATTACHING BOLT
- 4 - CALIPER ASSEMBLY ATTACHING BOLT

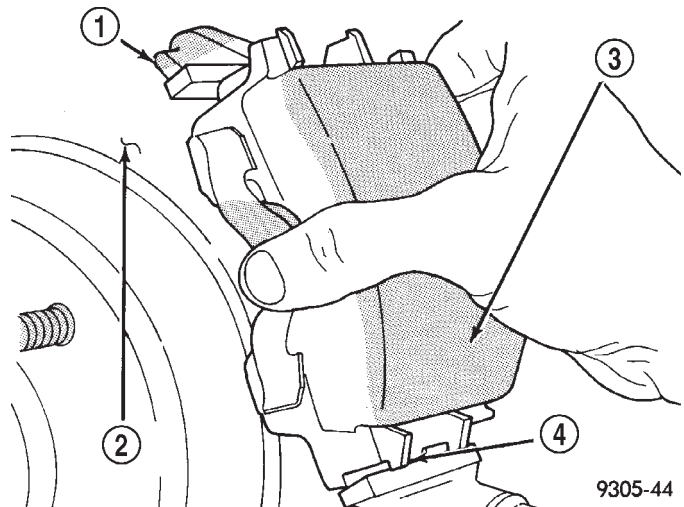
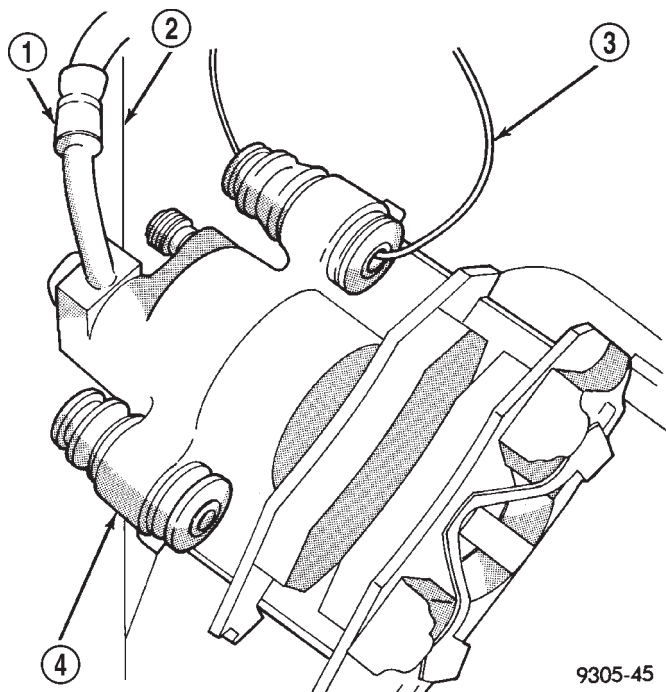


Fig. 23 Removing / Installing Caliper

- 1 - ADAPTER
- 2 - BRAKING DISC
- 3 - CALIPER ASSEMBLY
- 4 - ADAPTER ABUTMENT

BRAKE PADS/SHOES - REAR (Continued)

(5) Support caliper assembly firmly from rear strut to prevent weight of caliper from damaging the flexible brake hose (Fig. 24).



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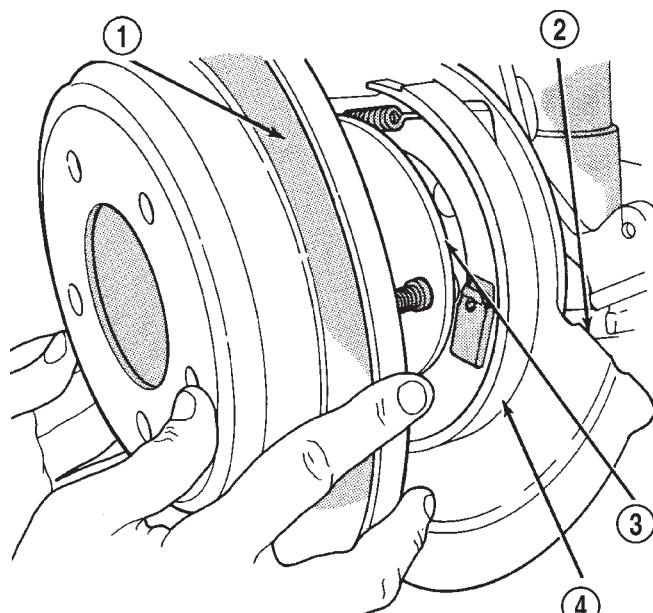
Fig. 24 Storing Caliper

- 1 - FLEX HOSE
- 2 - STRUT
- 3 - WIRE HANGER
- 4 - CALIPER ASSEMBLY

(6) Remove the rear rotor from the hub by pulling it straight off the wheel mounting studs (Fig. 25).

(7) Remove outboard brake shoe, by prying brake shoe retaining clip over raised area on caliper and sliding the shoe off the caliper (Fig. 26).

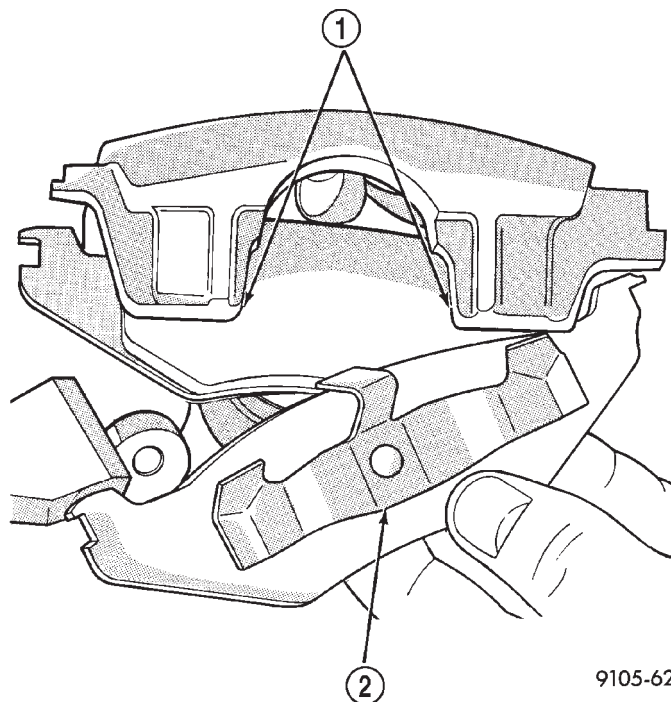
(8) Pull inboard brake shoe away from piston, until the retaining clip is free from the cavity in the piston (Fig. 27).



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Fig. 25 Removing / Installing Rear Rotor

- 1 - BRAKE ROTOR (DISC)
- 2 - DISC SHIELD
- 3 - HUB
- 4 - DRUM-IN-HAT PARKING BRAKE

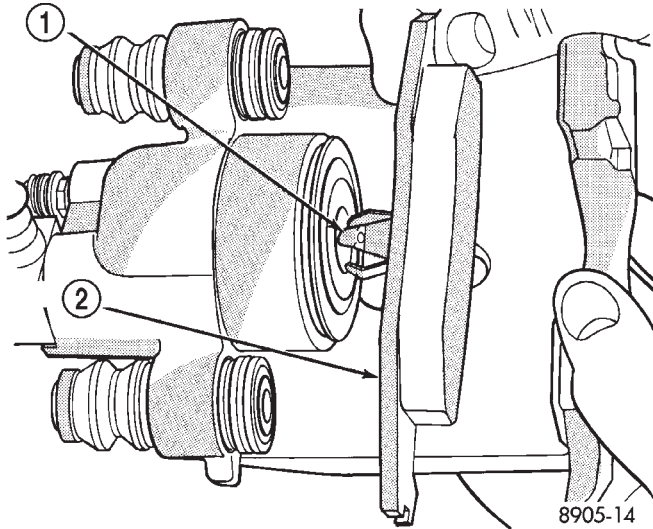


9105-62

Fig. 26 Removing / Installing Outboard Brake Shoe

- 1 - CALIPER FINGERS
- 2 - RETAINING CLIP

BRAKE PADS/SHOES - REAR (Continued)

**Fig. 27 Removing / Installing Inboard Brake Shoe**

- 1 - RETAINING CLIP
2 - INBOARD SHOE

CLEANING - DISC BRAKE SHOES

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

INSPECTION - DISC BRAKE SHOES

Visually inspect brake shoes (pads) for uneven lining wear. Also inspect for excessive lining deterioration. Check the clearance between the tips of the wear indicators on the shoes (if equipped) and the brake rotors.

If a visual inspection does not adequately determine the condition of the lining, a physical check will be necessary. To check the amount of lining wear, remove the disc brake shoes from the calipers.

Measure each brake shoe. The combined brake shoe and its lining material thickness should be measured at its thinnest point.

- For front disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.95 mm (5/16 inch), they should be replaced.
- For rear disc brake shoes, when a set of brake shoes are worn to a thickness of approximately 7.0 mm (9/32 inch), they should be replaced.
- Typically, if front shoes are worn out, both fronts and rears need to be replaced. Make sure to check rears.

Replace **both** disc brake shoes (inboard and outboard) on each caliper. It is necessary to replace the shoes on the opposite side of the vehicle as well as the shoes failing inspection.

If the brake shoe assemblies do not require replacement, be sure to reinstall the brake shoes in the original position they were removed from.

INSTALLATION - REAR DISC BRAKE SHOES

NOTE: Step 1 below is only required when installing a caliper after new brake shoes have been installed.

- (1) Completely retract caliper piston back into piston bore of caliper assembly.
- (2) Lubricate both adapter abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.
- (3) Install the rear rotor on the hub, making sure it is squarely seated on the face of the hub (Fig. 25).
- (4) Remove the protective paper from the noise suppression gasket on both the inner and outer brake shoe assemblies (if equipped).
- (5) Install the new inboard brake shoe assembly into the caliper piston by firmly pressing into piston bore with thumbs. Be sure inboard brake shoe assembly is positioned squarely against the face of the caliper piston (Fig. 27).
- (6) Slide the new outboard brake shoe assembly onto the caliper assembly (Fig. 26).

CAUTION: Use care when installing the caliper assembly onto the adapter, so the caliper guide pin bushings do not get damaged by the mounting bosses.

- (7) Carefully lower caliper and brake shoes over rotor and onto adapter, reversing the removal procedure (Fig. 23).

BRAKE PADS/SHOES - REAR (Continued)

CAUTION: When installing the caliper guide pin bolts extreme caution should be taken not to cross thread the guide pin bolts.

(8) Install the caliper guide pin bolts. Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(9) Install the wheel and tire assembly.

(10) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(11) Remove jackstands or lower hoist.

CAUTION: Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop the vehicle.

(12) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

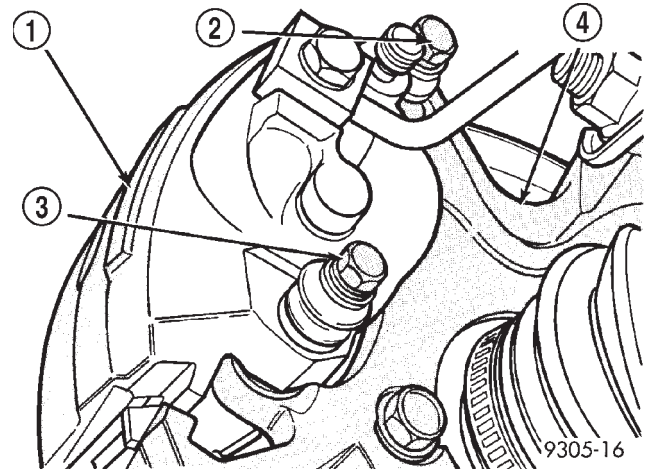


Fig. 28 Caliper Guide Pin Bolts

- 1 - CALIPER ASSEMBLY
- 2 - GUIDE PIN BOLT
- 3 - GUIDE PIN BOLT
- 4 - STEERING KNUCKLE

DISC BRAKE CALIPER - FRONT

REMOVAL

REMOVAL - FRONT CALIPER

(1) Using a brake pedal holding tool, depress brake pedal past its first 1 inch of travel and secure in this position. This will isolate the master cylinder reservoir from the brake hydraulic system, not allowing the brake fluid to drain out of the reservoir.

(2) Raise vehicle on jackstands or centered on a hoist. See Hoisting in Lubrication and Maintenance.

(3) Remove front wheel and tire assembly from vehicle.

(4) Remove the banjo bolt connecting the brake flex hose to the caliper. There will be two washers (one on each side of the flex hose fitting) that will come off at the same time.

NOTE: Note the positioning of the two rail shims between the knuckle's machined abutments and the brake shoes.

(5) Remove the two caliper guide pin bolts (Fig. 28).

(6) Remove caliper assembly from steering knuckle. Proceed by first rotating top of caliper away from steering knuckle, then lifting caliper off bottom machined abutment on steering knuckle (Fig. 29). Take care not to lose the two rail shims.

(7) If required, remove rotor from hub by pulling it straight off wheel mounting studs (Fig. 30).

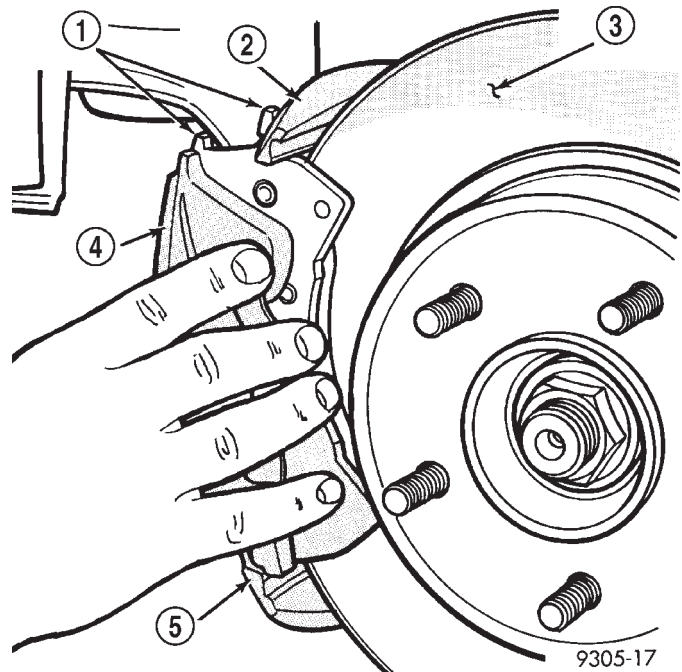
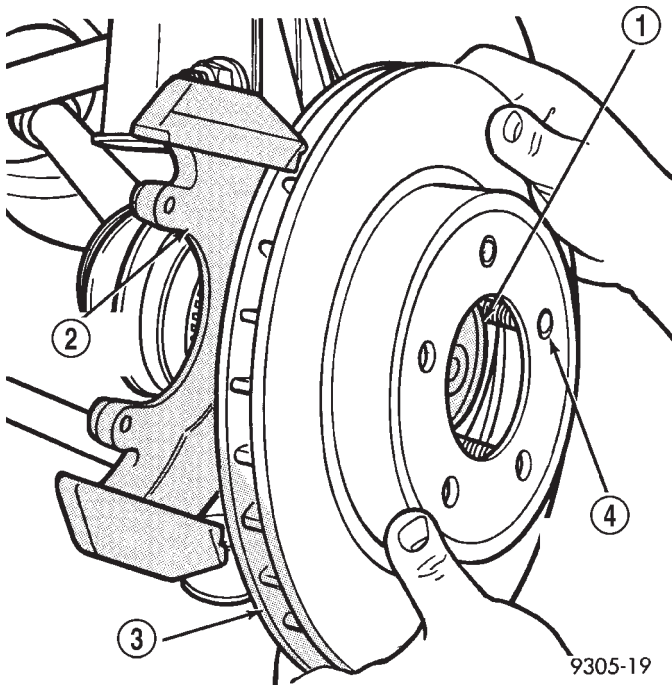


Fig. 29 Caliper Removal/Installation

- 1 - BRAKE SHOES
- 2 - STEERING KNUCKLE
- 3 - BRAKING DISC
- 4 - CALIPER ASSEMBLY
- 5 - MACHINED ABUTMENT

DISC BRAKE CALIPER - FRONT (Continued)

**Fig. 30 Brake Rotor**

- 1 - HUB
- 2 - STEERING KNUCKLE
- 3 - BRAKE ROTOR (DISC)
- 4 - WHEEL MOUNTING STUD

REMOVAL - FRONT CALIPER (EXPORT)

(1) Using a brake pedal holding tool, depress brake pedal past its first 1 inch of travel and secure in this position. This will isolate the master cylinder reservoir from the brake hydraulic system, not allowing the brake fluid to drain out of the reservoir.

(2) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove front wheel and tire assembly from vehicle.

(4) Remove the banjo bolt connecting the brake flex hose to the caliper. There will be two washers (one on each side of the flex hose fitting) that will come off at the same time.

(5) Remove the two caliper guide pin bolts (Fig. 28).

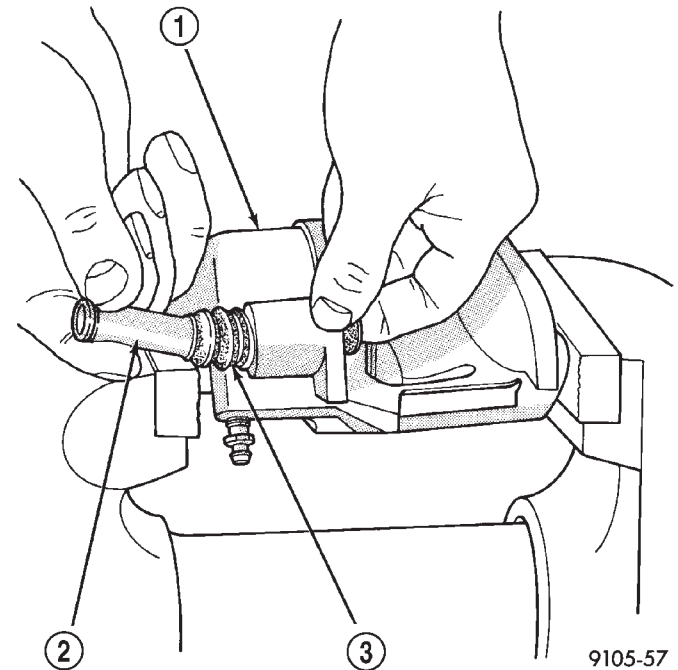
(6) Remove caliper assembly from steering knuckle. Proceed by first rotating top of caliper away from steering knuckle and then lifting caliper off bottom machined abutment on steering knuckle (Fig. 29).

(7) If required, remove rotor from hub by pulling it straight off wheel mounting studs (Fig. 30).

DISASSEMBLY**DISASSEMBLY - CALIPER GUIDE PIN BUSHINGS**

Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING or INSPECTION in this section.

(1) With one hand, push the guide pin bushing sleeve towards the back of the caliper, and at the same time, pull the sleeve out the back of the caliper and bushing (Fig. 31).

**Fig. 31 Removing Sleeve From Bushing**

- 1 - CALIPER
- 2 - SLEEVE
- 3 - BUSHING

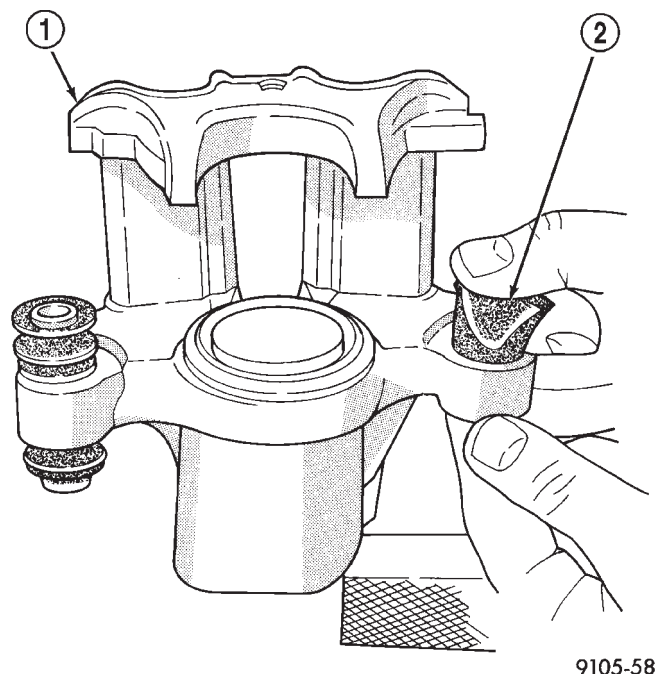
(2) Using your fingers, collapse one side of the rubber guide pin bushing. Pull the guide pin bushing out the other side of the brake caliper mounting boss (Fig. 32).

DISASSEMBLY - CALIPER PISTON AND SEAL

WARNING: UNDER NO CONDITION SHOULD HIGH PRESSURE AIR EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

NOTE: Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING AND INSPECTION in this section.

DISC BRAKE CALIPER - FRONT (Continued)

**Fig. 32 Removing Bushing From Caliper**

- 1 - CALIPER
2 - BUSHING

NOTE: The safest way to remove the piston from the caliper bore is to use the hydraulic pressure of the vehicle's brake system.

(1) Following the removal procedure in DISC BRAKE SHOES found in this section, remove the caliper from the brake rotor and hang the assembly on a wire hook away from rotor and body of the vehicle so brake fluid cannot get on these components. Remove the brake shoes, and place a small piece of wood between the piston and caliper fingers.

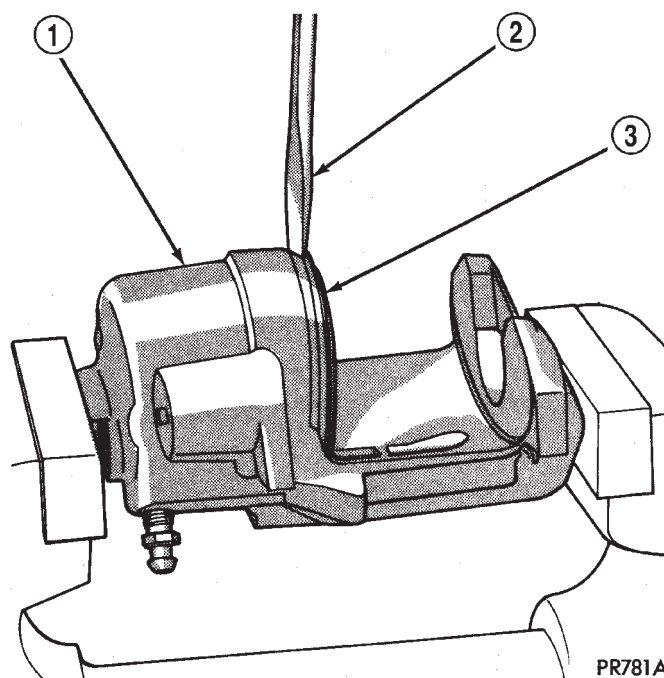
(2) Carefully depress the brake pedal to hydraulically push piston out of its bore. Once completed, apply and hold down the brake pedal to any position beyond the first inch of pedal travel using a brake pedal holding tool. This will prevent the fluid in the master cylinder reservoir from completely draining out.

(3) Disconnect the brake fluid flex hose from the caliper assembly and remove it from the vehicle.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

(4) Mount the caliper in a vise equipped with protective jaws.

(5) Remove the piston dust boot from the caliper and discard (Fig. 33).

**Fig. 33 Removing Caliper/Piston Dust Boot**

- 1 - CALIPER
2 - SCREWDRIVER
3 - BOOT

NOTE: Do not use a screw driver or other metal tool for seal removal. Using such tools can scratch the bore or leave burrs on the seal groove edges.

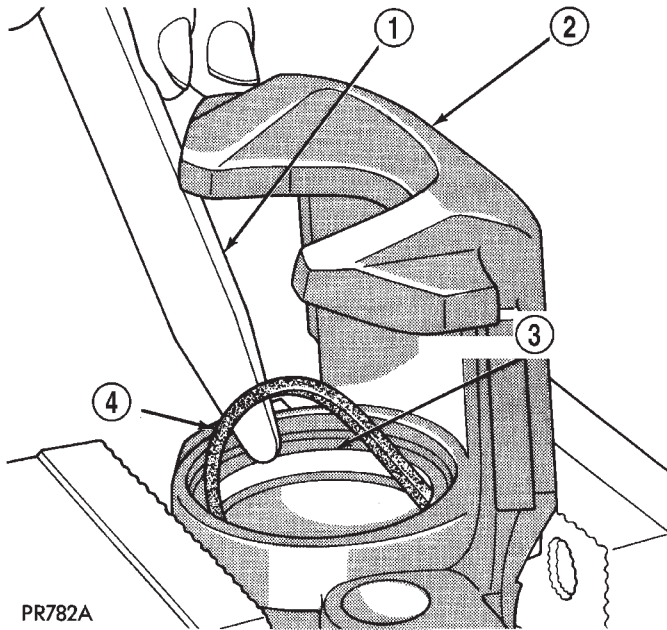
(6) Using a soft tool such as a plastic trim stick, work the piston seal out of its groove in caliper piston bore (Fig. 34). Discard the old seal.

(7) Clean the piston bore and drilled passage ways using alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.

(8) Inspect the piston bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of the light scratches or corrosion using crocus cloth. Bores that have deep scratches or scoring should be honed. Use Caliper Hone, Special Tool C-4095 or equivalent, to hone the bore. Do not over-hone the bore. Do not increase the diameter of the bore more than 0.0254 mm (0.001 inch) (Fig. 35). If the bore does not clean up within this specification, a new caliper housing should be installed.

NOTE: During the honing procedure, coat the stones and bore with brake fluid. After honing the bore, carefully clean the seal and boot grooves with a stiff non-metallic rotary brush. Use extreme care in cleaning the caliper after honing. Remove all dirt and grit by flushing the caliper bore with fresh clean brake fluid; wipe it dry with a clean, lint free cloth and then clean it a second time.

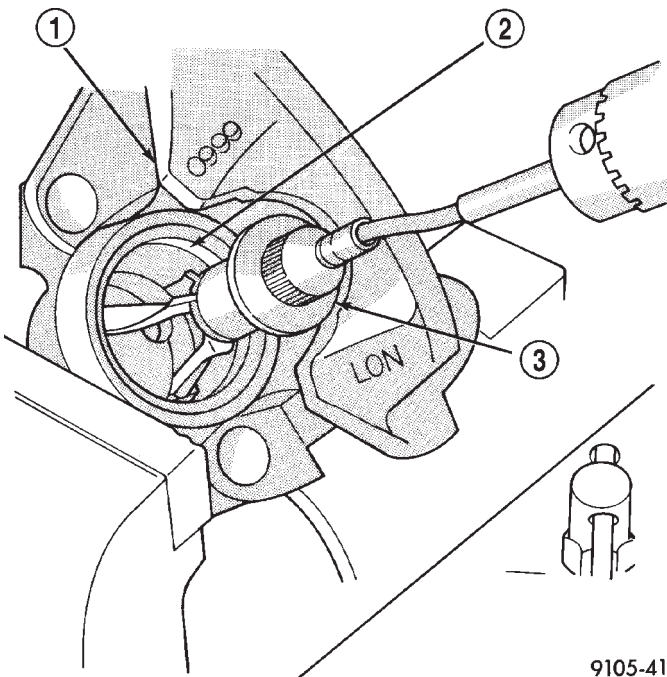
DISC BRAKE CALIPER - FRONT (Continued)



PR782A

Fig. 34 Removing Piston Seal

- 1 - PLASTIC TRIM STICK
- 2 - CALIPER
- 3 - PISTON SEAL GROOVE
- 4 - PISTON SEAL



9105-41

Fig. 35 Honing Brake Caliper Piston Bore

- 1 - CALIPER
- 2 - CALIPER BORE
- 3 - SPECIAL TOOL C-4095

(9) Inspect the caliper piston for pitting, scratches, or any physical damage. Replace the piston if there is evidence of scratches, pitting or physical damage.

CLEANING - CALIPER

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING, AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION - CALIPER

Inspect the disc brake caliper for the following:

- Brake fluid leaks in and around boot area and inboard lining
- Ruptures, brittleness or damage to the piston dust boot
- Damaged, dry or brittle guide pin dust boots

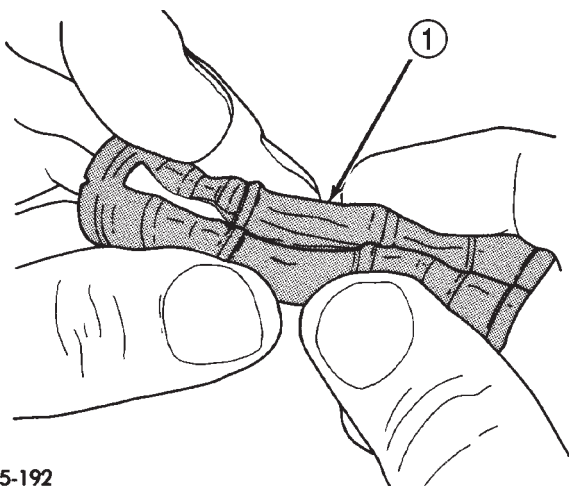
If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY**ASSEMBLY - CALIPER GUIDE PIN BUSHINGS**

(1) Fold the guide pin bushing in half lengthwise at the solid middle section (Fig. 36).

NOTE: To avoid damage to the bushing, do not use a sharp object to install the guide pin bushing.

DISC BRAKE CALIPER - FRONT (Continued)

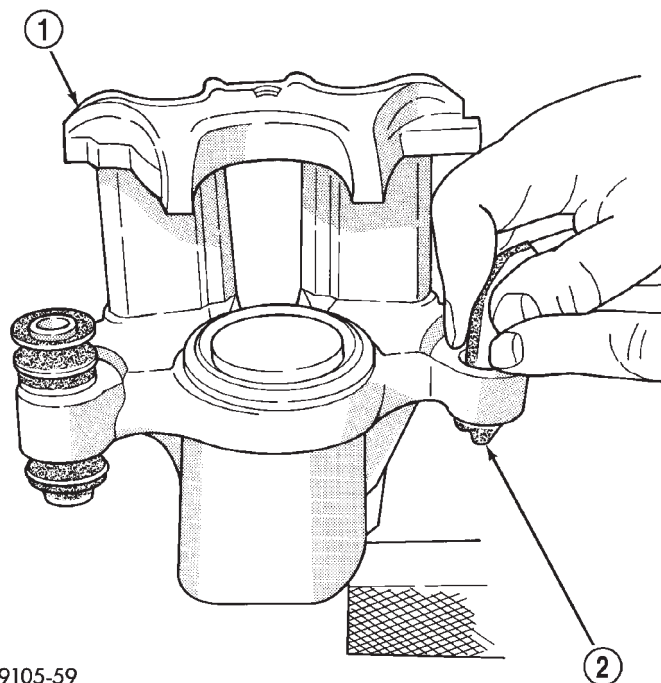


9205-192

Fig. 36 Folded Caliper Guide Pin Bushing

1 - CALIPER GUIDE PIN BUSHING

(2) Insert the folded bushing into the caliper mounting boss using your fingers (Fig. 37).



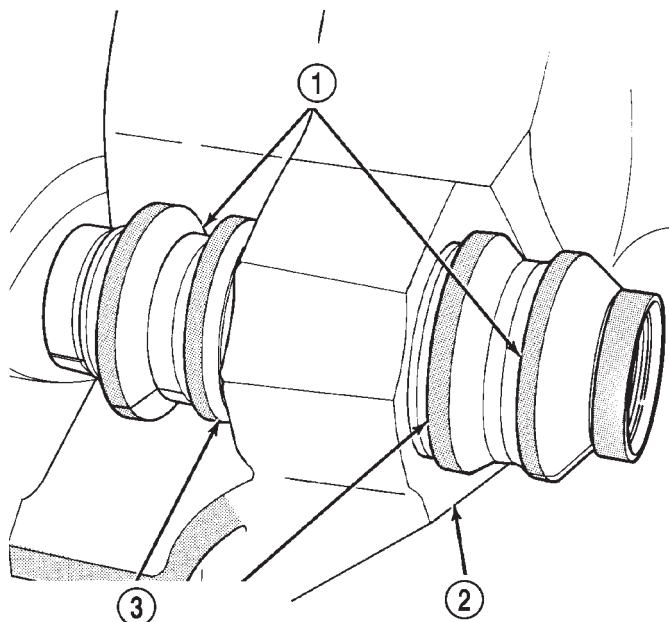
9105-59

Fig. 37 Installing Caliper Guide Pin Bushing

1 - CALIPER
2 - BUSHING

(3) Unfold the bushing using your fingers or a wooden dowel until the bushing is fully seated into the caliper housing. The bushing flanges should be seated evenly on both sides of the bushing hole (Fig. 38).

(4) Lubricate the inside surfaces of the bushing using Mopar® Dielectric Grease or an equivalent.



9205-193

Fig. 38 Bushing Correctly Installed In Caliper

1 - BUSHING
2 - CALIPER
3 - BE SURE BOTH BUSHING FLANGES ARE FULLY SEATED AROUND CALIPER BUSHING BORES.

(5) Install the guide pin sleeve into one end of bushing until the seal area of bushing is past the seal groove in the sleeve (Fig. 39).

(6) Holding the convoluted boot on the opposite end of the bushing, push the steel sleeve through the bushing until the bushing boot is fully seated into the seal groove on that end of sleeve (Fig. 39). Install the other end bushing boot into the groove on that end of the bushing sleeve.

(7) Verify both ends of the bushing are seated in the sleeve grooves (Fig. 40). When the sleeve is seated properly into the bushing, the sleeve/bushing can be held between your fingers and easily slid back and forth without the bushing unseating from the sleeve groove.

ASSEMBLY - CALIPER PISTON AND SEAL

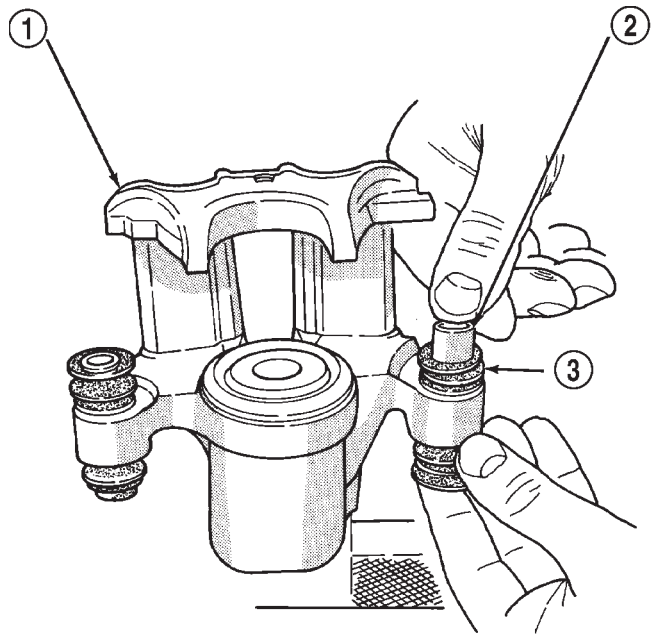
NOTE: Never use an old piston seal.

(1) Dip the new piston seal in clean brake fluid and install it in the groove of the caliper bore. The seal should be started at one area of the groove and gently worked around and into the groove (Fig. 41) using only your clean fingers to seat it.

(2) Coat the new piston boot with clean brake fluid leaving a generous amount inside the boot.

(3) Position the dust boot over the piston after coating it with brake fluid.

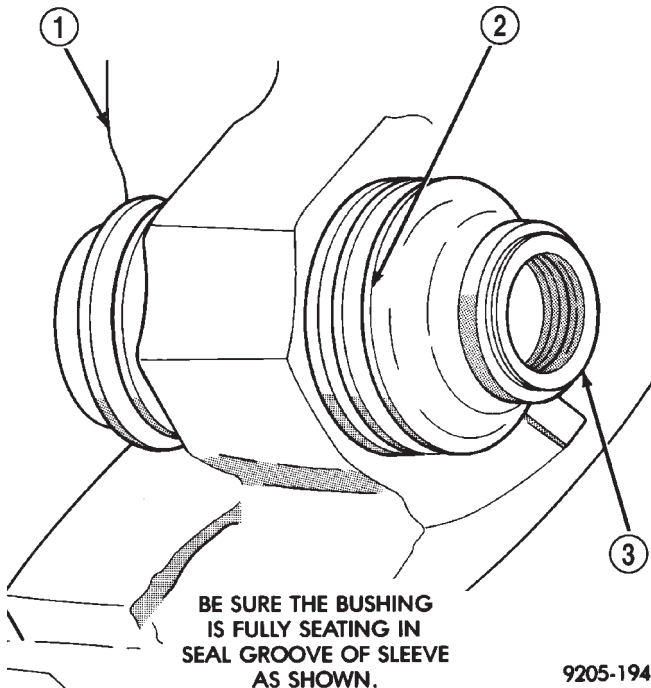
DISC BRAKE CALIPER - FRONT (Continued)



9105-60

Fig. 39 Installing Sleeve In Bushing

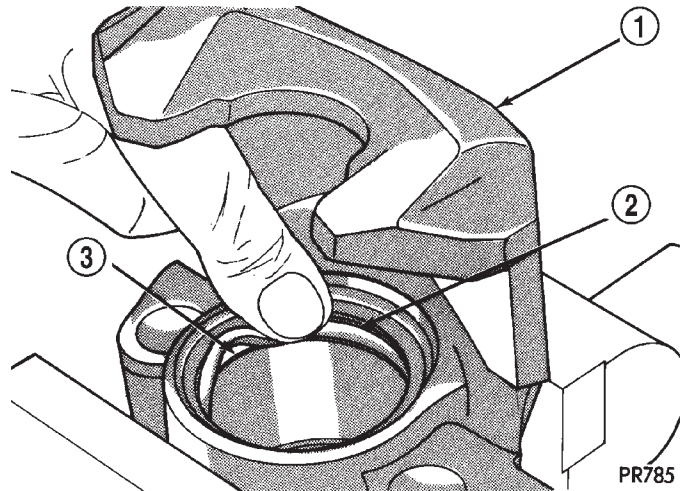
- 1 - CALIPER
- 2 - SLEEVE
- 3 - BUSHING



9205-194

Fig. 40 Correctly Installed Guide Pin Sleeve And Bushing

- 1 - CALIPER
- 2 - BUSHING
- 3 - SLEEVE



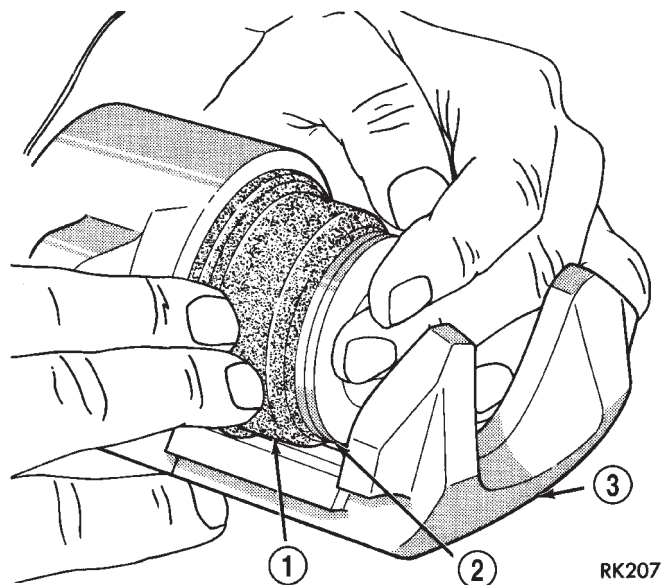
PR785

Fig. 41 Installing New Piston Seal

- 1 - CALIPER
- 2 - PISTON SEAL
- 3 - SEAL GROOVE

CAUTION: Force applied to the piston to seat it in the bore must be applied uniformly to avoid cocking and binding of the piston.

(4) Install piston into caliper bore pushing it past the piston seal until it bottoms in the caliper bore (Fig. 42).



RK207

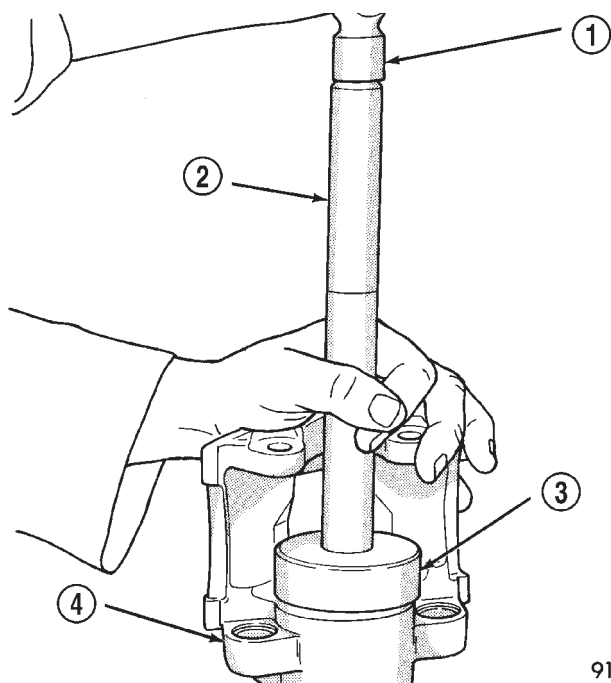
Fig. 42 Installing Piston Into Caliper Bore

- 1 - BOOT
- 2 - PISTON
- 3 - CALIPER

(5) Position the dust boot into the counterbore of the caliper assembly piston bore.

DISC BRAKE CALIPER - FRONT (Continued)

(6) Using a hammer and Installer, Special Tool C-4689 or C-4842 (depending on piston size), and Handle, Special Tool C-4171, drive the boot into the counterbore of the caliper as necessary (Fig. 43).



9105-42

Fig. 43 Installing Dust Boot

- 1 - HAMMER
- 2 - SPECIAL TOOL C-4171
- 3 - SPECIAL TOOL C-4689 or C-4842
- 4 - CALIPER

(7) Reinstall the caliper on the vehicle and bleed the brakes as necessary. Refer to Installation in this section.

INSTALLATION

INSTALLATION - FRONT CALIPER

CAUTION: Use care when installing the caliper assembly on the steering knuckle, so seals on caliper guide pin bushings do not get damaged by the steering knuckle bosses.

- (1) Completely retract the caliper piston back into the piston bore of the caliper.
- (2) If removed, install brake rotor on hub (Fig. 30).
- (3) Lubricate both machined knuckle abutments with a liberal amount of Mopar® Brake Grease For Caliper Slides Lubricant, or equivalent.
- (4) Install one rail shim on each machined abutment where it will contact the brake shoes. Make sure the alignment tabs on the shims are positioned toward the abutments.

(5) Carefully position caliper and brake shoes over rotor by reversing removal procedure (Fig. 29).

CAUTION: When being installed, extreme caution should be taken not to crosstread the caliper guide pin bolts.

(6) Install the caliper guide pin bolts. Tighten guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(7) Install the banjo bolt connecting the flex hose to the caliper. One washer should be installed on each side of the flex hose fitting before installing the banjo bolt. Tighten banjo bolt to a torque of 48 N·m (35 ft. lbs.).

(8) Install the wheel and tire assembly.

(9) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(10) Lower vehicle.

CAUTION: After performing any service to the vehicle brake system, be sure to obtain a firm brake pedal before moving vehicle.

(11) Remove the brake pedal holding tool.

(12) Bleed the base brakes. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

(13) Road test the vehicle and make several stops to wear off any foreign material off the brakes and to seat the brake shoe linings.

INSTALLATION - FRONT CALIPER (EXPORT)

CAUTION: Use care when installing the caliper assembly on the steering knuckle, so seals on caliper guide pin bushings do not get damaged by the steering knuckle bosses.

- (1) Completely retract the caliper piston back into the piston bore of the caliper.
- (2) If removed, install brake rotor on hub (Fig. 30).
- (3) Lubricate both machined knuckle abutments with a liberal amount of Mopar® Brake Grease For Caliper Slides Lubricant, or equivalent.
- (4) Carefully position caliper and brake shoes over rotor by reversing removal procedure (Fig. 29).

CAUTION: When being installed, extreme caution should be taken not to crosstread the caliper guide pin bolts.

(5) Install the caliper guide pin bolts. Tighten guide pin bolts to a torque of 22 N·m (192 in. lbs.).

(6) Install the banjo bolt connecting the flex hose to the caliper. One washer should be installed on each side of the flex hose fitting before installing the

DISC BRAKE CALIPER - FRONT (Continued)

banjo bolt. Tighten banjo bolt to a torque of 48 N·m (35 ft. lbs.).

(7) Install the wheel and tire assembly.

(8) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(9) Lower vehicle.

CAUTION: After performing any service to the vehicle brake system, be sure to obtain a firm brake pedal before moving vehicle.

(10) Remove the brake pedal holding tool.

(11) Bleed the base brakes. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

(12) Road test the vehicle and make several stops to wear off any foreign material off the brakes and to seat the brake shoe linings.

DISC BRAKE CALIPER - REAR

REMOVAL- REAR CALIPER

(1) Raise vehicle on jackstands or centered on a hoist. See Hoisting in the Lubrication and Maintenance section of this manual.

(2) Remove rear wheel and tire assemblies from vehicle.

(3) Remove the 2 caliper assembly to adapter guide pin bolts (Fig. 44).

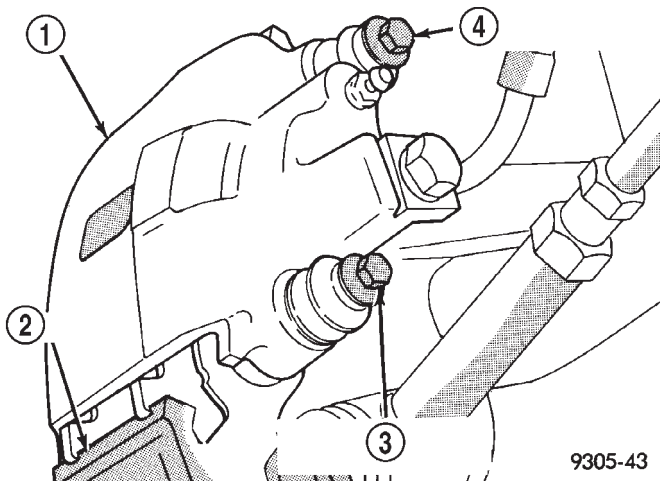


Fig. 44 Removing Caliper Guide Pin Bolts

- 1 - CALIPER ASSEMBLY
- 2 - ADAPTER
- 3 - CALIPER ASSEMBLY ATTACHING BOLT
- 4 - CALIPER ASSEMBLY ATTACHING BOLT

(4) Remove caliper from adapter using following procedure. First rotate top of caliper away from

adapter. Then lift the caliper off the bottom abutment on the adapter (Fig. 45).

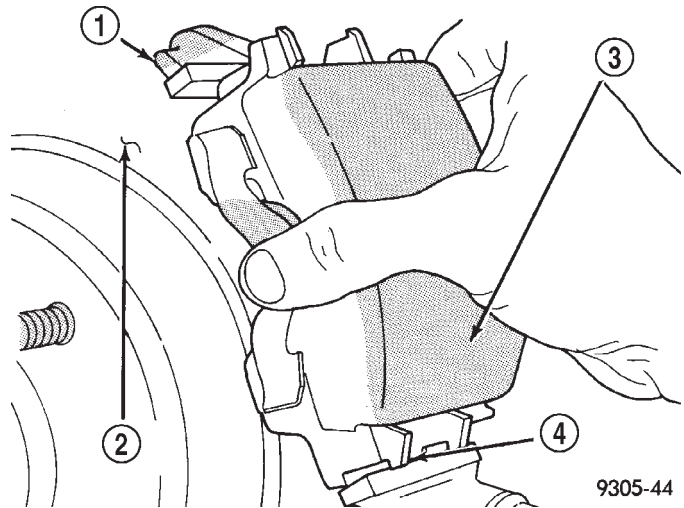


Fig. 45 Removing / Installing Caliper Assembly

- 1 - ADAPTER
- 2 - BRAKING DISC
- 3 - CALIPER ASSEMBLY
- 4 - ADAPTER ABUTMENT

(5) Support caliper assembly firmly from rear strut to prevent weight of caliper from damaging the flexible brake hose (Fig. 46).

(6) Remove the rear rotor from hub by pulling it straight off the wheel mounting studs (Fig. 47).

DISASSEMBLY

DISASSEMBLY - CALIPER GUIDE PIN BUSHINGS

Before disassembling the brake caliper, clean and inspect it. Refer to CLEANING or INSPECTION in this section.

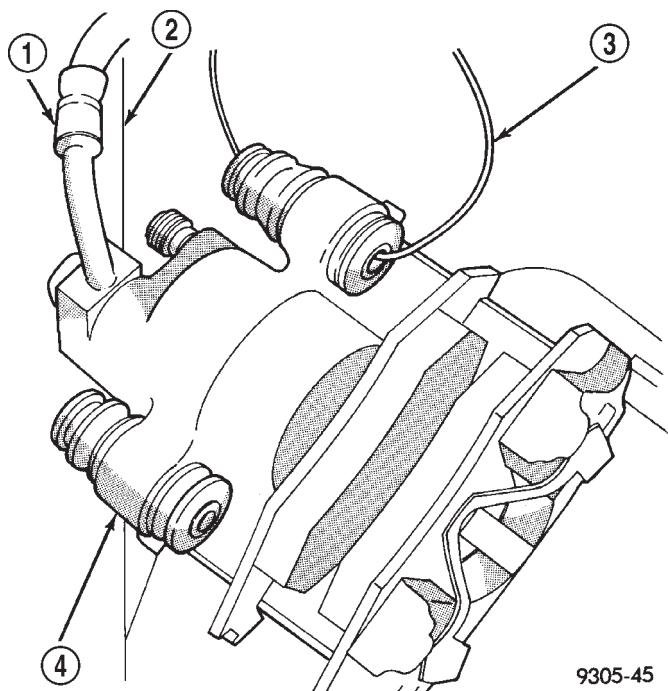
(1) With one hand, push the guide pin bushing sleeve towards the back of the caliper, and at the same time, pull the sleeve out the back of the caliper and bushing (Fig. 48).

(2) Using your fingers, collapse one side of the rubber guide pin bushing. Pull the guide pin bushing out the other side of the brake caliper mounting boss (Fig. 49).

DISASSEMBLY - CALIPER PISTON AND SEAL

WARNING: UNDER NO CONDITION SHOULD HIGH PRESSURE AIR EVER BE USED TO REMOVE A PISTON FROM A CALIPER BORE. PERSONAL INJURY COULD RESULT FROM SUCH A PRACTICE.

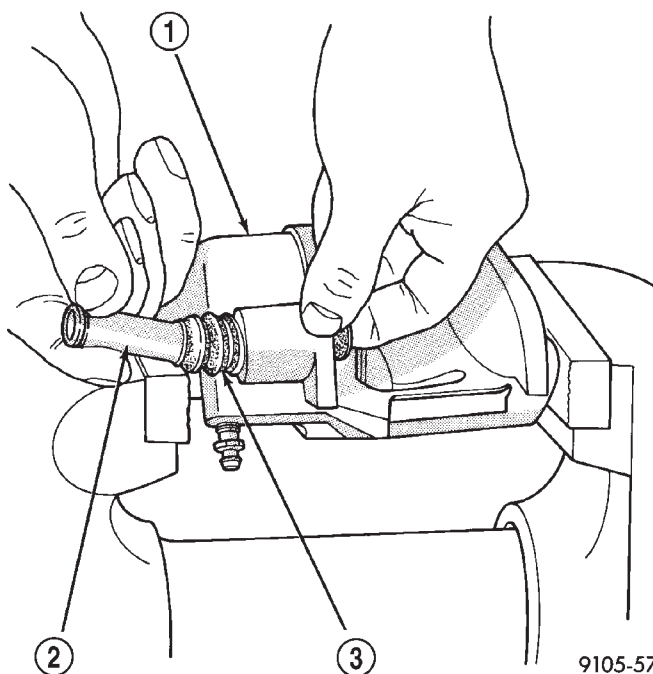
DISC BRAKE CALIPER - REAR (Continued)



9305-45

Fig. 46 Storing Caliper

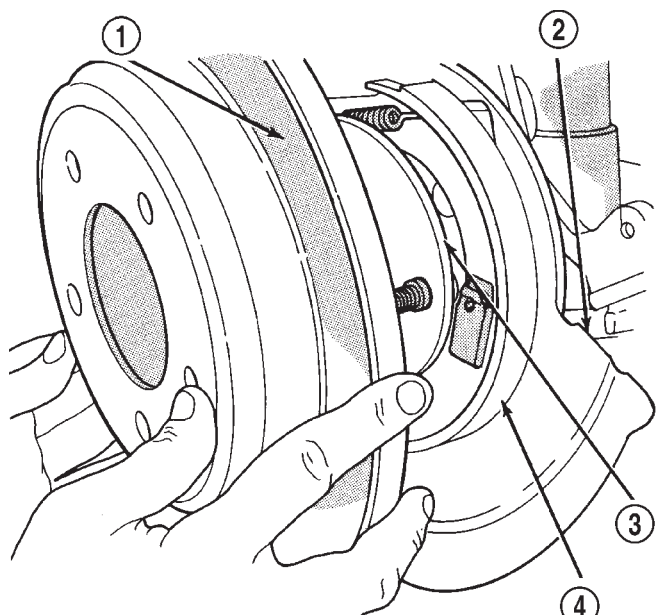
- 1 - FLEX HOSE
- 2 - STRUT
- 3 - WIRE HANGER
- 4 - CALIPER ASSEMBLY



9105-57

Fig. 48 Removing Sleeve From Bushing

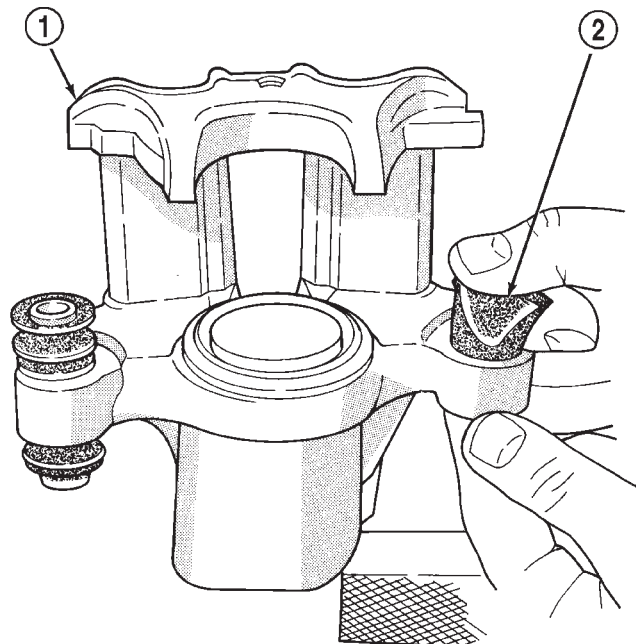
- 1 - CALIPER
- 2 - SLEEVE
- 3 - BUSHING



9305-46

Fig. 47 Removing / Installing Rear Rotor

- 1 - BRAKE ROTOR (DISC)
- 2 - DISC SHIELD
- 3 - HUB
- 4 - DRUM-IN-HAT PARKING BRAKE



9105-58

Fig. 49 Removing Bushing From Caliper

- 1 - CALIPER
- 2 - BUSHING

NOTE: Before disassembling the brake caliper, clean and inspect it. Refer to **CLEANING AND INSPECTION** in this section.

DISC BRAKE CALIPER - REAR (Continued)

NOTE: The safest way to remove the piston from the caliper bore is to use the hydraulic pressure of the vehicle's brake system.

(1) Following the removal procedure in DISC BRAKE SHOES found in this section, remove the caliper from the brake rotor and hang the assembly on a wire hook away from rotor and body of the vehicle so brake fluid cannot get on these components. Remove the brake shoes, and place a small piece of wood between the piston and caliper fingers.

(2) Carefully depress the brake pedal to hydraulically push piston out of its bore. Once completed, apply and hold down the brake pedal to any position beyond the first inch of pedal travel using a brake pedal holding tool. This will prevent the fluid in the master cylinder reservoir from completely draining out.

(3) Disconnect the brake fluid flex hose from the caliper assembly and remove it from the vehicle.

CAUTION: Do not use excessive force when clamping caliper in vise. Excessive vise pressure will cause bore distortion.

(4) Mount the caliper in a vise equipped with protective jaws.

(5) Remove the piston dust boot from the caliper and discard (Fig. 50).

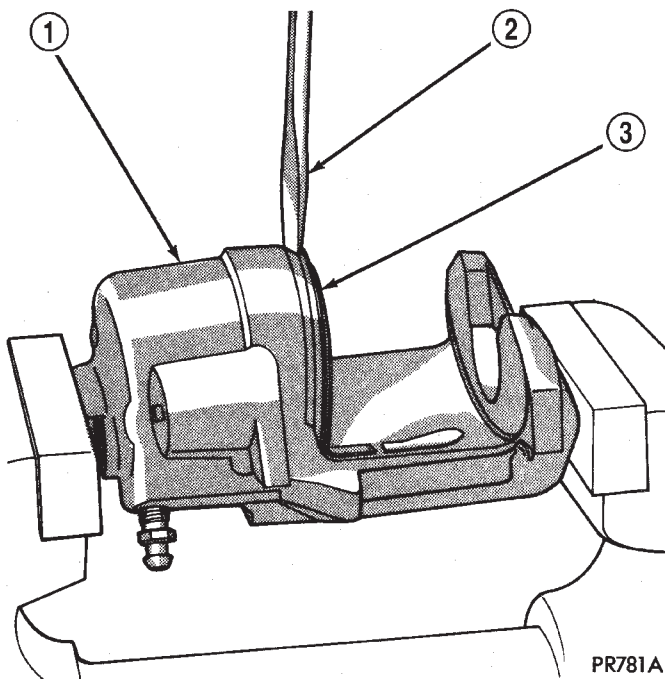


Fig. 50 Removing Caliper/Piston Dust Boot

- 1 - CALIPER
- 2 - SCREWDRIVER
- 3 - BOOT

NOTE: Do not use a screw driver or other metal tool for seal removal. Using such tools can scratch the bore or leave burrs on the seal groove edges.

(6) Using a soft tool such as a plastic trim stick, work the piston seal out of its groove in caliper piston bore (Fig. 51). Discard the old seal.

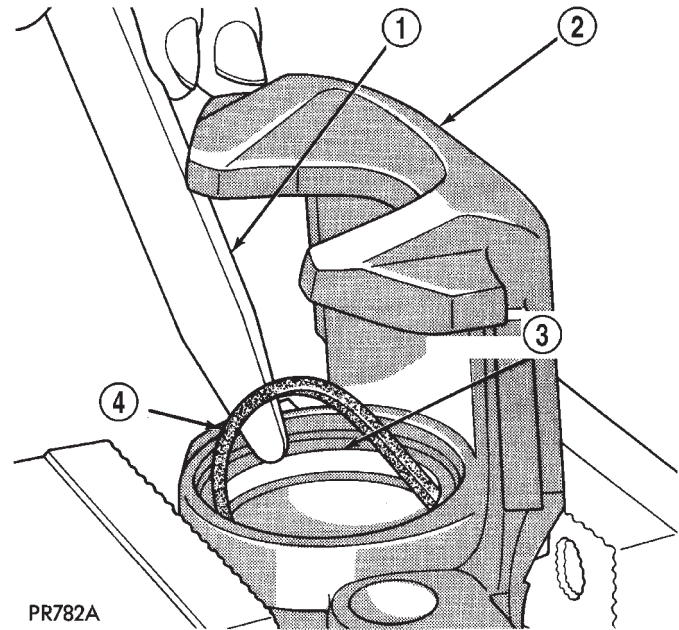


Fig. 51 Removing Piston Seal

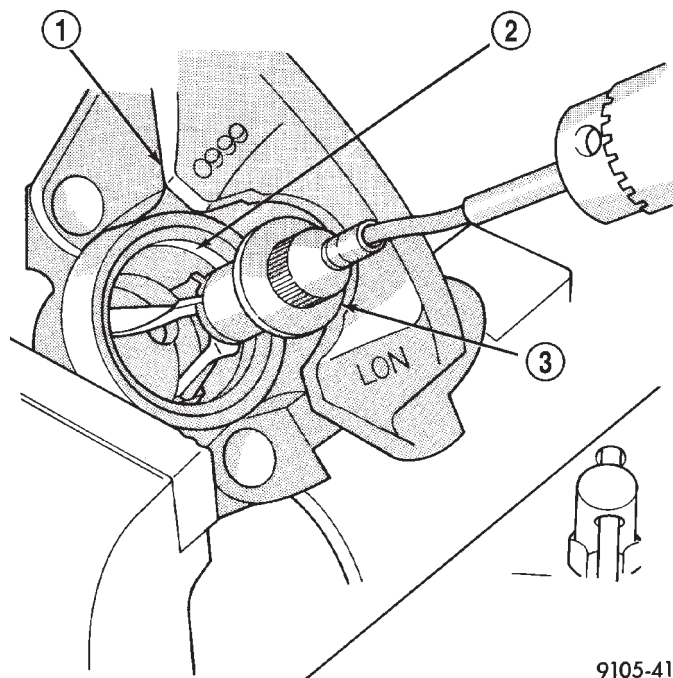
- 1 - PLASTIC TRIM STICK
- 2 - CALIPER
- 3 - PISTON SEAL GROOVE
- 4 - PISTON SEAL

(7) Clean the piston bore and drilled passage ways using alcohol or a suitable solvent. Wipe it dry using only a lint-free cloth.

(8) Inspect the piston bore for scoring or pitting. Bores that show light scratches or corrosion can usually be cleared of the light scratches or corrosion using crocus cloth. Bores that have deep scratches or scoring should be honed. Use Caliper Hone, Special Tool C-4095 or equivalent, to hone the bore. Do not over-hone the bore. Do not increase the diameter of the bore more than 0.0254 mm (0.001 inch) (Fig. 52). If the bore does not clean up within this specification, a new caliper housing should be installed.

NOTE: During the honing procedure, coat the stones and bore with brake fluid. After honing the bore, carefully clean the seal and boot grooves with a stiff non-metallic rotary brush. Use extreme care in cleaning the caliper after honing. Remove all dirt and grit by flushing the caliper bore with fresh clean brake fluid; wipe it dry with a clean, lint free cloth and then clean it a second time.

DISC BRAKE CALIPER - REAR (Continued)

**Fig. 52 Honing Brake Caliper Piston Bore**

- 1 - CALIPER
- 2 - CALIPER BORE
- 3 - SPECIAL TOOL C-4095

(9) Inspect the caliper piston for pitting, scratches, or any physical damage. Replace the piston if there is evidence of scratches, pitting or physical damage.

CLEANING - CALIPER

WARNING: DUST AND DIRT ACCUMULATING ON BRAKE PARTS DURING NORMAL USE MAY CONTAIN ASBESTOS FIBERS FROM PRODUCTION OR AFTERMARKET BRAKE LININGS. BREATHING EXCESSIVE CONCENTRATIONS OF ASBESTOS FIBERS CAN CAUSE SERIOUS BODILY HARM. EXERCISE CARE WHEN SERVICING BRAKE PARTS. DO NOT SAND OR GRIND BRAKE LINING UNLESS EQUIPMENT USED IS DESIGNED TO CONTAIN THE DUST RESIDUE. DO NOT CLEAN BRAKE PARTS WITH COMPRESSED AIR OR BY DRY BRUSHING. CLEANING SHOULD BE DONE BY DAMPENING THE BRAKE COMPONENTS WITH A FINE MIST OF WATER, THEN WIPING THE BRAKE COMPONENTS CLEAN WITH A DAMPENED CLOTH. DISPOSE OF CLOTH AND ALL RESIDUE CONTAINING ASBESTOS FIBERS IN AN IMPERMEABLE CONTAINER WITH THE APPROPRIATE LABEL. FOLLOW PRACTICES PRESCRIBED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) AND THE ENVIRONMENTAL PROTECTION AGENCY (EPA) FOR THE HANDLING, PROCESSING,

AND DISPOSING OF DUST OR DEBRIS THAT MAY CONTAIN ASBESTOS FIBERS.

To clean or flush the internal passages of the brake caliper, use fresh brake fluid or Mopar® Non-Chlorinated Brake Parts Cleaner. Never use gasoline, kerosene, alcohol, oil, transmission fluid or any fluid containing mineral oil to clean the caliper. These fluids will damage rubber cups and seals.

INSPECTION - CALIPER

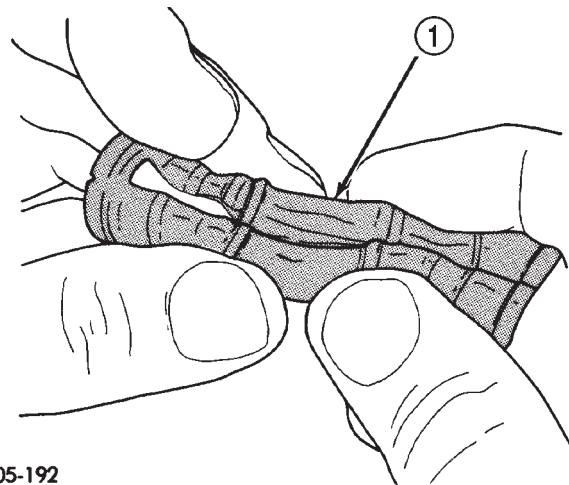
Inspect the disc brake caliper for the following:

- Brake fluid leaks in and around boot area and inboard lining
- Ruptures, brittleness or damage to the piston dust boot
- Damaged, dry or brittle guide pin dust boots

If caliper fails inspection, disassemble and recondition caliper, replacing the seals and dust boots.

ASSEMBLY**ASSEMBLY - CALIPER GUIDE PIN BUSHINGS**

(1) Fold the guide pin bushing in half lengthwise at the solid middle section (Fig. 53).

**Fig. 53 Folded Caliper Guide Pin Bushing**

- 1 - CALIPER GUIDE PIN BUSHING

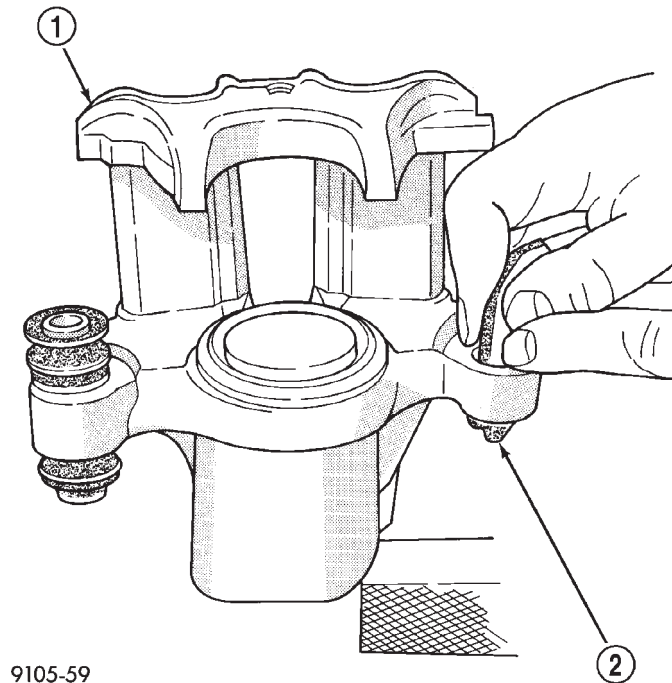
NOTE: To avoid damage to the bushing, do not use a sharp object to install the guide pin bushing.

(2) Insert the folded bushing into the caliper mounting boss using your fingers (Fig. 54).

(3) Unfold the bushing using your fingers or a wooden dowel until the bushing is fully seated into the caliper housing. The bushing flanges should be seated evenly on both sides of the bushing hole (Fig. 55).

(4) Lubricate the inside surfaces of the bushing using Mopar® Dielectric Grease or an equivalent.

DISC BRAKE CALIPER - REAR (Continued)

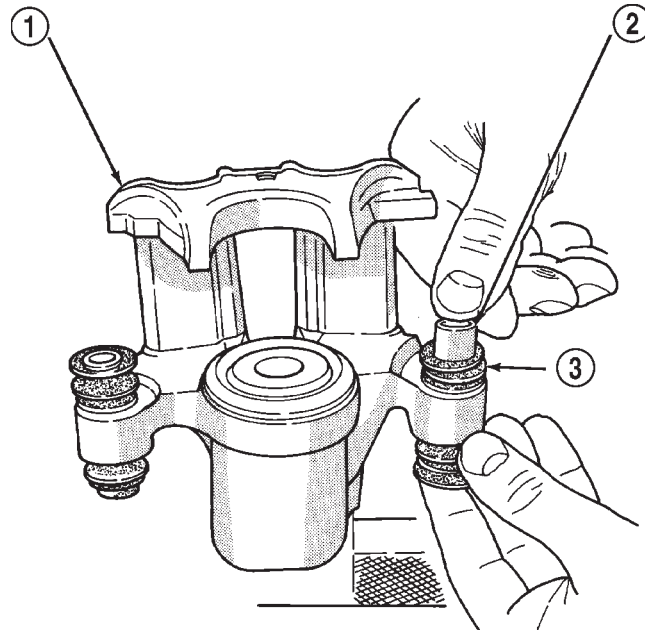


9105-59

Fig. 54 Installing Caliper Guide Pin Bushing

- 1 - CALIPER
2 - BUSHING

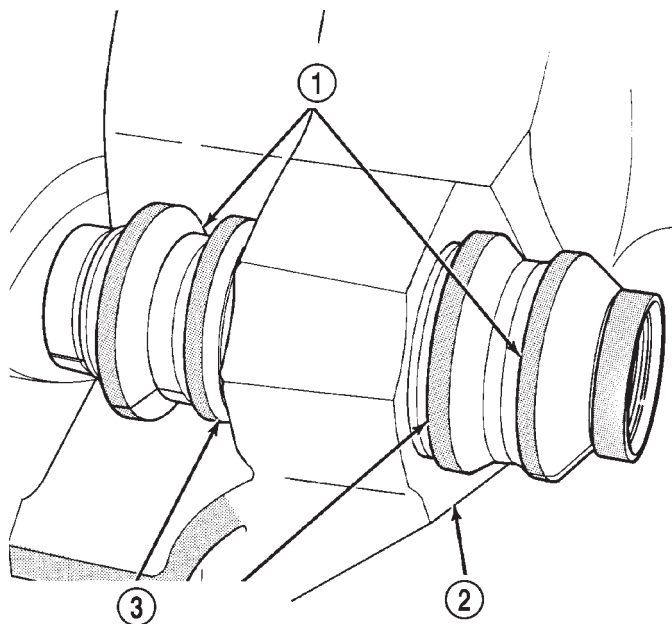
(5) Install the guide pin sleeve into one end of bushing until the seal area of bushing is past the seal groove in the sleeve (Fig. 56).



9105-60

Fig. 56 Installing Sleeve In Bushing

- 1 - CALIPER
2 - SLEEVE
3 - BUSHING



9205-193

Fig. 55 Bushing Correctly Installed In Caliper

- 1 - BUSHING
2 - CALIPER
3 - BE SURE BOTH BUSHING FLANGES ARE FULLY SEATED AROUND CALIPER BUSHING BORES.

(6) Holding the convoluted boot on the opposite end of the bushing, push the steel sleeve through the bushing until the bushing boot is fully seated into the seal groove on that end of sleeve (Fig. 56). Install the other end bushing boot into the groove on that end of the bushing sleeve.

(7) Verify both ends of the bushing are seated in the sleeve grooves (Fig. 57). When the sleeve is seated properly into the bushing, the sleeve/bushing can be held between your fingers and easily slid back and forth without the bushing unseating from the sleeve groove.

ASSEMBLY - CALIPER PISTON AND SEAL

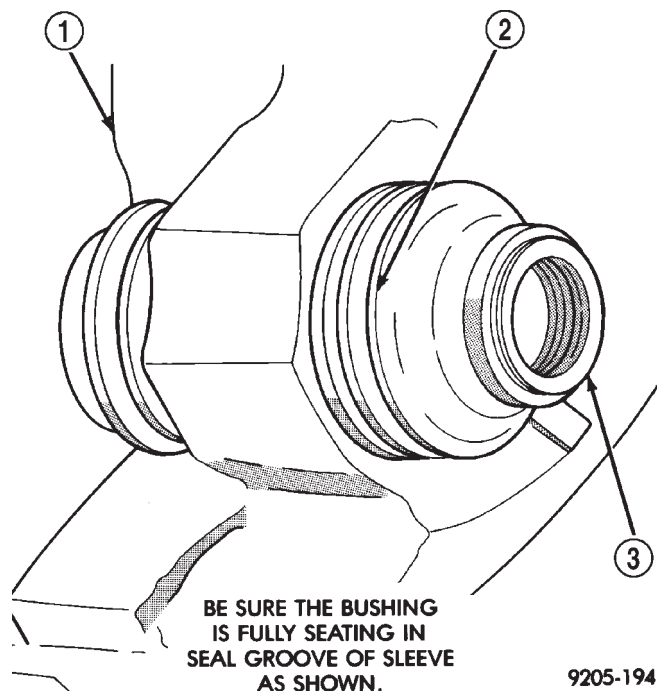
NOTE: Never use an old piston seal.

(1) Dip the new piston seal in clean brake fluid and install it in the groove of the caliper bore. The seal should be started at one area of the groove and gently worked around and into the groove (Fig. 58) using only your clean fingers to seat it.

(2) Coat the new piston boot with clean brake fluid leaving a generous amount inside the boot.

(3) Position the dust boot over the piston after coating it with brake fluid.

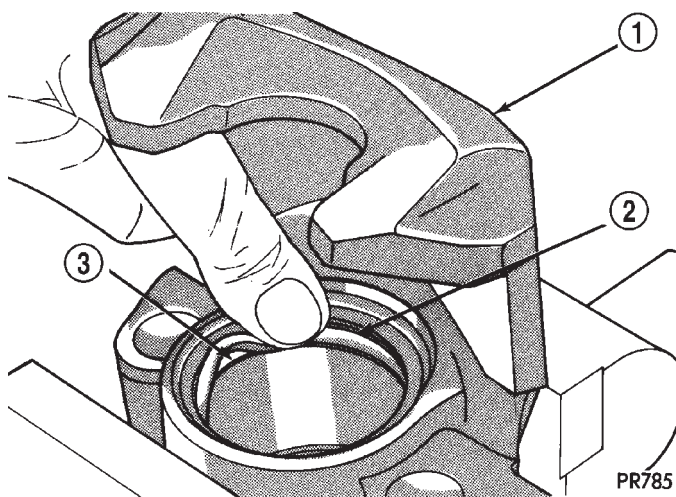
DISC BRAKE CALIPER - REAR (Continued)



9205-194

Fig. 57 Correctly Installed Guide Pin Sleeve And Bushing

- 1 - CALIPER
- 2 - BUSHING
- 3 - SLEEVE



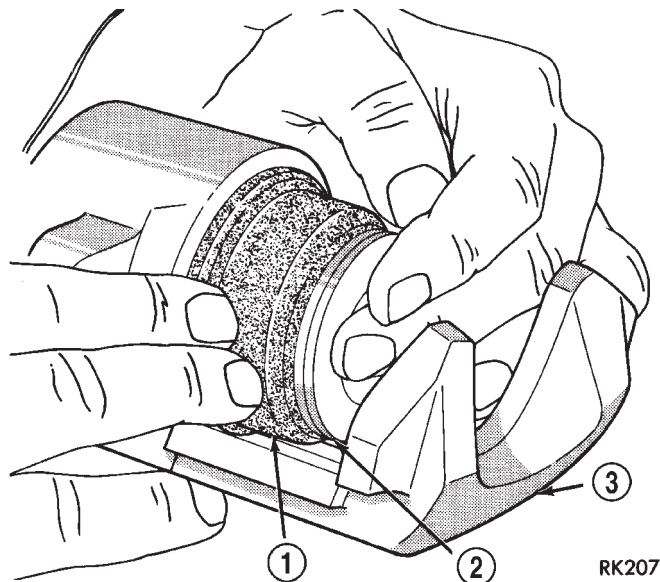
PR785

Fig. 58 Installing New Piston Seal

- 1 - CALIPER
- 2 - PISTON SEAL
- 3 - SEAL GROOVE

CAUTION: Force applied to the piston to seat it in the bore must be applied uniformly to avoid cocking and binding of the piston.

(4) Install piston into caliper bore pushing it past the piston seal until it bottoms in the caliper bore (Fig. 59).



RK207

Fig. 59 Installing Piston Into Caliper Bore

- 1 - BOOT
- 2 - PISTON
- 3 - CALIPER

(5) Position the dust boot into the counterbore of the caliper assembly piston bore.

(6) Using a hammer and Installer, Special Tool C-4689 or C-4842 (depending on piston size), and Handle, Special Tool C-4171, drive the boot into the counterbore of the caliper as necessary (Fig. 60).

(7) Reinstall the caliper on the vehicle and bleed the brakes as necessary. Refer to Installation in this section.

INSTALLATION- REAR CALIPER

NOTE: Step 1 below is only required when installing the disc brake caliper after new brake shoes have been installed.

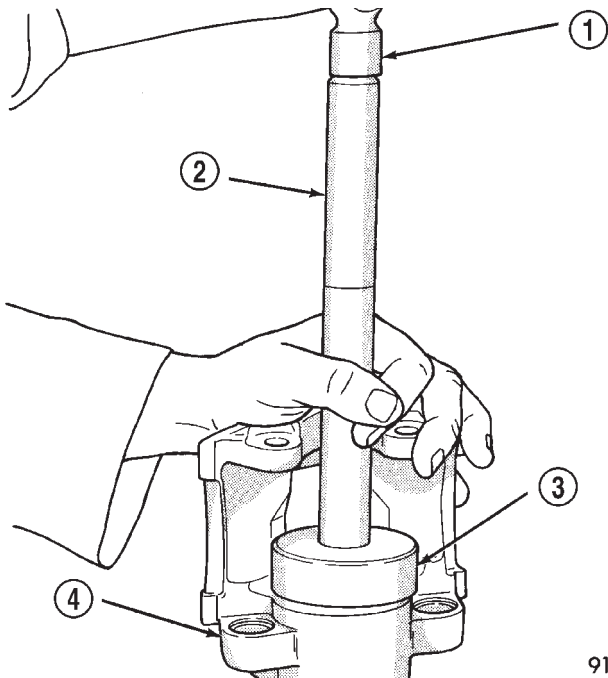
(1) Completely retract caliper piston back into piston bore of caliper assembly.

(2) Lubricate both adapter abutments with a liberal amount of Mopar® Multipurpose Lubricant, or equivalent.

(3) Install the rear rotor on the hub, making sure it is squarely seated on the face of the hub (Fig. 47).

CAUTION: Use care when installing the caliper assembly onto the adapter, so the caliper guide pin bushings do not get damaged by the mounting bosses.

DISC BRAKE CALIPER - REAR (Continued)



9105-42

Fig. 60 Installing Dust Boot

- 1 - HAMMER
- 2 - SPECIAL TOOL C-4171
- 3 - SPECIAL TOOL C-4689 or C-4842
- 4 - CALIPER

(4) Carefully lower caliper and brake shoes over rotor and onto the adapter using the reverse procedure for removal (Fig. 45).

CAUTION: When installing guide pin bolts extreme caution should be taken not to crossthread the caliper guide pin bolts.

- (5) Install the caliper guide pin bolts. Tighten the guide pin bolts to a torque of 22 N·m (192 in. lbs.).
- (6) Install the wheel and tire assembly.
- (7) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).
- (8) Remove jackstands or lower hoist.

CAUTION: Before moving vehicle, pump the brake pedal several times to insure the vehicle has a firm brake pedal to adequately stop vehicle.

- (9) Road test the vehicle and make several stops to wear off any foreign material on the brakes and to seat the brake shoe linings.

FLUID

DIAGNOSIS AND TESTING - BRAKE FLUID CONTAMINATION

Indications of fluid contamination are swollen or deteriorated rubber parts.

Swollen rubber parts indicate the presence of petroleum in the brake fluid.

To test for contamination, put a small amount of drained brake fluid in clear glass jar. If fluid separates into layers, there is mineral oil or other fluid contamination of the brake fluid.

If brake fluid is contaminated, drain and thoroughly flush system. Replace master cylinder, proportioning valve, caliper seals, wheel cylinder seals, Antilock Brakes hydraulic unit and all hydraulic fluid hoses.

STANDARD PROCEDURE - BRAKE FLUID LEVEL CHECK

Check master cylinder reservoir brake fluid level a minimum of twice a year.

Master cylinder fluid reservoirs for both standard and antilock brake systems are marked with a FULL fill line indicating the reservoirs proper fluid level (Fig. 61).

NOTE: When filling brake fluid reservoir, use only Mopar® brake fluid or an equivalent stored in a tightly sealed container. Brake fluid must conform to DOT 3 specifications. Do not use brake fluid with a lower boiling point than DOT 3, as brake failure could result during prolonged hard braking. Do not use petroleum-based fluid because seal damage in the brake system will result.

If necessary, add brake fluid to reservoir, bringing brake fluid level to the FULL fill line shown on fluid reservoir (Fig. 61).

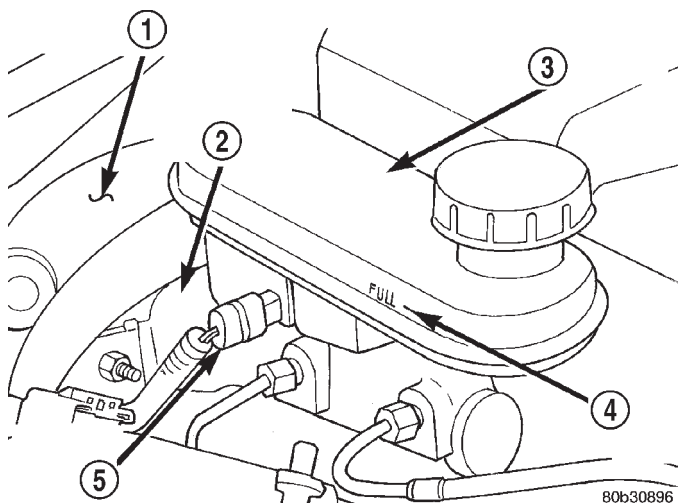
The master cylinder brake fluid reservoir used on this vehicle includes a brake fluid level switch. The brake fluid level sensor location is in the body of the brake fluid reservoir (Fig. 61). In the event of low brake fluid level in the brake fluid reservoir, the RED brake warning indicator lamp in the instrument cluster will turn on.

SPECIFICATIONS

BRAKE FLUID

The brake fluid used in this vehicle must conform to DOT 3 specifications and SAE J1703 standards. No other type of brake fluid is recommended or approved for usage in the vehicle brake system. Use

FLUID (Continued)

**Fig. 61 Master Cylinder Fluid Level**

- 1 - BOOSTER
- 2 - MASTER CYLINDER
- 3 - MASTER CYLINDER FLUID RESERVOIR
- 4 - FLUID LEVEL FULL MARK
- 5 - FLUID LEVEL SWITCH

only Mopar® brake fluid or an equivalent from a tightly sealed container.

CAUTION: Never use reclaimed brake fluid or fluid from a container which has been left open. An open container will absorb moisture from the air and contaminate the fluid.

CAUTION: Never use any type of petroleum-based fluid in the brake hydraulic system. Use of such type fluids will result in seal damage of the vehicle brake hydraulic system causing a failure of the vehicle brake system. Petroleum based fluids include items such as engine oil, transmission fluid, power steering fluid, etc.

JUNCTION BLOCK

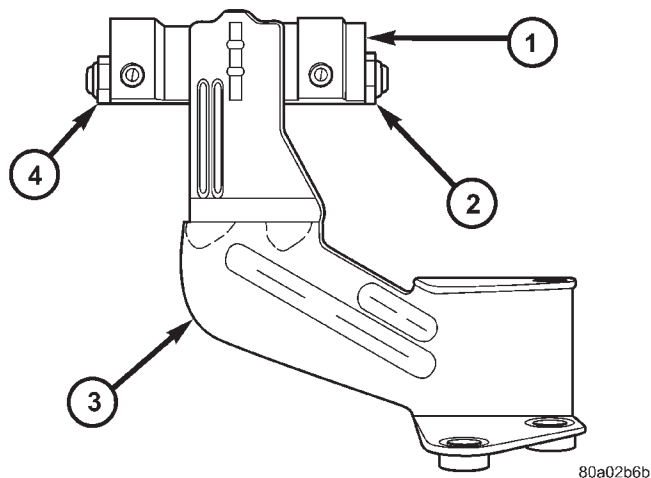
DESCRIPTION

A junction block is used on vehicles that are not equipped with antilock brakes (ABS). The junction block is located in front of the driver's side front tire behind the front fascia (Fig. 67). The junction block mounts in the same location as the ABS integrated control unit (ICU) does on vehicles with ABS.

It has six threaded ports to which the brake tubes connect. Two are for the brake tubes coming from the master cylinder. The remaining four ports are for the brake tubes going to each brake assembly. The valve

is permanently mounted to a bracket which fastens to the engine cradle crossmember.

Later production junction blocks have the proportioning valves for the rear brakes mounted in them. One valve is mounted in each end (Fig. 62). The proportioning valves are not serviced separately from the junction block. Vehicles with this type junction block no longer have proportioning valves mounted at the rear brake flex hoses.

**Fig. 62 Junction Block With Proportioning Valves**

- 1 - JUNCTION BLOCK
- 2 - PROPORTIONING VALVE (LEFT REAR)
- 3 - BRACKET
- 4 - PROPORTIONING VALVE (RIGHT REAR)

OPERATION

The junction block distributes the brake fluid coming from the master cylinder primary and secondary ports to the four brake tubes leading to the brakes. Since the junction block mounts in the same location as the ABS integrated control unit (ICU), it allows for the common use of brake tubes on the vehicle whether it is equipped with or without ABS.

Later applications of the junction block include two proportioning valves. Placed in the fluid flow passages leading to the rear brake tube ports, they balance front-to-rear braking. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/PROPORTIONING VALVE - OPERATION)

REMOVAL

(1) Disconnect and isolate the negative battery connection at the right front strut tower.

(2) Using a brake pedal holding tool such as shown (Fig. 63), depress brake pedal past its first 1 inch of travel and secure in this position. This will isolate the master cylinder reservoir from the brake hydraulic system, not allowing the brake fluid to drain out of the reservoir.

JUNCTION BLOCK (Continued)

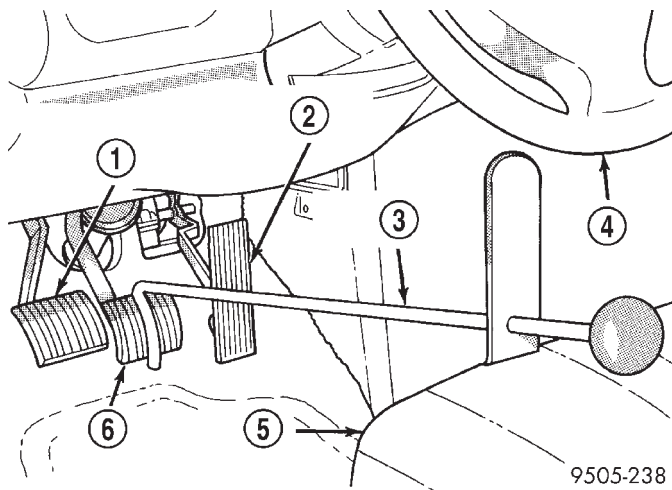


Fig. 63 Brake Pedal Holding Tool Installed

- 1 - CLUTCH PEDAL (IF EQUIPPED WITH MANUAL TRANSAXLE)
- 2 - THROTTLE PEDAL
- 3 - BRAKE PEDAL HOLDING TOOL
- 4 - STEERING WHEEL
- 5 - DRIVER'S SEAT
- 6 - BRAKE PEDAL

- (3) Remove screw fastening the speed control servo to the upper radiator closure panel (Fig. 64).
- (4) Remove screw fastening the washer filler tube to the upper radiator closure panel (Fig. 64).

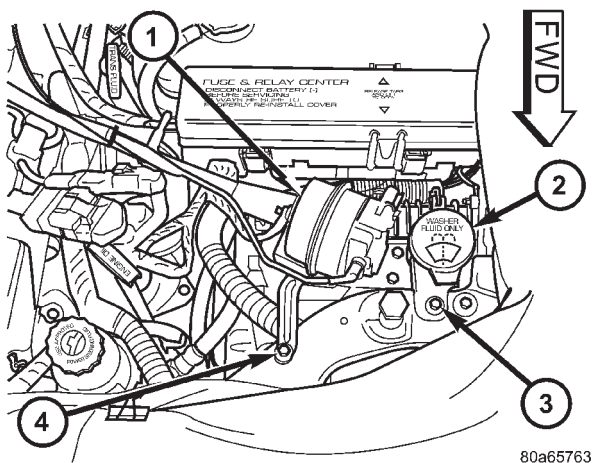


Fig. 64 Servo And Filler Tube Fasteners

- 1 - SPEED CONTROL SERVO
- 2 - WINDSHIELD WASHER FILLER TUBE
- 3 - SCREW
- 4 - SCREW

- (5) Remove nut and screw securing transmission control module to vehicle (Fig. 65).
- (6) Lift the transmission control module (with speed control servo attached) from its mount leaving its wiring harness attached. Move it off to the side

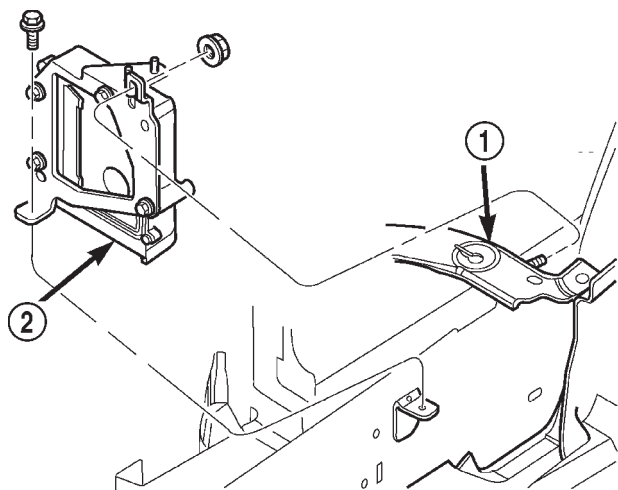


Fig. 65 Transmission Control Module (TCM)—Removal/Installation

- 1 - RADIATOR UPPER SUPPORT
- 2 - TCM

toward the engine making sure not to strain the wires and speed control servo cable.

(7) Clean any debris away from the fittings on top of the junction block.

(8) Remove the two brake tubes coming from the primary and secondary master cylinder ports at the junction block (Fig. 66).

(9) Remove the four chassis brake tubes going to each brake, mounted across the front top of the junction block (Fig. 66).

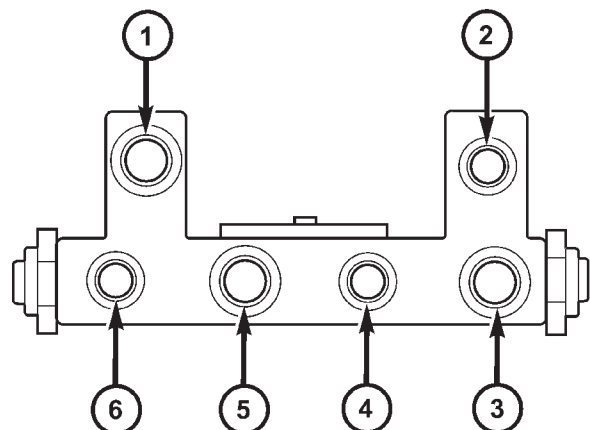


Fig. 66 Junction Block Fitting Identification

- 1 - FROM MASTER CYLINDER PRIMARY
- 2 - FROM MASTER CYLINDER SECONDARY
- 3 - TO LEFT FRONT BRAKE
- 4 - TO RIGHT REAR BRAKE
- 5 - TO LEFT REAR BRAKE
- 6 - TO RIGHT FRONT BRAKE

JUNCTION BLOCK (Continued)

(10) There are two bolts fastening the junction block and mounting bracket to the engine cradle crossmember. Remove the outboard bolt fastening the mounting bracket to the engine cradle crossmember.

(11) Raise the vehicle. See hoisting in Lubrication and Maintenance.

(12) Loosen, but do not remove, the remaining mounting bolt fastening the junction block mounting bracket to the engine cradle crossmember (Fig. 67).

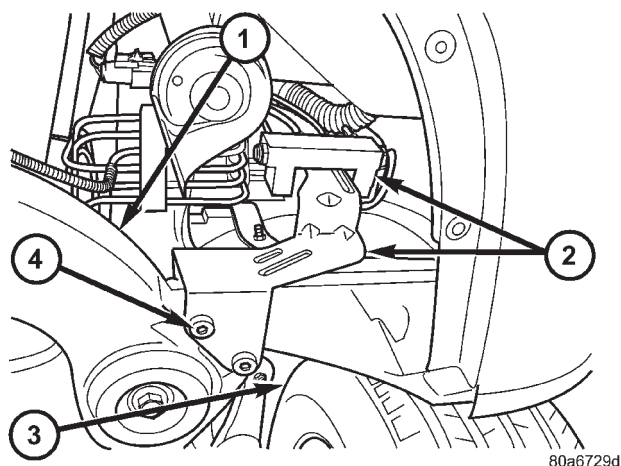


Fig. 67 Junction Block Mounting

- 1 - ENGINE CRADLE CROSSMEMBER
- 2 - JUNCTION BLOCK AND BRACKET
- 3 - LEFT FRONT TIRE
- 4 - REMAINING MOUNTING BOLT

(13) Pivot the junction block and bracket forward on the remaining mounting bolt and remove the junction block and bracket from the vehicle.

INSTALLATION

(1) If not already installed, install, but do not tighten, the one bolt in the junction block bracket (Fig. 67).

(2) Install the junction block with mounting bracket onto the engine cradle crossmember guiding the installed bolt into the slot in the engine cradle crossmember.

(3) Align the remaining mounting bolt hole in the junction block bracket with its mounting hole in the engine crossmember and install, but do not tighten, the remaining mounting bolt.

(4) Tighten the first mounting bolt (installed in engine cradle crossmember slot) (Fig. 67) to 26 N·m (230 in. lbs.) torque with the aid of a crow foot wrench.

(5) Lower the vehicle to the ground.

(6) Tighten the remaining junction block bracket-to-engine cradle crossmember mounting bolt to 26 N·m (230 in. lbs.) torque.

(7) Install the four chassis brake tubes (going to each brake) to the junction block (Fig. 66). Tighten the tube fittings to 17 N·m (145 in. lbs.) torque with the aid of a crow foot wrench.

(8) Install the two brake tubes coming from the primary and secondary master cylinder ports to the top rear corners of the junction block (Fig. 66). Tighten the tube fittings to 17 N·m (145 in. lbs.) torque with the aid of a crow foot wrench.

(9) Install the transmission control module (with speed control servo attached) in its normal position (Fig. 65). Install the nut and screw securing it in place.

(10) Install the transmission control module mounting nut and screw securing it in place. Tighten the screw to 6 N·m (45 in. lbs.). Tighten the nut to 12 N·m (107 in. lbs.) torque.

(11) Install the screw attaching the washer filler tube to the upper radiator closure panel (Fig. 64).

(12) Install the screw attaching the speed control servo to the upper radiator closure panel (Fig. 64).

(13) Remove the brake pedal holding tool.

(14) Bleed the base brake system. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

MASTER CYLINDER

DESCRIPTION

There are two different master cylinders used on this vehicle. A center-port master cylinder is used on ABS and Traction Control vehicles. A conventional vent-port master cylinder is used on vehicles without ABS. Both master cylinders appear the same externally except for the size of their outlet ports. The ABS master cylinder has outlet ports differing in size; the primary port is machined to accept a 12 mm tube nut, while the secondary port is machined for a 10 mm tube nut. Both the primary and secondary ports on a non-ABS master cylinder are machined to accept 12 mm tube nuts.

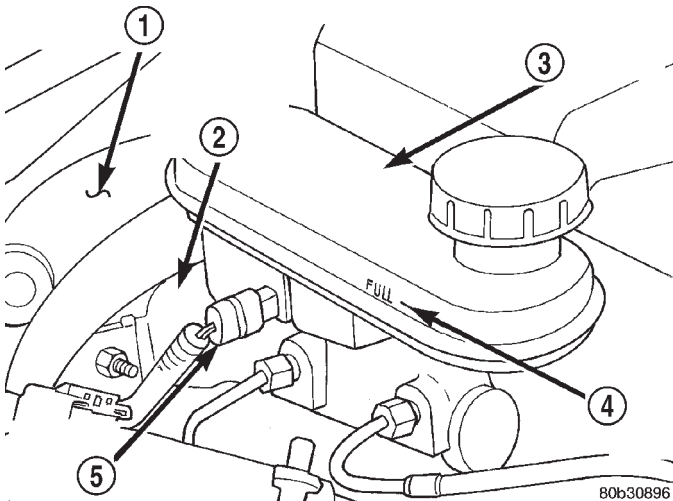
The master cylinder is mounted to the face of the power brake booster on the left side of the dash (Fig. 68). It has the brake fluid reservoir mounted on top and the brake fluid level switch is mounted in the side of that reservoir.

OPERATION

When the brake pedal is pressed, the master cylinder primary and secondary pistons apply brake pressure through the chassis brake tubes and proportioning valves to each brake assembly. The brake fluid reservoir supplies the brake hydraulic system with the necessary fluid to operate properly.

The primary and secondary outlet tubes of the master cylinder are connected to a junction block on

MASTER CYLINDER (Continued)

**Fig. 68 Master Cylinder**

- 1 - BOOSTER
- 2 - MASTER CYLINDER
- 3 - MASTER CYLINDER FLUID RESERVOIR
- 4 - FLUID LEVEL FULL MARK
- 5 - FLUID LEVEL SWITCH

non-ABS equipped vehicles. The tube from the master cylinder primary outlet port connects to the inboard port of the junction block, and the tube from the secondary outlet port connects to the outboard port of the junction block. The inboard port of the junction block supplies the right front and left rear brakes. The outboard port of the junction block supplies the left front and right rear brakes.

On vehicles equipped with Antilock Brakes (with or without Traction Control), the master cylinder primary outlet port outlet tube connects to the inboard port of the ICU, and the secondary outlet port outlet tube connects to the outboard port of the ICU.

The master cylinder reservoir cap diaphragm is slit to allow atmospheric pressure to equalize on both sides of the diaphragm.

STANDARD PROCEDURE - MASTER CYLINDER BLEEDING

CAUTION: When clamping the master cylinder in a vise for bleeding, carefully tighten the vise just enough to hold the master cylinder from moving. Excessive pressure can damage the master cylinder.

- (1) Clamp master cylinder in a vise.

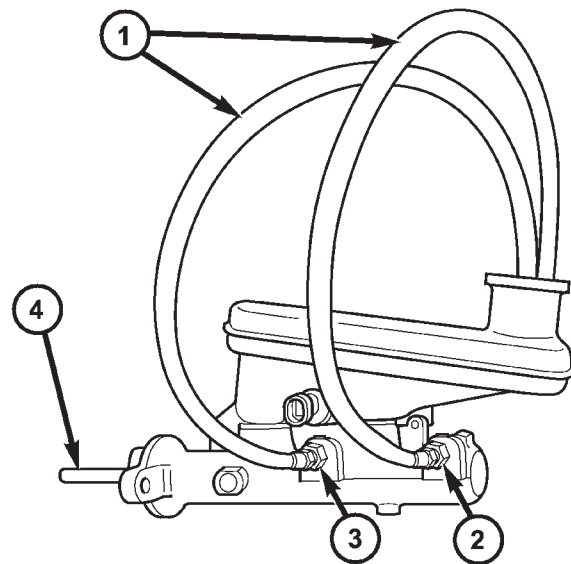
NOTE: The master cylinder outlet ports use ISO style flares and metric threads. Special Tool Package 8822 includes ISO style flare adapters with metric threads to be used in conjunction with Bleeder Tubes, Special Tool Package 8358.

(2) Attach special tools for bleeding master cylinder in the following fashion:

(a) **For non-ABS master cylinders**, thread one Adapter, Special Tool 8822-2, into each outlet port. Tighten Adapters to 17 N·m (145 in. lbs.) torque.

(b) **For ABS master cylinders**, thread one Adapter, Special Tools 8822-2, into the primary outlet port and one Adapter, Special Tool 8822-1, into the secondary outlet port. Tighten Adapters to 17 N·m (145 in. lbs.) torque.

(c) Thread one Bleeder Tube, Special Tool 8358-1, into each Adapter. Tighten each tube to 17 N·m (145 in. lbs.) torque. Flex bleeder tubes and place open ends into mouth of fluid reservoir as far down as possible (Fig. 69).

**Fig. 69 Master Cylinder Set Up For Bleeding**

- 1 - BLEEDER TUBES 8358
- 2 - NON-ABS - ADAPTER 8822-1; ABS - ADAPTER 8822-2
- 3 - ADAPTER 8822-2
- 4 - WOODEN DOWEL

NOTE: Make sure open ends of bleeder tubes stay below surface of brake fluid once reservoir is filled to proper level to avoid ingesting air while bleeding.

(3) Fill reservoir with Mopar® Brake Fluid or equivalent conforming to DOT 3 specifications. Make sure fluid level is above tips of bleeder tubes in reservoir.

(4) Using a wooden dowel as a pushrod (Fig. 69), slowly depress master cylinder pistons, then release pressure, allowing pistons to return to released position. Repeat several times until all air bubbles are expelled. Make sure fluid level stays above tips of bleeder tubes in reservoir while bleeding.

(5) Remove bleeding tubes. Plug outlets and install filler cap.

MASTER CYLINDER (Continued)

(6) Remove master cylinder from vise and install on power brake booster. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - INSTALLATION)

REMOVAL

(1) Disconnect brake fluid level switch wire connector on the side of the master cylinder reservoir.

(2) Disconnect primary and secondary brake tubes from master cylinder housing. Install plugs at brake tube outlets.

(3) Remove the 2 nuts attaching the master cylinder to the power brake vacuum booster (Fig. 70).

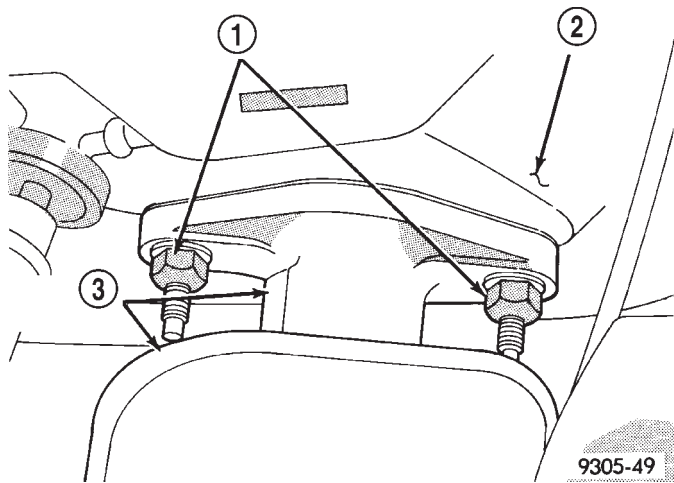


Fig. 70 Master Cylinder Mounting

- 1 - MASTER CYLINDER MOUNTING NUTS
- 2 - POWER BRAKE BOOSTER
- 3 - MASTER CYLINDER

(4) Slide master cylinder straight out from the booster.

DISASSEMBLY

(1) Remove the master cylinder from the power brake booster. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - REMOVAL)

(2) Using an appropriate cleaner such as Mopar® Brake Parts Cleaner, clean the master cylinder housing and brake fluid reservoir.

(3) Remove the filler cap and empty all brake fluid from reservoir.

(4) Clamp the master cylinder in vise.

(5) Remove the 2 fluid reservoir to master cylinder retaining pins (Fig. 71).

NOTE: Do not pry off fluid reservoir using a tool, damage to reservoir may result.

(6) Remove reservoir from master cylinder by pulling upward on the reservoir while rock it from side-to-side (Fig. 72).

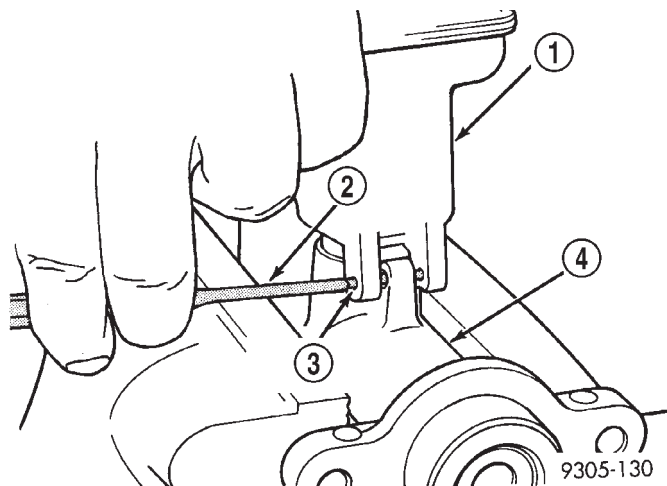


Fig. 71 Reservoir Retaining Pins

- 1 - BRAKE FLUID RESERVOIR
- 2 - DRIFT
- 3 - RETAINING PIN
- 4 - MASTER CYLINDER

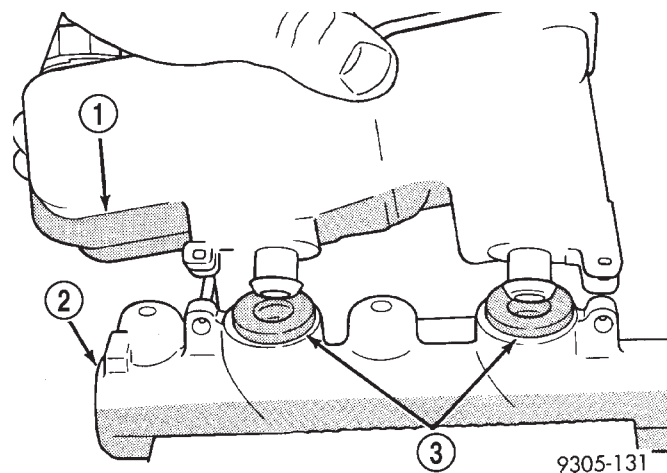


Fig. 72 Removing Reservoir

- 1 - FLUID RESERVOIR
- 2 - MASTER CYLINDER
- 3 - SEALING GROMMETS

(7) Remove the master cylinder housing-to-reservoir grommets (Fig. 73).

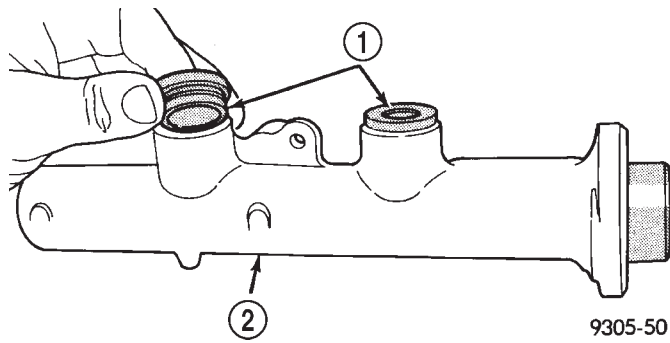
(8) For reassembly, (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - ASSEMBLY).

ASSEMBLY

(1) Install new housing-to-reservoir grommets in master cylinder housing (Fig. 73).

(2) Lubricate brake fluid reservoir-to-grommet mounting area with clean brake fluid. Place reservoir in position over grommets. Seat reservoir into sealing

MASTER CYLINDER (Continued)

**Fig. 73 Reservoir Sealing Grommets**

- 1 - RESERVOIR SEALING GROMMETS
2 - MASTER CYLINDER

grommets using a rocking motion while pushing down on reservoir.

(3) Make sure bottom of reservoir touches the top of both sealing grommets.

(4) Install the 2 fluid reservoir to master cylinder retaining pins (Fig. 71).

(5) Bleed and install master cylinder on vehicle. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - STANDARD PROCEDURE)

INSTALLATION

CAUTION: If the master cylinder is being replaced or has been repaired, the master cylinder must be bled before installation. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/MASTER CYLINDER - STANDARD PROCEDURE)

(1) Install master cylinder on studs of power brake vacuum booster, aligning the booster push rod with master cylinder piston.

(2) Install the master cylinder mounting nuts (Fig. 70). Tighten the nuts to a torque of 28 N·m (250 in. lbs.).

(3) Connect brake tubes to master cylinder primary and secondary ports. Tighten fittings to 17 N·m (145 in. lbs.) torque.

(4) Reconnect brake fluid level switch.

(5) Check and adjust brake fluid level as necessary using Mopar® Brake Fluid or equivalent.

CAUTION: It will be necessary to bleed the entire base hydraulic system if the brake system has been open to air for an excessive amount of time or air is present in the lines.

PEDAL**DESCRIPTION**

A suspended type brake pedal is used on this vehicle (Fig. 74). The pedal pivots on a shaft mounted in the pedal support bracket under the instrument panel. The pedal also connects to the power brake booster input rod. The pedal ratio is 3.44:1.

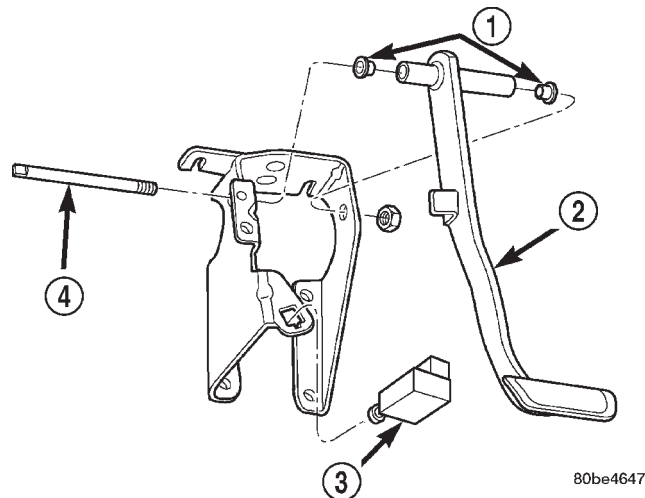
OPERATION

When the brake pedal is depressed, it pushes in on the power brake booster input rod applying the brakes. At the same time, it allows the brake lamp switch's plunger to extend, thus applying the brake lamps.

REMOVAL

(1) Disconnect and isolate the remote ground battery cable from the ground stud on the right strut tower.

(2) Remove the brake lamp switch from its bracket (Fig. 74). The brake lamp switch is removed by depressing and holding the brake pedal while rotating brake lamp switch in a counterclockwise direction approximately 30 degrees. Pull the switch rearward and remove it from its mounting bracket.

**Fig. 74 Brake Pedal**

- 1 - BUSHINGS
2 - BRAKE PEDAL
3 - BRAKE LAMP SWITCH
4 - PIVOT SHAFT

(3) Remove the retaining clip from the brake pedal pin securing the power brake booster to the pedal using following procedure (Fig. 75). Position a small screwdriver between the center tang on the retaining clip and the brake pedal pin. Rotate blade of screwdriver enough so center tang on retaining clip can

PEDAL (Continued)

pass over end of brake pedal pin, then pull retaining clip off brake pedal pin.

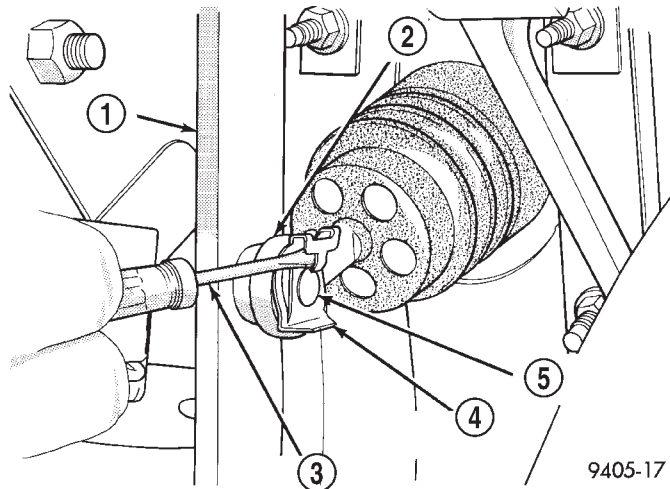


Fig. 75 Brake Pedal Retaining Clip

- 1 - BRAKE PEDAL
- 2 - INPUT ROD
- 3 - SCREWDRIVER
- 4 - RETAINING CLIP
- 5 - BRAKE PEDAL PIN

(4) Remove the booster input rod from the brake pedal pin.

(5) Remove the nut from the brake pedal pivot shaft (Fig. 74). The pivot shaft has a flat on it to hold while the nut is removed.

(6) Remove the brake pedal pivot shaft from the brake pedal and pedal mounting bracket.

(7) Remove the brake pedal with bushings from mounting bracket (Fig. 74).

NOTE: The bushings can be easily removed from the pedal by pulling them straight out each side.

INSTALLATION

(1) Make sure the pedal has a properly installed bushing on each side of the pedal (Fig. 74).

(2) Lubricate the brake pedal pivot shaft and brake pedal bushings using Mopar Lubriplate or an equivalent.

(3) Install the brake pedal in the pedal bracket (Fig. 74). Align the hole in brake pedal with the pivot shaft holes in the pedal bracket.

(4) Install the brake pedal shaft (Fig. 74).

(5) Install the nut on the end of the brake pedal pivot shaft. Tighten the nut to a torque of 34 N·m (25 ft. lbs.).

(6) Install the power brake booster input rod on the brake pedal pin.

CAUTION: When installing the retaining clip on the brake pedal pin, a **NEW** retaining clip must be used to ensure the retention of the power brake booster input rod.

(7) Install a **new** retaining clip (Fig. 75) on the brake pedal pin.

(8) Using Mopar Lubriplate or an equivalent, lightly lubricate the surface of the brake pedal striker where the plunger of the brake lamp switch contacts it.

NOTE: Prior to installing the brake lamp switch into its bracket, the plunger must be moved to its fully extended position using the procedure in Step 9.

(9) Hold brake lamp switch firmly in one hand. Using other hand, pull outward on the plunger of the brake lamp switch until it has ratcheted out to its fully extended position.

(10) Install the brake lamp switch in the brake pedal bracket (Fig. 74). Install it using the following procedure. Depress the brake pedal as far down as possible. Then while holding brake pedal down, align the index key on switch with notch in square hole of mounting bracket. When the switch is fully installed into the bracket, rotate the switch in a clockwise direction approximately 30 degrees until it locks into place.

CAUTION: Do not use excessive force when pulling back on brake pedal to adjust the brake lamp switch. If too much force is used, damage to the brake lamp switch or striker can result.

(11) Gently release/pull back the brake pedal until it stops moving. This will cause the switch plunger to ratchet back to its correctly adjusted position.

(12) Connect the remote ground cable to the ground stud on the right front strut tower.

(13) Check the operation of the brakes and brake lamp switch.

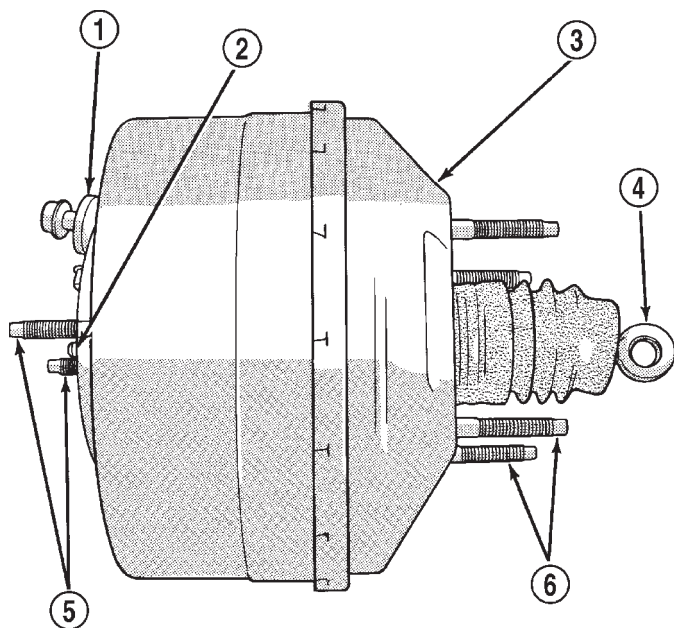
POWER BRAKE BOOSTER

DESCRIPTION

The power brake booster assembly mounts on the engine side of the dash panel. It is externally connected to the brake pedal by an input push rod extending out the rear of the booster (Fig. 76). The master cylinder is bolted to the front of the power brake booster assembly.

A vacuum check valve is mounted on the power brake booster body. A vacuum line connects the booster (check valve) to the intake manifold. Depend-

POWER BRAKE BOOSTER (Continued)



9205-258

Fig. 76 Power Brake Booster

- 1 - VACUUM CHECK VALVE
- 2 - OUTPUT ROD
- 3 - POWER BRAKE BOOSTER ASSEMBLY
- 4 - INPUT ROD
- 5 - MASTER CYLINDER MOUNTING STUDS (2)
- 6 - POWER BOOSTER ASSEMBLY TO DASH PANEL MOUNTING STUDS (4)

ing on the engine combination, different vacuum hose routings are required.

The power brake booster can be identified by the tag attached to the body of the booster assembly (Fig. 77). This tag contains the following information:

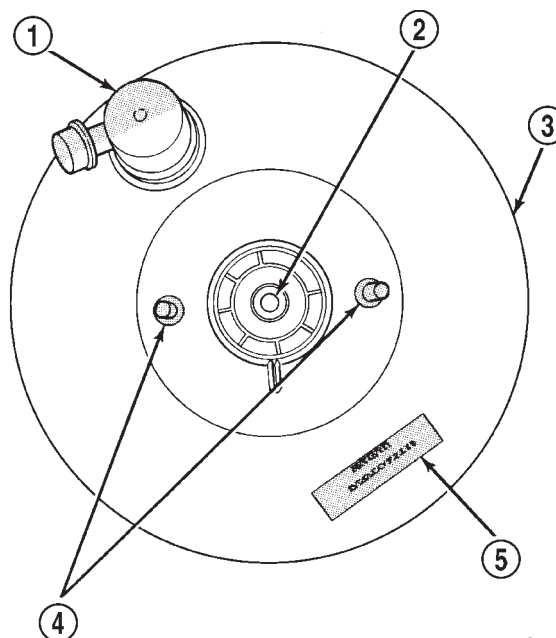
- the production part number
- the date it was built
- who manufactured it

NOTE: The power brake booster assembly is not a repairable part and must be replaced as a complete unit if it is found to be faulty in any way. The power booster vacuum check valve is not repairable but can be replaced as an assembly.

OPERATION

The purpose of the power brake booster is to reduce the amount of force required by the driver (foot-pedal pressure) to obtain the required hydraulic pressure in the brake system to stop the vehicle. This vehicle utilizes a Bosch power brake booster to accomplish this task in all brake applications.

The power brake booster is vacuum operated. The vacuum is supplied from the intake manifold on the engine through the vacuum hose and power brake booster check valve (Fig. 76) .



9305-51

Fig. 77 Power Brake Booster Identification

- 1 - VACUUM CHECK VALVE
- 2 - MASTER CYLINDER PUSH ROD
- 3 - POWER BRAKE BOOSTER ASSEMBLY
- 4 - MASTER CYLINDER MOUNTING STUDS
- 5 - PART IDENTIFICATION TAG

As the brake pedal is pressed, the power brake booster's input rod moves forward. This opens and closes valves in the power brake booster, creating a vacuum on one side of a diaphragm and allowing atmospheric pressure to enter on the other. This difference in pressure forces the output rod of the power booster out against the primary piston of the master cylinder. As the pistons in the master cylinder move forward this creates the hydraulic pressure in the brake system.

DIAGNOSIS AND TESTING - POWER BRAKE BOOSTER**BASIC TEST**

(1) With engine off, depress and release the brake pedal several times to purge all vacuum from the power brake booster.

(2) Depress and hold the pedal with light effort (15 to 25 lbs. pressure), then start the engine.

The pedal should fall slightly, then hold. Less effort should be needed to apply the pedal at this time. If the pedal fell as indicated, perform the VACUUM LEAK TEST listed after the BASIC TEST. If the pedal did not fall, continue on with this BASIC TEST.

(3) Disconnect the vacuum hose on the side of the vacuum check valve that leads to the speed control,

POWER BRAKE BOOSTER (Continued)

then connect a vacuum gauge to the open vacuum port on the valve.

(4) Start the engine.

(5) When the engine is at warm operating temperature, allow it to idle and check the vacuum at the gauge.

If the vacuum supply is 12 inches Hg (40.5 kPa) or more, the power brake booster is defective and must be replaced. If the vacuum supply is below 12 inches, continue on with this BASIC TEST.

(6) Shut off the engine.

(7) Connect the vacuum gauge to the vacuum reference port on the engine intake manifold.

(8) Start the engine and observe the vacuum gauge.

If the vacuum is still low, check the engine tune and repair as necessary. If the vacuum is above 12 inches, the hose or check to the booster has a restriction or leak.

Once an adequate vacuum supply is obtained, repeat the BASIC TEST.

VACUUM LEAK TEST

(1) Disconnect the vacuum hose on the side of the power brake booster vacuum check valve that leads to the speed control, then connect a vacuum gauge to the open vacuum port on the valve.

(2) Remove the remaining hose on the vacuum check valve that is not the vacuum supply hose coming from the intake manifold. Cap off the open port on the check valve.

(3) Start the engine.

(4) Allow the engine to warm up to normal operating temperature and engine idle.

(5) Using vacuum line pliers, close off the vacuum supply hose near the booster and observe the vacuum gauge.

If the vacuum drop exceeds 1.0 inch Hg (3.3 kPa) in one minute, repeat the above steps to confirm the reading. The vacuum loss should be less than 1.0 inch Hg in one minute time span. If the loss is more than 1.0 inch Hg, replace the power brake booster. If it is not, continue on with this test.

(6) Remove the pliers from the hose temporarily.

(7) Apply light effort (approximately 15 lbs. of force) to the brake pedal and hold the pedal steady. Do not move the pedal once the pressure is applied or the test results may vary.

(8) Have an assistant reattach the pliers to the vacuum supply hose.

(9) Allow 5 seconds for stabilization, then observe the vacuum gauge.

If the vacuum drop exceeds 3.0 inches Hg (10 kPa) in 15 seconds, repeat the above steps to confirm the reading. The vacuum loss should be less than 3.0 inches Hg in 15 seconds time span. If the loss is

more than 3.0 inches Hg, replace the power brake booster. If it is not, the booster is not defective.

REMOVAL - POWER BRAKE BOOSTER

(1) Remove the battery ground cable from the ground stud on the right strut tower. Then, correctly isolate the ground cable by installing the cable isolator on the ground stud (Fig. 78).

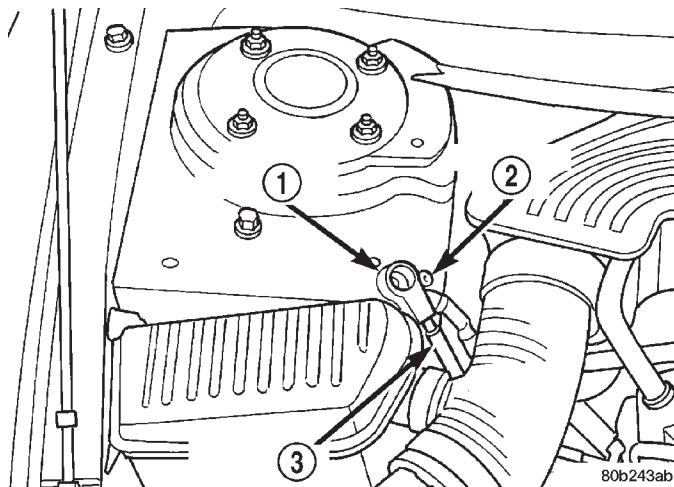


Fig. 78 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

(2) Remove caps from both wiper arms at the attachment to the pivots to expose the wiper arm attaching nut. Remove the nut attaching each wiper arm to its pivot (Fig. 79).

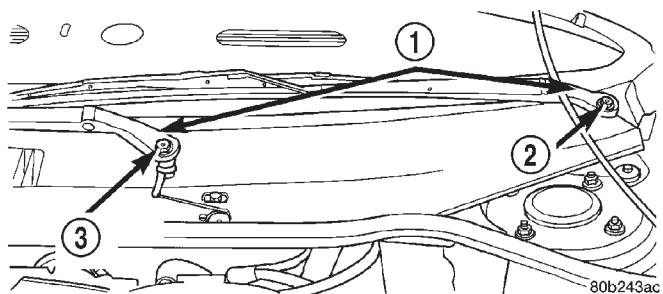


Fig. 79 Wiper Arm Attachment To Pivot

- 1 - WIPER ARMS
- 2 - ATTACHING NUT
- 3 - ATTACHING NUT

(3) Remove the wiper arms from the pivots. Wiper arms are removed from the pivots by rocking them back and force on the pivots until they can be pulled off the pivots.

(4) Remove the wiper module cover and cowl cover (Fig. 80) from the vehicle.

POWER BRAKE BOOSTER (Continued)

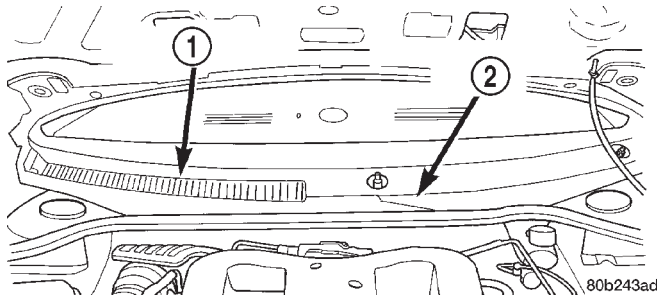


Fig. 80 Wiper Module And Cowl Cover

- 1 - COWL COVER
- 2 - WIPER MODULE COVER

(5) Remove the 8 bolts, attaching the reinforcement (Fig. 81) to the strut towers and the 1 bolt (Fig. 81) attaching the wiper module to the reinforcement. Remove the reinforcement from the vehicle.

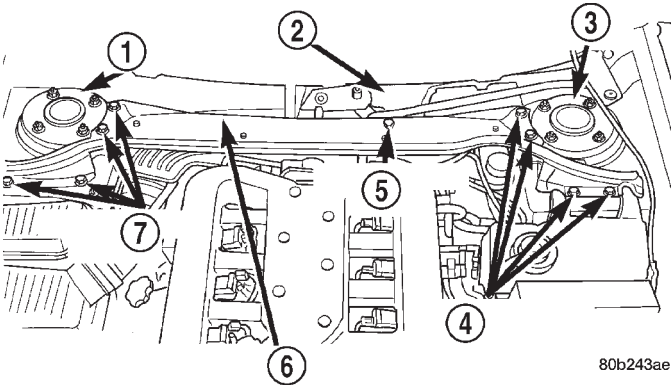


Fig. 81 Reinforcement Attachment To Vehicle

- 1 - RIGHT STRUT TOWER
- 2 - WIPER MODULE
- 3 - LEFT STRUT TOWER
- 4 - ATTACHING BOLTS
- 5 - ATTACHING BOLT
- 6 - REINFORCEMENT
- 7 - ATTACHING BOLTS

(6) Disconnect the wire connector from the brake fluid level sensor on the right side of the master cylinder reservoir.

(7) Remove the 2 nuts (Fig. 82) attaching the master cylinder to the vacuum booster.

(8) Carefully slide master cylinder off vacuum booster with brake lines attached, and position it backwards, on top of left engine cylinder head cover (Fig. 83).

(9) Disconnect vacuum hose from power brake booster check valve. **DO NOT REMOVE CHECK VALVE FROM POWER BRAKE BOOSTER.**

(10) From under instrument panel, position a small screwdriver between the center tang on the power brake booster input rod to brake pedal pin retaining clip.

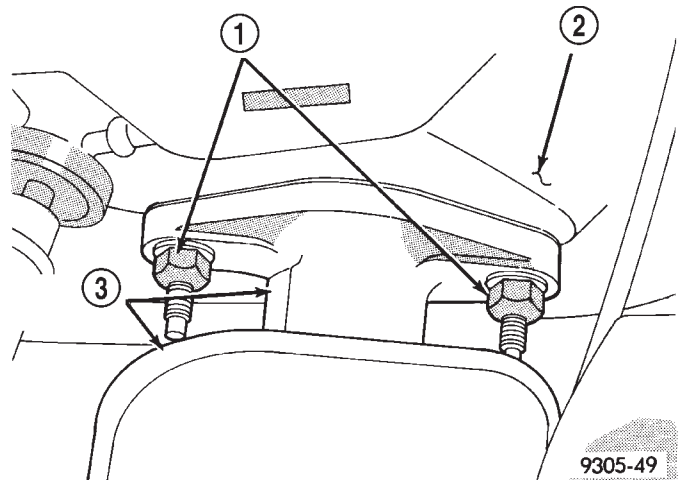


Fig. 82 Master Cylinder Mounting

- 1 - MASTER CYLINDER MOUNTING NUTS
- 2 - POWER BRAKE BOOSTER
- 3 - MASTER CYLINDER

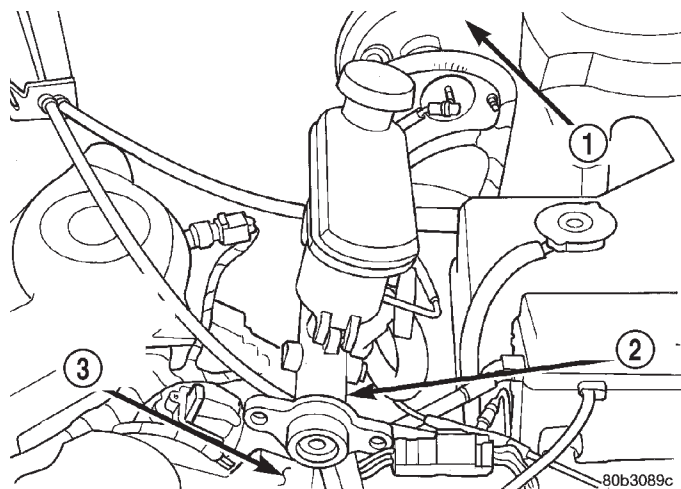


Fig. 83 Master Cylinder Positioning

- 1 - BOOSTER
- 2 - MASTER CYLINDER
- 3 - ENGINE CYLINDER HEAD COVER

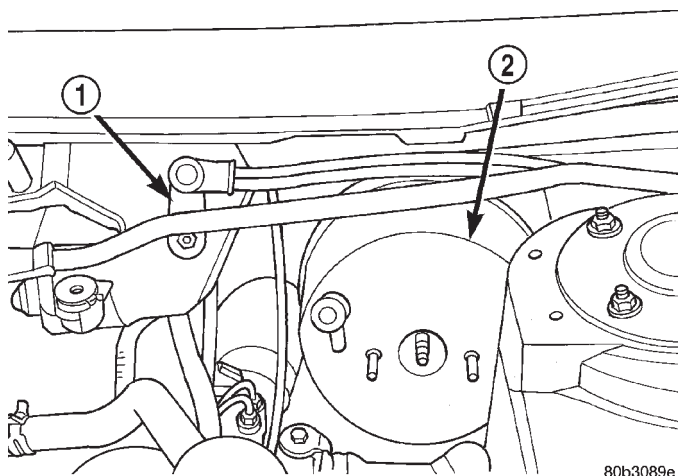
(11) Rotate screwdriver enough to allow retainer clip center tang to pass over end of brake pedal pin and pull retainer clip off pin. **Discard retainer clip it is not to be reused, replace only with a new retainer clip.**

(12) Remove the four nuts that attach the power brake booster to the vehicle dash panel. Nuts are accessible from under the dash panel in the area of the steering column and pedal bracket.

(13) Rotate the windshield wiper motor crank lever until the crank lever points in the 12 o'clock position (Fig. 84).

(14) Slide the power brake booster out of the dash panel and remove from vehicle.

POWER BRAKE BOOSTER (Continued)

**Fig. 84 Wiper Crank Lever Positioning**

- 1 - WIPER MOTOR CRANK LEVER
2 - BRAKE BOOSTER

CAUTION: Do not attempt to disassemble the power brake vacuum booster. It is serviced **ONLY** as a complete assembly.

INSTALLATION - POWER BRAKE BOOSTER

- (1) Position power brake vacuum booster on dash panel.
- (2) Install and tighten the 4 power brake booster to dash panel mounting nuts to 28 N·m (250 in. lbs.) torque.
- (3) Using lubriplate or equivalent, coat the bearing surface of brake pedal pin.
- (4) Connect booster input rod to brake pedal pin and install a NEW retainer clip. **Use only a new retainer clip DO NOT USE the old clip.**

NOTE: Before installing master cylinder, reposition under hood wiring harness above master cylinder mounting studs, in front of booster (Fig. 83).

- (5) Carefully position master cylinder on booster. Position wire harness routing bracket onto right master cylinder mounting stud.
- (6) Install and tighten the 2 master cylinder to booster mounting nuts (Fig. 82) to 28 N·m (250 in. lbs.) torque.
- (7) Reconnect brake fluid level sensor connector.
- (8) Connect all vacuum hoses onto the booster vacuum check valve.
- (9) Check brake lamp switch operation.
- (10) Install the wiper module reinforcement on the vehicle (Fig. 81). Install the 8 bolts, attaching the reinforcement to the strut towers. Install the bolt attaching the wiper module to the reinforcement.

(11) Install the covers over the wiper module and the cowl (Fig. 80). Install and securely tighten the attaching screws.

(12) Reconnect the battery ground cable to the ground stud on the shock tower.

(13) Turn windshield wipers ON, then OFF, in order to park wipers in the proper position before installing wiper arms.

(14) Install the wiper arms on the pivots (Fig. 79). Install and securely tighten the wiper arm to pivot attaching nuts. Install the caps on the wiper arms covering the pivot nuts.

(15) Verify proper operation of the power brake booster and brake system.

PROPORTIONING VALVE**DESCRIPTION**

Two proportioning valves are used on each vehicle without antilock brakes. One valve is used for each rear brake hydraulic circuit. The proportioning valves that are located in the junction block (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/JUNCTION BLOCK - DESCRIPTION). The valves are not serviceable and must be replaced as part of the junction block.

OPERATION

Proportioning valves balance front to rear braking by controlling (at a given ratio) brake hydraulic pressure to the rear brakes above a preset level (split point). On light pedal applications equal brake pressure is transmitted to both the front and rear brakes. On heavier pedal applications, through the use of proportioning valves, the pressure transmitted to the rear will be lower than the front brakes. This prevents premature rear wheel skid.

If hydraulic pressure is lost in one-half of the diagonally split brake hydraulic system, the operation of the proportioning valve in the remaining half is not affected.

DIAGNOSIS AND TESTING - PROPORTIONING VALVE

Vehicles without Antilock Brakes have two proportioning valves. One proportioning valve controls the right rear brake, and the other proportioning valve controls the left rear brake. The proportioning valves are located in the junction block. Vehicle's with ABS do not have proportioning valves to test, they use Electronic Variable Brake Proportioning which is built into the Integrated Control Unit (ICU).

If premature wheel skid occurs on a hard brake application, it could be an indication that a malfunction has occurred with one of the two rear brake pro-

PROPORTIONING VALVE (Continued)

portioning valves. Test the valve that controls the side of the vehicle on which the skid occurs. Both proportioning valves have the same pressure specifications and are tested in the same way.

(1) If the left rear proportioning valve is suspect, disconnect the tube nut fitting at the master cylinder primary port (port closest to power brake booster). Install Adapter, Special Tool 8494-2, in its place on the master cylinder.

(2) If the right rear proportioning valve is suspect, disconnect the tube nut fitting at the master cylinder secondary port (port furthest from power brake booster). Install Adapter, Special Tool 8494-2, in its place on the master cylinder.

(3) Connect primary brake tube to Adapter.

(4) Install a Pressure Gauge, Special Tool C-4007-A, to the Adapter.

(5) Tighten all tube nut fittings to 17 N·m (145 in. lbs.) torque.

(6) Remove screw fastening the speed control servo to the upper radiator closure panel (Fig. 85).

(7) Remove screw fastening the washer filler tube to the upper radiator closure panel (Fig. 85).

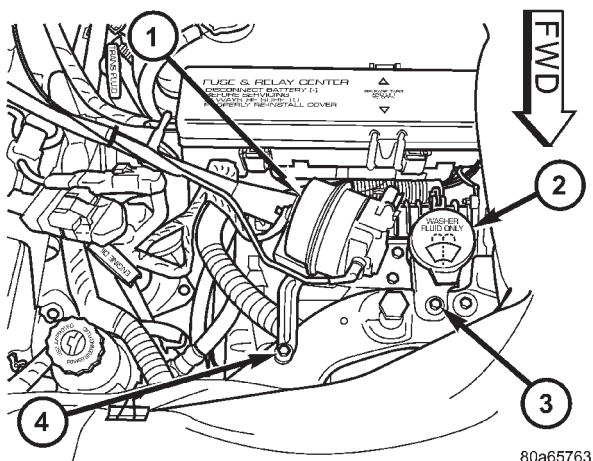


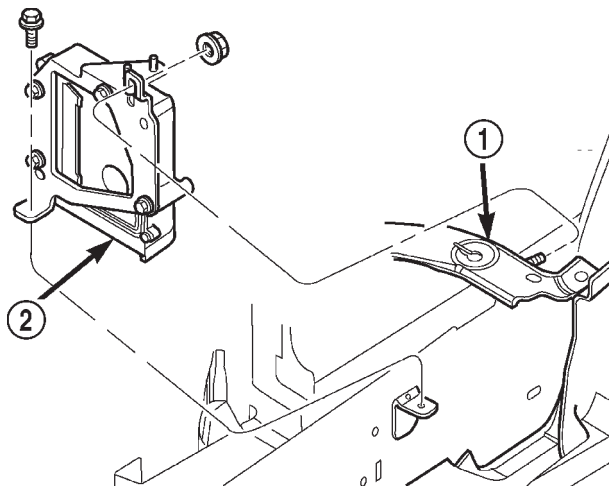
Fig. 85 Servo And Filler Tube Fasteners

- 1 - SPEED CONTROL SERVO
- 2 - WINDSHIELD WASHER FILLER TUBE
- 3 - SCREW
- 4 - SCREW

(8) Remove nut and screw securing transmission control module to vehicle (Fig. 86).

(9) Lift the transmission control module (with speed control servo attached) from its mount leaving its wiring harness attached. Move it off to the side toward the engine making sure not to strain the wires and speed control servo cable.

(10) Clean any debris away from the fittings on top of the junction block.

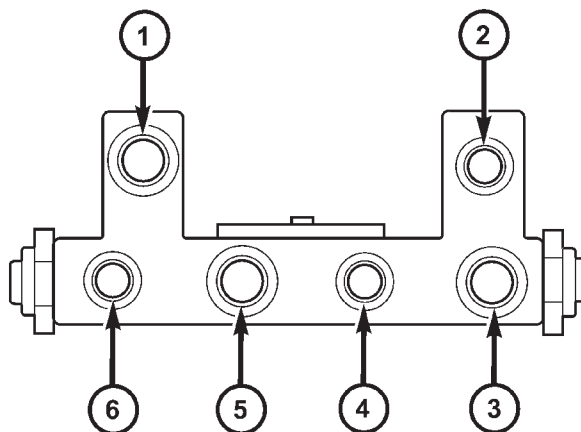


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**Fig. 86 Transmission Control Module (TCM)—
Removal/Installation**

- 1 - RADIATOR UPPER SUPPORT
- 2 - TCM

(11) Using the following figure, remove the chassis brake tube leading to either the left rear or right rear brake at the junction block (Fig. 87).



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Fig. 87 Junction Block Fitting Identification

- 1 - FROM MASTER CYLINDER PRIMARY
- 2 - FROM MASTER CYLINDER SECONDARY
- 3 - TO LEFT FRONT BRAKE
- 4 - TO RIGHT REAR BRAKE
- 5 - TO LEFT REAR BRAKE
- 6 - TO RIGHT FRONT BRAKE

(12) If the left rear proportioning valve is suspect, install Adapter, Special Tool 8494-3, in its place on the junction block.

(13) If the right rear proportioning valve is suspect, install Adapter, Special Tool 8494-4, in its place on the junction block.

PROPORTIONING VALVE (Continued)

(14) Install a Pressure Gauge, Special Tool C-4007-A, to the Adapter.

(15) Tighten all tube nut fittings to 17 N·m (145 in. lbs.) torque.

(16) Bleed any air out of the system. This includes bleeding the air from the hose between the pressure test fitting and pressure gauge, which is done at the pressure gauge.

(17) With the aid of a helper, apply pressure to the brake pedal until reading on proportioning valve inlet gauge (at master cylinder) is at the pressure shown on the chart at the end of this procedure. Then check the pressure reading on the proportioning valve outlet gauge (at junction block outlet to rear brake). If proportioning valve outlet pressure does not agree with value shown on the chart (once inlet pressure shown on chart is obtained), replace the junction block (with internal proportioning valves) (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/JUNCTION BLOCK - REMOVAL). If pressure is within specifications, do not replace proportioning valve and perform the following steps.

(18) Remove the Pressure Gauge and Adapter, Special Tool 8494-3 or 8494-4, from junction block.

(19) Reinstall the chassis brake tube to the junction block port. Tighten tube nut fitting to 17 N·m (145 in. lbs.) torque.

(20) Install the transmission control module (with speed control servo attached) in its normal position (Fig. 86). Install the nut and screw securing it in place.

(21) Install the transmission control module mounting nut and screw securing it in place. Tighten the screw to 6 N·m (45 in. lbs.). Tighten the nut to 12 N·m (107 in. lbs.) torque.

(22) Install the screw attaching the washer filler tube to the upper radiator closure panel (Fig. 85).

(23) Install the screw attaching the speed control servo to the upper radiator closure panel (Fig. 85).

(24) Remove the Pressure Gauge and Adapter from master cylinder.

(25) Install the brake tube to the master cylinder primary or secondary port. Tighten the tube nut to a torque of 17 N·m (145 in. lbs.).

(26) Bleed the affected brake line. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

(27) If no problem is found with the proportioning valves, check the rear wheel brake shoe linings for contamination or for replacement brake shoes not meeting OEM brake lining material specifications. These conditions can also cause premature rear wheel skid.

PROPORTIONING VALVE APPLICATIONS AND PRESSURE SPECIFICATIONS

Sales Code	Brake System Type	Split Point	Slope	Identification	Inlet Pressure	Outlet Pressure
All	All Disc/Disc	400 psi	0.34	Bar Code Label	1000 psi	525-625 psi

ROTOR

DIAGNOSIS AND TESTING - BRAKE ROTOR

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

Excessive runout or wobble in a rotor can increase pedal travel due to piston knock-back. This increases guide pin sleeve wear due to the tendency of the caliper to follow the rotor wobble.

When diagnosing a brake noise or pulsation, the machined disc braking surface should be checked and inspected.

BRAKING SURFACE INSPECTION

Light braking surface scoring and wear is acceptable. If heavy scoring or warping is evident, the rotor must be refaced or replaced. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE)

Excessive wear and scoring of the rotor can cause improper lining contact on the rotor's braking surface. If the ridges on the rotor are not removed before new brake shoes are installed, improper wear of the shoes will result.

If a vehicle has not been driven for a period of time, the rotor's braking surface will rust in the areas not covered by the brake shoes at that time. Once the vehicle is driven, noise and chatter from the disc brakes can result when the brakes are applied.

Some discoloration or wear of the rotor surface is normal and does not require resurfacing when linings are replaced. If cracks or burned spots are evident, the rotor must be replaced.

ROTOR MINIMUM THICKNESS

Measure rotor thickness at the center of the brake shoe contact surface. Replace the rotor if it is worn below minimum thickness or if machining the rotor will cause its thickness to fall below specifications.

ROTOR (Continued)

CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

Minimum thickness specifications are cast on the rotor's unmachined surface (Fig. 88). Limits can also be found in the table at the end of this brake rotor information.

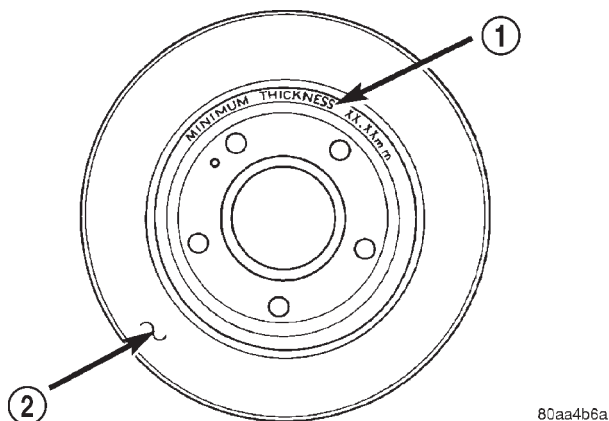


Fig. 88 Minimum Thickness Markings (Typical)

- 1 - ROTOR MINIMUM THICKNESS MARKING
- 2 - ROTOR

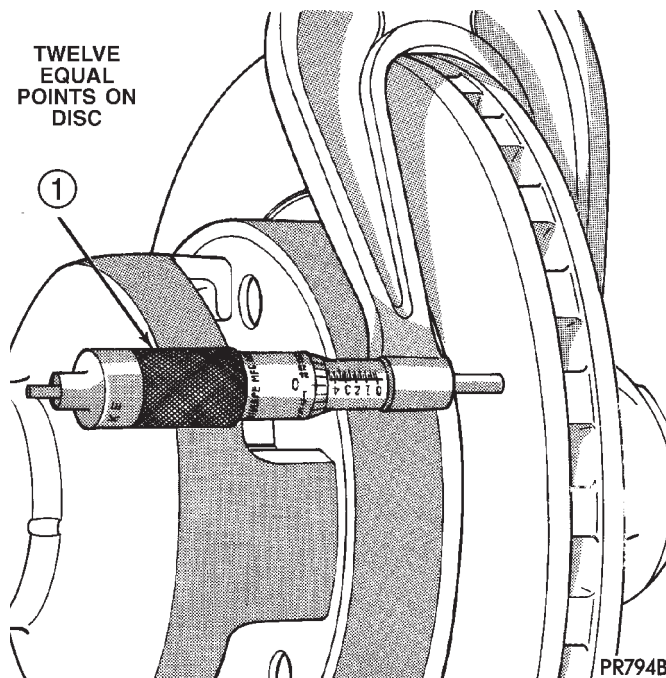


Fig. 89 Checking Rotor Thickness

- 1 - MICROMETER

ROTOR THICKNESS VARIATION

Thickness variation in a rotor's braking surface can result in pedal pulsation, chatter and surge. This can also be caused by excessive runout in the rotor or the hub.

Rotor thickness variation measurements should be made in conjunction with measuring runout. Measure thickness of the brake rotor at 12 equal points around the rotor braking surface with a micrometer at a radius approximately 25 mm (1 inch) from edge of rotor (Fig. 89). If thickness measurements vary by more than 0.013 mm (0.0005 inch), the rotor should refaced or replaced. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE)

ROTOR RUNOUT

On-vehicle rotor runout is the combination of the individual runout of the hub face and the runout of the rotor. (The hub and rotor runouts are separable). To measure rotor runout on the vehicle, first remove the tire and wheel assembly. Reinstall the wheel mounting nuts on the studs, tightening the rotor to the hub. Mount the Dial Indicator, Special Tool C-3339, with Mounting Adaptor, Special Tool SP-1910 on steering arm. The dial indicator plunger should contact braking surface of rotor approximately 25 mm (one inch) from outer edge of rotor (Fig. 90). Check lateral runout on both sides of the rotor, marking the low and high spots on both. Runout limits can be found in the table at the end of this brake rotor information.

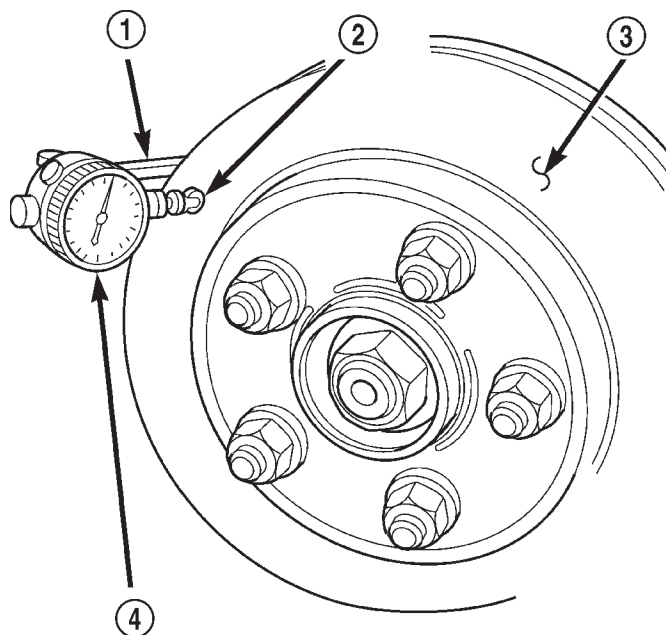
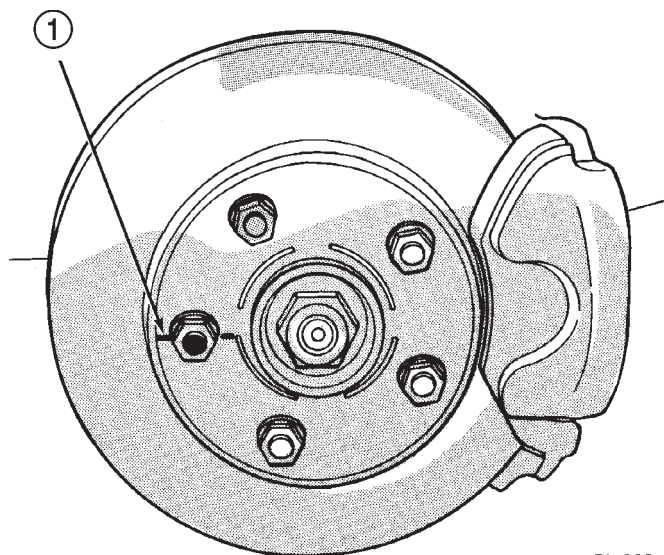


Fig. 90 Checking Rotor Runout

- 1 - SPECIAL TOOL SP-1910
- 2 - 25mm (1 INCH) FROM EDGE
- 3 - DISC SURFACE
- 4 - SPECIAL TOOL C-3339

ROTOR (Continued)

If runout is in excess of the specification, check the lateral runout of the hub face. Before removing the rotor from the hub, place a chalk mark across both the rotor and the one wheel stud closest to where the high runout measurement was taken. This way, the original mounting spot of the rotor on the hub is indexed (Fig. 91).



RN199

Fig. 91 Marking Rotor and Wheel Stud

1 - CHALK MARK

Remove the rotor from the hub.

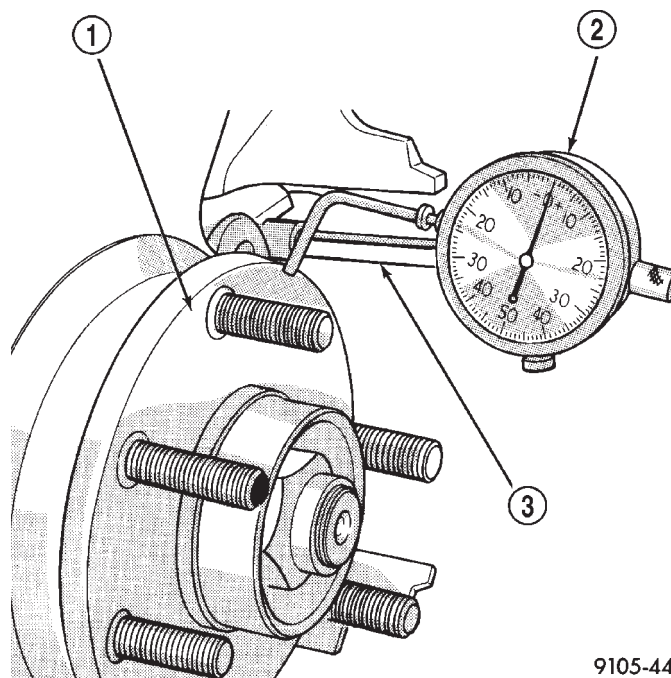
NOTE: Clean the hub face surface before checking runout. This provides a clean surface to get an accurate indicator reading.

Mount Dial Indicator, Special Tool C-3339, and Mounting Adaptor, Special Tool SP-1910, to the steering knuckle. Position the indicator stem so it contacts the hub face near the outer diameter. Care must be taken to position stem outside of the stud circle, but inside of the chamfer on the hub rim (Fig. 92).

Hub runout should not exceed 0.03 mm (0.0012 inch). If runout exceeds this specification, the hub must be replaced. Refer to SUSPENSION for the hub and bearing removal and installation procedure.

If the hub runout does not exceed this specification, install the rotor back on the hub, aligning the chalk marks on the rotor with a wheel mounting stud, two studs apart from the original stud (Fig. 93). Tighten nuts in the proper sequence and torque to specifications.

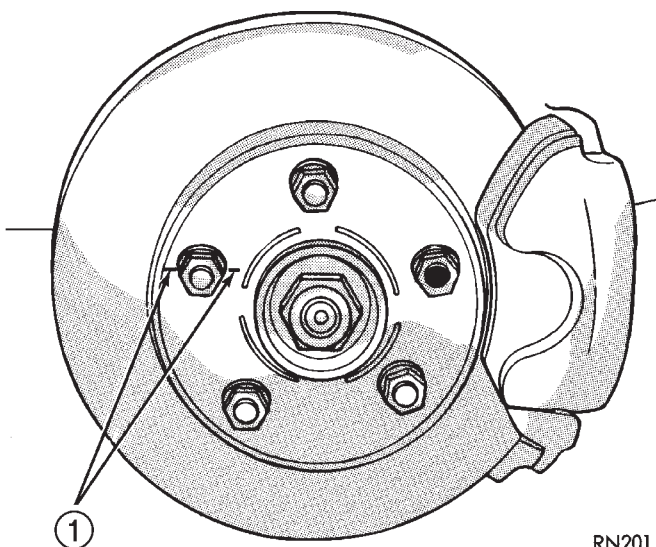
Recheck brake rotor runout to see if the runout is now within specifications.



9105-44

Fig. 92 Checking Hub Runout

1 - HUB SURFACE
2 - SPECIAL TOOL C-3339
3 - SPECIAL TOOL SP-1910



RN201

Fig. 93 Index Rotor And Wheel Stud

1 - CHALK MARK

If runout is not within specifications, reface or replace the brake rotor. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - STANDARD PROCEDURE)

ROTOR (Continued)

BRAKE ROTOR LIMITS

Braking Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Run Out*	Rotor Micro Finish
Front Rotor	25.87–26.13 mm 1.019 -1.029 in.	24.4 mm 0.960 in.	0.013 mm 0.0005 in.	0.08 mm 0.003 in.	15-80 RMS
Rear Rotor	11.63–12.13 mm 0.458 -0.478 in.	10.4 mm 0.409 in.	0.013 mm 0.0005 in.	0.08 mm 0.003 in.	15-80 RMS
* TIR Total Indicator Reading (Measured On Vehicle)					

STANDARD PROCEDURE - BRAKE ROTOR MACHINING

NOTE: Refacing of the rotor is not required each time the brake pads are replaced.

Any servicing of the rotor requires extreme care to maintain the rotor within service tolerances to ensure proper brake action.

If the rotor surface is deeply scored or warped, or there is a complaint of brake roughness or brake pedal pulsation, the rotor should be refaced using a hub-mounted on-car brake lathe (Fig. 94), or replaced.

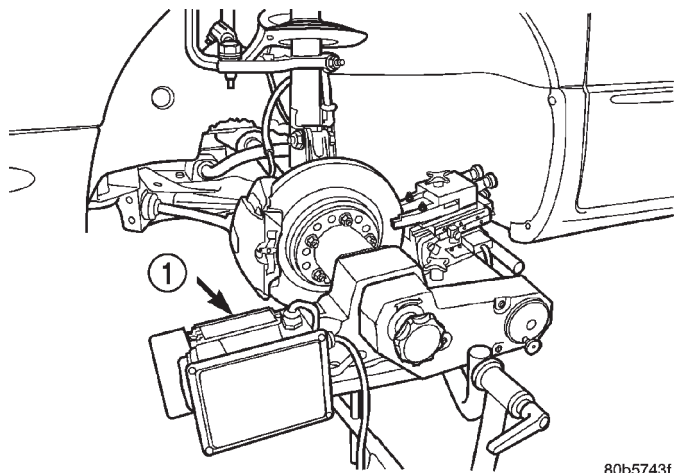
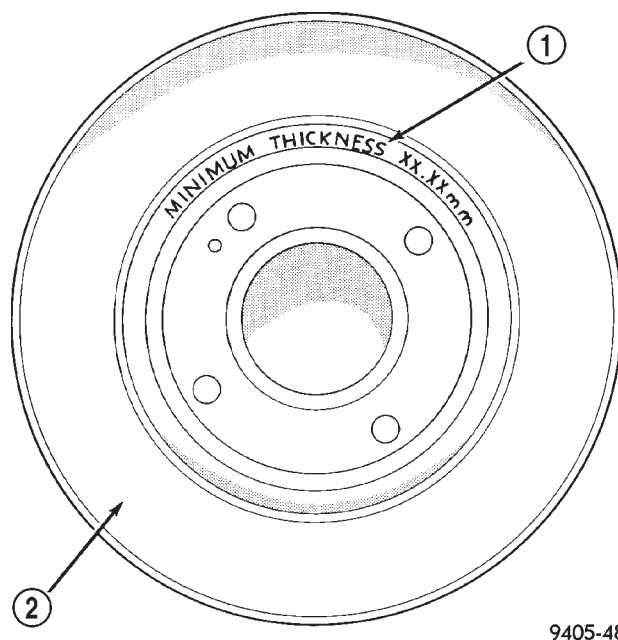


Fig. 94 Hub Mounted On-Car Brake Lathe

1 - ON-CAR BRAKE LATHE

The use of a hub-mounted on-car brake lathe is highly recommended to eliminate the possibility of excessive runout. It trues the brake rotor to the vehicle's hub and bearing.

NOTE: All rotors have markings for minimum allowable thickness cast on an un-machined surface of the rotor (Fig. 95) or (Fig. 96).



9405-48

Fig. 95 Front Rotor Thickness Markings

1 - BRAKING DISC MINIMUM THICKNESS MARKING
2 - BRAKING DISC

Minimum allowable thickness is the minimum thickness which the brake rotor machined surface may be cut to.

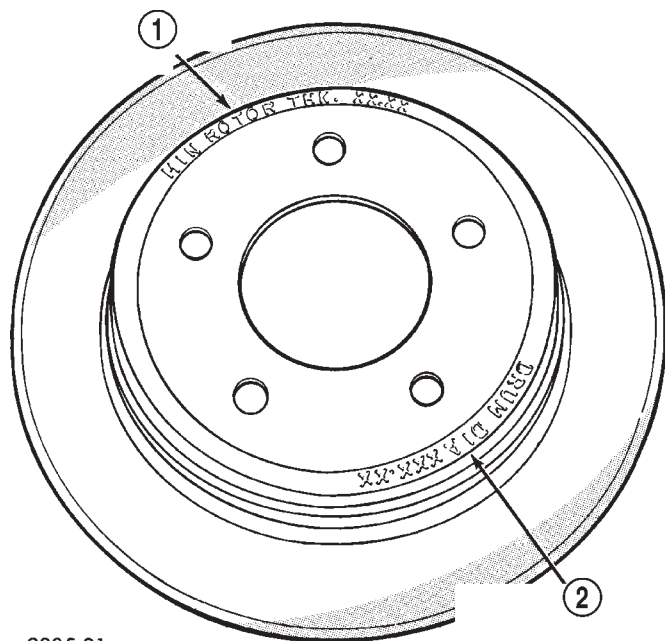
CAUTION: Do not machine the rotor if it will cause the rotor to fall below minimum thickness.

Before installation, verify the brake rotor face and the hub adapters are free of any chips, rust, or contamination.

When mounting and using the brake lathe, strict attention to the brake lathe manufacturer's operating instructions is required.

Machine both sides of the brake rotor at the same time. Cutting both sides at the same time minimizes the possibility of a tapered or uneven cut.

ROTOR (Continued)



9305-21

Fig. 96 Rear Rotor Thickness Markings

- 1 - BRAKING DISC MINIMUM THICKNESS MARKING
 2 - PARK BRAKE DRUM MAXIMUM DIAMETER MARKING

When refacing a rotor, the required TIR (Total Indicator Reading) and thickness variation limits **MUST BE MAINTAINED**. Extreme care in the operation of rotor turning equipment is required.

BRAKE ROTOR REFINISHING LIMITS

Braking Rotor	Rotor Thickness	Minimum Rotor Thickness	Rotor Thickness Variation	Rotor Run Out*	Rotor Micro Finish
Front Rotor	25.87–26.13 mm 1.019 -1.029 in.	24.4 mm .960 in.	.013 mm .0005 in.	.08 mm .003 in.	15-80 RMS
Rear Rotor	11.63–12.13 mm .458 -.478 in.	10.4 mm .409 in.	.013 mm .0005 in.	.08 mm .003 in.	15-80 RMS

* TIR Total Indicator Reading (Measured On Vehicle)

REMOVAL

REMOVAL - BRAKE ROTOR (FRONT)

(1) Remove disc brake caliper and store (hang) it out of the way following the procedure found in Brake Pads/Shoes. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL)

(2) Remove any clips retaining the brake rotor to the wheel mounting studs.

(3) Remove brake rotor from hub by pulling it straight off wheel mounting studs (Fig. 97).

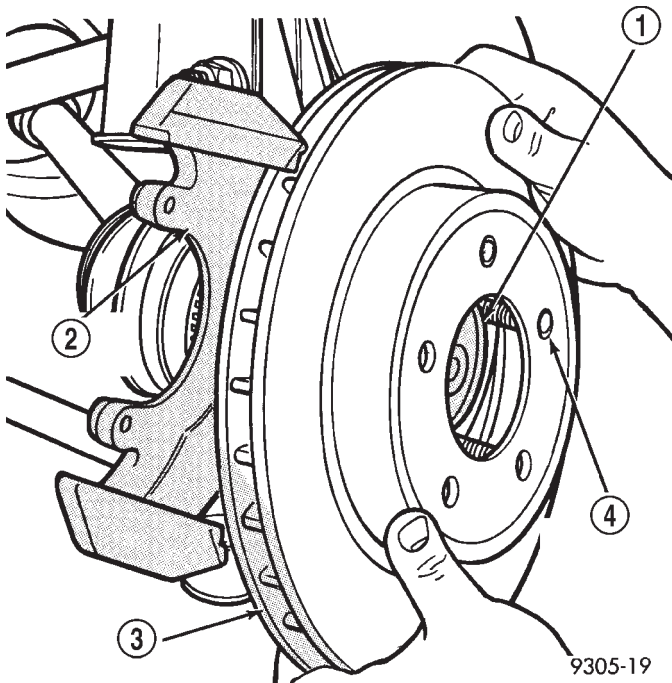
REMOVAL - BRAKE ROTOR (REAR)

(1) Remove disc brake caliper and store (hang) it out of the way following the procedure found in Brake Pads/Shoes. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/BRAKE PADS/SHOES - REMOVAL)

(2) Remove any clips retaining the brake rotor to the wheel mounting studs.

(3) Remove the rear rotor from hub by pulling it straight off the wheel mounting studs (Fig. 98).

ROTOR (Continued)

**Fig. 97 Front Rotor Removal/Installation**

- 1 - HUB
- 2 - STEERING KNUCKLE
- 3 - BRAKE ROTOR (DISC)
- 4 - WHEEL MOUNTING STUD

INSTALLATION

INSTALLATION - BRAKE ROTOR (FRONT)

(1) Install brake rotor over the wheel mounting studs onto hub (Fig. 97).

(2) Install disc brake caliper and shoes following the procedure found in Brake Pads/Shoes. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ BRAKE PADS/SHOES - INSTALLATION)

(3) Pump the brake pedal several times to ensure the vehicle has a firm brake pedal to adequately stop vehicle.

(4) Check and adjust brake fluid level as necessary.

INSTALLATION - BRAKE ROTOR (REAR)

(1) Install brake rotor over the wheel mounting studs onto hub (Fig. 98).

(2) Install disc brake caliper and shoes following the procedure found in Brake Pads/Shoes. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ BRAKE PADS/SHOES - INSTALLATION)

(3) Adjust parking brake shoes as necessary.

(4) Pump the brake pedal several times to ensure the vehicle has a firm brake pedal to adequately stop vehicle.

(5) Check and adjust brake fluid level as necessary.

PARKING BRAKE

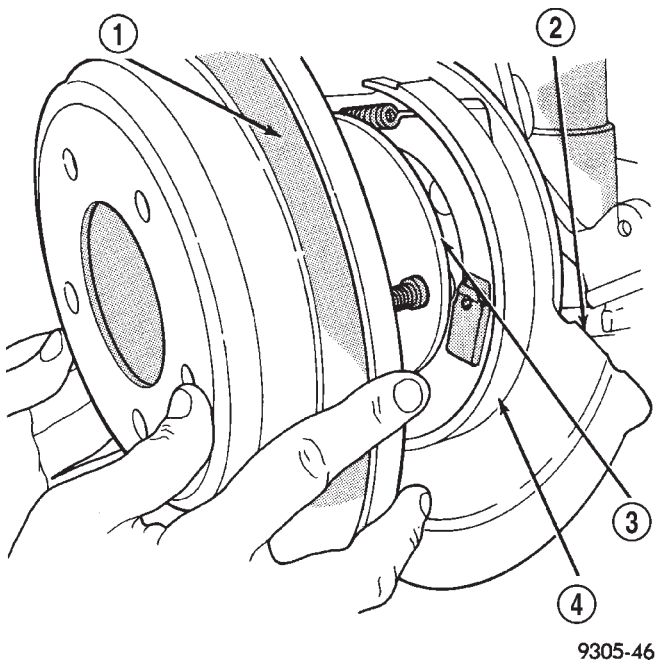
DESCRIPTION

The parking brake mechanism on vehicles equipped with rear disc brakes consists of a small duo-servo brake which is mounted to the disc brake caliper adapter. The hat (center) section (Fig. 99) of the rear rotor serves as the braking surface (drum) for the parking brakes.

The parking brake shoes are mechanically operated by an internal lever connected to a flexible steel (rear) cable. There are two rear cables, one for each rear wheel parking brake. The rear cables are joined at an equalizer bracket (and cable tensioner) which is attached to the intermediate cable. The opposite end of the intermediate cable is attached to the front cable which leads to the foot operated lever mounted inside the passenger compartment.

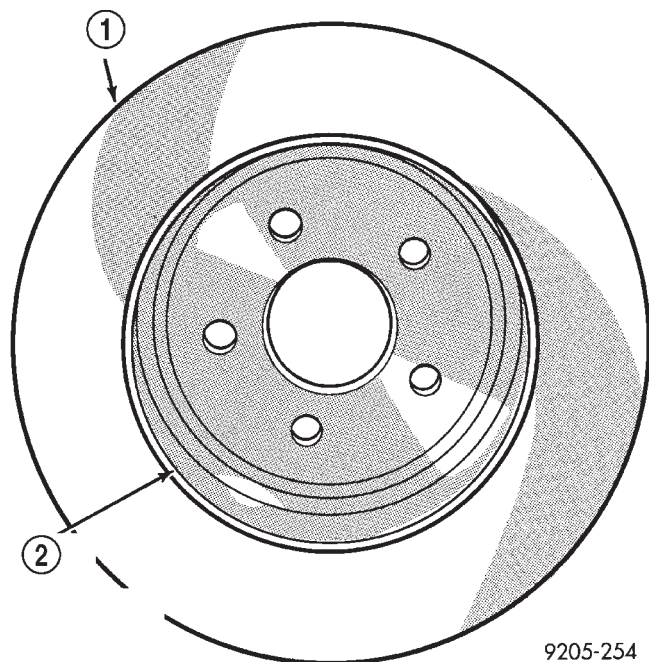
OPERATION

When the parking brake (foot) lever is pressed, the cables are pulled, thus actuating the parking brake shoes. The shoes expand outward against the drum section of the rear disc brake rotor.

**Fig. 98 Rear Rotor Removal/Installation**

- 1 - BRAKE ROTOR (DISC)
- 2 - DISC SHIELD
- 3 - HUB
- 4 - DRUM-IN-HAT PARKING BRAKE

PARKING BRAKE (Continued)



9205-254

Fig. 99 Drum-In-Hat Braking Disc

1 - REAR BRAKING DISK ROTOR

2 - HAT SECTION OF REAR BRAKING DISC (PARKING BRAKE BRAKING SURFACE)

ADJUSTMENTS

ADJUSTMENT - PARKING BRAKE

NOTE: Tension adjustment is only necessary when the tensioner, or a cable has been replaced or disconnected for service. When adjustment is necessary, perform adjustment only as described in the following procedure. This is necessary to avoid faulty park brake operation.

- (1) Raise vehicle.
- (2) Fully back off cable tensioner adjusting nut at equalizer to create slack in cables.
- (3) Remove rear wheel/tire assemblies. Remove brake calipers and rotors.
- (4) Verify park brakes are in good condition and operating properly.
- (5) Verify park brake cables operate freely and are not binding, or seized.
- (6) Check park brake shoe adjustment.
- (7) Reinstall rotors and make sure rotors turn freely.
- (8) Reinstall brake calipers. Tighten guide pin bolts to 41 n·m (30 ft.lbs.).
- (9) Reinstall wheel/tire assemblies after brake shoe adjustment is complete.
- (10) Lower vehicle enough for access to park brake foot pedal. Fully apply park brakes.

NOTE: Leave park brakes applied until adjustment is complete.

(11) Raise vehicle again.

(12) Mark tensioner rod 6.35 mm (1/4 in.) from edge of tensioner bracket (Fig. 100).

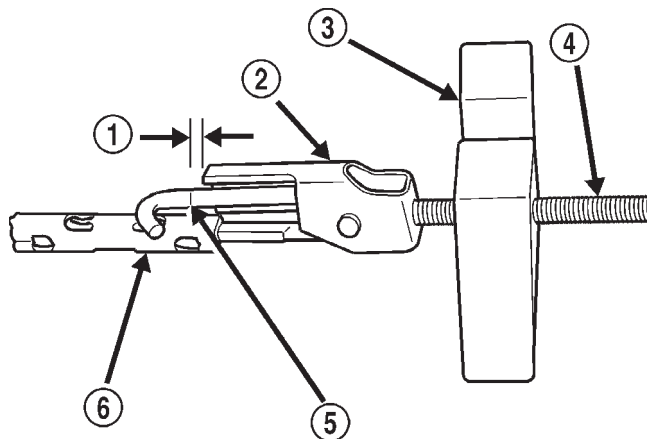
(13) Tighten adjusting nut at equalizer until mark on tensioner rod moves into alignment with tensioner bracket.

CAUTION: Do not loosen, or tighten the tensioner adjusting nut for any reason after completing adjustment.

(14) Lower vehicle until rear wheels are 15-20 cm (6-8 in.) off shop floor.

(15) Release park brake foot pedal and verify that rear wheels rotate freely without drag. Verify pedal returns to fully released position.

(16) Lower the vehicle.



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Fig. 100 Adjustment Mark On Cable Tensioner Rod

1 - MEASURE

2 - TENSIONER

3 - TENSIONER ISOLATOR

4 - THREADED ROD

5 - PLACE MARK HERE

6 - BRAKE CABLE CONNECTOR

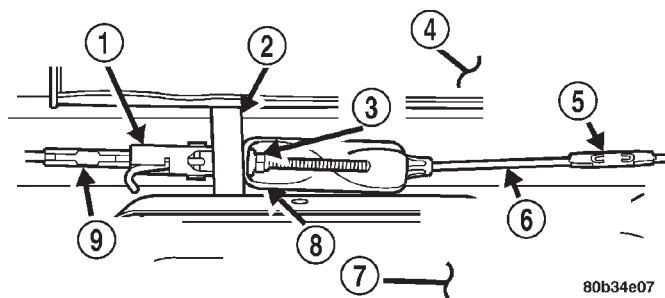
PARKING BRAKE CABLE TENSIONER

REMOVAL

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove the park brake tensioner adjuster nut (Fig. 101), releasing the tensioner from the equalizer bracket to the intermediate cable.

PARKING BRAKE CABLE TENSIONER (Continued)

**Fig. 101 Tensioner**

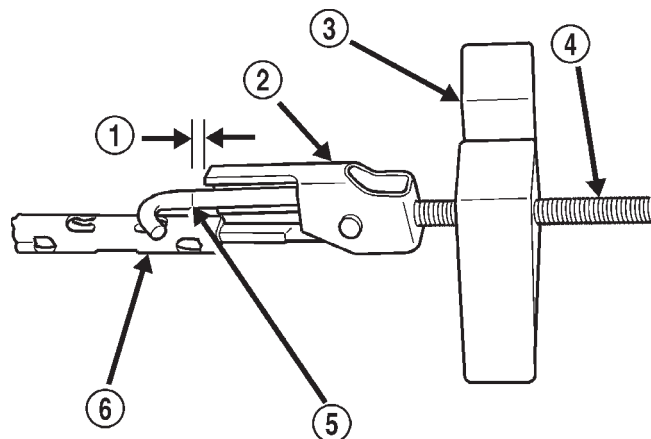
- 1 - TENSIONER
- 2 - ISOLATOR
- 3 - ADJUSTER NUT
- 4 - MUFFLER
- 5 - RIGHT REAR CABLE CONNECTOR
- 6 - INTERMEDIATE PARK BRAKE CABLE
- 7 - FUEL TANK
- 8 - BRACKET
- 9 - LEFT REAR CABLE CONNECTOR

(3) Disconnect the connector and remove the park brake tensioner from the left rear parking brake cable (Fig. 101).

(4) Remove the park brake tensioner with its isolator from the vehicle.

INSTALLATION

(1) Mark tensioner rod 6.35 mm (1/4 in.) from edge of tensioner bracket (Fig. 102) .

**Fig. 102 ADJUSTMENT MARK ON CABLE TENSION**

- 1 - MEASURE
- 2 - TENSIONER
- 3 - TENSIONER ISOLATOR
- 4 - THREADED ROD
- 5 - PLACE MARK HERE
- 6 - BRAKE CABLE CONNECTOR

(2) Install the park brake tensioner, with its isolator, in the vehicle, with the threaded adjustment

stud pointed towards the right side of the vehicle (Fig. 101) .

(3) Connect the left rear park brake cable to the cable connector on the tensioner (Fig. 101) .

(4) Attach the threaded end of the tensioner to the equalizer bracket (Fig. 101) , and install a new adjuster nut. Do not tighten at this time.

(5) Verify the rear park brake shoes are properly adjusted.

(6) Lower vehicle enough for access to park brake foot pedal. Fully apply park brakes.

NOTE: Leave park brakes applied until adjustment is complete.

(7) Raise vehicle again.

(8) Tighten adjusting nut at equalizer (Fig. 101) until mark on tensioner rod (Fig. 102) moves into alignment with edge of tensioner bracket.

CAUTION: Do not loosen, or tighten the tensioner adjusting nut for any reason after completing adjustment.

(9) Lower vehicle until rear wheels are 15-20 cm (6-8 in.) off shop floor.

(10) Release park brake foot pedal and verify that rear wheels rotate freely without drag. Verify pedal returns to the fully released position.

(11) Lower vehicle to the ground.

PARKING BRAKE CABLE - FRONT**REMOVAL - FRONT CABLE**

The front parking brake cable is serviced with the parking brake lever. (Refer to 5 - BRAKES - BASE/PARKING BRAKE/LEVER - REMOVAL)

INSTALLATION - FRONT CABLE

The front parking brake cable is serviced with the parking brake lever. (Refer to 5 - BRAKES - BASE/PARKING BRAKE/LEVER - INSTALLATION)

PARKING BRAKE CABLE - INTERMEDIATE**REMOVAL - INTERMEDIATE CABLE**

(1) Raise the vehicle using a frame contact type hoist or correctly supported on jackstands. See Hoisting in Lubrication and Maintenance.

(2) Loosen the park brake cable tensioner adjuster nut until tension is removed from cables.

PARKING BRAKE CABLE - INTERMEDIATE (Continued)

(3) Disconnect the cable connector between the front and intermediate cable.

(4) Remove the bolt attaching the intermediate cable retainer to the body torque box (Fig. 103).

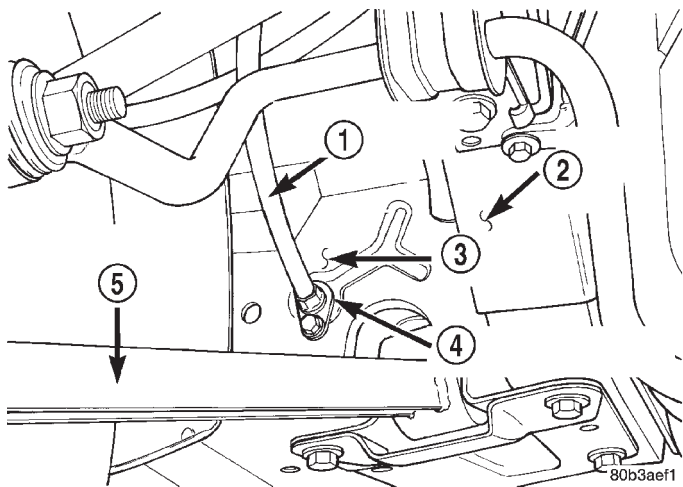


Fig. 103 Cable At Torque Box

- 1 - INTERMEDIATE PARK BRAKE CABLE
- 2 - LEFT FRAME RAIL
- 3 - TORQUE BOX
- 4 - CABLE RETAINER
- 5 - LEFT REAR TRAILING ARM

(5) Remove the intermediate cable from the body torque box (Fig. 103).

(6) Remove the connector from the intermediate cable at the right rear park brake cable.

(7) Remove the intermediate cable from the tensioner bracket using the box end of a 1/2 inch wrench.

(8) Release the latch on the routing clip for the intermediate cable, mounted above the left rear cable retainer clip, on rear suspension crossmember.

(9) Remove the intermediate park brake cable.

INSTALLATION - INTERMEDIATE CABLE

(1) Install the intermediate park brake cable.

NOTE: When guiding the cable towards the front of the rear crossmember from the left side, make sure the cable is routed between the rear suspension crossmember and the frame rail crossing below the rear park brake cable. It should also be routed below the brake tubes at this point.

(2) Install the intermediate cable to the tensioner bracket by snapping it into place.

(3) Reinstall retainer clip on top of left side of crossmember, around intermediate cable and into place.

(4) Connect the intermediate cable to the right rear cable connector.

(5) Install the intermediate cable through the hole in the body torque box (Fig. 103). Install the bolt attaching the intermediate cable retainer to the body torque box.

(6) Connect the intermediate cable to the front cable connector.

(7) Adjust parking brake. (Refer to 5 - BRAKES - BASE/PARKING BRAKE - ADJUSTMENTS)

(8) Lower the vehicle.

PARKING BRAKE CABLE - REAR

REMOVAL - REAR CABLE

NOTE: This procedure can be used to remove either rear parking brake cable.

(1) Raise vehicle using a frame contact type hoist or correctly jack and support the vehicle using jack stands. See Hoisting in Lubrication And Maintenance.

(2) Loose the park brake cable tensioner nut until tension is removed from cables.

(3) **Left rear cable only** - Remove the rear cable from the connector at the park brake cable tensioner.

(4) **Right rear cable only** - Remove the rear cable from the connector at the intermediate cable.

(5) Remove the retainer clip securing the preferred rear park brake cable to the crossmember (Fig. 104).

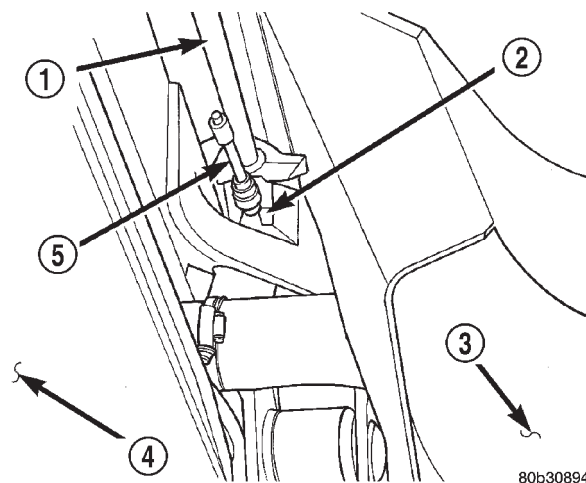


Fig. 104 Left Rear Parking Brake

- 1 - INTERMEDIATE PARKING BRAKE CABLE
- 2 - CLIP
- 3 - FUEL TANK
- 4 - MUFFLER
- 5 - REAR PARKING BRAKE CABLE

(6) Lower the vehicle enough to have rear brakes at good working height.

PARKING BRAKE CABLE - REAR (Continued)

(7) Remove the rear wheel and tire assembly from the side of the vehicle requiring service to the park brake cable.

(8) Remove the rear disc brake caliper from the adapter and rotor. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL)

(9) Remove the rear brake rotor from the rear hub/bearing assembly.

(10) Remove the parking brake shoes from the disc brake adapter. (Refer to 5 - BRAKES - BASE/PARKING BRAKE/SHOES - REMOVAL)

(11) Remove the park brake actuator lever from the rear park brake cable.

(12) Using a screwdriver, carefully compress the retainer tabs securing the rear park brake cable to the disc brake adapter.

(13) Remove the rear parking brake cable from the disc brake adapter and vehicle.

INSTALLATION - REAR CABLE

NOTE: This procedure can be used to install either rear parking brake cable.

(1) Install the rear parking brake cable by routing the leading end above the intermediate cable, then, between the frame, crossmember, and stabilizer bar.

(2) Install the other end of the cable into the disc brake adapter, allowing the retainer tabs to lock into place in the adapter.

(3) Install the park brake actuator lever onto the end of the rear park brake cable behind the spring.

(4) Install the parking brake shoes. (Refer to 5 - BRAKES - BASE/PARKING BRAKE/SHOES - INSTALLATION)

(5) Install the rear disc brake rotor on the hub/bearing.

(6) Install the brake caliper on the rotor and adapter. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION)

(7) Install the caliper guide pin bolts and tighten to 41 N·m (30 ft. lbs.).

(8) Install the tire and wheel assembly. Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.).

(9) Raise the vehicle back up.

(10) Install the rear park brake cable into the rear suspension crossmember mounting hole.

(11) Install a new retainer clip, on the end of the cable housing, to secure it in place.

(12) **Left rear cable only** - Connect the left rear park brake cable to the connector on the park brake cable tensioner.

(13) **Right rear cable only** - Connect the right rear park brake cable to the connector on the intermediate park brake cable.

(14) When repairs are complete, adjust parking brake shoes, then adjust parking brake tensioner. (Refer to 5 - BRAKES - BASE/PARKING BRAKE - ADJUSTMENTS)

PARKING BRAKE LEVER

REMOVAL - PARKING BRAKE LEVER AND CABLE

NOTE: The parking brake lever assembly on this vehicle is serviced with the front cable installed on it. They should be removed, replaced, and installed as an assembly.

(1) Remove remote ground cable from ground stud on shock tower. Then correctly isolate ground cable from vehicle by installing isolator on stud (Fig. 105).

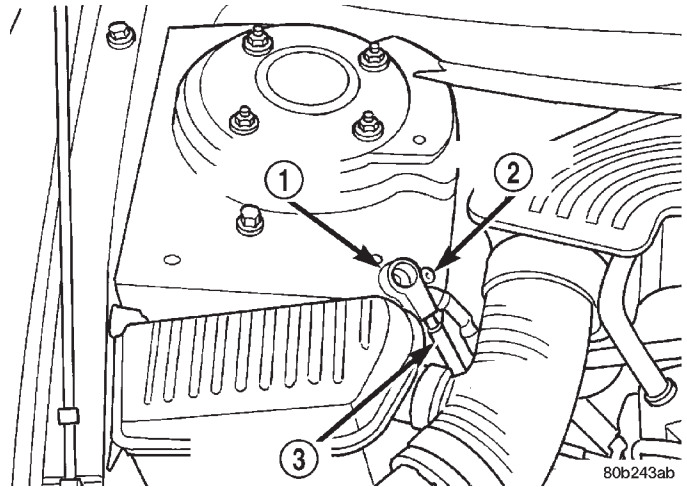


Fig. 105 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

(2) Raise the vehicle using a frame contact type hoist or correctly supported on jackstands. See Hoisting in Lubrication and Maintenance.

(3) Loosen the park brake tensioner adjuster nut, in front of the rear crossmember, until tension is removed from cables.

(4) Disconnect the cable connector between the front and intermediate cable.

(5) Lower the vehicle to the ground.

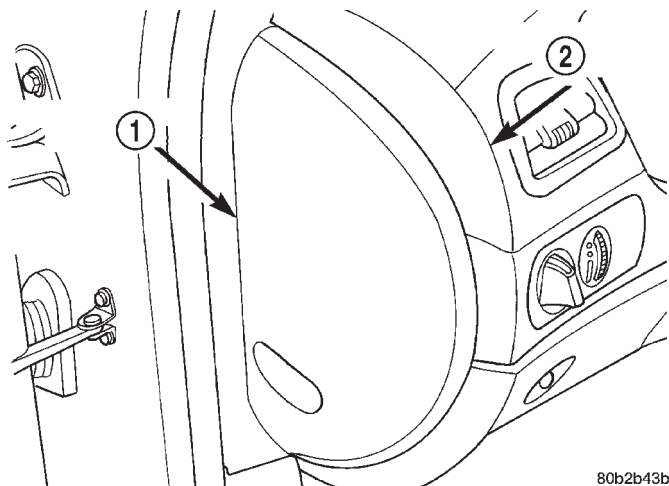
(6) Remove the driver's door opening sill cover.

(7) Remove the driver's side kick panel.

(8) Remove the fuse panel cover from the left end of the instrument panel (Fig. 106).

(9) Remove the 2 screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel mounting bracket (Fig. 107).

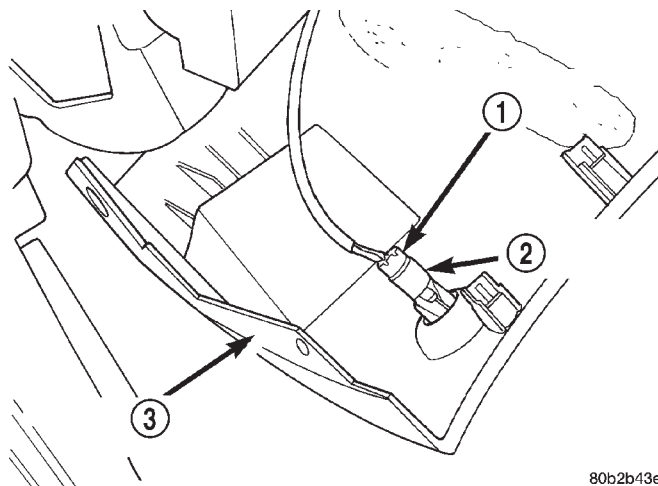
PARKING BRAKE LEVER (Continued)



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Fig. 106 Fuse Panel Cover

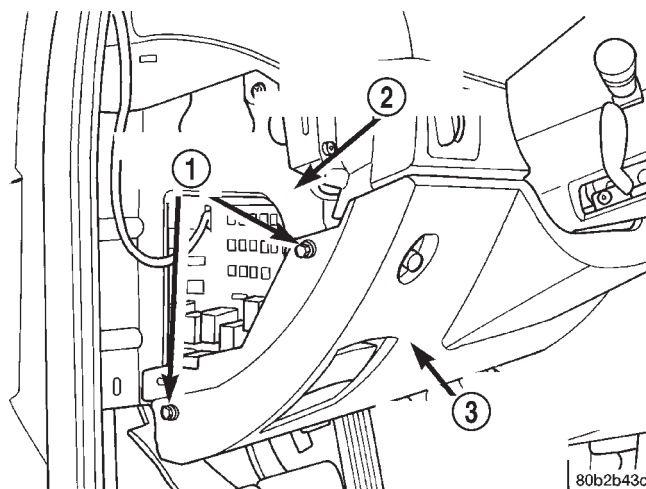
- 1 - FUSE PANEL COVER
- 2 - INSTRUMENT PANEL



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Fig. 108 Trunk Release Wiring

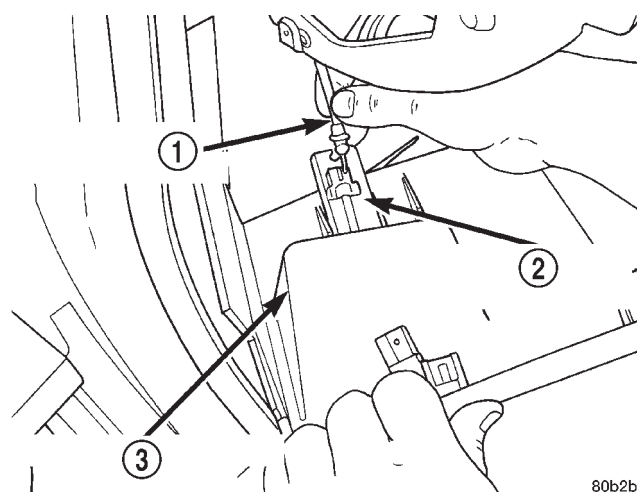
- 1 - WIRING HARNESS CONNECTOR
- 2 - TRUNK RELEASE SWITCH
- 3 - LOWER INSTRUMENT PANEL COVER



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Fig. 107 Lower Instrument Panel Cover Mounting Screws

- 1 - MOUNTING SCREWS
- 2 - INSTRUMENT PANEL BRACKET
- 3 - LOWER INSTRUMENT PANEL COVER



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Fig. 109 Park Brake Release Cable

- 1 - PARK BRAKE RELEASE CABLE
- 2 - PARK BRAKE RELEASE HANDLE
- 3 - LOWER INSTRUMENT PANEL COVER

(10) Remove the lower instrument panel cover from the instrument panel. It is attached by retaining clips along the top and right edge.

(11) Remove the wiring harness connector from the trunk release switch in the lower instrument panel cover (Fig. 108).

(12) Remove the park brake release cable from the park brake release handle in the lower instrument panel cover (Fig. 109).

(13) Remove the 4 bolts mounting the reinforcement to the instrument panel (Fig. 110). Remove the reinforcement from the instrument panel. Remove the diagnostic connector from the reinforcement.

(14) Remove the lower A/C duct below the steering column. It is secured with 1 screw.

(15) Remove the 2 lower mounting screws securing fuse junction block bracket to instrument panel end housing (Fig. 111).

(16) Remove the 2 screws securing fuse junction block upper edge to the instrument panel bracket. These screws are installed from above the right side of the fuse junction block and mount to the left.

(17) Remove the dome lamp wiring harness connector from the fuse junction block (Fig. 111).

(18) Move fuse junction block as far down and to the right as possible without causing damage to the harness or fuse junction block.

PARKING BRAKE LEVER (Continued)

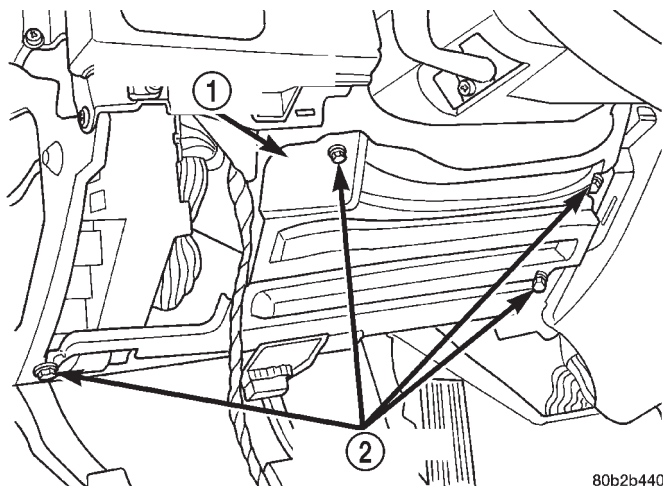


Fig. 110 Reinforcement Panel

- 1 - REINFORCEMENT PANEL
- 2 - MOUNTING BOLTS

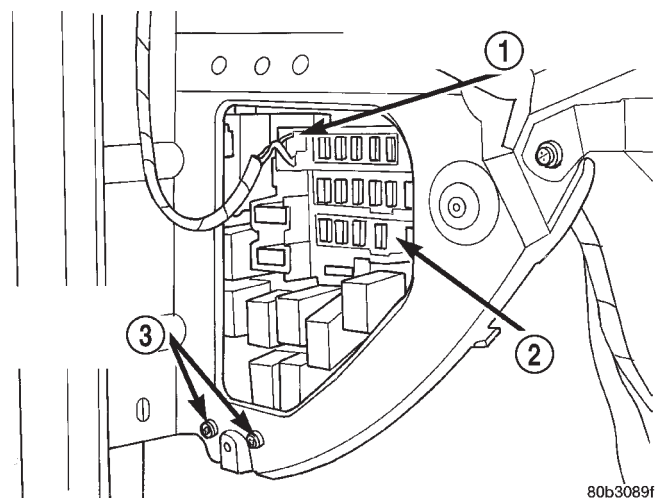


Fig. 111 Fuse Junction Block

- 1 - DOME LAMP WIRING HARNESS CONNECTOR
- 2 - FUSE JUNCTION BLOCK
- 3 - LOWER MOUNTING SCREWS

(19) Remove left rear door opening sill cover.
 (20) Remove front seat belt anchor bolt at base of left B-pillar.

(21) Pull back floor carpeting on left side of passenger compartment to reveal front park brake cable.

(22) Remove the screw securing the foot rest to the floor. Remove the foot rest.

(23) Remove the 2 screws securing the front park brake cable retainer bracket to the rear floor pan (Fig. 112).

(24) Remove 2 routing bracket screws securing front park brake cable to left side of the passenger compartment floor. One screw is at the base of the B-pillar by the seat belt anchor bolt (Fig. 112), and

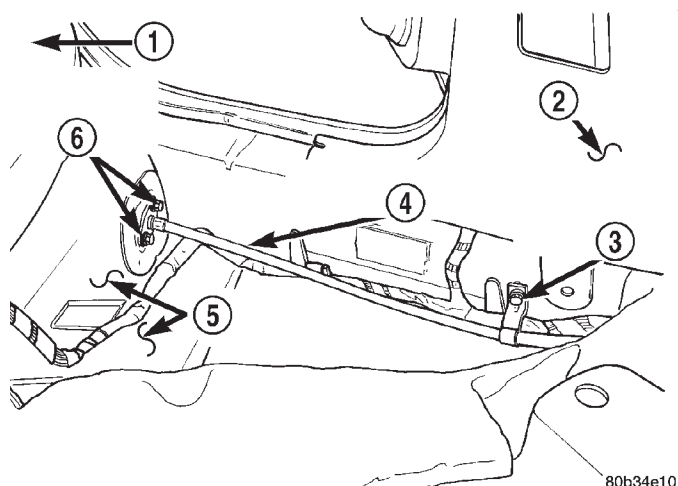


Fig. 112 Front Park Brake Cable At Rear Floor Pan

- 1 - REAR SEAT CUSHION
- 2 - B-PILLAR
- 3 - ROUTING BRACKET SCREW
- 4 - FRONT PARK BRAKE CABLE
- 5 - FLOOR PAN
- 6 - RETAINER BRACKET SCREWS

the other is below the park brake lever assembly on the floor pan (Fig. 113).

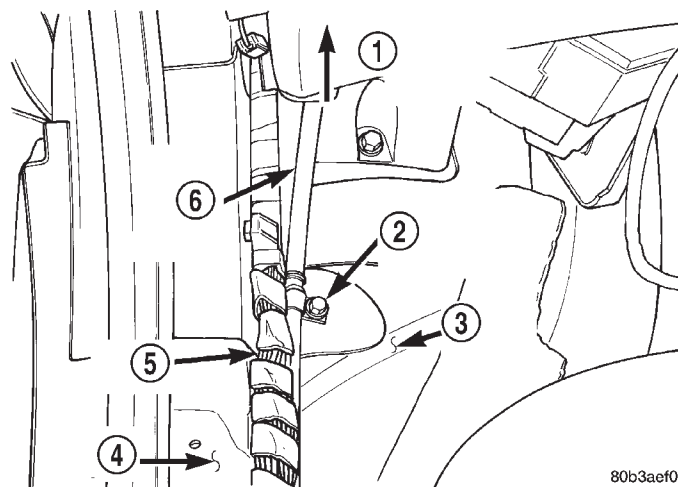


Fig. 113 Front Park Brake Cable Attachment At Front Floor Pan

- 1 - TO PARK BRAKE LEVER
- 2 - ROUTING BRACKET SCREW
- 3 - FLOOR PAN
- 4 - DOOR SILL
- 5 - WIRE HARNESS
- 6 - FRONT PARK BRAKE CABLE

(25) Remove the rear bolt, and loosen the 2 front nuts on studs, securing the parking brake lever assembly in place.

(26) Lower the parking brake lever assembly enough to gain access to the warning lamp ground wire connec-

PARKING BRAKE LEVER (Continued)

tor. Remove the brake warning light ground wire from the switch on the park brake lever assembly.

(27) Continue to move parking brake lever, with front park brake cable attached, downward, and remove both from vehicle together.

INSTALLATION - PARKING BRAKE LEVER AND CABLE

(1) Install the parking brake lever, with front cable, back in vehicle by first running the front cable, starting from front to the rear, along the left side of passenger compartment. Guide it into the hole at the rear of the floor pan.

(2) Guiding the lever assembly up past the fuse junction block, position the park brake release cable into place. Also, reinstall the brake warning lamp wire, through access hole in lever assembly, onto switch.

(3) Position the lever assembly in its mounting place. Install the rear mounting bolt and tighten it to a torque of 27 N·m (19 ft. lbs.). Tighten the 2 mounting nuts to a torque of 27 N·m (19 ft. lbs.).

(4) Ensure that the park brake cable is properly routed and install the two routing bracket screws.

(5) Install the 2 screws securing the front park brake cable retainer bracket to the rear floor pan.

(6) Install the foot rest, securing it in place with its one mounting screw.

(7) Reposition the carpeting in place.

(8) Reinstall the front seat belt anchor bolt at the base of the B-pillar.

(9) Reinstall the rear door opening sill cover.

(10) Reposition the fuse junction block in place, and install the two lower, then, the two upper mounting screws.

(11) Reinstall the lower A/C duct in place.

(12) Install the diagnostic connector to the instrument panel steel reinforcement. Reinstall the steel reinforcement to the instrument panel.

(13) Connect the park brake release cable to the release handle.

(14) Reconnect the trunk release harness connector to the release switch.

(15) Reinstall the lower instrument panel cover below the steering column. Reinstall the 2 screws securing the lower instrument panel cover behind the fuse panel cover.

(16) Reinstall the fuse panel cover on left side of instrument panel.

(17) Reinstall driver's side kick panel

(18) Reinstall driver's door opening sill cover

(19) Raise the vehicle up.

(20) Reconnect the cable connector between the front and intermediate cables.

(21) Adjust parking brake. (Refer to 5 - BRAKES - BASE/PARKING BRAKE - ADJUSTMENTS)

(22) Lower the vehicle.

PARKING BRAKE SHOES**REMOVAL - PARKING BRAKE SHOES**

(1) Remove rear disc brake caliper assembly from adapter and rotor. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - REMOVAL)

(2) Remove rear rotor from rear hub.

(3) Remove dust cap from rear hub.

(4) Remove the cotter pin, nut retainer, wave washer and rear hub/bearing assembly retaining nut and washer from the rear spindle.

(5) Remove rear hub and bearing assembly from rear spindle.

(6) Remove rear brake shoe assembly hold down clip.

(7) Turn brake shoe adjuster wheel until adjuster is at shortest length.

(8) Remove adjuster assembly from the parking brake shoe assemblies.

(9) Remove lower shoe to shoe spring.

(10) Pull rear brake shoe assembly away from anchor, then remove rear brake shoe and upper spring.

(11) Remove front brake shoe hold-down clip, then remove front brake shoe assembly.

INSTALLATION - PARKING BRAKE SHOES

(1) Install front brake shoe and hold down clip.

(2) Install rear brake shoe and the upper brake shoe to shoe return spring.

(3) Pull rear brake shoe over anchor block until properly located on adapter.

(4) Install the lower shoe to shoe return spring.

(5) Install brake shoe adjuster assembly with star wheel rearward.

(6) Install rear brake shoe hold down clip.

(7) Adjust brake shoes to a diameter to 171 mm (6.75 inch).

(8) Install rear hub and bearing assembly on spindle.

(9) Install hub and bearing assembly washer and retaining nut. Torque the hub and bearing assembly retaining nut to 168 N·m (124 ft. lbs.).

(10) Install the wave washer, retaining nut and cotter pin.

(11) Install hub and bearing assembly dust cap.

(12) Install rear brake rotor.

(13) Install rear disc brake caliper on the adapter. (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/DISC BRAKE CALIPERS - INSTALLATION)

(14) Install wheel and tire assemblies. Tighten wheel mounting nuts to 135 N·m (100 ft.lbs.).

BRAKES - ANTILOCK BRAKE SYSTEM

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BRAKES - ANTILOCK BRAKE SYSTEM

DESCRIPTION

DESCRIPTION - ANTILOCK BRAKES

This section covers the physical and operational descriptions and the on-car service procedures for vehicles equipped with the Mark 20e Antilock Brake System and the Mark 20e Antilock Brake System with traction control.

The purpose of this four-channel design antilock brake system is to prevent wheel lockup under braking conditions on virtually any type of road surface. Antilock braking is desirable because a vehicle that is stopped without locking the wheels retains directional stability and some steering capability. This

allows the driver to retain greater control of the vehicle during braking.

This system features ABS Plus and Electronic Variable Brake Proportioning (EVBP). (Refer to 5 - BRAKES - ABS - ABS PLUS - DESCRIPTION)(Refer to 5 - BRAKES - ABS - ELECTRONIC VARIABLE BRAKE PROPORTIONING - DESCRIPTION)

For information on traction control equipped vehicles, (Refer to 5 - BRAKES - ABS - TRACTION CONTROL - DESCRIPTION).

DESCRIPTION - ABS PLUS

There is an ABS Plus function built into the ABS CAB. ABS Plus is a brake-on stability enhancement. It is designed to help maintain the directional stability of the vehicle during braking. There are no additional external components required for this function.

BRAKES - ANTILOCK BRAKE SYSTEM (Continued)

DESCRIPTION - ELECTRONIC VARIABLE BRAKE PROPORTIONING

Vehicles equipped with ABS use electronic variable brake proportioning (EVBP) to balance front-to-rear braking. The EVBP is used in place of a rear proportioning valve. The EVBP system uses the ABS system to control the slip of the rear wheels in partial braking range. The braking force of the rear wheels is controlled electronically by using the inlet and outlet valves located in the integrated control unit (ICU).

DESCRIPTION - TRACTION CONTROL

Traction control reduces wheel slip and maintains traction at the driving wheels at speeds below 56 km/h (35 mph) when road surfaces are wet or snow covered. The traction control system reduces wheel slip by braking the wheel that is losing traction.

OPERATION**OPERATION - ANTILOCK BRAKES**

There are a few performance characteristics of the Mark 20e Antilock Brake System that may at first seem abnormal, but in fact are normal. These characteristics are described below.

NORMAL BRAKING

Under normal braking conditions, the ABS functions the same as a standard base brake system with a diagonally split master cylinder and conventional vacuum assist.

ABS BRAKING

ABS operation is available at all vehicle speeds above 5–8 km/h (3–5 mph). If a wheel locking tendency is detected during a brake application, the brake system enters the ABS mode. During ABS braking, hydraulic pressure in the four wheel circuits is modulated to prevent any wheel from locking. Each wheel circuit is designed with a set of electric solenoids to allow modulation and each wheel receives its own separate electrical signal. Wheel lockup may be perceived at the very end of an ABS stop and is considered normal.

During an ABS stop, the brakes hydraulic system is still diagonally split. However, the brake system pressure is further split into four control channels. During antilock operation of the vehicle's brake system, the front wheels are controlled independently and are on two separate control channels, and the rear wheels are controlled together for better vehicle stability.

The system can build and release pressure at each wheel, depending on signals generated by the wheel

speed sensors (WSS) at each wheel and received at the controller antilock brake (CAB).

NOISE AND BRAKE PEDAL FEEL

During ABS braking, some brake pedal movement may be felt. In addition, ABS braking will create ticking, popping, or groaning noises heard by the driver. This is normal and is due to pressurized fluid being transferred between the master cylinder and the brakes. If ABS operation occurs during hard braking, some pulsation may be felt in the vehicle body due to fore and aft movement of the suspension as brake pressures are modulated.

At the end of an ABS stop, ABS is turned off when the vehicle is slowed to a speed of 5–7 km/h (3–4 mph). There may be a slight brake pedal drop anytime that the ABS is deactivated, such as at the end of the stop when the vehicle speed is less than 5 km/h (3 mph) or during an ABS stop where ABS is no longer required. These conditions exist when a vehicle is being stopped on a road surface with patches of ice, loose gravel, or sand on it. Also, stopping a vehicle on a bumpy road surface activates ABS because of the wheel hop caused by the bumps.

TIRE NOISE AND MARKS

Although the ABS system prevents complete wheel lockup, some wheel slip is desired in order to achieve optimum braking performance. Wheel slip is defined as follows: 0 percent slip means the wheel is rolling freely and 100 percent slip means the wheel is fully locked. During brake pressure modulation, wheel slip is allowed to reach up to 25–30 percent. This means that the wheel rolling velocity is 25–30 percent less than that of a free rolling wheel at a given vehicle speed. This slip may result in some tire chirping, depending on the road surface. This sound should not be interpreted as total wheel lockup.

Complete wheel lockup normally leaves black tire marks on dry pavement. The ABS will not leave dark black tire marks since the wheel never reaches a fully locked condition. However, tire marks may be noticeable as light patched marks.

START-UP CYCLE

When the ignition is turned on, a popping sound and a slight brake pedal movement may be noticed. The ABS warning indicator lamp will also be on for up to 5 seconds after the ignition is turned on. These conditions occur as part of ABS self-diagnosis check. The popping sound is a result of brief activation of the solenoids in the integrated control unit.

DRIVE-OFF CYCLE

When the vehicle is first driven off, a humming may be heard or felt by the driver at approximately

BRAKES - ANTILOCK BRAKE SYSTEM (Continued)

25–40 km/h (15–25 mph). This is caused by brief activation of the ABS pump/motor and is a normal function of ABS as part of the self-diagnosis check.

PREMATURE ABS CYCLING

Symptoms of premature ABS cycling include: clicking sounds from the solenoid valves; pump/motor running; and pulsations in the brake pedal. Premature ABS cycling can occur at any braking rate of the vehicle and on any type of road surface. Neither the red BRAKE warning indicator lamp, nor the amber ABS warning indicator lamp, illuminate and no fault codes are stored in the CAB.

Premature ABS cycling is a condition that needs to be correctly assessed when diagnosing problems with the antilock brake system. It may be necessary to use a DRBIII® scan tool to detect and verify premature ABS cycling.

Check the following common causes when diagnosing premature ABS cycling: damaged tone wheels; incorrect tone wheels; damaged steering knuckle wheel speed sensor mounting bosses; loose wheel speed sensor mounting bolts; excessive tone wheel runout; or an excessively large tone wheel-to-wheel speed sensor air gap. Give special attention to these components when diagnosing a vehicle exhibiting premature ABS cycling.

After diagnosing the defective component, repair or replace it as required. When the component repair or replacement is completed, test drive the vehicle to verify that premature ABS cycling has been corrected.

OPERATION - ABS PLUS

When the brake pedal is depressed far enough to actuate the brake lamp switch, the CAB monitors and compares the speeds of the front (driving) wheels. It senses vehicle speed, brake application, and detects vehicle cornering and applies the brakes selectively to stabilize the vehicle.

OPERATION - ELECTRONIC VARIABLE BRAKE PROPORTIONING

Upon entry into EVBP the inlet valve for the rear brake circuit is switched on so that the fluid supply from the master cylinder is shut off. In order to decrease the rear brake pressure, the outlet valve for the rear brake circuit is pulsed. This allows fluid to enter the low pressure accumulator (LPA) in the hydraulic control unit (HCU) resulting in a drop in fluid pressure to the rear brakes. In order to increase the rear brake pressure, the outlet valve is switched off and the inlet valve is pulsed. This increases the pressure to the rear brakes. This back-and-forth process will continue until the required slip difference is obtained. At the end of EVBP braking (brakes

released) the fluid in the LPA drains back to the master cylinder by switching on the outlet valve and draining through the inlet valve check valve. At the same time the inlet valve is switched on in case of another brake application.

The EVBP will remain functional during many ABS fault modes. If both the red BRAKE and amber ABS warning indicators are illuminated, the EVBP may not be functioning.

OPERATION - TRACTION CONTROL

The traction control system monitors wheel speed. During acceleration, if the CAB detects front (drive) wheel slip and the brakes are not applied, the system enters traction control mode. Traction control operation proceeds in the following order:

- (1) Close the normally open isolator valves.
- (2) Start the pump/motor and supply volume and pressure to the front (drive) hydraulic circuit. (The pump/motor runs continuously during traction control operation.)
- (3) Open and close the build and decay valves to maintain minimum wheel slip and maximum traction.

The cycling of the build and decay valves during traction control is similar to that during antilock braking, except the valves work to control wheel spin by applying the brakes, whereas the ABS function is to control wheel skid by releasing the brakes.

HYDRAULIC SHUTTLE VALVES

Two hydraulic shuttle valves allow pressure and volume to return to the master cylinder reservoir when not consumed by the build and decay valves. These valves are necessary because the pump/motor supplies more volume than the system requires.

If the brakes are applied at anytime during a traction control cycle, the brake lamp switch triggers the CAB to switch off traction control.

TRACTION CONTROL FUNCTION LAMPS

The traction control function lamp illuminates during a traction control cycle, displaying TRAC ON.

The traction control system is enabled at each ignition cycle. It may be turned off by depressing the traction control switch button. The traction control function lamp (TRAC OFF) illuminates immediately upon depressing the button.

If the CAB calculates that the brake temperatures are high, the traction control system becomes inoperative until a time-out period has elapsed. During this "thermo-protection mode," the traction control function lamp illuminates TRAC OFF; note that no trouble code is registered.

BRAKES - ANTILOCK BRAKE SYSTEM (Continued)

In the event that a system fault occurs thus illuminating the amber ABS warning lamp, the TRAC OFF lamp will also illuminate.

CAUTION**CAUTIONS**

The ABS uses an electronic control module, the CAB. This module is designed to withstand normal current draws associated with vehicle operation. Care must be taken to avoid overloading the CAB circuits.

CAUTION: In testing for open or short circuits, do not ground or apply voltage to any of the circuits unless instructed to do so for a diagnostic procedure.

CAUTION: These circuits should only be tested using a high impedance multi-meter or the DRBIII® scan tool as described in this section. Power should never be removed or applied to any control module with the ignition in the ON position. Before removing or connecting battery cables, fuses, or connectors, always turn the ignition to the OFF position.

CAUTION: The CAB 24-way connector should never be connected or disconnected with the ignition switch in the ON position.

CAUTION: This vehicle utilizes active wheel speed sensors. Do not apply voltage to wheel speed sensors at any time.

CAUTION: Use only factory wiring harnesses. Do not cut or splice wiring to the brake circuits. The addition of aftermarket electrical equipment (car phone, radar detector, citizen band radio, trailer lighting, trailer brakes, etc.) on a vehicle equipped with antilock brakes may affect the function of the antilock brake system.

CAUTION: When performing any service procedure on a vehicle equipped with ABS, do not apply a 12-volt power source to the ground circuit of the pump motor in the HCU. Doing this will damage the pump motor and will require replacement of the entire HCU.

CAUTION: An attempt to remove or disconnect certain system components may result in improper

system operation. Only those components with approved removal and installation procedures in this manual should be serviced.

CAUTION: If welding work is to be performed on the vehicle, using an electric arc welder, the CAB connector should be disconnected during the welding operation.

CAUTION: Many components of the ABS System are not serviceable and must be replaced as an assembly. Do not disassemble any component which is not designed to be serviced.

CAUTION: Only the recommended jacking or hoisting positions for this vehicle are to be used whenever it is necessary to lift a vehicle. Failure to raise a vehicle from the recommended locations could result in lifting a vehicle by the hydraulic control unit mounting bracket. Lifting a vehicle by the hydraulic control unit mounting bracket will result in damage to the mounting bracket and the hydraulic control unit.

CAUTION: Brake fluid will damage painted surfaces. If brake fluid is spilled on any painted surface, wash off with water immediately.

DIAGNOSIS AND TESTING - INSPECTION AND ROAD TEST

(1) Visually inspect the ABS for damaged or disconnected components and connectors.

(2) Verify the brake lamps are operational. If they are not, repair them prior to continuing.

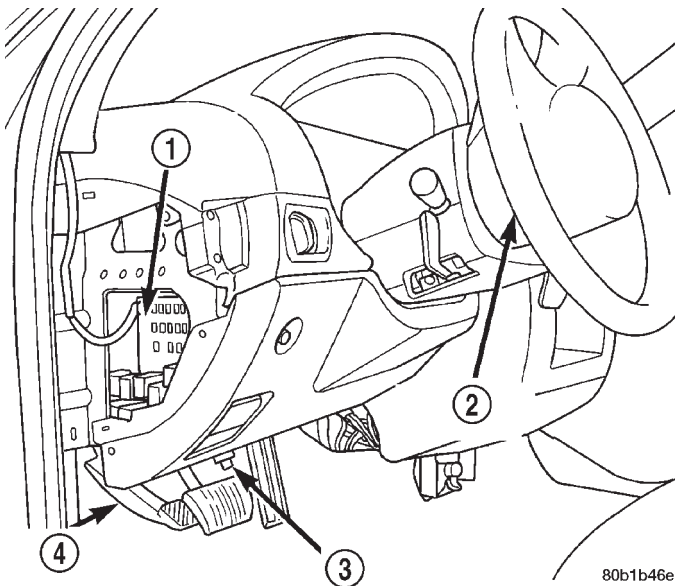
(3) Connect the DRBIII® scan tool to the Data Link Connector located under the instrument panel to the left of the steering column (Fig. 1). If the DRBIII® does not power-up, check the power and ground supplies to the connector.

(4) Turn the ignition key to the ON position. Select ANTILOCK BRAKES.

(5) Read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the appropriate chassis diagnostic information.

NOTE: Diagnostic trouble codes (DTCs) are kept in the controller's memory until either erased by the technician using the DRBIII®, or erased automatically after 3500 miles. DTCs are retained by the controller even if the ignition is turned off or the battery is disconnected. More than one DTC can be stored at a time. When accessed, the number of occurrences and the DTC that is stored are displayed.

BRAKES - ANTILOCK BRAKE SYSTEM (Continued)

**Fig. 1 Data Link Connector Location**

- 1 - JUNCTION BLOCK
- 2 - STEERING WHEEL
- 3 - DATA LINK CONNECTOR
- 4 - PARKING BRAKE

If no problems are observed, it will be necessary to road test the vehicle.

Many ABS conditions judged to be a problem by the driver may be normal operating conditions. See Antilock Brake System - Operation to become familiarized with the normal characteristics of this antilock brake system.

WARNING: CONDITIONS THAT RESULT IN TURNING ON THE RED BRAKE WARNING INDICATOR LAMP MAY INDICATE REDUCED BRAKING ABILITY.

Before road testing a brake complaint vehicle, note whether the red BRAKE warning indicator lamp, amber ABS warning indicator lamp, or both are turned on. If it is the red BRAKE warning indicator, there is a brake hydraulic problem that must be corrected before driving the vehicle. Refer to the Base Brake System - Diagnosis And Testing. If the red BRAKE warning indicator is illuminated, there is also a possibility that there is an ABS problem and the amber ABS warning indicator is not able to illuminate, so the MIC turns on the red BRAKE warning indicator by default.

If the amber ABS warning indicator is on, road test the vehicle as described below. While the amber ABS warning indicator is on, the ABS is not functional. The ability to stop the car using the base brake system should not be affected.

(6) Turn the key to the OFF position and then back to the ON position. Note whether the amber ABS warning lamp continues to stay on.

(7) If the amber ABS warning indicator lamp stays on, shift into gear and drive the car to a speed of approximately 25 km/h (15 mph) to complete the ABS Start-Up and Drive-Off Cycles (see Antilock Brake System - Operation). If at this time the amber ABS warning indicator lamp stays on, refer to the Appropriate Diagnostic Information.

(8) If the amber ABS warning indicator lamp goes out at any time, drive the vehicle a short distance. Accelerate the vehicle to a speed of at least 64 km/h (40 mph). Bring the vehicle to a complete stop, braking hard enough to cause the ABS to cycle. Repeat this action several times. Using the DRBIII®, read and record any Diagnostic Trouble Codes (DTCs). If any DTCs are present, refer to the Appropriate Diagnostic Information.

STANDARD PROCEDURE - ANTILOCK BRAKE SYSTEM BLEEDING

The base brake's hydraulic system must be bled anytime air enters the hydraulic system. The ABS though, particularly the ICU (HCU), should only need to be bled when the HCU is replaced or removed from the vehicle. The ABS must always be bled anytime it is suspected that the HCU has ingested air. Under most circumstances that require the bleeding of the brakes hydraulic system, only the base brake hydraulic system needs to be bled.

When bleeding the ABS system, the following bleeding sequence must be followed to insure complete and adequate bleeding.

(1) Make sure all hydraulic fluid lines are installed and properly torqued.

(2) Connect the DRBIII® scan tool to the Data Link Connector. The connector is located under the lower steering column cover to the left of the steering column.

(3) Using the DRBIII®, check to make sure the CAB does not have any fault codes stored. If it does, clear them using the DRBIII®.

WARNING: WHEN BLEEDING THE BRAKE SYSTEM WEAR SAFETY GLASSES. A CLEAR BLEED TUBE MUST BE ATTACHED TO THE BLEEDER SCREWS AND SUBMERGED IN A CLEAR CONTAINER FILLED PART WAY WITH CLEAN BRAKE FLUID. DIRECT THE FLOW OF BRAKE FLUID AWAY FROM YOURSELF AND THE PAINTED SURFACES OF THE VEHICLE. BRAKE FLUID AT HIGH PRESSURE MAY COME OUT OF THE BLEEDER SCREWS WHEN OPENED.

BRAKES - ANTILOCK BRAKE SYSTEM (Continued)

(4) Bleed the base brake system using the standard pressure or manual bleeding procedure. (Refer to 5 - BRAKES - BASE - STANDARD PROCEDURE)

(5) Using the DRBIII®, select ANTILOCK BRAKES, followed by MISCELLANEOUS, then BLEED BRAKES. Follow the instructions displayed. When the scan tool displays TEST COMPLETED, disconnect the scan tool and proceed.

(6) Bleed the base brake system a second time. Check brake fluid level in the reservoir periodically to prevent emptying, causing air to enter the hydraulic system.

(7) Fill the master cylinder reservoir to the full level.

(8) Test drive the vehicle to be sure the brakes are operating correctly and that the brake pedal does not feel spongy.

SPECIFICATIONS

ABS FASTENER TORQUE

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Brake Tubes	17	12	145
CAB To HCU Mounting Screws	2	—	17
ICU Mounting Screws	11	—	97
Wheel Speed Sensor Head Mounting Bolt	7	—	60

TONE WHEEL RUNOUT

DESCRIPTION	SPECIFICATION
Front Tone Wheel Maximum Runout	0.15 mm (0.006 in.)
Rear Tone Wheel Maximum Runout	0.15 mm (0.006 in.)

WHEEL SPEED SENSOR AIR GAP

DESCRIPTION	SPECIFICATION
Front Sensor	0.42 – 1.71 mm 0.017 – 0.067 in.
Rear Sensor	0.38 – 1.31 mm 0.015 – 0.052 in.

FRONT WHEEL SPEED SENSOR

DESCRIPTION

This system uses two-wire wheel speed sensors known as active wheel speed sensors. One wheel speed sensor (WSS) and one tone wheel is located at each front and rear wheel. Each front wheel speed sensor is attached to a boss in the steering knuckle (Fig. 2). The front tone wheel is part of the outboard constant velocity joint.

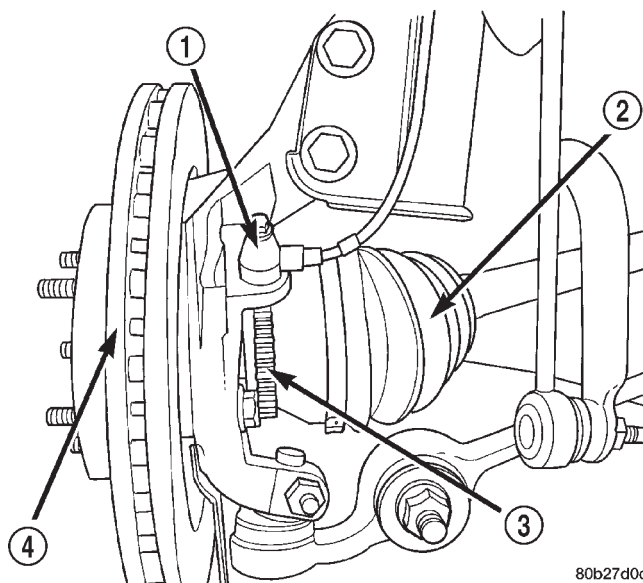


Fig. 2 Front Wheel Speed Sensor

- 1 - WHEEL SPEED SENSOR
- 2 - CV BOOT
- 3 - TONE WHEEL
- 4 - ROTOR

OPERATION

The CAB sends 12 volts to power an Integrated Circuit (IC) in the sensor. The IC supplies a constant 7 mA power supply to the CAB. The relationship of the tooth on the tone wheel to the permanent magnet in the sensor, signals the IC to enable a second 7 mA power supply. The output of the sensor, sent to the CAB, is a DC voltage signal with changing voltage and current levels. The ground for the IC and the current sense circuit is provided by the CAB.

When a valley of the tone wheel is aligned with the sensor, the voltage signal is approximately 0.8 volts and a constant 7 mA current is sent to the CAB. As the tone wheel rotates, the tooth shifts the magnetic field and the IC enables a second 7 mA current source. The CAB senses a voltage signal of approximately 1.6 volts and 14 mA. The CAB measures the amperage of the digital signal for each wheel. The

FRONT WHEEL SPEED SENSOR (Continued)

resulting signal is interpreted by the ABS CAB as the wheel speed.

REMOVAL

(1) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(2) Remove the tire and wheel assembly from the vehicle.

(3) Remove bolt securing the speed sensor cable routing bracket (Fig. 3) to the strut assembly.

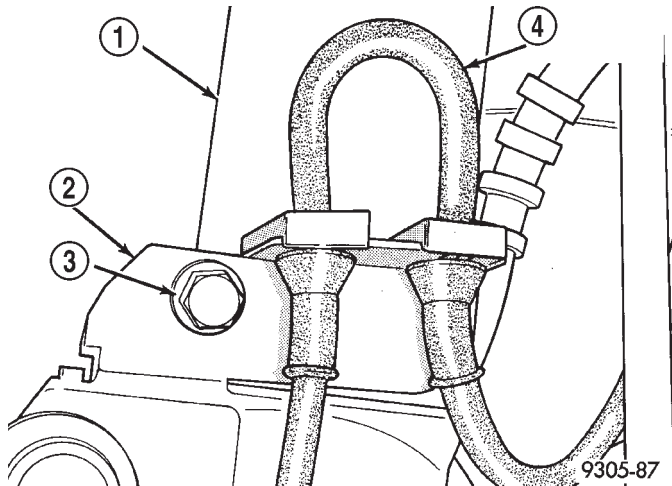


Fig. 3 Speed Sensor Cable Routing Bracket

- 1 - STRUT ASSEMBLY
- 2 - ROUTING BRACKET
- 3 - SCREW
- 4 - SPEED SENSOR CABLE

(4) Remove retainer, holding the speed sensor sealing grommet, from the inner fender. pull the grommet out, then unplug the speed sensor cable from the vehicle wiring harness

(5) Remove bolt attaching speed sensor to steering knuckle. Carefully remove speed sensor head from steering knuckle. If sensor is seized in place by corrosion, tap the edge of the sensor ear with a hammer and brass punch (Fig. 4), working it side to side.

CAUTION: If speed sensor head locating pin has seized to the steering knuckle, do not attempt to remove speed sensor head by grasping with pliers and turning. This will damage the speed sensor head. Use only the following procedure.

INSTALLATION

CAUTION: Proper installation of wheel speed sensor cables is critical to continued system operation. Be sure that cables are installed in retainers. Failure to install cables in retainers as shown in this

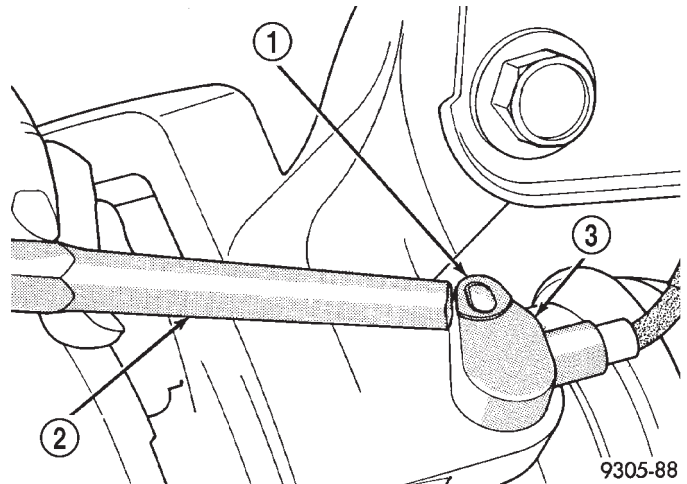


Fig. 4 Speed Sensor Head Removal

- 1 - SENSOR EAR
- 2 - PUNCH
- 3 - SPEED SENSOR HEAD

section may result in contact with moving parts and/or over extension of cables, resulting in an open circuit.

(1) Connect the wheel speed sensor cable connector to the vehicle wiring harness.

(2) Install the speed sensor cable assembly grommet into the front inner fender. Install speed sensor cable grommet and retainer bracket on the inner fender of the vehicle and install and securely tighten attaching bolt.

CAUTION: When installing the wheel speed sensor cable routing bracket on the strut, the speed sensor cable must be looped upward as shown (Fig. 3) . If speed sensor cable is not routed in this direction it may rub, damaging the speed sensor cable.

(3) Install the speed sensor cable routing bracket on the steering knuckle. Install and tighten routing bracket mounting bolt to a torque of 12 N·m (105 in. lbs.)

(4) Apply a small amount of High Temperature Multipurpose grease to the sensor head before installation. Install speed sensor head on steering knuckle. Install the speed sensor head attaching screw and tighten to a torque of 7 N·m (60 in. lbs.).

(5) Install the wheel and tire assembly on vehicle.

(6) Lower the vehicle to the ground.

(7) Road test vehicle to ensure proper operation of the base and ABS systems.

REAR WHEEL SPEED SENSOR

DESCRIPTION

This system uses two-wire wheel speed sensors known as active wheel speed sensors. One wheel speed sensor (WSS) and one tone wheel are located at each front and rear wheel. The rear wheel speed sensor on rear disc brake applications is mounted to the rear disc brake adapter (Fig. 5). The rear tone wheel is an integral part of the rear wheel hub and bearing.

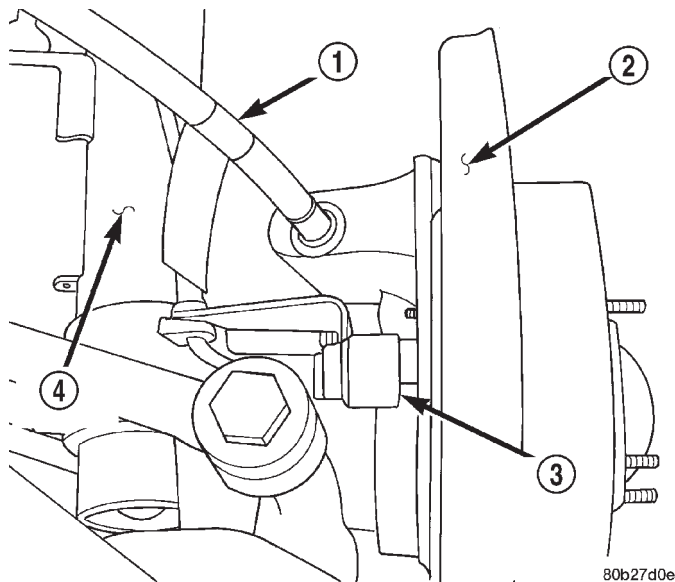


Fig. 5 Rear Wheel Speed Sensor

- 1 - PARKING BRAKE CABLE
- 2 - BACKING PLATE
- 3 - REAR WHEEL SPEED SENSOR
- 4 - REAR STRUT

OPERATION

The CAB sends 12 volts to power an Integrated Circuit (IC) in the sensor. The IC supplies a constant 7 mA power supply to the CAB. The relationship of the tooth on the tone wheel to the permanent magnet in the sensor, signals the IC to enable a second 7 mA power supply. The output of the sensor, sent to the CAB, is a DC voltage signal with changing voltage and current levels. The ground for the IC and the current sense circuit is provided by the CAB.

When a valley of the tone wheel is aligned with the sensor, the voltage signal is approximately 0.8 volts and a constant 7 mA current is sent to the CAB. As the tone wheel rotates, the tooth shifts the magnetic field and the IC enables a second 7 mA current source. The CAB senses a voltage signal of approximately 1.6 volts and 14 mA. The CAB measures the amperage of the digital signal for each wheel. The

resulting signal is interpreted by the ABS CAB as the wheel speed.

REMOVAL

NOTE: When removing rear wheel speed sensor from vehicle, access to the wire harness connector is through the passenger compartment of the vehicle.

(1) Remove the rear seat cushion, and the rear seat back, from the interior of the car. Refer to Seats in the Body section of this manual for the required procedure to be used for this vehicle.

(2) Disconnect the wheel speed sensor cable from the wire harness.

(3) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove the rear wheel and tire assembly from the vehicle.

(5) Remove the grommet from the floor pan, along with the end of the cable that fastens to the wire harness.

(6) Remove the sensor cable from the routing bracket attached to the strut tower flange.

(7) Remove the wheel speed sensor head and routing bracket from the disc brake caliper adapter by removing the bolt, then the sensor (Fig. 6).

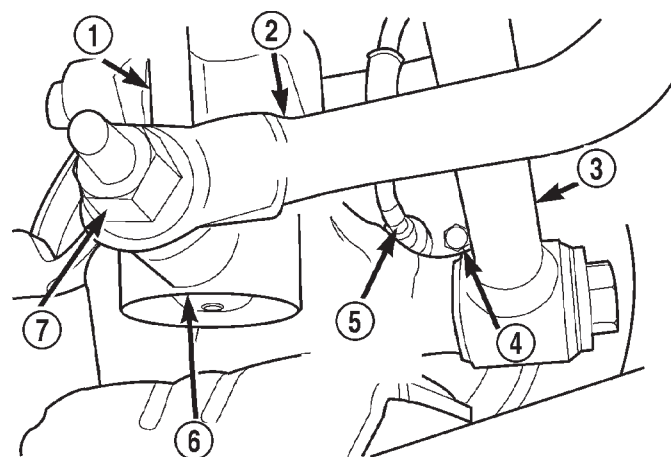


Fig. 6 Wheel Speed Sensor At Adapter

- 1 - STABILIZER BAR LINK
- 2 - STABILIZER BAR
- 3 - LATERAL LINK
- 4 - BOLT
- 5 - WHEEL SPEED SENSOR
- 6 - STRUT ASSEMBLY
- 7 - NUT

INSTALLATION

(1) Install rear wheel speed sensor and routing bracket into brake caliper adapter. Install head

REAR WHEEL SPEED SENSOR (Continued)

attaching bolt (Fig. 6) and tighten to 7 N·m (60 in. lbs.).

(2) Install the sensor cable to the routing bracket attached to the strut tower flange.

(3) Guide the cable through the hole in the floor pan and install the grommet.

(4) Install wheel and tire assembly on vehicle. Then torque all wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat tightening sequence to full specified torque of 129 N·m (95 ft. lbs.).

(5) Lower vehicle to the ground.

(6) Connect the sensor cable to the wiring harness.

(7) Reinstall the rear seat back and seat cushion.

(8) Road test vehicle to ensure proper operation of the base and ABS systems.

TONE WHEEL

DESCRIPTION

The tone wheel is used in conjunction with the wheel speed sensors. (Refer to 5 - BRAKES - ABS/ELECTRICAL/FRONT WHEEL SPEED SENSOR - DESCRIPTION) or (Refer to 5 - BRAKES - ABS/ELECTRICAL/REAR WHEEL SPEED SENSOR - DESCRIPTION)

OPERATION

The tone wheel is used in conjunction with the wheel speed sensors. (Refer to 5 - BRAKES - ABS/ELECTRICAL/FRONT WHEEL SPEED SENSOR - OPERATION) or (Refer to 5 - BRAKES - ABS/ELECTRICAL/REAR WHEEL SPEED SENSOR - OPERATION)

INSPECTION

Tone wheels can cause erratic wheel speed sensor signals. Inspect tone wheels for the following possible causes.

- missing, chipped, or broken teeth
- contact with the wheel speed sensor
- wheel speed sensor to tone wheel alignment
- wheel speed sensor to tone wheel clearance
- excessive tone wheel runout
- tone wheel loose on its mounting surface

If a front tone wheel is found to need replacement, the drive shaft must be replaced. No attempt should be made to replace just the tone wheel. Refer to DIFFERENTIAL AND DRIVELINE for removal and installation.

If a rear tone wheel is found to need replacement, the rear hub and bearing must be replaced. No attempt should be made to replace just the tone wheel. Refer to SUSPENSION for removal and installation.

If wheel speed sensor to tone wheel contact is evident, determine the cause and correct it before replacing the wheel speed sensor or tone wheel.

Check the gap between the speed sensor head and the tone wheel to ensure it is within specifications. Refer to SPECIFICATIONS in this section.

Excessive wheel speed sensor runout can cause erratic wheel speed sensor signals. Refer to SPECIFICATIONS in this section for the maximum allowed tone wheel runout. If tone wheel runout is excessive, determine if it is caused by a defect in the driveshaft assembly or hub and bearing. Replace as necessary.

Tone wheels are pressed onto their mounting surfaces and should not rotate independently from the mounting surface. Replacement of the front driveshaft or rear hub and bearing is necessary.

TRACTION CONTROL SWITCH

REMOVAL

The traction control switch is located in the upper right trim bezel on the instrument panel. The upper right trim bezel must be removed to service the switch. Refer to Upper Right Trim Bezel Removal and Installation.

(1) With the bezel removed, press the tabs in at both sides of the switch and remove the switch from the bezel.

INSTALLATION

(1) Position the switch over the hole in the upper right bezel, push through hole and firmly snap into place.

(2) Install the upper right trim bezel. Refer to Body, Instrument Panel, Upper Right Trim Bezel, Installation.

HYDRAULIC/MECHANICAL

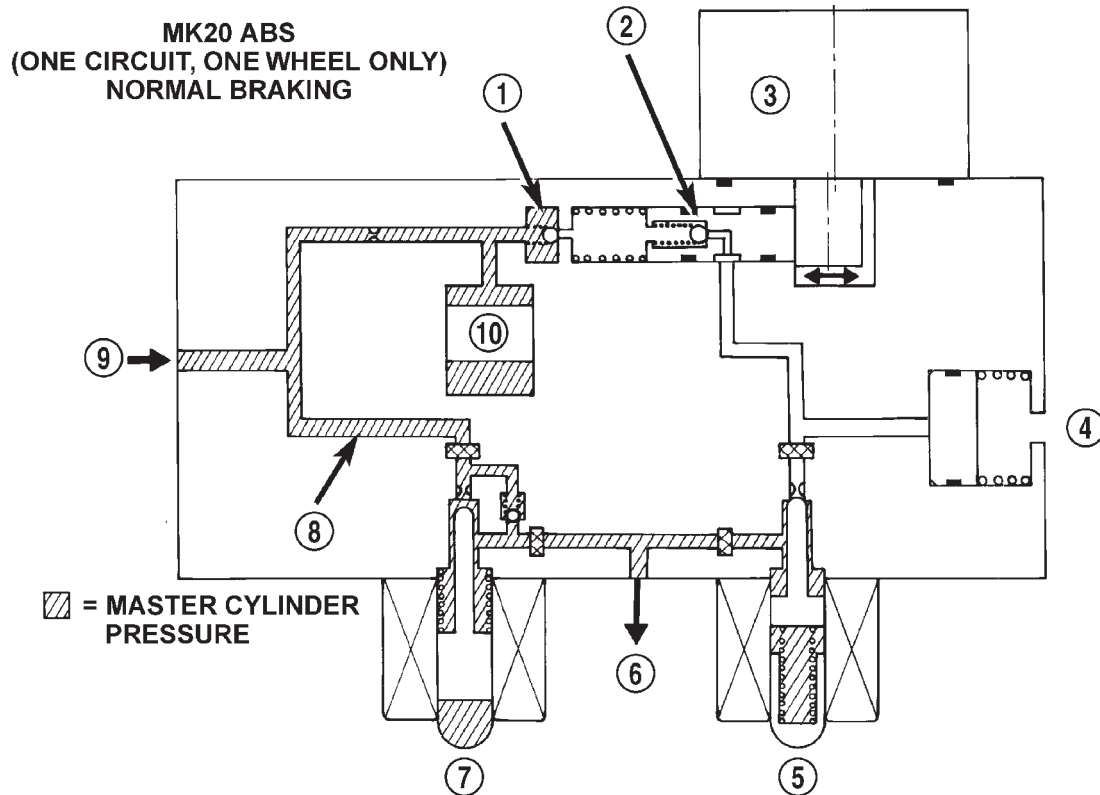
OPERATION - HYDRAULIC CIRCUITS AND VALVES

The hydraulic fluid control valves within the HCU control the flow of pressurized brake fluid to the wheel brakes during the different modes of ABS braking. The following paragraphs explain how this works. For purposes of explanation only, it is assumed that only the right front wheel is experiencing antilock braking; the following diagrams show only the right front wheel in an antilock braking operation.

HYDRAULIC/MECHANICAL (Continued)

NORMAL BRAKING HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION (ABS WITHOUT TRACTION CONTROL)

The hydraulic diagram (Fig. 7) shows the vehicle in the normal braking mode of the base brake hydraulic system. The diagram shows no wheel spin or slip occurring relative to the speed of the vehicle. The driver is applying the brake pedal which builds pressure in the brake hydraulic system to engage the brakes and stop the vehicle.



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Fig. 7 Normal Braking Hydraulic Circuit (W/O Traction Control)

- | | |
|---------------------------------|-------------------------------|
| 1 - OUTLET VALVE | 7 - NORMALLY OPEN VALVE (OFF) |
| 2 - PUMP PISTON | 8 - MASTER CYLINDER PRESSURE |
| 3 - PUMP MOTOR (OFF) | 9 - FROM MASTER CYLINDER |
| 4 - LOW PRESSURE ACCUMULATOR | 10 - NOISE DAMPER CHAMBER |
| 5 - NORMALLY CLOSED VALVE (OFF) | |
| 6 - TO RIGHT FRONT WHEEL | |

HYDRAULIC/MECHANICAL (Continued)

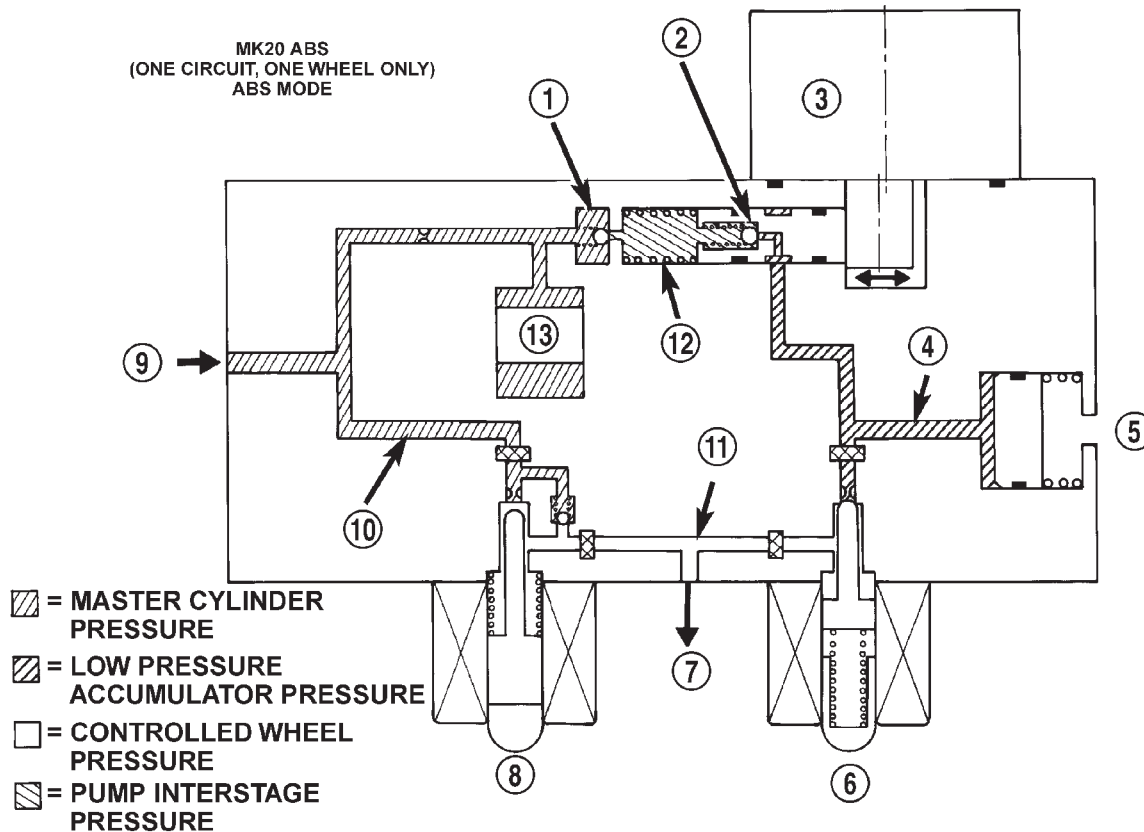
ABS HYDRAULIC CIRCUIT AND SOLENOID VALVE FUNCTION (ABS WITHOUT TRACTION CONTROL)

The hydraulic diagram (Fig. 8) shows the vehicle in the ABS braking mode. The diagram shows one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than is allowed by the surface on which the tires are riding.

- The normally open and normally closed valves modulate (build/decay) the brake hydraulic pressure as required.

- The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits.

- The brake fluid is routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.



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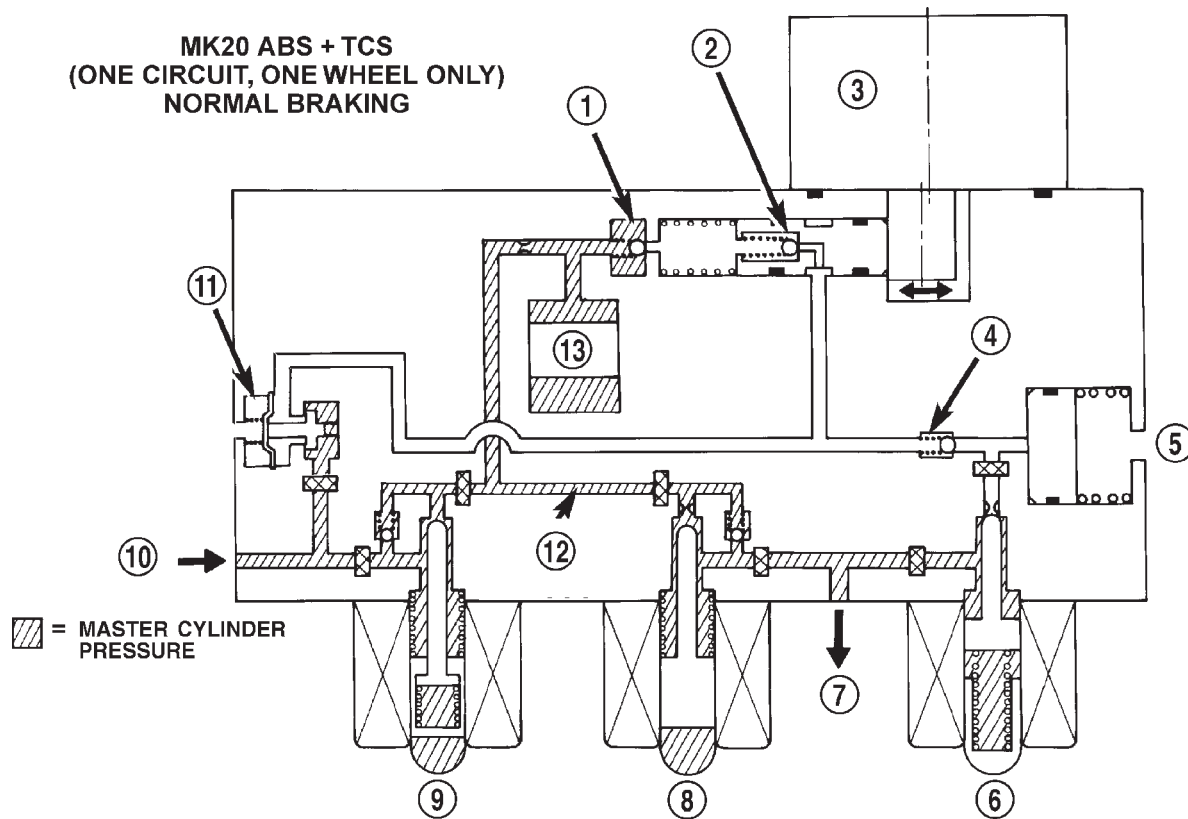
Fig. 8 ABS Mode Hydraulic Circuit (W/O Traction Control)

- | | |
|--|--------------------------------------|
| 1 - OUTLET VALVE | 8 - NORMALLY OPEN VALVE (MODULATING) |
| 2 - PUMP PISTON | 9 - FROM MASTER CYLINDER |
| 3 - PUMP MOTOR (ON) | 10 - MASTER CYLINDER PRESSURE |
| 4 - LOW PRESSURE ACCUMULATOR PRESSURE | 11 - CONTROLLED WHEEL PRESSURE |
| 5 - LOW PRESSURE ACCUMULATOR | 12 - PUMP INTERSTAGE PRESSURE |
| 6 - NORMALLY CLOSED VALVE (MODULATING) | 13 - NOISE DAMPER CHAMBER |
| 7 - TO RIGHT FRONT WHEEL | |

HYDRAULIC/MECHANICAL (Continued)

**NORMAL BRAKING HYDRAULIC CIRCUIT,
SOLENOID VALVE, AND SHUTTLE VALVE
FUNCTION (ABS WITH TRACTION CONTROL)**

The hydraulic diagram (Fig. 9) shows a vehicle with traction control in the normal braking mode. The diagram shows no wheel spin or slip occurring relative to the speed of the vehicle. The driver is applying the brake pedal which builds pressure in the brake hydraulic system to engage the brakes and stop the vehicle. The hydraulic shuttle valve closes with every brake pedal application so pressure is not created at the inlet to the pump/motor.



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Fig. 9 ABS With Traction Control - Normal Braking Hydraulic Circuit

- | | |
|---------------------------------|--|
| 1 - OUTLET VALVE | 8 - NORMALLY OPEN VALVE (OFF) |
| 2 - PUMP PISTON | 9 - NORMALLY OPEN TC (ASR) VALVE (OFF) |
| 3 - PUMP MOTOR (OFF) | 10 - FROM MASTER CYLINDER |
| 4 - SUCTION VALVE | 11 - HYDRAULIC SHUTTLE VALVE |
| 5 - LOW PRESSURE ACCUMULATOR | 12 - MASTER CYLINDER PRESSURE |
| 6 - NORMALLY CLOSED VALVE (OFF) | 13 - NOISE DAMPER CHAMBER |
| 7 - TO RIGHT FRONT WHEEL | |

HYDRAULIC/MECHANICAL (Continued)

ABS BRAKING HYDRAULIC CIRCUIT, SOLENOID VALVE, AND SHUTTLE VALVE FUNCTION (ABS WITH TRACTION CONTROL)

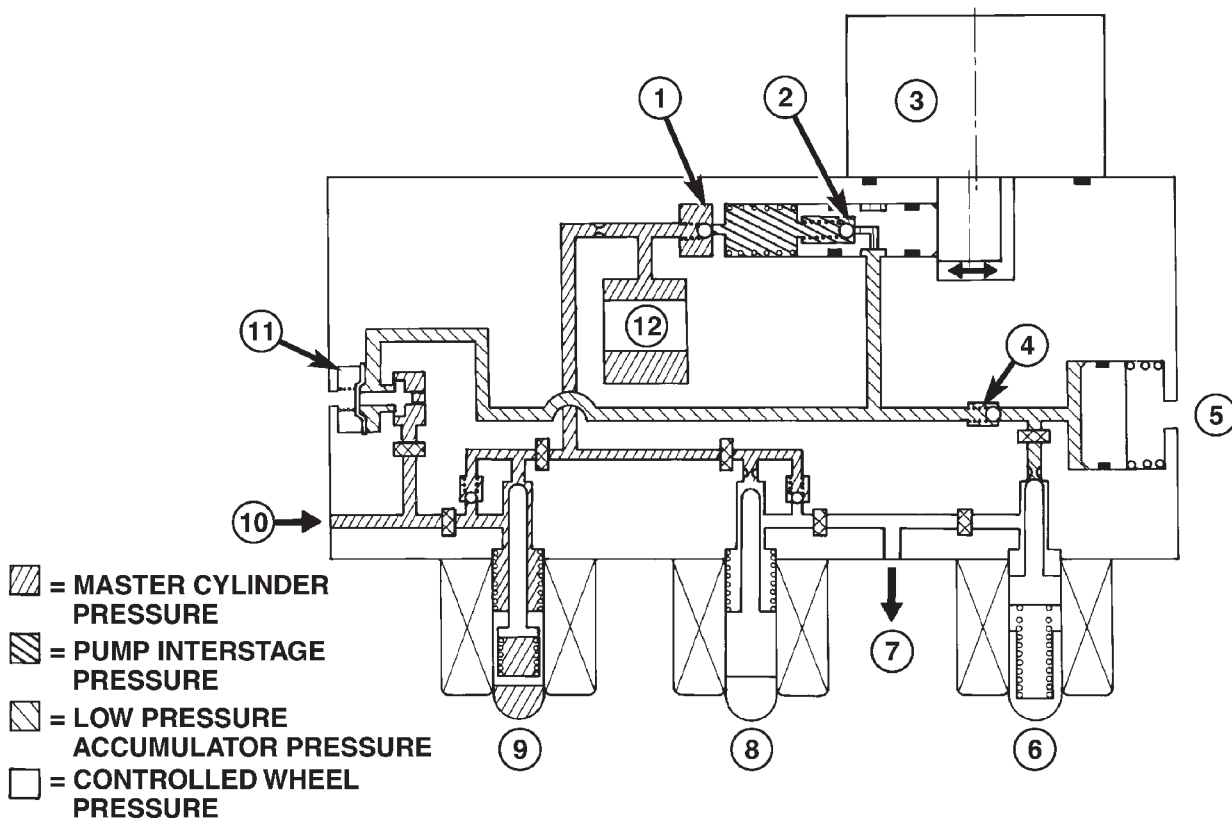
The hydraulic diagram (Fig. 10) shows the vehicle in the ABS braking mode. The diagram shows one wheel is slipping because the driver is attempting to stop the vehicle at a faster rate than is allowed by the surface on which the tires are riding.

- The hydraulic shuttle valve closes upon brake application so that the pump/motor cannot siphon brake fluid from the master cylinder.

- The normally open and normally closed valves modulate (build/decay) the brake hydraulic pressure as required.

- The pump/motor is switched on so that the brake fluid from the low pressure accumulators is returned to the master cylinder circuits.

- The brake fluid is routed to either the master cylinder or the wheel brake depending on the position of the normally open valve.



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Fig. 10 ABS With Traction Control - ABS Braking Hydraulic Circuit

- | | |
|--|--------------------------------------|
| 1 - OUTLET VALVE | 8 - NORMALLY OPEN VALVE (MODULATING) |
| 2 - PUMP PISTON | 9 - NORMALLY OPEN ASR VALVE (OFF) |
| 3 - PUMP MOTOR | 10 - FROM MASTER CYLINDER |
| 4 - SUCTION VALVE | 11 - HYDRAULIC SHUTTLE VALVE |
| 5 - LOW PRESSURE ACCUMULATOR | 12 - NOISE DAMPER CHAMBER |
| 6 - NORMALLY CLOSED VALVE (MODULATING) | |
| 7 - TO RIGHT FRONT WHEEL | |

HCU (HYDRAULIC CONTROL UNIT)

DESCRIPTION

The hydraulic control unit (HCU) is mounted to the CAB as part of the ICU (Fig. 12). The ICU is located in front of the driver's side front tire, behind the inner fender splash shield. The HCU controls the flow of brake fluid to the brakes using a series of valves and accumulators. A pump/motor is mounted on the HCU to supply build pressure to the brakes during an ABS stop.

The HCU on a vehicle equipped with traction control has a valve block that is approximately one inch longer than a HCU on a vehicle that is equipped with ABS only in order to incorporate the additional valves.

For more information, refer to the ICU. (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DESCRIPTION)

OPERATION

The operation of the HCU's hydraulic circuits can be found in Hydraulic Circuits And Valve Operation. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL - OPERATION)

The following topics explain how the different components within the HCU operate.

VALVES AND SOLENOIDS

The valve block contains four inlet valves and four outlet valves. The inlet valves are spring-loaded in the open position and the outlet valves are spring-loaded in the closed position during normal braking. The fluid is allowed to flow from the master cylinder to the wheel brakes.

During an ABS stop, these valves cycle to maintain the proper slip ratio for each wheel. The inlet valve closes preventing further pressure increase and the outlet valve opens to provide a path from the wheel brake to the HCU accumulators and pump/motor. This releases (decays) pressure from the wheel brake, thus releasing the wheel from excessive slippage. Once the wheel is no longer slipping, the outlet valve is closed and the inlet valve is opened to reapply (build) pressure.

For information on the valves used with the traction control system, (Refer to 5 - BRAKES - ABS - TRACTION CONTROL - OPERATION).

BRAKE FLUID ACCUMULATORS

There are two fluid accumulators in the HCU, one for the primary hydraulic circuit and one for the secondary hydraulic circuit. Each hydraulic circuit uses a 5 cc accumulator.

The fluid accumulators temporarily store brake fluid that is removed from the wheel brakes during an ABS cycle. This stored fluid is used by the pump/motor to provide build pressure for the brake hydraulic system. When the antilock stop is complete, the accumulators are drained by the pump/motor.

PUMP/MOTOR

There are two pump assemblies in the HCU, one for the primary hydraulic circuit and one for the secondary hydraulic circuit. Both pumps are driven by a common electric motor (Fig. 12). This DC-type motor is integral to the HCU and is controlled by the CAB.

The pump/motor provides the extra amount of brake fluid needed during antilock braking. Brake fluid is released to the accumulators when the outlet valve is opened during an antilock stop. The pump mechanism consists of two opposing pistons operated by an eccentric camshaft. In operation, one piston draws fluid from the accumulators, and the opposing piston pumps fluid to the master cylinder circuits. When the antilock stop is complete, the pump/motor drains the accumulators.

The CAB may turn on the pump/motor when an antilock stop is detected. The pump/motor continues to run during the antilock stop and is turned off after the stop is complete. Under some conditions, the pump/motor runs to drain the accumulators during the next drive-off.

The pump/motor is not a serviceable item; if it requires replacement, the HCU must be replaced.

REMOVAL - HCU

To remove the HCU, the ICU must be removed from the vehicle and disassembled. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - REMOVAL)

INSTALLATION - HCU

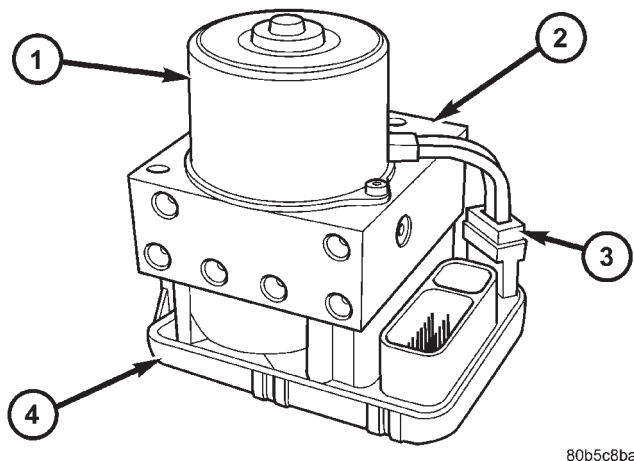
To install the HCU, it must be attached to the CAB, forming the ICU. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - ASSEMBLY)

ICU (INTEGRATED CONTROL UNIT)

DESCRIPTION

The hydraulic control unit (HCU) and the controller antilock brake (CAB) used with this antilock brake system are combined (integrated) into one unit, which is called the integrated control unit (ICU) (Fig. 12). The ICU is located in front of the driver's side front tire (Fig. 13), behind the inner fender splash shield.

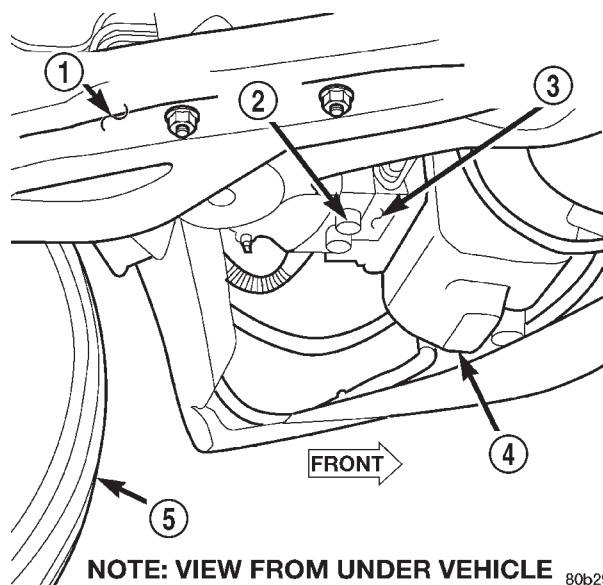
ICU (INTEGRATED CONTROL UNIT) (Continued)



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Fig. 12 Integrated Control Unit (ICU)

- 1 - PUMP/MOTOR
- 2 - HCU
- 3 - PUMP/MOTOR WIRING CONNECTOR
- 4 - CAB



NOTE: VIEW FROM UNDER VEHICLE 80b29f2f

Fig. 13 Integrated Control Unit (HCU And CAB) Location

- 1 - ENGINE CRADLE
- 2 - HCU
- 3 - CONTROLLER ANTILOCK BRAKE (CAB)
- 4 - BOTTOM OF WINDSHIELD WASHER RESERVOIR
- 5 - LEFT FRONT TIRE

Two different ICU's (HCU and CAB) are used on this vehicle depending on whether or not the vehicle is equipped with traction control. The HCU on a vehicle equipped with traction control has a valve block that is approximately one inch longer than a HCU on a vehicle that is equipped with ABS only.

The ABS-only ICU consists of the following components: the CAB, eight (build/decay) solenoid valves (four inlet valves and four outlet valves), valve block, fluid accumulators, a pump, and an electric motor.

The ABS-with traction control ICU consists of the following components: the CAB, eight (build/decay) solenoid valves (four inlet valves and four outlet valves), two traction control (ASR) valves, two hydraulic shuttle valves, valve block, fluid accumulators, a pump, and an electric motor.

The replaceable components of the ICU are the HCU and the CAB. No attempt should be made to service any individual components of the HCU or CAB.

OPERATION

For information of the ICU, refer to these individual components of the ICU:

- CONTROLLER ANTILOCK BRAKE (CAB) (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/CONTROLLER ANTILOCK BRAKE - OPERATION)
- HYDRAULIC CONTROL UNIT (HCU) (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/HCU (HYDRAULIC CONTROL UNIT) - OPERATION)

For information on the ICU's hydraulic circuits, refer to HYDRAULIC CIRCUITS AND VALVE OPERATION. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL - OPERATION)

REMOVAL - ICU

(1) Remove the remote ground cable from the ground stud on the right strut tower.

(2) Correctly isolate remote ground cable when servicing vehicle by installing the ground cable insulator on the strut tower ground stud as shown in (Fig. 14) and installing the nut on the stud. **This will prevent accidental grounding of the remote ground cable.**

(3) Using a brake pedal positioning tool such as shown in (Fig. 15) depress brake pedal past its first 1 inch of travel and hold in this position. This will isolate the master cylinder reservoir from the brake hydraulic system, not allowing the brake fluid to drain out of the reservoir.

(4) Remove the bolt and 2 nuts securing the speed control servo to vehicle. Disconnect the wire harness connector from speed control servo. Leaving the cable attached to the speed control servo, move it aside, out of the way.

(5) Remove the screw attaching the washer bottle filler neck to the vehicle. Move neck to the side without loosening the filler tube (Fig. 16).

(6) Remove the nut and bolt holding the transmission controller and bracket to vehicle (Fig. 16). Lift

ICU (INTEGRATED CONTROL UNIT) (Continued)

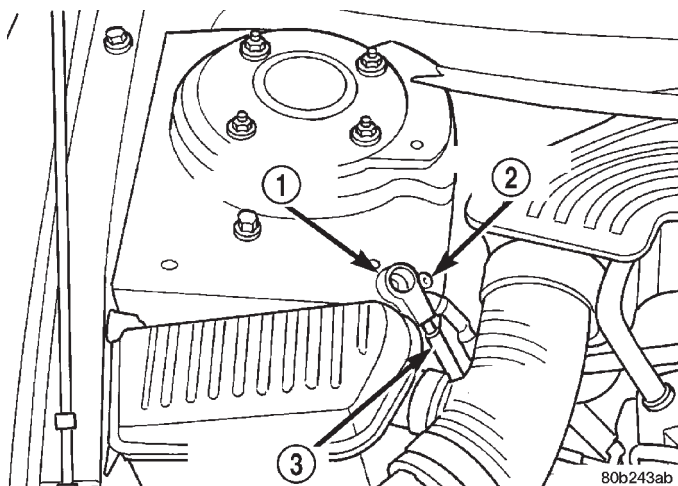


Fig. 14 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

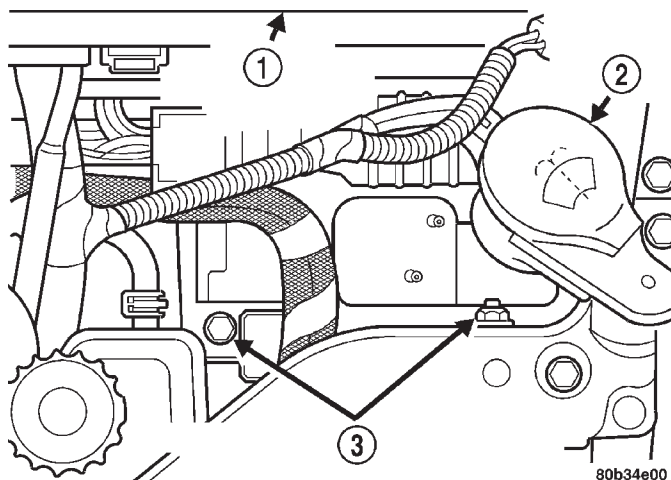


Fig. 16 Transmission Controller Mounting

- 1 - POWER DISTRIBUTION CENTER
- 2 - WASHER BOTTLE NECK
- 3 - TRANSMISSION CONTROLLER MOUNTING BOLT AND NUT

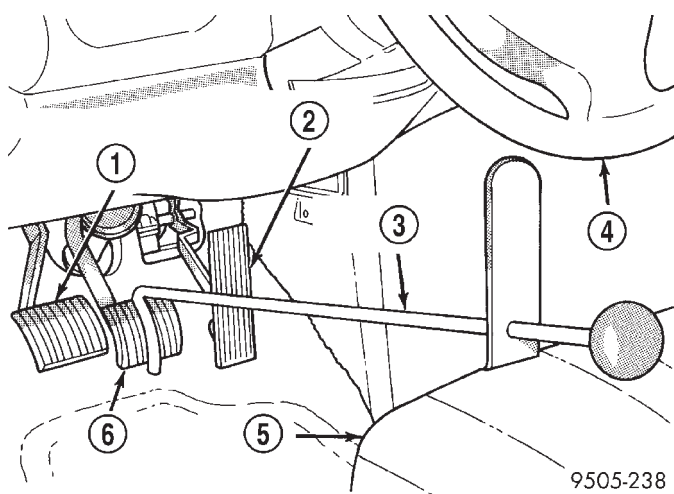


Fig. 15 Brake Pedal Holding Tool Installed

- 1 - CLUTCH PEDAL (IF EQUIPPED WITH MANUAL TRANSAXLE)
- 2 - THROTTLE PEDAL
- 3 - BRAKE PEDAL HOLDING TOOL
- 4 - STEERING WHEEL
- 5 - DRIVER'S SEAT
- 6 - BRAKE PEDAL

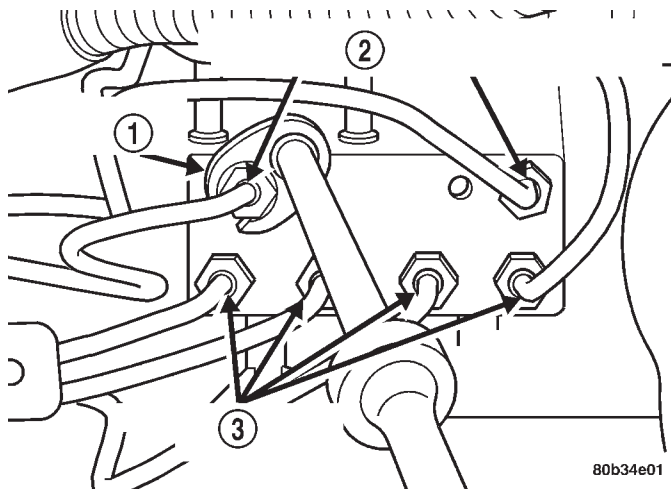


Fig. 17 Brake Tube Fittings

- 1 - CROW FOOT WRENCH
- 2 - PRIMARY AND SECONDARY BRAKE TUBES FROM MASTER CYLINDER
- 3 - CHASSIS BRAKE TUBES

transmission controller up and move away from mounting position.

(7) Using Mopar® Brake Parts Cleaner or an equivalent, thoroughly clean all surfaces of the HCU. Also, thoroughly clean all brake tube to HCU connections.

(8) Remove the primary and secondary brake tubes coming from the master cylinder, at the HCU, using a crow foot wrench (Fig. 17).

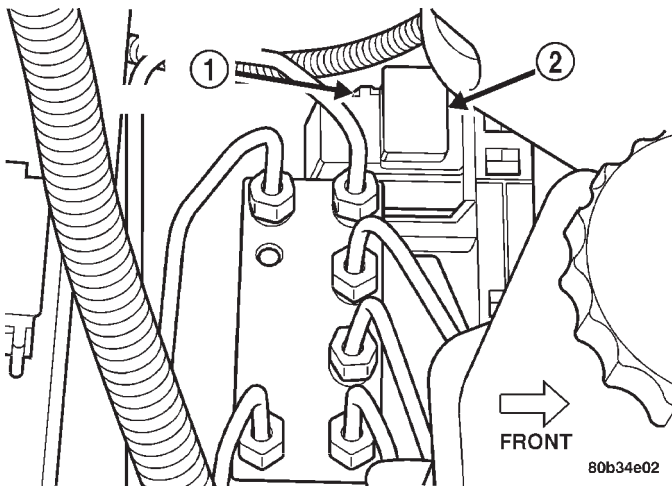
(9) Remove the chassis brake tubes at the HCU (Fig. 17), using a crow foot wrench.

CAUTION: Do not apply a 12-volt power source to any terminals of the 24-way HCU connector when disconnected from the CAB.

(10) Disconnect the 24-way wiring harness connector from the CAB using the following procedure. Grasp the lock on the 24-way connector (Fig. 18), and pull it up from the connector as far as possible. This will unlock and raise the 24-way connector out of the socket on the CAB.

(11) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

ICU (INTEGRATED CONTROL UNIT) (Continued)

**Fig. 18 24-way CAB Connector Lock**

- 1 - 24-WAY CAB CONNECTOR
2 - CONNECTOR LOCK

(12) Remove the left front tire and wheel assembly.
(13) Remove fasteners securing the inner fender splash shield in place. Move the splash shield out of the way.

(14) Remove the 3 bolts attaching the ICU to the mounting bracket.

(15) Remove the ICU from its mounting bracket. Then, remove the ICU from the vehicle by pulling it out around the left side of the mounting bracket, then through the wheel well.

NOTE: To separate the CAB from the HCU, (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - DISASSEMBLY)

DISASSEMBLY - ICU

NOTE: To replace the hydraulic control unit (HCU) or the controller antilock brake (CAB) on this vehicle, the entire integrated control unit (ICU) needs to be removed from the vehicle. The CAB can then be separated from the HCU. Do not attempt to replace the CAB with the ICU mounted in the vehicle.

(1) Remove the ICU from the vehicle. Refer to REMOVAL.

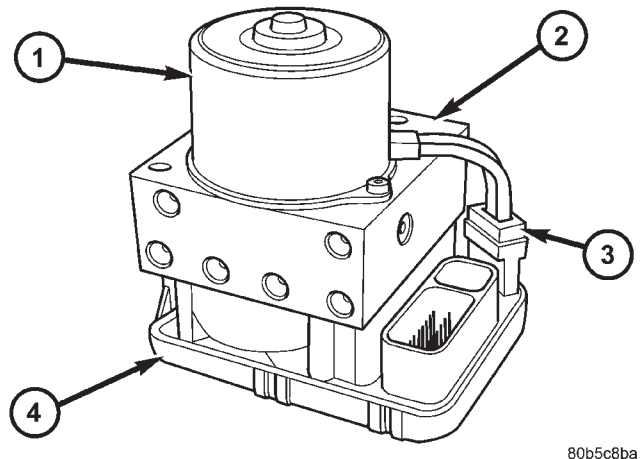
(2) Disconnect the pump/motor wiring harness from the CAB (Fig. 19).

(3) Remove the 4 bolts (Fig. 20) attaching the CAB to the HCU.

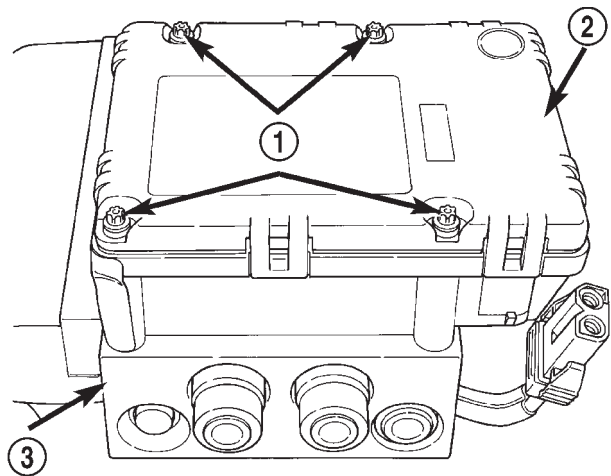
(4) Remove the CAB from the HCU (Fig. 21).

ASSEMBLY - ICU

(1) Install the CAB (Fig. 21) on the HCU.

**Fig. 19 Integrated Control Unit (ICU)**

- 1 - PUMP/MOTOR
2 - HCU
3 - PUMP/MOTOR WIRING CONNECTOR
4 - CAB

**Fig. 20 CAB Attaching Bolts**

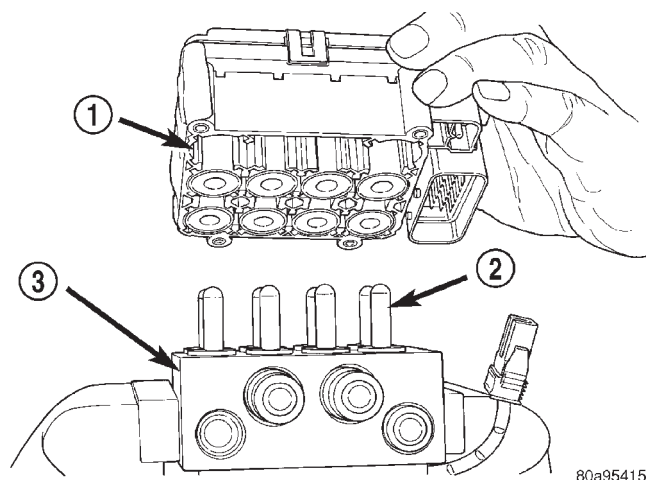
- 1 - MOUNTING BOLTS
2 - CAB
3 - HCU VALVE BLOCK

(2) Install the 4 bolts mounting the CAB (Fig. 20) to the HCU. Tighten the CAB mounting bolts to a torque of 2 N·m (17 in. lbs.).

(3) Plug the pump/motor wiring harness into the CAB (Fig. 19).

(4) Install the ICU in the vehicle. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - INSTALLATION)

ICU (INTEGRATED CONTROL UNIT) (Continued)

**Fig. 21 Remove/Install CAB**

- 1 - CAB
- 2 - HCU VALVES
- 3 - HCU VALVE BLOCK

INSTALLATION - ICU

- (1) Install the ICU back in the vehicle and attach it to its mounting bracket. Tighten the 3 ICU mounting bolts to 11 N·m (97 in. lbs.).
- (2) Reinstall the inner fender splash shield.
- (3) Reinstall the tire and wheel assembly. (Refer to 22 - TIRES/WHEELS - INSTALLATION)
- (4) Lower the vehicle.

CAUTION: Before installing the 24-way connector in the CAB be sure that the seal is properly installed in the connector.

- (5) Install the 24-way connector into the socket on the CAB. The connector is installed using the follow-

ing procedure. Position the 24-way connector in the socket on the CAB and carefully push it onto CAB as far as it will go. When connector is fully seated into the CAB socket push in the connector lock (Fig. 18) as far as it will go. This will pull the 24-way connector into the socket on the CAB and lock it in the installed position.

- (6) Install the 4 chassis brake tubes on the HCU (Fig. 17). Tighten the chassis brake tubes to 17 N·m (145 in. lbs.).

- (7) Install the primary and secondary brake lines from the master cylinder on the HCU (Fig. 17). Tighten the primary and secondary brake tubes to 17 N·m (145 in. lbs.).

- (8) Reinstall the transmission controller (Fig. 16).

- (9) Reattach the washer bottle filler neck to the radiator support.

- (10) Reinstall the speed control servo to its mounting studs and radiator support.

- (11) Remove brake pedal positioning tool.

- (12) Install the remote ground cable onto the ground stud located on left shock tower. Install the remote ground cable attaching nut and tighten to a torque of 28 N·m (250 in. lbs.).

NOTE: The ICU may need to be initialized using the DRBIII® scan tool after installation.

- (13) Bleed the base brakes and the ABS brakes hydraulic system. (Refer to 5 - BRAKES - STANDARD PROCEDURE)

- (14) Road test vehicle to ensure proper operation of the base and ABS systems.

COOLING

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COOLING

DESCRIPTION - ENGINE COOLING SYSTEM

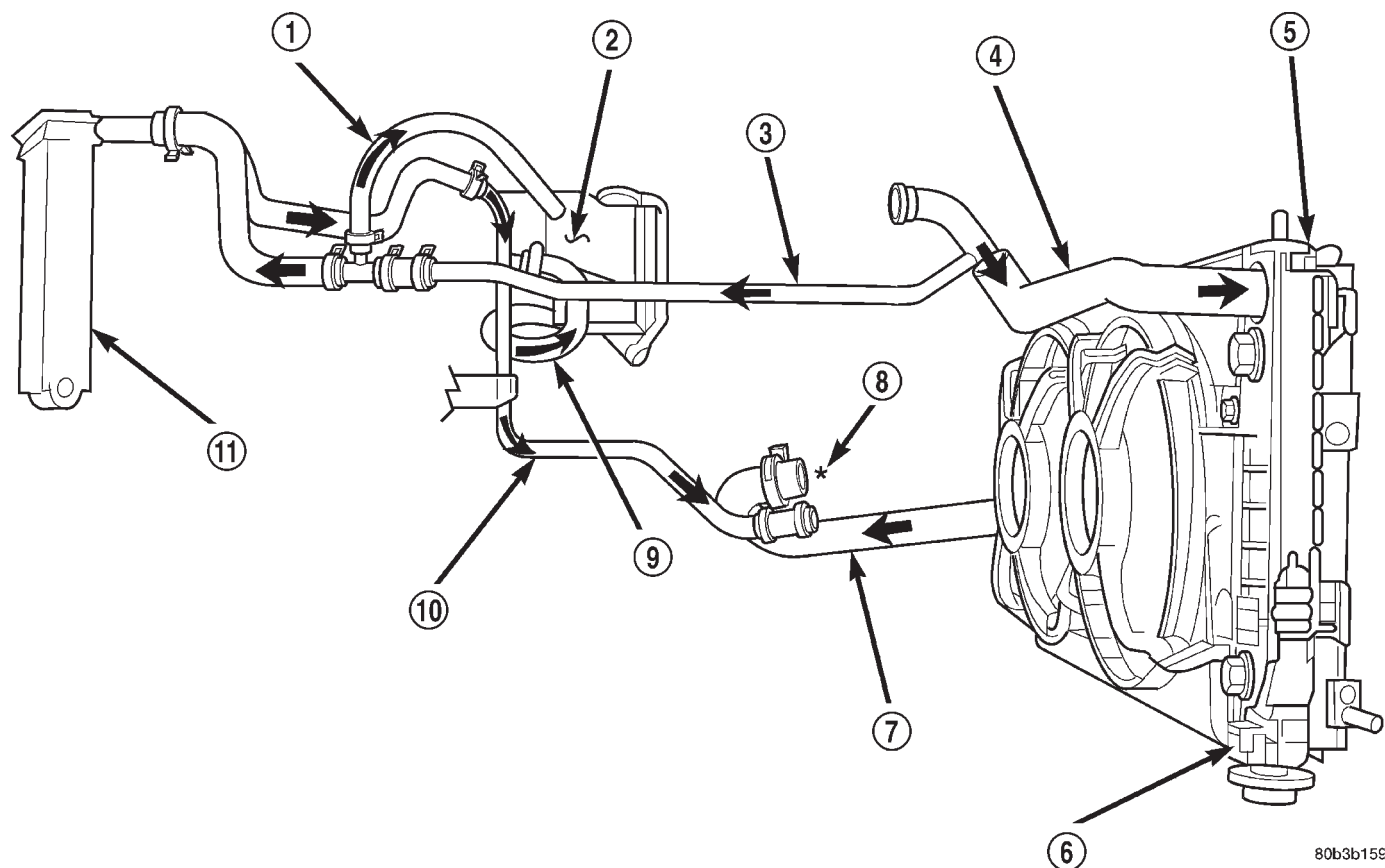
The engine cooling system consists of a cooling module, pressure cap, coolant bottle, thermostat (inlet type), coolant, plumbing, and a water pump to circulate the coolant (Fig. 1). The engine cooling module consist of a radiator, electric radiator fan motors, shroud, internal transmission oil cooler, internal engine oil cooler (if equipped), air conditioning condenser, and a auxiliary transmission oil cooler (if equipped).

OPERATION - ENGINE COOLING SYSTEM

CAUTION: The cooling system is designed to function with a 50/50 mixture of Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (MS-9769) or equivalent, and distilled water. Higher concentrations may result in poor cooling performance and premature water pump seal failure. This antifreeze/coolant may not be mixed or substituted with any other type.

- When Engine is cold: Thermostat is closed, cooling system has no flow through the radiator. The coolant flows through the engine, heater core, coolant bottle and an internal engine by-pass.
 - When Engine is warm: Thermostat is open, coolant flows through the radiator, heater core, coolant bottle and by-pass.
- The cooling systems primary purpose is to maintain engine temperature in a range that will provide satisfactory engine performance and emission levels under all expected driving conditions. It also provides hot coolant for heater, and cooling for automatic transmission fluid. It does this by transferring heat from engine metal to coolant, moving this heated coolant to the radiator, and then transferring this heat to the ambient air.
- The coolant flow circuit is shown in (Fig. 1).

COOLING (Continued)



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Fig. 1 COOLING SYSTEM FLOW

- 1 - BOTTLE SUPPLY HOSE
- 2 - PRESSURE BOTTLE
- 3 - HEATER SUPPLY TUBE
- 4 - RADIATOR UPPER INLET HOSE
- 5 - RADIATOR
- 6 - DRAIN COCK

- 7 - RADIATOR LOWER OUTLET HOSE
- 8 - THERMOSTAT LOCATION
- 9 - BOTTLE RETURN
- 10 - HEATER RETURN TUBE
- 11 - HEATER CORE

COOLING (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - COOLING SYSTEM

CONDITION	POSSIBLE CAUSES	CORRECTION
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC).	<ol style="list-style-type: none"> 1. During cold weather operation with the heater blower in the high position, the gauge reading may drop slightly. Fluctuation is also influenced by loads, outside temperature, and cycling of the air conditioning system. 2. Temperature gauge or engine sending unit sensor defective or shorted. Also, corroded or loose wiring in this circuit. 3. Gauge reading rises when vehicle is brought to a stop after heavy use (engine still running). 4. Gauge reading high after restarting a warmed-up (hot) engine. 5. Coolant level low (air will build up in the cooling system causing the thermostat to open late). 6. Cylinder head gasket leaking allowing exhaust gas to enter cooling system causing thermostat to open late. 7. Water pump impeller loose on shaft. 8. Air leak on the suction side of water pump allows air to build up in cooling system causing thermostat to open late. 	<ol style="list-style-type: none"> 1. A normal condition. No correction is necessary. 2. Check operation of gauge and repair if necessary. Refer to INSTRUMENT PANEL AND SYSTEMS. 3. A normal condition. No correction is necessary. Gauge reading should return to normal range after vehicle is driven. 4. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation. 5. Check and correct coolant leaks. Refer to Testing Cooling System for Leaks in this section. 6. (a) Check for cylinder head gasket leaks with a commercially available block leak tester. Repair as necessary. (b) Check for coolant in engine oil. Inspect for white steam emitting from exhaust system. Repair as necessary. 7. Check water pump and replace as necessary. Refer to Water Pump Removal in this section. 8. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN COOLANT RESERVE/OVERFLOW TANK.	<ol style="list-style-type: none"> 1. Pressure relief valve in radiator cap is defective, or was not properly seated. 2. Incorrect cap was installed. 3. Incorrect coolant mixture. 4. System overfilled. 	<ol style="list-style-type: none"> 1. Check condition of radiator cap and cap seal. Refer to Pressure Cap in this group. Replace cap as necessary. 2. Replace cap as necessary. 3. Make sure a 50% by volume mixture of coolant is used. 4. Ensure cold coolant level is between MIN and MAX marks on coolant bottle.

COOLING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT.	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test and repair as necessary. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING - COOLING SYSTEM LEAK TESTING)
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM) GAUGE MAY NOT BE READING HIGH.	1. Engine overheating. 2. Freeze point of coolant not correct. Mixture too concentrated or too diluted. 3. Wrong cooling system pressure cap.	1. Check reason for overheating and repair as necessary. 2. Check freeze point of the coolant. (Refer to 7 - COOLING/ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust the ethylene glycol to water ratio as required. 3. Install correct pressure cap.
HOSE(S) COLLAPSE AS ENGINE COOLS DOWN.	1. Vacuum created in cooling system on engine cool-down is not being relieved through coolant bottle system.	1. (a) Pressure cap relief valve stuck. (Refer to 7 - COOLING/ENGINE/RADIATOR PRESSURE CAP - INSPECTION) Replace as necessary. (b) Hose between the pressure and overflow container is plugged. Clean vent and repair as necessary. (c) Vent at coolant reserve/overflow container is plugged. Clean vent and repair as necessary. (d) Reserve/overflow container is internally blocked. Clean and repair as necessary
ELECTRIC RADIATOR FAN RUNS ALL THE TIME.	1. Fan relay, Powertrain Control Module (PCM) or engine coolant temperature sensor possibly defective. 2. Check for low coolant level. 3. A/C pressure transducer defective.	1. (Refer to Appropriate Diagnostic Information) Repair as necessary. 2. Repair as necessary. 3. (Refer to Appropriate Diagnostic Information) Repair as necessary.
NOISY RADIATOR FAN.	1. Fan blade loose. 2. Fan blade striking a surrounding object. 3. Air obstructions at radiator or A/C condenser. 4. Electric fan motor defective.	1. Replace radiator fan assembly. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL) 2. Locate point of fan blade contact and repair/replace as necessary. 3. Remove obstructions and/or clean debris. 4. Replace radiator fan assembly. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)

COOLING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED).	<ol style="list-style-type: none"> 1. Radiator and/or A/C condenser is restricted, obstructed or dirty (insects, leaves, etc.). 2. Electrical radiator fan not operating when A/C is operated. 3. Engine is overheating (heat may be transferred from radiator to A/C condenser. High underhood temperatures due to engine overheating may also transfer heat to A/C components. 4. All models are equipped with air seals at the radiator and/or A/C condenser. If these seals are missing or damaged, not enough air flow will be pulled through the radiator and A/C condenser. 	<ol style="list-style-type: none"> 1. Remove restriction and/or clean as necessary. 2. (Refer to Appropriate Diagnostic Information) Repair as necessary. 3. Correct overheating condition. 4. Check for missing or damaged air seals and repair as necessary.
INADEQUATE HEATER PERFORMANCE.	<ol style="list-style-type: none"> 1. Has a diagnostic trouble code (DTC) been set? 2. Low Coolant level. 3. Air Trapped in heater core. 4. Obstructions in heater hose fitting at engine or at heater core. 5. Heater hose kinked or obstructed. 6. Thermostat possibly stuck open. 7. Water pump is not pumping coolant to heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch. If only one of the hoses is hot, the water pump may not be operating correctly. 	<ol style="list-style-type: none"> 1. (Refer to Appropriate Diagnostic Information) Repair as necessary. 2. (Refer to 7 - COOLING - DIAGNOSIS AND TESTING) Repair as necessary. 3. Improper coolant fill procedure. (Refer to 7 - COOLING - STANDARD PROCEDURE) 4. Remove heater hoses at both ends and check for obstructions. Repair as necessary. 5. Locate kinked or obstructed area. Repair as necessary. 6. (Refer to 7 - COOLING/ENGINE/ ENGINE COOLANT THERMOSTAT - DIAGNOSIS AND TESTING) 7. (Refer to 7 - COOLING/ENGINE/ WATER PUMP - DIAGNOSIS AND TESTING)

COOLING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HEAT ODOR	<ol style="list-style-type: none"> 1. Various heat shields are used at certain driveline components. One or more of these shields may be missing. 2. Is the temperature gauge reading above the normal range? 3. Radiator fan operating incorrectly. 4. Has undercoating been applied to any unnecessary component? 5. Engine may be running rich, causing the catalytic converter to overheat 	<ol style="list-style-type: none"> 1. Locate missing shields and replace or repair as necessary. 2. Refer to Temperature Gauge Reads High in these Diagnosis Charts. 3. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - DIAGNOSIS AND TESTING) Repair as necessary. 4. Clean undercoating as necessary. 5. (Refer to Appropriate Diagnostic Information)
POOR DRIVEABILITY (THERMOSTAT POSSIBLY STUCK OPEN). GAUGE MAY BE READING LOW.	<ol style="list-style-type: none"> 1. For proper driveability, clean vehicle emissions and prevention of buildup of engine oil sludge, the thermostat must be operating properly. Has a diagnostic trouble code been set? 	<ol style="list-style-type: none"> 1. (Refer to Appropriate Diagnostic Information) Replace thermostat if necessary
STEAM IS COMING FROM FRONT OF VEHICLE NEAR GRILL AREA WHEN WEATHER IS WET, ENGINE WARMED UP AND RUNNING WITH VEHICLE STATIONARY, OR JUST SHUT OFF. TEMPERATURE GAUGE IS NORMAL.	<ol style="list-style-type: none"> 1. During wet weather, moisture (snow, ice, rain, or condensation) on the radiator will evaporate when the thermostat opens. The thermostat opening allows heated coolant into the radiator. When the moisture contacts the hot radiator, steam may be emitted. this usually occurs in cold weather with no fan or air flow to blow it away. 	<ol style="list-style-type: none"> 1. Occasional steam emitting from this area is normal. No repair is necessary.
COOLANT COLOR	<ol style="list-style-type: none"> 1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant. 	<ol style="list-style-type: none"> 1. Check the freeze point of the coolant. (Refer to 7 - COOLING/ENGINE/COOLANT - DIAGNOSIS AND TESTING) Adjust the ethylene glycol-to-water ratio as necessary and service according to maintenance schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)
COOLANT LEVEL CHANGES IN COOLANT BOTTLE. TEMPERATURE GAUGE IS IN NORMAL RANGE.	<ol style="list-style-type: none"> 1. Level changes are to be expected as coolant volume fluctuates with engine temperature. The coolant level will also drop as the system removes air from a recent filling. 	<ol style="list-style-type: none"> 1. A normal condition. No repair is necessary.

COOLING (Continued)

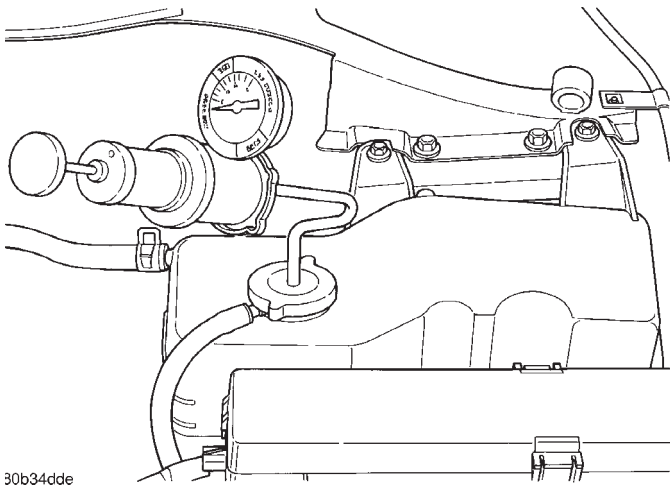
DIAGNOSIS AND TESTING - COOLING SYSTEM LEAK

With engine not running, wipe the coolant bottle neck sealing seat clean.

Attach a radiator pressure tester to the coolant bottle, as shown in (Fig. 2) and apply 104 kPa (15 psi) pressure. If the pressure drops more than 2 psi in 2 minutes inspect all points for external leaks.

All hoses, radiator and heater, should be moved while at 15 psi since some leaks occur while driving due to engine rock, etc.

If the cooling system will not pressurize easily and there is no coolant leaks, the cooling system is only partially filled. (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM FILL)



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Fig. 2 PRESSURE TESTING COOLING SYSTEM

If there are no external leaks after the gauge dial shows a drop in pressure, detach the tester. Start engine and run the engine to normal operating temperature in order to open the thermostat and allow the coolant to expand. Reattach the tester. If the needle on the dial fluctuates it indicates a combustion leak, usually a head gasket leak.

WARNING: WITH TOOL IN PLACE PRESSURE BUILDS UP FAST. ANY EXCESSIVE AMOUNT OF PRESSURE BUILT UP BY CONTINUOUS ENGINE OPERATION MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

If the needle on the dial does not fluctuate, race the engine a few times. If an abnormal amount of coolant or steam is emitted from the tail pipe, it may indicate a faulty head gasket, cracked engine block or cylinder head.

There may be internal leaks which can be determined by removing the oil dipstick. If water globules appear intermixed with the oil it will indicate an

internal leak in the engine. If there is an internal leak, the engine must be disassembled for repair.

DIAGNOSIS AND TESTING - COOLING SYSTEM AERATION

Low coolant level in a cross flow radiator will equalize in both tanks with engine off. With engine at running and at operating temperature, the high pressure inlet tank runs full and the low pressure outlet tank drops. If this level drops below the top of the transmission oil cooler, aeration will occur drawing air into the water pump resulting in the following:

- High reading shown on the temperature gauge.
- Loss of coolant flow through the heater core.
- Corrosion in the cooling system.
- Transmission oil will become hotter.
- Water pump seal may run dry, increasing the risk of premature seal failure.
- Combustion gas leaks into the coolant can also cause the above problems.

DIAGNOSIS AND TESTING - COOLING SYSTEM DEAERATION

As air is removed from the cooling system, it gathers in the coolant bottle. This pressure is released into the atmosphere through the pressure valve located in the pressure cap when pressure reaches 96 - 124 kPa (14 - 18 psi). This air is replaced with coolant from the coolant bottle, when the system is allowed to cool.

NOTE: Deaeration does not occur at engine idle—higher engine speeds are required. Normal driving will deaerate cooling system.

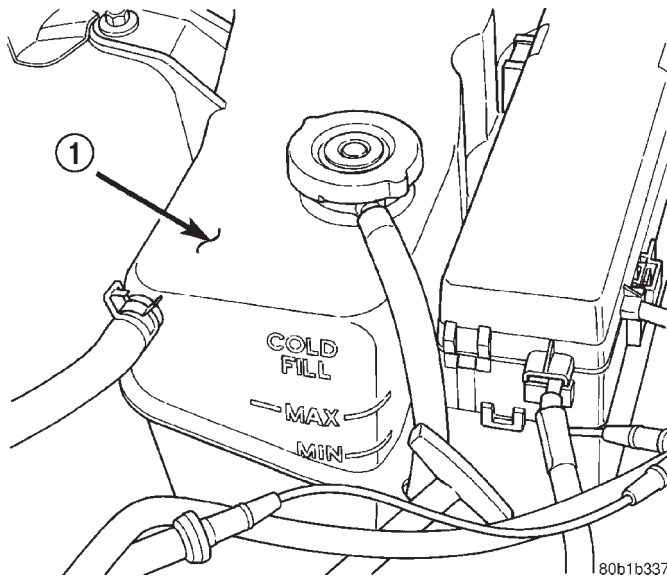
To effectively deaerate the system, multiple thermal cycles of the system may be required.

STANDARD PROCEDURE**STANDARD PROCEDURE - COOLANT LEVEL CHECK**

NOTE: Do not remove coolant bottle pressure cap for routine coolant level inspections.

The coolant bottle provides a quick visual method for determining the coolant level without removing the pressure cap. With the engine cold, the level of the coolant in the coolant bottle (Fig. 3) should be between the MIN and MAX lines on the bottle.

COOLING (Continued)

**Fig. 3 COOLANT BOTTLE COLD FILL LEVEL**

1 - COOLANT PRESSURE BOTTLE

STANDARD PROCEDURE - COOLING SYSTEM DRAINING

When servicing the cooling system, it is essential that coolant does not drip on the drive belts or pulleys. If necessary, shield the belts with shop towels before working on the cooling system. If coolant contacts the belts or pulleys, flush both with clean water.

WARNING: DO NOT REMOVE HOSE CLAMPS OR HOSES, CYLINDER BLOCK DRAIN PLUGS, COOLANT BOTTLE CAP, OR OPEN THE RADIATOR DRAINCOCK, WHEN THE SYSTEM IS HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM THE COOLANT CAN OCCUR.

The radiator draincock that is located at the lower right side of radiator (Fig. 4). The draincock stem is closed in the horizontal position, pointing to 3:00 o'clock. Draining takes place through the cooling module's lower right side insulator. **Do Not Use pliers to open draincock.**

CAUTION: Do not pull outward on the draincock flange while opening. Damage to the draincock body and O-ring seal may occur

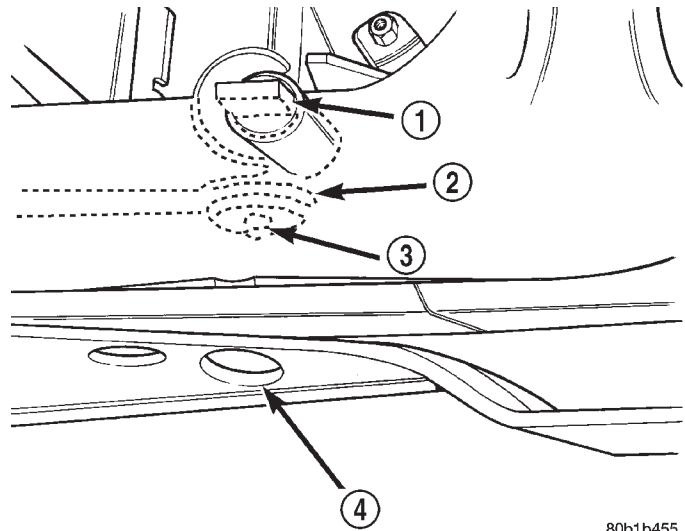
(1) To open the draincock to the minimum drain position, turn the draincock stem counterclockwise to the 12:00 o'clock position. For the maximum drain position, turn draincock stem counterclockwise 180 degrees to the 9:00 o'clock position.

(2) Remove coolant pressure bottle cap and open the bleed valve.

(3) Remove the cylinder block drain plug(s) located below each exhaust manifold.

Most service drains are about 80 percent of capacity because not all coolant is drained from system. For capacity specifications, (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS - FLUID CAPACITIES)

CAUTION: The cooling system normally operates at 97-124 kPa (14-18 psi) pressure. Exceeding this pressure may damage the radiator or hoses.



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Fig. 4 RADIATOR DRAINCOCK LOCATION

- 1 - DRAINCOCK STEM
- 2 - INSULATOR
- 3 - DRAIN
- 4 - DRAIN HOLE

STANDARD PROCEDURE - COOLING SYSTEM FILLING

WARNING: MAKE SURE ENGINE COOLING SYSTEM IS COOL BEFORE REMOVING PRESSURE CAP OR ANY HOSE. SEVERE PERSONAL INJURY MAY RESULT FROM ESCAPING HOT COOLANT. THE COOLING SYSTEM IS PRESSURIZED WHEN HOT.

CAUTION: Do not use well water, or suspect water supply in cooling system. Use only a 50/50 mixture of the specified ethylene glycol type antifreeze/coolant and distilled water. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION).

(1) Close radiator draincock by turning the stem clockwise to the 3:00 o'clock position. **Hand tighten only.**

(2) Install engine block drain plugs, if removed.

COOLING (Continued)

WARNING: WHEN INSTALLING DRAIN HOSE TO AIR BLEED VALVE, ROUTE HOSE AWAY FROM ACCESSORY DRIVE BELTS, ACCESSORY DRIVE PULLEYS, AND ELECTRIC COOLING FAN MOTORS.

(3) Attach one end of a 6.35 mm (0.250 in.) ID clear hose that is approximately 1200 mm (48 in.) long, to the bleed valve.

- **Bleed Valve Location (2.7L):** Located on the water outlet connector at the front of engine (Fig. 5).

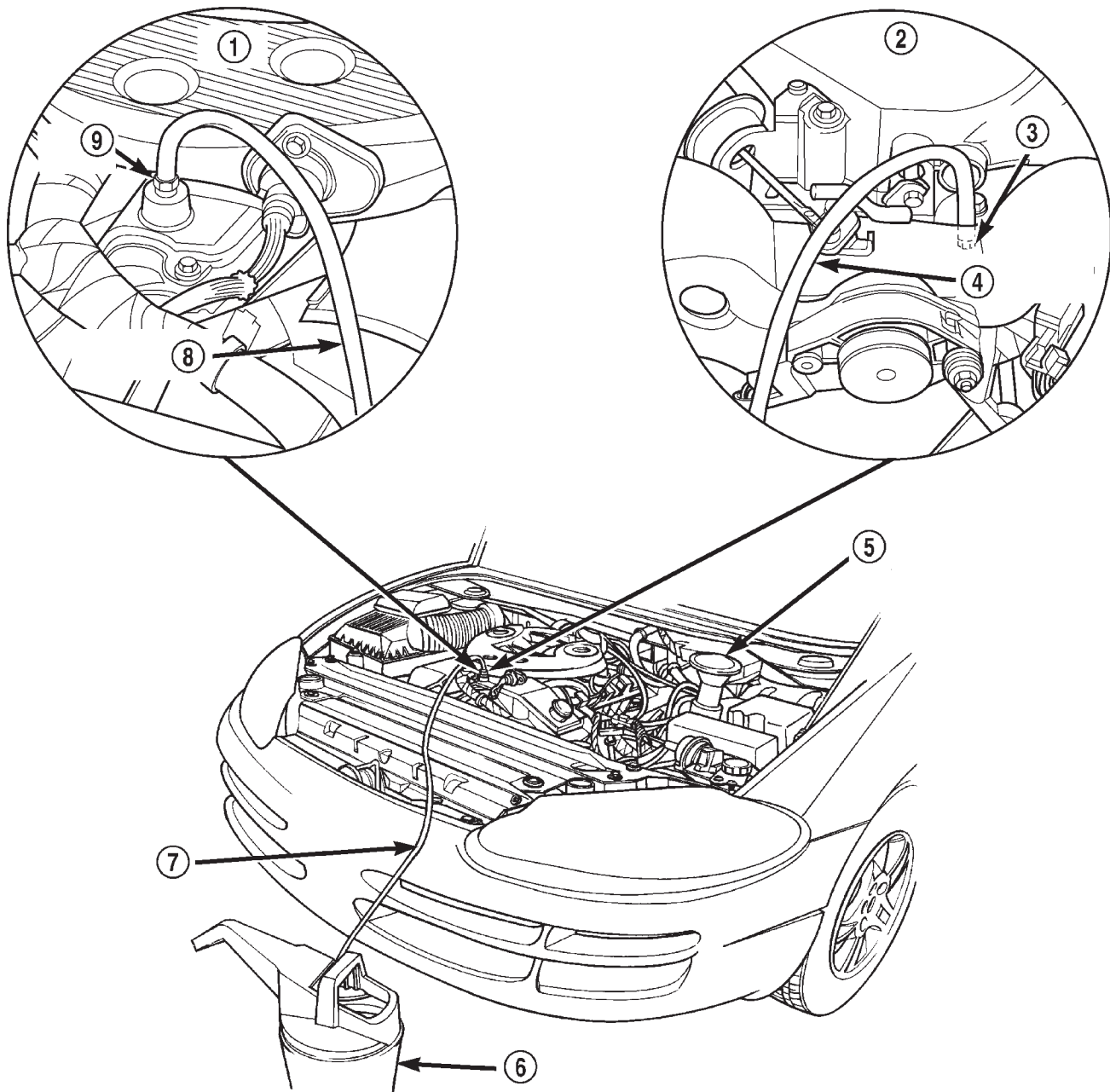
- **Bleed Valve Location (3.5L):** Located on the lower intake manifold, left of center and below the upper intake plenum (Fig. 5).

(4) Route hose away from the accessory drive belt, drive pulleys and electric cooling fan. Place the other end of hose into a clean container. The hose will prevent coolant from contacting the accessory drive belt when bleeding the system during the refilling operation (Fig. 5).

(5) Open the cooling system bleed valve (Fig. 5).

(6) Attach Special Tool 8195, Filling Aid Funnel to pressure bottle filler neck (Fig. 6).

(7) Use the supplied clip to pinch overflow hose that connects between the two chambers of the coolant bottle (Fig. 6).



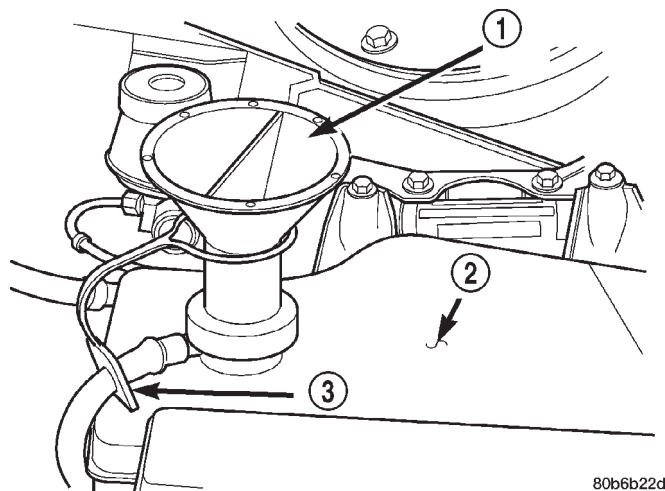
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Fig. 5 COOLING SYSTEM BLEEDING

COOLING (Continued)

- 1 - 2.7L ENGINE
- 2 - 3.5L ENGINE
- 3 - BLEED VALVE
- 4 - TO COOLANT CONTAINER
- 5 - SPECIAL TOOL 8195

- 6 - COOLANT CONTAINER
- 7 - HOSE
- 8 - TO COOLANT CONTAINER
- 9 - BLEED VALVE



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Fig. 6 SPECIAL TOOL 8195

- 1 - SPECIAL TOOL 8195
- 2 - PRESSURE BOTTLE
- 3 - PINCH OVERFLOW HOSE

CAUTION: Do not mix coolants. If coolant is used other than specified, a reduction in corrosion protection will occur.

(8) Pour a 50/50 mix of Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula and distilled water into the larger section of Filling Aid Funnel (the smaller section of funnel is to allow air to escape). For system capacity, (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS - FLUID CAPACITIES).

(9) Slowly fill the cooling system until a steady stream of coolant flows from the hose attached to the bleed valve (Fig. 5).

(10) Close the bleed valve and continue filling system to the top of the Filling Funnel.

(11) Remove clip from overflow hose (Fig. 6).

(12) Allow the coolant in Filling Funnel to drain into overflow chamber of the pressure bottle.

(13) Remove Special Tool 8195, Filling Aid Funnel. Install cap on coolant pressure bottle.

(14) Remove hose from bleed valve.

(15) Start engine and run until it reaches operating temperature.

NOTE: The engine cooling system will push any remaining air into the coolant bottle within about an hour of normal driving. As a result, a drop in coolant level in the pressure bottle may occur. If the

engine cooling system overheats and pushes coolant into the overflow side of the coolant bottle, this coolant will be sucked back into the cooling system **ONLY IF THE PRESSURE CAP IS LEFT ON THE BOTTLE**. Removing the pressure cap breaks the vacuum path between the two bottle sections and the coolant will not return to cooling system.

(16) Shut off engine allow it to cool down. This permits coolant to be drawn into the pressure chamber.

(17) With engine COLD, observe coolant level in pressure chamber. Coolant level should be within MIN and MAX marks. Adjust coolant level as necessary.

NOTE: The coolant bottle has two chambers. Coolant will normally only be in the inboard (smaller) of the two. The outboard chamber is only to recover coolant in the event of an overheat or after a recent service fill. The outboard chamber should normally be empty. If there is coolant in the overflow side of the coolant bottle (after several warm/cold cycles of the engine) and coolant level is within MIN and MAX marks, disconnect the end of the overflow hose at the fill neck and lower it into a clean container. Allow coolant to drain into the container until emptied. Reconnect overflow hose to fill neck.

STANDARD PROCEDURE - ADDING ADDITIONAL COOLANT

CAUTION: Do not use well water, or suspect water supply in cooling system. Use only a 50/50 mixture of the specified ethylene glycol type antifreeze/coolant and distilled water. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION).

When additional coolant is needed, it should be added to the coolant pressure bottle.

For coolant service schedules (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION).

WARNING: DO NOT OPEN COOLING SYSTEM WHEN HOT AND UNDER PRESSURE BECAUSE PERSONAL INJURY AND SERIOUS BURNS FROM COOLANT CAN OCCUR. ALLOW ENGINE TO COOL BEFORE SERVICING COOLING SYSTEM.

COOLING (Continued)

(1) Try squeezing the radiator upper hose to determine if the system is still pressurized.

(2) Place a shop towel over the pressure cap and turn to the first stop. Wait to see if any pressure is released. When no pressure is released, press down on the cap and turn to the second stop. Remove cap (Fig. 7).

NOTE: If the coolant pressure bottle is completely empty, (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM FILLING).

(3) If there is some coolant in coolant pressure bottle, slowly fill coolant pressure bottle.

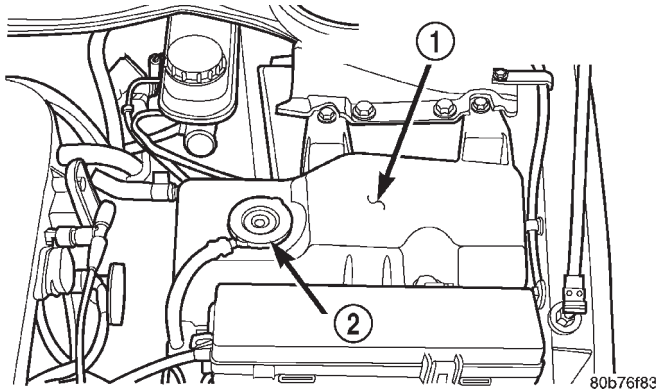


Fig. 7 COOLANT BOTTLE LOCATION

1 - COOLANT RECOVERY PRESSURE BOTTLE
2 - PRESSURE CAP

SPECIFICATIONS

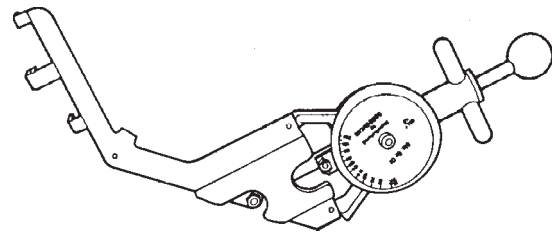
TORQUE

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
A/C Condenser to Radiator - Bolts	5	—	45
A/C Belt Tensioner & Pulley (2.7L) - Bolts	28	—	250
A/C Belt Tensioner Pulley (3.5L) - Nut	54	40	—
Engine Block Heater	12	—	105
Cooling System Bleed Valve - (2.7L)	12	—	110
Cooling System Bleed Valve - (3.5L)	8	—	70
Condenser Inlet Tube Bracket Screw	5	—	45
Engine Oil Cooler - Lines to Engine	30	—	260

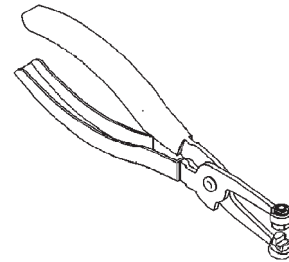
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Engine Oil Cooler - Lines to Radiator	18	—	160
Engine Coolant Sensor	28	20	—
Radiator Fan to Radiator - Screws	5	—	45
Generator/Power Steering Belt Tensioner Pulley - Nut	54	40	—
Thermostat Housing	12	—	105
Transmission Oil Cooler - Hose Clamps	3	—	28
Transmission Oil Cooler - Flare Nuts at Trans	30	—	260
Water Pump - Bolts	12	—	105
Water Outlet Connector - Bolts	12	—	105

SPECIAL TOOLS

COOLING

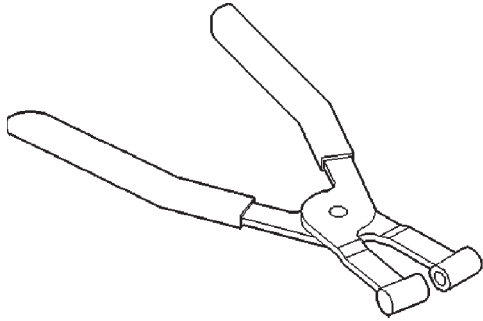


Belt Tension Gauge 7198



Hose Clamp Pliers 8495

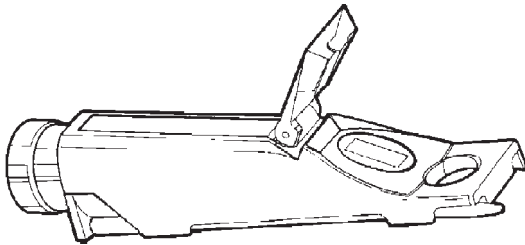
COOLING (Continued)



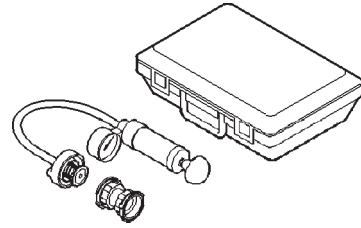
Hose Clamp Pliers 6094



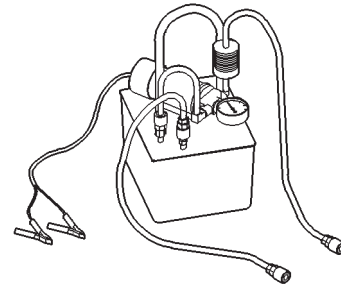
Filling Aid Funnel 8195



Coolant Refractometer 8286



Cooling System Tester 7700



Trans Cooler Flusher 6906

ACCESSORY DRIVE

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ACCESSORY DRIVE

DESCRIPTION

The accessory drive system on 2.7L and 3.5L engines utilizes two different belts. A conventional V-belt drives the air conditioning compressor on 3.5L engines, a Poly-V belt on the 2.7L engine. A Poly-V

belt drives the generator and power steering pump on all engines.

OPERATION

The accessory drive belts provide the link between the engine crankshaft and the engine driven accessories.

DIAGNOSIS AND TESTING - ACCESSORY DRIVE BELT

CONDITION	POSSIBLE CAUSE	CORRECTION
INSUFFICIENT ACCESSORY OUTPUT DUE TO BELT SLIPPAGE	1. Belt too loose. 2. Belt excessively glazed or worn.	1. Adjust belt tension. 2. Replace and tighten as specified.
BELT SQUEAL WHEN ACCELERATING ENGINE	1. Belts too loose. 2. Belts glazed.	1. Adjust belt tension. 2. Replace belts.
BELT CHIRP AT IDLE	1. Belts too loose. 2. Foreign material imbedded in belt. 3. Non-uniform belt. 4. Misaligned pulley(s). 5. Non-uniform groove or eccentric pulley.	1. Adjust belt tension. 2. Replace belt. 3. Replace belt. 4. Align accessories. 5. Replace pulley(s).
BELT ROLLED OVER IN GROOVE OR BELT JUMPS OFF	1. Broken cord in belt. 2. Belt too loose, or too tight. 3. Misaligned pulleys. 4. Non-uniform grooves or eccentric pulley.	1. Replace belt. 2. Adjust belt tension. 3. Align accessories. 4. Replace pulley(s).

DRIVE BELTS - 2.7L

REMOVAL

GENERATOR/POWER STEERING BELT

- (1) Loosen tensioner pulley locking nut (Fig. 1).
- (2) Loosen belt adjusting bolt (Fig. 1).
- (3) Remove generator/power steering belt.

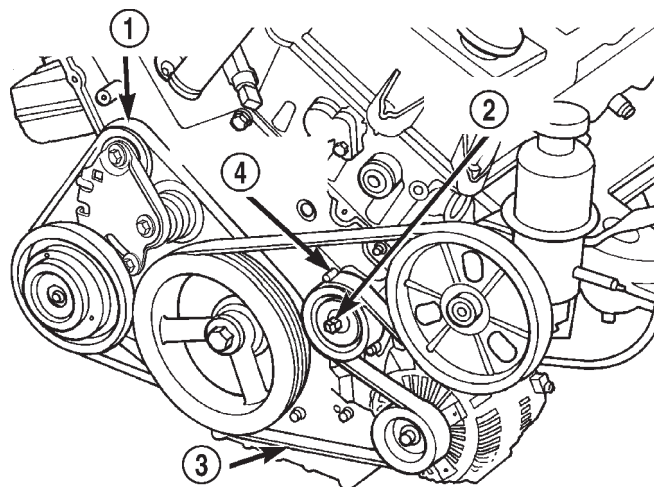


Fig. 1 ACCESSORY DRIVE BELTS

- 1 - A/C DRIVE BELT
- 2 - LOCKING NUT
- 3 - GENERATOR/POWER STEERING DRIVE BELT
- 4 - ADJUSTING BOLT

AIR CONDITIONING BELT

NOTE: The A/C drive belt self tensioner is **NOT** a dynamic tensioner. After adjustment the tensioner bracket bolts are tightened. The torsion spring is no longer responsible for tensioning the A/C belt. The torsion spring is only used for initial belt tensioning.

(1) Remove generator/power steering belt to gain access to A/C belt. Refer to GENERATOR/POWER STEERING BELT for procedure.

(2) Loosen **BUT DO NOT REMOVE** tensioner locking bolt and pivot bolt (Fig. 2).

(3) Insert 1/2" drive breaker bar into square opening on belt tensioner. Rotate tensioner counterclockwise until belt can be removed from pulleys (Fig. 2).

(4) Slowly rotate tensioner clockwise to relieve spring load.

CLEANING

Clean all foreign debris from belt pulley grooves. The belt pulleys must be free of oil, grease, and coolants before installing the drive belt.

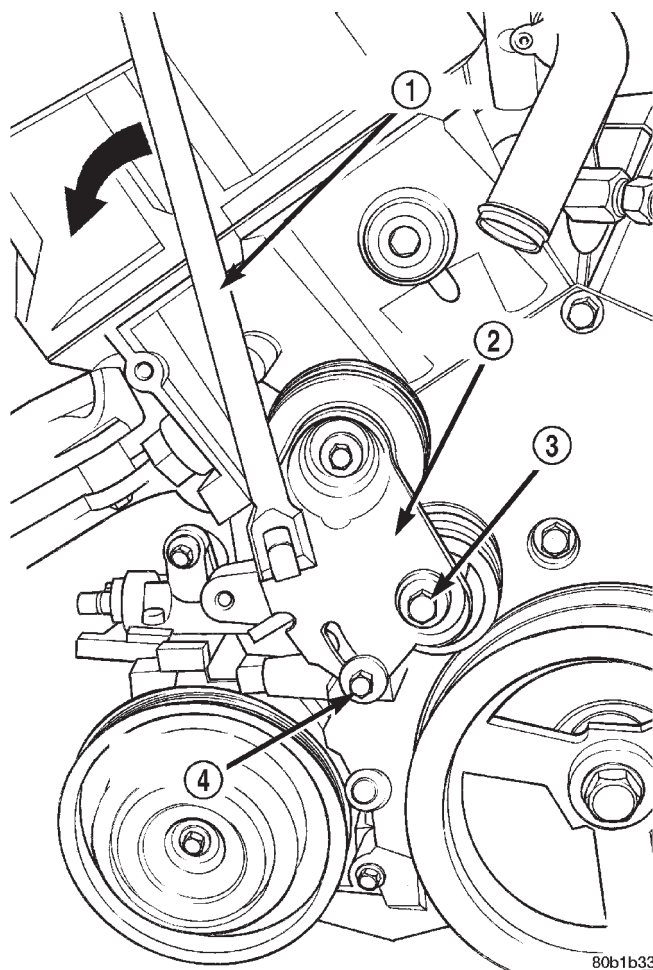


Fig. 2 AIR CONDITIONING DRIVE BELT

- 1 - 1/2" DRIVE BREAKER BAR
- 2 - TENSIONER
- 3 - PIVOT BOLT
- 4 - LOCKING BOLT

INSPECTION

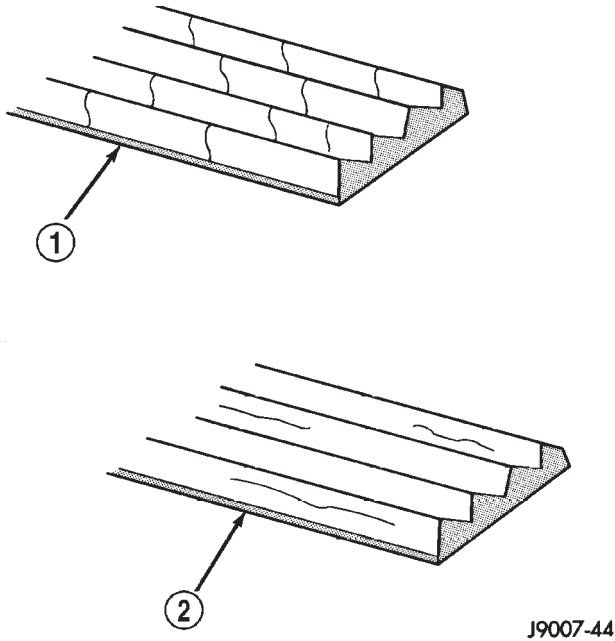
Belt replacement under any or all of the following conditions is required:

- Excessive wear
- Frayed cords
- Severe glazing

Poly-V Belt system may develop minor cracks across the ribbed side (due to reverse bending). These minor cracks are considered normal and acceptable. Parallel cracks are not (Fig. 3).

NOTE: Do not use any type of belt dressing or restorer on Poly-V Belts.

DRIVE BELTS - 2.7L (Continued)

**Fig. 3 Drive Belt Wear Pattern**

- 1 - NORMAL CRACKS - BELT OK
2 - NOT NORMAL CRACKS - REPLACE BELT

INSTALLATION**AIR CONDITIONING BELT - NEW**

WARNING: DO NOT REMOVE A/C BELT TENSIONER LOCKING BOLT WITHOUT FIRST HOLDING THE TENSIONER WITH A 1/2" DRIVE BREAKER BAR, AS PERSONAL INJURY COULD RESULT.

NOTE: Verify that torsion spring position is in the new belt position before installing a NEW belt (Fig. 4). If torsion spring is not in the new belt position, follow steps 1–7 to change the tensioner spring from the USED belt position to the NEW belt position.

(1) Insert a 1/2" drive breaker bar into the square opening on the tensioner. Hold counterclockwise pressure on tensioner while removing the locking bolt (Fig. 2).

(2) Carefully release spring load of the torsion spring on the tensioner.

(3) Remove pivot bolt, tensioner, and spring from front timing cover.

(4) Insert spring arm into the NEW belt position on the tensioner (Fig. 4).

(5) Install torsion spring, tensioner, and pivot bolt.

(6) Install pivot bolt. Tighten only finger tight, at this time.

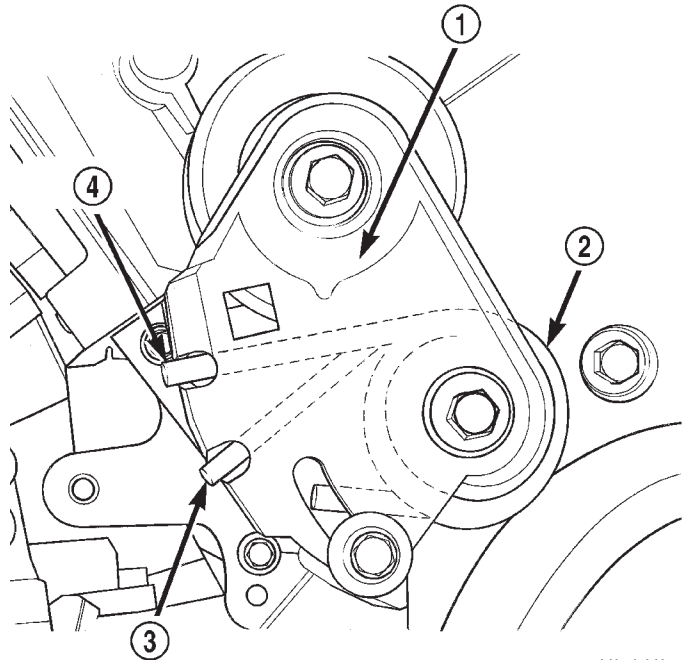
(7) Using a 1/2" drive breaker bar, apply counterclockwise pressure until locking bolt can be installed.

(8) Install the NEW belt by rotating the tensioner counterclockwise until the NEW belt can be installed on pulleys. See (Fig. 5) for belt routing.

(9) Release tensioner and remove breaker bar. Belt is automatically adjusted with the tensioner's torsion spring.

(10) Tighten tensioner locking bolt and pivot bolt to 28 N·m (250 in. lbs.) (Fig. 2).

(11) Install generator/power steering belt. Refer to GENERATOR/POWER STEERING BELT INSTALLATION for procedure.

**Fig. 4 Air Conditioning Belt Tensioner Spring Position**

- 1 - TENSIONER
2 - TORSION SPRING
3 - NEW BELT POSITION
4 - USED BELT POSITION

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AIR CONDITIONING BELT - USED

NOTE: A "used belt" is considered having more than 500 miles of service use.

NOTE: Perform steps 1–7 to change the tensioner spring from the NEW belt position, to the USED belt position.

(1) Insert a 1/2" drive breaker bar into the square opening on tensioner. Hold counterclockwise pressure on tensioner, while removing tensioner locking bolt (Fig. 2).

DRIVE BELTS - 2.7L (Continued)

(2) Carefully release the tension of spring on tensioner.

(3) Remove pivot bolt, tensioner, and spring from front cover.

(4) Insert spring into the USED belt position on tensioner bracket (Fig. 4).

(5) Install spring, tensioner bracket, and pivot bolt.

(6) Install pivot bolt. Tighten only finger tight, at this time.

(7) Using a 1/2" drive breaker bar, apply counterclockwise pressure until locking bolt can be installed.

(8) Install the USED belt by rotating tensioner counterclockwise until belt can be installed on pulleys. See (Fig. 5) for belt routing.

(9) Release tensioner and remove breaker bar. Belt is automatically adjusted with the tensioner's torsion spring.

(10) Tighten tensioner locking bolt and pivot bolt to 28 N·m (250 in. lbs.) (Fig. 2).

(11) Install generator/power steering belt. Refer to GENERATOR/POWER STEERING BELT INSTALLATION for procedure.

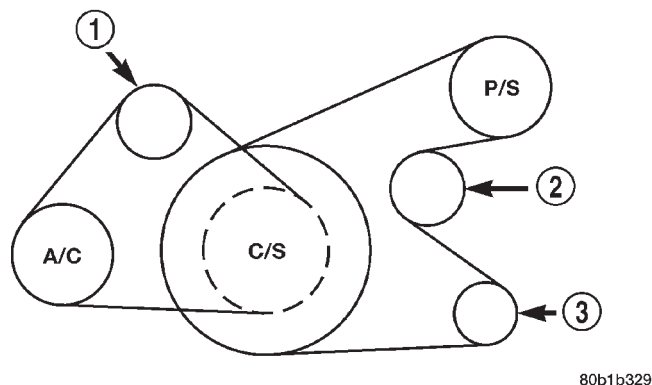


Fig. 5 BELT ROUTING - 2.7L

1 - IDLER

2 - IDLER

3 - GENERATOR

GENERATOR/POWER STEERING BELT INSTALLATION

(1) Install generator/power steering belt on pulleys.

(2) Tighten belt adjusting bolt to proper belt tension (Fig. 1). (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS)

(3) Tighten tensioner locking nut (Fig. 1).

ADJUSTMENTS - BELT TENSION

Use belt tension gauge, Special Tool 7198 for conventional V-belts and Poly-V belts. For Special Tool identification, (Refer to 7 - COOLING - SPECIAL TOOLS).

Adjust the belt tension for **NEW** or **USED** belt tension applications. Refer to BELT TENSION CHART—2.7/3.5L ENGINES .

BELT TENSION CHART—2.7/3.5L ENGINES

POLY-V BELT	GAUGE
Generator/Power Steering Belt (all engines)	New Belt: 836 \pm 44 N (190 \pm 10 lbs.)
	Used Belt: 534 N (120 lbs.)
V-BELT	GAUGE
Air Conditioning Belt (3.5L only)	New Belt: 667 \pm 44 N (160 \pm 10 lbs.)
	Used Belt: 534 N (120 lbs.)

DRIVE BELTS - 3.5L

REMOVAL

GENERATOR/POWER STEERING BELT

The Poly-V generator/power steering belt has an adjustable tensioner pulley located on the front timing belt cover.

(1) Loosen tensioner pulley locking nut.

(2) Raise vehicle on hoist.

(3) Remove the two (2) push clips attaching lower air shield to engine cradle. Remove air shield.

(4) Loosen tensioner adjusting bolt until the belt can be removed.

AIR CONDITIONING BELT

(1) Remove generator/power steering drive belt to gain access to the air conditioning drive belt. Refer to GENERATOR/POWER STEERING BELT for procedure.

(2) To remove air conditioning drive belt, first loosen the tensioner pulley lock nut, then loosen the adjusting screw to the tensioner pulley assembly until the belt can be removed (Fig. 6).

CLEANING

Clean all foreign debris from belt pulley grooves. The belt pulleys must be free of oil, grease, and coolants before installing the drive belt.

INSPECTION

Belt replacement under any or all of the following conditions is required:

- Excessive wear
- Frayed cords
- Severe glazing

Poly-V Belt system may develop minor cracks across the ribbed side (due to reverse bending). These minor cracks are considered normal and acceptable. Parallel cracks are not (Fig. 7).

DRIVE BELTS - 3.5L (Continued)

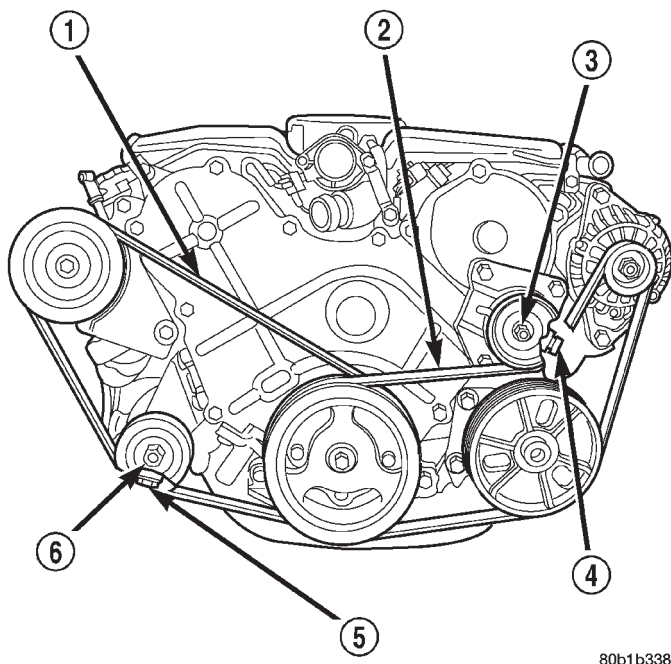


Fig. 6 ACCESSORY DRIVE BELTS

- 1 - V-BELT
- 2 - POLY-V BELT
- 3 - LOCKING NUT
- 4 - ADJUSTING BOLT
- 5 - ADJUSTING BOLT
- 6 - LOCKING NUT

NOTE: Do not use any type of belt dressing or restorer on Poly-V Belts.

INSTALLATION

NOTE: Use Special Tool 7198, Belt Tension Gauge to obtain proper tension on accessory drive belts. For Special Tool identification, (Refer to 7 - COOLING - SPECIAL TOOLS). For accessory drive belt tension specifications, (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS).

AIR CONDITIONING BELT

(1) Install air conditioning belt over drive pulleys. Tighten the tensioner adjusting bolt (Fig. 6) until the belt is at specified tension using a Belt Tension Gauge (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS). Tighten tensioner pulley locking nut to 54 N·m (40 ft. lbs.) (Fig. 6).

(2) Install generator/power steering drive belt and adjust to specified tension. Refer to GENERATOR/POWER STEERING BELT for procedure.

GENERATOR/POWER STEERING BELT

The Poly-V generator/power steering belt has an adjustable tensioner pulley located on the front timing belt cover.

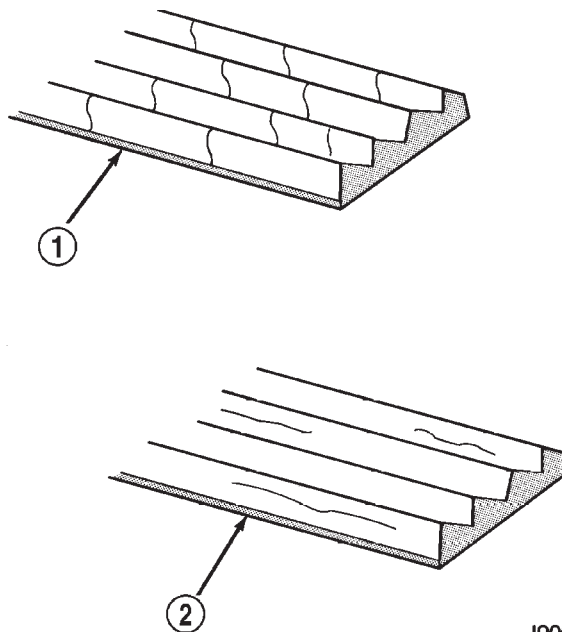


Fig. 7 Drive Belt Wear Pattern

- 1 - NORMAL CRACKS - BELT OK
- 2 - NOT NORMAL CRACKS - REPLACE BELT

- (1) Install generator/power steering belt.
- (2) Tighten adjusting bolt until the specified tension is obtained (Fig. 6) (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - ADJUSTMENTS).
- (3) Install lower air shield and attaching push clips.
- (4) Lower vehicle.
- (5) Tighten tensioner pulley locking nut to 54 N·m (40 ft. lbs.) (Fig. 6).

ADJUSTMENTS - BELT TENSION

Use belt tension gauge, Special Tool 7198 for conventional V-belts and Poly-V belts. For Special Tool identification, (Refer to 7 - COOLING - SPECIAL TOOLS).

Adjust the belt tension for **NEW** or **USED** belt tension applications. Refer to BELT TENSION CHART—2.7/3.5L ENGINES .

BELT TENSION CHART—2.7/3.5L ENGINES

POLY-V BELT	GAUGE
Generator/Power Steering Belt (all engines)	New Belt: 836 ±44 N (190 ±10 lbs.)
	Used Belt: 534 N (120 lbs.)
V-BELT	GAUGE
Air Conditioning Belt (3.5L only)	New Belt: 667 ±44 N (160 ±10 lbs.)
	Used Belt: 534 N (120 lbs.)

ENGINE

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ENGINE

CLEANING

Drain cooling system and refill with clean water. Refer to drain and fill procedures in this section. Run

engine with radiator cap installed until upper radiator hose is hot. Stop engine and drain water from system. If water is dirty; fill, run, and drain system again, until water runs clear. Refill cooling system with a 50/50 mixture of the recommended ethylene

ENGINE (Continued)

glycol and distilled water (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION).

INSPECTION

After performing a cleaning/flush procedure, inspect all hoses, clamps and connections for deterioration and leaks. Inspect radiator and heater core for leaks.

COOLANT**DIAGNOSIS AND TESTING - COOLANT CONCENTRATION TESTING**

Coolant concentration should be checked when any additional coolant was added to system or after a coolant drain, flush and refill. The coolant mixture offers optimum engine cooling and protection against corrosion when mixed to a freeze point of -37°C (-34°F) to -46°C (-50°F). The use of a hydrometer or a refractometer can be used to test coolant concentration.

A hydrometer will test the amount of glycol in a mixture by measuring the specific gravity of the mixture. The higher the concentration of ethylene glycol, the larger the number of balls that will float, and higher the freeze protection (up to a maximum of 60% by volume glycol).

A refractometer (Special Tool 8286)(Refer to 7 - COOLING - SPECIAL TOOLS) will test the amount of glycol in a coolant mixture by measuring the amount a beam of light bends as it passes through the fluid.

Some coolant manufactures use other types of glycols into their coolant formulations. Propylene glycol is the most common new coolant. However, propylene glycol based coolants do not provide the same freezing protection and corrosion protection and is not recommended.

CAUTION: Do not mix types of coolant—corrosion protection will be severely reduced.

COOLANT OUTLET CONNECTOR - 2.7L**REMOVAL**

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

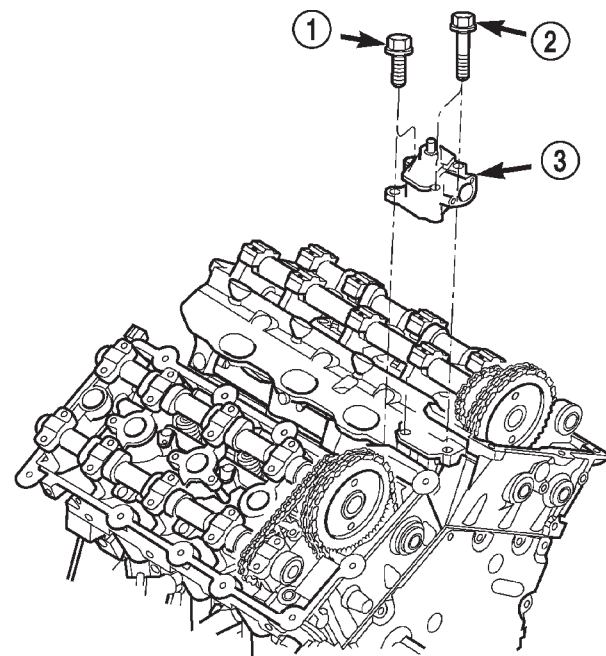
(2) Remove upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(3) Remove screws attaching heater tube to outlet connector.

(4) Disengage tube from outlet connector only enough for connector removal.

(5) Remove bolts attaching water outlet connector (Fig. 1).

(6) Remove outlet connector.



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Fig. 1 Coolant Outlet Connector - 2.7L

- 1 - BOLT (2)
- 2 - BOLT (2)
- 3 - COOLANT OUTLET CONNECTOR

INSTALLATION

(1) Clean sealing surfaces. Inspect gaskets for tears and cuts. Replace as necessary.

(2) Install outlet connector and tighten bolts to 12 N·m (105 in. lbs.) (Fig. 1).

(3) Inspect and replace heater supply tube O-ring as necessary.

(4) Lubricate O-ring and insert heater tube assembly into outlet connector. Tighten screws to 3 N·m (30 in. lbs.).

(5) Install upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION).

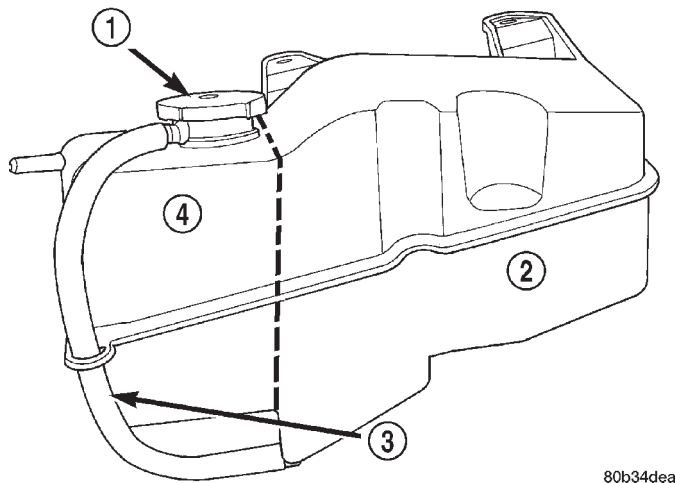
(6) Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

COOLANT RECOVERY PRESSURE CONTAINER

DESCRIPTION

The coolant bottle consists of a pressure chamber and a overflow chamber (Fig. 2) that is mounted in the engine compartment (Fig. 3). The overflow hose connects the pressure chamber to the overflow chamber.

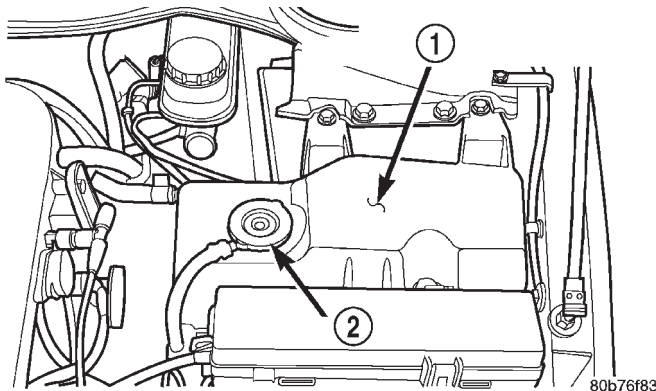
NOTE: Coolant will normally be in the pressure chamber side of the coolant bottle. The overflow chamber should normally be empty



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Fig. 2 COOLANT PRESSURE/RECOVERY BOTTLE

- 1 - PRESSURE CAP
- 2 - OVERFLOW CHAMBER
- 3 - OVERFLOW HOSE
- 4 - PRESSURE CHAMBER



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Fig. 3 COOLANT BOTTLE LOCATION

- 1 - COOLANT RECOVERY PRESSURE BOTTLE
- 2 - PRESSURE CAP

OPERATION

The pressure chamber keeps the coolant free of trapped air, provides a volume for expansion and contraction, and provides a convenient and safe method for checking and adjusting coolant level at atmospheric pressure. It also provides some reserve coolant to cover minor leaks, evaporation or boiling losses. The overflow chamber allows coolant recovery in case of an overheat.

ENGINE BLOCK HEATER

DESCRIPTION

The engine block heater is mounted in the cylinder block, near the right rear corner (Fig. 4). The block heater is a dry cylinder type design and is powered by 110 volt AC. **The power cord must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds and become damaged.**

OPERATION

When power is applied (110 volt AC) to the block heater, the heating element transfers heat through the aluminum engine block and into the coolant without directly penetrating the cooling system.

DIAGNOSIS AND TESTING - ENGINE BLOCK HEATER

If unit does not operate, trouble can be in either the power cord or the heater element. Test power cord for continuity with a 110-volt voltmeter or 110-volt test light; test heater element continuity with an ohmmeter or 12-volt test light.

REMOVAL

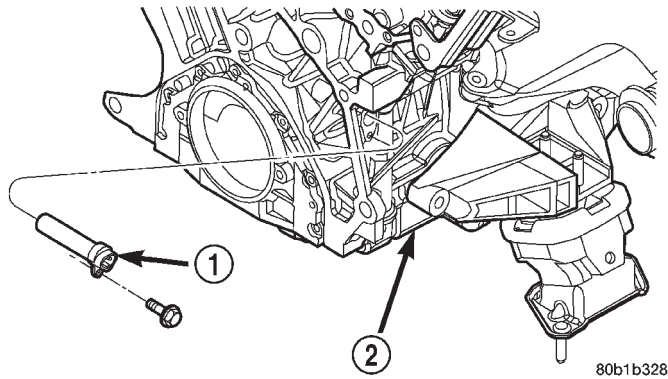
- (1) Raise vehicle on hoist.
- (2) Detach power cord plug from heater (Fig. 4).
- (3) Remove block heater attaching screw located below heater terminals.
- (4) Remove block heater from cylinder block.

INSTALLATION

- (1) Thoroughly clean cylinder block heater cavity.
- (2) Insert heater assembly into block such that mounting hole is located below heater terminals.
- (3) Install mounting screw and tighten to 12 N·m (105 in. lbs.).
- (4) Attach power cord to heater.

CAUTION: To prevent damage, the power cord must be secured in its retainer clips, and not positioned so it could contact linkages or exhaust manifolds.

ENGINE BLOCK HEATER (Continued)

**Fig. 4 ENGINE BLOCK HEATER**

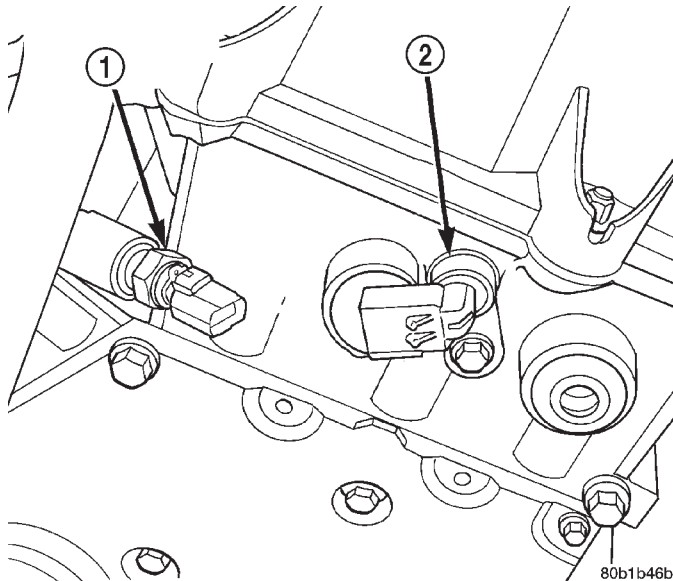
- 1 - BLOCK HEATER
2 - ENGINE — RIGHT SIDE

(5) Lower vehicle.

ENGINE COOLANT TEMPERATURE SENSOR

DESCRIPTION

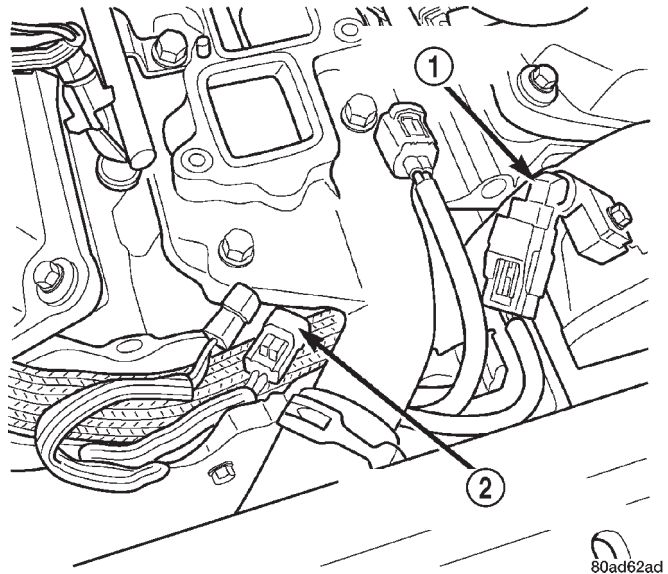
The engine coolant temperature sensor threads into the coolant system (Fig. 5) or (Fig. 6).

**Fig. 5 ENGINE COOLANT TEMPERATURE SENSOR - 2.7L**

- 1 - ENGINE COOLANT TEMPERATURE SENSOR
2 - CAMSHAFT POSITION SENSOR

OPERATION

The sensor provides an input to the Powertrain Control Module (PCM). As coolant temperature varies, the sensor resistance changes, resulting in a different input voltage to the PCM.

**Fig. 6 ENGINE COOLANT TEMPERATURE SENSOR - 3.5L**

- 1 - CAMSHAFT POSITION SENSOR
2 - ENGINE COOLANT TEMPERATURE SENSOR

When the engine is cold, the PCM will demand slightly richer air-fuel mixtures and higher idle speeds until normal operating temperatures are reached.

The engine coolant sensor input also determines operation of the low and high speed cooling fans.

REMOVAL

- (1) Disconnect negative cable from remote jumper terminal.
- (2) With the engine cold, disconnect coolant sensor electrical connector (Fig. 5) or (Fig. 6).
- (3) Remove sensor.

INSTALLATION

- (1) Install engine coolant temperature sensor (Fig. 5) or (Fig. 6). Tighten sensor to 28 N·m (20 ft. lbs.) torque.
- (2) Attach electrical connector to sensor.
- (3) Connect negative cable to remote jumper terminal.

ENGINE COOLANT THERMOSTAT

DESCRIPTION

The thermostat on the 2.7L and 3.5L engines are located on the lower left side of engine, near the front (Fig. 7) and (Fig. 8). The thermostat on both engines are on the inlet side of the water pump. The thermostats have an air bleed located in the thermo-

ENGINE COOLANT THERMOSTAT (Continued)

stat flange. The air bleed allows internal trapped air during cooling system filling to be released.

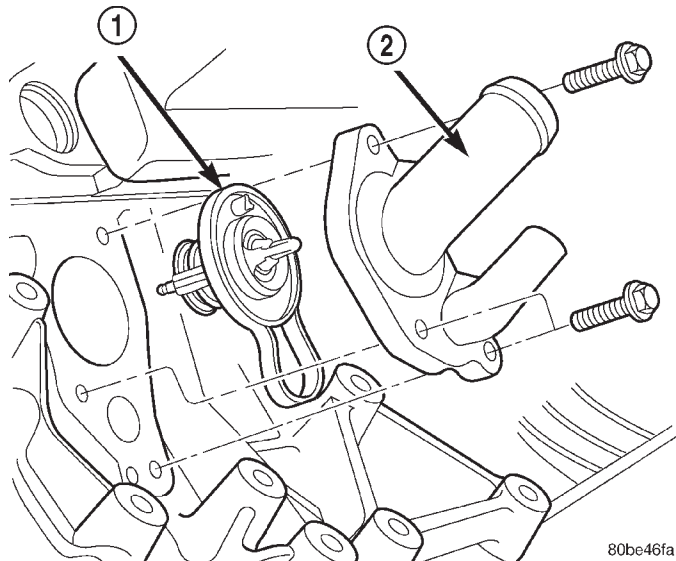


Fig. 7 THERMOSTAT AND HOUSING - 2.7L

- 1 - THERMOSTAT AND GASKET
- 2 - THERMOSTAT HOUSING/COOLANT INLET

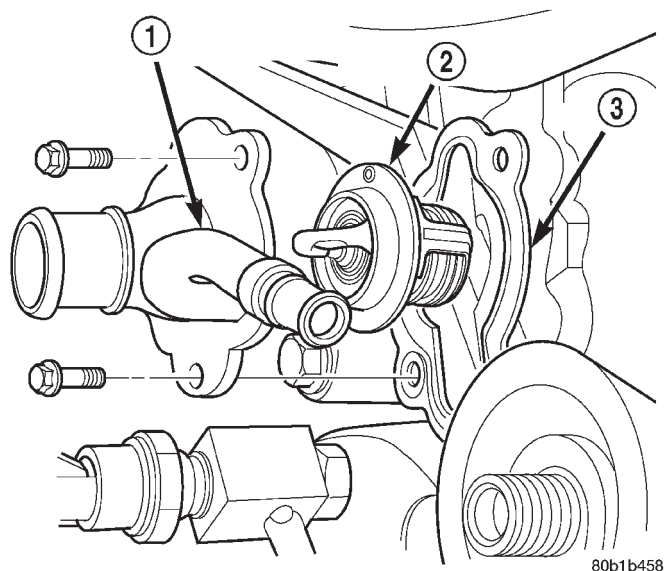


Fig. 8 THERMOSTAT AND HOUSING - 3.5L

- 1 - THERMOSTAT HOUSING/COOLANT INLET
- 2 - THERMOSTAT
- 3 - GASKET

OPERATION

The engine cooling thermostat is a wax pellet driven, reverse poppet type. The thermostat is located in the inlet side of the engine to provide fast warm up and to optimize a consistent temperature in the engine. The thermostat is designed to prevent leakage through it and to guarantee a minimum

engine operating temperature of 82°C (180°F). They also automatically reach wide open at a temperature of approximately 95°C (203°F) so they do not restrict flow to the radiator as temperature of the coolant rises in hot weather to around 104°C (220°F). Above 102°C (215°F) the coolant temperature is controlled by the radiator, fan, and ambient temperature, not the thermostat.

DIAGNOSIS AND TESTING - ENGINE COOLANT THERMOSTAT

The thermostat is operated by a wax filled container (pellet) which is sealed so that when heated to a predetermined temperature, the wax expands enough to overcome the closing spring and water pump pressure, which forces the valve to open. Coolant leakage into the pellet will cause a thermostat to fail open. Do not attempt to free up a thermostat with a screwdriver.

The open too soon type failure mode is included in the on-board diagnosis. The check engine light will not be lit by an open too soon condition. If it has failed open, a DTC diagnostic trouble code will be set. Do not change a thermostat for lack of heat by gauge or heater performance, unless a code is present, (Refer to 7 - COOLING - DIAGNOSIS AND TESTING) for other probable causes. Failing shut is the normal long term mode of failure, and normally, only on high mileage vehicles. The temperature gauge will indicate this condition.

ENGINE COOLANT THERMOSTAT - 2.7L

REMOVAL

(1) Disconnect negative cable from remote jumper terminal.

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(2) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(3) Remove the engine oil dipstick and tube. To prevent coolant from entering engine, cover the dipstick tube opening in crankcase with a suitable plug.

(4) Raise vehicle on hoist.

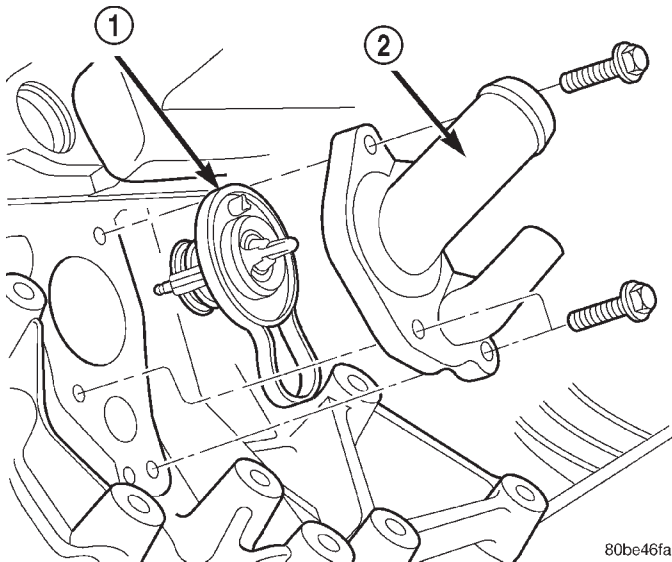
(5) Support the engine and remove the left engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/LEFT MOUNT - REMOVAL).

(6) Remove generator support strut.

(7) Disconnect generator electrical connector.

ENGINE COOLANT THERMOSTAT - 2.7L (Continued)

- (8) Remove the transaxle dipstick tube bracket attaching bolt.
- (9) Remove the lower heater hose tube bracket bolt.
- (10) Remove the lower heater hose from thermostat housing.
- (11) Remove radiator lower hose from thermostat housing.
- (12) Remove thermostat housing bolts (Fig. 9).
- (13) Remove thermostat and housing.

**Fig. 9 Thermostat and Housing - 2.7L**

- 1 - THERMOSTAT AND GASKET
2 - THERMOSTAT HOUSING/COOLANT INLET

INSTALLATION

- (1) Clean gasket sealing surfaces.

NOTE: Install thermostat with the bleed valve located at the 12 o'clock position.

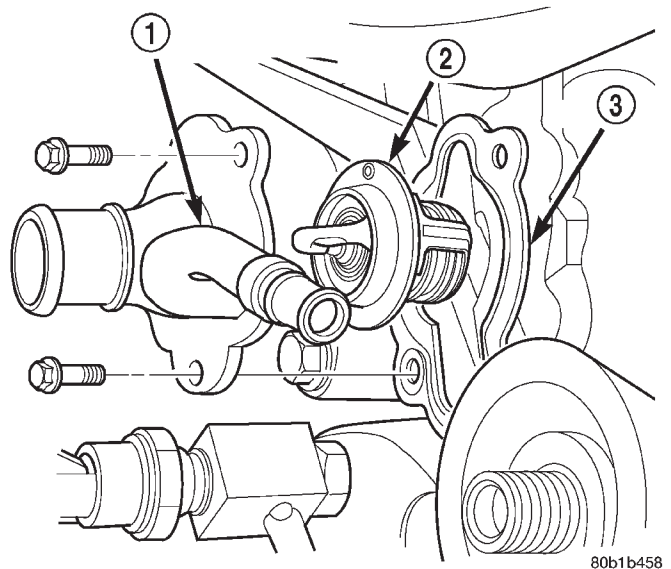
- (2) Install thermostat and gasket into the thermostat housing.
- (3) Install thermostat and housing to cylinder block. Tighten attaching bolts to 12 N·m (105 in. lbs.) (Fig. 9).
- (4) Connect the heater return and radiator lower hoses to the thermostat housing. Install hose clamps.
- (5) Install the heater hose tube bracket bolt.
- (6) Install the transaxle dipstick tube bracket attaching bolt.
- (7) Install the generator support strut.
- (8) Connect the generator electrical connector.
- (9) Install the left engine mount (Refer to 9 - ENGINE/ENGINE MOUNTING/LEFT MOUNT - INSTALLATION).
- (10) Lower vehicle.
- (11) Inspect and replace dipstick O-ring as necessary. Install the engine oil dipstick and tube.

- (12) Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
- (13) Connect negative cable to remote jumper terminal.

ENGINE COOLANT THERMOSTAT - 3.5L**REMOVAL**

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).
- (3) Raise vehicle on hoist.
- (4) Disconnect electrical connectors from engine oil and power steering pressure switches.
- (5) Disconnect radiator and heater hoses from thermostat housing.
- (6) Remove thermostat housing bolts (Fig. 10).
- (7) Remove housing, thermostat, and gasket.

**Fig. 10 Thermostat and Housing - 3.5L**

- 1 - THERMOSTAT HOUSING/COOLANT INLET
2 - THERMOSTAT
3 - GASKET

INSTALLATION

- (1) Clean gasket sealing surfaces.

ENGINE COOLANT THERMOSTAT - 3.5L (Continued)

(2) Install thermostat and gasket into thermostat housing. For ease of installation, install bolts in housing for thermostat and gasket retention.

(3) Install thermostat and housing to cylinder block (Fig. 10). Tighten bolts to 12 N·m (105 in. lbs.).

(4) Connect heater and radiator hoses and install hose clamps.

(5) Connect electrical connectors to engine oil and power steering pressure switches.

(6) Lower vehicle and connect negative cable to remote jumper terminal.

(7) Refill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(8) Connect negative cable to remote jumper terminal.

HEATER SUPPLY TUBE - 2.7L

REMOVAL

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

(1) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(2) Remove radiator upper crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)

(3) Remove radiator upper hose at tube.

(4) Remove heater hose from heater tube at rear of engine.

(5) Disconnect heater tube from retaining clip at rear of engine.

(6) Disconnect electrical connector from coolant temperature sensor.

(7) Remove screws attaching heater tube to outlet connector (Fig. 11).

(8) Disengage heater tube from outlet connector (Fig. 11). To remove heater tube, move forward until the tube clears cylinder heads.

INSTALLATION

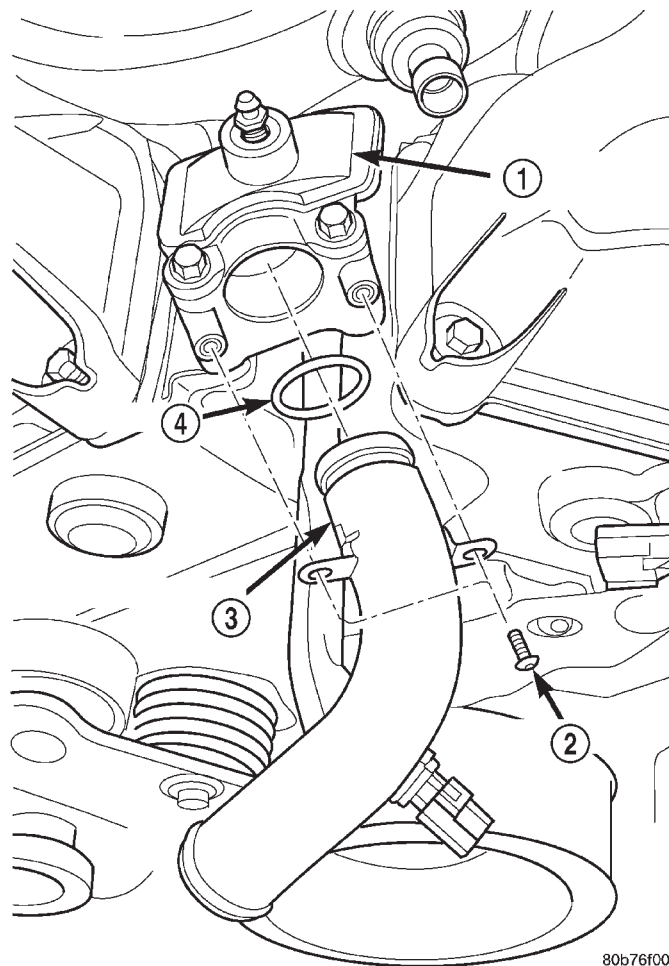
(1) Inspect heater tube O-ring. Replace as necessary.

(2) Lubricate O-ring with a silicone type grease such as Mopar® Dielectric Grease.

(3) Install the heater tube by inserting tube in-between cylinder heads. Insert tube into water outlet housing (Fig. 11).

(4) Attach heater tube to the retaining clip at rear of engine.

(5) Install attaching screws and tighten to 3 N·m (30 in. lbs.).



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Fig. 11 Heater Supply Tube - Removal/Installation

1 - OUTLET CONNECTOR

2 - SCREW (2)

3 - HEATER TUBE

4 - O-RING

(6) Install radiator upper and heater hoses to heater tube.

(7) Connect electrical connector to coolant temperature sensor.

(8) Install radiator upper crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)

(9) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

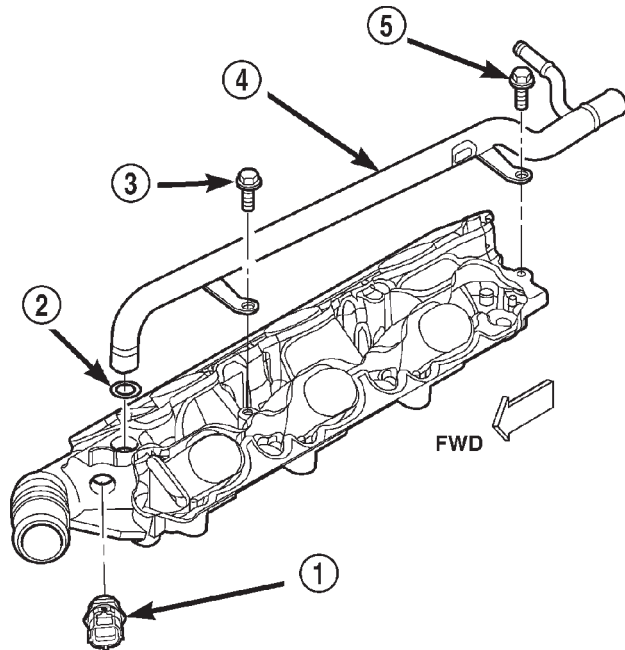
HEATER SUPPLY TUBE - 3.5L

REMOVAL

WARNING: DO NOT REMOVE PRESSURE CAP WITH SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

HEATER SUPPLY TUBE - 3.5L (Continued)

- (1) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (2) Remove upper and lower intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)
- (3) Position lower intake manifold upside down on bench and remove the tube retaining bolt (Fig. 12).
- (4) Remove tube from manifold and discard O-ring.



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Fig. 12 Heater Supply Tube - 3.2/3.5L

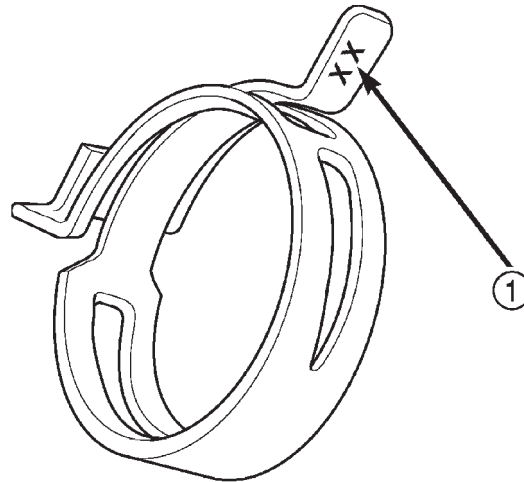
- 1 - COOLANT TEMPERATURE SENSOR
 2 - O-RING
 3 - BOLT
 4 - HEATER SUPPLY TUBE
 5 - BOLT

INSTALLATION

- (1) Clean heater tube sealing surfaces.
- (2) Inspect heater tube O-ring. Replace as necessary.
- (3) Lubricate O-ring with a silicone type grease such as Mopar® Dielectric Grease.
- (4) Install O-ring on heater tube (Fig. 12).
- (5) Install heater tube on manifold.
- (6) Install retaining bolts and tighten to 12 N·m (105 in. lbs.) (Fig. 12).
- (7) Install lower and upper intake manifolds. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)
- (8) Refill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

HOSE CLAMPS**DESCRIPTION**

The cooling system utilizes both worm drive and spring type hose clamps. If a spring type clamp replacement is necessary, replace with the original Mopar® equipment spring type clamp. To identify size of spring hose clamps, the size in millimeters has been stamped on each clamp (Fig. 13). Refer to HOSE CLAMP USAGE CHART for proper size and location of hose clamps.



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Fig. 13 Spring Clamp Size Location

1 - SPRING CLAMP SIZE LOCATION

HOSE CLAMP USAGE CHART

SPRING CLAMP LOCATION		2.7L	3.5L
Upper Radiator Hose	@ engine	39 mm	47 mm
	@ radiator	39 mm	39 mm
Lower Radiator Hose	@ engine	40 mm	39 mm
	@ radiator	39 mm	39 mm
Heater Hoses	3/4"	27 mm	27 mm
	3/8"	17 mm	17 mm

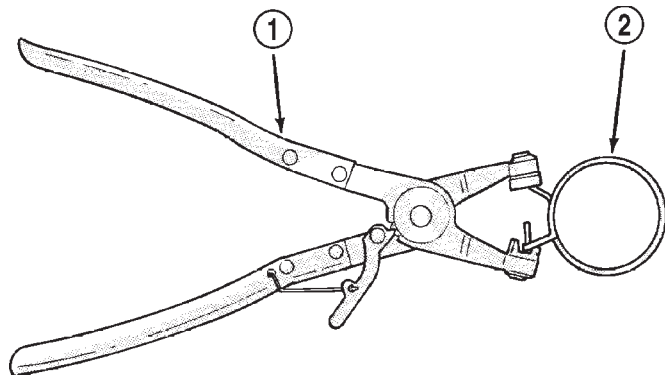
OPERATION

The worm type hose clamp uses a specified torque value to maintain proper tension on a hose connection.

The spring type hose clamp applies constant tension on a hose connection. To remove a spring type hose clamp, use Special Tool 6094 or equivalent, con-

HOSE CLAMPS (Continued)

stant tension clamp pliers (Fig. 14) to compress the hose clamp.



J9207-36

Fig. 14 HOSE CLAMP TOOL

1 - HOSE CLAMP TOOL 6094

2 - HOSE CLAMP

RADIATOR

DESCRIPTION

The radiators are cross-flow types (horizontal tubes) with design features that provide greater strength as well as sufficient heat transfer capabilities to keep the engine satisfactorily cooled. The radiator cooling tubes are made of aluminum and the side tanks are plastic (Fig. 15). The radiator is positioned in the front part of the engine compartment to allow air flow across the cooling fins while vehicle is in motion.

OPERATION

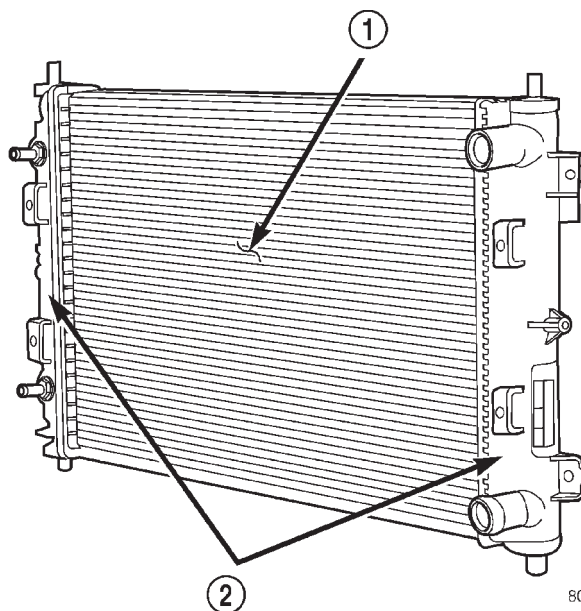
The radiator functions as a heat exchanger, using air flow across the exterior of the radiator tubes. This heat is then transferred from the coolant and into the passing air.

DIAGNOSIS AND TESTING - RADIATOR COOLANT FLOW

To determine whether coolant is flowing through the cooling system, use the following procedure:

- If engine is cold, first idle the engine until normal operating temperature is reached.
- Check temperature of the radiator upper hose. If hose is hot, coolant is circulating.

WARNING: DO NOT REMOVE COOLANT PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.



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Fig. 15 RADIATOR - TYPICAL

1 - COOLING TUBES

2 - TANKS

REMOVAL

NOTE: It is not necessary to discharge air conditioning system when removing the radiator.

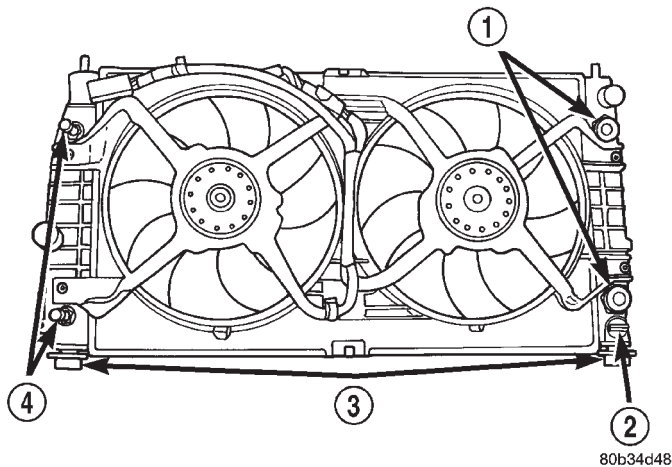
- (1) Disconnect negative cable from remote jumper terminal.

WARNING: DO NOT REMOVE THE CYLINDER BLOCK PLUG OR THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

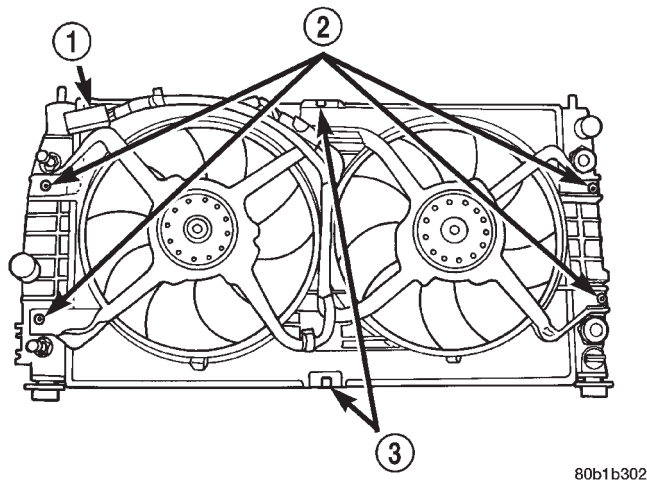
- (2) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (3) Remove radiator upper crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)
- (4) Remove upper and lower coolant hoses from the radiator.
- (5) Disconnect transmission hoses from cooler and plug (Fig. 16).
- (6) Disconnect engine oil cooler lines (if equipped) (Fig. 16).
- (7) Disconnect the radiator fan electrical connector (Fig. 17).
- (8) Remove radiator fan (Fig. 17).

CAUTION: Avoid bending the condenser inlet tube. Care should be taken not to damage radiator or condenser cooling fins or water tubes during removal.

RADIATOR (Continued)

**Fig. 16 RADIATOR**

- 1 - ENGINE OIL COOLER FITTINGS (IF EQUIPPED)
- 2 - DRAINCOCK
- 3 - LOWER MOUNTING ISOLATORS
- 4 - TRANSMISSION COOLER LINE NIPPLES

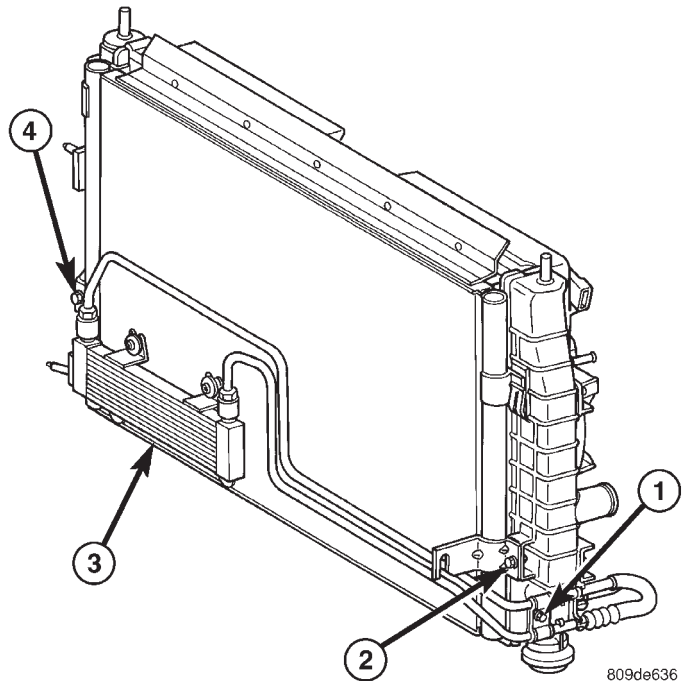
**Fig. 17 RADIATOR FAN**

- 1 - ELECTRICAL CONNECTOR
- 2 - FASTENERS
- 3 - CLIPS

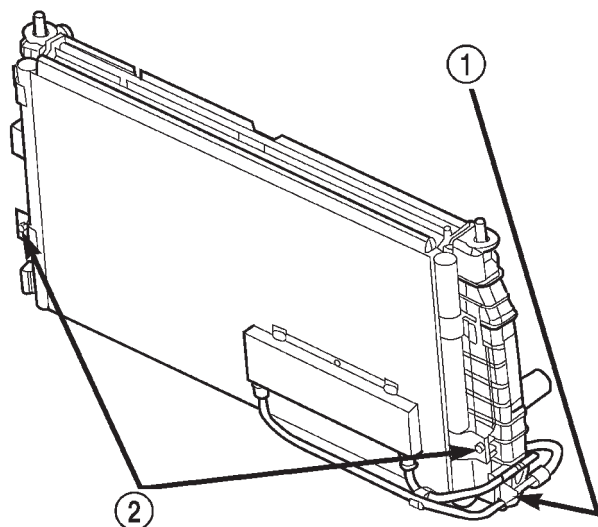
(9) Remove the air conditioning condenser attaching screws located at the front of the radiator (Fig. 18) or (Fig. 19).

(10) Remove fastener attaching transmission cooler line bracket to left side of radiator (Fig. 18) or (Fig. 19).

(11) Lift condenser upward enough to disengage upper mounting clips. Allow condenser to rest on lower radiator crossmember. It is not necessary to discharge the air conditioning system.

**Fig. 18 A/C CONDENSER TO RADIATOR - 3.5L & 2.7L w/AUTO STICK**

- 1 - TRANS COOLER LINE BRACKET SCREW
- 2 - SCREW - CONDENSER TO RADIATOR
- 3 - TRANS COOLER
- 4 - SCREW - CONDENSER TO RADIATOR

**Fig. 19 A/C CONDENSER TO RADIATOR - 2.7L w/o AUTO STICK**

- 1 - TRANSMISSION OIL COOLER LINE MOUNTING BRACKET
- 2 - A/C CONDENSER TO RADIATOR MOUNTING SCREWS

RADIATOR (Continued)

(12) Radiator can now be lifted from engine compartment. **Care should be taken not to damage radiator cooling fins or water tubes during removal.**

CLEANING

Clean radiator fins are necessary for good heat transfer. The radiator and air conditioning fins should be cleaned when an accumulation of debris has occurred. With the engine cold, apply cold water and compressed air to the back (engine side) of the radiator to flush the radiator and/or A/C condenser of debris.

INSPECTION

Inspect the radiator tanks for cracks, broken or missing fittings also inspect the joint where the tanks seam up to the radiator core for signs of leakage and/or deteriorating seals.

Inspect radiator core for corroded, bent or missing cooling fins. Inspect the core for bent or damaged cooling tubes.

INSTALLATION

(1) Position radiator into engine compartment. Seat the radiator assembly lower rubber isolators into the mounting holes in radiator lower support (Fig. 16).

(2) Attach air conditioning condenser to mounting clips on radiator. Install mounting screws and tighten to 5 N·m (45 in. lbs.) (Fig. 18) or (Fig. 19).

(3) Install the radiator lower hose and clamp.

(4) Install the transmission cooler line bracket and attaching fastener (Fig. 18) or (Fig. 19). Connect automatic transmission hoses and torque hose clamps to 3 N·m (28 in. lbs.).

(5) Install the radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)

(6) Connect radiator fan motor electrical connector.

(7) Connect engine oil cooler lines (if equipped). Torque lines to 18 N·m (160 in. lbs.).

(8) Install the radiator upper hose. Align hose so it does not interfere with the accessory drive belt or engine. Position hose clamp so it will not interfere with the hood.

(9) Install the radiator upper support crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)

(10) Connect negative cable to remote jumper terminal.

(11) Fill cooling system with coolant. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(12) Operate engine until it reaches normal operating temperature. Check cooling system and automatic transmission for correct fluid levels.

RADIATOR DRAINCOCK

REMOVAL

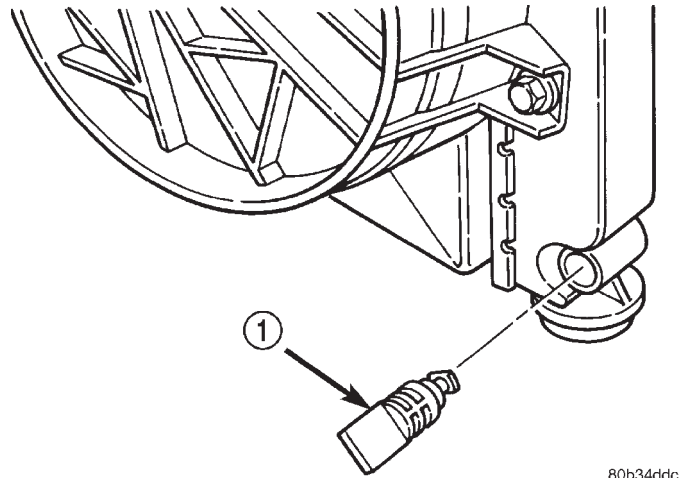
WARNING: DO NOT REMOVE THE CYLINDER BLOCK PLUG OR THE RADIATOR DRAINCOCK WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

CAUTION: Use of pliers on draincock is not recommended. Damage may occur to part. Draincock should not be removed unless leakage is observed.

(1) Drain the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(2) Turn the draincock stem counterclockwise 180 degrees to the 9:00 o'clock position.

(3) With the stem at the 9:00 o'clock position, pull the draincock assembly from the radiator tank (Fig. 20).



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Fig. 20 DRAINCOCK

1 - DRAINCOCK ASSEMBLY

INSTALLATION

(1) Inspect the draincock body and O-ring for damage. Replace as necessary.

(2) Position the draincock assembly horizontally to the tank opening with the manufactures identification mark facing down.

(3) Push the draincock assembly into the tank opening while rotating clockwise until it snaps into place.

(4) Close the draincock stem by turning clockwise until it stops at the horizontal position.

(5) Fill the cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

PRESSURE CAP

DESCRIPTION

The cooling system cap is located on the coolant pressure bottle. The cap construction includes; stainless steel swivel top, rubber seals and retainer, main spring, and a spring loaded valve (Fig. 21).

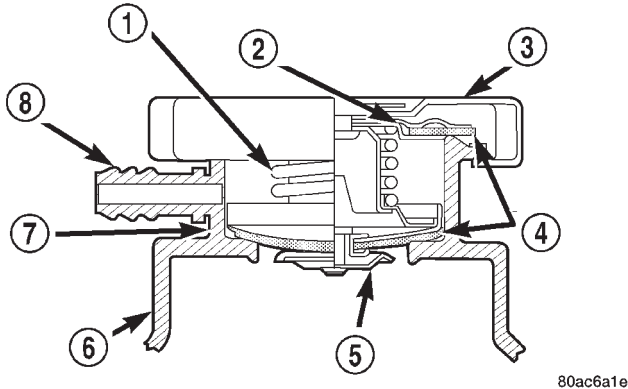


Fig. 21 PRESSURE CAP

- 1 - MAIN SPRING
- 2 - GASKET RETAINER
- 3 - STAINLESS STEEL SWIVEL TOP
- 4 - RUBBER SEALS
- 5 - SPRING LOADED VALVE
- 6 - COOLANT PRESSURE BOTTLE
- 7 - FILLER NECK
- 8 - OVERFLOW NIPPLE

OPERATION

The pressure cap allows the cooling system to operate at higher than atmospheric pressure which raises the coolant boiling point, thus allowing increased radiator cooling capacity. The pressure cap releases pressure at some point within a range of 110 kPa \pm 14 kPa (16 psi \pm 2 psi) (Fig. 21).

A spring-loaded vent valve in the center of the cap allows the system to pressurize and depressurize without creating a vacuum. If the valve is stuck open, coolant will escape to the overflow hose. There is also a gasket in the cap to seal to the top of the filler neck.

CAUTION: Use only the pressure cap specified for this vehicle. Use of other pressure caps can lead to coolant loss and overheating.

INSPECTION

WARNING: IF VEHICLE HAS BEEN RUN RECENTLY, WAIT 15 MINUTES BEFORE REMOVING CAP. THEN PLACE A SHOP TOWEL OVER THE CAP AND WITHOUT PUSHING DOWN ROTATE IT COUNTERCLOCKWISE TO THE FIRST STOP. ALLOW FLUIDS TO

ESCAPE THROUGH THE OVERFLOW TUBE AND WHEN THE SYSTEM STOPS PUSHING OUT COOLANT AND STEAM AND PRESSURE DROPS, REMOVE THE CAP COMPLETELY. SQUEEZING THE RADIATOR INLET HOSE WITH A SHOP TOWEL (TO CHECK PRESSURE) BEFORE AND AFTER TURNING TO THE FIRST STOP IS RECOMMENDED.

WARNING: THE WARNING WORDS DO NOT OPEN HOT ON THE COOLANT BOTTLE PRESSURE CAP IS A SAFETY PRECAUTION. WHEN HOT, PRESSURE BUILDS UP IN COOLING SYSTEM. TO PREVENT SCALDING OR INJURY, THE COOLANT BOTTLE PRESSURE CAP SHOULD NOT BE REMOVED WHILE THE SYSTEM IS HOT AND/OR UNDER PRESSURE.

The pressure cap upper gasket (seal) pressure relief can be checked by removing cap. Attach a suitable Cooling System Tester such as Tool 7700 to the cap and pump air into the cap. Pressure cap upper gasket should relieve at 124 kPa (18 psi) and hold pressure at 110 kPa (16 psi) minimum.

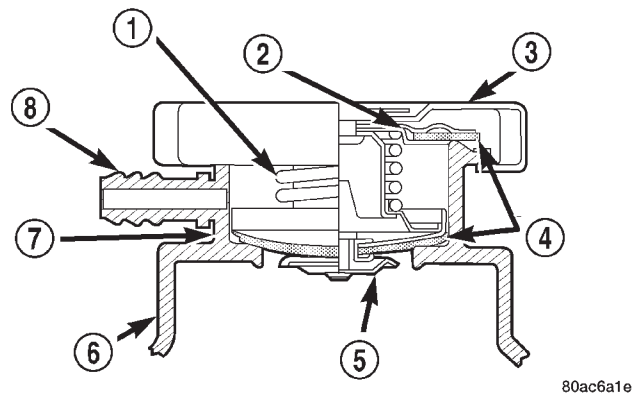


Fig. 22 PRESSURE CAP

- 1 - MAIN SPRING
- 2 - GASKET RETAINER
- 3 - STAINLESS STEEL SWIVEL TOP
- 4 - RUBBER SEALS
- 5 - SPRING LOADED VALVE
- 6 - COOLANT PRESSURE BOTTLE
- 7 - FILLER NECK
- 8 - OVERFLOW NIPPLE

Remove the pressure tester and hold the cap in hand, **right side up** (Fig. 22). The vent valve at the bottom of the cap should not open. If the rubber gasket has swollen and prevents the valve from closing, replace the cap.

Hold the cap in hand **upside down**. If any light can be seen between vent valve and rubber gasket, replace cap.

PRESSURE CAP (Continued)

There is no need to remove the pressure cap at any time **except** for the following purposes:

- Checking and adjust antifreeze freeze point.
- Refilling system with new coolant.
- Conducting service procedures.
- Checking for vacuum leaks.

RADIATOR FAN

DESCRIPTION

The radiator fan assembly includes two electric motors, a motor support, and a one piece shroud. The assembly is fastened to the radiator by screws with square nuts and retaining clips (Fig. 23).

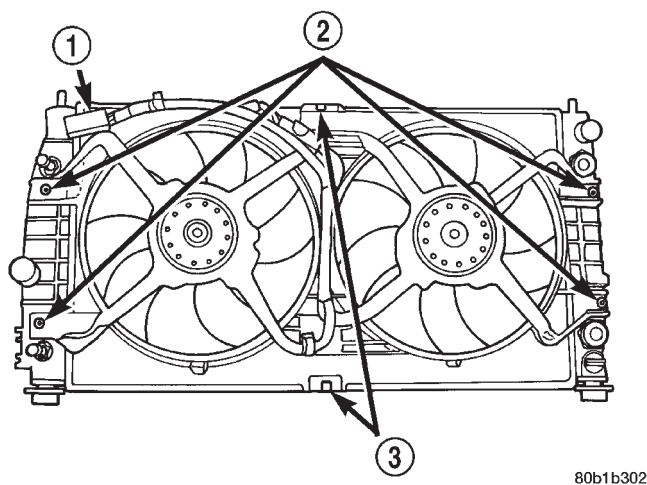


Fig. 23 RADIATOR FAN

- 1 - ELECTRICAL CONNECTOR
2 - FASTENERS
3 - CLIPS

OPERATION

The cooling system fans will operate at two speeds and are simultaneously activated. The dual fan system improves engine cooling and air conditioning performance in hot weather and severe driving conditions, while reducing fan noise and power consumption.

The cooling fans will operate based on inputs to the Powertrain Control Module (PCM). When fan operation is determined necessary, the PCM provides a ground to the fan relay control circuit.

The inputs provided to the PCM that influence fan operation are:

- Coolant Temperature Sensor
- Intake Air Temperature Sensor
- Output Speed Sensor
- Transmission Oil Temperature Sensor
- A/C Pressure Transducer

For more information (Refer to 7 - COOLING/ENGINE/RADIATOR FAN RELAY - OPERATION).

DIAGNOSIS AND TESTING - RADIATOR FAN CONTROL

Radiator fan control can be accomplished five ways. A pressure transducer on the air conditioning compressor discharge line sends a signal to the Powertrain Control Module (PCM) which will activate both fans if necessary. In addition to this control, the fans are turned on based on coolant temperature sensor, intake air temperature sensor, output speed sensor, and transmission oil temperature sensor output to the PCM. The PCM switches the fans on through the fan relays.

The PCM provides fan control for the following conditions:

- Regardless of coolant temperature the fan will not run during cranking until the engine starts.
- Fans will run in accordance with the specifications listed in the following operation charts.

For additional circuit and diagnostic information (Refer to Appropriate Wiring and Diagnostic Information).

RADIATOR FAN (Continued)

RADIATOR FAN OPERATION—2.7L ENGINE

ENGINE COOLANT TEMPERATURE							INTAKE (CHARGE) TEMPERATURE	
	A/C Off		A/C On		Engine @ Idle < 13 Km/h (8 MPH) Vehicle Speed		Vehicle Speed < 45 Km/h (28 MPH)**	
Fan Speed	Low	High	Low	High	Low	High	Low	High
Fan On:	106°C (223°F)	110°C (230°F)	105°C (221°F)	110°C (230°F)	104°C (219°F) - After 1st Fan Cycle	110°C (230°F)	65°C (149°F) if coolant < 93°C (199°F) 61°C (142°F) if coolant > 105°C (221°F)	After Low Fan On for 8 minutes.
Fan Off:	102°C (216°F)	107°C (225°F)	102°C (216°F)	106°C (223°F)	Fan on time = 4 minutes*	105°C (221°F)	64°C (147°F) if coolant < 92°C (197°F) 60°C (140°F) if coolant > 104°C (219°F)	Fan on time = 4 minutes*

*Minimum fan on time = 90 seconds

**Note: If low fan is on for 8 minutes, fan turns on high speed for 4 minutes, then goes back to low speed.

	A/C PRESSURE		TRANSMISSION OIL TEMPERATURE	
Fan Speed	Low	High	Low	High
Fan On:	1,448 Kpa (210 psi)	1,717 Kpa (249 psi)	109°C (228°F)	111°C (232°F)
Fan Off:	1,207 Kpa (175 psi)	1,503 Kpa (218 psi)	104°C (220°F)	109°C (228°F)

RADIATOR FAN OPERATION—3.5L ENGINE

ENGINE COOLANT TEMPERATURE					INTAKE (CHARGE) AIR TEMPERATURE	
	A/C Off/On		Engine @ Idle < 13 Km/h (8 MPH) Vehicle Speed		Vehicle Speed < 45 Km/h (28 MPH)	
Fan Speed	Low	High	Low	High	Low	High
Fan On:	102°C (216°F)	110°C (230°F)	99°C (210°F) - After 2nd Fan Cycle	110°C (230°F)	71°C (159°F) if coolant < 93°C (199°F) 66°C (150°F) if coolant > 99°C (210°F)	72°C (162°F)
Fan Off:	99°C (210°F)	105°C (221°F)	Fan on time = 4 minutes*	105°C (221°F)	Fan on time = 8 minutes*	Fan on time = 4 minutes*

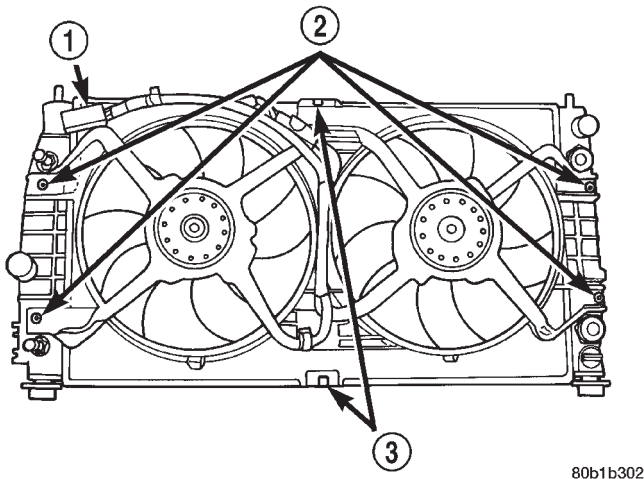
*Minimum fan on time = 90 seconds

	A/C PRESSURE		TRANSMISSION OIL TEMPERATURE	
Fan Speed	Low	High	Low	High
Fan On:	1,448 Kpa (210 psi)	1,717 Kpa (249 psi)	102°C (216°F)	109°C (228°F)
Fan Off:	1,207 Kpa (175 psi)	1,510 Kpa (219 psi)	98°C (208°F)	107°C (224°F)

RADIATOR FAN (Continued)

REMOVAL

- (1) Remove radiator upper crossmember (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL).
- (2) Disconnect radiator fan motor electrical connector.
- (3) Partially drain cooling system below the level of the upper radiator hose.
- (4) Disconnect upper radiator hose from radiator.
- (5) Remove radiator fan attaching fasteners and upper clip (Fig. 24).
- (6) Remove radiator fan by lifting upward to clear radiator.

**Fig. 24 RADIATOR FAN**

- 1 - ELECTRICAL CONNECTOR
- 2 - FASTENERS
- 3 - CLIPS

INSTALLATION

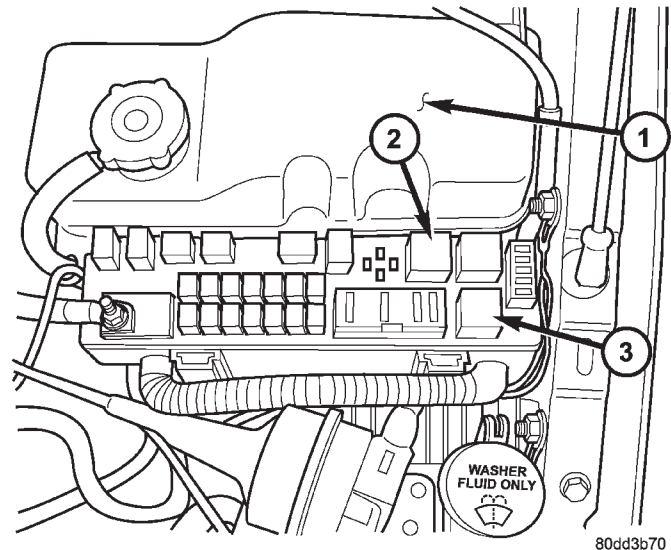
- (1) Install radiator fan.
- (2) Install upper clip and fasteners (Fig. 24).
- (3) Connect upper radiator hose to radiator.
- (4) Connect fan motor electrical connector (Fig. 24).
- (5) Install radiator upper crossmember (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION).
- (6) Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE - COOLING SYSTEM FILLING).

RADIATOR FAN RELAY

DESCRIPTION

The HI/LO and HI radiator fan relays are located in the Power Distribution Center (PDC) near the coolant recovery pressure container (Fig. 25). A decal on the inside of the PDC covers shows the location of

each relay and fuse contained in the PDC. It is an ISO relay.

**Fig. 25 Radiator Fan Relays (HI/LO & HI)**

- 1 - COOLANT RECOVERY PRESSURE CONTAINER
- 2 - RADIATOR FAN HI/LO RELAY
- 3 - RADIATOR FAN HI RELAY

All vehicles (except 2.7L base) are also equipped with No. 1 and No. 2 radiator fan relays that are mounted to the radiator fan motor shroud (Fig. 26).

OPERATION

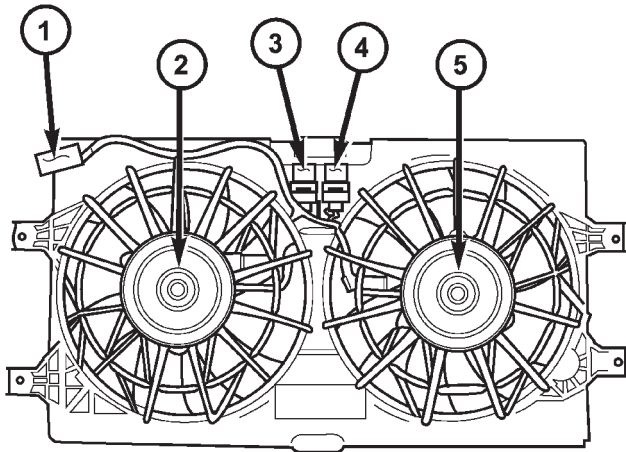
2.7L BASE

The cooling system uses two fans. Both fans operate at two different speeds, low and high. Depending on engine coolant temperature and A/C system high side pressure, the fans operate at either low or high speed. The PCM controls radiator fan speed by grounding the coil side of either the HI/LO fan relay or the HI fan relay. The ignition switch supplies voltage to the coil sides of the relay. When the PCM grounds the coil side of the relay, the contacts close and the battery supplies power to the fans. Refer to WIRING DIAGRAMS.

EXCEPT 2.7L BASE

The cooling system uses two fans. Both fans operate at two different speeds, low and high. Depending on engine coolant temperature and A/C system high side pressure, the fans operate at either low or high speed. The PCM controls radiator fan speed by grounding the coil side of either the HI/LO fan relay or the HI fan relay. Low speed radiator fan function is achieved by running both fan motors in a series circuit. High speed radiator fan function is achieved

RADIATOR FAN RELAY (Continued)



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Fig. 26 Radiator Fan Relays - No. 1 & No. 2 (Except 2.7L Base)

- 1 - ELECTRICAL CONNECTOR
- 2 - RADIATOR FAN MOTOR NO. 2
- 3 - RADIATOR FAN RELAY NO. 2
- 4 - RADIATOR FAN RELAY NO. 1
- 5 - RADIATOR FAN MOTOR NO. 1

by running both fan motors in a parallel circuit. Refer to WIRING DIAGRAMS.

WATER PUMP

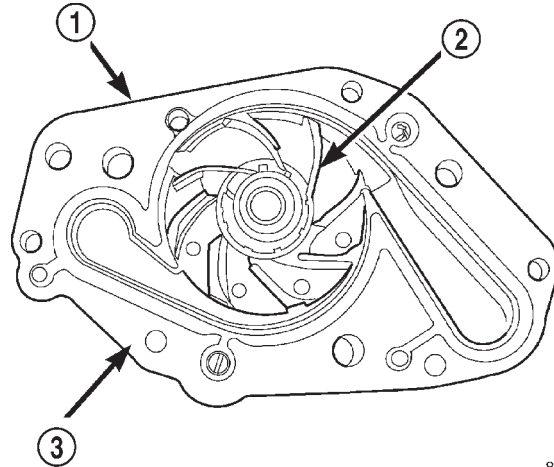
DIAGNOSIS AND TESTING - WATER PUMP

A quick test to determine water pump operation is to check for proper heater system performance (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING). A defective pump will not circulate heated coolant through the heater hoses. For additional diagnosis, (Refer to 7 - COOLING - DIAGNOSIS AND TESTING). For water pump inspection, (Refer to 7 - COOLING/ENGINE/WATER PUMP - INSPECTION).

WATER PUMP - 2.7L

DESCRIPTION

The 2.7L pump has a die cast aluminum housing and a plastic swept vane impeller. It bolts directly to the cylinder block, behind the timing chain cover (Fig. 27). The water pump is driven by the back side of the engine primary timing chain.



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Fig. 27 WATER PUMP - 2.7L ENGINE

- 1 - WATER PUMP BODY
- 2 - IMPELLER
- 3 - GASKET

REMOVAL

The water pump on all models can be replaced without discharging the air conditioning system.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain at weep passage). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident on side of the cylinder block from the weep hole passage (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND PRESSURIZED. SERIOUS BURNS FROM COOLANT CAN RESULT.

- (1) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (2) Remove radiator upper crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)
- (3) Remove radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)
- (4) Remove accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

NOTE: The water pump is driven by the primary timing chain.

- (5) Remove the timing chain and all chain guides. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

WATER PUMP - 2.7L (Continued)

(6) Remove bolts attaching water pump to block (Fig. 28).

(7) Remove water pump and gasket.

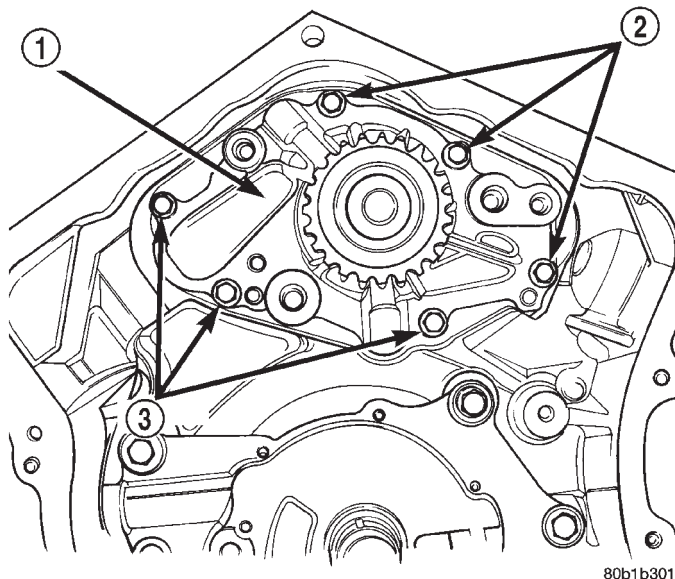


Fig. 28 WATER PUMP - 2.7L

- 1 - WATER PUMP
- 2 - BOLTS
- 3 - BOLTS

INSPECTION

Inspect and replace the water pump if it has any of the following defects:

- (1) Damage or cracks on the pump body.
- (2) Coolant leaks; if the seal is leaking, this will be evident by traces of thick deposits of dried glycol draining from the pump weep passage (Fig. 29), and components below. A thin black stain below pump weep hole/passage is considered normal operation.
- (3) Impeller rubs inside of cylinder block.
- (4) Excessively loose or rough turning bearing.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident from the weep passage (Fig. 29). This indicates a shaft seal failure and pump must be replaced. Be sure to perform a thorough analysis before replacing water pump.

INSTALLATION

- (1) Clean all sealing surfaces.
- (2) Install water pump and gasket. Tighten mounting bolts to 12 N·m (105 in. lbs.).
- (3) Install timing chain guides and timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION).

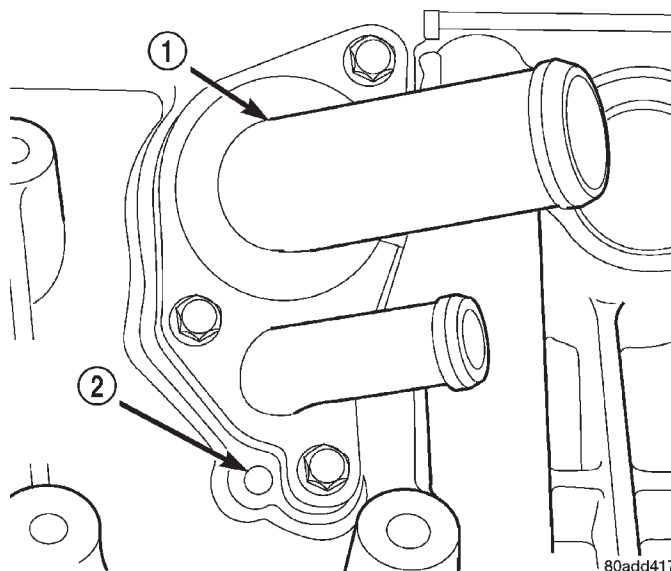


Fig. 29 WATER PUMP WEEP PASSAGE - 2.7L

- 1 - THERMOSTAT HOUSING/COOLANT INLET
- 2 - WATER PUMP WEEP PASSAGE

(4) Install the timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(5) Install the crankshaft damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION).

(6) Install the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(7) Install the radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION) and

(8) Install the radiator upper crossmember (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION).

(9) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

WATER PUMP - 3.5L

DESCRIPTION

The 3.5L water pump has a die cast aluminum housing and a plastic swept vane impeller. It bolts directly to the right rear timing belt cover using an O-ring for sealing (Fig. 31). The water pump is driven by the engine timing belt.

REMOVAL

The water pump on all models can be replaced without discharging the air conditioning system.

WARNING: DO NOT REMOVE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

WATER PUMP - 3.5L (Continued)

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident on water pump body from the weep hole (shaft seal failure). Be sure to perform a thorough analysis before replacing water pump.

(1) Drain cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(2) Remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

NOTE: The water pump is driven by the timing belt.

(3) Remove engine timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

(4) Remove water pump mounting bolts (Fig. 30). Note position of longer bolt for proper re-installation.

(5) Remove water pump body from engine (Fig. 30).

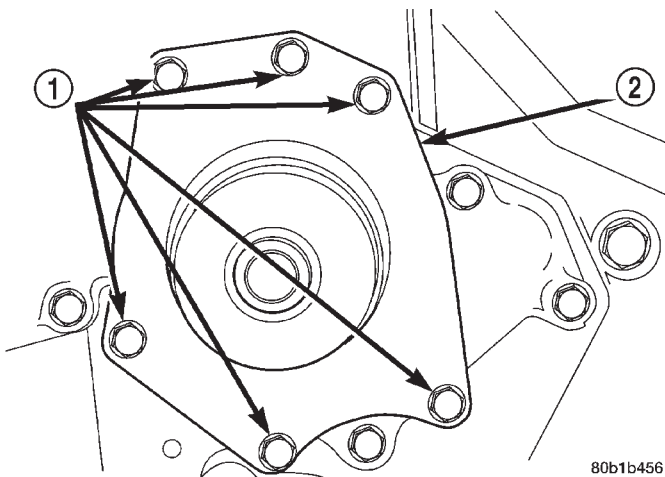


Fig. 30 WATER PUMP - 3.5L ENGINE

- 1 - SCREWS
- 2 - WATER PUMP BODY

INSPECTION

Inspect and replace the water pump if it has any of the following defects:

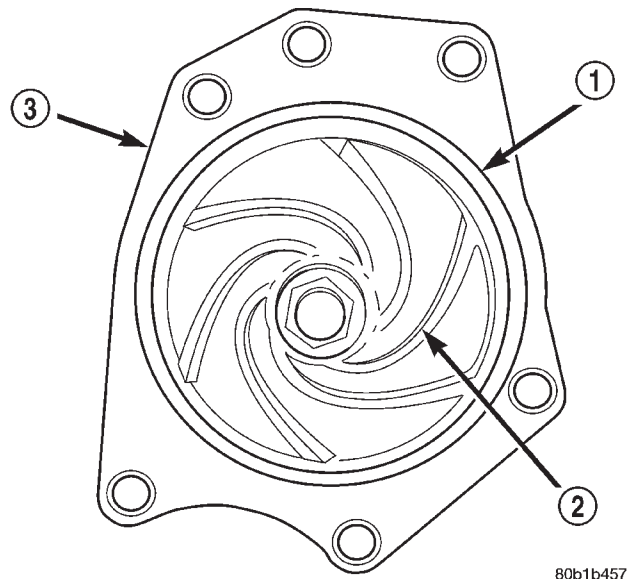
- (1) Damage or cracks on the pump body.
- (2) Coolant leaks; if the seal is leaking, this will be evident by traces of thick deposits of dried glycol running down the pump body and components below. A thin black stain below pump weep hole/passage is considered normal operation.
- (3) Impeller rubs inside of the rear timing belt cover.
- (4) Excessively loose or rough turning bearing.

NOTE: It is normal for the water pump to weep a small amount of coolant from the weep hole (black stain on water pump body). Do not replace the water pump if this condition exists. Replace the water pump if a heavy deposit or a steady flow of engine coolant is evident on water pump body. This indicates a shaft seal failure and pump must be replaced. Be sure to perform a thorough analysis before replacing water pump.

INSTALLATION

(1) Clean all O-ring surfaces on pump and cover.

(2) Apply Mopar® Dielectric Grease or the equivalent silicone grease to the O-ring to facilitate assembly. Install new O-ring on water pump (Fig. 31).



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Fig. 31 WATER PUMP - 3.5L

- 1 - O-RING
- 2 - IMPELLER
- 3 - WATER PUMP BODY

- (3) Position water pump to engine.
- (4) Install mounting bolts and tighten to 12 N·m (105 in. lbs.).
- (5) Install timing belt (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION).
- (6) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
- (7) Fill cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

TRANSMISSION

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TRANSMISSION

STANDARD PROCEDURE - FLUSHING
COOLERS AND TUBES

The recommended procedure for cooler flushing is to use Tool 6906 Cooler Flusher.

WARNING: WEAR PROTECTIVE EYEWEAR THAT MEETS THE REQUIREMENTS OF OSHA AND ANSI Z87.1-1968. WEAR STANDARD INDUSTRIAL RUBBER GLOVES. KEEP LIT CIGARETTES, SPARKS, FLAMES, AND OTHER IGNITION SOURCES AWAY FROM THE AREA TO PREVENT THE IGNITION OF COMBUSTIBLE LIQUIDS AND GASES. KEEP A CLASS (B) FIRE EXTINGUISHER IN THE AREA WHERE THE FLUSHER WILL BE USED.

WARNING: KEEP THE AREA WELL VENTILATED. DO NOT LET FLUSHING SOLVENT COME IN CONTACT WITH YOUR EYES OR SKIN: IF EYE CONTAMINATION OCCURS, FLUSH EYES WITH WATER FOR 15 TO 20 SECONDS. REMOVE CONTAMINATED CLOTHING AND WASH AFFECTED SKIN WITH SOAP AND WATER. SEEK MEDICAL ATTENTION.

(1) Remove cover plate filler plug on Tool 6906. Fill reservoir 1/2 to 3/4 full of fresh flushing solution. Use Mopar® Transmission Cooler Flush (MS-552) or equivalent solution conforming to MS-552. Flushing solvents are petroleum based solutions generally used to clean automatic transmission components. **DO NOT** use solvents containing acids, water, gasoline, or any other corrosive liquids.

(2) Reinstall filler plug on Tool 6906.

(3) Verify pump power switch is turned OFF. Connect red alligator clip to positive (+) battery post. Connect black (-) alligator clip to a good ground.

NOTE: When flushing transmission cooler and lines, ALWAYS reverse flush.

(4) Connect the BLUE pressure line to the OUTLET (From) cooler line.

(5) Connect the CLEAR return line to the INLET (To) cooler line

(6) Turn pump ON for two to three minutes to flush cooler and lines.

(7) Turn pump OFF.

(8) Disconnect CLEAR suction line from reservoir at cover plate. Disconnect CLEAR return line at cover plate, and place it in a drain pan.

(9) Turn pump ON for 30 seconds to purge flushing solution from cooler and lines. Turn pump OFF.

(10) Place CLEAR suction line into a one quart container of Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602).

(11) Turn pump ON until all transmission fluid is removed from the one quart container and lines. This purges any residual cleaning solvent from the transmission cooler and lines. Turn pump OFF.

(12) Disconnect alligator clips from battery. Reconnect flusher lines to cover plate, and remove flushing adapters from cooler lines.

TRANSMISSION OIL COOLER

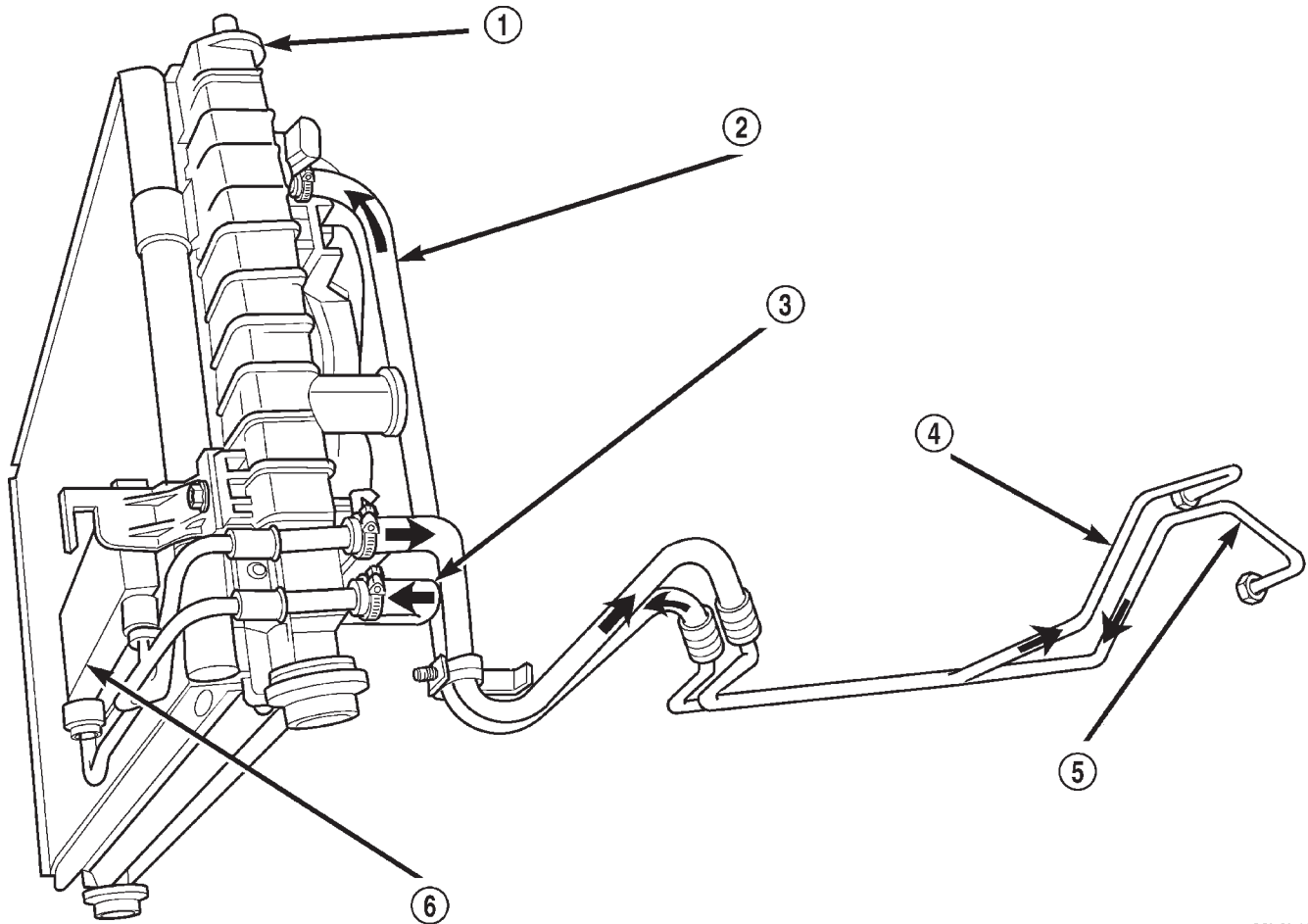
DESCRIPTION

The transmission oil cooler circuit consists of a series connected internal cooler mounted inside the left radiator tank and an external oil cooler mounted to the front of the air conditioning condenser (Fig. 1).

OPERATION

Transmission oil is supplied to the internal (in-tank) transmission cooler (Fig. 1). The oil is then routed to the external cooler mounted to the front side of the A/C condenser. Oil is then returned to the transmission from the external oil cooler (Fig. 1).

TRANSMISSION OIL COOLER (Continued)



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Fig. 1 TRANSMISSION OIL COOLER

1 - RADIATOR

2 - TRANSMISSION OIL COOLER SUPPLY LINE TO IN-TANK COOLER

3 - FROM IN-TANK COOLER TO EXTERNAL OIL COOLER

4 - TRANSMISSION OIL RETURN LINE

5 - TRANSMISSION OIL SUPPLY LINE TO IN-TANK OIL COOLER

6 - EXTERNAL TRANSMISSION OIL COOLER

REMOVAL

The in-tank transmission oil cooler is serviced with the radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL).

For removal of external trans cooler perform the following procedures:

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Remove the radiator upper support (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL).
- (3) Raise vehicle on hoist.
- (4) Remove right and left front wheels.
- (5) Remove front fascia (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - REMOVAL).
- (6) Disconnect the hoses connecting to the external cooler.
- (7) Remove the radiator side air shields.

(8) Remove the screw attaching the cooler line support bracket and remove the bracket.

(9) Cut-off the cooler to condenser attaching straps (Fig. 2).

(10) Remove the transmission oil cooler and lines (Fig. 2).

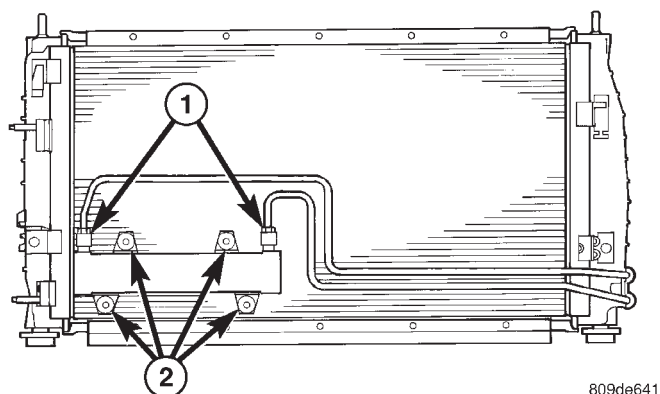
CLEANING

Check the external cooler for debris on the cooling fin surfaces. Clean as necessary. For internal cleaning/flushing procedures, (Refer to 7 - COOLING/TRANSMISSION - STANDARD PROCEDURE).

INSPECTION

Inspect all hoses, tubes, clamps and connections for leaks, cracks, or damage. Replace as necessary. Use only approved transmission oil cooler hoses that are molded to fit the space available.

TRANSMISSION OIL COOLER (Continued)

**Fig. 2 TRANSMISSION OIL COOLER**

- 1 - COOLER LINE FITTINGS - 19 N·m (170 in. lbs.)
2 - COOLER RETAINING STRAPS

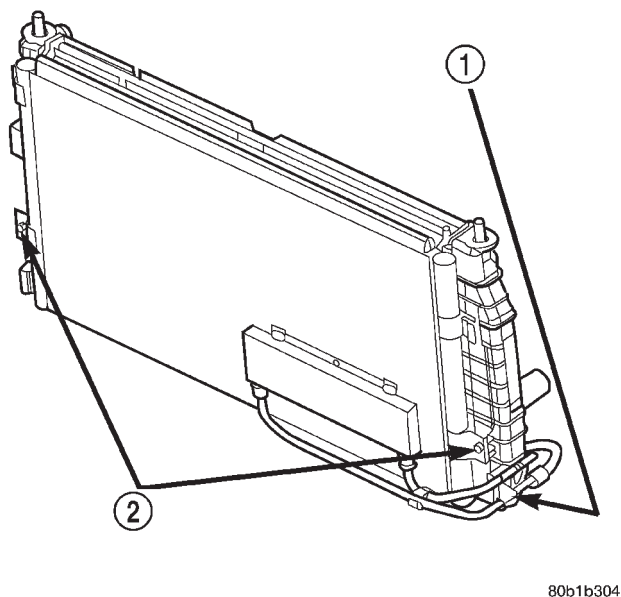
Inspect external coolers for leaks, loose mounts, or damage. Replace as necessary.

INSTALLATION

For in-tank transmission oil cooler installation (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION).

For external trans oil cooler installation, perform the following procedures:

- (1) Remove the bolts attaching the A/C condenser to the radiator (Fig. 3).
- (2) Lift A/C condenser up to disengage from upper retainers on radiator.

**Fig. 3 A/C CONDENSER TO RADIATOR**

- 1 - TRANSMISSION OIL COOLER LINE MOUNTING BRACKET
2 - A/C CONDENSER TO RADIATOR MOUNTING SCREWS

- (3) Reposition the A/C condenser to allow access to condenser rear surface.

- (4) Remove the previously cut-off cooler retaining straps.

- (5) Position and install the new retaining straps in the same locations on the condenser.

- (6) Reposition A/C condenser on the radiator upper retainers.

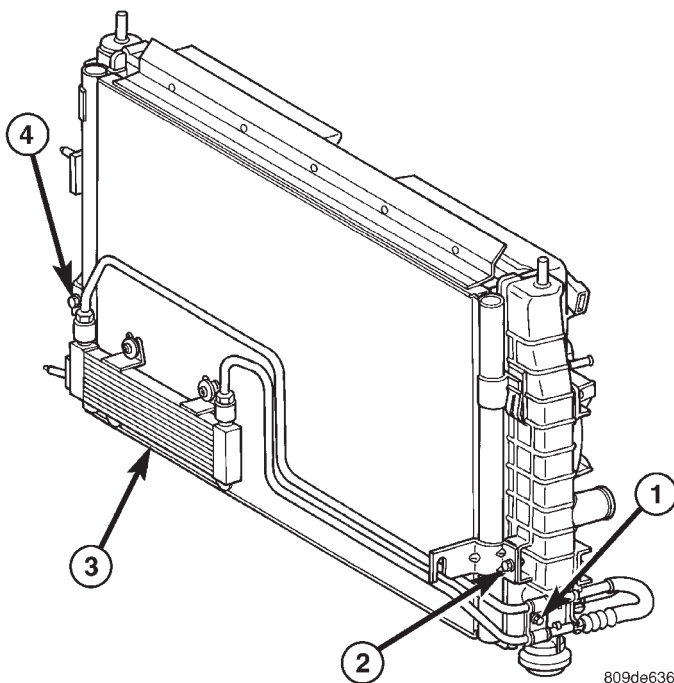
- (7) Install the A/C condenser mounting bolts and tighten to 5 N·m (45 in. lbs.) (Fig. 3).

- (8) Install the foam pads on the retaining straps

- (9) Position the transmission oil cooler on A/C condenser by guiding the retaining straps through the cooler mounting holes (Fig. 2).

- (10) Position the external cooler lines to the side of radiator. Install support bracket and screw (Fig. 4).

- (11) Install the retaining strap locks and tighten to secure the cooler to the condenser. Trim off the excess strap material.

**Fig. 4 A/C CONDENSER TO RADIATOR**

- 1 - TRANS COOLER LINE BRACKET SCREW
2 - SCREW - CONDENSER TO RADIATOR
3 - TRANS COOLER
4 - SCREW - CONDENSER TO RADIATOR

- (12) Connect the cooler hoses to cooler lines and tighten hose clamps to 3 N·m (28 in. lbs.).

- (13) Install radiator side air shields.

- (14) Install the front fascia (Refer to 13 - FRAMES & BUMPERS/BUMPERS/FRONT FASCIA - INSTALLATION).

- (15) Install the front wheels

TRANSMISSION OIL COOLER (Continued)

(16) Install the radiator upper support (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION).

(17) Connect negative cable to remote jumper terminal.

(18) Start engine and check transmission oil level. Adjust level as necessary.

TRANSMISSION OIL COOLER LINES

REMOVAL

(1) Loosen hose clamps at radiator connections and remove cooler hoses (Fig. 5).

(2) Remove lines from transmission.

(3) Remove lines from supports.

INSPECTION

Inspect all cooler lines and clamps. Replace as necessary.

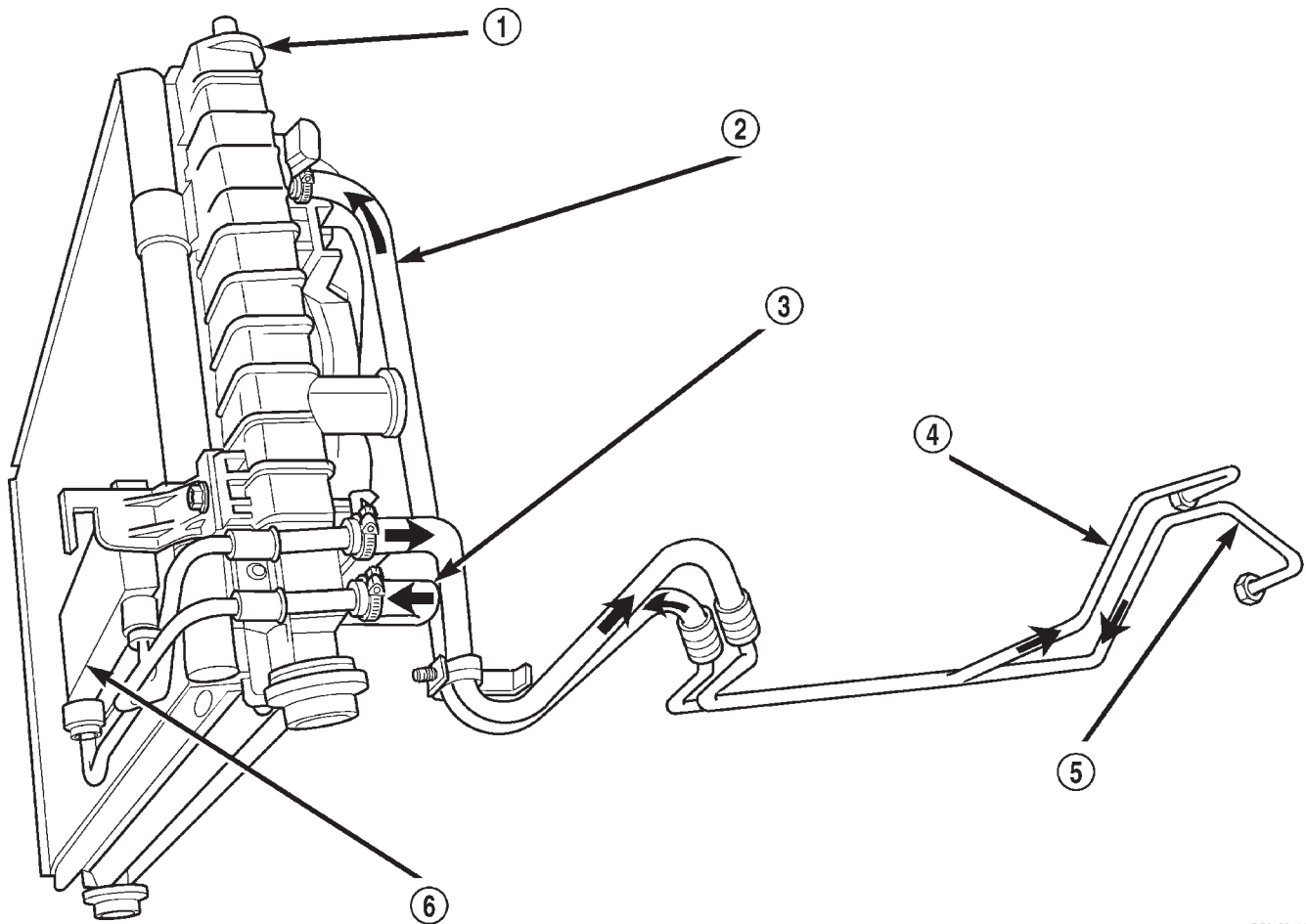
INSTALLATION

(1) Position cooler lines and connect to transmission. Torque flare nuts at transmission to 30 N·m (260 in. lbs.).

(2) Connect cooler lines to supports.

(3) Connect cooler hoses to radiator (Fig. 5). Tighten hose clamps to 3 N·m (28 in. lbs.).

(4) Start engine and check transmission fluid level. Adjust as necessary.



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Fig. 5 TRANSMISSION OIL COOLER

1 - RADIATOR

2 - TRANSMISSION OIL COOLER SUPPLY LINE TO IN-TANK COOLER

3 - FROM IN-TANK COOLER TO EXTERNAL OIL COOLER

4 - TRANSMISSION OIL RETURN LINE

5 - TRANSMISSION OIL SUPPLY LINE TO IN-TANK OIL COOLER

6 - EXTERNAL TRANSMISSION OIL COOLER

AUDIO

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AUDIO SYSTEM

DESCRIPTION

There are four different system combinations available on the LH models. They are a Base, Midline, Infinity I, and Infinity II system.

BASE SYSTEM The Base System includes:

- AM-FM stereo radio with cassette player.
- Two 6.5 inch round, full-range speakers in the front doors.
- Two 6 x 9-inch, full-range speakers mounted in the rear shelf panel.

MIDLINE SYSTEM The Midline System includes:

- AM-FM radio with cassette player.
- AM-FM stereo radio with CD/cassette.
- A compact 120 watt power amplifier with four output channels.
- Two 2.5 inch, round single-cone speakers in the lower front corners of the front door windows.
- Two 6.5 inch, round single-cone speakers in the front doors.
- Two 6 x 9-inch, full range speakers mounted in the rear shelf panel.

INFINITY I SYSTEM The Infinity I System includes:

- AM-FM stereo radio with cassette player and 4 disc in-dash CD changer.
- AM-FM stereo radio with CD and cassette player.
- A 240 watt Infinity power amplifier with six output channels
- One 2.5 inch, round single-cone, spatial imaging speaker in the center of the instrument panel.
- Two 2.5 inch, coaxial speakers in the lower corners of the front door windows.
- Two 6.5 inch, round single-cone speakers in the front doors.
- Two 6 x 9-inch, single-cone speakers mounted in the rear shelf panel.

INFINITY II SYSTEM The Infinity II System includes:

- AM-FM stereo radio with cassette player and 4 disc in-dash CD changer.
- A 360 watt power amplifier with nine output channels, one for each speaker location.
- One 2.5 inch, round single-cone, spatial imaging speaker in the center of the instrument panel.

AUDIO SYSTEM (Continued)

- Two 2.5 inch, coaxial speakers in the lower corners of the front door windows.
- Two 6.5 inch, round single-cone speakers in the front doors.
- Two 6 x 9-inch, single-cone speakers mounted in the rear shelf panel.
- Two 2.5 inch, round speakers mounted in the rear doors.

OPERATION

For operation of the factory installed standard and optional radios with cassette or compact disc player, refer to the Sound Systems Operating Instructions in the Owners Manual supplied with the vehicle.

The vehicles are shipped with fuse 13 removed from the junction block. The fuse replaces the ignition-off draw (IOD) connector. Fuse 13 is a ten amp fuse. When removed, it prevents the battery from discharging during storage. For specific wiring and location, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

DIAGNOSIS AND TESTING - AUDIO SYSTEM

CAUTION: The CD player will only operate between approximate temperatures of -23°C and +65°C (-10°F and +145°F).

Whenever a radio malfunction occurs;

(1) First check FUSES in the Junction Block:

- Radio power
- Ignition feed
- Power Amplifier
- Illumination
- Memory feed

Any diagnosis of the Audio system should begin with the use of the DRB diagnostic tool. For information on the use of the DRB, refer to the appropriate Diagnostic Service Manual.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

AUDIO SYSTEM DIAGNOSIS TABLE

CONDITION	POSSIBLE CAUSES	CORRECTION
NO AUDIO	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for shorted or open wires. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
	6. Speakers faulty.	6. Replace speaker as necessary.

AUDIO SYSTEM (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
NO RADIO DISPLAY	1. Fuse faulty.	1. Check radio fuse and Ignition-Off Draw (IOD) fuse in Junction Block (JB). Replace fuses, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
CLOCK WILL NOT KEEP SET TIME	1. Fuse faulty.	1. Check Ignition-Off Draw (IOD) fuse in the Junction Block (JB). Replace fuse, if required.
	2. Radio connector faulty.	2. Check for loose or corroded radio connector. Repair, if required.
	3. Wiring faulty.	3. Check for battery voltage at radio connector. Repair wiring, if required.
	4. Radio ground faulty.	4. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	5. Radio faulty.	5. Refer to appropriate Diagnostic Service Manual.
POOR RADIO RECEPTION	1. Antenna faulty.	1. (Refer to 8 - ELECTRICAL/AUDIO/ANTENNA BODY & CABLE - DIAGNOSIS AND TESTING).
	2. Radio ground faulty.	2. Check for continuity between radio chassis and a known good ground. There should be continuity. Repair ground, if required.
	3. Radio noise suppression faulty.	3. Repair or replace ground strap as necessary.
	4. Radio faulty.	4. Refer to appropriate Diagnostic Service Manual.
NO/POOR TAPE OPERATION	1. Faulty tape.	1. Insert known good tape and test operation.
	2. Foreign objects behind tape door.	2. Remove foreign objects and test operation.
	3. Dirty cassette tape head.	3. Clean head with Mopar Cassette Head Cleaner.
	4. Faulty tape deck.	4. Exchange or replace radio, if required.
NO COMPACT DISC OPERATION	1. Faulty CD.	1. Insert known good CD and test operation.
	2. Foreign material on CD.	2. Clean CD and test operation.
	3. Condensation on CD or optics.	3. Allow temperature of vehicle interior to stabilize and test operation.
	4. Faulty CD player.	4. Refer to appropriate Diagnostic Service Manual.

AMPLIFIER

DESCRIPTION

MIDLINE AND INFINITY I SYSTEM

The amplifier is located in the right front cowl panel.

INFINITY II SYSTEM

The amplifier is located beneath the trunk liner covering the right quarter inner panel.

OPERATION

For specific operation of each individual system, refer to the vehicle's owner's manual, Audio System Operation Manual.

When the radio system is ON, and all or some speakers are not operating or have a noise distortion refer to the diagnostic tests. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

REMOVAL

MIDLINE/INFINITY I SYSTEM

- (1) Disconnect and isolate the negative battery cable.
- (2) Remove right under panel silencer/duct.
- (3) Remove mounting fastener to remote amplifier (Fig. 1).
- (4) Pull amplifier inboard and then pull downward to remove from upper retaining clips.
- (5) Disconnect two wiring connectors.
- (6) Remove remote amplifier from vehicle.

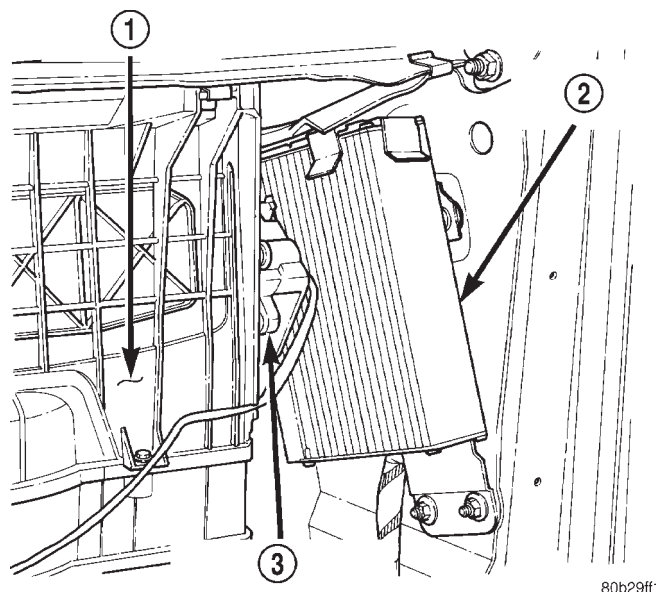
INFINITY II SYSTEM

- (1) Disconnect and isolate the negative battery cable.
- (2) Inside trunk, pull the trunk liner aside (right quarter panel passenger side).
- (3) Remove three retaining screws (Fig. 2).
- (4) Disconnect two wire connectors.
- (5) Remove remote amplifier from vehicle.

INSTALLATION

MIDLINE/INFINITY I SYSTEM

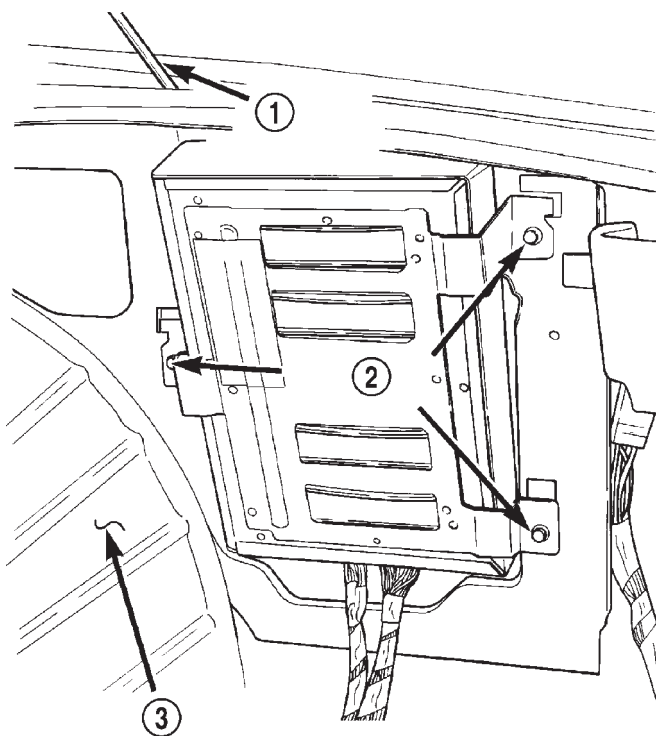
- (1) Install the remote amplifier into vehicle.
- (2) Connect two wiring connectors.
- (3) Push the amplifier upward and then outboard to install into upper retaining clips.
- (4) Install mounting fastener to remote amplifier.



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Fig. 1 Midline/Infinity Remote Amplifier Location

- 1 - HVAC UNIT
- 2 - REMOTE AMPLIFIER
- 3 - RECIRCULATION AIR MOTOR



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Fig. 2 Infinity II Remote Amplifier Location

- 1 - RIGHT DECKLID SUPPORT
- 2 - RETAINING SCREWS
- 3 - RIGHT INNER FENDER WELL

- (5) Install right under panel silencer/duct.
- (6) Connect the negative battery cable.

AMPLIFIER (Continued)

INFINITY II SYSTEM

- (1) Install remote amplifier into vehicle.
- (2) Connect two wire connectors.
- (3) Install three retaining screws.
- (4) Install the trunk liner (right quarter panel passenger side).
- (5) Connect the negative battery cable.

ANTENNA BODY & CABLE

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Inside trunk, pull passenger side trunk liner aside.
- (3) Unplug antenna lead from base of antenna mast.
- (4) Remove antenna mast by unscrewing mast from antenna body.
- (5) Remove screw from mounting bracket.
- (6) Pull antenna body down through the rubber grommet.

INSTALLATION

- (1) Push antenna body up through the rubber grommet in the quarter panel.
- (2) Install the screw to the mounting bracket.
- (3) Install the antenna mast by screwing mast to antenna body.
- (4) Plug antenna lead into the antenna base.
- (5) Install the passenger side trunk liner.
- (6) Connect the battery negative cable.

CD CHANGER

DESCRIPTION

The 4 Disc In-Dash CD Changer (if equipped) is located in the existing cubby bin. It is a cartridge-less changer controlled by the radio and allows the occupants to load up to four discs, one at a time.

OPERATION

Due to its compact design, the CD changer can only carry out one operation at a time. For example, you can not load a new disc while playing another at the same time. Each operation happens sequentially.

The radio unit provides control over all features of the CD changer with the exception of the CD load and eject functions, which are controlled by buttons located on the front of the CD changer. All features you would expect, such as Disc Up/Down, Track Up/Down, Random and Scan are controlled by the radio, which also displays all relevant CD changer information on the radio display.

The CD changer contains a Load/Eject button and an indicator light for each of the four disc positions. The individual light indicates whether a CD is currently loaded in that particular chamber of the CD changer. Pressing the individual Load/Eject button for a particular chamber will eject a disc currently present in that chamber. If the chamber is currently empty, actuating the Load/Eject button will position that chamber to receive and load a new disc in that chamber.

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove ash receiver (if applicable).
- (3) Using a trim stick (special tool #C-4755), gently pry out on center trim bezel. Disconnect wiring connectors to HVAC controls, cigar lighter/auxiliary power outlet and traction control switch.
- (4) Remove instrument panel center trim bezel.
- (5) Remove two retaining screws to in-dash CD changer.
- (6) Pull CD changer out of instrument panel, disconnect wiring and remove from vehicle.

INSTALLATION

- (1) Connect wiring and install CD changer into instrument panel. Make sure the rubber bumper engages into the instrument panel.
- (2) Install two retaining screws to in-dash CD changer.
- (3) Install instrument panel center trim bezel.
- (4) Connect wiring connectors to HVAC controls, cigar lighter/auxiliary power outlet and traction control switch.
- (5) Place center trim bezel into position and snap into place.
- (6) Install ash receiver (if applicable).
- (7) Connect the negative battery cable remote terminal to the remote battery post.

RADIO

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove instrument panel center trim bezel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
- (3) Remove four radio mounting screws.
- (4) Pull radio from panel and disconnect wiring and antenna lead from radio.
- (5) Remove radio from vehicle.

RADIO (Continued)

INSTALLATION

- (1) Place radio near instrument panel opening.
- (2) Connect wiring and antenna lead to radio and slide into place.
- (3) Install four radio mounting screws.
- (4) Install instrument panel center trim bezel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION).
- (5) Connect the battery negative cable.

RADIO NOISE SUPPRESSION
GROUND STRAP

DESCRIPTION

Some components used on the vehicles are equipped with a capacitor to suppress radio frequency interference/static.

Ground straps are mounted from the engine to each shock tower and from the body to the muffler. The ground straps should be securely tightened to assure good metal to metal contact.

OPERATION

Capacitors are mounted in various locations internal to the generator, instrument cluster and windshield wiper motor.

Ground straps conduct very small high frequency electrical signals to ground and require clean large surface area contact. On the RAS radio, the ground wire is attached to a single blade on the rear of the radio. All others are grounded through the main wire harness connector.

REAR WINDOW ANTENNA

REMOVAL

WARNING: DO NOT OPERATE THE VEHICLE WITHIN 24 HOURS OF REAR WINDOW GLASS INSTALLATION. IT TAKES AT LEAST 24 HOURS FOR URETHANE ADHESIVE TO CURE. IF IT IS NOT CURED, THE REAR WINDOW GLASS MAY NOT PERFORM PROPERLY IN AN ACCIDENT. BE SURE TO REFER TO THE URETHANE MANUFACTURER'S DIRECTIONS FOR CURING TIME SPECIFICATIONS, AND DO NOT USE ADHESIVE AFTER ITS EXPIRATION DATE.

CAUTION: Open the left front door glass before installing the rear window to avoid pressurizing the passenger compartment if a door is slammed before the urethane bonding is fully cured. Water leaks can result

- (1) Remove upper quarter trim panel.
- (2) Disconnect the wire connectors from rear window defogger, and rear window mounted radio antenna, if so equipped.

WARNING: WEAR EYE AND HAND PROTECTION WHEN HANDLING SAFETY GLASS. PERSONAL INJURY CAN RESULT.

CAUTION: Do not damage body or trim finish when cutting out glass or applying fence primer.

- (3) Cut the urethane around the perimeter of the rear window glass. (Refer to 23 - BODY/STATIONARY GLASS/WINDSHIELD - REMOVAL).

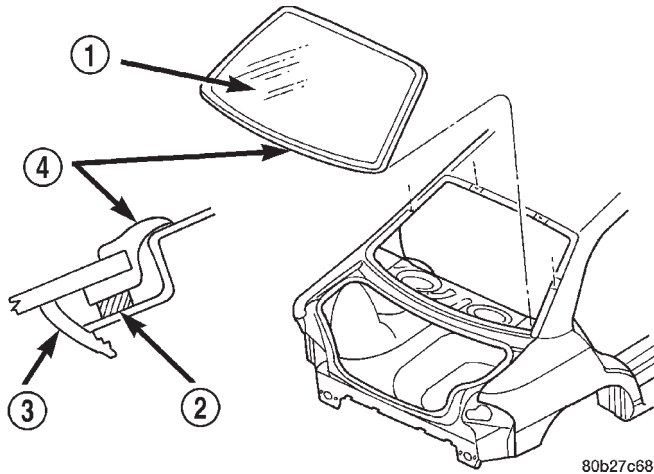
- (4) Remove the rear window from the vehicle.

INSTALLATION

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN WINDSHIELD BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

- (1) Clean inside of rear window with ammonia based glass cleaner and lint-free cloth.
- (2) Apply Glass Prep adhesion promoter 25 mm (1 in.) wide around perimeter of rear window encapsulation (not to the glass) and wipe with clean/dry lint-free cloth until no streaks are visible.
- (3) Apply Glass Primer 25 mm (1 in.) wide around perimeter of rear window encapsulation (not to the glass). Allow at least three minutes drying time.
- (4) Using a razor knife, remove as much original urethane as possible. Do not damage paint on rear window fence.
- (5) Apply pinch weld primer 15 mm (.75 in.) wide around the rear window fence. Allow at least three minutes drying time.
- (6) Apply a 10 mm (0.4 in.) bead of urethane to the encapsulation (Fig. 3).
- (7) With the aid of a helper, position the rear window over the opening.
- (8) Slowly lower rear window glass to the roof fence opening and engage over the two flanges located on the roof fence. Guide the encapsulation into proper position as necessary. Remove the backing paper from the tape on lower appendage and push rear window inward till flush to roof line and C-pillars (Intrepid).
- (9) Clean excess urethane from exterior with Mopar® Super Kleen or equivalent.
- (10) Connect rear window defogger wiring connector, and rear window mounted radio antenna connector, if so equipped.
- (11) Install interior trim.

REAR WINDOW ANTENNA (Continued)

**Fig. 3 REAR WINDOW GLASS - TYPICAL**

- 1 - REAR WINDOW GLASS
- 2 - URETHANE
- 3 - CLIP
- 4 - MOLDING

(12) After urethane has cured, water test rear window to verify repair. Verify rear window defogger operation. (Refer to 8 - ELECTRICAL/HEATED GLASS - OPERATION).

REAR WINDOW ANTENNA MODULE

DESCRIPTION

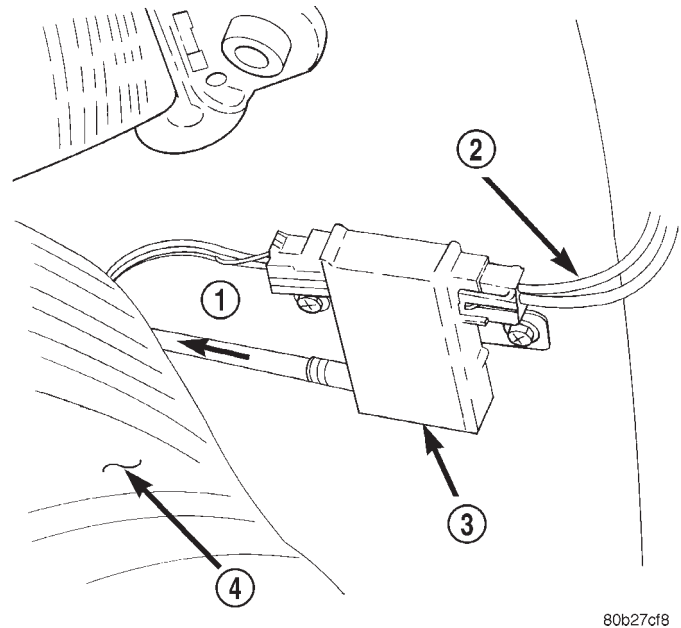
The integrated rear window antenna incorporates the rear window defogger and a electronic module to receive radio signals. The module is located in the right C-pillar behind the trim panel (Fig. 4).

OPERATION

The AM and FM signals are received via isolated unheated lines along the top of the rear window.

NOTE: If aftermarket window shading is added, it cannot be of the metallic type. Metallic type window shading can cause poor radio reception.

NOTE: If an accessory cellular phone glass mount antenna is installed, it should only be installed so as to avoid contact with any of the rear glass grid lines.

**Fig. 4 Rear Defogger/Antenna Module**

- 1 - TO RADIO
- 2 - TO BACKLITE
- 3 - REAR DEFOGGER/ANTENNA MODULE
- 4 - REAR SEAT

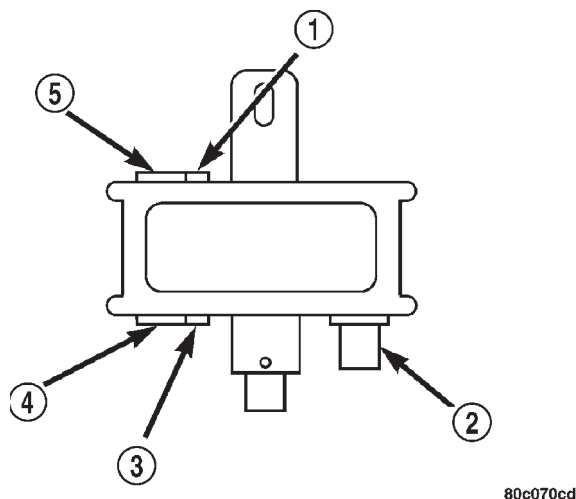
DIAGNOSIS AND TESTING - REAR WINDOW ANTENNA MODULE

NOTE: Due to a capacitor integral with the coaxial cable, the coax cable can not be tested. The continuity test between the center pin of the coax to the antenna does not apply. An ohm meter check to the center pin of the coaxial cable will falsely indicate an open circuit. The coaxial shield to ground test can be performed. Verify coaxial cable performance by using a known good cable.

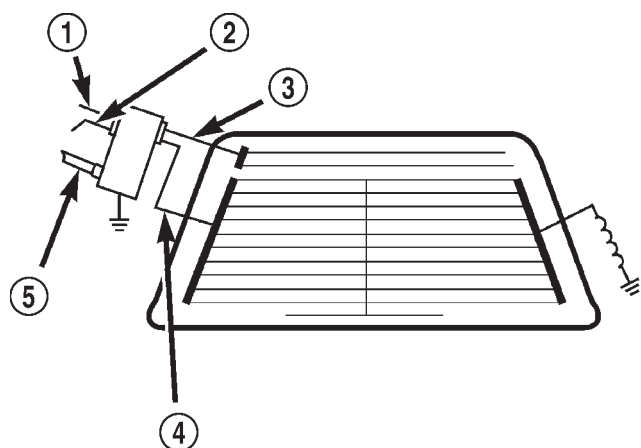
Before performing any antenna service procedures, verify that Rear Window Defogger is operating properly (Fig. 5) and (Fig. 6). If no, repair as necessary. (Refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING). Any repairs to either the AM or FM grid should be preformed as in Electrically Heated Systems, Grid Line and Terminal Repair.

(1) Check that the rear window adhesive does not come in contact with any portion of the grid lines or bus bars. There should be a minimum of 2 mm gap between adhesive and the grid lines or bus bars. If not OK, repair as necessary. If OK, go to Step 2.

REAR WINDOW ANTENNA MODULE (Continued)

**Fig. 5 Rear Window Antenna Module**

- 1 - TO FM/DEFOGGER GRID LINES
- 2 - RADIO COAX CONNECTOR
- 3 - 12 VOLT FEED TO REAR WINDOW DEFOGGER
- 4 - 12 VOLT FEED TO MODULE
- 5 - TO AM GRID LINES

**Fig. 6 Rear Window Grid Lines and Module**

- 1 - B+ FOR AMPLIFIER
- 2 - B+ FOR REAR WINDOW DEFOGGER
- 3 - AM
- 4 - FM & REAR WINDOW DEFOGGER
- 5 - RADIO COAX

(2) Check for proper radio coaxial cable connections at the radio and rear window antenna module. If not OK, repair as necessary. If OK, go to Step 3.

(3) Loss of reception on only one band (AM or FM) may indicate a continuity problem on the rear window grids. Test the grid lines with an ohmmeter. If not OK, repair grid lines as necessary. If OK, go to Step 5.

(4) Reception degradation when the rear window defogger is actuated may indicate discontinuity in the heated grid lines.

(5) Turn the radio and rear window defogger ON position. Using a voltmeter, test for battery voltage at the X60 and C15 circuit terminals of the rear window antenna module wire harness connector (Fig. 5). If not OK, check fuses, if fuses are OK, repair wire harness as necessary. Refer to Wiring Diagrams for circuit information.

(6) Ensure that the rear window defogger ground wire with integral coil in the C-pillar has a good ground. If not OK, repair as necessary. If OK, go to Step 7.

CAUTION:

Rear Window Defogger must be in the OFF position

(7) Quick check of the module:

- Place the ignition switch in the ACC position with the radio in the ON position on a appropriate station (AM/FM).

- Tune to a AM station

- Using a grounded jumper wire, momentarily short the AM lead to the grid lines (Fig. 6).

- There should be an audible CRACKLE through the speakers indicating circuit continuity.

- Tune to a FM station

- Using a grounded jumper wire, momentarily short the FM lead to the grid lines (Fig. 6).

- There should be an audible CRACKLE through the speakers indicating circuit continuity.

If not OK, go to Step 8. If OK, go to Step 9.

(8) Using a ohmmeter, check continuity between the module wire connector and:

- — AM grid lines.

- — FM/rear window antenna grid lines.

If not OK, repair as necessary. (Refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING). If OK, go to Step 9.

(9) If neither AM or FM can be received, use a known good radio and verify. If not OK, use a known good antenna module and verify. If OK, either exchange radio or replace antenna module.

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove right upper quarter trim panel. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - REMOVAL).

(3) Remove the attaching screw from module.

(4) Disconnect wire connectors and radio antenna coaxial cable (Fig. 5).

(5) Remove module from vehicle.

REAR WINDOW ANTENNA MODULE (Continued)

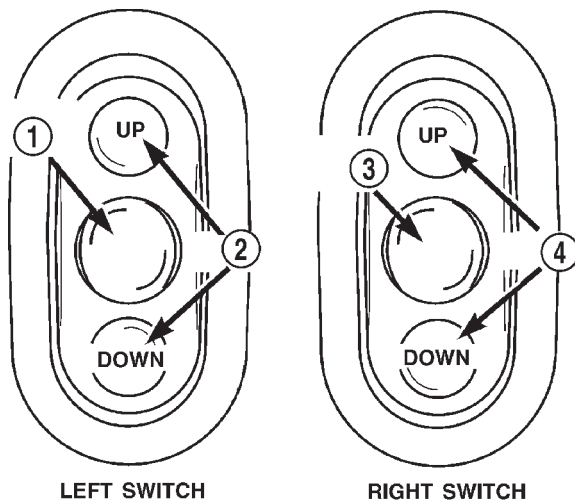
INSTALLATION

- (1) Install module from vehicle.
- (2) Connect wire connectors and radio antenna coaxial cable (Fig. 5).
- (3) Install the attaching screw to module.
- (4) Install right upper quarter trim panel. (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - INSTALLATION).
- (5) Connect the negative battery cable remote terminal to the remote battery post.

REMOTE SWITCHES

DESCRIPTION

Remote radio control switches are rocker-type switch units (Fig. 7) are mounted in the upper spoke covers of the rear (instrument panel side) steering wheel trim cover. The switch unit on the left side is the seek switch and has seek up, seek down, and preset station advance switch functions. The switch unit on the right side is the volume control switch and has volume up, volume down, and mode advance switch functions.



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Fig. 7 REMOTE RADIO SWITCHES

- 1 - PRESET ADVANCE
- 2 - SEEK
- 3 - MODE ADVANCE
- 4 - VOLUME

The two remote radio switch units are each retained in a mounting hole located on opposite sides of the rear steering wheel trim cover by four integral snap features. A plastic bracket on the back of each switch unit provides additional support for the unit by extending towards the center of the steering wheel where it is clamped between the steering wheel armature and the steering wheel rear trim cover mounting boss by the trim cover mounting screw.

The two remote radio switch units share a common steering wheel wire harness with the vehicle speed control switches. The steering wheel wire harness is connected to the instrument panel wire harness through the clockspring.

OPERATION

The six switches in the two remote radio switch units are normally open, resistor multiplexed momentary switches that are hard wired to the Body Control Module (BCM) through the clockspring. The BCM sends a five volt reference signal to both switch units on one circuit, and senses the status of all of the switches by reading the voltage drop on a second circuit.

When the BCM senses an input (voltage drop) from any one of the remote radio switches, it sends the proper switch status messages on the Programmable Communication Interface (PCI) data bus network to the radio receiver. The electronic circuitry within the radio receiver is programmed to respond to these remote radio switch status messages by adjusting the radio settings as requested. For diagnosis of the BCM or the PCI data bus, the use of a DRB III scan tool and the proper Body Diagnostic Procedures manual are recommended.

For more information on the features and control functions for each of the remote radio switches, see the owner's manual in the vehicle glove box.

DIAGNOSIS AND TESTING - REMOTE SWITCHES

Any diagnosis of the Audio system should begin with the use of the DRB diagnostic tool. For information on the use of the DRB, refer to the appropriate Diagnostic Service Manual.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

REMOTE SWITCHES (Continued)

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable. Remove the remote radio switch(es) (Fig. 8) from the steering wheel.

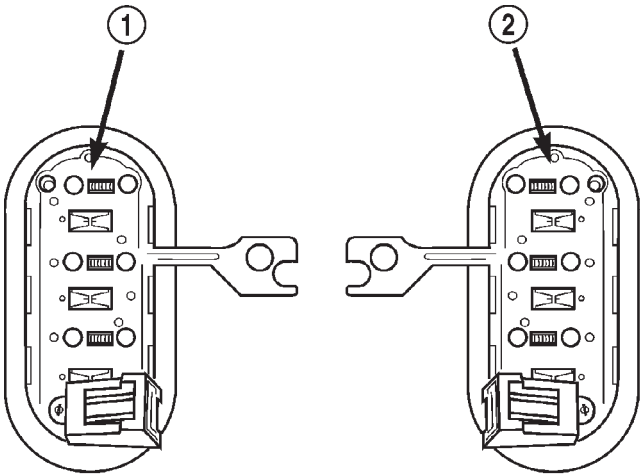


Fig. 8 REMOTE RADIO SWITCHES

- 1 - BLACK (LEFT) SWITCH
- 2 - WHITE (RIGHT) SWITCH

(2) Use an ohmmeter to check the switch resistances as shown in the Remote Radio Switch Test table. If the remote radio switch resistances check OK, go to Step 3. If not OK, replace the faulty switch.

REMOTE RADIO SWITCH TEST

Switch	Switch Position	Resistance
Right (White)	Volume Up	1.210 Kilohms
Right (White)	Volume Down	3.010 Kilohms
Right (White)	Mode Advance	0.0511 Kilohms
Left (Black)	Seek Up	0.261 Kilohms
Left (Black)	Seek Down	0.681 Kilohms
Left (Black)	Pre-Set Station Advance	0.162 Kilohms

(3) Reconnect the battery negative cable. Turn the ignition switch to the ON position. Check for 5 volts at the radio control mux circuit cavities of the steering wheel wire harness connectors for both remote radio switches. If OK, go to Step 4. If not OK, repair the open or shorted radio control mux circuit to the Body Control Module (BCM) as required.

(4) Disconnect and isolate the battery negative cable. Disconnect the 22-way instrument panel wire harness connector from the BCM. Check for continuity between the remote radio switch ground circuit cavities of the steering wheel wire harness connectors for both remote radio switches and a good ground. There should be no continuity. If OK, go to Step 5. If not OK, repair the shorted remote radio switch ground circuit to the BCM as required.

(5) Check for continuity between the remote radio switch ground circuit cavities of the steering wheel wire harness connectors for both remote radio switches and the 22-way instrument panel wire harness connector for the BCM. There should be continuity. If OK, refer to the proper Body Diagnostic Procedures manual to test the BCM and the PCI data bus. If not OK, repair the open remote radio switch ground circuit as required.

REMOTE SWITCHES (Continued)

REMOVAL

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the driver side airbag module from the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(3) Remove the speed control switch located on the same side of the steering wheel as the remote radio switch that is being serviced. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - REMOVAL).

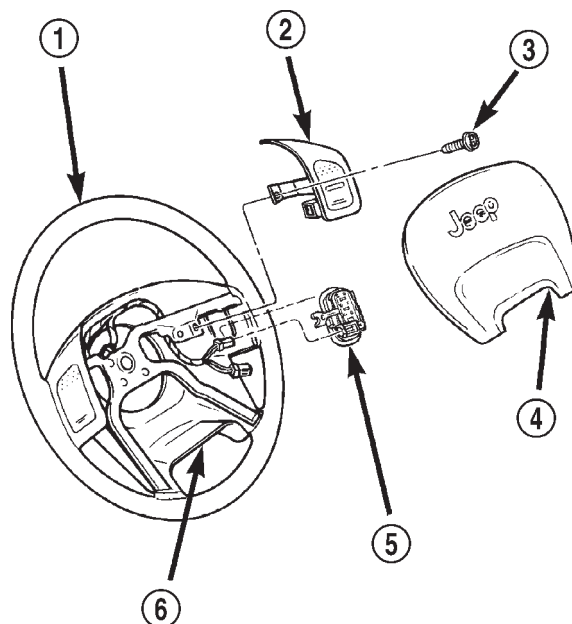
(4) Disconnect the steering wheel wire harness connector from the connector receptacle of the remote radio switch (Fig. 9).

(5) From the inside of the steering wheel rear trim cover, press firmly and evenly outward on the back of the switch to disengage the four snap features that secure the switch to the inside of the mounting hole.

(6) From the outside of the steering wheel rear trim cover, remove the remote radio switch from the trim cover mounting hole.

INSTALLATION

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.



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Fig. 9 REMOTE RADIO SWITCHES - REMOVE/INSTALL - TYPICAL

- 1 - STEERING WHEEL
- 2 - SPEED CONTROL SWITCH
- 3 - SCREW
- 4 - DRIVER SIDE AIRBAG MODULE
- 5 - REMOTE RADIO SWITCH
- 6 - REAR TRIM COVER

(1) Position the remote radio switch to the mounting hole on the outside of the steering wheel rear trim cover. Be certain that the connector receptacle is oriented toward the bottom of the switch and pointed toward the center of the steering wheel.

(2) Press firmly and evenly on the remote radio switch until each of the switch snap features is fully engaged in the mounting hole of the steering wheel rear trim cover.

(3) Reconnect the steering wheel wire harness connector to the connector receptacle of the remote radio switch.

(4) Install the speed control switch located on the same side of the steering wheel as the remote radio switch. (Refer to 8 - ELECTRICAL/SPEED CONTROL/SWITCH - INSTALLATION).

(5) Install the driver side airbag module to the steering wheel. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

(6) Connect the battery negative cable.

SPEAKER

REMOVAL

FRONT DOOR - LOWER

- (1) Disconnect and isolate the battery negative cable.
- (2) Open drivers door.
- (3) Using a trim stick (special tool #C-4755), carefully pry speaker grille away from door trim panel (Fig. 10).
- (4) Remove three speaker retaining screws.
- (5) Pull speaker away from door and disconnect wiring.

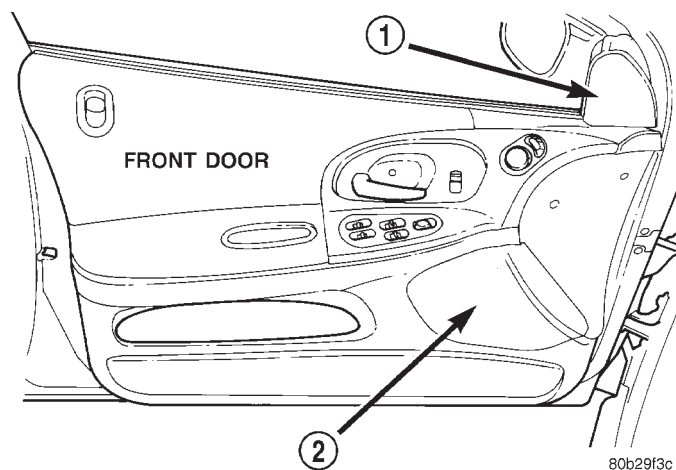


Fig. 10 Front Door Speakers

- 1 - INFINITY SPEAKERS
2 - DOOR SPEAKER

FRONT DOOR - UPPER

- (1) Disconnect and isolate the battery negative cable.
- (2) Open drivers door.
- (3) Remove two speaker enclosure attachment screws holding the enclosure ring and grill to the door.
- (4) Remove two speaker retaining screws.
- (5) Pull speaker away from door and disconnect wiring.

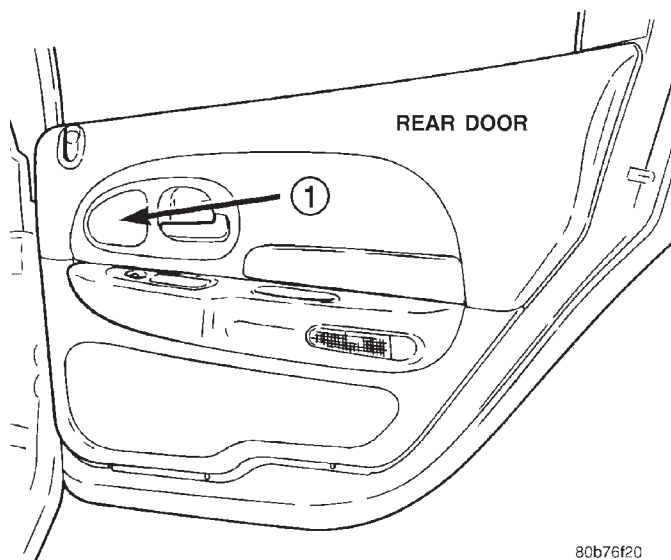
INSTRUMENT PANEL

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove instrument panel top cover.
- (3) Remove two retaining screws to center speaker and disconnect wiring connector.
- (4) Remove speaker from vehicle.

REAR DOOR

- (1) Disconnect and isolate the battery negative cable.

- (2) Open rear door.
- (3) Using a trim stick (special tool #C-4755), carefully pry speaker grille away from door trim panel (Fig. 11).



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Fig. 11 Rear Door Speaker

- 1 - DOOR SPEAKER

- (4) Remove two speaker retaining screws.
- (5) Pull speaker away from door and disconnect wiring.

REAR SHELF

- (1) Disconnect and isolate the battery negative cable.
- (2) Remove the rear shelf trim panel. (Refer to 23 - BODY/INTERIOR/REAR SHELF TRIM PANEL - REMOVAL).
- (3) Remove four retaining screws.
- (4) Remove speaker and disconnect wire connector.

INSTALLATION

FRONT DOOR - LOWER

- (1) Connect wiring and place speaker in door speaker opening.
- (2) Install three speaker retaining screws.
- (3) Place speaker grille into place and firmly press into place.
- (4) Connect battery negative cable.

FRONT DOOR - UPPER

- (1) Connect wiring and place speaker in door speaker opening.
- (2) Install two speaker retaining screws.
- (3) Install two speaker enclosure attachment screws holding the enclosure ring and grill to the door.
- (4) Connect battery negative cable.

SPEAKER (Continued)

INSTRUMENT PANEL

- (1) Place speaker into position on instrument panel.
- (2) connect wiring connector, install two retaining screws to center speaker.
- (3) Install instrument panel top cover.
- (4) Connect battery negative cable.

REAR DOOR

- (1) Connect wiring and place speaker in door speaker opening.
- (2) Install two speaker retaining screws.
- (3) Place speaker grille into place and firmly snap into place on the door trim panel.

- (4) Connect battery negative cable.

REAR SHELF

- (1) Connect wire connector and place speaker into speaker opening.

CAUTION: Be sure that the wiring connectors are facing forward when installed.

- (2) Install the four retaining screws.
- (3) Install the rear shelf trim panel.
- (4) Connect battery negative cable.

CHIME/BUZZER

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CHIME/BUZZER

DESCRIPTION

The Chime/Buzzer Warning System includes the following:

- **Exterior Lamps On chime** - An audible chime indicates the exterior lamps were left on with the driver door open and the key in the ignition in the OFF position.
- **Fasten Seat Belts chime** - A warning lamp on the instrument panel, and an audible chime are used as the fasten seat belt warning/reminder when the key is first turned to the RUN/START position.
- **Key In Ignition chime** - An audible chime that indicates the ignition key is in the ignition lock cylinder with the driver door open and ignition OFF.

OPERATION

When using the DRBIII® scan tool, refer to the proper Body Diagnostic Procedures Manual. Refer to Wiring Diagrams for circuit information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - CHIME CONDITIONS

- No tone when ignition switch is turned on and drivers seat belt is unbuckled and fully retracted.**
- (1) Check driver's seat belt retractor switch for a ground when belt is unbuckled.
 - (2) Use a DRBIII® scan tool to perform PCI bus diagnostics on the Body Control Module (BCM) for battery, ignition and seat belt switch input.
 - (3) Use a DRBIII® scan tool to perform actuator diagnostics on BCM chime.
 - (4) Check for battery feed at terminal J1-7 and ignition feed at terminal J1-5 of the BCM connector.
 - (5) Check for tone in any other function.

- No fasten seat belt lamp when ignition switch is turned on.**
- (1) Use DRBIII® scan tool to perform PCI bus diagnostics on BCM for battery and ignition switch input
 - (2) Check for burned out bulb.
 - (3) Using the DRBIII® scan tool, do the actuator test on cluster. Refer to proper Body Diagnostic Procedures Manual.
 - (4) Check for battery feed at terminal J1-7 of the BCM connector.
 - (5) Check for ignition feed at terminal J1-5 of the BCM connector.

- Fasten seat belt lamp or tone continue for more than 10 seconds after seat belts are fastened and ignition ON.**
- (1) Use DRBIII® scan tool to perform PCI bus diagnostics on BCM for battery and ignition switch input.
 - (2) Inspect the BCM connectors and wires for proper connection.

- No tone when headlamps are on, ignition switch is OFF and driver's door is open.**
- (1) Using a DRBIII® scan tool, check drivers door ajar switch for good ground when driver's door is open.
 - (2) Use DRBIII® scan tool to perform PCI bus diagnostics on BCM for battery, ignition switch input, headlamp switch and driver's door input and Chime Output Test.
 - (3) Inspect BCM connectors and wires for proper connection.
 - (4) Check for battery feed at terminal J1-7 of BCM connector.
 - (5) Check headlamp switch.

CHIME/BUZZER (Continued)

No tone when key is left in ignition. Ignition switch is in the OFF position and driver's door is open.

(1) Using a DRBIII® scan tool, check drivers door ajar switch for good ground when driver's door is open.

(2) Use DRBIII® scan tool to perform PCI bus diagnostics on BCM for battery, ignition switch input, key-in-switch and driver's door input and Chime Output Test.

(3) Inspect BCM connectors and wires for proper connection.

(4) Check for battery feed at terminal J1-7 of BCM connector.

(5) Check key-in switch.

Chimes continue when headlamps are turned off and/or key is removed from ignition.

(1) Use DRBIII® scan tool to perform PCI bus diagnostics on BCM for headlamp or key-in-ignition inputs.

(2) Check wiring for a grounded condition between key-in switch and BCM.

(3) Inspect the BCM connectors and wires for proper connection.

NOTE: Refer to Electrical, Electronic Control Modules, Body Control Module, Removal and Installation for service of the BCM.

DIAGNOSIS AND TESTING - EXTERIOR LAMPS ON

To test the headlamps left on function, remove the ignition key, turn exterior lamps on with driver's

door open. Chime should sound until headlamps are turned off or drivers door is closed.

Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Switch, Removal and Installation for service procedures.

DIAGNOSIS AND TESTING - FASTEN SEAT BELTS

To test the fasten seat belt function, start with the ignition switch in the OFF position. Turn the ignition switch to the ON position with the driver's seat belt unbuckled. The seat belt warning lamp will stay lit until the belt is moved sufficiently to buckle the belt. If the belt is not buckled, the light will not go out.

Refer to Electrical, Restraints, Seat Belt Buckle, Removal and Installation for service procedures.

DIAGNOSIS AND TESTING - KEY IN IGNITION

To test the key in ignition function, the ignition switch must be in the OFF position with key in the ignition switch. The driver's door must be open. The chime should sound until key is removed from the ignition switch or the drivers door is closed.

The Key-in Ignition switch is built into the ignition switch assembly. Should the Key-in switch require service, the ignition switch assembly must be replaced. Refer to Electrical, Ignition Control for service procedures.

CLOCK

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CLOCK

DESCRIPTION

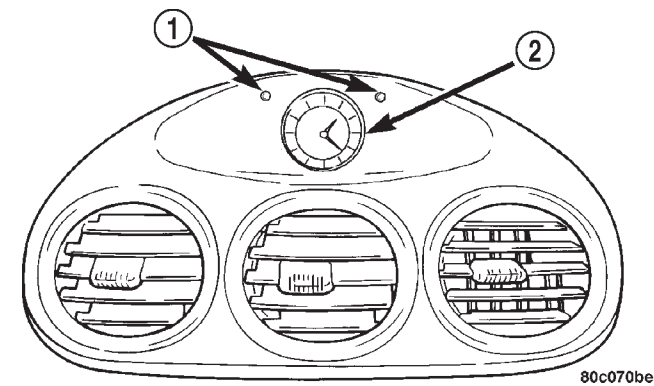


Fig. 1 ANALOG CLOCK

- 1 - SET BUTTONS
- 2 - ANALOG CLOCK

The clock is of analog type (Fig. 1), mounted in the instrument panel center air distribution bezel.

OPERATION

Refer to the Owner’s Manual for setting instructions.

REMOVAL

- (1) Open hood.
- (2) Disconnect and isolate the negative battery remote cable.

- (3) Using a trim stick (special tool #C-4755), gently pry out instrument panel air distribution outlet bezel that retains the analog clock.
- (4) Disconnect the one wire connector to the clock.
- (5) Remove bezel from vehicle.
- (6) On the bench, remove two retaining screws to analog clock and remove from bezel (Fig. 2).

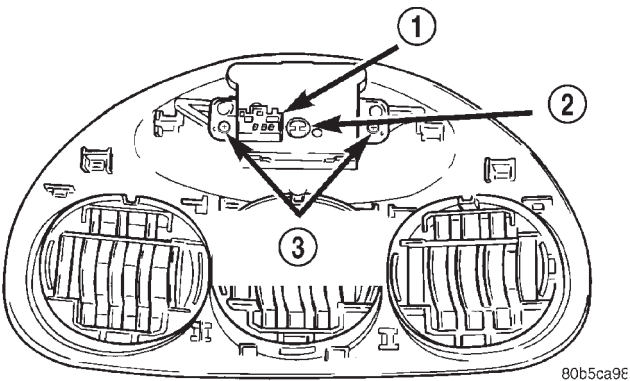


Fig. 2 ANALOG CLOCK REMOVAL

- 1 - WIRE HARNESS CONNECTOR
- 2 - CLOCK LAMP
- 3 - RETAINING SCREWS

INSTALLATION

- (1) On the bench, place the clock into place on the bezel and install the two retaining screws to analog clock (Fig. 2).
- (2) Connect the one wire connector to the clock.
- (3) Place bezel into place and firmly snap into place.
- (4) Connect and isolate the negative battery remote cable to the remote terminal.
- (5) Close hood.

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ELECTRONIC CONTROL MODULES

STANDARD PROCEDURE - PCM/SKIM PROGRAMMING

NOTE: Before replacing the PCM for a failed driver, control circuit or ground circuit, be sure to check the related component/circuit integrity for failures not detected due to a double fault in the circuit. Most PCM driver/control circuit failures are caused by internal component failures (i.e. relay and solenoids) and shorted circuits (i.e. pull-ups, drivers and switched circuits). These failures are difficult to detect when a double fault has occurred and only one DTC has set.

When a PCM (SBEC) and the SKIM are replaced at the same time perform the following steps in order:

- (1) Program the new PCM (SBEC)
- (2) Program the new SKIM
- (3) Replace all ignition keys and program them to the new SKIM.

PROGRAMMING THE PCM (SBEC)

The SKIS Secret Key is an ID code that is unique to each SKIM. This code is programmed and stored in the SKIM, PCM and transponder chip (ignition keys). When replacing the PCM it is necessary to program the secret key into the new PCM using the DRB III. Perform the following steps to program the secret key into the PCM.

- (1) Turn the ignition switch on (transmission in park/neutral).

ELECTRONIC CONTROL MODULES (Continued)

(2) Use the DRB III and select THEFT ALARM, SKIM then MISCELLANEOUS.

(3) Select PCM REPLACED (GAS ENGINE).

(4) Enter secured access mode by entering the vehicle four-digit PIN.

(5) Select ENTER to update PCM VIN.

NOTE: If three attempts are made to enter secure access mode using an incorrect PIN, secured access mode will be locked out for one hour. To exit this lockout mode, turn the ignition to the RUN position for one hour then enter the correct PIN. (Ensure all accessories are turned off. Also monitor the battery state and connect a battery charger if necessary).

(6) Press ENTER to transfer the secret key (the SKIM will send the secret key to the PCM).

(7) Press Page Back to get to the Select System menu and select ENGINE, MISCELLANEOUS, and SRI MEMORY CHECK.

(8) The DRB III will ask, Is odometer reading between XX and XX? Select the YES or NO button on the DRB III. If NO is selected, the DRB III will read, Enter odometer Reading<From I.P. odometer>. Enter the odometer reading from the Instrument Panel and press ENTER.

PROGRAMMING THE SKIM

(1) Turn the ignition switch on (transmission in park/neutral).

(2) Use the DRB III and select THEFT ALARM, SKIM then MISCELLANEOUS.

(3) Select PCM REPLACED (GAS ENGINE).

(4) Program the vehicle four-digit PIN into SKIM.

(5) Select COUNTRY CODE and enter the correct country.

NOTE: Be sure to enter the correct country code. If the incorrect country code is programmed into SKIM, the SKIM must be replaced.

(6) Select YES to update VIN (the SKIM will learn the VIN from the PCM).

(7) Press ENTER to transfer the secret key (the PCM will send the secret key to the SKIM).

(8) Program ignition keys to SKIM.

NOTE: If the PCM and the SKIM are replaced at the same time, all vehicle keys will need to be replaced and programmed to the new SKIM.

PROGRAMMING IGNITION KEYS TO THE SKIM

(1) Turn the ignition switch on (transmission in park/neutral).

(2) Use the DRB III and select THEFT ALARM, SKIM then MISCELLANEOUS.

(3) Select PROGRAM IGNITION KEYS.

(4) Enter secured access mode by entering the vehicle four-digit PIN.

NOTE: A maximum of eight keys can be learned to each SKIM. Once a key is learned to a SKIM it (the key) cannot be transferred to another vehicle.

If ignition key programming is unsuccessful, the DRB III will display one of the following messages:

Programming Not Attempted - The DRB III attempts to read the programmed key status and there are no keys programmed into SKIM memory.

Programming Key Failed (Possible Used Key From Wrong Vehicle) - SKIM is unable to program key due to one of the following:

- faulty ignition key transponder
- ignition key is programmed to another vehicle.

8 Keys Already Learned, Programming Not Done - SKIM transponder ID memory is full.

(5) Obtain ignition keys to be programmed from customer (8 keys maximum).

(6) Using the DRB III, erase all ignition keys by selecting MISCELLANEOUS and ERASE ALL CURRENT IGN. KEYS.

(7) Program all ignition keys.

Learned Key In Ignition - Ignition key transponder ID is currently programmed in SKIM memory.

BODY CONTROL MODULE

DESCRIPTION

The Body Control Module (BCM) is concealed below the driver side end of the instrument panel in the passenger compartment, where it is secured to the dash panel side of the Junction Block (JB).

The BCM utilizes integrated circuitry and information carried on the Programmable Communications Interface (PCI) data bus network along with many hard wired inputs to monitor many sensor and switch inputs throughout the vehicle. In response to those inputs, the internal circuitry and programming of the BCM allow it to control and integrate many electronic functions and features of the vehicle through both hard wired outputs and the transmission of electronic message outputs to other electronic modules in the vehicle over the PCI data bus.

OPERATION

The Body Control Module (BCM) is designed to control and integrate many of the electronic features and functions of the vehicle. The microprocessor-based BCM hardware and software monitors many hard wired switch and sensor inputs as well as those

BODY CONTROL MODULE (Continued)

resources it shares with other electronic modules in the vehicle through its communication over the PCI data bus network. The internal programming and all of these inputs allow the BCM microprocessor to determine the tasks it needs to perform and their priorities, as well as both the standard and optional features that it should provide. The BCM programming then performs those tasks and provides those features through both PCI data bus communication with other electronic modules and through hard wired low current outputs to a number of relays. These relays provide the BCM with the ability to control numerous high current accessory systems in the vehicle.

The BCM monitors its own internal circuitry as well as many of its input and output circuits, and will store a Diagnostic Trouble Code (DTC) in electronic memory for any failure it detects. These DTCs can be retrieved and diagnosed using a DRBIII® scan tool. Refer to the appropriate diagnostic information.

REMOVAL

- (1) Remove the Junction Block/BCM from the vehicle. Refer to Power Distribution Systems, Junction Block, Removal and Installation.
- (2) Remove the four BCM attaching screws from the Junction Block.
- (3) Disconnect BCM from the Junction Block.

NOTE: The Remote Keyless Entry (RKE) module is attached to the BCM with three screws. This must be transferred (if equipped) to the new BCM.

NOTE: If the BCM is replaced, the Vehicle Theft / Security System (VTSS (if equipped) must be enabled in the new BCM via the DRB III® scan tool in order to start the vehicle.

INSTALLATION

- (1) Connect the BCM to the Junction Block.
- (2) Install the four BCM attaching screws to the Junction Block.
- (3) Install the Junction Block/BCM into the vehicle. Refer to Power Distribution Systems, Junction Block, Removal and Installation.

COMMUNICATION

DESCRIPTION

The DaimlerChrysler Programmable Communication Interface (PCI) data bus system is a single wire multiplex system used for vehicle communications on many DaimlerChrysler Corporation vehicles. Multiplexing is a system that enables the transmission of

several messages over a single channel or circuit. All DaimlerChrysler vehicles use this principle for communication between various microprocessor-based electronic control modules. The PCI data bus exceeds the Society of Automotive Engineers (SAE) J1850 Standard for Class B Multiplexing.

Many of the electronic control modules in a vehicle require information from the same sensing device. In the past, if information from one sensing device was required by several controllers, a wire from each controller needed to be connected in parallel to that sensor. In addition, each controller utilizing analog sensors required an Analog/Digital (A/D) converter in order to "read" these sensor inputs. Multiplexing reduces wire harness complexity, sensor current loads and controller hardware because each sensing device is connected to only one controller, which reads and distributes the sensor information to the other controllers over the data bus. Also, because each controller on the data bus can access the controller sensor inputs to every other controller on the data bus, more function and feature capabilities are possible.

In addition to reducing wire harness complexity, component sensor current loads and controller hardware, multiplexing offers a diagnostic advantage. A multiplex system allows the information flowing between controllers to be monitored using a diagnostic scan tool. The DaimlerChrysler system allows an electronic control module to broadcast message data out onto the bus where all other electronic control modules can "hear" the messages that are being sent. When a module hears a message on the data bus that it requires, it relays that message to its microprocessor. Each module ignores the messages on the data bus that are being sent to other electronic control modules.

OPERATION

Data exchange between modules is achieved by serial transmission of encoded data over a single wire broadcast network. The wire colors used for the PCI data bus circuits are yellow with a violet tracer, or violet with a yellow tracer, depending upon the application. The PCI data bus messages are carried over the bus in the form of Variable Pulse Width Modulated (VPWM) signals. The PCI data bus speed is an average 10.4 Kilo-bits per second (Kbps). By comparison, the prior two-wire Chrysler Collision Detection (CCD) data bus system is designed to run at 7.8125 Kbps.

The voltage network used to transmit messages requires biasing and termination. Each module on the PCI data bus system provides its own biasing and termination. Each module (also referred to as a node) terminates the bus through a terminating

COMMUNICATION (Continued)

resistor and a terminating capacitor. There are two types of nodes on the bus. The dominant node terminates the bus through a 1 KW resistor and a 3300 pF capacitor. The Powertrain Control Module (PCM) is the only dominant node for the PCI data bus system. A standard node terminates the bus through an 11 KW resistor and a 330 pF capacitor.

The modules bias the bus when transmitting a message. The PCI bus uses low and high voltage levels to generate signals. Low voltage is around zero volts and the high voltage is about seven and one-half volts. The low and high voltage levels are generated by means of variable-pulse width modulation to form signals of varying length. The Variable Pulse Width Modulation (VPWM) used in PCI bus messaging is a method in which both the state of the bus and the width of the pulse are used to encode bit information. A "zero" bit is defined as a short low pulse or a long high pulse. A "one" bit is defined as a long low pulse or a short high pulse. A low (passive) state on the bus does not necessarily mean a zero bit. It also depends upon pulse width. If the width is short, it stands for a zero bit. If the width is long, it stands for a one bit. Similarly, a high (active) state does not necessarily mean a one bit. This too depends upon pulse width. If the width is short, it stands for a one bit. If the width is long, it stands for a zero bit.

In the case where there are successive zero or one data bits, both the state of the bus and the width of the pulse are changed alternately. This encoding scheme is used for two reasons. First, this ensures that only one symbol per transition and one transition per symbol exists. On each transition, every transmitting module must decode the symbol on the bus and begin timing of the next symbol. Since timing of the next symbol begins with the last transition detected on the bus, all of the modules are re-synchronized with each symbol. This ensures that there are no accumulated timing errors during PCI data bus communication.

The second reason for this encoding scheme is to guarantee that the zero bit is the dominant bit on

the bus. When two modules are transmitting simultaneously on the bus, there must be some form of arbitration to determine which module will gain control. A data collision occurs when two modules are transmitting different messages at the same time. When a module is transmitting on the bus, it is reading the bus at the same time to ensure message integrity. When a collision is detected, the module that transmitted the one bit stops sending messages over the bus until the bus becomes idle.

Each module is capable of transmitting and receiving data simultaneously. The typical PCI bus message has the following four components:

- **Message Header** - One to three bytes in length. The header contains information identifying the message type and length, message priority, target module(s) and sending module.

- **Data Byte(s)** - This is the actual message that is being sent.

- **Cyclic Redundancy Check (CRC) Byte** - This byte is used to detect errors during a message transmission.

- **In-Frame Response (IFR) byte(s)** - If a response is required from the target module(s), it can be sent during this frame. This function is described in greater detail in the following paragraph.

The IFR consists of one or more bytes, which are transmitted during a message. If the sending module requires information to be received immediately, the target module(s) can send data over the bus during the original message. This allows the sending module to receive time-critical information without having to wait for the target module to access the bus. After the IFR is received, the sending module broadcasts an End of Frame (EOF) message and releases control of the bus.

The PCI data bus can be monitored using the DRBIII® scan tool. It is possible, however, for the bus to pass all DRBIII® tests and still be faulty if the voltage parameters are all within the specified range and false messages are being sent.

CONTROLLER ANTILOCK BRAKE

DESCRIPTION

The controller antilock brake (CAB) is a microprocessor-based device which monitors the antilock brake system (ABS) during normal braking and controls it when the vehicle is in an ABS stop. The CAB is mounted to the HCU as part of the integrated control unit (ICU) (Fig. 1). The CAB uses a 24-way electrical connector on the vehicle wiring harness. The power source for the CAB is through the ignition switch in the RUN or ON position. The CAB is on the PCI bus.

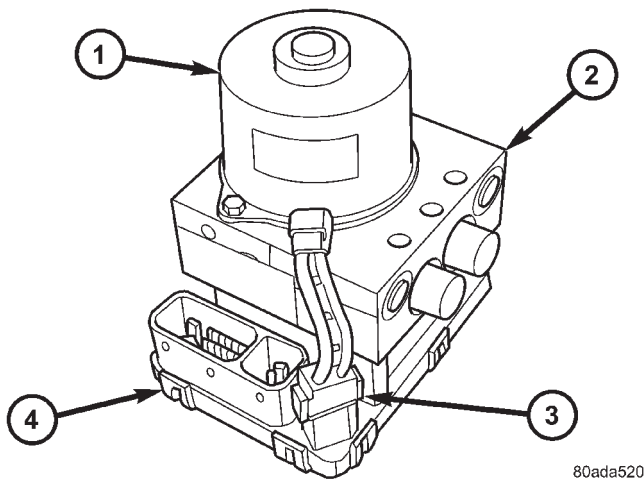


Fig. 1 INTEGRATED CONTROL UNIT (TYPICAL)

- 1 - PUMP/MOTOR
- 2 - HCU
- 3 - PUMP/MOTOR CONNECTOR
- 4 - CAB

OPERATION

The primary functions of the controller antilock brake (CAB) are to:

- Monitor the antilock brake system for proper operation.
- Detect wheel locking or wheel slipping tendencies by monitoring the speed of all four wheels of the vehicle.
- Control fluid modulation to the wheel brakes while the system is in an ABS mode.
- Store diagnostic information.
- Provide communication to the DRBIII® scan tool while in diagnostic mode.
- Illuminate the amber ABS warning indicator lamp.
- (With traction control only) Illuminate the TRAC ON lamp in the message center on the instrument panel when a traction control event occurs.

- (with traction control only) Illuminate the TRAC OFF lamp when the amber ABS warning indicator lamp illuminates.

The CAB constantly monitors the antilock brake system for proper operation. If the CAB detects a fault, it will turn on the amber ABS warning indicator lamp and disable the antilock braking system. The normal base braking system will remain operational.

NOTE: If the vehicle is equipped with traction control, the TRAC OFF lamp will illuminate anytime the amber ABS warning indicator lamp illuminates.

The CAB continuously monitors the speed of each wheel through the signals generated by the wheel speed sensors to determine if any wheel is beginning to lock. When a wheel locking tendency is detected, the CAB commands the CAB command coils to actuate. The coils then open and close the valves in the HCU that modulate brake fluid pressure in some or all of the hydraulic circuits. The CAB continues to control pressure in individual hydraulic circuits until a locking tendency is no longer present.

The CAB contains a self-diagnostic program that monitors the antilock brake system for system faults. When a fault is detected, the amber ABS warning indicator lamp is turned on and the fault diagnostic trouble code (DTC) is then stored in a diagnostic program memory. These DTC's will remain in the CAB memory even after the ignition has been turned off. The DTC's can be read and cleared from the CAB memory by a technician using the DRBIII® scan tool. If not cleared with a DRBIII® scan tool, the DTC will be automatically cleared from the CAB memory after the identical fault has not been seen during the next 3,500 miles.

CAB INPUTS

- Wheel speed sensors (four)
- Brake lamp switch
- Ignition switch
- System and pump voltage
- Ground
- Traction control switch (if equipped)
- Diagnostic communication (PCI)

CAB OUTPUTS

- Amber ABS warning indicator lamp actuation (via BUS)
- Instrument cluster (MIC) communication (PCI)
- Traction control lamps (if equipped)
- Diagnostic communication (PCI, via BUS)

REMOVAL

To remove the CAB, the ICU must be removed from the vehicle and disassembled. (Refer to 5 -

CONTROLLER ANTILOCK BRAKE (Continued)

BRAKES - ABS/HYDRAULIC/MECHANICAL/ICU
(INTEGRATED CONTROL UNIT) - REMOVAL

INSTALLATION

To install the CAB, it must be attached to the HCU, forming the ICU. (Refer to 5 - BRAKES - ABS/HYDRAULIC/MECHANICAL/ICU (INTEGRATED CONTROL UNIT) - ASSEMBLY)

DATA LINK CONNECTOR

DESCRIPTION

The data link connector is located inside the vehicle, below instrument panel next to the center column (Fig. 2).

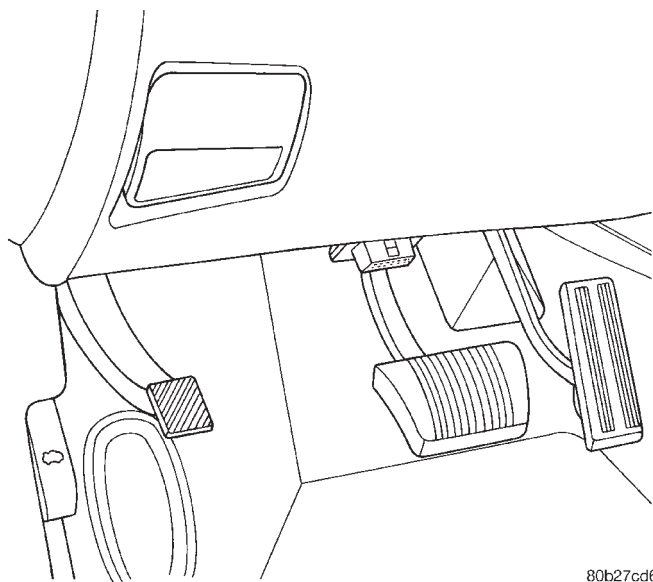


Fig. 2 DATA LINK CONNECTOR

OPERATION

The data link connector (diagnostic connector) links the DRB scan tool with the Powertrain Control Module (PCM). Refer to On-Board Diagnostics in the General Diagnosis section of this group.

MEMORY HEATED SEAT/
MIRROR MODULE

DESCRIPTION

There are three versions of the Memory Seat Module (MSM). The standard version of the MSM is used on vehicles that are not equipped with the optional heated seat system. A Memory Heated Seat/Mirror Module (MHSMM) is used on vehicles that are equipped with the heated seat system option. A third module, the Heated Seat Module (HSM), does not have any memory system capabilities and is only

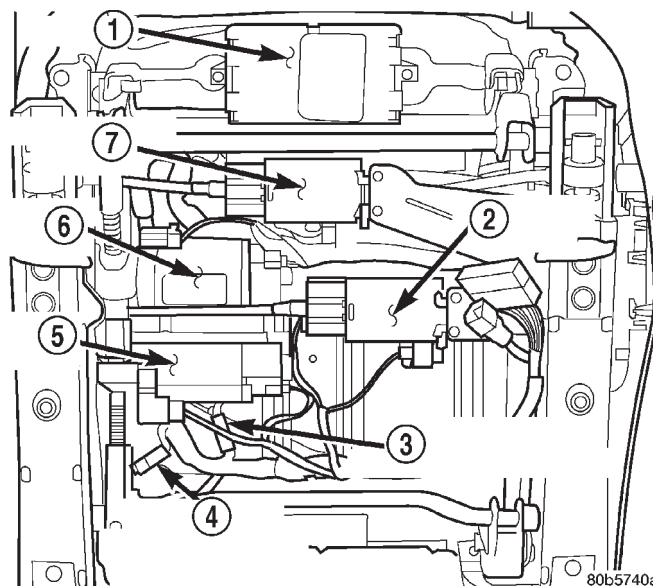


Fig. 3 Memory Heated Seat/Mirror Module (MHSMM)
Location

- 1 - MEMORY HEATED SEAT/MIRROR MODULE
- 2 - RECLINER MOTOR
- 3 - SEAT HEATER 4-WAY CONNECTOR
- 4 - SEAT BACK HEATER 2-WAY CONNECTOR
- 5 - REAR RISER
- 6 - FRONT RISER
- 7 - HORIZONTAL MOTOR

available on vehicles that are equipped with an optional heated seat system. Refer to **Heated Seats** for more information on the heated seat system option.

All three modules are packaged in an identical molded plastic housing which is mounted on a bracket that is located between the power seat track and the seat cushion frame under the forward edge of the driver side front seat cushion. The MSM or MHSMM is used to control all of the driver side power seat memory functions and features. The MSM or MHSMM contains a central processing unit and interfaces with other electronic modules in the vehicle on the Programmable Communications Interface (PCI) data bus network.

For diagnosis of the MSM, MHSMM or the PCI data bus, a DRB III® scan tool and the proper Diagnostic Procedures manual are recommended. The MSM or MHSMM cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The MSM receives hard wired inputs from the power seat switch and the potentiometers on each of the driver side power seat motors. The MSM receives messages over the PCI data bus from the Body Control Module (BCM) and the Powertrain Control Mod-

MEMORY HEATED SEAT/MIRROR MODULE (Continued)

ule (PCM) (vehicle speed status). The programming in the MSM allows it to process the information from these inputs and send control outputs to each of the driver side power seat motors. The MSM will prevent the seat memory recall function from being initiated if the driver side seat belt is buckled, if the transmission gear selector lever is not in the Park or Neutral positions, or if the vehicle is moving. The module also controls the seat heaters and is connected to the seat harness by four connectors.

DIAGNOSIS AND TESTING

MEMORY HEATED SEAT / MIRROR MODULE (MHSMM)

Before testing the Memory Heated Seat / Mirror Module (MHSMM), test the heated seat switches, the heated seat elements, and the heated seat sensors. If there are no problems, proceed as follows:

- Replace the current MHSMM with a known good module, and test the operation of the heated seats. If OK, discard the faulty MHSMM. If the problem persists, proceed.
- Test each of the circuits from the heated seat switch, elements, and sensors to the MHSMM. Repair any shorts or open circuits as required.

REMOVAL

(1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post.

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(2) Position the drivers seat as far upward and rearward as possible.

(3) Remove the two module attaching screws (Fig. 4).

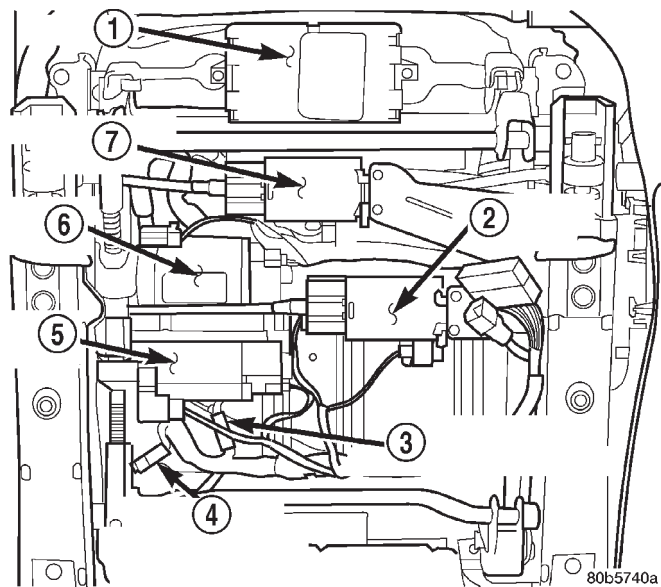


Fig. 4 Memory Heated Seat/Mirror Module (MHSMM) Location

- 1 - MHSMM
- 2 - RECLINER MOTOR
- 3 - SEAT HEATER 4-WAY CONNECTOR
- 4 - SEAT BACK HEATER 2-WAY CONNECTOR
- 5 - REAR RISER
- 6 - FRONT RISER
- 7 - HORIZONTAL MOTOR

(4) Disconnect the module connectors.

(5) Remove the module from drivers seat.

INSTALLATION

- (1) Position the module under the drivers seat.
- (2) Connect the module electrical connectors.
- (3) Install the two module attaching screws.
- (4) Position the drivers seat in its original position.
- (5) Connect the negative battery cable remote terminal.

POWERTRAIN CONTROL MODULE

DESCRIPTION

DESCRIPTION

The Powertrain Control Module (PCM) is a digital computer containing a microprocessor (Fig. 5). The PCM receives input signals from various switches and sensors referred to as Powertrain Control Module Inputs. Based on these inputs, the PCM adjusts various engine, transmission, and vehicle operations through devices referred to as Powertrain Control Module Outputs.

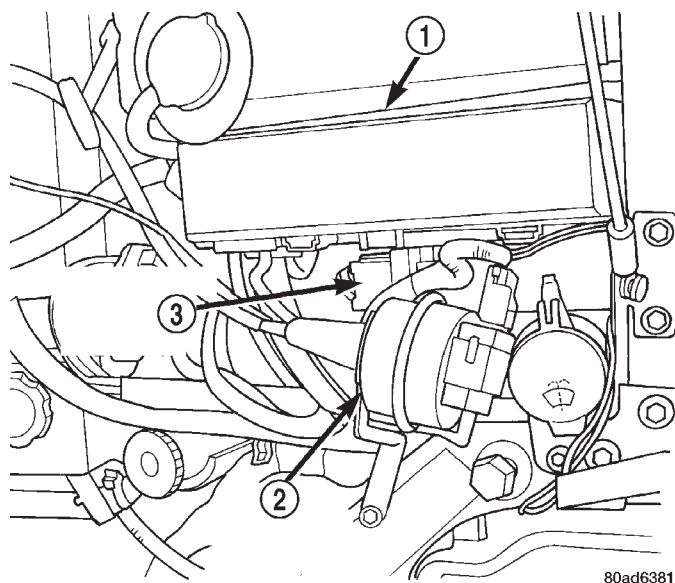


Fig. 5 Powertrain Control Module (PCM)

- 1 - PDC
- 2 - SPEED CONTROL SERVO
- 3 - POWERTRAIN CONTROL MODULE

NOTE: PCM Inputs:

- Air Conditioning Pressure Transducer
- ASD Relay
- Battery Voltage
- Brake Switch Status
- Camshaft Position Sensor
- Crankshaft Position Sensor
- Distance Sensor
- EGR Position Feedback
- Engine Coolant Temperature Sensor
- Heated Oxygen Sensors
- Ignition sense
- Intake Air Temperature Sensor
- Knock Sensor
- Manifold Absolute Pressure (MAP) Sensor

- Natural Vacuum Leak Detection
- PCI Bus
- Power Steering Pressure Switch
- Proportional Purge Sense
- SCI Receive
- Speed Control
- Throttle Position Sensor
- Torque Management Input (Integral to PCM)
- Transmission Control Relay (Switched B+)
- Transmission Range Sensor (TRS)
- Transmission Pressure Switches (L/R, 2/4, OD)
- Transmission Temperature Sensor (Integral to TRS)
- Transmission Input Shaft Speed Sensor
- Transmission Output Shaft Speed Sensor
- TRS Hall Effect Switch (Autostick)
- Vehicle Speed (From Transmission)

NOTE: PCM Outputs:

- Air Conditioning Clutch Relay
- Automatic Shut Down (ASD) and Fuel Pump Relays
- Data Link Connector (PCI and SCI Transmit)
- Double Start Override
- EGR Solenoid
- Fuel Injectors
- Generator Field
- High Speed Fan Relay
- Idle Air Control Motor
- Ignition Coils
- Low Speed Fan Relay
- MTV Actuator
- Natural Vacuum Leak Detection
- Proportional Purge Solenoid
- SRV Valve
- Speed Control Relay
- Speed Control Vent Relay
- Speed Control Vacuum Relay
- Transmission Autostick Display (To Cluster)
- Transmission Control Relay
- Transmission PRNDL Position (To Cluster)
- Transmission Solenoids (L/R, 2/4, OD and UD)
- Transmission Torque Reduction Request (Internal to PCM)
- Transmission Temperature (Internal to PCM)
- Vehicle Speed (Internal to PCM)
- 5 Volt Output

Based on inputs it receives, the powertrain control module (PCM) adjusts fuel injector pulse width, idle speed, ignition timing, and canister purge operation. The PCM also determines the appropriate transmission shift schedule and shift points, depending on the present operating conditions and driver demand. The PCM regulates the cooling fans, air conditioning and speed control systems. The PCM changes generator charge rate by adjusting the generator field.

POWERTRAIN CONTROL MODULE (Continued)

The PCM adjusts injector pulse width (air-fuel ratio) based on the following inputs.

- Battery Voltage
- Intake Air Temperature Sensor
- EGR valve position (if equipped)
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- EVAP Purge Valve Position
- Exhaust Gas Oxygen Content (heated oxygen sensors)
- Manifold Absolute Pressure
- Throttle Position

The PCM adjusts engine idle speed through the idle air control motor based on the following inputs:

- Brake Switch
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Park/Neutral (transmission gear selection)
- Transaxle Gear Engagement
- Throttle Position
- Vehicle Speed (from Transmission)

The PCM adjusts ignition timing based on the following inputs.

- Intake Air Temperature
- Engine Coolant Temperature
- Engine Speed (crankshaft position sensor)
- Knock Sensor
- Manifold Absolute Pressure
- Park/Neutral (transmission gear selection)
- Transaxle Gear Engagement
- Throttle Position

In addition to monitoring inputs and controlling outputs, the PCM has other important transmission related responsibilities and functions:

- Storing and maintaining Clutch Volume Indices (CVI)
- Storing and selecting appropriate Shift Schedules
- System self-diagnostics
- Diagnostic capabilities (with DRB III scan tool)

The automatic shut down (ASD) and fuel pump relays are mounted externally, but turned on and off by the powertrain control module.

The camshaft and crankshaft signals are sent to the powertrain control module. If the PCM does not receive both signals within approximately two second of engine cranking, it deactivates the ASD and fuel pump relays. When these relays are deactivated, power is shut off to the fuel injectors, ignition coils, fuel pump and the heating element in each oxygen sensor.

The PCM contains a voltage converter that changes battery voltage to a regulated 85.0 volts. The 5.0 volts power the camshaft position sensor, crankshaft position sensor, vehicle speed sensor, engine coolant temperature sensor, intake air temperature sensor, manifold absolute pressure sensor, and throttle position sensor.

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage in new PCM. Use the DRB scan tool to change the mileage in the PCM. Refer to the appropriate Powertrain Diagnostic Manual and the DRB scan tool.

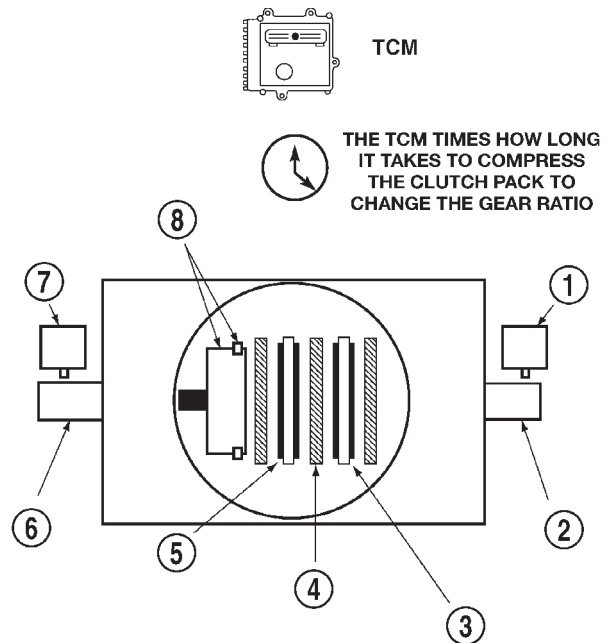
TRANSMISSION CONTROL

CLUTCH VOLUME INDEX (CVI)

An important function of the PCM is to monitor Clutch Volume Index (CVI). CVIs represent the volume of fluid needed to compress a clutch pack.

The PCM monitors gear ratio changes by monitoring the Input and Output Speed Sensors. The Input, or Turbine Speed Sensor sends an electrical signal to the PCM that represents input shaft rpm. The Output Speed Sensor provides the PCM with output shaft speed information.

By comparing the two inputs, the PCM can determine transaxle gear position. This is important to the CVI calculation because the PCM determines CVIs by monitoring how long it takes for a gear change to occur (Fig. 6).



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Fig. 6 Example of CVI Calculation

- 1 - OUTPUT SPEED SENSOR
- 2 - OUTPUT SHAFT
- 3 - CLUTCH PACK
- 4 - SEPARATOR PLATE
- 5 - FRICTION DISCS
- 6 - INPUT SHAFT
- 7 - INPUT SPEED SENSOR
- 8 - PISTON AND SEAL

POWERTRAIN CONTROL MODULE (Continued)

Gear ratios can be determined by using the DRB Scan Tool and reading the Input/Output Speed Sensor values in the "Monitors" display. Gear ratio can be obtained by dividing the Input Speed Sensor value by the Output Speed Sensor value.

For example, if the input shaft is rotating at 1000 rpm and the output shaft is rotating at 500 rpm, then the PCM can determine that the gear ratio is 2:1. In direct drive (3rd gear), the gear ratio changes to 1:1. The gear ratio changes as clutches are applied and released. By monitoring the length of time it takes for the gear ratio to change following a shift request, the PCM can determine the volume of fluid used to apply or release a friction element.

The volume of transmission fluid needed to apply the friction elements are continuously updated for adaptive controls. As friction material wears, the volume of fluid need to apply the element increases.

Certain mechanical problems within the input clutch assembly (broken return springs, out of position snap rings, excessive clutch pack clearance, improper assembly, etc.) can cause inadequate or out-of-range element volumes. Also, defective Input/Output Speed Sensors and wiring can cause these conditions. The following chart identifies the appropriate clutch volumes and when they are monitored/updated:

CLUTCH VOLUMES				
Clutch	When Updated			Proper Clutch Volume
	Shift Sequence	Oil Temperature	Throttle Angle	
L/R	2-1 or 3-1 coast downshift	> 70°	< 5°	35 to 83
2/4	1-2 shift	> 110°	5 - 54°	20 to 77
OD	2-3 shift			48 to 150
UD	4-3 or 4-2 shift		> 5°	24 to 70

POWERTRAIN CONTROL MODULE (Continued)

TRANSMISSION CONTROL

SHIFT SCHEDULES

As mentioned earlier, the PCM has programming that allows it to select a variety of shift schedules. Shift schedule selection is dependent on the following:

- Shift lever position

- Throttle position
- Engine load
- Fluid temperature
- Software level

As driving conditions change, the PCM appropriately adjusts the shift schedule. Refer to the following chart to determine the appropriate operation expected, depending on driving conditions.

Schedule	Condition	Expected Operation
Extreme Cold	Oil temperature at start-up below -16° F	Park, Reverse, Neutral and 2nd gear only (prevents shifting which may fail a clutch with frequent shifts)
Cold	Oil temperature at start-up above -12° F and below 36° F	<ul style="list-style-type: none"> – Delayed 2-3 upshift (approximately 22-31 mph) – Delayed 3-4 upshift (45-53 mph) – Early 4-3 coastdown shift (approximately 30 mph) – Early 3-2 coastdown shift (approximately 17 mph) – High speed 4-2, 3-2, 2-1 kickdown shifts are prevented – No EMCC
Warm	Oil temperature at start-up above 36° F and below 80 degree F	<ul style="list-style-type: none"> – Normal operation (upshift, kickdowns, and coastdowns) – No EMCC
Hot	Oil temperature at start-up above 80° F	<ul style="list-style-type: none"> – Normal operation (upshift, kickdowns, and coastdowns) – Full EMCC, no PEMCC except to engage FEMCC (except at closed throttle at speeds above 70-83 mph)
Overheat	Oil temperature above 240° F or engine coolant temperature above 244° F	<ul style="list-style-type: none"> – Delayed 2-3 upshift (25-32 mph) – Delayed 3-4 upshift (41-48 mph) – 3rd gear FEMCC from 30-48 mph – 3rd gear PEMCC from 27-31 mph
Super Overheat	Oil temperature above 260° F	<ul style="list-style-type: none"> – All "Overheat" shift schedule features apply – 2nd gear PEMCC above 22 mph – Above 22 mph the torque converter will not unlock unless the throttle is closed or if a wide open throttle 2nd PEMCC to 1 kickdown is made

POWERTRAIN CONTROL MODULE (Continued)

DIAGNOSTIC TROUBLE CODE

DESCRIPTION

A Diagnostic Trouble Code (DTC) indicates the PCM or TCM has recognized an abnormal condition in the system.

Remember that DTC's are the results of a system or circuit failure, but do not directly identify the failed component or components.

NOTE: For a list of DTC's, refer to the charts in this section.

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0016	Crankshaft/Camshaft Timing Misalignment	A rationality error has been detected for camshaft position out of phase with crankshaft
P0030	O2 sensor 1/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0031	O2 sensor 1/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0036	O2 sensor 1/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0037	O2 sensor 1/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0038	O2 sensor 1/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0043	O2 sensor 1/3 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0044	O2 sensor 1/3 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0050	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0051	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0052	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0056	O2 sensor 2/1 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0057	O2 sensor 2/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0058	O2 sensor 2/2 Heater Circuit	Shorted condition detected in the oxygen sensor heater element control feedback sense circuit.
P0068	Manifold Pressure/Throttle Position Correlation	MAP sensor signal does not correlate to throttle position sensor signal. Possible vacuum leak.
P0070	Ambient Temp Sensor Stuck	A rationality error has been detected in the ambient temp. sensor test.
P0071 (M)	Ambient Temp Sensor Performance	Ambient change less than 3° C in 200 Miles
P0072	Ambient Temp Sensor Low	Ambient temp. sensor input below the minimum acceptable voltage

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0073	Ambient Temp Sensor High	Ambient temp. sensor input above the maximum acceptable voltage
P0106 (M)	Barometric Pressure Out of Range	MAP sensor input voltage out of an acceptable range detected during reading of barometric pressure at key-on.
P0107 (M)	Map Sensor Voltage Too Low	MAP sensor input below minimum acceptable voltage.
P0108 (M)	Map Sensor Voltage Too High	MAP sensor input above maximum acceptable voltage.
P0110	Intake Air Temp Sensor Stuck	A rationality error has been detected for the intake air temp. sensor.
P0111 (M)	Intake Air Temp Sensor Performance	Intake Air change less than 3° C in 200 Miles
P0112 (M)	Intake Air Temp Sensor Voltage Low	Intake air (charge) temperature sensor input below the minimum acceptable voltage.
P0113 (M)	Intake Air Temp Sensor Voltage High	Intake air (charge) temperature sensor input above the maximum acceptable voltage.
P0116	Engine Coolant Temp Performance	A rationality error has been detected in the coolant temp sensor.
P0117 (M)	ECT Sensor Voltage Too Low	Engine coolant temperature sensor input below the minimum acceptable voltage.
P0118 (M)	ECT Sensor Voltage Too High	Engine coolant temperature sensor input above the maximum acceptable voltage.
P0120 (M)	Throttle Position Sensor Signal Circuit	Throttle angle out of range or abrupt angle change
P0121 (M)	TPS Voltage Does Not Agree With MAP	TPS signal does not correlate to MAP sensor signal.
P0122 (M)	Throttle Position Sensor Voltage Low	Throttle position sensor input below the acceptable voltage range.
P0123 (M)	Throttle Position Sensor Voltage High	Throttle position sensor input above the maximum acceptable voltage.
P0125 (M)	Engine Coolant Temp Not Reached	Time to enter Closed Loop Operation (Fuel Control) is excessive.
P0128	Thermostat Rationality	A rationality error has been detected for the thermostat
P0129	Barometric Pressure Out-of-Range low	MAP sensor input voltage out of an acceptable range detected during reading of barometric pressure.
P0130	1/1 O2 Sensor Heater Relay Circuit	An open or shorted condition detected in the ASD or CNG shutoff relay control ckt.
P0131 (M)	1/1 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0132 (M)	1/1 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0133 (M)	1/1 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0134 (M)	1/1 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor input.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0135 (M)	1/1 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0136	1/2 O2 Sensor Heater Relay Circuit	An open or shorted condition detected in the ASD or CNG shutoff relay control ckt.
P0137 (M)	1/2 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0138 (M)	1/2 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0139 (M)	1/2 O2 Sensor Slow Response	Oxygen sensor response not as expected.
P0140 (M)	1/2 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0141 (M)	1/2 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0143	1/3 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0144	1/3 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0145	1/3 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0146	1/3 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0147	1/3 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0151 (M)	2/1 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0152 (M)	2/1 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage sustained above normal operating range.
P0153 (M)	2/1 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0154 (M)	2/1 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0155 (M)	2/1 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0157 (M)	2/2 O2 Sensor Shorted To Ground	Oxygen sensor input voltage maintained below normal operating range.
P0158 (M)	2/2 O2 Sensor Shorted To Voltage	Oxygen sensor input voltage maintained above normal operating range.
P0159	2/2 O2 Sensor Slow Response	Oxygen sensor response slower than minimum required switching frequency.
P0160 (M)	2/2 O2 Sensor Stays at Center	Neither rich or lean condition is detected from the oxygen sensor.
P0161 (M)	2/2 O2 Sensor Heater Failure	Oxygen sensor heater element malfunction.
P0165	Starter Relay Circuit	
P0171 (M)	1/1 Fuel System Lean	A lean air/fuel mixture has been indicated by an abnormally rich correction factor.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0172 (M)	1/1 Fuel System Rich	A rich air/fuel mixture has been indicated by an abnormally lean correction factor.
P0174 (M)	2/1 Fuel System Lean	A lean air/fuel mixture has been indicated by an abnormally rich correction factor.
P0175 (M)	2/1 Fuel System Rich	A rich air/fuel mixture has been indicated by an abnormally lean correction factor.
P0176	Flex Fuel Calibration Signal	No calibration voltage present from flex fuel sensor.
P0178	Flex Fuel Sensor Volts Too Low	Flex fuel sensor input below minimum acceptable voltage.
P0179	Flex Fuel Sensor Volts Too High	Flex fuel sensor input above maximum acceptable voltage.
P0201 (M)	Injector #1 Control Circuit	An open or shorted condition detected in control circuit for injector #1 or the INJ 1 injector bank.
P0202 (M)	Injector #2 Control Circuit	An open or shorted condition detected in control circuit for injector #2 or the INJ 2 injector bank.
P0203 (M)	Injector #3 Control Circuit	An open or shorted condition detected in control circuit for injector #3 or the INJ 3 injector bank.
P0204 (M)	Injector #4 Control Circuit	Injector #4 or INJ 4 injector bank output driver stage does not respond properly to the control signal.
P0205 (M)	Injector #5 Control Circuit	Injector #5 output driver stage does not respond properly to the control signal.
P0206 (M)	Injector #6 Control Circuit	Injector #6 output driver stage does not respond properly to the control signal.
P0207	Injector #7 Control Circuit	Injector #7 output driver stage does not respond properly to the control signal.
P0208	Injector #8 Control Circuit	Injector #8 output driver stage does not respond properly to the control signal.
P0209	Injector #9 Control Circuit	Injector #9 output driver stage does not respond properly to the control signal.
P0210	Injector #10 Control Circuit	Injector #10 output driver stage does not respond properly to the control signal.
P0218	High Temperature Operation Activated	When overheat shift schedule is activated 116° C (240 F)
P0234	Boost Limit Exceeded	
P0243	Wastegate Solenoid Circuit	
P0300 (M)	Multiple Cylinder Mis-fire	Misfire detected in multiple cylinders.
P0301 (M)	CYLINDER #1 MISFIRE	Misfire detected in cylinder #1.
P0302 (M)	CYLINDER #2 MISFIRE	Misfire detected in cylinder #2.
P0303 (M)	CYLINDER #3 MISFIRE	Misfire detected in cylinder #3.
P0304 (M)	CYLINDER #4 MISFIRE	Misfire detected in cylinder #4.
P0305 (M)	CYLINDER #5 MISFIRE	Misfire detected in cylinder #5.
P0306 (M)	CYLINDER #6 MISFIRE	Misfire detected in cylinder #6.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0307 (M)	CYLINDER #7 MISFIRE	Misfire detected in cylinder #7
P0308 (M)	CYLINDER #8 MISFIRE	Misfire detected in cylinder #8.
P0309 (M)	CYLINDER #9 MISFIRE	Misfire detected in cylinder #9.
P0310 (M)	CYLINDER #10 MISFIRE	Misfire detected in cylinder #10.
P0315	No Crank Sensor Learned	Unable to learn the crank sensor's signal in preparation for misfire diagnostics.
P0320	No Crank Reference Signal at PCM	No reference signal (crankshaft position sensor) detected during engine cranking.
P0325	Knock Sensor #1 Circuit	Knock sensor (#1) signal above or below minimum acceptable threshold voltage at particular engine speeds.
P0330	Knock Sensor #2 Circuit	Knock sensor (#2) signal above or below minimum acceptable threshold voltage at particular engine speeds.
P0335	Crankshaft Position Sensor Circuit	A rationality error has been detected for loss of crankshaft position sensor.
P0339	Crankshaft Position Sensor Circuit Intermittent	A rationality error has been detected for intermittent loss of crankshaft position sensor.
P0340 (M)	Camshaft Position Sensor Circuit	A rationality error has been detected for loss of camshaft position sensor.
P0344	Camshaft Position Sensor Circuit Intermittent	A rationality error has been detected for intermittent loss of camshaft position sensor.
P0350	Ignition Coil Draws Too Much Current	A coil (1-5) is drawing too much current.
P0351 (M)	Ignition Coil Primary # 1 Circuit	Peak primary circuit current not achieved with maximum dwell time.
P0352 (M)	Ignition Coil Primary # 2 Circuit	Peak primary circuit current not achieved with maximum dwell time.
P0353 (M)	Ignition Coil Primary # 3 Circuit	Peak primary circuit current not achieved with maximum dwell time.
P0354 (M)	Ignition Coil Primary# 4 Circuit	Peak primary circuit current not achieved with maximum dwell time (High Impedance).
P0355 (M)	Ignition Coil Primary # 5 Circuit	Peak primary circuit current not achieved with maximum dwell time (High Impedance).
P0356 (M)	Ignition Coil Primary # 6 Circuit	Peak primary circuit current not achieved with maximum dwell time (high impedance).
P0357	Ignition Coil Primary # 7 Circuit	Peak primary circuit current not achieved with maximum dwell time (high impedance).
P0358	Ignition Coil Primary # 8 Circuit	Peak primary circuit current not achieved with maximum dwell time (high impedance).
P0400	Diesel EGR System Failure	
P0401 (M)	EGR System Failure	Required change in air/fuel ration not detected during diagnostic test.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0403 (M)	EGR Solenoid Circuit	An open or shorted condition detected in the EGR solenoid control circuit.
P0404 (M)	EGR Position Sensor Rationality	EGR position sensor signal does not correlate to EGR duty cycle.
P0405 (M)	EGR Position Sensor Volts Too Low	EGR position sensor input below the acceptable voltage range.
P0406 (M)	EGR Position Sensor Volts Too High	EGR position sensor input above the acceptable voltage range.
P0412	Secondary Air Solenoid Circuit	An open or shorted condition detected in the secondary air (air switching/aspirator) solenoid control circuit.
P0420 (M)	1/1 Catalytic Converter Efficiency	Catalyst 1/1 efficiency below required level.
P0432 (M)	1/2 Catalytic Converter Efficiency	Catalyst 2/1 efficiency below required level.
P0440	General EVAP System Failure	General system failure.
P0441 (M)	Evap Purge Flow Monitor	Insufficient or excessive vapor flow detected during evaporative emission system operation.
P0442 (M)	Evap Leak Monitor 0.040 Leak Detected	A 0.040 leak has been detected in the evaporative system.
P0443 (M)	Evap Purge Solenoid Circuit	An open or shorted condition detected in the EVAP purge solenoid control circuit.
P0452	NVLD Pressure Switch Stuck Closed	NVLD pressure switch stuck closed.
P0453	NVLD Pressure Switch Stuck Open	NVLD pressure switch stuck open.
P0455 (M)	Evap Leak Monitor Large Leak Detected	A large leak has been detected in the evaporative system.
P0456 (M)	Evap Leak Monitor 0.020 Leak Detected	A 0.020 leak has been detected in the evaporative system.
P0460	Fuel Level Unit No Change Over Miles	No movement of fuel level sender detected.
P0461	Fuel Level Unit No Changeover Time	No level of fuel level sender detected.
P0462	Fuel Level Sending Unit Volts Too Low	Fuel level sensor input below acceptable voltage.
P0463	Fuel Level Sending Unit Volts Too High	Fuel level sensor input above acceptable voltage.
P0480	Low Speed Fan Relay Control Circuit	An open or shorted condition detected in the low speed rad. fan relay control circuit.
P0481	High Speed Fan Relay Control Circuit	An open or shorted condition detected in the high speed rad. fan relay control circuit.
P0498	NVLD Canister Vent Valve Solenoid Circuit Low	A shorted low condition detected in NVLD solenoid circuit.
P0499	NVLD Canister Vent Valve Solenoid Circuit High	A shorted high condition detected in NVLD solenoid circuit.
P0500 (M)	No Vehicle Speed Sensor Signal	No vehicle speed sensor signal detected during road load conditions.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0501	Vehicle Speed Sensor #1 Performance	A rationality error has been detected for no vehicle speed sensor signal detected during road load conditions.
P0505 (M)	Idle Air Control Motor Circuits	Replace idle air control motor.
P0508 (M)	Idle Air Control Motor Circuit Low	Idle Air Control Motor Circuit input below acceptable current
P0509 (M)	Idle Air Control Motor Circuit High	Idle Air Control Motor Circuit input above acceptable current
P0511	Idle Air Control Valve Solenoid Circuit	An open or shorted condition detected in the IAC control circuit.
P0513	Invalid SKIM Key	The engine controller has received an invalid key from the Smart Key Immobilizer Module.
P0516	Battery Temperature Sensor Low	Battery Temp. sensor input below minimum acceptable voltage.
P0517	Battery Temperature Sensor High	Battery Temp. sensor input above maximum acceptable voltage.
P0519	Idle Speed Performance	A rationality error has been detected for target RPM not met during drive idle condition. Possible Vacuum leak or IAC lost steps.
P0522	Oil Pressure Sens Low	Oil pressure sensor input below acceptable voltage.
P0523	Oil Pressure Sens High	Oil pressure sensor input above acceptable voltage.
P0532	A/C Pressure Sensor Low	A/C pressure sensor input below the minimum acceptable voltage.
P0533	A/C Pressure Sensor High	A/C pressure sensor input above the maximum acceptable voltage.
P0551 (M)	Power Steering Switch Failure	Incorrect input state detected for the power steering switch circuit. PL: High pressure seen at high speed.
P0562 (M)	Battery Voltage Low	Battery voltage sense input below the minimum acceptable voltage.
P0563	Battery Voltage High	Battery voltage sense input above the maximum acceptable voltage.
P0579	Speed Control Switch #1 Performance	Cruise switch stuck in a valid voltage range.
P0580	Speed Control Switch #1 Low	Speed control switch input below minimum acceptable voltage.
P0581	Speed Control Switch #1 High	Speed control switch input above maximum acceptable voltage.
P0582	Speed Control Vacuum Solenoid Circuit	An open or shorted condition detected in speed control Vacuum solenoid control circuit.
P0586	Speed Control Vent Solenoid Circuit	An open or shorted condition detected in speed control vent solenoid control circuit.
P0594	Speed Control Servo Power Circuit	An open or shorted condition open/short condition detected in the speed control servo power control circuit.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0600 (M)	PCM Failure SPI Communications	No communication detected between co-processors in the control module.
P0601 (M)	Internal Controller Failure	Internal control module fault condition (check sum) detected.
P0604 (M)	Internal TCM	Transmission control module RAM self test fault detected.
P0605 (M)	Internal TCM	Transmission control module ROM self test fault detected.
P0613 (M)	Internal TCM	Transmission control module ROM self test fault detected.
P0615	Starter Relay Circuit	Open or shorted condition detected in the starter relay control circuit.
P0622 (G)	Generator Field Not Switching Properly	An open or shorted condition detected in the generator field control circuit.
P0627	Fuel Pump Relay Circuit	An open or shorted condition detected in the fuel pump relay control circuit.
P0630	VIN Not Programmed In PCM	VIN is not programmed in the control module EEPROM.
P0632	Odometer Not Programmed In PCM	Odometer is not programmed in the control module EEPROM.
P0633	SKIM Key Not Programmed In PCM	SKIM secert key is not programmed in the control module EEPROM.
P0645	A/C Clutch Relay Circuit	An open or shorted condition detected in the A/C clutch relay control circuit.
P0660	Manifold Tune Valve Solenoid Circuit	An open or shorted condition detected in the manifold tuning valve solenoid control circuit.
P0685	ASD Relay Control Circuit	An open or shorted condition detected in the ASD relay control circuit.
P0688	ASD Relay Sense Circuit Low	ASD voltage sensed when ASD relay is energized or ASD voltage not sensed when ASD relay is not energized.
P0700 (M)	Check Transmission DTC's	This SBEC III or JTEC DTC indicates that the EATX has an active fault and has requested illuminated the MIL via a BUS message. The specific fault must be acquired from the EATX.
P0703 (M)	Brake Switch Stuck Pressed or Released	Incorrect input state detected in the brake switch circuit. (Changed from P1595).
P0706	Check Shifter Signal	3 occurrences in one key start of an invalid PRNDL code which lasts for more than 0.1 second.
P0711	Trans Temp Sensor, No Temp Rise After Start	Relationship between the transmission temperature and overdrive operation and/or TCC operation indicates a failure of the Transmission Temperature Sensor. OBD II Rationality.
P0712	Trans Temp Sensor Voltage Too Low	Transmission fluid temperature sensor input below acceptable voltage.
P0713	Trans Temp Sensor Voltage Too High	Transmission fluid temperature sensor input above acceptable voltage.
P0715 (M)	Input Speed Sensor Error	Excessive input RPM change in any gear detected.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0720 (M)	Output Speed Sensor Error	Excessive output RPM change in any gear detected.
P0725	Engine Speed Sensor Circuit	Engine RPM less than 390 or greater than 8000 for more than 2 seconds.
P0731 (M)	Gear Ratio Error in 1st	Input/output RPM ratio does not match current gear ratio.
P0732 (M)	Gear Ratio Error in 2nd	Input/output RPM ratio does not match current gear ratio.
P0733 (M)	Gear Ratio Error in 3rd	Input/output RPM ratio does not match current gear ratio.
P0734 (M)	Gear Ratio Error in 4th	Input/output RPM ratio does not match current gear ratio.
P0736 (M)	Gear Ratio Error in Reverse	Input/output RPM ratio does not match current gear ratio.
P0740 (M)	Torque Converter Clutch Control Circuit	Slippage > 100 RPM for 10 seconds in FEMCC or RPM/input speed difference > 60 RPM in EMCC.
P0743	Torque Converter Clutch Solenoid/Trans Relay Circuits	An open or shorted condition detected in the torque converter clutch (part throttle unlock) solenoid control circuit. Shift solenoid C electrical fault - Asian transmission
P0748	Governor Pressure Sol Control/Trans Relay Circuits	An open or shorted condition detected in the Governor Pressure Solenoid circuit or Trans Relay Circuit in JTEC RE transmissions.
P0750 (M)	LR Solenoid Circuit	Three consecutive solenoid continuity test failures or one failure if test is in response to gear ratio or pressure switch error.
P0751	O/D Switch Pressed (Lo) More Than 5 Minutes	Overdrive override switch input is in a prolonged depressed state.
P0753	Trans 3-4 Shift Sol/Trans Relay Circuits	An open or shorted condition detected in the overdrive solenoid control circuit or Trans Relay Circuit in JTEC RE transmissions.
P0755 (M)	2/4 Solenoid Circuit	Three consecutive solenoid continuity test failures or one failure if test is in response to gear ratio or pressure switch error.
P0756	AW4 Shift Sol B (2-3) Functional Failure	Shift solenoid B (2-3) functional fault - Asian transmission
P0760 (M)	OD Solenoid Circuit	Three consecutive solenoid continuity test failures or one failure if test is in response to gear ratio or pressure switch error.
P0765 (M)	UD Solenoid Circuit	Three consecutive solenoid continuity test failures or one failure if test is in response to gear ratio or pressure switch error.
P0783	3-4 Shift Sol, No RPM Drop at Lockup	The overdrive solenoid is unable to engage the gear change from 3rd gear to the overdrive gear.
P0801	Reverse Gear Lockout Circuit Open or Short	An open or shorted condition detected in the transmission reverse gear lock-out solenoid control circuit.
P0833	Clutch Upstop Switch Performance	Rationality error detected for clutch upstop switch performance

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P0841 (M)	LR Pressure Switch Sense Circuit	LR pressure switch open or closed at wrong time in given gear.
P0845 (M)	2/4 Hydraulic Pressure Test Failure	Two failures of OFF element pressure switch status check.
P0846 (M)	2/4 Pressure Switch Circuit	2/4 pressure switch open or closed at wrong time in given gear.
P0850	Park/Neutral Switch Performance	A rationality error has been detected for park/neutral switch performance.
P0870 (M)	OD Hydraulic Pressure Test Failure	Two failures of OFF element pressure switch status check.
P0871 (M)	OD Pressure Switch Sense Circuit	OD pressure switch open or closed at wrong time in given gear.
P0884	Power Up at Speed	TCM powers up and senses a valid forward gear PRNDL DTC, and the output RPM is > 800.
P0888 (M)	Relay Output Always Off	Less than 3 volts present at relay output circuit when the controller is energizing the relay.
P0890 (M)	Switch Battery	Voltage sensed on pressure switch input prior to TCM energizing control relay
P0891 (M)	Transmission Relay Always On	Welded contacts. Greater than 3 volts sensed at relay output terminal prior to controller energizing the relay.
P0897	Worn Out/Burnt Transaxle Fluid	When vehicle shudder is detected during partial engagement (PEMCC).
P0992	2-4/OD Hydraulic Pressure Test Failure	Two failures of OFF element pressure switch status check.
P0944	Loss of Prime	Transmission slip and improper pressure switch status detected.
P0951	Autostick Sensor Circuit	Upshift or downshift switch closed with shifter NOT in Autostick mode or both switches closed with shifter in Autostick mode.
P1105	Baro Read Solenoid Circuit	Open or shorted condition detected in the baro read solenoid control circuit.
P1115	General Temperature Rationality	General temperature sensor rationality error.
P1192 (M)	Inlet Air Temp. Circuit Low	Inlet Air Temp. sensor input below acceptable voltage
P1193 (M)	Inlet Air Temp. Circuit High	Inlet Air Temp. sensor input above acceptable voltage.
P1194	PWM O2 Heater Performance	Incorrect or irrational performance has been detected for the PWM O2 heater circuit.
P1195 (M)	1/1 O2 Sensor Slow During Catalyst Monitor	A slow switching oxygen sensor has been detected in bank 1/1 during catalyst monitor test. (was P0133)
P1196 (M)	2/1 O2 Sensor Slow During Catalyst Monitor	A slow switching oxygen sensor has been detected in bank 2/1 during catalyst monitor test. (was P0153)
P1197	1/2 O2 Sensor Slow During Catalyst Monitor	A slow switching oxygen sensor has been detected in bank 1/2 during catalyst monitor test. (was P0139)

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1198	Radiator Temperature Sensor Volts Too High	Radiator coolant temperature sensor input above the maximum acceptable voltage.
P1199	Radiator Temperature Sensor Volts Too Low	Radiator coolant temperature sensor input below the minimum acceptable voltage.
P1281	Engine is Cold Too Long	Engine coolant temperature remains below normal operating temperatures during vehicle travel (Thermostat).
P1282	Fuel Pump Relay Control Circuit	An open or shorted condition detected in the fuel pump relay control circuit.
P1288	Intake Manifold Short Runner Solenoid Circuit	An open or shorted condition detected in the short runner tuning valve circuit.
P1289	Manifold Tune Valve Solenoid Circuit	An open or shorted condition detected in the manifold tuning valve solenoid control circuit.
P1290	CNG Fuel System Pressure Too High	Compressed natural gas system pressure above normal operating range.
P1291	No Temp Rise Seen From Intake Heaters	Energizing Heated Air Intake does not change intake air temperature sensor an acceptable amount.
P1292	CNG Pressure Sensor Voltage Too High	Compressed natural gas pressure sensor reading above acceptable voltage.
P1293	CNG Pressure Sensor Voltage Too Low	Compressed natural gas pressure sensor reading below acceptable voltage.
P1294 (M)	Target Idle Not Reached	Target RPM not achieved during drive idle condition. Possible vacuum leak or IAC (AIS) lost steps.
P1295	No 5 Volts to TP Sensor	Loss of a 5 volt feed to the Throttle Position Sensor has been detected.
P1296	No 5 Volts to MAP Sensor	Loss of a 5 volt feed to the MAP Sensor has been detected.
P1297 (M)	No Change in MAP From Start To Run	No difference is recognized between the MAP reading at engine idle and the stored barometric pressure reading.
P1298	Lean Operation at Wide Open Throttle	A prolonged lean condition is detected during Wide Open Throttle.
P1299 (M)	Vacuum Leak Found (IAC Fully Seated)	MAP Sensor signal does not correlate to Throttle Position Sensor signal. Possible vacuum leak.
P1388	Auto Shutdown Relay Control Circuit	An open or shorted condition detected in the ASD or CNG shutoff relay control ckt.
P1389	No ASD Relay Output Voltage At PCM	No Z1 or Z2 voltage sensed when the auto shutdown relay is energized.
P1390 (M)	Timing Belt Skipped 1 Tooth or More	Relationship between Cam and Crank signals not correct.
P1391 (M)	Intermittent Loss of CMP or CKP	Loss of the Cam Position Sensor or Crank Position sensor has occurred. For PL 2.0L
P1398 (M)	Mis-Fire Adaptive Numerator at Limit	PCM is unable to learn the Crank Sensor's signal in preparation for Misfire Diagnostics. Probable defective Crank Sensor.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1399	Wait To Start Lamp Circuit	An open or shorted condition detected in the Wait to Start Lamp circuit.
P1403	No 5 Volts to EGR Sensor	Loss of 5v feed to the EGR position sensor.
P1476	Too Little Secondary Air	Insufficient flow of secondary air injection detected during aspirator test.(was P0411)
P1477	Too Much Secondary Air	Excessive flow of secondary air injection detected during aspirator test (was P0411).
P1478 (M)	Battery Temp Sensor Volts Out of Limit	Internal temperature sensor input voltage out of an acceptable range.
P1479	Transmission Fan Relay Circuit	An open or shorted condition detected in the transmission fan relay circuit.
P1480	PCV Solenoid Circuit	An open or shorted condition detected in the PCV solenoid circuit.
P1481	EATX RPM Pulse Performance	ETAX RPM pulse generator signal for misfire detection does not correlate with expected value.
P1482	Catalyst Temperature Sensor Circuit Shorted Low	Catalyst temperature sensor circuit shorted low.
P1483	Catalyst Temperature Sensor Circuit Shorted High.	Catalyst temperature sensor circuit shorted high.
P1484	Catalytic Converter Overheat Detected	A catalyst overheat condition has been detected by the catalyst temperature sensor.
P1485	Air Injection Solenoid Circuit	An open or shorted condition detected in the air assist solenoid circuit.
P1486 (M)	Evap Leak Monitor Pinched Hose Found	LDP has detected a pinched hose in the evaporative hose system.
P1487	Hi Speed Rad Fan CTRL Relay Circuit	An open or shorted condition detected in the control circuit of the #2 high speed radiator fan control relay.
P1488	Auxiliary 5 Volt Supply Output Too Low	Auxiliary 5 volt sensor feed is sensed to be below an acceptable limit.
P1489 (M)	High Speed Fan CTRL Relay Circuit	An open or shorted condition detected in the control circuit of the high speed radiator fan control relay.
P1490 (M)	Low Speed Fan CTRL Relay Circuit	An open or shorted condition detected in control circuit of the low speed radiator fan control relay.
P1491	Rad Fan Control Relay Circuit	An open or shorted condition detected in the radiator fan control relay control circuit. This includes PWM solid state relays.
P1492 (M,G)	Ambient/Batt Temp Sen Volts Too High	External temperature sensor input above acceptable voltage.
P1493 (M,G)	Ambient/Batt Temp Sen Volts Too Low	External temperature sensor input below acceptable voltage.
P1494 (M)	Leak Detection Pump Sw or Mechanical Fault	Incorrect input state detected for the Leak Detection Pump (LDP) pressure switch.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1495 (M)	Leak Detection Pump Solenoid Circuit	An open or shorted condition detected in the Leak Detection Pump (LDP) solenoid circuit.
P1496 (M)	5 Volt Supply, Output Too Low	5 volt sensor feed is sensed to be below an acceptable limit. (< 4v for 4 sec).
P1498	High Speed Rad Fan Ground CTRL Rly Circuit	An open or shorted condition detected in the control circuit of the #3 high speed radiator fan control relay.
P1594 (G)	Charging System Voltage Too High	Battery voltage sense input above target charging voltage during engine operation.
P1595	Speed Control Solenoid Circuits	An open or shorted condition detected in either of the speed control vacuum or vent solenoid control circuits.
P1596	Speed Control Switch Always High	Speed control switch input above maximum acceptable voltage.
P1597	Speed Control Switch Always Low	Speed control switch input below minimum acceptable voltage.
P1598	A/C Pressure Sensor Volts Too High	A/C pressure sensor input above maximum acceptable voltage.
P1599	A/C Pressure Sensor Volts Too Low	A/C pressure sensor input below minimum acceptable voltage.
P1602 (M)	PCM not Programmed	PCM not programmed (generic controller fault).
P1603	PCM Internal Dual Port Ram Communication	Dual port RAM communication link error.
P1604	PCM Internal Dual Port Ram Read/Write Integrity Failure	Dual port RAM read/write error.
P1607	PCM internal Shutdown Timer Rationality	A rationality error has been detected for the shutdown timer.
P1652	Serial Communication Link Malfunction	No BUS messages received by TCM for approximately 20 seconds.
P1680	Clutch Released Switch Circuit	
P1681	No I/P Cluster CCD/J1850 Messages Received	No CCD/J1850 messages received from the cluster control module.
P1682 (G)	Charging System Voltage Too Low	Battery voltage sense input below target charging voltage during engine operation and no significant change in voltage detected during active test of generator output circuit.
P1683	SPD CTRL PWR Relay; or S/C 12v Driver CKT	An open or shorted condition detected in the speed control servo power control circuit. (SBECII: ext relay).
P1684	Battery Loss In The Last 50 Starts	The battery has been disconnected within the last 50 starts.
P1685	Skim Invalid Key	The engine controller has received an invalid key from the SKIM.
P1686	No SKIM BUS Messages Received	No CCD/J1850 messages received from the Smart Key Immobilizer Module (SKIM).

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1687	No Communication with the MIC	No BUS messages received from the Mechanical Instrument Cluster (MIC) for approximately 25 seconds.
P1693	DTC Detected in Companion Module	A fault has been generated in the companion engine control module.
P1694	BUS Communication with Engine Module	No BUS messages received from the powertrain control module for 10 seconds.
P1695	No CCD/J1850 Message From Body Control Module	No CCD/J1850 messages received from the body control module.
P1696 (M)	PCM Failure EEPROM Write Denied	Unsuccessful attempt to write to an EEPROM location by the control module.
P1697 (M)	PCM Failure SRI Mile Not Stored	Unsuccessful attempt to update Service Reminder Indicator (SRI or EMR) mileage in the control module EEPROM.
P1698 (M)	No CCD/J1850 Message From TCM	No CCD/J1850 messages received from the electronic transmission control module (EATX) or the Aisin transmission controller.
P1719	Skip Shift Solenoid Circuit	An open or shorted condition detected in the transmission 2-3 gear lock-out solenoid control circuit.
P1740	TCC or O/D Solenoid Performance	Rationality error detected in either the torque convertor clutch or solenoid or overdrive solenoid system.
P1756	GOV Press Not Equal to Target @ 15-20 PSI	The requested pressure and the actual pressure are not within a tolerance band for the Governor Control System which is used to regulate governor pressure to control shifts for 1st, 2nd, and 3rd gear. (Mid Pressure Malfunction)
P1757	GOV Press Not Equal to Target @ 15-20 PSI	The requested pressure and the actual pressure are not within a tolerance band for the Governor Control System which is used to regulate governor pressure to control shifts for 1st, 2nd, and 3rd gear (Zero Pressure Malfunction)
P1762	Gov Press Sen Offset Volts Too Low or High	The Governor Pressure Sensor input is greater than a calibration limit or is less than a calibration limit for 3 consecutive park/neutral calibrations.
P1763	Governor Pressure Sensor Volts Too Hi	The Governor Pressure Sensor input is above an acceptable voltage level.
P1764	Governor Pressure Sensor Volts Too Low	The Governor Pressure Sensor input is below an acceptable voltage level.
P1765	Trans 12 Volt Supply Relay CTRL Circuit	An open or shorted condition is detected in the Transmission Relay control circuit. This relay supplies power to the TCC
P1775 (M)	Solenoid Switch Valve Latched in the TCC position	Three unsuccessful attempts are made to shift into 1st gear in one given ignition start.

POWERTRAIN CONTROL MODULE (Continued)

(M) Malfunction Indicator Lamp (MIL) will illuminate during engine operation if this Diagnostic Trouble Code was recorded.		
(G) Generator Lamp Illuminated		
GENERIC SCAN TOOL CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
P1776 (M)	Solenoid Switch Valve Latched in the LR position	TCM detects LR pressure switch close while in PEMCC/FEMCC, or after two unsuccessful attempts to enter PEMCC/FEMCC.
P1790	Fault Immediately After Shift	Speed ratio code stored within 1.3 seconds after shift.
P1793 (M)	TRD Link Communication Error	Two unconfirmed torque reduction messages from TCM to PCM
P1794 (M)	Speed Sensor Ground Error	After a TCM reset in neutral and input/output ratio = 2.50
P1797	Manual Shift Overheat	Transmission temperature > 124° C (255° F) or temperature > 135° C (275° F) in Autostick mode.
P1799	Calculated Oil Temp in Use	If thermister temperature < 27° C (80° F) for extended period of time or continuous erratic thermister voltage is sensed.
P1899 (M)	P/N Switch Stuck in Park or in Gear	Incorrect input state detected for the Park/Neutral switch.
P2008	Short Runner Valve Solenoid Circuit	An open or shorted condition detected in the short runner tuning valve control circuit.
P2302	Ignition Coil Secondary #1 Circuit	
P2305	Ignition Coil Secondary #2 Circuit	
P2308	Ignition Coil Secondary #3 Circuit	
P2311	Ignition Coil Secondary #4 Circuit	
P2314	Ignition Coil Secondary #5 Circuit	
P2317	Ignition Coil Secondary #6 Circuit	
P2320	Ignition Coil Secondary #7 Circuit	
P2323	Ignition Coil Secondary #8 Circuit	
P2503	Charging System Voltage Low	Charging system voltage below minimum acceptable voltage.

OPERATION - SENSOR RETURN - PCM INPUT

The sensor return circuit provides a low electrical noise ground reference for all of the systems sensors. The sensor return circuit connects to internal ground circuits within the Powertrain Control Module (PCM).

OPERATION - SCI RECEIVE - PCM INPUT

SCI Receive is the serial data communication receive circuit for the DRB scan tool. The Powertrain Control Module (PCM) receives data from the DRB through the SCI Receive circuit.

OPERATION - IGNITION SENSE - PCM INPUT

The ignition sense input informs the Powertrain Control Module (PCM) that the ignition switch is in the crank or run position.

OPERATION - PCM GROUND

Ground is provided through multiple pins of the PCM connector. There five different ground pins. There are engine power grounds and trans power grounds.

The power grounds are used to control the ground side of any relay, solenoid, ignition coil or injector.

The NGC case is shielded to prevent RFI and EMI. The PCM case is grounded and must be firmly attached to a good, clean body ground.

Internally all grounds are connected together. For EMI and RFI protection the case is also grounded separately from the ground pins.

OPERATION - 5 VOLT SUPPLY - PCM OUTPUT

The PCM supplies 5 volts to the following sensors:

- A/C pressure transducer
- Engine coolant temperature sensor

POWERTRAIN CONTROL MODULE (Continued)

- Manifold absolute pressure sensor
- Throttle position sensor
- Linear EGR solenoid
- Battery temperature
- Knock sensor
- Crankshaft position sensor
- Camshaft position sensor

STANDARD PROCEDURE

STANDARD PROCEDURE - OBTAINING
DIAGNOSTIC TROUBLE CODES

BULB CHECK

Key on: Bulb illuminated until vehicle starts, as long as all once per trip (readiness) monitors completed. If monitors have **not** been completed, then: Key on: bulb check for about 8 seconds, lamp then flashes if once per trip (readiness) monitors have **not** been completed until vehicle is started, then MIL is extinguished.

OBTAINING DTC'S USING DRB SCAN TOOL

(1) Connect the DRB scan tool to the data link (diagnostic) connector. This connector is located in the passenger compartment; at the lower edge of instrument panel; near the steering column.

(2) Turn the ignition switch on and access the "Read Fault" screen.

(3) Record all the DTC's and "freeze frame" information shown on the DRB scan tool.

(4) To erase DTC's, use the "Erase Trouble Code" data screen on the DRB scan tool. **Do not erase any DTC's until problems have been investigated and repairs have been performed.**

OBTAINING DTC'S USING IGNITION KEY

(1) Cycle the ignition key On - Off - On - Off - On within 5 seconds.

(2) The Odometer will show the P-code for the DTC code number. Refer to the Emission section for the DTC chart for a detailed explanation of the DTC codes.

(3) If no DTC's are present, the cluster will display one of two texts: "P1684" and "done" or only "done".

- P1684 is only a status and indicates that the PCM memory has been cleared within the last 50 ignition cycles and does not indicate a problem.

- done indicates that NO DTCs are present and the procedure is complete.

STANDARD PROCEDURE - PINION FACTOR
PROCEDURE

The vehicle speed readings for the speedometer are taken from the output speed sensor. The PCM must

be calibrated to the different combinations of equipment available. Pinion Factor allows the technician to set the Powertrain Control Module initial setting so that the speedometer readings will be correct.

This procedure must be performed if the Powertrain Control Module has been replaced. Failure to perform this procedure will result in an inoperative speedometer.

To properly read or reset the Pinion Factor, it is necessary to use a DRB scan tool. Perform the following steps with the DRB scan tool to read or reset the Pinion Factor:

(1) Plug the DRB scan tool into the data link connector located under the instrument panel.

(2) Select the Transmission menu.

(3) Select the Miscellaneous menu.

(4) Select Pinion Factor. Then follow the instructions on the DRB scan tool screen.

STANDARD PROCEDURE - TCC BREAK-IN
VIEW/RESTART PROCEDURE

The Transmission Control Module (TCM) employs a strategy which modifies torque converter clutch (TCC) operation. This strategy conditions the torque converter clutch disc for optimum converter clutch engagement and feel throughout the life of the trans-axle. The cycle inhibits FEMCC until six hours of PEMCC operation have taken place, or the vehicle has been driven 6,035 km (3750 miles). The cycle automatically terminates when either the time or mileage has been achieved, however, the mileage may vary slightly from vehicle to vehicle.

The TCC break-in cycle must be restarted using the DRB Scan Tool, and upon:

- Replacement of TCM on vehicle with less than 6,035 km (3750 miles) or less than 6 hours of PEMCC operation

- Replacement of torque converter assembly at any vehicle mileage

NOTE: Failure to restart the TCC Break-In Cycle upon TCM replacement in vehicles with less than six hours of PEMCC or less than 6,035 km (3750 miles), or upon torque converter replacement at any mileage, may result in vehicle shudder during certain operating conditions.

Procedure

The DRBIII® Scan Tool is required to view and/or restart the TCC Break-In cycle.

(1) Connect the DRBIII® Scan Tool to the vehicle diagnostic connector.

(2) Navigate to "TCC Break-In" via Transmission/Transmission Control Module/Miscellaneous.

POWERTRAIN CONTROL MODULE (Continued)

(3) View or Start TCC Break-In as prompted by DRBIII® menu.

STANDARD PROCEDURE - TRANSAXLE QUICK LEARN PROCEDURE

The quick learn procedure requires the use of the DRB scan tool. This program allows the electronic transaxle system to recalibrate itself. This will provide the best possible transaxle operation. The quick learn procedure should be performed if any of the following procedures are performed:

- Transaxle Assembly Replacement
- Powertrain Control Module Replacement
- Solenoid/Pressure Switch Assembly Replacement
- Clutch and/or Seal Replacement
- Valve Body Replacement or Recondition

To perform the Quick Learn Procedure, the following conditions must be met:

- The brakes must be applied
- The engine speed must be above 500 rpm
- The throttle angle (TPS) must be less than 3 degrees
- The shift lever position must stay in neutral until prompted to shift to overdrive
- The shift lever position must stay in overdrive after the Shift to Overdrive prompt until the DRB indicates the procedure is complete
- The calculated oil temperature must be above 60° and below 200°

(1) Plug the DRB scan tool into the data link connector. The connector is located under the instrument panel.

(2) Go to the Transmission screen.

(3) Go to the Miscellaneous screen.

(4) Select Quick Learn Procedure. Follow the instructions of the DRB to perform the Quick Learn Procedure.

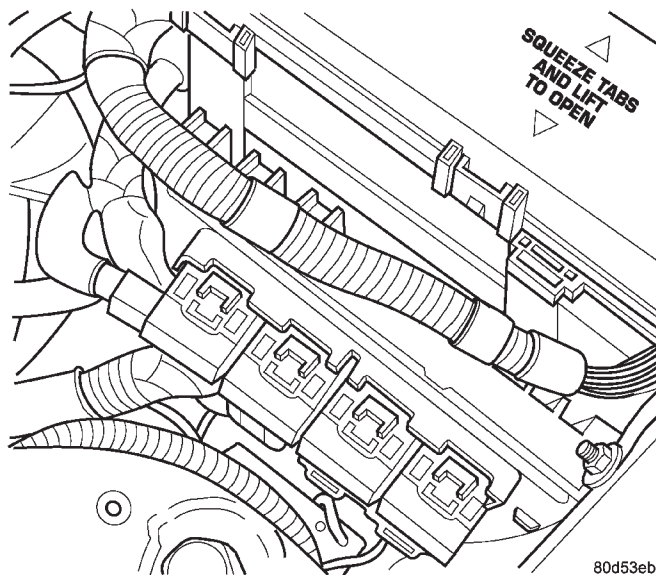
REMOVAL

USE THE DRBIII® SCAN TOOL TO REPROGRAM THE NEW PCM WITH THE VEHICLES ORIGINAL IDENTIFICATION NUMBER (VIN) AND THE VEHICLES ORIGINAL MILEAGE. IF THIS STEP IS NOT DONE A DIAGNOSTIC TROUBLE CODE (DTC) MAY BE SET.

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage and vehicle identification number (VIN) in the new PCM. Use the DRBIII® scan tool to change the mileage and VIN in the PCM. If this step is not done a diagnostic trouble code (DTC) may be set and SKIM must be done or car will not start if it is a SKIM equipped car. If a SKIM car you must do a secret key transfer also.

Refer to the appropriate Powertrain Diagnostic Manual and the DRBIII® scan tool.

To avoid possible voltage spike damage to PCM, ignition key must be off, and the negative battery cable must be disconnected before unplugging the PCM connectors. Note radio programs.



NGC CONTROLLER LOCATION

- (1) Unbolt the washer bottle filler neck and reposition.
- (2) Disconnect the 4 PCM electrical connector.
- (3) Reposition wiring harness out of the way (Fig. 7).

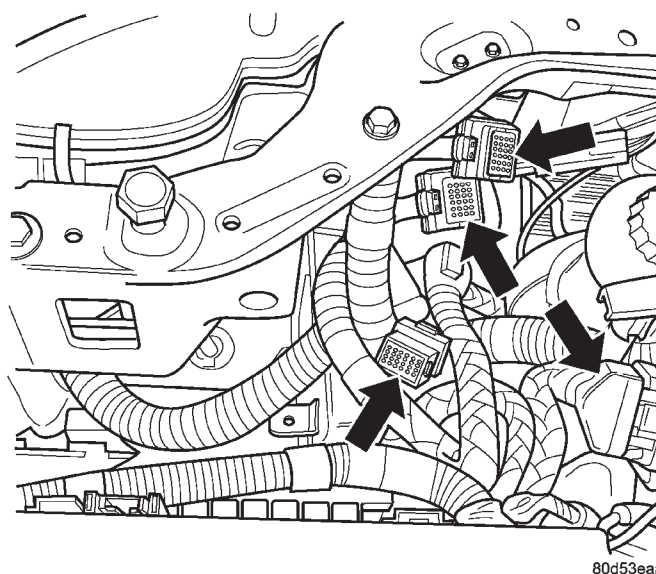


Fig. 7 NGC CONNECTORS

POWERTRAIN CONTROL MODULE (Continued)

(4) Remove the 3 fasteners from PCM mounting (Fig. 8).

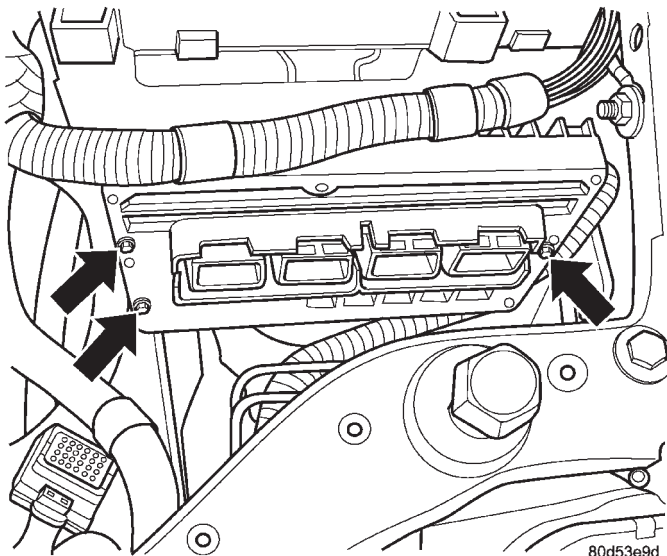


Fig. 8 NGC MOUNTING

(5) Remove PCM (Fig. 9).

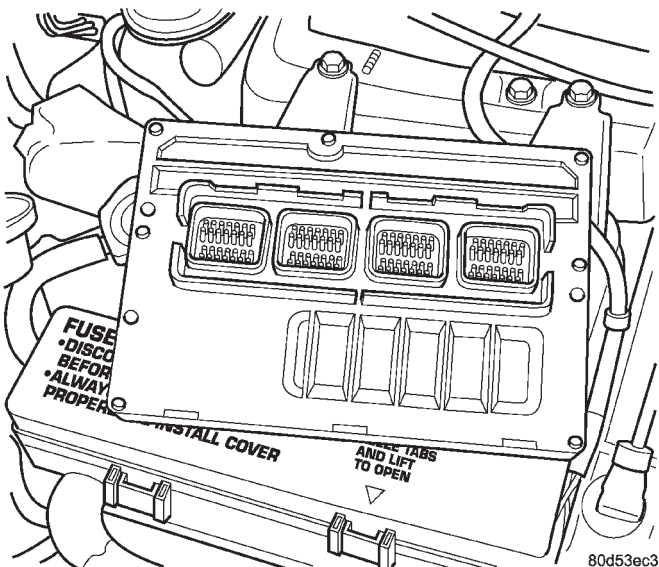


Fig. 9 NGC CONTROLLER

INSTALLATION

The PCM engine control strategy prevents reduced idle speeds until after the engine operates for 320 km (200 miles). If the PCM is replaced after 320 km (200 miles) of usage, update the mileage and vehicle identification number (VIN) in the new PCM. Use the DRBIII® scan tool to change the millage and VIN in

the PCM. If this step is not done a diagnostic trouble code (DTC) may be set and SKIM must be done or car will not start if it is a SKIM equipped car. If a SKIM car you must do a secret key transfer also. Refer to the appropriate Powertrain Diagnostic Manual and the DRBIII® scan tool.

(1) Install PCM. Tighten bolt to 4 N·m (35 in. lbs.) torque (Fig. 8).

(2) Reposition wiring harness.

(3) Connect the 4 PCM electrical connector (Fig. 7).

(4) Reposition the washer bottle filler neck and install the bolt.

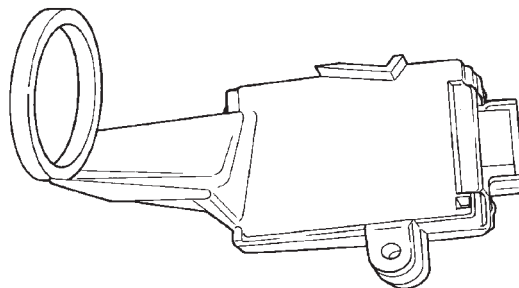
(5) Connect negative battery cable and reprogram radio and clock.

(6) Using DRBIII® scan tool, program mileage and vehicle identification number (VIN) into PCM. Refer to the DRBIII® scan tool and the appropriate Powertrain Diagnostic Manual.

SENTRY KEY IMMOBILIZER MODULE

DESCRIPTION

The Sentry Key Immobilizer Module (SKIM) (Fig. 10) contains a Radio Frequency (RF) transceiver and a central processing unit, which includes the Sentry Key Immobilizer System (SKIS) program logic. The SKIS programming enables the SKIM to program and retain in memory the codes of at least two, but no more than eight electronically coded Sentry Key transponders. The SKIS programming also enables the SKIM to communicate over the Programmable Communication Interface (PCI) bus network with the Powertrain Control Module (PCM), and/or the DRB III® scan tool.



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Fig. 10 SENTRY KEY IMMOBILIZER MODULE

SENTRY KEY IMMOBILIZER MODULE (Continued)

OPERATION

The SKIM transmits and receives RF signals through a tuned antenna enclosed within a molded plastic ring formation that is integral to the SKIM housing. When the SKIM is properly installed on the steering column, the antenna ring is oriented around the circumference of the ignition lock cylinder housing (Fig. 11). This antenna ring must be located within eight millimeters (0.31 inches) of the Sentry Key in order to ensure proper RF communication between the SKIM and the Sentry Key transponder.

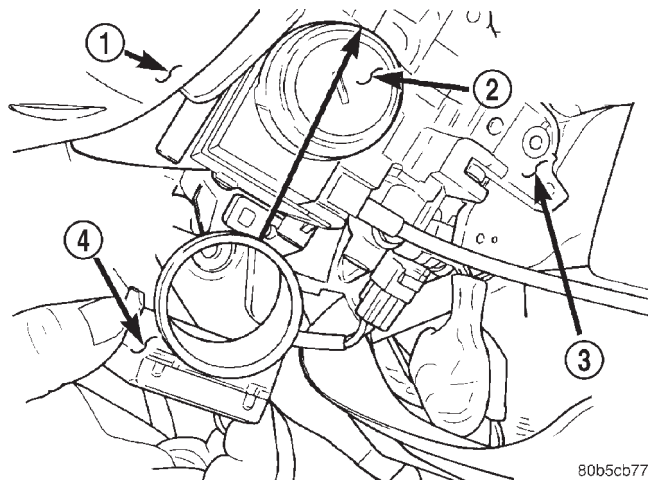


Fig. 11 SENTRY KEY IMMOBILIZER MODULE LOCATION

- 1 - STEERING WHEEL
- 2 - IGNITION KEY CYLINDER
- 3 - STEERING COLUMN
- 4 - SENTRY KEY IMMOBILIZER MODULE

For added system security, each SKIM is programmed with a unique "Secret Key" code and a security code. The SKIM keeps the "Secret Key" code in memory and sends the code over the PCI bus to the PCM, which also keeps this code in its memory. The SKIM also sends the "Secret Key" code to each of the programmed Sentry Key transponders. The security code is used by the assembly plant to access the SKIS for initialization, or by the dealer technician to access the system for service. The SKIM also stores in its memory the Vehicle Identification Number (VIN), which it learns through a PCI bus message from the PCM during initialization.

The SKIM and the PCM both use software that includes a rolling code algorithm strategy, which

helps to reduce the possibility of unauthorized SKIS disarming. The rolling code algorithm ensures security by preventing an override of the SKIS through the unauthorized substitution of the SKIM or the PCM. However, the use of this strategy also means that replacement of either the SKIM or the PCM units will require a system initialization procedure to restore system operation.

When the ignition switch is turned to the ON or START positions, the SKIM transmits an RF signal to excite the Sentry Key transponder. The SKIM then listens for a return RF signal from the transponder of the Sentry Key that is inserted in the ignition lock cylinder. If the SKIM receives an RF signal with valid "Secret Key" and transponder identification codes, the SKIM sends a "valid key" message to the PCM over the PCI bus. If the SKIM receives an invalid RF signal or no response, it sends "invalid key" messages to the PCM. The PCM will enable or disable engine operation based upon the status of the SKIM messages.

The SKIM also sends messages to the BCM which controls the VTSS indicator LED. The SKIM sends messages to the BCM to turn the LED on for about three seconds when the ignition switch is turned to the ON position as a bulb test. After completion of the bulb test, the SKIM sends bus messages to keep the LED off for a duration of about one second. Then the SKIM sends messages to turn the LED on or off based upon the results of the SKIS self-tests. If the VTSS indicator LED comes on and stays on after the bulb test, it indicates that the SKIM has detected a system malfunction and/or that the SKIS has become inoperative.

If the SKIM detects an invalid key when the ignition switch is turned to the ON position, it sends messages to flash the VTSS indicator LED. The SKIM can also send messages to flash the LED and to generate a single audible chime tone. These functions serve as an indication to the customer that the SKIS has been placed in its "Customer Learn" programming mode. See Sentry Key Immobilizer System Transponder Programming in this section for more information on the "Customer Learn" programming mode.

For diagnosis or initialization of the SKIM and the PCM, a DRB III® scan tool and the proper Body Diagnostic Procedures Manual are required. The SKIM cannot be repaired and, if faulty or damaged, the unit must be replaced.

SENTRY KEY IMMOBILIZER MODULE (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, REFER TO ELECTRICAL, RESTRAINTS, WARNINGS, BEFORE ATTEMPTING COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 12).

(2) Remove knee blocker.

(3) Remove the steering column upper and lower shrouds.

(4) Disengage the steering column wire harness from the Sentry Key Immobilizer Module (SKIM).

(5) Remove the one screw securing the SKIM to the bottom of the steering column.

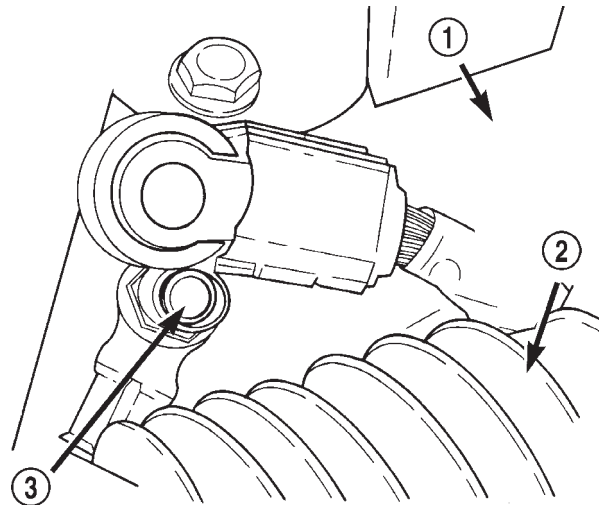
(6) Slide the SKIM away from the steering column to clear the SKIM antenna ring from around the ignition switch lock cylinder housing (Fig. 11).

(7) Remove the SKIM from the vehicle.

INSTALLATION

NOTE: If the SKIM is replaced with a new unit, a DRB III® scan tool and the proper Body Diagnostic Procedures Manual MUST be used to initialize the new SKIM and to program at least two Sentry Key transponders.

(1) Slide the SKIM toward the steering column making sure the SKIM antenna ring is around the ignition cylinder housing (Fig. 11).



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Fig. 12 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

(2) Install the one screw securing the SKIM to the bottom of the steering column.

(3) Engage the steering column wire harness to the Sentry Key Immobilizer Module (SKIM).

(4) Install the steering column upper and lower shrouds.

(5) Install knee blocker.

(6) Connect the negative battery cable remote terminal onto the remote battery post (Fig. 12).

ENGINE SYSTEMS

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BATTERY SYSTEM

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BATTERY SYSTEM

DESCRIPTION

A single 12-volt battery system is standard factory-installed equipment on this model. All of the components of the battery system are located within the engine compartment of the vehicle. The service information for the battery system in this vehicle covers the following related components, which are covered in further detail later in this section of the service manual:

- **Battery** - The storage battery provides a reliable means of storing a renewable source of electrical energy within the vehicle.
- **Battery Cables** - The battery cables connect the positive and negatively charged battery terminal posts to the vehicle electrical system.
- **Battery Holddown** - The battery holddown hardware secures the battery in the battery tray in the engine compartment.
- **Battery Heater Blanket** - The battery heater blanket is used to improve battery cold start ability.

BATTERY SYSTEM (Continued)

- **Battery Tray** - The battery tray provides a secure mounting location in the vehicle for the battery and an anchor point for the battery holddown hardware.

For battery system maintenance schedules and jump starting procedures, see the owner's manual in the vehicle glove box. Optionally, refer to Lubrication and Maintenance for the proper battery jump starting procedures. While battery charging can be considered a maintenance procedure, the battery charging procedures and related information are located in the service procedures section of this service manual. This was done because the battery must be fully-charged before any battery system diagnosis or testing procedures can be performed. Refer to Standard Procedures for the proper battery charging procedures.

OPERATION

The battery system is designed to provide a safe, efficient, reliable and mobile means of delivering and storing electrical energy. This electrical energy is required to operate the engine starting system, as well as to operate many of the other vehicle accessory systems for limited durations while the engine and/or the charging system are not operating. The battery system is also designed to provide a reserve of electrical energy to supplement the charging system for short durations while the engine is running and the electrical current demands of the vehicle exceed the output of the charging system. In addition to delivering, and storing electrical energy for the vehicle, the battery system serves as a capacitor and voltage stabilizer for the vehicle electrical system. It absorbs most abnormal or transient voltages caused by the switching of any of the electrical components or circuits in the vehicle.

DIAGNOSIS AND TESTING - BATTERY SYSTEM

The battery, starting, and charging systems in the vehicle operate with one another and must be tested

as a complete system. In order for the engine to start and the battery to maintain its charge properly, all of the components that are used in these systems must perform within specifications. It is important that the battery, starting, and charging systems be thoroughly tested and inspected any time a battery needs to be charged or replaced. The cause of abnormal battery discharge, overcharging or early battery failure must be diagnosed and corrected before a battery is replaced and before a vehicle is returned to service. The service information for these systems has been separated within this service manual to make it easier to locate the specific information you are seeking. However, when attempting to diagnose any of these systems, it is important that you keep their interdependency in mind.

The diagnostic procedures used for the battery, starting, and charging systems include the most basic conventional diagnostic methods, to the more sophisticated On-Board Diagnostics (OBD) built into the Powertrain Control Module (PCM). Use of an induction-type milliampere ammeter, a volt/ohmmeter, a battery charger, a carbon pile rheostat (load tester) and a 12-volt test lamp may be required. All OBD-sensed systems are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for any failure it detects. Refer to Charging System for the proper charging system on-board diagnostic test procedures.

MICRO 420 ELECTRICAL SYSTEM TESTER

The Micro 420 automotive battery system tester is designed to help the dealership technicians diagnose the cause of a defective battery. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the Micro 420 electrical system tester.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY SEEMS WEAK OR DEAD WHEN ATTEMPTING TO START THE ENGINE.	1. The electrical system ignition-off draw is excessive.	1. Refer to the IGNITION-OFF DRAW TEST Standard Procedure for the proper test procedures. Repair the excessive ignition-off draw, as required.
	2. The charging system is faulty.	2. Determine if the charging system is performing to specifications. Refer to Charging System for additional charging system diagnosis and testing procedures. Repair the faulty charging system, as required.
	3. The battery is discharged.	3. Determine the battery state-of-charge using the Micro 420 battery tester. Refer to the Standard Procedures in this section for additional test procedures. Charge the faulty battery, as required.
	4. The battery terminal connections are loose or corroded.	4. Refer to Battery Cables for the proper battery cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required.
	5. The battery has an incorrect size or rating for this vehicle.	5. Refer to Battery System Specifications for the proper size and rating. Replace an incorrect battery, as required.
	6. The battery is faulty.	6. Determine the battery cranking capacity using the Micro 420 battery tester. Refer to the Standard Procedures in this section for additional test procedures. Replace the faulty battery, as required.
	7. The starting system is faulty.	7. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required.
	8. The battery is physically damaged.	8. Inspect the battery for loose terminal posts or a cracked and leaking case. Replace the damaged battery, as required.

BATTERY SYSTEM (Continued)

BATTERY SYSTEM DIAGNOSIS		
CONDITION	POSSIBLE CAUSES	CORRECTION
THE BATTERY STATE OF CHARGE CANNOT BE MAINTAINED.	1. The battery has an incorrect size or rating for this vehicle.	1. Refer to Battery System Specifications for the proper specifications. Replace an incorrect battery, as required.
	2. The battery terminal connections are loose or corroded.	2. Refer to Battery Cable for the proper cable diagnosis and testing procedures. Clean and tighten the battery terminal connections, as required.
	3. The electrical system ignition-off draw is excessive.	3. Refer to the IGNITION-OFF DRAW TEST Standard Procedure for the proper test procedures. Repair the faulty electrical system, as required.
	4. The battery is faulty.	4. Test the battery using the Micro 420 battery tester. Refer to Standard Procedures for additional test procedures. Replace the faulty battery, as required.
	5. The starting system is faulty.	5. Determine if the starting system is performing to specifications. Refer to Starting System for the proper starting system diagnosis and testing procedures. Repair the faulty starting system, as required.
	6. The charging system is faulty.	6. Determine if the charging system is performing to specifications. Refer to Charging System for additional charging system diagnosis and testing procedures. Repair the faulty charging system, as required.
	7. Electrical loads exceed the output of the charging system.	7. Inspect the vehicle for aftermarket electrical equipment which might cause excessive electrical loads.
	8. Slow driving or prolonged idling with high-amperage draw systems in use.	8. Advise the vehicle operator, as required.
THE BATTERY WILL NOT ACCEPT A CHARGE.	1. The battery is faulty.	1. Test the battery using the Micro 420 battery tester.. Charge or replace the faulty battery, as required.

ABNORMAL BATTERY DISCHARGING

Any of the following conditions can result in abnormal battery discharging:

1. A faulty or incorrect charging system component. Refer to Charging System for charging system diagnosis and testing procedures.

2. A faulty or incorrect battery. Use Micro 420 tester and refer to Battery System for additional battery diagnosis and testing procedures.

3. A faulty circuit or component causing excessive ignition-off draw.

4. Electrical loads that exceed the output of the charging system. This can be due to equipment

installed after manufacture, or repeated short trip use.

5. A faulty or incorrect starting system component. Refer to Starting System for the proper starting system diagnosis and testing procedures.

6. Corroded or loose battery posts and/or terminal clamps.

7. Slow driving speeds (heavy traffic conditions) or prolonged idling, with high-amperage draw systems in use.

BATTERY SYSTEM (Continued)

CLEANING

The following information details the recommended cleaning procedures for the battery and related components. In addition to the maintenance schedules found in this service manual and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

(1) Clean the battery cable terminals of all corrosion. Remove any corrosion using a wire brush or cleaning tool, and a sodium bicarbonate (baking soda) and warm water cleaning solution.

(2) Clean the battery tray and battery holddown hardware of all corrosion. Remove any corrosion using a wire brush and a sodium bicarbonate (baking soda) and warm water cleaning solution. Paint any exposed bare metal.

(3) If the removed battery is to be reinstalled, clean the outside of the battery case and the top cover with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film (Fig. 1). Rinse the battery with clean water. Ensure that the cleaning solution does not enter the battery cells through the vent holes. If the battery is being replaced, refer to Battery System Specifications for the factory-installed battery specifications. Confirm that the replacement battery is the correct size and has the correct ratings for the vehicle.

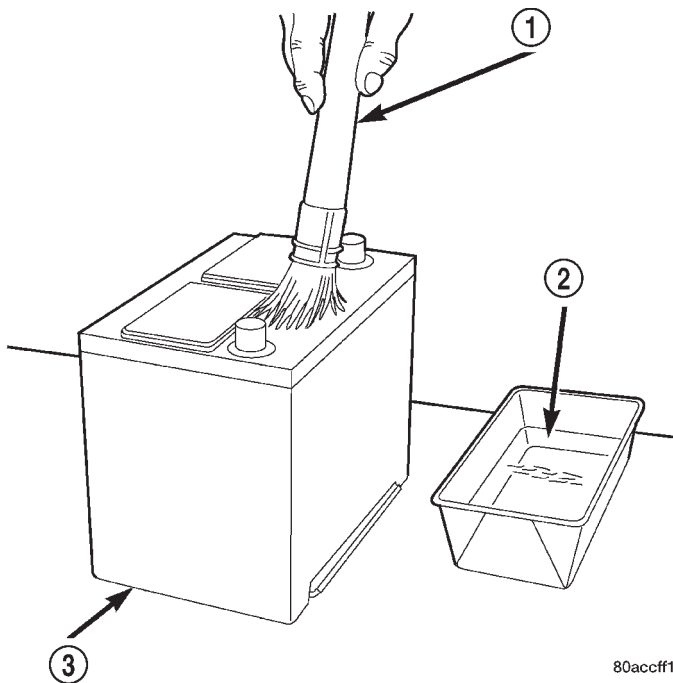


Fig. 1 Clean Battery - Typical

- 1 - CLEANING BRUSH
- 2 - WARM WATER AND BAKING SODA SOLUTION
- 3 - BATTERY

(4) If equipped, clean the battery heater blanket with a sodium bicarbonate (baking soda) and warm water cleaning solution using a stiff bristle parts cleaning brush to remove any acid film.

(5) Clean any corrosion from the battery terminals with a wire brush or terminal cleaner, and a sodium bicarbonate (baking soda) and warm water cleaning solution.

INSPECTION

The following information details the recommended inspection procedures for the battery and related components. In addition to the maintenance schedules found in this service manual and the owner's manual, it is recommended that these procedures be performed any time the battery or related components must be removed for vehicle service.

(1) Inspect the battery cable terminals for damage. Replace any battery cable that has a damaged or deformed terminal.

(2) Inspect the battery tray and battery holddown hardware for damage. Replace any damaged parts.

(3) If equipped, slide the heater blanket off of the battery case. Inspect the battery case for cracks or other damage that could result in electrolyte leaks. Also, check the battery terminals for looseness. Batteries with damaged cases or loose terminals must be replaced.

(4) If equipped, inspect the battery heater blanket for tears, cracks, deformation or other damage. Replace any battery heater blanket that has been damaged.

(5) Inspect the battery built-in test indicator sight glass for an indication of the battery condition. If the battery is discharged, charge as required. Refer to Standard Procedures for the proper battery built-in indicator test procedures. Also refer to Standard Procedures for the proper battery charging procedures.

SPECIFICATIONS

The battery Group Size number, the Cold Cranking Amperage (CCA) rating, and the Reserve Capacity (RC) rating or Ampere-Hours (AH) rating can be found on the original equipment battery label. Be certain that a replacement battery has the correct Group Size number, as well as CCA, and RC or AH ratings that equal or exceed the original equipment specification for the vehicle being serviced. Battery sizes and ratings are discussed in more detail below.

- **Group Size** - The outside dimensions and terminal placement of the battery conform to standards established by the Battery Council International (BCI). Each battery is assigned a BCI Group Size number to help identify a correctly-sized replacement.

BATTERY SYSTEM (Continued)

- **Cold Cranking Amperage** - The Cold Cranking Amperage (CCA) rating specifies how much current (in amperes) the battery can deliver for thirty seconds at -18° C (0° F). Terminal voltage must not fall below 7.2 volts during or after the thirty second discharge period. The CCA required is generally higher as engine displacement increases, depending also upon the starter current draw requirements.
- **Reserve Capacity** - The Reserve Capacity (RC) rating specifies the time (in minutes) it takes for battery terminal voltage to fall below 10.5 volts, at a

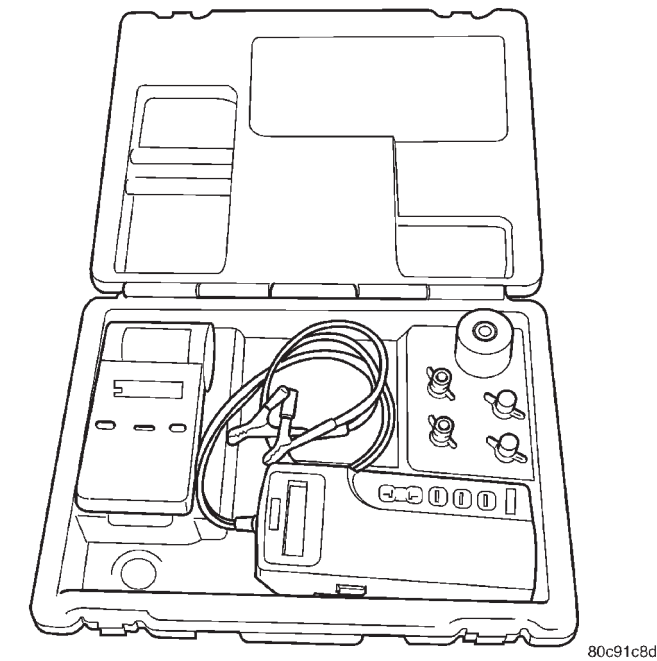
discharge rate of 25 amperes. RC is determined with the battery fully-charged at 26.7° C (80° F). This rating estimates how long the battery might last after a charging system failure, under minimum electrical load.

- **Ampere-Hours** - The Ampere-Hours (AH) rating specifies the current (in amperes) that a battery can deliver steadily for twenty hours, with the voltage in the battery not falling below 10.5 volts. This rating is also sometimes identified as the twenty-hour discharge rating.

BATTERY CLASSIFICATIONS & RATINGS					
Part Number	BCI Group Size Classification	Cold Cranking Amperage	Reserve Capacity	Ampere - Hours	Load Test Amperage
N/A	N/A	500	110 Minutes	60	250
N/A	N/A	600	120 Minutes	60	300

SPECIAL TOOLS

BATTERY SYSTEM SPECIAL TOOLS



MICRO 420 BATTERY TESTER

BATTERY

DESCRIPTION

Maintenance-free batteries have non-removable battery vent caps (Fig. 2). Water cannot be added to this battery. Under normal service the composition of this battery reduces gassing and water loss at normal charge rates. If the battery electrolyte level becomes low, this battery must be replaced.

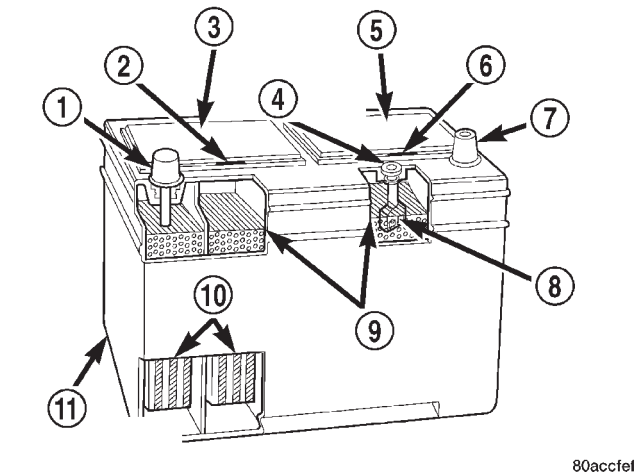


Fig. 2 LH Maintenance-Free Battery

- 1 - POSITIVE POST
- 2 - VENT
- 3 - CELL CAP
- 4 - TEST INDICATOR
- 5 - CELL CAP
- 6 - VENT
- 7 - NEGATIVE POST
- 8 - GREEN BALL
- 9 - ELECTROLYTE LEVEL
- 10 - PLATE GROUPS
- 11 - MAINTENANCE-FREE BATTERY

The battery is a device used to store electrical energy potential in a chemical form. When an electrical load is applied to the battery terminals, an electrochemical reaction occurs within the battery. This reaction causes the battery to discharge electrical current.

The battery is made up of six individual cells that are connected in series. Each cell contains positive

BATTERY (Continued)

charged plate groups made of lead oxide, and negatively charged plate groups made of sponge lead. The dissimilar metal plates are submerged in a sulfuric acid and water solution called an electrolyte.

OPERATION

The battery is designed to store electrical energy in a chemical form. When an electrical load is applied to the terminals of the battery, an electrochemical reaction occurs. This reaction causes the battery to discharge electrical current from its terminals. As the battery discharges, a gradual chemical change takes place within each cell. The sulfuric acid in the electrolyte combines with the plate materials, causing both plates to slowly change to lead sulfate. At the same time, oxygen from the positive plate material combines with hydrogen from the sulfuric acid, causing the electrolyte to become mainly water. The chemical changes within the battery are caused by the movement of excess or free electrons between the positive and negative plate groups. This movement of electrons produces a flow of electrical current through the load device attached to the battery terminals.

As the plate materials become more similar chemically, and the electrolyte becomes less acid, the voltage potential of each cell is reduced. However, by charging the battery with a voltage higher than that of the battery itself, the battery discharging process is reversed. Charging the battery gradually changes the sulfated lead plates back into sponge lead and lead dioxide, and the water back into sulfuric acid. This action restores the difference in the electron charges deposited on the plates, and the voltage potential of the battery cells. For a battery to remain useful, it must be able to produce high-amperage current over an extended period. A battery must also be able to accept a charge, so that its voltage potential may be restored.

The battery is vented to release excess hydrogen gas that is created when the battery is being charged or discharged. However, even with these vents, hydrogen gas can collect in or around the battery. If hydrogen gas is exposed to flame or sparks, it may ignite. If the electrolyte level is low, the battery may arc internally and explode. If the battery is equipped with removable cell caps, add distilled water whenever the electrolyte level is below the top of the plates. If the battery cell caps cannot be removed, the battery must be replaced if the electrolyte level becomes low.

DIAGNOSIS AND TESTING - BATTERY

The battery must be completely charged and the terminals should be properly cleaned and inspected before diagnostic procedures are performed. Refer to Battery System Cleaning for the proper cleaning procedures, and Battery System Inspection for the proper battery inspection procedures. Refer to Standard Procedures for the proper battery charging procedures.

MICRO 420 ELECTRICAL SYSTEM TESTER

The Micro420 automotive battery tester is designed to help the dealership technicians diagnose the cause of a defective battery. Follow the instruction manual supplied with the tester to properly diagnose a vehicle. If the instruction manual is not available refer to the standard procedure in this section, which includes the directions for using the Micro420 electrical system tester.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING OR LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

A battery that will not accept a charge is faulty, and must be replaced. Further testing is not required. A fully-charged battery must be load tested to determine its cranking capacity. A battery that is fully-charged, but does not pass the load test, is faulty and must be replaced.

NOTE: Completely discharged batteries may take several hours to accept a charge. Refer to Standard Procedures for the proper battery charging procedures.

BATTERY (Continued)

STANDARD PROCEDURE

STANDARD PROCEDURE - USING MICRO 420 ELECTRICAL TESTER

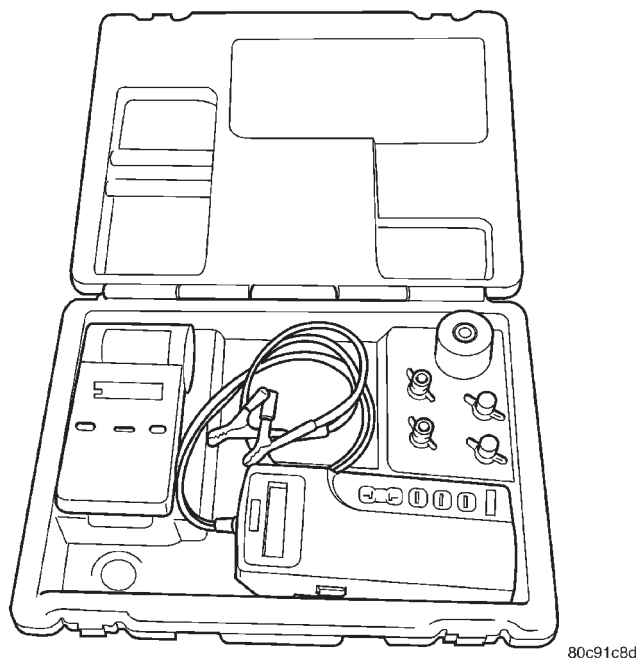


Fig. 3 MICRO 420 BATTERY TESTER

Always use the Micro 420 Instruction Manual that was supplied with the tester as a reference. If the Instruction Manual is not available the following procedure can be used:

WARNING: ALWAYS WEAR APPROPRIATE EYE PROTECTION AND USE EXTREME CAUTION WHEN WORKING WITH BATTERIES.

BATTERY TESTING

(1) If testing the battery OUT-OF-VEHICLE, clean the battery terminals with a wire brush before testing. If the battery is equipped with side post terminals, install and tighten the supplied lead terminal stud adapters. Do not use steel bolts. Failure to properly install the stud adapters, or using stud adapters that are dirty or worn-out may result in false test readings.

(2) If testing the battery IN-THE-VEHICLE, make certain all of the vehicle accessory loads are OFF, including the ignition. **The preferred test position is at the battery terminal.** If the battery is not

accessible, you may test using both the positive and negative jumper posts. Select TESTING AT JUMPER POST when connecting to that location.

(3) Connect the tester (Fig. 3) to the battery or jumper posts, the red clamp to positive (+) and the black clamp to negative (-).

NOTE: Multiple batteries connected in parallel must have the ground cable disconnected to perform a battery test. Failure to disconnect may result in false battery test readings.

(4) Using the ARROW key select **in** or **out** of vehicle testing and press ENTER to make a selection.

(5) If not selected, choose the Cold Cranking Amp (CCA) battery rating. Or select the appropriate battery rating for your area (see menu). The tester will then run its self programmed test of the battery and display the results. Refer to the test result table noted below.

CAUTION: If REPLACE BATTERY is the result of the test, this may mean a poor connection between the vehicle's cables and battery exists. After disconnecting the vehicle's battery cables from the battery, retest the battery using the OUT-OF-VEHICLE test before replacing.

(6) While viewing the battery test result, press the CODE button and the tester will prompt you for the last 4 digits of the VIN. Use the UP/DOWN arrow buttons to scroll to the correct character; then press ENTER to select and move to the next digit. Then press the ENTER button to view the SERVICE CODE. Pressing the CODE button a second time will return you to the test results.

BATTERY TEST RESULTS	
GOOD BATTERY	Return to service
GOOD - RECHARGE	Fully charge battery and return to service
CHARGE & RETEST	Fully charge battery and retest battery
REPLACE BATTERY	Replace the battery and retest complete system
BAD-CELL REPLACE	Replace the battery and retest complete system

NOTE: The SERVICE CODE is required on every warranty claim submitted for battery replacement.

BATTERY (Continued)

STANDARD PROCEDURE - BATTERY CHARGING

Battery charging is the means by which the battery can be restored to its full voltage potential. A battery is fully-charged when:

- Micro 420 electrical system tester indicates battery is OK.
- Open-circuit voltage of the battery is 12.4 volts or above.

WARNING: NEVER EXCEED TWENTY AMPERES WHEN CHARGING A COLD (-1° C [30° F] OR LOWER) BATTERY. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: IF THE BATTERY SHOWS SIGNS OF FREEZING, LEAKING, LOOSE POSTS, DO NOT TEST, ASSIST-BOOST, OR CHARGE. THE BATTERY MAY ARC INTERNALLY AND EXPLODE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: EXPLOSIVE HYDROGEN GAS FORMS IN AND AROUND THE BATTERY. DO NOT SMOKE, USE FLAME, OR CREATE SPARKS NEAR THE BATTERY. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT.

WARNING: THE BATTERY CONTAINS SULFURIC ACID, WHICH IS POISONOUS AND CAUSTIC. AVOID CONTACT WITH THE SKIN, EYES, OR CLOTHING. IN THE EVENT OF CONTACT, FLUSH WITH WATER AND CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF THE REACH OF CHILDREN.

WARNING: IF THE BATTERY IS EQUIPPED WITH REMOVABLE CELL CAPS, BE CERTAIN THAT EACH OF THE CELL CAPS IS IN PLACE AND TIGHT BEFORE THE BATTERY IS RETURNED TO SERVICE. PERSONAL INJURY AND/OR VEHICLE DAMAGE MAY RESULT FROM LOOSE OR MISSING CELL CAPS.

CAUTION: Always disconnect and isolate the battery negative cable before charging a battery. Do not exceed sixteen volts while charging a battery. Damage to the vehicle electrical system components may result.

CAUTION: Battery electrolyte will bubble inside the battery case during normal battery charging. Electrolyte boiling or being discharged from the battery

vents indicates a battery overcharging condition. Immediately reduce the charging rate or turn off the charger to evaluate the battery condition. Damage to the battery may result from overcharging.

CAUTION: The battery should not be hot to the touch. If the battery feels hot to the touch, turn off the charger and let the battery cool before continuing the charging operation. Damage to the battery may result.

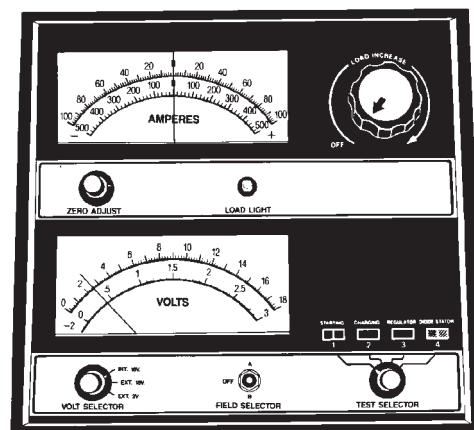
After the battery has been charged to 12.4 volts or greater, perform a load test to determine the battery cranking capacity. Refer to Standard Procedures for the proper battery load test procedures. If the battery will endure a load test, return the battery to service. If the battery will not endure a load test, it is faulty and must be replaced.

Clean and inspect the battery hold downs, tray, terminals, posts, and top before completing battery service. Refer to Battery System Cleaning for the proper battery system cleaning procedures, and Battery System Inspection for the proper battery system inspection procedures.

CHARGING A COMPLETELY DISCHARGED BATTERY

The following procedure should be used to recharge a completely discharged battery. Unless this procedure is properly followed, a good battery may be needlessly replaced.

(1) Measure the voltage at the battery posts with a voltmeter, accurate to 1/10 (0.10) volt (Fig. 4). If the reading is below ten volts, the battery charging current will be low. It could take some time before the battery accepts a current greater than a few milliamperes. Such low current may not be detectable on the ammeters built into many battery chargers.



898A-12

Fig. 4 Voltmeter - Typical

(2) Disconnect and isolate the battery negative cable. Connect the battery charger leads. Some bat-

BATTERY (Continued)

tery chargers are equipped with polarity-sensing circuitry. This circuitry protects the battery charger and the battery from being damaged if they are improperly connected. If the battery state-of-charge is too low for the polarity-sensing circuitry to detect, the battery charger will not operate. This makes it appear that the battery will not accept charging current. See the instructions provided by the manufacturer of the battery charger for details on how to bypass the polarity-sensing circuitry.

(3) Battery chargers vary in the amount of voltage and current they provide. The amount of time required for a battery to accept measurable charging current at various voltages is shown in the Charge Rate Table. If the charging current is still not measurable at the end of the charging time, the battery is faulty and must be replaced. If the charging current is measurable during the charging time, the battery may be good and the charging should be completed in the normal manner.

CHARGE RATE TABLE	
Voltage	Hours
16.0 volts maximum	up to 4 hours
14.0 to 15.9 volts	up to 8 hours
13.9 volts or less	up to 16 hours

CHARGING TIME REQUIRED

The time required to charge a battery will vary, depending upon the following factors:

- **Battery Capacity** - A completely discharged heavy-duty battery requires twice the charging time of a small capacity battery.
- **Temperature** - A longer time will be needed to charge a battery at -18°C (0°F) than at 27°C (80°F). When a fast battery charger is connected to a cold battery, the current accepted by the battery will be very low at first. As the battery warms, it will accept a higher charging current rate (amperage).
- **Charger Capacity** - A battery charger that supplies only five amperes will require a longer charging time. A battery charger that supplies twenty amperes or more will require a shorter charging time.
- **State-Of-Charge** - A completely discharged battery requires more charging time than a partially discharged battery. Electrolyte is nearly pure water in a completely discharged battery. At first, the charging current (amperage) will be low. As the battery charges, the specific gravity of the electrolyte will gradually rise.

The Battery Charging Time Table gives an indication of the time required to charge a typical battery at room temperature based upon the battery state-of-charge and the charger capacity.

BATTERY CHARGING TIME TABLE			
Charging Amperage	5 Amps	10 Amps	20 Amps
Open Circuit Voltage	Hours Charging @ 21°C (70°F)		
12.25 to 12.49	6 hours	3 hours	1.5 hours
12.00 to 12.24	10 hours	5 hours	2.5 hours
10.00 to 11.99	14 hours	7 hours	3.5 hours
Below 10.00	18 hours	9 hours	4.5 hours

STANDARD PROCEDURE - OPEN-CIRCUIT VOLTAGE TEST

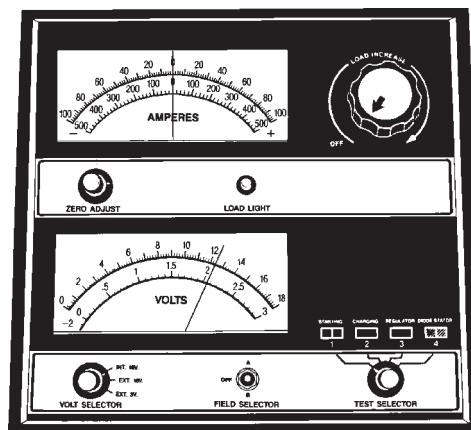
A battery open-circuit voltage (no load) test will show the approximate state-of-charge of a battery. This test can be used in place of the hydrometer test when a hydrometer is not available, or for maintenance-free batteries with non-removable cell caps.

Before proceeding with this test, completely charge the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE).

(1) Before measuring the open-circuit voltage, the surface charge must be removed from the battery. Turn on the headlamps for fifteen seconds, then allow up to five minutes for the battery voltage to stabilize.

(2) Disconnect and isolate both battery cables, negative cable first.

(3) Using a voltmeter connected to the battery posts (see the instructions provided by the manufacturer of the voltmeter), measure the open-circuit voltage (Fig. 5).



898A-7

Fig. 5 Testing Open-Circuit Voltage - Typical

See the Open-Circuit Voltage Table. This voltage reading will indicate the battery state-of-charge, but will not reveal its cranking capacity. If a battery has

BATTERY (Continued)

an open-circuit voltage reading of 12.4 volts or greater, it may be load tested to reveal its cranking capacity (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE).

OPEN CIRCUIT VOLTAGE TABLE	
Open Circuit Voltage	Charge Percentage
11.7 volts or less	0%
12.0 volts	25%
12.2 volts	50%
12.4 volts	75%
12.6 volts or more	100%

STANDARD PROCEDURE - IGNITION-OFF DRAW TEST

The term Ignition-Off Draw (IOD) identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. A normal vehicle electrical system will draw from five to thirty-five milliamperes (0.005 to 0.035 ampere) with the ignition switch in the Off position, and all non-ignition controlled circuits in proper working order. Up to thirty-five milliamperes are needed to enable the memory functions for the Powertrain Control Module (PCM), digital clock, electronically tuned radio, and other modules which may vary with the vehicle equipment.

A vehicle that has not been operated for approximately twenty days, may discharge the battery to an inadequate level. When a vehicle will not be used for twenty days or more (stored), remove the IOD fuse from the Junction Block (JB). This will reduce battery discharging.

Excessive IOD can be caused by:

- Electrical items left on.
- Faulty or improperly adjusted switches.
- Faulty or shorted electronic modules and components.
- An internally shorted generator.
- Intermittent shorts in the wiring.

If the IOD is over thirty-five milliamperes, the problem must be found and corrected before replacing a battery. In most cases, the battery can be charged and returned to service after the excessive IOD condition has been corrected.

(1) Verify that all electrical accessories are off. Turn off all lamps, remove the ignition key, and close all doors. If the vehicle is equipped with an illuminated entry system or an electronically tuned radio, allow the electronic timer function of these systems to automatically shut off (time out). This may take up to three minutes. See the Electronic Module Ignition-Off Draw Table for more information.

ELECTRONIC MODULE IGNITION-OFF DRAW (IOD) TABLE			
Module	Time Out? (If Yes, Interval And Wake-Up Input)	IOD	IOD After Time Out
Radio	No	1 to 3 milliamperes	N/A
Audio Power Amplifier	No	up to 1 milliampere	N/A
Central Timer Module (CTM)	No	4.75 milliamperes (max.)	N/A
Powertrain Control Module (PCM)	No	0.95 milliampere	N/A
ElectroMechanical Instrument Cluster (EMIC)	No	0.44 milliampere	N/A
Combination Flasher	No	0.08 milliampere	N/A

(2) Determine that the underhood lamp is operating properly, then disconnect the lamp wire harness connector or remove the lamp bulb.

(3) Disconnect the battery negative cable.

BATTERY (Continued)

(4) Set an electronic digital multi-meter to its highest amperage scale. Connect the multi-meter between the disconnected battery negative cable terminal clamp and the battery negative terminal post. Make sure that the doors remain closed so that the illuminated entry system is not activated. The multi-meter amperage reading may remain high for up to three minutes, or may not give any reading at all while set in the highest amperage scale, depending upon the electrical equipment in the vehicle. The multi-meter leads must be securely clamped to the battery negative cable terminal clamp and the battery negative terminal post. If continuity between the battery negative terminal post and the negative cable terminal clamp is lost during any part of the IOD test, the electronic timer function will be activated and all of the tests will have to be repeated.

(5) After about three minutes, the high-amperage IOD reading on the multi-meter should become very low or nonexistent, depending upon the electrical equipment in the vehicle. If the amperage reading remains high, remove and replace each fuse or circuit breaker in the Power Distribution Center (PDC) and then in the Junction Block (JB), one at a time until the amperage reading becomes very low, or nonexistent. Refer to the appropriate wiring information in this service manual for complete PDC and JB fuse, circuit breaker, and circuit identification. This will isolate each circuit and identify the circuit that is the source of the high-amperage IOD. If the amperage reading remains high after removing and replacing each fuse and circuit breaker, disconnect the wire harness from the generator. If the amperage reading now becomes very low or nonexistent, refer to Charging System for the proper charging system diagnosis and testing procedures. After the high-amperage IOD has been corrected, switch the multi-meter to progressively lower amperage scales and, if necessary, repeat the fuse and circuit breaker remove-and-replace process to identify and correct all sources of excessive IOD. It is now safe to select the lowest milliamperage scale of the multi-meter to check the low-amperage IOD.

CAUTION: Do not open any doors, or turn on any electrical accessories with the lowest milliamperage scale selected, or the multi-meter may be damaged.

(6) Observe the multi-meter reading. The low-amperage IOD should not exceed thirty-five milliam-

peres (0.035 ampere). If the current draw exceeds thirty-five milliamperes, isolate each circuit using the fuse and circuit breaker remove-and-replace process in Step 5. The multi-meter reading will drop to within the acceptable limit when the source of the excessive current draw is disconnected. Repair this circuit as required; whether a wiring short, incorrect switch adjustment, or a component failure is at fault.

REMOVAL

The battery is accessible without removing the right front wheel and tire assembly.

(1) Verify that the ignition switch and all accessories are OFF.

(2) Turn the steering wheel to the full right position.

(3) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.

WARNING: NEVER GET UNDER A LIFTED VEHICLE IF NOT SUPPORTED PROPERLY ON SAFETY STANDS.

(4) Remove the air cleaner housing. Refer to the index for the location of the procedure.

(5) Remove battery splash shield. Refer to the Body section of the service manual for the procedure.

(6) Disconnect the heater blanket cord, if equipped.

(7) Remove the two short bolts from the battery hold down and remove the hold down.

(8) Disconnect the positive battery cable from the battery.

(9) Slide the battery toward rear of vehicle.

(10) Disconnect the negative battery cable from the battery.

(11) Remove battery from vehicle.

INSTALLATION

(1) Position the battery in the battery tray.

(2) Connect the positive and negative battery cables. Torque to 16 N·m (150 in. lbs.).

(3) Connect the heater blanket cord, if equipped.

(4) Install the battery hold down and install the hold down bolt. Torque to 16 N·m (150 in. lbs.).

(5) Install battery splash shield. Refer to the Body section for the procedure.

(6) Install the air cleaner housing.

(7) Connect the negative battery cable.

BATTERY HOLDDOWN

DESCRIPTION

The battery holddown includes two bolts and a holddown bracket. The battery holddown bracket consists of a formed steel bracket with holes on each end.

When installing a battery into the battery tray, it is important that the holddown hardware is properly installed and that the fasteners are tightened to the proper specifications. Improper holddown fastener tightness, whether too loose or too tight, can result in damage to the battery, the vehicle, or both. Refer to Battery Holddown for the proper installation procedure, including the proper holddown fastener torque specifications.

OPERATION

The battery holddown secures the battery in the battery tray. This holddown is designed to prevent battery movement during the most extreme vehicle operation conditions. Periodic removal and lubrication of the battery holddown hardware is recommended to prevent hardware seizure at a later date.

CAUTION: Never operate a vehicle without a battery holddown device properly installed. Damage to the vehicle, components and battery could result.

REMOVAL

- (1) Verify that the ignition switch and all accessories are OFF.
- (2) Turn the steering wheel to the full right position.
- (3) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.
- (4) Remove the air cleaner housing. Refer to the index for the location of the procedure.
- (5) Remove battery splash shield. Refer to the Body section of the service manual for the procedure.
- (6) Remove the two short bolts from the battery hold down and remove the hold down.

INSTALLATION

- (1) Install the battery hold down and install the hold down bolt. Torque to 16 N·m (150 in. lbs.).
- (2) Install battery splash shield. Refer to the Body section for the procedure.
- (3) Install the air cleaner housing.

BATTERY CABLES

DESCRIPTION

The battery cables are large gauge, stranded copper wires sheathed within a heavy plastic or synthetic rubber insulating jacket. The wire used in the battery cables combines excellent flexibility and reliability with high electrical current carrying capacity. The battery cables feature a side post battery terminal made of soft lead that is die cast onto one end of the battery cable wire. Large eyelet type terminals are crimped onto the opposite end of the battery cable wire and then solder-dipped. The battery positive cable wires have a red insulating jacket to provide visual identification of the battery positive terminal. The battery negative cable wires have a black insulating jacket to provide visual identification of the battery negative terminal.

The battery cables cannot be repaired and, if damaged or faulty they must be replaced. Both the battery positive and negative cables are available for service replacement only as a unit with the battery wire harness, which may include portions of the wiring circuits for the generator and other components on some models. Refer to the appropriate wiring information in this service manual for the location of the proper battery cable wire harness diagrams. The wiring information also includes proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

OPERATION

The battery cables connect the battery terminal posts to the vehicle electrical system. These cables also provide a path back to the battery for electrical current generated by the charging system for restoring the voltage potential of the battery. The female battery terminal clamps on the ends of the battery cable wires provide a strong and reliable connection of the battery cable to the battery terminal posts. The terminal pinch bolts allow the female terminal clamps to be tightened around the male terminal posts on the top of the battery. The eyelet terminals secured to the opposite ends of the battery cable wires from the female battery terminal clamps provide secure and reliable connection of the battery cables to the vehicle electrical system.

BATTERY CABLES (Continued)

The battery positive cable terminal clamp is die cast onto the ends of two wires. One wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the Power Distribution Center (PDC), and the other wire has an eyelet terminal that connects the battery positive cable to the B(+) terminal stud of the engine starter motor solenoid. The battery negative cable terminal clamp is also die cast onto the ends of two wires. One wire has an eyelet terminal that connects the battery negative cable to the vehicle powertrain through a stud on the right side of the engine cylinder block. The other wire has an eyelet terminal that connects the battery negative cable to the vehicle body through a ground screw on the right front fender inner shield, near the battery.

DIAGNOSIS AND TESTING - BATTERY CABLES

A voltage drop test will determine if there is excessive resistance in the battery cable terminal connections or the battery cable. If excessive resistance is found in the battery cable connections, the connection point should be disassembled, cleaned of all corrosion or foreign material, then reassembled. Following reassembly, check the voltage drop for the battery cable connection and the battery cable again to confirm repair.

When performing the voltage drop test, it is important to remember that the voltage drop is giving an indication of the resistance between the two points at which the voltmeter probes are attached. **EXAMPLE:** When testing the resistance of the battery positive cable, touch the voltmeter leads to the battery positive cable terminal clamp and to the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud. If you probe the battery positive terminal post and the battery positive cable eyelet terminal at the starter solenoid B(+) terminal stud, you are reading the combined voltage drop in the battery positive cable terminal clamp-to-terminal post connection and the battery positive cable.

VOLTAGE DROP TEST

The following operation will require a voltmeter accurate to 1/10 (0.10) volt. Before performing this test, be certain that the following procedures are accomplished:

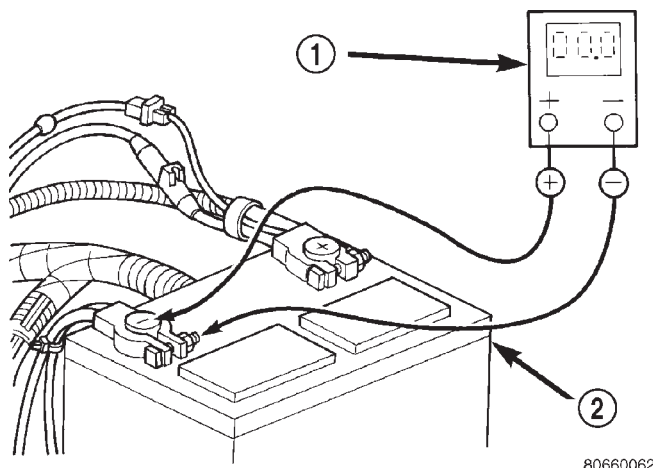
- The battery is fully-charged and load tested. Refer to Standard Procedures for the proper battery charging and load test procedures.
- Fully engage the parking brake.
- If the vehicle is equipped with an automatic transmission, place the gearshift selector lever in the Park position. If the vehicle is equipped with a manual transmission, place the gearshift selector lever in

the Neutral position and block the clutch pedal in the fully depressed position.

- Verify that all lamps and accessories are turned off.

- To prevent the engine from starting, remove the Automatic Shut Down (ASD) relay. The ASD relay is located in the Power Distribution Center (PDC), in the engine compartment. See the fuse and relay layout label affixed to the underside of the PDC cover for ASD relay identification and location.

(1) Connect the positive lead of the voltmeter to the battery negative terminal post. Connect the negative lead of the voltmeter to the battery negative cable terminal clamp (Fig. 6). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery negative cable terminal clamp and the battery negative terminal post.



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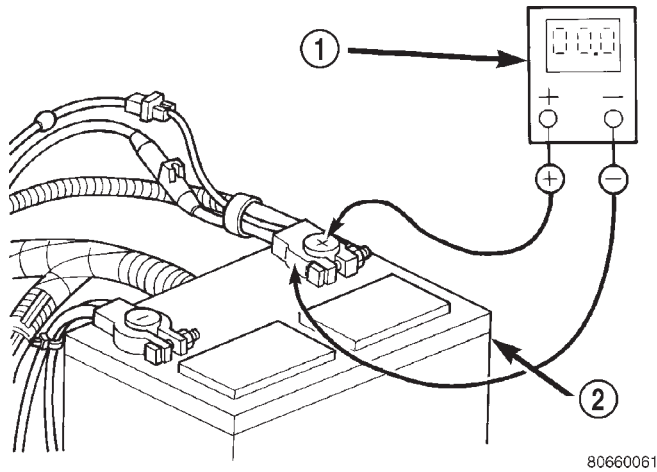
Fig. 6 TEST BATTERY NEGATIVE CONNECTION RESISTANCE - TYPICAL

1 - VOLTMETER
2 - BATTERY

(2) Connect the positive lead of the voltmeter to the battery positive terminal post. Connect the negative lead of the voltmeter to the battery positive cable terminal clamp (Fig. 7). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If voltage is detected, correct the poor connection between the battery positive cable terminal clamp and the battery positive terminal post.

(3) Connect the voltmeter to measure between the battery positive cable terminal clamp and the starter solenoid B(+) terminal stud (Fig. 8). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery positive cable eyelet terminal connection at the starter solenoid B(+) terminal stud. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery positive cable.

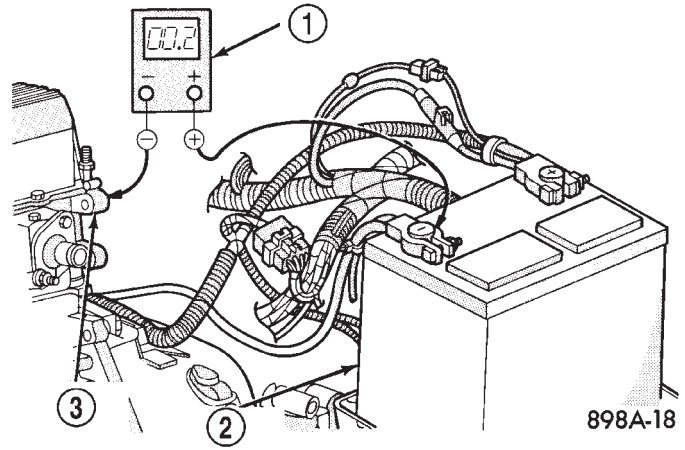
BATTERY CABLES (Continued)



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Fig. 7 TEST BATTERY POSITIVE CONNECTION RESISTANCE - TYPICAL

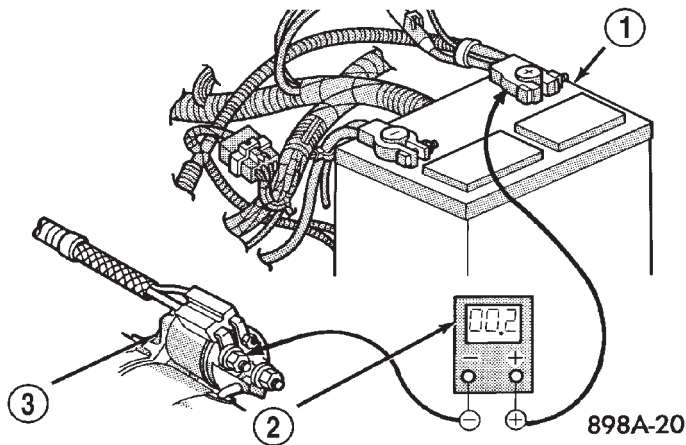
- 1 - VOLTMETER
- 2 - BATTERY



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Fig. 9 TEST GROUND CIRCUIT RESISTANCE - TYPICAL

- 1 - VOLTMETER
- 2 - BATTERY
- 3 - ENGINE GROUND



898A-20

Fig. 8 TEST BATTERY POSITIVE CABLE RESISTANCE - TYPICAL

- 1 - BATTERY
- 2 - VOLTMETER
- 3 - STARTER MOTOR

(4) Connect the voltmeter to measure between the battery negative cable terminal clamp and a good clean ground on the engine block (Fig. 9). Rotate and hold the ignition switch in the Start position. Observe the voltmeter. If the reading is above 0.2 volt, clean and tighten the battery negative cable eyelet terminal connection to the engine block. Repeat the test. If the reading is still above 0.2 volt, replace the faulty battery negative cable.

REMOVAL

- (1) Turn the ignition switch to the Off position. Be certain that all electrical accessories are turned off.
- (2) Disconnect and isolate the remote battery negative cable terminal.
- (3) Remove the battery from the vehicle. Refer to the procedure in this group.
- (4) One at a time, trace the battery cable retaining pushpins, fasteners and routing clips until the cables are free from the vehicle.
- (5) Remove the battery cables from the engine compartment.

INSTALLATION

- (1) Position the battery cables in the engine compartment.
- (2) One at a time, install the battery cable retaining pushpins, fasteners and routing clips until the cables are installed exactly where they were in the vehicle.
- (3) Install the battery in the vehicle. Refer to the procedure in this group.
- (4) Connect the remote battery negative cable terminal.

BATTERY TRAY

DESCRIPTION

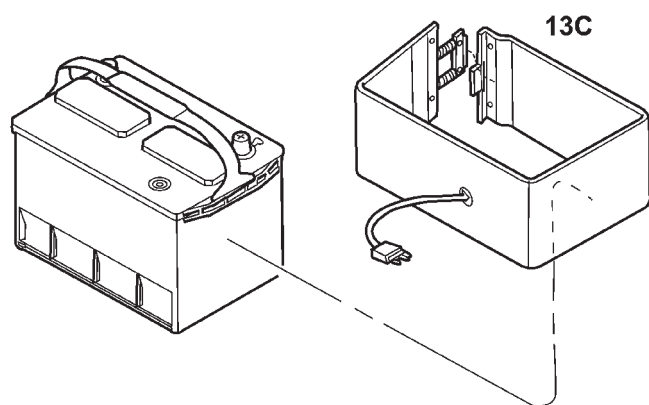
The battery is placed in a steel tray located in the right front corner of the vehicle. The battery tray is permanently attached to the front end sheet metal and cannot be removed from the vehicle. Refer to Charging System for information on the battery temperature sensor. Refer to Battery Hold down for more information on hold down hardware.

OPERATION

The battery tray provides a secure mounting location and supports the battery. On some vehicles, the battery tray also provides the anchor point/s for the battery holddown hardware. The battery tray and the battery holddown hardware combine to secure and stabilize the battery in the engine compartment, which prevents battery movement during vehicle operation. Unrestrained battery movement during vehicle operation could result in damage to the vehicle, the battery, or both.

BATTERY HEATER BLANKET

DESCRIPTION



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Fig. 10 LH HEATER BLANKET

A heater blanket (Fig. 10) is used to improve the battery cold-start ability. This blanket operates on 110 volt AC current and is used with Alaska and Canada cold weather packages.

The heater blanket cannot be adjusted or repaired. If the blanket is faulty or damaged it must be replaced.

OPERATION

The temperature of the battery can affect battery performance. Only DAIMLERCHRYSLER approved battery blanket/block heater combination should be used. The battery blanket heater is designed to provide optimum charging system performance in very cold ambient temperatures below -17.8°C (0°F).

DIAGNOSIS AND TESTING - BATTERY HEATER BLANKET

- (1) Remove the battery heater blanket from the battery (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/THERMAL GUARD - REMOVAL).
- (2) Clean the battery heater blanket with baking soda solution and wipe dry.
- (3) Inspect blanket for cuts, abrasion or other damage. If heater is damaged replace.
- (4) Position the heater flat and re-connect the blanket heater to the vehicles electrical system.
- (5) Connect the 110 volt AC power cord to 110 volt source for a maximum of 3 minutes.
- (6) Disconnect the 110 volt power cord.
- (7) Immediately feel the heater blanket on the inside, it should be warm to the touch. If warm the heater is OK, if not OK proceed.
- (8) Disconnect the heater blanket from the vehicles electrical system. Using an Ohmmeter, connect the leads across the two wire terminals coming from the heater blanket. A resistance value of 220 to 280 ohms should be present. If not replace the blanket. If OK proceed.
- (9) Ensure that the 110 volt AC power cord is supplying voltage to the heater blanket. If OK replace the heater blanket. If not verify the 110 volt AC power from another source. Inspect the power cord for damage and replace if necessary.

REMOVAL

- (1) Remove the battery and the battery heater blanket from the battery tray as a unit (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - REMOVAL).
- (2) Carefully slide the heater blanket straight off the battery case (Fig. 10).

INSTALLATION

- (1) Clean and inspect the battery heater blanket.
- (2) Install the battery heater blanket on the battery case.
- (3) Install the battery and the battery heater blanket into the battery tray as a unit (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - INSTALLATION).

CHARGING

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CHARGING

DESCRIPTION - CHARGING SYSTEM

The charging system consists of:

- Generator
- Decoupler Pulley (If equipped)
- Electronic Voltage Regulator (EVR) circuitry within the Powertrain Control Module (PCM)
 - Ignition switch (refer to the Ignition System section for information)
 - Battery (refer to the Battery section for information)
 - Inlet Air Temperature (calculated battery temperature)
 - Voltmeter (refer to the Instrument Cluster section for information if equipped)
 - Wiring harness and connections (refer to the Wiring section for information)
 - Accessory drive belt (refer to the Cooling section for more information)

OPERATION - CHARGING SYSTEM

The charging system is turned on and off with the ignition switch. The system is on when the engine is running and the ASD relay is energized. The ASD relay is energized when the PCM grounds the ASD control circuit. This voltage is connected through the PCM or IPM (intelligent power module) (if equipped) and supplied to one of the generator field terminals (Gen. Source +) at the back of the generator.

The generator is driven by the engine through a serpentine belt and pulley or decoupler pulley arrangement.

The amount of DC current produced by the generator is controlled by the EVR (field control) circuitry contained within the PCM. This circuitry is con-

nected in series with the second rotor field terminal and ground.

An Inlet air temperature sensor is used to calculate the temperature near the battery. This temperature data, along with data from monitored line voltage (battery voltage sense circuit), is used by the PCM to vary the battery charging rate. This is done by cycling the ground path to control the strength of the rotor magnetic field. The PCM then compensates and regulates generator current output accordingly to maintain system voltage at the targeted system voltage based on battery temperature.

All vehicles are equipped with On-Board Diagnostics (OBD). All OBD-sensed systems, including EVR (field control) circuitry, are monitored by the PCM. Each monitored circuit is assigned a Diagnostic Trouble Code (DTC). The PCM will store a DTC in electronic memory for certain failures it detects and illuminate the (MIL) lamp. Refer to On-Board Diagnostics in the Electronic Control Modules (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) section for more DTC information.

The Check Gauges Lamp (if equipped) or Battery Lamp monitors: **charging system voltage**, engine coolant temperature and engine oil pressure. If an extreme condition is indicated, the lamp will be illuminated. The signal to activate the lamp is sent via the PCI bus circuits. The lamp is located on the instrument panel. Refer to the Instrument Cluster section for additional information.

The PCM uses the inlet air temperature sensor to control the charge system voltage. This temperature, along with data from monitored line voltage, is used by the PCM to vary the battery charging rate. The system voltage is higher at cold temperatures and is gradually reduced as the calculated battery temperature increases.

CHARGING (Continued)

The ambient temperature sensor is used to control the battery voltage based upon ambient temperature (approximation of battery temperature). The PCM maintains the optimal output of the generator by monitoring battery voltage and controlling it to a range of 13.5 - 14.7 volts based on battery temperature.

DIAGNOSIS AND TESTING - ON-BOARD DIAGNOSTIC SYSTEM

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the OBD system. Some circuits are checked continuously and some are checked only under certain conditions.

If the OBD system senses that a monitored circuit is bad, it will put a DTC into electronic memory. The DTC will stay in electronic memory as long as the circuit continues to be bad. The PCM is programmed to clear the memory after 50 engine starts if the problem does not occur again.

DIAGNOSTIC TROUBLE CODES

A DTC description can be read using the DRBIII® scan tool. Refer to the appropriate Powertrain Diagnostic Procedures manual for information.

A DTC does not identify which component in a circuit is bad. Thus, a DTC should be treated as a symptom, not as the cause for the problem. In some cases, because of the design of the diagnostic test procedure, a DTC can be the reason for another DTC to be set. Therefore, it is important that the test procedures be followed in sequence, to understand what caused a DTC to be set.

ERASING DIAGNOSTIC TROUBLE CODES

The DRBIII® Scan Tool must be used to erase a DTC.

The following procedures may be used to diagnose the charging system if:

- the check gauges lamp or battery lamp is illuminated with the engine running
- the voltmeter (if equipped) does not register properly
- an undercharged or overcharged battery condition occurs.

Remember that an undercharged battery is often caused by:

- accessories being left on with the engine not running
- a faulty or improperly adjusted switch that allows a lamp to stay on. Refer to Ignition-Off Draw Test (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - STANDARD PROCEDURE)

INSPECTION

The Powertrain Control Module (PCM) monitors critical input and output circuits of the charging system, making sure they are operational. A Diagnostic Trouble Code (DTC) is assigned to each input and output circuit monitored by the On-Board Diagnostic (OBD) system. Some charging system circuits are checked continuously, and some are checked only under certain conditions.

Refer to Diagnostic Trouble Codes in; Powertrain Control Module; Electronic Control Modules for more DTC information. This will include a complete list of DTC's including DTC's for the charging system.

To perform a complete test of the charging system, refer to the appropriate Powertrain Diagnostic Procedures service manual and the DRBIII® scan tool. Perform the following inspections before attaching the scan tool.

(1) Inspect the battery condition. Refer to the Battery section (Refer to 8 - ELECTRICAL/BATTERY SYSTEM - DIAGNOSIS AND TESTING) for procedures.

(2) Inspect condition of battery cable terminals, battery posts, connections at engine block, starter solenoid and relay. They should be clean and tight. Repair as required.

(3) Inspect all fuses in both the fuseblock and Power Distribution Center (PDC) for tightness in receptacles. They should be properly installed and tight. Repair or replace as required.

(4) Inspect generator mounting bolts for tightness. Replace or tighten bolts if required. Refer to the Generator Removal/Installation section of this group for torque specifications (Refer to 8 - ELECTRICAL/CHARGING - SPECIFICATIONS).

(5) Inspect generator drive belt condition and tension. Tighten or replace belt as required. Refer to Belt Tension Specifications (Refer to 7 - COOLING/ACCESSORY DRIVE - SPECIFICATIONS).

(6) Inspect decoupler pulley (if equipped). Ensure decoupler pulley is driving the alternator rotor.

(7) Inspect automatic belt tensioner (if equipped). Refer to the Cooling System for more information.

(8) Inspect generator electrical connections at generator field, battery output, and ground terminal (if equipped). Also check generator ground wire connection at engine (if equipped). They should all be clean and tight. Repair as required.

CHARGING (Continued)

SPECIFICATIONS

GENERATOR

Type	Engine	Minimum Test Amperage
Denso	2.7L	105 Amp
Denso	3.5L	125 Amps
Test Specification:		
1. Engine RPM : 2500 RPM \pm 20 RPM		
2. Voltage Output : 14.0 V \pm 0.5 V		
3. Field Current : 5 amps \pm 0.1 amps		

Part number is located on the side of the generator.

SPECIFICATIONS - TORQUE

TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Battery Hold Down Clamp Bolt	14	10.3	125
Generator Mounting Bolt 8 mm	41	30	
Generator Mounting Bolt 10 mm	54	40	
Battery Terminal Nut	10	7.3	90
Generator B+ Terminal	9.8	7	85 \pm 15
Generator Pivot bolt Bolt 8 mm	54	40	

GENERATOR

DESCRIPTION

The generator is belt-driven by the engine. It is serviced only as a complete assembly. If the generator fails for any reason, the entire assembly must be replaced. The generator produces DC voltage.

OPERATION

As the energized rotor begins to rotate within the generator, the spinning magnetic field induces a current into the windings of the stator coil.

The Y type stator winding connections deliver the induced AC current to 3 positive and 3 negative

diodes for rectification. From the diodes, rectified DC current is delivered to the vehicles electrical system through the generator, battery, and ground terminals.

Noise emitting from the generator may be caused by:

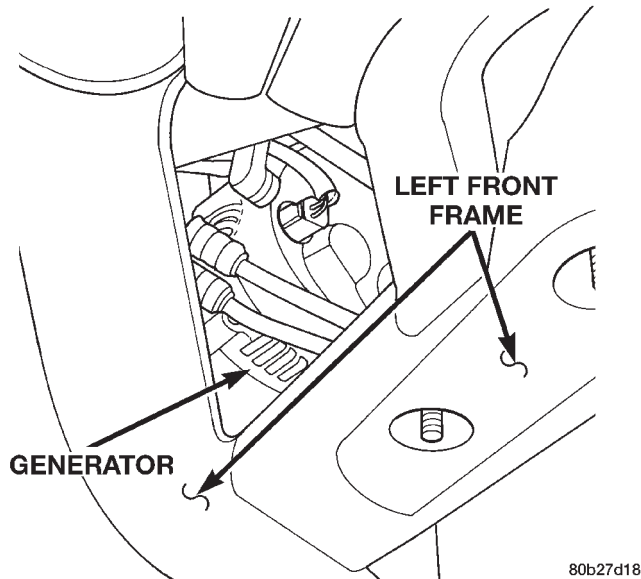
- Worn, loose or defective bearings
- Loose or defective drive pulley
- Incorrect, worn, damaged or misadjusted drive belt
- Loose mounting bolts
- Misaligned drive pulley
- Defective stator or diode
- Damaged internal fins

GENERATOR (Continued)

REMOVAL

REMOVAL - 2.7L

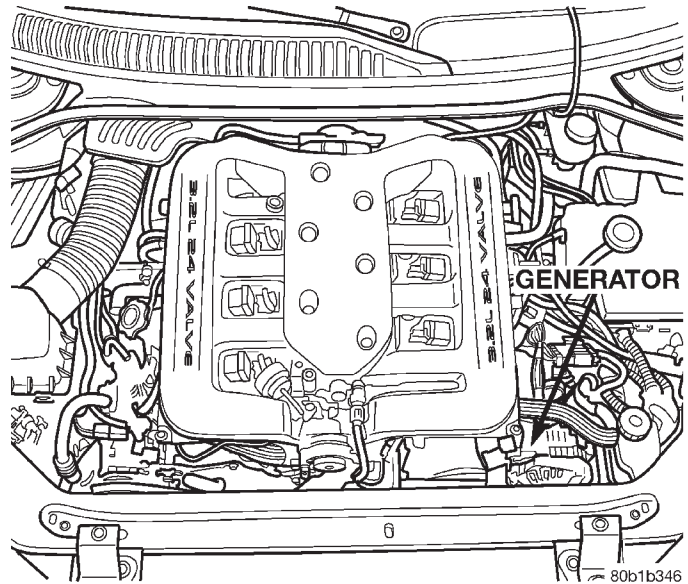
- (1) Disconnect negative battery cable.
- (2) Raise and support vehicle.
- (3) Remove lower plastic splash shield (Fig. 1).

**Fig. 1 GENERATOR 2.7L**

- (4) Remove transmission cooler and reposition cooler out of the way.
- (5) Remove lower radiator crossmember support and position a jackstand under radiator for support.
- (6) Loosen adjusting T-bolt, but do not remove.
- (7) Loosen pivot bolt, but do not remove.
- (8) Remove the generator drive belt. Refer to the Cooling System section.
- (9) Disconnect the generator field circuit plug.
- (10) Remove the B+ terminal nut and wire.
- (11) Remove pivot bolt, being careful not to lose spacer.
- (12) Remove generator.

REMOVAL - 3.5L

- (1) Disconnect negative battery cable (Fig. 2).
- (2) Loosen lower mounting bolt do not remove.
- (3) Remove the upper radiator support and relocate.
- (4) Loosen the lower mounting bolt, but do not remove.
- (5) Loosen pivot bolt, but do not remove.
- (6) Loosen belt adjustment bolt.
- (7) Remove the generator drive belt. Refer to the Cooling System section.
- (8) Remove lower mounting bolt.
- (9) Disconnect the generator field circuit plug.
- (10) Remove the B+ terminal nut and wire.
- (11) Remove pivot bolt.

**Fig. 2 GENERATOR 3.5L**

- (12) Remove generator.

INSTALLATION

INSTALLATION - 2.7L

- (1) Install generator.
- (2) Install pivot bolt, leave loose.
- (3) Connect the generator field circuit plug.
- (4) Install the B+ terminal nut and wire and tighten to 9.8 N·m (85 ±15 in. lbs.).
- (5) Install the generator drive belt. Refer to the Cooling System section.
- (6) Adjusting T-bolt and tighten belt.
- (7) Remove jackstand from under radiator and install lower radiator crossmember support.
- (8) Reposition transmission cooler and tighten fasteners.
- (9) Install lower plastic splash shield.
- (10) Lower vehicle.
- (11) Connect negative battery cable.

Tighten all fasteners to the proper torque. Refer to the Torque Specifications chart in this section.

INSTALLATION - 3.5L

- (1) Install generator.
- (2) Install the pivot bolt.
- (3) Install the lower mounting bolt.
- (4) Connect the B+ wire and tighten nut and tighten to 9.8 N·m (85 ±15 in. lbs.).
- (5) Connect the generator field circuit connector.
- (6) Install generator drive belt. Refer to the Cooling System section.
- (7) Tighten the pivot bolt.
- (8) Tighten the lower mounting bolt.

GENERATOR (Continued)

(9) Install the upper radiator support and tighten bolts.

(10) Connect the negative battery cable. Tighten all fasteners to the proper torque. Refer to the Torque Specifications chart in this section.

VOLTAGE REGULATOR

DESCRIPTION

The Electronic Voltage Regulator (EVR) is not a separate component. It is actually a voltage regulating circuit located within the Powertrain Control Module (PCM). The EVR is not serviced separately. If replacement is necessary, the PCM must be replaced.

OPERATION

The amount of DC current produced by the generator is controlled by EVR circuitry contained within the PCM. This circuitry is connected in series with

the generator's second rotor field terminal and its ground.

Voltage is regulated by cycling the ground path to control the strength of the rotor magnetic field. The EVR circuitry monitors system line voltage (B+) and calculated battery temperature or inlet air temperature sensor (refer to Inlet Air Temperature Sensor, if equipped, for more information). It then determines a target charging voltage. If sensed battery voltage is lower than the target voltage, the PCM grounds the field winding until sensed battery voltage is at the target voltage. A circuit in the PCM cycles the ground side of the generator field at 250 times per second (250Hz), but has the capability to ground the field control wire 100% of the time (full field) to achieve the target voltage. If the charging rate cannot be monitored (limp-in), a duty cycle of 25% is used by the PCM in order to have some generator output. Also refer to Charging System Operation for additional information.

STARTING

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STARTING

DESCRIPTION

- The starting system has (Fig. 1):
- Ignition switch
 - Starter relay
 - Transmission Range Sensor or Park/Neutral Switch
 - Wiring harness
 - Battery
 - Starter motor with an integral solenoid
 - Powertrain Control Module (PCM)

OPERATION

These components form two separate circuits. A high amperage circuit that feeds the starter motor up to 300+ amps, and a control circuit that operates on less than 20 amps.

The PCM controls a double start over-ride safety that does not allow the starter to be engaged if the engine is already running.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - STARTING SYSTEM TEST

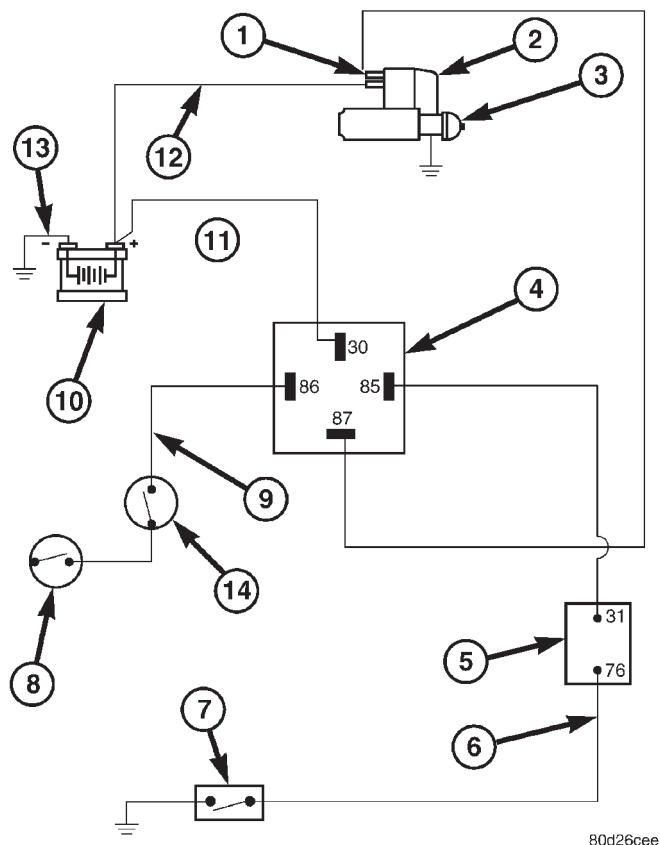
For circuit descriptions and diagrams, refer to the Wiring Diagrams.

WARNING: ON VEHICLES EQUIPPED WITH AIR-BAGS, REFER TO THE PASSIVE RESTRAINT SYSTEMS BEFORE ATTEMPTING STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

INSPECTION

- Before removing any unit from the starting system for repair or diagnosis, perform the following inspections:
- **Battery** - Visually inspect the battery for indications of physical damage and loose or corroded cable connections. Determine the state-of-charge and cranking capacity of the battery. Charge or replace the battery, if required. Refer to the Battery section for more information.
 - **Ignition Switch** - Visually inspect the ignition switch for indications of physical damage and loose or corroded wire harness connections.

STARTING (Continued)

**Fig. 1 STARTING SYSTEM SCHEMATIC**

- 1 - SOLENOID TERMINAL
- 2 - STARTER SOLENOID
- 3 - STARTER MOTOR
- 4 - STARTER RELAY CONNECTOR
- 5 - PCM
- 6 - GROUND CIRCUIT
- 7 - TRANSMISSION RANGE SENSOR/PARK/NEUTRAL SENSE
- 8 - IGNITION SWITCH
- 9 - IGNITION FEED
- 10 - BATTERY
- 11 - BATTERY RELAY FEED
- 12 - POSITIVE CABLE
- 13 - NEGATIVE CABLE
- 14 - CLUTCH INTERLOCK SWITCH (MTX ONLY)

- **Transmission Range Sensor** - Visually inspect the transmission range sensor for indications of physical damage and loose or corroded wire harness connections.

- **Starter Relay** - Visually inspect the starter relay for indications of physical damage and loose or corroded wire harness connections.

- **Starter** - Visually inspect the starter for indications of physical damage and loose or corroded wire harness connections.

- **Starter Solenoid** - Visually inspect the starter solenoid for indications of physical damage and loose or corroded wire harness connections.

- **Wiring** - Visually inspect the wire harness for damage. Repair or replace any faulty wiring, as required. Check for loose or corroded wire harness connections at main engine ground and remote jump post.

- **Power Distribution Center (PDC)** - Visually inspect the B+ connections at the PDC for physical damage and loose or corroded harness connections.

STARTING (Continued)

STARTING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER FAILS TO ENGAGE.	1. BATTERY DISCHARGED OR FAULTY. 2. STARTING CIRCUIT WIRING FAULTY. 3. STARTER RELAY FAULTY. 4. IGNITION SWITCH FAULTY. 5. PARK/NEUTRAL POSITION SWITCH (AUTO TRANS) FAULTY OR MIS-ADJUSTED. 6. CLUTCH PEDAL POSITION SWITCH (MAN TRANS) FAULTY. 7. STARTER SOLENOID FAULTY. 8. STARTER ASSEMBLY FAULTY. 9. FAULTY TEETH ON RING GEAR. 10. PCM DOUBLE START OVERRIDE OUTPUT FAILURE.	1. REFER TO THE BATTERY SECTION FOR MORE INFORMATION. CHARGE OR REPLACE BATTERY, IF REQUIRED. 2. REFER TO FEED CIRCUIT RESISTANCE TEST AND FEED CIRCUIT TEST IN THIS SECTION. 3. REFER TO RELAY TEST, IN THIS SECTION. REPLACE RELAY, IF NECESSARY. 4. REFER TO IGNITION SWITCH TEST, IN THE STEERING SECTION OR 8 WIRING DIAGRAMS. REPLACE SWITCH, IF NECESSARY. 5. REFER PARK/NEUTRAL POSITION SWITCH TEST, IN THE TRANSAXLE. SECTION FOR MORE INFORMATION. REPLACE SWITCH, IF NECESSARY. 6. REFER TO CLUTCH PEDAL POSITION SWITCH TEST, IN THE CLUTCH. SECTION. REPLACE SWITCH, IF NECESSARY. 7. REFER TO SOLENOID TEST, IN THIS SECTION. REPLACE STARTER ASSEMBLY, IF NECESSARY. 8. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY. 9. ROTATE FLYWHEEL 360°, AND INSPECT TEETH AND RING GEAR REPLACED IF DAMAGED. 10. REFER TO PCM DIAGNOSTIC. CHECK FOR CONTINUITY BETWEEN PCM AND TERMINAL 85. REPAIR OPEN CIRCUIT AS REQUIRED. IF OK, PCM MAY BE DEFECTIVE.
STARTER ENGAGES, FAILS TO TURN ENGINE.	1. BATTERY DISCHARGED OR FAULTY. 2. STARTING CIRCUIT WIRING FAULTY. 3. STARTER ASSEMBLY FAULTY. 4. ENGINE SEIZED. 5. LOOSE CONNECTION AT BATTERY, PDC, STARTER, OR ENGINE GROUND. 6. FAULTY TEETH ON RING GEAR.	1. REFER TO THE BATTERY SECTION FOR MORE INFORMATION. CHARGE OR REPLACE BATTERY AS NECESSARY. 2. REFER TO THE FEED CIRCUIT RESISTANCE TEST AND THE FEED CIRCUIT TEST IN THIS SECTION. REPAIR AS NECESSARY. 3. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY. 4. REFER TO THE ENGINE SECTION, FOR DIAGNOSTIC AND SERVICE PROCEDURES. 5. INSPECT FOR LOOSE CONNECTIONS. 6. ROTATE FLYWHEEL 360°, AND INSPECT TEETH AND RING GEAR REPLACED IF DAMAGED.

STARTING (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
STARTER ENGAGES, SPINS OUT BEFORE ENGINE STARTS.	1. BROKEN TEETH ON STARTER RING GEAR. 2. STARTER ASSEMBLY FAULTY.	1. REMOVE STARTER. INSPECT RING GEAR AND REPLACE IF NECESSARY. 2. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY.
STARTER DOES NOT DISENGAGE.	1. STARTER IMPROPERLY INSTALLED. 2. STARTER RELAY FAULTY. 3. IGNITION SWITCH FAULTY. 4. STARTER ASSEMBLY FAULTY. 5. FAULTY TEETH ON RING GEAR.	1. INSTALL STARTER. TIGHTEN STARTER MOUNTING HARDWARE TO CORRECT TORQUE SPECIFICATIONS. 2. REFER TO RELAY TEST, IN THIS SECTION. REPLACE RELAY, IF NECESSARY. 3. REFER TO IGNITION SWITCH TEST, IN THE STEERING SECTION. REPLACE SWITCH, IF NECESSARY. 4. IF ALL OTHER STARTING SYSTEM COMPONENTS AND CIRCUITS CHECK OK, REPLACE STARTER ASSEMBLY. 5. ROTATE FLYWHEEL 360°, AND INSPECT TEETH AND RING GEAR REPLACED IF DAMAGED.

DIAGNOSIS AND TESTING - CONTROL CIRCUIT TEST

The starter control circuit has:

- Starter motor with integral solenoid
- Starter relay
- Transmission range sensor, or Park/Neutral

Position switch with automatic transmissions

- Ignition switch
- Battery
- All related wiring and connections
- Powertrain Control Module (PCM)

CAUTION: Before performing any starter tests, the ignition and fuel systems must be disabled.

- To disable ignition and fuel systems, disconnect the Automatic Shutdown Relay (ASD). The ASD relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for the proper relay location.

STARTER SOLENOID

WARNING: CHECK TO ENSURE THAT THE TRANSMISSION IS IN THE PARK POSITION WITH THE PARKING BRAKE APPLIED.

(1) Verify battery condition. Battery must be in good condition with a full charge before performing any starter tests. Refer to Battery Tests.

(2) Perform Starter Solenoid test BEFORE performing the starter relay test.

(3) Perform a visual inspection of the starter/ starter solenoid for corrosion, loose connections or faulty wiring.

(4) Locate and remove the starter relay from the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location.

(5) Connect a remote starter switch or a jumper wire between the remote battery positive post and terminal 87 of the starter relay connector.

(a) If engine cranks, starter/starter solenoid is good. Go to the Starter Relay Test.

(b) If engine does not crank or solenoid chatters, check wiring and connectors from starter relay to starter solenoid for loose or corroded connections. Particularly at starter terminals.

(c) Repeat test. If engine still fails to crank properly, trouble is within starter or starter mounted solenoid, and replace starter. Inspect the ring gear teeth.

STARTER RELAY

WARNING: CHECK TO ENSURE THAT THE TRANSMISSION IS IN THE PARK/NEUTRAL POSITION WITH THE PARKING BRAKE APPLIED.

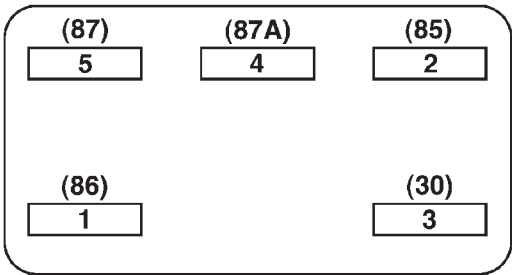
RELAY TEST

The starter relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

STARTING (Continued)

Remove the starter relay from the PDC as described in this group to perform the following tests:

- (1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.
- (2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ±5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.
- (3) Connect a battery B+ lead to terminals 86 and a ground lead to terminal 85 to energize the relay. The relay should click. Also test for continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, refer to Relay Circuit Test procedure. If not OK, replace the faulty relay.



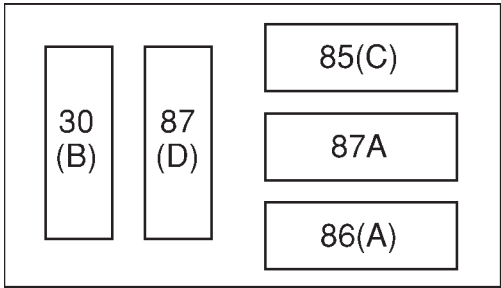
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Starter Relay Pinout

CAV	FUNCTION
30	B (+)
85	P/N POSITION SW.SENSE
86	IGNITION SWITCH OUTPUT
87	STARTER RELAY OUTPUT
87A	NO CONNECT

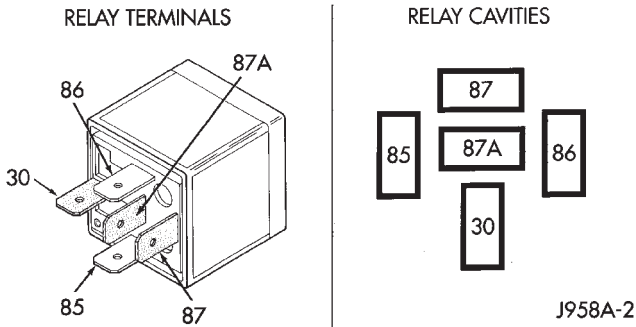
RELAY CIRCUIT TEST

- (1) The relay common feed terminal cavity (30) is connected to battery voltage and should be hot at all times. If OK, go to Step 2. If not OK, repair the open circuit to the PDC fuse as required.
- (2) The relay normally closed terminal (87A) is connected to terminal 30 in the de-energized position, but is not used for this application. Go to Step 3.
- (3) The relay normally open terminal (87) is connected to the common feed terminal (30) in the energized position. This terminal supplies battery voltage to the starter solenoid field coils. There should be continuity between the cavity for relay terminal 87 and the starter solenoid terminal at all times. If OK, go to Step 4. If not OK, repair the open circuit to the starter solenoid as required.
- (4) The coil battery terminal (86) is connected to the electromagnet in the relay. It is energized when the ignition switch is held in the Start position and the clutch pedal is depressed (manual trans). Check for battery voltage at the cavity for relay terminal 86 with the ignition switch in the Start position and the clutch pedal is depressed (manual trans), and no voltage when the ignition switch is released to the On position. If OK, go to Step 5. If not OK, check for an open or short circuit to the ignition switch and repair, if required. If the circuit to the ignition switch is OK, see the Ignition Switch Test procedure in this group.
- (5) The coil ground terminal (85) is connected to the electromagnet in the relay. It is grounded through the transmission range sensor only when the gearshift selector lever is in the Park or Neutral positions. Check for continuity to ground at the cavity for relay terminal 85. If not OK with an automatic transmission, check for an open or short circuit



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Starter Relay Pinout



J958A-2

NUMBER	TERMINAL LEGEND
30	IDENTIFICATION
85	COMMON FEED
86	COIL GROUND
87	COIL BATTERY
87A	NORMALLY OPEN
87A	NORMALLY CLOSED

STARTING (Continued)

to the transmission range sensor and repair. It is grounded by the PCM if the conditions are right to start the car. For automatic trans. cars the PCM must see Park Neutral switch and near zero engine rpm. For manual trans. cars the PCM only needs to see near zero engine rpm. To diagnose the Park Neutral switch of the trans range sensor refer to the transaxle section for more information. Check for continuity to ground while the ignition switch is in the start position. If not OK and the vehicle has an automatic trans. verify Park Neutral switch operation. If that checks OK check for continuity between PCM and the terminal 85. Repair open circuit as required. If OK, the PCM may be defective.

SAFETY SWITCHES

For diagnostics of the Transmission Range Sensor, refer to the Transaxle section for more information. If equipped with Clutch Interlock/Upstop Switch, refer to Diagnosis and Testing in the Clutch section.

IGNITION SWITCH

After testing starter solenoid and relay, test ignition switch and wiring. Refer to the Ignition Section or Wiring Diagrams for more information. Check all wiring for opens or shorts, and all connectors for being loose or corroded.

BATTERY

For battery diagnosis and testing, refer to the Battery section for procedures.

ALL RELATED WIRING AND CONNECTORS

Refer to Wiring Diagrams for more information.

DIAGNOSIS AND TESTING - FEED CIRCUIT RESISTANCE TEST

Before proceeding with this operation, review Diagnostic Preparation and Starter Feed Circuit Tests. The following operation will require a voltmeter, accurate to 1/10 of a volt.

CAUTION: Ignition and Fuel systems must be disabled to prevent engine start while performing the following tests.

- (1) To disable the Ignition and Fuel systems, disconnect the Automatic Shutdown Relay (ASD). The ASD relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for proper relay location.
- (2) Gain access to battery terminals.
- (3) With all wiring harnesses and components properly connected, perform the following:

(a) Connect the negative lead of the voltmeter to the battery negative post, and positive lead to the battery negative cable clamp. Rotate and hold the

- ignition switch in the START position. Observe the voltmeter. If voltage is detected, correct poor contact between cable clamp and post.
- (b) Connect positive lead of the voltmeter to the battery positive post, and negative lead to the battery positive cable clamp. Rotate and hold the ignition switch key in the START position. Observe the voltmeter. If voltage is detected, correct poor contact between the cable clamp and post.
- (c) Connect negative lead of voltmeter to battery negative terminal, and positive lead to engine block near the battery cable attaching point. Rotate and hold the ignition switch in the START position. If voltage reads above 0.2 volt, correct poor contact at ground cable attaching point. If voltage reading is still above 0.2 volt after correcting poor contacts, replace ground cable.
- (4) Connect positive voltmeter lead to the starter motor housing and the negative lead to the battery negative terminal. Hold the ignition switch key in the START position. If voltage reads above 0.2 volt, correct poor starter to engine ground.

(a) Connect the positive voltmeter lead to the battery positive terminal, and negative lead to battery cable terminal on starter solenoid. Rotate and hold the ignition switch in the START position. If voltage reads above 0.2 volt, correct poor contact at battery cable to solenoid connection. If reading is still above 0.2 volt after correcting poor contacts, replace battery positive cable.

(b) If resistance tests do not detect feed circuit failures, replace the starter motor.

SPECIFICATIONS

STARTER

MANUFACTURER	NIPPONDENSO	MELCO
ENGINE APPLICATION	3.5L	2.7L
POWER RATING	1.4 KW	1.4 KW
VOLTAGE	12 VOLTS	12 VOLTS
BRUSHES	4	4
DRIVE	OFFSET GEAR REDUCED	PLANETARY GEAR TRAIN
CRANKING AMPERAGE*	150 - 280 AMP*	150 - 280 AMP*
DRAW TEST		

NOTE: Engine should be up to operating temperature. Extremely heavy oil or tight engine will increase starter amperage draw.

STARTING (Continued)

SPECIFICATIONS - TORQUE

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Starter Mounting Bolts	54	40	—
Starter Solenoid Battery Nut	10	—	90

STARTER MOTOR

DESCRIPTION

DESCRIPTION - 2.7L

The Melco is a permanent magnet starter motor.

DESCRIPTION - 3.5L

The Nippondenso is a reduction gear-field coil starter motor.

OPERATION

OPERATION - 2.7L

A planetary gear train transmits power between starter motor and pinion shaft. The fields have permanent magnets.

OPERATION - 3.5L

Power is applied to the coil windings which causes the pinion to rotate the ring gear mounted on the drive plate.

REMOVAL

(1) Disconnect and isolate the battery negative remote cable from remote ground post (Fig. 3).

(2) Raise vehicle.

(3) Remove three bolts attaching starter to engine (Fig. 4).

(4) Remove battery positive feed wire from starter.

(5) Remove starter solenoid assembly from transmission housing. Position the starter to gain access to the Connector Positive Assurance (CPA) wiring connector.

(6) Position jack stand beneath engine and slightly lift to relieve pressure from left engine mount.

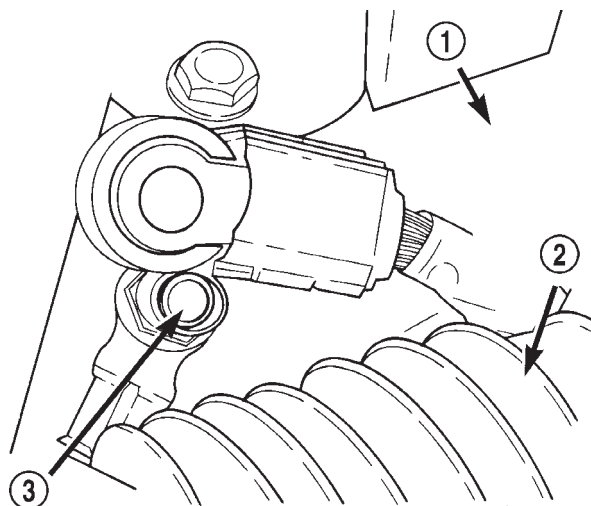
(7) Remove three left engine mount mounting bolts from engine block.

(8) Jack engine up slightly to give more room to maneuver starter assembly.

(9) Slide rear of starter motor out between catalyst and engine mount.

(10) Disconnect posi-lock starter solenoid connector.

(11) Remove the starter from vehicle.



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Fig. 3 NEGATIVE BATTERY CABLE

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

INSTALLATION

(1) Connect battery positive feed wire to starter.

(2) Connect posi-lock starter solenoid connector.

(3) Jack engine up slightly to give more room to maneuver starter assembly.

(4) Install the starter.

(5) Install three bolts attaching starter to engine (Fig. 4). Tighten all fasteners to the proper torque. Refer to the Torque Specifications chart in this section.

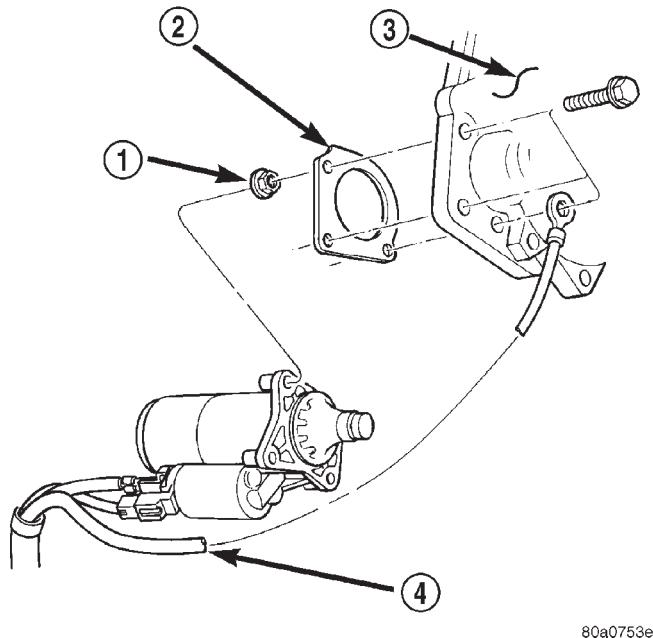
(6) Install three left engine mount mounting bolts to engine block.

(7) Install starter solenoid assembly from transmission housing. Position the starter to gain access to the Connector Positive Assurance (CPA) wiring connector.

(8) Lower vehicle.

(9) Connect the battery negative cable (Fig. 3).

STARTER MOTOR (Continued)

**Fig. 4 STARTER 3.5L**

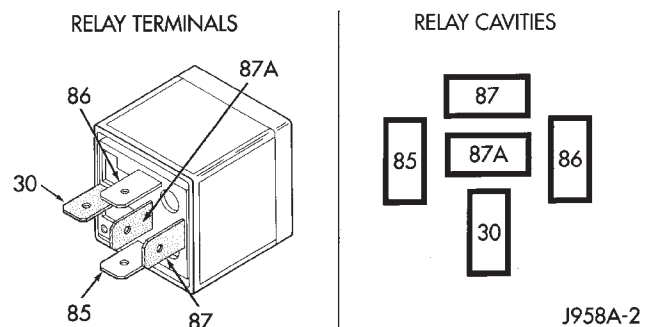
- 1 - STARTER SHIELD RETENTION SLEEVE
 2 - COVER
 3 - TRANSAXLE HOUSING (3)
 4 - GROUND CABLE

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no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery B+ lead to terminals 86 and a ground lead to terminal 85 to energize the relay. The relay should click. Also test for continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, refer to Starter Relay Circuit Test procedure. If not OK, replace the faulty relay.

STARTER RELAY CHART**STARTER MOTOR RELAY****DESCRIPTION**

The Starter Relay is a micro relay located in the Power Distribution Center (PDC), positioned in the left front corner of the engine compartment.

OPERATION

As battery power is applied to the relay from the ignition switch, battery power is applied to the starter motor through the relay to the starter solenoid.

DIAGNOSIS AND TESTING - STARTER RELAY

WARNING: CHECK TO ENSURE THAT THE TRANSMISSION IS IN THE PARK POSITION/NEUTRAL WITH THE PARKING BRAKE APPLIED

The starter relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

Remove the starter relay from the PDC as described in this group to perform the following tests. Refer to Starter Relay Chart for terminal numbers and locations.

(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and

TERMINAL LEGEND

NUMBER	IDENTIFICATION
30	COMMON FEED
85	COIL GROUND
86	COIL BATTERY
87	NORMALLY OPEN
87A	NORMALLY CLOSED

STARTER RELAY CIRCUIT TEST

(1) The relay common feed terminal cavity (30) is connected to battery voltage and should be hot at all times. If OK, go to Step 2. If not OK, repair the open circuit to the PDC fuse as required.

(2) The relay normally closed terminal (87A) is connected to terminal 30 in the de-energized position, but is not used for this application. Go to Step 3.

(3) The relay normally open terminal (87) is connected to the common feed terminal (30) in the energized position. This terminal supplies battery voltage to the starter solenoid field coils. There should be continuity between the cavity for relay terminal 87 and the starter solenoid terminal at all times. If OK, go to Step 4. If not OK, repair the open circuit to the starter solenoid as required.

(4) The coil battery terminal (86) is connected to the electromagnet in the relay. It is energized when the ignition switch is held in the Start position.

STARTER MOTOR RELAY (Continued)

Check for battery voltage at the cavity for relay terminal 86 with the ignition switch in the Start position, and no voltage when the ignition switch is released to the On position. If OK, go to Step 5. If not OK, check for an open or short circuit to the ignition switch and repair, if required. If the circuit to the ignition switch is OK, refer to the Ignition Switch Test procedure in this group.

(5) The coil ground terminal (85) is connected to the electromagnet in the relay. The relay is grounded through Pin 8 of the PCM, when the gear selector lever is in the Park or Neutral position. Check for continuity to ground at the cavity for relay terminal 85, when the gear selector lever is in the Park or Neutral position. If not OK, check for an open circuit to Pin 8 of the PCM and from Pin 76 of the PCM to transmission range sensor. Repair as necessary. If both circuits are OK, refer to the Transmission Range Sensor Test in Transaxle. If the Transmission Range Sensor test OK, and all other tests are OK, replace the PCM.

REMOVAL

The relay is located in the Power Distribution Center (PDC). Refer to the PDC cover for relay location.

STARTER SOLENOID

DESCRIPTION

The Starter Solenoid is mounted directly to the Starter Motor, mounted on the left side of the engine.

OPERATION

The Starter Solenoid is a switching device used to activate the high amperage starter motor circuit from a low amperage control circuit.

DIAGNOSIS AND TESTING - STARTER SOLENOID

WARNING: CHECK TO ENSURE THAT THE TRANSMISSION IS IN THE PARK POSITION WITH THE PARKING BRAKE APPLIED

(1) Verify battery condition. Battery must be in good condition with a full charge before performing any starter tests. Refer to Battery Tests.

(2) Perform Starter Solenoid test BEFORE performing the starter relay test.

(3) Raise the vehicle.

(4) Perform a visual inspection of the starter/starter solenoid for corrosion, loose connections or faulty wiring.

(5) Lower the vehicle.

(6) Locate and remove the starter relay from the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location.

(7) Connect a remote starter switch or a jumper wire between the remote battery positive post and terminal 87 of the starter relay connector.

(a) If engine cranks, starter/starter solenoid is good. Go to the Starter Relay Test.

(b) If engine does not or solenoid chatters, check wiring and connectors from starter relay to starter solenoid for loose or corroded connections. Particularly at starter terminals.

(c) Repeat test. If engine still fails to crank properly, trouble is within starter or starter mounted solenoid, and replace starter.

HEATED SYSTEMS

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HEATED GLASS

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HEATED GLASS

DESCRIPTION - WINDOW DEFOGGER

The Rear Window Defogger electrical system involves the operation of the Manual Temperature Control (MTC) or Automatic Temperature Control (ATC) head, the Body Control Module (BCM), and the rear window defogger relay and wiring. The system consists of a rear glass with two vertical bus bars and a series of electrically connected grid lines fired on the inside surface. The Body Control Module (BCM) operates a relay located in the right side trunk area on all models (Fig. 1).

Vehicles with Rear Window Antenna refer to Audio Systems.

Vehicles equipped with an electrically heated rear window defogger also have a 90 amp generator.

OPERATION - WINDOW DEFOGGER

The passenger can push the Rear Window Defogger button on the MTC or ATC head to defog the rear glass (Fig. 2). The system will only operate when the ignition switch is in the run position. Once the Rear Window Defogger button is pushed, the button indicator will light and the system will operate for a period of time and then automatically turn off. Refer to the owner's manual for operation of the MTC or ATC system.

When the rear window defogger relay is ON, current is directed to the rear defogger grid lines. The heated grid lines heat the rear glass to clear the surface of fog or frost.

Circuit protection is provided by a fusible link, located in the charging circuit, for the heated grid circuit and by a fuse for the relay control circuit.

The MTC or the ATC head sends a signal to the BCM, which indicates to the BCM that the operator wants the rear window grid to heat. An output wire from the BCM connects to the coil of the rear window

HEATED GLASS (Continued)

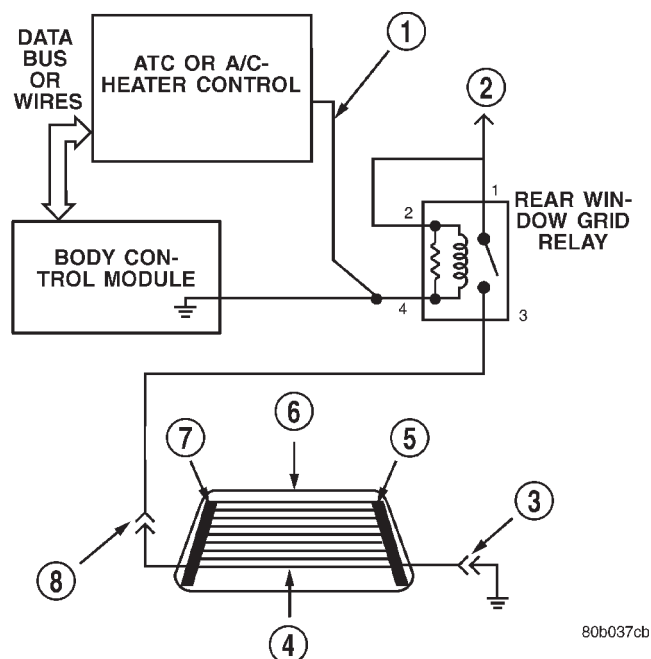


Fig. 1 REAR WINDOW DEFOGGER SYSTEM SCHEMATIC

- 1 - BCM AND BUTTON LED RELAY CONTROL LINE (MANUAL TEMPERATURE CONTROL ONLY)
- 2 - VEHICLE VOLTAGE SUPPLY
- 3 - GROUND CONNECTOR
- 4 - REAR WINDOW GRID LINE STRUCTURE
- 5 - POINT B
- 6 - MIDPOINT C (TYPICAL)
- 7 - POINT A
- 8 - POWER CONNECTOR

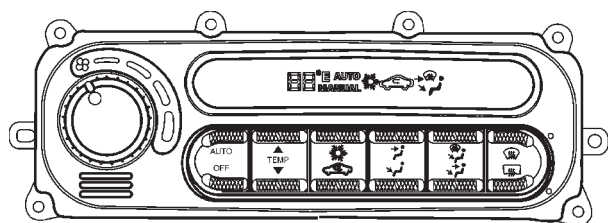


Fig. 2 ATC CONTROL HEAD

defogger relay. The other side of the coil is connected to a fuse. The BCM turns on the relay by connecting the output line of the BCM to vehicle ground. The relay contacts will then close supplying vehicle power to the rear window defogger grid.

CAUTION: Grid lines can be damaged or scraped off with sharp instruments, care should be taken in cleaning glass or removing foreign materials, decals or stickers. Normal glass cleaning solvents or hot water used with rags or toweling is recommended.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WINDOW DEFOGGER

Electrically Heated Rear Window Defogger operation can be easily checked in three steps:

(1) Use ATC or MTC self diagnostics, or the DRB III® scan tool to check fault codes and control button operation. (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - SELF DIAGNOSTICS) Note, this does not check the EBL system. There are no fault codes that can check for the EBL grid, relay, or wiring. Refer to steps 2 and 3 for system tests.

(2) Perform a system test with a voltmeter. (Refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING - SYSTEM TEST)

(3) Check the voltages at the rear grid relay. (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER RELAY - DIAGNOSIS AND TESTING)

DIAGNOSIS AND TESTING - SYSTEM TEST

(1) Start the engine. With the engine running, push the Rear Window Defogger button on the ATC or MTC head. The button LED indicator should light. If the EBL indicator does not light on the **MTC HEAD**, then there may be a wiring problem. This may also indicate that the BCM will not complete the circuit to ground that is required to energize the EBL relay coil (non-ATC vehicles only). (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER RELAY - DIAGNOSIS AND TESTING) On ATC vehicles, the LED indicator may light when the BCM failed to complete the circuit to ground required to energize the EBL relay coil (Fig. 3).

(2) Using a DC voltmeter with a 0-15 volt range, connect the negative lead to a known good vehicle electrical ground.

(3) Touch the positive bus bar and check voltage. The voltage should be above 11 volts. Push the Rear Window Defogger button to turn off the indicator. The measured voltage should be 0 volts. If these voltages are correct then the problem is with the Rear Window Grid or Grid ground electrical connection. (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER GRID - DIAGNOSIS AND TESTING) If there is no voltage to the rear window defogger grid when the system is ON, (Refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING - FUSE AND ELECTRICAL SHORT TEST).

HEATED GLASS (Continued)

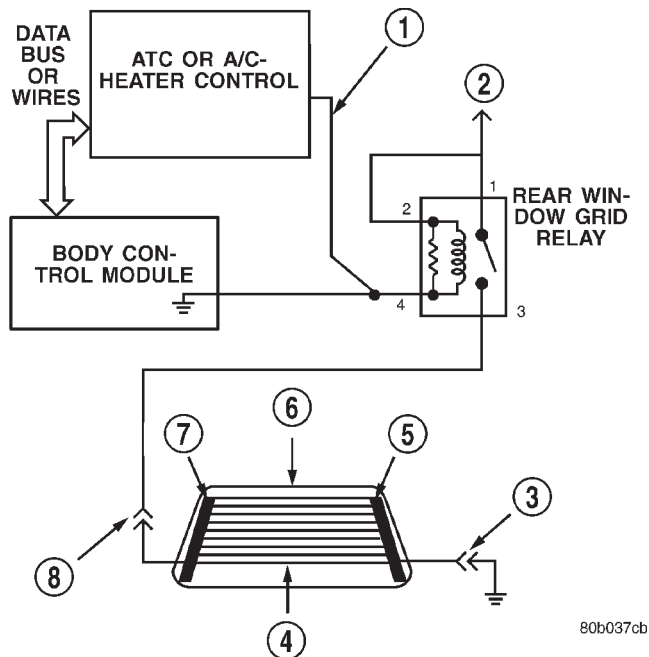


Fig. 3 REAR WINDOW DEFOGGER SYSTEM SCHEMATIC

- 1 - BCM AND BUTTON LED RELAY CONTROL LINE (MANUAL TEMPERATURE CONTROL ONLY)
- 2 - VEHICLE VOLTAGE SUPPLY
- 3 - GROUND CONNECTOR
- 4 - REAR WINDOW GRID LINE STRUCTURE
- 5 - POINT B
- 6 - MIDPOINT C (TYPICAL)
- 7 - POINT A
- 8 - POWER CONNECTOR

DIAGNOSIS AND TESTING - FUSE AND ELECTRICAL SHORT TEST

- (1) Stop the engine.
- (2) Check the fuse supplying power to the rear glass grid relay. If the fuse is good, (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER RELAY - DIAGNOSIS AND TESTING). If the fuse is open, then go to Step 3.
- (3) Locate the ground lug that connects the negative lead of the rear window grid to ground. Remove the screw holding the ground lug and isolate it from any vehicle ground.
- (4) Connect one lead of an ohmmeter to the negative ground lug of the rear window grid (with the lug still not connected to a vehicle ground), and check the resistance to a known good vehicle ground. If the ohmmeter indicates less than 10 ohms, then the rear window defogger grid is shorting to the vehicle ground, then go to Step 5. If the ohmmeter indicates more than 100 ohms of resistance, then go to Step 6.
- (5) Disconnect the rear window defogger grid voltage feed wire from the vehicle harness. If the ohmmeter still indicates less than 10 ohms, then the rear

window defogger grid is shorting to the vehicle ground and must be replaced. If the ohmmeter indicates more than 100 ohms of resistance with the grid voltage feed wire disconnected, then go to Step 6.

(6) There is a problem with the circuits that connect to the rear window defogger relay. Refer to the appropriate wiring information for circuit descriptions. Check wiring with an ohmmeter to verify proper wiring connections to the rear window defogger relay. If no problems are found, then replace the fuse and try running the system.

REAR WINDOW DEFOGGER GRID

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER GRID

The horizontal grid line and vertical bus bar line is printed and fired on the inside surface of the rear window glass. These comprise an electrical circuit. The electrically conductive lines are composed of a silver ceramic material which when fired on glass becomes bonded to the glass and is highly resistant to abrasion. It is possible, however, that a break may occur in an individual grid line resulting in no current flow through the line. To detect breaks in grid lines, the following procedure is required:

(1) Stop the engine. Connect the negative lead of a 0-25 volt range voltmeter to a known good vehicle electrical ground.

(2) Start the engine and push the rear window defogger button to turn on the system.

(3) Touch the ground side (point B) of the Rear Window Defogger Grid (Fig. 4). The voltage measured should be below 1 volt. If the voltage is greater than 1 volt then check the voltage on each grid line at the Mid-Point with the positive lead. If the voltage is not approximately 6 volts or half the voltage measured on the positive rear window grid bus bar, then the grid line is bad. The break in the grid can be found by moving the probe along the line until the voltage changes. The area where the voltage changes is where the open circuit is.

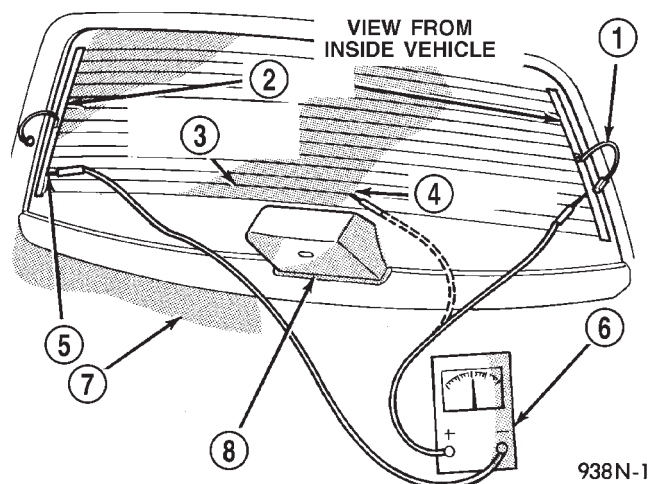
STANDARD PROCEDURE - REAR WINDOW DEFOGGER GRID REPAIR

The repair of the grid lines or the terminal is possible using the Mopar® Repair Package or equivalent.

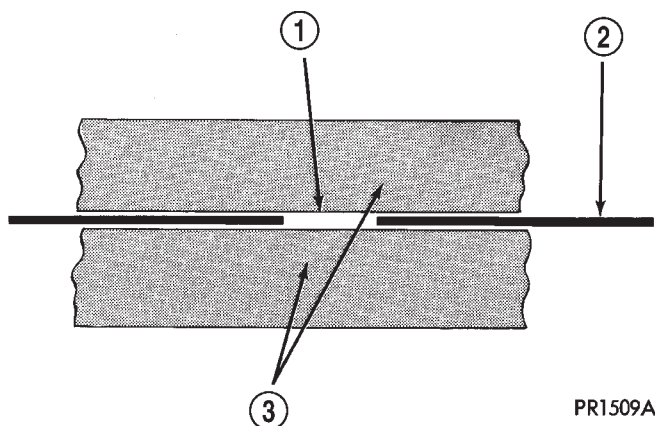
(1) Mask the repair area so conductive epoxy can be extended onto the line or the bus bar (Fig. 5).

(2) Follow the instructions in the repair kit for preparing the damaged area.

REAR WINDOW DEFOGGER GRID (Continued)

**Fig. 4 GRID LINE TEST**

- 1 - VOLTAGE FEED A
- 2 - BUS BARS
- 3 - REAR WINDOW DEFOGGER
- 4 - MIDPOINT C
- 5 - GROUND B
- 6 - VOLTMETER
- 7 - REAR SHELF
- 8 - CHMSL TRIM COVER

**Fig. 5 GRID LINE REPAIR**

- 1 - BREAK
- 2 - GRID LINE
- 3 - MASKING TAPE

(3) Remove the package separator clamp and mix the plastic conductive epoxy thoroughly. Fold in half and cut the center corner to dispense the epoxy.

(4) For grid line repair, mark off the area to be repaired with masking tape or a template (Fig. 5).

(5) Apply conductive epoxy through the slit in the masking tape. Overlap both ends of the break by 19 mm (3/4 inch).

(6) For a terminal or pigtail replacement, mask adjacent areas so the epoxy can be extended onto the line as well as the bus bar. Apply a thin layer of

epoxy to the area where the terminal was fastened and to the adjacent line.

(7) Apply a thin layer of conductive epoxy on the terminal and place terminal on desired location. To prevent the terminal from moving while the epoxy is curing, it must be wedged or clamped.

(8) Carefully remove the masking tape from the grid line.

CAUTION: Do not allow the glass surface to exceed 204°C (400°F), glass may fracture.

(9) Allow epoxy to cure 24 hours at room temperature or use a heat gun with a 260°-371°C (500°-700°F) range for 15 minutes. Hold the gun approximately 254 mm (10 inches) from the repaired area.

(10) After the conductive epoxy is properly cured remove the wedge from the terminal and check the rear window defogger operation. Do not attach the connectors until curing is complete.

WARNING: REPAIR KIT MAY CAUSE SKIN OR EYE IRRITATION. CONTAINS EPOXY RESIN AND AMINE TYPE HARDENER, HARMFUL IF SWALLOWED. AVOID CONTACT WITH SKIN AND EYES. FOR SKIN, WASH AFFECTED AREAS WITH SOAP AND WATER. DO NOT TAKE INTERNALLY. IF TAKEN INTERNALLY, INDUCE VOMITING; CALL A PHYSICIAN IMMEDIATELY. IF IN CONTACT WITH EYES, FLUSH WITH PLENTY OF WATER. USE WITH ADEQUATE VENTILATION. DO NOT USE NEAR FIRE OR FLAME. CONTENTS CONTAIN 3 PERCENT FLAMMABLE SOLVENTS.

KEEP OUT OF REACH OF CHILDREN.

REAR WINDOW DEFOGGER RELAY

DESCRIPTION

The rear window defogger relay is an electromechanical device that switches fused battery current to the rear glass heating grid and the Light-Emitting Diode (LED) indicator of the rear window defogger switch, when the Body Control Module (BCM) rear window defogger timer and logic circuitry grounds the relay coil. The rear window defogger relay is located in the right rear trunk area behind the carpeting.

The rear window defogger relay is a International Standards Organization (ISO) relay. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal patterns, and terminal functions.

REAR WINDOW DEFOGGER RELAY (Continued)

The rear window defogger relay cannot be repaired or adjusted and, if faulty or damaged, it must be replaced.

OPERATION

The ISO relay consists of an electromagnetic coil, a resistor or diode, and three (two fixed and one movable) electrical contacts. The movable (common feed) relay contact is held against one of the fixed contacts (normally closed) by spring pressure. When the electromagnetic coil is energized, it draws the movable contact away from the normally closed fixed contact, and holds it against the other (normally open) fixed contact.

When the electromagnetic coil is de-energized, spring pressure returns the movable contact to the normally closed position. The resistor or diode is con-

nected in parallel with the electromagnetic coil in the relay, and helps to dissipate voltage spikes that are produced when the coil is de-energized.

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER RELAY

(1) Stop the engine. Connect the negative lead of a 0-15 volt range voltmeter to a known good vehicle electrical ground.

(2) Reconnect rear window grid connections if disconnected for the Fuse and Electrical Short Test. Start the engine check the voltages present at the rear window defogger relay and rear window defogger grid (Fig. 3). Refer to the Rear Window Defogger Relay Test table for diagnosis.

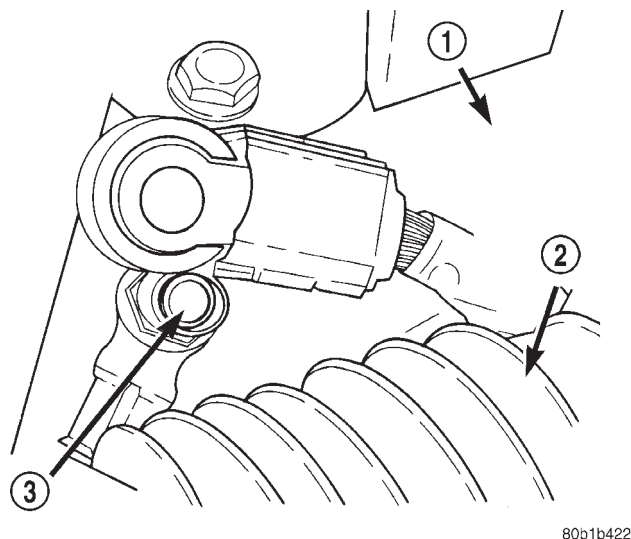
REAR WINDOW DEFOGGER RELAY TEST

POTENTIAL PROBLEM	SYSTEM ON OR OFF WITH ENGINE RUNNING	VOLTAGE AT REAR WINDOW DEFOGGER RELAY POINT TO GOOD VEHICLE GROUND				VOLTAGE AT REAR WINDOW DEFOGGER GRID TO GOOD VEHICLE GROUND	
		1	2	3	4	A	B
NO PROBLEM. VOLTAGES AS EXPECTED WITH THE SYSTEM OFF.	OFF	MORE THAN 11	MORE THAN 11	0	MORE THAN 11	0	0
NO PROBLEM. VOLTAGES AS EXPECTED WITH THE SYSTEM ON.	ON	MORE THAN 11	MORE THAN 11	MORE THAN 11	LESS THAN 1.0	MORE THAN 11	LESS THAN 1.0
RELAY CONTACTS NOT CLOSING. REPLACE RELAY.	ON	MORE THAN 11	MORE THAN 11	0	LESS THAN 1.0	0	0
WIRING OPEN BETWEEN BODY CONTROL MODULE AND REAR WINDOW DEFOGGER RELAY, OR, DEFECTIVE BODY CONTROL MODULE.	ON	MORE THAN 11	MORE THAN 11	0	MORE THAN 11	0	0
POOR CONNECTION BETWEEN PIN 3 OF RELAY AND POSITIVE CONNECTION ON REAR WINDOW DEFOGGER GRID CIRCUIT.	ON	MORE THAN 11	MORE THAN 11	MORE THAN 11	LESS THAN 1.0	0	0
POOR CONNECTION TO GROUND ON NEGATIVE SIDE OF REAR WINDOW DEFOGGER GRID.	ON	MORE THAN 11	MORE THAN 11	MORE THAN 11	LESS THAN 1.0	MORE THAN 11	MORE THAN 11
POOR WIRING CONNECTION BETWEEN PINS 1 TO 2 OF THE REAR WINDOW DEFOGGER RELAY.	ON	MORE THAN 11	0	0	0	0	0
OPEN FUSE OR OPEN WIRING CONNECTION TO PIN 1 OF REAR WINDOW DEFOGGER RELAY.	ON	0	0	0	0	0	0
RELAY CONTACTS SHORTED. REPLACE RELAY. REAR WINDOW DEFOGGER WILL NOT TURN OFF.	OFF	MORE THAN 11	MORE THAN 11	MORE THAN 11	MORE THAN 11	MORE THAN 11	0

REAR WINDOW DEFOGGER RELAY (Continued)

REMOVAL

(1) Disconnect the battery negative remote cable from the remote ground post (Fig. 6).



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Fig. 6 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

(2) Open the trunk. Remove the carpeting fasteners from the right rear panel and pull the trunk carpeting away.

(3) Remove the relay fastener screw and unplug the relay.

(4) Remove the relay from vehicle.

INSTALLATION

(1) Plug the relay into the wire harness connector.
 (2) Install the relay fastener screw.
 (3) Place the carpet back into position and install the fasteners.

(4) Connect the negative battery cable to the remote ground post.

(5) Test the rear window defogger system for proper operation.

REAR WINDOW DEFOGGER SWITCH

DESCRIPTION

The rear window defogger switch is integral to the a/c heater control, which is located in the instrument panel center bezel.

The rear window defogger switch and the rear window defogger switch LED indicator cannot be repaired and, if faulty or damaged, the entire a/c heater control

must be replaced. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - REMOVAL)

OPERATION

On Manual Temperature Control systems when the rear window defogger switch push button is depressed, it provides a hard wired signal by momentarily closing the rear window defogger switch sense circuit which is monitored by the BCM. On Automatic Temperature Control (ATC) systems, when the defogger switch is depressed, the ATC head sends a switch status message to the BCM over the Programmable Communications Interface (PCI) data bus network. A Light Emitting Diode (LED) in the push button for the rear window defogger switch illuminates to indicate when the rear window defogger system is turned on. Each time the BCM rear window defogger timer and logic circuitry sees another request, it toggles a control output to the rear window defogger relay. Energizing the rear window defogger relay provides electrical current to the rear window defogger grid and to the LED indicator in the switch, which lights to indicate when the defogger system is turned on. A dedicated fuse in the junction block protects the rear window defogger relay output circuit to the LED indicator.

DIAGNOSIS AND TESTING - REAR WINDOW DEFOGGER SWITCH

For instructions on how to use the DRB III® scan tool or the a/c heater control self-diagnostics to test the control, (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - SELF DIAGNOSTICS). The problem is not with the a/c heater control if no trouble codes are found. The next step should be to check the rest of the system after the MTC or ATC head is checked.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - REMOVAL)

HEATED MIRRORS

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HEATED MIRRORS

DESCRIPTION

Electrically heated outside rear view mirrors are optional equipment on this model. Heated mirrors are available with Memory Mirrors and Rear Window Defogger only. These mirrors feature an electric heating grid located behind the mirror glass of each power operated outside rear view mirror. These heating grids consist of a single resistor wire routed in a grid-like pattern and captured between two thin sheets of plastic. When electrical current is passed through the resistor wire, it produces enough heat energy to clear the outside mirror glass of ice, snow or fog. Battery current is directed to the outside mirror heating grid only when the rear window defogger switch is in the On position.

If the outside mirror heating grids and the rear window heating grid are all inoperative, (Refer to 8 - ELECTRICAL/HEATED GLASS - DIAGNOSIS AND TESTING - WINDOW DEFOGGER). If the outside mirror heating grids are inoperative, but the rear window heating grid is operating as designed, (Refer to 8 - ELECTRICAL/HEATED MIRRORS - DIAGNOSIS AND TESTING) for diagnosis of the outside mirror heating grids.

The heating grid behind each outside mirror glass cannot be repaired and, if faulty or damaged, the entire power mirror unit must be replaced. Refer to Power Mirrors for the procedures.

OPERATION

The heated mirror is controlled by the rear window defogger switch. The only time that the heated mirror is on is when the rear window defogger is on. The mirror should become warm to the touch.

DIAGNOSIS AND TESTING - HEATED MIRRORS

(1) Check the heated mirror fuse and repair as necessary. This fuse is located in line with the Rear Window Defogger Relay under the right rear panel carpeting in the trunk.

(2) Using an ohmmeter, check Pin 1 of the mirror motor harness connector for continuity to ground. If OK, go to Step 3. If not OK, repair as necessary. Refer to the appropriate wiring information for proper Pin location.

(3) Activate the rear window defogger switch, use a voltmeter and check Pin 3 for battery voltage.

(a) If OK, go to Step 4. If not OK, go to step b.

(b) Check rear window defogger switch. (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER SWITCH - DIAGNOSIS AND TESTING) If OK, go to step c. If not OK, repair as necessary.

(c) If no voltage repair wire as necessary. Refer to the appropriate wiring information.

(4) Remove mirror glass and check wires. If wires are OK, replace mirror glass. If not OK, repair as necessary or replace mirror.

HEATED SEAT SYSTEM

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HEATED SEAT SYSTEM

DESCRIPTION

Individually controlled driver and passenger side electrically heated front seats are available factory-installed optional equipment on this model. The heated seat system allows both the driver and the front seat passenger the option to select one of two seat heating ranges, Low or High, or to turn the individual seat heaters Off using the heated seat switches located in the outboard sides of the seat cushion side shields. The heated seat switch circuit operates on ignition switched battery current supplied through a fuse in the junction block, only when the ignition switch is in the On position.

This group covers the following components of the heated seat system:

- Heated seat elements and sensors
- Heated seat module (or memory heated seat module)
- Heated seat switches.

The heated seat system also relies upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition

of many new feature capabilities. For diagnosis of these electronic modules or of the PCI data bus network, the use of a DRB® scan tool and the proper Diagnostic Procedures manual are recommended.

The electronic modules that may affect heated seat system operation are as follows:

- **Body Control Module (BCM)** - Refer to **Body Control Module** in Electronic Control Modules for more information.

- **Heated Seat Module (HSM)** - Refer to **Heated Seat Module** in Electronic Control Modules for more information.

- **Memory Heated Seat Module (MHSM)** - If the vehicle is equipped with the Memory System, refer to **Memory Seat Module** in Electronic Control Modules for more information.

Refer to **Power Seats Premium I/III** in the Contents of Wiring Diagrams for complete circuit diagrams. Following are general descriptions of the major components in the heated seat system.

OPERATION

The heated seat system will only operate when the ignition switch is in the On position, and the surface temperature at the front seat heating element sensors is below the designed temperature set points of the system. The heated seat system will not operate in ambient temperatures greater than about 41° C (105° F). The front seat heating elements and sensors are hard wired to the Heated Seat Module (HSM) or the Memory Heated Seat Module (MHSM).

HEATED SEAT SYSTEM (Continued)

The heated seat switches are hard wired to the Body Control Module (BCM). The BCM monitors the heated seat switch inputs, then sends heated seat switch status messages to the HSM or MHSM over the Programmable Communications Interface (PCI) data bus. The HSM or MHSM contains the control logic for the heated seat system. The HSM or MHSM responds to the heated seat switch status messages, ignition switch status messages, and the front seat heating element sensor inputs by controlling the output to the front seat heating elements through integral solid-state relays.

When a seat heater is turned on, the sensor located on the seat cushion electric heater element provides the HSM or MHSM with an input indicating the surface temperature of the seat cushion. If the surface temperature input is below the temperature set point for the selected Low or High heated seat switch position, the HSM or MHSM energizes the integral solid-state relay, which supplies battery current to the heating elements in the seat cushion and back. When the sensor input indicates the correct temperature set point has been achieved, the HSM or MHSM de-energizes the solid-state relay. The HSM or MHSM will continue to cycle the solid-state relay as needed to maintain the temperature set point.

The HSM or MHSM and the seat heater elements operate on non-switched battery current supplied through the power seat circuit breaker in the junction block. However, the HSM or MHSM will automatically turn off the heating elements if it detects an open in the sensor circuit, a short in the heating element circuit causing an excessive current draw, or when the ignition switch is turned to the Off position.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the heated seat system.

DIAGNOSIS AND TESTING - HEATED SEAT SYSTEM

Following are tests that will help to diagnose the components and circuits that are hard wired inputs or outputs of the heated seat system. However, these tests may not prove conclusive in the diagnosis of this system. In order to obtain conclusive testing of the heated seat system, the Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the heated seat system components must be checked.

The most reliable, efficient, and accurate means to diagnose the heated seat system requires the use of a DRB® scan tool and the proper Diagnostic Procedures manual. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that

all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the Heated Seat Module (HSM) or Memory Heated Seat Module (MHSM) is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its heated seat system functions.

For complete circuit diagrams, refer to **Wiring**.

NOTE: DO NOT ATTEMPT TO SWAP MEMORY OR NON-MEMORY HEATED SEAT MODULES FROM ONE VEHICLE TO ANOTHER. MOST OF THESE MODULES ARE VEHICLE FEATURE SPECIFIC AND THEREFORE NOT INTERCHANGEABLE. ALWAYS USE THE CORRECT PART NUMBERED MODULE WHEN DIAGNOSING OR REPLACING A MODULE.

WARNING: REFER TO RESTRAINTS BEFORE ATTEMPTING ANY SEAT, STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

PRELIMINARY TEST

Before testing the individual components in the heated seat system, check the following:

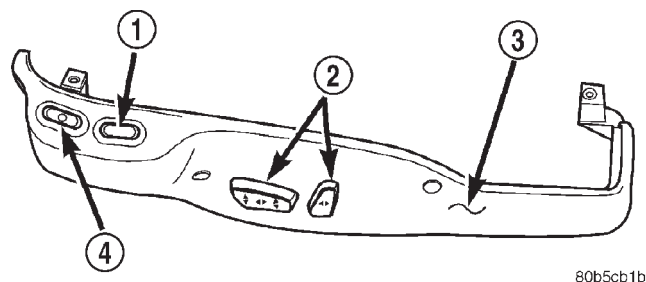
- If the heated seat switch LED indicators do not light with the ignition switch in the On position and the heated seat switch in the Low or High position, check the fused ignition switch output (run) fuse in the junction block. If OK, refer to **Heated Seat Switch Diagnosis and Testing** in this group. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.
- If the heated seat switch LED indicators light, but the heating elements do not heat, check the power seat circuit breaker in the junction block. If OK, refer to **Heated Seat Element Diagnosis and Testing** in this group. If not OK, replace the faulty power seat circuit breaker.

DRIVER HEATED SEAT SWITCH

DESCRIPTION

The heated seat switches are located on the out-board cushion side shield of the driver and passenger seats (Fig. 1) (Fig. 2). The two, three-position rocker type switches provide a resistor multiplexed signal to the Body Control Module (BCM) through separate hard wired circuits. Each switch has an Off, Low and High setting. Each switch contains two light emitting

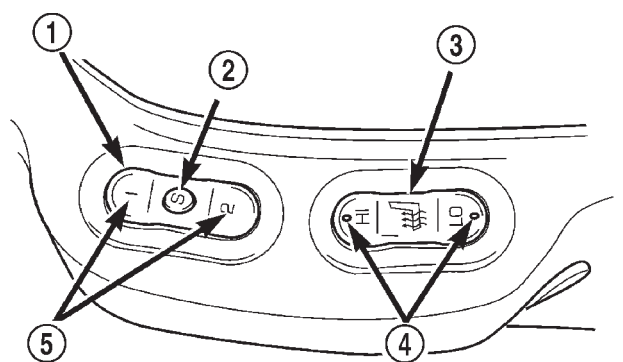
DRIVER HEATED SEAT SWITCH (Continued)



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Fig. 1 Memory and Heated Seat Switch Location

- 1 - HEATED SEAT SWITCH
- 2 - POWER SEAT SWITCH
- 3 - SEAT CUSHION SIDE SHIELD
- 4 - MEMORY SELECTOR SWITCH



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Fig. 2 Memory and Heated Seat Switches

- 1 - MEMORY SELECTOR SWITCH
- 2 - DRIVER POSITION SET
- 3 - HEATED SEAT SWITCH
- 4 - LED'S
- 5 - DRIVER POSITION

diodes (LED), one for each High and Low setting to let the occupant know that the seat heater system is on.

The heated seat switches and their LED's cannot be repaired. If either switch is faulty or damaged the entire switch must be replaced.

OPERATION

There are three positions that can be selected with each of the heated seat switches: Off, Low, and High. When the front of the switch rocker is fully depressed, the High position is selected and the high position LED indicator illuminates. When the rear of the switch rocker is fully depressed, the Low position is selected and the low position LED indicator illuminates. When the switch rocker is moved to its neutral position, or middle, Off is selected and both LED indicators are extinguished.

Both switches provide separate resistor multiplexed hard wire inputs to the BCM to indicate the selected switch position. The BCM monitors the

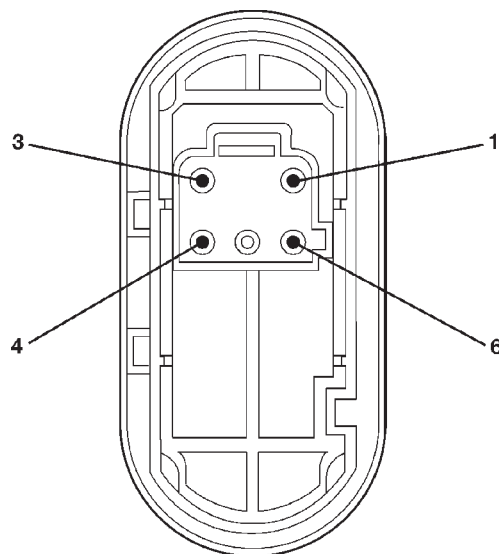
switch inputs and sends heated seat switch status messages to the Heated Seat Module (HSM) or the Memory Heated Seat Module (MHSM) over the Programmable Communications Interface (PCI) data bus. The HSM or MHSM responds to the heated seat switch status messages by controlling the output to the seat heater elements of the selected seat. The Low heat position set point is about 36° C (97° F), and the High heat position set point is about 41° C (105° F).

DIAGNOSIS AND TESTING - DRIVER HEATED SEAT SWITCH

For circuit description and diagrams, refer to Wiring Diagrams.

Inspect the Heated Seat Switches for apparent damage or sticking/binding and replace as required. Refer to Heated Seat Switch Removal and Installation.

Inspect the continuity between pin 4 and pin 6 of the switch. Measure the resistance between the two pins. Refer to (Fig. 3) and the Heated Seat Switch Pin Call-Out table. If the readings do not correspond to those in the Heated Seat Switch Continuity table, replace the heated seat switch.



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Fig. 3 Heated Seat Switch (Rear View)**HEATED SEAT SWITCH PIN CALL-OUT**

PIN	FUNCTION
1	LO LED
2	OPEN
3	GROUND
4	IGNITION FEED
5	HI LED
6	REQUEST LINE

DRIVER HEATED SEAT SWITCH (Continued)

HEATED SEAT SWITCH CONTINUITY

CONTINUITY BETWEEN	SWITCH POSITION	READING
PIN 4 AND 6	OFF	2200 OHMS
PIN 4 AND 6	LO	415 OHMS
PIN 4 AND 6	HI	33 OHMS

REMOVAL

(1) Disconnect and isolate the negative battery cable remote terminal from the remote battery post (Fig. 4).

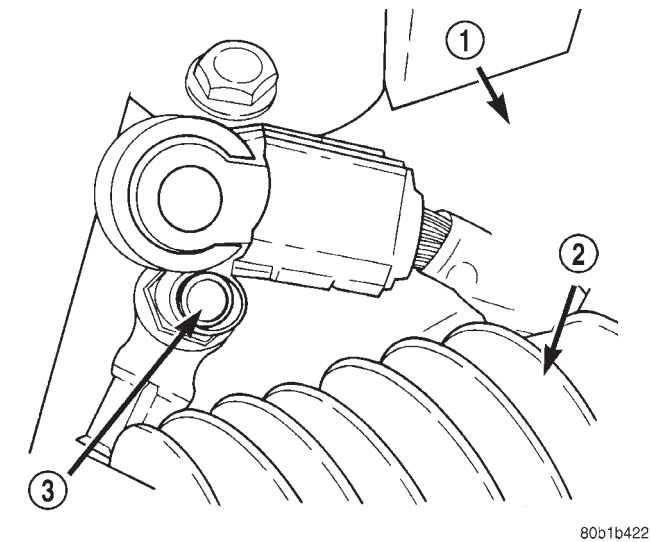


Fig. 4 Negative Battery Cable Remote Terminal

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

(2) Remove the appropriate seat cushion side shield (Fig. 5). Refer to the Body section for the procedure.

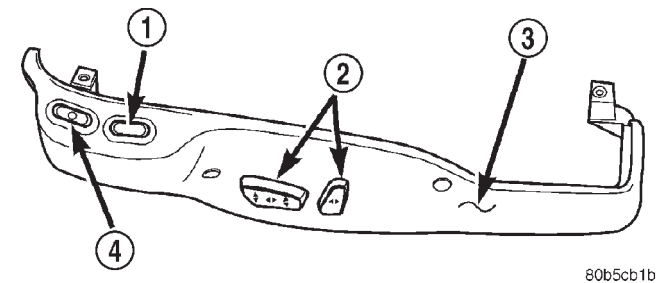


Fig. 5 Memory and Heated Seat Switch Location

- 1 - HEATED SEAT SWITCH
- 2 - POWER SEAT SWITCH
- 3 - SEAT CUSHION SIDE SHIELD
- 4 - MEMORY SELECTOR SWITCH

(3) Working from the underside of the switch, gently rock the switch back and forth out of its mounting location.

INSTALLATION

- (1) Gently rock the switch back and forth in to its mounting location.
- (2) Install the appropriate seat cushion side shield. Refer to Body for the procedure.
- (3) Connect the remote negative battery cable.

PASSENGER HEATED SEAT SWITCH

DESCRIPTION

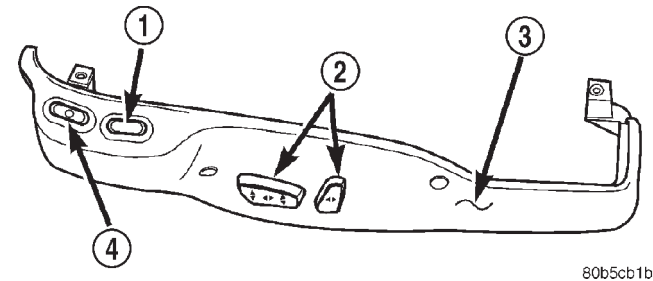


Fig. 6 Memory and Heated Seat Switch Location

- 1 - HEATED SEAT SWITCH
- 2 - POWER SEAT SWITCH
- 3 - SEAT CUSHION SIDE SHIELD
- 4 - MEMORY SELECTOR SWITCH

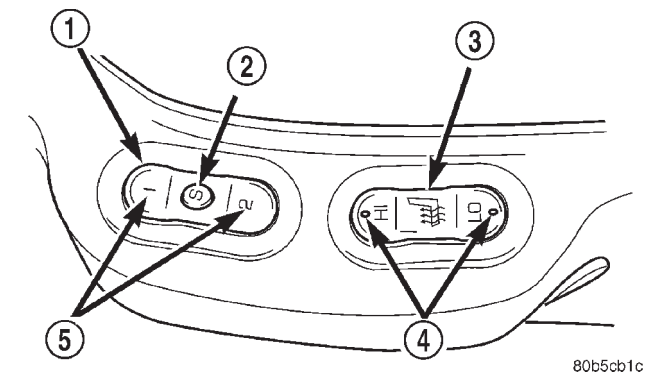


Fig. 7 Memory and Heated Seat Switches

- 1 - MEMORY SELECTOR SWITCH
- 2 - DRIVER POSITION SET
- 3 - HEATED SEAT SWITCH
- 4 - LED'S
- 5 - DRIVER POSITION

PASSENGER HEATED SEAT SWITCH (Continued)

The heated seat switches are located on the out-board cushion side shield of the driver and passenger seats (Fig. 6) (Fig. 7). The two, three-position rocker type switches provide a resistor multiplexed signal to the Body Control Module (BCM) through separate hard wired circuits. Each switch has an Off, Low and High setting. Each switch contains two light emitting diodes (LED), one for each High and Low setting to let the occupant know that the seat heater system is on.

The heated seat switches and their LED's cannot be repaired. If either switch is faulty or damaged the entire switch must be replaced.

OPERATION

There are three positions that can be selected with each of the heated seat switches: Off, Low, and High. When the front of the switch rocker is fully depressed, the High position is selected and the high position LED indicator illuminates. When the rear of the switch rocker is fully depressed, the Low position is selected and the low position LED indicator illuminates. When the switch rocker is moved to its neutral position, or middle, Off is selected and both LED indicators are extinguished.

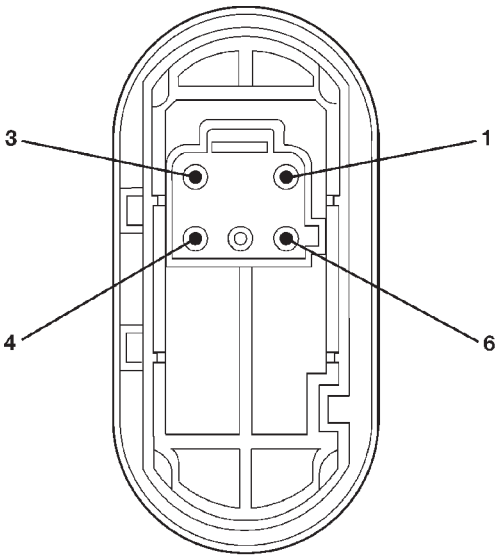
Both switches provide separate resistor multiplexed hard wire inputs to the BCM to indicate the selected switch position. The BCM monitors the switch inputs and sends heated seat switch status messages to the Heated Seat Module (HSM) or the Memory Heated Seat Module (MHSM) over the Programmable Communications Interface (PCI) data bus. The HSM or MHSM responds to the heated seat switch status messages by controlling the output to the seat heater elements of the selected seat. The Low heat position set point is about 36° C (97° F), and the High heat position set point is about 41° C (105° F).

DIAGNOSIS AND TESTING - PASSENGER HEATED SEAT SWITCH

For circuit description and diagrams, refer to Wiring Diagrams.

Inspect the Heated Seat Switches for apparent damage or sticking/binding and replace as required. Refer to Heated Seat Switch Removal and Installation.

Inspect the continuity between pin 4 and pin 6 of the switch. Measure the resistance between the two pins. Refer to (Fig. 8)and the Heated Seat Switch Pin Call-Out table. If the readings do not correspond to those in the Heated Seat Switch Continuity table, replace the heated seat switch.



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Fig. 8 Heated Seat Switch (Rear View)
HEATED SEAT SWITCH PIN CALL-OUT

PIN	FUNCTION
1	LO LED
2	OPEN
3	GROUND
4	IGNITION FEED
5	HI LED
6	REQUEST LINE

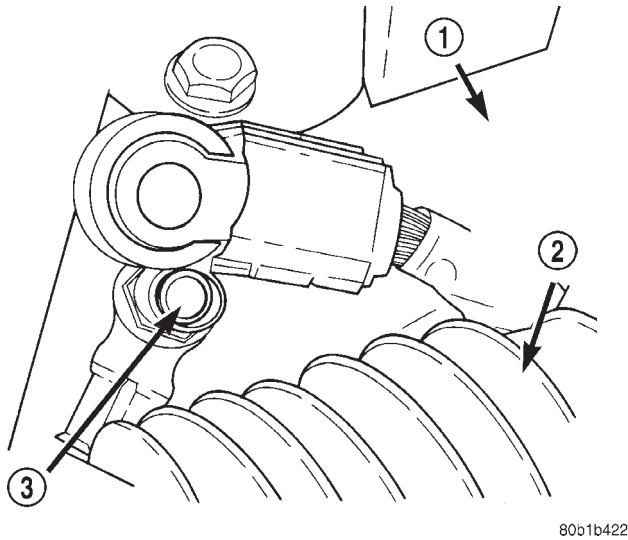
HEATED SEAT SWITCH CONTINUITY

CONTINUITY BETWEEN	SWITCH POSITION	READING
PIN 4 AND 6	OFF	2200 OHMS
PIN 4 AND 6	LO	415 OHMS
PIN 4 AND 6	HI	33 OHMS

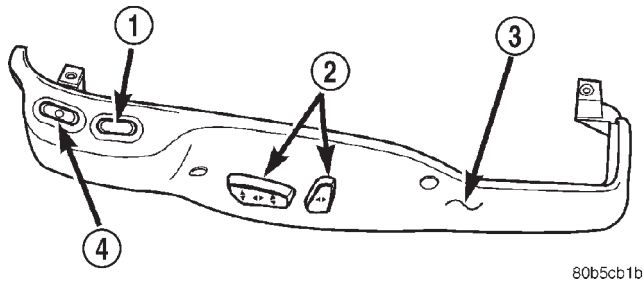
REMOVAL

- (1) Disconnect and isolate the negative battery cable remote terminal from the remote battery post (Fig. 9).
- (2) Remove the appropriate seat cushion side shield (Fig. 10). Refer to the Body section for the procedure.
- (3) Working from the underside of the switch, gently rock the switch back and forth out of its mounting location.

PASSENGER HEATED SEAT SWITCH (Continued)

**Fig. 9 Negative Battery Cable Remote Terminal**

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

**Fig. 10 Memory and Heated Seat Switch Location**

- 1 - HEATED SEAT SWITCH
- 2 - POWER SEAT SWITCH
- 3 - SEAT CUSHION SIDE SHIELD
- 4 - MEMORY SELECTOR SWITCH

INSTALLATION

- (1) Gently rock the switch back and forth in to its mounting location.
- (2) Install the appropriate seat cushion side shield. Refer to Body for the procedure.
- (3) Connect the remote negative battery cable.

HEATED SEAT ELEMENT**DESCRIPTION**

The heated seat system includes four seat heating elements two in each front seat, one for the seat cushion and the other for the seat back. All models use two resistor wire heating elements for each seat that are connected in series with the Memory Heated Seat/Mirror Module (MHSMM).

The seat heating elements are sewn into the seat cushion cover trim and seat back cover trim units. The heated seat elements and the temperature sensor cannot be adjusted or repaired and, if faulty or damaged, the seat element assembly must be replaced.

OPERATION

The heated seat elements resist the flow of electrical current. When battery current is passed through the elements, the energy lost by the resistance of the elements to the current flow is released in the form of heat. The temperature sensor is a NTC thermistor. When the temperature of the seat cushion cover rises, the resistance of the sensor decreases. The MHSMM supplies a five-volt current to one side of each sensor, and monitors the voltage drop through the sensor on a return circuit. The MHSMM uses this temperature sensor input to monitor the temperature of the seat, and regulates the current flow to the seat heating elements accordingly.

DIAGNOSIS AND TESTING - HEATED SEAT ELEMENTS

The wire harness connectors for the seat cushion and seat back heating elements are located under the seat, near the rear edge of the seat cushion frame.

NOTE: WHEN CHECKING HEATED SEAT ELEMENTS FOR CONTINUITY, BE CERTAIN TO MOVE THE HEATING ELEMENT BEING CHECKED. MOVING THE ELEMENT, SUCH AS SITTING IN THE SEAT WILL ELIMINATE THE POSSIBILITY OF AN INTERMITTENT OPEN IN THE ELEMENT WHICH WOULD ONLY BE EVIDENT IF THE ELEMENT WAS MOVED IN A CERTAIN DIRECTION. FAILURE TO CHECK THE ELEMENT IN VARIOUS POSITIONS COULD RESULT IN AN INCOMPLETE TEST.

SEAT CUSHION

- (1) Unplug the 4-way heated seat cushion wire harness connector.
- (2) Check the continuity between the two heated seat driver circuit cavities of the seat cushion cover half of the heated seat cushion wire harness connector. If there is continuity, go to Step 3, otherwise replace the faulty heated seat element.
- (3) Check the continuity between one of the heated seat driver circuit cavities of the seat cushion cover half of the heated seat cushion wire harness connector and the seat cushion frame. Continuity should NOT be present, If OK go to the Seat Back test below, If NOT OK replace the faulty heated seat element.

HEATED SEAT ELEMENT (Continued)

SEAT BACK

(1) Unplug the 2-way heated seat back wire harness connector.

(2) Check the continuity between the heated seat driver circuit cavity and the ground cavity of the seat back cover half of the heated seat cushion wire harness connector. If there is continuity go to Step 3, otherwise replace the faulty heated seat element.

(3) Check the continuity between the heated seat driver circuit cavity of the seat back cover half of the heated seat cushion wire harness connector and the seat back frame. Continuity should NOT be present. If OK test the heated seat sensor as described in this section, otherwise replace the faulty heated seat element.

REMOVAL

Do not remove the OEM heating element from the seat or seat back cushion/trim covers. The original element is permanently attached and cannot be removed without permanent damage. The service replacement heating element is designed to be applied directly on the seat cushion.

(1) Disconnect and isolate the negative battery cable.

(2) Remove the appropriate seat cushion or seat back trim cover. Refer to the Body section of the service manual for the procedures.

(3) Disconnect the inoperative heated seat cushion or seat back element electrical connectors.

(4) Locate the wires leading from the inoperative heating element and cut them off flush with the edge of the original heating element.

INSTALLATION

(1) Peel off the adhesive backing on the back of the replacement heating element and stick directly on the foam cushion.

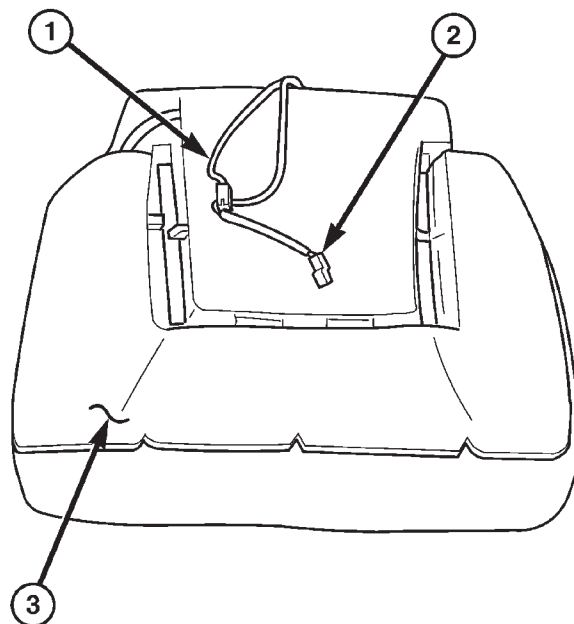
CAUTION: During the installation of the replacement heating element, be careful not to fold or crease the element assembly. Folds or creases will cause premature failure.

(2) Connect the new heating element electrical connectors (Fig. 11).

(3) Connect the negative battery cable.

(4) Verify heated seat system operation.

(5) Install the appropriate seat cushion or seat back trim cover. Make certain the seat wire harness is correctly routed through the seat and seat back. The excess wire between the cushion and back elements should be securely tucked between the rear of the cushion foam and the rear carpet flap of the trim cover.



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Fig. 11 HEATING ELEMENT INSTALLED - TYPICAL

1 - SEAT BACK WIRE HARNESS

2 - HEATED SEAT WIRE HARNESS CONNECTOR

3 - HEATED SEAT CUSHION ELEMENT

HEATED SEAT SENSOR

DESCRIPTION

Two heated seat sensors are used per vehicle, one in each front seat cushion heating element. The heated seat temperature sensor is a Negative Temperature Coefficient (NTC) thermistor.

The heated seat sensors cannot be repaired or adjusted and if found to be faulty, the complete heated seat cushion element must be replaced.

OPERATION

The temperature sensor is a NTC thermistor. When the temperature of the seat cushion cover rises, the resistance of the sensor decreases. The heated seat module supplies a five-volt current to one side of each sensor, and monitors the voltage drop through the sensor on a return circuit. The heated seat module uses this temperature sensor input to monitor the temperature of the seat, and regulates the current flow to the seat heating elements accordingly.

HEATED SEAT SENSOR (Continued)

DIAGNOSIS AND TESTING - HEATED SEAT SENSOR

For complete circuit diagrams, refer to the **WIRING** section of this manual.

(1) Disconnect and isolate the battery negative cable. Disconnect the 4-way heated seat cushion wire harness connector. The power seat wire harness connectors for the seat cushion and seat back heating elements are secured to a bracket located under the rear edge of the seat cushion frame.

(2) Using an ohmmeter, measure the resistance through the heated seat sensor. The sensor resistance should be between 2 and 200 kilohms. If OK, test the memory heated seat mirror module. If NOT OK, replace the faulty heated seat element and sensor assembly.

HORN

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HORN SYSTEM

DESCRIPTION

A dual-note electric horn system is standard factory-installed equipment on this model. The horn circuit consists of a horn switch, horn relay, and horns.

OPERATION

The horn circuit feed is from the fuse to the horn relay in the Junction Block. When the horn switch is depressed, it completes the ground circuit. Then the horn relay coil closes a set of contacts which allows current to flow to the horns. Refer to Horn System Schematic.

DIAGNOSIS AND TESTING - HORN SYSTEM

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT

DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

CAUTION: Continuous sounding of horns will cause horn to fail.

HORN SYSTEM (Continued)

Check fuse 18 in the Junction Block and fuse L in the Power Distribution Center. Refer to Horn System Test table.

HORN SYSTEM TEST

CONDITION	POSSIBLE CAUSE	CORRECTION
HORN SOUNDS CONTINUOUSLY. NOTE: IMMEDIATELY UNPLUG HORN AND RELAY IN THE JUNCTION BLOCK	1. FAULTY HORN RELAY.	1. REFER TO HORN RELAY TEST.
	2. HORN CONTROL CIRCUIT TO RELAY SHORTED TO GROUND.	2. CHECK HORN RELAY TERMINAL 7 IN JUNCTION BLOCK FOR CONTINUITY TO GROUND INDICATES: A. WIRING HARNESS SHORTED TO GROUND. B. FIND THE SHORT AND REPAIR AS NECESSARY.
	3. HORN RELAY CONTROL CIRCUIT X3 SHORTING TO GROUND INSIDE STEERING WHEEL.	3. REMOVE DRIVER AIRBAG MODULE AND CHECK FOR RUBBING, SHORTED OR LOOSE WIRE CONNECTOR AND REPAIR AS NECESSARY.
	4. PINCHED HORN SWITCH WIRE UNDER DRIVER AIRBAG MODULE.	4. REPLACE DRIVER AIRBAG MODULE.
	5. FAULTY HORN SWITCH	5. REPLACE DRIVER AIRBAG MODULE.
HORN SOUND INTERMITTENTLY AS THE STEERING WHEEL IS TURNED.	1. HORN RELAY CONTROL CIRCUIT 3 IS SHORTED TO GROUND INSIDE STEERING WHEEL.	1. REMOVE DRIVER AIRBAG MODULE AND CHECK FOR RUBBING OR LOOSE WIRE/ CONNECTOR, REPAIR AS NECESSARY.
	2. PINCHED HORN SWITCH WIRE UNDER DRIVER AIRBAG MODULE.	2. REPLACE DRIVER AIRBAG MODULE.
	3. FAULTY HORN SWITCH.	3. REPLACE DRIVER AIRBAG MODULE.
HORN DOES NOT SOUND	1. CHECK FUSE 18 IN THE JUNCTION BLOCK.	1. REPLACE FUSE IF BLOWN AS REPAIR AS NECESSARY.
	2. NO VOLTAGE AT HORN RELAY TERMINALS 1 & 2 AND FUSE IS OK.	2. NO VOLTAGE, REPLACE JUNCTION BLOCK OR REPAIR AS NECESSARY.
	3. OPEN CIRCUIT FROM TERMINAL 7 OF THE RELAY TO HORN SWITCH X3 CIRCUIT.	3. REPAIR CIRCUIT AS NECESSARY.
	4. FAULTY OR DAMAGED HORN.	4. VOLTAGE AT HORN WHEN HORN SWITCH IS PRESSED, REPLACE HORN.
	5. FAULTY HORN SWITCH	5. REPLACE DRIVER AIRBAG MODULE.

HORN SYSTEM (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
FUSE BLOWS WHEN HORN IS BLOWN	1. SHORT CIRCUIT IN HORN OR HORN WIRING	1. REMOVE HORN RELAY, CHECK FOR SHORTED HORN OR HORN WIRING. DISCONNECT HORN WIRE HARNESS TO ISOLATE SHORT AND REPAIR AS NECESSARY.
FUSE BLOWS WITHOUT BLOWING HORN	1. SHORT CIRCUIT	1. REMOVE RELAY, INSTALL NEW FUSE, IF FUSE DOES NOT BLOW REPLACE HORN RELAY. IF FUSE BLOWS WITH RELAY REMOVED, CHECK FOR SHORT TO GROUND WITH OHMMETER BETWEEN TERMINALS 1 & 2 AND THE FUSE TERMINAL. REPAIR AS NECESSARY.
NOTE: FOR WIRING REPAIRS REFER TO GROUP 8W, WIRE DIAGRAMS.		

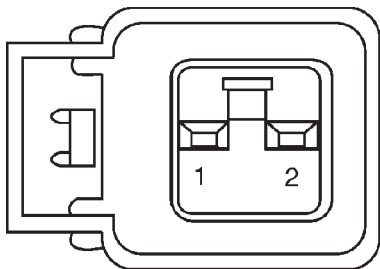
HORN

DIAGNOSIS AND TESTING - HORN

- (1) Disconnect wire connector at each horn.
- (2) Using a voltmeter, connect one lead to body ground and the other lead to the horn relay output pin of the horn connector (Fig. 1).

HORN CONNECTOR PIN CALL-OUT

PIN #	CIRCUIT NAME
1	GROUND
2	HORN RELAY OUTPUT



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Fig. 1 HORN CONNECTOR PIN CALL OUT

The right horn is grounded on the front outboard side of the right frame rail. The left horn is grounded on the left front fender apron.

- (3) When the horn switch is depressed, battery voltage should be present. Repeat for the other horn.

- (4) If no voltage, repair as necessary. If battery voltage is present, go to next step.

- (5) Using an ohmmeter, test the negative terminal of the connector for continuity to ground. Repeat for the other horn.

- (6) If no ground, repair as necessary.

- (7) If wires test OK and horn(s) does not sound, replace horn(s).

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Disconnect wire connector.
- (3) Remove the horn bracket mounting bolt and remove horn.

NOTE: Do not disconnect horn from horn bracket.

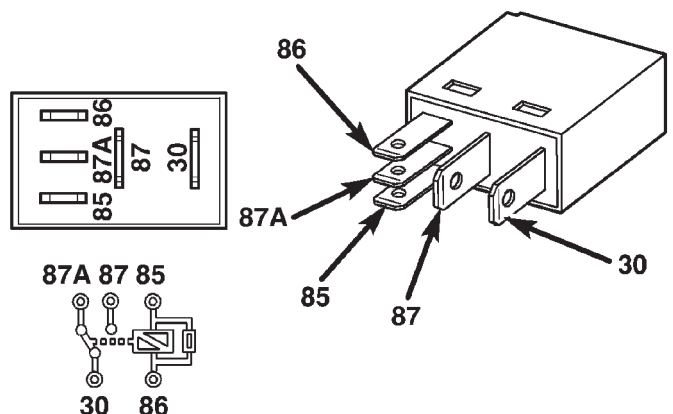
INSTALLATION

- (1) Position both horns and the mounting bracket onto the vehicle as a unit.
- (2) Install and tighten the screw that secures the horn mounting bracket to vehicle. Tighten the screw to 11.3 N·m (100 in. lbs.).
- (3) Connect the wire connector.
- (4) Reconnect the battery negative cable.

HORN RELAY

DIAGNOSIS AND TESTING - HORN RELAY

- (1) Remove horn relay.
- (2) Using ohmmeter, test between relay connector terminals 85 to 86 for 75 ± 8 ohms resistance. If resistance not OK, replace relay (Fig. 2).



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Fig. 2 Horn Relay

- 30 - COMMON FEED
 85 - COIL GROUND
 86 - COIL BATTERY
 87 - NORMALLY OPEN
 87A - NORMALLY CLOSED

- (3) Test for continuity between ground and terminal 85 of horn relay.

(a) When the horn switch is not depressed, no continuity should be present.

(b) Continuity to ground when horn switch is depressed.

(c) If continuity is not correct replace horn switch or wiring as necessary, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

- (4) Using voltmeter, test voltage at:

(a) Terminals 30 and 86 of the horn relay to body ground.

(b) If NO voltage check fuse in the Junction Block (JB).

(c) If incorrect voltage, repair as necessary. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

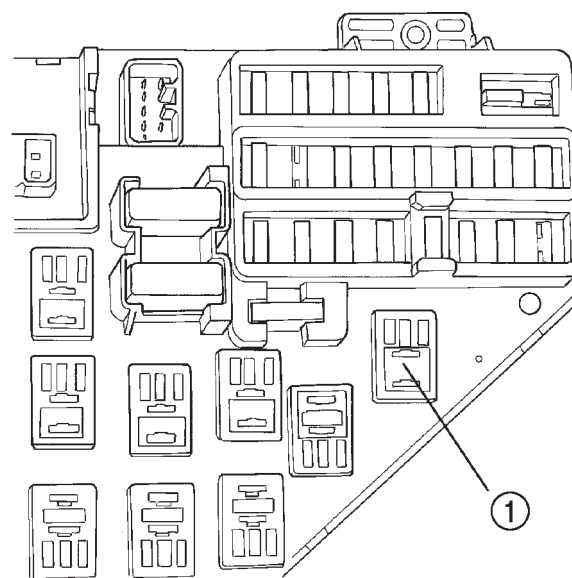
- (5) Insert a jumper wire between terminal 30 and 87 of the Junction Block (JB).

(a) If horn sounds replace relay.

(b) If the horn does not sound, install horn relay and test horn (Refer to 8 - ELECTRICAL/HORN/HORN - DIAGNOSIS AND TESTING).

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Open the driver's door and remove the left instrument panel end cover.
- (3) Remove the horn relay (Fig. 3).



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Fig. 3 Horn Relay Location

1 - HORN RELAY

INSTALLATION

- (1) Insert the horn relay.
- (2) Install the left instrument panel end cover.
- (3) Reconnect the battery negative cable remote terminal.

HORN SWITCH

DIAGNOSIS AND TESTING - HORN SWITCH

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

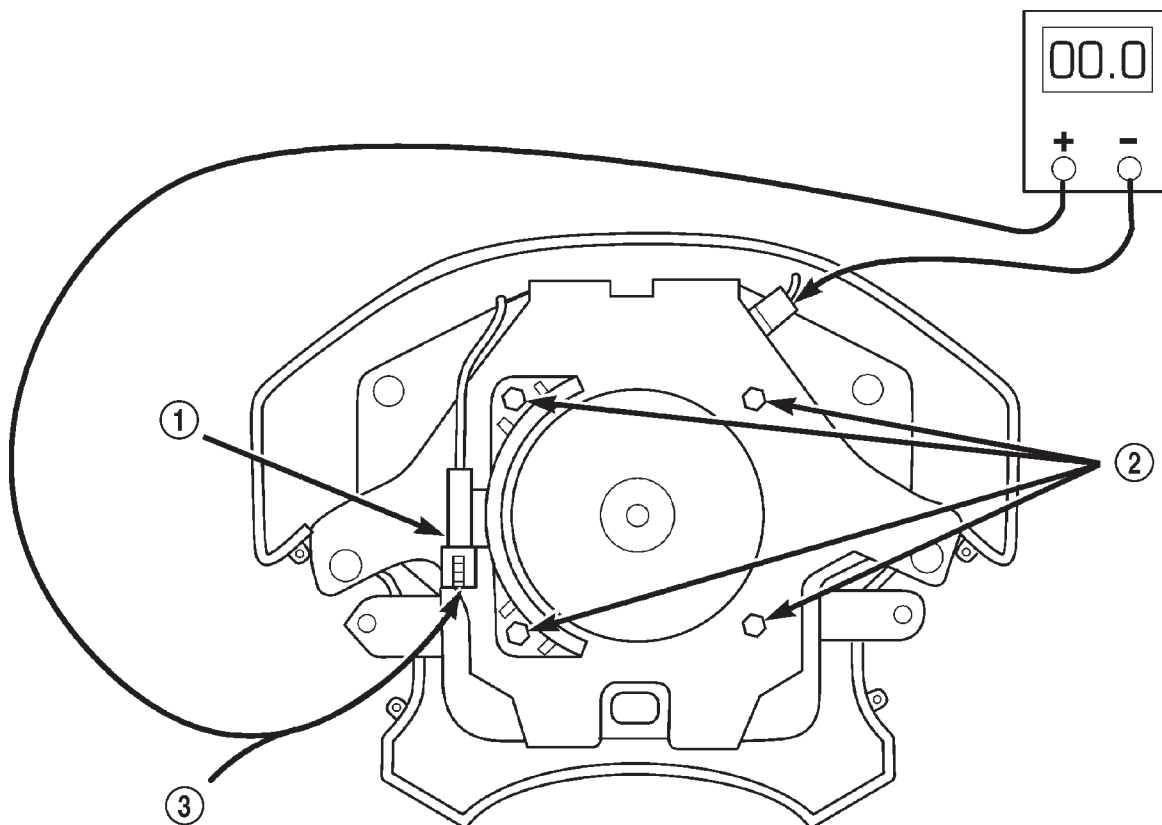
(1) Using ohmmeter, connect one lead to ground wire and the other lead to the positive wire (Fig. 4).

(2) Depress horn switch, continuity should be present. Repeat for other switch. If no continuity, replace switches.

REMOVAL

WARNING: DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, SEAT BELT TENSIONER, SIDE AIRBAG, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The Horn Switch is integral to the Driver Airbag and if defective, the Driver Airbag must be replaced. (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).



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Fig. 4 HORN SWITCH TEST LOCATIONS

1 - HORN SWITCH CONNECTOR
2 - DO NOT REMOVE NUTS

3 - INSIDE CONNECTOR

IGNITION CONTROL

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IGNITION CONTROL

DESCRIPTION - IGNITION SYSTEM

NOTE: All engines use a fixed ignition timing system. Basic ignition timing is not adjustable. All spark advance is determined by the Powertrain Control Module (PCM).

The distributorless ignition system used on these engines is referred to as the Direct Ignition System (DIS). The system's three main components are the coils, crankshaft position sensor, and camshaft position sensor. The coil on plug ignition system utilizes

an ignition coil for every cylinder, it is mounted directly over the each spark plug.

OPERATION - IGNITION SYSTEM

The crankshaft position sensor and camshaft position sensor are hall effect devices. The camshaft position sensor and crankshaft position sensor generate pulses that are inputs to the PCM. The PCM determines engine position from these sensors. The PCM calculates injector sequence and ignition timing from crankshaft & camshaft position. For a description of both sensors, refer to Camshaft Position Sensor and Crankshaft Position Sensor.

SPECIFICATIONS

TORQUE

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
2.7L Camshaft Position Sensor Screw	12	-	105
3.5L Camshaft Position Sensor Screw	12	-	105
Engine Coolant Sensor	28	20	-
2.7L Crankshaft Position Sensor Screw	12	-	105

IGNITION CONTROL (Continued)

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
3.5L Crankshaft Position Sensor Screw	12	-	105
2.7L Ignition Coil	6.2	-	55
3.5L Ignition Coil	6.7	-	60
Knock Sensor	10	-	83
2.7L Map Sensor	2	-	20
3.5L Map Sensor	2	-	17.7
2.7L Spark Plugs	17.6	13	155
3.5L Spark Plugs	28	20	-

SPARK PLUGS

Engine	Spark Plug	Gap	Thread Size
2.7L	RE10PMC5	0.048 TO 0.058 in.	14mm (1 in.) reach
3.5L	ZFR5LP-13G	0.048 TO 0.053 in.	14 mm (3/4 in.) reach

AUTO SHUT DOWN RELAY

DESCRIPTION

The relay is located in the Power Distribution Center (PDC) (Fig. 1). For the location of the relay within the PDC, refer to the PDC cover for location. Check electrical terminals for corrosion and repair as necessary.

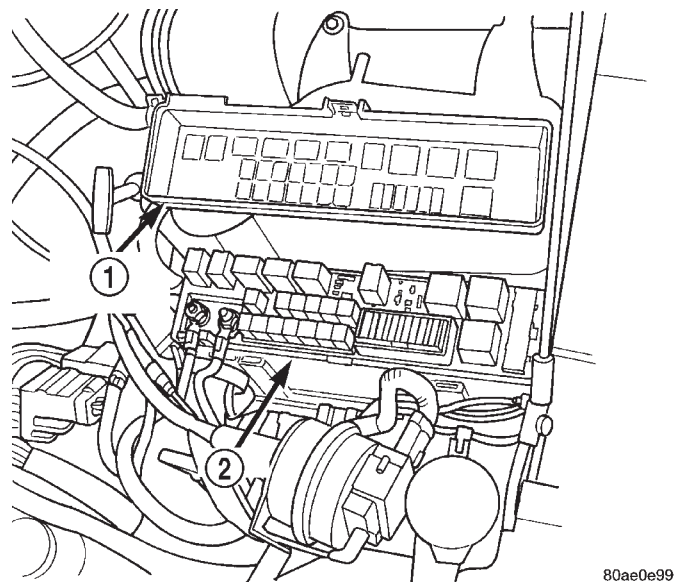


Fig. 1 Power Distribution Center (PDC)

- 1 - PDC COVER
2 - PDC

OPERATION

The ASD sense circuit informs the PCM when the ASD relay energizes. A 12 volt signal at this input indicates to the PCM that the ASD has been activated. This input is used only to sense that the ASD relay is energized.

When energized, the ASD relay supplies battery voltage to the fuel injectors, ignition coils and the heating element in each oxygen sensor.

When energized, the ASD relay provides power to operate the injectors, ignition coil, generator field, O2 sensor heaters (both upstream and downstream), (EGR solenoid and PCV heater if equipped) and also provides a sense circuit to the PCM for diagnostic purposes. If the PCM does not receive 12 volts from this input after grounding the ASD relay, it sets a Diagnostic Trouble Code (DTC). The PCM energizes the ASD any time there is a Crankshaft Position sensor signal that exceeds a predetermined value. The ASD relay can also be energized after the engine has been turned off to perform an O2 sensor heater test, if vehicle is equipped with OBD II diagnostics.

As mentioned earlier, the PCM energizes the ASD relay during an O2 sensor heater test. This test is performed only after the engine has been shut off. The PCM still operates internally to perform several checks, including monitoring the O2 sensor heaters.

CAMSHAFT POSITION SENSOR

DESCRIPTION

The camshaft position sensor is mounted in the front of the head on 2.7L (Fig. 2) or belt cover on the 3.5L (Fig. 3). It is a hall effect device.

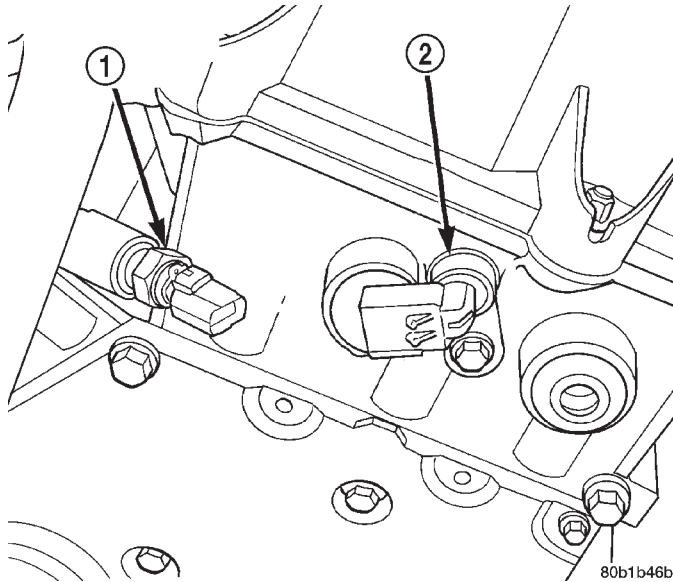


Fig. 2 Camshaft Position Sensor - 2.7L

- 1 - ENGINE COOLANT TEMPERATURE SENSOR
2 - CAM SENSOR

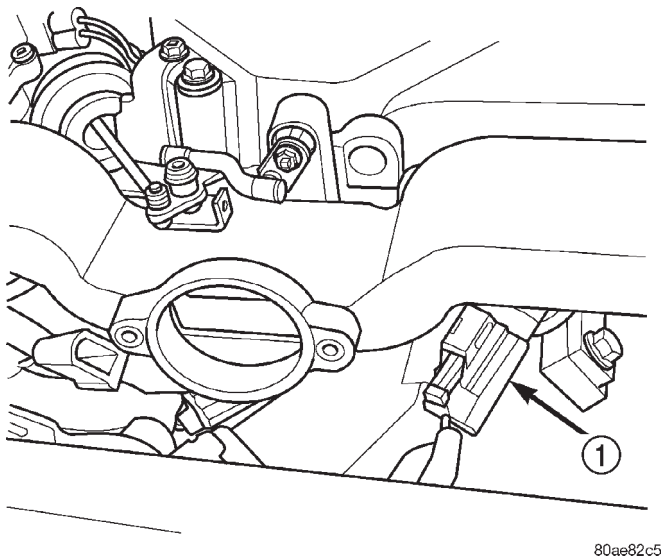


Fig. 3 CAMSHAFT POSITION SENSOR LOCATION 3.5L

- 1 - CAMSHAFT SENSOR

OPERATION

The camshaft position sensor contains a hall effect device that provide cylinder identification to the Powertrain Control Module (PCM) (Fig. 4) or (Fig. 5). The sensor generates pulses as groups of notches on the camshaft sprocket pass underneath it. The PCM keeps track of crankshaft rotation and identifies each cylinder by the pulses generated by the notches on the camshaft sprocket. Crankshaft pulses follow each group of camshaft pulses.

When metal aligns with the sensor, voltage goes low (less than 0.3 volts). When a notch aligns with the sensor, voltage spikes high (5.0 volts). As a group of notches pass under the sensor, the voltage switches from low (metal) to high (notch) then back to low. The number of notches determine the amount of pulses. If available, an oscilloscope or DRBIII® PEP Module can display the square wave patterns of each timing event.

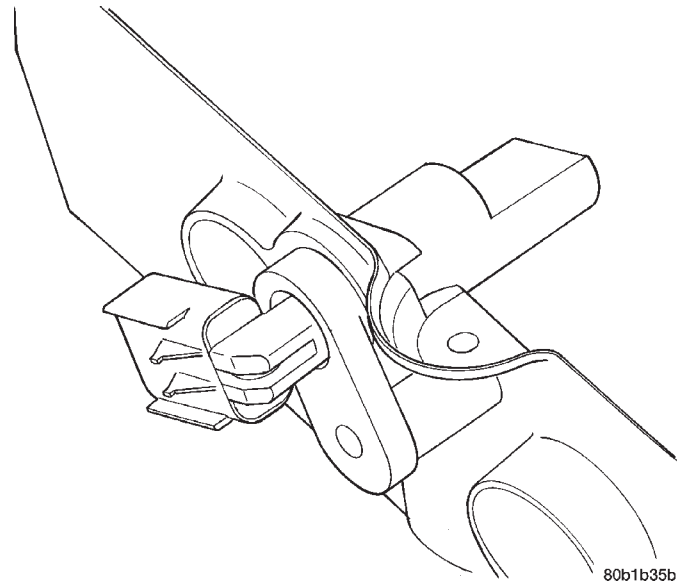


Fig. 4 Camshaft Position Sensor 2.7L

REMOVAL

REMOVAL - 2.7L

The camshaft position sensor is mounted in the front of the head.

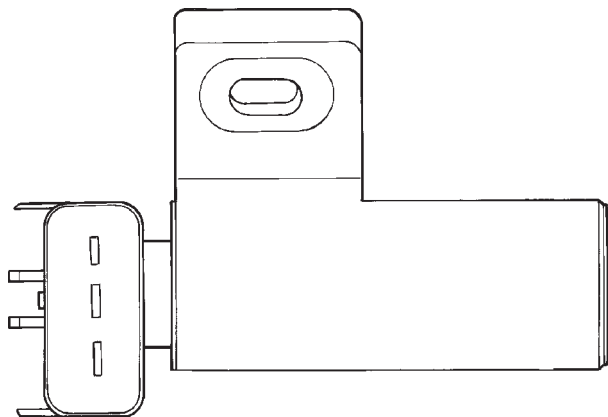
- (1) Disconnect electrical connector from sensor.
- (2) Remove camshaft position sensor screw.
- (3) Without pulling on the connector, pull the sensor out of the chain case cover.

REMOVAL - 3.5L

The camshaft position sensor is installed in the timing belt housing cover above the left camshaft sprocket.

- (1) Disconnect the negative battery cable.

CAMSHAFT POSITION SENSOR (Continued)



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Fig. 5 Camshaft Position Sensor 3.5L

- (2) Loosen the upper intake plenum, refer to the Intake System section.
- (3) Disconnect electrical connector from sensor.
- (4) Remove camshaft position sensor screw.
- (5) Pull sensor up out of the timing belt housing cover.

INSTALLATION

INSTALLATION - 2.7L

The camshaft position sensor is mounted in the front of the head.

- (1) Install sensor in the chain case cover and push sensor in until contact is made with the boss on the head. While holding the sensor in this position, install and tighten the retaining bolt to 12 N·m (105 in. lbs.) torque.

- (2) Attach electrical connector to sensor.

INSTALLATION - 3.5L

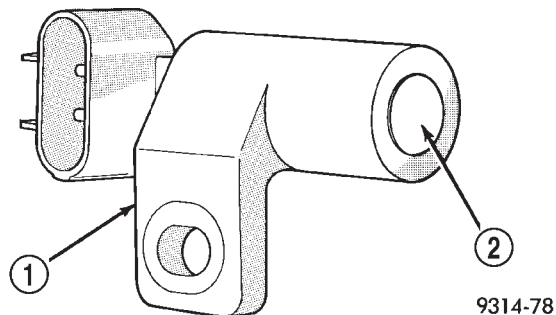
The camshaft position sensor is installed in the timing belt housing cover above the left camshaft sprocket.

If the removed sensor is reinstalled, completely remove the old spacer from the sensor face. Attach a NEW SPACER to the face of the sensor before installation. If installing a new sensor, confirm that the paper spacer is attached to the face (Fig. 6).

- (1) Install sensor in the timing belt housing and push sensor down until contact is made with the camshaft sprocket. While holding the sensor in this position, install and tighten the retaining bolt to 12 N·m (105 in. lbs.) torque.

- (2) Attach electrical connector to sensor.

- (3) Install the upper intake plenum, refer to the Intake System section.



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Fig. 6 Paper Spacer 3.5L

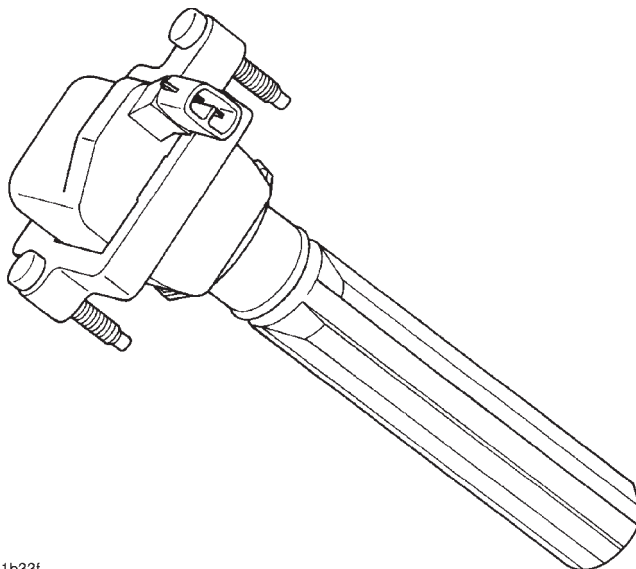
- 1 - CAMSHAFT POSITION SENSOR
- 2 - PAPER SPACER

- (4) Connect the negative battery cable.

IGNITION COIL

DESCRIPTION

The engines are equipped with a coil on plug ignition system (Fig. 7) or (Fig. 8). Each cylinder has a dedicated coil that sits atop each plug. No secondary wires are required and connection from the coil to plug is made with a boot that is attached to the coil. The combination of the coil, boot, and fasteners is known as the ignition coil assembly. The Powertrain Control Module (PCM) determines which coil to charge and fire at the correct time.



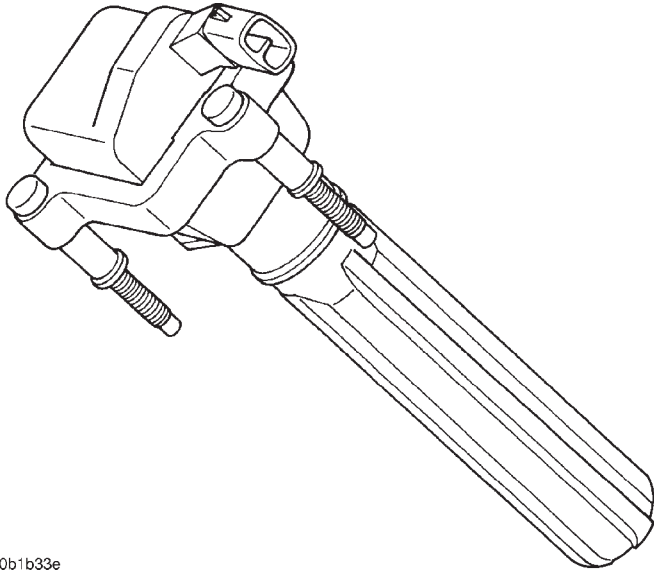
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Fig. 7 Ignition Coil - 2.7L

OPERATION

The Auto Shutdown (ASD) relay provides battery voltage to the ignition coil. The PCM provides a ground contact (circuit) for energizing the coil. When the PCM breaks the contact, the energy in the coil primary transfers to the secondary causing the

IGNITION COIL (Continued)

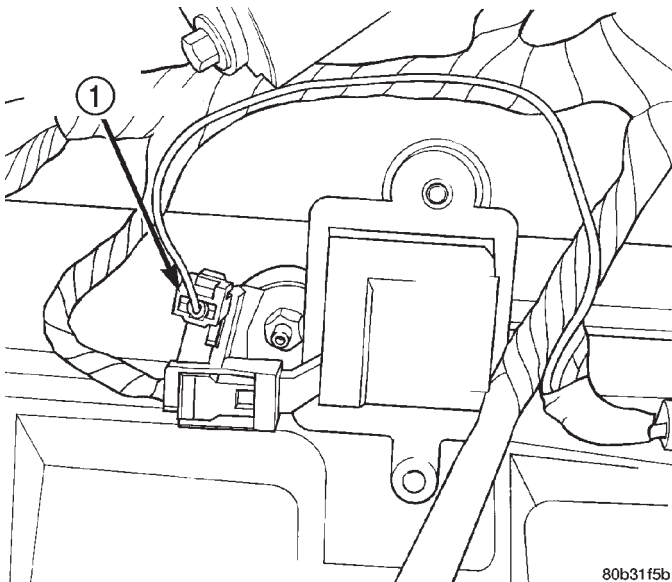


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Fig. 8 Ignition Coil - 3.5L

spark. The PCM will de-energize the ASD relay if it does not receive the crankshaft position sensor and camshaft position sensor inputs. For limp home capability, the engine can run on crankshaft sensor input only. Refer to Auto Shutdown (ASD) Relay—PCM Output, in this section for relay operation.

The coil's low primary resistance (0.4 - 0.6 ohm) allows the PCM to fully charge the coil for each firing. There is a coil capacitor added to each bank of cylinders for radio noise suppression (Fig. 9).



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Fig. 9 COIL CAPACITOR

1 - IGNITION COIL CAPACITOR

REMOVAL

(1) Prior to removing the ignition coils, spray compressed air around the coil area and spark plug.

(2) Remove electrical connector from ignition coil. On 3.5L engines, it is necessary to loosen the screws by alternating back and forth. Do not lose the spacers under the coil when loosening the screws.

(3) Remove 2 fasteners from ignition coil assembly.

(4) Remove ignition coil assembly.

INSTALLATION

(1) Install ignition coil assembly for spark plug.

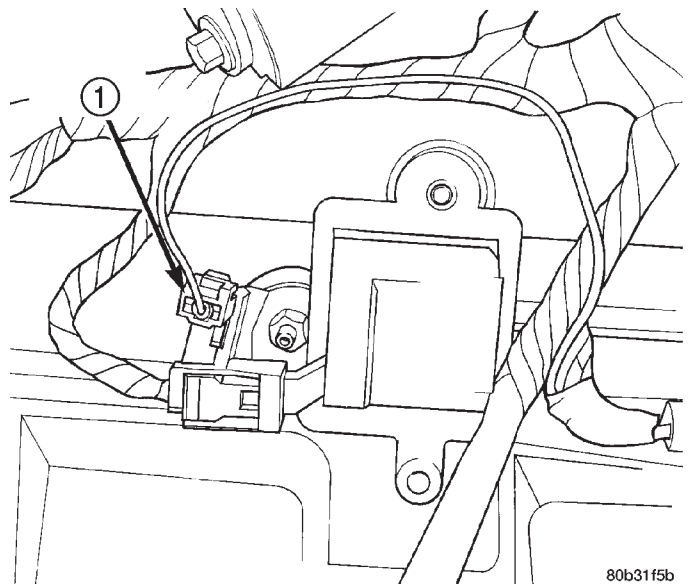
(2) Install coil screws and tighten: 2.7L engine to 6.2 N·m (55 in. lbs.), 3.5L engines to 6.7 N·m (60 in. lbs.).

(3) Connect the electrical connector.

IGNITION COIL CAPACITOR**DESCRIPTION**

The Auto Shutdown (ASD) relay provides battery voltage to the ignition coil. The PCM provides a ground contact (circuit) for energizing the coil. When the PCM breaks the contact, the energy in the coil primary transfers to the secondary causing the spark. The PCM will de-energize the ASD relay if it does not receive the crankshaft position sensor and camshaft position sensor inputs. For limp home capability, the engine can run on crankshaft sensor input only. Refer to Auto Shutdown (ASD) Relay—PCM Output, in this section for relay operation.

The coil's low primary resistance (0.4 - 0.6 ohm) allows the PCM to fully charge the coil for each firing. There is a coil capacitor for radio noise suppression (Fig. 10).



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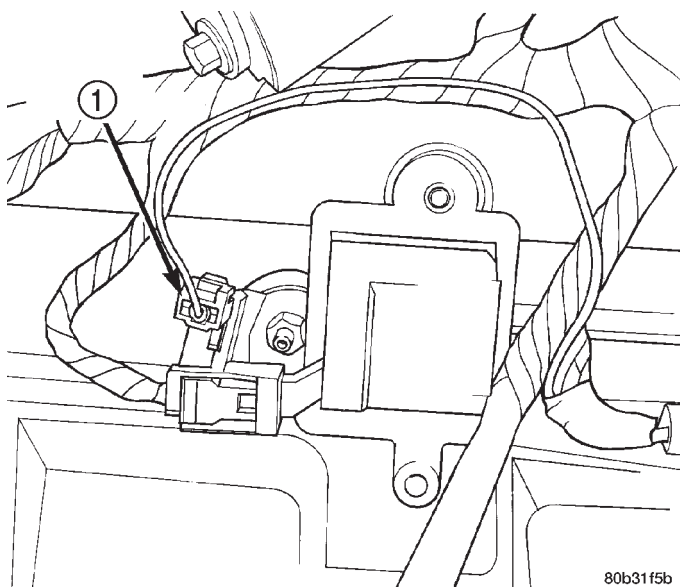
Fig. 10 COIL CAPACITOR

1 - IGNITION COIL CAPACITOR

IGNITION COIL CAPACITOR (Continued)

REMOVAL

- (1) Remove the negative battery cable.
- (2) Disconnect the electrical connector (Fig. 11).
- (3) Remove nut and capacitor.

**Fig. 11 COIL CAPACITOR**

1 - IGNITION COIL CAPACITOR

INSTALLATION

- (1) Install capacitor and tighten nut.
- (2) Attach electrical connector to capacitor.
- (3) Install the negative battery cable.

KNOCK SENSOR

DESCRIPTION

The knock sensor threads into the cylinder block. The knock sensor is designed to detect engine vibration that is caused by detonation.

OPERATION

When the knock sensor detects a knock in one of the cylinders, it sends an input signal to the PCM. In response, the PCM retards ignition timing for all cylinders by a scheduled amount.

Knock sensors contain a piezoelectric material which constantly vibrates and sends an input voltage (signal) to the PCM while the engine operates. As the intensity of the crystal's vibration increases, the knock sensor output voltage also increases.

The voltage signal produced by the knock sensor increases with the amplitude of vibration. The PCM receives as an input the knock sensor voltage signal. If the signal rises above a predetermined level, the PCM will store that value in memory and retard ignition timing to reduce engine knock. If the knock

sensor voltage exceeds a preset value, the PCM retards ignition timing for all cylinders. It is not a selective cylinder retard.

The PCM ignores knock sensor input during engine idle conditions. Once the engine speed exceeds a specified value, knock retard is allowed.

Knock retard uses its own short term and long term memory program.

Long term memory stores previous detonation information in its battery-backed RAM. The maximum authority that long term memory has over timing retard can be calibrated.

Short term memory is allowed to retard timing up to a preset amount under all operating conditions (as long as rpm is above the minimum rpm) except WOT. The PCM, using short term memory, can respond quickly to retard timing when engine knock is detected. Short term memory is lost any time the ignition key is turned off.

NOTE: Over or under tightening affects knock sensor performance, possibly causing improper spark control.

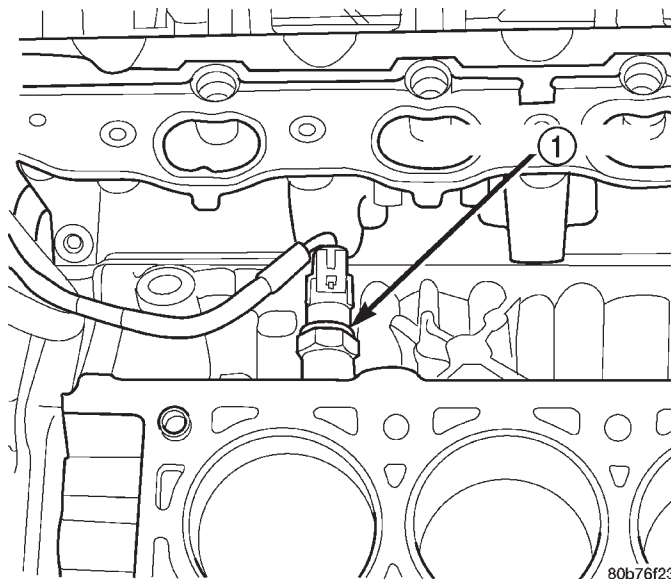
REMOVAL

The sensors screws into the cylinder block, directly below the intake manifold.

(1) Remove intake manifold plenum refer to the Engine section.

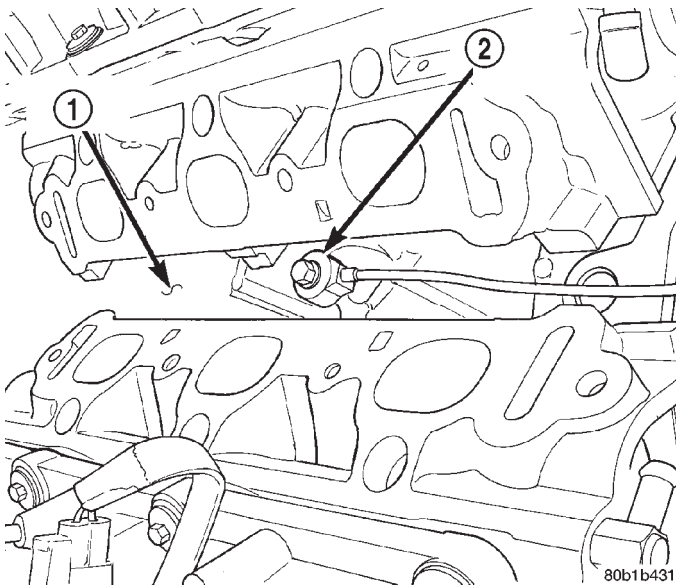
(2) **2.7L** Remove the passenger side cylinder head, refer to the Engine section.

(3) Disconnect electrical connector from knock sensor (Fig. 12) or (Fig. 13).

**Fig. 12 KNOCK SENSOR 2.7 L**

1 - KNOCK SENSOR

KNOCK SENSOR (Continued)

**Fig. 13 KNOCK SENSOR 3.5 L**

- 1 - CYLINDER BLOCK
2 - KNOCK SENSOR

(4) Use a crows foot socket to remove the knock sensors.

INSTALLATION

The sensors screws into the cylinder block, directly below the intake manifold.

(1) Install knock sensor. Tighten knock sensor to 10 N·m (7 ft. lbs.) torque. **Over or under tightening effects knock sensor performance resulting in possible improper spark control.**

(2) **2.7L** Install the passenger side cylinder head, refer to the Engine section.

(3) Attach electrical connector to knock sensor.

(4) Install intake manifold plenum. Refer to the Engine section.

SPARK PLUG

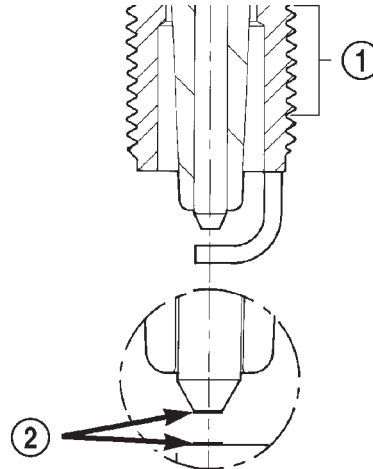
DESCRIPTION - PLATINUM PLUGS

The V6 engines use platinum resistor spark plugs. They have resistance values of 6,000 to 20,000 ohms when checked with at least a 1000 volt tester. For spark plug identification and specifications, Refer to the Specifications section.

Do not use an ohm meter to check the resistance of the spark plugs. This will give an inaccurate reading.

When the spark plugs use a single or double platinum tips and they have a recommended service life of 100,000 miles for normal driving conditions per schedule A in this manual. The spark plugs have a recommended service life of 75,000 miles for severe

driving conditions per schedule B in this manual. A thin platinum pad is welded to both or center electrode end(s) as show in (Fig. 14). Extreme care must be used to prevent spark plug cross threading, mis-gaping (Fig. 15) and ceramic insulator damage during plug removal and installation.

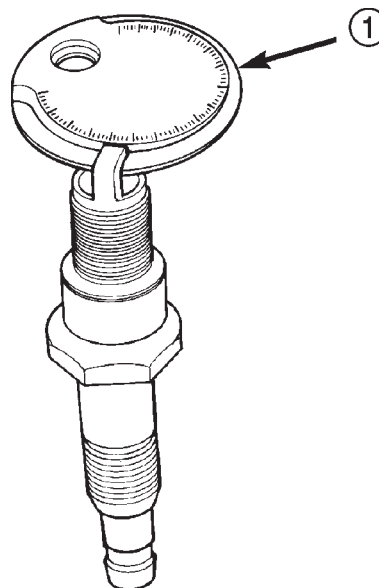


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Fig. 14 Platinum Pads

- 1 - APPLY ANTI-SEIZE COMPOUND HERE ONLY
2 - PLATINUM SPARK SURFACE

CAUTION: Cleaning of the platinum plug may damage the platinum tip.



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Fig. 15 Setting Spark Plug Electrode Gap

- 1 - TAPER GAUGE

SPARK PLUG (Continued)

REMOVAL

Always remove the ignition coil assembly by grasping at the spark plug boot, turning the assembly 1/2 turn and pulling straight back in a steady motion.

(1) Prior to removing the spark plug, spray compressed air around the coil area and spark plug.

(2) Remove electrical connector from ignition coil.

On 3.5L engines, it is necessary to loosen the screws by alternating back and forth. Do not lose the spacers under the coil when loosening the screws.

(3) Remove 2 fasteners from ignition coil.

(4) Remove ignition coil assembly.

(5) Remove the spark plug using a quality socket with a rubber or foam insert.

(6) Inspect the spark plug condition.

INSTALLATION

Always remove the ignition coil assembly by grasping at the spark plug boot, turning the assembly 1/2 turn and pulling straight back in a steady motion.

(1) To avoid cross threading, start the spark plug into the cylinder head by hand.

(2) 3.5L engines tighten spark plugs to 28 N·m (20 ft. lbs.) torque, 2.7L engine tighten spark plugs to 17.6 N·m (13 ft. lbs.).

(3) Install ignition coil assembly onto spark plug.

(4) Install coil screws and tighten: 2.7L engine to 6.2 N·m (55 in. lbs.), 3.5L engines to 6.7 N·m (60 in. lbs.).

(5) Connect the electrical connector.

INSTRUMENT CLUSTER

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INSTRUMENT CLUSTER

DESCRIPTION

The mechanical instrument cluster is an electro-mechanical module which receives most of its information via the Programmable Communication Interface (PCI) bus.

There are three types of clusters (Fig. 1) and (Fig. 2).

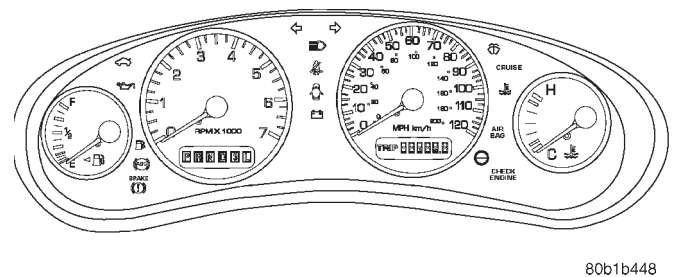
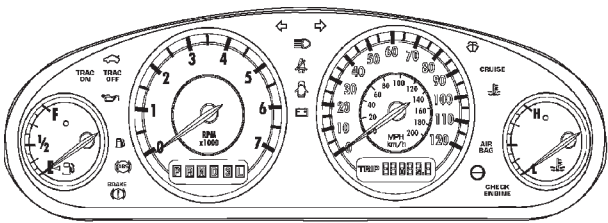


Fig. 1 CLUSTER - INTREPID/CONCORDE

The Instrument Cluster for the Intrepid and Concorde (Fig. 1) are almost identical. The gauge and warning lamp location and functionality are identical. The difference being, the Intrepid has white gauges with black numbers, and the Concorde has black gauges with white numbers and chrome rings around the gauges.

- Speedometer
- Tachometer
- Odometer/trip odometer
- Fuel gauge
- Temperature gauge



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Fig. 2 CLUSTER - 300M

- Electronic transmission range
- The warning and information indicators include the following:
- Check Engine
 - Airbag
 - Charging system
 - Low oil pressure
 - High temperature
 - Low fuel
 - Seat belt
 - Cruise
 - Brake/park brake
 - High beam
 - Turn signals
 - Door Ajar
 - Decklid Ajar
 - ABS (optional)
 - Traction Control Active (if equipped)
 - Traction Control Off (if equipped)
 - Low Washer Fluid

INSTRUMENT CLUSTER (Continued)

OPERATION

The gauges are the magnetic air-core type. When the ignition switch is OFF, the gauge pointers should rest at or below the low graduation.

DIAGNOSIS AND TESTING - INSTRUMENT CLUSTER

As a quick diagnosis, the cluster will perform a functional check of the odometer display, transmission range display and warning indicators after the ignition is switched to RUN/START. If the cluster is not receiving any PCI bus messages, the cluster will appear non-functional and "no bus" will appear in the odometer display.

A self-test of the cluster can also be initiated by pressing and holding the odometer reset button and switching the ignition from lock to unlock. The cluster will then step through several displays for functional verification.

If the cluster is not functioning properly, refer to the proper Body Diagnostic Procedures Manual.

If the cluster is not receiving PCI bus messages, refer to the pre-diagnostic test described in Body Diagnostic Procedures Manual.

In order to diagnose the instrument cluster functions, a DRB III® scan tool and the proper Body Diagnostic Procedures Manual are required.

If the diagnostic procedure determines that a replacement of an instrument cluster component is required, refer to Cluster and Bezel Removal and Installation in this section.

REMOVAL

To service any instrument cluster component, the instrument cluster must be removed from the instrument panel. Use the following procedure:

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove the instrument panel left end cap.
- (3) Remove steering column shroud cover.
- (4) Tilt the steering column down into the lowest position.
- (5) Remove one screw (Limited/300M) to cluster bezel
- (6) Remove the items to expose bezel mounting screws. Items vary depending on model.
- (7) Remove two screws over upper cluster bezel in instrument panel brow area and all remaining

attaching screws (four on Intrepid, Limited, and 300M, and five on Concorde).

(8) Using a trim stick (special tool #C-4755), gently pry out on the instrument panel cluster bezel, disconnect headlamp switch connector, and remove.

(9) Remove the instrument cluster screws.

NOTE: Tilt steering wheel down to gain access for instrument cluster removal.

(10) Remove the instrument cluster from panel. The instrument panel wiring harness connectors are self-aligning, mounted directly to the rear panel. A force of approximately 9 kilograms (30 lbs.) will be required to disengage the cluster from the connectors and upper clips.

INSTALLATION

NOTE: Tilt steering wheel down to gain access for instrument cluster installation.

(1) Install the instrument cluster into instrument panel. The instrument panel wiring harness connectors are self-aligning, mounted directly to the rear panel. A force of approximately 9 kilograms (30 lbs.) will be required to engage the cluster to the connectors and upper clips.

(2) Install the instrument cluster screws.

(3) Connect headlamp switch connector. Place the cluster bezel into position and snap it into place firmly.

(4) Install the two screws over upper cluster bezel in instrument panel brow area and all remaining attaching screws (four on Intrepid, Limited, and 300M, and five on Concorde).

(5) Install the items covering the bezel mounting screws.

(6) Install the one screw (Limited/300M) to cluster bezel.

(7) Tilt the steering column down into the lowest position.

(8) Install the steering column shroud cover.

(9) Install the instrument panel left end cap.

(10) Connect the negative battery cable remote terminal to the remote battery post.

ANTI-LOCK BRAKE SYSTEM INDICATOR

DESCRIPTION

The amber Anti-Lock Brake System (ABS) warning indicator lamp is located on the instrument panel in the instrument cluster.

OPERATION

When the ignition key is turned to the ON position, the amber ABS warning indicator lamp is lit until the Controller Anti-Lock Brakes (CAB) completes it's self-tests and turns off the indicator lamp (approximately 4 seconds). The amber ABS warning indicator lamp will illuminate when the CAB detects a condition that results in the shutdown of ABS function or when the instrument cluster does not receive messages from the CAB. The CAB sends a message across the PCI bus circuit that informs the instrument cluster to turn on the amber ABS warning indicator lamp.

NOTE: If the vehicle is equipped with traction control, the TRAC OFF indicator lamp will illuminate anytime the amber ABS warning indicator lamp is on.

Under most conditions, when the amber ABS warning indicator lamp is on, only the ABS function of the brake system is affected; the base brake system and the ability to stop the vehicle are not affected.

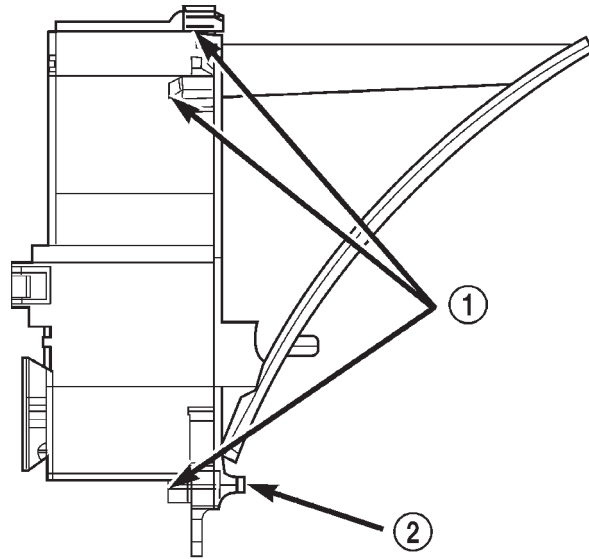
INSTRUMENT CLUSTER MASK/LENS

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove the instrument panel left end cap.
- (3) Remove steering column shroud cover.
- (4) Tilt the steering column down into the lowest position.
- (5) Remove one screw (Limited/300M) to cluster bezel
- (6) Remove the items to expose bezel mounting screws. Items vary depending on model.
- (7) Remove two screws over upper cluster bezel in instrument panel brow area and all remaining attaching screws (four on Intrepid, Limited, and 300M, and five on Concorde).
- (8) Using a trim stick (special tool #C-4755), gently pry out on the instrument panel cluster bezel, disconnect headlamp switch connector, and remove.
- (9) Remove the instrument cluster screws.

NOTE: Tilt steering wheel down to gain access for instrument cluster removal.

- (10) Remove the instrument cluster from panel. The instrument panel wiring harness connectors are self-aligning, mounted directly to the rear panel. A force of approximately 9 kilograms (30 lbs.) will be required to disengage the cluster from the connectors and upper clips.
- (11) Remove two screws to mask/lens (Fig. 3).

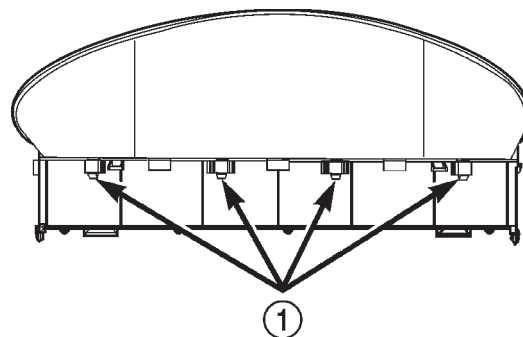


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Fig. 3 INSTRUMENT CLUSTER MASK/LENS RETAINING SCREWS

- 1 - MASK/LENS RETAINING TABS
- 2 - RETAINING SCREWS

- (12) Unsnap seven retaining tabs holding mask/lens to cluster housing (Fig. 4).



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Fig. 4 CLUSTER MASK/LENS RETAINING TABS - TOP

- 1 - MASK/LENS RETAINING TABS

INSTRUMENT CLUSTER MASK/LENS (Continued)

(13) Separate mask/lens from instrument cluster and remove.

INSTALLATION

(1) Align mask/lens with instrument cluster and snap into place (Fig. 4).

(2) Snap seven retaining tabs holding mask/lens into place.

(3) Install the two screws to mask/lens (Fig. 3).

NOTE: Tilt steering wheel down to gain access for instrument cluster installation.

(4) Install the instrument cluster into instrument panel. The instrument panel wiring harness connectors are self-aligning, mounted directly to the rear panel. A force of approximately 9 kilograms (30 lbs.) will be required to engage the cluster to the connectors and upper clips.

(5) Install the instrument cluster screws.

(6) Connect headlamp switch connector. Place the cluster bezel into position and snap it into place firmly.

(7) Install the two screws over upper cluster bezel in instrument panel brow area and all remaining attaching screws (four on Intrepid, Limited, and 300M, and five on Concorde).

(8) Install the items covering the bezel mounting screws.

(9) Install the one screw (Limited/300M) to cluster bezel

To service any instrument cluster component, the instrument cluster must be removed from the instrument panel. Use the following procedure:

(10) Tilt the steering column down into the highest position.

(11) Install the steering column shroud cover.

(12) Install the instrument panel left end cap.

(13) Connect the negative battery cable remote terminal to the remote battery post.

ODOMETER**REMOVAL**

The instrument cluster must be removed for Odometer service. Refer to Instrument Cluster Removal and Installation.

On **Intrepid**, **Concorde**, and **300M** models, the odometer and PRNDL are one assembly retained by three screws.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove instrument cluster from vehicle. Refer to Instrument Cluster Removal and Installation.

(3) Remove five cluster back cover retaining screws and remove the cover.

(4) Unplug connectors from printed circuit board.

(5) Remove cluster mask/lens from instrument cluster. Refer to Mask/Lens Removal and Installation.

(6) Remove two screws to Vacuum Fluorescent (VF) display Odometer and remove from cluster.

INSTALLATION

(1) Install the two screws to Vacuum Fluorescent (VF) display.

(2) Install the cluster mask/lens on to the instrument cluster. Refer to Mask/Lens Removal and Installation.

(3) Install connectors to the printed circuit board.

(4) Install the five cluster back cover retaining screws.

(5) Install the instrument cluster in vehicle. Refer to Instrument Cluster Removal and Installation.

(6) Connect the negative battery cable remote terminal to the remote battery post.

RED BRAKE WARNING INDICATOR**DESCRIPTION**

The red BRAKE warning indicator lamp is located on the instrument panel in the instrument cluster.

OPERATION

The red BRAKE warning indicator lamp is supplied 12-volt ignition feed anytime the ignition switch is on. The indicator lamp is then illuminated by completing the ground circuit either through the parking brake warning switch mounted on the parking brake lever, the brake fluid level switch mounted in the master cylinder reservoir, or the ignition switch when in the CRANK position.

TACHOMETER**DESCRIPTION**

Refer to Electrical, Instrument Cluster, Description for more information.

OPERATION

The tachometer receives its information across the PCI Bus from the Body Control Module (BCM). Information on engine RPM is transmitted from the Powertrain Control Module (PCM) across the PCI Bus to the BCM. The BCM calculates the position of the tachometer pointer based on the input from the PCM and adjusts the position of the gauge pointer to the necessary position. This signal is sent over the PCI Bus to the instrument cluster.

TRANSMISSION RANGE INDICATOR (PRNDL)

DESCRIPTION

The shift position indicator is located in the instrument cluster. It indicates the position of the manual valve lever by illuminating an LED located under the P, R, N, D, 3, or L (or Autostick) gear symbol.

OPERATION

The Transmission Range Sensor (TRS) sends a signal to the Powertrain Control Module (PCM) regarding the position of the manual valve lever. The PCM converts this signal into a Shift Lever Position (SLP) and sends the information to the Body Control Module (BCM) and the instrument cluster.

DIAGNOSIS AND TESTING - TRANSMISSION RANGE INDICATOR

The transmission range sensor (on the valve body) sends a signal to the PCM on the position of the transaxle manual valve lever. The PCM receives the switch signal and processes the data. The PCM sends the Shift Lever Position (SLP) information to the BCM via the communication bus. The BCM then outlines the appropriate transmission range indicator in the instrument cluster.

If a problem arises with the transmission range indicator, refer to TRANSMISSION RANGE INDICATOR TEST, and the proper Body Diagnostic Procedures manual if the problem still exists.

To replace the transmission range indicator (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE BEZEL - REMOVAL).

TRANSMISSION RANGE INDICATOR TEST

CONDITION	POSSIBLE CAUSE
ALL PRND3L (PRND1234 if Autostick equipped) DISPLAY LIGHTS "ON" IN P&N GEAR POSITIONS	Check wiring and connectors
	Faulty TRS
	Faulty manual lever
ALL DISPLAY LIGHTS "ON" IN ALL GEAR POSITIONS	Check wiring & connectors
	Faulty trans. range sensor
	Faulty manual lever
	Communication bus malfunction

CONDITION	POSSIBLE CAUSE
ALL DISPLAY LIGHTS "OFF"	Normal transient condition between P&R and R&N gear positions
	Check shift lever linkage
	BCM malfunction
	Check wiring and connectors
	Faulty instrument cluster
ALL DISPLAY LIGHTS "OFF" ACCOMPANIED BY A "NO BUS" MESSAGE	Communication bus malfunction
DISPLAY LIGHTS OUT OF SEQUENCE WITH SHIFT LEVER	Check wiring and connectors
	Faulty TRS
	Faulty manual lever
	Communication bus malfunction

TRIP ODOMETER RESET KNOB

REMOVAL

The instrument cluster must be removed for Trip Reset Knob service.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove instrument cluster from vehicle. Refer to Electrical, Instrument Cluster Removal.

(3) Remove five cluster back cover retaining screws and remove the cover.

(4) Remove nine screws to Printed Circuit Board and remove.

(5) Gently pull Trip Reset Knob from the instrument cluster housing and remove.

INSTALLATION

(1) Gently put Trip Odometer Reset Knob into the mask/lens.

(2) Install the nine screws to Printed Circuit Board.

(3) Install the five cluster back cover retaining screws.

(4) Install the instrument cluster. Refer to Electrical, Instrument Cluster Installation.

(5) Connect the negative battery cable remote terminal to the remote battery post.

LAMPS

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LAMPS/LIGHTING - EXTERIOR

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HEADLAMP SWITCH

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LAMPS/LIGHTING - EXTERIOR

SPECIFICATIONS

EXTERIOR LAMPS

CAUTION: Do not use bulbs other than those listed in the Bulb Application Table. Damage to lamp can result.

Do not touch halogen bulbs with fingers or other oily surfaces. Bulb life will be reduced.

LAMPS/LIGHTING - EXTERIOR (Continued)

BULB APPLICATION TABLE

LAMP	MODEL	BULB
Back up	Concorde/ Limited	921
	Intrepid/300M	3157K
CHMSL	Concorde/ Limited/300M	921
	Intrepid	912
	300M	921
Front Parking/Turn Signal	Limited	3157 AK or NA
Front Parking/Turn Signal/Side Marker	Concorde/ 300M	3157 K
	Intrepid	3157 KNA or AK
Front Side Marker	Limited	168
Fog lamps	Intrepid	H-3 (35 watt)
	300M	H-3 (55 watt)
	Limited	9040 (40 Watt)
Headlamps	High Beam (All)	9005 XSL
	Low Beam (All)	9006 XS
License Plate	All	168
Tail	300M	3157K
Tail Side Marker	Intrepid	168
Tail/Brake/Turn Signal	ALL except Concorde	3157K
	Concorde	3057K
Tail	Limited	916

BULB APPLICATION TABLE - EXPORT

LAMP	BULB
Back-up	P27/7W
CHMSL	W16W
Front Fog	H3 (55W)
Front Position	W5W
Front Turn Signal	P27/7W
Headlamps (High Beam)	9005 (HB3)
Headlamps (Low Beam)	9006 (HB4)
License Plate	W5W

LAMP	BULB
Rear Fog	P27/7W
Rear Tail/Stop	P27/7W
Rear Turn Signal	P27/7W
Side Repeater	W5W
Underhood	W5W
Underhood Retractable	105

BRAKE LAMP SWITCH

DESCRIPTION

The brake lamp switch is located under the instrument panel at the brake pedal arm (Fig. 1). This switch contains three internal switches controlling various functions of the vehicle, one of them controls operation of the vehicle's brake lamps. Other functions of the internal switches include speed control deactivation and brake sense for the ABS and the brake transmission shift interlock.

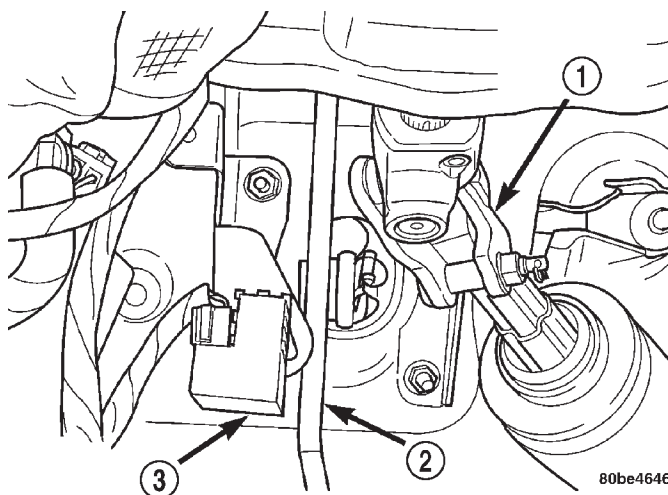


Fig. 1 BRAKE LAMP SWITCH

- 1 - STEERING COLUMN COUPLER
2 - BRAKE PEDAL
3 - SWITCH

OPERATION

The brake lamp switch has three internal switches used for various functions. Among these are:

- Brake lamp actuation
- Speed control deactivation, and
- Brake sense for ABS and brake transmission shift interlock

When the brake pedal is in the released position, the plunger on the outside of the brake lamp switch is pushed inward by the brake pedal. In this position, the electrical contacts for one internal switch are

BRAKE LAMP SWITCH (Continued)

open while the electrical contacts for other two internal switches are closed.

When the brake pedal is pressed, the plunger on the outside of the brake lamp switch extends outward. This action closes the electrical contacts for the one internal switch and opens the contacts for the remaining two switches within the brake lamp switch. The internal switch which closes when the brake pedal is pressed completes the circuit to the brake lamps at the rear of the vehicle, thus allowing illumination of the brake lamps and the center-high-mounted stop lamp (CHMSL).

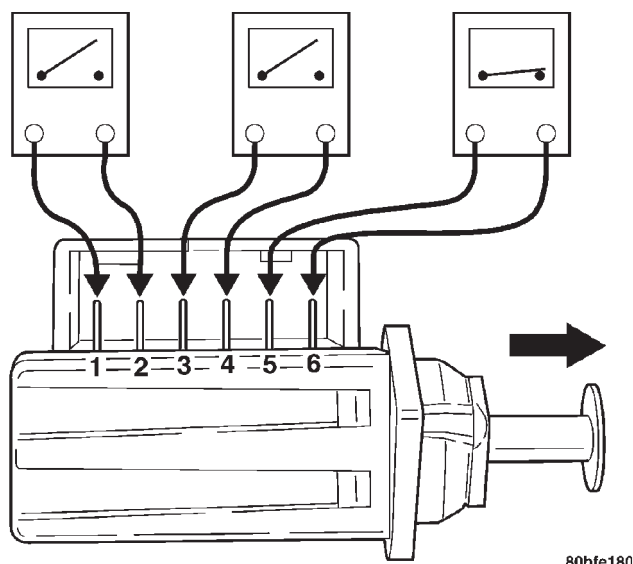
DIAGNOSIS AND TESTING - BRAKE LAMP SWITCH

NOTE: Before proceeding with this diagnostic test, verify the adjustment of the brake lamp switch to rule out misadjustment. Refer to **ADJUSTMENTS**.

If the electrical circuit has been tested and the brake lamp switch is suspected of being faulty, it can be tested using the following method.

(1) Remove the switch from the vehicle. Refer to **REMOVAL** for the proper procedure.

(2) With the switch in the released position (plunger extended), use an ohmmeter to test each of the three internal switches as shown (Fig. 2). You should achieve the results as listed in the figure.

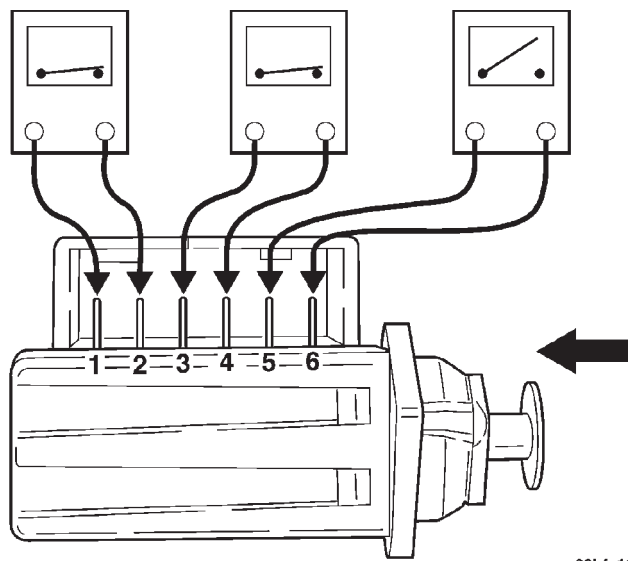


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Fig. 2 SWITCH TEST - RELEASED

(3) Gently push the plunger on the brake lamp switch in until it stops.

(4) With the switch in the depressed position (plunger pushed in), use an ohmmeter to test each of the three internal switches as shown (Fig. 3). You should achieve the results as listed in the figure.



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Fig. 3 SWITCH TEST - DEPRESSED POSITION

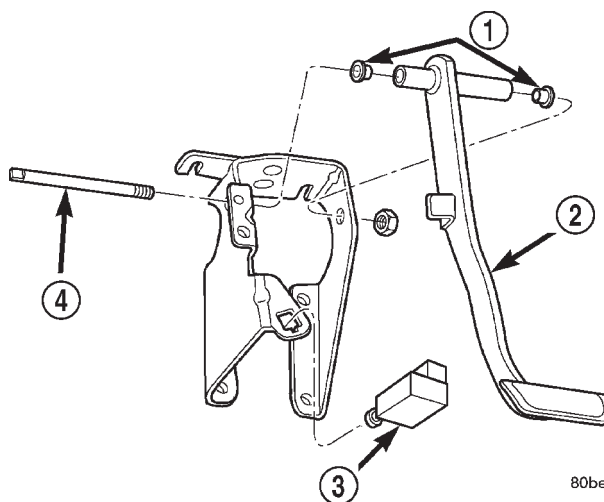
If you do not achieve the results as listed in both figures, the switch is faulty and must be replaced.

(5) Install the switch in the vehicle. Refer to **INSTALLATION** for the proper procedure.

REMOVAL

(1) Depress and hold the brake pedal.

(2) Remove the brake switch from its bracket (Fig. 4). To do so, rotate the brake lamp switch in a counterclockwise direction approximately 30 degrees from its proper mounting position. Pull the switch rearward and remove it from its mounting bracket.



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Fig. 4 BRAKE PEDAL AND BRAKE LAMP SWITCH

- 1 - BUSHINGS
- 2 - BRAKE PEDAL
- 3 - BRAKE LAMP SWITCH
- 4 - PIVOT SHAFT

(3) Disconnect the wiring harness connector from switch.

BRAKE LAMP SWITCH (Continued)

INSTALLATION

NOTE: Prior to installing the brake lamp switch into it's bracket, the plunger must be moved to its fully extended position using the procedure in Step 1.

(1) Hold the brake lamp switch firmly in one hand. Using your other hand, pull outward on the plunger of the switch until it has ratcheted out to its fully extended position.

(2) Connect the wiring harness connector to the brake lamp switch.

(3) Mount the brake lamp switch into the bracket as follows: Depress the brake pedal as far down as possible. Install the switch in it's bracket by aligning the index key on switch with the notch in the square mounting hole of the mounting bracket (Fig. 4). Once the switch is fully seated, rotate the switch clockwise approximately 30° to lock the switch into the bracket.

CAUTION: Do not use excessive force when pulling back on the brake pedal to adjust the brake lamp switch. If to much force is used, damage to the brake lamp switch or striker can result.

(4) Gently pull back on brake pedal until the pedal stops moving. This will cause the switch plunger to ratchet backward to the correct position.

(5) Check for proper operation of the brake lamps and speed control.

ADJUSTMENTS

ADJUSTMENT - BRAKE LAMP SWITCH

(1) Depress and hold the brake pedal.

(2) Remove the brake switch from it's bracket (Fig. 4). To do so, rotate the brake lamp switch in a counterclockwise direction approximately 30 degrees from its proper mounting position. Pull the switch rearward and remove it from it's mounting bracket.

(3) Hold the brake lamp switch firmly in one hand. Using your other hand, pull outward on the plunger of the switch until it has ratcheted out to its fully extended position.

(4) Mount the brake lamp switch into the bracket as follows: Depress the brake pedal as far down as possible. Install the switch in it's bracket by aligning the index key on switch with the notch in the square mounting hole of the mounting bracket (Fig. 4). Once the switch is fully seated, rotate the switch clockwise approximately 30° to lock the switch into the bracket.

CAUTION: Do not use excessive force when pulling back on the brake pedal to adjust the brake lamp switch. If to much force is used, damage to the brake lamp switch or striker can result.

(5) Gently pull back on brake pedal until the pedal stops moving. This will cause the switch plunger to ratchet backward to the correct position.

(6) Check for proper operation of the brake lamps and speed control.

CENTER HIGH MOUNTED STOP LAMP

REMOVAL

CONCORDE

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Release decklid latch and open decklid.

(3) From under rear shelf panel, disconnect the lamp socket from the CHMSL housing (Fig. 5).

(4) Remove bulb from the socket.

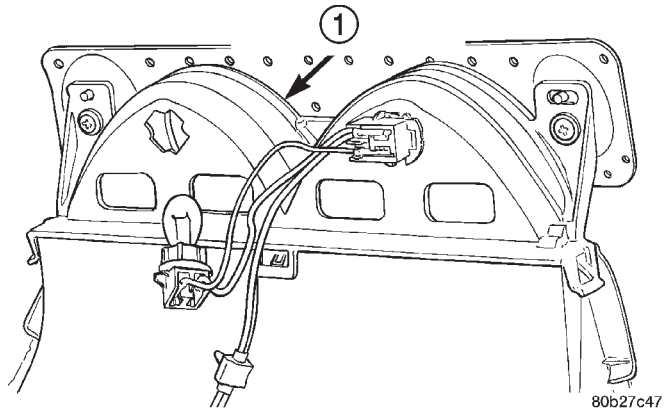


Fig. 5 CHMSL - REAR SHELF

1 - CHMSL HOUSING

INTREPID

(1) Open hood, disconnect and isolate the battery negative cable.

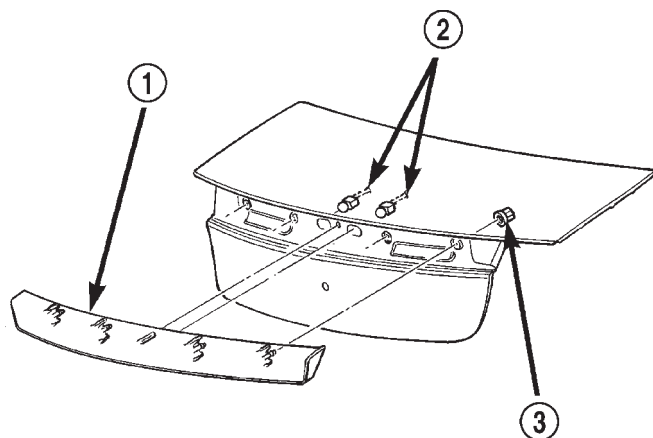
(2) Release decklid latch and open decklid.

(3) Remove decklid cover.

(4) Disconnect lamp socket from housing (Fig. 6).

(5) Remove bulb from socket.

CENTER HIGH MOUNTED STOP LAMP (Continued)



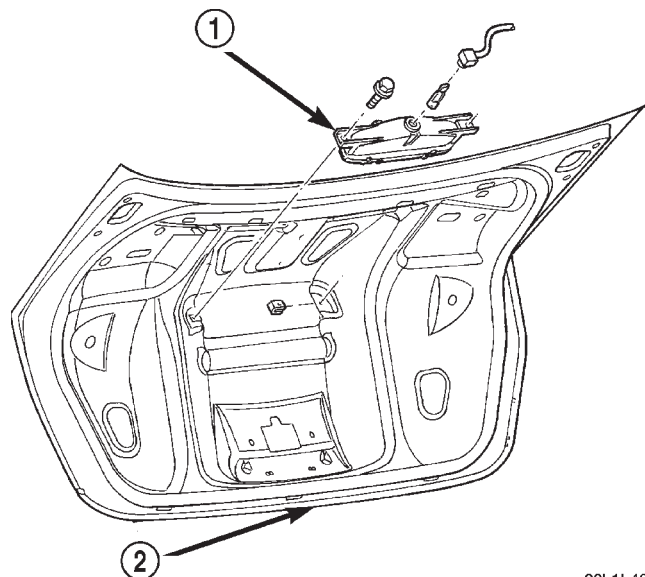
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Fig. 6 CHMSL - INTREPID

- 1 - TRUNK LID APPLIQUE AND CHMSL
- 2 - BODY WIRING AND LAMPS
- 3 - PLASTIC HEX NUT

300M

- (1) Open hood, disconnect and isolate the battery negative cable.
- (2) Release decklid latch and open decklid.
- (3) Remove decklid cover.
- (4) Disconnect lamp socket(s) from housing (Fig. 7).
- (5) Remove bulb(s) from socket(s).



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Fig. 7 CHMSL - 300M

- 1 - CHMSL LAMP
- 2 - TRUNK LID LOWER EDGE

INSTALLATION**CONCORDE**

- (1) Install the bulb into the socket.
- (2) Install socket into CHMSL housing.
- (3) Connect the battery negative cable and close the hood.
- (4) Verify CHMSL operation.

INTREPID

- (1) Install bulb into socket.
- (2) Install socket into housing.
- (3) Connect negative battery cable and close hood.
- (4) Verify CHMSL operation.
- (5) Install decklid cover.

300M

- (1) Install bulb(s) in socket(s).
- (2) Install socket(s) into housing.
- (3) Connect battery negative cable and close hood.
- (4) Verify CHMSL operation.
- (5) Install decklid cover.

CENTER HIGH MOUNTED STOP LAMP UNIT**REMOVAL****CONCORDE**

- (1) Open hood, disconnect and isolate the battery negative cable.
- (2) Release decklid latch and open decklid.
- (3) From under rear shelf panel, disconnect CHMSL wire connector from body harness.
- (4) Remove rear shelf upper panel.
- (5) Remove fasteners attaching the CHMSL to rear shelf upper panel (Fig. 8).
- (6) Remove CHMSL from rear shelf upper panel.

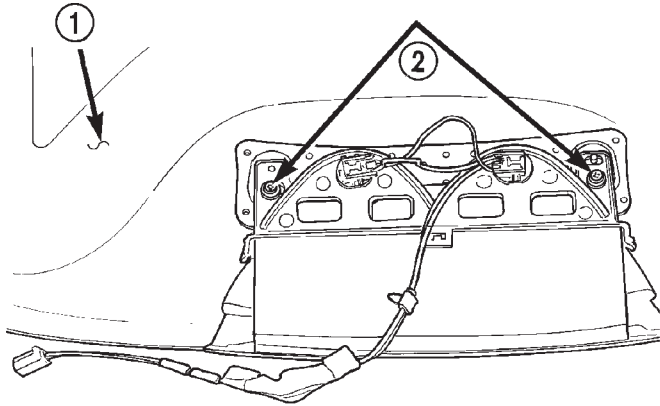
INTREPID

- (1) Release decklid latch and open decklid.
- (2) Remove decklid cover.
- (3) Disconnect CHMSL wire connector from body harness (Fig. 6).
- (4) Remove fasteners attaching CHMSL and applique to the decklid.
- (5) Remove CHMSL from decklid.

300M

- (1) Release decklid latch and open decklid.
- (2) Remove decklid cover.
- (3) Disconnect CHMSL wire connector from body harness (Fig. 7).
- (4) Remove fasteners attaching CHMSL to the decklid.

CENTER HIGH MOUNTED STOP LAMP UNIT (Continued)



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Fig. 8 CHMSL - REAR SHELF - CONCORDE

- 1 - REAR SHELF TRIM PANEL
2 - ATTACHING SCREWS

- (5) Remove CHMSL from decklid.

INSTALLATION**CONCORDE**

- (1) Place CHMSL in position on rear shelf upper panel.
- (2) Install fasteners to attach CHMSL to rear shelf upper panel.
- (3) Install rear shelf upper panel.
- (4) Connect CHMSL wire connector to body harness.
- (5) Connect the battery negative cable and close hood.
- (6) Verify CHMSL operation.

INTREPID

- (1) Place CHMSL in position on decklid.
- (2) Install fasteners attaching CHMSL and applique to decklid.
- (3) Connect CHMSL wire connector to body harness.
- (4) Verify CHMSL operation.
- (5) Install decklid cover.

300M

- (1) Place CHMSL in position on decklid.
- (2) Install fasteners attaching CHMSL to decklid.
- (3) Connect CHMSL wire connector to body harness.
- (4) Verify CHMSL operation.
- (5) Install decklid cover.

COMBINATION FLASHER**DESCRIPTION**

The Combination Flasher, also referred to as the combo-flasher, is mounted to the in-line bracket which is located to the right of the Junction Block. The flasher can be removed by pulling in a rearward direction. The left under panel silencer duct must be removed to access the flasher. The combo-flasher is black in color for ease of identification.

OPERATION

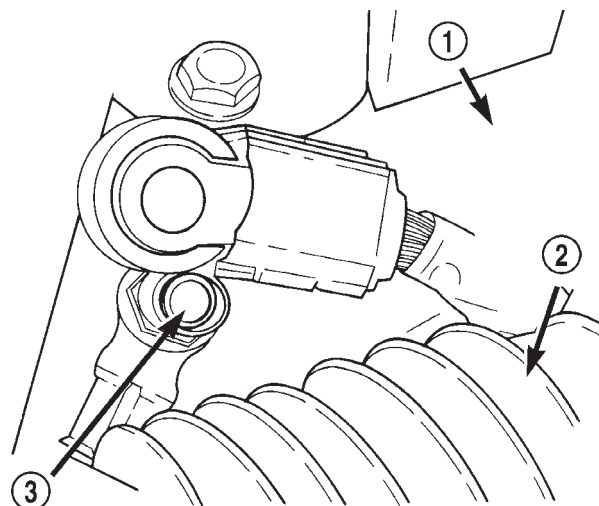
The Turn Signal and Hazard Warning Flasher is combined into one unit called a Combination Flasher (Combo-Flasher). The combo-flasher controls the flashing of the hazard warning system and the turn signal system. An inoperative bulb or incomplete turn signal circuit will result in an increase in flasher speed.

DIAGNOSIS AND TESTING - COMBINATION FLASHER

(Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/MULTI-FUNCTION SWITCH - DIAGNOSIS AND TESTING) and the COMBINATION FLASHER DIAGNOSIS table.

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 9).



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Fig. 9 BATTERY NEGATIVE CABLE REMOVE/INSTALL

- 1 - RIGHT STRUT TOWER
2 - AIR CLEANER INLET TUBE
3 - REMOTE TERMINAL

COMBINATION FLASHER (Continued)

(2) Remove the left instrument panel silencer. Refer to Body, Instrument Panel Silencer, Removal.

(3) The flasher can be removed by pulling in a rearward direction.

INSTALLATION

(1) Install the flasher by firmly pushing it into place.

(2) Install the left instrument panel silencer. Refer to Body, Instrument Panel Silencer, Installation.

(3) Connect the negative battery cable remote terminal to the remote battery post (Fig. 9).

DAYTIME RUNNING LAMP MODULE**DESCRIPTION**

On vehicles equipped with Daytime Running Lamps (DRL) (Canada only), they are controlled by the Daytime Running Lamp Module. The DRL module is attached to the Junction Block. The Junction Block is located on the left side of the instrument panel.

OPERATION

The DRL allows the high beam headlamps to illuminate at reduced power when the ignition switch is in the RUN position with the high and low beam headlamp switches in the OFF position. The Park Brake must be released and the Brake Fluid Level switch must be in the OPEN position to allow the headlamps to operate in DRL mode. The daytime running lamps will go out when the headlamp switch is turned ON. The passing light feature will flash bright high beams while the daytime running lamps are activated.

DIAGNOSIS AND TESTING - DAYTIME RUNNING LAMP MODULE

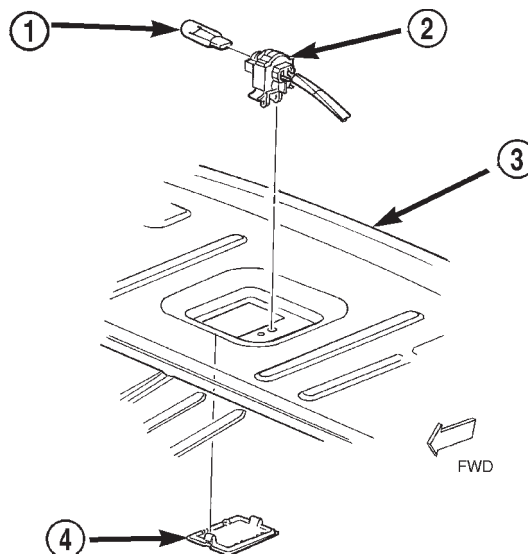
The Daytime Running Lamp Module (DRL Module) is controlled by inputs received from the ignition switch and High or Low Beam Headlamp relays, Park Brake switch, and the Brake Fluid Level switch. Refer to Wiring Diagrams, for component location and circuit information and the proper Body Diagnostic Procedures manual.

DECKLID/TRUNK LAMP**REMOVAL**

(1) Open hood, disconnect and isolate the battery negative cable.

(2) Remove lens from lamp from the rear shelf (Fig. 10).

(3) Pull bulb from socket.



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Fig. 10 Trunk Lamp Bulb

- 1 - BULB
- 2 - TRUNK LAMP SOCKET
- 3 - REAR SHELF
- 4 - LENS

INSTALLATION

(1) Insert bulb into socket.

(2) Install lamp lens.

(3) Connect the battery negative cable and close hood.

FOG LAMP**DIAGNOSIS AND TESTING - FOG LAMP**

When a vehicle experiences problems with the fog lamp system, verify the condition of:

- Battery connections
- Charging system
- Fog lamp bulbs
- Headlamp switch
- Body Control Module
- Wire connectors

Refer to Wiring Diagrams, for component locations and circuit information.

FOG LAMP (Continued)

FOG LAMP DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
FOG LAMPS ARE DIM WITH ENGINE IDLING OR IGNITION TURNED OFF.	<ol style="list-style-type: none"> 1. Loose or corroded battery cables. 2. Loose or worn generator drive belt. 3. Charging system output too low. 4. Battery has insufficient charge. 5. Battery is sulfated or shorted. 6. Poor lighting circuit Z1 ground. 7. Both fog lamps are defective. 	<ol style="list-style-type: none"> 1. Clean and secure battery cable clamps and posts. 2. Adjust or replace generator drive belt. 3. Test and repair charging system, refer to Electrical, Battery. 4. Test battery state-of-charge, refer to Electrical, Battery. 5. Load test battery, refer to Electrical, Battery. 6. Test for voltage drop across Z1 ground locations, refer to Wiring Diagrams. 7. Replace both fog lamp bulbs.
FOG LAMP BULBS BURN OUT FREQUENTLY	<ol style="list-style-type: none"> 1. Charging system output too high. 2. Loose or corroded terminals or splices in circuit. 	<ol style="list-style-type: none"> 1. Test and repair charging system, refer to Electrical, Battery. 2. Inspect and repair all connectors and splices, refer to Wiring Diagrams.
FOG LAMPS ARE DIM WITH ENGINE RUNNING ABOVE IDLE	<ol style="list-style-type: none"> 1. Charging system output too low. 2. Poor lighting circuit Z1 ground. 3. High resistance in fog lamp circuit. 4. Both fog lamp bulbs defective. 	<ol style="list-style-type: none"> 1. Test and repair charging system, refer to Electrical, Battery. 2. Test for voltage drop across Z1 ground locations, refer to Wiring Diagrams. 3. Test amperage draw of fog lamp circuit. 4. Replace both fog lamp bulbs.
FOG LAMPS FLASH RANDOMLY	<ol style="list-style-type: none"> 1. Poor lighting circuit Z1-ground. 2. High resistance in fog lamp circuit. 3. Faulty fog lamp switch. 4. Loose or corroded terminals or splices in circuit. 5. Bad connection between headlamp switch and BCM 6. Loose relay. 7. Faulty Body Control Module. 	<ol style="list-style-type: none"> 1. Test for voltage drop across Z1-ground locations, refer to Wiring Diagrams. 2. Test amperage draw of fog lamp circuit. 3. Replace headlamp switch. 4. Inspect and repair all connectors and splices, refer to Wiring Diagrams. 5. Test and diagnose circuit between headlamp switch and BCM. 6. Inspect and reset fog lamp relay. 7. Replace Body Control Module.

FOG LAMP (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
FOG LAMPS DO NOT ILLUMINATE	<div>1. Blown fuse for fog lamps.</div> <div>2. No Z1-ground at fog lamps.</div> <div>3. Faulty fog lamp switch.</div> <div>4. Broken connector terminal or wire splice in fog lamp circuit.</div> <div>5. Broken connection between BCM and fog lamp relay.</div> <div>6. Faulty fog lamp relay.</div> <div>7. Faulty Body Control Module.</div>	<div>1. Replace fuse, refer to Wiring Diagrams.</div> <div>2. Repair circuit ground, refer to Wiring Diagrams.</div> <div>3. Replace headlamp switch.</div> <div>4. Repair connector terminal or wire splice.</div> <div>5. Test relay connectors in the Junction Block and the circuit to BCM. Repair as necessary.</div> <div>6. Replace relay.</div> <div>7. Replace Body Control Module.</div>

REMOVAL

INTREPID/300M

- (1) Remove fog lamp housing screw in front fascia and pull lamp housing from the fascia.
- (2) Remove rear cover from fog lamp housing.
- (3) Disengage wire clip holding bulb in fog lamp.
- (4) Hinge wire clip out of bulb removal path.
- (5) Pull bulb from lamp housing (Fig. 11) or (Fig. 12).
- (6) Disengage wire connector from fog lamp wire harness.

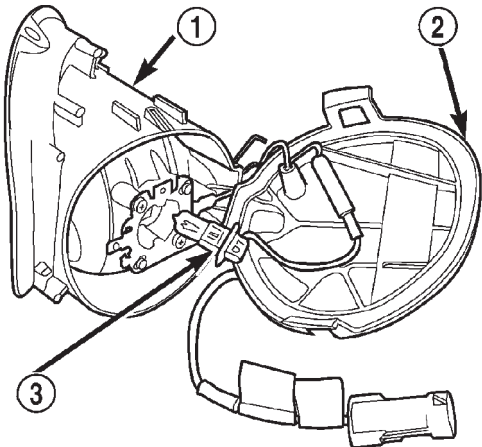


Fig. 11 FOG LAMP - INTREPID

- 1 - FOG LAMP UNIT
- 2 - REAR COVER
- 3 - FOG LAMP

CONCORDE

- (1) Remove fog lamp housing screw in front fascia and pull lamp housing from the front fascia.
- (2) Disconnect wire connector from fog lamp socket (Fig. 13).
- (3) Rotate socket and pull bulb/socket from lamp housing.

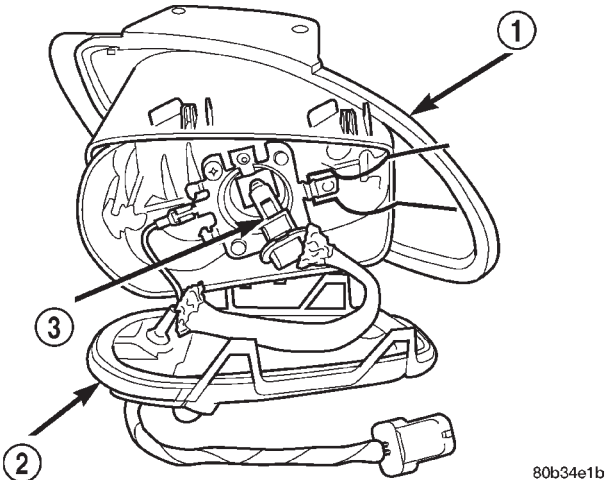


Fig. 12 FOG LAMP - 300M

- 1 - FOG LAMP UNIT
- 2 - REAR COVER
- 3 - FOG LAMP

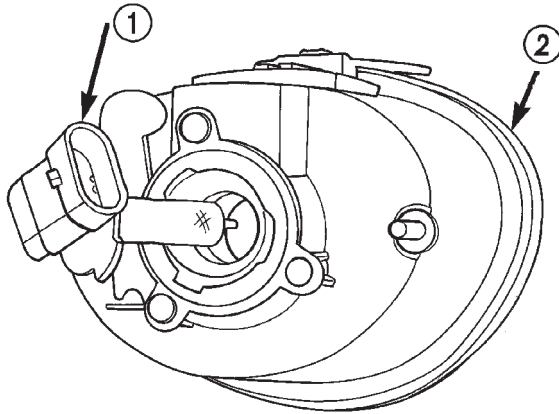
INSTALLATION

INTREPID/300M

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

- (1) Connect wire connector to fog lamp wire harness.
- (2) Cover exposed terminal with teflon coated sleeve.
- (3) Insert bulb into lamp housing.
- (4) Hinge wire clip over bulb base.
- (5) Engage wire clip to hold bulb in fog lamp.
- (6) Install rear cover to fog lamp housing.
- (7) Verify fog lamp operation and alignment.

FOG LAMP (Continued)



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Fig. 13 FOG LAMP BULB - CONCORDE

- 1 - FOG LAMP BULB/SOCKET
2 - FOG LAMP

(8) Install fog lamp housing screw to the front fascia.

CONCORDE

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

- (1) Install socket into fog lamp housing and rotate to the lock position.
- (2) Connect wire connector to the socket.
- (3) Verify fog lamp operation and alignment.
- (4) Install fog lamp housing into fascia.
- (5) Install fog lamp screw to the front fascia

FOG LAMP UNIT**STANDARD PROCEDURE - FOG LAMP UNIT ALIGNMENT**

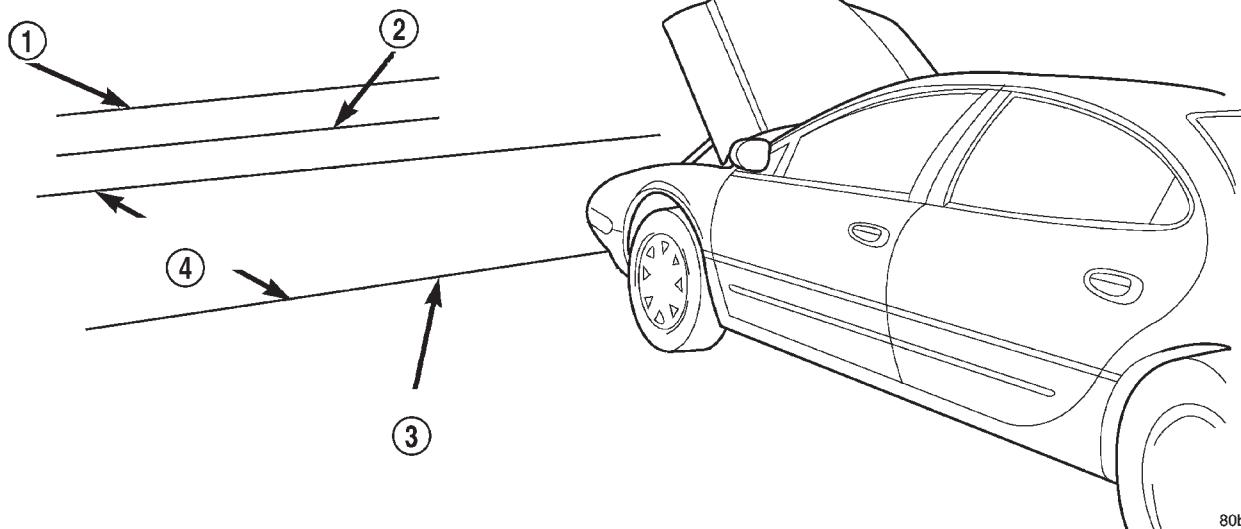
Prepare an alignment screen (Fig. 14). Refer to Electrical, Lamps/Lighting - Exterior, Headlamp, Adjustments for Alignment Screen Preparation. A properly aligned fog lamp will project a pattern on the alignment screen 100 mm (4 in.) below the fog lamp center line and straight ahead. To adjust fog lamp alignment, rotate the alignment screw (Fig. 15), (Fig. 16) or (Fig. 17).

REMOVAL

- (1) Open hood, disconnect and isolate the battery negative cable.
- (2) Remove screw(s) attaching fog lamp to fascia (Fig. 18), (Fig. 19), and (Fig. 20).
- (3) Pull fog lamp forward from opening in front bumper fascia.
- (4) Disconnect fog lamp wire connector from front lighting wire harness.
- (5) Remove fog lamp from vehicle.

INSTALLATION

- (1) Connect fog lamp wire connector to front lighting wire harness.
- (2) Insert fog lamp rearward into opening in front bumper fascia.
- (3) Install screw(s) attaching fog lamp to fascia.
- (4) Connect the battery negative cable and close hood.



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Fig. 14 FOG LAMP UNIT ALIGNMENT SCREEN

- 1 - HORIZONTAL CENTER LINE OF FOG LAMPS
2 - TOP OF FOG LAMP BEAM PATTERN CUT OFF \pm 4 INS. FROM HORIZONTAL CENTER LINE

- 3 - FRONT OF FOG LAMP
4 - 7.62 METERS (25 FT.)

FOG LAMP UNIT (Continued)

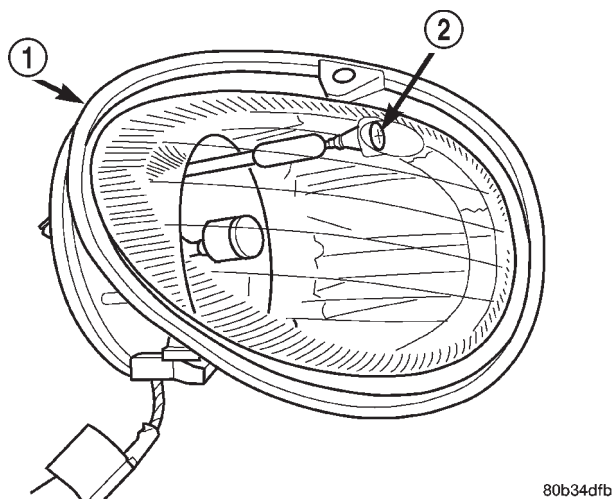
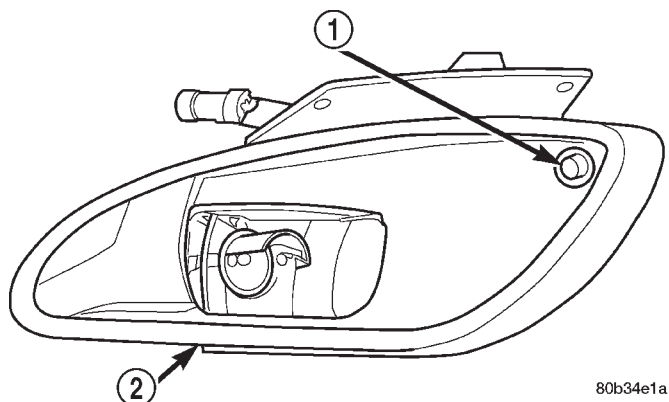


Fig. 15 FOG LAMP UNIT ADJUSTER SCREW - INTREPID

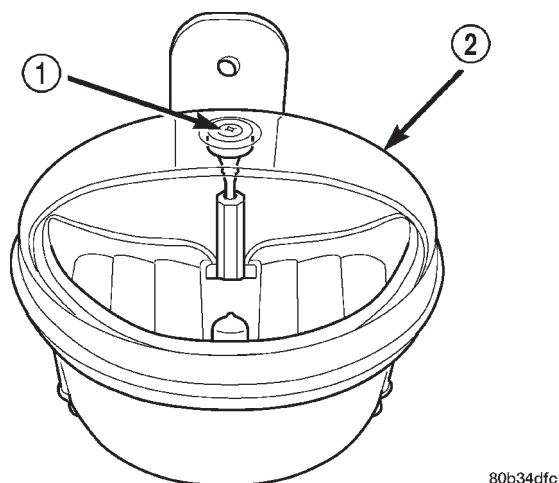
- 1 - FOG LAMP UNIT
2 - UP/DOWN ADJUSTER SCREW



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Fig. 17 FOG LAMP UNIT ADJUSTER SCREW - 300M

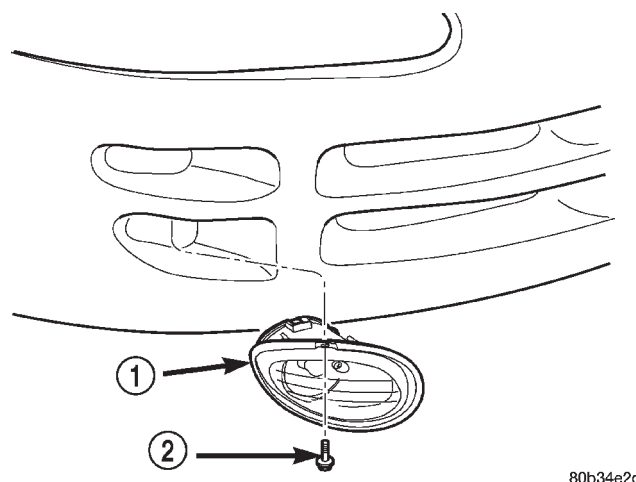
- 1 - UP/DOWN ADJUSTER SCREW
2 - FOG LAMP UNIT



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Fig. 16 FOG LAMP UNIT ADJUSTER SCREW - CONCORDE

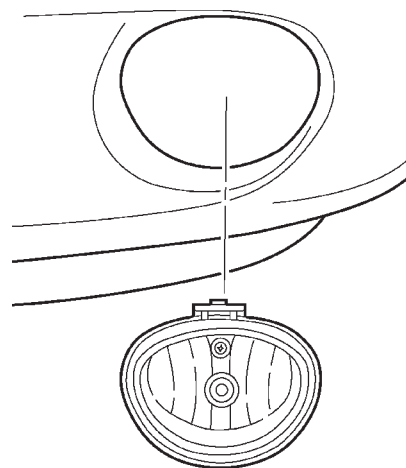
- 1 - UP/DOWN ADJUSTER SCREW
2 - FOG LAMP UNIT



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Fig. 18 FOG LAMP - INTREPID

- 1 - FOG LAMP
2 - SCREW



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Fig. 19 FOG LAMP - CONCORDE

(5) Verify fog lamp operation and alignment. Refer to Electrical, Exterior Lamps/Lighting, Fog Lamp, Adjustments.

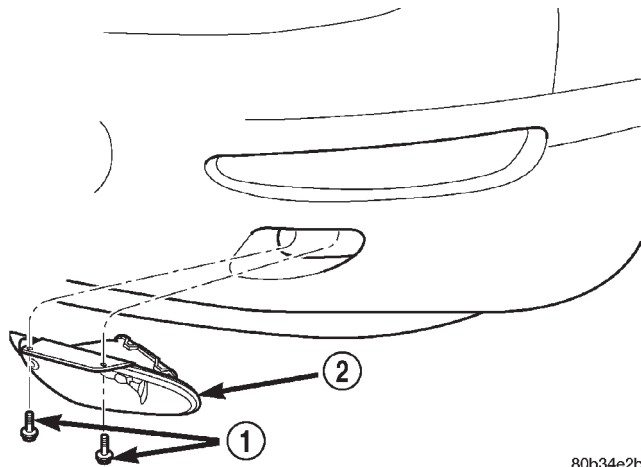
FRONT POSITION LAMP - EXPORT

DESCRIPTION

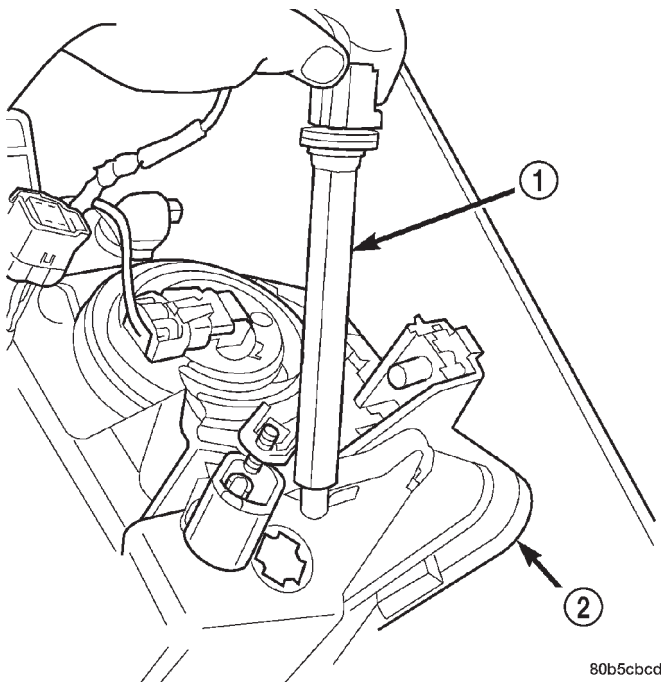
All vehicles are equipped with front position lamps. One front position lamp is incorporated into each of the headlamp modules (Fig. 21). These lamps utilize a clear lens and clear bulb and function in the same

way that Parking Lamps do on other market built vehicles (U.S., Canada). The front position lamp is

FRONT POSITION LAMP - EXPORT (Continued)

**Fig. 20 FOG LAMP - 300M**

- 1 - SCREWS
2 - FOG LAMP

**Fig. 21 FRONT POSITION LAMP - EXPORT**

- 1 - FRONT POSITION LAMP SOCKET
2 - HEADLAMP MODULE

built in to the headlamp and therefore doesn't require its own lamp housing.

OPERATION

The front position lamps are turned on or off with the headlamp switch. These lamps function in the same way that the parking lamps do on other market built vehicles. (U.S., Canada). Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

DIAGNOSIS AND TESTING - FRONT POSITION LAMP - EXPORT

The following test is designed to diagnosis a faulty front position lamp. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

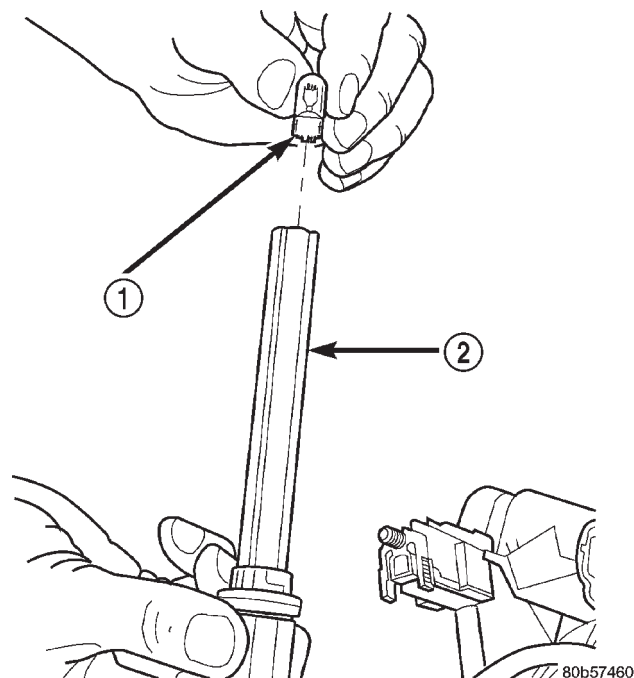
NOTE: Battery must be completely charged (12v) prior to testing. It may also be necessary to install battery charger on the vehicles electrical system when performing this test. Refer to the Battery section of the service manual for detailed information.

- (1) Remove the front position lamp bulb and check for burned out condition, replace bulb if necessary.
- (2) If bulb appears OK, reinstall the bulb in its socket and rotate the left side multi-function switch one detent position and check for lamp operation. If lamp is still inoperative proceed to step #3.
- (3) Remove lamp bulb and check for proper power (12v) and ground connections in lamp socket. If power and/or ground connections are not present, trace wire until open or short is found.

REMOVAL

- (1) Remove the headlamp module from the vehicle (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).
- (2) Twist and remove the front position lamp socket from the headlamp module.
- (3) Pull the front position lamp bulb straight from its socket (Fig. 22).

FRONT POSITION LAMP - EXPORT (Continued)

**Fig. 22 FRONT POSITION LAMP BULB**

- 1 - FRONT POSITION LAMP BULB
2 - FRONT POSITION LAMP SOCKET

INSTALLATION

- (1) Install the front position lamp bulb in lamp socket.
- (2) Verify lamp operation.
- (3) Install front position lamp socket in the headlamp module.
- (4) Install the headlamp module in the vehicle (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

HEADLAMP**DESCRIPTION****HEADLAMP SYSTEM**

The headlamp system is controlled completely by the Body Control Module (BCM). The BCM controls the Park lamps, Headlamps, and Front Fog Lamps using relays located in the Junction Block. Three wires are connected between the headlamp switch and the BCM. The first wire contains information regarding the position of the headlamp switch (Off, Automatic Headlamps, Automatic Headlamp switch fog, Park with Fog, Head, or Head with Fog Lamps). The second wire contains information regarding the position of the dimmer switch (Dome Lamp, Daytime Brightness, or Dimming Level). The third wire is a dedicated signal return (ground) wire.

AUTO HEADLAMP SYSTEM

The Automatic Headlamp system turns the instrumentation and exterior illumination lamps ON when the ambient light levels are low and OFF when light levels are high.

HEADLAMPS ON WITH WIPERS

For vehicles equipped with the Automatic Headlamp System, the instrumentation and exterior illumination lamps will be turned ON when the headlamp switch is in the AUTO position and the windshield wipers have been in the intermittent, low or high mode of operation for more than ten seconds. When the windshield wipers are turned OFF the Body Control Module will determine if the instrumentation and exterior illumination lamps should remain ON base upon the current ambient light level.

LAMP SYSTEMS

Vehicles use lighting on the interior and exterior of the vehicle for illuminating and indicating purposes. Lighting circuits are protected by fuses or circuit breakers. Lighting circuits require an overload protected power source, on/off device, lamps and body ground to operate properly. Plastic lamp sockets require a wire in the harness to supply body ground to the lamp socket. Lamp sockets that are exposed to moisture should be coated with Mopar® Multi purpose Grease or equivalent to avoid corrosion. If a socket has become corroded, clean socket and bulb base with abrasive fiber sanding pad or metallic bristle brush. Replace sockets and bulbs that are deformed from corrosion that could prevent a continuous body ground.

Wire connectors can make intermittent contact or become corroded. Before coupling wire connectors, inspect the terminals inside the connector. Male terminals should not be bent or disengaged from the insulator. Female terminals should not be sprung open or disengaged from the insulator. Bent and sprung terminals can be repaired using needle nose pliers and pick tool. Corroded terminals appear chalky or green. Corroded terminals should be replaced to avoid recurrence of the problem symptoms. Wire connector terminals should be coated with Mopar® Multi purpose Grease or equivalent to avoid corrosion.

Begin electrical system failure diagnosis by testing related fuses and circuit breakers in the fuse block and engine compartment. Verify that bulbs are in good condition and test continuity of the circuit ground. Refer to Wiring Diagrams, for component location and circuit information.

HEADLAMP (Continued)

OPERATION**HEADLAMP SYSTEM**

The headlamp system will default to the headlamps ON position when the ignition switch is ON, or when an open/short circuit failure occurs on the headlamp switch input. The system will return to normal operation when the open or short is repaired. A fault will be reported by the BCM when a failure occurs on the dimmer or headlamp switch input.

The dimmer system will default to Daytime Brightness when an open or a short occurs on the dimmer switch input.

The BCM will turn OFF the exterior lamps if they are left ON with the ignition switch OFF for more than ten minutes. This feature prevents the vehicle battery from being discharged when the vehicle lights have been left ON.

AUTO HEADLAMP SYSTEM

Automatic headlamps are controlled by the Body Control Module (BCM). With the headlamp switch in the AUTO position (Automatic mode). The BCM will control the headlamp, parking, side marker, tail and instrumentation lamps based on ambient light levels.

Ambient light levels are monitored by the BCM using the automatic temperature control system Sun Sensor, located on the top of the instrument panel cover. Ambient light readings are averaged to limit cycling the lamps ON and OFF when passing through areas with varying light levels. The automatic headlamps will only function when the engine is running. When the headlamp switch is in the AUTO position, the Headlamp Time Delay system will function when the ignition is switched OFF.

DIAGNOSIS AND TESTING - HEADLAMP

When a vehicle experiences problems with the headlamp system, verify the condition of:

- Battery connections
- Charging system
- Headlamp bulbs
- Head lamp relay
- High beam dimmer switch
- Headlamp switch
- Body Control Module
- Wire connectors

Refer to Wiring Diagrams, for component locations and circuit information.

HEADLAMP DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMPS ARE DIM WITH ENGINE IDLING OR IGNITION TURNED OFF	<ol style="list-style-type: none"> 1. Loose or corroded battery cables. 2. Loose or worn generator drive belt. 3. Charging system output too low. 4. Battery has insufficient charge. 5. Battery is sulfated or shorted. 6. Poor lighting circuit Z1 ground. 7. Both headlamp bulbs defective. 	<ol style="list-style-type: none"> 1. Clean and secure battery cable clamps and posts. 2. Adjust or replace generator drive belt. 3. Test and repair charging system, refer to Electrical, Battery 4. Test battery state-of-charge, refer to Electrical, Battery. 5. Load test battery, refer to Electrical, Battery. 6. Test for voltage drop across Z1 ground locations, refer to Wiring Diagrams. 7. Replace both headlamp bulbs.
HEADLAMP BULBS BURN OUT FREQUENTLY	<ol style="list-style-type: none"> 1. Charging system output too high. 2. Loose or corroded terminals or splices in circuit. 	<ol style="list-style-type: none"> 1. Test and repair charging system, refer to Electrical, Battery. 2. Inspect and repair all connectors and splices, refer to Wiring Diagrams.

HEADLAMP (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HEADLAMPS ARE DIM WITH ENGINE RUNNING ABOVE IDLE	<ol style="list-style-type: none"> 1. Charging system output too low. 2. Poor lighting circuit Z1 ground. 3. High resistance in headlamp circuit. 4. Both headlamp bulbs defective. 	<ol style="list-style-type: none"> 1. Test and repair charging system, refer to Electrical, Battery. 2. Test for voltage drop across Z1 ground locations, refer to Wiring Diagrams. 3. Test amperage draw of headlamp circuit. 4. Replace both headlamp bulbs.
HEADLAMPS FLASH RANDOMLY	<ol style="list-style-type: none"> 1. Poor lighting circuit Z1-ground. 2. High resistance in headlamp circuit. 3. Faulty headlamps switch circuit breaker. 4. Loose or corroded terminals or splices in circuit. 5. Loose relay 6. Faulty Body Control Module 	<ol style="list-style-type: none"> 1. Test for voltage drop across Z1-ground locations, refer to Wiring Diagrams. 2. Test amperage draw of headlamp circuit. 3. Replace headlamp switch. 4. Inspect and repair all connectors and splices, refer to Wiring Diagrams. 5. Inspect and reset headlamp and parking lamp relays. 6. Replace Body Control Module
HEADLAMPS DO NOT ILLUMINATE	<ol style="list-style-type: none"> 1. No voltage to headlamps. 2. No Z1-ground at headlamps. 3. Faulty headlamp switch. 4. Faulty dimmer switch. 5. Broken connection between BCM and headlamp/parking lamp relay. 6. Faulty parking lamp/headlamp relay. 7. Faulty Body Control Module 	<ol style="list-style-type: none"> 1. Repair open headlamp circuit, refer to Wiring Diagrams. 2. Repair circuit ground, refer to Wiring Diagrams. 3. Replace headlamp switch. 4. Replace headlamp switch. 5. Check Junction Block. continuity. Service as necessary. 6. Replace relay. 7. Replace Body Control Module
HEADLAMPS ILLUMINATE CONTINUOUSLY WITH IGNITION ON	<ol style="list-style-type: none"> 1. Check headlamp switch circuit G52 for continuity. If no continuity. 2. Check headlamp switch return circuit L80 for continuity. If no continuity. (BCM will automatically do this if no continuity is detected.) 3. Check circuit L43 left side and L44 right side for a short to battery between the headlamp switch and the headlamp relay. 4. Stuck relay. 5. Faulty Body Control Module 	<ol style="list-style-type: none"> 1. Repair circuit. 2. Repair circuit. 3. Repair circuit. 4. Replace relay. 5. Replace Body Control Module

HEADLAMP (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
INSTRUMENT PANEL LAMPS DO NOT DIM OR ILLUMINATE	1. No voltage to dimmer switch.	1. Check fuse. If good repair open headlamp circuit, refer to Wiring Diagrams.
	2. No Z1-ground at headlamps.	2. Repair circuit ground, refer to Wiring Diagrams.
	3. Faulty dimmer switch.	3. Replace dimmer switch.

REMOVAL

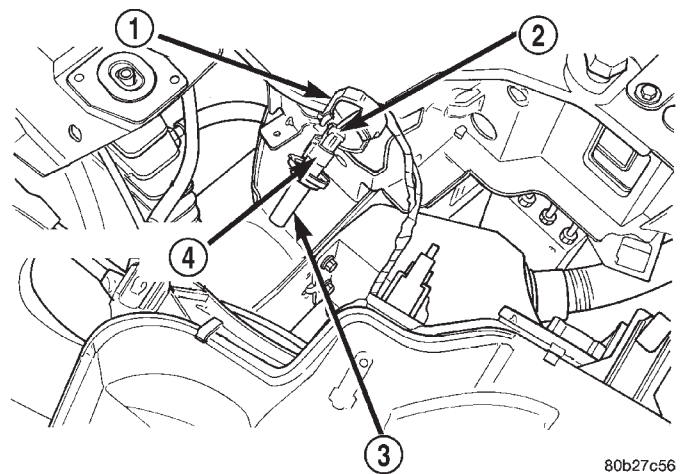
CONCORDE/300M

NOTE: Headlamp lens fogging is a normal condition and does not require service unless excessive or continual. Moisture will vent from tubes or vents located on the back of the lamp.

- Remove headlamp unit. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit, Removal.
- Rotate retaining ring (High beam or Low beam) and pull lamp socket from headlamp housing (Fig. 23).

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

- Remove bulb from lamp wiring connector.



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Fig. 23 HEADLAMP REMOVAL

- RETAINING RING
- WIRE CONNECTOR
- BULB
- LAMP SOCKET

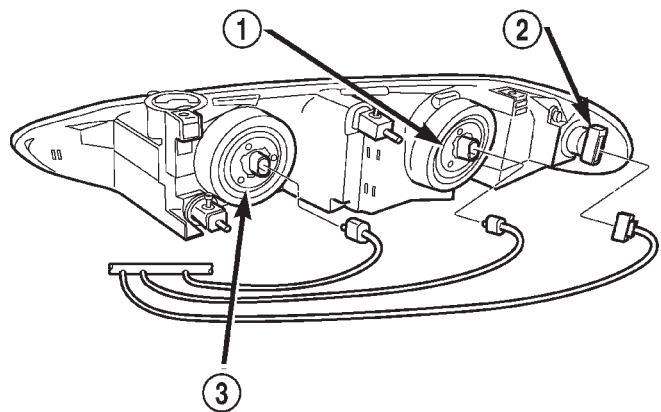
INTREPID

NOTE: Headlamp lens fogging is a normal condition and does not require service unless excessive or continual. Moisture will vent from tubes or vents located on the back of the lamp.

- Release hood latch and open hood.
- Disconnect and isolate the battery negative cable.
- Remove jackscrews attaching headlamp unit to crossmember and remove to access the lamp(s).
- Disconnect wire connector from back of lamp socket (Fig. 24).

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

- Rotate bulb (High beam or Low beam) and pull from headlamp unit.



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Fig. 24 HEADLAMP - INTREPID

- LOW BEAM
- PARKING AND TURN SIGNAL
- HIGH BEAM

HEADLAMP (Continued)

INSTALLATION

CONCORDE/300M

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

- (1) Install the headlamp wiring connector.
- (2) Place lamp into socket and rotate retaining ring (High beam or Low beam) to headlamp housing.
- (3) Install the headlamp unit. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit, Installation.

INTREPID

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

- (1) Rotate bulb (High beam or Low beam) and push into headlamp unit.
- (2) Connect wire connector to the back of lamp socket (Fig. 24).
- (3) Install the jackscrews attaching headlamp unit to crossmember.
- (4) Connect the battery negative cable.
- (5) Close the hood.

HEADLAMP DELAY

DESCRIPTION

The Headlamp Time Delay system is controlled by the Body Control Module (BCM) through the headlamp relay.

OPERATION

The headlamp time delay system is activated by turning the headlamps ON (high or low beam) while the engine is running, turning the ignition switch OFF, and then turning the headlamp switch OFF within 45 seconds. The system will not activate if more than 45 seconds elapse between ignition switch OFF and headlamp switch OFF. The BCM will allow the headlamps to remain ON for 90 seconds before they automatically turn off. Refer to the Owner's Manual for more information.

HEADLAMP LEVELING MOTOR
- EXPORT

DESCRIPTION

HEADLAMP LEVELING SYSTEM

The Remote Headlamp Leveling System allows the driver to adjust the headlamp beam pattern from the interior of the vehicle to compensate for passenger or cargo load. Only the vertical axis of the headlamp beam can be adjusted.

A headlamp leveling switch is located on the instrument panel and controls the headlamp leveling motors/modules found on the headlamp modules. The Leveling switch has three settings 0-2, 0 being the lowest, 2 being the highest headlight beam vertical setting.

NOTE: When performing a headlamp beam pattern alignment on a vehicle equipped with headlamp leveling, be certain the headlamp leveling switch is in the "0" position before starting. Failure to do so will result in an incorrect headlamp alignment.

HEADLAMP LEVELING MOTOR

Vehicles equipped with the remote headlamp leveling system, utilize headlamp leveling motors. Two leveling motors are used per vehicle, one for each headlamp. These leveling motors are attached to the rear of the headlamp modules. They can be described as a small semi-square shaped module with a electrical connector attached to one side. Due to vehicle design these motors can only be serviced or accessed by removing the headlamp from the vehicle.

OPERATION

HEADLAMP LEVELING SYSTEM

Moving the headlamp leveling switch control knob will adjust the voltage (rheostat) sent to the headlamp leveling motors. This signals the headlamp leveling motors to move and adjust the vertical headlamp beam pattern accordingly. The headlamp switch must be "ON" in order for the leveling system to function. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

HEADLAMP LEVELING MOTOR - EXPORT (Continued)

HEADLAMP LEVELING MOTOR

The headlamp leveling motors move the headlamp and beam pattern according to the signal received from the headlamp leveling switch. With the vehicles headlamps "ON" a signal voltage is sent from the headlamp leveling switch and received at each of the

headlamp leveling motors. This signal voltage (typically 2 – 9 volts) tells the headlamp leveling motors where to position the headlamps. The headlamp leveling motors are attached to the headlamps with a pushrod snapped into the rear of headlamp reflector mechanism.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - HEADLAMP LEVELING MOTOR - EXPORT***HEADLAMP LEVELING MOTOR DIAGNOSIS*

CONDITION	POSSIBLE CAUSES	CORRECTION
ONE MOTOR DOES NOT OPERATE.	1. Poor electrical connection at motor. 2. No voltage at motor. 3. No ground at motor. 4. Defective motor.	1. Check for proper electrical connection at motor. 2. Repair no voltage condition. Refer to Wiring Diagrams. 3. Repair no ground condition. Refer to Wiring Diagrams. 4. Replace leveling motor.
BOTH MOTORS DO NOT OPERATE.	1. No voltage at or from headlamp leveling switch. 2. No voltage at leveling motors. 3. No ground at leveling motors. 4. Both motors defective.	1. Repair no voltage condition. Check for proper headlamp leveling switch operation. 2. Repair no voltage condition. Refer to Wiring Diagrams. 3. Repair no ground condition. Refer to Wiring Diagrams. 4. Replace both motors.

DIAGNOSIS AND TESTING - HEADLAMP LEVELING SYSTEM - EXPORT

NOTE: The battery must be completely charged (12v) prior to testing. It may also be necessary to install a battery charger on the vehicles electrical system when performing this test. Refer to the Electrical, Battery System for detailed information.

(1) Rotate the headlamp switch (low beam) to the ON position.

(2) Disconnect the headlamp wire harness jumper electrical connector. This connector can be accessed by opening the bulb access panel, found in the appropriate front wheel well splash shield.

(3) Check PIN #1 for battery voltage. If not present, trace the circuit until the open or short is found.

(4) Check PIN #2 for ground. If not present, trace the circuit until the open or short is found.

(5) Check PIN #3 for headlamp leveling sense voltage (2.83 - 8.60v). If not present, trace circuit until open or short is found.

(6) If no open or short is found and the headlamp leveling system is still inoperative, replace the headlamp leveling motor (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(7) If testing is still inconclusive, (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP LEVELING SWITCH - DIAGNOSIS AND TESTING) for further tests.

REMOVAL

(1) Remove the headlamp assembly from the vehicle (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - REMOVAL).

(2) Disconnect the headlamp leveling motor wire connector.

(3) Place the headlamp assembly on a bench with a protective surface under the lens to prevent damage.

(4) Grasp the leveling motor and rotate approximately 45 degrees to unlatch it from the lamp housing.

HEADLAMP LEVELING MOTOR - EXPORT (Continued)

(5) Using an appropriate prying tool, place the edge of tool between leveling motor gasket and headlamp assembly. Pry the leveling motor up and out.

NOTE: Significant force will be required to unsnap the leveling motor pushrod from the headlamp reflector mechanism.

CAUTION: Be certain not to damage the lamp housing sealing surface.

INSTALLATION

(1) Be certain the replacement motor matches the configuration of the motor removed.

(2) Line up lugs on new motor with the corresponding openings on the headlamp housing making sure the ball stud on the motor lines up with ball stud receptacle on the lamp assembly. The receptacle can be moved by grasping the rubber boot area of the outboard lamp and moving by hand. Rotate the motor back into position to secure in place.

(3) Push down on outboard lamp until leveling motor ball stud snaps into place. Ensure that the ball stud is fully seated.

(4) Connect the headlamp leveling motor wire connector.

(5) Install the headlamp assembly on the vehicle (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - INSTALLATION).

(6) Verify headlamp leveling motor operation.

(7) Check the headlamps for proper alignment. Align the headlamps if required (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP UNIT - STANDARD PROCEDURE).

NOTE: Headlamps must be aligned with the headlamp leveling switch in the "0" position

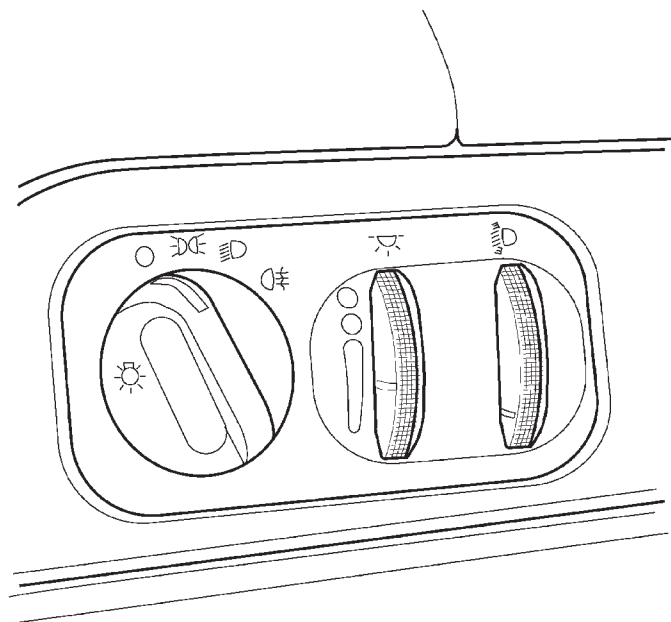
HEADLAMP LEVELING SWITCH - EXPORT

DESCRIPTION

The Headlamp Leveling Switch is located next to the headlamp switch (Fig. 25) and is the primary controller of the headlamp leveling system. The leveling switch has three settings 0-2, "0" being the lowest, "2" being the highest headlight beam vertical setting.

OPERATION

With the rotation of the headlamp leveling switch control knob, voltage is adjusted at the headlamp leveling switch (rheostat). This signals the headlamp



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Fig. 25 HEADLAMP LEVELING SWITCH - EXPORT

leveling motors (headlamp module mounted) to adjust the vertical headlamp beam pattern accordingly. The headlamps must be "ON" in order for the leveling system to function. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

DIAGNOSIS AND TESTING - HEADLAMP LEVELING SWITCH - EXPORT

(1) Disconnect and isolate the battery negative battery cable remote terminal.

(2) Remove the headlamp leveling switch from the instrument panel (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP SWITCH - REMOVAL).

(3) Disconnect the headlamp leveling switch electrical connector.

(4) Using an Ohm meter and the table below, check the resistance between the switch connector pins 1&2.

(5) If the test results are **NOT** as indicated in the HEADLAMP LEVELING SWITCH CONTINUITY table, replace the switch. If the test results **ARE** as indicated HEADLAMP LEVELING SWITCH CONTINUITY table, the switch is OK at this time. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR - DIAGNOSIS AND TESTING).

HEADLAMP LEVELING SWITCH - EXPORT (Continued)

HEADLAMP LEVELING SWITCH CONTINUITY

SWITCH POSITION	RESISTANCE BETWEEN PINS 1&2
0	0.752Ω
1	0.564Ω
2	348.8Ω

REMOVAL

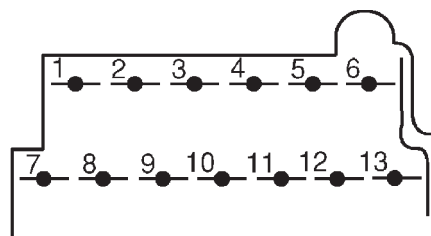
The headlamp leveling switch is integrated into the headlamp switch. If the headlamp leveling switch proves faulty the entire headlamp switch must be replaced. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP SWITCH - REMOVAL).

INSTALLATION

The headlamp leveling switch is integrated into the headlamp switch. If the headlamp leveling switch proves faulty the entire headlamp switch must be replaced. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP SWITCH - INSTALLATION)

POSITION	TERMINALS	RESISTANCE
RHEOSTAT (THUMBWHEEL) DIM POSITION	6 & 3	180 Ω - 1870 Ω (POT)
RHEOSTAT (THUMBWHEEL) BRIGHT POSITION (FUNERAL MODE)	6 & 3	2280 Ω - 2520 Ω
DOMELAMP	6 & 3	3230 Ω - 3570 Ω

REMOVAL



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HEADLAMP SWITCH

DIAGNOSIS AND TESTING - HEADLAMP SWITCH

Using an ohmmeter, test for resistance values between the terminals of the switch as shown in the Headlamp Switch Resistance table and (Fig. 26).

HEADLAMP SWITCH RESISTANCE

POSITION	TERMINALS	RESISTANCE
OFF	6 & 12	3600 Ω - 5400 Ω
PARK LAMP ON	6 & 12	44.65 Ω - 49.35 Ω
PARK LAMP W/FRONT FOG	6 & 12	64.6 Ω - 71.4 Ω
HEADLAMP ON	6 & 12	209.2 Ω - 231 Ω
HEADLAMP W/FRONT FOG	6 & 12	446.5 Ω - 493.5 Ω
AUTO	6 & 12	370.5 Ω - 409.5 Ω
AUTO WFRONT FOG	6 & 12	1251 Ω - 1529 Ω

Fig. 26 HEADLAMP SWITCH CONNECTOR

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove the left end cover, left instrument panel trim cover, and the cluster bezel. Refer to the various Removal and Installation procedures in this section.

(3) Remove the three screws retaining headlamp switch to cluster bezel.

(4) Remove headlamp switch from bezel.

(5) Twist out lamp sockets are serviceable at this time. Ensure that the switch is seated against the pad.

INSTALLATION

(1) Install the headlamp switch into bezel.

(2) Install the three screws retaining headlamp switch to cluster bezel.

(3) Install the left end cover, left instrument panel trim cover, and the cluster bezel. Refer to Instrument Panel, Removal and Installation.

(4) Connect the negative battery cable remote terminal to the remote battery post.

HEADLAMP UNIT

STANDARD PROCEDURE

STANDARD PROCEDURE - HEADLAMP UNIT ALIGNMENT

HEADLAMP UNIT ALIGNMENT PREPARATION

The vehicle headlamp units are equipped with a bubble level to aid up/down headlamp unit alignment. The bubble level is used to assist headlamp unit alignment when compensating for vehicle ride height changes due to heavy luggage compartment loads or vehicle ride height changes. The vehicle should always be on a level surface when headlamp unit alignments are checked or changed. Headlamp unit alignment should always be first attempted by using the bubble level.

The bubble levels cannot be calibrated. The bubble level adjustments are set by the manufacturer. Horizontal alignment does not ordinarily have to be changed except in the case of body damage or tampering.

(1) Verify headlamp dimmer switch and high beam indicator operation.

(2) Inspect and correct damaged or defective components that could interfere with proper headlamp alignment.

(3) Verify proper tire inflation.

(4) Clean headlamp lenses.

(5) Verify that luggage area is not heavily loaded.

(6) Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

ALIGNMENT SCREEN PREPARATION

(1) Position vehicle on a level surface perpendicular to a flat wall 7.62 meters (25 ft.) away from front of headlamp lens.

(2) If necessary, tape a line on the floor 7.62 meters (25 ft.) away from and parallel to the wall.

(3) From the floor up 1.27 meters (5 ft.), tape a line on the wall at the center line of the vehicle. Sight along the center line of the vehicle (from rear of vehicle forward) to verify accuracy of the line placement.

(4) Rock vehicle side-to-side three times to allow suspension to stabilize.

(5) Jounce front suspension three times by pushing downward on front bumper and releasing.

(6) Measure the distance from the center of the headlamp bulbs to the floor, or refer to HEADLAMP UNIT ALIGNMENT MEASUREMENT TABLE . Transfer measurement to the alignment screen (with tape). Use this line for up/down adjustment reference. Individual vehicles may vary.

(7) Measure distance from the center line of the vehicle to the center of the headlamp bulbs, or refer to the HEADLAMP UNIT ALIGNMENT MEASUREMENT TABLE . Transfer measurements to screen (with tape) to each side of vehicle center line. Use these lines for left/right adjustment reference (Fig. 27).

NOTE: There are reference marks on the lens to assist in locating the lamp centers.

HEADLAMP UNIT ALIGNMENT MEASUREMENT TABLE

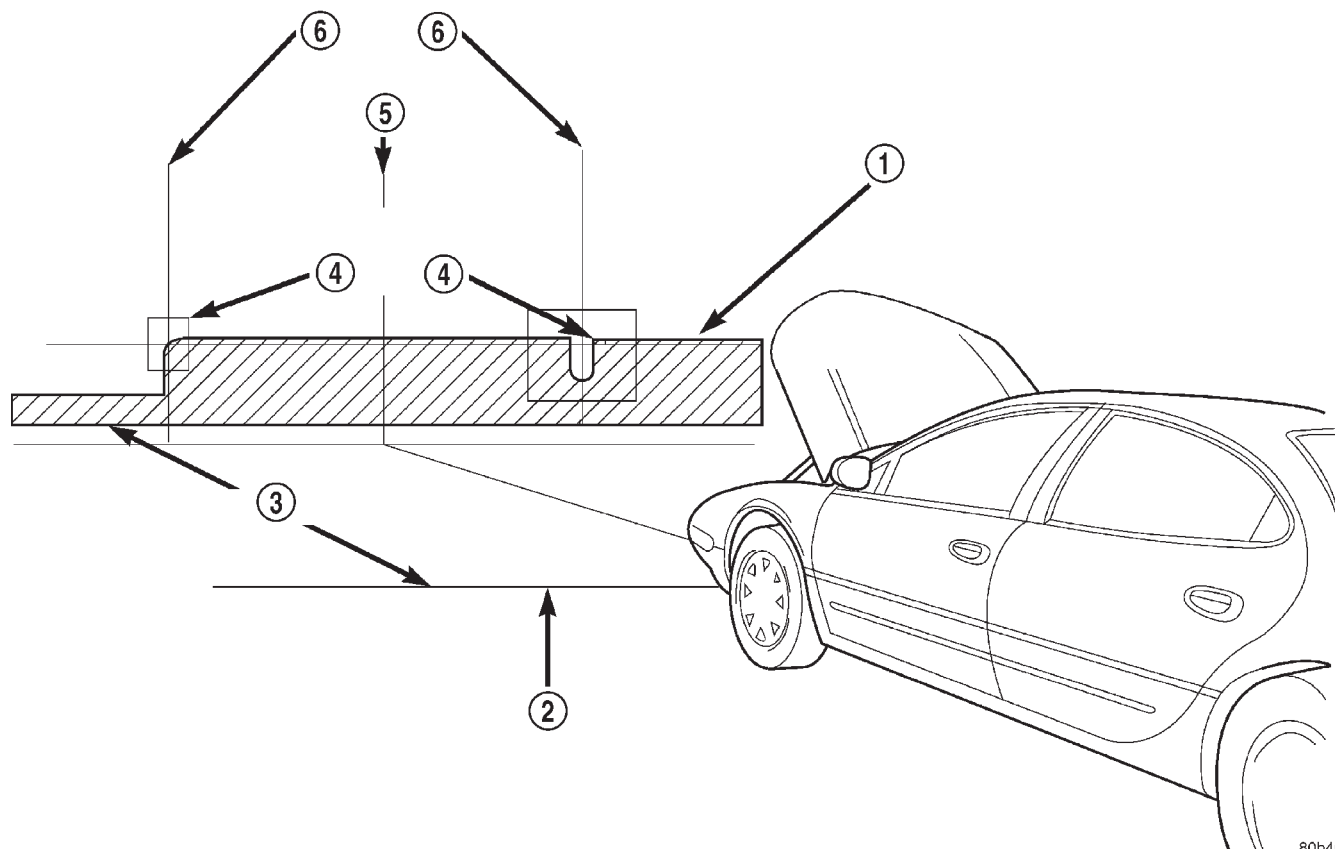
MODEL	LOW BEAM CENTERLINE TO GROUND		DISTANCE BETWEEN CENTERS (LOW BEAM)	
CONCORDE	25.0 in.	635.4 mm	54.2 in.	1376 mm
INTREPID	25.7 in.	652.4 mm	52.4 in.	1330 mm
LHS	25.0 in.	635.4 mm	49.3 in.	1254.5 mm
300M	24.8 in.	629.3	52.7 in.	1338.5 mm

HEADLAMP UNIT ADJUSTMENT

The low beam hot spot cut off should be within 2 inches above/below the horizontal center line, and to the right of the vertical center line (Fig. 27). This puts the low beam hot spot in the lower right quadrant of the aiming screen. Occasional stray filament images should be disregarded while verifying aim. Verify the vertical adjustment by checking the high

beams to ensure they are centered within ± 2 inches relative to the horizontal center line. The low beams should be shielded when checking high beams. Do NOT cover the headlamp(s) for extended periods, as the heat may damage them. To adjust headlamp alignment, rotate the alignment screws, (Fig. 28) and (Fig. 29) to achieve the specified pattern.

HEADLAMP UNIT (Continued)



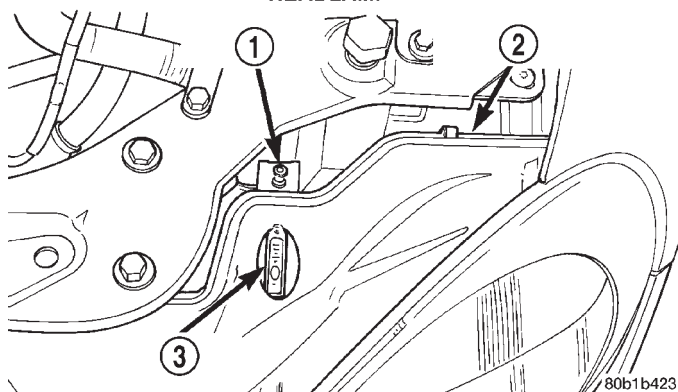
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Fig. 27 HEADLAMP UNIT ALIGNMENT SCREEN

- 1 - LOW BEAM CENTER LINE TO GROUND
 2 - FRONT OF HEADLAMP
 3 - 7.26 METERS (25 ft.)

- 4 - PREFERRED CUT OFF LOCATION \pm 2 INS.
 5 - CENTER OF VEHICLE
 6 - CENTER OF HEADLAMP

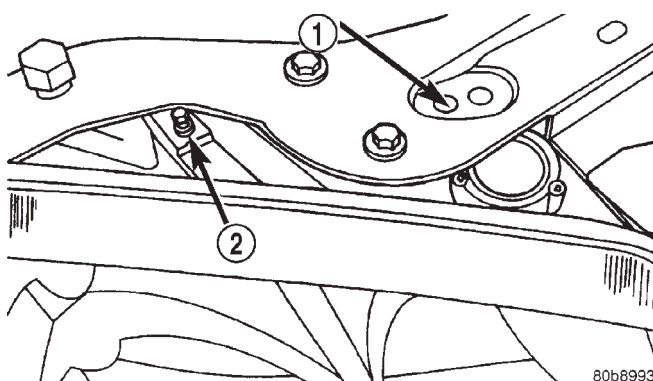
NOTE: THE HORIZONTAL ADJUSTER
 IS SHOWN BELOW THE TOP OF THE
 HEADLAMP



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Fig. 28 HEADLAMP UNIT ALIGNMENT SCREWS

- 1 - VERTICAL ADJUSTER
 2 - HORIZONTAL ADJUSTER
 3 - BUBBLE LEVEL



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Fig. 29 HEADLAMP UNIT ALIGNMENT SCREWS - INTREPID

- 1 - HORIZONTAL ADJUSTER
 2 - VERTICAL ADJUSTER

HEADLAMP UNIT (Continued)

STANDARD PROCEDURE - HEADLAMP UNIT ALIGNMENT - EXPORT**VEHICLE PREPARATION FOR HEADLAMP UNIT ALIGNMENT**

- (1) Verify the headlamp switch is in the low beam setting.
- (2) If the vehicle is equipped with a headlamp leveling system, be certain the headlamp leveling switch is in the "0" position.
- (3) Correct defective components that could hinder proper headlamp alignment.
- (4) Verify proper tire inflation.
- (5) Clean headlamp lenses.
- (6) Verify that luggage area is loaded as the vehicle is routinely used.
- (7) Fuel tank should be FULL. Add 2.94 kg (6.5 lbs.) of weight over the fuel tank for each estimated gallon of missing fuel.

ALIGNMENT SCREEN PREPARATION FOR HEADLAMP UNIT ALIGNMENT

- (1) Position vehicle on a level surface perpendicular to a flat wall 10 meters (32.8 ft) away from front of headlamp lens.
- (2) If necessary, tape a line on the floor 10 meters (32.8 ft) away from and parallel to the wall.
- (3) Place 75 kg in the drivers seat to simulate the ride height of the vehicle when driven.
- (4) Measure from the floor up 1.27 meters (5 ft) and tape a line on the wall at the centerline of the vehicle (Fig. 30). Sight along the centerline of the vehicle (from rear of vehicle forward) to verify accuracy of the line placement.
- (5) Rock vehicle side-to-side three times to allow suspension to stabilize.
- (6) Jounce front suspension three times by pushing downward on front bumper and releasing.
- (7) Measure the distance from the center of headlamp lens to the floor. Transfer measurement to the alignment screen (with tape). Use this line for up/down adjustment reference (this should be 623 mm (24.5 in.)).
- (8) Place a tape line 100 mm (4 in.) below and parallel to the center of headlamp line (Fig. 30).
- (9) Measure distance from the centerline of the vehicle to the center of each headlamp unit being aligned. Transfer measurements to screen (with tape) to each side of vehicle centerline. Use these lines for left/right adjustment reference (this should be 1338.5 mm (52.7 in.)).

HEADLAMP UNIT ADJUSTMENT

A properly aimed low beam headlamp will project a high intensity light pattern on the screen with the horizontal cut-off line aligned with the tape line 100

mm (4 in.) below the headlamp centerline (Fig. 30). The intersection of the horizontal and 15 degree cut-off lines in the projected pattern should align to the intersection of the headlamp centerline vertical tape line and the tape line 100 mm (4 in.) below the headlamp horizontal centerline.

NOTE: The vehicles low beam headlamps must be ON during the headlamp alignment procedure. The high beam pattern will be correct when the low beams are aligned properly.

NOTE: The headlamp leveling switch must be in the "0" position. Failure to do so will result in improperly adjusted headlamps.

To adjust headlamp unit alignment, rotate alignment screws to achieve the specified low beam hot spot pattern (Fig. 30).

REMOVAL**CONCORDE/300M**

NOTE: Headlamp lens fogging is a normal condition and does not require service unless excessive or continual. Moisture will vent from tubes or vents located on the back of the lamp.

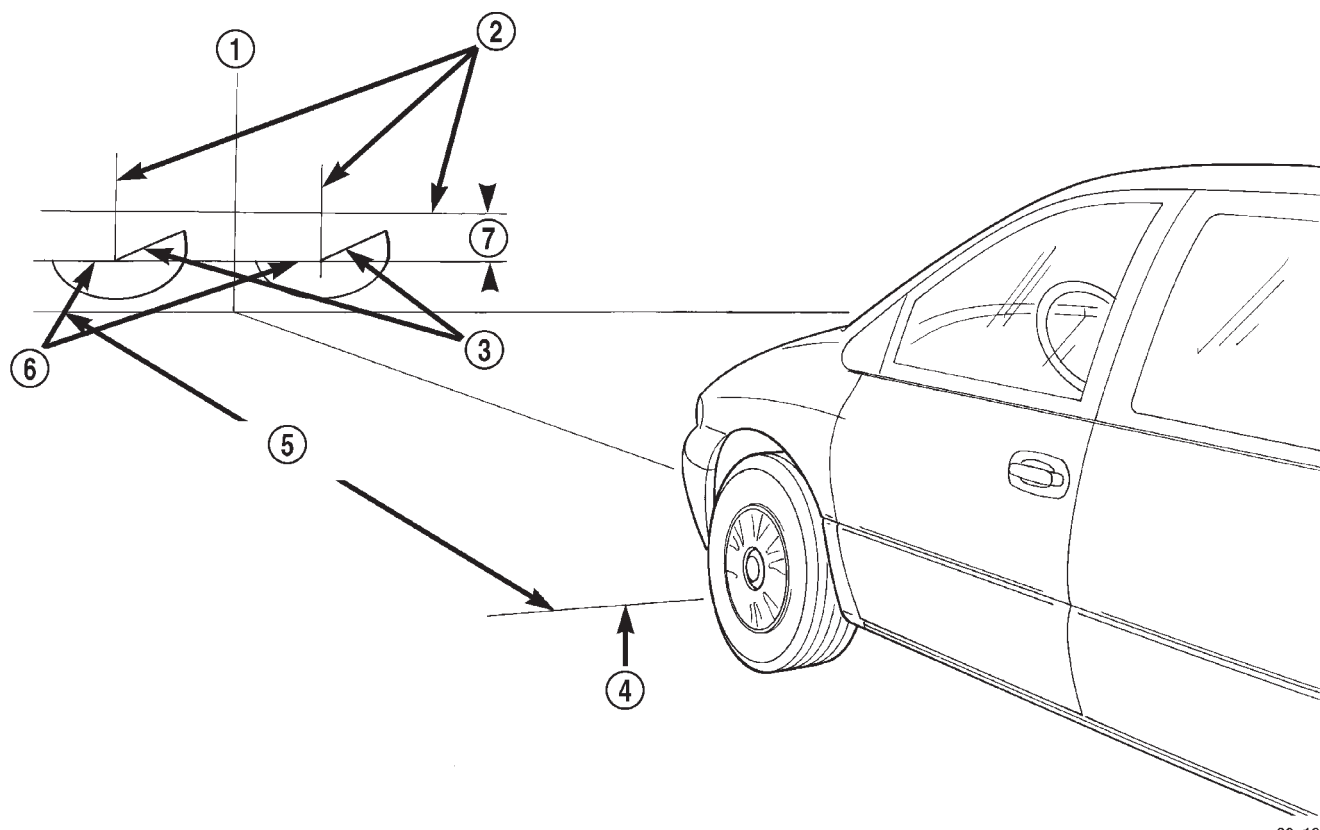
- (1) Release hood latch and open hood.
- (2) Disconnect and isolate the battery negative cable.
- (3) Remove the headlamp sight shield (300M).
- (4) Remove the upper crossmember attachments, both sides, headlamp jackscrews, windshield filler neck screw, and speed control servo screw (Fig. 31).
- (5) Lift and prop the crossmember above the headlamp on the side being serviced, and remove the electrical connectors from the headlamp.
- (6) Pull headlamp up and under crossmember to remove it from the vehicle.

INTREPID

NOTE: Headlamp lens fogging is a normal condition and does not require service unless excessive or continual. Moisture will vent from tubes or vents located on the back of the lamp.

- (1) Release hood latch and open hood.
- (2) Disconnect and isolate the battery negative cable.
- (3) Remove jackscrews attaching headlamp to body (Fig. 32).
- (4) Remove headlamp from body.
- (5) Disconnect wire connector from headlamp and parking, side marker, and turn signal lamps.
- (6) Remove headlamp housing from vehicle.

HEADLAMP UNIT (Continued)

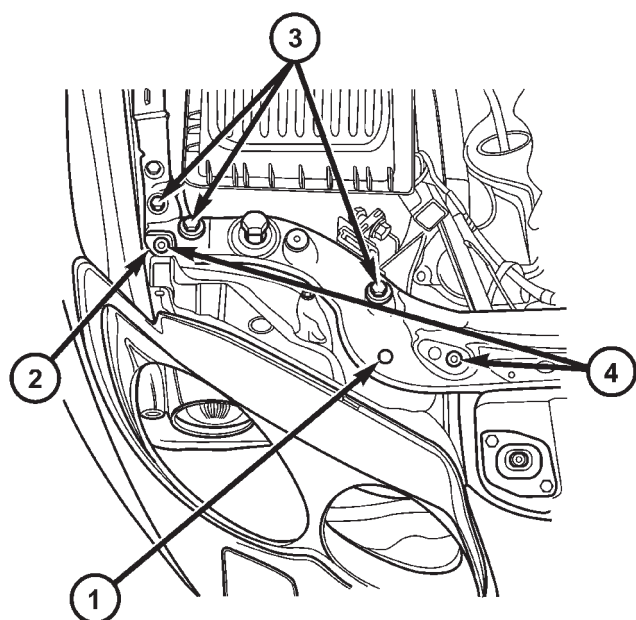


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Fig. 30 HEADLAMP ALIGNMENT SCREEN - EXPORT

- 1 - CENTER OF VEHICLE
- 2 - CENTER OF HEADLAMPS
- 3 - 15° CUT-OFF LINE
- 4 - FRONT OF HEADLAMP

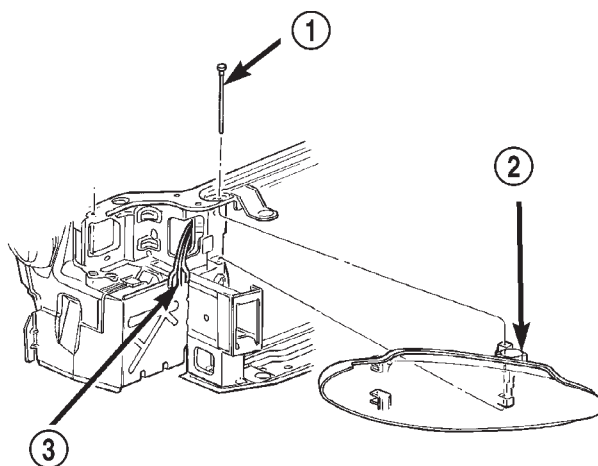
- 5 - 10 METERS (32.8 FT.)
- 6 - HORIZONTAL CUT-OFF LINE
- 7 - 100 MM



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Fig. 31 HEADLAMP ATTACHMENT

- 1 - CROSSMEMBER ATTACHMENTS DELETED
- 2 - HEADLAMP ATTACHMENT ELIMINATED
- 3 - CROSSMEMBER ATTACHMENTS
- 4 - HEADLAMP ATTACHMENTS (JACKSCREWS)



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Fig. 32 HEADLAMP UNIT - INTREPID

- 1 - JACKSCREW
- 2 - HEADLAMP HOUSING
- 3 - BODY WIRE CONNECTOR

HEADLAMP UNIT (Continued)

INSTALLATION

CONCORDE/300M

CAUTION: Do not touch the glass of halogen bulbs with fingers or other possibly oily surface, reduced bulb life will result.

NOTE: If replacing complete headlamp unit, transfer halogen bulb to new unit.

- (1) Put headlamp under crossmember to install it into the vehicle.
- (2) Install the electrical connectors to the headlamp, and lower the crossmember on the side being serviced.
- (3) Install the upper crossmember attachments, both sides, headlamp jackscrews, windshield filler neck screw, and speed control servo screw.
- (4) Install the headlamp sight shield (300M).
- (5) Connect and the battery negative cable.
- (6) Verify headlamp operation and alignment.
- (7) Close hood.

INTREPID

NOTE: Headlamp lens fogging is a normal condition and does not require service unless excessive or continual. Moisture will vent from tubes or vents located on the back of the lamp.

- (1) Place headlamp housing in position on vehicle.
- (2) Connect wire connectors to headlamp, parking, side marker, and turn signal lamps.
- (3) Place headlamp in position on body.
- (4) Install screws to attach headlamp to body.
- (5) Connect the battery negative cable and close hood.
- (6) Verify headlamp operation and alignment.

LICENSE PLATE LAMP

REMOVAL

- (1) Remove screws attaching license plate lamp to rear bumper fascia.
- (2) Remove license plate lamp from rear bumper fascia.
- (3) Remove socket from lamp (Fig. 33).
- (4) Pull bulb from socket.

INSTALLATION

- (1) Push bulb into socket.
- (2) Install socket into lamp.
- (3) Place license plate lamp in position on rear bumper fascia.

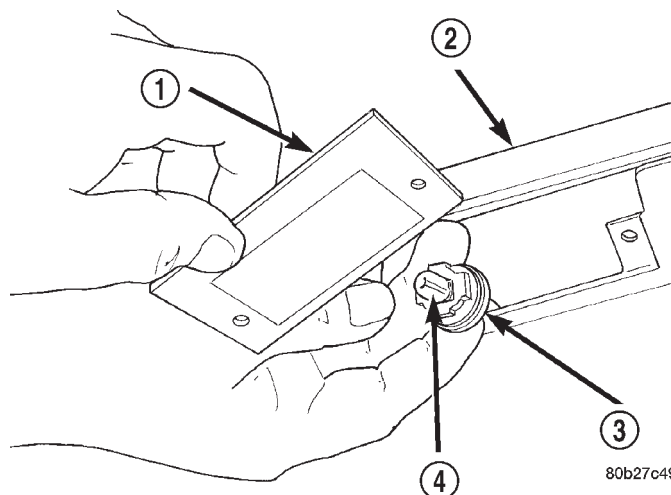


Fig. 33 LICENSE PLATE LAMP

- 1 - LICENSE PLATE LAMP
- 2 - TRUNK LID
- 3 - SOCKET
- 4 - BULB

- (4) Install screws to attach license plate lamp to rear bumper fascia.

LICENSE PLATE LAMP UNIT

REMOVAL

- (1) Remove screws holding license plate lamp to fascia (Fig. 34).
- (2) Remove license plate lamp from vehicle.

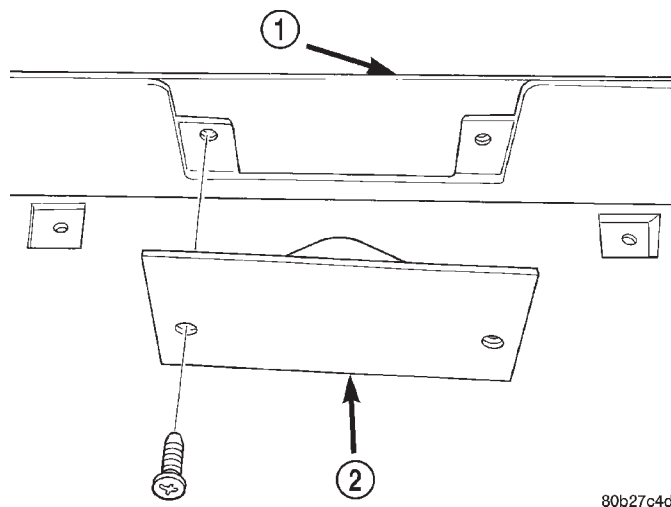


Fig. 34 LICENSE PLATE LAMP UNIT

- 1 - APPLIQUE OR FASCIA
- 2 - LICENSE PLATE LAMP

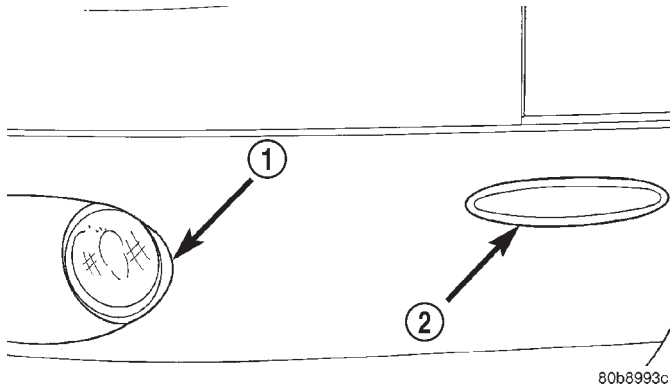
LICENSE PLATE LAMP UNIT (Continued)

INSTALLATION

- (1) Place license plate lamp in position on vehicle.
- (2) Install screws to attach license plate lamp to fascia.

MARKER LAMP - CONCORDE**REMOVAL**

- (1) Disconnect and isolate the battery negative cable.
- (2) Reach under the fascia and remove the socket from the side marker lamp housing (Fig. 35).
- (3) Pull bulb from socket.

**Fig. 35 FRONT SIDE MARKER LAMP - CONCORDE**

- 1 - FOG LAMP
2 - SIDE MARKER

INSTALLATION

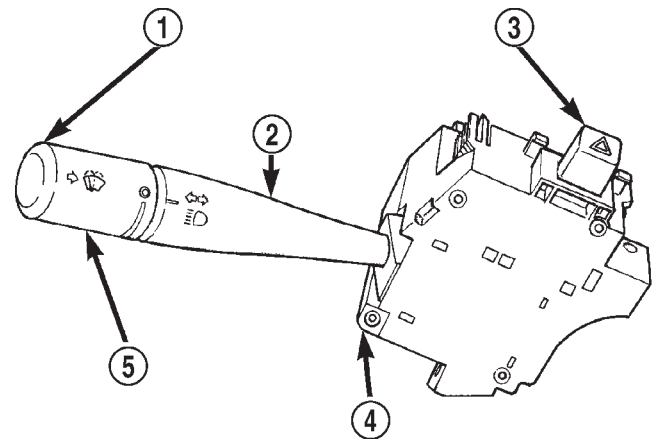
- (1) Push bulb into socket.
- (2) Install socket into front side marker lamp housing.
- (3) Connect the battery negative cable and close hood.
- (4) Verify park and front side marker lamp operation.

MARKER LAMP UNIT - CONCORDE**REMOVAL**

- (1) Loosen fascia as necessary to access lamp.
- (2) Remove bulb socket from lamp.
- (3) Disconnect fasteners attaching side marker lamp to fascia (Fig. 35).
- (4) Remove attaching fasteners.
- (5) Remove lamp unit from vehicle.

INSTALLATION

- (1) Place lamp in position on fascia.
- (2) Install lamp fasteners.
- (3) Install bulb socket in lamp.
- (4) Connect wire harness connector.
- (5) Verify lamp operation.
- (6) Attach fascia to vehicle.

MULTI-FUNCTION SWITCH**DESCRIPTION****MULTI-FUNCTION SWITCH****Fig. 36 MULTI-FUNCTION SWITCH**

- 1 - WINDSHIELD WASHER BUTTON
2 - CONTROL STALK (BEAM SELECT)
3 - HAZARD WARNING BUTTON
4 - MULTI-FUNCTION SWITCH
5 - WINDSHIELD WIPER CONTROL

The turn signals are part of the multi-function switch (Fig. 36) which contains:

- Electrical circuitry for turn signals.
- Hazard warning switch.
- Headlamp beam select switch.
- Headlamp optical horn.
- Windshield wiper switch.
- Pulse wipe and windshield washer switching.

The integrated switch assembly is mounted to the left hand side of the steering column.

HAZARD WARNING SYSTEM

The hazard warning system is actuated by a push button located on the top of the steering column between the steering wheel and the instrument panel (Fig. 36). The hazard switch is identified with a double triangle on top of the button.

MULTI-FUNCTION SWITCH (Continued)

OPERATION

MULTI-FUNCTION SWITCH

When the driver wishes to signal his intentions to change direction of travel, he moves the lever upward to cause the right signals to flash and downward to cause the left signals to flash. After completion of a turn the system is deactivated automatically. As the steering wheel returns to the straight ahead position, a canceling cam molded to the clock spring mechanism comes in contact with the cancel actuator on the turn signal multi-function switch assembly. The cam lobe, pushing on the cancel actuator, returns the switch to the off position.

If only momentary signaling such as indication of a lane change is desired, the switch is actuated to a left or right intermediate detent position. In this position the signal lamps flash as described above, but the switch returns to the OFF position as soon as the lever is released.

When the system is activated, one of two indicator lamps mounted in the instrument cluster flashes in unison with the turn signal lamps, indicating to the driver that the system is operating.

HAZARD WARNING SYSTEM

Push and release the button to turn the hazard function ON or OFF. The button will move out from the steering column in the ON position and will remain in toward the column in the OFF position.

DIAGNOSIS AND TESTING - MULTI-FUNCTION SWITCH

The multi-function switch contains electrical circuitry for turn signal, hazard warning, headlamp beam select, headlamp optical horn, windshield wiper, pulse wiper, and windshield washer switching. Refer to Electrical, Wipers/Washers, Description and Operation for wiper and washer functions. This integrated switch assembly is mounted to the left hand side of the steering column. Should any function of the switch fail, the entire switch assembly must be replaced. Refer to the COMBINATION FLASHER DIAGNOSIS table.

To test the switch, the switch must first be removed. Refer to Multi-function Switch Removal and Installation. Using an ohmmeter, test for continuity (no resistance) between the terminals of the switch as shown in the TURN SIGNAL AND HAZARD SWITCH CONTINUITY table, BEAM SELECT SWITCH CONTINUITY table, (Fig. 37), and (Fig. 38).

COMBINATION FLASHER DIAGNOSIS

CONDITION	POSSIBLE CAUSES	CORRECTION
SYSTEM DOES NOT FLASH ON ONE SIDE, INDICATOR LAMP FLASHES AT DOUBLE NORMAL RATE.	1. FAULTY EXTERNAL LAMP. 2. POOR GROUND AT LAMP. 3. OPEN CIRCUIT IN WIRING TO EXTERNAL LAMP.	1. REPLACE LAMP. 2. CHECK AND/OR REPLACE WIRING. 3. REPLACE WIRING HARNESS. CHECK CONNECTIONS.
INDICATOR LAMP FLASHES AT DOUBLE NORMAL RATE. EXTERNAL LAMP-DIM AND FLASHES RAPIDLY OR NO FLASH.	1. LOOSE OR CORRODED EXTERNAL LAMP CONNECTION. 2. POOR GROUND CIRCUIT AT EXTERNAL LAMP.	1. REPLACE SOCKET/HARNESS. 2. REPLACE WIRING HARNESS. CHECK CONNECTORS.

MULTI-FUNCTION SWITCH (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
HAZARD WARNING MALFUNCTION/SYSTEM DOES NOT FLASH.	<ol style="list-style-type: none"> 1. FAULTY FUSE. 2. FAULTY FLASHER UNIT. 3. OPEN CIRCUIT IN FEED WIRE TO SWITCH. 4. FAULTY CONTACT IN SWITCH. 5. OPEN OR GROUNDED CIRCUIT IN WIRING TO EXTERNAL LAMPS. 	<ol style="list-style-type: none"> 1. REPLACE FUSE. 2. REPLACE FLASHER UNIT. 3. REPLACE WIRING HARNESS. CHECK CONNECTORS. 4. REPLACE MULTI-FUNCTION SWITCH. 5. REPLACE WIRING HARNESS.
INDICATOR LAMP FLASHES AT DOUBLE NORMAL RATE. EXTERNAL LAMP DOES NOT LIGHT.	<ol style="list-style-type: none"> 1. OPEN CIRCUIT IN WIRE TO EXTERNAL LAMP. 2. BURNED OUT LAMP. 	<ol style="list-style-type: none"> 1. REPLACE WIRING HARNESS. 2. REPLACE LAMP.
SYSTEM DOES NOT FLASH ON EITHER SIDE.	<ol style="list-style-type: none"> 1. FAULTY FUSE. 2. FAULTY FLASHER UNIT. 3. LOOSE BULKHEAD CONNECTOR. 4. LOOSE OR FAULTY REAR WIRING HARNESS OR TERMINALS. 5. OPEN CIRCUIT TO FLASHER UNIT. 6. OPEN CIRCUIT IN FEED WIRE TO TURN SIGNAL SWITCH. 7. FAULTY SWITCH CONNECTION IN SWITCH. 8. OPEN OR GROUNDED CIRCUIT IN WIRING TO EXTERNAL LAMPS. 9. BURNED OUT LAMPS. 	<ol style="list-style-type: none"> 1. REPLACE FUSE. 2. REPLACE FLASHER UNIT. 3. TIGHTEN CONNECTOR. 4. REPLACE WIRING HARNESS. 5. CHECK CONNECTORS, REPLACE WIRING HARNESS. 6. CHECK CONNECTORS, REPLACE WIRING HARNESS. 7. REPLACE SWITCH. 8. REPLACE WIRING HARNESS. 9. REPLACE LAMPS.
SYSTEM DOES NOT CANCEL AFTER COMPLETION OF TURN.	<ol style="list-style-type: none"> 1. BROKEN CANCELLING FINGER ON SWITCH. 2. BROKEN OR MISSING CANCELLING CAM ON CLOCK SPRING. 3. STICKING CANCELLING FINGER ON MULTI-FUNCTION SWITCH. 	<ol style="list-style-type: none"> 1. REPLACE MULTI-FUNCTION SWITCH. 2. REPLACE CLOCK SPRING. 3. REPLACE MULTI-FUNCTION SWITCH.
EXTERNAL LAMPS OPERATE PROPERLY, NO INDICATOR LAMP OPERATION.	<ol style="list-style-type: none"> 1. FAULTY INDICATOR LAMP IN INSTRUMENT CLUSTER. 	<ol style="list-style-type: none"> 1. REPLACE LAMP.

MULTI-FUNCTION SWITCH (Continued)

TURN SIGNAL AND HAZARD SWITCH

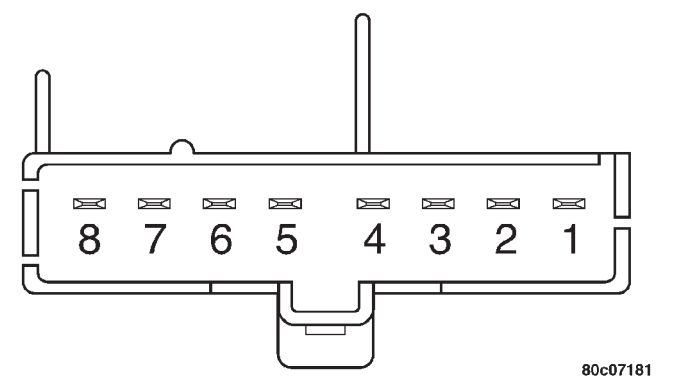


Fig. 37 TURN SIGNAL AND HAZARD SWITCH
CONNECTOR PIN CALL OUT
CONTINUITY

SWITCH POSITION		CONTINUITY
TURN SIGNAL	HAZARD WARNING	
NEUTRAL	OFF	1 AND 2
LEFT	OFF	7 AND 6
RIGHT	OFF	7 AND 8
NEUTRAL	ON	2 AND 3 7 AND 8 7 AND 6 4 AND 5

BEAM SELECT SWITCH CONTINUITY

SWITCH POSITION	CONTINUITY
LOW BEAM	7 AND 5
HIGH BEAM	7 AND 4
OPTICAL HORN	6 AND 4

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove tilt lever.
- (3) Remove both upper and lower steering column shrouds. Refer to Body, Instrument Panel, Steering Column Shrouds, Removal.
- (4) Remove multi-function switch mounting screws and connectors (Fig. 39).

INSTALLATION

- (1) Install the multi-function switch connectors and mounting screws (Fig. 39).
- (2) Tighten multi-function switch retaining screws to 17 in. lbs. (2 N·m) torque.

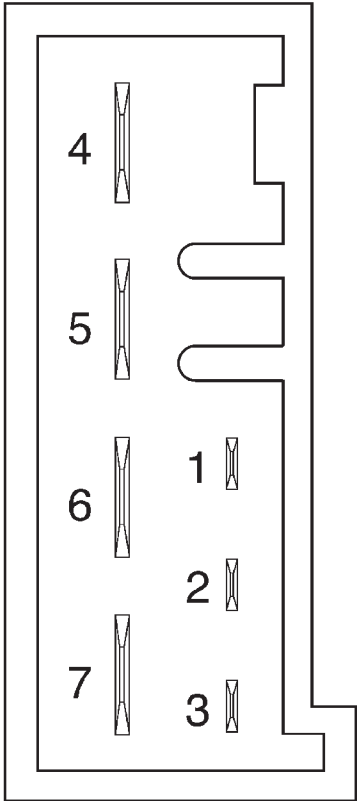


Fig. 38 BEAM SELECT SWITCH CONNECTOR PIN
CALL OUT

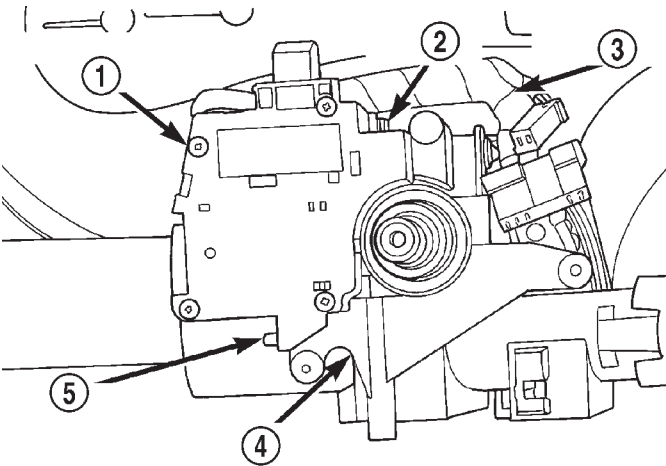


Fig. 39 MULTI-FUNCTION SWITCH

- 1 - MULTIFUNCTION SWITCH
- 2 - MOUNTING SCREW
- 3 - WIRING HARNESS
- 4 - STEERING COLUMN
- 5 - MOUNTING SCREW

MULTI-FUNCTION SWITCH (Continued)

(3) Install both upper and lower steering column shrouds. Refer to Body, Instrument Panel, Steering Column Shrouds, Installation.

(4) Install the tilt lever.

(5) Connect the negative battery cable remote terminal to the remote battery post.

PARK/TURN SIGNAL LAMP

REMOVAL

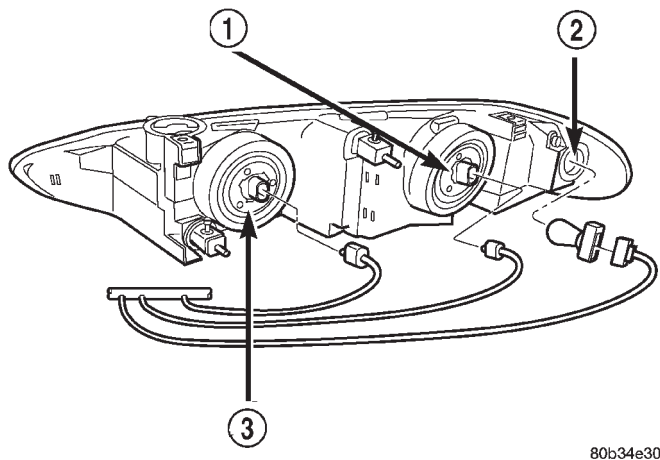
INTREPID

(1) Open Hood, disconnect and isolate the battery negative cable.

(2) Remove headlamp.

(3) Rotate and pull socket from lamp housing.

(4) Pull bulb from socket (Fig. 40).



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Fig. 40 PARKING, SIDE MARKER, AND TURN SIGNAL LAMP BULB - INTREPID

1 - BULB
2 - SOCKET

300M

(1) Open Hood, disconnect and isolate the battery negative cable.

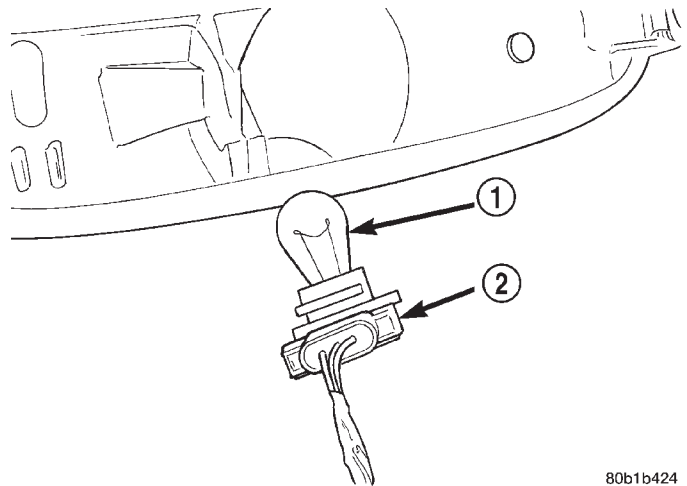
(2) Reach under the fascia and remove the socket from the lamp housing (Fig. 41).

(3) Rotate and pull socket from lamp housing.

(4) Pull bulb from socket.

CONCORDE

(1) Remove headlamp housing from vehicle.



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Fig. 41 PARKING, SIDE MARKER, AND TURN SIGNAL LAMP BULB - 300M

1 - BULB
2 - SOCKET

(2) Disconnect wire connector from back of lamp socket(s).

(3) Rotate socket and pull lamp socket from headlamp housing.

(4) Remove bulb from lamp socket.

INSTALLATION

INTREPID

(1) Push bulb into socket (Fig. 40).

(2) Install the lamp socket into lamp housing.

(3) Install the lamp housing.

(4) Install the jack screws attaching headlamp to crossmember.

(5) Connect the negative battery cable and close hood.

300M

(1) Push bulb into socket (Fig. 41). Rotate socket.

(2) Reach under the fascia and place the socket into the lamp housing and rotate to lock.

(3) Connect and the battery negative cable and close hood.

CONCORDE

(1) Push bulb into lamp socket.

(2) Place lamp socket into headlamp housing and rotate to the lock position.

(3) Connect wire connector to lamp socket(s).

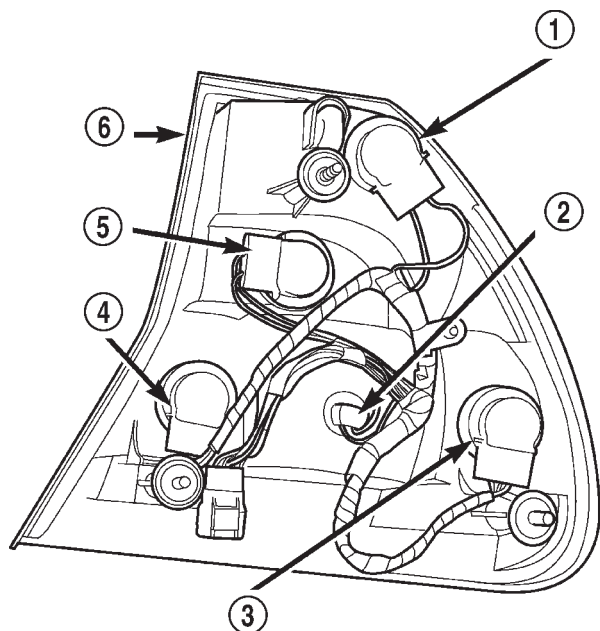
(4) Verify headlamp operation.

(5) Install headlamp housing.

(6) Verify headlamp operation and alignment.

REAR FOG LAMP - EXPORT

DESCRIPTION



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Fig. 42 TAIL LAMP BULBS

- 1 - REAR TURN SIGNAL LAMP
- 2 - REAR TAIL LAMP
- 3 - REAR STOP LAMP
- 4 - REAR FOG LAMP
- 5 - BACK-UP LAMP
- 6 - TAIL LAMP ASSEMBLY

Some vehicles are equipped with rear fog lamps (Fig. 42). The rear fog lamp is integrated into the tail lamp assembly. If the rear fog lamp proves faulty the entire tail lamp must be replaced. Rear fog lamps utilize a red lens and clear bulb.

Rear fog lamps are standard equipment in certain parts of the world where excessive fog is experienced on a regular basis.

OPERATION

The rear fog lamps are turned ON and OFF with the rear fog lamp switch. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/FOG LAMP SWITCH - OPERATION) and Wiring Diagrams.

DIAGNOSIS AND TESTING - REAR FOG LAMP - EXPORT

NOTE: Battery must be completely charged (12v) prior to testing. It may also be necessary to install battery charger on the vehicles electrical system when performing this test. Refer to the Battery section of the service manual for detailed information.

(1) Remove the rear fog lamp bulb and check for burned out condition, replace bulb if necessary.

(2) If bulb appears OK, reinstall the bulb in its socket and turn fog lamps ON and check for proper operation. If lamp is still inoperative proceed to Step 3.

(3) Remove lamp bulb and check for proper power (12v) and ground connections in lamp socket. If power and/or ground connections are not present, trace wire until open or short is found.

REMOVAL

(1) Remove the tail lamp from the vehicle.

(2) Rotate the rear fog lamp socket one-third turn and pull from lamp housing (Fig. 42).

(3) Pull the rear fog lamp bulb straight from its socket.

INSTALLATION

(1) Install the rear fog lamp bulb and socket in the lamp housing (Fig. 42).

(2) Verify lamp operation.

(3) Install the tail lamp assembly in the vehicle.

REAR FOG LAMP SWITCH - EXPORT

DESCRIPTION

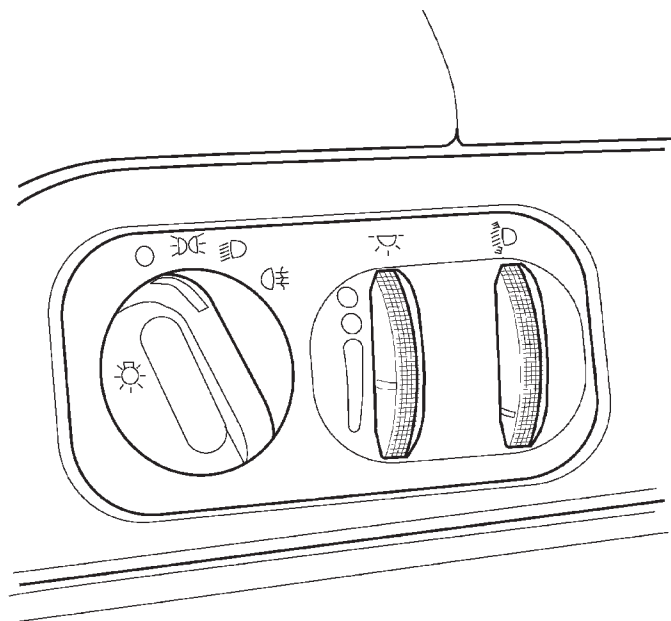


Fig. 43 REAR FOG LAMP SWITCH

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Vehicles equipped with rear fog lamps utilize a rear fog lamp switch. This switch is located next to the headlamp switch on (Fig. 43). The rear fog lamp switch is the primary controller of the rear fog lamps.

REAR FOG LAMP SWITCH - EXPORT (Continued)

OPERATION

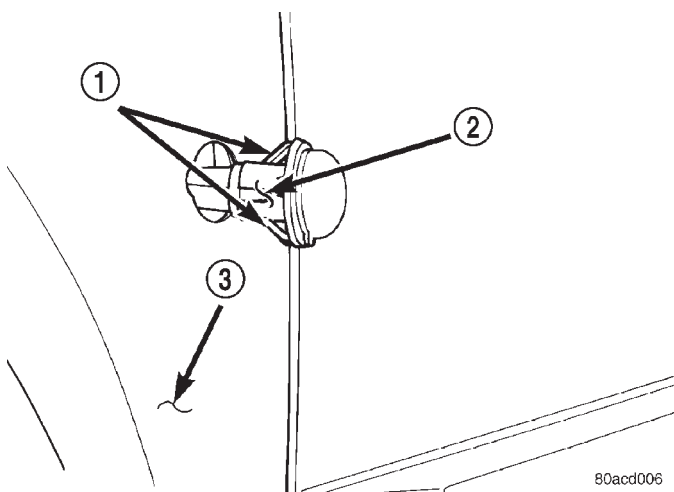
With the rotation of the rear fog lamp switch, voltage is sent through the rear fog lamp switch. This illuminates the rear fog lamp or lamps. The headlamps must be "on" in order for the rear fog lamp/s to function. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

REMOVAL

The rear fog lamp switch is integrated into the headlamp switch on LH models. If the rear fog lamp switch proves faulty the entire headlamp switch must be replaced. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP SWITCH - REMOVAL).

INSTALLATION

The rear fog lamp switch is integrated into the headlamp switch on LH models. If the rear fog lamp switch proves faulty the entire headlamp switch must be replaced. (Refer to 8 - ELECTRICAL/LAMPS/LIGHTING - EXTERIOR/HEADLAMP SWITCH - INSTALLATION).

SIDE REPEATER LAMP - EXPORT**DESCRIPTION****Fig. 44 SIDE REPEATER LAMP**

- 1 - SIDE REPEATER LAMP RETAINING TABS
- 2 - SIDE REPEATER LAMP HOUSING
- 3 - FENDER

One Side Repeater Lamp can be found on each side of the vehicle just behind the front wheel (Fig. 44). The side repeater lamp utilizes an amber colored housing and clear bulb.

OPERATION

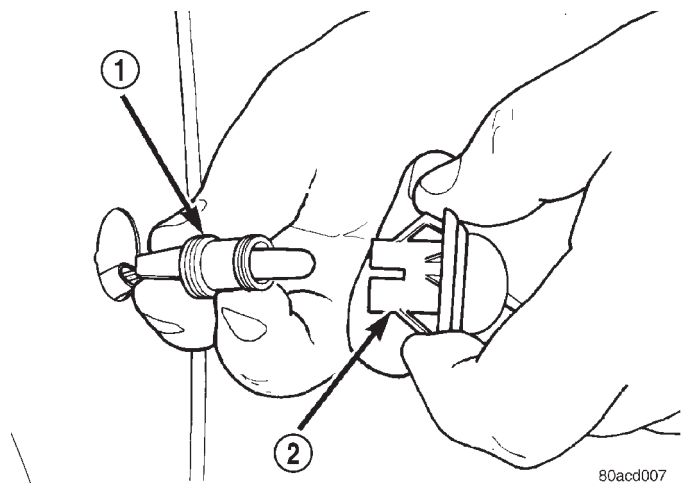
The side repeater lamps are turned ON or OFF with the turn signal lamps. These lamps are controlled by the steering column mounted multi-function switch.

DIAGNOSIS AND TESTING - SIDE REPEATER LAMP - EXPORT

- (1) Remove the suspect side repeater lamp bulb and check for burned out condition. Replace bulb if necessary.
- (2) If the bulb appears to be OK, reinstall the bulb in its socket and rotate the ignition switch to the ON position. Turn the appropriate turn signal lamp ON and check for lamp operation. If lamp is still inoperative proceed to Step 3.
- (3) Remove the suspect side repeater lamp bulb and check for power (12v) and ground connections in lamp socket. If either are not present, trace wire until open or short is found.

REMOVAL

- (1) Open front door.
- (2) Reach up behind the side repeater lamp and depress the two lamp unit retaining tabs. Remove the lamp unit from the fender opening.
- (3) Rotate the side repeater lamp unit counter-clockwise and remove the lamp socket from the lamp unit (Fig. 45).

**Fig. 45 SIDE REPEATER LAMP/HOUSING**

- 1 - BULB SOCKET
- 2 - SIDE REPEATER LAMP UNIT

- (4) Pull the lamp bulb straight from its socket.

SIDE REPEATER LAMP - EXPORT (Continued)

INSTALLATION

- (1) Install the side repeater lamp bulb in the socket.
- (2) Verify lamp operation.
- (3) Install the side repeater lamp socket into the lamp unit.
- (4) Install the side repeater lamp in the front fender. Be certain lamp unit is secure in fender.

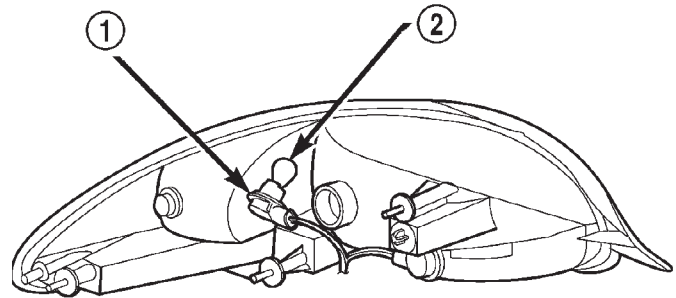
SIDE REPEATER LAMP UNIT - EXPORT

REMOVAL

- (1) Working in the appropriate front wheel well, remove the rear most fasteners from the front wheelhouse liner.
- (2) Reach up behind the side repeater lamp and depress the two lamp housing retaining tabs (Fig. 45). Remove the side repeater lamp unit from the fender opening.
- (3) Rotate the side repeater lamp unit counter-clockwise and remove the lamp socket from the lamp unit (Fig. 45).

INSTALLATION

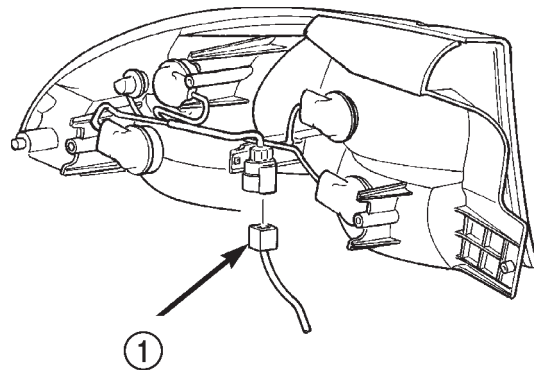
- (1) Install the side repeater lamp socket into the lamp unit.
- (2) Install the side repeater lamp in the front fender (Fig. 45). Be certain lamp is secure within the fender.
- (3) Install the front wheelhouse liner.
- (4) Verify lamp operation.



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Fig. 46 TAIL LAMP - CONCORDE

- 1 - SOCKET
2 - BULB



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Fig. 47 TAIL LAMP - INTREPID

- 1 - BODY WIRE HARNESS CONNECTOR

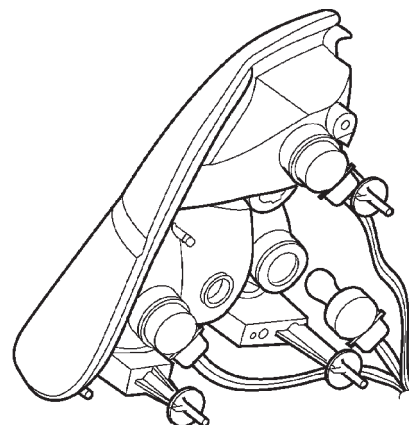
TAIL LAMP

REMOVAL

- (1) Release decklid latch and open decklid.
- (2) Remove trunk lining from rear closure panel as necessary to gain access to tail lamp fasteners.
- (3) Remove nuts attaching tail lamp to rear closure panel.
- (4) Remove tail lamp from rear closure panel.
- (5) Remove socket(s) from tail lamp unit (Fig. 46), (Fig. 47), and (Fig. 48).
- (6) Pull lamp from socket.

INSTALLATION

- (1) Push lamp into socket.
- (2) Install socket(s) in tail lamp unit.
- (3) Place tail lamp unit in position on rear closure panel.
- (4) Install nuts attaching tail lamp unit to rear closure panel.
- (5) Install trunk lining.



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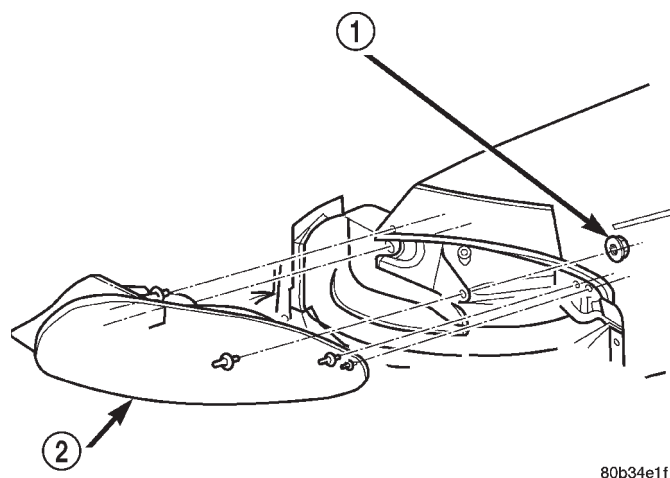
Fig. 48 TAIL LAMP - 300M

- (6) Connect the battery negative cable and close hood.
- (7) Verify lamp operation.

TAIL LAMP UNIT

REMOVAL

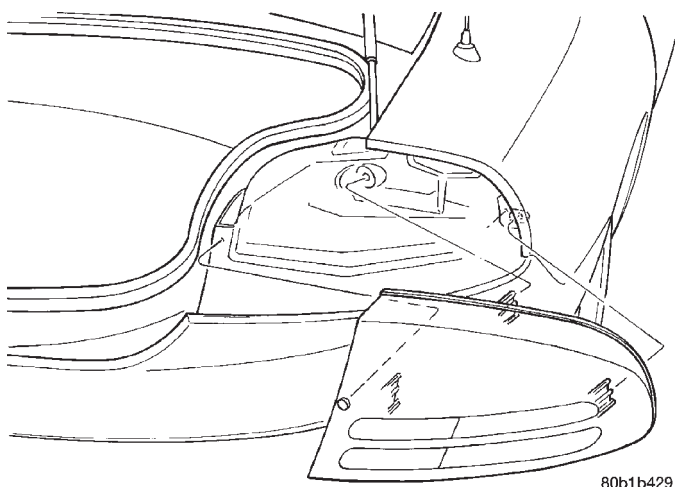
- (1) Release decklid latch and open decklid.
- (2) Remove fasteners attaching trunk lining to lower rear trunk panel.
- (3) Move the trunk lining to access the tail lamp unit fasteners.
- (4) Remove nuts attaching tail lamp unit to lower trunk and quarter panel (Fig. 49), (Fig. 50) and (Fig. 48).
- (5) Remove tail lamp unit from vehicle.
- (6) Disconnect tail lamp unit wire connector from body wire harness.



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Fig. 49 TAIL LAMP - CONCORDE

- 1 - PLASTIC HEX NUT (4)
2 - TAIL LAMP UNIT



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Fig. 50 TAIL LAMP - INTREPID

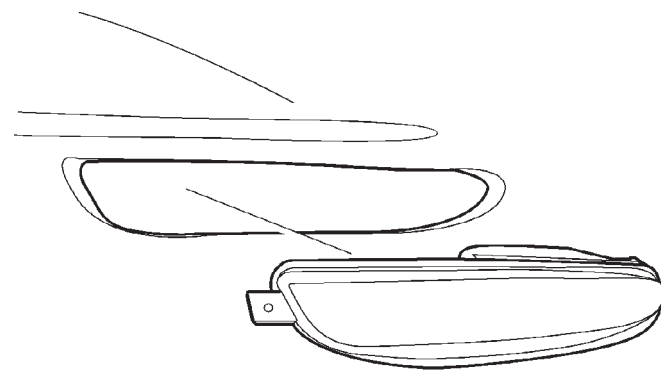
INSTALLATION

- (1) Connect tail lamp unit wire connector to body wire harness.
- (2) Place tail lamp unit in position on vehicle.
- (3) Install nuts to attach tail lamp unit to lower trunk and quarter panel.
- (4) Place trunk lining in position on lower trunk panel.
- (5) Install fasteners to attach trunk lining to lower rear trunk panel.
- (6) Verify lamp operation.

TURN LAMP UNIT - CONCORDE/300M

REMOVAL

- (1) Open hood, disconnect and isolate the battery negative cable.
- (2) Remove headlamp unit to access lamp housing.
- (3) Rotate and pull socket from lamp unit.
- (4) Disconnect fastener attaching lamp unit to fascia (Fig. 51).
- (5) Remove lamp unit from vehicle.



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Fig. 51 FRONT PARKING, SIDE MARKER/TURN SIGNAL LAMP UNIT

INSTALLATION

- (1) Place lamp unit in position on fascia.
- (2) Install lamp unit fastener.
- (3) Install bulb socket in lamp unit.
- (4) Connect the battery negative cable.
- (5) Verify lamp operation.
- (6) Install headlamp unit.
- (7) Close hood.

LAMPS/LIGHTING - INTERIOR

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LAMPS/LIGHTING - INTERIOR

SPECIFICATIONS

INTERIOR LAMPS

DIMMER CONTROLLED INTERIOR LAMPS

Service procedures for most of the lamps in the instrument panel, Instrument cluster and switches are located in Electrical, Instrument Cluster. Some components have lamps that can only be serviced by an Authorized Service Center (ASC) after the component is removed from the vehicle. Contact local dealer for location of nearest ASC.

DIMMER CONTROLLED LAMP APPLICATION TABLE

LAMP	BULB
A/C HEATER CONTROL	330
ASH RECEIVER	161
HEADLAMP SWITCH	4798351
INSTRUMENT CLUSTER	PC194
RADIO	ASC
ANALOG CLOCK	A9625

INDICATOR LAMPS

Service procedures for most of the lamps in the instrument cluster are located in Electrical, Instrument Cluster.

CAUTION: Do not use bulbs other than those listed in the Bulb Application Table. Damage to lamp can result.

CAUTION: Do not touch halogen bulbs with fingers or other oily surfaces. Bulb life will be reduced.

INDICATOR LAMP APPLICATION TABLE

INDICATOR	BULB
AIR BAG	LED
ANTI-LOCK BRAKE	LED
BRAKE WARNING	LED
CHARGING SYSTEM	LED
CHECK ENGINE	LED
CRUISE	74
DOOR OPEN	LED
ENGINE OIL PRESSURE	LED
ENGINE TEMPERATURE	LED
HIGH BEAM	74
LOW FUEL	LED
LOW WASHER FLUID	LED
SEAT BELT	LED
DECKLID OPEN	LED
TURN SIGNAL	PC194
TRAC ON	74
TRAC OFF	LED

LAMPS/LIGHTING - INTERIOR (Continued)

INTERIOR LAMPS

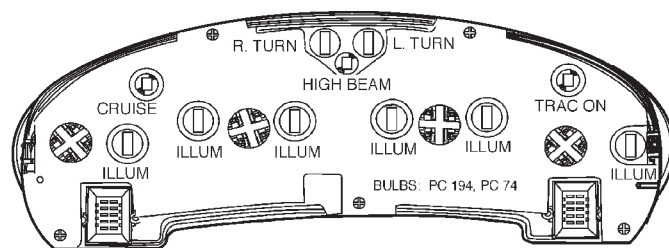
Service procedures for most of the lamps in the following list can be found in Body. Some components have lamps that can only be serviced by an Authorized Service Center (ASC) after the component is removed from the vehicle. Contact local dealer for location of nearest ASC.

INTERIOR LAMP APPLICATION TABLE

LAMP LOCATION	BULB
DOOR COURTESY	212-2
GLOVE COMPARTMENT	194
OVERHEAD CONSOLE	192
OVERHEAD INFORMATION CENTER	4437661
READING LAMP (FRONT/REAR)	192
TRUNK	906
VISOR VANITY	F6/7

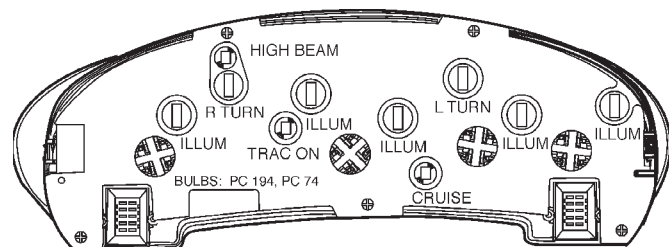
INDICATOR	COLOR	BULB #/LED
TURN SIGNALS	GREEN	194
CRUISE	GREEN	74
TRAC ON	GREEN	74
TRAC OFF	AMBER	LED
CHECK ENGINE	AMBER	LED
ABS	AMBER	LED
LOW FUEL	AMBER	LED
LOW WASHER FLUID	AMBER	LED
ILLUMINATION	BLUEGREEN	194

INSTALLATION



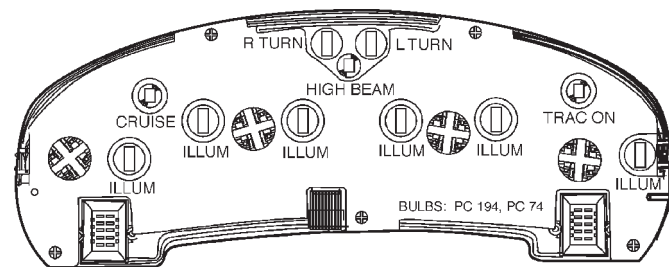
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Fig. 1 CLUSTER LAMPS - INTREPID



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Fig. 2 CLUSTER LAMPS - CONCORDE



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Fig. 3 CLUSTER LAMPS - 300M

(Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - INSTALLATION).

CLUSTER LAMPS

REMOVAL

To service instrument cluster lamps, the cluster must be removed from the instrument panel (Refer to 8 - ELECTRICAL/INSTRUMENT CLUSTER - REMOVAL).

Refer to (Fig. 1), (Fig. 2), and (Fig. 3) for cluster lamp locations.

The illumination/indicator lamps that ARE replaceable are called out on the back cover of the instrument cluster. All other indicators are Light Emitting Diodes (LED's), and are serviced with the cluster assembly. If a LED is non-functional, the entire instrument cluster must be replaced. Refer to the INDICATORS - BULBS table for applications.

INDICATORS - BULBS

INDICATOR	COLOR	BULB #/LED
BATTERY	RED	LED
BRAKE	RED	LED
AIRBAG	RED	LED
LOW OIL	RED	LED
SEATBELT	RED	LED
TEMPERATURE	RED	LED
DOOR AJAR	RED	LED
DECKLID AJAR	RED	LED
HIGH BEAM	BLUE	74

COURTESY LAMP

DESCRIPTION

The Body Control Module (BCM) illuminates the courtesy lamps whenever a door is opened. When the last door is closed, the BCM "fades-to-OFF" the courtesy lamps in five seconds if not in illuminated entry mode. If a door is left ajar, the courtesy lamps remain on for a maximum of 15 minutes when the ignition switch is OFF. After 15 minutes, the BCM "fades-to-OFF" the courtesy lamps.

GLOVE BOX LAMP

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Open the glove box door, using a trim stick (special tool #C-4755) or equivalent, gently pry out on the glove box lamp/switch assembly from upper right hand corner of opening.
- (3) Pull defective bulb out of lamp socket.

INSTALLATION

- (1) Push replacement bulb into the lamp socket.
- (2) Place glove box lamp/switch assembly into position, firmly snap into place, and close the glove box door.
- (3) Connect the negative battery cable remote terminal to the remote battery post.

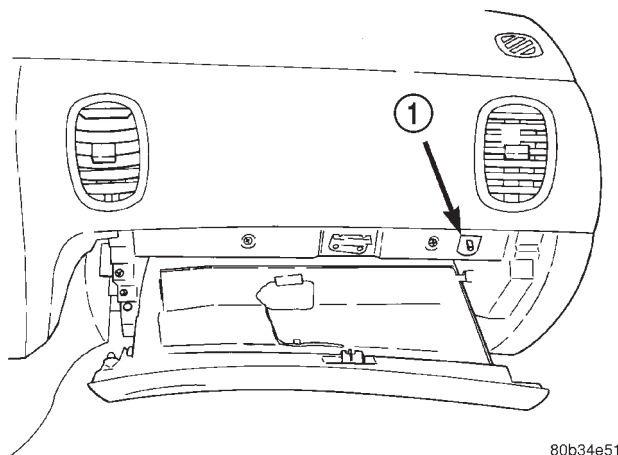
GLOVE BOX LAMP SWITCH

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 9).
- (2) Open the glove box door, using a trim stick (special tool #C-4755) or equivalent, gently pry out on the glove box lamp/switch assembly from upper right hand corner of opening (Fig. 4).
- (3) Disconnect the wire connector.

INSTALLATION

- (1) Connect the electrical connector to the new glove box lamp/switch.
- (2) Place glove box lamp/switch assembly into position, firmly snap into place (Fig. 4), and close the glove box door.



80b34e51

Fig. 4 Glove Box Lamp/Switch

1 - GLOVE BOX LAMP

- (3) Connect the negative battery cable remote terminal to the remote battery post.

ILLUMINATED ENTRY

DESCRIPTION

The Illuminated Entry System is available on vehicles equipped with the Remote Keyless Entry (RKE) system. The Illuminated Entry System turns ON the courtesy lamps when the remote keyless entry system is activated.

OPERATION

The Remote Keyless Entry Module and the Body Control Module (BCM) are used to control the system. Courtesy lamps will turn on for 30 seconds and "fade-to-OFF" over a five second period.

The Illuminated Entry System also turns ON the courtesy lamps when a door is opened. The courtesy lamps will remain ON while the door is open, then "fade-to-OFF" 30 seconds after the last door is closed.

The courtesy lamps will "fade-to-OFF" immediately when the ignition is switched to ON.

The Illuminated Entry System cannot be activated during the 30 second period after the ignition switch is turned OFF except by using the RKE transmitter. If a door is opened and closed during this 30 second period, the system will function as previously described.

The courtesy lamps will "fade-to-OFF" immediately if the RKE lock function is actuated with all the doors closed.

ILLUMINATED ENTRY (Continued)

DIAGNOSIS AND TESTING - ILLUMINATED ENTRY

When testing the system, all doors must be closed to prevent courtesy lamps from lighting. Verify that remote keyless entry system is operating properly before testing illuminated entry circuits. The body controller uses input from the remote keyless entry system to switch ON the courtesy lamps.

Refer to Wiring Diagrams, for component location and circuit information. Refer to the proper Body Diagnostic Procedures manual for complete diagnostic information.

TRANSMISSION RANGE INDICATOR ILLUMINATION**DESCRIPTION**

The floor console mounted Transmission Range Indicator Lamp display utilizes electroluminescent technology as the light source. The only diagnostics that should be performed is to check for the presence of 12 volts on the mating wire harness connector. The electroluminescent lamp requires a 120 volt AC signal that is provided by a power converter included in the assembly. Because of a potential shock hazard, diagnostics testing of the electroluminescent lamp and power converter should be avoided. The module is not serviceable. Refer to Body, Floor Console Shift Bezel Removal and Installation.

MESSAGE SYSTEMS

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OVERHEAD CONSOLE

DESCRIPTION

The available overhead consoles on LH models can include the Electronic Vehicle Information Center (EVIC) (Fig. 2), Overhead Travel Information System (OTIS) (Fig. 1) and two reading and courtesy lamps (Fig. 3). On vehicles equipped with a power sunroof, the sunroof switch is located between the two reading and courtesy lamps. The overhead console is mounted with one screw and two snap clips to a molded plastic retainer bracket located above the headliner.

OPERATION

Refer to the vehicle Owner's Manual for specific operation of each overhead console and its systems.

STANDARD PROCEDURE

STANDARD PROCEDURE - MODULE LAMP REPLACEMENT

- (1) Remove the overhead console (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).
- (2) Using a flat blade screwdriver twist out socket/lamp (Fig. 4).
- (3) Replace lamp(s) as necessary.

OVERHEAD CONSOLE (Continued)

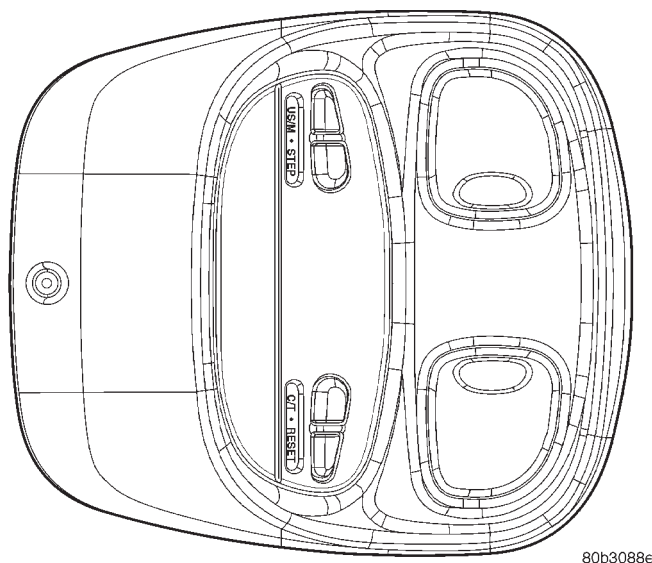


Fig. 1 Overhead Console Without Universal Transmitter

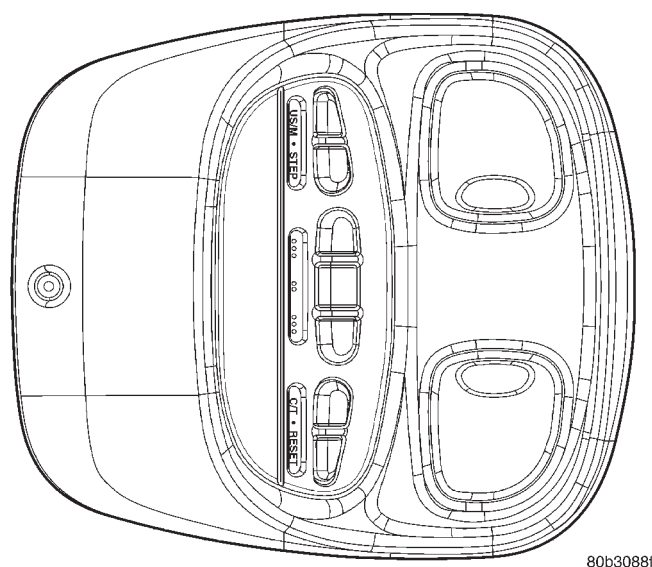


Fig. 2 Overhead Console With Universal Transmitter

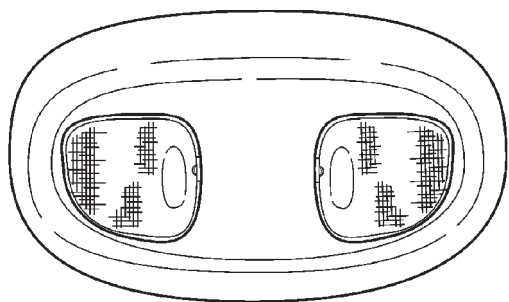


Fig. 3 Base Console

STANDARD PROCEDURE - COURTESY LAMP REPLACEMENT

(1) Open hood, disconnect and isolate the negative battery cable.

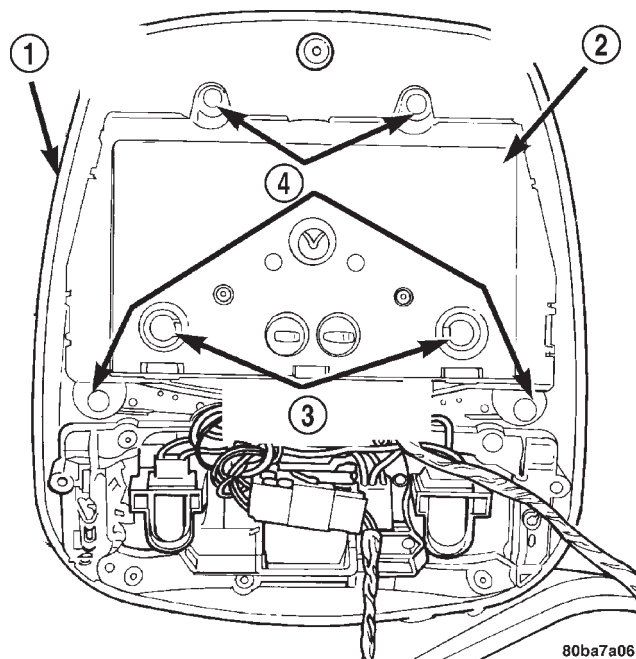


Fig. 4 Top of Overhead Console

- 1 - OVERHEAD CONSOLE HOUSING
- 2 - EVIC MODULE
- 3 - ILLUMINATION LAMPS
- 4 - SCREWS (4)

(2) Remove the overhead console from the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(3) Remove the lamp and socket assembly from the overhead console.

(4) Remove the lamp bulb by pulling it straight out of its socket.

STANDARD PROCEDURE - MODULE LENS REPLACEMENT

(1) Remove the overhead console (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(2) Remove the electronics module from the overhead console. Refer to the procedure in this section.

(3) Unsnap the lens from the module and replace lens as necessary.

STANDARD PROCEDURE - COMPASS CALIBRATION

CAUTION: Do not place any external magnets, such as magnetic roof mount antennas, in the vicinity of the compass. Do not use magnetic tools when servicing the overhead console.

The electronic compass unit features a self-calibrating design, which simplifies the calibration pro-

OVERHEAD CONSOLE (Continued)

cedure. This feature automatically updates the compass calibration while the vehicle is being driven. This allows the compass unit to compensate for small changes in the residual magnetism that the vehicle may acquire during normal use. If the compass readings appear to be erratic or out of calibration, perform the following calibration procedure. Also, new service replacement Electronic Vehicle Information Center (EVIC) modules must have their compass calibrated using this procedure. Do not attempt to calibrate the compass near large metal objects such as other vehicles, large buildings, or bridges; or, near overhead or underground power lines.

NOTE: Whenever an EVIC module is replaced, the variance number must also be reset. Refer to Compass Variation Adjustment in this group.

Calibrate the compass manually as follows:

(1) Turn the ignition switch to the On position. If the compass/temperature data is not currently being displayed, momentarily depress and release the C/T push button to reach the compass/temperature display.

(2) Depress the Reset push button and hold the button down until "CAL" appears in the display. This takes about ten seconds, and appears about five seconds after "VARIANCE = XX" is displayed.

(3) Release the Reset push button.

(4) Drive the vehicle on a level surface, away from large metal objects and power lines, through one complete circle at between five and eight kilometers-per-hour (three and five miles-per-hour) in not less than 20 seconds. The "CAL" message will disappear from the display to indicate that the compass is now calibrated.

NOTE: If the "CAL" message remains in the display, either there is excessive magnetism near the compass, or the unit is faulty. Repeat the calibration procedure one more time.

NOTE: If the wrong direction is still indicated in the compass display, the area selected for calibration may be too close to a strong magnetic field. Repeat the calibration procedure in another location.

STANDARD PROCEDURE - COMPASS DEMAGNETIZING

A degaussing tool (Special Tool 6029) is used to demagnetize, or degauss, the overhead console forward mounting screw and the roof panel above the overhead console. Equivalent units must be rated as continuous duty for 110/115 volts and 60 Hz. They

must also have a field strength of over 350 gauss at 7 millimeters (0.25 inch) beyond the tip of the probe.

To demagnetize the roof panel and the overhead console forward mounting screw, proceed as follows:

(1) Be certain that the ignition switch is in the Off position, before you begin the demagnetizing procedure.

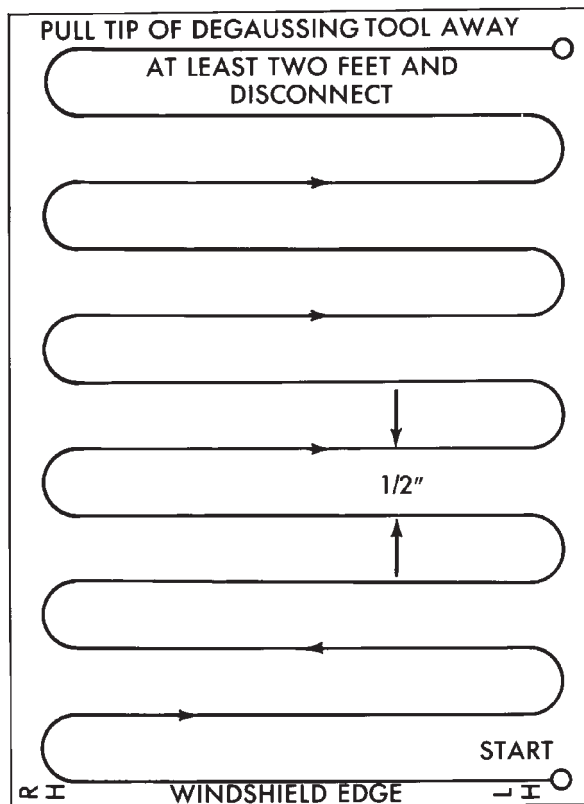
(2) Connect the degaussing tool to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.

(3) Slowly approach the head of the overhead console forward mounting screw with the degaussing tool connected.

(4) Contact the head of the screw with the plastic coated tip of the degaussing tool for about two seconds.

(5) With the degaussing tool still energized, slowly back it away from the screw. When the tip of the tool is at least 61 centimeters (2 feet) from the screw head, disconnect the tool.

(6) Place a piece of paper approximately 22 by 28 centimeters (8.5 by 11 inches), oriented on the vehicle lengthwise from front to rear, on the center line of the roof at the windshield header (Fig. 5). The purpose of the paper is to protect the roof panel from scratches, and to define the area to be demagnetized.



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Fig. 5 Roof Demagnetizing Pattern

OVERHEAD CONSOLE (Continued)

(7) Connect the degaussing tool to an electrical outlet, while keeping the tool at least 61 centimeters (2 feet) away from the compass unit.

(8) Slowly approach the center line of the roof panel at the windshield header, with the degaussing tool connected.

(9) Contact the roof panel with the plastic coated tip of the degaussing tool. Be sure that the template is in place to avoid scratching the roof panel. Using a slow, back-and-forth sweeping motion, and allowing 13 millimeters (0.50 inch) between passes, move the tool at least 11 centimeters (4 inches) to each side of the roof center line, and 28 centimeters (11 inches) back from the windshield header.

(10) With the degaussing tool still energized, slowly back it away from the roof panel. When the tip of the tool is at least 61 centimeters (2 feet) from the roof panel, disconnect the tool.

(11) Calibrate the compass and adjust the compass variance (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - STANDARD PROCEDURE).

STANDARD PROCEDURE - COMPASS VARIATION ADJUSTMENT

Compass variance, also known as magnetic declination, is the difference in angle between magnetic north and true geographic north. In some geographic locations, the difference between magnetic and geographic north is great enough to cause the compass to give false readings. If this problem occurs, the compass variance setting may need to be changed.

To set the compass variance:

(1) Using the Variance Settings map, find your geographic location and note the zone number (Fig. 6).

(2) Turn the ignition switch to the On position. If the compass/temperature data is not currently being displayed, momentarily depress and release the C/T push button to reach the compass/temperature display.

(3) Depress the Reset push button and hold the button down until "VARIANCE = XX" appears in the display. This takes about five seconds.

(4) Release the Reset push button. "VARIANCE = XX" will remain in the display. "XX" equals the current variance zone setting.

(5) Momentarily depress and release the Step push button to step through the zone numbers, until the zone number for your geographic location appears in the display.

(6) Momentarily depress and release the Reset push button to enter the displayed zone number into the EVIC module memory.

(7) Confirm that the correct directions are now indicated by the compass.

STANDARD PROCEDURE - ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING

EVIC PROGRAMMING MODE

The Electronic Vehicle Information Center (EVIC) provides the vehicle operator with a user interface, which allows the selection of several optional customer programmable electronic features to suit individual preferences. The EVIC must be placed into its programming mode in order to view or change the programmable features. To enter the EVIC programming mode and to view or change the selected programmable features options, proceed as follows:

(1) Turn the ignition switch to the On position.

(2) Depress and release the Menu push button. The first item in the programmable features menu list will appear in the EVIC display.

(3) Momentarily depress and release the Menu push button to step through the programmable features list. Each programmable feature and its currently selected option will appear on the EVIC display in the sequence shown in the Programmable Features list that follows.

(4) Momentarily depress and release the Step push button to step through the available options for the programmable feature being displayed.

(5) The option that last appears in the display with a programmable feature before exiting the programming mode, becomes the newly selected programmable feature option.

(6) The EVIC exits the programming mode and returns to its normal operating mode when the C/T push button is depressed or when the end of the programmable features menu list is reached, whichever occurs first.

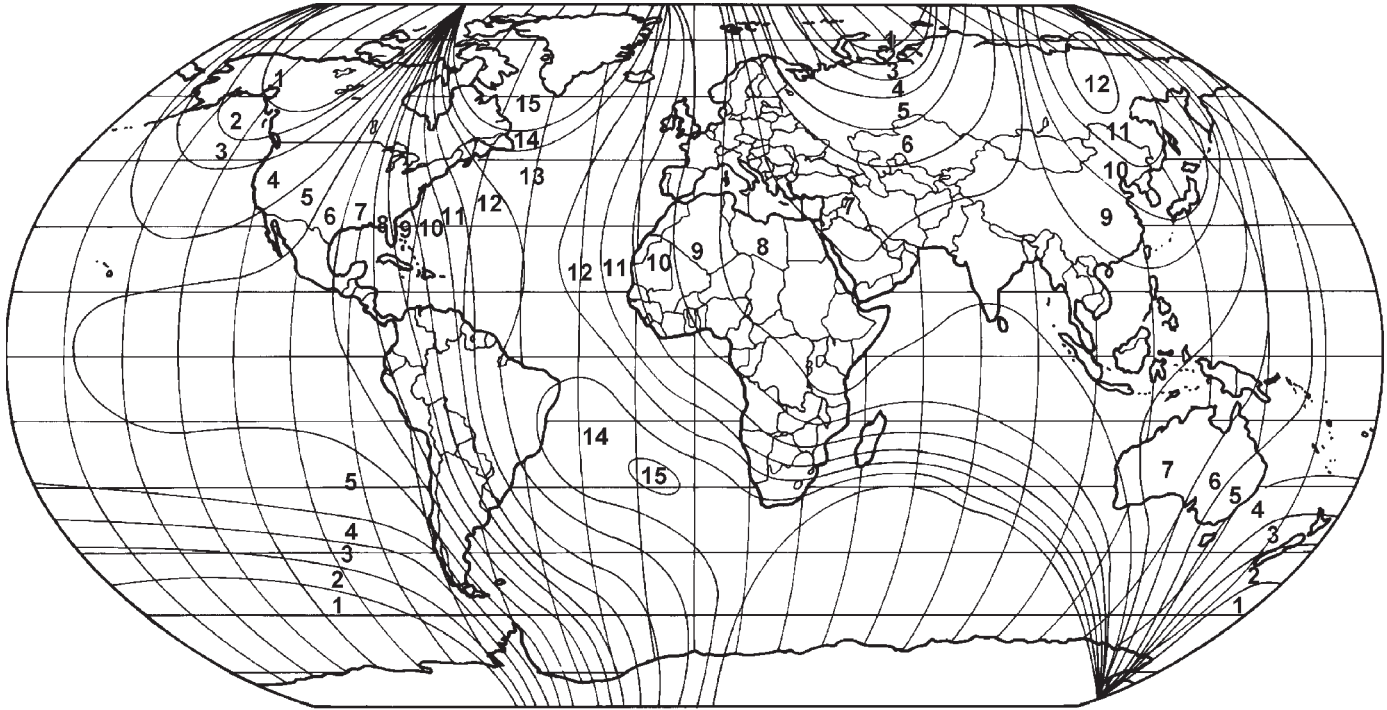
PROGRAMMABLE FEATURES

- **LANGUAGE?** - The options include English, Francaise, Deutsch, Italiana, or Espanol. The default is English. All EVIC display nomenclature, including the trip computer functions, warning messages and the programmable features appear in the selected language.

- **DISPLAY U.S. OR METRIC?** - The options include U.S. and M. The default is U.S. This feature toggles the trip computer temperature, fuel economy and odometer display readings between U.S. and metric units of measure. It also changes the odometer display in the instrument cluster.

- **AUTO DOOR LOCKS?** - The options include Yes and No. The default is Yes. When Yes is selected, all doors lock automatically when vehicle speed reaches 25 kilometers-per-hour (15 miles-per-hour). If YES is selected, a second programmable feature appears, **AUTO UNLOCK ON EXIT?** - The options

OVERHEAD CONSOLE (Continued)



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Fig. 6 Variance Settings

again include Yes and No. The default is No. When Yes is selected, following each Auto Door Lock event all doors will automatically unlock when the driver door is opened, if the vehicle is stopped and the transmission gear selector is in Park or Neutral. The Auto Door Unlock event will only occur once following each Auto Door Lock event.

- **REMOTE UNLOCK** - The options include Driver Door 1st and All Doors. The default is Driver Door 1st. When Driver Door 1st is selected, only the driver door unlocks when the Unlock button of the Remote Keyless Entry (RKE) transmitter is depressed once. The Unlock button of the RKE transmitter must be depressed twice to unlock all doors. When All Doors is selected, all doors unlock when the Unlock button of the RKE transmitter is depressed once.

- **REMOTE LINKED TO MEMORY?** - This programmable feature only applies to vehicles equipped with the optional memory / heated system. The options include Yes and No. The default is No. When Yes is selected, the memory system will recall the Driver 1 or Driver 2 memory settings assigned to the RKE transmitter being used to unlock the vehicle. When No is selected, the memory system will only recall memory settings when the Driver 1 or Driver 2 push buttons of the memory switch on the driver side front door trim panel are depressed.

- **SOUND HORN ON LOCK?** - The options include Yes and No. The default is No. When Yes is selected, a short horn chirp will provide an audible

confirmation when the RKE receiver recognizes a valid Lock signal from an RKE transmitter. When No is selected, no horn chirp will occur with the RKE Lock event. This feature may be selected independent of the **FLASH LIGHTS WITH LOCKS?** programmable feature.

- **FLASH LIGHTS WITH LOCKS?** - The options include Yes and No. The default is Yes. When Yes is selected, a single flash of the hazard warning lamps will provide an optical confirmation when the RKE receiver recognizes a valid Lock signal from an RKE transmitter, and two flashes of the same lamps will occur when the RKE receiver recognizes a valid Unlock signal from an RKE transmitter. When No is selected, no lamp flash will occur with the RKE Lock or Unlock event. This feature may be selected independent of the **SOUND HORN ON LOCK?** programmable feature.

- **HEADLAMP DELAY** = - The options include Off, 30 Sec, 60 Sec, and 90 Sec. The default is 90 Sec. When a time interval is selected, the headlamps will remain on for that length of time when the headlamps are turned off after the ignition is turned off, or if the Auto mode is selected on vehicles with the Auto Headlamps option. When Off is selected, the headlamp delay feature is disabled.

- **HEADLAMPS ON WITH WIPERS?** - This programmable feature only applies to vehicles equipped with the optional Auto Headlamps. The options include Yes and No. The default is No. When Yes is selected, the headlamps will turn on automatically

OVERHEAD CONSOLE (Continued)

when the windshield wipers are turned on. The headlamps will turn off when the wipers are turned off, as long as the headlamp switch is in the Auto or Off positions. When No is selected, the headlamps will only turn on if manually selected or if the Auto mode is selected and the outside ambient light levels dictate that they should be on.

- **SERVICE INTERVAL** = - The options include from 3200 to 12000 kilometers in 800 kilometer increments (2000 to 7500 miles in 500 mile increments). The default is 12000 kilometers (7500 miles). The selected distance becomes the interval at which the Perform Service warning message will be displayed by the EVIC. If a new distance is selected, a second programmable feature appears, **RESET SERVICE DISTANCE?** - The options include No and Yes. The default is Yes. When Yes is selected, the accumulated distance since the last previous Perform Service warning message will be reset to zero because the service interval has been changed. When No is selected, the distance until the next Perform Service warning message is reduced by the accumulated distance since the last previous message.

- **EASY EXIT SEAT** - This programmable feature only applies to vehicles equipped with the optional memory / heated system. The options include Yes and No. The default is No. When Yes is selected, the driver seat moves rearward about 55 millimeters (two inches) or to the farthest rearward position, whichever comes first, when the key is removed from the ignition switch lock cylinder. This provides additional ease for exiting from the vehicle. The seat will automatically return to the memory system setting position when the Driver 1 or Driver 2 button of the memory switch on the door panel is depressed or, if the **REMOTE LINKED TO MEMORY** programmable feature is enabled, when the RKE Unlock button is depressed. While not automatic, an easy entry feature can be obtained by enabling the **EASY EXIT SEAT** feature and disabling the **REMOTE LINKED TO MEMORY** feature. Then the **EASY EXIT SEAT** feature will move the seat back, but the RKE unlock event will not reposition the seat. Thus, the seat remains positioned for easy entry, and the memory switch on the door panel can be depressed after entering the vehicle to return the seat to the desired memory position.

- **SIDE VIEW MIRROR TILT** - This programmable feature only applies to vehicles equipped with the optional memory / heated system. The options include Enable and Disable. The default is Disable. When Enable is selected, both side view mirrors will move straight downward anytime the MHSM module detects a reverse gear indication from the cluster. This feature is designed to allow the driver to see directly behind the rear wheels before backing up.

- **TRAIN REMOTE** - When this feature is selected the driver can choose to train up to four remote keyless entry transmitters. The options include Yes and No. The default is No. When Yes is selected and the MENU button is pressed the EVIC will display "PRESS REMOTE LOCK & UNLOCK THEN PRESS UNLOCK", followed by a chime to indicate the training sequence can commence. You have approximately 30 seconds to train up to four transmitters, after each transmitter is trained a chime will sound indicating that the training was successful. If remote link to memory is "YES", the first transmitter trained will be associated with memory setting 1 and the second transmitter trained will be associated with memory setting 2. Additional transmitters will not be associated with a memory setting. When you have finished training the transmitters, press the menu button again and the EVIC will display "TRAIN DONE "X" TRAINED. If no transmitters are trained within approx. 30 seconds the EVIC will display "TRAIN TIMEOUT".

- **RETRAIN TIRE SENSORS** - This programmable feature only applies to vehicles equipped with the optional Tire Pressure Monitoring System. The options include Yes and No. The default is No. When Yes is selected, and the menu button is depressed, the EVIC will enter the training mode starting with the left front tire.

REMOVAL - OVERHEAD CONSOLE

- (1) Disconnect and isolate the remote negative battery cable.
- (2) Remove the overhead console retaining screw, located in the front of console near the windshield.
- (3) Using your fingertips, grasp the sides of the overhead console and pull straight down evenly to disengage the two snap clips at the rear of the unit.
- (4) Lower the overhead console far enough to access the wire harness connectors.
- (5) Disconnect the control module, courtesy lamps and if equipped, the power sunroof switch electrical connectors.
- (6) Remove the overhead console assembly from the vehicle.

INSTALLATION

- (1) Position the overhead console in the vehicle and connect the wire harness connectors.
- (2) Connect the control module, courtesy lamps and if equipped, the power sunroof switch electrical connector.
- (3) Using your fingertips, grasp the sides of the overhead console and push straight up evenly to engage the two snap clips at the rear of the unit.

OVERHEAD CONSOLE (Continued)

- (4) Install the overhead console retaining screw, located in the front of console near the windshield. Torque the screw to 1.2 N·m (10 in. lbs.).
- (5) Connect the remote negative battery cable.

COMPASS/MINI-TRIP COMPUTER

DESCRIPTION

The Compass Mini-Trip Computer (CMTC) is a module located within the overhead console. This module displays the following information:

- Compass/Temperature
- Average Fuel Economy
- Distance to Empty
- Instantaneous Fuel Economy
- Trip Odometer
- Elapsed Time
- Miles to Service
- Tire Pressure Display (if equipped)
- Blank Screen

When the vehicle is first turned ON:

- Compass Mini-Trip Computer blanks the display for a half second
- Illuminates all segments of the vacuum fluorescent display (VFD) at full brightness for one and a half seconds
- Displays whatever was being viewed when the ignition was last turned OFF

Compass Mini-Trip Computer may also be integrated with the Universal Transmitter. If so, your Compass Mini-Trip Computer module will have three buttons centered together between the outer four buttons.

OPERATION

The buttons operate when the ignition is in the ON position. The VFD will display the last display before ignition was turned OFF. The four outer buttons operate:

- STEP
- C/T - Compass/Temperature
- US/M - English/Metric
- RESET

1. STEP BUTTON

Pressing the STEP button selects one of the following 5 displays:

- Average fuel economy
- Distance to empty
- Instantaneous fuel economy
- Trip odometer
- Elapsed time

2. C/T (COMPASS/TEMPERATURE) BUTTON

Pressing the C/T button selects the Compass/Temperature display.

3. US/M (ENGLISH/METRIC MEASUREMENT) BUTTON

Pressing the US/M button switches the display units between English and Metric readings.

4. RESET BUTTON

Pressing the RESET button resets the function on the display, provided that function can be reset. The functions which can be reset are Average fuel economy, Trip odometer and Elapsed time.

The RESET button is also used to set the variance and/or calibrate the compass. Refer to the Variance Procedure and Calibration Procedure in this section.

DIAGNOSIS AND TESTING - COMPASS MINI-TRIP COMPUTER

TEMPERATURE

The Compass Mini-Trip Computer (CMTC) receives Programmable Communications Interface bus (PCI bus) messages from the Body Control Module for all displayed information except the compass display. If a dash (-) is displayed, the Compass Mini-Trip Computer is not receiving a PCI bus message from the BCM. To check out the PCI bus line and the BCM use the DRB III® scan tool and proper Body Diagnostic Procedure Manual.

If Compass Mini-Trip Computer displays a temperature reading more than 54° C (130° F). Check for a short circuit between the temperature sensor and the BCM.

If Compass Mini-Trip Computer displays a temperature reading less than -40° C (-67° F). Check for an open circuit between the temperature sensor and the BCM.

AVERAGE FUEL ECONOMY

Compass Mini-Trip Computer receives average fuel economy information from the BCM over the PCI bus line. If Compass Mini-Trip Computer displays -- instead of an average fuel economy value, it is not receiving a PCI bus message for the average fuel economy from the BCM. To check out the PCI bus line and the BCM use the DRB III® scan tool.

DISTANCE TO EMPTY

Compass Mini-Trip Computer receives distance to empty information from the BCM over the PCI bus line. If Compass Mini-Trip Computer displays a dash (-) instead of a distance to empty value, it is not receiving a PCI bus message for the distance to empty from the BCM. To check out the PCI bus line and the BCM use the DRB III® scan tool.

INSTANTANEOUS FUEL ECONOMY

Compass Mini-Trip Computer receives instantaneous fuel economy information from the BCM over

COMPASS/MINI-TRIP COMPUTER (Continued)

the PCI bus line. If Compass Mini-Trip Computer displays a dash (-) instead of an instantaneous fuel economy value, it is not receiving a PCI bus message for the instantaneous fuel economy from the BCM. To check out the PCI bus line and the BCM use the DRB III® scan tool.

TRIP ODOMETER

Compass Mini-Trip Computer receives trip odometer information from the Cluster over the PCI bus line. If Compass Mini-Trip Computer displays dashes -.- instead of the trip odometer value, it is not receiving a PCI bus message for the trip odometer from the Cluster. To check out the PCI bus line and the BCM, use the DRB III® scan tool.

ELAPSED TIME

Compass Mini-Trip Computer receives a PCI bus message containing elapsed time information. If Compass Mini-Trip Computer displays dashes -:- instead of the elapsed time, it is not receiving a PCI bus message for the elapsed time from the BCM. To check out the PCI bus line and the BCM, use the DRB III® scan tool.

COMPASS DISPLAY

To display the vehicle direction, the Compass Mini-Trip Computer processes information from a sensor internal to the module. The Compass Mini-Trip Computer is self-calibrating and requires only variance adjustments dependent upon location. The Compass Mini-Trip Computer displays the label CAL whenever the compass is in the fast calibration mode.

If all three of the following conditions listed below occur, the vehicle must be demagnetized.

- Compass portion of the display is blank
- Temperature portion of the display is OK
- The label CAL is illuminated

If demagnetizing the vehicle is needed, refer to the demagnetizing procedure in this section. After demagnetizing, to calibrate the compass refer to Calibration Procedure and to set the variance refer to Variance Procedure, both within this section. If the compass portion of the display is still blank, replace the Compass Mini-Trip Computer.

COMPASS MINI-TRIP COMPUTER - SELF DIAGNOSTIC TEST

(1) With the ignition switch in the OFF position simultaneously press the C/T and STEP buttons and hold.

(2) Turn ignition switch ON, then release C/T and STEP buttons.

(3) Compass Mini-Trip Computer lights all segments on the VFD for 2-4 seconds. Check for segments that are not illuminated.

(4) If Compass Mini-Trip Computer displays PASS, the module is OK.

(5) If Compass Mini-Trip Computer displays FAIL, replace the module.

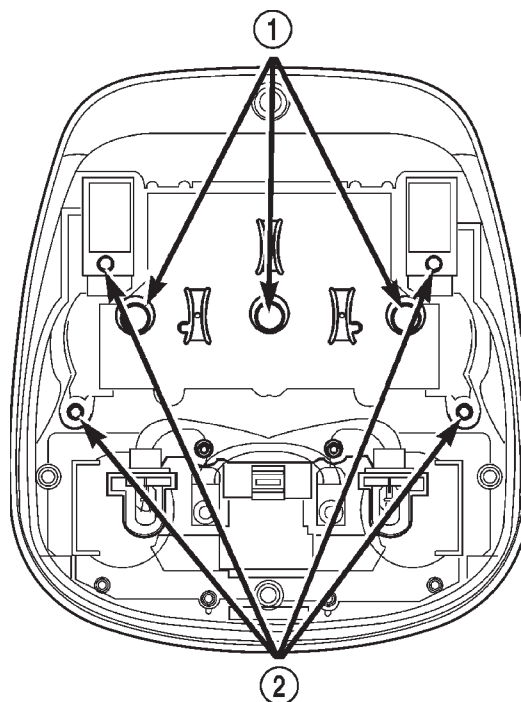
(6) If Compass Mini-Trip Computer displays bUS, check for an open or a short in the PCI bus communication circuit.

(7) Press the C/T or the STEP button to exit self-test.

REMOVAL

(1) Remove overhead console (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(2) Remove mounting screws and release the map lamp wire connector from the Compass Mini-Trip Computer (Fig. 7).



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Fig. 7 Compass Mini-Trip Computer Retaining Screws

- 1 - Lamps
2 - Retaining Screws

(3) Remove the Compass Mini-Trip Computer from overhead console.

INSTALLATION

(1) Position the Compass Mini-Trip Computer and install the retaining screws.

(2) Connect the Compass Mini-Trip Computer electrical connector. Make sure the wire that was clipped into the module housing is properly clipped into the new module before the overhead console is placed back into the headliner.

(3) Install the overhead console (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

ELECTRONIC VEHICLE INFO CENTER

DESCRIPTION - ELECTRONIC VEHICLE INFORMATION CENTER (EVIC)

The Electronic Vehicle Information Center (EVIC) is located in the overhead console on models equipped with this option. The EVIC module features a large Vacuum Fluorescent Display (VFD) screen for displaying information, and back-lit push button function switches labeled C/T (compass/temperature), RESET, STEP, and MENU.

The EVIC module contains a central processing unit and interfaces with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, reduce internal controller hardware, and reduce component sensor current loads. At the same time, this system provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities.

The EVIC includes the following display options:

- **Compass and temperature** - provides the outside temperature and one of eight compass readings to indicate the direction the vehicle is facing.
- **Average fuel economy** - shows the average fuel economy since the last trip computer reset.
- **Distance to empty** - shows the estimated distance that can be travelled with the fuel remaining in the fuel tank. This estimated distance is computed using the average miles-per-gallon from the last 30 gallons of fuel used.
- **Instant fuel economy** - shows the present fuel economy based upon the current vehicle distance and fuel used information.
- **Trip odometer** - shows the distance travelled since the last trip computer reset.
- **Elapsed time** - shows the accumulated ignition-on time since the last trip computer reset.
- **Distance to service** - shows the distance remaining until the next scheduled service interval.
- **Tire Pressure** - shows tire pressure in each road tire.
- **Blank screen** - the EVIC compass/temperature/trip computer VFD is turned off.

The EVIC "Menu" push button provides the vehicle operator with a user interface, which allows the selection of several optional customer programmable electronic features to suit individual preferences. Refer to **ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING** in the Service Procedures section of this group for more information on the customer programmable feature options.

If the vehicle is equipped with the optional Universal Transmitter, the EVIC will also display messages and an icon indicating when the Universal Transmitter is being trained, which of the three transmitter buttons is transmitting, and when the transceiver is cleared.

If the vehicle is equipped with the optional **Tire Pressure Monitoring System**, the EVIC will also display messages and an icon indicating when the tire air pressure falls below a given set-point, and which of the five tires is transmitting the low pressure warning, and when the condition is cleared. Refer to the Tires/Wheels section of this manual for complete Tire Pressure Monitoring System description. Refer to this section of the service manual for EVIC modules function description for the Tire Pressure Monitoring.

NOTE: Some 300M vehicles use a different recommended tire pressure (tire specified). For this reason, anytime a EVIC module is removed or replaced a DRB III® scan tool must be used to set/verify that the correct tire pressure set-point is programmed in the EVIC module. Failure to do so could result in incorrect tire pressure monitoring set points.

Data input for all EVIC functions, including VFD dimming level, is received through PCI data bus messages. The EVIC module uses its internal programming and all of its data inputs to calculate and display the requested data. If the data displayed is incorrect, perform the self-diagnostic tests as described in this group. If these tests prove inconclusive, the use of a DRB III® scan tool and the proper Diagnostic Procedures manual are recommended for further testing of the EVIC module and the PCI data bus.

The EVIC module cannot be repaired, and is available for service only as a unit. This unit includes the push button switches and the plastic module. If any of these components is faulty or damaged, the complete EVIC module must be replaced. The incandescent bulbs used for EVIC push button back-lighting and the lens are available for service replacement.

DESCRIPTION - COMPASS

While in the compass/temperature mode, the compass will display the direction in which the vehicle is pointed using the eight major compass headings (Examples: north is N, northeast is NE). The self-calibrating compass unit requires no adjusting in normal use. The only calibration that may prove necessary is to drive the vehicle in three complete circles at 5 to 8 kilometers-per-hour (3 to 5 miles-per-hour), on level ground, in not less than forty-eight seconds. This will reorient the compass unit to its vehicle.

ELECTRONIC VEHICLE INFO CENTER (Continued)

The compass unit also will compensate for magnetism the body of the vehicle may acquire during normal use. However, avoid placing anything magnetic directly on the roof of the vehicle. Magnetic mounts for an antenna, a repair order hat, or a funeral procession flag can exceed the compensating ability of the compass unit if placed on the roof panel. Magnetic bit drivers used on the fasteners that hold the overhead console assembly to the roof header can also affect compass operation. If the vehicle roof should become magnetized, the demagnetizing and calibration procedures found in this group may be required to restore proper compass operation.

DESCRIPTION - TEMPERATURE

The temperature displays the outside ambient temperature in whole degrees. The temperature display can be toggled from Fahrenheit to Celsius by selecting the desired U.S./Metric option from the customer programmable features as described in **ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING** in the Service Procedures section of this group. The displayed temperature is not an instant reading of conditions, but an average temperature. It may take the thermometer display several minutes to respond to a major temperature change, such as driving out of a heated garage into winter temperatures.

When the ignition switch is turned to the Off position, the last displayed temperature reading stays in the Body Control Module (BCM) unit memory. When the ignition switch is turned to the On position again, the EVIC will display the memory temperature for one minute; then update the display to the current average temperature reading within five minutes.

The temperature function is supported by an ambient temperature sensor. The sensor is mounted outside the passenger compartment near the front and center of the vehicle, and is hard wired to the Body Control Module (BCM). The BCM sends temperature status messages to the EVIC module over the PCI data bus network. The ambient temperature sensor is available as a separate service item.

OPERATION

The EVIC has access to both non-switched and ignition switched sources of battery current so that some of its features remain operational at any time, while others may only operate with the ignition switch in the On position. When the ignition switch is turned to the On position, the EVIC module VFD will return to the last function being displayed before the ignition was turned to the Off position.

The compass/temperature display is the normal EVIC display. With the ignition switch in the On

position, momentarily depressing and releasing the C/T (compass/temperature) push button switch will cause the EVIC to return to the compass/temperature/trip computer display mode from any other mode. While in the compass/temperature/trip computer display mode, momentarily depressing and releasing the Step push button will step through the available trip computer display options.

The EVIC trip computer features several functions that can be reset. The functions that can be reset are: average fuel economy, trip odometer and elapsed time. With the ignition switch in the On position and with one of the functions of the trip computer that can be reset currently displayed, depressing the Reset push button twice within three seconds will perform a global reset, and all of the trip computer information that can be reset will be reset to zero. With the ignition switch in the On position and the function that is to be reset currently displayed, momentarily depressing and releasing the Reset push button once will perform a local reset, and only the value of the displayed function will be reset to zero. A global or local reset will only occur if the function currently displayed is a function that can be reset. The distance to service function can also be reset using the local reset method, but it will reset back to the Service Interval distance that is set in the EVIC programmable features mode. Refer to **ELECTRONIC VEHICLE INFORMATION CENTER PROGRAMMING** in the Service Procedures section of this group for more information on setting the Service Interval.

For more information on the features, control functions and setting procedures for the EVIC module, see the owner's manual in the vehicle glove box.

DIAGNOSIS AND TESTING - ELECTRONIC VEHICLE INFORMATION CENTER

If the problem with the EVIC is an inaccurate or scrambled display, refer to **Self-Diagnostic Test** in the Diagnosis and Testing section of this group. If the problem with the EVIC is incorrect Vacuum Fluorescent Display (VFD) dimming levels, use a DRB scan tool and the proper Diagnostic Procedures manual to test for the correct dimming message inputs being received from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus. If the problem is a no-display condition, use the following procedures. For complete circuit diagrams, refer to **Overhead Console** in Wiring Diagrams.

(1) Check the fused B(+) fuse in the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

ELECTRONIC VEHICLE INFO CENTER (Continued)

(2) Check for battery voltage at the fused B(+) fuse in the junction block. If OK, go to Step 3. If not OK, repair the open fused B(+) circuit to the fused B(+) fuse in the PDC as required.

(3) Check the fused ignition switch output (run/start) fuse in the junction block. If OK, go to Step 4. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(4) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) fuse in the junction block. If OK, go to Step 5. If not OK, repair the open fused ignition switch output (run/start) circuit to the ignition switch as required.

(5) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Remove the overhead console. Check for continuity between the ground circuit cavity of the roof wire harness connector for the EVIC module and a good ground. There should be continuity. If OK, go to Step 6. If not OK, repair the open ground circuit to ground as required.

(6) Connect the battery negative cable. Check for battery voltage at the fused B(+) circuit cavity of the roof wire harness connector for the EVIC module. If OK, go to Step 7. If not OK, repair the open fused B(+) circuit to the fused B(+) fuse in the junction block as required.

(7) Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the roof wire harness connector for the EVIC module. If OK, refer to **Self-Diagnostic Test** in the Diagnosis and Testing section of this group for further diagnosis of the EVIC module and the PCI data bus. If not OK, repair the open fused ignition switch output (run/start) circuit to the fuse in the junction block as required.

SELF-DIAGNOSTIC TEST

A self-diagnostic test is used to determine that the EVIC module is operating properly, and that all PCI data bus messages are being received for initial operation. Initiate the self-diagnostic test as follows:

(1) With the ignition switch in the Off position, simultaneously depress and hold the **C/T button** and the **Reset button**.

(2) Turn the ignition switch to the On position.

(3) Continue to hold both buttons depressed until the EVIC software version information is displayed, then release both buttons.

(4) Following completion of these tests, the EVIC module will display one of the following messages:

a. **PASS SELF TEST** - Momentarily depress and release the Reset button to return to the compass/temperature/trip computer display mode. The EVIC module is working properly.

b. **FAILED SELF TEST** - The EVIC module has an internal failure. The EVIC module is faulty and must be replaced.

c. **NOT RECEIVING J1850 MESSAGE** - The EVIC module is not receiving proper message input through the PCI data bus. This can result from one or more faulty electronic modules in the vehicle, or from a faulty PCI data bus. The use of a DRB scan tool and the proper Diagnostic Procedures manual are required for further diagnosis.

NOTE: If the compass functions, but accuracy is suspect, it may be necessary to perform a variation adjustment. This procedure allows the compass unit to accommodate variations in the earth's magnetic field strength, based on geographic location. Refer to Compass Variation Adjustment in the Service Procedures section of this group.

NOTE: If the compass reading displays a blank, and only "CAL" appears in the display, demagnetizing may be necessary to remove excessive residual magnetic fields from the vehicle. Refer to Compass Demagnetizing in the Service Procedures section of this group.

STANDARD PROCEDURE - TIRE PRESSURE SYSTEM TEST

The following test can be used to verify two functions. One, that the tire pressure sensors are transmitting properly and two, the EVIC module is receiving these transmissions accordingly.

(1) Retrain the tire sensors (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE). The tire sensors must be retrained in order to set the proper transmitting time cycle (twice a minute), failure to retrain the sensors will cause a much slower transmitting time cycle (once a hour).

(2) Using the STEP button on the overhead console, scroll to the blank display, then press the RESET button for five seconds, a beep will sound indicating the start of this test. The vehicle icon and transmission counters will now be displayed, (same display as individual tire pressure except counters replace tire pressure values).

ELECTRONIC VEHICLE INFO CENTER (Continued)

(3) Upon entering the test mode, the EVIC will clear the sensor counter and each time a sensor signal for a road tire is received, the EVIC will update the counter value (vehicle must be driven at 25 mph to transmit). The counter values should all read the same value. If any of the road tires indicate a different value than another tire sensor, this is a sign of a problem. Replace the appropriate tire sensor and retest the system. This test will continue until any of the overhead console buttons are pressed or the ignition is turned off.

NOTE: Pressing the RESET button during the test will sound a beep and reset all the counter values back to zero.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the overhead console from the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - REMOVAL).

(3) Remove the four screws that secure the Electronic Vehicle Information Center (EVIC) module to the overhead console housing (Fig. 8).

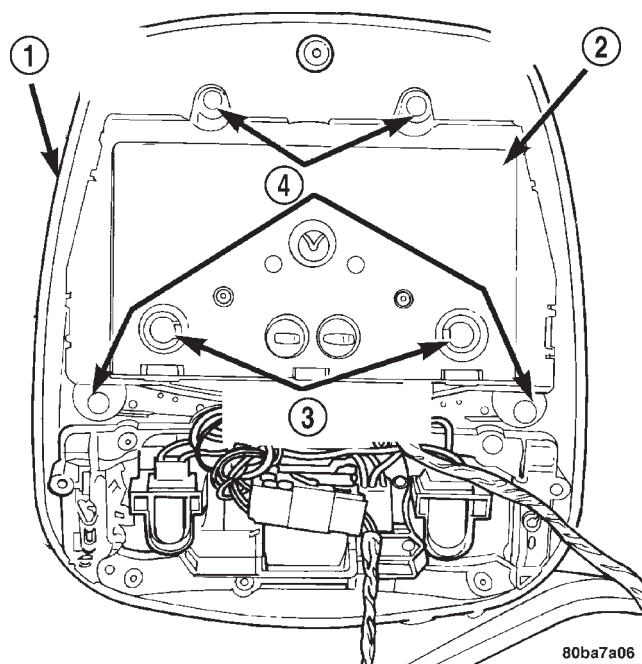


Fig. 8 Electronic Vehicle Information Center (EVIC) Module

- 1 - Overhead Console Housing
- 2 - EVIC Module
- 3 - Illumination Lamps
- 4 - Screws (4)

(4) Remove the EVIC module from the overhead console housing.

NOTE: IF THE EVIC MODULE IS BEING REPLACED, THE TIRE PRESSURE MONITORING SYSTEM MUST BE PROGRAMMED. REFER TO THE TIRES/WHEELS SECTION OF THIS MANUAL FOR DETAILED INSTRUCTIONS.

INSTALLATION

(1) Position the EVIC module onto the overhead console housing.

(2) Install and tighten the four screws that secure the EVIC module to the overhead console housing. Tighten the screws to 0.9 N·m (8 in. lbs.).

(3) Install the overhead console onto the headliner (Refer to 8 - ELECTRICAL/OVERHEAD CONSOLE - INSTALLATION).

(4) Reconnect the battery negative cable.

NOTE: IF A NEW COMPASS MINI-TRIP COMPUTER HAS BEEN INSTALLED, THE COMPASS WILL HAVE TO BE CALIBRATED AND THE VARIANCE SET. REFER TO COMPASS VARIATION ADJUSTMENT AND COMPASS CALIBRATION IN THE SERVICE PROCEDURES SECTION OF THIS GROUP FOR THE PROCEDURES.

NOTE: IF THE EVIC MODULE IS BEING REPLACED, THE TIRE PRESSURE MONITORING SYSTEM MUST BE PROGRAMMED. REFER TO THE TIRES/WHEELS SECTION OF THIS MANUAL FOR DETAILED INSTRUCTIONS.

NOTE: SOME 300M VEHICLES USE A DIFFERENT RECOMMENDED TIRE PRESSURE (TIRE SPECIFIED). FOR THIS REASON, ANYTIME A EVIC MODULE IS REMOVED OR REPLACED A DRB III® SCAN TOOL MUST BE USED TO SET/VERIFY THAT THE CORRECT TIRE PRESSURE SET-POINT IS PROGRAMMED IN THE EVIC MODULE. FAILURE TO DO SO COULD RESULT IN INCORRECT TIRE PRESSURE MONITORING SET POINTS.

UNIVERSAL TRANSMITTER

DESCRIPTION

On some LH models a Universal Transmitter is standard factory-installed equipment. The universal transmitter transceiver is integral to the Electronic Vehicle Information Center (EVIC), which is located in the overhead console. The only visible component of the universal transmitter are the three transmitter push buttons centered between the four EVIC push buttons located just rearward of the EVIC display screen in the overhead console. The three universal transmitter push buttons are identified with one, two or three light indicators so that they be easily identified by sight.

Each of the three universal transmitter push buttons controls an independent radio transmitter channel. Each of these three channels can be trained to transmit a different radio frequency signal for the remote operation of garage door openers, motorized gate openers, home or office lighting, security systems or just about any other device that can be equipped with a radio receiver in the 288 to 410 MegaHertz (MHz) frequency range for remote operation. The universal transmitter is capable of operating systems using either rolling code or non-rolling code technology.

The EVIC module displays messages and a small house-shaped icon with one, two or three dots corresponding to the three transmitter buttons to indicate the status of the universal transmitter. The EVIC messages are:

- **Cleared Channels** - Indicates that all of the transmitter codes stored in the universal transmitter have been successfully cleared.
- **Training** - Indicates that the universal transmitter is in its transmitter learning mode.
- **Trained** - Indicates that the universal transmitter has successfully acquired a new transmitter code.
- **Transmit** - Indicates that a trained universal transmitter button has been depressed and that the universal transmitter is transmitting.

The universal transmitter cannot be repaired, and is available for service only as a unit with the EVIC module. This unit includes the push button switches and the plastic module. If any of these components is faulty or damaged, the complete EVIC module must be replaced.

OPERATION

The universal transmitter operates on a non-switched source of battery current so the unit will remain functional, regardless of the ignition switch position. For more information on the features, programming procedures and operation of the universal

transmitter, see the owner's manual in the vehicle glove box.

DIAGNOSIS AND TESTING - UNIVERSAL TRANSMITTER

If the Universal Transmitter is inoperative, but the Electronic Vehicle Information Center (EVIC) is operating normally, see the owner's manual in the vehicle glove box for instructions on training the Transmitter. Retrain the Transmitter with a known good transmitter as instructed in the owner's manual and test the Transmitter operation again. If the unit is still inoperative, replace the faulty Transmitter and EVIC module as a unit. If both the Transmitter and the EVIC module are inoperative, refer to **Electronic Vehicle Information Center Diagnosis and Testing** in this group for further diagnosis. For complete circuit diagrams, refer to **Wiring Diagrams**.

STANDARD PROCEDURE

STANDARD PROCEDURE - ERASING UNIVERSAL TRANSMITTER CODES

To erase the universal transmitter codes, simply hold down the two outside buttons until the red LED begins to flash.

NOTE: Individual channels cannot be erased. Erasing the transmitter codes will erase ALL programmed codes.

STANDARD PROCEDURE - SETTING UNIVERSAL TRANSMITTER CODES

- (1) Turn off the engine.
- (2) Erase the factory test codes by pressing the two outside buttons. Release the buttons when the red light begins to flash (about 20 seconds).
- (3) Choose one of the three buttons to train. Place the hand-held transmitter within one inch of the universal transmitter and push the buttons on both transmitters. The red light on the universal transmitter will begin to flash slowly.
- (4) When the red light on the universal transmitter begins to flash rapidly (this may take as long as 60 seconds), release both buttons. Your universal transmitter is now "trained". To train the other buttons, repeat Step 3 and Step 4. Be sure to keep your hand-held transmitter in case you need to retrain the universal transmitter.

AMBIENT TEMP SENSOR

DESCRIPTION

Ambient air temperature is monitored by the Electronic Vehicle Information Center (EVIC) through ambient temperature messages received from the Body Control Module (BCM) over the Programmable Communications Interface (PCI) data bus network. The BCM receives a hard wired input from the ambient temperature sensor. The ambient temperature sensor is a variable resistor mounted to a bracket that is secured with a screw to the right side of the headlamp mounting module grille opening, behind the radiator grille and in front of the engine compartment.

Refer to **Body Control Module** in Electronic Control Modules. For complete circuit diagrams, refer to the appropriate wiring information. The ambient temperature sensor cannot be adjusted or repaired and, if faulty or damaged, it must be replaced.

OPERATION

The ambient temperature sensor is a variable resistor that operates on a five-volt reference signal sent to it by the BCM. The resistance in the sensor changes as temperature changes, changing the temperature sensor signal circuit voltage to the BCM. Based upon the resistance in the sensor, the BCM senses a specific voltage on the temperature sensor signal circuit, which it is programmed to correspond to a specific temperature. The BCM then sends the proper ambient temperature messages to the EVIC over the PCI data bus.

The thermometer function is supported by the ambient temperature sensor, a wiring circuit, the Body Control Module (BCM), the Programmable Communications Interface (PCI) data bus, and a portion of the Electronic Vehicle Information Center (EVIC) module. If any portion of the ambient temperature sensor circuit fails, the BCM will self-diagnose the circuit.

The ambient temperature sensor circuit can also be diagnosed by referring to **Diagnosis and Testing - Ambient Temperature Sensor, and Diagnosis and Testing - Ambient Temperature Sensor Circuit**. If the temperature sensor and circuit are confirmed to be OK, but the temperature display is inoperative or incorrect, refer to **Diagnosis and Testing - Electronic Vehicle Information Center** in this group. For complete circuit diagrams, refer to the appropriate wiring information.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - AMBIENT TEMPERATURE SENSOR

(1) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the ambient temperature sensor wire harness connector.

(2) Measure the resistance of the ambient temperature sensor. At -40°C (-40°F), the sensor resistance is 336.6 kilohms. At 60°C (140°F), the sensor resistance is 2.49 kilohms. The sensor resistance should read between these two values. If OK, refer to **Diagnosis and Testing - Ambient Temperature Sensor Circuit** in this group. If not OK, replace the faulty ambient temperature sensor.

DIAGNOSIS AND TESTING - AMBIENT TEMPERATURE SENSOR CIRCUIT

(1) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Disconnect the 2-way ambient temperature sensor wire harness connector and the 22-way Body Control Module (BCM) wire harness connector.

(2) Connect a jumper wire between the two terminals in the body half of the 2-way ambient temperature sensor wire harness connector.

(3) Check for continuity between the sensor return circuit and the ambient temperature sensor signal circuit cavities of the 22-way BCM wire harness connector. There should be continuity. If OK, go to Step 4. If not OK, repair the open sensor return circuit or ambient temperature sensor signal circuit to the ambient temperature sensor as required.

(4) Remove the jumper wire from the body half of the 2-way ambient temperature sensor wire harness connector. Check for continuity between the sensor return circuit cavity of the 22-way BCM wire harness connector and a good ground. There should be no continuity. If OK, go to Step 5. If not OK, repair the shorted sensor return circuit as required.

(5) Check for continuity between the ambient temperature sensor signal circuit cavity of the 22-way BCM wire harness connector and a good ground. There should be no continuity. If OK, refer to **Diagnosis and Testing - Electronic Vehicle Information Center** in this group. If not OK, repair the shorted ambient temperature sensor signal circuit as required.

AMBIENT TEMP SENSOR (Continued)

REMOVAL

(1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post (Fig. 9).

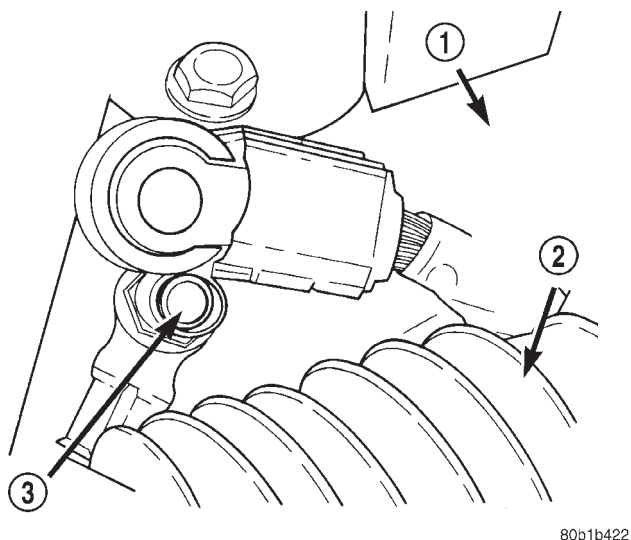


Fig. 9 Negative Battery Cable Remote Terminal

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

(3) From behind front bumper fascia, remove the screw attaching the ambient temperature sensor to radiator closure panel (Fig. 10).

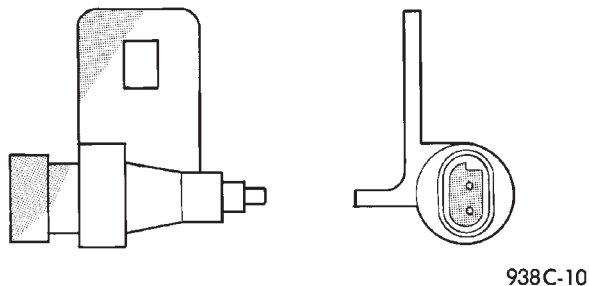


Fig. 10 Ambient Temperature Sensor

INSTALLATION

- (1) Connect the ambient temperature sensor electrical connector.
- (2) Install the ambient temperature sensor retaining screw.
- (3) Connect the negative battery cable.

(2) Raise and support the vehicle on safety stands.

POWER SYSTEMS

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POWER LOCKS

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POWER LOCKS

DESCRIPTION

POWER DOOR LOCKS

All doors can be locked or unlocked electrically by operating the switch on either front door panels. When the door lock switch is activated the Body Control Module (BCM) actuates the door lock relay.

All doors can be locked or unlocked mechanically and independently with their respective locking knobs.

The right and left front door can be locked or unlocked mechanically from the outside with the key or all locks can be remotely locked or unlocked with the Remote Keyless Entry (RKE) transmitter. All doors can be locked/unlocked from the front doors via the Central Locking System. The front doors can also

be unlocked by actuation of the inside remote door handle.

The deck lid can be unlatched by either depressing the push switch from inside the car, manually by key from outside or by depressing the remote keyless entry deck lid release button. This feature is customer programmable. The customer has a choice of immediate release or press and hold release for deck lid opening. The vehicle is shipped in the press and hold release mode.

NOTE: The Power Door Lock Motor is not serviced separately. It is part of the door latch assembly. Refer to Body, Door - Front, Front Door Latch, or Body, Door - Rear, Rear Door Latch, Removal and Installation.

POWER LOCKS (Continued)

CENTRAL LOCKING

The Central Locking System is part of the Vehicle Theft Security System (VTSS).

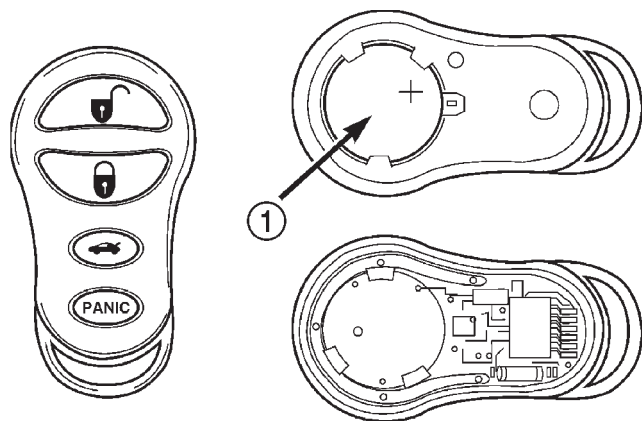
CHILD PROTECTION LOCK

The child protection locks are on the rear doors only.

DOOR LOCK INHIBIT

The Door Lock Inhibit prevents the vehicle from being locked with the key in the ignition.

REMOTE KEYLESS ENTRY



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Fig. 1 REMOTE KEYLESS ENTRY TRANSMITTER

1 - BATTERIES

The system allows locking and unlocking of vehicle door(s), deck lid release, and panic by remote control using a hand held radio frequency transmitter (Fig. 1). The vehicle must be in PARK before the trunk lid can be unlatched with the transmitter.

The receiver may receive signals from up to four transmitters. Each transmitter has its own code, and the code is programmed and stored into receiver memory. If a transmitter is replaced or additional transmitters are added, the codes for all units have to be reprogrammed into the receiver memory. If a receiver module is replaced, the transmitter codes must be stored in the new receiver memory.

HORN CHIRP TOGGLE

Once the transmitters have been programmed, the horn chirp can be enabled/disabled by sending the horn chirp toggle operation code to the Body Control Module (BCM).

OPERATION

POWER DOOR LOCKS

The Body Control Module (BCM) actuates the power door lock relays when a door lock switch is activated. If the door lock switch is pressed for longer than eight consecutive seconds, the BCM will de-energize the door lock relay.

The system includes an Automatic Door Locking feature. **The vehicle is shipped with the system enabled.** When the system is disabled the door locks will work by use of the door lock switches and the Remote Keyless Entry System only. When the Automatic Door Lock System is enabled the BCM will automatically lock all the doors when all of the conditions below are met:

- All doors are closed.
- The vehicle speed exceeds 15 ± 1 mph.
- The throttle position sensor tip-in is greater than 10 ± 2 degrees.

The DRB III® scan tool is used to enable/disable the automatic door lock system. Refer to the proper Body Diagnostic Procedures Manual. They are also customer programmable. Refer to Owners Manual for customer programming procedures.

The BCM will automatically re-lock all doors if the above conditions are met and if any of the doors become ajar and then closes again.

The power lock motors are also equipped with a thermal protection system which prevents the motors from burning out. The motors may chatter if they are continuously activated.

CENTRAL LOCKING

Using the key, turn the driver's or passenger door cylinder lock to the lock position, all doors will lock. This feature operates differently on each door. Turn the key in the driver's door to the unlock position once will unlock the driver's door only. Turning the key a second time to the unlock position within five seconds of the first time will unlock all the doors. Turn the key once in the passenger's door to the unlock position will unlock all doors.

The lock/unlock operation will arm/disarm the VTSS and will also activate/cancel the illuminated entry feature.

CHILD PROTECTION LOCK

The lock when engaged, will disable the inside door handle from opening the door. The lock is part of the latch/lock assembly. The lock is engaged by moving a lever that is located on the rearward inside edge of the door.

POWER LOCKS (Continued)

DOOR LOCK INHIBIT

With the key in the ignition switch and the driver's door open, the Body Control Module (BCM) will ignore the command to lock the power door locks.

Once the key is removed, or the driver's door is closed, the BCM will allow the power door locks to lock.

REMOTE KEYLESS ENTRY

The transmitter has four buttons for operation. They are LOCK, UNLOCK, DECK LID RELEASE, and PANIC.

- The UNLOCK button will unlock the driver's door and enable illuminated entry. Pushing and releasing the button once will unlock the driver's door. Pushing and releasing the button two times, within a five second interval, will unlock all doors.

- Upon pressing the LOCK button, the horn will sound a short CHIRP (if enabled) and flash the park lamps to notify that the all door lock signal was received and set. Illuminated entry is cancelled and the interior lamps are faded to off.

- Pushing and releasing the DECK LID RELEASE button (immediate release or press and hold release) within a two second interval, will slightly ajar the deck lid.

- Pushing and holding the PANIC button will cause the panic alarm to sound for three minutes, until the panic button is pressed and held a second time, or the vehicle reaches a speed of 15 mph.

The receiver is capable of retaining a Vehicle Access Code (VAC) even when power is removed.

Each Remote Keyless Entry (RKE) module must have at least one and no more than four transmitters.

HORN CHIRP TOGGLE

This can be done using a DRB III® scan tool or by the customer. The horn chirp will enter the opposite state of its current programmed state by receiving this operation code. The BCM is responsible for keeping track of the horn chirp status.

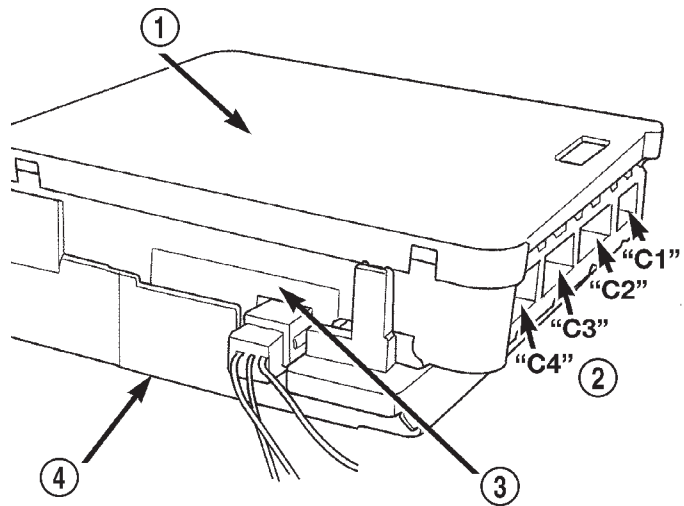
DIAGNOSIS AND TESTING - POWER LOCKS

When trouble shooting problems with the Remote Keyless Entry System (Fig. 2) and (Fig. 3), always verify that the power door lock/unlock switches are functional. If the doors do not lock/unlock with the power switches, the following components should be analyzed:

- Door Lock Switches
- Body Control Module
- Lock and unlock relays
- Door lock/unlock motors
- Remote keyless entry system
- Radio/clock

A blown fuse is the probable cause. The remote keyless entry fuse 13 is located in the Junction Block. If neither terminal measures battery voltage, check for an open or shorted circuit to the Junction Block, repair as needed. If battery voltage is still not available, check the high current fuse G in the Power Distribution Center, located in the engine compartment.

To diagnose the Remote Keyless Entry (RKE) System, use a DRB III® scan tool and refer to Power Door Lock System in the proper Body Diagnostic Procedures Manual.



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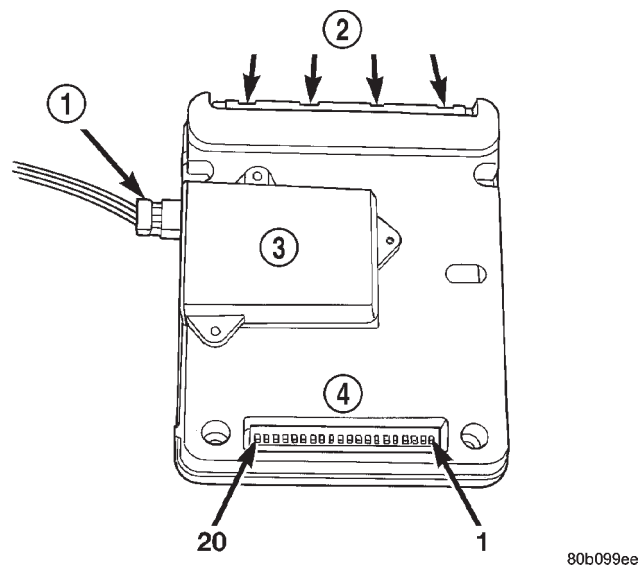
Fig. 2 REMOTE KEYLESS ENTRY MODULE LOCATION

- 1 - BODY CONTROL MODULE
- 2 - CONNECTORS
- 3 - REMOTE KEYLESS ENTRY MODULE
- 4 - JUNCTION BLOCK

STANDARD PROCEDURE - TOGGING CUSTOMER PREFERENCES**DECK LID RELEASE TOGGLE**

Deck lid release toggle is programmed to immediate release or press and hold release by continually pressing the unlock button for a minimum of 4 seconds to a maximum of 10 seconds. Within the 4-10 second range, the deck lid release button is depressed. Both buttons are then released.

POWER LOCKS (Continued)

**Fig. 3 REMOTE KEYLESS ENTRY MODULE/BCM**

- 1 - RKE ANTENNA CONNECTOR
- 2 - CONNECTORS
- 3 - RKE MODULE
- 4 - 20-WAY INTERNAL

HORN CHIRP TOGGLE

Once the transmitters have been programmed, the horn chirp can be enabled/disabled by sending the horn chirp toggle operation code to the Body Control Module (BCM). This can be done using a DRB III® scan tool or by the customer. The horn chirp will enter the opposite state of its current programmed state by receiving this operation code. The BCM is responsible for keeping track of the horn chirp status.

DECK LID RELEASE SOLENOID**DIAGNOSIS AND TESTING - DECK LID RELEASE**

For vehicles equipped with electric deck lid release.

- (1) Confirm motor lead wire is connected and 10 volts or more are available at solenoid.
- (2) Provide proper ground through latch mounting screws.
- (3) Remove latch and examine plunger. Plunger should spring back when pressed.
- (4) Insure that solenoid plunger travel is adequate approximately 16 mm (5/8 inch).

REMOVAL

- (1) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.
- (2) Raise deck lid to the full up position.
- (3) Remove latch cover attaching screws then remove cover.
- (4) Remove two mounting motor screws and remote key cable retainers then remove motor.

INSTALLATION

- (1) Install the two mounting motor screws and remote key cable retainers and motor.
- (2) Install the cover and latch cover attaching screws.
- (3) Connect and isolate the negative battery cable remote terminal onto the remote battery post.
- (4) Close the deck lid.

DECK LID RELEASE SWITCH**REMOVAL**

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove left lower instrument panel cover. Refer to Body, Instrument Panel, Instrument Panel and Pad Assembly, Removal and Installation.
- (3) Pinch four tabs around side of decklid release switch on the rear side of the left lower instrument panel cover, and push switch through opening.

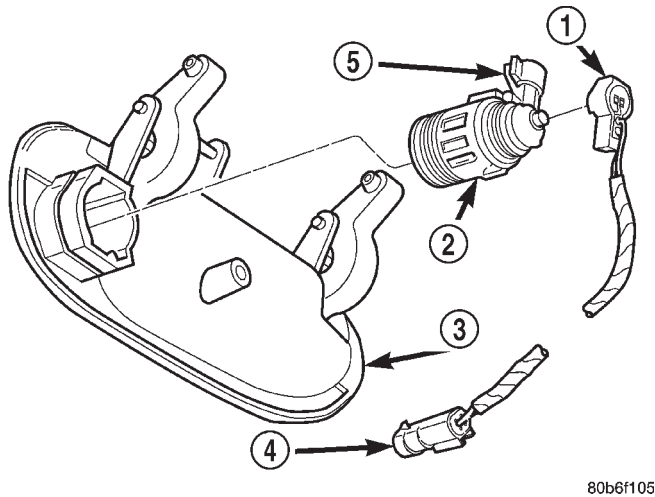
INSTALLATION

- (1) push switch through opening and firmly snap into place on the left lower instrument panel cover.
- (2) Install the left lower instrument panel cover. Refer to Body, Instrument Panel, Instrument Panel and Pad Assembly, Removal and Installation.
- (3) Connect the negative battery cable remote terminal to the remote battery post.

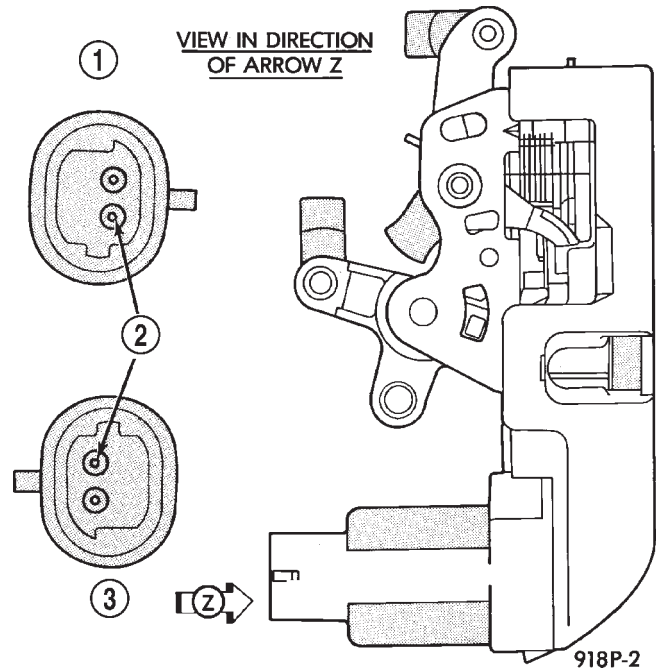
DOOR CYLINDER LOCK SWITCH**REMOVAL**

- (1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post.
- (2) Refer to Body, Door - Front, for door trim and water shield Removal.
- (3) Disconnect the wiring clip and pigtail wire connector (Fig. 4).
- (4) Remove the Door Cylinder Lock Switch from door lock cylinder.

DOOR CYLINDER LOCK SWITCH (Continued)

**Fig. 4 DOOR CYLINDER LOCK SWITCH**

- 1 - DOOR CYLINDER LOCK SWITCH
- 2 - LOCK CYLINDER
- 3 - DOOR HANDLE
- 4 - PIGTAIL CONNECTOR
- 5 - CLIP

**Fig. 5 DOOR LOCK MOTOR/LATCH**

- 1 - PASSENGER SIDE CONNECTOR
- 2 - + TO LOCK
- 3 - DRIVER SIDE CONNECTOR

INSTALLATION

- (1) Install the Door Cylinder Lock Switch onto the door lock cylinder.
- (2) Connect the wiring clip and pigtail wire connector (Fig. 4).
- (3) Refer to Body, Door - Front, for Door Trim and Water Shield Installation.
- (4) Connect the negative battery cable remote terminal onto the remote battery post.

DOOR LOCK MOTOR**DIAGNOSIS AND TESTING - DOOR LOCK MOTOR**

Make certain battery is in normal condition before circuits are tested.

To determine which motor is faulty, check each individual door for electrical lock and unlock or disconnect the motor connectors one at a time, while operating the door lock switch. In the event that none of the motors work, the problem maybe caused by a shorted motor, a bad switch, or a bad relay. Disconnecting a defective motor will allow the others to work.

To test an individual door lock motor, disconnect the electrical connector from the motor. To lock the door, connect a 12 volt power source to the positive pin of the lock motor and a ground wire to the other pin (Fig. 5). To unlock the door reverse the wire connections at the motor pin terminals. If these results are NOT obtained, replace the motor.

DOOR LOCK SWITCH**DIAGNOSIS AND TESTING - DOOR LOCK SWITCH****VOLTAGE**

The following wiring test sequence determines whether or not voltage is continuous through the body harness to switch.

- (1) Remove left side switch from door trim panel.
- (2) Carefully separate multiple terminal block on wiring harness from switch body.
- (3) Connect one lead of test light to a ground terminal:

- Touch other test light lead to battery feed B+ terminal.
- If test light comes on, the wiring circuit between the battery and switch is functional.
- If test light does not come on, check fuse 13 in the Junction Block for a blown fuse. Refer to Wiring Diagrams for circuit information.

DOOR LOCK SWITCH

Remove the switch from its mounting location. Using an ohmmeter, refer to Door Lock Switch Continuity table to determine if the continuity is correct in the LOCK and UNLOCK switch positions. If these results are not obtained, replace the switch.

DOOR LOCK SWITCH (Continued)

DOOR LOCK SWITCH CONTINUITY

SWITCH POSITION	CONTINUITY BETWEEN	RESISTANCE VALUE
LOCK	1 AND 4	2700 Ω \pm 10%
UNLOCK	1 AND 4	620 Ω \pm 10%

KEYLESS ENTRY TRANSMITTER

STANDARD PROCEDURE - TRANSMITTER PROGRAMMING

The Remote Keyless Entry (RKE) Transmitter(s) can be programmed with the use of the DRB III® scan tool, or by the customer.

PROGRAMMING TRANSMITTER WITH THE DRB III® SCAN TOOL

For procedures on programming the transmitter(s) with the DRB III® scan tool, refer to the proper Body Diagnostic Procedures Manual.

PROGRAMMING BY CUSTOMER

For a customer to be able to program RKE transmitters themselves, at least one RKE transmitter must be programmed already. This procedure is to add additional transmitters. If all transmitters are lost, the DRB III® scan tool must be used to program the new transmitter(s).

Transmitter programming by the customer is done by continually pressing the unlock button, on a programmed fob, for a minimum of 4 seconds to a maximum of 10 seconds with the ignition switch ON. Within the 4-10 second range, the panic button is depressed. Both buttons are then released.

The BCM will chime. Then press any button on each fob to be programmed. The BCM will chime as each fob is learned. To exit program mode, turn off ignition or wait 32 seconds. The BCM will chime again.

SPECIFICATIONS

TRANSMITTER

BATTERY

The transmitter has two 3 volt batteries, which can be removed and replaced without special tools. Insert a dime in the side slot of the transmitter and twist. The halves should separate and the batteries are stacked on top of each other. The batteries are available at local retail stores. Recommended batteries are Panasonic CR 2016 or equivalent. Battery life is about two years (Fig. 1).

RANGE

Operation range is within 12 meters (40 ft.) of the module/receiver.

REMOTE KEYLESS ENTRY MODULE

REMOVAL

The Remote Keyless Entry (RKE) Module is located between the junction block and body control module. Refer to Electrical, Electronic Control Modules, Body Control Module, Removal.

(1) Disconnect and isolate the battery negative cable.

(2) With the junction block/BCM removed, separate the two by removing the four retaining screws.

(3) Unsnap the RKE module from the BCM.

INSTALLATION

(1) Place module into position on BCM and snap the RKE Module into place.

(2) Attach the junction block/BCM and install the four retaining screws.

(3) Connect battery negative cable.

Install the BCM. Refer to Electrical, Electronic Control Modules, Body Control Module, Installation.

NOTE: The RKE transmitters must be reprogrammed to the new RKE module.

POWER MIRRORS

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POWER MIRRORS

DESCRIPTION

AUTOMATIC DAY/NIGHT MIRROR

The automatic day/night mirror system is able to automatically change the reflectance of the inside rear view mirror in order to reduce the glare of headlamps approaching the vehicle from the rear. The automatic day/night rear view mirror receives battery current through a fuse in the junction block only when the ignition switch is in the ON position.

OUTSIDE REAR VIEW MIRROR

The power operated outside rear view mirrors allow the driver to adjust both outside mirrors electrically from the driver side front seat position by operating a switch on the driver side front door trim panel.

OPERATION

AUTOMATIC DAY/NIGHT MIRROR

A switch located on the bottom of the automatic day/night mirror housing allows the vehicle operator to select whether the automatic dimming feature is operational. When the automatic day/night mirror is turned on, the mirror switch is lighted by an integral Light-Emitting Diode (LED). The mirror will automatically disable its self-dimming feature whenever the vehicle is being driven in reverse.

Refer to the owner's manual for more information on the features, use and operation of the automatic day/night mirror system.

OUTSIDE REAR VIEW MIRROR

The power mirrors receive a non-switched battery feed through a fuse in the junction block so that the system will remain operational, regardless of the ignition switch position.

DIAGNOSIS AND TESTING - POWER MIRRORS

WIRING VOLTAGE TEST

The following wiring test determines whether or not voltage is continuous through the body harness to switch.

- (1) Remove the power mirror switch.
- (2) Disconnect wire harness connector from back of power mirror switch.
- (3) Connect the clip end of a 12 volt test light to Pin 11 in the mirror switch harness connector. Touch the test light probe to Pin 9.

If the test light illuminates, the wiring circuit between the battery and switch is OK.

If the lamp does not illuminate, first check fuse in the Junction Block (JB). If circuit breaker is OK, then check for a broken wire.

Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER MIRROR MOTOR TEST

If the power mirror switch is receiving proper current and ground and mirrors do not operate, proceed with power mirror motor test. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing

POWER MIRRORS (Continued)

and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

- (1) Remove the power mirror switch.
- (2) Disconnect wire harness connector to power mirror switch (Fig. 1).
- (3) Using two jumper wires:
 - Connect one to a 12 volt source
 - Connect the other to a good body ground
 - Refer to the Mirror Motor Test Chart for proper wire connections at the switch connector
- (4) If results shown in table are not obtained, check for open or shorted circuit. Replace mirror assembly as necessary.

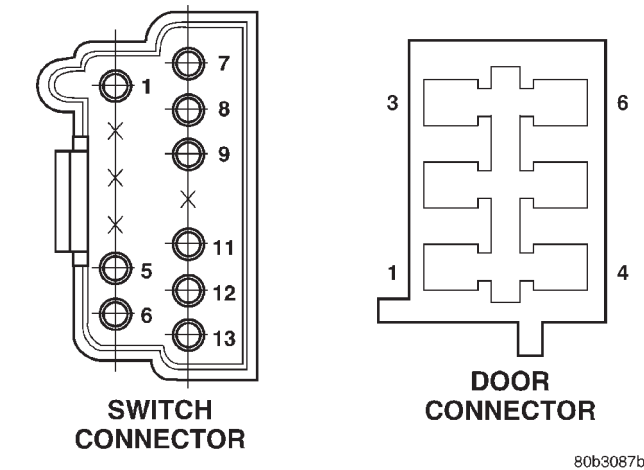


Fig. 1 Connector Pin Call-Out
MIRROR MOTOR TEST

MIRROR SWITCH CONNECTOR			
B (+)	B (-)	MIRROR REACTION	
		LEFT	RIGHT
PIN 12	PIN 6		UP
PIN 13	PIN 1	UP	
PIN 6	PIN 12		DOWN
PIN 1	PIN 13	DOWN	
PIN 6	PIN 7		RIGHT
PIN 1	PIN 8	RIGHT	
PIN 7	PIN 6		LEFT
PIN 8	PIN 1	LEFT	
DOOR CONNECTOR			
PIN 6	PIN 2	UP	
PIN 2	PIN 6	DOWN	
PIN 2	PIN 5	RIGHT	
PIN 5	PIN 2	LEFT	
PIN 1	PIN 3	HEATER	

AUTOMATIC DAY / NIGHT
MIRROR

DESCRIPTION

The automatic day/night mirror uses a thin layer of electrochromic material between two pieces of conductive glass to make up the face of the mirror. When the mirror switch is in the On position, two photocell sensors are used by the mirror circuitry to monitor external light levels and adjust the reflectance of the mirror.

OPERATION

The ambient photocell sensor is located on the forward-facing (windshield side) of the rear view mirror housing, and detects the ambient light levels outside of the vehicle. The headlamp photocell sensor is located inside the rear view mirror housing behind the mirror glass and faces rearward, to detect the level of the light being received at the rear window side of the mirror. When the circuitry of the automatic day/night mirror detects that the difference between the two light levels is too great (the light level received at the rear of the mirror is much higher than that at the front of the mirror), it begins to darken the mirror.

The automatic day/night mirror circuitry also monitors the transmission using an input from the backup lamp circuit. The mirror circuitry is programmed to automatically disable its self-dimming feature whenever it senses that the transmission backup lamp circuit is energized.

The automatic day/night mirror is a completely self-contained unit and cannot be repaired. If faulty or damaged, the entire mirror assembly must be replaced.

DIAGNOSIS AND TESTING - AUTOMATIC
DAY/NIGHT INSIDE MIRROR

For complete circuit diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

(1) Check the fuse in the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Turn the ignition switch to the On position. Check for battery voltage at the fuse in the junction block. If OK, go to Step 3. If not OK, repair the open circuit to the ignition switch as required.

(3) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable.

AUTOMATIC DAY / NIGHT MIRROR (Continued)

Unplug the wire harness connector from the automatic day/night mirror. Connect the battery negative cable. Turn the ignition switch to the On position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the automatic day/night mirror wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the junction block as required.

(4) Turn the ignition switch to the Off position. Disconnect and isolate the battery negative cable. Check for continuity between the ground circuit cavity of the automatic day/night mirror wire harness connector and a good ground. There should be continuity. If OK, go to Step 5. If not OK, repair the circuit to ground as required.

(5) Connect the battery negative cable. Turn the ignition switch to the On position. Set the parking brake. Place the transmission gear selector lever in the Reverse position. Check for battery voltage at the backup lamp switch output circuit cavity of the automatic day/night mirror wire harness connector. If OK, go to Step 6. If not OK, repair the open circuit as required.

(6) Turn the ignition switch to the Off position. Disconnect the battery negative cable. Plug in the automatic day/night mirror wire harness connector. Connect the battery negative cable. Turn the ignition switch to the On position. Place the transmission gear selector lever in the Neutral position. Place the mirror switch in the On (the LED in the mirror switch is lighted) position. Cover the forward facing ambient photocell sensor to keep out any ambient light.

NOTE: The ambient photocell sensor must be covered completely, so that no light reaches the sensor. Use a finger pressed tightly against the sensor, or cover the sensor completely with electrical tape.

(7) Shine a light into the rearward facing headlamp photocell sensor. The mirror glass should darken. If OK, go to Step 8. If not OK, replace the faulty automatic day/night mirror unit.

(8) With the mirror glass darkened, place the transmission gear selector lever in the Reverse position. The mirror should return to its normal reflectance. If not OK, replace the faulty automatic day/night mirror unit.

POWER MIRROR SWITCH

DESCRIPTION

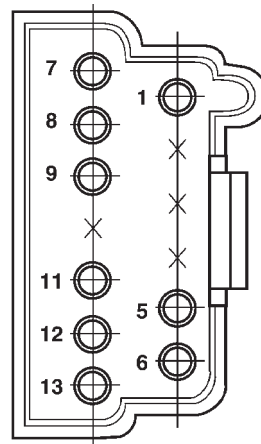
The mirror switch on the door trim panel operates both the outside rear view mirrors. On vehicles equipped with Memory/Heated Seats, the Memory Heated Seat Mirror Module (MHSMM) activates the mirror motors in recall mode.

OPERATION

Position sensing potentiometers are built into each mirror's vertical and horizontal motor assembly. These potentiometers provide a sense voltage to the MHSMM that indicates where the actual location of each mirror is. If a memory position is set, the values of the potentiometers at that location are stored in memory.

DIAGNOSIS AND TESTING - POWER MIRROR SWITCH

- (1) Remove power mirror switch.
- (2) Disconnect wire harness connector from back of power mirror switch.
- (3) Using an ohmmeter, test for continuity between the terminals of the switch (Fig. 2) as shown in the Mirror Switch Test table.
- (4) If test results are not obtained as shown in the Mirror Switch Test table, replace the switch.



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Fig. 2 Mirror Switch Connector Pin Call-Out

POWER MIRROR SWITCH (Continued)

MIRROR SWITCH TEST

SWITCH POSITION MOVE BUTTON	CONTINUITY BETWEEN TERMINALS
MIRROR IN "L" POSITION	
UP	PIN 11 TO 12 PIN 12 TO 13 PIN 9 TO 1
RIGHT	PIN 11 TO 1 PIN 9 TO 7 PIN 9 TO 8
DOWN	PIN 11 TO 1 PIN 9 TO 12 PIN 9 TO 13
LEFT	PIN 11 TO 7 PIN 11 TO 8 PIN 9 TO 1
MIRROR IN "R" POSITION	
UP	PIN 11 TO 12 PIN 11 TO 13 PIN 9 TO 2
RIGHT	PIN 11 TO 6 PIN 9 TO 7 PIN 9 TO 8
DOWN	PIN 11 TO 6 PIN 9 TO 12 PIN 9 TO 13
LEFT	PIN 11 TO 7 PIN 11 TO 8 PIN 9 TO 6

REMOVAL

- (1) Disconnect and isolate the battery negative cable.
- (2) Using a trim stick, remove power mirror switch from mounting position.
- (3) Disconnect wire connector.
- (4) Remove switch.

INSTALLATION

- (1) Connect the wire connector to the switch.
- (2) Insert power mirror switch to the mounting position.
- (3) Connect battery negative cable.

SIDEVIEW MIRROR

REMOVAL

For removal procedure, (Refer to 23 - BODY/EXTERIOR/SIDE VIEW MIRROR - REMOVAL)

POWER SEATS

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POWER SEATS

DESCRIPTION

DESCRIPTION - POWER SEAT SYSTEM

The power seat system option allows the driver and front seat passenger to electrically adjust their seating positions for optimum control and comfort using the power seat switches located on the out-board seat cushion side shield of each front seat. The power seat system receives battery current through a 40 amp fuse in the Power Distribution Center (PDC) and a 20 amp circuit breaker in the junction block so that the power seats remain operational, regardless of the ignition switch position.

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD

RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

A eight-way power seat is standard on highline models and optional on others. This option includes a six-way adjustable seat cushion track and a two-way power seat back.

The eight-way power seat is also available with the heated seat and memory seat system that automatically positions the power seat for two different drivers. Refer to **Heated Seat System** for more information on the heated seat option. Refer to **Memory System** in the Memory System section of this group for more information on the memory system.

The power seat system includes the following components:

- Power seat recliner
- Power seat switch
- Power seat track.

The power seat system with memory and heated seat options includes the following components:

- Power seat recliner
- Power seat switch
- Power seat track.
- Memory Heated Seat Module (MHSM)
- Memory set switch
- Heated seat switch
- Electronic Vehicle Information Center (EVIC)

POWER SEATS (Continued)

- Programmable Communications Interface (PCI) data bus network

Refer to Wiring Diagrams for complete circuit diagrams. Following are general descriptions and operations for the major components in the power seat system and memory seat system.

DESCRIPTION - MEMORY SEAT SYSTEM

An electronic memory and heated seat system is available on some models. The memory system is able to store and recall the driver side power seat positions (including the power recliner position), and both outside power mirror positions for two drivers. For vehicles with a radio and heated / memory seat system connected to the Programmable Communications Interface (PCI) data bus network, the memory system is also able to store and recall up to twenty - ten AM and ten FM - radio station presets for two drivers. The memory system also will store and recall the last station listened to for each driver, even if it is not one of the twenty preset stations.

The memory system will automatically return to all of these settings when the corresponding numbered and button of the memory switch on the driver side seat side shield is depressed, or when the doors are unlocked using the Remote Keyless Entry (RKE) transmitter. A customer programmable feature of the memory system allows the RKE recall of memory features to be disabled in cases where there are more than two drivers of the vehicle.

The memory system also has a customer programmable easy exit feature that will move the driver seat rearward 55 millimeters (two inches) or to the end of its travel, whichever occurs first, when the key is removed from the ignition switch lock cylinder.

A Memory Heated Seat Module (MHSM) is used on some models to control and integrate the many electronic functions and features included in the memory / heated seat system.

The memory system includes the following components:

- Memory heated seat module (MHSM)
- Memory set/selector switch
- Position potentiometers on both outside power mirrors
- Position potentiometers on the driver side power seat track and power seat recliner motors.
- Radio receiver (if PCI data bus capable).

Certain functions and features of the memory system rely upon resources shared with other electronic modules in the vehicle over the Programmable Communications Interface (PCI) data bus network. The PCI data bus network allows the sharing of sensor information. This helps to reduce wire harness complexity, internal controller hardware, and component sensor current loads. At the same time, this system

provides increased reliability, enhanced diagnostics, and allows the addition of many new feature capabilities. For diagnosis of these electronic modules or of the PCI data bus network, the use of a DRB® scan tool and the proper Diagnostic Procedures manual are recommended.

The other electronic modules that may affect memory system operation are as follows:

- **Body Control Module (BCM)** - Refer to **Body Control Module** in Electronic Control Modules for more information.

- **Electronic Vehicle Information Center (EVIC)** - Refer to **Electronic Vehicle Information Center** in Overhead Console Systems for more information.

- **Powertrain Control Module (PCM)** - Refer to **Powertrain Control Module** in Electronic Control Modules for more information.

- **Radio Receiver** - Refer to **Radio Receiver** in Audio Systems for more information.

Refer to **Heated Seat System** for more information on the heated seat system. Refer to **Remote Keyless Entry System** in Power Lock Systems for more information on the RKE system. Refer to **Power Mirror** in Power Mirrors for more information on the mirror position potentiometers. Refer to **Power Seat Track** and **Power Seat Recliner** in the Power Seat System section of this group for more information on the driver side power seat position potentiometers.

Refer to **Power Seat** in the Contents of Wiring Diagrams for complete circuit diagrams. Following are general descriptions of the remaining major components in the factory-installed memory system.

OPERATION**OPERATION - POWER SEAT SYSTEM**

The power seat system allows the driver and/or front passenger seating positions to be adjusted electrically and independently using the separate power seat switches found on the outboard seat cushion side shield of each front seat. See the owner's manual in the vehicle glove box for more information on the features, use and operation of the power seat system.

OPERATION - MEMORY SEAT SYSTEM

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the memory system. For diagnosis of the MHSM, the PCI data bus, or the other electronic modules on the PCI data bus that provide inputs and outputs for the memory system, the use of a DRB® scan tool and the proper Diagnostic Procedures manual are recommended.

POWER SEATS (Continued)

DESCRIPTION - ELECTRONIC VEHICLE INFORMATION CENTER

The Electronic Vehicle Information Center (EVIC) serves as the user interface for the memory / heated seat system. It displays memory system status messages and provides the user with the means for enabling and disabling the many customer programmable features available on the vehicle, including those for the memory system.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the EVIC. Refer to **Electronic Vehicle Information Center** in Overhead Console Systems for more information on the EVIC.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - POWER SEATS**

Following are tests that will help to diagnose the hard wired components and circuits of the power seat system. However, if the vehicle is also equipped with the optional memory system, these tests may not prove conclusive in the diagnosis of the driver side power seat. In order to obtain conclusive testing of the driver side power seat with the memory system option, the Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the memory system components must be checked.

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: Vehicles equipped with the memory/heated seat option utilize a unique low voltage cut-off feature. This feature shuts off the power seat system anytime vehicle voltage is below 11.7v. Be certain to check the vehicle electrical system for proper operation anytime the power seat system appears inoperational.

The most reliable, efficient, and accurate means to diagnose the driver side power seat with the memory system option requires the use of a DRB III® scan tool and the proper Diagnostic Procedures manual. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the memory system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its driver side power seat functions.

Before any testing of the power seat system is attempted, the battery should be fully-charged and all of the power seat system wire harness connections and pins cleaned and tightened to ensure proper circuit continuity and ground paths. For complete circuit diagrams, refer to **Power Seat** in the Contents of Wiring Diagrams.

With the dome lamp on, apply the power seat switch in the direction of the failure. If the dome lamp dims, the seat may be jamming. Check under and behind the seat for binding or obstructions. If the dome lamp does not dim, proceed with testing of the individual components and circuits.

VOLTAGE TEST

The following test will determine whether or not voltage is continuous through the body harness to the seat switch.

(1) Remove the front seat cushion side shield from the seat to be tested. Refer to Body for the procedure.

(2) Using a voltmeter, connect the ground lead to Pin 5 and positive lead to Pin 1 of the seat switch connector. If battery voltage is present circuit is OK. If no voltage is present check circuit breaker and repair as necessary.

CIRCUIT BREAKER TEST

Find correct circuit breaker on fuse block. Pull out slightly but be sure that circuit breaker terminals still contact terminals in fuse block. Connect ground wire of voltmeter to a good ground. With probe of voltmeter positive wire, check both terminals of circuit breaker for battery voltage. If only one terminal checks at battery voltage, circuit breaker is defective and must be replaced. If neither terminal shows battery voltage, check for open or shorted circuit to circuit breaker.

DIAGNOSIS AND TESTING - MEMORY SEAT SYSTEM

In order to obtain conclusive testing of the memory system, the Programmable Communications Interface (PCI) data bus network and all of the electronic modules that provide inputs to, or receive outputs from the memory system components must be checked.

POWER SEATS (Continued)

The most reliable, efficient, and accurate means to diagnose the memory system requires the use of a DRB III® scan tool and the proper Diagnostic Procedures manual. The DRB III® scan tool can provide confirmation that the PCI data bus is functional, that all of the electronic modules are sending and receiving the proper messages on the PCI data bus, and that the memory system is receiving the proper hard wired inputs and relaying the proper hard wired outputs to perform its functions.

STANDARD PROCEDURE - MEMORY SYSTEM PROGRAMMING

The Memory Heated Seat Mirror Module (MHSM) interfaces with the RKE via the Programmable Communication Interface (PCI) bus. The proper procedure of setting and recalling a memory position using the RKE is as follows:

- (1) Press memory switch 1 and release to recall memory position 1.
- (2) Adjust the seat, recliner and side view mirrors to the desired position.
- (3) Press momentarily and release memory switch S.
- (4) Press momentarily and release memory switch 1 or 2.
- (5) Press and release the **LOCK** button on one of the RKE transmitters. Do NOT press any switch for 10 seconds.
- (6) Set radio station presets.

To program the second driver's position, repeat the above procedure using memory switch 2. The second RKE transmitter can be programmed in the same fashion.

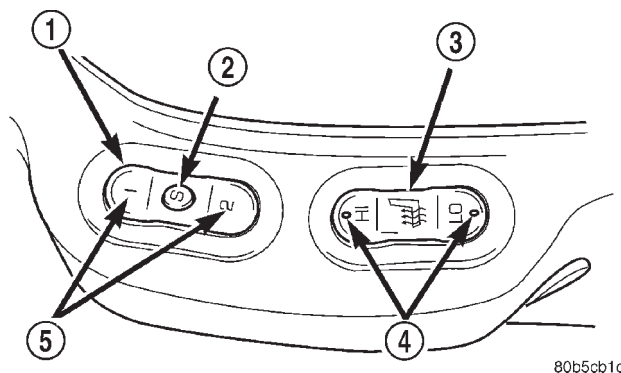
To recall either of the programmed positions momentarily press and release either memory selector switch 1 or 2. If using RKE, just press and release the UNLOCK button on the proper transmitter for either position 1 or 2.

A recall is possible any time the vehicle transmission is in PARK. This condition is monitored by the Body Control Module (BCM).

NOTE: The module will abort a recall if the transmission is moved out of park or if any seat movement is activated whether manually or by memory recall.

MEMORY SET SWITCH

DESCRIPTION

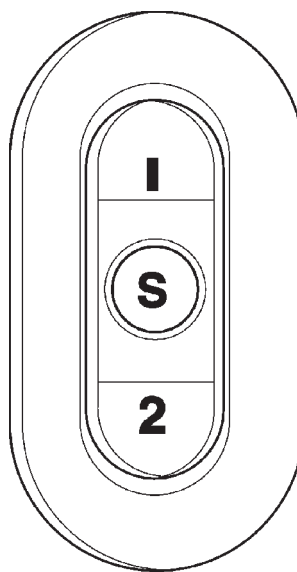


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Fig. 1 Memory and Heated Seat Switches

- 1 - MEMORY SET SWITCH ASSEMBLY
- 2 - MEMORY POSITION SET SWITCH
- 3 - HEATED SEAT SWITCH
- 4 - LED'S
- 5 - MEMORY POSITION SWITCHES

The memory selector switch is mounted on the drivers seat cushion side shield (Fig. 1), within easy reach of the driver. This switch provides a way to set new and recall preset positions of seat, seat recliner, and the side view mirror. There are three separate switches incorporated into the memory set switch. The memory position set switch and memory position one and two switches (Fig. 2).



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Fig. 2 LH Memory Set Switch

The memory set switch cannot be repaired or adjusted. If one switch is damaged or faulty, the entire memory set switch must be replaced.

MEMORY SET SWITCH (Continued)

OPERATION

When the memory set switch is depressed, a resistance multiplexed signal is sent to the memory/heated seat module via hard wired connections. The memory/heated seat module then receives this hard-wired input and moves the power seat track/side view mirror according to the preset position. When the memory system is in "set" mode a chime will be generated by the body control module.

See the owner's manual in the vehicle glove box for more information on the features, use and operation of the memory switch.

DIAGNOSIS AND TESTING - MEMORY SET SWITCH

For complete circuit diagrams, refer to **Wiring Diagrams**.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the driver side front seat side shield. Refer to Body for the procedure.

(3) Disconnect the memory switch wire harness connector from the memory switch.

(4) Use an ohmmeter to test for continuity between the memory switch terminals.

(5) Connect one end of the ohmmeter to pin #3. While holding the memory 1 button check for continuity with pin #6. If not OK, replace the faulty memory switch.

(6) Connect one end of the ohmmeter to pin #3. While holding the memory 2 button check for continuity with pin #4. If not OK, replace the faulty memory switch.

(7) Connect one end of the ohmmeter to pin #3. While holding the memory S button check for continuity with pin #5. If not OK, replace the faulty memory switch.

(8) If OK, refer to **Memory System Diagnosis and Testing** in this group. If not OK, replace the faulty memory switch.

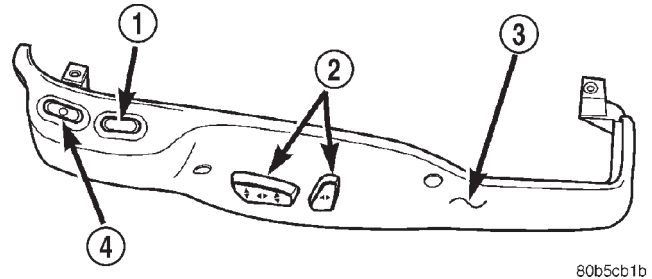
REMOVAL

(1) Disconnect and isolate the negative battery cable remote terminal from the remote battery post.

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD

RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(2) Remove the drivers seat cushion side shield from the seat (Fig. 3). Refer to the Body section for the procedure.



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Fig. 3 Memory and Heated Seat Switch Location

1 - HEATED SEAT SWITCH

2 - POWER SEAT SWITCH

3 - SEAT CUSHION SIDE SHIELD

4 - MEMORY SET SWITCH

(3) From the bottom, disengage the memory set switch by gently rock through the opening.

INSTALLATION

(1) Install the switch in the seat cushion side shield.

(2) Install the seat cushion side shield. Refer to the Body section for the procedure.

(3) Connect the negative battery cable remote terminal.

DRIVER POWER SEAT SWITCH

DESCRIPTION

Vehicles equipped with power seats utilize a eight-way driver power seat switch. This eight-way power seat switch features two knobs ganged together on the outboard seat cushion side shield.

The switch is secured to the back of the seat cushion side shield with two screws. However, the control knobs for the eight-way power seat switch unit must be removed before the seat switch can be removed from the side shield.

The power seat switch cannot be repaired. If one switch is damaged or faulty, the entire power seat switch assembly must be replaced.

OPERATION

When a power seat switch control knob or knobs are actuated, a battery feed and a ground path are applied through the switch contacts to the power seat track or recliner adjuster motor. The selected adjuster motor operates to move the seat track or recliner through its drive unit in the selected direc-

DRIVER POWER SEAT SWITCH (Continued)

tion until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the adjuster motor to run in the opposite direction.

No power seat switch should be held applied in any direction after the adjuster has reached its travel limit. The power seat adjuster motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker must not be allowed to continue, or the motor may be damaged. See the owner's manual in the vehicle glove box for more information on the power seat switch functions and the seat adjusting procedures.

DIAGNOSIS AND TESTING - DRIVER POWER SEAT SWITCH

(1) Remove the power seat switch. Refer to the procedure in this section.

(2) Using an ohmmeter, check pin #1 of the power seat switch connector for continuity to ground. It should be present, If OK go to Step 3 , If NOT OK repair the open ground circuit as required.

(3) Using a voltmeter, check pin #5 of the power seat switch connector for approx. 12v. It should be present, If OK go to Step 4 , If NOT OK repair the open voltage supply circuit as required.

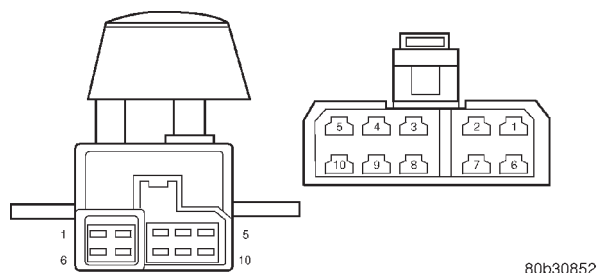
(4) Using an ohmmeter, verify the Seat Switch Continuity Test table, using the seat switch connector (Fig. 4). If there is no continuity at any of the switch positions, replace the power seat switch.

DRIVER SEAT SWITCH CONTINUITY TEST TABLE

SWITCH POSITION	CONTINUITY BETWEEN PINS
	DRIVER
OFF	PIN 5 & 4
	PIN 5 & 3
	PIN 5 & 2
	PIN 5 & 10
	PIN 5 & 9
	PIN 5 & 8
	PIN 5 & 7
	PIN 5 & 6
FRONT RISER UP	PIN 5 & 6 PIN 1 & 9
FRONT RISER DOWN	PIN 5 & 9 PIN 1 & 6

CENTER SWITCH FORWARD	PIN 5 & 3 PIN 1 & 10
CENTER SWITCH REARWARD	PIN 5 & 10 PIN 3 & 1
REAR RISER UP	PIN 5 & 7 PIN 1 & 8
REAR RISER DOWN	PIN 5 & 8 PIN 1 & 7
RECLINER UP	PIN 5 & 2 PIN 4 & 1
RECLINER DOWN	PIN 5 & 4 PIN 2 & 1

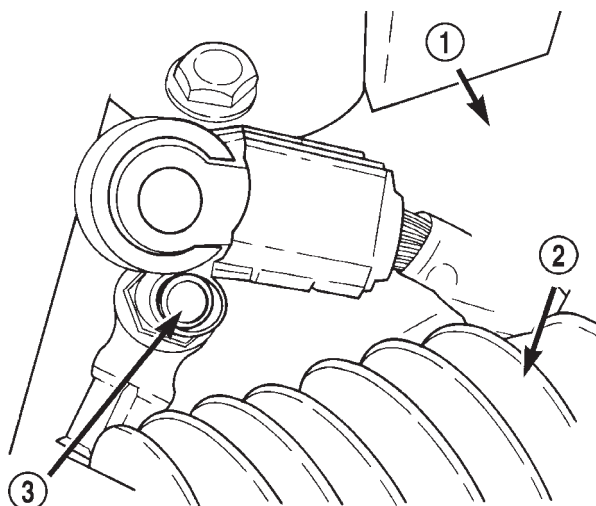
REMOVAL



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Fig. 4 Seat Switch Pin Call-Out

(1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post (Fig. 5).



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Fig. 5 Negative Battery Cable Remote Terminal

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

DRIVER POWER SEAT SWITCH (Continued)

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (2) Remove seat cushion side shield (Fig. 6). Refer to the Body section for the procedure.

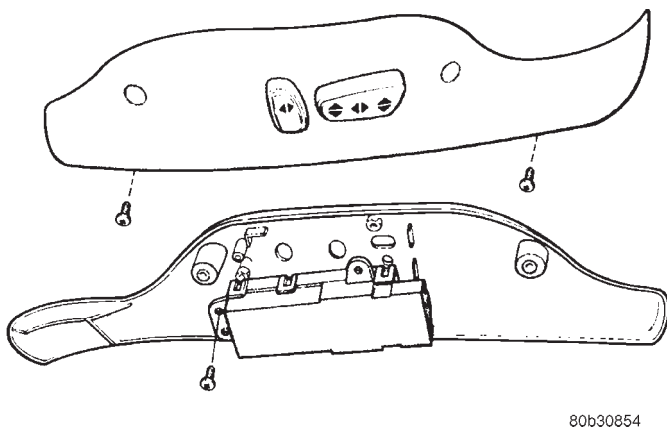


Fig. 6 Power Seat Switch and Seat Side Shield

- (3) Disconnect wiring from switch.
- (4) Remove knobs from the switch.
- (5) Remove switch attaching screws.
- (6) Remove switch from cushion side shield

INSTALLATION

- (1) Position the switch and install the switch attaching screws.
- (2) Install the knobs on the switch.
- (3) Connect wiring electrical connector on switch.
- (4) Install the seat cushion side shield. Refer to the Body section for the procedure.
- (5) Connect the negative battery cable remote terminal on the remote battery post.

PASSENGER POWER SEAT SWITCH

DESCRIPTION

Vehicles equipped with power seats utilize a eight/six-way passenger power seat switch. This eight/six-way power seat switch features two knobs ganged together on the outboard seat cushion side shield. Vehicles equipped with the eight-way, incorporate a

power rear seat riser motor. Vehicles with the six-way do not.

The switch is secured to the back of the seat cushion side shield with two screws. However, the control knobs for the power seat switch must be removed before the seat switch can be removed from the side shield.

The power seat switch cannot be repaired. If one switch is damaged or faulty, the entire power seat switch assembly must be replaced.

OPERATION

When a power seat switch control knob or knobs are actuated, a battery feed and a ground path are applied through the switch contacts to the power seat track or recliner adjuster motor. The selected adjuster motor operates to move the seat track or recliner through its drive unit in the selected direction until the switch is released, or until the travel limit of the adjuster is reached. When the switch is moved in the opposite direction, the battery feed and ground path to the motor are reversed through the switch contacts. This causes the adjuster motor to run in the opposite direction.

No power seat switch should be held applied in any direction after the adjuster has reached its travel limit. The power seat adjuster motors each contain a self-resetting circuit breaker to protect them from overload. However, consecutive or frequent resetting of the circuit breaker must not be allowed to continue, or the motor may be damaged. See the owner's manual in the vehicle glove box for more information on the power seat switch functions and the seat adjusting procedures.

DIAGNOSIS AND TESTING - PASSENGER POWER SEAT SWITCH

- (1) Remove the power seat switch, refer to the Switch Removal and Installation procedures in this section.
- (2) Using an ohmmeter, check pin #1 of the power seat switch connector for continuity to ground. It should be present, If OK go to Step 3 , If NOT OK repair the open ground circuit as required.
- (3) Using an voltmeter, check pin #5 of the power seat switch connector for approx. 12v. It should be present, If OK go to Step 4 , If NOT OK repair the open voltage supply circuit as required.
- (4) Using an ohmmeter, perform the Seat Switch Continuity Test table using (Fig. 7). If there is no continuity at any of the switch positions, replace the power seat switch.

PASSENGER POWER SEAT SWITCH (Continued)

PASSENGER SEAT SWITCH CONTINUITY
TEST TABLE

SWITCH POSITION	CONTINUITY BETWEEN PINS
	PASSENGER
OFF	PIN 5 & 4
	PIN 5 & 3
	PIN 5 & 2
	PIN 5 & 10
	PIN 5 & 9
	PIN 5 & 8
	PIN 5 & 7
	PIN 5 & 6
FRONT RISER UP	PIN 5 & 9 PIN 1 & 6
FRONT RISER DOWN	PIN 5 & 6 PIN 1 & 9
CENTER SWITCH FORWARD	PIN 5 & 3 PIN 1 & 10
CENTER SWITCH REARWARD	PIN 5 & 10 PIN 3 & 1
REAR RISER UP (IF EQUIP.)	PIN 5 & 8 PIN 1 & 7
REAR RISER DOWN (IF EQUIP.)	PIN 5 & 7 PIN 1 & 8
RECLINER UP	PIN 5 & 2 PIN 4 & 1
RECLINER DOWN	PIN 5 & 4 PIN 2 & 1

REMOVAL

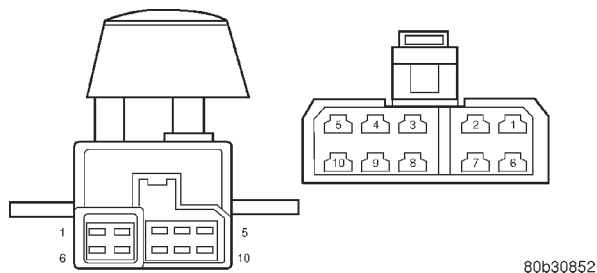
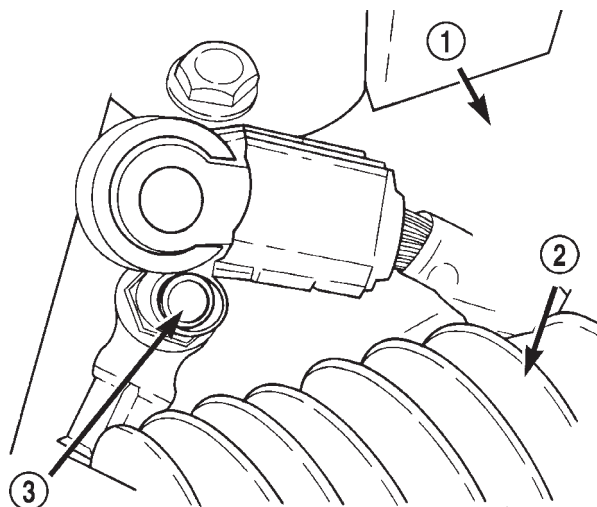


Fig. 7 Seat Switch Pin Call-Out

(1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post (Fig. 8).



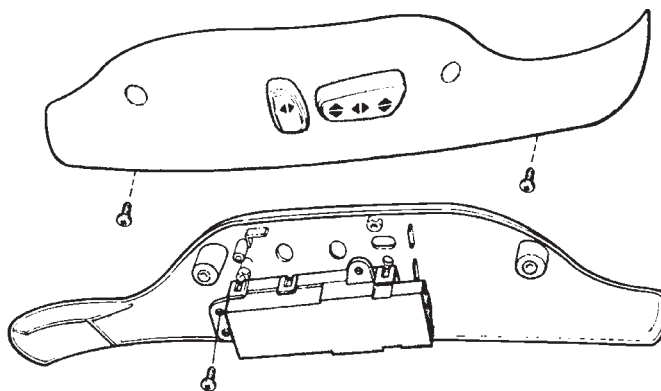
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Fig. 8 Negative Battery Cable Remote Terminal

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(2) Remove seat cushion side shield (Fig. 9). Refer to the Body section for the procedure.



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Fig. 9 Power Seat Switch and Seat Side Shield

- (3) Disconnect wiring from switch.
- (4) Remove knobs from the switch.
- (5) Remove switch attaching screws.
- (6) Remove switch from cushion side shield

PASSENGER POWER SEAT SWITCH (Continued)

INSTALLATION

- (1) Position the switch and install the switch attaching screws.
- (2) Install the knobs on the switch.
- (3) Connect wiring electrical connector on switch.
- (4) Install the seat cushion side shield. Refer to the Body section for the procedure.
- (5) Connect the negative battery cable remote terminal on the remote battery post.

POWER SEAT TRACK**DESCRIPTION**

The eight/six-way power seat options include a single electrically operated power seat track located under each front bucket seat. The power seat track unit replaces the standard equipment manual seat tracks. The lower half of the power seat track is secured at the front with two bolts to the floor panel seat cross member, and at the rear with two bolts to the floor panel. Four nuts secure the bottom of the seat cushion frame to four studs on the upper half of the power seat track unit.

The power seat track unit cannot be repaired, and is serviced only as a complete unit. If any component in this unit is faulty or damaged, the entire power seat track unit must be replaced.

OPERATION

The power seat track unit includes two/three reversible electric motors that are secured to the upper half of the track unit. Each motor moves the seat adjuster through a combination of worm-drive gearboxes and screw-type drive units. Each of the driver side power seat track motors used on models equipped with the optional memory system, also has a position potentiometer integral to the motor assembly, which electronically monitors the motor position.

The front and rear (if equipped) of the seat are operated by two separate vertical adjustment motors. These motors can be operated independently of each other, tilting the entire seat assembly forward or rearward; or, they can be operated in unison by selecting the proper power seat switch functions, which will raise or lower the entire seat assembly. The third motor is the horizontal adjustment motor, which moves the seat track in the forward and rearward directions.

DIAGNOSIS AND TESTING - POWER SEAT TRACK

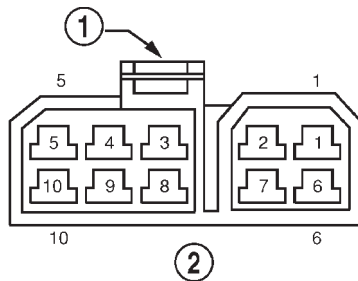
- (1) Remove power seat switch from seat. Refer to the procedure in this section.
- (2) Disconnect wire harness connector.
- (3) Check Pin 1 for battery voltage and Pin 5 for ground.
- (4) To test the seat motors and verify proper seat responses, refer to (Fig. 10) and the Seat Motor Test table. Using two jumper wires, connect one to a battery supply and the second to a ground. Connect the other ends to the seat wire harness connector as described in the Seat Motor Test table.

SEAT TRACK MOTOR TEST

SEAT CONNECTOR			
CONNECT JUMPER		SEAT ACTION	
B (+)	B (-)	DRIVER SIDE	PASSENGER SIDE
PIN 9	PIN 6	FRONT RISER UP	FRONT RISER DOWN
PIN 6	PIN 9	FRONT RISER DOWN	FRONT RISER UP
PIN 10	PIN 3	FORWARD	FORWARD
PIN 3	PIN 10	REARWARD	REARWARD
PIN 8	PIN 7	REAR RISER UP	REAR RISER DOWN (IF EQUIP.)
PIN 7	PIN 8	REAR RISER DOWN	REAR RISER UP (IF EQUIP.)
PIN 4	PIN 2	RECLINER UP	RECLINER UP
PIN 2	PIN 4	RECLINER DOWN	RECLINER DOWN

POWER SEAT TRACK (Continued)

REMOVAL



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Fig. 10 Power Seat Wire Harness Pin Call-Out

1 - BLUE

2 - VIEWED FROM BODY HARNESS END

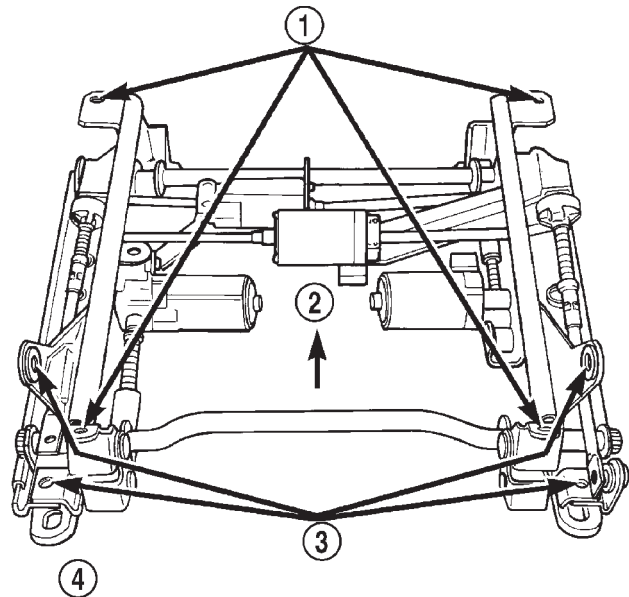
WARNING: SOME VEHICLES ARE EQUIPPED WITH SEATBACK MOUNTED AIRBAGS. BEFORE ATTEMPTING TO DIAGNOSE OR SERVICE ANY SEAT OR POWER SEAT SYSTEM COMPONENT YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE. THEN WAIT TWO MINUTES FOR THE SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Remove the appropriate front seat from the vehicle. Refer to the Body section for the procedure.

(2) Remove two seat back mounting bolts and also remove two seat back recliner bolts (Fig. 11).

(3) Remove four seat track mounting bolts from cushion pan.

(4) Remove the seat track from seat.



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Fig. 11 Seat Track Removal

1 - TRACK TO SEAT CUSHION BOLTS

2 - FRONT

3 - SEAT BACK RECLINER BOLTS

4 - VIEWED FROM TOP OF TRACK

INSTALLATION

(1) Position the seat track and install the retaining bolts in the seat cushion pan. Torque the bolts to 45-60 N·m.

(2) Install the two seat back mounting bolts. Torque the bolts to 45-60 N·m.

(3) Install the two seat back recliner bolts. Torque the bolts to 45-60 N·m.

(4) Install the seat in the vehicle. Refer to the Body section of the service manual for the procedure.

POWER WINDOWS

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POWER WINDOWS

DESCRIPTION

The power window system allows each of the door windows to be raised and lowered electrically by actuating a switch on the trim panel of each respective door. A master switch on the driver side front door trim panel allows the driver to raise or lower each of the passenger door windows, and to lock out the individual switches on the passenger doors from operation. The power window system receives battery feed through a circuit breaker in the junction block, only when the ignition switch is in the On position.

The power window system includes the power window switches on each door trim panel, the circuit breaker in the junction block, and the power window motors inside each door. For service of mechanical components, (Refer to 23 - BODY/DOOR - FRONT/ WINDOW REGULATOR - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR - REMOVAL).

OPERATION

Front and rear door window lift motors are of the permanent magnet type. A battery positive and negative connection to either of the two motor terminals will cause the motor to rotate in one direction. Reversing current through these same two connections will cause the motor to rotate in the opposite direction.

Each individual motor is grounded through the master switch.

DIAGNOSIS AND TESTING - POWER WINDOWS

WIRING VOLTAGE TEST

The following circuit test sequence determines whether or not voltage is continuous through the body harness to switch.

(1) Remove the driver door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL) for proper procedures.

(2) Carefully separate wiring harness connector from switch body.

(3) Using a voltmeter, connect the ground lead to the Pin 10 of the wiring harness connector.

(4) Using the positive lead, check Pin 1 of the harness connector for battery voltage. If OK, go to Window Switch Test below. If not OK, check 20 amp circuit breaker in the Junction Block, if the circuit breaker is OK, repair wire as necessary. For wiring, specific connector type and location, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

POWER WINDOW MOTOR TEST

(1) Remove door trim panel, (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).

(2) Connect positive (+) lead from a test battery to either of the two motor terminals.

(3) Connect negative (-) lead from test battery to remaining motor terminal.

(4) The motor should now rotate in one direction to either move window up or down.

(a) If window happens to already be in full UP position and motor is connected so as to move it in UP direction no movement will be observed.

(b) Likewise, motor connected to move window in DOWN direction no movement will be observed if window is already in full DOWN position.

(c) Reverse battery leads in Step 1 and Step 2 and window should now move. If window does not move, remove motor. (Refer to 8 - ELECTRICAL/

POWER WINDOWS (Continued)

POWER WINDOWS/WINDOW MOTOR - REMOVAL.

(5) If window moved completely up or down, the test leads should be reversed one more time to complete a full window travel inspection.

(6) If window does not move, check to make sure that it is free.

(7) It is necessary that the window be free to slide up and down in the glass channels. If the window is not free to move up and down, the window lift motor will not be able to move the glass.

(8) To determine if the glass is free is to disconnect the regulator from the glass lift plate. Remove the two attaching screws, and slide the window up and down by hand.

WINDOW MOTOR**REMOVAL**

(1) Move the window to the full-up position, if possible.

(2) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(3) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL).

(4) Remove window regulator. (Refer to 23 - BODY/DOOR - FRONT/WINDOW REGULATOR - REMOVAL) or (Refer to 23 - BODY/DOORS - REAR - REMOVAL).

WARNING:

FAILURE TO CLAMP THE SECTOR GEAR TO THE MOUNTING PLATE WHEN REMOVING THE MOTOR CAN RESULT IN INJURY.

(5) Disconnect wiring connector from motor.

(6) Secure the sector gear and mounting plate with a C clamp or similar clamping tool. This will prevent a sudden and forceful movement of the regulator when the motor is removed.

(7) Remove three mounting screws that hold motor gearbox to regulator (Fig. 1).

(8) Remove motor from regulator.

INSTALLATION

(1) Install new motor on regulator by positioning motor gearbox so that it engages regulator sector teeth.

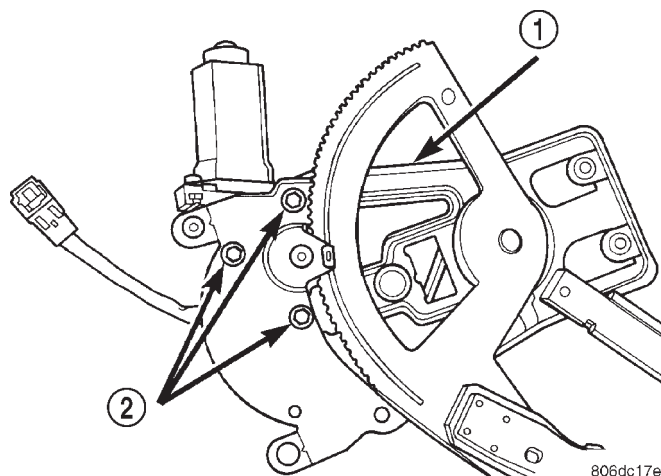


Fig. 1 Motor Removal

1 - CLAMP REGULATOR TO SECTOR GEAR

2 - MOTOR MOUNTING SCREWS

(2) A slight rotational or rocking movement may be necessary to bring three motor gearbox screw holes into proper position.

(3) Install three gearbox screws and one tie down bracket screw, if applicable. Tighten to 5.6 to 8 N·m (50 to 70 in. lbs.) torque.

(4) Install regulator. Using the switch, test operation of motor.

(5) Install trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION) or (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION).

(6) Connect the negative battery cable remote terminal to the remote battery post.

WINDOW SWITCH**DIAGNOSIS AND TESTING - WINDOW SWITCH**

For switch testing, remove the switch from its mounting, refer to Switch Removal. Using an ohmmeter, refer to Window Switch Continuity Charts to determine if continuity is correct (Fig. 2) and (Fig. 3). If the results are not obtained, replace the switch.

The master window switch has an Auto-Down feature. Actuation of the master switch to the second down detent position will move the drivers side window completely down. The electronic switch will automatically disconnect the motor approximately 1 second after the window bottoms out. Failure of the electronic switch to detect stall current, will cause the switch to disconnect after approximately 15 seconds of operation. The auto down function can be canceled by any movement of the switch.

WINDOW SWITCH (Continued)

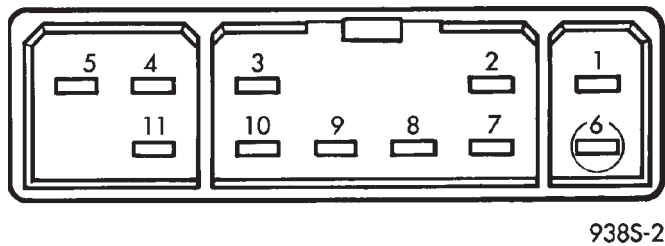


Fig. 2 Master Window Switch

OFF		PIN 8 to 10
		PIN 8 to 11
		PIN 8 to 7
		PIN 8 to 6
		PIN 8 to 3
		PIN 8 to 4
		PIN 8 to 9
		PIN 8 to 2
UP	DRIVER'S	PIN 8 to 10
UP	RIGHT	PIN 5 to 11
		PIN 8 to 7
UP	FRONT	PIN 5 to 6
	LEFT	PIN 8 to 3
UP	REAR	PIN 5 to 4
	RIGHT	PIN 8 to 9
DOWN	REAR	PIN 5 to 2
	DRIVER'S	PIN 8 to 11
DOWN	RIGHT	PIN 5 to 10
		PIN 8 to 6
DOWN	FRONT	PIN 5 to 7
	LEFT	PIN 8 to 4
DOWN	REAR	PIN 5 to 3
	RIGHT	PIN 8 to 2
DOWN	REAR	PIN 5 to 9
	REAR	PIN 5 to 1
WINDOW LOCK		

REMOVAL

MASTER SWITCH

INTREPID AND CONCORDE

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove driver's door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
- (3) Remove three mounting screws.
- (4) Remove switch and disconnect wire connector.

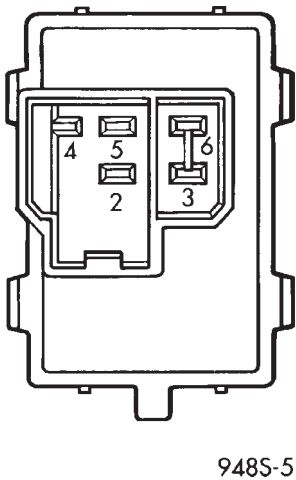


Fig. 3 Passenger Window Switch

OFF'	PIN 2 to 5
	PIN 6 to 3
UP	PIN 6 to 3
	PIN 4 to 5
DOWN	PIN 2 to 5
	PIN 4 to 3

LHS and 300M

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Using a trim stick (special tool #C-4755) or equivalent, gently pry up on switch trim bezel and lift up and out of trim panel.
- (3) Disconnect wire connector from rear of switch and remove switch from vehicle.

PASSENGER SWITCH

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove passenger door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL).
- (3) Disconnect switch wire connector.
- (4) Remove switch from bezel and vehicle.

REAR DOOR SWITCHES

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Open rear door.
- (3) Using a trim stick (special tool #C-4755), gently pry up on rear edge of switch pushing forward as you pry up on switch bezel.
- (4) Pull switch up and out of rear door trim panel.
- (5) Using a trim stick, gently pry out on retaining tabs on side of switch connector and pull connector from switch.
- (6) Remove switch from vehicle.

WINDOW SWITCH (Continued)

INSTALLATION

MASTER SWITCH

INTREPID AND CONCORDE

- (1) Install switch and wire connector.
- (2) Install three mounting screws.
- (3) Install drivers door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
- (4) Connect negative battery cable remote terminal.

LHS and 300M

- (1) Install wire connector to switch.
- (2) Install switch to trim panel.

- (3) Connect negative battery cable remote terminal.

PASSENGER SWITCH

- (1) Install switch and wire connector.
- (2) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION).
- (3) Connect negative battery cable remote terminal.

REAR DOOR SWITCHES

- (1) Install connector to switch.
- (2) Insert switch into door trim panel.
- (3) Connect negative battery cable remote terminal.

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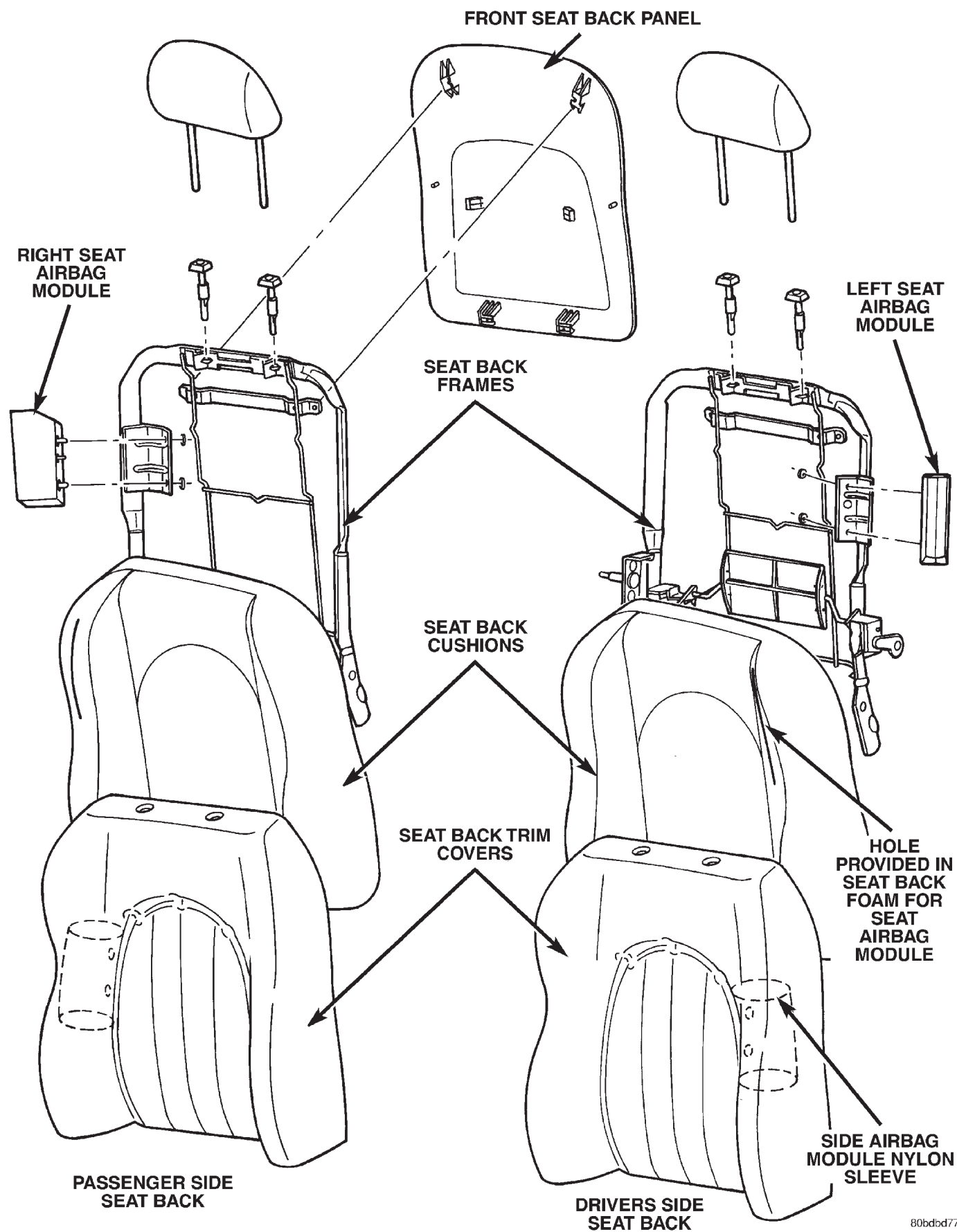
RESTRAINTS

DESCRIPTION - SIDE IMPACT AIRBAG SYSTEM

Vehicles equipped with the Side Impact Airbag System utilize two airbags mounted to each front seat back

frame (Fig. 1). This system is designed to protect occupants in the event of a side impact collision.

RESTRAINTS (Continued)



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Fig. 1 SIDE AIRBAG LOCATION - TYPICAL

RESTRAINTS (Continued)

- | | |
|--|------------------------------|
| 1 - FRONT SEAT BACK PANEL | 5 - SEAT BACK TRIM COVERS |
| 2 - LEFT SEAT AIRBAG MODULE | 6 - SEAT BACK CUSHIONS |
| 3 - HOLE PROVIDED IN SEAT BACK FOAM FOR SEAT AIRBAG MODULE | 7 - SEAT BACK FRAMES |
| 4 - SIDE AIRBAG MODULE NYLON SLEEVE | 8 - RIGHT SEAT AIRBAG MODULE |

OPERATION - SIDE IMPACT AIRBAG SYSTEM

The Side Impact Airbag Control Module (SIACM) controls the seat back mounted airbags. If the SIACM determines the impact is severe enough, the appropriate airbag will inflate, tearing open the front seat back trim cover protecting the passengers. Once a seat back mounted airbag has been deployed, the complete seat back assembly and all damaged parts must be replaced.

WARNING

WARNING: THIS SYSTEM IS A SENSITIVE, COMPLEX ELECTRONIC UNIT. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE REMOTE CABLE BEFORE BEGINNING AIRBAG SYSTEM COMPONENT REMOVAL OR INSTALLATION PROCEDURES. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR TWO MINUTES BEFORE REMOVING AIRBAG COMPONENTS.

DO NOT PLACE AN INTACT UNDEPLOYED AIRBAG FACE DOWN ON A SOLID SURFACE, THE AIRBAG WILL PROPEL INTO THE AIR IF ACCIDENTALLY DEPLOYED AND COULD RESULT IN PERSONAL INJURY. WHEN CARRYING OR HANDLING AN UNDEPLOYED AIRBAG, THE TRIM SIDE OF THE AIRBAG SHOULD BE POINTING AWAY FROM THE BODY TO MINIMIZE POSSIBILITY OF INJURY IF ACCIDENTAL DEPLOYMENT OCCURS.

REPLACE AIRBAG SYSTEM COMPONENTS WITH MOPAR® REPLACEMENT PARTS. SUBSTITUTE PARTS MAY APPEAR INTERCHANGEABLE, BUT INTERNAL DIFFERENCES MAY RESULT IN INFERIOR OCCUPANT PROTECTION.

WEAR SAFETY GLASSES, RUBBER GLOVES, AND LONG SLEEVED CLOTHING WHEN CLEANING POWDER RESIDUE FROM THE VEHICLE AFTER AN AIRBAG DEPLOYMENT. SODIUM HYDROXIDE POWDER RESIDUE EMITTED FROM A DEPLOYED AIRBAG CAN CAUSE SKIN IRRITATION. FLUSH AFFECTED AREA WITH COOL WATER IF IRRITATION IS EXPERIENCED. IF NASAL OR THROAT IRRITATION IS EXPERIENCED, EXIT THE VEHICLE FOR FRESH AIR UNTIL THE IRRITATION CEASES.

IF IRRITATION CONTINUES, SEE A PHYSICIAN.

DO NOT USE A REPLACEMENT AIRBAG THAT IS NOT IN THE ORIGINAL PACKAGING, IMPROPER DEPLOYMENT AND PERSONAL INJURY CAN RESULT.

THE FACTORY INSTALLED FASTENERS, SCREWS AND BOLTS USED TO FASTEN AIRBAG COMPONENTS HAVE A SPECIAL COATING AND ARE SPECIFICALLY DESIGNED FOR THE AIRBAG SYSTEM. DO NOT USE SUBSTITUTE FASTENERS, USE ONLY ORIGINAL EQUIPMENT FASTENERS LISTED IN THE PARTS CATALOG WHEN FASTENER REPLACEMENT IS REQUIRED.

AIRBAGS SHOULD BE STORED IN A COOL, DRY PLACE, AWAY FROM EXCESSIVE HEAT AND STATIC ELECTRICAL ACTIVITY WITH THE FABRIC AIRBAG FACING UP. IF NOT, A PREMATURE DEPLOYMENT CAN RESULT.

IF THE DRIVER/PASSENGER AIRBAG IS DEFECTIVE AND DEPLOYED, REFER TO CHRYSLER CORPORATIONS CURRENT RETURN LIST FOR PROPER HANDLING PROCEDURES.

NOTE: Please refer to the Hazardous Substance Control System for Proper Disposal. Dispose of deployed air bags in a manner consistent with state, provincial, local, and federal regulations.

DIAGNOSIS AND TESTING - AIRBAG SYSTEM

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 2).

(2) Connect the DRB III® scan tool to the Data Link connector, located on the left side of the steering column and at the lower edge of the instrument panel.

(3) Turn the ignition key to ON position. Exit vehicle with the DRB III® scan tool. Use the latest version of the proper cartridge.

(4) After checking that no one is inside the vehicle, connect the battery negative remote terminal.

(5) Using the DRB III® scan tool, read and record active diagnostic code data.

(6) Read and record any stored diagnostic codes.

(7) Refer to the proper Body Diagnostic Procedures manual if any diagnostic codes are found in Step 5 or Step 6.

RESTRAINTS (Continued)

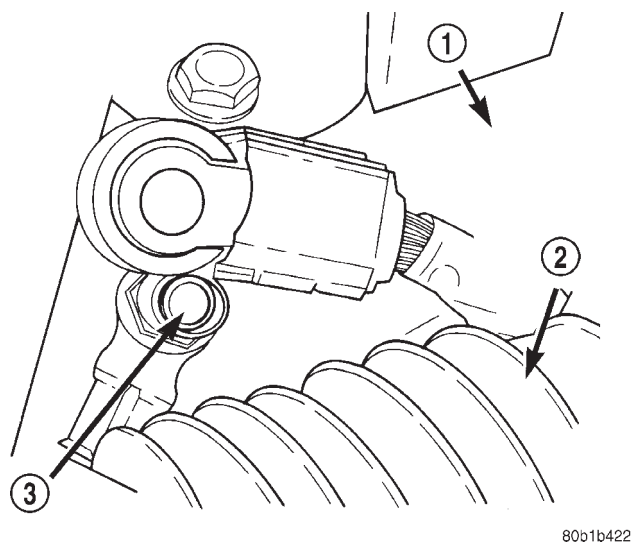


Fig. 2 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

(8) Erase stored diagnostic codes if there are no active diagnostic codes. If problems remain, diagnostic codes will not erase. Refer to the proper Body Diagnostic Procedures manual to diagnose the problem. **If the airbag warning lamp either fails to light, or goes ON and stays ON, there is a system malfunction. Refer to the proper Body Diagnostic Procedures manual to diagnose the problem.**

STANDARD PROCEDURE

STANDARD PROCEDURE - INSPECTION

Check the airbag warning lamp for proper operation as follows:

(1) Turn the ignition switch to the ON position. The airbag warning lamp should illuminate. If it does not, test the system using a DRB III® scan tool and the proper Body Diagnostic Procedures manual. Repair as required.

(2) If the airbag warning lamp lights but fails to go out after ten seconds, test the system using a DRB III® scan tool and the proper Body Diagnostic Procedures manual. Repair as required.

STANDARD PROCEDURE - HANDLING AIRBAGS

DEPLOYED AIRBAG

The vehicle interior may contain a very small amount of potassium hydroxide powder, a by-product

of airbag deployment. Sodium hydroxide powder can irritate the skin, eyes, nose and throat. Wear safety glasses, rubber gloves, and long sleeved clothing when cleaning any of the powder residue from the vehicle.

If you find that the cleanup is irritating your skin, run cool water over the affected area. Also, if you experience nasal or throat irritation, exit the vehicle for fresh air until the irritation ceases. If irritation continues, see a physician.

UNDEPLOYED AIRBAG

The airbags must be stored in its original special container until used for service. At no time should a source of electricity be permitted near the inflator on the back of an airbag module. When carrying or handling an undeployed airbag module, the trim side of the airbag should be pointing away from the body to minimize possibility of injury if accidental deployment occurs. Do not place undeployed airbag face down on a solid surface, the airbag will propel into the air if accidental deployment occurs.

STANDARD PROCEDURE - CLEAN UP

Roll or fold the passenger airbag towards the instrument panel surface and tuck into instrument panel into module area. Then tape the ripped instrument panel pad over the deployed airbag.

Use a vacuum cleaner to remove any residual powder from the vehicle interior. Work from the outside in to avoid kneeling or sitting in a contaminated area. Vacuum the heater and A/C outlets as well (Fig. 3). If the heater or air conditioner was in RECIRC mode at time of airbag deployment, operate blower motor on low speed and vacuum powder residue expelled from the heater and A/C outlets. Multiple vacuum cleaning may be necessary to decontaminate the interior of the vehicle.

Place the deployed driver and passenger airbag modules along with the instrument panel and center duct in your automotive scrap.

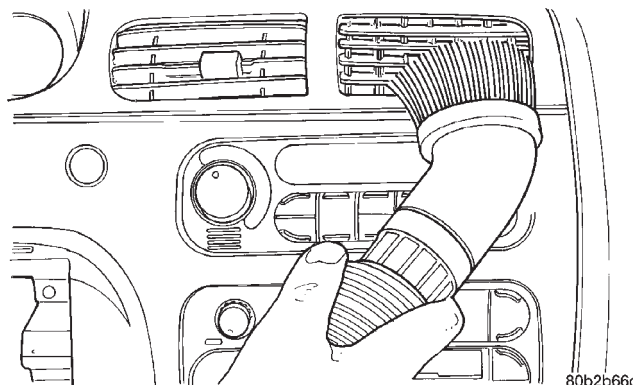


Fig. 3 VACUUM HEATER AND A/C OUTLETS

RESTRAINTS (Continued)

SERVICE OF DEPLOYED AIRBAG

DRIVER AIRBAG

After a Driver Airbag has been deployed due to a collision, the following must be replaced:

- Driver Airbag
- Clock Spring Assembly
- Steering Wheel
- Complete Steering Column Assembly with Lower Steering Column Coupler

The component above must be replaced because they cannot be reused. Other restraint system components should be replaced if damaged.

PASSENGER AIRBAG

After a Passenger Airbag has been deployed due to a collision, the following must be replaced:

- Passenger Airbag
- Instrument Panel and Pad Assembly

The components above must be replaced because of visible or non visible structural damage.

Any other components should be replaced if damaged.

CHILD TETHER CUP

REMOVAL

- (1) Remove the rear shelf trim panel from vehicle.
- (2) Turn the shelf panel over so that the bottom side is upward to access the Child Tether Cup locks.
- (3) With a trim stick (special tool #C-4733) or equivalent, push attachment locks toward the center of the cup to release the Child Tether Cup from the rear shelf panel.
- (4) Remove the Child Tether Cup.

INSTALLATION

- (1) Place the Child Tether Cup into position on top of the rear shelf trim panel.
- (2) Press rearward until cup engages into the rear shelf trim panel.
- (3) Push the front of cup down into the rear shelf trim panel.
- (4) Install the rear shelf panel.

CHILD TETHER CUP COVER

REMOVAL

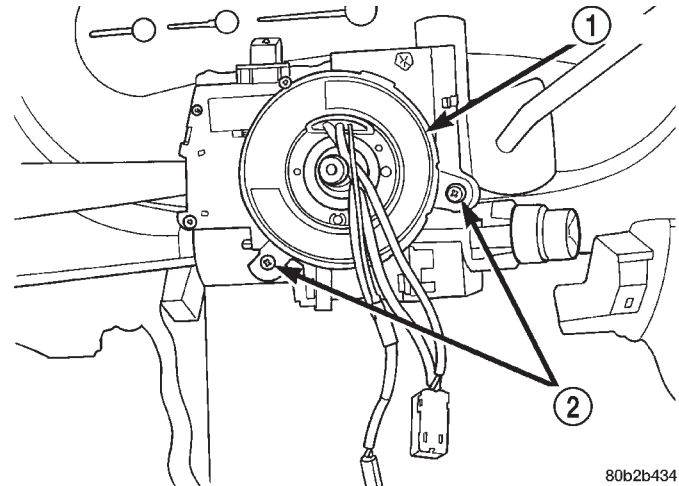
- (1) Open the Child Tether Cup Cover to the full open position.
- (2) Push cover towards the rear of the vehicle until the cover detaches from the cup.

INSTALLATION

- (1) Place the Child Tether Cup cover into position on top of the rear shelf trim panel.
- (2) Push downward on the Child Tether Cup Cover until it locks into position (you will hear it click into place).

CLOCK SPRING

DESCRIPTION



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Fig. 4 CLOCK SPRING LOCATION

- 1 - CLOCK SPRING
2 - MOUNTING SCREWS

The clock spring is mounted to the steering column behind the steering wheel (Fig. 4). The clock spring is used to maintain a continuous electrical circuit between the wiring harness and the:

- Driver's airbag
- Speed control switches
- Horn switch
- BCM - Remote Radio Switches (optional)

OPERATION

The clock spring consists of a flat, ribbon like, electrically conductive tape which winds and unwinds with the steering wheel rotation.

STANDARD PROCEDURE - CLOCK SPRING CENTERING

If the rotating tape within the clock spring is not positioned properly with the steering wheel and the front wheels, the clock spring may fail during use. The following procedure **MUST BE USED** to center the clock spring if:

- The clock spring is not known to be properly positioned.

CLOCK SPRING (Continued)

- The front wheels were moved with the steering wheel off.

- The steering wheel was moved from the half turn (180 degrees) to the right (clockwise) position.

- (1) Remove steering wheel. Refer to Steering, Column, Steering Wheel Removal and Installation.

- (2) After removal, depress the plastic locking pin to disengage locking mechanism.

- (3) Keeping locking mechanism disengaged, rotate the clock spring rotor until a yellow dot appears in centering window and black arrow lines up with drive pin.

- (4) Reinstall steering wheel upside down with wheels turned 180° clockwise.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, AIRBAG SYSTEM TEST FOR PROCEDURE.

REMOVAL

- (1) Place the front road wheels in the straight ahead position then:

- Rotate the steering wheel half turn (180 degrees) to the right (clockwise).

- Lock column with ignition lock cylinder.

- (2) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 2).

- (3) Wait two minutes for the reserve capacitor to discharge before removing non deployed module.

- (4) Remove speed control switch mounting screws, from the back of the steering wheel, and disconnect the wire connectors. If equipped with remote radio switches, the speed control switches can remain attached to the wire connectors.

- (5) Remove the Driver Airbag attaching bolts.

- (6) Lift airbag out of steering wheel and disconnect the airbag and horn wire connectors. If equipped with remote radio switches, disconnect the 4-way connector between the clock spring and the steering wheel wiring harness.

- (7) Remove the steering wheel. Refer to Electrical, Restraints, Steering Wheel, Removal.

- (8) Remove the tilt wheel release lever.

- (9) Remove upper and lower steering column shrouds to gain access to clock spring wiring.

- (10) Disconnect the 2-way and 4-way connectors between the clock spring and the instrument panel wiring harness at the base of the clock spring.

- (11) Remove two mounting screws and pull clock spring assembly from steering shaft. The clock spring cannot be repaired, and must be replaced if faulty.

INSTALLATION

- (1) Confirm that:

- The steering wheel position is a half turn (180°) to the right (clockwise).

- The column is locked with the ignition cylinder lock.

- Locate the clock spring on the steering shaft and push down on the rotor until the clock spring is fully seated on the steering column.

- Fasten clock spring to steering column using the two mounting screws and torque screws to 24 in. lbs. (2.7 N·m).

- (2) Connect the clock spring to the instrument panel harness, ensure wiring is properly routed. Check that the connectors, locking tabs are properly engaged.

- (3) Install steering column shrouds. Be sure all wires are inside of shrouds.

- (4) Install the tilt wheel release lever, if equipped.

- (5) Pull all wires through the large opening of the hub area on the steering wheel. Install steering wheel ensuring the flats on hub align with the clock spring. Tighten steering wheel nut to 61 N·m (45 ft. lbs.) torque. Ensure leads do not get pinched under the steering wheel.

- (6) Unlock the steering column with the ignition lock cylinder. Return the steering wheel to the upright position (180° counterclockwise).

- (7) Route speed control wires under and behind the airbag mounting tabs.

- (a) If equipped with remote radio switches, connect the 4-way harness connector between the steering wheel and the clock spring. Push the 4-way connector into docking tab at the 12 o'clock position of the steering wheel back cover.

- (8) Connect the horn lead wire and the airbag lead wire to the airbag module.

- (9) Install the airbag and torque bolts to 7-9 N·m (65-85 in. lbs.) torque.

- (10) Connect the speed control wires to the switches and install switches. Torque screws to 1.5 N·m (13 in. lbs.) torque.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

DRIVER AIRBAG

DESCRIPTION

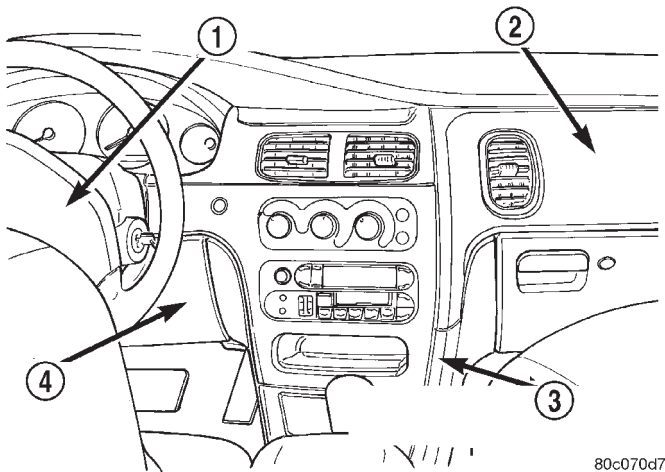


Fig. 5 AIRBAG COMPONENT LOCATION

- 1 - DRIVER AIRBAG
- 2 - PASSENGER AIRBAG
- 3 - OCCUPANT RESTRAINT CONTROLLER (ORC)
- 4 - KNEE BLOCKER

The driver airbag protective trim cover is the most visible part of the driver airbag. The driver airbag is mounted directly to the steering wheel (Fig. 5). Located under the airbag trim cover are the horn switch, the folded airbag cushion, and the airbag cushion supporting components. The resistive membrane-type horn switch is secured beneath a plastic tray that is mounted to the back side of the driver airbag trim cover.

The driver airbag cannot be repaired, and must be replaced if deployed. The driver airbag trim cover/horn switch are serviced separately from the driver airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG TRIM COVER - REMOVAL).

OPERATION

The driver airbag includes a stamped metal housing to which the cushion and an inflator unit are attached and sealed. The inflator assembly is mounted to studs on the back of the airbag housing. The inflator seals the hole in the airbag cushion so it can discharge the gas it produces directly into the cushion when supplied with the proper electrical signal. Following an airbag deployment, the airbag cushion quickly deflates by venting this gas towards the instrument panel.

The protective trim cover is fitted to the front of the airbag and forms a decorative cover in the center of the steering wheel. The inside of the trim cover has locking blocks molded into it that engage a lip on

the airbag nylon housing. A stamped metal retainer is placed over the inflator mounting studs on the back of the airbag nylon housing. A stamped metal retainer is placed over the inflator mounting studs. The trim cover will split at predetermined breakout lines, then fold back out of the way along with the horn switch and tray unit upon airbag deployment.

REMOVAL

When removing a deployed airbag, rubber gloves, eye protection and long sleeved shirt should be worn, as there may be deposits on the surface which could irritate the skin and eyes.

When removing a Driver Airbag for any reason the following procedures must be followed:

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove speed control switch screws from steering wheel back cover, remove switches and disconnect the wires.
 - (a) If equipped with remote radio switches, it is not necessary to disconnect the speed control switches.
- (3) Remove two bolts retaining Driver Airbag.
- (4) Lift airbag and disconnect airbag and horn wire connectors.
- (5) Remove Driver Airbag from vehicle.

WARNING: When replacing a deployed Driver Airbag, the clock spring must also be replaced. Refer to Electrical, Restraints, Clock Spring Removal.

INSTALLATION

(1) Connect clock spring, horn and airbag wiring connectors to the airbag. Make airbag connection by pressing straight in on the connector. The connector should be fully seated to assure positive connection. Check that the wires are not pinched during installation.

(2) Install the airbag screws and tighten to 7 to 9 N·m (65 to 85 in. lbs.) torque.

(3) Connect the wire connectors to the speed control switches and install switches. Tighten speed control screws to 1.5 N·m (13 in. lbs.).

(a) If equipped with remote radio switches, only the 4-way connector between the steering wheel and wire harness and the clock spring needs to be connected. Dock the 4-way connector in the tab at the 12 o'clock position of the steering wheel back cover.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

DRIVER AIRBAG TRIM COVER

REMOVAL

To replace the Driver Airbag Trim Cover, you must first remove the driver airbag (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - REMOVAL).

(1) Remove the plastic wire retainer that captures the horn feed pigtail (Fig. 6) or (Fig. 7).

(2) Remove the four nuts that secure the retainer bracket to the airbag housing studs.

(3) Disengage the six trim cover locking blocks from the lip around the outside edge of the driver airbag housing and remove the housing from the cover (Fig. 8).

(4) Remove the trim cover retainer bracket from the horn ground wire. The trim cover retainer bracket will be reused with the new trim cover (Fig. 9).

INSTALLATION

(1) Move horn switch feed wire and horn switch ground wire out of the way, to avoid being trapped.

(2) Place inflator, driver airbag housing, and airbag (as one unit) in the driver airbag trim cover.

Make sure that neither horn wire is trapped between the airbag housing and the trim cover locking blocks.

(3) Engage the upper and lower trim cover locking blocks with the lip of the driver airbag housing. Then engage the locking blocks on each side of the trim cover with the lips of the housing (Fig. 8) and (Fig. 10).

WARNING: BE CERTAIN THAT EACH OF THE LOCKING BLOCKS IS FULLY ENGAGED ON THE LIP OF THE AIRBAG HOUSING.

(4) Install the trim cover retainer bracket to the horn ground wire and place over the airbag housing studs.

WARNING: BE CERTAIN THAT THE TABS ON THE RETAINER ARE ENGAGED IN THE RETAINER SLOTS OF THE TRIM COVER LOCKING BLOCKS (Fig. 8).

(5) Install and tighten the nuts that secure the trim cover retainers to the airbag housing studs. Torque nuts to 10 N·m (90 in. lbs.).

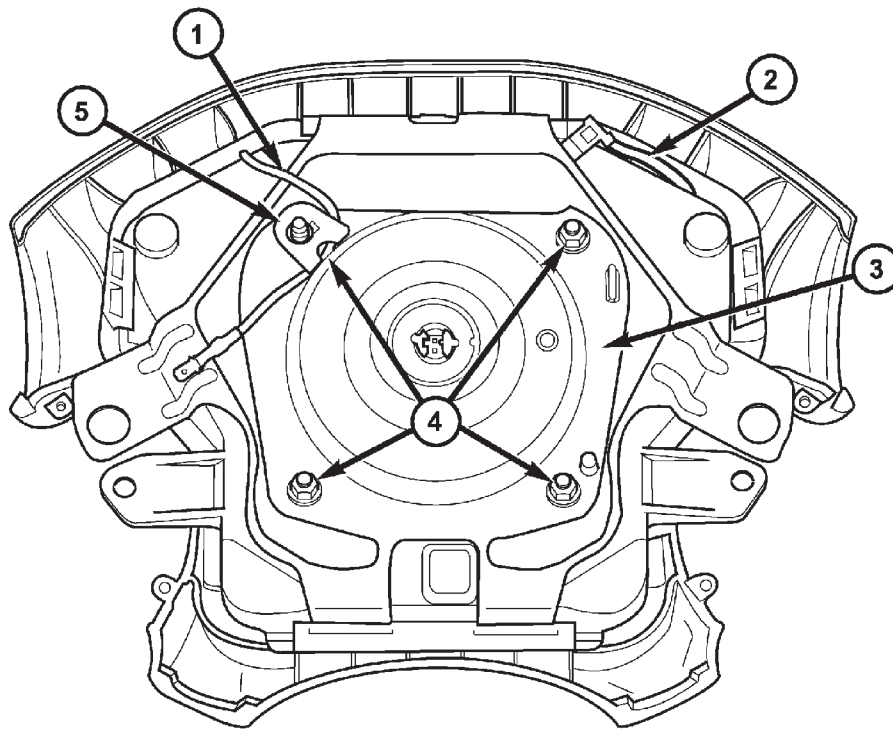


Fig. 6 DRIVER AIRBAG TRIM COVER BLADE CONNECTOR - REMOVAL

1 - HORN SWITCH FEED WIRE

2 - HORN SWITCH GROUND WIRE

3 - TRIM COVER RETAINER BRACKET

4 - NUTS

5 - WIRE RETAINER

DRIVER AIRBAG TRIM COVER (Continued)

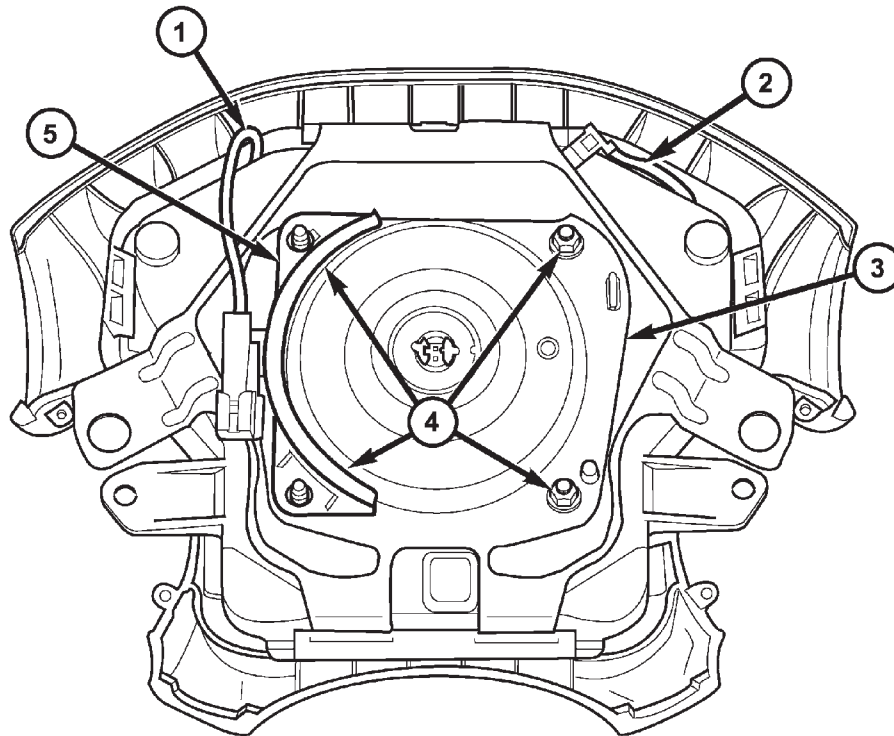


Fig. 7 DRIVER AIRBAG TRIM COVER INSULATOR CONNECTOR - REMOVAL

- | | |
|---------------------------------|-------------------|
| 1 - HORN SWITCH FEED WIRE | 4 - NUTS |
| 2 - HORN SWITCH GROUND WIRE | 5 - WIRE RETAINER |
| 3 - TRIM COVER RETAINER BRACKET | |

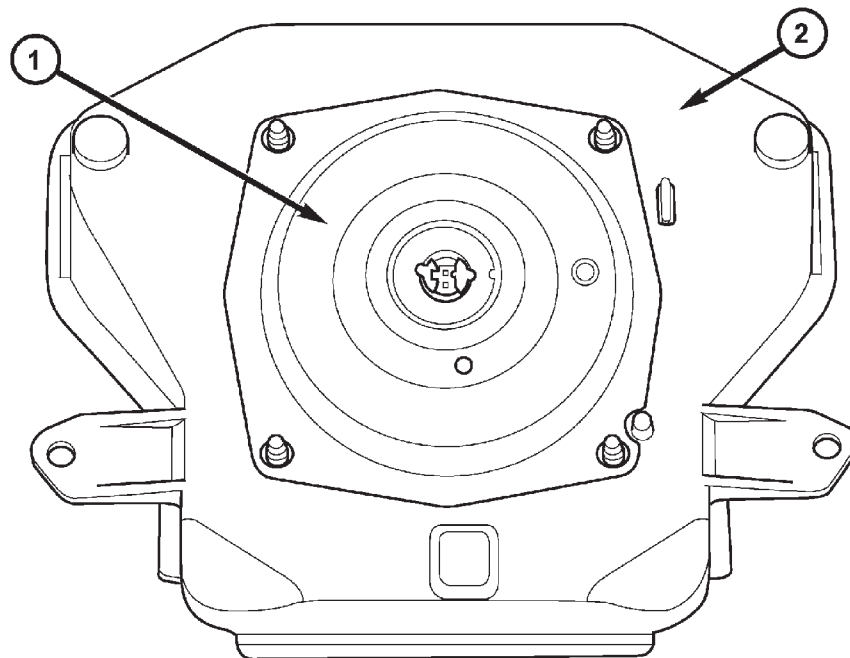
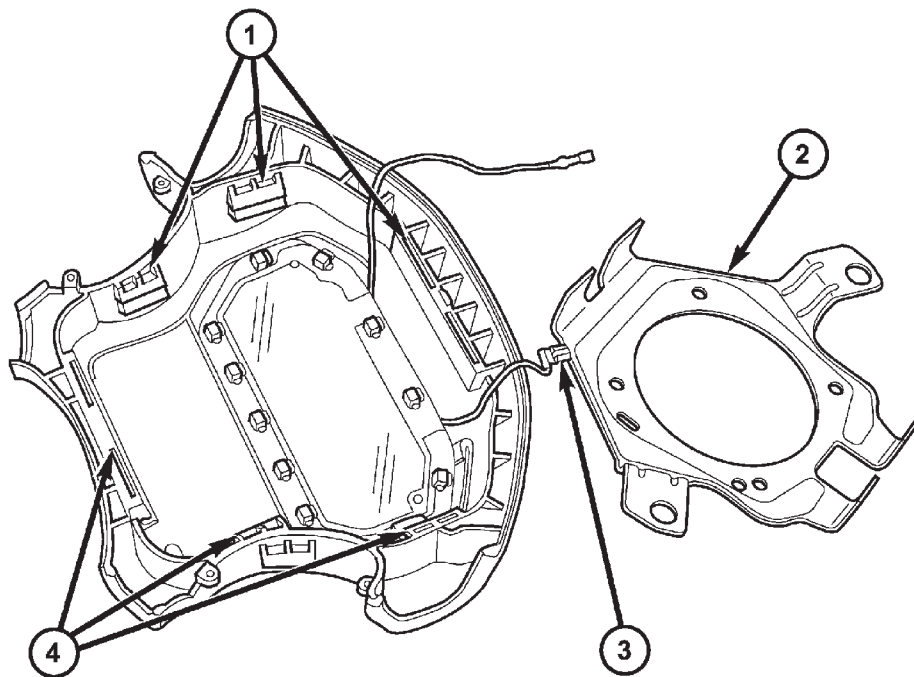


Fig. 8 DRIVER AIRBAG, HOUSING, AND INFLATOR

- | | |
|--------------|---------------------------|
| 1 - INFLATOR | 2 - DRIVER AIRBAG HOUSING |
|--------------|---------------------------|

DRIVER AIRBAG TRIM COVER (Continued)



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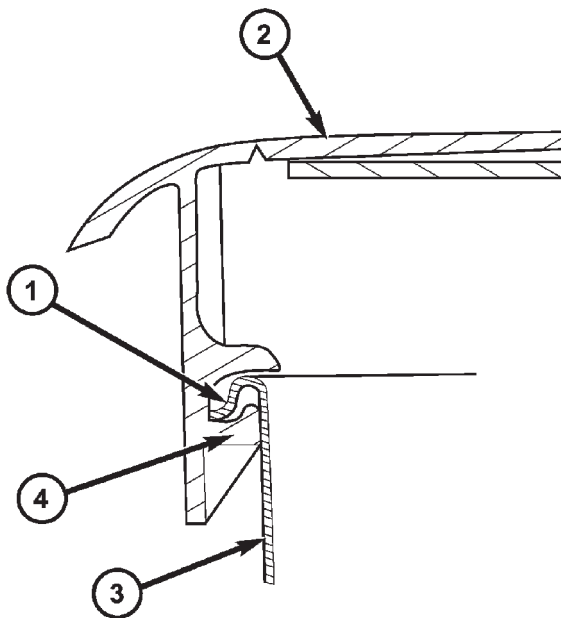
Fig. 9 DRIVER AIRBAG TRIM COVER

1 - LOCKING BLOCKS

2 - TRIM COVER RETAINER BRACKET

3 - HORN GROUND WIRE

4 - LOCKING BLOCKS



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Fig. 10 DRIVER AIRBAG TRIM COVER HOUSING CUT-AWAY

1 - LIP

2 - DRIVER AIRBAG TRIM COVER

3 - DRIVER AIRBAG HOUSING

4 - LOCKING BLOCK

For airbags with a blade style horn switch feed wire:

(6) Route the horn switch feed wire between the inflator housing and the upper airbag housing stud (Fig. 6).

For airbags with connector style horn switch feed wire:

(7) Install plastic wire retainer on the two side studs (Fig. 7).

(8) Install the driver airbag onto the steering wheel (Refer to 8 - ELECTRICAL/RESTRAINTS/DRIVER AIRBAG - INSTALLATION).

FRONT SEAT BELT & RETRACTOR**REMOVAL**

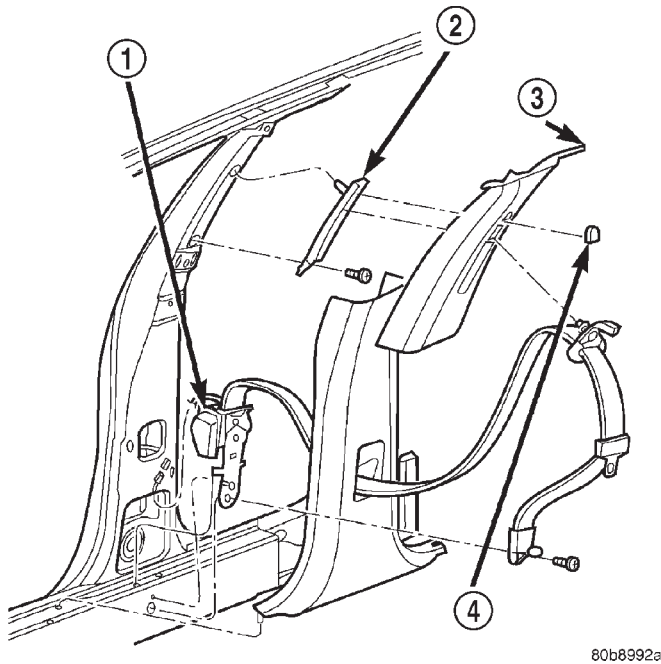
WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

(1) If necessary, move the front seat all the way forward for access.

(2) Remove the turning loop adjuster knob.

FRONT SEAT BELT & RETRACTOR (Continued)

- (3) Detach the turning loop cover from the upper anchor bolt.
- (4) Remove the upper anchor bolt (Fig. 11).

**Fig. 11 FRONT SEAT BELT RETRACTOR**

- 1 - FRONT SEAT BELT RETRACTOR
- 2 - TURNING LOOP ADJUSTER
- 3 - B-PILLAR UPPER
- 4 - TURNING LOOP ADJUSTER KNOB

- (5) Remove the B-pillar upper trim.
- (6) Remove the lower anchor bolt.
- (7) Remove the B-pillar lower trim panel.
- (8) Disconnect the retractor wire harness connector (driver side only).
- (9) Remove the retractor from the vehicle.

INSTALLATION

WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

- (1) Position the retractor in the vehicle.
- (2) Connect the retractor wire harness connector (driver side only).
- (3) Install the lower B-pillar trim.
- (4) Install the retractor anchor bolt. Tighten to 40 N·m (30 ft. lbs.) torque.
- (5) Route the belt webbing through the access slots in the B-pillar upper trim.
- (6) Install the B-pillar upper trim.

- (7) Install the upper anchor bolt. Tighten to 40 N·m (30 ft. lbs.) torque.
- (8) Close the turning loop covers.
- (9) Install the turning loop adjuster knob.
- (10) Anchor bolt must go through the webbing anchor plate and retractor bracket.
- (11) Slide cover over bolt and anchor plate.

IMPACT SENSOR**DESCRIPTION**

The Airbag System is a supplemental safety device designed to help protect the driver and passenger from serious injury, caused by a frontal impact of the vehicle.

The Occupant Restraint Controller's (ORC) internal impact sensor provides verification of the direction and severity of an impact. The sensor is mounted within the ORC.

OPERATION

The Occupant Restraint Controller (ORC) uses data collected from its internal accelerometers to discriminate the direction and severity of an impact. The ORC will activate power stages internal to the module in order to deploy the driver and passenger side airbags once a predetermined threshold has been exceeded. The ORC is calibrated for a particular vehicle family and uses an advanced software algorithm to discriminate the severity and direction of any vehicle event.

OCCUPANT RESTRAINT CONTROLLER**DESCRIPTION**

The Occupant Restraint Controller (ORC) contains the accelerometer and energy reserve capacitor. The ORC is mounted on the tunnel floor pan, forward of the center console.

OPERATION

The accelerometer is located inside the ORC. The accelerometer provides confirmation of a crash, discriminating severity. The ORC monitors the system to determine the system readiness. The ORC may store sufficient energy to deploy the airbags for only two minutes after the battery is disconnected. The ORC contains on-board diagnostics, and will illuminate the AIRBAG warning lamp on the cluster when a fault occurs. The warning equipment is tested for a few seconds every time the vehicle is started.

OCCUPANT RESTRAINT CONTROLLER - 5 PASSENGER VEHICLES

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 2).

NOTE: If working on a Concorde, the Instrument Panel must be removed. Refer to Body, Instrument Panel for Removal and Installation. Then go to Step 10.

- (2) Remove one screw to shift knob.
- (3) Remove two screws to shifter bezel.
- (4) Disconnect power outlet connector and remove bezel from vehicle.
- (5) Remove left instrument panel endcap covering the junction block.
- (6) Remove two screws to steering column cover then pull toward rear of vehicle to disengage clips.
- (7) Open glove box door. Continue to pull down on the door until the glove box drops and you see the screws in the upper and lower left corner or the glove box bin.
- (8) Pull the right console side panel off.
- (9) Remove two screws to left console side panel and pull off.
- (10) With the ORC now exposed, slide the red Connector Position Assurance (CPA) tab out. Press down on the locking latch and disconnect the ORC 23-way connector.
- (11) Remove the two side module mounting screws on the drivers side.
- (12) Loosen the top screw on the drivers side.
- (13) Lift up the module and slide out the ORC.

NOTE: If the ORC cannot be lifted out, the passenger side screw needs some additional loosening.

- (14) Remove the ORC from vehicle.

INSTALLATION

WARNING: THE ORC IS A SAFETY MODULE AND FAILURE TO INSTALL AND SECURE IT PROPERLY, COULD CAUSE THE MODULE TO POSSIBLY MALFUNCTION AND CAUSE PERSONAL INJURY.

(1) Position the ORC (arrow pointing forward in vehicle) on the ORC mounting bracket. The mounting bosses on the controller will correctly position the ORC on the bracket. Attach the ORC to the bracket with the three screws supplied and torque to 88 to 124 in. lbs. (10 to 14 N·m).

CAUTION: USE SUPPLIED SCREWS ONLY.

- (2) Tighten the top screw on the drivers side.
- (3) Install the two side ORC mounting screws on the drivers side.
- (4) Connect ORC 23-way connector and slide the red Connector Position Assurance (CPA) tab in.

NOTE: If working on a Concorde, the Instrument Panel must be installed. Refer to Body, Instrument Panel for Installation and then go to Electrical, Restraints, Diagnosis and Testing - Airbag System.

- (5) Install left console side panel and two retaining screws.
- (6) Install the right console side panel.
- (7) Install the screws in the upper and lower left corner or the glove box bin.
- (8) Close the glove box door.
- (9) Install the steering wheel cover and the two screws to steering column cover.
- (10) Install the left instrument panel end cover covering the junction block.
- (11) Connect power outlet connector and install the center bezel into vehicle.
- (12) Install the two screws to shifter bezel.
- (13) Install the one screw to shift knob.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

OCCUPANT RESTRAINT CONTROLLER - 6 PASSENGER VEHICLES

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 2).
- (2) Open glove box door and release side tabs and swing down.

NOTE: If working on a Concorde, the Instrument Panel must be removed. Refer to Body, Instrument Panel, for Removal. Then go to Step 10.

- (3) Remove the left endcap at the junction block.
- (4) Remove two screws to steering column cover then pull toward rear of vehicle to disengage clips.
- (5) Open glove box door. Continue to pull down on the door until the glove box drops and you see the screws in the upper and lower left corner or the glove box bin.

OCCUPANT RESTRAINT CONTROLLER - 6 PASSENGER VEHICLES (Continued)

(6) Remove the instrument panel center bezel. The temperature control module, power outlet and traction control switch will pop out with the center bezel.

(7) Disconnect the connectors at center bezel.

(8) Remove four screws to Chin bezel. Two on the right side and two on the left side of vehicle.

(9) Remove one screw and one push fastener retaining floor bin.

(10) With the ORC now exposed, slide the red Connector Position Assurance (CPA) tab out. Press down on the locking latch and disconnect the ORC 23-way connector.

(11) Remove the two side module mounting screws on the drivers side.

(12) Loosen the top screw on the drivers side.

(13) Lift up the module and slide out the ORC.

NOTE: If the ORC cannot be lifted out, the passenger side screw needs some additional loosening.

(14) Remove the ORC from vehicle.

INSTALLATION

WARNING: THE ORC IS A SAFETY MODULE. FAILURE TO INSTALL AND SECURE IT PROPERLY COULD CAUSE THE MODULE TO MALFUNCTION AND CAUSE PERSONAL INJURY.

(1) Position the ORC (arrow pointing forward in vehicle) on the ORC mounting bracket. The mounting bosses on the controller will correctly position the ORC on the bracket. Attach the ORC to the bracket with the three screws supplied and torque to 88 to 124 in. lbs. (10 to 14 N-m).

CAUTION: Use supplied screws only.

(2) Tighten the top screw on the drivers side.

(3) Install the two side module mounting screws on the drivers side.

(4) Connect the ORC 23-way connector. Slide the red Connector Position Assurance (CPA) tab in.

NOTE: If working on a Concorde, the Instrument Panel must be installed. Refer to Body, Instrument Panel, for Installation and then go to Electrical, Restraints, Diagnosis and Testing - Airbag System.

(5) Install the one screw and one push fastener retaining the floor bin.

(6) Install the four screws to Chin bezel. Two on the right side and two on the left side of vehicle.

(7) Connect the connectors at center bezel.

(8) Install the instrument panel center bezel.

(9) Install the screws in the upper and lower left corner or the glove box bin. Close the glove box door.

(10) Install the two screws to steering column cover.

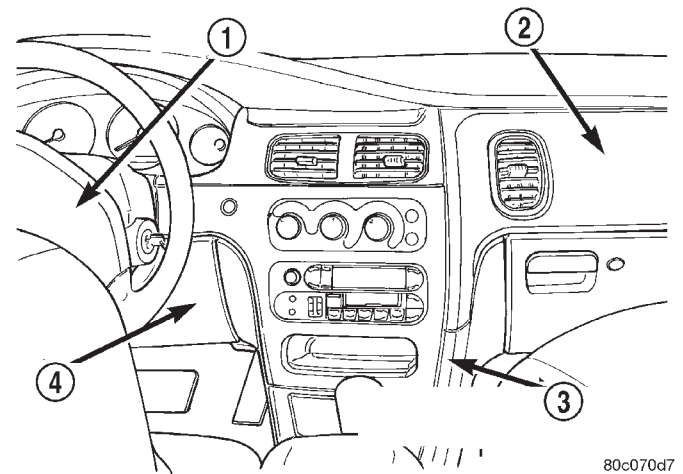
(11) Install the left end cover at the junction block.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

PASSENGER AIRBAG

DESCRIPTION

WARNING: NEVER DISASSEMBLE THE PASSENGER AIRBAG, THE PASSENGER AIRBAG HAS NO SERVICEABLE PARTS.



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Fig. 12 AIRBAG COMPONENT LOCATION

1 - DRIVER AIRBAG

2 - PASSENGER AIRBAG

3 - OCCUPANT RESTRAINT CONTROLLER (ORC)

4 - KNEE BLOCKER

The Passenger Airbag is located beneath the instrument panel and pad assembly (Fig. 12). The airbag is mounted to a bracket (welded to the floor pan) with three screws.

The instrument panel top pad is the most visible part of the passenger airbag system. Located under the instrument panel top pad are the airbag door, the passenger airbag cushion and the airbag cushion supporting components.

The passenger airbag includes an extruded housing within which the cushion and inflator are mounted and sealed. Two stamped metal brackets, one on each end of the housing, enclose the cushion and inflator and also serve as the mounting brackets for the airbag.

PASSENGER AIRBAG (Continued)

Following a passenger airbag deployment, the passenger side airbag, instrument panel, and instrument panel wiring harness must be replaced. The passenger side airbag cannot be repaired, and must be replaced if deployed or in any way damaged.

OPERATION

The passenger inflator assembly is within the airbag housing. The inflator seals the hole in the airbag cushion so it can discharge the gas it produces directly into the cushion when supplied with the proper electrical signal. Following an airbag deployment, the airbag cushion quickly deflates by venting this gas through the discrete vent holes used on each end panel of the airbag cushion.

The passenger airbag is secured with screws to the instrument panel beneath the instrument panel top pad and above the glove box opening. The instrument panel top pad above the glove box opening conceals the airbag door and a predetermined hinge line beneath its decorative cover. Upon airbag deployment, the top pad will bend at the hinge line and the door will fold back out of the way onto the top of the instrument panel.

REMOVAL

NON DEPLOYED AIRBAG

Use this procedure when removing an airbag for any reason **OTHER THAN DEPLOYMENT**.

The instrument panel must be **PARTIALLY** removed for Passenger Airbag service. Refer to Body, Instrument Panel for graphics of complete instrument panel.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove the four screws that attach the glove box door to the instrument panel and remove the glove box door.

(3) Remove right instrument panel endcap.

(4) If equipped with center console:

- Remove the gearshift handle set screw and then remove the gear shift handle.

- Remove the console shifter bezel.

- Remove the right console side trim panel.

(5) Accessing through the glove box door, remove five screws to the glove box close - out assembly (20 in. lbs. torque) (Fig. 13).

(6) Remove the left and right A-pillar trim moldings.

(7) Remove the left instrument panel endcap.

(8) Remove the left lower instrument panel trim cover. Disconnect the hood release cable and decklid release electrical connector. Remove and set panel aside.

(9) Remove the left knee blocker.

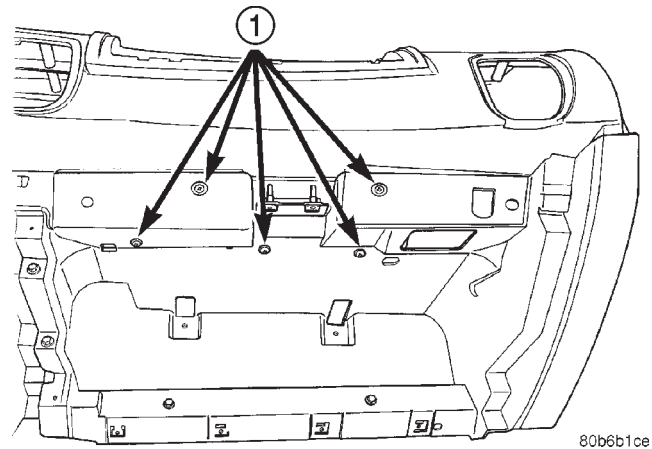


Fig. 13 GLOVE BOX CLOSE - OUT TO REINFORCEMENT

1 - GLOVE BOX CLOSE-OUT ATTACHING SCREWS

(10) Remove the instrument panel center bezel. Disconnect the heater - A/C control unit and traction control switch (if equipped) electrical connectors.

(11) If equipped with console, remove the left instrument panel side cover.

(12) If not equipped with center console, remove the center lower instrument panel floor bin.

(13) Remove the two center instrument panel lower attaching nuts.

(14) Remove the left (driver's) side air distribution ducts.

(15) Disconnect the brake switch electrical connector.

(16) Remove the bulkhead connector mounting screw.

NOTE: It is not necessary to disconnect the bulkhead connector.

(17) Disconnect the Occupant Restraint Controller (ORC) electrical connector.

(18) Disconnect the two center instrument panel ground eyelets on the left side of the floor tunnel.

(19) Remove the four steering column nuts and lower the steering column to the floor.

(20) Remove the three lower left instrument panel mounting bolts.

(21) Remove the three upper left instrument panel mounting bolts.

(22) Disconnect the instrument panel to body harness electrical connector.

(23) Disconnect the radio antenna connector.

(24) Remove the three lower right instrument panel mounting bolts.

(25) Remove the three upper right instrument panel mounting bolts.

PASSENGER AIRBAG (Continued)

(26) Pull the right side of the instrument panel back and set on right (passenger side) seat to access the passenger airbag module.

NOTE: The instrument panel does not have to be removed any more than this for passenger airbag service.

(27) Remove four screws to the right demister duct (20 in. lbs. torque).

(28) Remove two screws to the right distribution duct assembly (20 in. lbs. torque).

(29) Disconnect the yellow wire harness connector from the airbag assembly and the three christmas tree fasteners.

(30) Remove the right and left pencil strut to Passenger Airbag screws (45 in. lbs. torque) (Fig. 14).

(31) Disconnect the instrument panel wiring harness from the airbag reinforcement bracket.

(32) Remove four 10 mm hex head screws to the deployment door reinforcement - two screws per side (75 in. lbs. torque.) (Fig. 14)

(33) Remove five screws from the passenger airbag assembly to retainer (20 in. lbs. torque) (Fig. 14).

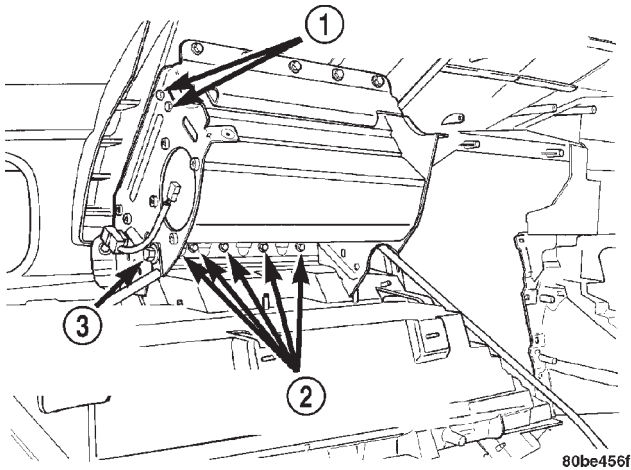


Fig. 14 INSTRUMENT PANEL AND PAD ASSEMBLY

- 1 - STEP #32 2 SCREWS PER SIDE
- 2 - STEP #33 5 SCREWS
- 3 - STEP #30 1 SCREW PER SIDE

(34) Remove the airbag assembly from the instrument panel retainer.

(35) Remove four screws to the reinforcement brace on the old airbag (20 in. lbs. torque) (Fig. 15).

DEPLOYED AIRBAG

The instrument panel **MUST** be removed for **DEPLOYED** Passenger Airbag service.

WARNING: THE PASSENGER AIRBAG, INSTRUMENT PANEL, AND INSTRUMENT PANEL WIRE

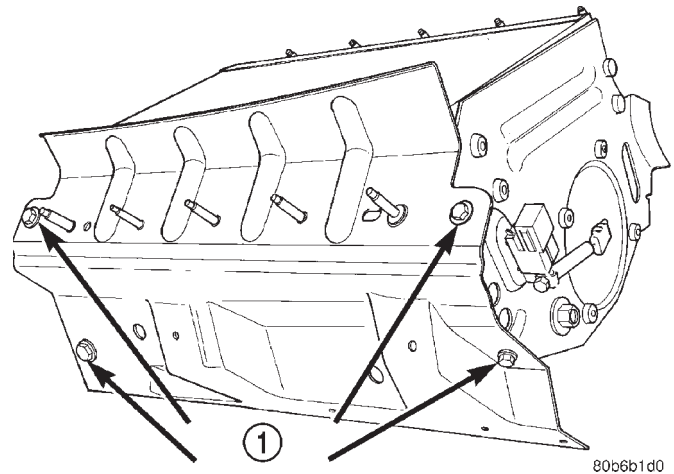


Fig. 15 REINFORCEMENT TO PASSENGER AIRBAG

- 1 - RETAINING SCREWS

HARNESS MUST BE REPLACED AFTER A PASSENGER AIRBAG DEPLOYMENT.

When removing a deployed airbag: rubber gloves, eye protection, and a long-sleeved shirt should be worn. There may be deposits on the surface which could irritate the skin and eyes.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Roll or fold the passenger airbag towards the instrument panel surface and tuck into instrument panel into module area. Then tape the ripped instrument panel pad over the deployed airbag.

(3) Remove instrument panel and pad assembly. Refer to Body, Instrument Panel for Removal and Installation.

(4) Remove Passenger Airbag. Refer to Electrical, Restraints, Passenger Airbag Removal and Installation for a Non-Deployed Airbag.

INSTALLATION

NON DEPLOYED AIRBAG

(1) Install the four screws to the reinforcement brace on the airbag (20 in. lbs. torque) (Fig. 15).

(2) Install the airbag assembly into the instrument panel retainer.

(3) Install the five screws attaching the passenger airbag assembly to retainer (20 in. lbs. torque) (Fig. 14).

(4) Install the four 10 mm hex head screws to the deployment door reinforcement - two screws per side (75 in. lbs. torque.) (Fig. 14)

(5) Connect the instrument panel wiring harness to the airbag reinforcement bracket.

PASSENGER AIRBAG (Continued)

(6) Install the right and left pencil strut to Passenger Airbag screws (45 in. lbs. torque) (Fig. 14).

(7) Connect the yellow wire harness connector to the airbag assembly and the three christmas tree fasteners. Align the connector, then firmly press straight in, being careful not to damage pins on airbag.

(8) Install the two screws to the right distribution duct assembly (20 in. lbs. torque).

(9) Install the four screws to the right demister duct (20 in. lbs. torque).

(10) Lift instrument panel assembly off of passenger seat and into position on the dash panel.

(11) Install the three upper right instrument panel mounting bolts.

(12) Install the three lower right instrument panel mounting bolts.

(13) Connect the radio antenna connector.

(14) Connect the instrument panel to body harness electrical connector.

(15) Install the three upper left instrument panel mounting bolts.

(16) Install the three lower left instrument panel mounting bolts.

(17) Lift the steering column into position and install the four steering column nuts.

(18) Connect the two center instrument panel ground eyelets on the left side of the floor tunnel.

(19) Connect the Occupant Restraint Controller (ORC) electrical connector.

(20) Install the bulkhead connector mounting screw.

(21) Connect the brake switch electrical connector.

(22) Install the left (driver's) side air distribution ducts.

(23) Install the two center instrument panel lower attaching nuts.

(24) If not equipped with center console, install the center lower instrument panel floor bin.

(25) If equipped with console, install the left instrument panel side cover.

(26) Connect the heater - A/C control unit and traction control switch (if equipped) electrical connectors and install the instrument panel center bezel.

(27) Install the left knee blocker.

(28) Connect the hood release cable and decklid release electrical connector. Install the left lower instrument panel trim cover.

(29) Install the left instrument panel end cover.

(30) Install the left and right A-pillar trim moldings.

(31) Accessing through the glove box door, install five screws to the glove box close - out assembly (20 in. lbs. torque) (Fig. 13).

(32) If equipped with center console:

- Install the right console side trim panel.
- Install the console shifter bezel.
- Install the gearshift handle and set screw.

(33) Install the right instrument panel end cover.

(34) Install the four screws that attach the glove box door to the instrument panel and install the glove box door.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

DEPLOYED AIRBAG

(1) Transfer all instrument panel components which are not damaged to NEW instrument panel and pad assembly. Tighten screws to 2 N·m (20 in. lbs.) torque.

WARNING: DO NOT REUSE THE INSTRUMENT PANEL WIRING HARNESS. A NEW WIRING HARNESS MUST BE USED.

(2) Install the four screws to the airbag reinforcement brace on the airbag (20 in. lbs. torque) (Fig. 15).

(3) Install the airbag assembly into the instrument panel retainer.

(4) Install the five screws attaching the passenger airbag assembly to retainer (20 in. lbs. torque) (Fig. 14).

(5) Install the four 10 mm hex head screws to the deployment door reinforcement - two screws per side (75 in. lbs. torque.) (Fig. 14)

(6) Connect the **NEW** instrument panel wiring harness to the airbag reinforcement bracket.

(7) Install the right and left pencil strut to Passenger Airbag screws (45 in. lbs. torque) (Fig. 14).

(8) Connect the yellow wire harness connector to the airbag assembly and the three christmas tree fasteners. Align the connector, then firmly press straight in, being careful not to damage pins on airbag.

(9) Install the two screws to the right distribution duct assembly (20 in. lbs. torque).

(10) Install the four screws to the right demister duct (20 in. lbs. torque).

Install the instrument panel. Refer to Body, Instrument Panel, Installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

REAR SEAT BELT & RETRACTOR

REMOVAL

WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

- (1) Remove the seat cushion and back.
- (2) Remove the upper quarter trim panel.
- (3) Remove the lower quarter trim panel.
- (4) Remove the nut attaching the lower seat belt anchor to the floor.
- (5) Remove the turning loop bolt.
- (6) Remove the bolt attaching the seat belt retractor to the quarter panel. (Fig. 16).

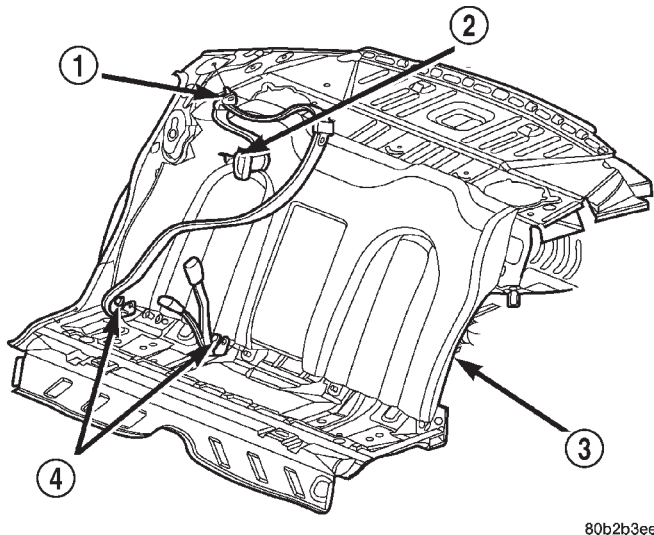


Fig. 16 REAR SEAT BELT RETRACTOR

- 1 - TURNING LOOP
 2 - REAR SEAT BELT RETRACTOR
 3 - SEAT BACK
 4 - ANCHOR NUT

- (7) Remove the seat belt retractor from the vehicle.

INSTALLATION

WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

- (1) Place belt in position in the vehicle.
- (2) Install the bolt to attach the seat belt retractor to the quarter panel.
- (3) Install the turning loop.

- (4) Route the anchor end of the seat belt through the upper quarter trim opening. Tighten to 40 N·m (30 ft. lbs.).

- (5) Install the nut to attach the lower seat belt anchor to the floor. Tighten nut to 40 N·m (30 ft. lbs.) torque.

- (6) Install the lower quarter trim panel.
- (7) Install the upper quarter trim panels.
- (8) Install the seat back and cushion.

REAR SEAT BELT & RETRACTOR - CENTER

REMOVAL

WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

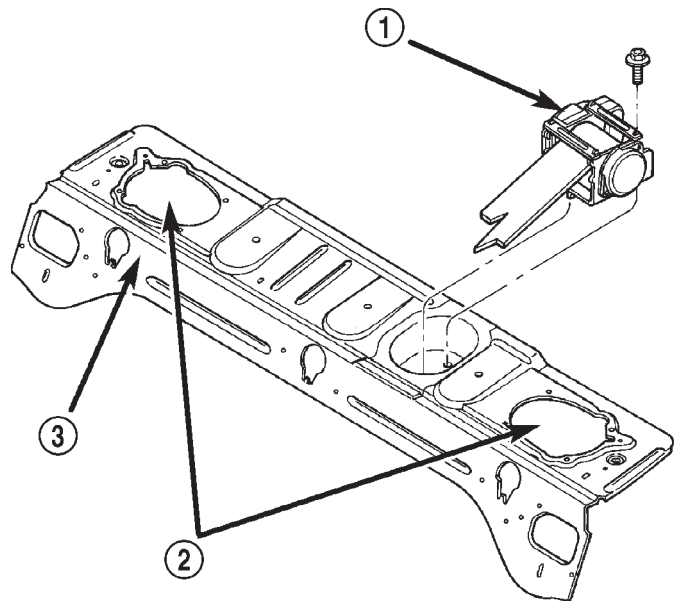


Fig. 17 REAR SEAT BELT RETRACTOR - CENTER

- 1 - CENTER REAR SEAT BELT RETRACTOR
 2 - REAR SHELF
 3 - REAR SPEAKER LOCATIONS

- (1) Remove the rear shelf trim panel.
- (2) Remove the bolt attaching the center rear seat belt retractor to the rear shelf (Fig. 17).
- (3) Remove the center rear seat belt retractor assembly from the vehicle.

REAR SEAT BELT & RETRACTOR - CENTER (Continued)

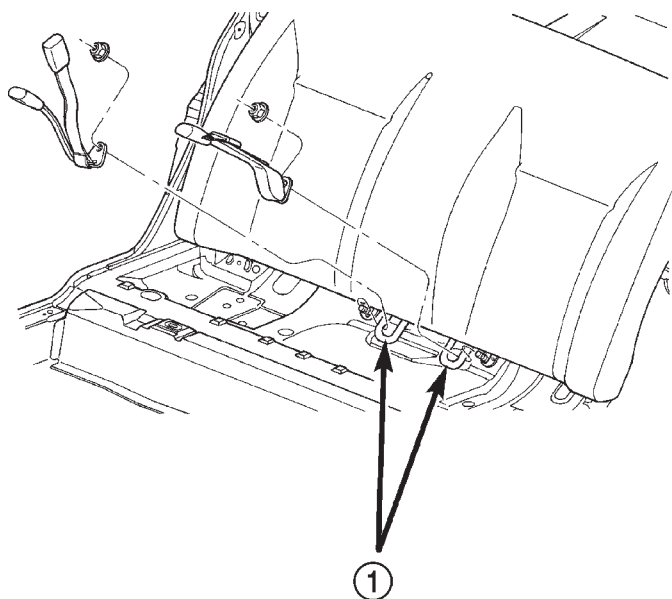
INSTALLATION

WARNING: INSPECT THE CONDITION OF THE SHOULDER/LAP BELT. REPLACE THE RETRACTOR IF THE BELT IS CUT, FRAYED, TORN, OR DAMAGED IN ANY WAY.

(1) Install the center rear seat belt retractor assembly on the rear shelf. Torque the bolt to 40 N·m (30 ft. lbs.).

(2) Install the rear shelf trim panel.

WARNING: THE REAR SEAT BACK RETAINING NUT ALSO SERVES AS THE CENTER SEAT BELT ANCHOR (Fig. 18). BE CERTAIN TO TORQUE THIS NUT TO 40 N·m (30 ft. lbs.).



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Fig. 18 REAR SEAT BACK RETAINING NUTS

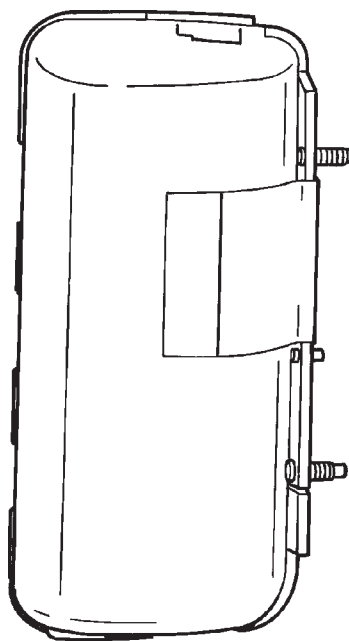
1 - ELASTIC STRAPS

(3) Install the rear seat back. Be certain rear seat belts are properly routed to avoid twisted or tangled belts and/or buckles (Fig. 18).

SEAT AIRBAG

DESCRIPTION

The side impact airbag system Seat Airbags are located in the outboard side of the front seat backs (Fig. 1). One in each front seat. The seat airbag inflator assembly is within the airbag housing (Fig. 19). Each airbag is mounted to the seat back frame (Fig. 1).



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Fig. 19 SEAT AIRBAG - TYPICAL

OPERATION

Only the Side Impact Airbag Control Module (SIACM) can deploy the side airbags. When supplied with the proper electrical signal the seat airbag inflator will produce a gas and discharge the bag directly between the occupant and the side of the vehicle, protecting the occupant. Upon deployment, the seat back trim cover will tear open and allow the side airbag to fully inflate and quickly deflate.

REMOVAL

WARNING: DO NOT REPLACE A DEPLOYED AIRBAG. IF SEAT AIRBAG HAS BEEN DEPLOYED, THE ENTIRE SEAT BACK AND ALL DAMAGED PARTS MUST BE REPLACED.

DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

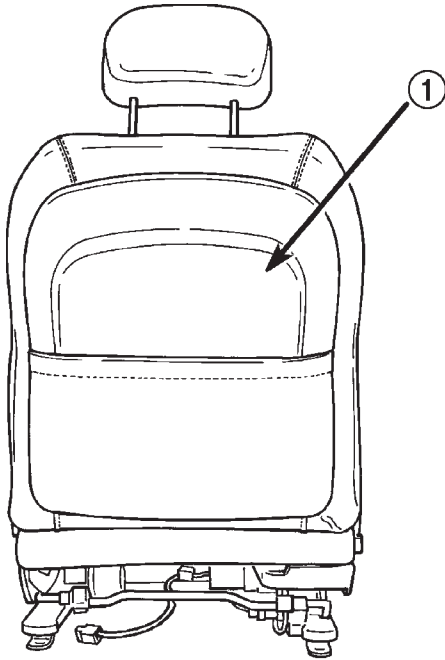
ONCE THE BATTERY NEGATIVE CABLE IS DISCONNECTED, WAIT 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENT.

(1) Position the front seat in the full forward position.

(2) Disconnect and isolate the battery negative cable remote terminal.

SEAT AIRBAG (Continued)

(3) Remove the plastic back panel from the seat back (Fig. 20). Refer to Body, Seats, Seat Back, Removal.



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Fig. 20 FRONT SEAT BACK PANEL

1 - FRONT SEAT BACK PANEL

(4) With seat back on bench, disengage the seat back trim cover J-strap from the upper, lower and airbag side of seat back.

(5) Disconnect the side airbag electrical connector. Slide yellow locking tab down to unlock. Then with two fingers, push the two side retaining tabs in and pull the connector straight from airbag.

(6) Remove the side airbag retaining nuts.

(7) Grasp the upper airbag side of the seat back trim cover and pull trim cover and cushion over top of seat back frame. This will allow room to remove side airbag without damaging the trim cover or cushion.

(8) Working between the seat back trim cover/cushion and frame, carefully unhook the airbag studs from the nylon sleeve and slide the airbag out of sleeve. Be careful not to tear the nylon sleeve as this will affect functionality of the airbag.

WARNING: BE CERTAIN NOT TO TEAR THE SEAT AIRBAG NYLON SLEEVE DURING REMOVAL. IF THIS OCCURS, THE SEAT BACK TRIM COVER MUST BE REPLACED.

INSTALLATION

WARNING: DO NOT REPLACE A DEPLOYED AIRBAG. IF SEAT AIRBAG HAS BEEN DEPLOYED, THE ENTIRE SEAT BACK AND ALL DAMAGED PARTS MUST BE REPLACED.

NOTE: THE AIRBAG CONNECTOR MUST FACE DOWN (TOWARD SEAT CUSHION) AFTER INSTALLATION.

(1) Carefully slide the seat airbag into the nylon sleeve until the mounting studs line up with the holes provided in nylon sleeve. Be careful not to tear nylon sleeve as this will affect the functionality of the side airbag system.

WARNING: THE AIRBAG MUST BE INSIDE THE NYLON SLEEVE BEFORE INSTALLING THE RETAINING NUTS. FAILURE TO DO SO WILL ADVERSELY AFFECT THE FUNCTIONALITY OF THE SIDE AIRBAG SYSTEM.

(2) Pull airbag and nylon sleeve assembly up, to line up mounting studs and mistake proofing pin with holes provided in seat back frame mounting bracket. Install airbag retaining nuts. Torque to $10.7 \pm 1 \text{ N}\cdot\text{m}$ (94.7 in. lbs.).

(3) Position the upper seat back trim cover and cushion over the seat back frame.

(4) Connect the side airbag electrical connector. After the initial connector is installed, be certain the yellow locking tab is in the upper "LOCKED" position. Check to be certain the connector cannot be removed once the yellow locking tab is positioned.

(5) Position the seat back trim cover and install the seat back trim cover J-straps on the upper, lower, and airbag side of seat back frame.

CAUTION: Always install new push pins when installing the seat back plastic panel.

(6) Install the plastic back panel on the seat back. Be sure to use new push pins in the upper mounting location of the back cover. Refer to Body, Seats, Seat Back, Installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

SEAT AIRBAG WIRING HARNESS

REMOVAL

WARNING: DISCONNECT AND ISOLATE THE BATTERY NEGATIVE CABLE REMOTE TERMINAL BEFORE BEGINNING ANY SEAT AIRBAG REMOVAL. THIS WILL DISABLE THE SIDE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL SIDE AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY. ONCE THE BATTERY NEGATIVE CABLE IS DISCONNECTED AND ISOLATED, WAIT 2 MINUTES BEFORE REMOVING ANY SIDE AIRBAG SYSTEM COMPONENT.

(1) Disconnect and isolate the battery negative battery cable remote terminal.

(2) Remove the left front seat from the vehicle and place on a bench. Refer to Body, Seats, Front Seat, Removal.

(3) Remove plastic back panel from the seat back. Refer to Body, Seats, Front Seat Back Cover, Removal.

(4) Disengage seat back trim cover J-strap from the upper, lower and airbag side of seat back.

(5) Disconnect the side airbag electrical connector. Slide yellow locking tab down to unlock. Then with two fingers, push two side retaining tabs in and pull connector straight from side airbag.

(6) Remove the front seat cushion side shield. Refer to Body, Seats, Front Seat Cushion Side Shield, Removal.

(7) Disengage push pin and remove the wire harness (Fig. 21) and (Fig. 22) from the seat assembly.

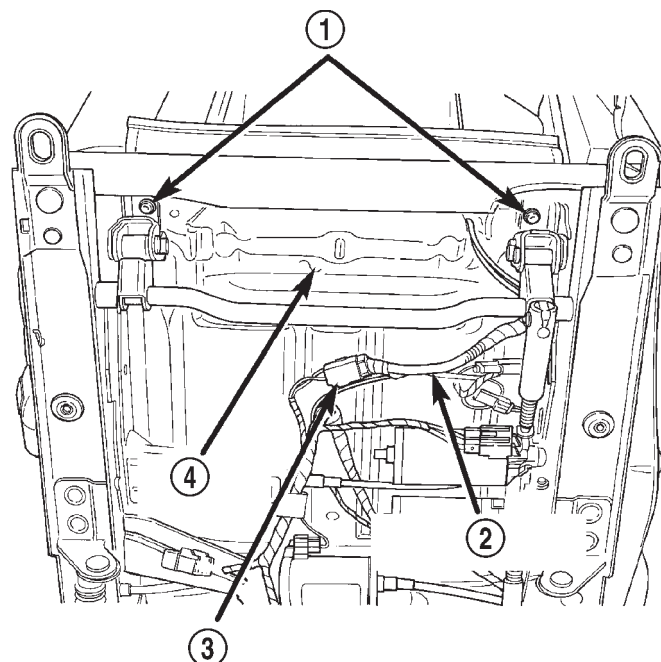
INSTALLATION

(1) Install the airbag wire harness in the seat. Be certain the wire harness routing is correct. The harness should follow the leading edge of the seat back frame down into the lower seat cushion. Once inserted in lower cushion, the harness is positioned between the cushion pan and the seat track, and held in place with push pins.

(2) Connect the side airbag electrical connector. After connector is installed be certain the yellow locking tab is in the upper "LOCKED" position. Check to be certain that the connector cannot be removed once yellow locking tab is positioned.

(3) Install the seat back trim cover J-straps on the upper, lower, and airbag side of the seat back frame.

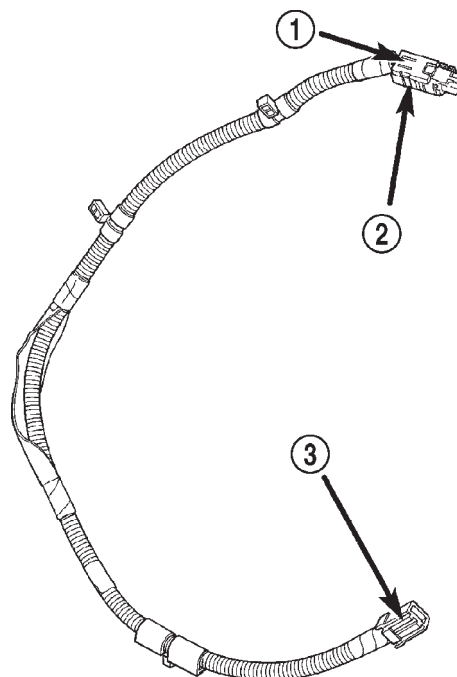
CAUTION: Always install new push pins when installing the seat back plastic panel.



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Fig. 21 SEAT AIRBAG WIRE HARNESS LOCATION

- 1 - SEAT TRACK RETAINING BOLTS
- 2 - SEAT AIRBAG WIRE HARNESS
- 3 - SEAT AIRBAG WIRE HARNESS CONNECTOR
- 4 - CUSHION PAN



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Fig. 22 SEAT AIRBAG WIRING HARNESS

- 1 - YELLOW CONNECTOR LOCK
- 2 - TO AIRBAG MODULE
- 3 - TO BODY HARNESS

SEAT AIRBAG WIRING HARNESS (Continued)

(4) Install the plastic back panel on the seat back. Install new push pins in the upper mounting location of the back cover. Refer to Body, Seats, Front Seat Back Cover, Installation.

(5) Install the front seat cushion side shield. Refer to Body, Seats, Front Seat Cushion Side Shield, Installation.

WARNING: BE CERTAIN PLASTIC BACK COVER IS SECURELY INSTALLED ON THE SEAT BACK. FAILURE TO DO SO WILL ADVERSELY AFFECT THE FUNCTIONALITY OF THE SIDE AIRBAG SYSTEM.

(6) Install the left front seat in the vehicle. Refer to Body, Seats, Front Seat, Installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

SEAT BELT BUCKLE - REAR SEAT

REMOVAL

- (1) Remove the rear seat cushion.
- (2) Remove the seat belt anchor nut (Fig. 23).

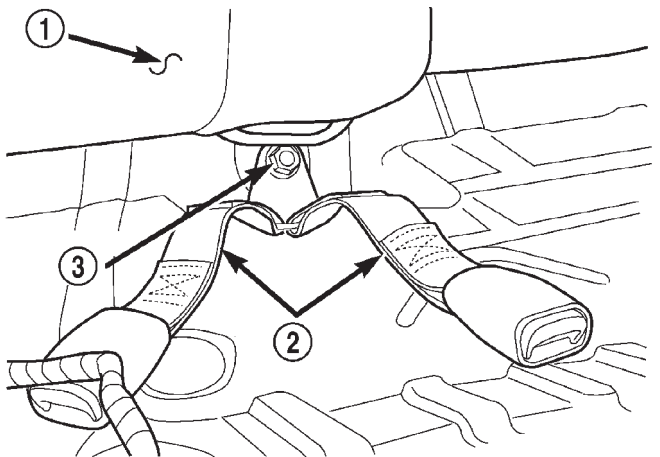


Fig. 23 REAR SEAT BELT BUCKLE

- 1 - REAR SEAT BACK
- 2 - SEAT BELT BUCKLES
- 3 - ANCHOR

- (3) Remove the seat belt buckle from stud on floor.

INSTALLATION

- (1) Place the seat belt buckle anchor over stud on floor.
- (2) Install the rear seat belt anchor nut. Tighten to 40 N·m (30 ft. lbs.) torque.
- (3) Install the rear seat cushion.

SEAT BELT BUCKLE - FRONT SEAT CENTER OCCUPIED - CONCORDE/INTREPID

REMOVAL

- (1) Move or remove the front seat as necessary to gain access to seat belt buckle anchor bolt.
- (2) Remove the bolt attaching buckle and reinforcement to front seat track (Fig. 24).

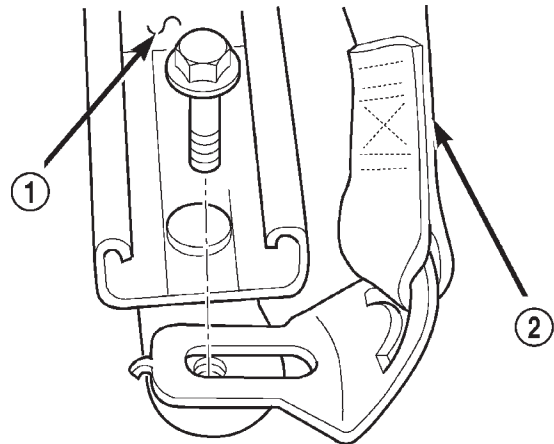


Fig. 24 FRONT SEAT CENTER OCCUPIED BELT BUCKLE - REMOVE/INSTALL

- 1 - FRONT SEAT TRACK
- 2 - FRONT SEAT BELT BUCKLE

- (3) Remove the seat belt buckle from vehicle.

INSTALLATION

- (1) Place the seat belt buckle in position in the vehicle.
- (2) Install the buckle attaching bolt and reinforcement to the front seat track or floor. Tighten bolt to 40 N·m (30 ft. lbs.) torque.
- (3) Install the front seat, if it was removed.

SIDE IMPACT AIRBAG CONTROL MODULE

DESCRIPTION

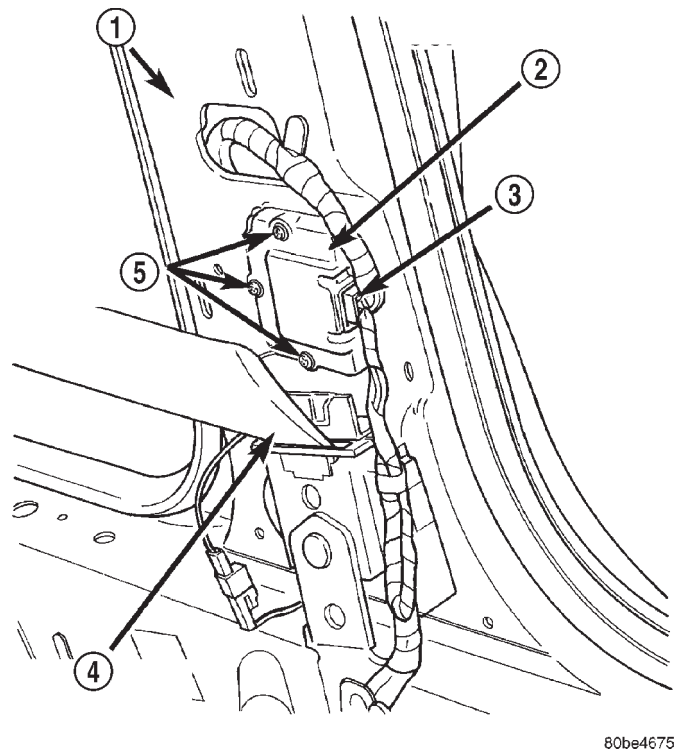


Fig. 25 SIACM POSITION/ORIENTATION

- 1 - VEHICLE BODY B-PILLAR
- 2 - SIDE IMPACT AIRBAG CONTROL MODULE (S.I.A.C.M.)
- 3 - S.I.A.C.M. ELECTRICAL CONNECTOR
- 4 - SEAT BELT RETRACTOR ASSEMBLY
- 5 - S.I.A.C.M. RETAINING SCREWS

Vehicles equipped with side impact airbags use two Side Impact Airbag Control Modules (SIACM). One is located on each respective side body B-pillar (Fig. 25).

OPERATION

Each Side Impact Airbag Control Module (SIACM) serves as the impact sensor for its seat mounted airbag. The right side SIACM controls the right seat airbag (Fig. 26). The left side SIACM controls the left seat airbag (Fig. 26). Each SIACM contains two accelerometers, both accelerometers must agree in order to deploy the side airbag. In the event of a side impact the appropriate SIACM will send a electronic signal to its airbag, deploying the airbag. The SIACM communicates with the occupant restraint controller via the PCI bus circuit.

REMOVAL

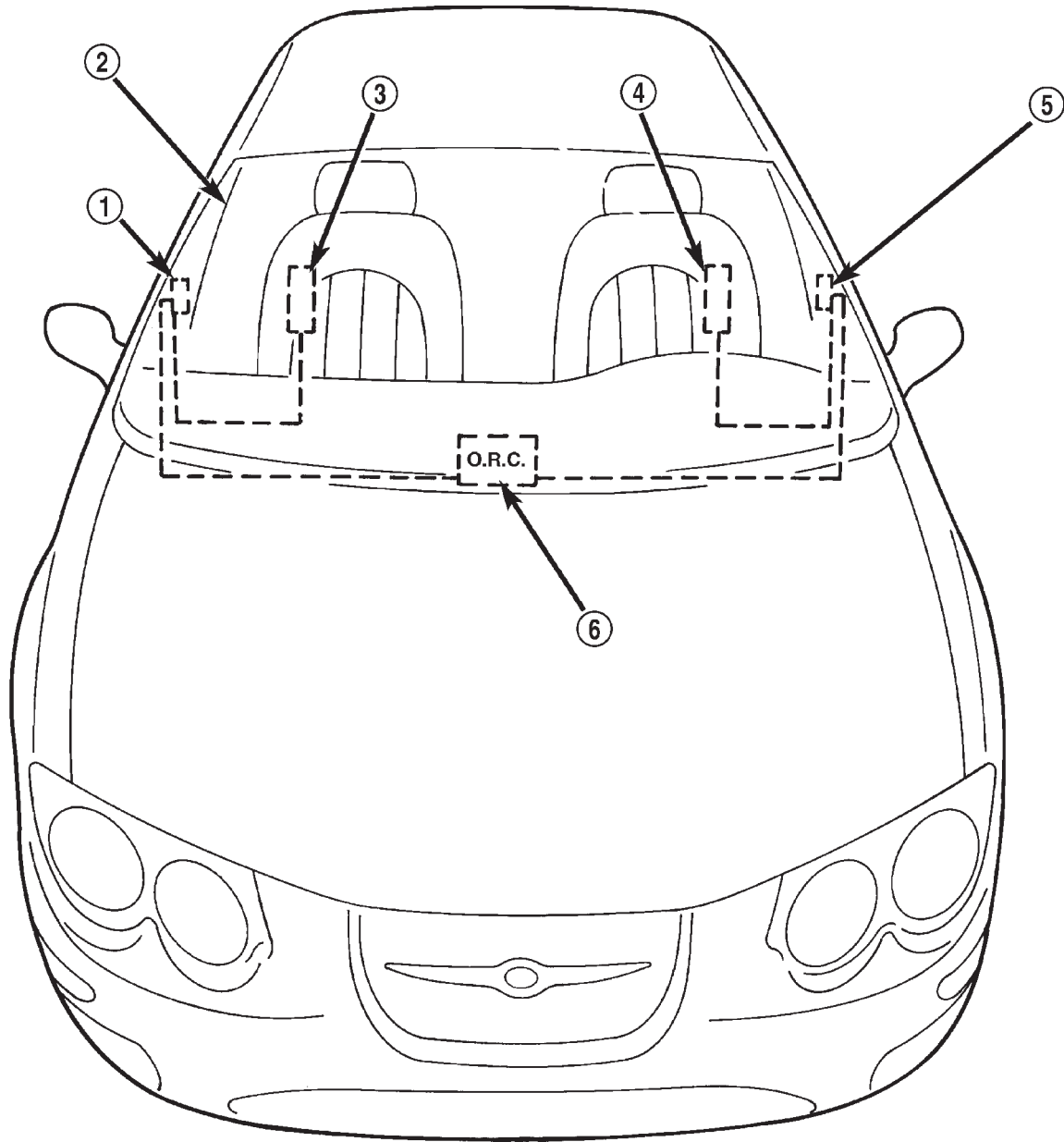
- (1) Disconnect and isolate the battery negative cable remote terminal.
- (2) Remove the lower B-pillar trim from the appropriate side of the vehicle. Refer to Body, Interior, B-Pillar Lower Trim, Removal.
- (3) Disconnect the side impact airbag control module electrical connector (Fig. 25).
- (4) Remove the SIACM retaining screws and remove the module from the vehicle (Fig. 25).

INSTALLATION

- (1) Position the SIACM in B-pillar and install the retaining screws (Fig. 25). Torque the screws to 12 N·m (105 in. lbs.).
- (2) Connect the SIACM electrical connector (Fig. 25).
- (3) Install the lower B-pillar trim. Refer to Body, Interior, B-Pillar Lower Trim, Installation.

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL. REFER TO ELECTRICAL, RESTRAINTS, DIAGNOSIS AND TESTING - AIRBAG SYSTEM FIRST.

SIDE IMPACT AIRBAG CONTROL MODULE (Continued)



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Fig. 26 SIDE IMPACT AIRBAG SYSTEM COMPONENT LOCATION

1 - RIGHT SIDE IMPACT AIRBAG CONTROL MODULE (SIACM)
2 - VEHICLE BODY B-PILLAR
3 - RIGHT SEAT AIRBAG MODULE

4 - LEFT SEAT AIRBAG MODULE
5 - LEFT SIDE IMPACT AIRBAG CONTROL MODULE (SIACM)
6 - OCCUPANT RESTRAINT CONTROLLER

SPEED CONTROL

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SPEED CONTROL

DESCRIPTION

The speed control system is electronically controlled and vacuum operated. The electronic control is integrated into the Powertrain Control Module. The controls are located on the steering wheel. The ON/OFF, and SET buttons are located on the left side of the airbag module. The RESUME/ACCEL, CANCEL and COAST buttons are located on the right side of the airbag module (Fig. 1).

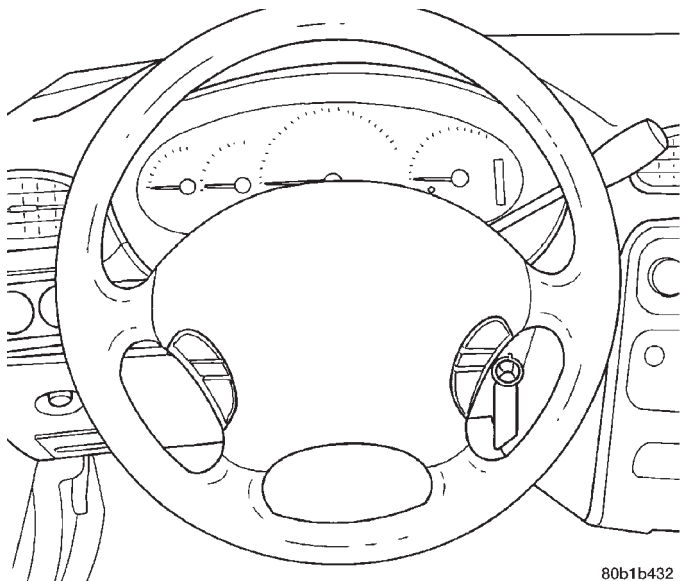


Fig. 1 SPEED CONTROL SWITCHES - Typical

The system is designed to operate at speeds above 30 mph (48 km/h).

WARNING: THE USE OF SPEED CONTROL IS NOT RECOMMENDED WHEN DRIVING CONDITIONS DO NOT PERMIT MAINTAINING A CONSTANT SPEED, SUCH AS IN HEAVY TRAFFIC OR ON ROADS THAT ARE WINDING, ICY, SNOW COVERED, OR SLIPPERY.

OPERATION

OPERATION

When speed control is activated by depressing the ON switch, the PCM allows a set speed to be stored in RAM for speed control. To store a set speed, depress and release the SET switch while the vehicle is moving at a speed between 25 and 85 mph. In order for the speed control to engage, the brakes cannot be applied, nor can the gear selector be indicating the transmission is in Park or Neutral. The speed control can be disengaged manually by:

- Stepping on the brake pedal
- Depressing the OFF switch
- Depressing the CANCEL switch.
- Depressing the clutch pedal
- Operating in 1st or 2nd gear (autostick, if equipped)

SPEED CONTROL (Continued)

NOTE: Turning the system off by depressing the OFF switch or turning off the ignition switch will erase the set speed stored in the PCM.

For added safety, the speed control system is programmed to disengage for any of the following conditions:

- An indication of Park or Neutral
- A rapid increase rpm (indicates that the clutch has been disengaged)
- Excessive engine rpm (indicates that the transmission may be in a low gear)
- The speed signal increases at a rate of 10 mph per second (indicates that the co-efficient of friction between the road surface and tires is extremely low)
- The speed signal decreases at a rate of 10 mph per second (indicates that the vehicle may have decelerated at an extremely high rate)
- If the actual speed is greater than 20 mph over the set speed.
- Autostick shifts into 1st or 2nd gear (autostick, if equipped)

Once the speed control has been disengaged, depressing the RESUME switch when speed is greater than 20 mph allows the vehicle to resume control to the target speed that was stored in the PCM.

While the speed control is engaged, the driver can increase the vehicle speed by depressing the ACCEL switch. The new target speed is stored in the PCM when the ACCEL switch is released. The PCM also has a "tap-up" feature in which target speed increases by 2 mph for each momentary switch activation of the ACCEL switch. The PCM also provides a means to decelerate to a new lower target speed without disengaging speed control. Depress and hold the COAST switch until the desired speed is reached, then release the switch.

The PCM also has a "Tap Down" feature in which target speed decreases at 1 mph for each momentary switch activation of the coast switch.

OPERATION - INTERACTIVE SPEED CONTROL (4 Speed EATX Only)

Interactive means that communication between the PCM and the TCM is taking place. Interactive speed control avoids unnecessary shifting for smoother, quieter operation and when downshifts are required, makes the shifts smoother.

CLIMBING A GRADE

DESCRIPTION

When climbing a grade the interactive speed control tries to maintain the set speed by increasing the

throttle opening, while inhibiting/delaying downshifts.

OPERATION

If opening the throttle alone cannot maintain the set speed and the vehicle speed drops more than three mph below the set speed, the transmission will downshift to third gear. If the vehicle continues to lose speed, by more than 6 mph, the transmission will downshift again to maintain the set speed. After the vehicle encounters a less-steep grade, or has crested the grade (reduced the load on the powertrain) and can maintain the set speed at a reduced throttle position, the transmission will upshift, as appropriate, until the set speed can be maintained in Overdrive.

GRADE HUNTING

DESCRIPTION

All vehicles equipped with a four speed automatic transmission have a grade hunting feature for the 2nd to 3rd gear upshift and the 3rd to Overdrive upshift.

OPERATION

The PCM identifies the powertrain loading conditions and selects the proper gear to maintain the current vehicle speed. Under moderate loading conditions the transaxle will stay in 3rd gear until the top of the grade is reached or the powertrain loading is reduced.

If powertrain loading is severe, the transaxle may shift into 2nd gear and remain there until powertrain loading is reduced, then a 2nd to 3rd gear upshift will be scheduled. Grade hunting features always operate regardless of whether or not the interactive speed control is engaged. **If the interactive speed control is not engaged and powertrain loading is not reduced, the driver may have to completely lift off of the throttle before an upshift will occur.** If the driver does lift off the throttle to induce an upshift under these conditions, vehicle speed will reduce and the Overdrive to 3rd and 3rd to 2nd gear downshifts will reoccur when the throttle is reapplied. If grade hunting is repeatedly induced by the driver, transaxle damage may result.

AUTOMATIC SPEED CONTROL OVERSPEED REDUCTION

DESCRIPTION

Transmission control software includes an automatic speed control overspeed reduction feature. This maintains vehicle speed at the selected set point when descending a grade.

SPEED CONTROL (Continued)

OPERATION

The Powertrain Control Module (PCM) first senses that the speed control is set. If the set speed is exceeded by more than 4 mph (6.5 km/hr) and the throttle is closed, the PCM causes the transaxle to downshift to THIRD gear. After downshifting, the automatic speed control resumes normal operation. To ensure that an upshift is appropriate after the set speed is reached, the PCM waits until the speed control system opens the throttle at least 6 degrees before upshifting to OVERDRIVE again.

If the driver applies the brakes, canceling automatic speed control operation with the transaxle still in THIRD gear, the PCM maintains this gear until the driver opens the throttle at least 6 degrees to avoid an inappropriate upshift. The upshift is also delayed for 2.5 seconds after reaching the 6 degrees throttle opening in anticipation that the driver might open the throttle enough to require THIRD gear. This will avoid unnecessary and disturbing transmission cycling. If the automatic speed control RESUME feature is used after braking, the upshift is delayed until the set speed is achieved to reduce cycling and provide better response.

DIAGNOSIS AND TESTING - ROAD TEST

Perform a vehicle road test to verify reports of speed control system malfunction. The road test should include attention to the speedometer. Speedometer operation should be smooth and without flutter at all speeds.

Flutter in the speedometer indicates a problem which might cause surging in the speed control sys-

tem. The cause of any speedometer problems should be corrected before proceeding. Refer to the Instrument Cluster for speedometer diagnosis.

If a road test verifies an inoperative system, and the speedometer operates properly, check for:

- A Diagnostic Trouble Code (DTC). If a DTC exists, conduct tests per the Powertrain Diagnostic Procedures manual.
- A misadjusted brake (stop) lamp switch. This could also cause an intermittent problem.
- Loose or corroded electrical connections at the servo. Corrosion should be removed from electrical terminals and a light coating of Mopar Multipurpose Grease, or equivalent, applied.
- Leaking vacuum reservoir.
- Loose or leaking vacuum hoses or connections.
- Defective one-way vacuum check valve.
- Secure attachment at both ends of the speed control servo cable.
- Smooth operation of throttle linkage and throttle body air valve.
- Conduct electrical test at PCM.
- Failed speed control servo. Do the servo vacuum test.

CAUTION: When test probing for voltage or continuity at electrical connectors, care must be taken not to damage connector, terminals or seals. If these components are damaged, intermittent or complete system failure may occur.

SPECIFICATIONS - TORQUE

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Vacuum Reservoir Screws	12	8.8	106.2
Servo Mounting Bracket Nuts	14	10.3	123.9
Servo Mounting Bracket Bolts	14	10.3	123.9
Servo Mounting Nuts	6.7	—	60

CABLE

DESCRIPTION

The speed control servo cable is connected between the speed control vacuum servo diaphragm and the throttle body control linkage.

OPERATION

This cable causes the throttle control linkage to open or close the throttle valve in response to movement of the vacuum servo diaphragm.

CABLE (Continued)

REMOVAL

REMOVAL - 2.7L

- (1) Disconnect the negative battery cable.
- (2) Remove speed control cable from throttle cam by sliding clasp out hole used for throttle cable.
- (3) Compress the retaining tabs on the cable and slide cable out of bracket.
- (4) Remove 2 nuts and 1 bolt from servo bracket.
- (5) Disconnect electrical connectors and vacuum hose.
- (6) Remove two nuts attaching speed control cable and mounting bracket to servo.
- (7) Pull cable away from servo to expose retaining clip and remove clip attaching cable to servo.
- (8) Remove servo mounting bracket.

REMOVAL - 3.5L

- (1) Disconnect the negative battery cable.
- (2) Remove throttle cable bracket from intake manifold.
- (3) Remove speed control cable from throttle cam by sliding clasp out hole used for throttle cable.
- (4) Remove the throttle cable (with retaining tab) and then slide cable speed control cable out from bracket.
- (5) Remove one bolt and two nuts from servo bracket.
- (6) Disconnect electrical connectors and vacuum hose.
- (7) Remove two nuts attaching mounting bracket and speed control cable to servo.
- (8) Pull cable away from servo to expose retaining clip and remove clip attaching cable to servo.
- (9) Remove servo mounting bracket.

INSTALLATION

INSTALLATION - 2.7L

- (1) Slide cable into throttle cable bracket and engage retaining tabs.
- (2) Rotate the throttle cam forward to the wide open position and install speed control cable clasp (Fig. 2).
- (3) Rotate the throttle cam forward to the wide open position and install throttle cable clasp.
- (4) Install retaining clip to cable at servo.
- (5) Insert servo studs through holes in the mounting bracket and speed control cable.
- (6) Install nuts, tighten to 6.7 N·m (60 in. lbs.).
- (7) Connect vacuum hose to servo.
- (8) Connect electrical connector.
- (9) Install servo and bracket and tighten nuts and bolt.
- (10) Connect negative battery cable.

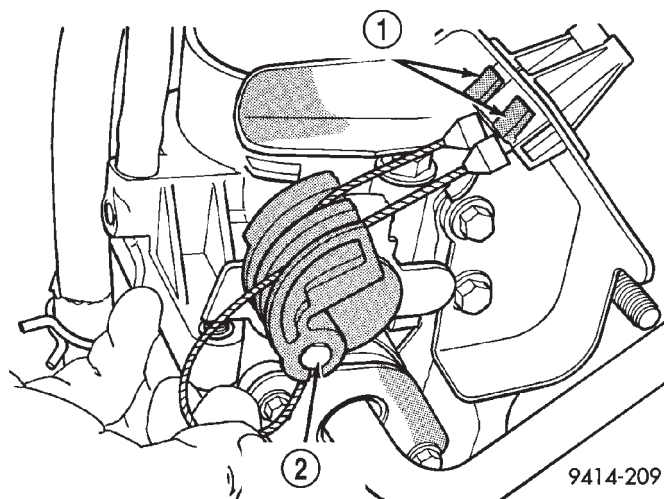


Fig. 2 Disconnecting Throttle Cable—Typical

- 1 - TABS
2 - CABLE CLASP

INSTALLATION - 3.5L

- (1) Slide speed control cable into bracket and with locator positioned into notch in bracket, then slide throttle cable into bracket and engage retaining tab.
- (2) Rotate the throttle cam forward to the wide open position and install speed control cable clasp (Fig. 2).
- (3) Rotate the throttle cam forward to the wide open position and install throttle cable clasp.
- (4) Install throttle cable bracket and tighten bolts.
- (5) Route cable through bracket and install retaining clip to cable at servo.
- (6) Insert servo studs through holes in mounting bracket and speed control cable.
- (7) Install nuts, tighten to 6.7 N·m (60 in. lbs.).
- (8) Connect vacuum hose to servo.
- (9) Connect electrical connector.
- (10) Install servo and bracket and tighten bolts.
- (11) Connect negative battery cable.

SERVO

DESCRIPTION

The servo unit consists of a solenoid valve body, and a vacuum chamber. The solenoid valve body contains three solenoids:

- Vacuum
- Vent
- Dump

The vacuum chamber contains a diaphragm with a cable attached to control the throttle linkage.

SERVO (Continued)

OPERATION

The PCM controls the solenoid valve body. The solenoid valve body controls the application and release of vacuum to the diaphragm of the vacuum servo. The servo unit cannot be repaired and is serviced only as a complete assembly.

Power is supplied to the servo by the PCM through the brake switch. The PCM controls the ground path for the vacuum and vent solenoids.

The dump solenoid is energized anytime it receives power. If power to the dump solenoid is interrupted, the solenoid dumps vacuum in the servo. This provides a safety backup to the vent and vacuum solenoids.

The vacuum and vent solenoids must be grounded by the PCM to operate. When the PCM grounds the vacuum servo solenoid, the solenoid allows vacuum to enter the servo and pull open the throttle plate using the cable. When the PCM breaks the ground, the solenoid closes and no more vacuum is allowed to enter the servo. The PCM also operates the vent solenoid via ground. The vent solenoid opens and closes a passage to bleed or hold vacuum in the servo as required.

The PCM cycles the vacuum and vent solenoids to maintain the set speed, or to accelerate and decelerate the vehicle. To increase throttle opening, the PCM grounds the vacuum and vent solenoids. To decrease throttle opening, the PCM removes the grounds from the vacuum and vent solenoids.

REMOVAL

- (1) Disconnect the negative battery cable.
- (2) Remove three bolts from servo bracket.
- (3) Disconnect electrical connectors and vacuum hose.
- (4) Remove two nuts attaching speed control cable and mounting bracket to servo.
- (5) Remove servo mounting bracket.
- (6) Pull cable away from servo to expose retaining clip and remove clip attaching cable to servo.

INSTALLATION

- (1) With throttle in full open position align hole in speed control cable sleeve with hole in servo pin and install retaining clip.
- (2) Connect vacuum hose to servo.
- (3) Connect electrical connector.
- (4) Insert servo studs through holes in speed control cable and mounting bracket.
- (5) Install nuts, tighten to 6.7 N·m (60 in. lbs.).
- (6) Install servo and bracket and tighten bolt and nuts.
- (7) Connect negative battery cable.

SWITCH**DESCRIPTION**

There are two separate switch pods that operate the speed control system and are located on the steering wheel.

OPERATION

The speed control system has five separate resistive switches that provide a single multiplexed (MUX) voltage inputs to the PCM. The switch names are: ON, OFF, SET, COAST, RESUME, ACCEL, TAP-UP, COAST, and CANCEL. Based on conditions when the buttons are pushed (and released), the five voltages ranges provided to the PCM result in the following functions: ON, OFF, SET, COAST, RESUME, ACCEL, TAP-UP, TAP-DOWN, COAST, and CANCEL. Refer to the Speed Control Section for more information.

Also the PCM receives an input from the brake switch to sense whether the brake pedal has been depressed. When the PCM receives the brake depressed input, it turns off power to the speed control servo and disengages speed control. Also the power to the servo is supplied through the brake switch, which opens the circuit when the brake pedal is depressed.

The individual switches cannot be repaired. If one switch fails, the entire switch module must be replaced.

REMOVAL

The speed control switch is mounted in the steering wheel and wired through the clock spring device under the airbag module.

WARNING: IF REMOVAL OF AIRBAG MODULE IS NECESSARY, REFER TO THE RESTRAINT SYSTEMS SECTION FOR MORE INFORMATION.

- (1) Remove the negative battery cable.
- (2) Turn off ignition.
- (3) Remove two screws from side of the switch.
- (4) Rock switch away from airbag and steering wheel.
- (5) Disconnect two-way electrical connector.
- (6) Repeat for the other switch.

INSTALLATION

- (1) Connect two-way electrical connector.
- (2) Install switch.
- (3) Install two screws into the side of the switch.
- (4) Repeat for the other switch.
- (5) Install the negative battery cable.

VACUUM RESERVOIR

DESCRIPTION

The vacuum reservoir is located in the engine compartment. It is made of plastic.

OPERATION

The reservoir stores engine vacuum. Manifold vacuum is supplied from the brake booster check valve. The speed control vacuum supply hose has a check valve at the source (brake booster) to maintain the highest available vacuum level in the servo, reservoir and vacuum hoses. When engine vacuum drops, as in climbing a grade while driving, the reservoir supplies the vacuum needed to maintain proper speed control operation. The vacuum reservoir cannot be repaired and must be replaced if faulty.

REMOVAL

- (1) Disconnect the negative battery cable.
- (2) Remove the Powertrain Control Module (PCM) refer to the Fuel Injection System section.
- (3) Remove and reposition coolant reservoir.
- (4) Remove PDC and bracket.
- (5) Remove vacuum reservoir.
- (6) Disconnect vacuum hose

INSTALLATION

- (1) Connect vacuum hose.
- (2) Install vacuum reservoir and tighten fasteners.
- (3) Install PDC and bracket and tighten fasteners.
- (4) Install coolant reservoir.
- (5) Install PCM refer to the Fuel Injection System section.
- (6) Connect the negative battery cable.

VEHICLE THEFT SECURITY

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VEHICLE THEFT SECURITY

DESCRIPTION

VEHICLE THEFT SECURITY SYSTEM

The Vehicle Theft Security System (VTSS) is designed to protect against whole vehicle theft. The system monitors vehicle doors, deck lid key cylinder, and ignition action for unauthorized operation. The alarm activates:

- Sounding of the horn
- Flashing of the park and tail lamps
- Flashing of the headlamps
- An engine kill feature (without SKIS)

SENTRY KEY IMMOBILIZER SYSTEM

The Sentry Key Immobilizer System (SKIS) is designed to provide passive protection against unauthorized vehicle use by preventing the engine from operating. The components of this system are the Sentry Key Immobilizer Module (SKIM) (Fig. 1), Body Control Module (BCM), Sentry Key transponder, VTSS indicator LED, and the Powertrain Control Module (PCM).

The SKIM is installed on the steering column near the ignition lock cylinder. The transponder is located under the molded rubber cap on the head of the ignition key. The VTSS indicator LED is located in the instrument panel top cover.

TRIGGERING THE VTSS Any of the following actions will trigger the system:

- (1) Opening any door.
- (2) Removing the deck lid lock cylinder.
- (3) Turning the ignition to the ON position.

Using the power door switch or the keyless transmitter will arm the system.

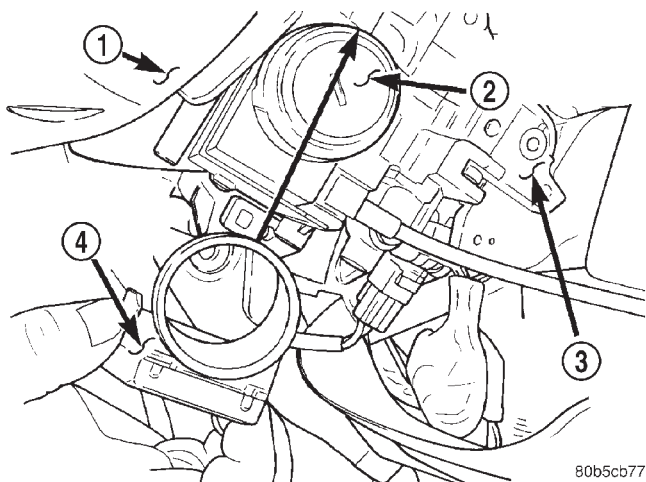


Fig. 1 SENTRY KEY IMMOBILIZER MODULE LOCATION

- 1 - STEERING WHEEL
- 2 - IGNITION KEY CYLINDER
- 3 - STEERING COLUMN
- 4 - SENTRY KEY IMMOBILIZER MODULE

CAUTION: The VTSS indicator LED will trigger and engine will continue to run if the vehicle is equipped with SKIS and the proper key is used to start the vehicle. This condition will occur if the VTSS has been triggered.

NOTE: The ignition switch can be turned to the accessory position without triggering alarm system.

VEHICLE THEFT SECURITY (Continued)

OPERATION

VEHICLE THEFT SECURITY SYSTEM

Upon failure of proper VTSS/SKIM communication to the PCM, the PCM will shut off fuel after two seconds of run time. The engine will not re-crank on the key cycle that the failure occurred, a full key down sequence must be performed for the engine to crank again. After six consecutive fuel shut-offs, the engine will no longer crank on subsequent key cycles. The failure must be corrected and a valid communication process between the BCM (VTSS), or SKIM, and the PCM must occur for the engine to crank and start again.

The electronics for the VTSS are part of the Body Control Module (BCM). The system is armed when the vehicle is locked using the:

- Power door lock switches
- Remote Keyless Entry transmitter.
- Door Cylinder Lock Switches.

For vehicles equipped with SKIS, the doors do not have to be locked to enable the fuel shut off feature.

After the vehicle is locked and the last door is closed, the set LED indicator in the top cover will flash quickly for 16 seconds, indicating that arming is in progress. If no monitored systems are activated during this period, the system will arm. After 16 seconds the indicator LED will continue to flash at a slower rate.

This indicates that the system is armed. If the deck lid key cylinder switch is not sensed by the system, the indicator LED will remain lit during the arming process, although the system will still arm. If the indicator LED does not illuminate at all upon door closing it indicates that the system is not arming.

Passive disarming occurs upon normal vehicle entry by unlocking either door with the ignition key/remote transmitter. This disarming will also halt the alarm once it has been activated.

A tamper alert exists to notify the driver that the VTSS had been activated. This alert consists of 3 horn pulses when the vehicle is disarmed.

NOTE: The VTSS will not arm by pushing down the door lock mechanism. This will manually override the system.

For Door Cylinder Lock Switch Removal and Installation, refer to Electrical, Power Locks, Door Cylinder Lock Switch.

SENTRY KEY IMMOBILIZER SYSTEM

The SKIS includes two valid Sentry Key transponders from the factory. These two Sentry Keys can be used to program additional non-coded blank Sentry Keys. These blank keys can be cut to match a valid

ignition key, but the engine will not start unless the key transponder is also programmed to the vehicle. The SKIS will recognize no more than eight valid Sentry Key transponders at any one time.

The SKIS performs a self-test each time the ignition switch is turned to the ON position, and will store Diagnostic Trouble Codes (DTC's) if a system malfunction is detected. The SKIS can be diagnosed, and any stored DTC can be retrieved using a DRBIII® scan tool as described in the proper Body Diagnostic Procedures Manual.

DIAGNOSIS AND TESTING - SENTRY KEY IMMOBILIZER SYSTEM

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS, WARNINGS, BEFORE ATTEMPTING COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

NOTE: The following tests may not prove conclusive in the diagnosis of this system. The most reliable, efficient, and accurate means to diagnose the Sentry Key Immobilizer System involves the use of a DRB III® scan tool. Refer to the proper Body Diagnostic Procedures Manual.

The Sentry Key Immobilizer System (SKIS) and the Programmable Communication Interface (PCI) bus network should be diagnosed using a DRBIII® scan tool. The DRBIII® will allow confirmation that the PCI bus is functional, that the Sentry Key Immobilizer Module (SKIM) is placing the proper messages on the PCI bus, and that the Powertrain Control Module (PCM) is receiving the PCI bus messages. Refer to the proper Body Diagnostic Procedures Manual, and Wiring Diagrams for complete circuit descriptions and diagrams.

(1) Check the fuses in the junction block. If OK, go to Step 2. If not OK, repair the shorted circuit or component as required and replace the faulty fuse.

(2) Disconnect and isolate the battery negative remote cable from the remote terminal. Unplug the wire harness connector at the SKIM. Check for continuity between the ground circuit cavity of the SKIM wire harness connector and a good ground. There should be continuity. If OK, go to Step 3. If not OK, repair the open circuit to ground as required.

(3) Connect the battery negative remote cable. Check for battery voltage at the fused B(+) circuit cavity of the SKIM wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit to the fuse in the junction block as required.

VEHICLE THEFT SECURITY (Continued)

(4) Turn the ignition switch to the ON position. Check for battery voltage at the fused ignition switch output (run/start) circuit cavity of the SKIM wire harness connector. If OK, use a DRBIII® scan tool and the proper Body Diagnostic Procedures Manual to complete the diagnosis of the SKIS. If not OK, repair the open circuit to the fuse in the junction block as required.

DECKLID SECURITY SWITCH

REMOVAL

(1) Open hood, disconnect and isolate the negative battery cable remote terminal from the remote battery post.

(2) Refer to Body, Deck Lid, Deck Lid Latch Removal.

(3) Disconnect connector and remove deck lid lock cylinder from bracket (Fig. 2), (Fig. 3), and (Fig. 4).

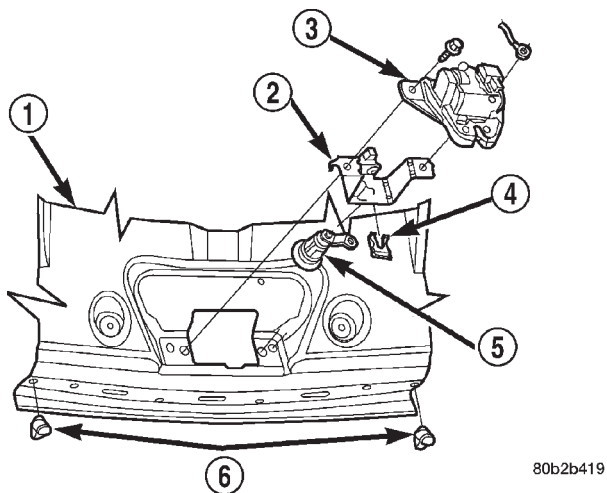


Fig. 2 DECK LID LATCH - CONCORDE/LHS

- 1 - TRUNK LID
- 2 - TRUNK LID CYLINDER BRACKET
- 3 - TRUNK LID LATCH
- 4 - LOCK SET
- 5 - TRUNK LID LOCK CYLINDER
- 6 - TRUNK LID OVER SLAM BUMPERS

INSTALLATION

(1) Connect connector and install the deck lid lock cylinder onto bracket (Fig. 2), (Fig. 3), and (Fig. 4).

(2) Refer to Body, Deck Lid, Deck Lid Latch, Installation.

(3) Connect the negative battery cable remote terminal onto the remote battery post.

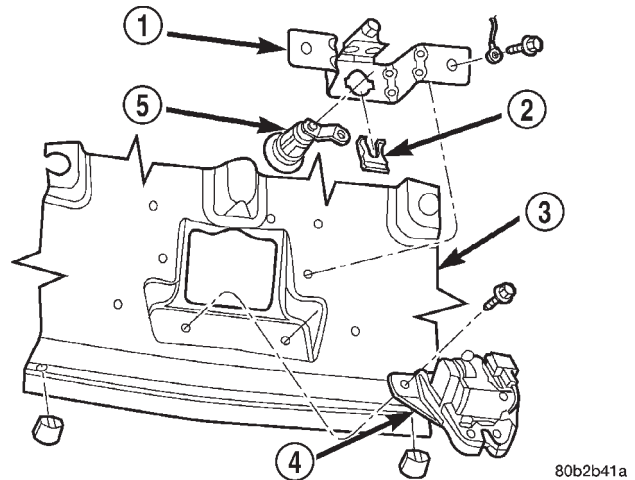


Fig. 3 DECK LID LATCH - INTREPID

- 1 - LOCK CYLINDER BRACKET
- 2 - LOCK SET
- 3 - TRUNK LID
- 4 - TRUNK LID LATCH
- 5 - TRUNK LOCK CYLINDER

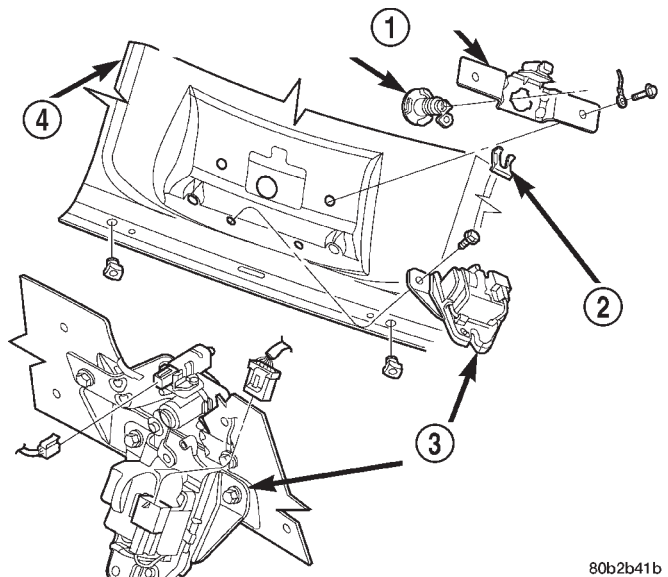


Fig. 4 DECK LID LATCH - 300M

- 1 - LOCK CYLINDER BRACKET AND LOCK CYLINDER
- 2 - LOCK SET
- 3 - TRUNK LID LATCH
- 4 - TRUNK LID

SKIS INDICATOR LAMP

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses the Vehicle Theft Security System (VTSS) indicator LED to give an indication when the SKIS is faulty or when the vehicle has been immobilized due to the use of an invalid ignition key. The LED is controlled by the BCM based upon messages received from the Sentry Key Immobilizer Module (SKIM). The VTSS/SKIS indicator LED is hard wired directly to the BCM.

OPERATION

The SKIM sends messages to the BCM to turn the LED on for about three seconds when the ignition switch is turned to the ON position as a bulb test. After completion of the bulb test, the SKIM sends bus messages to the BCM to keep the LED off for a duration of about one second. Then the SKIM sends messages to the BCM to turn the LED on or off based upon the results of the SKIS self-tests. If the VTSS indicator LED comes on and stays on after the bulb test, it indicates that the SKIM has detected a system malfunction and/or that the SKIS has become inoperative. If the SKIM detects an invalid key when the ignition switch is turned to the ON position, it sends messages to the BCM to flash the VTSS indicator LED.

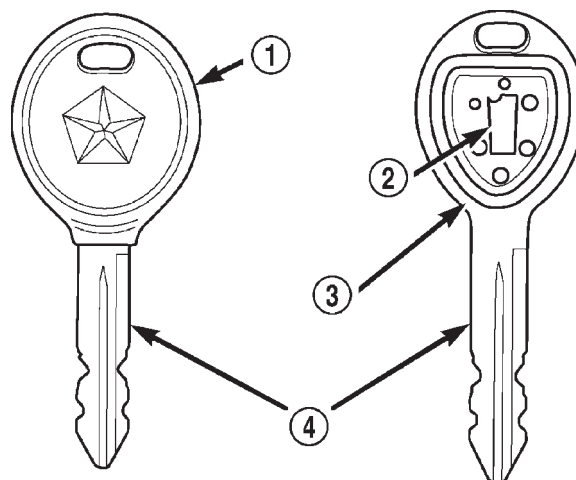
The SKIM can also send messages to the BCM to flash the LED and to generate a single audible chime tone. These functions serve as an indication to the customer that the SKIS has been placed in its "Customer Learn" programming mode. See Sentry Key Immobilizer System Transponder Programming in this section for more information on the "Customer Learn" programming mode.

The VTSS indicator LED is housed in the Automatic Temperature Control (ATC) Sun Sensor located in the instrument panel top cover. Refer to Group 8E - Instrument Panel and Systems for service of ATC Sun Sensor. If the VTSS indicator LED comes on and stays on after the bulb test function, diagnosis of the SKIS should be performed with a DRBIII® scan tool and the proper Body Diagnostic Procedures Manual.

TRANSPONDER KEY

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses a transponder that is integral to each of two ignition keys (Fig. 5) that are supplied with the vehicle when it is shipped from the factory. The transponder chip is insulated within a nylon mount inserted in the



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Fig. 5 TRANSPONDER KEY

- 1 - MOLDED CAP
- 2 - TRANSPONDER
- 3 - MOLDED CAP REMOVED
- 4 - SENTRY KEY

head of the key, and invisible beneath a molded rubber cap.

OPERATION

Each Sentry Key transponder has a unique transponder identification code programmed into it by the manufacturer. The Sentry Key Immobilizer Module (SKIM) has a unique "Secret Key" code programmed into it by the manufacturer. When a Sentry Key transponder is programmed into the memory of the SKIM, the SKIM learns the transponder identification code from the transponder, and the transponder learns the "Secret Key" code from the SKIM. Each of these codes is stored within the transponder and in the nonvolatile memory of the SKIM. Therefore, blank keys for the SKIS must be programmed by and into the SKIM, in addition to being cut to match the mechanical coding of the ignition lock cylinder. See Sentry Key Immobilizer System Transponder Programming in this section for more information.

The Sentry Key transponder is within the range of the SKIM transceiver antenna ring when it is inserted in the ignition lock cylinder. When the ignition switch is turned to the START or ON positions, the SKIM transceiver issues a Radio Frequency (RF) signal that excites the transponder chip. The transponder chip responds by issuing an RF signal containing its transponder identification code and the "Secret Key" code. The SKIM transceiver compares the transponder codes with the codes stored in its memory to determine whether a valid key is in the ignition lock cylinder.

TRANSPONDER KEY (Continued)

The Sentry Key transponder cannot be repaired and, if faulty or damaged, it must be replaced.

STANDARD PROCEDURE - TRANSPONDER PROGRAMMING

Two programmed sentry key transponders are included with the Sentry Key Immobilizer System (SKIS) when it is shipped from the factory. The Sentry Key Immobilizer Module (SKIM) can be programmed to recognize up to six additional transponders, for a total of eight Sentry Keys. The following "Customer Learn" programming procedure for the programming of additional transponders requires access to at least two of the valid Sentry Keys. If two valid Sentry Keys are not available, Sentry Key programming will require the use of a DRBIII® scan tool and the proper Body Diagnostic Procedures Manual.

CUSTOMER LEARN

(1) Obtain the additional Sentry Key transponder blank(s) that are to be programmed for the vehicle. Cut the additional Sentry Key transponder blanks to match the ignition lock cylinder mechanical key codes.

(2) Insert one of the two valid Sentry Key transponders into the ignition switch and turn the ignition switch to the ON position.

(3) After the ignition switch has been in the ON position for about three seconds, but no more than fifteen seconds, cycle the ignition switch back to the OFF position. Replace the first valid Sentry Key in the ignition lock cylinder with the second valid Sentry Key and turn the ignition switch back to the ON position. Both operations must be performed within 15 seconds.

(4) About ten seconds after the completion of Step 3, the VTSS indicator LED will start to flash and a single audible chime tone will sound to indicate that the system has entered the "Customer Learn" programming mode.

(5) Within about fifty seconds of entering the "Customer Learn" programming mode, turn the ignition switch to the OFF position, replace the valid Sentry Key with a blank Sentry Key transponder, and turn the ignition switch back to the ON position.

(6) About ten seconds after the completion of Step 5, a single audible chime tone will sound and the VTSS indicator LED will stop flashing and stay on solid for about three seconds to indicate that the blank Sentry Key transponder has been successfully programmed. The SKIS will immediately return to normal system operation following exit from the "Customer Learn" programming mode.

(7) Go back to Step 2 and repeat this process for each additional Sentry Key transponder blank to be programmed.

If any of the above steps is not completed in the proper sequence, or within the allotted time, the SKIS will automatically exit the "Customer Learn" programming mode. The SKIS will also automatically exit the "Customer Learn" programming mode if it sees a non-blank Sentry Key transponder when it should see a blank, if it has already programmed eight valid Sentry Keys, or if the ignition switch is turned to the OFF position for more than about fifty seconds.

VTSS INDICATOR

DESCRIPTION

The Sentry Key Immobilizer System (SKIS) uses the Vehicle Theft Security System (VTSS) indicator LED to give an indication when the SKIS is faulty or when the vehicle has been immobilized due to the use of an invalid ignition key. The LED is controlled by the BCM based upon messages received from the Sentry Key Immobilizer Module (SKIM). The VTSS/SKIS indicator LED is hard wired directly to the BCM.

OPERATION

The SKIM sends messages to the BCM to turn the LED on for about three seconds when the ignition switch is turned to the ON position as a bulb test. After completion of the bulb test, the SKIM sends bus messages to the BCM to keep the LED off for a duration of about one second. Then the SKIM sends messages to the BCM to turn the LED on or off based upon the results of the SKIS self-tests. If the VTSS indicator LED comes on and stays on after the bulb test, it indicates that the SKIM has detected a system malfunction and/or that the SKIS has become inoperative. If the SKIM detects an invalid key when the ignition switch is turned to the ON position, it sends messages to the BCM to flash the VTSS indicator LED.

The SKIM can also send messages to the BCM to flash the LED and to generate a single audible chime tone. These functions serve as an indication to the customer that the SKIS has been placed in its "Customer Learn" programming mode. See Sentry Key Immobilizer System Transponder Programming in this section for more information on the "Customer Learn" programming mode.

The VTSS indicator LED is housed in the Automatic Temperature Control (ATC) Sun Sensor located in the instrument panel top cover. Refer to Group 8E - Instrument Panel and Systems for service of ATC Sun Sensor. If the VTSS indicator LED comes on and stays on after the bulb test function, diagnosis of the SKIS should be performed with a DRBIII® scan tool and the proper Body Diagnostic Procedures Manual.

WIPERS/WASHERS

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WIPERS/WASHERS

DESCRIPTION

WIPER SYSTEM

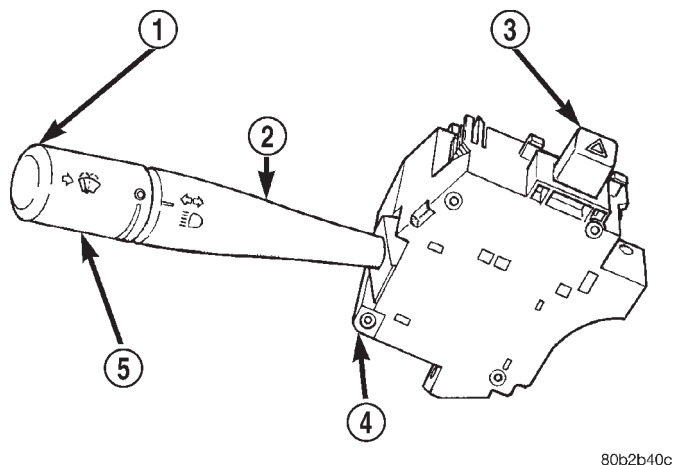
The windshield wiper system is controlled by a switch located on the multi-function switch stalk

(Fig. 1). The multi-function switch is located on the steering column behind the steering wheel.

WASHER SYSTEM

All models are equipped with electric operated windshield washer pumps. The electric pump assembly is mounted with a grommet directly to the reservoir.

WIPERS/WASHERS (Continued)



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Fig. 1 WIPER/WASHER SWITCH

- 1 - WINDSHIELD WASHER BUTTON
- 2 - CONTROL STALK (BEAM SELECT)
- 3 - HAZARD WARNING BUTTON
- 4 - MULTI-FUNCTION SWITCH
- 5 - WINDSHIELD WIPER CONTROL

The windshield washer system is controlled by a switch located on the multi-function switch stalk (Fig. 1). The multi-function switch is located on the steering column behind the steering wheel.

OPERATION**WIPER SYSTEM**

The windshield wipers will operate when the ignition switch is in the ACCESSORY or IGNITION ON position. The windshield wipers will return to the parked position when the ignition switch is turned to the OFF position. Fuses, located in the Junction Block and Power Distribution Center protects the circuitry of the wiper system and the vehicle.

The wiper motor has permanent magnet fields. The speeds are determined by current flow to the appropriate set of brushes.

The intermittent wiper system, in addition to low and high speed, has a delay mode. The delay mode

has a range of 1/2 to 18 seconds. The wiper delay times will double to a range of 1 to 36 seconds when the vehicle speed is less than 10 mph. The delay is controlled by a variable resistor in the wiper switch and the Body Control Module (BCM). The BCM controls the timing for the wiper ON/OFF, as well as the wiper HI/LO relay.

The wiper system completes the wipe cycle when the switch is turned OFF. The blades park in the lowest portion of the wipe pattern.

When using the DRB III® scan tool, refer to the proper Body Diagnostic Procedures Manual for Diagnosis and Testing.

WASHER SYSTEM

The wash function can be accessed in the OFF position of the wiper control switch. Wash switch must be pressed for at least 0.5 second to get the wipe after wash. Holding the wash button depressed when the switch is in the OFF position will operate the wipers and washer motor pump continuously until the washer button is released. Releasing the button will stop the washer pump but the wipers will complete the current wipe cycle, followed by an average of two more wipe cycles (± 1) before the wipers park and the module turns off. If the wash switch is pressed momentarily with the wipers in the OFF or INTERMITTENT position, a pulse wipe cycle consisting of two wipes will occur.

Fluid is gravity fed from the reservoir to the motor. The fluid is forced by the pump through rubber hoses to the hood mounted nozzles which direct the fluid streams to the windshield. The one way flow check valves are located in each hood nozzle. The purpose of the check valves is to improve fluid flow response time and to prevent excessive washer fluid staining the surface of the hood. The hood mounted nozzles distribute washer fluid on the surface of the windshield. The nozzles are adjustable, refer to the Washer Nozzle Adjusting Procedures. The pump and reservoir are serviced as separate assemblies.

WIPERS/WASHERS (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - INTERMITTENT WIPERS

The intermittent wiper function is controlled by the Body Control Module (BCM), located in the left side of the instrument panel, attached to the Junction Block (Fig. 2). If the Body Control Module is determined to be the problem, refer to Electrical, Electronic Control Modules, Body Control Module, Removal.

DIAGNOSIS AND TESTING - WINDSHIELD WASHERS

Whenever a windshield washer malfunction occurs, first verify that the windshield washer wire harness is properly connected to all connectors before starting normal diagnosis and repair procedures. Refer to Windshield Washer Test table.

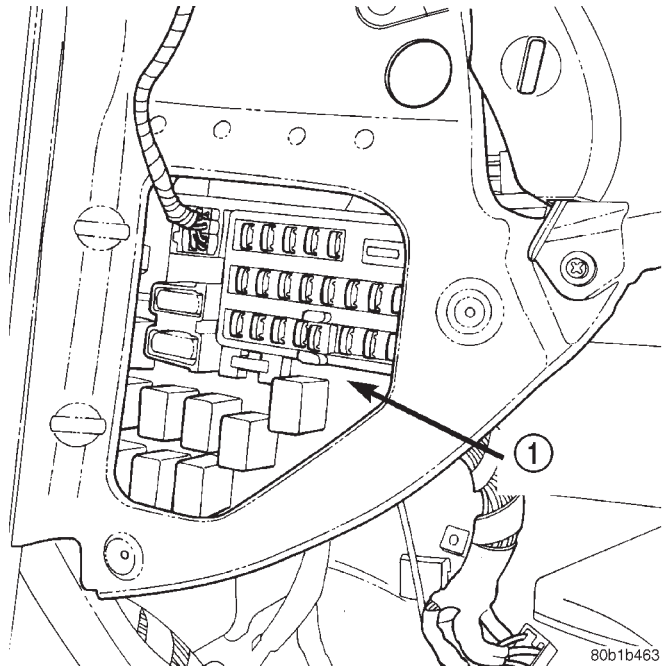


Fig. 2 Body Control Module

1 - JUNCTION BLOCK/BCM

WINDSHIELD WASHER TEST

CONDITION	POSSIBLE CAUSE	CORRECTION
WASHER POWER FEED FUSE OPEN.	1. JUNCTION BLOCK FUSE #5 BLOWN.	1. CHECK FUSE #5. REPLACE IF NOT OK.
BLOWN FUSE WHEN WASHER SWITCH IS DEPRESSED.	1. SHORT IN WIPER/WASHER SWITCH. 2. SHORT IN MOTOR POWER CIRCUIT. 3. SHORT IN WASHER MOTOR.	1. DEFECTIVE WASHER SWITCH. REFER TO WIPE/WASHER SWITCH DIAGNOSTIC PROCEDURES. 2. SHORT OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 3. CONNECT AN OHMMETER ACROSS WASHER MOTOR TERMINALS #1 AND #2 AND CHECK FOR A SHORT CIRCUIT. IF NOT OK, REPLACE WASHER MOTOR.

WIPERS/WASHERS (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WASHER SYSTEM WILL NOT FLOW WASHER FLUID.	1. NO WASHER FLUID IN RESERVOIR. 2. JUNCTION BLOCK FUSE #5 BLOWN. 3. WASHER HOSE NOT FLOWING FLUID. 4. MOTOR CONNECTOR LOOSE. 5. MOTOR CONNECTOR TERMINALS BENT. 6. OPEN POWER CIRCUIT TO SWITCH. 7. OPEN OR DEFECTIVE WIPER/WASHER SWITCH. 8. OPEN POWER CIRCUIT TO MOTOR. 9. OPEN OR DEFECTIVE MOTOR GROUND CIRCUIT. 10. OPEN CIRCUIT IN MOTOR. 11. SEIZED MOTOR BEARINGS.	1. FILL RESERVOIR. 2. SHORT CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WIPER SWITCH TERMINAL #1. SHORT IN WIPER SWITCH. IF NOT OK, REPAIR CIRCUIT OR REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 3. ASSURE WASHER HOSE IS NOT PINCHED, LOOSE, BROKEN, OR DISCONNECTED. IF NOT OK, PROPERLY ROUTE OR REPAIR WASHER HOSE. 4. PROPERLY SEAT CONNECTOR TO MOTOR. 5. REPAIR TERMINALS AND PROPERLY SEAT CONNECTOR TO MOTOR. 6. OPEN OR DEFECTIVE CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WASHER SWITCH CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 7. CONNECT AN OHMMETER ACROSS WIPER/WASHER SWITCH TERMINAL #1 AND #2 AND DEPRESS WASHER BUTTON AND CHECK FOR CONTINUITY. IF NOT OK, REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 8. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 9. OPEN OR DEFECTIVE CIRCUIT BETWEEN WASHER MOTOR CONNECTOR GROUND TERMINAL #2 AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2. 10. CHECK FOR AN OPEN CIRCUIT ON MOTOR BETWEEN POWER TERMINAL #1 AND GROUND TERMINAL #2. IF NOT OK, REPLACE WASHER MOTOR. 11. APPLY DIRECT BATTERY VOLTAGE TO MOTOR TERMINALS. IF MOTOR DOES NOT RUN, REPLACE MOTOR.

WIPERS/WASHERS (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
HOOD NOZZLE WILL NOT FLOW.	1. FROZEN NOZZLE. 2. NOZZLE HOSE NOT FLOWING. 3. NOZZLE OR NOZZLE HOSE PLUGGED BY CONTAMINATION. 4. DEFECTIVE NOZZLE CHECK VALVE.	1. DE-ICE NOZZLE BY ALLOWING TIME FOR UNDERHOOD ENGINE HEAT TO THAW NOZZLE. IF NOT OK, MOVE VEHICLE INTO HEATED AREA. ASSURE WASHER FLUID IS PROPERLY BLENDED FOR AMBIENT OUTSIDE TEMPERATURES. 2. ASSURE NOZZLE HOSE IS NOT PINCHED, LOOSE, BROKEN, OR DISCONNECTED. IF NOT OK, PROPERLY ROUTE OR REPAIR NOZZLE HOSE. 3. CLEAN NOZZLE OR NOZZLE HOSE OF CONTAMINATION. DETERMINE SOURCE OF CONTAMINATION. INSPECT RESERVOIR FOR EXCESSIVE CONTAMINATION. CLEAN SYSTEM AS REQUIRED. 4. REPLACE HOOD NOZZLE.
WASHER FLUID OUTPUT IS LOW.	1. PARTIALLY PINCHED HOSE. 2. REVERSE POLARITY TO PUMP.	1. ASSURE WASHER HOSE IS NOT PARTIALLY PINCHED. IF NOT OK, PROPERLY ROUTE HOSE. 2. CHECK FOR CROSSED CIRCUIT TO PUMP. IF NOT OK, REPAIR CIRCUIT.
HOOD NOZZLE STREAM OVERSHOOTS WINDSHIELD.	1. NOZZLE NOT SEATED IN HOOD. 2. NOZZLE JET(S) OUT OF ADJUSTMENT.	1. ASSURE NOZZLE IS SNAPPED IN PLACE. 2. ADJUST NOZZLE JETS USING A SAFETY PIN.
WIPER WILL NOT CYCLE WHEN WASHER SWITCH IS DEPRESSED.	1. OPEN OR DEFECTIVE WASHER SYSTEM CONTROL CIRCUIT. 2. DEFECTIVE BODY CONTROL MODULE (BCM).	1. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND BCM #C2 BLACK CONNECTOR TERMINAL #7. IF NOT OK REPAIR CIRCUIT. 2. REFER TO BCM DIAGNOSTIC PROCEDURES.
WASHER OPERATES INTERMITTENTLY.	1. INTERMITTENT OPEN OR DEFECTIVE WASHER MOTOR POWER CIRCUIT. 2. INTERMITTENT OPEN TO MOTOR GROUND. 3. INTERMITTENT OPEN IN WASHER SWITCH. 4. DEFECTIVE WASHER MOTOR.	1. INTERMITTENT OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 2. INTERMITTENT OPEN BETWEEN MOTOR CONNECTOR TERMINAL #2 AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2. 3. REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 4. REPLACE WASHER MOTOR.

WIPERS/WASHERS (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WASHER FLUID LEVEL INDICATOR INOPERATIVE.	1. LOOSE FLUID LEVEL SENSOR CONNECTOR. 2. OPEN POWER CIRCUIT TO SWITCH. 3. OPEN GROUND CIRCUIT. 4. DEFECTIVE INSTRUMENT CLUSTER 5. FLUID LEVEL SENSOR SWITCH OPEN OR DEFECTIVE.	1. PROPERLY SEAT CONNECTOR TO SWITCH. 2. OPEN OR DEFECTIVE CIRCUIT BETWEEN INSTRUMENT CLUSTER CONNECTOR TERMINAL #B4 AND LOW FLUID LEVEL SENSOR CONNECTOR TERMINAL. IF NOT OK, REPAIR CIRCUIT. 3. OPEN OR DEFECTIVE CIRCUIT BETWEEN FLUID LEVEL SENSOR CONNECTOR AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2. 4. REFER TO INSTRUMENT CLUSTER DIAGNOSTIC PROCEDURES. 5. CONNECT AND OHMMETER TO SWITCH TERMINALS TO CHECK FOR COMPLETE CIRCUIT. CYCLE SWITCH FLOAT BACK AND FORTH BY FILLING AND DEPLETING RESERVOIR OF WASHER FLUID TO CHECK FOR PROPER SWITCH FUNCTION. IF NOT OK, REPLACE SWITCH.
LEAKING WASHER FLUID.	1. FILLER TUBE LEAKING. 2. FILLER TUBE OUT OR DAMAGED. 3. PUMP OR SENSOR GROMMET DEFECTIVE. 4. LEAKING OR DEFECTIVE RESERVOIR BODY.	1. ASSURE FILLER TUBE IS NOT LOOSE OR DISCONNECTED. IF NOT OK, PROPERLY SEAT FILLER TUBE. 2. REPLACE FILLER TUBE. 3. REPLACE PUMP OR SENSOR GROMMET. 4. REPLACE RESERVOIR BODY.

DIAGNOSIS AND TESTING - WIPER SYSTEM CONDITIONS

The following is a list of general wiper motor system problems and tests that are to be performed to locate the faulty part, and the corrective action to be taken. When installing harness connector to motor connector on vehicle, assure motor terminals are not bent causing an open circuit to motor.

MOTOR WILL NOT RUN IN ANY SWITCH POSITION

(1) Check fuse 5, in the Junction Block and fuse M in the Power Distribution Center and. Refer to Wiring Diagrams for pin call outs.

(a) If fuse(s) are good, go to Step 2.

(b) If fuse(s) are defective replace, and check motor operation in all switch positions.

(c) If motor is still inoperative and the fuse does not blow, go to Step 2.

(d) If replacement fuse blows, go to Step 11.

(2) Disconnect motor wire harness connector.

(3) Check the wiper motor low speed. Using two jumper wires, connect one jumper wire between the battery positive jump start terminal and Pin 2 on the wiper motor connector. Connect the other jumper wire to ground and Pin 5 on the wiper motor connector. Check the wiper motor high speed, connect the positive jumper wire to Pin 1 on the wiper motor connector. Connect the negative jumper wire to Pin 5 on the wiper motor connector.

(a) If motor runs, go to Step 4.

(b) If motor does not run, high or low speed replace the wiper motor.

(4) Using an ohmmeter, check for good ground at Pin 5 of the wiper motor wire harness connector. If not OK, repair the ground circuit as necessary. If OK, go to Step 5.

(5) Place the wiper switch in the ON position. Using a voltmeter, check for battery voltage at terminal D and A of the intermittent wiper relay in the

WIPERS/WASHERS (Continued)

Power Distribution Center. If no voltage check fuse M. If OK, go to Step 6. If not OK, repair as necessary.

(6) Using an ohmmeter, check from terminal D of the HI-LO wiper relay to Pin 1 of the motor wire connector for continuity. Check from terminal E of the HI-LO wiper relay to Pin 2 of the motor wire connector for continuity. If OK, go to Step 7. If not repair as necessary.

(7) Using an ohmmeter, check for continuity between the HI-LO wiper relay and the intermittent wiper relay. Check from terminal B of the HI-LO wiper relay to terminal B of the intermittent wiper relay. If OK, check for faulty relays and go to Step 8. If not repair as necessary.

(8) Disconnect the C3 bone 12-way connector from the BCM.

(9) Using an ohmmeter, check for continuity from terminal 4 of the BCM C3 24-way, black connector to the terminal C of the intermittent wiper relay. If OK, go to Step 10. If not repair as necessary.

(10) Using a voltmeter, connect positive lead to terminal 8 of the BCM C2 black 24-way connector and negative lead to ground. Turn ignition switch to the ON position. Slowly move the wiper switch from OFF position through each position to HIGH.

(a) If voltage increases from zero to approximately 10 volts in the HIGH position, replace BCM. If no voltage, go to Step b.

(b) Using an ohmmeter, check for continuity from terminal 3 of wiper switch connector to terminal 8 of the BCM C2 black 24-way connector. If no continuity, repair circuit. If OK, go to Step c.

(c) Using a voltmeter, connect positive lead to terminal 1 of the wiper switch connector. If ignition voltage is present, replace the wiper switch. If no voltage, check continuity from fuse 5 to terminal 1 of the wiper switch connector. Repair circuit as necessary.

(11) Disconnect motor connector and replace fuse 5 from the Junction Block.

(a) If fuse does not blow, go to Step 2.

(b) If fuse blows, wiper control circuit is at fault, repair as necessary, refer to Wiring Diagrams.

MOTOR RUNS SLOWLY AT ALL SPEEDS

(1) Disconnect the wire harness from the wiper motor. Remove wiper arms and blades. Disconnect motor drive link from motor. Connect an amp meter between battery negative jump start terminal and Pin 5 on the wiper motor connector. Connect battery positive wire to Pin 2 on the wiper motor connector. When replacing motor crank nut tighten to 15-20 N·m (130-177 in. lbs.) torque.

(a) If average amp meter reading is more than 10 amps with a hot motor and dry windshield, replace motor.

(b) If motor runs and average ammeter reading is less than 10 amps, go to Step 2.

(2) Check to see if wiper linkage or pivots are binding or caught.

MOTOR WILL RUN AT HIGH SPEED, BUT NOT MOVE AT LOW SPEED. MOTOR WILL RUN AT LOW SPEED, BUT WILL NOT MOVE AT HIGH SPEED

(1) Disconnect motor connector.

(2) If motor will not run on low speed, connect a jumper wire between battery positive jump start terminal and Pin 2 on the wiper motor connector. Connect a second jumper wire between ground and Pin 5 on the wiper motor wire harness connector.

(a) If motor runs, go to Step 3.

(b) If motor does not run, replace the motor.

(3) If motor will not run on high speed, connect a jumper wire between battery positive terminal and Pin 1. Connect a second jumper wire between ground and Pin 5 of the motor connector.

(a) If motor runs, go to Step 4.

(b) If motor does not run, replace the motor.

(4) If wipers will not run at low speed, using an ohmmeter, check for open circuit. Check between terminal E of the HI-LO wiper relay to Pin 2 of the wiper motor wire harness connector for continuity. If OK, go to Step 5. If not repair circuit as necessary.

(5) If wiper will not run at the high speed, using an ohmmeter, check for an open circuit. Check between terminal D of the HI-LO wiper relay and Pin 2 of the wiper motor wire harness connector for continuity. If OK, go to Step 6. If not repair circuit as necessary.

(6) Check for faulty HI-LO wiper relay.

WIPERS RUN AT HIGH SPEED WITH SWITCH IN LOW SPEED POSITION. WIPERS OPERATE IN INTERMITTENT MODE, BUT EACH WIPE IS AT HIGH SPEED.

(1) Disconnect motor connector.

(2) Using two jumper wires, connect one between the battery positive jump start terminal and Pin 2 on the wiper motor connector. Connect the second lead between ground and Pin 5 on the wiper motor connector. If motor runs at low speed, go to Step 3. If motor runs at high speed, replace the motor.

(3) Check for faulty HI-LO wiper relay. Check for crossed wires in harness from HI-LO relay to motor.

(4) Disconnect C3 bone 12-way connector from the BCM and remove the HI/LO wiper relay.

(5) Using an ohmmeter, check terminal 12 of the C3 bone 12-way connector for short to ground.

(6) If continuity to ground is present, repair as necessary. If no continuity to ground, replace the BCM.

WIPERS/WASHERS (Continued)

WIPERS RUN AT LOW SPEED WITH SWITCH IN HIGH SPEED POSITION

- (1) Check for faulty HI-LO wiper relay.
- (2) Using an ohmmeter, check for open circuit between terminal C of the HI-LO wiper relay and terminal 12 of the BCM 33 bone 12-way connector. If OK, go to Step 3. If not OK, repair as necessary.
- (3) Check wiper switch.
- (4) Check for binding linkage
- (5) Refer to MOTOR RUNS SLOWLY AT ALL SPEEDS.

MOTOR WILL KEEP RUNNING WITH SWITCH IN OFF POSITION.

- (1) Check wiper motor wiring harness for shorts between the low speed motor feed terminal 2 or high speed motor feed terminal 1 and battery or ignition.
- (2) Check for faulty wiper ON/OFF or HI/LO relay.
- (3) Check circuit from ON/OFF relay terminal C to HI/LO relay terminal B for short to battery or ignition.
- (4) Disconnect the C3 bone 12-way connector from the BCM. Check circuit from terminal 4 of C3 bone 12-way connector to terminal C of the ON/OFF wiper relay for short to ground.
- (5) Check circuit from terminal 3 of C2 bone 24-way connector to Pin 4 of the wiper motor harness connector for an open. If open circuit, repair as necessary.
- (6) Using a voltmeter, connect positive lead to terminal 8 of the C2 black 24-way connector. Connect negative lead to ground. If voltmeter reads greater than 0 volts, check wiper switch and wiring.
- (7) Using a voltmeter, connect positive lead to terminal 8 of the C3 black 12-way connector.
 - (a) If voltmeter reads 10 to 15 volts, check the circuit for short to battery or ignition.
 - (b) If the voltmeter reads 0 volts, replace the BCM.

WIPER WILL RUN CONTINUOUSLY WITH SWITCH IN THE INTERMITTENT POSITION. WHEN COLUMN SWITCH IS TURNED OFF, WIPERS STOP WHEREVER THEY ARE, WITHOUT RETURNING TO PARK POSITION.

- (1) Using an ohmmeter, check for ground at Pin 4 on the wiper motor connector. If grounded, replace motor.
- (2) Using an ohmmeter, with the wiper motor in the PARK position, check for continuity between Pin 5 and Pin 4 on the wiper motor connector. If continuous continuity, go to Step 3. If not OK, replace motor.
- (3) Disconnect the wiper motor wire harness connector and the BCM C3 bone 12-way connector.

Check for continuity between Pin 1 of the wiper motor wire harness connector and terminal 3 of the BCM C3 bone 12-way connector. If no continuity, repair as necessary. If continuity is OK, test the wiper motor.

WIPERS DO NOT RUN WHEN WASHER MOTOR IS ENGAGED

- (1) Disconnect the C2 black 24-way connector from the BCM.
- (2) Using a voltmeter, connect positive lead to terminal 7 of the C2 black 24-way connector and the negative lead to ground.
- (3) Engage the washer switch so that the washer motor runs continuously.
 - (a) If the voltage is zero, check the wiring between the washer switch terminal 2 and the BCM and repair as necessary.
 - (b) If the battery voltage is shown, replace the BCM.

HEADLAMP WASHERS - EXPORT**DESCRIPTION**

Headlamp washers are available as a factory-installed option on this model. The headlamp washers on this vehicle work in conjunction with the windshield washers. The headlamp washers are enabled with the headlamps "ON" and the windshield washers activated. With the windshield washers activated the headlamp washers will spray for a preset amount of time controlled by a relay.

OPERATION

The headlamp washer system utilizes a separate high pressure pump that is attached to the windshield washer reservoir. The headlamp washer pump feeds four nozzles that are mounted behind the front fascia of the vehicle. The nozzle bodies have a telescopic action that will extend the nozzles in front of the headlamp assembly. During the telescopic action, doors in the fascia will open to allow the nozzles to advance into the proper spray position. These nozzles spray the headlamps when the system is activated.

DIAGNOSIS AND TESTING - HEADLAMP WASHER - EXPORT

Whenever a headlamp washer malfunction occurs, first verify that the windshield washer wire harness is properly connected to all connectors before starting normal diagnosis and repair procedures. Refer to Windshield/Headlamp Washer Test table.

HEADLAMP WASHERS - EXPORT (Continued)

WINDSHIELD/HEADLAMP WASHER TEST

CONDITION	POSSIBLE CAUSE	CORRECTION
WASHER POWER FEED FUSE OPEN.	1. JUNCTION BLOCK FUSE #5 BLOWN.	1. CHECK FUSE #5. REPLACE IF NOT OK.
BLOWN FUSE WHEN WASHER SWITCH IS DEPRESSED.	1. SHORT IN WIPER/WASHER SWITCH. 2. SHORT IN MOTOR POWER CIRCUIT. 3. SHORT IN WASHER MOTOR.	1. DEFECTIVE WASHER SWITCH. REFER TO WIPE/WASHER SWITCH DIAGNOSTIC PROCEDURES. 2. SHORT OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 3. REPLACE WASHER MOTOR.
WASHER SYSTEM WILL NOT FLOW WASHER FLUID.	1. JUNCTION BLOCK FUSE #5 BLOWN. 2. MOTOR CONNECTOR LOOSE. 3. MOTOR CONNECTOR TERMINALS BENT. 4. OPEN POWER CIRCUIT TO SWITCH. 5. OPEN OR DEFECTIVE WIPER/WASHER SWITCH. 6. OPEN POWER CIRCUIT TO MOTOR. 7. OPEN OR DEFECTIVE MOTOR GROUND CIRCUIT. 8. OPEN CIRCUIT IN MOTOR. 9. SEIZED MOTOR BEARINGS. 10. PINCHED WASHER HOSE.	1. SHORT CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WIPER SWITCH TERMINAL #1. SHORT IN WIPER SWITCH. IF NOT OK, REPAIR CIRCUIT OR REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 2. PROPERLY SEAT CONNECTOR TO MOTOR. 3. REPAIR TERMINALS AND PROPERLY SEAT CONNECTOR TO MOTOR. 4. OPEN OR DEFECTIVE CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WASHER SWITCH CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 5. REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 6. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 7. OPEN OR DEFECTIVE CIRCUIT BETWEEN WASHER MOTOR CONNECTOR GROUND TERMINAL #2 AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR #2. 8. CHECK FOR AN OPEN CIRCUIT ON MOTOR BETWEEN POWER TERMINAL #1 AND GROUND TERMINAL #2. IF NOT OK, REPLACE WASHER MOTOR. 9. APPLY DIRECT BATTERY VOLTAGE TO MOTOR TERMINALS. IF MOTOR DOES NOT RUN, REPLACE MOTOR. 10. ASSURE WASHER HOSE IS NOT PINCHED. IF NOT OK, PROPERLY ROUTE WASHER HOSE.

HEADLAMP WASHERS - EXPORT (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
HOOD NOZZLE WILL NOT FLOW.	1. PINCHED NOZZLE HOSE. 2. PLUGGED NOZZLE OR NOZZLE HOSE BY CONTAMINATION. 3. DEFECTIVE NOZZLE CHECK VALVE.	1. ASSURE NOZZLE HOSE IS NOT PINCHED, LOOSE, BROKEN, OR DISCONNECTED. IF NOT OK, PROPERLY ROUTE OR REPAIR NOZZLE HOSE. 2. CLEAN NOZZLE OR NOZZLE HOSE OF CONTAMINATION. DETERMINE SOURCE OF CONTAMINATION. INSPECT RESERVOIR FOR EXCESSIVE CONTAMINATION. CLEAN SYSTEM AS REQUIRED. 3. REPLACE HOOD NOZZLE.
HOOD NOZZLE STREAM OVERSHOOTS WINDSHIELD.	1. NOZZLE NOT SEATED IN HOOD. 2. NOZZLE JET(S) OUT OF ADJUSTMENT.	1. ASSURE NOZZLE IS SNAPPED IN PLACE. 2. ADJUST JETS USING A SAFETY PIN.
WIPER WILL NOT CYCLE WHEN WASHER SWITCH IS DEPRESSED.	1. OPEN OR DEFECTIVE WASHER SYSTEM CONTROL CIRCUIT. 2. DEFECTIVE BODY CONTROL MODULE (BCM).	1. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND BCM #C2 BLACK CONNECTOR TERMINAL #7. IF NOT OK REPAIR CIRCUIT. 2. REFER TO BCM DIAGNOSTIC PROCEDURES.
WASHER FLUID LEVEL INDICATOR INOPERATIVE.	1. LOOSE FLUID LEVEL SENSOR CONNECTOR. 2. FLUID LEVEL SENSOR SWITCH OPEN OR DEFECTIVE.	1. PROPERLY SEAT CONNECTOR TO SWITCH. 2. ASSURE SENSOR FLOAT SWITCH IS CLOSED (DOWN POSITION). APPLY OHMMETER TO SWITCH TO CHECK FOR COMPLETE CIRCUIT. IF NOT OK, REPLACE SWITCH.

HEADLAMP WASHERS - EXPORT (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
HEADLAMP WASHER SYSTEM WILL NOT FLOW WASHER FLUID.	1. NO WASHER FLUID IN RESERVOIR. 2. JUNCTION BLOCK FUSE #5 BLOWN. 3. HEADLAMP WASHER HOSE NOT FLOWING FLUID. 4. MOTOR CONNECTOR LOOSE. 5. MOTOR CONNECTOR TERMINALS BENT. 6. OPEN POWER CIRCUIT TO SWITCH. 7. OPEN OR DEFECTIVE WIPER/WASHER SWITCH. 8. OPEN POWER CIRCUIT TO MOTOR. 9. OPEN OR DEFECTIVE MOTOR GROUND CIRCUIT. 10. OPEN CIRCUIT IN HEADLAMP WASHER MOTOR. 11. SEIZED MOTOR BEARINGS. 12. DEFECTIVE HEADLAMP WASHER RELAY.	1. FILL RESERVOIR. 2. SHORT CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WIPER SWITCH TERMINAL #1. SHORT IN WIPER SWITCH. IF NOT OK, REPAIR CIRCUIT OR REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 3. ASSURE WASHER HOSE IS NOT PINCHED, LOOSE, BROKEN, OR DISCONNECTED. IF NOT OK, PROPERLY ROUTE OR REPAIR WASHER HOSE. 4. PROPERLY SEAT CONNECTOR TO MOTOR. 5. REPAIR TERMINALS AND PROPERLY SEAT CONNECTOR TO MOTOR. 6. OPEN OR DEFECTIVE CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WASHER SWITCH CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 7. CONNECT AN OHMMETER ACROSS WIPER/WASHER SWITCH TERMINAL #1 AND #2 AND DEPRESS WASHER BUTTON AND CHECK FOR CONTINUITY. IF NOT OK, REFER TO WIPER/WASHER SWITCH DIAGNOSTIC PROCEDURES. 8. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER/WASHER SWITCH CONNECTOR TERMINAL #2 AND MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 9. OPEN OR DEFECTIVE CIRCUIT BETWEEN WASHER MOTOR CONNECTOR GROUND TERMINAL #2 AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2. 10. CHECK FOR AN OPEN CIRCUIT ON MOTOR BETWEEN POWER TERMINAL #1 AND GROUND TERMINAL #2. IF NOT OK, REPLACE WASHER MOTOR. 11. APPLY DIRECT BATTERY VOLTAGE TO MOTOR TERMINALS. IF MOTOR DOES NOT RUN, REPLACE MOTOR. 12. REPLACE THE HEADLAMP WASHER RELAY.
ONE HEADLAMP WASHER NOZZLE WILL NOT FLOW WASHER FLUID.	1. HEADLAMP WASHER HOSE NOT FLOWING FLUID. 2. PLUGGED HEADLAMP WASHER NOZZLE.	1. REPAIR OR REPLACE THE HEADLAMP WASHER HOSE. 2. REPLACE HEADLAMP WASHER NOZZLE.

HEADLAMP WASHERS - EXPORT (Continued)

STANDARD PROCEDURE - HEADLAMP WASHER SYSTEM PRIMING - EXPORT

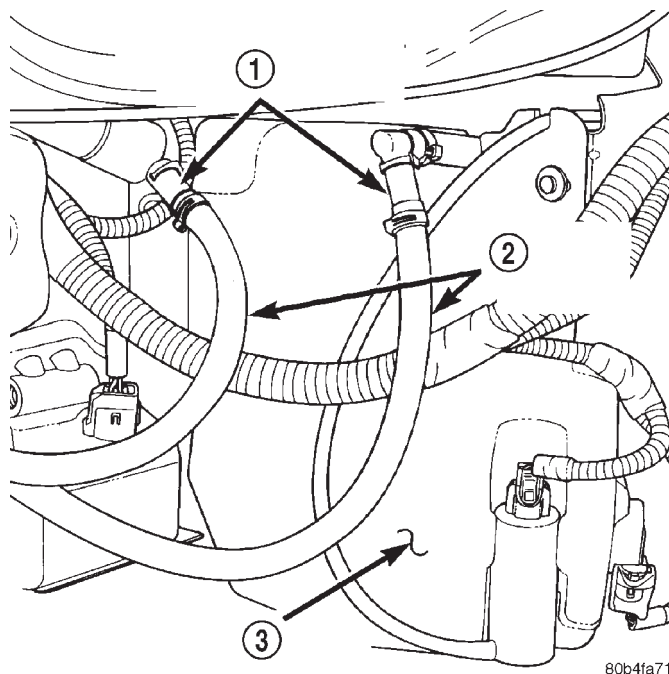
The headlamp washer system may lose its prime when the system is serviced. The following procedure must be used to prime the headlamp washer system. A DRB III® scan tool must be used for this priming procedure.

Do not allow washer fluid to spray on hot engine with the hood up.

Do not stand near the headlamp washer nozzles when actuating the headlamp washer system. The washer fluid comes out of the nozzles at high pressure.

- (1) Connect a DRB III® scan tool.
- (2) Go to the "BODY" menu.
- (3) Go to the "ACTUATOR" menu.
- (4) Actuate the "HEADLAMP WASHER" actuator until the headlamp washer system is properly primed.

Do not actuate the headlamp washers longer than 4 seconds at a time. Allow pump to cool prior to next attempt. Damage to the headlamp washer pump may occur.



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Fig. 3 LEFT SIDE HEADLAMP WASHER HOSE

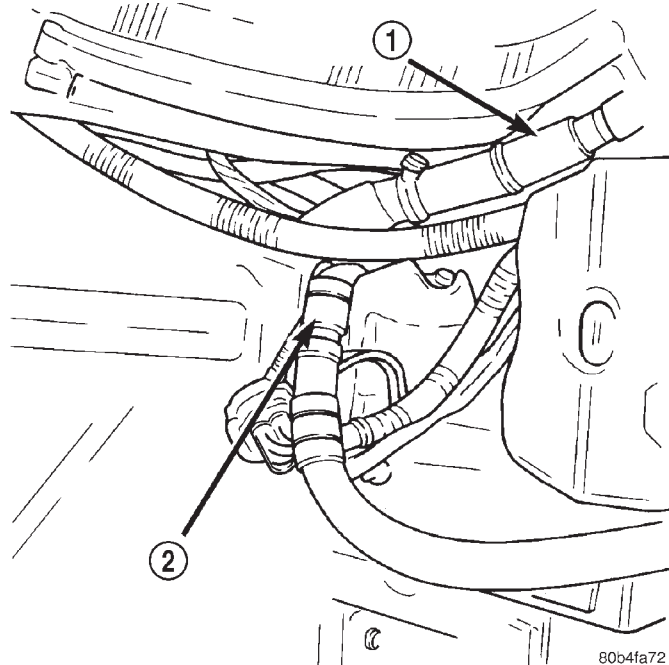
- 1 - HEADLAMP WASHER HOSE QUICK DISCONNECT
- 2 - HEADLAMP WASHER HOSE
- 3 - WINDSHIELD/HEADLAMP WASHER RESERVOIR

HEADLAMP WASHER HOSES - EXPORT**REMOVAL**

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Hoist vehicle.
- (3) Remove the front fascia. Refer to Body for Removal procedures.
- (4) Disconnect the headlamp washer hoses at the quick disconnect connectors (Fig. 3) and (Fig. 4).
- (5) Remove the headlamp washer hoses from the radiator closure panel.

INSTALLATION

- (1) Install the headlamp washer hoses to the radiator closure panel.
- (2) Connect the headlamp washer hoses quick disconnect connectors (Fig. 3) and (Fig. 4).
- (3) Reinstall the front fascia. Refer to Body for Installation procedures.
- (4) Lower vehicle from hoist.
- (5) Refill the washer fluid.
- (6) Reconnect the negative battery cable remote terminal.



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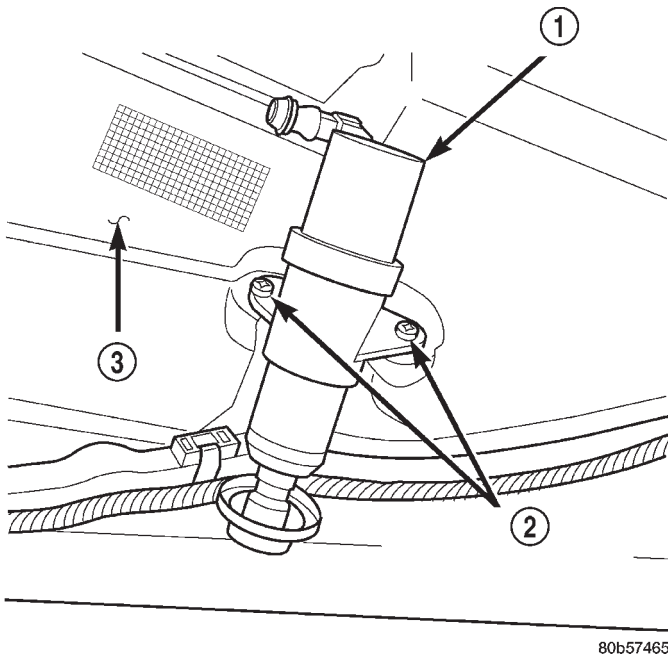
Fig. 4 RIGHT SIDE HEADLAMP WASHER HOSE

- 1 - HEADLAMP WASHER NOZZLE
- 2 - HEADLAMP WASHER HOSE QUICK DISCONNECT

HEADLAMP WASHER NOZZLE - EXPORT

REMOVAL

- (1) Hoist vehicle.
- (2) Partially remove the front fascia to gain access to the headlamp assembly. Refer to Body for Removal procedures.
- (3) Remove the headlamp assembly. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit, Removal.
- (4) Remove the headlamp washer nozzle retaining screws and remove the nozzle from the headlamp assembly (Fig. 5).



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Fig. 5 HEADLAMP WASHER NOZZLE

- 1 - HEADLAMP WASHER NOZZLE
- 2 - HEADLAMP WASHER NOZZLE RETAINING SCREWS
- 3 - HEADLAMP ASSEMBLY

INSTALLATION

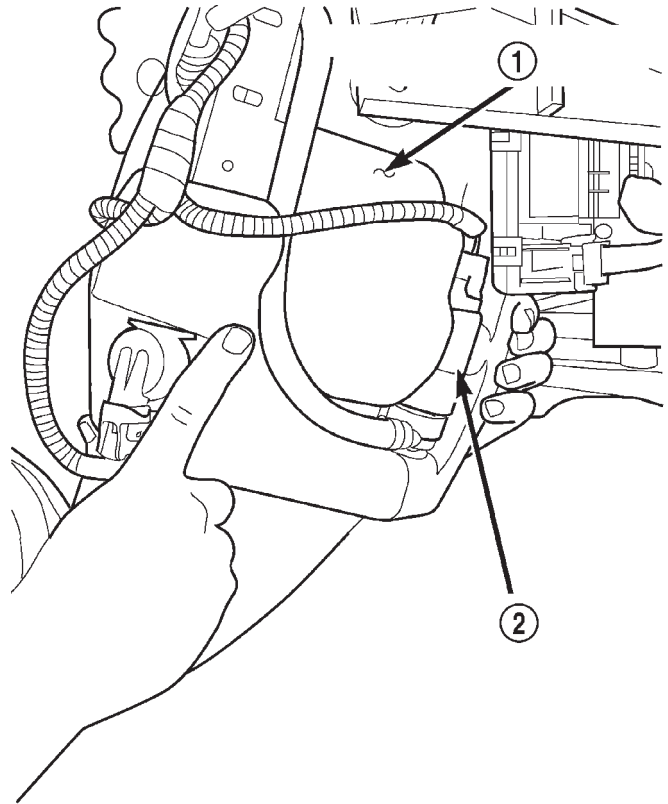
- (1) Place the headlamp washer nozzle in position on the headlamp assembly.
- (2) Install the headlamp washer nozzle retaining screws. Torque to 0.7 to 1.3 N-m.
- (3) Reinstall the headlamp assembly. Electrical, Lamps/Lighting - Exterior, Headlamp Unit, Installation.
- (4) Reinstall the front fascia as necessary. Refer to Body for Installation procedures.
- (5) Lower vehicle from hoist.
- (6) Refill the washer fluid.
- (7) Prime the headlamp washer system. Refer to the Electrical, Wipers/Washers, Headlamp Washers,

Standard Procedures - Headlamp Washer System Priming.

HEADLAMP WASHER PUMP - EXPORT

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the battery post.
- (2) Hoist vehicle.
- (3) Drain washer fluid into a clean container.
- (4) Partially remove the front fascia to gain access to the windshield/headlamp washer pump. Refer to Body for Removal procedures.
- (5) Remove the four windshield/headlamp washer reservoir mounting bolts.
- (6) Pull the reservoir away from body to gain access to the headlamp washer pump (Fig. 6).



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Fig. 6 HEADLAMP WASHER PUMP

- 1 - WINDSHIELD/HEADLAMP WASHER RESERVOIR
- 2 - HEADLAMP WASHER PUMP

- (7) Disconnect the headlamp washer pump electrical connector and the headlamp washer pump hose.
- (8) Pull the headlamp washer pump from the reservoir.

HEADLAMP WASHER PUMP - EXPORT (Continued)

INSTALLATION

- (1) Install the headlamp washer motor in the windshield/headlamp washer pump.
- (2) Connect the headlamp washer pump hose and electrical connector.
- (3) Install the reservoir retaining bolts. Torque bolts to 5 to 7 N·m.
- (4) Reinstall the front fascia as necessary. Refer to Body for Installation procedures.
- (5) Lower vehicle from hoist.
- (6) Refill the windshield/headlamp washer reservoir.
- (7) Reconnect the negative battery cable remote terminal.
- (8) Prime the headlamp washer system. Refer to the Electrical, Wipers/Washers, Headlamp Washers, Standard Procedures - Headlamp Washer System Priming.

WASHER FLUID LEVEL SWITCH**REMOVAL**

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Hoist vehicle.
- (3) Remove front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Removal.
- (4) Disconnect the wire connector from the reservoir fluid level sensor.
- (5) Gently pry sensor away from reservoir and out of grommet. Care must be taken not to puncture reservoir (Fig. 10).
- (6) Remove rubber grommet from reservoir and throw away.

INSTALLATION

NOTE: Use a new mounting grommet when installing a new sensor assembly.

Assure "flat" of sensor is aligned under the "ridge" of reservoir and that sensor connector is facing down in the fully seated position.

- (1) Install new rubber grommet into reservoir.
- (2) Carefully install sensor into reservoir and grommet. Care must be taken not to puncture reservoir or grommet (Fig. 10).
- (3) Connect the wire connector to the reservoir fluid level sensor.
- (4) Install the front fascia as necessary. Refer to Body for Installation.
- (5) Lower vehicle from hoist.

- (6) Connect the negative battery cable remote terminal to the remote battery post.

WASHER FLUID LEVEL SWITCH - INTREPID**REMOVAL**

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove the Washer Reservoir. Refer to Electrical, Wipers and Washers, Washer Reservoir, Removal.
- (3) Gently pry sensor away from reservoir and out of grommet. Care must be taken not to puncture reservoir (Fig. 10).
- (4) Remove rubber grommet from reservoir and throw away.

INSTALLATION

NOTE: Use a new mounting grommet when installing a new sensor assembly.

Assure "flat" of sensor is aligned under the "ridge" of reservoir and that sensor connector is facing down in the fully seated position.

- (1) Install new rubber grommet into reservoir.
- (2) Carefully install sensor into reservoir and grommet. Care must be taken not to puncture reservoir or grommet (Fig. 10).
- (3) Connect the wire connector to the reservoir fluid level sensor.
- (4) Install the Washer Reservoir. Refer to Electrical, Wipers and Washers, Washer Reservoir, Installation.
- (5) Connect the negative battery cable remote terminal to the remote battery post.

WASHER HOSES**REMOVAL**

- (1) Remove left headlamp unit. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit, Removal.
- (2) Remove underhood silencer pad clips only along left rear of hood.
- (3) Carefully pull silencer pad away from hood.
- (4) Disconnect "Y" connector from hood.
- (5) Disconnect right and left hood nozzle hoses at "Y" connector.
- (6) Disconnect hose clips from hood, tower to tower beam, and fender beam.
- (7) Disconnect washer hose from top of reservoir and from washer pump discharge port.
- (8) Carefully pull washer hose up through engine compartment.

WASHER HOSES (Continued)

INSTALLATION

- (1) Route washer hose up through engine compartment.
- (2) Connect washer hose to top of reservoir and to washer pump discharge port.
- (3) Connect hose clips to hood, tower to tower beam, and fender beam.
- (4) Connect right and left hood nozzle hoses at "Y" connector.
- (5) Connect "Y" connector to hood.
- (6) install the underhood silencer pad clips along left rear of hood.
- (7) Install the left headlamp unit. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit, Installation.

Be sure to test and check system for leaks and pinched or kinked hoses.

WASHER NOZZLE

STANDARD PROCEDURE - WASHER NOZZLE AIMING

Right and left nozzles have three adjustable spray jets each.

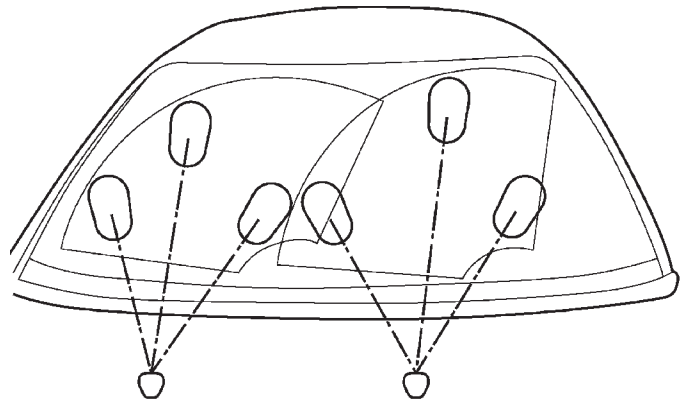
CAUTION: During adjustment, be careful not to damage inside opening of jet. Assure proper ventilation of engine exhaust.

- (1) Using a safety pin, adjust each nozzle jet as required to windshield washer spray pattern.
- (2) Each adjustment of the jet should be checked by actuating the washer system switch from inside of vehicle.
- (3) After adjustment, a final check of the spray pattern should be done by actuating the washer system switch from inside the vehicle with engine idling.

This model is equipped with two hood mounted washer nozzles. Each nozzle emits three streams into the wiper sweep pattern. If nozzle performance is unsatisfactory they can be adjusted. To adjust it is recommended to use a safety pin. Insert a safety pin into the nozzle ball and adjust the spray pattern on the windshield as shown in (Fig. 7). The right and left nozzles are identical.

REMOVAL

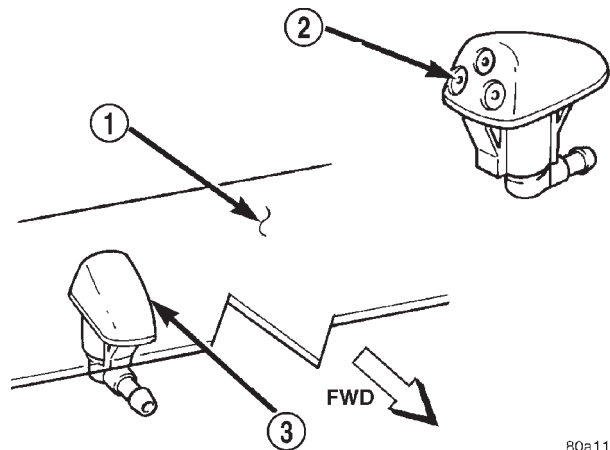
- (1) Using a plastic body filler spreader or equivalent (credit card), gently place it underneath the front of the washer nozzle. Be careful not to damage the hood seal underneath the nozzle (Fig. 8).
- (2) Rock the nozzle back and forth slightly to release it from the hood panel.



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Fig. 7 WINDSHIELD WASHER SPRAY PATTERN

- (3) Pull the nozzle out of the hood panel far enough to disconnect the hose.



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Fig. 8 Windshield Washer Nozzle

- 1 - HOOD
- 2 - ADJUST WITH A SAFETY PIN
- 3 - NOZZLE

INSTALLATION

- (1) Connect washer hose and position nozzle over opening in hood and firmly snap into place (Fig. 8). After connecting hose, check for proper system function and to assure leak free connections by actuating the washer system switch from inside of vehicle.

WASHER PUMP MOTOR

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Hoist vehicle.
- (3) Remove front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Removal.

WASHER PUMP MOTOR (Continued)

(4) Disconnect the wire connectors from the reservoir pump.

(5) Gently pry pump away from reservoir and out of grommet. Care must be taken not to puncture reservoir (Fig. 10).

(6) Remove rubber grommet from reservoir and throw away.

INSTALLATION

(1) Install new rubber grommet in reservoir.

(2) Carefully install pump motor into reservoir. Care must be taken not to puncture reservoir (Fig. 10).

(3) Connect the wire connectors to the reservoir pump.

(4) Install the front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Installation.

(5) Lower vehicle from hoist.

(6) Connect the negative battery cable remote terminal to the remote battery post.

WASHER PUMP MOTOR - INTREPID**REMOVAL**

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove the left headlamp assembly and set aside. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit (Intrepid), Removal.

(3) Remove the four retaining bolts to the washer reservoir (Fig. 9).

(4) Disconnect the pump and sensor wire connectors.

(5) Disconnect the washer hose.

(6) Disconnect the washer filler hose.

(7) Pivot the inboard side of the reservoir forward and lift out of vehicle.

(8) Carefully pull the pump out of the reservoir (Fig. 10).

NOTE: When replacing the pump, make sure to use a new grommet for proper sealing and to avoid leaks.

INSTALLATION

NOTE: When replacing the pump, make sure to use a new grommet for proper sealing and to avoid leaks.

(1) Install the new pump grommet (Fig. 10).

(2) Position pump motor over grommet and firmly snap into place.

(3) Place reservoir into position in engine compartment, pivot the inboard side of the reservoir rearward.

(4) Connect the washer filler hose.

(5) Connect the washer hose.

(6) Connect the pump and sensor wire connectors.

(7) Install the four retaining bolts to the washer reservoir (Fig. 9).

(8) Install the left headlamp assembly. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit (Intrepid), Installation.

(9) Connect the negative battery cable remote terminal to the remote battery post.

WASHER RESERVOIR**REMOVAL**

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Hoist vehicle.

(3) Remove front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Removal.

(4) Disconnect the wire connectors from the reservoir pump and float sensor.

(5) Disconnect the washer hose and block the liquid outlet to prevent the liquid from running out of the reservoir.

(6) Reach up behind the washer reservoir and pull the filler tube off the rear of the reservoir.

(7) Remove four mounting bolts to washer reservoir (Fig. 9).

(8) Remove washer reservoir from vehicle.

(9) Transfer fluid level sensor, pump, and washer fluid to new reservoir (Fig. 10).

INSTALLATION

(1) Transfer fluid level sensor, pump, and washer fluid to new reservoir (Fig. 10).

(2) Place washer reservoir into vehicle into the mounting position.

(3) Install the four mounting bolts to the washer reservoir (Fig. 9).

(4) Reach up behind the washer reservoir and place the filler tube onto the rear of the reservoir.

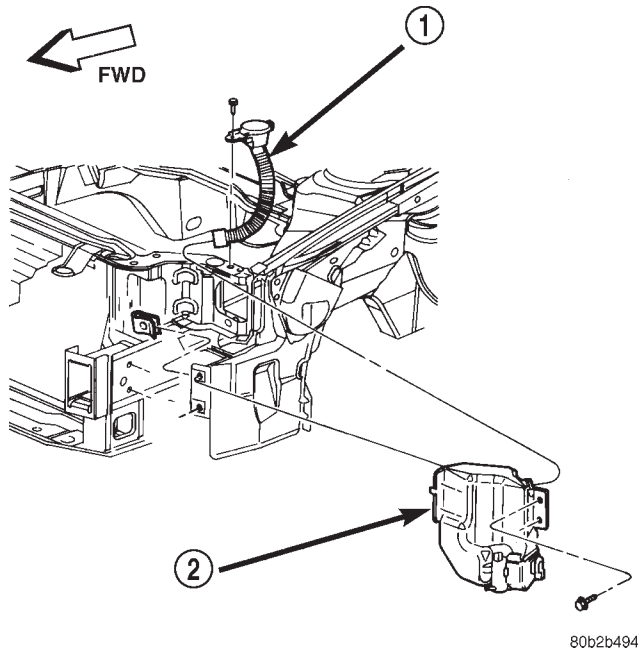
(5) Connect the washer hose to the washer pump outlet.

(6) Connect the wire connectors to the reservoir pump and float sensor.

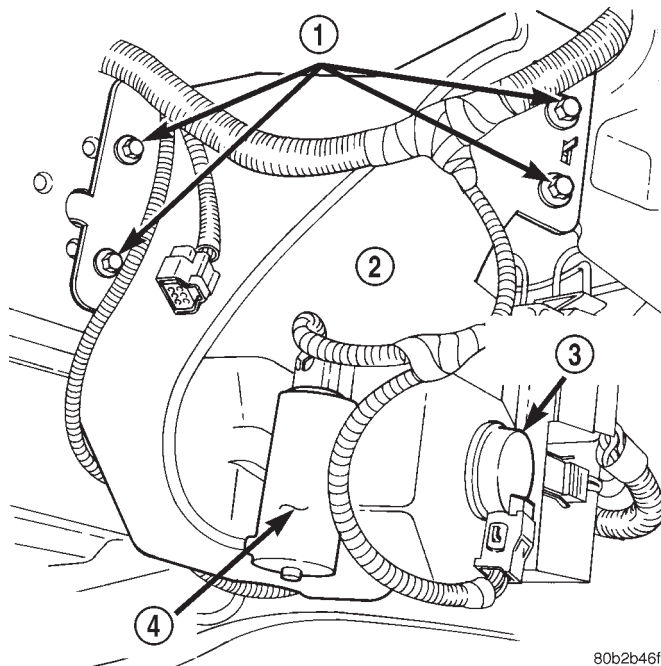
(7) Install the front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Installation.

(8) Lower vehicle from hoist.

WASHER RESERVOIR (Continued)

**Fig. 9 WASHER RESERVOIR REMOVAL**

- 1 - WASHER RESERVOIR FILLER TUBE
2 - WASHER RESERVOIR

**Fig. 10 WASHER RESERVOIR**

- 1 - RETAINING BOLTS
2 - WASHER RESERVOIR
3 - FLUID LEVEL SENSOR
4 - WASHER FLUID PUMP

(9) Connect the negative battery cable remote terminal to the remote battery post.

WASHER RESERVOIR - INTREPID

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove the left headlamp assembly and set aside. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit (Intrepid), Removal.
- (3) Remove the four retaining bolts to the washer reservoir (Fig. 9).
- (4) Disconnect the pump and sensor wire connectors.
- (5) Disconnect the washer hose.
- (6) Disconnect the washer filler hose.
- (7) Pivot the inboard side of the reservoir forward and lift out of vehicle.
- (8) If replacing the reservoir, you must transfer the pump and sensor to the new reservoir (Fig. 10).

NOTE: When transferring pump and sensor, make sure to use a new grommet for proper sealing and to avoid leaks.

INSTALLATION

NOTE: When transferring pump and sensor, make sure to use a new grommet for proper sealing and to avoid leaks.

- (1) If replacing the reservoir, you must transfer the pump and sensor to the new reservoir (Fig. 10).
- (2) Place reservoir into position in engine compartment, pivot the inboard side of the reservoir rearward.
- (3) Connect the washer filler hose.
- (4) Connect the washer hose.
- (5) Connect the pump and sensor wire connectors.
- (6) Install the four retaining bolts to the washer reservoir (Fig. 9).
- (7) Install the left headlamp assembly. Refer to Electrical, Lamps/Lighting - Exterior, Headlamp Unit (Intrepid), Installation.
- (8) Connect the negative battery cable remote terminal to the remote battery post.

WASHER RESERVOIR FILLER TUBE

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Hoist vehicle.

WASHER RESERVOIR FILLER TUBE (Continued)

(3) Remove front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Removal.

(4) Reach up behind the washer reservoir and pull the filler tube off the rear of the reservoir.

(5) Remove one screw attaching washer reservoir filler tube to upper radiator support (Fig. 11).

(6) Pull filler tube and hose up through left fender and remove.

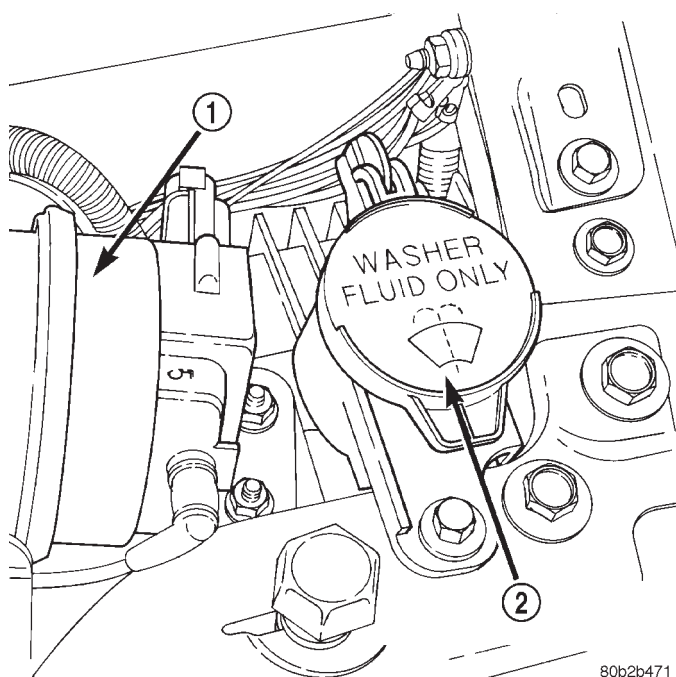


Fig. 11 WASHER RESERVOIR FILLER TUBE

1 - SPEED CONTROL SERVO

2 - WASHER RESERVOIR FILLER TUBE

INSTALLATION

(1) Place filler tube in engine compartment and route through left fender.

(2) INstall the one screw attaching washer reservoir filler tube to upper radiator support (Fig. 11).

(3) Reach up behind the washer reservoir and install the filler tube on the rear of the reservoir.

(4) Install the front fascia as necessary (left side only and use a 2x4 to prop left edge of fascia away from body). Refer to Body for Installation.

(5) Lower vehicle off hoist.

(6) Connect the negative battery cable remote terminal to the remote battery post.

WIPER ARMS

STANDARD PROCEDURE - WIPER ARM ALIGNMENT

The wiper system does not have an indexing feature designed into the arm and blade assembly. The arms and blades are positioned to "TIC" marks on the windshield and secured. This design allows for a tighter fit between wiper arm and pivot shaft.

(1) Cycle the wiper motor into the PARK position.

CAUTION: After cycling the wipers, turn the wiper switch and the ignition switch to OFF.

(2) Check drivers side blade tip position is on or between two "TIC" marks on the windshield. Check that passenger side blade edge is on or near one "TIC" mark on windshield.

(3) If requirements are not met, check for and repair as necessary:

- bent arm or blades
- loose or worn wiper module links
- loose wiper module
- defective module mounting grommets
- defective wiper parking system
- etc.

(4) Position arm and blade to "TIC" marks on windshield as described above and secure the wiper arm retaining nuts.

(5) Operate system and verify proper operation. If problem still exists, refer to Electrical, Wipers and Washers, Diagnosis and Testing - Wiper System Conditions.

REMOVAL

(1) Cycle the wiper arm/blades into PARK position and turn ignition OFF.

(2) Using a trim stick (special tool #C-4755) or equivalent, gently pry up on the wiper arm retaining nut cap and remove.

(3) Remove the retaining nut from the wiper arm pivot.

(4) Lift wiper arm to raise blade off glass and remove the arm from the pivot using a rocking motion and remove from vehicle.

INSTALLATION

(1) Place the wiper arm on wiper pivot.

(2) Install the retaining nut to the wiper arm pivot.

(3) Install the wiper arm retaining nut cap.

(4) Cycle the wiper arm/blades to make sure the arms are positions correctly.

Refer to Electrical, Wipers and Washers, Wiper Arms, Standard Procedures for adjustments if necessary.

WIPER BLADES

DESCRIPTION

The wiper blades are a rubber element with a steel vertebrae that are mounted on the end of the windshield wiper arm and sweep across the front windshield to clear it of water, snow, and debris.

OPERATION

When the wiper blade rubber element is exposed to the weather for a long period of time, it tends to lose wiping ability. Periodic cleaning of the wiper blade element is suggested to remove the accumulation of salt and road film. The wiper blades, arms, and windshield should be cleaned with a sponge or cloth and a mild detergent or non-abrasive cleaner. If the blades continue to streak or smear, they should be replaced. The driver blade element is 600 mm in length and the passenger blade element is 550 mm in length.

REMOVAL

- (1) Lift wiper arm to raise blade off glass.
- (2) Remove blade assembly from arm by pushing release tab under arm tip and slide blade away from arm tip (Fig. 12) and (Fig. 13). The vertebra is curved on the right blade only. Install with the curve matching the shape of the windshield.
- (3) Gently place wiper arm tip on glass surface.

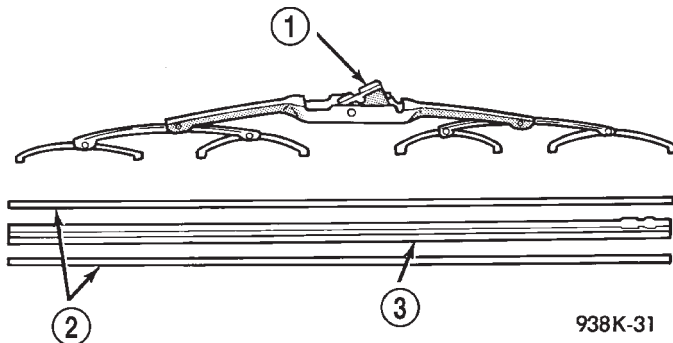


Fig. 12 WIPER BLADE AND ELEMENT

- 1 - ARM RELEASE TAB
- 2 - VERTABRA
- 3 - RUBBER ELEMENT

INSTALLATION

- (1) Lift wiper arm tip off glass and snap blade and element onto wiper arm (Fig. 13). The vertebra is curved on the right blade only. Install with the curve matching the shape of the windshield.
- (2) Lower wiper arm to glass.

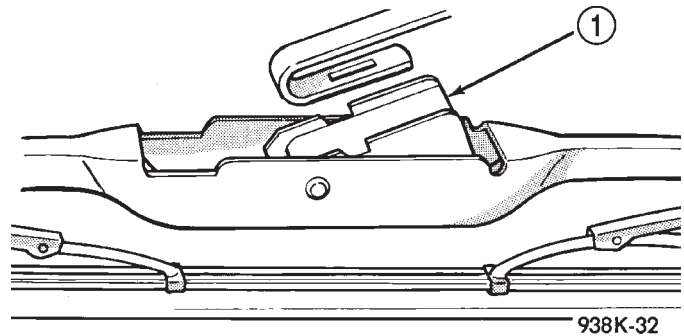


Fig. 13 REMOVE BLADE FROM ARM

- 1 - RELEASE TAB

WIPER BLADE ELEMENT

REMOVAL

- (1) Remove wiping element from blade assembly by grasping and pulling stopper of blade element out of end claw together with vertebra (metal rails).
- (2) Remove wiping element and vertebra by sliding them out of claws.
- (3) Remove vertebra from wiping element (Fig. 14).

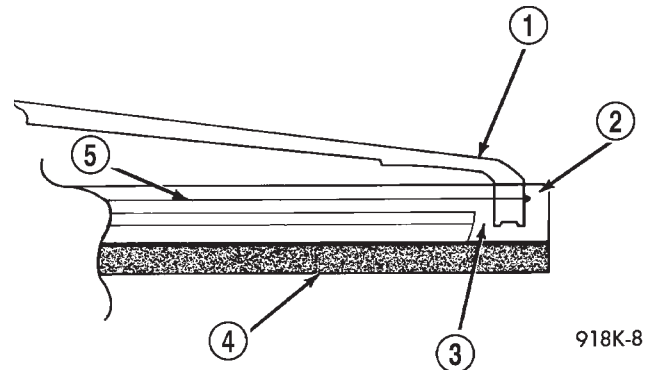


Fig. 14 WIPER BLADE AND ELEMENT

- 1 - CLAW
- 2 - TO GRASP AND PULL
- 3 - CHANNEL
- 4 - RUBBER ELEMENT
- 5 - VERTABRA

INSTALLATION

- (1) Install the vertebra onto the wiping element (Fig. 14).
- (2) Install the wiping element and vertebra into the blade assembly by sliding them into the claws.

NOTE: Install right blade element vertebra to match the shape of the windshield. Install vertebra with curve down. Install left blade element vertebra flat.

- (3) Check that blade element and vertebra are through all the claws and the final claw is locked in

WIPER BLADE ELEMENT (Continued)

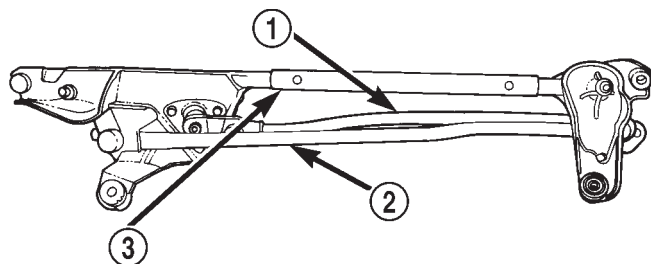
the stopper. Assure element locked end is closest to wiper system pivot.

WIPER LINKAGE

REMOVAL

There are two serviceable link assemblies in the wiper module (Fig. 15). The Master Link connects the motor output crank to the driver's side pivot. The Slave link connects the driver side pivot to the passenger side pivot. To service these links, remove the wiper module from the vehicle.

The wiper module mounting grommets can be serviced anytime the module is removed from the vehicle. Replace module mounting grommets if they are broken, cracked, deteriorated, or defective.



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Fig. 15 WIPER LINK ARMS

- 1 - MASTER LINK ARM
- 2 - SLAVE LINK ARM
- 3 - WINDSHIELD WIPER FRAME ASSEMBLY

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove wiper module from vehicle. Refer to Electrical, Wipers and Washers, Wiper Module Removal.

(3) Disconnect wiper module slave link from pivot levers by carefully using a ball and socket wedge. Do not damage ball and socket or seal when using wedge.

(4) Disconnect wiper module master link from pivot lever and motor crank by carefully using a ball and socket wedge. Do not damage ball and socket or seal when using wedge.

(5) Remove module linkage mounting grommets.

NOTE: Grommet eyelet may need to be removed from rubber isolator on rear inboard and forward outboard mounting grommets only during disassembly.

(6) Remove "U" nut from body (if necessary).

INSTALLATION

NOTE: Grommet eyelet may have been removed from rubber isolator on rear inboard and forward outboard mounting grommets during disassembly. Install if removed.

- (1) Install "U" nut to body (if necessary).
- (2) Install the module linkage mounting grommets.

NOTE: When assembling master link or slave link to module frame, use channel locks wrapped in cloth to prevent damage to ball and socket joint. Apply light pressure to assemble socket to ball.

(3) Connect the wiper module master link to the pivot lever and motor crank by carefully snapping together. Do not damage ball and socket or seal.

(4) Connect wiper module slave link to pivot levers by carefully snapping together. Do not damage ball and socket or seal.

(5) Install the wiper module into the vehicle. Refer to Electrical, Wipers and Washers, Wiper Module Installation.

(6) Connect the negative battery cable remote terminal to the remote battery post.

WIPER MODULE

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove driver and passenger side wiper arms. Refer to Electrical, Wipers and Washers, Wiper Arm Removal.

(3) Remove nine screws to cowl screen panel. Refer to Body for Removal.

(4) Remove wiper module mounting bolt located on top of the tower to tower beam.

(5) Remove eight bolts to Tower to Tower (crosscar) support (Fig. 16). Refer to Body for Removal.

(6) Remove three retaining bolts to windshield wiper module (Fig. 17).

(7) Lift wiper module away from vehicle body.

(8) Disconnect one wire connector.

(9) Remove windshield wiper module from vehicle.

(10) If replacing module, transfer wiper module grommets to new module assembly (Fig. 18).

(11) Remove one nut to crank arm and remove from motor (Fig. 19).

(12) Remove three retaining bolts from wiper motor (Fig. 19).

(13) Remove wiper motor from wiper module assembly. Install onto new wiper module assembly. Refer to Electrical, Wipers and Washers, Wiper Motor, Removal.

WIPER MODULE (Continued)

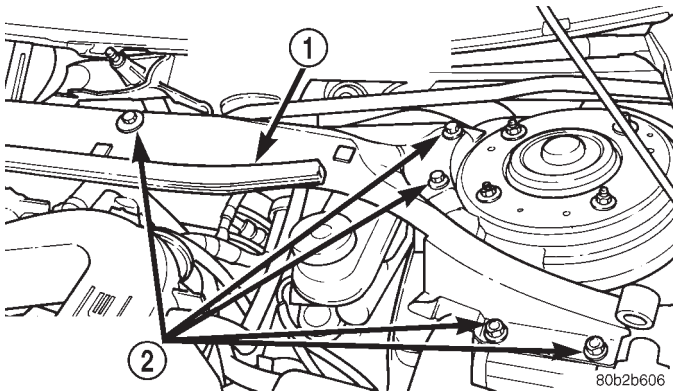


Fig. 16 TOWER TO TOWER SUPPORT REMOVAL

- 1 - TOWER TO TOWER SUPPORT
- 2 - RETAINING BOLTS

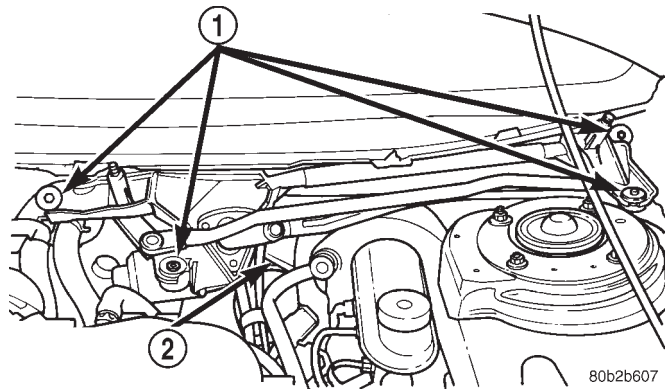


Fig. 17 WIPER MODULE RETAINING BOLTS

- 1 - RETAINING BOLTS
- 2 - WIPER MOTOR CONNECTOR

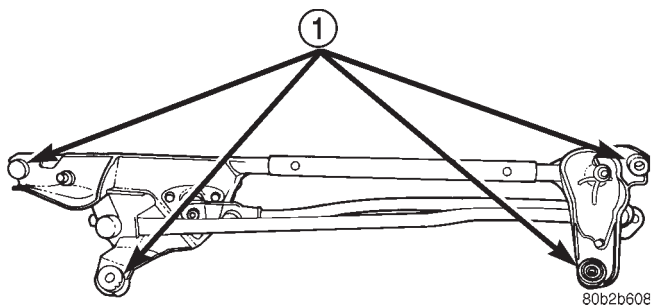


Fig. 18 WIPER FRAME GROMMETS

- 1 - GROMMETS

INSTALLATION

(1) Install the wiper motor onto the wiper module assembly. Refer to Electrical, Wipers and Washers, Wiper Motor, Removal.

(2) Install the three retaining bolts to the wiper motor (Fig. 19).

(3) Install the crank arm and install the one nut to crank arm (Fig. 19).

NOTE: If replacing module, transfer wiper module grommets to new module assembly (Fig. 18).

(4) Install the windshield wiper module into vehicle.

(5) Start rear outboard screw first, rear inboard screw second, and forward outboard screw last.

(6) Start all module mounting screws and bolt by hand before torquing to specifications.

(7) Connect one wire connector.

(8) Install the three retaining bolts to windshield wiper module (Fig. 17).

(9) Install the eight bolts to Tower to Tower (cross-car) support (Fig. 16). Refer to Body for Removal.

(10) Install the wiper module mounting bolt located on top of the tower to tower beam.

(11) Install the nine screws to cowl screen panel. Refer to Body for Removal.

(12) Assure wiper module pivots are in "PARK" position cycling the switch "ON" and "OFF" with engine off prior to installing arms and blades.

CAUTION: Keep hands clear when cycling the wiper motor within the wiper module.

(13) Install the driver and passenger side wiper arms. Refer to Electrical, Wipers and Washers, Wiper Arm Removal.

(14) Connect the negative battery cable remote terminal to the remote battery post.

WIPER MOTOR

DIAGNOSIS AND TESTING - WIPER MOTOR

Whenever a wiper motor malfunction occurs, disconnect motor wire harness and clean the terminals. Ensure the wire harness is properly connected before starting diagnosis and repair procedures. Refer to Wiper Motor Test table.

WIPER MOTOR (Continued)

WIPER MOTOR TEST

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER OPERATES IN LOW SPEED OR INTERMITTENT ONLY.	1. HI/LO RELAY DEFECTIVE. 2. OPEN OR DEFECTIVE CONTROL CIRCUIT IN BCM. 3. DEFECTIVE WIPER SWITCH. 4. OPEN HIGH SPEED CIRCUIT. 5. DEFECTIVE MOTOR.	1. CHECK HI/LO RELAY WITH KNOWN GOOD RELAY. IF NOT OK, REPLACE HI/LO RELAY. 2. OPEN OR DEFECTIVE CIRCUIT BETWEEN HI/LO RELAY CAVITY "C" AND BCM CONNECTOR TERMINAL #12C. DEFECTIVE BCM. IF NOT OK, REPAIR CIRCUIT OR REFER TO BCM DIAGNOSTIC PROCEDURES. 3. REFER TO WIPER SWITCH DIAGNOSTIC PROCEDURES. 4. OPEN OR DEFECTIVE CIRCUIT BETWEEN HI/LO RELAY CAVITY "D" AND WIPER MOTOR CONNECTOR TERMINAL #1. IF NOT OK, REPAIR CIRCUIT. 5. APPLY BATTERY JUMPER OVER TO WIPER TERMINAL #1 AND GROUND TERMINAL #5. IF NOT OK, REPLACE MOTOR.
WIPER OPERATES IN INTERMITTENT MODE ONLY.	1. DEFECTIVE WIPER SWITCH.	1. REFER TO WIPER SWITCH DIAGNOSTIC PROCEDURES.
WIPER OPERATES IN HIGH SPEED ONLY.	1. DEFECTIVE HI/LO RELAY. 2. DEFECTIVE CONTROL CIRCUIT TO BCM. 3. DEFECTIVE BCM. 4. OPEN LOW SPEED CIRCUIT. 5. DEFECTIVE MOTOR.	1. CHECK WIPER HI/LO RELAY WITH KNOWN GOOD RELAY. REPLACE IF NOT OK. 2. CONTINUOUS SHORT BETWEEN HI/LO RELAY CAVITY "C" AND BCM CONNECTOR TERMINAL #12C. IF NOT OK, REPAIR CIRCUIT. 3. REFER TO BCM DIAGNOSTIC PROCEDURES. 4. OPEN OR DEFECTIVE CIRCUIT BETWEEN HI/LO RELAY CAVITY "E" AND WIPER MOTOR CONNECTOR TERMINAL #2. IF NOT OK, REPAIR CIRCUIT. 5. APPLY BATTERY JUMPER POWER TO WIPER TERMINAL #2 AND GROUND TERMINAL #5. IF NOT OK, REPLACE MOTOR.
WIPER OPERATION SWITCHES BETWEEN LOW AND HIGH SPEED OPERATION.	1. DEFECTIVE CONTROL CIRCUIT TO BCM. 2. DEFECTIVE BCM.	1. INTERMITTENT SHORT BETWEEN HI/LO RELAY CAVITY "C" AND BCM CONNECTOR TERMINAL #12C, IF NOT OK, REPAIR CIRCUIT. 2. REFER TO BCM DIAGNOSTIC PROCEDURES.

WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER WILL NOT PARK.	1. OPEN WIPER MOTOR PARK CIRCUIT. 2. DEFECTIVE BCM. 3. DEFECTIVE WIPER MOTOR.	1. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER MOTOR CONNECTOR TERMINAL #4 AND BCM TERMINAL #3C. IF NOT OK, REPAIR CIRCUIT. 2. REFER TO BCM DIAGNOSTIC PROCEDURES. 3. APPLY BATTERY JUMPER POWER TO WIPER TERMINAL #2 (LOW SPEED) AND GROUND TERMINAL #5 (COMMON GROUND). POSITION AN OHMMETER ACROSS MOTOR PARK TERMINAL #4 AND COMMON GROUND. THE OHMMETER MUST INDICATE ONE SHORT, ONCE EVERY MOTOR REVOLUTION. OR WITH MOTOR IN "PARK" POSITION, CHECK FOR CONTINUITY BETWEEN MOTOR TERMINAL #4 AND 5. IF NOT OK, REPLACE MOTOR.
WIPER WILL NOT RUM TO PARK AFTER IGNITION OFF.	1. DEFECTIVE BCM.	1. REFER TO BCM DIAGNOSTIC PROCEDURES.
WIPER RUNS THRU PARK POSITION ON WINDSHIELD.	1. DEFECTIVE ON/OFF RELAY. 2. OPEN ON/OFF RELAY GROUND CIRCUIT.	1. CHECK WIPER ON/OFF RELAY WITH KNOWN GOOD RELAY. IF NOT OK, REPLACE RELAY. 2. OPEN OR DEFECTIVE CIRCUIT BETWEEN ON/OFF RELAY CAVITY "E" AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2.
WIPER RUNS CONTINUOUSLY OR INTERMITTENTLY IN LOW SPEED WITH IGNITION OR ACCESSORY ON AND WIPER SWITCH OFF.	1. DEFECTIVE ON/OFF RELAY. 2. DEFECTIVE CONTROL CIRCUIT TO BCM. 3. DEFECTIVE BCM.	1. CHECK WIPER ON/OFF RELAY WITH KNOWN GOOD RELAY. IF NOT OK, REPLACE RELAY. 2. INTERMITTENT OR CONTINUOUS SHORT BETWEEN ON/OFF RELAY CAVITY "C" AND BCM CONNECTOR TERMINAL #4C. IF NOT OK, REPAIR CIRCUIT. 3. REFER TO BCM DIAGNOSTIC PROCEDURES.
WIPER MOTOR POWER FEED FUSE OPEN.	1. POWER DISTRIBUTION CENTER (PDC) FUSE "M" DEFECTIVE.	1. CHECK FUSE "M". IF NOT OK, REPLACE FUSE.
WIPER SWITCH POWER FEED FUSE OPEN.	1. JUNCTION BLOCK FUSE #5 DEFECTIVE.	1. CHECK FUSE #5. IF NOT OK, REPLACE FUSE.

WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER SYSTEM WILL NOT RUN.	<p>1. PDC FUSE "M" BLOWN.</p> <p>2. JUNCTION BLOCK FUSE #5 BLOWN.</p> <p>3. ON/OFF RELAY DEFECTIVE.</p> <p>4. MOTOR CONNECTOR DEFECTIVE (LOOSE, BENT OR CORRODED).</p> <p>5. OPEN POWER CIRCUIT TO MOTOR.</p> <p>6. BCM CONNECTORS "B" AND "C" (LOOSE, BENT OR CORRODED).</p> <p>7. OPEN OR DEFECTIVE CONTROL CIRCUIT TO BCM.</p> <p>8. OPEN OR DEFECTIVE MOTOR GROUND CIRCUIT.</p> <p>9. OPEN CIRCUIT IN MOTOR.</p> <p>10. STRIPPED GEARS IN MOTOR.</p> <p>11. SEIZED MOTOR BEARINGS.</p>	<p>1. SHORT CIRCUIT BETWEEN PDC FUSE "M" AND ON/OFF RELAY CAVITY "A" OR "D" OR HI/LO RELAY CAVITY "A". SHORT CIRCUIT IN ON/OFF RELAY OR HI/LO RELAY. SHORT CIRCUIT BETWEEN ON/OFF RELAY CAVITY "B" AND HI/LO RELAY CAVITY "B". IF NOT OK, REPLACE ON/OFF RELAY OR REPAIR CIRCUIT(S).</p> <p>2. SHORT CIRCUIT BETWEEN JUNCTION BLOCK FUSE #5 AND WIPER SWITCH TERMINAL #1. SHORT IN WIPER SWITCH. IF NOT OK, REPAIR CIRCUIT OR REFER TO WIPER SWITCH DIAGNOSTIC PROCEDURES.</p> <p>3. CHECK WITH A KNOWN GOOD RELAY. IF NOT OK, REPLACE RELAY.</p> <p>4. CHECK MOTOR CONNECTOR FOR BENT, LOOSE, OR CORRODED CONNECTOR.</p> <p>5. OPEN OR DEFECTIVE CIRCUIT BETWEEN PDC FUSE "M" AND ON/OFF RELAY CAVITY "A" OR "D". OPEN OR DEFECTIVE CIRCUIT BETWEEN ON/OFF RELAY CAVITY "B" AND HI/LO RELAY CAVITY "B". IF NOT OK, REPLACE ON/OFF RELAY OR REPAIR CIRCUIT(S).</p> <p>6. CHECK BCM CONNECTORS "B" AND "C" FOR BENT, LOOSE, OR CORRODED CONNECTORS.</p> <p>7. OPEN OR DEFECTIVE CIRCUIT BETWEEN ON/OFF RELAY CAVITY "C" AND BCM CONNECTOR TERMINAL #4C. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER SWITCH TERMINAL #5 AND BCM CONNECTOR TERMINAL #5B. DEFECTIVE BCM. IF NOT OK, REPAIR CIRCUIT(S) OR REFER TO BCM DIAGNOSTIC PROCEDURES.</p> <p>8. OPEN OR DEFECTIVE CIRCUIT BETWEEN WIPER MOTOR CONNECTOR GROUND TERMINAL #5 AND LEFT HEADLAMP GROUND #5 OR ENGINE GROUND #1 OR 2.</p> <p>9. CHECK FOR OPEN CIRCUIT IN MOTOR BETWEEN LO SPEED TERMINAL #2 AND GROUND TERMINAL #5 OR BETWEEN HI SPEED TERMINAL #1 AND GROUND TERMINAL #5. IF NOT OK, REPLACE WIPER MOTOR.</p> <p>10. APPLY BATTERY VOLTAGE TO MOTOR HI SPEED OR LO SPEED CIRCUIT. IF MOTOR RUNS AND OUTPUT CRANK RUNS INTERMITTENTLY OR DOES NOT RUN, REPLACE MOTOR.</p> <p>11. APPLY BATTERY VOLTAGE TO MOTOR HI SPEED OR LO SPEED CIRCUIT. IF MOTOR DOES NOT RUN, REPLACE MOTOR.</p>

WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
WIPER SYSTEM MAKES REVERSAL NOISE.	<ol style="list-style-type: none"> 1. LOOSE ARM TO BLADE CONNECTION. 2. LOOSE MASTER LINK. 3. LOOSE SLAVE LINK. 4. LOOSE LINKAGE PIVOT(S). 5. LOOSE MOTOR CRANK. 6. EXCESSIVE MOTOR GEARBOX "BACKLASH" OR LOOSE ARMATURE. 	<ol style="list-style-type: none"> 1. INSPECT CONNECTION FOR DAMAGE, BENDING, EXCESSIVE WEAR. REPLACE ARM OR BLADE IF NOT OK. 2. REPLACE MASTER LINK IF NOT OK. 3. REPLACE SLAVE LINK IF NOT OK. 4. REPLACE LINKAGE FRAME IF NOT OK. 5. TIGHTEN CRANK NUT TO SPECIFICATION. 6. REPLACE WIPER MOTOR.
WIPER ARM(S) CHATTER ON WINDSHIELD.	<ol style="list-style-type: none"> 1. PERMANENT HI OR LO TEMPERATURE SET OF BLADE ELEMENT EDGE. 2. BENT OR DAMAGED BLADE STRUCTURE. 3. BENT OR DAMAGED ARM. 	<ol style="list-style-type: none"> 1. INSPECT RUBBER ELEMENT FOR PERMANENT SET. IF NOT OK, REPLACE RUBBER ELEMENT. 2. INSPECT BLADE. IF NOT OK, REPLACE BLADE. 3. INSPECT ARM. IF NOT OK, REPLACE ARM.
DRIVER AND/OR PASSENGER ARM WILL NOT CYCLE (OPERATE).	<ol style="list-style-type: none"> 1. LOOSE ARM TO PIVOT SHAFT. 2. STRIPPED ARM TO PIVOT SHAFT. 	<ol style="list-style-type: none"> 1. CHECK ARM TO PIVOT SHAFT CONNECTION FOR LOOSENESS. TORQUE NUT TO SPECIFICATION. 2. CHECK ARM TO PIVOT SHAFT FOR STRIPPING. TORQUE NUT TO SPECIFICATION. IF NOT OK, REPLACE ARM.
DRIVER AND/OR PASSENGER ARM OR BLADE HITS COWL SCREEN OR WINDSHIELD MOLDINGS.	<ol style="list-style-type: none"> 1. ARM(S) OUT OF POSITION. 	<ol style="list-style-type: none"> 1. REMOVE ARM OFF PIVOT SHAFT, CYCLE MODULE TO PARK. REPOSITION ARM/BLADE TO LOCATION MARKS ON WINDSHIELD. SECURE ARM TO PIVOT SHAFT AND TORQUE TO SPECIFICATION.
WIPER BLADE(S) STREAK.	<ol style="list-style-type: none"> 1. CONTAMINATION ON BLADE ELEMENT OR WINDSHIELD. 2. BLADE ELEMENT DAMAGED. 	<ol style="list-style-type: none"> 1. CLEAN BLADE ELEMENT EDGE WITH MILD SOAP OR ALCOHOL AND WATER. CLEAN WINDSHIELD WITH MILD SOAP OR NON-ABRASIVE CLEANSER AND WATER. CHECK FOR PROPER WIPE QUALITY. IF NOT OK, REPLACE BLADE ELEMENT. 2. REPLACE BLADE ELEMENT.

WIPER MOTOR (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
POOR COLD TEMPERATURE WIPE QUALITY.	1. NO WASHER FLUID FOR WASH/WIPE CYCLE. 2. POOR WINDSHIELD DEFROST PERFORMANCE. 3. PERMANENT HI OR LO TEMPERATURE SET OF BLADE ELEMENT EDGE. 4. LOW ARM FORCE	1. ADD WASHER FLUID TO RESERVOIR. 2. CHECK WINDSHIELD DEFROSTER FOR PROPER FUNCTION AND PERFORMANCE. 3. INSPECT RUBBER ELEMENT FOR PERMANENT SET. IF NOT OK, REPLACE RUBBER ELEMENT. 4. CHECK FOR PROPER ARM FORCE. IF NOT OK, REPLACE ARM.

REMOVAL

The Wiper Module Assembly must be removed to service the wiper motor.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove wiper module. Refer to Electrical, Wipers and Washers, Wiper Module Removal.

(3) Disconnect wiper module master link from motor crank by carefully using a ball and socket wedge. Do not damage ball and socket or seal when using wedge.

(4) Remove three retaining bolts from the wiper motor (Fig. 19).

(5) Remove wiper motor from wiper module.

INSTALLATION

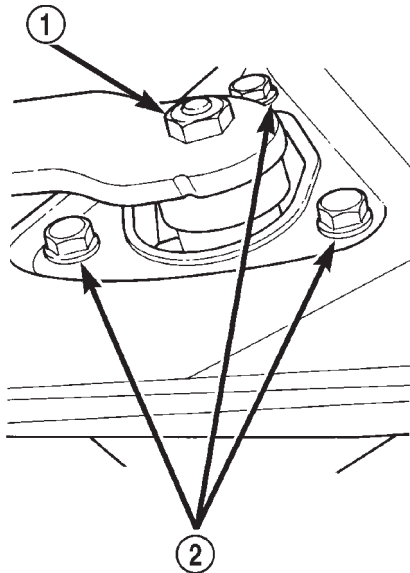
(1) Place wiper motor in position onto wiper module.

(2) Install the three retaining bolts to the wiper motor (Fig. 19).

(3) Connect the wiper module master link to the motor crank by carefully snapping together. Do not damage ball and socket or seal.

(4) Install the wiper module. Refer to Electrical, Wipers and Washers, Wiper Module Installation.

(5) Connect the negative battery cable remote terminal to the remote battery post.



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Fig. 19 WIPER MOTOR RETAINING BOLTS

1 - CRANK ARM NUT

2 - WIPER MOTOR RETAINING BOLTS

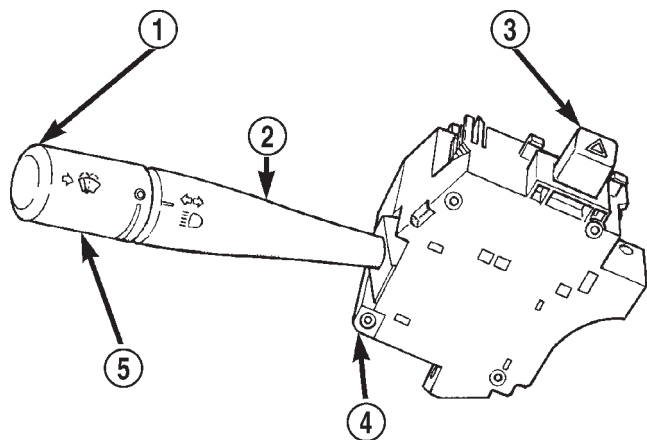
WIPER SWITCH**DIAGNOSIS AND TESTING - WIPER SWITCH**

To test the multi-function/wiper switch, first disconnect the switch wires from the body wiring in the steering column (Fig. 20). Using an ohmmeter, test for continuity between the terminals of the switch, as indicated in the following continuity table. The identity of each terminal is shown in (Fig. 21).

For test purposes, the first position is the OFF position, the next six positions are for the DELAY wipe. LOW is the next detent position and HIGH is the full counterclockwise detent position.

In any wiper switch position, if the control stalk end cap is depressed, the washer circuit will be completed.

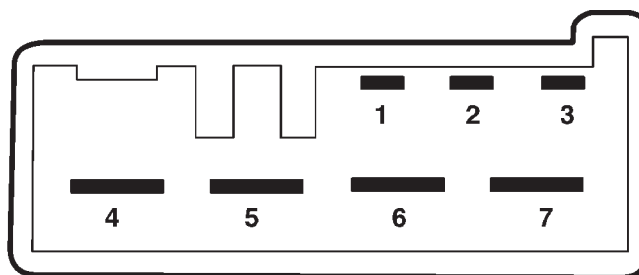
WIPER SWITCH (Continued)



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Fig. 20 WIPER SWITCH LOCATION

- 1 - WINDSHIELD WASHER BUTTON
- 2 - CONTROL STALK (BEAM SELECT)
- 3 - HAZARD WARNING BUTTON
- 4 - MULTI-FUNCTION SWITCH
- 5 - WINDSHIELD WIPER CONTROL



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Fig. 21 MULTI-FUNCTION/WIPER SWITCH PIN CALL OUT

WIPER/WASHER SWITCH RESISTANCE

SWITCH POSITION		TERMINALS	RESISTANCE VALUE
OFF		PINS 1 TO 3	OPEN > 300 K OHMS
DELAY LEVEL	1	PINS 1 TO 3	9.72 K OHMS
	2	PINS 1 TO 3	8.22 K OHMS
	3	PINS 1 TO 3	6.61 K OHMS
	4	PINS 1 TO 3	5.12K OHMS
	5	PINS 1 TO 3	3.67K OHMS
	6	PINS 1 TO 3	2.22K OHMS
LOW		PINS 1 TO 3	1.02 K OHMS
HIGH		PINS 1 TO 3	0.51K OHMS
WASH		PINS 1 TO 2	0 OHMS

WIRING

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8W-01 WIRING DIAGRAM INFORMATION

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WIRING DIAGRAM
INFORMATION

DESCRIPTION

DESCRIPTION - HOW TO USE WIRING
DIAGRAMS

DaimlerChrysler Corporation wiring diagrams are designed to provide information regarding the vehicle wiring content. In order to effectively use the wiring diagrams to diagnose and repair DaimlerChrysler Corporation vehicles, it is important to understand all of their features and characteristics.

Diagrams are arranged such that the power (B+) side of the circuit is placed near the top of the page, and the ground (B-) side of the circuit is placed near the bottom of the page (Fig. 1).

All switches, components, and modules are shown in the at rest position with the doors closed and the key removed from the ignition (Fig. 2).

Components are shown two ways. A solid line around a component indicates that the component is complete. A dashed line around the component indicates that the component is being shown is not complete. Incomplete components have a reference number to indicate the page where the component is shown complete.

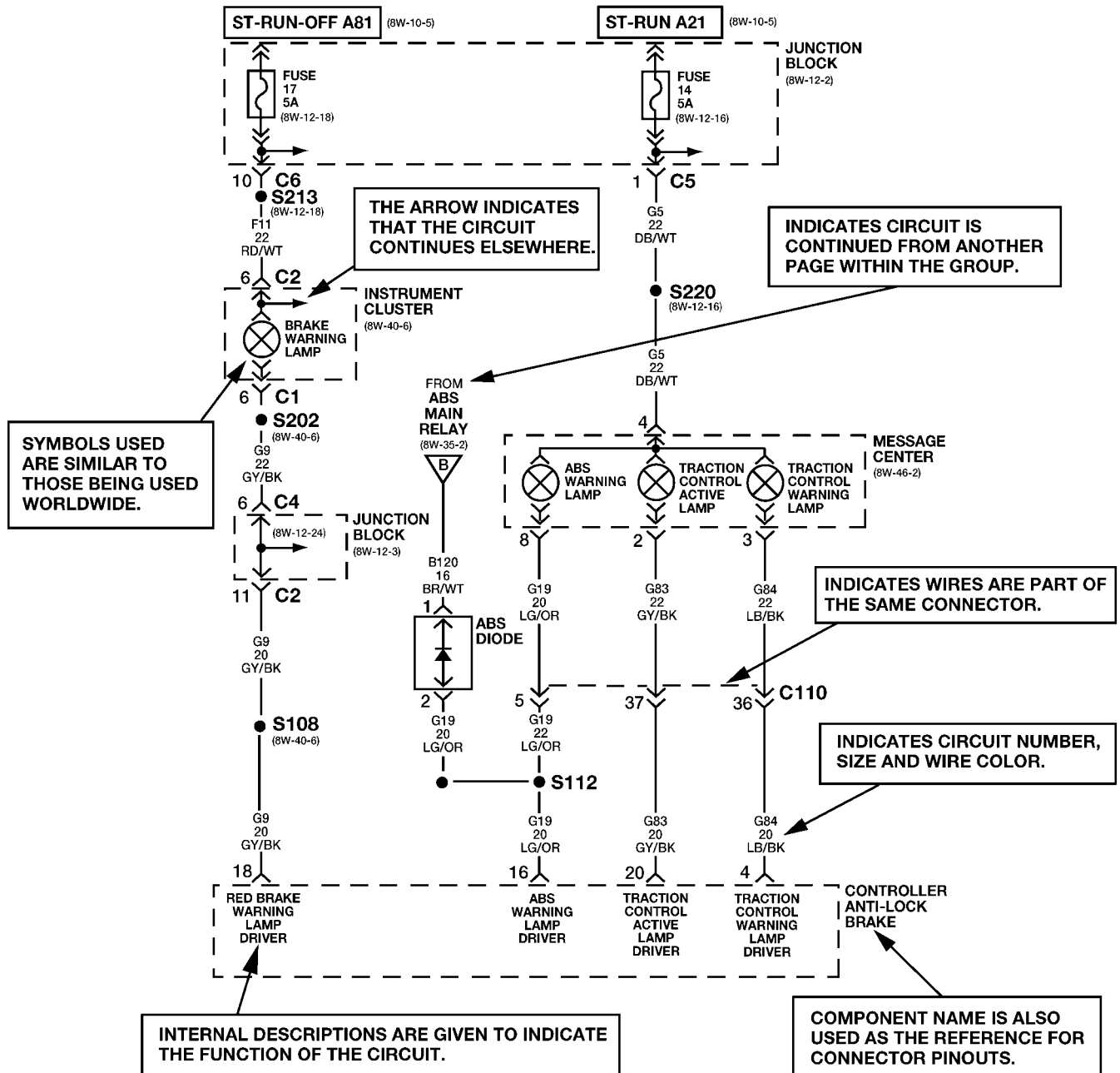
It is important to realize that no attempt is made on the diagrams to represent components and wiring as they appear on the vehicle. For example, a short piece of wire is treated the same as a long one. In addition, switches and other components are shown as simply as possible, with regard to function only.

SYMBOLS

International symbols are used throughout the wiring diagrams. These symbols are consistent with those being used around the world (Fig. 3).

WIRING DIAGRAM INFORMATION (Continued)

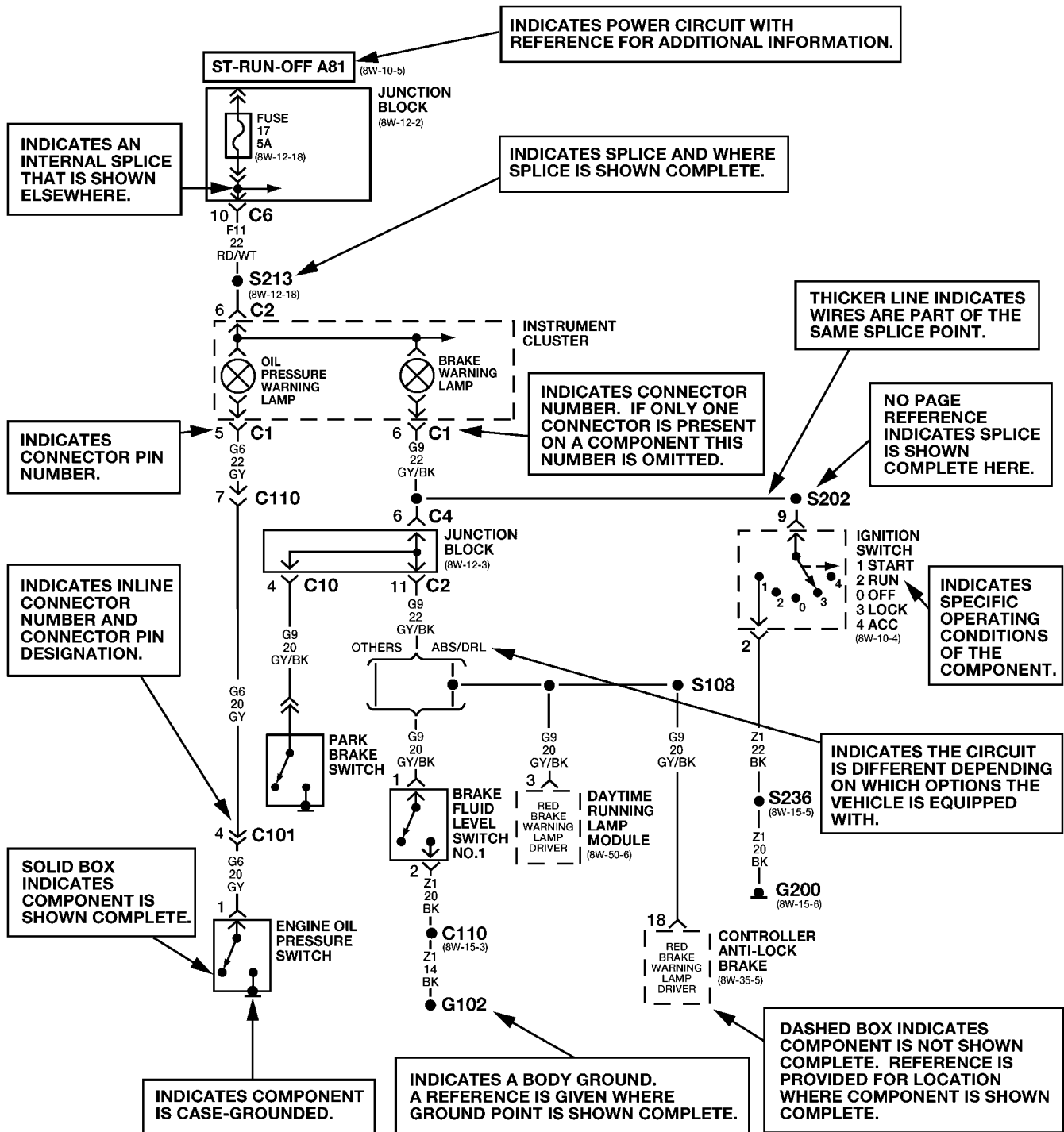
DIAGRAMS ARE ARRANGED WITH THE POWER B+ SIDE OF THE CIRCUIT NEAR THE TOP OF THE PAGE, AND THE GROUND SIDE OF THE CIRCUIT NEAR THE BOTTOM OF THE PAGE.



The System shown here is an **EXAMPLE ONLY**. It does not represent the actual circuit shown in the **WIRING DIAGRAM SECTION**.

Fig. 1 WIRING DIAGRAM EXAMPLE 1

WIRING DIAGRAM INFORMATION (Continued)



The System shown here is an **EXAMPLE ONLY**. It does not represent the actual circuit shown in the **WIRING DIAGRAM SECTION**.

Fig. 2 WIRING DIAGRAM EXAMPLE 2

WIRING DIAGRAM INFORMATION (Continued)



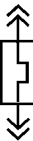




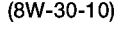
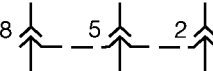
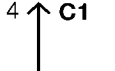
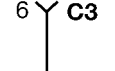

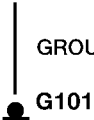




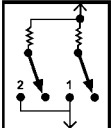


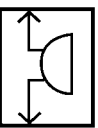
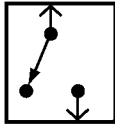
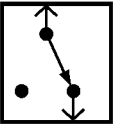

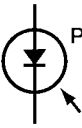


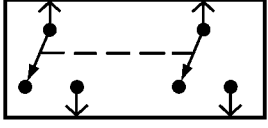
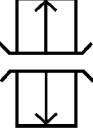


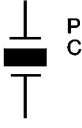
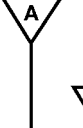





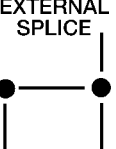
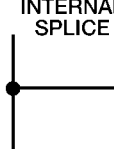
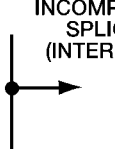

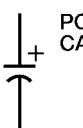
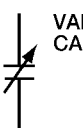




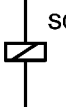

 FUSIBLE LINK  FUSE  CIRCUIT BREAKER OR PTC PROTECTION DEVICE	 BATTERY  IN-LINE CONNECTORS
 BATT A0 HOT BAR  CHOICE BRACKET  (8W-30-10) PAGE REFERENCE	 MULTIPLE CONNECTOR  MALE CONNECTOR  FEMALE CONNECTOR
 CLOCKSPRING  GROUND G101  SCREW TERMINAL	 SINGLE FILAMENT LAMP  DUAL FILAMENT LAMP  ANTENNA
 RESISTIVE MULTIPLEX SWITCH	 NPN TRANSISTOR  PNP TRANSISTOR  TONE GENERATOR
 OPEN SWITCH  CLOSED SWITCH	 LED  PHOTODIODE  DIODE  ZENER DIODE
 GANGED SWITCH  SLIDING DOOR CONTACT	 OXYGEN SENSOR  GAUGE  PIEZOELECTRIC CELL
 WIRE ORIGIN & DESTINATION SHOWN WITHIN CELL  WIRE DESTINATION SHOWN IN ANOTHER CELL	 RESISTOR  POTENTIOMETER  VARIABLE RESISTOR OR THERMISTOR  HEATER ELEMENT
 EXTERNAL SPLICE S350  INTERNAL SPLICE  INCOMPLETE SPLICE (INTERNAL)	 NON-POLARIZED CAPACITOR  POLARIZED CAPACITOR  VARIABLE CAPACITOR
 ONE SPEED MOTOR  TWO SPEED MOTOR  REVERSIBLE MOTOR	 COIL  SOLENOID  SOLENOID VALVE

Fig. 3 WIRING DIAGRAM SYMBOLS

WIRING DIAGRAM INFORMATION (Continued)

TERMINOLOGY

This is a list of terms and definitions used in the wiring diagrams.

LHD..... Left Hand Drive Vehicles

RHD Right Hand Drive Vehicles

ATX . . Automatic Transmissions-Front Wheel Drive

MTX . . . Manual Transmissions-Front Wheel Drive

AT . . . Automatic Transmissions-Rear Wheel Drive

MT Manual Transmissions-Rear Wheel Drive

SOHC Single Over Head Cam Engine

DOHC Double Over Head Cam Engine

Built-Up-Export Vehicles Built For Sale In

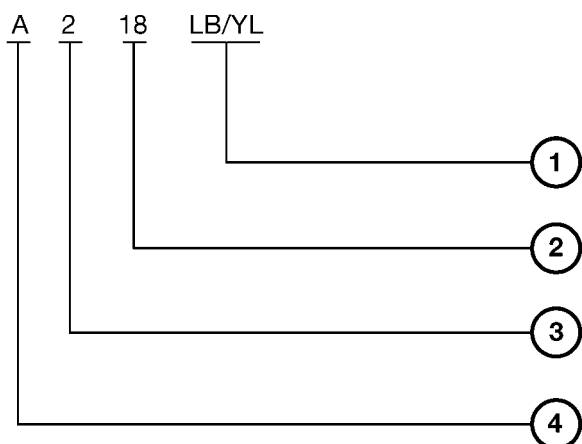
Markets Other Than North America

Except Built-Up-Export . Vehicles Built For Sale In

North America

DESCRIPTION - CIRCUIT INFORMATION

Each wire shown in the diagrams contains a code which identifies the main circuit, part of the main circuit, gage of wire, and color (Fig. 4).



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Fig. 4 WIRE CODE IDENTIFICATION

- 1 - COLOR OF WIRE (LIGHT BLUE WITH YELLOW TRACER)
- 2 - GAGE OF WIRE (18 GAGE)
- 3 - PART OF MAIN CIRCUIT (VARIES DEPENDING ON EQUIPMENT)
- 4 - MAIN CIRCUIT IDENTIFICATION

WIRE COLOR CODE CHART

COLOR CODE	COLOR
BL	BLUE
BK	BLACK
BR	BROWN
DB	DARK BLUE
DG	DARK GREEN
GY	GRAY
LB	LIGHT BLUE
LG	LIGHT GREEN
OR	ORANGE
PK	PINK
RD	RED
TN	TAN
VT	VIOLET
WT	WHITE
YL	YELLOW
*	WITH TRACER

WIRING DIAGRAM INFORMATION (Continued)

DESCRIPTION - CIRCUIT FUNCTIONS

All circuits in the diagrams use an alpha/numeric code to identify the wire and it's function. To identify which circuit code applies to a system, refer to the Circuit Identification Code Chart. This chart shows the main circuits only and does not show the secondary codes that may apply to some models.

CIRCUIT IDENTIFICATION CODE CHART

CIRCUIT	FUNCTION
A	BATTERY FEED
B	BRAKE CONTROLS
C	CLIMATE CONTROLS
D	DIAGNOSTIC CIRCUITS
E	DIMMING ILLUMINATION CIRCUITS
F	FUSED CIRCUITS
G	MONITORING CIRCUITS (GAUGES)
H	OPEN
I	NOT USED
J	OPEN
K	POWERTRAIN CONTROL MODULE
L	EXTERIOR LIGHTING
M	INTERIOR LIGHTING
N	NOT USED
O	NOT USED
P	POWER OPTION (BATTERY FEED)
Q	POWER OPTIONS (IGNITION FEED)
R	PASSIVE RESTRAINT
S	SUSPENSION/STEERING
T	TRANSMISSION/TRANSAXLE/TRANSFER CASE
U	OPEN
V	SPEED CONTROL, WIPER/WASHER
W	OPEN
X	AUDIO SYSTEMS
Y	OPEN
Z	GROUND

DESCRIPTION - SECTION IDENTIFICATION AND INFORMATION

The wiring diagrams are grouped into individual sections. If a component is most likely found in a particular group, it will be shown complete (all wires, connectors, and pins) within that group. For example, the Auto Shutdown Relay is most likely to be found in Group 30, so it is shown there complete. It can, however, be shown partially in another group if it contains some associated wiring.

Splice diagrams in Section 8W-70 show the entire splice and provide references to other sections the splices serves. Section 8W-70 only contains splice diagrams that are not shown in their entirety somewhere else in the wiring diagrams.

Section 8W-80 shows each connector and the circuits involved with that connector. The connectors are identified using the name/number on the diagram pages.

WIRING SECTION CHART

GROUP	TOPIC
8W-01 thru 8W-09	General information and Diagram Overview
8W-10 thru 8W-19	Main Sources of Power and Vehicle Grounding
8W-20 thru 8W-29	Starting and Charging
8W-30 thru 8W-39	Powertrain/Drivetrain Systems
8W-40 thru 8W-49	Body Electrical items and A/C
8W-50 thru 8W-59	Exterior Lighting, Wipers and Trailer Tow
8W-60 thru 8W-69	Power Accessories
8W-70	Splice Information
8W-80	Connector Pin Outs
8W-91	Connector, Ground and Splice Locations

WIRING DIAGRAM INFORMATION (Continued)

DESCRIPTION - CONNECTOR, GROUND AND SPLICE INFORMATION

CAUTION: Not all connectors are serviced. Some connectors are serviced only with a harness. A typical example might be the Supplemental Restraint System connectors. Always check parts availability before attempting a repair.

IDENTIFICATION

In-line connectors are identified by a number, as follows:

- In-line connectors located in the engine compartment are C100 series numbers
- In-line connectors located in the Instrument Panel area are C200 series numbers.
- In-line connectors located in the body are C300 series numbers.
- Jumper harness connectors are C400 series numbers.
- Grounds and ground connectors are identified with a "G" and follow the same series numbering as the in-line connectors.
- Splices are identified with an "S" and follow the same series numbering as the in-line connectors.
- Component connectors are identified by the component name instead of a number. Multiple connectors on a component use a C1, C2, etc. identifier.

LOCATIONS

Section 8W-91 contains connector/ground/splice location illustrations. The illustrations contain the connector name (or number)/ground number/splice number and component identification. Connector/ground/splice location charts in section 8W-91 reference the figure numbers of the illustrations.

The abbreviation T/O is used in the component location section to indicate a point in which the wiring harness branches out to a component. The abbreviation N/S means Not Shown in the illustrations

WARNING**WARNINGS - GENERAL**

WARNINGS provide information to prevent personal injury and vehicle damage. Below is a list of general warnings that should be followed any time a vehicle is being serviced.

WARNING: ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.

WARNING: USE SAFETY STANDS ANYTIME A PROCEDURE REQUIRES BEING UNDER A VEHICLE.

WARNING: BE SURE THAT THE IGNITION SWITCH ALWAYS IS IN THE OFF POSITION, UNLESS THE PROCEDURE REQUIRES IT TO BE ON.

WARNING: SET THE PARKING BRAKE WHEN WORKING ON ANY VEHICLE. AN AUTOMATIC TRANSMISSION SHOULD BE IN PARK. A MANUAL TRANSMISSION SHOULD BE IN NEUTRAL.

WARNING: OPERATE THE ENGINE ONLY IN A WELL-VENTILATED AREA.

WARNING: KEEP AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE FAN AND BELTS.

WARNING: TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD(S), TAIL PIPE, CATALYTIC CONVERTER AND MUFFLER.

WARNING: DO NOT ALLOW FLAME OR SPARKS NEAR THE BATTERY. GASES ARE ALWAYS PRESENT IN AND AROUND THE BATTERY.

WARNING: ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY AND AVOID LOOSE CLOTHING.

DIAGNOSIS AND TESTING - WIRING HARNESS**TROUBLESHOOTING TOOLS**

When diagnosing a problem in an electrical circuit there are several common tools necessary. These tools are listed and explained below.

- Jumper Wire - This is a test wire used to connect two points of a circuit. It can be used to bypass an open in a circuit.

WARNING: NEVER USE A JUMPER WIRE ACROSS A LOAD, SUCH AS A MOTOR, CONNECTED BETWEEN A BATTERY FEED AND GROUND.

- Voltmeter - Used to check for voltage on a circuit. Always connect the black lead to a known good ground and the red lead to the positive side of the circuit.

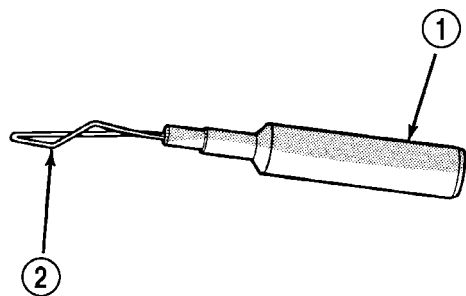
CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking voltages in these circuits, use a meter with a 10 - megohm or greater impedance rating.

WIRING DIAGRAM INFORMATION (Continued)

- Ohmmeter - Used to check the resistance between two points of a circuit. Low or no resistance in a circuit means good continuity.

CAUTION: Most of the electrical components used in today's vehicles are Solid State. When checking resistance in these circuits use a meter with a 10 - megohm or greater impedance rating. In addition, make sure the power is disconnected from the circuit. Circuits that are powered up by the vehicle's electrical system can cause damage to the equipment and provide false readings.

- Probing Tools - These tools are used for probing terminals in connectors (Fig. 5). Select the proper size tool from Special Tool Package 6807, and insert it into the terminal being tested. Use the other end of the tool to insert the meter probe.



948W-233

Fig. 5 PROBING TOOL

- 1 - SPECIAL TOOL 6801
2 - PROBING END

INTERMITTENT AND POOR CONNECTIONS

Most intermittent electrical problems are caused by faulty electrical connections or wiring. It is also possible for a sticking component or relay to cause a problem. Before condemning a component or wiring assembly, check the following items.

- Connectors are fully seated
- Spread terminals, or terminal push out
- Terminals in the wiring assembly are fully seated into the connector/component and locked into position
- Dirt or corrosion on the terminals. Any amount of corrosion or dirt could cause an intermittent problem
- Damaged connector/component casing exposing the item to dirt or moisture
- Wire insulation that has rubbed through causing a short to ground
- Some or all of the wiring strands broken inside of the insulation
- Wiring broken inside of the insulation

TROUBLESHOOTING WIRING PROBLEMS

When troubleshooting wiring problems there are six steps which can aid in the procedure. The steps

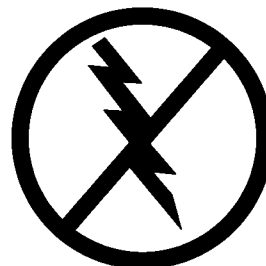
are listed and explained below. Always check for non-factory items added to the vehicle before doing any diagnosis. If the vehicle is equipped with these items, disconnect them to verify these add-on items are not the cause of the problem.

- (1) Verify the problem.
- (2) Verify any related symptoms. Do this by performing operational checks on components that are in the same circuit. Refer to the wiring diagrams.
- (3) Analyze the symptoms. Use the wiring diagrams to determine what the circuit is doing, where the problem most likely is occurring and where the diagnosis will continue.
- (4) Isolate the problem area.
- (5) Repair the problem area.
- (6) Verify the proper operation. For this step, check for proper operation of all items on the repaired circuit. Refer to the wiring diagrams.

STANDARD PROCEDURE**STANDARD PROCEDURE - ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES**

All ESD sensitive components are solid state and a symbol (Fig. 6) is used to indicate this. When handling any component with this symbol, comply with the following procedures to reduce the possibility of electrostatic charge build up on the body and inadvertent discharge into the component. If it is not known whether the part is ESD sensitive, assume that it is.

- (1) Always touch a known good ground before handling the part. This should be repeated while handling the part and more frequently after sliding across a seat, sitting down from a standing position, or walking a distance.
- (2) Avoid touching electrical terminals of the part, unless instructed to do so by a written procedure.
- (3) When using a voltmeter, be sure to connect the ground lead first.
- (4) Do not remove the part from its protective packing until it is time to install the part.
- (5) Before removing the part from its package, ground the package to a known good ground on the vehicle.



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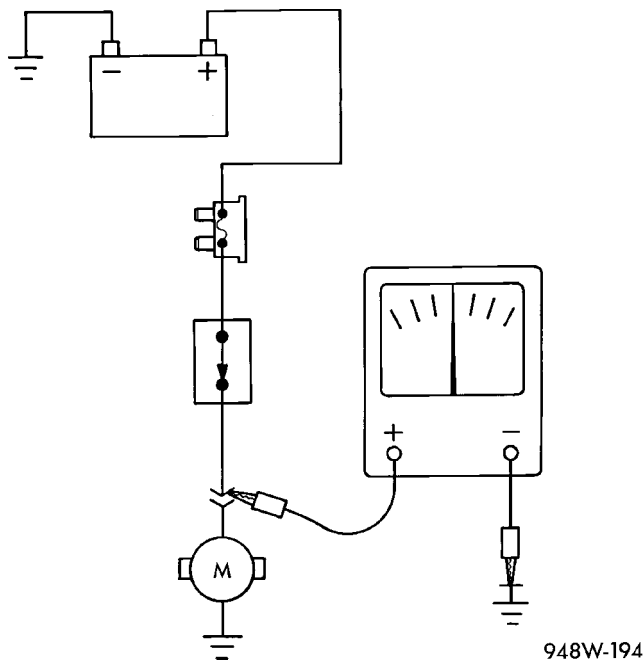
Fig. 6 ELECTROSTATIC DISCHARGE SYMBOL

WIRING DIAGRAM INFORMATION (Continued)

STANDARD PROCEDURE - TESTING OF VOLTAGE POTENTIAL

(1) Connect the ground lead of a voltmeter to a known good ground (Fig. 7).

(2) Connect the other lead of the voltmeter to the selected test point. The vehicle ignition may need to be turned ON to check voltage. Refer to the appropriate test procedure.



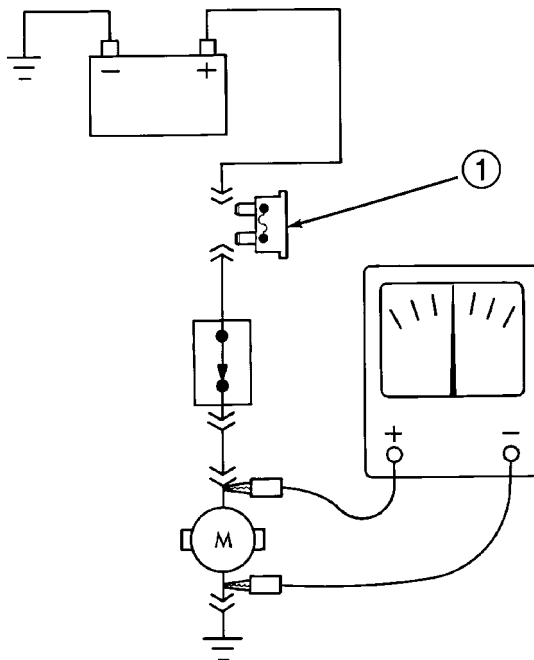
948W-194

Fig. 7 TESTING FOR VOLTAGE POTENTIAL**STANDARD PROCEDURE - TESTING FOR CONTINUITY**

(1) Remove the fuse for the circuit being checked or, disconnect the battery.

(2) Connect one lead of the ohmmeter to one side of the circuit being tested (Fig. 8).

(3) Connect the other lead to the other end of the circuit being tested. Low or no resistance means good continuity.



948W-195

Fig. 8 TESTING FOR CONTINUITY

1 - FUSE REMOVED FROM CIRCUIT

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND

(1) Remove the fuse and disconnect all items involved with the fuse.

(2) Connect a test light or a voltmeter across the terminals of the fuse.

(3) Starting at the fuse block, wiggle the wiring harness about six to eight inches apart and watch the voltmeter/test lamp.

(4) If the voltmeter registers voltage or the test lamp glows, there is a short to ground in that general area of the wiring harness.

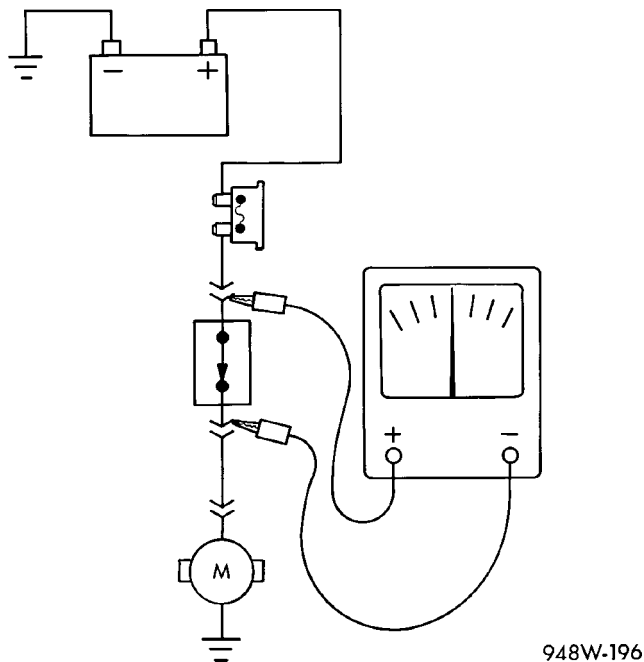
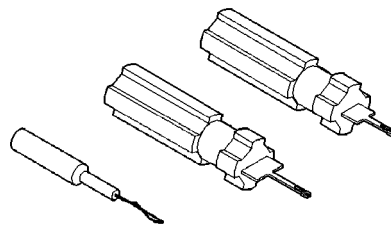
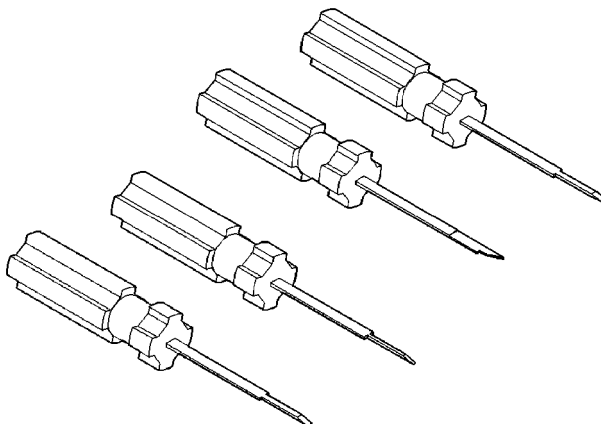
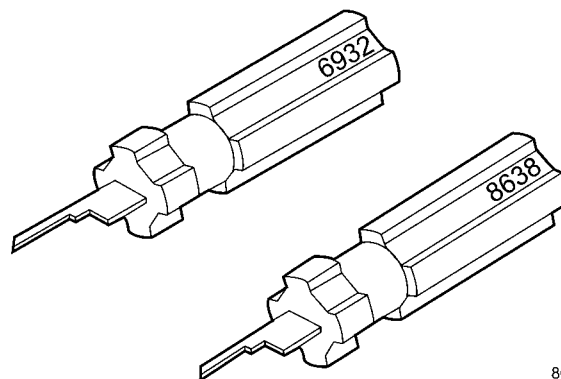
WIRING DIAGRAM INFORMATION (Continued)

STANDARD PROCEDURE - TESTING FOR A SHORT TO GROUND ON FUSES POWERING SEVERAL LOADS

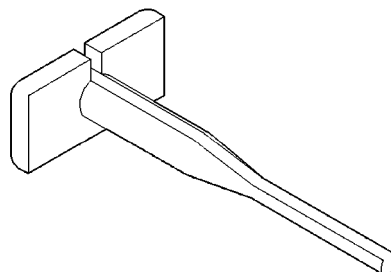
- (1) Refer to the wiring diagrams and disconnect or isolate all items on the suspected fused circuits.
- (2) Replace the blown fuse.
- (3) Supply power to the fuse by turning ON the ignition switch or re-connecting the battery.
- (4) Start connecting or energizing the items in the fuse circuit one at a time. When the fuse blows the circuit with the short to ground has been isolated.

STANDARD PROCEDURE - TESTING FOR A VOLTAGE DROP

- (1) Connect the positive lead of the voltmeter to the side of the circuit closest to the battery (Fig. 9).
- (2) Connect the other lead of the voltmeter to the other side of the switch, component or circuit.
- (3) Operate the item.
- (4) The voltmeter will show the difference in voltage between the two points.

**Fig. 9 TESTING FOR VOLTAGE DROP****SPECIAL TOOLS****WIRING/TERMINAL****PROBING TOOL PACKAGE 6807****TERMINAL PICK TOOL SET 6680****TERMINAL REMOVING TOOLS 6932 AND 8638**

8091c8da

**TERMINAL REMOVING TOOL 6934**

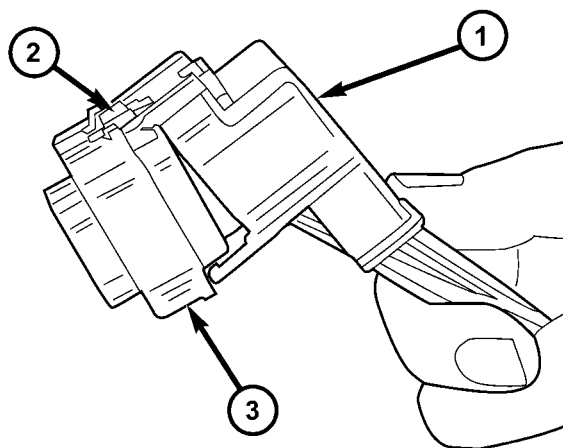
CONNECTOR

REMOVAL

- (1) Disconnect battery.
- (2) Release Connector Lock (Fig. 10).
- (3) Disconnect the connector being repaired from its mating half/component.
- (4) Remove the dress cover (if applicable) (Fig. 10).
- (5) Release the Secondary Terminal Lock, if required (Fig. 11).
- (6) Position the connector locking finger away from the terminal using the proper special tool. Pull on the wire to remove the terminal from the connector (Fig. 12).

INSTALLATION

- (1) Insert the removed terminal in the same cavity on the repair connector.
- (2) Repeat steps for each terminal in the connector, being sure that all wires are inserted into the proper cavities. For additional connector pin-out identification, refer to the wiring diagrams.
- (3) When the connector is re-assembled, the secondary terminal lock must be placed in the locked position to prevent terminal push out.



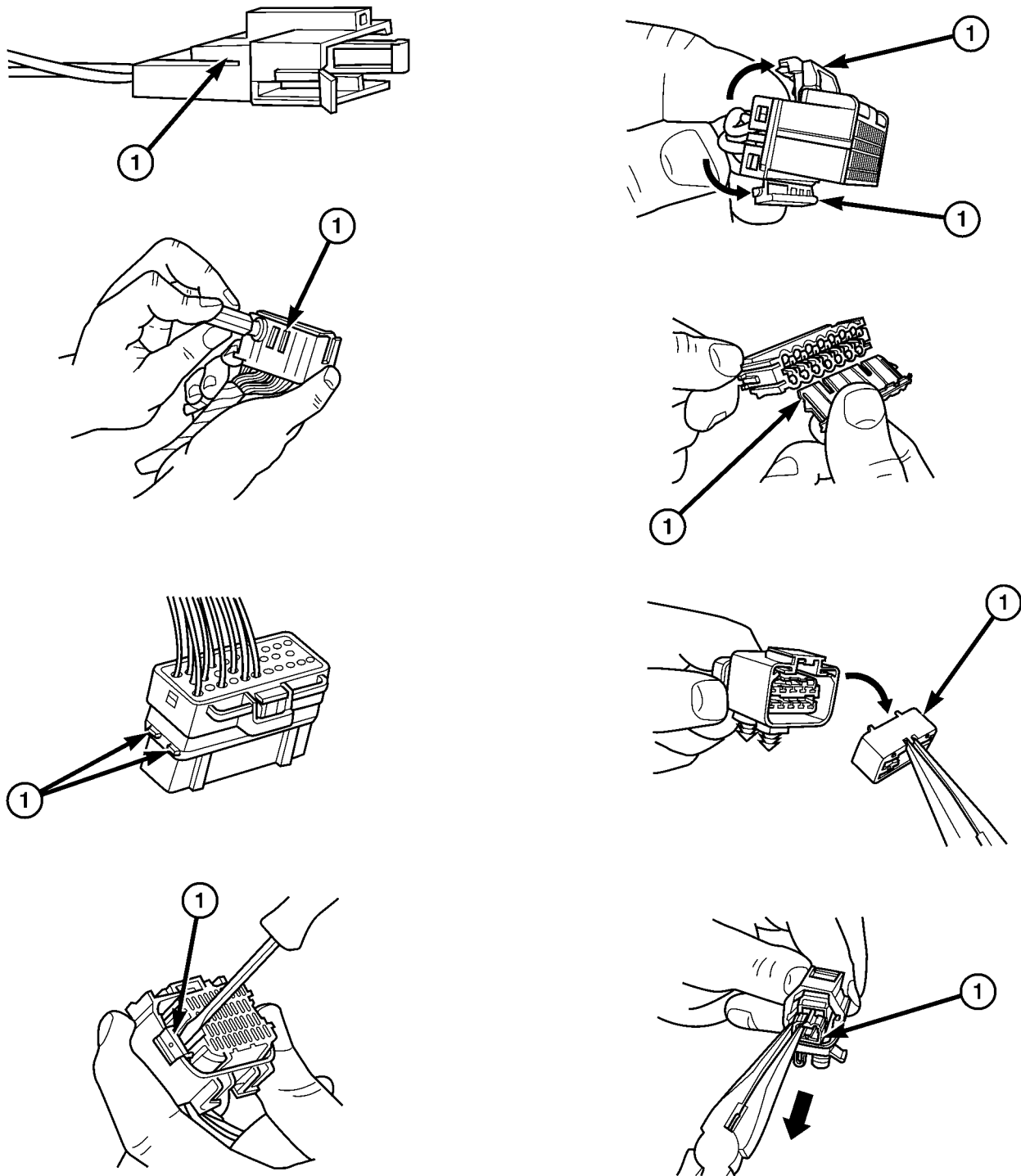
80c97bac

Fig. 10 REMOVAL OF DRESS COVER

- 1 - DRESS COVER
- 2 - CONNECTOR LOCK
- 3 - CONNECTOR

- (4) Replace dress cover (if applicable).
- (5) Connect connector to its mating half/component.
- (6) Connect battery and test all affected systems.

CONNECTOR (Continued)

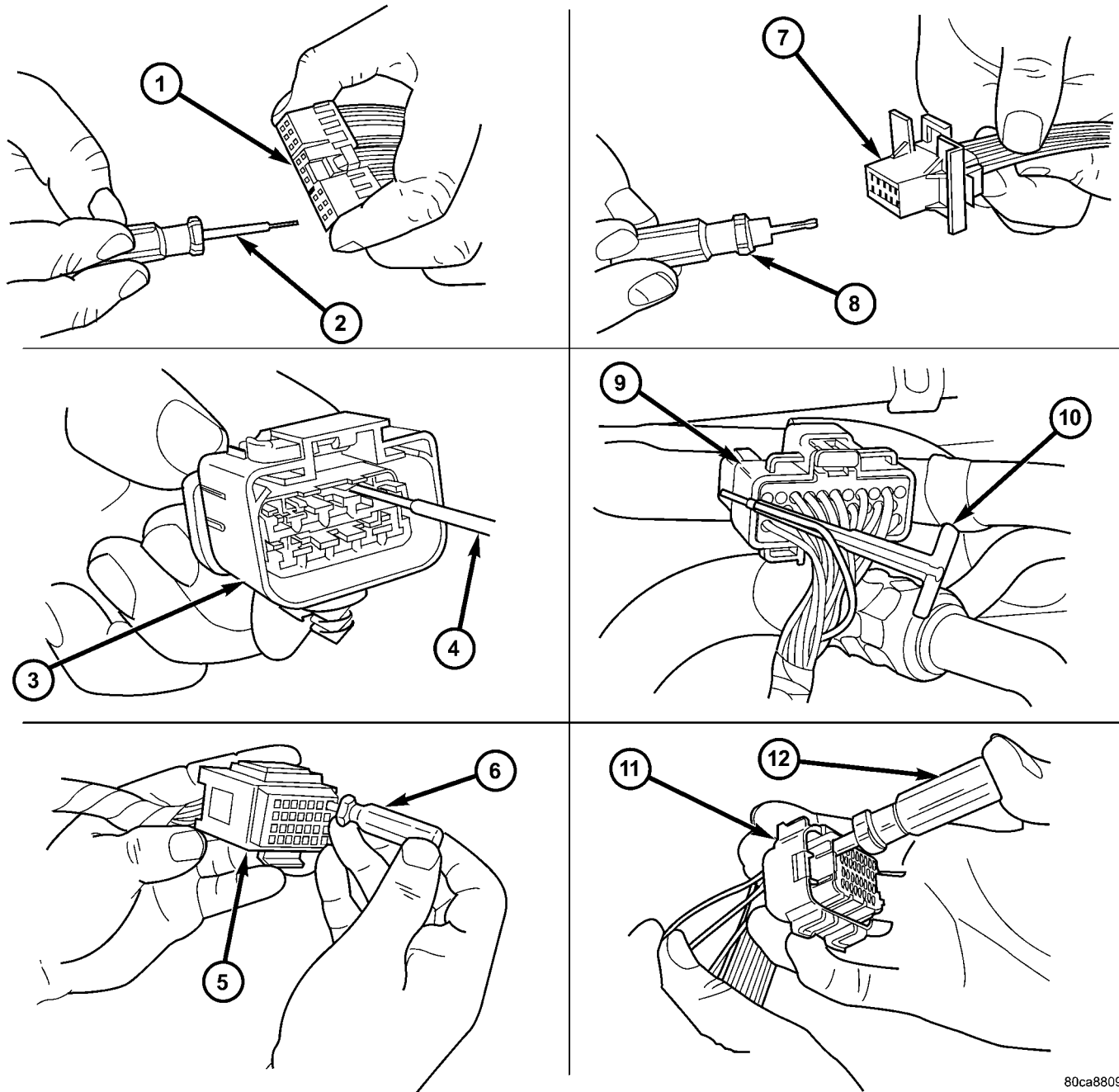


80ca8802

Fig. 11 EXAMPLES OF CONNECTOR SECONDARY TERMINAL LOCKS

1 - Secondary Terminal Lock

CONNECTOR (Continued)



80ca8809

Fig. 12 TERMINAL REMOVAL

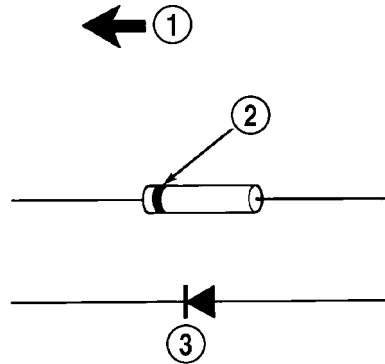
- 1 - TYPICAL CONNECTOR
- 2 - PICK FROM SPECIAL TOOL KIT 6680
- 3 - APEX CONNECTOR
- 4 - PICK FROM SPECIAL TOOL KIT 6680
- 5 - AUGAT CONNECTOR
- 6 - SPECIAL TOOL 6932

- 7 - MOLEX CONNECTOR
- 8 - SPECIAL TOOL 6742
- 9 - THOMAS AND BETTS CONNECTOR
- 10 - SPECIAL TOOL 6934
- 11 - TYCO CONNECTOR
- 12 - SPECIAL TOOL 8638

DIODE

REMOVAL

- (1) Disconnect the battery.
- (2) Locate the diode in the harness, and remove the protective covering.
- (3) Remove the diode from the harness, pay attention to the current flow direction (Fig. 13).



948W-197

Fig. 13 DIODE IDENTIFICATION

- 1 - CURRENT FLOW
 2 - BAND AROUND DIODE INDICATES CURRENT FLOW
 3 - DIODE AS SHOWN IN THE DIAGRAMS

INSTALLATION

- (1) Remove the insulation from the wires in the harness. Only remove enough insulation to solder in the new diode.
- (2) Install the new diode in the harness, making sure current flow is correct. If necessary, refer to the appropriate wiring diagram for current flow (Fig. 13).
- (3) Solder the connection together using rosin core type solder only. **Do not use acid core solder.**
- (4) Tape the diode to the harness using electrical tape. Make sure the diode is completely sealed from the elements.
- (5) Re-connect the battery and test affected systems.

TERMINAL

REMOVAL

- (1) Follow steps for removing terminals described in the connector removal section.
- (2) Cut the wire 6 inches from the back of the connector.

INSTALLATION

- (1) Select a wire from the terminal repair kit that best matches the color and gage of the wire being repaired.
- (2) Cut the repair wire to the proper length and remove one-half (1/2) inch of insulation.
- (3) Splice the repair wire to the wire harness (see wire splicing procedure).
- (4) Insert the repaired wire into the connector.
- (5) Install the connector locking wedge, if required, and reconnect the connector to its mating half/component.
- (6) Re-tape the wire harness starting at 1-1/2 inches behind the connector and 2 inches past the repair.
- (7) Connect battery and test all affected systems.

WIRE

STANDARD PROCEDURE - WIRE SPLICING

When splicing a wire, it is important that the correct gage be used as shown in the wiring diagrams.

(1) Remove one-half (1/2) inch of insulation from each wire that needs to be spliced.

(2) Place a piece of adhesive lined heat shrink tubing on one side of the wire. Make sure the tubing will be long enough to cover and seal the entire repair area.

(3) Place the strands of wire overlapping each other inside of the splice clip (Fig. 14).

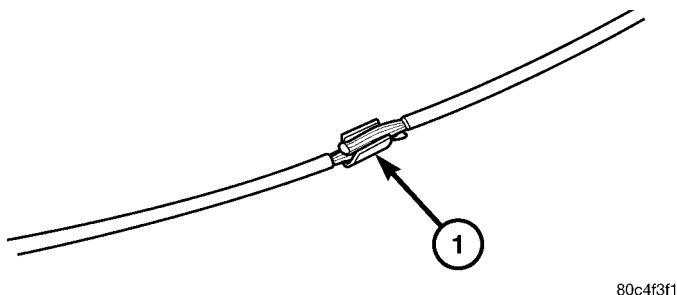


Fig. 14 SPLICE BAND

1 - SPLICE BAND

(4) Using crimping tool, Mopar p/n 05019912AA, crimp the splice clip and wires together (Fig. 15).

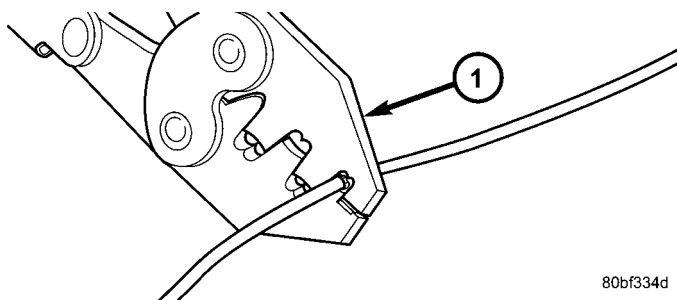


Fig. 15 CRIMPING TOOL

1 - CRIMPING TOOL

(5) Solder the connection together using rosin core type solder only (Fig. 16).

CAUTION: DO NOT USE ACID CORE SOLDER.

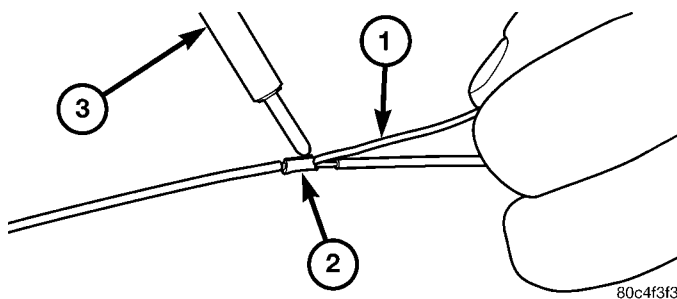


Fig. 16 SOLDER SPLICE

1 - SOLDER
2 - SPLICE BAND
3 - SOLDERING IRON

(6) Center the heat shrink tubing over the joint and heat using a heat gun. Heat the joint until the tubing is tightly sealed and sealant comes out of both ends of the tubing (Fig. 17).

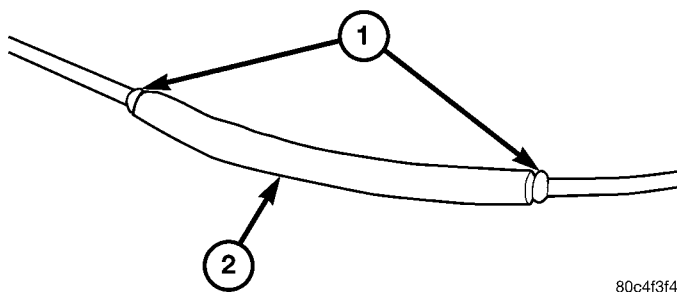


Fig. 17 HEAT SHRINK TUBE

1 - SEALANT
2 - HEAT SHRINK TUBE

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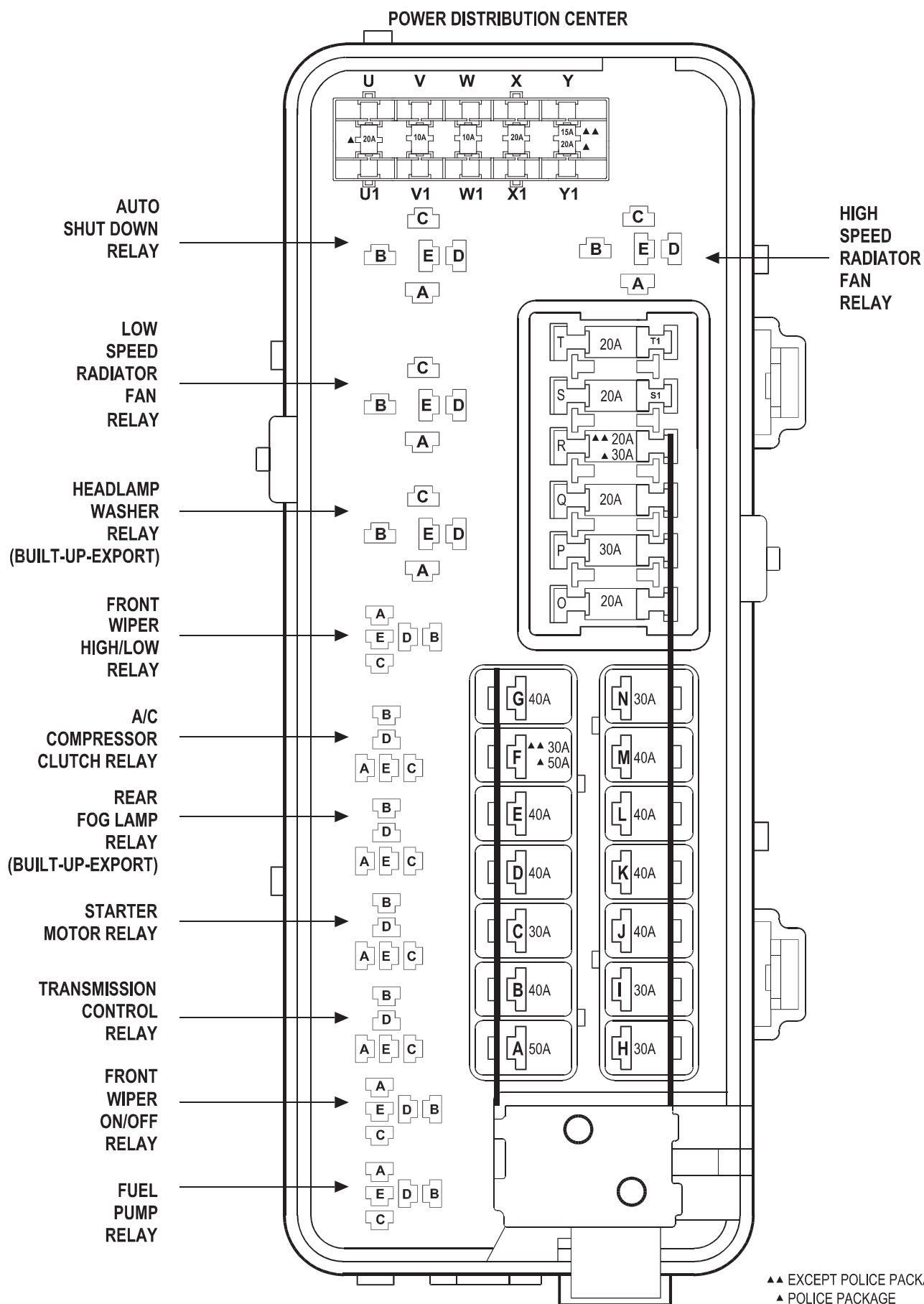
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FUSES

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B	40A	A17 12RD/BR	FUSED B(+)
C	30A	A3 14RD/TN	FUSED B(+)
D	40A	A34 12LB/RD	FUSED B(+)
E	40A	A16 12GY	FUSED B(+)
F ▲▲	30A	A37 16WT/DB	FUSED B(+)
F ▲	50A	A37 16WT/DB	FUSED B(+)
G	40A	A1 12RD	FUSED B(+)
H □	30A	A20 12RD/DB	FUSED B(+)
I	30A	A7 14RD/BK	FUSED B(+)
J	40A	A2 12PK/BK	FUSED B(+)
K □	40A	A10 12RD/DG	FUSED B(+)
L	40A	A13 12PK/WT	FUSED B(+)
M	40A	A5 12 RD/OR	FUSED B(+)
N	30A	A14 14RD/WT	FUSED B(+)
O	20A	A15 18PK	FUSED B(+)
P ●	30A	A53 14RD/YL	FUSED B(+)
P ▲	30A	A101 16RD/TN	FUSED B(+)
Q	20A	A30 14RD/LB	FUSED B(+)
R ●	20A	A35 18DB	FUSED B(+)
R ▲	30A	A102 16RD/OR	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
S	20A	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
T	20A	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
U ▲	20A	A103 16RD/YL	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
V	10A	A41 12YL	FUSED IGNITION SWITCH OUTPUT (START)
W	10A	A209 20RD	FUSED B(+)
X ▲▲	20A	A130 16VT/RD	FUSED B(+)
X ▲	20A	SL1 18LB/WT	FUSED B(+)
Y ▲▲	15A	A105 18DB/RD	FUSED B(+)
Y ▲	20A	SL2 18DB/WT	FUSED B(+)

- ▲ POLICE PACKAGE
- ▲▲ EXCEPT POLICE PACKAGE
- ABS
- BUILT-UP-EXPORT

**A/C
COMPRESSOR
CLUTCH
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A17 12RD/BR	FUSED B(+)
C	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
D	C2 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
E	-	-

**AUTO
SHUT DOWN
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	A209 20RD	FUSED B(+)
B	A14 14RD/WT	FUSED B(+)
C	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
D	A142 14DG/OR	AUTOMATIC SHUT DOWN RELAY OUTPUT
E	-	-

**FRONT
WIPER
HIGH/LOW
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	A5 14RD/OR	FUSED B(+)
B	V5 12DG	FRONT WIPER RELAY COMMON
C	V16 20VT	FRONT WIPER HIGH/LOW RELAY CONTROL
D	V4 14RD/YL	FRONT WIPER HIGH/LOW RELAY HIGH SPEED OUTPUT
E	V3 14BR/WT	FRONT WIPER HIGH/LOW RELAY LOW SPEED OUTPUT

**FRONT
WIPER
ON/OFF
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	A5 14RD/OR	FUSED B(+)
B	V5 12DG	FRONT WIPER RELAY COMMON
C	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
D	A5 12RD/OR	FUSED B(+)
E	Z1 14BK	GROUND

**FUEL
PUMP
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A1 12RD	FUSED B(+)
C	K31 20BR	FUEL PUMP RELAY CONTROL
D	A141 12DG/WT	FUEL PUMP RELAY OUTPUT
E	-	-

**HEADLAMP
WASHER
RELAY
(BUILT-UP-EXPORT)**

CAVITY	CIRCUIT	FUNCTION
A	V58 20BR/YL	HEADLAMP WASHER RELAY CONTROL
B	A53 14RD/YL	FUSED B(+)
C	A53 14RD/YL	FUSED B(+)
D	V53 14RD/OR	HEADLAMP WASHER RELAY OUTPUT
E	-	-

**HIGH
SPEED
RADIATOR
FAN
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A17 12RD/BR	FUSED B(+)
C	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
D	C25 12YL	HIGH SPEED RADIATOR RELAY OUTPUT
E	-	-

**LOW
SPEED
RADIATOR
FAN
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
B	A16 12GY	FUSED B(+)
C	C24 20DB/PK	LOW SPEED RADIATOR FAN RELAY CONTROL
D	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
E	-	-

**REAR
FOG
LAMP
RELAY
(BUILT-UP-EXPORT)**

CAVITY	CIRCUIT	FUNCTION
A	A35 18DB	FUSED B(+)
B	A35 18DB	FUSED B(+)
C	L96 18LG/RD	REAR FOG LAMP SWITCH GROUND
D	L95 18DG/YL	REAR FOG LAMP RELAY OUTPUT
E	-	-

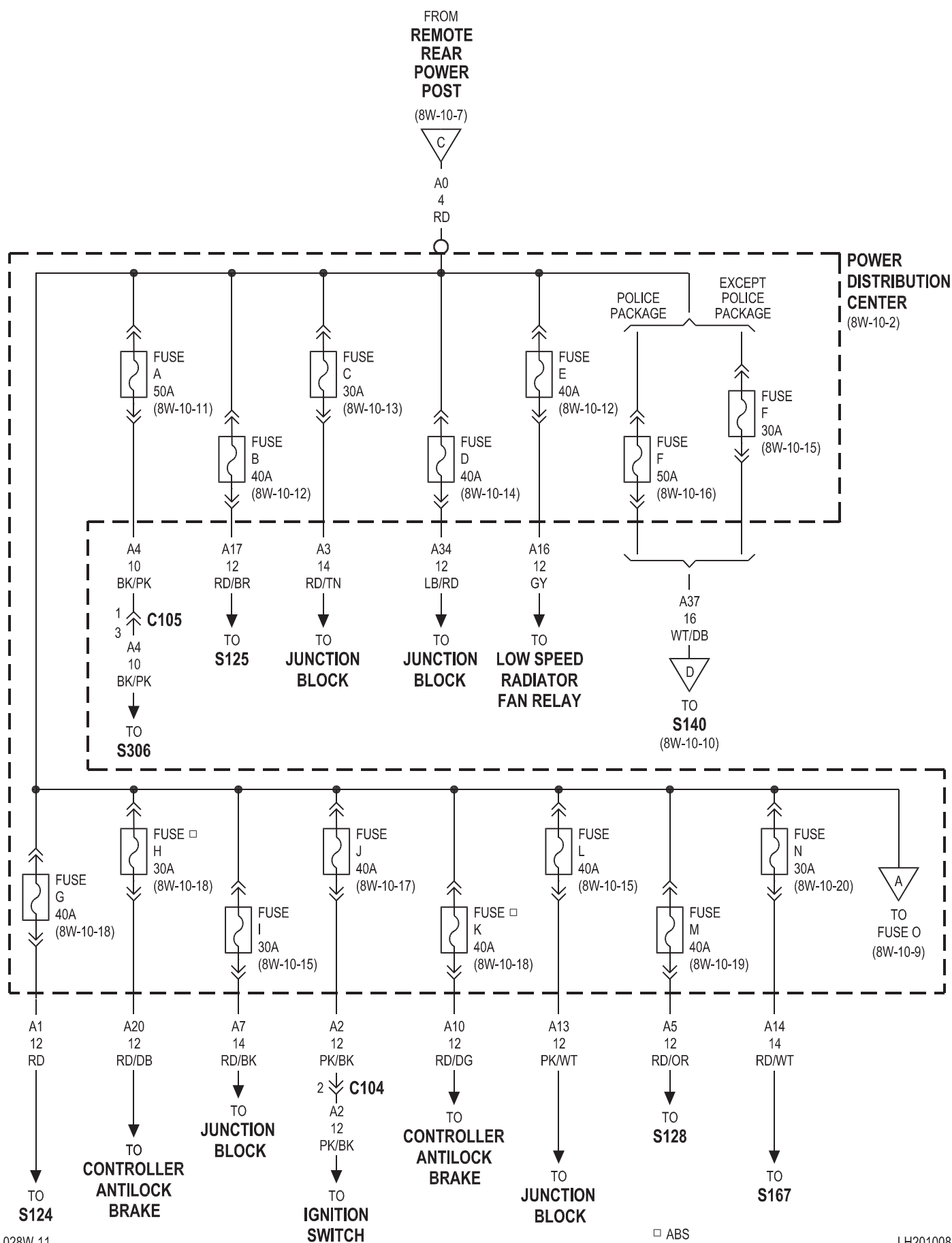
**STARTER
MOTOR
RELAY**

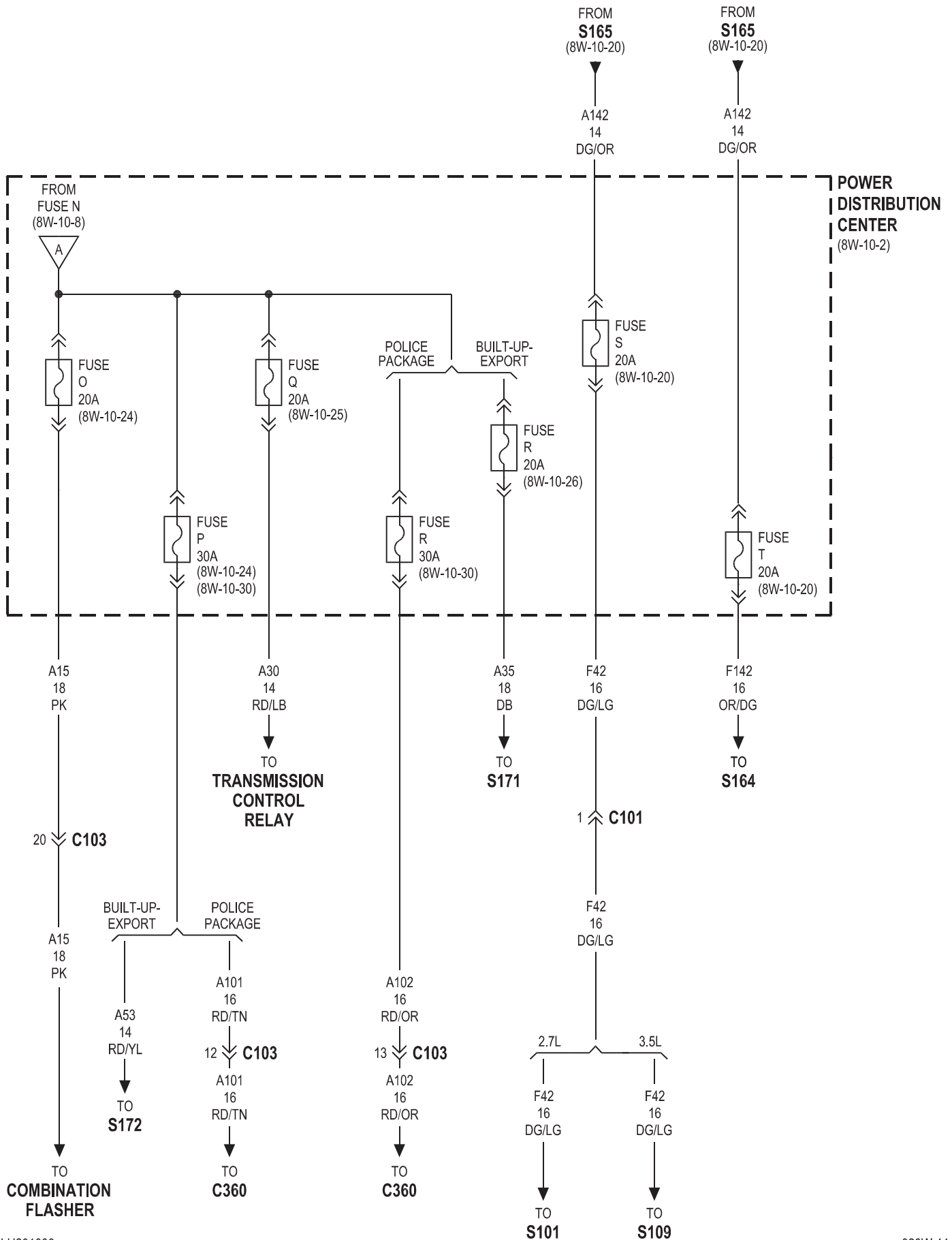
CAVITY	CIRCUIT	FUNCTION
A	T751 20YL/BK	FUSED IGNITION SWITCH OUTPUT (START)
B	A1 12RD	FUSED B(+)
C	K90 20TN	STARTER RELAY CONTROL
D	T40 12BR	STARTER RELAY OUTPUT
E	-	-

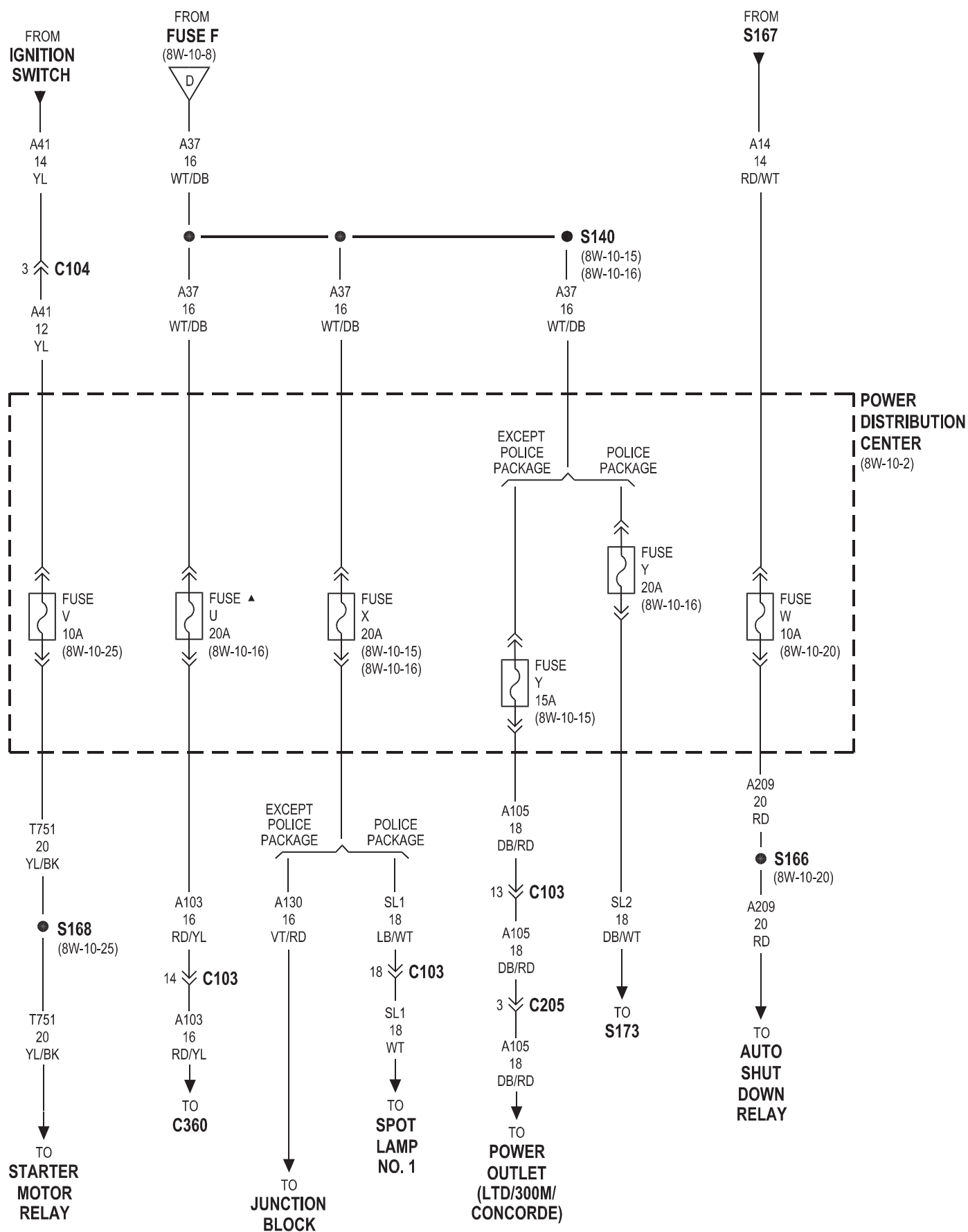
**TRANSMISSION
CONTROL
RELAY**

CAVITY	CIRCUIT	FUNCTION
A	T15 20LG	TRANSMISSION RELAY CONTROL
B	A30 14RD/LB	FUSED B(+)
C	Z1 20BK	GROUND
D	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
E	-	-

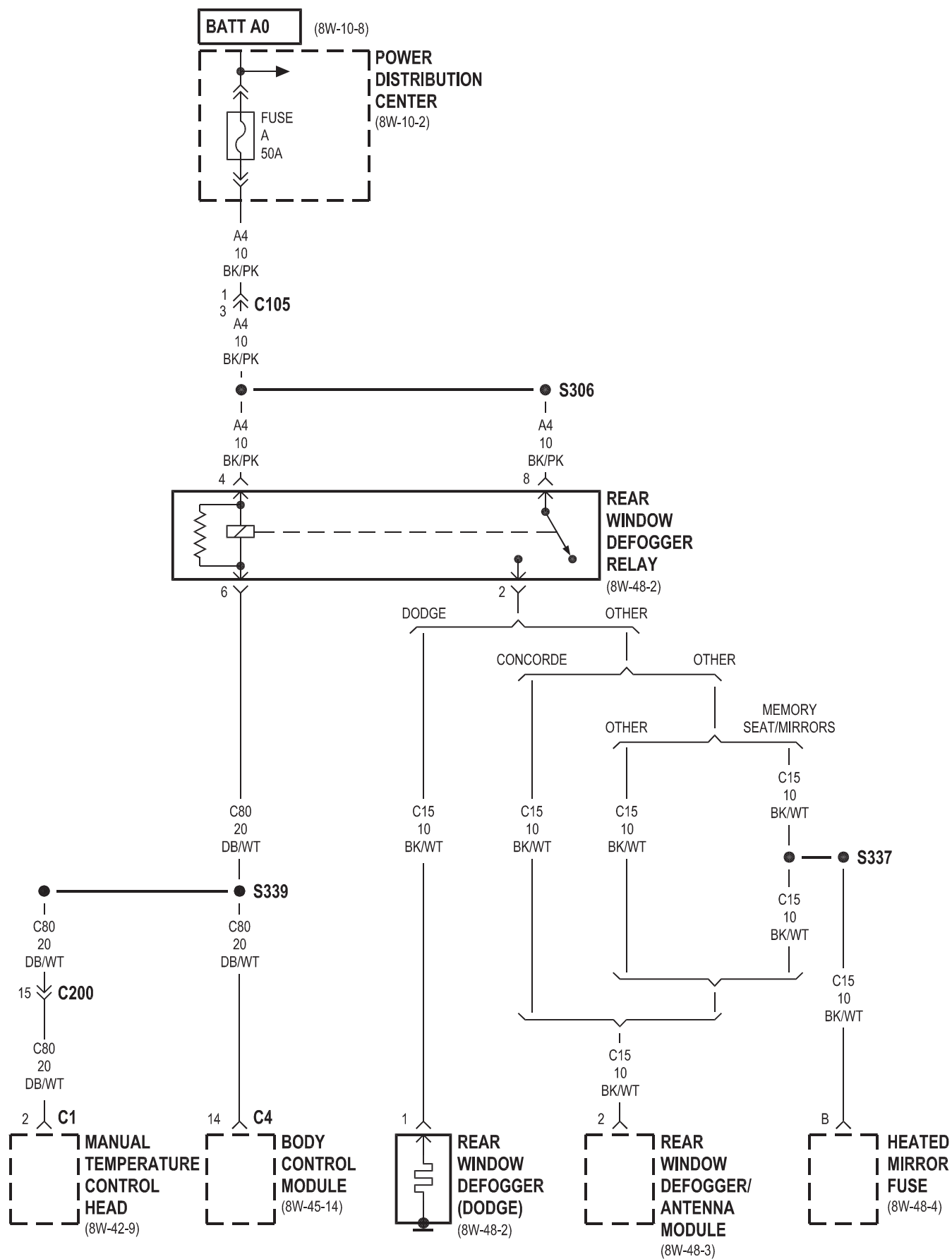


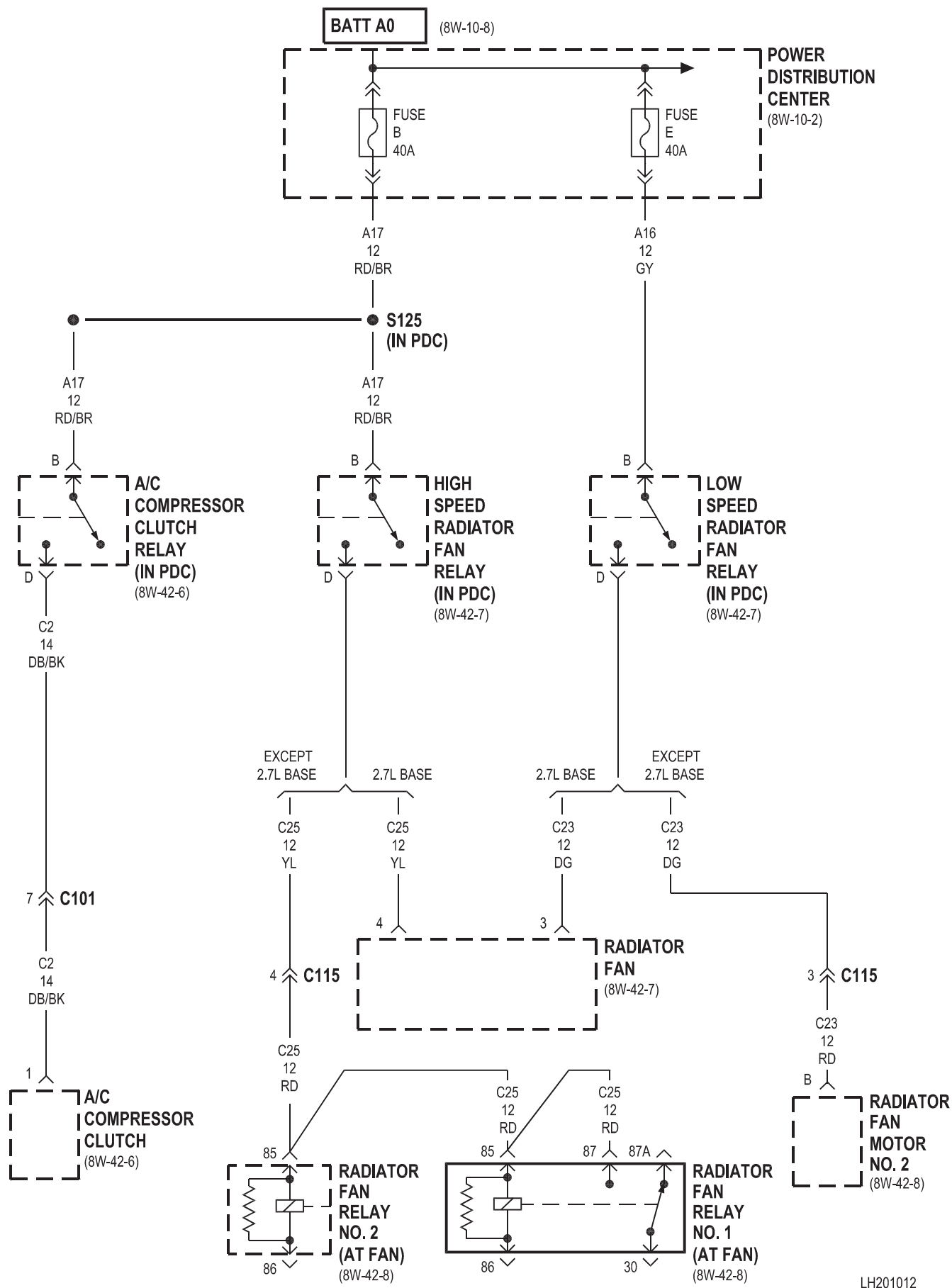


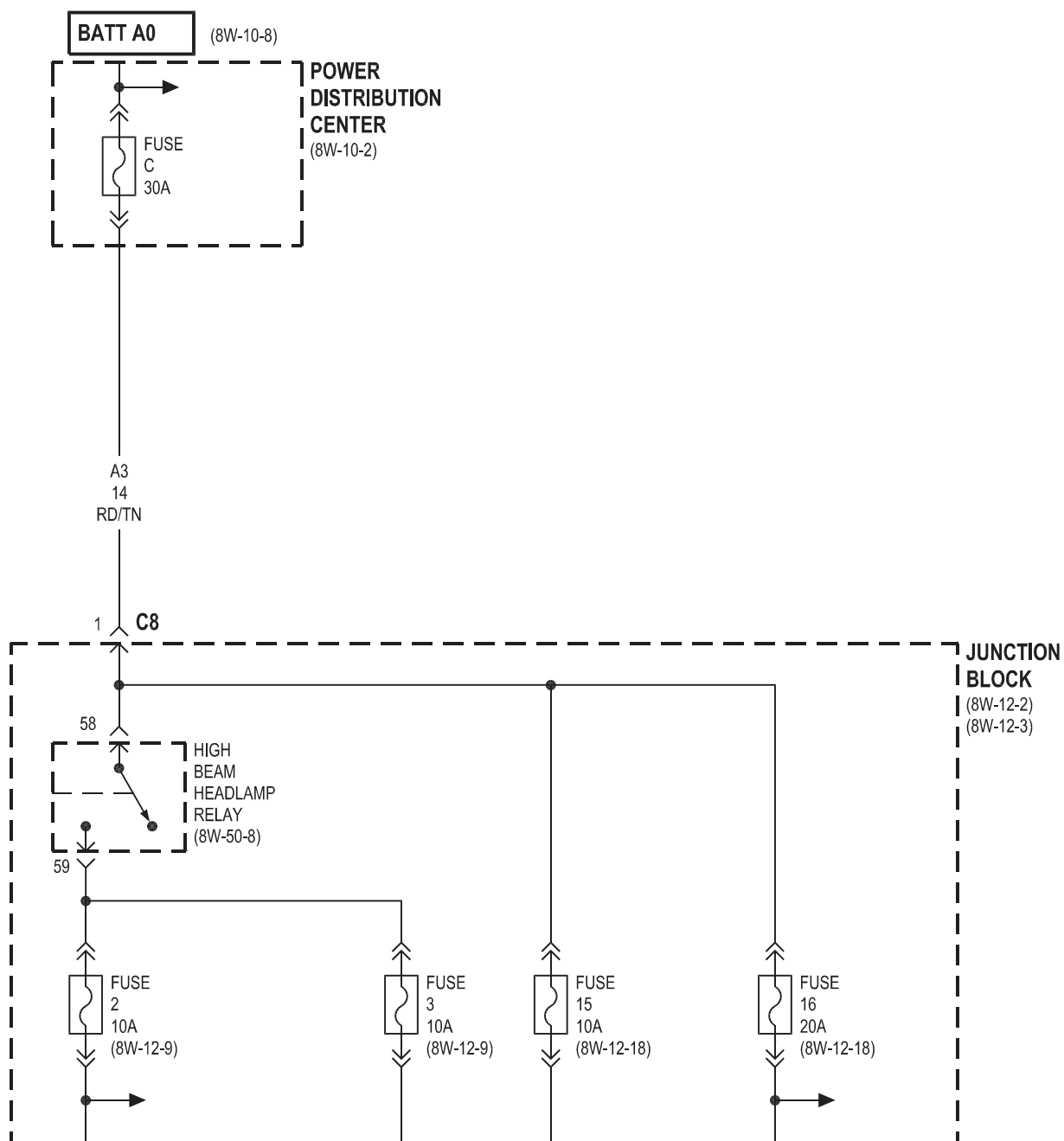


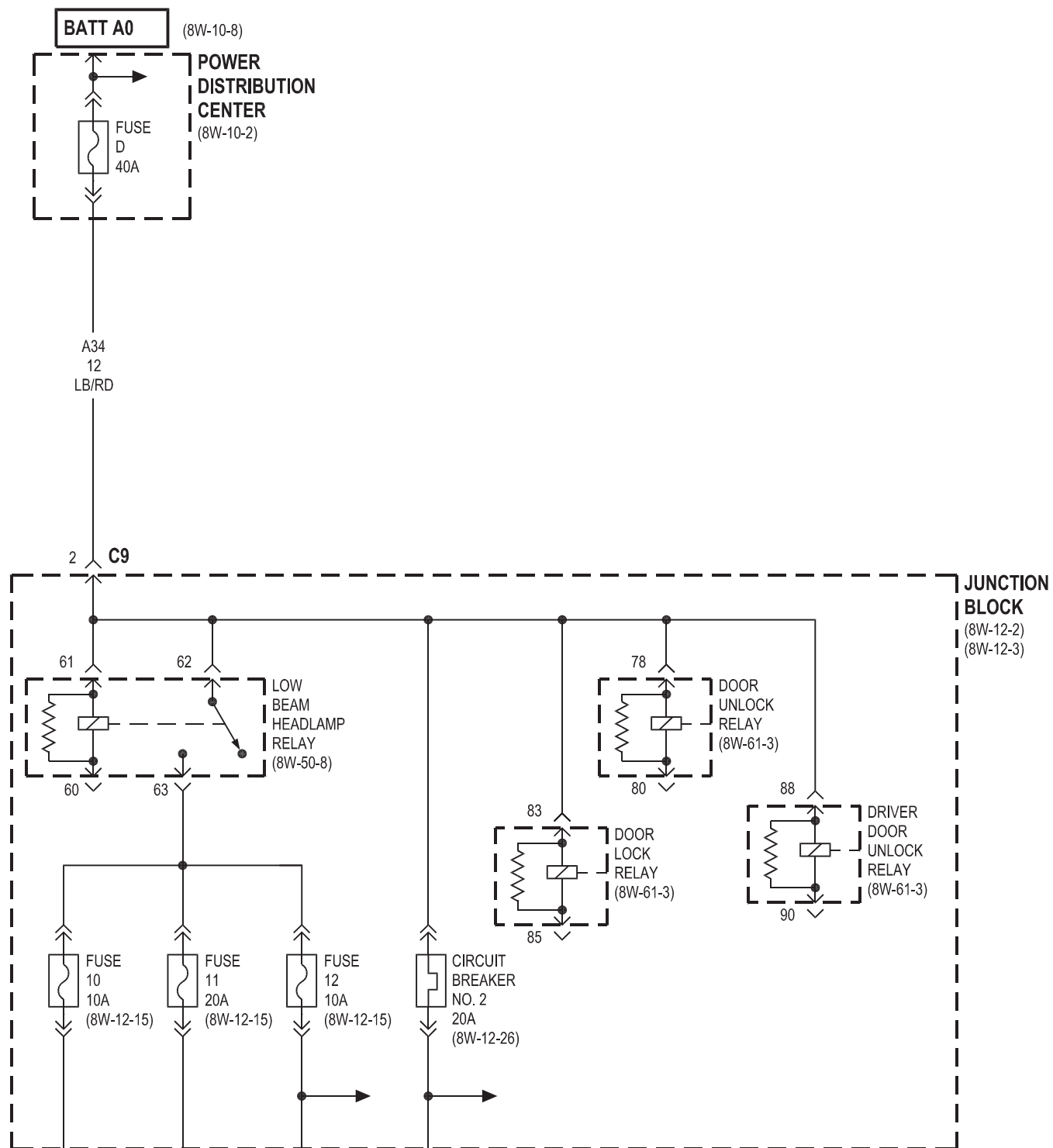


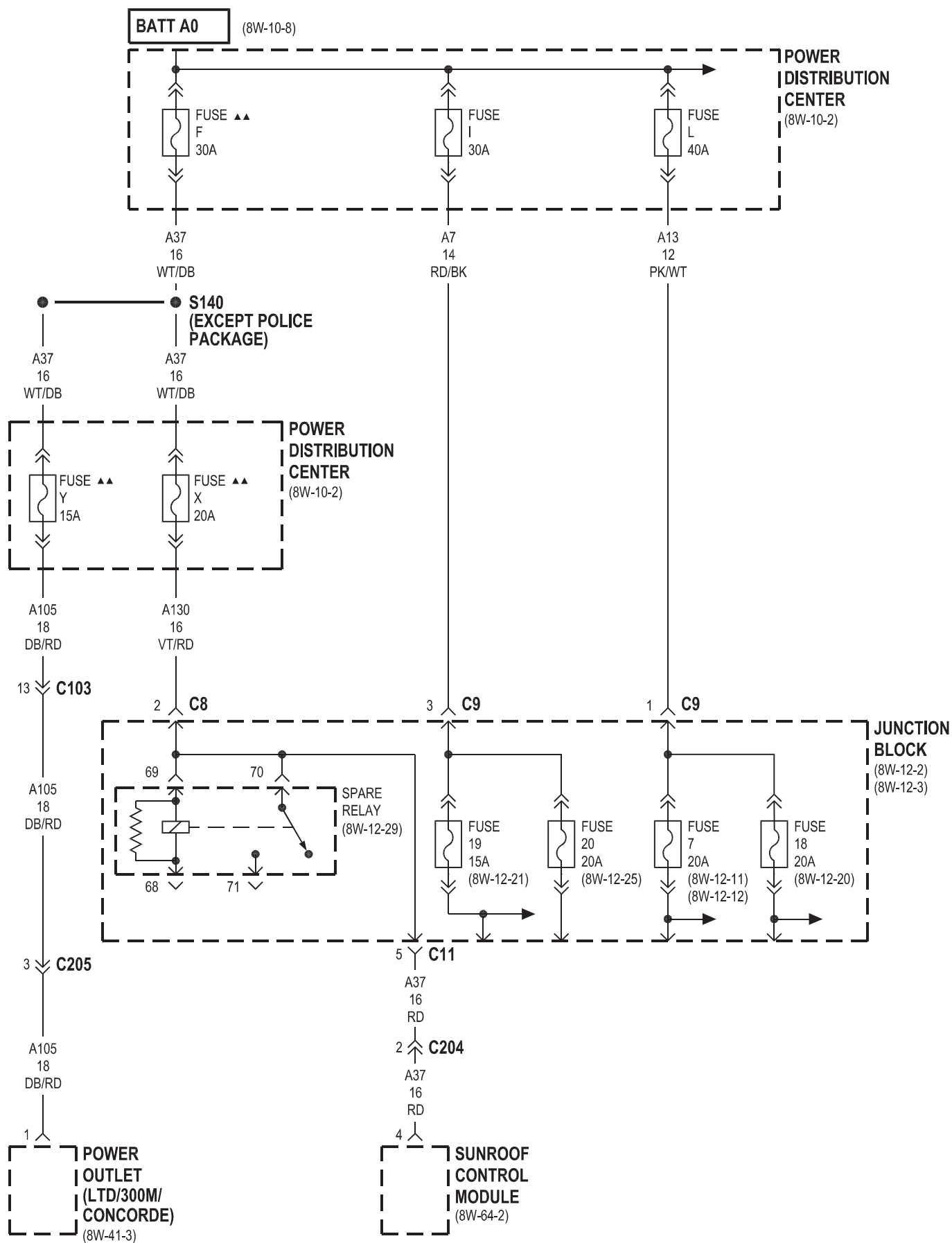
▲ POLICE PACKAGE



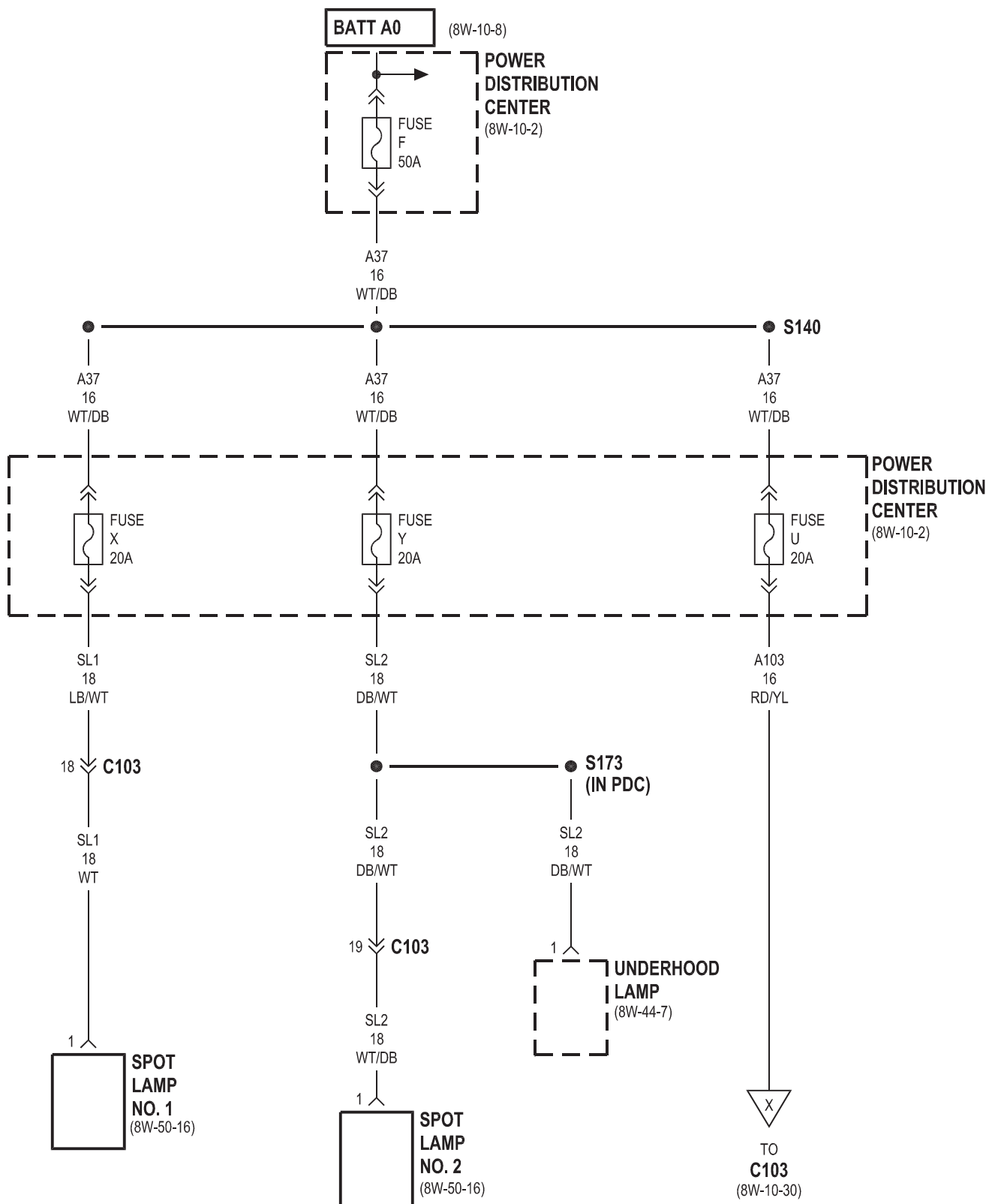


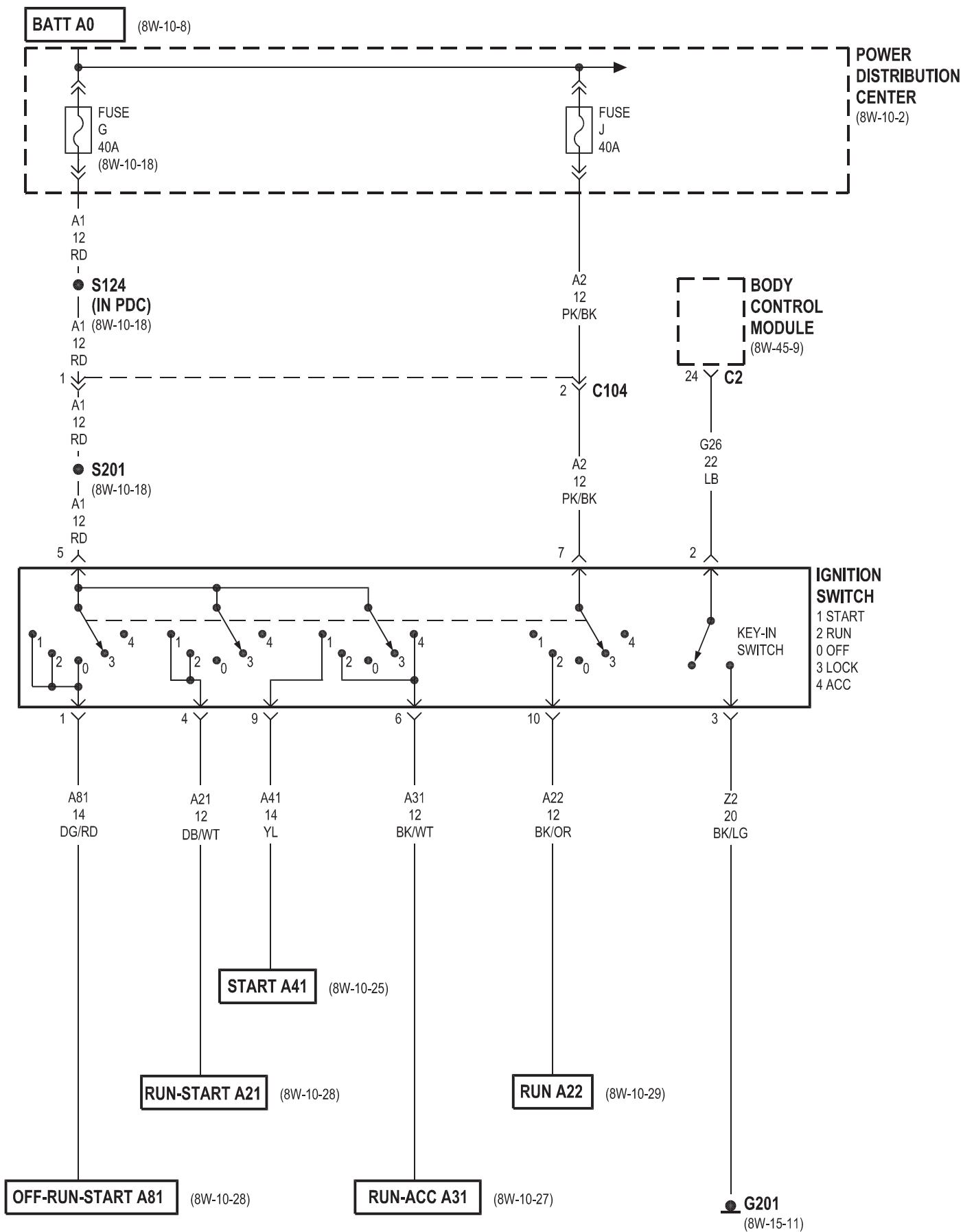


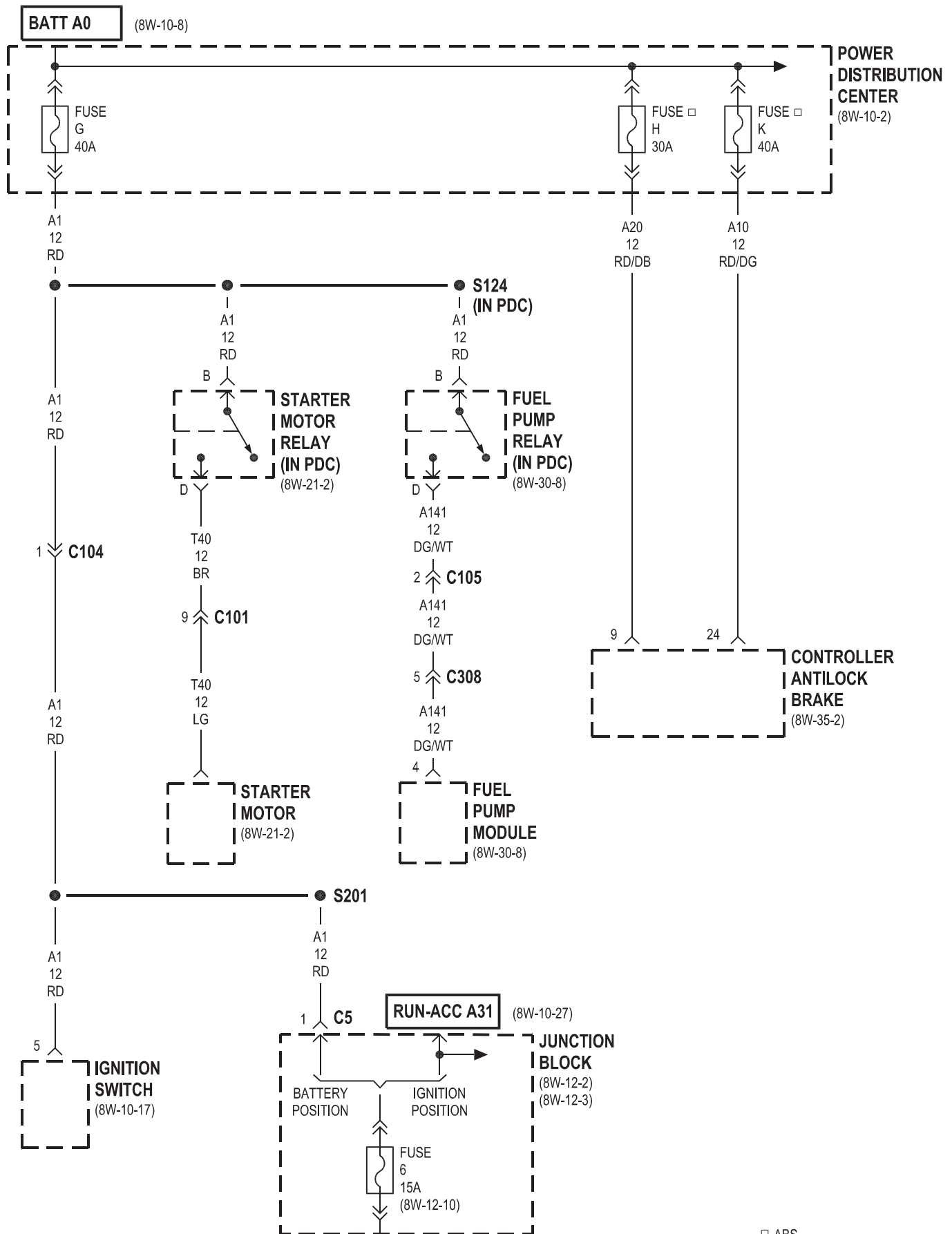


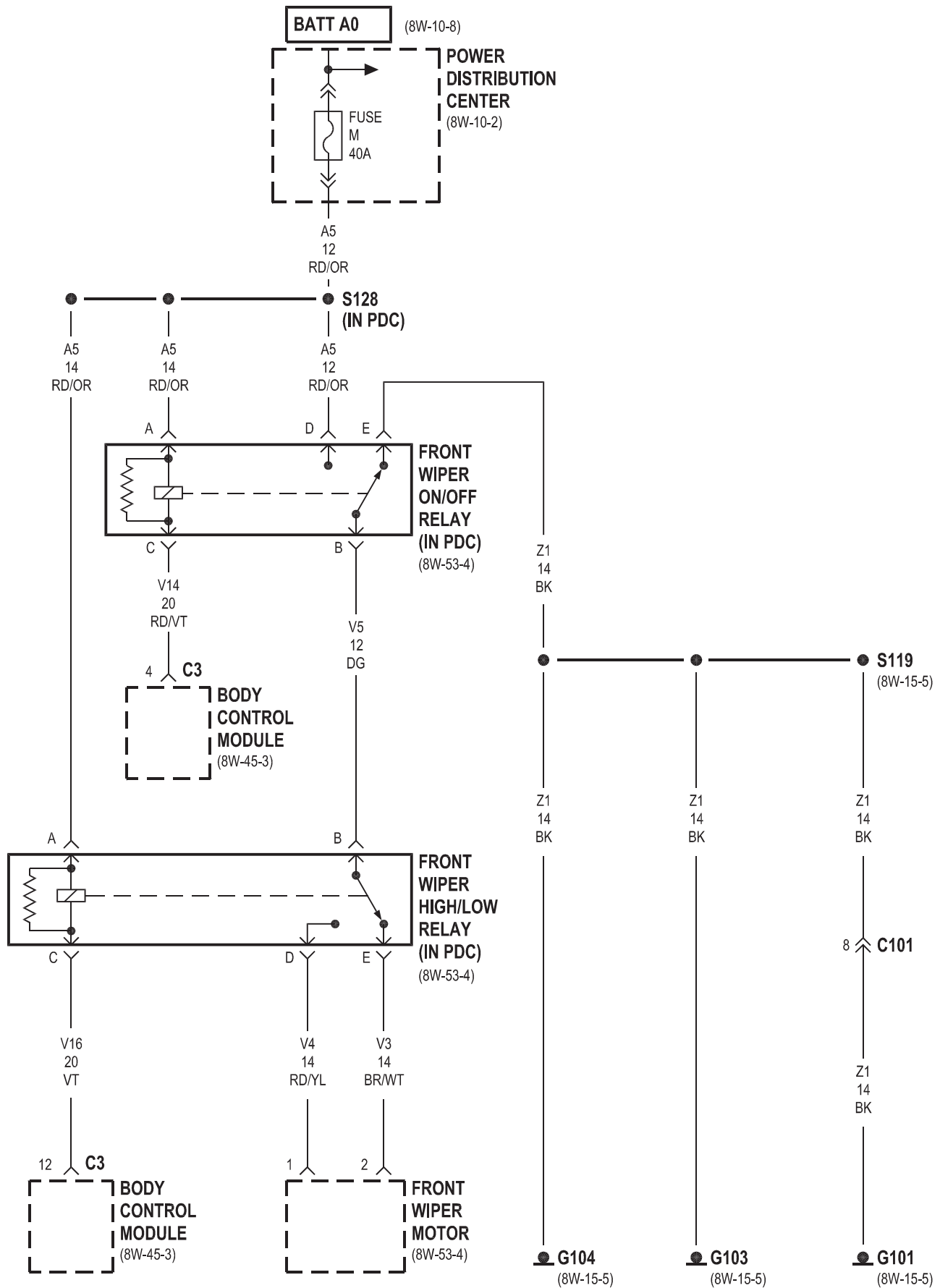


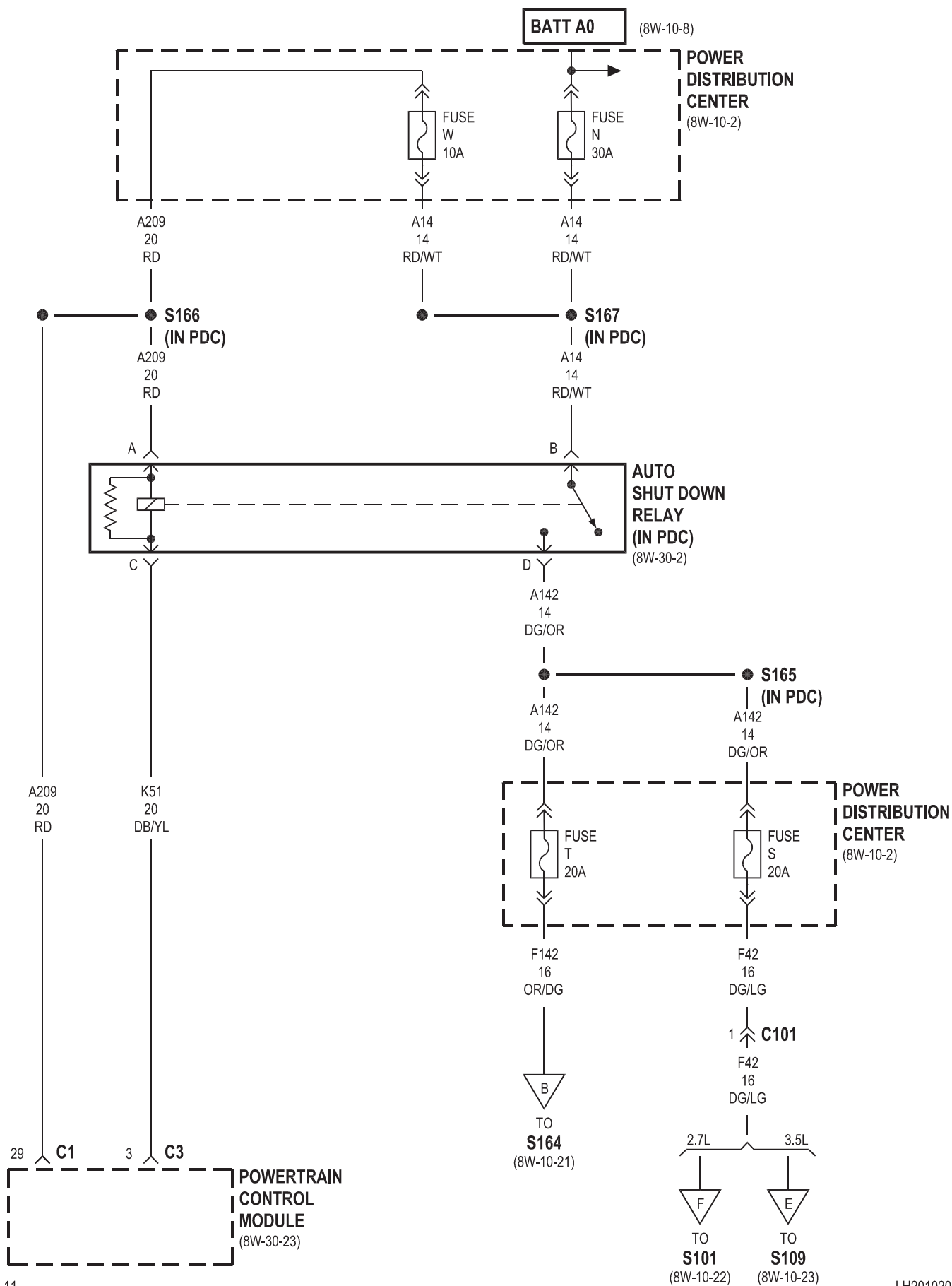
▲▲ EXCEPT POLICE PACKAGE

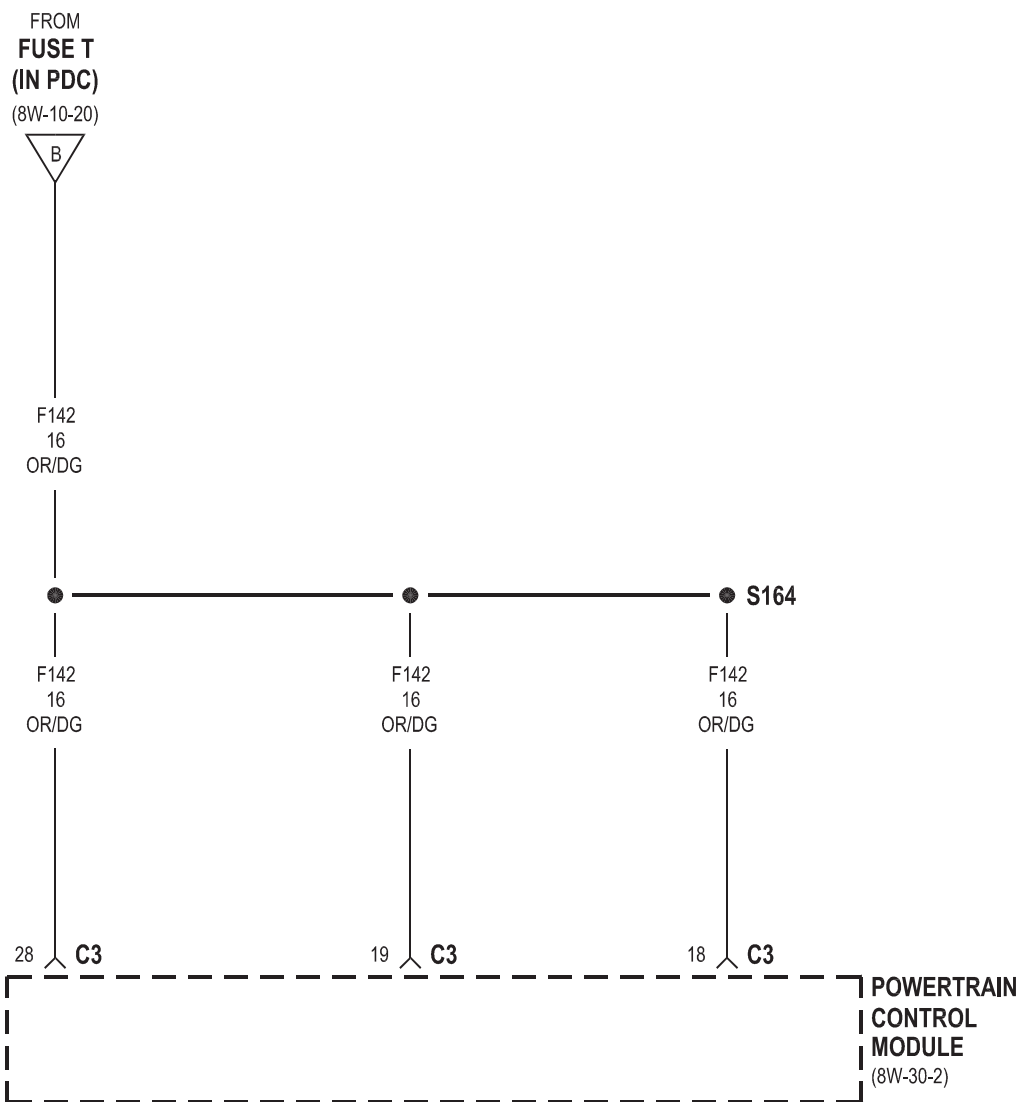


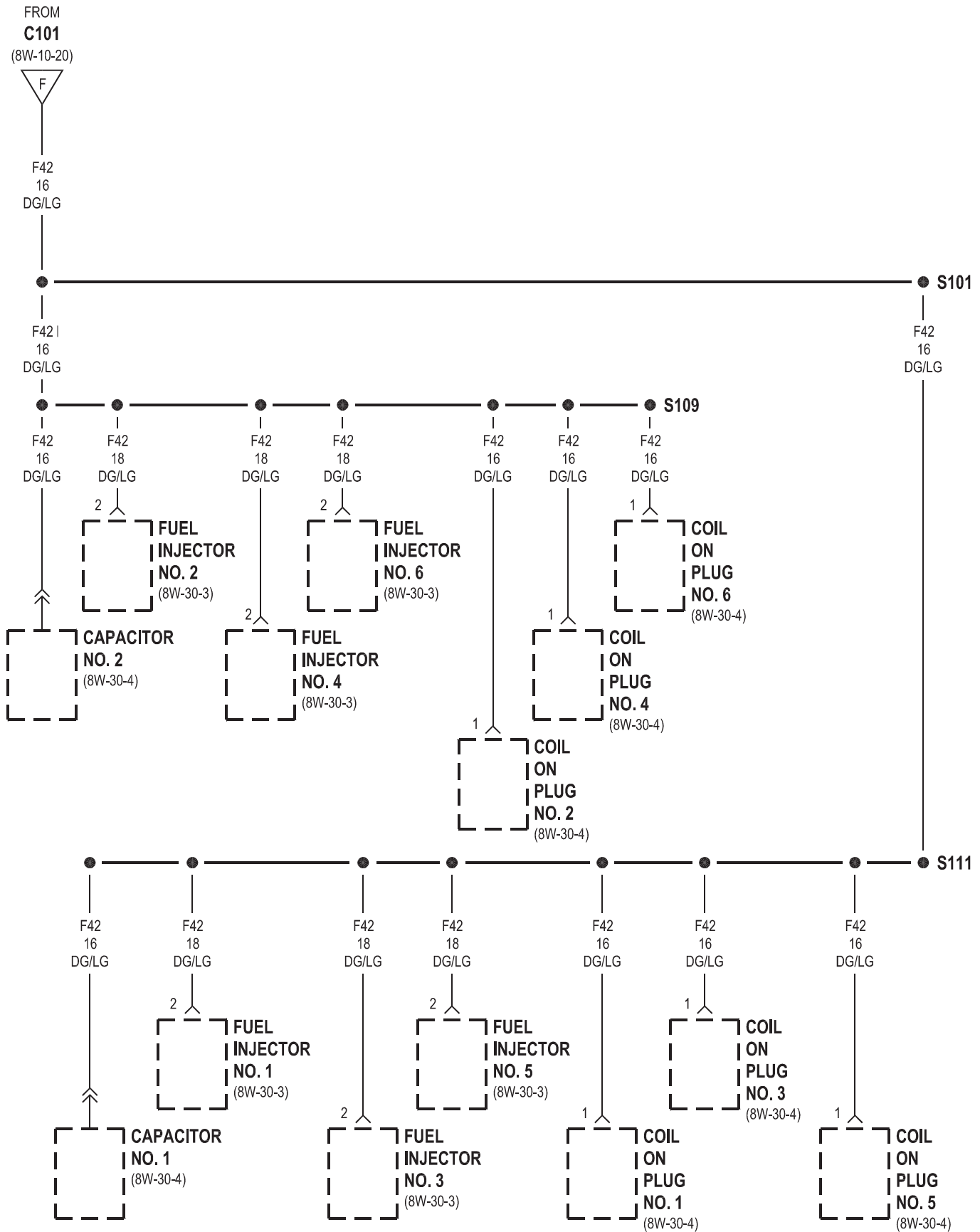


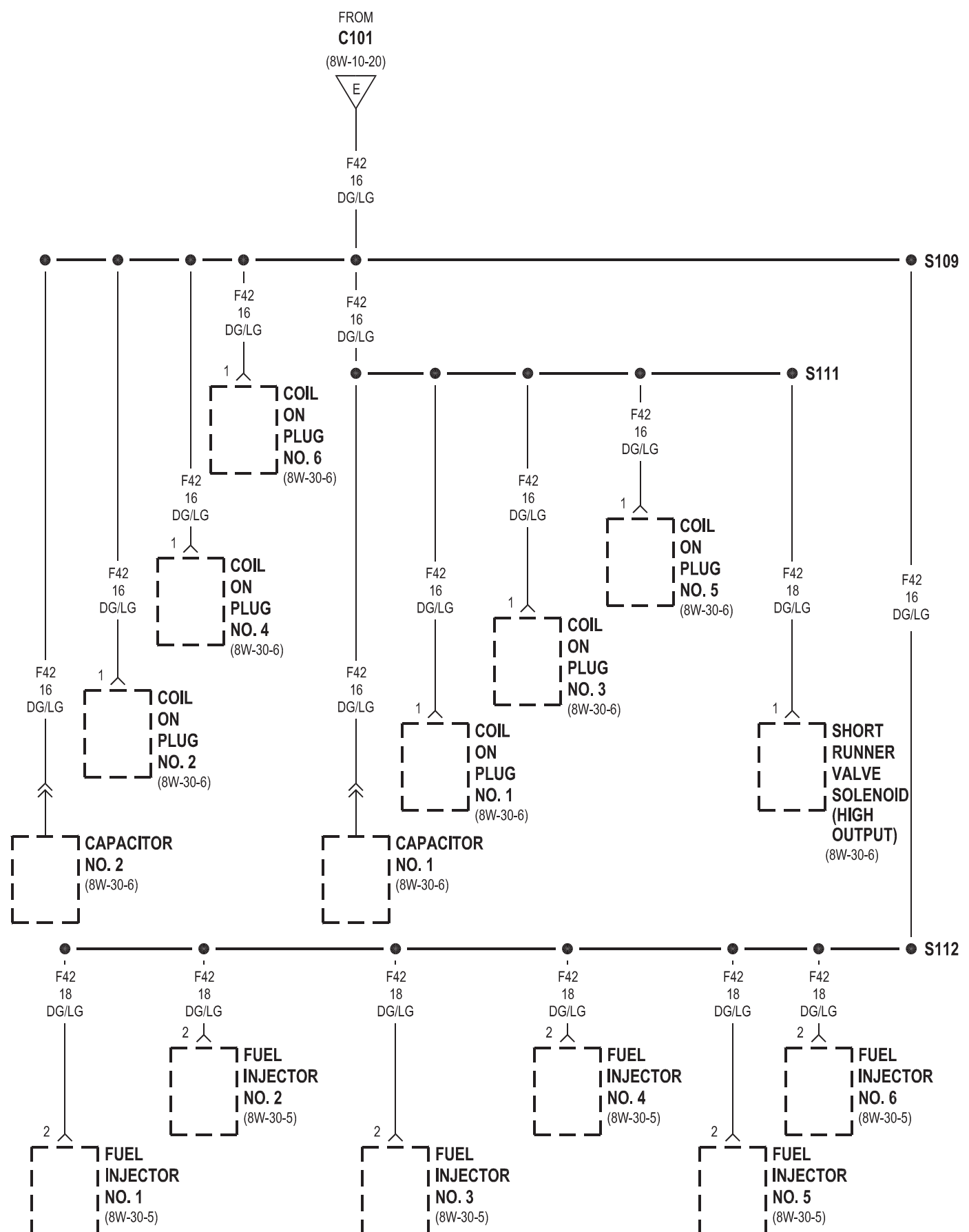


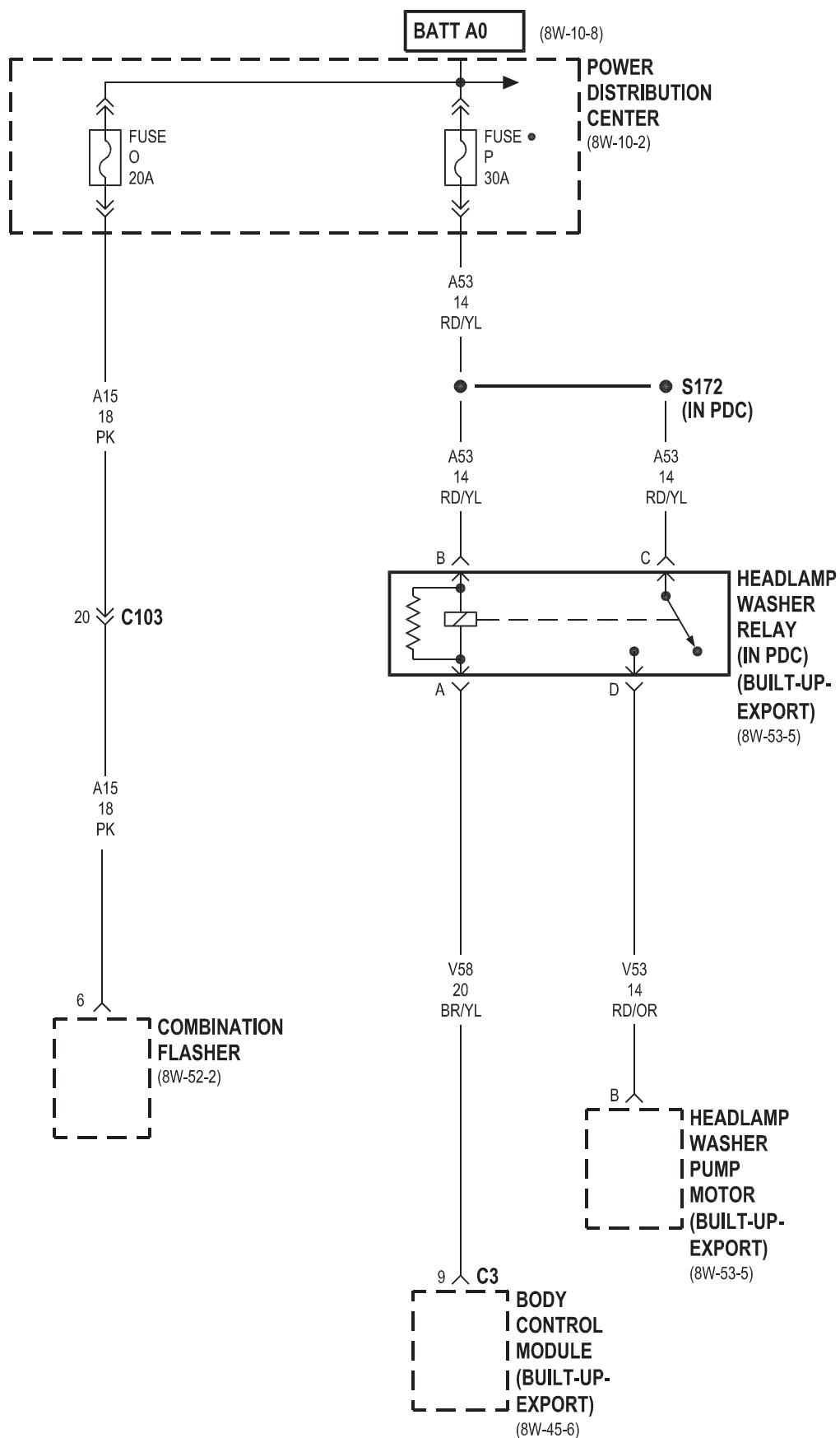


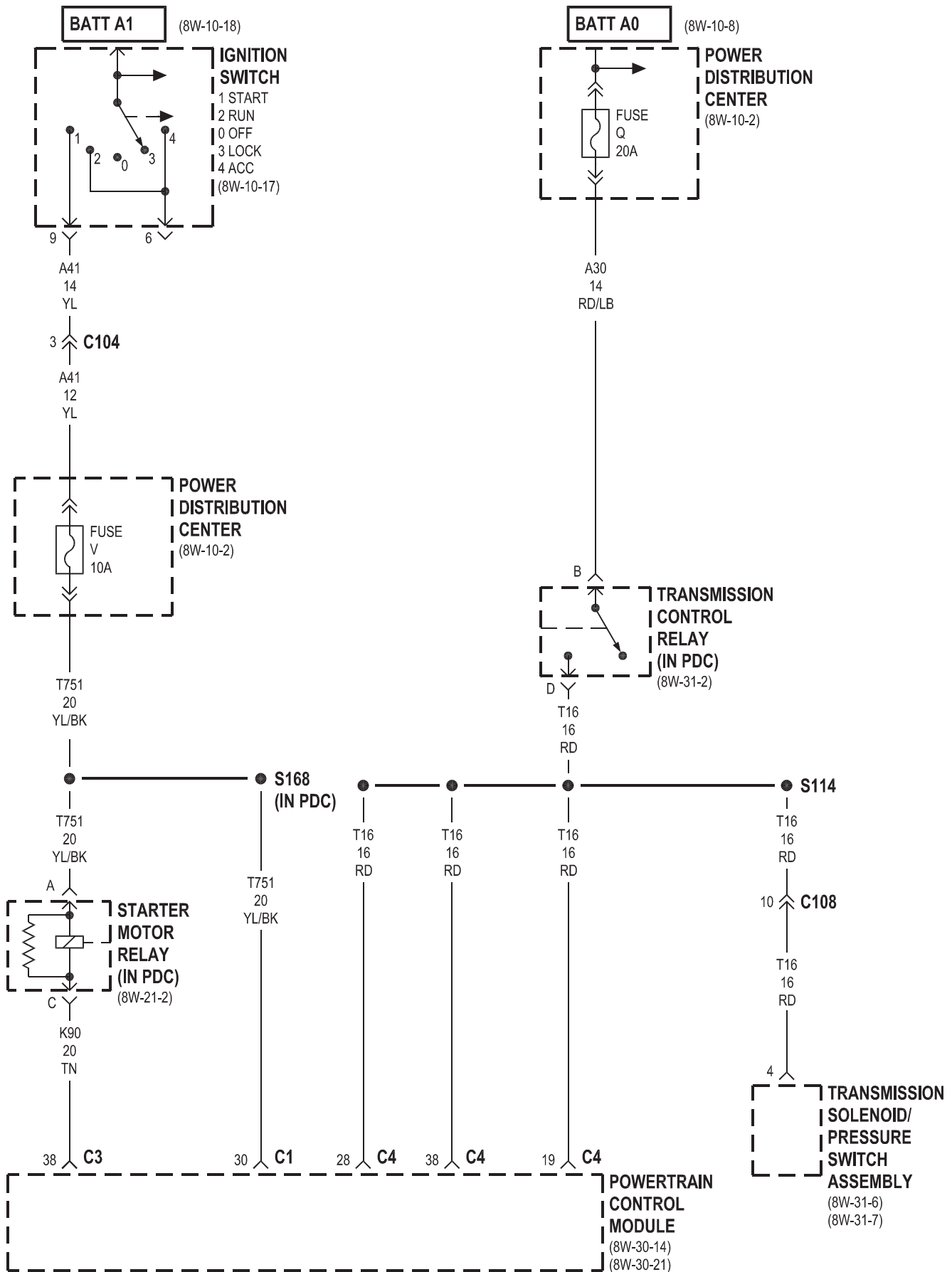


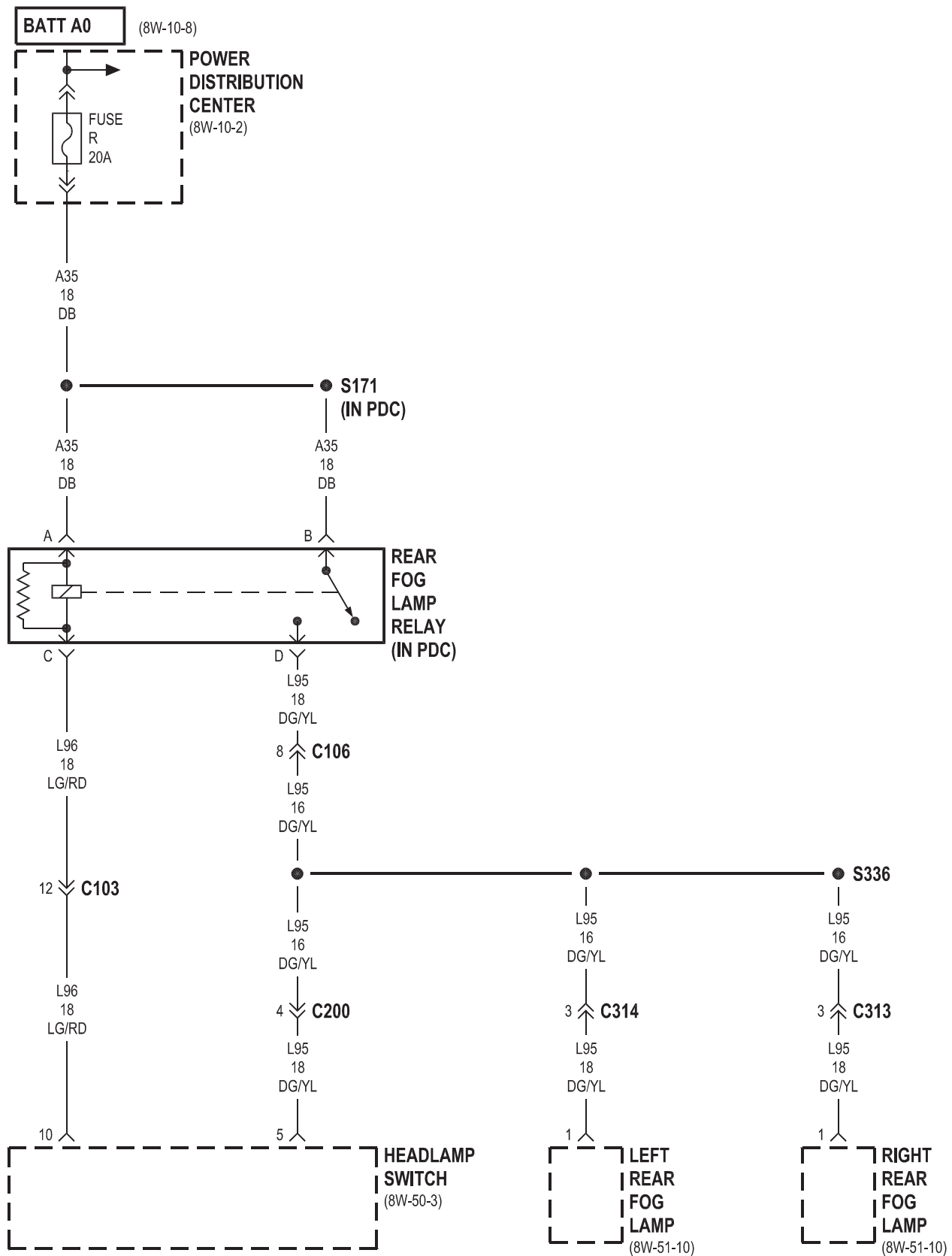


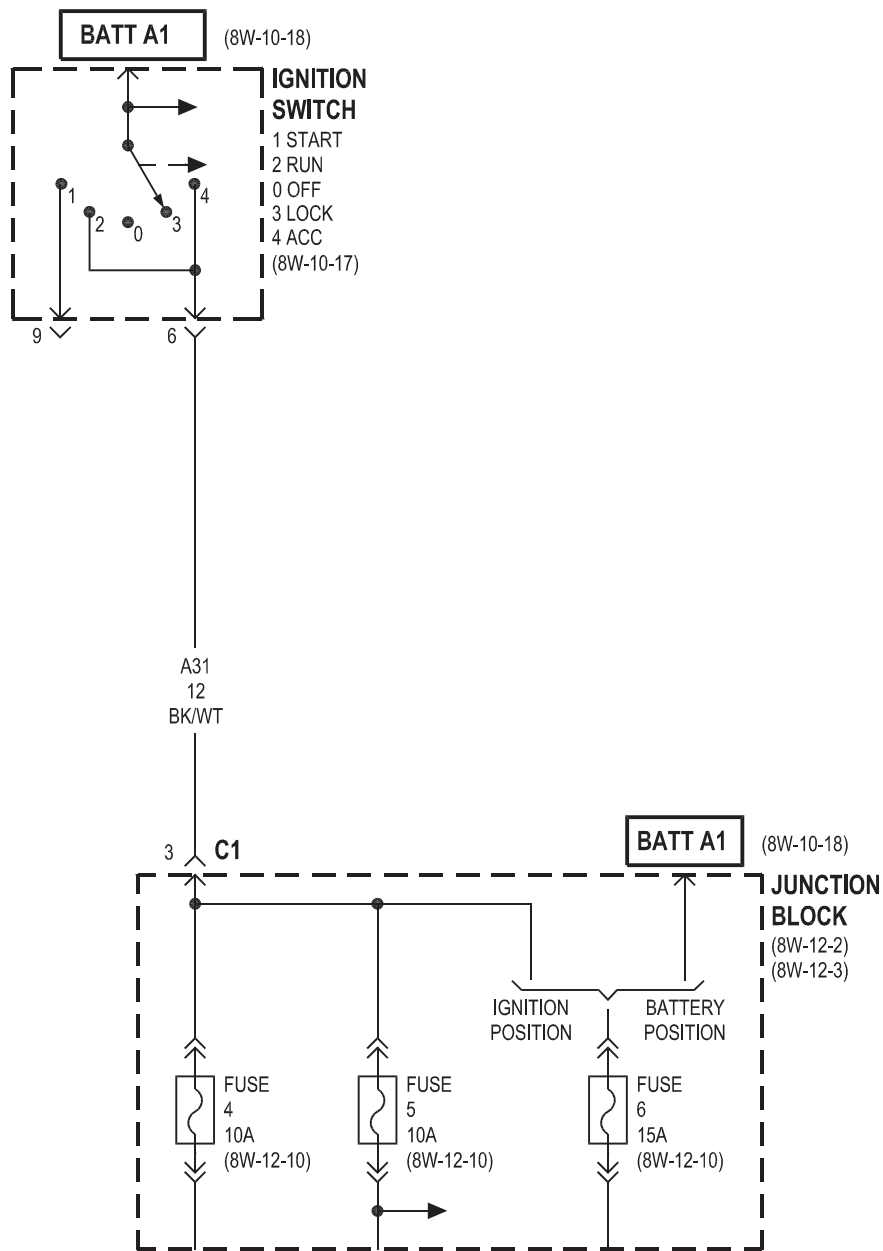


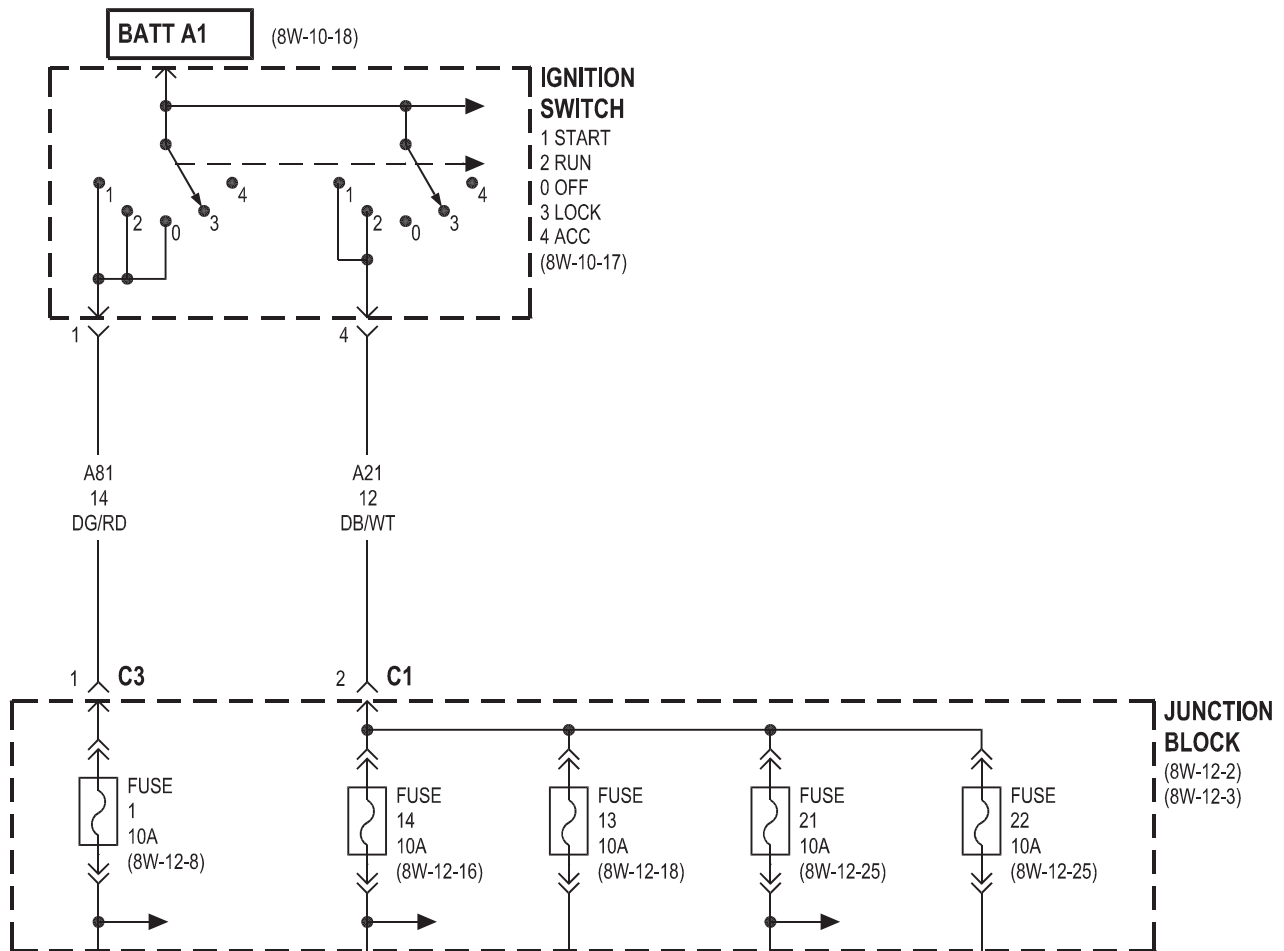


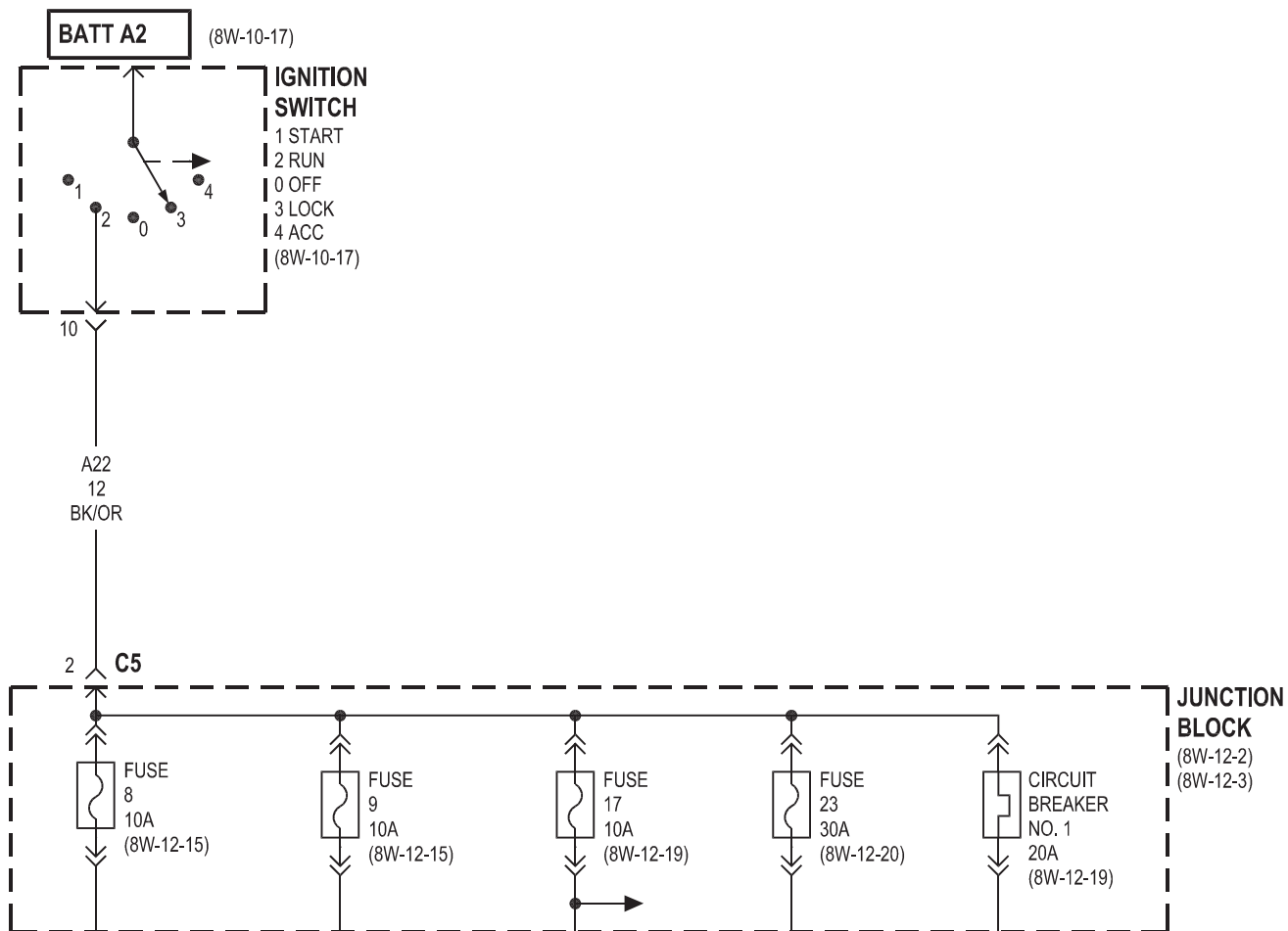


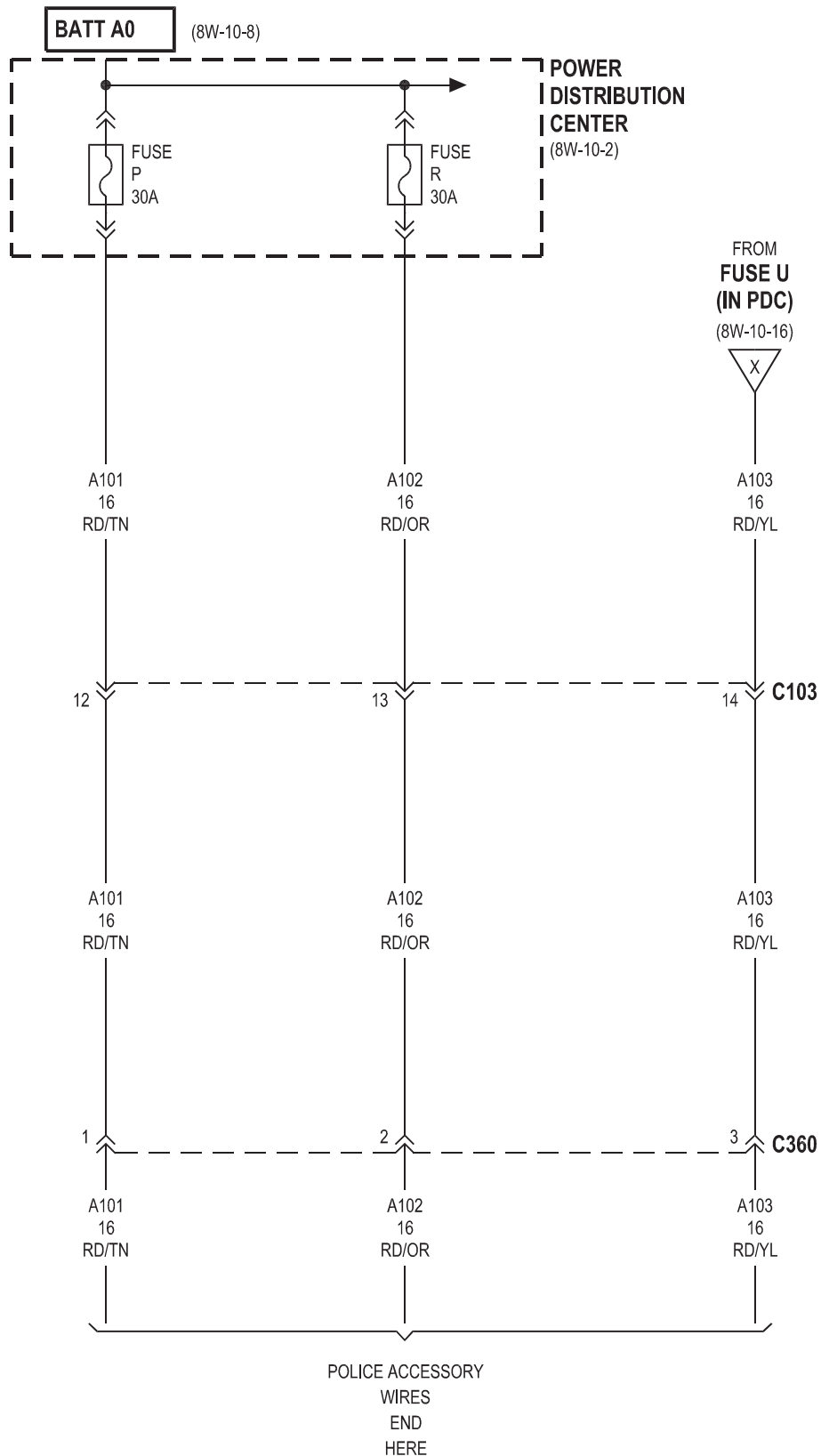












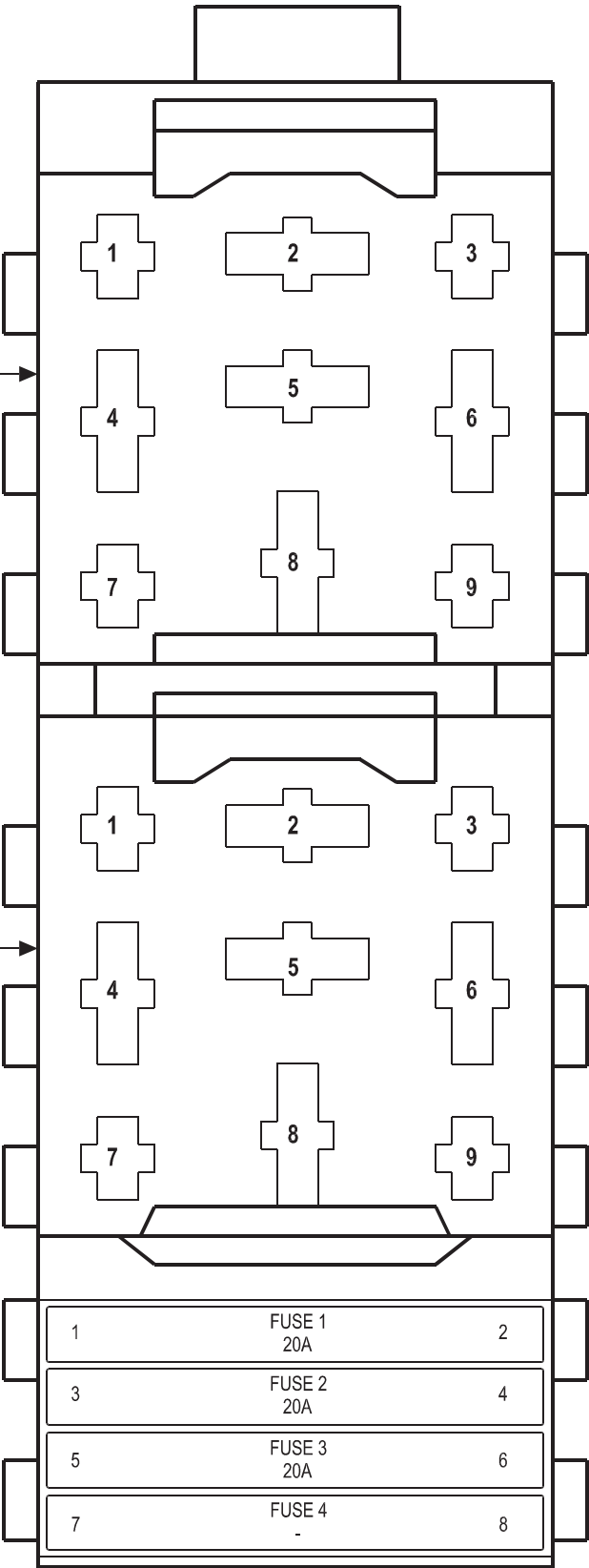
8W-11 FUSE BLOCK

Component	Page	Component	Page
Fuse 1 (RFB)	8W-11-5	ISO Relay No. 2	8W-11-4, 5
Fuse 2 (RFB)	8W-11-5	Junction Block	8W-11-4
Fuse 3 (RFB)	8W-11-5	Police Accessory	8W-11-6
Fuse P (PDC)	8W-11-6	Power Distribution Center	8W-11-6
Fuse R (PDC)	8W-11-6	Radio	8W-11-4
Fuse U (PDC)	8W-11-6	Rear Fuse Block	8W-11-2, 5, 6
G301	8W-11-5	Remote Rear Power Post	8W-11-5
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8W-11 FUSE BLOCK
POLICE PACKAGE
REAR FUSE BLOCK

ISO
RELAY
NO. 1

ISO
RELAY
NO. 2



FUSES

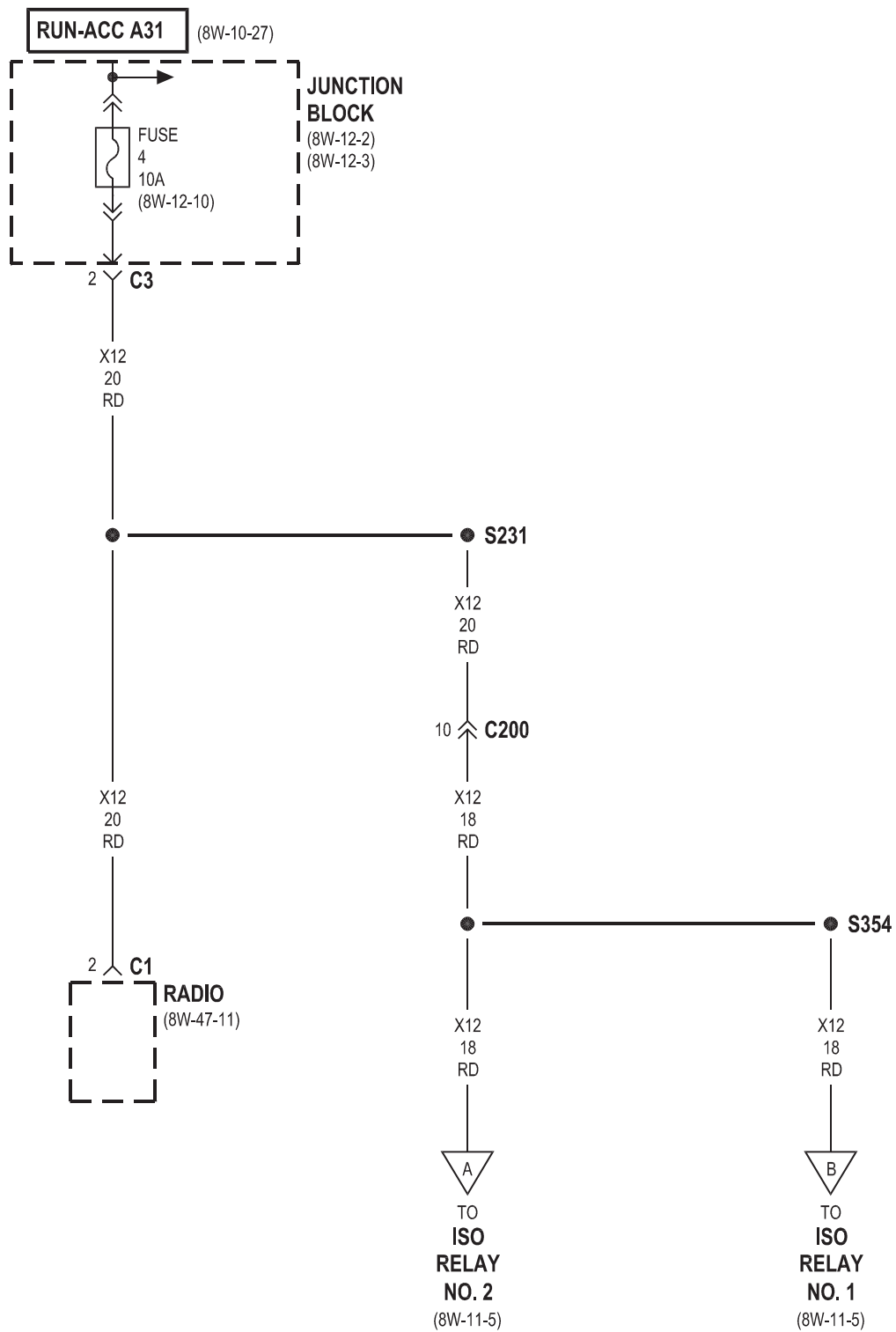
FUSE	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	F101 16YL/TN	FUSED POLICE ACCESSORY NO. 1
2	20A	F102 16YL/OR	FUSED POLICE ACCESSORY NO. 1
3	20A	F103 16YL/RD	FUSED POLICE ACCESSORY NO. 1
4	-	-	-

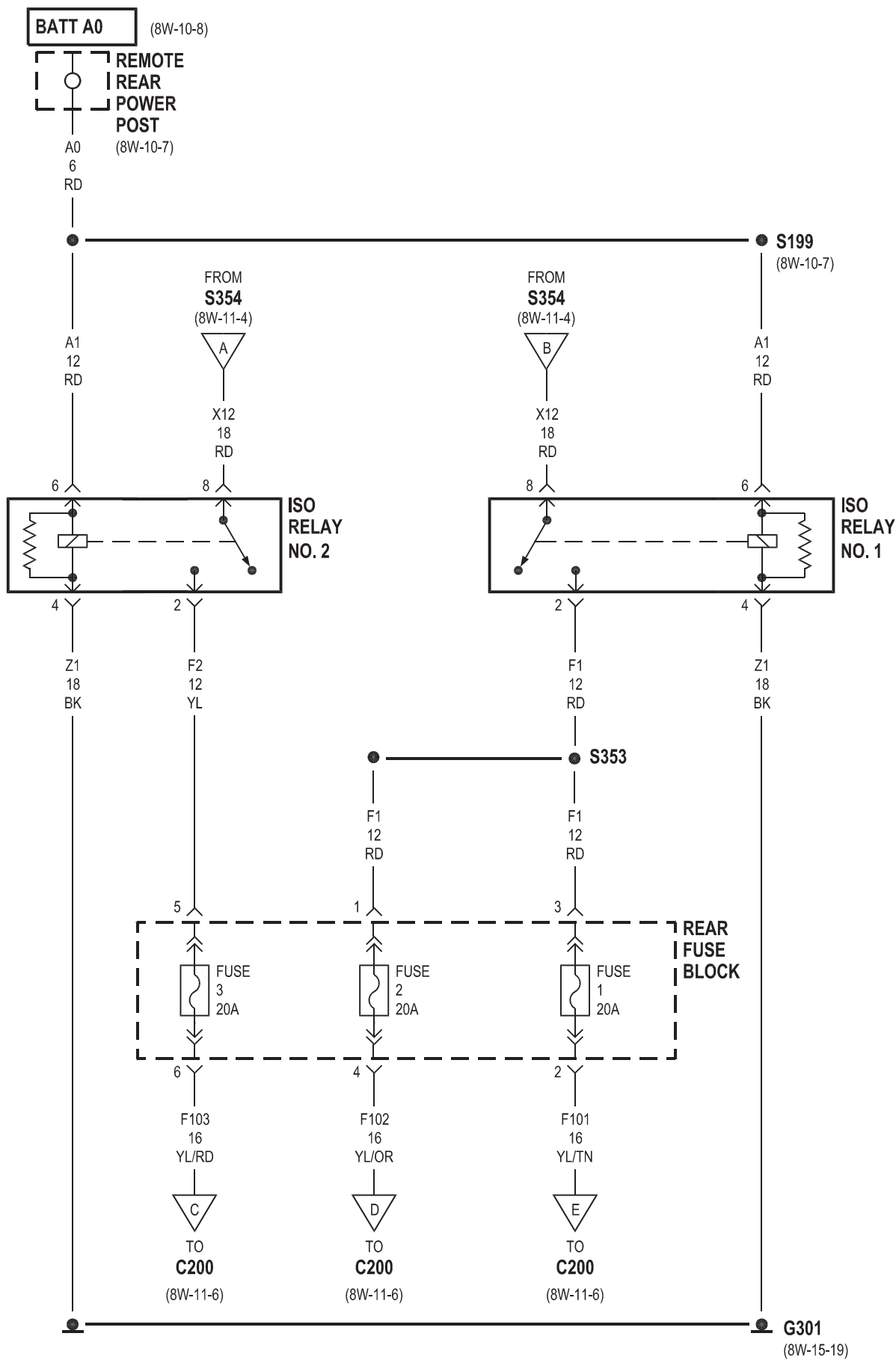
ISO RELAY NO. 1

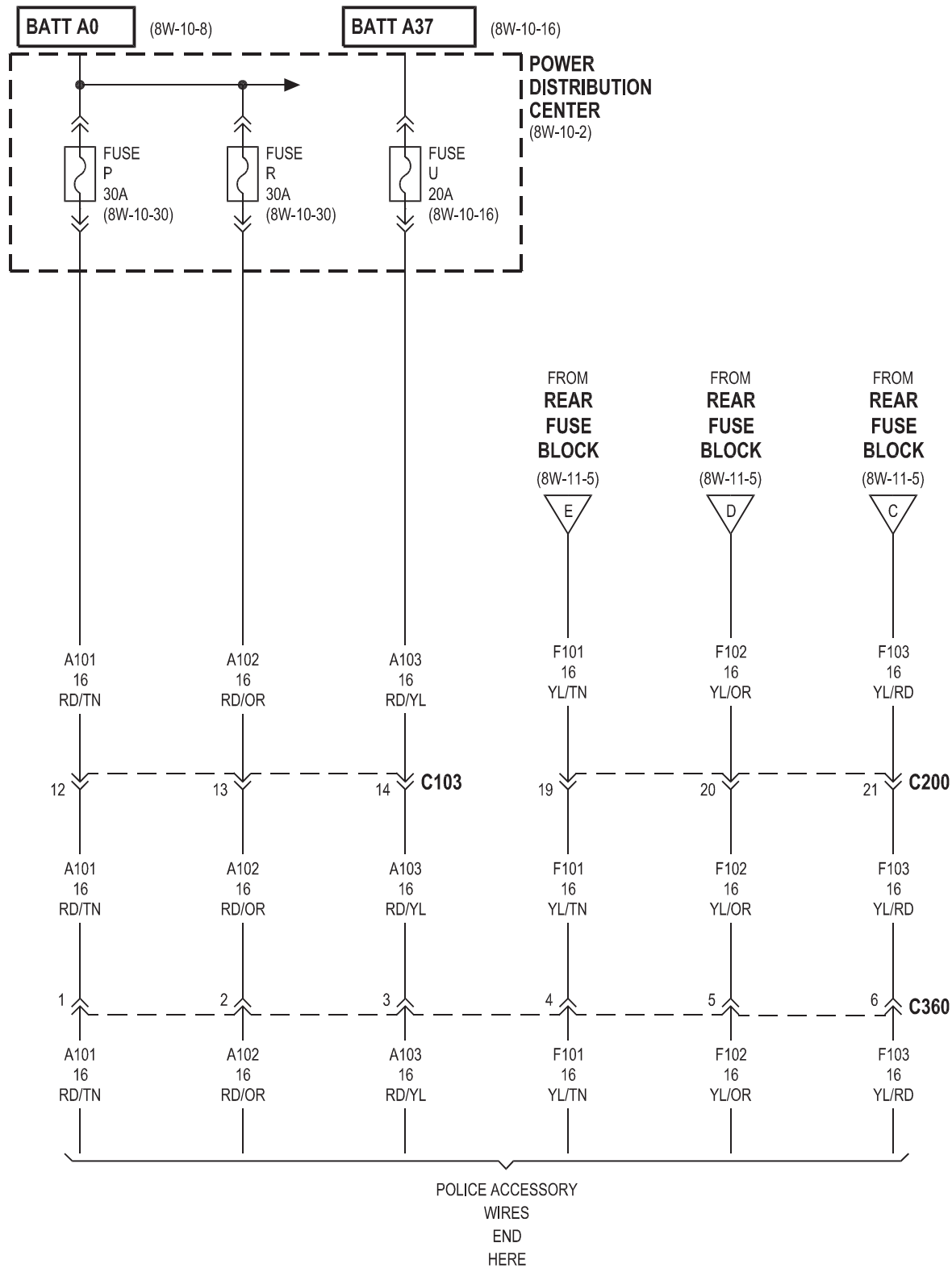
CAVITY	CIRCUIT	FUNCTION
1	-	-
2	F1 12RD	ISO RELAY NO. 1 OUTPUT
3	-	-
4	Z1 18BK	GROUND
5	-	-
6	A1 12RD	FUSED B(+)
7	-	-
8	X12 18RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	-	-

ISO RELAY NO. 2

CAVITY	CIRCUIT	FUNCTION
1	-	-
2	F2 12YL	ISO RELAY NO. 2 OUTPUT
3	-	-
4	Z1 18BK	GROUND
5	-	-
6	A1 12RD	FUSED B(+)
7	-	-
8	X12 18RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
9	-	-



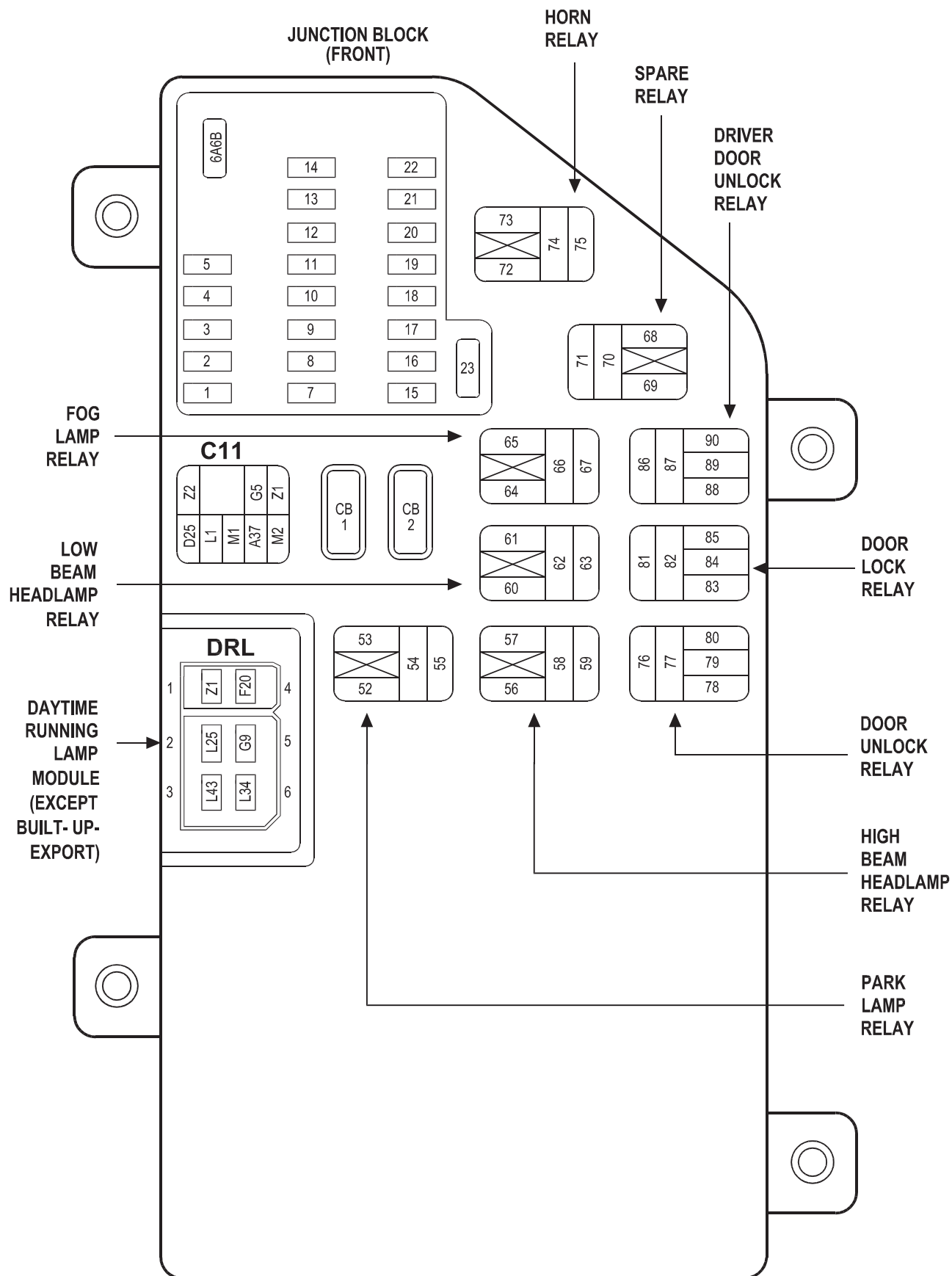


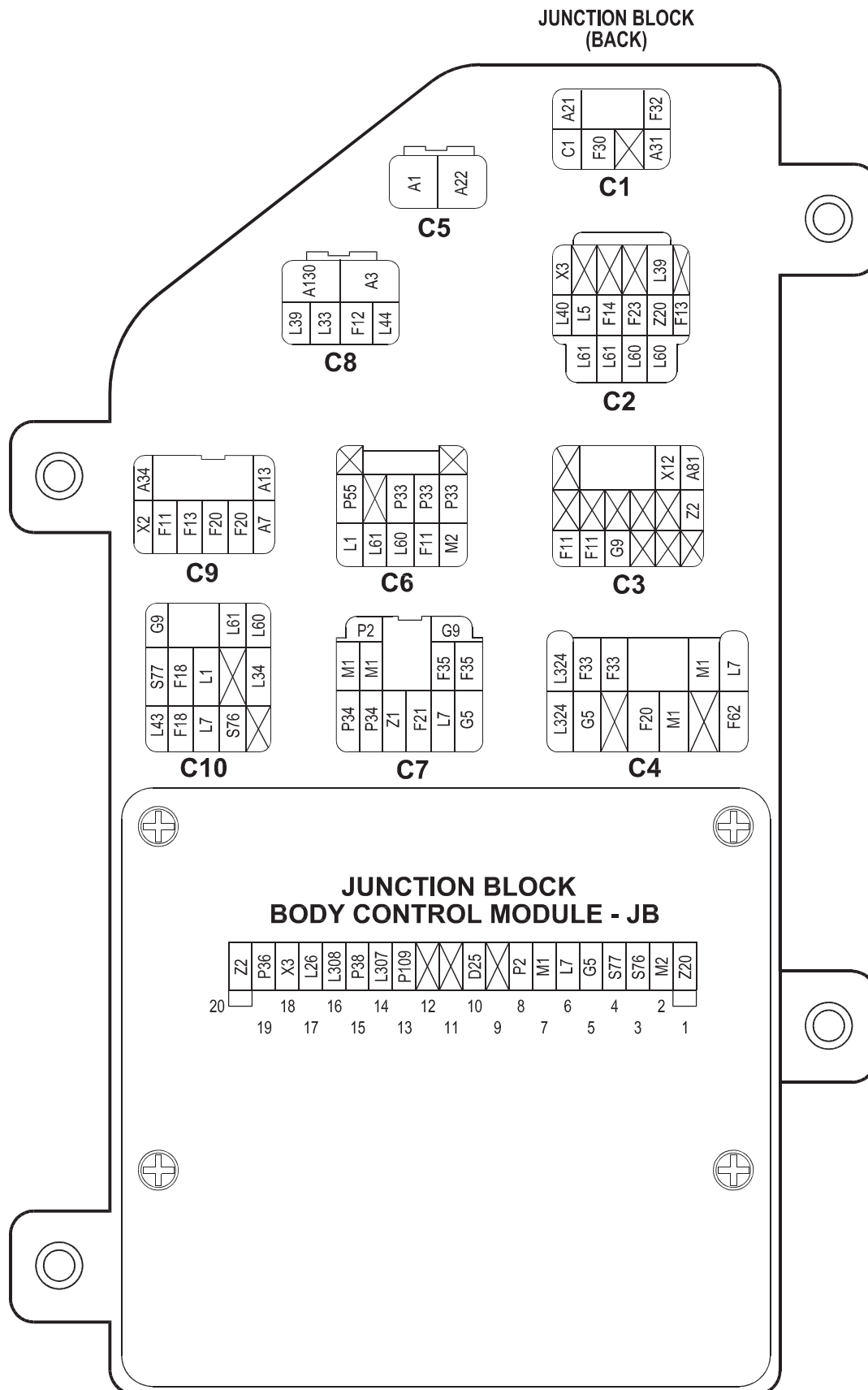


8W-12 JUNCTION BLOCK

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Automatic Temperature Control Head	8W-12-19, 22
Autostick Switch	8W-12-8
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Blower Motor Resistor Block	8W-12-20
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Decklid Release Switch	8W-12-10, 22
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Door Unlock Relay	8W-12-26, 27
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Driver Door Courtesy Lamp	8W-12-21, 32
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Driver Heated Seat Switch	8W-12-17
Driver Power Door Lock Switch	8W-12-17, 21
Driver Power Mirror	8W-12-35
Driver Power Seat Switch	8W-12-26
Driver Power Window Switch	8W-12-19
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Fuel Pump Relay	8W-12-18
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Fuse 2 (JB)	8W-12-9
Fuse 3 (JB)	8W-12-9
Fuse 4 (JB)	8W-12-10
Fuse 5 (JB)	8W-12-10
Fuse 6 (JB)	8W-12-10
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Fuse 8 (JB)	8W-12-15
Fuse 9 (JB)	8W-12-15
Fuse 10 (JB)	8W-12-15
Fuse 11 (JB)	8W-12-15
Fuse 12 (JB)	8W-12-15
Fuse 13 (JB)	8W-12-18
Fuse 14 (JB)	8W-12-16
Fuse 15 (JB)	8W-12-18
Fuse 16 (JB)	8W-12-18
Fuse 17 (JB)	8W-12-19
Fuse 18 (JB)	8W-12-20
Fuse 19 (JB)	8W-12-21
Fuse 20 (JB)	8W-12-25
Fuse 21 (JB)	8W-12-25
Fuse 22 (JB)	8W-12-25
Fuse 23 (JB)	8W-12-20
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Left Rear Turn Signal Lamp	8W-12-35
Left Side Impact Airbag Control Module	8W-12-25
Left Side Repeater Lamp	8W-12-35
Left Tail Lamp	8W-12-13
Left Tail/Stop Lamp	8W-12-13
Left Tail/Stop Lamp No. 1	8W-12-13
Left Tail/Stop Lamp No. 2	8W-12-13
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Low Speed Radiator Fan Relay	8W-12-25
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Passenger Door Courtesy Lamp	8W-12-24, 32
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Right Horn	8W-12-20
Right License Lamp	8W-12-13
Right Low Beam Headlamp	8W-12-15
Right Rear Door Lock Motor/Ajar Switch	8W-12-27
Right Rear Reading/Courtesy Lamp	8W-12-23, 33
Right Rear Reading/Courtesy Lamp Switch	8W-12-33
Right Rear Side Marker Lamp	8W-12-14
Right Rear Turn Signal Lamp	8W-12-34
Right Side Impact Airbag Control Module	8W-12-25
Right Side Repeater Lamp	8W-12-34
Right Tail Lamp	8W-12-14
Right Tail/Stop Lamp	8W-12-14
Right Tail/Stop Lamp No. 1	8W-12-14
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Sunroof Control Module	8W-12-16, 29
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Wiper Switch	8W-12-10





FUSES

FUSE NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	10A	INTERNAL	IGNITION SWITCH OUTPUT (OFF-RUN-START)
2	10A	L34 20RD/OR	FUSED HIGH BEAM RELAY OUTPUT
3	10A	L33 20RD	FUSED HIGH BEAM RELAY OUTPUT
4	10A	X12 20RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
5	10A	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6 ○	15A	F30 18RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6 ○○	15A	F30 18RD	FUSED B(+)
7	20A	F33 18PK/RD	FUSED B(+)
8	10A	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
9	10A	L5 22BK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
10	15A	L44 16VT/RD	FUSED LOW BEAM RELAY OUTPUT (RIGHT)
11	20A	L40 18BR/WT	FUSED LOW BEAM RELAY OUTPUT
12	15A	L43 16VT	FUSED LOW BEAM RELAY OUTPUT (LEFT)
13	10A	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
14	10A	G5 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	10A	INTERNAL	FUSED B(+)
16	20A	INTERNAL	FUSED B(+)
17	10A	F20 WT/VT	FUSED IGNITION SWITCH OUTPUT (RUN)
18	20A	F62 16RD	FUSED B(+)
19	15A	M1 20PK	FUSED B(+)
20	20A	F32 16PK/DB	FUSED B(+)
21	10A	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
22	10A	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
23	30A	C1 12DG	FUSED IGNITION SWITCH OUTPUT (RUN)

CIRCUIT BREAKERS

CB NO.	AMPS	FUSED CIRCUIT	FUNCTION
1	20A	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
2	20A	F35 16RD	FUSED B(+)

○ IGNITION POSITION
 ○○ BATTERY POSITION

**DAYTIME
RUNNING
LAMP
MODULE
(EXCEPT BUILT-
UP-EXPORT)**

CAVITY	CIRCUIT	FUNCTION
1	Z1 14BK	GROUND
2	INTERNAL	FUSED B(+)
3	INTERNAL	LOW BEAM RELAY OUTPUT
4	INTERNAL	FUSED IGNITION SWITCH OUTPUT (RUN)
5	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
6	INTERNAL	FUSED HIGH BEAM RELAY OUTPUT

**DOOR
LOCK
RELAY**

CAVITY	CIRCUIT	FUNCTION
81	INTERNAL	LOCK RELAY OUTPUT
82	INTERNAL	FUSED B(+)
83	INTERNAL	FUSED B(+)
84	INTERNAL	GROUND
85	INTERNAL	DOOR LOCK RELAY CONTROL

**DOOR
UNLOCK
RELAY**

CAVITY	CIRCUIT	FUNCTION
76	INTERNAL	UNLOCK RELAY OUTPUT
77	INTERNAL	FUSED B(+)
78	INTERNAL	FUSED B(+)
79	INTERNAL	GROUND
80	INTERNAL	DOOR UNLOCK RELAY CONTROL

**DRIVER
DOOR UNLOCK
RELAY**

CAVITY	CIRCUIT	FUNCTION
86	P55 16DB	DRIVER DOOR UNLOCK RELAY OUTPUT
87	INTERNAL	FUSED B(+)
88	INTERNAL	FUSED B(+)
89	INTERNAL	GROUND
90	INTERNAL	DRIVER DOOR UNLOCK RELAY CONTROL

**FOG LAMP
RELAY**

CAVITY	CIRCUIT	FUNCTION
64	INTERNAL	FOG LAMP RELAY CONTROL
65	INTERNAL	FUSED B(+)
66	INTERNAL	FUSED B(+)
67	INTERNAL	FOG LAMP RELAY OUTPUT
-	-	-

**HIGH BEAM
HEADLAMP
RELAY**

CAVITY	CIRCUIT	FUNCTION
56	INTERNAL	GROUND
57	INTERNAL	SWITCHED HIGH BEAM RELAY CONTROL
58	INTERNAL	FUSED B(+)
59	INTERNAL	HIGH BEAM HEADLAMP RELAY OUTPUT
-	-	-

**HORN
RELAY**

CAVITY	CIRCUIT	FUNCTION
72	INTERNAL	HORN RELAY CONTROL
73	INTERNAL	FUSED B(+)
74	INTERNAL	FUSED B(+)
75	X2 18DG/RD	HORN RELAY OUTPUT
-	-	-

**LOW BEAM
HEADLAMP
RELAY**

CAVITY	CIRCUIT	FUNCTION
60	INTERNAL	LOW BEAM HEADLAMP RELAY CONTROL
61	INTERNAL	FUSED B(+)
62	INTERNAL	FUSED B(+)
63	INTERNAL	LOW BEAM HEADLAMP RELAY OUTPUT
-	-	-

**PARK LAMP
RELAY**

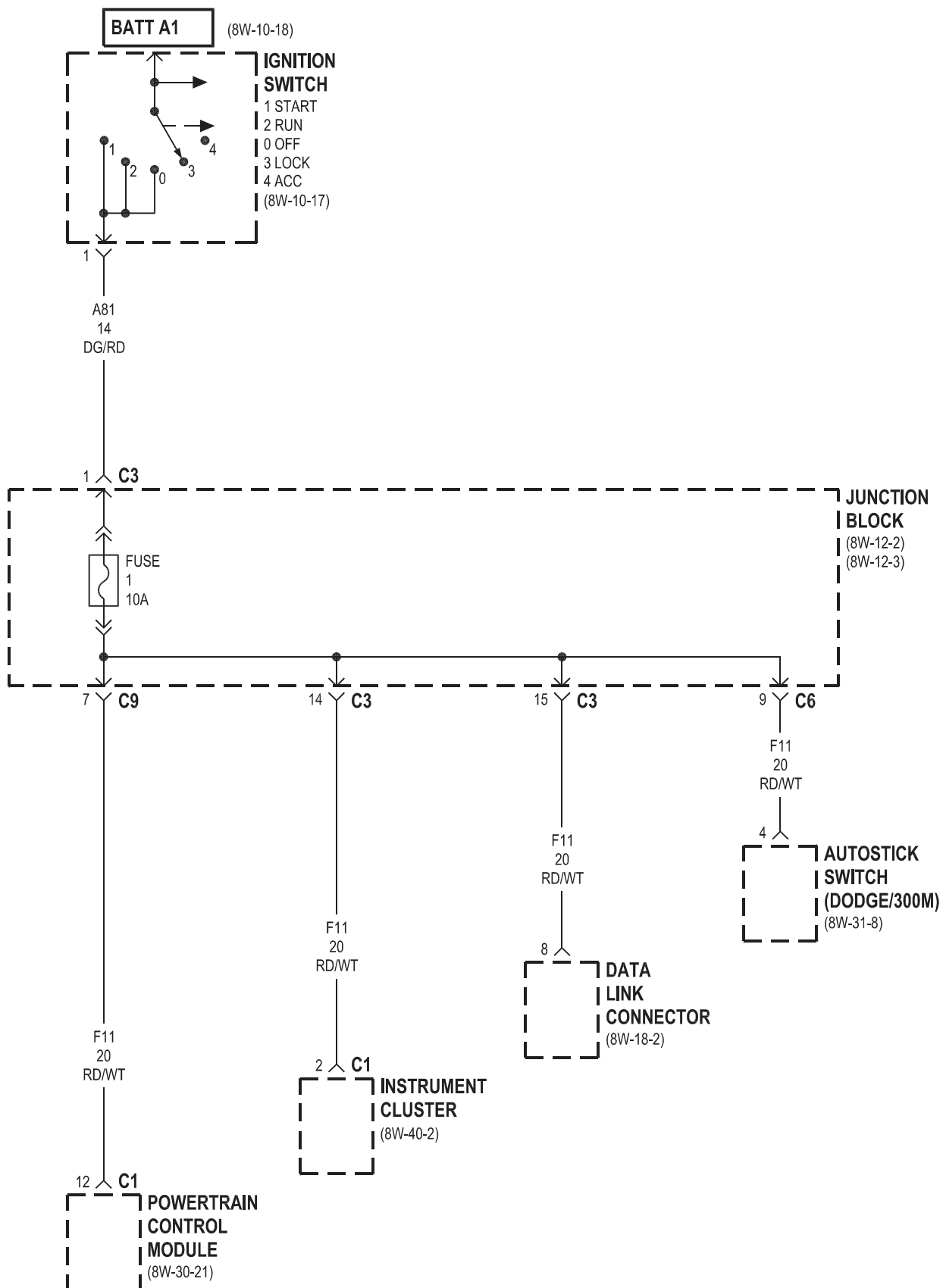
CAVITY	CIRCUIT	FUNCTION
52	INTERNAL	PARK LAMP RELAY CONTROL
53	INTERNAL	FUSED B(+)
54	INTERNAL	FUSED B(+)
55	INTERNAL	PARK LAMP RELAY OUTPUT
-	-	-

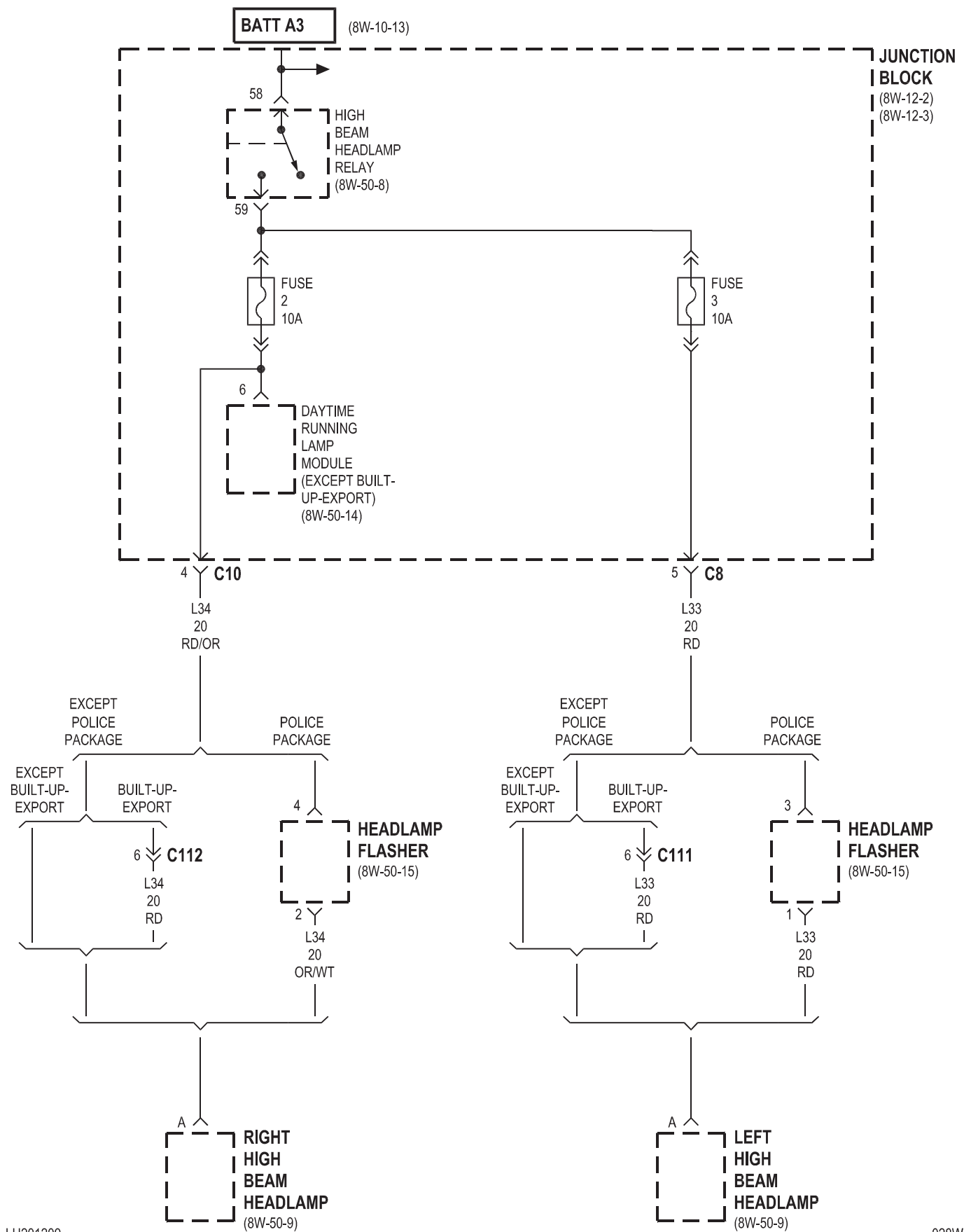
**SPARE
RELAY**

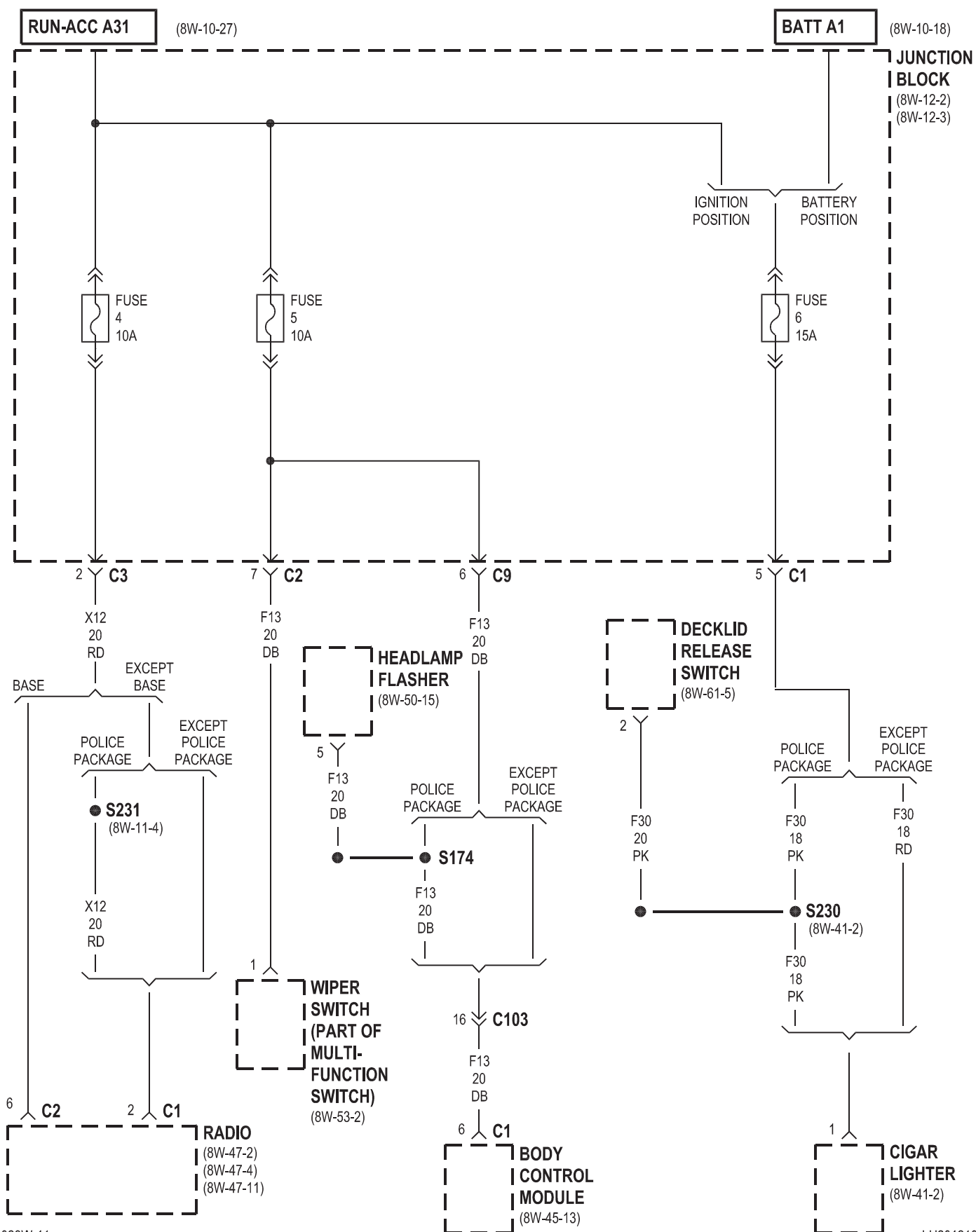
CAVITY	CIRCUIT	FUNCTION
68	-	-
69	A37 16RD	FUSED B(+)
70	A37 16RD	FUSED B(+)
71	-	-
-	-	-

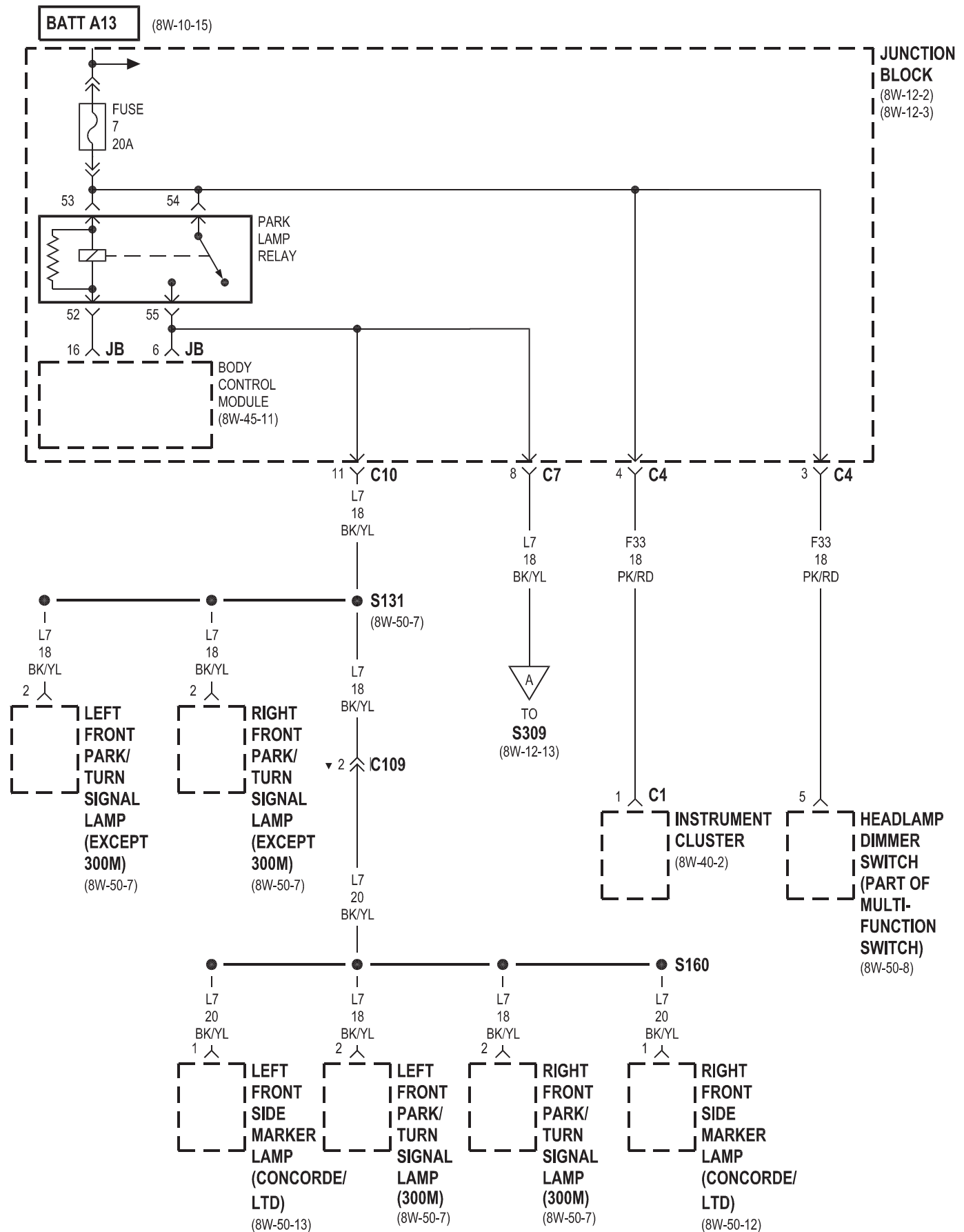
**JUNCTION BLOCK
BODY CONTROL MODULE**

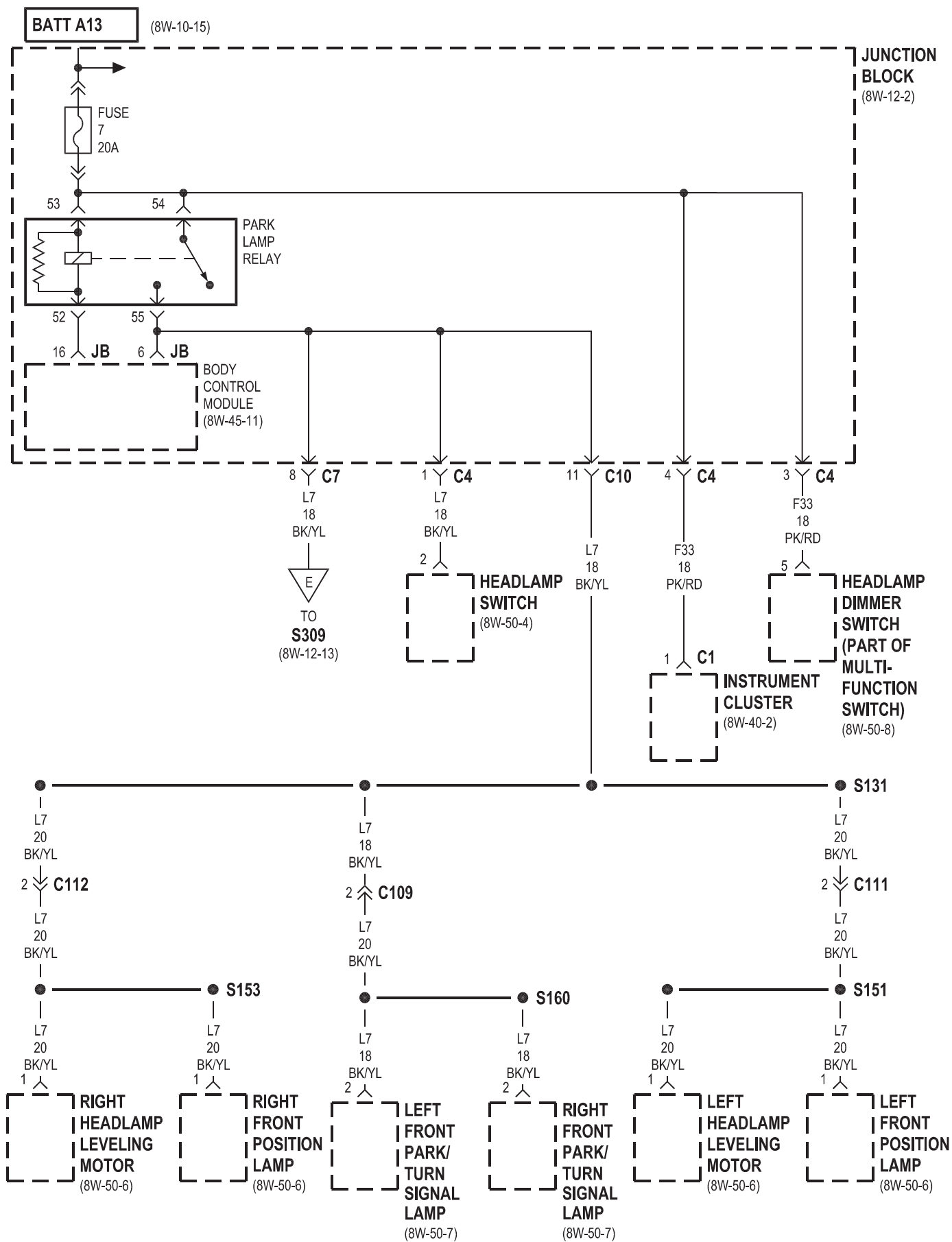
CAVITY	CIRCUIT	FUNCTION
1	Z20	GROUND
2	M2	COURTESY LAMP DRIVER
3	S76	SPEED PROPORTIONAL STEERING SOLENOID (-)
4	S77	SPEED PROPORTIONAL STEERING SOLENOID (+)
5	G5	FUSED IGNITION SWITCH OUTPUT (RUN-START)
6	L7	PARK LAMP RELAY OUTPUT
7	M1	FUSED B(+)
8	P2	DECKLID RELEASE CONTROL
9	-	-
10	D25	PCI BUS (OTIS)
11	-	-
12	-	-
13	P109	DRIVER UNLOCK RELAY CONTROL
14	L307	LOW BEAM RELAY CONTROL
15	P38	DOOR LOCK RELAY CONTROL
16	L308	PARK LAMP RELAY CONTROL
17	L26	FOG LAMP RELAY CONTROL
18	X3	HORN RELAY CONTROL
19	P36	DOOR UNLOCK RELAY CONTROL
20	Z2	GROUND

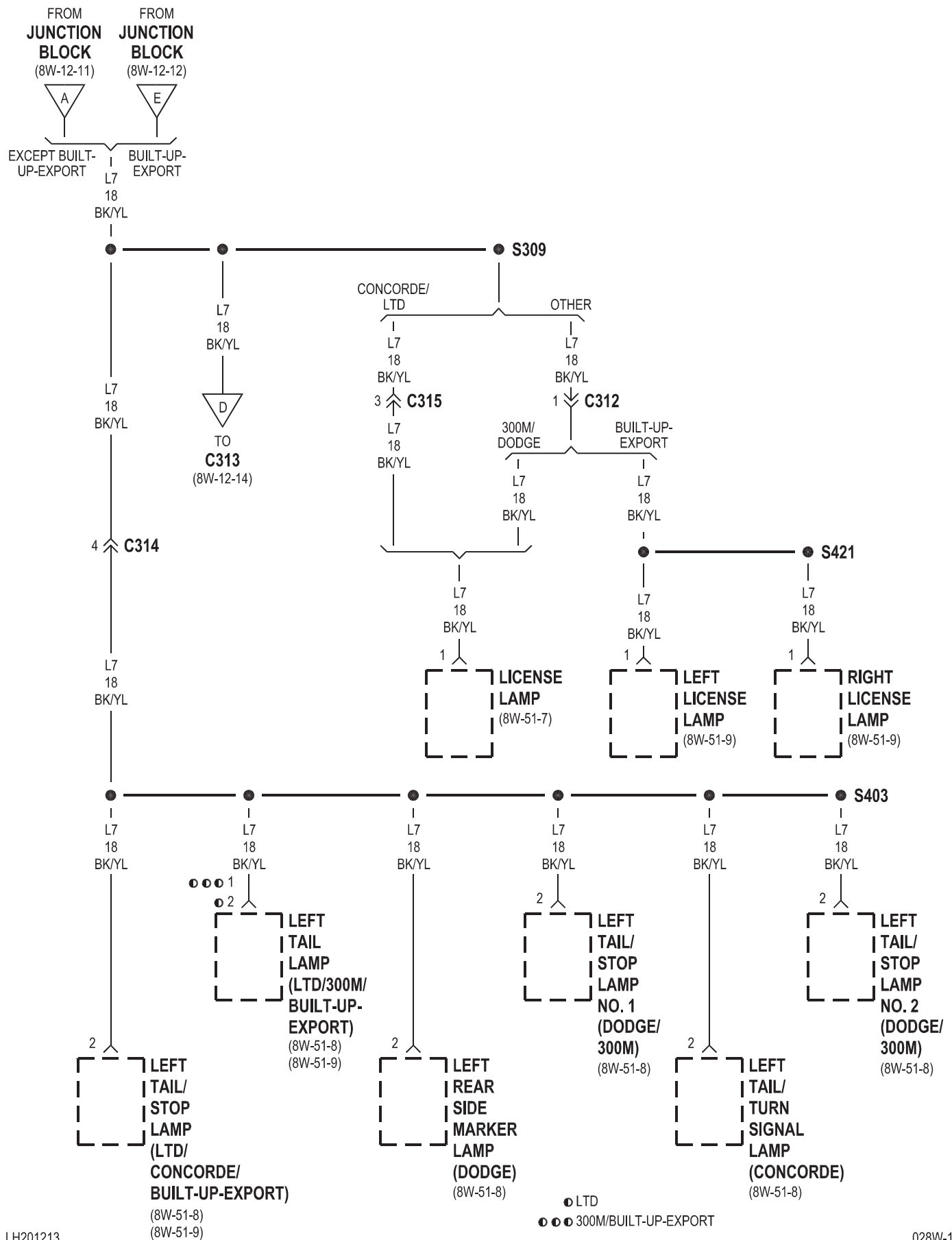


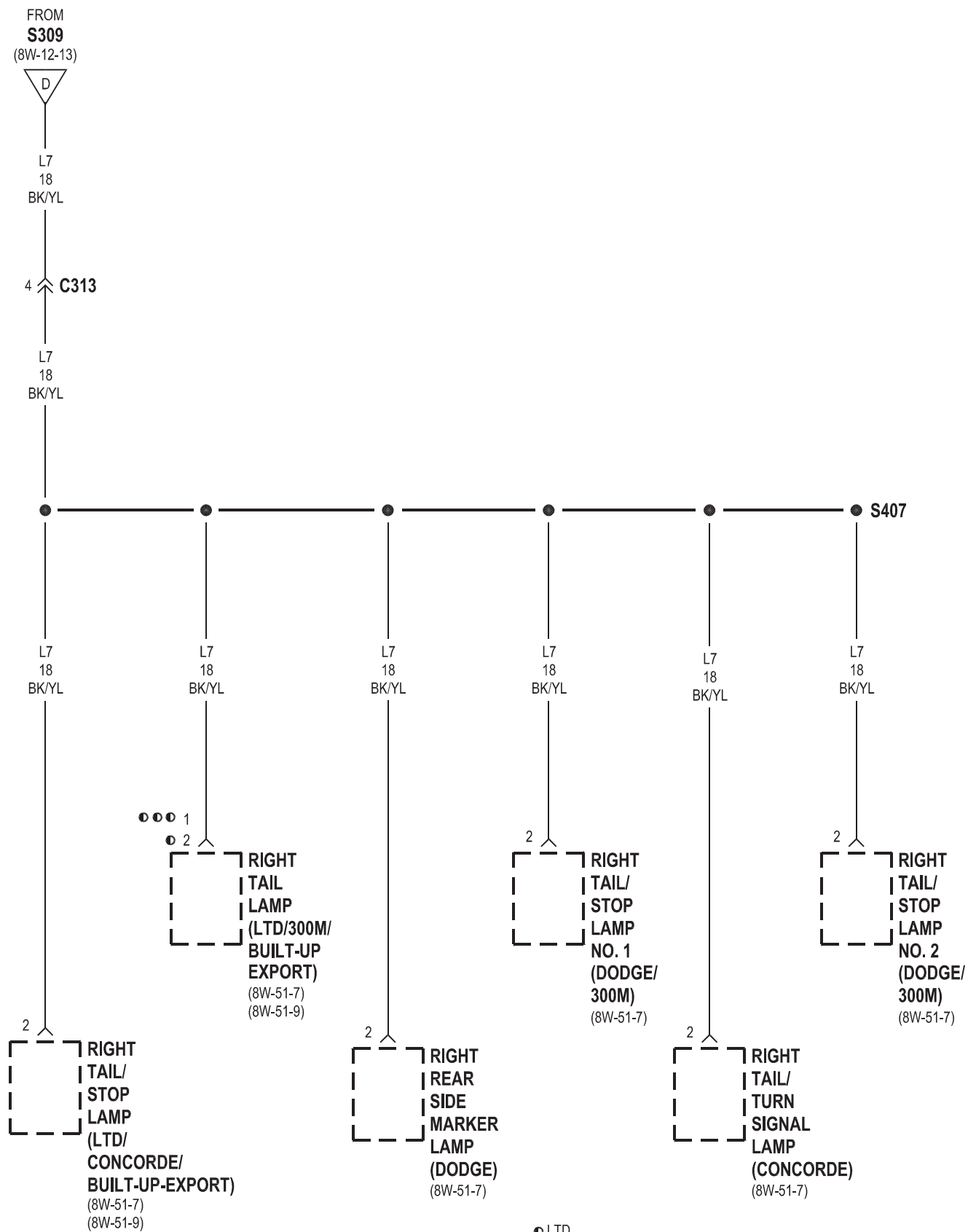


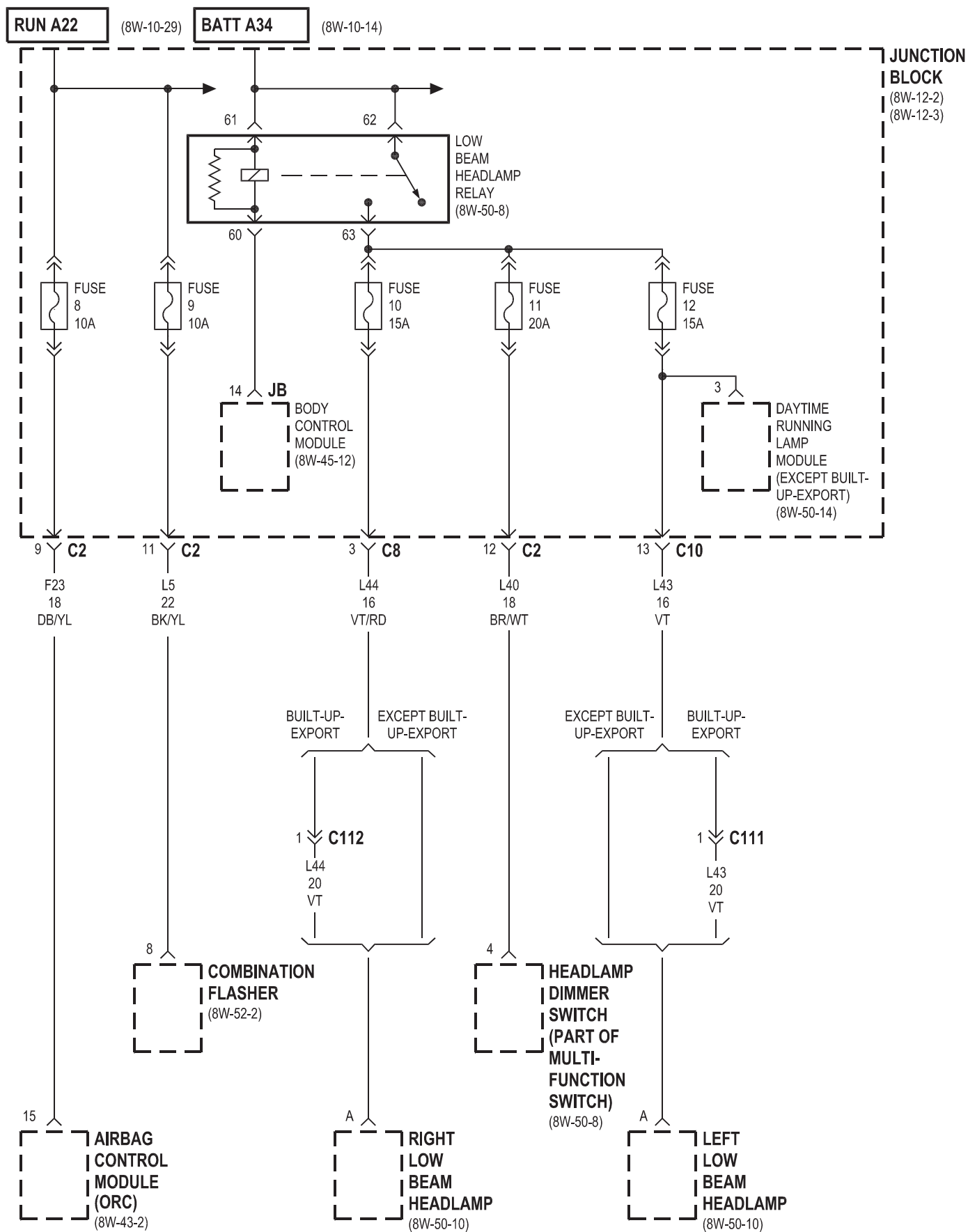


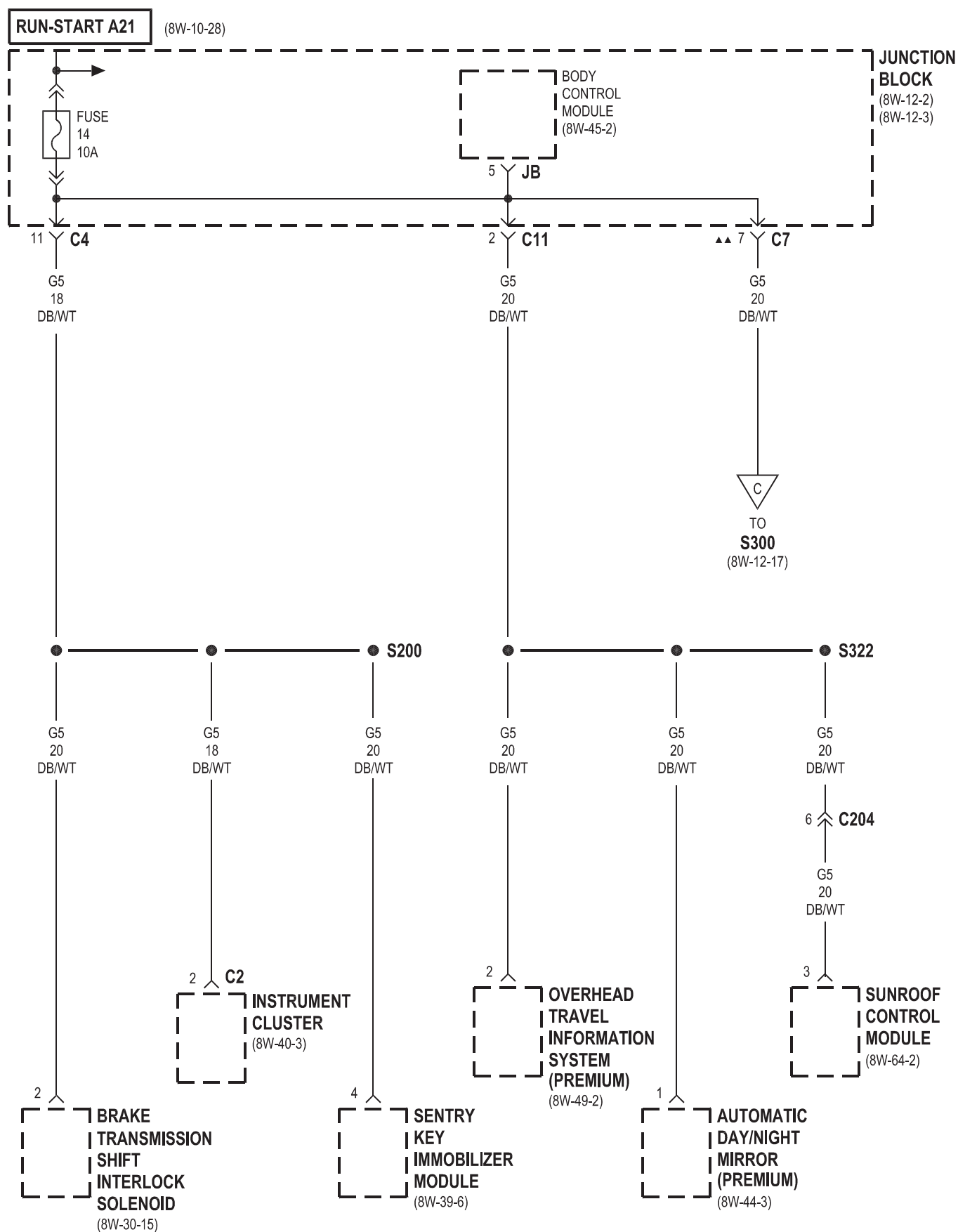




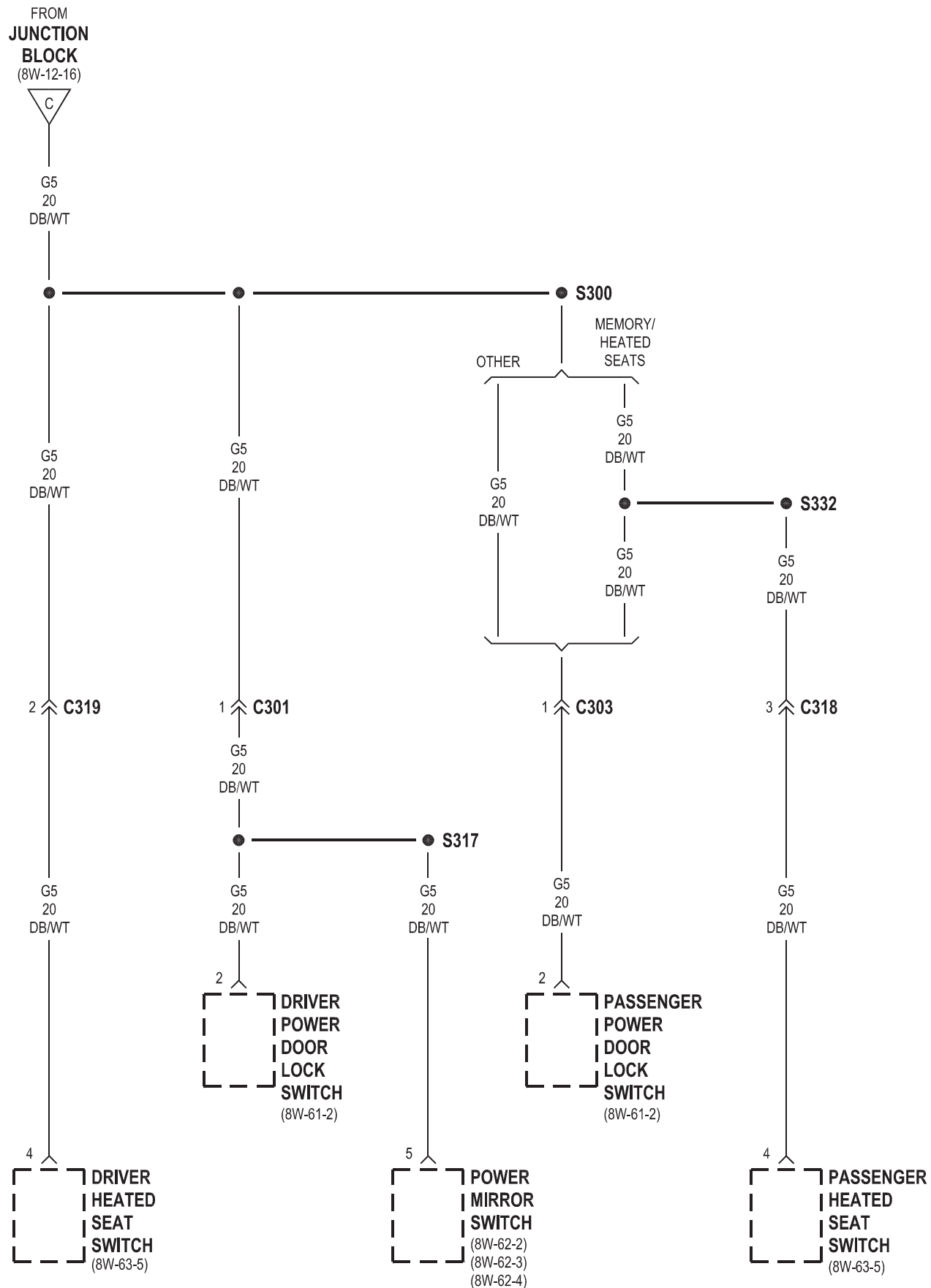


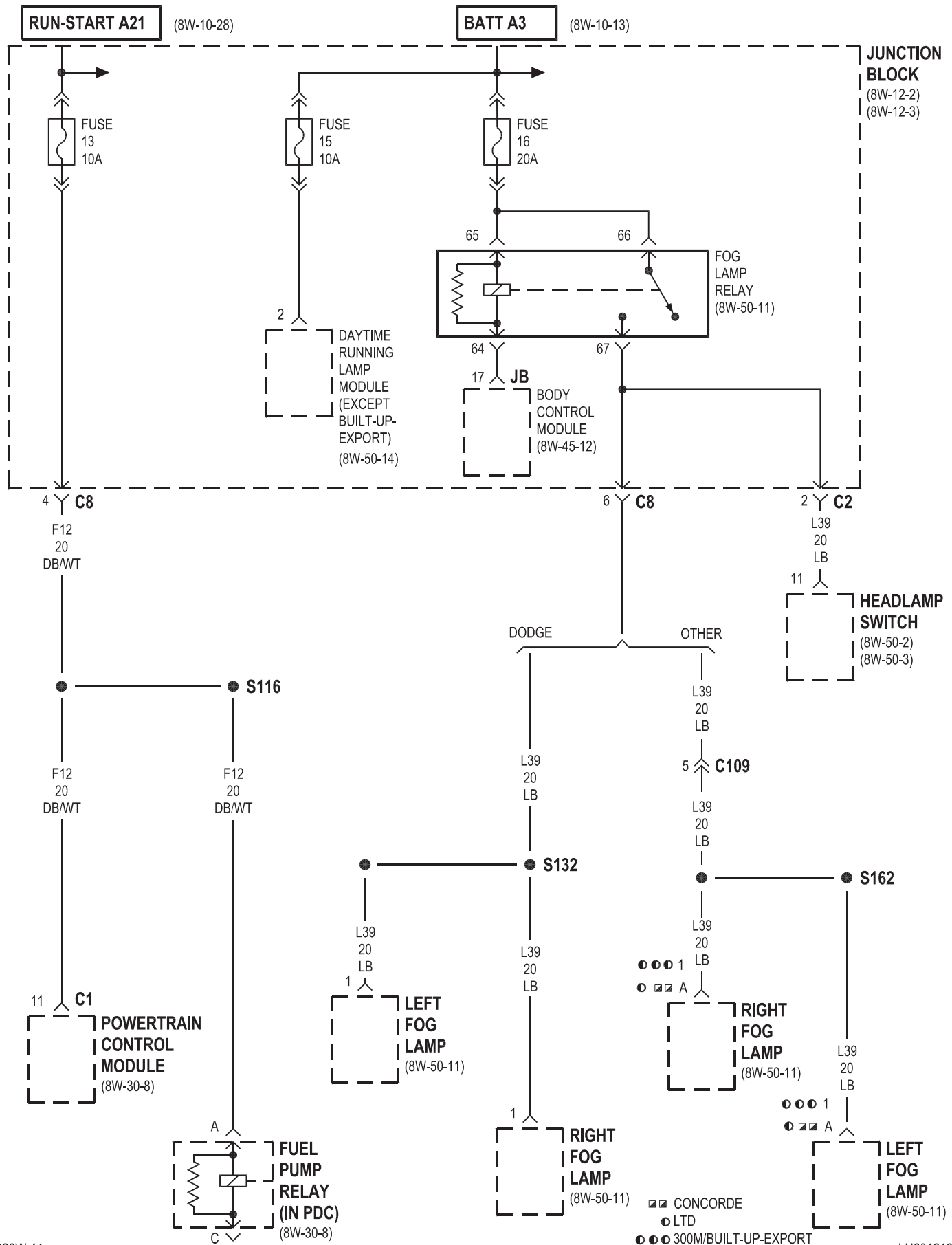


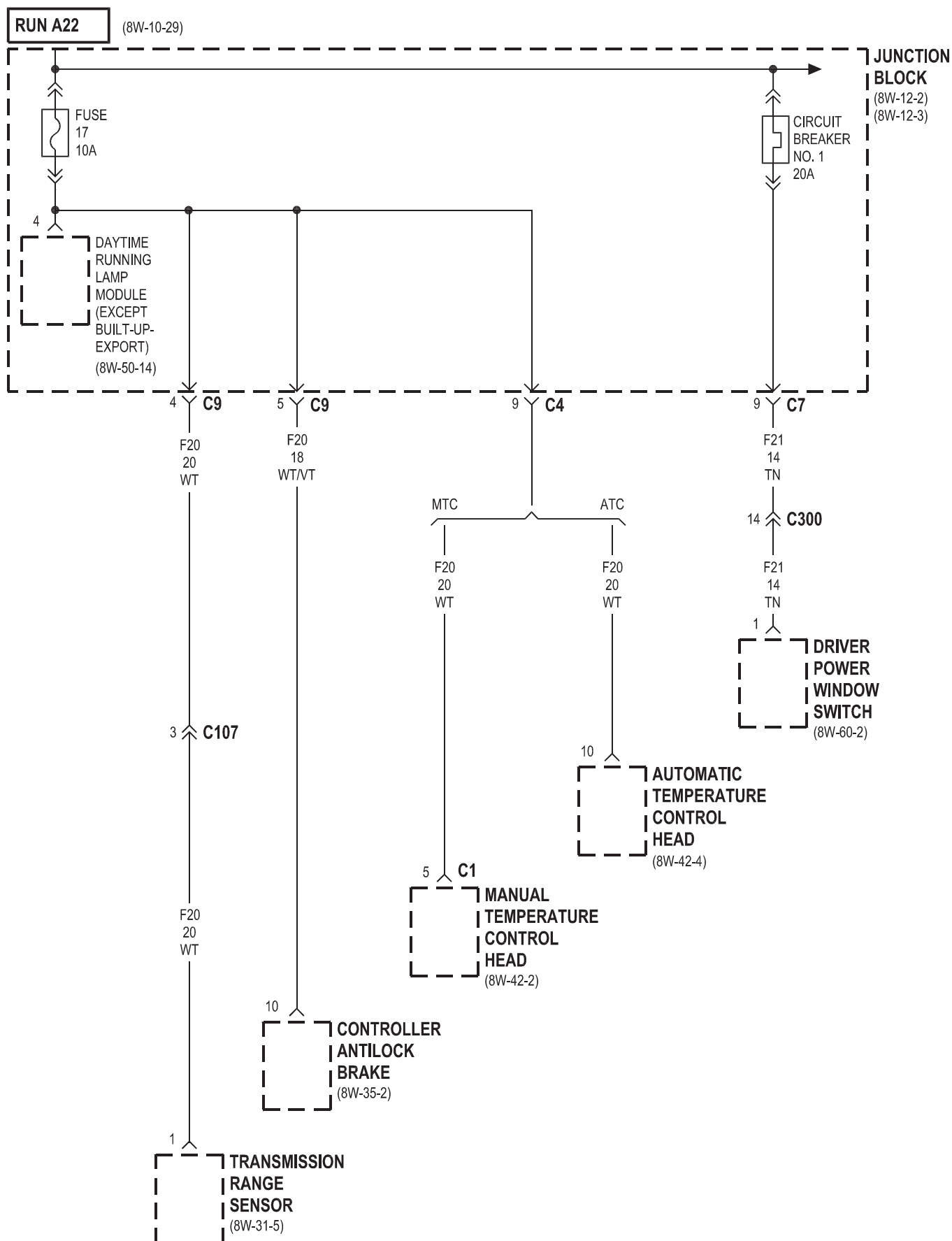


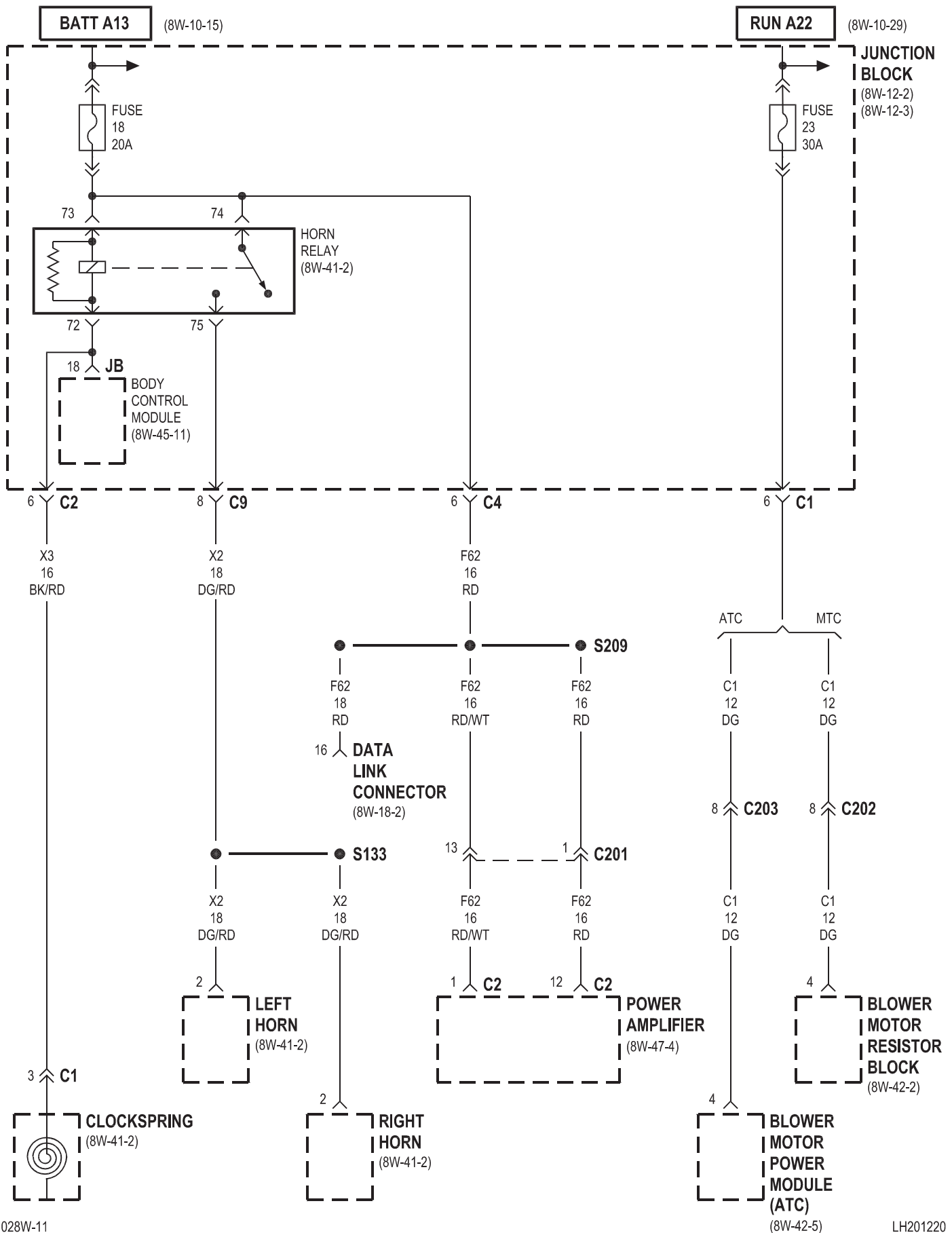


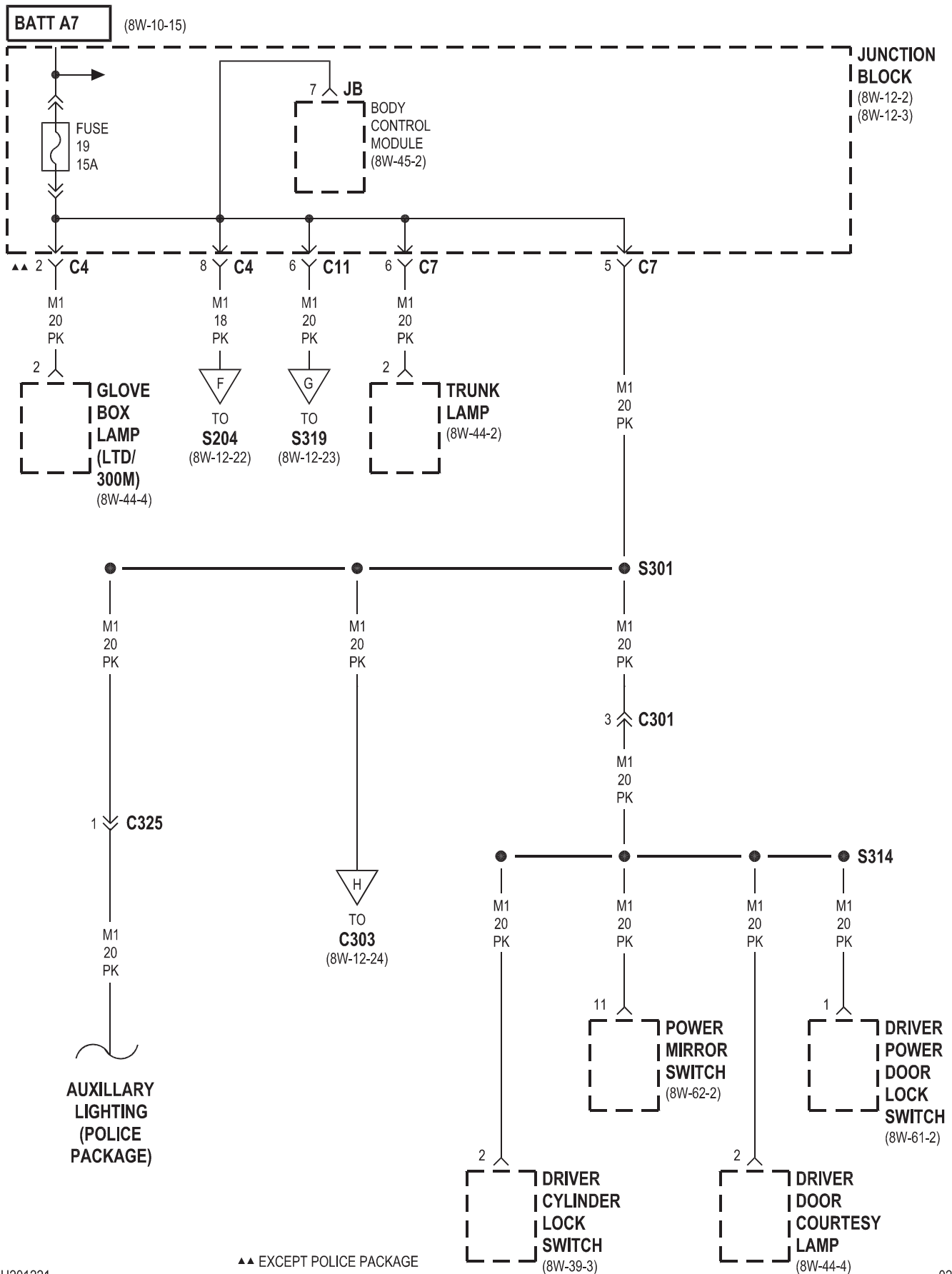
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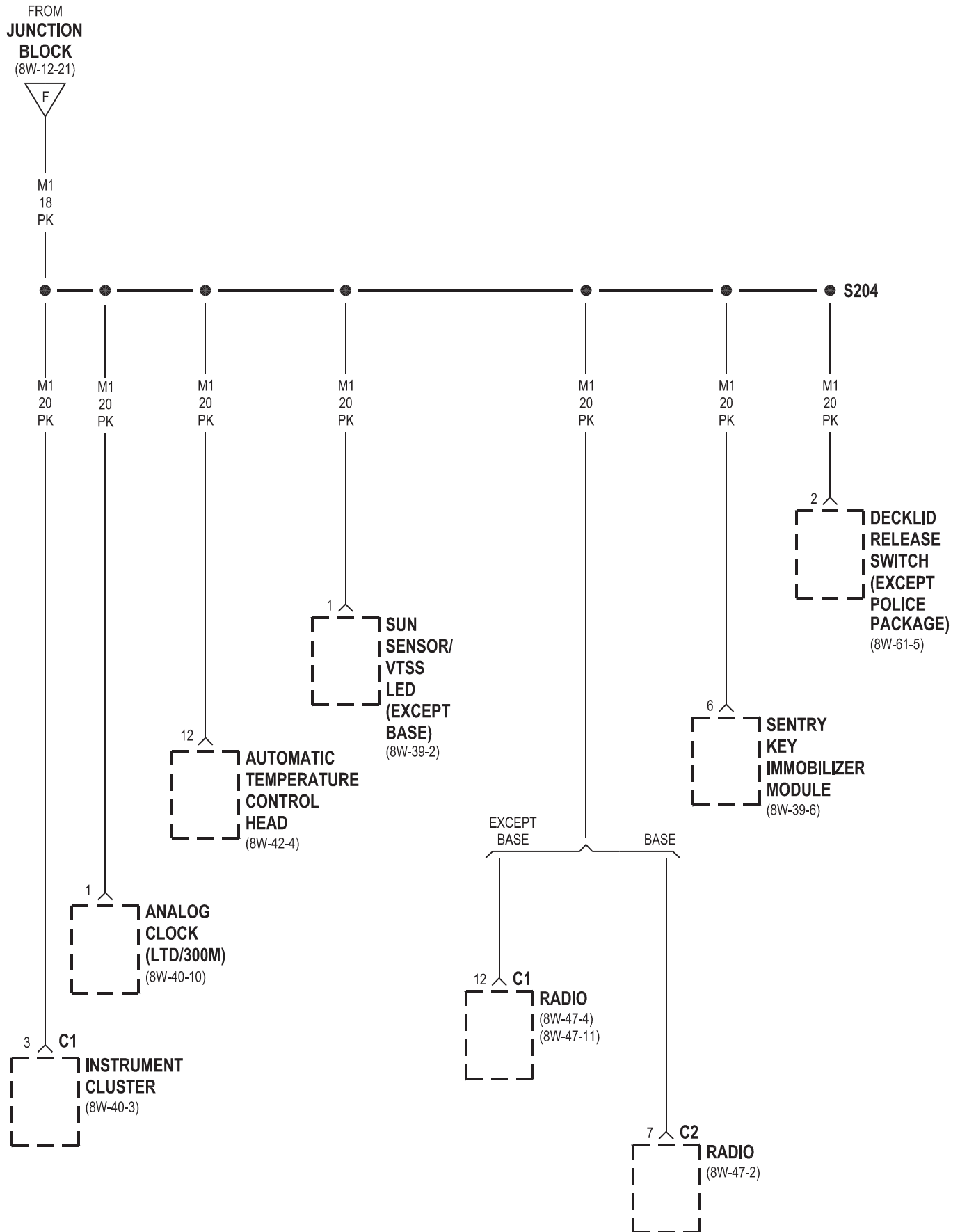


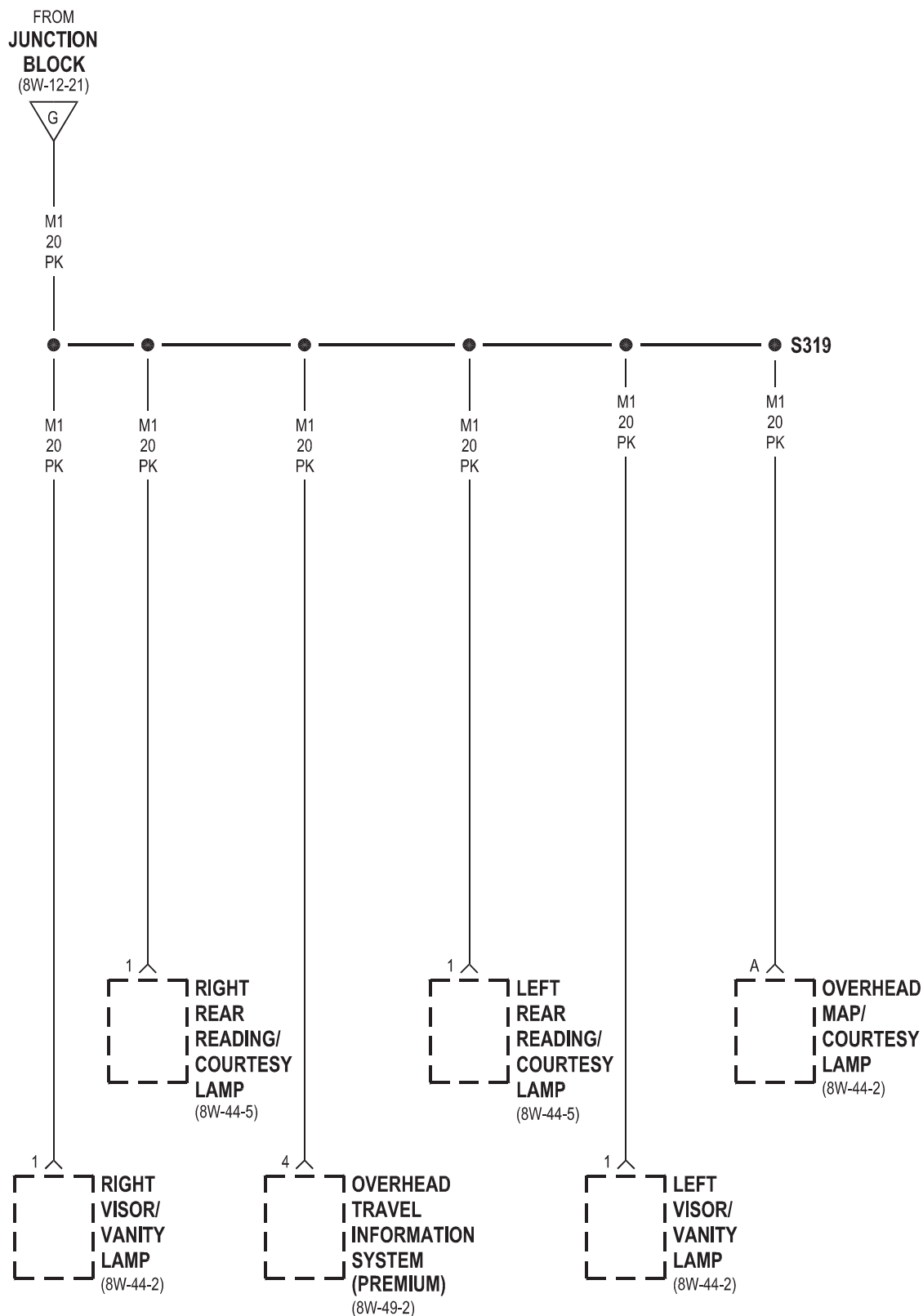


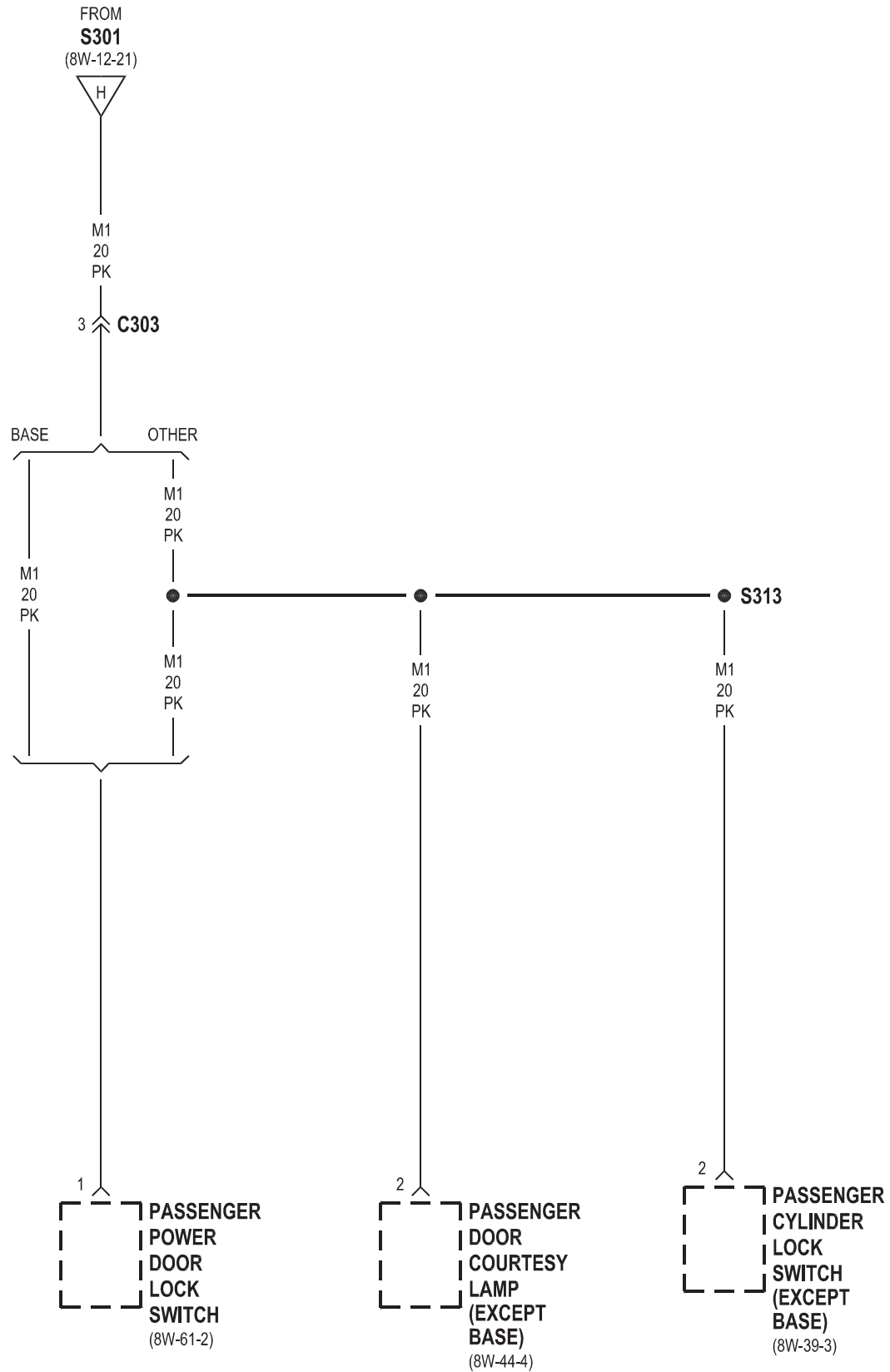


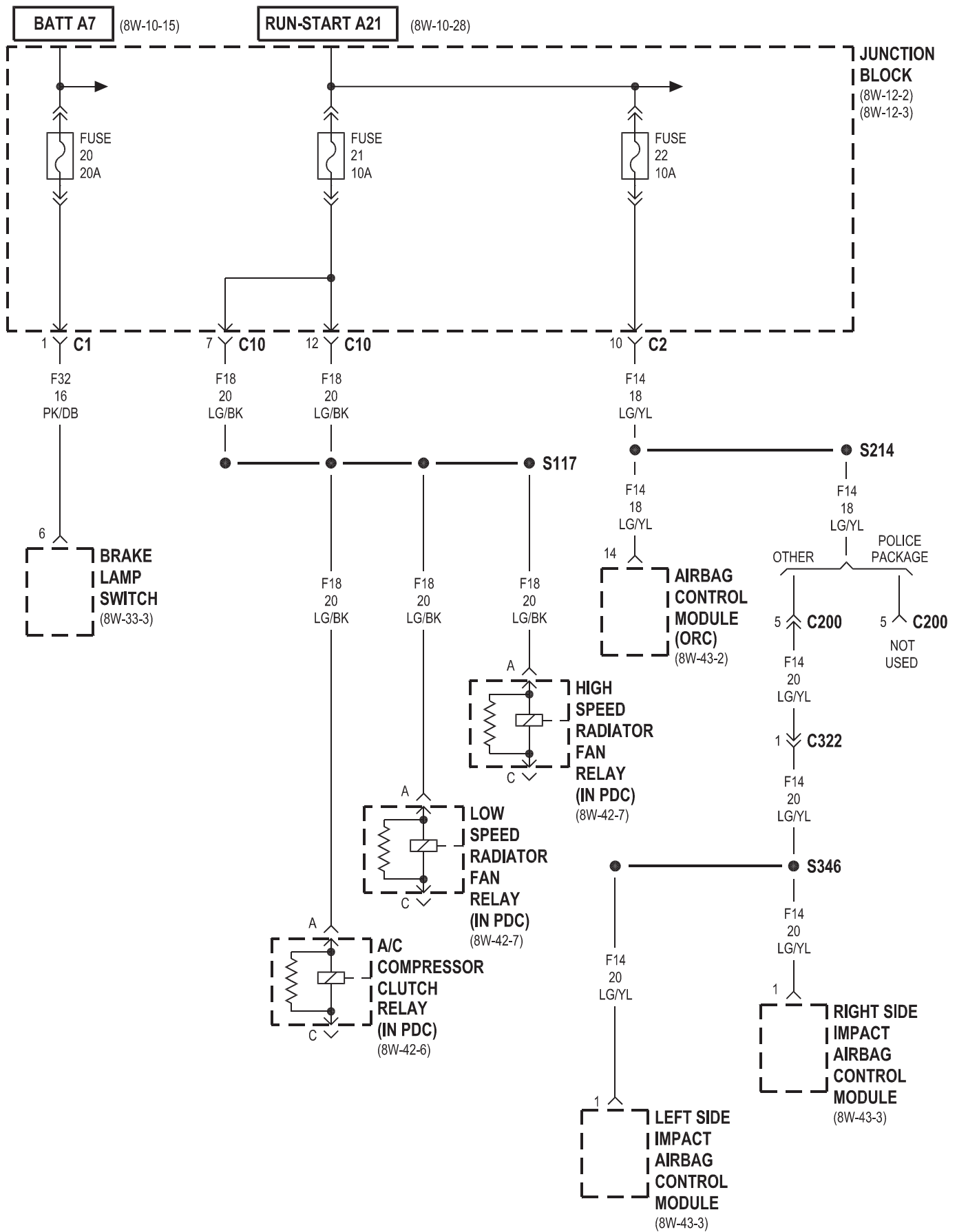


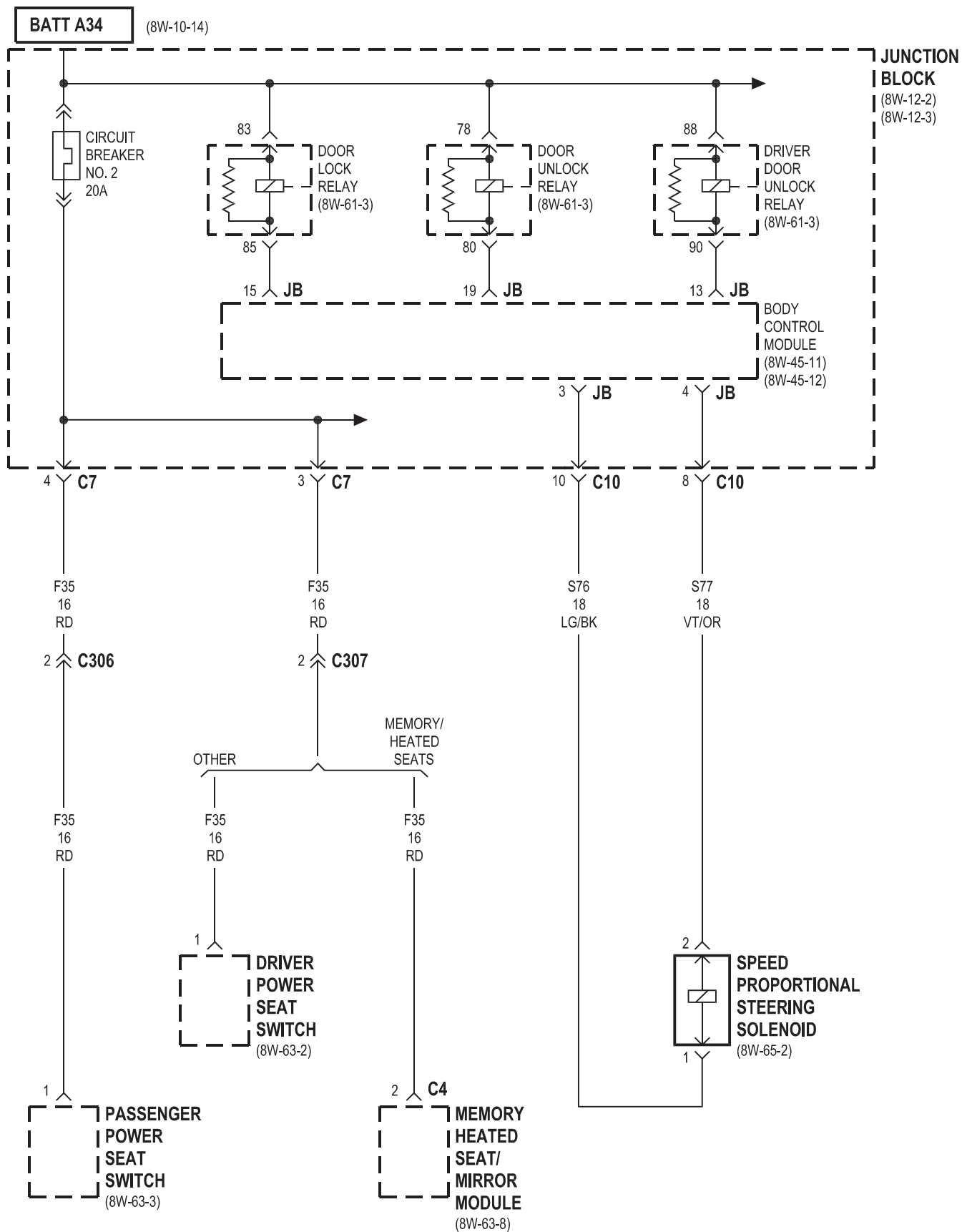


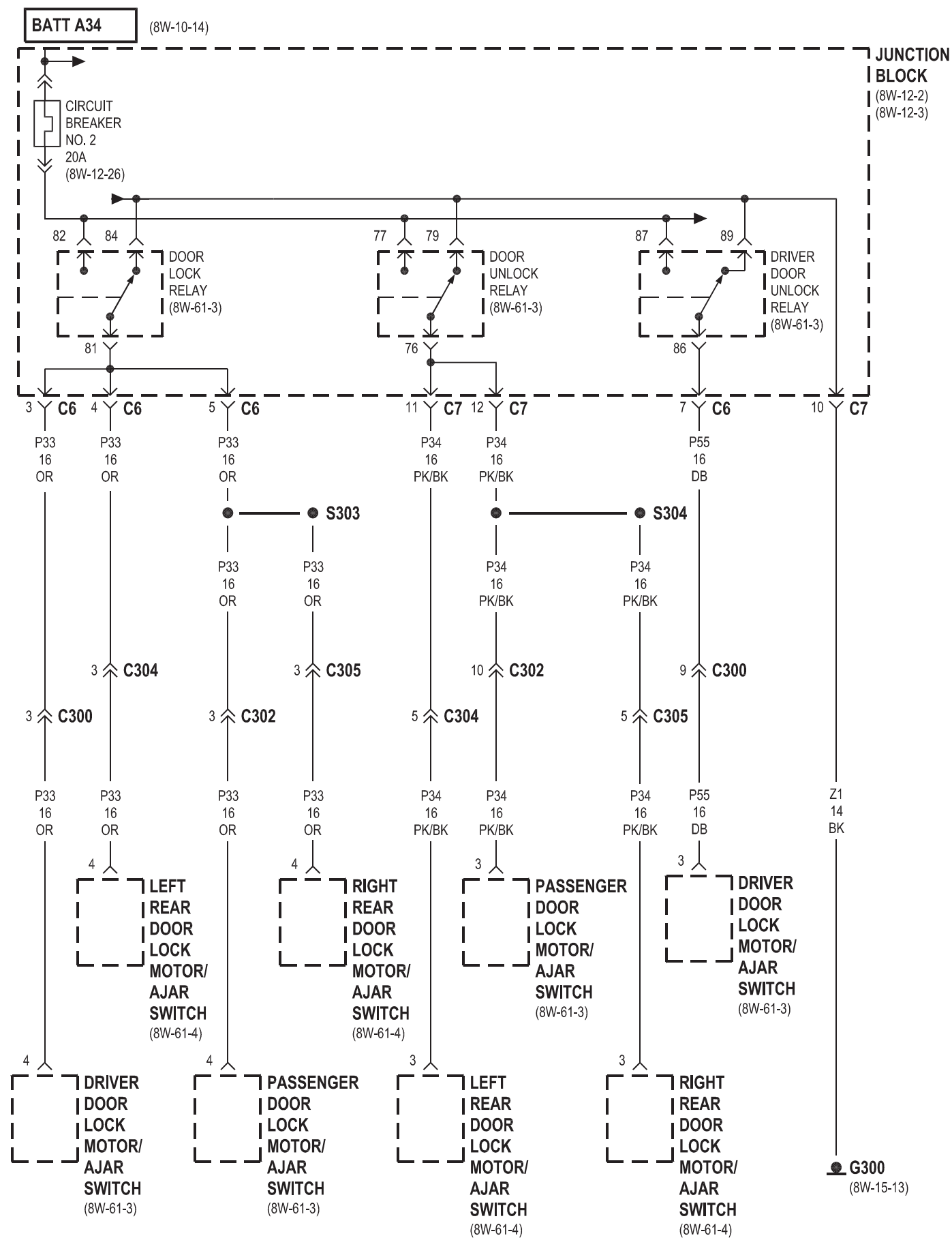


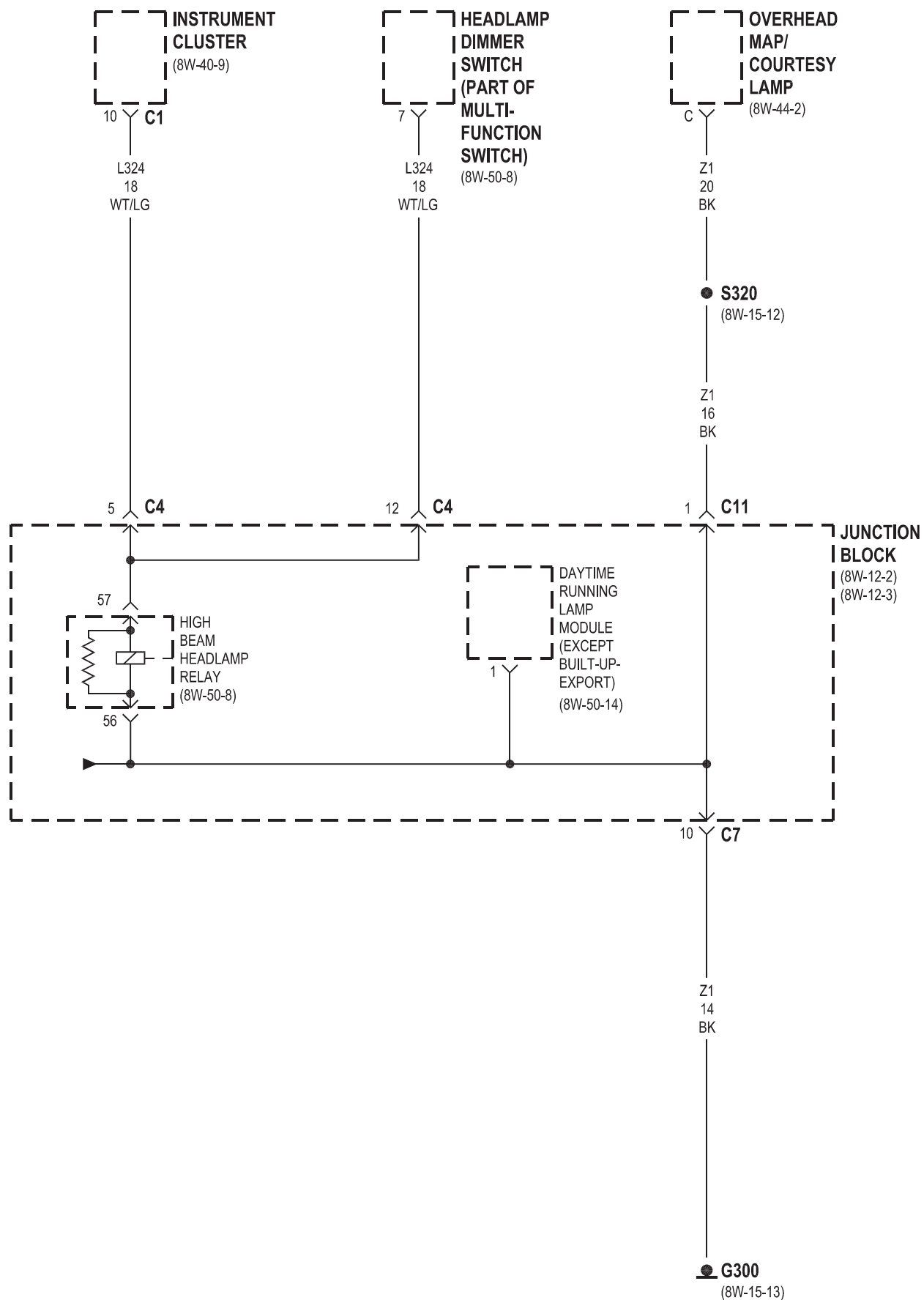


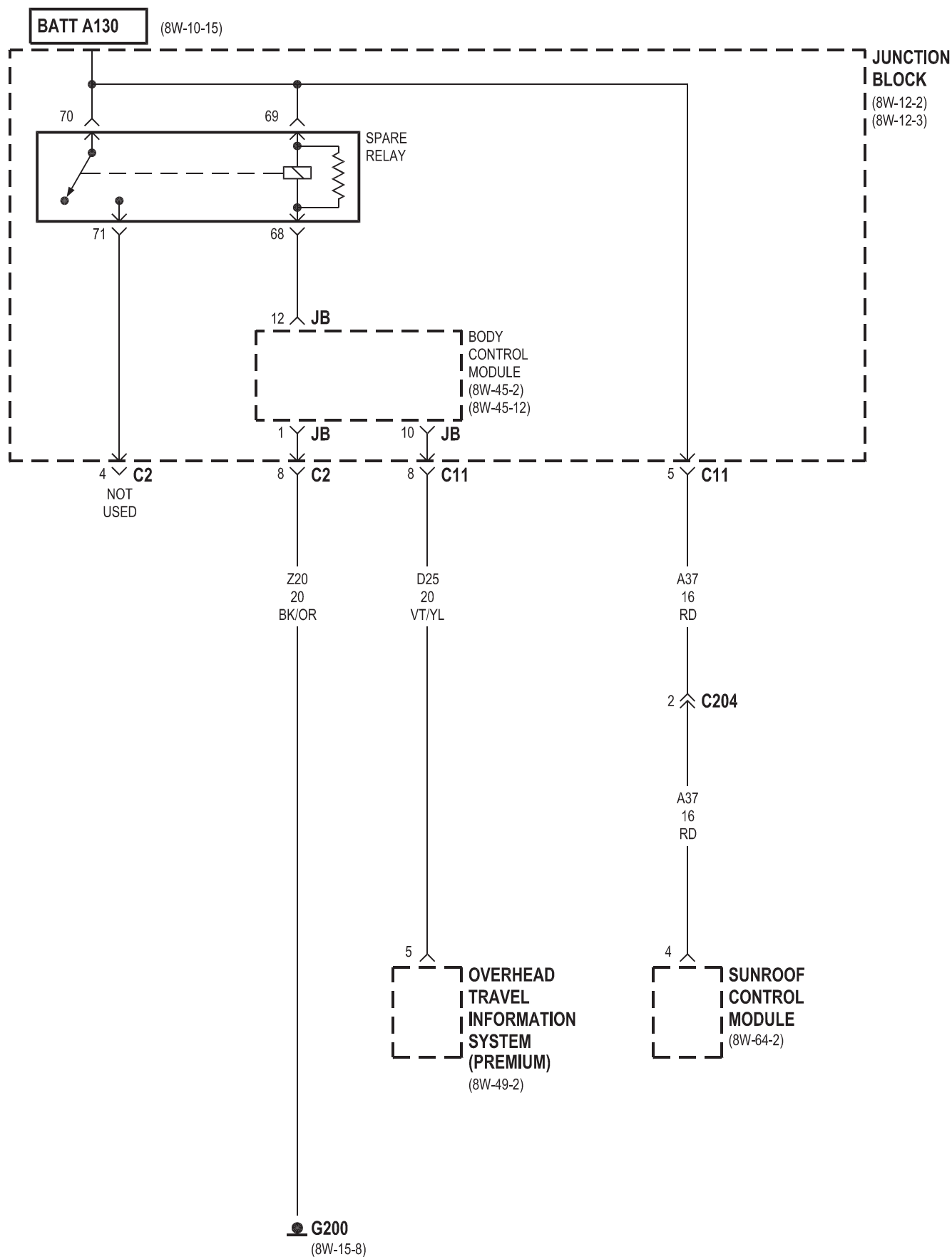


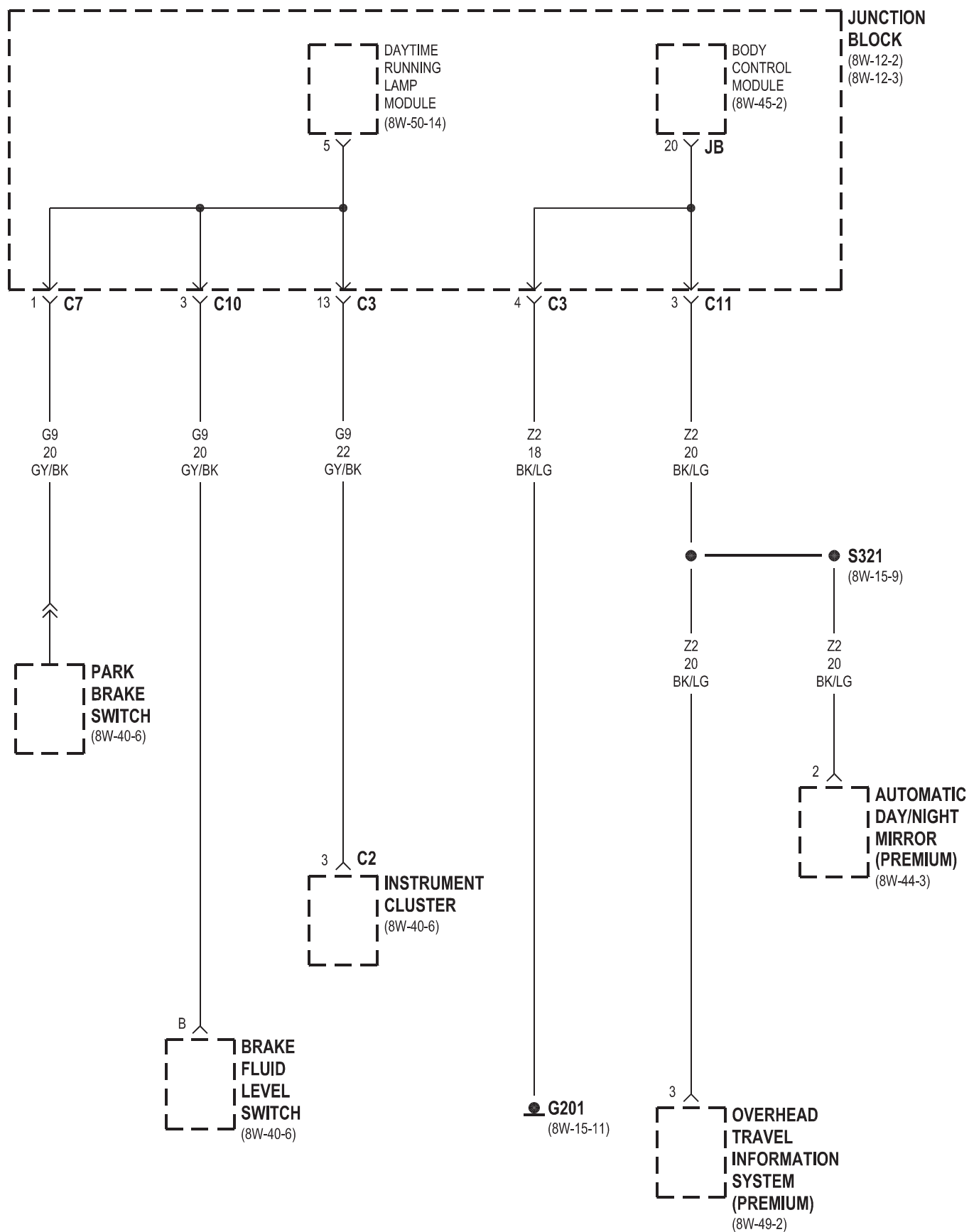


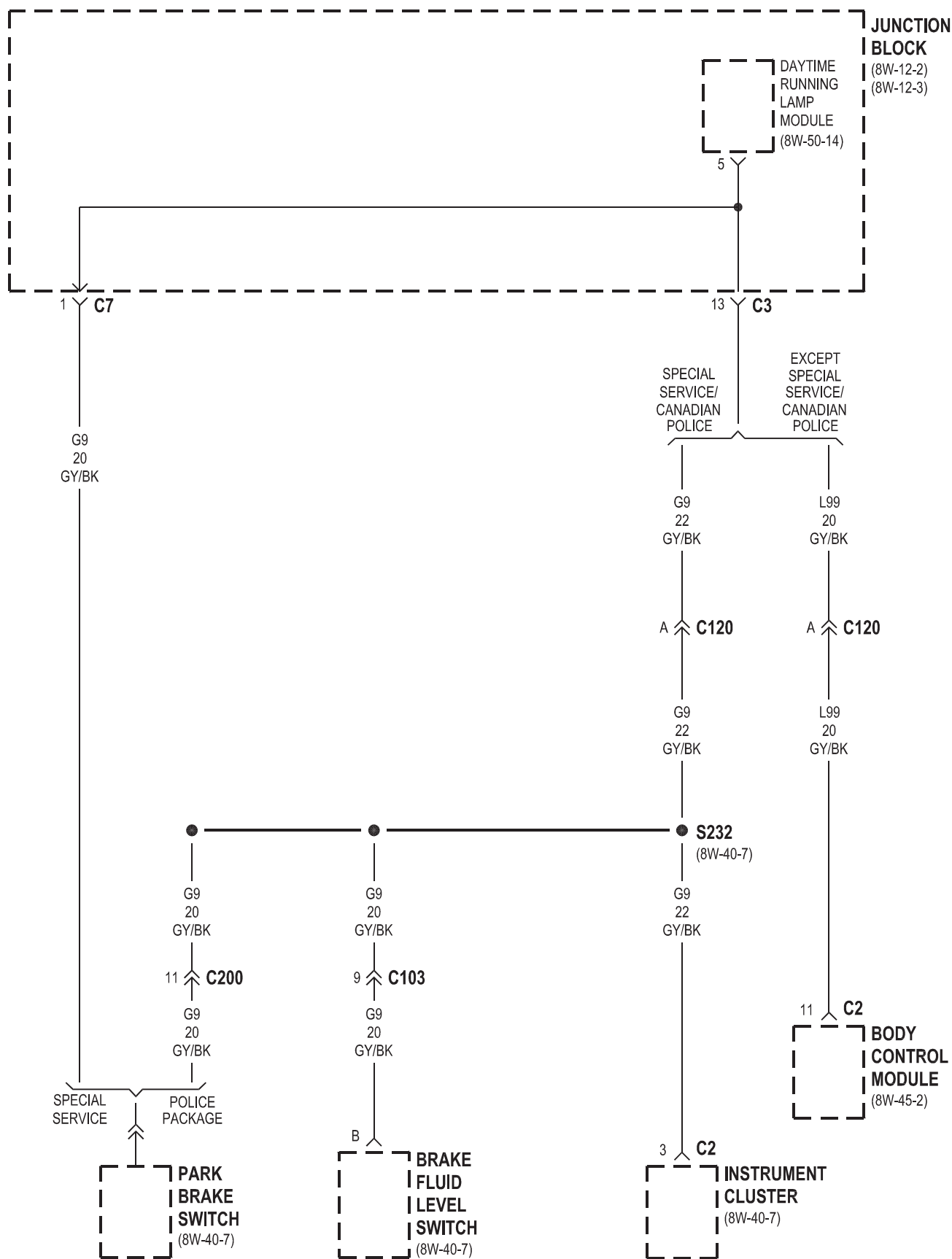


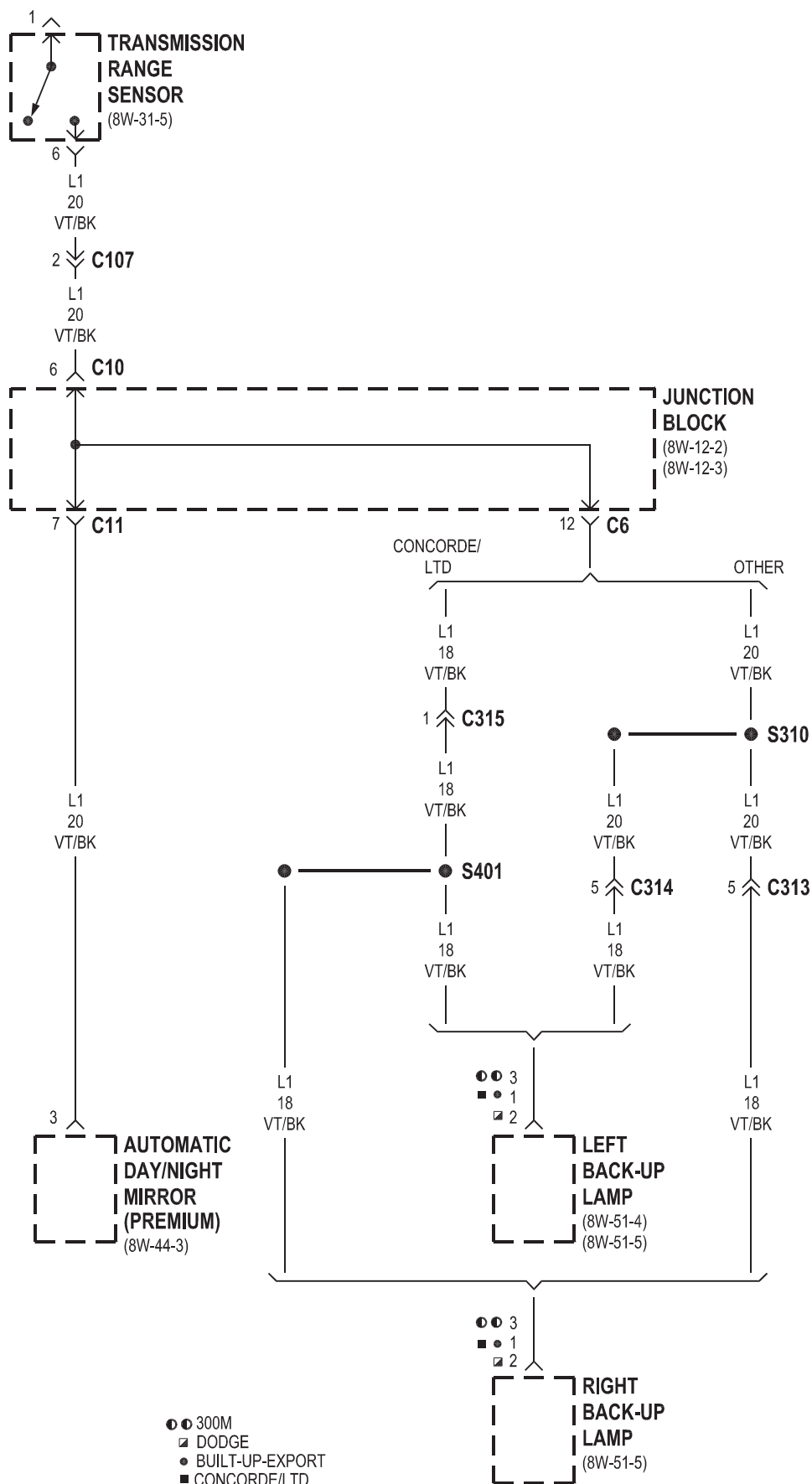


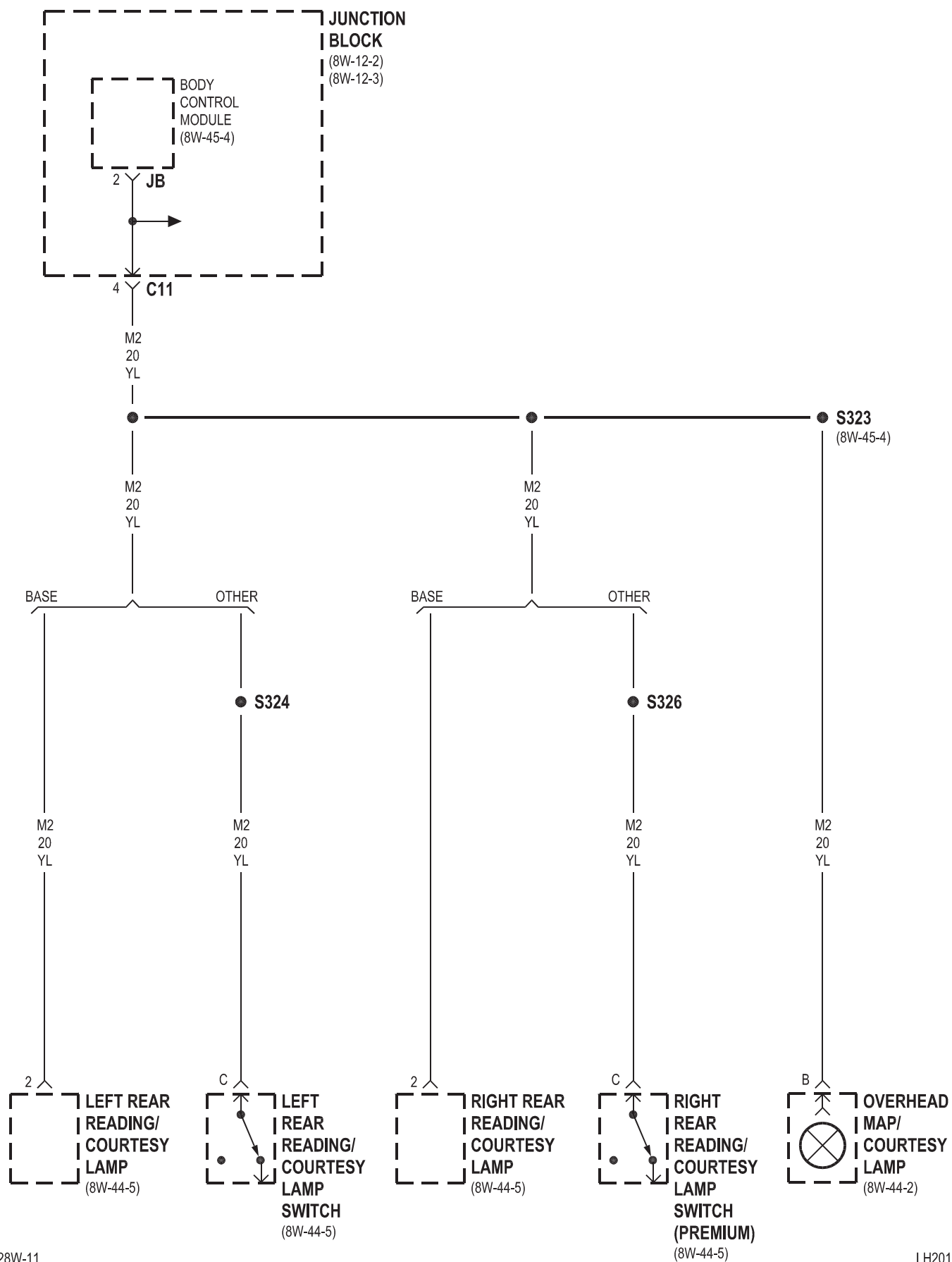


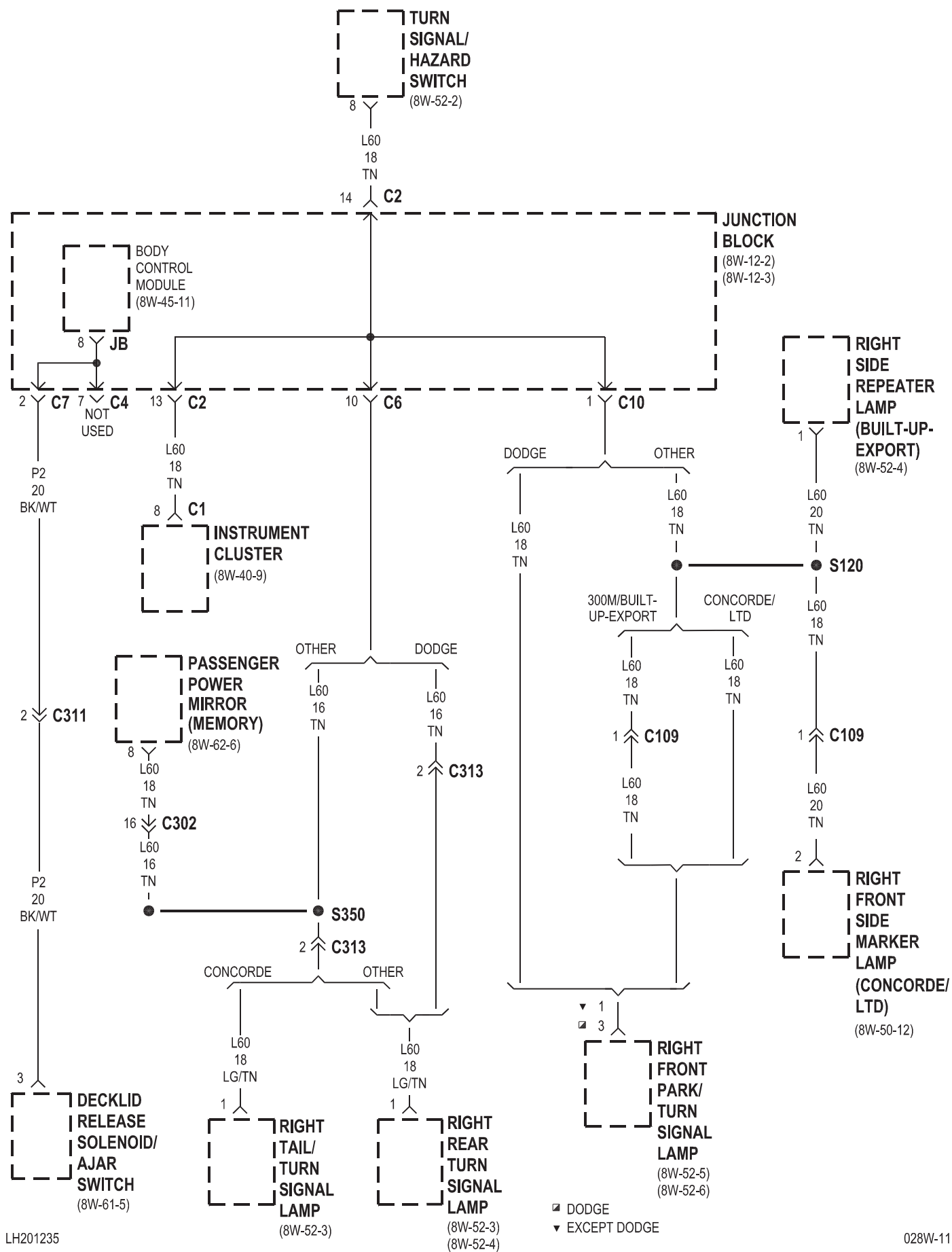


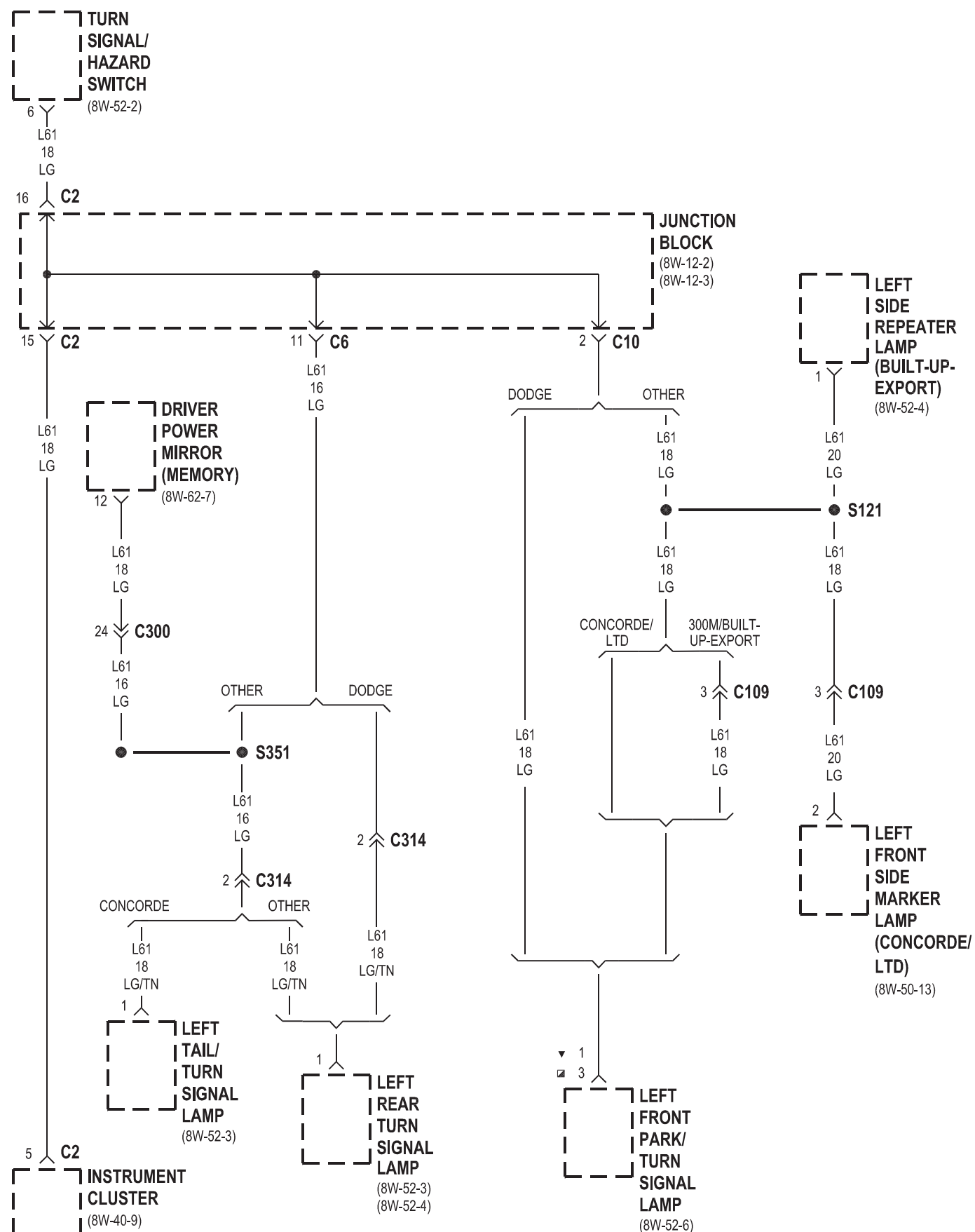








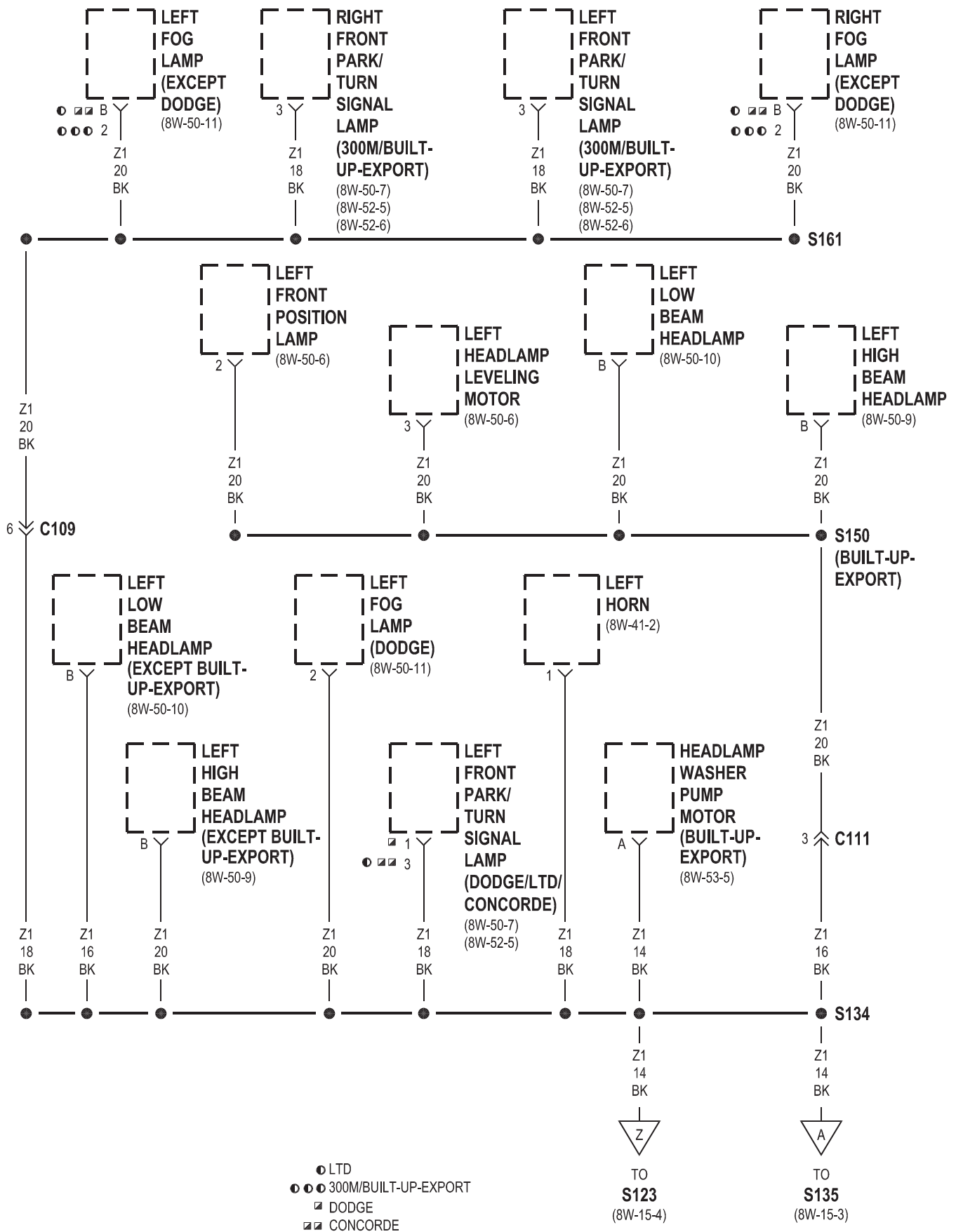


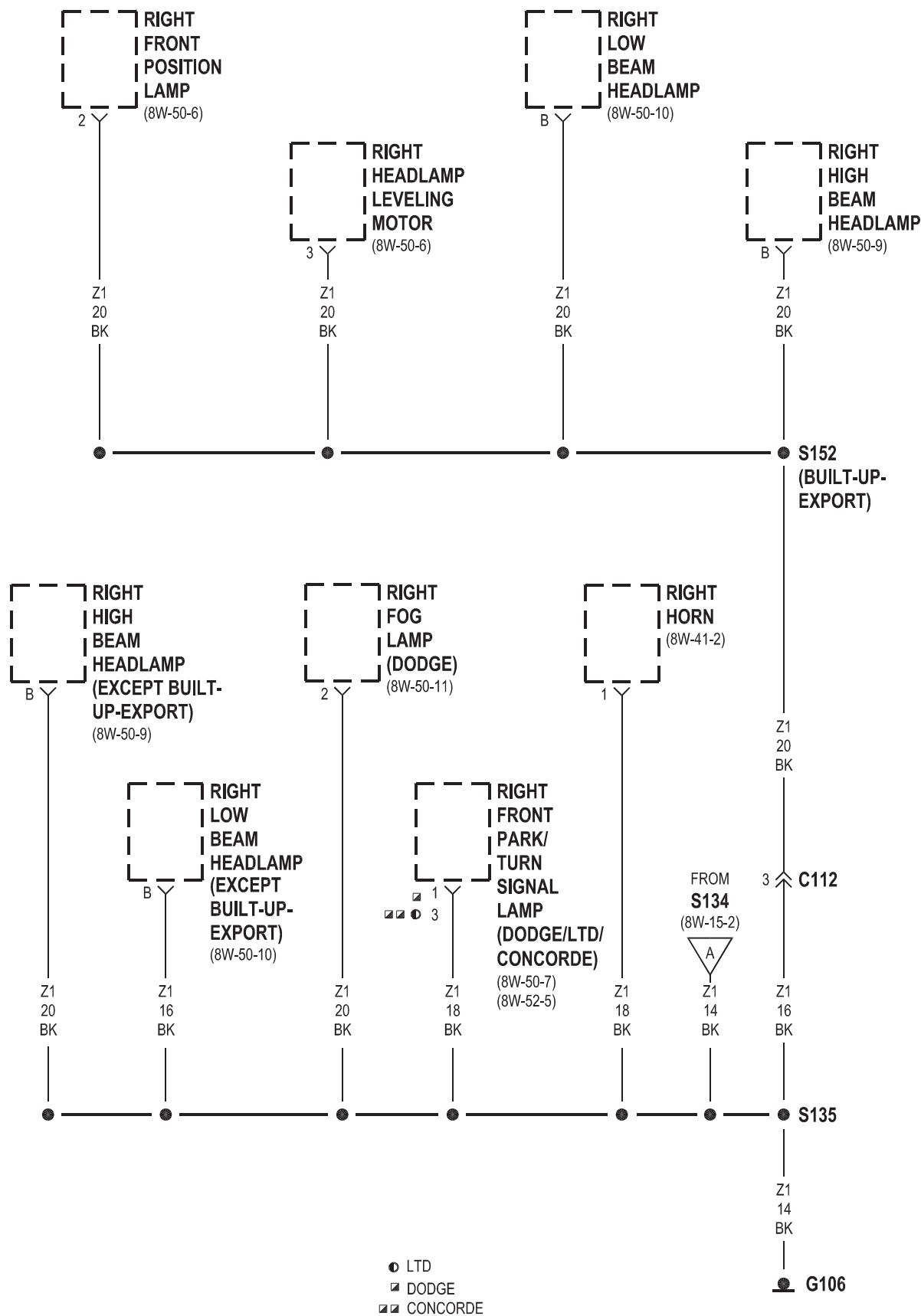


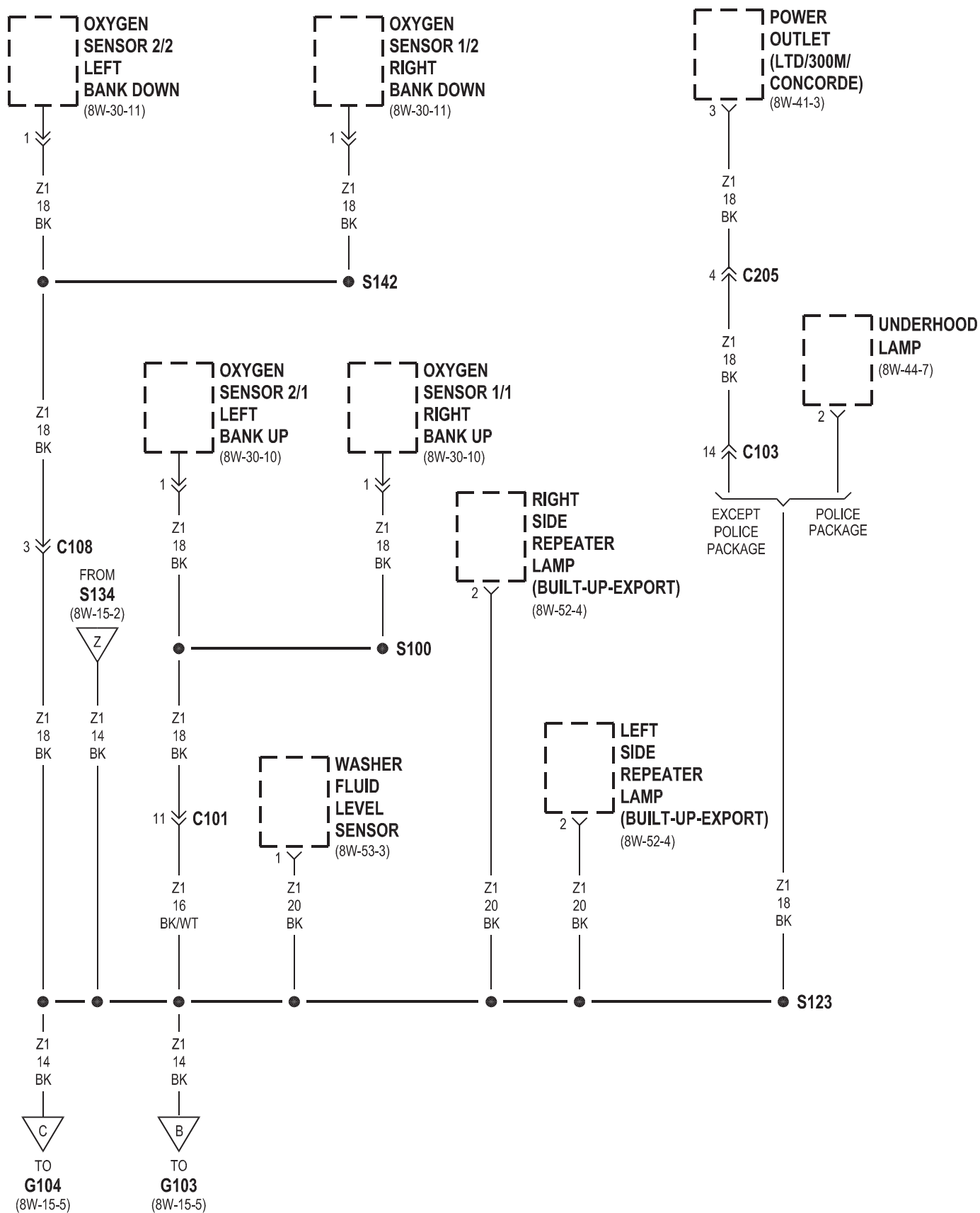
8W-15 GROUND DISTRIBUTION

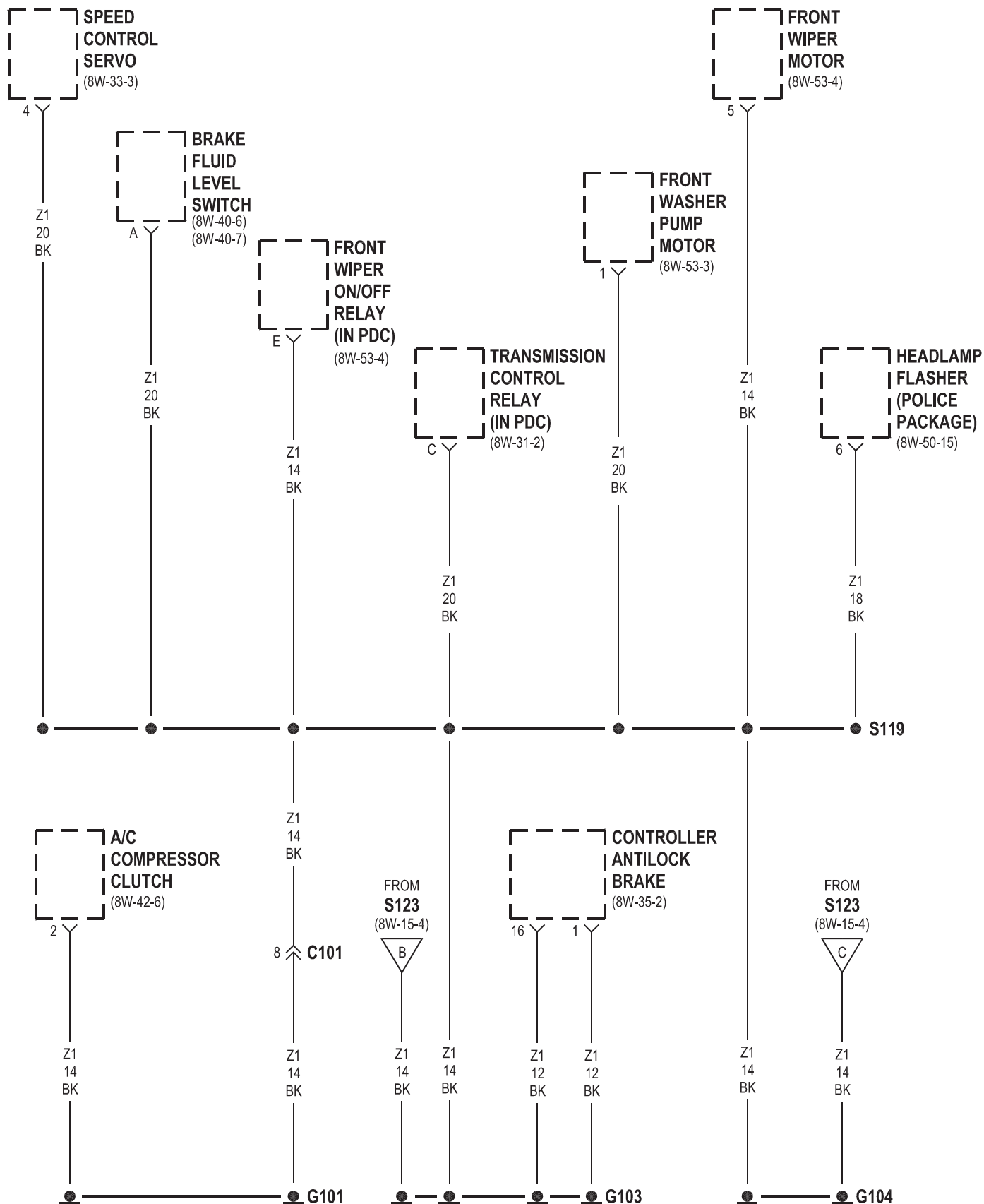
Component	Page
A/C Compressor Clutch	8W-15-5
Airbag Control Module (ORC)	8W-15-10
Analog Clock	8W-15-11
Automatic Day/Night Mirror	8W-15-9
Automatic Temperature Control Head	8W-15-8, 10
Autostick Switch	8W-15-13
Battery	8W-15-6
Blower Motor Power Module	8W-15-8
Body Control Module	8W-15-8, 9, 16
Brake Fluid Level Switch	8W-15-5
Brake Lamp Switch	8W-15-11
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Center High Mounted Stop Lamp No. 1	8W-15-18, 20
Center High Mounted Stop Lamp No. 2	8W-15-18, 20
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Combination Flasher	8W-15-7
Controller Antilock Brake	8W-15-5
Data Link Connector	8W-15-7, 10
Daytime Running Lamp Module	8W-15-12
Decklid Release Solenoid/Ajar Switch	8W-15-20
Door Lock Relay	8W-15-12
Door Unlock Relay	8W-15-12
Driver Door Lock Motor/Ajar Switch	8W-15-13
Driver Door Unlock Relay	8W-15-12
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Driver Power Door Lock Switch	8W-15-13
Driver Power Mirror	8W-15-13
Driver Power Seat Switch	8W-15-9, 13
Driver Power Window Switch	8W-15-13
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Front Wiper Motor	8W-15-5
Front Wiper On/Off Relay	8W-15-5
Fuel Pump Module	8W-15-18
G101	8W-15-5
G102	8W-15-6, 21
G103	8W-15-4, 5
G104	8W-15-4, 5
G105	8W-15-6
G106	8W-15-3
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G200	8W-15-7, 8
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G400	8W-15-20
Generator	8W-15-21
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Headlamp Flasher	8W-15-5
Headlamp Switch	8W-15-7
Headlamp Washer Pump Motor	8W-15-2
High Beam Headlamp Relay	8W-15-12
Ignition Switch	8W-15-11
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ISO Relay No. 1	8W-15-19
ISO Relay No. 2	8W-15-19
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Leak Detection Pump	8W-15-18
Left Back-Up Lamp	8W-15-16, 17
Left Fog Lamp	8W-15-2
Left Front Park/Turn Signal Lamp	8W-15-2
Left Front Position Lamp	8W-15-2
Left Headlamp Leveling Motor	8W-15-2
Left High Beam Headlamp	8W-15-2
Left Horn	8W-15-2
Left License Lamp	8W-15-17
Left Low Beam Headlamp	8W-15-2
Left Rear Door Lock Motor/Ajar Switch	8W-15-13
Left Rear Fog Lamp	8W-15-17
Left Rear Reading/Courtesy Lamp Switch	8W-15-12
Left Rear Side Marker Lamp	8W-15-16

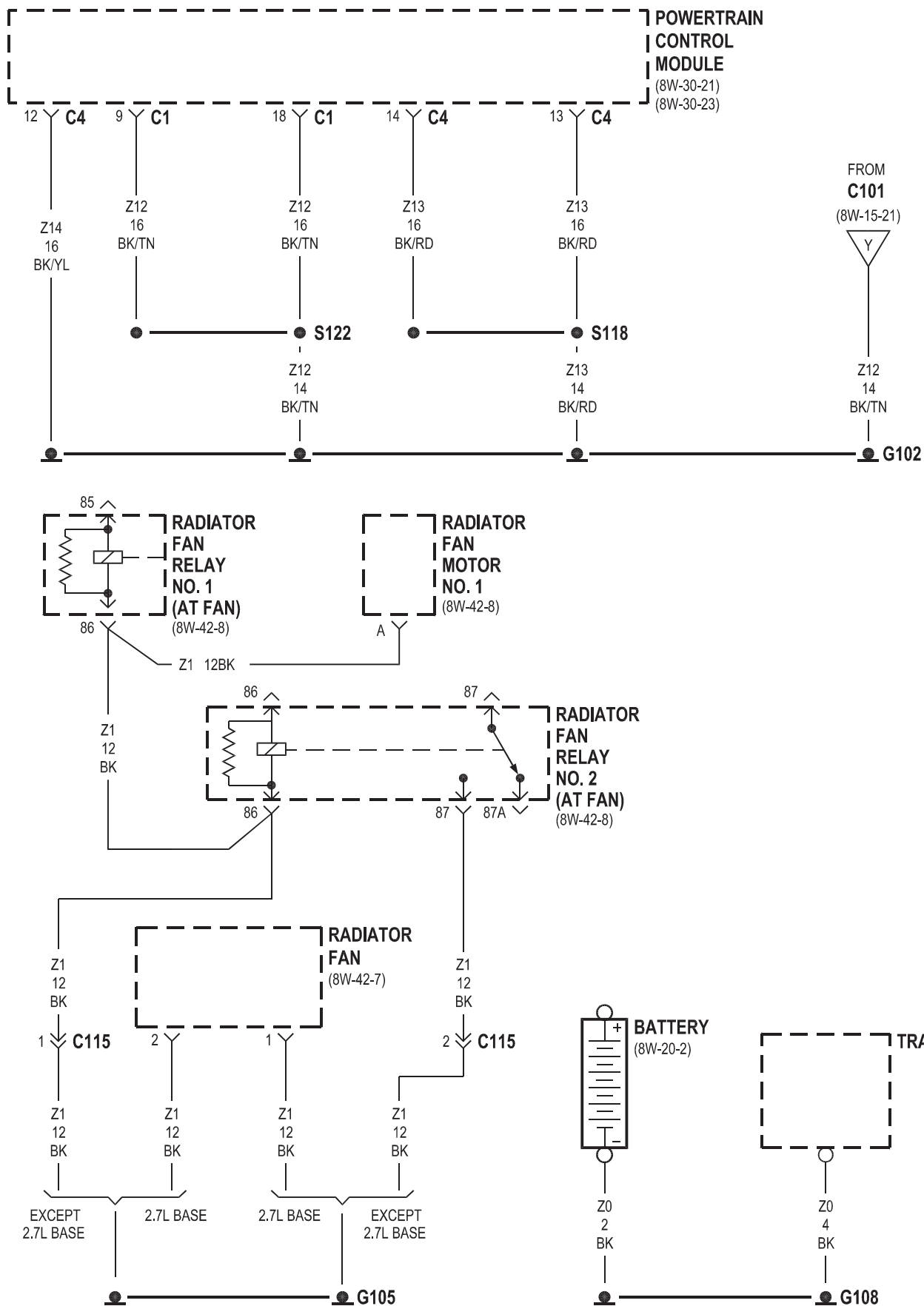
Component	Page
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Left Side Impact Airbag Control Module	8W-15-10
Left Side Repeater Lamp	8W-15-4
Left Tail Lamp	8W-15-16, 17
Left Tail/Stop Lamp	8W-15-16, 17
Left Tail/Stop Lamp No. 1	8W-15-16
Left Tail/Stop Lamp No. 2	8W-15-16
Left Tail/Turn Signal Lamp	8W-15-16
Left Visor/Vanity Lamp	8W-15-12
License Lamp	8W-15-16
Manifold Tuning Valve	8W-15-21
Manual Temperature Control Head	8W-15-8
Memory Heated Seat/Mirror Module	8W-15-9
Memory Set Switch	8W-15-9
Overhead Map/Courtesy Lamp	8W-15-12
Overhead Travel Information System	8W-15-9
Oxygen Sensor 1/1 Right Bank Up	8W-15-4
Oxygen Sensor 1/2 Right Bank Down	8W-15-4
Oxygen Sensor 2/1 Left Bank Up	8W-15-4
Oxygen Sensor 2/2 Left Bank Down	8W-15-4
Passenger Door Lock Motor/Ajar Switch	8W-15-18
Passenger Heated Seat Back	8W-15-21
Passenger Heated Seat Switch	8W-15-21
Passenger Power Door Lock Switch	8W-15-18
Passenger Power Mirror	8W-15-18
Passenger Power Seat Switch	8W-15-21
Power Amplifier	8W-15-18
Power Mirror Switch	8W-15-13
Power Outlet	8W-15-4
Powertrain Control Module	8W-15-6
Radiator Fan	8W-15-6
Radiator Fan Motor No. 1	8W-15-6
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Radiator Fan Relay No. 2	8W-15-6
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Right Back-Up Lamp	8W-15-14, 15, 16
Right Fog Lamp	8W-15-2, 3
Right Front Park/Turn Signal Lamp	8W-15-2, 3
Right Front Position Lamp	8W-15-3
Right Headlamp Leveling Motor	8W-15-3
Right High Beam Headlamp	8W-15-3
Right Horn	8W-15-3
Right License Lamp	8W-15-17
Right Low Beam Headlamp	8W-15-3
Right Rear Door Lock Motor/Ajar Switch	8W-15-18
Right Rear Fog Lamp	8W-15-15
Right Rear Reading/Courtesy Lamp Switch	8W-15-12
Right Rear Side Marker Lamp	8W-15-14
Right Rear Turn Signal Lamp	8W-15-14, 15
Right Side Impact Airbag Control Module	8W-15-10
Right Side Repeater Lamp	8W-15-4
Right Tail Lamp	8W-15-14, 15
Right Tail/Stop Lamp	8W-15-14, 15
Right Tail/Stop Lamp No. 1	8W-15-14
Right Tail/Stop Lamp No. 2	8W-15-14
Right Tail/Turn Signal Lamp	8W-15-14
Right Visor/Vanity Lamp	8W-15-12
Seat Belt Switch	8W-15-10, 19
Sentry Key Immobilizer Module	8W-15-11
Speed Control Servo	8W-15-5
Sunroof Control Module	8W-15-12
Sunroof Limit Switch	8W-15-12
Sunroof Switch	8W-15-12
Traction Control Switch	8W-15-10
Transmission Control Relay	8W-15-5
Transmission Range Indicator Illumination	8W-15-7
Trunk Knock Out Switch	8W-15-20
Turn Signal/Hazard Switch	8W-15-8
Underhood Lamp	8W-15-4
Washer Fluid Level Sensor	8W-15-4

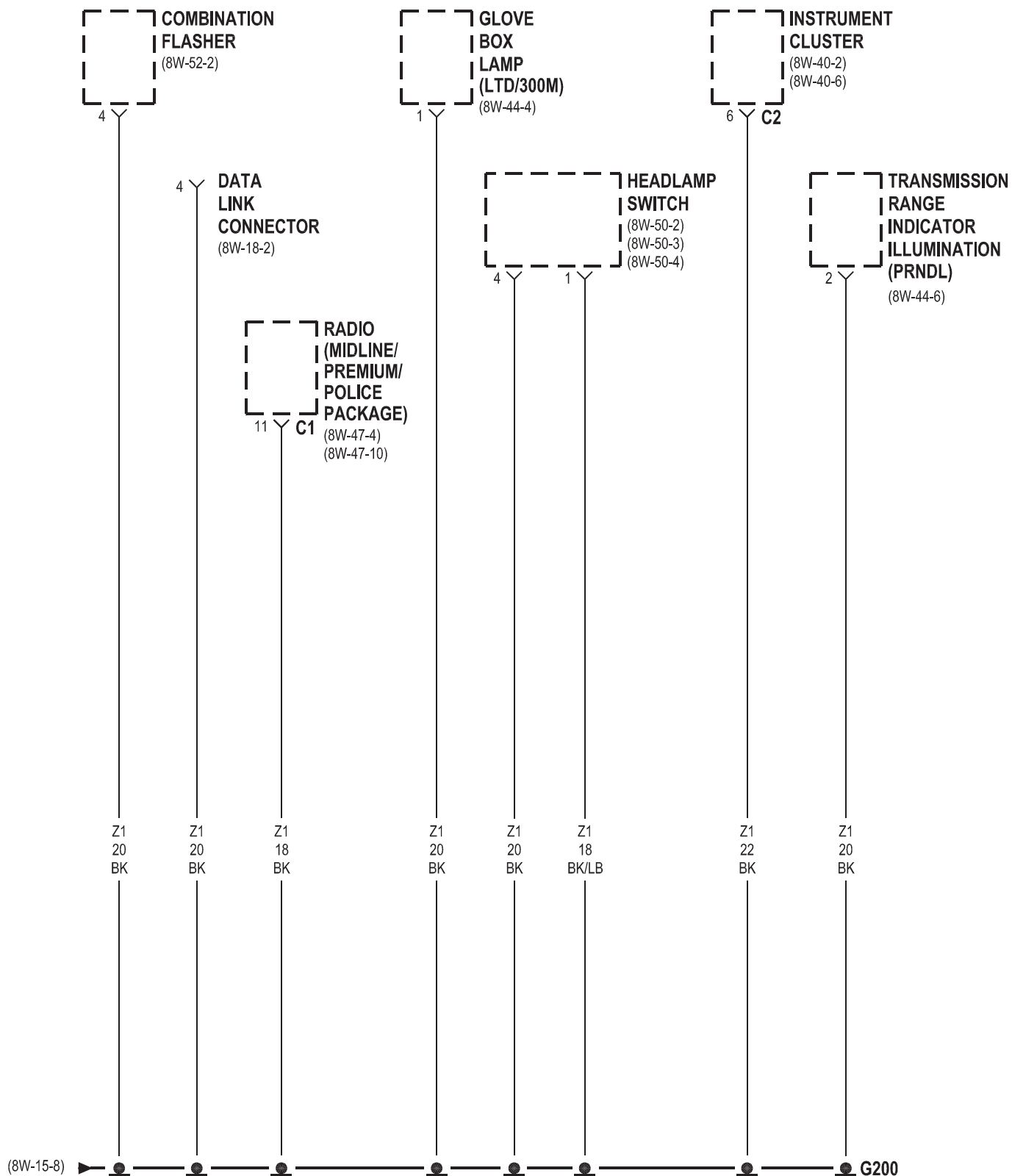


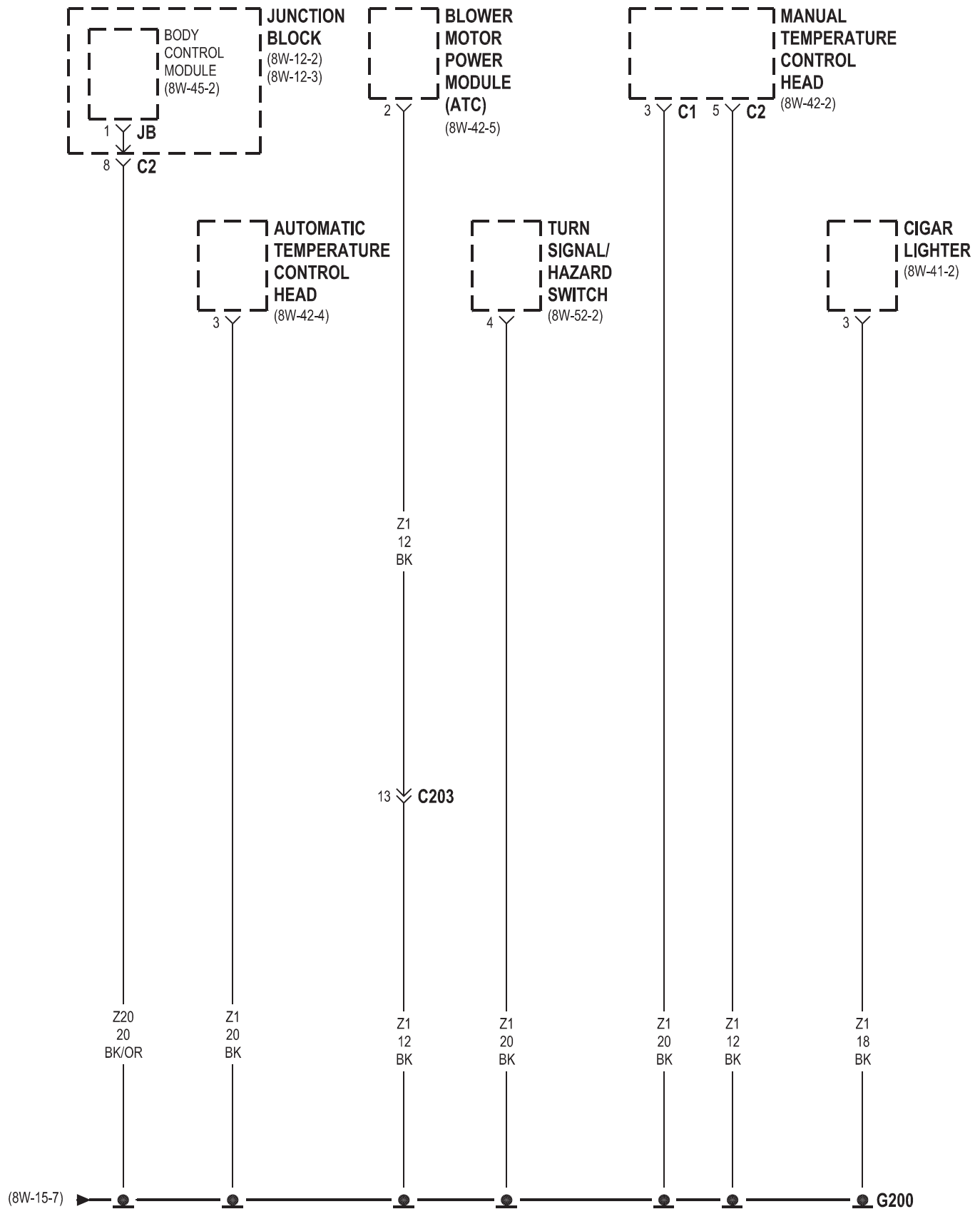


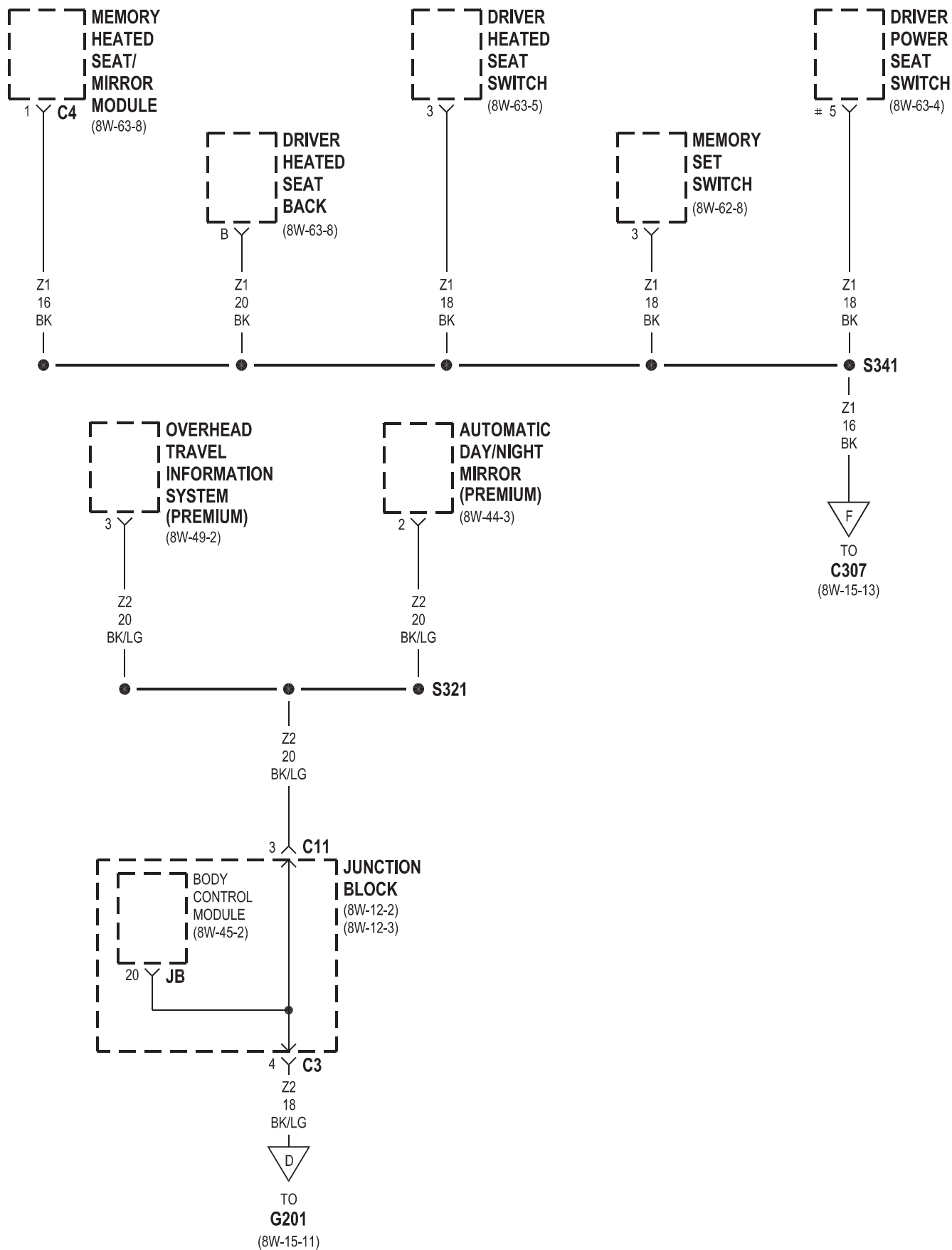


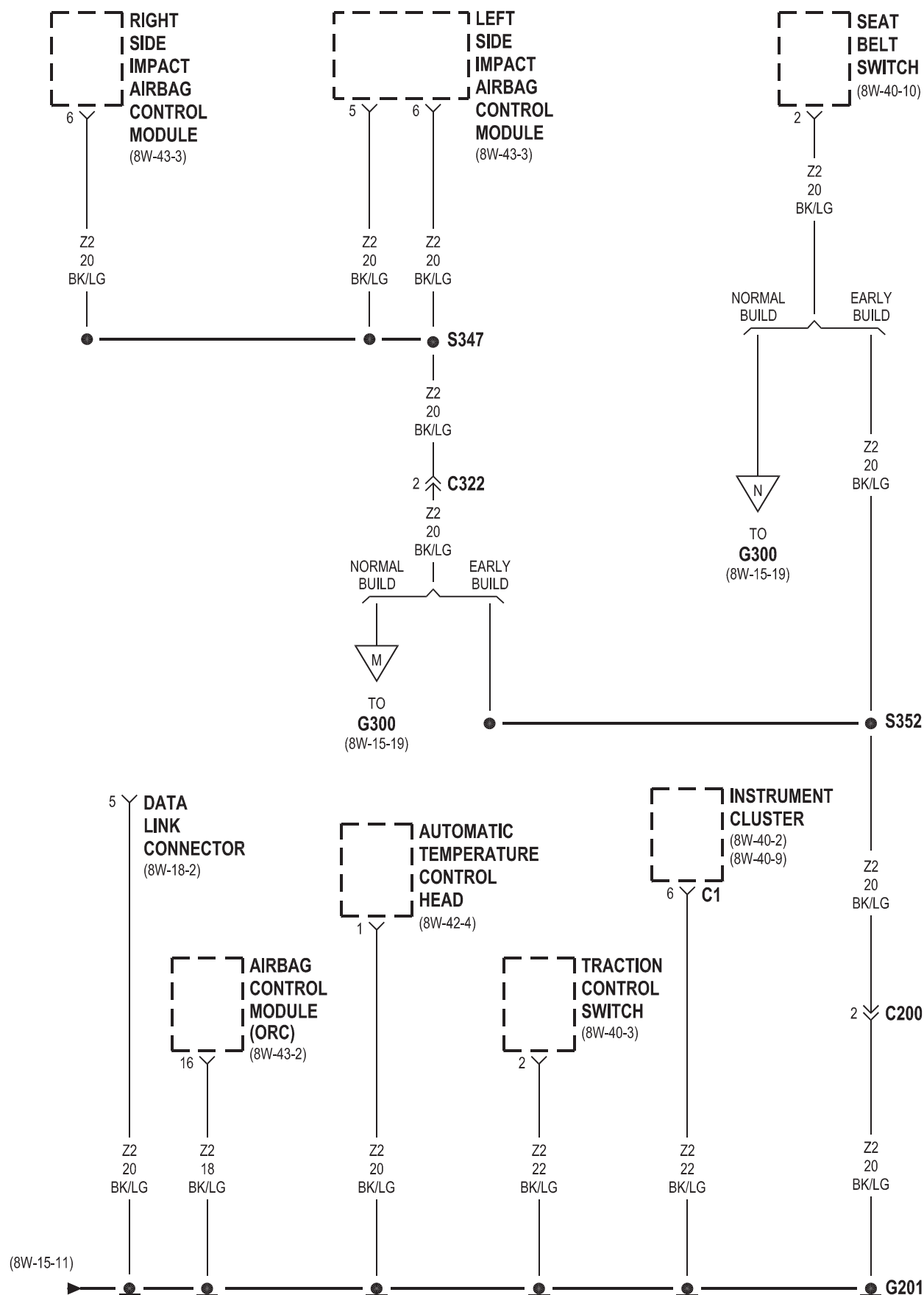


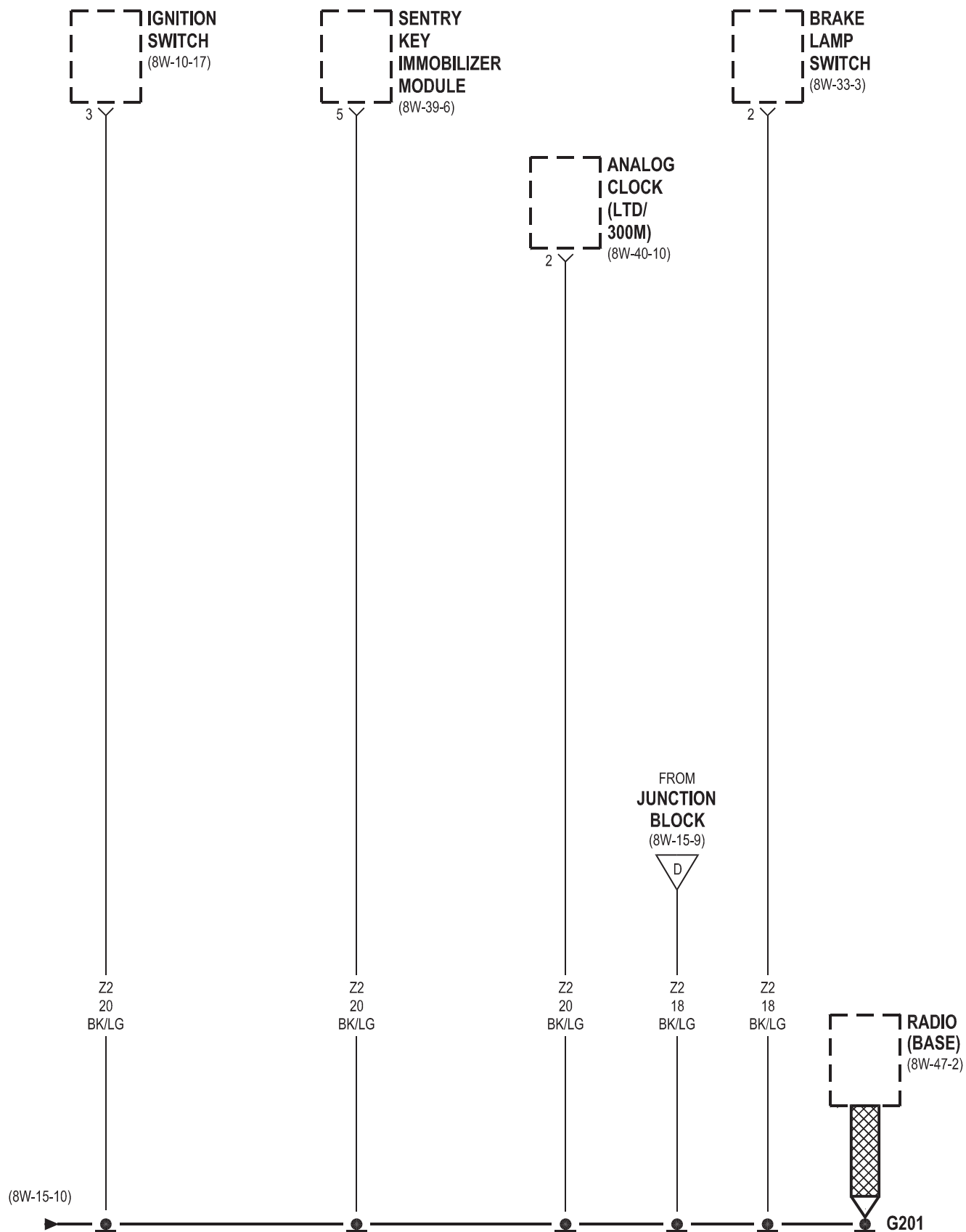


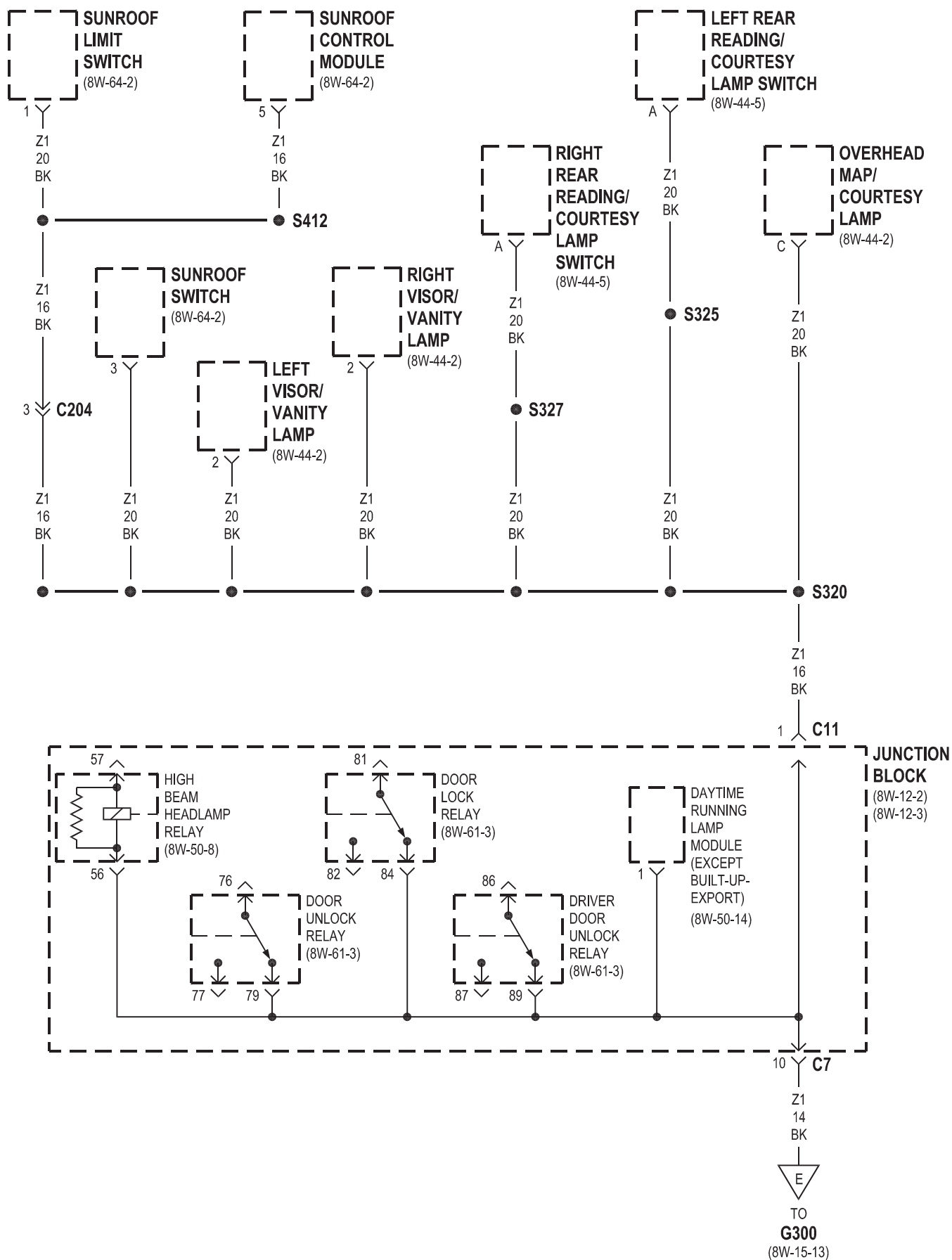


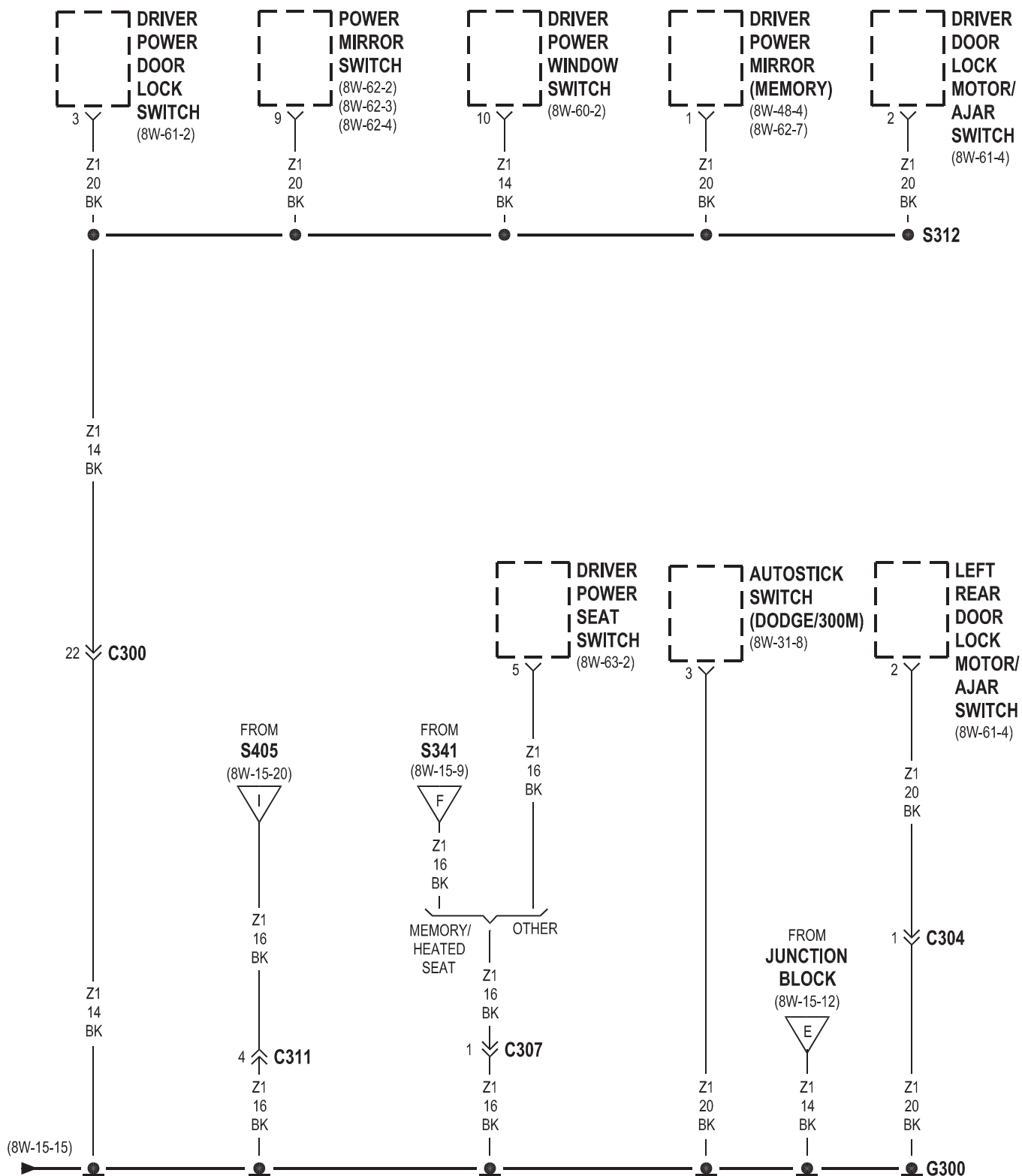


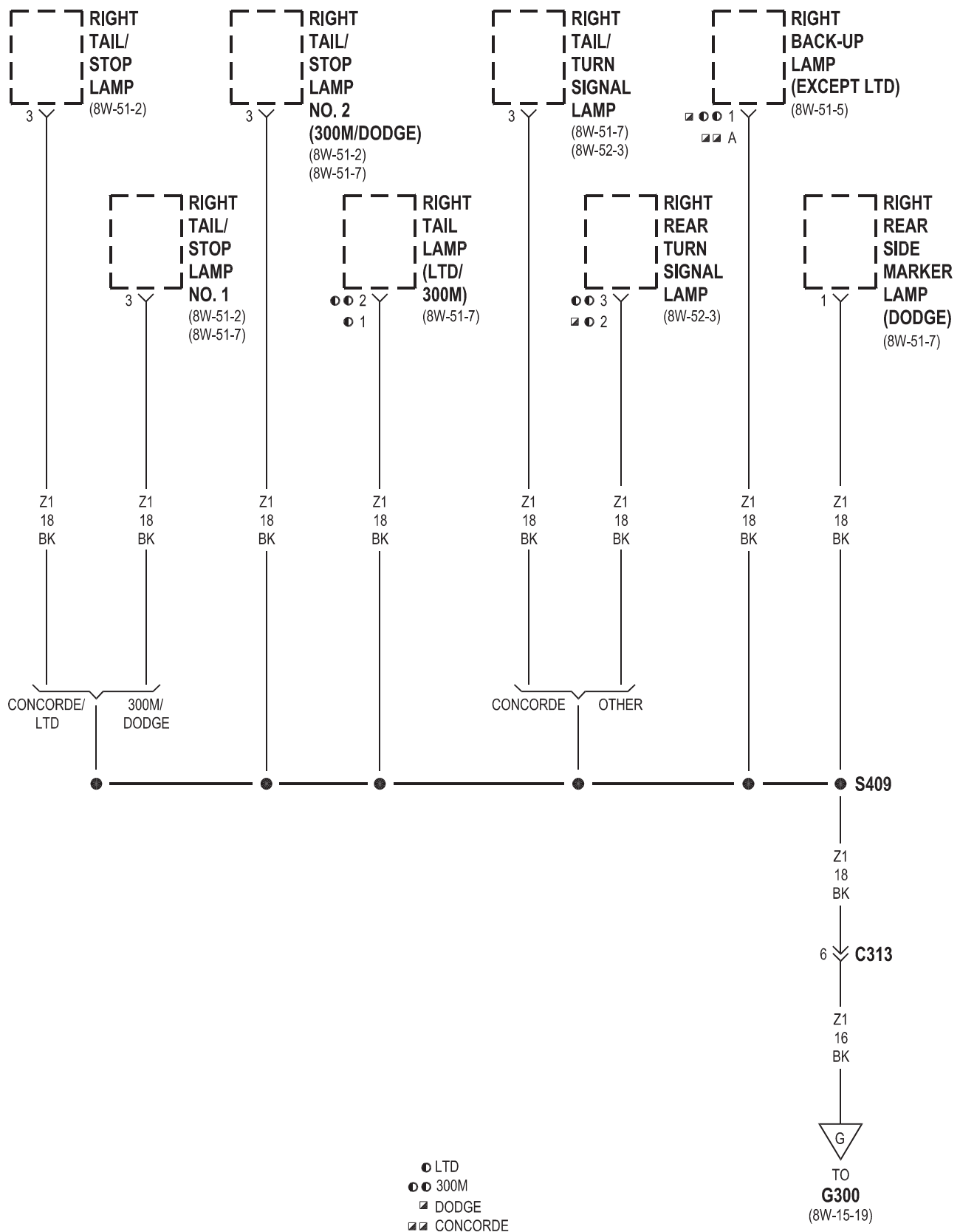




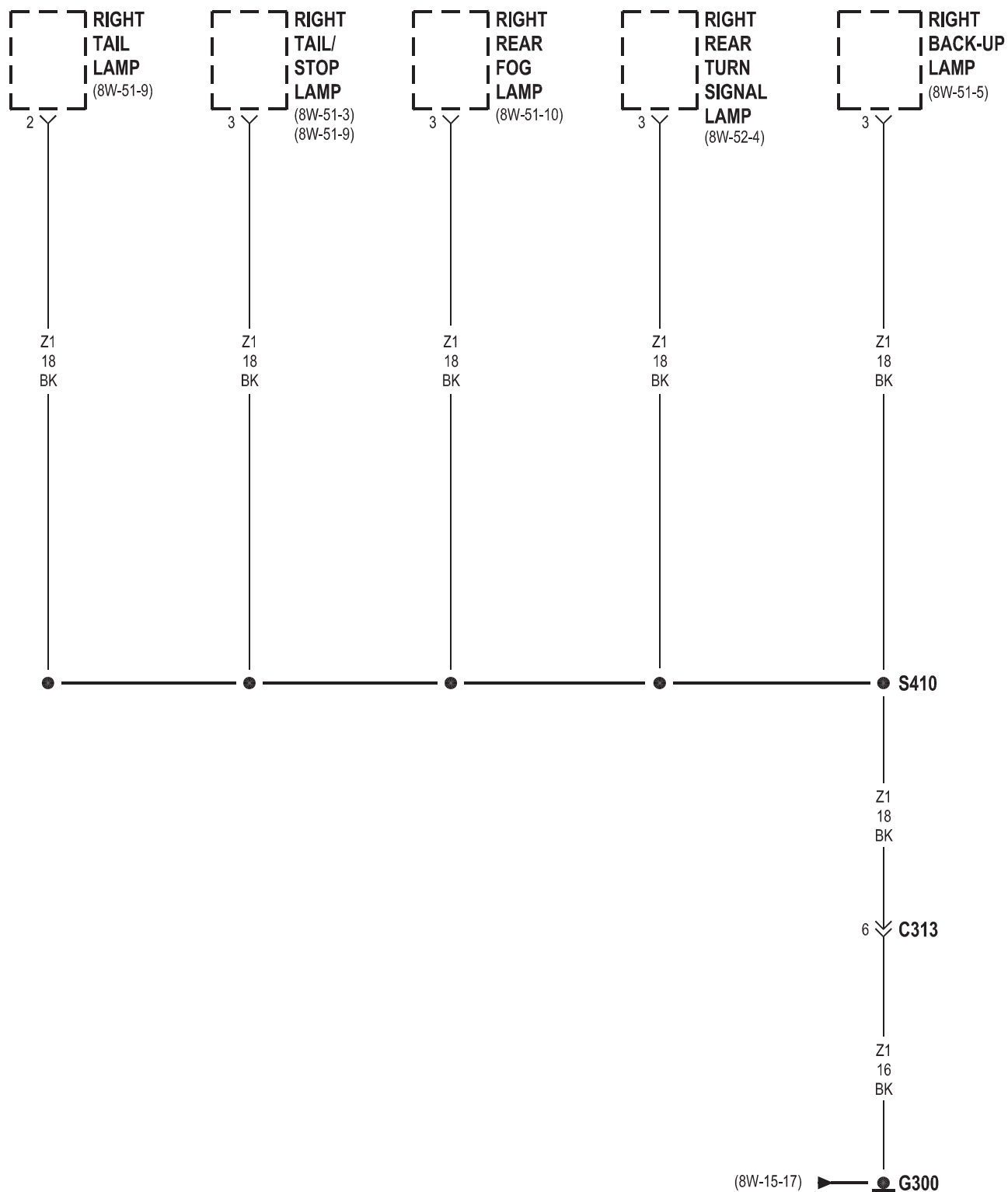


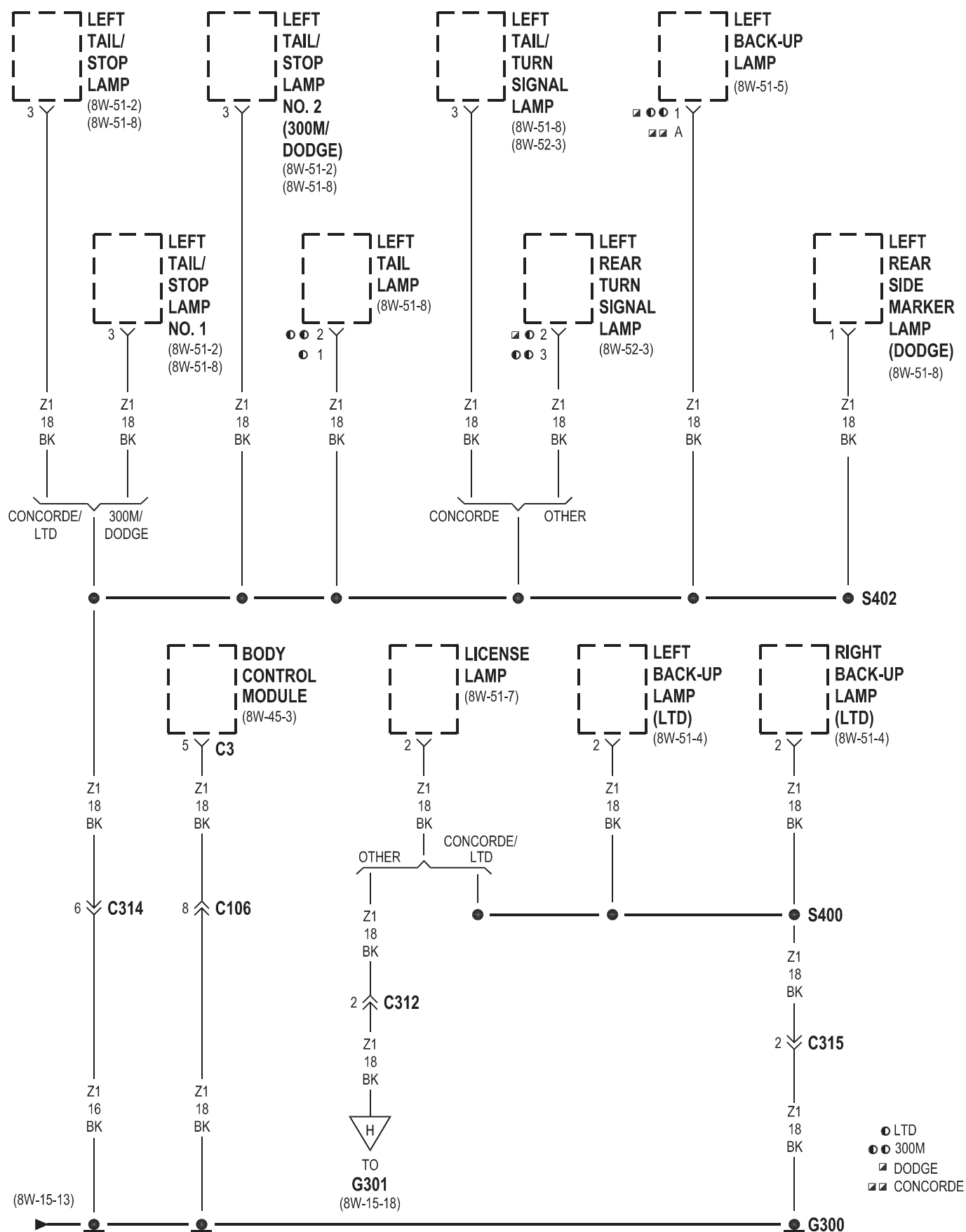


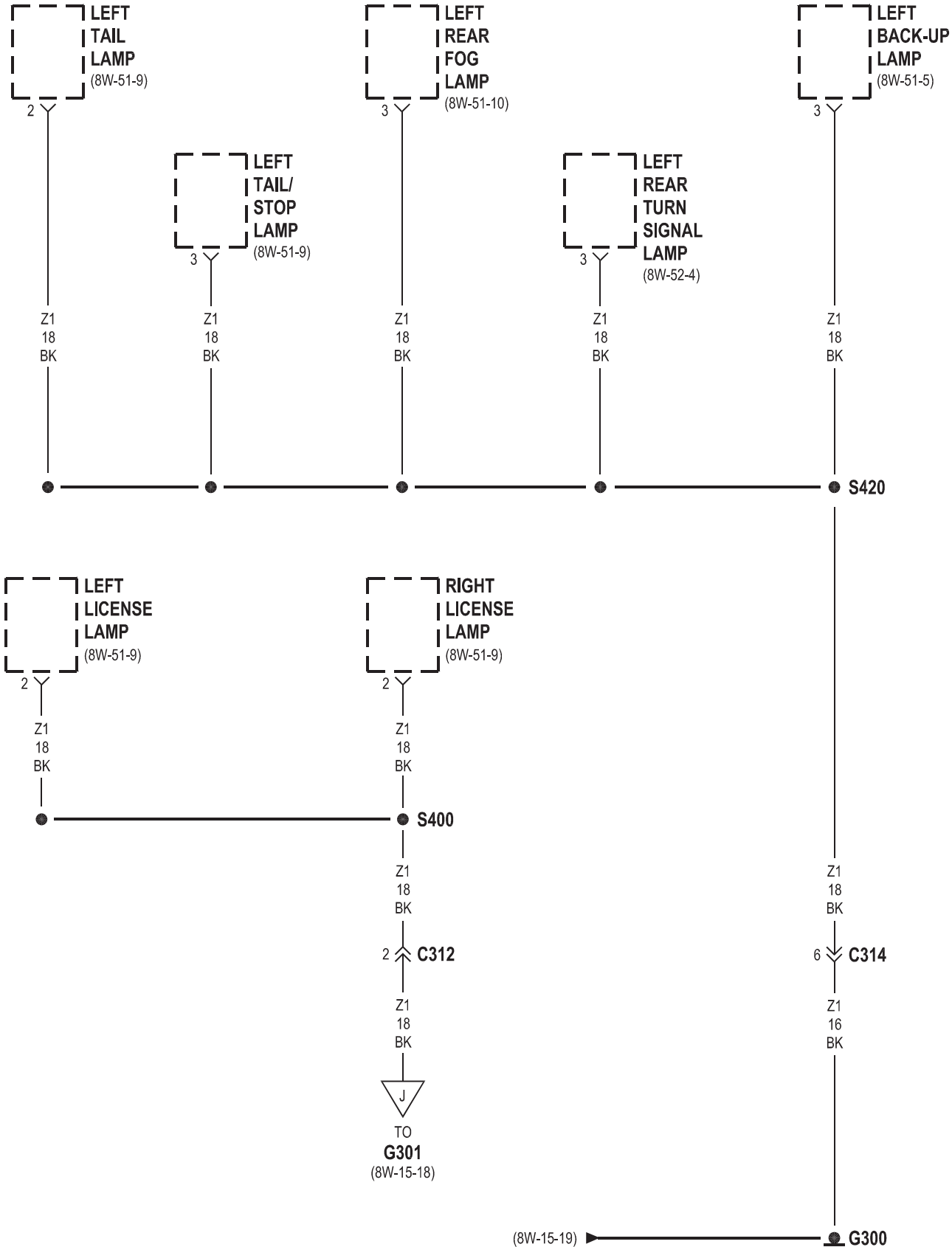


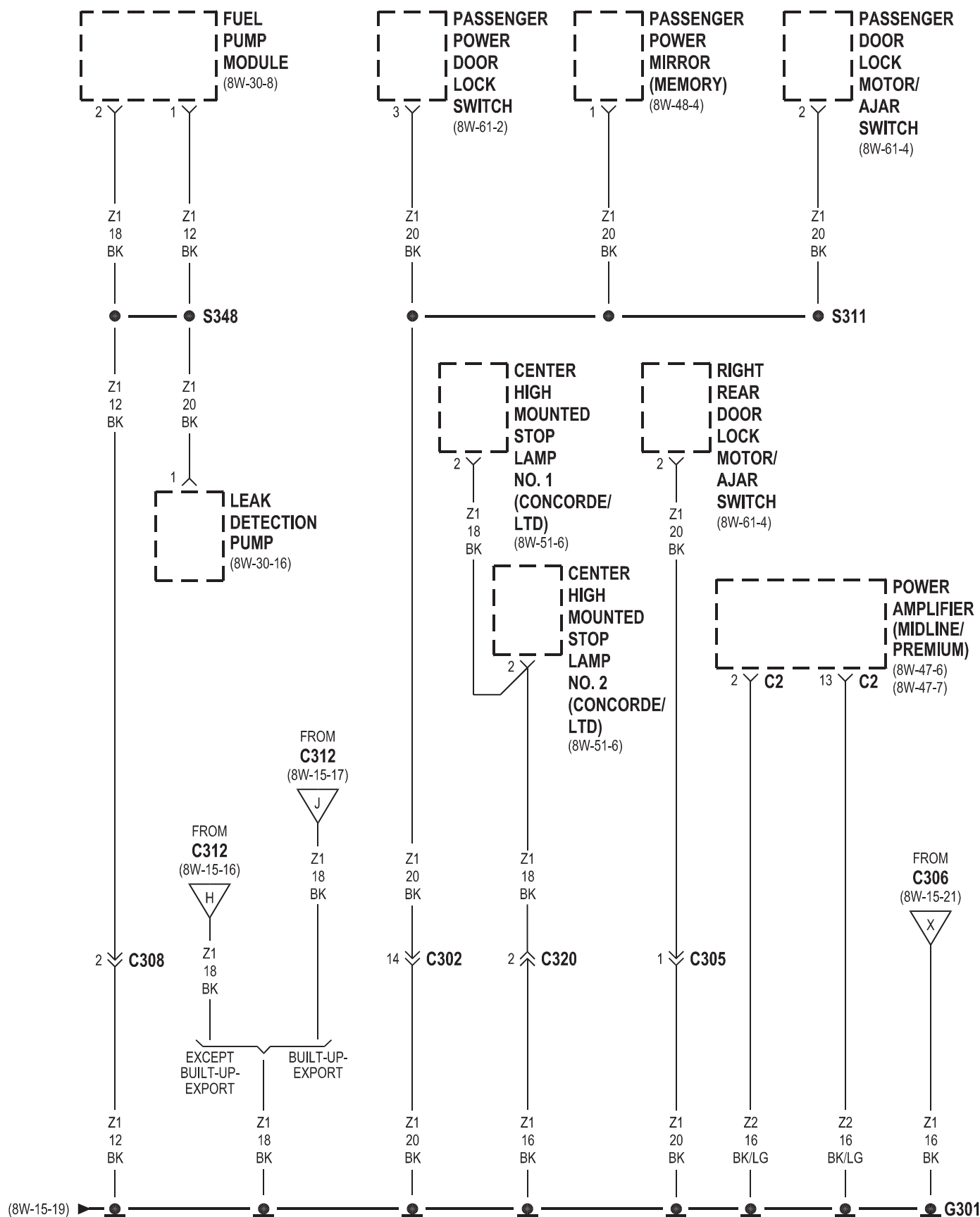


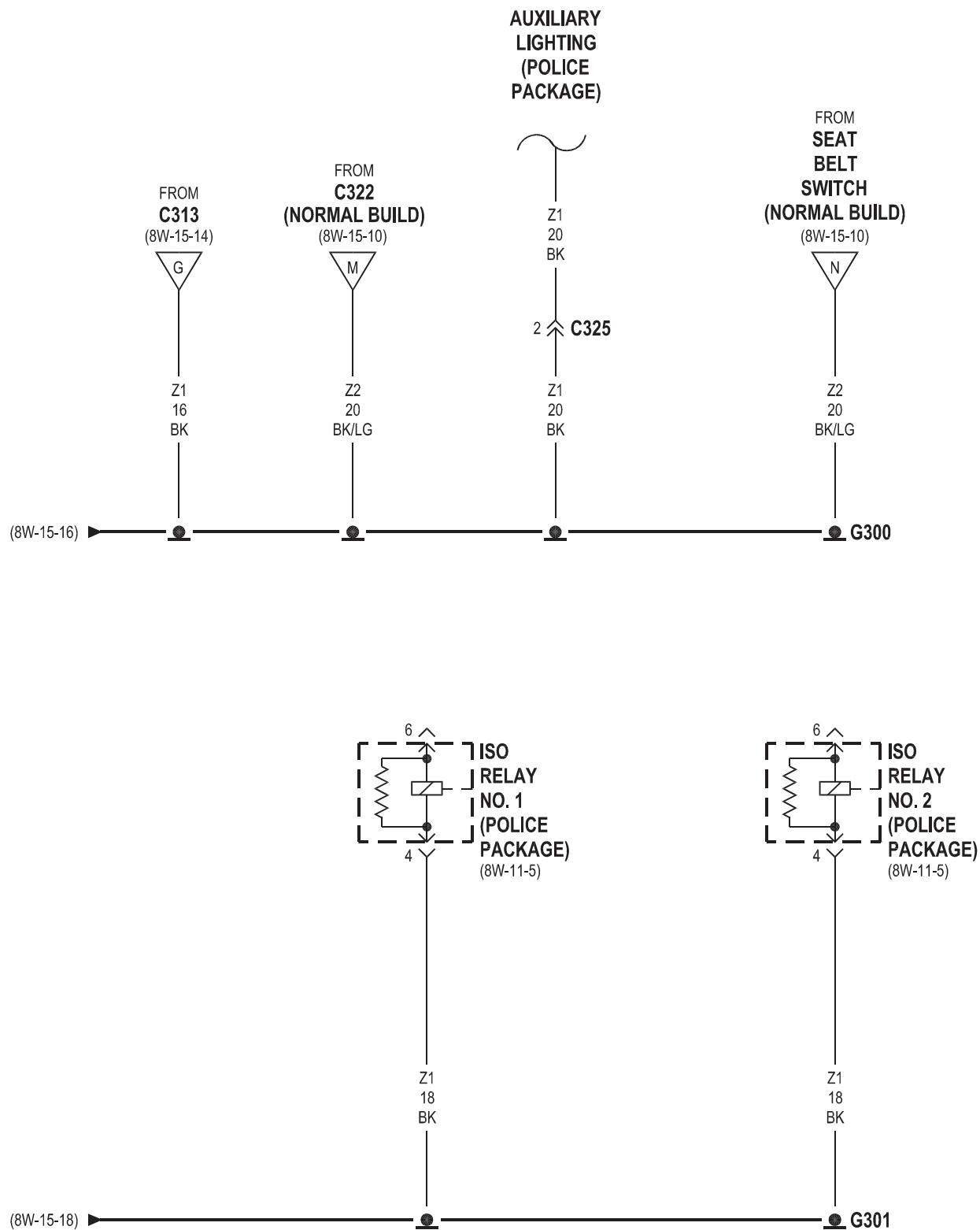
LH **8W-15 GROUND DISTRIBUTION** **8W - 15 - 15**
BUILT-UP-EXPORT

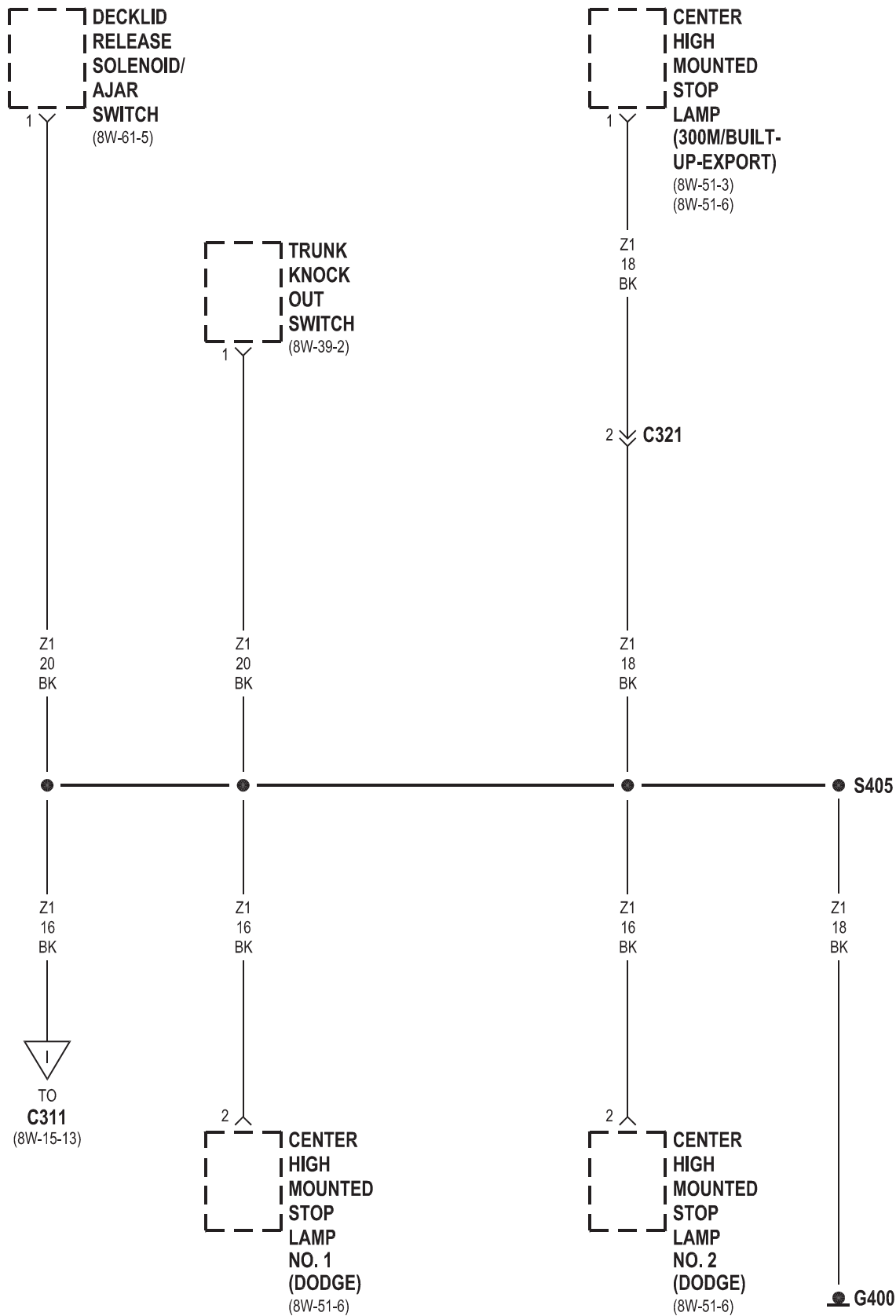


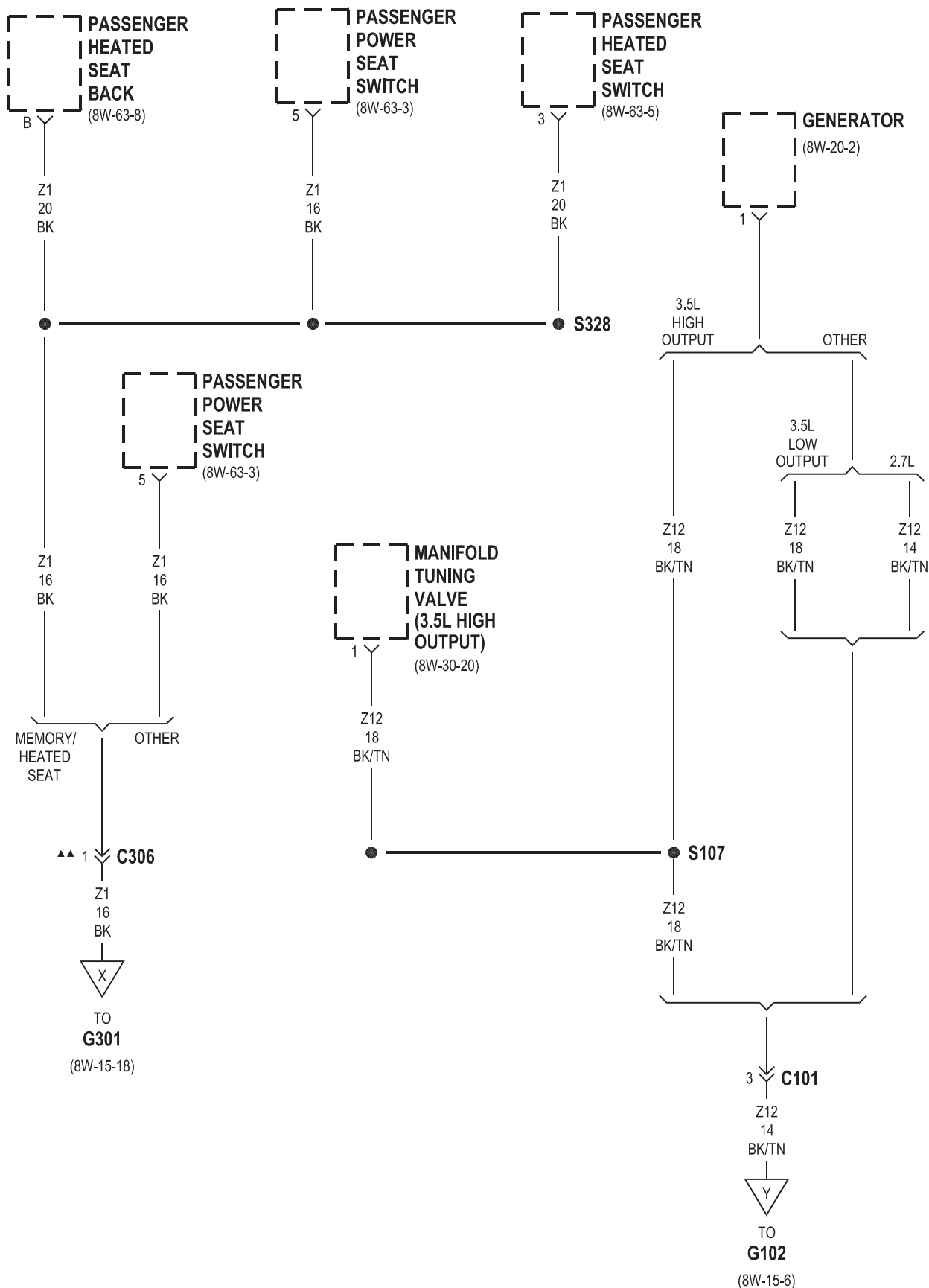






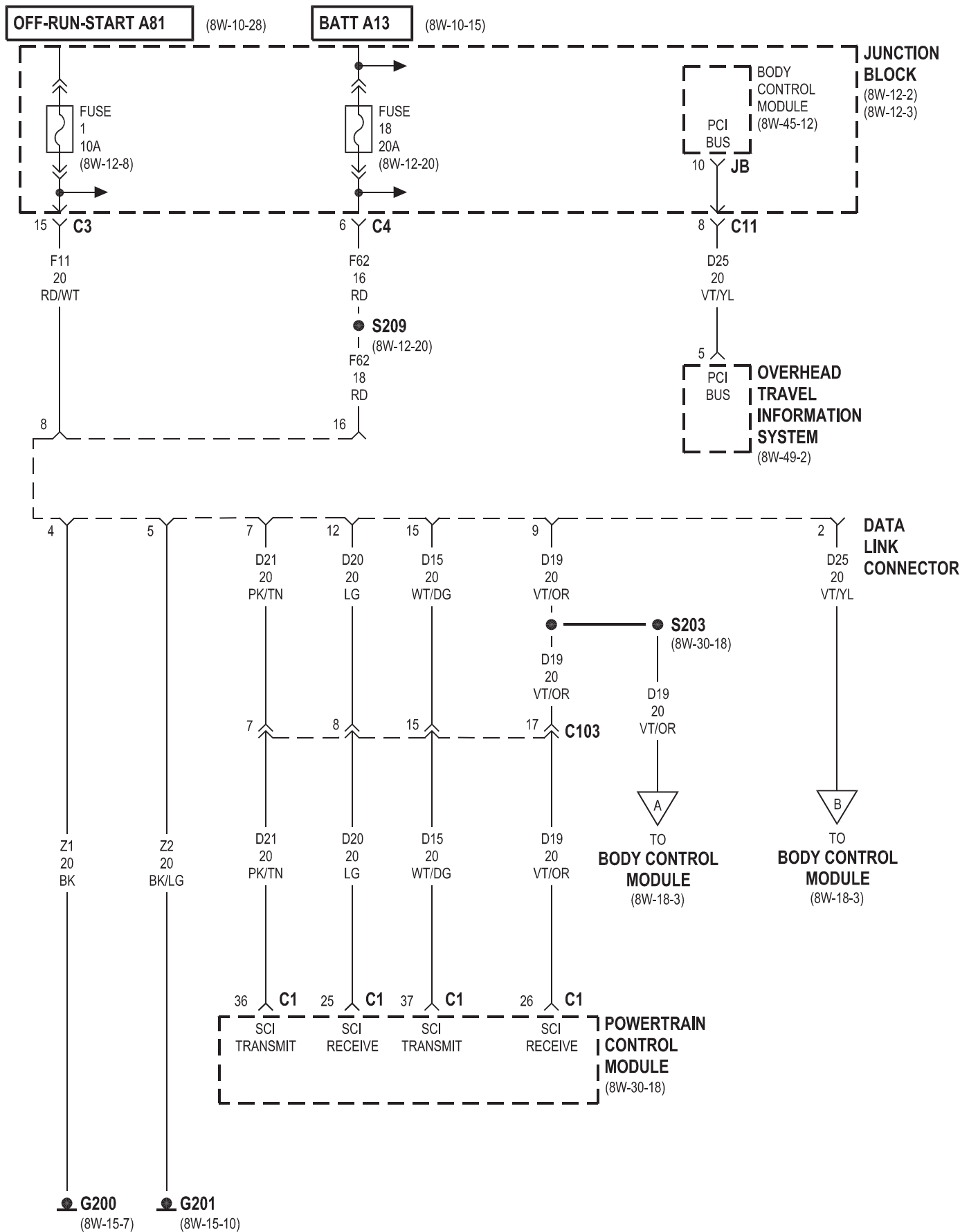






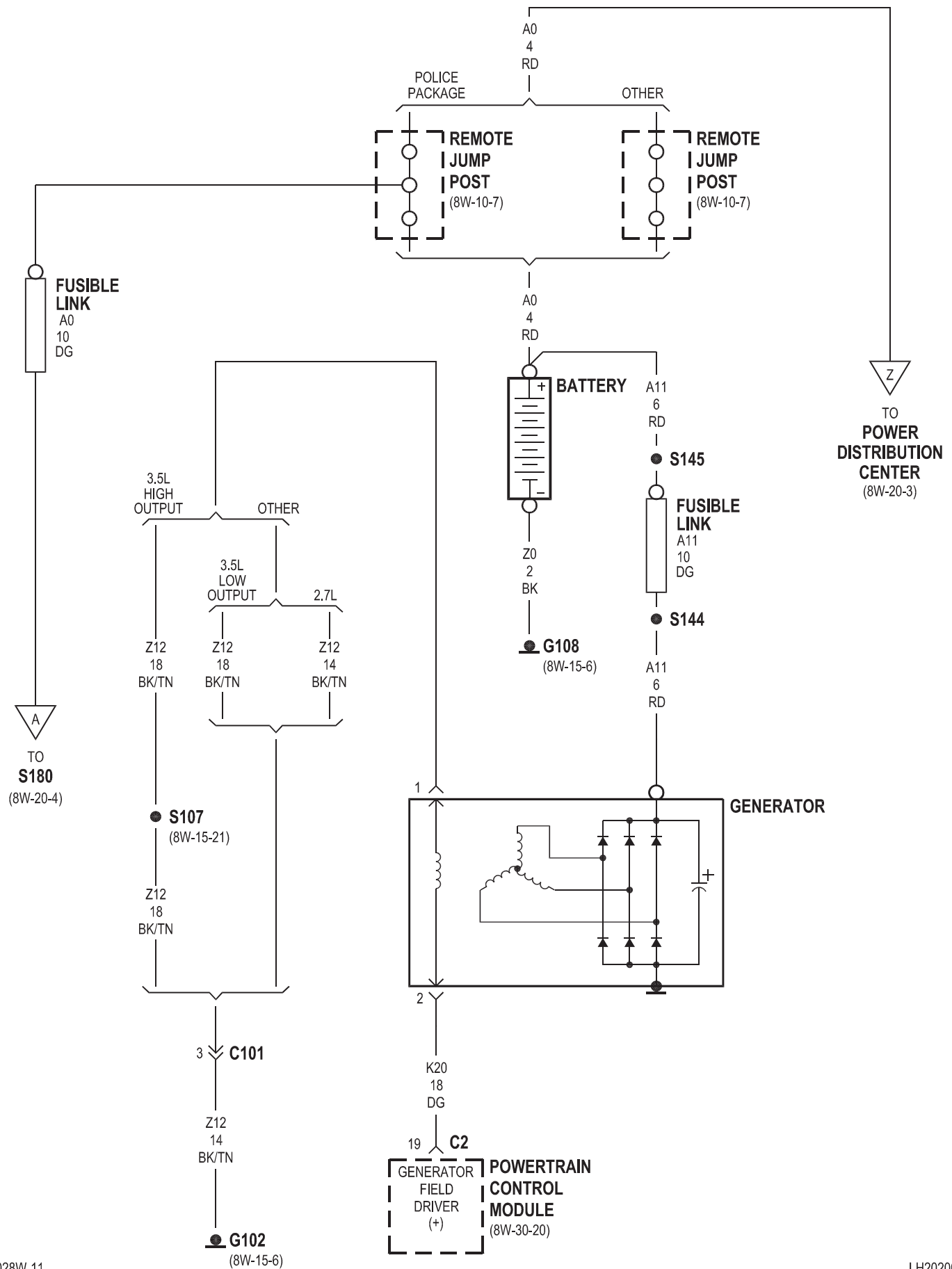
8W-18 BUS COMMUNICATIONS

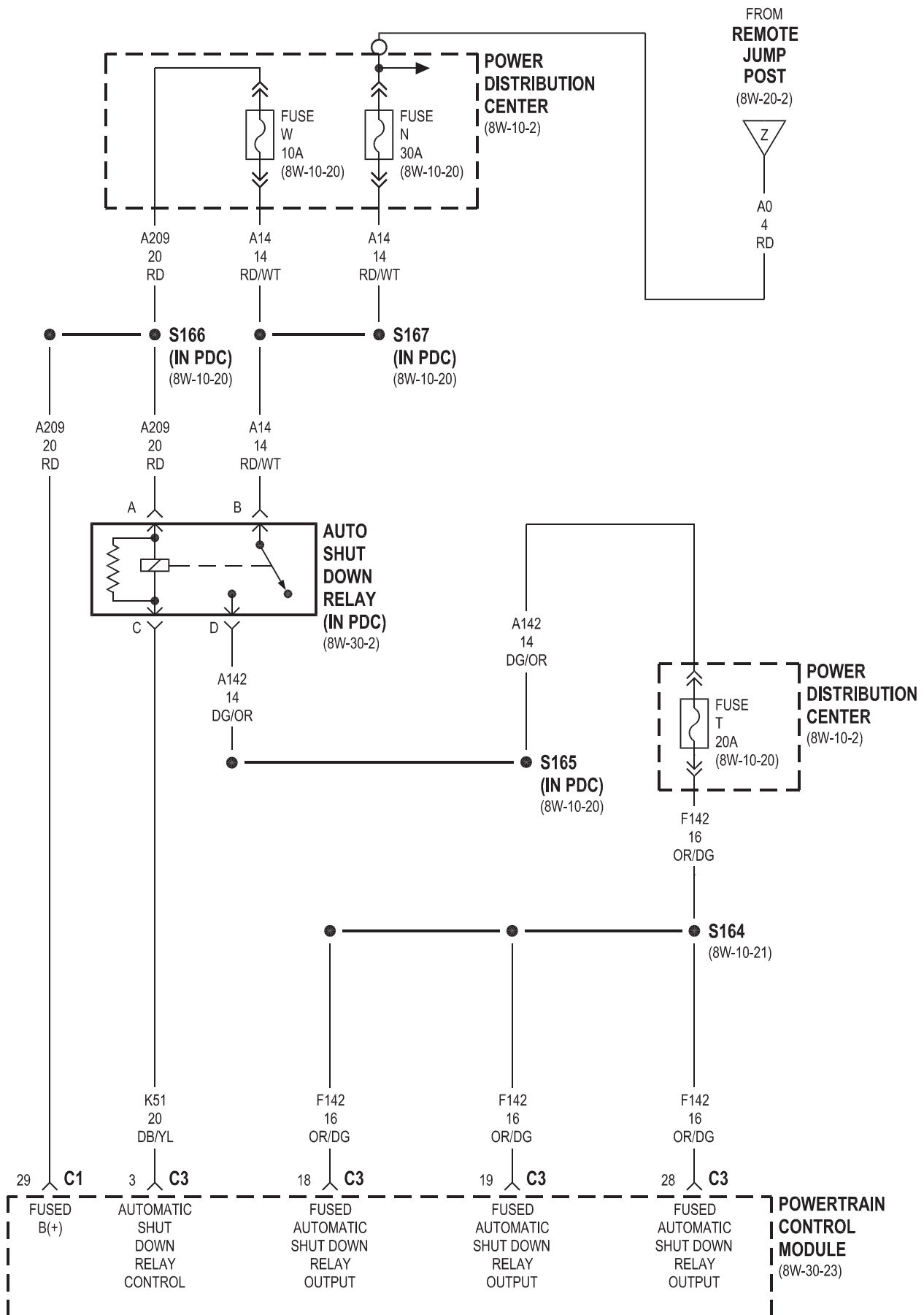
Component	Page	Component	Page
Airbag Control Module (ORC)	8W-18-3	Instrument Cluster	8W-18-3
Automatic Temperature Control Head	8W-18-3	Junction Block	8W-18-2
Body Control Module	8W-18-2, 3	Left Side Impact Airbag Control Module . .	8W-18-3
Compact Disc Changer	8W-18-3	Memory Heated Seat/Mirror Module	8W-18-3
Controller Antilock Brake	8W-18-3	Overhead Travel Information System	8W-18-2
Data Link Connector	8W-18-2, 3	Powertrain Control Module	8W-18-2, 3
Fuse 1 (JB)	8W-18-2	Radio	8W-18-3
Fuse 18 (JB)	8W-18-2	Right Side Impact Airbag Control Module .	8W-18-3
G200	8W-18-2	Sentry Key Immobilizer Module	8W-18-3
G201	8W-18-2		

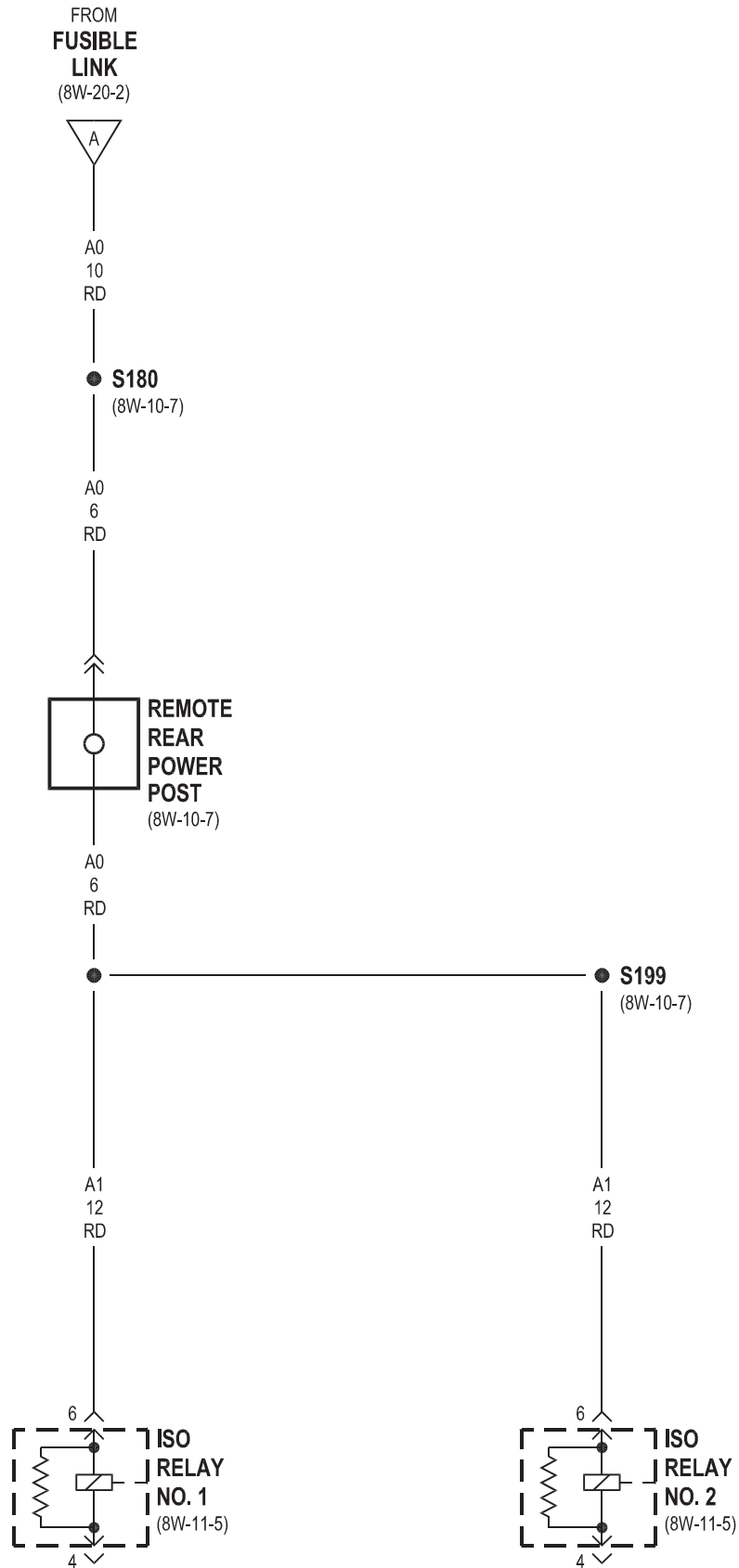


8W-20 CHARGING SYSTEM

Component	Page	Component	Page
Auto Shut Down Relay	8W-20-3	Generator	8W-20-2
Battery	8W-20-2	ISO Relay No. 1	8W-20-4
Fuse N (PDC)	8W-20-3	ISO Relay No. 2	8W-20-4
Fuse T (PDC)	8W-20-3	Power Distribution Center	8W-20-2, 3
Fuse W (PDC)	8W-20-3	Powertrain Control Module	8W-20-2, 3
Fusible Link	8W-20-2, 4	Remote Jump Post	8W-20-2, 3
G102	8W-20-2	Remote Rear Power Post	8W-20-4
G108	8W-20-2		

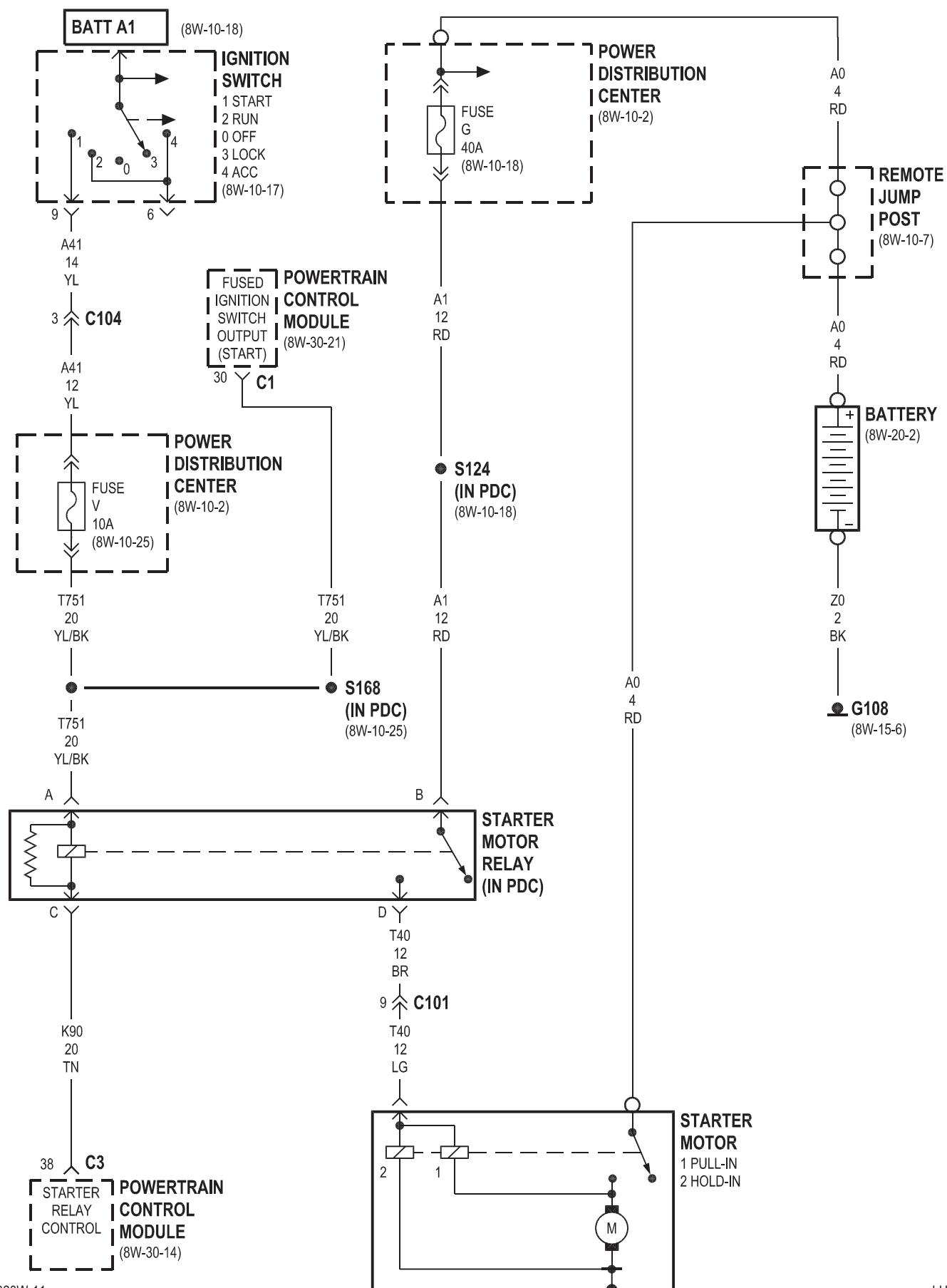






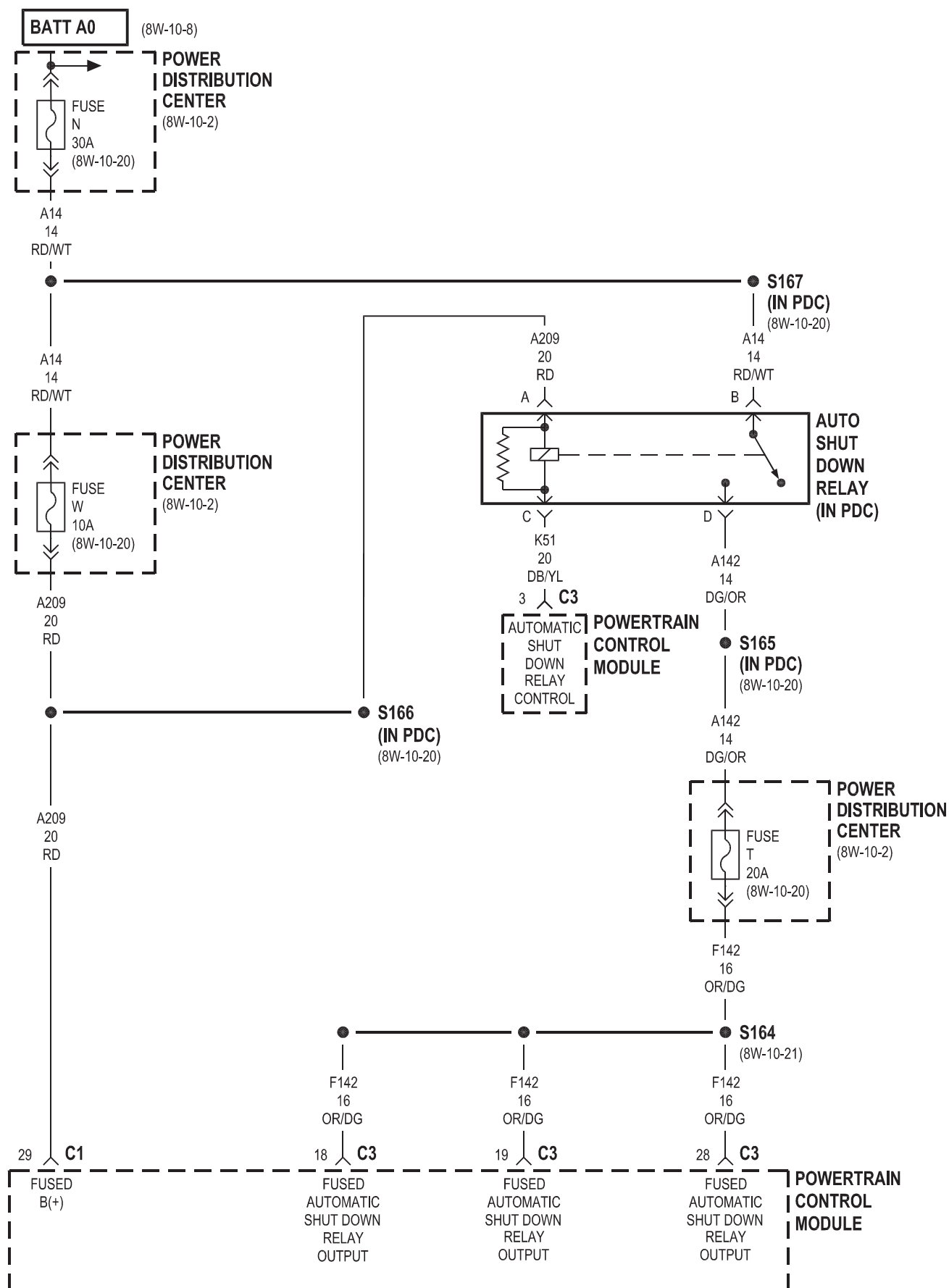
8W-21 STARTING SYSTEM

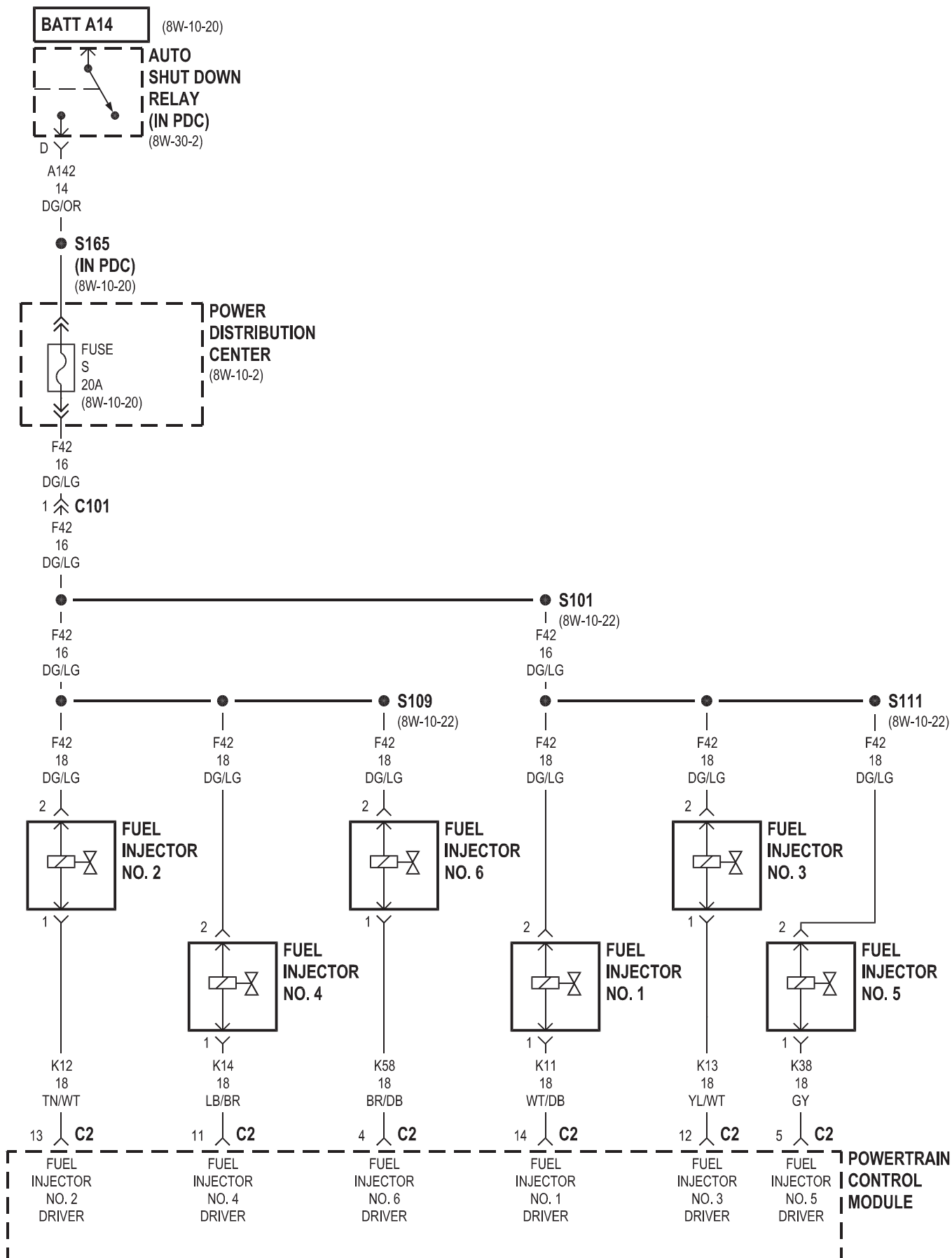
Component	Page	Component	Page
Battery	8W-21-2	Powertrain Control Module	8W-21-2
Fuse G (PDC)	8W-21-2	Remote Jump Post	8W-21-2
Fuse V (PDC)	8W-21-2	Starter Motor	8W-21-2
G108	8W-21-2	Starter Motor Relay	8W-21-2
Ignition Switch	8W-21-2		
Power Distribution Center	8W-21-2		

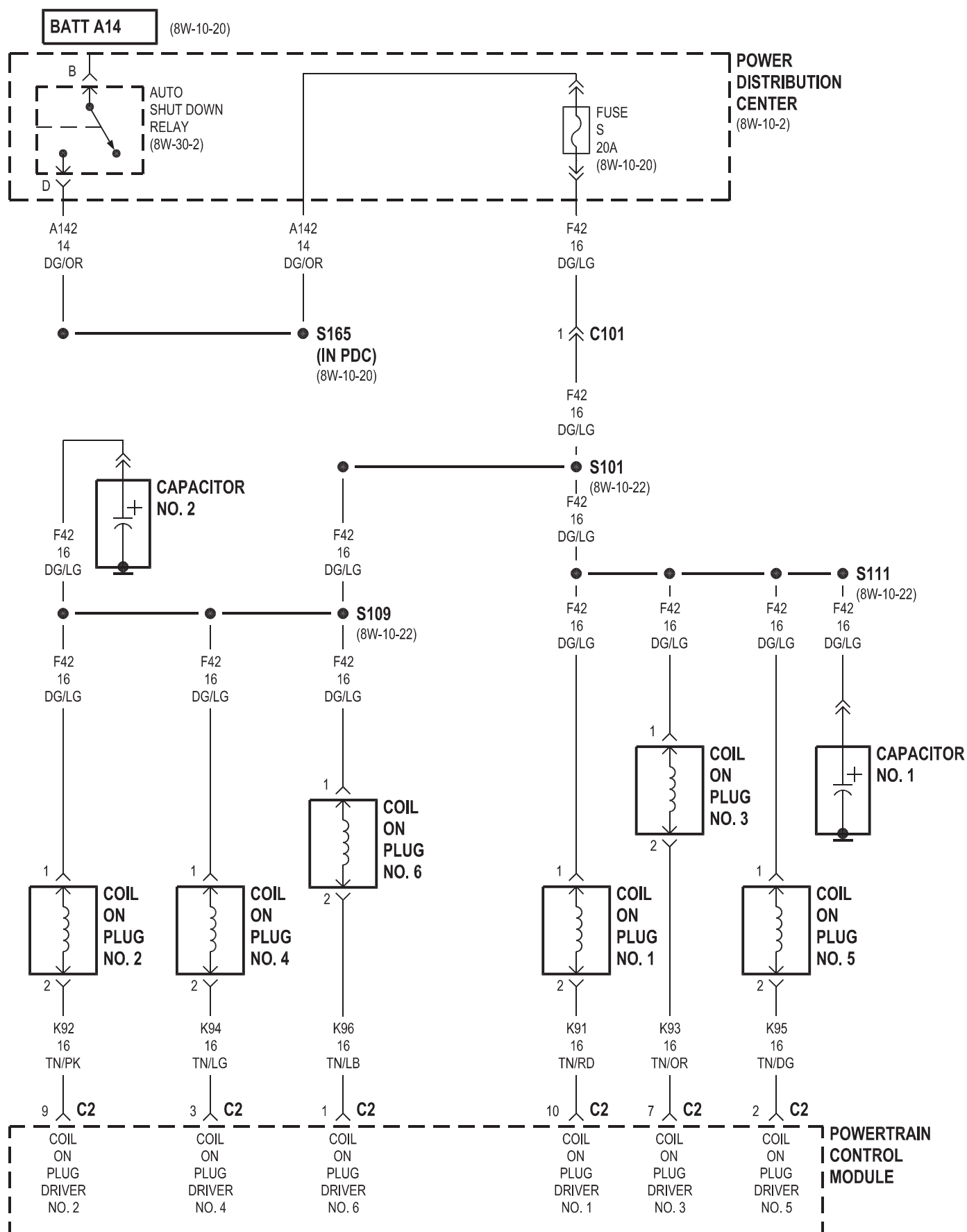


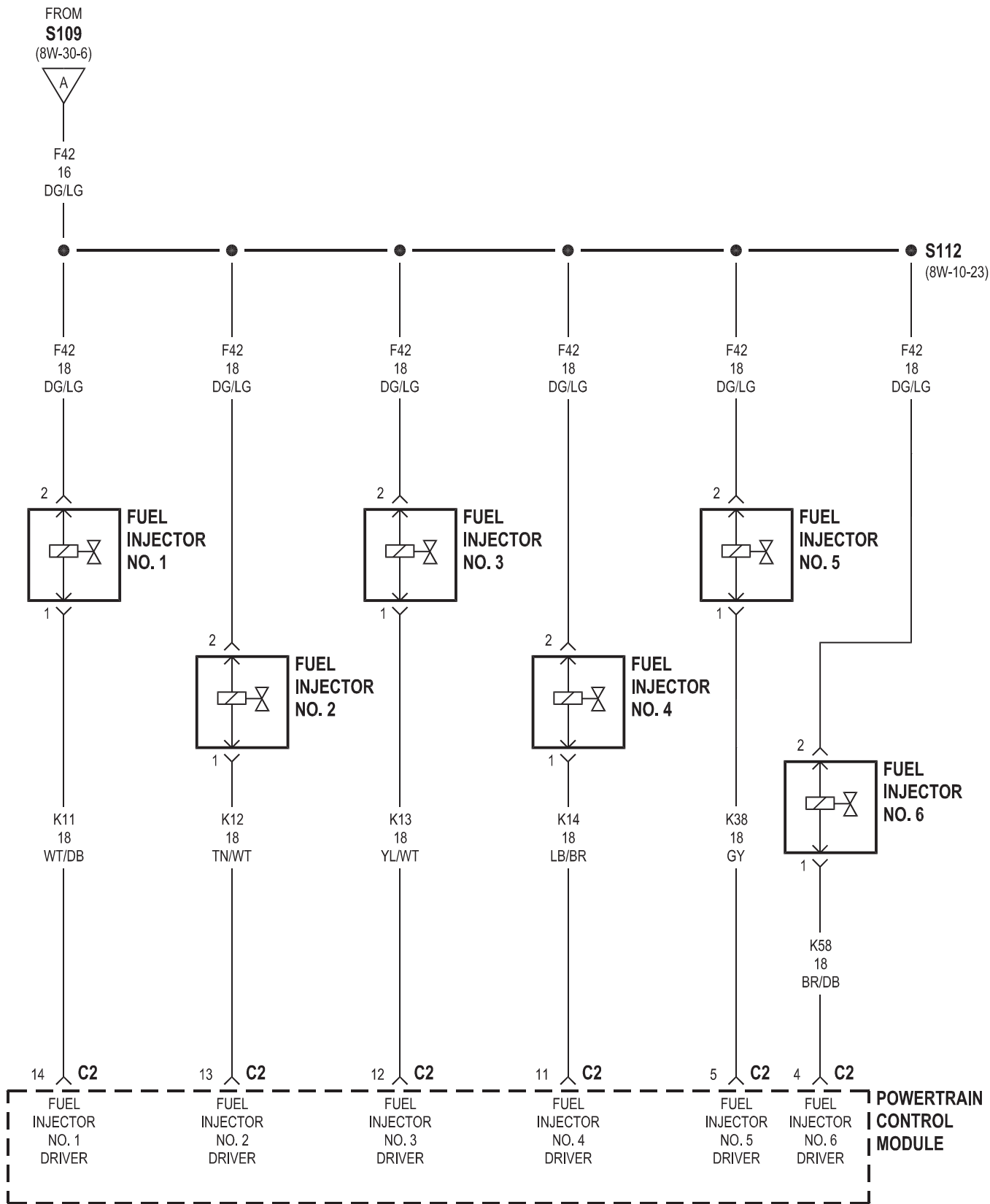
8W-30 FUEL/IGNITION SYSTEM

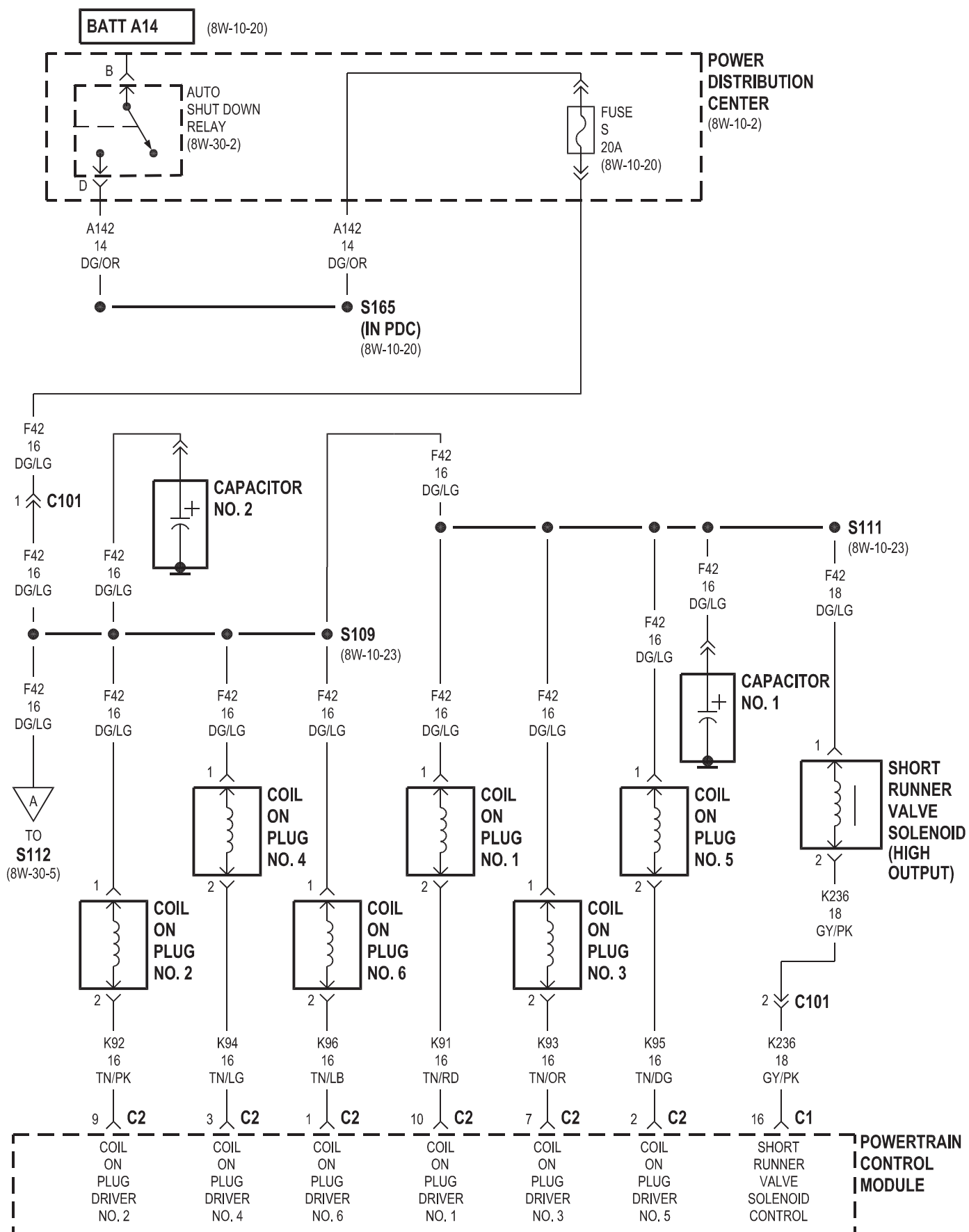
Component	Page	Component	Page
A/C Compressor Clutch Relay	8W-30-16	Fuse T (PDC)	8W-30-2
A/C Pressure Transducer	8W-30-12, 13	Fuse V (PDC)	8W-30-21
Ambient Temperature Sensor	8W-30-15, 17	Fuse W (PDC)	8W-30-2
Auto Shut Down Relay	8W-30-2, 3, 4, 6	G101	8W-30-21
Automatic Day/Night Mirror	8W-30-24	G102	8W-30-20, 21, 23
Autostick Switch	8W-30-23	G103	8W-30-10, 11, 21
Body Control Module	8W-30-8, 18	G104	8W-30-10, 11, 21
Brake Lamp Switch	8W-30-14, 15	G301	8W-30-8, 16
Brake Transmission Shift Interlock Solenoid	8W-30-15	Generator	8W-30-20
Camshaft Position Sensor	8W-30-7, 12, 19	High Speed Radiator Fan Relay	8W-30-16
Capacitor No. 1	8W-30-4, 6	Idle Air Control Motor	8W-30-17
Capacitor No. 2	8W-30-4, 6	Input Speed Sensor	8W-30-22
Clockspring	8W-30-15	Intake Air Temperature Sensor	8W-30-12, 13
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Coil On Plug No. 2	8W-30-4, 6	Knock Sensor	8W-30-9
Coil On Plug No. 3	8W-30-4, 6	Leak Detection Pump	8W-30-16
Coil On Plug No. 4	8W-30-4, 6	Left Speed Control Switch	8W-30-15
Coil On Plug No. 5	8W-30-4, 6	Low Speed Radiator Fan Relay	8W-30-16
Coil On Plug No. 6	8W-30-4, 6	Manifold Absolute Pressure Sensor . . .	8W-30-12, 13
Crankshaft Position Sensor	8W-30-7, 13, 19	Manifold Tuning Valve	8W-30-20
Data Link Connector	8W-30-18	Output Speed Sensor	8W-30-22
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EVAP/Purge Solenoid	8W-30-19	Oxygen Sensor 1/2 Right Bank Down . . .	8W-30-11
Fuel Injector No. 1	8W-30-3, 5	Oxygen Sensor 2/1 Left Bank Up	8W-30-10
Fuel Injector No. 2	8W-30-3, 5	Oxygen Sensor 2/2 Left Bank Down	8W-30-11
Fuel Injector No. 3	8W-30-3, 5	Power Distribution Center . . 8W-30-2, 3, 4, 6, 8, 14, 21, 25, 26	
Fuel Injector No. 4	8W-30-3, 5	Powertrain Control Module . . 8W-30-2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	
Fuel Injector No. 5	8W-30-3, 5	Right Speed Control Switch	8W-30-15
Fuel Injector No. 6	8W-30-3, 5	Short Runner Valve Solenoid	8W-30-6
Fuel Pump Module	8W-30-8	Speed Control Servo	8W-30-14
Fuel Pump Relay	8W-30-8	Starter Motor Relay	8W-30-14
Fuse 1 (JB)	8W-30-21	Throttle Position Sensor	8W-30-9
Fuse 13 (JB)	8W-30-8	Transmission Control Relay	8W-30-21, 25, 26
Fuse 14 (JB)	8W-30-15	Transmission Range Sensor	8W-30-22, 24
Fuse 17 (JB)	8W-30-24	Transmission Solenoid/Pressure Switch Assembly	8W-30-25, 26
Fuse 21 (JB)	8W-30-16		
Fuse G (PDC)	8W-30-8		
Fuse N (PDC)	8W-30-2		
Fuse Q (PDC)	8W-30-21		
Fuse S (PDC)	8W-30-3, 4, 6		

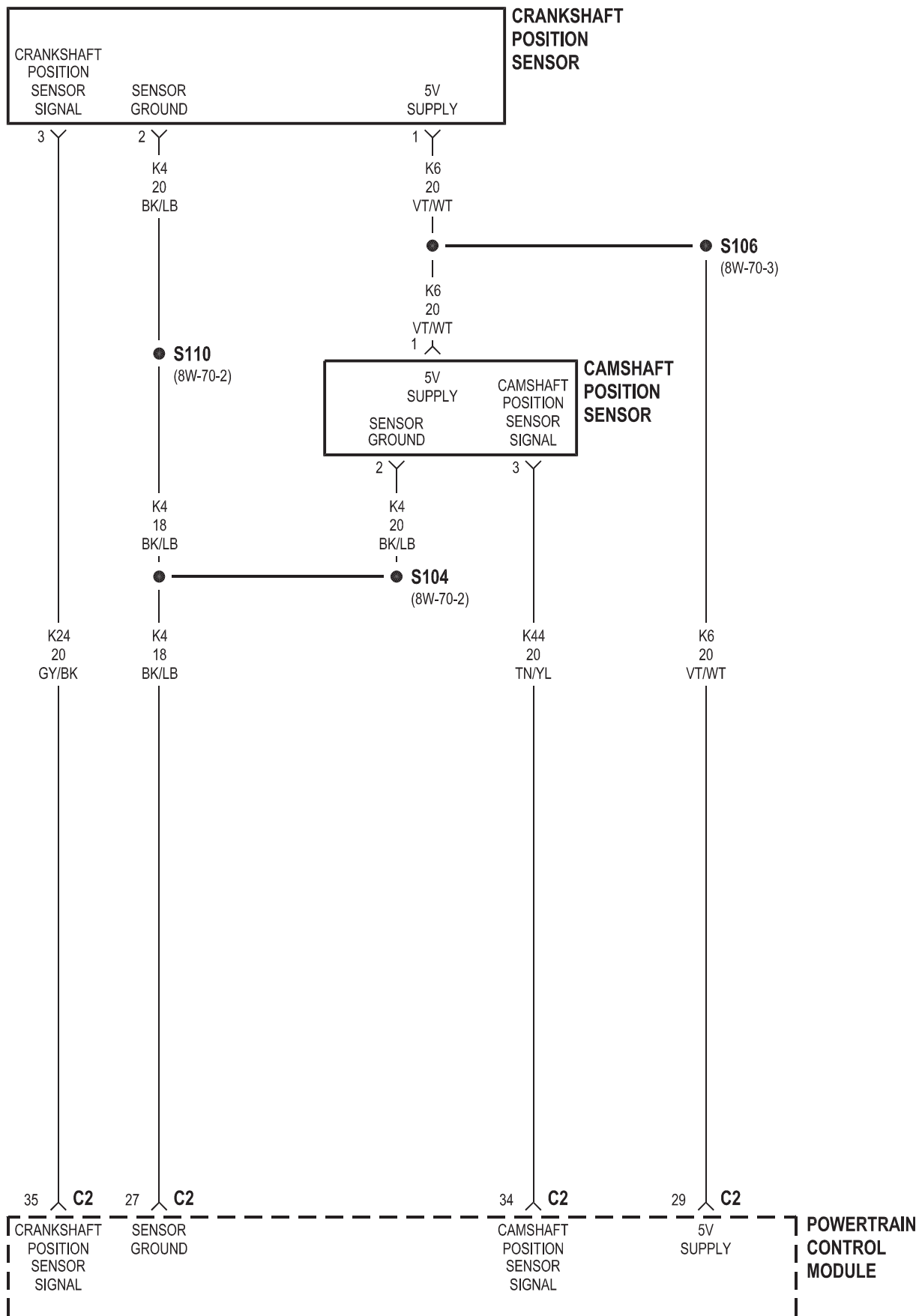


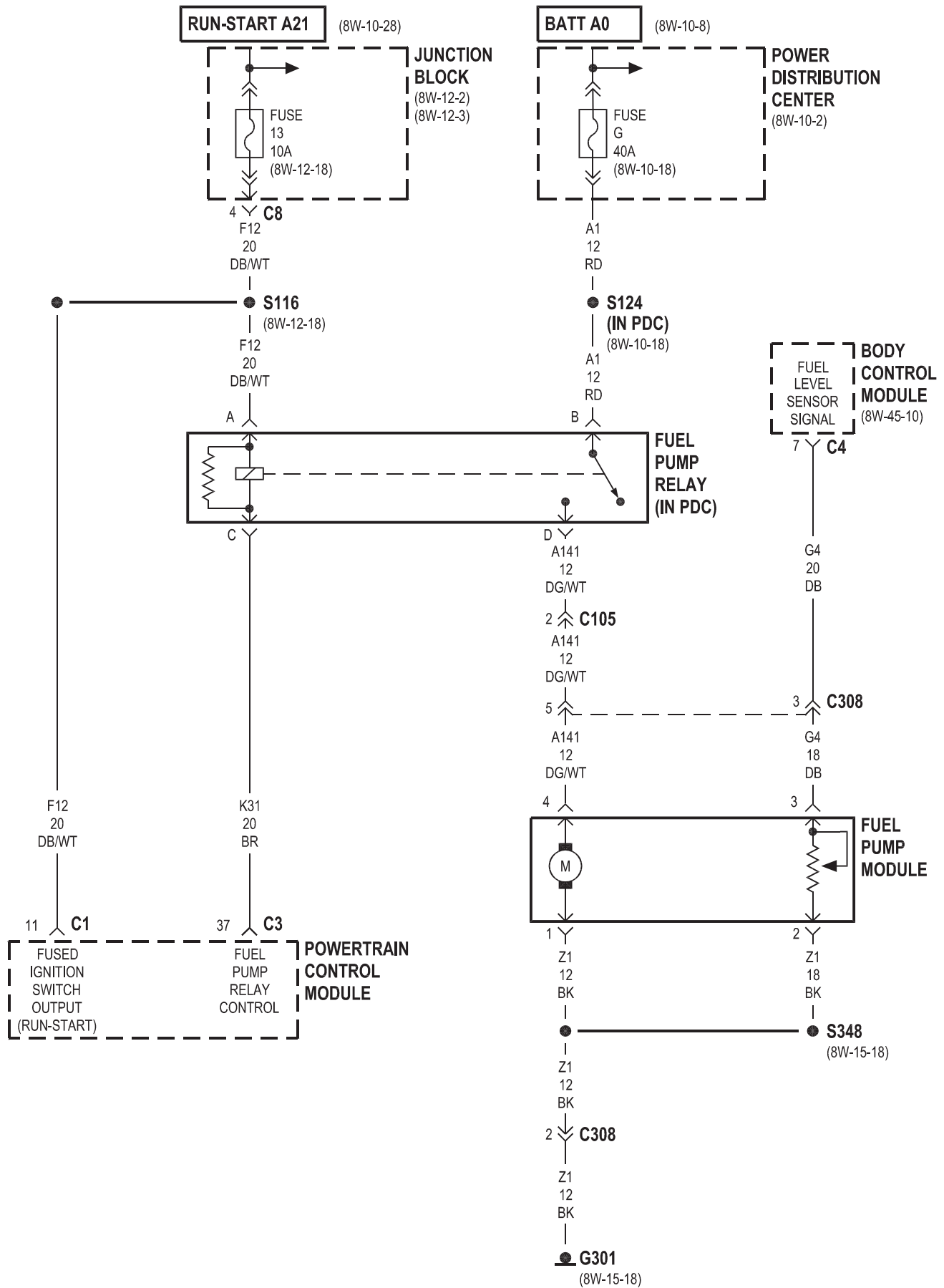


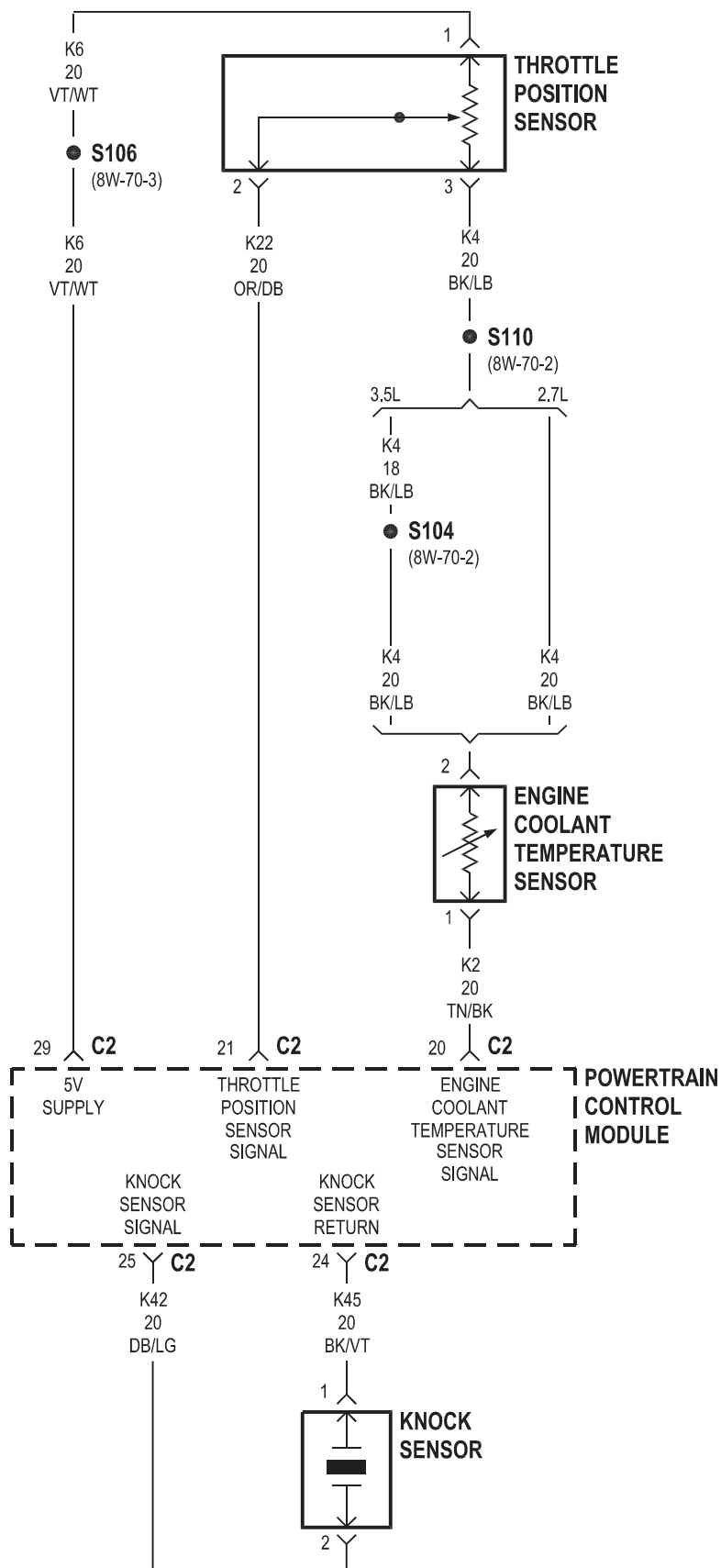


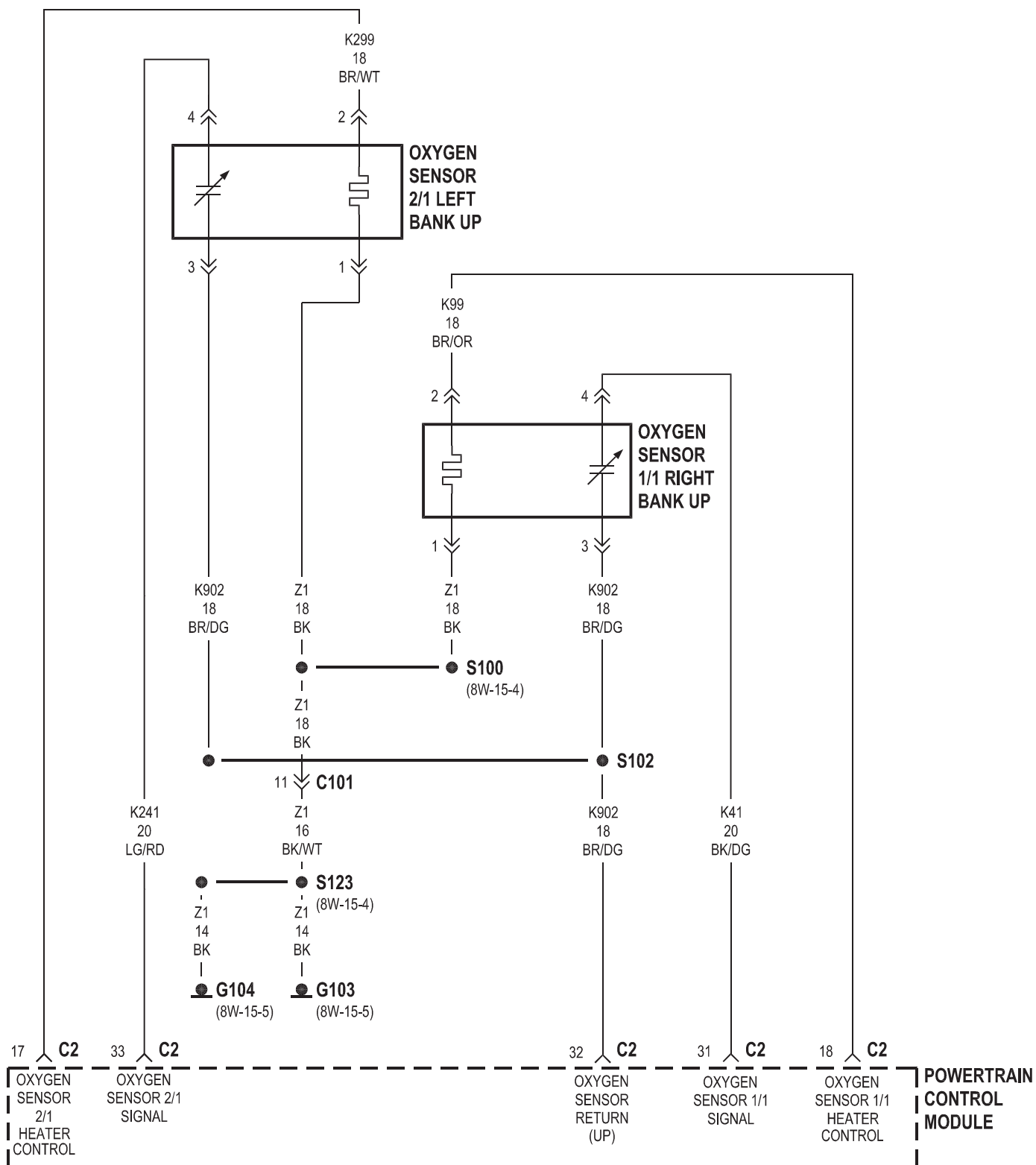


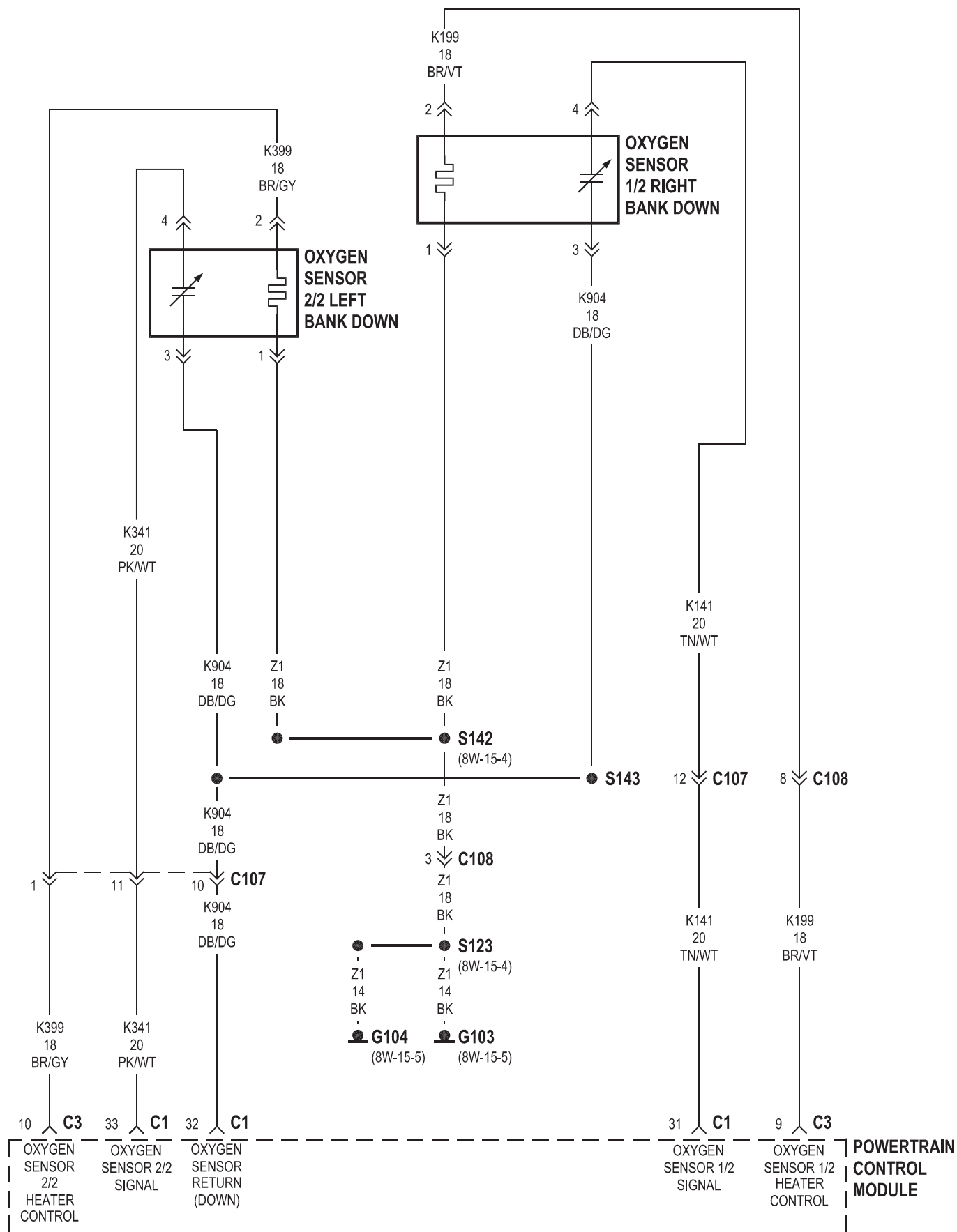


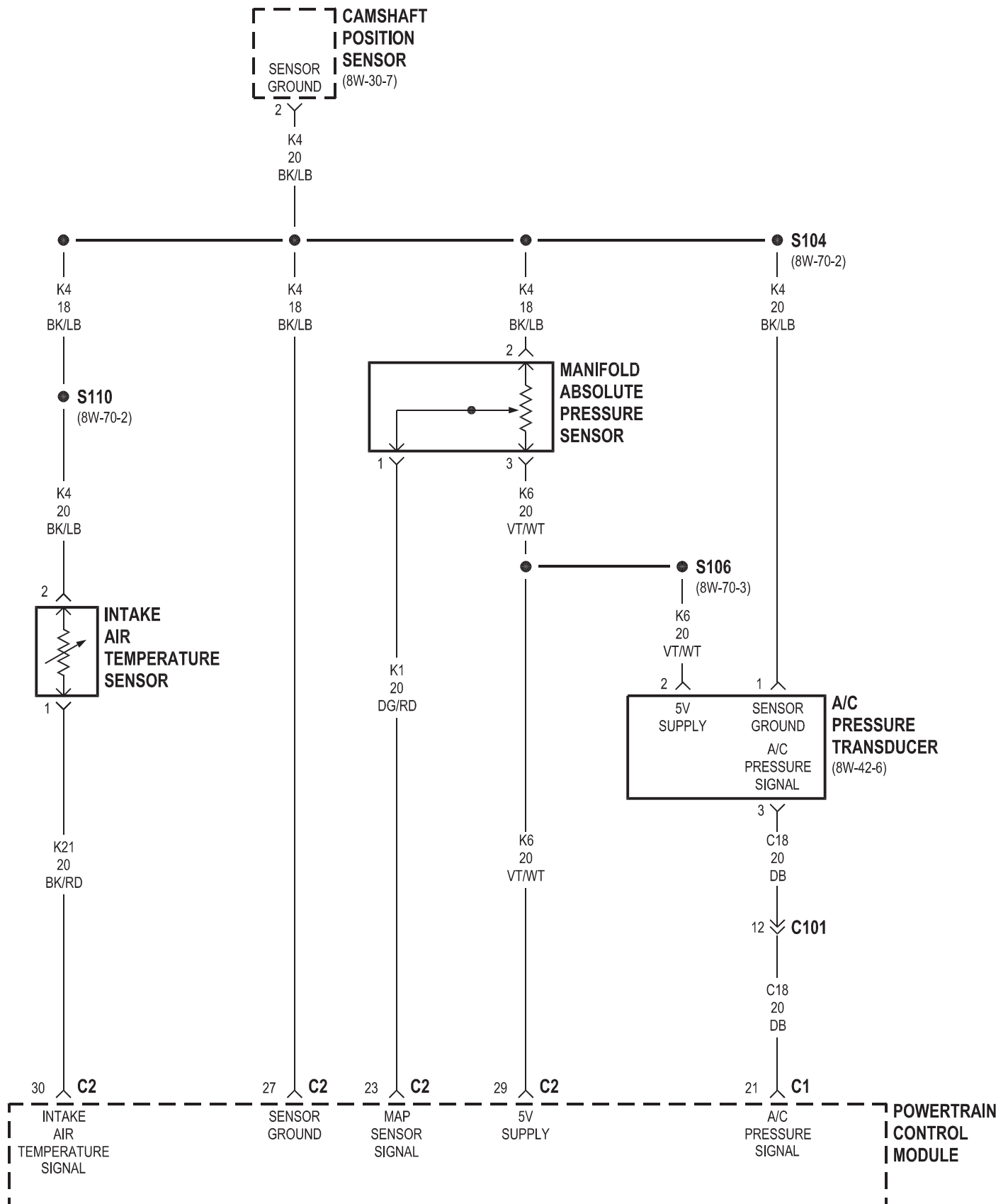


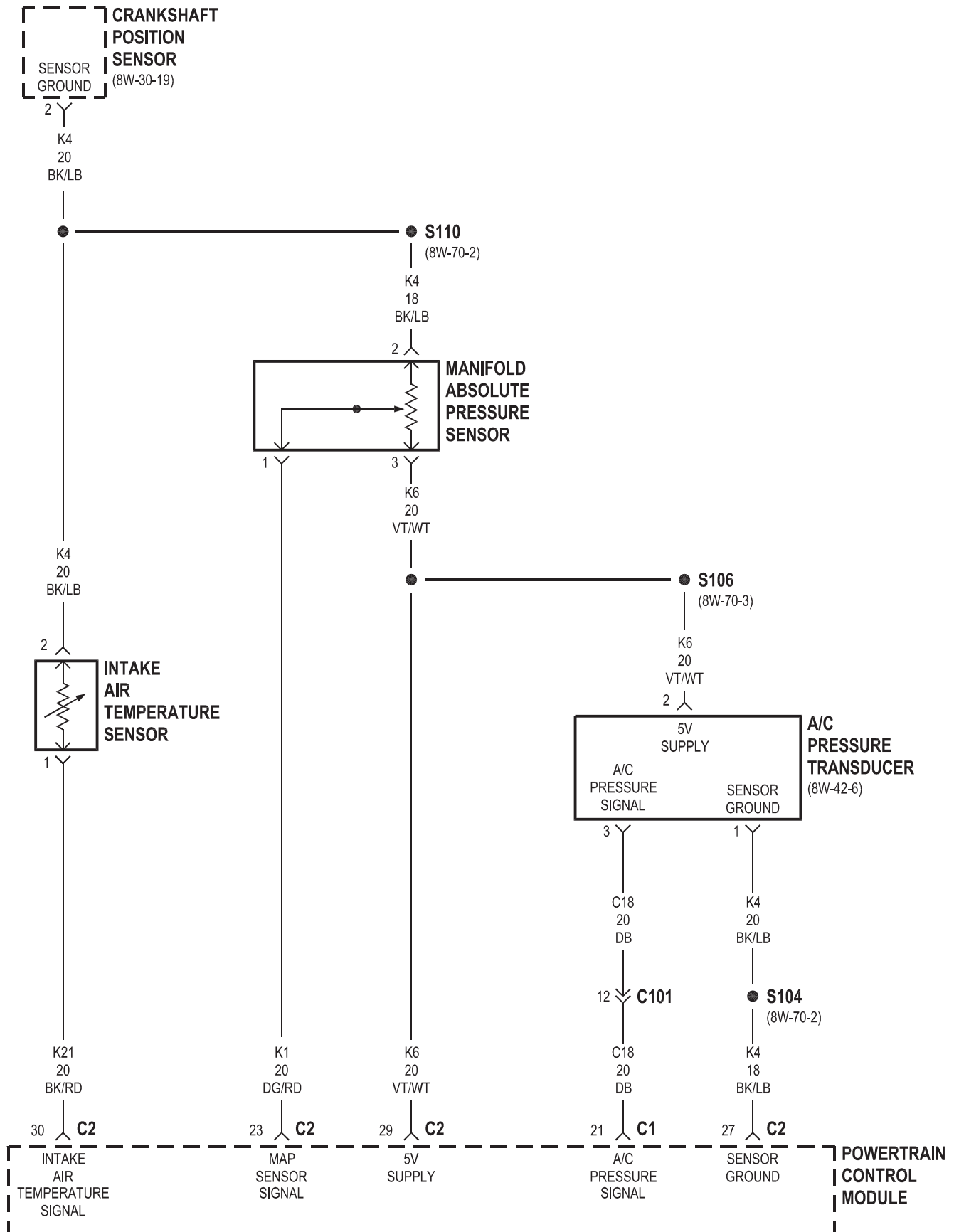


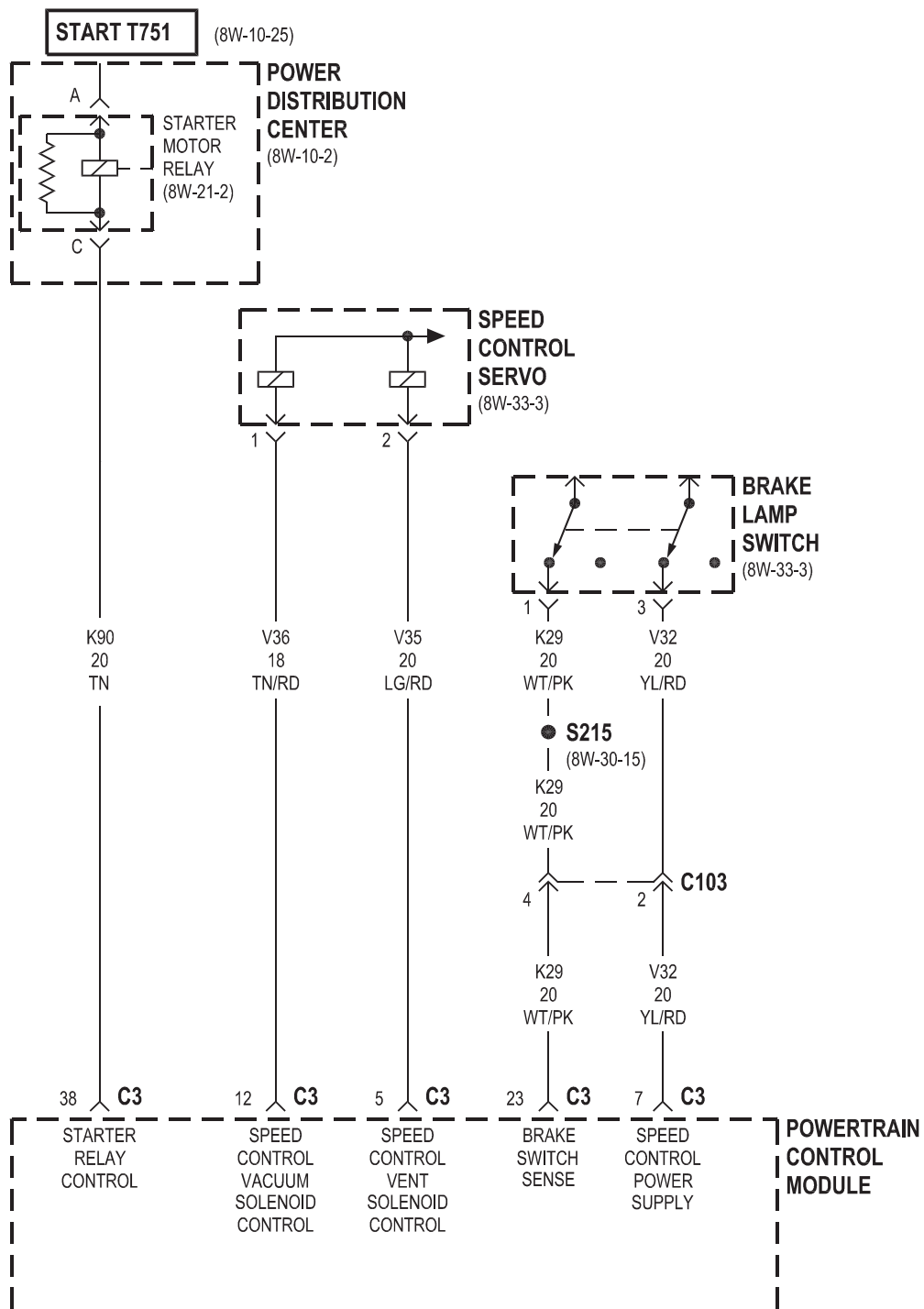


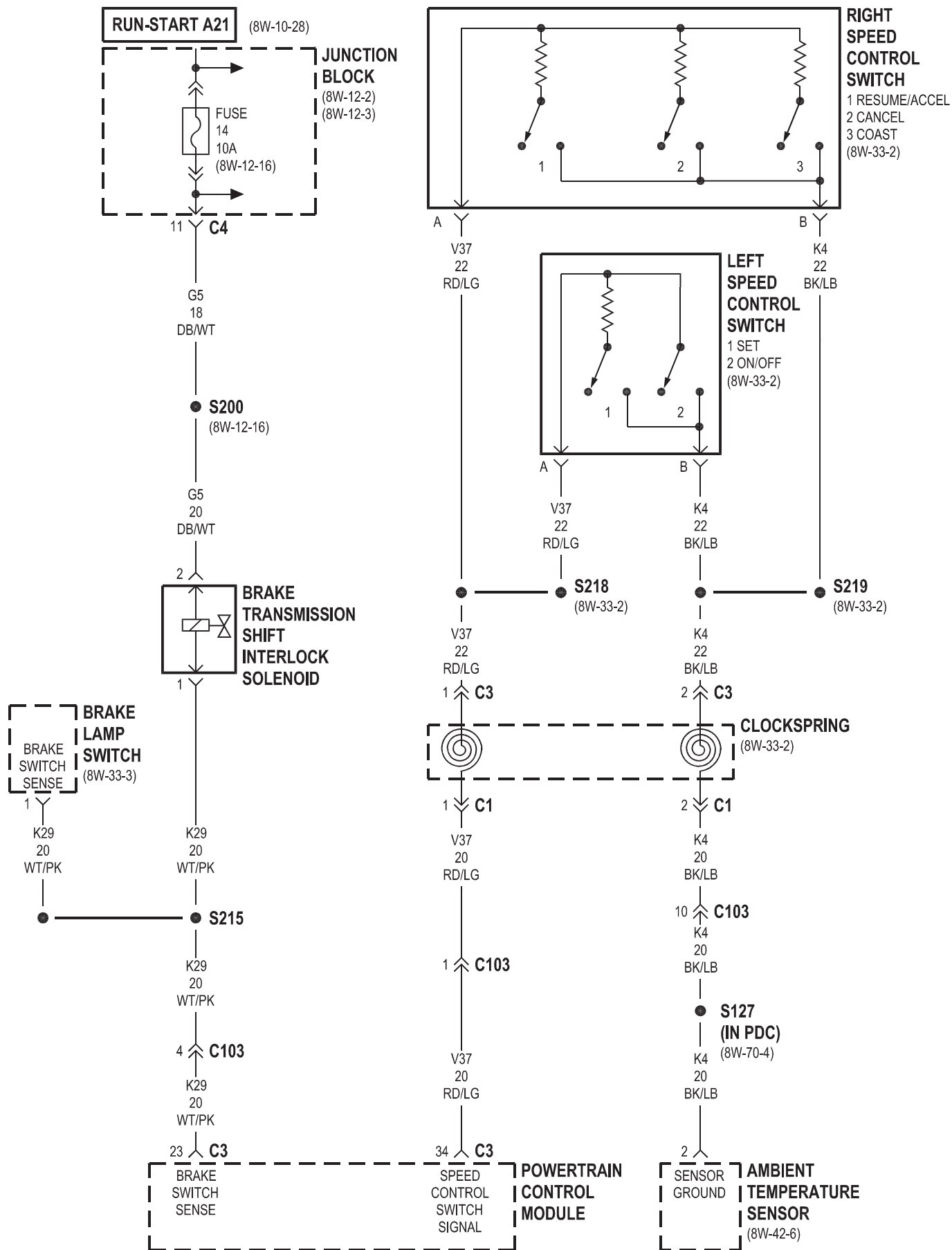


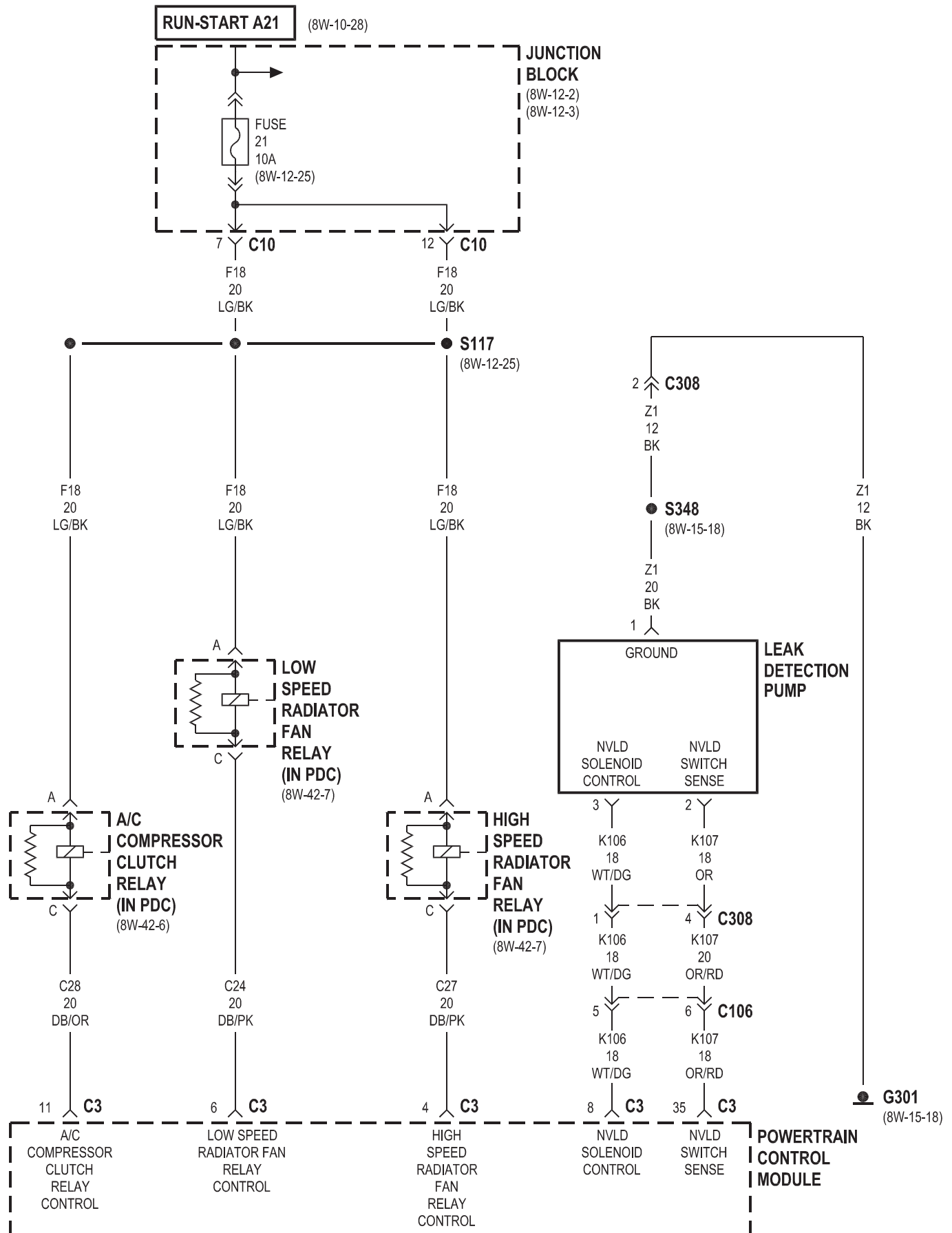


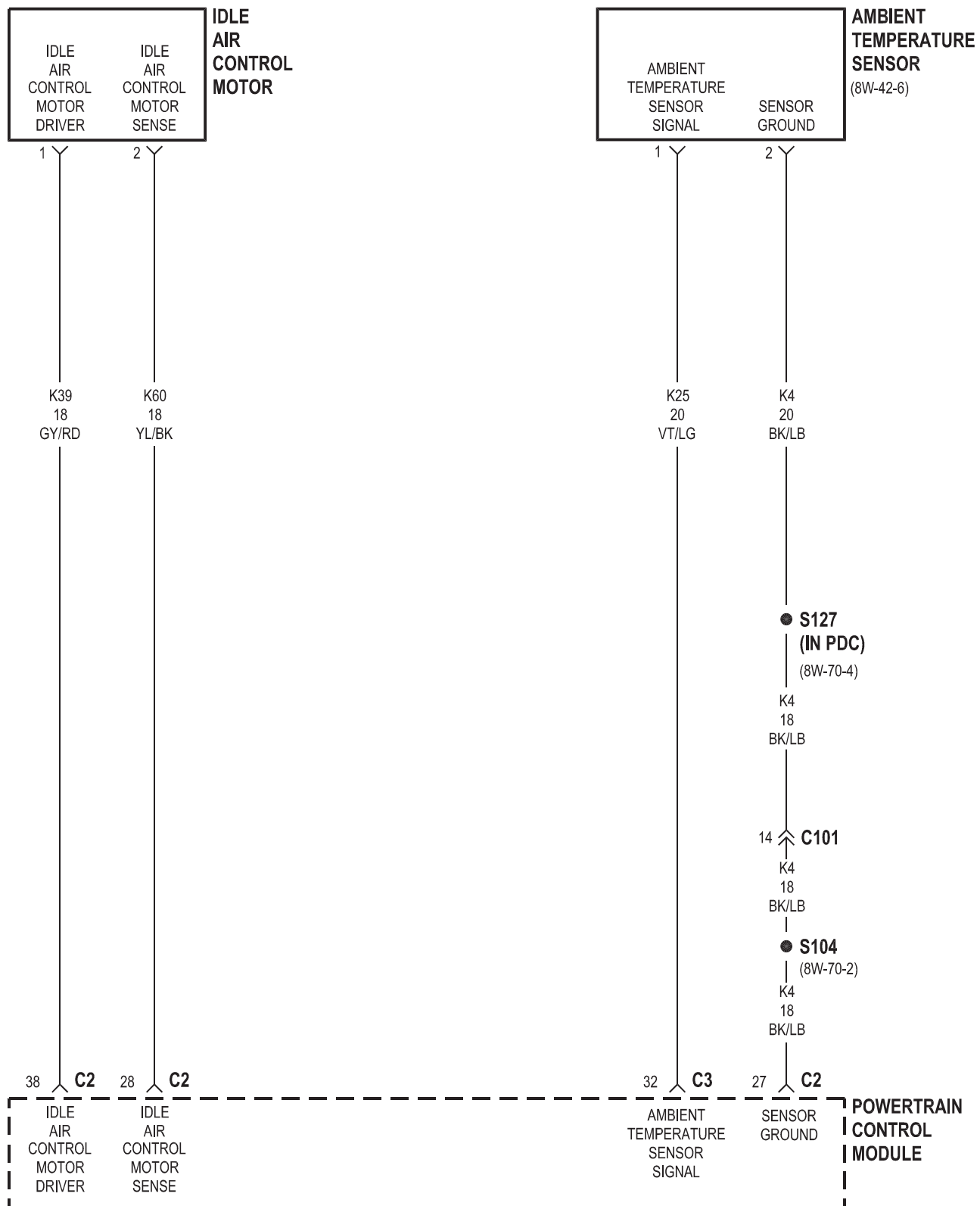


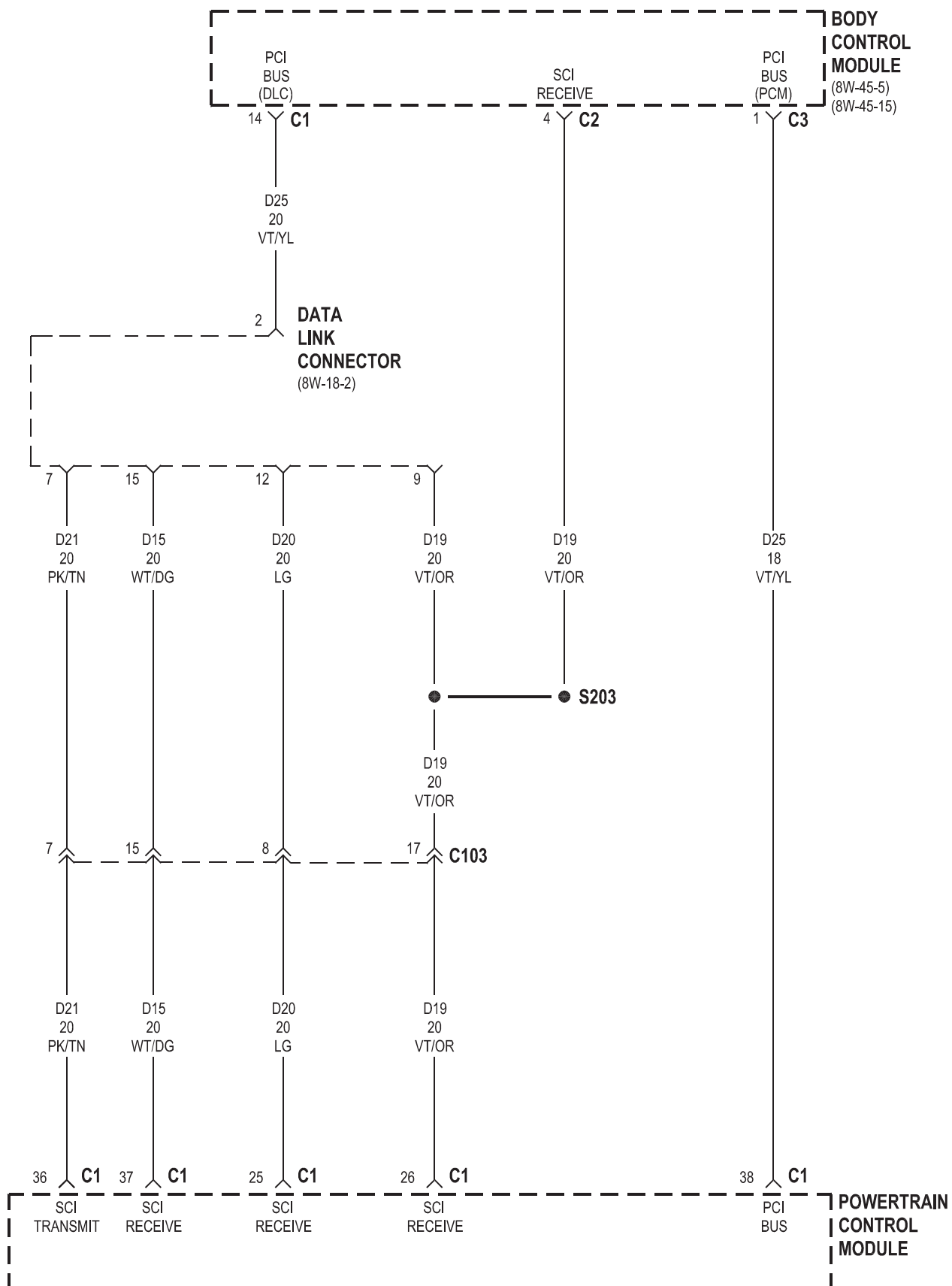


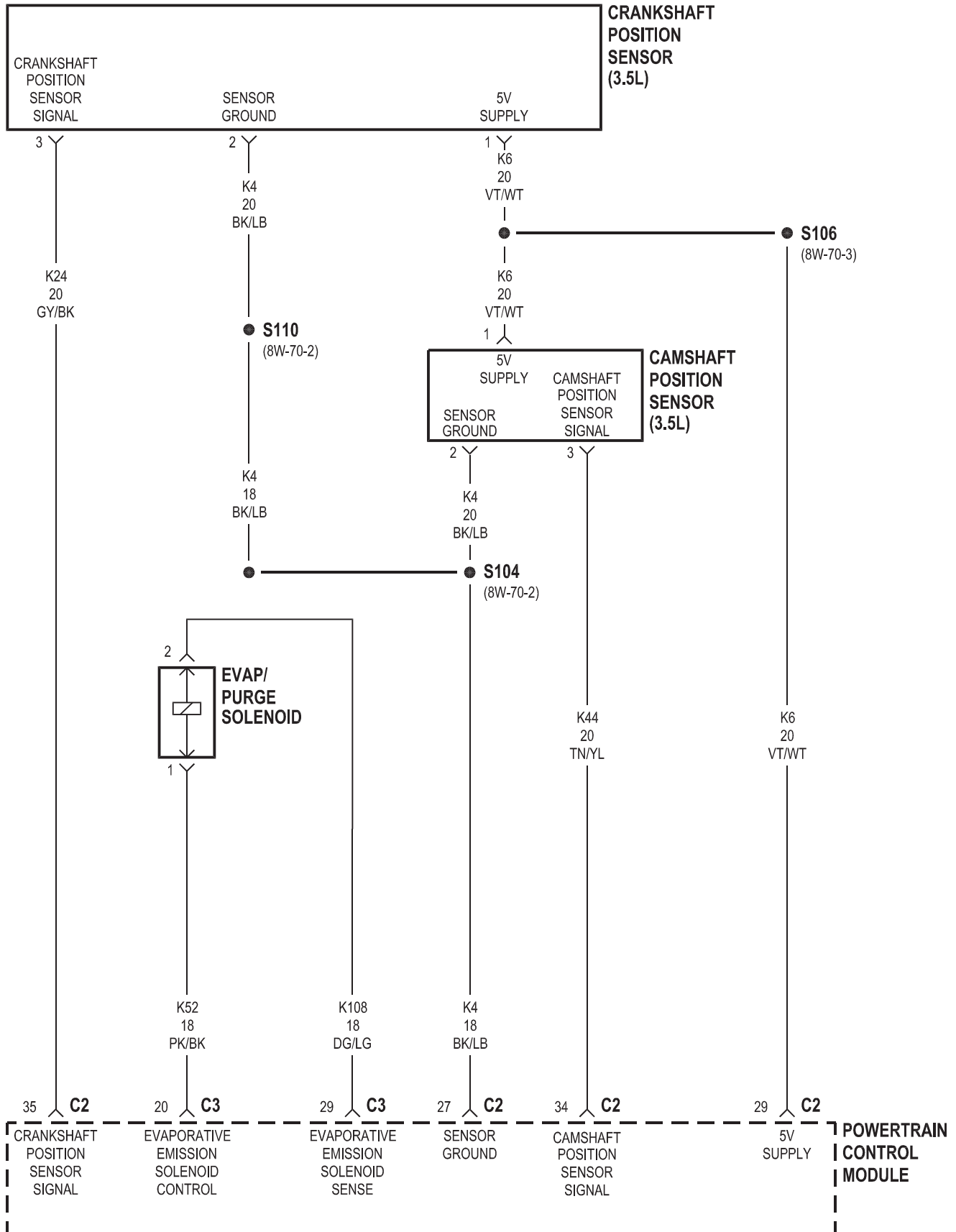


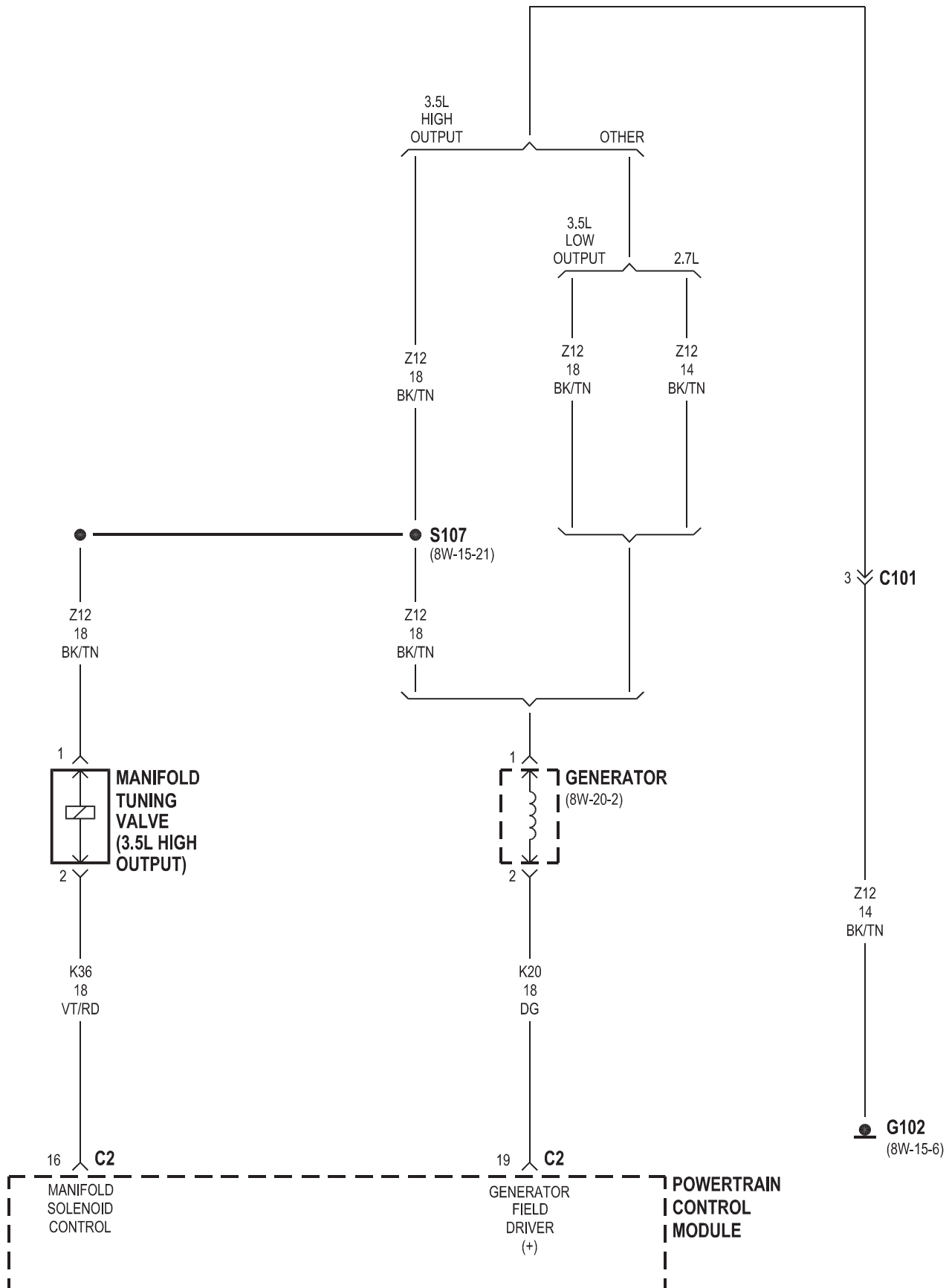


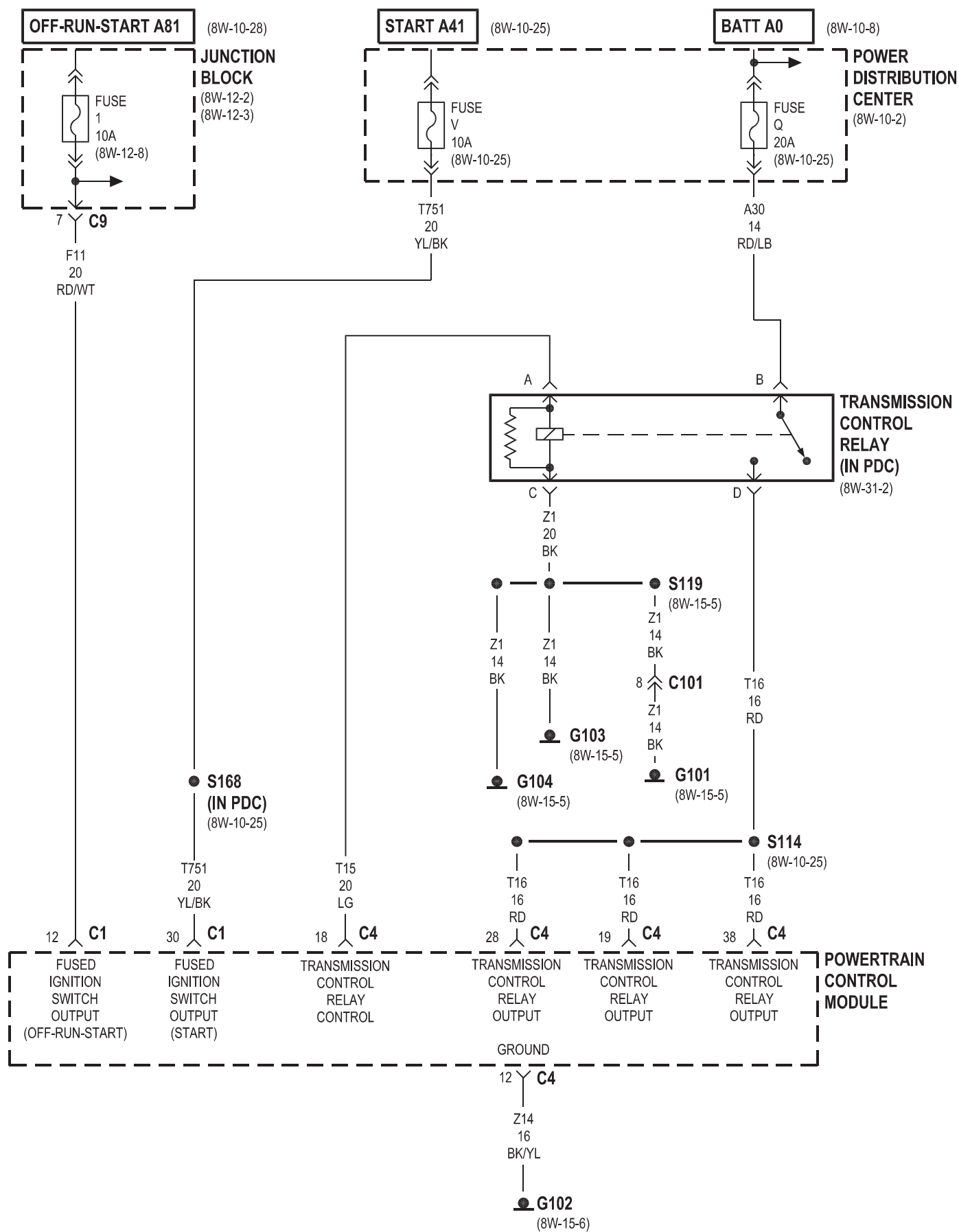


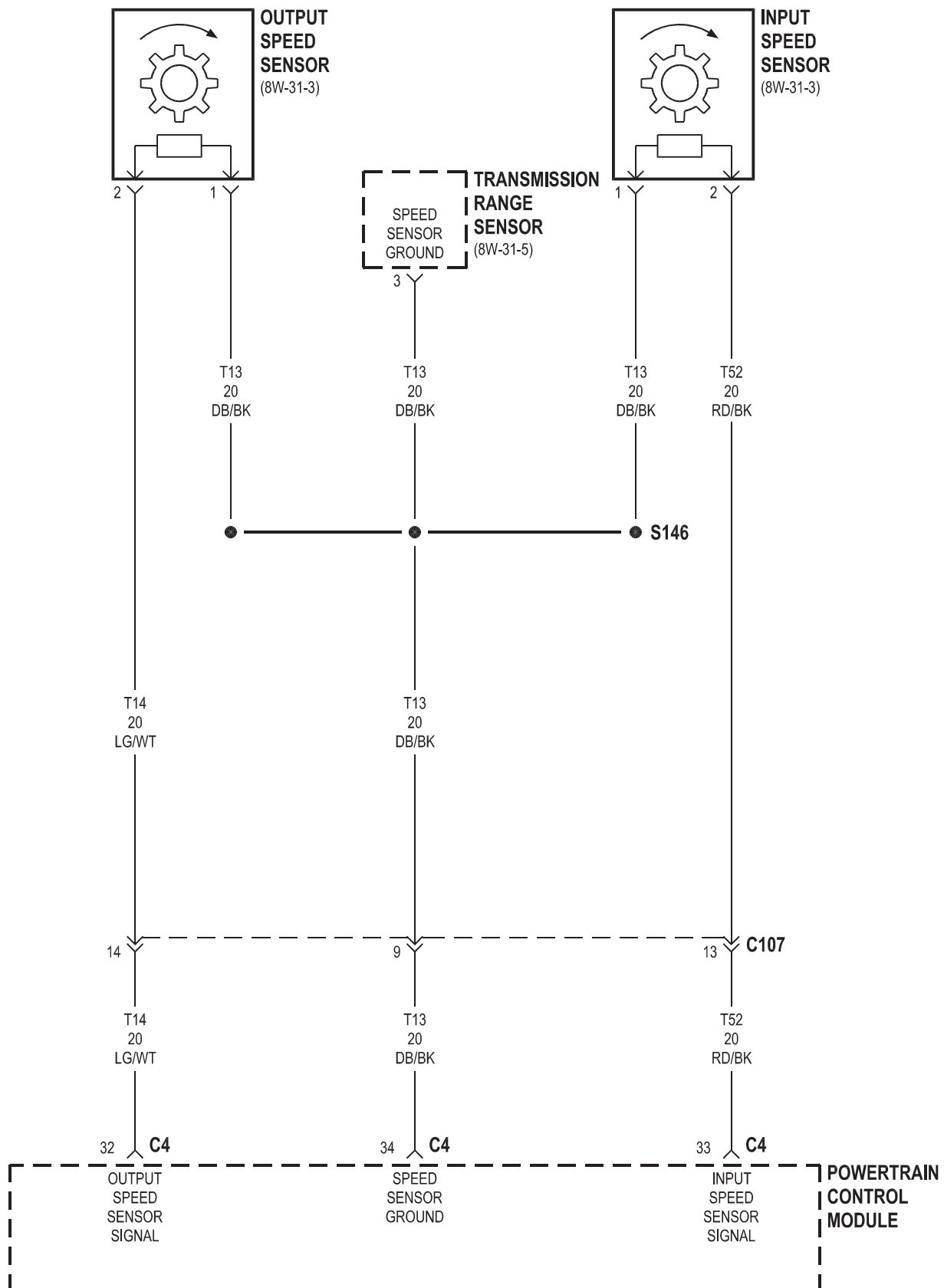


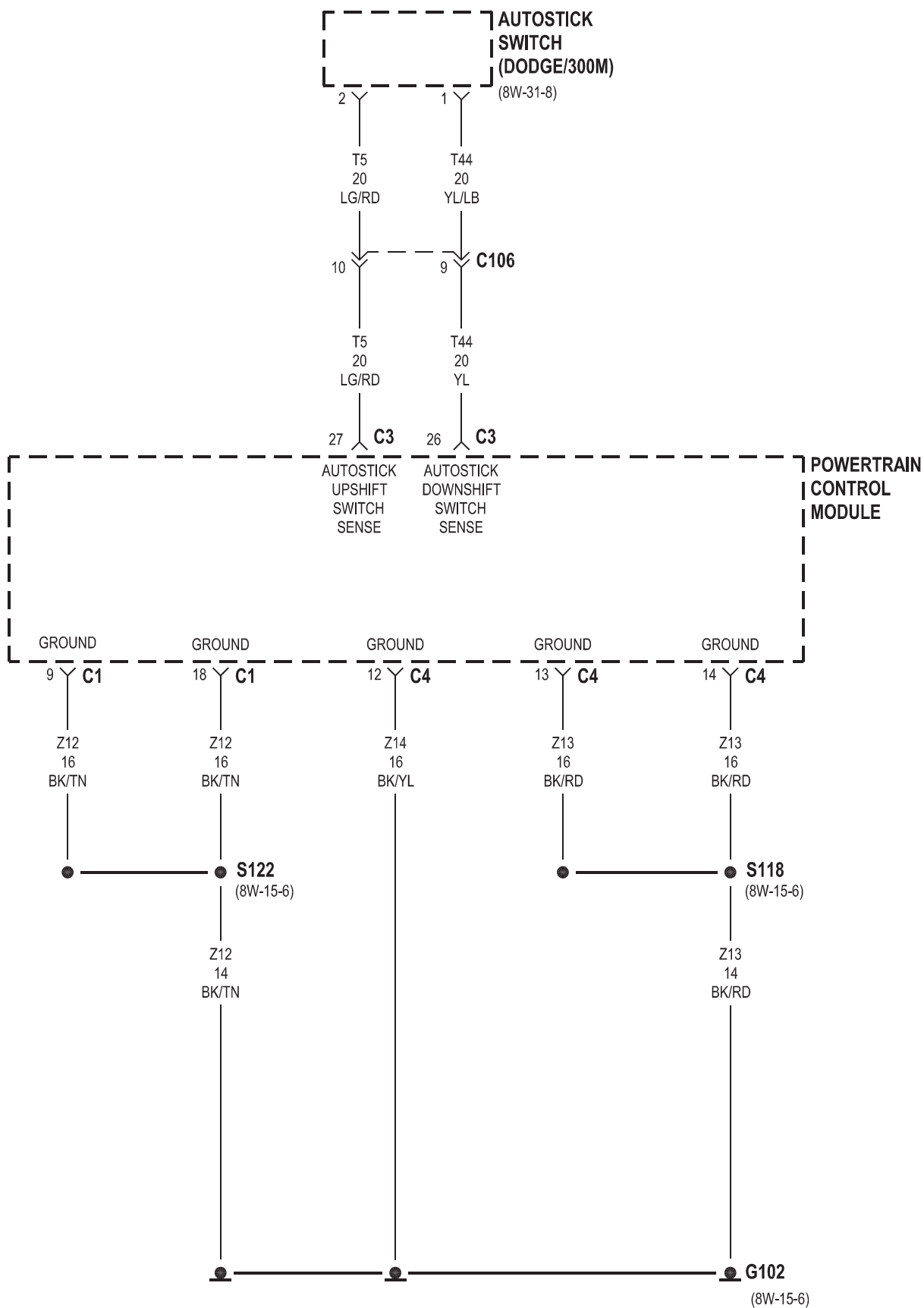


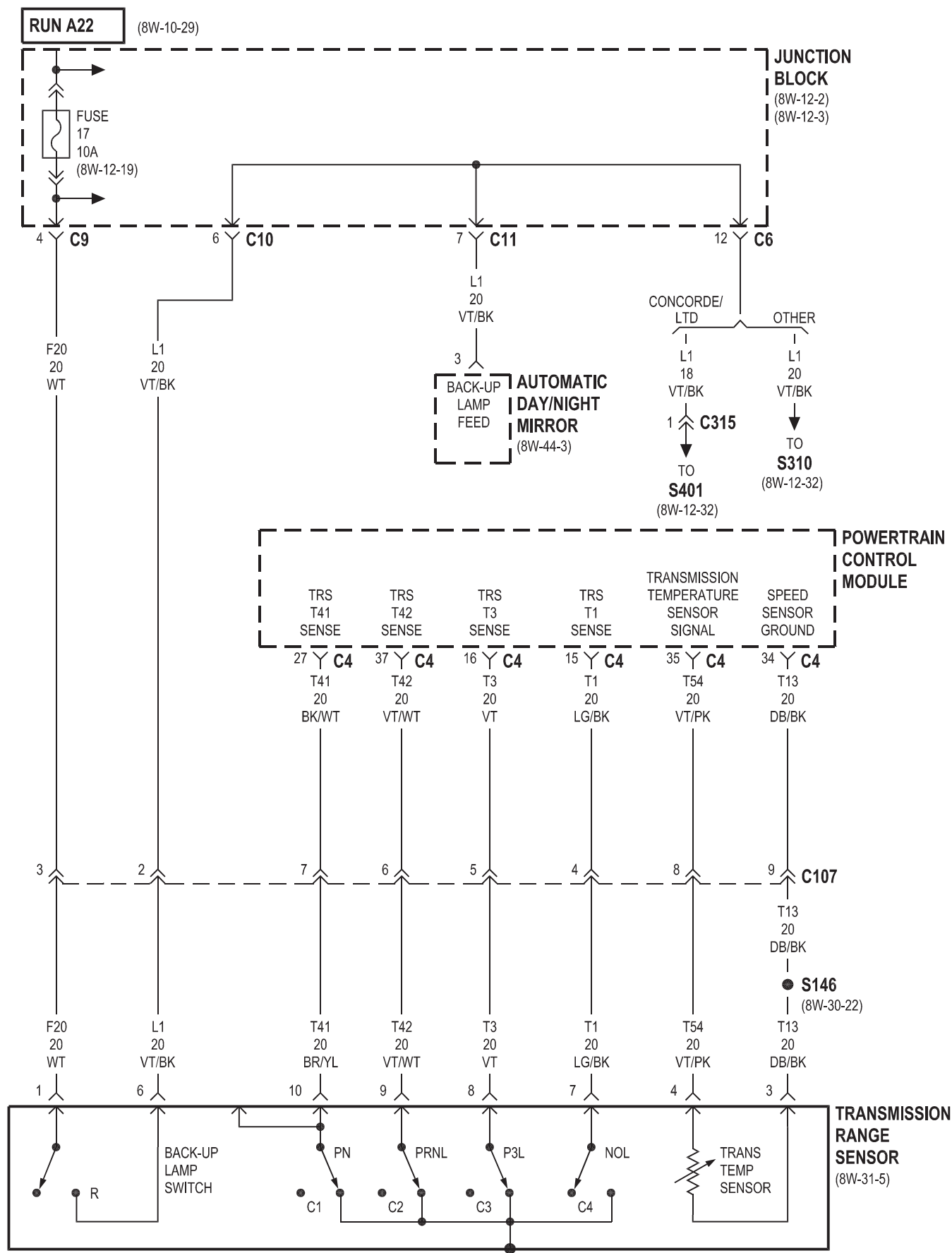


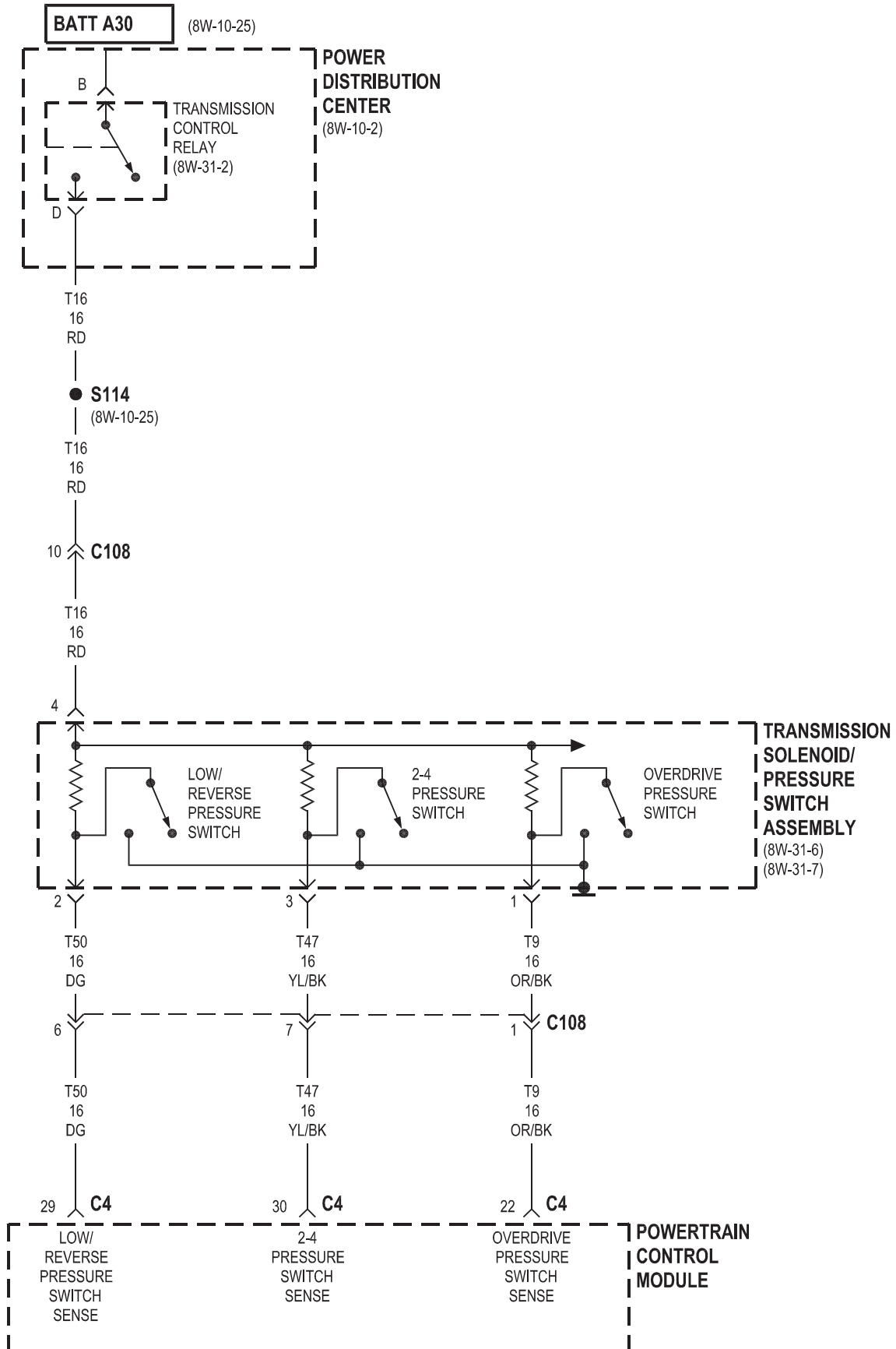


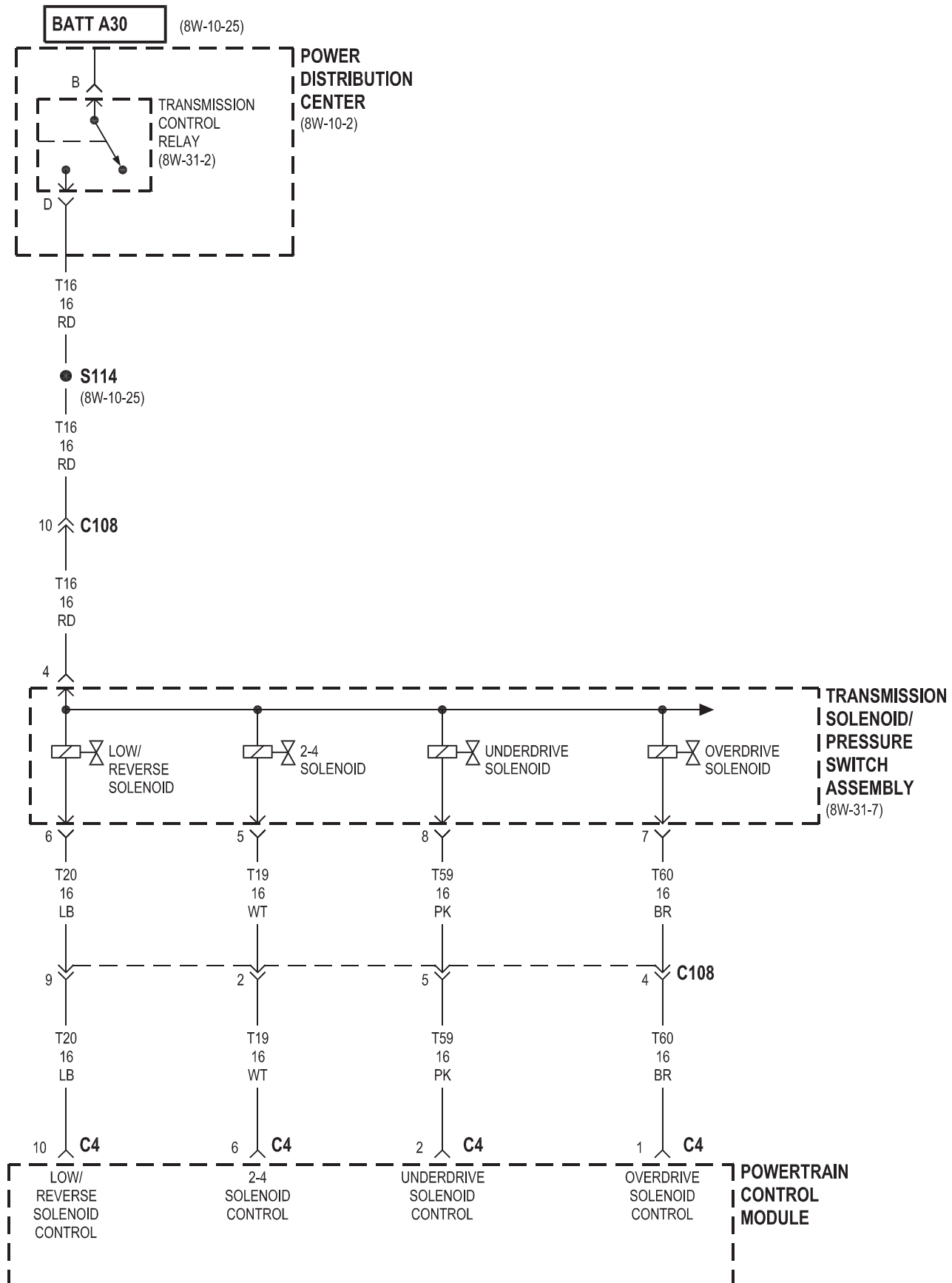








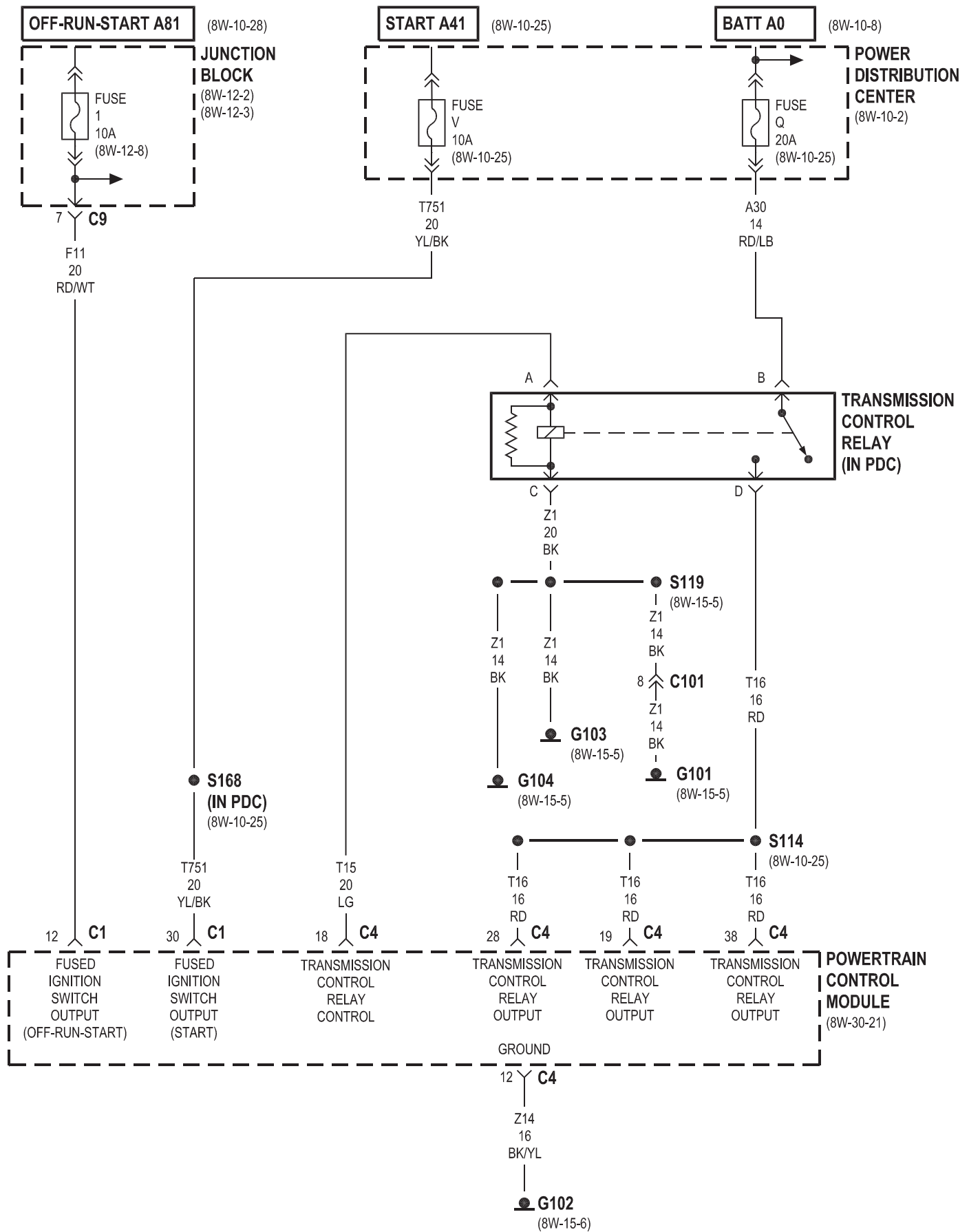


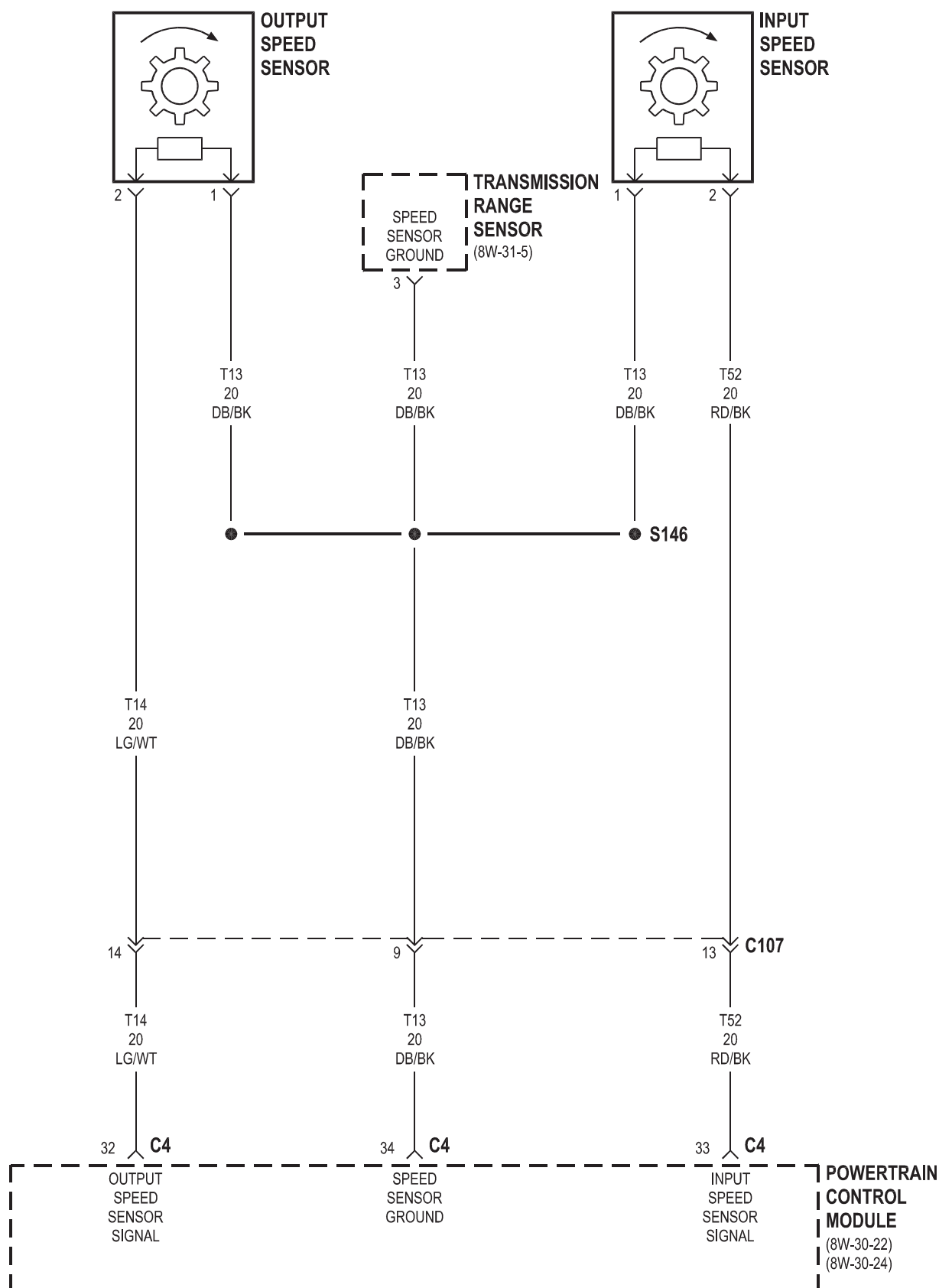


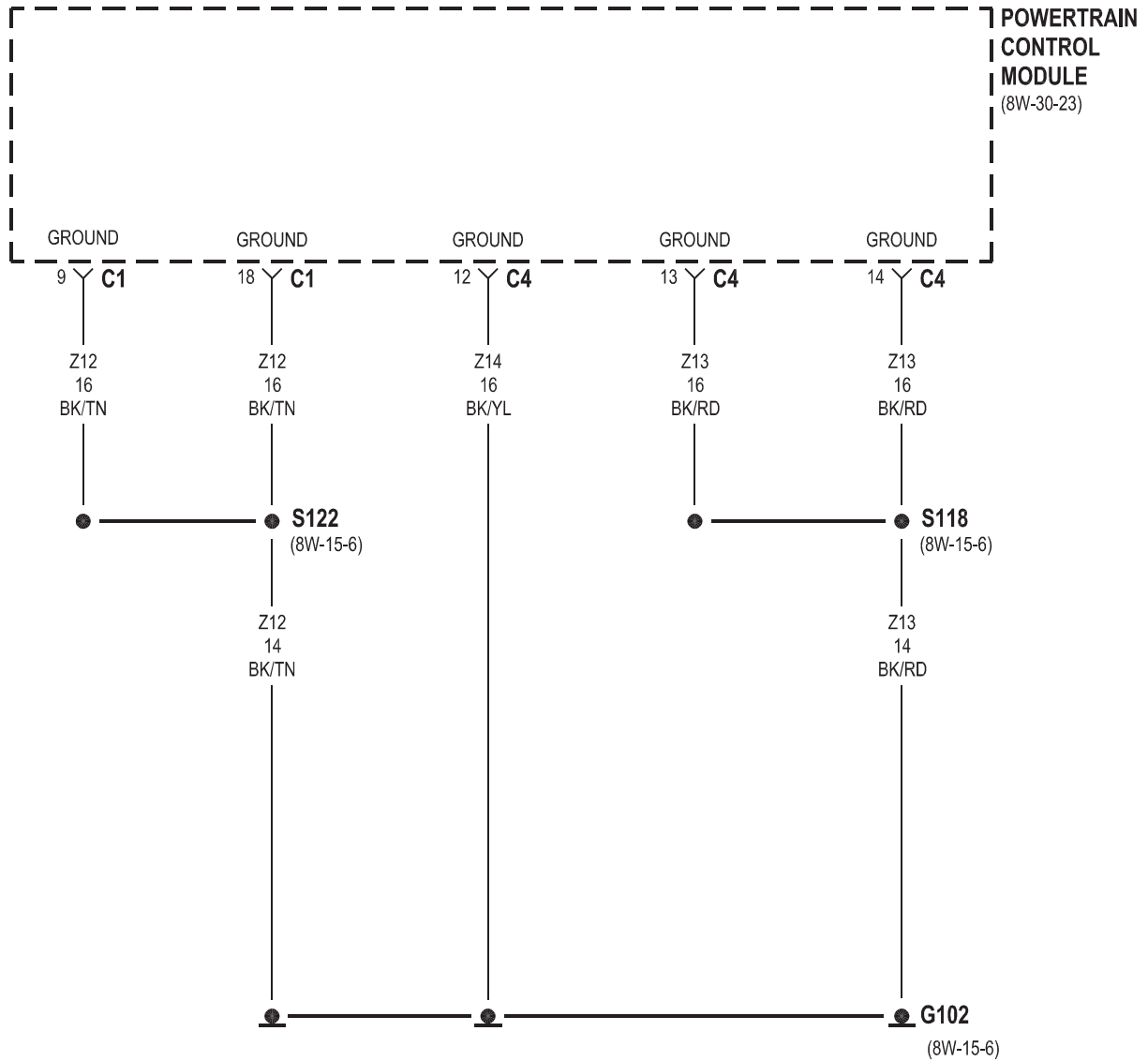
8W-31 TRANSMISSION CONTROL SYSTEM

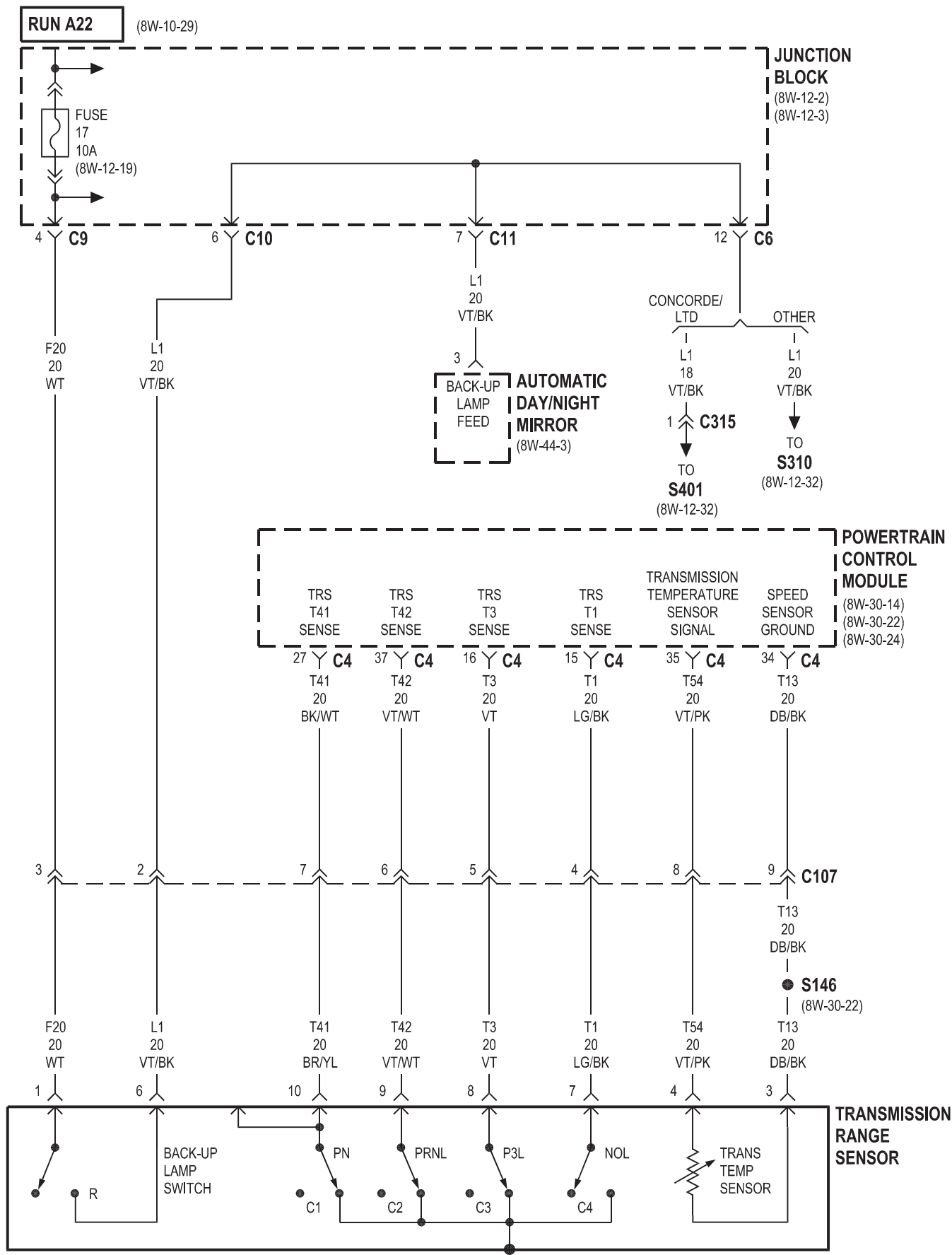
Component	Page
Automatic Day/Night Mirror	8W-31-5
Autostick Switch	8W-31-8
Fuse 1 (JB)	8W-31-2, 8
Fuse 17 (JB)	8W-31-5
Fuse Q (PDC)	8W-31-2
Fuse V (PDC)	8W-31-2
G101	8W-31-2
G102	8W-31-2, 4
G103	8W-31-2
G104	8W-31-2
G300	8W-31-8

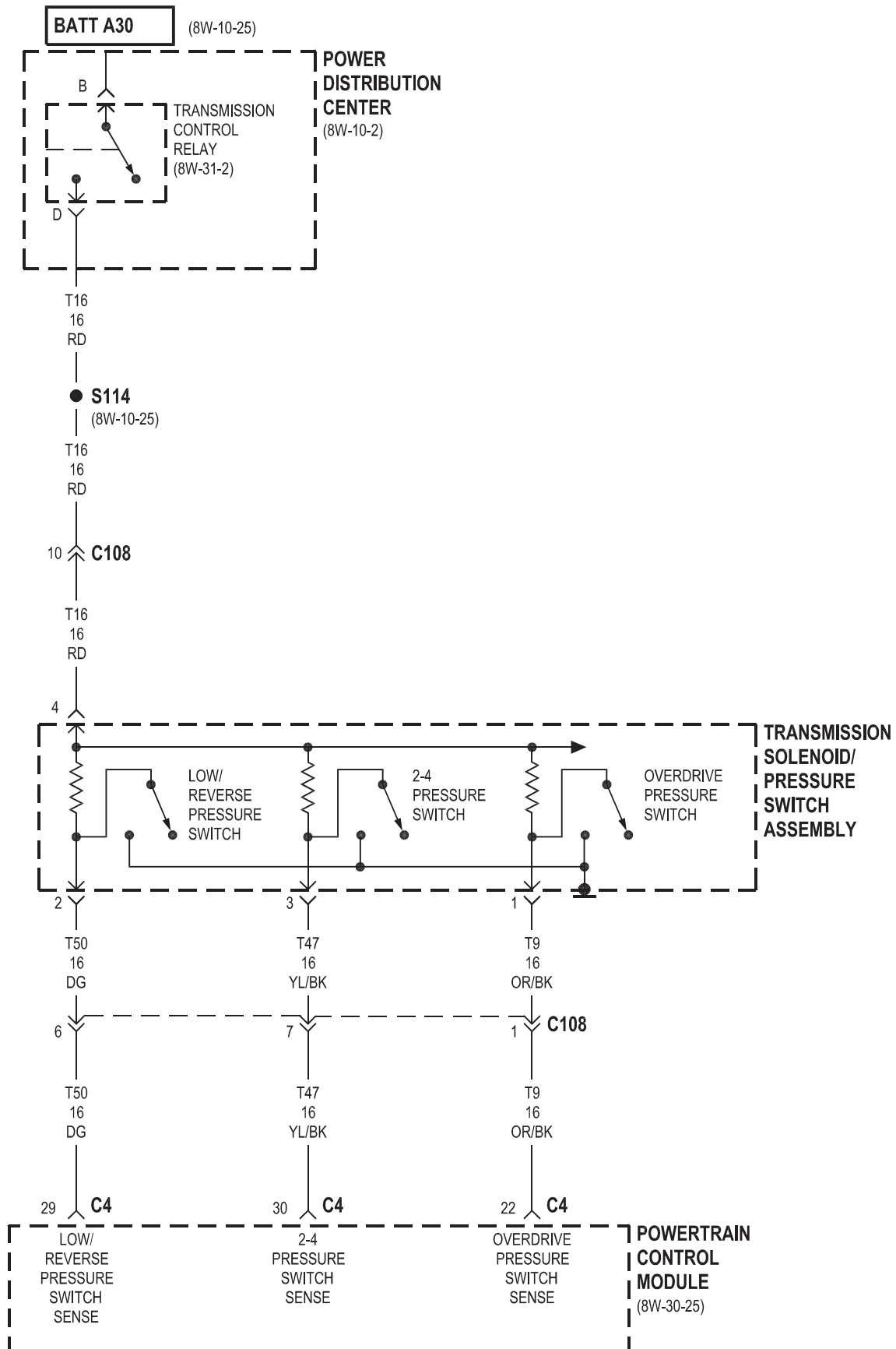
Component	Page
Input Speed Sensor	8W-31-3
Junction Block	8W-31-2, 5, 8
Output Speed Sensor	8W-31-3
Power Distribution Center	8W-31-2, 6, 7
Powertrain Control Module	8W-31-2, 3, 4, 5, 6, 7, 8
Transmission Control Relay	8W-31-2, 6, 7
Transmission Range Sensor	8W-31-3, 5
Transmission Solenoid/Pressure Switch Assembly	8W-31-6, 7

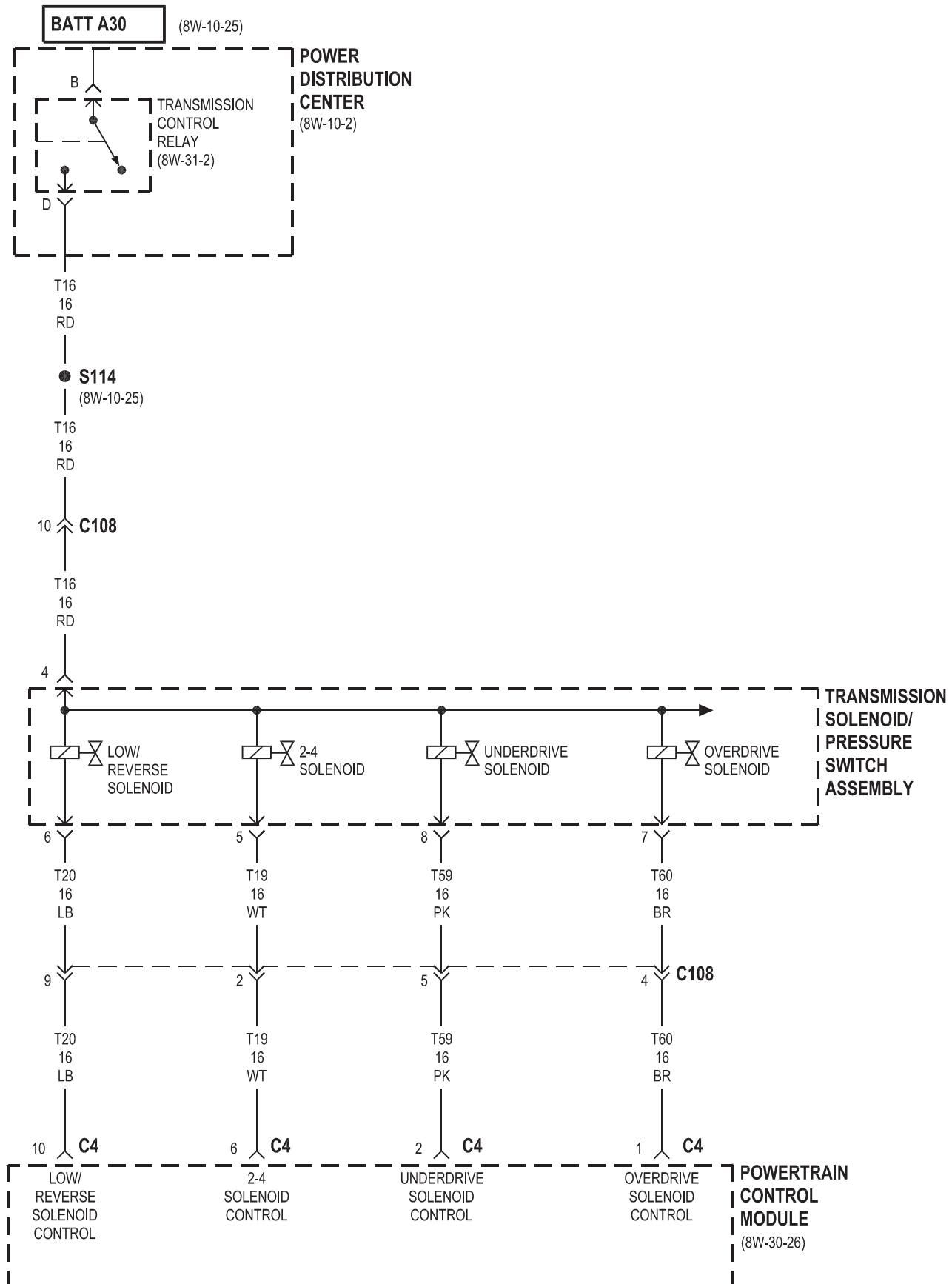


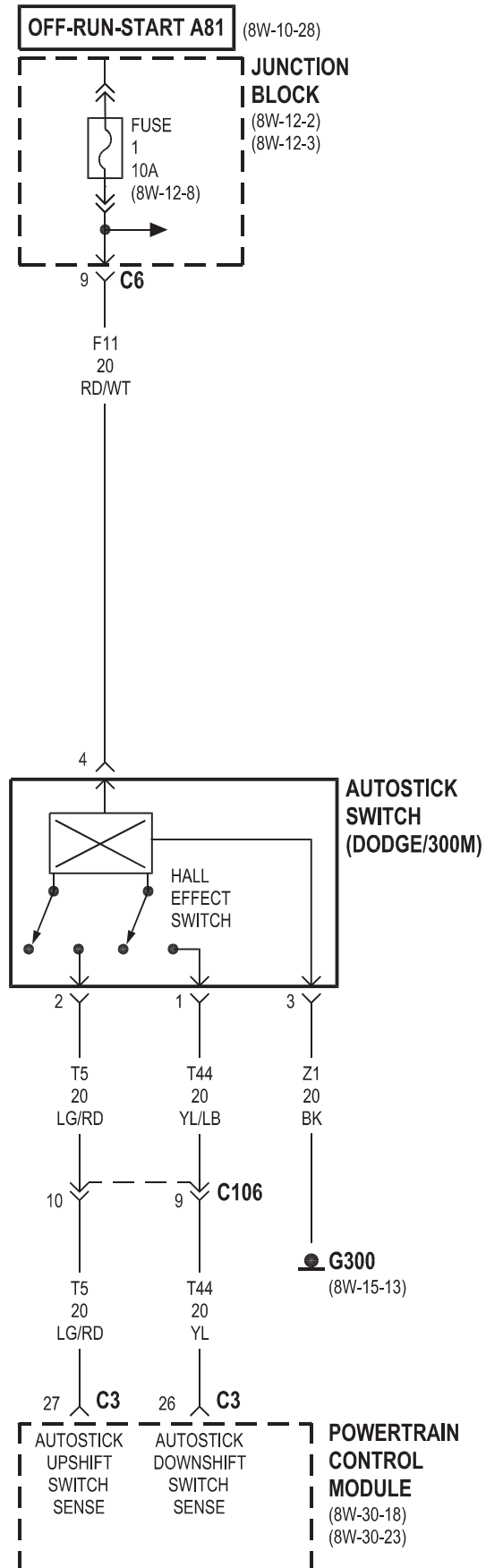






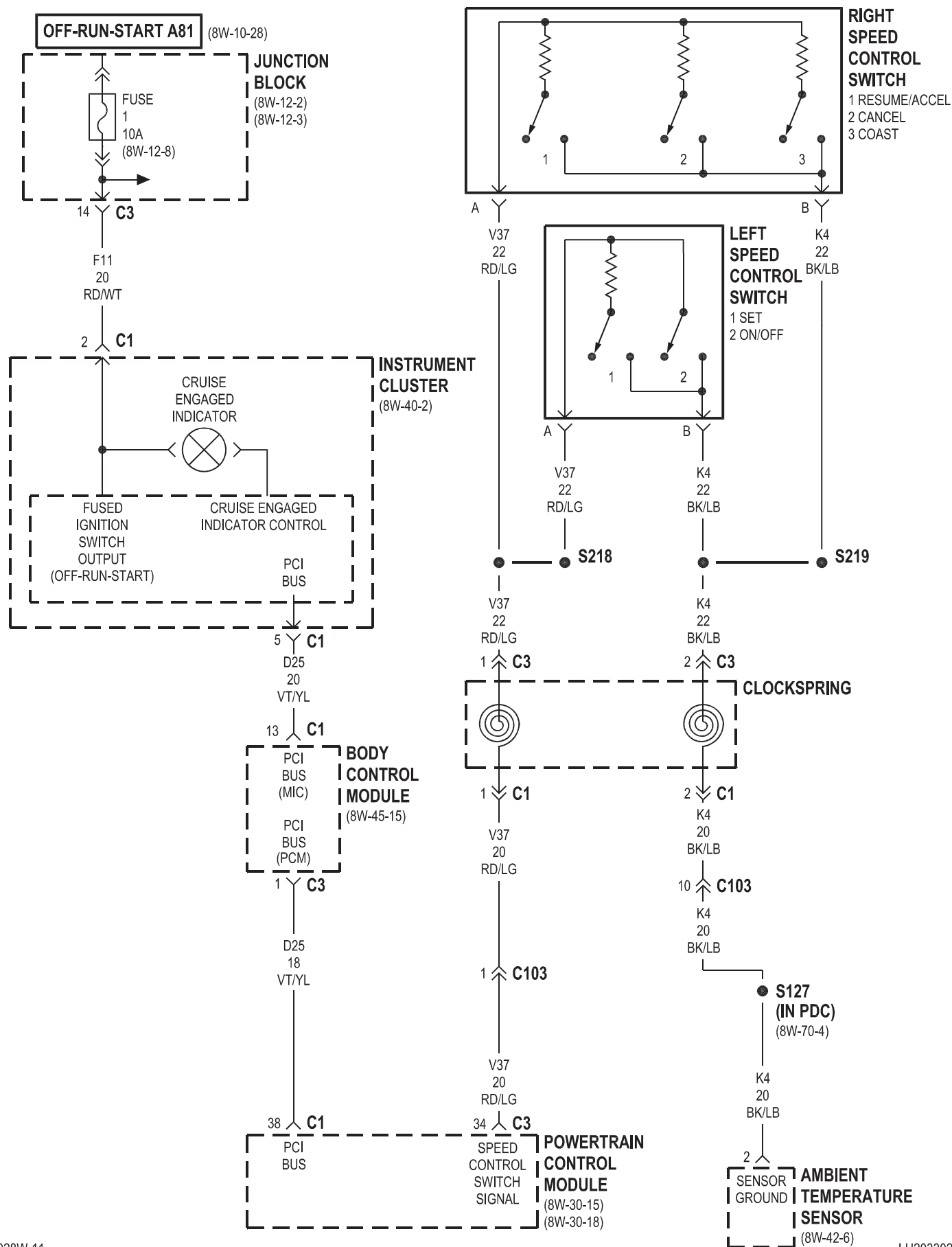


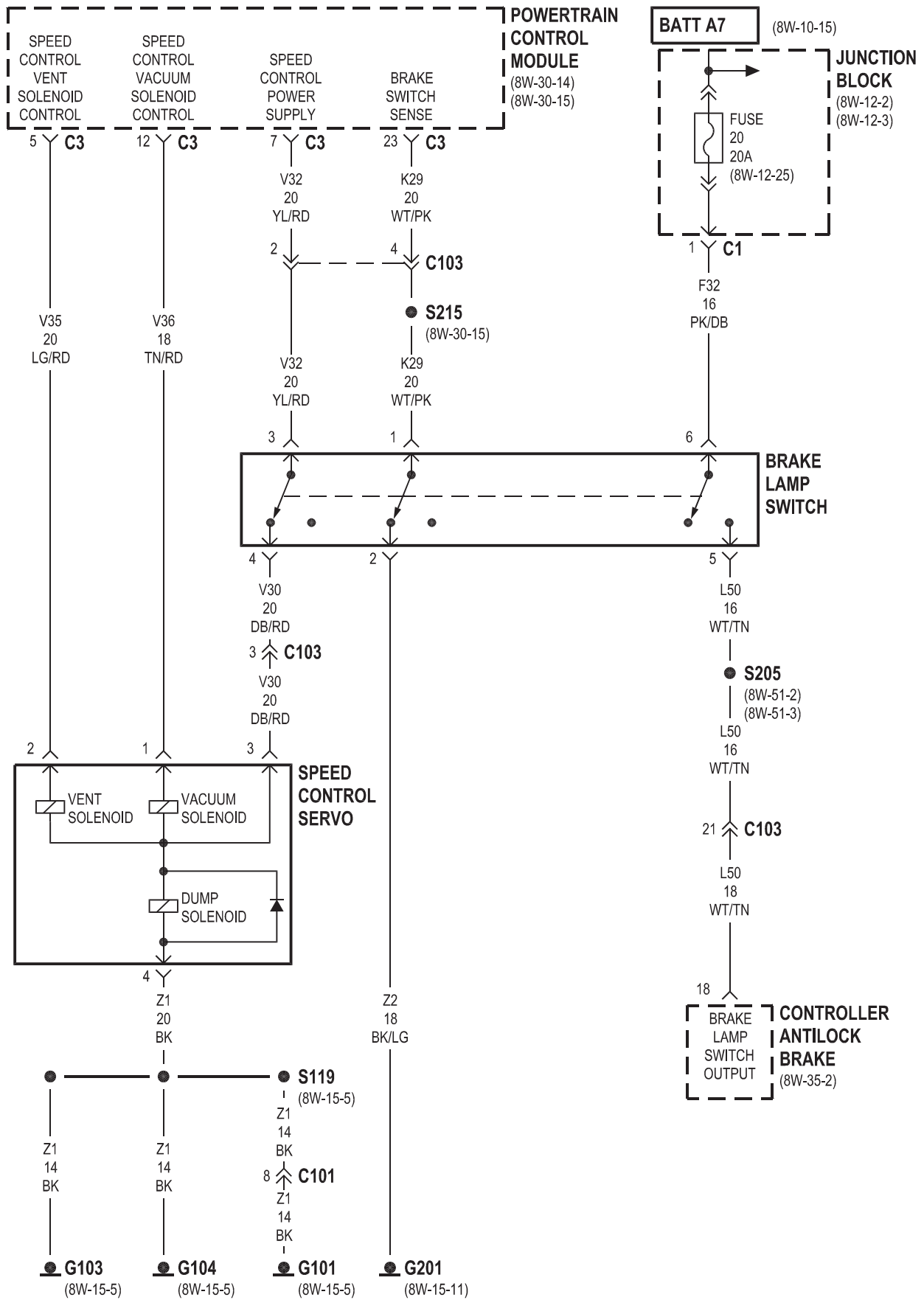




8W-33 VEHICLE SPEED CONTROL

Component	Page	Component	Page
Ambient Temperature Sensor	8W-33-2	G104	8W-33-3
Body Control Module	8W-33-2	G201	8W-33-3
Brake Lamp Switch	8W-33-3	Instrument Cluster	8W-33-2
Clockspring	8W-33-2	Junction Block	8W-33-2, 3
Controller Antilock Brake	8W-33-3	Left Speed Control Switch	8W-33-2
Cruise Engaged Indicator	8W-33-2	Powertrain Control Module	8W-33-2, 3
Fuse 1 (JB)	8W-33-2	Right Speed Control Switch	8W-33-2
Fuse 20 (JB)	8W-33-3	Speed Control Servo	8W-33-3
G101	8W-33-3		
G103	8W-33-3		

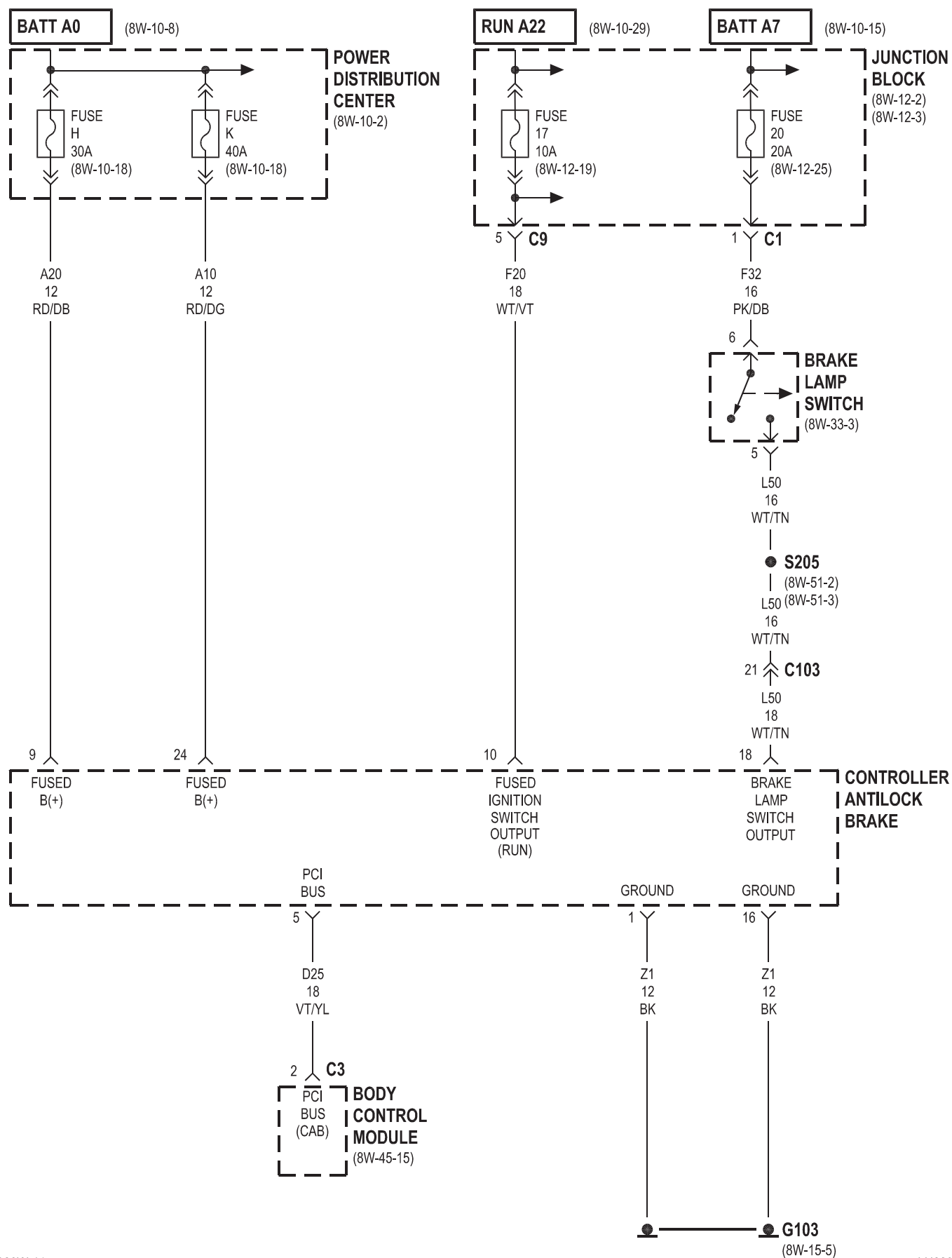


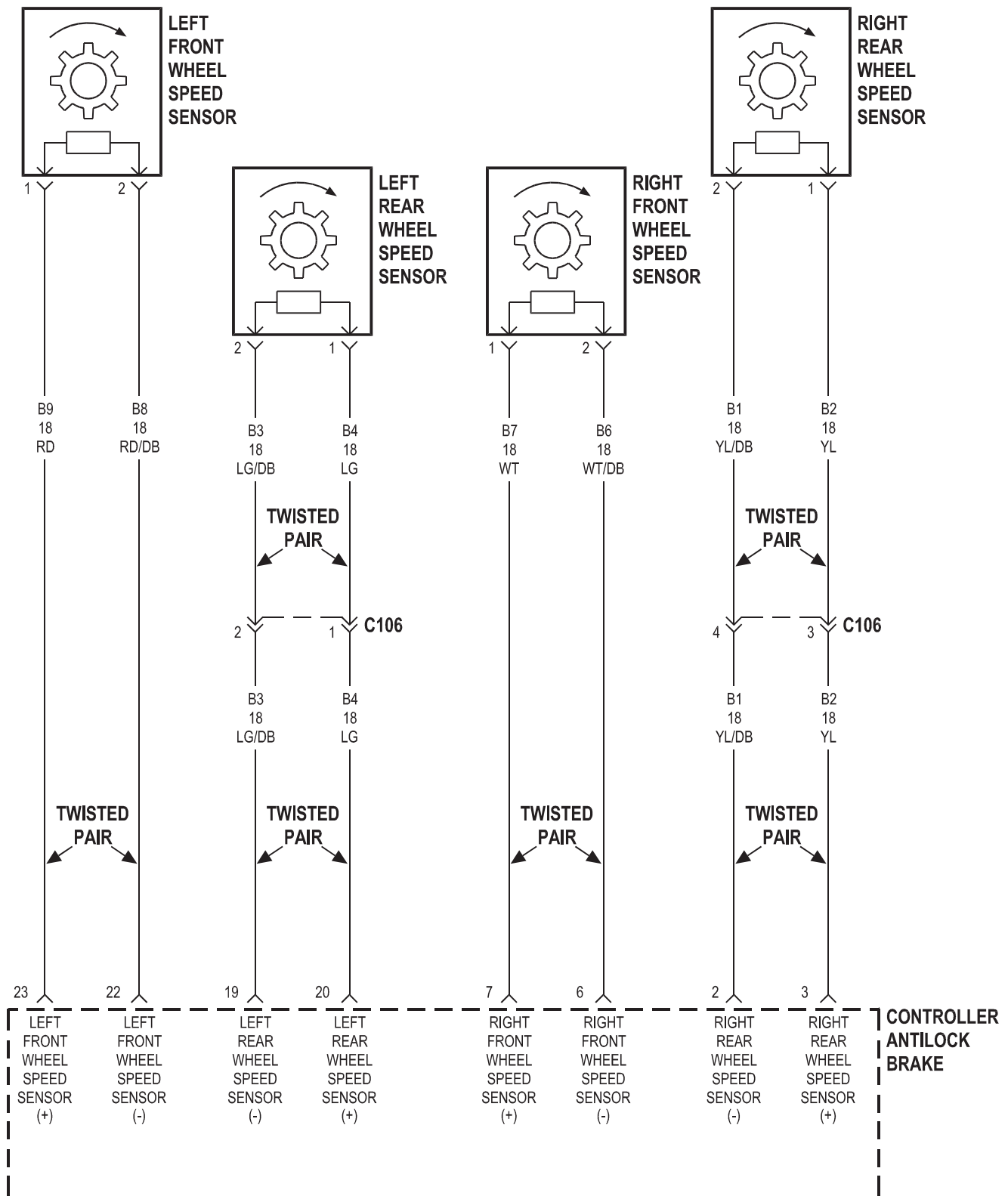


8W-35 ANTILOCK BRAKES

Component	Page
Body Control Module	8W-35-2
Brake Lamp Switch	8W-35-2
Controller Antilock Brake	8W-35-2, 3
Fuse 17 (JB)	8W-35-2
Fuse 20 (JB)	8W-35-2
Fuse H (PDC)	8W-35-2
Fuse K (PDC)	8W-35-2
G103	8W-35-2

Component	Page
Junction Block	8W-35-2
Left Front Wheel Speed Sensor	8W-35-3
Left Rear Wheel Speed Sensor	8W-35-3
Power Distribution Center	8W-35-2
Right Front Wheel Speed Sensor	8W-35-3
Right Rear Wheel Speed Sensor	8W-35-3

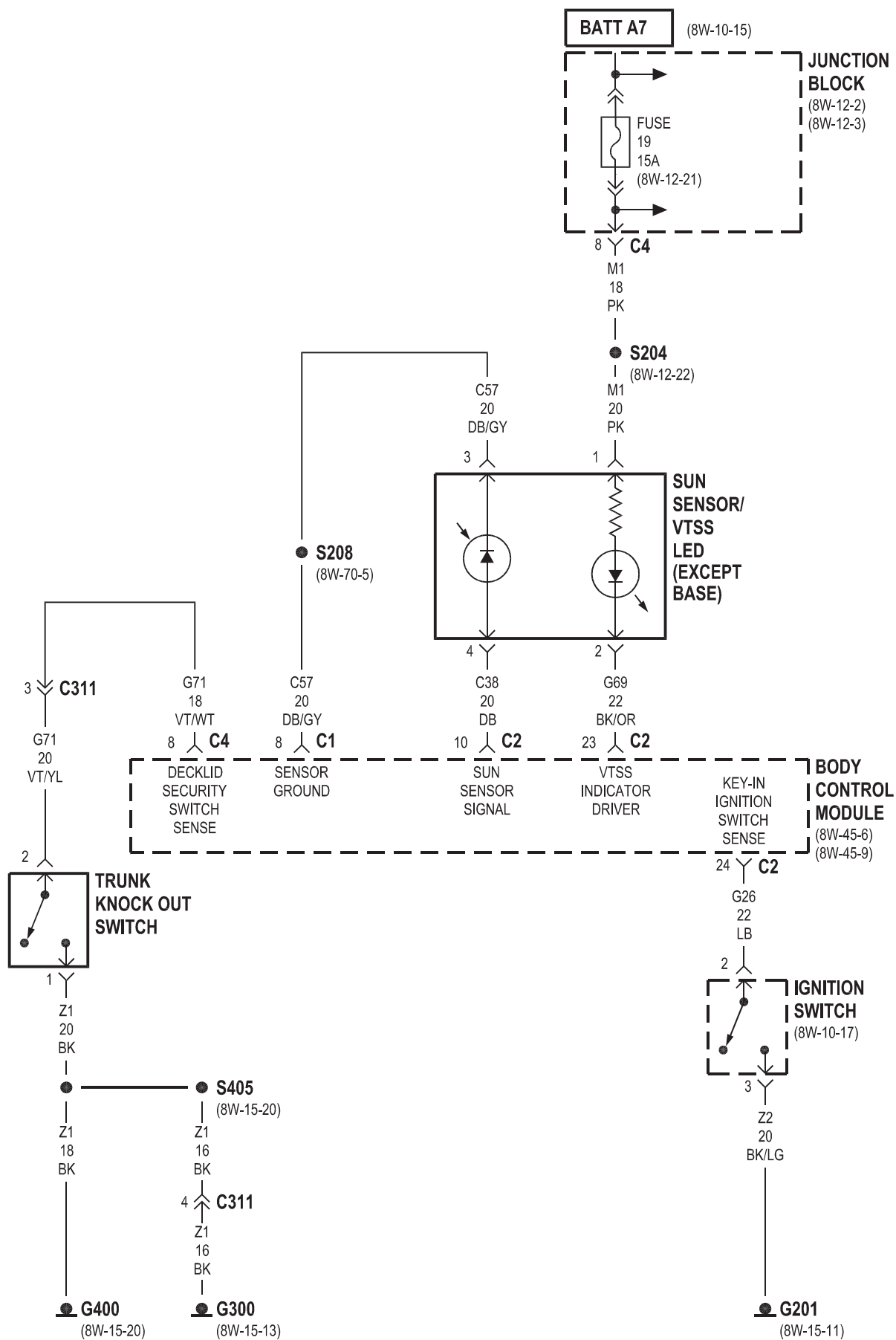


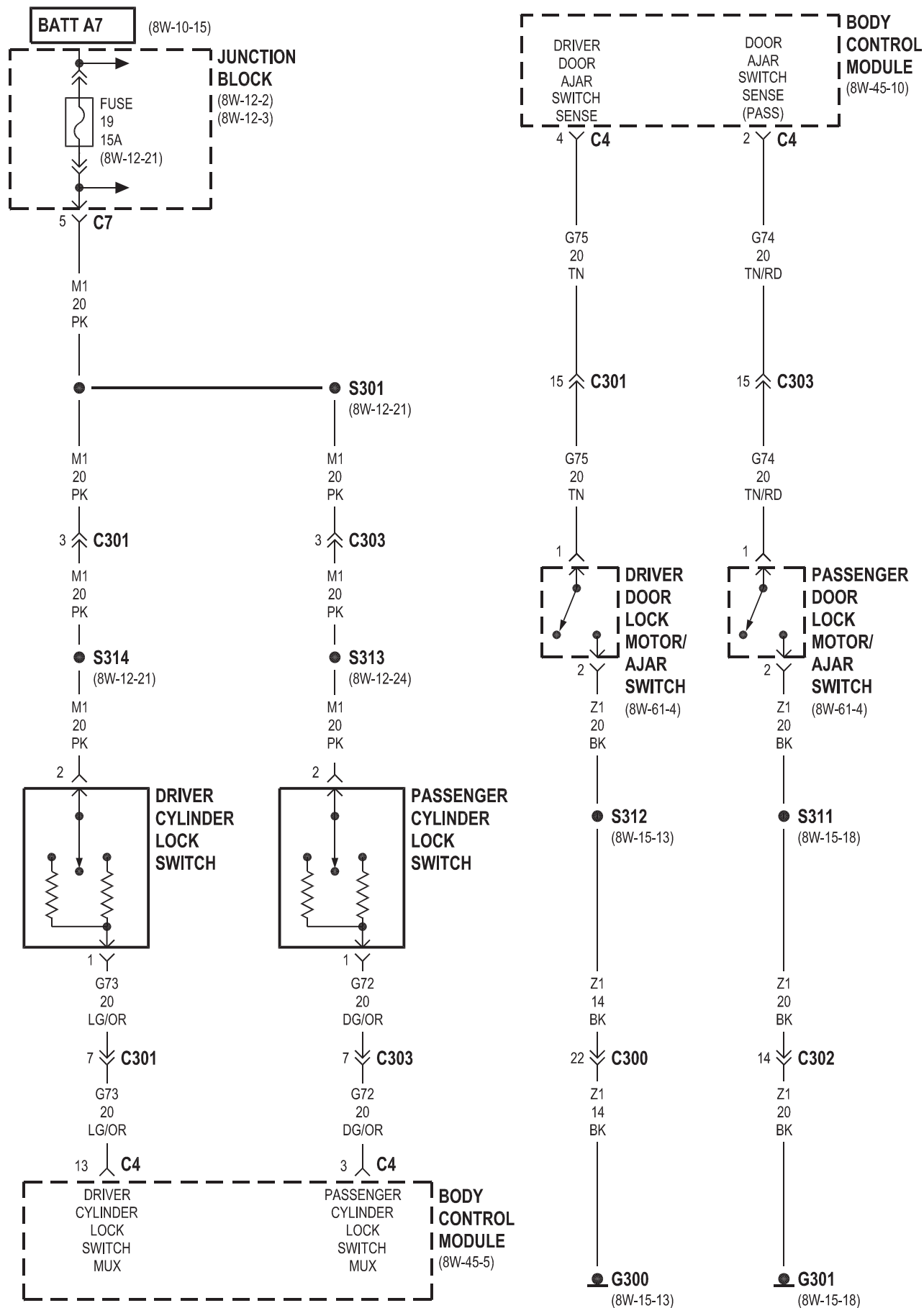


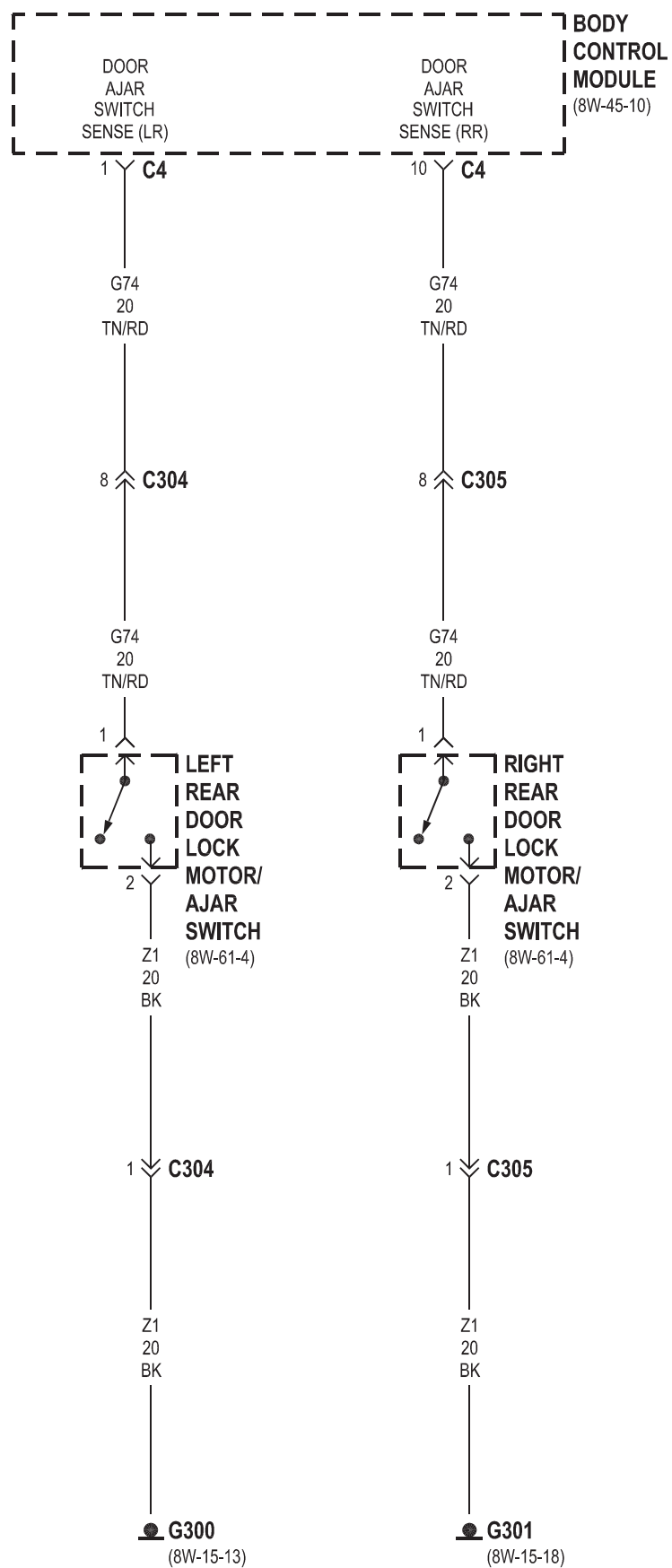
8W-39 VEHICLE THEFT SECURITY SYSTEM

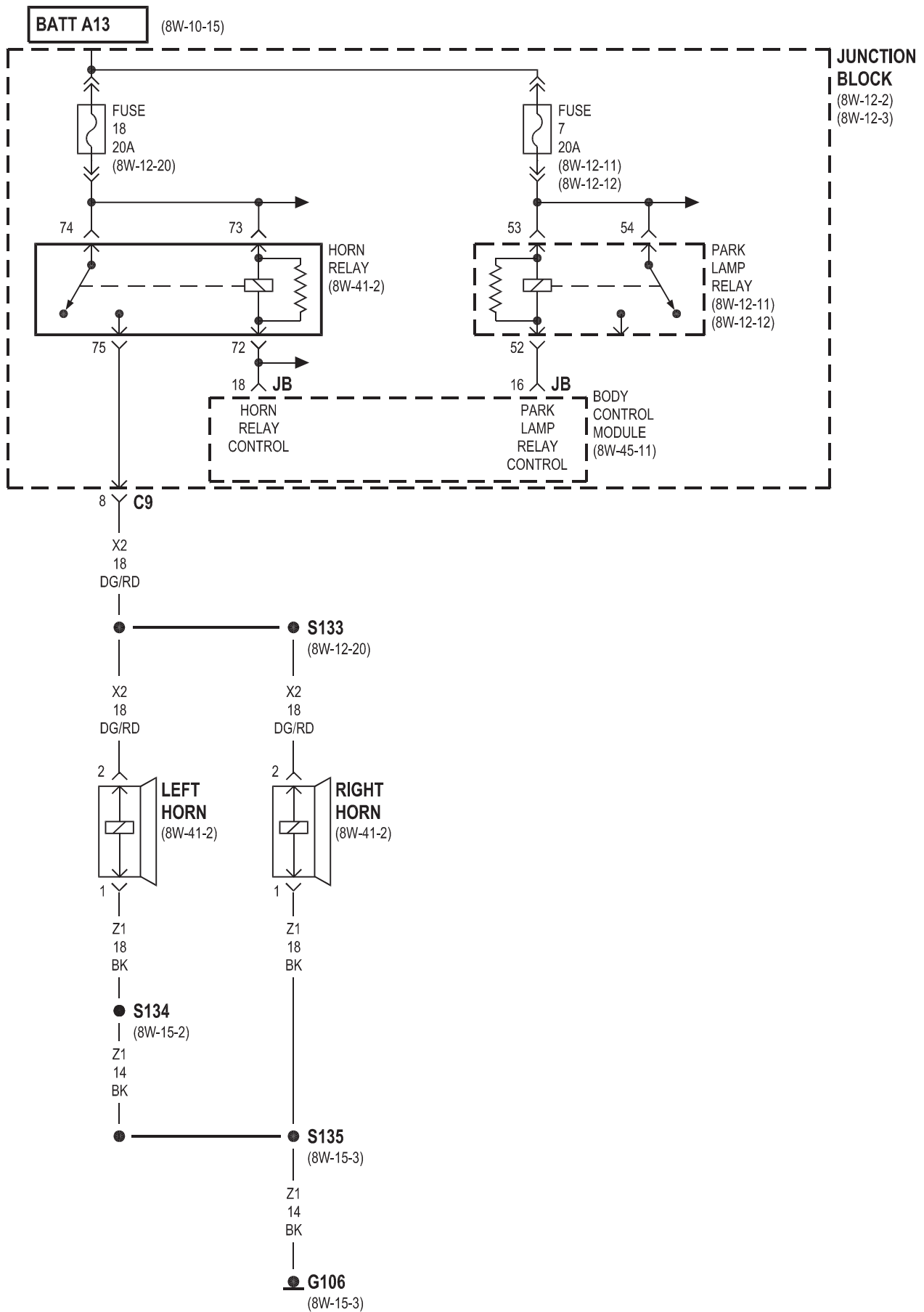
Component	Page
Body Control Module	8W-39-2, 3, 4, 5, 6
Driver Cylinder Lock Switch	8W-39-3
Driver Door Lock Motor/Ajar Switch	8W-39-3
Fuse 7 (JB)	8W-39-5
Fuse 14 (JB)	8W-39-6
Fuse 18 (JB)	8W-39-5
Fuse 19 (JB)	8W-39-2, 3, 6
G106	8W-39-5
G201	8W-39-2, 6
G300	8W-39-2, 3, 4
G301	8W-39-3, 4
G400	8W-39-2
Horn Relay	8W-39-5

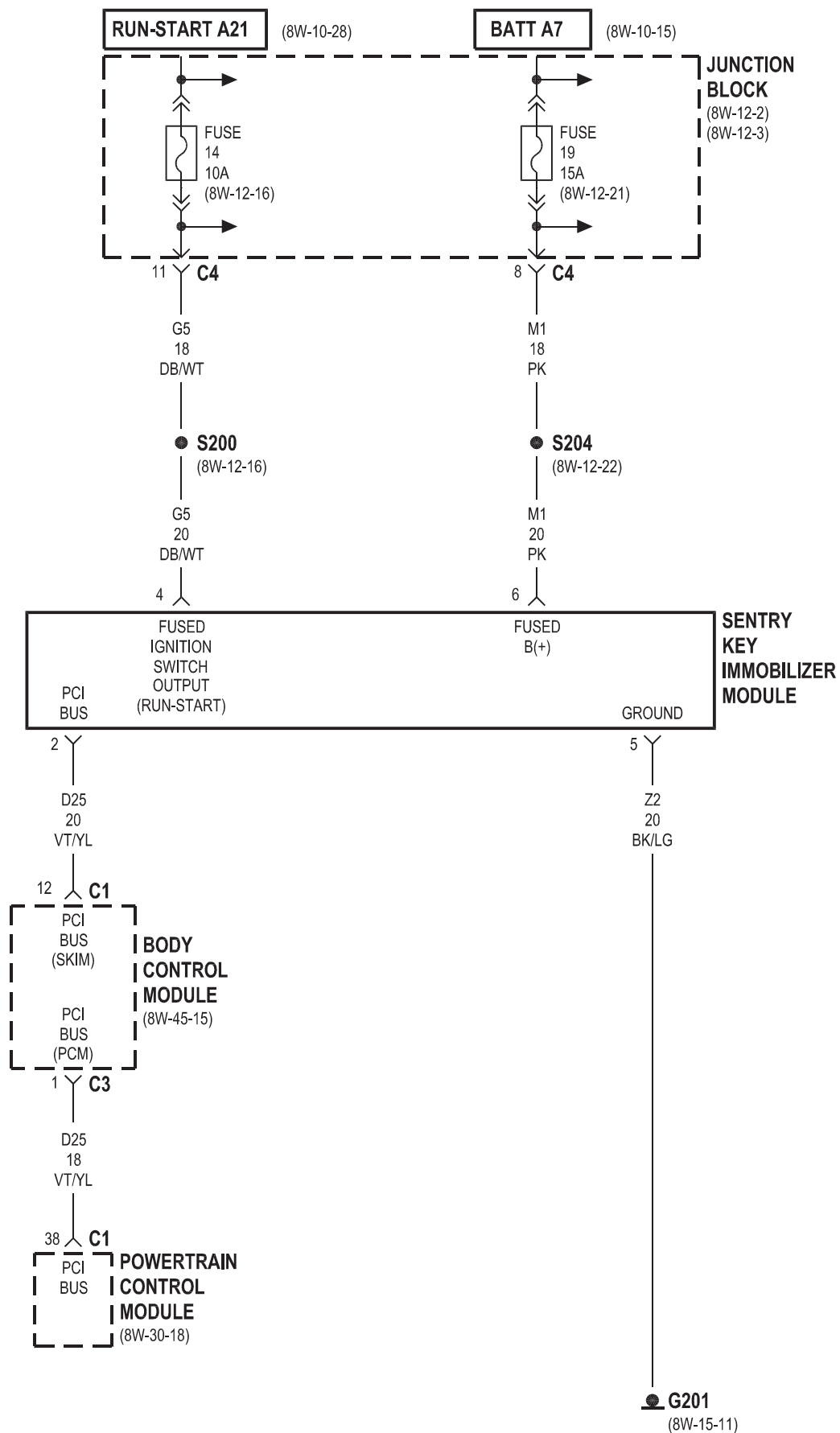
Component	Page
Ignition Switch	8W-39-2
Left Horn	8W-39-5
Left Rear Door Lock Motor/Ajar Switch	8W-39-4
Park Lamp Relay	8W-39-5
Passenger Cylinder Lock Switch	8W-39-3
Passenger Door Lock Motor/Ajar Switch	8W-39-3
Powertrain Control Module	8W-39-6
Right Horn	8W-39-5
Right Rear Door Lock Motor/Ajar Switch	8W-39-4
Sentry Key Immobilizer Module	8W-39-6
Sun Sensor/VTSS Led	8W-39-2
Trunk Knock Out Switch	8W-39-2







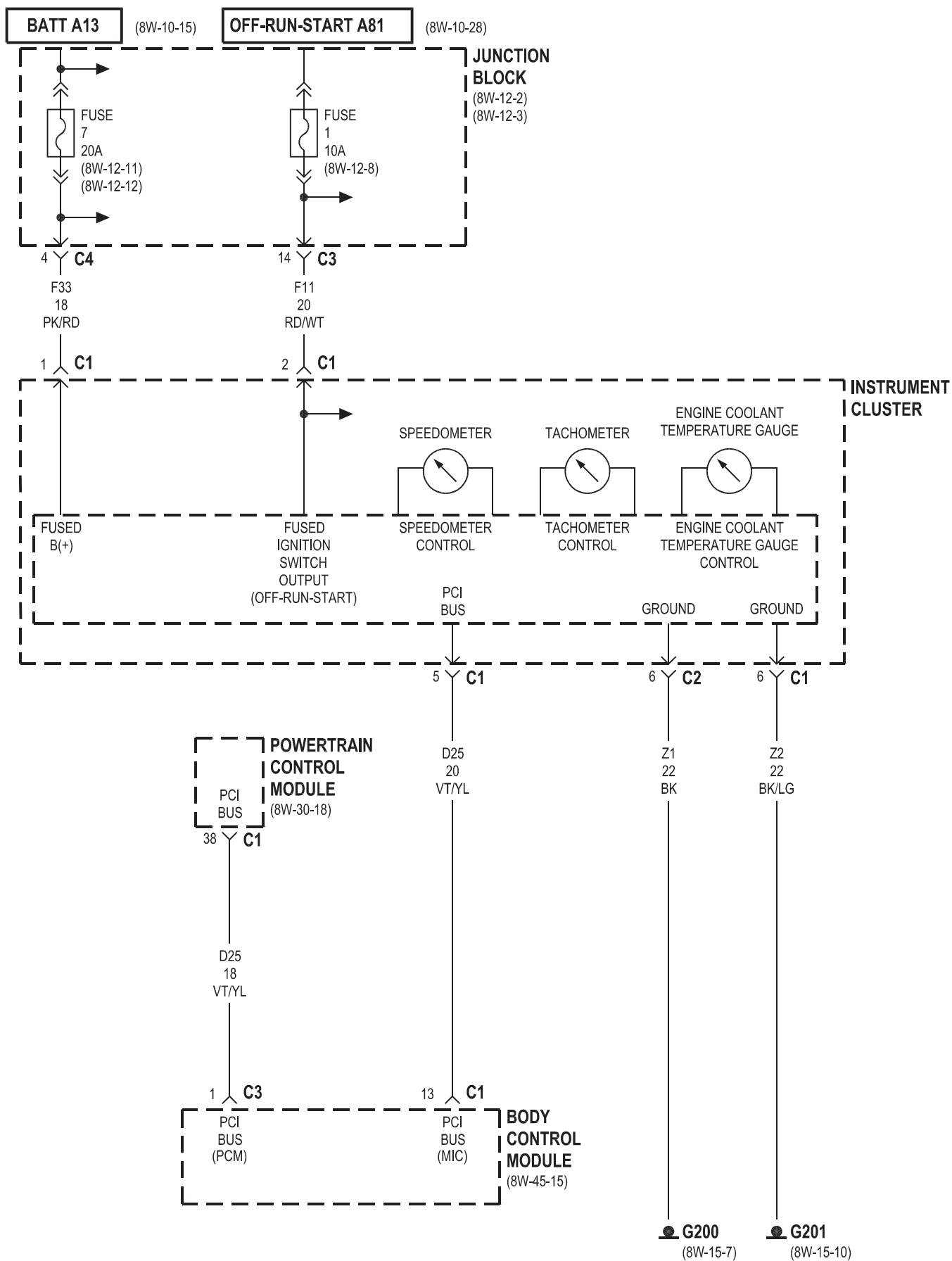


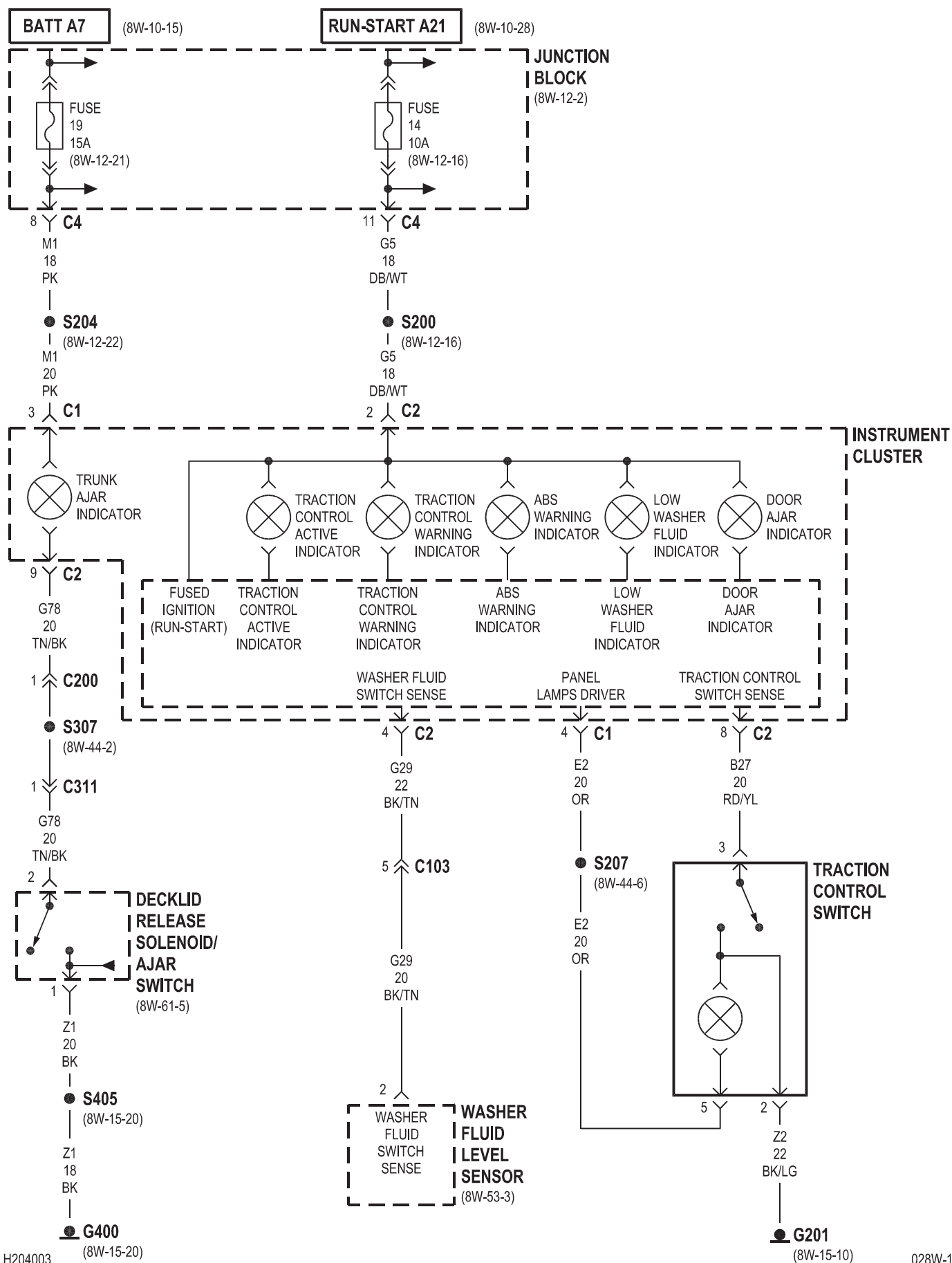


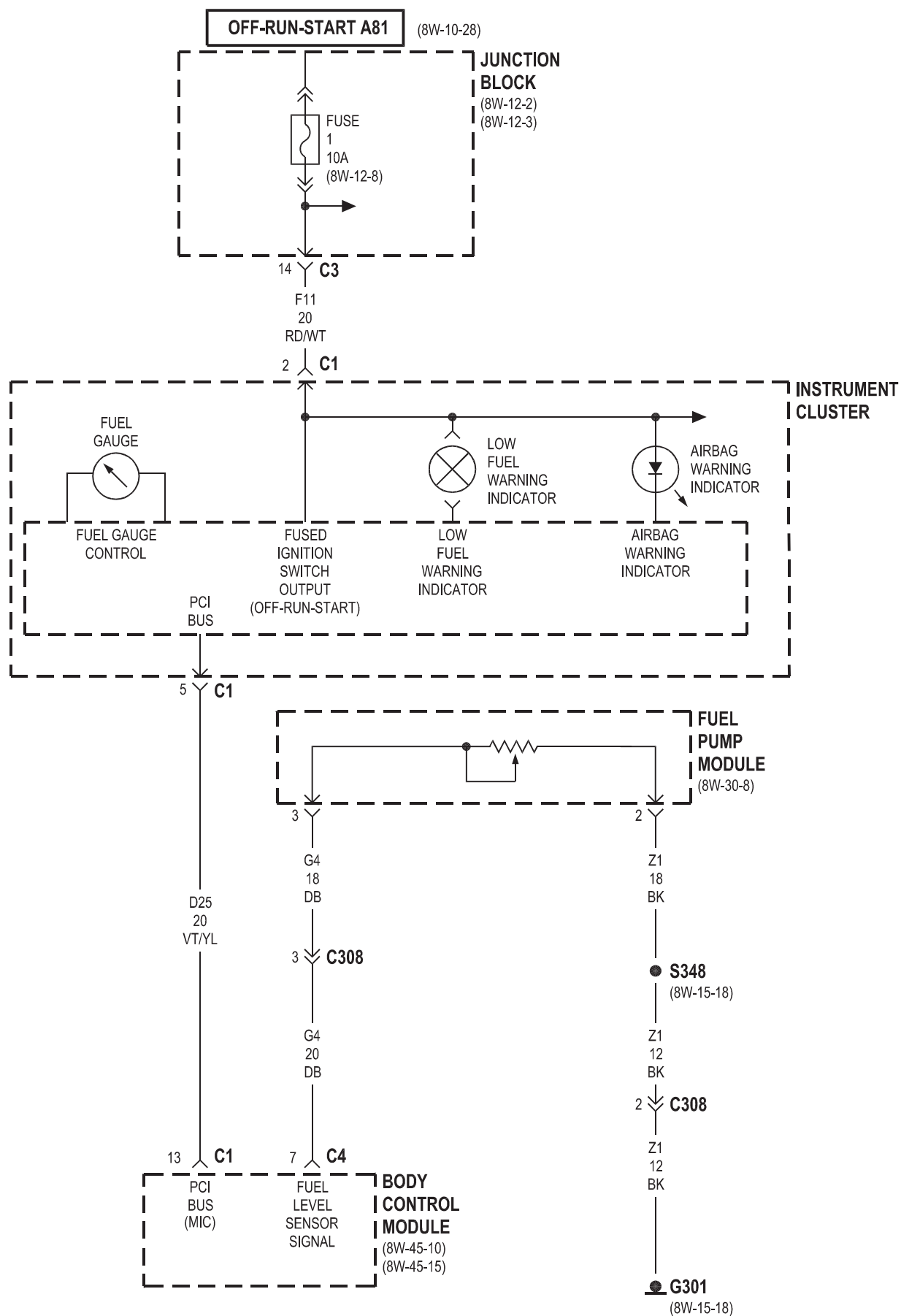
8W-40 INSTRUMENT CLUSTER

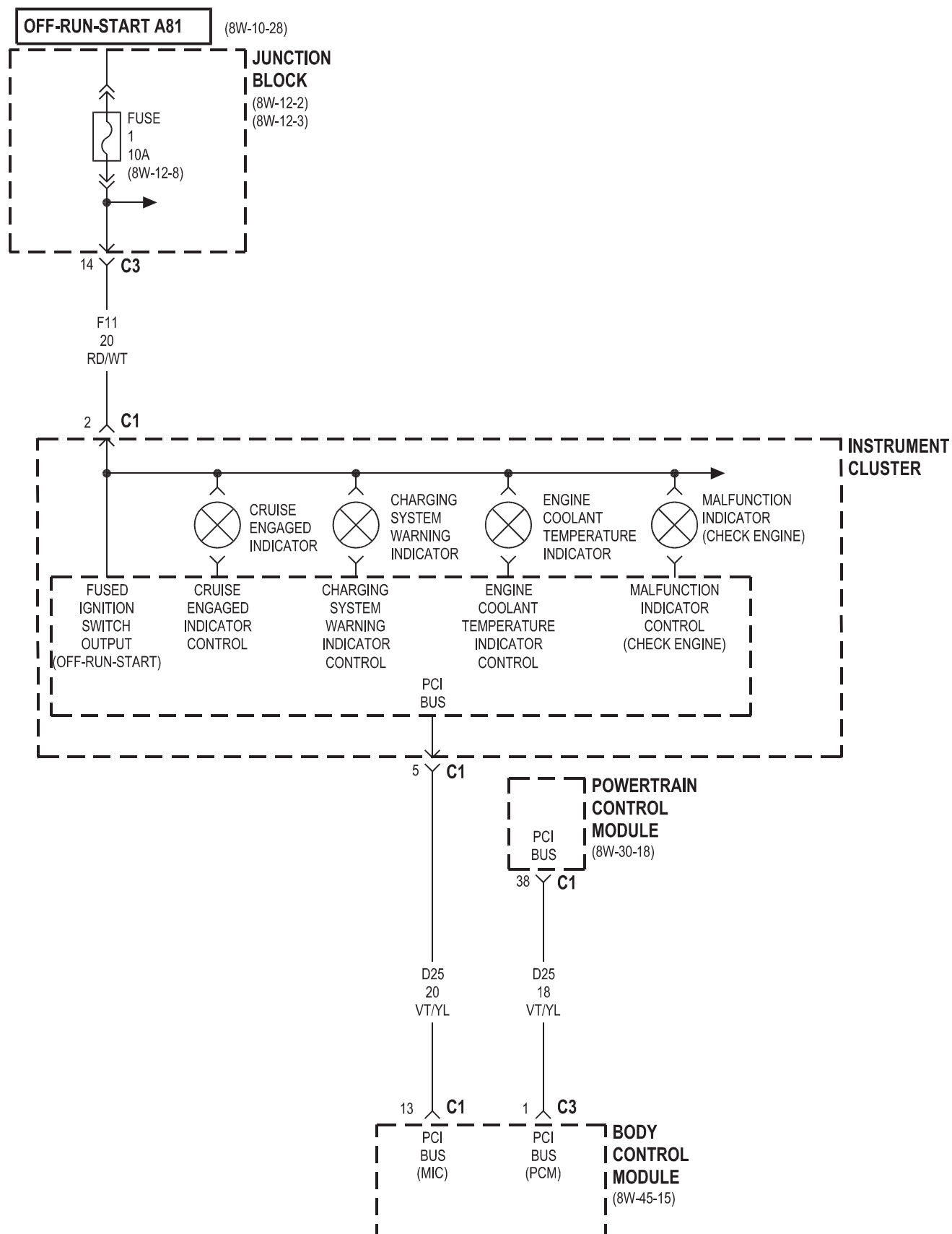
Component	Page
ABS Warning Indicator	8W-40-3
Analog Clock	8W-40-10
Body Control Module	8W-40-2, 4, 5, 8, 10
Brake Fluid Level Switch	8W-40-6, 7
Daytime Running Lamp Module	8W-40-6
Decklid Release Solenoid/Ajar Switch	8W-40-3
Door Ajar Indicator	8W-40-3
Engine Oil Pressure Switch	8W-40-6
Fuel Pump Module	8W-40-4
Fuse 1 (JB)	8W-40-2, 4, 5, 6, 8, 10
Fuse 7 (JB)	8W-40-2
Fuse 14 (JB)	8W-40-3, 10
Fuse 19 (JB)	8W-40-3, 10
G101	8W-40-6, 7
G103	8W-40-6, 7
G104	8W-40-6, 7
G200	8W-40-2, 6
G201	8W-40-2, 3, 9, 10

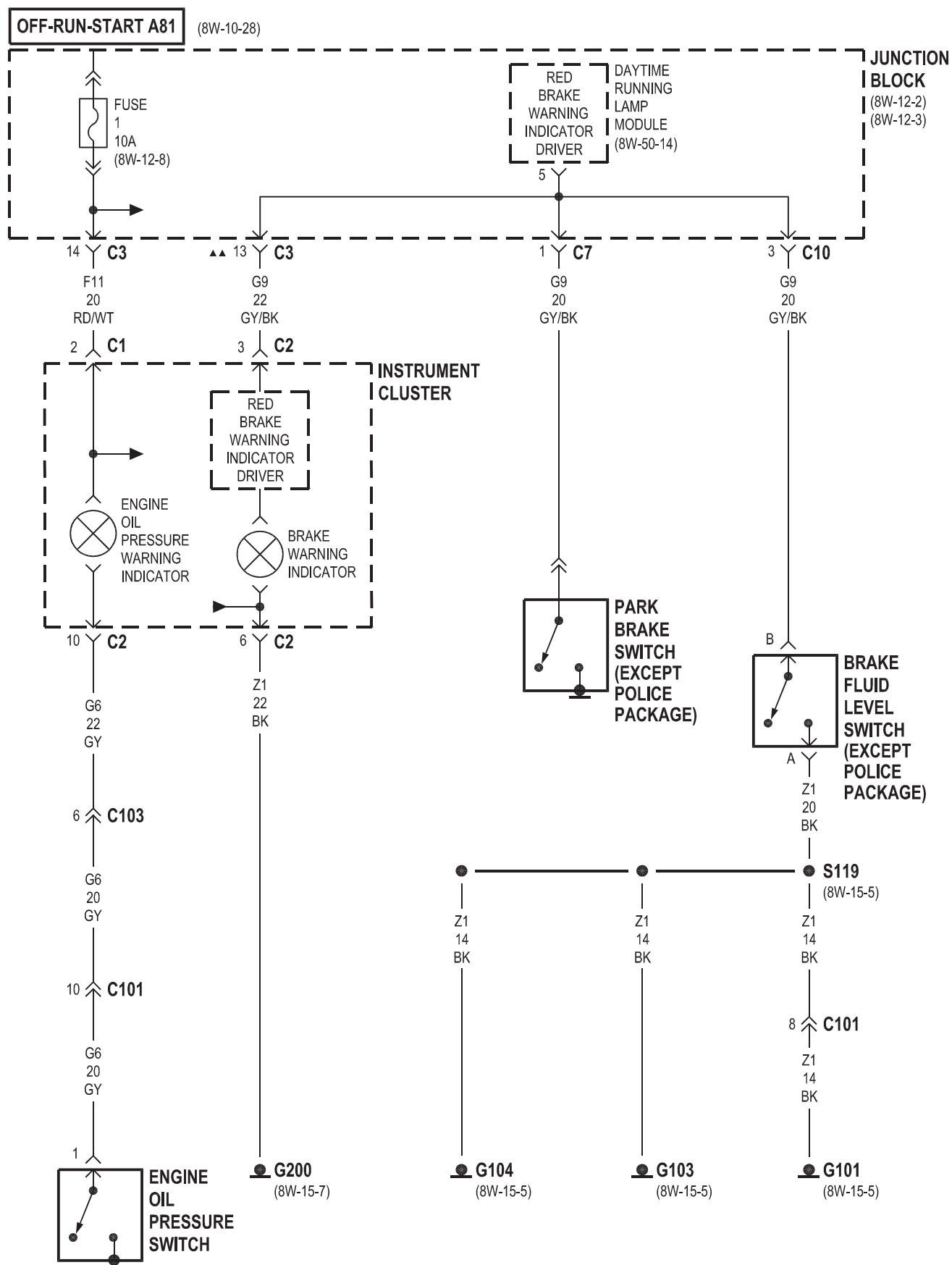
Component	Page
G300	8W-40-10
G301	8W-40-4
G400	8W-40-3
Headlamp Dimmer Switch	8W-40-9
High Beam Headlamp Relay	8W-40-9
Instrument Cluster	8W-40-2, 3, 4, 5, 6, 7, 8, 9, 10
Junction Block	8W-40-2, 3, 4, 5, 6, 7, 8, 9, 10
Low Washer Fluid Indicator	8W-40-3
Park Brake Switch	8W-40-6, 7
Powertrain Control Module	8W-40-2, 5, 8
Seat Belt Switch	8W-40-10
Traction Control Active Indicator	8W-40-3
Traction Control Switch	8W-40-3
Traction Control Warning Indicator	8W-40-3
Trunk Ajar Indicator	8W-40-3
Turn Signal/Hazard Switch	8W-40-9
Washer Fluid Level Sensor	8W-40-3



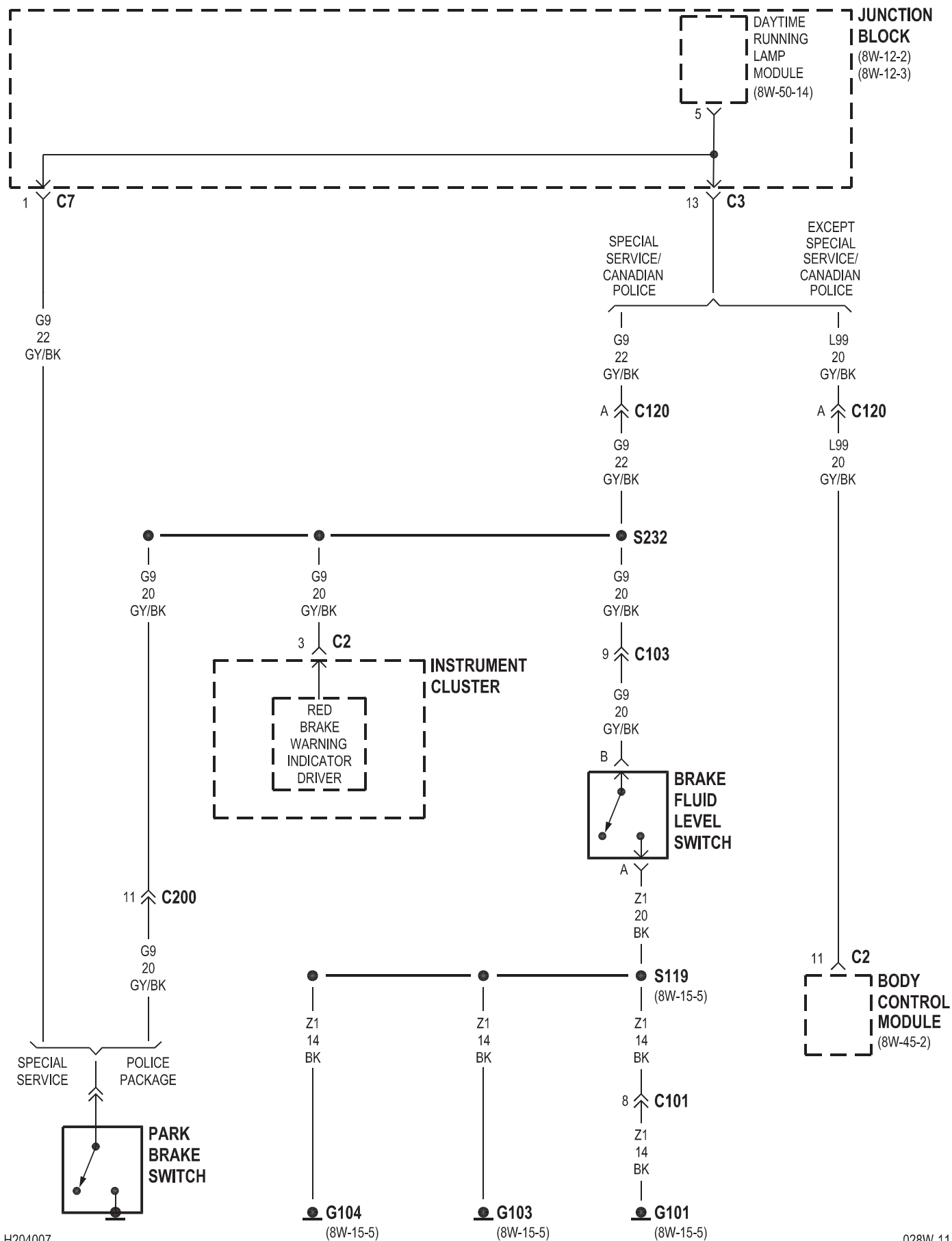


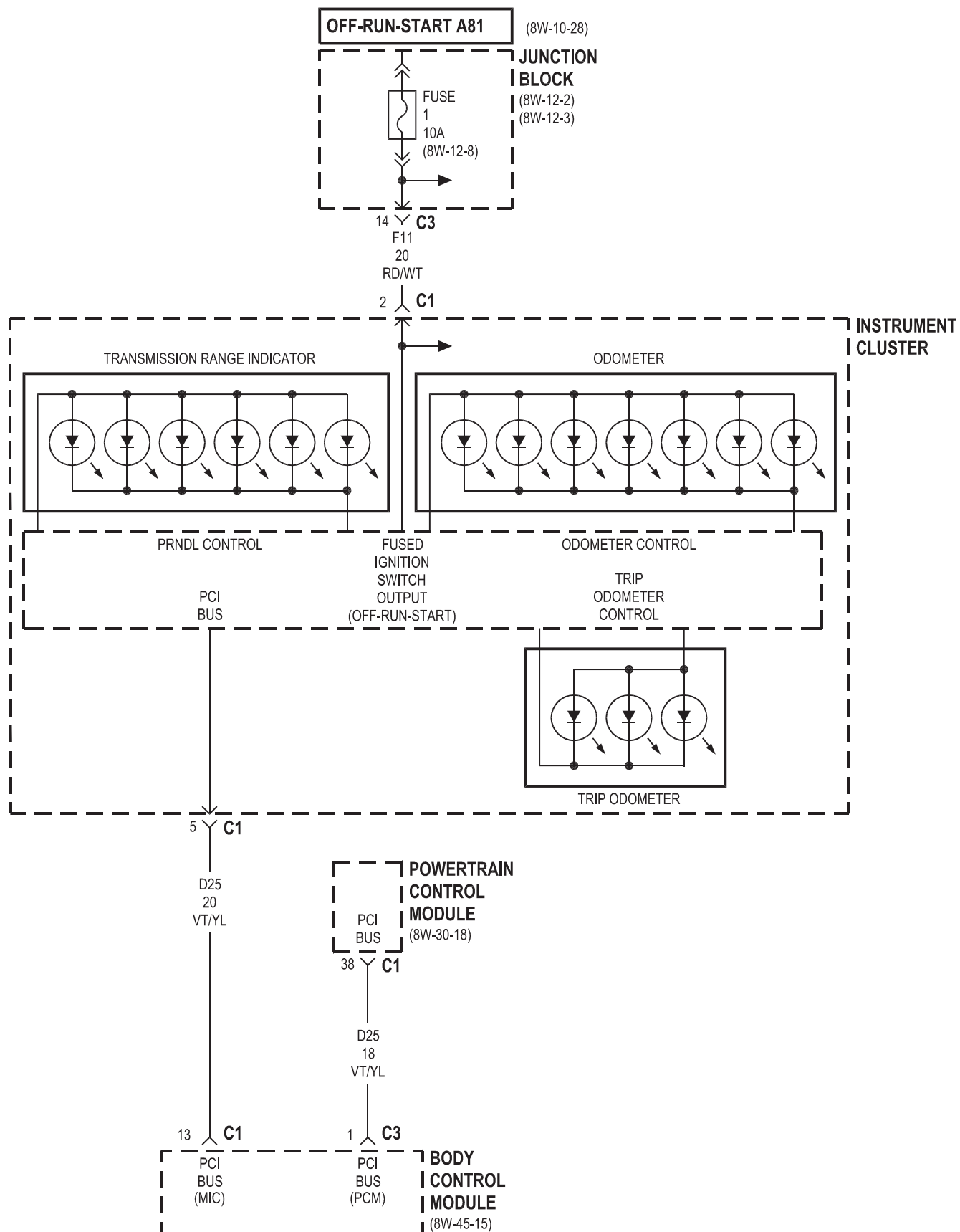


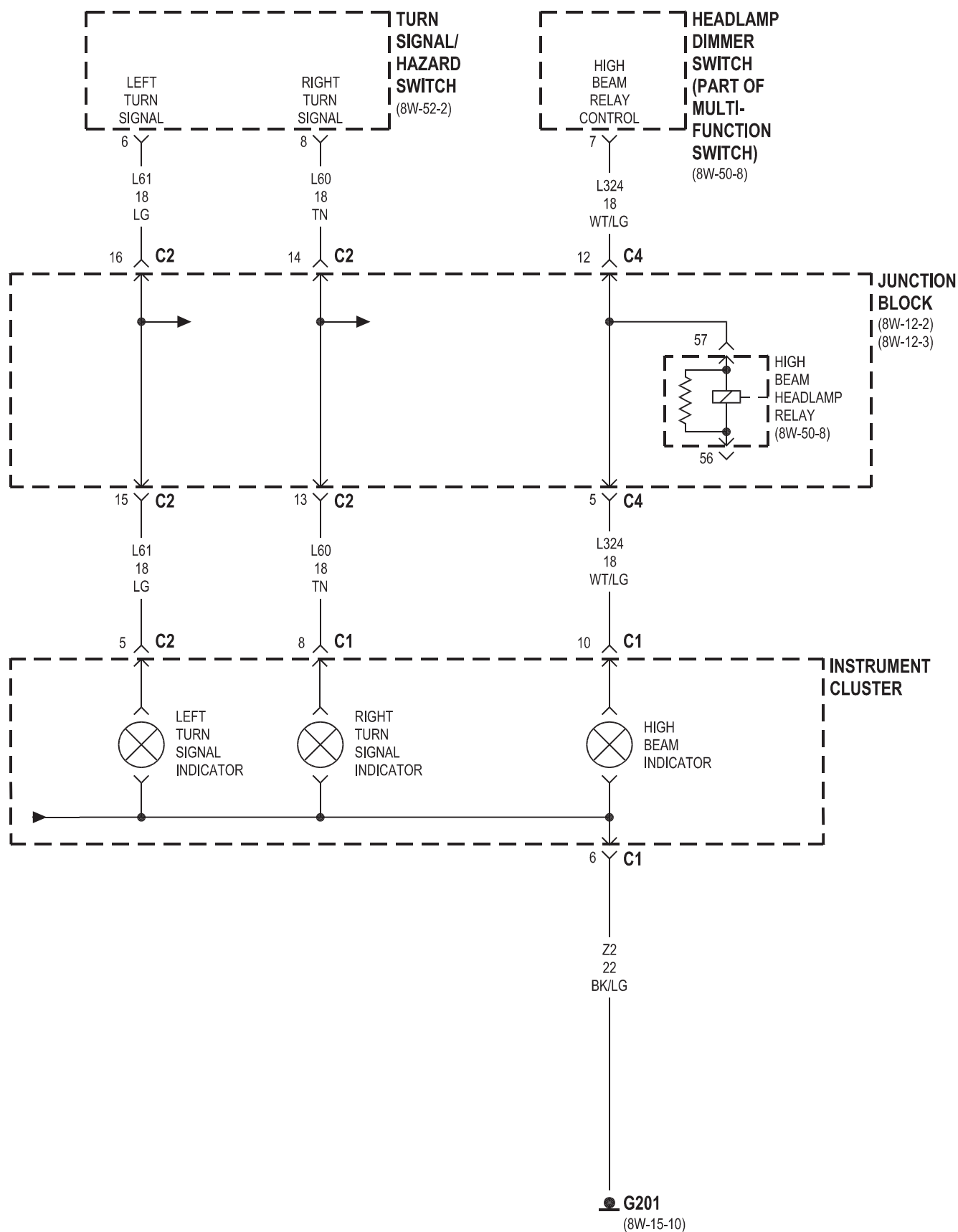


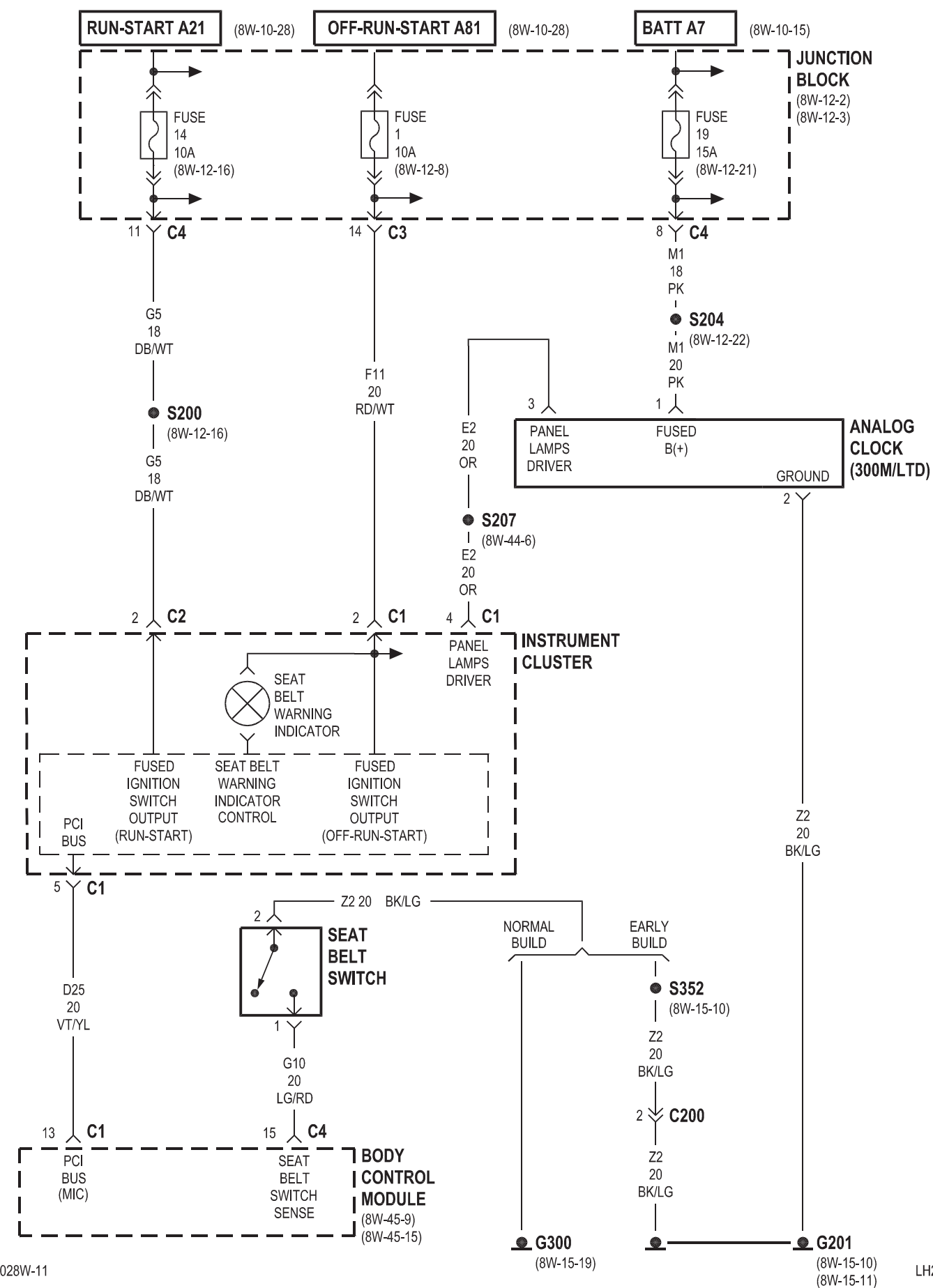


▲▲ EXCEPT POLICE PACKAGE



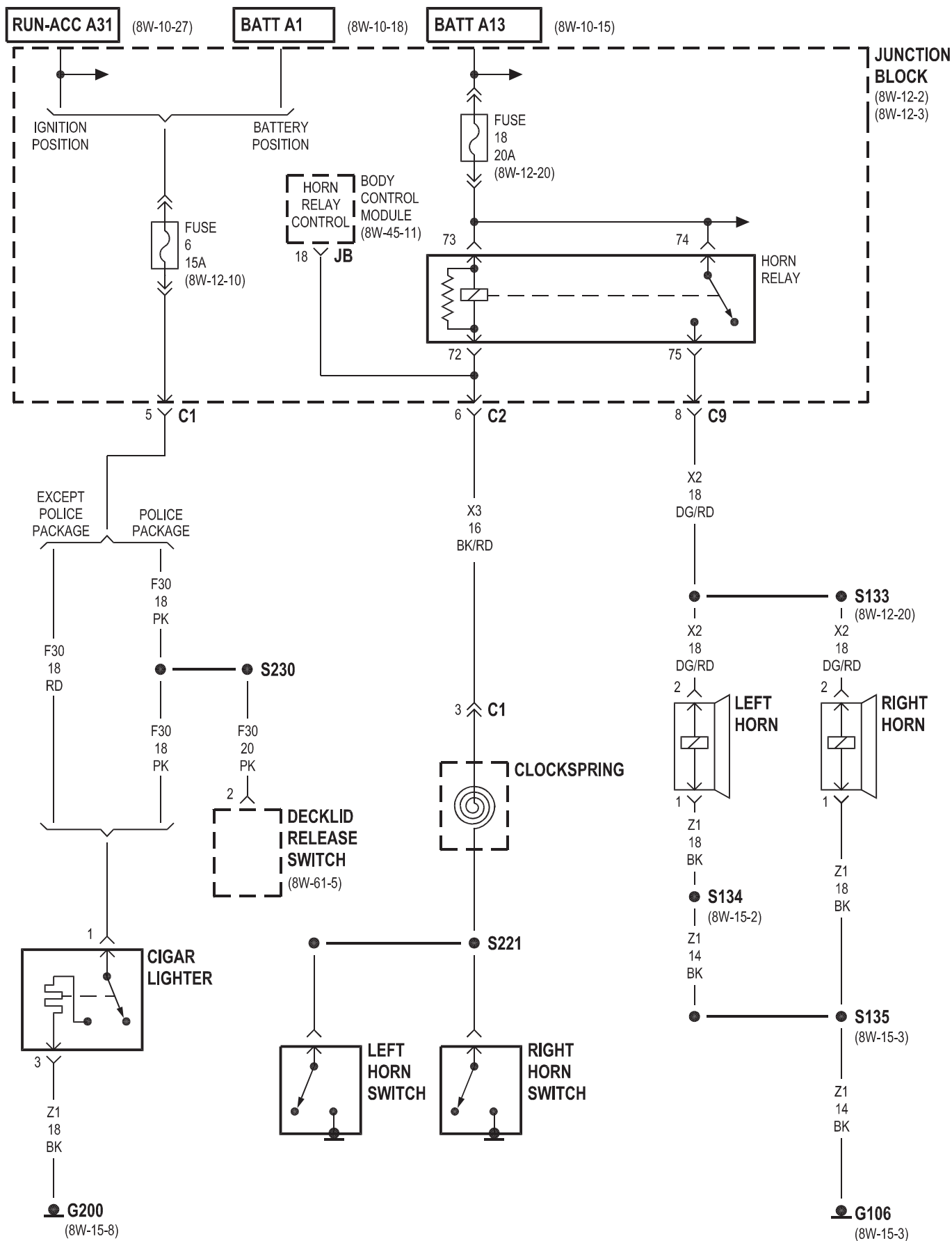


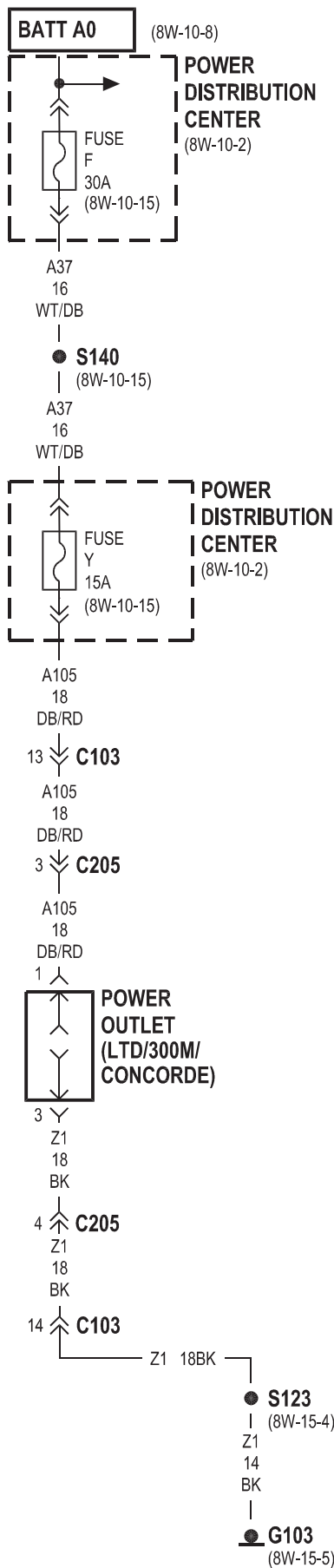




8W-41 HORN/CIGAR LIGHTER/POWER OUTLET

Component	Page	Component	Page
Body Control Module	8W-41-2	G200	8W-41-2
Cigar Lighter	8W-41-2	Horn Relay	8W-41-2
Clockspring	8W-41-2	Junction Block	8W-41-2
Decklid Release Switch	8W-41-2	Left Horn	8W-41-2
Fuse 6 (JB)	8W-41-2	Left Horn Switch	8W-41-2
Fuse 18 (JB)	8W-41-2	Power Distribution Center	8W-41-3
Fuse F (PDC)	8W-41-3	Power Outlet	8W-41-3
Fuse Y (PDC)	8W-41-3	Right Horn	8W-41-2
G103	8W-41-3	Right Horn Switch	8W-41-2
G106	8W-41-2		

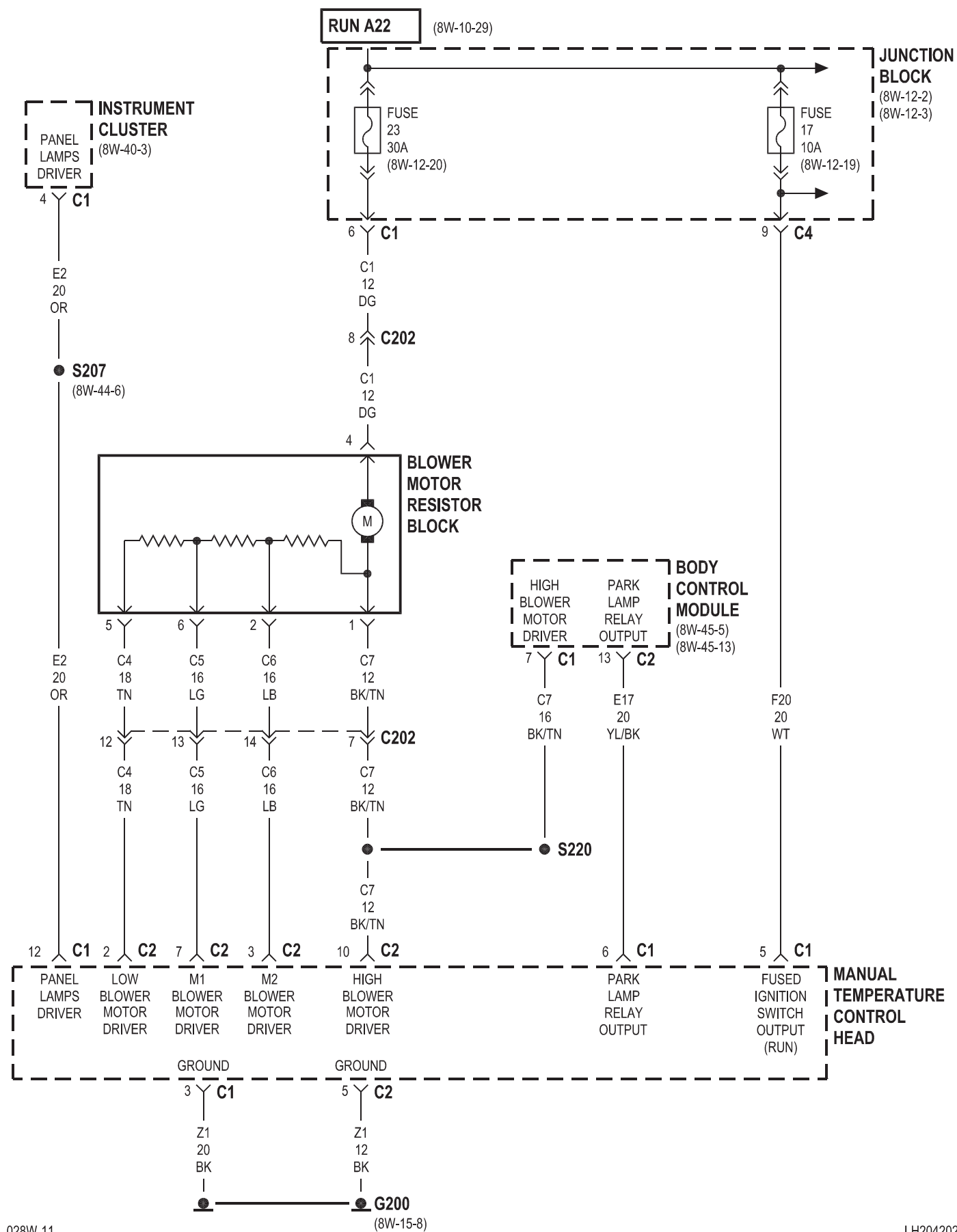


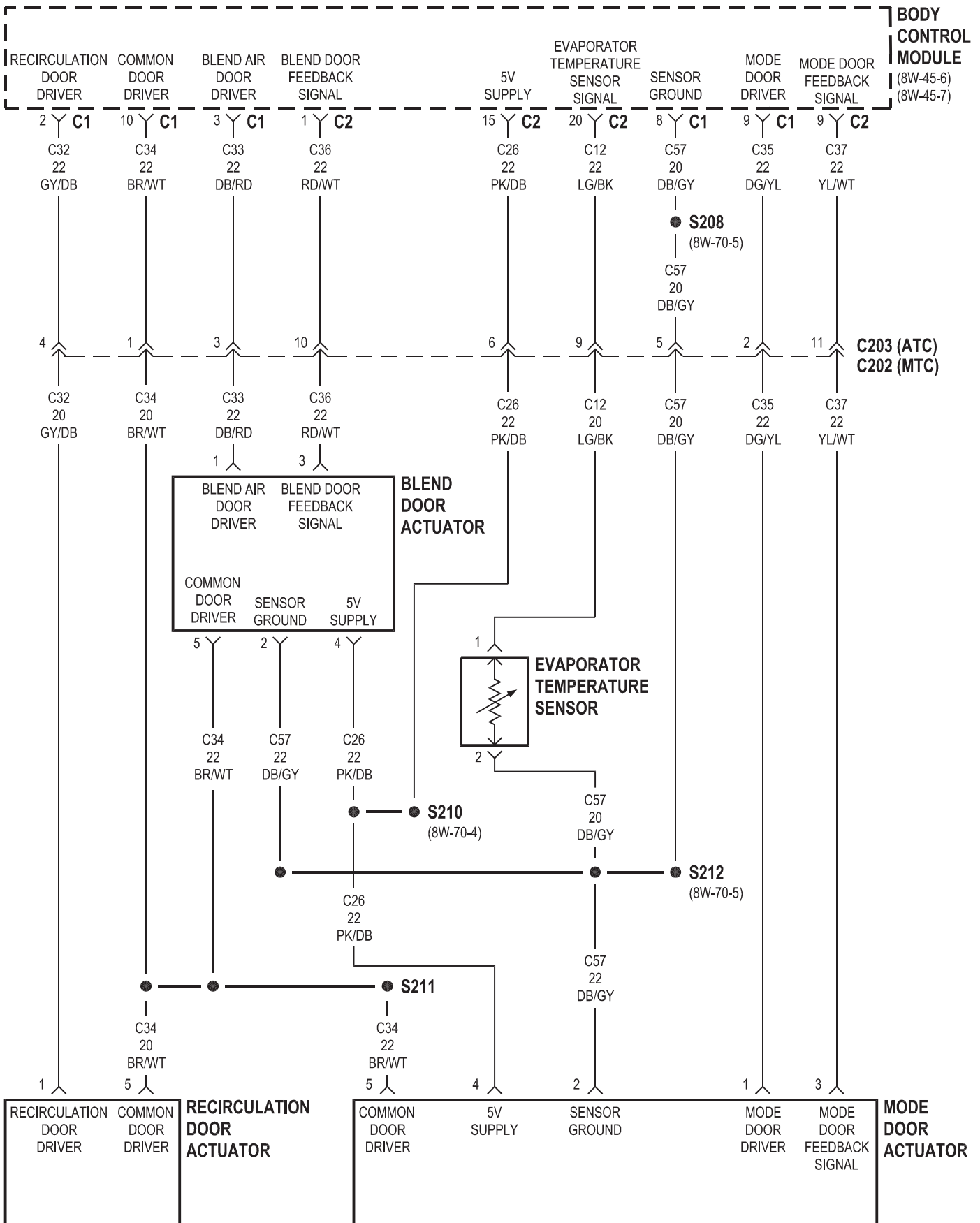


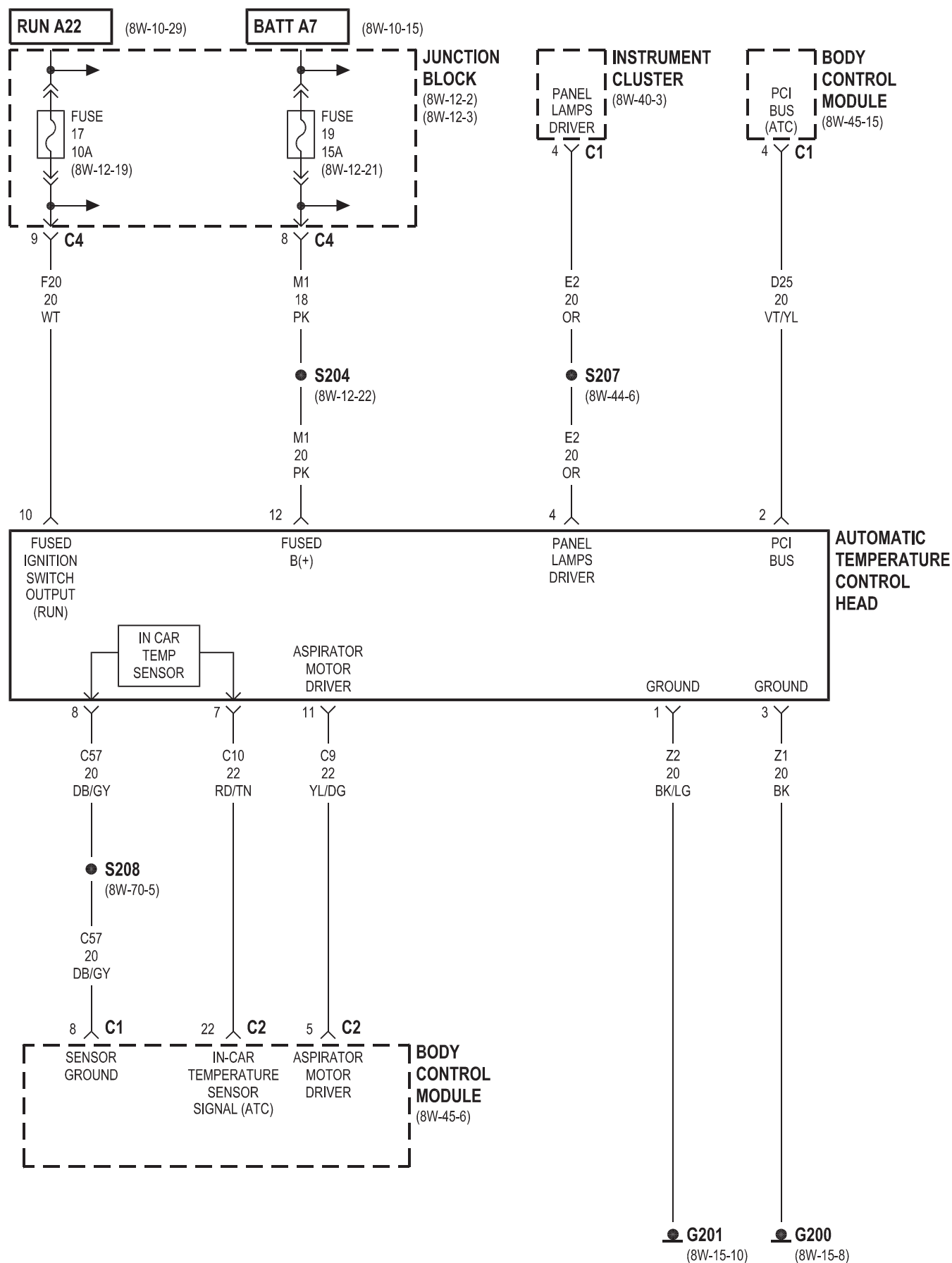
8W-42 AIR CONDITIONING-HEATER

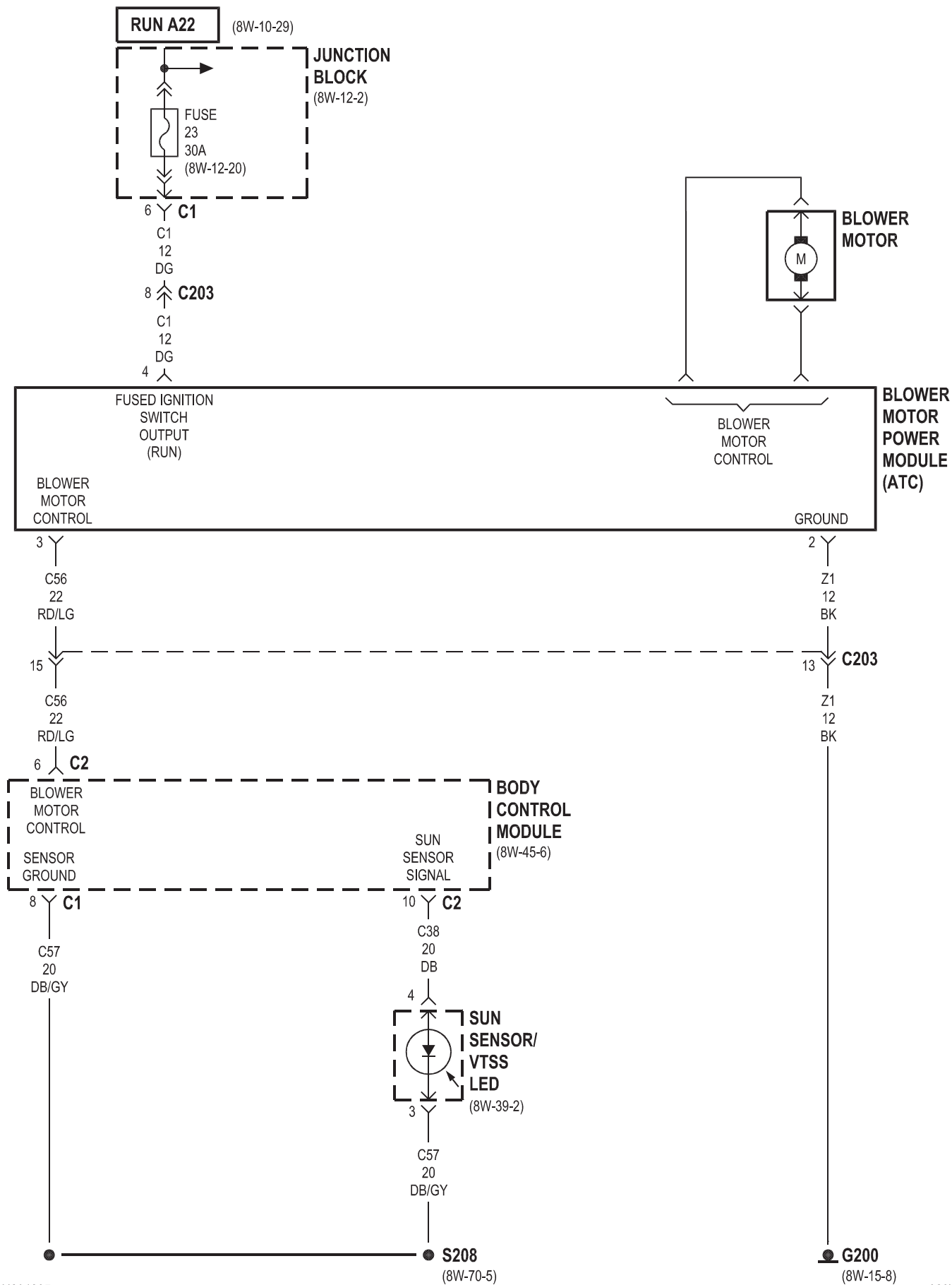
Component	Page
A/C Compressor Clutch	8W-42-6
A/C Compressor Clutch Relay	8W-42-6
A/C Pressure Transducer	8W-42-6
Ambient Temperature Sensor	8W-42-6
Automatic Temperature Control Head	8W-42-4
Blend Door Actuator	8W-42-3
Blower Motor	8W-42-5
Blower Motor Power Module	8W-42-5
Blower Motor Resistor Block	8W-42-2
Body Control Module	8W-42-2, 3, 4, 5, 9
Evaporator Temperature Sensor	8W-42-3
Fuse 17 (JB)	8W-42-2, 4
Fuse 19 (JB)	8W-42-4
Fuse 21 (JB)	8W-42-6, 7
Fuse 23 (JB)	8W-42-2, 5
Fuse B (PDC)	8W-42-6, 7
Fuse E (PDC)	8W-42-7
G101	8W-42-6

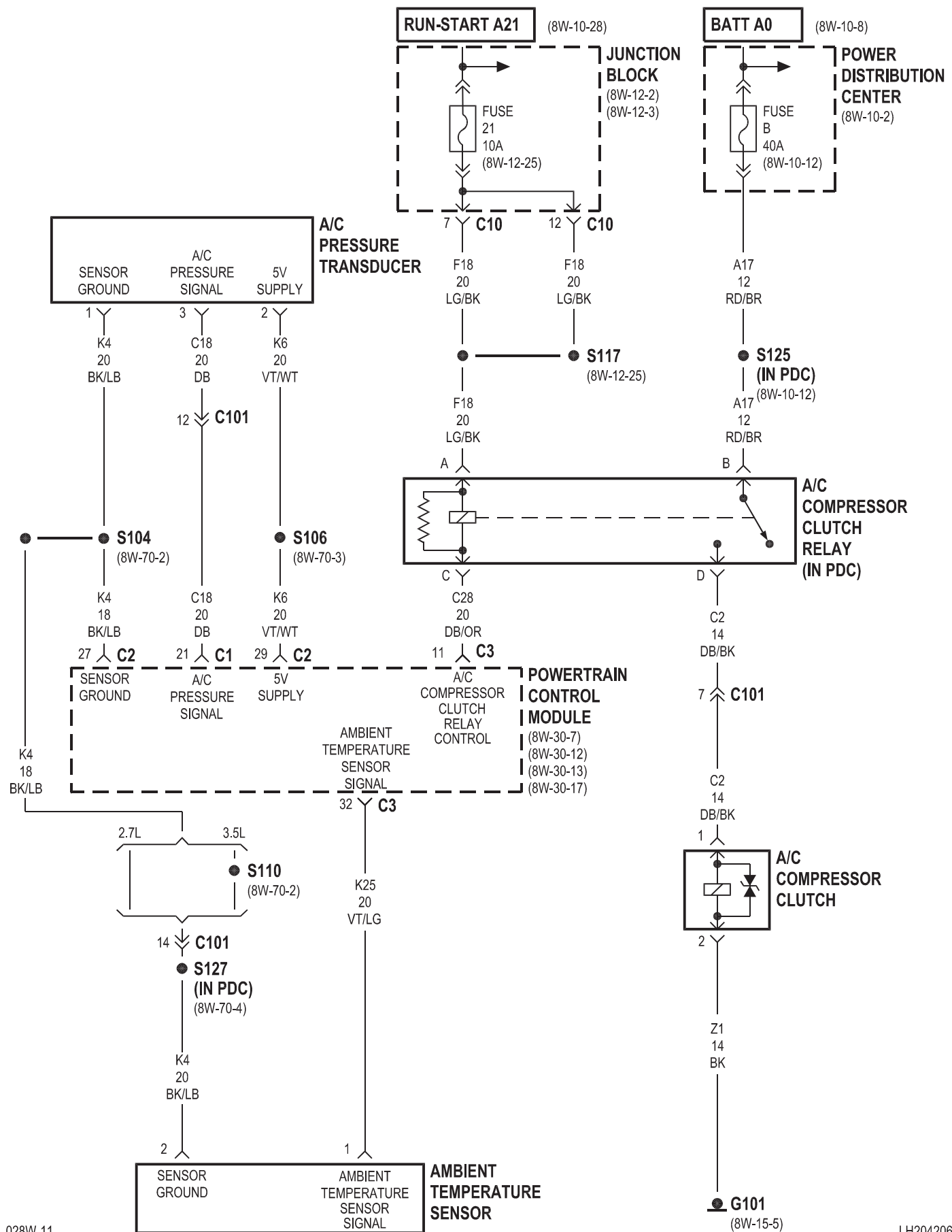
Component	Page
G105	8W-42-7, 8
G200	8W-42-2, 4, 5
G201	8W-42-4
High Speed Radiator Fan Relay	8W-42-7, 8
Instrument Cluster	8W-42-2, 4
Low Speed Radiator Fan Relay	8W-42-7, 8
Manual Temperature Control Head	8W-42-2, 9
Mode Door Actuator	8W-42-3
Powertrain Control Module	8W-42-6, 7
Radiator Fan	8W-42-7
Radiator Fan Motor No. 1	8W-42-8
Radiator Fan Motor No. 2	8W-42-8
Radiator Fan Relay No. 1	8W-42-8
Radiator Fan Relay No. 2	8W-42-8
Recirculation Door Actuator	8W-42-3
Sun Sensor/VTSS Led	8W-42-5

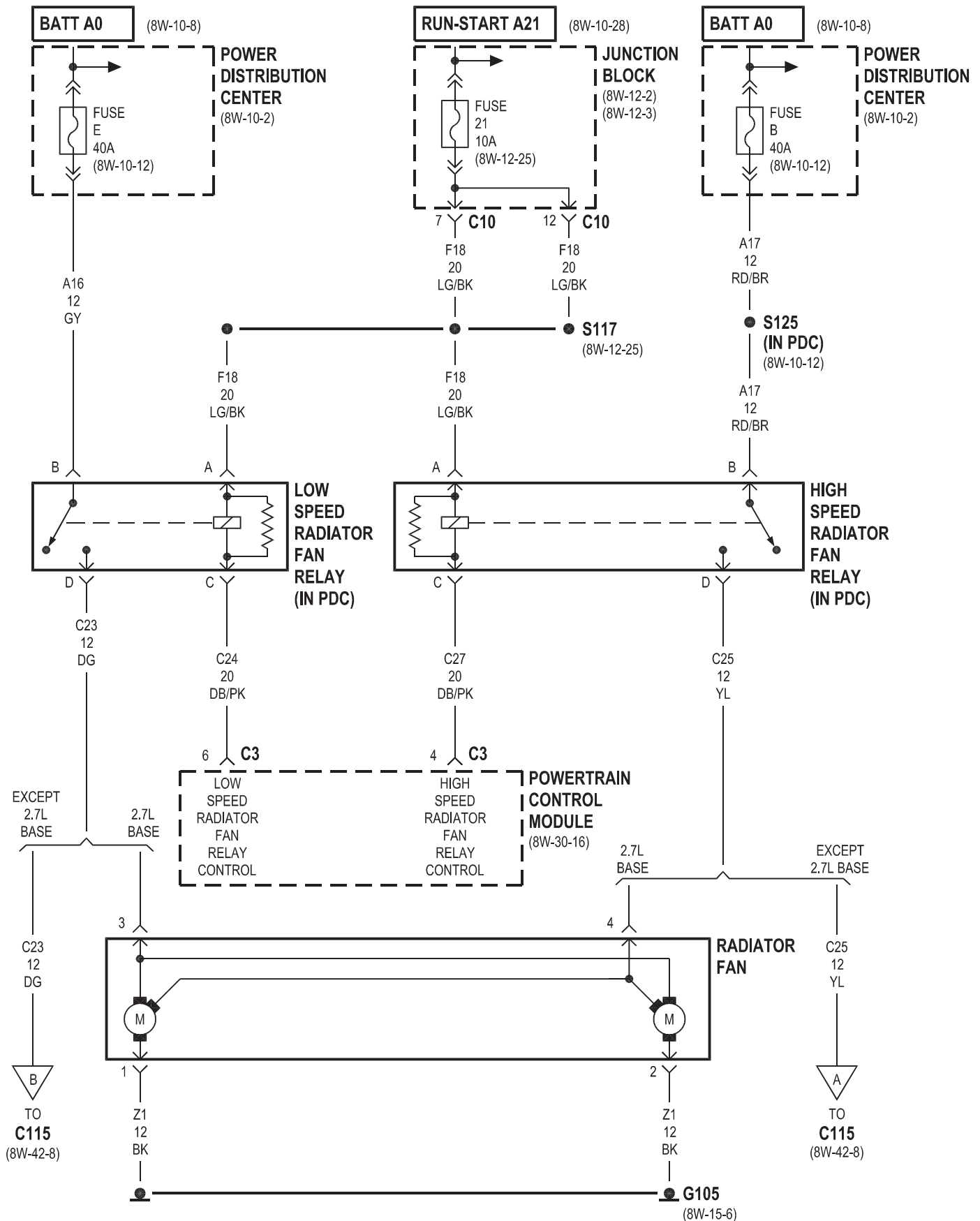


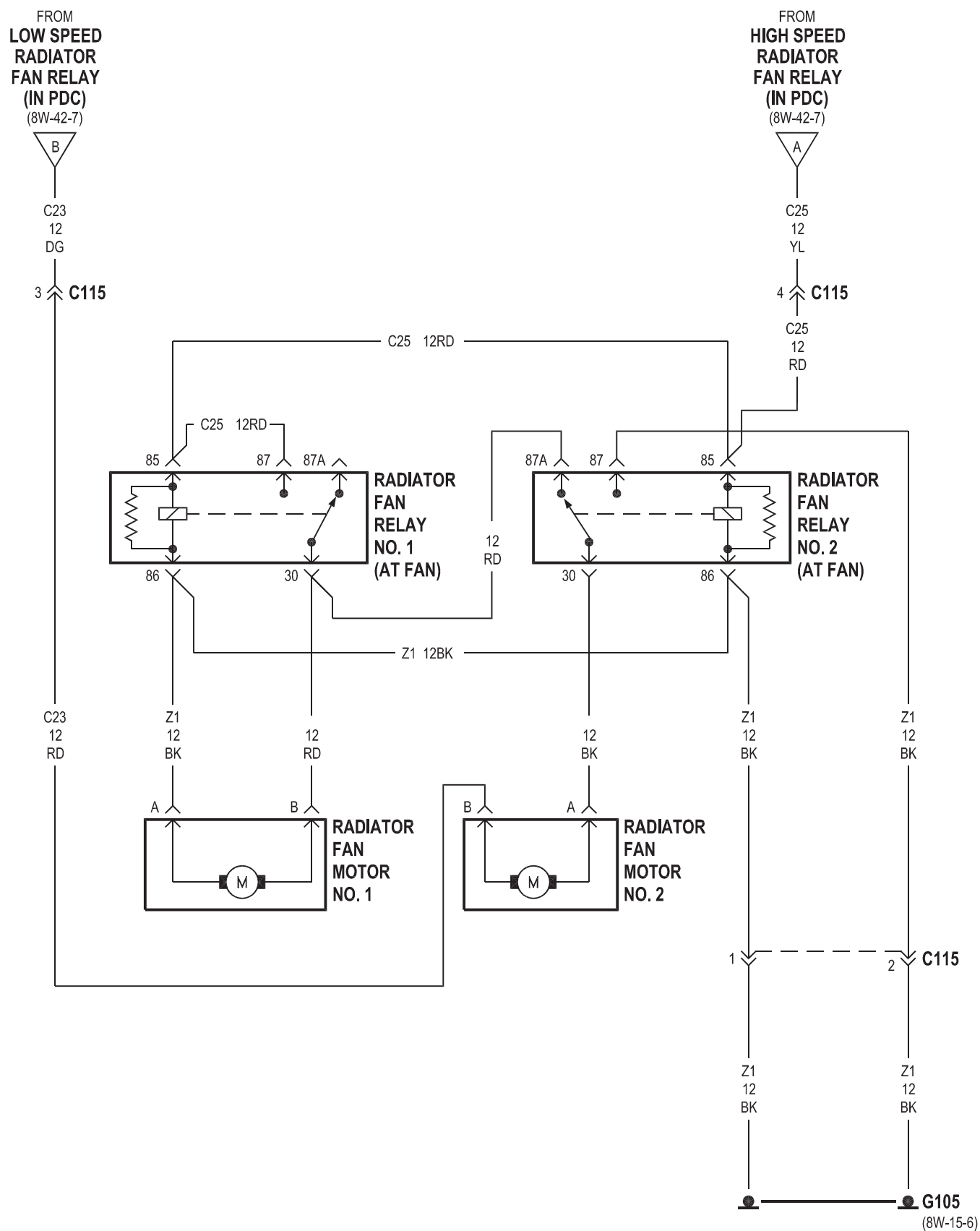


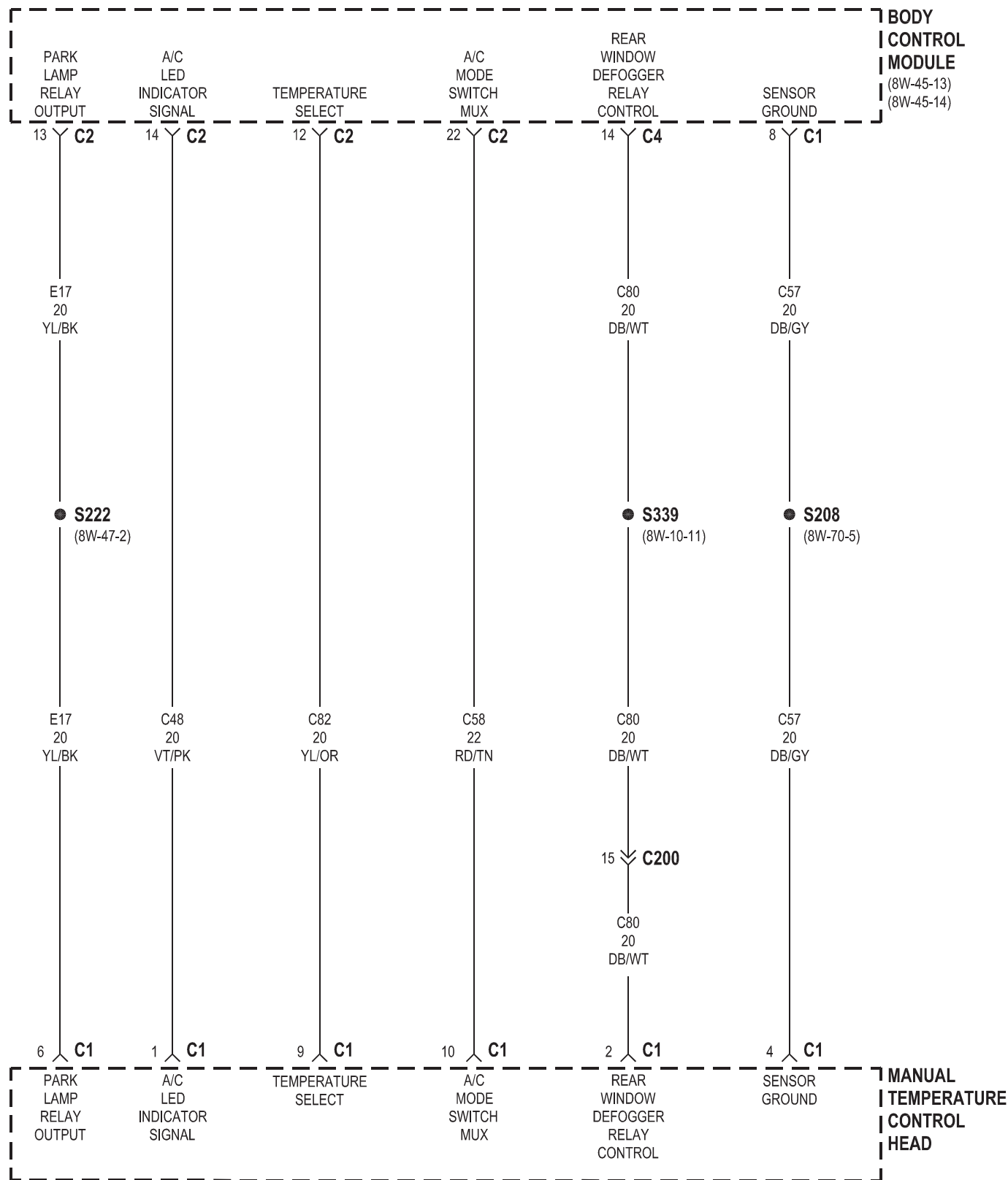








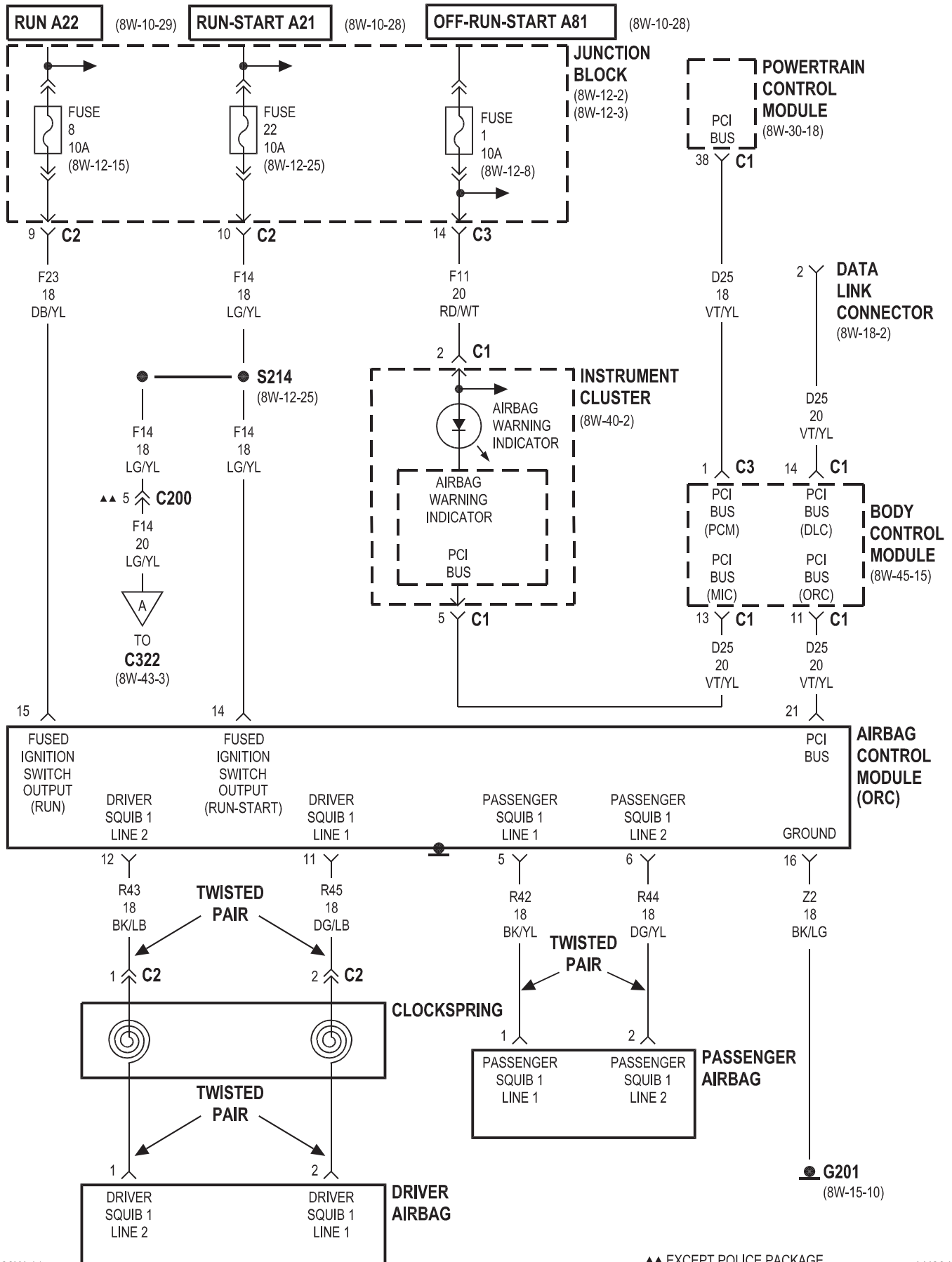


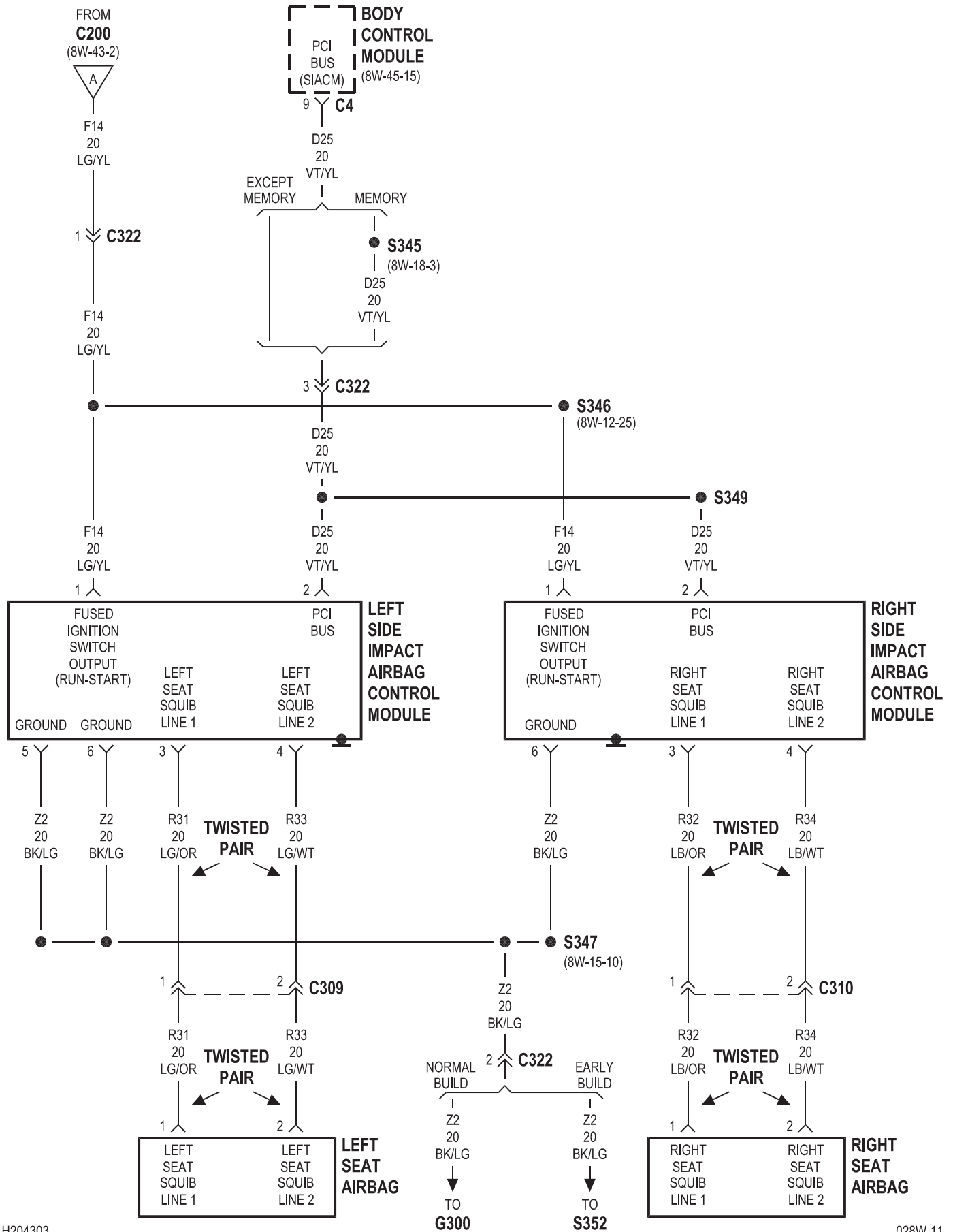


8W-43 OCCUPANT RESTRAINT SYSTEM

Component	Page
Airbag Control Module (ORC)	8W-43-2
Body Control Module	8W-43-2, 3
Clockspring	8W-43-2
Data Link Connector	8W-43-2
Driver Airbag	8W-43-2
Fuse 1 (JB)	8W-43-2
Fuse 8 (JB)	8W-43-2
Fuse 22 (JB)	8W-43-2
G201	8W-43-2
G300	8W-43-3

Component	Page
Instrument Cluster	8W-43-2
Junction Block	8W-43-2
Left Seat Airbag	8W-43-3
Left Side Impact Airbag Control Module . .	8W-43-3
Passenger Airbag	8W-43-2
Powertrain Control Module	8W-43-2
Right Seat Airbag	8W-43-3
Right Side Impact Airbag Control Module	8W-43-3





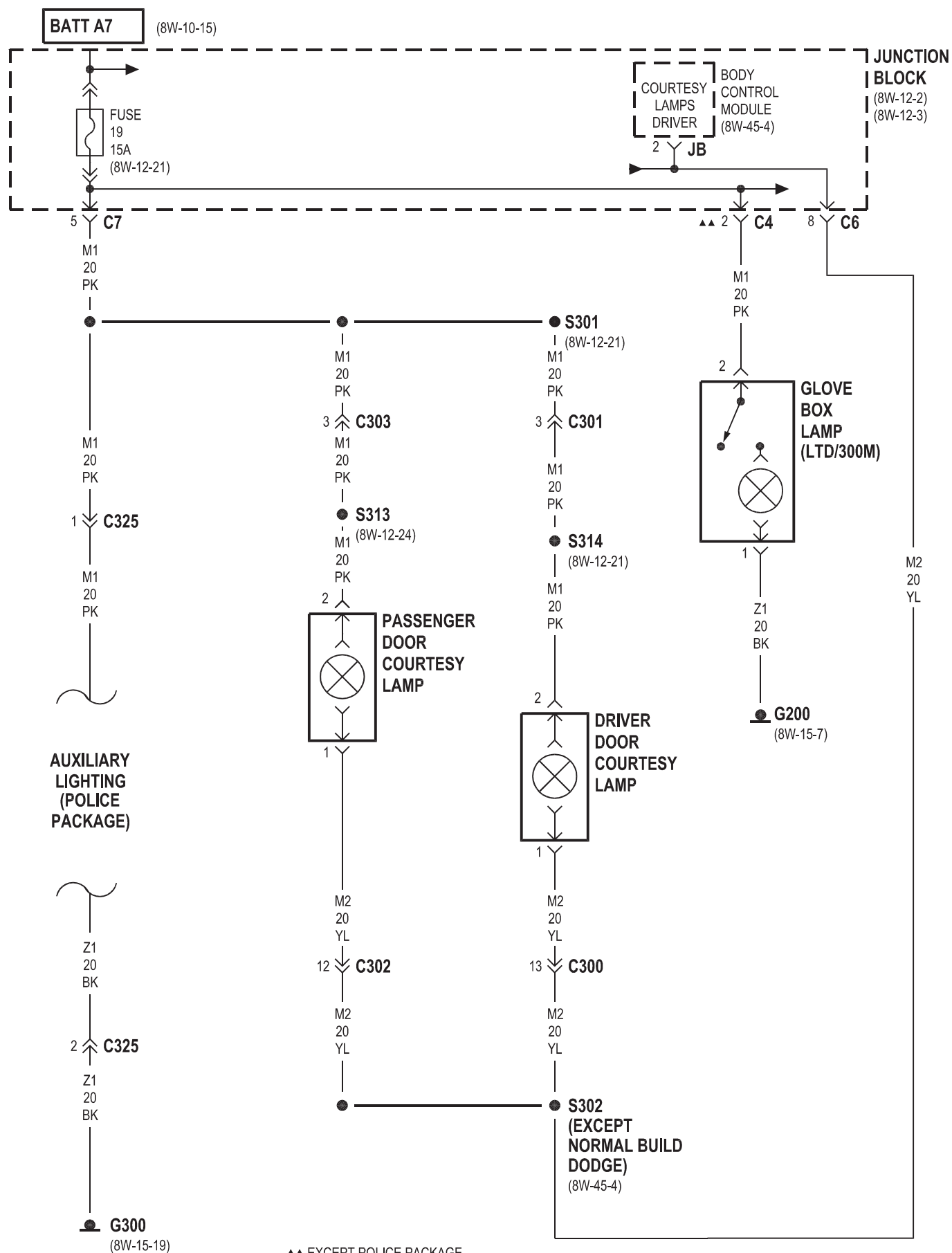
8W-44 INTERIOR LIGHTING

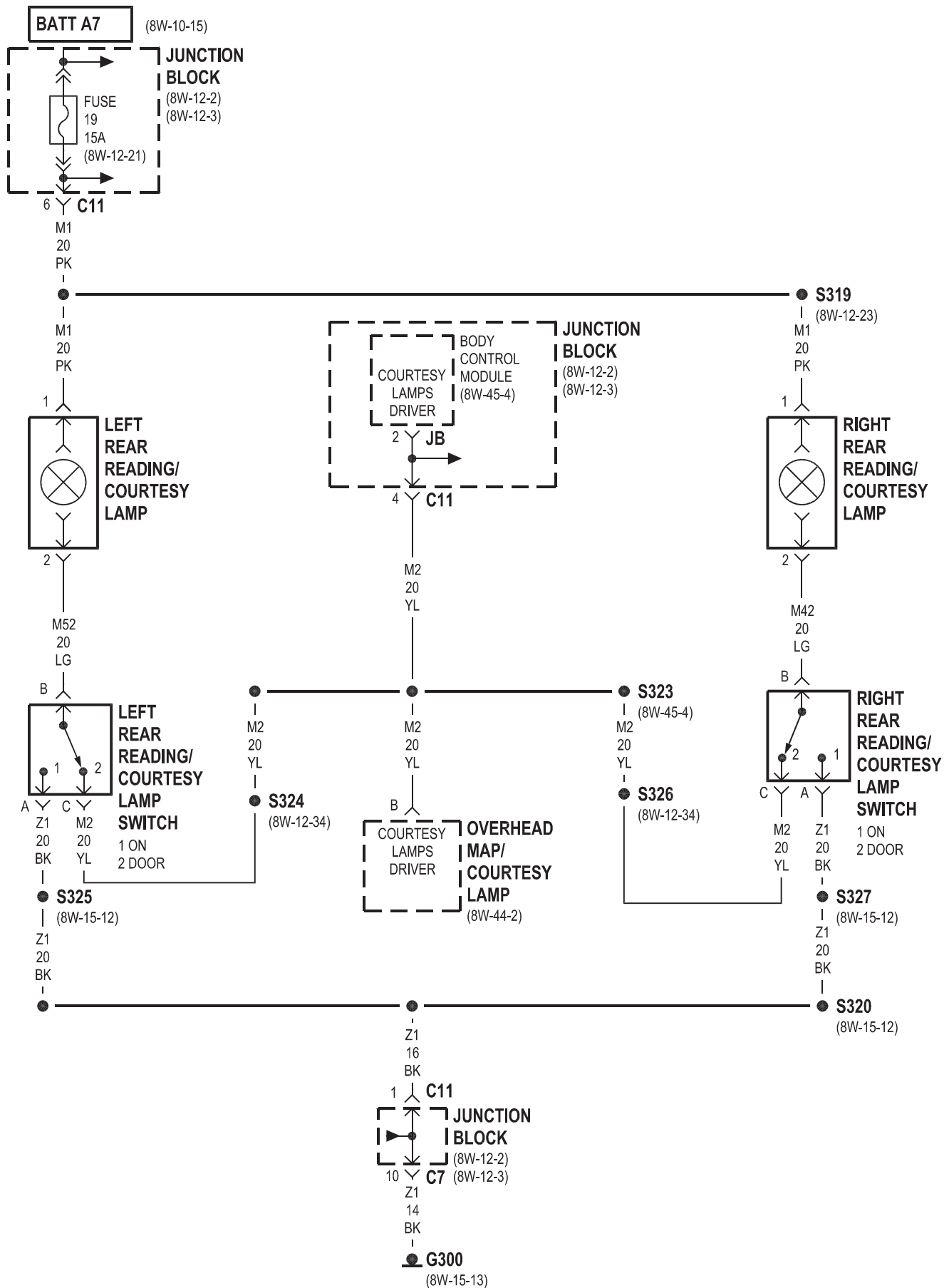
Component	Page
Analog Clock	8W-44-6
Automatic Day/Night Mirror	8W-44-3
Automatic Temperature Control Head	8W-44-6
Body Control Module	8W-44-2, 4, 5, 6
Decklid Release Solenoid/Ajar Switch	8W-44-2
Driver Door Courtesy Lamp	8W-44-4
Driver Power Mirror	8W-44-3
Fuse 14 (JB)	8W-44-3
Fuse 17 (JB)	8W-44-3
Fuse 19 (JB)	8W-44-2, 4, 5
Fuse Y (PDC)	8W-44-7
G103	8W-44-7
G104	8W-44-7
G200	8W-44-4, 6
G201	8W-44-3
G300	8W-44-2, 4, 5
G400	8W-44-2
Glove Box Lamp	8W-44-4
Headlamp Switch	8W-44-6
Instrument Cluster	8W-44-2, 6

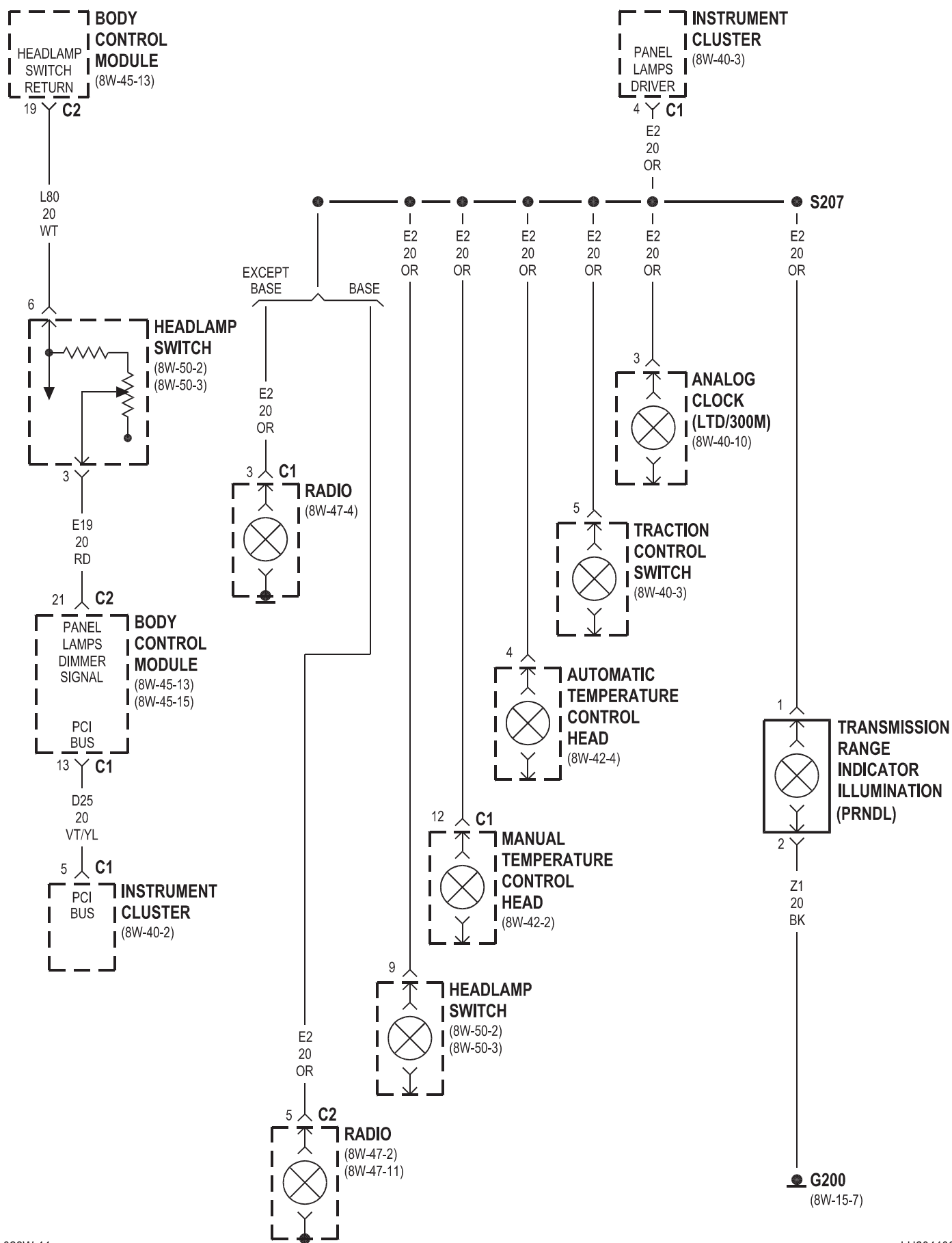
Component	Page
Left Rear Reading/Courtesy Lamp	8W-44-5
Left Rear Reading/Courtesy Lamp Switch	8W-44-5
Left Visor/Vanity Lamp	8W-44-2
Manual Temperature Control Head	8W-44-6
Overhead Map/Courtesy Lamp	8W-44-2, 5
Overhead Travel Information System . . .	8W-44-2, 3
Passenger Door Courtesy Lamp	8W-44-4
Radio	8W-44-6
Right Rear Reading/Courtesy Lamp	8W-44-5
Right Rear Reading/Courtesy Lamp Switch	8W-44-5
Right Visor/Vanity Lamp	8W-44-2
Traction Control Switch	8W-44-6
Transmission Range Indicator Illumination	8W-44-6
Transmission Range Sensor	8W-44-3
Trunk Lamp	8W-44-2
Underhood Lamp	8W-44-7

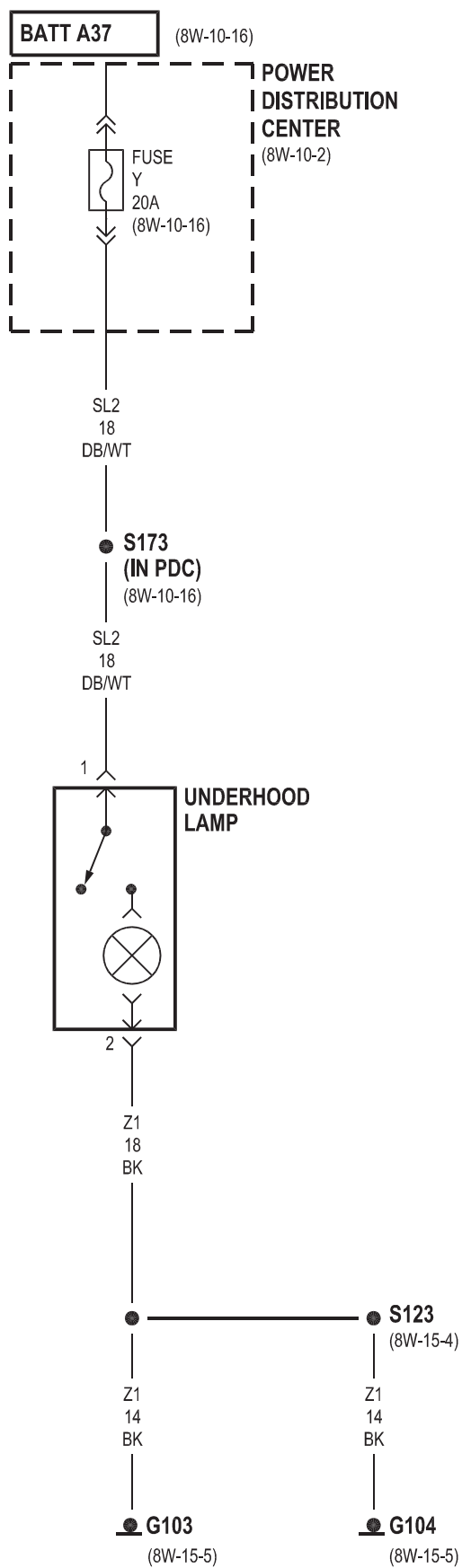








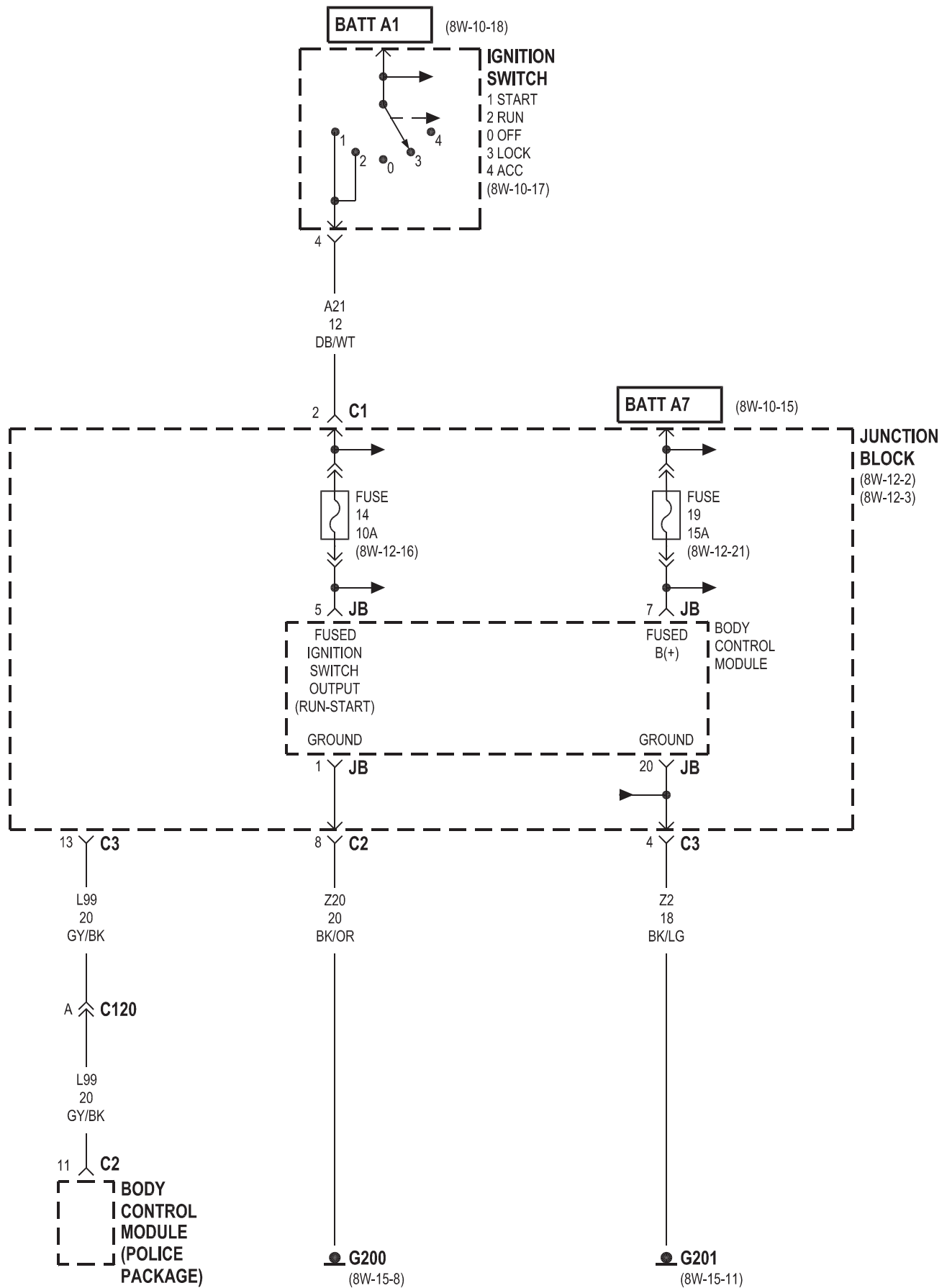


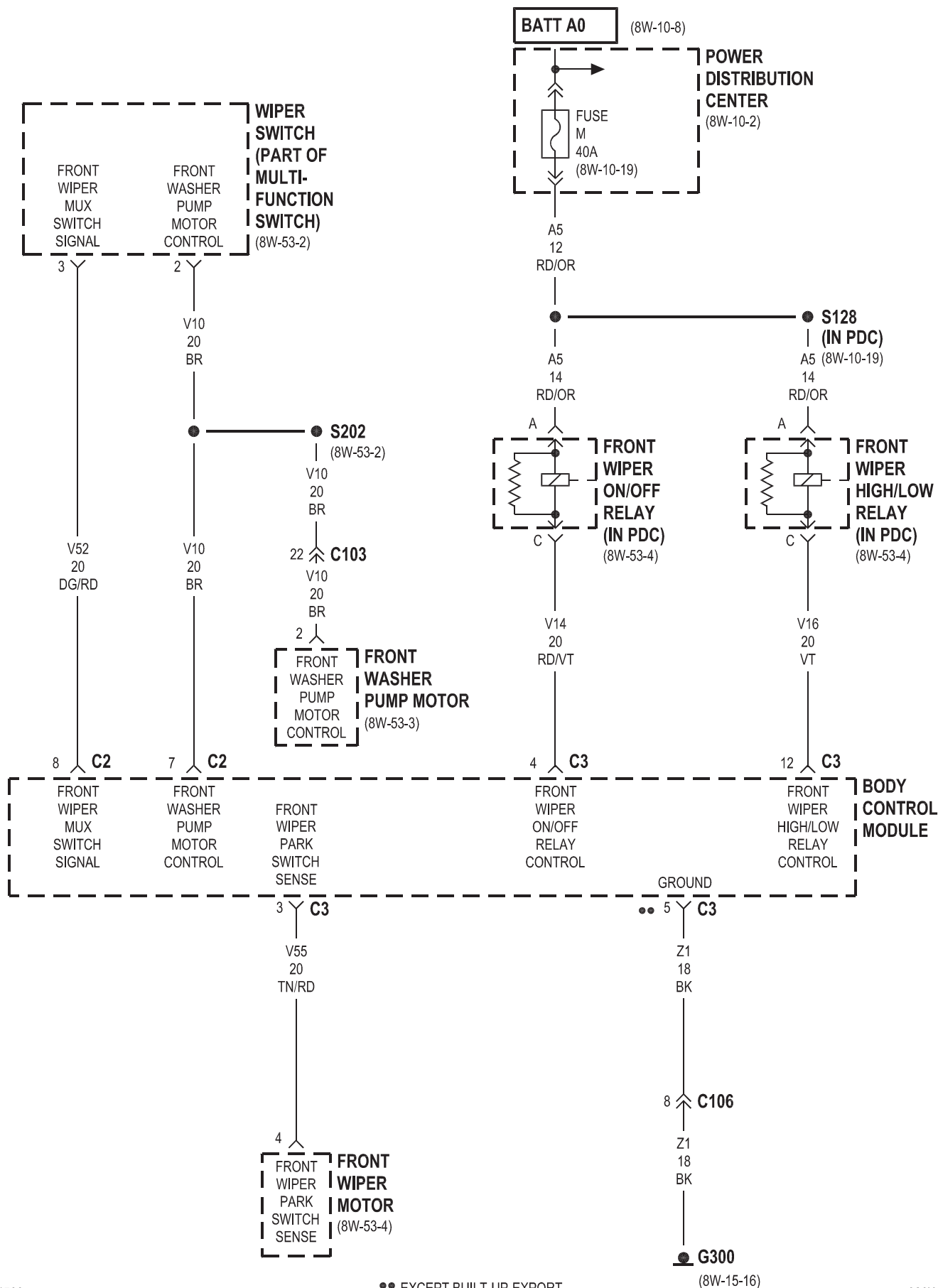


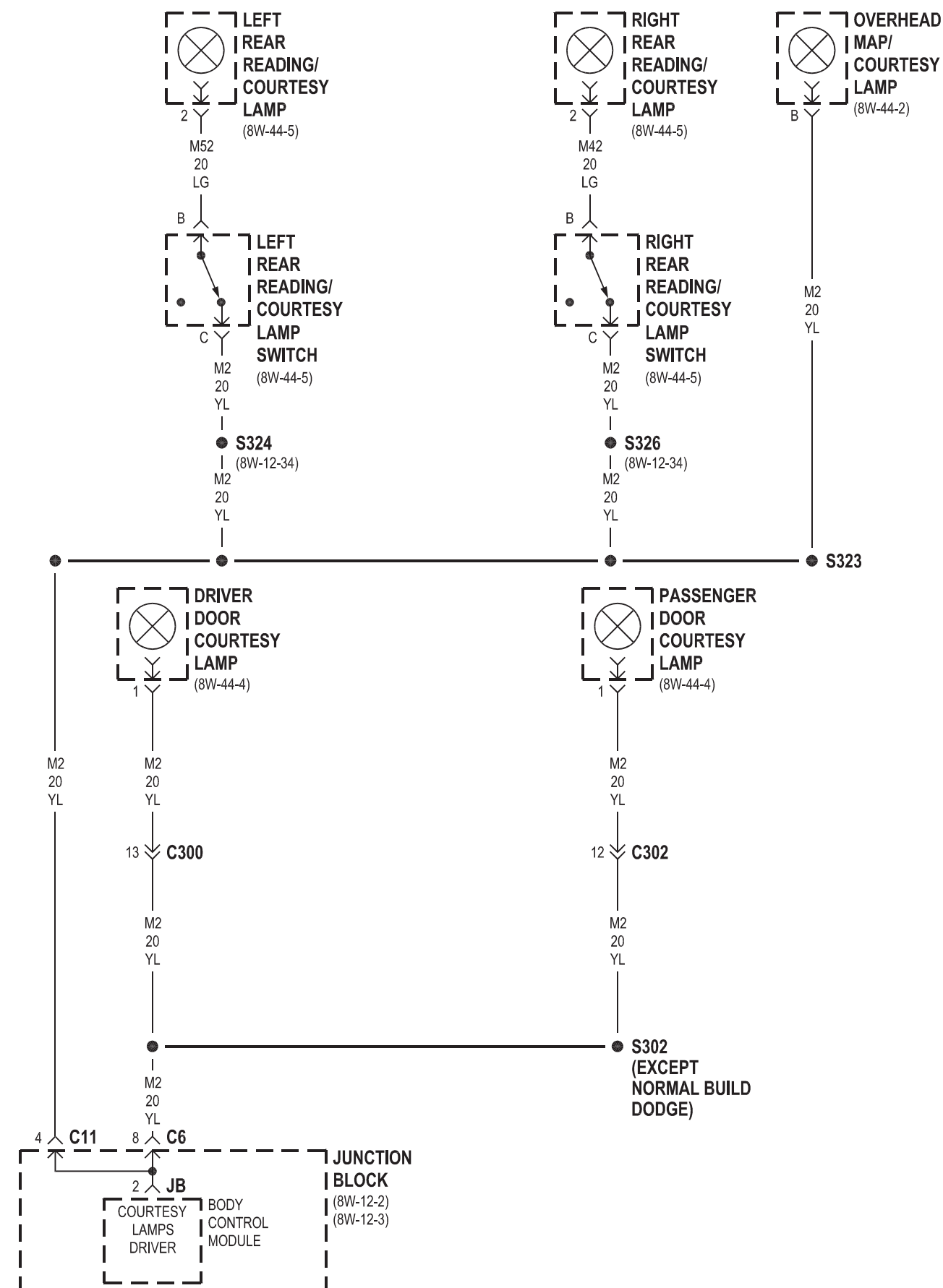
8W-45 BODY CONTROL MODULE

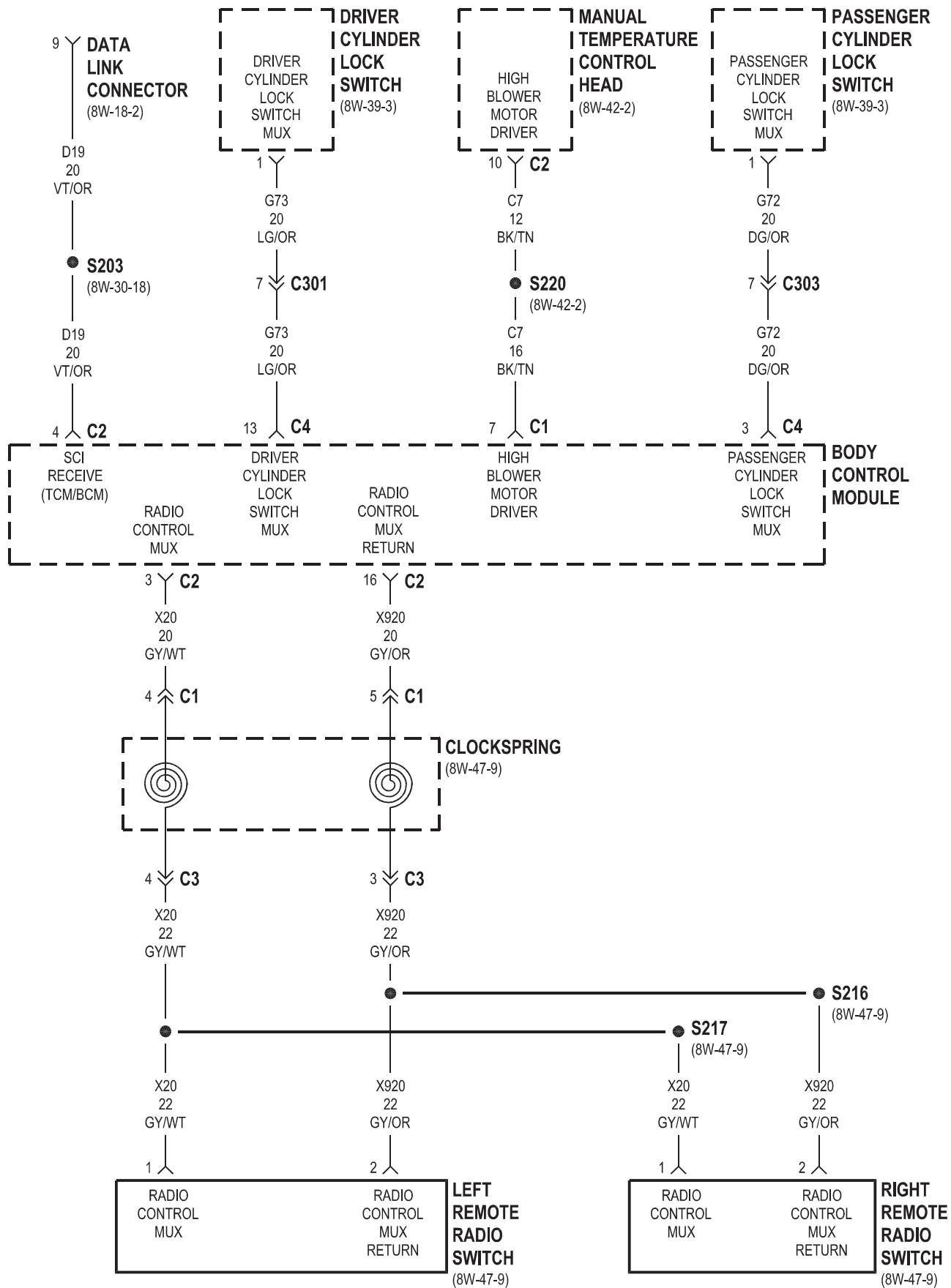
Component	Page
Airbag Control Module (ORC)	8W-45-15
Automatic Temperature Control Head	8W-45-6, 15
Blend Door Actuator	8W-45-8
Blower Motor Power Module	8W-45-6
Body Control Module	8W-45-2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15
Clockspring	8W-45-5, 11
Controller Antilock Brake	8W-45-15
Data Link Connector	8W-45-5, 15
Decklid Release Solenoid/Ajar Switch	8W-45-11
Decklid Release Switch	8W-45-13
Door Lock Relay	8W-45-11
Door Unlock Relay	8W-45-11
Driver Cylinder Lock Switch	8W-45-5
Driver Door Courtesy Lamp	8W-45-4
Driver Door Lock Motor/Ajar Switch	8W-45-10
Driver Power Door Lock Switch	8W-45-9
Evaporator Temperature Sensor	8W-45-6
Fog Lamp Relay	8W-45-12
Front Washer Pump Motor	8W-45-3
Front Wiper High/Low Relay	8W-45-3
Front Wiper Motor	8W-45-3
Front Wiper On/Off Relay	8W-45-3
Fuel Pump Module	8W-45-10
Fuse 5 (JB)	8W-45-13
Fuse 7 (JB)	8W-45-11
Fuse 14 (JB)	8W-45-2
Fuse 16 (JB)	8W-45-12
Fuse 18 (JB)	8W-45-11
Fuse 19 (JB)	8W-45-2, 13
Fuse M (PDC)	8W-45-3
G200	8W-45-2
G201	8W-45-2
G300	8W-45-3
G400	8W-45-11
Headlamp Switch	8W-45-9, 13
Headlamp Washer Relay	8W-45-6
Horn Relay	8W-45-11
Ignition Switch	8W-45-2, 9
Instrument Cluster	8W-45-15
Junction Block	8W-45-2, 4, 11, 12, 13
Left Horn Switch	8W-45-11

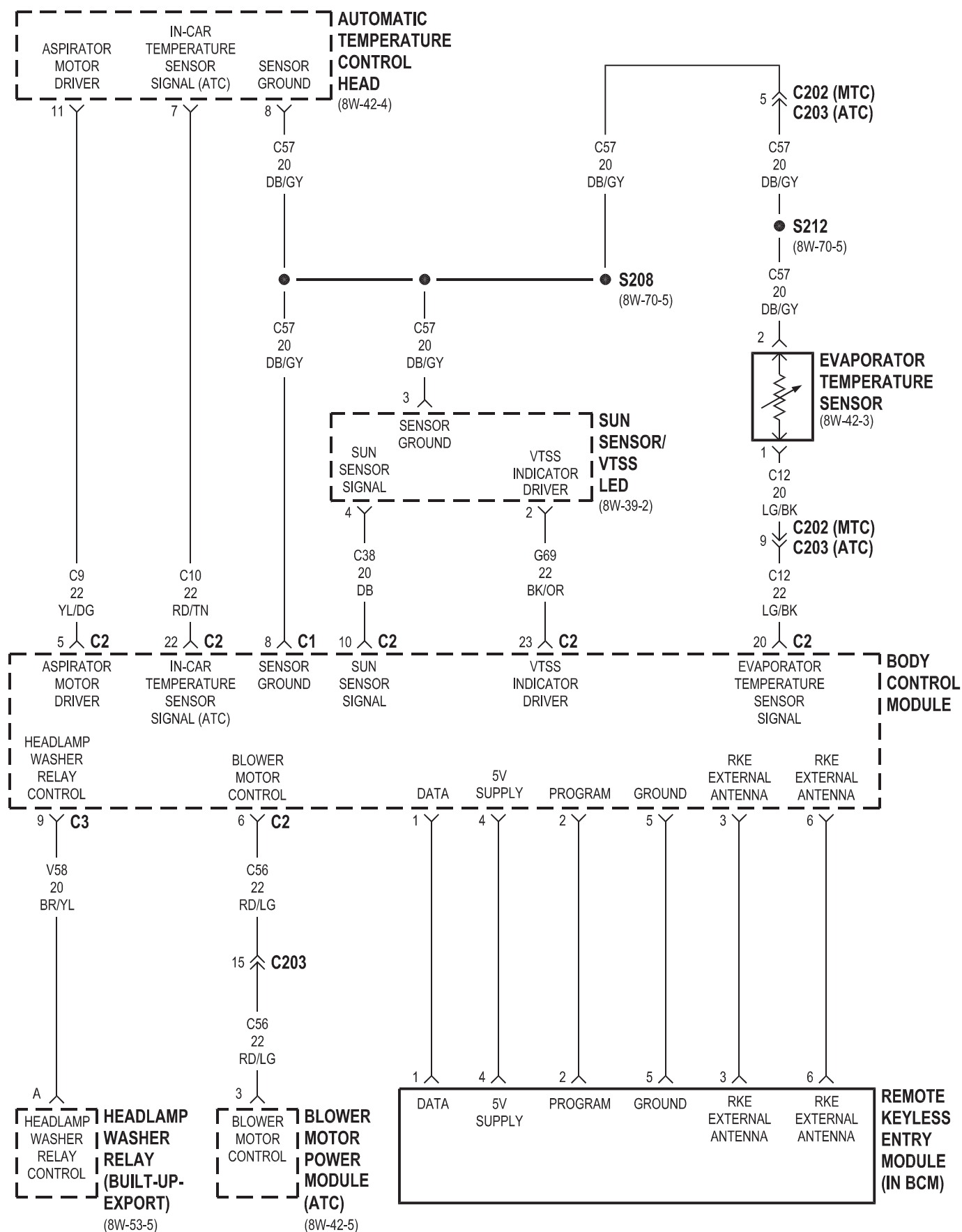
Component	Page
Left Rear Door Lock Motor/Ajar Switch	8W-45-10
Left Rear Reading/Courtesy Lamp	8W-45-4
Left Rear Reading/Courtesy Lamp Switch	8W-45-4
Left Remote Radio Switch	8W-45-5
Left Side Impact Airbag Control Module	8W-45-15
Low Beam Headlamp Relay	8W-45-12
Manual Temperature Control Head	8W-45-5, 14
Memory Heated Seat/Mirror Module	8W-45-15
Mode Door Actuator	8W-45-7
Overhead Map/Courtesy Lamp	8W-45-4
Overhead Travel Information System	8W-45-12
Park Lamp Relay	8W-45-11
Passenger Cylinder Lock Switch	8W-45-5
Passenger Door Courtesy Lamp	8W-45-4
Passenger Door Lock Motor/Ajar Switch	8W-45-10
Passenger Power Door Lock Switch	8W-45-9
Powertrain Control Module	8W-45-15
Radio	8W-45-13, 15
Rear Window Defogger Relay	8W-45-14
Recirculation Door Actuator	8W-45-8
Remote Keyless Entry Antenna	8W-45-10
Remote Keyless Entry Module	8W-45-6
Right Horn Switch	8W-45-11
Right Rear Door Lock Motor/Ajar Switch	8W-45-10
Right Rear Reading/Courtesy Lamp	8W-45-4
Right Rear Reading/Courtesy Lamp Switch	8W-45-4
Right Remote Radio Switch	8W-45-5
Right Side Impact Airbag Control Module	8W-45-15
Seat Belt Switch	8W-45-9
Sentry Key Immobilizer Module	8W-45-15
Spare Relay	8W-45-12
Speed Proportional Steering Solenoid	8W-45-12
Sun Sensor/VTSS Led	8W-45-6
Trunk Knock Out Switch	8W-45-9
Wiper Switch	8W-45-3

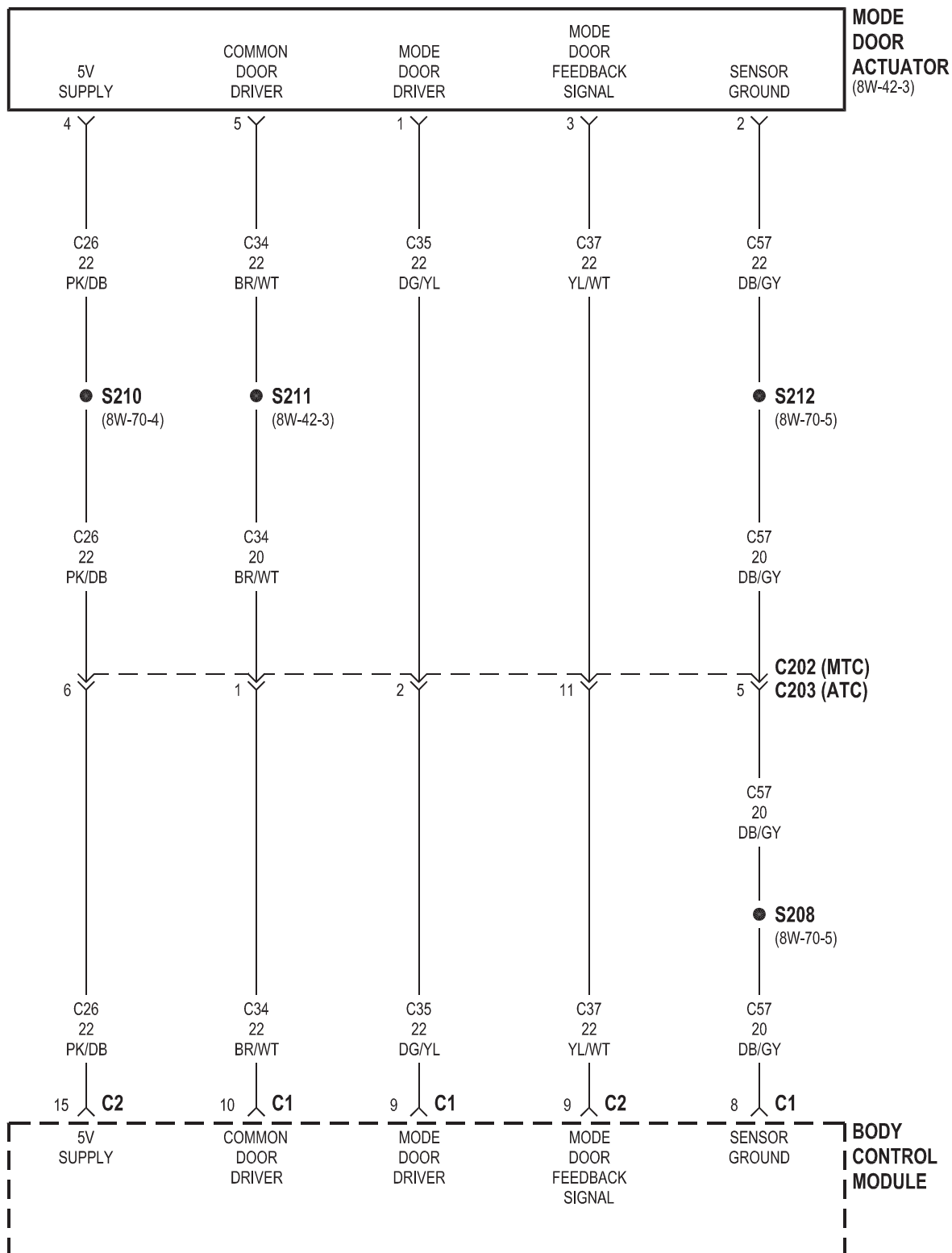


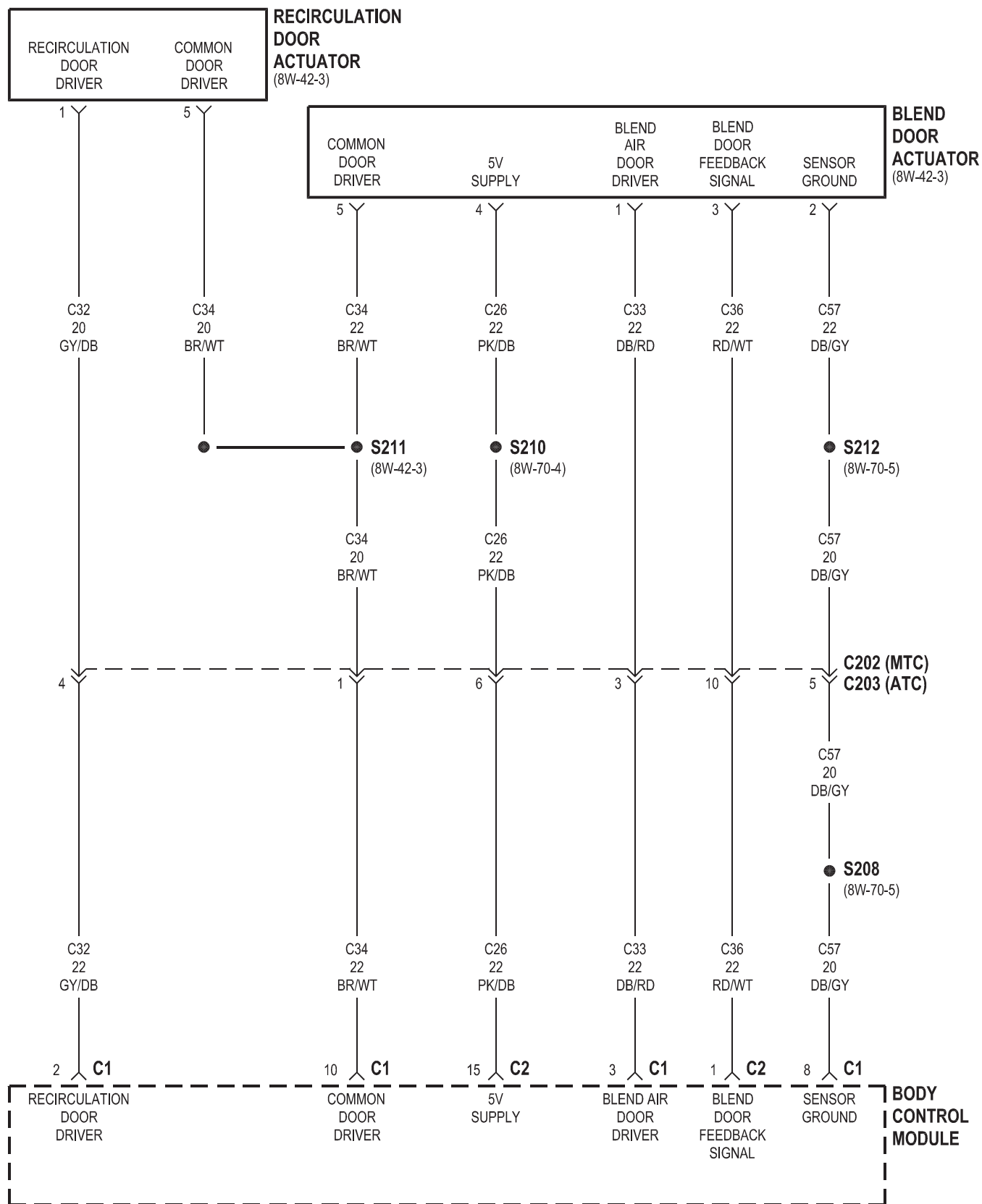


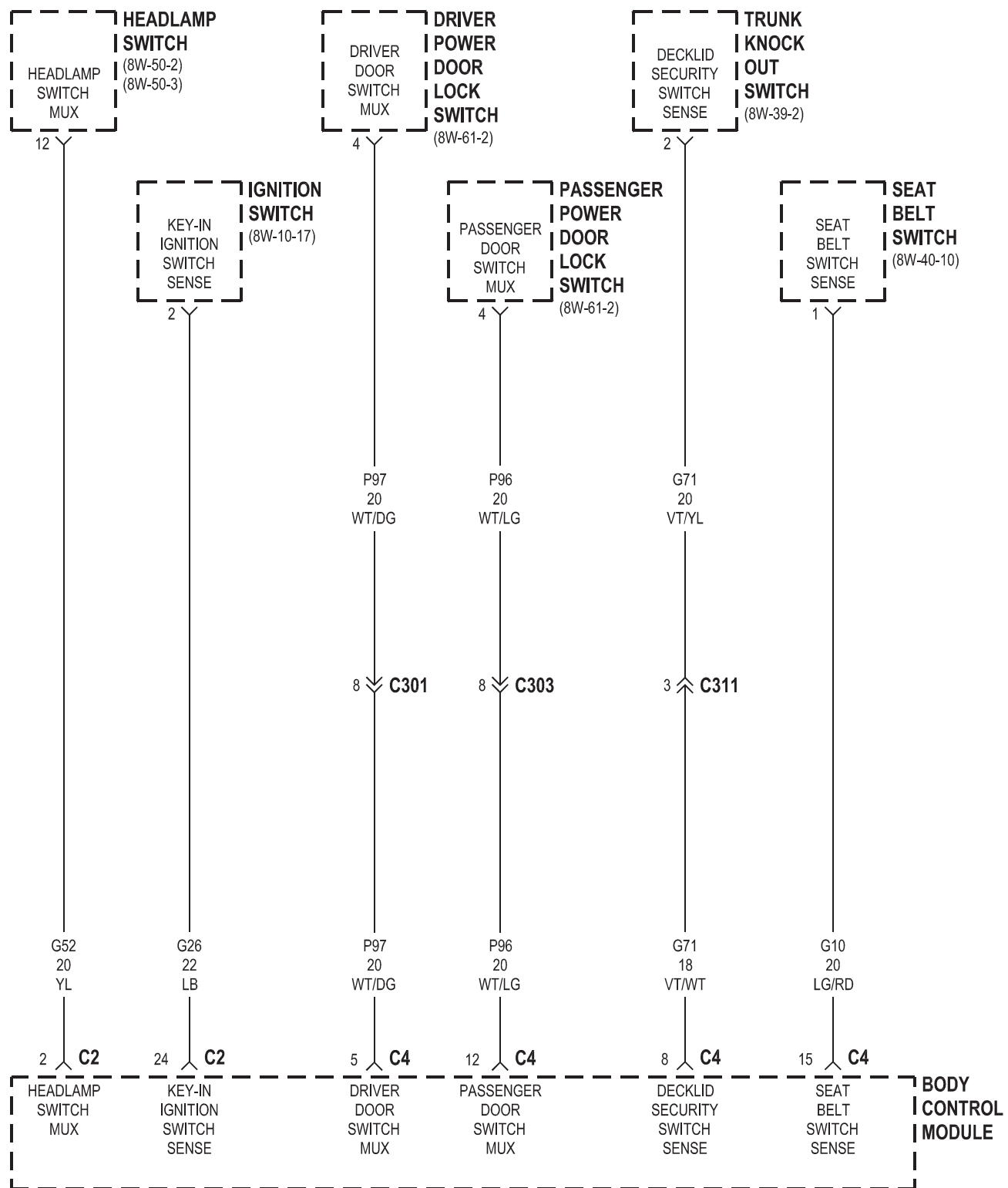


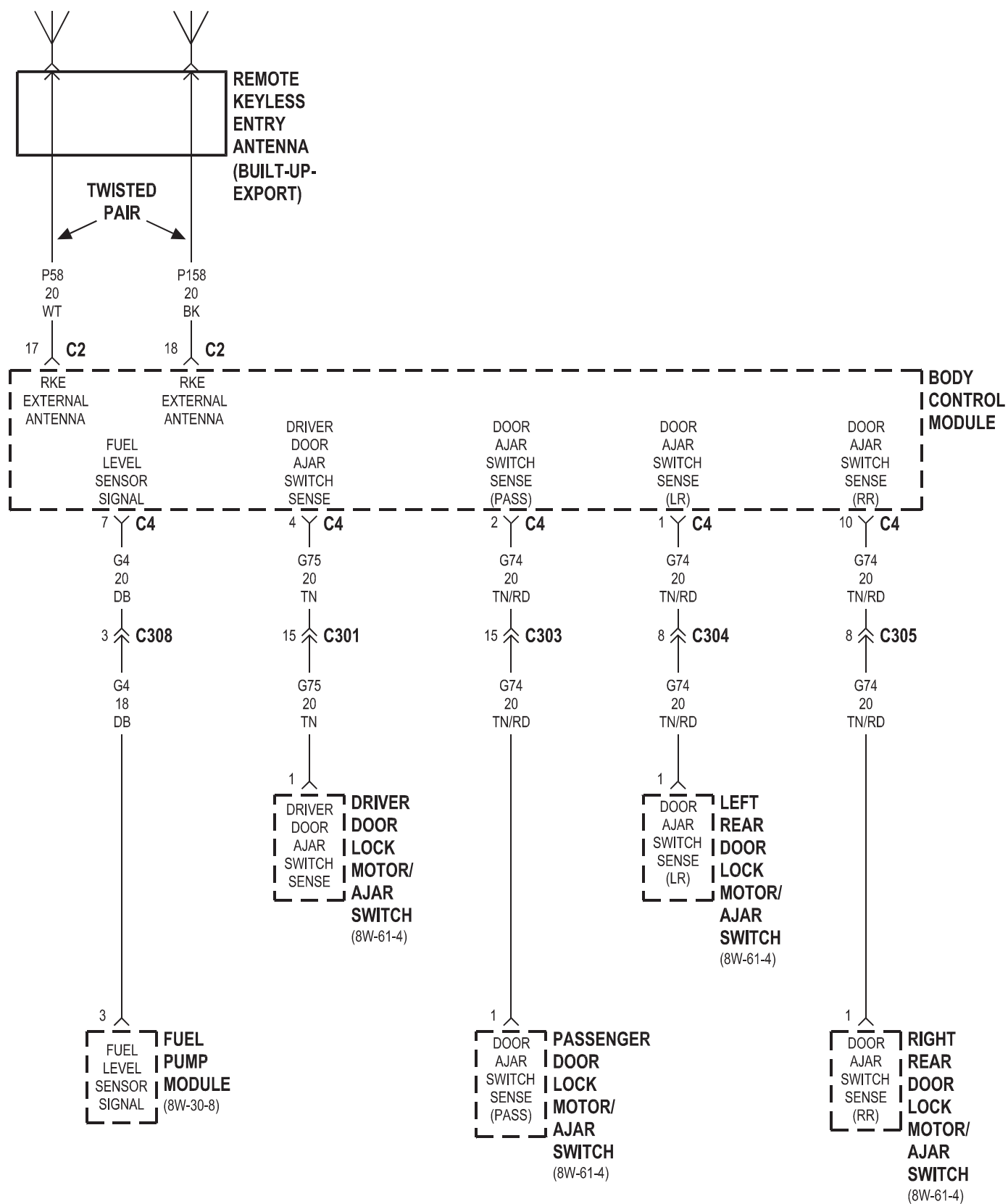


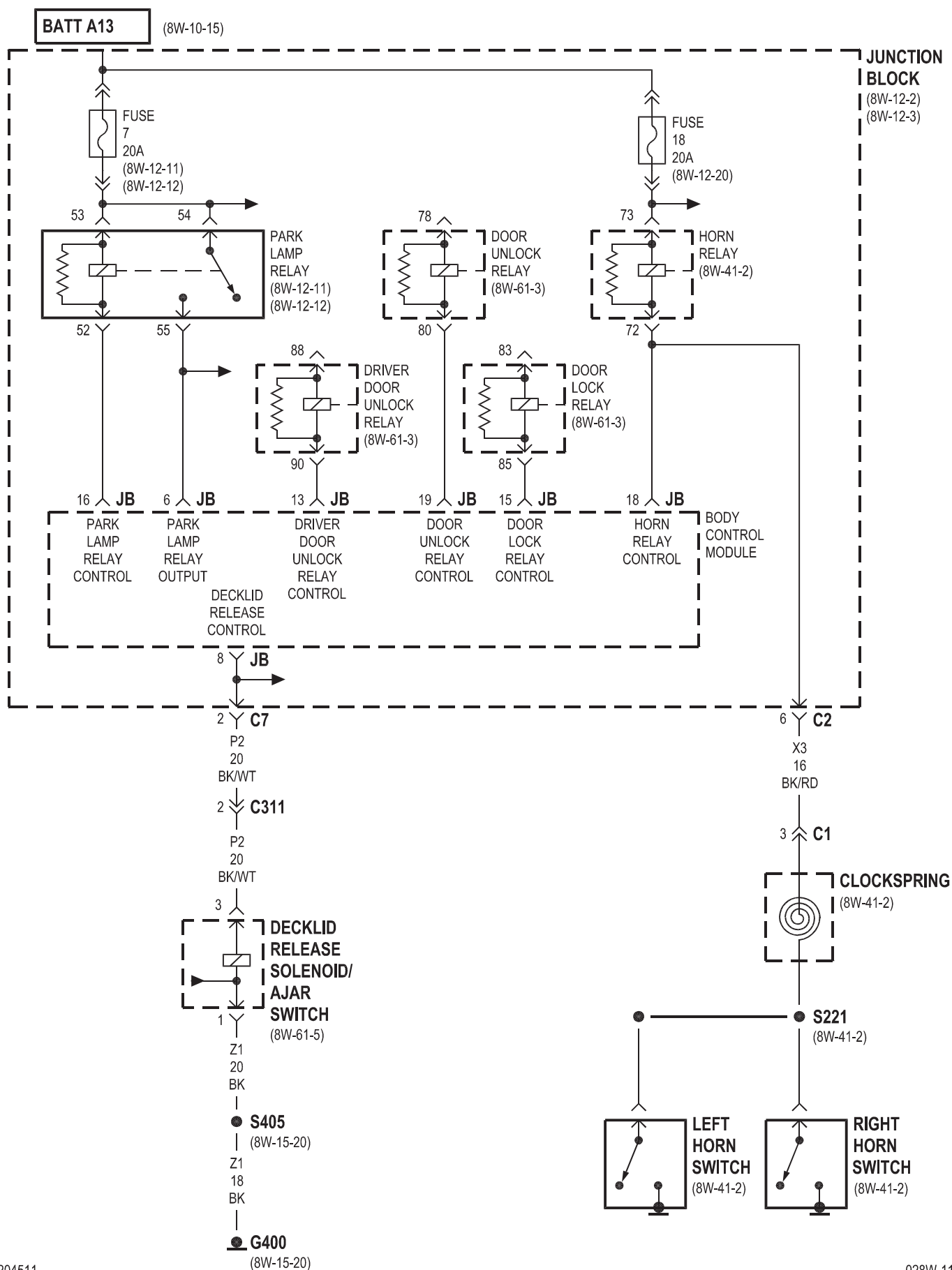


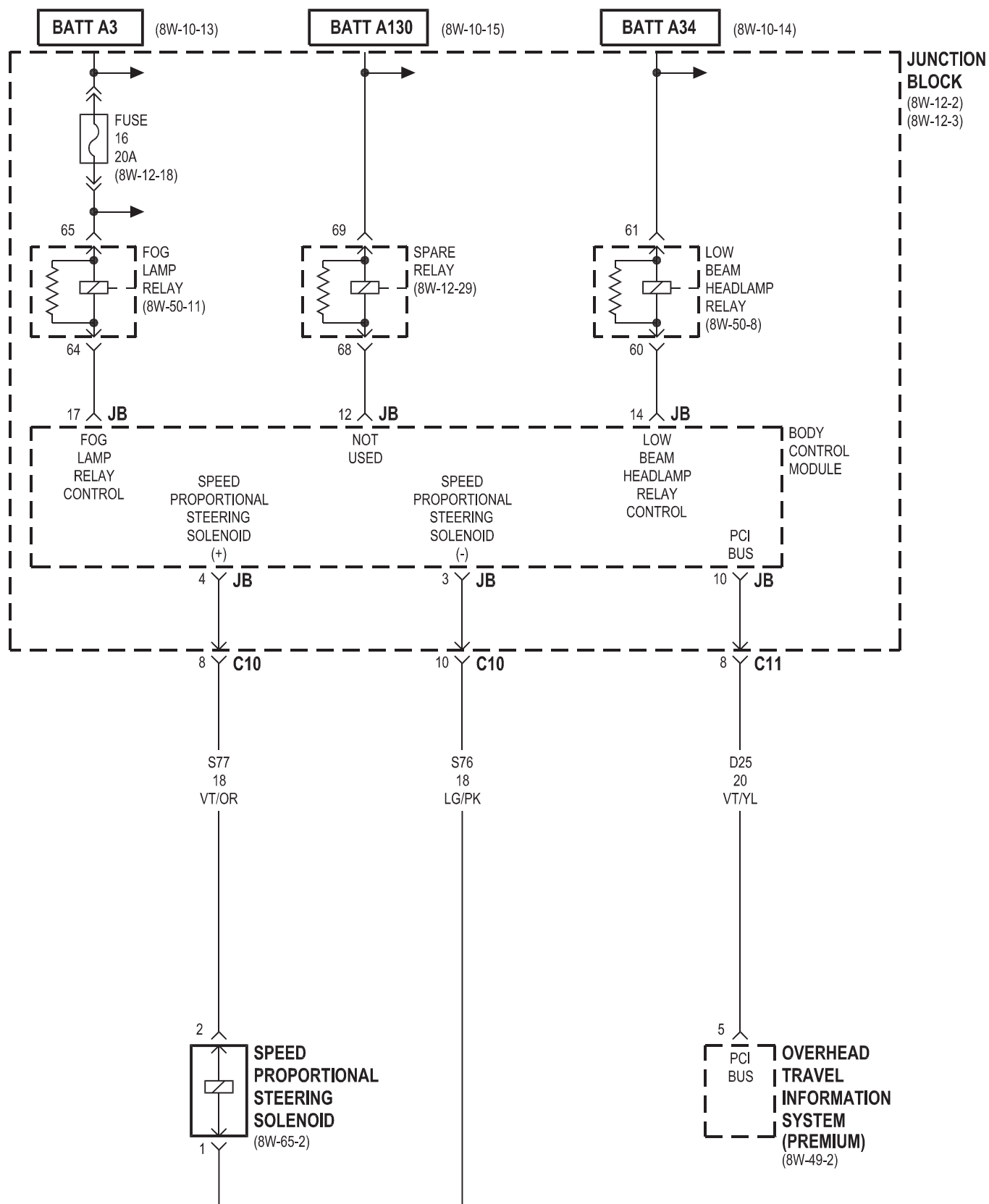


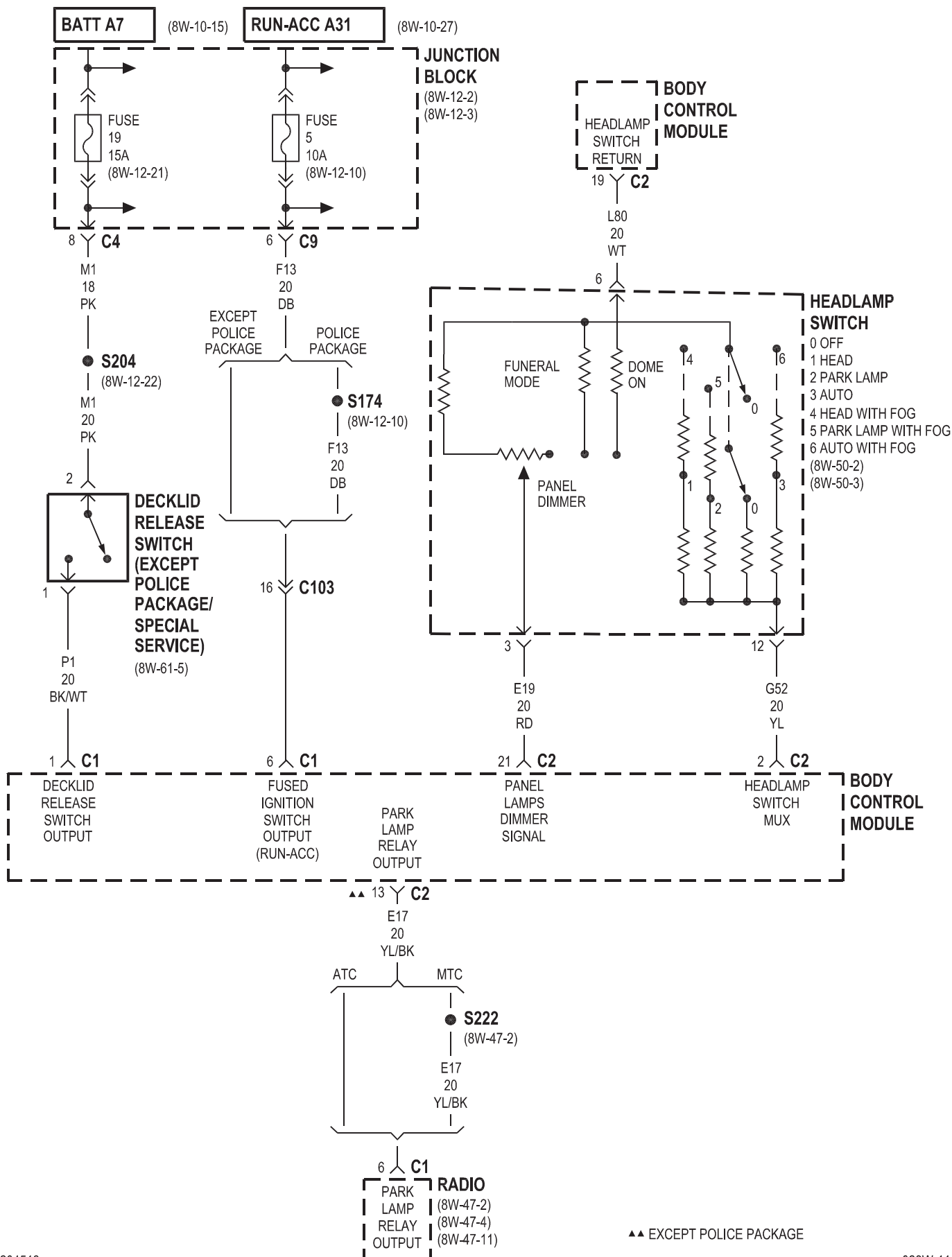


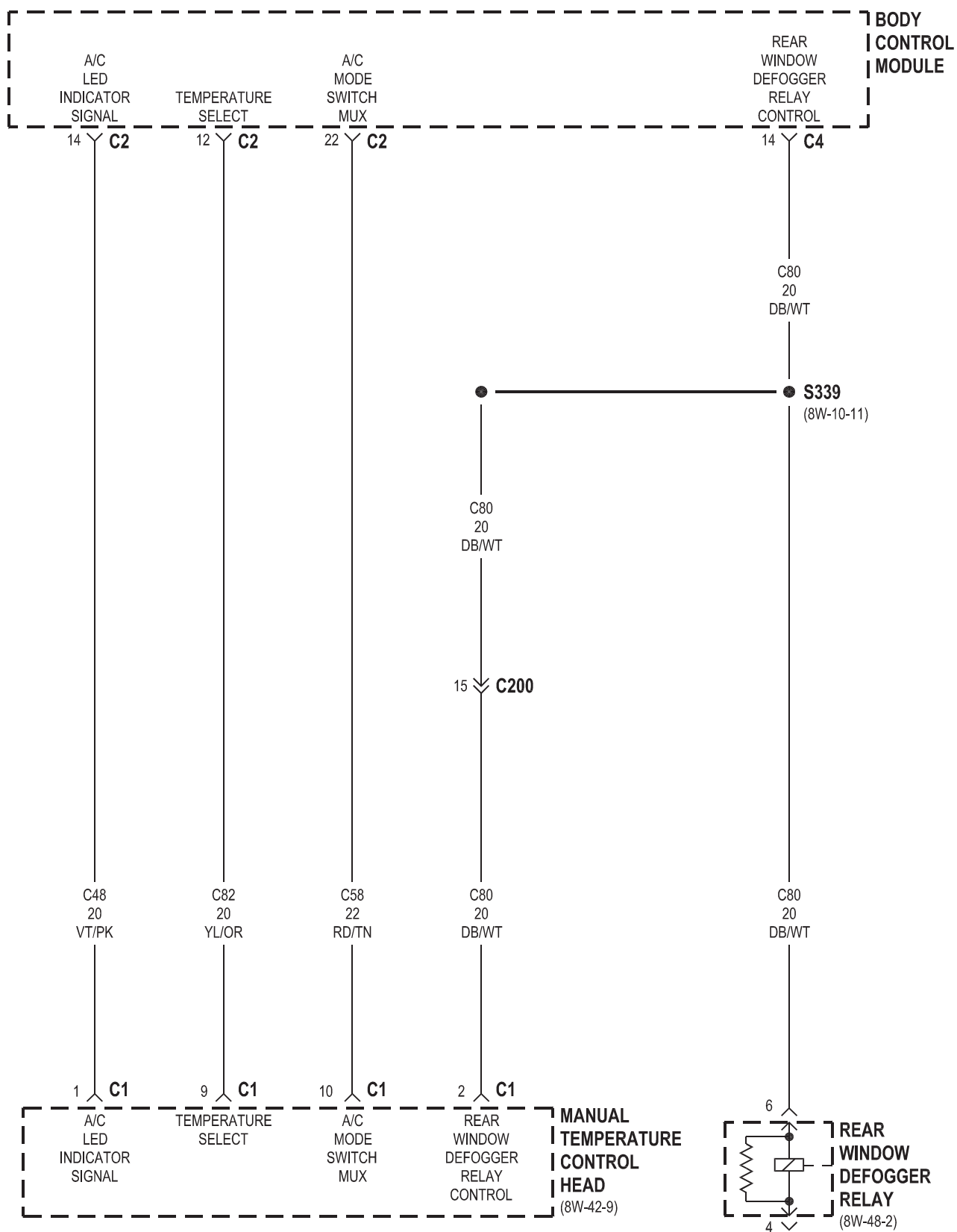


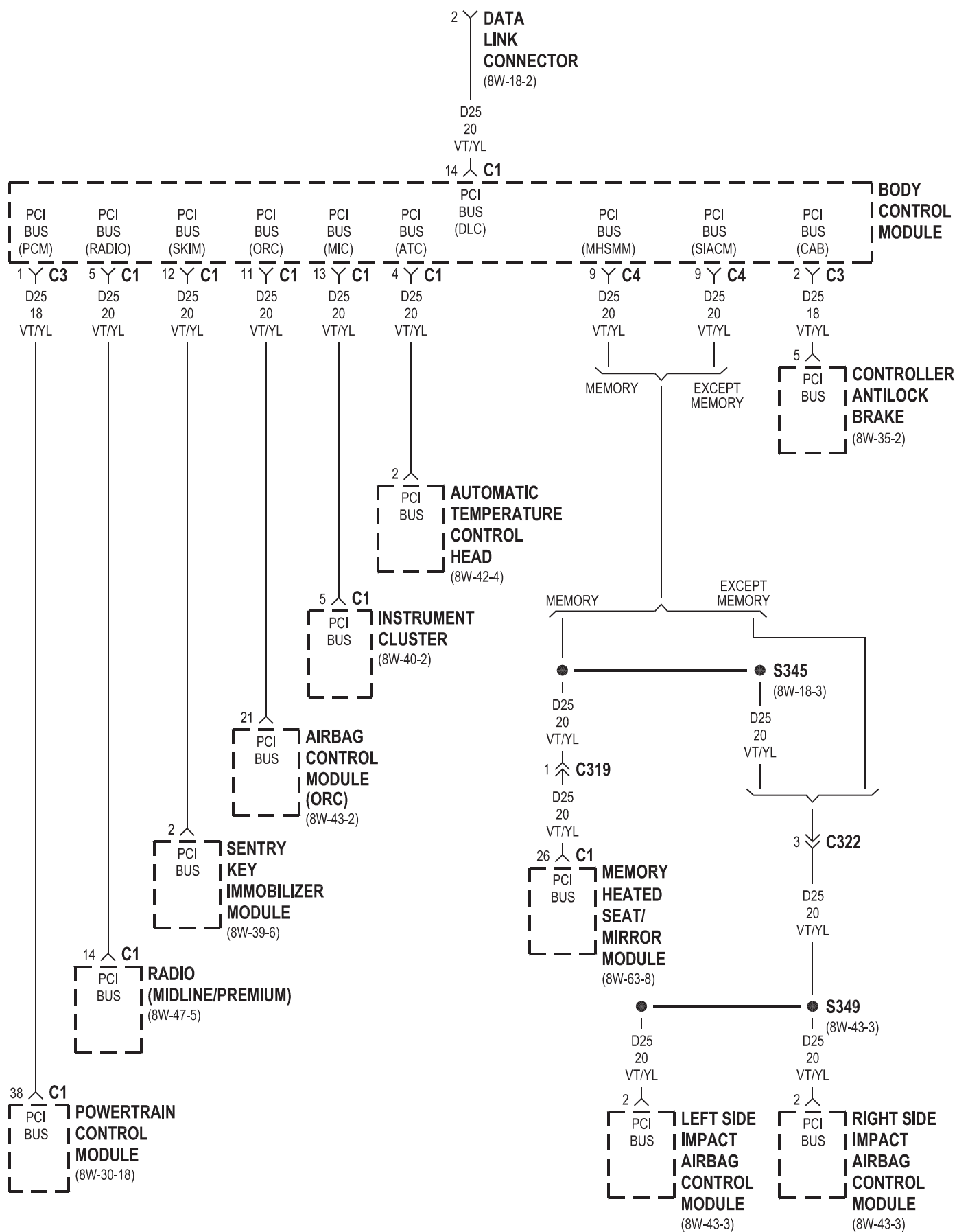








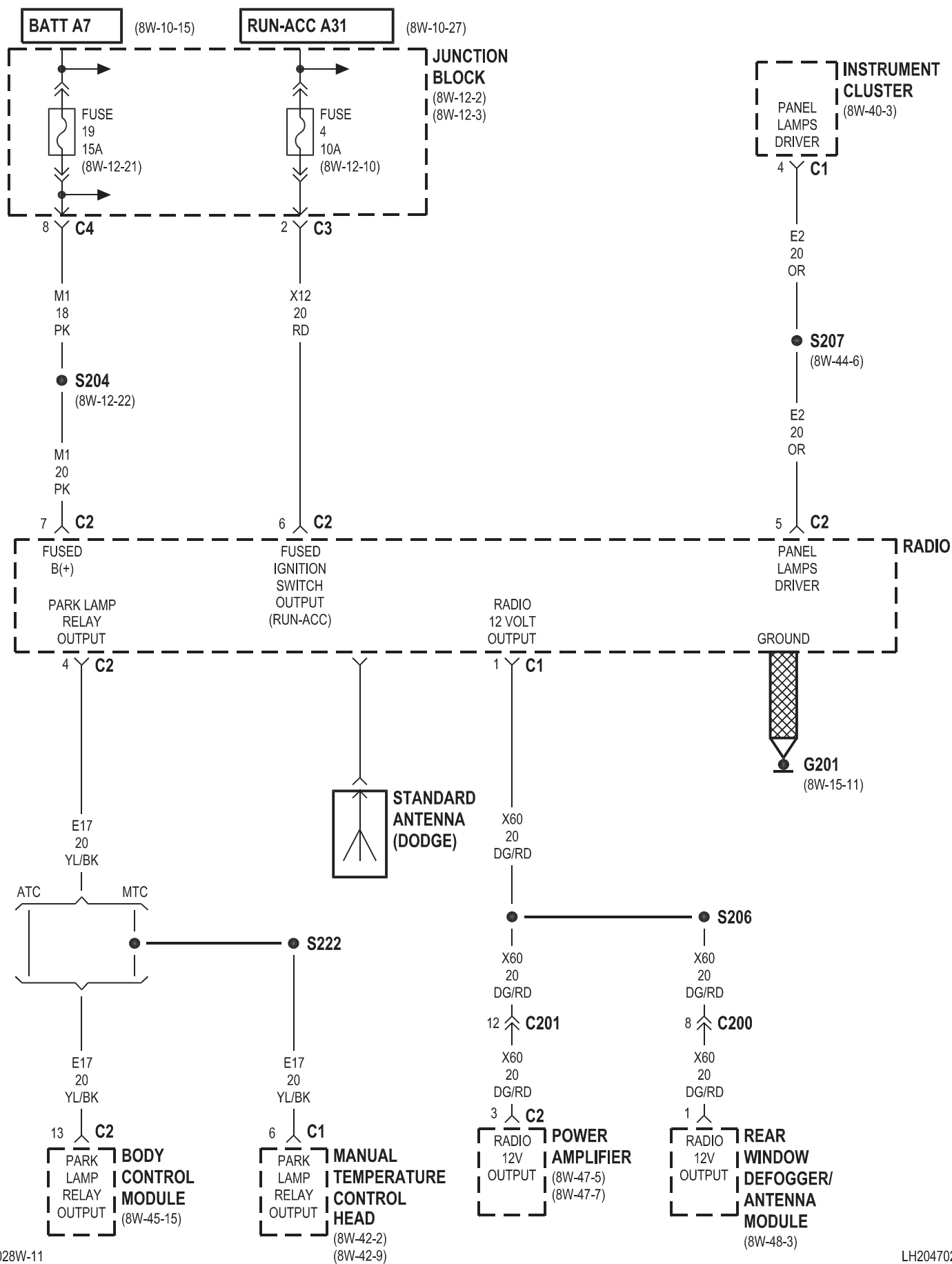


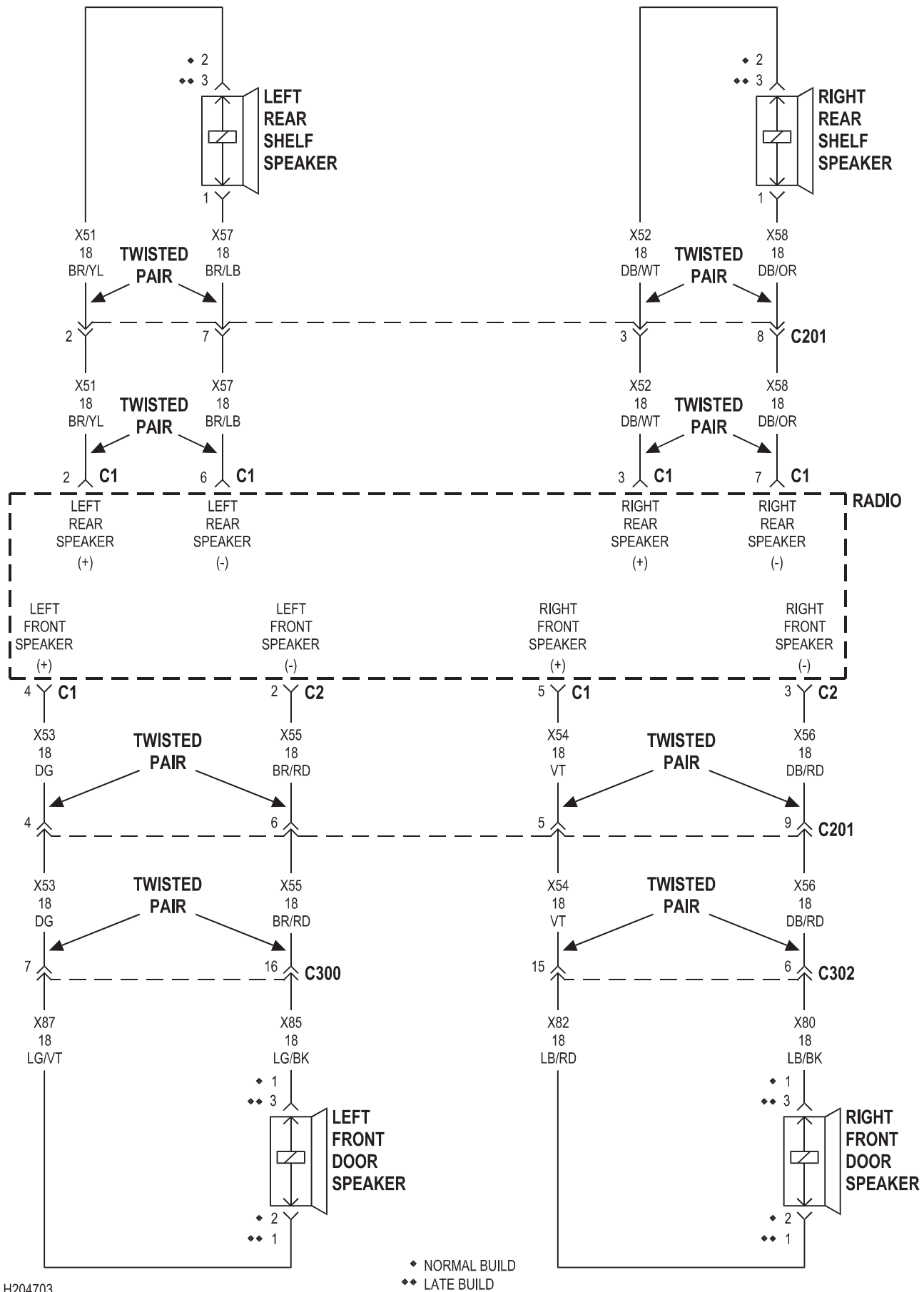


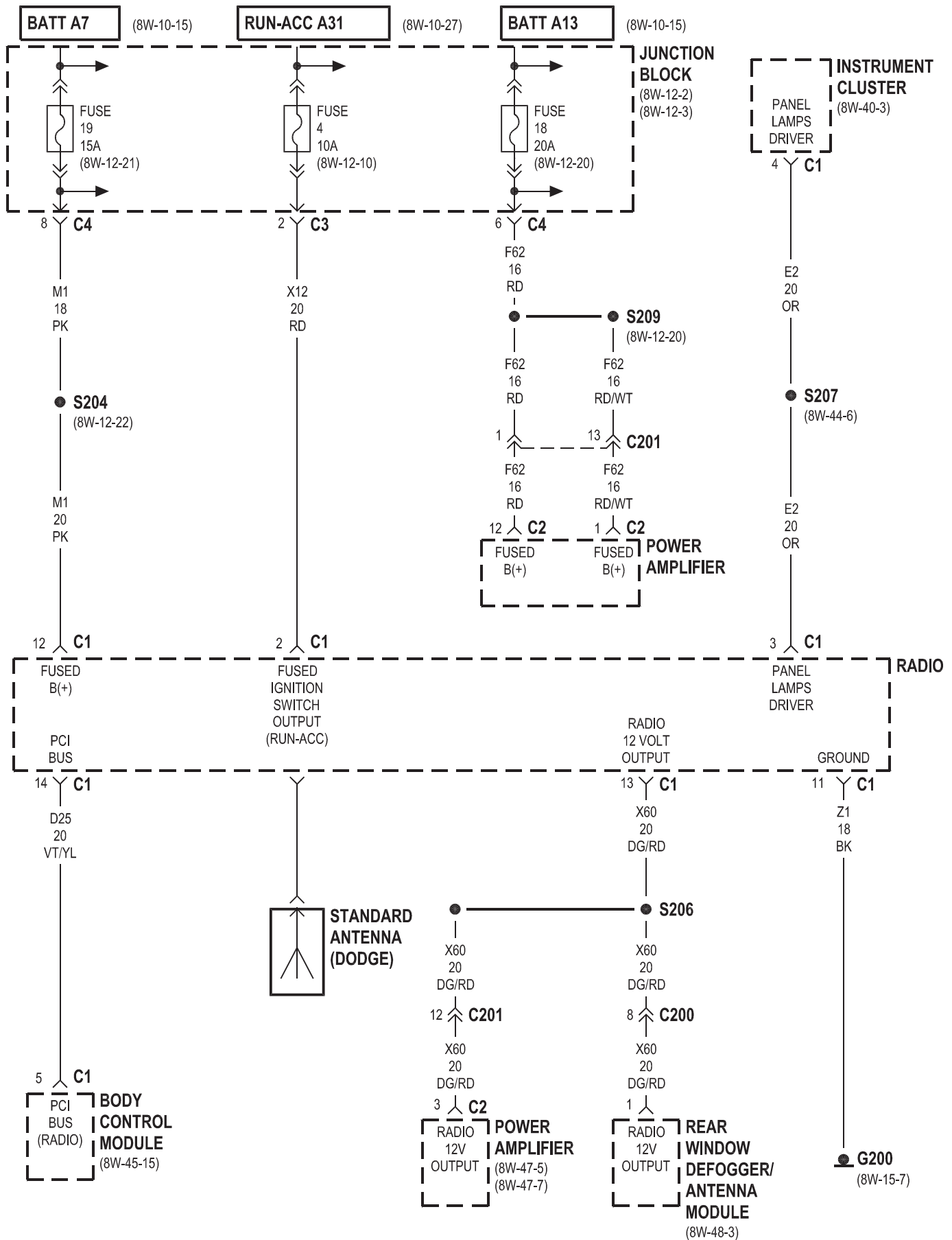
8W-47 AUDIO SYSTEM

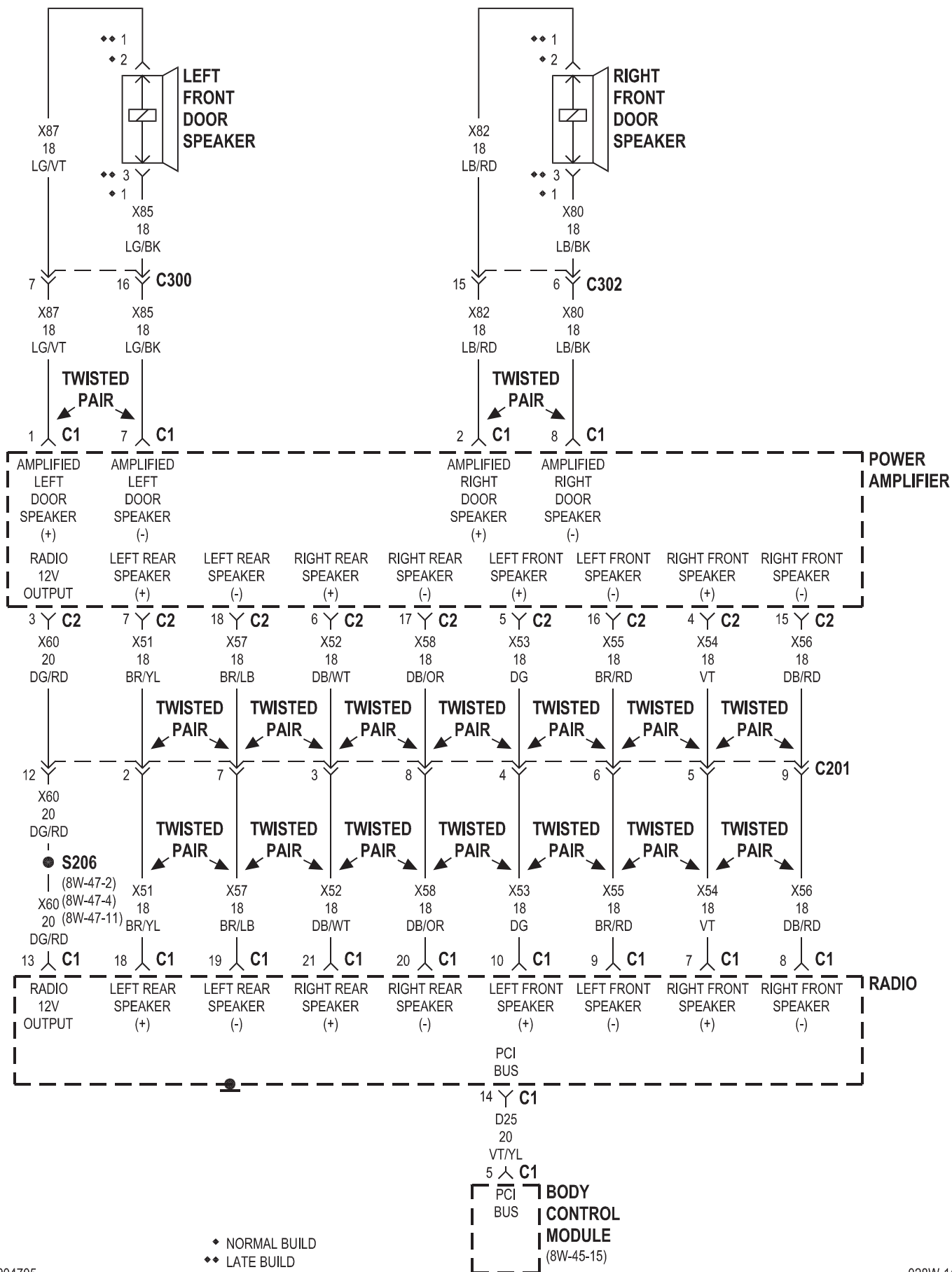
Component	Page
Body Control Module	8W-47-2, 4, 5, 9, 10
Center Instrument Panel Speaker	8W-47-6
Clockspring	8W-47-9
Compact Disc Changer	8W-47-12
Fuse 4 (JB)	8W-47-2, 4, 11
Fuse 18 (JB)	8W-47-4
Fuse 19 (JB)	8W-47-2, 4, 11
G200	8W-47-4, 10
G201	8W-47-2
G301	8W-47-6, 7
G401	8W-47-7
Instrument Cluster	8W-47-2, 4, 11
ISO Relay No. 1	8W-47-11
ISO Relay No. 2	8W-47-11
Left Front Door Sail Speaker	8W-47-6
Left Front Door Speaker	8W-47-3, 5, 10
Left Rear Door Speaker	8W-47-8

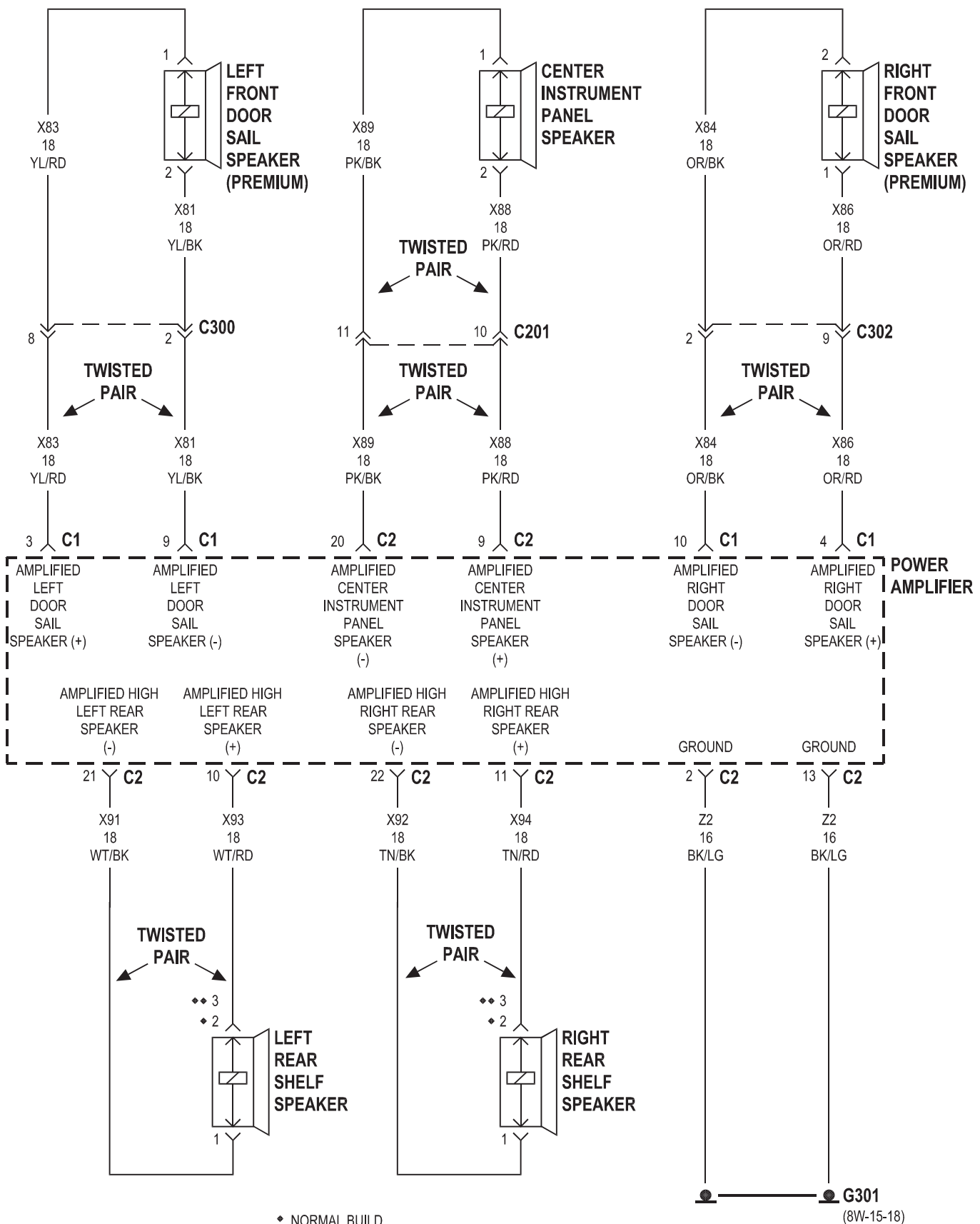
Component	Page
Left Rear Shelf Speaker	8W-47-3, 6, 10
Left Remote Radio Switch	8W-47-9
Manual Temperature Control Head	8W-47-2
Power Amplifier	8W-47-2, 4, 5, 6, 7, 8
Radio	8W-47-2, 3, 4, 5, 7, 10, 11, 12
Rear Window Defogger Antenna	8W-47-7
Rear Window Defogger Relay	8W-47-7
Rear Window Defogger/Antenna Module	8W-47-2, 4, 7
Right Front Door Sail Speaker	8W-47-6
Right Front Door Speaker	8W-47-3, 5, 10
Right Rear Door Speaker	8W-47-8
Right Rear Shelf Speaker	8W-47-3, 6, 10
Right Remote Radio Switch	8W-47-9
Standard Antenna	8W-47-2, 4

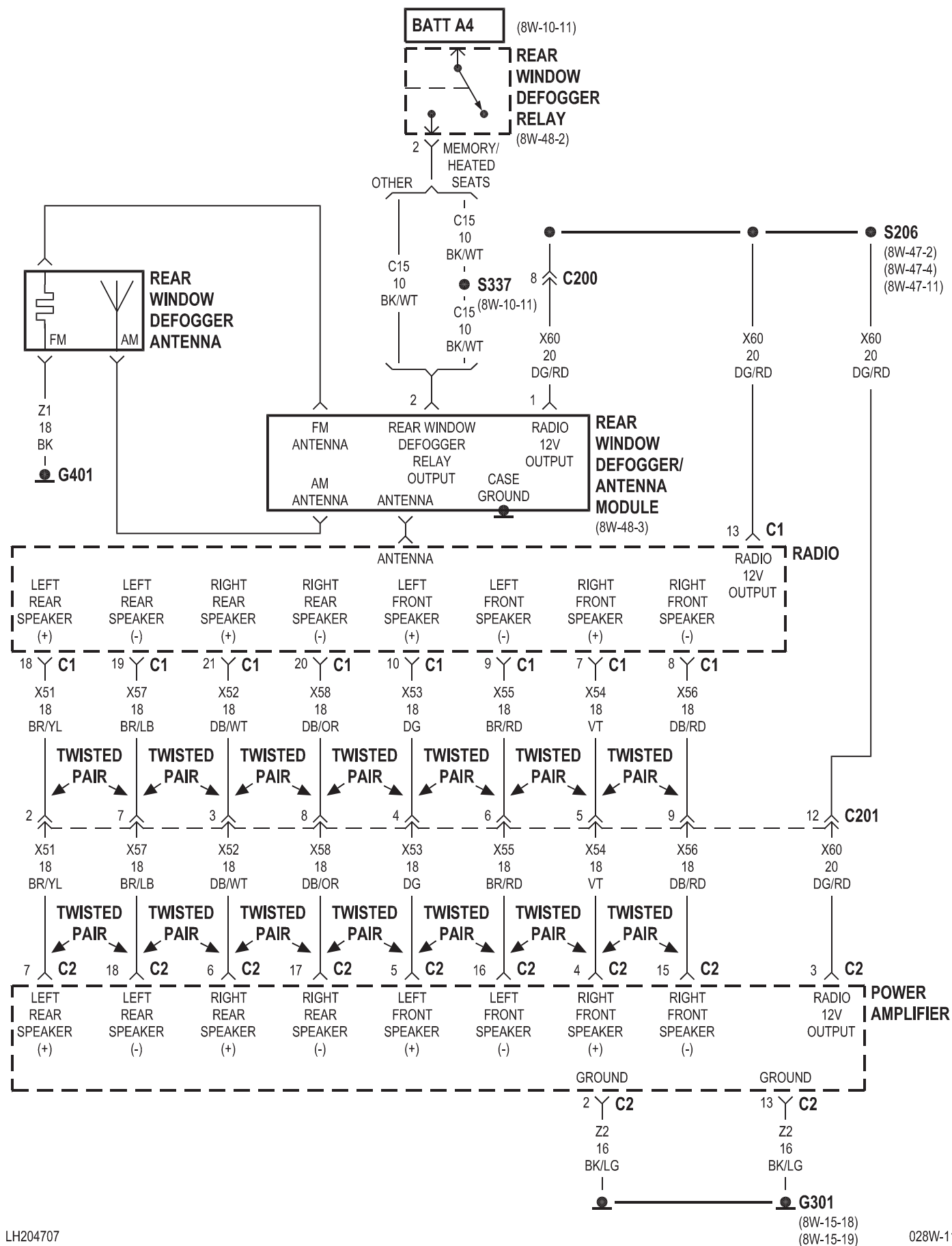


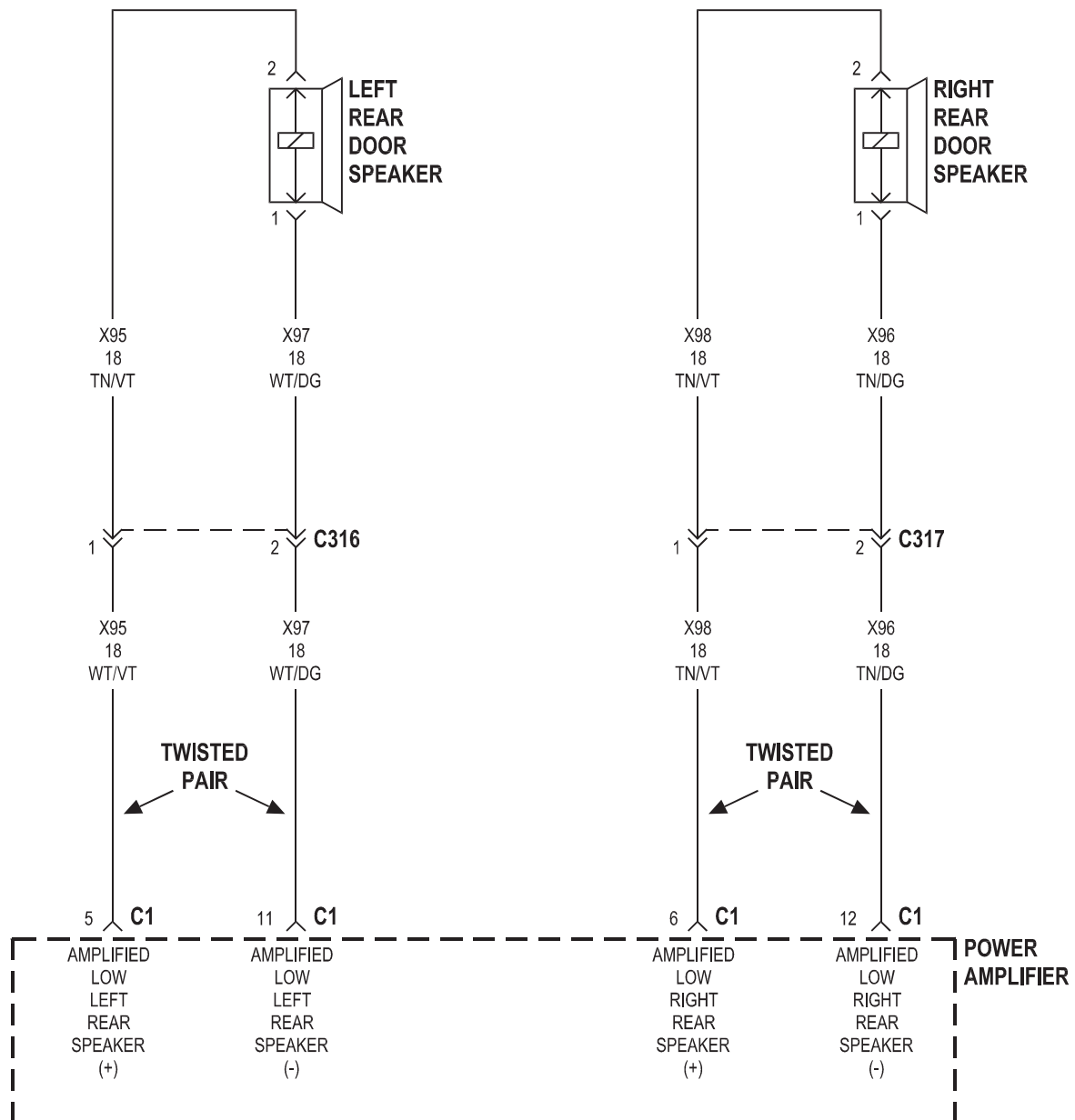


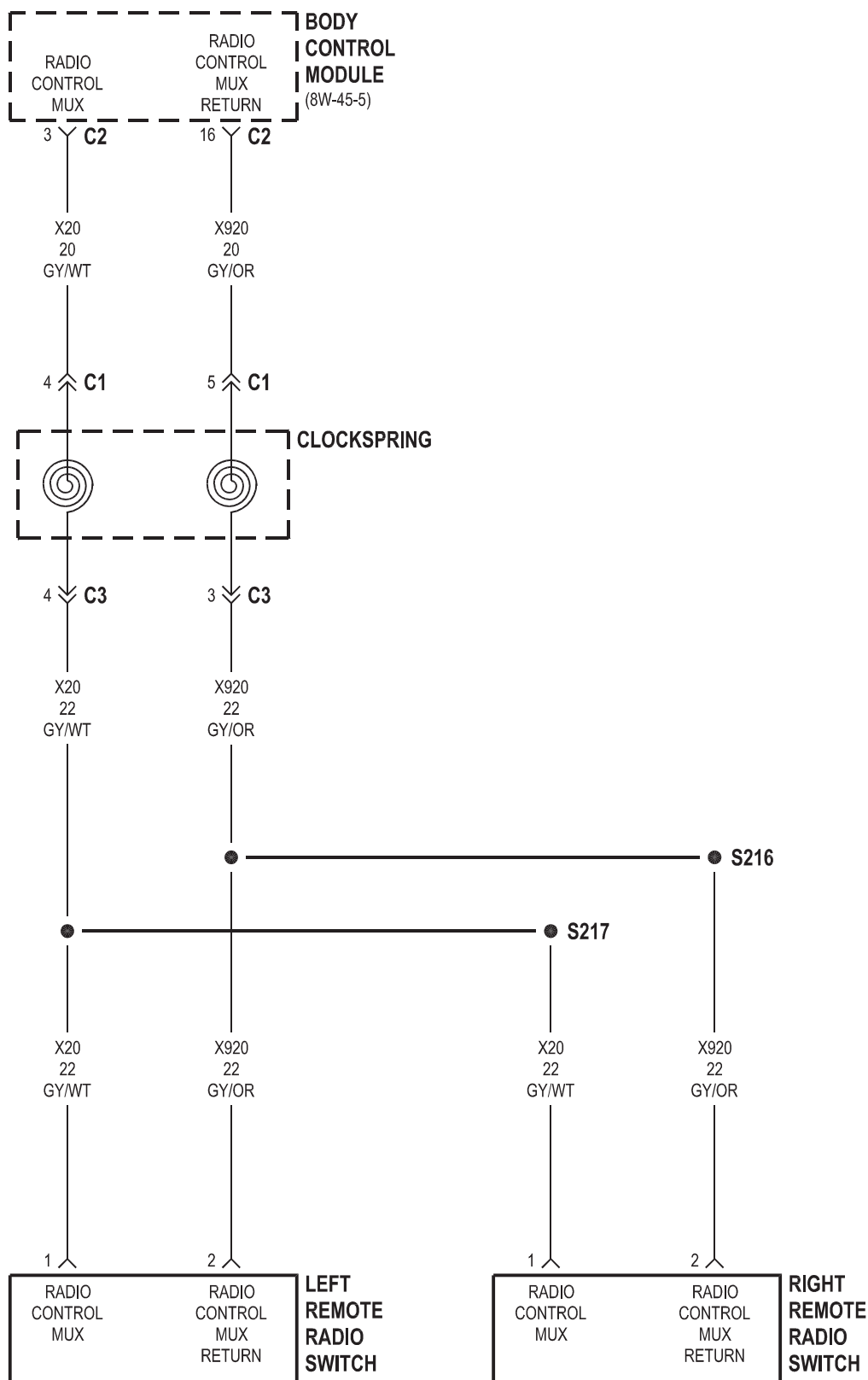


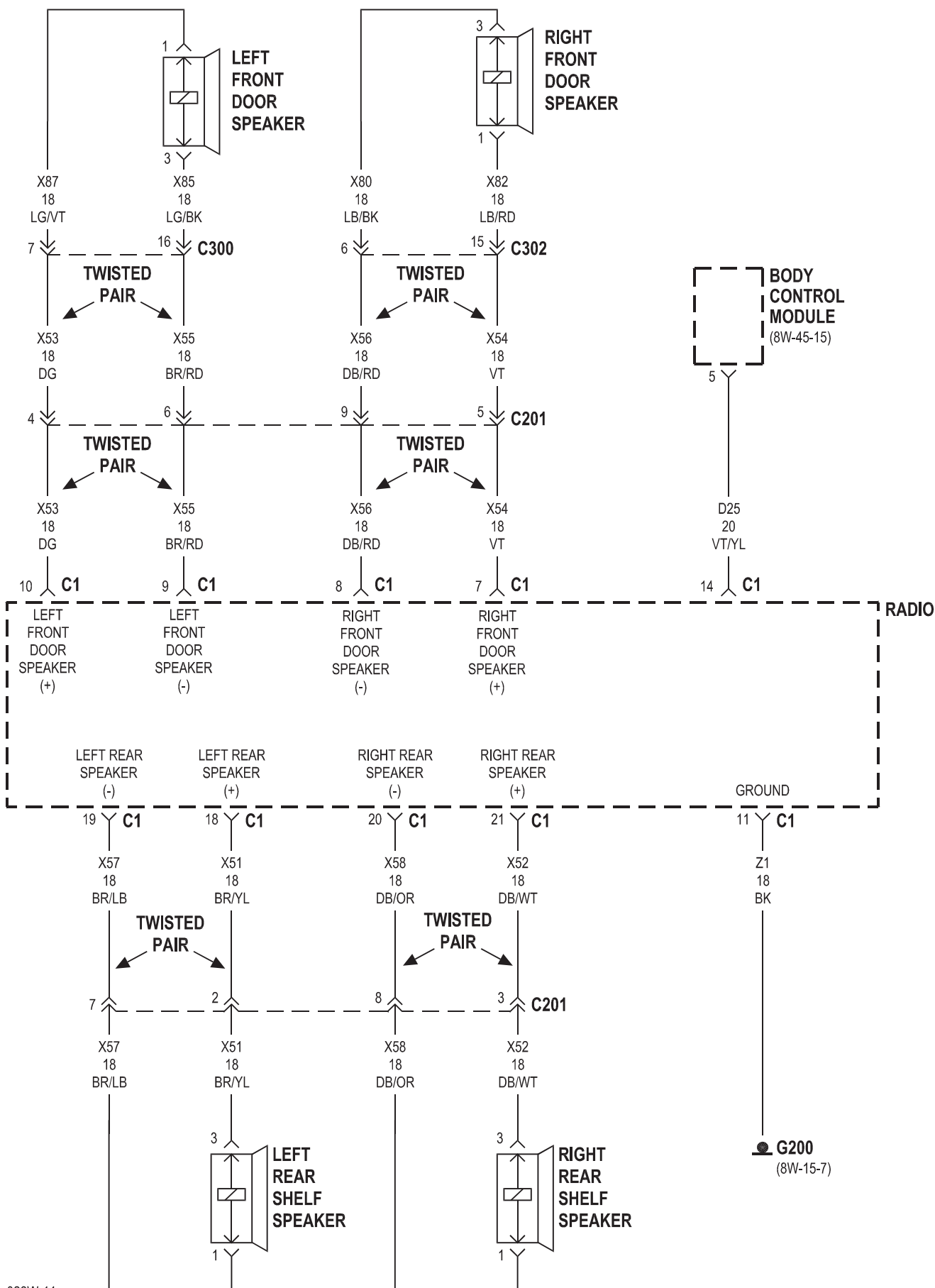


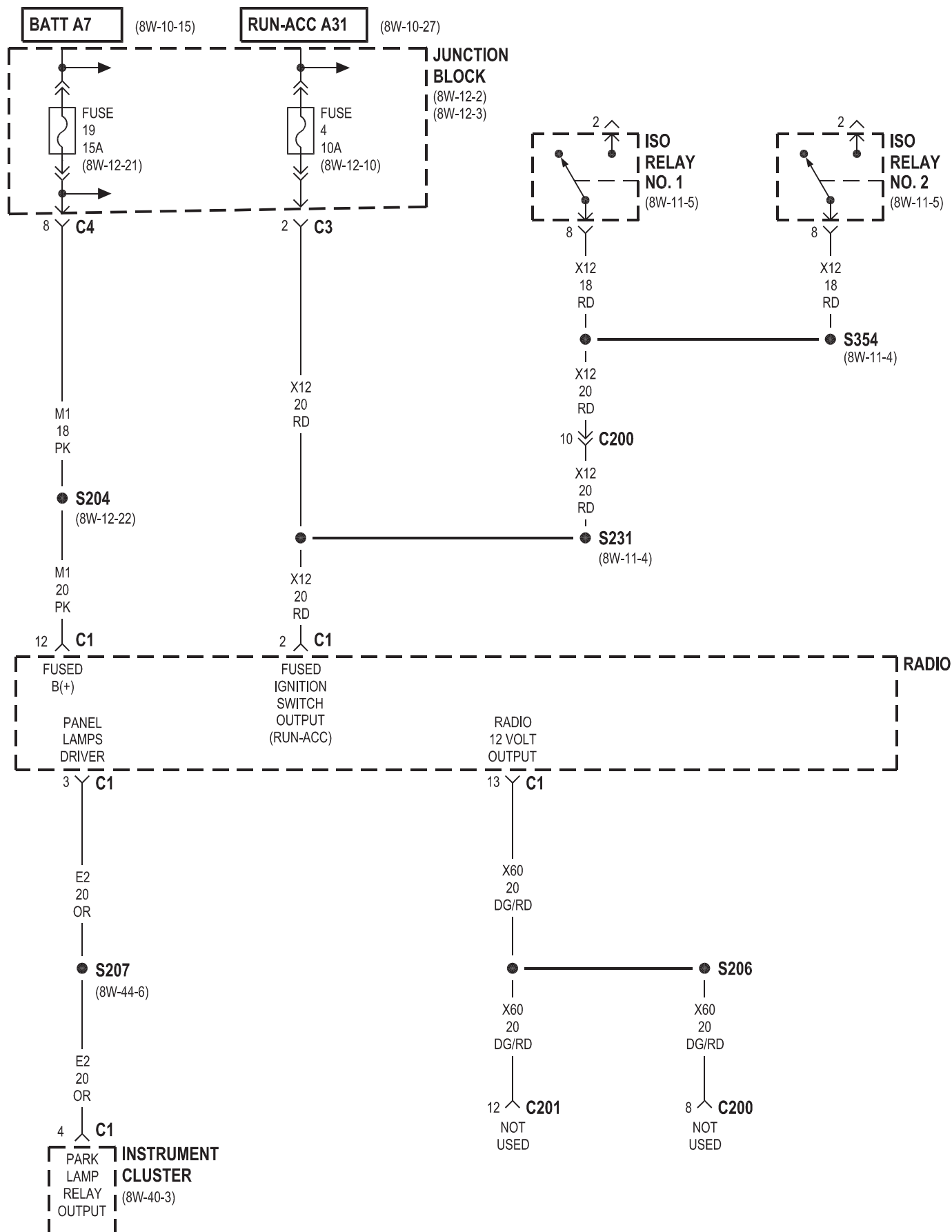


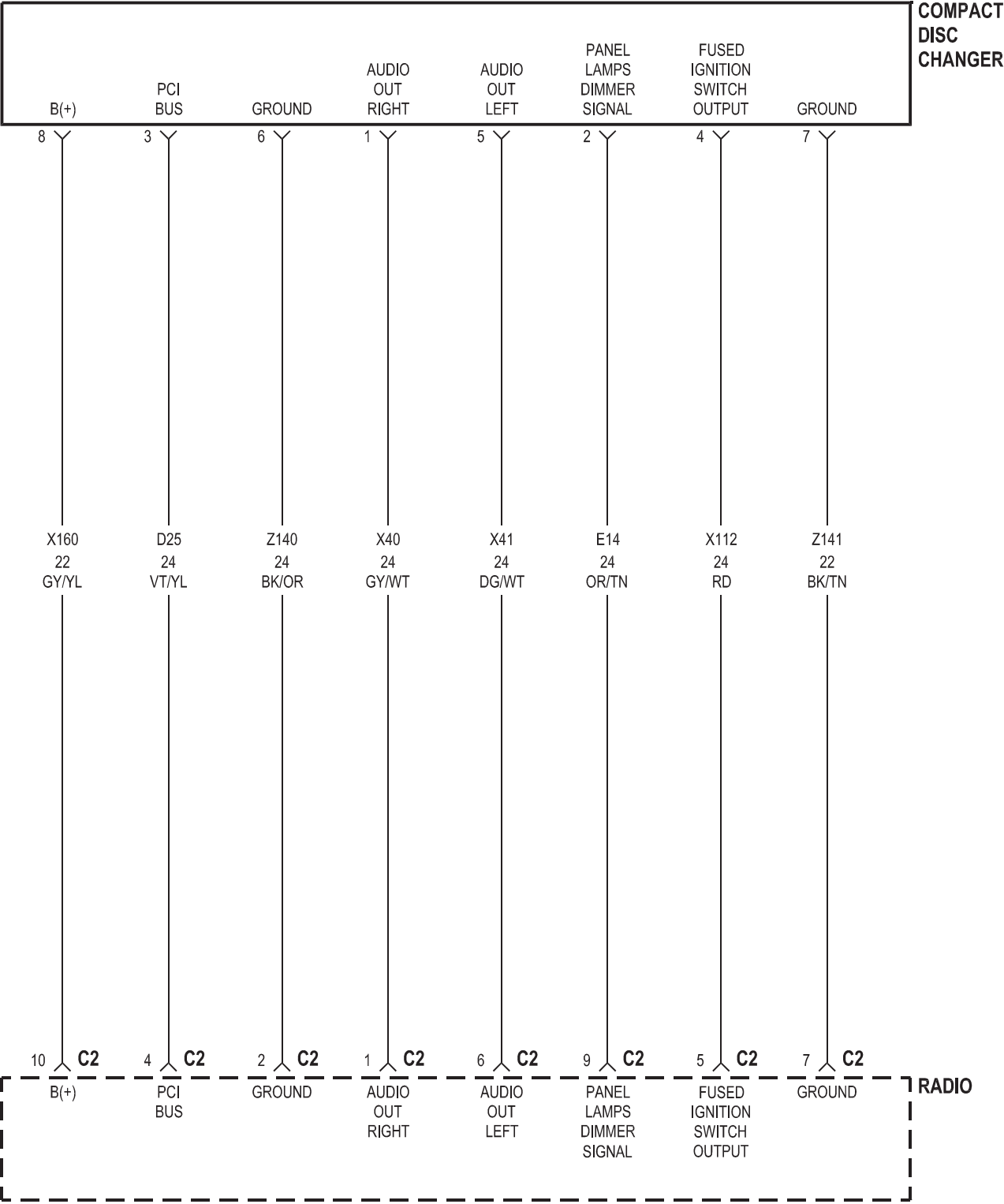








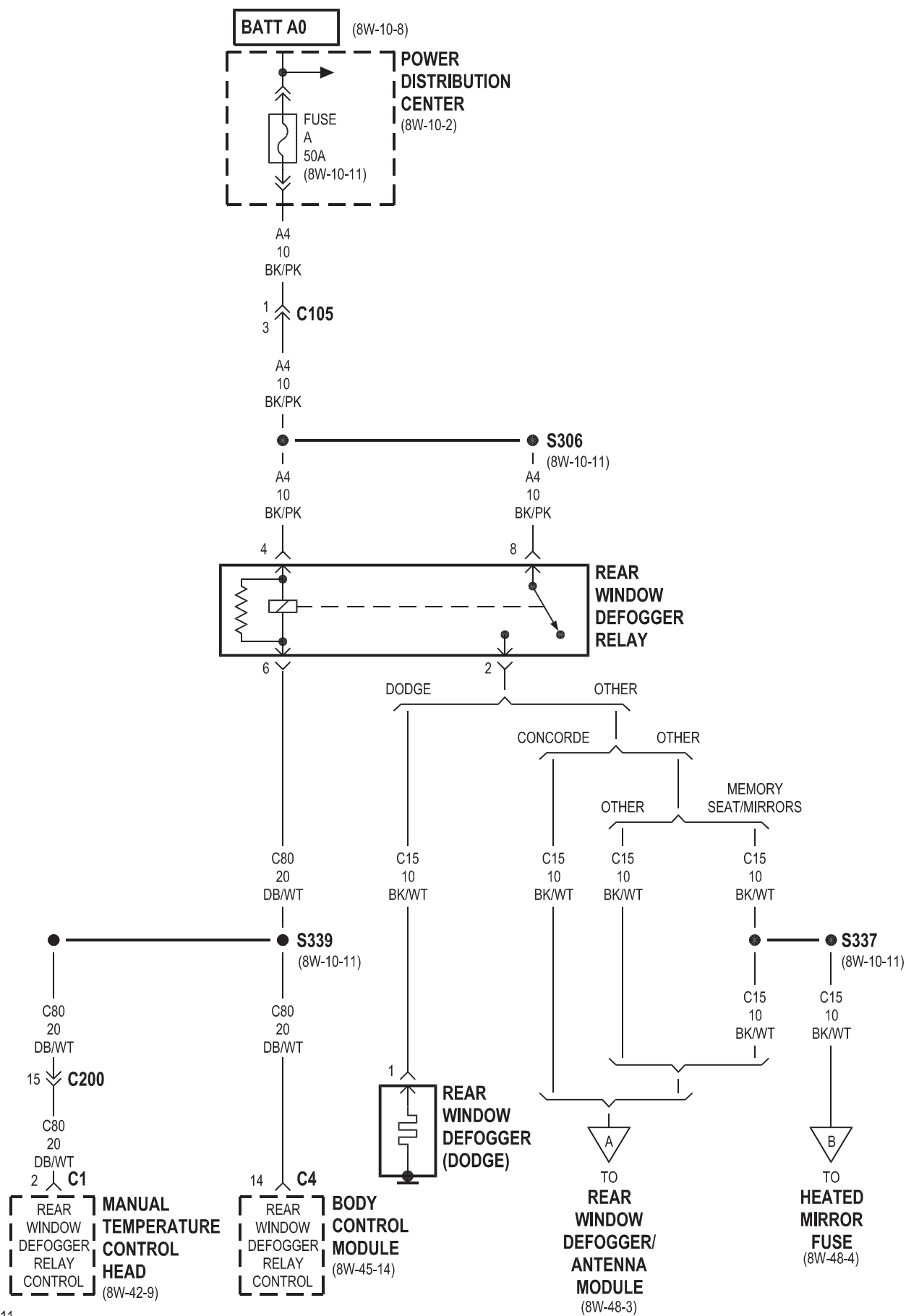


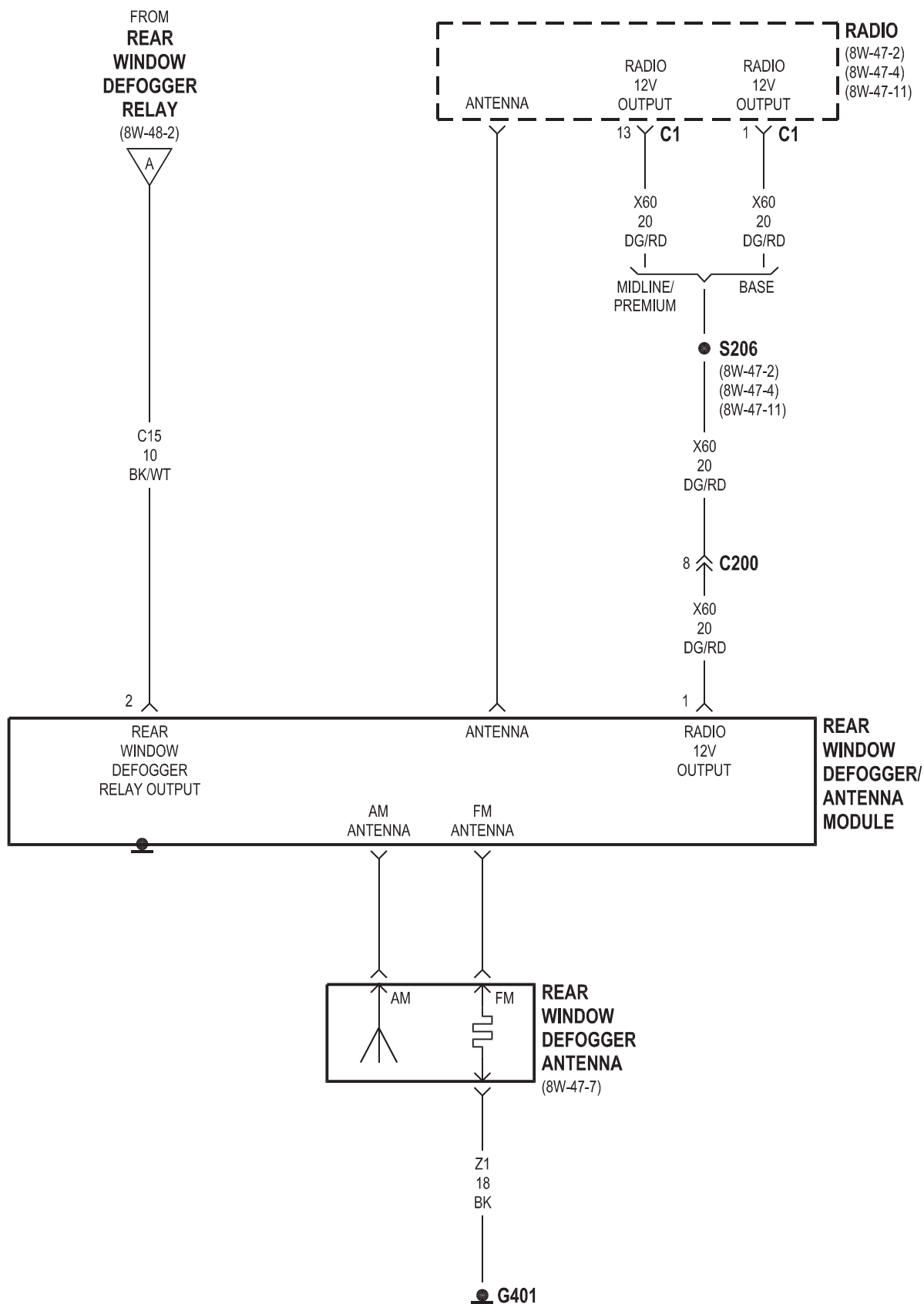


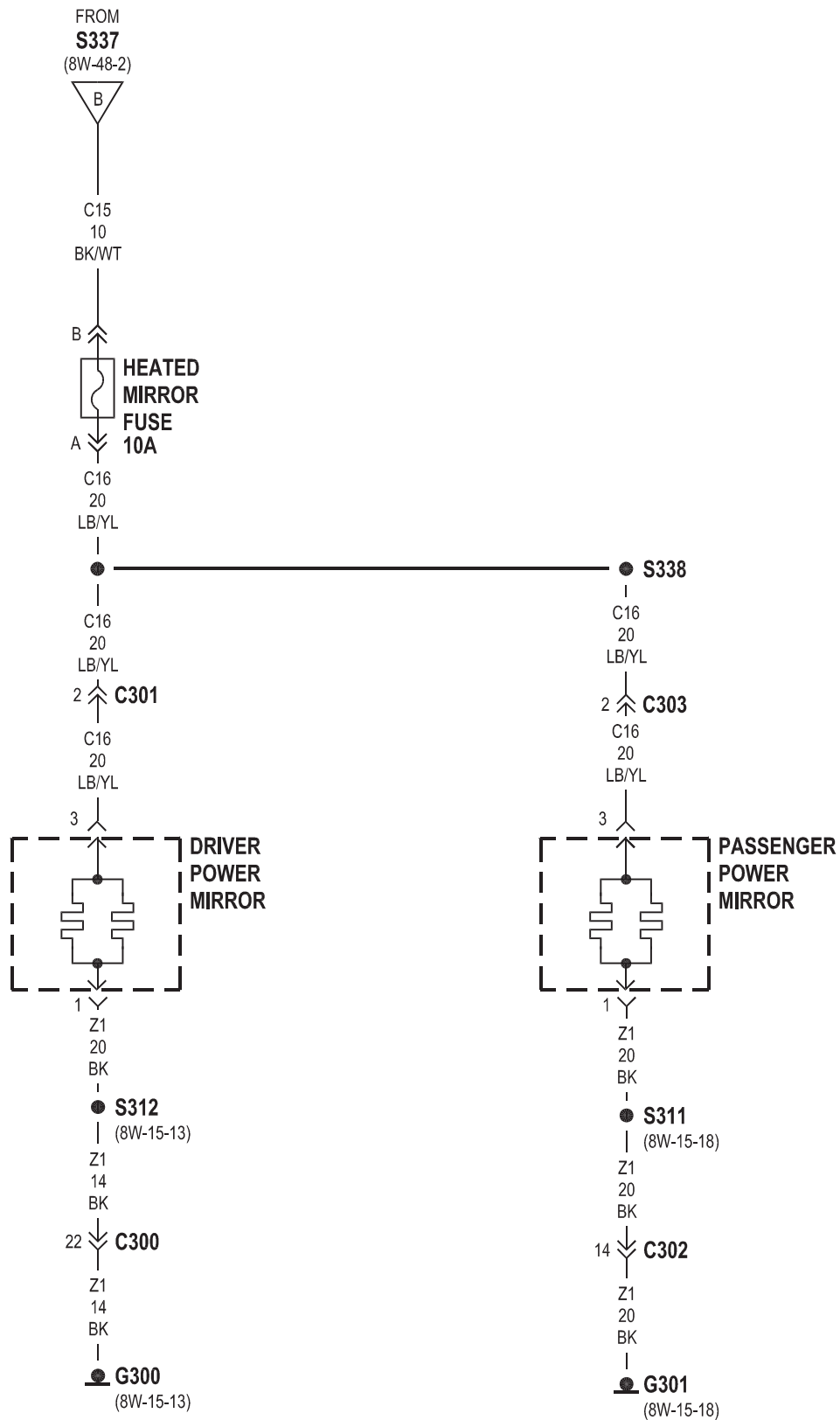
8W-48 REAR WINDOW DEFOGGER

Component	Page
Body Control Module	8W-48-2
Driver Power Mirror	8W-48-4
Fuse A (PDC)	8W-48-2
G300	8W-48-4
G301	8W-48-4
G401	8W-48-3
Heated Mirror Fuse	8W-48-2, 4
Manual Temperature Control Head	8W-48-2
Passenger Power Mirror	8W-48-4

Component	Page
Power Distribution Center	8W-48-2
Radio	8W-48-3
Rear Window Defogger	8W-48-2
Rear Window Defogger Antenna	8W-48-3
Rear Window Defogger Relay	8W-48-2, 3
Rear Window Defogger/Antenna Module	8W-48-2, 3

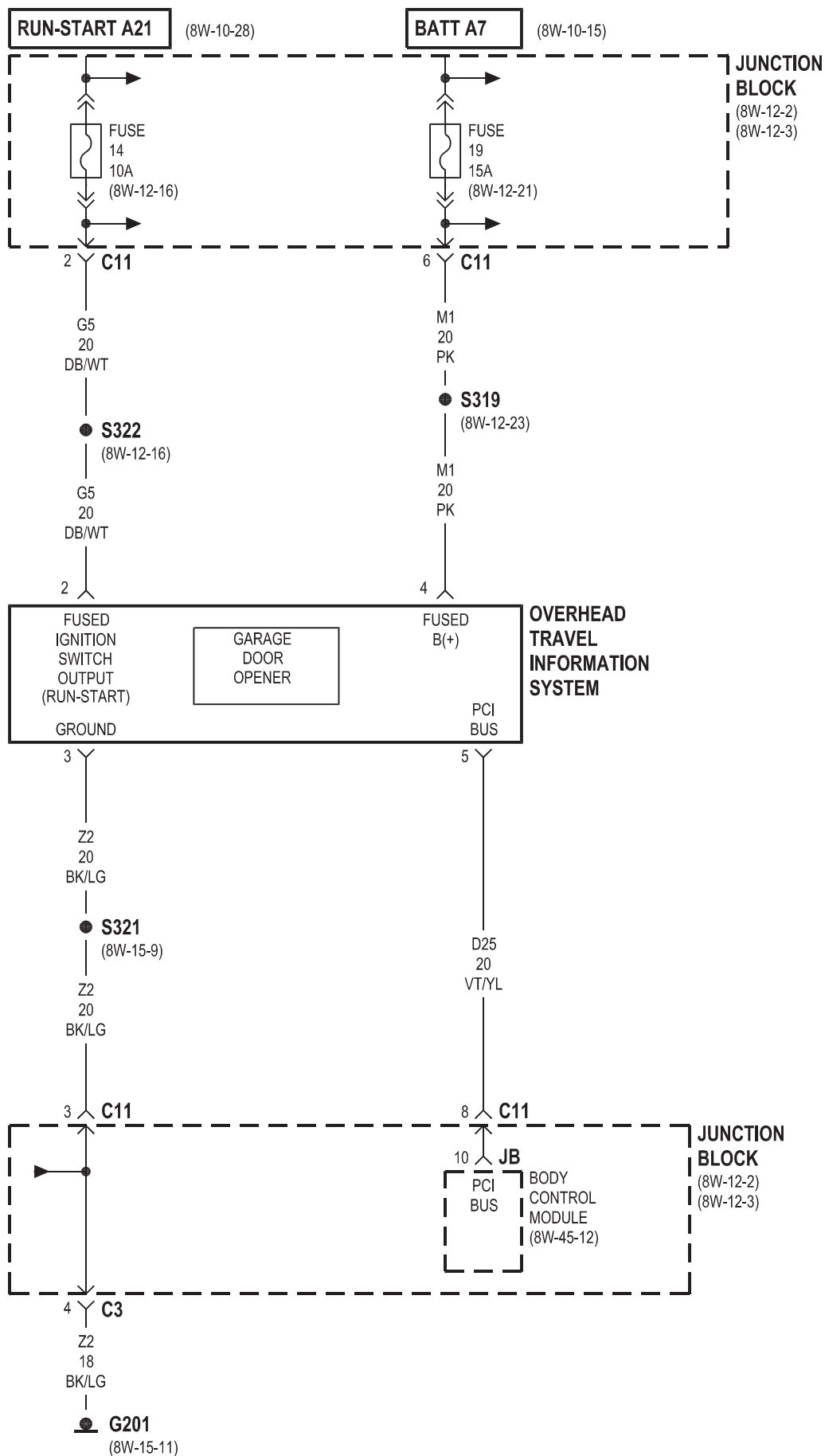






8W-49 OVERHEAD CONSOLE

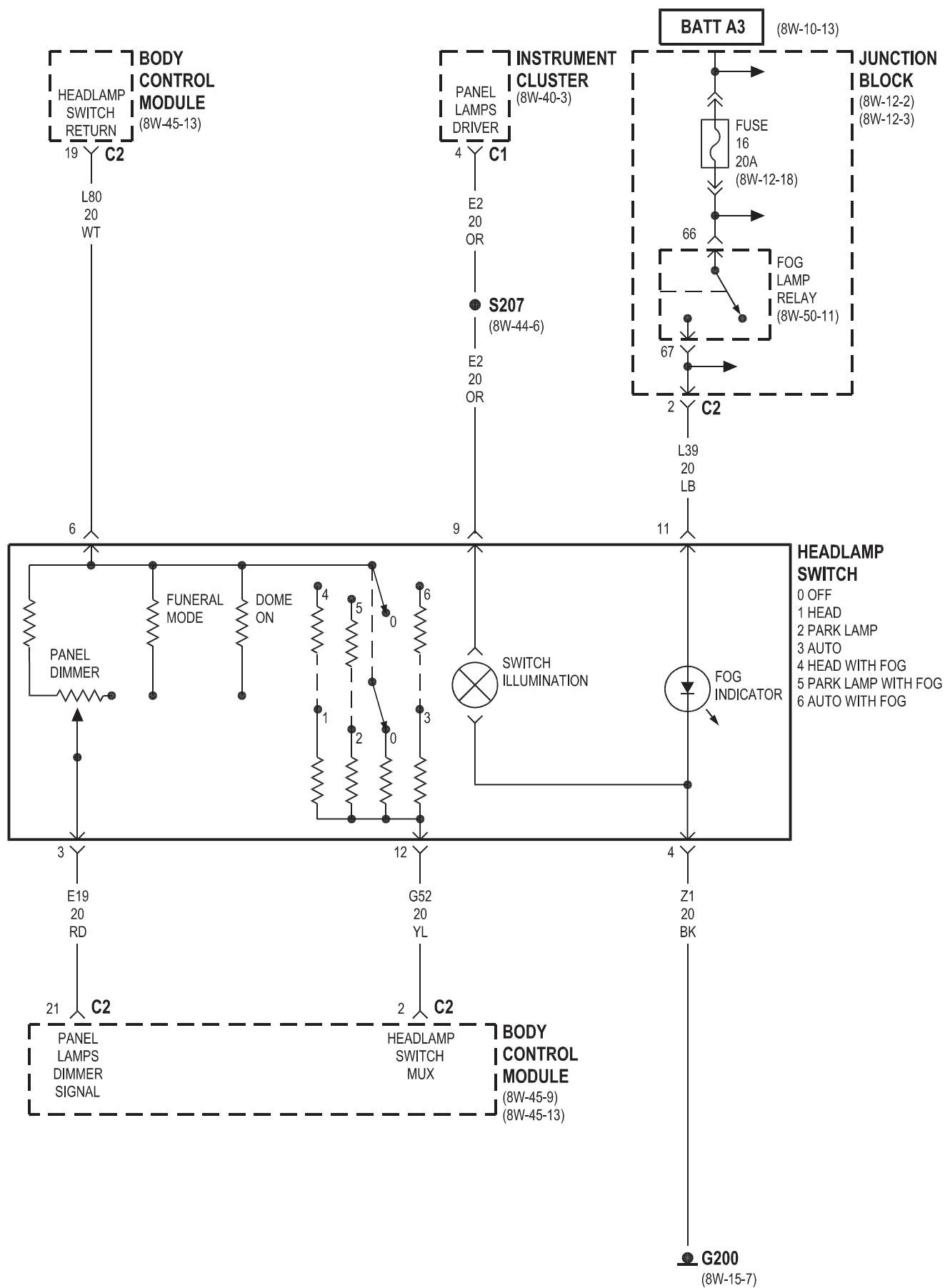
Component	Page	Component	Page
Body Control Module	8W-49-2	Junction Block	8W-49-2
Fuse 14 (JB)	8W-49-2	Overhead Travel Information System	8W-49-2
Fuse 19 (JB)	8W-49-2		
G201	8W-49-2		

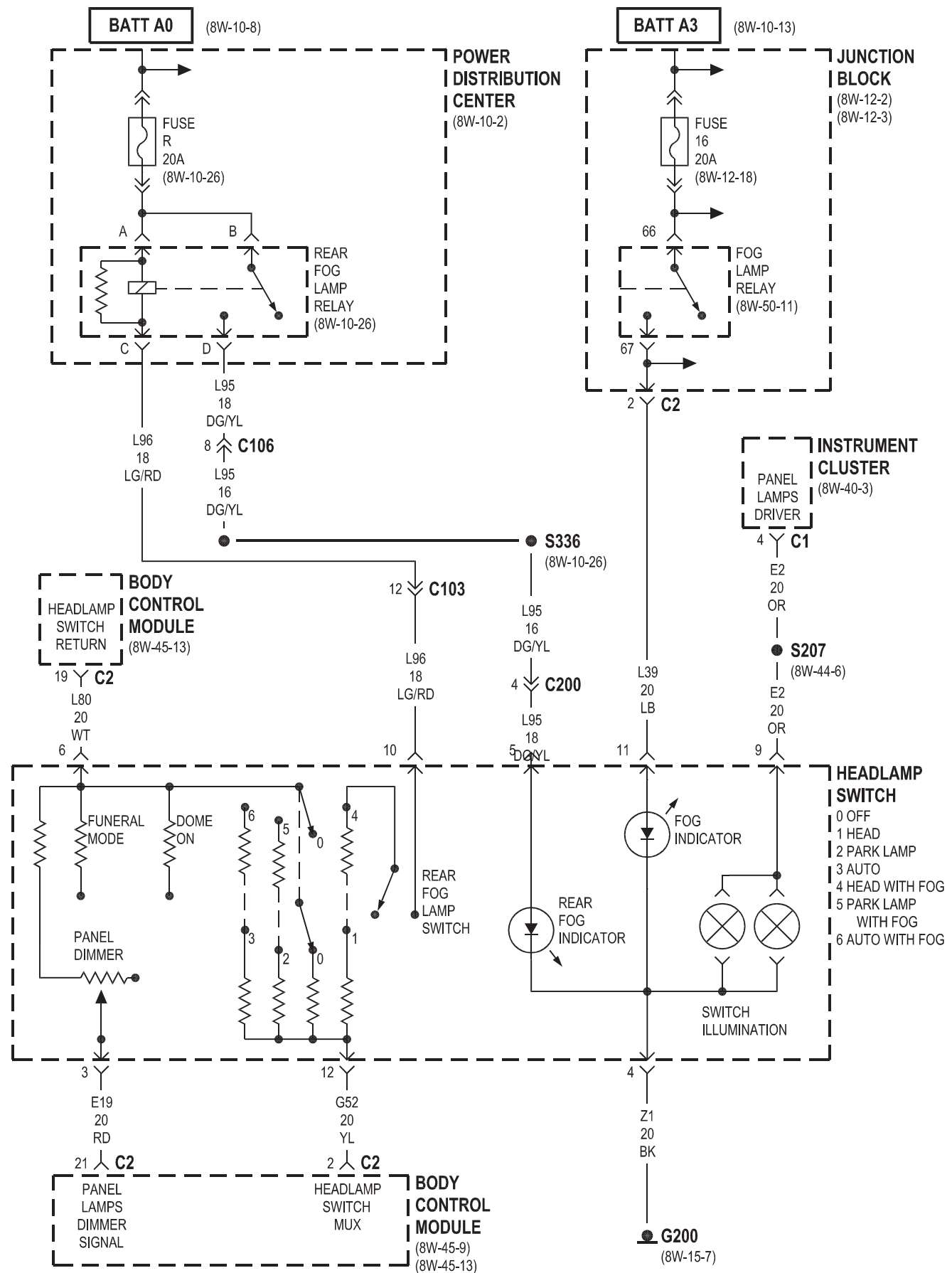


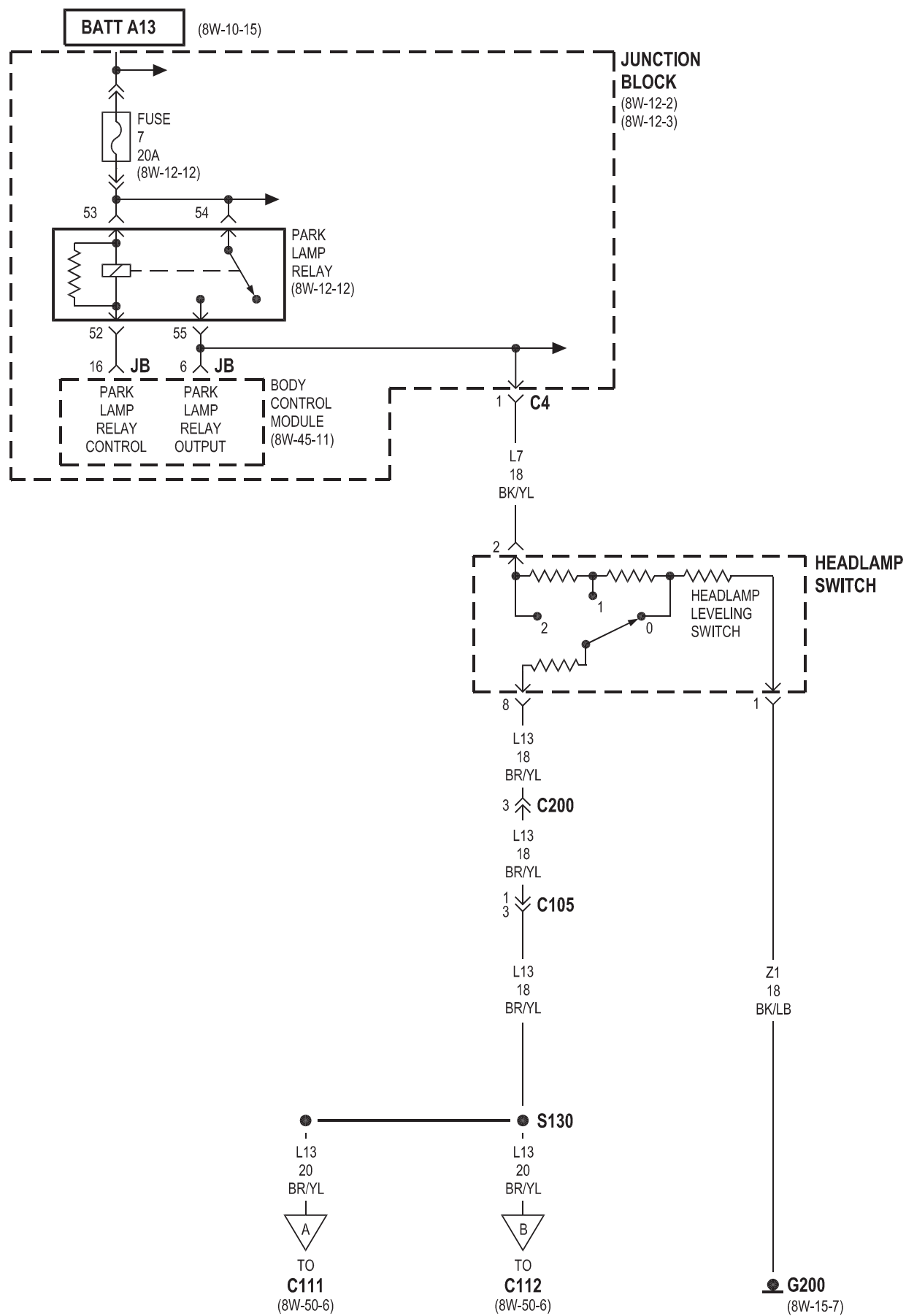
8W-50 FRONT LIGHTING

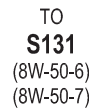
Component	Page
Accessory No. 1	8W-50-16
Accessory No. 2	8W-50-16
Body Control Module	8W-50-2, 3, 4, 5, 8, 11
Daytime Running Lamp Module	8W-50-14
Fog Lamp Relay	8W-50-2, 3, 11
Fuse 2 (JB)	8W-50-8, 14, 15
Fuse 3 (JB)	8W-50-8, 15
Fuse 5 (JB)	8W-50-15
Fuse 7 (JB)	8W-50-4, 5, 8
Fuse 10 (JB)	8W-50-8
Fuse 11 (JB)	8W-50-8
Fuse 12 (JB)	8W-50-8, 14
Fuse 15 (JB)	8W-50-14
Fuse 16 (JB)	8W-50-2, 3, 11
Fuse 17 (JB)	8W-50-14
Fuse R (PDC)	8W-50-3
Fuse X (PDC)	8W-50-16
Fuse Y (PDC)	8W-50-16
G101	8W-50-15
G103	8W-50-15
G104	8W-50-15
G106	8W-50-6, 7, 9, 10, 11, 12, 13
G200	8W-50-2, 3, 4
G300	8W-50-8, 14
Headlamp Dimmer Switch	8W-50-8
Headlamp Flasher	8W-50-8, 9, 15
Headlamp Flasher Cap	8W-50-15

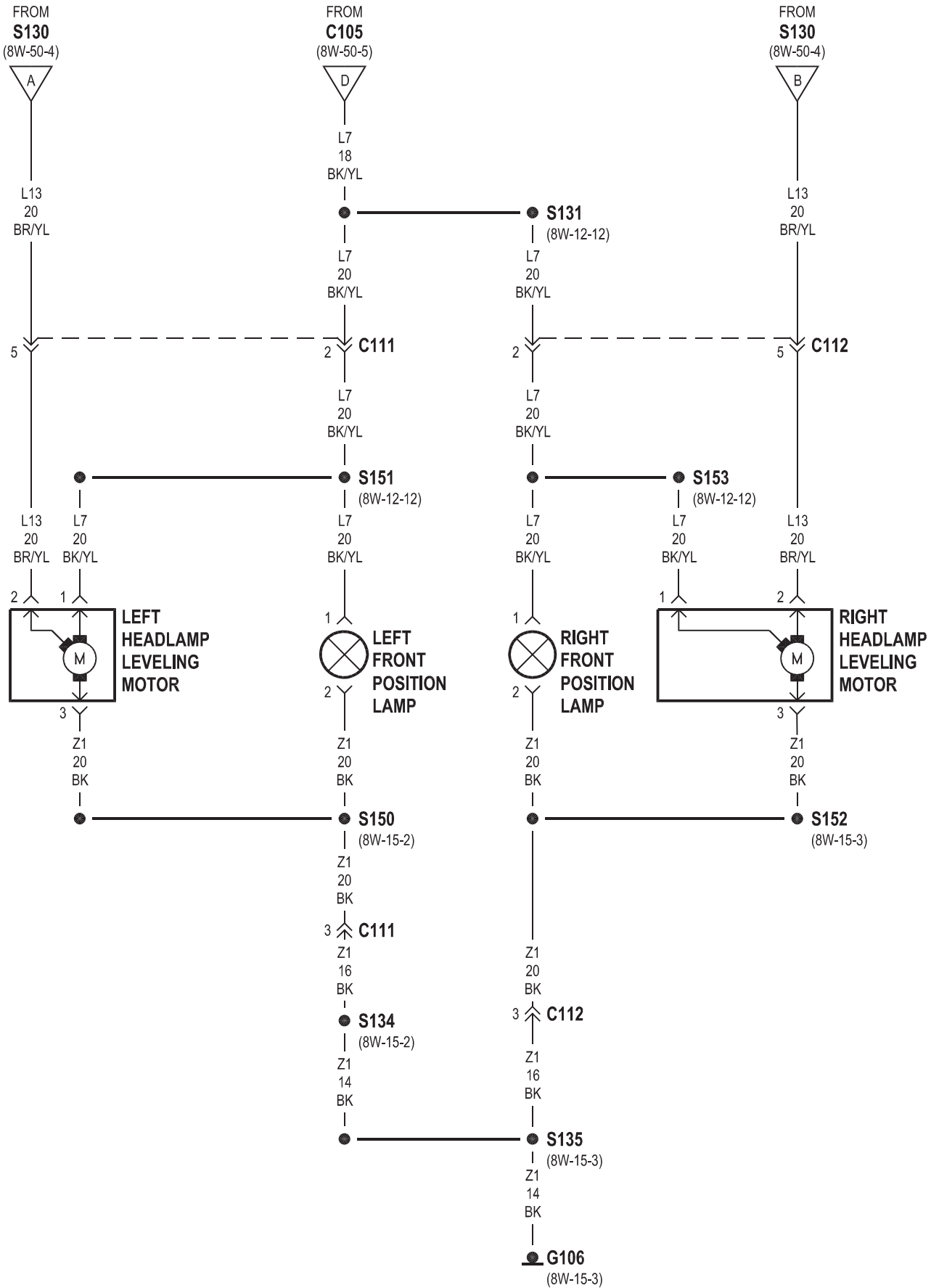
Component	Page
Headlamp Switch	8W-50-2, 3, 4, 11
High Beam Headlamp Relay	8W-50-8, 14, 15
Instrument Cluster	8W-50-2, 3, 14
Junction Block	8W-50-2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15
Left Fog Lamp	8W-50-11
Left Front Park/Turn Signal Lamp	8W-50-7, 13
Left Front Position Lamp	8W-50-6
Left Front Side Marker Lamp	8W-50-13
Left Headlamp Leveling Motor	8W-50-6
Left High Beam Headlamp	8W-50-8, 9, 15
Left Low Beam Headlamp	8W-50-8, 10
Low Beam Headlamp Relay	8W-50-8, 14
Park Brake Switch	8W-50-14
Park Lamp Relay	8W-50-4, 5
Rear Fog Lamp Relay	8W-50-3
Right Fog Lamp	8W-50-11
Right Front Park/Turn Signal Lamp	8W-50-7, 12
Right Front Position Lamp	8W-50-6
Right Front Side Marker Lamp	8W-50-12
Right Headlamp Leveling Motor	8W-50-6
Right High Beam Headlamp	8W-50-8, 9, 15
Right Low Beam Headlamp	8W-50-8, 10
Spot Lamp No. 1	8W-50-16
Spot Lamp No. 2	8W-50-16
Turn Signal/Hazard Switch	8W-50-12, 13

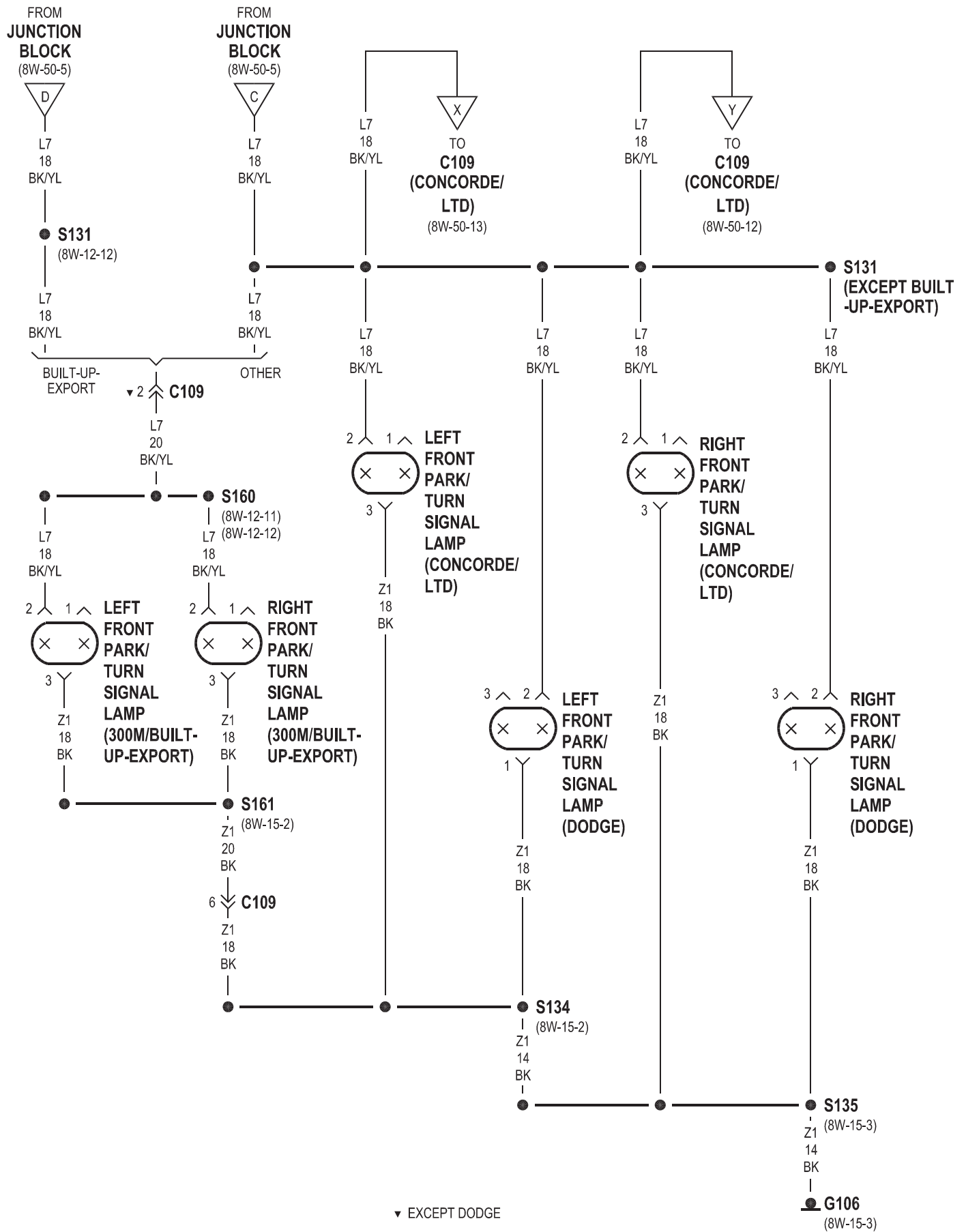


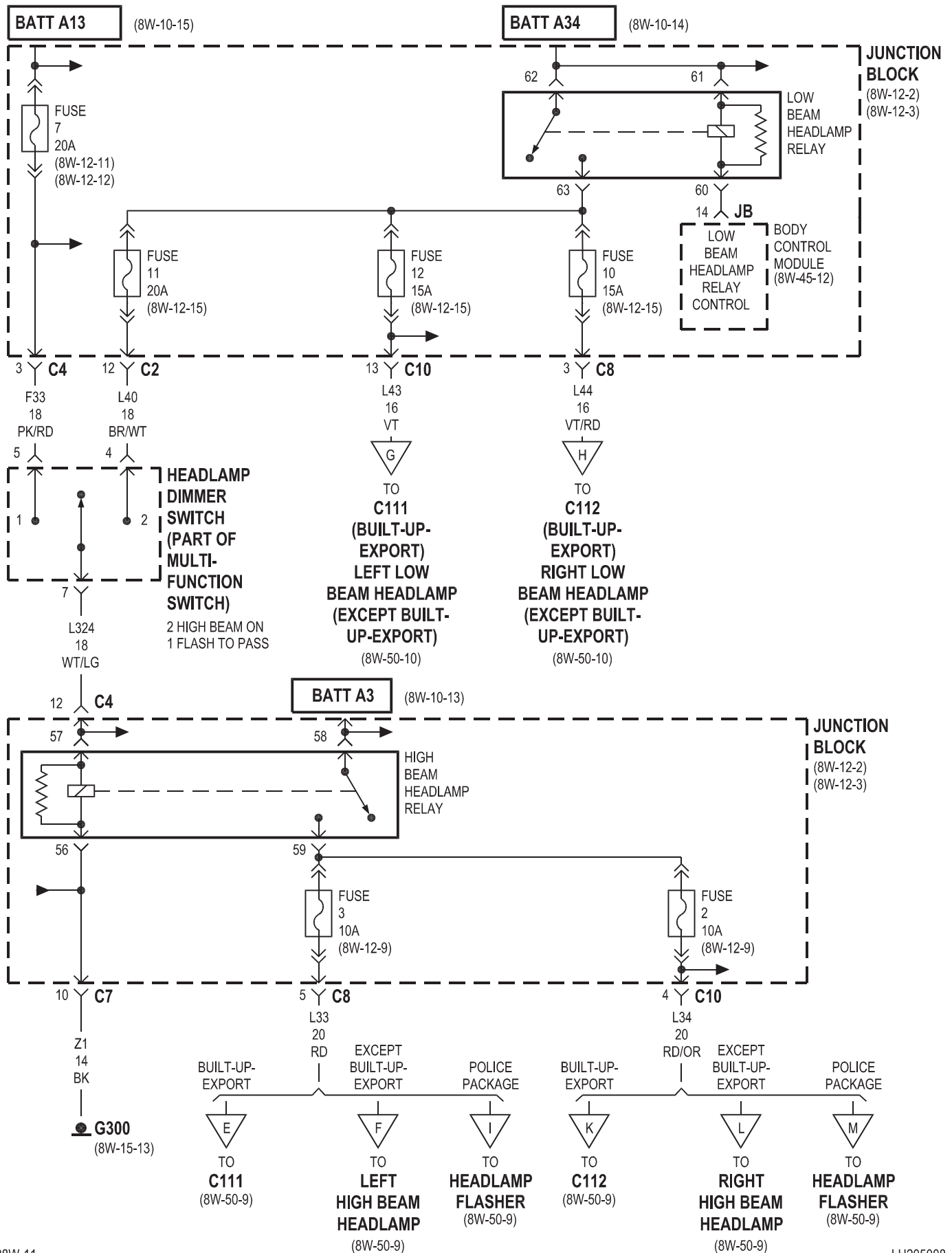


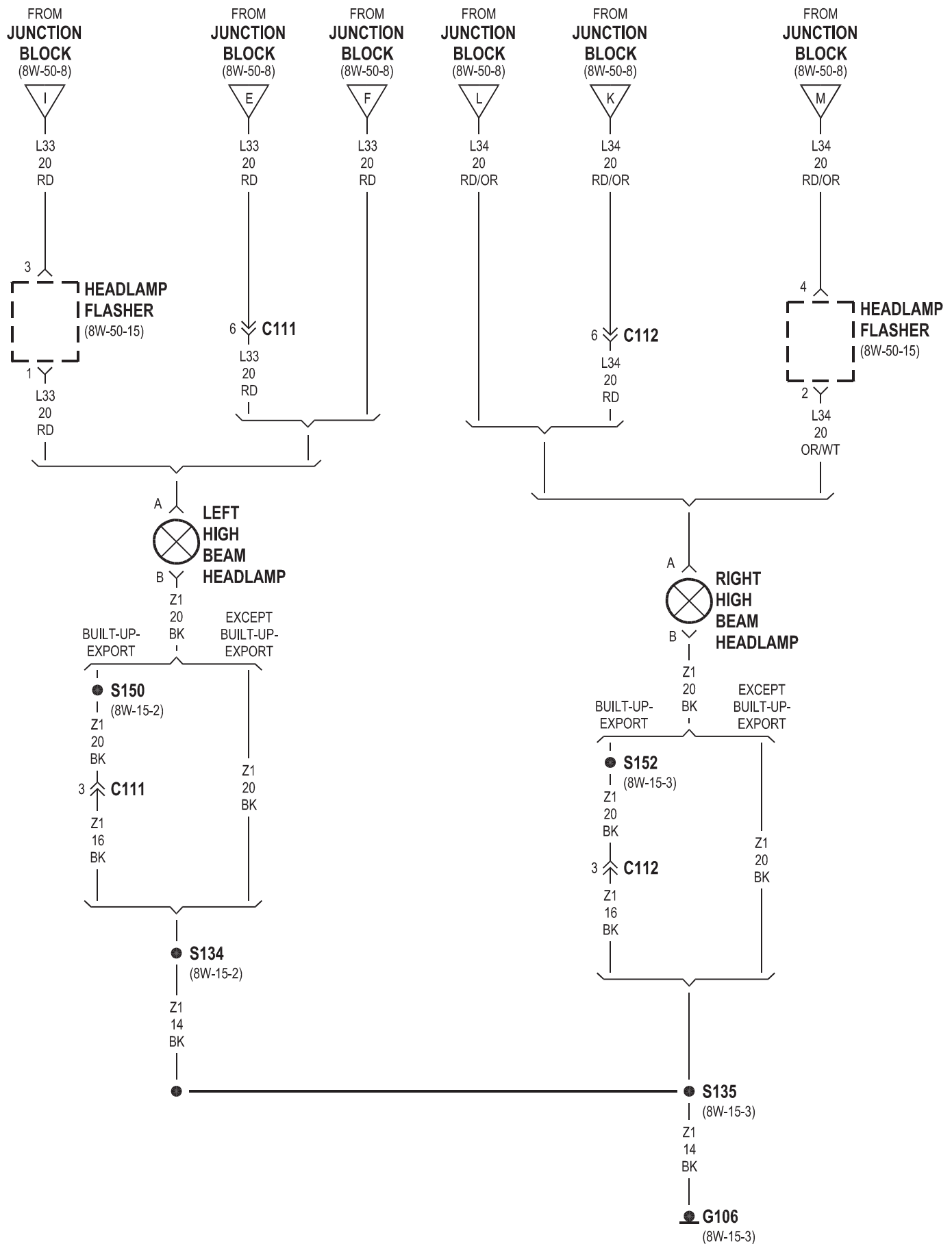


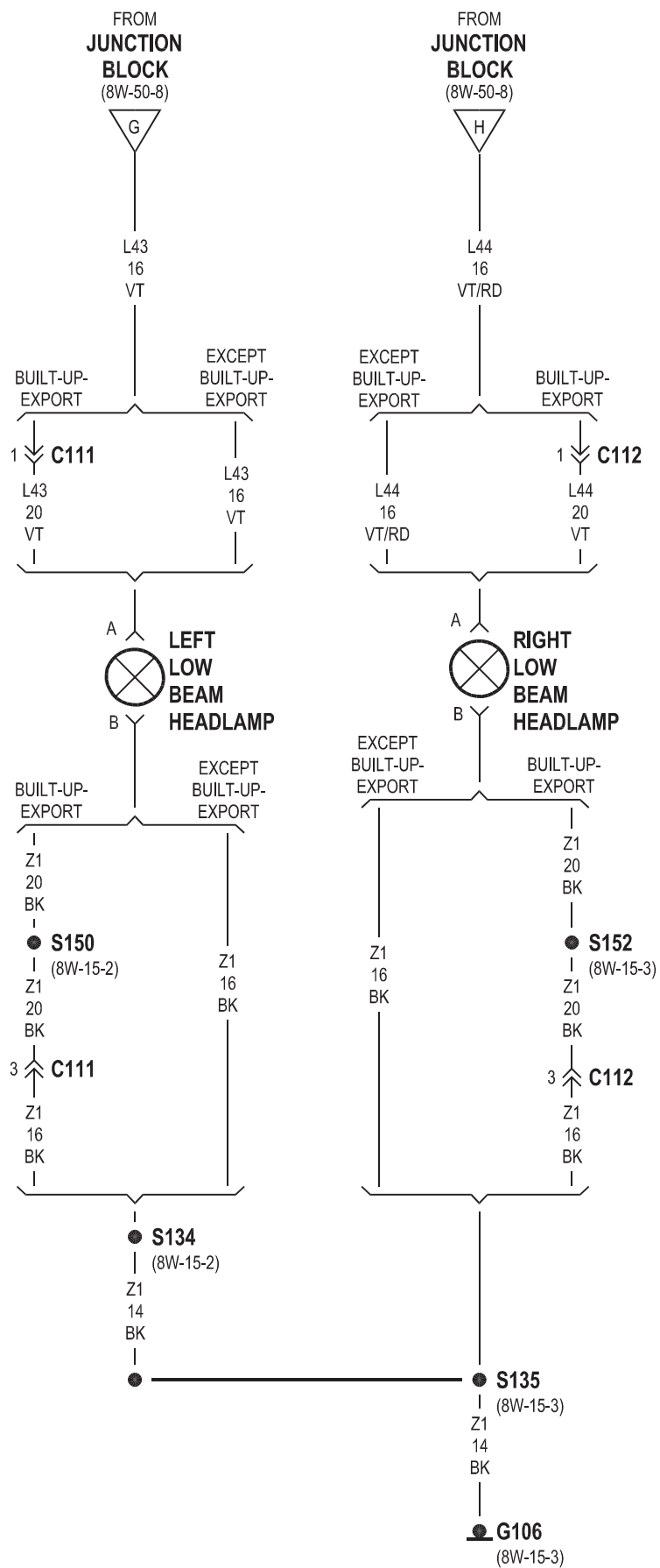




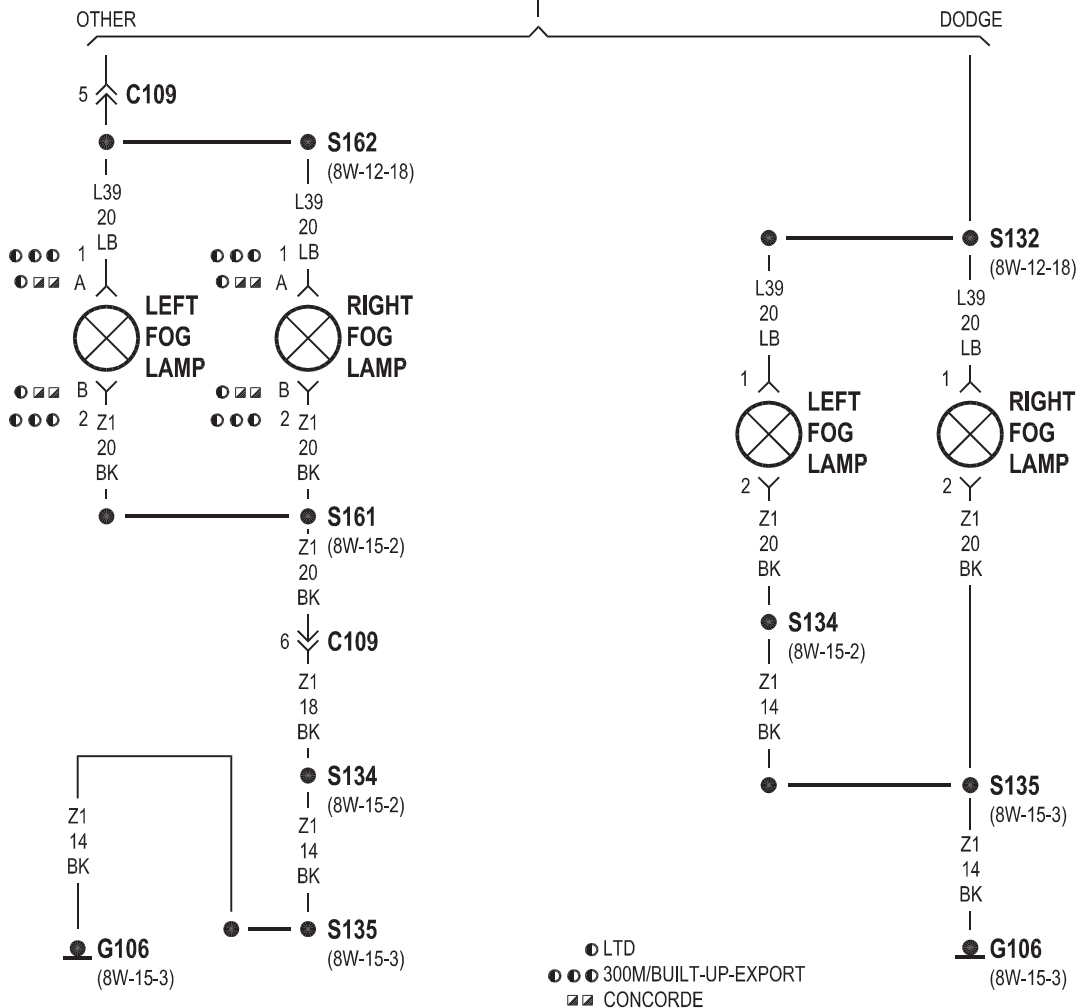
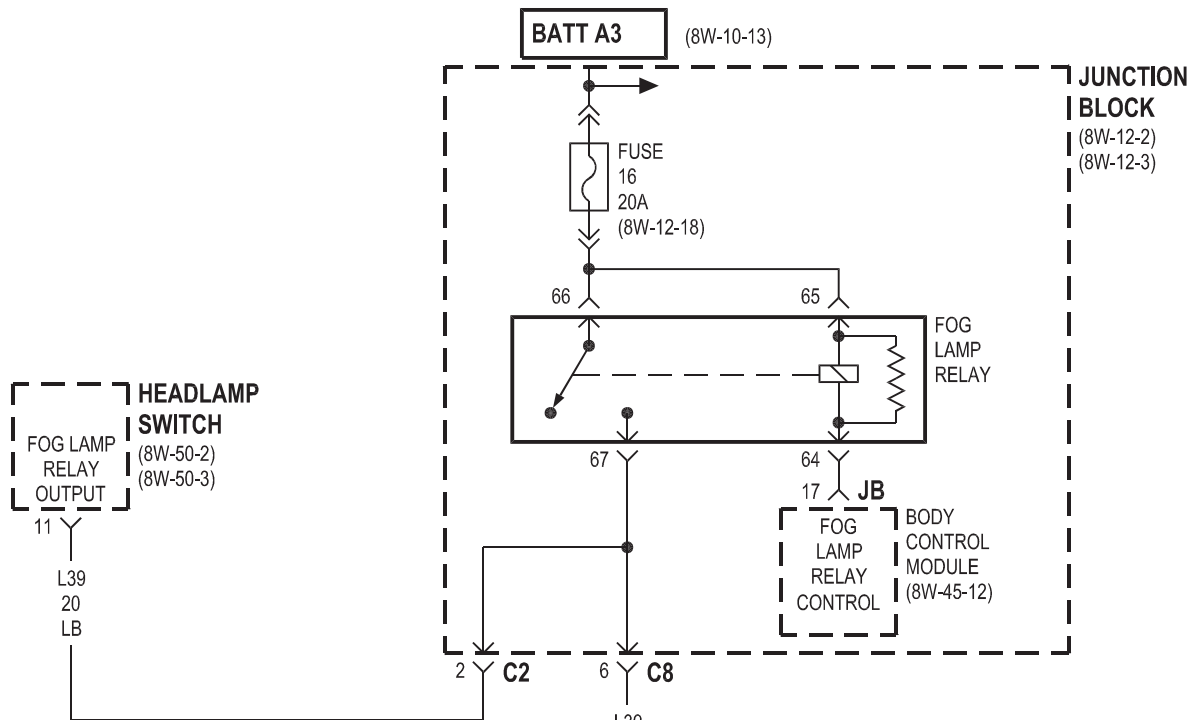


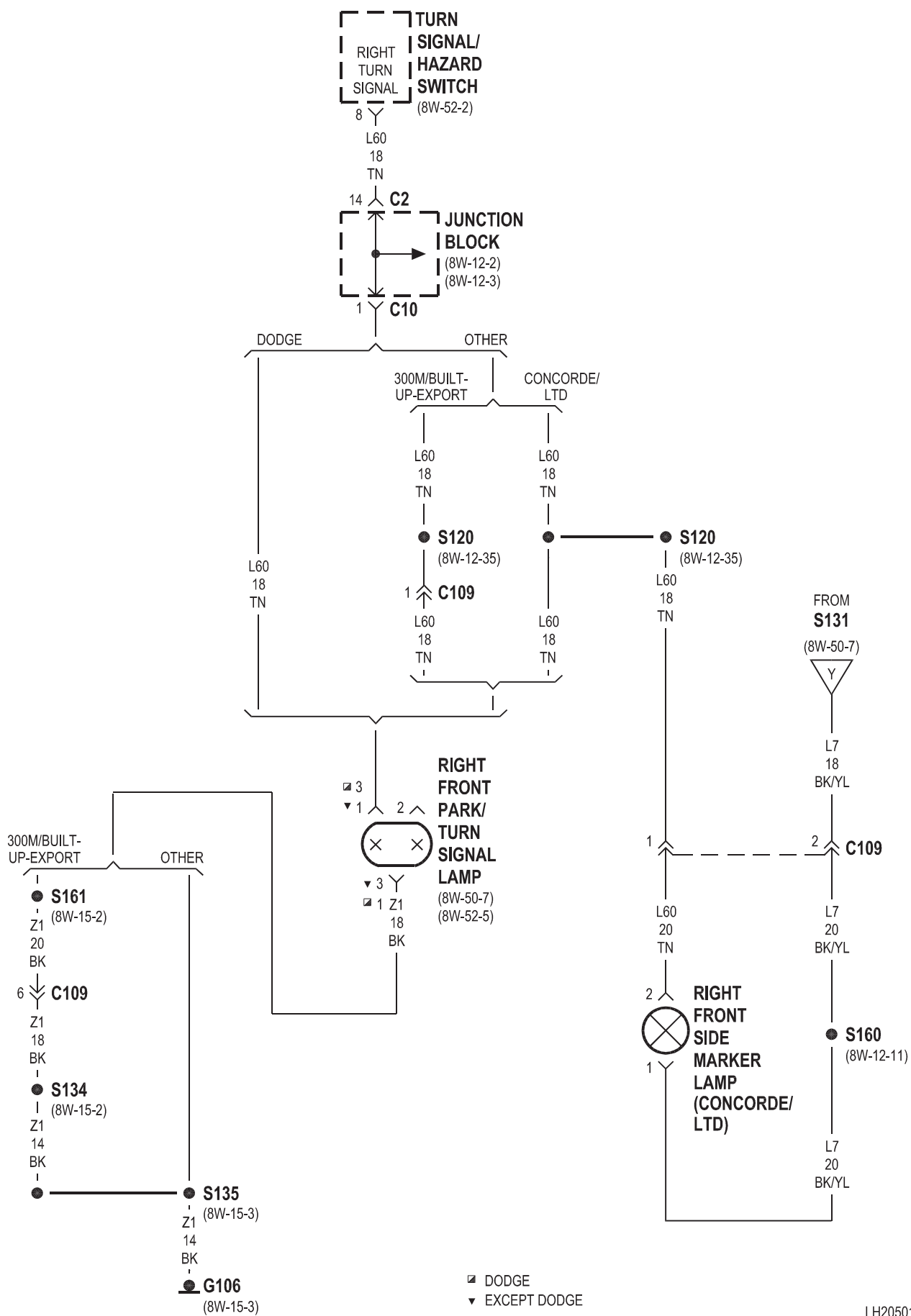


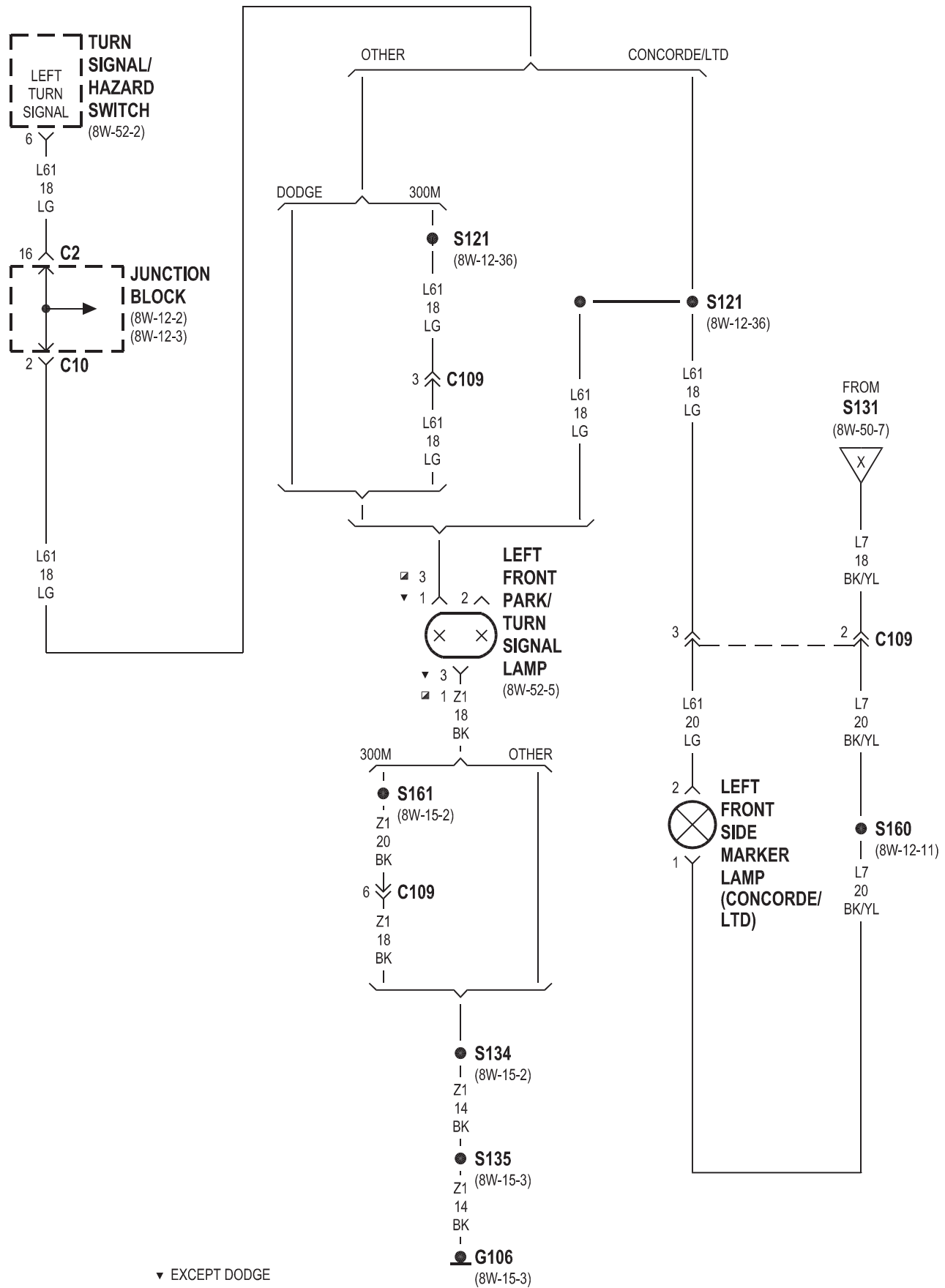


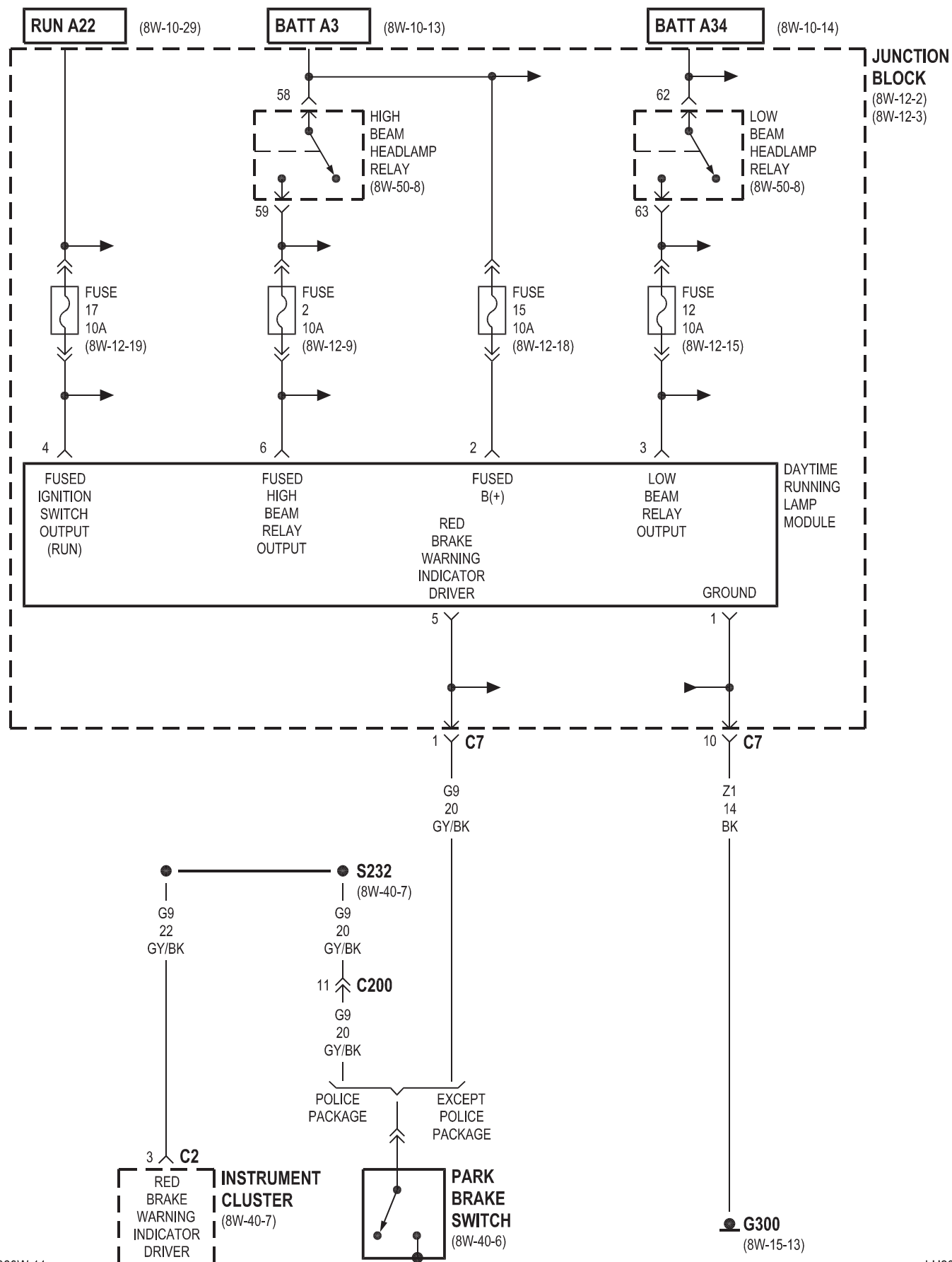


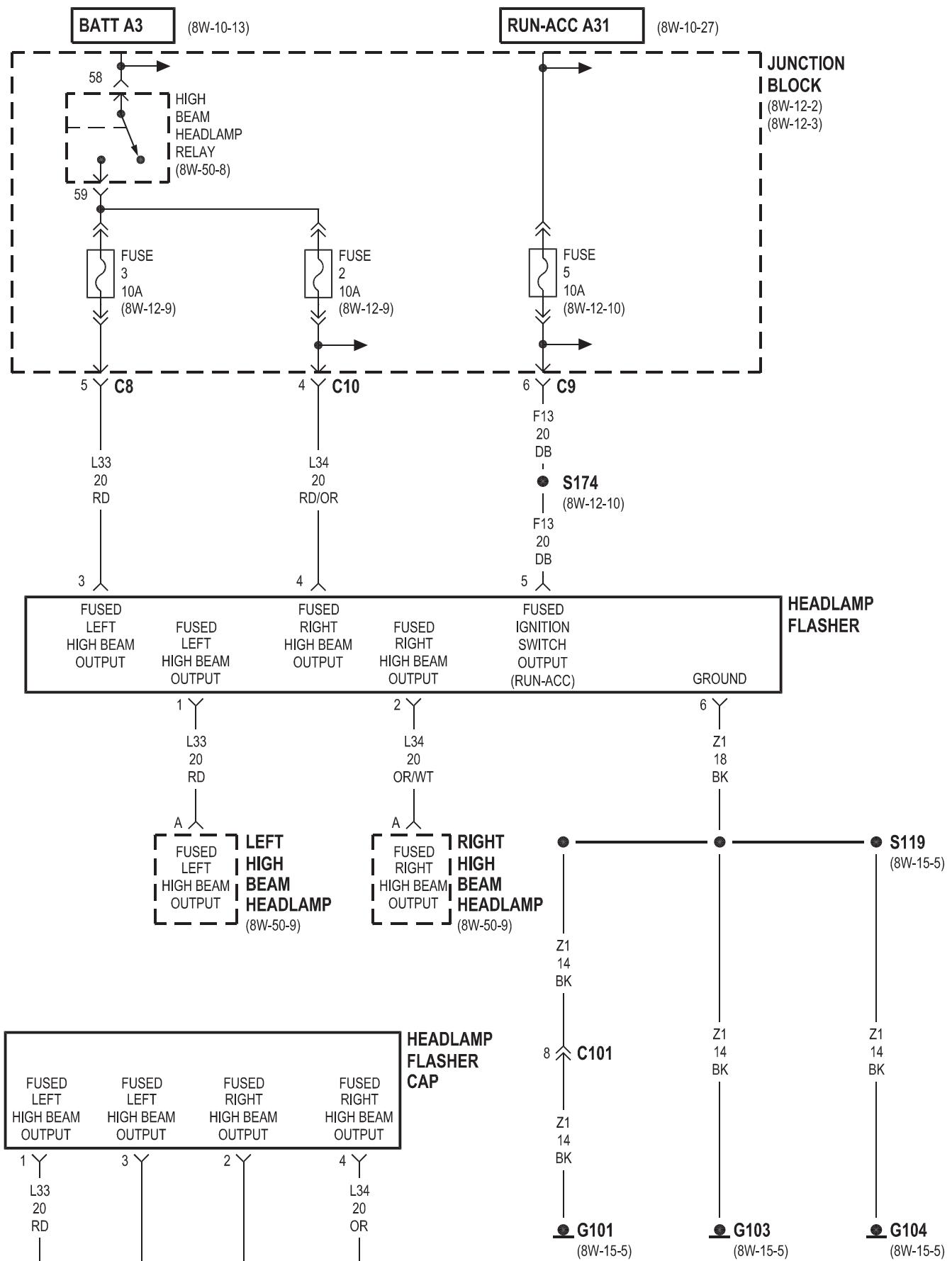
FOG LAMPS

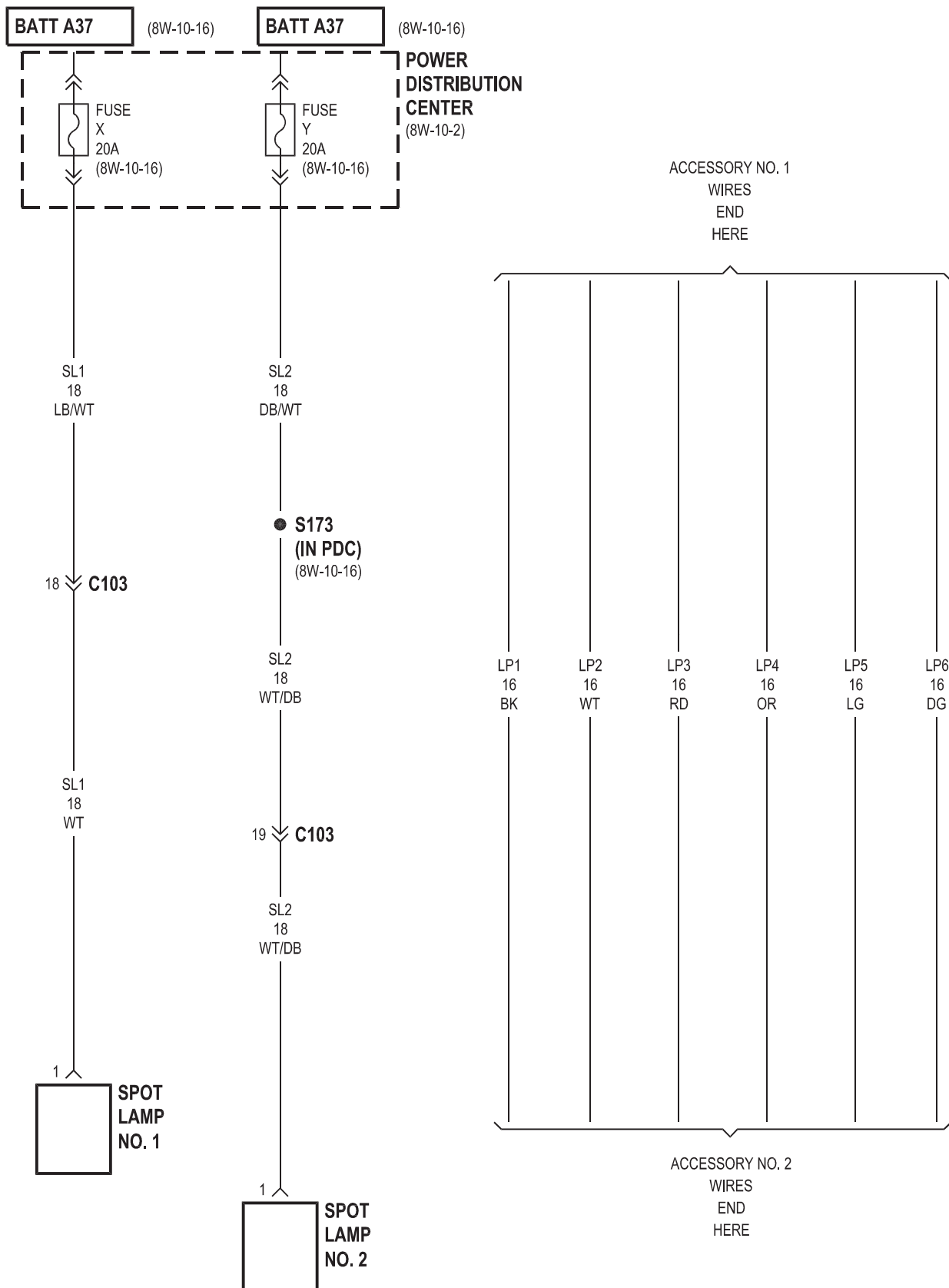








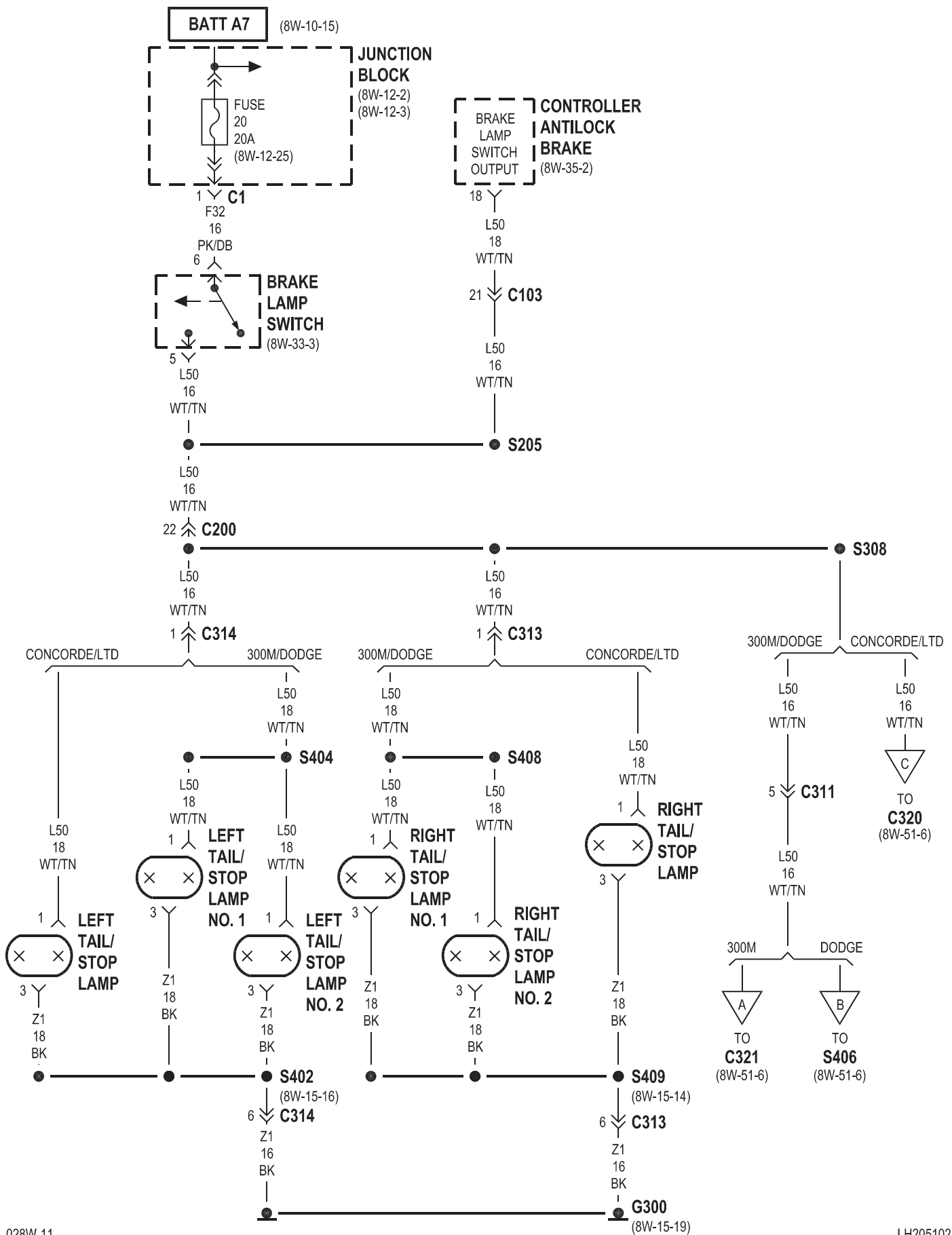


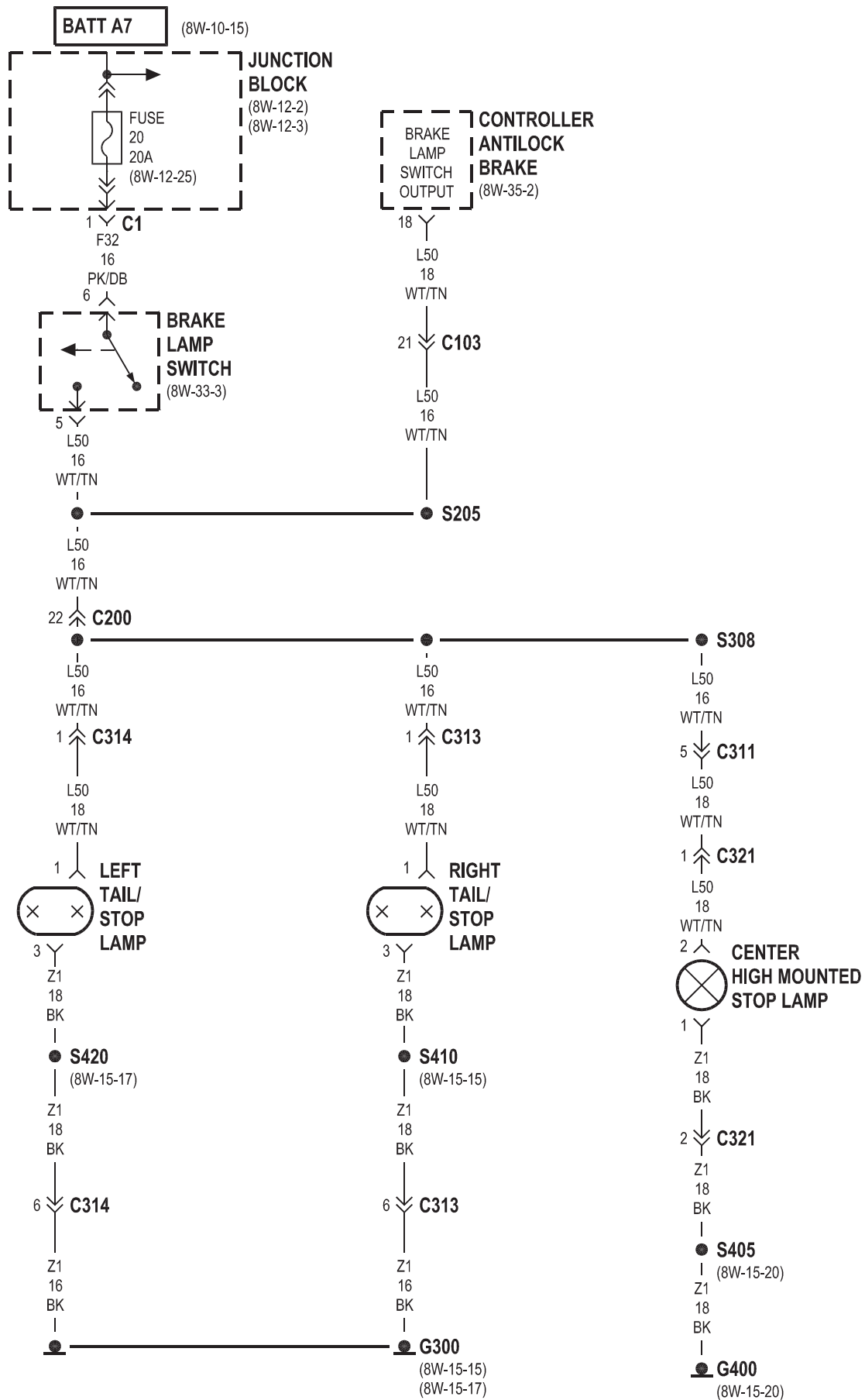


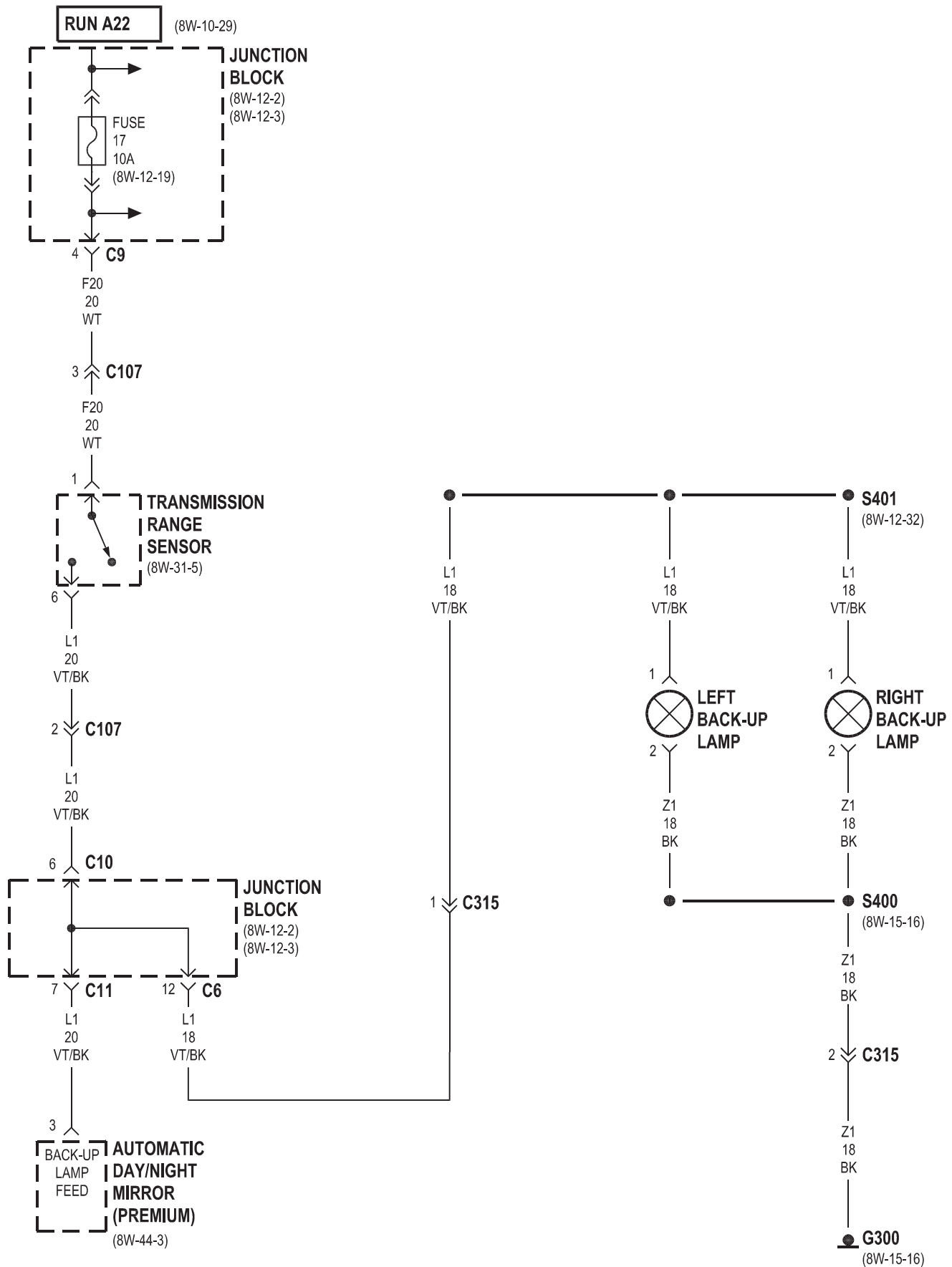
8W-51 REAR LIGHTING

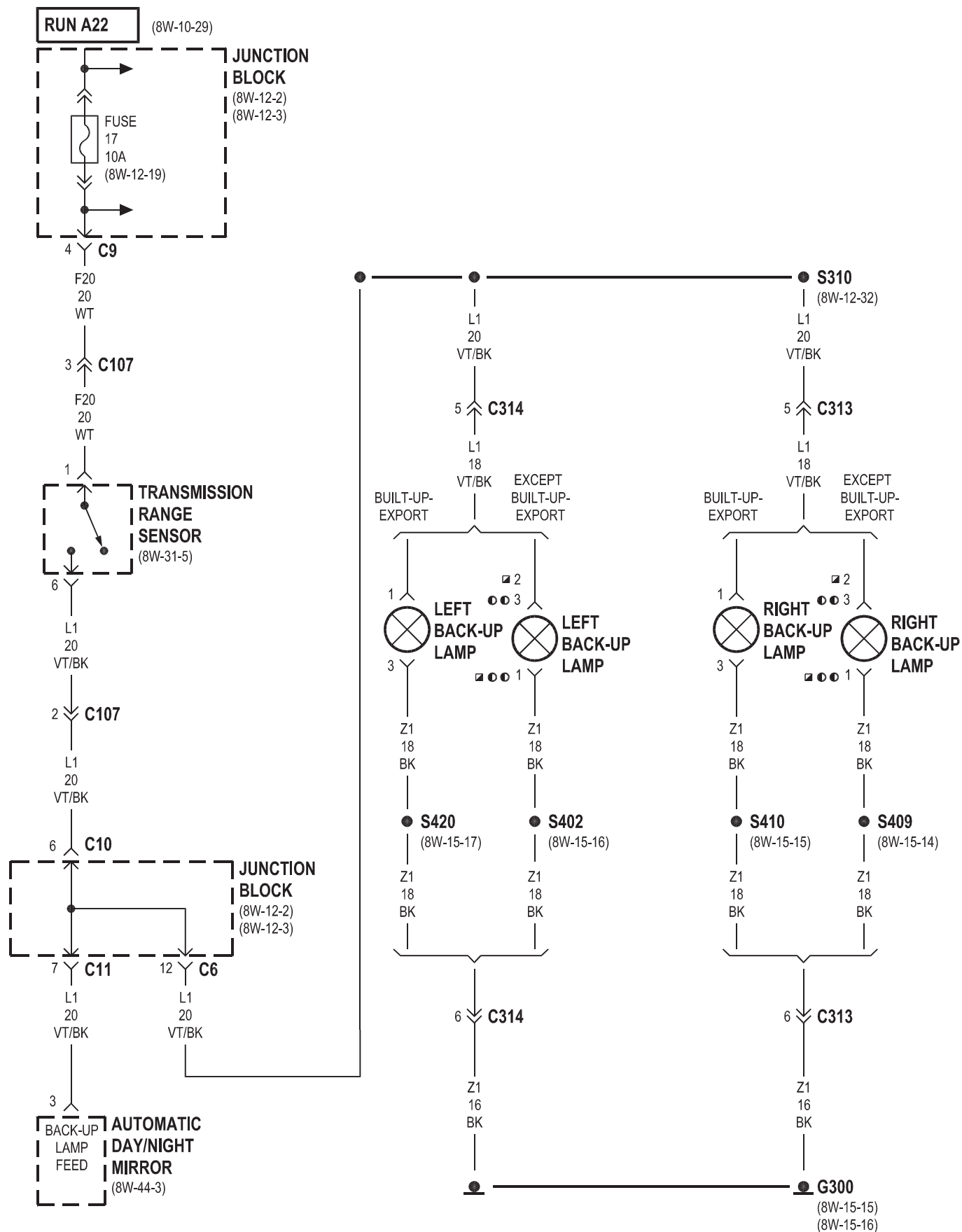
Component	Page
Automatic Day/Night Mirror	8W-51-4, 5
Brake Lamp Switch	8W-51-2, 3
Center High Mounted Stop Lamp	8W-51-3, 6
Center High Mounted Stop Lamp No. 1 . . .	8W-51-6
Center High Mounted Stop Lamp No. 2 . . .	8W-51-6
Controller Antilock Brake	8W-51-2, 3
Fuse 7 (JB)	8W-51-7, 8, 9
Fuse 17 (JB)	8W-51-4, 5
Fuse 20 (JB)	8W-51-2, 3
Fuse R (PDC)	8W-51-10
G200	8W-51-10
G300	8W-51-2, 3, 4, 5, 6, 7, 8, 9, 10
G301	8W-51-6, 7, 9
G400	8W-51-3, 6
Headlamp Switch	8W-51-10
Junction Block	8W-51-2, 3, 4, 5, 7, 8, 9
Left Back-Up Lamp	8W-51-4, 5
Left License Lamp	8W-51-9
Left Rear Fog Lamp	8W-51-10
Left Rear Side Marker Lamp	8W-51-8

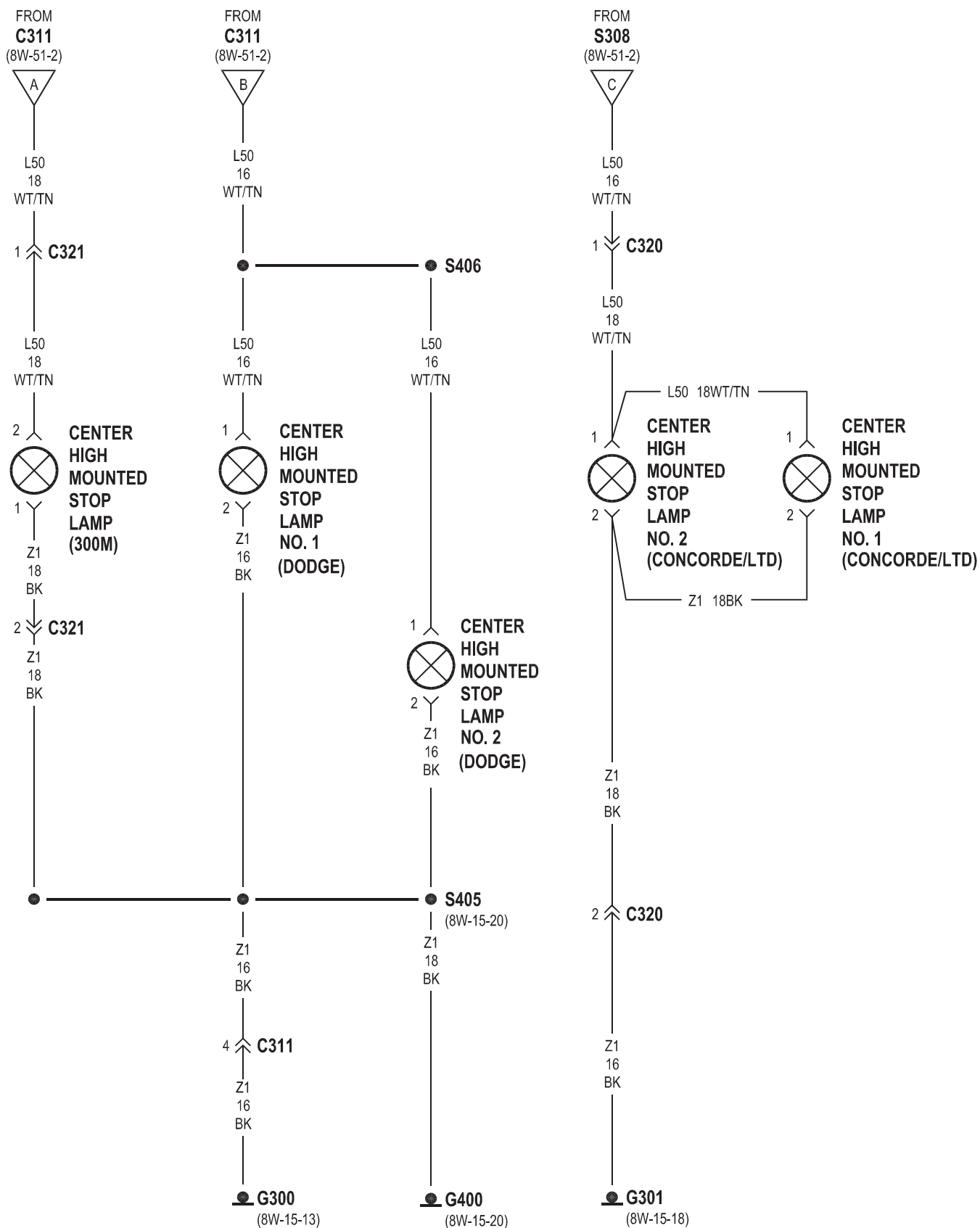
Component	Page
Left Tail Lamp	8W-51-8, 9
Left Tail/Stop Lamp	8W-51-2, 3, 8, 9
Left Tail/Stop Lamp No. 1	8W-51-2, 8
Left Tail/Stop Lamp No. 2	8W-51-2, 8
Left Tail/Turn Signal Lamp	8W-51-8
License Lamp	8W-51-7
Park Lamp Relay	8W-51-7, 8, 9
Rear Fog Lamp Relay	8W-51-10
Right Back-Up Lamp	8W-51-4, 5
Right License Lamp	8W-51-9
Right Rear Fog Lamp	8W-51-10
Right Rear Side Marker Lamp	8W-51-7
Right Tail Lamp	8W-51-7, 9
Right Tail/Stop Lamp	8W-51-2, 3, 7, 9
Right Tail/Stop Lamp No. 1	8W-51-2, 7
Right Tail/Stop Lamp No. 2	8W-51-2, 7
Right Tail/Turn Signal Lamp	8W-51-7
Transmission Range Sensor	8W-51-4, 5

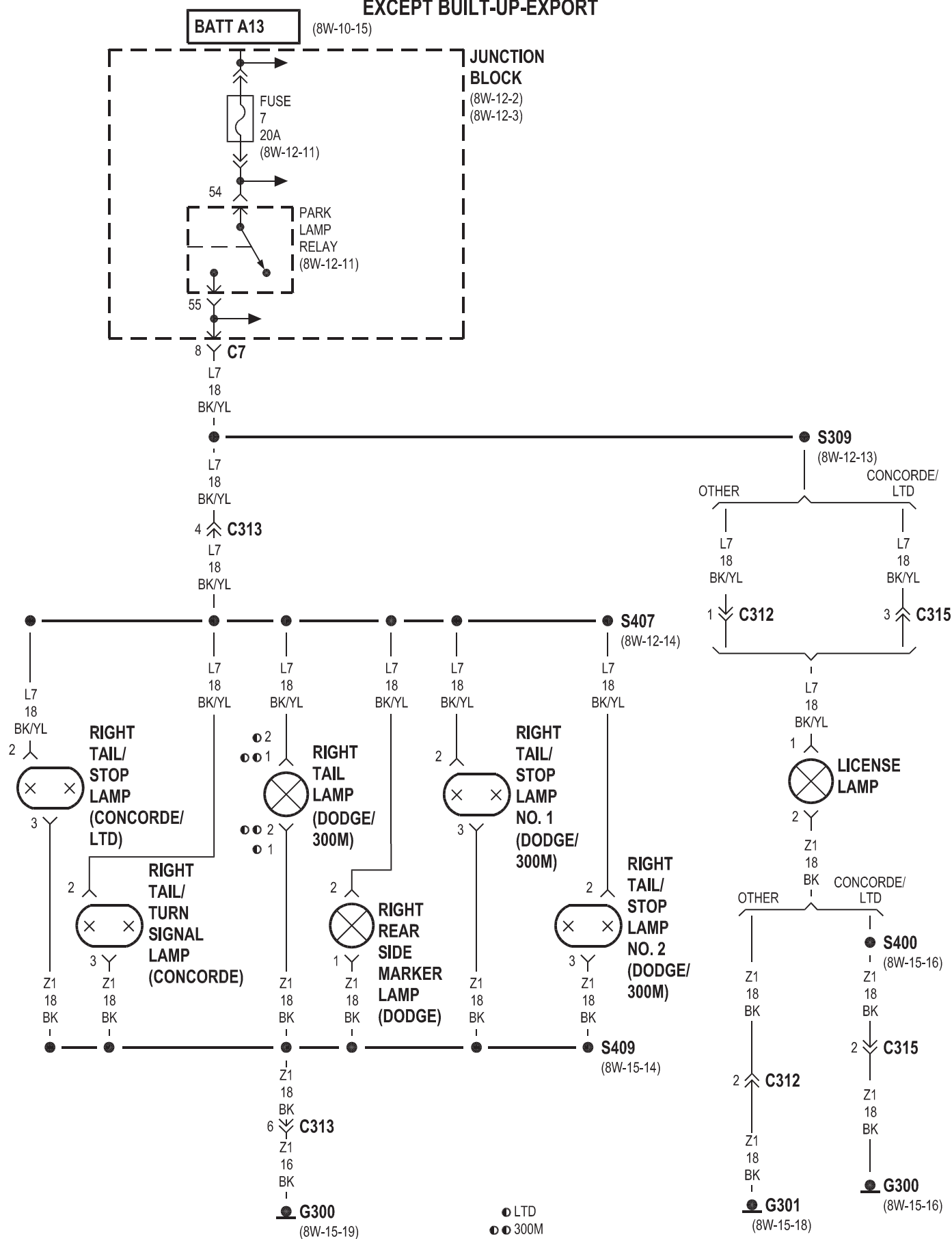


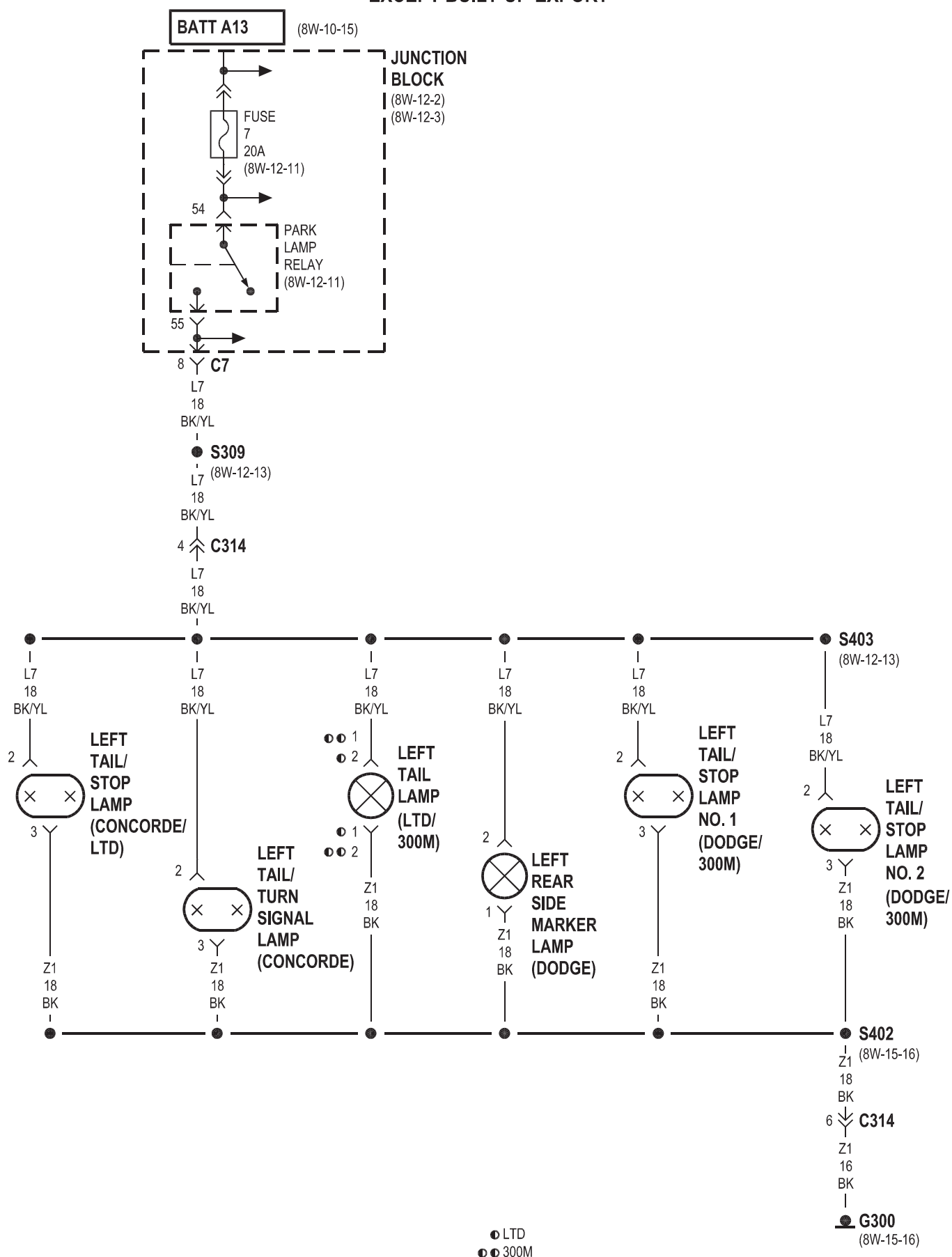


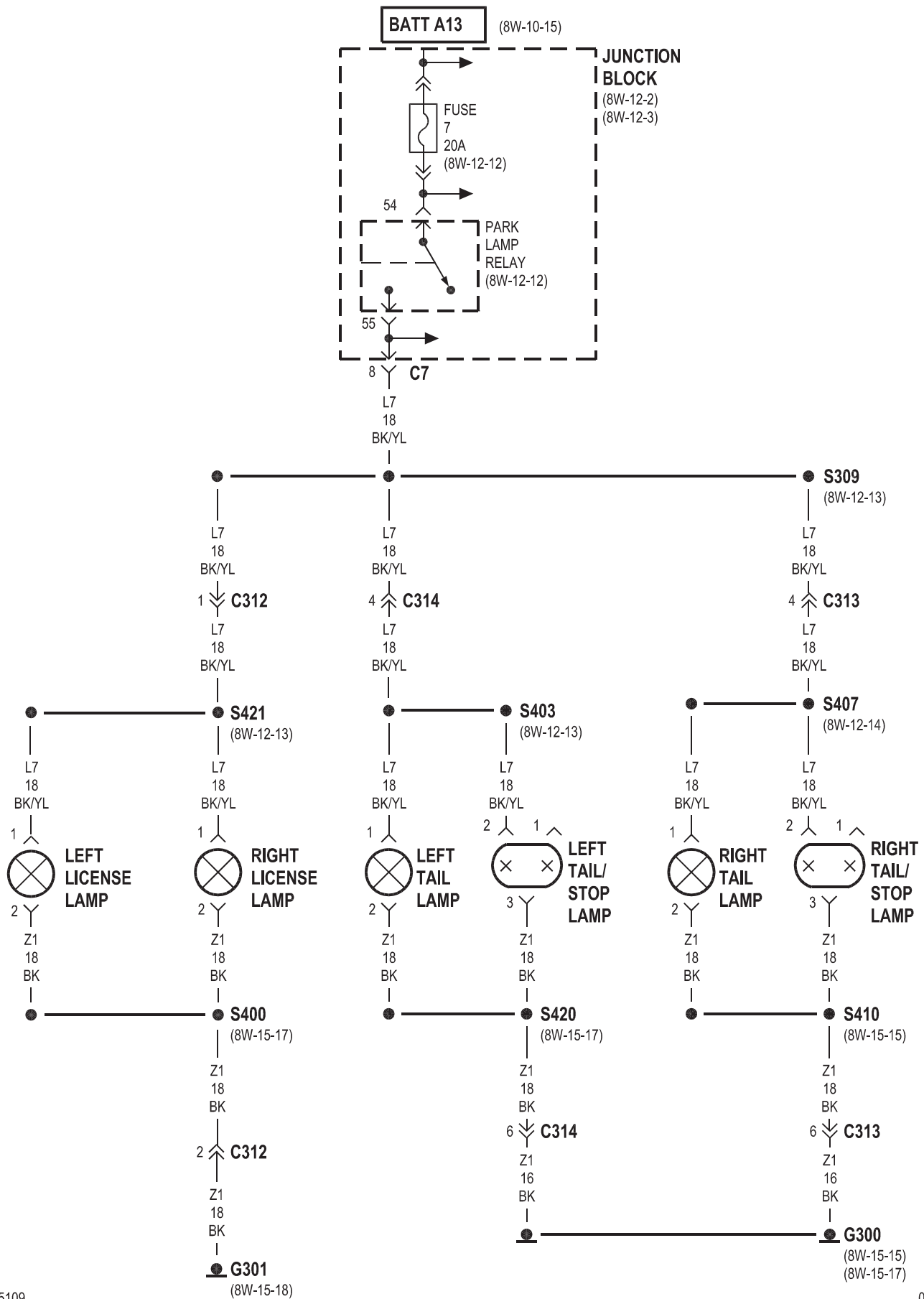


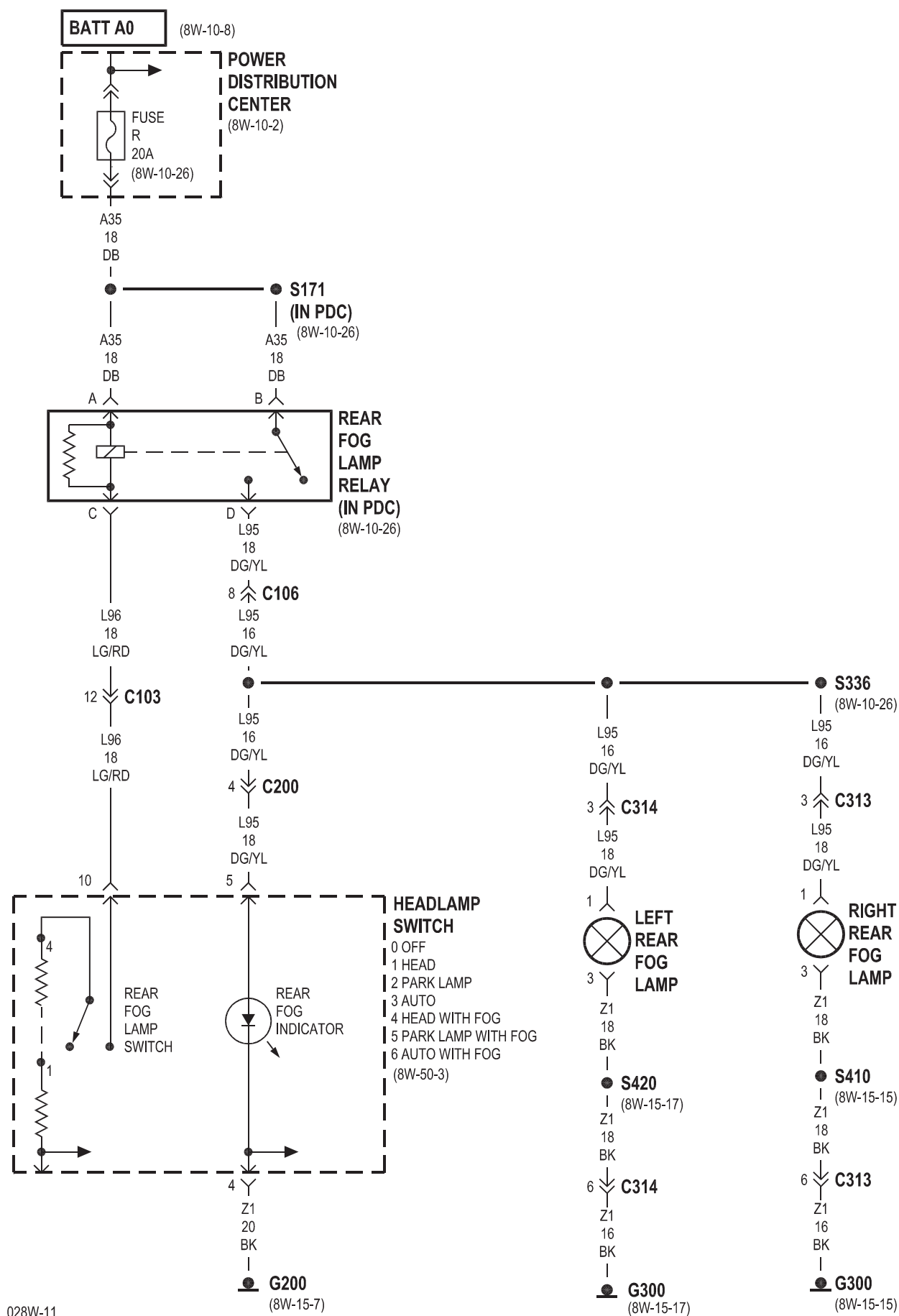








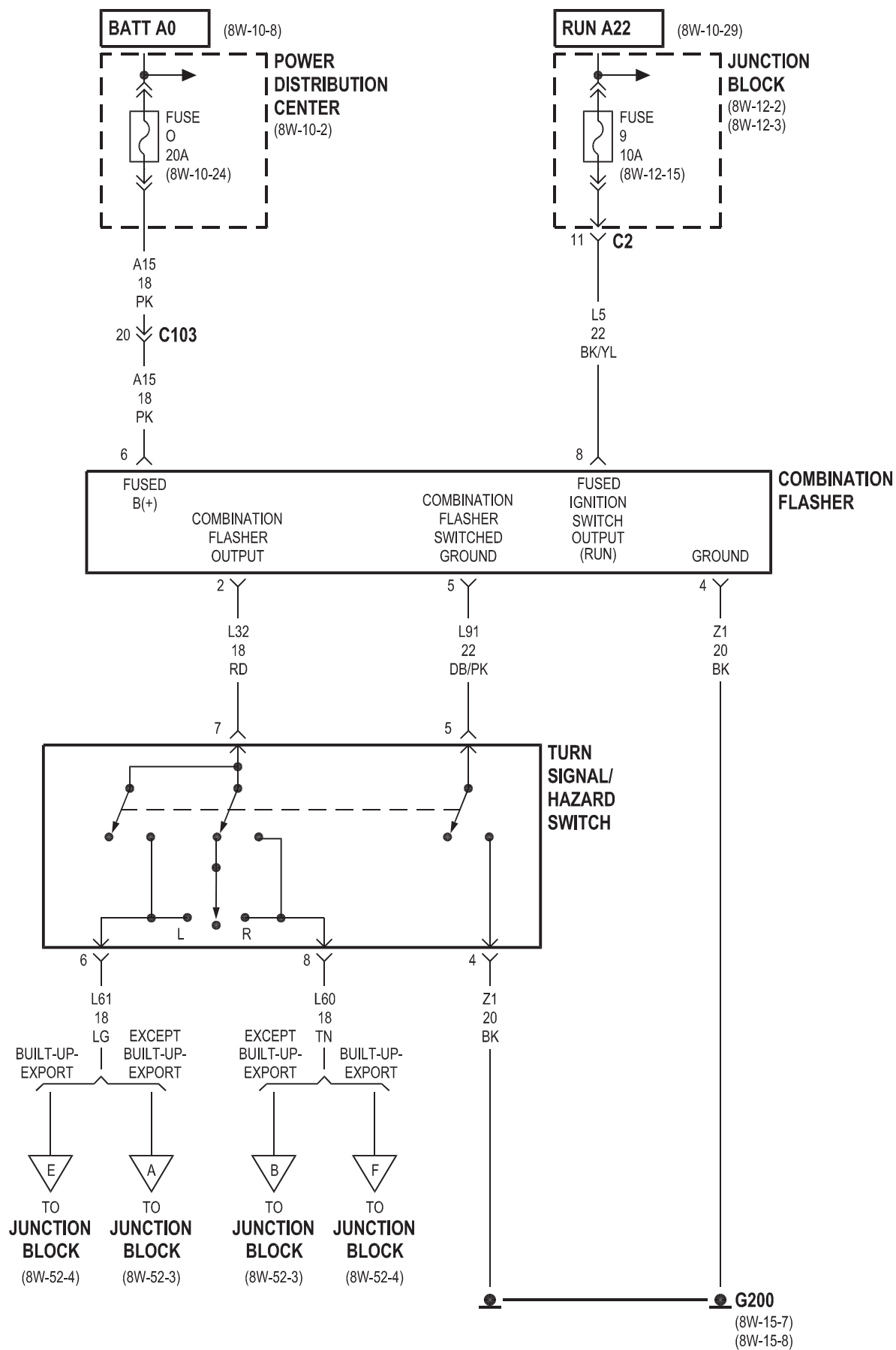


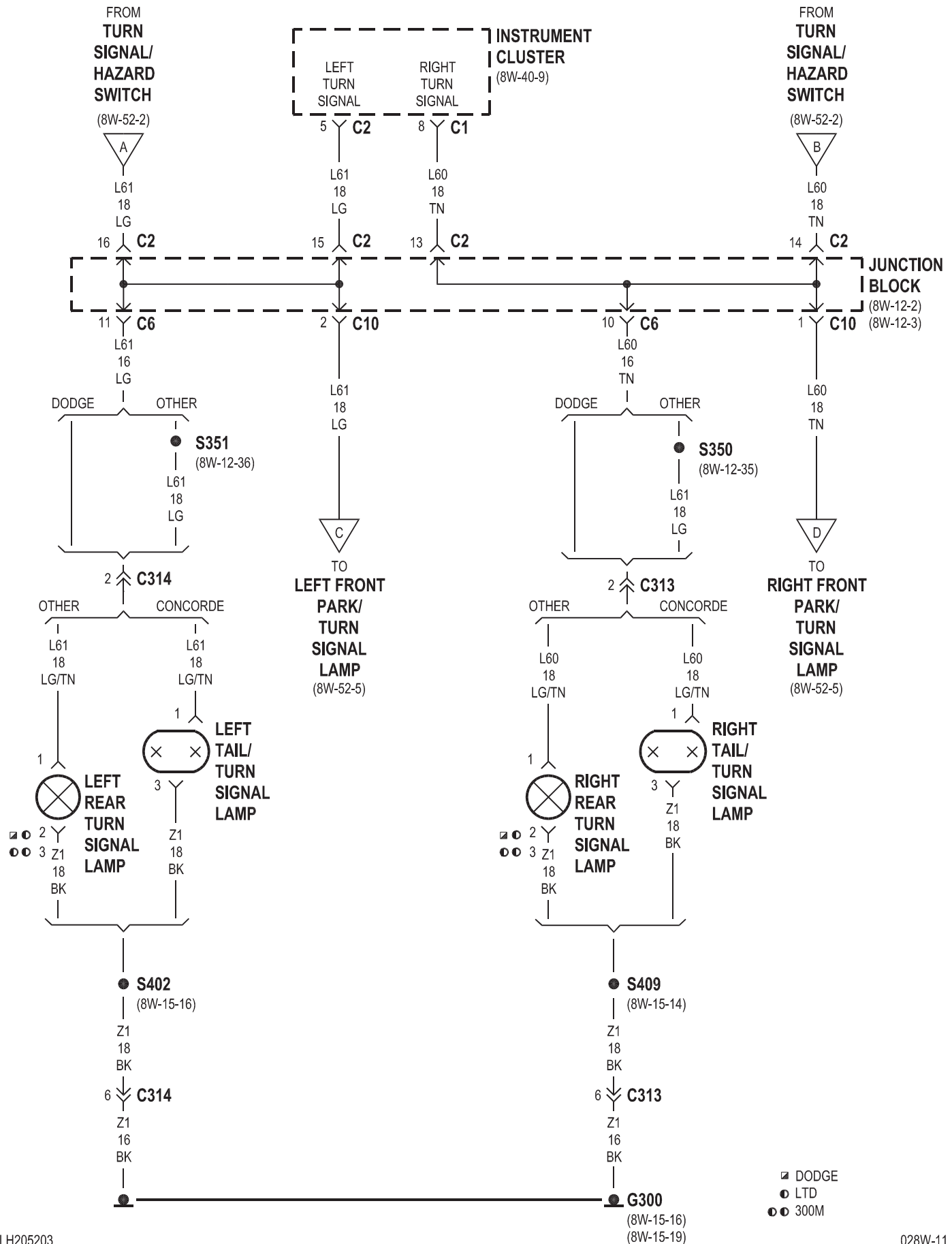


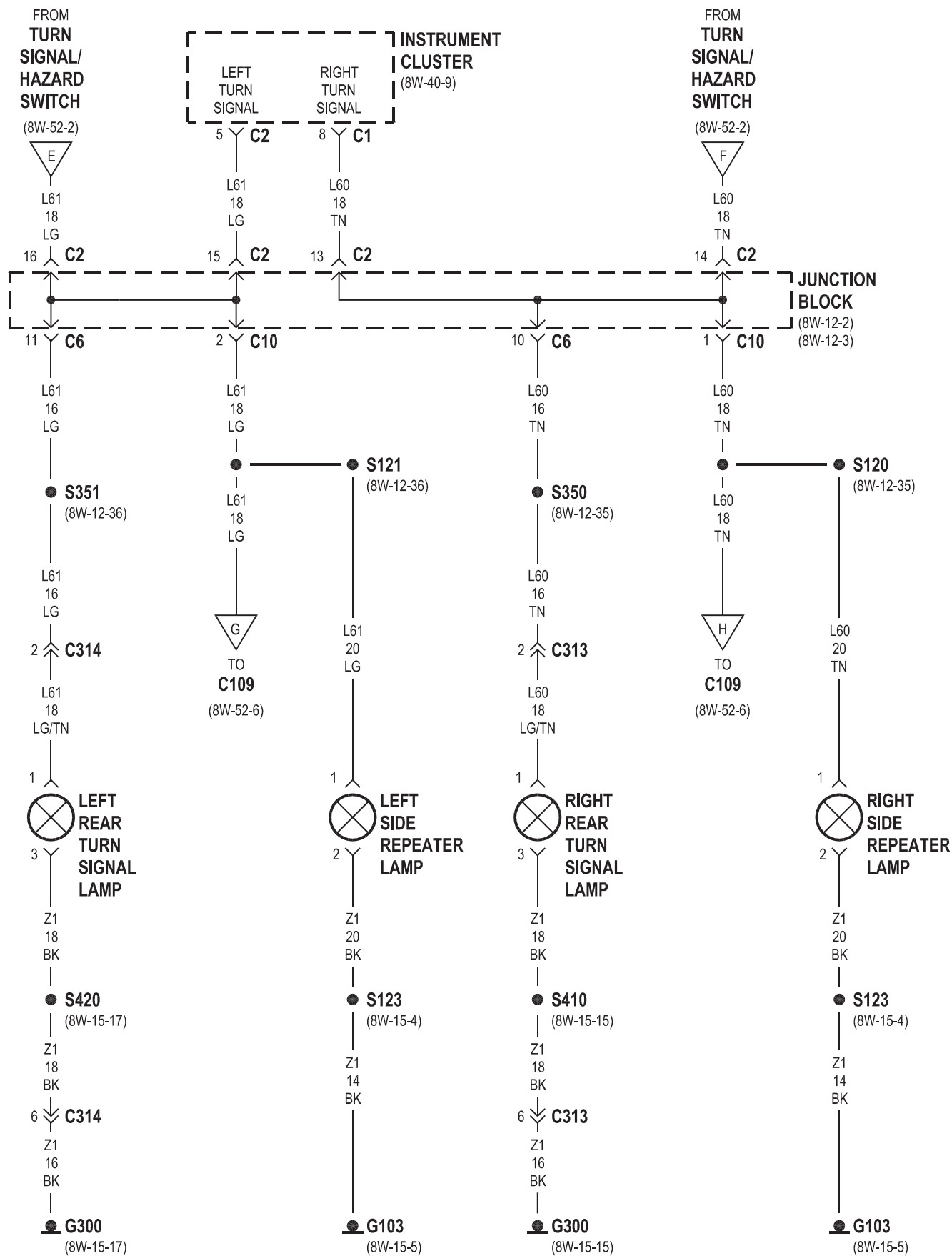
8W-52 TURN SIGNALS

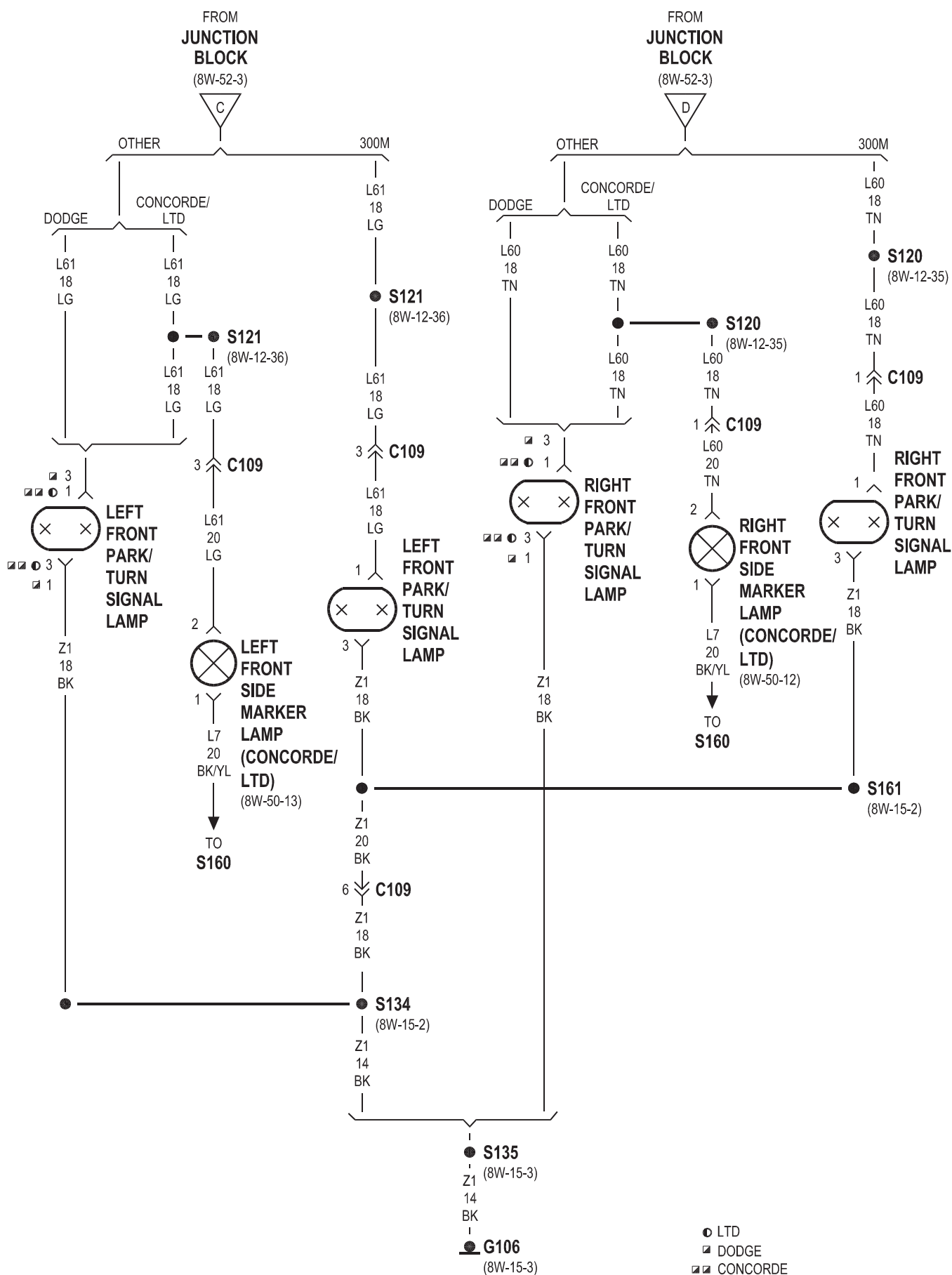
Component	Page
Combination Flasher	8W-52-2
Fuse 9 (JB)	8W-52-2
Fuse O (PDC)	8W-52-2
G103	8W-52-4
G106	8W-52-5, 6
G200	8W-52-2
G300	8W-52-3, 4
Instrument Cluster	8W-52-3, 4
Junction Block	8W-52-2, 3, 4, 5
Left Front Park/Turn Signal Lamp . . .	8W-52-3, 5, 6
Left Front Side Marker Lamp	8W-52-5
Left Rear Turn Signal Lamp	8W-52-3, 4

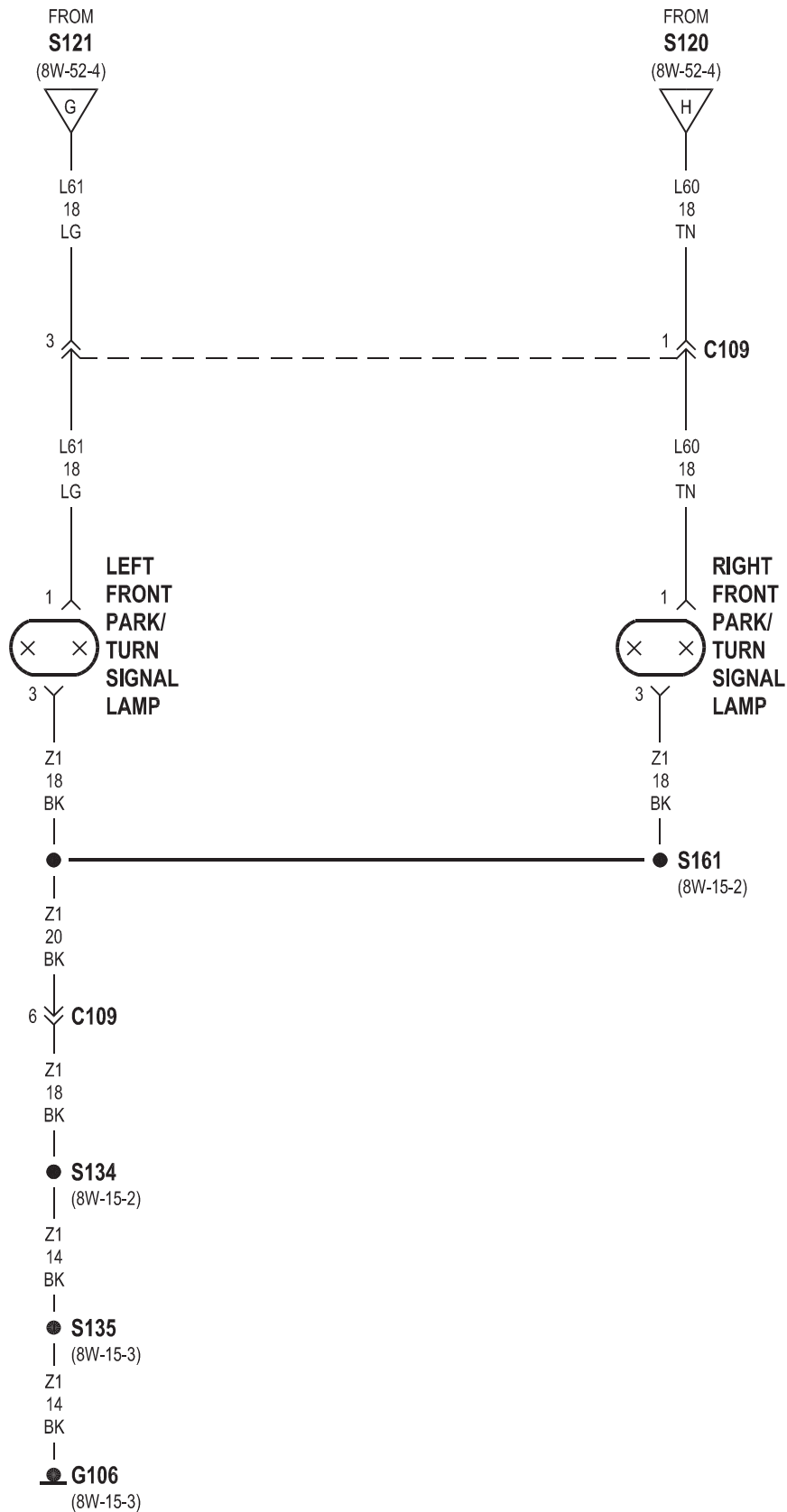
Component	Page
Left Side Repeater Lamp	8W-52-4
Left Tail/Turn Signal Lamp	8W-52-3
Power Distribution Center	8W-52-2
Right Front Park/Turn Signal Lamp	8W-52-3, 5, 6
Right Front Side Marker Lamp	8W-52-5
Right Rear Turn Signal Lamp	8W-52-3, 4
Right Side Repeater Lamp	8W-52-4
Right Tail/Turn Signal Lamp	8W-52-3
Turn Signal/Hazard Switch	8W-52-2, 3, 4







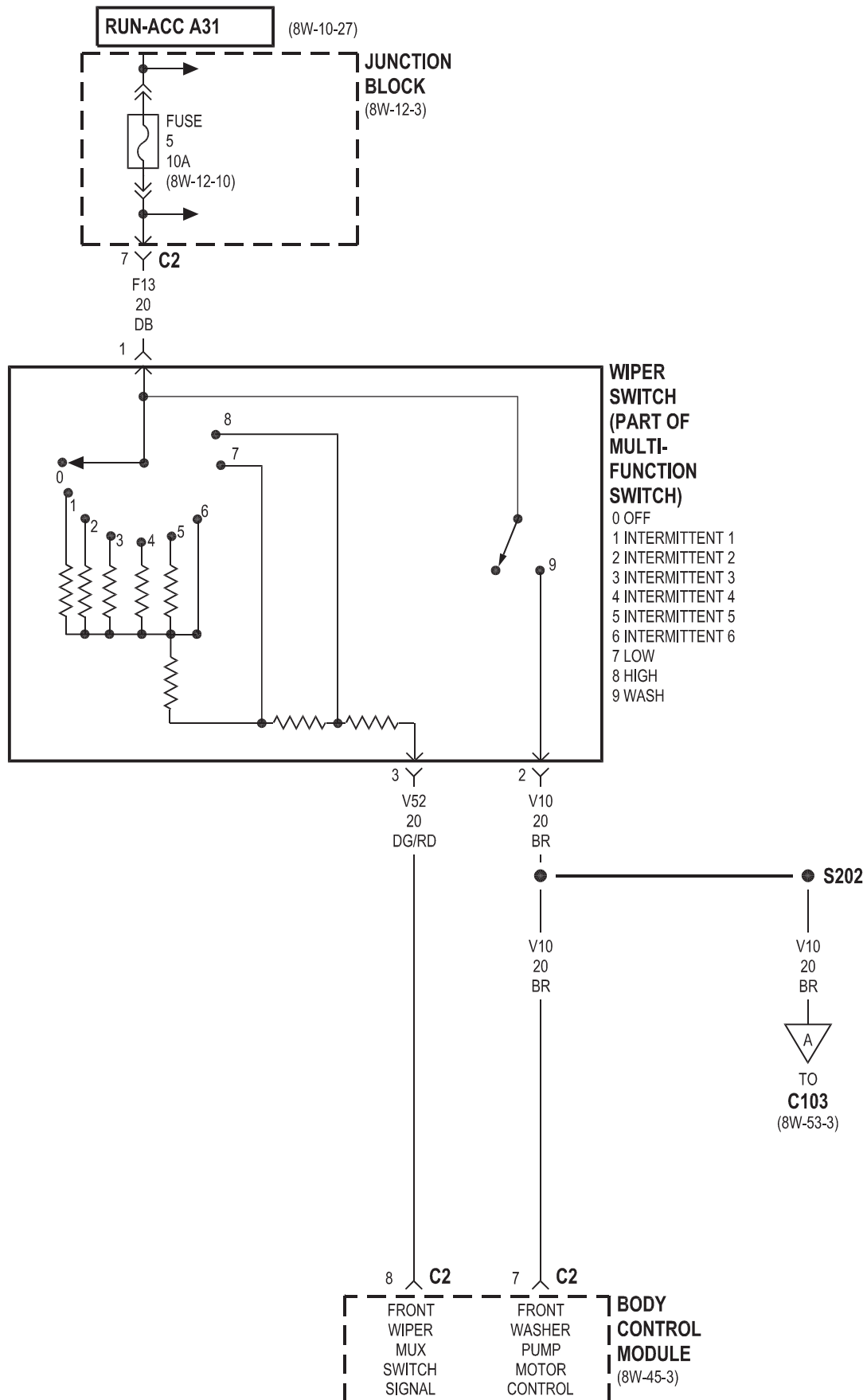


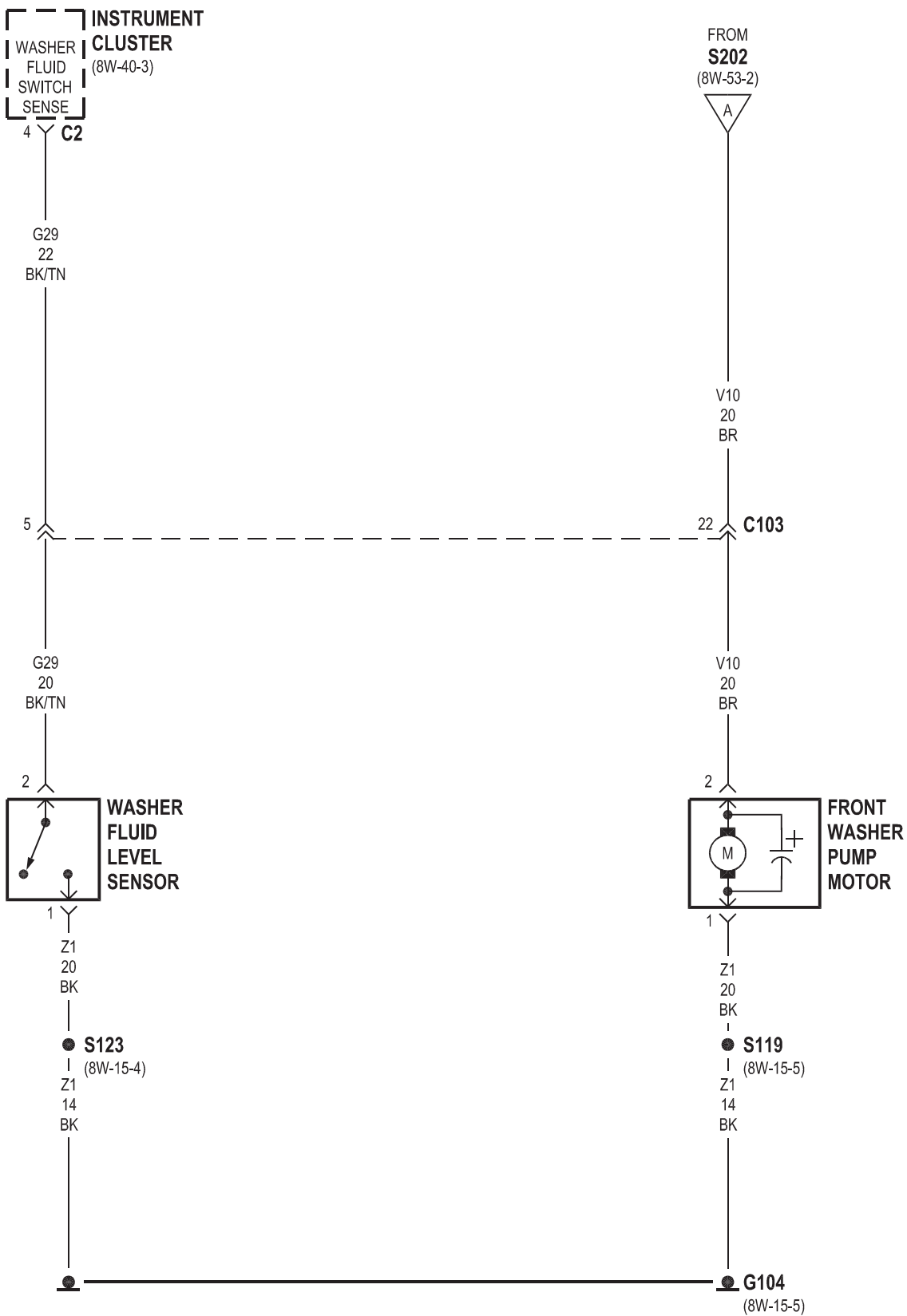


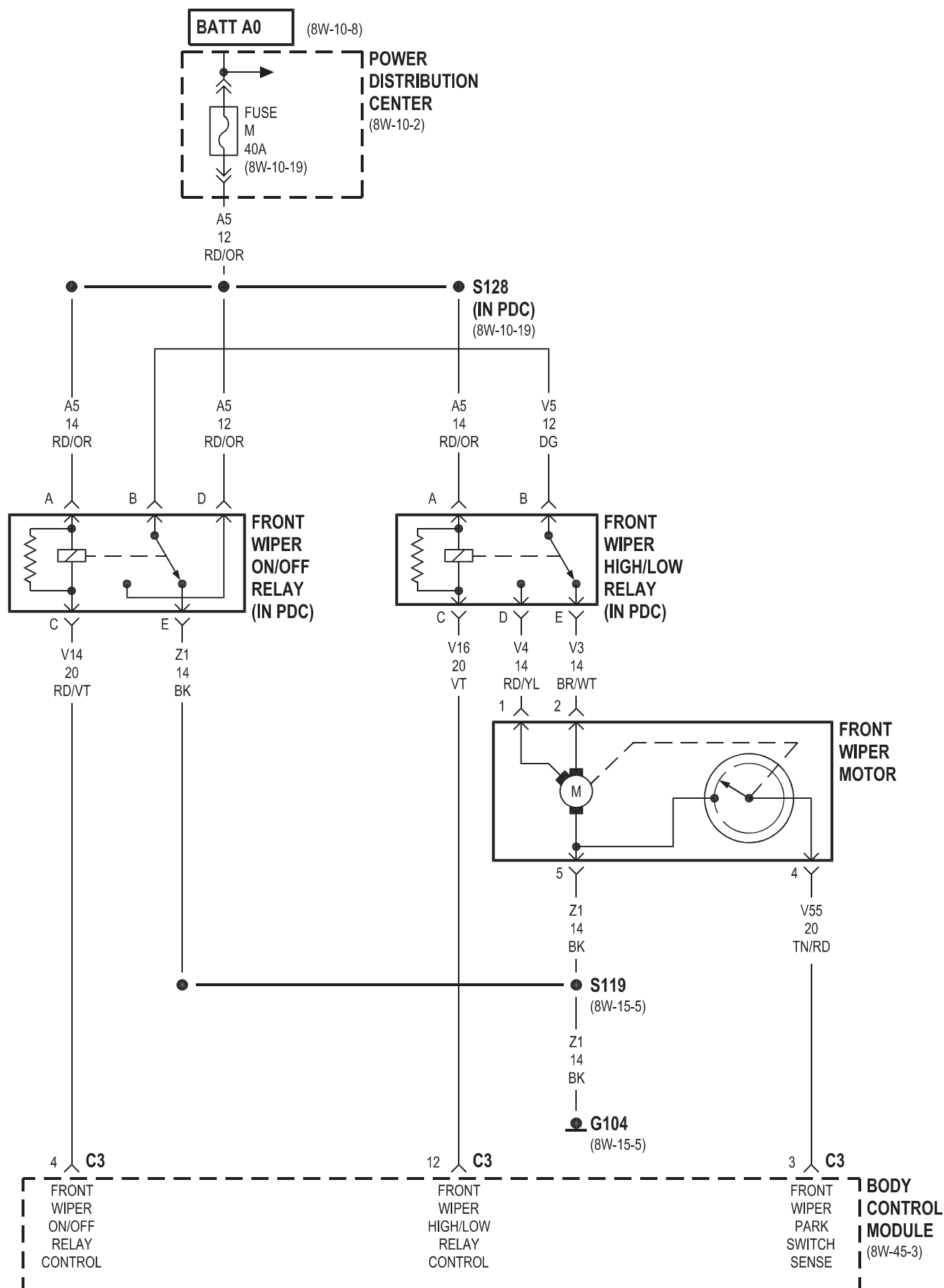
8W-53 WIPERS

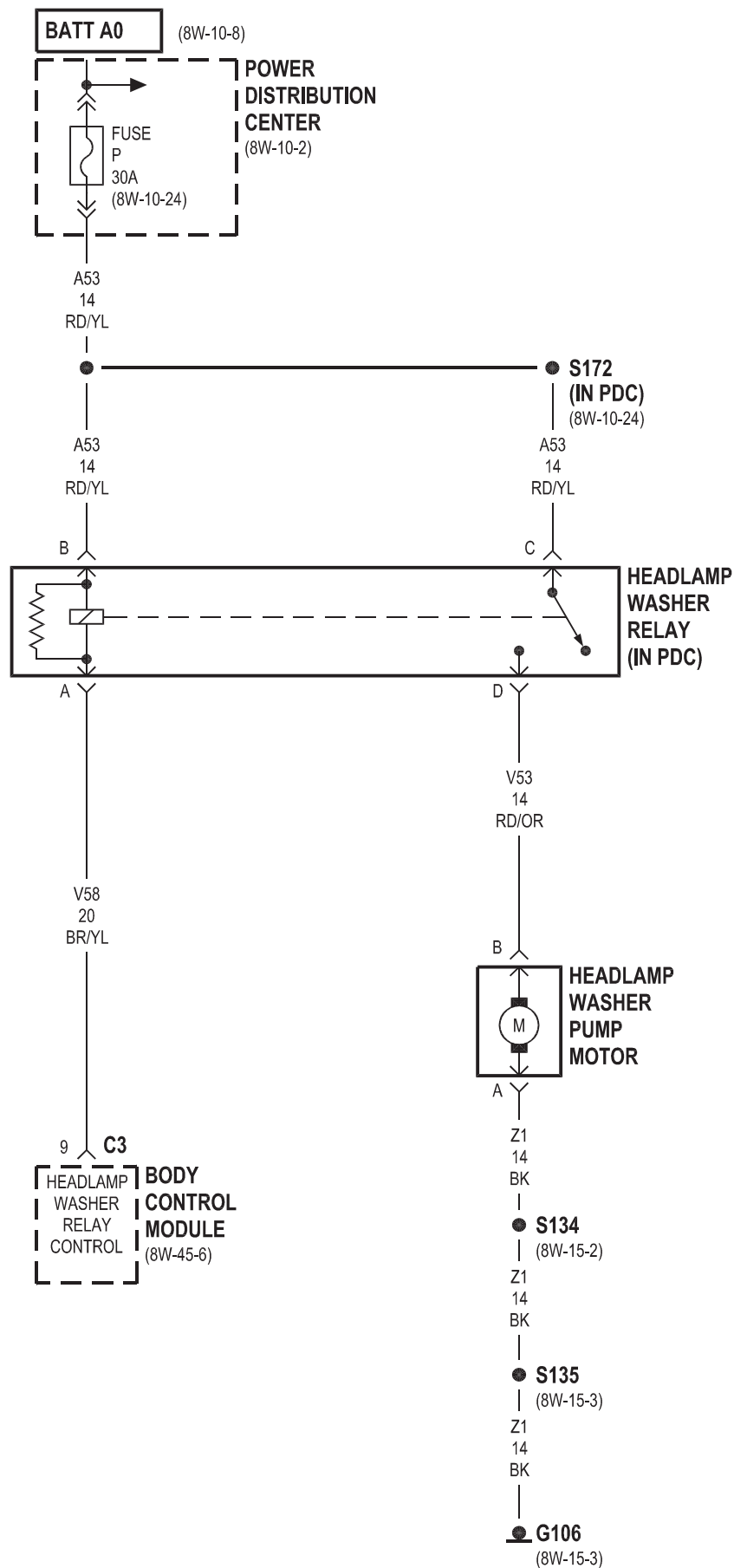
Component	Page
Body Control Module	8W-53-2, 4, 5
Front Washer Pump Motor	8W-53-3
Front Wiper High/Low Relay	8W-53-4
Front Wiper Motor	8W-53-4
Front Wiper On/Off Relay	8W-53-4
Fuse 5 (JB)	8W-53-2
Fuse M (PDC)	8W-53-4
Fuse P (PDC)	8W-53-5
G104	8W-53-3, 4

Component	Page
G106	8W-53-5
Headlamp Washer Pump Motor	8W-53-5
Headlamp Washer Relay	8W-53-5
Instrument Cluster	8W-53-3
Junction Block	8W-53-2
Power Distribution Center	8W-53-4, 5
Washer Fluid Level Sensor	8W-53-3
Wiper Switch	8W-53-2





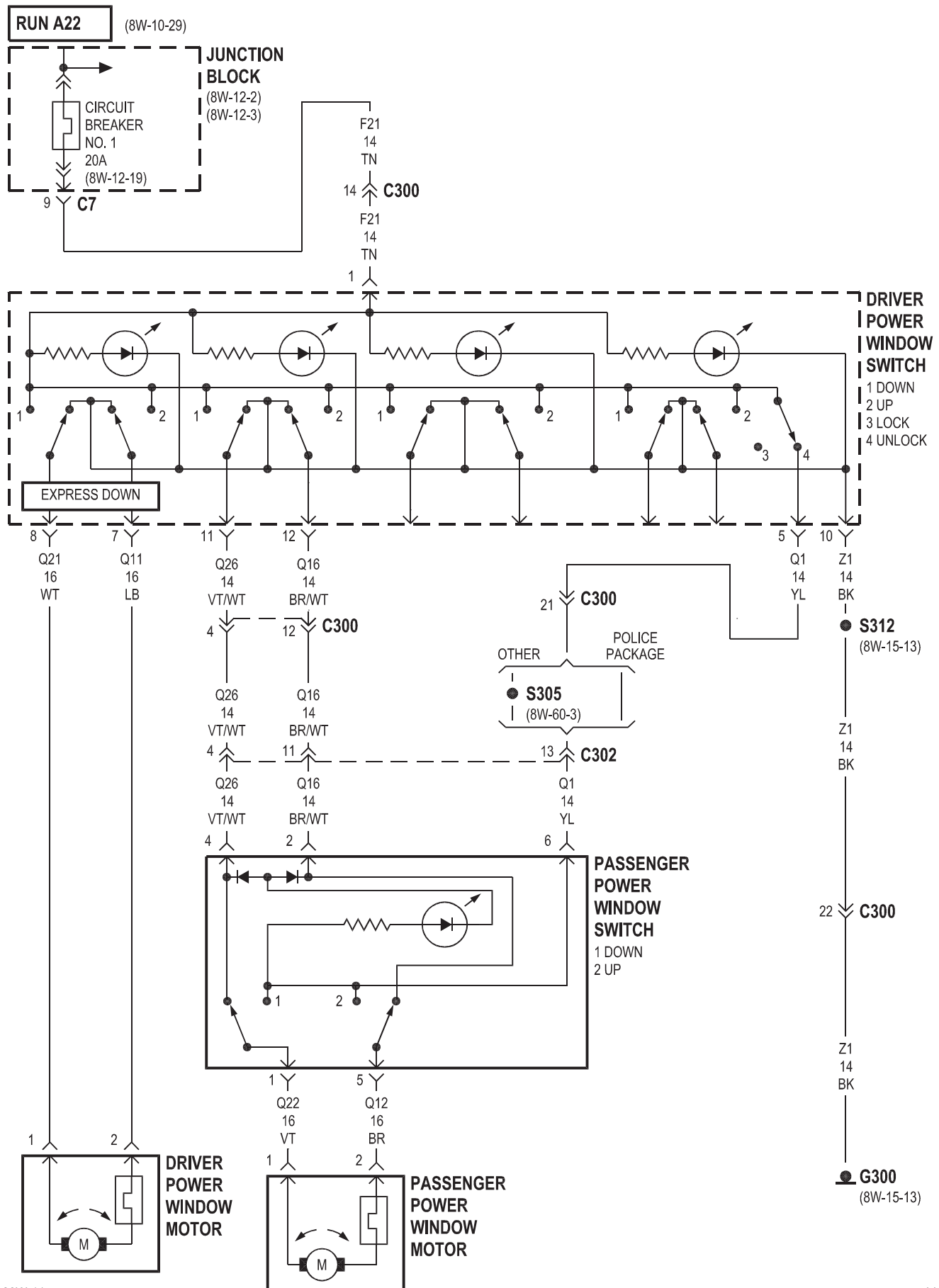


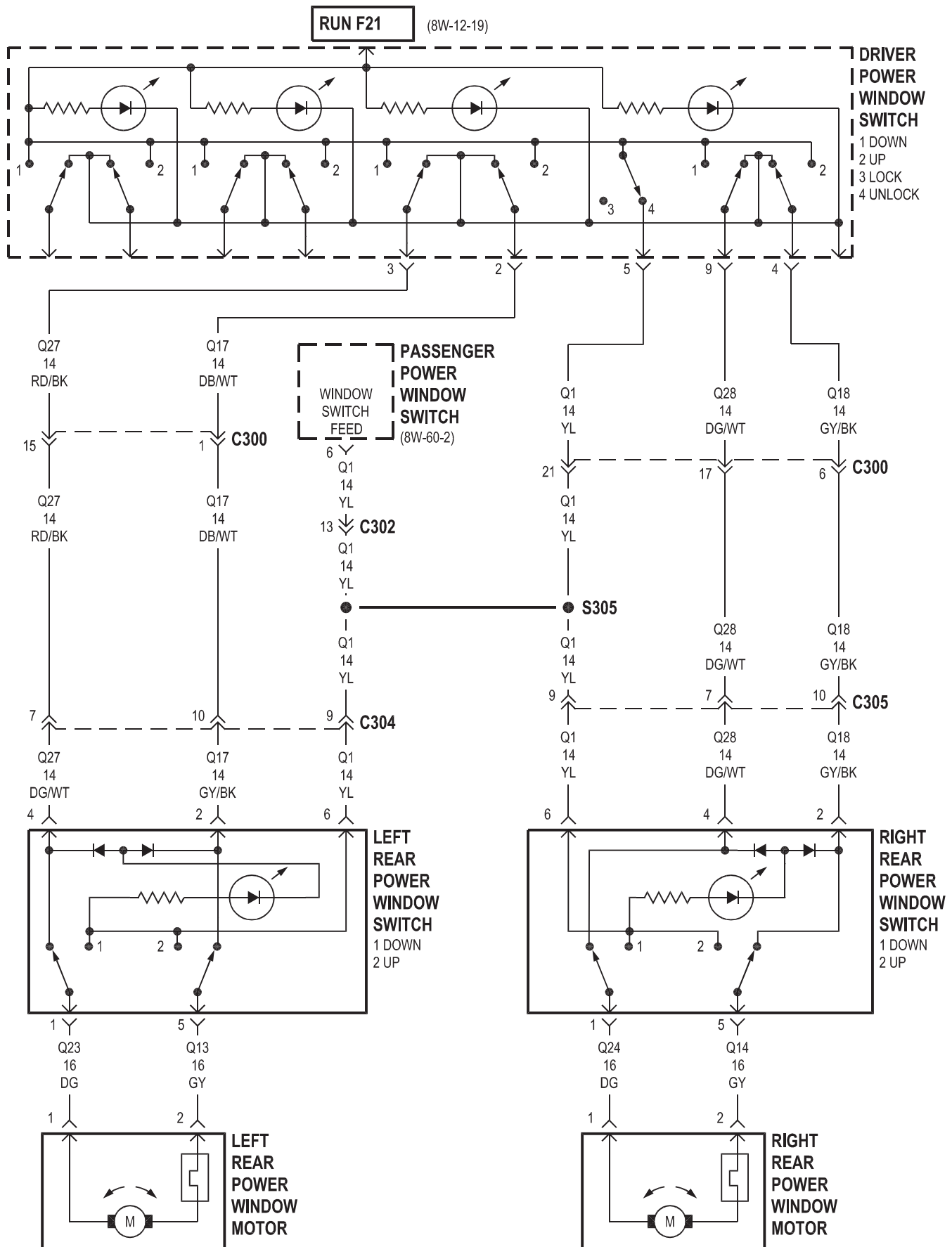


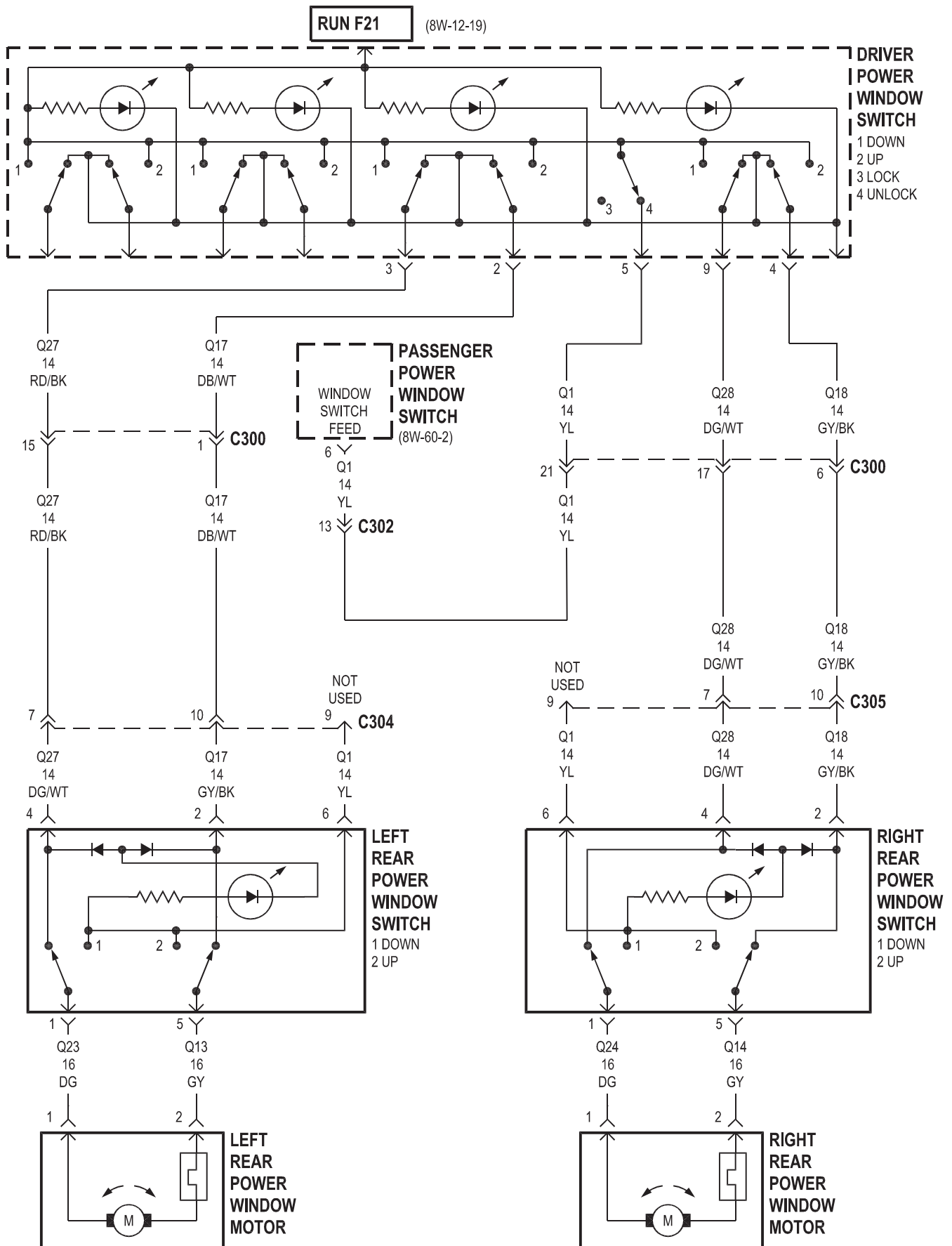
8W-60 POWER WINDOWS

Component	Page
Circuit Breaker No. 1	8W-60-2
Driver Power Window Motor	8W-60-2
Driver Power Window Switch	8W-60-2, 3, 4
G300	8W-60-2
Junction Block	8W-60-2
Left Rear Power Window Motor	8W-60-3, 4

Component	Page
Left Rear Power Window Switch	8W-60-3, 4
Passenger Power Window Motor	8W-60-2
Passenger Power Window Switch	8W-60-2, 3, 4
Right Rear Power Window Motor	8W-60-3, 4
Right Rear Power Window Switch	8W-60-3, 4



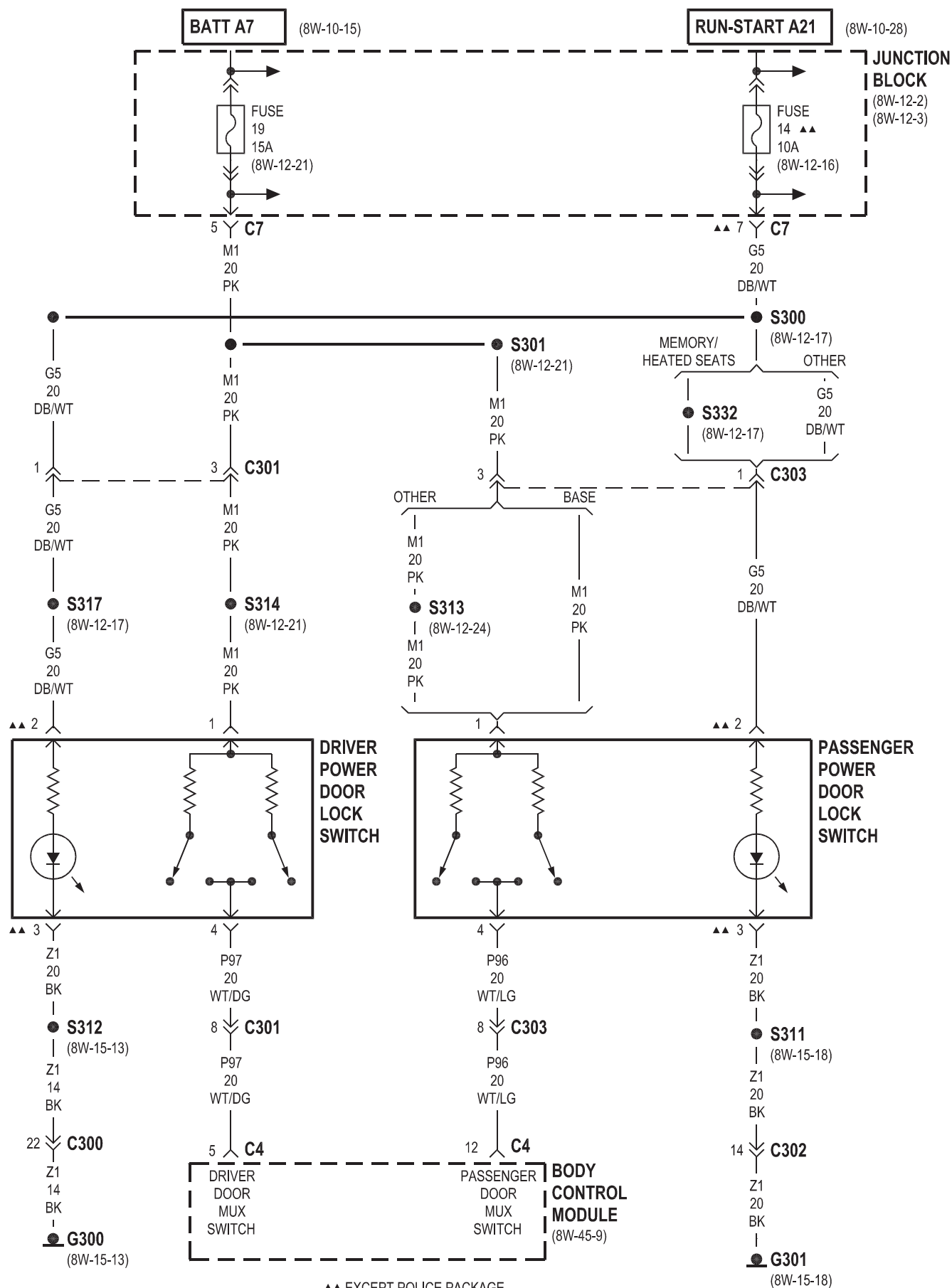


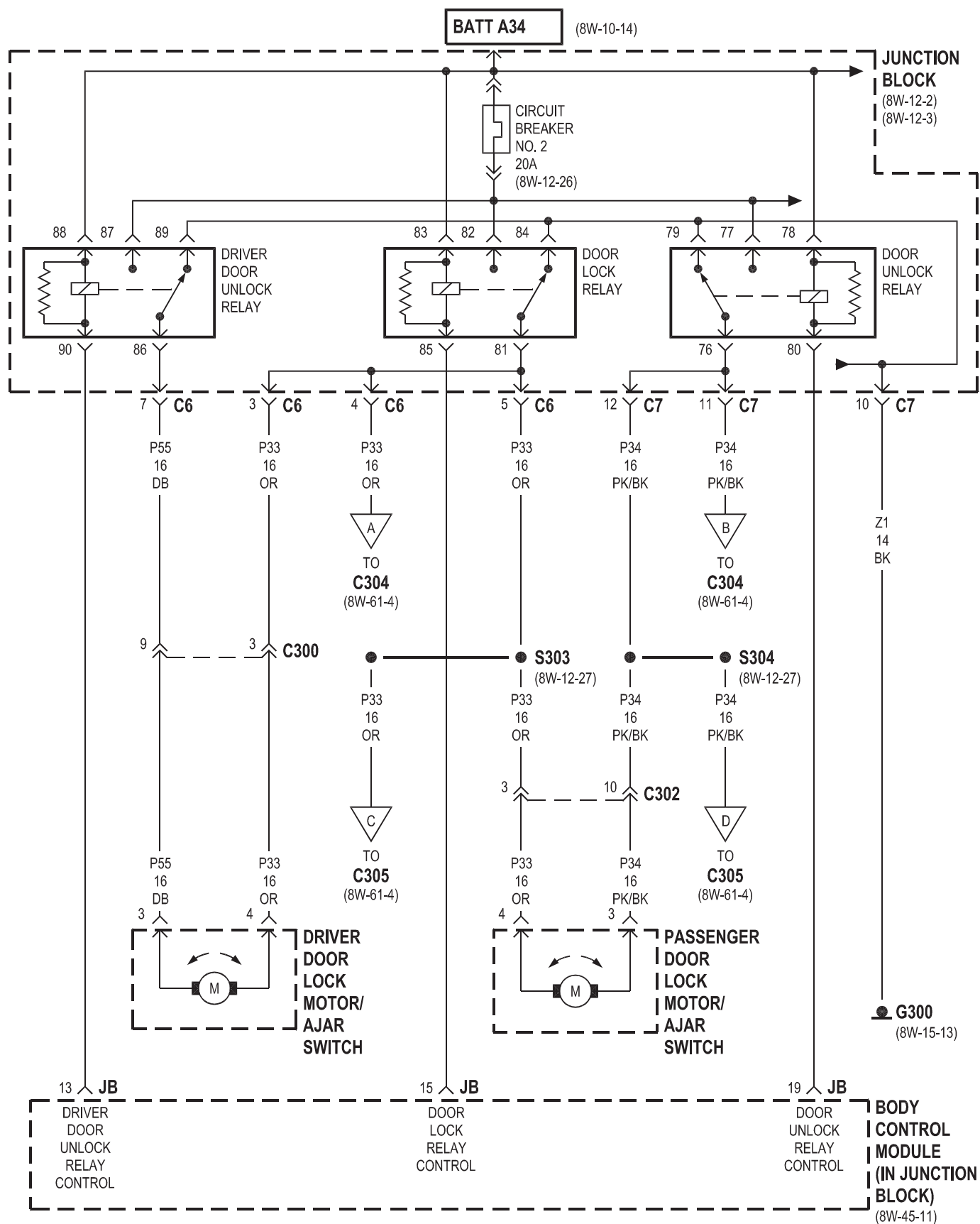


8W-61 POWER DOOR LOCKS

Component	Page
Body Control Module	8W-61-2, 3, 4, 5
Circuit Breaker No. 2	8W-61-3
Decklid Release Solenoid/Ajar Switch	8W-61-5
Decklid Release Switch	8W-61-5
Door Lock Relay	8W-61-3
Door Unlock Relay	8W-61-3
Driver Door Lock Motor/Ajar Switch	8W-61-3, 4
Driver Power Door Lock Switch	8W-61-2
Fuse 6 (JB)	8W-61-5
Fuse 14 (JB)	8W-61-2
Fuse 19 (JB)	8W-61-2, 5
G300	8W-61-2, 3, 4

Component	Page
G301	8W-61-2, 4
G400	8W-61-5
Instrument Cluster	8W-61-5
Junction Block	8W-61-2, 3, 4, 5
Left Rear Door Lock Motor/Ajar Switch	8W-61-4
Passenger Door Lock Motor/Ajar Switch	8W-61-3, 4
Passenger Power Door Lock Switch	8W-61-2
Right Rear Door Lock Motor/Ajar Switch	8W-61-4





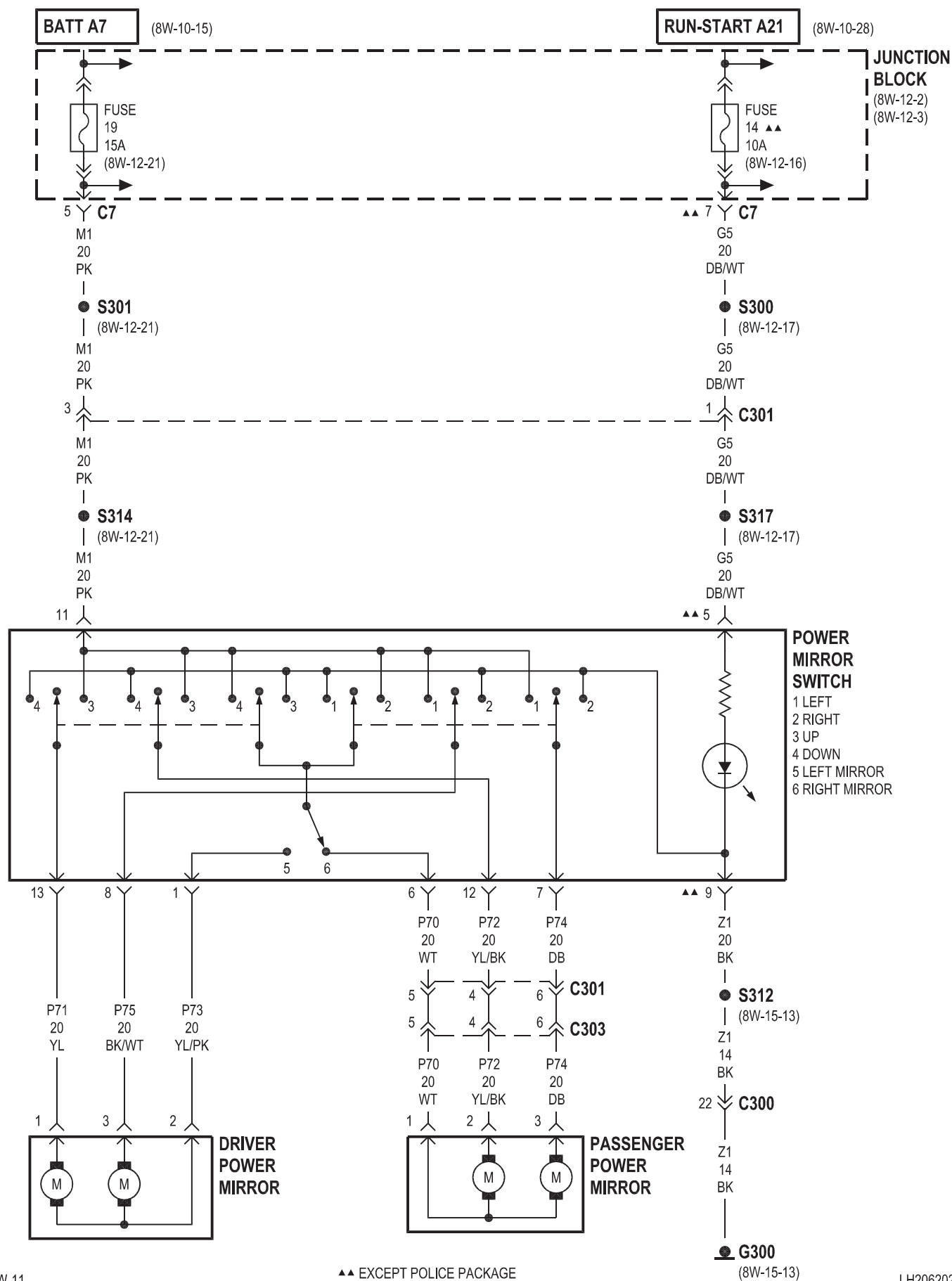


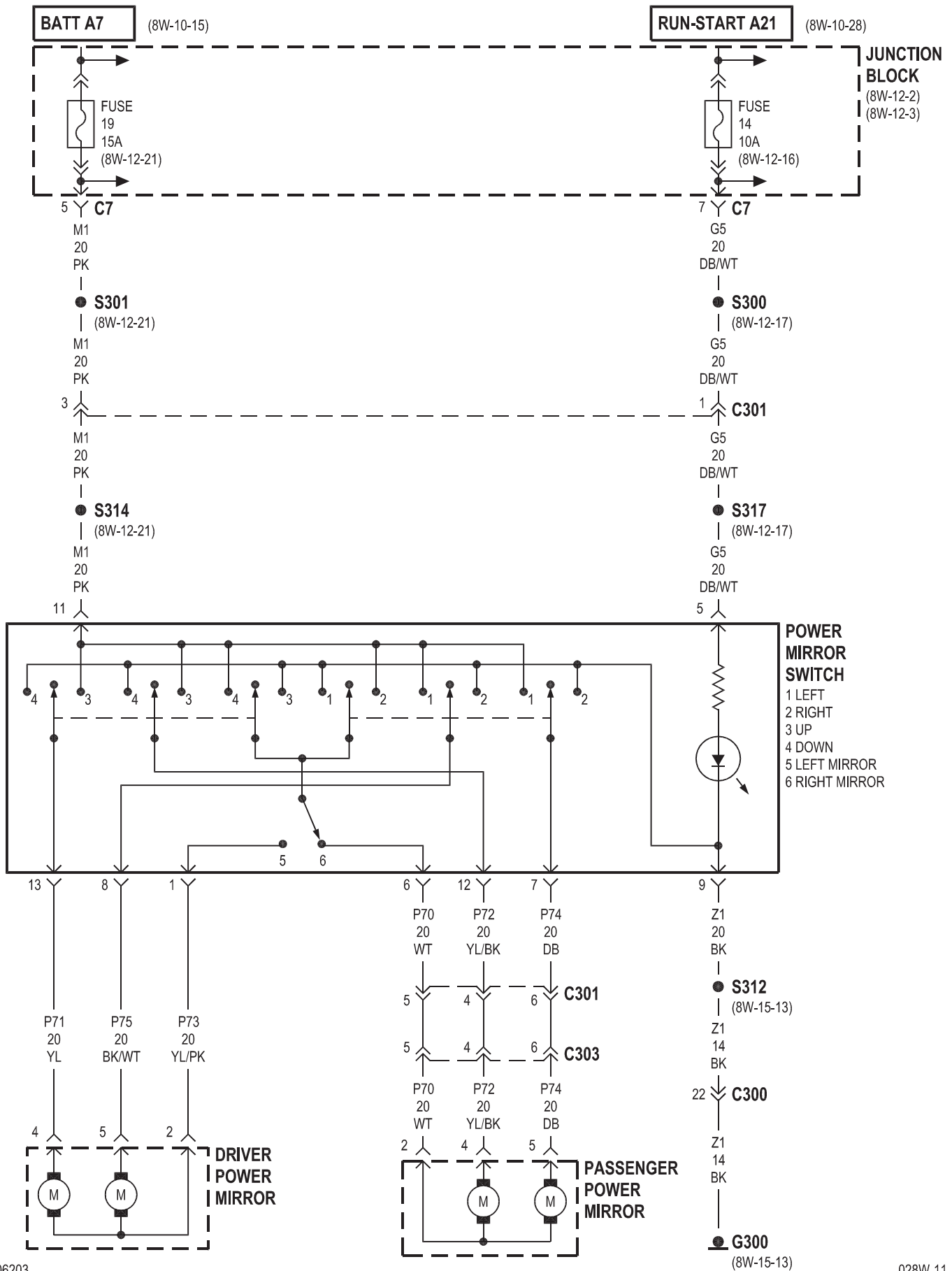


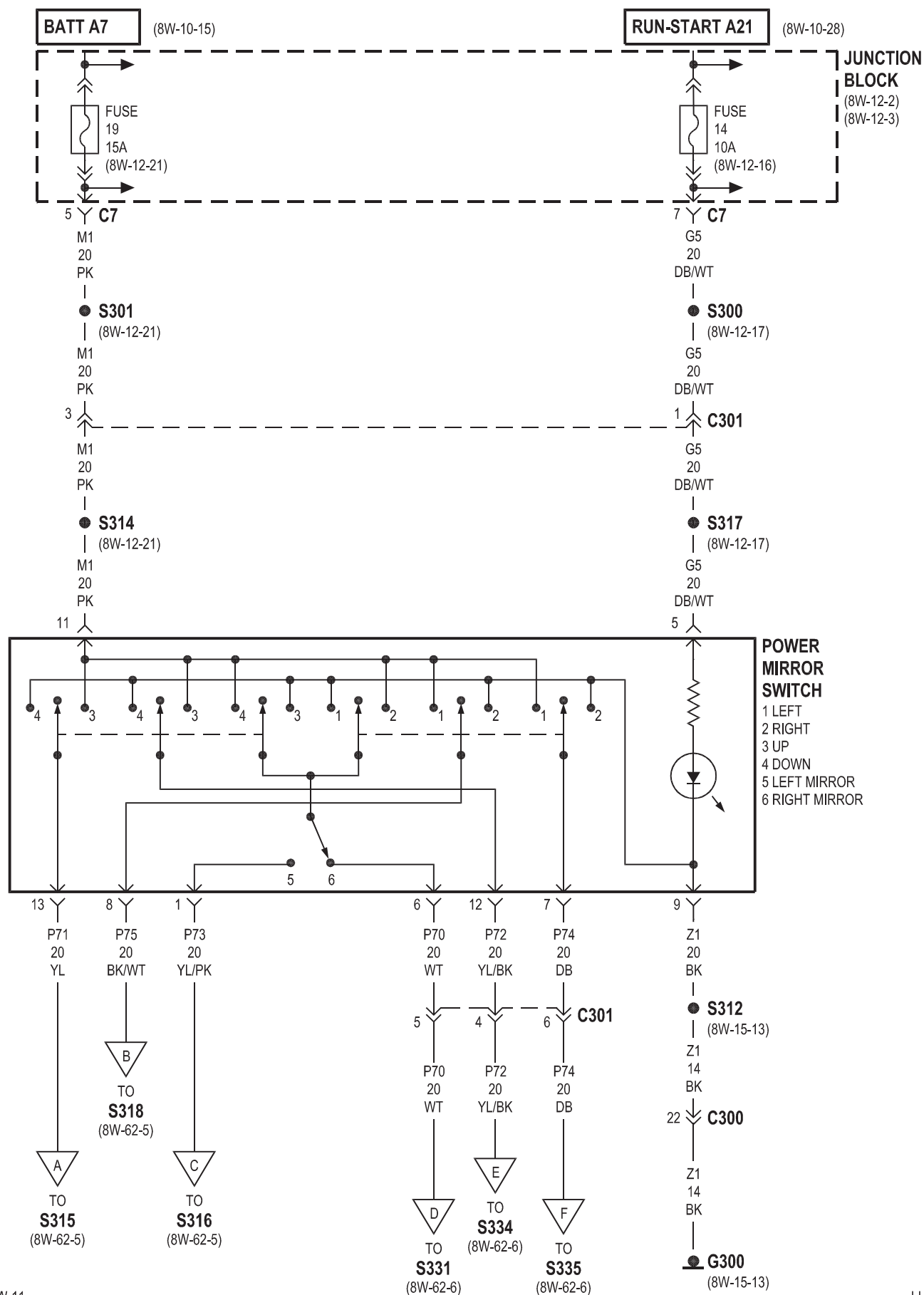
8W-62 POWER MIRRORS

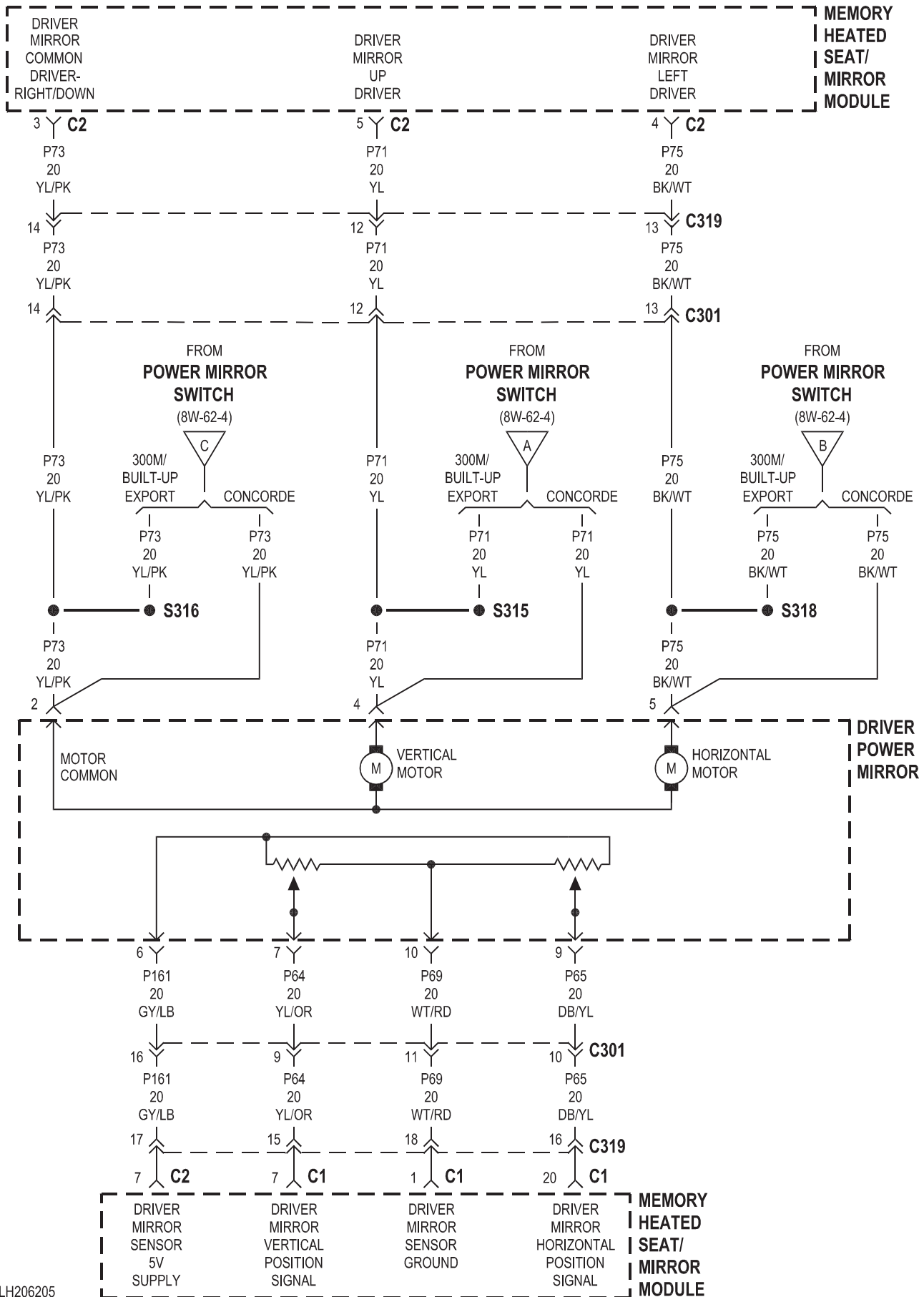
Component	Page
Automatic Day/Night Mirror	8W-62-7
Driver Power Mirror	8W-62-2, 3, 5, 7
Fuse 14 (JB)	8W-62-2, 3, 4
Fuse 19 (JB)	8W-62-2, 3, 4
G300	8W-62-2, 3, 4, 7, 8
G301	8W-62-7
Heated Mirror Fuse	8W-62-7
Junction Block	8W-62-2, 3, 4, 6, 7

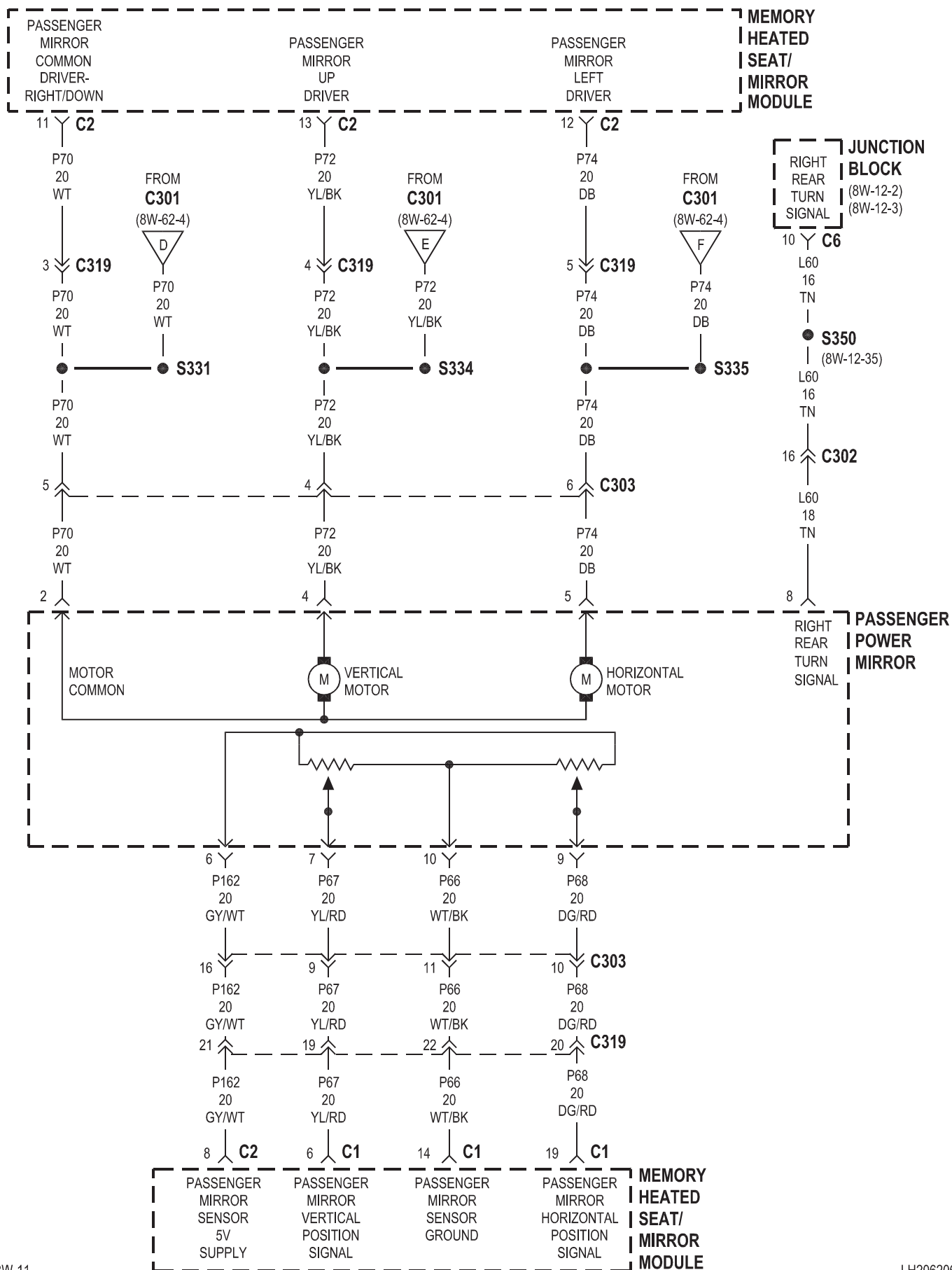
Component	Page
Memory Heated Seat/Mirror Module	8W-62-5, 6, 8
Memory Set Switch	8W-62-8
Passenger Power Mirror	8W-62-2, 3, 6, 7
Power Mirror Switch	8W-62-2, 3, 4, 5
Rear Window Defogger Relay	8W-62-7

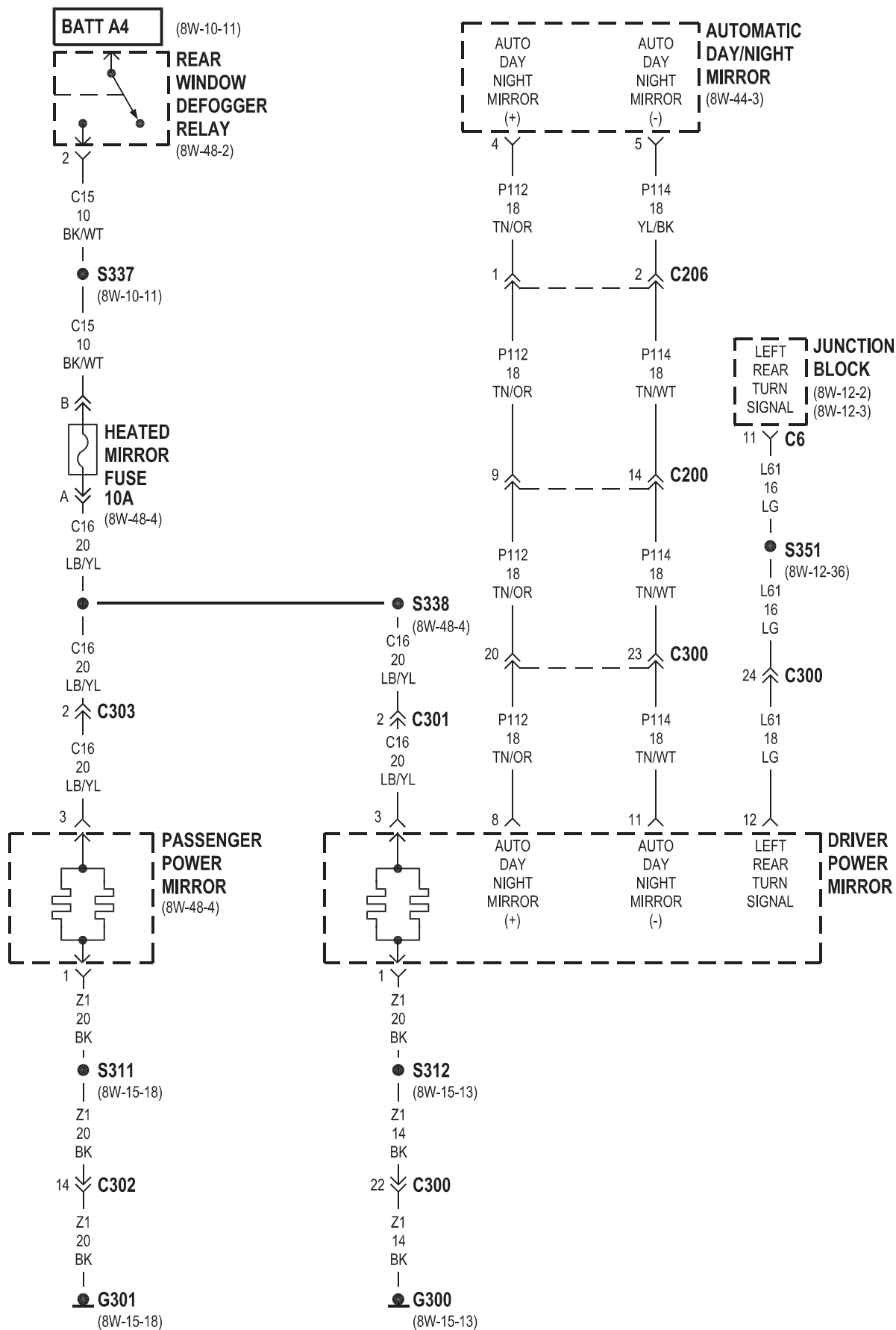


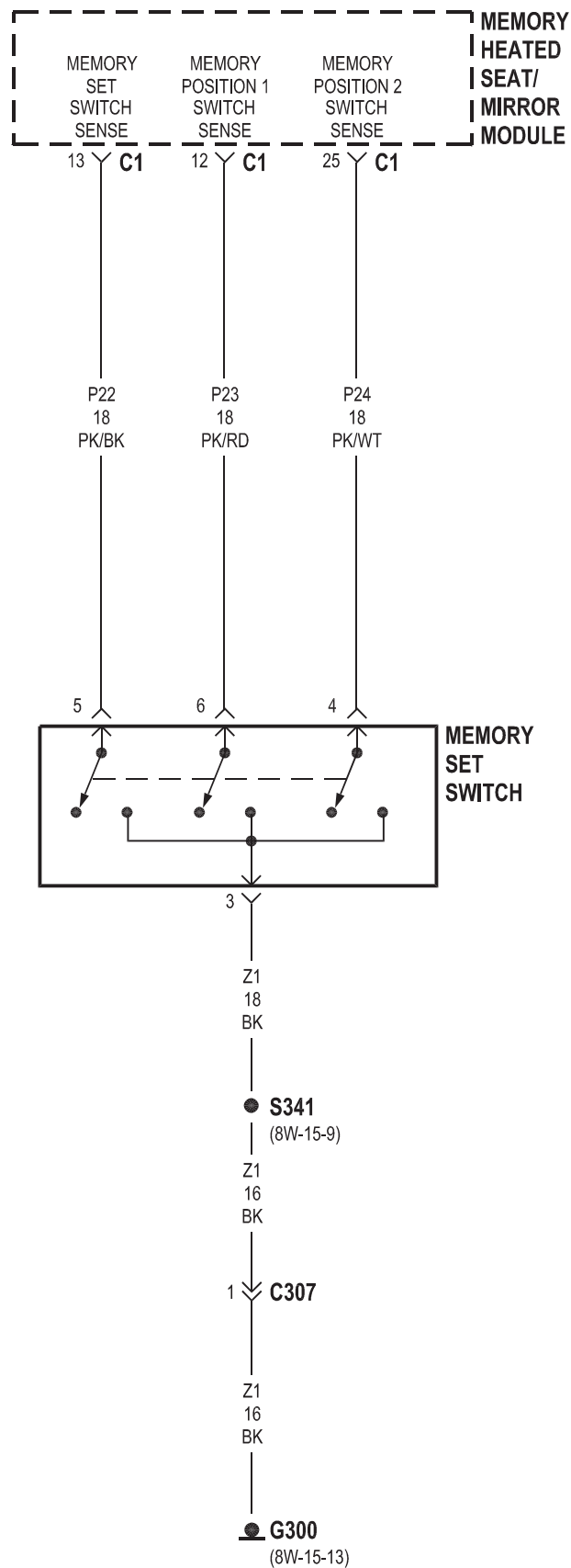








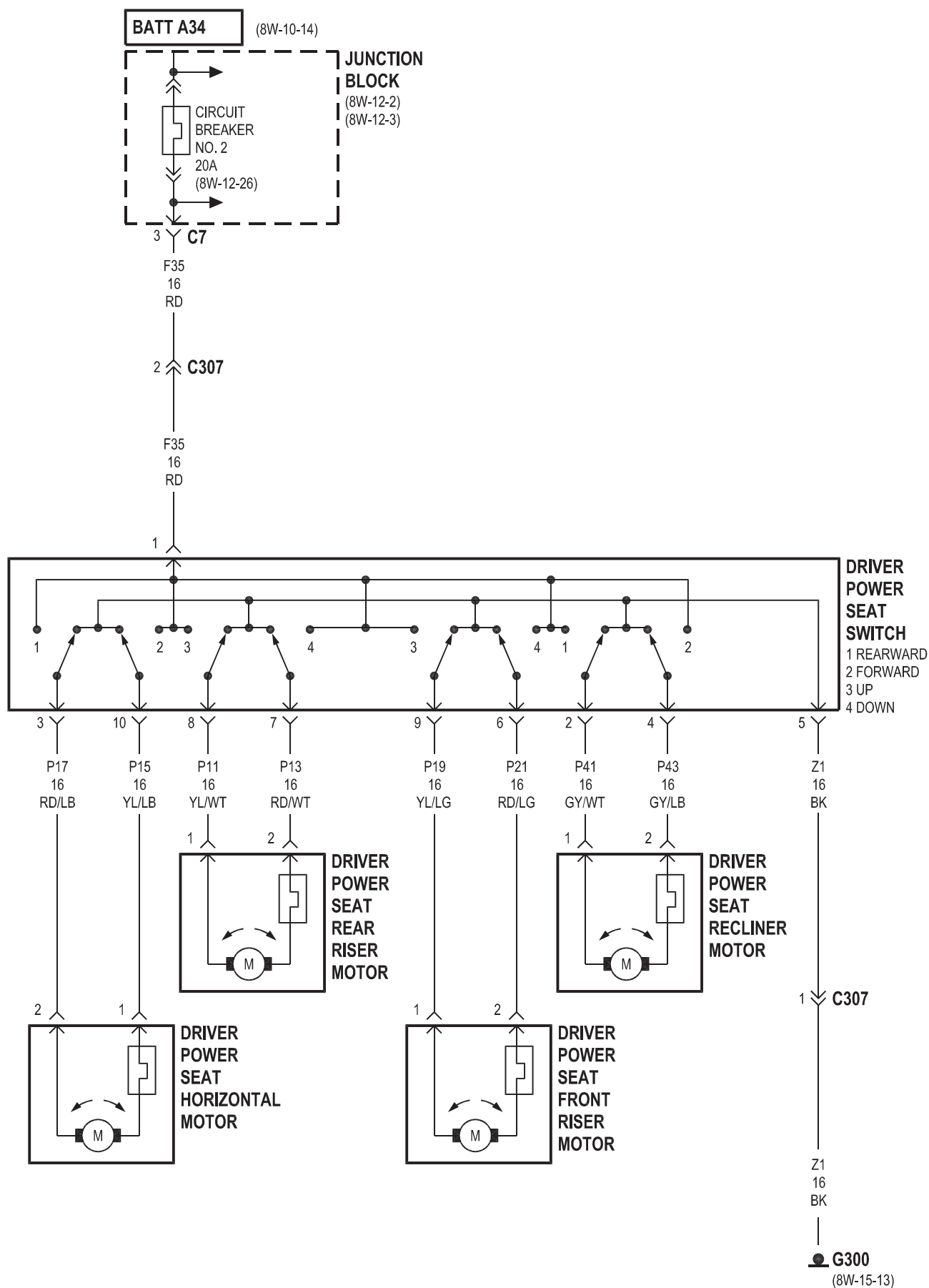


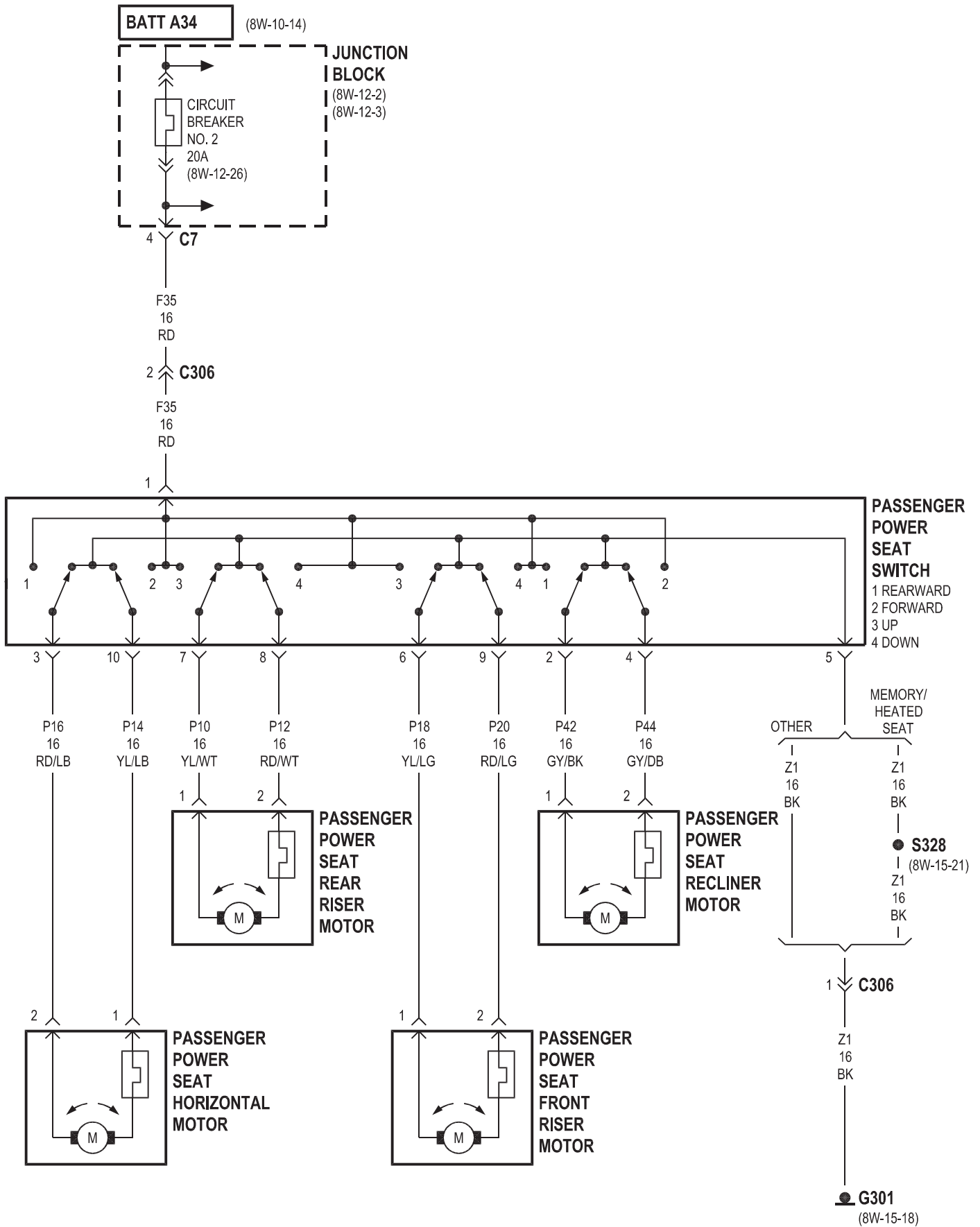


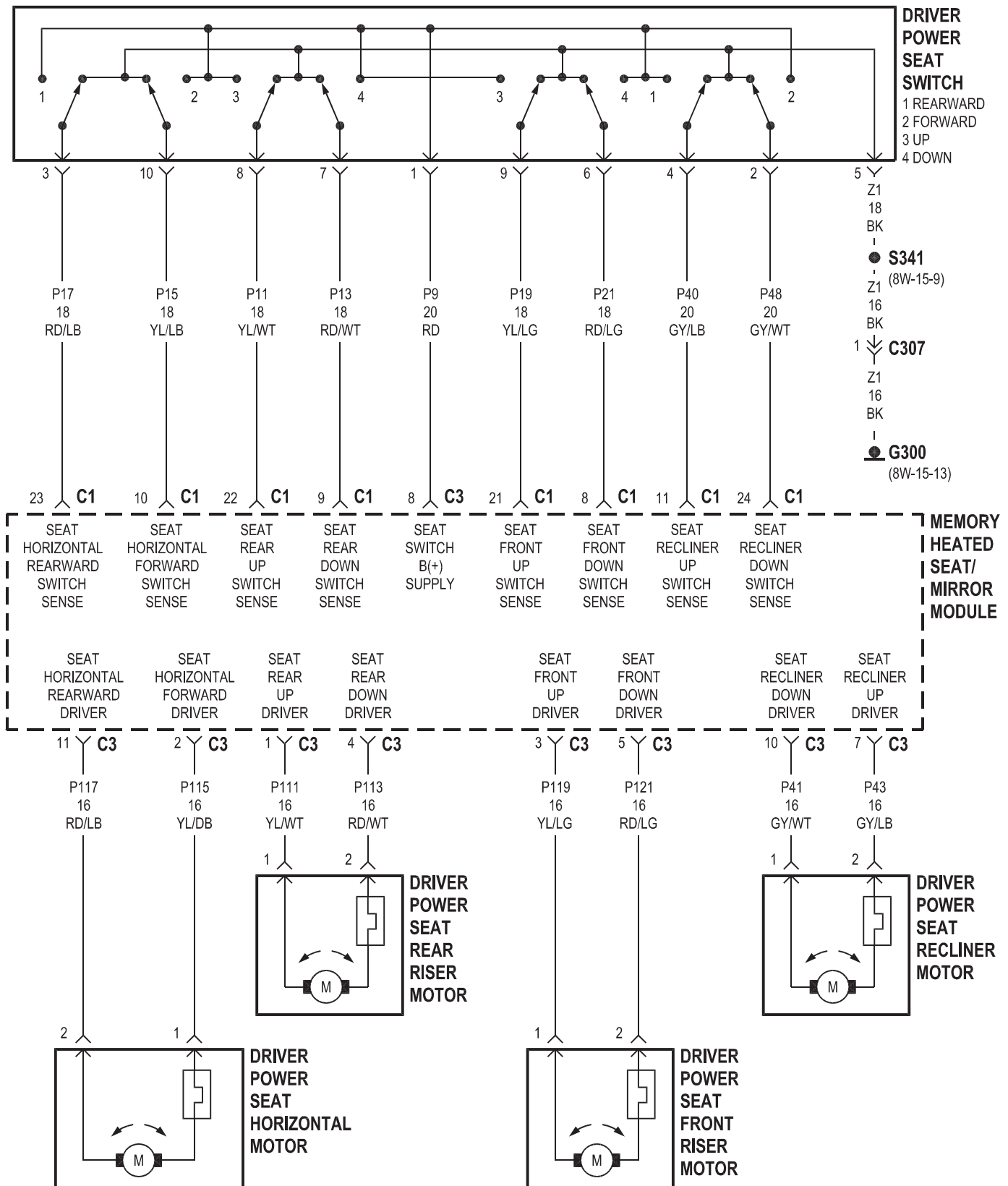
8W-63 POWER SEAT

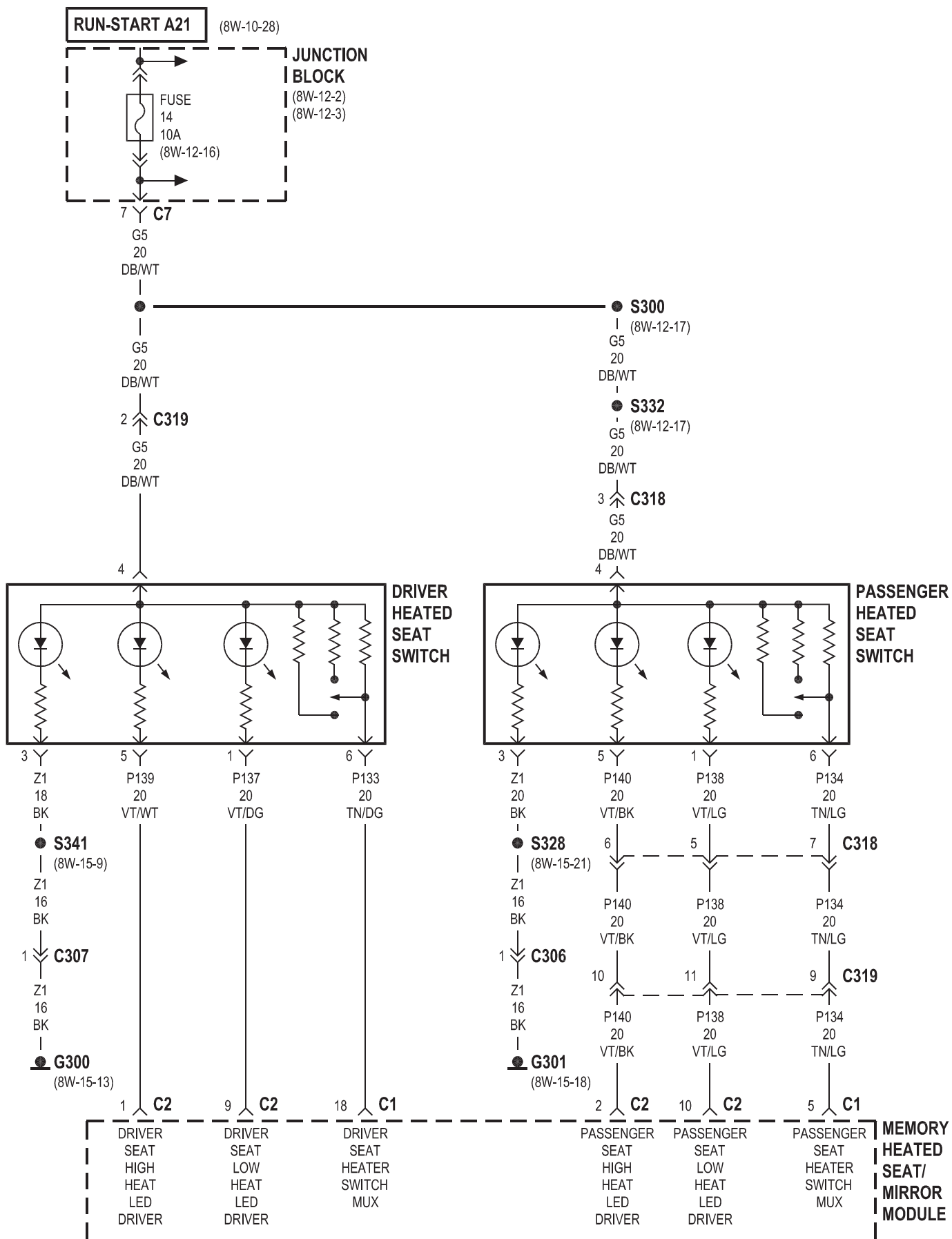
Component	Page
Body Control Module	8W-63-8
Circuit Breaker No. 2	8W-63-2, 3, 8
Driver Heated Seat Back	8W-63-8
Driver Heated Seat Cushion	8W-63-8
Driver Heated Seat Switch	8W-63-5
Driver Power Seat Front Riser Motor . . .	8W-63-2, 4
Driver Power Seat Front Riser Motor Sensor	8W-63-6, 7
Driver Power Seat Horizontal Motor . . .	8W-63-2, 4
Driver Power Seat Horizontal Motor Sensor	8W-63-6, 7
Driver Power Seat Rear Riser Motor . . .	8W-63-2, 4
Driver Power Seat Rear Riser Motor Sensor	8W-63-6, 7
Driver Power Seat Recliner Motor	8W-63-2, 4
Driver Power Seat Recliner Motor Sensor	8W-63-6, 7

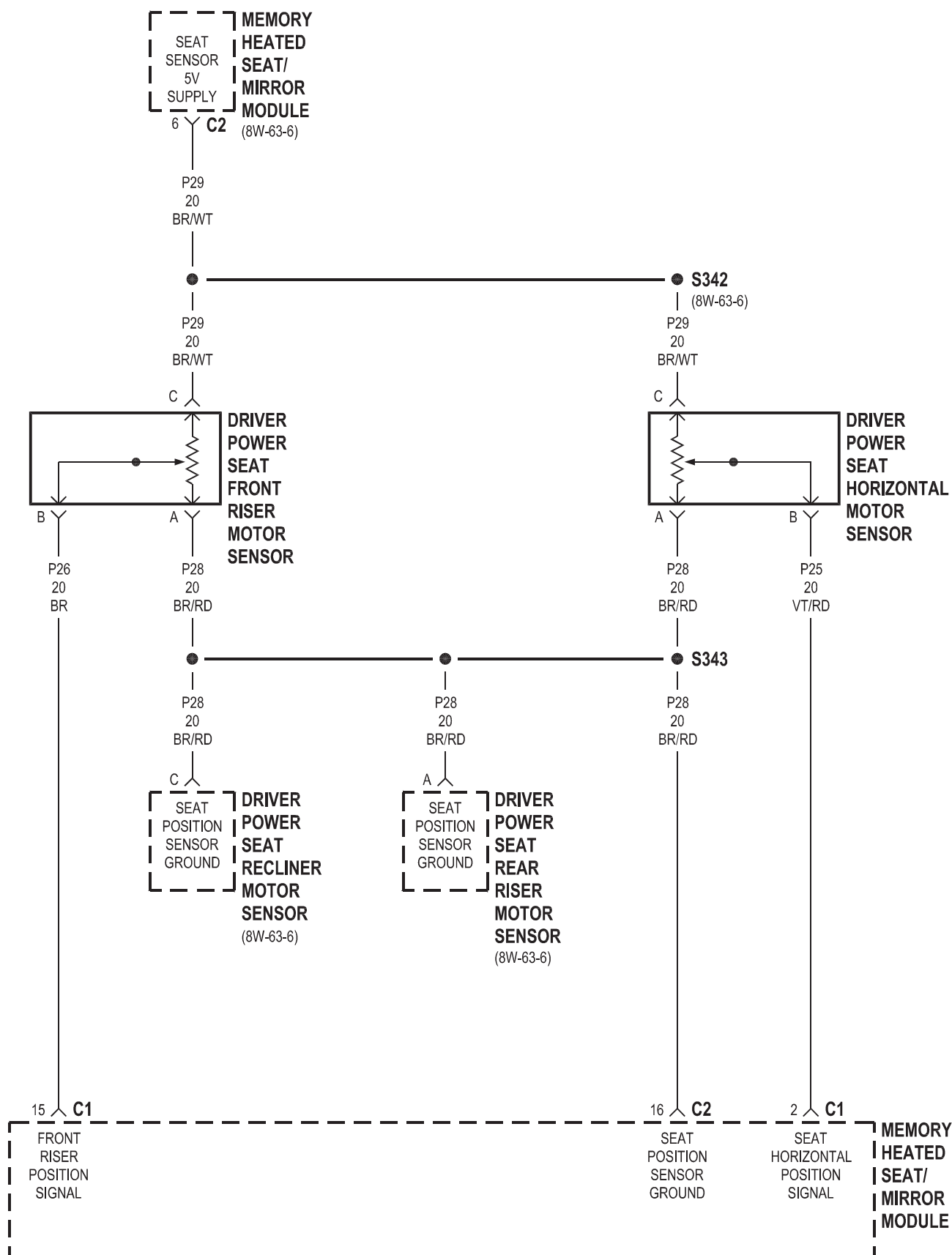
Component	Page
Driver Power Seat Switch	8W-63-2, 4
Fuse 14 (JB)	8W-63-5
G300	8W-63-2, 4, 5, 8
G301	8W-63-3, 5, 8
Junction Block	8W-63-2, 3, 5, 8
Memory Heated Seat/Mirror Module	8W-63-4, 5, 6, 7, 8
Passenger Heated Seat Back	8W-63-8
Passenger Heated Seat Cushion	8W-63-8
Passenger Heated Seat Switch	8W-63-5
Passenger Power Seat Front Riser Motor . .	8W-63-3
Passenger Power Seat Horizontal Motor . .	8W-63-3
Passenger Power Seat Rear Riser Motor . .	8W-63-3
Passenger Power Seat Recliner Motor	8W-63-3
Passenger Power Seat Switch	8W-63-3

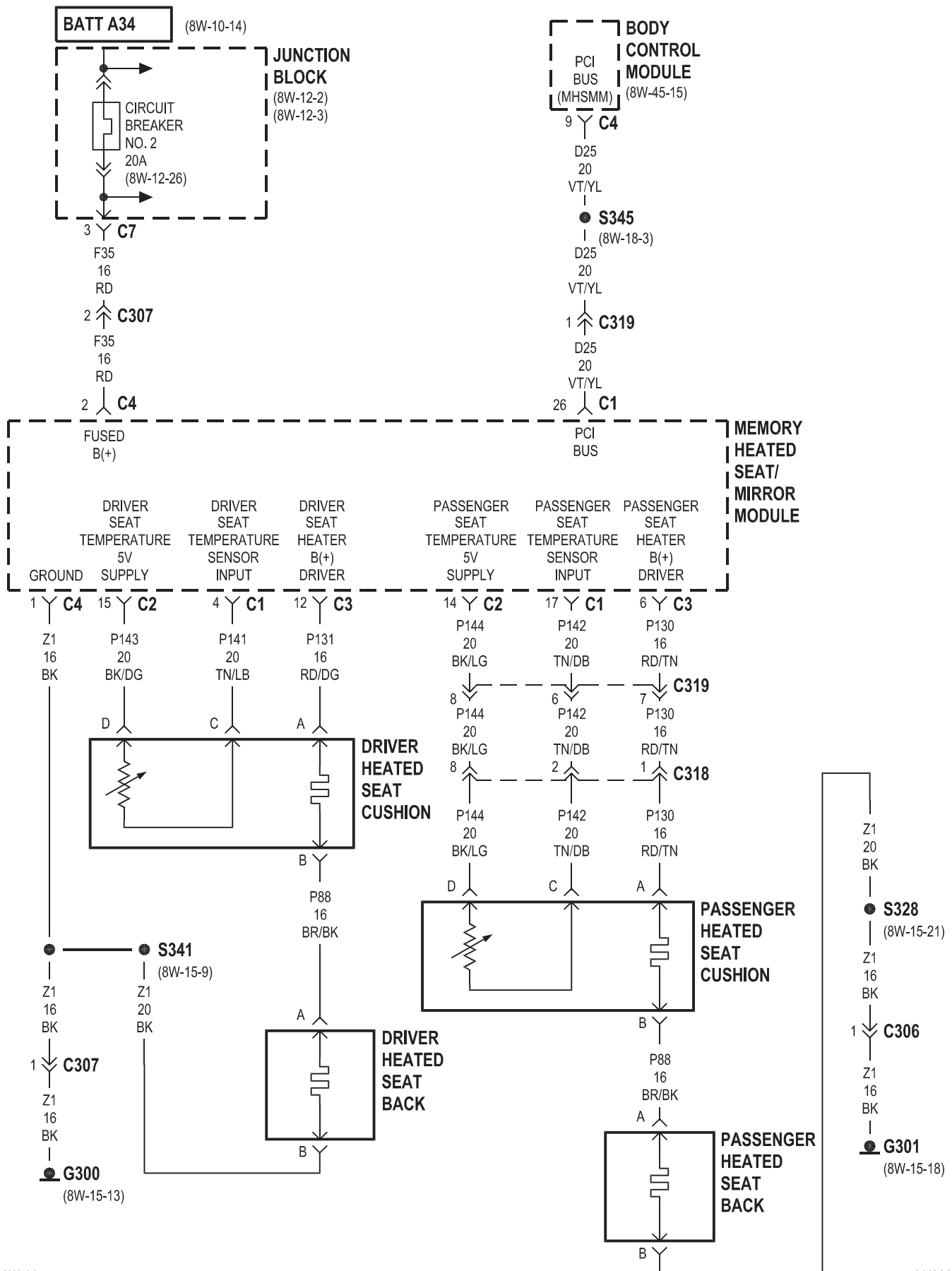






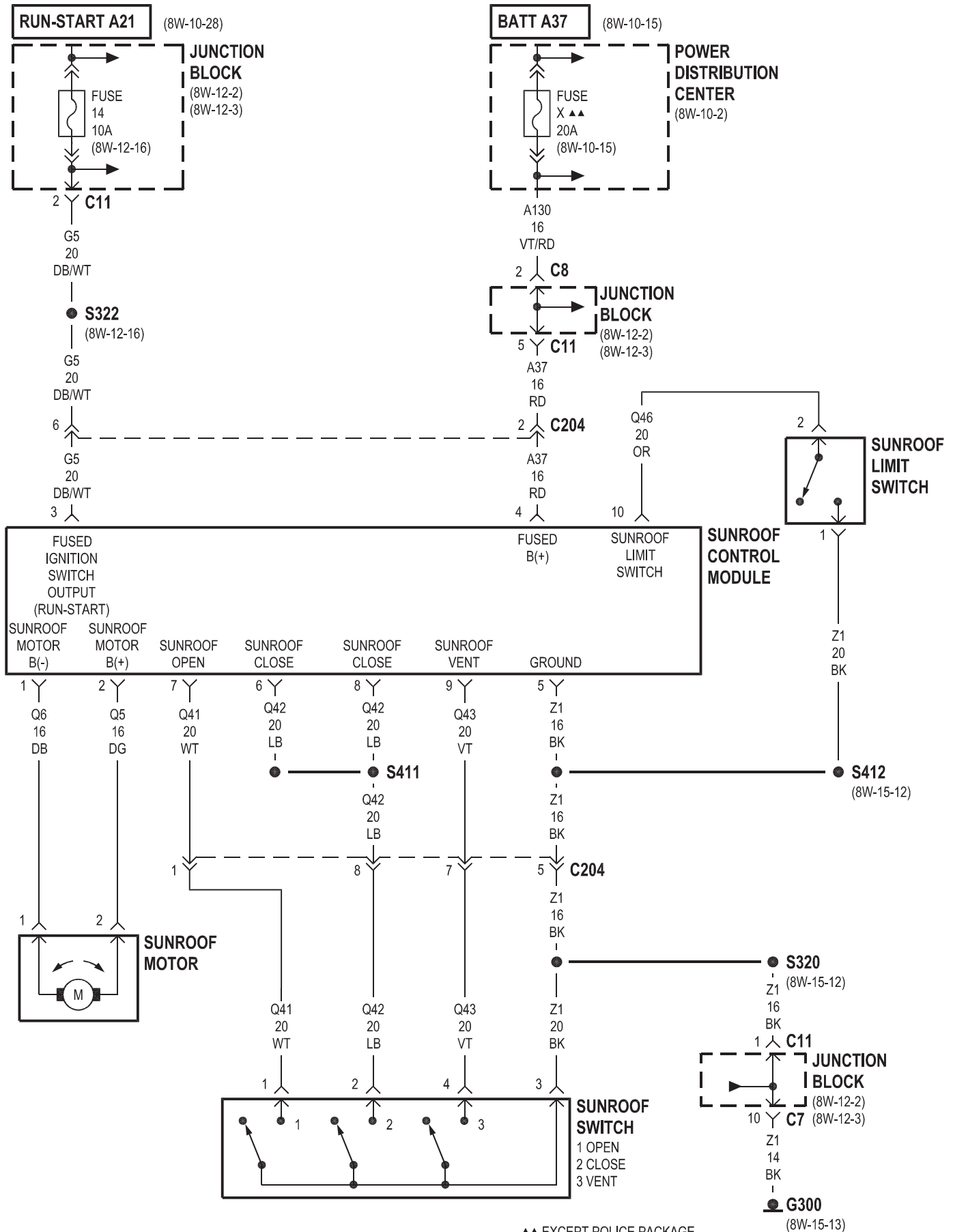






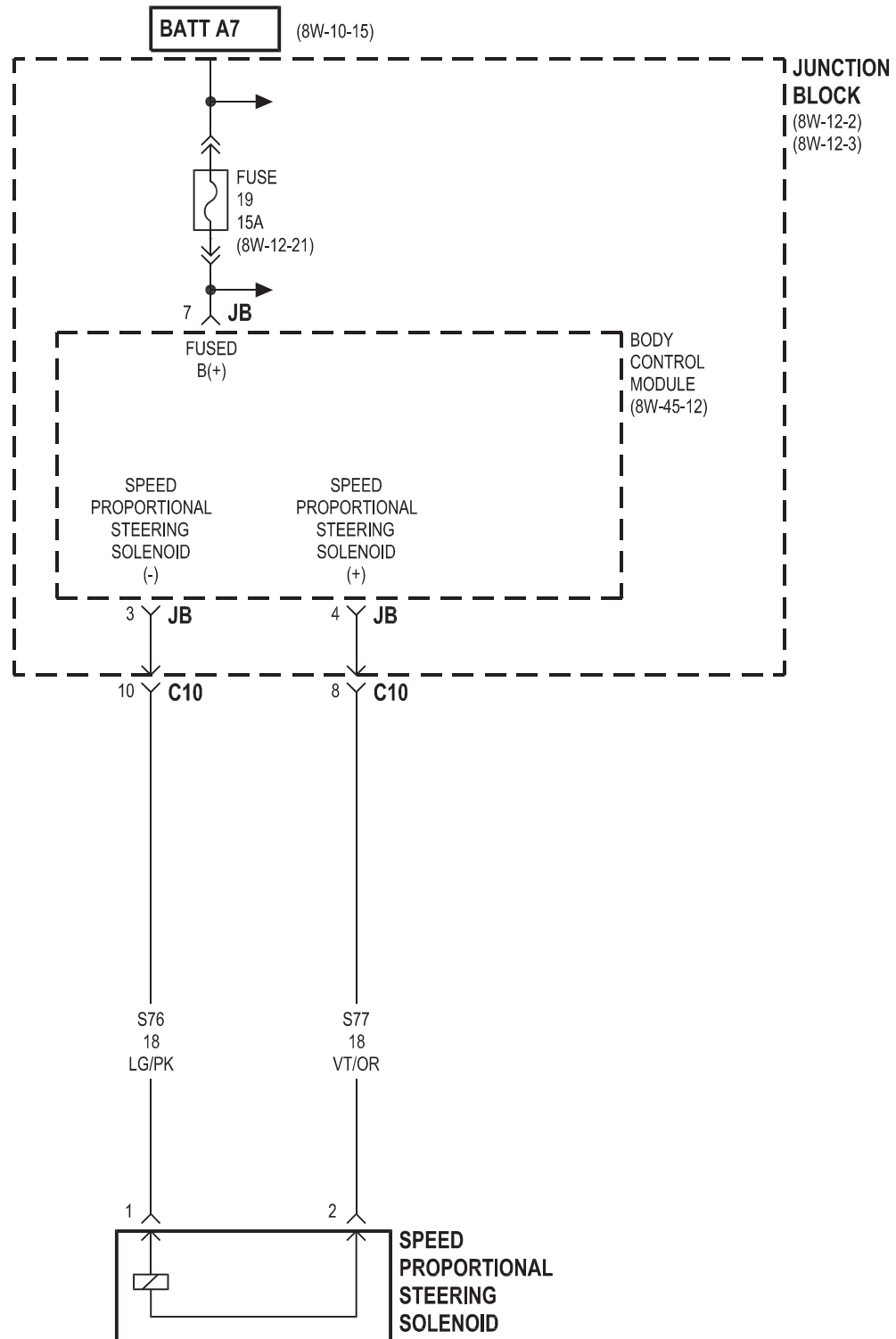
8W-64 POWER SUNROOF

Component	Page	Component	Page
Fuse 14 (JB)	8W-64-2	Sunroof Control Module	8W-64-2
Fuse X (PDC)	8W-64-2	Sunroof Limit Switch	8W-64-2
G300	8W-64-2	Sunroof Motor	8W-64-2
Junction Block	8W-64-2	Sunroof Switch	8W-64-2
Power Distribution Center	8W-64-2		



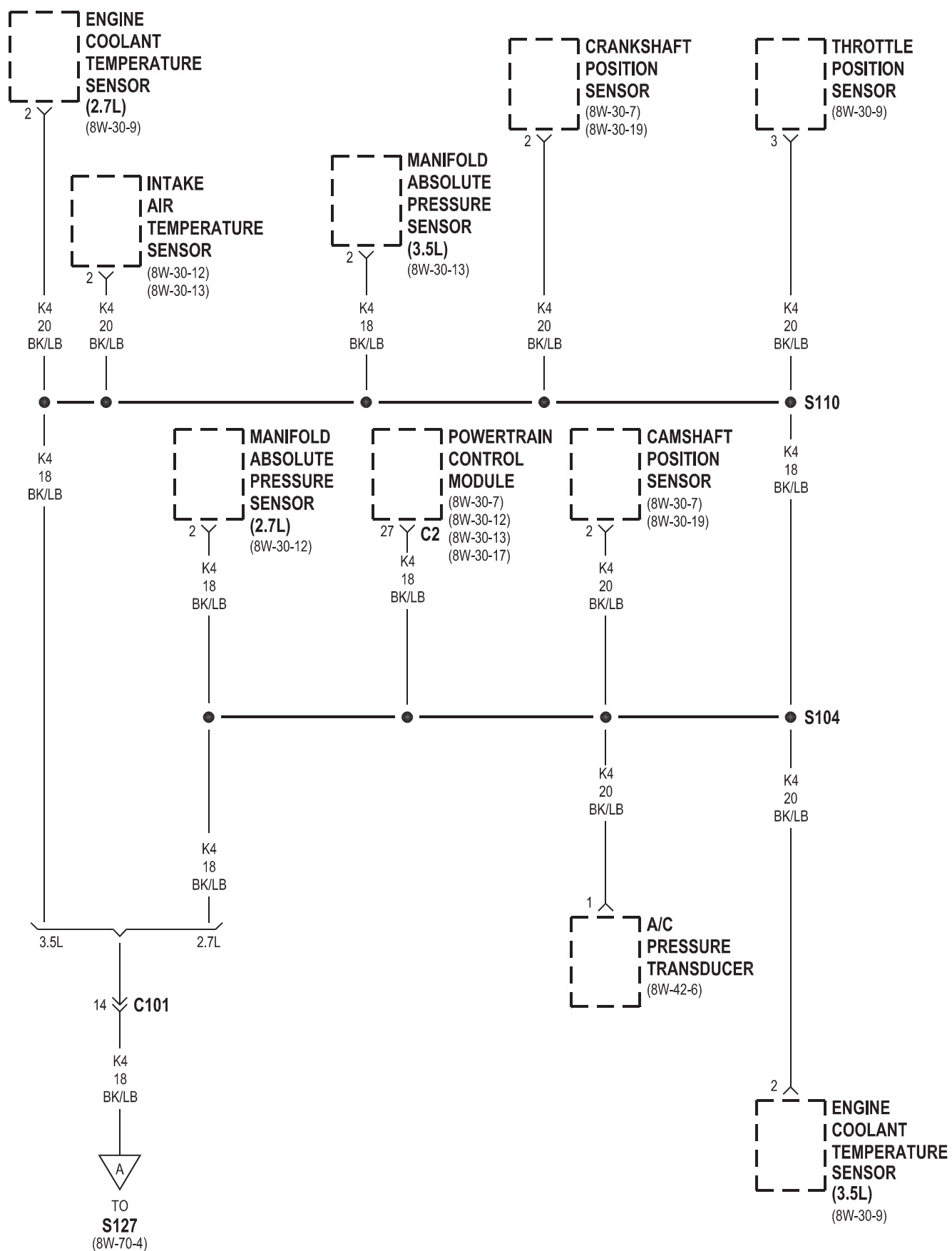
8W-65 SPEED PROPORTIONAL STEERING

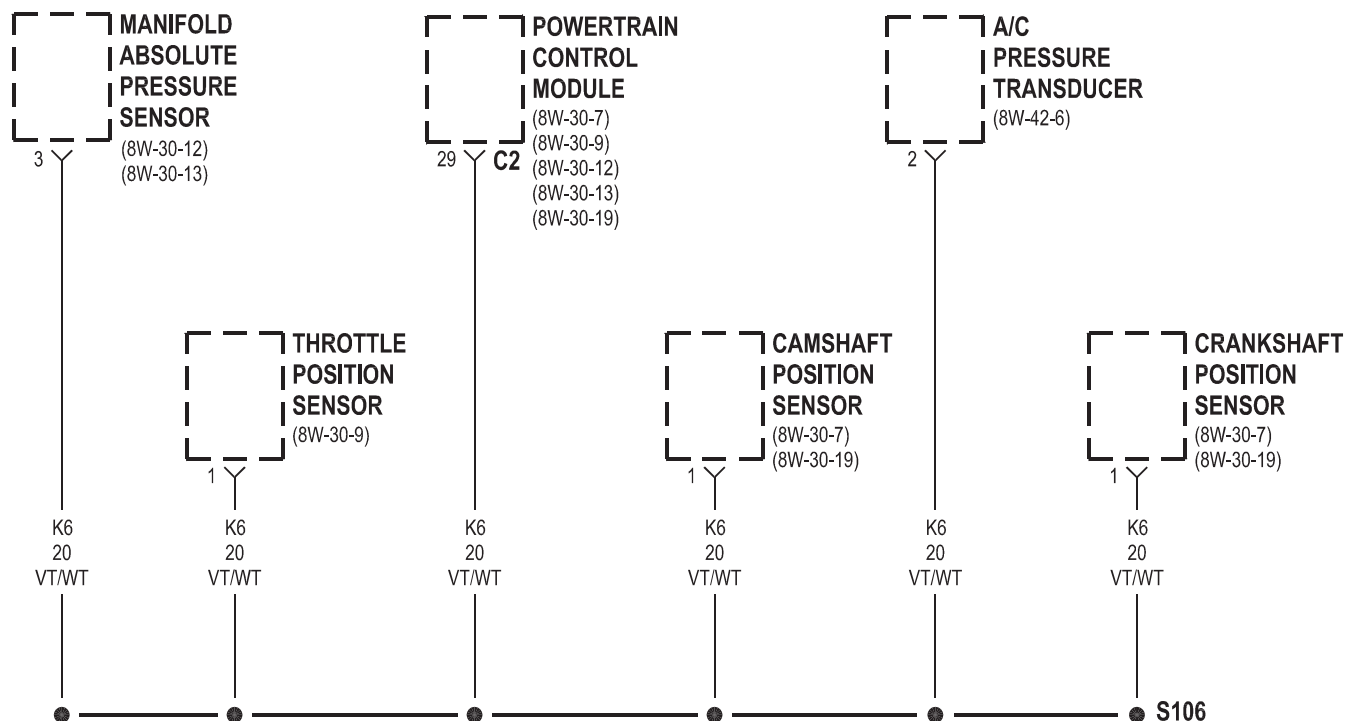
Component	Page	Component	Page
Body Control Module	8W-65-2	Junction Block	8W-65-2
Fuse 19 (JB)	8W-65-2	Speed Proportional Steering Solenoid	8W-65-2

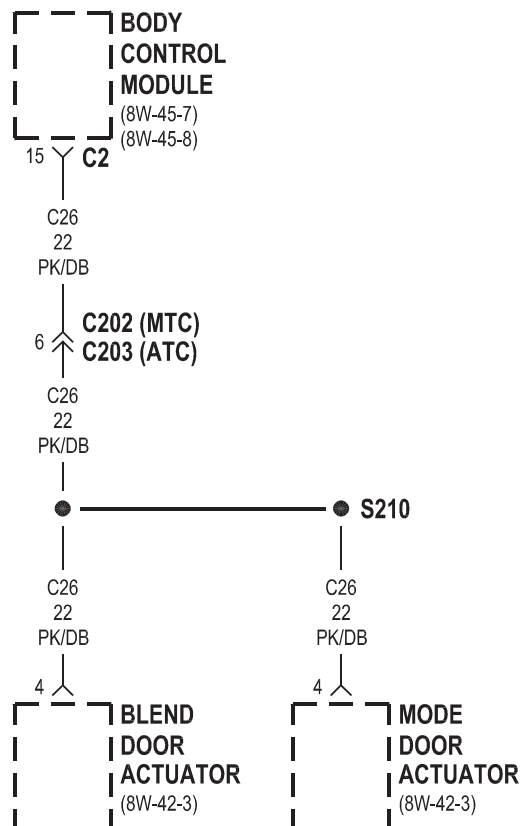
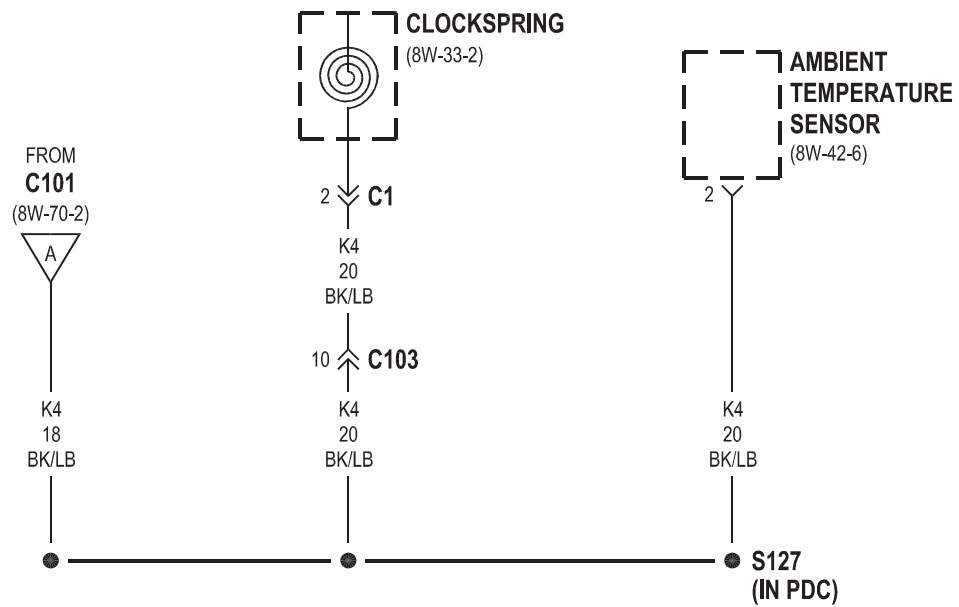


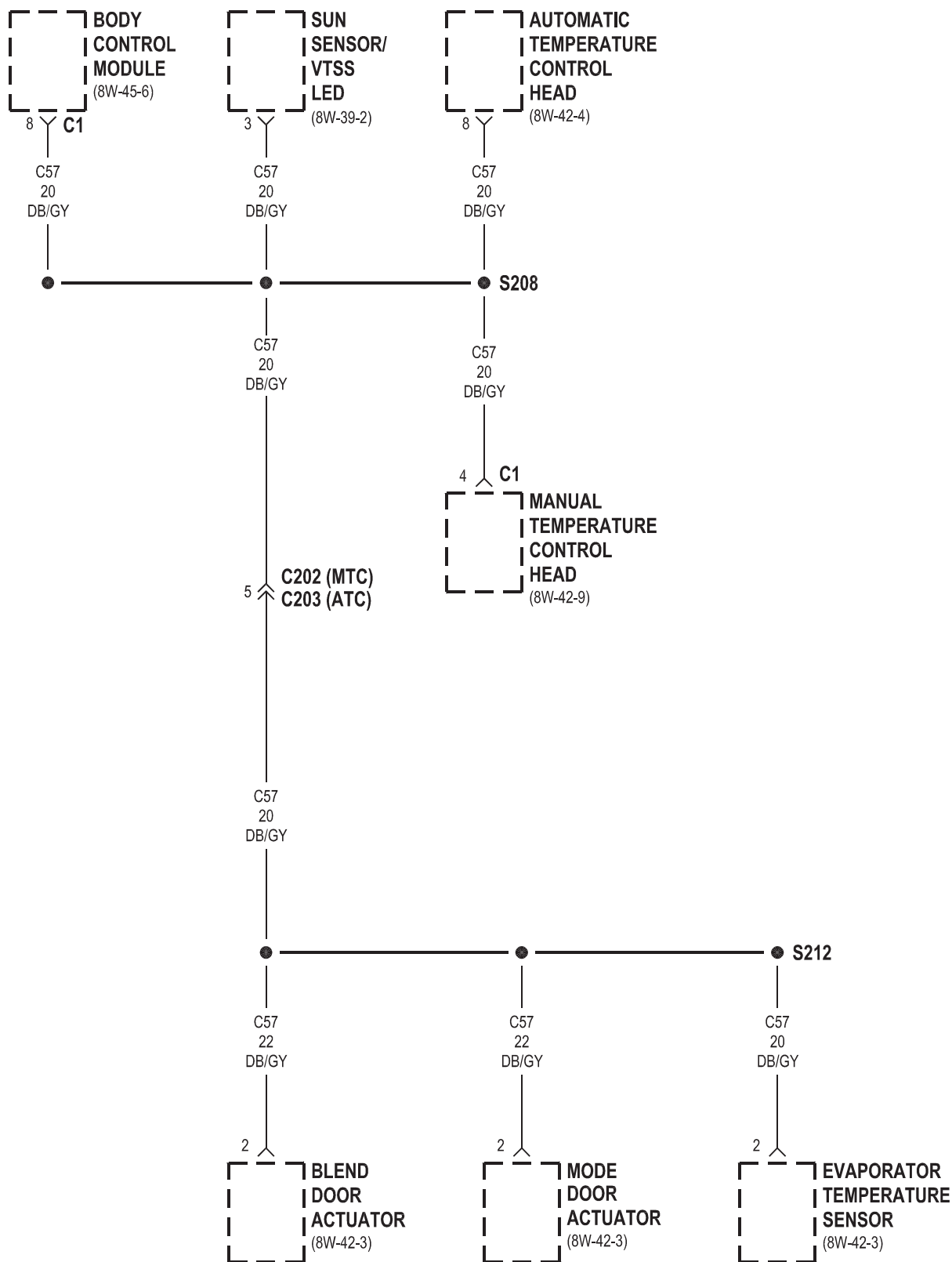
8W-70 SPLICE INFORMATION

Component	Page	Component	Page
S100	8W-15-4	S220	8W-42-2
S101	8W-10-22	S221	8W-41-2
S102	8W-30-10	S222	8W-47-2
S104	8W-70-2	S230	8W-41-2
S106	8W-70-3	S231	8W-11-4
S107	8W-15-21	S232	8W-40-7
S109	8W-10-22, 23	S300	8W-12-17
S110	8W-70-2	S301	8W-12-21
S111	8W-10-22, 23	S302	8W-45-4
S112	8W-10-23	S303	8W-12-27
S114	8W-10-25	S304	8W-12-27
S116	8W-12-18	S305	8W-60-3
S117	8W-12-25	S306	8W-10-11
S118	8W-15-6	S307	8W-44-2
S119	8W-15-5	S308	8W-51-2, 3
S120	8W-12-34	S309	8W-12-13
S121	8W-12-35	S310	8W-12-31
S122	8W-15-6	S311	8W-15-18
S123	8W-15-4	S312	8W-15-13
S124	8W-10-18	S313	8W-12-24
S125	8W-10-12	S314	8W-12-21
S127	8W-70-4	S315	8W-62-5
S128	8W-10-19	S316	8W-62-5
S130	8W-50-4	S317	8W-12-17
S131	8W-12-12	S318	8W-62-5
S132	8W-12-18	S319	8W-12-23
S133	8W-12-20	S320	8W-15-12
S134	8W-15-2	S321	8W-15-9
S135	8W-15-3	S322	8W-12-16
S140	8W-10-15, 16	S323	8W-45-4
S142	8W-15-4	S324	8W-12-33
S143	8W-30-11	S325	8W-15-12
S144	8W-20-2	S326	8W-12-33
S145	8W-20-2	S327	8W-15-12
S146	8W-30-22	S328	8W-15-21
S150	8W-15-2	S331	8W-62-6
S151	8W-12-12	S332	8W-12-17
S152	8W-15-3	S334	8W-62-6
S153	8W-12-12	S335	8W-62-6
S160	8W-12-11, 12	S336	8W-10-26
S161	8W-15-2	S337	8W-10-11
S162	8W-12-18	S338	8W-48-4
S164	8W-10-21	S339	8W-10-11
S165	8W-10-20	S341	8W-15-9
S166	8W-10-20	S342	8W-63-6
S167	8W-10-20	S343	8W-63-7
S168	8W-10-25	S345	8W-18-3
S171	8W-10-26	S346	8W-12-25
S172	8W-10-24	S347	8W-15-10
S173	8W-10-16	S348	8W-15-18
S174	8W-12-10	S349	8W-43-3
S180	8W-10-7	S350	8W-12-34
S199	8W-10-7	S351	8W-12-35
S200	8W-12-16	S352	8W-15-10
S201	8W-10-18	S353	8W-11-5
S202	8W-53-2	S354	8W-11-4
S203	8W-30-18	S400	8W-15-16, 17
S204	8W-12-22	S401	8W-12-31
S205	8W-51-2, 3	S402	8W-15-16
S206	8W-47-2, 4, 11	S403	8W-12-13
S207	8W-44-6	S404	8W-51-2
S208	8W-70-5	S405	8W-15-20
S209	8W-12-20	S406	8W-51-6
S210	8W-70-4	S407	8W-12-14
S211	8W-42-3	S408	8W-51-2
S212	8W-70-5	S409	8W-15-14
S214	8W-12-25	S410	8W-15-15
S215	8W-30-15	S411	8W-64-2
S216	8W-47-9	S412	8W-15-12
S217	8W-47-9	S420	8W-15-17
S218	8W-33-2	S421	8W-12-13
S219	8W-33-2		









8W-80 CONNECTOR PIN-OUTS

Component	Page	Component	Page
A/C Compressor Clutch	8W-80-5	C204	8W-80-20
A/C Pressure Transducer	8W-80-5	C205 (Except Police Package)	8W-80-21
Airbag Control Module (ORC)	8W-80-5	C205 (Except Police Package)	8W-80-21
Ambient Temperature Sensor	8W-80-6	C206 (Except Police Package)	8W-80-21
Analog Clock (LTD/300M)	8W-80-6	C206 (Except Police Package)	8W-80-21
Automatic Day/Night Mirror (Premium) . .	8W-80-6	C300	8W-80-22
Automatic Temperature Control Head . . .	8W-80-6	C300	8W-80-22
Autostick Switch (Dodge/300M)	8W-80-7	C301	8W-80-23
Blend Door Actuator	8W-80-7	C301	8W-80-23
Blower Motor Power Module (ATC)	8W-80-7	C302	8W-80-24
Blower Motor Resistor Block	8W-80-7	C302	8W-80-24
Body Control Module C1	8W-80-7	C303	8W-80-25
Body Control Module C2	8W-80-8	C303	8W-80-25
Body Control Module C3	8W-80-8	C304	8W-80-26
Body Control Module C4	8W-80-9	C304	8W-80-26
Brake Fluid Level Switch	8W-80-9	C305	8W-80-26
Brake Lamp Switch	8W-80-9	C305	8W-80-27
Brake Transmission Shift Interlock		C306	8W-80-27
Solenoid	8W-80-10	C306	8W-80-27
C101	8W-80-10	C307	8W-80-27
C101	8W-80-10	C307	8W-80-28
C103	8W-80-11	C308	8W-80-28
C103	8W-80-11	C308	8W-80-28
C104	8W-80-12	C309	8W-80-28
C104	8W-80-12	C309	8W-80-28
C105	8W-80-12	C310	8W-80-29
C105	8W-80-12	C310	8W-80-29
C106	8W-80-12	C311	8W-80-29
C106	8W-80-13	C311	8W-80-29
C107	8W-80-13	C312	8W-80-29
C107	8W-80-13	C312	8W-80-30
C108	8W-80-14	C313 (Concorde/Dodge/300M)	8W-80-30
C108	8W-80-14	C313 (Dodge/300M)	8W-80-30
C109	8W-80-14	C313 (LTD/Built-Up-Export)	8W-80-30
C109	8W-80-15	C313 (LTD/Concorde/Built-Up-Export) . .	8W-80-31
C111 (Built-Up-Export)	8W-80-15	C314 (Concorde/Dodge/300M)	8W-80-31
C111 (Built-Up-Export)	8W-80-15	C314 (Dodge/300M)	8W-80-31
C112 (Built-Up-Export)	8W-80-15	C314 (LTD/Built-Up-Export)	8W-80-31
C112 (Built-Up-Export)	8W-80-16	C314 (LTD/Concorde/Built-Up-Export) . .	8W-80-32
C115 (Except 2.7L Base)	8W-80-16	C315 (Concorde/LTD)	8W-80-32
C115 (Except 2.7L Base)	8W-80-16	C315 (Concorde/LTD)	8W-80-32
C120 (Police Package/Special Service) . .	8W-80-16	C316	8W-80-32
C120 (Police Package/Special Service) . .	8W-80-16	C316	8W-80-32
C200	8W-80-17	C317	8W-80-33
C200	8W-80-17	C317	8W-80-33
C201	8W-80-18	C318 (Memory)	8W-80-33
C201	8W-80-18	C318 (Memory)	8W-80-34
C202 (MTC)	8W-80-18	C319 (Memory)	8W-80-34
C202 (MTC)	8W-80-19	C319 (Memory)	8W-80-35
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C203 (ATC)	8W-80-20	C320 (Concorde/LTD)	8W-80-35
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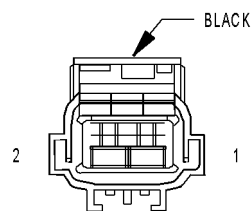
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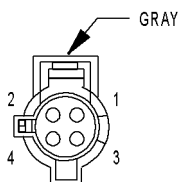
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		Windshield Wiper Motor	8W-80-102



A/C COMPRESSOR
CLUTCH

A/C COMPRESSOR CLUTCH - BLACK 2 WAY

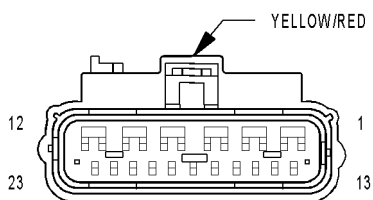
CAV	CIRCUIT	FUNCTION
1	C2 14DB/BK	A/C COMPRESSOR CLUTCH RELAY OUTPUT
2	Z1 14BK	GROUND



A/C PRESSURE
TRANSDUCER

A/C PRESSURE TRANSDUCER - GRAY 4 WAY

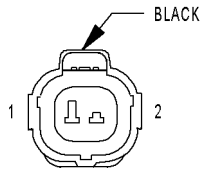
CAV	CIRCUIT	FUNCTION
1	K4 20BK/LB	SENSOR GROUND
2	K6 20VT/WT	5V SUPPLY
3	C18 20DB	A/C PRESSURE SIGNAL
4	-	-



AIRBAG
CONTROL
MODULE
(ORC)

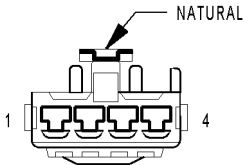
AIRBAG CONTROL MODULE (ORC) - YELLOW/RED 23 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	R42 18BK/YL	PASSENGER SQUIB 1 LINE 1
6	R44 18DG/YL	PASSENGER SQUIB 1 LINE 2
7	-	-
8	-	-
9	-	-
10	-	-
11	R45 18DG/LB	DRIVER SQUIB 1 LINE 1
12	R43 18BK/LB	DRIVER SQUIB 1 LINE 2
13	-	-
14	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
15	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
16	Z2 18BK/LG	GROUND
17	-	-
18	-	-
19	-	-
20	-	-
21	D25 20VT/YL	PCI BUS
22	-	-
23	-	-



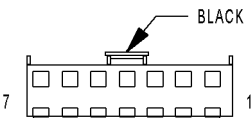
AMBIENT
TEMPERATURE
SENSOR

AMBIENT TEMPERATURE SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K25 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



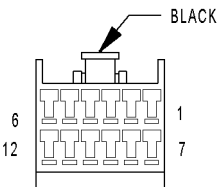
ANALOG CLOCK
(LTD/300M)

ANALOG CLOCK (LTD/300M) - NATURAL 4 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	Z2 20BK/LG	GROUND
3	E2 20OR	PANEL LAMPS DRIVER
4	-	-



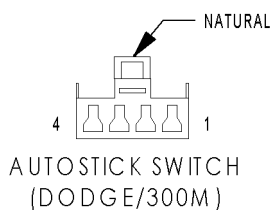
AUTOMATIC
DAY/NIGHT
MIRROR
(PREMIUM)

AUTOMATIC DAY/NIGHT MIRROR (PREMIUM) - BLACK 7 WAY		
CAV	CIRCUIT	FUNCTION
1	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	Z2 20BK/LG	GROUND
3	L1 20VT/BK	BACK-UP LAMP FEED
4	P112 18TN/OR	AUTO DAY NIGHT MIRROR (+)
5	P114 18YL/BK	AUTO DAY NIGHT MIRROR (-)
6	-	-
7	-	-

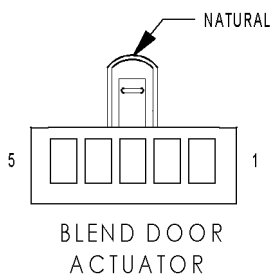


AUTOMATIC
TEMPERATURE
CONTROL
HEAD

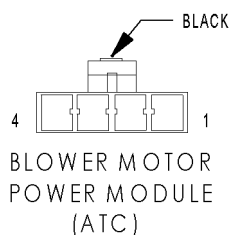
AUTOMATIC TEMPERATURE CONTROL HEAD - BLACK 12 WAY		
CAV	CIRCUIT	FUNCTION
1	Z2 20BK/LG	GROUND
2	D25 20VT/YL	PCI BUS
3	Z1 20BK	GROUND
4	E2 20OR	PANEL LAMPS DRIVER
5	-	-
6	-	-
7	C10 22RD/TN	IN-CAR TEMPERATURE SENSOR SIGNAL (ATC)
8	C57 20DB/GY	SENSOR GROUND
9	-	-
10	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
11	C9 22YL/DG	ASPIRATOR MOTOR DRIVER
12	M1 20PK	FUSED B (+)



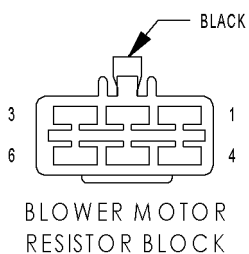
AUTOSTICK SWITCH (DODGE/300M) - NATURAL 4 WAY		
CAV	CIRCUIT	FUNCTION
1	T44 20YL/LB	AUTOSTICK DOWNSHIFT SWITCH SENSE
2	T5 20LG/RD	AUTOSTICK UPSHIFT SWITCH SENSE
3	Z1 20BK	GROUND
4	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)



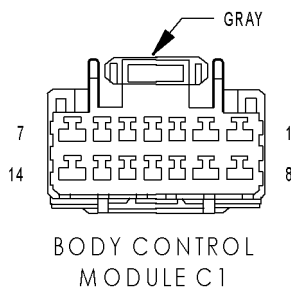
BLEND DOOR ACTUATOR - BLACK 5 WAY		
CAV	CIRCUIT	FUNCTION
1	C33 22DB/RD	BLEND AIR DOOR DRIVER
2	C57 22DB/GY	SENSOR GROUND
3	C36 22RD/WT	BLEND DOOR FEEDBACK SIGNAL
4	C26 22PK/DB	5V SUPPLY
5	C34 22BR/WT	COMMON DOOR DRIVER



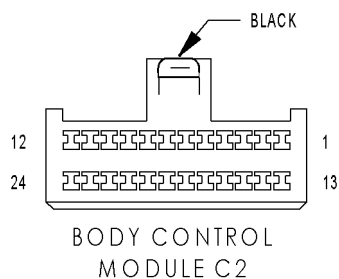
BLOWER MOTOR POWER MODULE (ATC) - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	Z1 12BK	GROUND
3	C56 22RD/LG	BLOWER MOTOR CONTROL
4	C1 12DG	FUSED IGNITION SWITCH OUTPUT (RUN)



BLOWER MOTOR RESISTOR BLOCK - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	C7 12BK/TN	HIGH BLOWER MOTOR DRIVER
2	C6 16LB	M2 BLOWER MOTOR DRIVER
3	-	-
4	C1 12DG	FUSED IGNITION SWITCH OUTPUT (RUN)
5	C4 18TN	LOW BLOWER MOTOR DRIVER
6	C5 16LG	M1 BLOWER MOTOR DRIVER

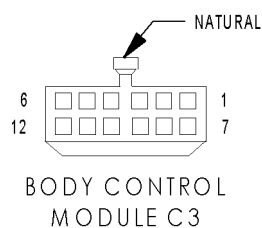


BODY CONTROL MODULE C1 - GRAY 14 WAY		
CAV	CIRCUIT	FUNCTION
1	P1 20BK/WT	DECKLID RELEASE SWITCH OUTPUT
2	C32 22GY/DB	RECIRCULATION DOOR DRIVER
3	C33 22DB/RD	BLEND AIR DOOR DRIVER
4	D25 20VT/YL	PCI BUS (ATC)
5	D25 20VT/YL	PCI BUS (RADIO)
6	F13 20DB	FUSED IGNITION SWITCH OUPUT (RUN-ACC)
7	C7 16BK/TN (MTC)	HIGH BLOWER MOTOR DRIVER
8	C57 20DB/GY	SENSOR GROUND
9	C35 22DG/YL	MODE DOOR DRIVER
10	C34 22BR/WT	COMMON DOOR DRIVER
11	D25 20VT/YL	PCI BUS (ORC)
12	D25 20VT/YL	PCI BUS (SKIM)
13	D25 20VT/YL	PCI BUS (MIC)
14	D25 20VT/YL	PCI BUS (DLC)



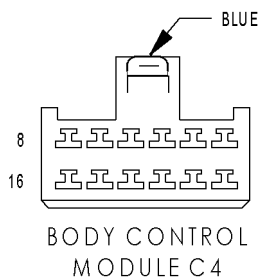
BODY CONTROL MODULE C2 - BLACK 24 WAY

CAV	CIRCUIT	FUNCTION
1	C36 22RD/WT	BLEND DOOR FEEDBACK SIGNAL
2	G52 20YL	HEADLAMP SWITCH MUX
3	X20 20GY/WT	RADIO CONTROL MUX
4	D19 20VT/OR	SCI RECEIVE (TCM/BCM)
5	C9 22YL/DG (ATC)	ASPIRATOR MOTOR DRIVER
6	C56 22RD/LG (ATC)	BLOWER MOTOR CONTROL
7	V10 20BR	FRONT WASHER PUMP MOTOR CONTROL
8	V52 20DG/RD	FRONT WIPER MUX SWITCH SIGNAL
9	C37 22YL/WT	MODE DOOR FEEDBACK SIGNAL
10	C38 20DB (EXCEPT BASE)	SUN SENSOR SIGNAL
11	L99 20GY/BK(POLICE PACKAGE)	FUSED B(+)
12	C82 20YL/OR (MTC)	TEMPERATURE SELECT
13	E17 20YL/BK (BASE INTREPID)	PARK LAMP RELAY OUTPUT
14	C48 20VT/PK (MTC)	A/C LED INDICATOR SIGNAL
15	C26 22PK/DB	5V SUPPLY
16	X920 20GY/OR	RADIO CONTROL MUX RETURN
17	P58 20WT	RKE EXTERNAL ANTENNA
18	P158 20BK	RKE EXTERNAL ANTENNA
19	L80 20WT	HEADLAMP SWITCH RETURN
20	C12 22LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
21	E19 20RD	PANEL LAMPS DIMMER SIGNAL
22	C10 22RD/TN (ATC)	IN-CAR TEMPERATURE SENSOR SIGNAL (ATC)
22	C58 22RD/TN (MTC)	A/C MODE SWITCH MUX
23	G69 22BK/OR	VTSS INDICATOR DRIVER
24	G26 22LB	KEY-IN IGNITION SWITCH SENSE



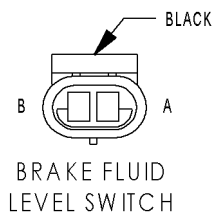
BODY CONTROL MODULE C3 - NATURAL 12 WAY

CAV	CIRCUIT	FUNCTION
1	D25 18VT/YL	PCI BUS (PCM)
2	D25 18VT/YL (ABS)	PCI BUS (CAB)
3	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
4	V14 20RD/VT	FRONT WIPER ON/OFF RELAY CONTROL
5	Z1 18BK (EXCEPT BUILT-UP-EXPORT)	GROUND
6	-	-
7	-	-
8	-	-
9	V58 20BR/YL (BUILT-UP-EXPORT)	HEADLAMP WASHER RELAY CONTROL
10	-	-
11	-	-
12	V16 20VT	FRONT WIPER HIGH/LOW RELAY CONTROL



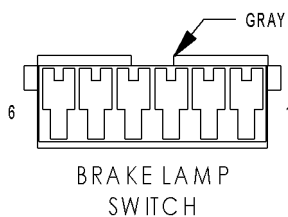
BODY CONTROL MODULE C4 - BLUE 16 WAY

CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	DOOR AJAR SWITCH SENSE (LR)
2	G74 20TN/RD	DOOR AJAR SWITCH SENSE (PASS)
3	G72 20DG/OR	PASSENGER CYLINDER LOCK SWITCH MUX
4	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
5	P97 20WT/DG	DRIVER DOOR SWITCH MUX
6	-	-
7	G4 20DB	FUEL LEVEL SENSOR SIGNAL
8	G71 18VT/WT	DECKLID SECURITY SWITCH SENSE
9	D25 20VT/YL	PCI BUS (MHSM) (SIACM)
10	G74 20TN/RD	DOOR AJAR SWITCH SENSE (RR)
11	-	-
12	P96 20WT/LG	PASSENGER DOOR SWITCH MUX
13	G73 20LG/OR	DRIVER CYLINDER LOCK SWITCH MUX
14	C80 20DB/WT	REAR WINDOW DEFOGGER RELAY CONTROL
15	G10 20LG/RD	SEAT BELT SWITCH SENSE
16	-	-



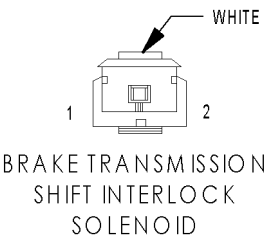
BRAKE FLUID LEVEL SWITCH - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
A	Z1 20BK	GROUND
B	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER

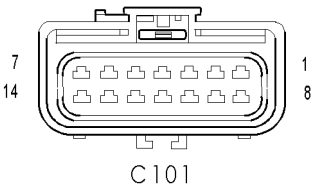


BRAKE LAMP SWITCH - GRAY 6 WAY

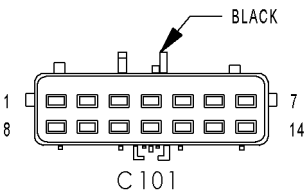
CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	Z2 18BK/LG	GROUND
3	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
4	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
5	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
6	F32 16PK/DB	FUSED B(+)



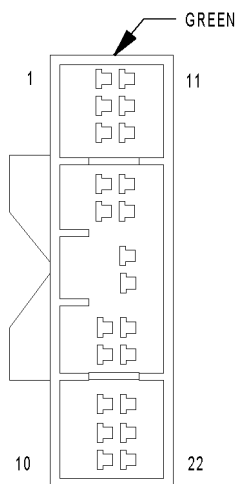
BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID - WHITE 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K29 20WT/PK	BRAKE SWITCH SENSE
2	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)



C101 - (HEADLAMP/DASH SIDE)	
CAV	CIRCUIT
1	F42 16DG/LG
2	K236 18GY/PK
3	Z12 14BK/TN
4	-
5	-
6	-
7	C2 14DB/BK
8	Z1 14BK
9	T40 12BR
10	G6 20GY
11	Z1 16BK/WT
12	C18 20DB
13	-
14	K4 18BK/LB



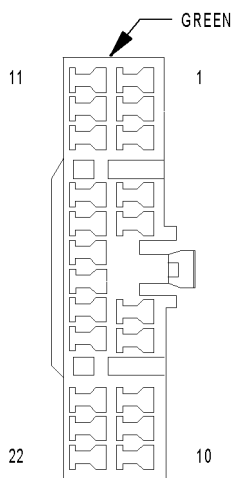
C101 - BLACK (ENGINE HARNESS SIDE)	
CAV	CIRCUIT
1	F42 16DG/LG
2	K236 18GY/PK (3.5L)
3	Z12 18BK/TN (3.5L)
3	Z12 14BK/TN (2.7L)
4	-
5	-
6	-
7	C2 14DB/BK
8	Z1 14BK
9	T40 12LG
10	G6 20GY
11	Z1 18BK
12	C18 20DB
13	-
14	K4 18BK/LB



C 103

C103 - GREEN (HEADLAMP AND DASH HARNESS SIDE)

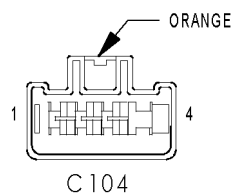
CAV	CIRCUIT
1	V37 20RD/LG
2	V32 20YL/RD
3	V30 20DB/RD
4	K29 20WT/PK
5	G29 20BK/TN
6	G6 20GY
7	D21 20PK/TN
8	D20 20LG
9	G9 22GY/BK(POLICE PACKAGE/SPECIAL SERVICE)
10	K4 20BK/LB
11	-
12	L96 18LG/RD (BUILT-UP-EXPORT)
12	A101 16RD/TN(POLICE PACKAGE)
13	A105 18DB/RD(EXCEPT POLICE PACKAGE)
13	A102 16RD/OR(POLICE PACKAGE)
14	A103 16RD/YL(POLICE PACKAGE)
14	Z1 18BK(EXCEPT POLICE PACKAGE)
15	D15 20WT/DG
16	F13 20DB
17	D19 20VT/OR
18	SL1 18LB/WT(POLICE PACKAGE)
19	SL2 18DB/WT(POLICE PACKAGE)
20	A15 18PK
21	L50 18WT/TN (ABS)
22	V10 20BR



C 103

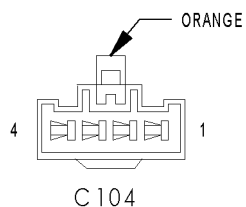
C103 - GREEN (I/P SIDE HARNESS)

CAV	CIRCUIT
1	V37 20RD/LG
2	V32 20YL/RD
3	V30 20DB/RD
4	K29 20WT/PK
5	G29 22BK/TN
6	G6 22GY
7	D21 20PK/TN
8	D20 20LG
9	G9 20GY/BK(POLICE PACKAGE/SPECIAL SERVICE)
10	K4 20BK/LB
11	Y98 18OR/WT(EXCEPT POLICE PACKAGE)
12	L96 18LG/RD (BUILT-UP-EXPORT) (BASE CONCORDE)
12	A101 16RD/TN(POLICE PACKAGE)
13	A105 18DB/RD(EXCEPT POLICE PACKAGE)
13	A102 16RD/OR(POLICE PACKAGE)
14	A103 16RD/YL(POLICE PACKAGE)
14	Z1 18BK(EXCEPT POLICE PACKAGE)
15	D15 20WT/DG
16	F13 20DB
17	D19 20VT/OR
18	SL1 18WT(POLICE PACKAGE)
19	SL2 18WT/DB(POLICE PACKAGE)
20	A15 18PK
21	L50 16WT/TN
22	V10 20BR



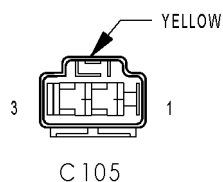
C104 - ORANGE (HEADLAMP/DASH SIDE)

CAV	CIRCUIT
1	A1 12RD
2	A2 12PK/BK
3	A41 12YL
4	-



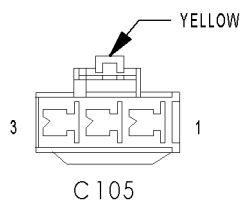
C104 - ORANGE (I/P HARNESS SIDE)

CAV	CIRCUIT
1	A1 12RD
2	A2 12PK/BK
3	A41 14YL
4	-



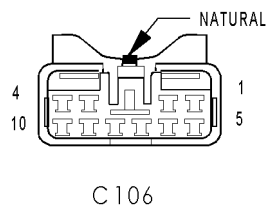
C105 - YELLOW (BODY HARNESS SIDE)

CAV	CIRCUIT
1	L13 18BR/YL
2	A141 12DG/WT
3	A4 10BK/PK



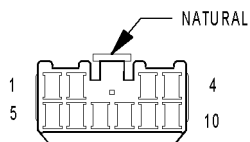
C105 - YELLOW (HEADLAMP/DASH SIDE)

CAV	CIRCUIT
1	A4 10BK/PK
2	A141 12DG/WT
3	L13 18BR/YL



C106 - NATURAL (BODY HARNESS SIDE)

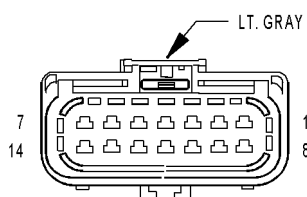
CAV	CIRCUIT
1	B4 18LG
2	B3 18LG/DB
3	B2 18YL
4	B1 18YL/DB
5	K106 18WT/DG
6	K107 200R/RD
7	-
8	Z1 18BK (EXCEPT 300M)
8	L95 16DG/YL (300M/BUILT-UP-EXPORT)
9	T44 20YL/LB (300M/DODGE)
10	T5 20LG/RD (300M/DODGE)



C106

C106 - NATURAL (HEADLAMP/DASH SIDE)

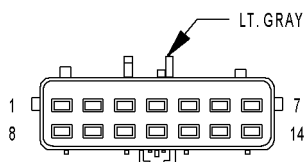
CAV	CIRCUIT
1	B4 18LG (ABS)
2	B3 18LG/DB (ABS)
3	B2 18YL (ABS)
4	B1 18YL/DB (ABS)
5	K106 18WT/DG
6	K107 18OR/RD
7	F18 20LG/BK
8	Z1 18BK (EXCEPT BUILT-UP-EXPORT)
8	L95 18DG/YL (BUILT-UP-EXPORT)
9	T44 20YL
10	T5 20LG/RD



C107

C107 - LT. GRAY (HEADLAMP/DASH SIDE)

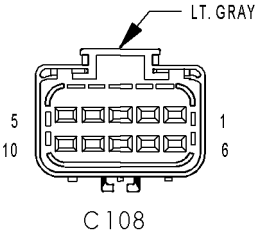
CAV	CIRCUIT
1	K399 18BR/GY
2	L1 20VT/BK
3	F20 20WT
4	T1 20LG/BK
5	T3 20VT
6	T42 20VT/WT
7	T41 20BK/WT
8	T54 20VT/PK
9	T13 20DB/BK
10	K904 18DB/DG
11	K341 20PK/WT
12	K141 20TN/WT
13	T52 20RD/BK
14	T14 20LG/WT



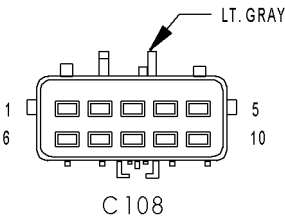
C107

C107 - LT. GRAY (TRANSMISSION HARNESS SIDE)

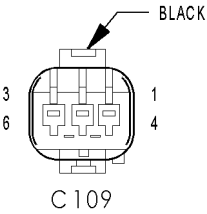
CAV	CIRCUIT
1	K399 18BR/GY
2	L1 20VT/BK
3	F20 20WT
4	T1 20LG/BK
5	T3 20VT
6	T42 20VT/WT
7	T41 20BR/YL
8	T54 20VT/PK
9	T13 20DB/BK
10	K904 18DB/DG
11	K341 20PK/WT
12	K141 20TN/WT
13	T52 20RD/BK
14	T14 20LG/WT



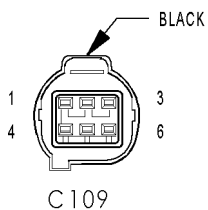
C108 - LT. GRAY (HEADLAMP/DASH SIDE)	
CAV	CIRCUIT
1	T9 16OR/BK
2	T19 16WT
3	Z1 18BK
4	T60 16BR
5	T59 16PK
6	T50 16DG
7	T47 16YL/BK
8	K199 18BR/VT
9	T20 16LB
10	T16 16RD



C108 - LT. GRAY (TRANSMISSION HARNESS SIDE)	
CAV	CIRCUIT
1	T9 16OR/BK
2	T19 16WT
3	Z1 18BK
4	T60 16BR
5	T59 16PK
6	T50 16DG
7	T47 16YL/BK
8	K199 18BR/VT
9	T20 16LB
10	T16 16RD

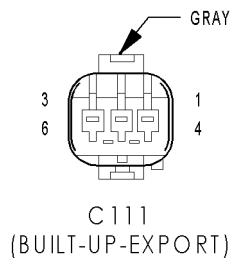


C109 - BLACK (FRONT FASCIA HARNESS SIDE)	
CAV	CIRCUIT
1	L60 18TN (300M/BUILT-UP-EXPORT)
1	L60 20TN (CONCORDE/LTD)
2	L7 20BK/YL
3	L61 18LG (300M/BUILT-UP-EXPORT)
3	L61 20LG (CONCORDE/LTD)
4	-
5	L39 20LB
6	Z1 20BK



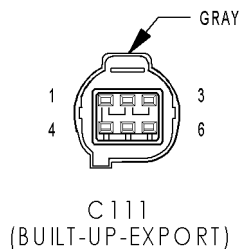
C109 - BLACK (HEADLAMP AND DASH SIDE)

CAV	CIRCUIT
1	L60 18TN
2	L7 18BK/YL
3	L61 18LG
4	-
5	L39 20LB
6	Z1 18BK



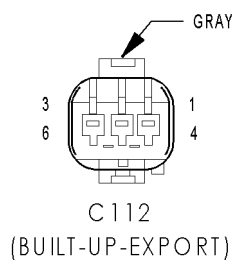
C111 (BUILT-UP-EXPORT) - GRAY (HEADLAMP LEVELING SIDE)

CAV	CIRCUIT
1	L43 16VT
2	L7 20BK/YL
3	Z1 16BK
4	-
5	L13 20BR/YL
6	L33 20RD



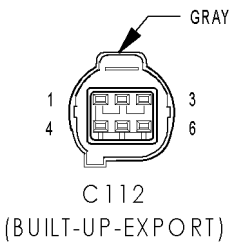
C111 (BUILT-UP-EXPORT) - GRAY (HEADLAMP MODULE SIDE)

CAV	CIRCUIT
1	L43 20VT
2	L7 20BK/YL
3	Z1 20BK
4	-
5	L13 20BR/YL
6	L33 20RD



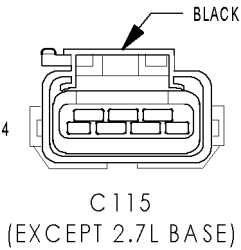
C112 (BUILT-UP-EXPORT) - GRAY (HEADLAMP MODULE SIDE)

CAV	CIRCUIT
1	L44 16VT/RD
2	L7 20BK/YL
3	Z1 16BK
4	-
5	L13 20BR/YL
6	L34 20RD/OR



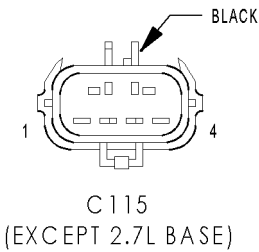
C112 (BUILT-UP-EXPORT) - GRAY (HEADLIGHT
LEVELING SIDE)

CAV	CIRCUIT
1	L44 20VT
2	L7 20BK/YL
3	Z1 20BK
4	-
5	L13 20BR/YL
6	L34 20RD



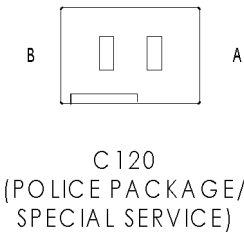
C115 (EXCEPT 2.7L BASE) - BLACK (ENGINE
SIDE)

CAV	CIRCUIT
1	Z1 12BK
2	Z1 12BK
3	C23 12DG
4	C25 12YL



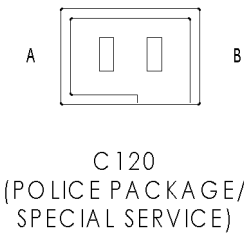
C115 (EXCEPT 2.7L BASE) - BLACK (RADIATOR
MOTOR HARNESS)

CAV	CIRCUIT
1	Z1 12BK
2	Z1 12BK
3	C23 12RD
4	C25 12RD



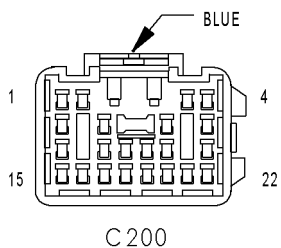
C120 (POLICE PACKAGE/SPECIAL SERVICE) -
(HEADLAMP AND DASH HARNESS SIDE)

CAV	CIRCUIT
A	G9 20GY/BK(SPECIAL SERVICE/ CANADIAN POLICE PACKAGE)
A	L99 20GY/BK(EXCEPT SPECIAL SERVICE/CANADIAN POLICE PACKAGE)
B	-



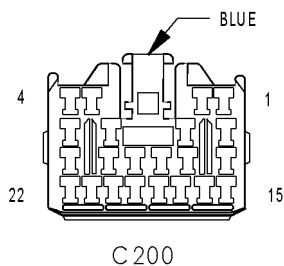
C120 (POLICE PACKAGE/SPECIAL SERVICE) -
(JUNCTION BLOCK HARNESS SIDE)

CAV	CIRCUIT
A	G9 20GY/BK
A	L99 20GY/BK
B	-



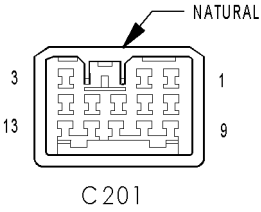
C200 - BLUE (BODY HARNESS SIDE)

CAV	CIRCUIT
1	G78 20TN/BK
2	Z2 20BK/LG
3	L13 18BR/YL
4	L95 16DG/YL (300M/BUILT-UP-EXPORT)
5	F14 20LG/YL
6	-
7	-
8	X60 20DG/RD (EXCEPT DODGE)
9	P112 18TN/OR (EXCEPT DODGE)
10	X12 18RD (POLICE PACKAGE)
11	G9 20GY/BK (POLICE PACKAGE)
12	-
13	-
14	P114 18TN/WT (EXCEPT DODGE)
15	C80 20DB/WT
16	-
17	-
18	-
19	F101 16YL/TN (POLICE PACKAGE)
20	F102 16YL/OR (POLICE PACKAGE)
21	F103 16YL/RD (POLICE PACKAGE)
22	L50 16WT/TN

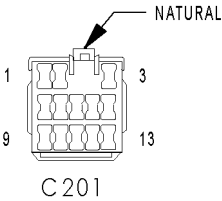


C200 - BLUE (I/P HARNESS SIDE)

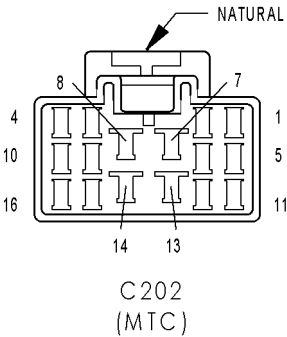
CAV	CIRCUIT
1	G78 20TN/BK
2	Z2 20BK/LG
3	L13 18BR/YL (BUILT-UP-EXPORT)
4	L95 18DG/YL (BUILT-UP-EXPORT)
5	F14 18LG/YL
6	-
7	-
8	X60 20DG/RD
9	P112 18TN/OR
10	X12 20RD(POLICE PACKAGE)
11	G9 20GY/BK(POLICE PACKAGE)
12	-
13	-
14	P114 18TN/WT
15	C80 20DB/WT
16	-
17	-
18	-
19	F101 16YL/TN(POLICE PACKAGE)
20	F102 16YL/OR(POLICE PACKAGE)
21	F103 16YL/RD(POLICE PACKAGE)
22	L50 16WT/TN



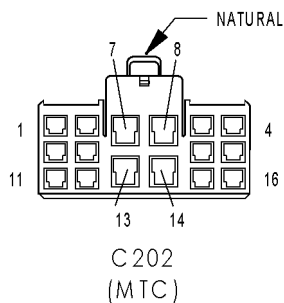
C201 - NATURAL (BODY HARNESS SIDE)	
CAV	CIRCUIT
1	F62 16RD
2	X51 18BR/YL
3	X52 18DB/WT
4	X53 18DG
5	X54 18VT
6	X55 18BR/RD
7	X57 18BR/LB
8	X58 18DB/OR
9	X56 18DB/RD
10	X88 18PK/RD
11	X89 18PK/BK
12	X60 20DG/RD
13	F62 16RD/WT



C201 - NATURAL (I/P HARNESS SIDE)	
CAV	CIRCUIT
1	F62 16RD
2	X51 18BR/YL
3	X52 18DB/WT
4	X53 18DG
5	X54 18VT
6	X55 18BR/RD
7	X57 18BR/LB
8	X58 18DB/OR
9	X56 18DB/RD
10	X88 18PK/RD (EXCEPT BASE)
11	X89 18PK/BK (EXCEPT BASE)
12	X60 20DG/RD
13	F62 16RD/WT

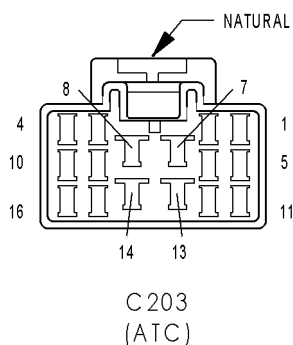


C202 (MTC) - NATURAL (HVAC HARNESS SIDE)	
CAV	CIRCUIT
1	C34 20BR/WT
2	C35 22DG/YL
3	C33 22DB/RD
4	C32 20GY/DB
5	C57 20DB/GY
6	C26 22PK/DB
7	C7 12BK/TN
8	C1 12DG
9	C12 20LG/BK
10	C36 22RD/WT
11	C37 22YL/WT
12	C4 18TN
13	C5 16LG
14	C6 16LB
15	-
16	-



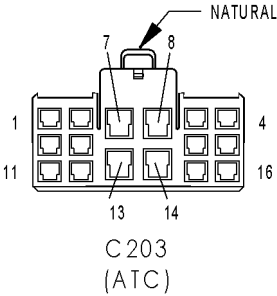
C202 (MTC) - NATURAL (I/P HARNESS SIDE)

CAV	CIRCUIT
1	C34 22BR/WT
2	C35 22DG/YL
3	C33 22DB/RD
4	C32 22GY/DB
5	C57 20DB/GY
6	C26 22PK/DB
7	C7 12BK/TN
8	C1 12DG
9	C12 22LG/BK
10	C36 22RD/WT
11	C37 22YL/WT
12	C4 18TN
13	C5 16LG
14	C6 16LB
15	-
16	-

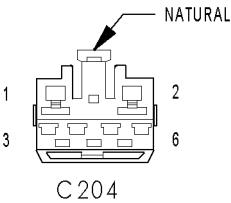


C203 (ATC) - NATURAL (HVAC HARNESS SIDE)

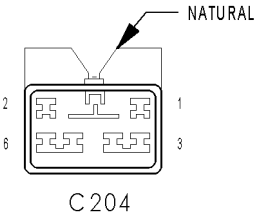
CAV	CIRCUIT
1	C34 20BR/WT
2	C35 22DG/YL
3	C33 22DB/RD
4	C32 20GY/DB
5	C57 20DB/GY
6	C26 22PK/DB
7	-
8	C1 12DG
9	C12 20LG/BK
10	C36 22RD/WT
11	C37 22YL/WT
12	-
13	Z1 12BK
14	-
15	C56 22RD/LG
16	-



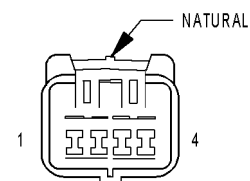
C203 (ATC) - NATURAL (I/P HARNESS SIDE)	
CAV	CIRCUIT
1	C34 22BR/WT
2	C35 22DG/YL
3	C33 22DB/RD
4	C32 22GY/DB
5	C57 20DB/GY
6	C26 22PK/DB
7	-
8	C1 12DG
9	C12 22LG/BK
10	C36 22RD/WT
11	C37 22YL/WT
12	-
13	Z1 12BK
14	-
15	C56 22RD/LG
16	-



C204 - NATURAL (HEADLINER HARNESS SIDE)	
CAV	CIRCUIT
1	Q41 20WT
2	A37 16RD
3	Z1 16BK
4	G5 20DB/WT
5	Q43 20VT
6	Q42 20LB



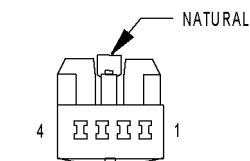
C204 - NATURAL (SUNROOF HARNESS SIDE)	
CAV	CIRCUIT
1	Q41 20WT
2	A37 16RD
3	Z1 16BK
4	G5 20DB/WT
5	Q43 20VT
6	Q42 20LB



C 205
(EXCEPT POLICE
PACKAGE)

C205 (EXCEPT POLICE PACKAGE) - NATURAL
(INSTRUMENT PANEL SIDE)

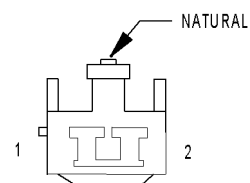
CAV	CIRCUIT
1	E2 200R
2	Z1 20BK
3	A105 18DB/RD
4	Z1 18BK



C 205
(EXCEPT POLICE
PACKAGE)

C205 (EXCEPT POLICE PACKAGE) - NATURAL
(POWERPOINT SIDE)

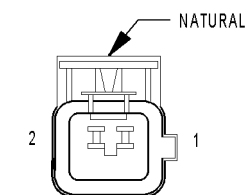
CAV	CIRCUIT
1	E2 200R
2	Z1 20BK
3	A105 18DB/RD
4	Z1 18BK



C 206
(EXCEPT POLICE
PACKAGE)

C206 (EXCEPT POLICE PACKAGE) - NATURAL
(HEADLINER SIDE)

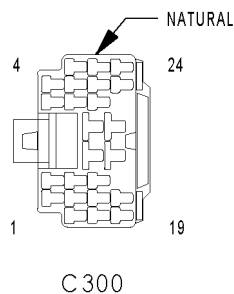
CAV	CIRCUIT
1	P112 18TN/OR
2	P114 18YL/BK



C 206
(EXCEPT POLICE
PACKAGE)

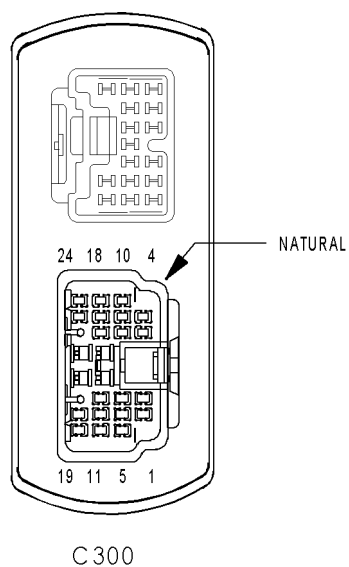
C206 (EXCEPT POLICE PACKAGE) - NATURAL
(INSTRUMENT PANEL SIDE)

CAV	CIRCUIT
1	P112 18TN/OR
2	P114 18TN/WT



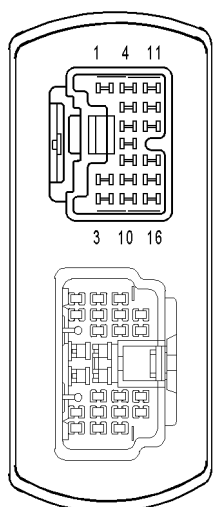
C300 - NATURAL (BODY HARNESS SIDE)

CAV	CIRCUIT
1	Q17 14DB/WT
2	X81 18YL/BK (MIDLINE AND PREMIUM AUDIO)
3	P33 16OR
4	Q26 14VT/WT
5	-
6	Q18 14GY/BK
7	X53 18DG (BASE AUDIO) (POLICE PACKAGE)
7	X87 18LG/VT (MIDLINE AND PREMIUM AUDIO)
8	X83 18YL/RD (MIDLINE AND PREMIUM AUDIO)
9	P55 16DB
10	-
11	-
12	Q16 14BR/WT
13	M2 20YL
14	F21 14TN
15	Q27 14RD/BK
16	X55 18BR/RD (BASE AUDIO) (POLICE PACKAGE)
16	X85 18LG/BK (MIDLINE AND PREMIUM AUDIO)
17	Q28 14DG/WT
18	-
19	-
20	P112 18TN/OR
21	Q1 14YL
22	Z1 14BK
23	P114 18TN/WT
24	L61 16LG (EXCEPT DODGE)



C300 - NATURAL (LEFT FRONT DOOR SIDE)

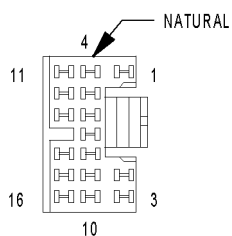
CAV	CIRCUIT
1	Q17 14DB/WT
2	X81 18YL/BK (MIDLINE AND PREMIUM AUDIO)
3	P33 16OR
4	Q26 14VT/WT
5	-
6	Q18 14GY/BK
7	X87 18LG/VT
8	X83 18YL/RD (MIDLINE AND PREMIUM AUDIO)
9	P55 16DB
10	-
11	-
12	Q16 14BR/WT
13	M2 20YL
14	F21 14TN
15	Q27 14RD/BK
16	X85 18LG/BK
17	Q28 14DG/WT
18	-
19	-
20	P112 18TN/OR
21	Q1 14YL
22	Z1 14BK
23	P114 18TN/WT
24	L61 18LG



C301

C301 - (LEFT FRONT DOOR SIDE)

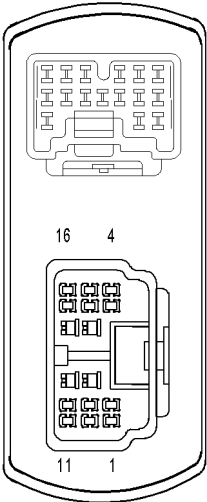
CAV	CIRCUIT
1	G5 20DB/WT
2	C16 20LB/YL
3	M1 20PK
4	P72 20YL/BK
5	P70 20WT
6	P74 20DB
7	G73 20LG/OR
8	P97 20WT/DG
9	P64 20YL/OR
10	P65 20DB/YL
11	P69 20WT/RD
12	P71 20YL (MEMORY)
13	P75 20BK/WT (MEMORY)
14	P73 20YL/PK (MEMORY)
15	G75 20TN
16	P161 20GY/LB



C301

C301 - NATURAL (BODY HARNESS SIDE)

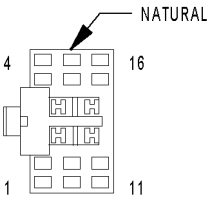
CAV	CIRCUIT
1	G5 20DB/WT
2	C16 20LB/YL
3	M1 20PK
4	P72 20YL/BK
5	P70 20WT
6	P74 20DB
7	G73 20LG/OR
8	P97 20WT/DG
9	P64 20YL/OR
10	P65 20DB/YL
11	P69 20WT/RD
12	P71 20YL (MEMORY)
13	P75 20BK/WT (MEMORY)
14	P73 20YL/PK (MEMORY)
15	G75 20TN
16	P161 20GY/LB



C 302

C302 - (RIGHT FRONT DOOR SIDE)

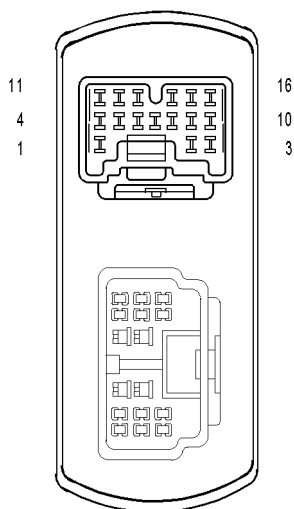
CAV	CIRCUIT
1	-
2	X84 18OR/BK (MIDLINE AND PREMIUM AUDIO)
3	P33 16OR
4	Q26 14VT/WT
5	-
6	X80 18LB/BK
7	-
8	-
9	X86 18OR/RD (MIDLINE AND PREMIUM AUDIO)
10	P34 16PK/BK
11	Q16 14BR/WT
12	M2 20YL
13	Q1 14YL
14	Z1 20BK
15	X82 18LB/RD
16	L60 18TN



C 302

C302 - NATURAL (BODY HARNESS SIDE)

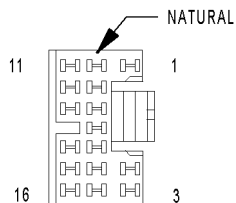
CAV	CIRCUIT
1	-
2	X84 18OR/BK (MIDLINE AND PREMIUM AUDIO)
3	P33 16OR
4	Q26 14VT/WT
5	-
6	X80 18LB/BK (MIDLINE AND PREMIUM AUDIO) (POLICE PACKAGE)
6	X56 18DB/RD (BASE)
7	-
8	-
9	X86 18OR/RD (MIDLINE AND PREMIUM AUDIO)
10	P34 16PK/BK
11	Q16 14BR/WT
12	M2 20YL
13	Q1 14YL
14	Z1 20BK
15	X82 18LB/RD (MIDLINE AND PREMIUM AUDIO)
15	X54 18VT (BASE) (POLICE PACKAGE)
16	L60 16TN (EXCEPT DODGE)



C 303

C303 - (RIGHT FRONT DOOR SIDE)

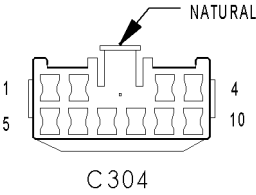
CAV	CIRCUIT
1	G5 20DB/WT
2	C16 20LB/YL (MEMORY)
3	M1 20PK
4	P72 20YL/BK
5	P70 20WT
6	P74 20DB
7	G72 20DG/OR
8	P96 20WT/LG
9	P67 20YL/RD (MEMORY)
10	P68 20DG/RD (MEMORY)
11	P66 20WT/BK (MEMORY)
12	-
13	-
14	-
15	G74 20TN/RD
16	P162 20GY/WT (MEMORY)



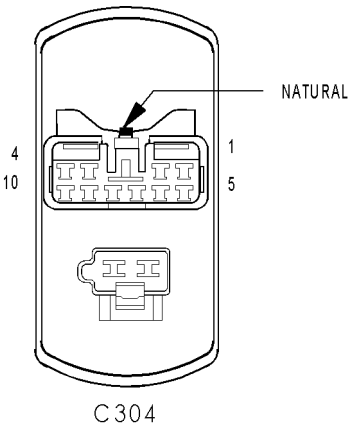
C 303

C303 - NATURAL (BODY SIDE)

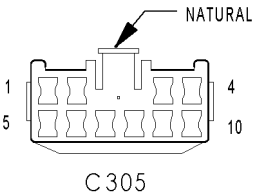
CAV	CIRCUIT
1	G5 20DB/WT
2	C16 20LB/YL
3	M1 20PK
4	P72 20YL/BK
5	P70 20WT
6	P74 20DB
7	G72 20DG/OR
8	P96 20WT/LG
9	P67 20YL/RD (300M/LTD/CONCORDE)
10	P68 20DG/RD (300M/LTD/CONCORDE)
11	P66 20WT/BK (300M/LTD/CONCORDE)
12	-
13	-
14	-
15	G74 20TN/RD
16	P162 20GY/WT (300M/LTD/CONCORDE)



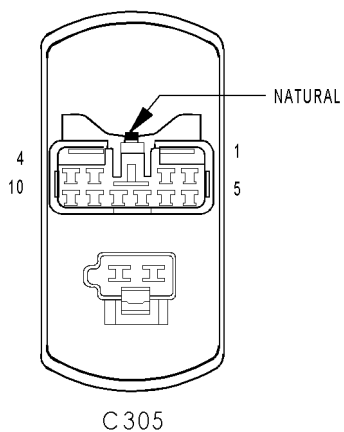
C304 - NATURAL (BODY SIDE)	
CAV	CIRCUIT
1	Z1 20BK
2	-
3	P33 16OR
4	-
5	P34 16PK/BK
6	-
7	Q27 14RD/BK
8	G74 20TN/RD
9	Q1 14YL
10	Q17 14DB/WT



C304 - NATURAL (REAR DOOR SIDE)	
CAV	CIRCUIT
1	Z1 20BK
2	-
3	P33 16OR
4	-
5	P34 16PK/BK
6	-
7	Q27 14DG/WT
8	G74 20TN/RD
9	Q1 14YL
10	Q17 14GY/BK

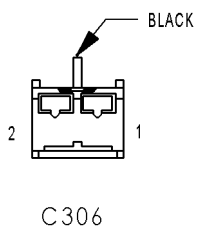


C305 - NATURAL (BODY SIDE)	
CAV	CIRCUIT
1	Z1 20BK
2	-
3	P33 16OR
4	-
5	P34 16PK/BK
6	-
7	Q28 14DG/WT
8	G74 20TN/RD
9	Q1 14YL(EXCEPT POLICE PACKAGE)
10	Q18 14GY/BK



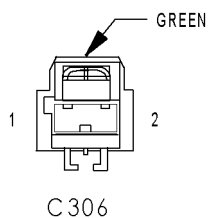
C305 - NATURAL (REAR DOOR SIDE)

CAV	CIRCUIT
1	Z1 20BK
2	-
3	P33 16OR
4	-
5	P34 16PK/BK
6	-
7	Q28 14DG/WT
8	G74 20TN/RD
9	Q1 14YL
10	Q18 14GY/BK



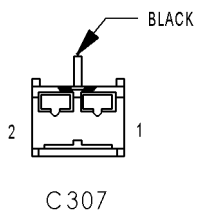
C306 - BLACK (BODY SIDE)

CAV	CIRCUIT
1	Z1 16BK
2	F35 16RD



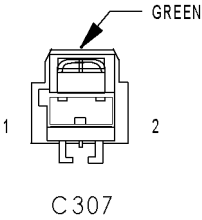
C306 - GREEN (POWER SEAT SIDE)

CAV	CIRCUIT
1	Z1 16BK
2	F35 16RD

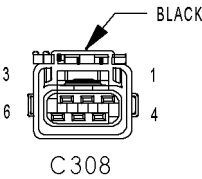


C307 - BLACK (BODY SIDE)

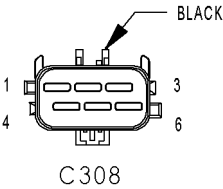
CAV	CIRCUIT
1	Z1 16BK (HEATED SEATS)
2	F35 16RD



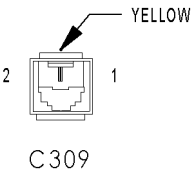
C307 - GREEN (POWER SEAT SIDE)	
CAV	CIRCUIT
1	Z1 16BK
2	F35 16RD



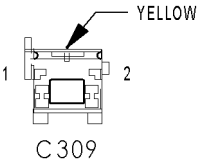
C308 - BLACK (BODY SIDE)	
CAV	CIRCUIT
1	K106 18WT/DG
2	Z1 12BK
3	G4 20DB
4	K107 200R/RD
5	A141 12DG/WT
6	-



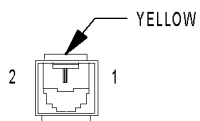
C308 - BLACK (FUEL TANK JUMPER SIDE)	
CAV	CIRCUIT
1	K106 18WT/DG (EXCEPT BUILT-UP-EXPORT)
2	Z1 12BK
3	G4 18DB
4	K107 180R (EXCEPT BUILT-UP-EXPORT)
5	A141 12DG/WT
6	-



C309 - YELLOW (BODY SIDE)	
CAV	CIRCUIT
1	R31 20LG/OR
2	R33 20LG/WT



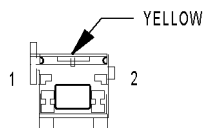
C309 - YELLOW (LEFT SEAT SIDE)	
CAV	CIRCUIT
1	R31 20LG/OR
2	R33 20LG/WT



C310

C310 - YELLOW (BODY SIDE)

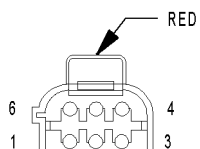
CAV	CIRCUIT
1	R32 20LB/OR
2	R34 20LB/WT



C310

C310 - YELLOW (RIGHT SEAT SIDE)

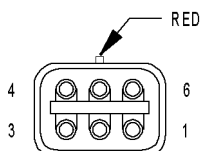
CAV	CIRCUIT
1	R32 20LB/OR
2	R34 20LB/WT



C311

C311 - RED (BODY SIDE)

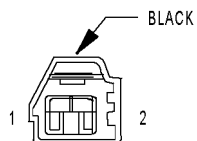
CAV	CIRCUIT
1	G78 20TN/BK
2	P2 20BK/WT
3	G71 18VT/WT
4	Z1 16BK
5	L50 16WT/TN (EXCEPT LTD/CONCORDE)
6	-



C311

C311 - RED (DECKLID SIDE)

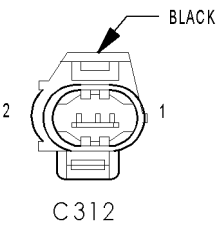
CAV	CIRCUIT
1	G78 20TN/BK
2	P2 20BK/WT
3	G71 20VT/YL
4	Z1 16BK
5	L50 16WT/TN (DODGE)
5	L50 18WT/TN (BUILT-UP-EXPORT)
6	-



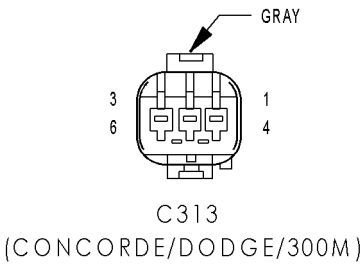
C312

C312 - BLACK (BODY SIDE)

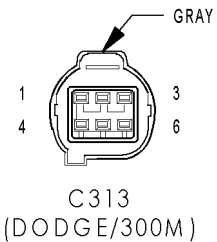
CAV	CIRCUIT
1	L7 18BK/YL
2	Z1 18BK



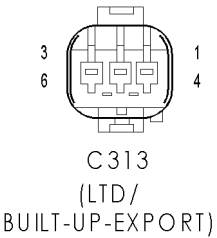
C312 - BLACK (REAR FASCIA SIDE)	
CAV	CIRCUIT
1	L7 18BK/YL
2	Z1 18BK



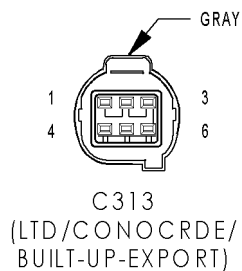
C313 (CONCORDE/DODGE/300M) - GRAY (TAIL LAMP SIDE)	
CAV	CIRCUIT
1	L50 18WT/TN
2	L60 18LG/TN
3	-
4	L7 18BK/YL
5	L1 18VT/BK
6	Z1 18BK



C313 (DODGE/300M) - GRAY (BODY SIDE)	
CAV	CIRCUIT
1	L50 16WT/TN
2	L60 16TN
3	-
4	L7 18BK/YL
5	L1 20VT/BK
6	Z1 16BK

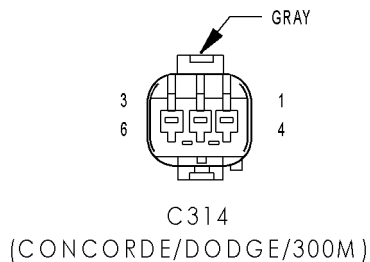


C313 (LTD/BUILT-UP-EXPORT) - (TAIL LAMPS SIDE)	
CAV	CIRCUIT
1	L50 18WT/TN
2	L60 18LG/TN
3	L95 18DG/YL (BUILT-UP-EXPORT)
4	L7 18BK/YL
5	L1 18VT/BK (BUILT-UP-EXPORT)
6	Z1 18BK



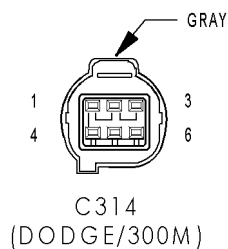
C313 (LTD/CONCORDE/BUILT-UP-EXPORT) - GRAY (BODY SIDE)

CAV	CIRCUIT
1	L50 16WT/TN
2	L60 16TN
3	L95 16DG/YL (BUILT-UP-EXPORT)
4	L7 18BK/YL
5	L1 20VT/BK (BUILT-UP-EXPORT)
6	Z1 16BK



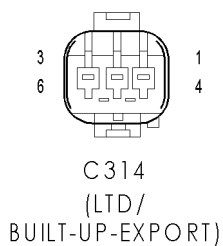
C314 (CONCORDE/DODGE/300M) - GRAY (TAIL LAMP SIDE)

CAV	CIRCUIT
1	L50 16WT/TN
2	L61 18LG/TN
3	-
4	L7 18BK/YL
5	L1 18VT/BK
6	Z1 18BK



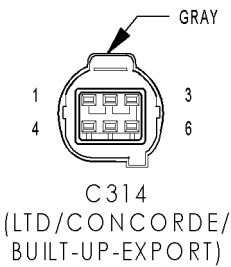
C314 (DODGE/300M) - GRAY (BODY SIDE)

CAV	CIRCUIT
1	L50 16WT/TN
2	L61 16LG
3	-
4	L7 18BK/YL
5	L1 20VT/BK
6	Z1 16BK

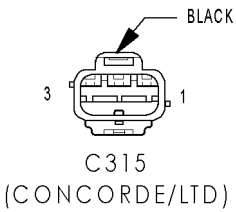


C314 (LTD/BUILT-UP-EXPORT) - (TAILAMPS SIDE)

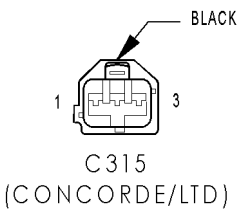
CAV	CIRCUIT
1	L50 18WT/TN
2	L61 18LG/TN
3	L95 18DG/YL (BUILT-UP-EXPORT)
4	L7 18BK/YL
5	L1 18VT/BK (BUILT-UP-EXPORT)
6	Z1 18BK



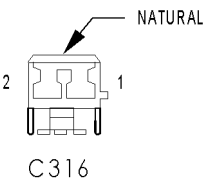
C314 (LTD/CONCORDE/BUILT-UP-EXPORT) - GRAY (BODY SIDE)	
CAV	CIRCUIT
1	L50 16WT/TN
2	L61 16LG
3	L95 16DG/YL (BUILT-UP-EXPORT)
4	L7 18BK/YL
5	L1 20 VT/BK (BUILT-UP-EXPORT)
6	Z1 16BK



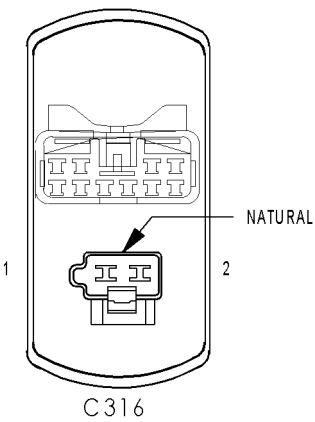
C315 (CONCORDE/LTD) - BLACK (BODY SIDE)	
CAV	CIRCUIT
1	L1 18VT/BK
2	Z1 18BK
3	L7 18BK/YL



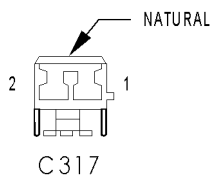
C315 (CONCORDE/LTD) - BLACK (REAR FASCIA SIDE)	
CAV	CIRCUIT
1	L1 18VT/BK
2	Z1 18BK
3	L7 18BK/YL



C316 - NATURAL (BODY SIDE)	
CAV	CIRCUIT
1	X95 18WT/VT (PREMIUM II AUDIO)
2	X97 18WT/DG (PREMIUM II AUDIO)

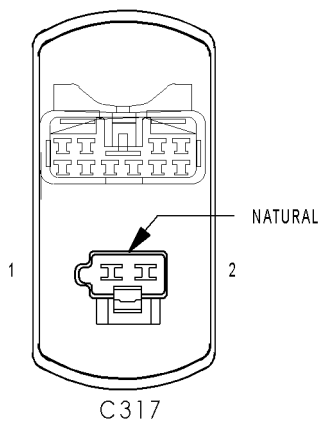


C316 - NATURAL (REAR DOOR SIDE)	
CAV	CIRCUIT
1	X95 18TN/VT (PREMIUM II AUDIO)
2	X97 18TN/DG (PREMIUM II AUDIO)



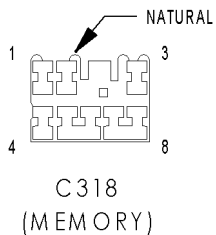
C317 - NATURAL (BODY SIDE)

CAV	CIRCUIT
1	X98 18TN/VT (PREMIUM II AUDIO)
2	X96 18TN/DG (PREMIUM II AUDIO)



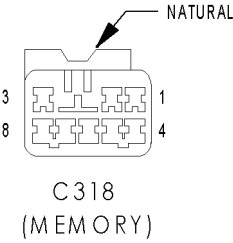
C317 - NATURAL (REAR DOOR SIDE)

CAV	CIRCUIT
1	X98 18TN/VT (PREMIUM II AUDIO)
2	X96 18TN/DG (PREMIUM II AUDIO)

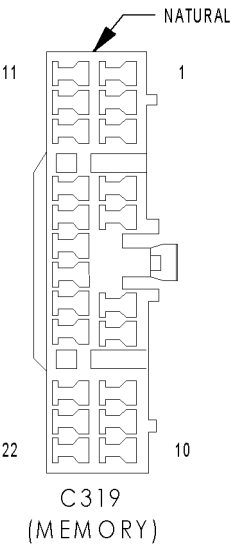


C318 (MEMORY) - NATURAL (BODY SIDE)

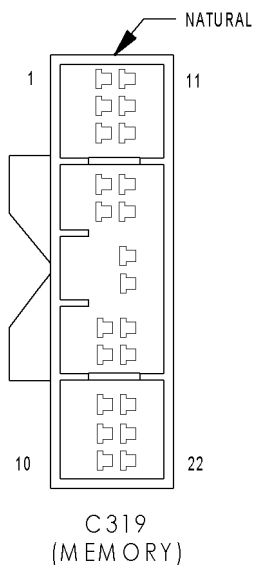
CAV	CIRCUIT
1	P130 16RD/TN
1	P130 16RD/TN
2	P142 20TN/DB
2	P142 20TN/DB
3	G5 20DB/WT
3	G5 20DB/WT
4	-
4	-
5	P138 20VT/LG
5	P138 20VT/LG
6	P140 20VT/BK
6	P140 20VT/BK
7	P134 20TN/LG
7	P134 20TN/LG
8	P144 20BK/LG
8	P144 20BK/LG



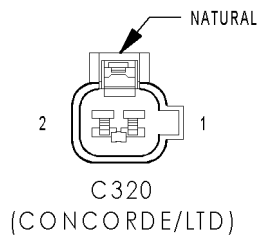
C318 (MEMORY) - NATURAL (BODY SIDE)	
CAV	CIRCUIT
1	P130 16RD/TN
1	P130 16RD/TN
2	P142 20TN/DB
2	P142 20TN/DB
3	G5 20DB/WT
3	G5 20DB/WT
4	-
4	-
5	P138 20VT/LG
5	P138 20VT/LG
6	P140 20VT/BK
6	P140 20VT/BK
7	P134 20TN/LG
7	P134 20TN/LG
8	P144 20BK/LG
8	P144 20BK/LG



C319 (MEMORY) - NATURAL (BODY SIDE)	
CAV	CIRCUIT
1	D25 20VT/YL
2	G5 20DB/WT
3	P70 20WT
4	P72 20YL/BK
5	P74 20DB
6	P142 20TN/DB
7	P130 16RD/TN
8	P144 20BK/LG
9	P134 20TN/LG
10	P140 20VT/BK
11	P138 20VT/LG
12	P71 20YL
13	P75 20BK/WT
14	P73 20YL/PK
15	P64 20YL/OR
16	P65 20DB/YL
17	P161 20GY/LB
18	P69 20WT/RD
19	P67 20YL/RD
20	P68 20DG/RD
21	P162 20GY/WT
22	P66 20WT/BK

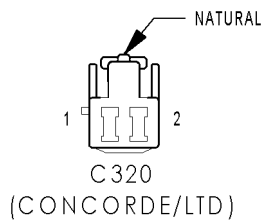

C319 (MEMORY) - NATURAL (POWER SEAT SIDE)
SIDE)

CAV	CIRCUIT
1	D25 20VT/YL
2	G5 20DB/WT
3	P70 20WT
4	P72 20YL/BK
5	P74 20DB
6	P142 20TN/DB
7	P130 16RD/TN
8	P144 20BK/LG
9	P134 20TN/LG
10	P140 20VT/BK
11	P138 20VT/LG
12	P71 20YL
13	P75 20BK/WT
14	P73 20YL/PK
15	P64 20YL/OR
16	P65 20DB/YL
17	P161 20GY/LB
18	P69 20WT/RD
19	P67 20YL/RD
20	P68 20DG/RD
21	P162 20GY/WT
22	P66 20WT/BK



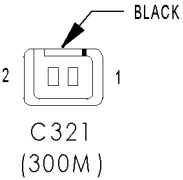
C320 (CONCORDE/LTD) - NATURAL (BODY SIDE)

CAV	CIRCUIT
1	L50 16WT/TN
2	Z1 16BK

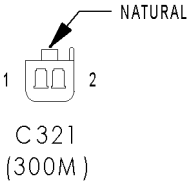


C320 (CONCORDE/LTD) - NATURAL (CHMSL SIDE)

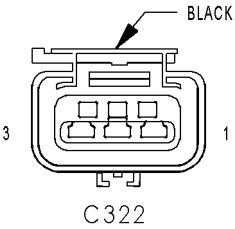
CAV	CIRCUIT
1	L50 18WT/TN
2	Z1 18BK



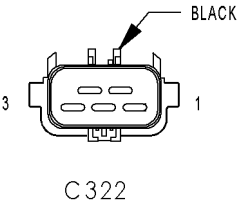
C321 (300M) - BLACK (CHMSL SIDE)	
CAV	CIRCUIT
1	L50 18WT/TN
2	Z1 18BK



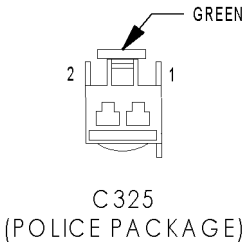
C321 (300M) - NATURAL (DECKLID SIDE)	
CAV	CIRCUIT
1	L50 18WT/TN
2	Z1 18BK



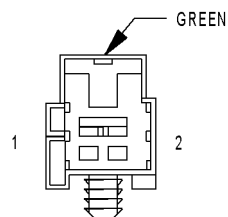
C322 - BLACK (BODY SIDE)	
CAV	CIRCUIT
1	F14 20LG/YL
2	Z2 20BK/LG
3	D25 20VT/YL



C322 - BLACK (SAB JUMPER SIDE)	
CAV	CIRCUIT
1	F14 20LG/YL
2	Z2 20BK/LG
3	D25 20VT/YL



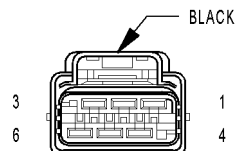
C325 (POLICE PACKAGE) - GREEN (AUXILIARY LIGHTING SIDE)	
CAV	CIRCUIT
1	M1 20PK
2	Z1 20BK



C325
(POLICE PACKAGE)

C325 (POLICE PACKAGE) - GREEN (BODY SIDE)

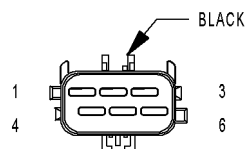
CAV	CIRCUIT
1	M1 20PK
2	Z1 20BK



C360
(POLICE PACKAGE/
SPECIAL SERVICE)

C360 (POLICE PACKAGE/SPECIAL SERVICE) -
BLACK (I/P HARNESS)

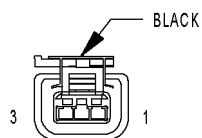
CAV	CIRCUIT
1	A101 16RD/TN
2	A102 16RD/OR
3	A103 16RD/YL
4	F101 16YL/TN
5	F102 16YL/OR
6	F103 16YL/RD



C360
(POLICE PACKAGE/
SPECIAL SERVICE)

C360 (POLICE PACKAGE/SPECIAL SERVICE) -
BLACK (POLICE ACCESSORY HARNESS SIDE)

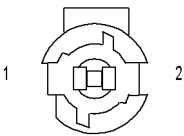
CAV	CIRCUIT
1	A101 16RD/TN
2	A102 16RD/OR
3	A103 16RD/YL
4	F101 16YL/TN
5	F102 16YL/OR
6	F103 16YL/RD



CAM SHAFT
POSITION
SENSOR

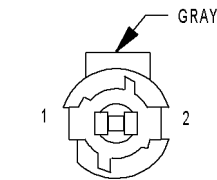
CAMSHAFT POSITION SENSOR - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL



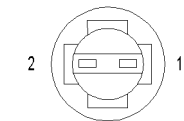
CENTER HIGH MOUNTED STOP LAMP (300M)

CENTER HIGH MOUNTED STOP LAMP (300M) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



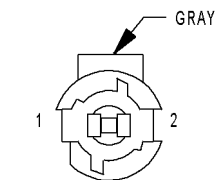
CENTER HIGH MOUNTED STOP LAMP NO. 1 (CONCORDE/LTD)

CENTER HIGH MOUNTED STOP LAMP NO. 1 (CONCORDE/LTD) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	Z1 18BK	GROUND



CENTER HIGH MOUNTED STOP LAMP NO. 1 (DODGE)

CENTER HIGH MOUNTED STOP LAMP NO. 1 (DODGE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
2	Z1 16BK	GROUND



CENTER HIGH MOUNTED STOP LAMP NO. 2 (CONCORDE/LTD)

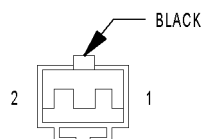
CENTER HIGH MOUNTED STOP LAMP NO. 2 (CONCORDE/LTD) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	Z1 18BK	GROUND
2	Z1 18BK	GROUND



CENTER HIGH
MOUNTED STOP
LAMP NO. 2
(DODGE)

CENTER HIGH MOUNTED STOP LAMP NO. 2 (DODGE) - 2 WAY

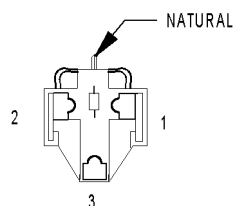
CAV	CIRCUIT	FUNCTION
1	L50 16WT/TN	BRAKE LAMP SWITCH OUTPUT
2	Z1 16BK	GROUND



CENTER INSTRUMENT
PANEL SPEAKER

CENTER INSTRUMENT PANEL SPEAKER - BLACK 2 WAY

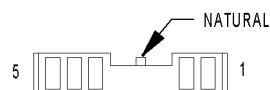
CAV	CIRCUIT	FUNCTION
1	X89 18PK/BK	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (-)
2	X88 18PK/RD	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (+)



CIGAR
LIGHTER

CIGAR LIGHTER - NATURAL 3 WAY

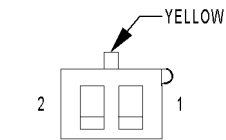
CAV	CIRCUIT	FUNCTION
1	F30 18PK(POLICE PACKAGE) (IGNITION POSITION)	FUSED IGNITION SWITCH OUTPUT (RUN)
1	F30 18PK(POLICE PACKAGE)) (BATTERY POSITION)	FUSED B(+)
1	F30 18RD(EXCEPT POLICE PACKAGE) (IGNITION POSITION)	FUSED IGNITION SWITCH OUTPUT (RUN)
1	F30 18RD(EXCEPT POLICE PACKAGE) (BATTERY POSITION)	FUSED B(+)
2	-	
3	Z1 18BK	GROUND



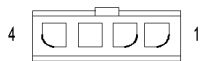
CLOCKSPRING C1

CLOCKSPRING C1 - NATURAL 5 WAY

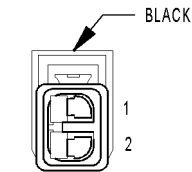
CAV	CIRCUIT	FUNCTION
1	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
2	K4 20BK/LB	SENSOR GROUND
3	X3 16BK/RD	HORN RELAY CONTROL
4	X20 20GY/WT	RADIO CONTROL MUX
5	X920 20GY/OR	RADIO CONTROL MUX RETURN



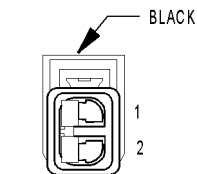
CLOCKSPRING C2



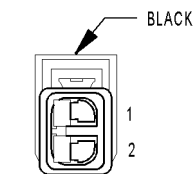
CLOCKSPRING C3



COIL ON
PLUG NO. 1



COIL ON
PLUG NO. 2



COIL ON
PLUG NO. 3

CLOCKSPRING C2 - YELLOW 2 WAY

CAV	CIRCUIT	FUNCTION
1	R43 18BK/LB	DRIVER SQUIB 1 LINE 2
2	R45 18DG/LB	DRIVER SQUIB 1 LINE 1

CLOCKSPRING C3 - 4 WAY

CAV	CIRCUIT	FUNCTION
1	V37 22RD/LG	SPEED CONTROL SWITCH SIGNAL
2	K4 22BK/LB	SENSOR GROUND
3	X920 22GY/OR	RADIO CONTROL MUX RETURN
4	X20 22GY/WT	RADIO CONTROL MUX

COIL ON PLUG NO. 1 - BLACK 2 WAY

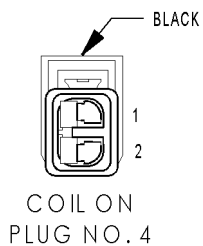
CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K91 16TN/RD	COIL ON PLUG DRIVER NO. 1

COIL ON PLUG NO. 2 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K92 16TN/PK	COIL ON PLUG DRIVER NO. 2

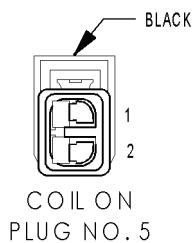
COIL ON PLUG NO. 3 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K93 16TN/OR	COIL ON PLUG DRIVER NO. 3



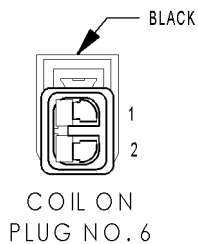
COIL ON PLUG NO. 4 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K94 16TN/LG	COIL ON PLUG DRIVER NO. 4



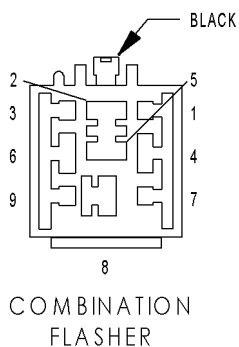
COIL ON PLUG NO. 5 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K95 16TN/DG	COIL ON PLUG DRIVER NO. 5



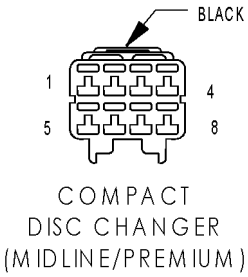
COIL ON PLUG NO. 6 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	F42 16DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K96 16TN/LB	COIL ON PLUG DRIVER NO. 6

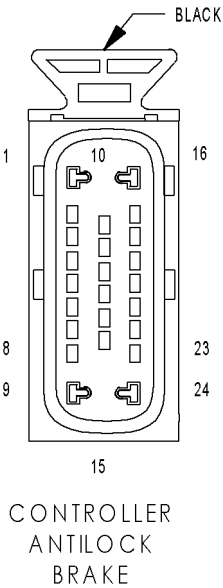


COMBINATION FLASHER - BLACK 9 WAY

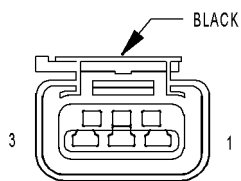
CAV	CIRCUIT	FUNCTION
1	-	-
2	L32 18RD	COMBINATION FLASHER OUTPUT
3	-	-
4	Z1 20BK	GROUND
5	L91 22DB/PK	COMBINATION FLASHER SWITCHED GROUND
6	A15 18PK	FUSED B(+)
7	-	-
8	L5 22BK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
9	-	-



COMPACT DISC CHANGER (MIDLINE/PREMIUM) - BLACK 8 WAY		
CAV	CIRCUIT	FUNCTION
1	X40 24GY/WT	AUDIO OUT RIGHT
2	E14 24OR/TN	PANEL LAMPS DIMMER SIGNAL
3	D25 24VT/YL	PCI BUS
4	X112 24RD	FUSED IGNITION SWITCH OUTPUT
5	X41 24DG/WT	AUDIO OUT LEFT
6	Z140 24BK/OR	GROUND
7	Z141 22BK/TN	GROUND
8	X160 22GY/YL	B(+)



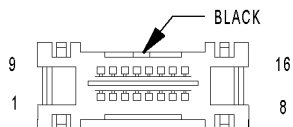
CONTROLLER ANTILOCK BRAKE - BLACK 25 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR (-)
3	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR (+)
4	-	-
5	D25 18VT/YL	PCI BUS
6	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR (-)
7	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR (+)
8	-	-
9	A20 12RD/DB	FUSED B(+)
10	F20 18WT/VT	FUSED IGNITION SWITCH OUTPUT (RUN)
11	-	-
12	-	-
13	-	-
14	-	-
15	-	-
16	Z1 12BK	GROUND
17	-	-
18	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
19	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)
20	B4 18LG	LEFT REAR WHEEL SPEED SENSOR (+)
21	-	-
22	B8 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR (-)
23	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR (+)
24	A10 12RD/DG	FUSED B(+)



CRANKSHAFT
POSITION
SENSOR

CRANKSHAFT POSITION SENSOR - BLACK 3 WAY

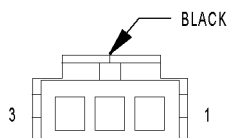
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K4 20BK/LB	SENSOR GROUND
3	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL



DATA LINK
CONNECTOR

DATA LINK CONNECTOR - BLACK 16 WAY

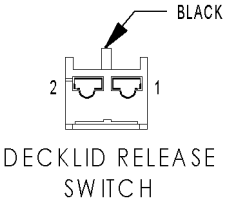
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	Z1 20BK	GROUND
5	Z2 20BK/LG	GROUND
6	-	-
7	D21 20PK/TN	SCI TRANSMIT (PCM)
8	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
9	D19 20VT/OR	SCI RECEIVE (TCM/BCM)
10	-	-
11	-	-
12	D20 20LG	SCI RECEIVE (PCM)
13	-	-
14	-	-
15	D15 20WT/DG	SCI TRANSMIT (TCM)
16	F62 16RD	FUSED B (+)



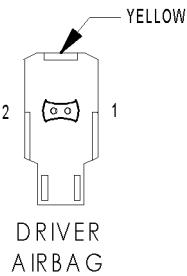
DECKLID RELEASE
SOLENOID/
AJAR SWITCH

DECKLID RELEASE SOLENOID/AJAR SWITCH - BLACK 3 WAY

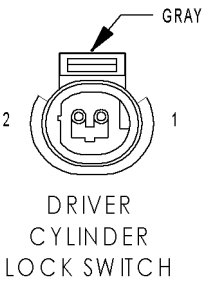
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	G78 20TN/BK	DECKLID AJAR SWITCH SENSE
3	P2 20BK/WT	DECKLID RELEASE CONTROL



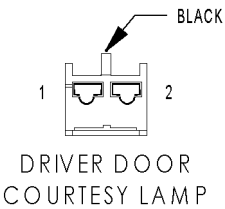
DECKLID RELEASE SWITCH - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P1 20BK/WT	DECKLID RELEASE SWITCH OUTPUT
2	F30 20PK(POLICE PACKAGE BATTERY POSITION)	FUSED B(+)
2	M1 20PK	FUSED B(+)
2	F30 20PK(POLICE PACKAGE IGNITION POSITION)	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)



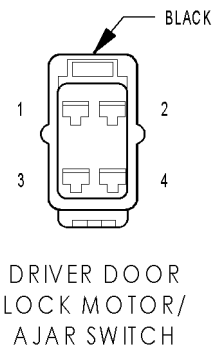
DRIVER AIRBAG - YELLOW 2 WAY		
CAV	CIRCUIT	FUNCTION
1	BK	DRIVER SQUIB 1 LINE 2
2	BK	DRIVER SQUIB 1 LINE 1



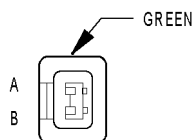
DRIVER CYLINDER LOCK SWITCH - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G73 20LG/OR	DRIVER CYLINDER LOCK SWITCH MUX
2	M1 20PK	FUSED B(+)



DRIVER DOOR COURTESY LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M2 20YL	COURTESY LAMPS DRIVER
2	M1 20PK	FUSED B(+)



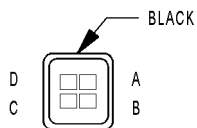
DRIVER DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G75 20TN	DRIVER DOOR AJAR SWITCH SENSE
2	Z1 20BK	GROUND
3	P55 16DB	DRIVER DOOR UNLOCK RELAY OUTPUT
4	P33 16OR	DOOR LOCK RELAY OUTPUT



DRIVER HEATED
SEAT BACK

DRIVER HEATED SEAT BACK - GREEN 2 WAY

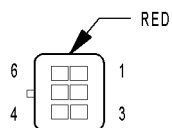
CAV	CIRCUIT	FUNCTION
A	P88 16BR/BK	HEATED SEAT DRIVER
B	Z1 20BK	GROUND



DRIVER HEATED
SEAT CUSHION

DRIVER HEATED SEAT CUSHION - BLACK 4 WAY

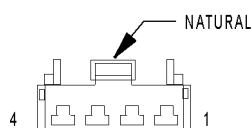
CAV	CIRCUIT	FUNCTION
A	P131 16RD/TN (EXCEPT MEMORY)	DRIVER SEAT HEATER B(+) DRIVER
A	P131 16RD/DG (MEMORY)	DRIVER SEAT HEATER B(+) DRIVER
B	P88 16BR/BK	HEATED SEAT DRIVER
C	P141 20TN/LB	DRIVER SEAT TEMPERATURE SENSOR INPUT
D	P143 20BK/DG (MEMORY)	DRIVER SEAT TEMPERATURE 5V SUPPLY
D	P143 20BK/LG (EXCEPT MEMORY)	DRIVER SEAT TEMPERATURE 5V SUPPLY



DRIVER HEATED
SEAT SWITCH

DRIVER HEATED SEAT SWITCH - RED 6 WAY

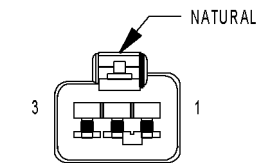
CAV	CIRCUIT	FUNCTION
1	P137 20VT/DG	DRIVER SEAT LOW HEAT LED DRIVER
2	-	-
3	Z1 18BK (MEMORY SEATS)	GROUND
3	Z1 20BK (EXCEPT MEMORY SEATS)	GROUND
4	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	P139 20VT/WT	DRIVER SEAT HIGH HEAT LED DRIVER
6	P133 20TN/DG	DRIVER SEAT HEATER SWITCH MUX



DRIVER
POWER DOOR
LOCK SWITCH

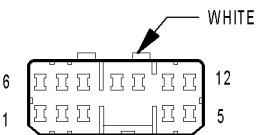
DRIVER POWER DOOR LOCK SWITCH - NATURAL 4 WAY

CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	Z1 20BK	GROUND
4	P97 20WT/DG	DRIVER DOOR SWITCH MUX



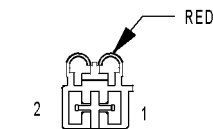
DRIVER POWER
MIRROR
(EXCEPT MEMORY)

DRIVER POWER MIRROR (EXCEPT MEMORY) - NATURAL 3 WAY		
CAV	CIRCUIT	FUNCTION
1	P71 20YL	DRIVER MIRROR UP DRIVER
2	P73 20YL/PK	DRIVER MIRROR COMMON DRIVER
3	P75 20BK/WT	DRIVER MIRROR LEFT DRIVER



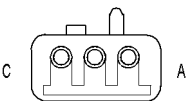
DRIVER POWER
MIRROR
(MEMORY)

DRIVER POWER MIRROR (MEMORY) - WHITE 11 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	P73 20YL/PK	DRIVER MIRROR COMMON DRIVER (RIGHT/DOWN)
3	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
4	P71 20YL	DRIVER MIRROR UP DRIVER
5	P75 20BK/WT	DRIVER MIRROR LEFT DRIVER
6	P161 20GY/LB	DRIVER MIRROR SENSOR 5V SUPPLY
7	P64 20YL/OR	DRIVER MIRROR VERTICAL POSITION SIGNAL
8	P112 18TN/OR	AUTO DAY NIGHT MIRROR (+)
9	P65 20DB/YL	DRIVER MIRROR HORIZONTAL POSITION SIGNAL
10	P69 20WT/RD	DRIVER MIRROR SENSOR GROUND
11	P114 18TN/WT	AUTO DAY NIGHT MIRROR (-)
12	L61 18LG	LEFT TURN SIGNAL (300M SPECIAL)



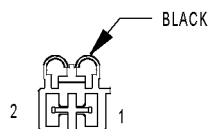
DRIVER POWER
SEAT FRONT
RISER MOTOR

DRIVER POWER SEAT FRONT RISER MOTOR - RED 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P119 16YL/LG (MEMORY SEATS)	SEAT FRONT UP DRIVER
1	P19 16YL/LG (EXCEPT MEMORY SEATS)	DRIVER SEAT FRONT UP
2	P121 16RD/LG (MEMORY SEATS)	SEAT FRONT DOWN DRIVER
2	P21 16RD/LG (EXCEPT MEMORY SEATS)	DRIVER SEAT FRONT DOWN



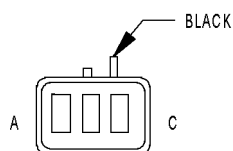
DRIVER POWER
SEAT FRONT
RISER MOTOR
SENSOR
(MEMORY)

DRIVER POWER SEAT FRONT RISER MOTOR SENSOR (MEMORY) - 3 WAY		
CAV	CIRCUIT	FUNCTION
A	P28 20BR/RD	SEAT POSITION SENSOR GROUND
B	P26 20BR	FRONT RISER POSITION SENSOR SIGNAL
C	P29 20 BR/WT	SEAT SENSOR 5V SUPPLY



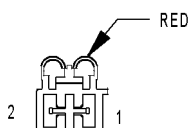
DRIVER POWER
SEAT HORIZONTAL
MOTOR

DRIVER POWER SEAT HORIZONTAL MOTOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P115 16YL/DB (MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD DRIVER
1	P15 16YL/LB (EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD DRIVER
2	P117 16RD/LB (MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD DRIVER
2	P17 16RD/LB (EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD DRIVER



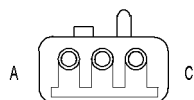
DRIVER POWER SEAT
HORIZONTAL MOTOR
SENSOR
(MEMORY)

DRIVER POWER SEAT HORIZONTAL MOTOR SENSOR (MEMORY) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
A	P28 20BR/RD	SEAT POSITION SENSOR GROUND
B	P25 20VT/RD	SEAT HORIZONTAL POSITION SIGNAL
C	P29 20BR/WT	SEAT HEATER 5V SUPPLY



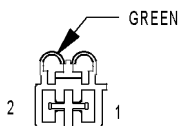
DRIVER POWER
SEAT REAR
RISER MOTOR

DRIVER POWER SEAT REAR RISER MOTOR - RED 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P111 16YL/WT (MEMORY SEATS)	SEAT REAR UP DRIVER
1	P11 16YL/WT (EXCEPT MEMORY SEATS)	SEAT REAR UP SWITCH SENSE
2	P13 16RD/WT (EXCEPT MEMORY SEATS)	SEAT REAR DOWN SWITCH SENSE
2	P113 16RD/WT (MEMORY SEATS)	SEAT REAR DOWN DRIVER



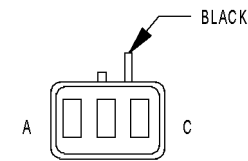
DRIVER POWER SEAT
REAR RISER MOTOR
SENSOR
(MEMORY)

DRIVER POWER SEAT REAR RISER MOTOR SENSOR (MEMORY) - 3 WAY		
CAV	CIRCUIT	FUNCTION
A	P28 20BR/RD	SEAT POSITION SENSOR GROUND
B	P27 20LB/RD	REAR RISER POSITION SIGNAL
C	P29 20BR/WT	SEAT SENSOR 5V SUPPLY



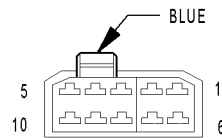
DRIVER POWER
SEAT RECLINER
MOTOR

DRIVER POWER SEAT RECLINER MOTOR - GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P41 16GY/WT	DRIVER SEAT RECLINER DOWN DRIVER
2	P43 16GY/LB	DRIVER SEAT RECLINER UP DRIVER



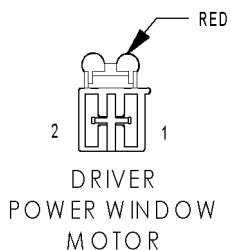
DRIVER POWER
SEAT RECLINER
MOTOR SENSOR
(MEMORY)

DRIVER POWER SEAT RECLINER MOTOR SENSOR (MEMORY) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
A	P29 20BR/WT	SEAT SENSOR 5V SUPPLY
B	P47 20LB	RECLINER POSITION SIGNAL
C	P28 20BR/RD	SEAT POSITION SENSOR GROUND



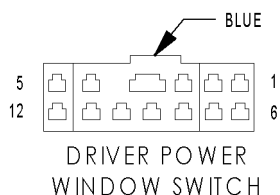
DRIVER POWER SEAT
SWITCH

DRIVER POWER SEAT SWITCH - BLUE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	P9 20RD (MEMORY SEATS)	SEAT SWITCH B(+) SUPPLY
1	F35 16RD (EXCEPT MEMORY SEATS)	FUSED B(+)
2	P41 16GY/WT (EXCEPT MEMORY SEATS)	DRIVER SEAT RECLINER SWITCH UP
2	P48 20GY/WT (MEMORY SEATS)	RECLINER DOWN SWITCH SENSE
3	P17 16RD/LB (EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL REARWARD
3	P17 18RD/LB (MEMORY SEATS)	SEAT HORIZONTAL REARWARD SWITCH SENSE
4	P43 16GY/LB (EXCEPT MEMORY SEATS)	DRIVER SEAT RECLINER SWITCH DOWN
4	P40 20GY/LB (MEMORY SEATS)	DRIVER SEAT RECLINER UP
5	Z1 18BK (MEMORY SEATS)	GROUND
5	Z1 16BK (EXCEPT MEMORY SEATS)	GROUND
6	P21 18RD/LG (MEMORY SEATS)	SEAT FRONT DOWN SWITCH SENSE
6	P21 16RD/LG (EXCEPT MEMORY SEATS)	DRIVER SEAT FRONT DOWN
7	P13 16RD/WT (EXCEPT MEMORY SEATS)	DRIVER SEAT REAR DOWN
7	P13 18RD/WT (MEMORY SEATS)	SEAT REAR DOWN SWITCH SENSE
8	P11 16YL/WT (EXCEPT MEMORY SEATS)	DRIVER SEAT REAR UP
8	P11 18YL/WT (MEMORY SEATS)	SEAT REAR UP SWITCH SENSE
9	P19 16YL/LG (EXCEPT MEMORY SEATS)	DRIVER SEAT FRONT UP
9	P19 18YL/LG (MEMORY SEATS)	SEAT FRONT UP SWITCH SENSE
10	P15 18YL/LB (MEMORY SEATS)	SEAT HORIZONTAL FORWARD SWITCH SENSE
10	P15 16YL/LB (EXCEPT MEMORY SEATS)	DRIVER SEAT HORIZONTAL FORWARD



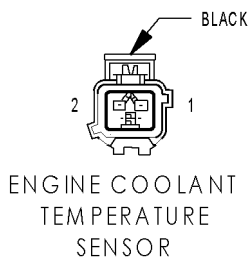
DRIVER POWER WINDOW MOTOR - RED 2 WAY

CAV	CIRCUIT	FUNCTION
1	Q21 16WT	DRIVER WINDOW DRIVER (DOWN)
2	Q11 16LB	DRIVER WINDOW DOWN (UP)



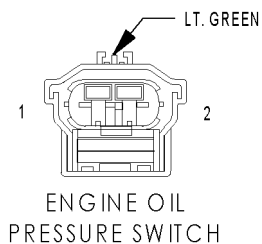
DRIVER POWER WINDOW SWITCH - BLUE 12 WAY

CAV	CIRCUIT	FUNCTION
1	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
2	Q17 14DB/WT	LEFT REAR WINDOW DRIVER (UP)
3	Q27 14RD/BK	LEFT REAR WINDOW DRIVER (DOWN)
4	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER (UP)
5	Q1 14YL	WINDOW SWITCH FEED
6	-	-
7	Q11 16LB	DRIVER WINDOW DRIVER (UP)
8	Q21 16WT	DRIVER WINDOW DRIVER (DOWN)
9	Q28 14DG/WT	RIGHT REAR WINDOW DRIVER (DOWN)
10	Z1 14BK	GROUND
11	Q26 14VT/WT	MASTER WINDOW SWITCH PASSENGER (DOWN)
12	Q16 14BR/WT	MASTER WINDOW SWITCH PASSENGER (UP)



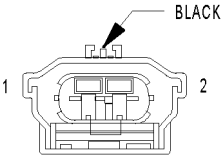
ENGINE COOLANT TEMPERATURE SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
2	K4 20BK/LB	SENSOR GROUND



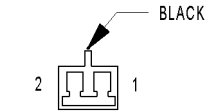
ENGINE OIL PRESSURE SWITCH - LT. GREEN 2 WAY

CAV	CIRCUIT	FUNCTION
1	G6 20GY	OIL PRESSURE SWITCH SENSE
2	-	-



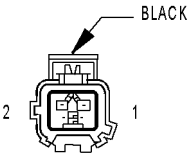
EVAP/PURGE
SOLENOID

EVAP/PURGE SOLENOID - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
2	K108 18DG/LG	EVAPORATIVE EMISSION SOLENOID SENSE



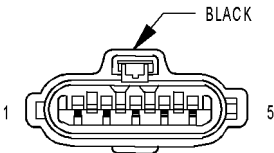
EVAPORATOR
TEMPERATURE
SENSOR

EVAPORATOR TEMPERATURE SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	C12 20LG/BK	EVAPORATOR TEMPERATURE SENSOR SIGNAL
2	C57 20DB/GY	SENSOR GROUND



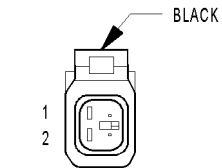
FRONT
WASHER
PUMP
MOTOR

FRONT WASHER PUMP MOTOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	V10 20BR	FRONT WASHER PUMP MOTOR CONTROL



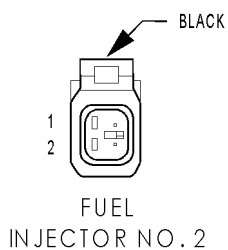
FRONT
WIPER
MOTOR

FRONT WIPER MOTOR - BLACK 5 WAY		
CAV	CIRCUIT	FUNCTION
1	V4 14RD/YL	FRONT WIPER RELAY HIGH SPEED OUTPUT
2	V3 14BR/WT	FRONT WIPER RELAY LOW SPEED OUTPUT
3	-	-
4	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
5	Z1 14BK	GROUND



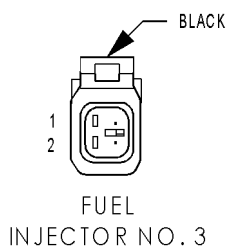
FUEL
INJECTOR NO. 1

FUEL INJECTOR NO. 1 - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



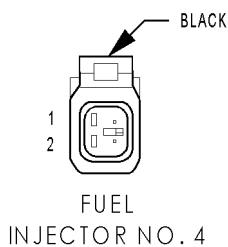
FUEL INJECTOR NO. 2 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K12 18TN/WT	FUEL INJECTOR NO. 2 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



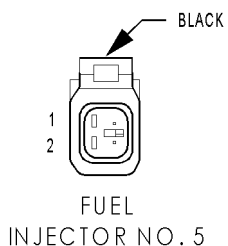
FUEL INJECTOR NO. 3 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



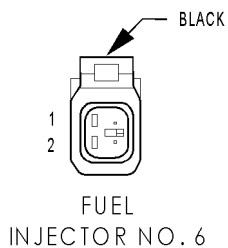
FUEL INJECTOR NO. 4 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



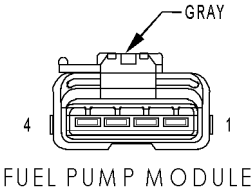
FUEL INJECTOR NO. 5 - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT

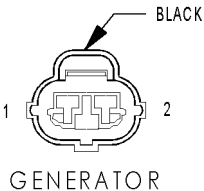


FUEL INJECTOR NO. 6 - BLACK 2 WAY

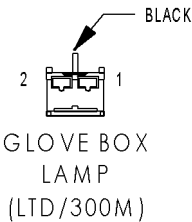
CAV	CIRCUIT	FUNCTION
1	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
2	F42 18DG/LG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT



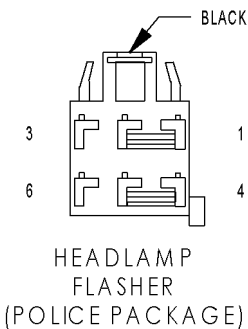
FUEL PUMP MODULE - GRAY 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	Z1 18BK	GROUND
3	G4 18DB	FUEL LEVEL SENSOR SIGNAL
4	A141 12DG/WT	FUEL PUMP RELAY OUTPUT



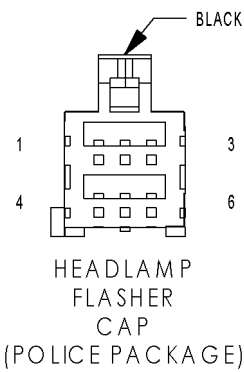
GENERATOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z12 18BK/TN(3.5L)	GROUND
1	Z12 14BK/TN(2.7L)	GROUND
2	K20 18DG	GENERATOR FIELD DRIVER (+)



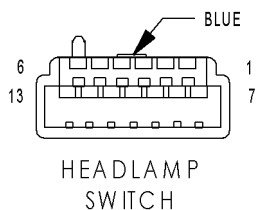
GLOVE BOX LAMP (LTD/300M) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	M1 20PK	FUSED B(+)



HEADLAMP FLASHER (POLICE PACKAGE) - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	L33 20RD	FUSED LEFT HIGH BEAM OUTPUT
2	L34 20OR/WT	FUSED RIGHT HIGH BEAM OUTPUT
3	L33 20RD	FUSED LEFT HIGH BEAM OUTPUT
4	L34 20RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
5	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
6	Z1 18BK	GROUND

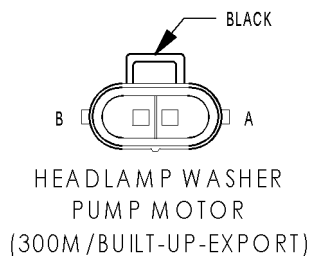


HEADLAMP FLASHER CAP (POLICE PACKAGE) - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	L33 20RD	FUSED LEFT HIGH BEAM OUTPUT
2	L34 20OR	FUSED RIGHT HIGH BEAM OUTPUT
3	L33 20RD	FUSED LEFT HIGH BEAM OUTPUT
4	L34 20OR	FUSED RIGHT HIGH BEAM OUTPUT
5	-	-
6	-	-



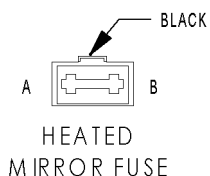
HEADLAMP SWITCH - BLUE 13 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK/LB (BUILT-UP-EXPORT)	GROUND
2	L7 18BK/YL (BUILT-UP-EXPORT)	HEADLAMP SWITCH OUTPUT
3	E19 20RD	PANEL LAMPS DIMMER SIGNAL
4	Z1 20BK	GROUND
5	L95 18DG/YL (BUILT-UP-EXPORT)	REAR FOG LAMP RELAY CONTROL
6	L80 20WT	HEADLAMP SWITCH RETURN
7	-	-
8	L13 18BR/YL (BUILT-UP-EXPORT)	HEADLAMP ADJUST SIGNAL
9	E2 20OR	PANEL LAMPS DRIVER
10	L96 18LG/RD (BUILT-UP-EXPORT) (BASE CONCORDE)	REAR FOG LAMP SWITCH GROUND
11	L39 20LB	FOG LAMP RELAY OUTPUT
12	G52 20YL	HEADLAMP SWITCH MUX
13	-	-



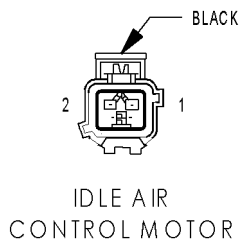
HEADLAMP WASHER PUMP MOTOR (300M/BUILT-UP-EXPORT)) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
A	Z1 14BK	GROUND
B	V53 14RD/OR	HEADLAMP WASHER RELAY OUTPUT



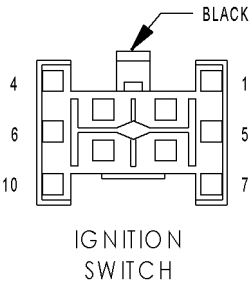
HEATED MIRROR FUSE - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
A	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
B	C15 10BK/WT	REAR WINDOW DEFOGGER RELAY OUTPUT

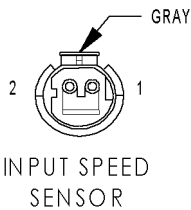


IDLE AIR CONTROL MOTOR - BLACK 2 WAY

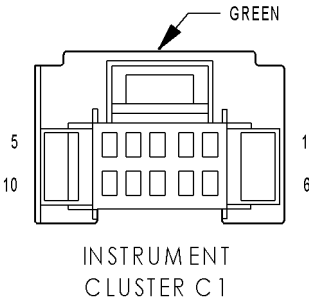
CAV	CIRCUIT	FUNCTION
1	K39 18GY/RD	IDLE AIR CONTROL MOTOR DRIVER
2	K60 18YL/BK	IDLE AIR CONTROL MOTOR SENSE



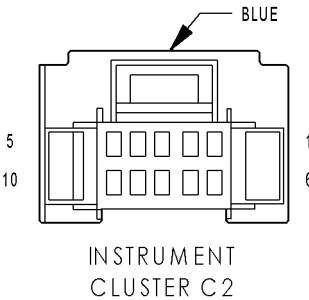
IGNITION SWITCH - BLACK 10 WAY		
CAV	CIRCUIT	FUNCTION
1	A81 14DG/RD	IGNITION SWITCH OUTPUT (OFF-RUN-START)
2	G26 22LB	KEY-IN IGNITION SWITCH SENSE
3	Z2 20BK/LG	GROUND
4	A21 12DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	A1 12RD	FUSED B (+)
6	A31 12BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
7	A2 12PK/BK	FUSED B (+)
8	-	-
9	A41 14YL	FUSED IGNITION OUTPUT (START)
10	A22 12BK/OR	FUSED IGNITION SWITCH OUTPUT (RUN)



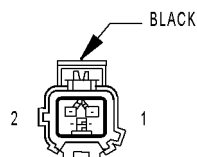
INPUT SPEED SENSOR - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	T13 20DB/BK	SPEED SENSOR GROUND
2	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL



INSTRUMENT CLUSTER C1 - GREEN 10 WAY		
CAV	CIRCUIT	FUNCTION
1	F33 18PK/RD	FUSED B(+)
2	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
3	M1 20PK	FUSED B(+)
4	E2 20OR	PANEL LAMPS DRIVER
5	D25 20VT/YL	PCI BUS
6	Z2 22BK/LG	GROUND
7	-	-
8	L60 18TN	RIGHT TURN SIGNAL
9	-	-
10	L324 18WT/LG	HIGH BEAM RELAY CONTROL



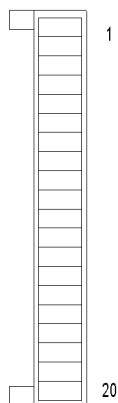
INSTRUMENT CLUSTER C2 - BLUE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	G5 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	G9 22GY/BK	RED BRAKE WARNING INDICATOR DRIVER
4	G29 22BK/TN	WASHER FLUID SWITCH SENSE
5	L61 18LG	LEFT TURN SIGNAL
6	Z1 22BK	GROUND
7	-	-
8	B27 20RD/YL	TRACTION CONTROL SWITCH SENSE
9	G78 20TN/BK	DECKLID CONTROL SWITCH SENSE
10	G6 22GY	ENGINE OIL PRESSURE SWITCH SENSE



INTAKE AIR
TEMPERATURE SENSOR

INTAKE AIR TEMPERATURE SENSOR - BLACK 2 WAY

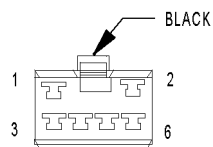
CAV	CIRCUIT	FUNCTION
1	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
2	K4 20BK/LB	SENSOR GROUND



JUNCTION BLOCK
BODY
CONTROL
MODULE-JB

JUNCTION BLOCK BODY CONTROL MODULE-JB - 20 WAY

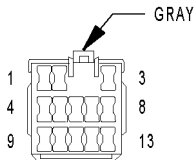
CAV	CIRCUIT	FUNCTION
1	Z20	GROUND
2	M2	COURTESY LAMP DRIVER
3	S76	SPEED PROPORTIONAL STEERING SOLENOID (-)
4	S77	SPEED PROPORTIONAL STEERING SOLENOID (+)
5	G5	FUSED IGNITION SWITCH OUTPUT (RUN-START)
6	L7	PARK LAMP RELAY OUTPUT
7	M1	FUSED B(+)
8	P2	DECKLID RELEASE CONTROL
9	-	-
10	D25	PCI BUS (OTIS)
11	-	-
12	-	-
13	P109	DRIVER FRONT DOOR UNLOCK RELAY CONTROL
14	L307	LOW BEAM RELAY CONTROL
15	P38	DOOR LOCK RELAY CONTROL
16	L308	PARK LAMP RELAY CONTROL
17	L26	FOG LAMP RELAY CONTROL
18	X3	HORN RELAY CONTROL
19	P36	DOOR UNLOCK RELAY CONTROL
20	Z2	GROUND



JUNCTION
BLOCK C1

JUNCTION BLOCK C1 - BLACK 6 WAY

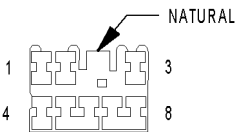
CAV	CIRCUIT	FUNCTION
1	F32 16PK/DB	FUSED B(+)
2	A21 12DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	A31 12BK/WT	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
4	-	-
5	F30 18RD	FUSED B (+)
6	C1 12DG	BLOWER MOTOR FEED



JUNCTION
BLOCK C10

JUNCTION BLOCK C10 - GRAY 13 WAY

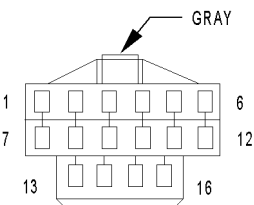
CAV	CIRCUIT	FUNCTION
1	L60 18TN	RIGHT TURN SIGNAL
2	L61 18LG	LEFT TURN SIGNAL
3	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
4	L34 20RD/OR	FUSED RIGHT HIGH BEAM OUTPUT
5	-	-
6	L1 20VT/BK	BACK-UP LAMP FEED
7	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	S77 18VT/OR (EXCEPT BUILT-UP-EXPORT)	SPEED PROPORTIONAL STEERING SOLENOID (+)
9	-	-
10	S76 18LG/PK (EXCEPT BUILT-UP-EXPORT)	SPEED PROPORTIONAL STEERING SOLENOID (-)
11	L7 18BK/YL	PARK LAMP RELAY OUTPUT
12	F18 20LG/BK	FUSED IGNITION SWITCH OUTPUT (RUN-START)
13	L43 16VT	FUSED LEFT LOW BEAM INPUT



JUNCTION
BLOCK C11

JUNCTION BLOCK C11 - NATURAL 8 WAY

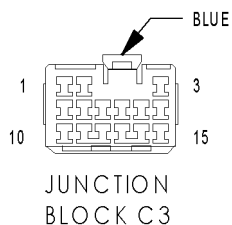
CAV	CIRCUIT	FUNCTION
1	Z1 16BK (SUNROOF) (EXCEPT BASE)	GROUND
2	G5 20DB/WT (SUNROOF)	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	Z2 20BK/LG (PREMIUM)	GROUND
4	M2 20YL	COURTESY LAMPS DRIVER
5	A37 16RD (SUNROOF)	FUSED B(+)
6	M1 20PK	FUSED B(+)
7	L1 20VT/BK (PREMIUM)	BACK-UP LAMP FEED
8	D25 20VT/YL (PREMIUM)	PCI BUS



JUNCTION
BLOCK C2

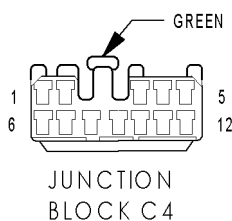
JUNCTION BLOCK C2 - GRAY 16 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	L39 20LB	FOG LAMP RELAY OUTPUT
3	-	-
4	-	-
5	-	-
6	X3 16BK/RD	HORN RELAY CONTROL
7	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
8	Z20 20BK/OR	GROUND
9	F23 18DB/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
10	F14 18LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
11	L5 22BK/YL	FUSED IGNITION SWITCH OUTPUT (RUN)
12	L40 18BR/WT	FUSED FOG LAMP FEED
13	L60 18TN	RIGHT TURN SIGNAL
14	L60 18TN	RIGHT TURN SIGNAL
15	L61 18LG	LEFT TURN SIGNAL
16	L61 18LG	LEFT TURN SIGNAL



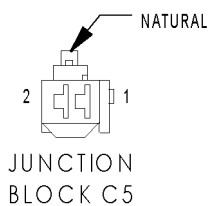
JUNCTION BLOCK C3 - BLUE 15 WAY

CAV	CIRCUIT	FUNCTION
1	A81 14DG/RD	IGNITION SWITCH OUTPUT (OFF-RUN-START)
2	X12 20RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	-	-
4	Z2 18BK/LG	GROUND
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	L99 20GY/BK(POLICE PACKAGE)	FUSED B(+)
13	G9 22GY/BK	RED BRAKE WARNING INDICATOR DRIVER
14	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
15	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)



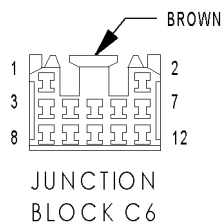
JUNCTION BLOCK C4 - GREEN 12 WAY

CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL (BUILT-UP-EXPORT)	HEADLAMP SWITCH OUTPUT
2	M1 20PK(EXCEPT POLICE PACKAGE)	FUSED B(+)
3	F33 18PK/RD	FUSED B(+)
4	F33 18PK/RD	FUSED B(+)
5	L324 20WT/LG	SWITCHED HIGH BEAM RELAY CONTROL
6	F62 16RD	FUSED B(+)
7	-	-
8	M1 18PK	FUSED B(+)
9	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
10	-	-
11	G5 18DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	L324 18 WT/LG	SWITCHED HIGH BEAM RELAY CONTROL



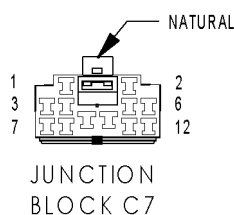
JUNCTION BLOCK C5 - NATURAL 2 WAY

CAV	CIRCUIT	FUNCTION
1	A1 12RD	FUSED B(+)
2	A22 12BK/OR	IGNITION SWITCH OUTPUT (RUN)



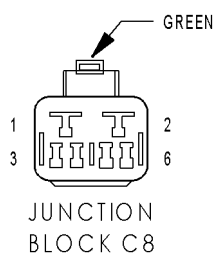
JUNCTION BLOCK C6 - BROWN 12 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	P33 16OR	LOCK RELAY OUTPUT
4	P33 16OR	LOCK RELAY OUTPUT
5	P33 16OR	LOCK RELAY OUTPUT
6	-	-
7	P55 16DB	DRIVER DOOR UNLOCK RELAY OUTPUT
8	M2 20YL	COURTESY LAMPS DRIVER
9	F11 20RD/WT (DODGE/300M)	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
10	L60 16TN	RIGHT TURN SIGNAL
11	L61 16LG	LEFT TURN SIGNAL
12	L1 18VT/BK (CONCORDE/LTD)	BACK-UP LAMP FEED
12	L1 20VT/BK (EXCEPT CONCORDE/LTD)	BACK-UP LAMP FEED



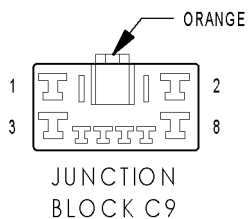
JUNCTION BLOCK C7 - NATURAL 12 WAY

CAV	CIRCUIT	FUNCTION
1	G9 20GY/BK	RED BRAKE WARNING INDICATOR DRIVER
2	P2 20BK/WT	DECKLID RELEASE CONTROL
3	F35 16RD	FUSED B(+)
4	F35 16RD	FUSED B(+)
5	M1 20PK	FUSED B(+)
6	M1 20PK	FUSED B(+)
7	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
8	L7 18BK/YL	PARK LAMP RELAY OUTPUT
9	F21 14TN	FUSED IGNITION SWITCH OUTPUT (RUN)
10	Z1 14BK	GROUND
11	P34 16PK/BK	UNLOCK RELAY OUTPUT
12	P34 16PK/BK	UNLOCK RELAY OUTPUT



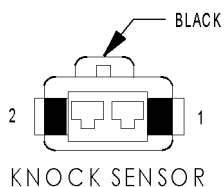
JUNCTION BLOCK C8 - GREEN 6 WAY

CAV	CIRCUIT	FUNCTION
1	A3 14RD/TN	FUSED B(+)
2	A130 16VT/RD	FUSED B(+)
3	L44 16VT/RD	FUSED RIGHT LOW BEAM OUTPUT
4	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT
5	L33 20RD	FUSED B(+)
6	L39 20LB	FOG LAMP RELAY OUTPUT



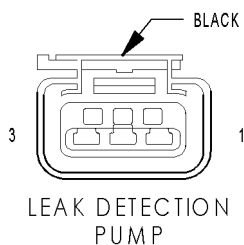
JUNCTION BLOCK C9 - ORANGE 8 WAY

CAV	CIRCUIT	FUNCTION
1	A13 12PK/WT	FUSED B(+)
2	A34 12LB/RD	FUSED B(+)
3	A7 14RD/BK	FUSED B(+)
4	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
5	F20 18WT/VT (ABS)	FUSED IGNITION SWITCH OUTPUT (RUN)
6	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN)
7	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
8	X2 18DG/RD	HORN RELAY OUTPUT



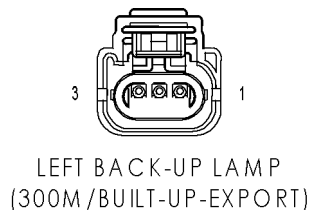
KNOCK SENSOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	K45 20BK/VT	KNOCK SENSOR RETURN
2	K42 20DB/LG	KNOCK SENSOR SIGNAL



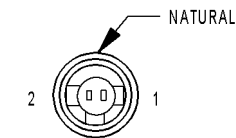
LEAK DETECTION PUMP - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	K107 18OR	NVLD SWITCH SENSE
3	K106 18WT/DG	NVLD SOLENOID CONTROL



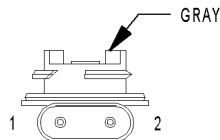
LEFT BACK-UP LAMP (300M/BUILT-UP-EXPORT) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK (300M)	GROUND
1	L1 18VT/BK (BUILT-UP-EXPORT)	BACK-UP LAMP FEED
2	-	-
3	L1 18VT/BK (300M)	BACK-UP LAMP FEED
3	Z1 18BK (BUILT-UP-EXPORT)	GROUND



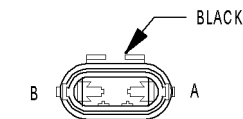
LEFT BACK-UP
LAMP
(CONCORDE/
LTD)

LEFT BACK-UP LAMP (CONCORDE/LTD) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L1 18VT/BK	BACK-UP LAMP FEED
2	Z1 18BK	GROUND



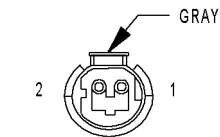
LEFT BACK-UP
LAMP
(DODGE)

LEFT BACK-UP LAMP (DODGE) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18VT/BK	GROUND
2	L1 18VT/BK	BACK-UP LAMP FEED



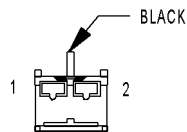
LEFT FOG
LAMP
(CONCORDE/LTD)

LEFT FOG LAMP (CONCORDE/LTD) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
A	L39 20LB	FOG LAMP RELAY OUTPUT
B	Z1 20BK	GROUND



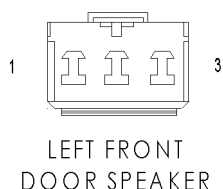
LEFT FOG
LAMP
(DODGE/300M /
BUILT-UP-EXPORT)

LEFT FOG LAMP (DODGE/300M/BUILT-UP-EXPORT) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L39 20LB	FOG LAMP RELAY OUTPUT
2	Z1 20BK	GROUND



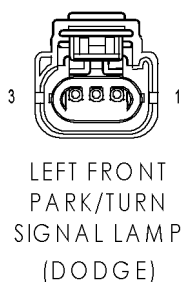
LEFT FRONT
DOOR SAIL
SPEAKER

LEFT FRONT DOOR SAIL SPEAKER - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X83 18YL/RD	AMPLIFIED LEFT DOOR SAIL SPEAKER (+)
2	X81 18YL/BK	AMPLIFIED LEFT DOOR SAIL SPEAKER (-)



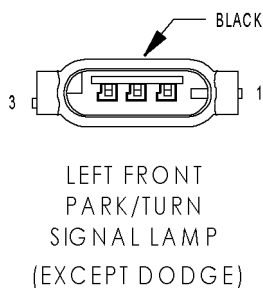
LEFT FRONT DOOR SPEAKER - 3 WAY

CAV	CIRCUIT	FUNCTION
1	X87 18LG/VT (NORMAL BUILD)	AMPLIFIED LEFT DOOR SPEAKER (+)
2	X87 18LG/VT (EARLY BUILD)	AMPLIFIED LEFT DOOR SPEAKER (+)
3	X85 18LG/BK	AMPLIFIED LEFT DOOR SPEAKER (-)



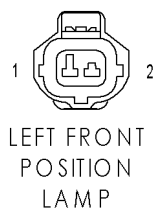
LEFT FRONT PARK/TURN SIGNAL LAMP (DODGE) - 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	L61 18LG	LEFT TURN SIGNAL



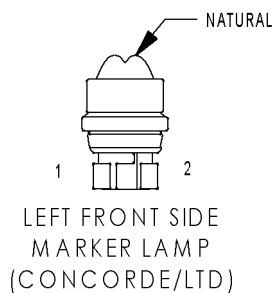
LEFT FRONT PARK/TURN SIGNAL LAMP (EXCEPT DODGE) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	L61 18LG	LEFT TURN SIGNAL
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



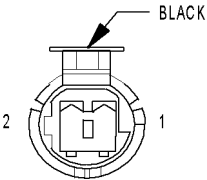
LEFT FRONT POSITION LAMP - 2 WAY

CAV	CIRCUIT	FUNCTION
1	L7 20BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 20BK	GROUND



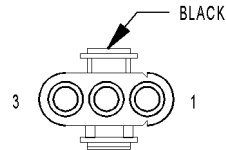
LEFT FRONT SIDE MARKER LAMP (CONCORDE/LTD) - NATURAL 2 WAY

CAV	CIRCUIT	FUNCTION
1	L7 20BK/YL	PARK LAMP RELAY OUTPUT
2	L61 20LG	LEFT TURN SIGNAL



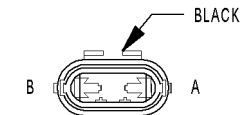
LEFT FRONT
WHEEL SPEED
SENSOR

LEFT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	B9 18RD	LEFT FRONT WHEEL SPEED SENSOR (+)
2	B9 18RD/DB	LEFT FRONT WHEEL SPEED SENSOR (-)



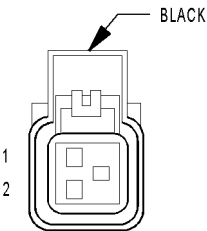
LEFT HEADLAMP
LEVELING MOTOR
(BUILT-UP-EXPORT)

LEFT HEADLAMP LEVELING MOTOR (BUILT-UP-EXPORT) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L7 20BK/YL	PARK LAMP RELAY OUTPUT
2	L13 20BR/YL	HEADLAMP ADJUST SIGNAL
3	Z1 20BK	GROUND



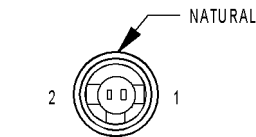
LEFT HIGH
BEAM HEADLAMP

LEFT HIGH BEAM HEADLAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
A	L33 20RD	FUSED LEFT HIGH BEAM OUTPUT
B	Z1 20BK	GROUND



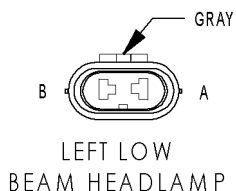
LEFT HORN

LEFT HORN - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	X2 18DG/RD	HORN RELAY OUTPUT

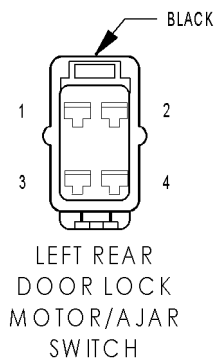


LEFT
LICENSE LAMP
(BUILT-UP-EXPORT)

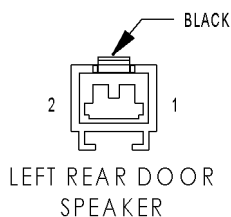
LEFT LICENSE LAMP (BUILT-UP-EXPORT) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 18BK	GROUND



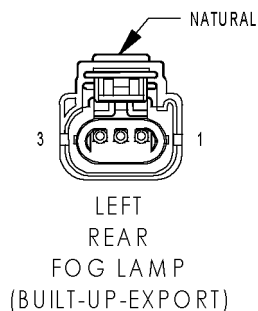
LEFT LOW BEAM HEADLAMP - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
A	L43 20VT (BUILT-UP-EXPORT)	FUSED LEFT LOW BEAM OUTPUT
A	L43 16VT (EXCEPT BUILT-UP-EXPORT)	FUSED LEFT LOW BEAM OUTPUT
B	Z1 16BK (EXCEPT BUILT-UP-EXPORT)	GROUND
B	Z1 20BK (BUILT-UP-EXPORT)	GROUND



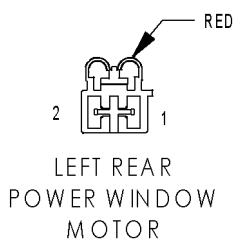
LEFT REAR DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	DOOR AJAR SWITCH SENSE
2	Z1 20BK	GROUND
3	P34 16PK/BK	UNLOCK RELAY OUTPUT
4	P33 16OR	LOCK RELAY OUTPUT



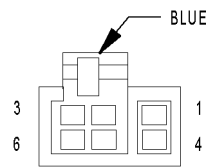
LEFT REAR DOOR SPEAKER - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X97 18TN/DG	AMPLIFIED LOW LEFT REAR SPEAKER (-)
2	X95 18TN/VT	AMPLIFIED LOW LEFT REAR SPEAKER (+)



LEFT REAR FOG LAMP (BUILT-UP-EXPORT) - NATURAL 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L95 18DG/YL	REAR FOG LAMP RELAY OUTPUT
2	-	-
3	Z1 18BK	GROUND

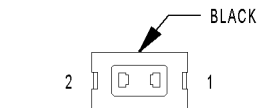


LEFT REAR POWER WINDOW MOTOR - RED 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Q23 16DG	LEFT REAR POWER WINDOW DRIVER DOWN
2	Q13 16GY	WINDOW LEFT REAR B(+) UP



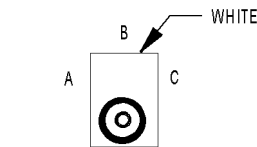
LEFT REAR
POWER WINDOW
SWITCH

LEFT REAR POWER WINDOW SWITCH - BLUE 6 WAY		
CAV	CIRCUIT	FUNCTION
1	Q23 16DG	LEFT REAR WINDOW DRIVER DOWN
2	Q17 14GY/BK	LEFT REAR WINDOW DRIVER (UP)
3	-	-
4	Q27 14DG/WT	LEFT REAR WINDOW DRIVER (DOWN)
5	Q13 16GY	WINDOW LEFT REAR B(+) UP
6	Q1 14YL	WINDOW SWITCH FEED



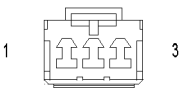
LEFT REAR
READING/COURTESY
LAMP

LEFT REAR READING/COURTESY LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M52 20LG (EXCEPT BASE)	COURTESY LAMPS DRIVER



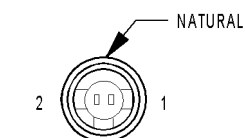
LEFT REAR
READING/COURTESY
LAMP SWITCH

LEFT REAR READING/COURTESY LAMP SWITCH - WHITE 3 WAY		
CAV	CIRCUIT	FUNCTION
A	Z1 20BK	GROUND
B	M52 20LG	LEFT REAR READING LAMP SWITCH CONTROL
C	M2 20YL	COURTESY LAMPS DRIVER



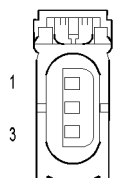
LEFT REAR
SHELF SPEAKER

LEFT REAR SHELF SPEAKER - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	X91 18WT/BK (MIDLINE AND PREMIUM AUDIO)	AMPLIFIED HIGH LEFT REAR SPEAKER (-)
1	X57 18BR/LB (BASE AUDIO)	LEFT REAR SPEAKER (-)
2	X93 18WT/RD (EARLY BUILD MIDLINE AND PREMIUM AUDIO)	AMPLIFIED HIGH LEFT REAR SPEAKER (+)
2	X51 18BR/YL (EARLY BUILD BASE AUDIO)	LEFT REAR SPEAKER (+)
3	X93 18WT/RD (NORMAL BUILD MIDLINE AND PREMIUM AUDIO)	AMPLIFIED HIGH LEFT REAR SPEAKER (+)
3	X51 18BR/YL (NORMAL BUILD BASE AUDIO)	LEFT REAR SPEAKER (+)



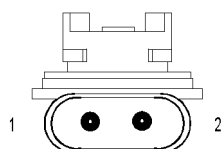
LEFT REAR SIDE
MARKER LAMP
(DODGE)

LEFT REAR SIDE MARKER LAMP (DODGE) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT



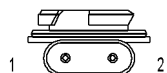
LEFT REAR TURN
SIGNAL LAMP
(300M/BUILT-UP-EXPORT)

LEFT REAR TURN SIGNAL LAMP (300M/BUILT-UP-EXPORT) - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L61 18LG/TN	LEFT TURN SIGNAL
2	-	-
3	Z1 18BK	GROUND



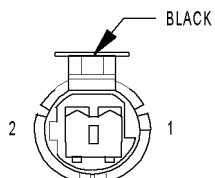
LEFT REAR TURN
SIGNAL LAMP
(DODGE)

LEFT REAR TURN SIGNAL LAMP (DODGE) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L61 18LG/TN	LEFT TURN SIGNAL
2	Z1 18BK	GROUND



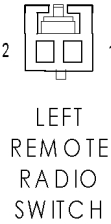
LEFT REAR
TURN SIGNAL
LAMP
(LTD)

LEFT REAR TURN SIGNAL LAMP (LTD) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L61 18LG/TN	LEFT TURN SIGNAL
2	Z1 18BK	GROUND

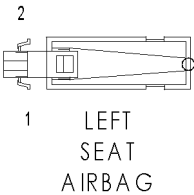


LEFT REAR
WHEEL SPEED
SENSOR

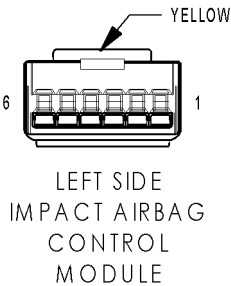
LEFT REAR WHEEL SPEED SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	B4 18LG	LEFT REAR WHEEL SPEED SENSOR (+)
2	B3 18LG/DB	LEFT REAR WHEEL SPEED SENSOR (-)



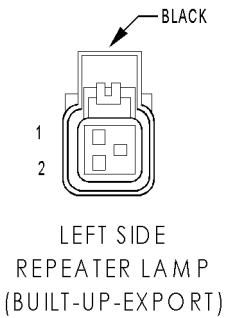
LEFT REMOTE RADIO SWITCH - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X20 22GY/WT	RADIO CONTROL MUX
2	X920 22GY/OR	RADIO CONTROL MUX RETURN



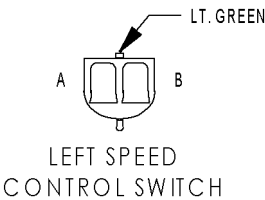
LEFT SEAT AIRBAG - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R31 20LG/OR	LEFT SEAT SQUIB LINE 1
2	R33 20LG/WT	LEFT SEAT SQUIB LINE 2



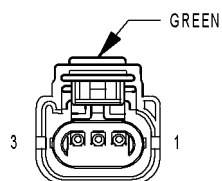
LEFT SIDE IMPACT AIRBAG CONTROL MODULE - YELLOW 6 WAY		
CAV	CIRCUIT	FUNCTION
1	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	D25 20VT/YL	PCI BUS
3	R31 20LG/OR	LEFT SEAT SQUIB LINE 1
4	R33 20LG/WT	LEFT SEAT SQUIB LINE 2
5	Z2 20BK/LG	GROUND
6	Z2 20BK/LG	GROUND



LEFT SIDE REPEATER LAMP (BUILT-UP-EXPORT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L61 20LG	LEFT TURN SIGNAL
2	Z1 20BK	GROUND



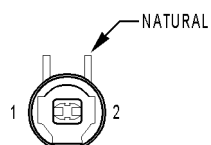
LEFT SPEED CONTROL SWITCH - LT. GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
A	V37 22RD/LG	SPEED CONTROL SWITCH SIGNAL
B	K4 22BK/LB	SENSOR GROUND



LEFT TAIL LAMP
(300M/BUILT-UP-EXPORT)

LEFT TAIL LAMP (300M/BUILT-UP-EXPORT) - GREEN 3 WAY

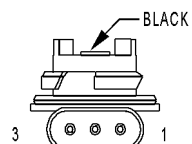
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 18BK	GROUND
3	-	-



LEFT TAIL LAMP
(LTD)

LEFT TAIL LAMP (LTD) - NATURAL 2 WAY

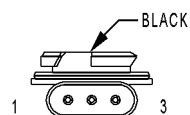
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT



LEFT TAIL/
STOP LAMP
(CONCORDE)

LEFT TAIL/STOP LAMP (CONCORDE) - BLACK 3 WAY

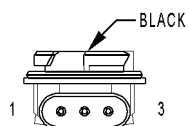
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18 BK	DRIVER



LEFT TAIL/
STOP LAMP
(LTD/
BUILT-UP-EXPORT)

LEFT TAIL/STOP LAMP (LTD/BUILT-UP-EXPORT) - BLACK 3 WAY

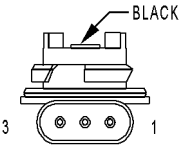
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



LEFT TAIL/STOP
LAMP NO. 1
(300M/BUILT-
UP-EXPORT)

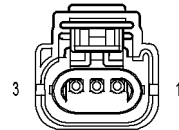
LEFT TAIL/STOP LAMP NO. 1 (300M/BUILT-UP-EXPORT) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



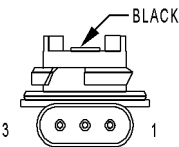
LEFT TAIL/
STOP LAMP
NO. 1
(DODGE)

LEFT TAIL/STOP LAMP NO. 1 (DODGE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



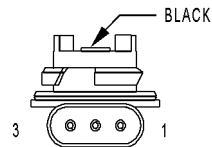
LEFT TAIL/ STOP
LAMP NO. 2
(300M)

LEFT TAIL/STOP LAMP NO. 2 (300M) - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



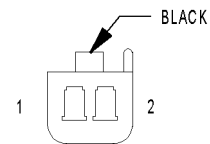
LEFT TAIL/
STOP LAMP
NO. 2
(DODGE)

LEFT TAIL/STOP LAMP NO. 2 (DODGE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



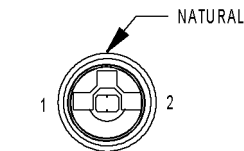
LEFT TAIL/ TURN
SIGNAL LAMP
(CONCORDE)

LEFT TAIL/TURN SIGNAL LAMP (CONCORDE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L61 18LG/TN	LEFT TURN SIGNAL
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



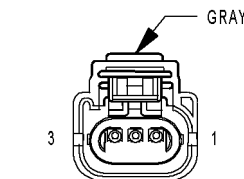
LEFT
VISOR/VANITY
LAMP

LEFT VISOR/VANITY LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	Z1 20BK	GROUND



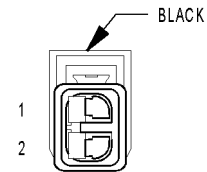
LICENSE LAMP
(EXCEPT
BUILT-UP-EXPORT)

LICENSE LAMP (EXCEPT BUILT-UP-EXPORT) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 18BK	GROUND



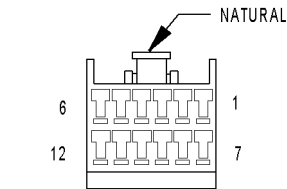
MANIFOLD ABSOLUTE
PRESSURE SENSOR

MANIFOLD ABSOLUTE PRESSURE SENSOR - GRAY 3 WAY		
CAV	CIRCUIT	FUNCTION
1	K1 20DG/RD	MAP SENSOR SIGNAL
2	K4 18BK/LB	SENSOR GROUND
3	K6 20VT/WT	5V SUPPLY



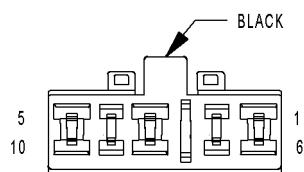
MANIFOLD
TUNING
VALVE
(3.5L
HIGH OUTPUT)

MANIFOLD TUNING VALVE (3.5L HIGH OUTPUT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z12 18BK/TN	GROUND
2	K36 18VT/RD	MANIFOLD SOLENOID CONTROL



MANUAL TEMPERATURE
CONTROL HEAD C1

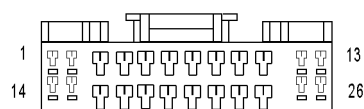
MANUAL TEMPERATURE CONTROL HEAD C1 - NATURAL 12 WAY		
CAV	CIRCUIT	FUNCTION
1	C48 20VT/PK	A/C LED INDICATOR SIGNAL
2	C80 20DB/WT	REAR WINDOW DEFOGGER RELAY CONTROL
3	Z1 20BK	GROUND
4	C57 20DB/GY	SENSOR GROUND
5	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
6	E17 20YL/BK	PARK LAMP RELAY OUTPUT
7	-	-
8	-	-
9	C82 20YL/OR	TEMPERATURE SELECT
10	C58 22RD/TN	A/C MODE SWITCH MUX
11	-	-
12	E2 20OR	PANEL LAMPS DRIVER



MANUAL TEMPERATURE
CONTROL HEAD C2

MANUAL TEMPERATURE CONTROL HEAD C2 - BLACK 10 WAY

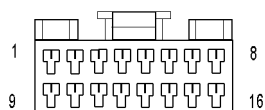
CAV	CIRCUIT	FUNCTION
1	-	-
2	C4 18TN	LOW BLOWER MOTOR DRIVER
3	C6 16LB	M2 BLOWER MOTOR DRIVER
4	-	-
5	Z1 12BK	GROUND
6	-	-
7	C5 16LG	M1 BLOWER MOTOR DRIVER
8	-	-
9	-	-
10	C7 12BK/TN	HIGH BLOWER MOTOR DRIVER



MEMORY HEATED
SEAT/MIRROR
MODULE C1

MEMORY HEATED SEAT/MIRROR MODULE C1 - 26 WAY

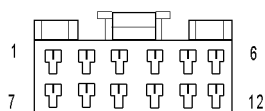
CAV	CIRCUIT	FUNCTION
1	P69 20WT/RD	DRIVER MIRROR SENSOR GROUND
2	P25 20VT/RD	SEAT HORIZONTAL POSITION SIGNAL
3	P27 20LB/RD	REAR RISER POSITION SIGNAL
4	P141 20TN/LB	DRIVER SEAT TEMPERATURE SENSOR INPUT
5	P134 20TN/LG	PASSENGER SEAT HEATER MUX SWITCH
6	P67 20YL/RD	PASSENGER MIRROR VERTICAL POSITION SIGNAL
7	P64 20YL/OR	DRIVER MIRROR VERTICAL POSITION SIGNAL
8	P21 18RD/LG	SEAT FRONT DOWN SWITCH SENSE
9	P13 18RDWT	SEAT REAR DOWN SWITCH SENSE
10	P15 18YL/LB	SEAT HORIZONTAL FORWARD SWITCH SENSE
11	P40 20GY/LB	DRIVER SEAT RECLINER UP
12	P23 18PK/RD	MEMORY POSITION 1 SWITCH SENSE
13	P22 18PK/BK	MEMORY SET SWITCH SENSE
14	P66 20WT/BK	PASSENGER MIRROR SENSOR GROUND
15	P26 20BR	FRONT RISER POSITION SIGNAL
16	P47 20LB	RECLINER POSITION SIGNAL
17	P142 20TN/DB	PASSENGER SEAT TEMPERATURE SENSOR INPUT
18	P133 20TN/DG	DRIVER SEAT HEATER SWITCH MUX
19	P68 20DG/RD	PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
20	P65 20DB/YL	DRIVER MIRROR HORIZONTAL POSITION SIGNAL
21	P19 18YL/LG	SEAT FRONT UP SWITCH SENSE
22	P11 18YL/WT	SEAT REAR UP SWITCH SENSE
23	P17 18RD/LB	SEAT HORIZONTAL REARWARD SWITCH SENSE
24	P48 20GY/WT	DRIVER SEAT RECLINER DOWN
25	P24 18PK/WT	MEMORY POSITION 2 SWITCH SENSE
26	D25 20VT/YL	PCI BUS



MEMORY HEATED
SEAT/MIRROR
MODULE C2

MEMORY HEATED SEAT/MIRROR MODULE C2 - 16 WAY

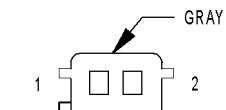
CAV	CIRCUIT	FUNCTION
1	P139 20VT/WT	DRIVER SEAT HIGH HEAT LED DRIVER
2	P140 20VT/BK	PASSENGER SEAT HIGH HEAT LED DRIVER
3	P73 20YL/PK	DRIVER MIRROR COMMON DRIVER-RIGHT/DOWN
4	P75 20BK/WT	DRIVER MIRROR LEFT DRIVER
5	P71 20YL	DRIVER MIRROR UP DRIVER
6	P29 20BR/WT	SEAT SENSOR 5V SUPPLY
7	P161 20GY/LB	DRIVER MIRROR SENSOR 5V SUPPLY
8	P162 20GY/WT	PASSENGER MIRROR SENSOR 5V SUPPLY
9	P137 20VT/DG	DRIVER SEAT LOW HEAT LED DRIVER
10	P138 20VT/LG	PASSENGER SEAT LOW HEAT LED DRIVER
11	P70 20WT	PASSENGER MIRROR COMMON DRIVER-RIGHT/DOWN
12	P74 20DB	PASSENGER MIRROR LEFT DRIVER
13	P72 20YL/BK	PASSENGER MIRROR UP DRIVER
14	P144 20BK/LG	PASSENGER SEAT TEMPERATURE 5V SUPPLY
15	P143 20BK/DG	DRIVER SEAT TEMPERATURE 5V SUPPLY
16	P28 20BR/RD	SEAT POSITION SENSOR GROUND



MEMORY HEATED
SEAT/MIRROR
MODULE C3

MEMORY HEATED SEAT/MIRROR MODULE C3 - 12 WAY

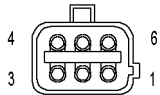
CAV	CIRCUIT	FUNCTION
1	P111 16YL/WT	SEAT REAR UP DRIVER
2	P115 16YL/DB	SEAT HORIZONTAL FORWARD DRIVER
3	P119 16YL/LG	SEAT FRONT UP DRIVER
4	P113 16RD/WT	SEAT REAR DOWN DRIVER
5	P121 16RD/LG	SEAT FRONT DOWN DRIVER
6	P130 16RD/TN	PASSENGER SEAT HEATER B(+) DRIVER
7	P43 16GY/LB	DRIVER SEAT RECLINER UP DRIVER
8	P9 20RD	SEAT SWITCH B(+) SUPPLY
9	-	-
10	P41 16GY/WT	DRIVER SEAT RECLINER DOWN DRIVER
11	P117 16RD/LB	SEAT HORIZONTAL REARWARD DRIVER
12	P131 16RD/DG	DRIVER SEAT HEATER B(+) DRIVER



MEMORY HEATED
SEAT/MIRROR
MODULE C4

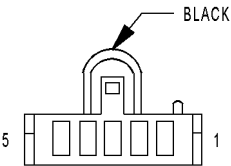
MEMORY HEATED SEAT/MIRROR MODULE C4 - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 16BK	GROUND
2	F35 16RD	FUSED B(+)



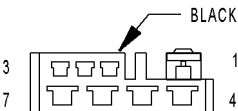
MEMORY SET SWITCH

MEMORY SET SWITCH - 6 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	Z1 18BK	GROUND
4	P24 18PK/WT	MEMORY POSITION 2 SWITCH SENSE
5	P22 18PK/BK	MEMORY SET SWITCH SENSE
6	P23 18PK/RD	MEMORY POSITION SWITCH SENSE



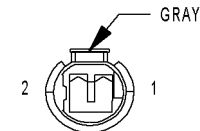
MODE DOOR ACTUATOR

MODE DOOR ACTUATOR - BLACK 5 WAY		
CAV	CIRCUIT	FUNCTION
1	C35 22DG/YL	MODE DOOR DRIVER
2	C57 22DB/GY	SENSOR GROUND
3	C37 22YL/WT	MODE DOOR FEEDBACK SIGNAL
4	C26 22PK/DB	5V SUPPLY
5	C34 22BR/WT	COMMON DOOR DRIVER



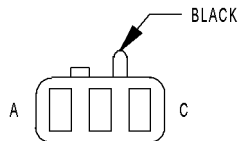
MULTI-FUNCTION SWITCH

MULTI-FUNCTION SWITCH - BLACK 7 WAY		
CAV	CIRCUIT	FUNCTION
1	F13 20DB	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
2	V10 20BR	FRONT WASHER PUMP MOTOR CONTROL
3	V52 20DG/RD	FRONT WIPER MUX SWITCH SIGNAL
4	L40 18BR/WT	FUSED LOW BEAM RELAY OUTPUT
5	F33 18PK/RD	FUSED B(+)
6	-	-
7	L324 18WT/LG	SWITCHED HIGH BEAM RELAY CONTROL



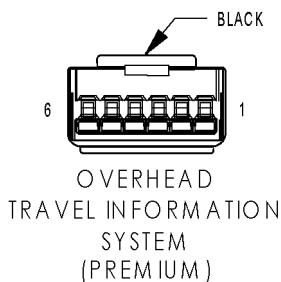
OUTPUT SPEED SENSOR

OUTPUT SPEED SENSOR - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	T13 20DB/BK	SPEED SENSOR GROUND
2	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL

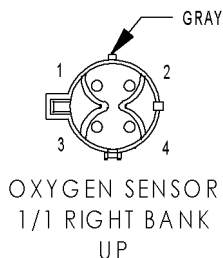


OVERHEAD MAP/COURTESY LAMP

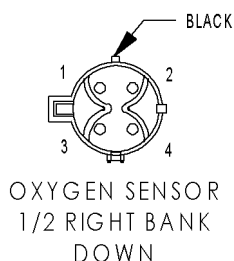
OVERHEAD MAP/COURTESY LAMP - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
A	M1 20PK	FUSED B(+)
B	M2 20YL	COURTESY LAMPS DRIVER
C	Z1 20BK (PREMIUM) (BASE/SUNROOF)	GROUND



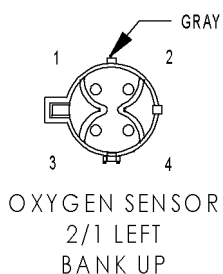
OVERHEAD TRAVEL INFORMATION SYSTEM (PREMIUM) - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	Z2 20BK/LG	GROUND
4	M1 20PK	FUSED B(+)
5	D25 20VT/YL	PCI BUS
6	-	-



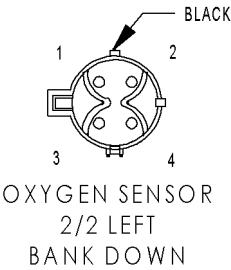
OXYGEN SENSOR 1/1 RIGHT BANK UP - GRAY 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
3	K902 18BR/DG	OXYGEN SENSOR RETURN (UP)
4	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL



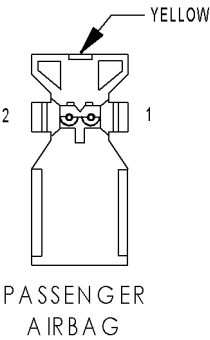
OXYGEN SENSOR 1/2 RIGHT BANK DOWN - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K199 18BR/VT	OXYGEN SENSOR 1/2 HEATER CONTROL
3	K904 18DB/DG	OXYGEN SENSOR RETURN (DOWN)
4	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL



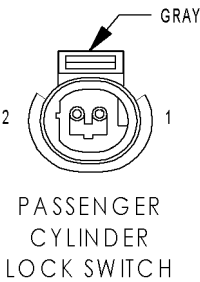
OXYGEN SENSOR 2/1 LEFT BANK UP - GRAY 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K299 18BR/WT	OXYGEN SENSOR 2/1 HEATER CONTROL
3	K902 18BR/DG	OXYGEN SENSOR RETURN (UP)
4	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL



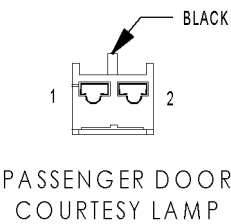
OXYGEN SENSOR 2/2 LEFT BANK DOWN - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	K399 18BR/GY	OXYGEN SENSOR 2/2 HEATER CONTROL
3	K904 18DB/DG	OXYGEN SENSOR RETURN (DOWN)
4	K341 20PK/WT	OXYGEN SENSOR 2/2 SIGNAL



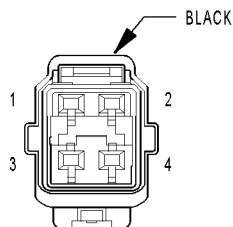
PASSENGER AIRBAG - YELLOW 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R42 18BK/YL	PASSENGER SQUIB 1 LINE 1
2	R44 18DG/YL	PASSENGER SQUIB 1 LINE 2



PASSENGER CYLINDER LOCK SWITCH - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G72 20DG/OR	PASSENGER CYLINDER LOCK SWITCH MUX
2	M1 20PK	FUSED B(+)

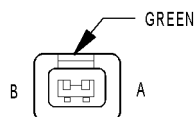


PASSENGER DOOR COURTESY LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M2 20YL	COURTESY LAMPS DRIVER
2	M1 20PK	FUSED B(+)



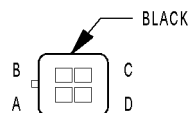
PASSENGER DOOR
LOCK MOTOR/
AJAR SWITCH

PASSENGER DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	DOOR AJAR SWITCH SENSE
2	Z1 20BK	GROUND
3	P34 16PK/BK	UNLOCK RELAY OUTPUT
4	P33 16OR	LOCK RELAY OUTPUT



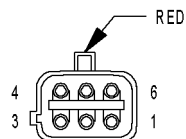
PASSENGER HEATED
SEAT BACK

PASSENGER HEATED SEAT BACK - GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
A	P88 16BR/BK	HEATED SEAT DRIVER
B	Z1 20BK	GROUND



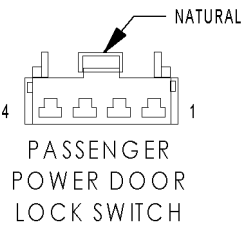
PASSENGER HEATED
SEAT CUSHION

PASSENGER HEATED SEAT CUSHION - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
A	P130 16RD/TN	PASSENGER SEAT HEATER B(+) DRIVER
B	P88 16BR/BK	HEATED SEAT DRIVER
C	P142 20TN/DB	PASSENGER SEAT TEMPERATURE SENSOR INPUT
D	P144 20BK/LG	PASSENGER SEAT TEMPERATURE 5V SUPPLY

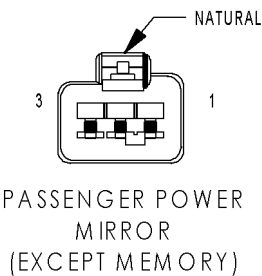


PASSENGER HEATED
SEAT SWITCH

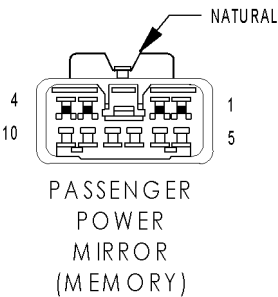
PASSENGER HEATED SEAT SWITCH - RED 6 WAY		
CAV	CIRCUIT	FUNCTION
1	P138 20VT/LG	PASSENGER SEAT LOW HEAT LED DRIVER
2	-	-
3	Z1 20BK	GROUND
4	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	P140 20VT/BK	PASSENGER SEAT HIGH HEAT LED DRIVER
6	P134 20TN/LG	PASSENGER SEAT HEATER MUX SWITCH



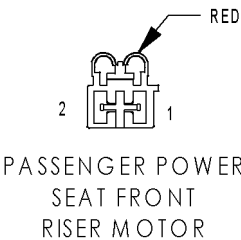
PASSENGER POWER DOOR LOCK SWITCH - NATURAL 4 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
3	Z1 20BK	GROUND
4	P96 20WT/LG	PASSENGER DOOR MUX SWITCH



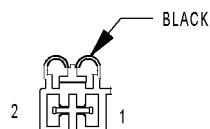
PASSENGER POWER MIRROR (EXCEPT MEMORY) - NATURAL 3 WAY		
CAV	CIRCUIT	FUNCTION
1	P70 20WT	PASSENGER MIRROR RIGHT/DOWN
2	P72 20YL/BK	PASSENGER MIRROR UP
3	P74 20DB	PASSENGER MIRROR LEFT



PASSENGER POWER MIRROR (MEMORY) - NATURAL 10 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	P70 20WT	PASSENGER MIRROR COMMON DRIVER (RIGHT/DOWN)
3	C16 20LB/YL	FUSED REAR WINDOW DEFOGGER RELAY OUTPUT
4	P72 20YL/BK	PASSENGER MIRROR UP DRIVER
5	P74 20DB	PASSENGER MIRROR LEFT DRIVER
6	P162 20GY/WT	PASSENGER MIRROR SENSOR 5V SUPPLY
7	P67 20YL/RD	PASSENGER MIRROR VERTICAL POSITION SIGNAL
8	L60 18TN	RIGHT TURN SIGNAL (300M SPECIAL)
9	P68 20DG/RD	PASSENGER MIRROR HORIZONTAL POSITION SIGNAL
10	P66 20WT/BK	PASSENGER MIRROR SENSOR GROUND

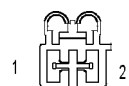


PASSENGER POWER SEAT FRONT RISER MOTOR - RED 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P18 16YL/LG	PASSENGER SEAT FRONT UP
2	P20 16RD/LG	PASSENGER SEAT FRONT DOWN



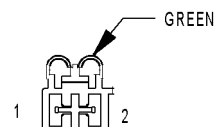
PASSENGER POWER
SEAT HORIZONTAL
MOTOR

PASSENGER POWER SEAT HORIZONTAL MOTOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P14 16YL/LB	PASSENGER SEAT HORIZONTAL FORWARD
2	P16 16RD/LB	PASSENGER SEAT HORIZONTAL FORWARD



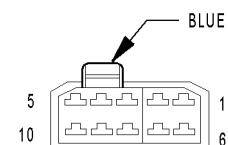
PASSENGER POWER
SEAT REAR
RISER MOTOR

PASSENGER POWER SEAT REAR RISER MOTOR - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P10 16YL/WT	PASSENGER SEAT REAR UP
2	P12 16RD/WT	PASSENGER SEAT REAR DOWN



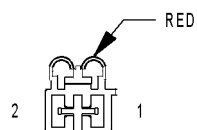
PASSENGER POWER
SEAT RECLINER
MOTOR

PASSENGER POWER SEAT RECLINER MOTOR - GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
1	P42 16GY/BK	PASSENGER SEAT RECLINER SWITCH DOWN
2	P44 16GY/DB	PASSENGER SEAT RECLINER SWITCH UP



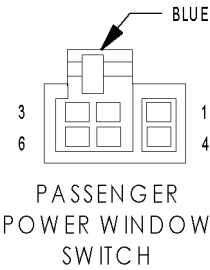
PASSENGER POWER
SEAT SWITCH

PASSENGER POWER SEAT SWITCH - BLUE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	F35 16RD	FUSED B(+)
2	P42 16GY/BK	PASSENGER SEAT RECLINER SWITCH DOWN
3	P16 16RD/LB	PASSENGER SEAT HORIZONTAL FORWARD
4	P44 16GY/DB	PASSENGER SEAT RECLINER SWITCH UP
5	Z1 16BK	GROUND
6	P18 16YL/LG	PASSENGER SEAT FRONT UP
7	P10 16YL/WT	PASSENGER SEAT REAR UP
8	P12 16RD/WT	PASSENGER SEAT FRONT DOWN
9	P20 16RD/LG	PASSENGER SEAT FRONT DOWN
10	P14 16YL/LB	PASSENGER SEAT HORIZONTAL FORWARD

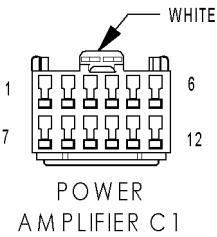


PASSENGER
POWER WINDOW
MOTOR

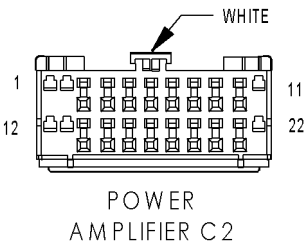
PASSENGER POWER WINDOW MOTOR - RED 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Q22 16VT	PASSENGER WINDOW DRIVER (DOWN)
2	Q12 16BR	PASSENGER WINDOW DRIVER (UP)



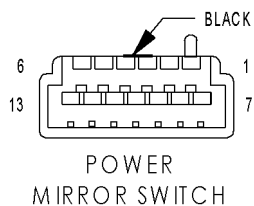
PASSENGER POWER WINDOW SWITCH - BLUE 6 WAY		
CAV	CIRCUIT	FUNCTION
1	Q22 16VT	PASSENGER WINDOW DRIVER (DOWN)
2	Q16 14BR/WT	MASTER WINDOW SWITCH (RIGHT FRONT UP)
3	-	-
4	Q26 14VT/WT	MASTER WINDOW SWITCH (RIGHT FRONT DOWN)
5	Q12 16BR	PASSENGER WINDOW DRIVER (UP)
6	Q1 14YL	POWER WINDOW SWITCH FEED



POWER AMPLIFIER C1 - WHITE 12 WAY		
CAV	CIRCUIT	FUNCTION
1	X87 18LG/VT	AMPLIFIED LEFT DOOR SPEAKER (+)
2	X82 18LB/RD	AMPLIFIED RIGHT DOOR SPEAKER (+)
3	X83 18YL/RD	AMPLIFIED LEFT DOOR SAIL SPEAKER (+)
4	X86 18OR/RD	AMPLIFIED RIGHT DOOR SAIL SPEAKER (+)
5	X95 18WT/VT (PREMIUM II AUDIO)	AMPLIFIED LOW LEFT REAR SPEAKER (+)
6	X98 18TN/VT (PREMIUM II AUDIO)	AMPLIFIED LOW RIGHT REAR SPEAKER (+)
7	X85 18LG/BK	AMPLIFIED LEFT DOOR SPEAKER (-)
8	X80 18LB/BK	AMPLIFIED RIGHT DOOR SPEAKER (-)
9	X81 18YL/BK	AMPLIFIED LEFT DOOR SAIL SPEAKER (-)
10	X84 18OR/BK	AMPLIFIED RIGHT DOOR SAIL SPEAKER (-)
11	X97 18WT/DG (PREMIUM II AUDIO)	AMPLIFIED LOW LEFT REAR SPEAKER (-)
12	X96 18TN/DG (PREMIUM II AUDIO)	AMPLIFIED LOW RIGHT REAR SPEAKER (-)

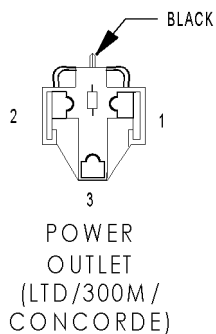


POWER AMPLIFIER C2 - WHITE 22 WAY		
CAV	CIRCUIT	FUNCTION
1	F62 16RD/WT	FUSED B(+)
2	Z2 16BK/LG	GROUND
3	X60 20DG/RD	RADIO 12V OUTPUT
4	X54 18VT	RIGHT FRONT SPEAKER (+)
5	X53 18DG	LEFT FRONT SPEAKER (+)
6	X52 18DB/WT	RIGHT REAR SPEAKER (+)
7	X51 18BR/YL	LEFT REAR SPEAKER (+)
8	-	-
9	X88 18PK/RD	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (+)
10	X93 18WT/RD	AMPLIFIED HIGH LEFT REAR SPEAKER (+)
11	X94 18TN/RD	AMPLIFIED HIGH RIGHT REAR SPEAKER (+)
12	F62 16RD	FUSED B(+)
13	Z2 16BK/LG	GROUND
14	-	-
15	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
16	X55 18BR/RD	LEFT FRONT SPEAKER (-)
17	X58 18DB/OR	RIGHT REAR SPEAKER (-)
18	X57 18BR/LB	LEFT REAR SPEAKER (-)
19	-	-
20	X89 18PK/BK	AMPLIFIED CENTER INSTRUMENT PANEL SPEAKER (-)
21	X91 18WT/BK	AMPLIFIED HIGH LEFT REAR SPEAKER (-)
22	X92 18TN/BK	AMPLIFIED HIGH RIGHT REAR SPEAKER (-)



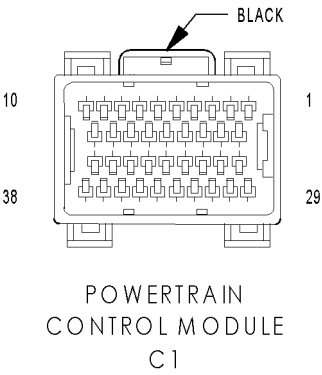
POWER MIRROR SWITCH - BLACK 13 WAY

CAV	CIRCUIT	FUNCTION
1	P73 20YL/PK	DRIVER MIRROR COMMON DRIVER (RIGHT/DOWN)
2	-	-
3	-	-
4	-	-
5	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
6	P70 20WT	PASSENGER MIRROR COMMON DRIVER (RIGHT/DOWN)
7	P74 20DB	PASSENGER MIRROR LEFT DRIVER
8	P75 20BK/WT	DRIVER MIRROR LEFT DRIVER
9	Z1 20BK	GROUND
10	-	-
11	M1 20PK	FUSED B(+)
12	P72 20YL/BK	PASSENGER MIRROR UP DRIVER
13	P71 20YL	DRIVER MIRROR UP DRIVER

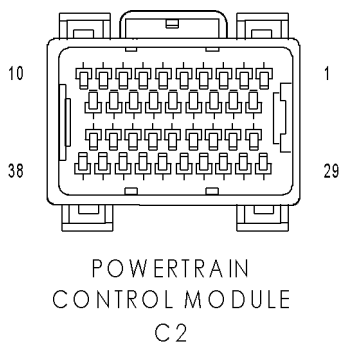


POWER OUTLET (LTD/300M/CONCORDE) - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	A105 18DB/RD	FUSED B(+)
2	-	-
3	Z1 18BK	GROUND

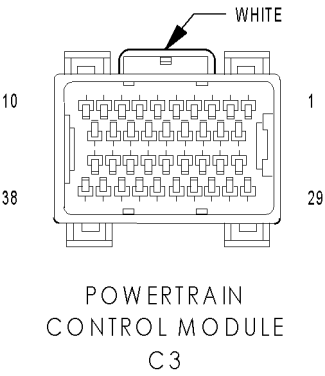


POWERTRAIN CONTROL MODULE C1 - BLACK 38 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	-	-
5	-	-
6	-	-
7	-	-
8	-	-
9	Z12 16BK/TN	GROUND
10	-	-
11	F12 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
12	F11 20RD/WT	FUSED IGNITION SWITCH OUTPUT (OFF-RUN-START)
13	-	-
14	-	-
15	-	-
16	K236 18GY/PK (3.5L HIGH OUTPUT)	SHORT RUNNER VALVE SOLENOID CONTROL
17	-	-
18	Z12 16BK/TN	GROUND
19	-	-
20	-	-
21	C18 20DB	A/C PRESSURE SIGNAL
22	-	-
23	-	-
24	-	-
25	D20 20LG	SCI RECEIVE (PCM)
26	D19 20VT/OR	SCI RECEIVE (TCM)
27	-	-
28	-	-
29	A209 20RD	FUSED B(+)
30	T751 20YL/BK	FUSED IGNITION SWITCH OUTPUT (START)
31	K141 20TN/WT	OXYGEN SENSOR 1/2 SIGNAL
32	K904 18DB/DG	OXYGEN SENSOR RETURN (DOWN)
33	K341 20PK/WT	OXYGEN SENSOR 2/2 SIGNAL
34	-	-
35	-	-
36	D21 20PK/TN	SCI TRANSMIT (PCM)
37	D15 20WT/DG	SCI TRANSMIT (TCM)
38	D25 18VT/YL	PCI BUS (PCM)

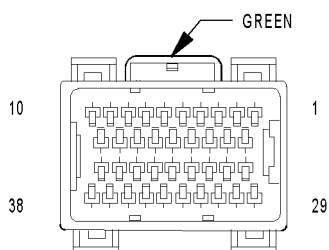


POWERTRAIN CONTROL MODULE C2 - 38 WAY

CAV	CIRCUIT	FUNCTION
1	K96 16TN/LB	COIL ON PLUG DRIVER NO. 6
2	K95 16TN/DG	COIL ON PLUG DRIVER NO. 5
3	K94 16TN/LG	COIL ON PLUG DRIVER NO. 4
4	K58 18BR/DB	FUEL INJECTOR NO. 6 DRIVER
5	K38 18GY	FUEL INJECTOR NO. 5 DRIVER
6	-	-
7	K93 16 TN/OR	COIL ON PLUG DRIVER NO. 3
8	-	-
9	K92 16TN/PK	COIL ON PLUG DRIVER NO. 2
10	K91 16TN/RD	COIL ON PLUG DRIVER NO.1
11	K14 18LB/BR	FUEL INJECTOR NO. 4 DRIVER
12	K13 18YL/WT	FUEL INJECTOR NO. 3 DRIVER
13	K12 18TN/WT	FUEL INJECTOR NO. 2 DRIVER
14	K11 18WT/DB	FUEL INJECTOR NO. 1 DRIVER
15	-	-
16	K36 18VT/RD	MANIFOLD SOLENOID CONTROL
17	K299 18BR/WT	OXYGEN SENSOR 2/1 HEATER CONTROL
18	K99 18BR/OR	OXYGEN SENSOR 1/1 HEATER CONTROL
19	K20 18DG	GENERATOR FIELD DRIVER (+)
20	K2 20TN/BK	ENGINE COOLANT TEMPERATURE SENSOR SIGNAL
21	K22 20OR/DB	THROTTLE POSITION SENSOR SIGNAL
22	-	-
23	K1 20DG/RD	MAP SENSOR SIGNAL
24	K45 20BK/VT	KNOCK SENSOR RETURN
25	K42 20DB/LG	KNOCK SENSOR SIGNAL
26	-	-
27	K4 18BK/LB	SENSOR GROUND
28	K60 18YL/BK	IDLE AIR CONTROL MOTOR SENSE
29	K6 20VT/WT	5V SUPPLY
30	K21 20BK/RD	INTAKE AIR TEMPERATURE SIGNAL
31	K41 20BK/DG	OXYGEN SENSOR 1/1 SIGNAL
32	K902 18BR/DG	OXYGEN SENSOR RETURN (UP)
33	K241 20LG/RD	OXYGEN SENSOR 2/1 SIGNAL
34	K44 20TN/YL	CAMSHAFT POSITION SENSOR SIGNAL
35	K24 20GY/BK	CRANKSHAFT POSITION SENSOR SIGNAL
36	-	-
37	-	-
38	K39 18GY/RD	IDLE AIR CONTROL MOTOR DRIVER



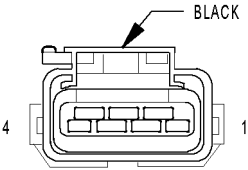
POWERTRAIN CONTROL MODULE C3 - WHITE 38 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	K51 20DB/YL	AUTOMATIC SHUT DOWN RELAY CONTROL
4	C27 20DB/PK	HIGH SPEED RADIATOR FAN RELAY CONTROL
5	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
6	C24 20DB/PK	LOW SPEED RADIATOR FAN RELAY CONTROL
7	V32 20YL/RD	SPEED CONTROL POWER SUPPLY
8	K106 18WT/DG	NVLD SOLENOID CONTROL
9	K199 18BR/VT	OXYGEN SENSOR 1/2 HEATER CONTROL
10	K399 18BR/GY	OXYGEN SENSOR 2/2 HEATER CONTROL
11	C28 20DB/OR	A/C COMPRESSOR CLUTCH RELAY CONTROL
12	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
13	-	-
14	-	-
15	-	-
16	-	-
17	-	-
18	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
19	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
20	K52 18PK/BK	EVAPORATIVE EMISSION SOLENOID CONTROL
21	-	-
22	-	-
23	K29 20WT/PK	BRAKE SWITCH SENSE
24	-	-
25	-	-
26	T44 20YL	AUTOSTICK DOWNSHIFT SWITCH SENSE
27	T5 20LG/RD	AUTOSTICK UPSHIFT SWITCH SENSE
28	F142 16OR/DG	FUSED AUTOMATIC SHUT DOWN RELAY OUTPUT
29	K108 18DG/LG	EVAPORATIVE EMISSION SOLENOID SENSE
30	-	-
31	-	-
32	K25 20VT/LG	AMBIENT TEMPERATURE SENSOR SIGNAL
33	-	-
34	V37 20RD/LG	SPEED CONTROL SWITCH SIGNAL
35	K107 18OR/RD	NVLD SWITCH SENSE
36	-	-
37	K31 20BR	FUEL PUMP RELAY CONTROL
38	K90 20TN	STARTER RELAY CONTROL



POWERTRAIN
CONTROL MODULE
C4

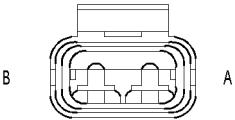
POWERTRAIN CONTROL MODULE C4 - GREEN 38 WAY

CAV	CIRCUIT	FUNCTION
1	T60 16BR	OVERDRIVE SOLENOID CONTROL
2	T59 16PK	UNDERDRIVE SOLENOID CONTROL
3	-	-
4	-	-
5	-	-
6	T19 16WT	2-4 SOLENOID CONTROL
7	-	-
8	-	-
9	-	-
10	T20 16LB	LOW/REVERSE SOLENOID CONTROL
11	-	-
12	Z14 16BK/YL	GROUND
13	Z13 16BK/RD	GROUND
14	Z13 16BK/RD	GROUND
15	T1 20LG/BK	TRS T1 SENSE
16	T3 20VT	TRS T3 SENSE
17	-	-
18	T15 20LG	TRANSMISSION CONTROL RELAY CONTROL
19	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
20	-	-
21	-	-
22	T9 16OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
23	-	-
24	-	-
25	-	-
26	-	-
27	T41 20BK/WT	TRS T41 SENSE
28	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
29	T50 16DG	LOW/REVERSE PRESSURE SWITCH SENSE
30	T47 16YL/BK	2-4 PRESSURE SWITCH SENSE
31	-	-
32	T14 20LG/WT	OUTPUT SPEED SENSOR SIGNAL
33	T52 20RD/BK	INPUT SPEED SENSOR SIGNAL
34	T13 20DB/BK	SPEED SENSOR GROUND
35	T54 20VT/PK	TRANSMISSION TEMPERATURE SENSOR SIGNAL
36	-	-
37	T42 20VT/WT	TRS T42 SENSE
38	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT



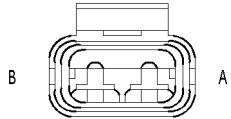
RADIATOR FAN

RADIATOR FAN - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 12BK	GROUND
2	Z1 12BK	GROUND
3	C23 12DG	LOW SPEED RADIATOR FAN RELAY OUTPUT
4	C25 12YL	HIGH SPEED RADIATOR FAN RELAY OUTPUT



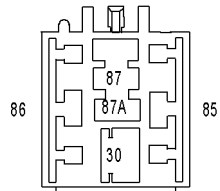
RADIATOR FAN MOTOR NO. 1
(EXCEPT 2.7L BASE)

RADIATOR FAN MOTOR NO. 1 (EXCEPT 2.7L BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
A	Z1 12BK	GROUND
B	12RD	RADIATOR FAN MOTOR NO. 1 CONTROL



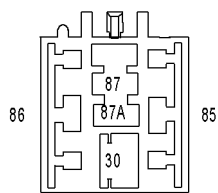
RADIATOR FAN MOTOR NO. 2
(EXCEPT 2.7L BASE)

RADIATOR FAN MOTOR NO. 2 (EXCEPT 2.7L BASE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
A	12BK	GROUND
B	C23 12RD	LOW SPEED RADIATOR FAN RELAY OUTPUT



RADIATOR FAN RELAY NO. 1
(AT FAN)
(EXCEPT 2.7L BASE)

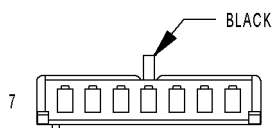
RADIATOR FAN RELAY NO. 1 (AT FAN) (EXCEPT 2.7L BASE)		
CAV	CIRCUIT	FUNCTION
30	12RD	RADIATOR FAN MOTOR NO. 1 CONTROL
30	12RD	RADIATOR FAN MOTOR NO. 1 CONTROL
85	C25 12RD	HIGH SPEED RADIATOR FAN RELAY OUTPUT
85	C25 12RD	HIGH SPEED RADIATOR FAN RELAY OUTPUT
86	Z1 12BK	GROUND
86'	Z1 12BK	GROUND
87A	-	-
87	C25 12RD	HIGH SPEED RADIATOR FAN RELAY OUTPUT



RADIATOR
FAN RELAY
NO. 2
(AT FAN)
(EXCEPT 2.7L BASE)

RADIATOR FAN RELAY NO. 2 (AT FAN) (EXCEPT 2.7L BASE)

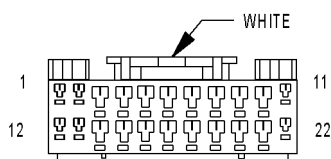
CAV	CIRCUIT	FUNCTION
30	12BK	GROUND
85	C25 12RD	HIGH SPEED RADIATOR RELAY OUTPUT
85	C25 12RD	HIGH SPEED RADIATOR RELAY OUTPUT
86	Z1 12BK	RADIATOR FAN MOTOR NO. 1 CONTROL
86	Z1 12BK	GROUND
87A	12RD	GROUND
87	Z1 12BK	GROUND



RADIO C1
(BASE)

RADIO C1 (BASE) - BLACK 7 WAY

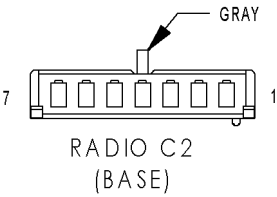
CAV	CIRCUIT	FUNCTION
1	X60 20DG/RD	RADIO 12 VOLT OUTPUT
2	X51 18BR/YL	LEFT REAR SPEAKER (+)
3	X52 18DB/WT	RIGHT REAR SPEAKER (+)
4	X53 18DG	LEFT FRONT SPEAKER (+)
5	X54 18VT	RIGHT FRONT SPEAKER (+)
6	X57 18BR/LB	LEFT REAR SPEAKER (-)
7	X58 18DB/OR	RIGHT REAR SPEAKER (-)



RADIO C1
(EXCEPT
BASE)

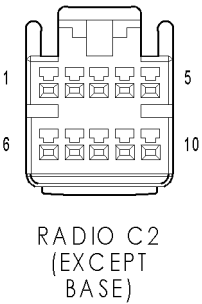
RADIO C1 (EXCEPT BASE) - WHITE 22 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	X12 20RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
3	E2 20OR	PANEL LAMPS DRIVER
4	-	-
5	-	-
6	-	-
7	X54 18VT	RIGHT FRONT SPEAKER (+)
8	X56 18DB/RD	RIGHT FRONT SPEAKER (-)
9	X55 18BR/RD	LEFT FRONT SPEAKER (-)
10	X53 18DG	LEFT FRONT SPEAKER (+)
11	Z1 18BK	GROUND
12	M1 20PK	FUSED B(+)
13	X60 20DG/RD	RADIO 12V OUTPUT
14	D25 20VT/YL	PCI BUS
15	-	-
16	-	-
17	-	-
18	X51 18BR/YL	LEFT REAR SPEAKER (+)
19	X57 18BR/LB	LEFT REAR SPEAKER (-)
20	X58 18DB/OR	RIGHT REAR SPEAKER(-)
21	X52 18DB/WT	RIGHT REAR SPEAKER(+)
22	-	-



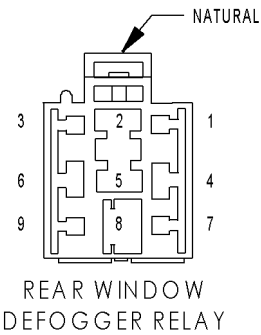
RADIO C2 (BASE) - GRAY 7 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	X55 18BR/RD	LEFT FRONT DOOR SPEAKER (-)
3	X56 18DB/RD	RIGHT FRONT DOOR SPEAKER (-)
4	E17 20YL/BK	PARK LAMP RELAY OUTPUT
5	E2 20OR	PANEL LAMPS DRIVER
6	X12 20RD	FUSED IGNITION SWITCH OUTPUT (RUN-ACC)
7	M1 20PK	FUSED B(+)



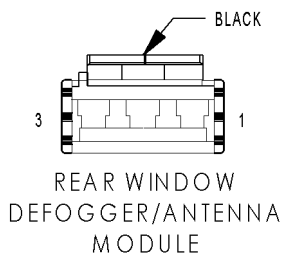
RADIO C2 (EXCEPT BASE) - 10 WAY

CAV	CIRCUIT	FUNCTION
1	X40 24GY/WT	AUDIO OUT RIGHT
2	Z140 24BK/OR	GROUND
3	-	-
4	D25 24VT/YL	PCI BUS (RADIO)
5	X112 24RD	FUSED IGNITION SWITCH OUTPUT
6	X41 24DG/WT	AUDIO OUT LEFT
7	Z141 22BK/TN	GROUND
8	-	-
9	E14 24OR/TN	PANEL LAMPS DIMMER SIGNAL
10	X160 22GY/YL	B(+)



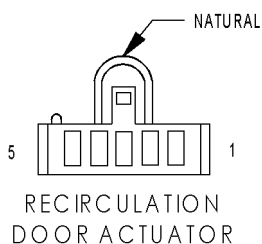
REAR WINDOW DEFOGGER RELAY - NATURAL 9 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	C15 10BK/WT	REAR WINDOW DEFOGGER RELAY OUTPUT
3	-	-
4	A4 10BK/PK	FUSED B(+)
5	-	-
6	C80 20DB/WT	REAR WINDOW DEFOGGER RELAY CONTROL
7	-	-
8	A4 10BK/PK	FUSED B(+)
9	-	-



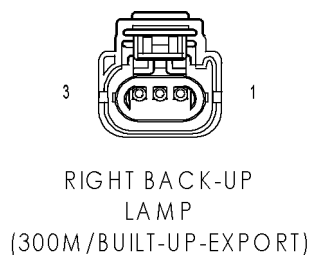
REAR WINDOW DEFOGGER/ANTENNA MODULE - BLACK 3 WAY

CAV	CIRCUIT	FUNCTION
1	X60 20DG/RD	RADIO 12V OUTPUT
2	C15 10BK/WT	REAR WINDOW DEFOGGER RELAY OUTPUT
3	-	-



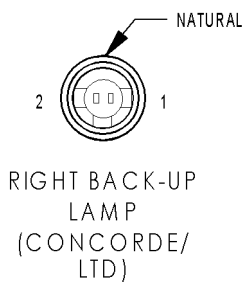
RECIRCULATION DOOR ACTUATOR - NATURAL 5 WAY

CAV	CIRCUIT	FUNCTION
1	C32 20GY/DB	RECIRCULATION DOOR DRIVER
2	-	-
3	-	-
4	-	-
5	C34 20BR/WT	COMMON DOOR DRIVER



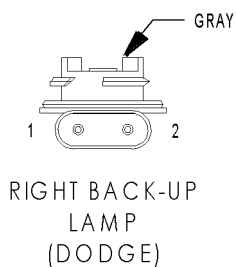
RIGHT BACK-UP LAMP (300M/BUILT-UP-EXPORT) - NATURAL 3 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK (300M)	GROUND
1	L1 18VT/BK (BUILT-UP-EXPORT)	BACK-UP LAMP FEED
2	-	-
3	L1 18VT/BK (300M)	BACK-UP LAMP FEED
3	Z1 18BK (BUILT-UP-EXPORT)	GROUND



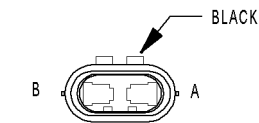
RIGHT BACK-UP LAMP (CONCORDE/LTD) - NATURAL 2 WAY

CAV	CIRCUIT	FUNCTION
1	L1 18VT/BK	BACK-UP LAMP FEED
2	Z1 18BK	GROUND



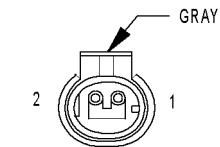
RIGHT BACK-UP LAMP (DODGE) - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L1 18VT/BK	BACK-UP LAMP FEED



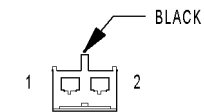
RIGHT FOG
LAMP
(CONCORDE/LTD)

RIGHT FOG LAMP (CONCORDE/LTD) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
A	L39 20LB	FOG LAMP RELAY OUTPUT
B	Z1 20BK	GROUND



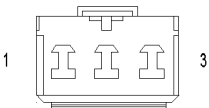
RIGHT FOG
LAMP
(DODGE/300M/
BUILT-UP-EXPORT)

RIGHT FOG LAMP (DODGE/300M/BUILT-UP-EXPORT) - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L39 20LB	FOG LAMP SWITCH OUTPUT
2	Z1 20BK	GROUND



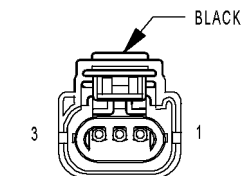
RIGHT FRONT
DOOR SAIL
SPEAKER

RIGHT FRONT DOOR SAIL SPEAKER - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X86 180R/RD	AMPLIFIED RIGHT DOOR SAIL SPEAKER (+)
2	X84 180R/BK	AMPLIFIED RIGHT DOOR SAIL SPEAKER (-)



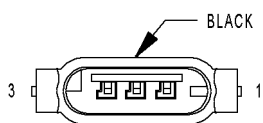
RIGHT FRONT
DOOR SPEAKER

RIGHT FRONT DOOR SPEAKER - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	X82 18LB/RD (NORMAL BUILD)	AMPLIFIED RIGHT DOOR SPEAKER (+)
2	X82 18LB/RD (EARLY BUILD)	AMPLIFIED RIGHT DOOR SPEAKER (+)
3	X80 18LB/BK	AMPLIFIED RIGHT DOOR SPEAKER (-)



RIGHT FRONT PARK/
TURN SIGNAL LAMP
(DODGE)

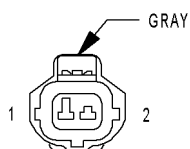
RIGHT FRONT PARK/TURN SIGNAL LAMP (DODGE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	L60 18TN	RIGHT TURN SIGNAL



RIGHT FRONT
PARK/TURN
SIGNAL LAMP
(EXCEPT DODGE)

RIGHT FRONT PARK/TURN SIGNAL LAMP (EXCEPT DODGE) - BLACK 3 WAY

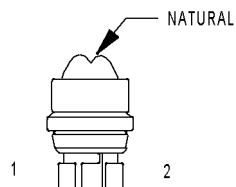
CAV	CIRCUIT	FUNCTION
1	L60 18TN	RIGHT TURN SIGNAL
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



RIGHT FRONT
POSITION LAMP

RIGHT FRONT POSITION LAMP - GRAY 2 WAY

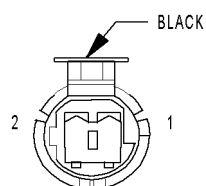
CAV	CIRCUIT	FUNCTION
1	L7 20BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 20BK	GROUND



RIGHT FRONT SIDE
MARKER LAMP
(CONCORDE/LTD)

RIGHT FRONT SIDE MARKER LAMP (CONCORDE/LTD) - NATURAL 2 WAY

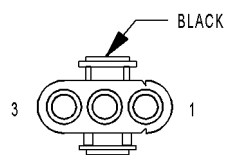
CAV	CIRCUIT	FUNCTION
1	L7 20BK/YL	PARK LAMP RELAY OUTPUT
2	L60 20TN	RIGHT TURN SIGNAL



RIGHT FRONT
WHEEL SPEED
SENSOR

RIGHT FRONT WHEEL SPEED SENSOR - BLACK 2 WAY

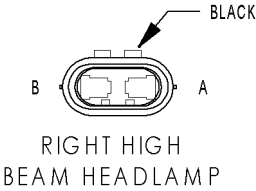
CAV	CIRCUIT	FUNCTION
1	B7 18WT	RIGHT FRONT WHEEL SPEED SENSOR (+)
2	B6 18WT/DB	RIGHT FRONT WHEEL SPEED SENSOR (-)



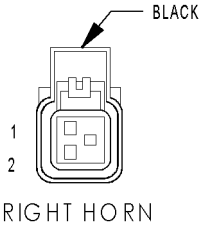
RIGHT HEADLAMP
LEVELING MOTOR
(BUILT-UP-EXPORT)

RIGHT HEADLAMP LEVELING MOTOR (BUILT-UP-EXPORT) - BLACK 3 WAY

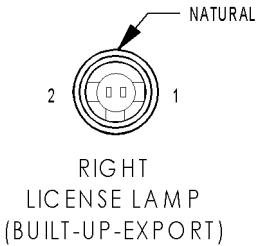
CAV	CIRCUIT	FUNCTION
1	L7 20BK/YL	PARK LAMP RELAY OUTPUT
2	L13 20BR/YL	HEADLAMP ADJUST SIGNAL
3	Z1 20BK	GROUND



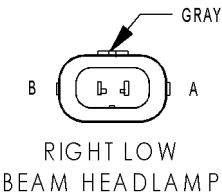
RIGHT HIGH BEAM HEADLAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
A	L34 20RD/OR (EXCEPT POLICE PACKAGE/EXCEPT BUILT-UP-EXPORT)	FUSED RIGHT HIGH BEAM OUTPUT
A	L34 20RD (BUILT-UP-EXPORT)	FUSED RIGHT HIGH BEAM OUTPUT
A	L34 20OR/WT (POLICE PACKAGE)	FUSED RIGHT HIGH BEAM OUTPUT
B	Z1 20BK	GROUND



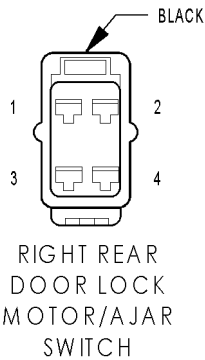
RIGHT HORN - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	X2 18DG/RD	HORN RELAY OUTPUT



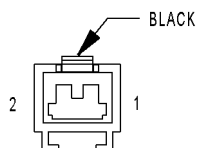
RIGHT LICENSE LAMP (BUILT-UP-EXPORT) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 18BK	GROUND



RIGHT LOW BEAM HEADLAMP - GRAY 2 WAY		
CAV	CIRCUIT	FUNCTION
A	L44 16VT/RD (BUILT-UP-EXPORT)	FUSED RIGHT LOW BEAM OUTPUT
A	L44 20VT (EXCEPT BUILT-UP-EXPORT)	FUSED RIGHT LOW BEAM OUTPUT
B	Z1 16BK (EXCEPT BUILT-UP-EXPORT)	GROUND
B	Z1 20BK (BUILT-UP-EXPORT)	GROUND



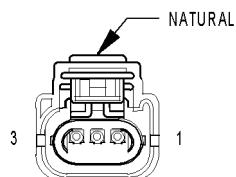
RIGHT REAR DOOR LOCK MOTOR/AJAR SWITCH - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	G74 20TN/RD	DOOR AJAR SWITCH SENSE
2	Z1 20BK	GROUND
3	P34 16PK/BK	UNLOCK RELAY OUTPUT
4	P33 16OR	LOCK RELAY OUTPUT



RIGHT REAR
DOOR SPEAKER

RIGHT REAR DOOR SPEAKER - BLACK 2 WAY

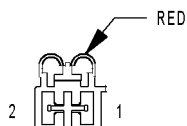
CAV	CIRCUIT	FUNCTION
1	X96 18TN/DG	AMPLIFIED LOW RIGHT REAR SPEAKER (-)
2	X98 18TN/VT	AMPLIFIED LOW RIGHT REAR SPEAKER (+)



RIGHT REAR
FOG LAMP
(BUILT-UP-EXPORT)

RIGHT REAR FOG LAMP (BUILT-UP-EXPORT) - NATURAL 3 WAY

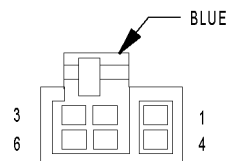
CAV	CIRCUIT	FUNCTION
1	L95 18DG/YL	REAR FOG LAMP RELAY OUTPUT
2	-	-
3	Z1 18BK	GROUND



RIGHT REAR
POWER WINDOW
MOTOR

RIGHT REAR POWER WINDOW MOTOR - RED 2 WAY

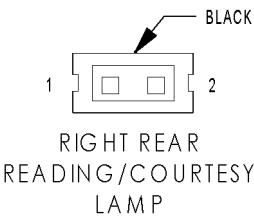
CAV	CIRCUIT	FUNCTION
1	Q24 16DG	WINDOW RIGHT REAR B (+) DOWN
2	Q14 16GY	WINDOW RIGHT REAR B (+) UP



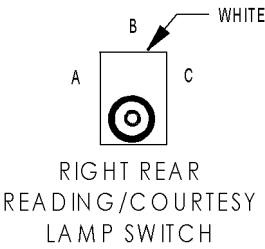
RIGHT REAR
POWER WINDOW
SWITCH

RIGHT REAR POWER WINDOW SWITCH - BLUE 6 WAY

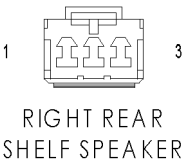
CAV	CIRCUIT	FUNCTION
1	Q24 16DG	WINDOW RIGHT REAR B (+) DOWN
2	Q18 14GY/BK	RIGHT REAR WINDOW DRIVER (UP)
3	-	-
4	Q28 14DG/WT	RIGHT REAR WINDOW DRIVER DOWN
5	Q14 16GY	WINDOW RIGHT REAR B(+) UP
6	Q1 14YL	WINDOW SWITCH FEED



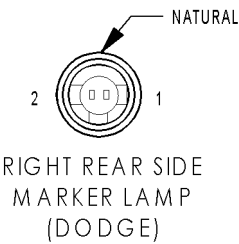
RIGHT REAR READING/COURTESY LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	M42 20LG (EXCEPT BASE)	COURTESY LAMPS DRIVER



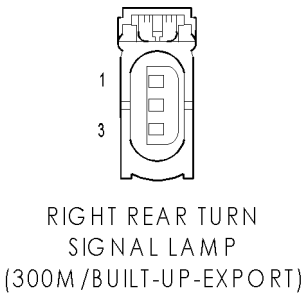
RIGHT REAR READING/COURTESY LAMP SWITCH - WHITE 3 WAY		
CAV	CIRCUIT	FUNCTION
A	Z1 20BK	COURTESY LAMPS DRIVER
B	M42 20LG	COURTESY LAMPS DRIVER
C	M2 20YL	GROUND



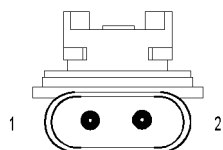
RIGHT REAR SHELF SPEAKER - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	X92 18TN/BK (MIDLINE AND PREMIUM AUDIO)	AMPLIFIED HIGH RIGHT REAR SPEAKER (-)
1	X58 18DB/OR (BASE)	RIGHT REAR SPEAKER (-)
2	X94 18TN/RD (MIDLINE AND PREMIUM AUDIO EARLY BUILD)	AMPLIFIED HIGH RIGHT REAR SPEAKER (+)
2	X52 18DB/WT (BASE EARLY BUILD)	RIGHT REAR SPEAKER (+)
3	X52 18DB/WT (BASE NORMAL BUILD)	RIGHT REAR SPEAKER (+)
3	X94 18TN/RD (MIDLINE AND PREMIUM AUDIO NORMAL BUILD)	AMPLIFIED HIGH RIGHT REAR SPEAKER (+)



RIGHT REAR SIDE MARKER LAMP (DODGE) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT

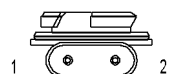


RIGHT REAR TURN SIGNAL LAMP (300M/BUILT-UP-EXPORT) - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L60 18LG/TN	RIGHT TURN SIGNAL
2	-	-
3	Z1 18BK	GROUND



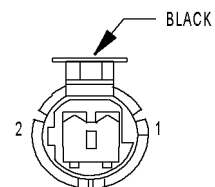
RIGHT REAR TURN
SIGNAL LAMP
(DODGE)

RIGHT REAR TURN SIGNAL LAMP (DODGE) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L60 18LG/TN	RIGHT TURN SIGNAL
2	Z1 18BK	GROUND



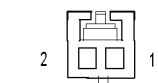
RIGHT REAR
TURN SIGNAL
LAMP
(LTD)

RIGHT REAR TURN SIGNAL LAMP (LTD) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L60 18LG/TN	RIGHT TURN SIGNAL
2	Z1 18BK	GROUND



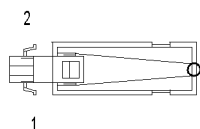
RIGHT REAR
WHEEL SPEED
SENSOR

RIGHT REAR WHEEL SPEED SENSOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	B2 18YL	RIGHT REAR WHEEL SPEED SENSOR(+)
2	B1 18YL/DB	RIGHT REAR WHEEL SPEED SENSOR(-)



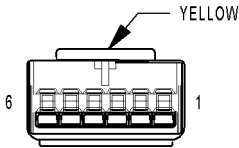
RIGHT REMOTE
RADIO
SWITCH

RIGHT REMOTE RADIO SWITCH - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	X20 22GY/WT	RADIO CONTROL MUX
2	X920 22GY/OR	RADIO CONTROL MUX RETURN



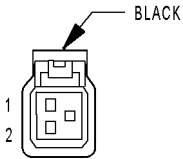
RIGHT
SEAT
AIRBAG

RIGHT SEAT AIRBAG - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	R32 20LB/OR	RIGHT SEAT SQUIB LINE 1
2	R34 20LB/WT	RIGHT SEAT SQUIB LINE 2



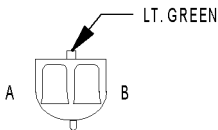
RIGHT SIDE
IMPACT AIRBAG
CONTROL
MODULE

RIGHT SIDE IMPACT AIRBAG CONTROL MODULE - YELLOW 6 WAY		
CAV	CIRCUIT	FUNCTION
1	F14 20LG/YL	FUSED IGNITION SWITCH OUTPUT (RUN-START)
2	D25 20VT/YL	PCI BUS
3	R32 20LB/OR	RIGHT SEAT SQUIB LINE 1
4	R34 20LB/WT	RIGHT SEAT SQUIB LINE 2
5	-	-
6	Z2 20BK/LG	GROUND



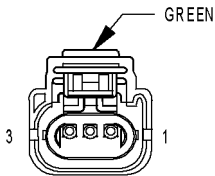
RIGHT SIDE
REPEATER LAMP
(BUILT-UP-EXPORT)

RIGHT SIDE REPEATER LAMP (BUILT-UP-EXPORT) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	L60 20TN	RIGHT TURN SIGNAL
2	Z1 20BK	GROUND



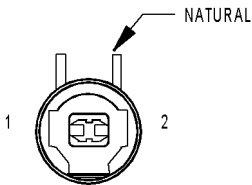
RIGHT SPEED
CONTROL SWITCH

RIGHT SPEED CONTROL SWITCH - LT. GREEN 2 WAY		
CAV	CIRCUIT	FUNCTION
A	V37 22RD/LG	SPEED CONTROL SWITCH SIGNAL
B	K4 22BK/LB	SENSOR GROUND



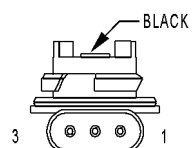
RIGHT TAIL LAMP
(300M/BUILT-UP-EXPORT)

RIGHT TAIL LAMP (300M/BUILT-UP-EXPORT) - GREEN 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L7 18BK/YL	PARK LAMP RELAY OUTPUT
2	Z1 18BK	GROUND
3	-	-



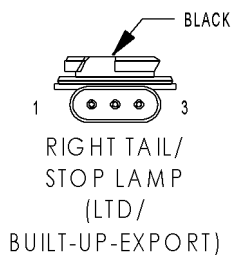
RIGHT TAIL LAMP
(LTD)

RIGHT TAIL LAMP (LTD) - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT



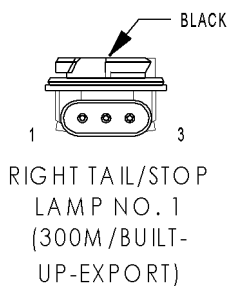
RIGHT TAIL/
STOP LAMP
(CONCORDE)

RIGHT TAIL/STOP LAMP (CONCORDE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



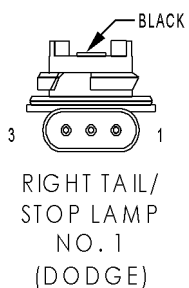
RIGHT TAIL/
STOP LAMP
(LTD/
BUILT-UP-EXPORT)

RIGHT TAIL/STOP LAMP (LTD/BUILT-UP-EXPORT)) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



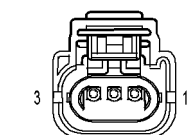
RIGHT TAIL/STOP
LAMP NO. 1
(300M/BUILT-
UP-EXPORT)

RIGHT TAIL/STOP LAMP NO. 1 (300M/BUILT-UP-EXPORT) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



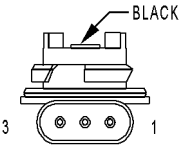
RIGHT TAIL/
STOP LAMP
NO. 1
(DODGE)

RIGHT TAIL/STOP LAMP NO. 1 (DODGE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 18BK	GROUND
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT



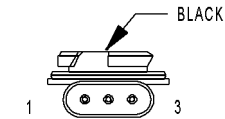
RIGHT TAIL/STOP
LAMP NO. 2
(300M)

RIGHT TAIL/STOP LAMP NO. 2 (300M) - 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



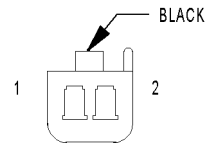
RIGHT TAIL/
STOP LAMP
NO. 2
(DODGE)

RIGHT TAIL/STOP LAMP NO. 2 (DODGE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L50 18WT/TN	BRAKE LAMP SWITCH OUTPUT
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



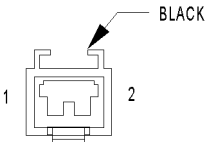
RIGHT TAIL/TURN
SIGNAL LAMP
(CONCORDE)

RIGHT TAIL/TURN SIGNAL LAMP (CONCORDE) - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	L60 18LG/TN	RIGHT TURN SIGNAL
2	L7 18BK/YL	PARK LAMP RELAY OUTPUT
3	Z1 18BK	GROUND



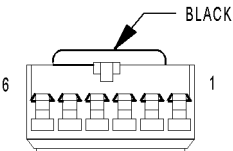
RIGHT
VISOR/VANITY
LAMP

RIGHT VISOR/VANITY LAMP - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	Z1 20BK	GROUND



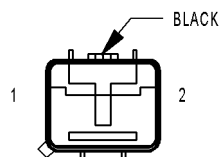
SEAT BELT
SWITCH

SEAT BELT SWITCH - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	G10 20LG/RD	SEAT BELT SWITCH SENSE
2	Z2 20BK/LG	GROUND



SENTRY KEY
IMMOBILIZER
MODULE

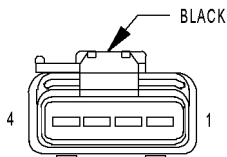
SENTRY KEY IMMOBILIZER MODULE - BLACK 6 WAY		
CAV	CIRCUIT	FUNCTION
1	-	-
2	D25 20VT/YL	PCI BUS
3	-	-
4	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
5	Z2 20BK/LG	GROUND
6	M1 20PK	FUSED B(+)



SHORT RUNNER
VALVE SOLENOID
(3.5L
HIGH OUTPUT)

SHORT RUNNER VALVE SOLENOID (3.5L HIGH OUTPUT) - BLACK 2 WAY

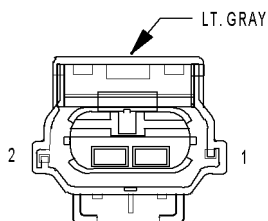
CAV	CIRCUIT	FUNCTION
1	F42 18DG/LG	AUTOMATIC SHUT DOWN RELAY OUTPUT
2	K236 18GY/PK	SHORT RUNNER VALVE SOLENOID CONTROL



SPEED
CONTROL SERVO

SPEED CONTROL SERVO - BLACK 4 WAY

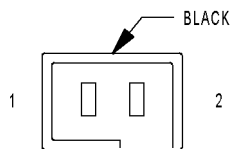
CAV	CIRCUIT	FUNCTION
1	V36 18TN/RD	SPEED CONTROL VACUUM SOLENOID CONTROL
2	V35 20LG/RD	SPEED CONTROL VENT SOLENOID CONTROL
3	V30 20DB/RD	SPEED CONTROL BRAKE SWITCH OUTPUT
4	Z1 20BK	GROUND



SPEED
PROPORTIONAL
STEERING SOLENOID

SPEED PROPORTIONAL STEERING SOLENOID - LT. GRAY 2 WAY

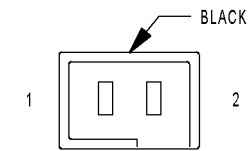
CAV	CIRCUIT	FUNCTION
1	S76 18LG/PK	SPEED PROPORTIONAL STEERING SOLENOID (-)
2	S77 18VT/OR	SPEED PROPORTIONAL STEERING SOLENOID (+)



SPOT
LAMP
NO. 1
(POLICE PACKAGE)

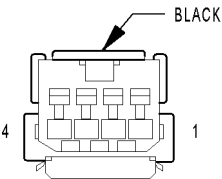
SPOT LAMP NO. 1 (POLICE PACKAGE) - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	SL1 18WT	FUSED B(+)
2	-	-



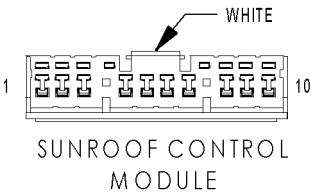
SPOT
LAMP
NO. 2
(POLICE PACKAGE)

SPOT LAMP NO. 2 (POLICE PACKAGE) - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	SL2 18WT/DB	FUSED B(+)
2	-	-



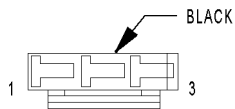
SUN SENSOR/
VTSS LED

SUN SENSOR/VTSS LED - BLACK 4 WAY		
CAV	CIRCUIT	FUNCTION
1	M1 20PK	FUSED B(+)
2	G69 22BK/OR	VTSS INDICATOR DRIVER
3	C57 20DB/GY	SENSOR GROUND
4	C38 20DB	SUN SENSOR SIGNAL



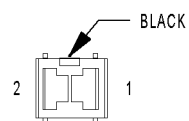
SUNROOF CONTROL
MODULE

SUNROOF CONTROL MODULE - WHITE 10 WAY		
CAV	CIRCUIT	FUNCTION
1	Q6 16DB	SUNROOF MOTOR B(-)
2	Q5 16DG	SUNROOF MOTOR B(+)
3	G5 20DB/WT	FUSED IGNITION SWITCH OUTPUT (RUN-START)
4	A37 16RD	FUSED B(+)
5	Z1 16BK	GROUND
6	Q42 20LB	SUNROOF CLOSE
7	Q41 20WT	SUNROOF OPEN
8	Q42 20LB	SUNROOF CLOSE
9	Q43 20VT	SUNROOF VENT
10	Q46 20OR	SUNROOF LIMIT SWITCH

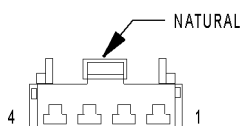


SUNROOF LIMIT
SWITCH

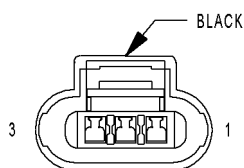
SUNROOF LIMIT SWITCH - BLACK 3 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	Q46 20OR	SUNROOF LIMIT SWITCH
3	-	-



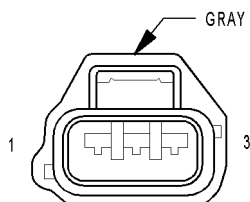
SUNROOF
MOTOR



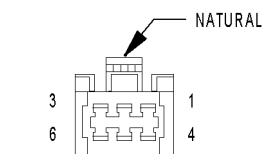
SUNROOF
SWITCH



THROTTLE POSITION
SENSOR
(2.7L)



THROTTLE POSITION
SENSOR
(3.5L)



TRACTION
CONTROL SWITCH

SUNROOF MOTOR - BLACK 2 WAY

CAV	CIRCUIT	FUNCTION
1	Q6 16DB	SUNROOF MOTOR B(-)
2	Q5 16DG	SUNROOF MOTOR B(+)

SUNROOF SWITCH - NATURAL 4 WAY

CAV	CIRCUIT	FUNCTION
1	Q41 20WT	SUNROOF OPEN
2	Q42 20LB	SUNROOF CLOSE
3	Z1 20BK	GROUND
4	Q43 20VT	SUNROOF VENT

THROTTLE POSITION SENSOR (2.7L) - BLACK 3 WAY

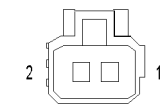
CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND

THROTTLE POSITION SENSOR (3.5L) - GRAY 3 WAY

CAV	CIRCUIT	FUNCTION
1	K6 20VT/WT	5V SUPPLY
2	K22 OR/DB	THROTTLE POSITION SENSOR SIGNAL
3	K4 20BK/LB	SENSOR GROUND

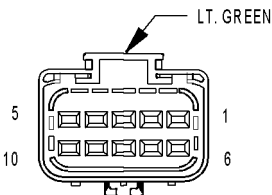
TRACTION CONTROL SWITCH - NATURAL 6 WAY

CAV	CIRCUIT	FUNCTION
1	-	-
2	Z2 22BK/LG	GROUND
3	B27 20RD/YL	TRACTION CONTROL SWITCH SENSE
4	-	-
5	E2 20OR	PANEL LAMPS DRIVER
6	-	-



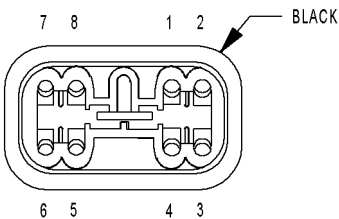
TRANSMISSION
RANGE
INDICATOR
ILLUMINATION
(PRNDL)

TRANSMISSION RANGE INDICATOR ILLUMINATION (PRNDL) - 2 WAY		
CAV	CIRCUIT	FUNCTION
1	E2 20OR	PANEL LAMPS FEED
2	Z1 20BK	GROUND



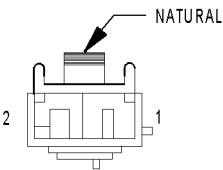
TRANSMISSION
RANGE SENSOR

TRANSMISSION RANGE SENSOR - LT. GREEN 10 WAY		
CAV	CIRCUIT	FUNCTION
1	F20 20WT	FUSED IGNITION SWITCH OUTPUT (RUN)
2	-	-
3	T13 20DB/BK	SPEED SENSOR GROUND
4	T54 20VT/PK	TRANSMISSION TEMPERATURE SENSOR SIGNAL
5	-	-
6	L1 20VT/BK	BACK-UP LAMP FEED
7	T1 20LG/BK	TRS T1 SENSE
8	T3 20VT	TRS T3 SENSE
9	T42 20VT/WT	TRS T42 SENSE
10	T41 20BR/YL	TRS T41 SENSE



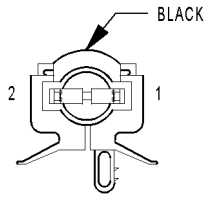
TRANSMISSION
SOLENOID/PRESSURE
SWITCH ASSEMBLY

TRANSMISSION SOLENOID/PRESSURE SWITCH ASSEMBLY - BLACK 8 WAY		
CAV	CIRCUIT	FUNCTION
1	T9 16OR/BK	OVERDRIVE PRESSURE SWITCH SENSE
2	T50 16DG	LOW/REVERSE PRESSURE SWITCH SENSE
3	T47 16YL/BK	2-4 PRESSURE SWITCH SENSE
4	T16 16RD	TRANSMISSION CONTROL RELAY OUTPUT
5	T19 16WT	2-4 SOLENOID CONTROL
6	T20 16LB	LOW/REVERSE SOLENOID CONTROL
7	T60 16BR	OVERDRIVE SOLENOID CONTROL
8	T59 16PK	UNDERDRIVE SOLENOID CONTROL



TRUNK
KNOCK OUT
SWITCH

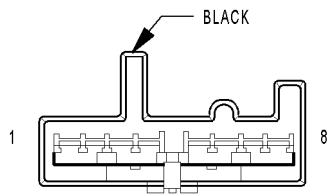
TRUNK KNOCK OUT SWITCH - NATURAL 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	G71 20VT/YL	DECKLID SECURITY SWITCH SENSE



TRUNK LAMP

TRUNK LAMP - BLACK 2 WAY

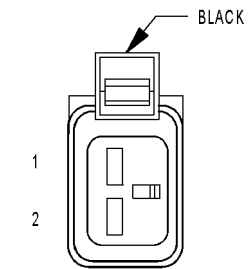
CAV	CIRCUIT	FUNCTION
1	G78 20TN/BK	DECKLID AJAR SWITCH SENSE
2	M1 20PK	FUSED B(+)



TURN SIGNAL/
HAZARD SWITCH

TURN SIGNAL/HAZARD SWITCH - BLACK 8 WAY

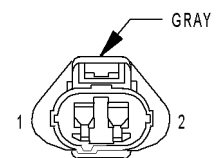
CAV	CIRCUIT	FUNCTION
1	-	-
2	-	-
3	-	-
4	Z1 20BK	GROUND
5	L91 22DB/PK	COMBINATION FLASHER SWITCHED GROUND
6	L61 18LG	LEFT TURN SIGNAL
7	L32 18RD	COMBINATION FLASHER OUTPUT
8	L60 18TN	RIGHT TURN SIGNAL



UNDERHOOD
LAMP
(POLICE PACKAGE)

UNDERHOOD LAMP (POLICE PACKAGE) - BLACK 2 WAY

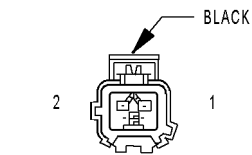
CAV	CIRCUIT	FUNCTION
1	SL2 18DB/WT	No Function Defined
2	Z1 18BK	GROUND



WASHER FLUID
LEVEL SENSOR

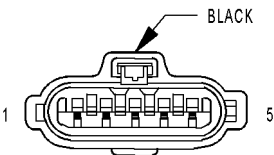
WASHER FLUID LEVEL SENSOR - GRAY 2 WAY

CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	G29 20BK/TN	WASHER FLUID LEVEL SWITCH SENSE



WINDSHIELD WASHER
PUMP MOTOR

WINDSHIELD WASHER PUMP MOTOR - BLACK 2 WAY		
CAV	CIRCUIT	FUNCTION
1	Z1 20BK	GROUND
2	V10 20BR	FRONT WASHER PUMP MOTOR CONTROL



WINDSHIELD
WIPER MOTOR

WINDSHIELD WIPER MOTOR - BLACK 5 WAY		
CAV	CIRCUIT	FUNCTION
1	V4 14RD/YL	FRONT WIPER RELAY HIGH SPEED OUTPUT
2	V3 14BR/WT	FRONT WIPER RELAY LOW SPEED OUTPUT
3	-	-
4	V55 20TN/RD	FRONT WIPER PARK SWITCH SENSE
5	Z1 14BK	COURTESY LAMPS DRIVER

8W-91 CONNECTOR/GROUND/SPLICE LOCATION

TABLE OF CONTENTS

page

CONNECTOR/GROUND/SPLICE LOCATION

DESCRIPTION 1

**CONNECTOR/GROUND/SPLICE
LOCATION**

Use the wiring diagrams in each section for connector, ground, and splice identification. Refer to the index for the proper figure number. For items that are not shown in this section N/S is placed in the Fig. column.

DESCRIPTION

This section provides illustrations identifying connector, ground, and splice locations in the vehicle. Connector, ground, and splice indexes are provided.

CONNECTORS

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
A/C Compressor Clutch	BK	Top of Compressor	5, 6
A/C Compressor Clutch Relay		In the Power Distribution Center	N/S
A/C Pressure Transducer	GY	Right Front Engine Compartment	1, 2
Accessory No. 1 (Police)		Behind center of front bumper	3
Accessory No. 2 (Police)		Behind Park Brake Lever	12
Airbag Control Module (OCR)	YL	Lower Center of Instrument Panel	9
Ambient Temperature Sensor	BK	Front Grille Area	1
Analog Clock	NAT	At Clock	N/S
Automatic Day/Night Mirror	BK	At Mirror	N/S
Auto Shut Down Relay		In the Power Distribution Center	N/S
Automatic Temperature Control Head	BK	Center of I/P	9
Autostick Switch	NAT	Center Console	13
Auxiliary Lighting	LG	At Left C Pillar, Behind Shoulder Belt Anchor	21
Blend Door Actuator	NAT	Right Side of HVAC	N/S
Blower Motor Power Module	BK	Right Side of HVAC	N/S
Blower Motor Resistor Block	BK	Right Side of HVAC	N/S
Body Control Module C1	GY	Left Side of I/P	8
Body Control Module C2	BK	Left Side of I/P	8
Body Control Module C3	NAT	Left Side of I/P	N/S
Body Control Module C4	BL	Left Side of I/P	N/S
Brake Fluid Level Switch	BK	At Master Cylinder	4
Brake Lamp Switch	GY	Top of Brake Pedal	N/S
Brake Transmission Shift Interlock Solenoid	WT	At Steering Column	8
C101	BK	Left Front of Engine	5, 6, 7

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
C103	GN	Left Side Instrument Panel	8, 15
C104	OR	Left Side Instrument Panel	8, 15
C105	YL	Left Side Instrument Panel	15
C106	NAT	Left Side Instrument Panel	15
C107	LTGY	Rear of Engine	7
C108	LTGY	Rear of Engine	7
C109	BK	Under Left Front Headlamp	3
C111	GY	Near Left Headlamp	3
C112	GY	Near Left Headlamp	2
C115 (3.5L)	BK	Radiator Connection	N/S
C120	BK	Between JB-C3 and Splice S232	N/S
C200	BL	Left Side Instrument Panel	8, 15
C201	NAT	Right Side Instrument Panel	9, 13
C202	NAT	Lower Center of Instrument Panel	9
C203	NAT	Lower Center of Instrument Panel	9
C204	NAT	At Headliner	N/S
C205	NAT	Near Cigar Lighter	9
C206	NAT	Left Side of Instrument Panel	N/S
C300	NAT	Left Cowl	15
C301	NAT	Left Cowl	15
C302	NAT	Right Cowl	13, 17
C303	NAT	Right Cowl	13, 17
C304	NAT	Left B Pillar	15, 16
C305	NAT	Right B Pillar	13, 16
C306 Side Airbag	YL	Under Passenger Seat	13
C306 Except Side Airbag	BK	Under Passenger Seat	13
C307 Side Airbag	YL	Under Driver Seat	15
C307 Except Side Airbag	BK	Under Driver Seat	15
C308	BK	Under Rear Seat	13
C309	YL	Under Driver Seat	16
C310	YL	Under Passenger Seat	16
C311	RD	Left Trunk Area	22
C312	BK	Left Trunk Area	24
C313 (Dodge, 300M)	GY	Right Trunk Area	24
C313 (LTD, Concorde, BUX)	GY	Right Trunk Area	24
C314	GY	Left Trunk Area	24
C315	BK	Left Trunk Area	24
C316	NAT	Left B Pillar	15, 16
C317	NAT	Right B Pillar	13, 16

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
C318	NAT	Under Passenger Seat	13
C319	NAT	Under Drivers Seat	15
C320	NAT	Left Side Shelf Panel	20, 22
C321 (300M)		Deck Lid	22
C322	BK	Left B Pillar	16
C325	LG	At Left C Pillar, Behind Sholder Belt Ancor	21
C360	BK	At bottom of I/P Center Stack	12
Camshaft Position Sensor	BK	Front of Engine	5, 6
Center High Mounted Stop Lamp	BK	At Lamp	N/S
Center Instrument Panel Speaker	BK	At Speaker	9
Cigar Lighter	NAT	Lower Center of Instrument Panel	9
Clockspring No. 1	NAT	Rear of Clockspring	8
Clockspring No. 2	YL	Rear of Clockspring	8
Clockspring No. 3		At Steering Wheel	N/S
Coil On Plug No. 1	BK	At Plug	5, 6
Coil On Plug No. 2	BK	At Plug	5, 6
Coil On Plug No. 3	BK	At Plug	5, 6
Coil On Plug No. 4	BK	At Plug	5, 6
Coil On Plug No. 5	BK	At Plug	5, 6
Coil On Plug No. 6	BK	At Plug	5, 6
Combination Flasher	BK	Left Side Instrument Panel	8, 15
Compact Disc Changer	BK	At Rear of CD Changer	N/S
Controller Anti-Lock Brake	BK	Left Fender Side Shield	3
Crankshaft Position Sensor	BK	Rear of Cyl Block	5, 6
Data Link Connector	BK	LT Side of Steering Column	8, 12
Daytime Running Lamp Module		In Junction Block	N/S
Decklid Release Solenoid/Ajar Switch	BK	At Decklid Latch	22
Decklid Release Switch	BK	Left Side of I/P	8
Door Lock Relay		In Junction Block	N/S
Door Unlock Relay		In Junction Block	N/S
Driver Airbag Squib	YL	At Steering Wheel	N/S
Driver Door Courtesy Lamp	BK	Left Front Door	18
Driver Door Cylinder Lock Switch	GY	Left Front Door	17
Driver Door Lock Motor/Ajar Switch	BK	Left Front Door	17
Driver Door Unlock Relay		In Junction Block	N/S
Driver Heated Seat Back	GN	At Driver Seat	N/S
Driver Heated Seat Cushion	BK	At Driver Seat	N/S
Driver Heated Seat Switch	RD	At Driver Seat	N/S
Driver Power Door Lock Switch	NAT	Left Front Door	18
Driver Power Mirror	NAT	Driver Door	17
Driver Power Mirror (Memory)	WT	Driver Door	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Driver Power Seat Front Riser Motor	RD	At Driver Seat	N/S
Driver Power Seat Front Riser Sensor		At Driver Seat	N/S
Driver Power Seat Horizontal Motor	BK	At Driver Seat	N/S
Driver Power Seat Horizontal Motor Sensor	BK	At Driver Seat	N/S
Driver Power Seat Rear Riser Motor	RD	At Driver Seat	N/S
Driver Power Seat Rear Riser Motor Sensor		At Driver Seat	N/S
Driver Power Seat Recliner Motor	GN	At Driver Seat	N/S
Driver Power Seat Recliner Motor Sensor	BK	At Driver Seat	N/S
Driver Power Seat Switch	BL	At Driver Seat	N/S
Driver Power Window Motor	RD	Left Front Door	N/S
Driver Power Window Switch	BL	Driver Door	18
EGR Solenoid	BK	Rear of Engine	5, 6
Engine Coolant Temp Sensor	BK	Front of Engine	5, 6
Engine Oil Pressure Switch	LTGN	Right Side of Engine	5, 6
Evaporator Temperature Sensor	BK	Lower Right Side of Heater Housing	N/S
EVAP/Purge Solenoid	BK	Right Front of Engine Compartment	3
Fog Lamp Relay		In Junction Block	N/S
Front Washer Pump Motor	BK	Left Fender Side Shield	3
Front Wiper High/Low Relay		In Junction Block	N/S
Front Wiper Motor	BK	At Wiper Motor	4
Front Wiper On/Off Relay		In Junction Block	N/S
Fuel Injector No. 1	BK	At Injector	5, 6
Fuel Injector No. 2	BK	At Injector	5, 6
Fuel Injector No. 3	BK	At Injector	5, 6
Fuel Injector No. 4	BK	At injector	5, 6
Fuel Injecotr No. 5	BK	At Injector	5, 6
Fuel Injector No. 6	BK	At Injector	5, 6
Fuel Pump Module	GY	Center Rear of Trunk Area	N/S
Fuel Pump Relay		In the Power Distribution Center	N/S
Generator	BK	Rear of Generator	5, 6
Generator Output		Rear of Generator	7
Glove Box Lamp	BK	At Lamp	9
Headlamp Flasher		Behind Park Brake Lever	12
Headlamp Flasher Cap		Behind Park Brake Lever	12
Headlamp Switch	BL	At Switch	8
Headlamp Washer Pump Motor	BK	Near Left Headlamp	N/S
Headlamp Washer Relay (BUX)		In the Power Distribution Center	N/S
Heated Mirror Fuse	BK	At Rear Window Defogger Relay	24

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
High Beam Headlamp Relay		In Junction Block	N/S
High Speed Radiator Fan Relay		In Power Distribution Center	N/S
Horn Relay		In Junction Block	N/S
Idle Air Control Motor	BK	On Throttle Body	5, 6
Ignition Switch	BK	At Switch	8
Input Speed Sensor	GY	Left Side of Transmission	7
Instrument Cluster C1	GN	Rear of Cluster	8
Instrument Cluster C2	BL	Rear of Cluster	8
Intake Air Temp Sensor (2.7L)	GY	In Intake Hose Before Throttle Body	N/S
Intake Air Temp Sensor (3.5L)	GY	In Intake Hose Before Throttle Body	N/S
ISO Relay No. 1 (Police)		On Rear Fuse Block, Right side of trunk	23
ISO Relay No. 2 (Police)		On Rear Fuse Block, Right side of trunk	23
Junction Block C1	BK	Left Side of I/P	8
Junction Block C2	GY	Left Side of I/P	8
Junction Block C3	BL	Left Side of I/P	8
Junction Block C4	GN	Left Side of I/P	8
Junction Block C5	NAT	Left Side of I/P	8
Junction Block C6	BR	Left Side of I/P	15
Junction Block C7	NAT	Left Side of I/P	15
Junction Block C8	GN	Left Side of I/P	15
Junction Block C9	OR	Left Side of I/P	15
Junction Block C10	GY	Left Side of I/P	15
Junction Block C11	NAT	Left Side of I/P	N/S
Knock Sensor (2.7L)	GY	Under Intake Manifold	N/S
Knock Sensor (3.5L)	BK	Under Intake Manifold	N/S
Leak Detection Pump	BK	Center of Trunk Area	N/S
Left Back-Up Lamp (Dodge)		At Lamp	N/S
Left Back-Up Lamp (300M, BUX)		At Lamp	N/S
Left Back-Up Lamp (LTD)		At Lamp	N/S
Left Fog Lamp	GY	At Lamp	3
Left Fog Lamp (LTD)	BK	At Lamp	3
Left Front Door Sail Speaker	BK	At Left Front Door, see Right Front Door Figure	N/S
Left Front Door Speaker	BK	Left Front Door	17, 18
Left Front Park/Turn Signal Lamp (Dodge)	BK	At Lamp	N/S
Left Front Park/Turn Signal Lamp (Except Dodge)	BK	At Lamp	N/S
Left Front Position Lamp	GY	At Left Headlamp	3
Left Front Side Marker Lamp	NAT	At Lamp	N/S
Left Front Wheel Speed Sensor	BK	At Sensor	4
Left Headlamp Leveling Motor	BK	At Left Headlamp	3
Left High Beam Headlamp	BK	At Lamp	3
Left Horn	BK	Left Fender	3

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Left License Lamp		At Lamp	N/S
Left Low Beam Headlamp	GY	At Lamp	3
Left Rear Courtesy Reading Lamp Switch	BK	At Switch	N/S
Left Rear Courtesy Reading Lamp	BK	Near Switch	N/S
Left Rear Door Lock Motor/Ajar Switch	BK	At Left Rear Door	N/S
Left Rear Door Speaker	BK	At Left Rear Door	19
Left Rear Fog Lamp	NAT	At Lamp	N/S
Left Rear Power Window Motor	RD	At Left Rear Door	N/S
Left Rear Power Window Switch	BL	At Left Rear Door	19
Left Rear Shelf Speaker	BK	At Speaker	20
Left Rear Side Marker Lamp		At Lamp	N/S
Left Rear Turn Signal Lamp (300M)	BK	At Lamp	N/S
Left Rear Turn Signal Lamp (Dodge)	BK	At Lamp	N/S
Left Rear Turn Signal Lamp (LTD)	BK	At Lamp	N/S
Left Rear Wheel Speed Sensor	BK	Left Rear Trunk Area	N/S
Left Remote Radio Switch		Steering Wheel	N/S
Left Seat Airbag		At Seat	N/S
Left Side Impact Airbag Control Module	YL	Left B Pillar	16
Left Side Repeater Lamp	BK	Left Fender Side Shield	N/S
Left Speed Control Switch		Steering Wheel	N/S
Left Tail Lamp (300M, BUX)	GN	At Lamp	N/S
Left Tail Lamp (LTD)	NAT	At Lamp	N/S
Left Tail / Stop Lamp (Concorde)		At Lamp	N/S
Left Tail / Stop Lamp (LTD/BUX)		At Lamp	N/S
Left Tail / Stop Lamp No.1 (Dodge)		At Lamp	N/S
Left Tail / Stop Lamp No.1 (LTD, 300M,BUX)		At Lamp	N/S
Left Tail / Stop Lamp No.2 (300M)		At Lamp	N/S
Left Tail / Stop Lamp No.2 (Dodge)		At Lamp	N/S
Left Tail / Turn Signal Lamp (Concorde)		At Lamp	N/S
Left Visor/Vanity Lamp		At Lamp	N/S
License Lamp		At Lamp	N/S
Low Beam Headlamp Relay		In Junction Block	N/S
Low Speed Radiator Fan Relay		In PDC	N/S
Manifold Absolute Pressure Sensor	BK	Top Left of Engine	5
Manifold Tuning Valve	BK	Front of Engine	5, 6
Manual Temperature Control Head - C1	NAT	Center of I/P	9

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Manual Temperature Control Head - C2	BK	Center of I/P	9
Memory Heated Seat / Mirror Module C1		Under Driver Seat	N/S
Memory Heated Seat / Mirror Module C2		Under Driver Seat	N/S
Memory Heated Seat / Mirror Module C3		Under Driver Seat	N/S
Memory Heated Seat / Mirror Module C4	GY	Under Driver Seat	N/S
Memory Set Switch		On Driver Seat	N/S
Mode Door Actuator	BK	On HVAC Unit	N/S
Multi-Function Switch	BK	Steering Column	8
Output Speed Sensor	GY	Left Rear of Transmission	7
Overhead Map/Courtesy Lamp		At Lamp	N/S
Overhead Travel Information System	BK	Headliner	N/S
Oxygen Sensor 1/1 Right Bank Up	BK	Right Exhaust manifold	5, 6
Oxygen Sensor 1/2 Right Bank Down	BK	Right Exhaust - Post Convertor	7
Oxygen Sensor 2/1 Left Bank Up	BK	Left Exhaust Manifold	5, 6
Oxygen Sensor 2/2 Left Bank Down	BK	Left Exhaust - Post Convertor	7
Park Brake Switch	BK	At Park Brake Lever	15
Park Lamp Relay		In Junction Block	N/S
Passenger Airbag	YL	Behind I/P Near Glove Box	9
Passenger Cylinder Lock Switch	GY	Passenger Door	17
Passenger Door Lock Motor / Ajar Switch	BK	Passenger Door	17
Passenger Door Courtesy Lamp	BK	Passenger Door	N/S
Passenger Heated Seat Back	GN	At Passenger Seat	N/S
Passenger Heated Seat Cushion	BK	At Passenger Seat	N/S
Passenger Heated Seat Switch		At Passenger Seat	N/S
Passenger Power Door Lock Switch	BK	Passenger Door	18
Passenger Power Mirror	NAT	At Mirror	17
Passenger Power Mirror (Memory)	NAT	Passenger Door	N/S
Passenger Power Seat Front Riser Motor	RD	At Passenger Seat	N/S
Passenger Power Seat Horizontal Motor		At Passenger Seat	N/S
Passenger Power Seat Rear Risor Motor		At Passenger Seat	N/S
Passenger Power Seat Recliner Motor	GN	At Passenger Seat	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Passenger Power Seat Switch	BL	At Seat	N/S
Passenger Power Window Motor	RD	Passenger Door	N/S
Passenger Power Window Switch	BL	Passenger Door	18
Passenger Side Airbag		At Seat	N/S
Power Amplifier C1 (Front)	WT	At Amplifier Right Cowl	13
Power Amplifier C2 (Front)	WT	At Amplifier Right Cowl	13
Power Amplifier C1 (Rear)	WT	Left Side Trunk Area	24
Power Amplifier C2 (Rear)	WT	Left Side Trunk Area	24
Power Mirror Switch	BK	Driver Door	N/S
Power Point (Power Outlet)	RD	Center Instrument Panel	N/S
Powertrain Control Module - C1	BK	Near PDC	4, 5
Powertrain Control Module - C2	GY	Near PDC	4
Powertrain Control Module - C3	WT	Near PDC	4
Powertrain Control Module - C4	GN	Near PDC	4
Radiator Fan Motor	BK	Rear of Motor	3
Radiator Fan Motor No.1 (Except Base 2.7L)	BK	Rear of Motor	N/S
Radiator Fan Motor No.2 (Except Base 2.7L)	BK	Rear of Motor	N/S
Radiator Fan Relay No.1 (Except Base 2.7L)		On Fan Module	N/S
Radiator Fan Relay No.2 (Except Base 2.7L)		On Fan Module	N/S
Radio - C1	WT	Rear of Radio	9
Radio - C2	BK	Rear of Radio	9
Rear Fog Lamp Relay		In Power Distribution Center	N/S
Rear Fuse Block (Police)		In Trunk at Right Side Panel	23
Rear Window Defogger Relay	NAT	In Trunk at Right Side Panel	23, 24
Rear Window Defogger/Antenna Module	BK	Right Side C Pillar	20
Rear Window Defogger Heated Mirror Fuse		Right Rear Trunk	24
Recirculation Door Actuator	NAT	On HVAC Unit	N/S
Remote Keyless Entry Antenna (BUX)	WT	Near Body Control Module	8
Remote Rear Power Post		In Trunk at Right Side Panel	23
Right Back-Up Lamp (300M, BUX)		At Lamp	N/S
Right Back-Up Lamp (Concorde)		At Lamp	N/S
Right Back-Up Lamp (Dodge)		At Lamp	N/S
Right Back-Up Lamp (LTD)		At Lamp	N/S
Right Fog Lamp (300M, BUX, Dodge)	GY	At Lamp	2
Right Fog Lamp (LTD)	BK	At Lamp	2
Right Front Door Sail Speaker		Right Front Door	17

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Right Front Door Speaker	BK	Right Front Door	17
Right Front Park/Turn Signal Lamp (Dodge)	BK	At Lamp	N/S
Right Front Park/Turn Signal Lamp (Except Dodge)	BK	At Lamp	N/S
Right Front Position Lamp	GY	At Right Headlamp	2
Right Front Side Marker Lamp		At Lamp	N/S
Right Front Wheel Speed Sensor	BK	Right Fender Side Shield	N/S
Right Headlamp Leveling Motor	BK	At Right Headlamp	2
Right High Beam Headlamp	BK	At Lamp	2
Right Horn	BK	At Horn	2
Right License Lamp		At Lamp	N/S
Right Low Beam Headlamp	GY	At Lamp	2
Right Rear Door Lock Motor/Ajar Switch	BK	At Door	N/S
Right Rear Door Speaker	BK	At Door	19
Right Rear Fog Lamp	NAT	At Lamp	N/S
Right Rear Power Window Motor	RD	At Door	N/S
Right Rear Power Window Switch	BL	Right Rear Door	19
Right Rear Reading Courtesy Lamp	BK	At Switch	N/S
Right Rear Reading Courtesy Lamp Switch	BK	At Switch	N/S
Right Rear Shelf Speaker	BK	At Speaker	20
Right Rear Side Marker Lamp	BK	At Lamp	N/S
Right Rear Turn Signal Lamp (300M, BUX)		At Lamp	N/S
Right Rear Turn Signal Lamp (Dodge)		At Lamp	N/S
Right Rear Turn Signal Lamp (LTD)		At Lamp	N/S
Right Rear Wheel Speed Sensor	BK	Right Side Trunk Area	13
Right Remote Radio Switch		Steering Wheel	N/S
Right Seat Airbag		At Seat	N/S
Right Side Impact Airbag Control Module	YL	Right B Pillar	16
Right Side Repeater Lamp		Right Fender Side Shield	1
Right Speed Control Switch		Steering Wheel	N/S
Right Tail Lamp (300M, BUX)	NAT	At Lamp	N/S
Right Tail Lamp (LTD)	NAT	At Lamp	N/S
Right Tail / Stop Lamp (Concorde)		At Lamp	N/S
Right Tail / Stop Lamp (LTD)		At Lamp	N/S
Right Tail / Stop Lamp No.1 (Dodge)		At Lamp	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	COLOR	LOCATION	FIG.
Right Tail / Stop Lamp No.1 (LTD, 300M, BUX)		At Lamp	N/S
Right Tail / Stop Lamp No.2 (Dodge)		At Lamp	N/S
Right Tail / Stop Lamp No.2 (300M)		At Lamp	N/S
Right Tail / Turn Signal Lamp (Concorde)		At Lamp	N/S
Right Visor/Vanity Lamp		At Lamp	N/S
Seat Belt Switch	BK	Left B Pillar	15, 16
Sentry Key Immobilizer Module	BK	Steering Column	8
Short Runner Valve Solenoid		ON Solenoid	N/S
Speed Control Servo	BK	Left Side Engine Compartment	4
Speed Proportional Steering Solenoid	LTGY	Near Brake Master Cylinder	4
Spot Lamp No. 1	GY	Behind Left I/P end cap	10
Spot Lamp No. 2	GY	Behind Right I/P end cap	N/S
Starter Motor Relay		In Power Distribution Center	N/S
Sun Sensor/VTSS Set LED	BK	Top Center of Instrument Panel	N/S
Sunroof Control Module	WT	At Module	N/S
Sunroof Limit Switch	BK	At Switch	N/S
Sunroof Motor	BK	At Motor	N/S
Sunroof Switch	NAT	Headliner	N/S
Throttle Position Sensor	BK	On Throttle Body	5, 6
Traction Control Switch	NAT	Center of I/P	9
Transmission Control Relay		In the Power Distribution Center	N/S
Transmission Range Indicator Illumination		At Cluster	N/S
Transmission Range Sensor	LG	Left Side of Transmission	7
Transmission Solenoid/Pressure Switch Assembly	BK	Right Side of Transmission	N/S
Trunk Knock Out Switch		Deck Lid	22
Trunk Lamp	BK	At Lamp	20
Turn Signal/Hazard Switch	BK	Steering Column	8
Under Hood Lamp		At Lamp	N/S
Washer Fluid Level Sensor	GY	Left Fender Side Shield	3

GROUNDS

CONNECTOR NAME/NUMBER	LOCATION	FIG.
G100	Rear of Block Right Side	5, 6
G101	Rear of Block Left Side	5, 6
G102	Left Headlamp	4
G103	Left Headlamp	N/S
G104	Left Headlamp	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

CONNECTOR NAME/NUMBER	LOCATION	FIG.
G105	Near Right Horn	2
G106	Near Right Horn	2
G108	Near Power Distribution Center	N/S
G200	Lower Center of Instrument Panel	9
G201	Lower Center of Instrument Panel	9
G300	Under Driver Seat	15, 16
G301	Under Passenger Seat	13
G303	Fuel Pump Ground	N/S
G400	Deck Lid Ground	22
G401	Right C Pillar	N/S

SPLICES

SPLICE NUMBER	LOCATION	FIG.
S100	Engine Harness in T/O for Powertrain Control Module	5, 6
S101	Engine Harness Front of Engine	5
S102	Engine Harness in T/O for Powertrain Control Module	5, 6
S104	Right Side of Engine (2.7L), Front of Engine between Coolant and Camshaft Sensors (3.5L)	N/S
S106	Engine Harness Front of Engine	5, 6
S107	Engine Harness in T/O for Powertrain Control Module	5, 6
S109 (2.7L)	Engine Harness, Between Fuel Injector No.1 and Fuel Injector No.4	5
S109 (3.5L)	Engine Harness Left Side of Engine	6
S110 (2.7L)	Engine Harness, Near Idle Air Control Motor T/O	5
S110 (3.5L)	Engine Harness Front of Engine	6
S111 (2.7L)	Engine Harness, Between Fuel Injector No.3 and Fuel Injector No.5	5
S111 (3.5L)	Engine Harness, Between Fuel Injector No.1 and Fuel Injector No.3	6
S112	Engine Harness Front of Engine	6
S114	Headlamp and Dash in T/O for Transmission Control Module	4
S115	Headlamp and Dash in T/O for Transmission Control Module	4
S116	Headlamp and Dash Left Inner Fender	3
S117	Headlamp and Dash Left Inner Fender	3
S118	Headlamp and Dash Left Inner Fender	3
S119	Headlamp and Dash Left Inner Fender	3
S120	Front Lighting Near T/O for Left Front Lamps	3
S121	Front Lighting Near T/O for Left Front Lamps	3
S122	Headlamp and Dash in Ground T/O from Power Distribution Center	4
S123	Headlamp and Dash in Ground T/O from Power Distribution Center	4
S124	Headlamp and Dash in Power Distribution Center	N/S
S125	Headlamp and Dash in Power Distribution Center	N/S
S127	Headlamp and Dash in Power Distribution Center	N/S
S128	Headlamp and Dash in Power Distribution Center	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S130	Front Lighting Near T/O for Left Front Lamps	3
S131	Front Lighting Near T/O for Left Front Lamps	3
S132	Front Lighting Near T/O for Left Front Lamps	3
S133	Front Lighting Near T/O for Left Front Lamps	3
S134	Front Lighting Near T/O for Left Front Lamps	3
S135	Front Lighting Near T/O for Ambient Temperature Sensor	2
S140	Headlamp and Dash in Power Distribution Center	N/S
S142	Transmission Harness Near T/O for Oxygen Sensors	7
S143	Transmission Harness Near T/O for Oxygen Sensors	7
S144	Engine Harness in T/O to Battery	5, 6
S145	Engine Harness in T/O to Battery	5, 6
S146	Transmission Harness Near T/O to Output Shaft Speed Sensor	7
S147	Headlamp and Dash Left Inner Fender	3
S150	In T/O to C111	N/S
S151	In T/O to Left Position Lamp	N/S
S152	In T/O to C112	N/S
S153	In T/O to Right Position Lamp	N/S
S160	Front Fascia Harness Between Right and Left Headlamps	N/S
S161	Front Fascia Harness Between Right and Left Headlamps	N/S
S162	Front Fascia Harness Between Right and Left Headlamps	N/S
S163	Headlamp and Dash Near T/O for Brake Fluid Level Switch	4
S164	Headlamp and Dash Harness Near T/O for Left Front Wheel Speed Sensor	4
S165	Headlamp and Dash Harness in Power Distribution Center	N/S
S166	Headlamp and Dash Harness in Power Distribution Center	N/S
S167	Headlamp and Dash Harness in Power Distribution Center	N/S
S168	Headlamp and Dash Harness in Power Distribution Center	N/S
S170	Headlamp and Dash Harness Near T/O to Front End Lighting	3
S171	Headlamp and Dash Harness in Power Distribution Center	N/S
S172	Headlamp and Dash Harness in Power Distribution Center	N/S
S200	Instrument Panel Left Side, Near T/O to Data Link Connector	8
S201	Instrument Panel Left Side, Near T/O to Data Link Connector	8
S202	Instrument Panel Left Side, Near T/O to Brake Lamp Switch	8
S203	Near Splice S202	N/S
S204	Instrument Panel Behind Cluster	8
S205	Instrument Panel Left Side in T/O to C104	8
S206	Instrument Panel Center	9
S207	Instrument Panel Center	9
S208	Instrument Panel Center	9
S209	Instrument Panel Right Side in T/O to C201	9
S210	A/C Heater Harness Near T/O to Blend Door Actuator	N/S
S211	A/C Heater Harness Near T/O to Blend Door Actuator	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S212	A/C Heater Harness Near T/O to Blend Door Actuator	N/S
S214	Instrument Panel, Behind Cluster	8
S215	Instrument Panel Left Side in T/O to C103	8
S216	In T/O to Right Radio Remote Switch	N/S
S217	In T/O to Right Radio Remote Switch	N/S
S218	In T/O to Left Speed Control Switch	N/S
S219	In T/O to Right Speed Control Switch	N/S
S220	In T/O to A/C Heater Controls	N/S
S221	In T/O to Right Horn Switch	N/S
S230	In T/O near JB C1	N/S
S231	In T/O near JB C3	N/S
S232	In T/O near C200	N/S
S300	Body Harness Left Cowl	15
S301	Body Harness Left Front Sill	15
S302	Body Harness Left Front Sill	15
S303	Body Harness, Right Side Body	13
S304	Body Harness, Right Side Body	13
S305	Body Harness Under Drivers Seat	15
S306	Body Harness Body Rear	20
S307	Body Harness Left Body Rear	14
S308	Body Harness Left Body Rear	14
S309	Body Harness Left Body Rear	14
S310	Body Harness Left Body Rear	14
S311	Right Front Door Harness	17
S312	Left Front Door Harness	N/S
S313	Right Front Door Harness	17
S314	Left Front Door Harness	N/S
S315	Left Front Door Harness Near Courtesy Lamp T/O	N/S
S316	Left Front Door Harness Between Courtesy Lamp and Door Speaker T/O's	N/S
S317	Left Front Door Harness Near Courtesy Lamp T/O	N/S
S318	Left Front Door Harness Between Courtesy Lamp and Door Speaker T/O's	N/S
S319	Headliner Harness Near T/O to Day/Night Mirror	N/S
S320	Headliner Harness Near T/O to Day/Night Mirror	N/S
S321	Headliner Harness Near T/O to Day/Night Mirror	N/S
S322	Headliner Harness Near T/O to Day/Night Mirror	N/S
S323	Headliner Harness Near T/O to Day/Night Mirror	N/S
S324	Headliner Harness Near T/O to Left Rear Door Courtesy Lamp	N/S
S325	Headliner Harness Near T/O to Left Rear Door Courtesy Lamp	N/S
S326	Headliner Harness Near T/O to Right Rear Door Courtesy Lamp	N/S
S327	Headliner Harness Near T/O to Right Rear Door Courtesy Lamp	N/S
S328	Power Seat Harness at Seat	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

SPLICE NUMBER	LOCATION	FIG.
S331	Body Harness, Left Side Body	15
S332	Body Harness, Right Side Body	13
S334	Body Harness, Left Side Body	15
S335	Body Harness, Left Side Body	15
S336	Body Harness, Left Cowl	15
S337	Body Harness, Body Rear	20
S338	Body Harness, Right Side Body	13
S341	Memory Seat Harness Near T/O to Seat Motors	N/S
S342	Memory Seat Harness Near Heated Seat Heater Connector	N/S
S343	Memory Seat Harness Near Heated Seat Heater Connector	N/S
S345	Body Harness, Left Front Sill	15
S346	Body Harness, Left Front Sill	15
S347	Body Harness, Left Front Sill	15
S348	In T/O For Fuel Pump Module	N/S
S349	In T/O to Left Airbag Module	N/S
S350	Body Harness, Left Front Sill	N/S
S351	Body Harness, Left Front Sill	N/S
S352	Body Harness, Left Front Sill	N/S
S400	Rear Fascia Harness	N/S
S401	Rear Fascia Harness	N/S
S402	Taillamp Harness, Left Tail Lamps	N/S
S403	Taillamp Harness, Left Tail Lamps	N/S
S404	Taillamp Harness, Left Tail Lamps	N/S
S405	Deck Lid Harness	22
S407	Taillamp Harness, Right Tail Lamps	N/S
S408	Taillamp Harness, Right Tail Lamps	N/S
S409	Taillamp Harness, Right Tail Lamps	N/S
S410	In T/O to Right Rear Fog Lamp	N/S
S411	Near T/O for Sun Roof Motor Connector	N/S
S412	Near T/O for Sun Roof Motor Connector	N/S
S420	In T/O to Left Rear Fog Lamp	N/S
S421	Rear Fascia Harness	N/S

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

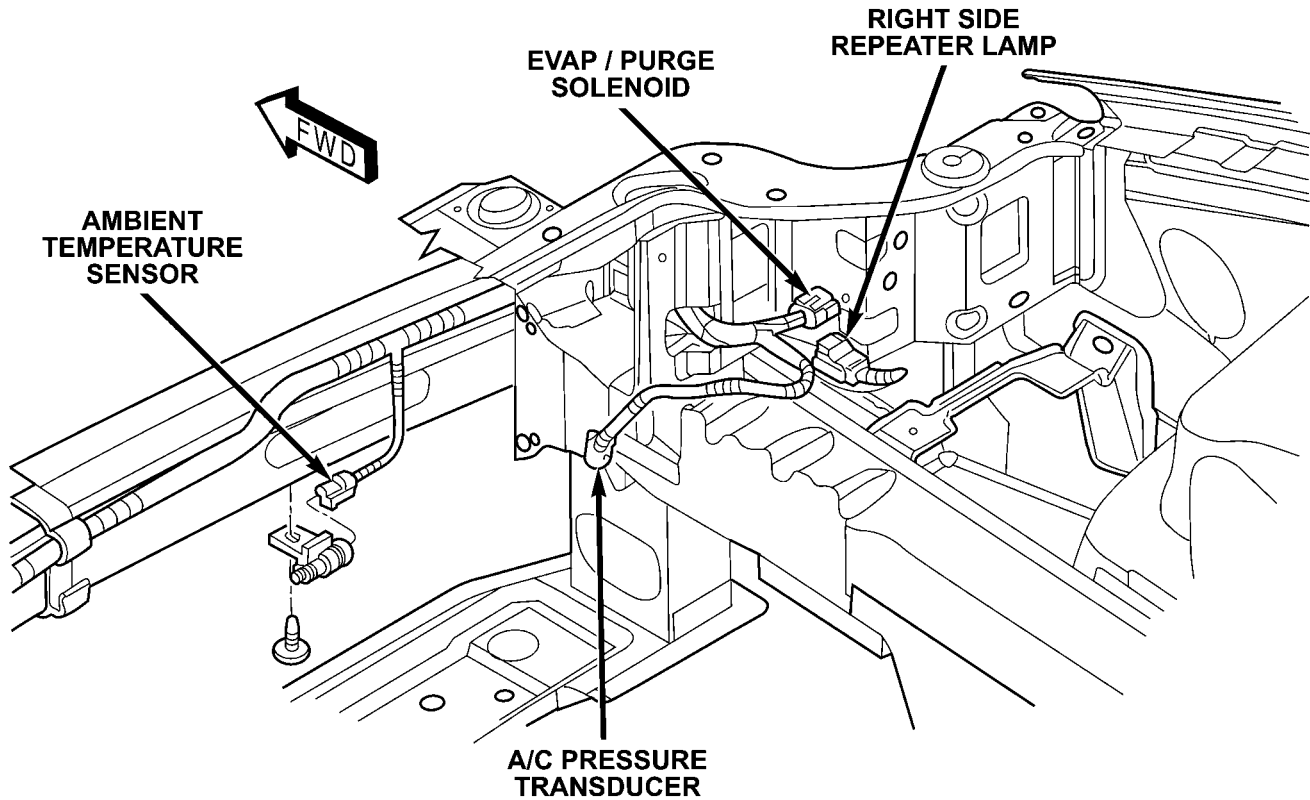


Fig. 1 FRONT OF ENGINE

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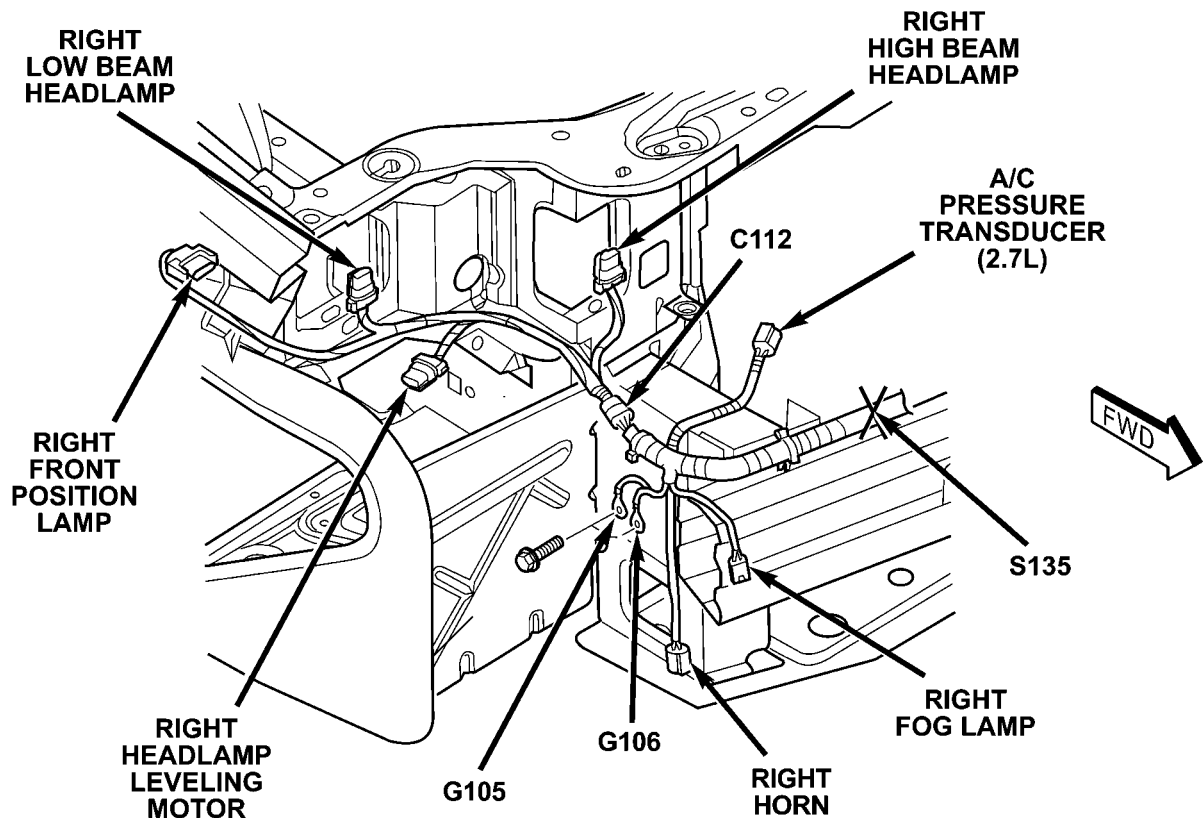


Fig. 2 RIGHT FRONT ENGINE COMPARTMENT

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80ea9522

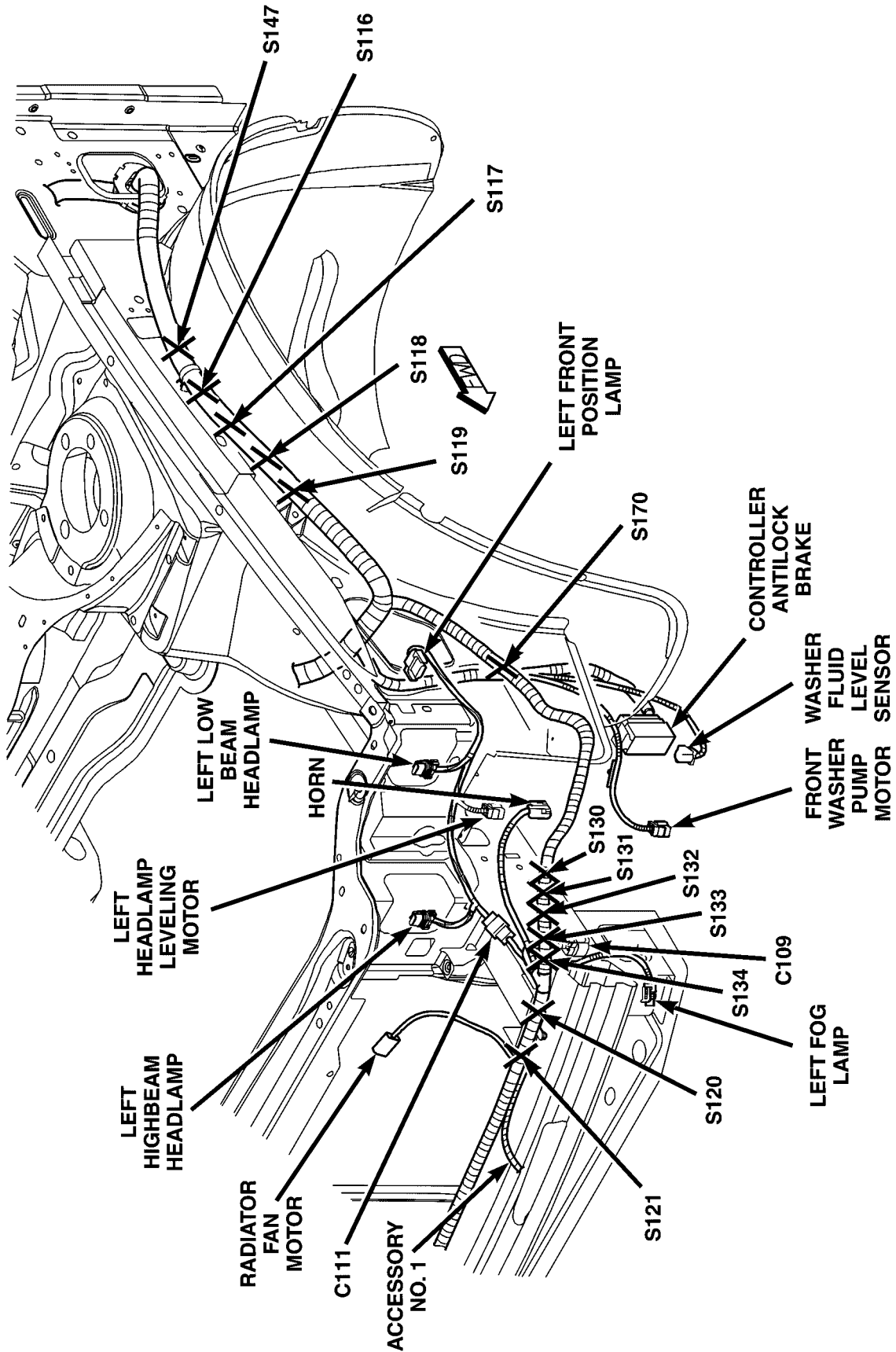


Fig. 3 LEFT FRONT LAMPS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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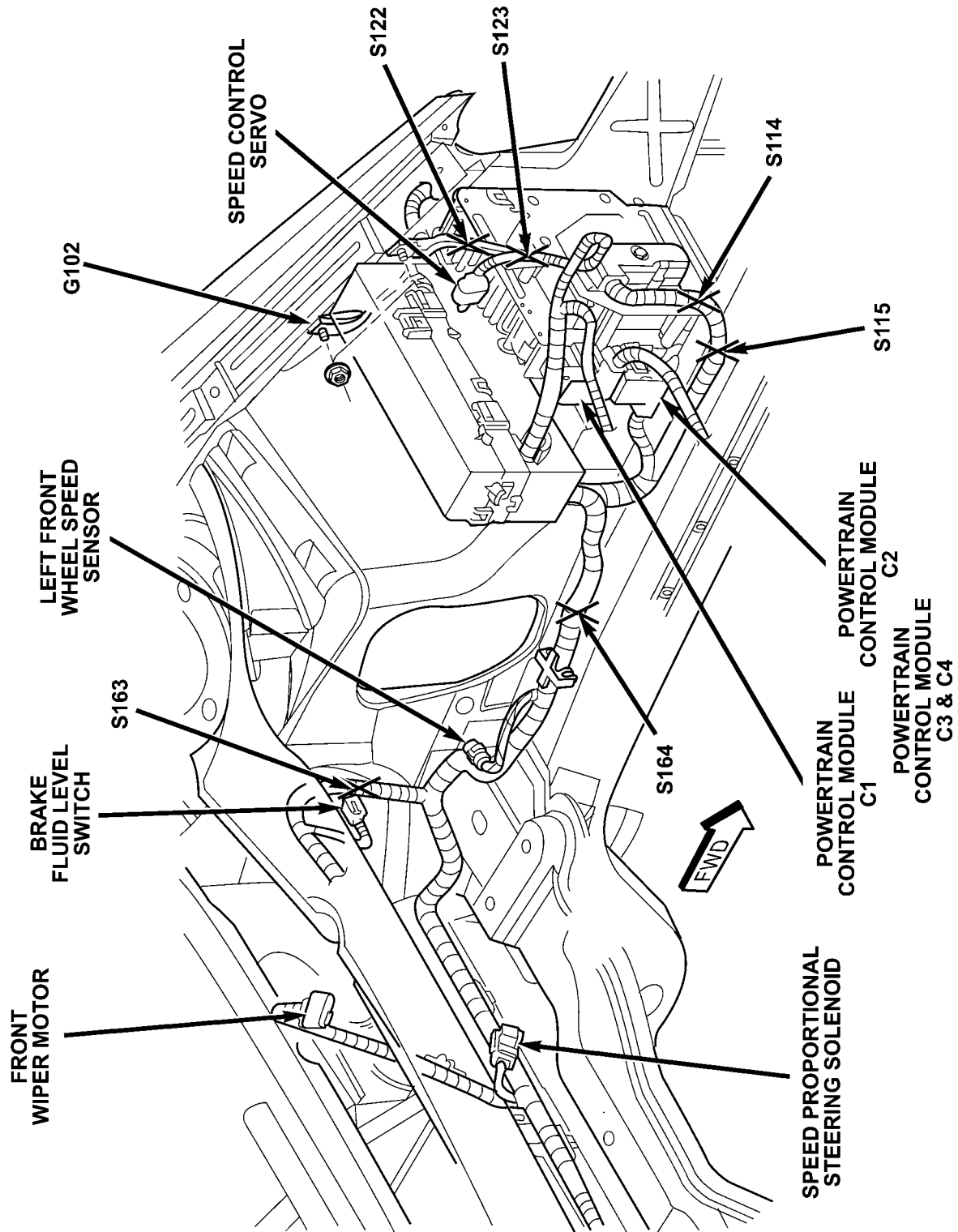


Fig. 4 LEFT REAR ENGINE COMPARTMENT

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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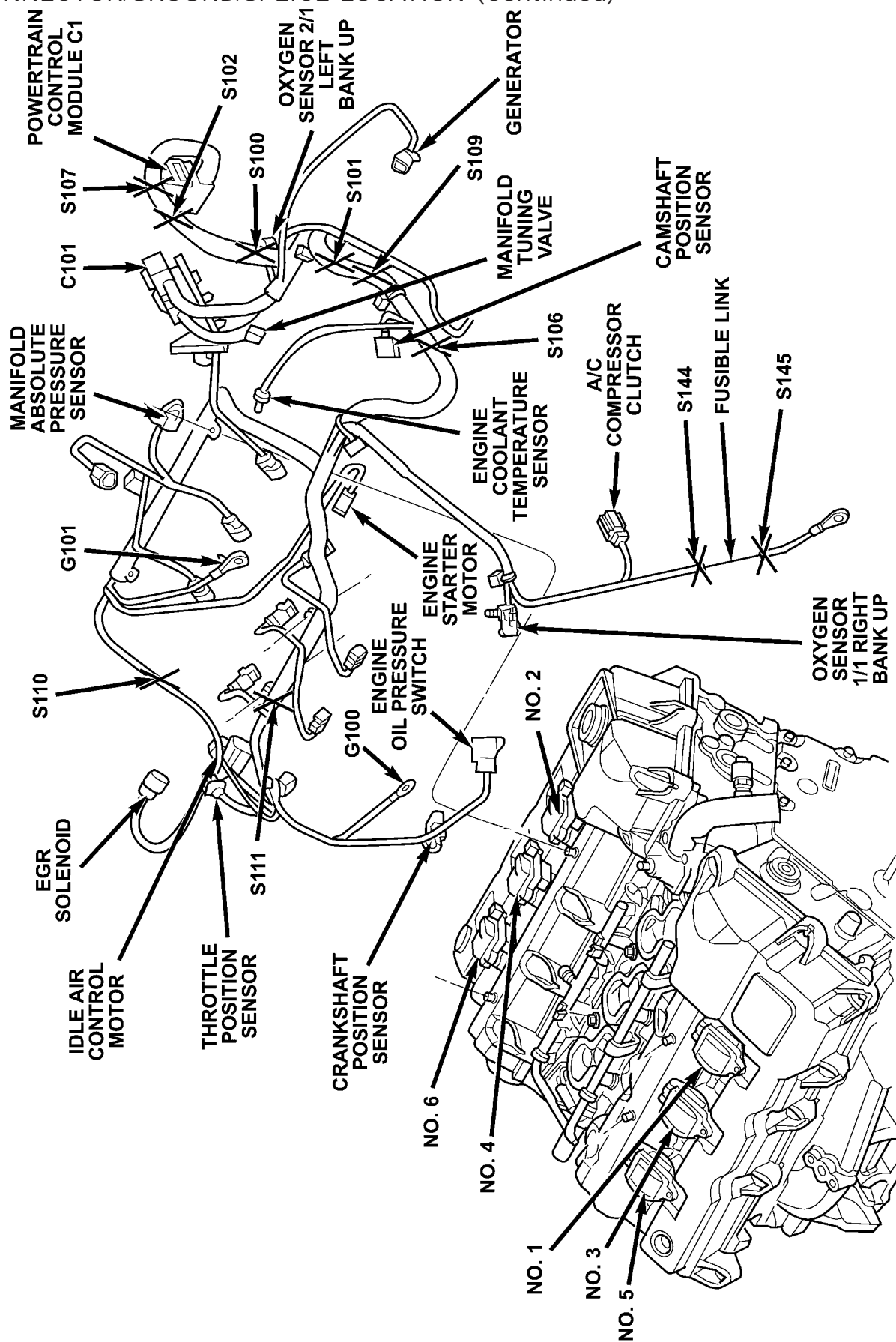
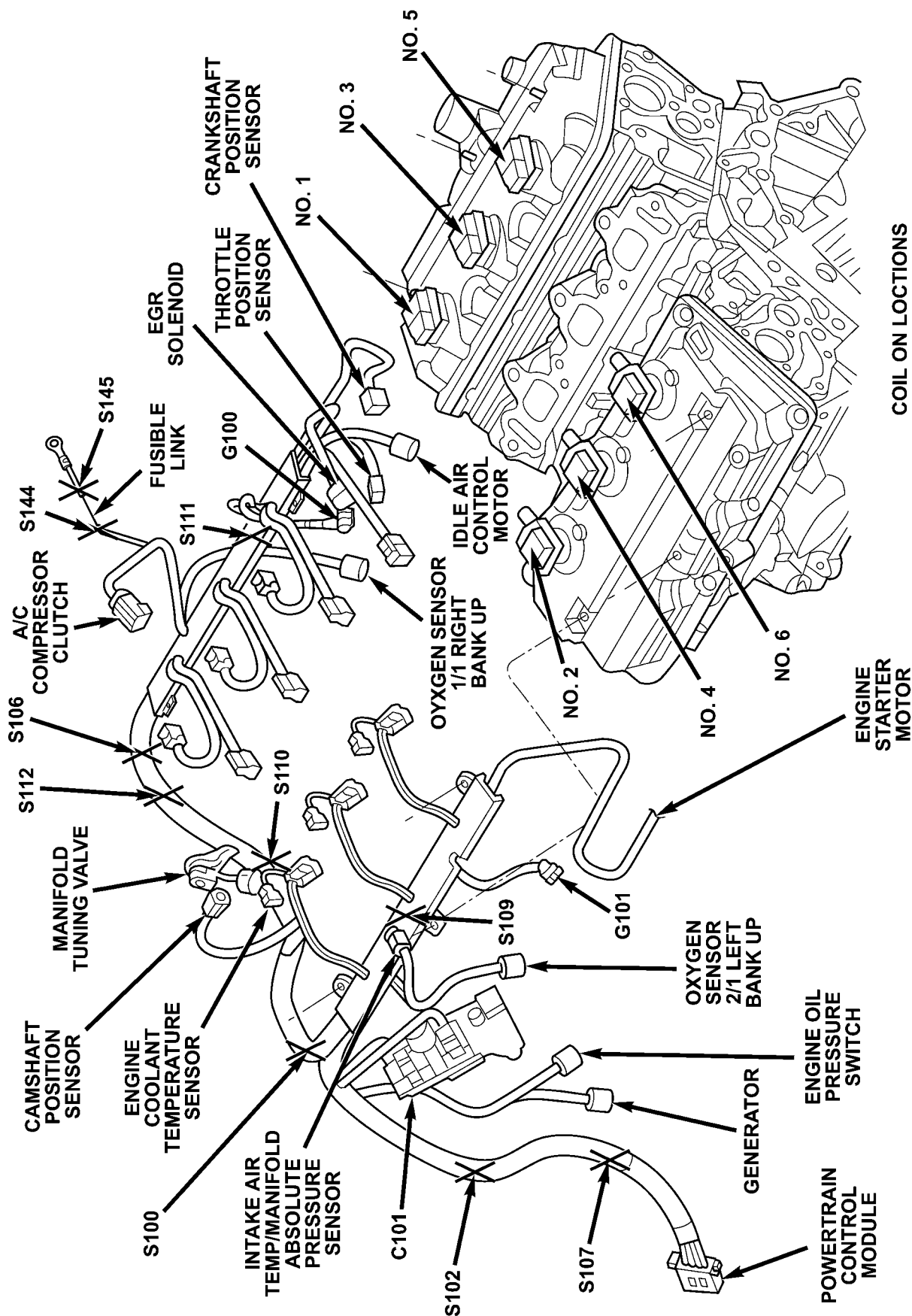


Fig. 5 ENGINE 2.7 LITER

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



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Fig. 6 ENGINE 3.5 LITER

80d68d57

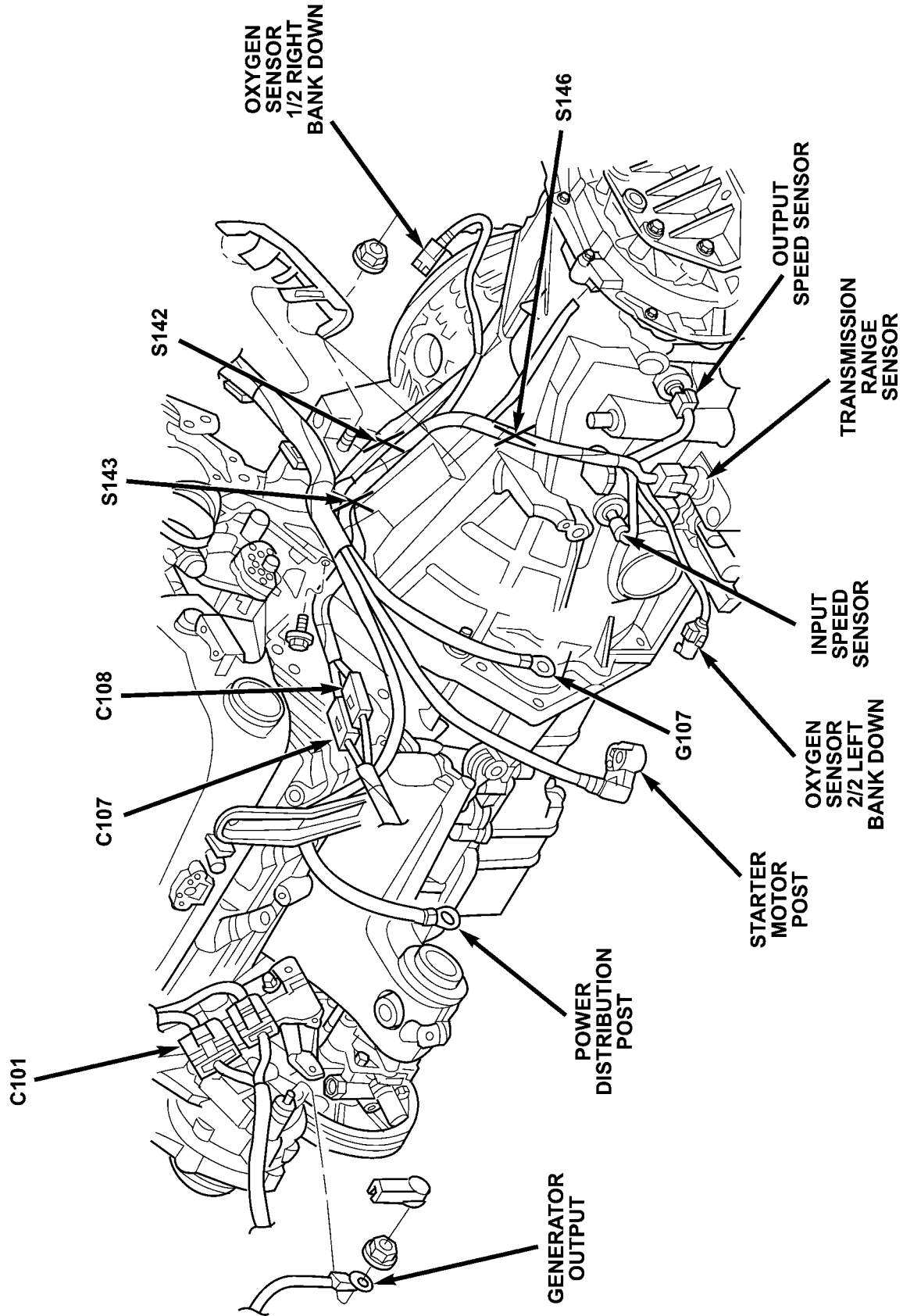


Fig. 7 TRANSMISSION

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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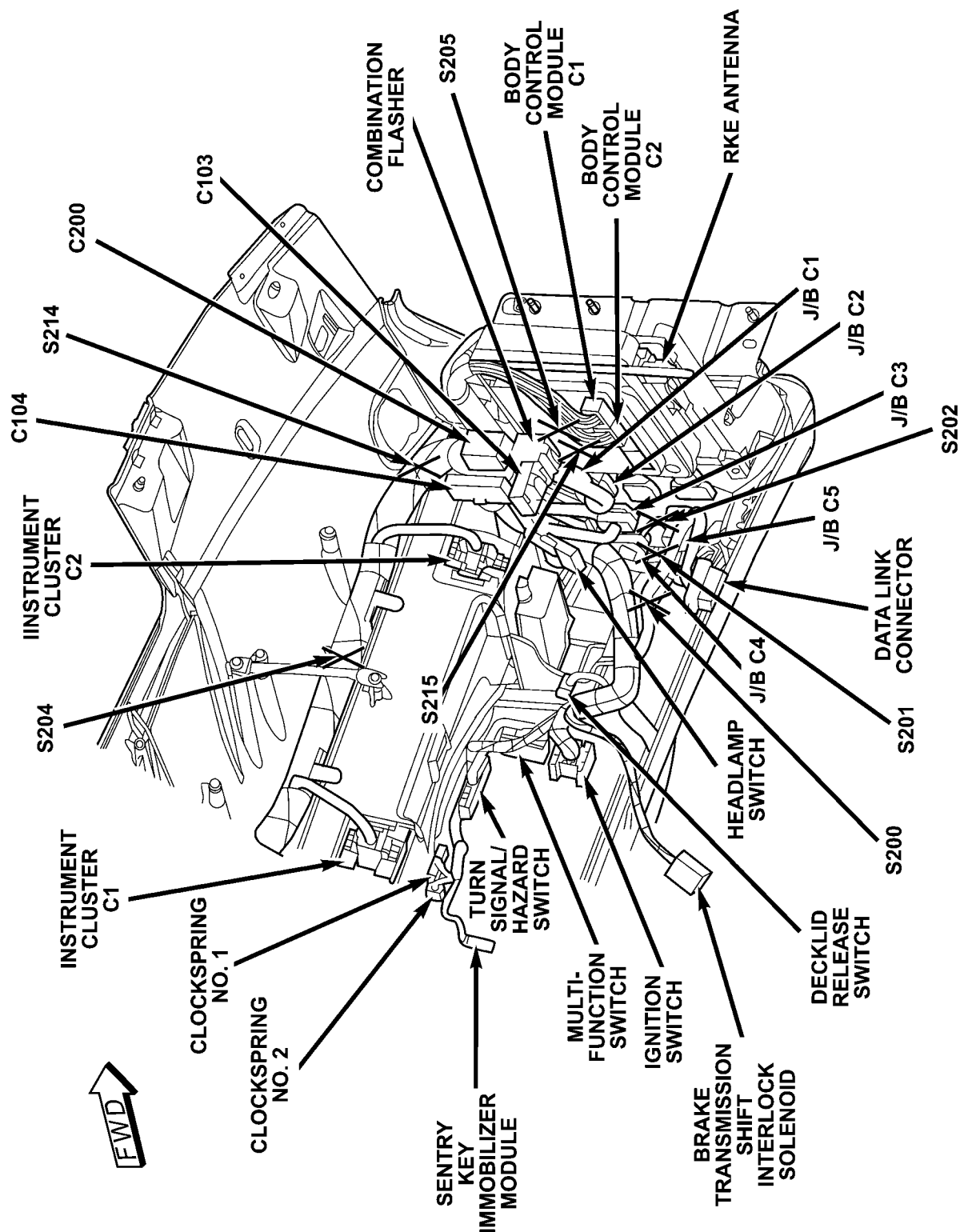
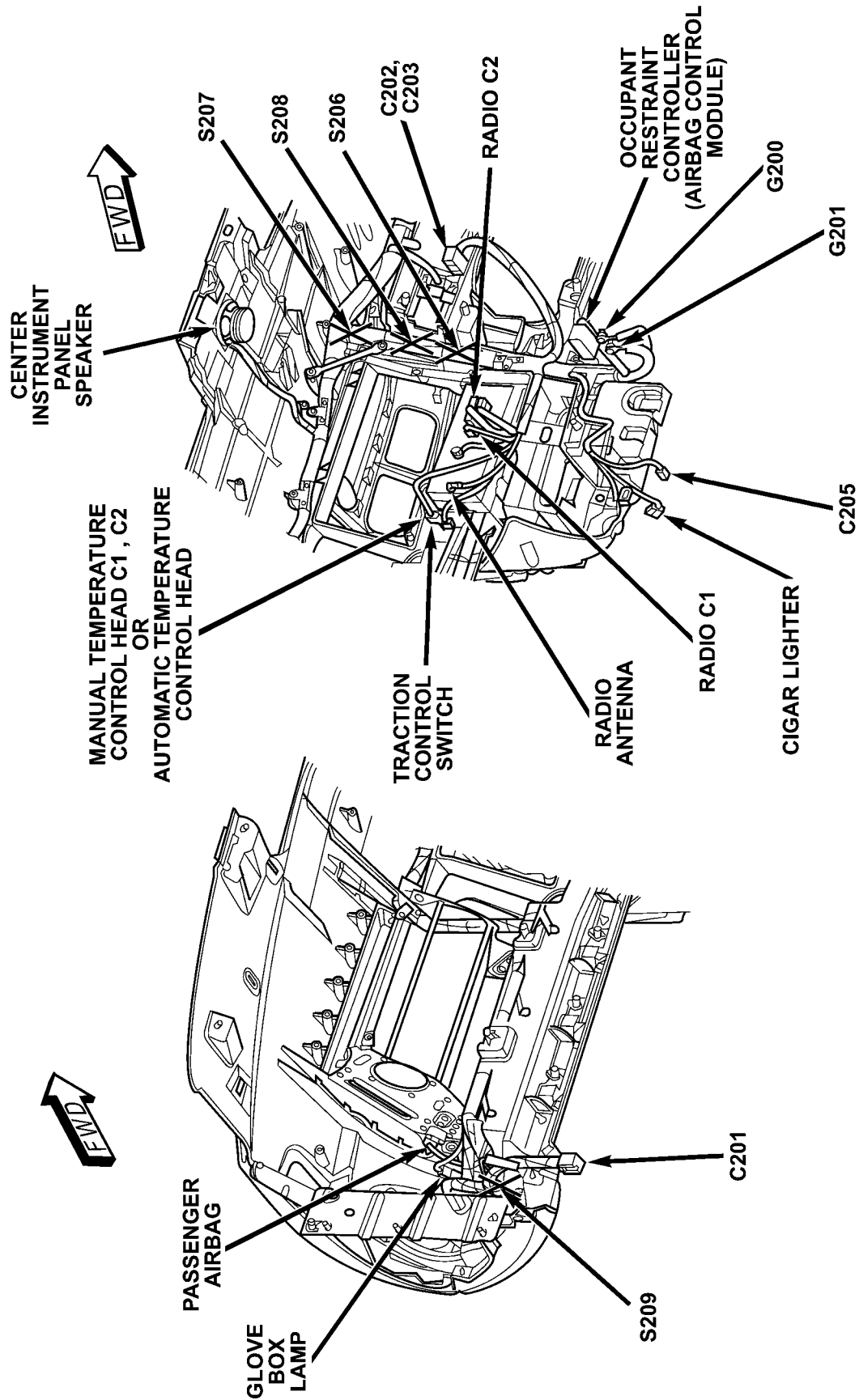


Fig. 8 LEFT SIDE OF INSTRUMENT PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)



80d68d4b

Fig. 9 INSTRUMENT PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

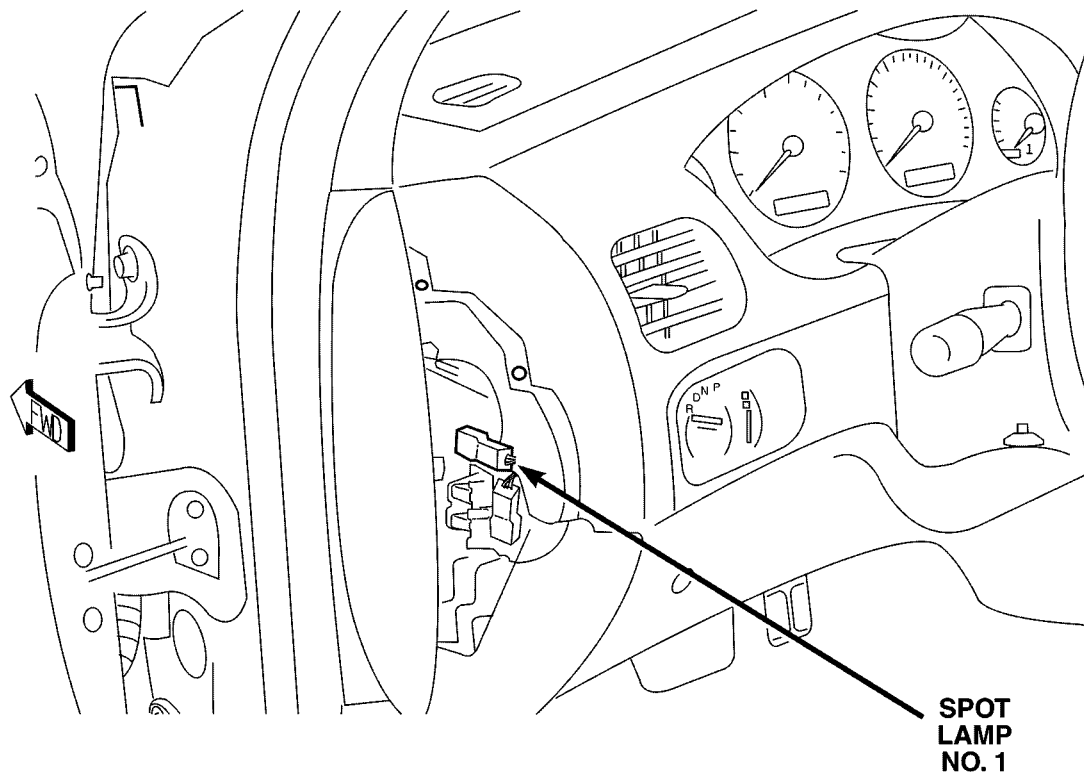


Fig. 10 LEFT INSTRUMENT PANEL END CAP

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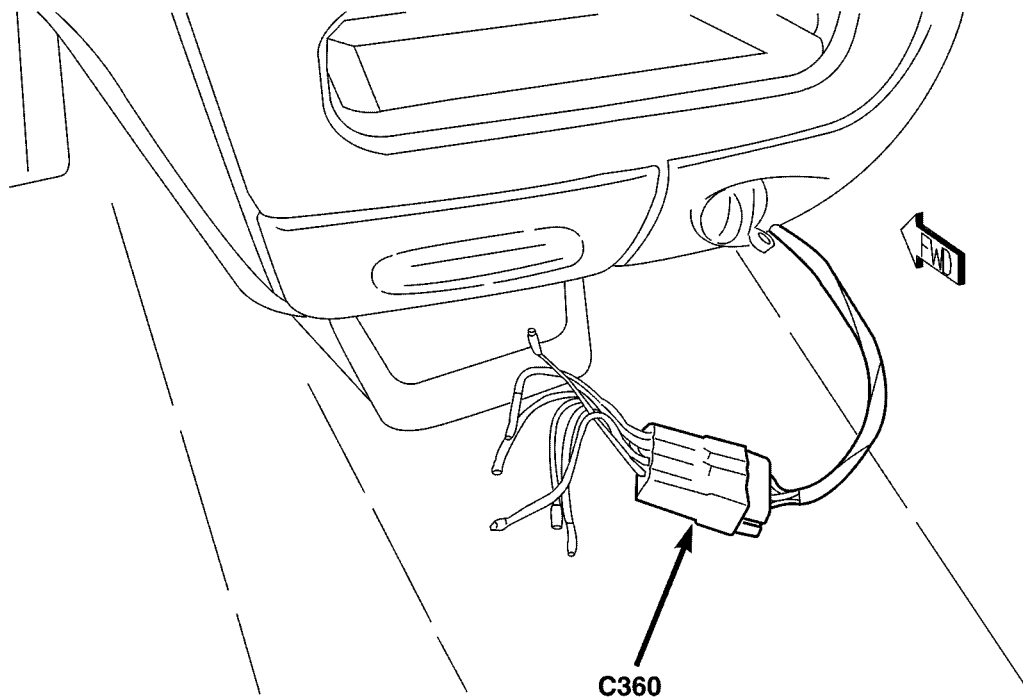
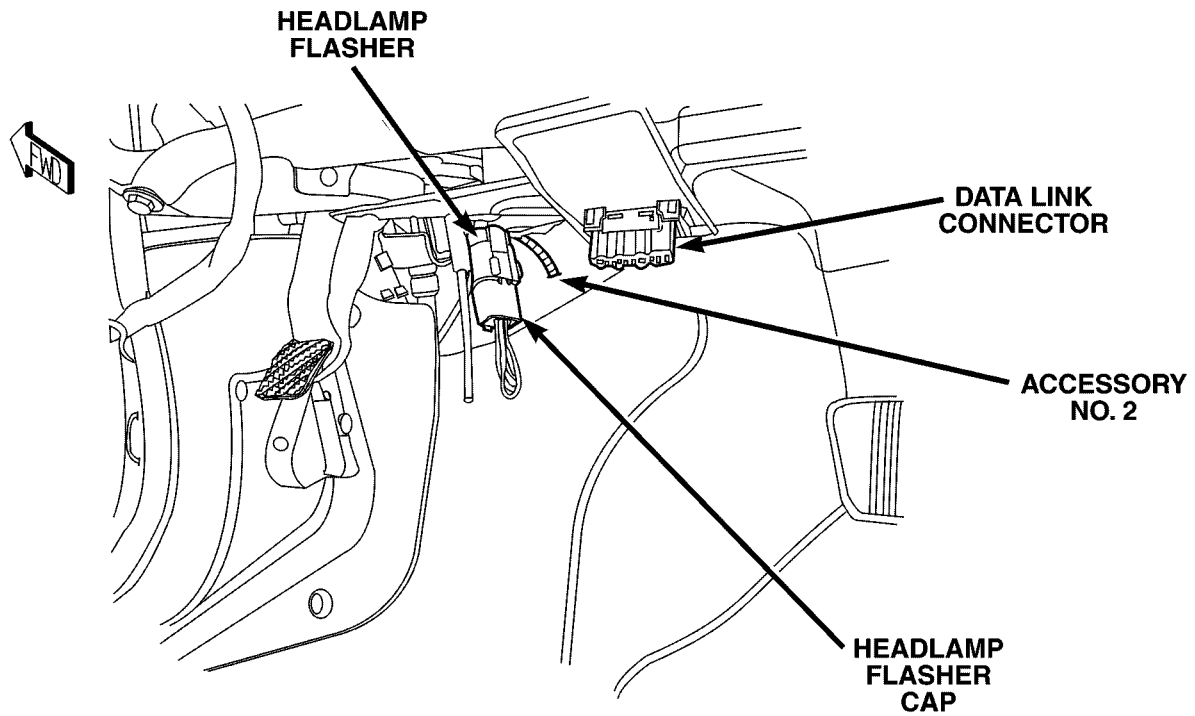


Fig. 11 ACCESSORY EQUIPMENT CONNECTOR

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80ea94d6

Fig. 12 HEADLAMP FLASHER - POLICE

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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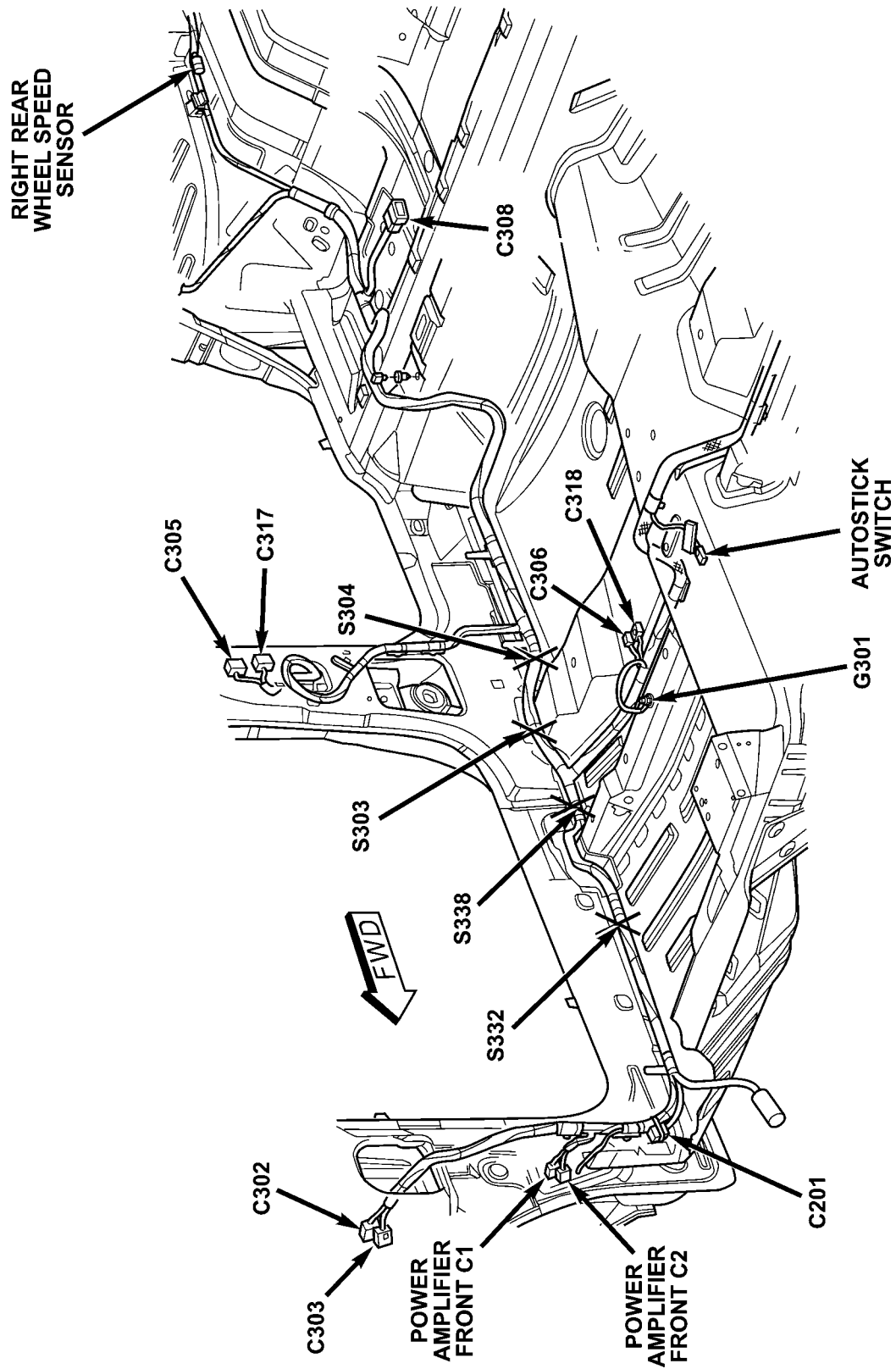
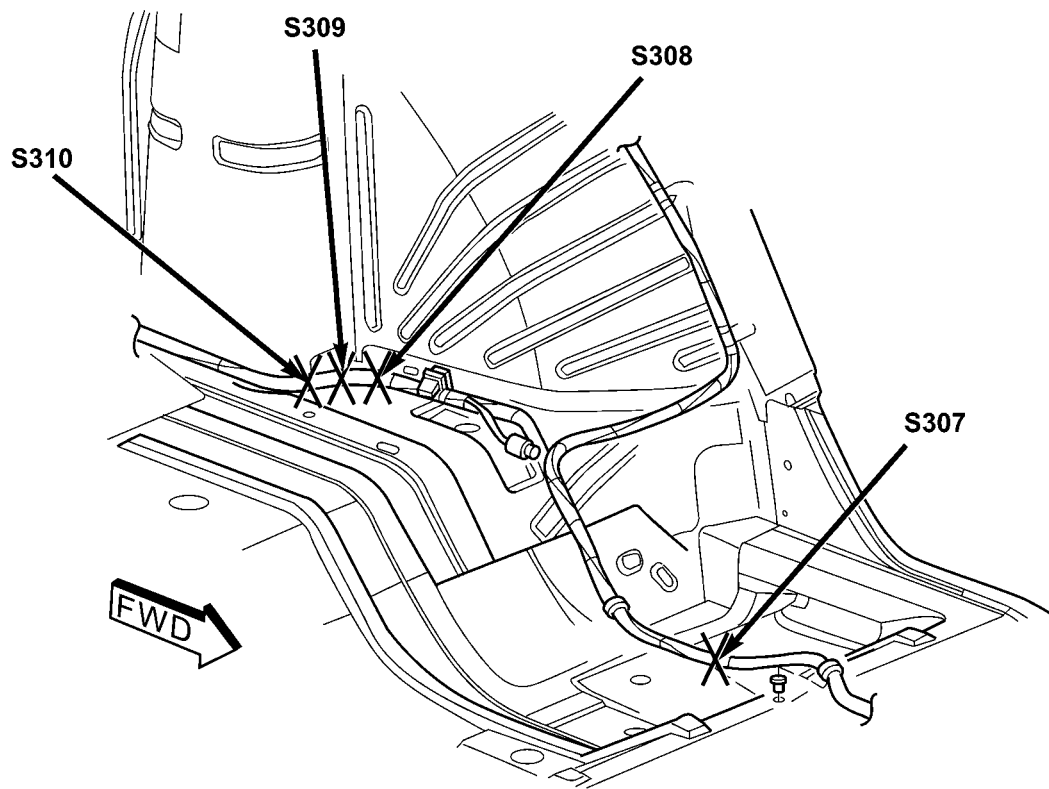


Fig. 13 RIGHT SIDE BODY



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Fig. 14 LEFT SIDE BODY REAR

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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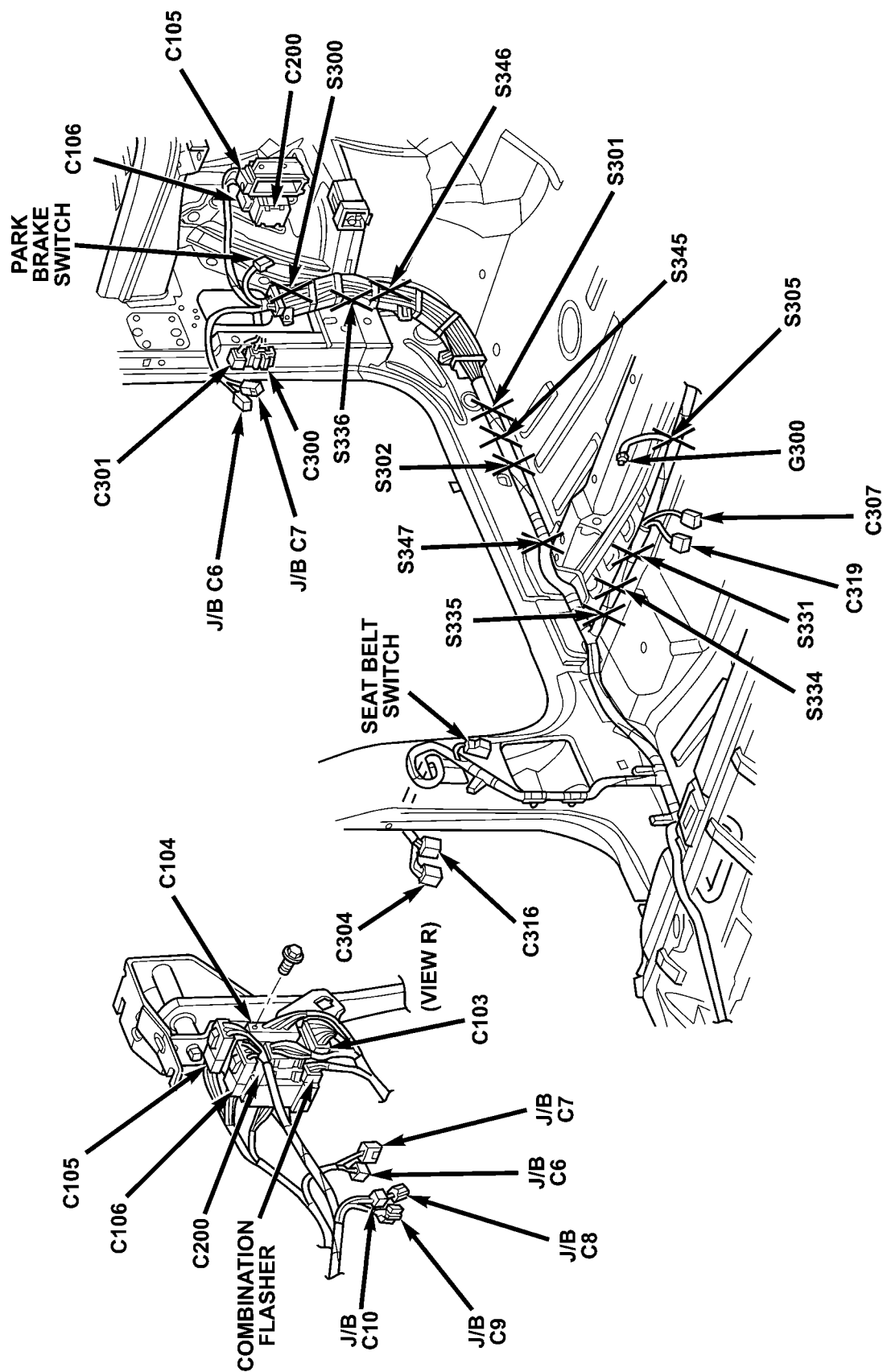


Fig. 15 LEFT SIDE BODY

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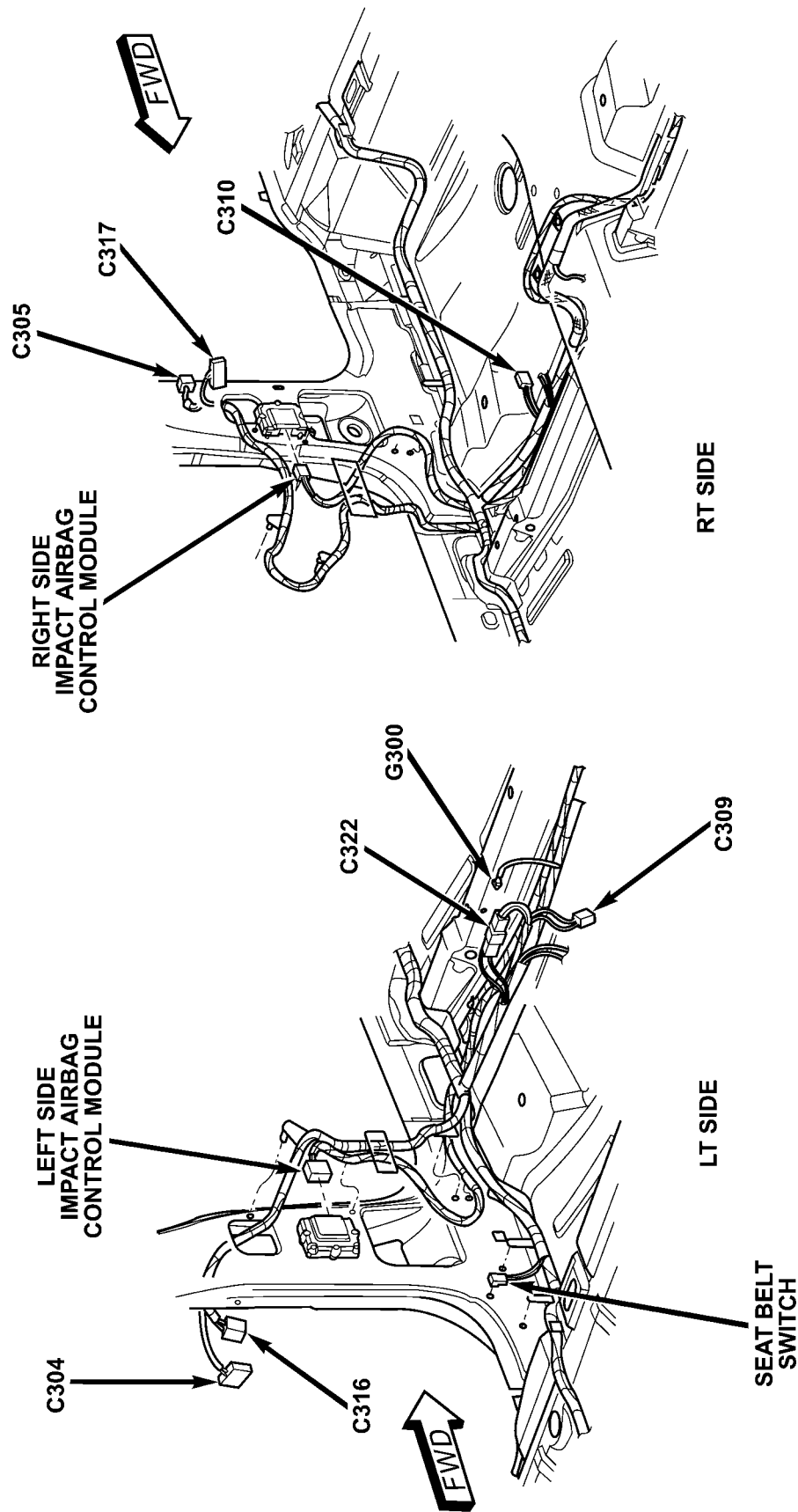


Fig. 16 SIDE IMPACT AIRBAGS

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

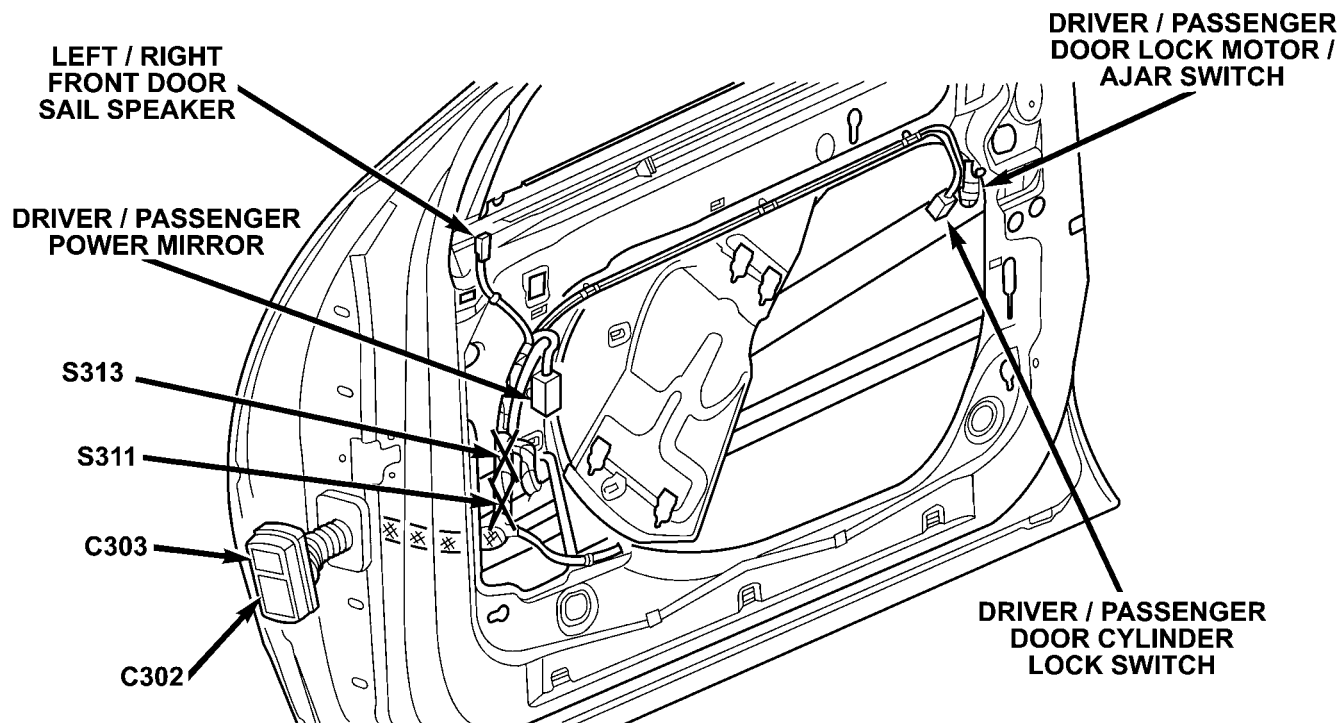


Fig. 17 RIGHT FRONT DOOR

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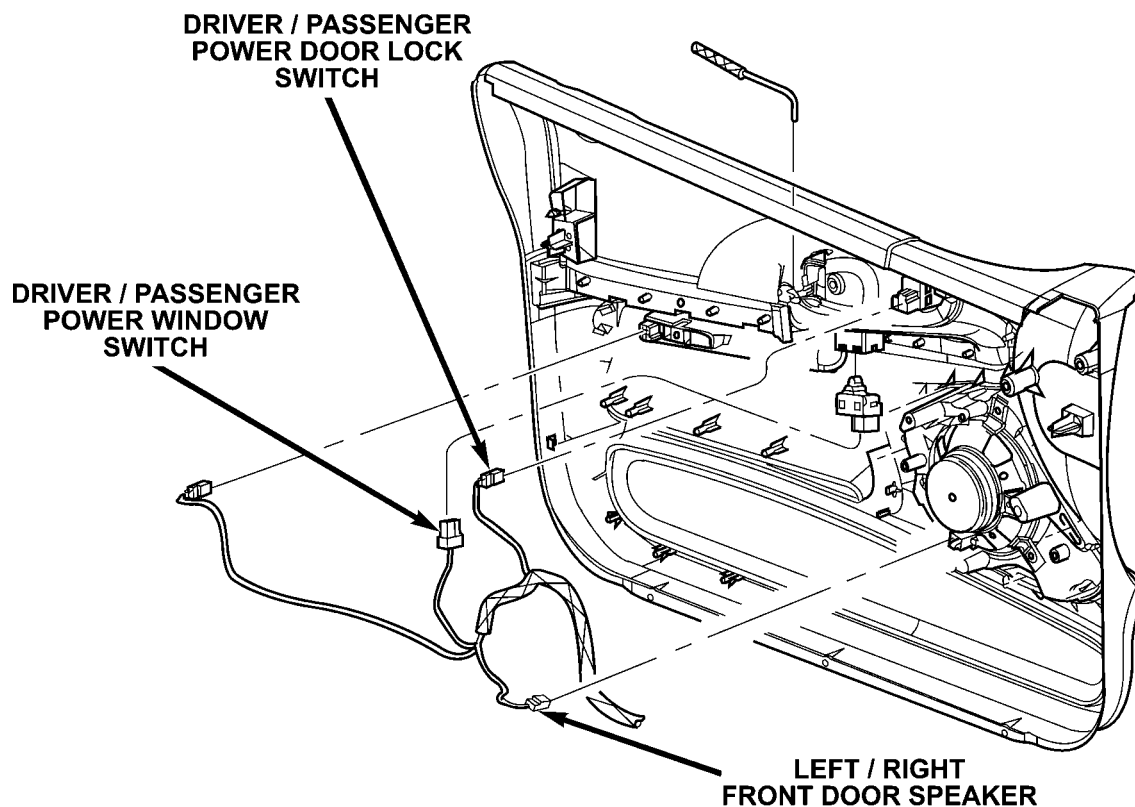
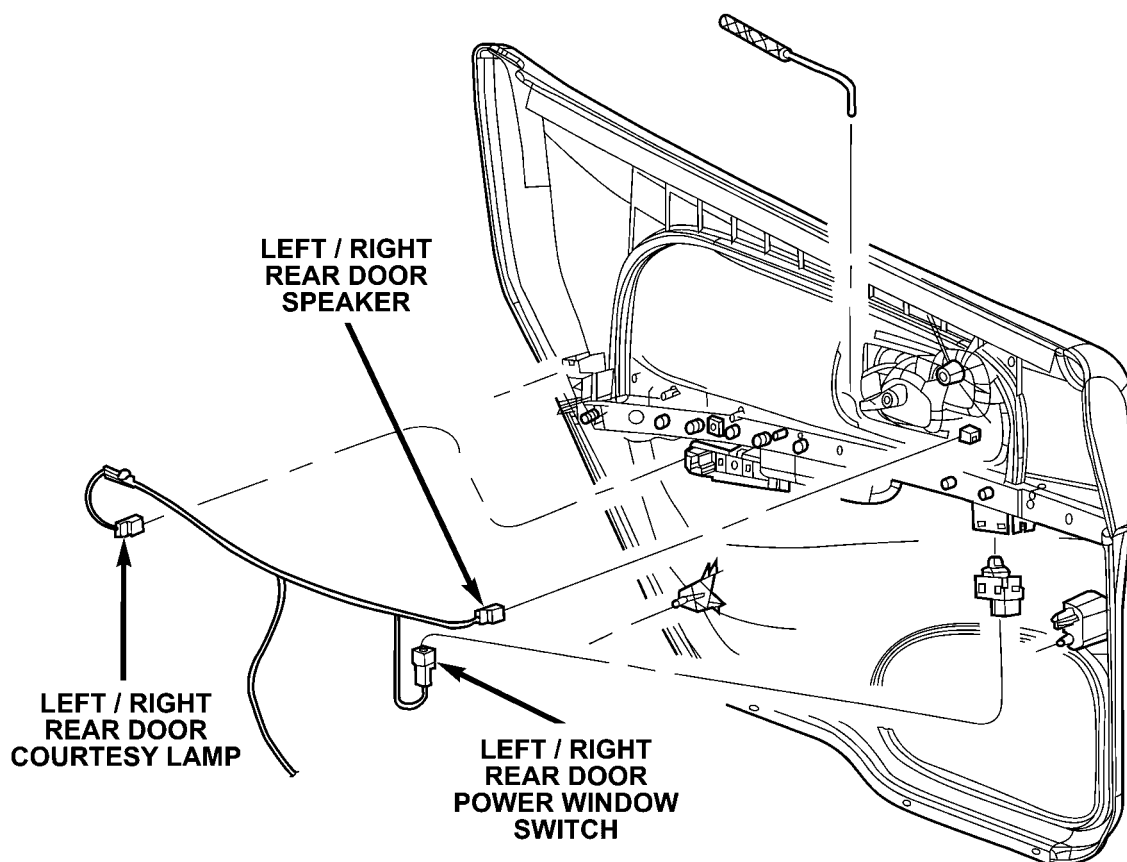


Fig. 18 RIGHT FRONT DOOR PANEL

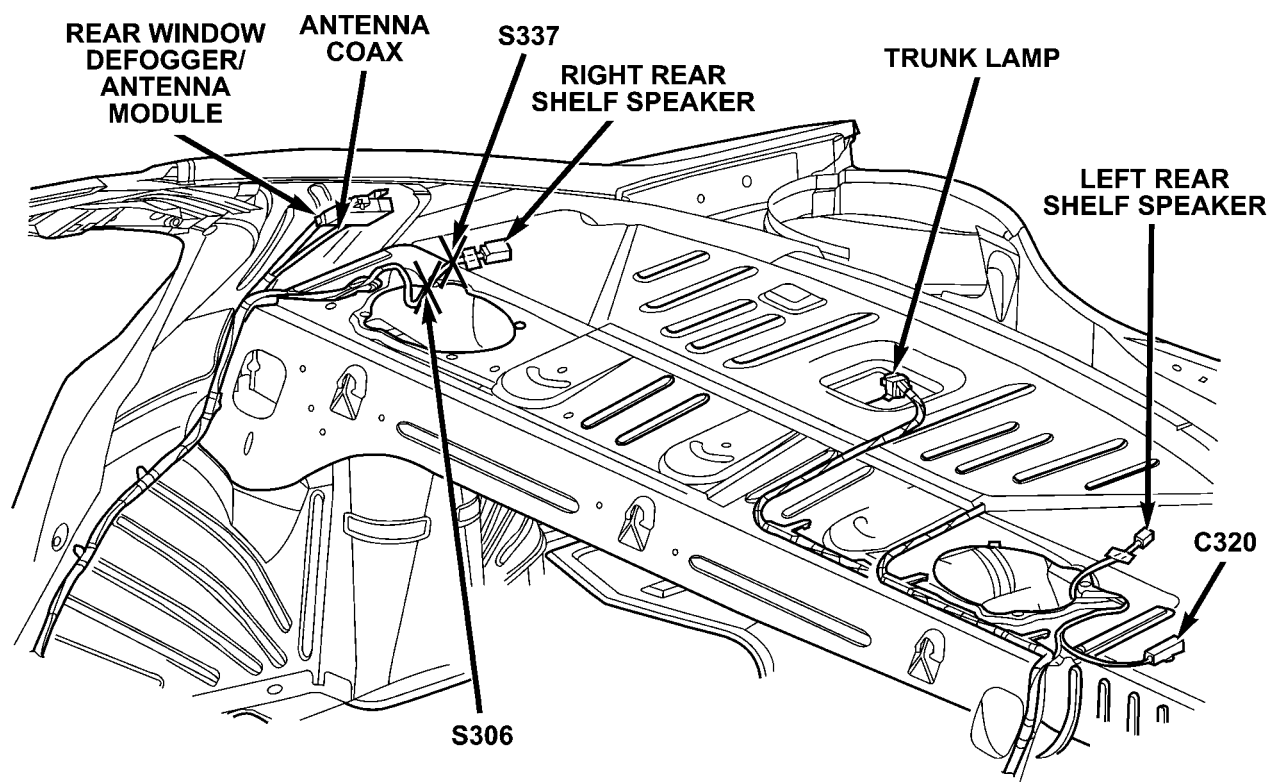
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CONNECTOR/GROUND/SPLICE LOCATION (Continued)



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Fig. 19 RIGHT REAR DOOR PANEL



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Fig. 20 SHELF PANEL

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

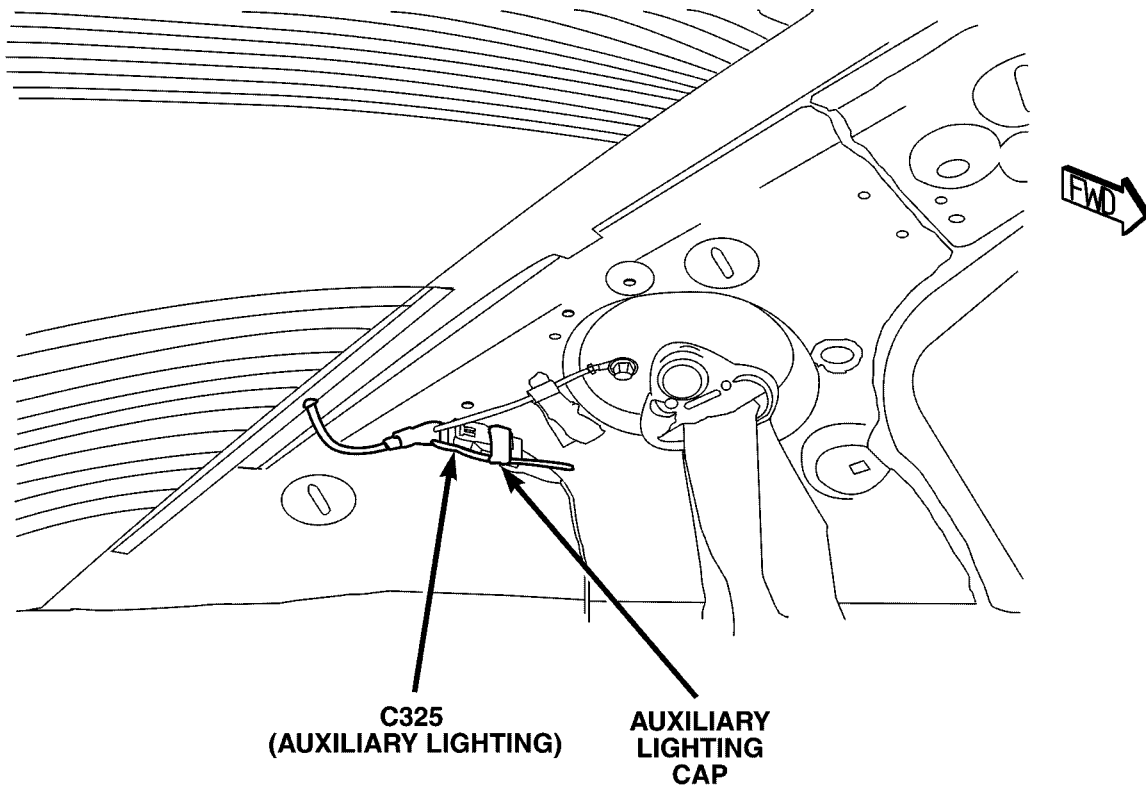


Fig. 21 AUXILIARY LIGHT CONNECTOR

80ea94da

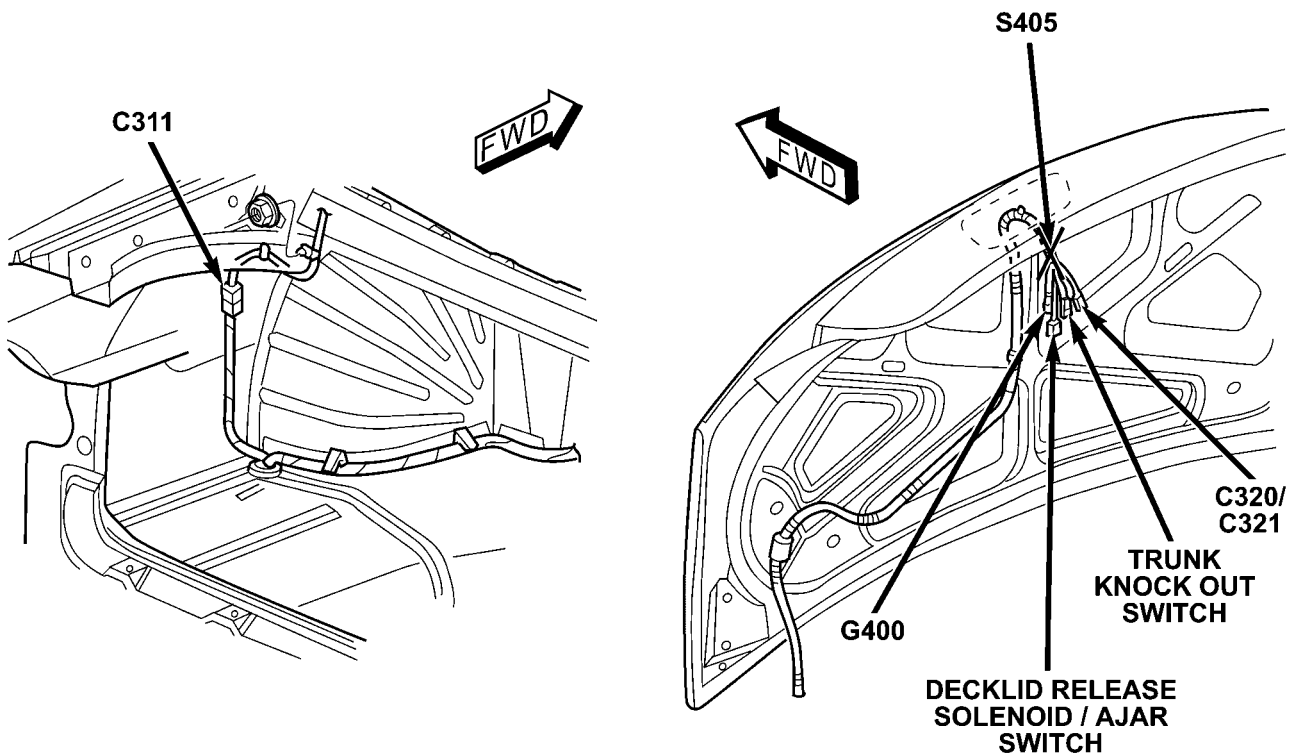
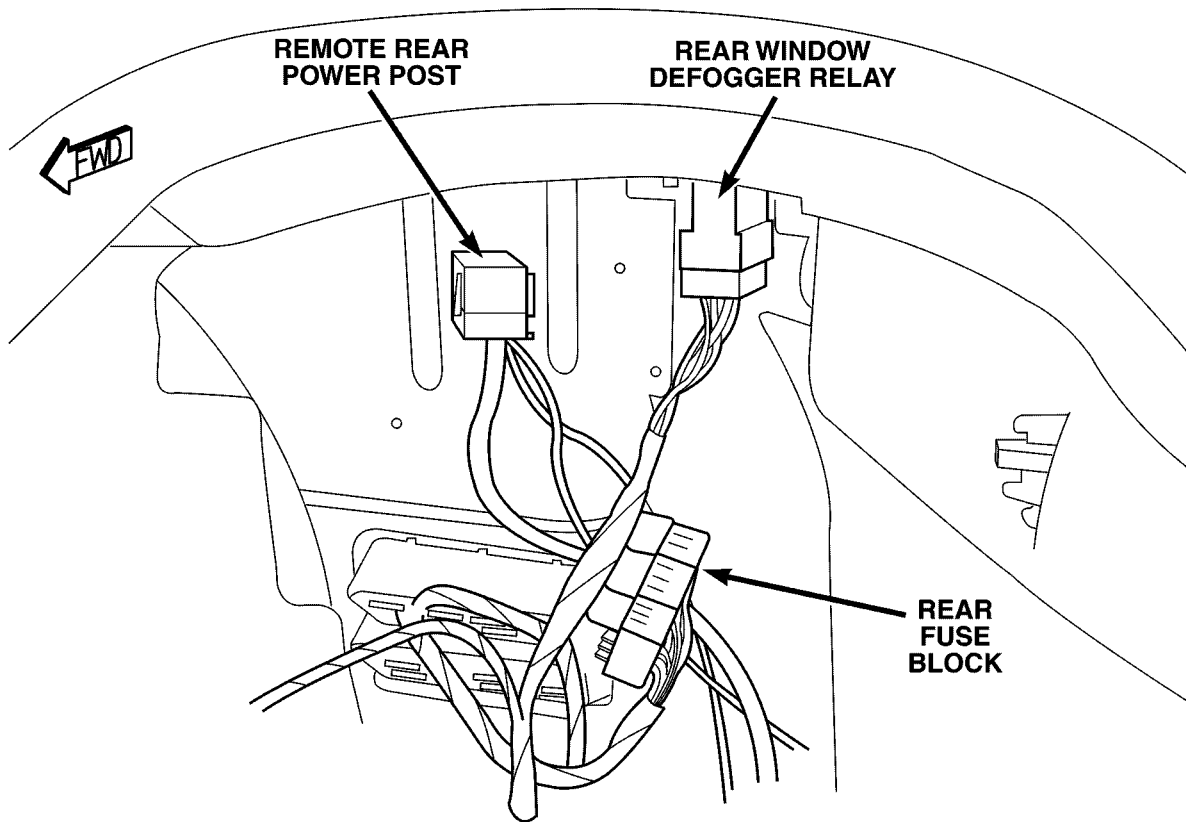


Fig. 22 DECK LID

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Fig. 23 RIGHT TRUNK, REAR POWER AND ACCESSORIES

CONNECTOR/GROUND/SPLICE LOCATION (Continued)

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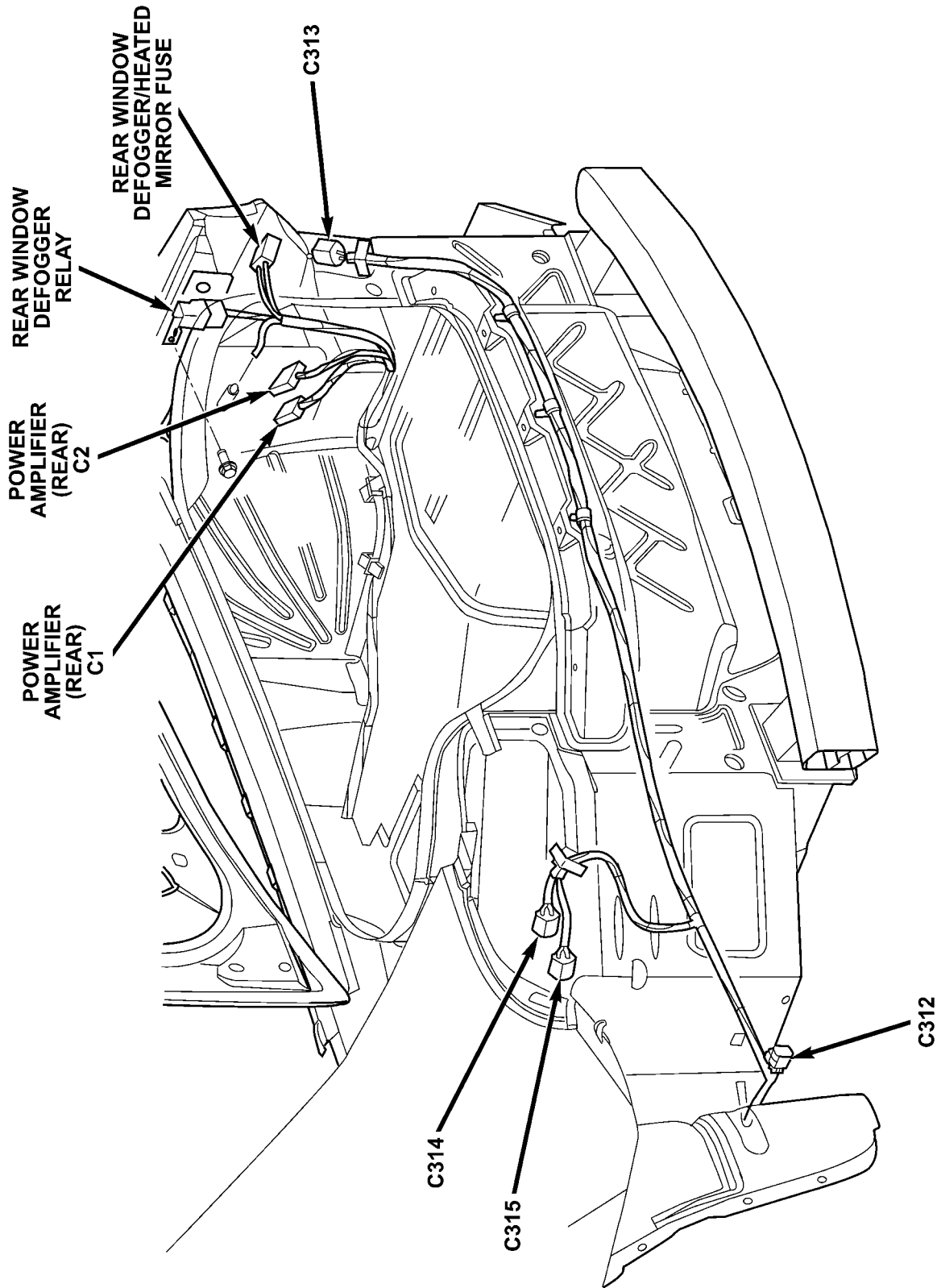


Fig. 24 TAIL LAMPS

8W-97 POWER DISTRIBUTION

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POWER DISTRIBUTION

DESCRIPTION

All of the electrical current distributed throughout this vehicle (except for police package wiring used with rear fuse block) is directed through the standard equipment Power Distribution Center (PDC). The molded plastic PDC housing is located in the left front corner of the engine compartment, just in front of the coolant reservoir bottle. The PDC housing has a molded plastic cover. The PDC cover is easily removed for service access and has a convenient fuse and relay layout label affixed to the inside surface of the cover to ensure proper component identification. The PDC housing is secured in the engine compartment by one screw to the rear of the PDC and two clips on the front side. A small molded plastic protective cover on the front right side of the engine compartment is unsnapped to access the battery/generator cable input connection studs.

Included in the police package is an additional rear fuse block and remote rear power post.

The rear fuse block is located in the right corner of the trunk behind the trunk trim panel. The rear fuse block houses 2 relays and three fuses. The wiring is routed to an area just below the instrument panel in a six cavity connector to provide three fused ignition feeds. Three fused battery feeds in the PDC also are provided to the center stack area of the instrument panel within the same six cavity connector.

Only the police package has both fused ignition and battery circuits below the instrument panel. Special service vehicles have only the three fused battery circuits in the six cavity connector.

The remote rear power post is located in the right corner of the trunk side panel.

CAUTION: DO NOT USE THE REMOTE REAR POWER POST AS A REMOTE JUMP POST. SERIOUS DAMAGE CAN OCCUR. REFER TO LUBRICATION AND MAINTENANCE, JUMP STARTING FOR PROPER JUMP STARTING PROCEDURES.

The rear fuse block and the remote power post are serviced as part of the body harness.

OPERATION

The power distribution system for this vehicle is designed to provide safe, reliable, centralized and convenient to access distribution of the electrical current required to operate all of the many standard and optional factory-installed electrical and electronic powertrain, chassis, safety, comfort and convenience systems. At the same time, these systems were designed to provide centralized locations for conducting diagnosis of faulty circuits, and for sourcing the additional current requirements of many aftermarket vehicle accessory and convenience items.

These power distribution systems also incorporate various types of circuit control and protection features, including:

- Fuses
- Fuse cartridges
- Fusible links
- Automatic resetting circuit breakers
- Relays
- Flashers
- Timers
- Circuit splice blocks.

POWER DISTRIBUTION (Continued)

The power distribution system for this vehicle consists of the following components:

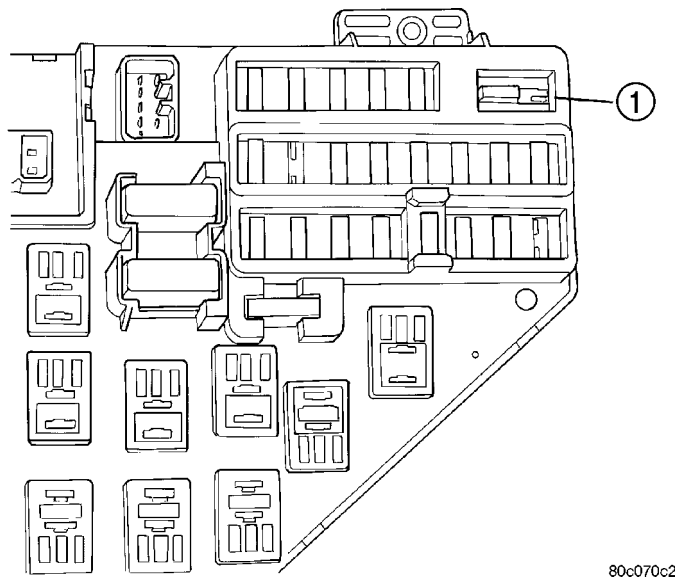
- Power Distribution Center (PDC)
- Junction Block (JB)
- Accessory power outlet.

NOTE: DO NOT ATTEMPT TO SWAP POWER DISTRIBUTION CENTERS (PDC) FROM ONE VEHICLE TO ANOTHER. MOST OF THESE ASSEMBLIES ARE VEHICLE FEATURE SPECIFIC AND THEREFORE NOT INTERCHANGEABLE. ALWAYS USE THE CORRECT PART NUMBERED ASSEMBLY WHEN DIAGNOSING OR REPLACING A PDC.

STANDARD PROCEDURE - CIGAR LIGHTER/POWER OUTLET CUSTOMER PREFERENCE

This vehicle was delivered with the Cigar Lighter/Power Outlet activated only when the ignition is ON. To convert the lighter/outlet to operate with the ignition OFF, perform the following:

- Remove the left instrument panel end cap from the left end of the instrument panel.
- Remove fuse #6 in the upper right of the junction block (Fig. 1) from its "IGN" position.



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Fig. 1 Cigar Lighter/Power Outlet Customer Preference Fuse Location

1 - FUSE #6

- Move the fuse slightly right and insert it in the fuse #6 "BAT" location in the junction block.
- Reinstall the left instrument panel end cap.

CAUTION:

• Many accessories that can be plugged in draw power from the vehicle's battery, even when not in use (i.e. cellular phones, etc.). Eventually, if plugged in long enough, the vehicle's battery will discharge sufficiently to degrade battery life and/or prevent engine starting.

• Accessories that draw higher power (i.e. coolers, vacuum cleaners, lights, etc.), will degrade the battery even more quickly. Only use these intermittently and with greater caution.

• After the use of high power draw accessories, or long periods of the vehicle not being started (with accessories still plugged in), the vehicle must be driven a sufficient length of time to allow the generator to recharge the vehicle's battery.

CIGAR LIGHTER/POWER OUTLET

DESCRIPTION

The power feed to the Cigar Lighter/Power Outlet can be HOT (12v - B+) with the ignition ON, or HOT (12v - B+) with the ignition OFF.

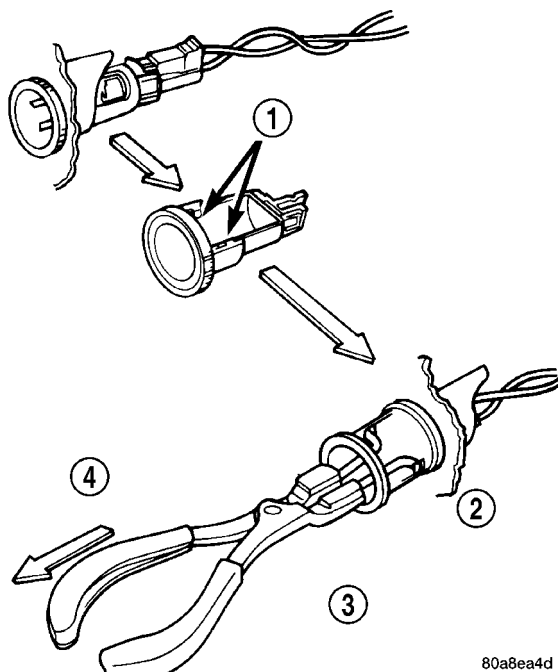
OPERATION

To change the operating mode of the Cigar Lighter/Power Outlet, (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION - STANDARD PROCEDURE).

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Look inside and note position of the retaining bosses (Fig. 2).
- (3) Using external snap ring pliers with 90 degree tips. Insert pliers with tips against bosses and squeeze forcing bosses out of base.
- (4) Pull out the base through mounting ring by gently rocking pliers. A tool can be made to do the same. Refer to (Fig. 3).
- (5) Disconnect the base wires.
- (6) Set base aside and remove base mount ring.

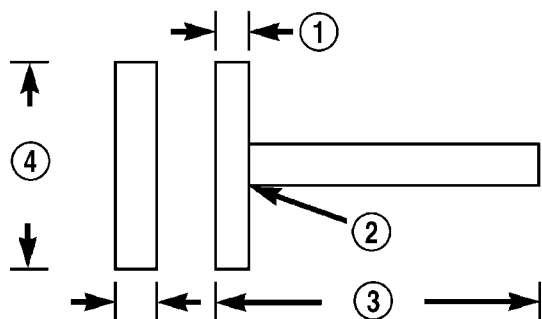
CIGAR LIGHTER/POWER OUTLET (Continued)



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Fig. 2 Cigar Lighter / Power Outlet Base Removal

- 1 - RETAINING BOSSES-ENGAGE PLIERS HERE
- 2 - PARTIALLY REMOVED
- 3 - EXTERNAL SNAP-RING PLIERS
- 4 - PULL BASE OUT-THROUGH MOUNTING RING



80a929c2

Fig. 3 Tool For Cigar Lighter / Power Outlet Removal

- 1 - 2.5MM (3/32 INS.)
- 2 - WELD
- 3 - 100MM (4 INS.)
- 4 - 22.25 TO 22.45MM (7/8 TO 57/64 INS.)

INSTALLATION

- (1) Install base mount ring.
- (2) Connect the base wires.
- (3) Firmly snap base into position inside of instrument panel.
- (4) Connect the negative battery cable remote terminal to the remote battery post.

IOD FUSE**DESCRIPTION**

All vehicles are equipped with an Ignition-Off Draw (IOD) fuse that is disconnected within the Junction Block when the vehicle is shipped from the factory. Dealer personnel are to reconnect the IOD fuse in the junction block as part of the preparation procedures performed just prior to new vehicle delivery.

On left hand drive vehicles, the left end of the instrument panel cover has a snap-fit fuse access panel that can be removed to provide service access to the fuses in the junction block. On right hand drive vehicles the junction block is mounted on the right hand side of the instrument panel. A finger recess is molded into the access panel for easy removal. An adhesive-backed fuse layout map is secured to the instrument panel side of the access panel to ensure proper fuse identification. The IOD fuse is a 15 ampere mini blade-type fuse, located in fuse cavity # 34. The fuse is secured within a White molded plastic fuse holder and puller unit that serves both as a tool for disconnecting and reconnecting the fuse in its junction block cavity, and as a fuse holder that conveniently stores the fuse in the same junction block cavity after it has been disconnected.

CIRCUITS INCLUDED WITH IOD FUSE

- Cluster
- Body Control Module
- Diagnostic Connector
- Map Lamps
- Glove Box Lamp
- Courtesy Lamps
- Compass Mini-Trip Computer
- Radio

OPERATION

The term ignition-off draw identifies a normal condition where power is being drained from the battery with the ignition switch in the Off position. The IOD fuse feeds the memory and sleep mode functions for some of the electronic modules in the vehicle as well as various other accessories that require battery current when the ignition switch is in the Off position. The only reason the IOD fuse is disconnected is to reduce the normal IOD of the vehicle electrical system during new vehicle transportation and pre-delivery storage to reduce battery depletion, while still allowing vehicle operation so that the vehicle can be loaded, unloaded and moved as needed by both vehicle transportation company and dealer personnel.

The IOD fuse is disconnected from JB fuse cavity # 34 when the vehicle is shipped from the assembly plant. Dealer personnel must reconnect the IOD fuse

IOD FUSE (Continued)

when the vehicle is being prepared for delivery in order to restore full electrical system operation. Once the vehicle is prepared for delivery, the IOD function of this fuse becomes transparent and the fuse that has been assigned the IOD designation becomes only another Fused B(+) circuit fuse.

The IOD fuse can be used by the vehicle owner as a convenient means of reducing battery depletion when a vehicle is to be stored for periods not to exceed about thirty days. However, it must be remembered that disconnecting the IOD fuse will not eliminate IOD, but only reduce this normal condition. If a vehicle will be stored for more than about thirty days, the battery negative cable should be disconnected to eliminate normal IOD; and, the battery should be tested and recharged at regular intervals during the vehicle storage period to prevent the battery from becoming discharged or damaged.

REMOVAL

The Ignition-Off Draw (IOD) fuse is disconnected from Junction Block fuse cavity # 34 when the vehicle is shipped from the assembly plant. Dealer personnel must reconnect the IOD fuse when the vehicle is being prepared for delivery in order to restore full electrical system operation.

- (1) Turn the ignition switch to the Off position.
- (2) Remove the fuse access panel by unsnapping it from the outboard end of the instrument panel.
- (3) Grasp the outer tabs of the IOD fuse holder unit in fuse cavity # 34 of the Junction Block between the thumb and forefinger and pull the unit firmly outward.
- (4) Install the fuse access panel by snapping it onto the outboard end of the instrument panel.

INSTALLATION

- (1) Turn the ignition switch to the Off position.
- (2) To install the IOD fuse, use a thumb to press the IOD fuse holder unit in fuse cavity # 34 firmly into the junction block.
- (3) Install the fuse access panel by snapping it onto the left outboard end of the instrument panel.

JUNCTION BLOCK

DESCRIPTION

An electrical Junction Block (JB) is located in the left endcap of the instrument panel (Fig. 4). The JB combines the functions previously provided by a separate fuseblock module and relay center. It also serves to simplify and centralize numerous electrical components, as well as to distribute electrical current to many of the accessory systems in the vehicle. It eliminates the need for numerous splice connections

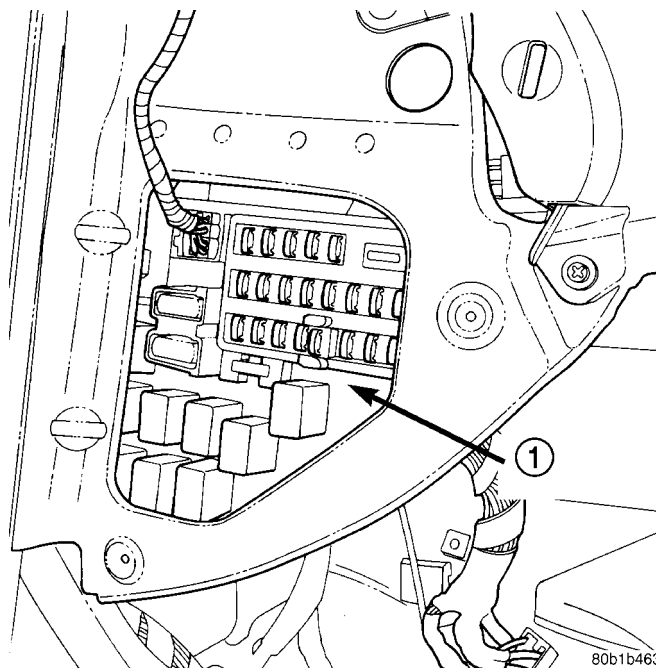


Fig. 4 Junction Block Location

1 - JUNCTION BLOCK/BCM

and serves in place of a bulkhead connector between many of the engine compartment, instrument panel, and body wire harnesses.

The JB is positioned on a mounting bracket up and under the left instrument panel. It is secured by four screws. The JB is concealed behind the left instrument panel endcap. The left instrument panel endcap is a snap-fit fuse access cover that conceals the JB fuses. A fuse puller and spare fuse holders are located on the back of the endcap, as well as the fuse layout to ensure proper fuse identification. The left instrument panel endcap must be removed to access components other than the fuses in the JB.

OPERATION

All of the current entering and leaving the JB does so through wire harnesses, which are connected to the JB through integral connector receptacles molded into the JB housing. The JB houses blade-type fuses, blade-type automatic resetting circuit breakers, full International Standards Organization (ISO) relays, and ISO micro-relays. Internal connection of all the JB circuits is accomplished by an intricate network of hard wiring and bus bars. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

The fuses, circuit breakers, relays, and are available for service replacement. The JB unit cannot be

JUNCTION BLOCK (Continued)

repaired and is only serviced as an assembly. If any internal circuit or the JB housing is faulty or damaged, the entire Junction Block assembly must be replaced.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, REFER TO ELECTRICAL, RESTRAINTS BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The Junction Block and Body Control Module (BCM) are attached to each other. After removal, they can be separated. The Junction Block/BCM assemblies are located on the driver's side of the vehicle.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Open the front driver's door and remove left end cap.

(3) Remove two screws from lower instrument panel cover (outside end). Pull rearward on lower instrument panel cover releasing clips. Disconnect decklid release switch wiring, cable to hood release, and remove cover from vehicle.

(4) Remove left knee blocker.

(5) Remove under column ducts.

(6) Remove Junction Block/BCM four mounting screws.

(7) Remove wire harness connectors from Junction Block/BCM.

(8) Remove Junction Block/BCM.

(9) Disconnect BCM wire connectors and RKE antenna connector.

(10) Remove Junction Block/BCM from vehicle.

INSTALLATION

(1) Install Junction Block/BCM to vehicle.

(2) Connect BCM wire connectors and RKE antenna connector.

(3) Install Junction Block/BCM.

(4) Install wire harness connectors to Junction Block/BCM.

(5) Install four mounting screws.

(6) Install under column ducts.

(7) Install left knee blocker.

(8) Connect cable to hood release, decklid release switch wiring, and install two screws to lower instrument panel.

(9) Install left end cap.

(10) Connect the negative battery cable remote terminal to the remote battery post.

POWER DISTRIBUTION CENTER

DESCRIPTION

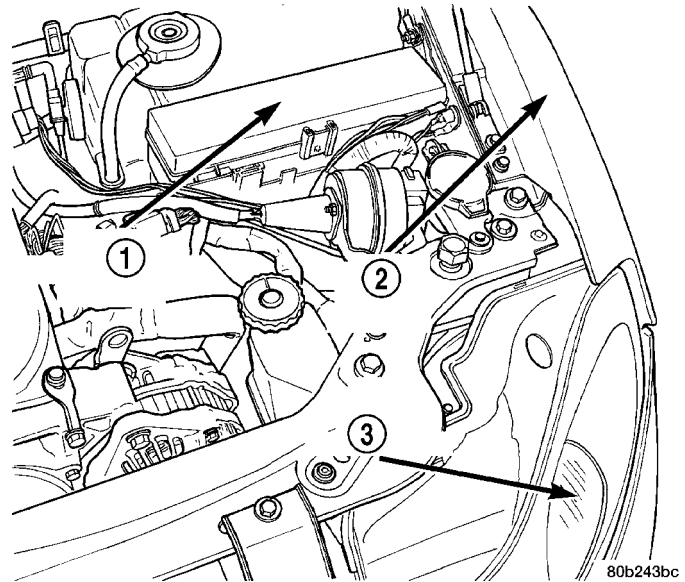


Fig. 5 Power Distribution Center Location

- 1 - POWER DISTRIBUTION CENTER
- 2 - LEFT FRONT FENDER
- 3 - LEFT FRONT HEADLAMP

All of the electrical current distributed throughout this vehicle is directed through the standard equipment Power Distribution Center (PDC) (Fig. 5). The molded plastic PDC housing is located in the left front corner of the engine compartment, just in front of the coolant reservoir bottle. The PDC housing has a molded plastic cover. The PDC cover is easily removed for service access and has a convenient fuse and relay layout label affixed to the inside surface of the cover to ensure proper component identification. The PDC housing is secured in the engine compartment by one screw to the rear of the PDC and two clips on the front side. A small molded plastic protective cover on the front right side of the engine compartment is unsnapped to access the battery/generator cable input connection studs.

OPERATION

All of the PDC outputs are through the integral engine compartment wire harness, which exits from the front of the PDC housing.

All of the current from the battery/generator cable connection enters the PDC through a 140 ampere fusible link that is secured with screws just inside the left end of the PDC housing. The PDC houses up to fourteen maxi-fuse cartridges, which replace all in-line fusible links. The PDC also houses up to six blade-type fuses, up to four full International Stan-

POWER DISTRIBUTION CENTER (Continued)

dards Organization (ISO) relays, and up to seven ISO micro-relays. Internal connection of all the PDC circuits is accomplished by an intricate network of hard wiring and bus bars. Refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, details of wire harness routing and retention, connector pin-out information and location views for the various wire harness connectors, splices and grounds.

The fusible link, fuse cartridges, fuses and relays are available for service replacement. The PDC unit cannot be repaired and is only serviced as a unit with the engine compartment wire harness. If the PDC is faulty or damaged, the engine compartment wire harness assembly must be replaced.

REMOVAL

The Power Distribution Center (PDC) is serviced as a unit with the engine compartment wire harness. If any internal circuit of the PDC or the PDC housing is faulty or damaged, the entire PDC and engine compartment wire harness unit must be replaced.

(1) Disconnect and isolate the battery negative remote cable.

(2) Disconnect each of the engine compartment wire harness connectors. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DIAGNOSIS AND TESTING) for more information on the locations of the affected connectors.

(3) Remove the fasteners that secure each of the engine compartment wire harness ground eyelets to the vehicle body and chassis components. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DIAGNOSIS AND TESTING) for more information on the ground eyelet locations.

(4) Disengage each of the retainers that secure the engine compartment wire harness to the vehicle body and chassis components. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DIAGNOSIS AND TESTING) for more information on the retainer locations.

(5) Remove one PDC mounting screw and disengage the PDC housing by pushing the locking tabs in on the PDC base. The mounting bracket blades are retained by a snap fit in the PDC mounting slots.

(6) Remove the PDC and the engine compartment wire harness from the engine compartment as a unit.

INSTALLATION

The Power Distribution Center (PDC) is serviced as a unit with the engine compartment wire harness. If any internal circuit of the PDC or the PDC housing is faulty or damaged, the entire PDC and engine compartment wire harness unit must be replaced.

NOTE: If the power distribution center (PDC) is being replaced with a new unit, be certain to transfer each of the fuses, fuse cartridges, fusible links and relays from the old power distribution center to the proper cavities of the new power distribution center. Refer to Electrical, Wiring Diagram Information for the proper power distribution center cavity assignments.

(1) Position the PDC over the mounting bracket in the engine compartment.

(2) Align the PDC mounting slots with the blades on the PDC mounting bracket.

(3) Push down firmly and evenly on the PDC housing until it snaps into place on the PDC mounting bracket.

(4) Route the engine compartment wire harness from the PDC through the engine compartment, engaging each of the harness retainers to the mounting provisions in the vehicle body and chassis components. Make sure to make clip attachment into the rail located behind the PDC. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DIAGNOSIS AND TESTING) for more information on the harness routing and retainer locations.

(5) Install and tighten the fasteners that secure each of the engine compartment wire harness ground eyelets to the vehicle body and chassis components. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DIAGNOSIS AND TESTING) for more information on the ground eyelet locations.

(6) Reconnect each of the engine compartment wire harness connectors. (Refer to 8 - ELECTRICAL/WIRING DIAGRAM INFORMATION - DIAGNOSIS AND TESTING) for more information on the locations of the affected connectors.

(7) Torque nut retaining positive battery cable at PDC to 96 - 141 N·m (85 - 130 in. lbs.).

(8) Reconnect the battery negative remote cable.

ENGINE

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ENGINE 2.7L

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ENGINE 2.7L

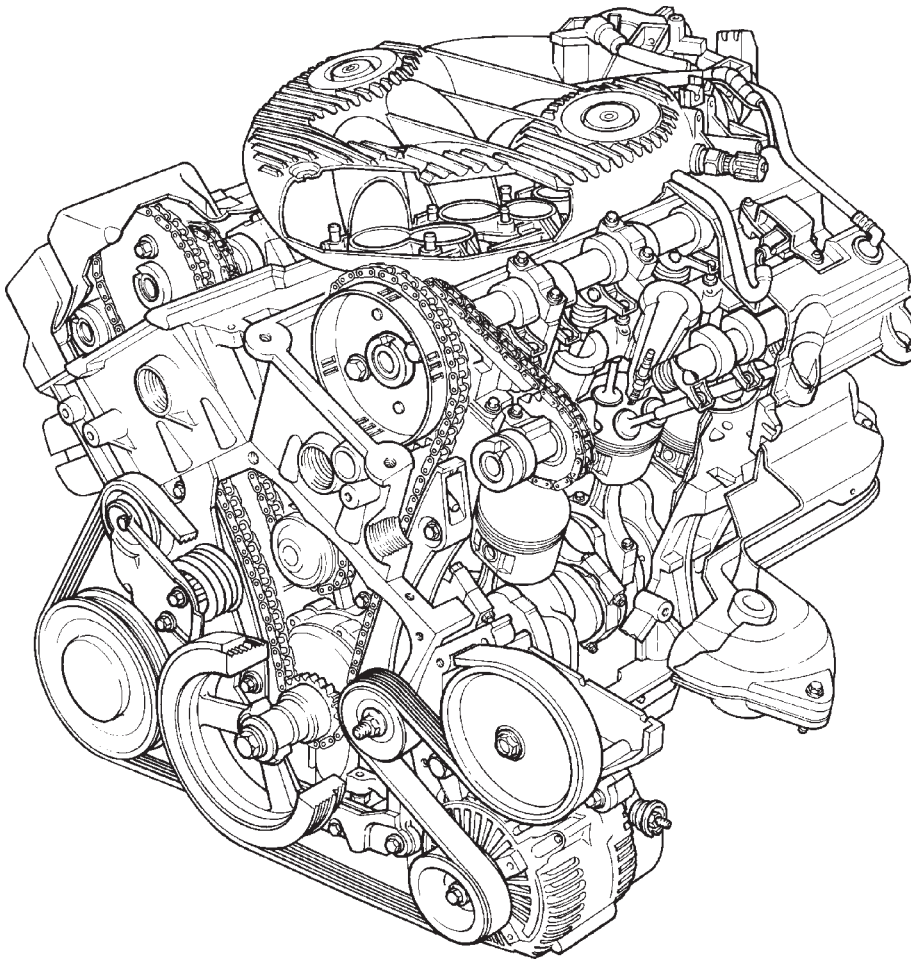
DESCRIPTION

The 2.7 Liter (167 Cubic Inches) 60 degree V-6 engine is a double overhead camshaft design with hydraulic lifters and four valves per cylinder (Fig. 1). The engine does not have provisions for a free wheeling valve train.

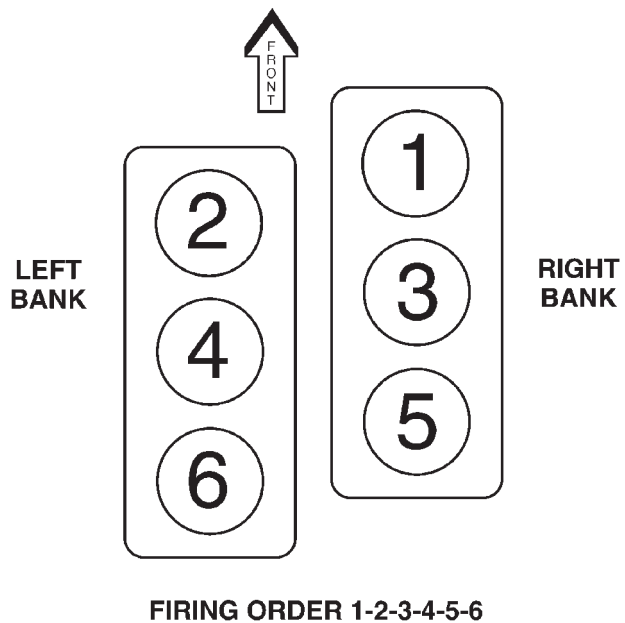
The cylinders are numbered from front to rear, with the right bank odd numbered, and the left bank even numbered (Fig. 2). The firing order is 1-2-3-4-5-6.

The engine identification number is located on the rear of the cylinder block just below the left cylinder head (Fig. 3)

ENGINE 2.7L (Continued)



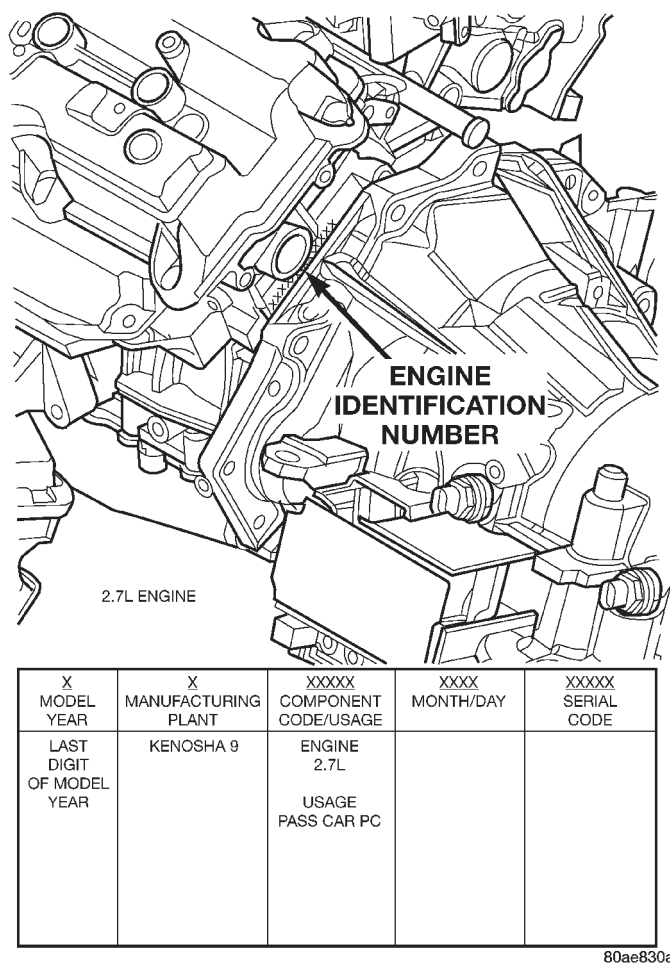
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Fig. 1 2.7 Liter Engine

80ae847a

Fig. 2 Cylinder Numbering and Firing Order

ENGINE 2.7L (Continued)

**Fig. 3 Engine Identification****DIAGNOSIS AND TESTING****DIAGNOSIS AND TESTING - ENGINE
DIAGNOSIS - INTRODUCTION**

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to the Engine Mechanical and the Engine Performance diagnostic charts, for possible causes and corrections of malfunctions (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - MECHANICAL) (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - PERFORMANCE).

For fuel system diagnosis, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING).

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Engine Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis
- Hydraulic Lash Adjuster Noise Diagnosis
- Engine Oil Leak Inspection

ENGINE 2.7L (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	<ol style="list-style-type: none"> 1. Weak battery. 2. Corroded or loose battery connections. 3. Faulty starter. 4. Faulty coil(s) or control unit. 5. Incorrect spark plug gap. 6. Contamination in fuel system. 7. Faulty fuel pump. 8. Incorrect engine timing. 	<ol style="list-style-type: none"> 1. Test battery. Charge or replace as necessary. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/BATTERY - DESCRIPTION) 2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals. 3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING) 4. Test and replace as needed. (Refer to Appropriate Diagnostic Information) 5. Check and adjust gap as needed. 6. Clean system and replace fuel filter. 7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information) 8. Check for a skipped timing belt/chain or a loose camshaft sprocket (3.2/3.5L).
ENGINE STALLS OR IDLES ROUGH	<ol style="list-style-type: none"> 1. Idle speed too low. 2. Incorrect fuel mixture. 3. Intake manifold leakage. 4. Faulty coil(s). 	<ol style="list-style-type: none"> 1. Test minimum air flow. (Refer to Appropriate Diagnostic Information) 2. (Refer to Appropriate Diagnostic Information) 3. Inspect intake manifold gasket, manifold, and vacuum hoses. 4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)

ENGINE 2.7L (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE LOSS OF POWER	<ol style="list-style-type: none"> 1. Dirty or incorrectly gapped plugs. 2. Contamination in fuel system. 3. Faulty fuel pump. 4. Incorrect valve timing. 5. Leaking cylinder head gasket. 6. Low compression. 7. Burned, warped, or pitted valves. 8. Plugged or restricted exhaust system. 9. Faulty coil(s). 	<ol style="list-style-type: none"> 1. Set gap as needed or replace plug(s). 2. Clean system and replace fuel filter. 3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information) 4. Correct valve timing as needed. 5. Replace cylinder head gasket. 6. Test compression of each cylinder. 7. Replace valves. 8. Check exhaust system restriction. Replace parts, as necessary. 9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	<ol style="list-style-type: none"> 1. Dirty or incorrectly gapped spark plugs. 2. Contamination in Fuel System. 3. Burned, warped, or pitted valves. 4. Faulty coil(s). 	<ol style="list-style-type: none"> 1. Set gap as needed or replace plug(s). 2. Clean fuel system and replace fuel filter. 3. Replace valves. 4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	<ol style="list-style-type: none"> 1. Dirty or incorrect spark plug gap. 2. Faulty coil(s). 3. Dirty fuel injector(s). 4. Contamination in fuel system. 	<ol style="list-style-type: none"> 1. Set gap as needed or replace plug(s). 2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information) Test and replace as necessary. (Refer to Appropriate Diagnostic Information) 4. Clean system and replace fuel filter.

ENGINE 2.7L (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	<ol style="list-style-type: none"> 1. High or low oil level in crankcase. 2. Thin or diluted oil. 3. Thick oil 4. Low oil pressure. 5. Dirt in tappets/lash adjusters. 6. Worn rocker arms. 7. Worn tappets/lash adjusters. 8. Worn valve guides. 9. Excessive runout of valve seats on valve faces. 10. Missing adjuster pivot. 	<ol style="list-style-type: none"> 1. Check and correct engine oil level. 2. Change oil to correct viscosity. 3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again. 4. Check and correct engine oil level. 5. Replace rocker arm/hydraulic lash adjuster assembly. 6. Inspect oil supply to rocker arms. 7. Install new rocker arm/hydraulic lash adjuster assembly. 8. Ream guides and install new valves with oversize stems. 9. Grind valve seats and valves. 10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	<ol style="list-style-type: none"> 1. Insufficient oil supply. 2. Low oil pressure. 3. Thin or diluted oil. 4. Thick oil 5. Excessive bearing clearance. 6. Connecting rod journal out-of-round. 7. Misaligned connecting rods. 	<ol style="list-style-type: none"> 1. Check engine oil level. 2. Check engine oil level. Inspect oil pump relief valve and spring. 3. Change oil to correct viscosity. 3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again. 5. Measure bearings for correct clearance. Repair as necessary. 6. Replace crankshaft or grind surface. 7. Replace bent connecting rods.

ENGINE 2.7L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	<ol style="list-style-type: none"> 1. Insufficient oil supply. 2. Low oil pressure. 3. Thin or diluted oil. 4. Thick oil 4. Excessive bearing clearance. 5. Excessive end play. 6. Crankshaft journal out-of-round or worn. 7. Loose flywheel or torque converter. 	<ol style="list-style-type: none"> 1. Check engine oil level. 2. Check engine oil level. Inspect oil pump relief valve and spring. 3. Change oil to correct viscosity. 3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again. 4. Measure bearings for correct clearance. Repair as necessary. 5. Check thrust bearing for wear on flanges. 6. Replace crankshaft or grind journals. 7. Tighten to correct torque.
OIL PRESSURE DROP	<ol style="list-style-type: none"> 1. Low oil level. 2. Faulty oil pressure sending unit. 3. Low oil pressure. 4. Clogged oil filter. 5. Worn parts in oil pump. 6. Thin or diluted oil. 7. Oil pump relief valve stuck. 8. Oil pump suction tube loose. 9. Oil pump cover warped or cracked. 10. Excessive bearing clearance. 	<ol style="list-style-type: none"> 1. Check engine oil level. 2. Install new sending unit. 3. Check sending unit and main bearing oil clearance. 4. Install new oil filter. 5. Replace worn parts or pump. 6. Change oil to correct viscosity. 7. Remove valve and inspect, clean, or replace. 8. Remove oil pan and install new tube or clean, if necessary. 9. Install new oil pump. 10. Measure bearings for correct clearance.
OIL LEAKS	<ol style="list-style-type: none"> 1. Misaligned or deteriorated gaskets. 2. Loose fastener, broken or porous metal part. 3. Misaligned or deteriorated cup or threaded plug. 	<ol style="list-style-type: none"> 1. Replace gasket(s). 2. Tighten, repair or replace the part. 3. Replace as necessary.

ENGINE 2.7L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	<ol style="list-style-type: none"> 1. PCV system malfunction. 2. Worn, scuffed or broken rings. 3. Carbon in oil ring slots. 4. Rings fitted too tightly in grooves. 5. Worn valve guide(s). 6. Valve stem seal(s) worn or damaged. 	<ol style="list-style-type: none"> 1. Check system and repair as necessary. (Refer to Appropriate Diagnostic Manual) 2. Hone cylinder bores. Install new rings. 3. Clean pistons and install new rings. 4. Remove rings and check grooves. If groove is not proper width, replace piston. 5. Replace cylinder head(s). 6. Replace seal(s).

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

- (1) Check engine oil level and add oil if necessary.
- (2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.
- (3) Disconnect and remove all ignition coils from spark plugs.

(4) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.

(5) Be sure throttle blade is fully open during the compression check.

(6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0–500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(7) Crank engine until maximum pressure is reached on gage. Record this pressure as #1 cylinder pressure.

(8) Repeat the previous step for all remaining cylinders.

(9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.

(10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.

(11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).
- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

- Clean spark plug recesses with compressed air.
- Remove the spark plugs.
- Remove the oil filler cap.
- Remove the air cleaner.

ENGINE 2.7L (Continued)

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

STANDARD PROCEDURE

STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It

will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed-plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

ENGINE 2.7L (Continued)

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 4)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 4)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 4)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

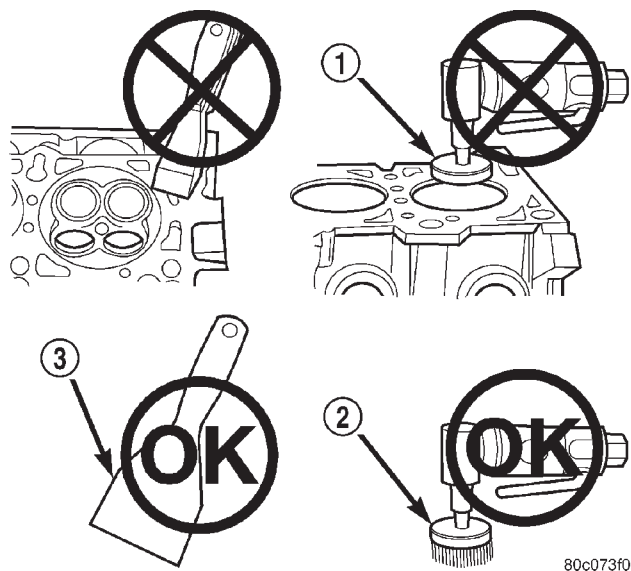
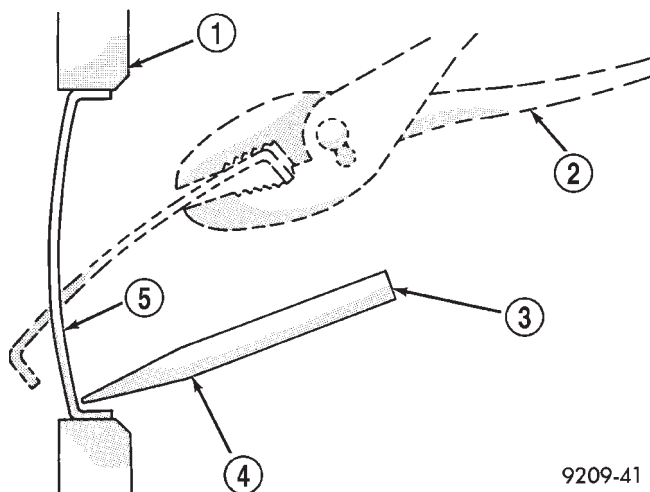


Fig. 4 Proper Tool Usage For Surface Preparation

- 1 - ABRASIVE PAD
2 - 3M ROLOC™ BRISTLE DISC
3 - PLASTIC/WOOD SCRAPER

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).



9209-41

Fig. 5 Core Hole Plug Removal

- 1 - CYLINDER BLOCK
2 - REMOVE PLUG WITH PLIERS
3 - STRIKE HERE WITH HAMMER
4 - DRIFT PUNCH
5 - CUP PLUG

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

ENGINE 2.7L (Continued)

STANDARD PROCEDURE - HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.

(2) Remove negative battery cable.

(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.

(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.

(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).

(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)

(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

(8) Install new spark plugs.

(9) Drain engine oil and remove oil filter.

(10) Install a new oil filter.

(11) Fill engine with specified amount of approved oil.

(12) Connect negative battery cable.

(13) Start engine and check for any leaks.

STANDARD PROCEDURE - MEASURING BEARING CLEARANCE USING PLASTIGAGE

Engine crankshaft bearing clearances can be determined by use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

(1) Remove oil film from surface to be checked. Plastigage is soluble in oil.

(2) Place a piece of Plastigage across the entire width of the bearing shell in the cap approximately 6.35 mm (1/4 in.) off center and away from the oil holes (Fig. 6). (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap bolts of the bearing being checked to the proper specifications.

(3) Remove the bearing cap and compare the width of the flattened Plastigage with the metric

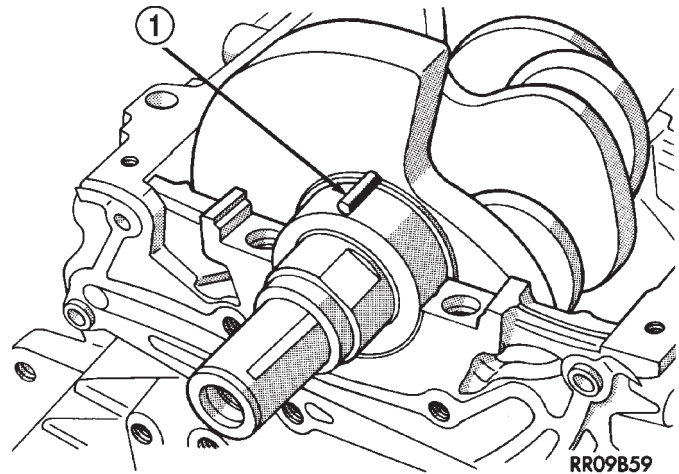


Fig. 6 Plastigage Placed in Lower Shell—Typical

1 - PLASTIGAGE

scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance in thousandths of a millimeter. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Compare clearance measurements to specs found in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.**

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

(4) Install the proper crankshaft bearings to achieve the specified bearing clearances.

REMOVAL - ENGINE ASSEMBLY

(1) Release fuel pressure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable at remote jumper terminal located at right strut tower (Fig. 7).

(3) Mark hood position at hinges and remove hood. (Refer to 23 - BODY/HOOD/HOOD - REMOVAL)

(4) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(5) Remove both wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL)

(6) Remove right and left cowl screens. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE AND SCREEN - REMOVAL)

(7) Remove strut tower brace. (Refer to 23 - BODY/EXTERIOR/FRONT STRUT TOWER TO TOWER BRACE - REMOVAL)

ENGINE 2.7L (Continued)

(8) Remove air cleaner assembly and air inlet hose (Fig. 8).

(9) Remove upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)

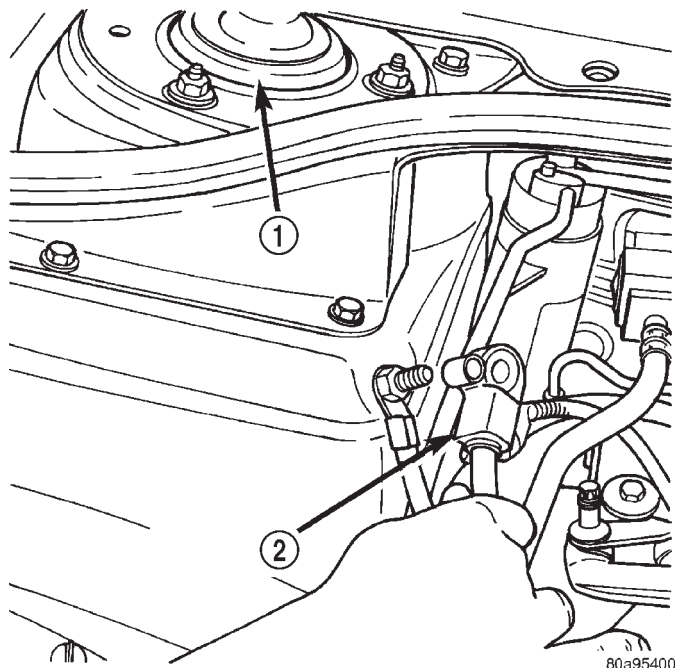


Fig. 7 Negative Cable Remote Terminal

- 1 - RIGHT STRUT TOWER
2 - BATTERY NEGATIVE CABLE

(10) Disconnect hood release cable from hood latch.
(11) Remove radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)

(12) Disconnect radiator upper hose at engine.

(13) Disconnect radiator lower hose at radiator.

(14) Remove radiator. (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL)

(15) Remove accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(16) Remove power steering pump mounting bolts and set pump aside. (Refer to 19 - STEERING/PUMP - REMOVAL)

NOTE: Generator can be removed with engine assembly.

(17) Disconnect A/C compressor electrical connector.

(18) Remove A/C compressor mounting bolts and set compressor aside.

(19) Loosen and remove V-Band clamps at exhaust manifolds.

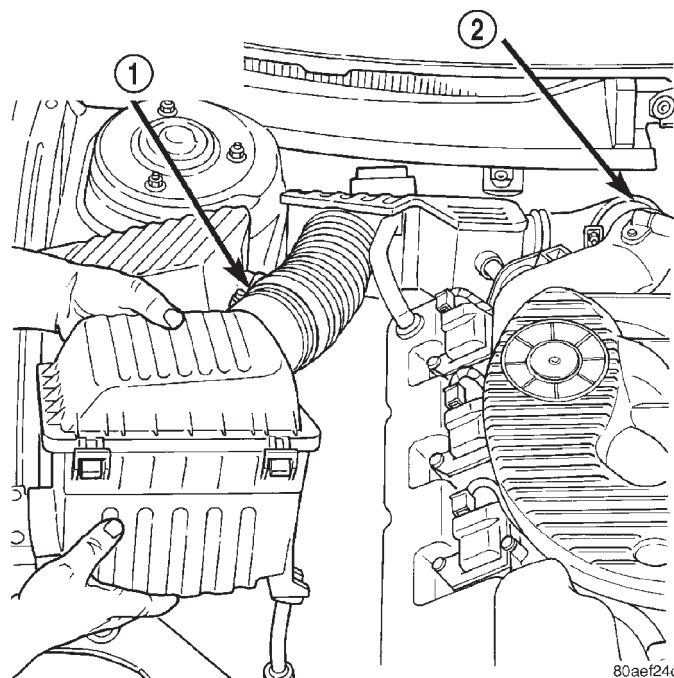


Fig. 8 Air Cleaner and Inlet Hose

- 1 - AIR CLEANER ASSEMBLY WITH AIR INLET HOSE
2 - THROTTLE BODY

(20) Disconnect throttle and speed control cables. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - REMOVAL)

(21) Disconnect coolant hoses at coolant pressure/recovery container.

(22) Disconnect heater hoses.

(23) Perform fuel pressure release procedure and disconnect fuel line. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(24) Disconnect all vacuum lines and electrical connectors.

(25) Disconnect all ground straps attaching to engine.

(26) Hoist vehicle and drain engine oil.

(27) Remove fasteners supporting catalytic converter down pipes at front and rear mounts.

(28) Remove structural collar. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - REMOVAL)

(29) Mark flex plate to torque converter position. Remove torque converter bolts.

(30) Disconnect both transaxle cooler line brackets from engine.

(31) Remove starter. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)

(32) Remove crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - REMOVAL)

(33) Remove the two lower transaxle to block bolts.

ENGINE 2.7L (Continued)

- (34) Lower vehicle.
- (35) Remove screws attaching fuel line and electrical harness to the throttle body bracket.
- (36) Remove the fasteners attaching the following brackets to the transaxle to block double-ended bolts:
 - Electrical harness attaching bracket.
 - Transaxle shift cable attaching bracket.
 - Throttle body support bracket.
- (37) Remove the upper transaxle to block bolts.
- (38) Remove right and left engine mount isolator to engine mount bracket fasteners.

CAUTION: Intake manifolds and cylinder head covers are a composite design. Therefore, care should be taken when lifting the engine from engine compartment.

- (39) Attach Special Tool 8342, Engine Lifting Fixture to engine at the locations shown in (Fig. 9).
- (40) Support transaxle with a floor jack.
- (41) Hoist engine from engine compartment.

INSTALLATION - ENGINE ASSEMBLY

- (1) Attach Special Tool 8342, Engine Lifting Fixture to engine (Fig. 9). Lower engine into engine compartment.

CAUTION: Do not tighten the transaxle case to engine block bolts until all bolts have been hand started, and the two mating surfaces are completely joined together, as damage to cylinder block or transaxle could occur.

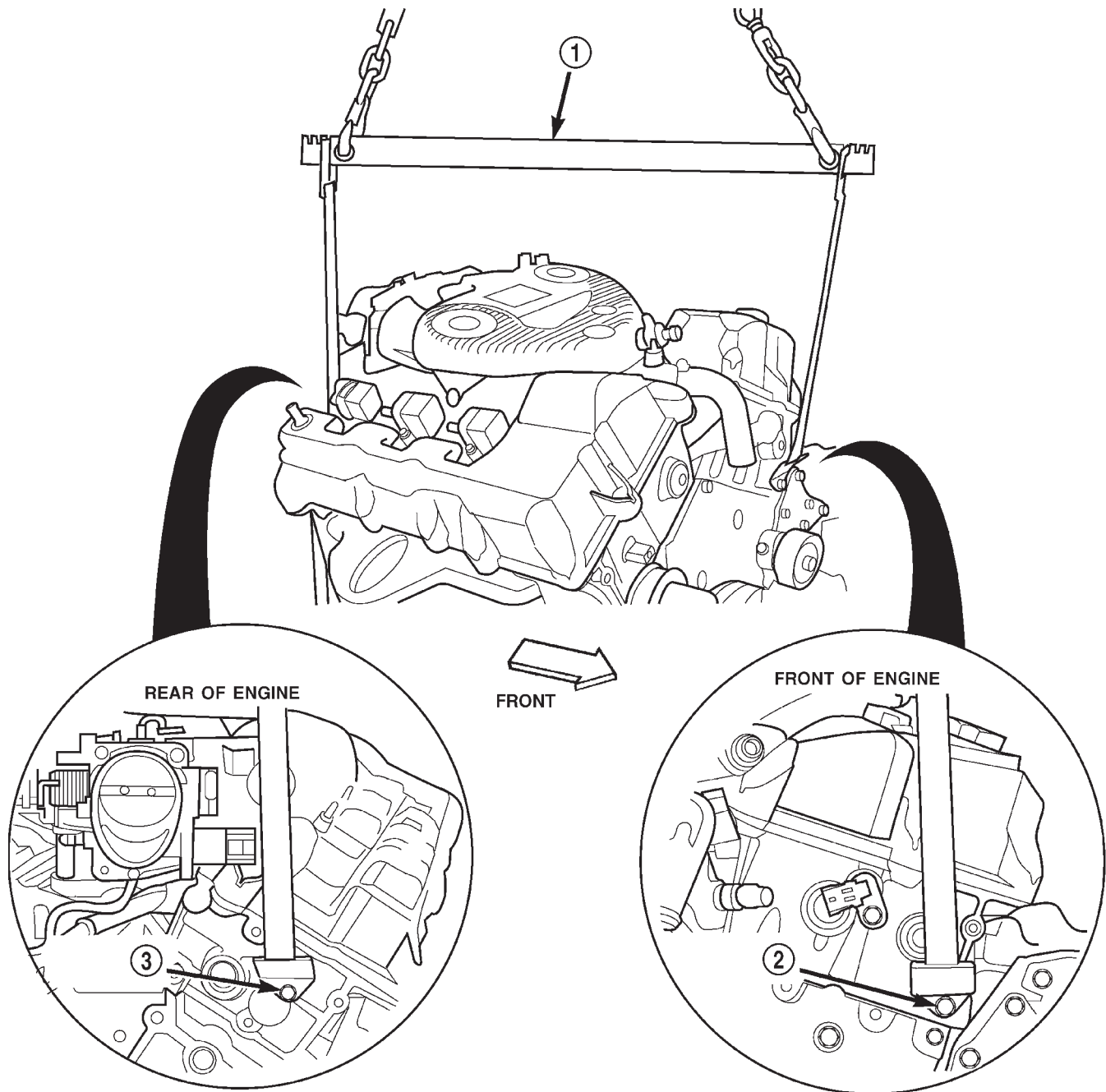
- (2) Align engine mounts and install fasteners but **do not tighten** until all mounting bolts have been installed.
- (3) Install transaxle case to engine block bolts and tighten to 102 N·m (75 ft. lbs.).
- (4) Remove 8342 Engine Lifting Fixture.
- (5) Tighten left and right engine mount isolator to engine mount bracket fasteners to 61 N·m (45 ft. lbs.).
- (6) Raise vehicle.
- (7) Align flex plate to torque converter. Install mounting bolts and tighten to 75 N·m (55 ft. lbs.).
- (8) Install crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - INSTALLATION)
- (9) Install starter. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)
- (10) Install the transaxle oil cooler lines bracket to engine.
- (11) Install structural collar to oil pan and transaxle. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION)

- (12) Lower vehicle.
- (13) Install rear throttle body support bracket.
- (14) Install electrical harness and fuel line support brackets to the throttle body support bracket.
- (15) Install fastener attaching electrical harness bracket to the transaxle to block bolt.
- (16) Connect heater hoses.
- (17) Connect all ground straps to engine.
- (18) Connect all vacuum hoses and electrical connectors.
- (19) Connect both hoses at coolant pressure/recovery container.
- (20) Connect throttle and speed control cables.
- (21) Connect fuel line. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

NOTE: Do not reuse V-Band clamps.

- (22) Install new V-Band clamps at exhaust manifolds and tighten to 11 N·m (100 in. lbs.).
- (23) Install catalytic converter down pipe front and rear supports.
- (24) Install air conditioning compressor. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/A/C COMPRESSOR - INSTALLATION)
- (25) Install power steering pump. (Refer to 19 - STEERING/PUMP - INSTALLATION)
- (26) Install radiator. (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION)
- (27) Connect engine oil cooler lines to radiator (if equipped).
- (28) Connect transmission oil cooler lines to radiator.
- (29) Attach A/C condenser to radiator.
- (30) Install lower radiator hose.
- (31) Install upper radiator hose.
- (32) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
- (33) Install radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)
- (34) Refill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (35) Fill engine with proper amount of oil.
- (36) Connect hood release cable to hood latch and install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)
- (37) Install air cleaner and air inlet hose.
- (38) Install cowl support. (Refer to 23 - BODY/EXTERIOR/FRONT STRUT TOWER TO TOWER BRACE - INSTALLATION)

ENGINE 2.7L (Continued)



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Fig. 9 ENGINE LIFTING FIXTURE

1 - SPECIAL TOOL 8342 - ENGINE LIFTING FIXTURE
 2 - ATTACHING LOCATION - FRONT OF ENGINE

3 - ATTACHING LOCATION - REAR OF ENGINE

(39) Install right and left cowl screens. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE AND SCREEN - INSTALLATION)

(40) Install both wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION)

(41) Install hood. (Refer to 23 - BODY/HOOD/HOOD - INSTALLATION)

(42) Connect negative cable to remote jumper terminal at right strut tower.

(43) Start engine and operate until operating temperature is reached.

ENGINE 2.7L (Continued)

SPECIFICATIONS

2.7L ENGINE

DESCRIPTION	SPECIFICATION
General Specifications	
Type	60° DOHC V-6 24-Valve
Displacement	2.7 Liters (167 Cubic Inches)
Bore & Stroke	86.0 x 78.5 mm (3.386 in. x 3.091 in.)
Compression Ratio	9.67:1
Lead Cylinder	#1 Right Bank
Firing Order	1-2-3-4-5-6
Cylinder Block	
Cylinder Bore Diameter	86.0 mm ±0.0076 (3.3859 in. ±0.0003)
Out of Round (Max.)	0.076 mm (0.003 in.)
Taper (Max.)	0.051 mm (0.002 in.)
Pistons	
Material	Aluminum Alloy
Piston Diameter	85.983 mm ±0.019 (3.3851 in. ±0.0017)
Clearance at Size Location	– 0.0096 to +0.0436 mm (– 0.0003 to +0.0016 in.)
Piston Weight	316–326 grams (11.1466–11.4994 oz.)
Piston Ring Groove Diameter—No. 1	77.8–78 mm (3.063–3.070 in.)
Piston Ring Groove Diameter—No. 2	75.9–76.1 mm (2.988–2.996 in.)
Piston Ring Groove Diameter—No. 3	76.5–76.7 mm (3.011–3.019 in.)
Piston Pins	
Type	Full Floating
Pin Diameter	21.997–22.000 mm (0.8661–0.8662 in.)
Clearance in Piston	0.005–0.013 mm (0.0002–0.0005 in.)
Clearance in Rod	0.007–0.018 mm (0.0003–0.0008 in.)

DESCRIPTION	SPECIFICATION
Piston Rings	
Ring Gap—Top Compression Ring	0.20–0.36 mm (0.008–0.014 in.)
Ring Gap—2nd Compression Ring	0.37–0.63 mm (0.0146–0.0249 in.)
Ring Gap—Oil Control (Steel Rails)	0.25–0.76 mm (0.010–0.030 in.)
Piston Ring Side Clearance	
Compression Ring—Top	0.035–0.083 mm (0.0013–0.0032 in.)
Compression Ring—Second	0.040–0.080 mm (0.0016–0.0031 in.)
Oil Ring (Steel Rails)	0.058–0.204 mm (0.0022–0.0080 in.)
Piston Ring Width	
Compression Rings—Top and Second	1.47–1.49 mm (0.0579–0.0587 in.)
Oil Ring (Steel Rails)	0.445–0.470 mm (0.0176–0.0186 in.)
Connecting Rods	
Bearing Clearance	0.024–0.064 mm (0.001–0.0026 in.)
Side Clearance	0.13–0.38 mm (0.0052–0.015 in.)
Side Clearance (Max.)	0.4318 mm (0.017 in.)
Piston Pin Bore Diameter	22.007–22.015 mm (0.8665–0.8668 in.)
Bearing Bore Out of Round (Max.)	0.004 mm (0.0002 in.)
Total Weight (Less Bearing)	529.9 ±7 grams (18.6917 ±0.247 oz.)
Crankshaft Main Bearing Journals	
Diameter	63.49–63.51 mm (2.4997–2.5004 in.)
Bearing Clearance	0.035–0.053 mm (0.0014–0.0021 in.)
Bearing Clearance (Max.)	0.087 mm (0.0034 in.)
Out of Round (Max.)	0.015 mm (0.0006 in.)

ENGINE 2.7L (Continued)

DESCRIPTION	SPECIFICATION
Taper (Max.)	0.015 mm (0.0006 in.)
End Play	0.0475–0.2725 mm (0.0019–0.0108 in.)
End Play (Max.)	0.43 mm (0.017 in.)
Connecting Rod Journals	
Diameter	53.51–53.49 mm (2.1067–2.106 in.)
Bearing Clearance	0.024–0.064 mm (0.001–0.0026 in.)
Out of Round (Max.)	0.015 mm (0.0006 in.)
Taper (Max.)	0.015 mm (0.0006 in.)
Camshaft	
Bore Diameter	24.050–24.071 mm (0.9469–0.09476 in.)
Bearing Journal Diameter	24.000–23.981 (0.9449–0.9441 in.)
Bearing Clearance	0.05–0.09 mm (0.0020–0.0035 in.)
Bearing Clearance (Max.)	0.13 mm (0.0051 in.)
End Play	0.13 mm (0.0051–0.0110 in.)
Valve Timing—Intake Valve	
Opens (ATDC)	2°
Closes (ABDC)	44°
Duration	222°
Valve Timing—Exhaust Valve	
Opens (BBDC)	36°
Closes (ATDC)	4°
Duration	220°
Valve Overlap	2°
Cylinder Head	
Gasket Thickness (Compressed)	1.50 mm ±0.05 (0.0591 in. ±0.002 in.)
Valve Seat Angle	45°–45.5°
Valve Seat Runout (Max.)	0.05 mm (0.002 in.)

DESCRIPTION	SPECIFICATION
Intake Valve Seat Width	1.00–1.5 mm (0.0394–0.0591 in.)
Exhaust Valve Seat Width	1.25–1.75 mm (0.0492–0.0689 in.)
Guide Bore Diameter (Std.)	5.975–6.00 mm (0.2353–0.2363 in.)
Valve Guide Height*—Intake & Exhaust	13.25–13.75 mm (0.5217–0.5414 in.)
*Measured from cylinder head surface to top of guide	
Valves	
Face Angle	44.5°–45.5°
Head Diameter—Intake	33.67–33.93 (1.3256–1.3358 in.)
Head Diameter—Exhaust	27.67–27.93 mm (1.0894–1.1000 in.)
Length—Intake (Overall)	107.89–108.39 mm (4.2476–4.2673 in.)
Length—Exhaust (Overall)	105.88–106.38 mm (4.1685–4.1882 in.)
Stem Diameter—Intake	5.934–5.952 mm (0.2337–0.2344 in.)
Stem Diameter—Exhaust	5.906–5.924 mm (0.2326–0.2333 in.)
Stem-to-Guide Clearance—Intake (New)	0.023–0.066 mm (0.0009–0.0026 in.)
Stem-to-Guide Clearance—Exhaust (New)	0.051–0.094 mm (0.002–0.0037 in.)
Stem-to-Guide Clearance—Intake (Max., Rocking Method)	0.29 mm (0.0114 in.)
Stem-to-Guide Clearance—Exhaust (Max., Rocking Method)	0.370 mm (0.0146 in.)
Valve Lift—Intake (Zero Lash)	9.0 mm (0.3543 in.)
Valve Lift—Exhaust (Zero Lash)	8.0 mm (0.3150 in.)
Valve Stem Tip Height—Intake	47.120 ±0.467 mm (1.8551 ±0.00184 in.)
Valve Stem Tip Height—Exhaust	48.672 ±0.467 mm (1.9162 ±0.00184 in.)

ENGINE 2.7L (Continued)

DESCRIPTION	SPECIFICATION
Valve Spring	
Free Length—Intake & Exhaust (Approx.)	45.63 mm (1.7965 in.)
Spring Force—Intake & Exhaust (Valve Closed)	249–284 N @ 38.0 mm (56.0–64.0 lbs. @ 1.4961 in.)
Spring Force—Intake (Valve Open)	658–721 N @ 29.0 mm (147.9–162.1 lbs. @ 1.1417 in.)
Spring Force—Exhaust (Valve Open)	614–671 N @ 30.0 mm (138.0–150.8 lbs. @ 1.1811 in.)
Number of Coils—Intake & Exhaust	7.35
Wire Diameter—Intake & Exhaust	3.861 mm (0.1520 in.)
Installed Height—Intake & Exhaust (Spring seat to bottom of retainer)	38.0 mm (1.4961 in.)
Oil Pump	
Clearance Over Rotors (Max.)	0.077 mm (0.003 in.)
Cover—Out-of-Flat (Max.)	0.025 mm (0.001 in.)
Inner & Outer Rotor Thickness	9.475–9.500 mm (0.3731–0.3741 in.)
Outer Rotor Clearance (Max.)	0.39 mm (0.015 in.)
Outer Rotor Diameter (Min.)	89.175 mm (3.5109 in.)
Tip Clearance Between Rotors (Max.)	0.20 mm (0.008 in.)
Oil Pressure	
(NOTE: At Normal Operating Temperatures)	
Pressure @ Curb Idle Speed*	34.7 kPa Min. (5 psi) Min.
Pressure @ 3000 RPM	300–724 kPa (45–105 psi)
*CAUTION: If oil pressure is zero at idle, DO NOT run engine at 3000 RPM.	

TORQUE

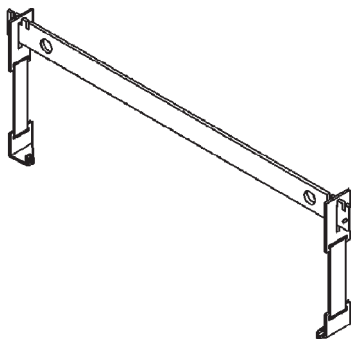
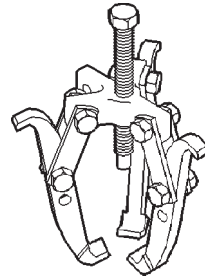
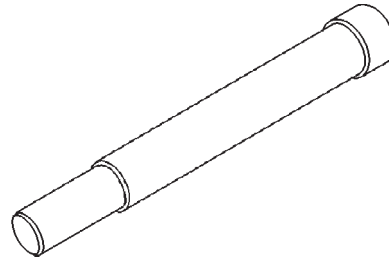
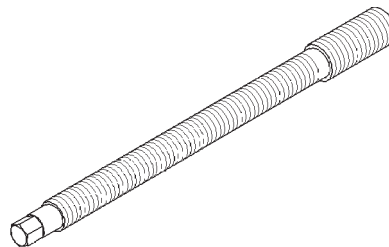
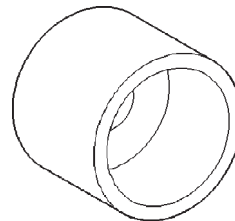
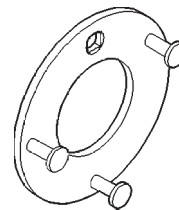
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
A/C Compressor to Engine—Bolts	28	21	—
Camshaft Sprocket—Bolts	28	—	250
Camshaft Chain Tensioner (Secondary)—Bolts	12	—	105
Camshaft Bearing Cap—Bolts	12	—	105
Connecting Rod Cap—Bolts	27 + ¹ / ₄ Turn	20 + ¹ / ₄ Turn	—
Crankshaft Main Bearing Cap			
—Tie Bolts	28	—	250
—Inner Cap Bolts	20 + ¹ / ₄ Turn	15 + ¹ / ₄ Turn	—
—Outer Cap Bolts	27 + ¹ / ₄ Turn	20 + ¹ / ₄ Turn	—
Crankshaft Damper—Bolt	170	125	—
Cylinder Head—Bolts	(Refer to 9 - ENGINE/ CYLINDER HEAD - INSTALLATION)		
Cylinder Head Cover—Bolts	12	—	105
Exhaust Manifold—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Exhaust Manifold to Catalytic Converter V-Band Clamp	11	—	100
Engine Mount Bracket to Block—Bolts	61	45	—
Engine Mount Isolator—Nuts	61	45	—
Intake Manifold (Upper and Lower)—Bolts	12	—	105
Generator Bracket—Bolts	41	30	—
Oil Pan			
—Bolts	28	—	250
—Nuts	12	—	105
Oil Pan Drain—Plug	27	20	—
Oil Filter	16	12	—
Oil Pump to Block—Bolts	28	—	250

ENGINE 2.7L (Continued)

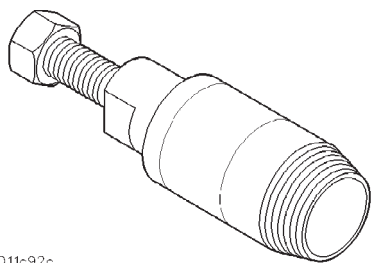
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Oil Pump Cover—Bolts	12	—	105
Oil Pump Pick Up Tube—Bolt	28	—	250
PCV Valve	7	—	60
Crankshaft Rear Seal Retainer—Bolts	12	—	105
Spark Plugs	20	15	—
Starter Mounting—Bolts	41	30	—
Structural Collar	(Refer to 9 - ENGINE/ ENGINE BLOCK/ STRUCTURAL COVER - INSTALLATION)		
Thermostat Housing/ Water Inlet Connector— Bolts	12	—	105
Throttle Body—Bolts	12	—	105
Timing Chain Cover			
—M6 Bolts	12	—	105
—M10 Bolts	54	40	—
Timing Chain Tensioner (Primary)	54	40	—
Timing Chain Guide Access Plug	20	15	—
Water Pump—Bolts	12	—	105
Cooling System Bleed Screw	12	—	105
Water Outlet Housing— Bolts	12	—	105

SPECIAL TOOLS

2.7L ENGINE

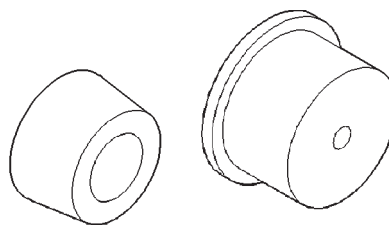
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ENGINE 2.7L (Continued)

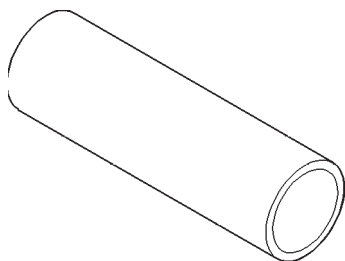


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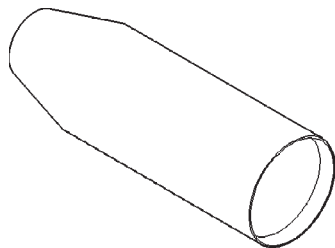
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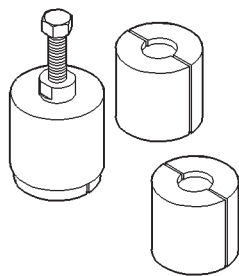
Crankshaft Rear Seal Guide 6926-1 & Installer 6926-2



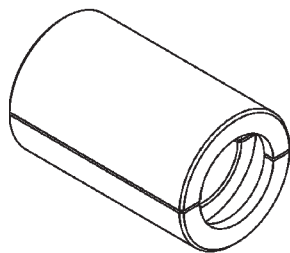
Crankshaft Seal & Sprocket Installer 6780-1



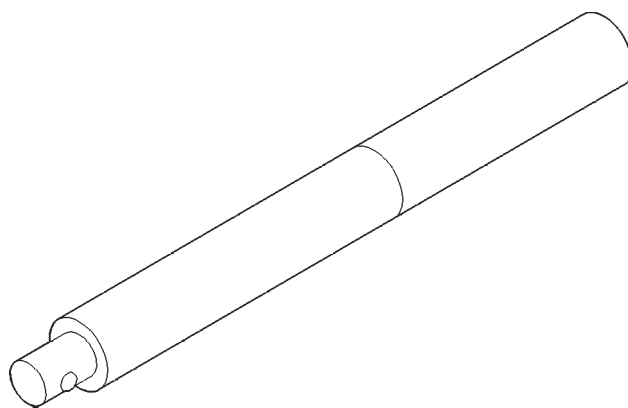
Crankshaft Seal Protector 6780-2



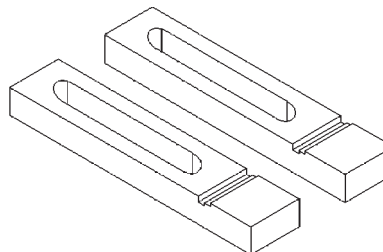
Puller 5048



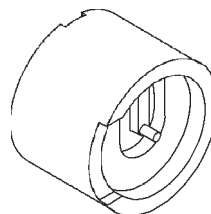
Puller Adaptor 8539



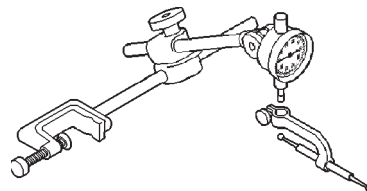
Driver Handle C-4171



Crankshaft Real Seal Retainer Alignment Fixture 8225



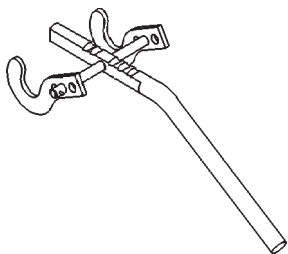
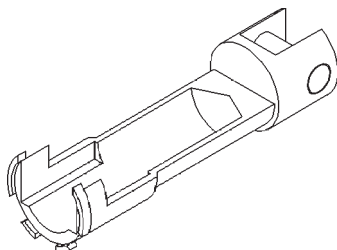
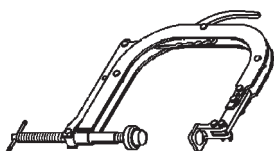
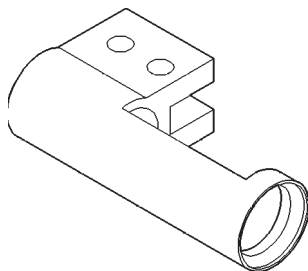
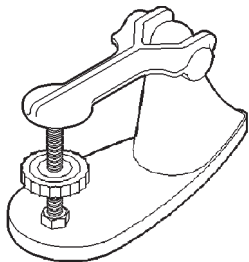
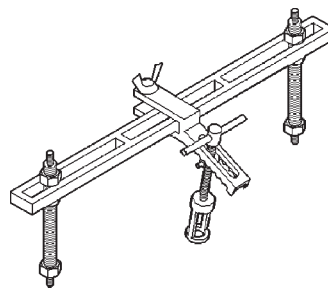
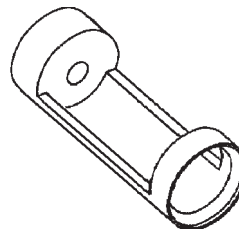
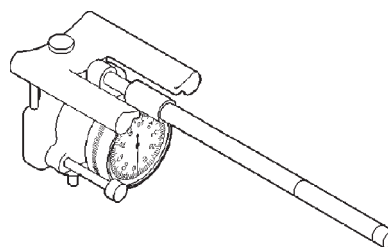
Timing Chain Tensioner Resetting Gauge 8186



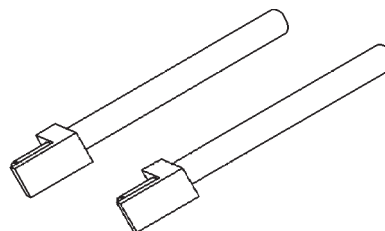
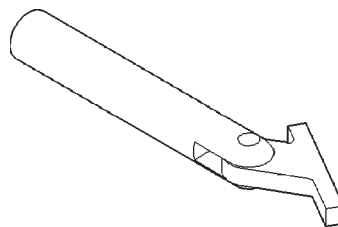
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Dial Indicator C-3339

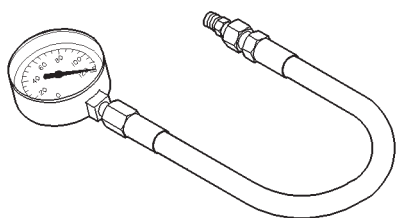
ENGINE 2.7L (Continued)

**Valve Spring Compressor 8215****Adapter 8216****Valve Spring Compressor C-3422-D****Valve Spring Adapter 6526****Valve Spring Tester C-647****Valve Spring Compressor MD-998772-A****Valve Spring Adapter 6527**

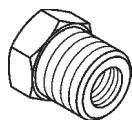
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Indicator Bore Size C-119**Connecting Rod Installation Guides 8189****Main Bearing Remover/Installer C-3059**

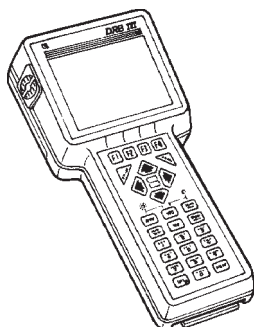
ENGINE 2.7L (Continued)



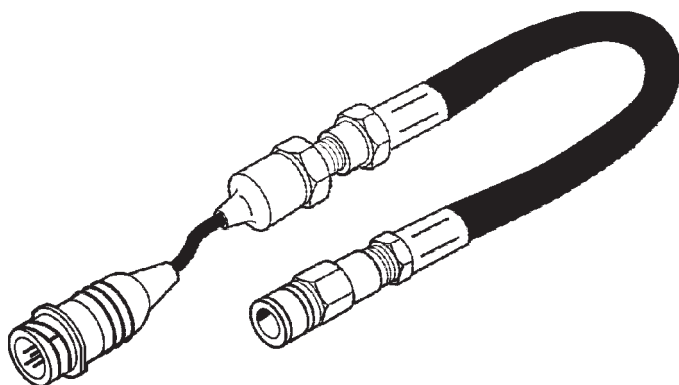
Pressure Gauge C-3292



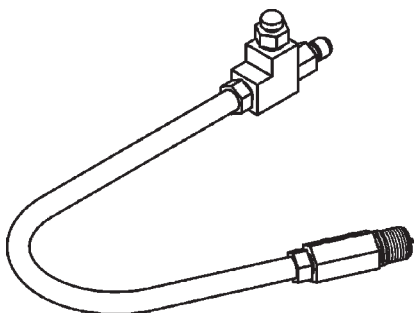
Adapter 8406



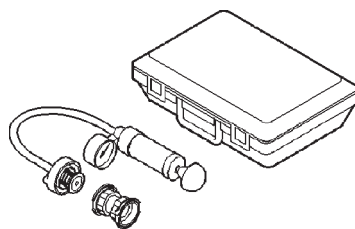
DRBIII® with PEP Module – OT-CH6010A



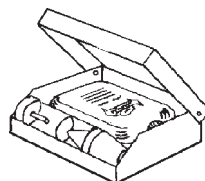
Pressure Transducer CH7059



Adaptor 8116



Cooling System Tester 7700



Combustion Leak Tester C-3685-A

AIR CLEANER ELEMENT

REMOVAL

- (1) Remove air cleaner lid. Lift lid off of air cleaner housing.
- (2) Remove filter element (Fig. 10).

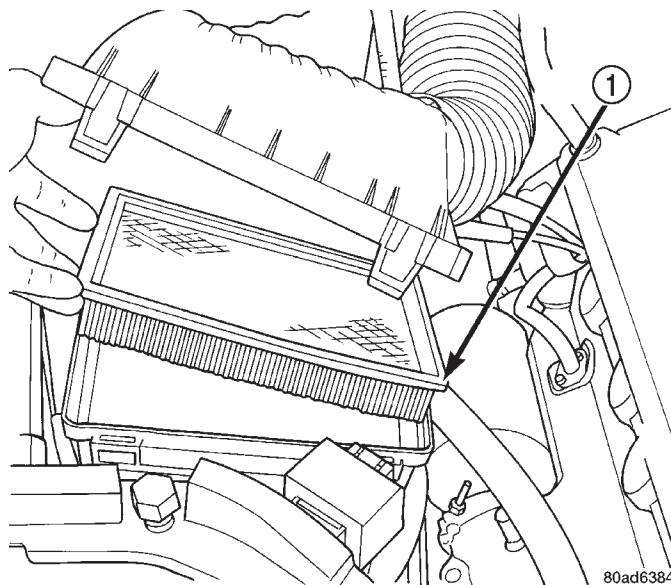


Fig. 10 Air Cleaner Housing and Element

1 - AIR FILTER ELEMENT

INSTALLATION

- (1) If necessary, clean the inside of the air cleaner housing.
- (2) Install new filter element (Fig. 10).
- (3) Place lid over air cleaner housing.

CYLINDER HEAD

DESCRIPTION

The cylinder heads are made of an aluminum alloy (Fig. 11). The cylinder head features four valves per cylinder with pressed in powdered metal valve guides. The cylinder heads provide enclosures for the timing chain drive, necessitating a unique right and left cylinder head.

DIAGNOSIS AND TESTING—CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

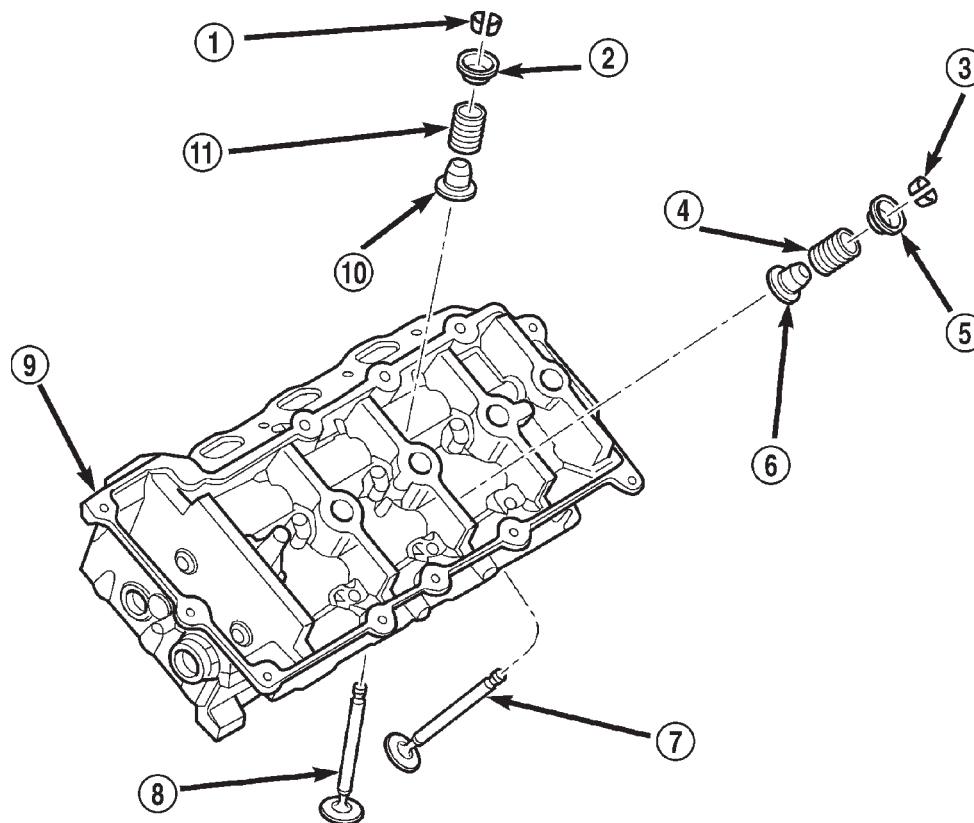
- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.



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Fig. 11 CYLINDER HEAD, VALVES, & SPRINGS

- 1 - VALVE KEEPER
- 2 - SPRING RETAINER
- 3 - VALVE KEEPER
- 4 - VALVE SPRING-EXHAUST
- 5 - SPRING RETAINER
- 6 - VALVE STEM SEAL

- 7 - VALVE-EXHAUST
- 8 - VALVE-INTAKE
- 9 - CYLINDER HEAD
- 10 - VALVE STEM SEAL
- 11 - VALVE SPRING-INTAKE

CYLINDER HEAD (Continued)

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL

(1) Perform fuel pressure release procedure **before attempting any repairs.** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable from remote jumper terminal.

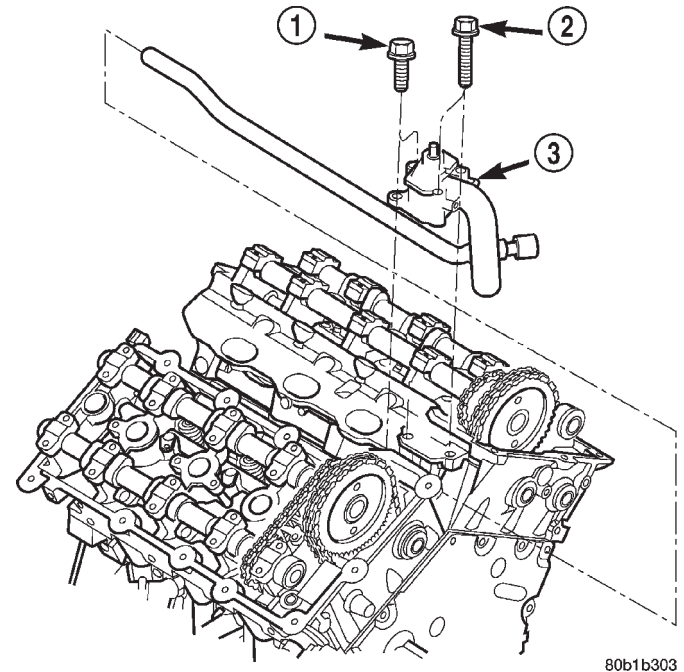
(3) Drain cooling system (Refer to 7 - COOLING/ENGINE - STANDARD PROCEDURE) and remove accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(4) Remove the vibration dampner (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL).

(5) Remove upper and lower intake manifolds (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).

(6) Remove cylinder head cover and timing chain cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(7) Remove water outlet connector (Fig. 12). (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - REMOVAL)



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Fig. 12 WATER OUTLET CONNECTOR

1 - BOLT (2)

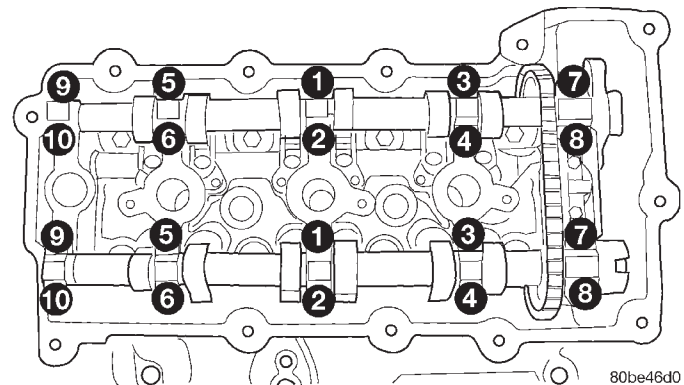
2 - BOLT (2)

3 - WATER OUTLET CONNECTOR

(8) Rotate crankshaft until crankshaft sprocket timing mark aligns with timing mark on oil pump housing.

(9) Remove primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(10) Remove camshaft bearing caps **gradually** in REVERSE sequence of installation (10-1) (Fig. 13).

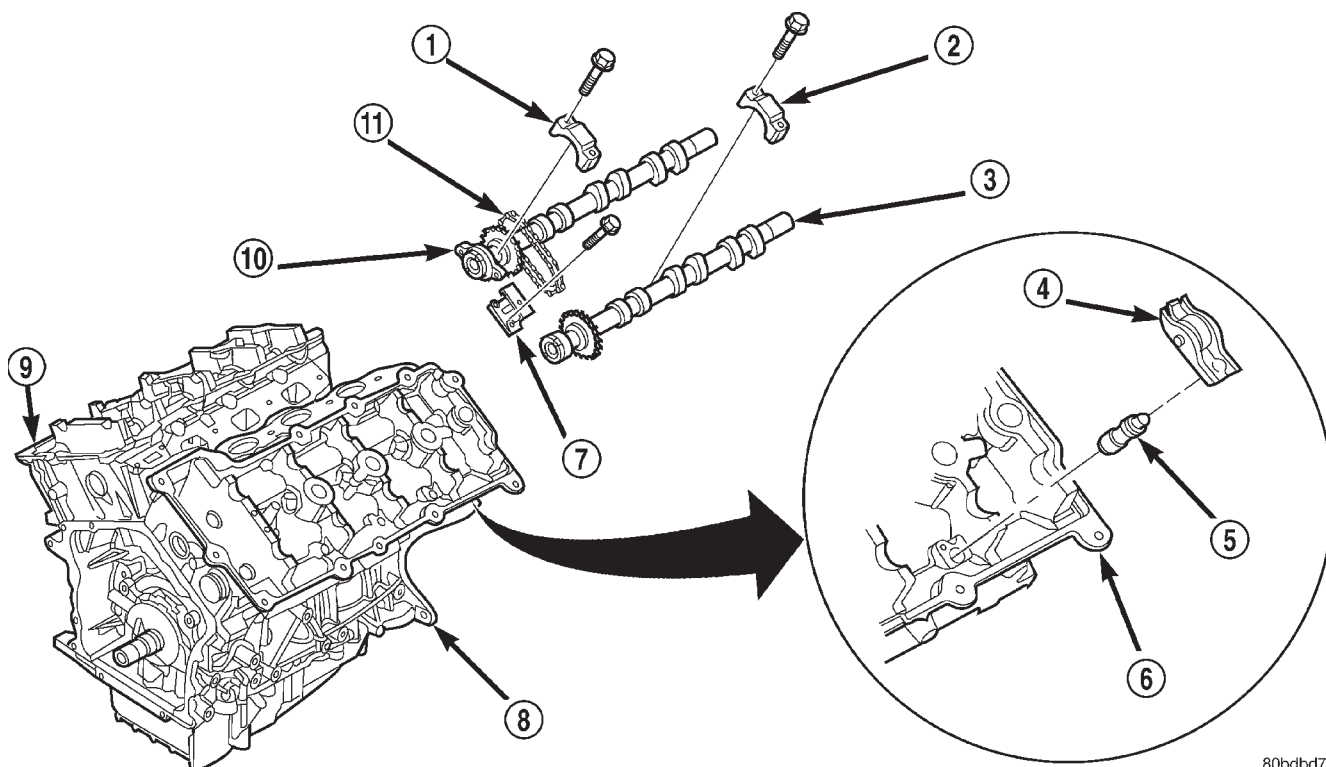


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Fig. 13 CAMSHAFT BEARING CAPS

(11) Remove camshafts and valvetrain components from cylinder head (Fig. 14). Note component locations for re-installation in original locations.

CYLINDER HEAD (Continued)



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Fig. 14 CAMSHAFT & VALVETRAIN COMPONENTS

- 1 – CAMSHAFT BEARING CAP - INTAKE
- 2 – CAMSHAFT BEARING CAP - EXHAUST
- 3 – CAMSHAFT - EXHAUST
- 4 – ROCKER ARM
- 5 – HYDRAULIC LIFTER
- 6 – CYLINDER HEAD

- 7 – CAMSHAFT (SECONDARY) CHAIN TENSIONER
- 8 – CYLINDER BLOCK
- 9 – CYLINDER HEAD
- 10 – CAMSHAFT - INTAKE
- 11 – CAMSHAFT (SECONDARY) TIMING CHAIN

(12) Remove V-Band clamp(s) at exhaust manifold to catalytic converter pipe.

NOTE: Do not reuse V-Band clamp.

CAUTION: Ensure cylinder head bolts 11–9 (Fig. 15) are removed before attempting the removal of cylinder head, as damage to cylinder head and/or block may occur.

(13) Remove cylinder head bolts in reverse sequence of installation (Fig. 15) starting with bolts 11–9, then bolts 8–1.

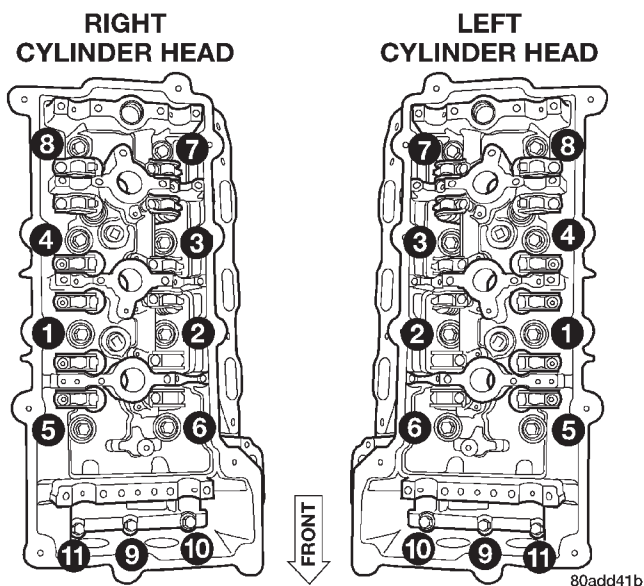
(14) Remove cylinder head(s).

(15) Remove and discard cylinder head gasket.

(16) Clean cylinder head and block sealing surfaces. (Refer to 9 - ENGINE/CYLINDER HEAD - CLEANING)

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the



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Fig. 15 CYLINDER HEAD BOLTS

use of aluminum engine components and multi-layer steel cylinder head gaskets.

CYLINDER HEAD (Continued)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block (Refer to 9 - ENGINE - STANDARD PROCEDURE). Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

(1) Before cleaning, check for leaks, damage and cracks.

(2) Clean cylinder head and oil passages.

(3) Check cylinder head for flatness (Fig. 16).

(4) Cylinder head must be flat within:

- Standard dimension = less than 0.05 mm (0.002 inch.)

- Service Limit = 0.2 mm (0.008 inch.)

- Grinding Limit = Maximum of 0.2 mm (0.008 inch.) is permitted.

CAUTION: 0.20 mm (0.008 in.) MAX is a combined total dimension of the stock removal limit from cylinder head and block top surface (Deck) together.

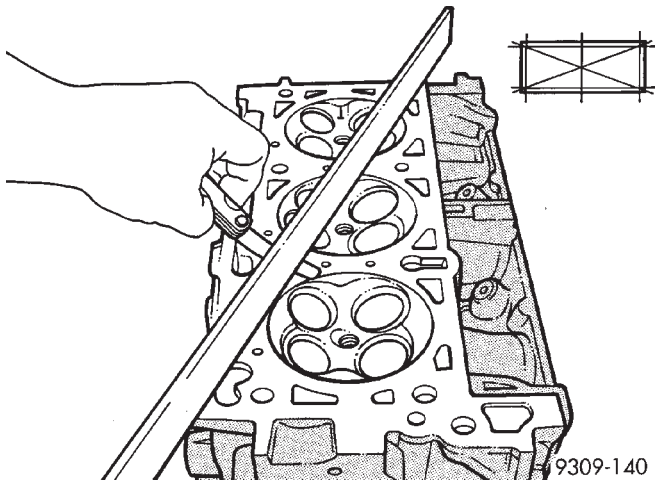


Fig. 16 Checking Cylinder Head Flatness—Typical INSTALLATION

NOTE: The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined BEFORE reuse. If the threads are necked down the bolts must be replaced (Fig. 17)

Necking can be checked by holding a straight edge against the threads. If all the threads do not contact the scale, the bolt must be replaced (Fig. 17)

CAUTION: When cleaning cylinder head and cylinder block surfaces, DO NOT use a metal scraper because the surfaces could be cut or ground. Use ONLY a wooden or plastic scraper.

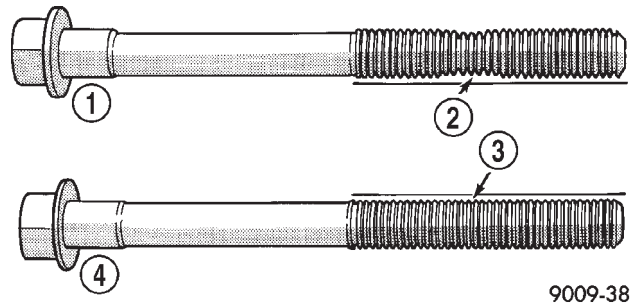


Fig. 17 Check for Stretched Bolts

1 - STRETCHED BOLT

2 - THREADS ARE NOT STRAIGHT ON LINE

3 - THREADS ARE STRAIGHT ON LINE

4 - UNSTRETCHED BOLT

(1) Clean sealing surfaces of cylinder head and block. (Refer to 9 - ENGINE - STANDARD PROCEDURE)

(2) Install new head gasket over locating dowels.

(3) Install cylinder head to block, assuring head is properly positioned over locating dowels.

(4) Lubricate bolt threads with clean engine oil and install bolts.

(5) Tighten bolts in sequence shown in (Fig. 18), using the following steps and torque values:

- Step 1: Bolts 1-8 to 48 N·m (35 ft. lbs.)

- Step 2: Bolts 1-8 to 75 N·m (55 ft. lbs.)

- Step 3: Bolts 1-8 to 75 N·m (55 ft. lbs.)

- Step 4: Bolts 1-8 to +90° Turn **Do not use a torque wrench for this step.**

- Step 5: Bolts 9-11 to 28 N·m (250 in. lbs.)

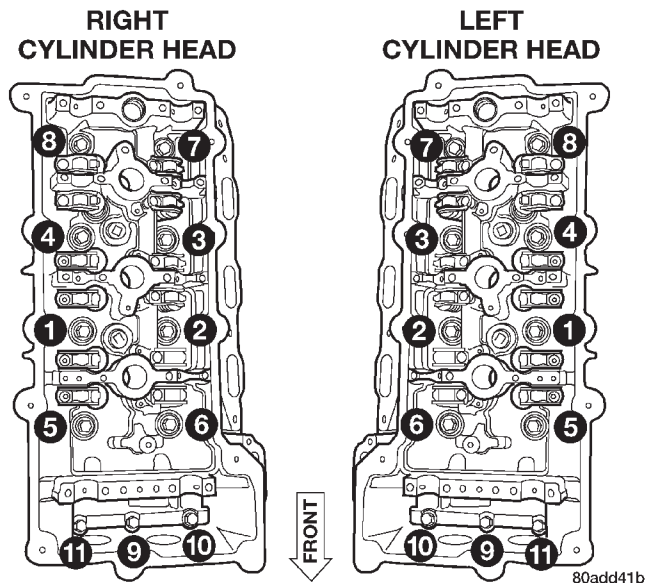


Fig. 18 Cylinder Head Tightening Sequence

(6) Connect catalytic converter to exhaust manifold with a new V-Band clamp. Tighten V-Band clamp to 10 N·m (100 in. lbs.).

CYLINDER HEAD (Continued)

(7) Install all valvetrain components and camshafts. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION) Tighten camshaft bearing caps in sequence shown in (Fig. 19)

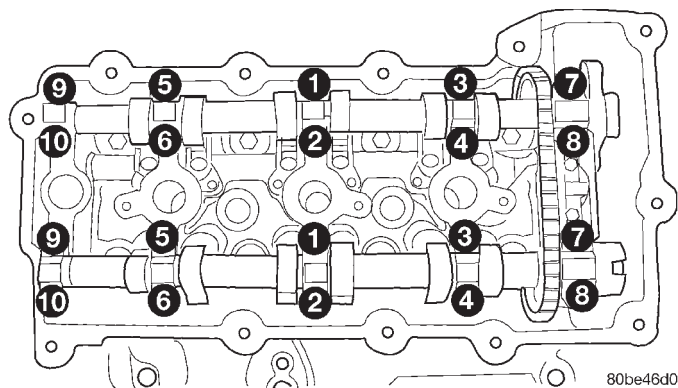


Fig. 19 Camshaft Bearing Cap Tightening Sequence

(8) Install timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(9) Install water outlet connector (Fig. 12). (Refer to 7 - COOLING/ENGINE/COOLANT OUTLET HOUSING - INSTALLATION)

(10) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(11) Install timing chain cover and crankshaft vibration damper. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(12) Install lower and upper intake manifolds. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(13) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(14) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(15) Connect negative cable to remote jumper terminal.

CAMSHAFT(S)

DESCRIPTION

The assembled fabricated camshafts are composed of five bearing journals machined into a hollow steel tube (Fig. 20). Six steel lobes, a secondary timing drive sprocket, and a primary sprocket/thrust flange are pressed onto the camshaft tube using a unique assembly process. Camshaft end play is controlled by the primary camshaft sprocket attachment flange on the intake camshafts and by a thrust flange on the exhaust camshafts.

OPERATION

The camshaft has precisely machined (egg shaped) lobes to provide accurate valve timing and duration. The camshaft is driven by the crankshaft via drive sprockets and chains.

STANDARD PROCEDURE - CAMSHAFT END PLAY

(1) Measure camshafts end play by mounting a dial indicator to a stationary point on cylinder head (Fig. 21).

(2) Locate the probe perpendicular against the end of camshaft being checked.

(3) Move camshaft all the way to the rear of its travel. Zero the dial indicator.

(4) Move camshaft forward to limits of travel and read the dial indicator.

REMOVAL

(1) Remove the primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Remove secondary chain tensioner mounting bolts.

NOTE: Camshaft bearing caps have been marked during engine manufacturing. For example, number one exhaust camshaft bearing is marked "1E>"

(3) Slowly loosen camshaft bearing cap bolts in reverse order of installation (Fig. 22).

(4) Remove camshaft bearing caps.

(5) Remove camshafts, secondary chain, and tensioner together as an assembly.

(6) Remove tensioner and camshaft chain from camshafts.

(7) Inspect camshafts. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSPECTION)

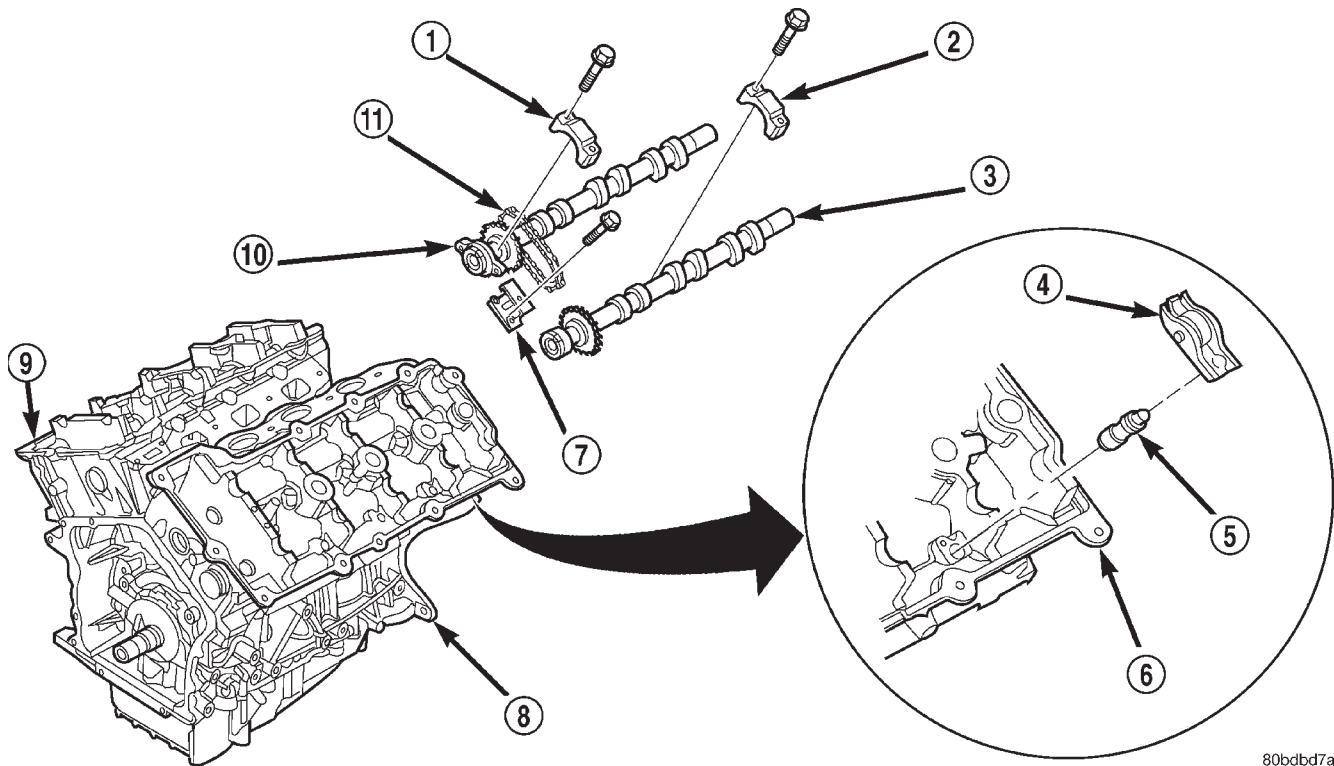
INSPECTION

(1) Inspect camshaft bearing journals for damage and binding (Fig. 23). If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.

(2) Inspect camshaft sprockets for excessive wear. Replace camshafts if necessary.

(3) Check the cam lobe surfaces for abnormal wear and damage. Replace camshaft if defective. Measure the actual wear (Fig. 23) and replace, if out of limits—standard value is 0.0254 mm (0.001 in.); wear **limit** is 0.254 mm (0.010 in.).

CAMSHAFT(S) (Continued)



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Fig. 20 Camshaft and Valvetrain Components

- 1 – CAMSHAFT BEARING CAP - INTAKE
- 2 – CAMSHAFT BEARING CAP - EXHAUST
- 3 – CAMSHAFT - EXHAUST
- 4 – ROCKER ARM
- 5 – HYDRAULIC LIFTER
- 6 – CYLINDER HEAD

- 7 – CAMSHAFT (SECONDARY) CHAIN TENSIONER
- 8 – CYLINDER BLOCK
- 9 – CYLINDER HEAD
- 10 – CAMSHAFT - INTAKE
- 11 – CAMSHAFT (SECONDARY) TIMING CHAIN

INSTALLATION

CAUTION: When the timing chain is removed and the cylinder heads are installed, **DO NOT** rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

(1) Assemble camshaft chain on the cams. Ensure that plated links are facing toward the front. Align the plated links to the dot on the camshaft sprockets (Fig. 25).

(2) If camshaft chain tensioner is already in the compressed and locked position, proceed to step (4).

(3) When the camshaft chain tensioner is removed, it is necessary to compress and lock the tensioner using the following procedures:

- (a) Place tensioner into a soft jaw vise (Fig. 24).
- (b) **SLOWLY** compress tensioner until fabricated lock pin or the equivalent can be inserted into the locking holes.
- (c) Remove compressed and locked tensioner from the vise.

(4) Insert the compressed and locked camshaft chain tensioner in-between the camshafts and chain.

(5) Rotate the cams so that the plated links and dots are facing the 12:00 O'clock position (Fig. 25).

(6) Install cams to cylinder head. Ensure that rocker arms are correctly seated and in proper positions.

(7) Install camshaft bearing caps. Ensure that bearing caps are installed in same position as removed.

(8) Tighten cam bearing cap bolts gradually in sequence shown in (Fig. 22) to 12 N·m (105 in. lbs.).

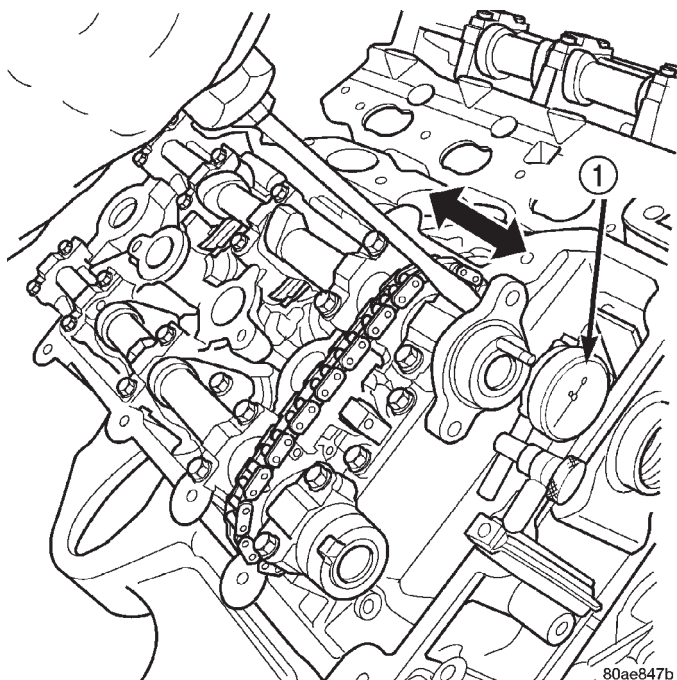
(9) Install secondary chain tensioner bolts and tighten to 12 N·m (105 in. lbs.).

(10) Remove locking pin from secondary tensioners.

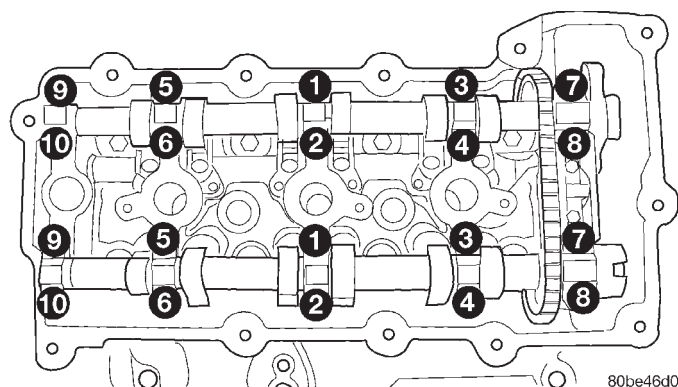
(11) Measure camshafts end play. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - STANDARD PROCEDURE)

(12) Install the primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

CAMSHAFT(S) (Continued)

**Fig. 21 Camshaft End Play Measuring**

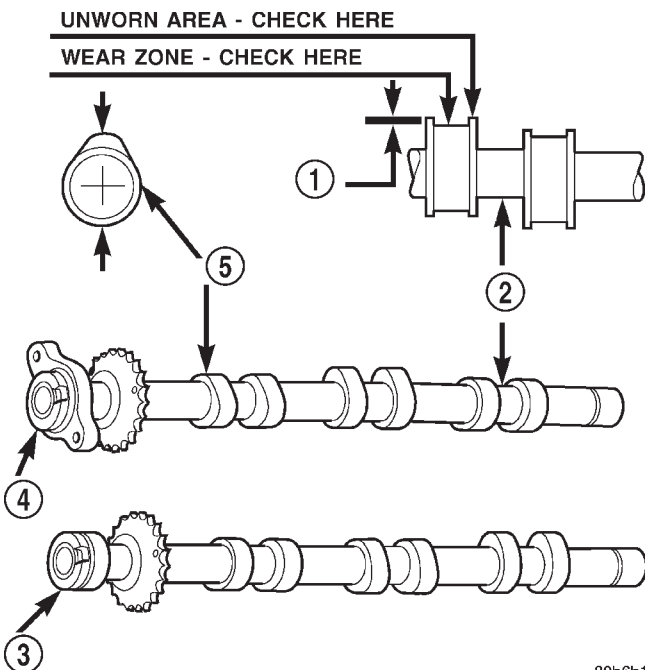
1 - DIAL INDICATOR

**Fig. 22 Camshaft Bearing Cap Tightening Sequence**

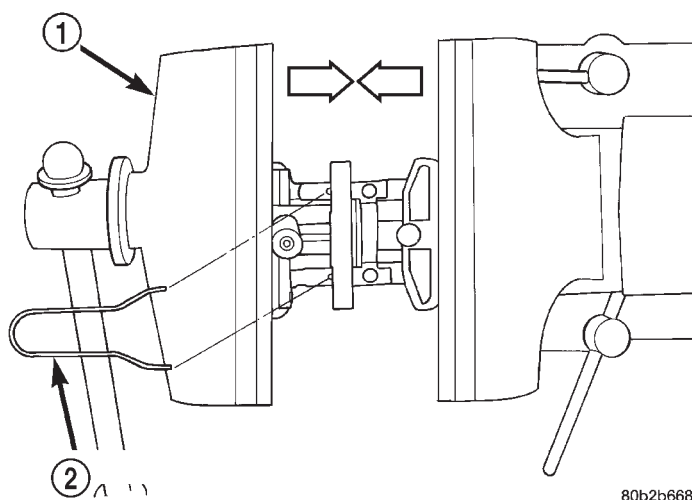
CYLINDER HEAD COVER(S)

REMOVAL

- (1) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)
- (2) Remove electrical connectors from ignition coils.
- (3) Remove ground strap from right cylinder head.
- (4) Disconnect electrical and vacuum harness retaining clips from cylinder head cover studs.
- (5) Remove fasteners attaching ignition coil capacitors.
- (6) Loosen all cylinder head cover attaching bolts (Fig. 26).

**Fig. 23 Camshaft Inspection**

- 1 - ACTUAL WEAR
- 2 - BEARING JOURNAL
- 3 - EXHAUST CAMSHAFT
- 4 - INTAKE CAMSHAFT
- 5 - LOBE

**Fig. 24 Locking Camshaft (Secondary) Chain Tensioner**

- 1 - VISE
- 2 - LOCK PIN

NOTE: Cylinder head cover attaching bolts are captured to the cover.

- (7) Remove cylinder head covers.

CYLINDER HEAD COVER(S) (Continued)

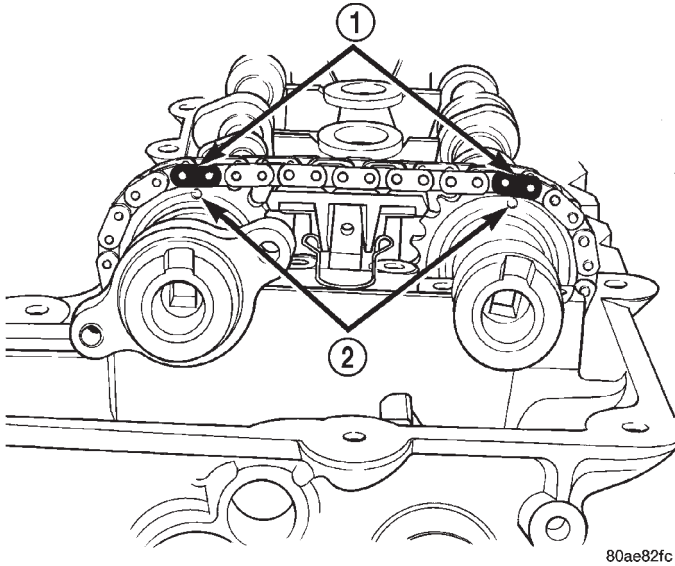


Fig. 25 Camshaft Chain Timing

- 1 - PLATED CHAIN LINKS
- 2 - CAMSHAFT TIMING MARKS

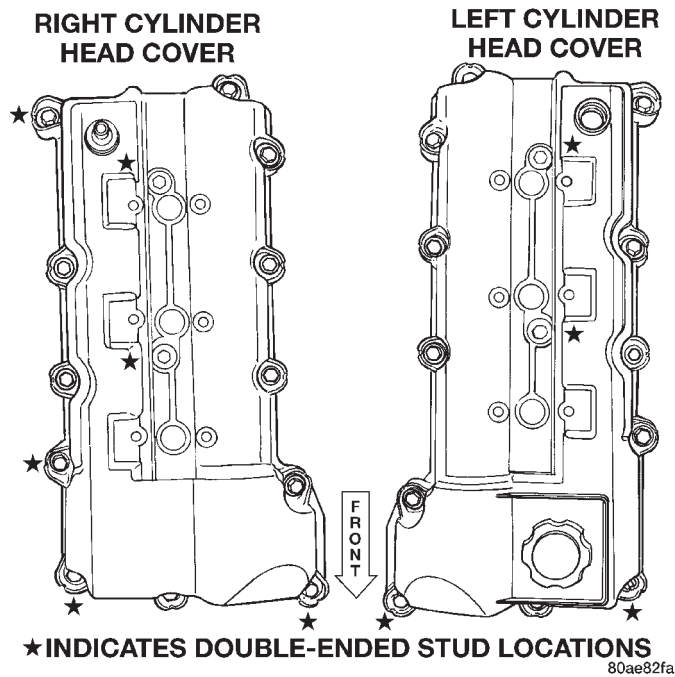
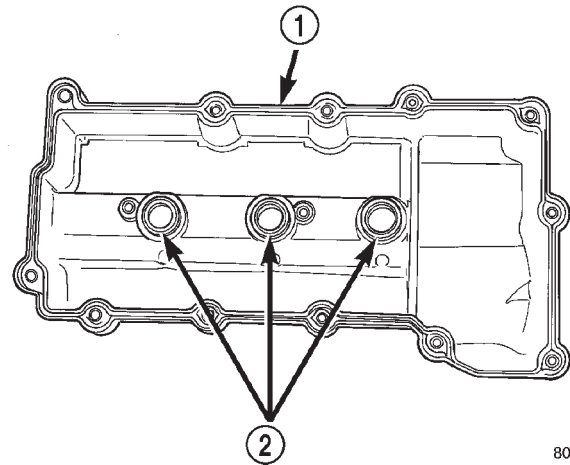


Fig. 26 Cylinder Head Covers

INSTALLATION

- (1) Clean cylinder head cover and both sealing surfaces. Inspect and replace gaskets as necessary (Fig. 27).
- (2) Install cylinder head covers and hand start all fasteners. Verify that all double-ended studs are in the correct locations as shown in (Fig. 26).
- (3) Tighten cylinder head cover attaching bolts and double-ended studs to 12 N·m (105 in. lbs.).



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Fig. 27 Cylinder Head Cover Gasket and Spark Plug Seals

- 1 - ONE PIECE GASKET
- 2 - SPARK PLUG WELL SEALS

(4) Connect all electrical connectors and harness clips.

(5) Install ignition coil capacitors and fasteners.

(6) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

INTAKE/EXHAUST VALVES & SEATS

DESCRIPTION

The valves are made of heat resistant steel, and have chrome plated stems to prevent scuffing (Fig. 11). The four valves per cylinder (two intake and two exhaust) are actuated by roller rocker arms, which pivot on stationary lash adjusters. All valves use three bead lock keepers to retain springs and to promote valve rotation.

OPERATION

The intake valve allows the air/fuel mixture to enter the combustion chamber. The exhaust valve allows the burned air/fuel mixture to exit the combustion chamber. Also, the intake and exhaust valves seal the combustion chamber during the compression and power strokes.

STANDARD PROCEDURE - VALVE AND VALVE SEAT REFACING

The intake and exhaust valves have a 44.5 to 45 degree face angle. The valve seats have a 45 to 45.5 degree face angle. The valve face and valve seat angles are shown in (Fig. 28).

INTAKE/EXHAUST VALVES & SEATS (Continued)

VALVES

Inspect the remaining margin after the valves are refaced. (Refer to 9 - ENGINE - SPECIFICATIONS)

VALVE SEATS

(1) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(2) Measure the concentricity of valve seat using dial indicator. Total runout should not exceed 0.051 mm (0.002 inch.) total indicator reading.

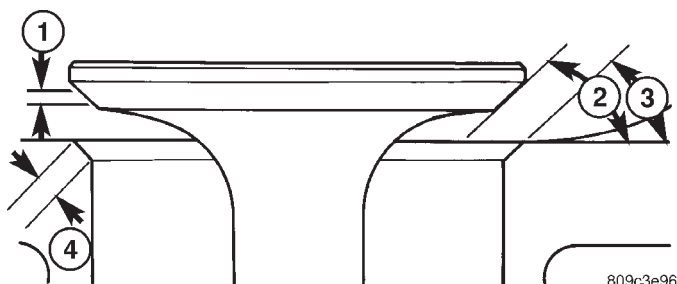


Fig. 28 Valve Face and Seat

- 1 - SEAT WIDTH
- 2 - FACE ANGLE
- 3 - SEAT ANGLE
- 4 - SEAT CONTACT AREA

(3) Inspect the valve seat with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat **LIGHTLY** with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to top edge of valve face, then lower valve seat with a 15 degree stone. If the blue is transferred to the bottom edge of valve face, then raise valve seat with a 65 degree stone.

NOTE: Valve seats which are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise cylinder head must be replaced.

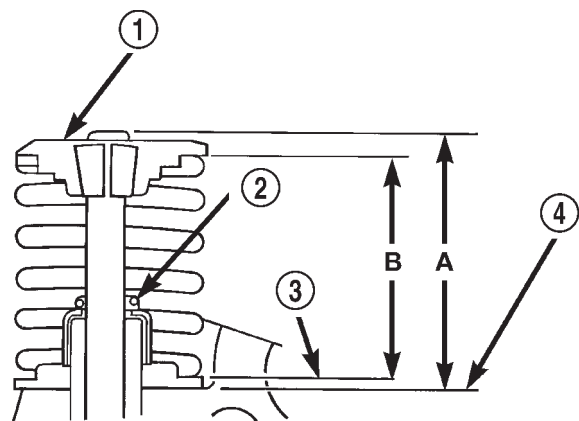
(4) When seat is properly positioned the width of the intake 1.00 to 1.50 mm (0.0394 to 0.0591 in.) and exhaust seats should be 1.25 to 1.75 mm (0.049 to 0.069 in.) (Fig. 28).

(5) Check the valve spring installed height after refacing the valve and seat (Fig. 29).

VALVE AND SPRING INSTALLED HEIGHT

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been refaced, check valve tip height (A) (Fig. 29). If valve tip height for



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Fig. 29 Checking Valve Tip Height and Valve

- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE

intake valve is greater than 47.59 (1.8737 in.) or 49.14 (1.9347 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

(3) Install valve seal/spring seat assembly over valve guides on all valve stems (Fig. 30). Ensure that the garter spring is intact around the top of the rubber seal.

(4) Position valve springs and retainer on spring seat (Fig. 30).

(5) Compress valve spring with a valve spring compressor.

(6) Install retainer locks and release tool.

(7) If valves and/or seats are refaced, measure the installed height of springs (B) (Fig. 29). Measurement is taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.

REMOVAL

(1) Remove cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(2) Remove valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(3) Before removing valves, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.**

(4) Remove valve. Identify each valve to ensure installation in original location.

INTAKE/EXHAUST VALVES & SEATS (Continued)

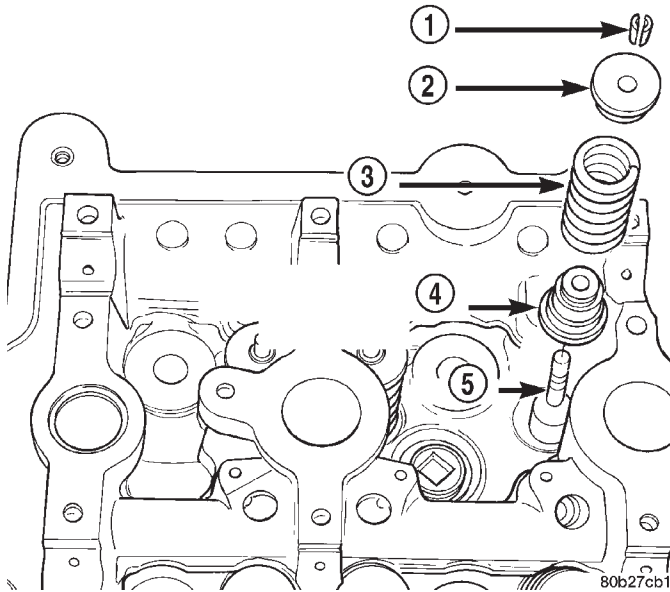


Fig. 30 Valve Seal and Spring

- 1 - VALVE RETAINING LOCKS
- 2 - VALVE SPRING RETAINER
- 3 - VALVE SPRING
- 4 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY
- 5 - VALVE

INSPECTION

VALVES

(1) Clean and inspect valves thoroughly. Replace burned, warped and cracked valves.

(2) Measure valve stems for wear (Fig. 31). For valve specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Valve stems are chrome plated and should not be polished (Fig. 31).

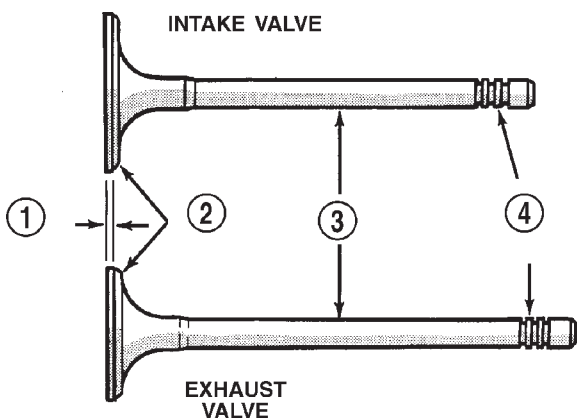


Fig. 31 Intake and Exhaust Valves

- 1 - MARGIN
- 2 - FACE
- 3 - STEM
- 4 - VALVE SPRING RETAINER LOCK GROOVES

VALVE GUIDES

(1) Remove carbon and varnish deposits from inside of valve guides with a reliable guide cleaner.

(2) Measure valve stem-to-guide clearance as follows:

(3) Install valve into cylinder head so it is 15 mm (0.590 inch.) off the valve seat. A small piece of hose may be used to hold valve in place.

(4) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle of valve stem being measured (Fig. 32).

(5) Move valve to and from the indicator. For clearance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Replace cylinder head if stem-to-guide clearance exceeds specifications, or if guide is loose in cylinder head.

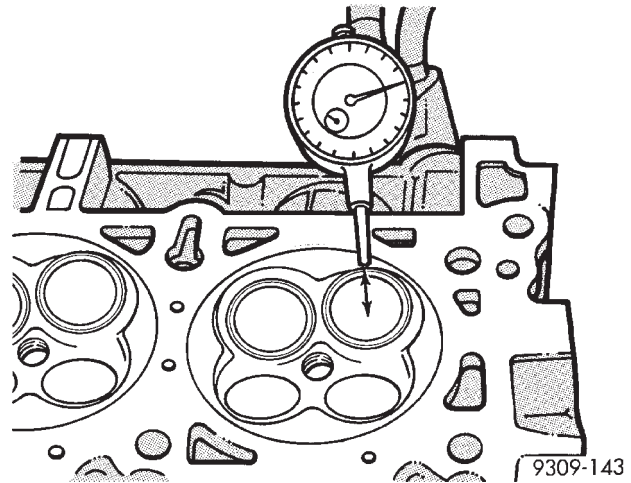


Fig. 32 Measuring Valve Guide Wear - Typical

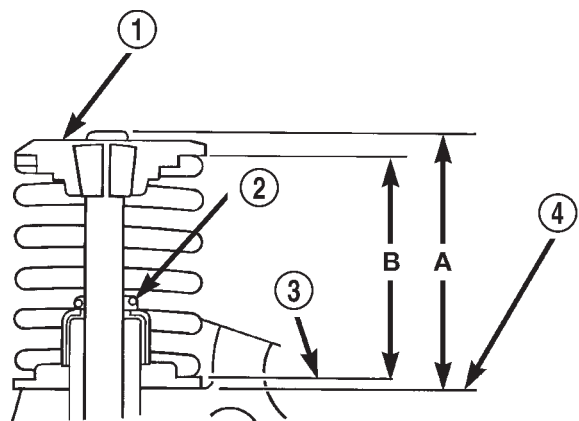
INSTALLATION

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been reground, check valve tip height (A) (Fig. 33). If valve tip height for intake valve is greater than 47.59 mm (1.8737 in.) or 49.14 mm (1.9347 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

(3) Install valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

INTAKE/EXHAUST VALVES & SEATS (Continued)



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Fig. 33 Checking Valve Tip Height and Valve Spring Installed Height

- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE

VALVE SPRINGS

DESCRIPTION

The valve springs are made from high strength, chrome-silicon steel (Fig. 11). The springs are common for intake and exhaust applications. The valve spring seat is integral with the valve stem seal, which incorporates a garter spring to maintain consistent lubrication control to the valve stem.

OPERATION

The valve spring returns the valve against its seat for a positive seal of the combustion chamber.

REMOVAL

REMOVAL - IN VEHICLE

- (1) Perform fuel system pressure release procedure **before attempting any repairs.** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)
- (2) Disconnect negative cable from remote jumper terminal.
- (3) Remove air cleaner housing and inlet hose.
- (4) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(5) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(6) Remove crankshaft vibration damper (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL), timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL), and timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL).

(7) Remove camshafts and rocker arms. (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - REMOVAL)

(8) With air hose attached to spark plug adapter installed in the cylinder being serviced, apply 620.5–689 kPa (90–100 psi) air pressure. This is to hold valves in place while servicing components.

(9) Using Special Tool MD 998772A with adapter 6779, compress valve spring and remove valve locks, retainer, and valve spring.

(10) Remove valve stem seal (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL).

REMOVAL - OFF VEHICLE

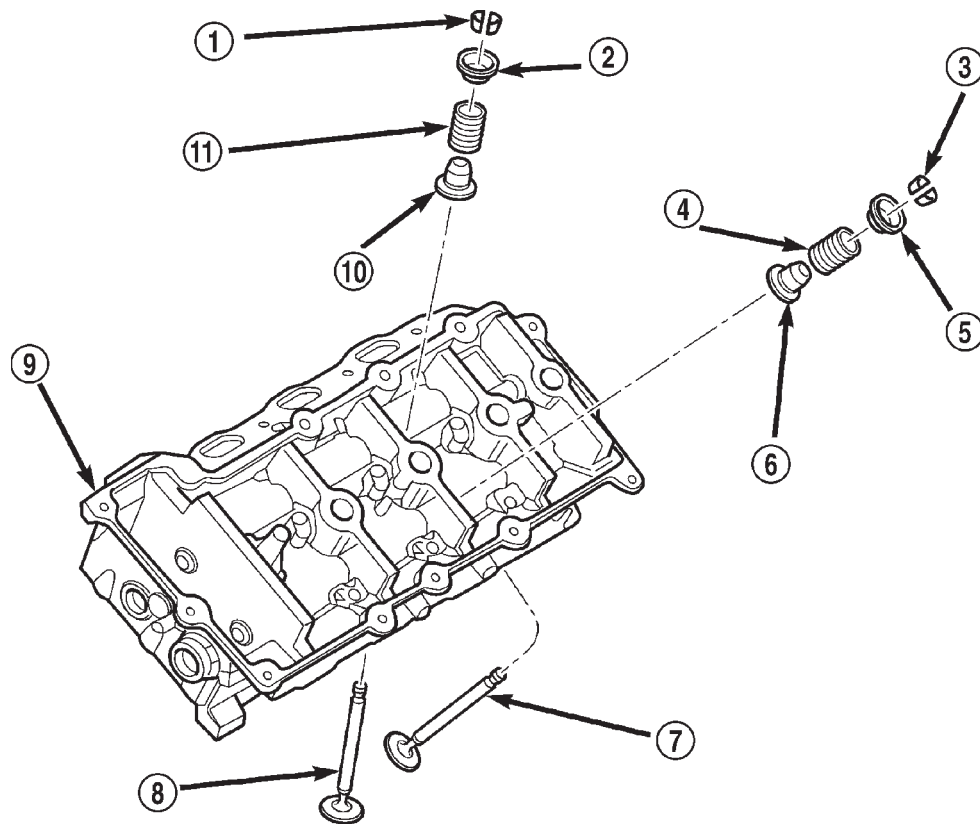
(1) With cylinder head removed, compress valve springs using a Special Tool C-3422-D, Valve Spring Compressor.

(2) Remove valve retaining locks, valve spring retainers, valve springs and valve spring seat/stem seal assembly (Fig. 34).

INSPECTION

Whenever valves have been removed for inspection, reconditioning or replacement, valve springs should be tested (Fig. 35). **As an example;** the compression length of a spring to be tested is 38.00 mm (1.496 in.). Turn the table of Tool C-647 until surface is in line with the 38.00 mm (1.496 in.) mark on the threaded stud and the zero mark on the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Engine Specifications to obtain specified height and allowable tensions (Refer to 9 - ENGINE - SPECIFICATIONS). Replace any springs that do not meet specifications.

VALVE SPRINGS (Continued)

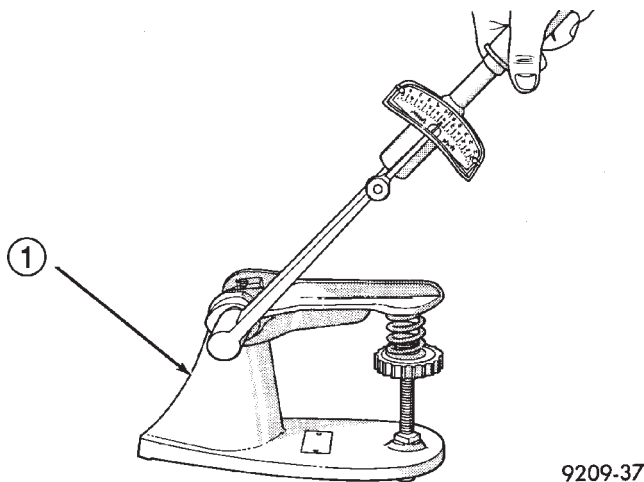


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Fig. 34 VALVE, SPRING SEAT/SEAL, SPRING, REATINER AND LOCKS

- 1 - VALVE KEEPER
- 2 - SPRING RETAINER
- 3 - VALVE KEEPER
- 4 - VALVE SPRING-EXHAUST
- 5 - SPRING RETAINER
- 6 - VALVE STEM SEAL

- 7 - VALVE-EXHAUST
- 8 - VALVE-INTAKE
- 9 - CYLINDER HEAD
- 10 - VALVE STEM SEAL
- 11 - VALVE SPRING-INTAKE



9209-37

Fig. 35 TESTING VALVE SPRING

- 1 - SPECIAL TOOL C-647

INSTALLATION

INSTALLATION - IN VEHICLE

(1) The valve stem seal/valve spring seat should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide. When installing the valve retainer locks, compress the spring **only enough** to install locks

(2) Follow the same procedure on the remaining cylinders using the firing sequence 1-2-3-4-5-6. **Make sure piston is at TDC on the cylinder that the valve spring is to be removed.**

(3) Remove spark plug adapter tool and Special Tool MD 998772A.

(4) Install rocker arm(s).

(5) Install camshafts (Refer to 9 - ENGINE/CYLINDER HEAD/CAMSHAFT(S) - INSTALLATION), timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION), and timing chain cover (Refer to 9

VALVE SPRINGS (Continued)

- ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION).

(6) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(7) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

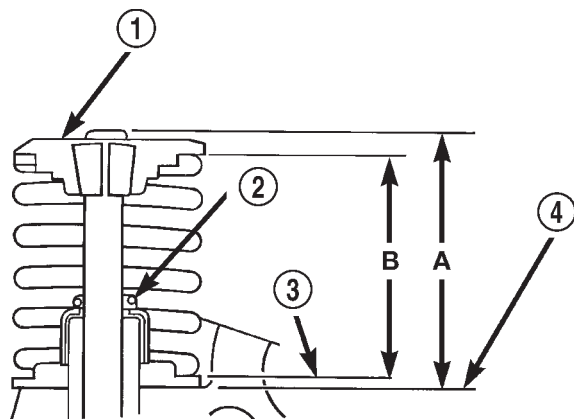
(8) Install air cleaner housing and inlet hose.

(9) Connect negative cable.

INSTALLATION - OFF VEHICLE

(1) If removed, install valve(s). (Refer to 9 - ENGINE/CYLINDER HEAD/INTAKE/EXHAUST VALVES & SEATS - INSTALLATION)

(2) If valves or seats have been reground, check valve tip height (A) (Fig. 36). If valve tip height for intake valve is greater than 47.59 mm (1.8737 in.) or 49.14 mm (1.9347 in.) for exhaust valve, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.



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Fig. 36 Valve Tip Height and Valve Spring Installed Height

- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE

(3) Install valve seal/spring seat assembly over valve guides on all valve stems (Fig. 37). Ensure that the garter spring is intact around the top of the rubber seal. Install valve springs, valve retainers.

(4) Compress valve springs with a valve spring compressor install locks and release tool. **If valves and/or seats are reground, measure the installed height of springs (B) (Fig. 36), make sure measurements are taken from top of spring seat to the bottom surface of spring**

retainer. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.

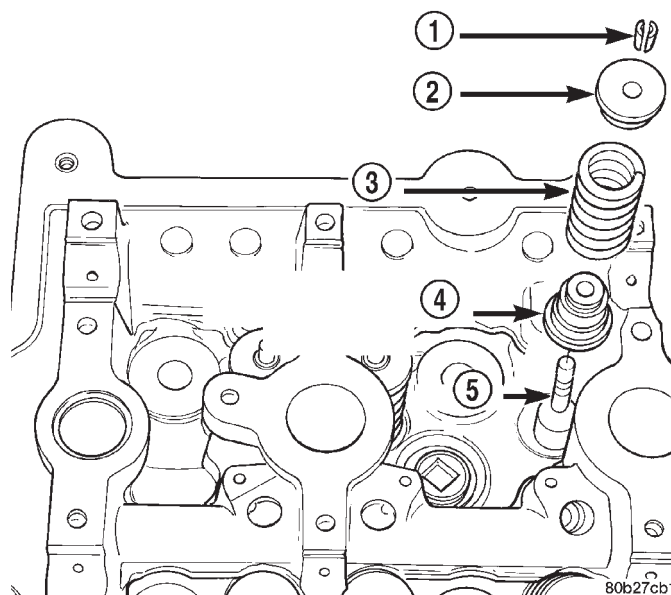


Fig. 37 Valve Seal and Spring

- 1 - VALVE RETAINING LOCKS
- 2 - VALVE SPRING RETAINER
- 3 - VALVE SPRING
- 4 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY
- 5 - VALVE

VALVE STEM SEALS

REMOVAL

(1) Remove valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(2) Remove valve stem seal by using a valve seal tool (Fig. 38).

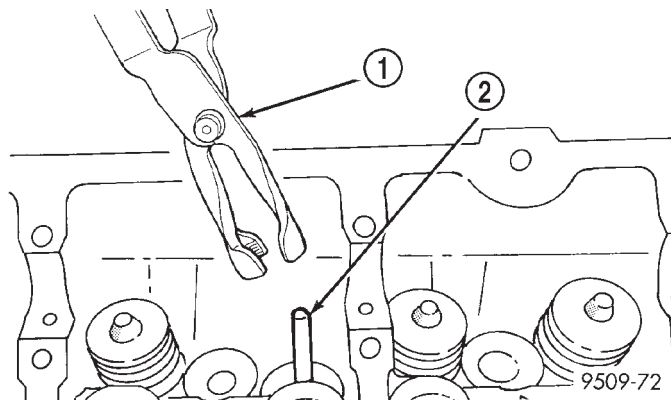


Fig. 38 Valve Stem Seal—Removal

- 1 - VALVE SEAL TOOL
- 2 - VALVE STEM

VALVE STEM SEALS (Continued)

INSTALLATION

(1) The valve stem seal/valve spring seat should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide.

(2) Install valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

HYDRAULIC LASH ADJUSTERS**DIAGNOSIS AND TESTING - HYDRAULIC LASH ADJUSTER NOISE DIAGNOSIS**

Proper noise diagnosis is essential in locating the source of a NVH complaint. Locating a lash adjuster (tappet) type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur.

Refer to LASH ADJUSTER (TAPPET) NOISE CHART indicating possible lash adjuster (tappet) noise sources and possible sources that could lead to a misdiagnosis.

Refer to LASH ADJUSTER (TAPPET) NOISE CHART for possible causes and correction of a lash adjuster (tappet) type noise.

LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level—too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct engine oil level.
2. Insufficient running time after rebuilding cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in lash adjuster (after 1 hour run time).	3. See below: (a) Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily. (b) If lash adjuster(s) are still spongy, replace with new adjuster/rocker arm assembly.
4. Low oil pressure	4. See below: (a) Check and correct engine oil level. (b) Check engine oil pressure. (c) Check for excessive bearing clearance and correct. (d) Check for worn oil pump.
5. Oil passage to cylinder head(s) plugged with debris.	5. Check cylinder head oil passages and cylinder head gasket restrictor for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Ream guide(s) and replace valve(s) with oversize valves and seal(s).
7. Air injected into oil due to broken or cracked oil pump pickup tube.	7. Inspect pickup tube and replace as necessary.
8. Collapsed lash adjuster due to debris injection.	8. Clean debris from engine and replace lash adjuster(s).

HYDRAULIC LASH ADJUSTERS (Continued)

REMOVAL

(1) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Remove rocker arm(s). (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - REMOVAL)

CAUTION: If lash adjusters and rocker arms are to be reused, always mark position for reassembly in their original positions.

(3) Remove lash adjuster(s).

INSTALLATION

(1) Install hydraulic lash adjuster making sure adjusters are at least partially full of oil. This can be verified by little or no plunger travel when lash adjuster is depressed.

(2) Install rocker arm(s) (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSTALLATION) and cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

ROCKER ARMS

DESCRIPTION

The rocker arms are composed of steel stampings with an integral roller bearing (Fig. 39). The rocker arms incorporate a 0.5 mm (0.0197 in.) oil hole in the lash adjuster socket for roller/camshaft lobe lubrication (Fig. 39).

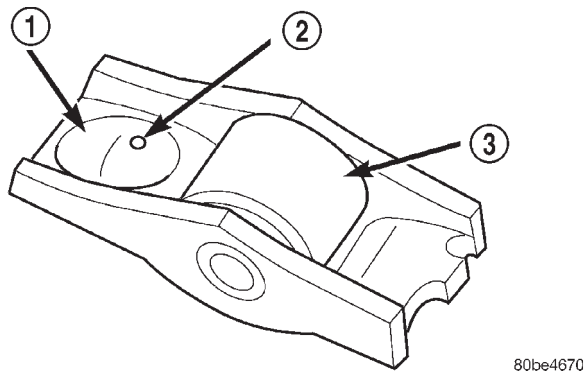


Fig. 39 Rocker Arm

- 1 - LASH ADJUSTER POCKET
- 2 - OIL SQUIRT HOLE
- 3 - ROLLER

OPERATION

The rocker arm is the pivot point between the camshaft lobe and the valve.

REMOVAL

(1) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

CAUTION: Always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

(2) Rotate engine until the cam lobe is on its base circle (heel), on the rocker arm being removed.

CAUTION: Depress valve spring only enough to remove rocker arm.

(3) Using Special Tools 8215 and 8216 Adaptor, depress valve spring only enough to release tension on rocker arm (Fig. 40).

(4) Remove rocker arm from cylinder head.

CAUTION: If rocker arms are to be reused, identify position of rocker arms for reassembly in their original positions.

(5) Repeat procedure for each rocker arm removed.

(6) Inspect the rocker arm for wear or damage. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARMS - INSPECTION)

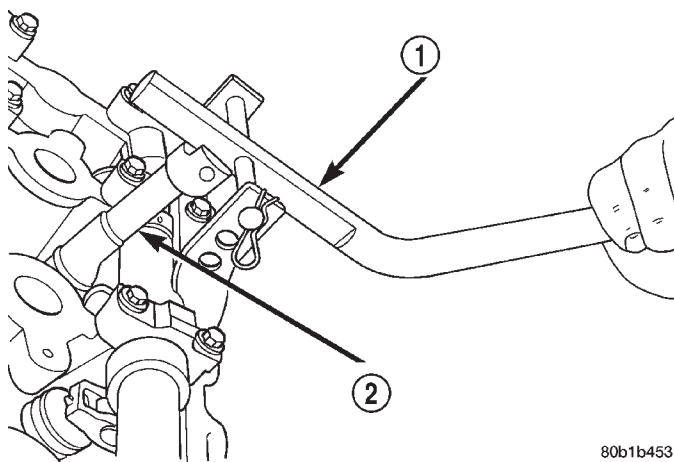


Fig. 40 Rocker Arm—Removal/Installation

- 1 - SPECIAL TOOL 8215
- 2 - ADAPTOR 8216

ROCKER ARMS (Continued)

INSPECTION

Inspect the cam follower assembly for wear or damage (Fig. 41). Replace as necessary.

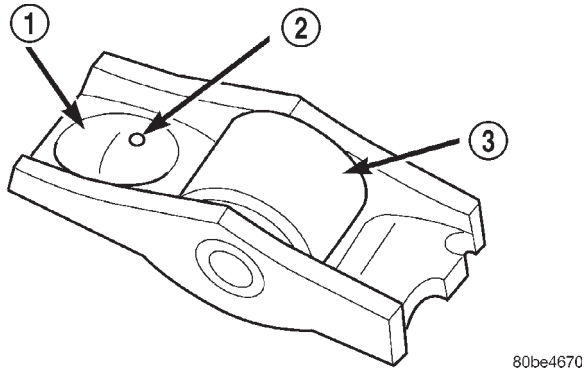


Fig. 41 Rocker Arm

- 1 - LASH ADJUSTER POCKET
2 - OIL SQUIRT HOLE
3 - ROLLER

INSTALLATION

- (1) Lubricate rocker arms with clean engine oil before installation.
- (2) Rotate engine until cam lobe is on its base circle (heel) of rocker arm being installed.
- (3) Using Special Tools 8215 and 8216 Adaptor, depress valve spring only enough to install rocker arm (Fig. 40).
- (4) Install rocker arm in original position (if reused) over valve and lash adjuster. Release tension on valve spring.

NOTE: Inspect rocker arm for proper engagement into lash adjuster and valve tip.

- (5) Repeat procedure for each rocker arm installed.
- (6) Install cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

ENGINE BLOCK

DESCRIPTION

The cylinder block is made of heat treated aluminum with cast-in-place iron liners (Fig. 42). The block is a closed deck design with the right bank forward. To provide high rigidity and improved NVH, the block has cast-in contours and ribs, along with powdered metal 6 bolt main caps (4 vertical, 2 horizontal), with a die cast aluminum structural beam windage tray mounted to the main caps.

The block design allows coolant flow between the cylinder bores and an internal coolant by-pass to the thermostat.

STANDARD PROCEDURE - CYLINDER BORE HONING

(1) Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with 220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20-60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 40-60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 43).

(4) A controlled hone motor speed between 200-300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40-60 degree angle. Faster up and down strokes increase the cross-hatch angle.

(5) After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

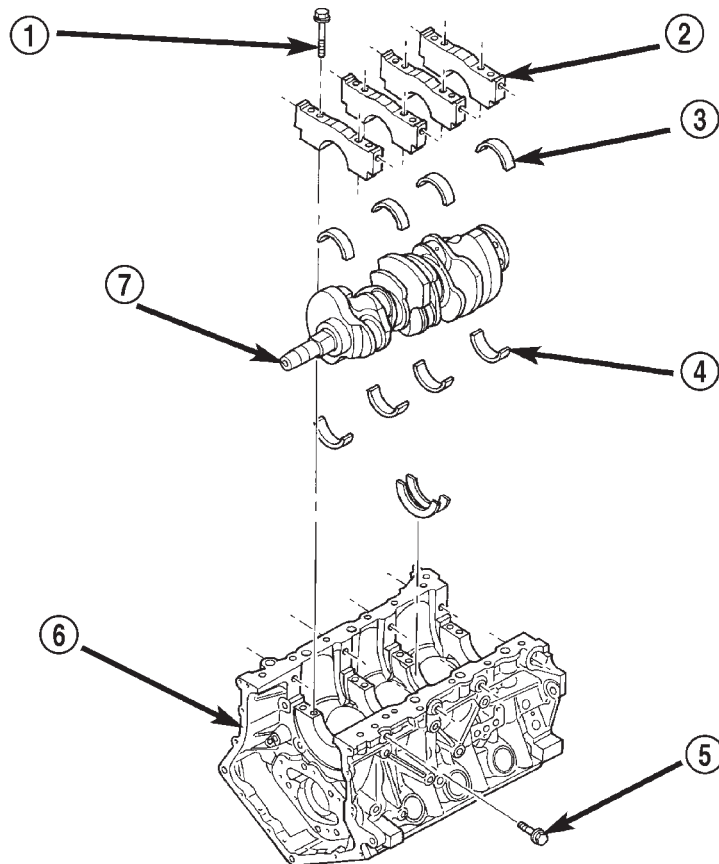
ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

(3) Examine block and cylinder bores for cracks or fractures.

ENGINE BLOCK (Continued)

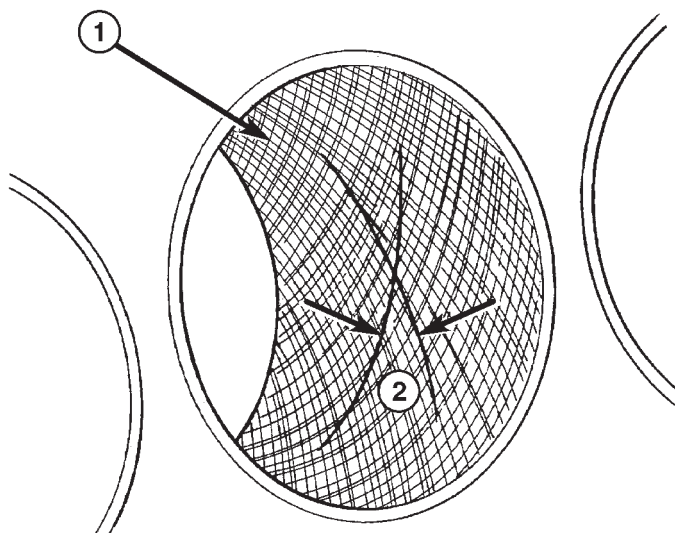


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Fig. 42 ENGINE BLOCK AND CRANKSHAFT

- 1 - MAIN CAP BOLT—VERTICAL
- 2 - MAIN CAP
- 3 - MAIN BEARING—LOWER
- 4 - MAIN BEARING—UPPER

- 5 - MAIN CAP BOLT —HORIZONTAL
- 6 - CYLINDER BLOCK
- 7 - CRANKSHAFT



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Fig. 43 Cylinder Bore Cross-Hatch Pattern

- 1 - CROSS-HATCH PATTERN
- 2 - 40°-60°

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 44) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.

Measure the cylinder bore at three levels in directions A and B (Fig. 44). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

ENGINE BLOCK (Continued)

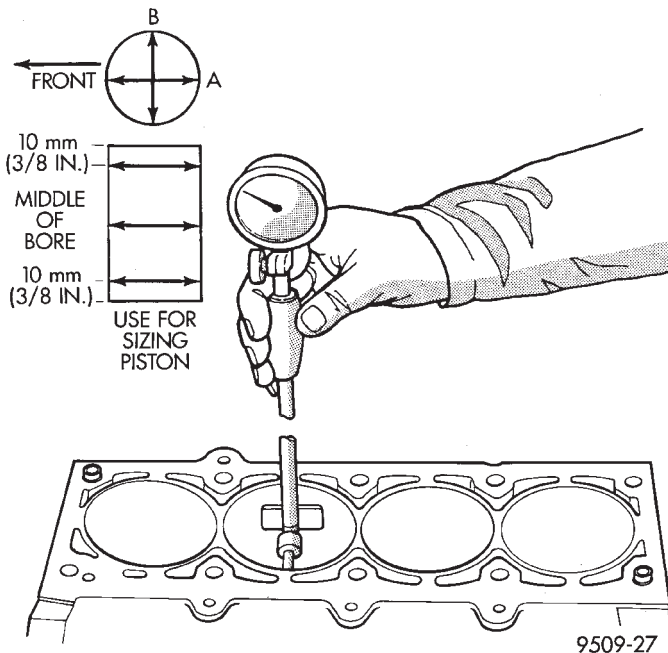


Fig. 44 Checking Cylinder Bore Size

CONNECTING ROD BEARINGS

STANDARD PROCEDURE - CONNECTING ROD AND BEARING FITTING

CONNECTING ROD BEARING

Fit all connecting rods on one bank until complete.

The bearing caps are not interchangeable and should be marked at removal to ensure correct assembly.

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces as engine damage may occur.

The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Also, assure that the hole in upper bearing half aligns with oil squirt hole in rod. Install cap with the tangs on the same side as the rod.

CAUTION: Assure that hole in upper bearing half aligns with hole in connecting rod as engine damage may occur.

Limits of taper or out-of-round on any crankshaft journals should be held to 0.015 mm (0.0006 in.). Bearings are available 0.025 mm (0.001 in.) and 0.250 mm (0.010 in.) undersize. **Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.**

(1) For measuring Main Bearing Clearance and Connecting Rod Bearing Clearance use plastigage (Fig. 45). For more information on using plastigage (Refer to 9 - ENGINE - STANDARD PROCEDURE). Refer to Engine Specifications for bearing clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

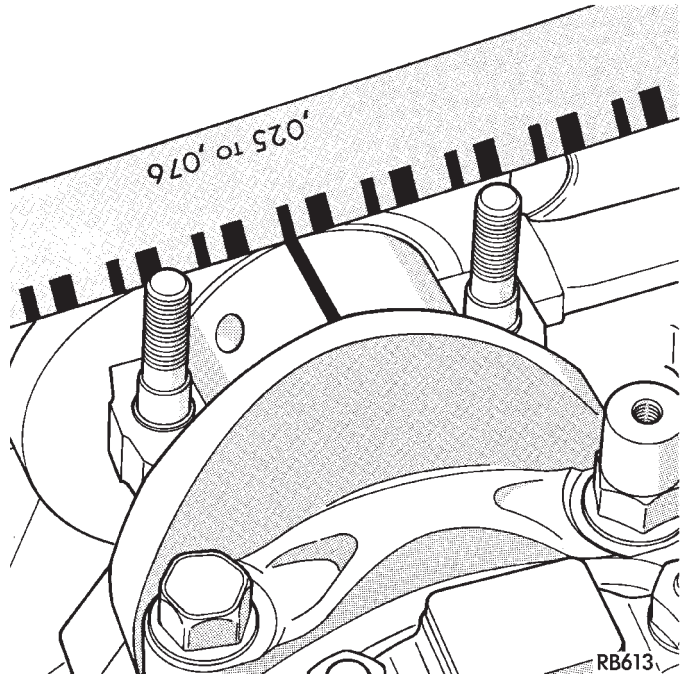


Fig. 45 Checking Connecting Rod Bearing Clearance—Typical

CONNECTING ROD BOLTS

NOTE: The connecting rod bearing cap bolts must be examined before reuse. If the threads are necked down due to stretching, the bolt(s) must be replaced (Fig. 46).

NOTE: Connecting rod bolts are retained in the rod cap with a light press fit. If bolts are to be removed, use a hammer and punch to drive bolts from connecting rod cap using care not to damage fractured cap surface.

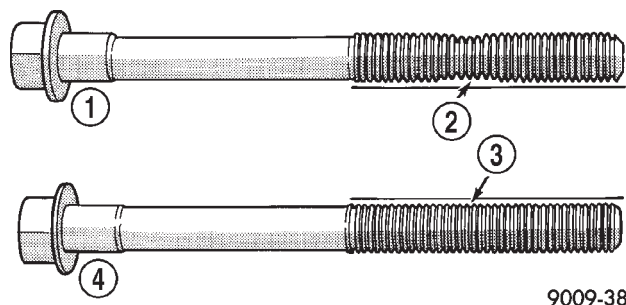
(1) Examine connecting rod bolt for stretching. Stretching can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt should be replaced.

(2) Before installing the bolts, lubricate the threads with engine oil.

(3) Install bolts finger tight. Then alternately torque each nut to assemble the cap properly.

(4) Tighten the nuts to specification. (Refer to 9 - ENGINE - SPECIFICATIONS)

CONNECTING ROD BEARINGS (Continued)



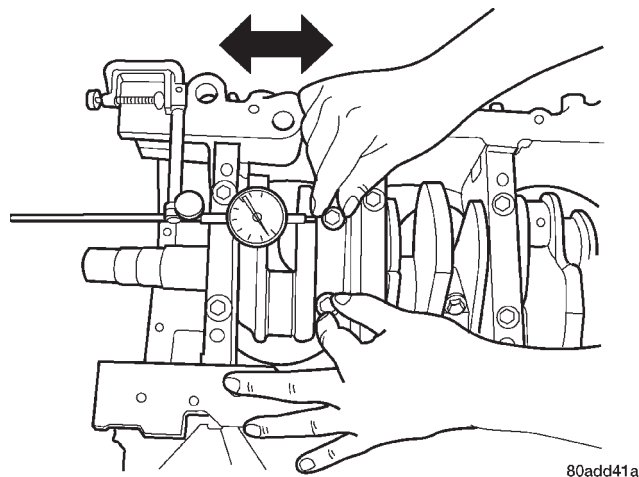
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Fig. 46 Check for Stretched Bolts

- 1 - STRETCHED BOLT
- 2 - THREADS ARE NOT STRAIGHT ON LINE
- 3 - THREADS ARE STRAIGHT ON LINE
- 4 - UNSTRETCHED BOLT

CONNECTING ROD SIDE CLEARANCE

(1) Mount a dial indicator to a stationary point on engine. Locate probe perpendicular to and resting against the connecting rod cap being checked. Move connecting rod all the way to rear of its travel. Zero the dial indicator. Move connecting rod forward to limit of travel and read the dial indicator (Fig. 47). Compare measurement to specification listed in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). Repeat procedure for each connecting rod. Turn crankshaft for connecting rod accessibility.



80add41a

Fig. 47 Connecting Rod Side Clearance Measuring
CRANKSHAFT

DESCRIPTION

The crankshaft is constructed of a forged micro alloy steel. The six throw, nine counterweight crankshaft is supported by four select fit main bearings with the number three serving as the thrust washer location (Fig. 42). The select fit identification markings will be on the rear side of the number nine (rearmost) counterweight. The six separate connect-

ing rod throws are an even-firing design which reduces torque fluctuations while a vibration damper is used to control torsional vibration.

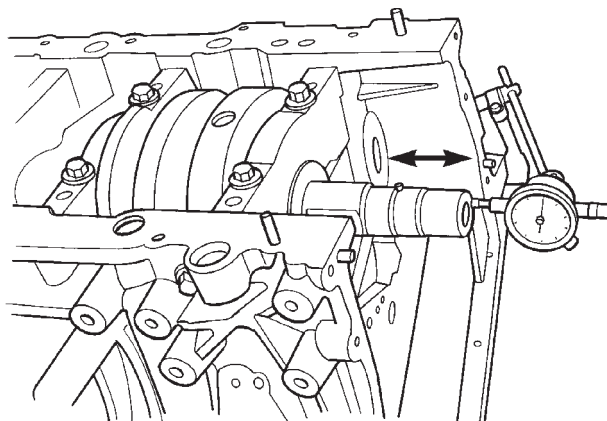
The crankshaft oil seals are a one piece design. The front seal is retained by the timing chain cover, and the rear seal in a housing that attaches to the cylinder block.

OPERATION

The crankshaft transfers force generated by combustion within the cylinder to the flywheel or flexplate.

STANDARD PROCEDURE - CRANKSHAFT END PLAY

- (1) Mount a dial indicator to a stationary point at front of engine. Locate the probe perpendicular against nose of crankshaft (Fig. 48).
- (2) Move crankshaft all the way to the rear of its travel.
- (3) Zero the dial indicator.
- (4) Move crankshaft all the way to the front and read the dial indicator. For crankshaft end play clearances (Refer to 9 - ENGINE - SPECIFICATIONS).



80aff4eb

Fig. 48 CHECKING CRANKSHAFT END PLAY

REMOVAL

- (1) Remove engine from vehicle (Refer to 9 - ENGINE - REMOVAL).
- (2) Mount engine on an engine stand.
- (3) Drain engine oil and remove oil filter.
- (4) Remove oil pan and oil pick-up tube (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL).
- (5) Remove idler pulley bracket for accessory drive belt.
- (6) Remove upper intake manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL).
- (7) Remove cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

CRANKSHAFT (Continued)

(8) Remove timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN COVER - REMOVAL).

(9) Remove primary timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - REMOVAL).

(10) Remove crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - REMOVAL).

(11) Remove oil pump (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - REMOVAL).

(12) Remove crankshaft rear oil seal retainer (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINER - REMOVAL).

(13) Remove structural windage tray (Fig. 49).

(14) Turn crankshaft until connecting rod cap to be removed is accessible.

NOTE: Connecting rod bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(15) Mark connecting rod bearing cap positions using a permanent ink marker or scribe tool.

(16) Remove connecting rod bearing caps. Use care to prevent damage to the crankshaft bearing surfaces.

CAUTION: Care should be taken not to damage the fractured rod and cap joint face surfaces or damage to the engine may occur.

(17) Remove main bearing cap bolts and tie bolts (Fig. 50).

(18) Remove main bearing caps (Fig. 50).

CAUTION: When removing crankshaft, use care not to damage bearing surfaces on the crankshaft

(19) Remove crankshaft from cylinder block (Fig. 51).

INSTALLATION

NOTE: Upper and lower bearing halves are NOT interchangeable.

CAUTION: Main bearings are select fit (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE).

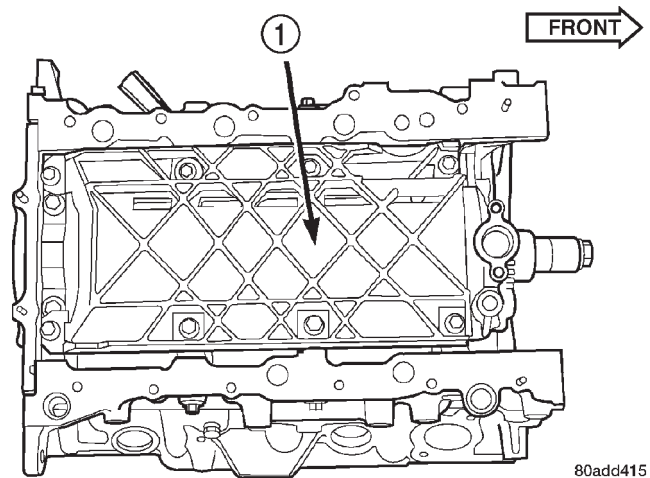


Fig. 49 Windage Tray

1 - STRUCTURAL WINDAGE TRAY

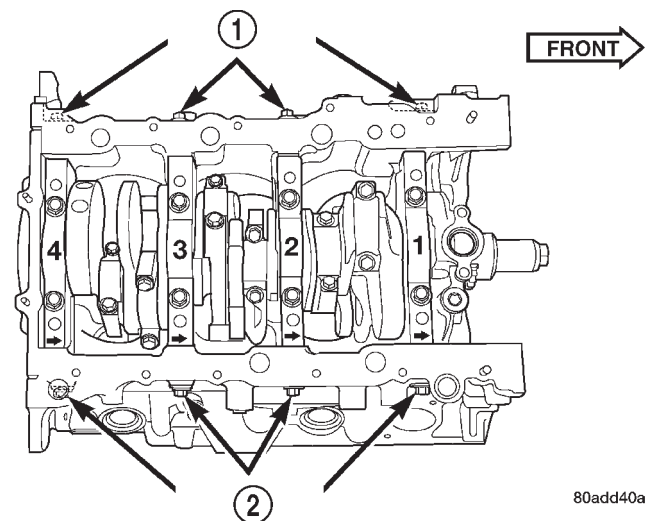


Fig. 50 Main Bearing Cap Identification

1 - TIE BOLTS
2 - TIE BOLTS

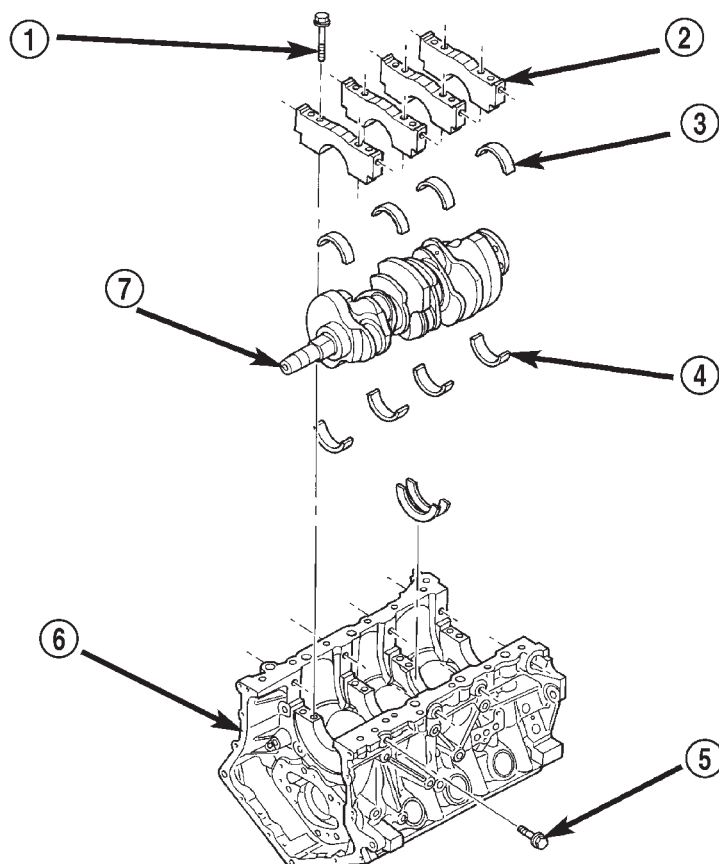
(1) Lubricate upper main bearing halves with engine oil (Fig. 52).

CAUTION: When installing crankshaft, use care not to damage bearing surfaces on the crankshaft.

(2) Install crankshaft (Fig. 51).

NOTE: Make sure that the coated and oil groove side of crankshaft thrust washer faces the crankshaft thrust surface.

CRANKSHAFT (Continued)

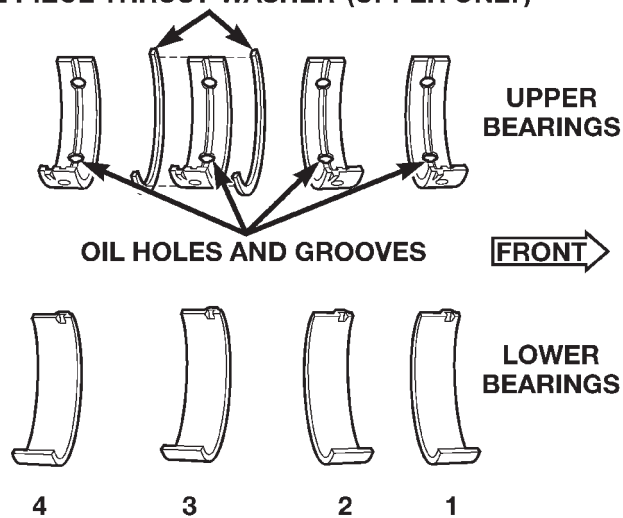


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Fig. 51 CYLINDER BLOCK AND CRANKSHAFT

- 1 - MAIN CAP BOLT—VERTICAL
- 2 - MAIN CAP
- 3 - MAIN BEARING—LOWER
- 4 - MAIN BEARING—UPPER

- 5 - MAIN CAP BOLT —HORIZONTAL
- 6 - CYLINDER BLOCK
- 7 - CRANKSHAFT

2 PIECE THRUST WASHER (UPPER ONLY)

80ae847c

Fig. 52 Main Bearing Identification

(3) Push crankshaft forward. Lubricate and install the front thrust washer by rolling the thrust washer onto the machined shelf between the No. 3 upper main bulk head and crankshaft thrust surface (Fig. 53).

(4) Move crankshaft rearward. Lubricate and install the rear thrust washer by rolling the thrust washer onto the machined shelf between the No. 3 upper main bulk head and crankshaft thrust surface.

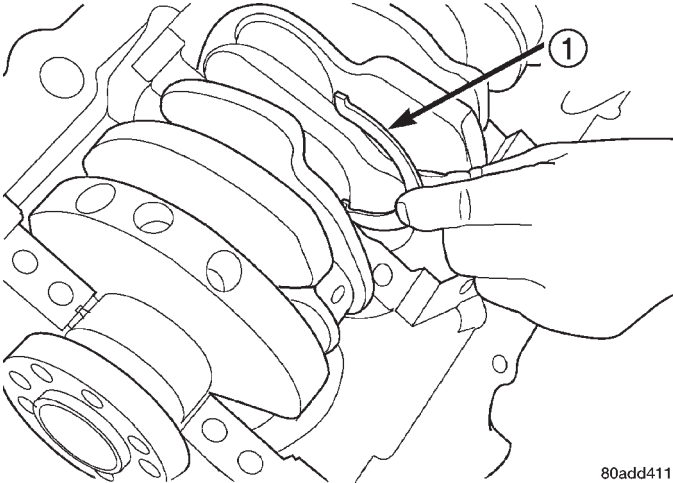
(5) Lubricate lower main bearings with engine oil.

(6) Install main bearings and caps.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, and lastly the main cap tie (horizontal) bolts.

CRANKSHAFT (Continued)



80add411

Fig. 53 Thrust Washer - Installation

1 - FRONT THRUST WASHER

(7) Install the inside main bearing cap bolts and tighten to 20 N·m + 1/4 Turn (15 ft. lbs. + 1/4 Turn) (Fig. 50).

(8) Measure crankshaft end play (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE).

(9) Install connecting rods and measure side clearance (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE).

(10) Install windage tray (Fig. 49). Lubricate bolts with engine oil and tighten to 27 N·m + 1/4 Turn (20 ft. lbs. + 1/4 turn).

(11) Install the main cap tie (horizontal) bolts and tighten to 28 N·m (250 in. lbs.) (Fig. 50).

(12) Install rear crankshaft oil seal retainer and oil seal (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINER - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION).

(13) Install oil pump assembly (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION).

(14) Install crankshaft sprocket (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

(15) Install timing chain (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

(16) Install timing chain cover (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN COVER - INSTALLATION).

(17) Install cylinder head covers (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION).

(18) Install idler pulley bracket for accessory drive belt.

(19) Install oil pick-up tube and O-ring.

(20) Install oil pan and oil filter (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION).

(21) Install oil dipstick tube.

(22) Install engine assembly (Refer to 9 - ENGINE - INSTALLATION).

(23) Fill engine crankcase with proper oil to correct level (Refer to 9 - ENGINE/LUBRICATION/OIL - STANDARD PROCEDURE).

CRANKSHAFT MAIN BEARINGS

STANDARD PROCEDURE - CRANKSHAFT MAIN BEARING FITTING

The main bearings are "select fit" to achieve proper oil clearances. For main bearing selection, the block and crankshaft have grade identification marks.

The grade marks for the cylinder block main bearing bore grade is located on the pan rail just below the left side engine mount bracket (Fig. 55). These marks are read left to right, corresponding to main bore 1, 2, 3, 4.

The grade marks for the crankshaft are located on the rearmost crankshaft counter weight as shown in (Fig. 54). The crankshaft journal grade marks are read left to right, corresponding with journal number 1, 2, 3, 4.

Refer to the MAIN BEARING SELECTION CHART—2.7L to properly select the main bearings. For an example, if the main bore grade is 3 and the journal grade is 2, the proper select fit bearing would be (2) +0.003 mm (+0.0002 in.).

NOTE: Service main bearings have a number from 1–5 marked in ink on the bearing surface (Fig. 56). For verification, use the MAIN BEARING SELECTION CHART—2.7L for number to size identification.

The upper main bearing has a oil feed hole and a center groove to allow lubrication of the main journal and must be properly positioned in the block.

NOTE: Although cylinder bores are graded for size, there is only one piston size.

CRANKSHAFT MAIN BEARINGS (Continued)

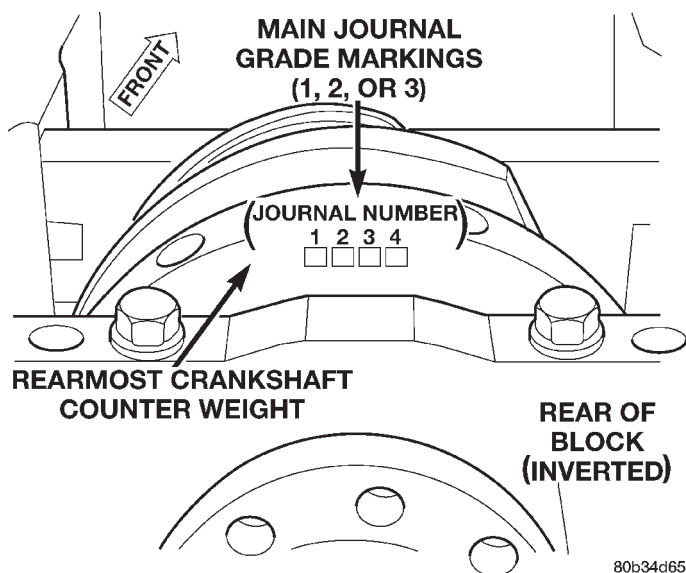


Fig. 54 Crankshaft Main Journal Grade Marking Location

CYLINDER BORE GRADE	CRANKSHAFT MAIN BORE GRADE
CYLINDER NUMBER	MAIN BORE NUMBER
123456 XXXXXX	1234 XXXX

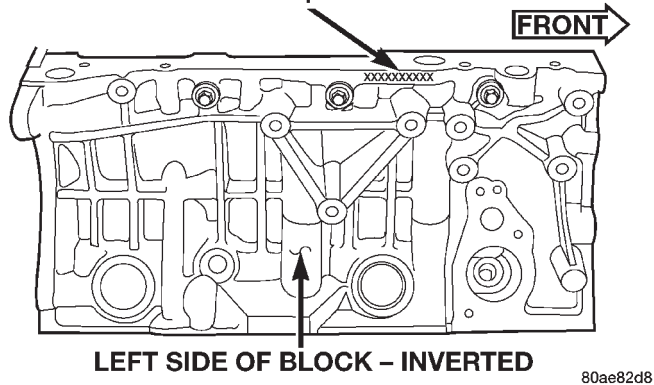


Fig. 55 Cylinder Block Main Bore Grade Marking

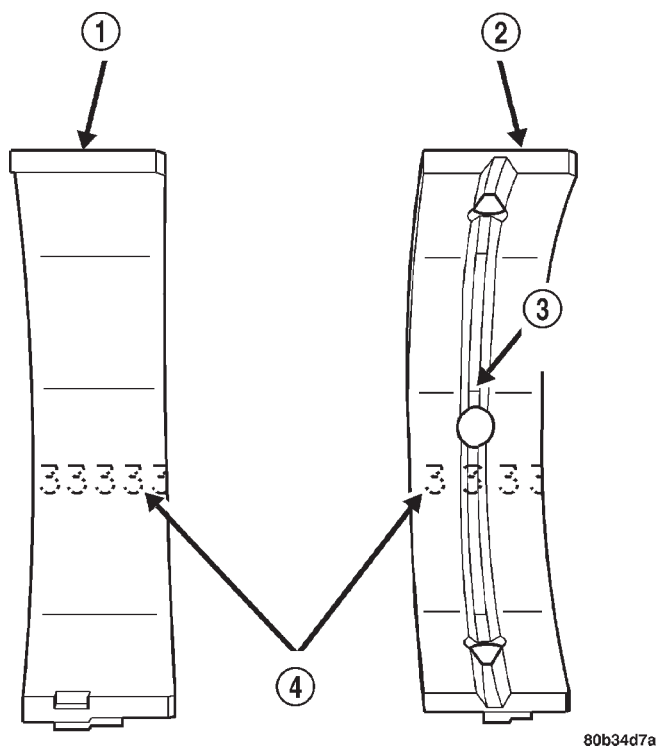


Fig. 56 Main Bearing Grade Marks

- 1 - LOWER MAIN BEARING
- 2 - UPPER MAIN BEARING
- 3 - OIL FEED HOLE AND GROOVE
- 4 - GRADE SELECTION INK MARKS

MAIN BEARING SELECTION CHART—2.7L

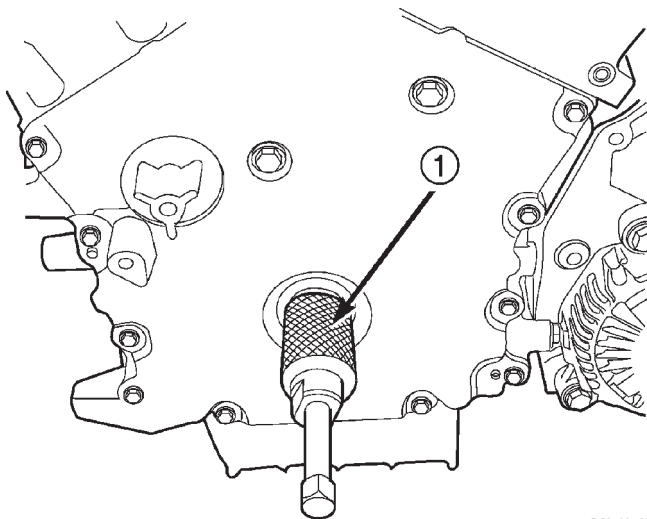
		Main Bearing Bore Grade Mark		
		1	2	3
Crankshaft Main Journal Grade Mark	1	(3) standard	(2) +0.003 mm (+0.0002 in.)	(1) +0.006 mm (+0.0003 in.)
	2	(4) -0.003 mm (- 0.0002)	(3) standard	(2) +0.003 mm (+0.0002 in.)
	3	(5) -0.006 mm (- 0.0003 in.)	(4) -0.003 mm (- 0.0002 in.)	(3) standard

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

(1) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(2) Install Special Tool 8194, Insert into crankshaft nose. Remove seal using Special Tool 6771, Remover (Fig. 57).



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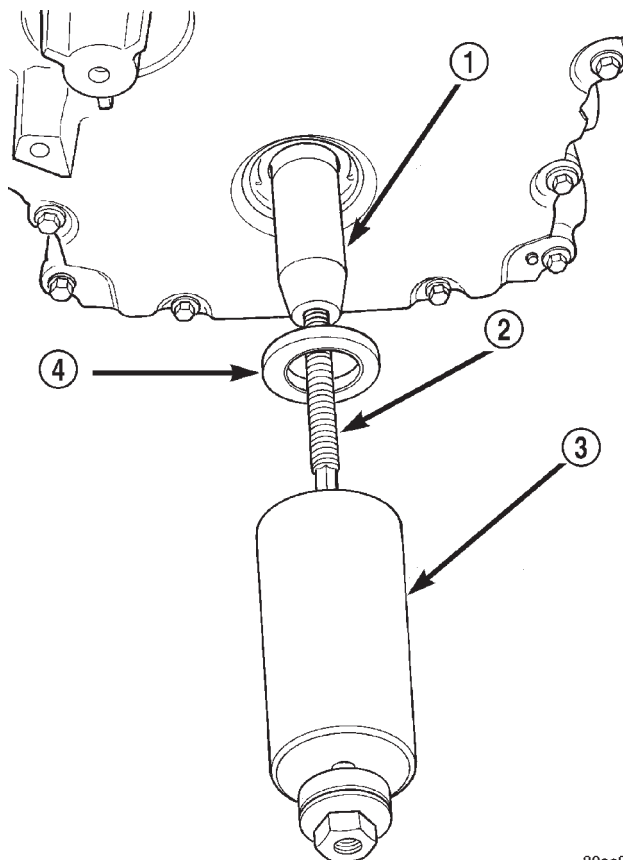
Fig. 57 Crankshaft Front Oil Seal - Removal

1 - SPECIAL TOOL 6771

INSTALLATION

(1) Install new seal using Special Tools 6780-2 Sleeve, 6780-1 Installer, and 8179 Stud (Fig. 58).

(2) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)



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Fig. 58 Crankshaft Front Oil Seal - Installation

- 1 - SPECIAL TOOL 6780-2
- 2 - SPECIAL TOOL 8179
- 3 - SPECIAL TOOL 6780-1
- 4 - SEAL

CRANKSHAFT OIL SEAL - REAR

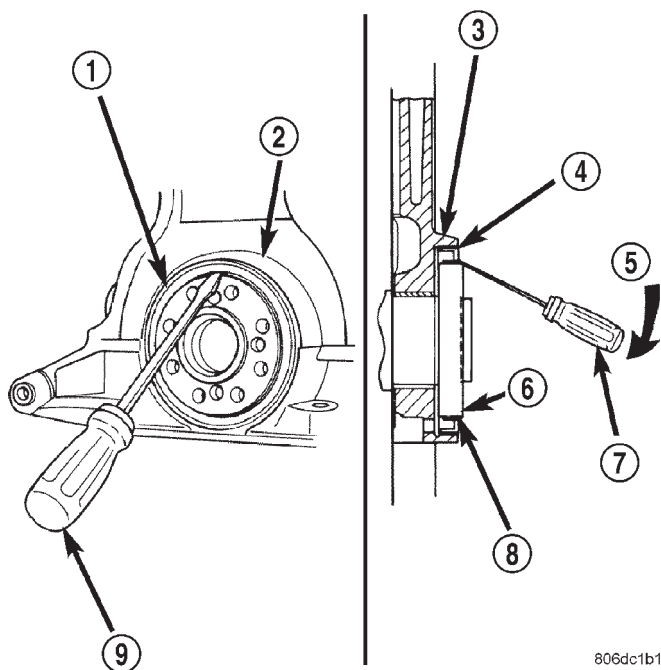
REMOVAL

(1) Remove transaxle from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL)

(2) Remove drive plate.

(3) Insert a 3/16" wide flat bladed screwdriver between the dust lip and the metal case of the crankshaft seal. Angle the screwdriver (Fig. 59) through the dust lip against the metal case of the seal. Pry out seal.

CAUTION: Do not allow the screwdriver blade to contact the crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.



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Fig. 59 Rear Crankshaft Oil Seal Removal - Typical

- 1 - REAR CRANKSHAFT SEAL
- 2 - ENGINE BLOCK
- 3 - ENGINE BLOCK
- 4 - REAR CRANKSHAFT SEAL METAL CASE
- 5 - PRY IN THIS DIRECTION
- 6 - CRANKSHAFT
- 7 - SCREWDRIVER
- 8 - REAR CRANKSHAFT SEAL DUST LIP
- 9 - SCREWDRIVER

INSTALLATION

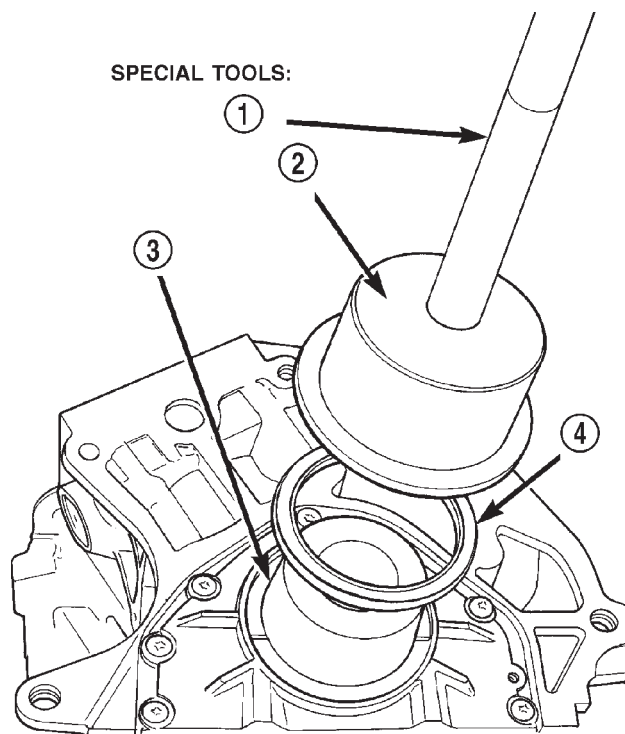
CAUTION: If a burr or scratch is present on the crankshaft edge (chamfer), clean surface using 400 grit sand paper to prevent seal damage during installation.

(1) Place Special Tool 6926-1 Guide on crankshaft (Fig. 60). This is a pilot tool with a magnetic base.

(2) Position seal over pilot tool. Assume that lip of seal is facing towards the crankshaft during installation. The pilot tool remains on crankshaft during seal installation.

(3) Using Special Tool 6926-2 Installer, and C-4171 Handle (Fig. 60), drive seal into the retainer housing until seal is flush with housing surface.

(4) Install drive plate and transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)



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Fig. 60 Crankshaft Rear Seal - Installation

- 1 - C-4171 HANDLE
- 2 - 6926-2 INSTALLER
- 3 - 6926-1 GUIDE
- 4 - SEAL

CRANKSHAFT REAR OIL SEAL RETAINER

REMOVAL

(1) Remove crankshaft rear oil seal and oil pan. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL) (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(2) Remove seal retainer attaching screws (Fig. 61).

(3) Remove retainer and gasket (Fig. 61).

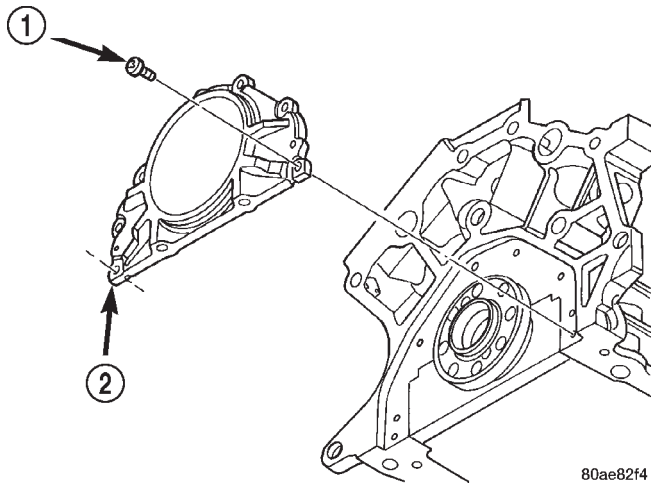


Fig. 61 Oil Seal Retainer

- 1 - SCREWS (7)
2 - SEAL RETAINER

INSTALLATION

(1) Clean sealing surfaces and replace gasket as needed.

(2) Install gasket and loose assemble seal retainer to block.

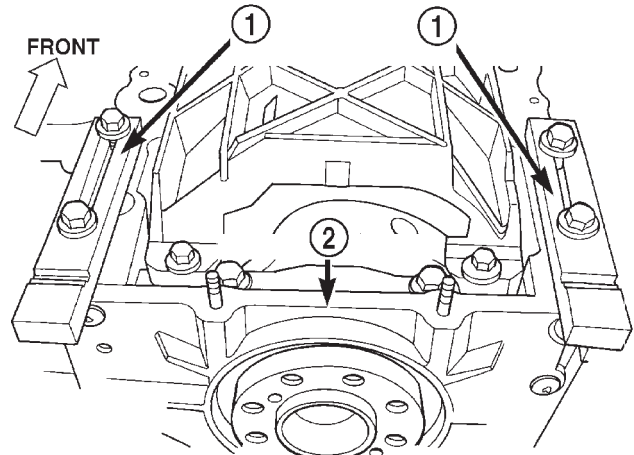
NOTE: The following steps must be performed to prevent oil leaks at sealing joints.

(3) Attach Special Tools 8225 to pan rail using the oil pan fasteners.

NOTE: Make sure that the "2.7L" stamped on the special tool is facing the cylinder block (flat side of tools against pan rail).

(4) While applying firm pressure to the seal retainer against Special Tools 8225 (Fig. 62), tighten seal retainer screws to 12 N·m (105 in. lbs.).

(5) Install oil pan and crankshaft rear oil seal. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)



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Fig. 62 SEAL RETAINER ALIGNMENT

- 1 - SPECIAL TOOLS 8225
2 - SEAL RETAINER

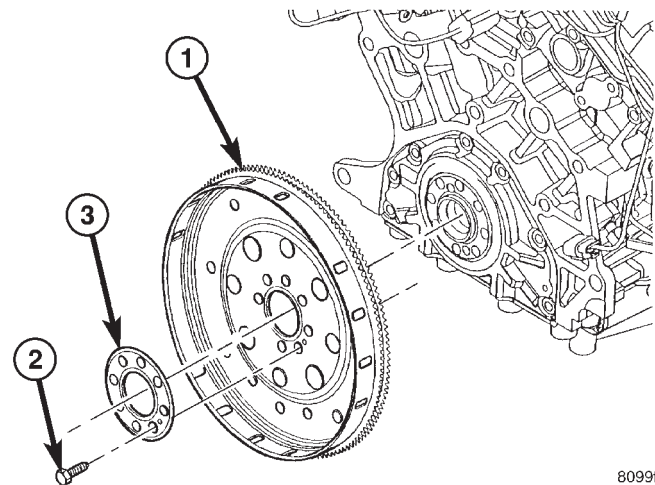
FLEX PLATE

REMOVAL

(1) Remove the transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL)

(2) Remove flex plate attaching bolts.

(3) Remove the flex plate (Fig. 63).



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Fig. 63 FLEX PLATE

- 1 - FLEX PLATE
2 - BOLT (QTY. 8)
3 - BACKING PLATE

INSTALLATION

(1) Position flex plate with backing plate on the crankshaft (Fig. 63).

(2) Apply Mopar® Lock & Seal Adhesive to the flex plate bolts.

FLEX PLATE (Continued)

(3) Install flex plate bolts (Fig. 63). Tighten bolts to 95 N·m (70 ft. lbs.).

(4) Install the transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)

PISTON & CONNECTING ROD

DESCRIPTION

The pistons are made of a high strength aluminum alloy with an anodized top ring groove. Piston skirts are coated with a solid lubricant for scuff resistance. The connecting rods are made of powdered metal with a "fractured cap" design. The connecting rod attaches to the piston with a full floating pin retained by lock rings. The piston and connecting rod are serviced as an assembly (Fig. 64).

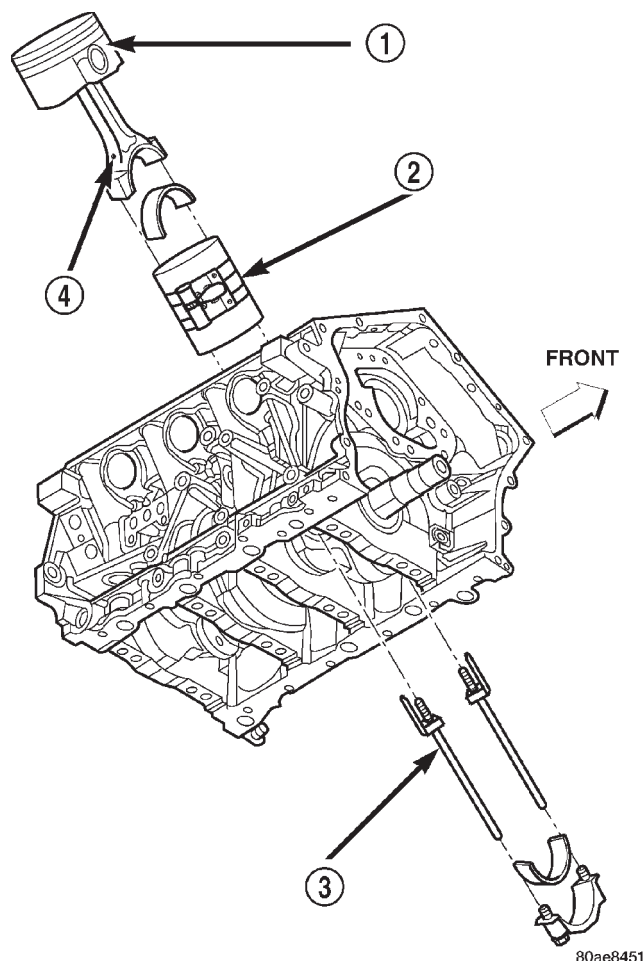


Fig. 64 Piston and Connecting Rod

- 1 - "F" TOWARD FRONT OF ENGINE
- 2 - RING COMPRESSOR
- 3 - SPECIAL TOOL 8189
- 4 - OIL SQUIRT HOLE

OPERATION

The piston and connecting rod is the link between the combustion force to the crankshaft.

STANDARD PROCEDURE - FITTING PISTONS

The pistons have been cast and machined to one size and weight. The piston and rod assemblies are matched to weigh the same for engine balance.

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin at size location shown in (Fig. 65). Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line. Refer to Engine Specifications. (Refer to 9 - ENGINE - SPECIFICATIONS) **Pistons and cylinder bores should be measured at normal room temperature, 70°F (21°C).**

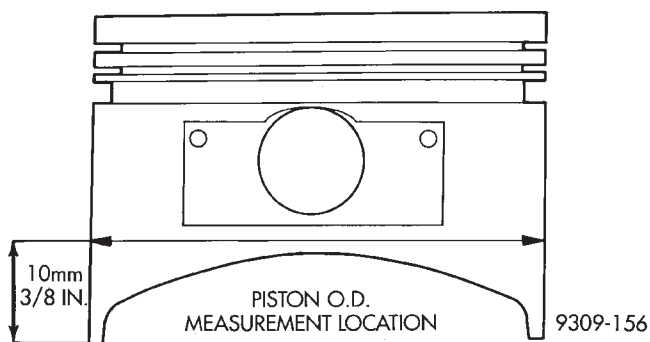


Fig. 65 Piston Measurements

PISTON PINS

The pistons have been cast and machined to one size and weight. The piston and rod assemblies are matched to weigh the same for engine balance.

The piston pin is full floating and is held in place by lock rings. **Do Not switch pistons with other rods.** Pistons and connecting rods are serviced as an assembly for balance.

REMOVAL

(1) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation. Pistons and connecting rods must be removed from top of cylinder block.** When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.

NOTE: Connecting rod bearing caps are not interchangeable and should be marked before removing to ensure correct reassembly.

PISTON & CONNECTING ROD (Continued)

CAUTION: DO NOT use a number stamp or a punch to mark connecting rods. Damage to connecting rod could occur.

(2) Mark connecting rod and bearing cap positions using a permanent ink marker or scribe tool (Fig. 66).

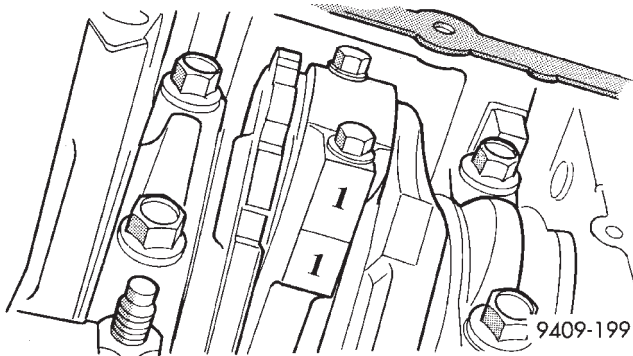


Fig. 66 IDENTIFY CONNECTING ROD TO CYLINDER

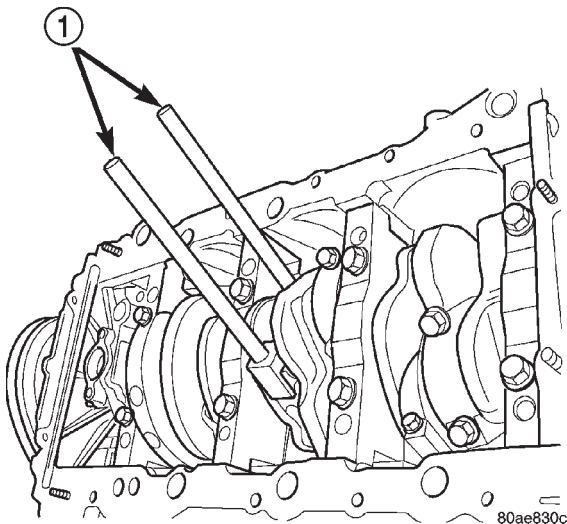


Fig. 67 CONNECTING ROD GUIDES

1 - SPECIAL TOOL 8189 CONNECTING ROD GUIDES

CAUTION: Care must be taken not to damage the fractured rod and cap joint face surfaces, as engine damage may occur.

(3) Remove connecting rod cap. Install Special Tool 8189 Connecting Rod Guides into the connecting rod being removed (Fig. 67). Remove each piston and rod assembly out of cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

(4) After removal, install bearing cap on the mating rod to prevent damage to the fractured cap to rod surfaces.

INSTALLATION

(1) Install the piston rings. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - INSTALLATION)

(2) Before installing piston and connecting rod assemblies into the bore, ensure that compression ring gaps are staggered so that neither is in line with oil ring rail gap.

(3) Before installing the ring compressor, make sure the oil ring expander ends are butted and the rail gaps located as shown in (Fig. 75).

(4) Immerse the piston head and rings in clean engine oil, slide the ring compressor over the piston and tighten with the special wrench. **Ensure position of rings does not change during this operation.**

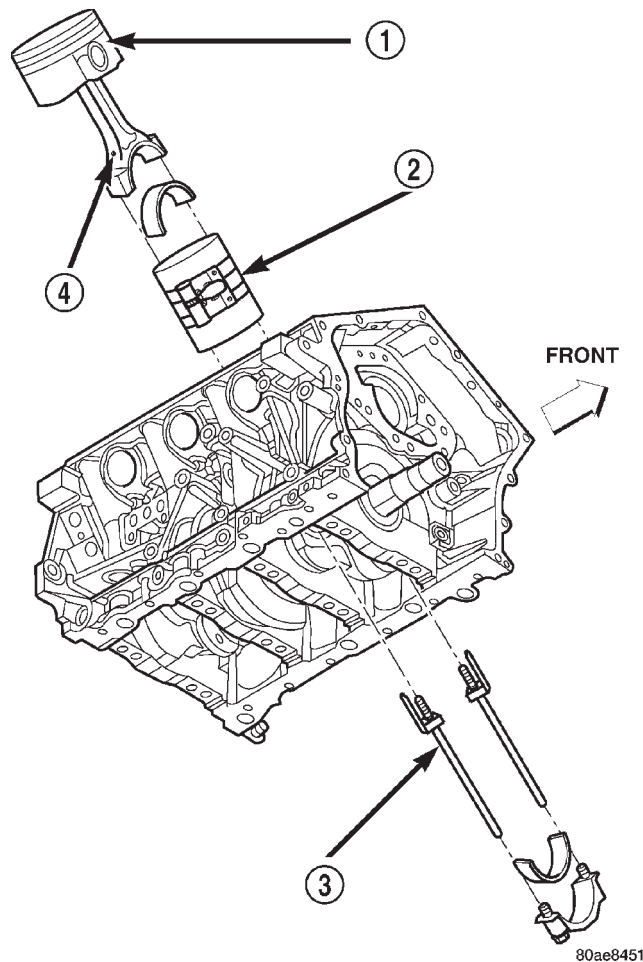


Fig. 68 Piston and Connecting Rod

1 - "F" TOWARD FRONT OF ENGINE

2 - RING COMPRESSOR

3 - SPECIAL TOOL 8189

4 - OIL SQUIRT HOLE

CAUTION: Ensure the hole in bearing half aligns with hole in connecting rod, as damage to engine may occur.

PISTON & CONNECTING ROD (Continued)

(5) Position bearing onto connecting rod. Ensure that hole in bearing half is aligned to hole in connecting rod. Lubricate bearing surface with clean engine oil.

(6) Install Special Tools 8189 Connecting Rod Guides into connecting rod (Fig. 67).

(7) The pistons are marked on top with an arrow and with an "F" (Front) above the pin boss. These marks must be pointing toward the front of engine on both cylinder banks. The connecting rod oil squirt hole faces the major thrust (right) side of the block (Fig. 69).

(8) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal (Fig. 68).

CAUTION: Do Not interchange piston assemblies bank to bank, as engine damage may occur.

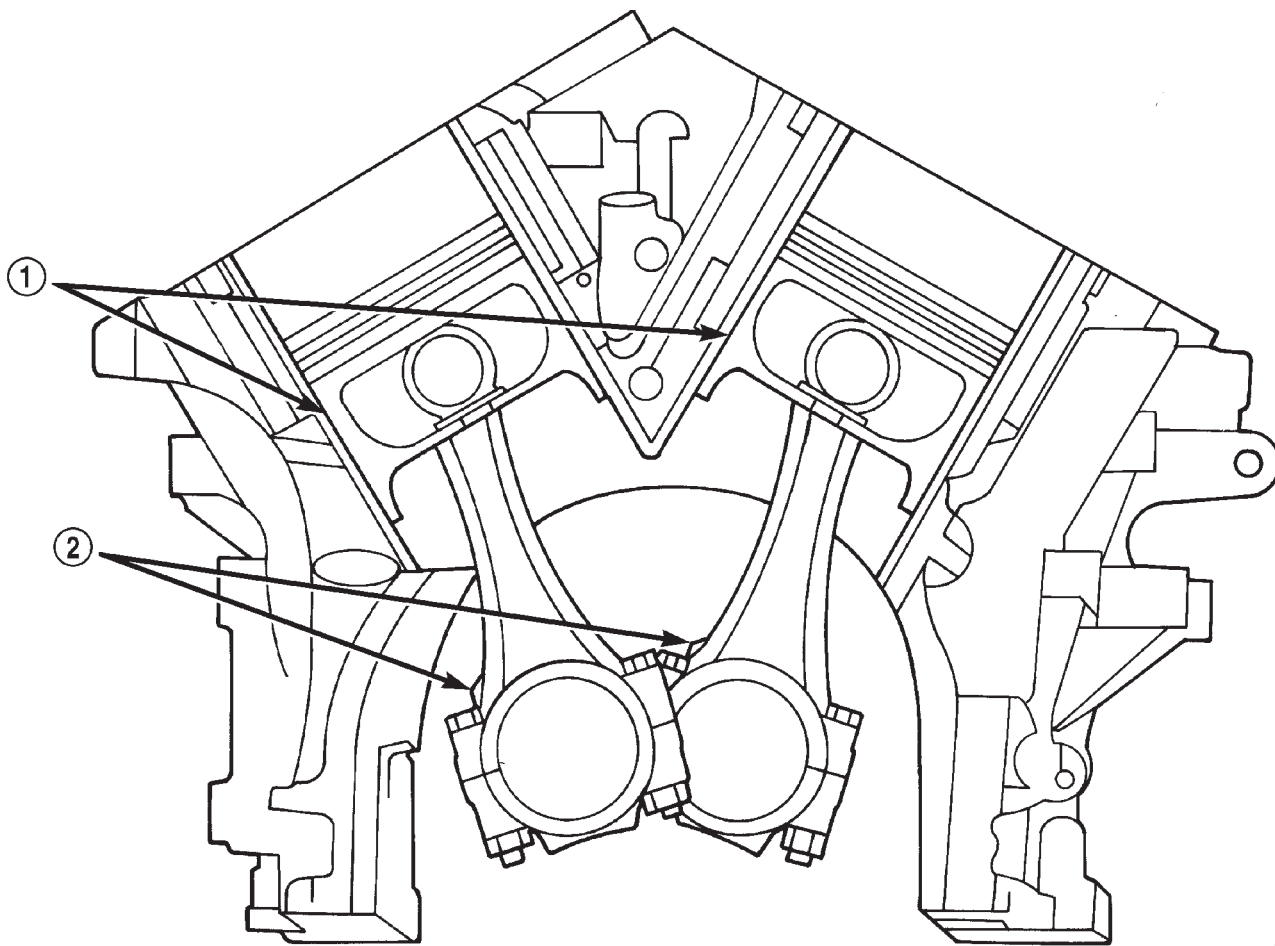
(9) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.

(10) Lubricate rod bolts and bearing surface with engine oil. Install connecting rod cap and bearing. Tighten bolts to 27 N·m (20 ft. lbs.) Plus 1/4 turn.

PISTON RINGS

STANDARD PROCEDURE - PISTON RING FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 inch.) from bottom of cylinder bore. Check gap with feeler gauge (Fig. 70). Refer to (Refer to 9 - ENGINE - SPECIFICATIONS) for clearance measurements.



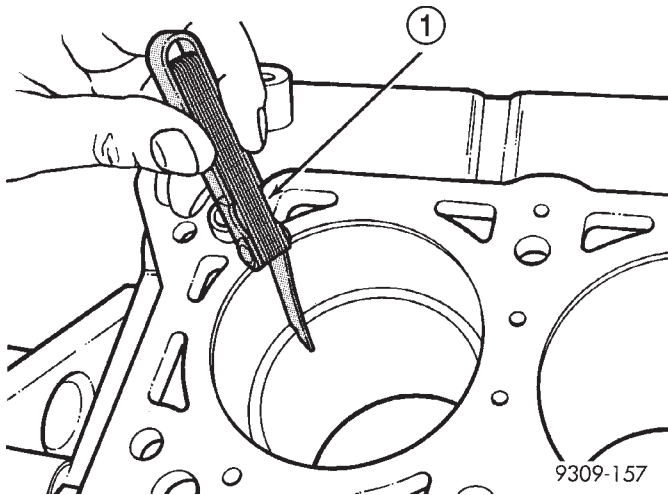
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Fig. 69 Piston and Connecting Rod Positioning (Front View of Engine)

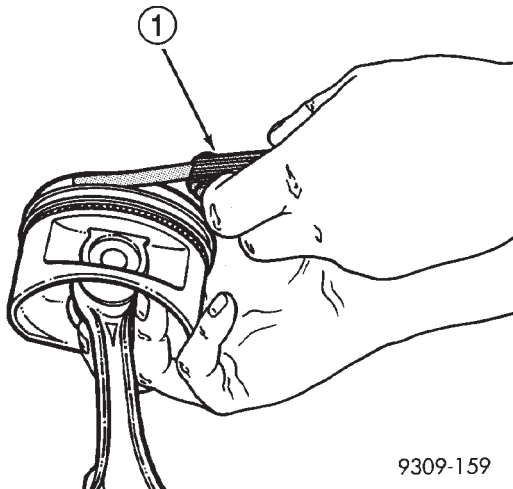
1 - MAJOR THRUST SIDE OF PISTON

2 - OIL SQUIRT HOLE

PISTON RINGS (Continued)

**Fig. 70 CHECK GAP ON PISTON RINGS**

1 - FEELER GAUGE

**Fig. 71 Measuring Piston Ring Side Clearance**

1 - FEELER GAUGE

(2) Check piston ring to groove clearance (Fig. 71). For clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

REMOVAL

- (1) Remove piston and connecting rod. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - REMOVAL)
- (2) Remove No. 1 and No.2 piston rings (Fig. 72) from piston using a ring expander tool (Fig. 74).
- (3) Remove upper oil ring side rail (Fig. 72).
- (4) Remove lower oil ring side rail (Fig. 72).
- (5) Remove oil ring expander (Fig. 72).

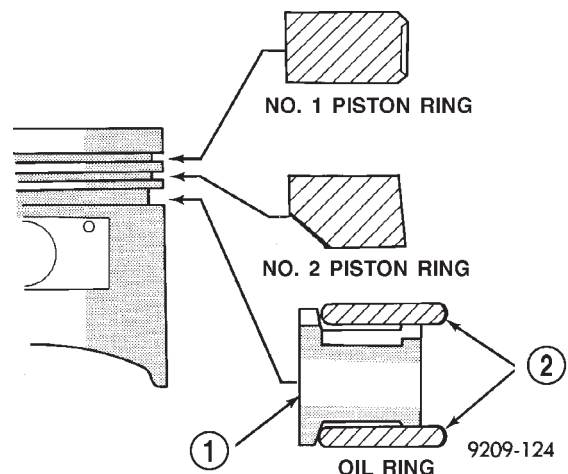
INSTALLATION

(1) Measure clearance of piston rings to the cylinder bore and piston. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE)

(2) The No. 1 and No. 2 piston rings have a different cross section. Ensure No. 2 ring is installed with manufacturers I.D. mark (dot) facing up, towards top of the piston (Fig. 72).

CAUTION: Install piston rings in the following order:

- (3) Oil ring expander.
- (4) Upper oil ring side rail.
- (5) Lower oil ring side rail.
- (6) No. 2 Intermediate piston ring.
- (7) No. 1 Upper piston ring.
- (8) Install the side rail by placing one end between the piston ring groove and the expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander during this step (Fig. 73).**

**Fig. 72 PISTON RING - INSTALLATION**

1 - SPACER EXPANDER
2 - SIDE RAIL

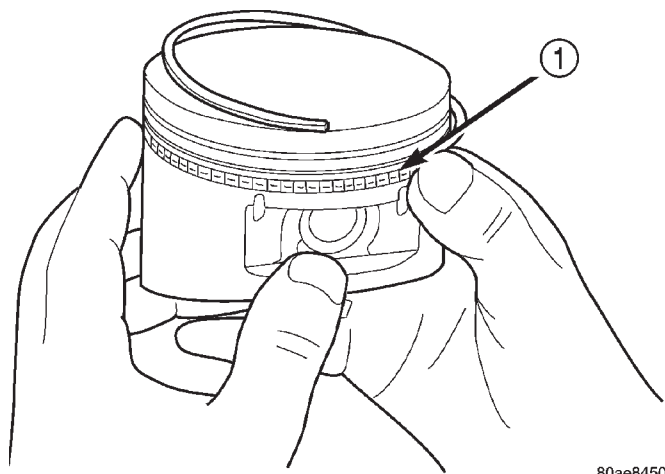
(9) Install upper side rail first and then the lower side rail.

(10) Install No. 2 piston ring and then No. 1 piston ring (Fig. 74).

(11) Position piston ring end gaps as shown in (Fig. 75).

(12) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

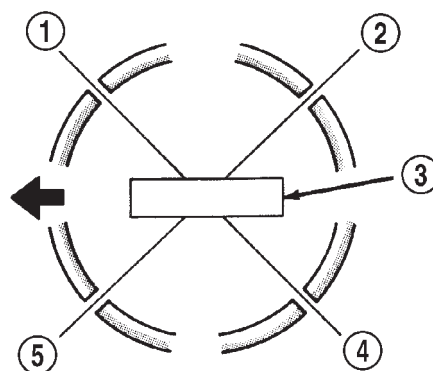
PISTON RINGS (Continued)



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Fig. 73 SIDE RAIL - INSTALLATION

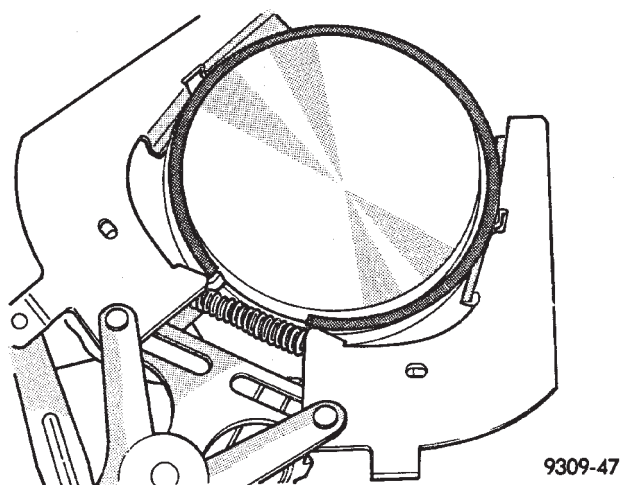
1 - SIDE RAIL END



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Fig. 75 PISTON RING END GAP POSITION

- 1 - SIDE RAIL UPPER
- 2 - NO. 1 RING GAP
- 3 - PISTON PIN
- 4 - SIDE RAIL LOWER
- 5 - NO. 2 RING GAP AND SPACER EXPANDER GAP



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Fig. 74 UPPER AND INTERMEDIATE RINGS

VIBRATION DAMPER

REMOVAL

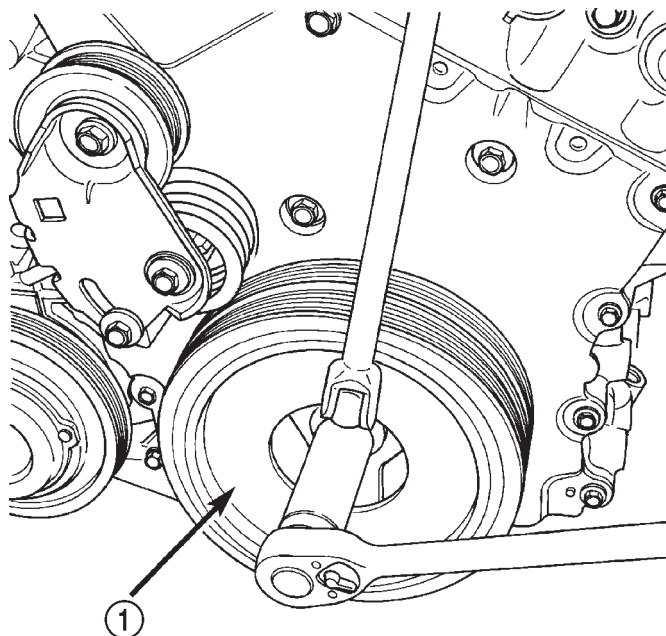
(1) Remove upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)

(2) Remove radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL) and accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Remove damper center bolt while holding the damper with Special Tool 8191 (Fig. 76).

CAUTION: Before removing damper, verify that A/C belt tensioner is not contacting the damper, as damage could occur to tensioner, timing chain cover, and/or damper.

(4) Remove damper by using Special Tools 8194 Insert and 1023 Three Jaw Puller (Fig. 77).



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Fig. 76 VIBRATION DAMPER CENTER BOLT - REMOVAL/INSTALLATION

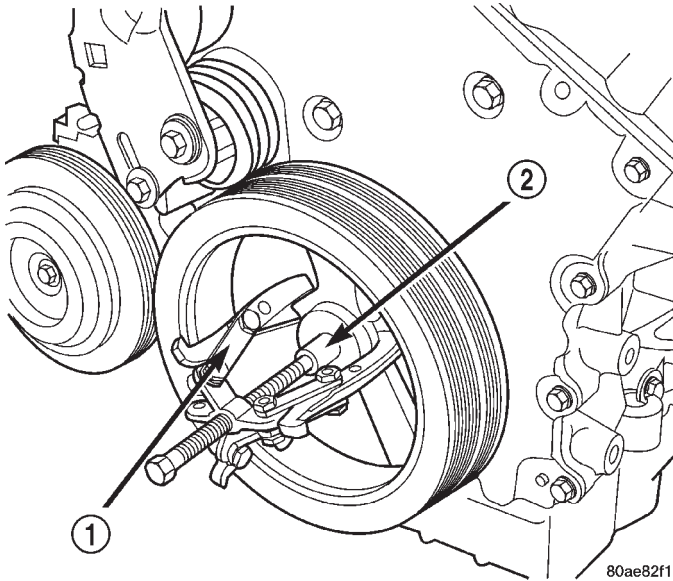
1 - SPECIAL TOOL 8191

INSTALLATION

(1) Install damper using Special Tools 8179 Screw, with Nut and Thrust Bearing from 6792, and 6792-1 Installer (Fig. 78).

(2) Install damper center bolt. Tighten center bolt while holding the damper with Special Tool 8191 to 170 N·m (125 ft. lbs.) (Fig. 76).

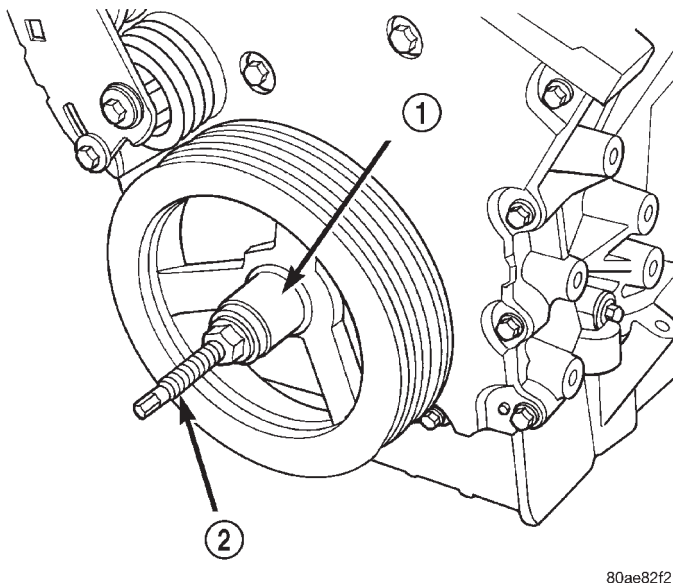
VIBRATION DAMPER (Continued)

**Fig. 77 VIBRATION DAMPER - REMOVAL**

- 1 - SPECIAL TOOL 1023
2 - SPECIAL TOOL 8194 INSERT

(3) Install accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION) and radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION).

(4) Install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)

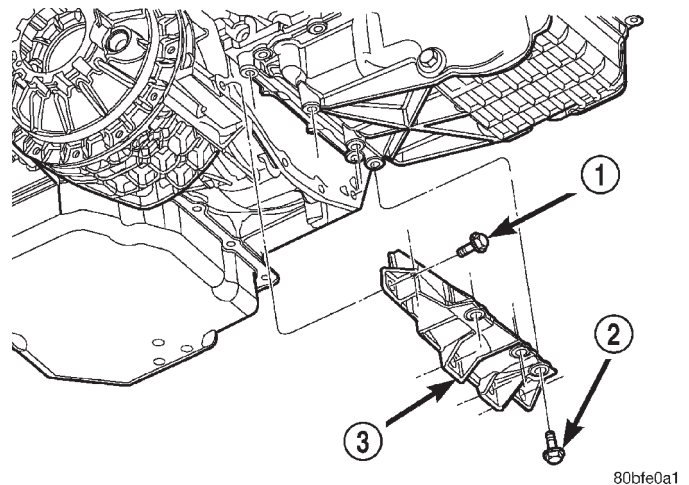
**Fig. 78 VIBRATION DAMPER - INSTALLATION**

- 1 - SPECIAL TOOL 6792-1
2 - SPECIAL TOOL 8179

STRUCTURAL COLLAR / COVER

REMOVAL

- (1) Raise vehicle on hoist.
- (2) Remove bolts attaching structural collar to oil pan and transmission housing (Fig. 79).
- (3) Remove collar (Fig. 79).

**Fig. 79 Structural Collar**

- 1 - BOLT-HORIZONTAL
2 - BOLT-VERTICAL
3 - STRUCTURAL COLLAR

INSTALLATION

CAUTION: The collar must be tighten using this service procedure, as damage to collar and/or oil pan may occur.

(1) Install structural collar (Fig. 79) using the following tightening sequence:

- a. Install the **vertical** collar to oil pan bolts. Torque bolts initially to 1.1 N·m (10 in. lbs.).
- b. Install the **horizontal** collar to transmission bolts and torque to 55 N·m (40 ft. lbs.).
- c. Starting with the center vertical bolts and working outward, final torque bolts to 55 N·m (40 ft. lbs.).

(2) Lower vehicle.

ENGINE MOUNTING

DESCRIPTION

The engine mounting system consist of three mounts; two hydro-type mounts are attached to the right and left side of the engine block, and one molded rubber type rear mount is attached to the transaxle (Fig. 80). All three mounts attach to the suspension crossmember/engine cradle.

The engine hydro-type mounts contain a liquid that is encased in a solid rubber housing.

INSPECTION

Engine hydro-mounts may show surface cracks. This will not effect performance and mount should not be replaced. Only replace the engine hydro-mounts when leaking fluid.

LEFT MOUNT

REMOVAL

- (1) Raise vehicle on hoist.

- (2) Remove the isolator attaching nuts from top of the mounting bracket (Fig. 80).

- (3) Support the engine with a jack and a block of wood across the full width of the oil pan.

- (4) Remove the lower attaching nuts from the bottom of the isolator to the frame (Fig. 80).

- (5) Raise engine carefully with jack enough to remove the isolator with heat shield from its mount.

INSTALLATION

- (1) Install isolator mount with heat shield onto the frame.

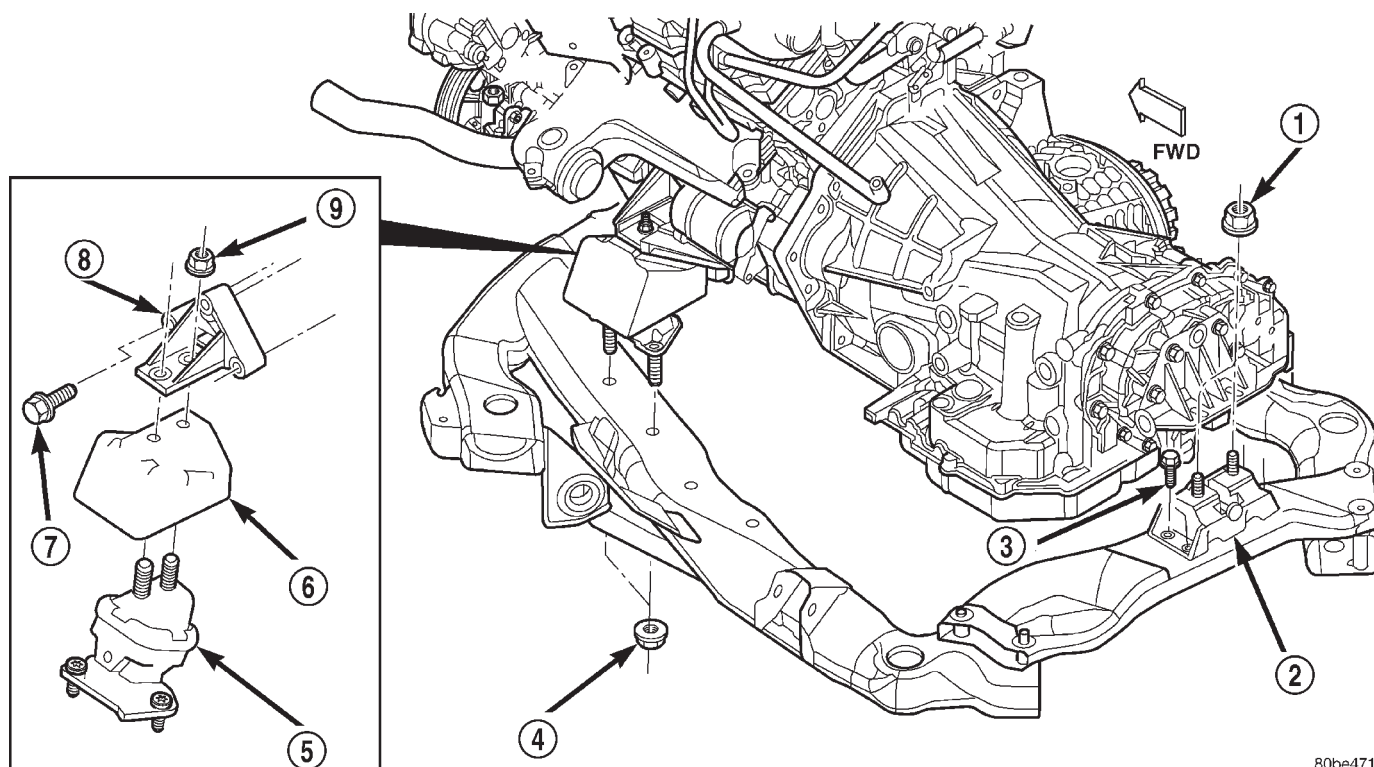
- (2) Lower the engine onto the isolator mount.

- (3) Remove jack from vehicle.

- (4) Tighten the isolator to frame nuts to 61 N·m (45 ft. lbs.) (Fig. 80).

- (5) Install the upper attaching nuts to mount and tighten to 61 N·m (45 ft. lbs.) (Fig. 80).

- (6) Lower vehicle.



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Fig. 80 ENGINE MOUNTING

- 1 - NUT
- 2 - REAR ISOLATOR
- 3 - BOLT
- 4 - NUT
- 5 - ISOLATOR

- 6 - HEAT SHIELD
- 7 - BOLT
- 8 - ENGINE MOUNT BRACKET
- 9 - NUT

REAR MOUNT

REMOVAL

- (1) Raise vehicle on hoist.
- (2) Support transaxle with a jack.
- (3) Remove isolator nuts from the mount to transaxle mount bracket (Fig. 80).
- (4) Remove rear mount isolator bolts to crossmember and remove mount (Fig. 80).

INSTALLATION

- (1) Position isolator onto crossmember.
- (2) Install bolts attaching isolator to crossmember and tighten to 33 N·m (250 in. lbs.) (Fig. 81).
- (3) Lower transaxle onto isolator.
- (4) Install isolator nuts and tighten to 61 N·m (45 ft. lbs.) (Fig. 81).
- (5) Lower vehicle.

(2) Remove the isolator attaching nuts from top of the mounting bracket (Fig. 81).

(3) Support the engine with a jack and a block of wood across the full width of the oil pan.

(4) Remove the lower attaching nuts from the bottom of the isolator to the frame (Fig. 81).

(5) Raise engine carefully with jack enough to remove the isolator with heat shield from its mount.

INSTALLATION

(1) Install isolator mount with heat shield onto the frame.

(2) Lower the engine onto the isolator mount.

(3) Remove jack from vehicle.

(4) Tighten the isolator to frame nuts to 61 N·m (45 ft. lbs.) (Fig. 81).

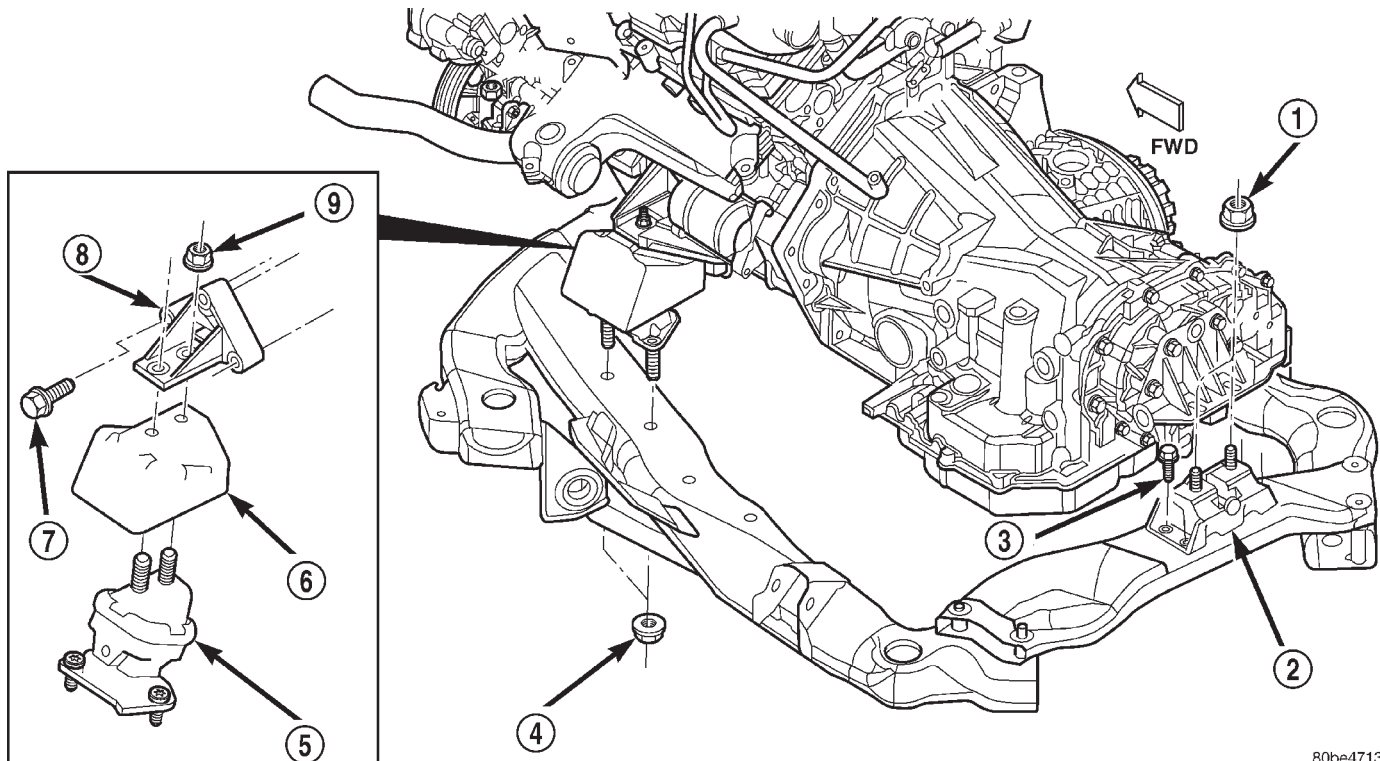
(5) Install the upper attaching nuts to mount and tighten to 61 N·m (45 ft. lbs.) (Fig. 81).

(6) Lower vehicle.

RIGHT MOUNT

REMOVAL

- (1) Raise vehicle on hoist.



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Fig. 81 ENGINE MOUNTING

- 1 - NUT
- 2 - REAR ISOLATOR
- 3 - BOLT
- 4 - NUT
- 5 - ISOLATOR

- 6 - HEAT SHIELD
- 7 - BOLT
- 8 - ENGINE MOUNT BRACKET
- 9 - NUT

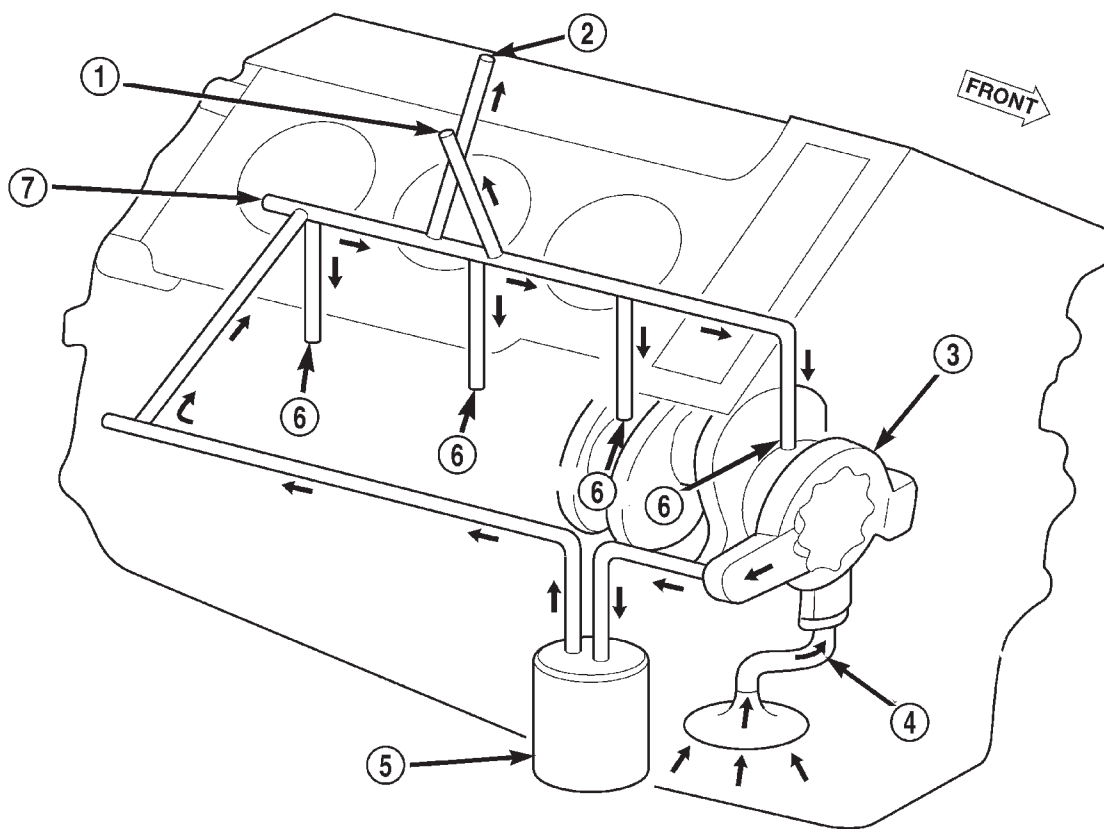
LUBRICATION

DESCRIPTION

The lubrication system is a full-flow filtration, pressure feed type. The oil pump body is mounted to the engine block. The pump inner rotor is driven by the crankshaft. A structural windage tray is used to increase power by minimizing oil windage at high engine RPM. An engine oil cooler is used on some models.

OPERATION

Oil from the oil pan is pumped by a gerotor type oil pump directly coupled to the crankshaft (Fig. 82). Oil pressure is controlled by a relief valve mounted inside the oil pump housing. See (Fig. 82), (Fig. 83), and (Fig. 84) for engine oil lubrication circuits.



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Fig. 82 Cylinder Block Oil Lubrication System

- 1 - TO RIGHT CYLINDER HEAD
- 2 - TO LEFT CYLINDER HEAD
- 3 - OIL PUMP
- 4 - OIL PICKUP TUBE

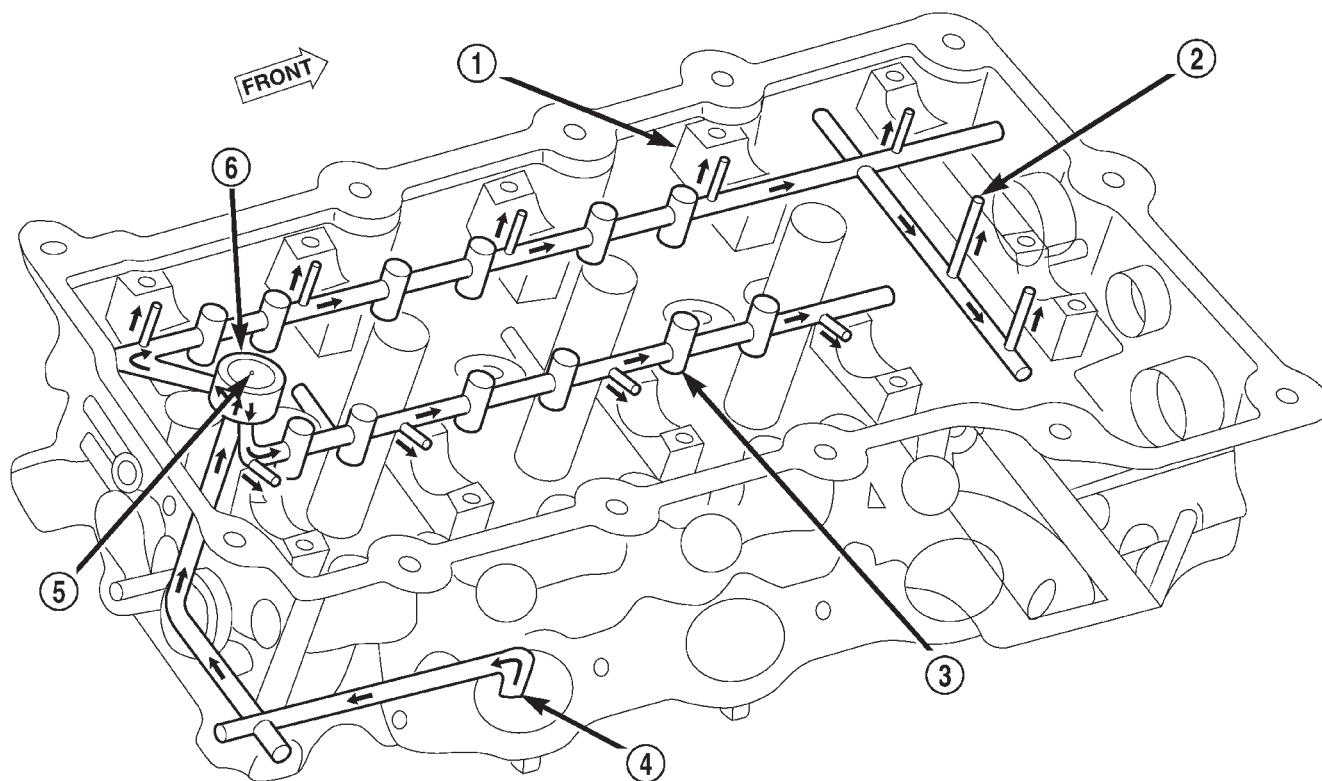
- 5 - OIL FILTER
- 6 - TO CRANKSHAFT MAIN JOURNALS
- 7 - MAIN OIL GALLERY

LUBRICATION (Continued)

FROM:	TO:	FROM:	TO:
Oil Pump	Oil Filter Mounting (inlet)	Main Oil Gallery - Center of Block	1. Crankshaft Main Bearings
Oil Filter Mounting (inlet)	Oil Filter		2. Left Cylinder Head*
Oil Filter	Oil Filter Mounting (outlet)		3. Right Cylinder Head*
Oil Filter Mounting (outlet)	Oil Gallery - Right side of Block	Crankshaft Main Bearings	Connecting Rod Bearings
Oil Gallery - Right side of Block	Oil Gallery - Rear of Block and to Oil Cooler (some models)	Left Cylinder Head	Refer to
Oil Gallery - Rear of Block	Main Oil Gallery - Center of Block	Right Cylinder Head	Refer to

*The cylinder head gaskets have an oil restrictor to control oil flow to the cylinder heads.

LEFT CYLINDER HEAD



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Fig. 83 Cylinder Head Oil Lubrication System - Left Side

1 - CAM JOURNALS

2 - OIL FEED TO CAMSHAFT (SECONDARY) CHAIN TENSIONER

3 - LASH ADJUSTER BORES

4 - OIL FEED FROM BLOCK

5 - VENT HOLE

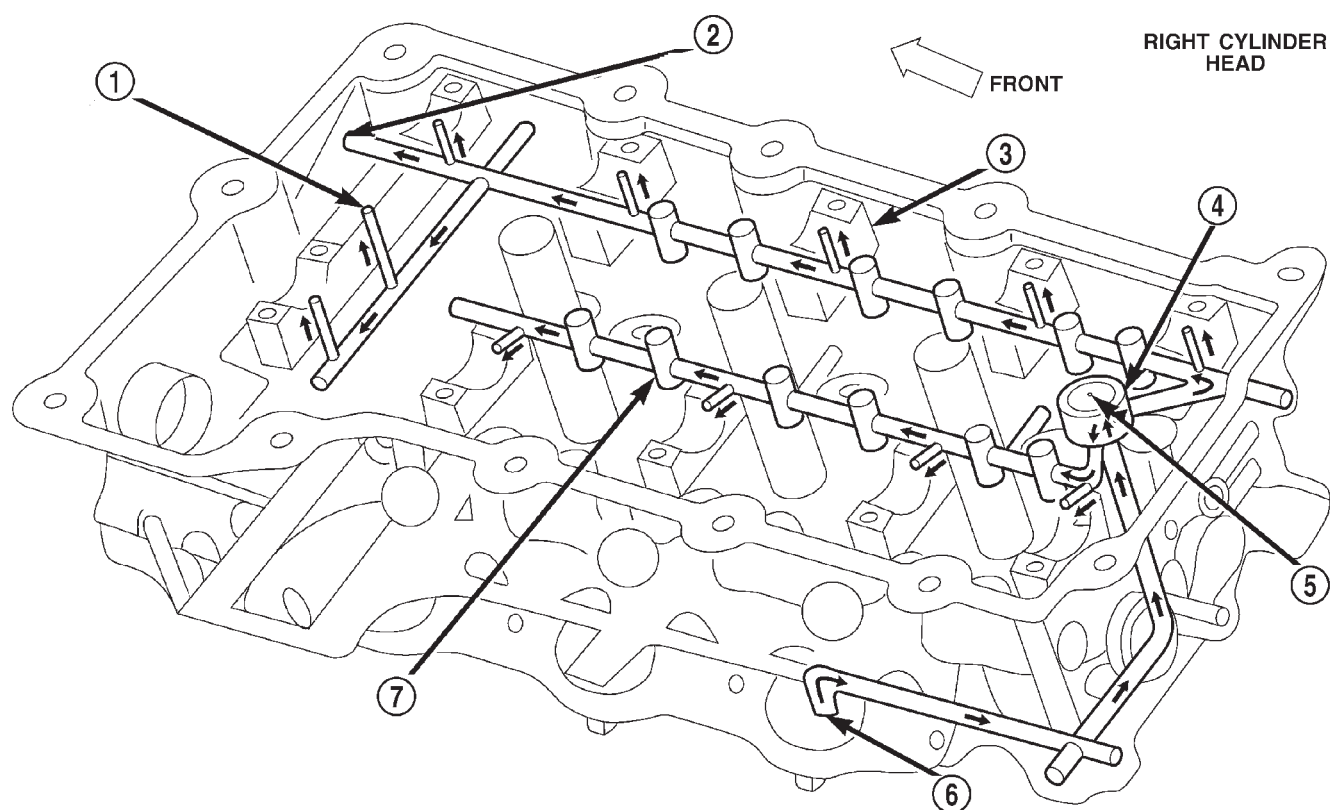
6 - ACCUMULATOR

LUBRICATION (Continued)

FROM:	TO:
Left Cylinder Head Oil Inlet Gallery (intake side of head)	Oil Gallery and Accumulator – Rear of Head*
Oil Gallery and Accumulator – Rear of Head*	1. Exhaust Camshaft Oil Passage 2. Intake Camshaft Oil Passage
Left Exhaust Camshaft Oil Passage	1. Left Exhaust Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms 3. Left Camshaft (Secondary) Chain Tensioner**
Left Intake Camshaft Oil Passage	1. Left Intake Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms

* When oil reaches the back of the cylinder head, the oil gallery feeds oil into an accumulator chamber that is located towards center of the head. The accumulator chamber is closed off with a pressed in core plug that has a small orifice to act as a vent. Oil then travels down at a 45 degree angle from the accumulator into two passages, one for the intake and one for the exhaust side of the cylinder head.

** The secondary camshaft chain tensioner is the last component to receive oil on the left cylinder head.



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Fig. 84 Cylinder Head Oil Lubrication System - Right Side

- 1 - OIL FEED TO CAMSHAFT (SECONDARY) CHAIN TENSIONER
- 2 - OIL FEED TO TIMING CHAIN (PRIMARY) TENSIONER
- 3 - CAM JOURNALS
- 4 - ACCUMULATOR

- 5 - VENT HOLE
- 6 - OIL FEED FROM BLOCK
- 7 - LASH ADJUSTOR BORES

LUBRICATION (Continued)

FROM:	TO:
Right Cylinder Head Oil Inlet Gallery (intake side of head)	Oil Gallery and Accumulator – Rear of Head*
Oil Gallery and Accumulator – Rear of Head*	1. Exhaust Camshaft Oil Passage 2. Intake Camshaft Oil Passage
Right Exhaust Camshaft Oil Passage	1. Right Exhaust Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms 3. Right Camshaft (Secondary) Chain Tensioner 4. Primary Timing Chain Tensioner - Right Head**
Right Intake Camshaft Oil Passage	1. Right Intake Camshaft Journals 2. Hydraulic Valve Lash Adjusters and Rocker Arms
* When oil reaches the back of the cylinder head, the oil gallery feeds oil into an accumulator chamber that is located towards center of the head. The accumulator chamber is closed off with a pressed in core plug that has a small orifice to act as a vent. Oil then travels down at a 45 degree angle from the accumulator into two passages, one for the intake and one for the exhaust side of the cylinder head.	
** The timing (primary) chain tensioner is the last component to receive oil on the right cylinder head.	

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.

- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.

- Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kpa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.

- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the dipstick tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

LUBRICATION (Continued)

If the leakage occurs at the crankshaft rear oil seal area:

- (1) Disconnect the battery.
- (2) Raise the vehicle.
- (3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.
 - (a) Circular spray pattern generally indicates seal leakage or crankshaft damage.
 - (b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.
- (4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

DIAGNOSIS AND TESTING - CHECKING ENGINE OIL PRESSURE

- (1) Remove the oil pressure switch. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL)
- (2) Install oil pressure test gauge assembly, Special Tools C-3292 with 8406 adaptor.
- (3) Start engine and monitor gauge readings.

CAUTION: If oil pressure is 0 at idle, Do Not Run engine at 3000 RPM

(4) Oil Pressure (engine at operating temperature):
Curb Idle 34.5 kPa (5 psi) minimum **3000 RPM** 300–724 kPa (45–105 psi).

(5) If oil pressure is 0 at idle. Shut off engine, check for pressure relief valve stuck open or a clogged oil pickup screen.

(6) Install oil pressure switch after testing is completed. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - INSTALLATION)

OIL

DESCRIPTION

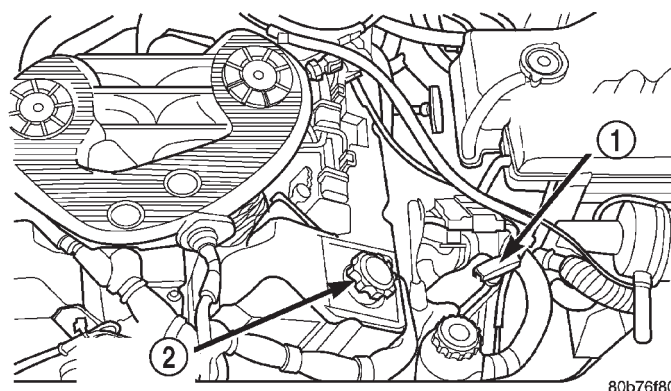
For engine oil type and capacity (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL)

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading (Fig. 85). Add only when the level is at or below the ADD mark.



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Fig. 85 ENGINE OIL FILL AND DIPSTICK LOCATIONS

- 1 - ENGINE OIL DIPSTICK
- 2 - ENGINE OIL FILL

OIL (Continued)

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

Change engine oil and filter at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

TO CHANGE ENGINE OIL

- (1) Run engine until achieving normal operating temperature.
- (2) Position the vehicle on a level surface and turn engine off.
- (3) Hoist and support vehicle on safety stands. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)
- (4) Remove oil fill cap (Fig. 85).
- (5) Place a suitable drain pan under crankcase drain.
- (6) Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.
- (7) Remove oil filter. Refer to (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)
- (8) Install drain plug in crankcase.
- (9) Install new oil filter. Refer to (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION)
- (10) Lower vehicle and fill crankcase with specified type and amount of engine oil, (Fig. 85). (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL) (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
- (11) Install oil fill cap.
- (12) Start engine and inspect for leaks.
- (13) Stop engine and inspect oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. When replacing oil filter, use a Mopar® filter or equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING listed above.

OIL COOLER & LINES**DESCRIPTION**

Vehicles equipped with the Heavy Duty Cooling option (Sales Code NMC) use an engine oil cooler that is mounted inside the right radiator tank (Fig. 86). Oil lines connect the cooler to the engine.

OPERATION

Engine oil travels from the engine through the supply line and into the cooler. The supply line is connected to a control valve that allows engine oil flow when pressure is above 138–207 kPa (20–30 psi) and an internal orifice limits oil flow to a maximum of 11.3 LPM (3 GPM). The engine oil exits the cooler through the oil return line and is returned to the engine oil pan (Fig. 87) .

REMOVAL**ENGINE OIL COOLER**

- (1) The engine oil cooler is serviced with the radiator. (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL)

COOLER LINES

- (1) Disconnect cooler lines at radiator (Fig. 88).

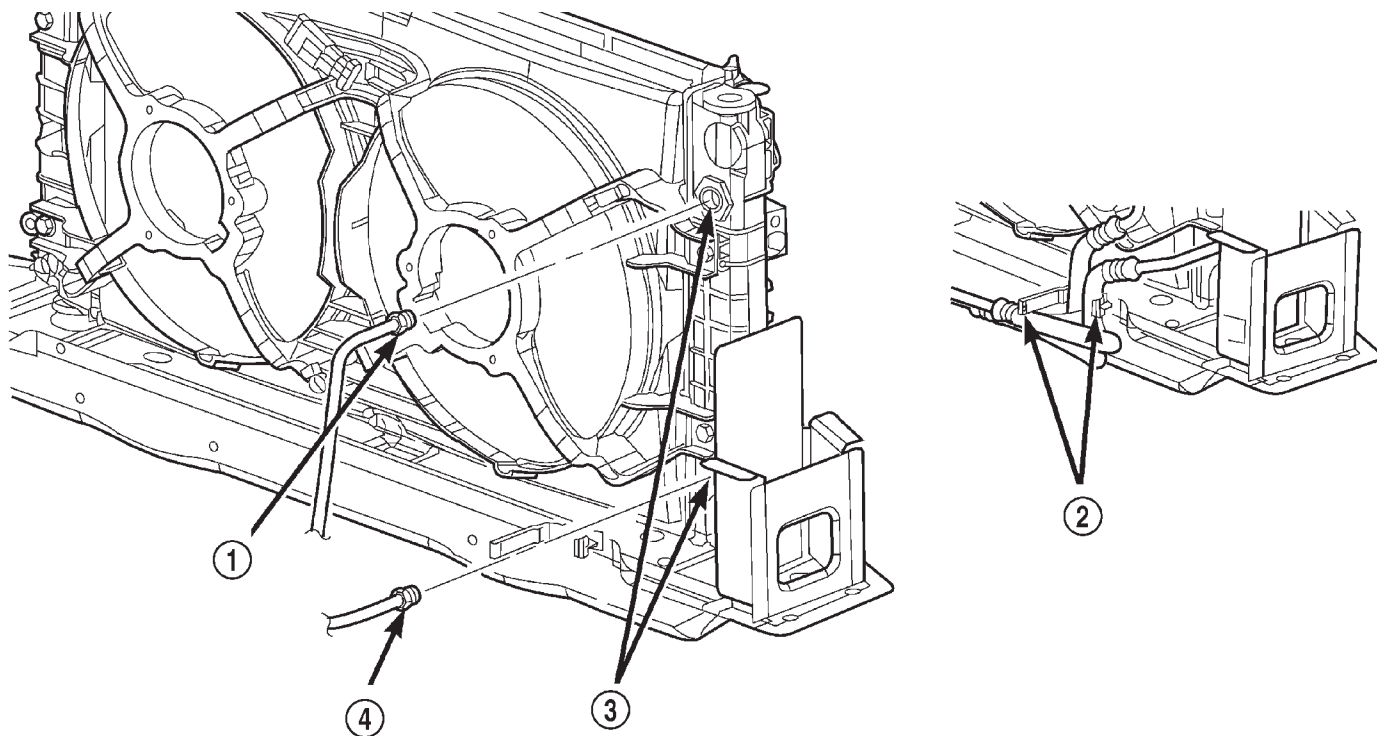
NOTE: The quick connect feature of the cooler lines are a one time assembly only design. To remove cooler lines, unscrew the fittings from block and oil pan.

- (2) Disconnect lines at the engine block and oil pan by unscrewing the fittings.
- (3) Disconnect lines from support bracket and retainer (Fig. 88)and (Fig. 89).
- (4) Remove lines (Fig. 89).

PRESSURE CONTROL VALVE

- (1) Disconnect supply line to control valve.
- (2) Remove control valve by unscrewing fitting from engine block (Fig. 89).

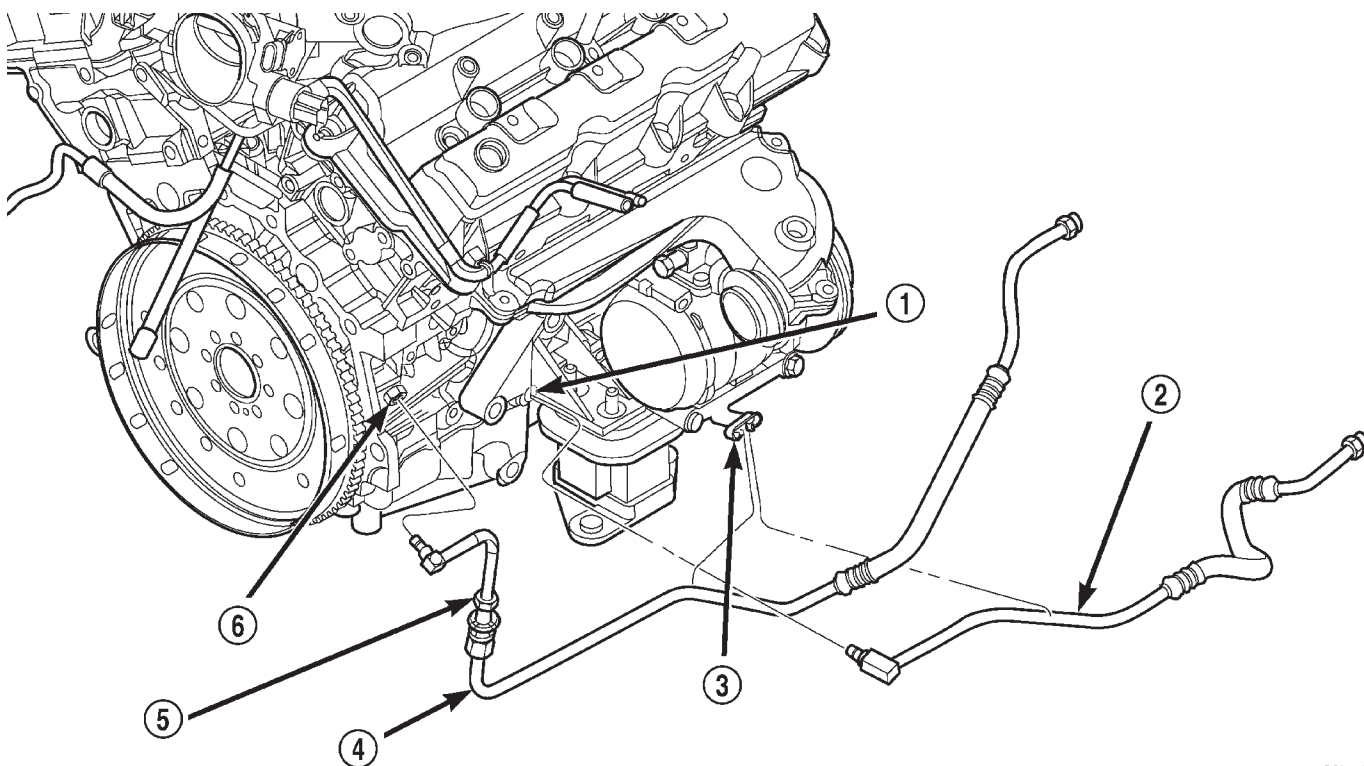
OIL COOLER & LINES (Continued)

**Fig. 86 ENGINE OIL COOLER - 2.7L ENGINE**

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- 1 - ENGINE OIL COOLER SUPPLY LINE
2 - RETAINER

- 3 - ENGINE OIL COOLER FITTINGS
4 - ENGINE OIL COOLER RETURN LINE

**Fig. 87 ENGINE OIL COOLER LINES - 2.7L**

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- 1 - RETURN LINE FITTING
2 - OIL COOLER RETURN LINE
3 - SUPPORT BRACKET

- 4 - OIL COOLER SUPPLY LINE
5 - PRESSURE CONTROL VALVE
6 - SUPPLY LINE FITTING

OIL COOLER & LINES (Continued)

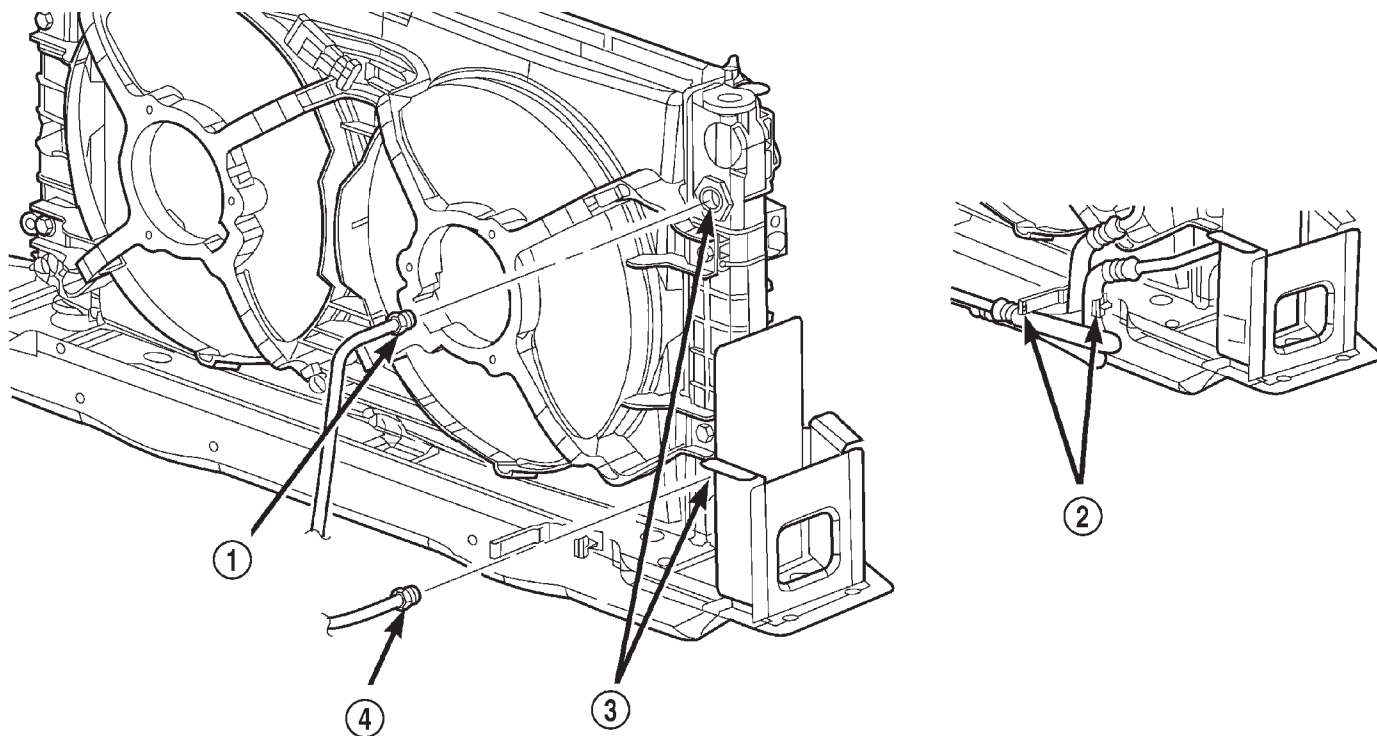


Fig. 88 ENGINE OIL COOLER - 2.7L

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- 1 - ENGINE OIL COOLER SUPPLY LINE
2 - RETAINER

- 3 - ENGINE OIL COOLER FITTINGS
4 - ENGINE OIL COOLER RETURN LINE

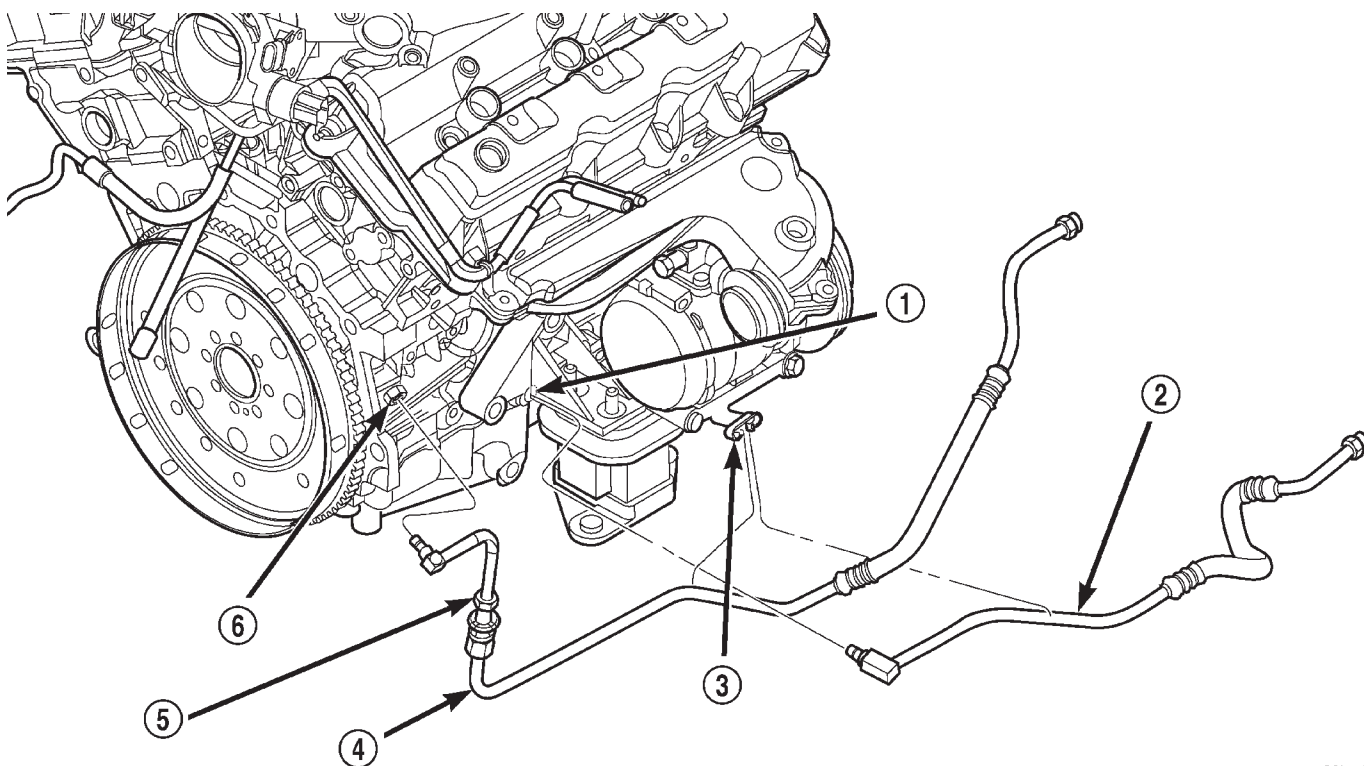


Fig. 89 Engine Oil Cooler Lines—2.7L

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- 1 - RETURN LINE FITTING
2 - OIL COOLER RETURN LINE
3 - SUPPORT BRACKET

- 4 - OIL COOLER SUPPLY LINE
5 - PRESSURE CONTROL VALVE
6 - SUPPLY LINE FITTING

OIL COOLER & LINES (Continued)

INSTALLATION

ENGINE OIL COOLER

(1) Install radiator assembly. (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION)

(2) Tighten oil cooler lines to radiator fittings to 18 N·m (160 in. lbs.).

COOLER LINES

(1) Connect cooler lines to radiator fittings and retainer clip (Fig. 88). Tighten lines to radiator fittings to 18 N·m (160 in. lbs.).

(2) Installation of NEW cooler lines:

(a) Install new line fittings to engine block and oil pan (Fig. 89). Tighten fittings to 30 N·m (260 in. lbs.).

(b) Position lines to fittings. Push line into fitting until it locks in place. Ensure proper connection is made by pulling in-and-out on line.

(c) Connect lines to support bracket (Fig. 89).

(3) Installation of the original cooler lines:

(a) Position cooler lines to engine block and oil pan (Fig. 89). Tighten fittings to 30 N·m (260 in. lbs.).

(b) Connect lines to support bracket (Fig. 89).

PRESSURE CONTROL VALVE

(1) Install supply line fitting into engine block (Fig. 89). Tighten fitting to 30 N·m (260 in. lbs.).

(2) Position control valve into fitting. Push valve into fitting until it locks in place. Ensure proper connection is made by pulling in-and-out on valve.

(3) Connect supply line to control valve. Tighten connection fitting to 30 N·m (260 in. lbs.).

OIL FILTER

REMOVAL

(1) Remove oil filter using suitable oil filter wrench (Fig. 90). Dispose of oil filter following environmental guidelines.

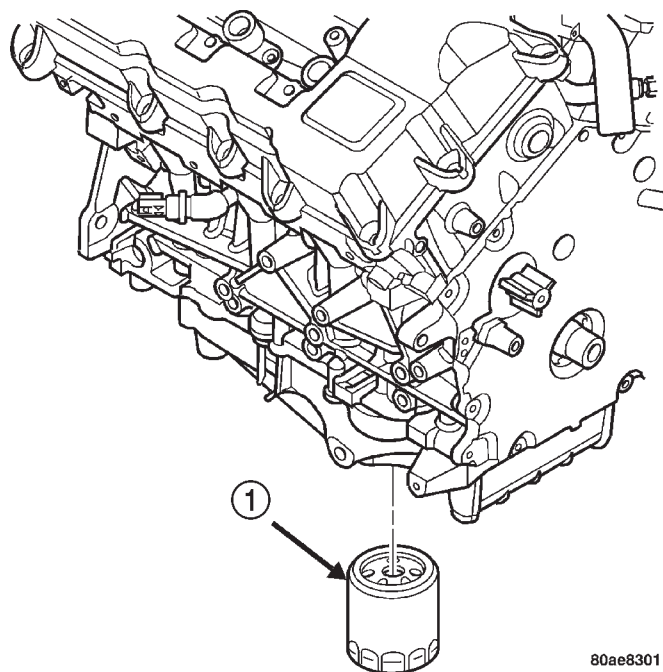
INSTALLATION

(1) Wipe filter base clean, then inspect gasket sealing surface.

(2) Lubricate gasket of new filter with clean engine oil.

(3) Install oil filter (Fig. 90) and tighten to 16 N·m (12 ft. lbs.) of torque after gasket contacts base. Use filter wrench if necessary.

(4) Fill crankcase with proper engine oil to correct level if drained. Start engine and check for leaks.



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Fig. 90 ENGINE OIL FILTER

1 - OIL FILTER

OIL PAN

REMOVAL

(1) Remove dipstick and tube.

(2) Raise vehicle on hoist.

(3) Drain engine oil and remove oil filter.

(4) Disconnect suspension stabilizer bar and reposition for oil pan clearance. (Refer to 2 - SUSPENSION/FRONT/STABILIZER BAR - REMOVAL)

(5) Remove structural collar from oil pan to transmission housing (Fig. 91).

(6) Remove lower bolt attaching the A/C compressor to oil pan.

(7) Disconnect engine oil cooler line from pan (if equipped).

CAUTION: Assure removal of the two bolts attaching the timing cover to the oil pan, as damage to the timing cover and/or oil pan may occur.

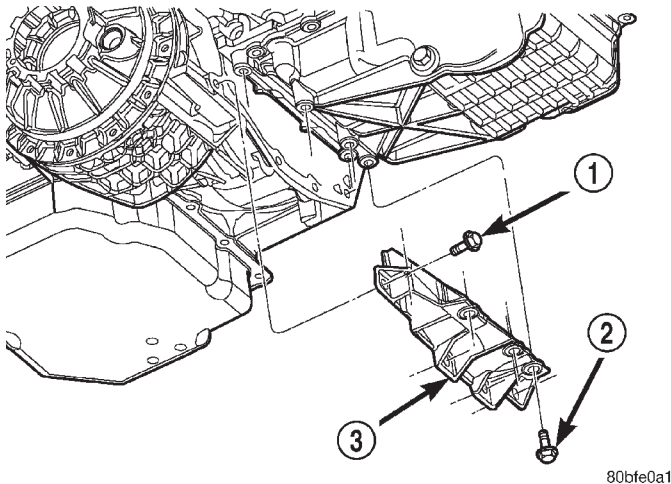
(8) Remove oil pan attaching fasteners. Remove oil pan and gasket (Fig. 92).

INSTALLATION

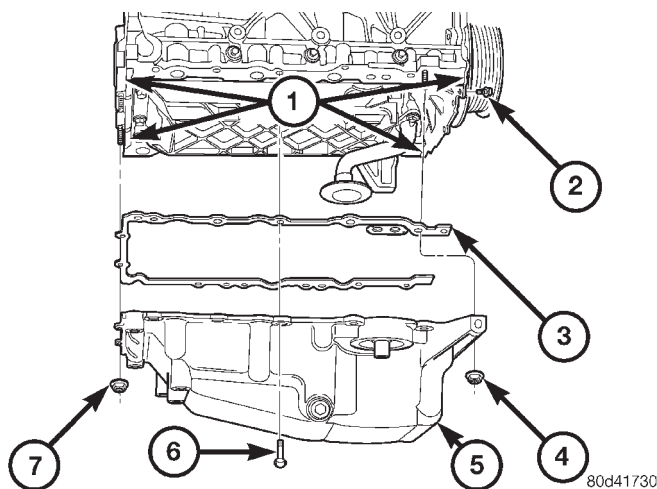
(1) Clean oil pan and sealing surfaces. Inspect oil pan and timing chain cover gaskets. Replace as necessary.

(2) Apply an 1/8 inch bead of Mopar® Engine RTV GEN II to the front T-joints (oil pan gasket to timing cover gasket interface) and the rear T-joints (oil pan

OIL PAN (Continued)

**Fig. 91 Structural Collar**

- 1 - BOLT-HORIZONTAL
- 2 - BOLT-VERTICAL
- 3 - STRUCTURAL COLLAR

**Fig. 92 Oil Pan and Sealing**

- 1 - SEALER LOCATION
- 2 - BOLT-M6
- 3 - GASKET
- 4 - NUT-M6
- 5 - OIL PAN
- 6 - BOLT-M8
- 7 - NUT-M6

gasket to crankshaft rear oil seal retainer gasket interface) (Fig. 92).

(3) Install oil pan gasket to block.

NOTE: To prevent oil leaks at oil pan to timing chain cover, the following tightening sequence procedure must be performed.

(4) Install oil pan and fasteners (Fig. 92) using the following tightening sequence:

(a) Install oil pan bolts and nuts **finger tight only—just tight enough to compress the gasket's rubber seal.**

(b) Install timing chain cover to pan bolts and tighten to 12 N·m (105 in. lbs.).

(c) Tighten oil pan bolts to 28 N·m (250 in. lbs.).

(d) Tighten oil pan nuts to 12 N·m (105 in. lbs.).

(5) Install lower bolt attaching the A/C compressor to oil pan. Tighten bolt to 28 N·m (21 ft. lbs.).

(6) Connect engine oil cooler line to oil pan (if equipped).

CAUTION: The collar must be tighten using the following procedure, as damage to the collar or oil pan may occur.

(7) Install structural collar (Fig. 91) using the following tightening sequence:

(a) Install the **vertical** collar to oil pan bolts. Torque bolts initially to 1.1 N·m (10 in. lbs.).

(b) Install the **horizontal** collar to transmission bolts and torque to 55 N·m (40 ft. lbs.).

(c) Starting with the center vertical bolts and working outward, final torque bolts to 55 N·m (40 ft. lbs.).

(8) Install oil filter and drain plug.

(9) Connect suspension stabilizer bar. (Refer to 2 - SUSPENSION/FRONT/STABILIZER BAR - INSTALLATION)

(10) Lower vehicle and install oil dipstick and tube.

(11) Fill engine crankcase with proper oil to correct level.

OIL PRESSURE RELIEF VALVE

REMOVAL

(1) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(2) Remove the pressure relief valve by remove the threaded retaining cap from the oil pump housing.

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 93) or engine damage may occur.

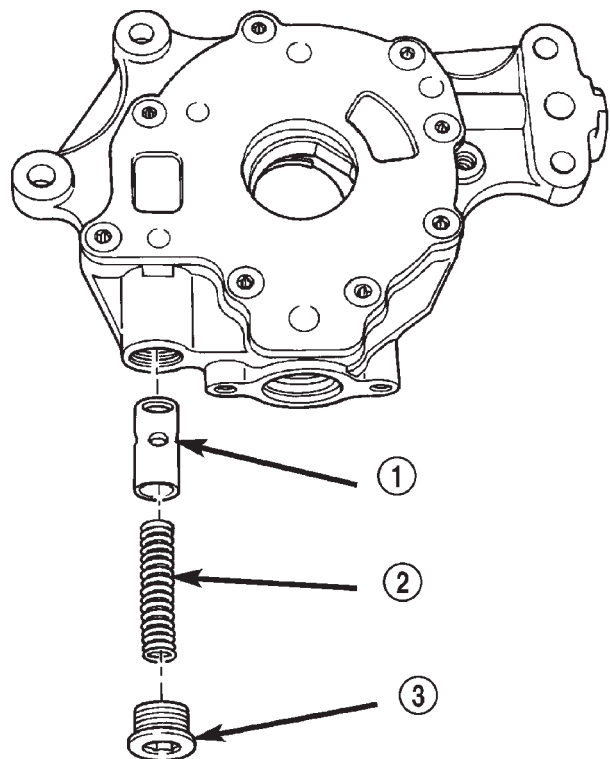
(3) Remove spring and relief valve (Fig. 93).

INSPECTION

(1) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.

(2) The relief valve spring has a free length of approximately 49.5 mm (1.95 in.) it should test between 101–110 N (23–25 lbs.) when compressed to

OIL PRESSURE RELIEF VALVE (Continued)



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Fig. 93 Oil Pressure Relief Valve

- 1 - RELIEF VALVE
- 2 - SPRING
- 3 - RETAINER CAP

34 mm (1.34 in.). Replace spring that fails to meet specifications.

INSTALLATION

- (1) Lubricate relief valve with oil.

CAUTION: The pressure relief valve must be installed as shown in (Fig. 93), or engine damage may occur.

- (2) Install relief valve, spring and retainer cap (Fig. 93). Tighten cap to 12 N·m (105 in. lbs.).
- (3) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

OIL PRESSURE SWITCH**DESCRIPTION**

The engine oil pressure switch is located on the right side of the engine block. The switch screws into the engine main oil gallery. The normally closed switch provides an input through a single wire to the low pressure indicator light on the instrument cluster.

OPERATION

The oil pressure switch provides a ground for the instrument cluster low oil pressure indicator light. The switch receives oil pressure input from the engine main oil gallery. When engine oil pressure is greater than 27.5 Kpa (4 psi), the switch contacts open, providing a open circuit to the low pressure indicator light. For wiring circuits and diagnostic information, (Refer to Appropriate Wiring/Diagnostic Information).

REMOVAL

- (1) Raise vehicle on hoist.
- (2) Position an oil collecting container under switch location.
- (3) Disconnect electrical connector.
- (4) Remove switch by unscrewing from the engine block.

INSTALLATION

- (1) Apply Mopar® Thread Sealant to the switch threads.
- (2) Install oil pressure switch.
- (3) Connect electrical connector.
- (4) Lower vehicle.
- (5) Start engine and check for leaks.
- (6) Check engine oil level and adjust as necessary.

OIL PUMP**REMOVAL**

The oil pump pressure relief valve can be serviced by removing the oil pan.

- (1) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)
- (2) Remove timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)
- (3) Remove timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)
- (4) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
- (5) Remove oil pick-up tube and O-ring (Fig. 95).
- (6) Ensure that crankshaft position is at 60° ATDC of No.1 cylinder, or crankshaft sprocket mark aligns with mark on oil pump (Fig. 94). This position will properly locate oil pump upon installation.
- (7) Remove oil pump attaching bolts (Fig. 95).
- (8) Remove oil pump.

DISASSEMBLY

- (1) Remove the pressure relief valve by remove the threaded retaining cap from the oil pump housing.

OIL PUMP (Continued)

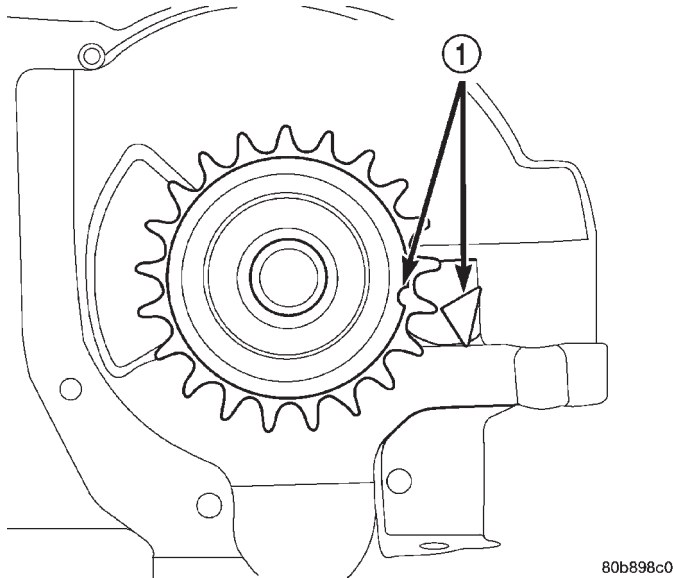


Fig. 94 Crankshaft Positioned At 60 DEGREES ATDC No.1 Cylinder

1 - CRANKSHAFT POSITION = 60° ATDC NO. 1 CYLINDER

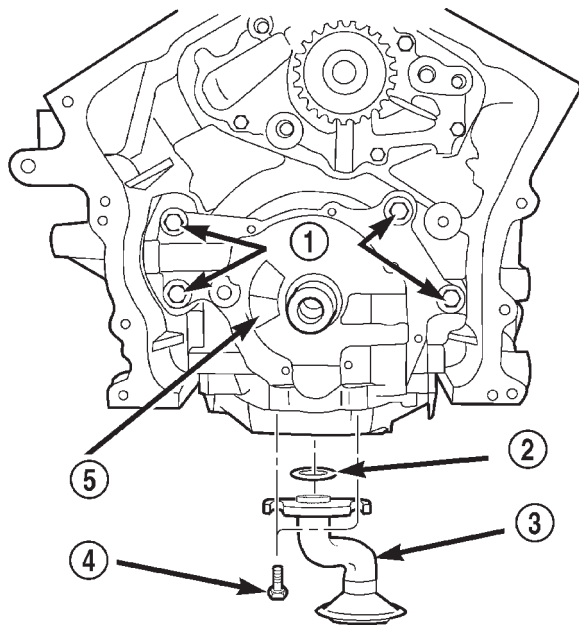


Fig. 95 Oil Pump and Pick-up Tube

- 1 - BOLTS
- 2 - O-RING
- 3 - PICK-UP TUBE
- 4 - BOLT
- 5 - OIL PUMP

CAUTION: Oil pump pressure relief valve must be installed as shown in (Fig. 96) or engine damage may occur.

(2) Remove spring and relief valve.

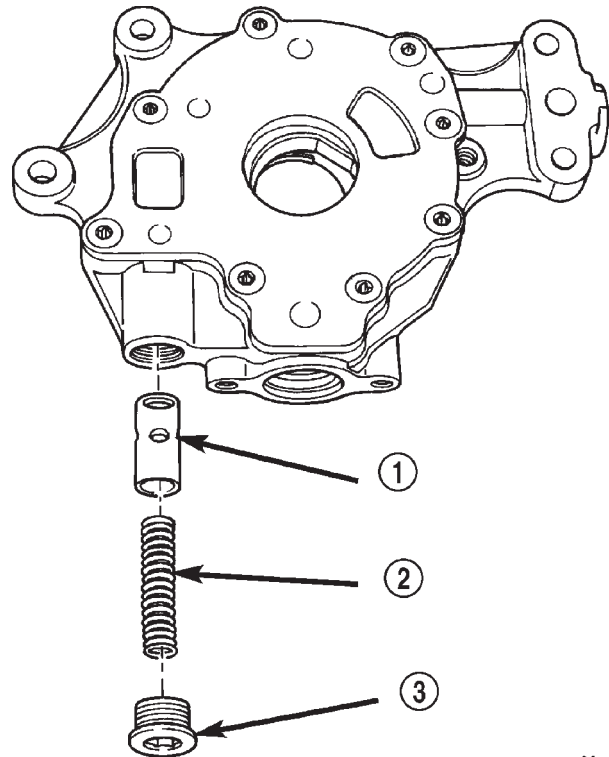


Fig. 96 Oil Pressure Relief Valve

- 1 - RELIEF VALVE
- 2 - SPRING
- 3 - RETAINER CAP

(3) Remove oil pump cover screws and lift off cover plate (Fig. 97).

(4) Remove pump rotors.

(5) Wash all parts in a suitable solvent.

(6) Inspect components carefully for damage or wear. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSPECTION)

CLEANING

(1) Clean all parts thoroughly in a suitable solvent.

INSPECTION

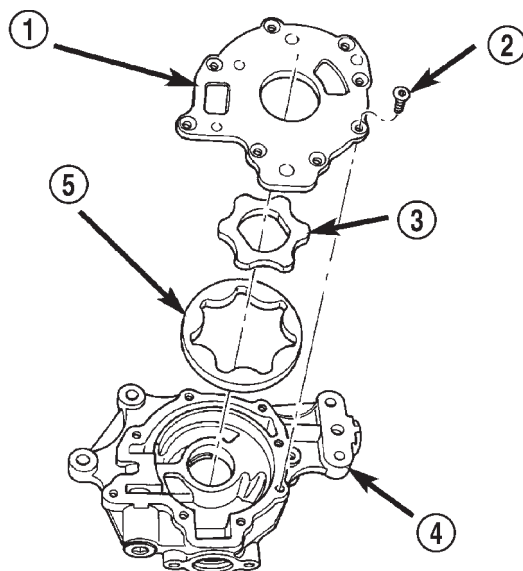
(1) Disassemble the oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - DISASSEMBLY)

(2) Clean all oil pump components. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - CLEANING)

(3) Inspect mating surface of the oil pump housing and cover. Replace oil pump if deeply scratched or grooved (minor surface scratches and polishing is normal).

(4) Lay a straightedge across the pump cover surface (Fig. 98). If a 0.025 mm (0.001 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

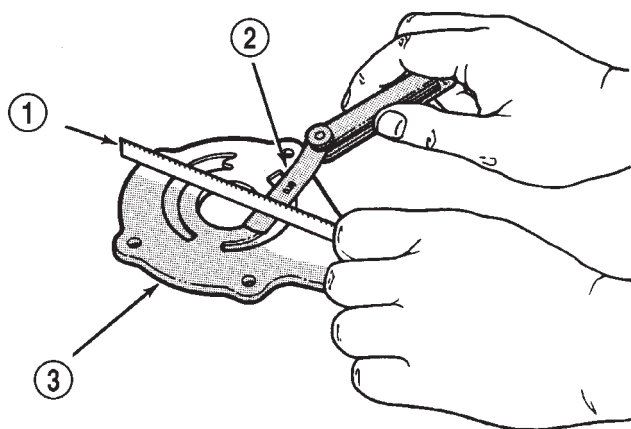
OIL PUMP (Continued)



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Fig. 97 Oil Pump

- 1 - OIL PUMP COVER
- 2 - SCREWS (8)
- 3 - OIL PUMP INNER ROTOR
- 4 - OIL PUMP HOUSING
- 5 - OIL PUMP OUTER ROTOR



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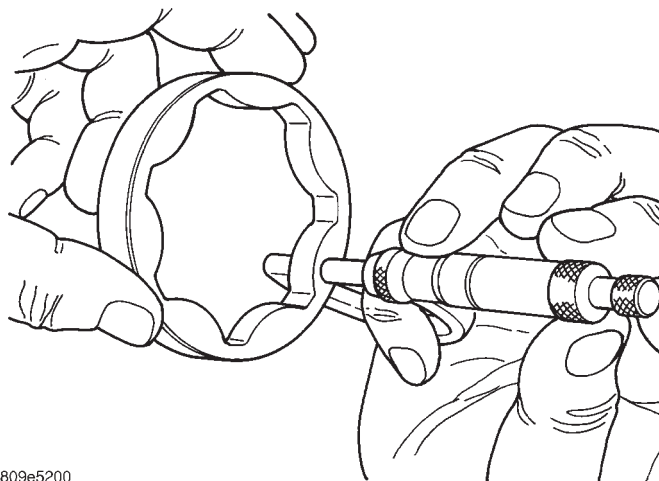
Fig. 98 CHECKING OIL PUMP COVER FLATNESS - TYPICAL

- 1 - STRAIGHT EDGE
- 2 - FEELER GAUGE
- 3 - OIL PUMP COVER

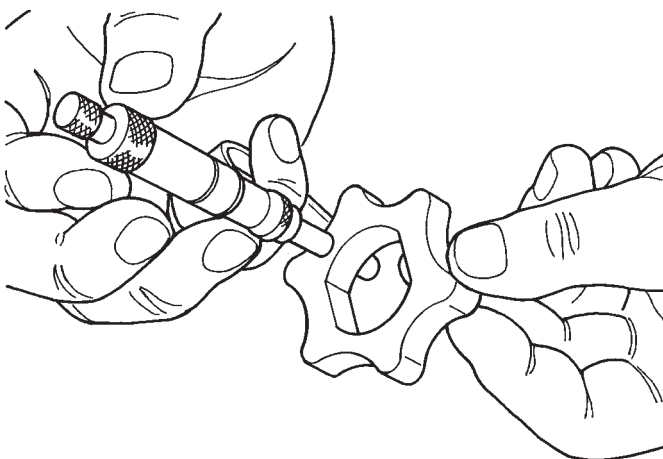
(5) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 9.474 mm (0.373 in.) or less (Fig. 99), or if the diameter is 89.174 mm (3.5108 in.) or less, replace outer rotor.

(6) If inner rotor measures 9.474 mm (0.373 in.) or less replace inner rotor (Fig. 100).

(7) Slide outer rotor into body, press to one side with fingers and measure clearance between rotor and body (Fig. 101). If measurement is 0.39 mm



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Fig. 99 MEASURING OUTER ROTOR THICKNESS

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Fig. 100 MEASURING INNER ROTOR THICKNESS

(0.015 in.) or more, replace body only if outer rotor is in specifications.

(8) Install inner rotor into body. If clearance between inner and outer rotors (Fig. 102) is 0.20 mm (0.008 in.) or more, replace both rotors.

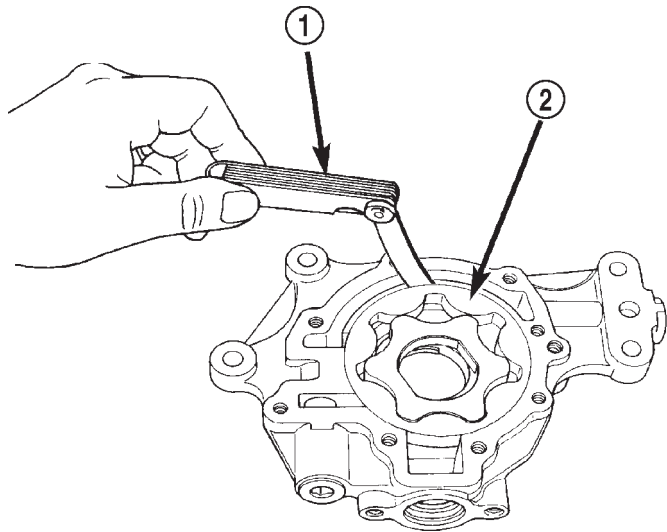
(9) Place a straightedge across the face of the body, between bolt holes. If a feeler gauge of 0.077 mm (0.003 in.) or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 103) **ONLY** if rotors are in specification.

(10) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.

(11) The relief valve spring has a free length of approximately 49.5 mm (1.95 in.) it should test between 23 - 25 pounds when compressed to 34 mm (1.34 in.). Replace spring that fails to meet specifications.

(12) Assemble oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - ASSEMBLY)

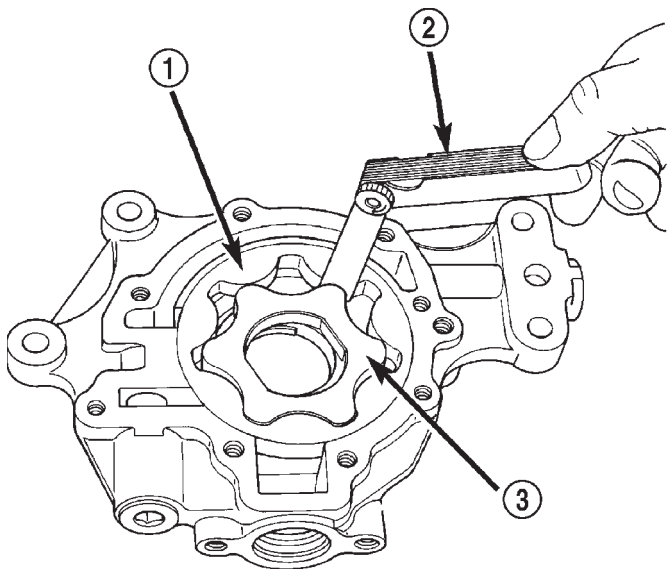
OIL PUMP (Continued)



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Fig. 101 MEASURING OUTER ROTOR CLEARANCE IN HOUSING

- 1 - FEELER GAUGE
2 - OUTER ROTOR



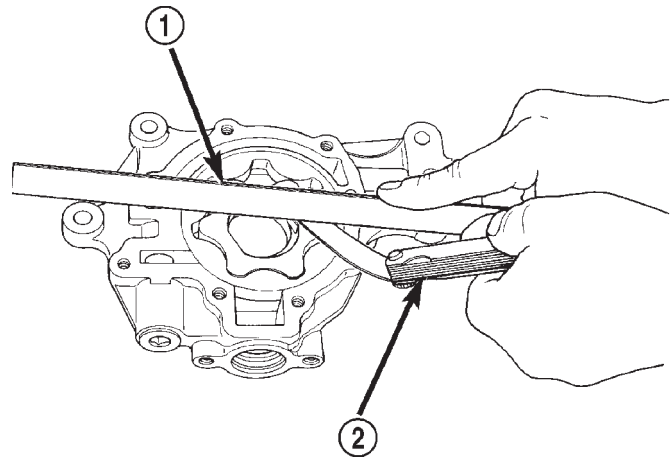
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Fig. 102 MEASURING CLEARANCE BETWEEN ROTORS

- 1 - OUTER ROTOR
2 - FEELER GAUGE
3 - INNER ROTOR

ASSEMBLY

- (1) Assemble pump using new parts as required.
- (2) Tighten cover screws to 12 N·m (105 in. lbs.) (Fig. 97).
- (3) Tighten oil pressure relief valve retaining cap to 12 N·m (105 in. lbs.) (Fig. 96).



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Fig. 103 MEASURING CLEARANCE OVER ROTORS

- 1 - STRAIGHT EDGE
2 - FEELER GAUGE

- (4) Prime oil pump before installation by filling rotor cavity with engine oil.

INSTALLATION

CAUTION: Crankshaft position must be at 60° ATDC of No.1 cylinder before installing oil pump (Fig. 94). This position will properly locate oil pump. If not properly located, severe damage to oil pump can occur.

- (1) Prime oil pump before installation by filling rotor cavity with engine oil.
- (2) If crankshaft has been rotated, it must be repositioned to 60° ATDC of No.1 cylinder prior to oil pump installation (Fig. 94).
- (3) Install oil pump carefully over crankshaft and into position.
- (4) Install oil pump attaching bolts. Tighten bolts to 28 N·m (250 in. lbs.) (Fig. 95).
- (5) Install oil pick-up tube with new O-ring. Lubricate O-ring before installation. Tighten attaching bolts to 28 N·m (250 in. lbs.) (Fig. 95).
- (6) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)
- (7) Install timing chain and sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)
- (8) Install timing chain cover. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)
- (9) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)
- (10) Fill crankcase with engine oil to correct level.

INTAKE MANIFOLD

DESCRIPTION

The two piece intake manifold is made of a composite material. The intake manifold features a compact, low rumble design that maximizes engine performance while minimizing induction noise.

OPERATION

The intake air plenum chambers absorb air pulsations created during each cylinder's intake stroke.

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

- (1) Start the engine.
- (2) Spray a small stream of water (Spray Bottle) at the suspected leak area.
- (3) If engine RPM'S change, the area of the suspected leak has been found.
- (4) Repair as required.

INTAKE MANIFOLD - UPPER

STANDARD PROCEDURE - INTAKE MANIFOLD VACUUM PORT REPAIR

The composite intake manifold vacuum ports can be repaired. Although, if the manifold plenum chamber is damaged or cracked, the manifold must be replaced.

To repair a broken or damaged vacuum nipple (port) on the composite intake manifold, perform the following procedure:

PARTS REQUIRED	TOOLS REQUIRED
Brass Nipple – 3/8" O.D. x 1/4" pipe thread (Speed Control Port)	Pipe Tap – 1/4" - 18 NPT
Brass Nibble – 1/2" O.D. x 1/4" pipe thread (Brake Booster Port)	Drill Bit – 7/16"
	File/Sand Paper

NOTE: While performing this procedure, avoid getting the manifold material residue into the plenum chamber.

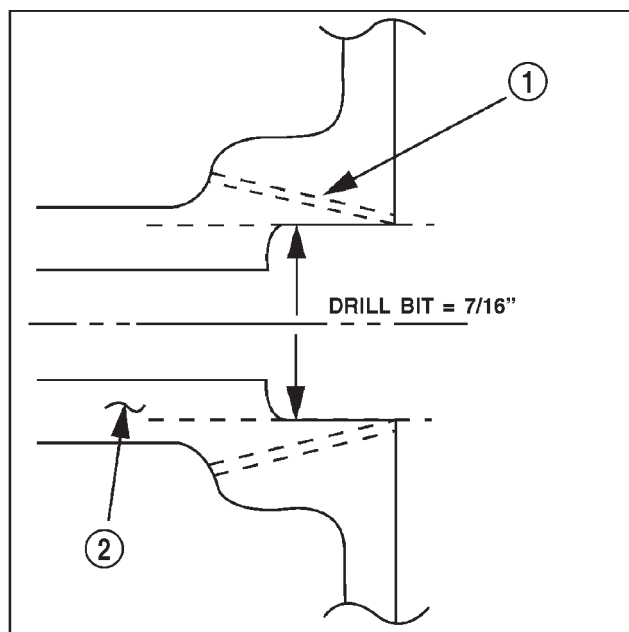
(1) File or sand the remaining port back until a flat surface is obtained (plane normal to nipple (port) axis).

(2) Drill out the nipple (port) base using a 7/16" drill bit (Fig. 104).

(3) Using a 1/4"-18 NPT pipe tap, cut internal threads (Fig. 104). Use caution to start tap in a axis same as original nipple.

(4) Apply Mopar® Thread Sealant to threads of repair nipple(s).

(5) Install repair nipple(s). Do not over torque repair nipple(s).



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Fig. 104 MANIFOLD PORT (NIPPLE) REPAIR

- 1 - 1/4" — 18NPT PIPE TAP
- 2 - NIPPLE (PORT)

REMOVAL - UPPER

(1) Disconnect negative cable from battery remote jumper terminal.

(2) Disconnect Inlet Air Temperature (IAT) Sensor connector. Remove air inlet resonator and inlet tube.

(3) Remove throttle cable and speed control cable from throttle arm and bracket (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - REMOVAL).

(4) Remove throttle cable bracket.

(5) Disconnect electrical connectors from the following components:

- Manifold Absolute Pressure (MAP) Sensor
- Throttle Position Sensor (TPS) Sensor
- Idle Air Control (IAC) Motor

(6) Disconnect Vapor Purge hose, Brake Booster hose, Speed Control Servo, Positive Crankcase Ventilation (PCV) hose (Fig. 105).

INTAKE MANIFOLD - UPPER (Continued)

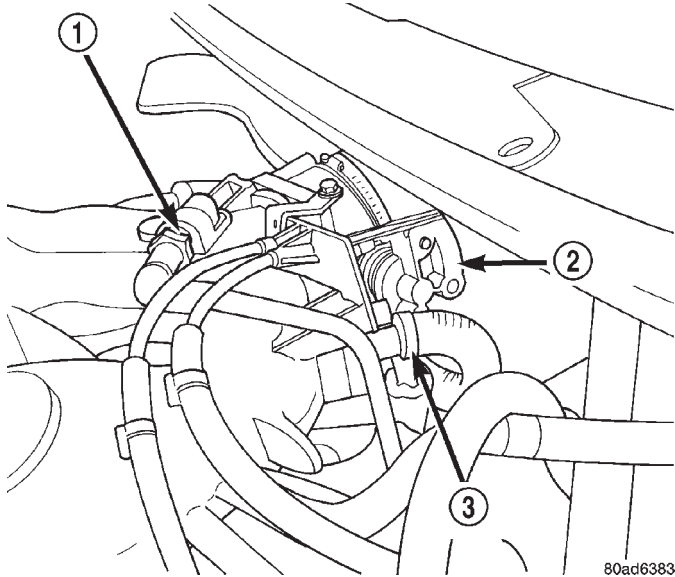


Fig. 105 PCV VALVE

- 1 - PCV VALVE
- 2 - THROTTLE BODY
- 3 - EGR TUBE

(7) Loosen upper fastener at throttle body support bracket.

(8) Remove manifold attaching bolts (Fig. 107).

(9) Remove upper manifold (Fig. 106).

(10) Inspect manifold (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSPECTION).

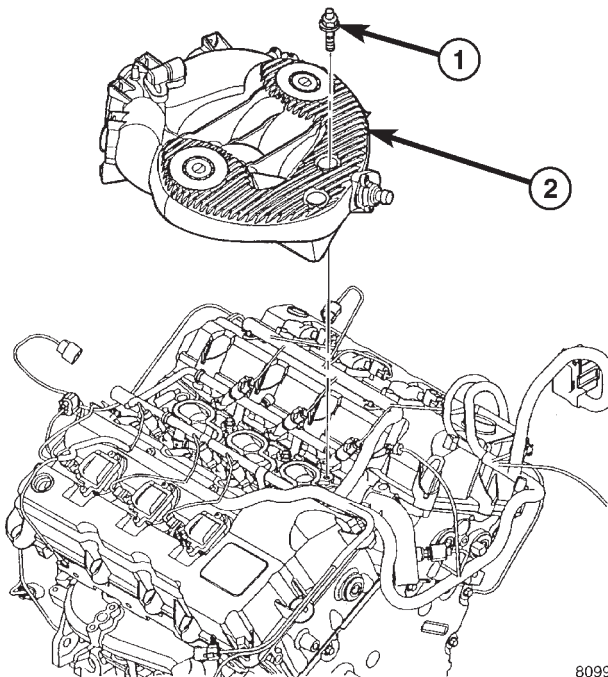


Fig. 106 INTAKE MANIFOLD - UPPER

- 1 - BOLT
- 2 - INTAKE MANIFOLD - UPPER

INSPECTION

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged or clogged EGR ports

If the manifold exhibits any damaged or warped conditions, replace the manifold. Clean EGR ports as necessary.

If a vacuum port is damaged, a repair procedure can be performed (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - STANDARD PROCEDURE).

INSTALLATION

(1) Clean and inspect sealing surfaces. Gaskets can be reused, if free of cuts or tears.

NOTE: Make sure fuel injectors and wiring harnesses are in correct position to not interfere with upper manifold installation.

(2) Position upper manifold onto lower manifold (Fig. 106).

(3) Install manifold attaching bolts and tighten in sequence shown in (Fig. 107) to 12 N-m (105 in. lbs.).

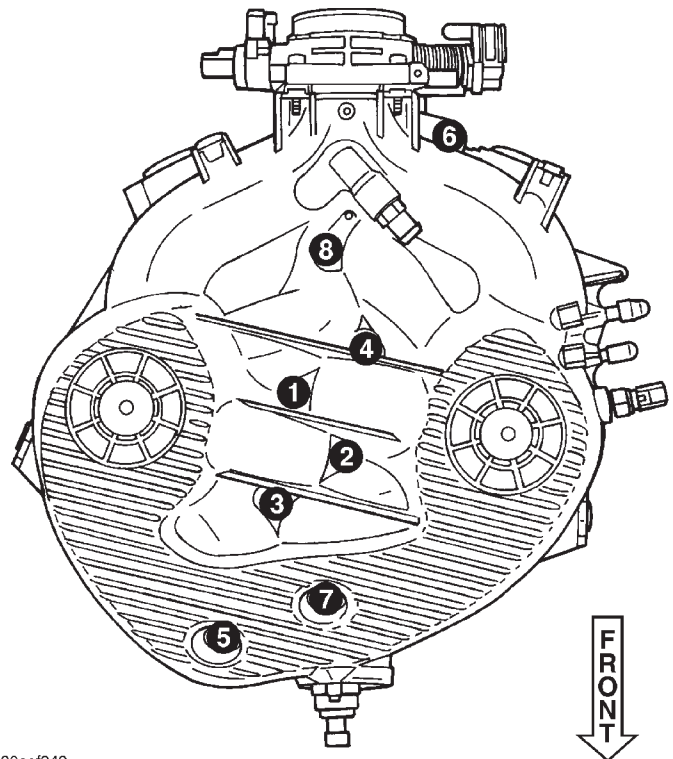


Fig. 107 Upper Intake Manifold Tightening Sequence

(4) Tighten upper fastener at throttle body support bracket.

(5) Connect speed control servo, PCV (Fig. 105), brake booster, and vapor purge hoses.

INTAKE MANIFOLD - UPPER (Continued)

(6) Connect electrical connectors to the following components:

- Manifold Absolute Pressure (MAP) Sensor
- Throttle Position Sensor (TPS) Sensor
- Idle Air Control (IAC) Motor

(7) Install throttle cable bracket.

(8) Connect throttle and speed control cables to bracket and throttle arm (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - INSTALLATION).

(9) Install air inlet resonator and inlet tube. Connect Inlet Air Temperature (IAT) Sensor connector.

(10) Connect negative cable to battery remote jumper terminal.

INTAKE MANIFOLD - LOWER

REMOVAL

(1) Release fuel system pressure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(3) Disconnect electrical connectors from the fuel injectors.

(4) Remove fuel supply hose from fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(5) Remove screw attaching fuel rail support bracket to the throttle body support bracket.

(6) Remove bolts attaching fuel rail.

(7) Remove fuel rail and injectors as an assembly.

(8) Remove manifold attaching bolts (Fig. 108).

(9) Remove lower manifold.

(10) Inspect manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSPECTION)

INSPECTION

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged fuel injector ports

If the manifold exhibits any of these conditions, replace the manifold.

INSTALLATION

(1) Clean and inspect sealing surfaces of cylinder head and manifold. Gaskets can be reused provided they are free of cuts or tears.

(2) Position manifold on cylinder head surfaces.

NOTE: For ease of installing upper intake manifold, install a bolt 2 – 3 turns to the rearmost attaching hole of intake. This will properly position lower manifold.

(3) Install fuel rail with injectors.

(4) Install manifold attaching bolts and tighten in sequence shown in (Fig. 108) to 12 N·m (105 in. lbs.). Remove bolt used for aligning manifold.

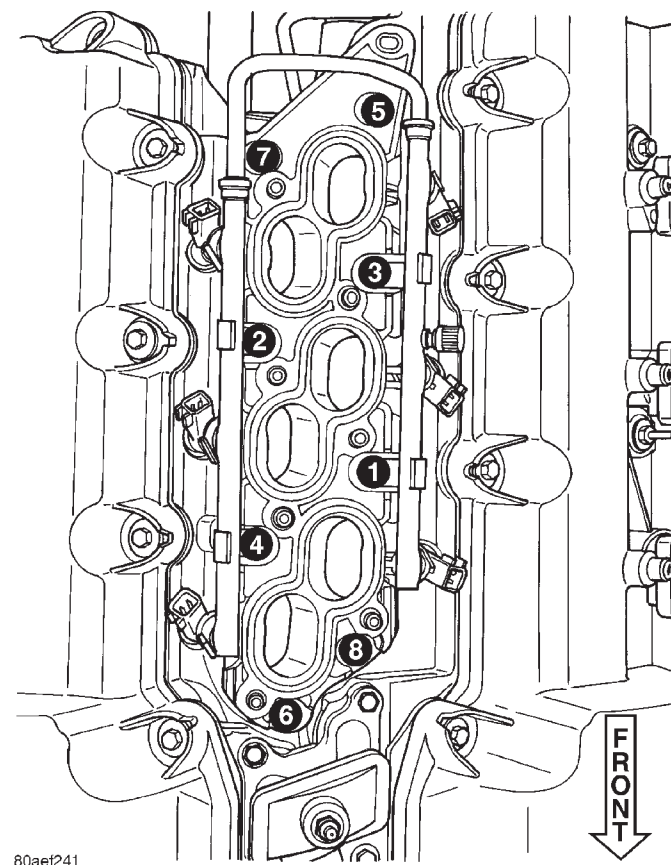


Fig. 108 Lower Intake Manifold Tightening Sequence

(5) Connect the fuel injector electrical connectors.

NOTE: Make sure fuel injectors are located in the correct location and position, as upper intake manifold interference could occur.

(6) Install screw attaching fuel rail support bracket to the throttle body support bracket.

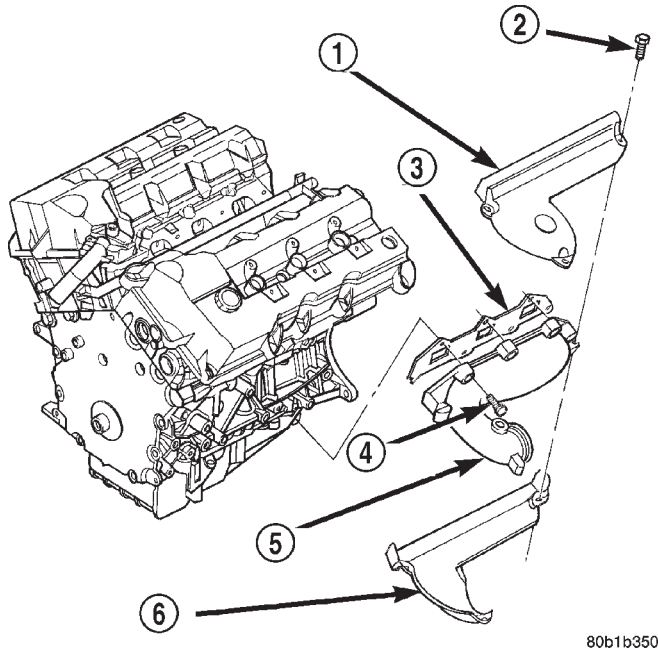
(7) Connect fuel supply hose to fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(8) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

EXHAUST MANIFOLD

DESCRIPTION

The exhaust manifolds are a log style design and made of cast nodular iron (Fig. 109). The outlets are designed for V-band clamp attachment of close coupled catalytic converters.



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Fig. 109 EXHAUST MANIFOLD

- 1 - HEAT SHIELD - UPPER
- 2 - BOLT - HEAT SHIELD
- 3 - GASKET
- 4 - BOLT - EXHAUST MANIFOLD
- 5 - EXHAUST MANIFOLD
- 6 - HEAT SHIELD - LOWER

EXHAUST MANIFOLD - RIGHT

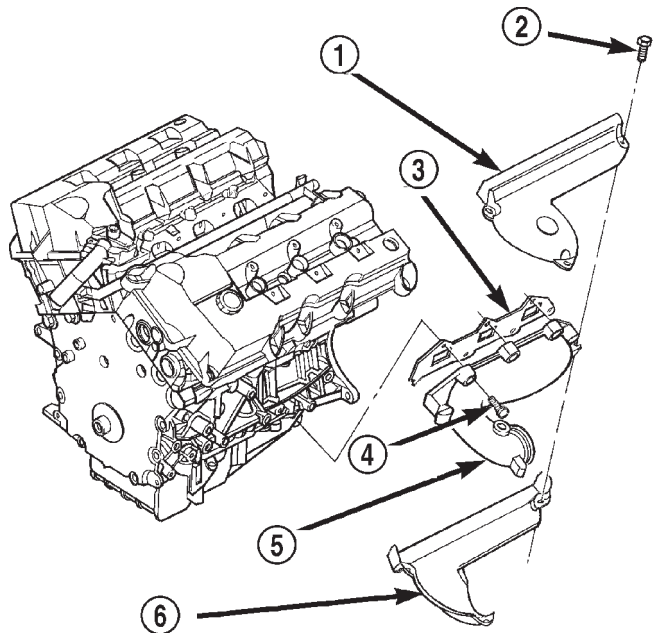
REMOVAL

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Remove air intake tube and air filter housing.
- (3) Remove bolt attaching battery cable housing tube to transmission housing.
- (4) Remove bolts attaching EGR tube from exhaust manifold and EGR valve. Discard gaskets. (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/TUBE - REMOVAL)
- (5) Disconnect electrical connector and remove exhaust manifold mounted oxygen sensor.
- (6) Loosen and remove the manifold to catalytic converter V-Band clamp.

NOTE: Do not reuse V-Band clamp.

(7) Remove heat shield attaching screws and remove heat shields (Fig. 110).

(8) Remove exhaust manifold attaching bolts and remove manifold (Fig. 110).



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Fig. 110 EXHAUST MANIFOLD (LEFT SHOWN - RIGHT SIMILAR)

- 1 - HEAT SHIELD - UPPER
- 2 - BOLT - HEAT SHIELD
- 3 - GASKET
- 4 - BOLT - EXHAUST MANIFOLD
- 5 - EXHAUST MANIFOLD
- 6 - HEAT SHIELD - LOWER

INSPECTION

- (1) Inspect exhaust manifolds for damage or cracks.
- (2) Check manifold flatness.
- (3) Inspect the exhaust manifold gasket for obvious discoloration or distortion.
- (4) Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

INSTALLATION

- (1) Install exhaust manifold and gasket. Tighten bolts working from center outwards to 23 N·m (200 in. lbs.) (Fig. 110).
- (2) Install heat shields. Tighten attaching screws to 12 N·m (105 in. lbs.) (Fig. 110).
- (3) Install a new V-Band clamp and tighten 10 N·m (100 in. lbs.).
- (4) Install oxygen sensor and connect electrical connector.
- (5) Install EGR tube using new gaskets. Tighten screws to 11 N·m (95 in. lbs.).

EXHAUST MANIFOLD - RIGHT (Continued)

- (6) Install bolt attaching battery cable housing tube to transmission housing. Tighten bolt to 101 N·m (75 ft. lbs.).
- (7) Install air intake tube and air filter housing.
- (8) Connect negative cable.

EXHAUST MANIFOLD - LEFT

REMOVAL

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Raise vehicle on hoist.
- (3) Remove exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)
- (4) Remove left catalytic converter. (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - REMOVAL)

NOTE: Do not reuse V-Band clamp.

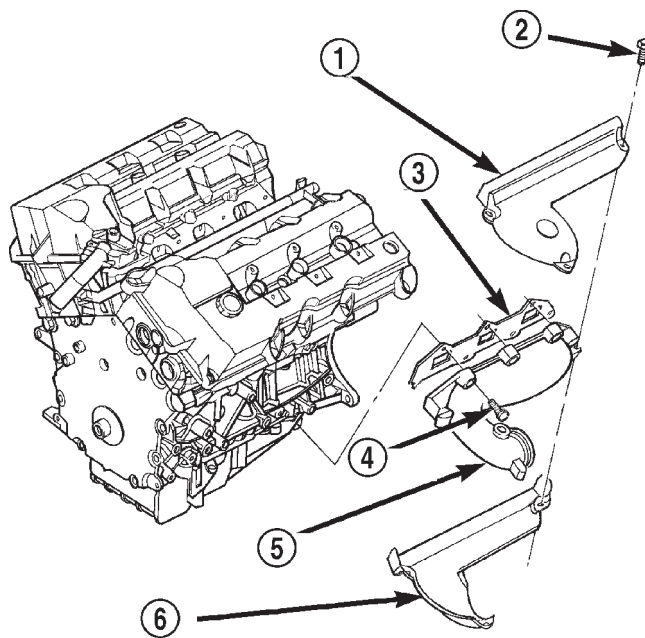
- (5) Remove bolt attaching transmission dipstick tube and rotate housing away from engine.
- (6) Lower vehicle.
- (7) Remove screws attaching the two electrical connectors and harness to support bracket.
- (8) Remove engine wiring harness support bracket from cylinder head.
- (9) Disconnect exhaust manifold mounted oxygen sensor connector and remove sensor from manifold.
- (10) Remove engine oil dipstick tube.
- (11) Remove heat shield attaching screws and remove heat shields (Fig. 111).
- (12) Remove exhaust manifold attaching bolts and remove manifold (Fig. 111).

INSPECTION

- (1) Inspect exhaust manifolds for damage or cracks.
- (2) Check manifold flatness.
- (3) Inspect the exhaust manifold gasket for obvious discoloration or distortion.
- (4) Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

INSTALLATION

- (1) Install exhaust manifold and gasket. Tighten bolts starting at the center working outward to 23 N·m (200 in. lbs.) (Fig. 111).
- (2) Install heat shields. Tighten screws to 12 N·m (105 in. lbs.) (Fig. 111).
- (3) Install oxygen sensor and connect electrical connector.
- (4) Raise vehicle on hoist.
- (5) Install bolt attaching transmission dipstick tube.



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Fig. 111 EXHAUST MANIFOLD

- 1 - HEAT SHIELD - UPPER
- 2 - BOLT - HEAT SHIELD
- 3 - GASKET
- 4 - BOLT - EXHAUST MANIFOLD
- 5 - EXHAUST MANIFOLD
- 6 - HEAT SHIELD - LOWER

- (6) Replace the O-ring on engine oil dipstick tube and install tube.
- (7) Install the left catalytic converter. (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - INSTALLATION)
- (8) Install a new V-Band clamp and tighten to 10 N·m (100 in. lbs.).
- (9) Install engine wiring harness support bracket to cylinder head and attach connectors to bracket.
- (10) Install exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)
- (11) Connect negative cable.

VALVE TIMING

DESCRIPTION

The timing drive system has been designed to provide quiet performance and reliability to support a **NON** free-wheeling engine. The system consists of a primary and secondary chain drive.

The **primary** timing chain drive (Fig. 112) uses a single, double-flexure, inverted tooth type chain. The primary chain drives both of the intake camshafts directly from a sprocket mounted on the crankshaft. In addition, the water pump is driven by the "back

VALVE TIMING (Continued)

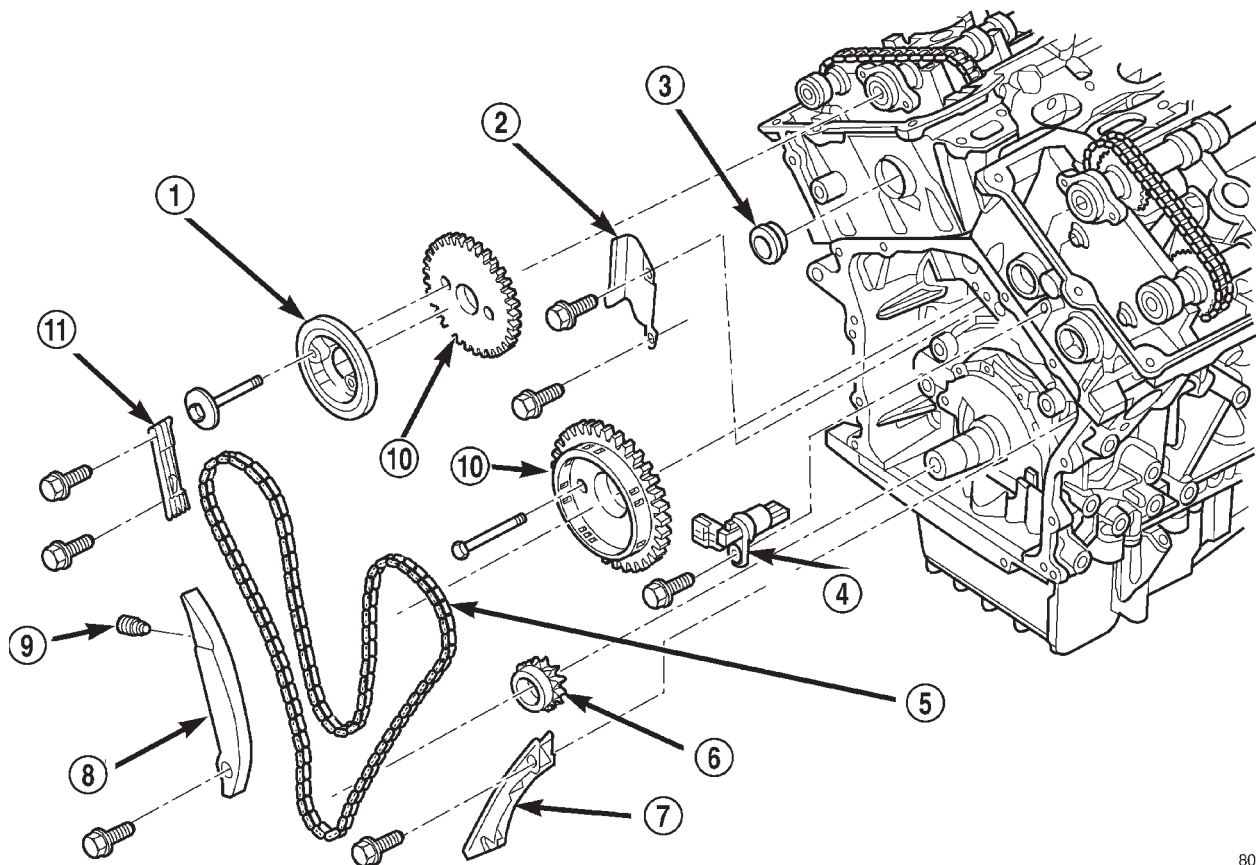
side" of the primary chain, necessitating the double-flexure type chain.

The chain is controlled by three fixed chain guides and a pivoting tensioner arm (Fig. 112). These guides utilize low-friction and long wearing nylon plastic wear faces. To tension the primary chain, a fully automatic spring-loaded, engine oil-fed, hydraulic tensioner is used. The tensioner is mounted in the right cylinder head with the plunger contacting the pivoting tensioner arm. A mechanical ratchet mechanism inside the tensioner prevents excessive chain slack upon engine start-up as the chain wears. The tensioner is designed with an internal oil reservoir to assure noise-free performance, even during engine start-up before oil pressure reaches the tensioner.

For lubrication the primary chain utilizes oil leakage from the front of the oil pump. This oil spills on the crankshaft sprocket, which is then carried by the chain throughout the primary drive.

The **secondary** timing chain drive system uses two conventional roller-type chains, one at each cylinder bank (Fig. 20). The purpose of the secondary chain is to provide a mechanical driven connection between the intake and exhaust camshafts. The intake camshafts drive the exhaust camshafts. The sprockets for both intake and exhaust camshafts are a press-fit and are only serviced as an assembly with the camshafts.

To tension the secondary chain a spring-loaded, hydraulic tensioner is used at each bank and attaches to each cylinder head between the intake and exhaust camshafts (Fig. 20). The tensioner incorporates upper and lower chain guide faces. The lower guide face is attached directly to the tensioner's hydraulic plunger. Also, the tensioner uses an internal oil reservoir design to prevent engine start-up noise. The secondary chains are lubricated via an oil passage through the upper guide face on each tensioner.



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Fig. 112 TIMING DRIVE SYSTEM

- 1 – CAMSHAFT DAMPER (IF EQUIPPED)
- 2 – CHAIN GUIDE
- 3 – ACCESS PLUG
- 4 – CAMSHAFT POSITION SENSOR
- 5 – PRIMARY TIMING CHAIN
- 6 – CRANKSHAFT SPROCKET

- 7 – CHAIN GUIDE
- 8 – CHAIN TENSIONER ARM
- 9 – CHAIN TENSIONER
- 10 – CAMSHAFT SPROCKETS
- 11 – CHAIN GUIDE

VALVE TIMING (Continued)

STANDARD PROCEDURE

ENGINE TIMING - VERIFICATION

Correct timing is critical for the NON free-wheeling designed, 2.7L engine. Engine timing can be verified by using the following procedures:

(1) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Rotate engine until number one cylinder is at TDC on the EXHAUST stroke.

(3) View the intake camshaft sprocket timing mark. The mark should be 90° from the cylinder head cover sealing surface (Fig. 113) on both right and left cylinder banks.

(4) Count chain pins from the mark on the intake camshaft towards the exhaust camshaft. Engine is timed correctly when there are 12 chain pins between the timing marks on the intake camshaft and exhaust camshaft (Fig. 113).

(5) If marks are not correctly aligned, proceed to Timing Chain and Sprockets for service procedures. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

TIMING CHAIN COVER

REMOVAL

(1) Disconnect negative cable from remote jumper terminal.

(2) Remove upper radiator support crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)

(3) Remove radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)

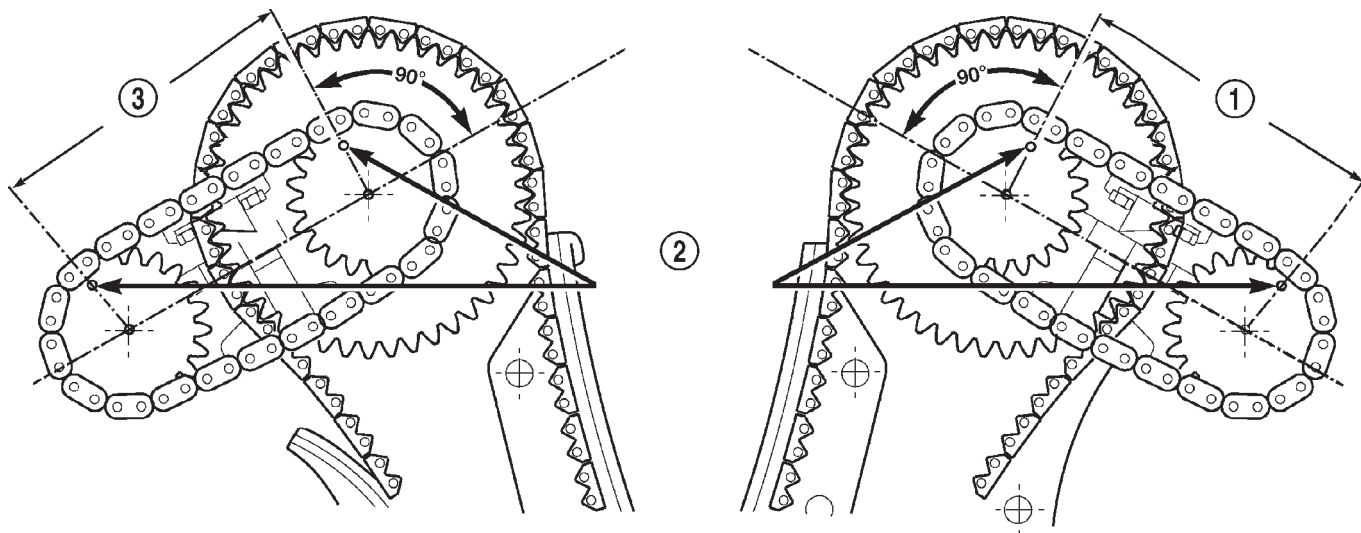
(4) Remove accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(5) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(6) Remove power steering pump from mounting bracket.

(7) Remove accessory drive belt tensioner pulley and bracket.

(8) Remove timing chain cover attaching bolts and remove cover (Fig. 114).



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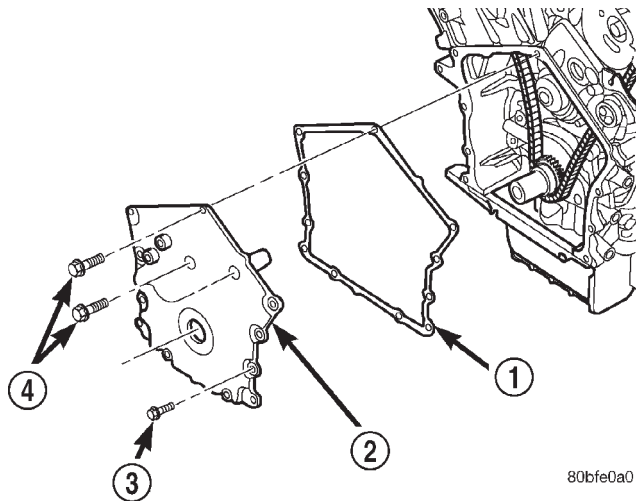
Fig. 113 ENGINE TIMING

1 - 12 PINS

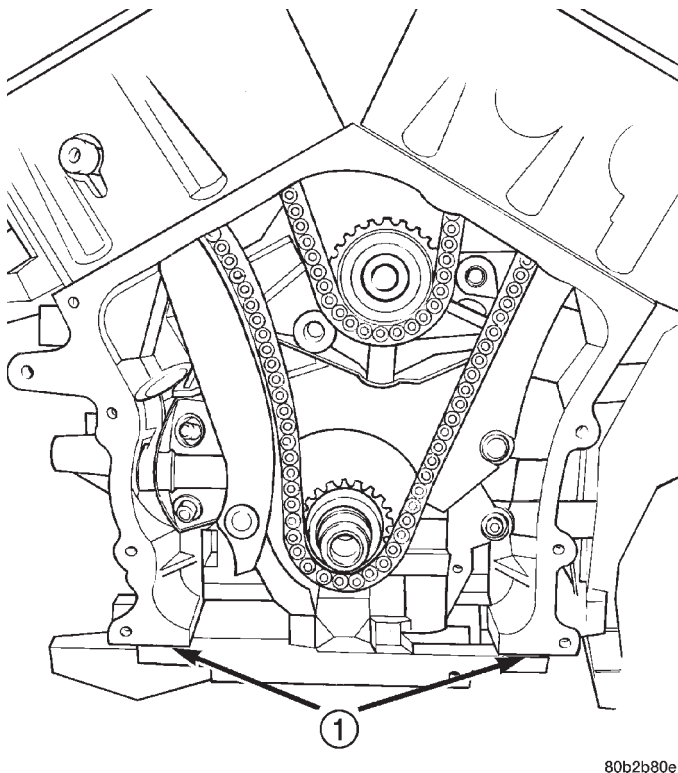
2 - CAMSHAFT TIMING MARKS

3 - 12 PINS

TIMING CHAIN COVER (Continued)

**Fig. 114 TIMING CHAIN COVER**

- 1 - GASKET
- 2 - TIMING CHAIN COVER
- 3 - BOLT-M6
- 4 - BOLT-M10

**Fig. 115 TIMING CHAIN COVER SEALING**

- 1 - PLACE A 1/8 INCH BEAD OF SEALER AT PARTING LINE

INSTALLATION

(1) Inspect and clean sealing surfaces. Inspect and replace gasket and seal as necessary.

(2) If front crankshaft seal was bench installed, place Special Tool 6780-2, Sleeve over crankshaft nose to guide and protect seal lip.

(3) Before installing timing cover gasket apply a 1/8 inch bead of Mopar® Engine RTV GEN II to the parting lines between the oil pan and cylinder block (Fig. 115).

(4) Install timing cover and gasket. Tighten M10 cover bolts to 54 N·m (40 ft. lbs.) and M6 bolts to 12 N·m (105 in. lbs.) (Fig. 114).

(5) If not previously performed, install crankshaft oil seal using Special Tool 6780-2 sleeve and 6780-2 installer.

(6) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(7) Attach power steering pump to bracket.

(8) Install A/C belt tensioner assembly to timing cover.

(9) Install generator/power steering drive belt tensioner pulley and bracket.

(10) Install radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)

(11) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(12) Install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)

(13) Connect negative cable.

TIMING BELT/CHAIN AND SPROCKETS**REMOVAL****REMOVAL - TIMING CHAIN**

(1) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(2) Remove cylinder head covers, crankshaft vibration damper, and timing chain cover. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL) (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

TIMING BELT/CHAIN AND SPROCKETS (Continued)

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

(3) Align crankshaft sprocket timing mark to mark on oil pump housing (Fig. 116). The mark on oil pump housing is 60° ATDC of #1 cylinder.

CAUTION: When the timing chain is removed and the cylinder heads are still installed, DO NOT rotate the camshafts or crankshaft without first locating the proper crankshaft position. Failure to do so will result in valve and/or piston damage.

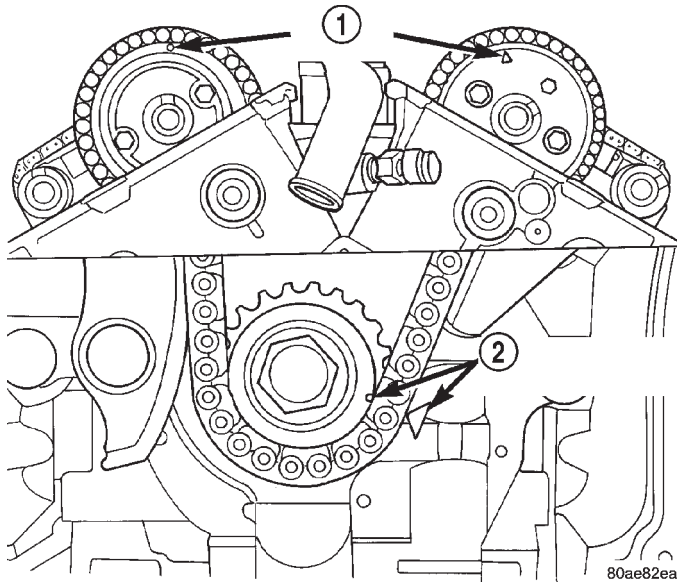


Fig. 116 TIMING MARK ALIGNMENT

- 1 - CAMSHAFT TIMING MARKS
- 2 - CRANKSHAFT TIMING MARKS

(4) Remove primary timing chain tensioner from right cylinder head (Fig. 117).

(5) Remove camshaft position sensor from left cylinder head (Fig. 118).

(6) Remove chain guide access plug from left cylinder head (Fig. 118).

NOTE: When camshaft sprocket bolts are removed, the camshafts will rotate in a clockwise direction.

(7) Starting with the right camshaft sprocket, remove the sprocket attaching bolts. Remove camshaft damper (if equipped) and sprocket (Fig. 118).

(8) Remove left side camshaft sprocket attaching bolts and remove sprocket (Fig. 118).

(9) Remove lower chain guide and tensioner arm (Fig. 118).

(10) Remove the primary timing chain.

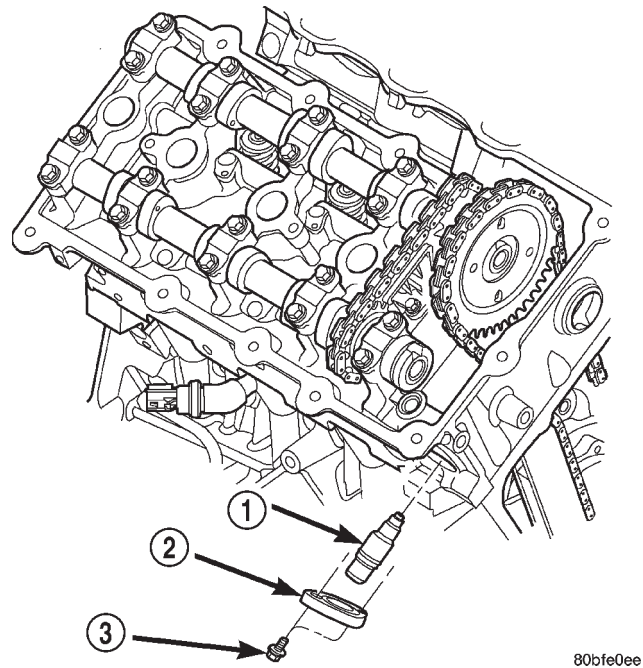


Fig. 117 PRIMARY TIMING CHAIN TENSIONER

- 1 - TENSIONER
- 2 - RETAINER CAP
- 3 - BOLT

(11) For removal of crankshaft sprocket, (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - REMOVAL).

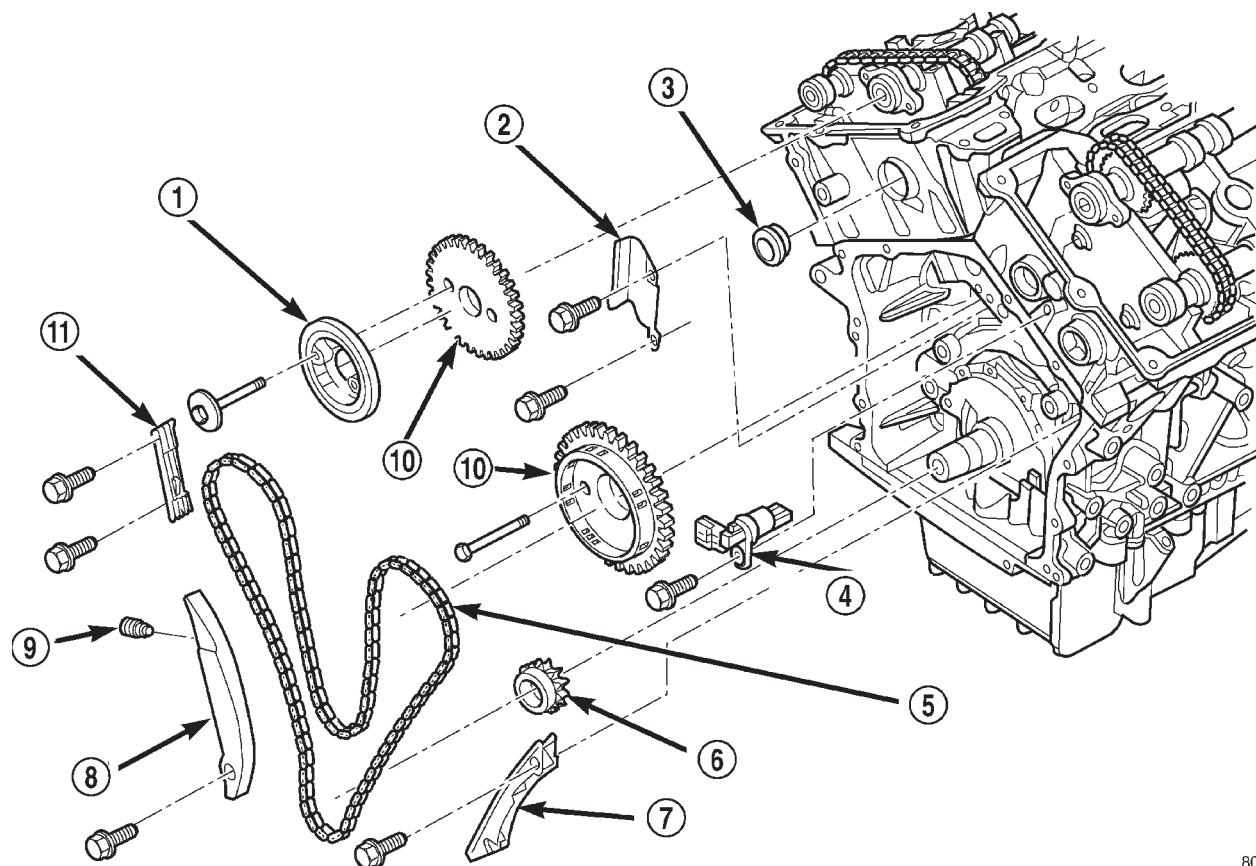
REMOVAL - CRANKSHAFT SPROCKET

(1) Remove primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

CAUTION: Use care not to turn crankshaft while removing crankshaft sprocket, as damage to valves and or pistons could occur.

(2) Remove crankshaft sprocket by first installing the crankshaft damper bolt. Apply grease or equivalent to damper bolt head and position Special Tools 5048-1, 5048-6, and 8539 on sprocket and crankshaft nose (Fig. 119). Remove sprocket using care not to rotate the crankshaft.

TIMING BELT/CHAIN AND SPROCKETS (Continued)



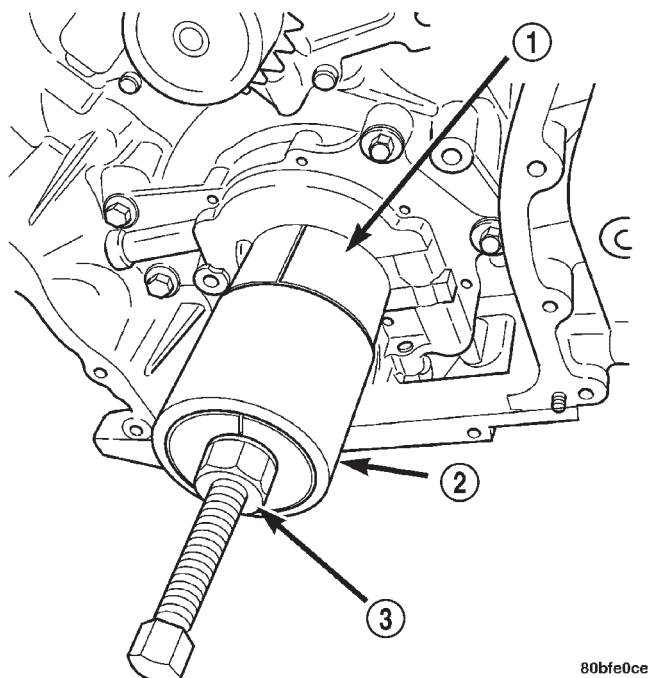
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Fig. 118 TIMING DRIVE SYSTEM - PRIMARY

- 1 - CAMSHAFT DAMPER
- 2 - CHAIN GUIDE
- 3 - ACCESS PLUG
- 4 - CAMSHAFT POSITION SENSOR
- 5 - PRIMARY TIMING CHAIN
- 6 - CRANKSHAFT SPROCKET

- 7 - CHAIN GUIDE
- 8 - CHAIN TENSIONER ARM
- 9 - CHAIN TENSIONER
- 10 - CAMSHAFT SPROCKETS
- 11 - CHAIN GUIDE

TIMING BELT/CHAIN AND SPROCKETS (Continued)

**Fig. 119 Crankshaft Sprocket - Removal**

- 1 - SPECIAL TOOL 8539
- 2 - SPECIAL TOOL 5048-6
- 3 - SPECIAL TOOL 5048-1

INSTALLATION

INSTALLATION - TIMING CHAIN

(1) Inspect all sprockets and chain guides. Replace if worn.

(2) For crankshaft sprocket installation procedures (Refer to 9 - ENGINE/VALVE TIMING/TIMING CHAIN AND SPROCKETS - INSTALLATION).

(3) If removed, install right and left side short chain guides (Fig. 118). Tighten attaching bolts to 28 N·m (250 in. lbs.).

(4) Align crankshaft sprocket timing mark to the mark on oil pump housing (Fig. 120).

NOTE: Lubricate timing chain and guides with engine oil before installation.

(5) Place left side primary chain sprocket onto the chain so that the timing mark is located in-between the two (plated) timing links (Fig. 120).

(6) Lower the primary chain with left side sprocket through the left cylinder head opening.

NOTE: The camshaft sprockets can be allowed to float on the camshaft hub during installation.

(7) Loosely position left side camshaft sprocket over camshaft hub.

(8) Align timing (plated) link to the crankshaft sprocket timing mark (Fig. 120).

(9) Position primary chain onto water pump drive sprocket.

(10) Align right camshaft sprocket timing mark to the timing (plated) link on the timing chain (Fig. 120) and loosely position over camshaft hub.

(11) Verify that all chain timing (plated) links are properly aligned to the timing marks on all sprockets (Fig. 120).

(12) Install left side lower chain guide and tensioner arm (Fig. 118). Tighten attaching bolts to 28 N·m (250 in. lbs.).

NOTE: Inspect oil ring on chain guide access plug before installing. Replace O-ring as necessary.

(13) Install chain guide access plug to left side cylinder head (Fig. 118). Tighten plug to 20 N·m (15 ft. lbs.).

NOTE: To reset the primary timing chain tensioner, engine oil will first need to be purged from the tensioner (Fig. 121).

(14) Purge oil from timing chain tensioner using the following procedure:

(a) Place the check ball end of tensioner into the shallow end of Special Tool 8186 (Fig. 121).

(b) Using hand pressure, slowly depress tensioner until oil is purged from tensioner (Fig. 121).

(15) Reset timing chain tensioner using the following procedure:

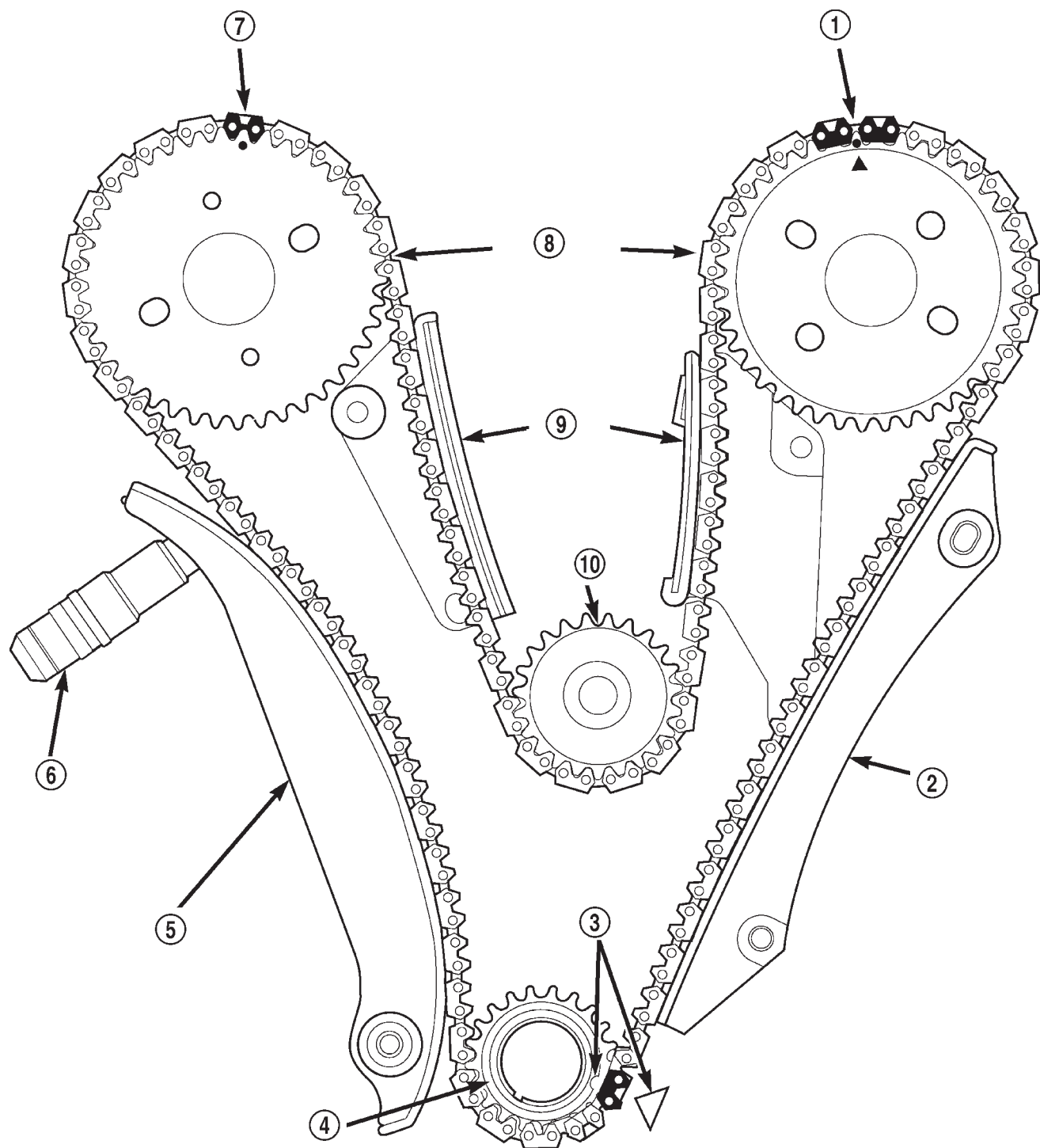
(a) Position cylinder plunger into the deeper end of Special Tool 8186 (Fig. 122).

(b) Apply a downward force until tensioner is reset (Fig. 122).

NOTE: If oil was not first purged from the tensioner, use slight finger pressure to assist the center arm pin of Special Tool 8186 to unseat the tensioner's check ball.

CAUTION: Ensure the tensioner is properly reset. The tensioner body must bottom against the top edge of Special Tool 8186. Failure to properly perform the resetting procedure may cause tensioner jamming.

TIMING BELT/CHAIN AND SPROCKETS (Continued)

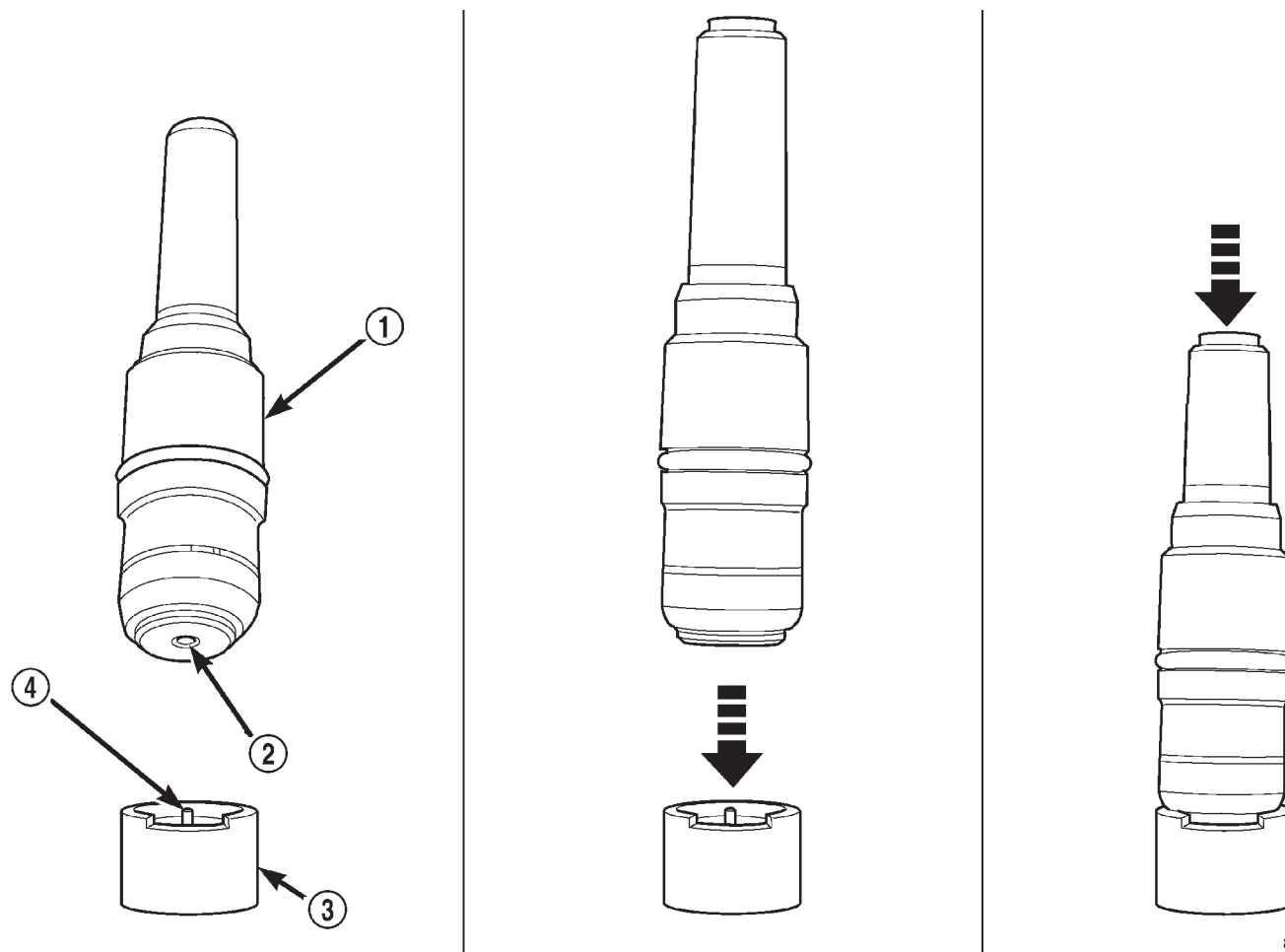


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Fig. 120 TIMING CHAIN ALIGNMENT MARKS - PRIMARY

- | | |
|-----------------------------|-------------------------------|
| 1 - CAMSHAFT TIMING MARKS | 6 - CHAIN TENSIONER |
| 2 - CHAIN GUIDE | 7 - CAMSHAFT TIMING MARK |
| 3 - CRANKSHAFT TIMING MARKS | 8 - INTAKE CAMSHAFT SPROCKETS |
| 4 - CRANKSHAFT SPROCKET | 9 - CHAIN GUIDES |
| 5 - CHAIN TENSIONER ARM | 10 - WATER PUMP SPROCKET |

TIMING BELT/CHAIN AND SPROCKETS (Continued)



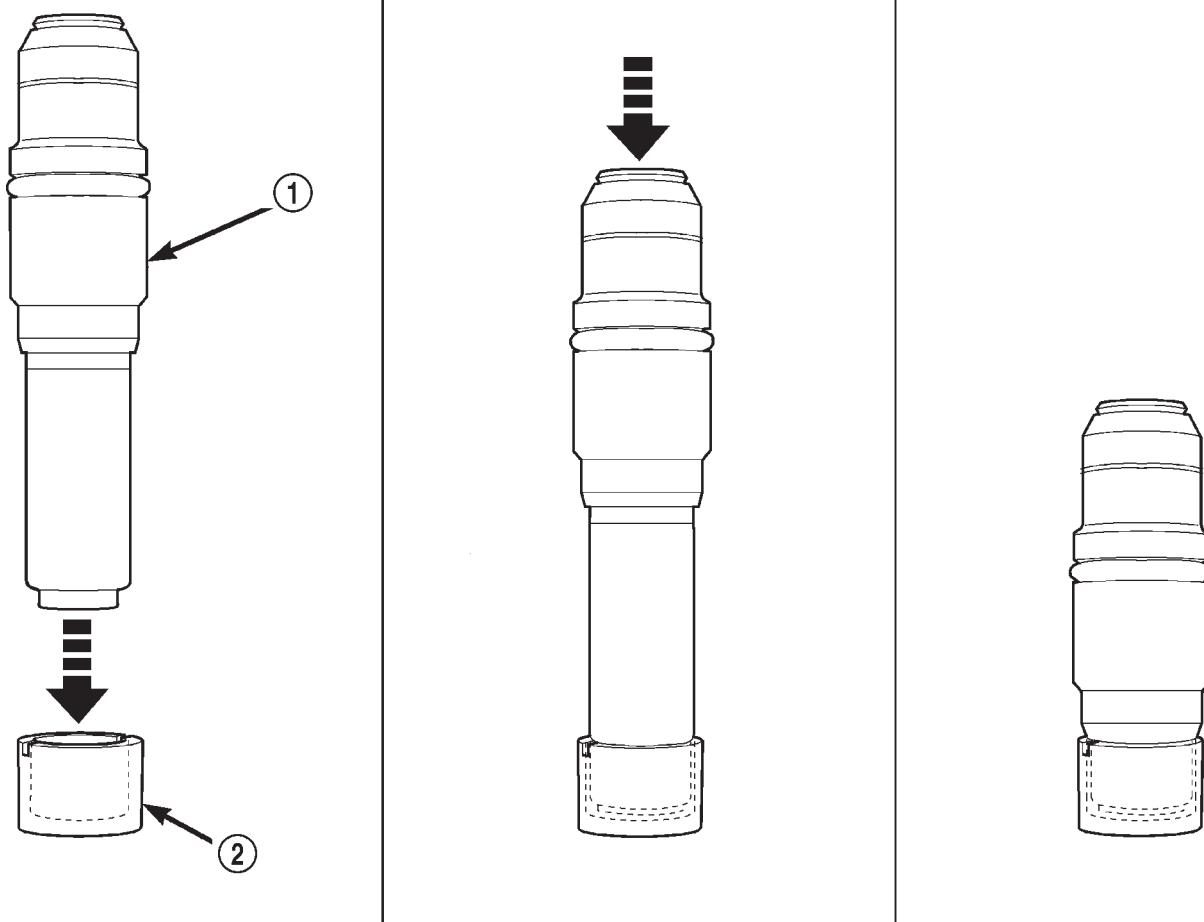
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Fig. 121 TIMING CHAIN TENSIONER - OIL PURGING

1 - TENSIONER
2 - CHECK BALL

3 - SPECIAL TOOL 8186
4 - PIN

TIMING BELT/CHAIN AND SPROCKETS (Continued)



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Fig. 122 TIMING CHAIN TENSIONER - RESETTING

- 1 - TENSIONER
2 - SPECIAL TOOL 8186

(16) Install the reset chain tensioner into the right cylinder head (Fig. 117).

(17) Position tensioner retaining plate and tighten bolts to 12 N·m (105 in. lbs.) (Fig. 117).

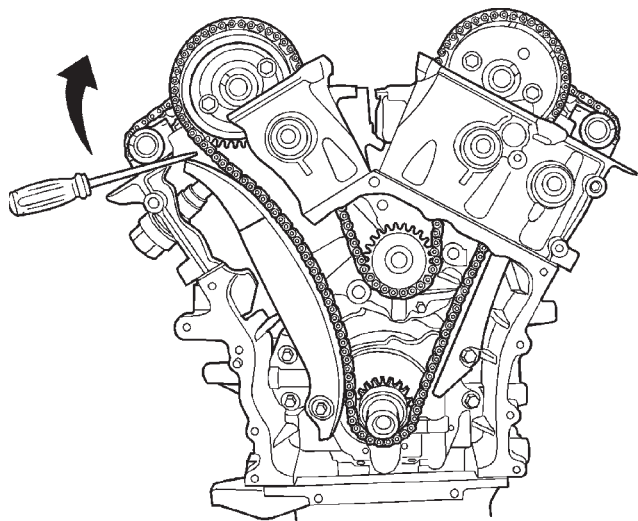
(18) Starting at the right cylinder bank, first position the camshaft damper (if equipped) on camshaft hub, then insert a 3/8" square drive extension with a breaker bar into intake camshaft drive hub. Rotate camshaft until the camshaft hub aligns to the camshaft sprocket and damper attaching holes. Install the sprocket attaching bolts and tighten to 28 N·m (250 in. lbs.) (Fig. 118).

(19) Turn the left side camshaft by inserting a 3/8" square drive extension with a breaker bar into intake camshaft drive hub and rotate camshaft until the sprocket attaching bolts can be installed. Tighten sprocket bolts to 28 N·m (250 in. lbs.) (Fig. 118).

(20) Rotate engine slightly clockwise to remove timing chain slack, if necessary.

(21) Activate the timing chain tensioner by using a flat bladed pry tool to gently pry tensioner arm towards the tensioner slightly (Fig. 123). Then release the tensioner arm. Verify the tensioner is activated (extends).

TIMING BELT/CHAIN AND SPROCKETS (Continued)



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Fig. 123 TIMING CHAIN TENSIONER ACTIVATING

(22) Install the timing chain cover, crankshaft vibration damper, and cylinder head covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION) (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

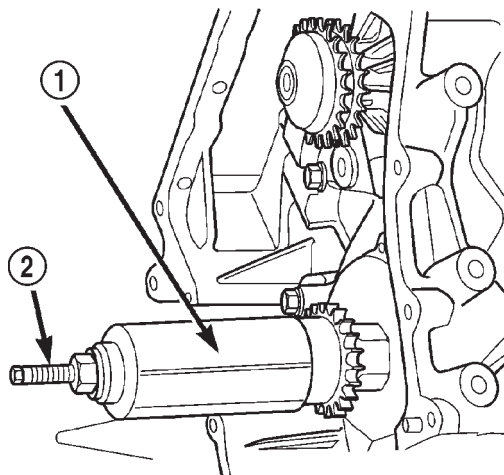
(23) Install camshaft position sensor and connect electrical connector.

(24) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

NOTE: After installation of a reset tensioner, engine noise will occur after initial start-up. This noise will normally disappear within 5–10 seconds.

INSTALLATION - CRANKSHAFT SPROCKET

(1) Install crankshaft sprocket using Special Tools 6780-1 and 8179 (Fig. 124) until sprocket bottoms against crankshaft step flange. Use care not to rotate crankshaft.



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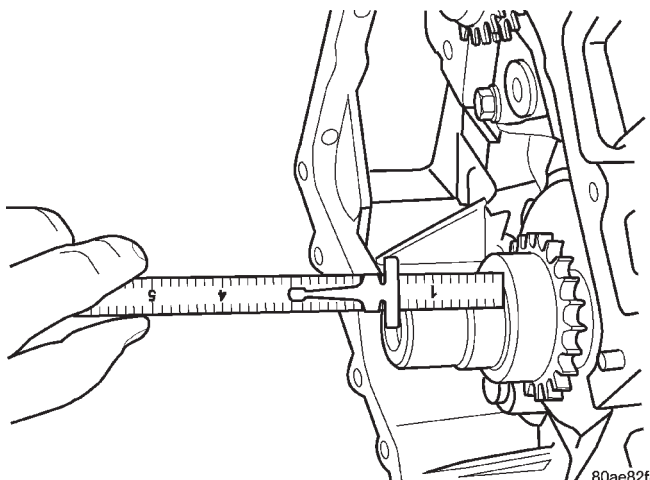
Fig. 124 Crankshaft Sprocket - Installation

1 - SPECIAL TOOL 6780-1

2 - SPECIAL TOOL 8179

(2) Verify that crankshaft sprocket is installed to proper depth by measuring from sprocket outer face to end of crankshaft (Fig. 125). Measurement should read: 39.05 ± 0.50 mm (1.5374 ± 0.020 in.).

(3) Install primary timing chain. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)



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Fig. 125 Crankshaft Sprocket Depth Measurement

ENGINE 3.5L

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ENGINE 3.5L

DESCRIPTION

The 3.5 Liter (214 Cubic Inches) 60 degree V-6 engines is a single overhead camshaft design with hydraulic lifters and four valves per cylinder (Fig. 1). The engine does not have provisions for a free wheeling valve train.

The cylinders are numbered from front to rear, with the right bank odd numbered, and the left bank even numbered (Fig. 2). The firing order is 1-2-3-4-5-6.

The engine identification number is located on the rear of engine block just below the cylinder head (Fig. 3).

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - INTRODUCTION

Engine diagnosis is helpful in determining the causes of malfunctions not detected and remedied by routine maintenance.

These malfunctions may be classified as either mechanical (e.g., a strange noise), or performance (e.g., engine idles rough and stalls).

Refer to the Engine Mechanical and the Engine Performance diagnostic charts, for possible causes and corrections of malfunctions (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - MECHANICAL) (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING - PERFORMANCE).

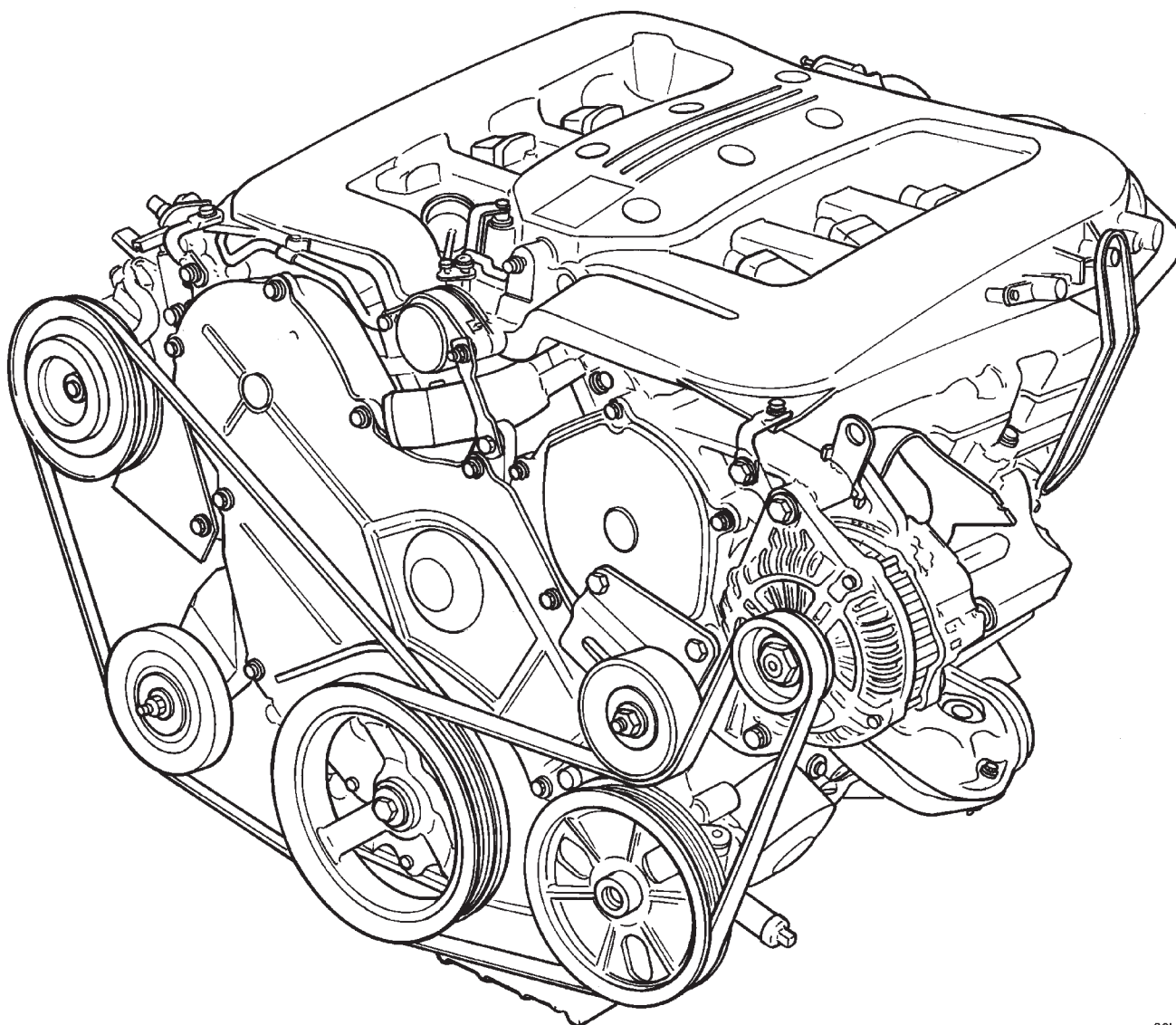
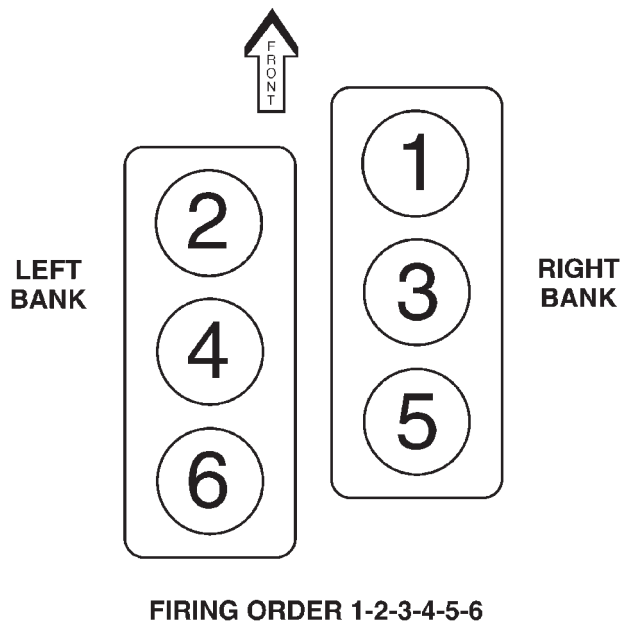


Fig. 1 3.5L Engine

ENGINE 3.5L (Continued)



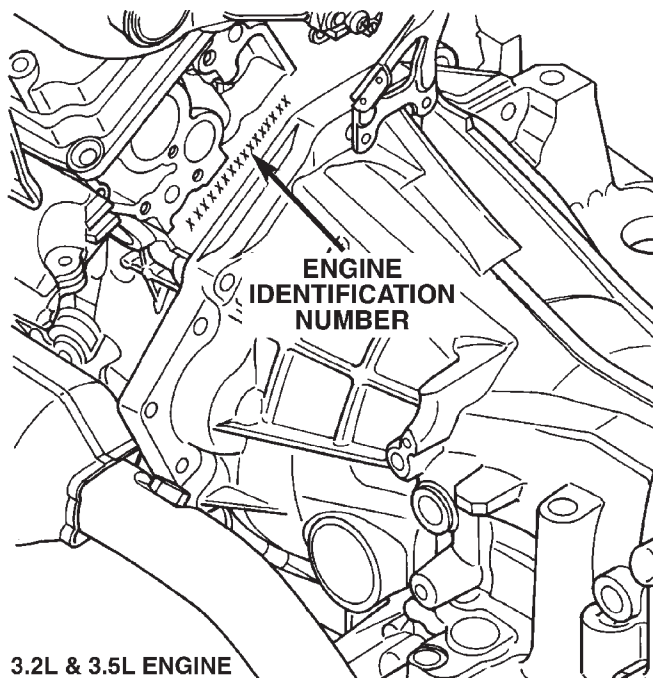
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Fig. 2 Cylinder Numbering & Firing Order - 3.5L

For fuel system diagnosis, (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - DIAGNOSIS AND TESTING).

Additional tests and diagnostic procedures may be necessary for specific engine malfunctions that cannot be isolated with the Service Diagnosis charts. Information concerning additional tests and diagnosis is provided within the following:

- Cylinder Compression Pressure Test
- Cylinder Combustion Pressure Leakage Test
- Engine Cylinder Head Gasket Failure Diagnosis
- Intake Manifold Leakage Diagnosis



<u>X</u> Model Year	<u>X</u> Manufacturing Plant	<u>XXXXX</u> Component Code/Usage	<u>XXXX</u> Month/Day	<u>XXXXX</u> Serial Code
Last digit of model year	Trenton T	Engine 3.2L 3.5L Usage Pass Car PC		

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Fig. 3 ENGINE IDENTIFICATION

- Hydraulic Lash Adjuster Noise Diagnosis
- Engine Oil Leak Inspection

ENGINE 3.5L (Continued)

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - MECHANICAL

CONDITION	POSSIBLE CAUSES	CORRECTION
NOISY VALVES	<ol style="list-style-type: none"> 1. High or low oil level in crankcase. 2. Thin or diluted oil. 3. Thick oil 4. Low oil pressure. 5. Dirt in tappets/lash adjusters. 6. Worn rocker arms. 7. Worn tappets/lash adjusters. 8. Worn valve guides. 9. Excessive runout of valve seats on valve faces. 10. Missing adjuster pivot. 	<ol style="list-style-type: none"> 1. Check and correct engine oil level. 2. Change oil to correct viscosity. 3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again. 4. Check and correct engine oil level. 5. Replace rocker arm/hydraulic lash adjuster assembly. 6. Inspect oil supply to rocker arms. 7. Install new rocker arm/hydraulic lash adjuster assembly. 8. Ream guides and install new valves with oversize stems. 9. Grind valve seats and valves. 10. Replace rocker arm/hydraulic lash adjuster assembly.
CONNECTING ROD NOISE	<ol style="list-style-type: none"> 1. Insufficient oil supply. 2. Low oil pressure. 3. Thin or diluted oil. 4. Thick oil 5. Excessive bearing clearance. 6. Connecting rod journal out-of-round. 7. Misaligned connecting rods. 	<ol style="list-style-type: none"> 1. Check engine oil level. 2. Check engine oil level. Inspect oil pump relief valve and spring. 3. Change oil to correct viscosity. 3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again. 5. Measure bearings for correct clearance. Repair as necessary. 6. Replace crankshaft or grind surface. 7. Replace bent connecting rods.

ENGINE 3.5L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
MAIN BEARING NOISE	<ol style="list-style-type: none"> 1. Insufficient oil supply. 2. Low oil pressure. 3. Thin or diluted oil. 4. Thick oil 4. Excessive bearing clearance. 5. Excessive end play. 6. Crankshaft journal out-of-round or worn. 7. Loose flywheel or torque converter. 	<ol style="list-style-type: none"> 1. Check engine oil level. 2. Check engine oil level. Inspect oil pump relief valve and spring. 3. Change oil to correct viscosity. 3. (a.) Change oil and filter. (b.) Run engine to operating temperature. (c.) Change oil and filter again. 4. Measure bearings for correct clearance. Repair as necessary. 5. Check thrust bearing for wear on flanges. 6. Replace crankshaft or grind journals. 7. Tighten to correct torque.
OIL PRESSURE DROP	<ol style="list-style-type: none"> 1. Low oil level. 2. Faulty oil pressure sending unit. 3. Low oil pressure. 4. Clogged oil filter. 5. Worn parts in oil pump. 6. Thin or diluted oil. 7. Oil pump relief valve stuck. 8. Oil pump suction tube loose. 9. Oil pump cover warped or cracked. 10. Excessive bearing clearance. 	<ol style="list-style-type: none"> 1. Check engine oil level. 2. Install new sending unit. 3. Check sending unit and main bearing oil clearance. 4. Install new oil filter. 5. Replace worn parts or pump. 6. Change oil to correct viscosity. 7. Remove valve and inspect, clean, or replace. 8. Remove oil pan and install new tube or clean, if necessary. 9. Install new oil pump. 10. Measure bearings for correct clearance.
OIL LEAKS	<ol style="list-style-type: none"> 1. Misaligned or deteriorated gaskets. 2. Loose fastener, broken or porous metal part. 3. Misaligned or deteriorated cup or threaded plug. 	<ol style="list-style-type: none"> 1. Replace gasket(s). 2. Tighten, repair or replace the part. 3. Replace as necessary.

ENGINE 3.5L (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
OIL CONSUMPTION OR SPARK PLUGS FOULED	<ol style="list-style-type: none"> 1. PCV system malfunction. 2. Worn, scuffed or broken rings. 3. Carbon in oil ring slots. 4. Rings fitted too tightly in grooves. 5. Worn valve guide(s). 6. Valve stem seal(s) worn or damaged. 	<ol style="list-style-type: none"> 1. Check system and repair as necessary. (Refer to Appropriate Diagnostic Manual) 2. Hone cylinder bores. Install new rings. 3. Clean pistons and install new rings. 4. Remove rings and check grooves. If groove is not proper width, replace piston. 5. Replace cylinder head(s). 6. Replace seal(s).

DIAGNOSIS AND TESTING - ENGINE DIAGNOSIS - PERFORMANCE

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE WILL NOT START	<ol style="list-style-type: none"> 1. Weak battery. 2. Corroded or loose battery connections. 3. Faulty starter. 4. Faulty coil(s) or control unit. 5. Incorrect spark plug gap. 6. Contamination in fuel system. 7. Faulty fuel pump. 8. Incorrect engine timing. 	<ol style="list-style-type: none"> 1. Test battery. Charge or replace as necessary. (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/ BATTERY - DESCRIPTION) 2. Clean and tighten battery connections. Apply a coat of light mineral grease to terminals. 3. Test starting system. (Refer to 8 - ELECTRICAL/STARTING - DIAGNOSIS AND TESTING) 4. Test and replace as needed. (Refer to Appropriate Diagnostic Information) 5. Check and adjust gap as needed. 6. Clean system and replace fuel filter. 7. Test fuel pump and replace as needed. (Refer to Appropriate Diagnostic Information) 8. Check for a skipped timing belt/chain or a loose camshaft sprocket (3.2/3.5L).

ENGINE 3.5L (Continued)

CONDITION	POSSIBLE CAUSE	CORRECTION
ENGINE STALLS OR IDLES ROUGH	<ol style="list-style-type: none"> 1. Idle speed too low. 2. Incorrect fuel mixture. 3. Intake manifold leakage. 4. Faulty coil(s). 	<ol style="list-style-type: none"> 1. Test minimum air flow. (Refer to Appropriate Diagnostic Information) 2. (Refer to Appropriate Diagnostic Information) 3. Inspect intake manifold gasket, manifold, and vacuum hoses. 4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE LOSS OF POWER	<ol style="list-style-type: none"> 1. Dirty or incorrectly gapped plugs. 2. Contamination in fuel system. 3. Faulty fuel pump. 4. Incorrect valve timing. 5. Leaking cylinder head gasket. 6. Low compression. 7. Burned, warped, or pitted valves. 8. Plugged or restricted exhaust system. 9. Faulty coil(s). 	<ol style="list-style-type: none"> 1. Set gap as needed or replace plug(s). 2. Clean system and replace fuel filter. 3. Test and replace as necessary. (Refer to Appropriate Diagnostic Information) 4. Correct valve timing as needed. 5. Replace cylinder head gasket. 6. Test compression of each cylinder. 7. Replace valves. 8. Check exhaust system restriction. Replace parts, as necessary. 9. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES ON ACCELERATION	<ol style="list-style-type: none"> 1. Dirty or incorrectly gapped spark plugs. 2. Contamination in Fuel System. 3. Burned, warped, or pitted valves. 4. Faulty coil(s). 	<ol style="list-style-type: none"> 1. Set gap as needed or replace plug(s). 2. Clean fuel system and replace fuel filter. 3. Replace valves. 4. Test and replace as necessary. (Refer to Appropriate Diagnostic Information)
ENGINE MISSES AT HIGH SPEED	<ol style="list-style-type: none"> 1. Dirty or incorrect spark plug gap. 2. Faulty coil(s). 3. Dirty fuel injector(s). 4. Contamination in fuel system. 	<ol style="list-style-type: none"> 1. Set gap as needed or replace plug(s). 2. Test and replace as necessary. (Refer to Appropriate Diagnostic Information) Test and replace as necessary. (Refer to Appropriate Diagnostic Information) 4. Clean system and replace fuel filter.

ENGINE 3.5L (Continued)

DIAGNOSIS AND TESTING - CYLINDER COMPRESSION PRESSURE TEST

The results of a cylinder compression pressure test can be utilized to diagnose several engine malfunctions.

Ensure the battery is completely charged and the engine starter motor is in good operating condition. Otherwise the indicated compression pressures may not be valid for diagnosis purposes.

- (1) Check engine oil level and add oil if necessary.
- (2) Drive the vehicle until engine reaches normal operating temperature. Select a route free from traffic and other forms of congestion, observe all traffic laws, and accelerate through the gears several times briskly.
- (3) Disconnect and remove all ignition coils from spark plugs.
- (4) Remove all spark plugs from engine. As spark plugs are being removed, check electrodes for abnormal firing indicators fouled, hot, oily, etc. Record cylinder number of spark plug for future reference.
- (5) Be sure throttle blade is fully open during the compression check.
- (6) Insert compression gauge adaptor Special Tool 8116 or the equivalent, into the #1 spark plug hole in cylinder head. Connect the 0-500 psi (Blue) pressure transducer (Special Tool CH7059) with cable adaptors to the DRBIII®. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).
- (7) Crank engine until maximum pressure is reached on gage. Record this pressure as #1 cylinder pressure.
- (8) Repeat the previous step for all remaining cylinders.
- (9) Compression should not be less than 689 kPa (100 psi) and not vary more than 25 percent from cylinder to cylinder.
- (10) If one or more cylinders have abnormally low compression pressures, repeat the compression test.
- (11) If the same cylinder or cylinders repeat an abnormally low reading on the second compression test, it could indicate the existence of a problem in the cylinder in question. **The recommended compression pressures are to be used only as a guide to diagnosing engine problems. An engine should not be disassembled to determine the cause of low compression unless some malfunction is present.**

DIAGNOSIS AND TESTING - CYLINDER COMBUSTION PRESSURE LEAKAGE TEST

The combustion pressure leakage test provides an accurate means for determining engine condition.

Combustion pressure leakage testing will detect:

- Exhaust and intake valve leaks (improper seating).

- Leaks between adjacent cylinders or into water jacket.
- Any causes for combustion/compression pressure loss.

WARNING: DO NOT REMOVE THE PRESSURE CAP WITH THE SYSTEM HOT AND UNDER PRESSURE BECAUSE SERIOUS BURNS FROM COOLANT CAN OCCUR.

Check the coolant level and fill as required. DO NOT install the pressure cap.

Start and operate the engine until it attains normal operating temperature, then turn the engine OFF.

Clean spark plug recesses with compressed air.

Remove the spark plugs.

Remove the oil filler cap.

Remove the air cleaner.

Calibrate the tester according to the manufacturer's instructions. The shop air source for testing should maintain 483 kPa (70 psi) minimum, 1,379 kPa (200 psi) maximum, with 552 kPa (80 psi) recommended.

Perform the test procedures on each cylinder according to the tester manufacturer's instructions. While testing, listen for pressurized air escaping through the throttle body, tailpipe and oil filler cap opening. Check for bubbles in the coolant.

All gauge pressure indications should be equal, with no more than 25% leakage per cylinder.

FOR EXAMPLE: At 552 kPa (80 psi) input pressure, a minimum of 414 kPa (60 psi) should be maintained in the cylinder.

STANDARD PROCEDURE**STANDARD PROCEDURE - FORM-IN-PLACE GASKETS AND SEALERS**

There are numerous places where form-in-place gaskets are used on the engine. Care must be taken when applying form-in-place gaskets to assure obtaining the desired results. **Do not use form-in-place gasket material unless specified.** Bead size, continuity, and location are of great importance. Too thin a bead can result in leakage while too much can result in spill-over which can break off and obstruct fluid feed lines. A continuous bead of the proper width is essential to obtain a leak-free gasket.

There are numerous types of form-in-place gasket materials that are used in the engine area. Mopar® Engine RTV GEN II, Mopar® ATF-RTV, and Mopar® Gasket Maker gasket materials, each have different properties and can not be used in place of the other.

MOPAR® ENGINE RTV GEN II is used to seal components exposed to engine oil. This material is a

ENGINE 3.5L (Continued)

specially designed black silicone rubber RTV that retains adhesion and sealing properties when exposed to engine oil. Moisture in the air causes the material to cure. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® ATF RTV is a specifically designed black silicone rubber RTV that retains adhesion and sealing properties to seal components exposed to automatic transmission fluid, engine coolants, and moisture. This material is available in three ounce tubes and has a shelf life of one year. After one year this material will not properly cure. Always inspect the package for the expiration date before use.

MOPAR® GASKET MAKER is an anaerobic type gasket material. The material cures in the absence of air when squeezed between two metallic surfaces. It will not cure if left in the uncovered tube. The anaerobic material is for use between two machined surfaces. Do not use on flexible metal flanges.

MOPAR® BED PLATE SEALANT is a unique (green-in-color) anaerobic type gasket material that is specially made to seal the area between the bed-plate and cylinder block without disturbing the bearing clearance or alignment of these components. The material cures slowly in the absence of air when torqued between two metallic surfaces, and will rapidly cure when heat is applied.

MOPAR® GASKET SEALANT is a slow drying, permanently soft sealer. This material is recommended for sealing threaded fittings and gaskets against leakage of oil and coolant. Can be used on threaded and machined parts under all temperatures. This material is used on engines with multi-layer steel (MLS) cylinder head gaskets. This material also will prevent corrosion. Mopar® Gasket Sealant is available in a 13 oz. aerosol can or 4oz./16 oz. can w/applicator.

SEALER APPLICATION

Mopar® Gasket Maker material should be applied sparingly 1 mm (0.040 in.) diameter or less of sealant to one gasket surface. Be certain the material surrounds each mounting hole. Excess material can easily be wiped off. Components should be torqued in place within 15 minutes. The use of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Engine RTV GEN II or ATF RTV gasket material should be applied in a continuous bead approximately 3 mm (0.120 in.) in diameter. All mounting holes must be circled. For corner sealing, a 3.17 or 6.35 mm (1/8 or 1/4 in.) drop is placed in the center of the gasket contact area. Uncured sealant

may be removed with a shop towel. Components should be torqued in place while the sealant is still wet to the touch (within 10 minutes). The usage of a locating dowel is recommended during assembly to prevent smearing material off the location.

Mopar® Gasket Sealant in an aerosol can should be applied using a thin, even coat sprayed completely over both surfaces to be joined, and both sides of a gasket. Then proceed with assembly. Material in a can w/applicator can be brushed on evenly over the sealing surfaces. Material in an aerosol can should be used on engines with multi-layer steel gaskets.

STANDARD PROCEDURE - ENGINE GASKET SURFACE PREPARATION

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

Never use the following to clean gasket surfaces:

- Metal scraper
- Abrasive pad or paper to clean cylinder block and head
- High speed power tool with an abrasive pad or a wire brush (Fig. 4)

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Only use the following for cleaning gasket surfaces:

- Solvent or a commercially available gasket remover
- Plastic or wood scraper (Fig. 4)
- Drill motor with 3M Roloc™ Bristle Disc (white or yellow) (Fig. 4)

CAUTION: Excessive pressure or high RPM (beyond the recommended speed), can damage the sealing surfaces. The mild (white, 120 grit) bristle disc is recommended. If necessary, the medium (yellow, 80 grit) bristle disc may be used on cast iron surfaces with care.

STANDARD PROCEDURE - REPAIR OF DAMAGED OR WORN THREADS

Damaged or worn threads (excluding spark plug and camshaft bearing cap attaching threads) can be repaired. Essentially, this repair consists of drilling out worn or damaged threads, tapping the hole with a special Heli-Coil Tap, (or equivalent) and installing an insert into the tapped hole. This brings the hole back to its original thread size.

CAUTION: Be sure that the tapped holes maintain the original center line.

ENGINE 3.5L (Continued)

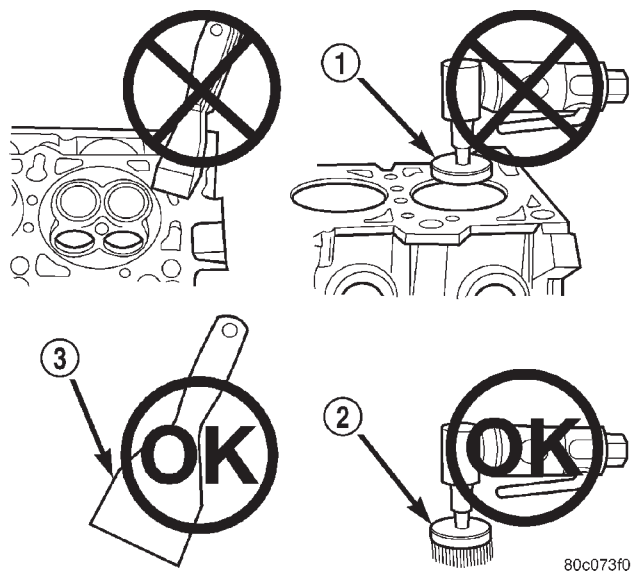


Fig. 4 Proper Tool Usage For Surface Preparation

- 1 - ABRASIVE PAD
- 2 - 3M ROLOC™ BRISTLE DISC
- 3 - PLASTIC/WOOD SCRAPER

Heli-Coil tools and inserts are readily available from automotive parts jobbers.

STANDARD PROCEDURE - HYDROSTATIC LOCKED ENGINE

When an engine is suspected to be hydrostatically locked, regardless of what caused the problem, the following steps should be used.

CAUTION: DO NOT use starter motor to rotate the engine, severe damage may occur.

(1) Inspect air cleaner, induction system and intake manifold to insure system is dry and clear of foreign material.

(2) Remove negative battery cable.

(3) Place a shop towel around the spark plugs when removing them from the engine. This will catch any fluid that may possibly be in the cylinder under pressure.

(4) With all spark plugs removed, rotate engine crankshaft using a breaker bar and socket.

(5) Identify the fluid in the cylinder(s) (i.e., coolant, fuel, oil or other).

(6) Make sure all fluid has been removed from the cylinders. Inspect engine for damage (i.e., connecting rods, pistons, valves, etc.)

(7) Repair engine or components as necessary to prevent this problem from re-occurring.

CAUTION: Squirt approximately one teaspoon of oil into the cylinders, rotate engine to lubricate the cylinder walls to prevent damage on restart.

- (8) Install new spark plugs.
- (9) Drain engine oil and remove oil filter.
- (10) Install a new oil filter.
- (11) Fill engine with specified amount of approved oil.
- (12) Connect negative battery cable.
- (13) Start engine and check for any leaks.

STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS

Using a blunt tool such as a drift and a hammer, strike the bottom edge of the cup plug. With the cup plug rotated, grasp firmly with pliers or other suitable tool and remove plug (Fig. 5).

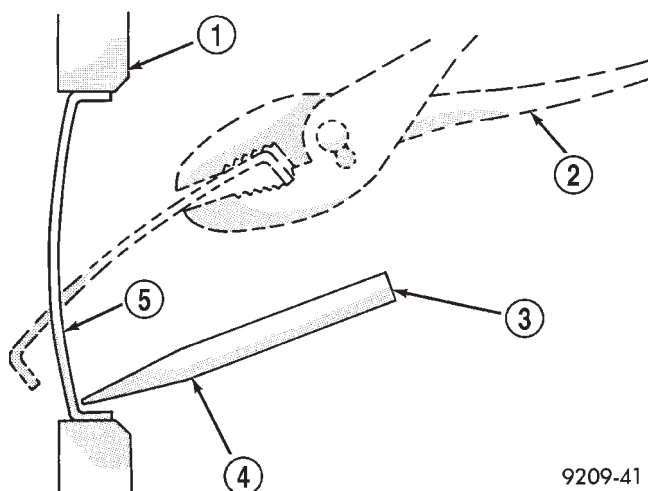


Fig. 5 Core Hole Plug Removal

- 1 - CYLINDER BLOCK
- 2 - REMOVE PLUG WITH PLIERS
- 3 - STRIKE HERE WITH HAMMER
- 4 - DRIFT PUNCH
- 5 - CUP PLUG

CAUTION: Do not drive cup plug into the casting as restricted cooling can result and cause serious engine problems.

Thoroughly clean inside of cup plug hole in cylinder block or head. Be sure to remove old sealer. Lightly coat inside of cup plug hole with Mopar® Stud and Bearing Mount. Make certain the new plug is cleaned of all oil or grease. Using proper drive plug, drive plug into hole so that the sharp edge of the plug is at least 0.5 mm (0.020 in.) inside the lead-in chamfer.

It is not necessary to wait for curing of the sealant. The cooling system can be refilled and the vehicle placed in service immediately.

ENGINE 3.5L (Continued)

STANDARD PROCEDURE - MEASURING BEARING CLEARANCE USING PLASTIGAGE

Engine crankshaft bearing clearances can be determined by use of Plastigage or equivalent. The following is the recommended procedure for the use of Plastigage:

(1) Remove oil film from surface to be checked. Plastigage is soluble in oil.

(2) Place a piece of Plastigage across the entire width of the bearing shell in the cap approximately 6.35 mm (1/4 in.) off center and away from the oil holes (Fig. 6). (In addition, suspected areas can be checked by placing the Plastigage in the suspected area). Torque the bearing cap bolts of the bearing being checked to the proper specifications.

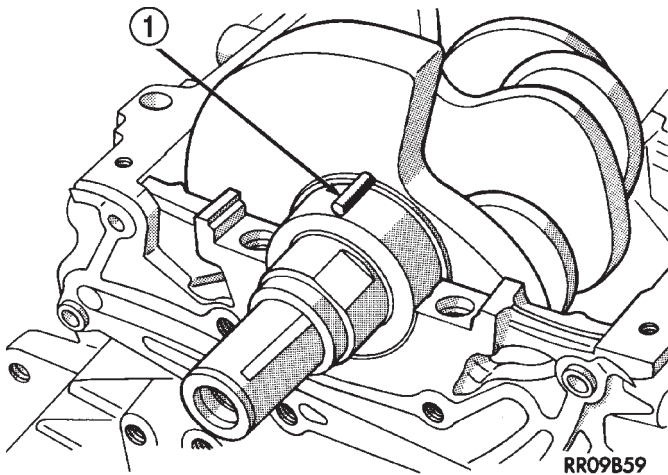


Fig. 6 Plastigage Placed in Lower Shell—Typical

1 - PLASTIGAGE

(3) Remove the bearing cap and compare the width of the flattened Plastigage with the metric scale provided on the package. Locate the band closest to the same width. This band shows the amount of clearance in thousandths of a millimeter. Differences in readings between the ends indicate the amount of taper present. Record all readings taken. Compare clearance measurements to specs found in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). **Plastigage generally is accompanied by two scales. One scale is in inches, the other is a metric scale.**

NOTE: Plastigage is available in a variety of clearance ranges. Use the most appropriate range for the specifications you are checking.

(4) Install the proper crankshaft bearings to achieve the specified bearing clearances.

REMOVAL - ENGINE ASSEMBLY

(1) Release fuel pressure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable at right strut tower (Fig. 7).

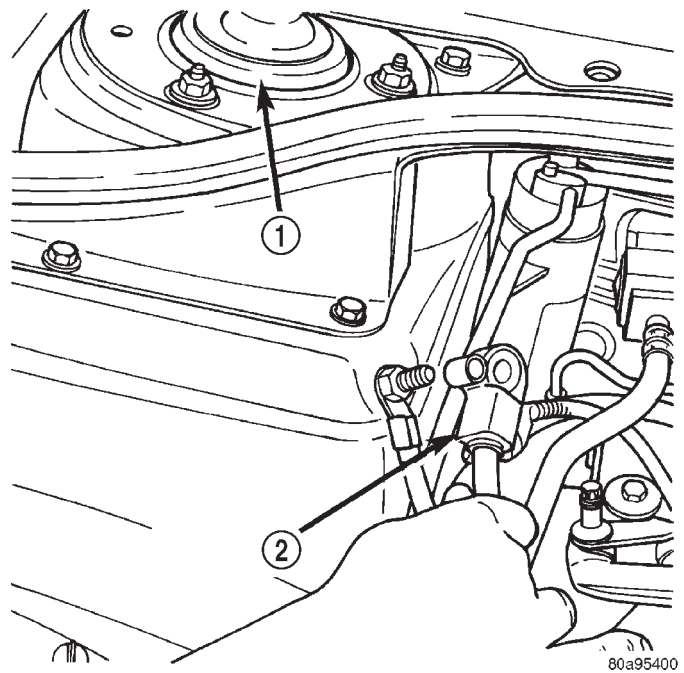


Fig. 7 NEGATIVE CABLE REMOTE TERMINAL

1 - RIGHT STRUT TOWER

2 - BATTERY NEGATIVE CABLE

(3) Mark hood position at hinges and remove hood. (Refer to 23 - BODY/HOOD/HOOD - REMOVAL)

(4) Remove both wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL)

(5) Remove both right and left cowl screens. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE AND SCREEN - REMOVAL)

(6) Remove strut tower brace. (Refer to 23 - BODY/EXTERIOR/FRONT STRUT TOWER TO TOWER BRACE - REMOVAL)

(7) Remove air cleaner assembly with air inlet hose (Fig. 8).

(8) Remove upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)

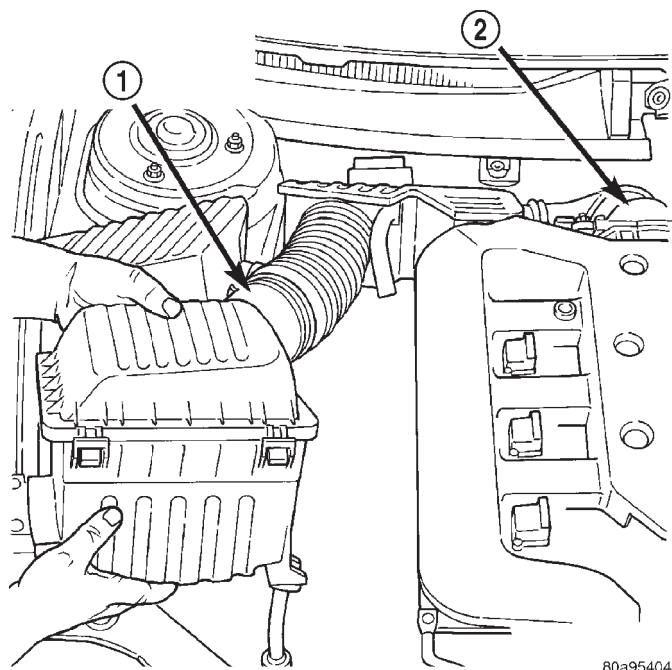
(9) Disconnect hood release cable from hood latch.

(10) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(11) Remove radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)

(12) Remove accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

ENGINE 3.5L (Continued)

**Fig. 8 AIR CLEANER WITH INLET HOSE**

1 - AIR CLEANER ASSEMBLY WITH AIR INLET HOSE

2 - THROTTLE BODY

- (13) Disconnect upper radiator hose at engine.
- (14) Disconnect lower radiator hose at radiator.
- (15) Disconnect engine oil and transmission cooler lines at radiator.
- (16) Remove power steering line bracket at left side of radiator.
- (17) Remove fasteners attaching air conditioning condenser to radiator.
- (18) Remove radiator. (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL)
- (19) Remove generator. (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - REMOVAL)
- (20) Remove power steering pump mounting bolts and set pump aside (Do not disconnect lines). (Refer to 19 - STEERING/PUMP - REMOVAL)
- (21) Remove air conditioning compressor mounting bolts and set aside (Do not disconnect lines).
- (22) Loosen and remove V-Band clamp at right exhaust manifold.
- (23) Remove front and rear support bracket fasteners attaching right side catalytic converter down pipe.
- (24) Disconnect fuel line. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)
- (25) Disconnect throttle and speed control cables from bracket. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - REMOVAL)

- (26) Disconnect coolant hoses at coolant recovery/pressure container.
- (27) Disconnect all vacuum hoses.
- (28) Disconnect ground straps at both cylinder heads.

CAUTION: Upper Intake manifold is a composite design. Therefore, manifold should be removed before lifting engine or damage to the manifold could occur.

- (29) Remove upper intake manifold and cover intake manifold openings with tape. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)
- (30) Disconnect heater hoses.
- (31) Remove rear throttle body support bracket.
- (32) Remove fastener for water pipe at transmission to block bolt.
- (33) Remove four upper transmission to block bolts.
- (34) Disconnect all electrical connections.
- (35) Hoist vehicle.
- (36) Drain engine oil.
- (37) Remove structural collar and mark flex plate to torque converter position.
- (38) Remove bolts holding torque converter to flex plate.
- (39) Disconnect both transmission oil cooler line brackets from engine.
- (40) Loosen and remove left exhaust manifold V-Band clamp.
- (41) For starter removal, loosen the left converter exhaust pipe band clamp and exhaust pipe support bracket at transaxle.
- (42) Remove starter. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - REMOVAL)
- (43) Remove left engine mount bolts.
- (44) Remove right engine mount bolts.
- (45) Remove crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - REMOVAL)
- (46) Remove two lower transmission to block bolts.
- (47) Lower vehicle.
- (48) Attach lifting device to engine.
- (49) Insert floor jack with small block of wood under transmission pan to support transmission.
- (50) Hoist engine from engine compartment.

INSTALLATION - ENGINE ASSEMBLY

- (1) Attach lifting device and lower engine into engine compartment.
- (2) Align engine mounts and install fasteners but **do not tighten** until all mounting bolts have been installed.
- (3) Install transmission case to engine block tighten bolts to 102 N·m (75 ft. lbs.).

ENGINE 3.5L (Continued)

- (4) Remove engine lifting device.
- (5) Raise vehicle.
- (6) Tighten engine mount fastener to 61 N·m (45 ft. lbs.).
- (7) Align flex plate to torque converter and install mounting bolts. Tighten bolts to 75 N·m (55 ft. lbs.).
- (8) Install crankshaft position sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/CRANKSHAFT POSITION SENSOR - INSTALLATION)
- (9) Install starter. (Refer to 8 - ELECTRICAL/STARTING/STARTER MOTOR - INSTALLATION)
- (10) Install new V-Band clamp at left side exhaust manifold to catalytic converter. Tighten V-Band clamp to 11 N·m (100 in. lbs.).
- (11) Install left side catalytic converter down pipe support fastener at transaxle. Tighten fastener to 47 N·m (35 ft. lbs.).
- (12) Tighten the left converter down pipe band clamp.
- (13) Install the transmission oil cooler lines bracket to engine.
- (14) Install structural collar/cover. (Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION)
- (15) Lower vehicle.
- (16) Connect all electrical connections.
- (17) Install four upper transmission to block bolts tighten to 102 N·m (75 ft. lbs.).
- (18) Install water pipe and retaining fasteners to the transaxle/cylinder block double-ended bolts.
- (19) Install rear throttle body support bracket.
- (20) Connect heater hoses.
- (21) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)
- (22) Connect ground straps at both cylinder heads.
- (23) Connect all vacuum hoses.
- (24) Connect coolant hoses at coolant recovery/pressure container.
- (25) Connect throttle and speed control cables to bracket and throttle arm. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - INSTALLATION)
- (26) Connect fuel line. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)
- (27) Install new V-Band clamp at right exhaust manifold. Tighten V-Band clamp to 11 N·m (100 in. lbs.).
- (28) Install and tighten right side catalytic converter down pipe support bracket fastener at trans-axle mount.
- (29) Install air conditioning compressor and tighten fasteners to 28 N·m (250 in. lbs.).
- (30) Install power steering pump and tighten fasteners to 28 N·m (250 in. lbs.).
- (31) Install generator. (Refer to 8 - ELECTRICAL/CHARGING/GENERATOR - INSTALLATION)
- (32) Install radiator. (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION)
- (33) Attach air conditioning condenser to radiator.
- (34) Install power steering line bracket to radiator.
- (35) Connect engine oil and transmission cooler lines to radiator.
- (36) Install lower radiator hose.
- (37) Install upper radiator hose.
- (38) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
- (39) Install radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)
- (40) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (41) Fill engine with proper amount of oil.
- (42) Connect hood release cable to hood latch and install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)
- (43) Install air cleaner and air inlet hose.
- (44) Install strut tower brace. (Refer to 23 - BODY/EXTERIOR/FRONT STRUT TOWER TO TOWER BRACE - INSTALLATION)
- (45) Install both cowl covers. (Refer to 23 - BODY/EXTERIOR/COWL GRILLE AND SCREEN - INSTALLATION)
- (46) Install both wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION)
- (47) Install hood. (Refer to 23 - BODY/HOOD/HOOD - INSTALLATION)
- (48) Connect negative cable.

ENGINE 3.5L (Continued)

SPECIFICATIONS

3.5L ENGINE

DESCRIPTION	SPECIFICATION
Type	60° SOHC V-6 24-Valve
Displacement	3.5 Liters (214 Cubic Inches)
Bore and Stroke	96.0 x 81.0 mm (3.780 x 3.189 in.)
Compression Ratio	9.9:1
Lead Cylinder	#1 Right Bank
Firing Order	1-2-3-4-5-6
Cylinder Block	
Cylinder Bore Diameter	96.0 mm ±0.0076 (3.780 in. ±0.0003 in.)
Out-of-Round (Max.)	0.076 mm (0.003 in.)
Taper (Max.)	0.051 mm (0.002 in.)
Pistons	
Type Material	Aluminum (Full Floating Pins)
Piston Diameter	95.98 ± 0.019 mm (3.7788 ± 0.0008 in.)
Clearance at Size Location	−0.007 to +0.047 mm (−0.0003 to +0.0018 in.)
Piston Weight	
—A Size	438–443 grams (15.45–15.62 oz.)
—B Size	433–438 grams (15.27–15.45 oz.)
Piston Ring Groove Diameter	
—No. 1	87.4–87.6 mm (3.441–3.449 in.)
—No. 2	86.3–86.5 mm (3.397–3.4055 in.)
—No. 3	85.8–86.0 mm (3.378–3.385 in.)
Piston Pins	
Type	Full Floating
Clearance in Piston	0.005–0.015 mm (0.0002–0.0006 in.)

DESCRIPTION	SPECIFICATION
Clearance in Rod	0.007–0.018 mm (0.0003–0.007 in.)
Diameter	23.997–24.000 mm (0.9448–0.9449 in.)
Piston Rings	
Ring Gap—Top Compression Ring	0.20–0.36 mm (0.008–0.014 in.)
Ring Gap—2nd Compression Ring	0.23–0.50 mm (0.0091–0.0197 in.)
Ring Gap—Oil Control (Steel Rails)	0.25–0.76 mm (0.010–0.030 in.)
Ring Side Clearance	
Top and Second Compression Ring	0.04–0.08 mm (0.0016–0.0031 in.)
Oil Ring (Steel Rails)	0.038–0.184 mm (0.0015–0.0073 in.)
Ring Width	
Top Compression Ring	1.17–1.19 mm (0.0461–0.0469 in.)
2nd Compression Ring	1.47–1.49 mm (0.058–0.059 in.)
Oil Ring (Steel Rings)	0.445–0.470 mm (0.0176–0.0186 in.)
Connecting Rods	
Bearing Clearance	0.019–0.081 mm (0.0007–0.0031 in.)
Piston Pin Bore Diameter	24.0076–24.0153 mm (0.9452–0.9455 in.)
Side Clearance (Max.)	0.39 mm (0.0153 in.)
Total Weight (Less Bearing)	647 grams (22.8223 oz.)
Crankshaft Main Bearing Journals	
Diameter	63.987–64.013 mm (2.519–2.520 in.)
Main Bearing Diametrical Clearance	0.011–0.077 mm (0.0007–0.0030 in.)
—(Max. Allowable)	0.087 mm (0.0034 in.)
Out-of-Round (Max.)	0.015 mm (0.0006 in.)

ENGINE 3.5L (Continued)

DESCRIPTION	SPECIFICATION
Taper (Max.)	0.015 mm (0.0006 in.)
End Play	0.10–0.30 mm (0.004–0.012 in.)
—(Max.)	0.43 mm (0.017 in.)
Connecting Rod Journals	
Diameter	57.979–58.005 mm (2.283–2.284 in.)
Bearing Diametrical Clearance	0.019–0.087 mm (0.00075–0.0034 in.)
Out-of-Round (Max.)	0.015 mm (0.0006 in.)
Taper (Max.)	0.015 mm (0.0006 in.)
Camshaft	
Bore Diameter	43.038–43.059 mm (1.6944–1.6952 in.)
Bearing Journal Diameter	42.939–42.960 mm (1.6905–1.6913 in.)
Diametrical Clearance	0.078–0.12 mm (0.003–0.0047 in.)
—(Max.)	0.15 mm (0.0059 in.)
End Play	0.11–0.35 mm (0.004–0.014 in.)
Valve Timing—Intake Valve	
Opens (ATDC)	3°
Closes (ABDC)	61°
Duration	238°
Centerline	122°
Valve Timing—Exhaust Valve	
Opens (BBDC)	56°
Closes (ATDC)	16°
Duration	252°
Centerline	112°
Valve Overlap	13°
Cylinder Head	
Gasket Thickness (Compressed)	1.78 mm (0.070 in.)
Valve Seat Angle	45–45.5°

DESCRIPTION	SPECIFICATION
Valve Seat Runout (Max.)	0.051 mm (0.002 in.)
Valve Seat Width—Intake	0.75–1.25 mm (0.0295–0.0492 in.)
Valve Seat Width—Exhaust	1.25–1.75 mm (0.0492–0.0689 in.)
Guide Bore Diameter (Std.)	6.975–7.00 mm (0.2746–0.2756 in.)
Valve Guide Height*	9.5–10.5 mm (0.3740–0.4134 in.)
*Measured from cylinder head surface	
Valves	
Face Angle	44.5–45°
Head Diameter—Intake	36.37–36.63 mm (1.4319–1.4421 in.)
Head Diameter—Exhaust	28.87–29.13 mm (1.1366–1.1469 in.)
Length—Intake (Overall)	114.41–114.99 mm (4.5043–4.5272 in.)
Length—Exhaust (Overall)	125.67–126.25 mm (4.9476–4.9705 in.)
Stem Diameter—Intake	6.935–6.953 mm (0.2730–0.2737 in.)
Stem Diameter—Exhaust	6.906–6.924 mm (0.2719–0.2726 in.)
Stem-to-Guide Clearance—Intake	0.022–0.065 mm (0.0009–0.0026 in.)
—(Max.) Rocking Method	0.29 mm (0.0114 in.)
Stem-to-Guide Clearance—Exhaust	0.051–0.094 mm (0.002–0.0037 in.)
—(Max.) Rocking Method	0.370 mm (0.0146 in.)
Valve Lift—Intake (Zero Lash)	8.55 mm (0.3367 in.)
Valve Lift—Exhaust (Zero Lash)	6.53 mm (0.2571 in.)
Valve Margin - Intake:	0.835–1.165 mm (0.0329–0.0459 in.)
Valve Margin - Exhaust:	1.44–1.77 mm (0.0567–0.0697 in.)

ENGINE 3.5L (Continued)

DESCRIPTION	SPECIFICATION
Valve Stem Tip Height—Intake	42.366–43.655 mm (1.6680–1.7187 in.)
Valve Stem Tip Height—Exhaust	44.705–45.986 mm (1.760–1.8105 in.)
Valve Springs	
Free Length—Intake (Approx.)	43.675 mm (1.7195 in.)
Free Length—Exhaust (Approx.)	44.319 mm (1.7448 in.)
Spring Force—Intake (Valve Closed)	309–358 N @ 38.0 mm (69.5–80.5 lbs. @ 1.4961 in.)
Spring Force—Exhaust (Valve Closed)	314–354 N @ 38.0 mm (71–79 lbs. @ 1.4961 in.)
Spring Force—Intake (Valve Open)	836–907 N @ 29.85 mm (188–204 lbs. @ 1.1594 in.)
Spring Force—Exhaust (Valve Open)	579–640 N @ 31.47 mm (130–144 lbs. @ 1.239 in.)
Number of Coils—Intake	6.86
Number of Coils—Exhaust	7.66
Color of Spring (Top of Coils)	Orange Yellow
—Intake (Right Hand Coil Direction)	
—Exhaust (Left Hand Coil Direction)	
Wire Diameter—Intake	4.29–4.34 mm (0.1689–0.1709 in.)

DESCRIPTION	SPECIFICATION
Wire Diameter—Exhaust	4.16–4.22 mm (0.1638–0.1661 in.)
Spring Installed Height (Spring Seat to Bottom of Retainer)—Intake & Exhaust	38.0 mm (1.4961 in.)
Oil Pump	
Clearance Over Rotors	0.077 mm (0.003 in.)
Cover Out-of-Flat (Max.)	0.025 mm (0.001 in.)
Inner & Outer Rotor Thickness (Min.)	14.299 mm (0.563 in.)
Outer Rotor Thickness (Max.)	0.39 mm (0.015 in.)
Outer Rotor Diameter (Min.)	79.997 mm (3.149 in.)
Tip Clearance Between Rotors (Max.)	0.20 mm (0.008 in.)
Oil Pressure	
(NOTE: At Normal Operating Temperatures)	
Pressure @ Curb Idle Speed*	34.47 kPa Min. (5 psi) Min.
Pressure @ 3000 RPM	300–724 kPa (45–105 psi)
*CAUTION: If pressure is zero at curb idle, DO NOT run engine at 3000 RPM.	

ENGINE 3.5L (Continued)

TORQUE

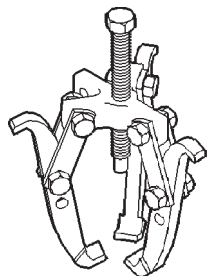
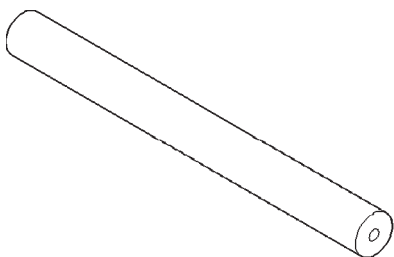
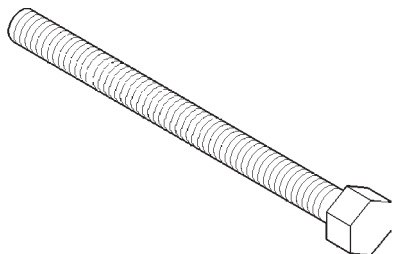
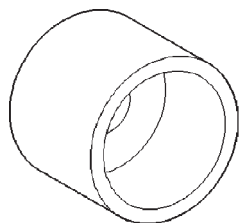
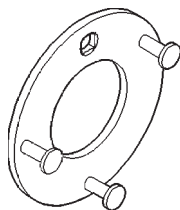
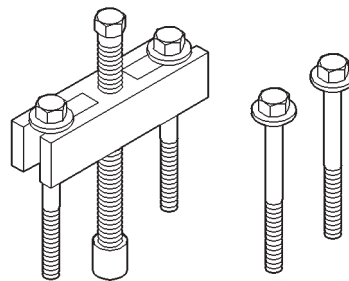
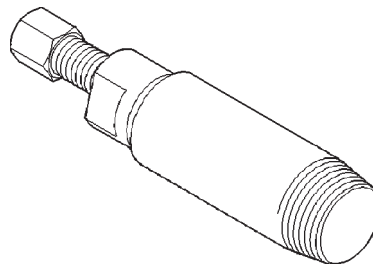
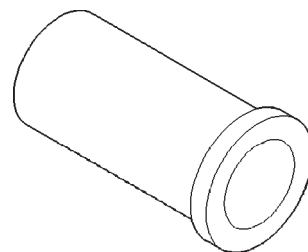
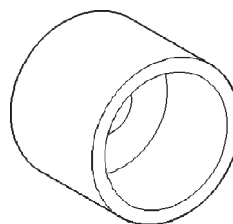
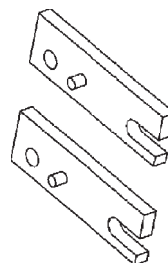
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
A/C Compressor Bracket to Engine—Bolts	54	40	—
A/C Compressor to Bracket	28	—	250
Camshaft Sprocket Bolt—Right Side	102 +¼ Turn	75 +¼ Turn	—
Camshaft Sprocket Bolt—Left Side	115 +¼ Turn	85 +¼ Turn	—
Camshaft Thrust Plate—Bolts	28	—	250
Connecting Rod Cap—Nuts	54 +¼ Turn	40 +¼ Turn	—
Crankshaft Main Bearing Cap			
—Inner Main Cap Bolts	20 +¼ Turn	15 +¼ Turn	—
—Outer Main Cap Bolts	27 +¼ Turn	20 +¼ Turn	—
—Tie Bolts (Horizontal)	28	—	250
Crankshaft Damper—Bolt	95	70	—
Cylinder Head Bolts*			
—Step 1	61	45	—
—Step 2	88	65	—
—Step 3	88	65	—
—Step 4	+¼ Turn	+¼ Turn	—
*Refer to procedure for tightening sequence. (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)			
Cylinder Head Cover—Bolts	12	—	105
Exhaust Manifold to Cylinder Head—Bolts	23	—	200
Exhaust Manifold Heat Shield—Bolts	12	—	105
Engine Mount Bracket to Block—Bolts	61	45	—

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Engine Mount Isolator—Nuts	61	45	—
Generator Bracket—Bolts	54	40	—
Intake Manifold			
—M6 Bolts	12	—	105
—M8 Bolts	28	—	250
Oil Pan			
—M6 Bolts	12	—	105
—M8 Bolts	28	—	250
Oil Pan Drain Plug	27	20	—
Oil Filter	16	12	—
Oil Pump to Block—Bolts	28	—	250
Oil Pump Cover—Bolts	12	—	105
Oil Pump Pick Up Tube—Bolt	28	—	250
PCV Valve	7	—	60
Crankshaft Rear Seal Retainer	12	—	105
Rocker Shaft Pedestal Retaining—Bolts	31	—	275
Spark Plugs	28	20	—
Structural Collar	(Refer to 9 - ENGINE/ENGINE BLOCK/STRUCTURAL COVER - INSTALLATION)		
Thermostat Housing/Water Inlet Connector—Bolts	12	—	105
Throttle Body—Bolts	12	—	105
Timing Belt Tensioner—Bolts	28	—	250
Timing Belt Tensioner Pulley Assembly—Bolt	61	45	—
Timing Belt Cover			
—M6 Bolts	12	—	105
—M8 Bolts	28	—	250
—M10 Bolts	54	40	—

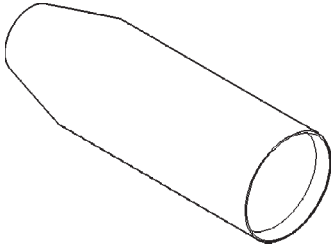
ENGINE 3.5L (Continued)

SPECIAL TOOLS

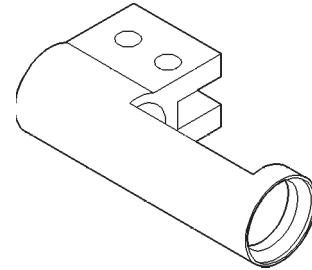
3.5L ENGINE

**Puller Damper 1023****Crankshaft Damper Remover Insert C-4685-C2****Crankshaft Damper/Sprocket Installer Bolt C-4685-C1****Crankshaft Sprocket Installer 6641****Crankshaft Damper Holder 8191****Crankshaft Sprocket Puller L-4407A****Crankshaft Seal Remover****Crankshaft Seal Installer 6342****Crankshaft Sprocket Installer 6641****Camshaft Alignment 6642**

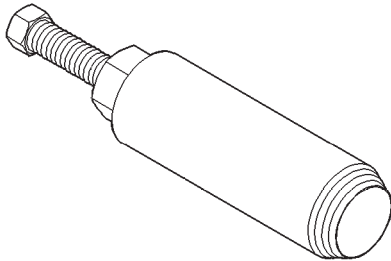
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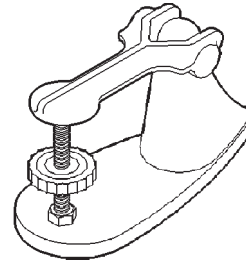
Camshaft Seal Protector 6788



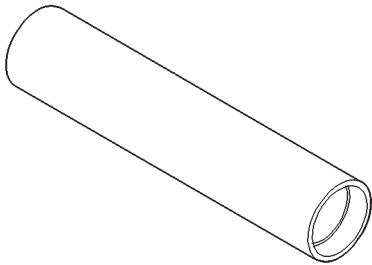
Valve Spring Adapter 6526



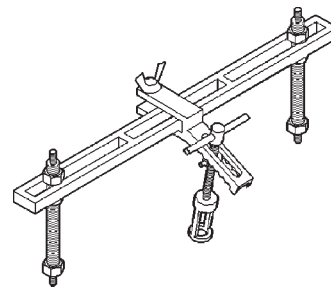
Camshaft Seal Remover C-3981B



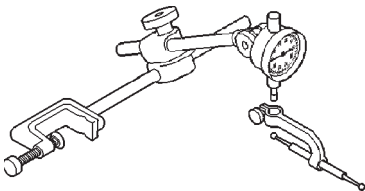
Valve Spring Tester C-647



Camshaft Seal Installer 6052

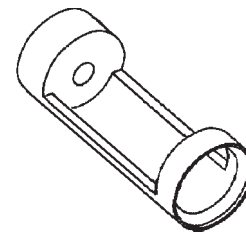


Valve Spring Compressor MD-998772-A

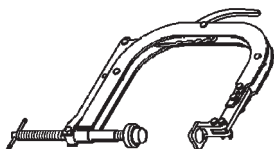


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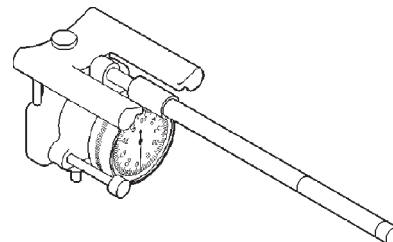
Dial Indicator C-3339



Valve Spring Adapter 6527



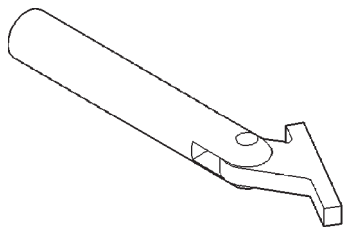
Valve Spring Compressor C-3422-D



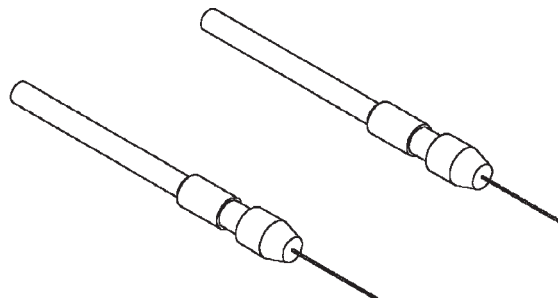
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Indicator Bore Size C-119

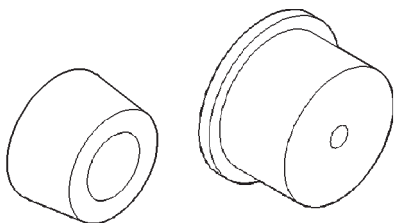
ENGINE 3.5L (Continued)



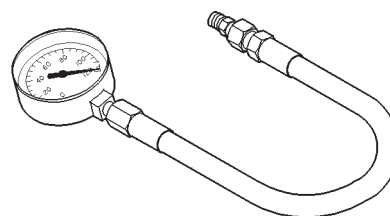
Main Bearing Remover/Installer C-3059



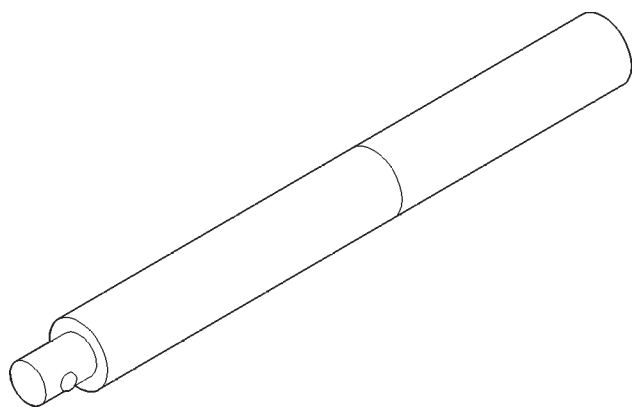
Release Probe 8351



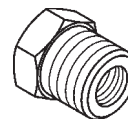
Crankshaft Rear Seal Guide 6926-1 & Installer 6926-2



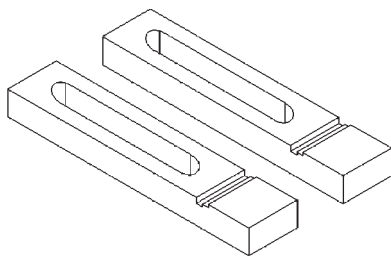
Pressure Gauge C-3292



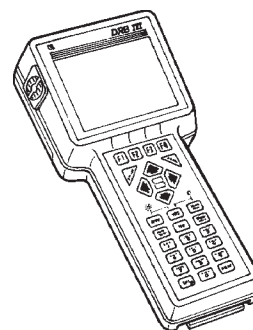
Driver Handle C-4171



Adapter 8406

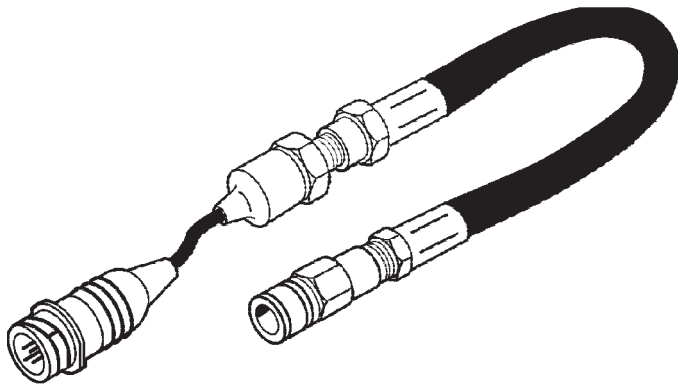
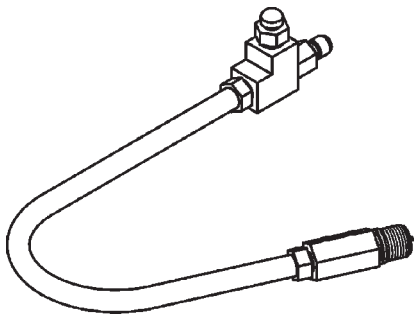
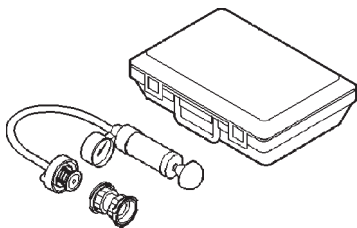
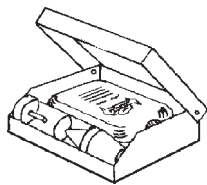


Crankshaft Rear Seal Retainer Alignment Fixture 8225



DRBIII® with PEP Module – OT-CH6010A

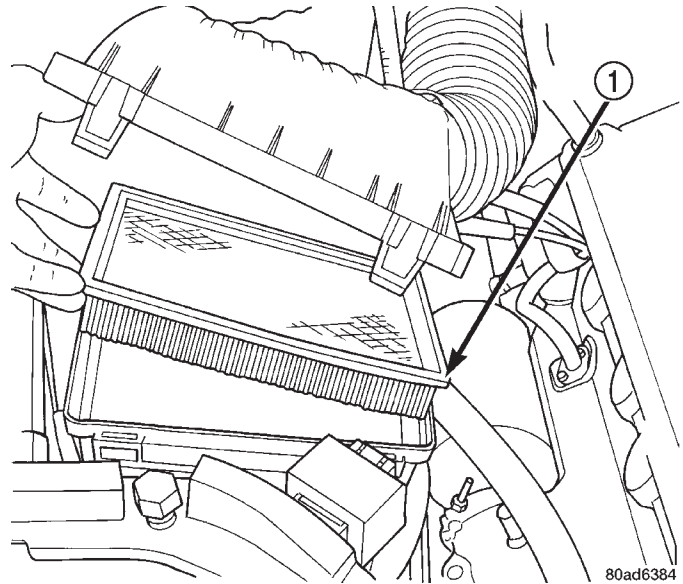
ENGINE 3.5L (Continued)

**Pressure Transducer CH7059****Adaptor 8116****Cooling System Tester 7700****Combustion Leak Tester C-3685-A****AIR CLEANER ELEMENT****REMOVAL**

- (1) Remove air cleaner lid. Lift lid off of air cleaner housing.
- (2) Remove filter element (Fig. 9).

INSTALLATION

- (1) If necessary, clean the inside of the air cleaner housing.
- (2) Install new filter element (Fig. 9).
- (3) Place lid over air cleaner housing.

**Fig. 9 Air Cleaner Housing and Element**

1 - AIR FILTER ELEMENT

CYLINDER HEAD**DESCRIPTION**

The aluminum alloy cylinder heads feature cross-flow type intake and exhaust ports. Valve guides and seat inserts are powdered metal. Valves are arranged in a "V", with each camshaft on center. To improve combustion speed the chambers are a compact spherical design with a squish area of approximately 30 percent of the piston top area. The cylinder heads are common to either cylinder bank by reversing the direction of installation.

DIAGNOSIS AND TESTING—CYLINDER HEAD GASKET

A cylinder head gasket leak can be located between adjacent cylinders or between a cylinder and the adjacent water jacket.

Possible indications of the cylinder head gasket leaking between adjacent cylinders are:

- Loss of engine power
- Engine misfiring
- Poor fuel economy

Possible indications of the cylinder head gasket leaking between a cylinder and an adjacent water jacket are:

- Engine overheating
- Loss of coolant
- Excessive steam (white smoke) emitting from exhaust
- Coolant foaming

CYLINDER HEAD (Continued)

CYLINDER-TO-CYLINDER LEAKAGE TEST

To determine if an engine cylinder head gasket is leaking between adjacent cylinders, follow the procedures in Cylinder Compression Pressure Test (Refer to 9 - ENGINE - DIAGNOSIS AND TESTING). An engine cylinder head gasket leaking between adjacent cylinders will result in approximately a 50–70% reduction in compression pressure.

CYLINDER-TO-WATER JACKET LEAKAGE TEST

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING WITH COOLANT PRESSURE CAP REMOVED.

VISUAL TEST METHOD

With the engine cool, remove the coolant pressure cap. Start the engine and allow it to warm up until thermostat opens.

If a large combustion/compression pressure leak exists, bubbles will be visible in the coolant.

COOLING SYSTEM TESTER METHOD

WARNING: WITH COOLING SYSTEM TESTER IN PLACE, PRESSURE WILL BUILD UP FAST. EXCESSIVE PRESSURE BUILT UP, BY CONTINUOUS ENGINE OPERATION, MUST BE RELEASED TO A SAFE PRESSURE POINT. NEVER PERMIT PRESSURE TO EXCEED 138 kPa (20 psi).

Install Cooling System Tester 7700 or equivalent to pressure cap neck. Start the engine and observe the tester's pressure gauge. If gauge pulsates with every power stroke of a cylinder a combustion pressure leak is evident.

CHEMICAL TEST METHOD

Combustion leaks into the cooling system can also be checked by using Bloc-Chek Kit C-3685-A or equivalent. Perform test following the procedures supplied with the tool kit.

REMOVAL

(1) Perform fuel pressure release procedure **before attempting any repairs..** (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable from remote battery jumper terminal.

(3) Drain cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

(4) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(5) Remove front timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(6) Remove camshaft sprockets. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

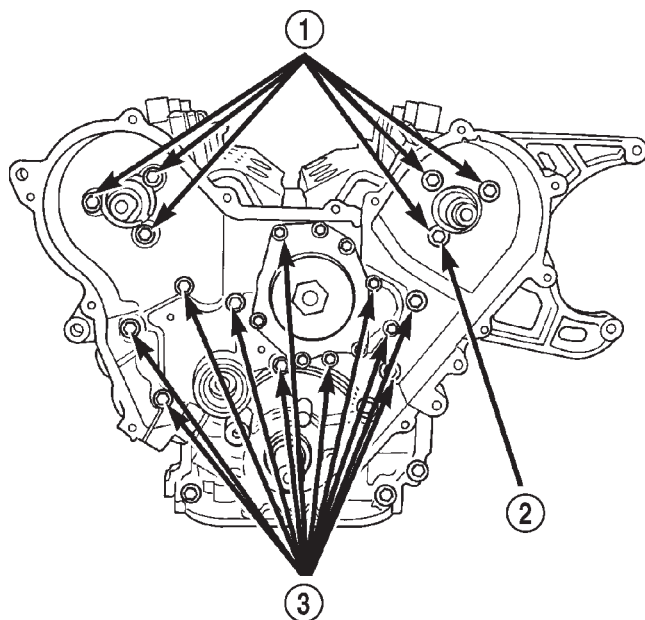
(7) Remove upper and lower intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(8) Remove V-Band clamp(s) at exhaust manifold to catalytic converter pipe connection.

NOTE: Do not reuse V-Band Clamp.

(9) Remove rear timing belt cover to cylinder head fasteners (Fig. 10). Remove the rear covers.

(10) The right side rear timing belt cover has O-rings to seal the water pump passages to cylinder block (Fig. 11). Do not reuse O-rings.



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Fig. 10 Rear Timing Belt Cover Bolts

1 - REAR COVER TO CYLINDER HEAD BOLTS

2 - APPLY SEALANT TO BOLT THREADS

3 - REAR COVER TO CYLINDER BLOCK BOLTS

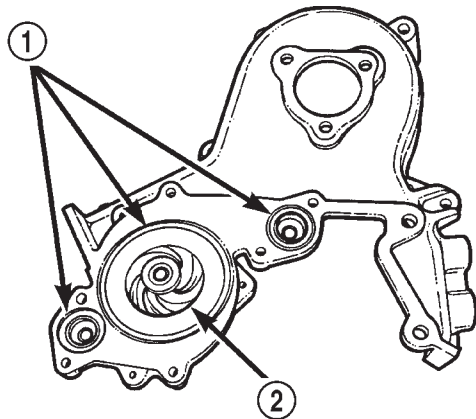
(11) Remove cylinder head bolts in REVERSE of tightening sequence (Fig. 15).

(12) Remove cylinder head(s).

CLEANING

To ensure engine gasket sealing, proper surface preparation must be performed, especially with the use of aluminum engine components and multi-layer steel cylinder head gaskets.

CYLINDER HEAD (Continued)



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Fig. 11 Right Side Timing Belt Cover Water Pump O-Rings

- 1 - O-RINGS
2 - WATER PUMP IMPELLER

NOTE: Multi-Layer Steel (MLS) head gaskets require a scratch free sealing surface.

Remove all gasket material from cylinder head and block (Refer to 9 - ENGINE - STANDARD PROCEDURE). Be careful not to gouge or scratch the aluminum head sealing surface.

Clean all engine oil passages.

INSPECTION

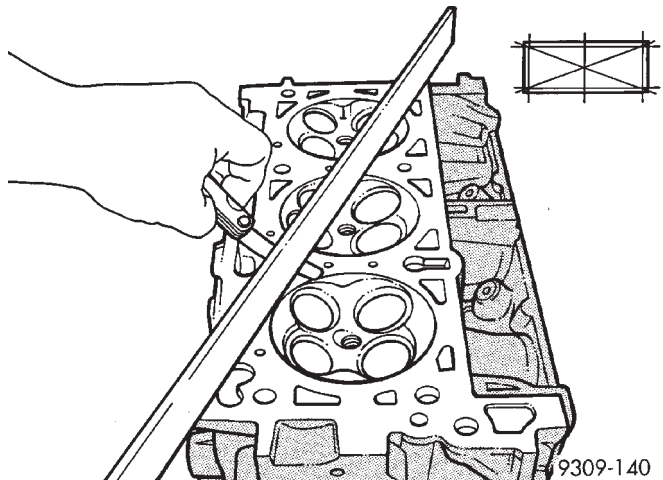
- (1) Before cleaning, check for leaks, damage and cracks.
- (2) Clean cylinder head and oil passages.
- (3) Check cylinder head for flatness (Fig. 12).
- (4) Cylinder head must be flat within:
 - Standard dimension = less than 0.05 mm (0.002 inch.)
 - Service Limit = 0.2 mm (0.008 inch.)
 - Grinding Limit = Maximum of 0.2 mm (0.008 inch.) is permitted.

CAUTION: 0.20 mm (0.008 in.) MAX is a combined total dimension of the stock removal limit from cylinder head and block top surface (Deck) together.

INSTALLATION

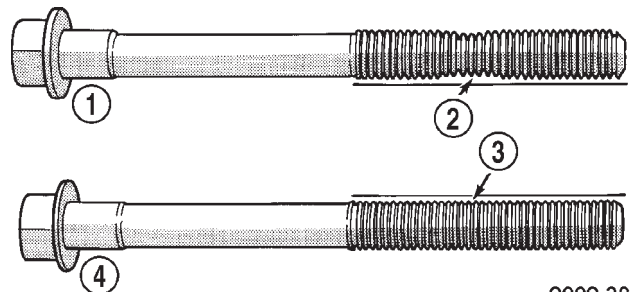
The cylinder head bolts are tightened using a torque plus angle procedure. The bolts must be examined **BEFORE** reuse. If the threads are necked down the bolts must be replaced (Fig. 13).

Necking can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced.



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Fig. 12 Checking Cylinder Head Flatness



9009-38

Fig. 13 Checking Bolts for Stretching (Necking)

- 1 - STRETCHED BOLT
2 - THREADS ARE NOT STRAIGHT ON LINE
3 - THREADS ARE STRAIGHT ON LINE
4 - UNSTRETCHED BOLT

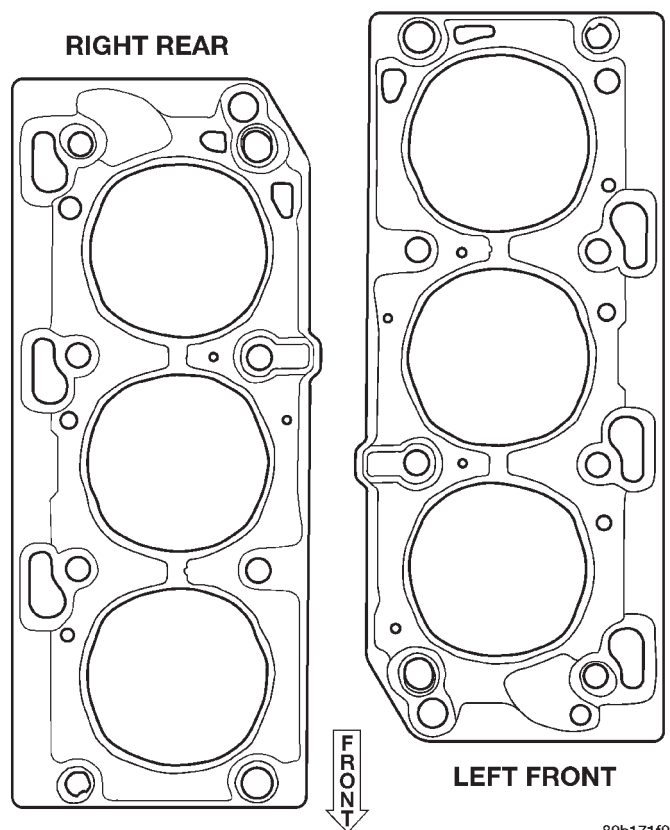
CAUTION: When cleaning cylinder head and cylinder block surfaces, **DO NOT** use a metal scraper because the surfaces could be cut or ground. Use **ONLY** a wooden or plastic scraper.

- (1) Clean sealing surfaces of cylinder head and block.

CAUTION: Ensure that the correct head gaskets are used and are oriented correctly on cylinder block. The 3.5L engine head gaskets have perfectly round combustion sealing rings. The 3.2L engine does **NOT** have perfectly round combustion sealing rings.

- (2) Install head gasket over locating dowels. Ensure the gasket is installed on the correct side of engine (Fig. 14).
- (3) Install cylinder head over locating dowels.
- (4) Before installing the bolts, lubricate the threads with engine oil.
- (5) Tighten the cylinder head bolts in the sequence shown in (Fig. 15). Using the 4 step torque-turn

CYLINDER HEAD (Continued)



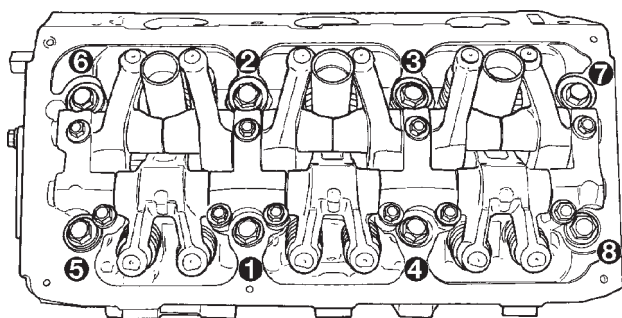
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Fig. 14 Cylinder Head Gasket Identification

method, tighten according to the following torque values:

- Step 1: All to 61 N·m (45 ft. lbs.)
- Step 2: All to 88 N·m (65 ft. lbs.)
- Step 3: All (again) to 88 N·m (65 ft. lbs.)
- Step 4: + 90° Turn **Do not use a torque wrench for this step.**

(6) Bolt torque after 90° turn should be over 122 N·m (90 ft. lbs.) in the tightening direction. If not, replace the bolt.



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Fig. 15 Cylinder Head Bolt Tightening Sequence

(7) Clean right rear timing belt cover O-ring sealing surfaces and grooves (Fig. 11). Lubricate new O-rings with Mopar® Dielectric Grease or equivalent to facilitate assembly.

(8) Install rear timing belt covers (Fig. 10) and (Fig. 11). Tighten bolts to specified torque:

- M10—54 N·m (40 ft. lbs.)
- M8—28 N·m (20 ft. lbs.)
- M6—12 N·m (105 in. lbs.)

(9) Install camshaft sprockets and timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(10) Install front timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(11) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(12) Install upper and lower intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(13) Connect catalytic converter to exhaust manifold using a new V-band clamp(s). Tighten clamp to 10 N·m (100 in. lbs.).

(14) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

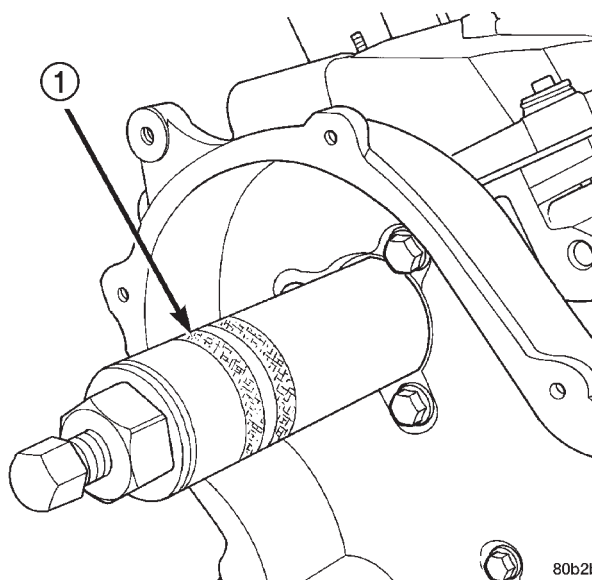
(15) Connect negative cable to remote jumper terminal

CAMSHAFT OIL SEAL(S)

REMOVAL

(1) Remove camshaft sprocket(s). (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Use Special Tool C-3981B to remove camshaft oil seal (Fig. 16).



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Fig. 16 Camshaft Oil Seal - Removal

1 - SPECIAL TOOL C-3981B

CAMSHAFT OIL SEAL(S) (Continued)

INSTALLATION

(1) Apply light coat of engine oil to the camshaft oil seal lip.

(2) Install the oil seal using Special Tool 6788 Seal Protector Sleeve (Fig. 17) and Seal Installer 6052 (Fig. 18).

(3) Install camshaft sprocket(s). (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

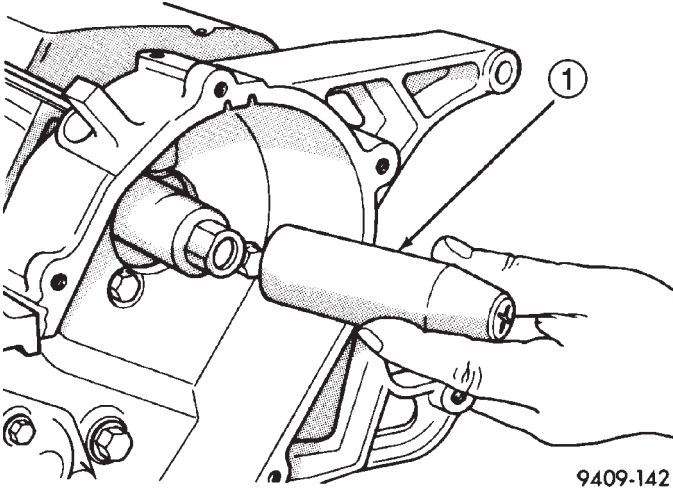


Fig. 17 Camshaft Oil Seal Protector Sleeve

1 - SPECIAL TOOL 6788

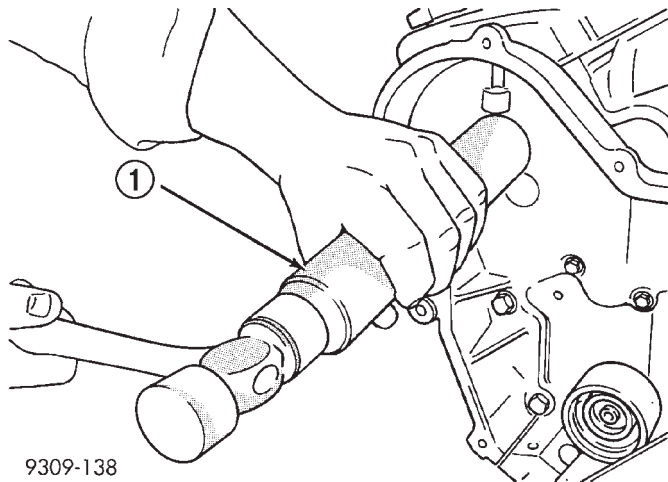


Fig. 18 Camshaft Oil Seal - Installation

1 - SPECIAL TOOL 6052

CAMSHAFT(S)

DESCRIPTION

A single overhead camshaft per cylinder head provides valve actuation. The left camshaft accommodates a cam sensor pick-up wheel and is therefore longer. Each camshaft is supported by four bearing journals. Thrust for each camshaft is taken at a thrust plate attached to the rear of each cylinder head. Right and left camshaft driving sprockets are not interchangeable because of the cam sensor pick-up wheel on the left sprocket. Camshaft bearing lubrication is provided via oil feed passage through each rocker shaft pedestal dowel.

OPERATION

The camshaft is driven by the crankshaft via drive sprockets and belt. The camshaft has precisely machined lobes to provide accurate valve timing and duration.

STANDARD PROCEDURE - MEASURING CAMSHAFT END PLAY

(1) Oil camshaft journals and install camshaft **WITHOUT** rocker arms. Install rear cam caps and tighten screws to specified torque.

(2) Using a suitable tool, move camshaft as far rearward as it will go.

(3) Zero dial indicator (Fig. 19).

(4) Move camshaft as far forward as it will go.

(5) Record reading on dial indicator. For end play specification, (Refer to 9 - ENGINE - SPECIFICATIONS).

(6) If end play is excessive, check cylinder head and camshaft for wear; replace as necessary.

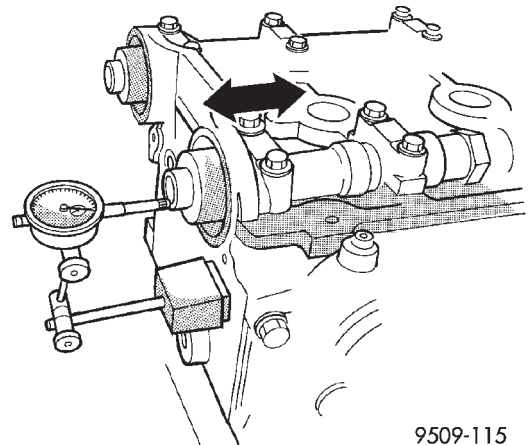


Fig. 19 Camshaft End Play - Typical

CAMSHAFT(S) (Continued)

REMOVAL

Camshafts are removed from the rear of each cylinder head. The cylinder head must be removed.

(1) Remove camshaft sprocket(s). (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

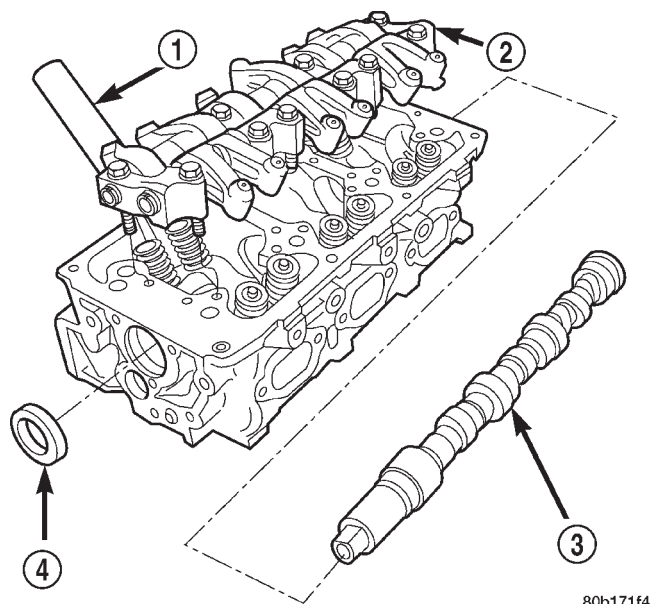
(2) Remove cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)

(3) Mark the rocker arm and shaft assembly before removal. Remove the rocker arm and shaft assembly from the head. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL)

(4) Remove the rear camshaft cover and O-ring from head.

CAUTION: Be careful not to nick or scratch the journals when removing the camshaft.

(5) Carefully remove the camshaft from the rear of the cylinder head (Fig. 20).



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Fig. 20 Cylinder Head, Camshaft, and Rocker Arms

- 1 - SPARK PLUG TUBE
- 2 - ROCKER ARM ASSEMBLY
- 3 - CAMSHAFT
- 4 - SEAL

CLEANING

Clean camshaft with a suitable solvent.

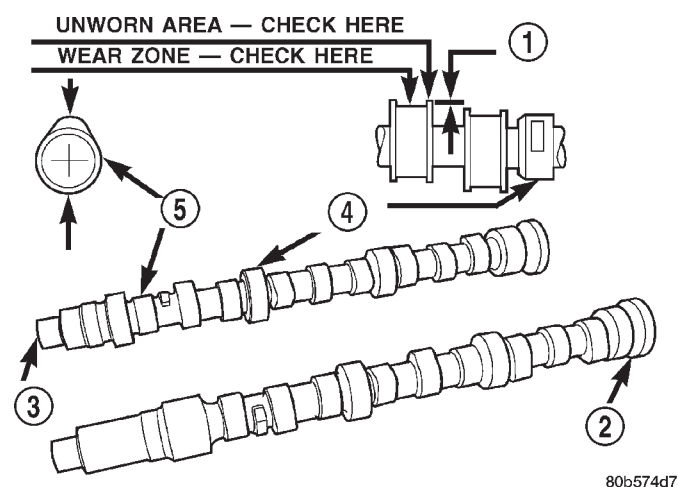
INSPECTION

(1) Inspect camshaft bearing journals for damage and binding (Fig. 21). If journals are binding, check the cylinder head for damage. Also check cylinder head oil holes for clogging.

(2) Check the cam lobe and bearing surfaces for abnormal wear and damage. Replace camshaft if defective.

NOTE: If camshaft is replaced due to lobe wear or damage, always replace the rocker arms.

(3) Measure the lobe actual wear (Fig. 21) and replace camshaft if out of limit. Standard value is 0.0254 mm (0.001 in.), wear **limit** is 0.254 mm (0.010 in.).



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Fig. 21 Camshaft Inspection

- 1 - ACTUAL WEAR
- 2 - LEFT CAMSHAFT
- 3 - RIGHT CAMSHAFT
- 4 - BEARING JOURNAL
- 5 - LOBE

INSTALLATION

(1) Lubricate camshaft bearing journals and camshaft lobes with clean engine oil and install camshaft into cylinder head (Fig. 20).

(2) Install cylinder head(s). (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(3) Install the rocker arm assembly. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION)

(4) Install camshaft sprockets and timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

CYLINDER HEAD COVER(S)

REMOVAL

WARNING: DO NOT START OR RUN ENGINE WITH CYLINDER HEAD COVER REMOVED FROM THE ENGINE. DAMAGE OR PERSONAL INJURY MAY OCCUR.

- (1) Remove air cleaner assembly.
- (2) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)
- (3) Cover lower intake manifold with a suitable cover during service.
- (4) Disconnect electrical connectors and remove ignition coils (Fig. 23).
- (5) Remove nuts attaching wire harness to cylinder head cover (Fig. 22). Move harness for cover removal clearance.

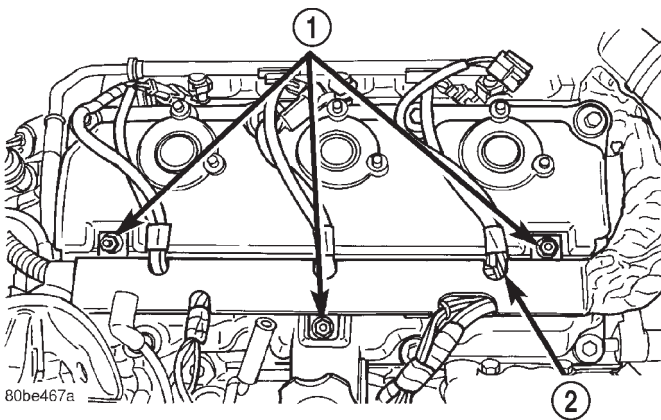


Fig. 22 WIRE HARNESS RETAINING NUTS

- 1 - NUTS
- 2 - WIRE HARNESS

(6) For right cylinder head cover removal perform the following:

- (a) Remove A/C compressor belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)
- (b) Remove A/C compressor mounting bolts.
- (c) Move compressor aside for cylinder head cover clearance.
- (7) Remove cylinder head cover bolts and remove cover (Fig. 24).

INSTALLATION

- (1) Clean cylinder head and cover mating surfaces. Inspect and replace gasket and seals as necessary (Fig. 25).
- (2) To replace spark plug tube seals:

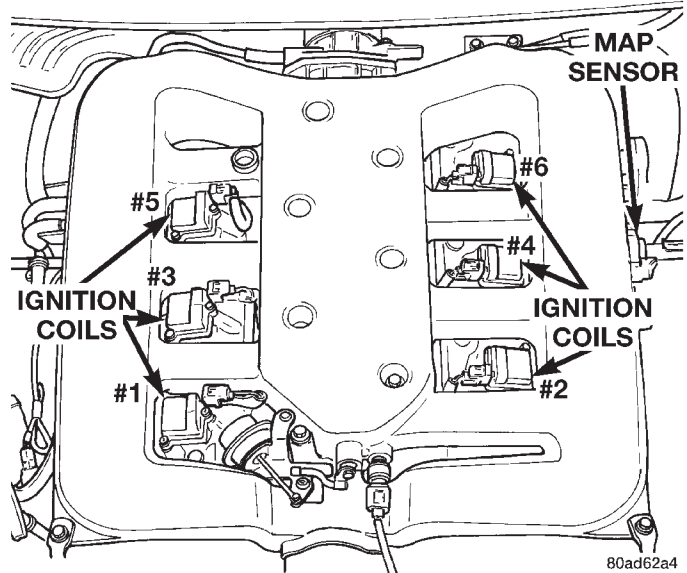


Fig. 23 Ignition Coils

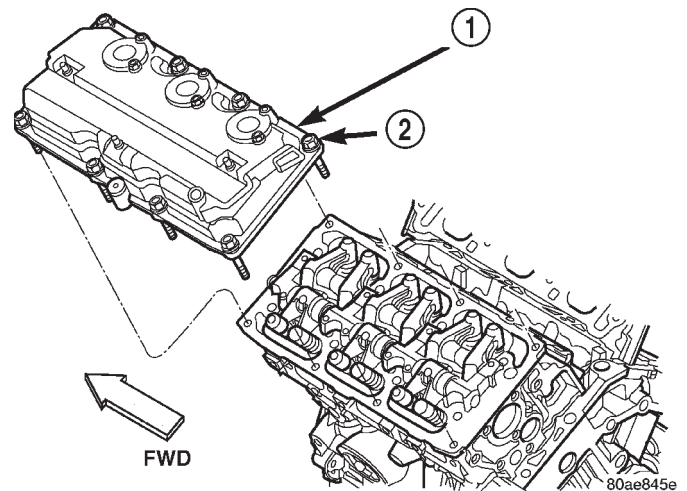
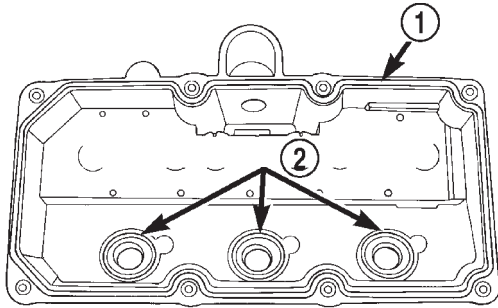


Fig. 24 CYLINDER HEAD COVERS

- 1 - CYLINDER HEAD COVER-LEFT SIDE
- 2 - BOLTS (8)

- (a) Using a suitable pry tool, carefully remove tube seals.
- (b) Position new seal with the part number on seal facing cylinder head cover.
- (c) Install seals using Special Tool MD-998306 (Fig. 26).
- (3) Install cylinder head cover bolts and tighten to 12 N·m (105 in. lbs.) (Fig. 24).
- (4) For right cylinder head cover installation perform the following:
 - (a) Position A/C compressor on bracket and install mounting bolts.
 - (b) Install A/C compressor belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

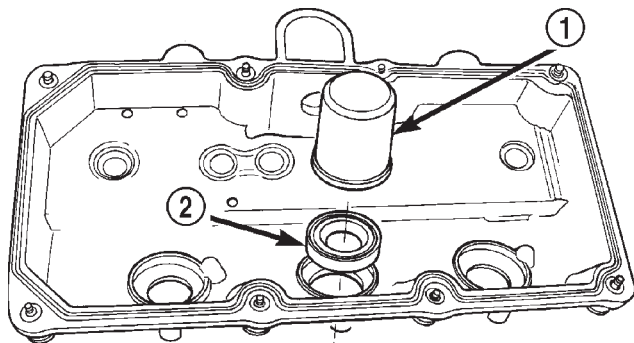
CYLINDER HEAD COVER(S) (Continued)



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Fig. 25 Cylinder Head Cover Gasket and Spark Plug Tube Seals

- 1 - CYLINDER HEAD COVER GASKET
- 2 - SPARK PLUG TUBE SEALS



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Fig. 26 Spark Plug Tube Seal Installation

- 1 - SPECIAL TOOL MD-998306
- 2 - SPARK PLUG TUBE SEAL

(5) Position wire harness on cylinder head cover and install retaining nuts (Fig. 22).

(6) Install ignition coils and connect all electrical connectors (Fig. 23).

(7) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(8) Install air cleaner assembly.

INTAKE/EXHAUST VALVES & SEATS

DESCRIPTION

Valves are made of highly heat-resistant steel and are chrome plated to prevent stem scuffing. The intake valve is a one-piece forging, while the exhaust valve has a forged head with a welded stem for lock groove hardenability. The four valves (two intake and two exhaust) employ a three-groove lock design to help facilitate valve rotation.

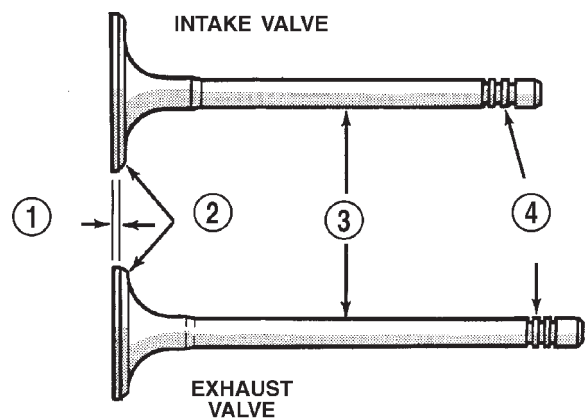
OPERATION

The intake valve allows the air/fuel mixture to enter the combustion chamber. The exhaust valve allows the burned air/fuel mixture to exit the combustion chamber. Also, the intake and exhaust valves seal the combustion chamber during the compression and power strokes.

STANDARD PROCEDURE - VALVE AND VALVE SEAT REFACING

The valve face and valve seat angles are shown in (Fig. 28).

VALVES



9309-144

Fig. 27 Intake and Exhaust Valves

- 1 - MARGIN
- 2 - FACE
- 3 - STEM
- 4 - VALVE SPRING RETAINER LOCK GROOVES

(1) Inspect the remaining margin after the valves are refaced (Fig. 27). (Refer to 9 - ENGINE - SPECIFICATIONS)

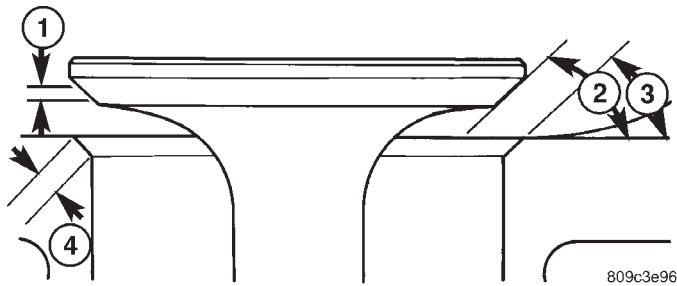
VALVE SEATS

(1) When refacing valve seats, it is important that the correct size valve guide pilot be used for reseating stones. A true and complete surface must be obtained.

(2) Measure the concentricity of valve seat using dial indicator. Total runout should not exceed 0.051 mm (0.002 inch.) total indicator reading.

(3) Inspect the valve seat with Prussian blue to determine where the valve contacts the seat. To do this, coat valve seat **LIGHTLY** with Prussian blue then set valve in place. Rotate the valve with light pressure. If the blue is transferred to the center of valve face, contact is satisfactory. If the blue is transferred to top edge of valve face, then lower valve seat with a 15 degree stone. If the blue is transferred to

INTAKE/EXHAUST VALVES & SEATS (Continued)

**Fig. 28 Valve Face and Seat**

- 1 - SEAT WIDTH
- 2 - FACE ANGLE
- 3 - SEAT ANGLE
- 4 - SEAT CONTACT AREA

the bottom edge of valve face, then raise valve seat with a 65 degree stone.

NOTE: Valve seats which are worn or burned can be reworked, provided that correct angle and seat width are maintained. Otherwise cylinder head must be replaced.

(4) When seat is properly positioned the width of the intake seats should be 0.75 to 1.25 mm (0.0296 to 0.0493 in.) and exhaust seats should be 1.25 to 1.75 mm (0.049 to 0.069 in.) (Fig. 28).

VALVE AND SPRING INSTALLED HEIGHT

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

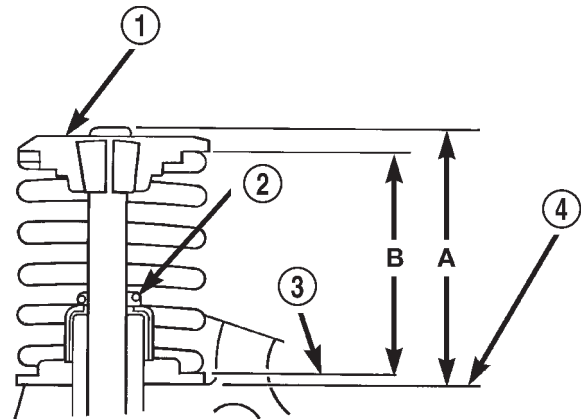
(2) If valves or seats have been refaced, check valve tip height (A) (Fig. 29). If valve tip height is greater than 43.65 mm (1.7185 in.) intake or 45.98 mm (1.8102 in.) exhaust, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

(3) Install valve seal/spring seat assembly over valve guides on all valve stems (Fig. 31). Ensure that the garter spring is intact around the top of the rubber seal.

(4) Place valve spring (color-coded end facing up (Fig. 30)) and valve retainer into position on spring seat (Fig. 31).

(5) Compress valve springs with valve spring compressor C-3422-D and adapter 6526 (Refer to 9 - ENGINE - SPECIAL TOOLS), install locks and release tool.

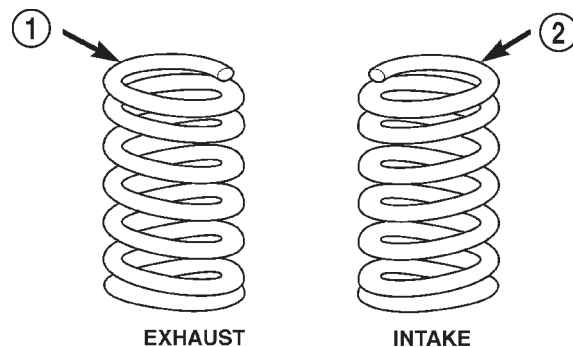
(6) If valves and/or seats are refaced, measure the installed height of springs (B) (Fig. 29). Measurements are taken from top of spring seat to the bottom surface of spring retainer. If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head counterbore under the valve spring seat to bring spring height back within specification.



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Fig. 29 Checking Valve Tip Height and Valve Spring Installed Height

- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE



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Fig. 30 Valve Spring Identification

- 1 - YELLOW DYE
- 2 - ORANGE DYE

REMOVAL

(1) Remove valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

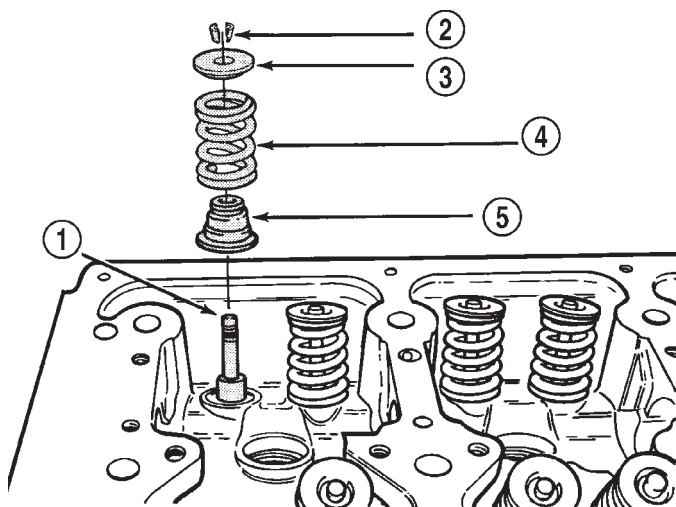
(2) Before removing valve, **remove any burrs from valve stem lock grooves to prevent damage to the valve guides.** Identify valves to insure installation in original location.

(3) Remove valve(s) from cylinder head.

CLEANING

(1) Clean all valves thoroughly and discard burned, warped and cracked valves.

INTAKE/EXHAUST VALVES & SEATS (Continued)



9309-150

Fig. 31 Valve Seal and Spring - Installation

- 1 - VALVE
- 2 - VALVE RETAINING LOCKS
- 3 - VALVE SPRING RETAINER
- 4 - VALVE SPRING
- 5 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY

INSPECTION

INSPECTION - VALVES

(1) Measure valve stems for wear (Fig. 32) approximately 60 mm (2.36 in.) below the valve lock grooves.

(2) Compare measurement to specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: Valve stems are chrome plated and should not be polished (Fig. 32).

INSPECTION - VALVE GUIDES

(1) Measure valve stem-to-guide clearance as follows:

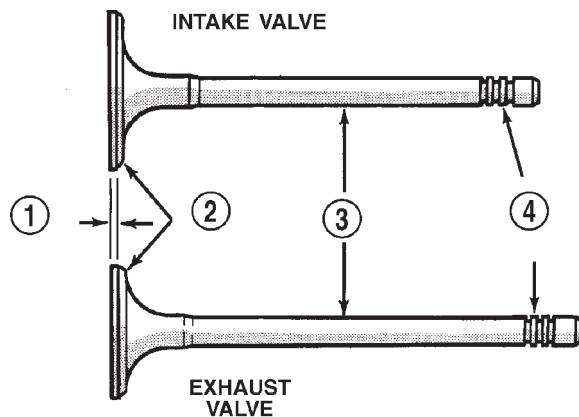
(2) Install valve into cylinder head so it is 15 mm (0.590 inch.) off the valve seat. A small piece of hose may be used to hold valve in place.

(3) Attach dial indicator Tool C-3339 to cylinder head and set it at right angle of valve stem being measured (Fig. 33).

(4) Move valve to and from the indicator.

(5) Note dial indicator reading and compare to engine specifications. (Refer to 9 - ENGINE - SPECIFICATIONS)

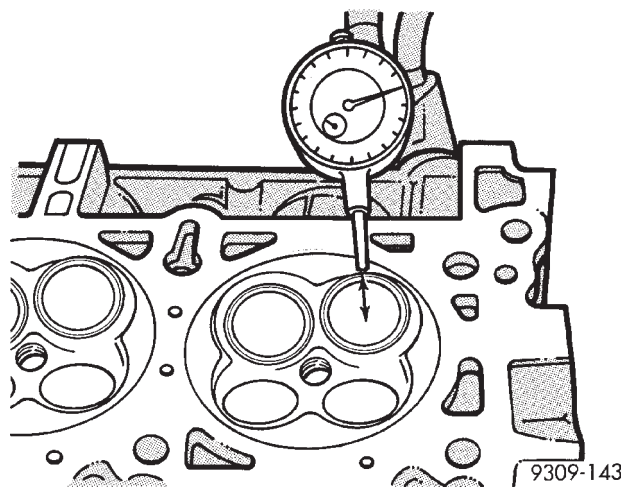
NOTE: Replace cylinder head if stem-to-guide clearance exceeds specifications, or if guide is loose in cylinder head.



9309-144

Fig. 32 Intake and Exhaust Valves

- 1 - MARGIN
- 2 - FACE
- 3 - STEM
- 4 - VALVE SPRING RETAINER LOCK GROOVES

**Fig. 33 Measuring Valve Guide Wear**

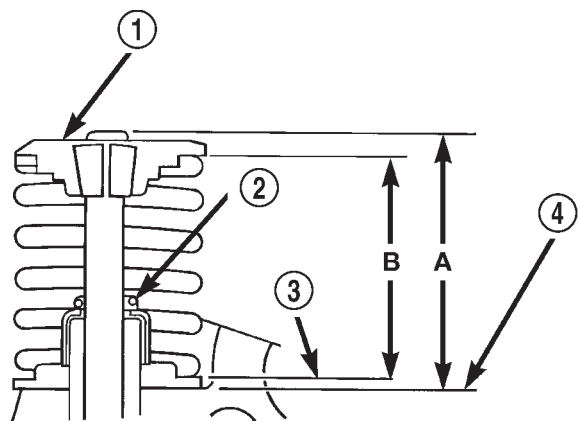
INSTALLATION

(1) Coat valve stems with clean engine oil and insert them in cylinder head.

(2) If valves or seats have been reground, check valve tip height (A) (Fig. 34). If valve tip height is greater than 43.65 mm (1.7185 in.) intake or 45.98 mm (1.8102 in.) exhaust, grind valve tip until within specifications. Make sure measurement is taken from cylinder head surface to the top of valve stem.

(3) Install valve stem seals and valve springs. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - INSTALLATION) (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

INTAKE/EXHAUST VALVES & SEATS (Continued)



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Fig. 34 Checking Valve Tip Height and Valve Spring Installed Height

- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE

ROCKER ARM / ADJUSTER ASSEMBLY

DESCRIPTION

DESCRIPTION - ROCKER ARM

Rocker arms are made of light weight permanent mold aluminum alloy with a roller type follower operating against the camshaft (Fig. 35). The valve actuating end of the rocker arms are machined to retain hydraulic lash adjusters, eliminating the need for manual valve lash adjustment.

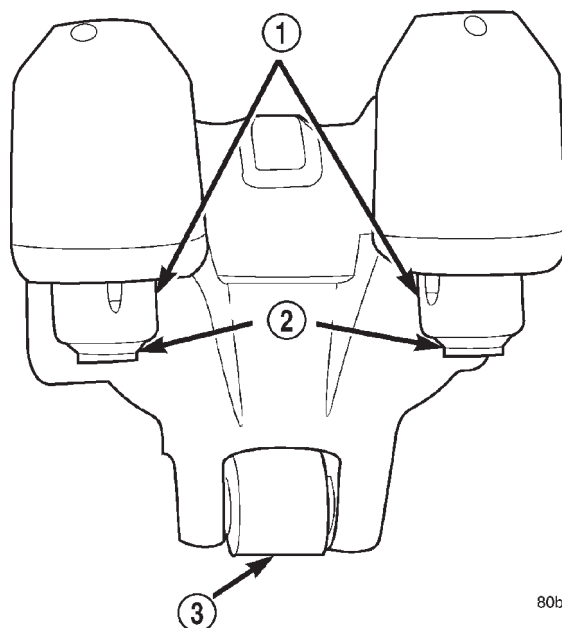
DESCRIPTION - ROCKER ARM SHAFTS

The rocker arm shafts (Fig. 36) are tubular steel and are supported by several forged aluminum alloy pedestals, which are fastened to the cylinder head. Four shafts are used, one for each intake and exhaust rocker arm bank on each cylinder head. The shafts are hollow to provide a duct for lubricating oil flow from the cylinder head to the valve mechanisms. One hollow dowel per pedestal is used to locate the pedestal to the cylinder head, orient the exhaust rocker shaft, and serve as a cam bearing oil feed passage.

OPERATION

The rocker arm is the pivot point between the camshaft lobe and the valve.

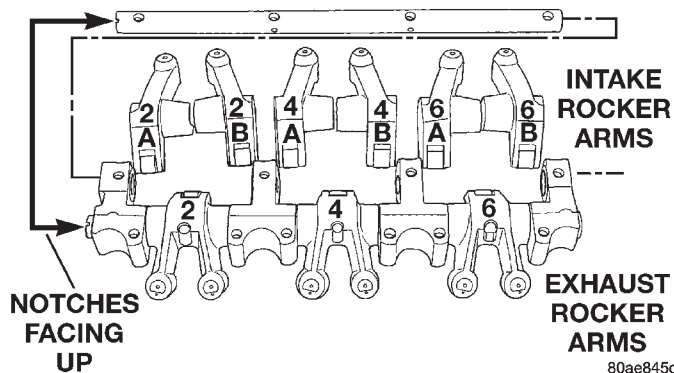
HYDRAULIC LASH ADJUSTER:



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Fig. 35 Rocker Arm Assembly

- 1 - RETAINER
- 2 - SWIVEL PAD
- 3 - ROLLER



80ae845c

Fig. 36 Rocker Arms and Shafts

DIAGNOSIS AND TESTING

LASH ADJUSTER (TAPPET) NOISE DIAGNOSIS

Proper noise diagnosis is essential in locating the source of a NVH complaint. Locating a lash adjuster (tappet) type noise can sometimes be difficult. As a result, an initial misdiagnosis may occur.

Refer to the following chart indicating possible lash adjuster (tappet) noise sources and possible sources that could lead to a misdiagnosis.

Refer to Lash Adjuster (Tappet) Noise Chart for Possible Causes and Correction of a lash adjuster (tappet) type noise.

ROCKER ARM / ADJUSTER ASSEMBLY (Continued)

POSSIBLE NOISE SOURCES	POSSIBLE NOISE MISDIAGNOSIS SOURCES
<p>Spongy/soft/aerated lash adjusters.</p> <p>Missing lash adjuster swivel contact pads.</p> <p>Intake rocker-to-camshaft bearing journal contact.</p> <p>Rocker arm bind-up.</p> <p>Intake rocker arm-to-spark plug tube contact.</p> <p>Excessive cam end play.</p> <p>Broken valve spring.</p> <p>Broken/loose camshaft sprocket bolt.</p> <p>Incomplete cam lobe machining.</p> <p>Cracked lash adjuster cartridge body.</p>	<p>SRV valve axle chatter.</p> <p>Exhaust rocker arm-to-cylinder head cover contact.</p> <p>Piston pin bore fit.</p> <p>Timing drive hydraulic tensioner tick.</p> <p>Accessory drive belt deterioration.</p> <p>Piston-to-bore clearance knock.</p> <p>Crankshaft bearing noise.</p>

LASH ADJUSTER (TAPPET) NOISE CHART

POSSIBLE CAUSES	CORRECTION
1. Engine oil level—too high or too low. This may cause aerated oil to enter the adjusters and cause them to be spongy.	1. Check and correct engine oil level.
2. Insufficient running time after rebuilding cylinder head.	2. Low speed running of up to 1 hour may be required to fully evacuate trapped air from the valve train system. During this time, turn engine off and let set for a few minutes before restarting. Repeat this several times after engine has reached normal operating temperature.
3. Air trapped in lash adjuster (after 1 hour run time).	<p>3. See below:</p> <p>(a) Check lash adjusters for sponginess while installed in cylinder head. Depress part of rocker arm over adjuster. Normal adjusters should feel very firm. Very spongy adjusters can be bottomed out easily.</p> <p>(b) Before proceeding, perform Lash Adjuster Bleeding procedure.</p> <p>(c) If lash adjuster(s) are still spongy, replace with new adjuster/rocker arm assembly*.</p>
4. Low oil pressure	<p>4. See below:</p> <p>(a) Check and correct engine oil level.</p> <p>(b) Check engine oil pressure.</p> <p>(c) Check for excessive bearing clearance and correct.</p> <p>(d) Check for worn oil pump.</p>
5. Oil passage to cylinder head(s) plugged with debris.	5. Check cylinder head oil passages and cylinder head gasket restrictor for blockage. Clean or replace as necessary.
6. Worn valve guide(s).	6. Ream guide(s) and replace valve(s) with oversize valves and seal(s).
7. Air injected into oil due to broken or cracked oil pump pickup tube.	7. Inspect pickup tube and replace as necessary.
8. Collapsed lash adjuster due to debris injection.	8. Clean debris from engine and replace lash adjuster/rocker assembly*.
9. Intake rocker arm roller clevis ear(s) contacting camshaft bearing journal(s) on side.	9. Inspect camshaft end play and all valve train components for wear. Replace as necessary.
*Lash adjusters are serviced with the rocker arms—do not disassemble.	

ROCKER ARM / ADJUSTER ASSEMBLY (Continued)

STANDARD PROCEDURE - HYDRAULIC LASH ADJUSTER BLEEDING

Use this procedure to manually bleed aerated oil from the lash adjuster and remove sponginess.

(1) Run the engine, bringing it to operating temperature in order to freshly pressurize and warm the valvetrain system oil supply.

(2) Remove cylinder head cover(s).

(3) Ensure the rocker arm is positioned on the base circle of the cam (Fig. 37). Rotate engine as necessary.

(4) For intake rocker arm positions:

(a) Adjust Special Tool 8351 Release Probe's gauge pin to extend approximately 20 mm (0.787 in.). Then, carefully insert the release probe gauge pin into the lash adjuster service access hole (Fig. 38).

CAUTION: If probe tip breaks off within the lash adjuster, replace the affected rocker arm.

(b) Gently unseat lash adjuster's internal check ball.

(c) While the internal check ball is held unseated, press the rocker arm into the valve tip, allowing the lash adjuster to fully collapse. Hold this fully collapsed position for about one second, or longer.

(d) Slowly release the rocker arm, thereby allowing the lash adjuster to extend, which in turn refills the high pressure chamber with non-aerated oil.

(e) Remove probe to allow check ball to seat.

(f) Recheck for sponginess. If the lash adjuster sponginess is not completely or nearly eliminated, then repeat procedure.

(g) If the spongy condition cannot be removed, replace effected rocker arm(s).

(5) For exhaust rocker arm positions:

(a) Adjust Special Tool 8351 Release Probe gauge pin to extend approximately 20 mm (0.787 in.). Then, using two release probes, carefully insert gauge pins into the lash adjuster service access holes (Fig. 38).

CAUTION: If probe tip breaks off within the lash adjuster, replace the affected rocker arm.

(b) Gently unseat BOTH lash adjuster's internal check ball at the same time.

(c) While the internal check ball is held unseated, press the rocker arm into the valve tip, allowing the lash adjuster to fully collapse. Hold this fully collapsed position for about one second, or longer.

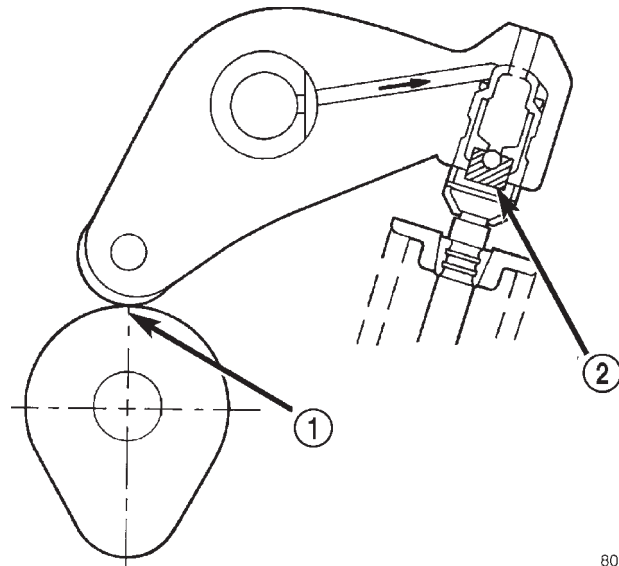
(d) Slowly release the rocker arm, thereby allowing the lash adjuster to extend, which in turn refills the high pressure chamber with non-aerated oil.

(e) Remove probes to allow check balls to seat.

(f) Recheck for sponginess. If the lash adjuster sponginess is not completely or nearly eliminated, then repeat procedure.

(g) If the spongy condition cannot be removed, replace effected rocker arm(s).

(6) Install cylinder head cover(s).



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Fig. 37 Rocker Arm Positioned On Base Circle Of Camshaft

- 1 - CAMSHAFT BASE CIRCLE
2 - HIGH-PRESSURE CHAMBER

REMOVAL

CAUTION: The rocker arm shafts are hollow and are used as lubrication oil passages. The rocker arm and shaft assembly on the **RIGHT** side of the engine has an oil passage hole from the cylinder head to the third rocker shaft support. The rocker arm shaft assembly on the **LEFT** side of the engine has an oil passage hole from the cylinder head to the second rocker shaft support.

(1) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Identify the rocker arm assembly and rocker arms before disassembly (Fig. 39).

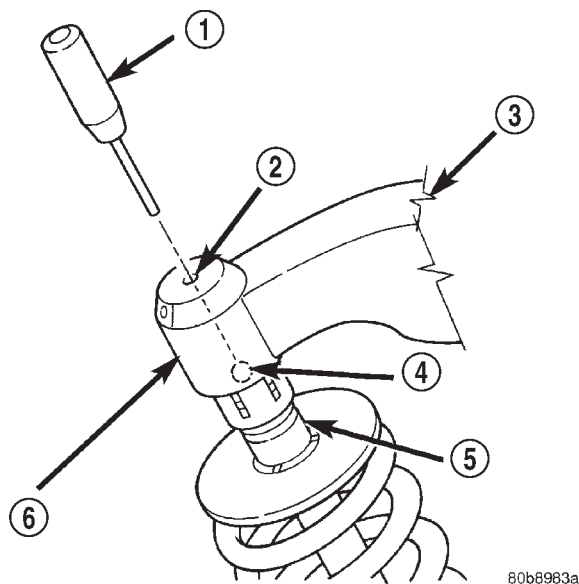
(3) Remove rocker arm assembly bolts.

(4) Remove rocker arm assembly.

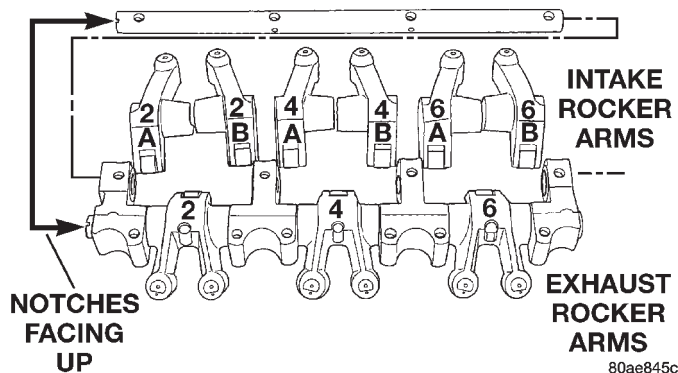
NOTE: To prevent air ingestion into lash adjusters, avoid turning rocker arm assembly upside down.

CAUTION: Do not allow rocker arm assembly to rest on lash adjusters, as damage may occur to lash adjusters and/or plastic retainers.

ROCKER ARM / ADJUSTER ASSEMBLY (Continued)

**Fig. 38 Purging Air From Lash Adjuster**

- 1 - SPECIAL TOOL 8351
- 2 - OIL AIR RELIEF SERVICE ACCESS HOLE
- 3 - ROCKER ARM ASSY
- 4 - INTERNAL CHECK BALL
- 5 - VALVE TIP
- 6 - HYDRAULIC LASH ADJUSTER WITHIN ROCKER ARM

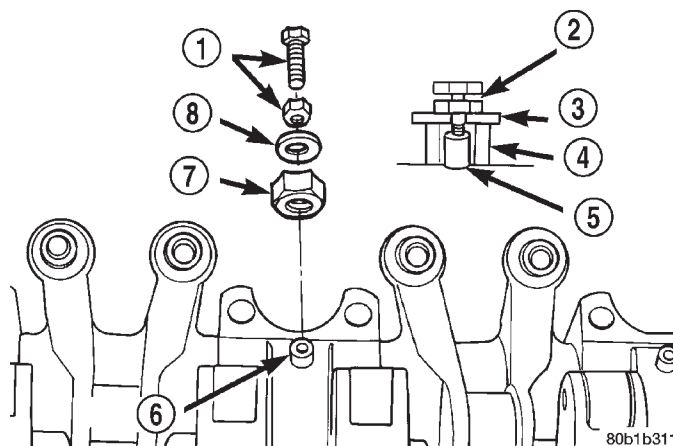
**Fig. 39 Rocker Arms and Shafts****DISASSEMBLY**

(1) Remove rocker arm and shafts. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL)

(2) Remove dowel pin using a 4 mm screw, nut, spacer, and washer installed into the pin (Fig. 40). Thread the screw into the pin, then loosen the nut on the screw. This will pull the dowel out of the shaft support. Do not reuse dowel pins. Remove the rocker arms and pedestals in order.

(3) Check the rocker arm mounting portion of the shafts for wear or damage. Replace if damaged or heavily worn.

(4) Check shaft oil holes for clogging with small wire, clean as required.

**Fig. 40 Rocker Arms and Shaft - Disassembly**

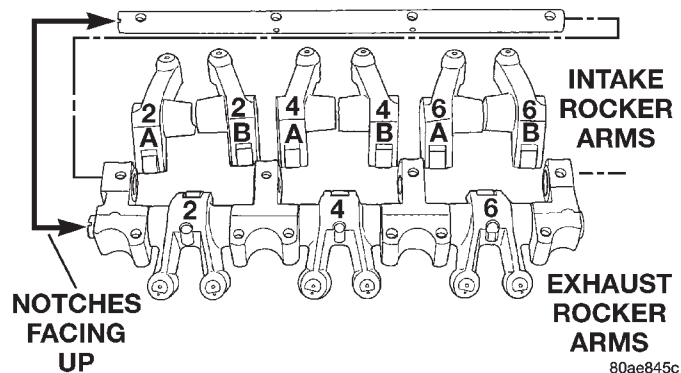
- 1 - 4mm SCREW AND NUT
- 2 - 4mm SCREW AND NUT
- 3 - WASHER
- 4 - SPACER
- 5 - DOWEL
- 6 - DOWEL
- 7 - SPACER
- 8 - WASHER

INSPECTION

The rocker arm shafts are hollow and are used as lubrication oil ducts. The rocker arm and shaft assembly on the **right** side of the engine has an oil passage hole from the cylinder head located at the third rocker shaft support pedestal. The rocker arm and shaft assembly on the **left** side of the engine has an oil passage hole from the cylinder head located at the second rocker shaft support pedestal.

NOTE: To prevent air ingestion into lash adjusters, avoid turning rocker arm assembly upside down.

CAUTION: Do not allow rocker arm assembly to rest on lash adjusters, as damage may occur to lash adjuster and plastic retainer.

**Fig. 41 Rocker Arms and Shafts**

ROCKER ARM / ADJUSTER ASSEMBLY (Continued)

The intake and exhaust rocker arms are different. They should be identified before disassembling the assembly (Fig. 41).

Check rocker arms for wear or damage (Fig. 42):

- Roller scuffing or wear
- Shaft bore scuffing or wear
- Swivel pad on lash adjuster missing or broken
- Rocker arm showing signs of fatigue or cracking
- Roller axle protruding from arm

Replace assembly as necessary if any rocker arms shows signs of wear.

CAUTION: Do Not remove lash adjuster from rocker arm assembly. Damage to the adjuster and rocker arm will result.

HYDRAULIC LASH
ADJUSTER:

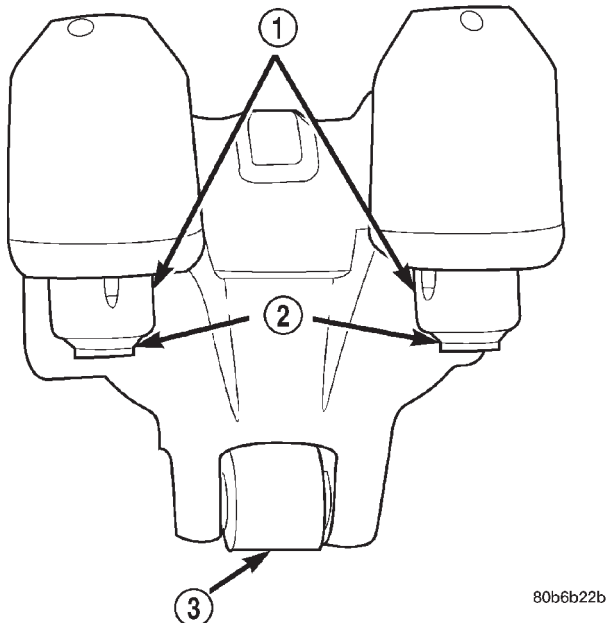


Fig. 42 Rocker Arm Assembly

- 1 - RETAINER
- 2 - SWIVEL PAD
- 3 - ROLLER

ASSEMBLY

CAUTION: New dowel pins must be installed when reassembling.

(1) Install the rocker arms, and pedestals onto the shaft.

(2) Install dowel pins (Fig. 43). Dowel pins pass through the pedestal into the exhaust rocker shafts. Dowel pins should be pressed in until they bottom-out against the rocker shaft in the pedestal.

(3) Install rocker arm and shafts. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION)

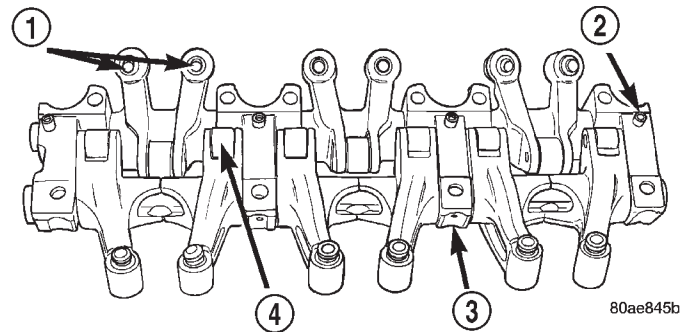


Fig. 43 Assemble Rocker Arms and Shaft

- 1 - HYDRAULIC LASH ADJUSTERS
- 2 - DOWEL PIN
- 3 - PEDESTAL
- 4 - ROLLER

INSTALLATION

NOTE: Rocker arm and shaft assembly can be installed either prior to or after (preferred) cylinder head installation.

(1) Rotate camshafts to the position shown in (Fig. 44). With the camshafts in these positions the lobes are in a neutral position (no load to the valve). This will allow the rocker arm shaft assembly to be tightened into position with little or no valve spring load on it.

(2) Install the rocker arm and shaft assembly making sure that the identification marks face toward the front of engine for left head and toward the rear of the engine for right head.

(3) Tighten rocker arm/shaft assembly bolts in sequence to 31 N·m (275 in. lbs.) (Fig. 45).

(4) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

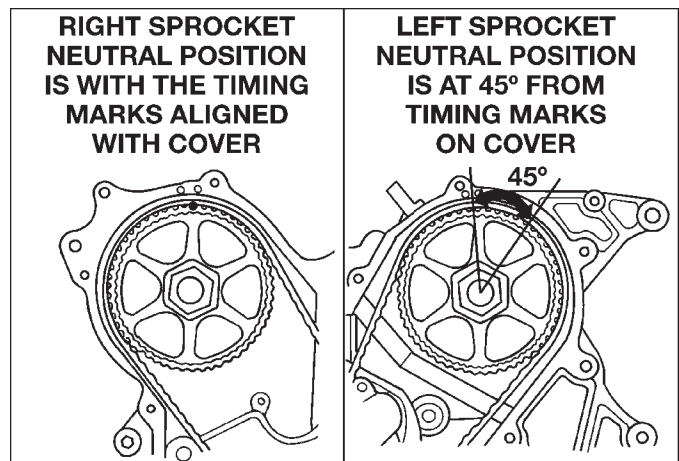


Fig. 44 Camshaft Sprockets Neutral Position

ROCKER ARM / ADJUSTER ASSEMBLY (Continued)

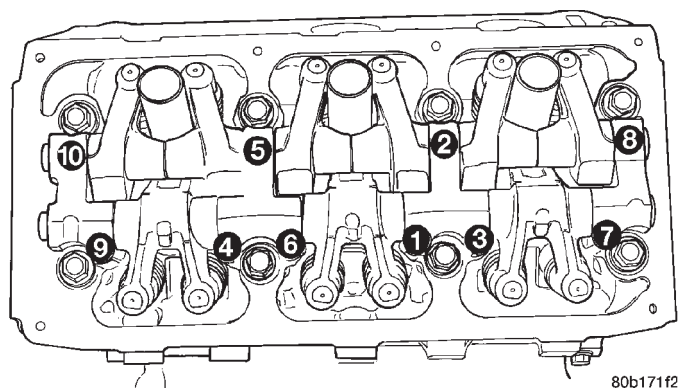


Fig. 45 Rocker Arm and Shaft Assembly Tightening Sequence

SPARK PLUG TUBE

REMOVAL

(1) Remove cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(2) Using suitable locking pliers, remove the tube from the cylinder head (Fig. 46) and discard tube.

(3) Clean area around spark plug with Mopar® Parts Cleaner or equivalent.

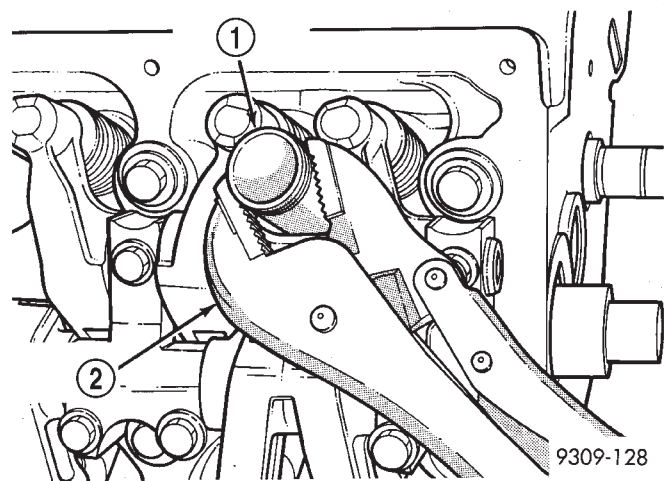


Fig. 46 Servicing Spark Plug Tubes

- 1 - SPARK PLUG TUBE
2 - LOCKING PLIERS

INSTALLATION

(1) Apply Mopar® Stud and Bearing Mount to a new tube approximately 1 mm (0.039 in.) from the end of tube, in a 3 mm (0.118 in.) wide area.

(2) Install sealer end of tube into the cylinder head. Then carefully install the tube using a hardwood block and mallet. Install the tube until it is seated into the bottom of the bore.

(3) For spark plug tube seal replacement, (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL).

(4) Install cylinder head cover(s). (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

VALVE STEM SEALS

REMOVAL

(1) Remove valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - REMOVAL)

(2) Remove valve stem seals by using a valve stem seal tool (Fig. 47).

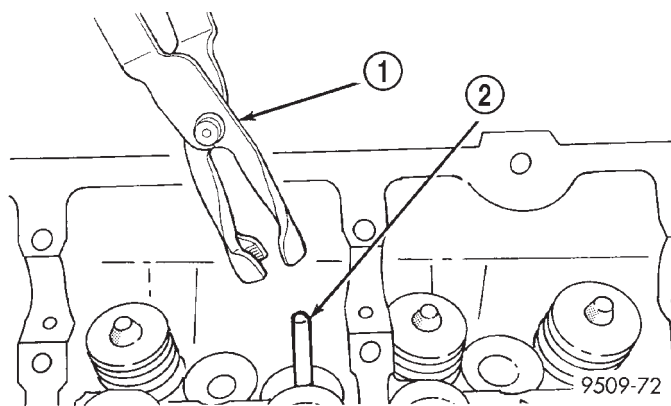


Fig. 47 Valve Stem Seal - Removal

- 1 - VALVE SEAL TOOL
2 - VALVE STEM

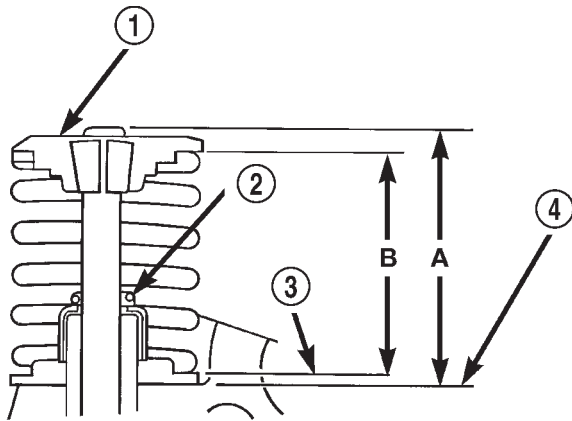
INSTALLATION

(1) The valve stem seal/valve spring seat should be pushed firmly and squarely over the valve guide using the valve stem as guide. **Do Not Force** seal against top of guide. When installing the valve retainer locks, compress the spring **only enough** to install the locks.

CAUTION: Do not remove garter spring around the seal at the top of the valve stem seal (Fig. 48).

(2) Install valve spring. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE SPRINGS - INSTALLATION)

VALVE STEM SEALS (Continued)



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Fig. 48 Checking Valve Tip Height and Valve Spring Installed Height

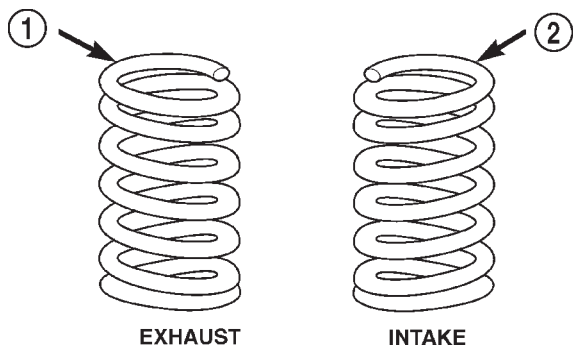
- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE

VALVE SPRINGS

DESCRIPTION

The valve springs are made from chrome silicon alloy wire and incorporate a "bee-hive" design. Valve spring retainers and locks are common from valve-to-valve. The valve spring seat is integral with the valve stem oil seal, which incorporates a garter spring to maintain consistent lubrication control to the valve stem.

The valve springs are unique for intake compared to exhaust. Both have different lengths and are wound in opposite directions. The valve springs are color coded, intake spring is right hand coil direction with orange dye on the top coils, and the exhaust spring is left hand coil direction with a yellow dye on the top coils (Fig. 49).



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Fig. 49 Valve Spring Identification

- 1 - YELLOW DYE
- 2 - ORANGE DYE

OPERATION

The valve spring returns the valve against its seat for a positive seal of the combustion chamber.

REMOVAL

REMOVAL - CYLINDER HEAD OFF

(1) Using Special Tool C-3422-D (valve spring compressor) with Adapter 6526 compress valve spring and remove valve retaining locks. For Special Tool identification, (Refer to 9 - ENGINE - SPECIAL TOOLS).

(2) Slowly release valve spring compressor. Remove valve spring retainer and valve spring.

(3) Remove valve stem seal assembly (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL).

REMOVAL - CYLINDER HEAD ON

(1) Perform fuel system pressure release procedure **before attempting any repairs**. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

(2) Disconnect negative cable from battery.

(3) Remove air cleaner housing and hose assembly.

(4) Remove upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

(5) Remove cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - REMOVAL)

(6) Remove rocker arm and shaft assembly. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - REMOVAL)

(7) Remove spark plugs. (Refer to 8 - ELECTRICAL/IGNITION CONTROL/SPARK PLUG - REMOVAL)

(8) Rotate the crankshaft clockwise, until the number 1 piston is at TDC (Top Dead Center) on the compression stroke.

(9) With air hose attached to spark plug adapter installed in number 1 spark plug hole, apply 620.5 to 689 kPa (90 to 100 psi) air pressure. This is to hold valves into place while servicing components.

(10) Using Tool MD 998772A with adapter 6527 or equivalent, compress valve spring and remove valve locks, retainer, and valve spring.

(11) Remove valve stem seal, if required. (Refer to 9 - ENGINE/CYLINDER HEAD/VALVE STEM SEALS - REMOVAL)

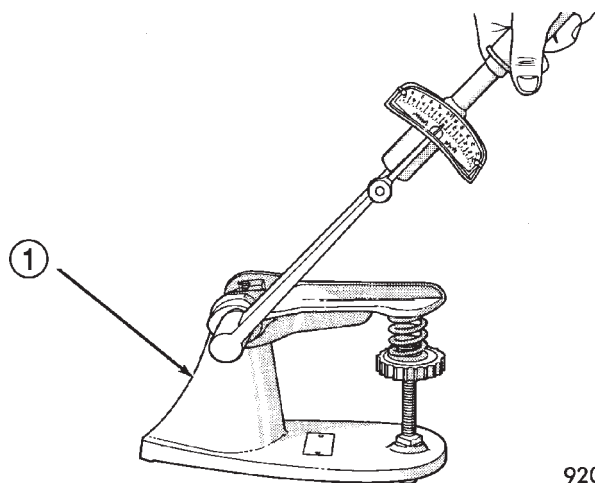
(12) Follow the same procedure on the remaining 5 cylinders using the firing sequence 1-2-3-4-5-6. **Make sure piston is at TDC in each cylinder of the valve spring that is being removed.**

(13) Remove spark plug adapter tool.

VALVE SPRINGS (Continued)

INSPECTION

When valves have been removed for inspection, reconditioning or replacement, valve springs should be tested (Fig. 50). **As an example;** the compression length of the spring to be tested is 38.00 mm (1.496 in.). Turn table of Tool C-647 until surface is in line with the 38.00 mm (1.496 inches.) mark on the threaded stud and the zero mark on the front. Place spring over stud on the table and lift compressing lever to set tone device. Pull on torque wrench until ping is heard. Take reading on torque wrench at this instant. Multiply this reading by two. This will give the spring load at test length. Fractional measurements are indicated on the table for finer adjustments. Refer to Engine Specifications to obtain specified height and allowable tensions (Refer to 9 - ENGINE - SPECIFICATIONS). Replace springs that do not meet specifications.



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Fig. 50 Testing Valve Spring

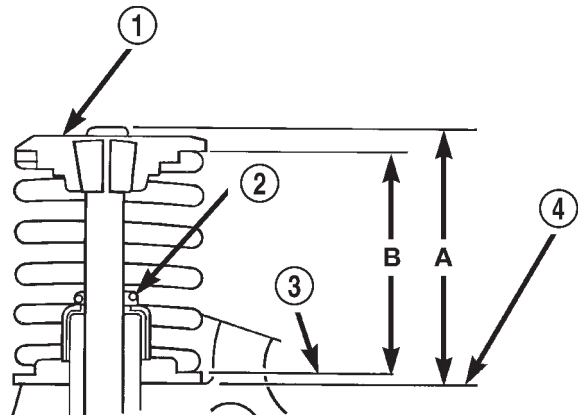
1 - SPECIAL TOOL C-647

INSTALLATION

INSTALLATION - CYLINDER HEAD OFF

- (1) Install valves if removed.
- (2) Install valve stem seal/spring seat assembly over valve guides on all valve stems (Fig. 52). Ensure that the garter spring is intact around the top of the rubber seal.
- (3) Place valve spring (color-coded end facing up) and valve retainer into position.
- (4) Compress valve spring with valve spring compressor. Install locks and release tool. **If valves and/or seats are reground, measure the installed height of springs (B) (Fig. 51), make sure measurements are taken from top of spring seat to the bottom surface of spring retainer.** If height is greater than 38.75 mm (1.5256 in.), install a 0.762 mm (0.030 in.) spacer in head

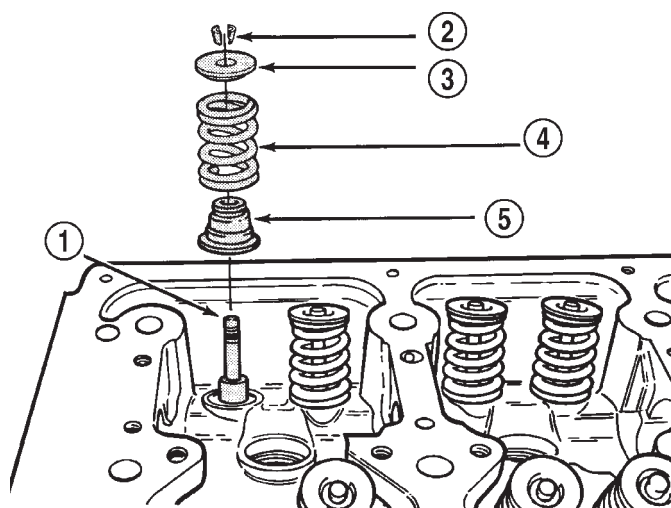
counterbore under the valve spring seat to bring spring height back within specification.



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Fig. 51 Checking Valve Tip Height and Valve Spring Installed Height

- 1 - SPRING RETAINER
- 2 - GARTER SPRING
- 3 - VALVE SPRING SEAT TOP
- 4 - CYLINDER HEAD SURFACE



9309-150

Fig. 52 Valve, Spring, and Valve Seal

- 1 - VALVE
- 2 - VALVE RETAINING LOCKS
- 3 - VALVE SPRING RETAINER
- 4 - VALVE SPRING
- 5 - VALVE SEAL AND VALVE SPRING SEAT ASSEMBLY

VALVE SPRINGS (Continued)

INSTALLATION - CYLINDER HEAD ON

(1) Compress valve spring using Special Tool MD 998772A with Adaptor 6527 only enough to install retainer and locks.

(2) After installing locks, release tension on valve spring and verify proper installation.

(3) Remove Special Tool MD 998772A.

(4) Install rocker arm and shaft assembly. (Refer to 9 - ENGINE/CYLINDER HEAD/ROCKER ARM / ADJUSTER ASSY - INSTALLATION)

(5) Install cylinder head covers. (Refer to 9 - ENGINE/CYLINDER HEAD/CYLINDER HEAD COVER(S) - INSTALLATION)

(6) Install spark plugs. (Refer to 8 - ELECTRICAL/IGNITION CONTROL/SPARK PLUG - INSTALLATION)

(7) Install upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(8) Connect negative cable.

ENGINE BLOCK**DESCRIPTION**

The cylinder block (Fig. 53) is made of heat treated aluminum with cast-in-place iron liners. The block is a closed deck design with the right bank forward. To provide high rigidity and improved NVH, the block has cast-in contours and ribs, along with powdered metal 6 bolt main caps (4 vertical, 2 horizontal), with a die cast aluminum structural beam windage tray mounted to the main caps.

STANDARD PROCEDURE - CYLINDER BORE HONING

(1) Used carefully, the cylinder bore resizing hone, recommended tool C-823 or equivalent, equipped with 220 grit stones, is the best tool for this honing procedure. In addition to deglazing, it will reduce taper and out-of-round as well as removing light scuffing, scoring or scratches. Usually a few strokes will clean up a bore and maintain the required limits.

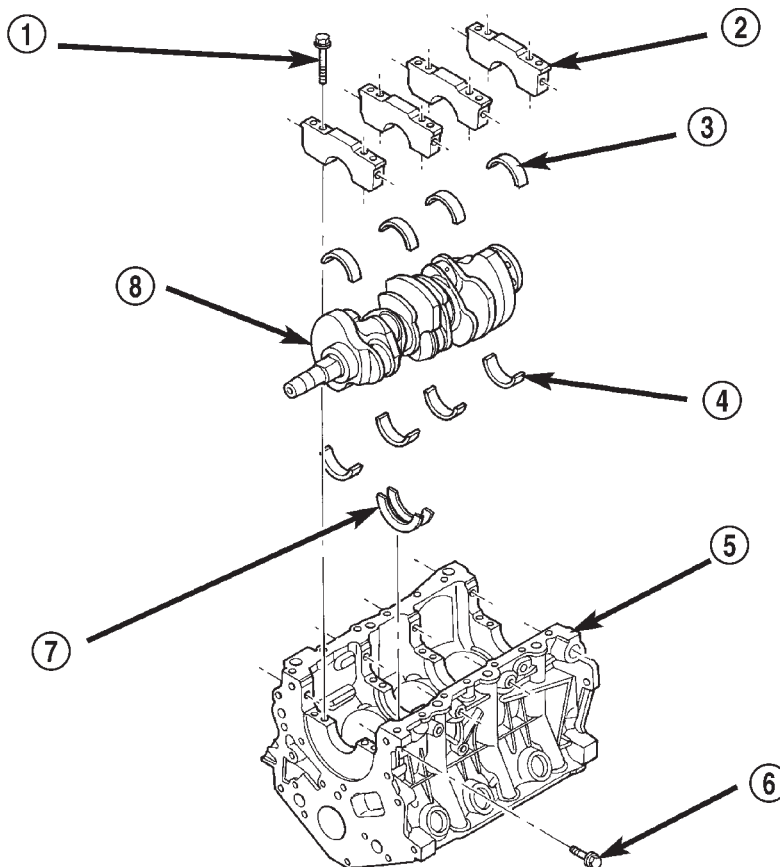


Fig. 53 ENGINE BLOCK AND CRANKSHAFT

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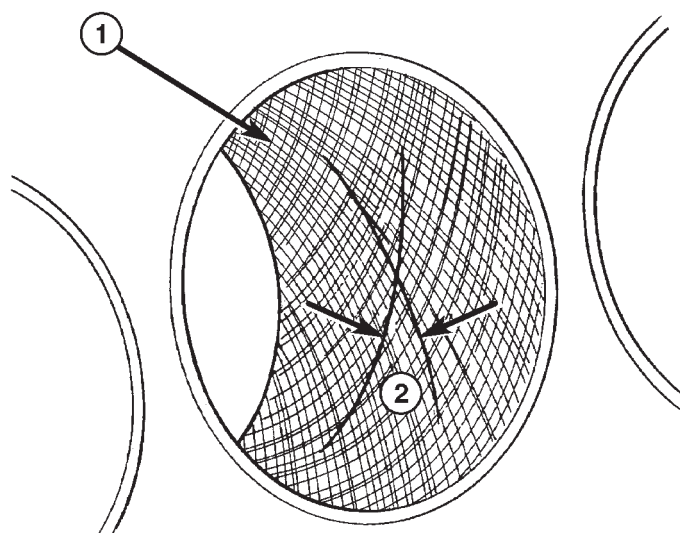
- 1 - MAIN CAP BOLT - VERTICAL
- 2 - MAIN CAP
- 3 - MAIN BEARING - LOWER
- 4 - MAIN BEARING - UPPER

- 5 - CYLINDER BLOCK
- 6 - MAIN CAP BOLT - HORIZONTAL
- 7 - CRANKSHAFT THRUST WASHER
- 8 - CRANKSHAFT

ENGINE BLOCK (Continued)

(2) Deglazing of the cylinder walls may be done using a cylinder surfacing hone, recommended tool C-3501 or equivalent, equipped with 280 grit stones, if the cylinder bore is straight and round. 20–60 strokes depending on the bore condition, will be sufficient to provide a satisfactory surface. Use a light honing oil. **Do not use engine or transmission oil, mineral spirits or kerosene.** Inspect cylinder walls after each 20 strokes.

(3) Honing should be done by moving the hone up and down fast enough to get a cross-hatch pattern. When hone marks **intersect** at 40–60 degrees, the cross hatch angle is most satisfactory for proper seating of rings (Fig. 54).



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Fig. 54 Cylinder Bore Cross-Hatch Pattern

- 1 - CROSS-HATCH PATTERN
2 - 40°–60°

(4) A controlled hone motor speed between 200–300 RPM is necessary to obtain the proper cross-hatch angle. The number of up and down strokes per minute can be regulated to get the desired 40–60 degree angle. Faster up and down strokes increase the cross-hatch angle.

(5) After honing, it is necessary that the block be cleaned again to remove all traces of abrasive.

CAUTION: Ensure all abrasives are removed from engine parts after honing. It is recommended that a solution of soap and hot water be used with a brush and the parts then thoroughly dried. The bore can be considered clean when it can be wiped clean with a white cloth and cloth remains clean. Oil the bores after cleaning to prevent rusting.

CLEANING

Clean cylinder block thoroughly using a suitable cleaning solvent.

INSPECTION

ENGINE BLOCK

(1) Clean cylinder block thoroughly and check all core hole plugs for evidence of leaking.

(2) If new core plugs are to be installed, (Refer to 9 - ENGINE - STANDARD PROCEDURE - ENGINE CORE AND OIL GALLERY PLUGS).

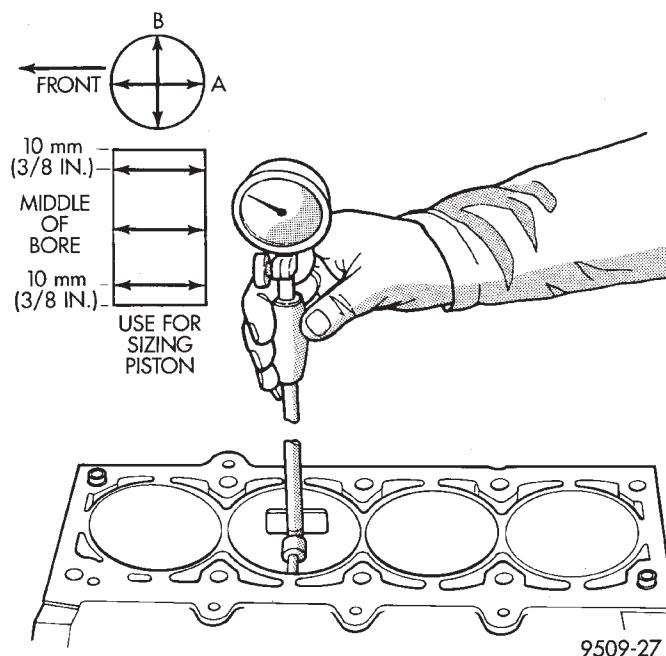
(3) Examine block and cylinder bores for cracks or fractures.

(4) Check block deck surfaces for flatness. Deck surface must be within service limit of 0.1 mm (0.004 in.).

CYLINDER BORE

NOTE: The cylinder bores should be measured at normal room temperature, 21°C (70°F).

The cylinder walls should be checked for out-of-round and taper with Tool C119 or equivalent (Fig. 55) (Refer to 9 - ENGINE - SPECIFICATIONS). If the cylinder walls are badly scuffed or scored, the cylinder block should be replaced, and new pistons and rings fitted.



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Fig. 55 Checking Cylinder Bore Size

Measure the cylinder bore at three levels in directions A and B (Fig. 55). Top measurement should be 10 mm (3/8 in.) down and bottom measurement should be 10 mm (3/8 in.) up from bottom of bore. (Refer to 9 - ENGINE - SPECIFICATIONS).

CONNECTING ROD BEARINGS

STANDARD PROCEDURE - CONNECTING RODS AND BEARINGS

CONNECTING ROD BEARINGS

The bearing caps are not interchangeable and should be marked at removal to insure correct assembly.

The bearing shells must be installed with the tangs inserted into the machined grooves in the rods and caps. Install cap with the tangs on the same side as the rod.

Fit all rods on one bank until complete.

Limits of taper or out-of-round on any crankshaft journals should be held to 0.015 mm (0.0006 in.). Bearings are available in standard, 0.025 mm (0.001 in.), and 0.254 mm (0.010 in.) undersizes. **Install the bearings in pairs. Do not use a new bearing half with an old bearing half. Do not file the rods or bearing caps.**

(1) For measuring main bearing clearance and connecting rod bearing clearance use plastigage (Fig. 56). For more information on using plastigage (Refer to 9 - ENGINE - STANDARD PROCEDURE). Refer to Engine Specifications for bearing clearance specifications (Refer to 9 - ENGINE - SPECIFICATIONS).

NOTE: The rod bearing bolts should be examined before reuse. If the threads are necked down the bolts must be replaced (Fig. 57).

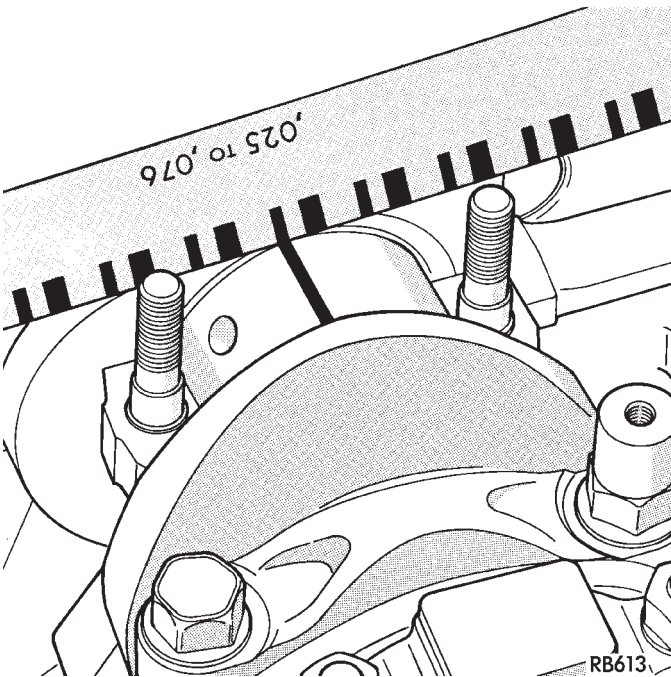


Fig. 56 CHECKING CONNECTING ROD BEARING

CONNECTING ROD BOLTS

(1) Examine connecting rod bolts for stretching. Stretching can be checked by holding a scale or straight edge against the threads. If all the threads do not contact the scale the bolt must be replaced.

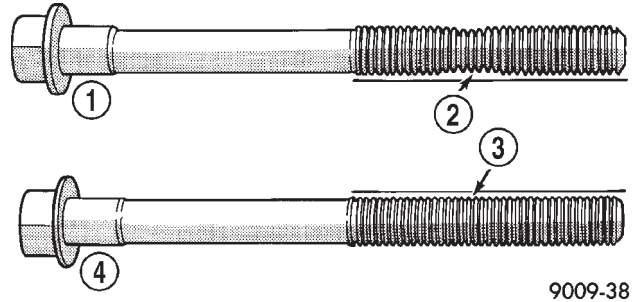


Fig. 57 CHECK FOR STRETCHED BOLTS

- 1 - STRETCHED BOLT
- 2 - THREADS ARE NOT STRAIGHT ON LINE
- 3 - THREADS ARE STRAIGHT ON LINE
- 4 - UNSTRETCHED BOLT

(2) Before installing the nuts the threads should be oiled with engine oil.

(3) Install nuts on each bolt finger tight. Then alternately torque each nut to assemble the cap properly.

(4) Tighten the connecting rod cap nuts to specifications. (Refer to 9 - ENGINE - SPECIFICATIONS)

CONNECTING ROD SIDE CLEARANCE

(1) Mount a dial indicator to a stationary point on engine. Locate probe perpendicular to and resting against the connecting rod cap being checked. Move connecting rod all the way to rear of its travel. Zero the dial indicator. Move connecting rod forward to limit of travel and read the dial indicator (Fig. 58). Compare measurement to specification listed in engine specifications (Refer to 9 - ENGINE - SPECIFICATIONS). Repeat procedure for each connecting rod. Turn crankshaft for connecting rod accessibility.

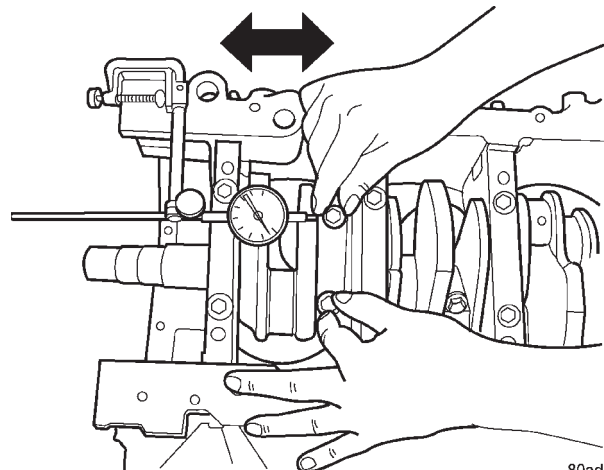


Fig. 58 CONNECTING ROD SIDE CLEARANCE

CRANKSHAFT

DESCRIPTION

The crankshaft (Fig. 53) is constructed of a forged micro alloy steel. A six throw, nine counterweight crankshaft is supported by four select fit main bearings with number two serving as the thrust washer location. The six separate connecting rod throws are an even-firing design which reduces torque fluctuations while a torsional vibration damper is used to control torsion caused vibration of the crankshaft. Rubber lipped seals are used at front and rear. The front seal is retained in the oil pump case and the rear seal is retained in a block-mounted housing.

OPERATION

The crankshaft transfers force generated by combustion within the cylinder to the flywheel or flexplate.

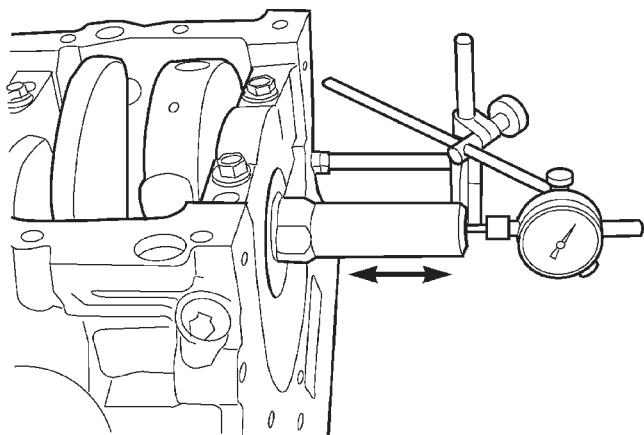
STANDARD PROCEDURE - CRANKSHAFT END PLAY

(1) Using Dial Indicator C-3339 and Mounting Post L-4438, attach to front of engine, locating probe perpendicular on nose of crankshaft (Fig. 59).

(2) Move crankshaft all the way to the rear of its travel.

(3) Zero the dial indicator.

(4) Move crankshaft all the way to the front and read the dial indicator. Refer to Engine Specifications.



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Fig. 59 Checking Crankshaft End Play

REMOVAL

(1) Remove engine from vehicle. (Refer to 9 - ENGINE - REMOVAL)

(2) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(3) Remove oil pickup tube.

(4) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(5) Remove idler pulley for accessory drive belt.

(6) Remove front lower timing belt cover.

(7) Remove front main timing belt cover.

(8) Remove front left side timing belt cover.

(9) Remove timing belt tensioner and timing belt.

(10) Remove crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(11) Tap dowel pin out of crankshaft.

(12) Remove oil pump assembly.

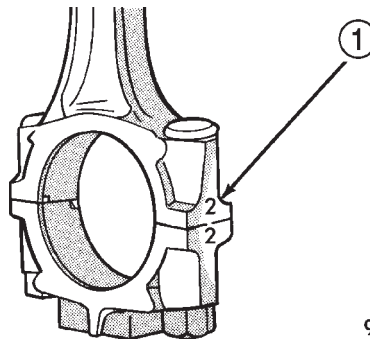
(13) Remove crankshaft rear oil seal retainer. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINER - REMOVAL)

(14) Remove connecting rod bearing caps. Connecting rod bearing caps are not interchangeable and should be marked before removal to insure correct assembly (Fig. 60).

(15) Remove main bearing caps. Main bearing caps are not interchangeable and are marked to insure correct assembly (Fig. 61).

(16) Remove crankshaft from cylinder block (Fig. 62).

NOTE: Before installing crankshaft, refer to Fitting Main Bearings and Installation of Connecting Rod Bearings. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE) (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE)

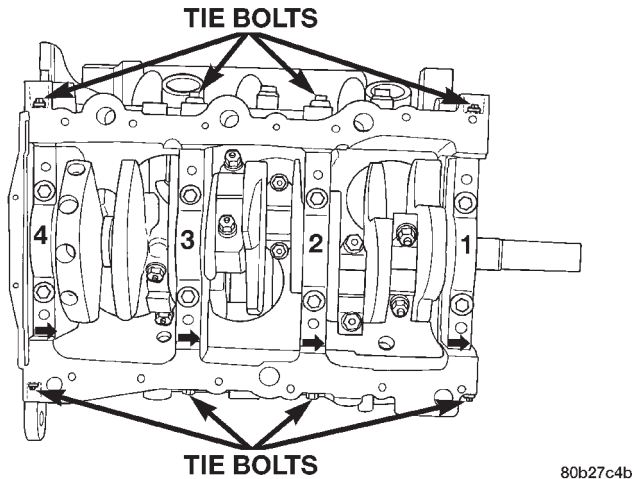


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Fig. 60 CONNECTING ROD TO CYLINDER IDENTIFICATION

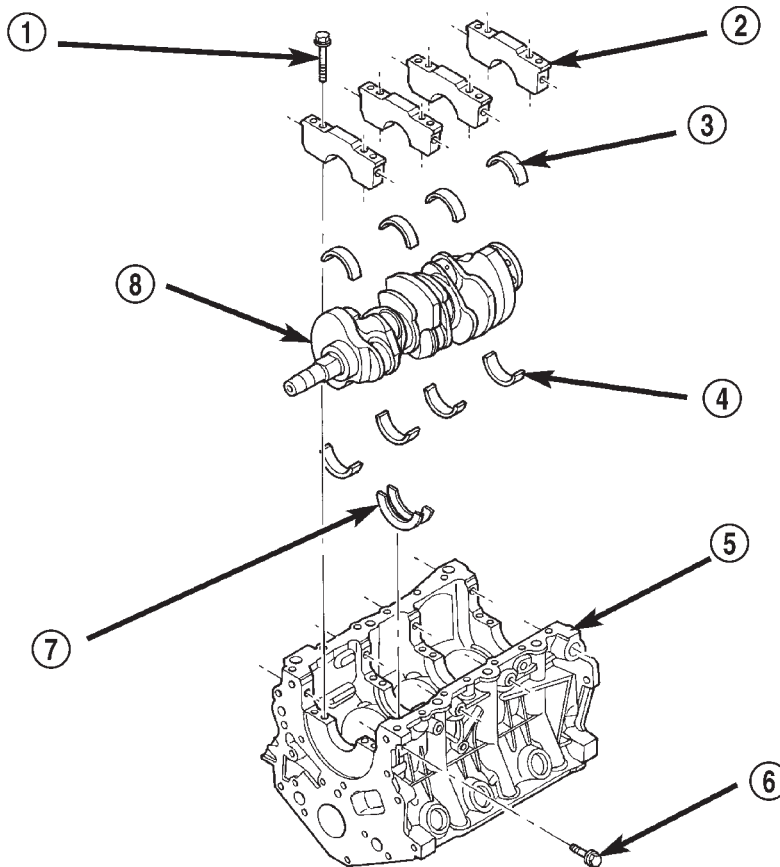
1 - CYLINDER NUMBER

CRANKSHAFT (Continued)

**Fig. 61 MAIN BEARING CAP IDENTIFICATION****INSPECTION**

The crankshaft journals should be checked for excessive wear, taper and scoring. Limits of taper or out-of-round on any crankshaft journals should be held to 0.015 mm (0.0006 in.). Journal grinding should not exceed 0.305 mm (0.012 in.) under the standard journal diameter. DO NOT grind thrust faces of Number 2 main bearing. DO NOT nick crank pin or bearing fillets. After grinding, remove rough edges from crankshaft oil holes and clean out all passages.

CAUTION: With a forged steel crankshaft it is important that the final paper or cloth polish after any journal regrind be in the same direction as normal rotation in the engine.

**Fig. 62 ENGINE BLOCK AND CRANKSHAFT**

- 1 - MAIN CAP BOLT - VERTICAL
- 2 - MAIN CAP
- 3 - MAIN BEARING - LOWER
- 4 - MAIN BEARING - UPPER

- 5 - CYLINDER BLOCK
- 6 - MAIN CAP BOLT - HORIZONTAL
- 7 - CRANKSHAFT THRUST WASHER
- 8 - CRANKSHAFT

CRANKSHAFT (Continued)

INSTALLATION

CAUTION: Main bearings are select fit. (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE)

(1) Install crankshaft main bearings (Fig. 63). (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE)

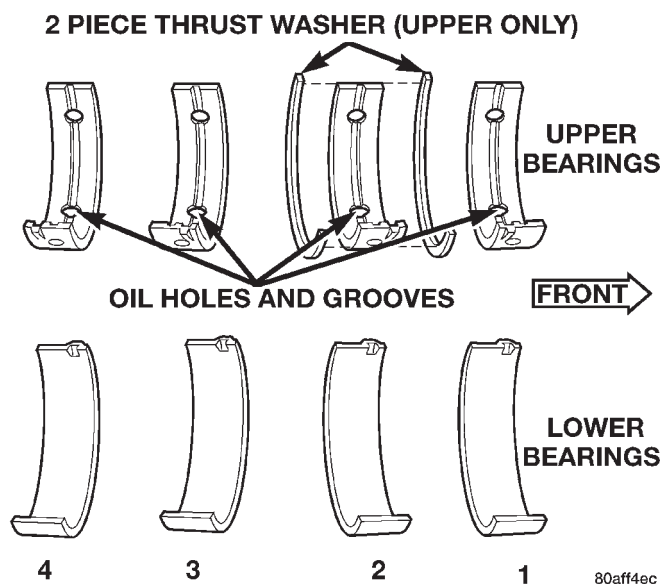


Fig. 63 Main Bearing Identification

(2) Install the crankshaft to cylinder block. (Fig. 62)

(3) Move crankshaft forward to limit of travel. Lubricate and install the front thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface (Fig. 64).

(4) Move crankshaft rearward to limit of travel. Lubricate and install the rear thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.

(5) Lubricate lower main bearings with clean engine oil.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

(6) Install each main cap and tighten bolts finger tight.

The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, lastly the main cap tie (horizontal) bolts.

(7) Install the inside main bearing cap bolts and tighten to 20 N·m + 1/4 turn (15 ft. lbs. + 1/4 turn).

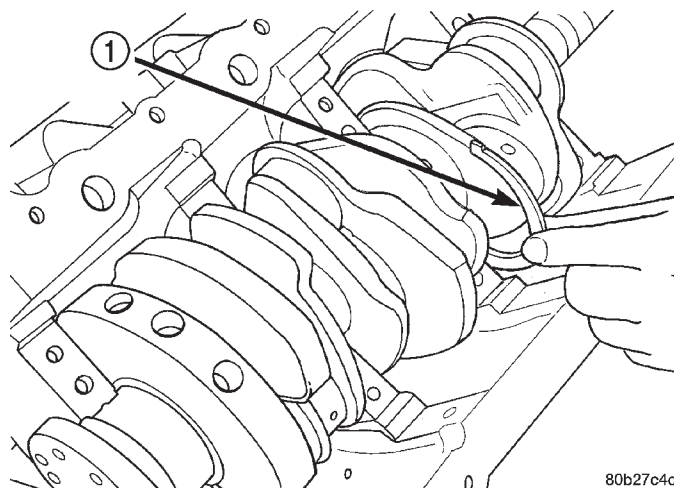


Fig. 64 Thrust Washer Installation

1 - FRONT THRUST WASHER

(8) Measure crankshaft end play. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE)

(9) Install connecting rods and measure side clearance. (Refer to 9 - ENGINE/ENGINE BLOCK/CONNECTING ROD BEARINGS - STANDARD PROCEDURE)

(10) Install windage tray. Lubricate bolts with engine oil and tighten to 27 N·m + 1/4 turn (20 ft. lbs. + 1/4 turn).

(11) Install the main cap tie (horizontal) bolts and tighten to 28 N·m (250 in. lbs.).

(12) Install rear crankshaft oil seal retainer and oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT REAR OIL SEAL RETAINER - INSTALLATION) (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)

(13) Install oil pump assembly. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - INSTALLATION)

(14) Install dowel pin in crankshaft. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - FRONT - INSTALLATION)

(15) Install crankshaft sprocket. Refer to Front Crankshaft Oil Seal Removal and Installation for procedure.

(16) Install camshaft sprockets and timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

(17) Install timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(18) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(19) Install idler pulley for accessory drive belt.

CRANKSHAFT (Continued)

(20) Install oil pickup tube and tighten bolt to 28 N·m (250 in. lbs.).

(21) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

(22) Install engine assembly. (Refer to 9 - ENGINE - INSTALLATION)

(23) Fill engine crankcase with proper amount of oil.

CRANKSHAFT MAIN BEARINGS

STANDARD PROCEDURE - CRANKSHAFT MAIN BEARING FITTING

The main bearings are a "select fit" to achieve proper oil clearances. For main bearing selection, the block and crankshaft have grade identification marks.

The marks for the cylinder block main bore grade are located on the left side pan rail, just rear of the left engine mount bracket (Fig. 65). These grade marks (1, 2, or 3) are read left to right, corresponding to main bore 1, 2, 3, 4.

The grade marks for the crankshaft are located on the rearmost crankshaft counter weight as shown in (Fig. 66). The crankshaft journal grade marks (A, B, or C) are read left to right, corresponding with journal number 1, 2, 3, 4.

Refer to the MAIN BEARING SELECTION CHART—3.2/3.5L to properly select the main bearings. For an example, if the main bore grade is 3 and the journal grade is B, the proper select fit bearing would be a (2) +0.003 mm (+0.0002 in.).

NOTE: Service main bearings have a number from (1–5) marked in ink on the bearing surface (Fig. 67). For verification, refer to the MAIN BEARING SELECTION CHART—3.2/3.5L for number to size identification.

The upper main bearing has a oil feed hole and a center groove to allow lubrication of the main journal and must be properly positioned in the block.

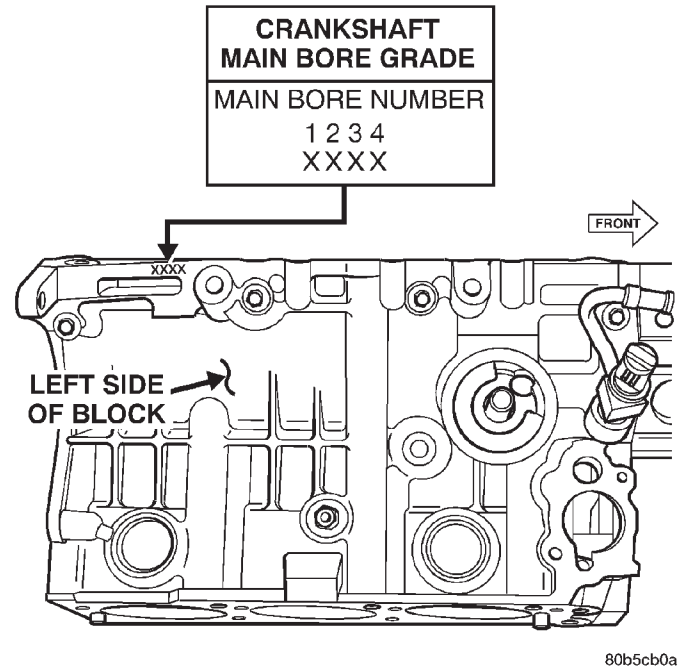


Fig. 65 Cylinder Block Main Bore Grade Marking Location

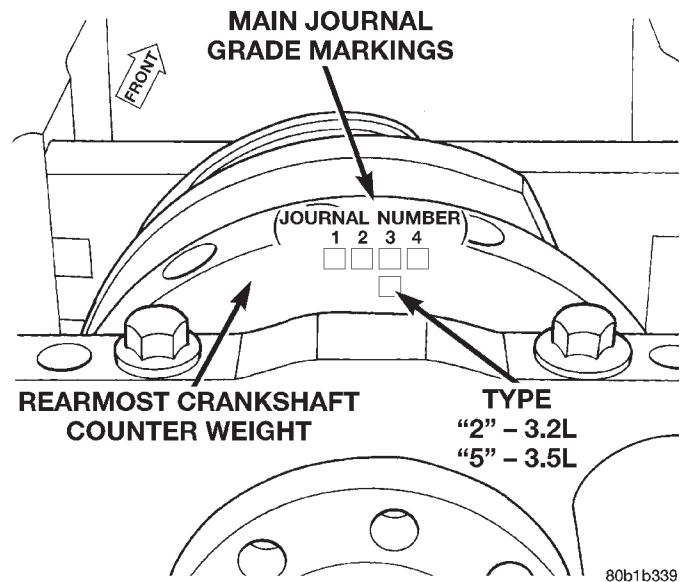
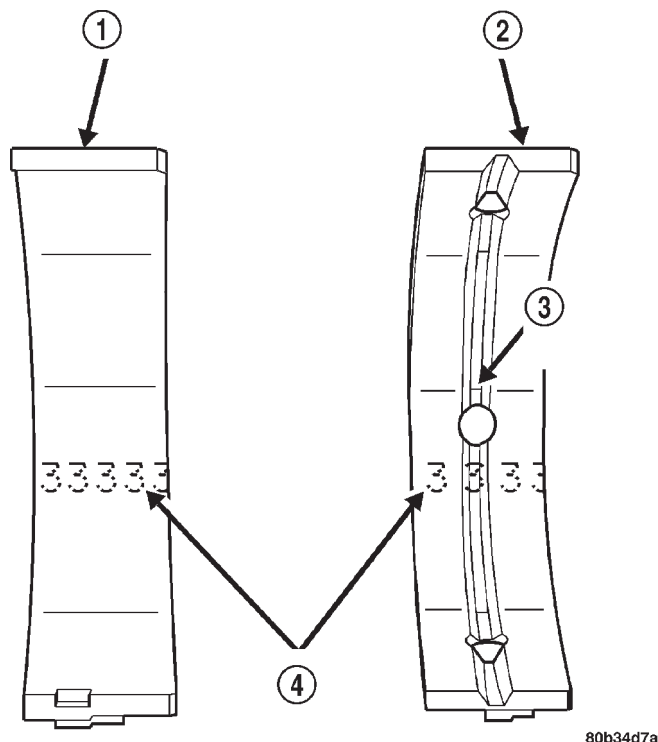


Fig. 66 Crankshaft Main Journal Grade Marking Location - Rear Of Block (Inverted) View

CRANKSHAFT MAIN BEARINGS (Continued)

**Fig. 67 Main Bearing Grade Marks**

- 1 - LOWER MAIN BEARING
 2 - UPPER MAIN BEARING
 3 - OIL FEED HOLE AND GROOVE
 4 - GRADE SELECTION INK MARKS

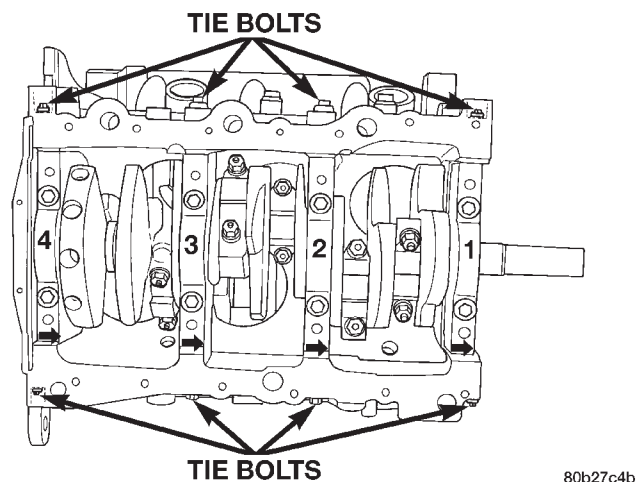
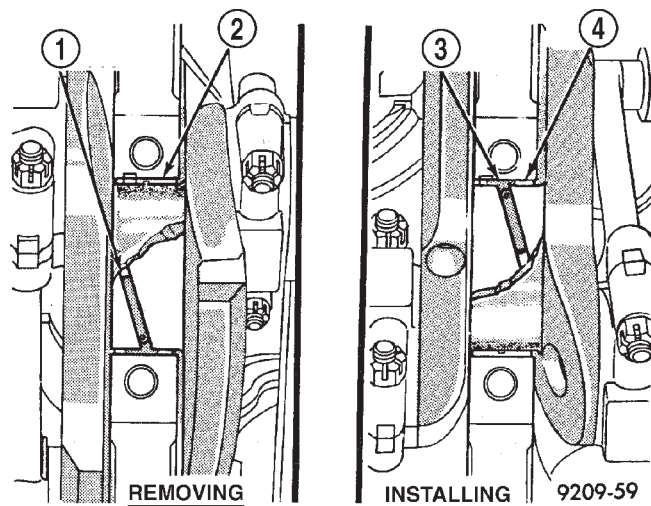
MAIN BEARING SELECTION CHART—3.2/3.5L

Crankshaft Main Journal Grade Marks	Main Bearing Bore Grade Marks		
	1	2	3
	(3) standard	(2) +003 mm (+0.0002 in.)	(1) +0.006 mm (+0.0003 in.)
	(4) -0.003 mm (-0.0002 in.)	(3) standard	(2) +003 mm (+0.0002 in.)
	(5) -0.006 mm (-0.0003 in.)	(4) -0.003 mm (-0.0002 in.)	(3) standard
A			
B			
C			

REMOVAL

Bearing caps are not interchangeable and are marked to insure correct assembly (Fig. 68). Upper and lower bearing halves are NOT interchangeable.

- (1) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
- (2) Remove oil pick-up tube and windage tray.
- (3) Identify bearing caps before removal (Fig. 68).
- (4) Remove bearing caps one at a time. Remove upper half of bearing by inserting Special Main Bearing Tool C-3059 (Fig. 69) into the oil hole of crankshaft.
- (5) Slowly rotate crankshaft clockwise, forcing out upper half of bearing shell.

**Fig. 68 Main Bearing Cap Identification****Fig. 69 Removing and Installing Upper Main Bearing With Special Tool C- 3059**

- 1 - SPECIAL TOOL C-3059
 2 - BEARING
 3 - SPECIAL TOOL C-3059
 4 - BEARING

CRANKSHAFT MAIN BEARINGS (Continued)

INSTALLATION

Bearing caps are not interchangeable and are marked to insure correct assembly. Upper and lower bearing halves are NOT interchangeable (Fig. 70).

2 PIECE THRUST WASHER (UPPER ONLY)

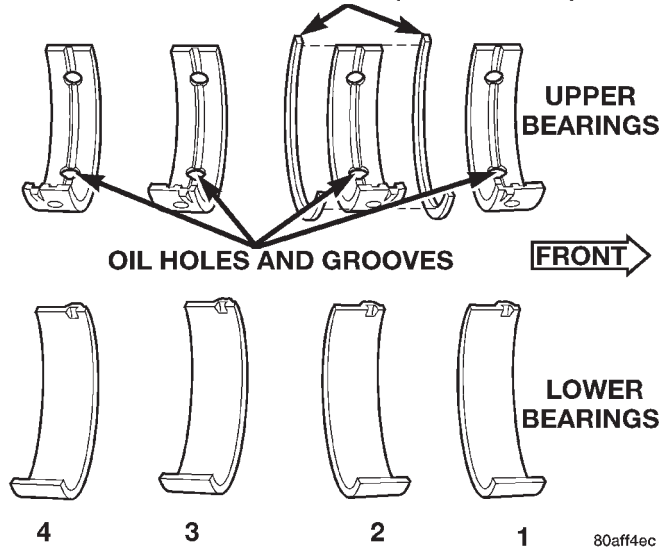


Fig. 70 Main Bearing Cap Identification

CAUTION: Main bearings are select fit. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT MAIN BEARINGS - STANDARD PROCEDURE)

NOTE: Only one main bearing should be selectively fitted while all other main bearing caps are properly tightened.

When installing a new upper bearing shell, slightly chamfer the sharp edges from the plain side.

- (1) Lubricate main bearing with clean engine oil.
- (2) Start bearing in place, and insert Main Bearing Tool C-3059 into oil hole of crankshaft (Fig. 69).
- (3) Slowly rotate crankshaft counterclockwise sliding the bearing into position. Remove Special Main Bearing Tool C-3059.

NOTE: Lubricate main bearing cap bolts with engine oil before installation.

- (4) Lubricate and install lower bearing half and main cap. Tighten bolts finger tight.

- (5) For installing thrust washers at the No. 2 main bearing location, use the following procedure:

(a) Move crankshaft forward to limit of travel. Lubricate and install the front thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface (Fig. 71).

(b) Move crankshaft rearward to limit of travel. Lubricate and install the rear thrust washer by rolling the washer onto the machined shelf between the No. 2 upper main bulk head and crankshaft thrust surface.

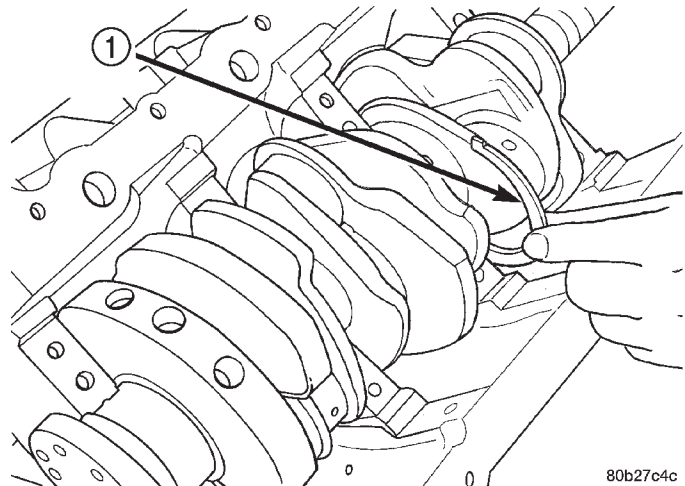


Fig. 71 Thrust Washer Installation

1 - FRONT THRUST WASHER

The main bearing cap bolts must be tightened in the proper sequence. First the inner main cap bolts, secondly the windage tray bolts, lastly the main cap tie (horizontal) bolts.

- (6) Install each main bearing cap and tighten inner bolts finger tight.

- (7) Tighten inner main bearing cap bolts to 20 N·m + 1/4 turn (15 ft. lbs. + 1/4 turn).

- (8) Measure crankshaft end play. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT - STANDARD PROCEDURE)

- (9) Install windage tray. Lubricate bolts with engine oil and tighten to 27 N·m + 1/4 turn (20 ft. lbs. + 1/4 turn).

- (10) Install the main cap tie (horizontal) bolts and tighten to 28 N·m (250 in. lbs.).

- (11) Install oil pick-up tube.

- (12) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

- (13) Fill engine crankcase with proper oil to correct level.

CRANKSHAFT OIL SEAL - FRONT

REMOVAL

(1) Remove the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Tap the dowel pin out of the crankshaft (Fig. 72).

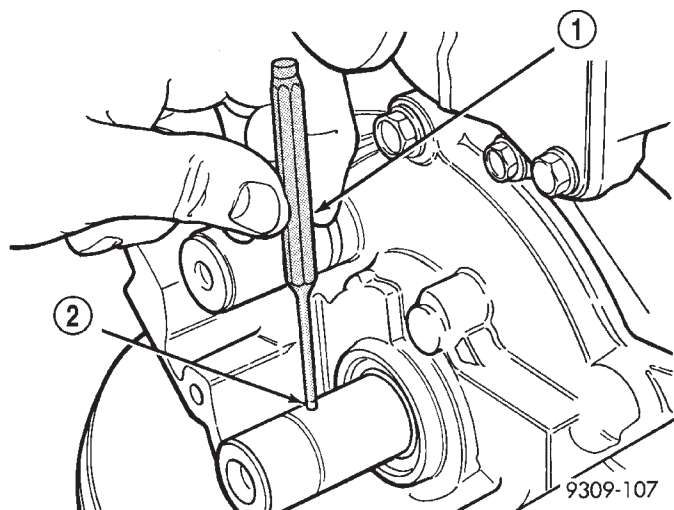


Fig. 72 Crankshaft Dowel Pin - Removal/Installation

- 1 - PIN PUNCH
2 - DOWEL

(3) Remove crankshaft seal using Special Tool 6341A (Fig. 73).

CAUTION: Do not nick shaft seal surface or seal bore.

(4) Shaft seal lip surface must be free of varnish, dirt or nicks. Polish with 400 grit paper if necessary.

INSTALLATION

(1) Install crankshaft seal using Special Tool 6342 (Fig. 74).

(2) Install the dowel pin into the crankshaft to 1.2 mm (0.047 in.) protrusion (Fig. 72).

(3) Install the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

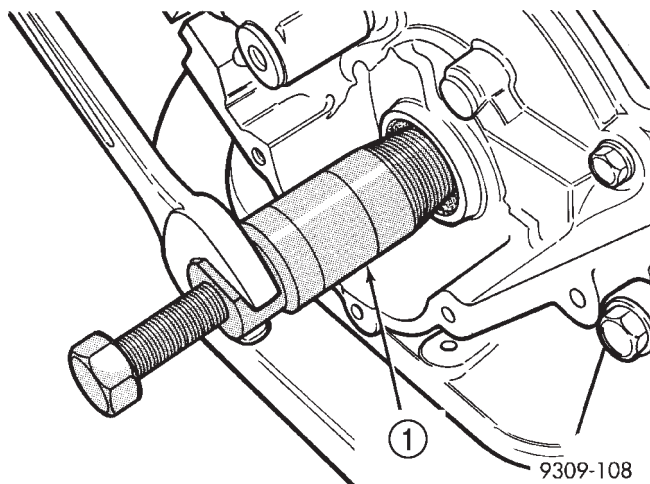


Fig. 73 REMOVING CRANKSHAFT OIL SEAL WITH SPECIAL TOOL

- 1 - SPECIAL TOOL 6341A

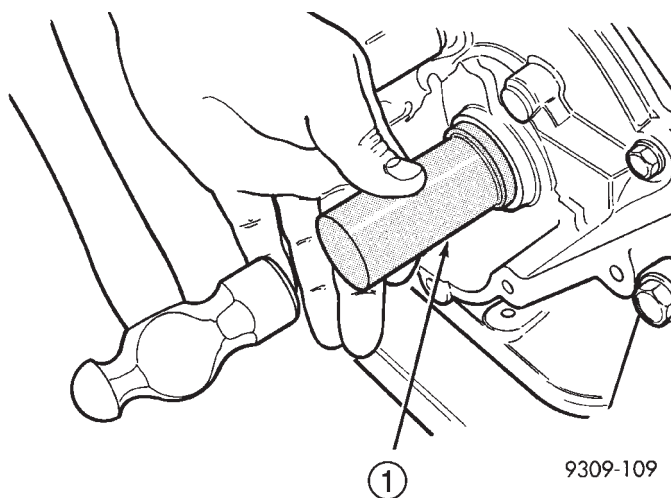


Fig. 74 INSTALLING CRANKSHAFT OIL SEAL WITH SPECIAL TOOL

- 1 - SPECIAL TOOL 6342

CRANKSHAFT OIL SEAL - REAR

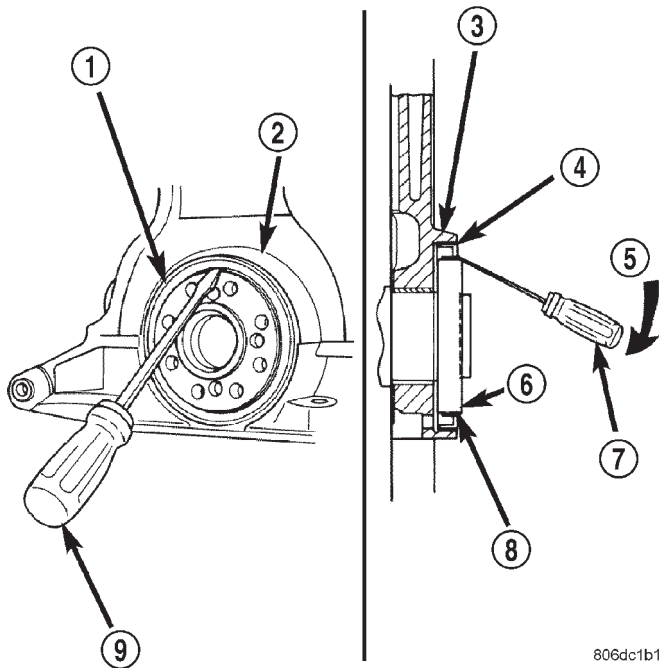
REMOVAL

(1) Remove transaxle from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL)

(2) Remove drive plate.

(3) Insert a 3/16" wide flat bladed screwdriver between the dust lip and the metal case of the crankshaft seal. Angle the screwdriver (Fig. 75) through the dust lip against the metal case of the seal. Pry out seal.

CAUTION: Do not allow the screwdriver blade to contact the crankshaft seal surface. Contact of the screwdriver blade against crankshaft edge (chamfer) is permitted.



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Fig. 75 Rear Crankshaft Oil Seal Removal - Typical

- 1 - REAR CRANKSHAFT SEAL
- 2 - ENGINE BLOCK
- 3 - ENGINE BLOCK
- 4 - REAR CRANKSHAFT SEAL METAL CASE
- 5 - PRY IN THIS DIRECTION
- 6 - CRANKSHAFT
- 7 - SCREWDRIVER
- 8 - REAR CRANKSHAFT SEAL DUST LIP
- 9 - SCREWDRIVER

INSTALLATION

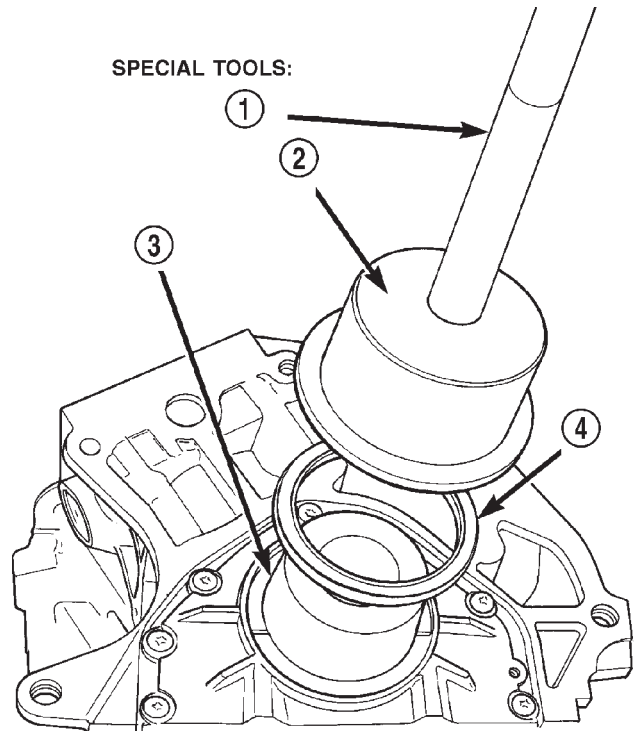
CAUTION: If a burr or scratch is present on the crankshaft edge (chamfer), clean surface using 400 grit sand paper to prevent seal damage during installation.

(1) Place Special Tool 6926-1 Guide on crankshaft (Fig. 76). This is a pilot tool with a magnetic base.

(2) Position seal over pilot tool. Assume that lip of seal is facing towards the crankshaft during installation. The pilot tool remains on crankshaft during seal installation.

(3) Using Special Tool 6926-2 Installer, and C-4171 Handle (Fig. 76), drive seal into the retainer housing until seal is flush with housing surface.

(4) Install drive plate and transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)



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Fig. 76 Crankshaft Rear Seal - Installation

- 1 - C-4171 HANDLE
- 2 - 6926-2 INSTALLER
- 3 - 6926-1 GUIDE
- 4 - SEAL

CRANKSHAFT REAR OIL SEAL RETAINER

REMOVAL

- (1) Remove crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - REMOVAL)
- (2) Remove oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
- (3) Remove seal retainer attaching screws.
- (4) Remove seal retainer (Fig. 77).

NOTE: Seal retainer gasket is bonded to the retainer and must be replaced as an assembly.

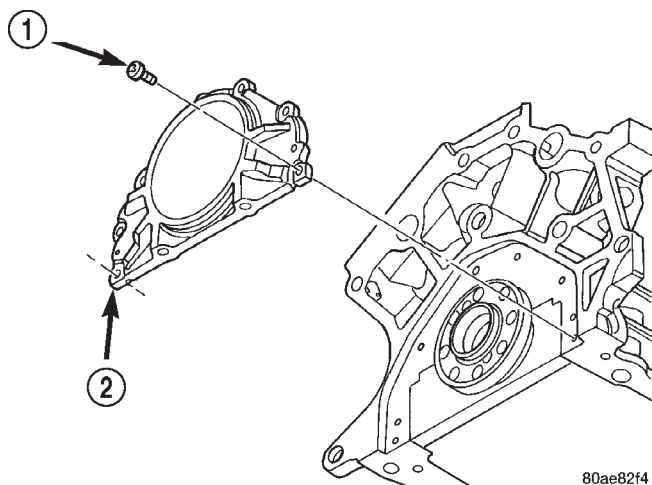


Fig. 77 Oil Seal Retainer

- 1 - SCREWS (7)
2 - SEAL RETAINER

INSTALLATION

- (1) Clean all sealing surfaces. Replace retainer assembly if gasket is torn or damaged.
- (2) Install seal retainer to block, but do not tighten attaching screws at this time.

NOTE: The following steps must be performed to prevent oil leaks at sealing joints.

- (3) Attach Special Tools 8225 to pan rail using the oil pan fasteners (Fig. 78).

NOTE: Make sure the marking "3.2/3.5L" on Special Tools 8225, is facing towards the cylinder block pan rail surface (notch on tool is towards the seal retainer).

- (4) While applying firm pressure to the seal retainer against Special Tools 8225 (Fig. 78), tighten seal retainer screws to 12 N·m (105 in. lbs.).

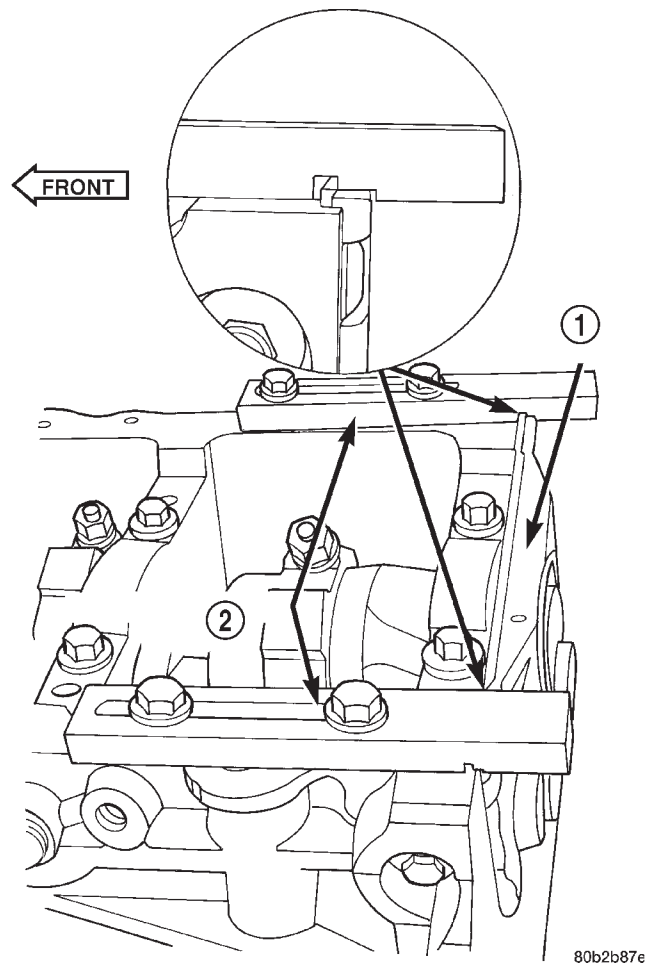


Fig. 78 Rear Crankshaft Seal Retainer Alignment

- 1 - SEAL RETAINER
2 - SPECIAL TOOLS 8225

- (5) Install crankshaft rear oil seal. (Refer to 9 - ENGINE/ENGINE BLOCK/CRANKSHAFT OIL SEAL - REAR - INSTALLATION)
- (6) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

FLEX PLATE

REMOVAL

- (1) Remove the transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL)
- (2) Remove flex plate attaching bolts.
- (3) Remove the flex plate (Fig. 79).

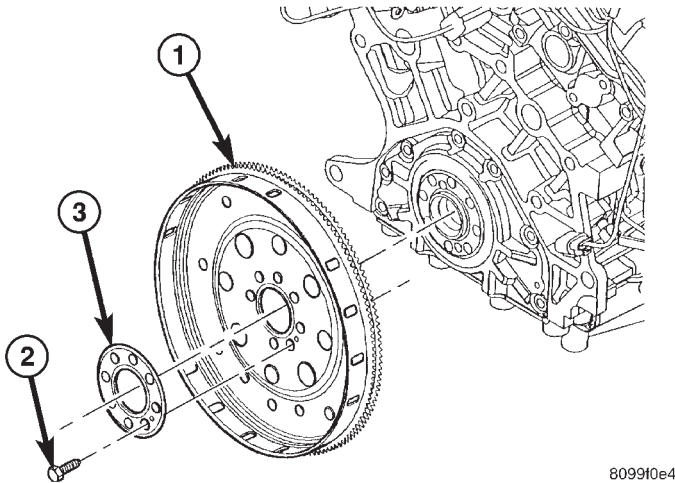


Fig. 79 FLEX PLATE

- 1 - FLEX PLATE
2 - BOLT (QTY. 8)
3 - BACKING PLATE

INSTALLATION

- (1) Position flex plate with backing plate on the crankshaft (Fig. 79).
- (2) Apply Mopar® Lock & Seal Adhesive to the flex plate bolts.
- (3) Install flex plate bolts (Fig. 79). Tighten bolts to 95 N·m (70 ft. lbs.).
- (4) Install the transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)

PISTON & CONNECTING ROD

DESCRIPTION

The pistons are made of a high strength aluminum alloy. Top land height has been decreased to reduce emissions. Piston skirts are coated with a solid lubricant for scuff resistance. Connecting rod is forged steel with a squirt hole and attaches to the piston with a full floating pin retained by lock rings.

OPERATION

The piston and connecting rod is the link between the combustion force to the crankshaft.

STANDARD PROCEDURE - FITTING PISTONS

The pistons are machined to two different weight specifications and matched to rods based on weight. All piston and rod assemblies weigh the same to maintain engine balance.

Piston and cylinder wall must be clean and dry. Piston diameter should be measured 90 degrees to piston pin at size location shown in (Fig. 80). Cylinder bores should be measured halfway down the cylinder bore and transverse to the engine crankshaft center line (Refer to 9 - ENGINE - SPECIFICATIONS). **Pistons and cylinder bores should be measured at normal room temperature, 70°F (21°C).**

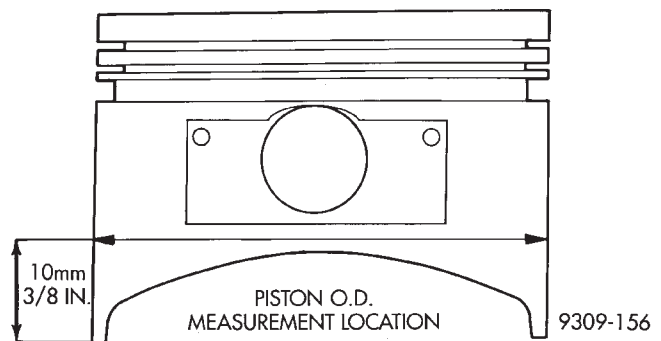


Fig. 80 Piston Measurements

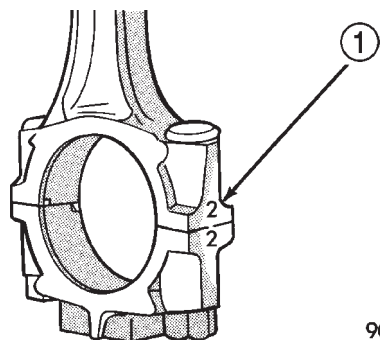
REMOVAL

- (1) Remove the cylinder heads (Refer to 9 - ENGINE/CYLINDER HEAD - REMOVAL)
- (2) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
- (3) Remove top ridge of cylinder bores with a reliable ridge reamer before removing pistons from cylinder block. **Be sure to keep tops of pistons covered during this operation. Pistons and connecting rods must be removed from top of cylinder block. When removing piston and connecting rod assemblies from the engine, rotate crankshaft so that each connecting rod is centered in cylinder bore.**
- (4) Inspect connecting rods and connecting rod caps for cylinder identification. Identify them if necessary (Fig. 81).
- (5) Remove connecting rod cap. Install protectors on connecting rod bolts (Fig. 82). Push each piston and rod assembly out of cylinder bore.

NOTE: Be careful not to nick crankshaft journals.

- (6) After removal, install bearing cap on the mating rod.

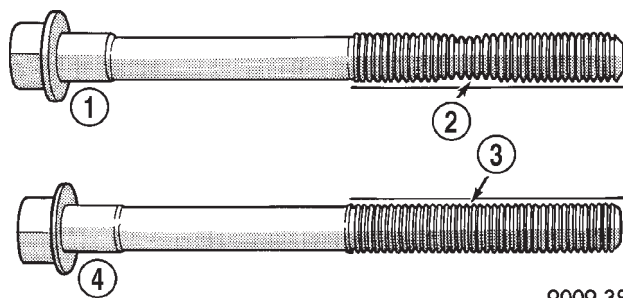
PISTON & CONNECTING ROD (Continued)



9009-74

Fig. 81 Connecting Rod to Cylinder Identification

1 - CYLINDER NUMBER

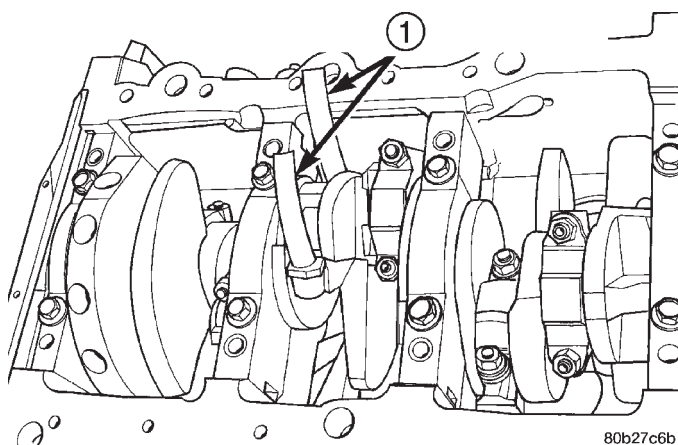


9009-38

Fig. 83 Check for Stretched Bolts

- 1 - STRETCHED BOLT
- 2 - THREADS ARE NOT STRAIGHT ON LINE
- 3 - THREADS ARE STRAIGHT ON LINE
- 4 - UNSTRETCHED BOLT

(3) Before installing pistons and connecting rod assemblies into the bore, ensure that compression ring gaps are staggered so that neither is in line with oil ring rail gap (Fig. 84).



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Fig. 82 Connecting Rod Guides and Crankshaft Protectors

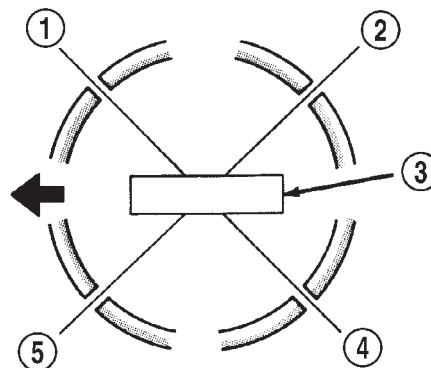
1 - COVER ROD BOLTS WITH A SUITABLE COVERING WHEN REMOVING OR INSTALLING PISTON ASSEMBLY

INSTALLATION

(1) Install the piston rings. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - INSTALLATION)

NOTE: The connecting rod bearing cap bolts must be examined before reuse. If the threads are necked down, the bolts must be replaced.

(2) Check connecting rod bolts for necking by holding a scale or straight edge against the threads. If all threads do not contact the scale, the bolt must be replaced (Fig. 83).



RR09B48

Fig. 84 Piston Ring End Gap Position

- 1 - SIDE RAIL UPPER
- 2 - NO. 1 RING GAP
- 3 - PISTON PIN
- 4 - SIDE RAIL LOWER
- 5 - NO. 2 RING GAP AND SPACER EXPANDER GAP

PISTON & CONNECTING ROD (Continued)

(4) Immerse the piston head and rings in clean engine oil, slide the ring compressor over the piston and tighten with the special wrench (Fig. 85). **Ensure position of rings does not change during this operation.**

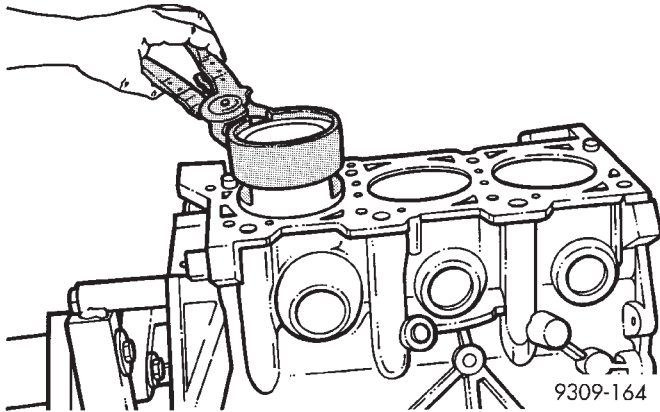


Fig. 85 Piston - Installation

(5) Install connecting rod bolt protectors on rod bolts (Fig. 82).

(6) Rotate crankshaft so that the connecting rod journal is on the center of the cylinder bore. Insert rod and piston into cylinder bore and guide rod over the crankshaft journal.

CAUTION: Do Not interchange piston assemblies cylinder-to-cylinder or bank-to-bank.

(7) The arrow on top of piston must be pointing toward front of engine (Fig. 86) and oil squirt hole on connecting rod faces the major thrust (right) side of the cylinder bore (Fig. 87).

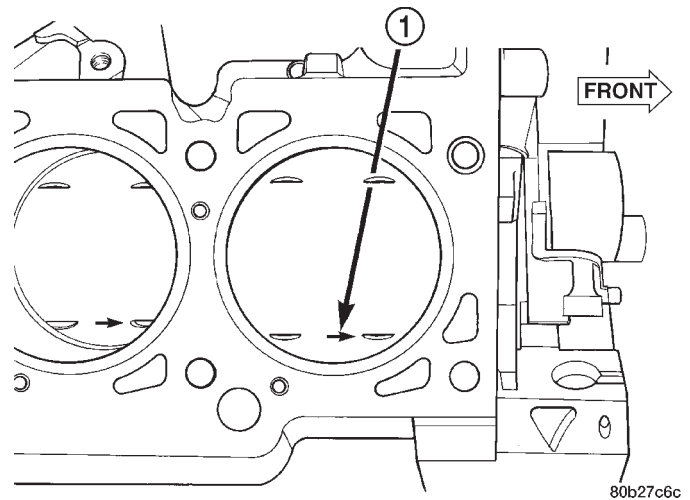


Fig. 86 Piston Orientation

1 - ARROW FACES FRONT OF ENGINE

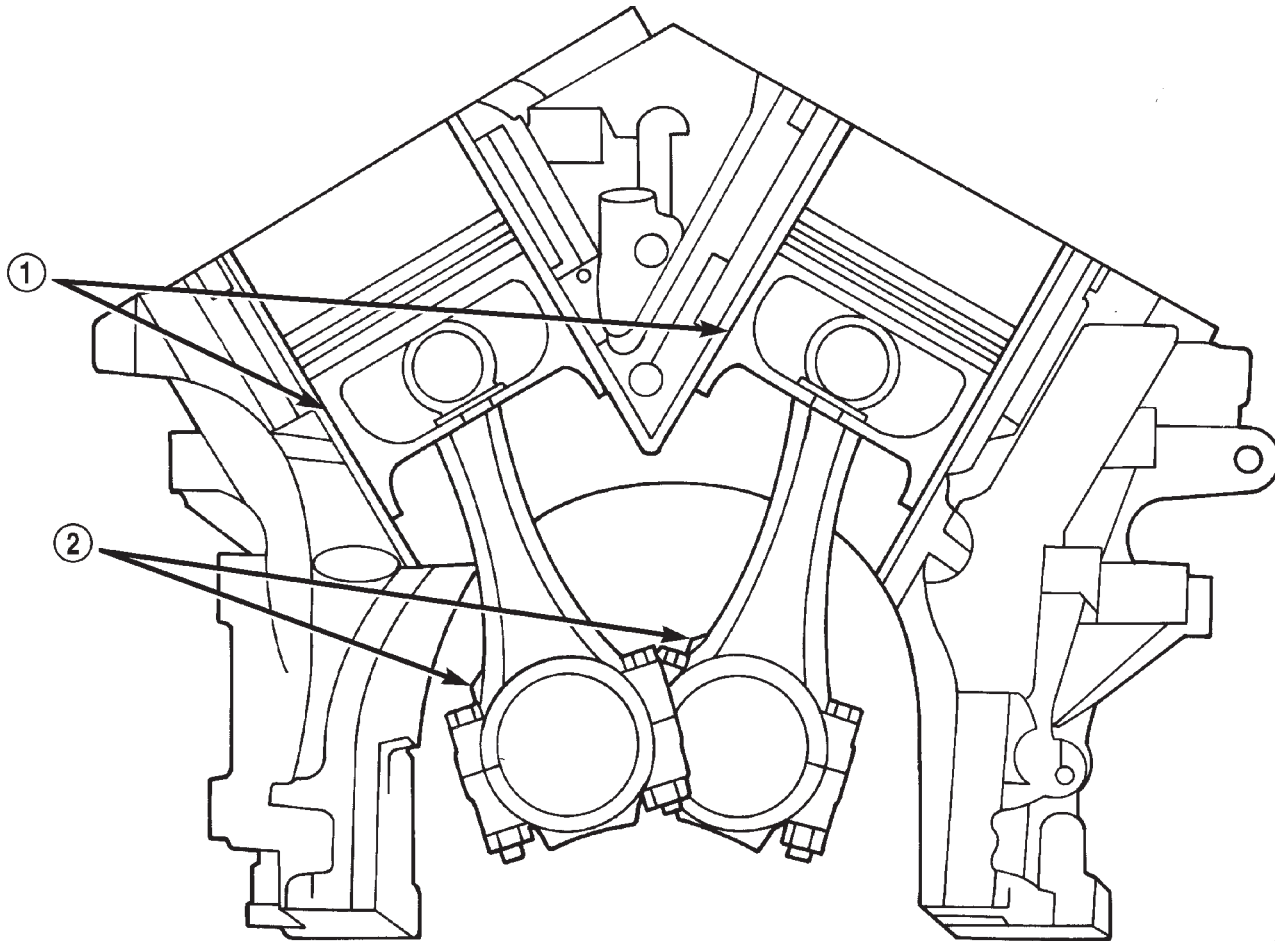
(8) Tap the piston down in cylinder bore, using a hammer handle. At the same time, guide connecting rod into position on connecting rod journal.

(9) Install rod caps. Install nuts on cleaned and oiled rod bolts and tighten nuts to 54 N·m (40 ft. lbs.) Plus 1/4 turn.

(10) Install the cylinder head(s) (Refer to 9 - ENGINE/CYLINDER HEAD - INSTALLATION)

(11) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

PISTON & CONNECTING ROD (Continued)



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Fig. 87 Piston and Connecting Rod Positioning (Front View of Engine)

- 1 - MAJOR THRUST SIDE OF PISTON
2 - OIL SQUIRT HOLE

PISTON RINGS

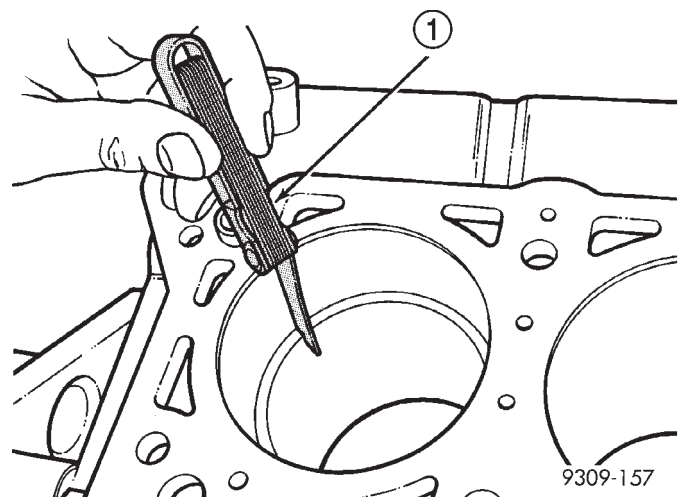
STANDARD PROCEDURE - PISTON RING FITTING

(1) Wipe cylinder bore clean. Insert ring and push down with piston to ensure it is square in bore. The ring gap measurement must be made with the ring positioning at least 12 mm (0.50 in.) from bottom of cylinder bore. Check gap with feeler gauge (Fig. 88). For clearance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

(2) Check piston ring to groove clearance: (Fig. 89). For clearance specifications, (Refer to 9 - ENGINE - SPECIFICATIONS).

REMOVAL

(1) Remove piston and connecting rod. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON & CONNECTING ROD - REMOVAL)

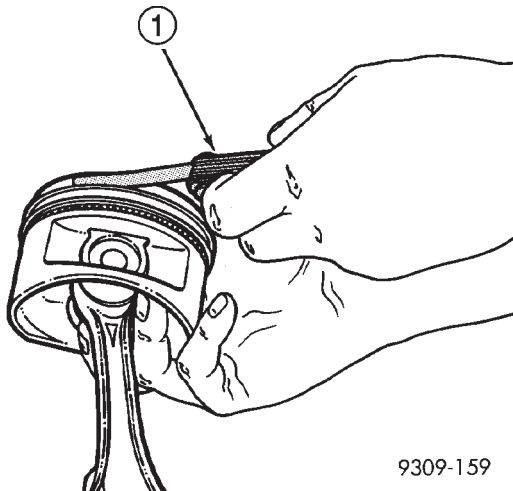


9309-157

Fig. 88 Check Gap on Piston Rings

- 1 - FEELER GAUGE

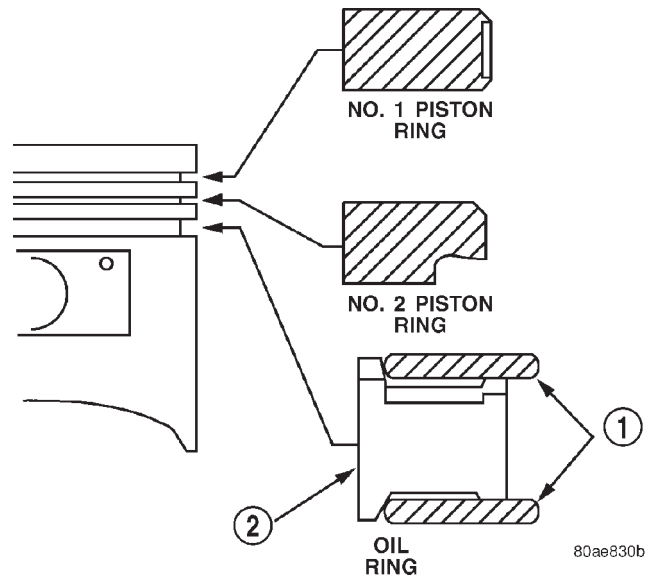
PISTON RINGS (Continued)



9309-159

Fig. 89 Measuring Piston Ring Side Clearance

1 - FEELER GAUGE



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Fig. 90 PISTON RING - INSTALLATION1 - SIDE RAIL
2 - SPACER EXPANDER

- (2) Remove No. 1 and No.2 piston rings from piston using a ring expander tool (Fig. 92).
- (3) Remove upper oil ring side rail (Fig. 90).
- (4) Remove lower oil ring side rail (Fig. 90).
- (5) Remove oil ring expander (Fig. 90).

INSTALLATION

(1) Measure clearance of piston rings to the cylinder bore and piston. (Refer to 9 - ENGINE/ENGINE BLOCK/PISTON RINGS - STANDARD PROCEDURE)

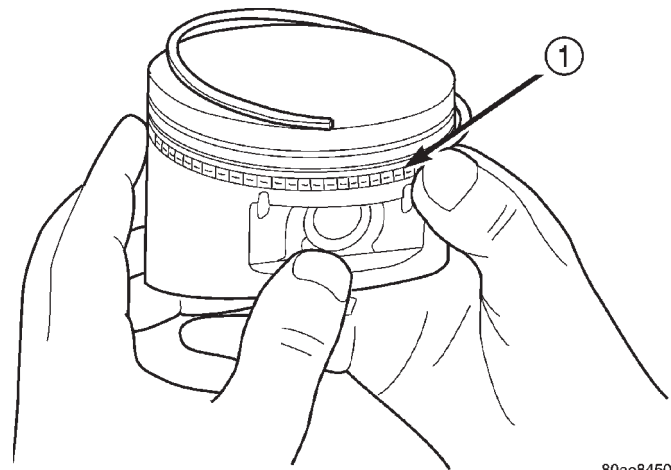
The No. 1 and No. 2 piston rings have a different cross section. Insure that the No. 2 ring is installed with manufacturers I.D. mark (dot) facing up, towards top of the piston (Fig. 90).

CAUTION: Install piston rings in the following order:

- Oil ring expander.
- Upper oil ring side rail.
- Lower oil ring side rail.
- No. 2 Intermediate piston ring.
- No. 1 Upper piston ring.

(2) Install oil ring expander.

(3) Install the side rail by placing one end between the piston ring groove and the expander. Hold end firmly and press down the portion to be installed until side rail is in position. **Do not use a piston ring expander during this step (Fig. 91).**



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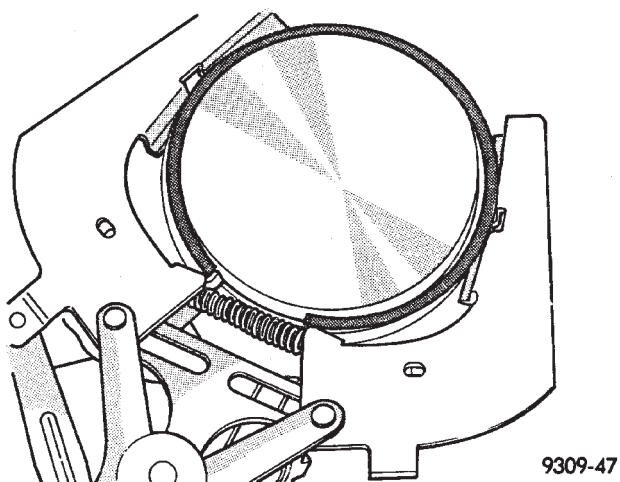
Fig. 91 SIDE RAIL - INSTALLATION

1 - SIDE RAIL END

(4) Install upper side rail first and then the lower side rail.

The No. 1 and No. 2 piston rings have a different cross section. Insure that the No. 2 ring is installed with manufacturers I.D. mark (dot) facing up, towards top of the piston (Fig. 90).

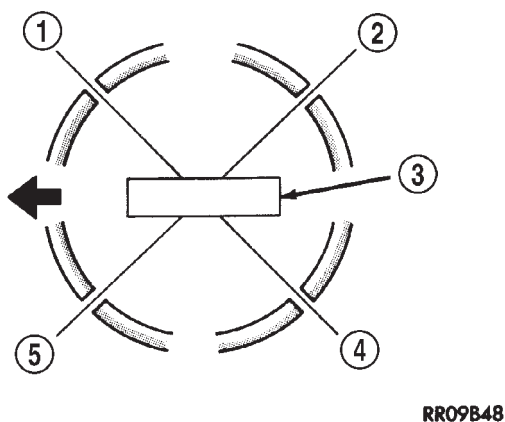
PISTON RINGS (Continued)

**Fig. 92 UPPER AND INTERMEDIATE RINGS**

(5) Install No. 2 piston ring and then No. 1 piston ring (Fig. 92).

(6) Position piston ring end gaps as shown in (Fig. 93).

(7) Position oil ring expander gap at least 45° from the side rail gaps but **not** on the piston pin center or on the thrust direction. Staggering ring gap is important for oil control.

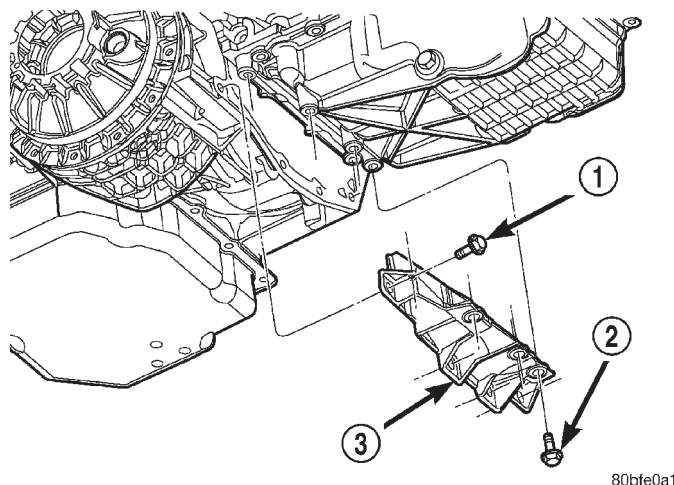
**Fig. 93 PISTON RING END GAP POSITION**

- 1 - SIDE RAIL UPPER
- 2 - NO. 1 RING GAP
- 3 - PISTON PIN
- 4 - SIDE RAIL LOWER
- 5 - NO. 2 RING GAP AND SPACER EXPANDER GAP

STRUCTURAL COLLAR / COVER

REMOVAL

- (1) Raise vehicle on hoist.
- (2) Remove bolts attaching structural collar to oil pan and transmission housing (Fig. 94).
- (3) Remove collar (Fig. 94).

**Fig. 94 Structural Collar**

- 1 - BOLT-HORIZONTAL
- 2 - BOLT-VERTICAL
- 3 - STRUCTURAL COLLAR

INSTALLATION

CAUTION: The collar must be tighten using this service procedure, as damage to collar and/or oil pan may occur.

(1) Install structural collar (Fig. 94) using the following tightening sequence:

- a. Install the **vertical** collar to oil pan bolts. Torque bolts initially to 1.1 N·m (10 in. lbs.).
- b. Install the **horizontal** collar to transmission bolts and torque to 55 N·m (40 ft. lbs.).
- c. Starting with the center vertical bolts and working outward, final torque bolts to 55 N·m (40 ft. lbs.).

(2) Lower vehicle.

VIBRATION DAMPER

REMOVAL

- (1) Disconnect negative cable at right strut tower.
- (2) Remove upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)
- (3) Remove radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)
- (4) Remove the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)
- (5) Use Special Tool 8191 to hold crankshaft damper while removing center bolt (Fig. 95).
- (6) Use Special Tool 1023 puller, and insert C-4685-C2, remove crankshaft damper (Fig. 96).

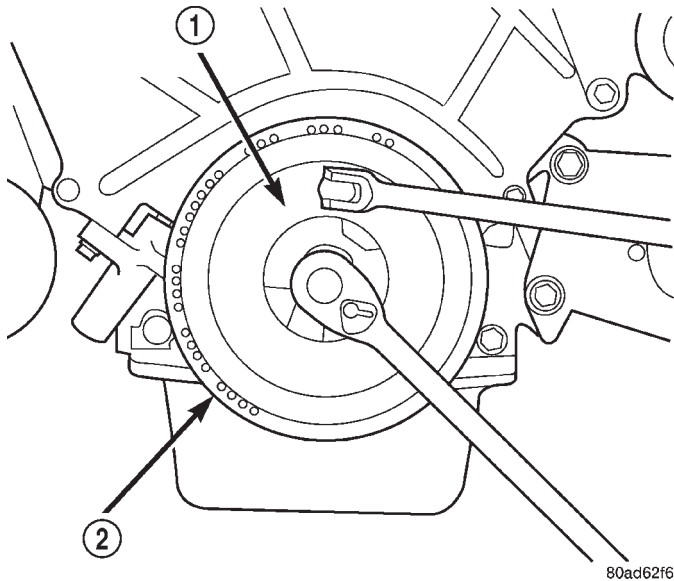


Fig. 95 Crankshaft Damper Center Bolt - Removal and Installation

- 1 - SPECIAL TOOL 8191
2 - CRANKSHAFT DAMPER

INSTALLATION

- (1) Install crankshaft damper using Special Tools C-4685-C1 (5.9 in.) Bolt, with Nut and Thrust Bearing from 6792, and 6792-1 Installer (Fig. 97). Install center bolt and tighten to 115 N·m (85 ft. lbs.) (Fig. 95).
- (2) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
- (3) Install radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)
- (4) Install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)
- (5) Connect negative cable.

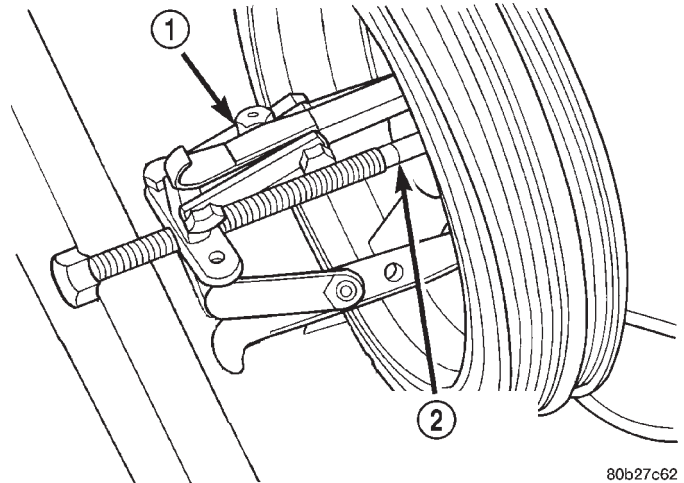


Fig. 96 CRANKSHAFT DAMPER - REMOVAL

- 1 - SPECIAL TOOL 1023
2 - SPECIAL TOOL C-4685-C2 INSERT

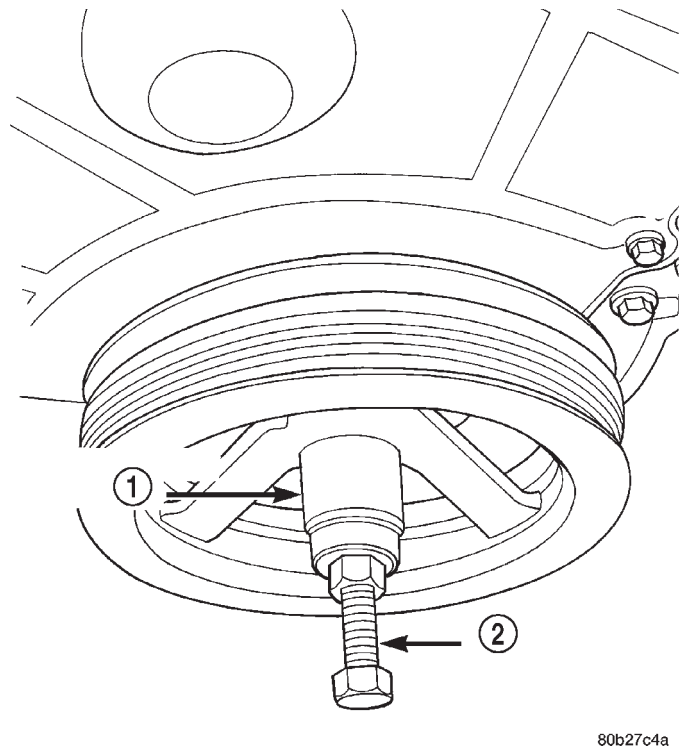


Fig. 97 CRANKSHAFT DAMPER - INSTALLATION

- 1 - SPECIAL TOOL 6792-1
2 - SPECIAL TOOL C-4685-C1

ENGINE MOUNTING

DESCRIPTION

The engine mounting system consist of three mounts; two hydro-type mounts are attached to the right and left side of the engine block, and one molded rubber type rear mount is attached to the transaxle (Fig. 98). All three mounts attach to the suspension crossmember/engine cradle.

The engine hydro-type mounts contain a liquid that is encased in a solid rubber housing.

INSPECTION

Engine hydro-mounts may show surface cracks. This will not effect performance and mount should not be replaced. Only replace the engine hydro-mounts when leaking fluid.

LEFT MOUNT

REMOVAL

- (1) Raise vehicle on hoist.

- (2) Remove the isolator attaching nuts from top of the mounting bracket (Fig. 98).

- (3) Support the engine with a jack and a block of wood across the full width of the oil pan.

- (4) Remove the lower attaching nuts from the bottom of the isolator to the frame (Fig. 98).

- (5) Raise engine carefully with jack enough to remove the isolator with heat shield from its mount.

INSTALLATION

- (1) Install isolator mount with heat shield onto the frame.

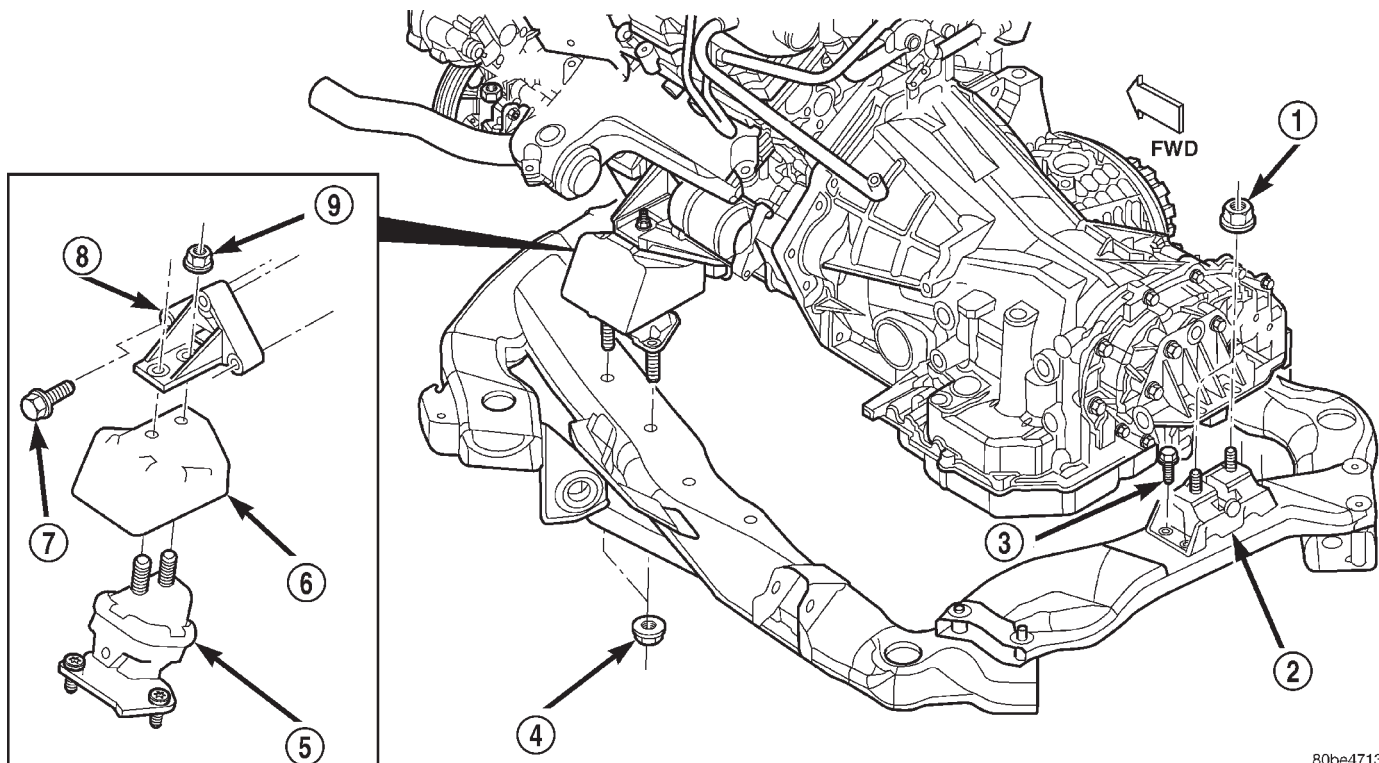
- (2) Lower the engine onto the isolator mount.

- (3) Remove jack from vehicle.

- (4) Tighten the isolator to frame nuts to 61 N·m (45 ft. lbs.) (Fig. 98).

- (5) Install the upper attaching nuts to mount and tighten to 61 N·m (45 ft. lbs.) (Fig. 98).

- (6) Lower vehicle.



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Fig. 98 ENGINE MOUNTING

- 1 - NUT
- 2 - REAR ISOLATOR
- 3 - BOLT
- 4 - NUT
- 5 - ISOLATOR

- 6 - HEAT SHIELD
- 7 - BOLT
- 8 - ENGINE MOUNT BRACKET
- 9 - NUT

REAR MOUNT

REMOVAL

- (1) Raise vehicle on hoist.
- (2) Support transaxle with a jack.
- (3) Remove isolator nuts from the mount to transaxle mount bracket (Fig. 98).
- (4) Remove rear mount isolator bolts to crossmember and remove mount (Fig. 98).

INSTALLATION

- (1) Position isolator onto crossmember.
- (2) Install bolts attaching isolator to crossmember and tighten to 33 N·m (250 in. lbs.) (Fig. 99).
- (3) Lower transaxle onto isolator.
- (4) Install isolator nuts and tighten to 61 N·m (45 ft. lbs.) (Fig. 99).
- (5) Lower vehicle.

(2) Remove the isolator attaching nuts from top of the mounting bracket (Fig. 99).

(3) Support the engine with a jack and a block of wood across the full width of the oil pan.

(4) Remove the lower attaching nuts from the bottom of the isolator to the frame (Fig. 99).

(5) Raise engine carefully with jack enough to remove the isolator with heat shield from its mount.

INSTALLATION

(1) Install isolator mount with heat shield onto the frame.

(2) Lower the engine onto the isolator mount.

(3) Remove jack from vehicle.

(4) Tighten the isolator to frame nuts to 61 N·m (45 ft. lbs.) (Fig. 99).

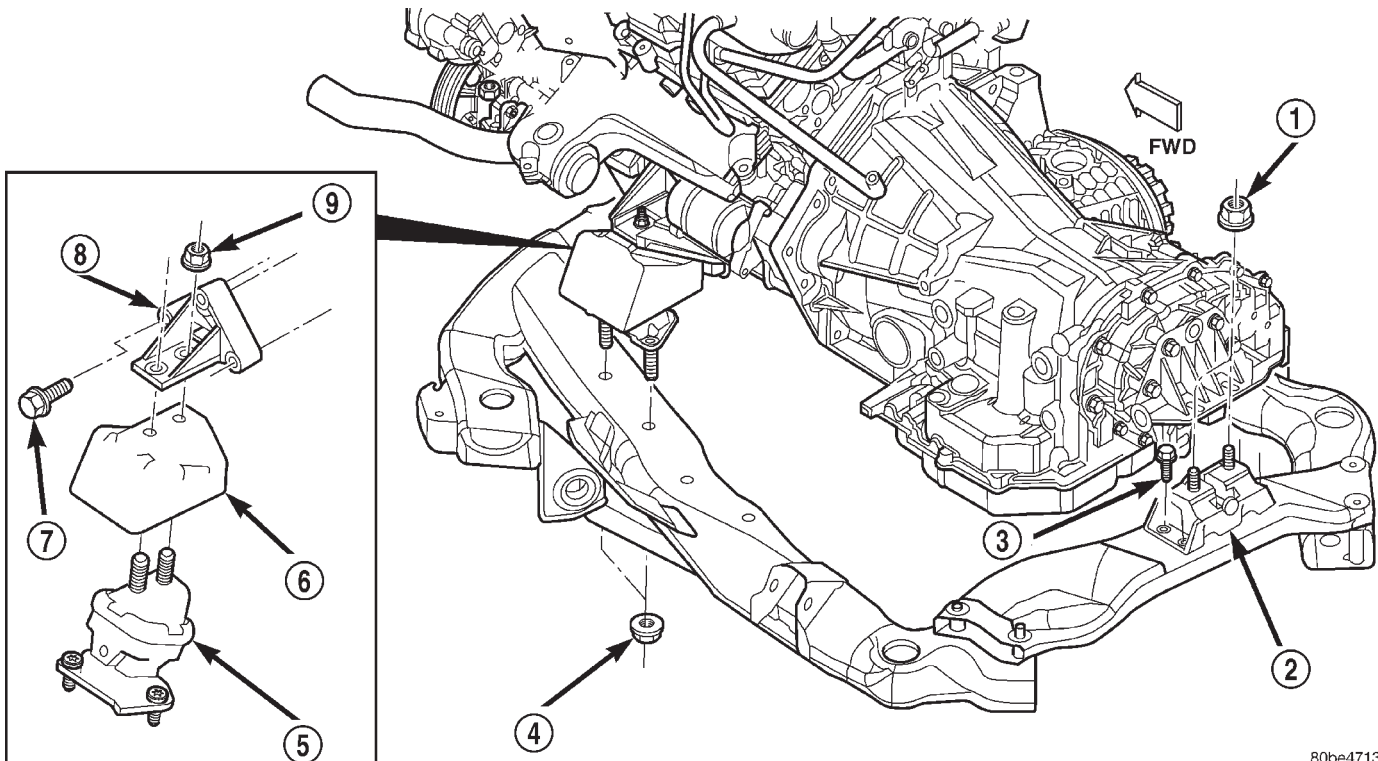
(5) Install the upper attaching nuts to mount and tighten to 61 N·m (45 ft. lbs.) (Fig. 99).

(6) Lower vehicle.

RIGHT MOUNT

REMOVAL

- (1) Raise vehicle on hoist.



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Fig. 99 ENGINE MOUNTING

- 1 - NUT
- 2 - REAR ISOLATOR
- 3 - BOLT
- 4 - NUT
- 5 - ISOLATOR

- 6 - HEAT SHIELD
- 7 - BOLT
- 8 - ENGINE MOUNT BRACKET
- 9 - NUT

LUBRICATION

DESCRIPTION

System is a full-flow filtration, pressure feed type. The oil pump body is mounted to the engine block. The pump inner rotor is driven by the crankshaft. A windage tray, increases power by minimizing oil windage at high engine RPM. For increased oil cooling, an oil-to-coolant oil cooler is used. This cooler is mounted inside the radiator tank.

OPERATION

Engine oil stored in the oil pan is drawn in and discharged by a gerotor type oil pump. The oil pump is directly coupled to the crankshaft. Oil pressure is regulated by a relief valve. The oil is fed through an oil filter and to the crankshaft journals from the oil gallery in the cylinder block. This gallery also feeds oil under pressure to the cylinder heads. Oil flows

through each cylinder heads oil passage to the rocker shafts. Oil then feeds the camshaft journals, rocker arms, and hydraulic lash adjusters (Fig. 100).

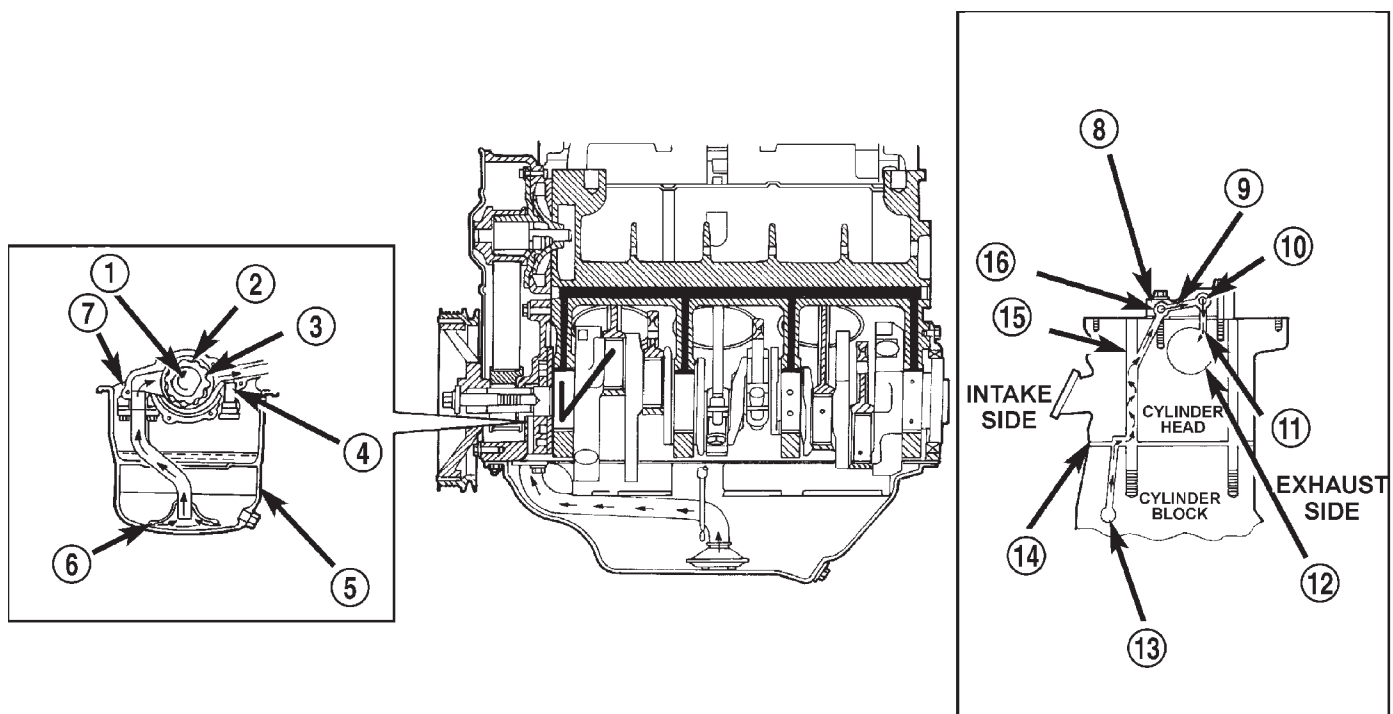
DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - ENGINE OIL LEAK INSPECTION

Begin with a thorough visual inspection of the engine, particularly at the area of the suspected leak. If an oil leak source is not readily identifiable, the following steps should be followed:

(1) Do not clean or degrease the engine at this time because some solvents may cause rubber to swell, temporarily stopping the leak.

(2) Add an oil soluble dye (use as recommended by manufacturer). Start the engine and let idle for approximately 15 minutes. Check the oil dipstick to



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Fig. 100 OIL LUBRICATION SYSTEM

- | | |
|---|-----------------------------------|
| 1 - CRANKSHAFT | 9 - PEDESTAL DRILLED PASSAGE |
| 2 - OUTER ROTOR | 10 - EXHAUST ROCKER SHAFT |
| 3 - INNER ROTOR | 11 - SHAFT/PEDESTAL DOWEL PASSAGE |
| 4 - RELIEF VALVE | 12 - CAMSHAFT BEARING BORE |
| 5 - OIL PAN | 13 - CYLINDER BLOCK OIL GALLERY |
| 6 - OIL SCREEN | 14 - CYLINDER HEAD GASKET |
| 7 - OIL PUMP CASE | 15 - HEAD BOLT HOLE |
| 8 - OIL FLOWS TO ONLY ONE PEDESTAL ON EACH HEAD - SECOND FROM REAR ON RIGHT HEAD - SECOND FROM FRONT ON LEFT HEAD | 16 - INTAKE ROCKER SHAFT |

LUBRICATION (Continued)

make sure the dye is thoroughly mixed as indicated with a bright yellow color under a black light.

(3) Using a black light, inspect the entire engine for fluorescent dye, particularly at the suspected area of oil leak. If the oil leak is found and identified, repair as necessary.

(4) If dye is not observed, drive the vehicle at various speeds for approximately 24 km (15 miles), and repeat inspection.

(5) **If the oil leak source is not positively identified at this time**, proceed with the air leak detection test method as follows:

- Disconnect the fresh air hose (make-up air) at the cylinder head cover and plug or cap the nipple on the cover.
- Remove the PCV valve hose from the cylinder head cover. Cap or plug the PCV valve nipple on the cover.
- Attach an air hose with pressure gauge and regulator to the dipstick tube.

CAUTION: Do not subject the engine assembly to more than 20.6 kPa (3 PSI) of test pressure.

- Gradually apply air pressure from 1 psi to 2.5 psi maximum while applying soapy water at the suspected source. Adjust the regulator to the suitable test pressure that provides the best bubbles which will pinpoint the leak source. If the oil leak is detected and identified, repair per service manual procedures.

- If the leakage occurs at the crankshaft rear oil seal area, refer to the section, Inspection for Rear Seal Area Leak.

(6) If no leaks are detected, turn off the air supply. Remove the air hose, all plugs, and caps. Install the PCV valve and fresh air hose (make-up air). Proceed to next step.

(7) Clean the oil off the suspect oil leak area using a suitable solvent. Drive the vehicle at various speeds approximately 24 km (15 miles). Inspect the engine for signs of an oil leak by using a black light.

NOTE: If oil leakage is observed at the dipstick tube to block location; remove the tube, clean and reseal using Mopar® Stud & Bearing Mount (press fit tube applications only), and for O-ring style tubes, remove tube and replace the O-ring seal.

INSPECTION FOR REAR SEAL AREA LEAKS

Since it is sometimes difficult to determine the source of an oil leak in the rear seal area of the engine, a more involved inspection is necessary. The following steps should be followed to help pinpoint the source of the leak.

If the leakage occurs at the crankshaft rear oil seal area:

- (1) Disconnect the battery.
- (2) Raise the vehicle.
- (3) Remove torque converter or clutch housing cover and inspect rear of block for evidence of oil. Use a black light to check for the oil leak. If a leak is present in this area, remove transmission for further inspection.
 - (a) Circular spray pattern generally indicates seal leakage or crankshaft damage.
 - (b) Where leakage tends to run straight down, possible causes are a porous block, oil gallery cup plug, bedplate to cylinder block mating surfaces and seal bore. See proper repair procedures for these items.
- (4) If no leaks are detected, pressurize the crankcase as previously described.

CAUTION: Do not exceed 20.6 kPa (3 psi).

(5) If the leak is not detected, very slowly turn the crankshaft and watch for leakage. If a leak is detected between the crankshaft and seal while slowly turning the crankshaft, it is possible the crankshaft seal surface is damaged. The seal area on the crankshaft could have minor nicks or scratches that can be polished out with emery cloth.

CAUTION: Use extreme caution when crankshaft polishing is necessary to remove minor nicks and scratches. The crankshaft seal flange is especially machined to complement the function of the rear oil seal.

(6) For bubbles that remain steady with shaft rotation, no further inspection can be done until disassembled.

(7) After the oil leak root cause and appropriate corrective action have been identified, replace component(s) as necessary.

DIAGNOSIS AND TESTING - CHECKING
ENGINE OIL PRESSURE

- (1) Remove the oil pressure switch. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - REMOVAL)
- (2) Install oil pressure test gauge assembly, Special Tools C-3292 with 8406 adaptor.
- (3) Start engine and monitor gauge readings.

CAUTION: If oil pressure is 0 at idle, Do Not Run engine at 3000 RPM

(4) Oil Pressure (engine at operating temperature):
Curb Idle 34.5 kPa (5 psi) minimum **3000 RPM** 300–724 kPa (45–105 psi).

LUBRICATION (Continued)

(5) If oil pressure is 0 at idle. Shut off engine, check for pressure relief valve stuck open or a clogged oil pickup screen.

(6) Install oil pressure switch after testing is completed. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE SENSOR/SWITCH - INSTALLATION)

OIL

DESCRIPTION

For engine oil type and capacity (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL)

STANDARD PROCEDURE

STANDARD PROCEDURE - ENGINE OIL LEVEL CHECK

The best time to check engine oil level is after it has sat overnight, or if the engine has been running, allow the engine to be shut off for at least 5 minutes before checking oil level.

Checking the oil while the vehicle is on level ground will improve the accuracy of the oil level reading (Fig. 101). Add only when the level is at or below the ADD mark.

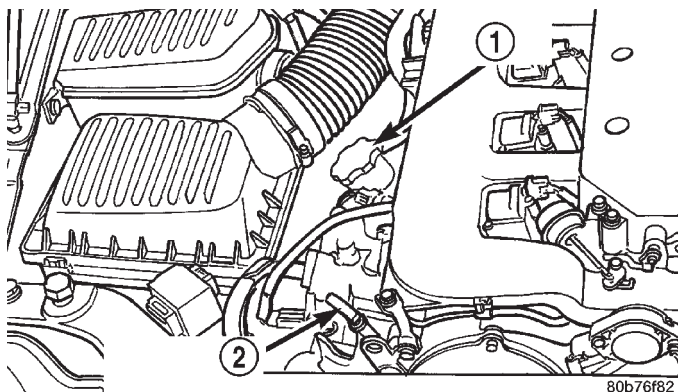


Fig. 101 ENGINE OIL FILL AND DIPSTICK LOCATIONS

- 1 - ENGINE OIL FILL
- 2 - ENGINE OIL DIPSTICK

STANDARD PROCEDURE - ENGINE OIL AND FILTER CHANGE

Change engine oil at mileage and time intervals described in the Maintenance Schedule. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

WARNING: NEW OR USED ENGINE OIL CAN BE IRRITATING TO THE SKIN. AVOID PROLONGED OR REPEATED SKIN CONTACT WITH ENGINE OIL. CONTAMINANTS IN USED ENGINE OIL, CAUSED BY INTERNAL COMBUSTION, CAN BE HAZARDOUS TO YOUR HEALTH. THOROUGHLY WASH EXPOSED SKIN WITH SOAP AND WATER. DO NOT WASH SKIN WITH GASOLINE, DIESEL FUEL, THINNER, OR SOLVENTS, HEALTH PROBLEMS CAN RESULT. DO NOT POLLUTE, DISPOSE OF USED ENGINE OIL PROPERLY. CONTACT YOUR DEALER OR GOVERNMENT AGENCY FOR LOCATION OF COLLECTION CENTER IN YOUR AREA.

TO CHANGE ENGINE OIL

- (1) Run engine until achieving normal operating temperature.
- (2) Position the vehicle on a level surface and turn engine off.
- (3) Hoist and support vehicle on safety stands. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)
- (4) Remove oil fill cap (Fig. 101).
- (5) Place a suitable drain pan under crankcase drain.
- (6) Remove drain plug from crankcase and allow oil to drain into pan. Inspect drain plug threads for stretching or other damage. Replace drain plug and gasket if damaged.
- (7) Remove oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - REMOVAL)
- (8) Install drain plug in crankcase.
- (9) Install new oil filter. (Refer to 9 - ENGINE/LUBRICATION/OIL FILTER - INSTALLATION)
- (10) Lower vehicle and fill crankcase with specified type and amount of engine oil (Fig. 101). (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION - ENGINE OIL) (Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS)
- (11) Install oil fill cap.
- (12) Start engine and inspect for leaks.
- (13) Stop engine and inspect oil level.

OIL FILTER SPECIFICATION

All engines are equipped with a high quality full-flow, disposable type oil filter. When replacing oil filter, use a Mopar® filter or equivalent.

USED ENGINE OIL DISPOSAL

Care should be exercised when disposing used engine oil after it has been drained from a vehicle engine. Refer to the WARNING above.

OIL COOLER & LINES

DESCRIPTION

Vehicles equipped with the Heavy Duty Cooling option (Sales Code NMC) or Severe Duty Cooling option (Sales Code NMS) use an engine oil cooler that is mounted inside the right radiator tank. An oil cooler pressure control valve is used to control flow to the cooler (Fig. 102).

OPERATION

Engine oil travels from the control valve through the supply line and into the cooler. The control valve allows engine oil flow when pressure is above 138–207 kPa (20–30 psi) and an internal orifice limits oil flow to a maximum of 11.3 LPM (3 GPM). The engine oil exits the cooler through the oil return line and is returned to the engine oil pan (Fig. 102).

REMOVAL

ENGINE OIL COOLER

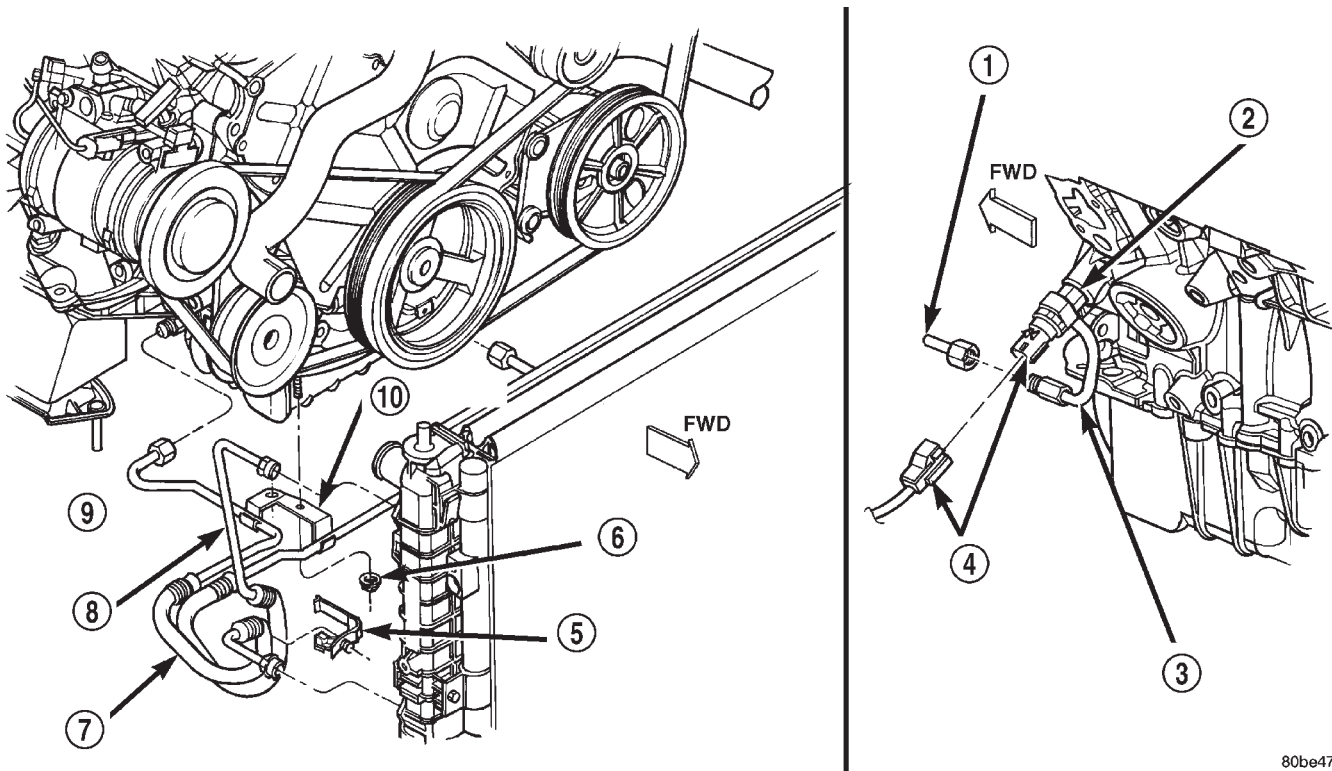
(1) The engine oil cooler is serviced with the radiator (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL).

COOLER LINES

- (1) Disconnect cooler lines at radiator (Fig. 102).
- (2) Disconnect lines at the pressure control valve and oil pan fitting (Fig. 102).
- (3) Disconnect lines for support retainer and isolator.
- (4) Remove lines.

PRESSURE CONTROL VALVE

- (1) Disconnect oil pressure switch connector (Fig. 102).
- (2) Disconnect cooler supply line for valve.
- (3) Remove valve from engine block by unscrewing fitting.



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Fig. 102 Engine Oil Cooler - 3.5L

- | | |
|---------------------------------------|------------------------|
| 1 - SUPPLY LINE TO OIL COOLER | 6 - NUT |
| 2 - FITTING | 7 - RETURN LINE |
| 3 - OIL COOLER PRESSURE CONTROL VALVE | 8 - SUPPLY LINE |
| 4 - OIL PRESSURE SWITCH AND CONNECTOR | 9 - ENGINE OIL COOLER: |
| 5 - RETAINER | 10 - ISOLATOR |

OIL COOLER & LINES (Continued)

INSTALLATION

ENGINE OIL COOLER

(1) Install radiator assembly (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION). Tighten lines to radiator fittings to 18 N·m (160 in. lbs.) (Fig. 102).

COOLER LINES

(1) Position cooler lines and connect lines to radiator fittings. Tighten lines to radiator fittings to 18 N·m (160 in. lbs.) (Fig. 102).

(2) Connect lines to pressure control valve and oil pan fitting. Tighten lines to 30 N·m (260 in. lbs.) (Fig. 102).

(3) Connect lines to support retainer and isolator.

PRESSURE CONTROL VALVE

(1) For installation of a NEW control valve:

(a) Install fitting into block. Tighten fitting to 30 N·m (260 in. lbs.).

(b) Position control valve to fitting. Push line into fitting until it locks in place. Ensure proper connection is made by pulling in-and-out on valve.

(2) For installation of original control valve:

(a) Install pressure control valve to engine block. Tighten fitting to 30 N·m (260 in. lbs.).

(3) Connect oil cooler supply line. Tighten to 30 N·m (260 in. lbs.) (Fig. 102).

(4) Connect oil pressure switch connector.

OIL FILTER

REMOVAL

NOTE: When servicing the oil filter, avoid deforming the filter can. Install the remove/install tool band strap against the base lock seam. The lock seam joining the can to the base is reinforced by the base plate.

(1) Using a suitable oil filter wrench, unscrew filter from base and discard (Fig. 103).

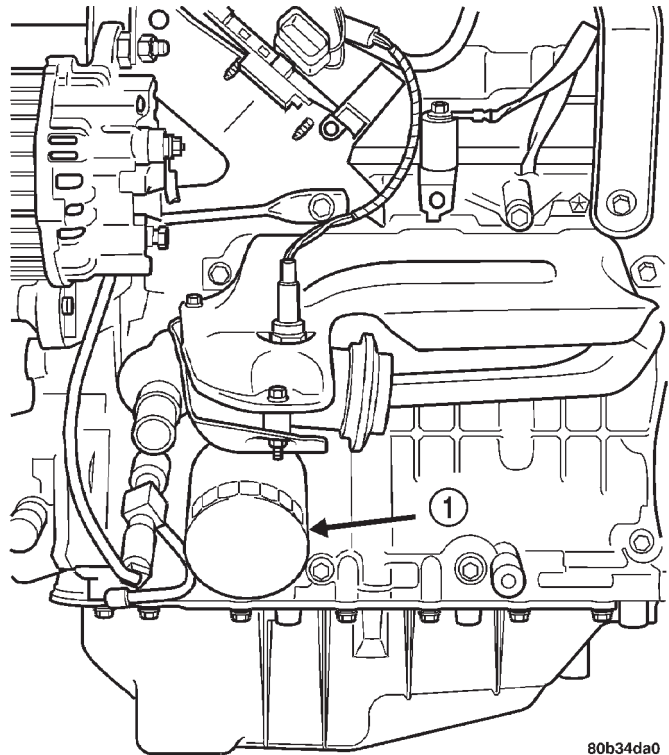


Fig. 103 OIL FILTER

1 - OIL FILTER

INSTALLATION

(1) Wipe base clean, then inspect gasket contact surface.

(2) Lubricate gasket of new filter with clean engine oil.

(3) Install and tighten filter to 16 N·m (12 ft. lbs.) of torque after gasket contacts base (Fig. 103). Use filter wrench if necessary.

(4) Start engine and check for leaks.

OIL PAN

REMOVAL

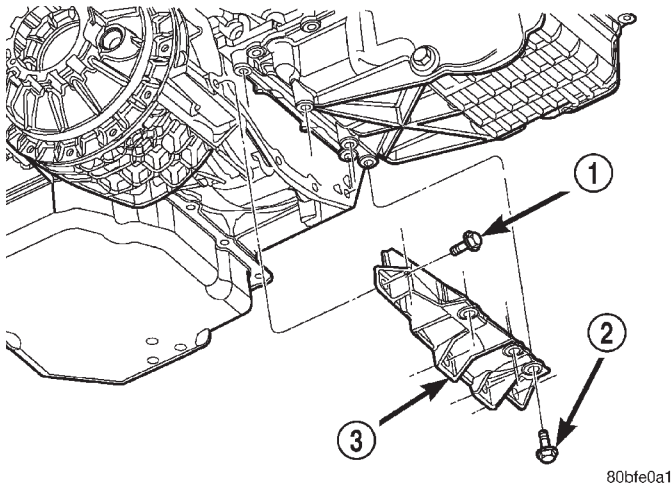
(1) Disconnect negative cable from remote jumper terminal.

(2) Remove dipstick and tube.

(3) Raise vehicle on hoist and drain engine oil.

(4) Remove structural collar from rear of oil pan and transmission housing (Fig. 104).

OIL PAN (Continued)

**Fig. 104 STRUCTURAL COLLAR**

- 1 - BOLT-HORIZONTAL
- 2 - BOLT-VERTICAL
- 3 - STRUCTURAL COLLAR

- (5) Disconnect engine oil cooler line from pan.
- (6) Disconnect transmission oil cooler line clips.
- (7) Remove oil pan (Fig. 105).
- (8) Remove oil pan gasket.
- (9) Clean oil pan and all gasket surfaces.

INSTALLATION

(1) Apply a 1/8 inch bead of Mopar® Engine RTV GEN II at the parting line of the oil pump housing and the rear seal retainer (Fig. 106).

(2) Install oil pan gasket to the engine block.

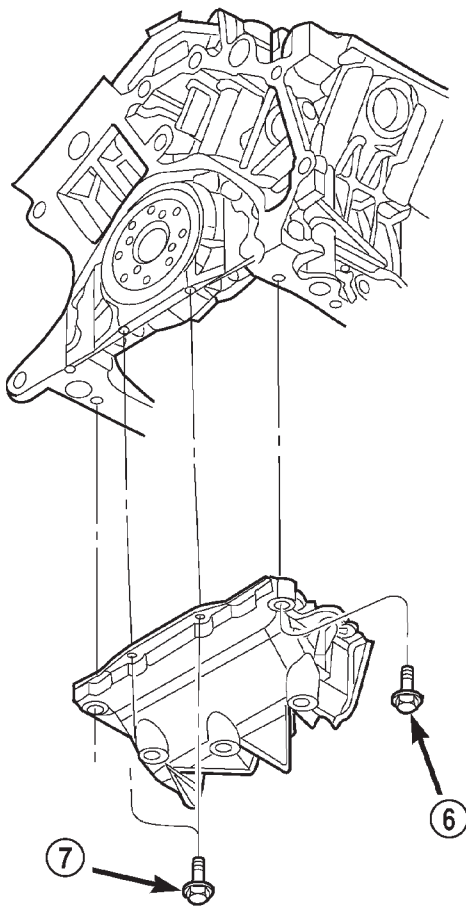
(3) Install pan and attaching fasteners (Fig. 105).

(4) Install the structural collar (Fig. 104), using the follow procedure:

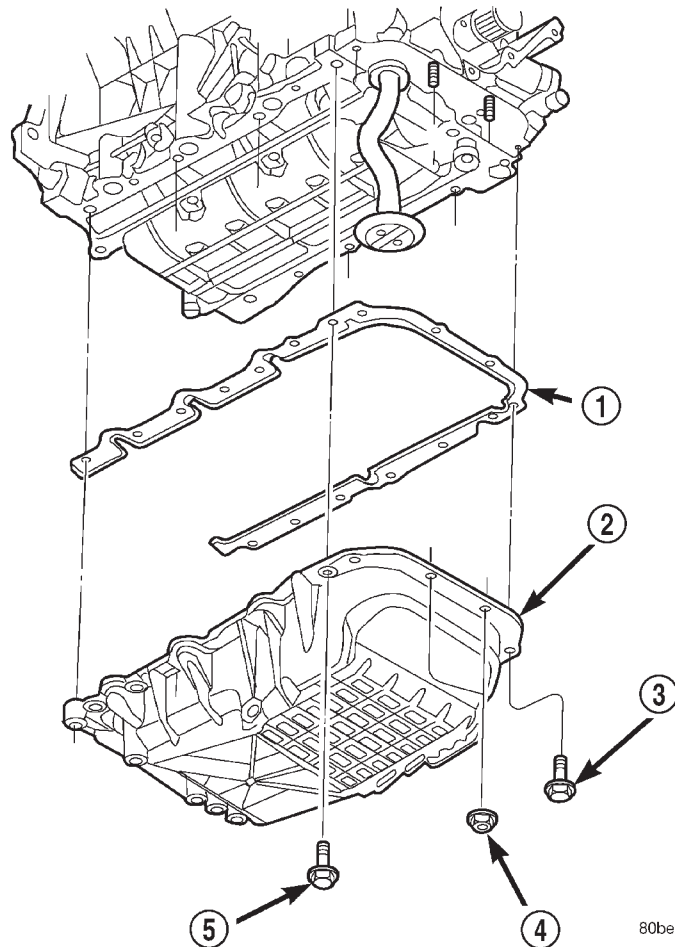
(a) Install the **vertical** collar to oil pan bolts. Pre-torque bolts to 1.1 N·m (10 in. lbs.).

(b) Install the **horizontal** collar to transmission bolts and tighten to 55 N·m (40 ft. lbs.).

(c) Starting with center vertical bolts and working outward, final torque all bolts to 55 N·m (40 ft. lbs.).

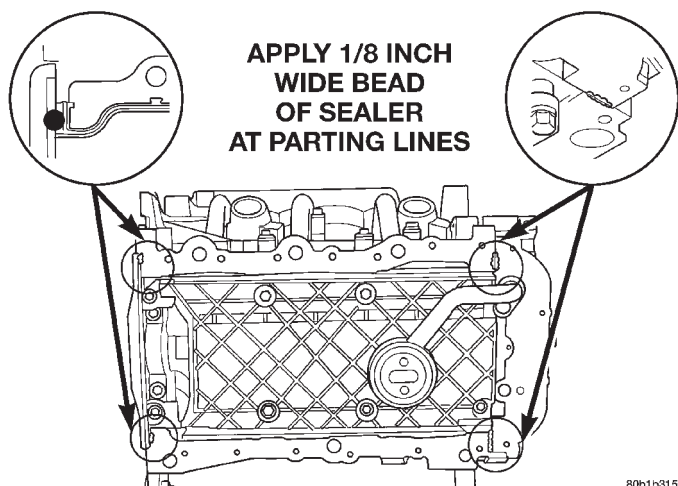


- 1 - GASKET
- 2 - OIL PAN
- 3 - BOLT-M6
- 4 - NUT-M6

**Fig. 105 OIL PAN**

- 5 - BOLT-M8
- 6 - BOLT-M8
- 7 - BOLT-M6

OIL PAN (Continued)

**Fig. 106 OIL PAN SEALING**

- (5) Lower vehicle and install dipstick and tube.
- (6) Fill engine crankcase with proper oil to correct level.
- (7) Connect negative cable.

OIL PRESSURE RELIEF VALVE

REMOVAL

- (1) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)
- (2) To remove the relief valve, proceed as follows:
 - (a) Remove the cotter pin that retains the retainer cap.
 - (b) Drill a 3.175 mm (1/8 inch.) hole into the relief valve retainer cap
 - (c) Insert a self-threading sheet metal screw into cap.
 - (d) Using a suitable slide hammer tool, remove retainer cap. Discard retainer cap
 - (e) Remove spring and relief valve (Fig. 107).

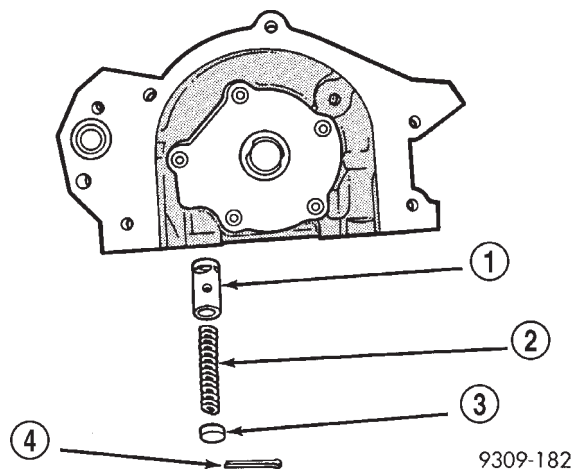
INSPECTION

- (1) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.
- (2) The relief valve spring has a free length of approximately 49.5 mm (1.95 in.) it should test between 101–110 N (23–25 lbs.) when compressed to 34 mm (1.34 in.). Replace spring that fails to meet specifications.

INSTALLATION

- (1) Lubricate relief valve with oil.

CAUTION: The pressure relief valve must be installed as shown in (Fig. 107), or engine damage may occur.

**Fig. 107 Oil Pressure Relief Valve**

- 1 - RELIEF VALVE
- 2 - SPRING
- 3 - RETAINER CAP
- 4 - COTTER PIN

- (2) Install valve, spring and retainer cap (Fig. 107).

- (3) Install new cotter pin.

- (4) Install the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)

OIL PRESSURE SWITCH

DESCRIPTION

The engine oil pressure switch is located on the lower left front side of the engine (Fig. 108). It screws into the engine oil cooler adapter fitting that is installed into the engine main oil gallery. The normally closed switch provides an input through a single wire to the low pressure indicator light on the instrument cluster.

OPERATION

The oil pressure switch provides a ground for the instrument cluster low oil pressure indicator light. The switch receives oil pressure input from the engine main oil gallery. When engine oil pressure is greater than 27.5 Kpa (4 psi), the switch contacts open, providing an open circuit to the low pressure indicator light. For wiring circuits and diagnostic information, (Refer to Appropriate Wiring/Diagnostic Information).

REMOVAL

- (1) Raise vehicle on hoist.
- (2) Position an oil collecting container under switch location.
- (3) Disconnect electrical connector (Fig. 108).
- (4) Hold oil cooler fitting with a wrench.

OIL PRESSURE SWITCH (Continued)

(5) Unscrew oil pressure switch from fitting (Fig. 108).

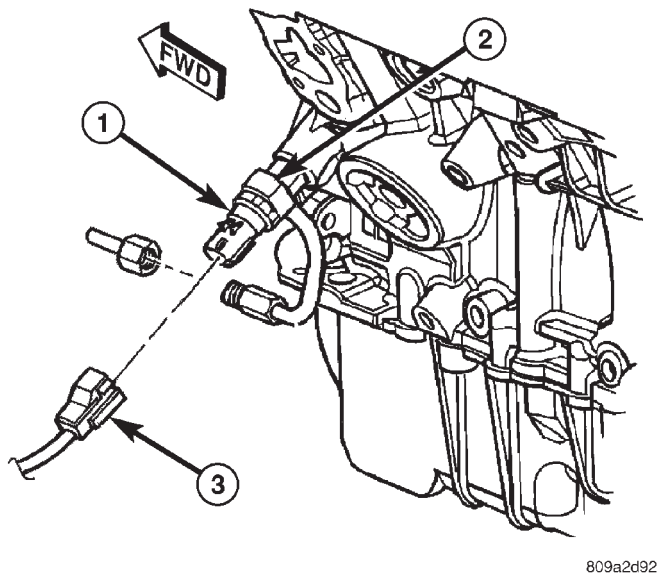


Fig. 108 OIL PRESSURE SWITCH

- 1 - OIL PRESSURE SWITCH
- 2 - OIL COOLER FITTING
- 3 - ELECTRICAL CONNECTOR

INSTALLATION

- (1) Apply Mopar® Thread Sealant to the switch threads.
- (2) Install oil pressure switch to fitting (Fig. 108).
- (3) Hold oil cooler fitting with a wrench and tighten oil pressure switch.
- (4) Connect electrical connector (Fig. 108).
- (5) Lower vehicle.
- (6) Start engine and check for leaks.
- (7) Check engine oil level and adjust as necessary.

OIL PUMP

REMOVAL

It is necessary to remove the oil pump body to service the oil pump rotors.

The oil pump pressure relief valve can be serviced by removing the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PRESSURE RELIEF VALVE - REMOVAL)

- (1) Drain the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (2) Remove the radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)
- (3) Remove the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(4) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(5) Remove the crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(6) Remove the oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - REMOVAL)

(7) Remove the oil pickup tube.

(8) Remove the oil pump fasteners. Remove pump and gasket from engine (Fig. 109).

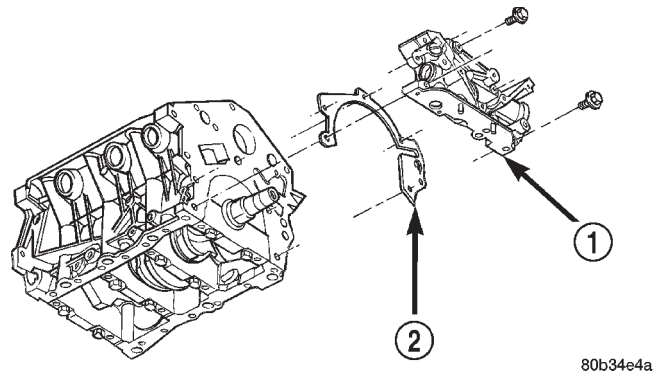


Fig. 109 OIL PUMP - REMOVAL/INSTALLATION

- 1 - OIL PUMP
- 2 - GASKET

DISASSEMBLY

- (1) To remove the relief valve, proceed as follows:
- (2) Remove cotter pin. Drill a 3.175 mm (1/8 inch.) hole into the relief valve retainer cap and insert a self-threading sheet metal screw into cap.
- (3) Clamp screw into a vise and while supporting oil pump body, remove cap by tapping oil pump body using a soft hammer. Discard retainer cap and remove spring and relief valve (Fig. 110).
- (4) Remove oil pump cover screws, and lift off cover.
- (5) Remove pump rotors.
- (6) Wash all parts in a suitable solvent and inspect carefully for damage or wear (Fig. 111).

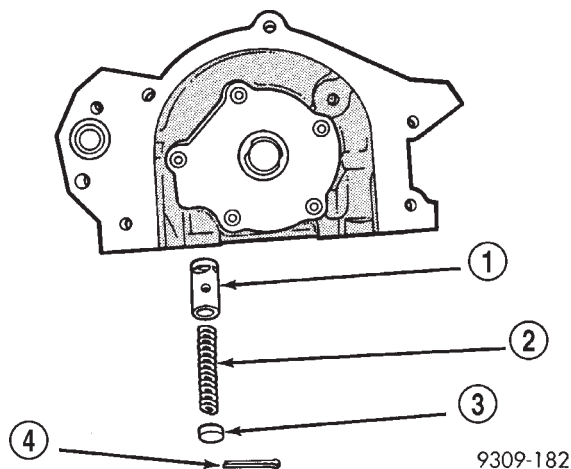
CLEANING

- (1) Clean all parts thoroughly in a suitable solvent.

INSPECTION

- (1) Disassemble oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - DISASSEMBLY)
- (2) Clean all parts thoroughly. Mating surface of the oil pump housing should be smooth. Replace pump cover if scratched or grooved.

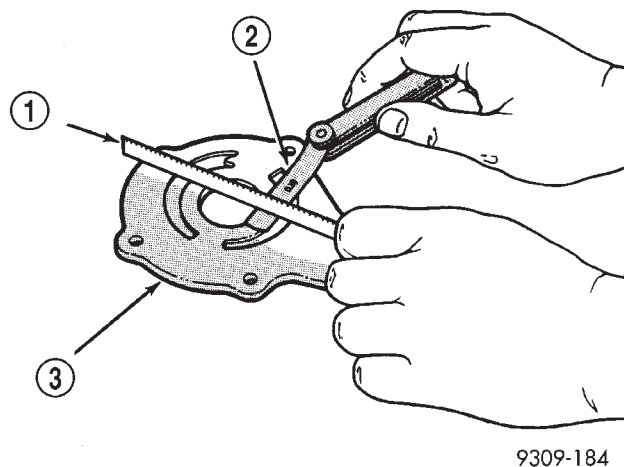
OIL PUMP (Continued)



9309-182

Fig. 110 Oil Pressure Relief Valve

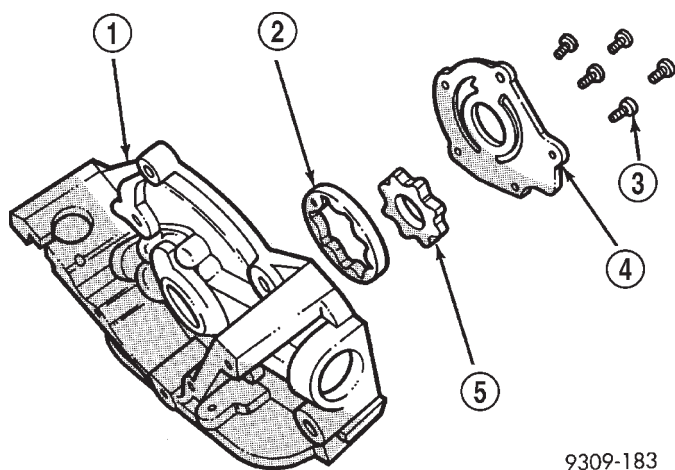
- 1 - RELIEF VALVE
- 2 - SPRING
- 3 - RETAINER CAP
- 4 - COTTER PIN



9309-184

Fig. 112 Checking Oil Pump Cover Flatness

- 1 - STRAIGHT EDGE
- 2 - FEELER GAUGE
- 3 - OIL PUMP COVER



9309-183

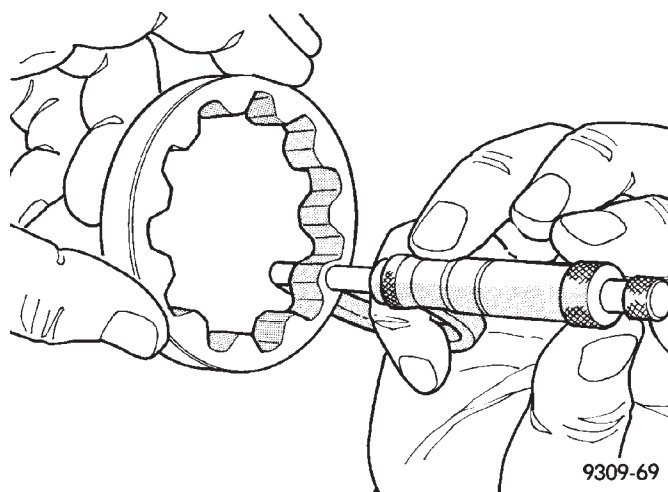
Fig. 111 Oil Pump

- 1 - OIL PUMP BODY
- 2 - OIL PUMP OUTER ROTOR
- 3 - SCREWS
- 4 - OIL PUMP COVER
- 5 - OIL PUMP INNER ROTOR

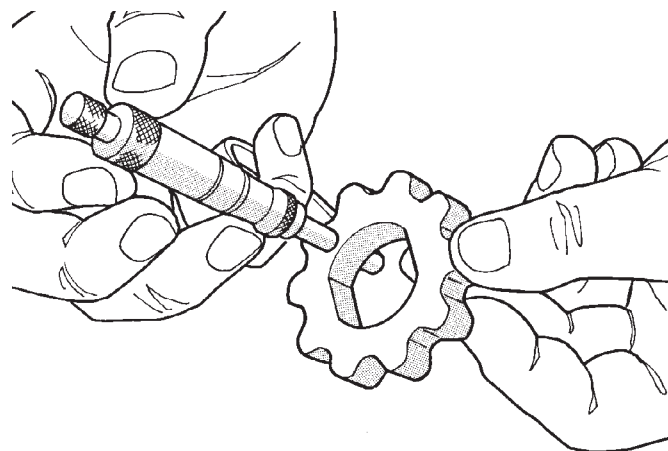
(3) Lay a straightedge across the pump cover surface (Fig. 112). If a 0.025 mm (0.001 in.) feeler gauge can be inserted between cover and straight edge, cover should be replaced.

(4) Measure thickness and diameter of outer rotor. If outer rotor thickness measures 14.299 mm (0.563 in.) or less (Fig. 113), or if the diameter is 79.78 mm (3.141 inches.) or less, replace outer rotor.

(5) If inner rotor measures 14.299 mm (0.563 in.) or less replace inner rotor (Fig. 114).



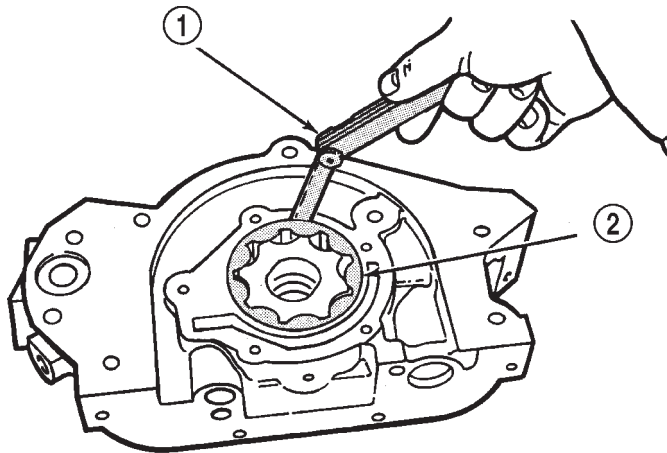
9309-69

Fig. 113 Measuring Outer Rotor Thickness

9309-70

Fig. 114 Measuring Inner Rotor Thickness

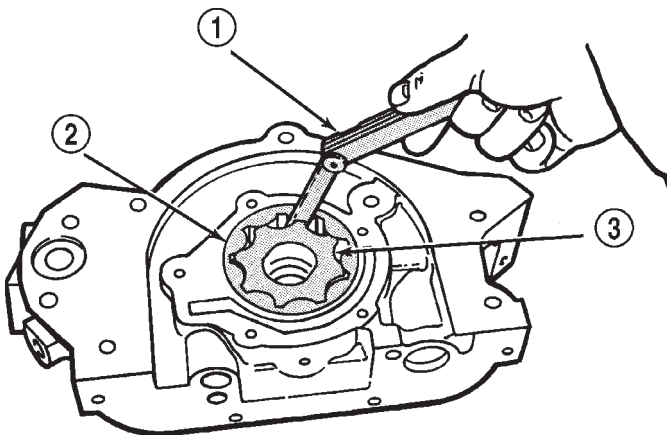
OIL PUMP (Continued)



9309-187

Fig. 115 Measuring Outer Rotor Clearance in Housing

- 1 - FEELER GAUGE
2 - OUTER ROTOR



9309-188

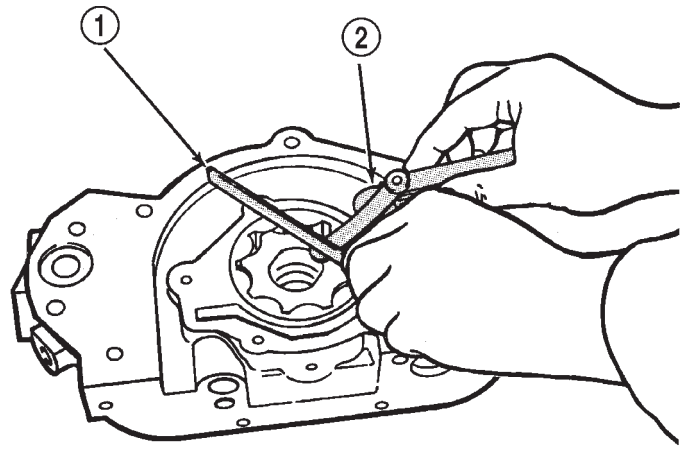
Fig. 116 Measuring Clearance Between Rotors

- 1 - FEELER GAUGE
2 - OUTER ROTOR
3 - INNER ROTOR

(6) Slide outer rotor into body, press to one side with fingers and measure clearance between rotor and body (Fig. 115). If measurement is 0.39 mm (0.015 inch.) or more, replace body only if outer rotor is in specifications.

(7) Install inner rotor into body. If clearance between inner and outer rotors (Fig. 116) is 0.20 mm (0.008 inch.) or more, replace both rotors.

(8) Place a straightedge across the face of the body, between bolt holes. If a feeler gauge of 0.077 mm (0.003 in.) or more can be inserted between rotors and the straightedge, replace pump assembly (Fig. 117) **ONLY** if rotors are in specs.



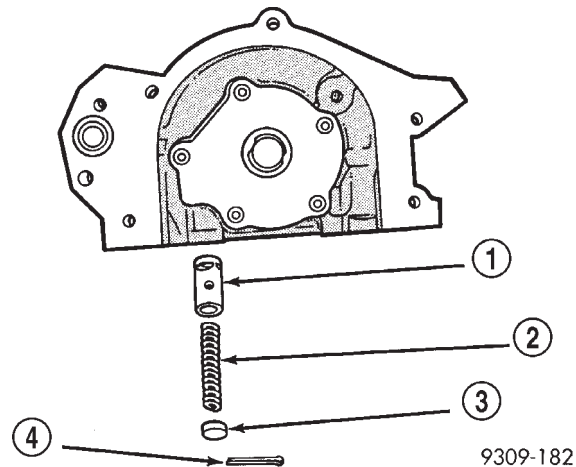
9309-189

Fig. 117 Measuring Clearance Over Rotors

- 1 - STRAIGHT EDGE
2 - FEELER GAUGES

(9) Inspect oil pressure relief valve plunger for scoring and free operation in its bore. Small marks may be removed with 400-grit wet or dry sandpaper.

(10) The relief valve spring (Fig. 118) has a free length of approximately 49.5 mm (1.95 in.) it should test between 101–110 N (23–25 lbs.) when compressed to 34 mm (1–11/32 in.). Replace spring that fails to meet specifications.



9309-182

Fig. 118 Oil Pressure Relief Valve

- 1 - RELIEF VALVE
2 - SPRING
3 - RETAINER CAP
4 - COTTER PIN

(11) Assemble oil pump. (Refer to 9 - ENGINE/LUBRICATION/OIL PUMP - ASSEMBLY)

OIL PUMP (Continued)

ASSEMBLY

- (1) Assemble oil pump using new parts as required.
- (2) Tighten cover screws to 12 N·m (105 in. lbs.) (Fig. 111).
- (3) Prime oil pump before installation by filling rotor cavity with engine oil.
- (4) If oil pressure is low and pump is within specifications, inspect for worn engine bearings or other reasons for oil pressure loss.

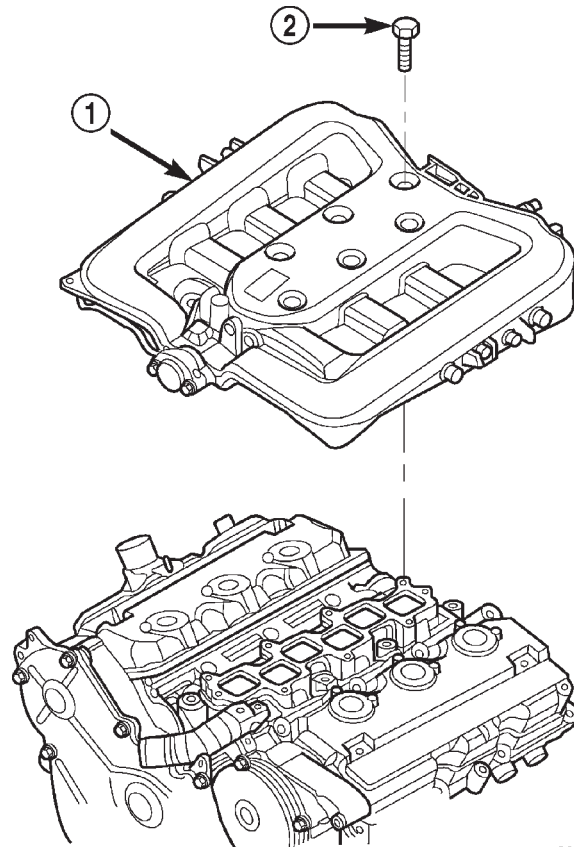
INSTALLATION

- (1) Prime oil pump before installation by filling rotor cavity with engine oil.
- (2) Install oil pump and gasket carefully over the crankshaft. Position pump onto block and tighten bolts to 28 N·m (250 in. lbs.).
- (3) Install new O-ring on oil pickup tube.
- (4) Install oil pickup tube.
- (5) Install oil pan. (Refer to 9 - ENGINE/LUBRICATION/OIL PAN - INSTALLATION)
- (6) Install crankshaft sprocket. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)
- (7) Install timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)
- (8) Install the timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)
- (9) Install the crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)
- (10) Install the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)
- (11) Install the radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)
- (12) Fill the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)
- (13) Fill engine crankcase with proper oil to the correct level.

INTAKE MANIFOLD**DESCRIPTION**

The composite upper intake manifold is a cross-flow type with long runners to improve air charge inertia (Fig. 119). An active Short Runner Valve (SRV) opens during certain operating conditions to improve top end performance. A Manifold Tuning Valve (MTV) connects the plenums at specific engine speeds to maximize low RPM torque without reducing high RPM power.

The aluminum lower intake manifold attaches to each cylinder head and uses a gasket for sealing (Fig. 120). The manifold coolant passage allows coolant to flow between cylinder heads. An attached steel tube, allows coolant flow to the heater.

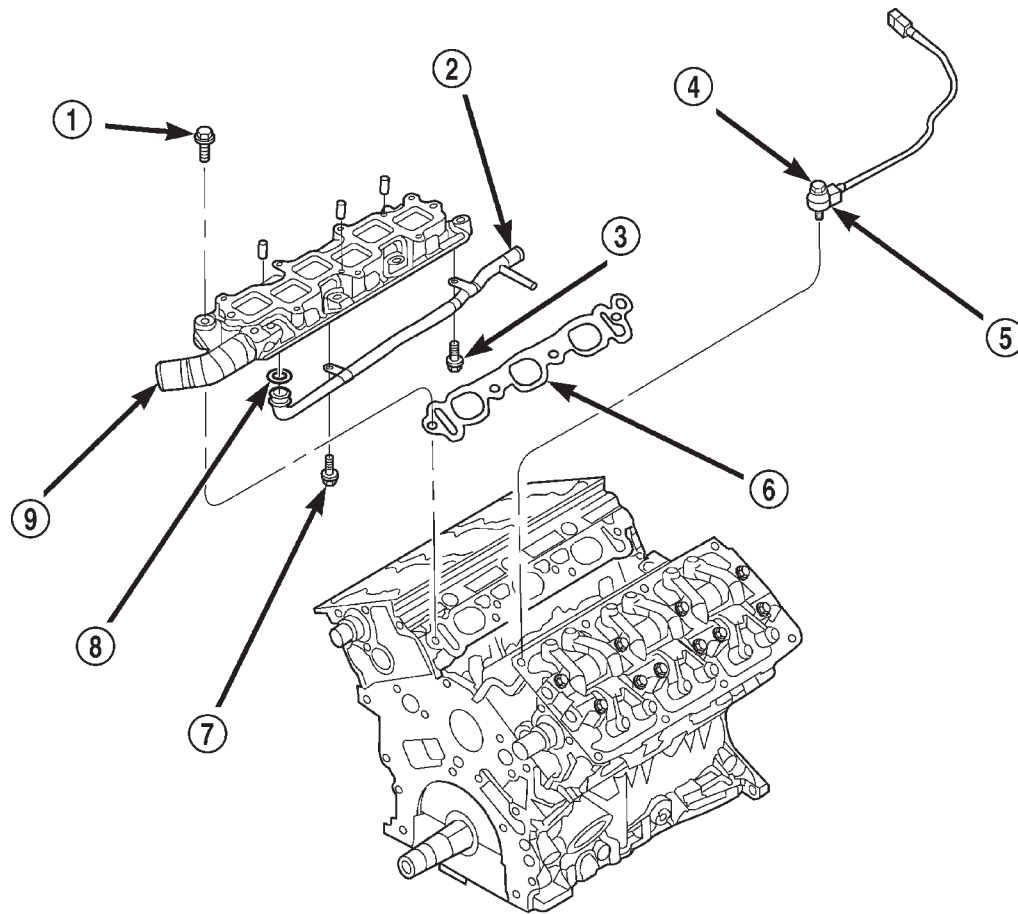


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Fig. 119 UPPER INTAKE MANIFOLD

- 1 - INTAKE MANIFOLD-UPPER
2 - BOLT

INTAKE MANIFOLD (Continued)



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Fig. 120 LOWER INTAKE MANIFOLD

- | | |
|------------------------|---------------------------|
| 1 - BOLT | 6 - GASKET |
| 2 - HEATER SUPPLY TUBE | 7 - BOLT |
| 3 - BOLT | 8 - O-RING |
| 4 - BOLT | 9 - INTAKE MANIFOLD-LOWER |
| 5 - KNOCK SENSOR | |

DIAGNOSIS AND TESTING - INTAKE MANIFOLD LEAKS

An intake manifold air leak is characterized by lower than normal manifold vacuum. Also, one or more cylinders may not be functioning.

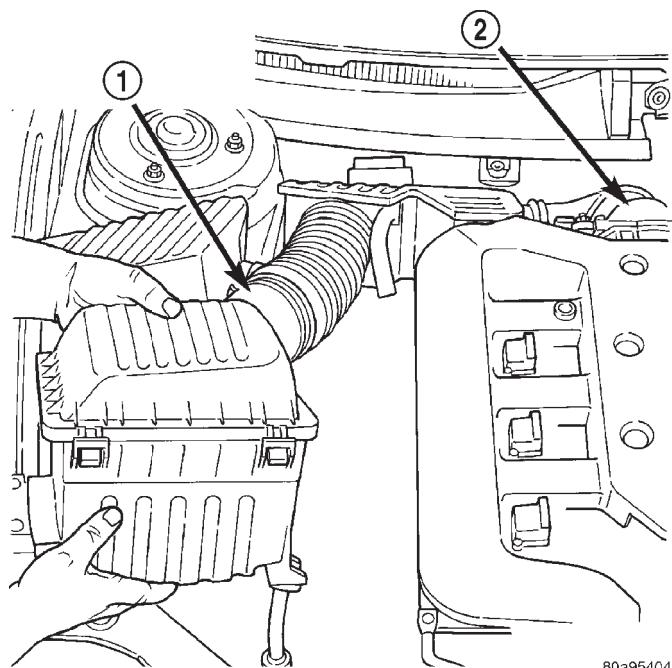
WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN A DIRECT LINE WITH THE FAN. DO NOT PUT YOUR HANDS NEAR THE PULLEYS, BELTS OR THE FAN. DO NOT WEAR LOOSE CLOTHING.

- (1) Start the engine.
- (2) Spray a small stream of water (Spray Bottle) at the suspected leak area.
- (3) If engine RPM'S change, the area of the suspected leak has been found.
- (4) Repair as required.

INTAKE MANIFOLD - UPPER**REMOVAL**

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Disconnect the Inlet Air Temperature (IAT) Sensor connector. Remove air cleaner housing and inlet hose (Fig. 121).
- (3) Remove throttle and speed control cables from throttle arm and bracket (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - REMOVAL).
- (4) Disconnect electrical connectors from the following sensors and actuators:
 - Short Runner Valve (SRV)(If Equipped)
 - Manifold Tuning Valve (MTV)(If Equipped)
 - Throttle Position Sensor (TPS)
 - Idle Air Control (IAC)

INTAKE MANIFOLD - UPPER (Continued)

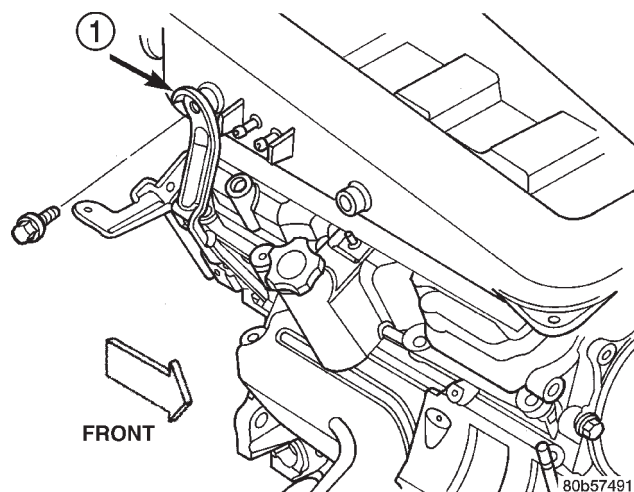


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Fig. 121 AIR CLEANER WITH INLET HOSE

- 1 - AIR CLEANER ASSEMBLY WITH AIR INLET HOSE
2 - THROTTLE BODY

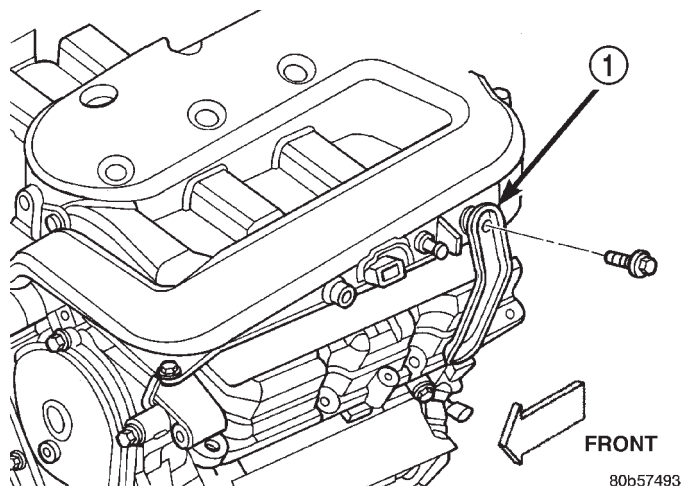
- Manifold Absolute Pressure (MAP)
- (5) Disconnect vacuum hoses from the following:
- Speed Control Reservoir
 - Positive Crankcase Ventilation (PCV) Valve
 - Proportional Purge Solenoid
 - Power Brake Booster
- (6) Remove right side (Fig. 122) and left side (Fig. 123) intake manifold supports.



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Fig. 122 INTAKE MANIFOLD SUPPORT - RIGHT

- 1 - SUPPORT BRACKET

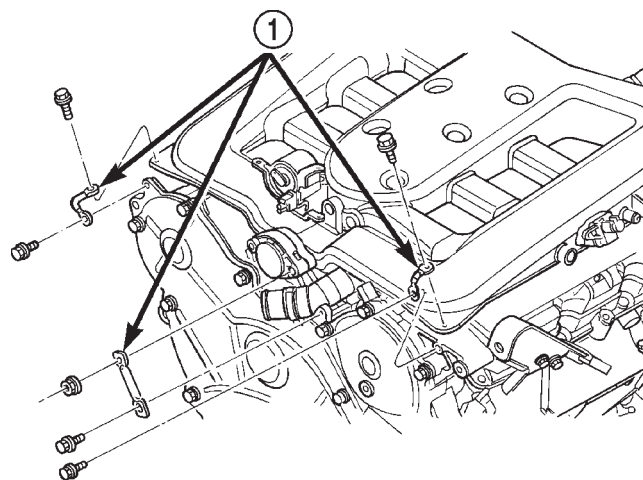


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Fig. 123 INTAKE MANIFOLD SUPPORT - LEFT

- 1 - SUPPORT BRACKET

(7) Remove support brackets at intake manifold front corners and at MTV (Fig. 124).



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Fig. 124 INTAKE MANIFOLD SUPPORTS - FRONT

- 1 - SUPPORT BRACKETS

(8) Loosen upper fastener attaching throttle body to support bracket.

(9) Remove bolts attaching intake manifold and remove manifold (Fig. 125).

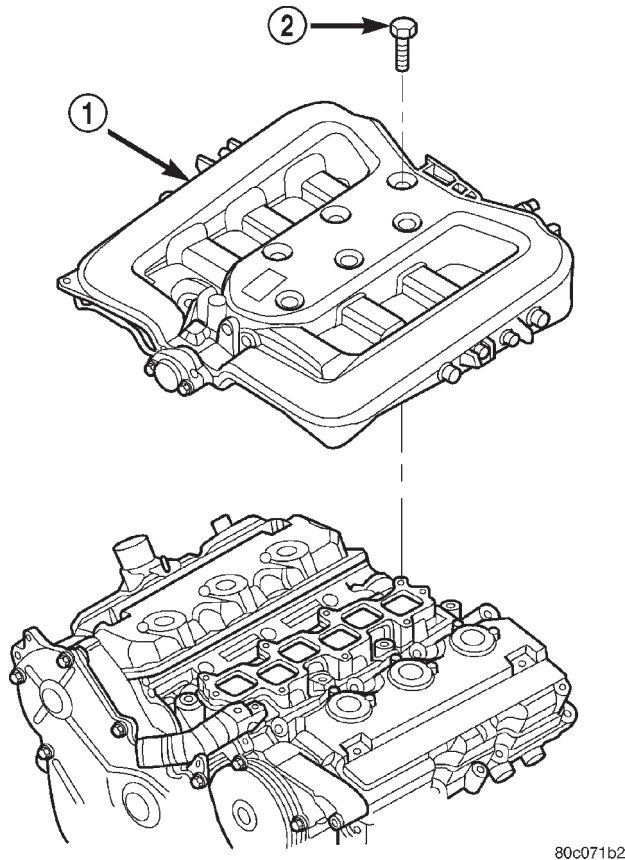
INSPECTION

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged or clogged EGR ports

If the manifold exhibits any damaged or warped conditions, replace the manifold. Clean EGR ports as necessary.

INTAKE MANIFOLD - UPPER (Continued)

**Fig. 125 UPPER INTAKE MANIFOLD**

- 1 - INTAKE MANIFOLD-UPPER
2 - BOLT

INSTALLATION

- (1) Clean and inspect gasket sealing surfaces.

NOTE: Intake gaskets can be reused, provided they are free of cuts or tears.

- (2) Inspect gasket for cuts or tears. Replace gaskets as necessary.

- (3) Install intake manifold (Fig. 125) and hand start all attaching bolts.

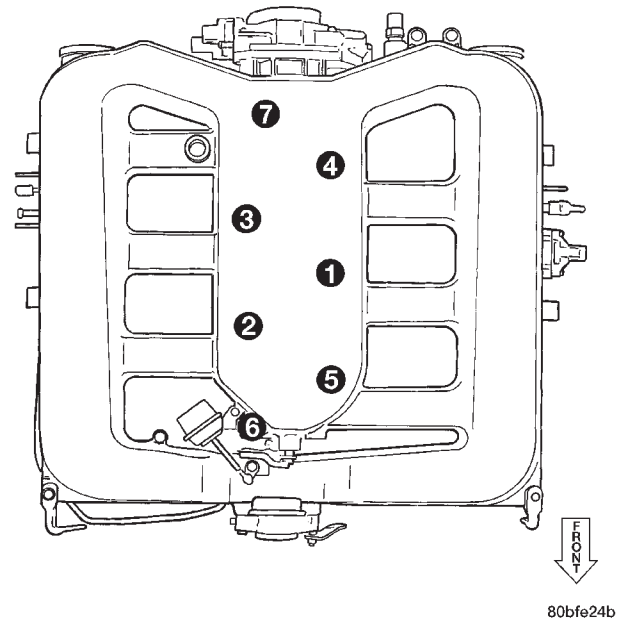
- (4) Tighten bolts gradually in sequence shown in (Fig. 126) until a torque of 12 N·m (105 in. lbs.) is obtained.

- (5) Install right side (Fig. 122) and left side (Fig. 123) intake manifold supports.

- (6) Install manifold support brackets at front corners and at MTV (Fig. 124).

- (7) Tighten fastener attaching throttle body to support bracket.

- (8) Connect vacuum lines to the following:
- Speed Control Reservoir
 - Positive Crankcase Ventilation (PCV) Valve
 - Proportional Purge Solenoid
 - Power Brake Booster

**Fig. 126 UPPER INTAKE MANIFOLD TIGHTENING**

- (9) Connect electrical connectors to the following:

- Short Runner Valve (SRV)(If Equipped)
- Manifold Tuning Valve (MTV)(If Equipped)
- Throttle Position Sensor (TPS)
- Idle Air Control (IAC)
- Manifold Absolute Pressure (MAP)

- (10) Install throttle and speed control cables to bracket and throttle arm (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/THROTTLE CONTROL CABLE - INSTALLATION).

- (11) Install air cleaner housing and inlet hose (Fig. 121). Connect Inlet Air Temperature (IAT) Sensor connector.

- (12) Connect negative cable to remote jumper terminal.

INTAKE MANIFOLD - LOWER**REMOVAL**

- (1) Perform fuel pressure release procedure. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY - STANDARD PROCEDURE)

- (2) Drain the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

- (3) Disconnect the radiator upper hose from the coolant outlet at front of manifold.

- (4) Remove the upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - REMOVAL)

- (5) Disconnect the electrical connectors to fuel injectors and coolant temperature sensor.

INTAKE MANIFOLD - LOWER (Continued)

(6) Disconnect heater and coolant bottle supply hoses from coolant tube at rear of intake manifold (Fig. 127).

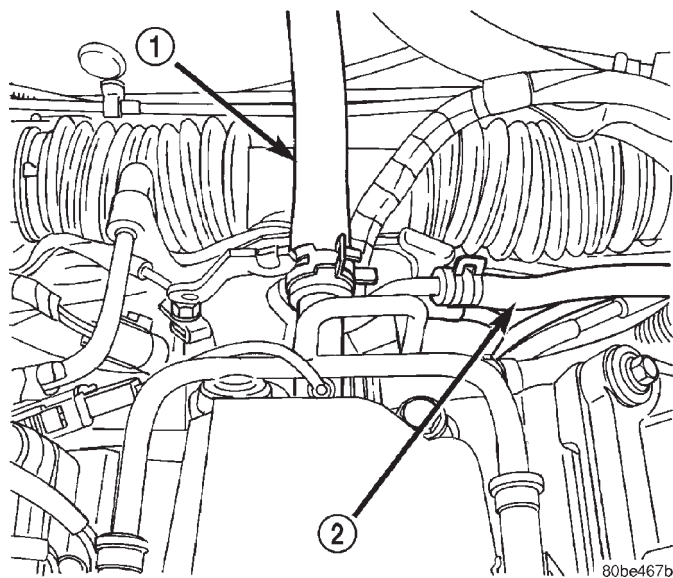


Fig. 127 HEATER SUPPLY HOSE CONNECTIONS

1 - HEATER SUPPLY HOSE

2 - COOLANT BOTTLE SUPPLY HOSE

(7) Disconnect the fuel supply hose from fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(8) Remove the screw attaching the fuel rail support bracket to the throttle body support bracket.

(9) Remove the bolts attaching fuel rail.

(10) Remove fuel rail and injectors as an assembly.

(11) Remove bolts attaching lower intake and remove intake manifold (Fig. 128).

INSPECTION

Check manifold for:

- Damage and cracks
- Gasket surface damage or warpage
- Damaged fuel injector ports

If the manifold exhibits any of these conditions, replace the manifold.

INSTALLATION

(1) Clean all sealing surfaces.

NOTE: Gaskets can be reused provided they are free of tears or cuts.

(2) Inspect gaskets for tears or cuts. Replace as necessary.

(3) Position gaskets and intake manifold on cylinder head surfaces.

(4) Install fuel rail with injectors.

(5) Install intake manifold bolts and gradually tighten in sequence shown in (Fig. 129) until a torque of 28 N·m (250 in. lbs.) is obtained.

(6) Install screw attaching fuel rail support bracket to the throttle body support bracket.

(7) Connect fuel supply hose to fuel rail. (Refer to 14 - FUEL SYSTEM/FUEL DELIVERY/FUEL LINES - STANDARD PROCEDURE)

(8) Connect heater and coolant bottle supply hoses to coolant tube at rear of intake manifold (Fig. 127).

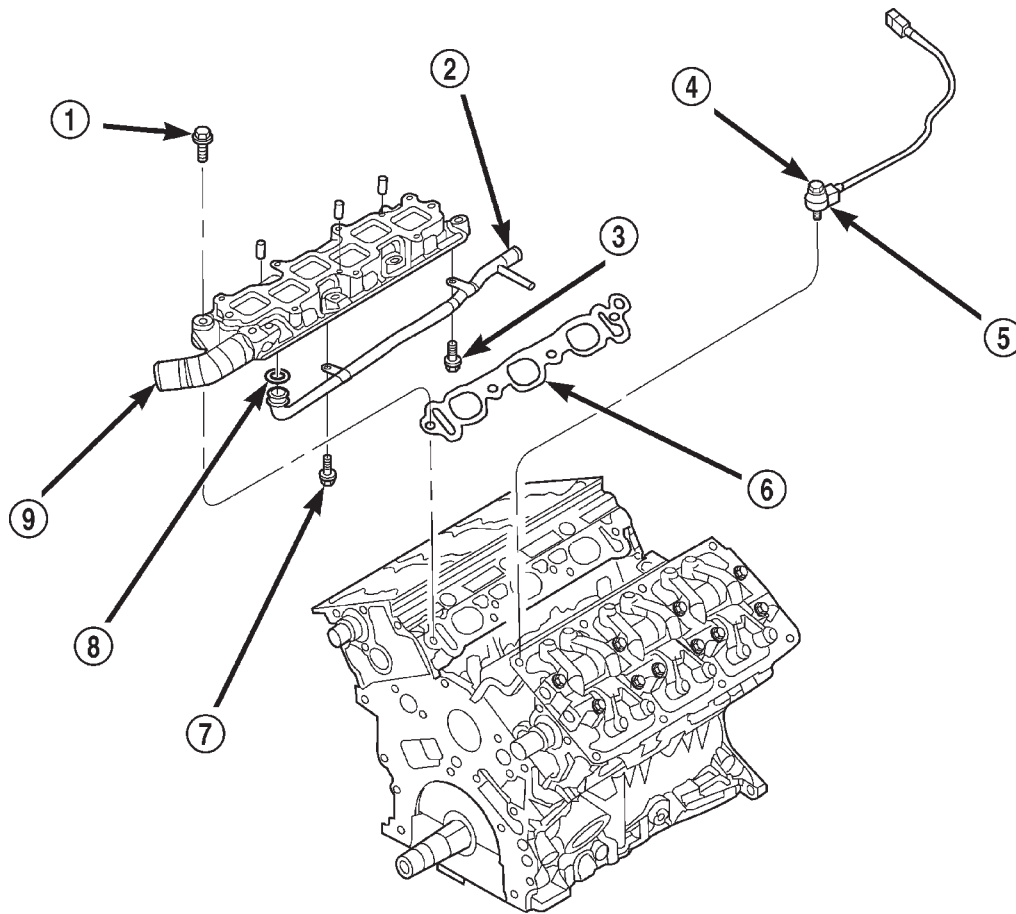
(9) Connect electrical connectors to fuel injectors and coolant temperature sensor.

(10) Install the upper intake manifold. (Refer to 9 - ENGINE/MANIFOLDS/INTAKE MANIFOLD - INSTALLATION)

(11) Connect the radiator upper hose to the coolant outlet at front of lower manifold.

(12) Fill the cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

INTAKE MANIFOLD - LOWER (Continued)

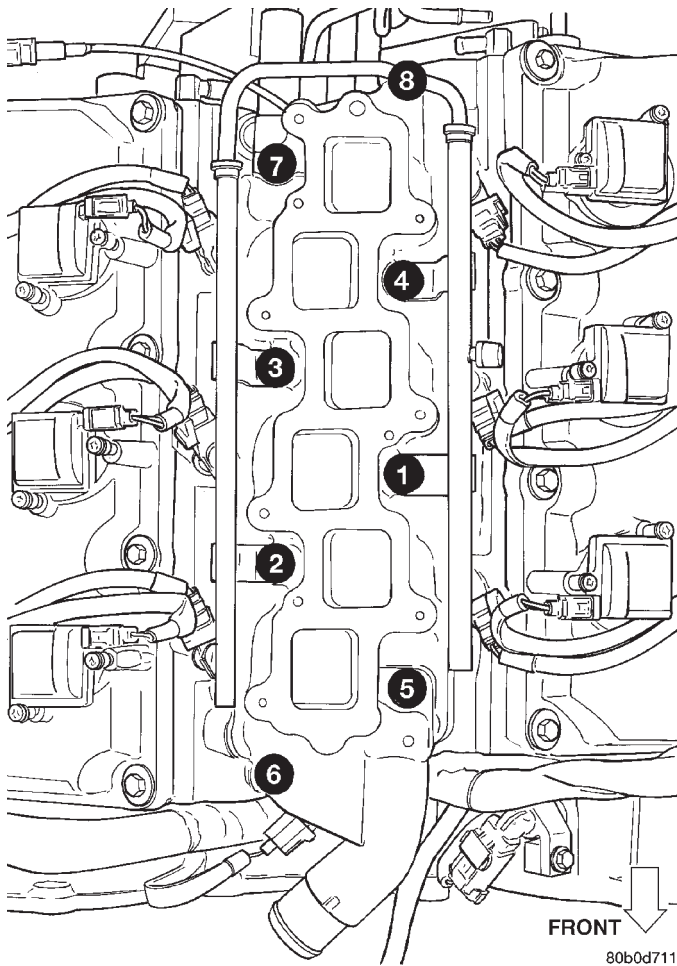


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Fig. 128 LOWER INTAKE MANIFOLD

- | | |
|------------------------|---------------------------|
| 1 - BOLT | 6 - GASKET |
| 2 - HEATER SUPPLY TUBE | 7 - BOLT |
| 3 - BOLT | 8 - O-RING |
| 4 - BOLT | 9 - INTAKE MANIFOLD-LOWER |
| 5 - KNOCK SENSOR | |

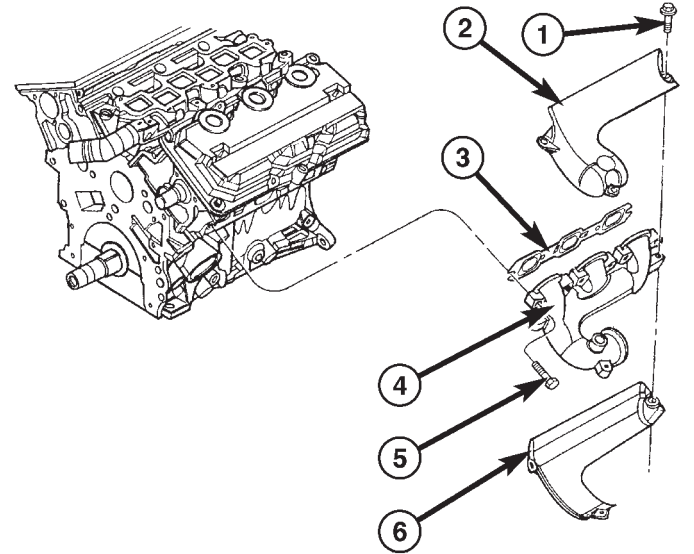
INTAKE MANIFOLD - LOWER (Continued)

**Fig. 129 LOWER INTAKE MANIFOLD TIGHTENING**

EXHAUST MANIFOLD

DESCRIPTION

Both manifolds are a log style made of ductile cast iron (Fig. 130). The outlets are designed for V-Band clamp attachment of close coupled catalytic converters.

**Fig. 130 EXHAUST MANIFOLD**

- 1 - BOLT - HEAT SHIELD
- 2 - HEAT SHIELD
- 3 - GASKET
- 4 - EXHAUST MANIFOLD
- 5 - BOLT - EXHAUST MANIFOLD
- 6 - HEAT SHIELD

EXHAUST MANIFOLD - RIGHT

REMOVAL

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Raise vehicle on hoist.
- (3) Remove the exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)
- (4) Loosen converter pipe support attaching bolt at transaxle mount.
- (5) Loosen the A/C belt. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)
- (6) Lower vehicle.
- (7) Remove air cleaner housing and air inlet tube.
- (8) Loosen and remove V-Band clamp at exhaust manifold connector.

NOTE: Do not reuse V-Band clamp.

- (9) Remove the A/C compressor attaching bolts and set compressor aside.
- (10) Remove engine oil dipstick tube.
- (11) Remove the A/C compressor bracket.
- (12) Disconnect oxygen sensor electrical connector and remove sensor.
- (13) Remove heat shield attaching bolts and remove heat shields (Fig. 130).
- (14) Remove the exhaust manifold attaching bolts (Fig. 131).
- (15) Remove the exhaust manifold and gasket (Fig. 131).

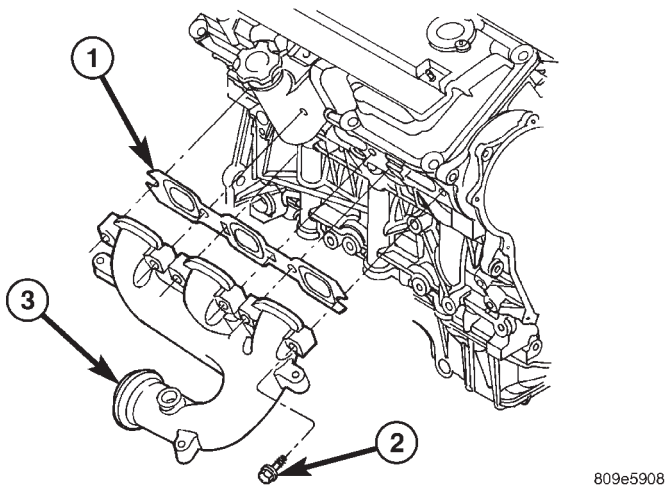


Fig. 131 EXHAUST MANIFOLD - RIGHT SIDE

- 1 - GASKET
2 - BOLT - EXHAUST MANIFOLD
3 - EXHAUST MANIFOLD

INSPECTION

- (1) Inspect exhaust manifolds for damage or cracks.
- (2) Check manifold flatness.
- (3) Inspect the exhaust manifold gasket for obvious discoloration or distortion.
- (4) Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

INSTALLATION

- (1) Install exhaust manifold and gasket. Tighten bolts starting at the center working outward to 23 N·m (200 in. lbs.) (Fig. 131).
- (2) Install heat shields and tighten attaching bolts to 12 N·m (105 in. lbs.) (Fig. 130).
- (3) Install oxygen sensor to manifold and connect electrical connector.
- (4) Install the A/C compressor mounting bracket.
- (5) Install engine oil dipstick tube.
- (6) Install the A/C compressor and drive belt. For belt installation procedure, (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).
- (7) Install a new V-Band clamp and tighten to 11 N·m (100 in. lbs.).
- (8) Raise vehicle on hoist.
- (9) Install the exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)
- (10) Install and/or tighten nut attaching converter pipe support to transaxle mount to 47 N·m (35 ft. lbs.).
- (11) Lower the vehicle.
- (12) Install air cleaner housing and air inlet tube.
- (13) Connect negative cable.

EXHAUST MANIFOLD - LEFT

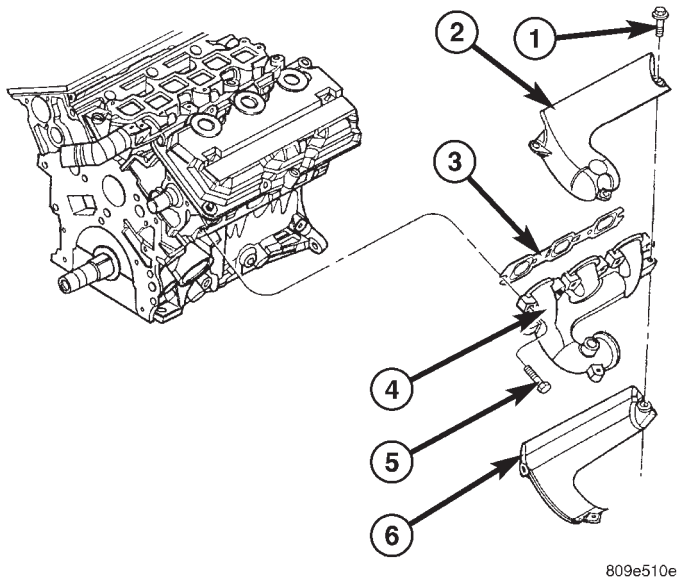
REMOVAL

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Raise the vehicle on hoist.
- (3) Remove the exhaust system. (Refer to 11 - EXHAUST SYSTEM - REMOVAL)
- (4) Loosen converter pipe support attaching bolt at transaxle mount.
- (5) Lower the vehicle.
- (6) Loosen and remove the V-Band clamp at exhaust manifold connector.

NOTE: Do not reuse V-Band clamp.

EXHAUST MANIFOLD - LEFT (Continued)

- (7) Remove electrical connector harness bracket.
- (8) Disconnect oxygen sensor electrical connector and remove sensor from manifold.
- (9) Remove heat shield attaching bolts and remove heat shield (Fig. 132).
- (10) Remove exhaust manifold attaching bolts (Fig. 132).
- (11) Remove exhaust manifold and gasket (Fig. 132).

**Fig. 132 EXHAUST MANIFOLD**

- 1 - BOLT - HEAT SHIELD
- 2 - HEAT SHIELD
- 3 - GASKET
- 4 - EXHAUST MANIFOLD
- 5 - BOLT - EXHAUST MANIFOLD
- 6 - HEAT SHIELD

INSPECTION

- (1) Inspect exhaust manifolds for damage or cracks.
- (2) Check manifold flatness.
- (3) Inspect the exhaust manifold gasket for obvious discoloration or distortion.
- (4) Check distortion of the cylinder head mounting surface with a straightedge and thickness gauge.

INSTALLATION

- (1) Install the exhaust manifold and gasket. Tighten bolts starting at the center working outward to 23 N·m (200 in. lbs.) (Fig. 132).
- (2) Install heat shields and tighten bolts to 12 N·m (105 in. lbs.) (Fig. 132).
- (3) Install oxygen sensor to manifold and connect electrical connector.
- (4) Attach electrical connector bracket to brace.
- (5) Install a new V-Band clamp and tighten to 11 N·m (100 In. lbs.).
- (6) Raise vehicle on hoist.
- (7) Install and/or tighten nut attaching converter pipe support to transaxle mount to 47 N·m (35 ft. lbs.).
- (8) Install the exhaust system. (Refer to 11 - EXHAUST SYSTEM - INSTALLATION)
- (9) Lower vehicle and connect negative cable.

VALVE TIMING**DESCRIPTION**

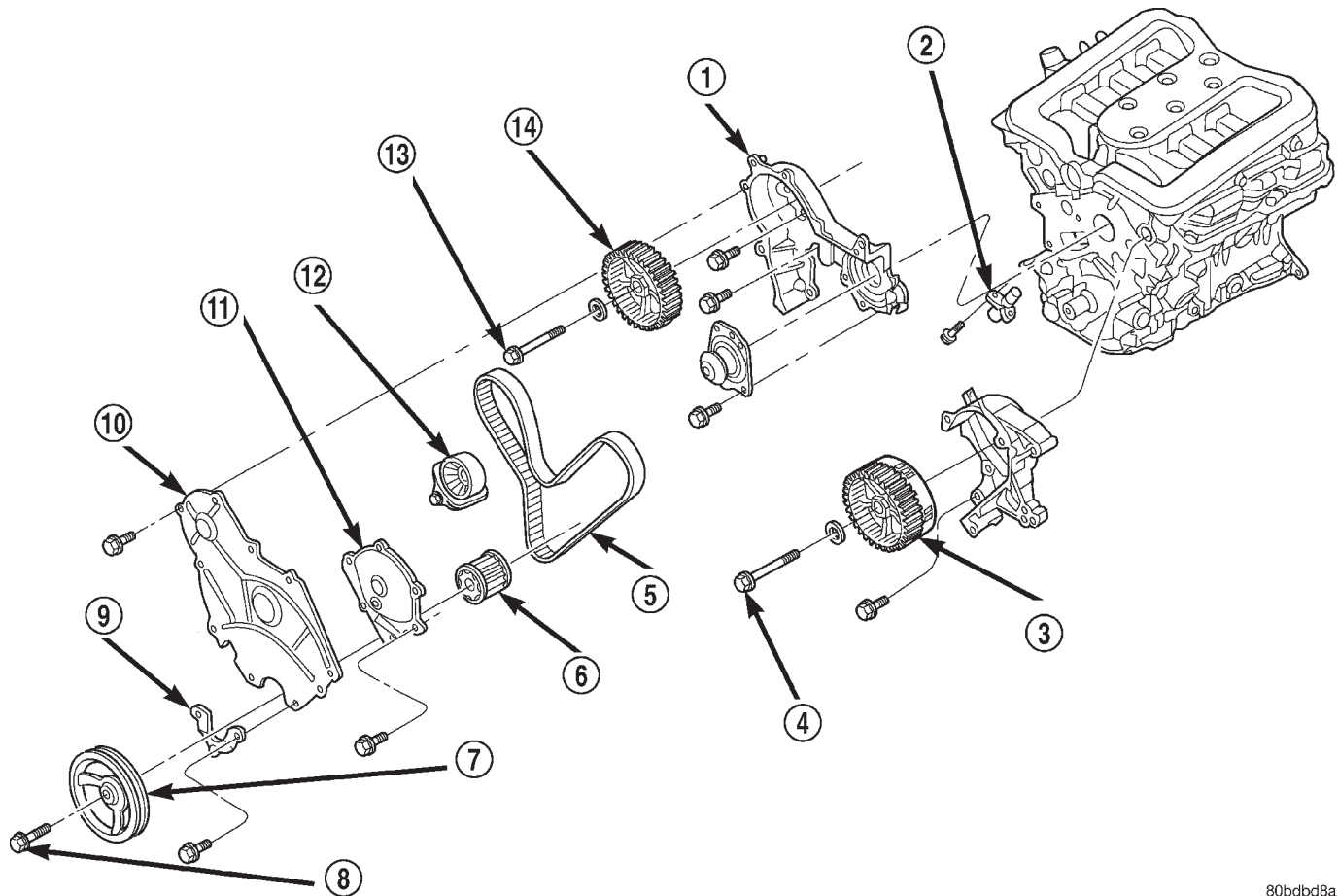
The timing drive system (Fig. 133) has been designed to provide quiet performance and reliability to support a **NON** free-wheeling engine.

The timing drive components include a crankshaft sprocket, camshaft sprockets, tensioner pulley, hydraulic tensioner and a timing belt. The water pump is driven by the back side of the timing belt. The right and left camshaft sprockets are not interchangeable because of the cam sensor pick-up wheel on the left sprocket.

STANDARD PROCEDURE - VALVE TIMING VERIFICATION

- (1) Refer to Camshaft Sprocket Removal procedure for verification of valve timing (Refer to 9 - ENGINE/ VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

VALVE TIMING (Continued)



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Fig. 133 TIMING DRIVE SYSTEM

- | | |
|------------------------------------|------------------------------|
| 1 - TIMING BELT COVER - RIGHT REAR | 8 - BOLT-CRANKSHAFT DAMPER |
| 2 - TENSIONER-TIMING BELT | 9 - TIMING BELT COVER-LOWER |
| 3 - CAMSHAFT SPROCKET | 10 - TIMING BELT COVER-RIGHT |
| 4 - BOLT-CAMSHAFT SPROCKET | 11 - TIMING BELT COVER-LEFT |
| 5 - TIMING BELT | 12 - TENSIONER PULLEY |
| 6 - CRANKSHAFT SPROCKET | 13 - BOLT-CAMSHAFT SPROCKET |
| 7 - CRANKSHAFT DAMPER | 14 - CAMSHAFT SPROCKET |

TIMING BELT COVER(S) -
FRONT**REMOVAL**

- (1) Disconnect negative cable from remote jumper terminal.
- (2) Remove upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)
- (3) Remove the radiator fan (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)

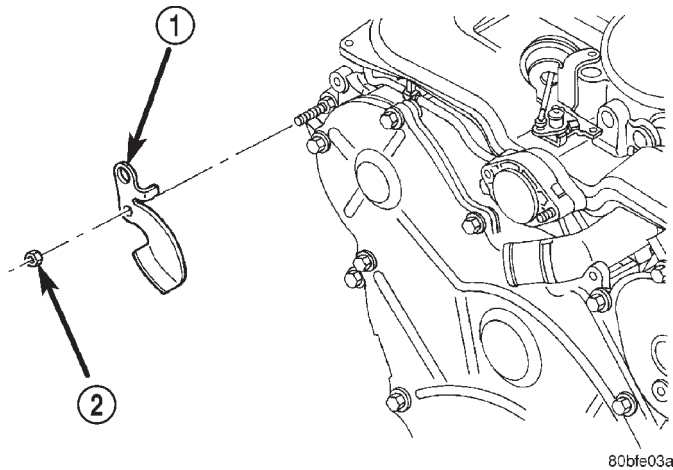
(4) Remove the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(5) Remove crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(6) Remove the lower belt cover located behind the crankshaft vibration damper (Fig. 135).

(7) Remove the A/C belt guide/lift bracket (Fig. 134).

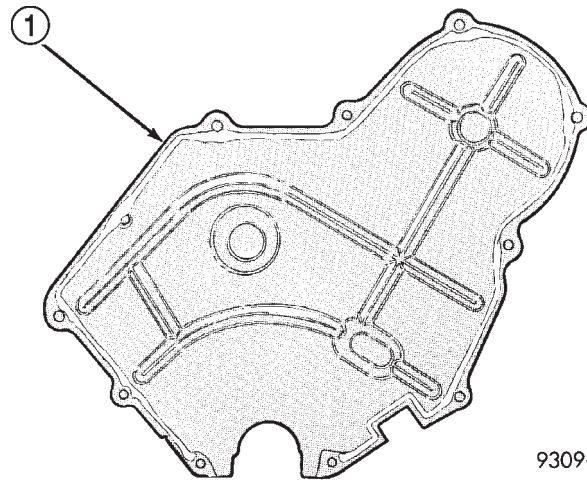
TIMING BELT COVER(S) - FRONT (Continued)



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Fig. 134 A/C BELT GUIDE/LIFT BRACKET

- 1 - A/C BELT GUIDE/LIFT BRACKET
2 - NUT



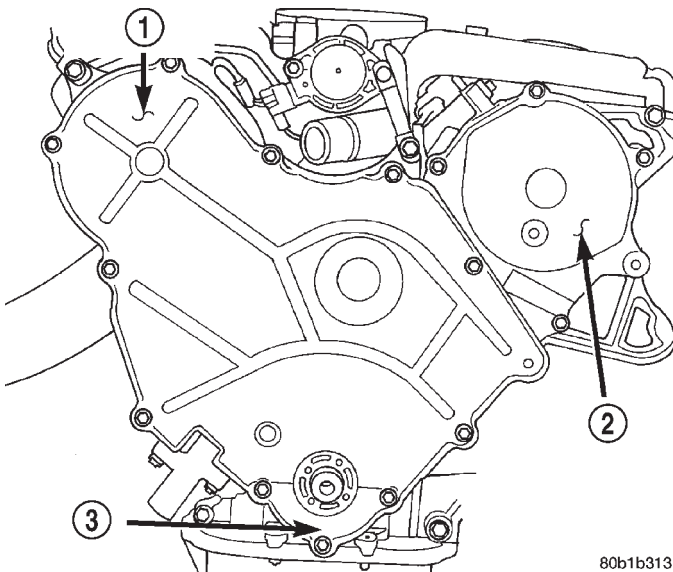
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Fig. 136 TIMING BELT COVER SEALER

- 1 - SEALER

(8) Remove the stamped steel cover (Fig. 135). **Do not remove the sealer on the cover, it is reusable (Fig. 136).** If some sealer is missing use Mopar® Engine RTV GEN II to replace the missing sealer.

(9) Remove the left cast cover (Fig. 135).



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Fig. 135 TIMING BELT COVERS

- 1 - RIGHT SIDE COVER (STAMPED)
2 - LEFT SIDE COVER (CAST)
3 - LOWER COVER

INSTALLATION

- (1) Install the left cast cover (Fig. 135) and generator/power steering belt tensioner pulley and bracket.
- (2) Install the right stamped steel cover (Fig. 135).
- (3) Install A/C belt guide/lift bracket (Fig. 134).
- (4) Install the lower cover (Fig. 135).

(5) Install the crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(6) Install the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(7) Install the radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)

(8) Install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)

(9) Connect negative cable to remote jumper terminal.

TIMING BELT COVER(S) - REAR**REMOVAL**

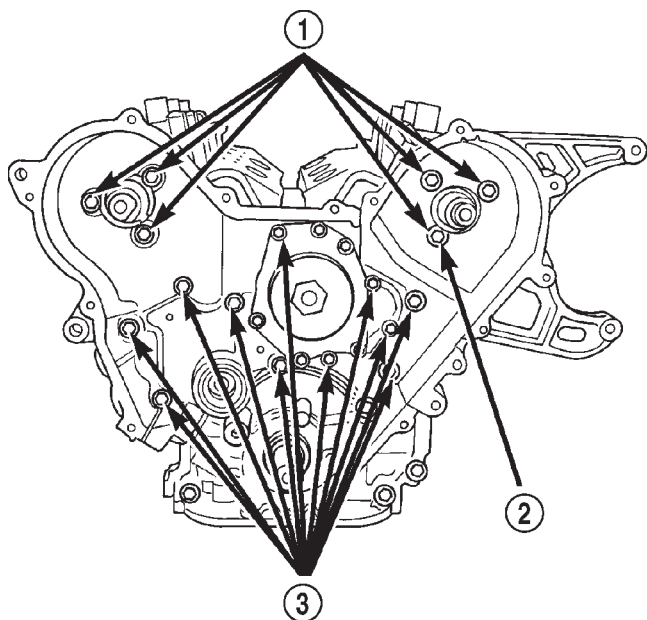
- (1) Remove camshaft sprocket(s). (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)
- (2) Remove rear timing belt cover bolts (Fig. 137).
- (3) Remove the rear cover(s).

NOTE: The right side rear timing belt cover has O-rings to seal the water pump passages to cylinder block (Fig. 139). Do not reuse the O-rings.

INSTALLATION

- (1) Inspect the rear cover foam seals for damage or wear (Fig. 138). Replace as necessary.
- (2) Clean right rear timing belt cover O-ring sealing surfaces and grooves (Fig. 139). Lubricate new O-rings with Mopar® Dielectric Grease or equivalent to facilitate assembly.

TIMING BELT COVER(S) - REAR (Continued)

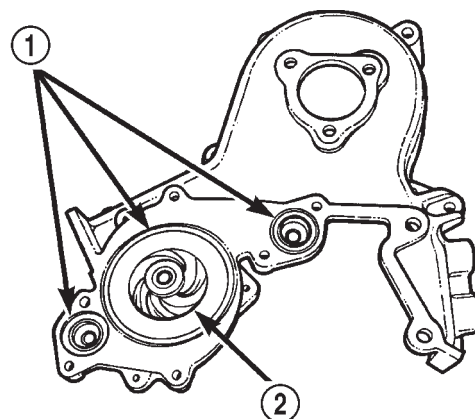


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Fig. 137 Rear Timing Belt Cover Bolts

- 1 - REAR COVER TO CYLINDER HEAD BOLTS
- 2 - APPLY SEALANT TO BOLT THREADS
- 3 - REAR COVER TO CYLINDER BLOCK BOLTS

(3) Position NEW O-rings on cover (Fig. 139).



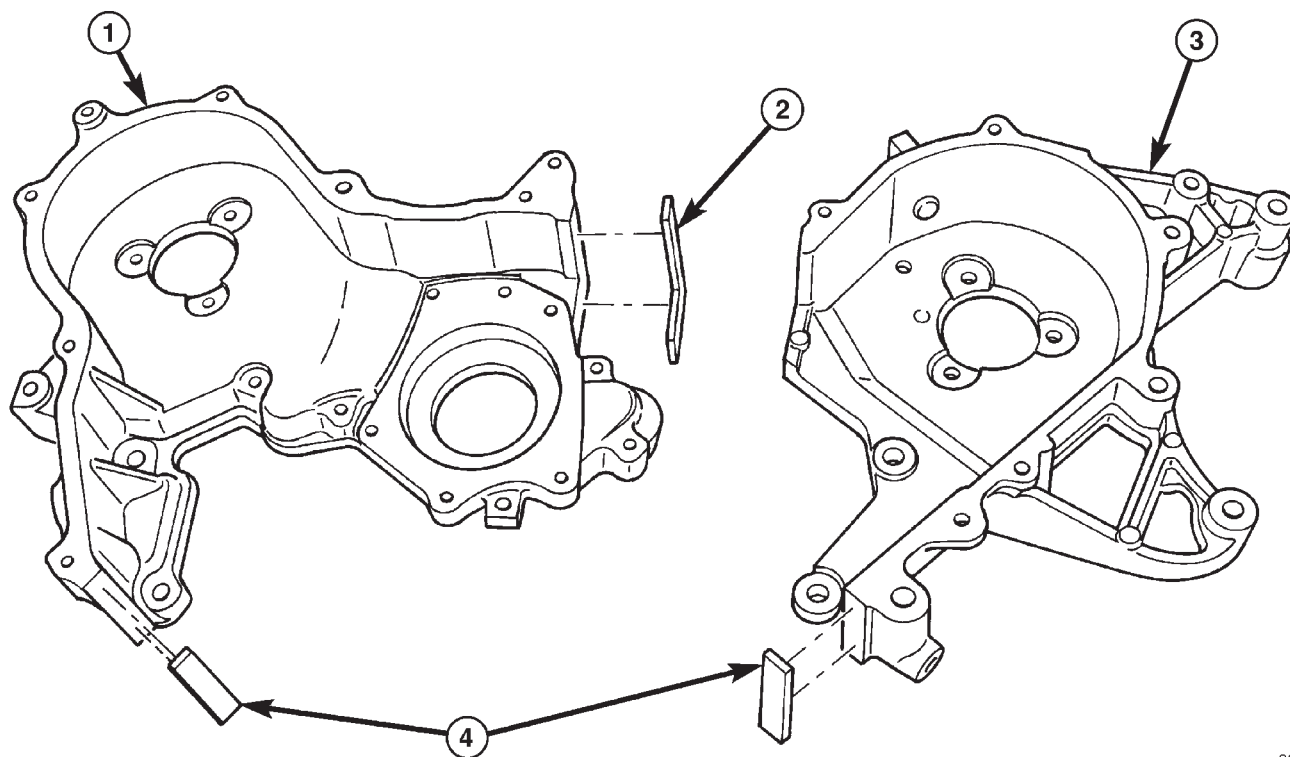
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Fig. 139 Right Side Timing Belt Cover O-Rings

- 1 - O-RINGS
- 2 - WATER PUMP IMPELLER

(4) Install rear timing belt covers (Fig. 140) and (Fig. 141). Tighten bolts to the following specified torque:

- M10—54 N·m (40 ft. lbs.)
- M8—28 N·m (20 ft. lbs.)



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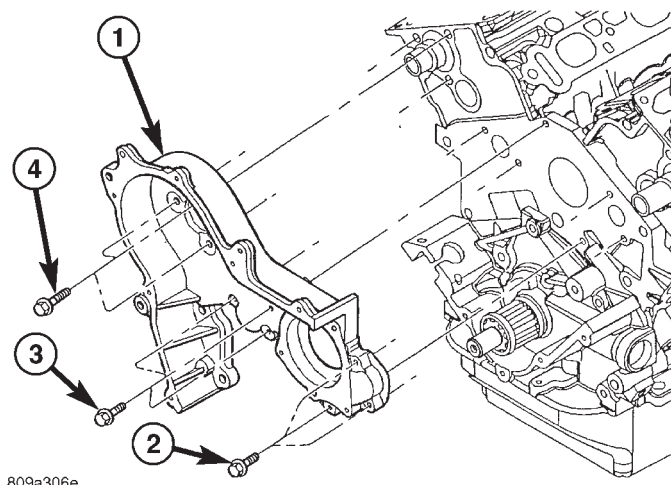
Fig. 138 TIMING COVER REAR SEALS

- 1 - REAR COVER - RIGHT SIDE
- 2 - FOAM SEAL

- 3 - REAR COVER - LEFT SIDE
- 4 - FOAM SEALS

TIMING BELT COVER(S) - REAR (Continued)

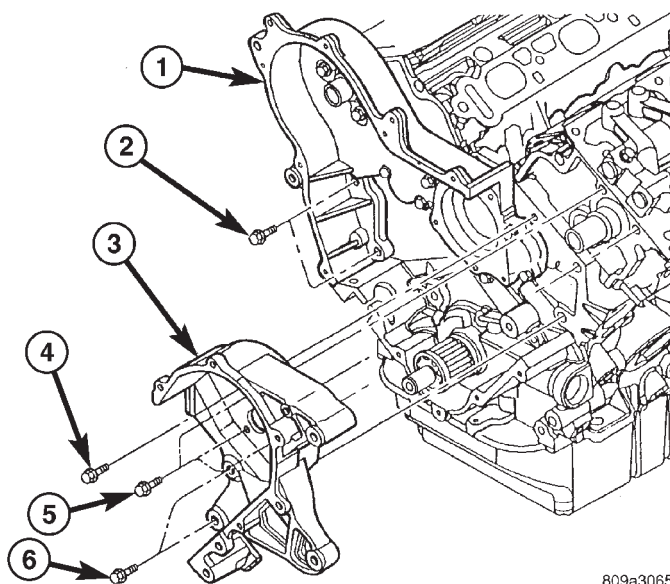
- M6—12 N·m (105 in. lbs.)



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Fig. 140 REAR COVER - RIGHT

- 1 - REAR COVER - RIGHT SIDE
- 2 - BOLT
- 3 - BOLT
- 4 - BOLT



809a3065

Fig. 141 REAR COVER - LEFT

- 1 - REAR COVER - RIGHT SIDE
- 2 - BOLT
- 3 - REAR COVER - LEFT SIDE
- 4 - BOLT
- 5 - BOLT
- 6 - BOLT

(5) Install camshaft sprockets and reassemble all components. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

TIMING BELT TENSIONER & PULLEY

REMOVAL

REMOVAL - TENSIONER PULLEY ASSEMBLY

(1) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL - TIMING BELT)

(2) Remove the timing belt tensioner pulley and bracket assembly by unscrewing the pivot bolt from the oil pump housing (Fig. 142).

REMOVAL - TENSIONER

(1) For timing belt tensioner removal procedure (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL - TIMING BELT)

INSPECTION

INSPECTION - TENSIONER PULLEY ASSEMBLY

NOTE: The tensioner pulley, bracket, and pivot bolt is serviced as an assembly.

(1) Inspect pulley for free movement (Fig. 142). Replace if pulley is loose, seized, or rough turning

(2) Inspect pulley bearing and seal (Fig. 142). Replace if damaged.

(3) Inspect pivot bolt for free movement in tensioner bracket (Fig. 142). Replace assembly if seized or excessive looseness.

INSPECTION - TENSIONER

(1) Inspect hydraulic tensioner for fluid loss around the plunger seal (Fig. 143). Replace tensioner if leaking.

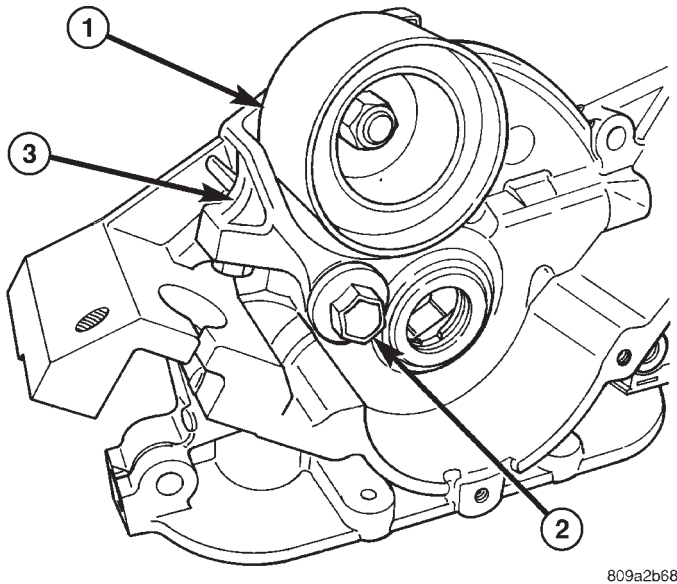
INSTALLATION

INSTALLATION - TENSIONER PULLEY ASSEMBLY

(1) Install the timing belt tensioner pulley assembly (Fig. 142). Tighten the pivot bolt to 61 N·m (45 ft. lbs.).

(2) Install the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION - TIMING BELT)

TIMING BELT TENSIONER & PULLEY (Continued)



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Fig. 142 TENSIONER PULLEY ASSEMBLY

- 1 - TENSIONER PULLEY
- 2 - PIVOT BOLT
- 3 - TENSIONER BRACKET

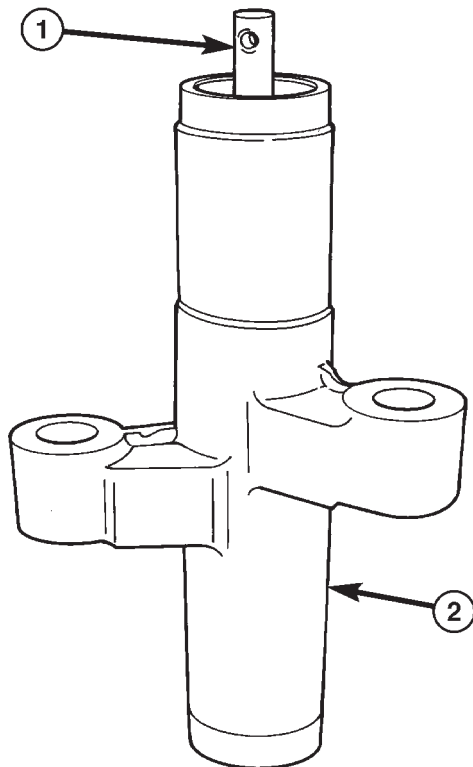
INSTALLATION - TENSIONER

(1) For timing belt tensioner installation procedure (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - INSTALLATION - TIMING BELT).

TIMING BELT AND SPROCKETS**REMOVAL****REMOVAL - TIMING BELT**

CAUTION: The following procedure can only be used when the camshaft sprockets **HAVE NOT BEEN LOOSENED** or removed from the camshafts. Once the camshaft sprockets are loosened, an engine timing procedure is required. This procedure is detailed in the Camshaft Removal and Installation procedures (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - REMOVAL).

CAUTION: The 3.2/3.5L are **NOT** freewheeling engines. Therefore, care should be taken not to rotate the camshafts or crankshaft with the timing belt removed.



809a2b76

Fig. 143 TIMING BELT TENSIONER

- 1 - PLUNGER (EXTENDED POSITION)
- 2 - TENSIONER HOUSING

(1) Disconnect negative cable from remote jumper terminal.

(2) Remove radiator upper crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - REMOVAL)

(3) Remove the radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - REMOVAL)

(4) Remove the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL)

(5) Remove the crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - REMOVAL)

(6) Remove the front timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(7) Mark belt running direction, if timing belt is to be reused.

CAUTION: When aligning timing marks, always rotate engine by turning the crankshaft. Failure to do so will result in valve and/or piston damage.

(8) Rotate engine clockwise until crankshaft mark aligns with the TDC mark on oil pump housing and the camshaft sprocket timing marks are between the marks on the rear covers (Fig. 144).

TIMING BELT AND SPROCKETS (Continued)

CAUTION: Align the camshaft sprockets between the marks on rear belt covers before timing belt removal or damage to valve and/or pistons could occur.

(9) Using a ink or paint marker; mark the exact position of the camshaft sprocket timing mark relative to the two timing marks on the rear timing cover.

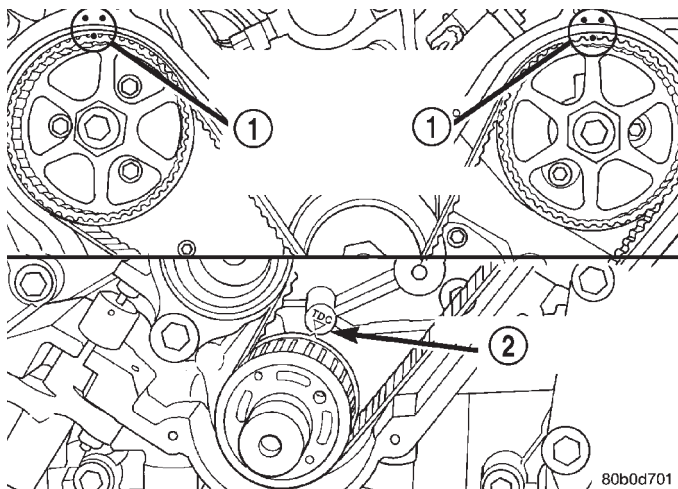


Fig. 144 Engine Timing

- 1 - ALIGN CAMSHAFT SPROCKET TIMING MARK BETWEEN MARKS ON REAR TIMING BELT COVER
- 2 - CRANKSHAFT AT TDC

(10) Remove the timing belt tensioner (Fig. 145) and remove timing belt.

TIMING BELT TENSIONER

CAUTION: Compress the tensioner slowly, as damage to tensioner could result.

(11) When tensioner is removed from the engine it is necessary to compress the plunger into the tensioner body.

CAUTION: Index the tensioner in the vise the same way it is installed on the engine. This ensures proper pin orientation when tensioner is installed on the engine.

(a) Place the tensioner into a vise and SLOWLY compress the plunger (Fig. 146). Total bleed down of tensioner should take about 5 minutes.

(b) When plunger is compressed into the tensioner body install a pin through the body and plunger to retain plunger in place until tensioner is installed.

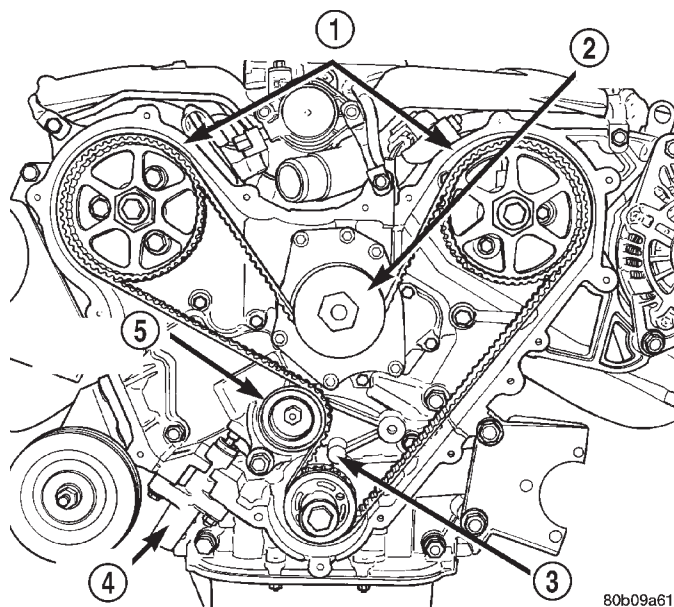


Fig. 145 TIMING BELT SYSTEM

- 1 - REAR TIMING BELT COVERS
- 2 - WATER PUMP
- 3 - TDC INDICATOR
- 4 - BELT TENSIONER
- 5 - TENSIONER PULLEY

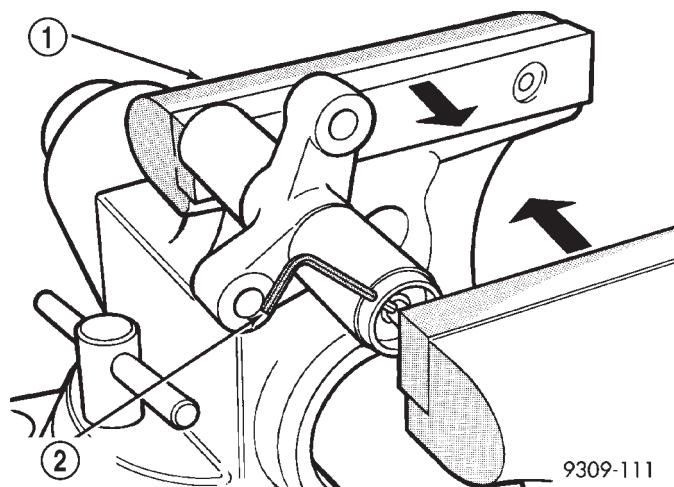


Fig. 146 Compressing Timing Belt Tensioner

- 1 - VISE
- 2 - LOCKING PIN

REMOVAL - CAMSHAFT SPROCKETS

CAUTION: The 3.2/3.5L engines are NOT a free-wheeling design. Therefore, care should be taken not to rotate the camshafts or crankshaft with the timing belt removed.

TIMING BELT AND SPROCKETS (Continued)

CAUTION: When camshaft sprocket bolts are loosened or removed, the camshafts must be re-timed to the engine. Also, the camshaft sprocket bolts must NOT be reused.

(1) Remove front timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(2) Position crankshaft sprocket to the TDC mark on the oil pump housing by turning crankshaft in the clockwise direction (Fig. 147).

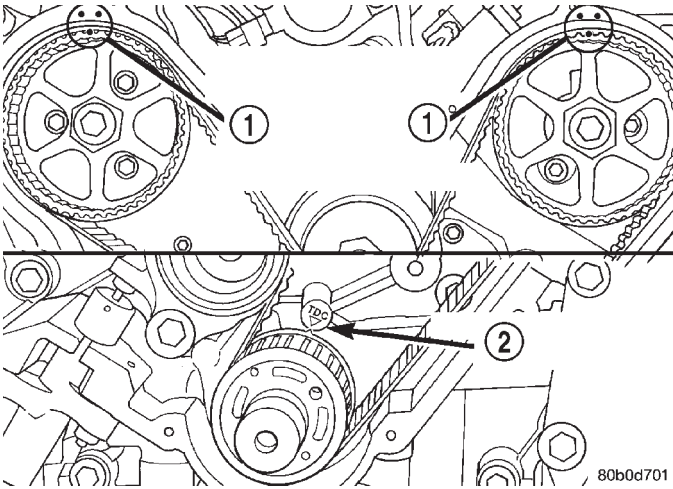


Fig. 147 Camshaft Sprocket Timing Marks

- 1 - ALIGN CAMSHAFT SPROCKET TIMING MARK BETWEEN MARKS ON REAR TIMING BELT COVER
2 - CRANKSHAFT AT TDC

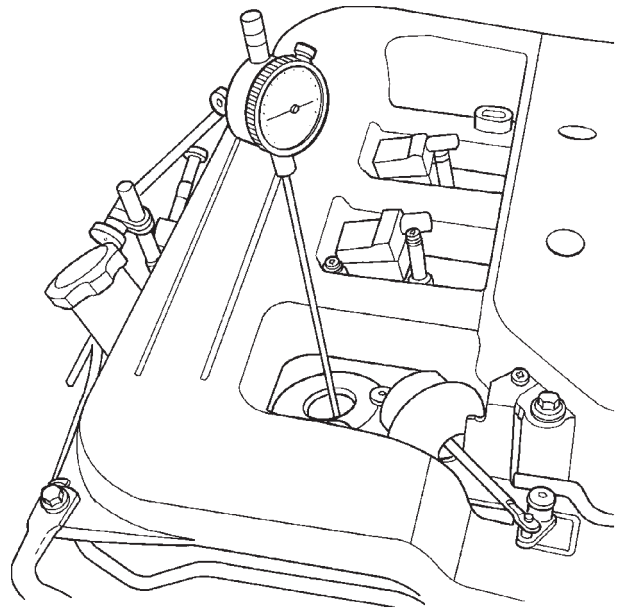
(3) Install a dial indicator in number 1 cylinder to check TDC of the piston (Fig. 148). Rotate the crankshaft until the piston is at exactly TDC.

(4) Remove camshaft retainer/thrust plates from rear of cylinder heads. To access the right side plate, remove the EGR valve. (Refer to 25 - EMISSIONS CONTROL/EXHAUST GAS RECIRCULATION/VALVE - REMOVAL)

NOTE: Special Tool 6642 is interchangeable between cylinder banks.

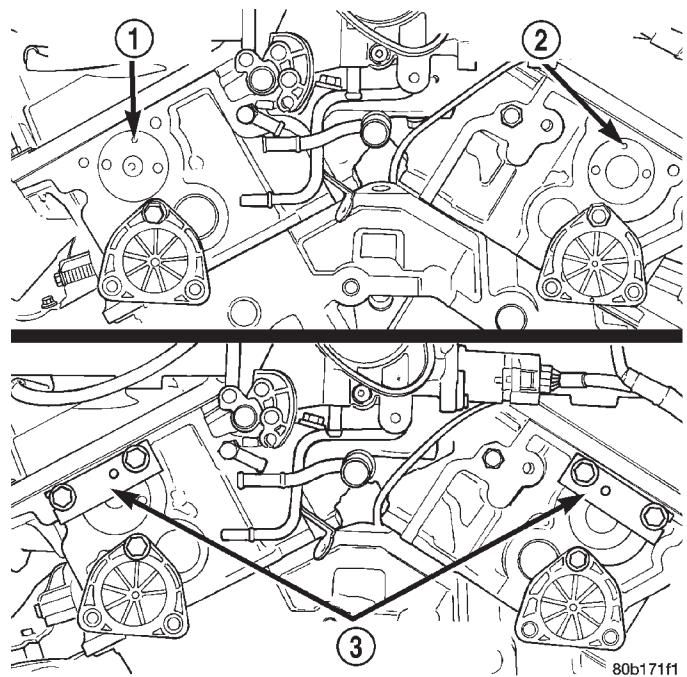
(5) Install Special Tools 6642 Camshaft Alignment tools to the rear of each cylinder head by inserting pin on the alignment tool to the pilot hole on the camshaft. Attach tools using the retainer plate bolts. (Fig. 149).

NOTE: If the alignment tools do not properly line-up to install attaching bolts, first remove the timing belt tensioner, then slowly rotate camshaft with a wrench until bolts can be installed.



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Fig. 148 Dial Indicator



80b171f1

Fig. 149 Camshaft Alignment Holding Tools

- 1 - LEFT CAMSHAFT PILOT HOLE
2 - RIGHT CAMSHAFT PILOT HOLE
3 - CAMSHAFT ALIGNMENT SPECIAL TOOLS 6642

(6) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(7) Hold camshaft sprocket with 36 mm (1 7/16 in.) box end wrench.

TIMING BELT AND SPROCKETS (Continued)

(8) Loosen and remove bolt and washer. To remove the camshaft sprocket bolts with engine in the vehicle, it may be necessary to lift the engine to allow bolt removal clearance. The right bolt is 213 mm (8 3/8 in.) long and the left bolt is 255 mm (10.0 in.) long.

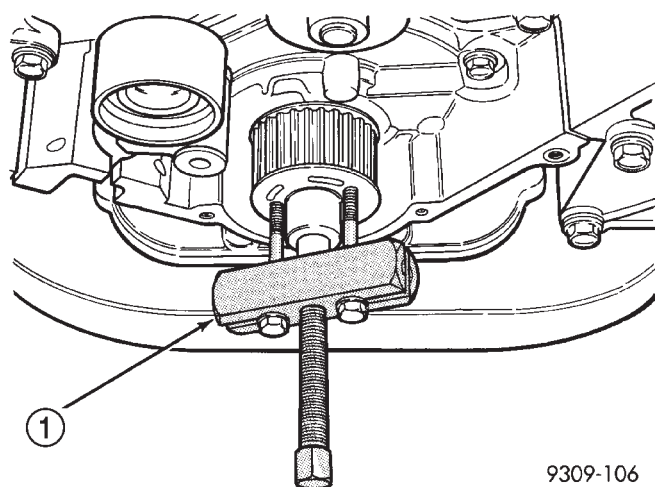
NOTE: Each sprocket has a "D" shaped hole that allows it to rotate several degrees in each direction on its shaft. This design requires the crankshaft-to-camshaft to be properly timed to ensure proper engine performance.

(9) Remove the camshaft sprockets.

REMOVAL - CRANKSHAFT SPROCKET

(1) Remove the timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - REMOVAL)

(2) Remove crankshaft sprocket using Special Tool L-4407-A (Fig. 150).



9309-106

Fig. 150 Crankshaft Sprocket - Removal

1 - SPECIAL TOOL L-4407-A

INSPECTION - TIMING BELT

(1) Remove timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - REMOVAL)

(2) Inspect both sides of the timing belt. Replace belt if any of the following conditions exist (Fig. 151):

(a) Hardening of back rubber back side is glossy without resilience and leaves no indent when pressed with fingernail.

(b) Cracks on rubber back.

(c) Cracks or peeling of canvas.

(d) Cracks on rib root.

(e) Cracks on belt sides.

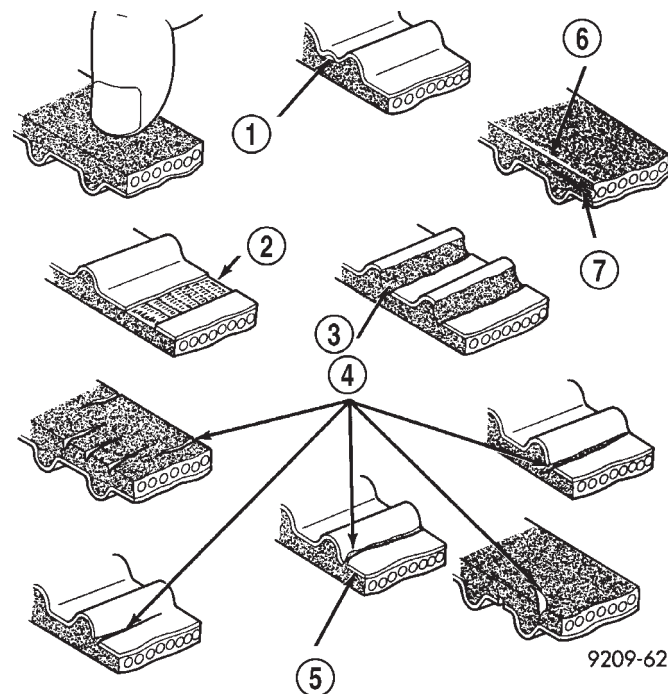
(f) Missing teeth.

(g) Abnormal wear of belt sides. The sides are normal if they are sharp as if cut by a knife.

(h) Vehicle mileage or time at component maintenance requirement. (Refer to LUBRICATION & MAINTENANCE/MAINTENANCE SCHEDULES - DESCRIPTION)

(3) If none of the above conditions are seen on the belt, the belt cover can be installed.

NOTE: If belt requires replacing, ensure the proper length belt is used.



9209-62

Fig. 151 Timing Belt Inspection

- 1 - PEELING
- 2 - TOOTH MISSING AND CANVAS FIBER EXPOSED
- 3 - RUBBER EXPOSED
- 4 - CRACKS
- 5 - PEELING
- 6 - ROUNDED EDGE
- 7 - ABNORMAL WEAR (FLUFFY STRAND)

INSTALLATION

INSTALLATION - TIMING BELT

CAUTION: This procedure can only be used when the camshaft sprockets HAVE NOT BEEN LOOSENED or removed from the camshafts.

CAUTION: If camshafts have moved from the timing marks, always rotate camshaft towards the direction nearest to the timing marks (DO NOT TURN CAMSHAFTS A FULL REVOLUTION OR DAMAGE to valves and/or pistons could result).

TIMING BELT AND SPROCKETS (Continued)

(1) Align the crankshaft sprocket with the TDC mark on oil pump cover (Fig. 152).

(2) Align the camshaft sprockets (to reference mark made upon removal) between the marks on the rear covers (Fig. 144).

(3) Install the timing belt starting at the crankshaft sprocket going in a counterclockwise direction (Fig. 152). Install the belt around the last sprocket. Maintain tension on the belt as it is positioned around the tensioner pulley.

(4) Holding the tensioner pulley against the belt, install the tensioner into the housing and tighten to 28 N·m (250 in. lbs.). Each camshaft sprocket mark should still fall between the cover marks.

(5) When tensioner is in place pull retaining pin to allow the tensioner to extend to the pulley bracket.

(6) Rotate crankshaft sprocket 2 revolutions and check the timing marks on the camshafts and crankshaft. The marks should line up within their respective locations (Fig. 152). If marks do not line up, repeat procedure.

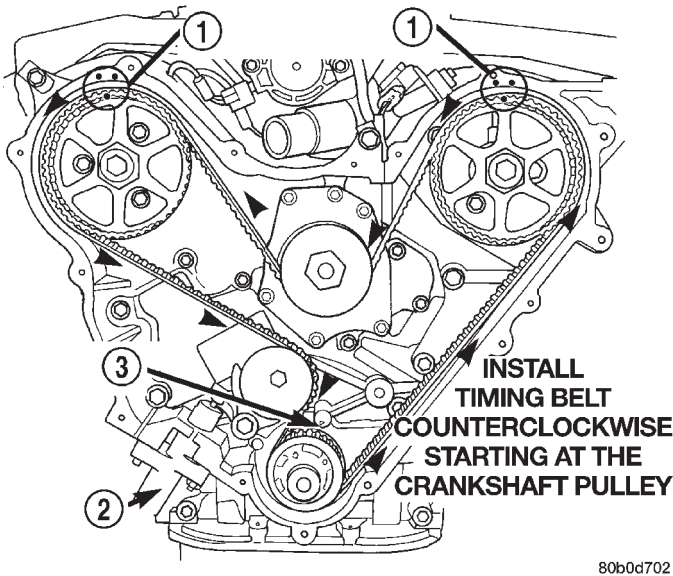


Fig. 152 TIMING BELT - INSTALLATION

- 1 - ALIGN CAMSHAFTS WITH TIMING MARKS
- 2 - INSTALL TENSIONER LOOSE
- 3 - CRANKSHAFT AT TDC

(7) Install the front timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(8) Install the crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(9) Install the accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(10) Install the radiator fan. (Refer to 7 - COOLING/ENGINE/RADIATOR FAN - INSTALLATION)

(11) Install upper radiator crossmember. (Refer to 23 - BODY/EXTERIOR/GRILLE OPENING REINFORCEMENT - INSTALLATION)

(12) Connect negative cable to remote jumper terminal.

INSTALLATION - CAMSHAFT SPROCKETS

CAUTION: The camshaft sprockets are not interchangeable from side to side (Fig. 153).

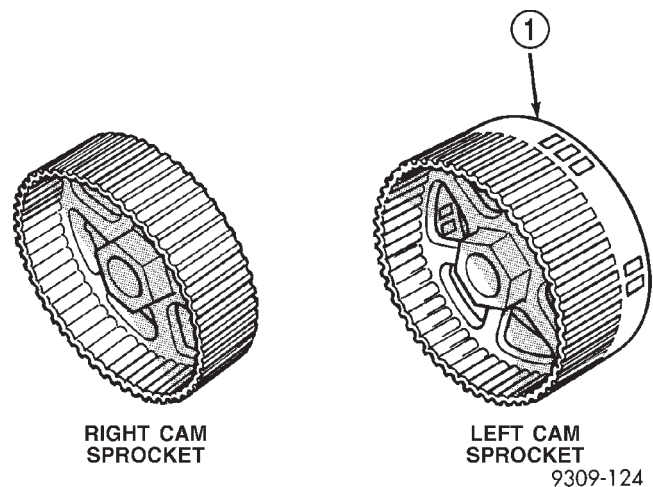


Fig. 153 CAMSHAFT SPROCKETS

1 - DIS PICKUP SLOTS

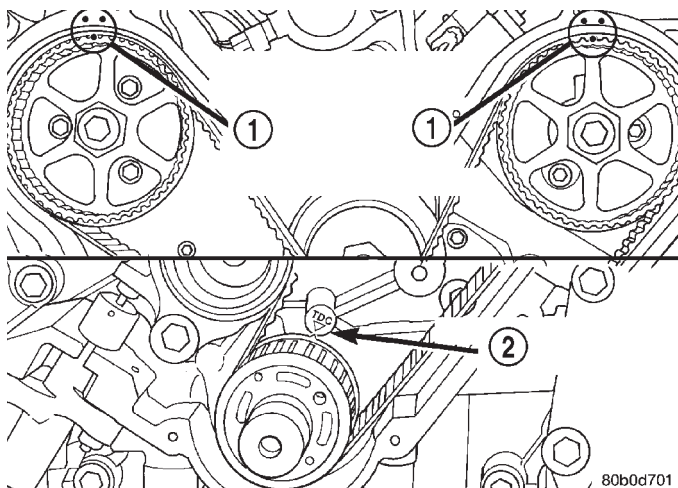
(1) Install camshaft sprockets onto the camshafts. Install **NEW** sprocket attaching bolts into place. The 255 mm (10 in.) bolt is to be installed in the left camshaft and the 213 mm (8 3/8 in.) bolt is to be installed into the right camshaft. **Do not tighten the bolts; tightened at later step.** Camshaft sprocket mark should be positioned between the marks on the cover at both sprockets (Fig. 154).

(2) Install the timing belt starting first at the crankshaft sprocket, then to remaining components in a counterclockwise direction (Fig. 155).

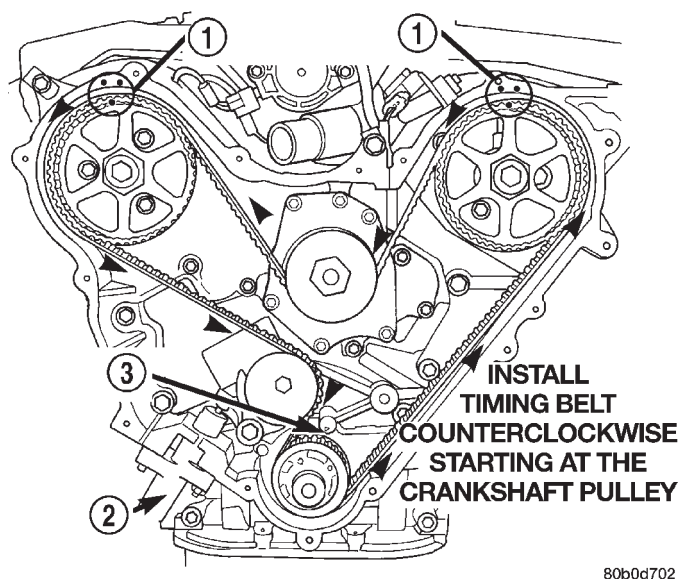
(3) Install the belt around the last sprocket. Maintain tension on the belt as it is positioned around the tensioner pulley. Each camshaft sprockets mark should still fall between the cover marks (Fig. 155).

NOTE: For timing belt tensioner reset procedure, (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT AND SPROCKETS - TIMING BELT - REMOVAL).

TIMING BELT AND SPROCKETS (Continued)

**Fig. 154 Camshaft Sprocket Timing Marks**

- 1 - ALIGN CAMSHAFT SPROCKET TIMING MARK BETWEEN MARKS ON REAR TIMING BELT COVER
2 - CRANKSHAFT AT TDC

**Fig. 155 TIMING BELT - INSTALLATION**

- 1 - ALIGN CAMSHAFTS WITH TIMING MARKS
2 - INSTALL TENSIONER LOOSE
3 - CRANKSHAFT AT TDC

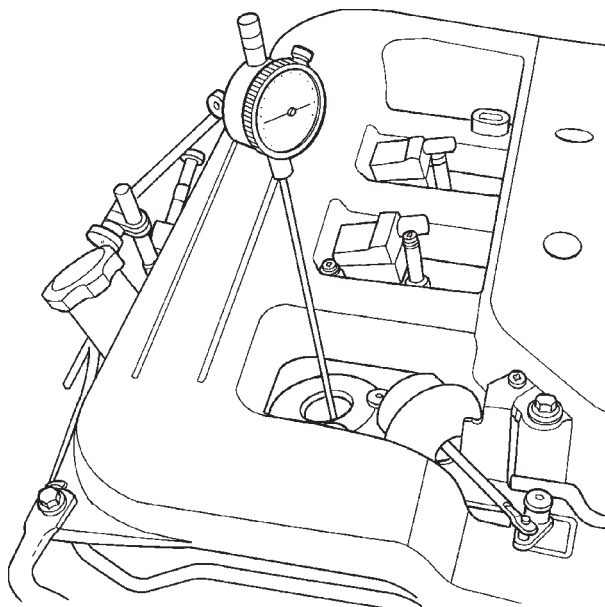
(4) Hold the tensioner pulley against the belt and install the reset (pinned) timing belt tensioner into the housing. Tighten attaching bolts to 28 N·m (250 in. lbs.).

(5) Remove tensioner retaining pin to allow the tensioner to extend to the pulley bracket.

(6) Using a dial indicator, position the number 1 piston at TDC (Fig. 156).

(7) Hold the camshaft sprocket hex with a 36 mm (1 7/16 in.) wrench and tighten the camshaft bolts to the following:

- Right side = 102 N·m (75 ft. lbs.) +90° turn
- Left side = 115 N·m (85 ft. lbs.) +90° turn



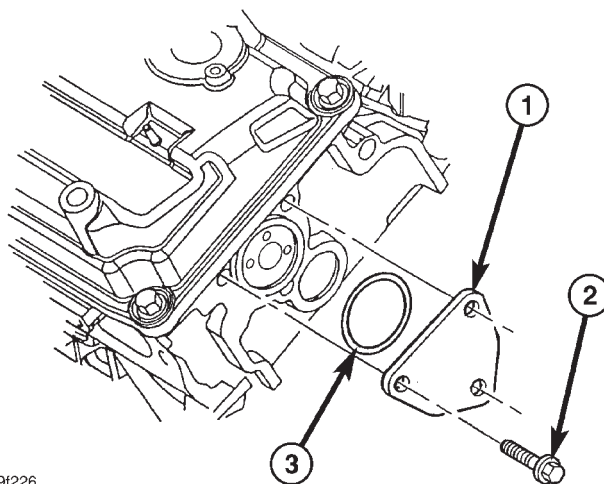
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Fig. 156 Dial Indicator

(8) Remove dial indicator and install spark plug.

(9) Remove Special Tools 6642.

(10) Install cam retainer/thrust plates and O-rings (Fig. 157). Tighten bolts to 28 N·m (250 in. lbs.).



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Fig. 157 CAMSHAFT THRUST PLATE

- 1 - CAMSHAFT THRUST PLATE
2 - BOLT
3 - O-RING

TIMING BELT AND SPROCKETS (Continued)

(11) Install timing belt covers. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT / CHAIN COVER(S) - INSTALLATION)

(12) Install crankshaft vibration damper. (Refer to 9 - ENGINE/ENGINE BLOCK/VIBRATION DAMPER - INSTALLATION)

(13) Install accessory drive belts. (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION)

(14) Fill cooling system. (Refer to 7 - COOLING - STANDARD PROCEDURE)

INSTALLATION - CRANKSHAFT SPROCKET

CAUTION: To ensure proper installation depth of crankshaft sprocket, Special Tool 6641 must be used.

(1) Install crankshaft sprocket using Special Tools 6641 and C-4685-C1 (Fig. 158).

(2) Install timing belt. (Refer to 9 - ENGINE/VALVE TIMING/TIMING BELT/CHAIN AND SPROCKETS - INSTALLATION)

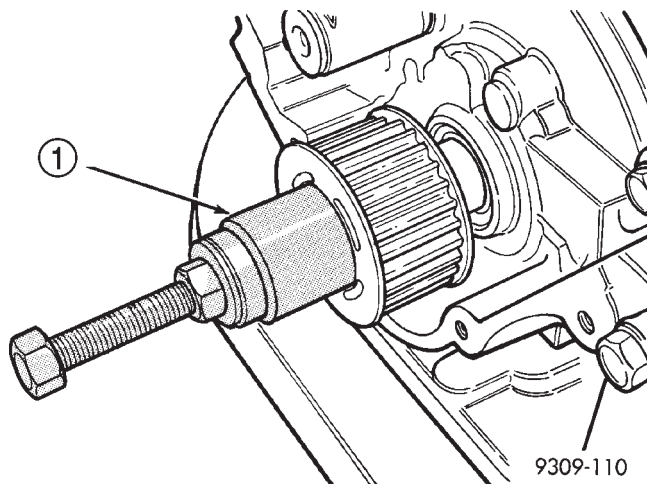


Fig. 158 CRANKSHAFT SPROCKET INSTALLATION

1 - INSTALL WITH SPECIAL TOOL 6641 WITH 12mm SCREW C-4685-C1 AND THRUST BEARING AND WASHER

EXHAUST SYSTEM

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		INSTALLATION	9

EXHAUST SYSTEM

DESCRIPTION

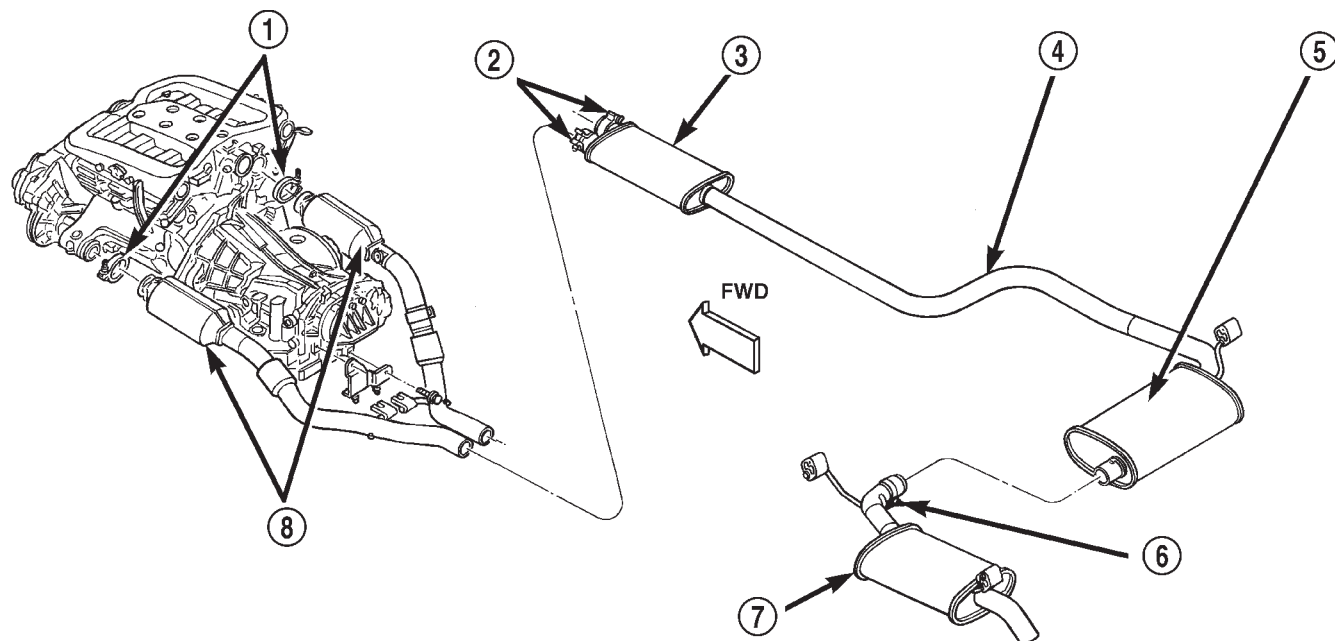
The exhaust system (Fig. 1) or (Fig. 2) consists of two front close coupled catalytic converters. Both converters attach directly to the exhaust manifold using a V-Band clamp. The exhaust down pipes exit the converters and connect into the front resonator. The front resonator, intermediate pipe, and muffler are one single module. The rear resonator and tailpipe connect to the muffler outlet. The 300M Special has

both a left and right rear resonator. The upstream oxygen sensors are located in each exhaust manifold. The downstream oxygen sensors are located at the rear of each catalytic converter.

OPERATION

The exhaust system channels the exhaust gases created by engine to the rear of the vehicle. The muffler and resonator quiets the exhaust noises. The catalytic converter reduces exhaust emissions.

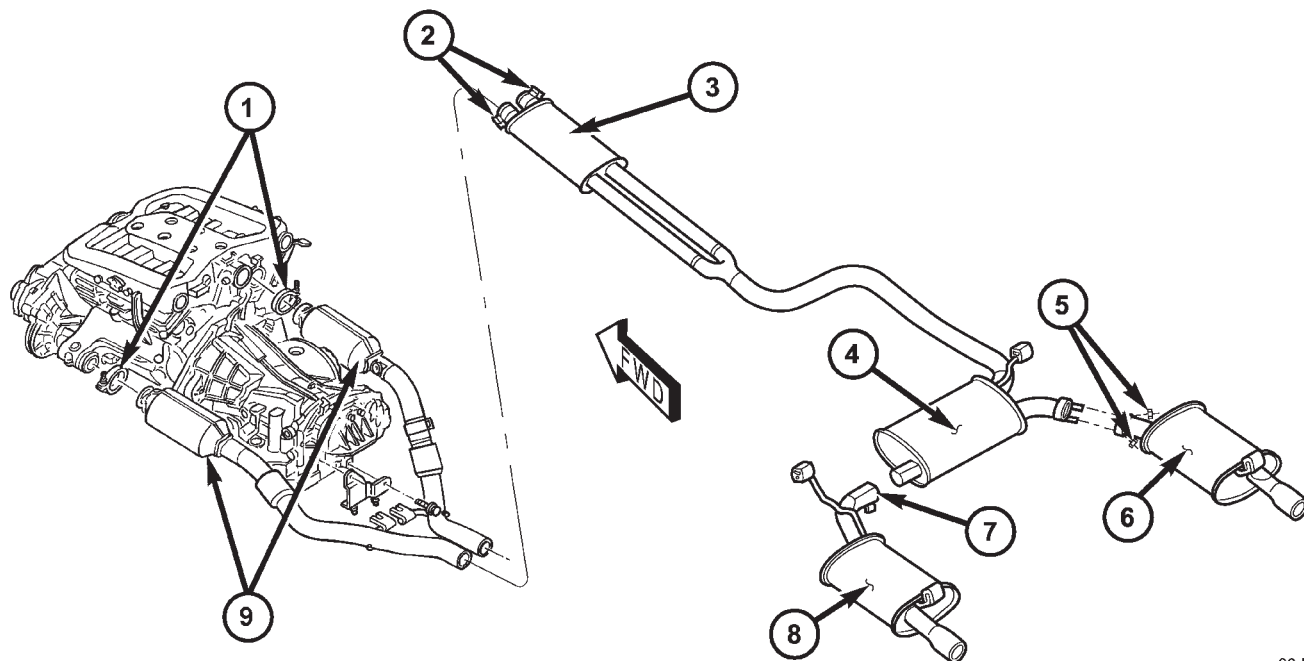
EXHAUST SYSTEM (Continued)

**Fig. 1 Exhaust System**

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- 1 - V-BAND CLAMPS
- 2 - BAND CLAMPS
- 3 - FRONT RESONATOR
- 4 - INTERMEDIATE PIPE

- 5 - MUFFLER
- 6 - BAND CLAMP
- 7 - LEFT REAR RESONATOR/PIPE ASSEMBLY
- 8 - CATALYTIC CONVERTERS

**Fig. 2 Exhaust System - 300M Special**

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- 1 - V-BAND CLAMPS
- 2 - BAND CLAMPS
- 3 - FRONT RESONATOR
- 4 - MUFFLER
- 5 - NUTS—28 N·m (250 in. lbs.)

- 6 - RIGHT REAR RESONATOR/PIPE ASSEMBLY
- 7 - BAND CLAMP
- 8 - LEFT REAR RESONATOR/PIPE ASSEMBLY
- 9 - CATALYTIC CONVERTERS

EXHAUST SYSTEM (Continued)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - EXHAUST SYSTEM

CONDITION	POSSIBLE CAUSES	CORRECTION
EXCESSIVE EXHAUST NOISE (UNDER HOOD)	1. Exhaust manifold cracked or broken. 2. Manifold to cylinder head leak. 3. EGR tube to manifold gasket leakage. 4. EGR Valve to EGR tube gasket leakage. 5. Exhaust to manifold leak. 6. Pipe and shell noise from front exhaust pipe.	1. Replace manifold. 2. Tighten manifold and/or replace gasket. 3. Tighten fasteners or replace gasket. 4. Tighten fasteners or replace gasket. 5. Tighten or replace V-Band Clamp. 6. Characteristic of single wall pipe.
EXCESSIVE EXHAUST NOISE	1. Leak at exhaust pipe joints. 2. Burned or rusted out muffler assembly or exhaust pipe. 3. Burned or rusted out resonator(s). 4. Restriction in exhaust system. 5. Converter material in muffler or resonators.	1. Tighten clamps at leaking joints. 2. Replace exhaust module, rear resonator/tailpipe assembly or exhaust pipe with catalytic converter assembly. 3. Replace resonator assembly. 4. Remove restriction if possible, or replace components as necessary. 5. Replace muffler, resonators and converter assemblies. Check fuel injection and ignition systems for proper operation.

DIAGNOSIS AND TESTING - EXHAUST SYSTEM
RESTRICTION CHECK

Exhaust system restriction can be checked by measuring back pressure using the DRB III® and PEP module pressure tester.

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Disconnect and remove the upstream (before catalytic converter) oxygen sensor. (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/O2 SENSOR - REMOVAL)

(2) Install the Exhaust Back Pressure Fitting Adaptor CH8519.

(3) Connect the Low Pressure Sensor (15 psi) CH7063 to the back pressure fitting.

(4) Following the PEP module instruction manual, connect all required cables to the DRB III® and PEP module. Select the available menu options on the DRBIII® display screen for using the digital pressure gauge function.

(5) Apply the park brake and start the engine.

(6) With transmission in Park or Neutral, raise engine speed to 2000 RPM. Monitor the pressure readings on the DRBIII®. Back pressure should not exceed specified limit. Refer to specification in table below EXHAUST BACK PRESSURE LIMITS .

NOTE: For applications with dual catalytic converters, repeat test on opposite converter using the previous steps.

EXHAUST SYSTEM (Continued)

(7) If pressure exceeds maximum limits, inspect exhaust system for restricted component. For further catalytic converter inspection procedures, (Refer to 11 - EXHAUST SYSTEM/CATALYTIC CONVERTER - INSPECTION). Replace component(s) as necessary.

EXHAUST BACK PRESSURE LIMITS

Exhaust Back Pressure Limit (Max)	
Vehicle in Park/Neutral (no load) RPM	3.45 Kpa (0.5 psi)

REMOVAL - EXHAUST SYSTEM

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

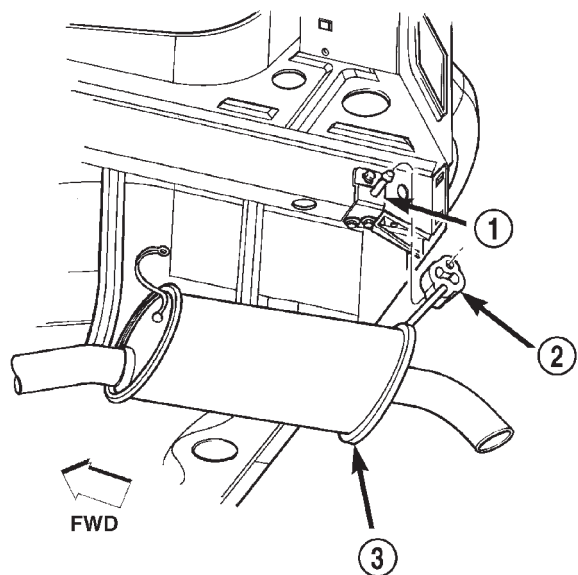
It is easier to service the exhaust system module components (Fig. 1) or (Fig. 2), when system is removed from the vehicle.

- (1) Raise vehicle on hoist.
- (2) Apply penetrating oil and loosen band clamps at resonator connector.
- (3) Separate exhaust module at front resonator from the converter downpipes.

CAUTION: At this time, the exhaust system is held by only isolators. Support the exhaust system underneath the front resonator and the muffler while the isolators are being removed. Do not use any tools to remove the isolators, remove by hand only. Soapy water or silicone-based spray may be used to assist removal. Do Not use a petroleum-based lubricant on the isolators. This will damage the rubber material.

- (4) Support exhaust system with jack stand.
- (5) Remove screw attaching exhaust system ground strap.
- (6) Remove the rubber isolators from the rear suspension crossmember and support brackets on body (Fig. 3) and (Fig. 4).
- (7) Lower exhaust system and lay on the ground.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts be used for the following reasons:



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Fig. 3 Rubber Isolator Hanger to Body Support

- 1 - SUPPORT BRACKET
- 2 - ISOLATOR
- 3 - RESONATOR/PIPE

- To ensure proper alignment with other parts in the system.
- Provide acceptable exhaust noise levels and does not change exhaust system back pressure that could affect emissions and performance.

INSPECTION

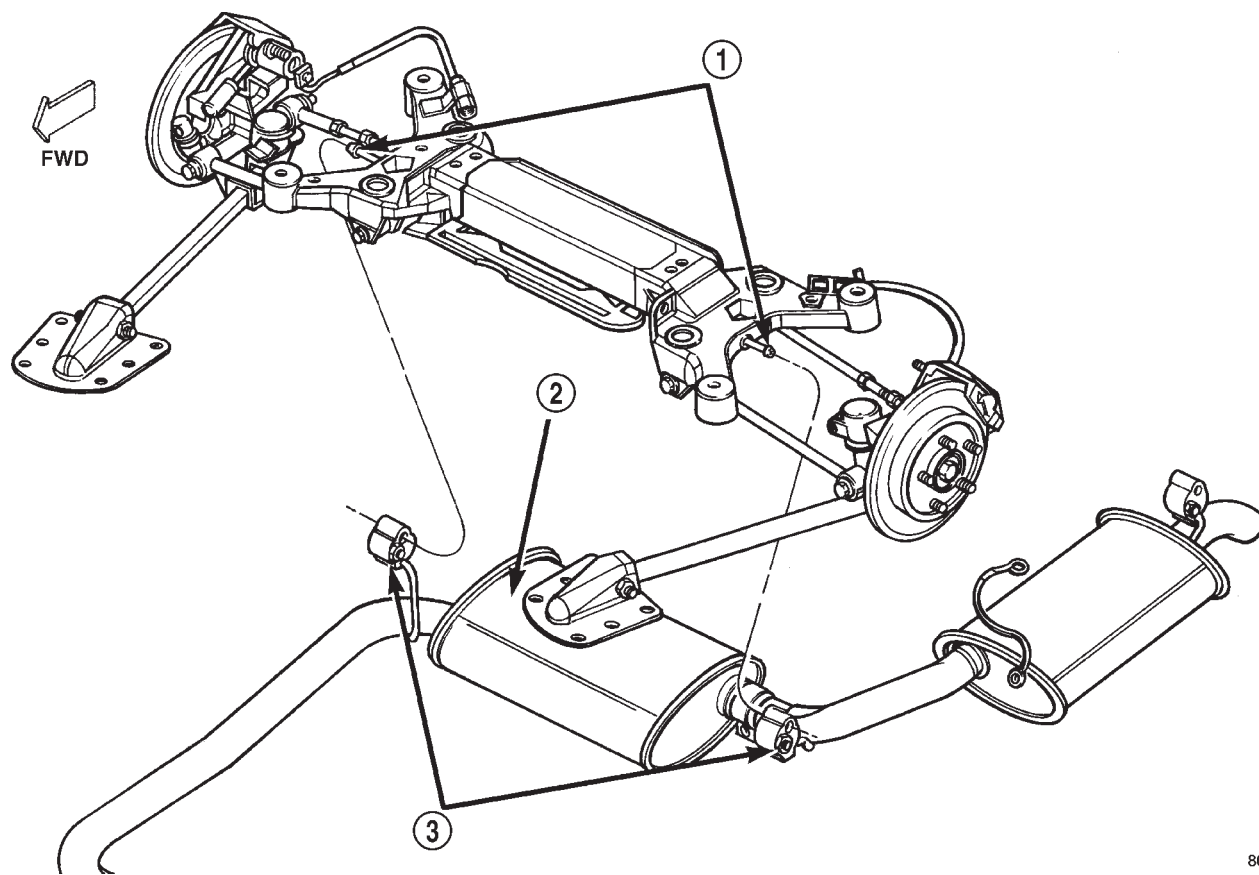
Inspect the exhaust pipes, catalytic converters, muffler, and resonators for cracked joints, broken welds and corrosion damage that would result in a leaking exhaust system. Inspect the clamps, support brackets, and insulators for cracks and corrosion damage.

NOTE: Slip joint band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off.

INSTALLATION - EXHAUST SYSTEM

- (1) Install and loose assemble the front resonator to the converter pipes.
- (2) Place the exhaust system on two supports (one on side of muffler, one behind the resonator). Connect the system to the converter pipes.
- (3) Install the system's rubber isolators onto the support brackets (Fig. 3) and (Fig. 4).
- (4) Install exhaust system ground strap.
- (5) Visually inspect the isolators. They should be straight when viewing from front to back of the vehicle. Working from the front of system, align each

EXHAUST SYSTEM (Continued)



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Fig. 4 Exhaust System Supports

1 - SUPPORTS
2 - MUFFLER

3 - ISOLATORS

component to maintain position and proper clearance with underbody parts.

- (6) Tighten band clamps to 61 N·m (45 ft. lbs.).
- (7) Lower the vehicle.

ADJUSTMENTS

A misaligned exhaust system is usually indicated by a vibration, rattling noise, or binding of exhaust system components. These noises are sometimes hard to distinguish from other chassis noises. Inspect exhaust system for broken or loose clamps, heat shields, isolators, and brackets. Replace or tighten as necessary. It is important that exhaust system clearances and alignment be maintained.

Perform the following procedures to align the exhaust system:

- (1) Loosen clamps and support brackets.
- (2) Align the exhaust system starting at the front, working rearward.
- (3) Tighten all clamps and brackets once alignment and clearances are achieved.

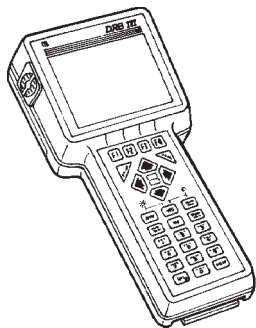
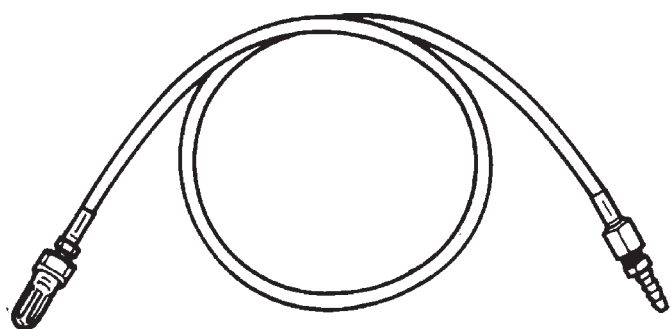
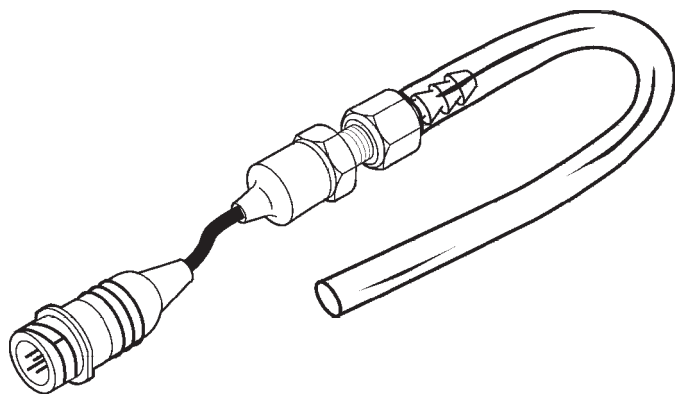
SPECIFICATIONS**TORQUE**

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Band Clamp	61	45	—
Catalytic Converter Pipe to Support Bracket - Nut	47	35	—
V-Band Clamp - Exhaust Manifold to Catalytic Converter	11	—	100
Exhaust Support to Body Bracket - Fasteners	25	—	215
Exhaust Support Bracket to Transmission - Fasteners	47	35	—
Right Rear Resonator (300M Special) - Nuts	28	—	250

EXHAUST SYSTEM (Continued)

SPECIAL TOOLS

EXHAUST SYSTEM

**DRB III & PEP Module - OT-CH6010A****Back Pressure Test Adapter - CH8519****Pressure Transducer CH7063**

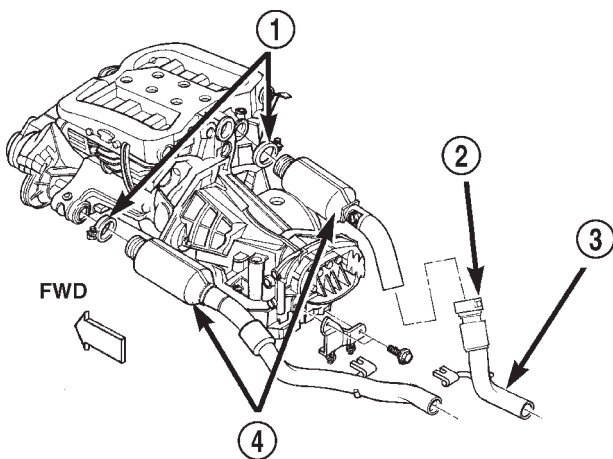
CATALYTIC CONVERTER(S)

DESCRIPTION

The close coupled, three-way catalytic converter inlets are connected to the exhaust manifolds by the use of V-Band clamps (Fig. 5). The left side converter outlet pipe connects to the exhaust system. The right side converter connects to an extension pipe (Fig. 5).

OPERATION

The three-way catalytic converter simultaneously converts three exhaust emissions into harmless gases. Specifically, HC and CO emissions are con-



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Fig. 5 Catalytic Converters

- 1 - V-BAND CLAMPS
- 2 - BAND CLAMP
- 3 - EXTENSION PIPE
- 4 - CATALYTIC CONVERTERS

verted into water (H₂O) and carbon dioxide (CO₂). Oxides of Nitrogen (NO_x) are converted into elemental Nitrogen (N) and water. The three-way catalyst is most efficient in converting HC, CO and NO_x at the stoichiometric air fuel ratio of 14.7:1.

The oxygen content in a catalyst is important for efficient conversion of exhaust gases. When a high oxygen content (lean) air/fuel ratio is present for an extended period, oxygen content in a catalyst can reach a maximum. When a rich air/fuel ratio is present for an extended period, the oxygen content in the catalyst can become totally depleted. When this occurs, the catalyst fails to convert the gases. This is known as catalyst "punch through."

Catalyst operation is dependent on its ability to store and release the oxygen needed to complete the emissions-reducing chemical reactions. As a catalyst deteriorates, its ability to store oxygen is reduced. Since the catalyst's ability to store oxygen is somewhat related to proper operation, oxygen storage can be used as an indicator of catalyst performance. Refer to the appropriate Powertrain Diagnostic Procedure for diagnosis of a catalyst related Diagnostic Trouble Code (DTC).

The combustion reaction caused by the catalyst releases additional heat in the exhaust system, causing temperature increases in the area of the reactor under severe operating conditions. Such conditions can exist when the engine misfires or otherwise does not operate at peak efficiency. **Do not** remove spark plug wires from plugs or by any other means short out cylinders, if exhaust system is equipped with a catalytic converter. Failure of the catalytic converter can occur due to temperature increases caused by unburned fuel passing through the converter. This

CATALYTIC CONVERTER(S) (Continued)

deterioration of the catalyst core can result in excessively high emission levels, noise complaints, and exhaust restrictions.

The use of catalysts also involves some non-automotive problems. Unleaded gasoline must be used to avoid poisoning the catalyst core. Do not allow engine to operate above 1200 RPM in neutral for extended periods over 5 minutes. This condition may result in excessive exhaust system/floor pan temperatures because of no air movement under the vehicle.

CAUTION: Due to exterior physical similarities of some catalytic converters with pipe assemblies, extreme care should be taken with replacement parts. There are internal converter differences required in some parts of the country (particularly vehicles built for States with strict emission requirements).

INSPECTION

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

Check catalytic converter for a flow restriction. (Refer to 11 - EXHAUST SYSTEM - DIAGNOSIS AND TESTING) Exhaust System Restriction Check for procedure.

Visually inspect the catalytic converter element by using a borescope or equivalent. Remove oxygen sensor(s) and insert borescope. If borescope is not available, remove converter and inspect element using a flashlight. Inspect element for cracked or melted substrate.

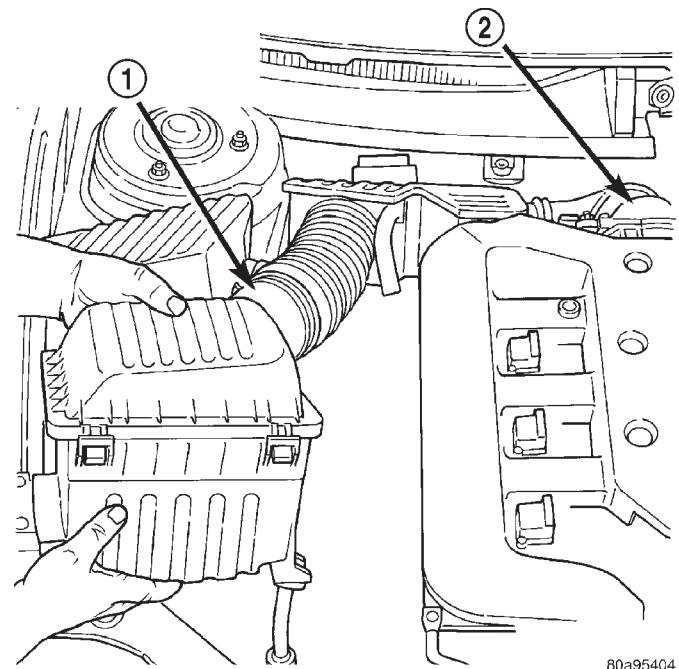
NOTE: Before replacing a catalytic converter, determine the root cause of failure. Most catalytic converter failures are caused by air, fuel or ignition problems. (Refer to Appropriate Diagnostic Information) for test procedures.

CATALYTIC CONVERTER - RIGHT

REMOVAL - RIGHT SIDE

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

- (1) Raise vehicle on hoist.
- (2) Remove exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).
- (3) Loosen or remove nut attaching right pipe to transaxle bracket.
- (4) Loosen extension pipe band clamp.
- (5) Remove right side converter extension pipe (Fig. 5).
- (6) Lower vehicle.
- (7) Remove air cleaner assembly with air inlet hose (Fig. 6).



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Fig. 6 Air Cleaner with Inlet Hose

- 1 - AIR CLEANER ASSEMBLY WITH AIR INLET HOSE
- 2 - THROTTLE BODY

CATALYTIC CONVERTER - RIGHT (Continued)

(8) Remove SRV (Short Runner Valve) vacuum reservoir and control valve assembly at right rear of engine (3.5L engine only).

(9) Disconnect downstream oxygen sensor connector and remove sensor from converter pipe (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/O₂ SENSOR - REMOVAL).

(10) Loosen and remove V-Band clamp at exhaust manifold.

NOTE: Do not reuse V-Band clamp.

(11) Remove converter from engine compartment.

INSTALLATION - RIGHT SIDE

(1) Position a NEW V-Band clamp onto the exhaust manifold outlet. DO NOT latch the clamp's T-bolt at this time.

(2) Install catalytic converter. If necessary, stretch open the V-Band clamp to allow the converter to engage the manifold outlet.

(3) Latch the V-Band clamp T-bolt.

(4) Raise vehicle on hoist.

(5) Install right side converter extension pipe (Fig. 5), but do not tighten clamp at this time.

(6) Lower vehicle on hoist.

NOTE: Check for proper alignment and clearance to underbody and engine compartment components before tightening clamps.

(7) Tighten V-Band clamp to 11 N·m (100 in. lbs.).

(8) Install downstream oxygen sensor and connect electrical connector (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/O₂ SENSOR - INSTALLATION).

(9) Install SRV (Short Runner Valve) vacuum reservoir and control valve assembly at right rear of engine (3.5L engine only).

(10) Install air cleaner assembly with air inlet hose.

(11) Raise vehicle on hoist.

(12) Tighten extension pipe band clamp to 61 N·m (45 ft. lbs.) (Fig. 5).

(13) Install and/or tighten nut attaching extension pipe to transaxle bracket to 47 N·m (35 ft. lbs.).

(14) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).

(15) Lower vehicle.

CATALYTIC CONVERTER - LEFT**REMOVAL - LEFT SIDE**

(1) Loosen and remove V-Band clamp at exhaust manifold joint (Fig. 5).

NOTE: Do not reuse V-Band clamp.

(2) Hoist vehicle.

(3) Remove exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).

(4) Disconnect downstream oxygen sensor electrical connector and remove sensor from converter pipe (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/O₂ SENSOR - REMOVAL).

(5) Loosen or remove nut attaching left pipe to transaxle bracket (Fig. 5).

CAUTION: Care should be taken when removing converter not to damage driveshaft boot.

(6) Remove converter from below vehicle.

INSTALLATION - LEFT SIDE

(1) Install converter.

(2) Attach a NEW V-Band clamp and tighten to 11 N·m (100 in. lbs.) (Fig. 5).

(3) Install and/or tighten nut attaching pipe to transaxle bracket to 47 N·m (35 ft. lbs.) (Fig. 5).

(4) Install downstream oxygen sensor and connect electrical connector (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/O₂ SENSOR - INSTALLATION).

(5) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).

(6) Lower vehicle.

HEAT SHIELDS**DESCRIPTION**

The catalytic converters have an integral heat shield attached to them and are not to be removed.

OPERATION

Heat shields are needed to protect both the car and the environment from the high temperatures developed in the vicinity of the catalytic converters.

HEAT SHIELDS (Continued)

CAUTION: Avoid application of rust prevention compounds or undercoating materials to exhaust system heat shields on cars if equipped. Light over spray near the edges is permitted. Application of coating will greatly reduce the efficiency of the heat shields resulting in excessive floor pan temperatures and objectionable fumes.

MUFFLER/FRONT RESONATOR ASSEMBLY

REMOVAL

- (1) Remove exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).
- (2) Loosen clamp and separate left rear resonator/pipe from muffler/front resonator assembly (Fig. 1) or (Fig. 2).
- (3) **300M Special:** Remove nuts securing right rear resonator/pipe to muffler/front resonator assembly (Fig. 2).

INSTALLATION

- (1) Install left rear resonator/pipe onto new muffler/front resonator (Fig. 1) or (Fig. 2), but do not tighten clamp until exhaust system is installed on vehicle.
- (2) **300M Special:** Install right rear resonator/pipe onto new muffler/front resonator (Fig. 2), but do not tighten nuts until exhaust system is installed on vehicle.
- (3) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).
- (4) Align exhaust components for proper clearance.
- (5) Tighten all exhaust band clamps to 61 N·m (45 ft. lbs.).
- (6) **300M Special:** Tighten right rear resonator/pipe nuts to 28 N·m (250 in. lbs.) (Fig. 2).

RESONATOR - LEFT REAR

REMOVAL

- (1) Remove the exhaust system (Refer to 11 - EXHAUST SYSTEM - REMOVAL).
- (2) Loosen the clamp of the left rear resonator/pipe assembly (Fig. 1) or (Fig. 2).
- (3) Remove the left rear resonator/pipe assembly.

INSTALLATION

- (1) Install the left rear resonator/pipe assembly onto the muffler/front resonator assembly and loosely assemble the accompanying clamp (Fig. 1) or (Fig. 2).
- (2) Install exhaust system (Refer to 11 - EXHAUST SYSTEM - INSTALLATION).
- (3) Align exhaust components for proper clearance. Tighten all band clamps to 61 N·m (45 ft. lbs.).

RESONATOR - RIGHT REAR (300M SPECIAL)

REMOVAL

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

- (1) Raise vehicle on hoist.
- (2) Apply penetrating oil to right rear resonator/pipe nuts (Fig. 2).

CAUTION: Do not use any tools to remove the isolators, remove by hand only. Soapy water or silicone-based spray may be used to assist removal. Do Not use a petroleum-based lubricant on the isolators. This will damage the rubber material.

- (3) Remove the rubber isolator from the rear support bracket on body.
- (4) Remove right rear resonator/pipe nuts (Fig. 2).
- (5) Remove right rear resonator/pipe assembly.

INSTALLATION

- (1) Position right rear resonator/pipe assembly into mounting position. Loosely install attaching nuts (Fig. 2).
- (2) Install the rubber isolator to the rear support bracket on body.
- (3) Align right rear resonator/pipe for proper clearance. Tighten nuts to 28 N·m (250 in. lbs.).

FRAME & BUMPERS

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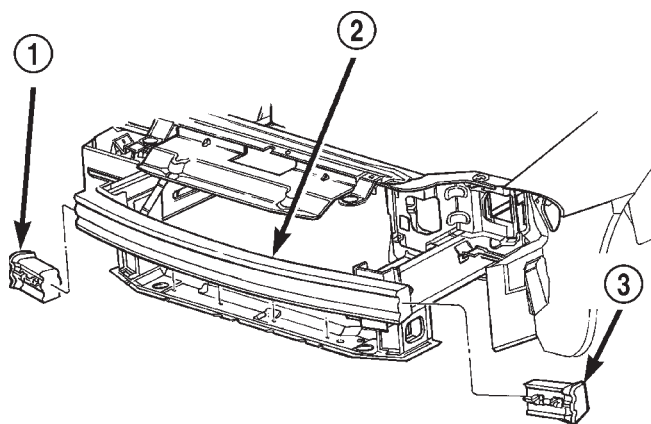
FRONT BUMPER REINFORCEMENT

REMOVAL

- (1) Remove front fascia.
- (2) Remove end plugs in ends of bumper after removing screws in front of bumper.
- (3) Remove attaching bolts from bumper reinforcement to adapter plate through ends of the bumper. (Fig. 1).
- (4) If beam is damaged, the adapter plate to rail welds will have to be cut off

INSTALLATION

- (1) Place reinforcement in position on front of vehicle.
- (2) Install attaching bolts to inside of bumper reinforcement to adapter plates.
- (3) Install end plugs in ends of bumper, using screws in front of the bumper.
- (4) Install front fascia.



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Fig. 1 FRONT BUMPER REINFORCEMENT

- 1-END CAP
2-FRONT BUMPER REINFORCEMENT
3-END CAP

FRONT FASCIA

REMOVAL

REMOVAL

- (1) Release hood latch and open hood.
- (2) Remove large rubber grommet (70 mm x 168 mm) from splash shield to gain access to fascia fasteners (Fig. 2).
- (3) Remove fasteners attaching fascia to the front fender and splash shield.
- (4) Remove the nuts on the fascia studs through the splash shield access holes on each side (Fig. 3).
- (5) Remove the fasteners attaching the fascia to the lower crossmember (Fig. 4).
- (6) Remove the fasteners attaching the fascia to the upper radiator closure panel (Fig. 4).
- (7) Disconnect wire connectors (fog lamps, parking/turn signal, side marker), if equipped (Fig. 5).
- (8) Remove fascia from vehicle.

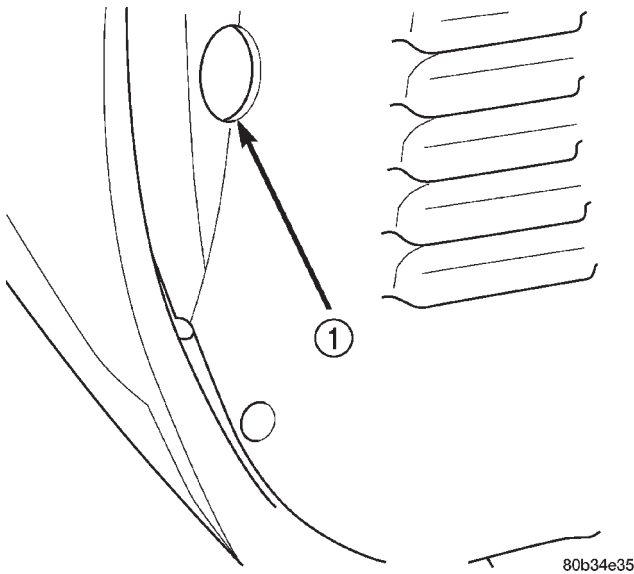


Fig. 2 ACCESS RUBBER GROMMET

1 - ACCESS RUBBER GROMMET

REMOVAL - INTREPID

- (1) Release hood latch and open hood.
- (2) Remove push pin fasteners attaching bottom of fascia (air dam) to lower crossmember (Fig. 6).
- (3) Remove fasteners attaching fascia to splash shields (Fig. 7).
- (4) Remove push pin fasteners attaching the fascia to upper radiator closure panel.
- (5) Pull the sides of the fascia outwards to disengage fascia from drive pins then pull fascia forward.
- (6) Disconnect fog lamp wire connectors, if equipped.

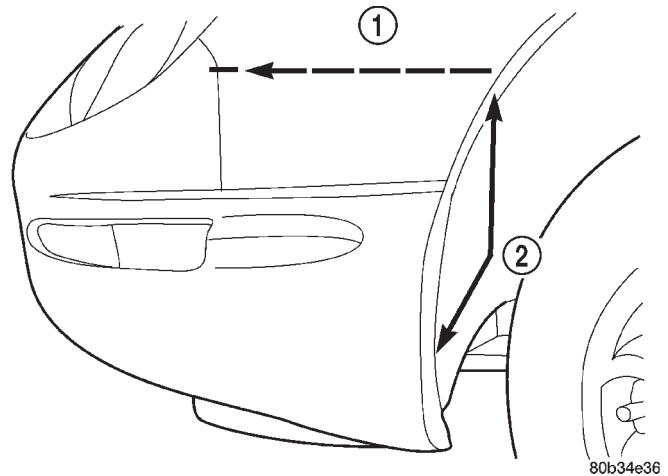


Fig. 3 FASTENER LOCATIONS

1 - THROUGH ACCESS REMOVE FASTENER
2 - FASTENERS

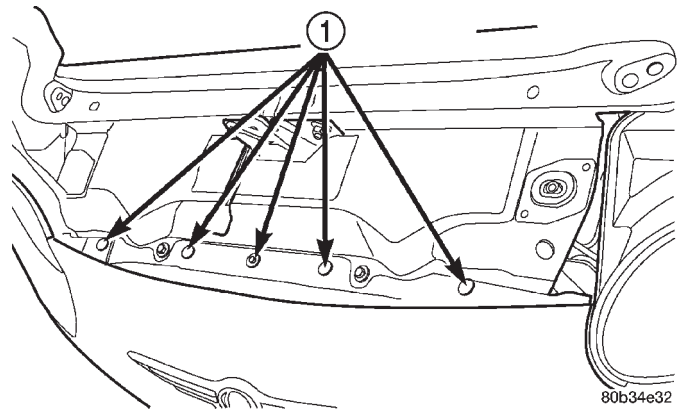


Fig. 4 REMOVE PUSH PIN FASTENERS

1 - PUSH PIN FASTENERS

- (7) Remove fascia from vehicle.

INSTALLATION

INSTALLATION

- (1) Connect wire connectors.
- (2) Place fascia in position on vehicle, by fitting foam to bumper reinforcement. Use care not to scratch fender. Tape may be put on fender for protection.
- (3) Install the top center fasteners, to upper radiator closure panel.
- (4) Align fascia to bumper reinforcement.
- (5) Align the two fascia studs to the fender vertical attachments, at the same time align the fascia groove on the horizontal flange with the fender fasteners. Push fascia rearward to engage the fasteners.

FRONT FASCIA (Continued)

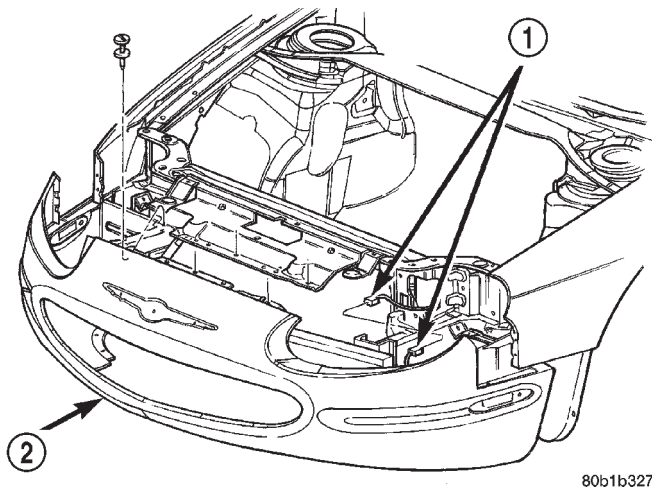


Fig. 5 FRONT BUMPER FASCIA

- 1 - BODY & FASCIA WIRE CONNECTORS
- 2 - FRONT FASCIA

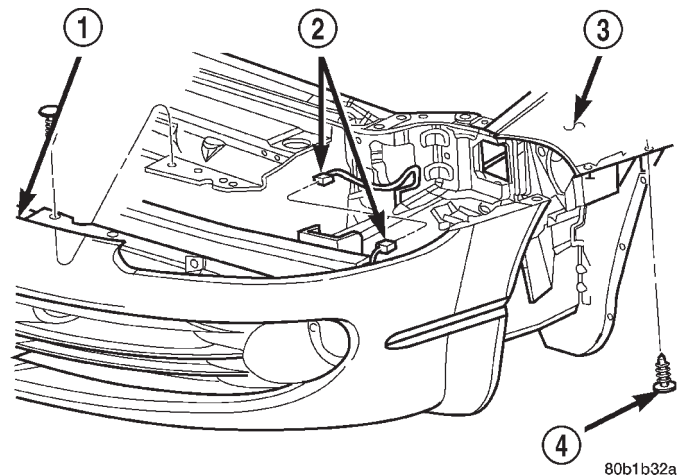


Fig. 7 FRONT BUMPER FASCIA

- 1 - FRONT FASCIA
- 2 - FOG LAMP CONNECTORS
- 3 - FRONT FENDER
- 4 - PUSH PIN FASTENER

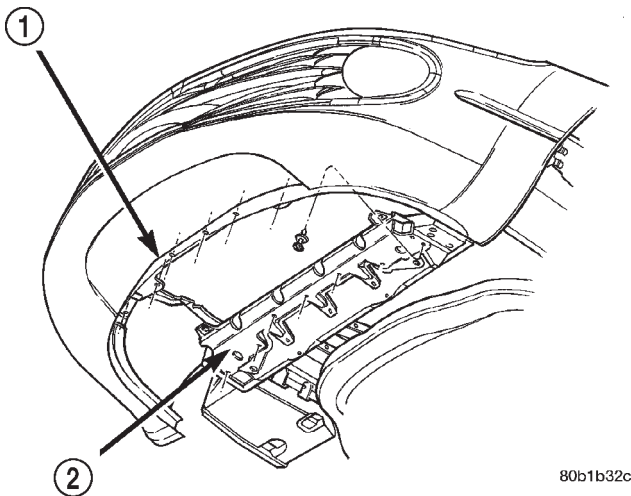


Fig. 6 AIR DAM

- 1 - AIR DAM
- 2 - LOWER CROSSMEMBER

(6) Install nut on fascia stud through the splash shield access hole, on each side.

(7) Install fasteners attaching fascia to the front fender and splash shield.

(8) Install grommet.

(9) Install the fasteners attaching the fascia to the lower crossmember.

INSTALLATION - INTREPID

(1) Connect fog lamp wire connectors, if equipped.
(2) Place fascia pin position on vehicle, by fitting foam to bumper beam.

(3) Snap sides of fascia over drive pin fasteners on fenders.

(4) Install fasteners to upper radiator closure.

(5) Install fasteners attaching fascia to splash shields.

(6) Install fasteners attaching bottom of fascia to lower crossmember.

REAR BUMPER

REMOVAL

(1) Remove rear fascia.

(2) Remove attaching bolts and nuts from attaching bracket to rails (Fig. 8) .

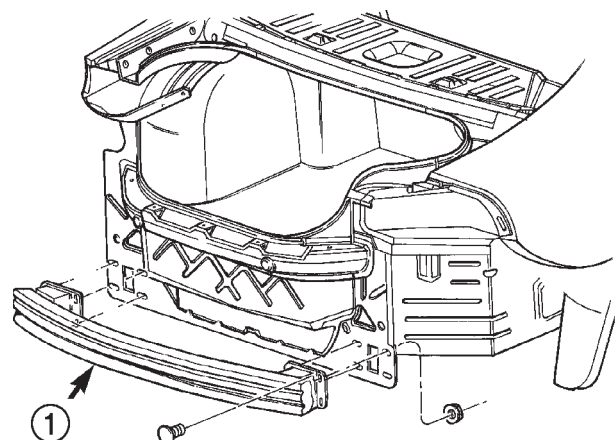


Fig. 8 REAR BUMPER REINFORCEMENT

- 1 - REAR BUMPER REINFORCEMENT

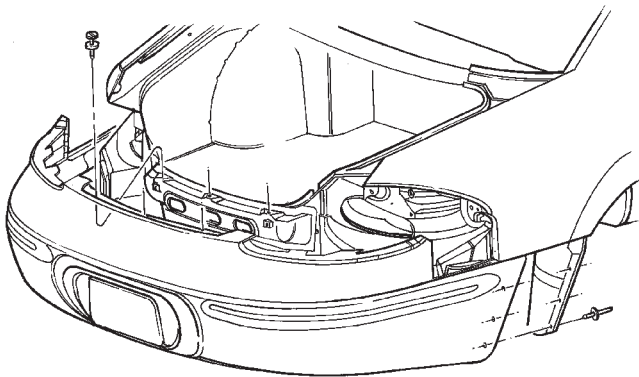
REAR BUMPER (Continued)

INSTALLATION

- (1) Place reinforcement in position on rear of vehicle.
- (2) Install bracket to rails attaching bolts and nuts.

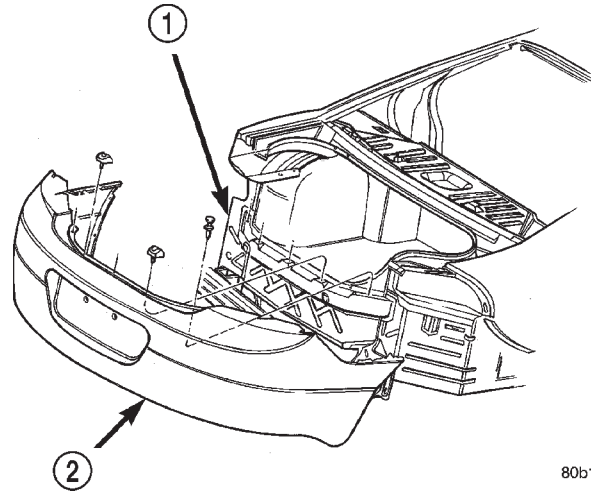
REAR FASCIA**REMOVAL****REMOVAL**

- (1) Release deck lid latch and open deck lid.
- (2) Partially remove trunk carpet to gain access to fascia attaching nuts and remove nuts.
- (3) 300M only, remove both tail lamp housings to gain access to fascia attaching nuts and remove attaching nuts.
- (4) Remove fasteners attaching fascia to rear quarter and splash shield.
- (5) Remove upper push pins attaching the fascia to the body.
- (6) Pull fascia with 30 pound force to disengage plastic clip and grommet that attaches the fascia to the quarter panel vertical flange one side at a time (Fig. 9).
- (7) Disengage main wire connector from the body harness. The connector is on the left side of vehicle.
- (8) Remove fascia from vehicle.

**Fig. 9 REAR BUMPER FASCIA****REMOVAL - INTREPID**

- (1) Open deck lid.
- (2) Remove fasteners attaching fascia to rear quarter and splash shields.
- (3) Remove fasteners attaching fascia to lower trunk panel.
- (4) Pull sides of fascia outwards to disengage snaps to quarter panel attaching bracket (Fig. 10).

- (5) Pull fascia rearward to expose license plate lamp wire connector. Disconnect wire harness connector. The connector is located on the left side of vehicle.

**Fig. 10 REAR BUMPER FASCIA**

1 - LOWER TRUNK OPENING

2 - REAR FASCIA

INSTALLATION

- (1) Connect main wire connector to the body harness connector.
- (2) Place rear fascia in position on bumper reinforcement.
- (3) Align the two fascia studs to the quarter panel vertical attachment, at the same time align the fascia key hole slot on the horizontal flange with the drive pin. Push fascia forward to engage the fasteners.
- (4) Install push pins attaching top of fascia to body.
- (5) 300M only, install nut on fascia stud and install tail lamp.
- (6) Install trunk carpet back in position.
- (7) Install fasteners attaching fascia to rear quarter panel and splash shields.

REAR FASCIA - INTREPID**INSTALLATION - INTREPID**

- (1) Connect the license plate lamp wire connector to the body harness.
- (2) Place rear fascia in position on vehicle, by fitting foam to bumper beam.
- (3) Install center fastener to lower trunk panel.
- (4) Snap sides of fascia between quarter panel and bracket.
- (5) Install fasteners attaching fascia to rear quarter panel and splash shields.
- (6) Install the remaining fasteners to lower trunk panel.

FRAME

SPECIFICATIONS

FRAME DIMENSIONS

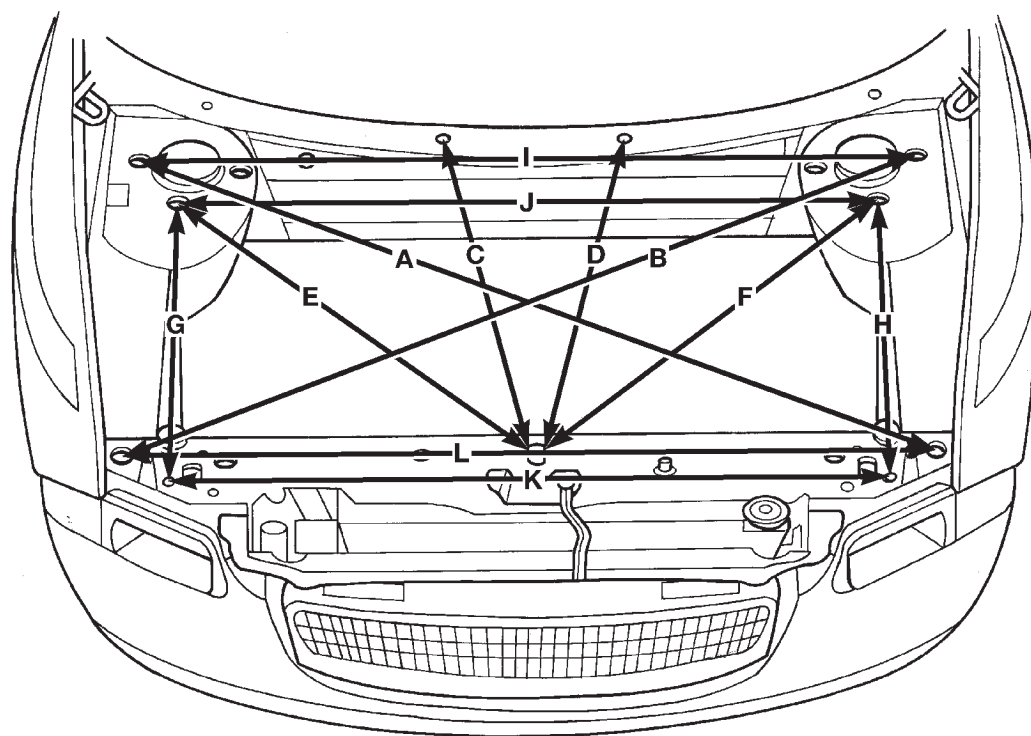
Frame dimensions are listed in metric scale then converted to inch scale listed in parenthesis. All

dimensions are from center to center of Principal Locating Point (PLP), or from center to center of PLP and fastener location. Vertical dimensions can be taken from the work surface to the locations indicated.

INDEX

DESCRIPTION	FIGURE
ENGINE COMPARTMENT TOP VIEW	11
ENGINE COMPARTMENT SIDE VIEW	12
FORWARD FRAME SECTION AND ENGINE CRADLE	13
REAR FRAME SECTION	14

FRAME (Continued)



ENGINE BOX

A.	1497.95
B.	1497.95
C.	586.07
D.	580.38
E.	781.31
F.	781.31
G.	560.71
H.	560.71
I.	1362.51
J.	1217.18
K.	1093.54
L.	1400.52

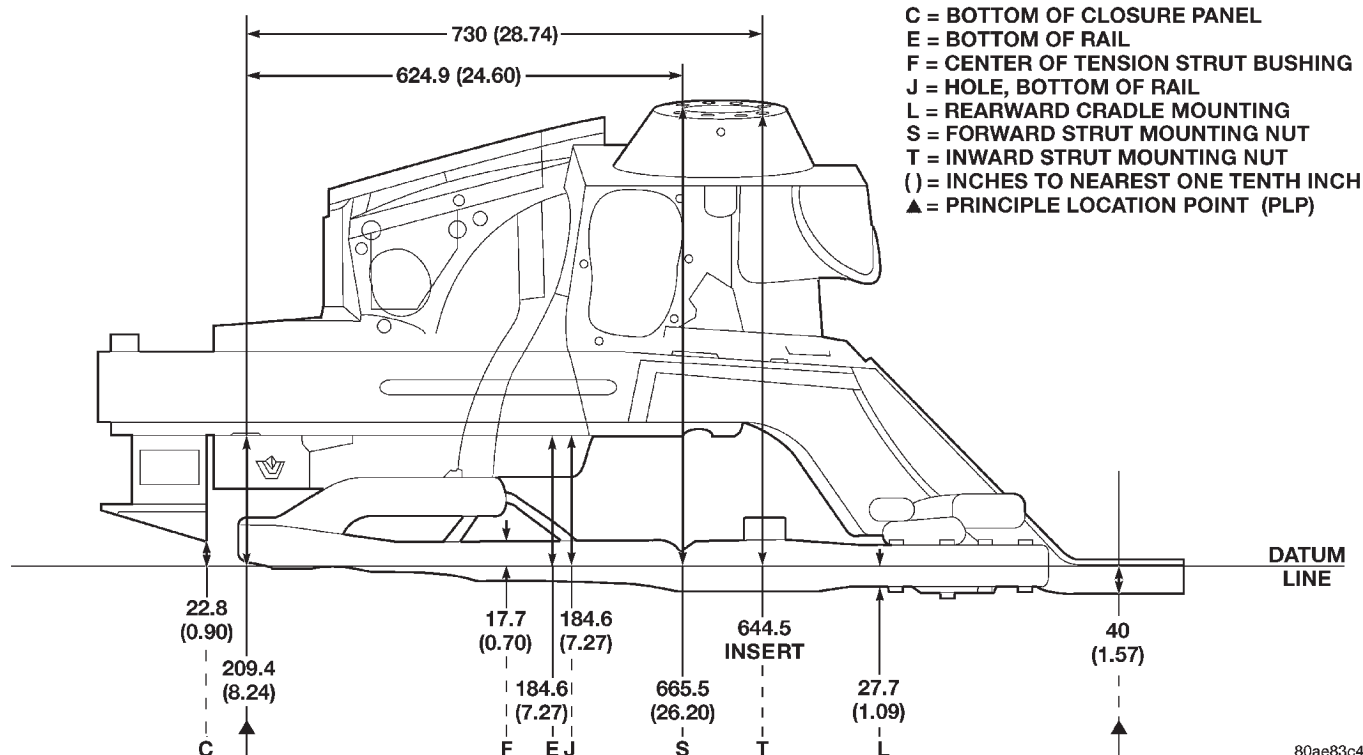
NOTE:

ALL
MEASUREMENTS
CENTER OF HOLE
TO CENTER OF
HOLE.
MEASUREMENTS
ARE THE SAME
FOR LWB & SWB

ALL DIMENSIONS IN MILLIMETERS

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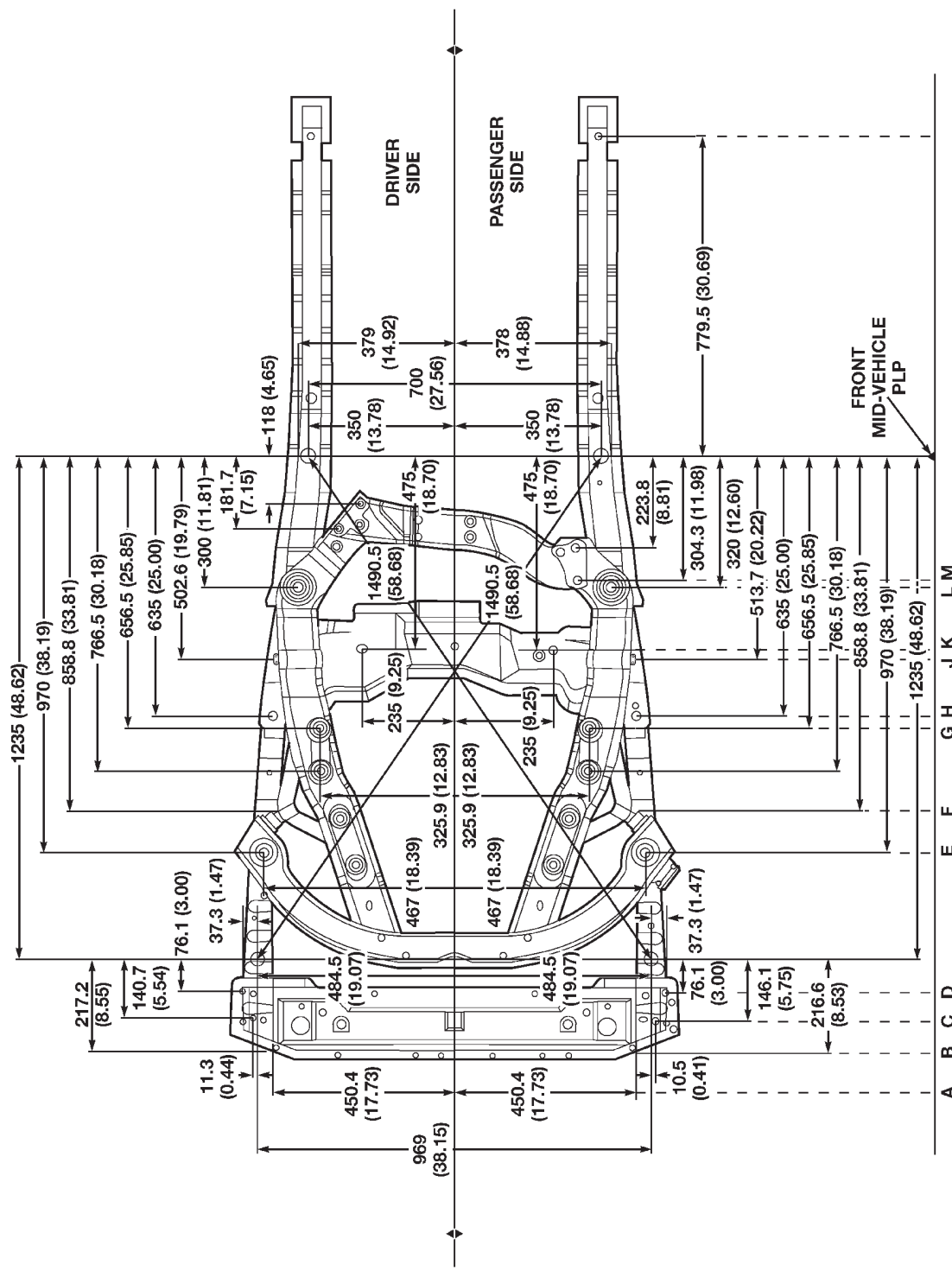
Fig. 11 ENGINE COMPARTMENT TOP VIEW



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Fig. 12 ENGINE COMPARTMENT SIDE VIEW

FRAME (Continued)

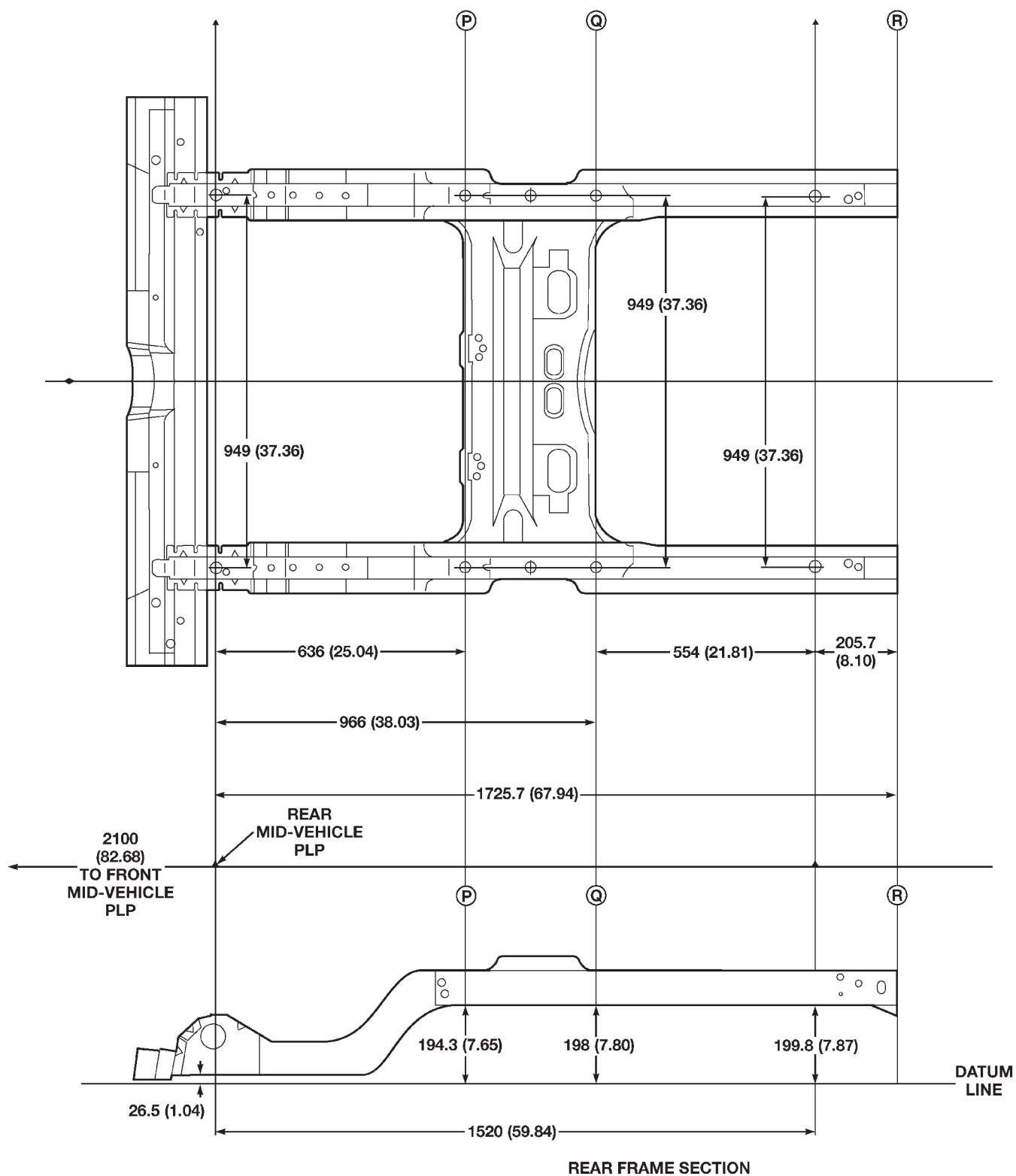


- A = INBOARD SIDE OF RAIL
- B = FRONT OF RAIL
- C = HOLE, BOTTOM OF CRADLE
- D = HOLE, TOP OF OUTBOARD OF CLOSURE PANEL
- E = FORWARD CRADLE MOUNTING BOLT
- F = CENTER OF TENSION STRUT BUSHING
- G = REARWARD ENGINE MOUNTING BOLT
- H = HOLE, BOTTOM OF CRADLE
- J = HOLE, BOTTOM OF RAIL
- K = HOLE, BOTTOM OF COWL
- L = REARWARD CRADLE MOUNTING BOLT
- M = REAR CROSSMEMBER MOUNTING BOLTS
- N = HOLE, BETWEEN MID-VEHICLE PLPS
- () = INCH EQUIVALENT TO ONE TENTH INCH
- ▲ = PRINCIPLE LOCATION POINT (PLP)
- ⇄ = CENTER LINE (C/L)

Fig. 13 FORWARD FRAME SECTION AND ENGINE CRADLE

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FRAME (Continued)



P = BOLT, SUSPENSION MOUNTING FORWARD
 Q = BOLT, SUSPENSION MOUNTING REARWARD
 R = END OF FRAME RAIL ADAPTER
 () = INCH EQUIVALENT TO ONE TENTH INCH
 ▲ = PRINCIPAL LOCATION POINT (PLP)
 ◆ = CENTER LINE (C/L)

Fig. 14 REAR FRAME SECTION

FRAME (Continued)

SPECIFICATIONS - TORQUE

TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Rear bumper reinforcement attaching nut	28	21	—
Front suspension crossmember front attaching bolt	109	80	—
Front suspension crossmember rear attaching bolt	102	75	—
Radiator support crossmember attaching bolts	51	45	—

ENGINE CRADLE
CROSSMEMBER

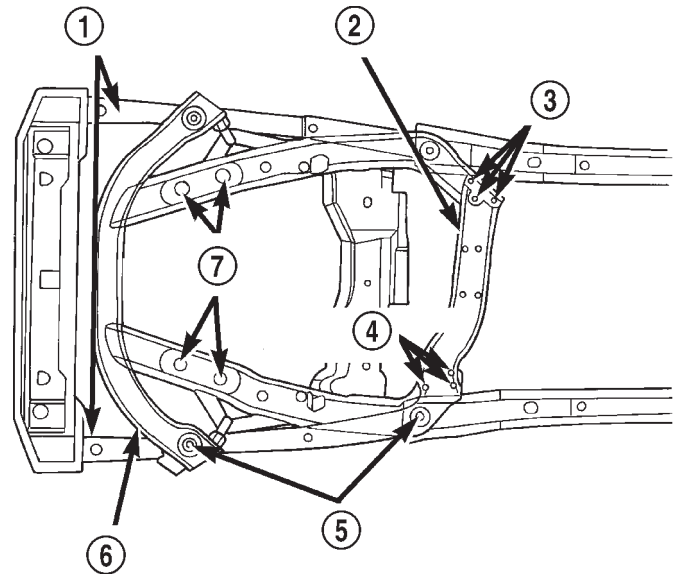
REMOVAL

CAUTION: VERIFY THAT VEHICLE IS PROPERLY SUPPORTED AND SECURED TO THE LIFTING DEVICE. VEHICLE CENTER OF GRAVITY WILL CHANGE WHEN HEAVY COMPONENTS ARE REMOVED CAUSING A HAZARDOUS CONDITION.

- (1) Release hood latch and open hood.
- (2) Remove nuts holding engine mounts to cradle.
- (3) Install a suitable engine support device.
- (4) Raise and support vehicle on safety stands.
- (5) Remove bolts holding transaxle crossmember to cradle.
- (6) Lower vehicle and lift engine and transaxle off cradle.
- (7) Raise and support vehicle on safety stands.
- (8) Disconnect sway bar links.
- (9) Remove bolts retaining suspension lower ball joints to spindles.
- (10) Separate lower control arm from spindle. Refer to Group 2, Suspension, for proper procedures.
- (11) Support cradle on a 10 cm by 10 cm by 90 cm (4 in. by 4 in. by 36 in.) wood beam and a jack.
- (12) Remove bolts holding cradle to body shell (Fig. 15).
- (13) Lower cradle away from body shell.

INSTALLATION

NOTE: If cradle replacement is required, transfer suspension components and jounce and bounce plates to replacement cradle.



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Fig. 15 ENGINE CRADLE

- 1 - FRONT FRAME RAILS
- 2 - TRANSAXLE CROSSMEMBER
- 3 - CROSSMEMBER BOLTS
- 4 - CROSSMEMBER BOLTS
- 5 - CRADLE MOUNT BOLTS
- 6 - ENGINE CRADLE
- 7 - ENGINE MOUNT BOLTS

- (1) Support cradle on wood beam and a jack.
- (2) Position cradle under body shell.
- (3) Install bolts to hold cradle to body shell.
- (4) Connect lower control arms to spindles. Refer to Group 2, Suspension, for proper procedures.
- (5) Install bolts to retain suspension lower ball joints to spindles.
- (6) Connect sway bar links.
- (7) Lower vehicle and lower engine and transaxle onto cradle.
- (8) Raise vehicle.
- (9) Install bolts to hold transaxle crossmember to cradle.
- (10) Lower vehicle.
- (11) Remove engine support device.
- (12) Install nuts to hold engine mounts to cradle.
- (13) Align front suspension if necessary.

FRONT TOW EYE

REMOVAL

(1) Unthread the front tow eye from the tow eye bracket (Fig. 16).

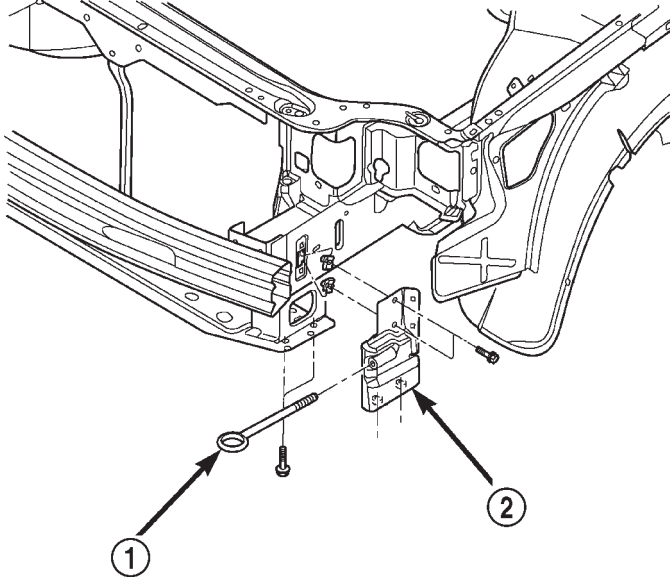


Fig. 16 FRONT TOW EYE POSITION & ORIENTATION

- 1 - FRONT TOW EYE
2 - FRONT TOW EYE BRACKET

(2) Remove the front tow eye.

INSTALLATION

(1) Install the tow eye into the tow eye bracket. No torque specification is required, hand tighten only (Fig. 17).

FRONT TOW HOOK BRACKET

REMOVAL

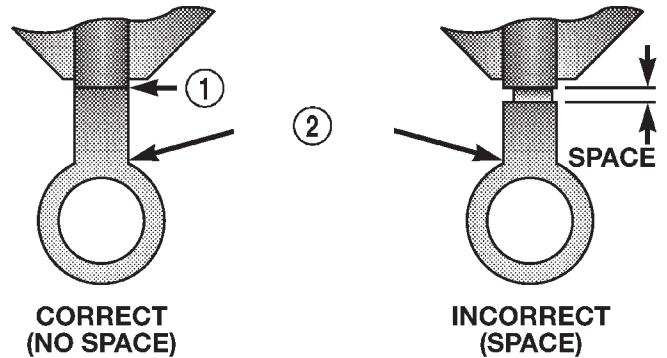
(1) Unthread the front tow eye from the tow eye bracket (Fig. 16).

(2) Open hood and disconnect the negative battery cable remote terminal from the battery post.

(3) Hoist vehicle.

(4) Partially remove the front fascia to gain access to the windshield/headlamp washer reservoir. Refer to Body for the procedure.

(5) Remove the front tow eye bracket.



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Fig. 17 FRONT TOW EYE INSTALLATION

- 1 - NO SPACE
2 - TOW EYE

INSTALLATION

(1) Install the front tow eye bracket and fasteners. Torque bolts to 23 to 34 N-m (Fig. 16).

(2) Reinstall the front fascia as necessary. Refer to Body for procedure.

(3) Lower vehicle from the hoist.

(4) Install the tow eye into the tow eye bracket. No torque specification is required, hand tighten only (Fig. 17).

(5) Reconnect the negative battery cable at the remote battery post.

REAR CROSSMEMBER

DESCRIPTION

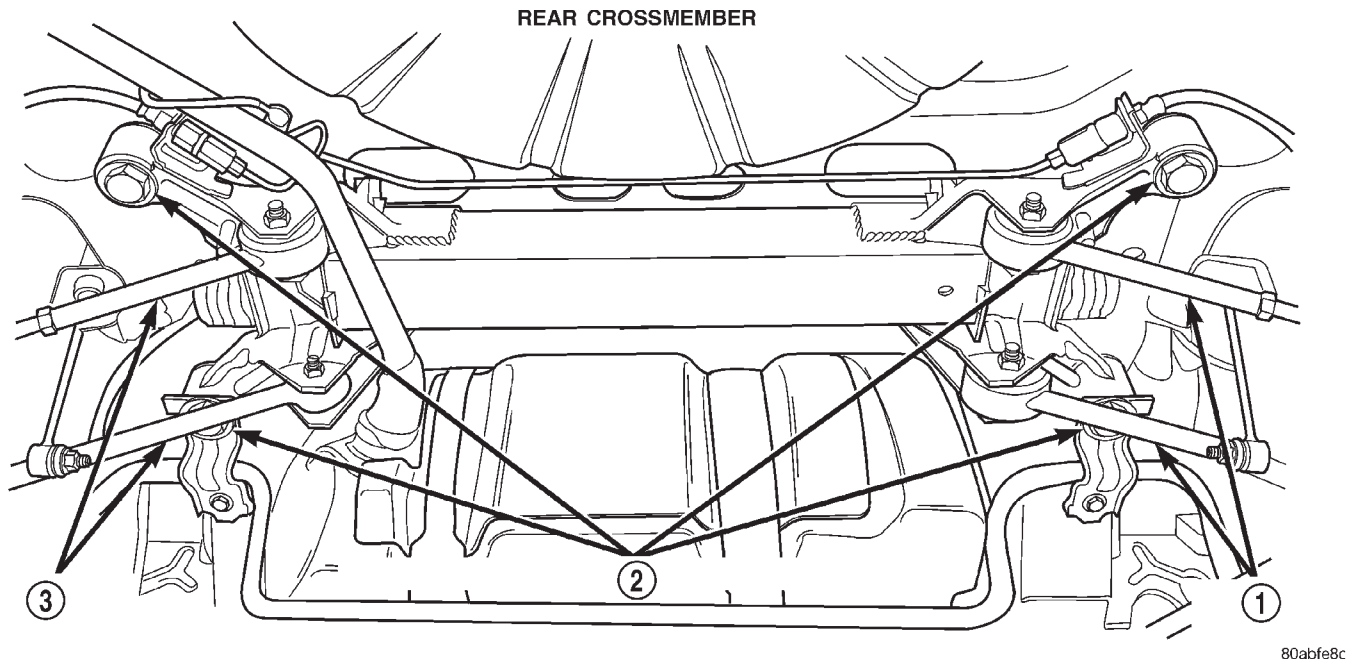
This vehicle is equipped with a aluminum alloy rear suspension crossmember that spans the distance between the rear frame rails (Fig. 18). It is isolated from the frame rails with the use of rubber isolator bushings. These bushings may be replaced separately.

The rear suspension crossmember has 4 rubber isolator bushings which are replaceable.

OPERATION

The purpose of the rear suspension crossmember is to support the lower end of the rear suspension through the use of four lateral links. Two lateral links are mounted on each end of the crossmember (Fig. 18) .

REAR CROSSMEMBER (Continued)

**Fig. 18 REAR SUSPENSION CROSSMEMBER**

1 - LATERAL LINKS

2 - REAR CROSSMEMBER ISOLATOR BUSHINGS

3 - LATERAL LINKS

REMOVAL

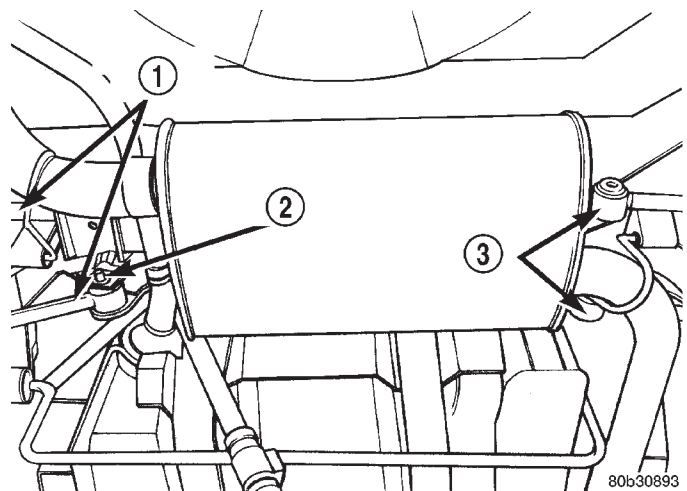
(1) Open the fuel filler door. Remove the 3 fuel filler neck attaching screws. Remove the fuel filler cap.

(2) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section of this manual, for the required lifting procedure to be used for this vehicle.

(3) Remove both rear wheel and tire assemblies from the vehicle.

(4) Remove the nut and bolt attaching each of the 4 lateral links to the crossmember (Fig. 19). **The bolt for the left front lateral link may not be removed at this time. Remove the nut only. Once the crossmember is lowered, the bolt can be easily removed.** (Fig. 19). Notice the forward attaching bolts face rearward.

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 19) to prevent damage to the fuel tank and or fuel tubes in case of an accident. The bolt attaching the left rear lateral link must be installed with the bolt pointing forward to prevent damage to the fuel filler tube.

**Fig. 19 LATERAL LINK ATTACHMENT TO CROSSMEMBER**

1 - LATERAL LINKS

2 - LEFT FRONT LATERAL LINK BOLT

3 - LATERAL LINKS

(5) Remove the screw securing the brake tubes to the left stabilizer bar isolator bushing retainer.

REAR CROSSMEMBER (Continued)

(6) Remove the 4 bolts attaching both stabilizer bar isolator bushing retainers to the frame rails (the 2 rearward attaching bolts also attach the front corners of the rear suspension crossmember in place). Allow the stabilizer bar to hang down.

(7) Remove the parking brake cable tensioner from the intermediate parking brake cable. Refer to Base Brake System in Group 5 Brakes in this manual for the required service procedure.

(8) Remove the parking brake cable tensioner from the left rear parking brake cable. Refer to Base Brake System in Group 5 Brakes in this manual for the required service procedure.

(9) Remove the right rear parking brake cable from the intermediate parking brake cable. Refer to Base Brake System in Group 5 Brakes in this manual for the required service procedure.

(10) Remove the retainer clips securing both rear parking brake cables assemblies to the rear suspension crossmember (Fig. 20).

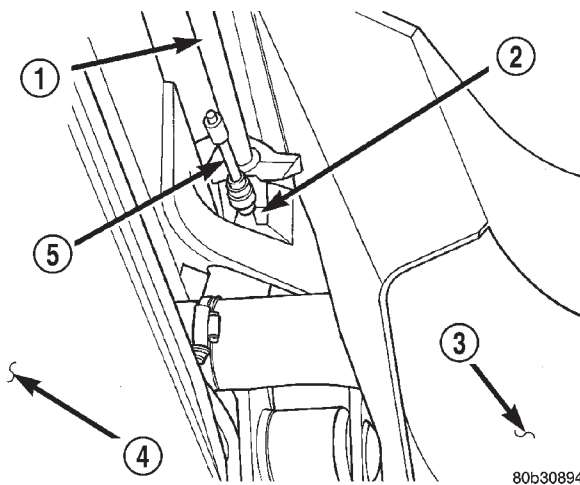


Fig. 20 REAR PARKING BRAKE AND RETAINER CLIP (LEFT)

- 1 - INTERMEDIATE PARKING BRAKE CABLE
- 2 - CLIP
- 3 - FUEL TANK
- 4 - MUFFLER
- 5 - REAR PARKING BRAKE CABLE

(11) Remove parking brake cables from crossmember.

(12) Remove nuts attaching both brake proportioning valves to the rear corners of the crossmember (Fig. 21).

(13) Position a transmission jack under the muffler.

(14) Disconnect the hanger securing the exhaust resonator to the rear frame rail.

(15) Disconnect the hangers securing the exhaust muffler to the rear suspension crossmember. There is one hanger on each side of the muffler.

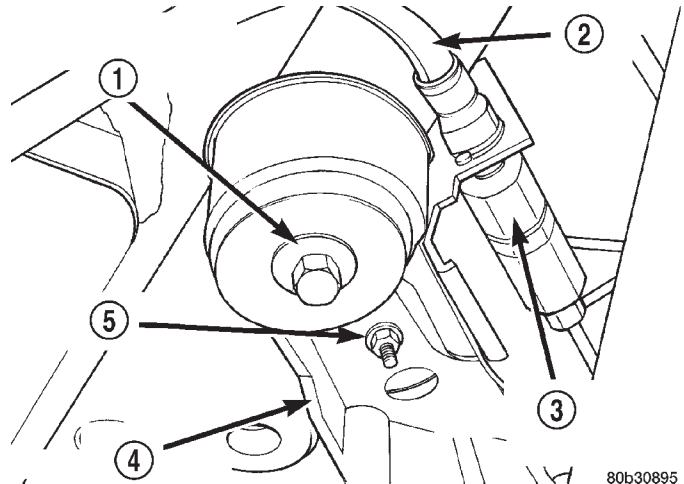


Fig. 21 REAR BRAKE PROPORTIONING VALVE

- 1 - CROSSMEMBER ATTACHING BOLT
- 2 - REAR FLEX HOSE
- 3 - BRAKE PROPORTIONING VALVE
- 4 - REAR CROSSMEMBER
- 5 - ATTACHING NUT

(16) Lower the transmission jack and muffler enough to allow for better access to the rear crossmember.

(17) Remove the screw securing the fuel filler neck to the left frame rail.

(18) Remove the final 2 bolts attaching the rear suspension crossmember to the frame rails. These are located at the rear corners of the crossmember (Fig. 21).

(19) Lower rear suspension crossmember as low as possible to allow for removal of lateral link attaching bolt at left front corner of crossmember.

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 19) to prevent damage to the fuel tank and or fuel tubes. Also, the bolt attaching the left rear lateral link must be installed with the bolt pointing forward to prevent damage to the fuel filler tube.

(20) Remove the link attaching bolt and link from the left front corner of the crossmember.

(21) Remove the rear suspension crossmember from the vehicle.

DISASSEMBLY

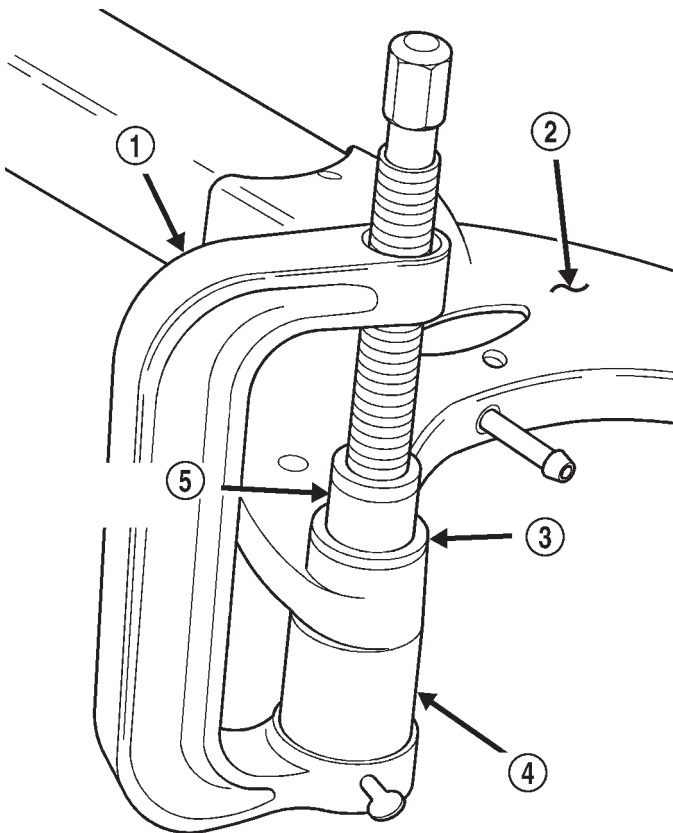
(1) Lay the crossmember right-side-up on a bench with the bushing to be removed hanging over the edge of the bench.

(2) Install cup, Special Tool 8173-1, in well of press, Special Tool C-4212F.

REAR CROSSMEMBER (Continued)

(3) Install Remover/Installer, Special Tool 8173-2, on end of the threaded push rod on Special Tool C-4212F.

(4) Install Special tool C-4212F with Special Tools 8173-1, and 8173-2, on bushing (Fig. 22).



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Fig. 22 BUSHING REMOVAL

- 1 - SPECIAL TOOL C-4212F
- 2 - REAR SUSPENSION CROSSMEMBER
- 3 - BUSHING
- 4 - SPECIAL TOOL 8173-1
- 5 - SPECIAL TOOL 8173-2

(5) Turn the threaded rod, pushing bushing down through crossmember and into cup 8173-1.

(6) Remove special tools, and bushing

ASSEMBLY

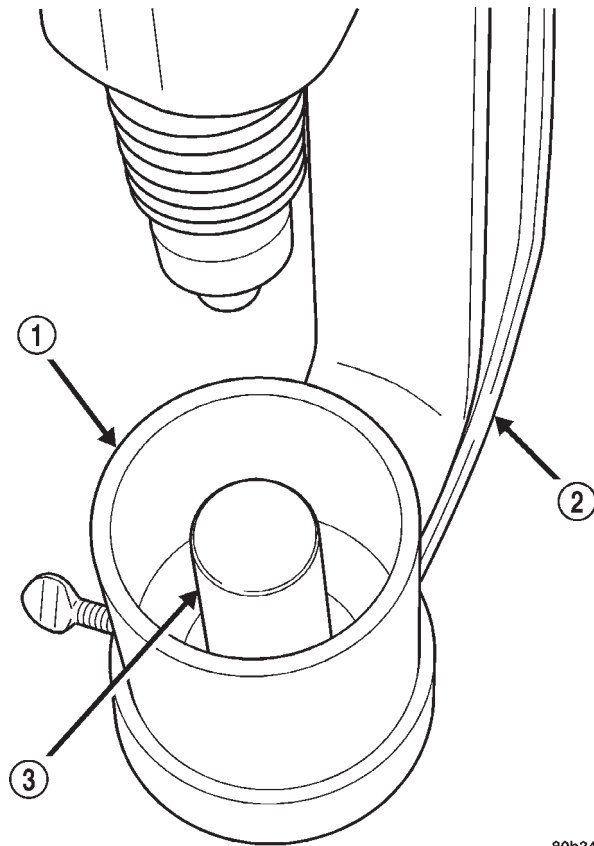
(1) Clean bore in crossmember where bushing mounts.

(2) Thoroughly coat new bushing and crossmember bore with Mopar® Rubber Bushing Installation Lube.

(3) Place Installer, Special Tool C-8173-3, on top of crossmember bushing bore with inside taper end facing up. Locator lip on bottom of tool should align the tool with bushing bore.

(4) Coat the tapered bore of Special Tool C-8173-3 with Mopar® Rubber Bushing Installation Lube, then place the bushing in its tapered bore (Fig. 24).

(5) Install Special Tool 8173-4 in the cup, Special Tool 8173-1 (Fig. 23). Install cup, Special Tool 8173-1 into well of press, Special Tool C-4212F (Fig. 23).



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Fig. 23 SPECIAL TOOLS

- 1 - SPECIAL TOOL 8173-1
- 2 - SPECIAL TOOL C-4212F
- 3 - SPECIAL TOOL 8173-4

(6) Install Remover/Installer, Special Tool 8173-2, on end of the threaded push rod on Special Tool C-4212F.

(7) Place special tools on crossmember and bushing (Fig. 24).

(8) Turn the threaded rod, pushing bushing down through Special tool 8173-3 and into place in the crossmember. Continue pushing the bushing until bottoms against Special Tool 8173-4.

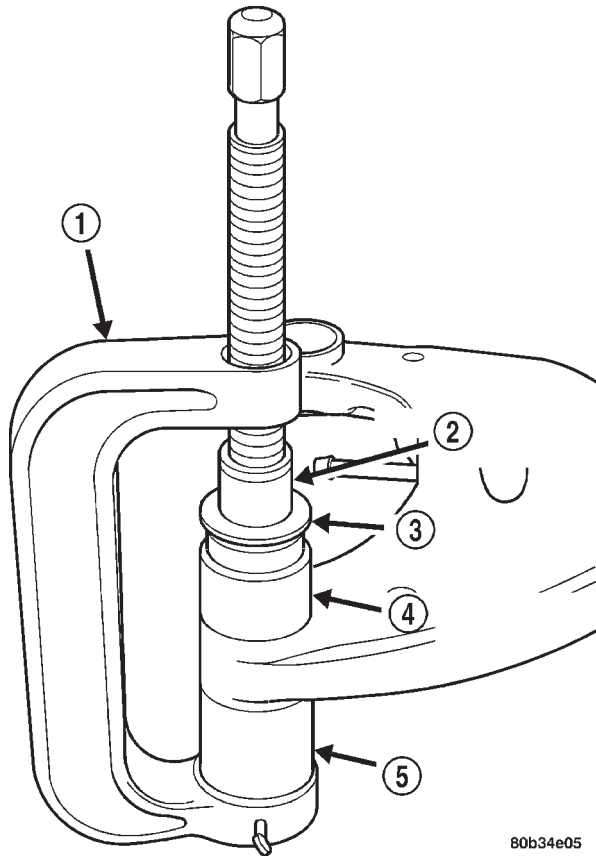
(9) Remove special tools.

(10) Verify the bushing is properly centered in the crossmember bore and the outer bushing lips are not pinched.

INSTALLATION

(1) Install the rear suspension crossmember back into vehicle above muffler. Make sure that the brake tubes are properly routed above the crossmember as it is installed.

REAR CROSSMEMBER (Continued)



80b34e05

Fig. 24 BUSHING INSTALLATION

- 1 - SPECIAL TOOL C-4212F
- 2 - SPECIAL TOOL 8173-2
- 3 - BUSHING
- 4 - SPECIAL TOOL 8173-3
- 5 - SPECIAL TOOL 8173-1

(2) Install the rear proportioning valve mounting brackets into mounting position at the rear corners of the crossmember (Fig. 21). Install the attaching nuts.

(3) Install Intermediate parking brake cable routing clip into place on left front of crossmember (Fig. 20).

(4) Reattach left forward lateral link to crossmember. Install mounting bolt through the front of the crossmember mount towards the rear. Do not install and torque nut at this time.

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 19) to prevent damage to the fuel tank and or fuel tubes. Also, when installing the bolt attaching the left rear lateral link, install the bolt pointing forward to prevent damage to the fuel filler tube.

(5) Raise the crossmember up against the frame rails. Install, but do not fully tighten, the 2 bolts

attaching the rear of the crossmember to the frame rails.

(6) Raise the exhaust into place. Reattach the 3 exhaust hangers previously removed from the muffler and resonator.

(7) Remove transmission jack supporting muffler and exhaust system.

(8) Reinstall the fuel filler neck attaching screw and secure the fuel filler neck to the left frame rail.

(9) Position the rear parking brake cables into crossmember alignment holes (Fig. 20).

(10) Install the retainer clips securing both rear parking brake cables assemblies to the rear suspension crossmember (Fig. 20).

(11) Reconnect the right rear parking brake cable to the intermediate parking brake cable.

(12) Install the parking brake cable tensioner to the left rear parking brake cable.

(13) Install the parking brake cable tensioner to the intermediate parking brake cable. Refer to Base Brake System in Group 5 Brakes in this manual for the required service procedure to install and properly adjust the parking brakes.

(14) Install the 4 bolts attaching both stabilizer bar isolator bushing retainers to the frame rails (the 2 rearward attaching bolts attach the front corners of the rear suspension crossmember in place). Tighten the forward stabilizer bar isolator bushing retainer attaching bolts to 40 N·m (30 ft. lbs.). Tighten the 2 rearward stabilizer bar isolator bushing retainer attaching bolts (which also serve as the front crossmember attaching bolts) to 100 N·m (75 ft. lbs.).

(15) Tighten the rear suspension crossmember rear attaching bolts to 100 N·m (75 ft. lbs.).

(16) Install the screw securing the brake tubes to the left stabilizer bar isolator bushing retainer.

(17) Install the remaining 3 lateral links to the rear suspension crossmember. The forward lateral arm mounting bolts must point rearward, and the rearward lateral arm mounting bolts must point forward.

CAUTION: The bolts attaching the forward lateral links to the crossmember must be installed with the bolts pointing rearward (Fig. 19) to prevent damage to the fuel tank and or fuel tubes. The bolt attaching the left rear lateral link must be installed with the bolt pointing forward to prevent damage to the fuel filler tube.

(18) Install the lateral link attaching nuts, but DO NOT fully tighten at this time.

REAR CROSSMEMBER (Continued)

CAUTION: Tightening the lateral link attaching bolts at this time will cause the bushings contort at curb riding height, leading to premature failure of the bushings. Tighten bolts only when vehicle is at curb riding height.

- (19) Install wheel and tire assemblies on vehicle.
- (20) Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).
- (21) Lower vehicle to the ground.
- (22) Install the 3 fuel filler neck attaching screws. Reinstall the fuel filler cap.
- (23) Tighten all 4 lateral arm to crossmember attaching bolt and nut assemblies to 95 N·m (70 ft. lbs.).
- (24) Check and reset rear wheel TOE to specifications if required.

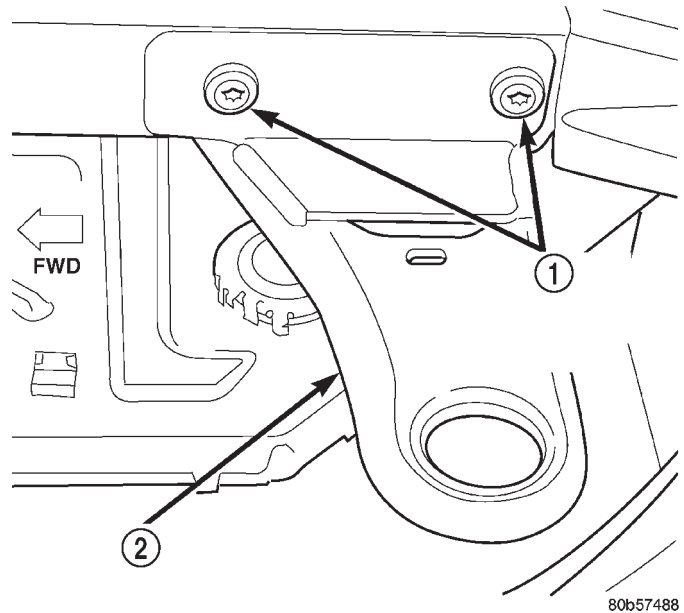


Fig. 25 REAR TOW EYE ASSEMBLY

- 1 - REAR TOW EYE BRACKET MOUNTING SCREWS
- 2 - REAR TOW EYE BRACKET

REAR TOW EYE

REMOVAL

- (1) Hoist and support vehicle. Refer to Lubrication and Maintenance, for proper lifting procedure.
- (2) Remove bolts holding rear tow eye bracket to rear frame rail (Fig. 25).
- (3) Remove rear tow eye bracket from vehicle.

INSTALLATION

- (1) Position rear tow eye bracket on vehicle.
- (2) Install bolts to hold rear tow eye bracket to rear frame rail. Torque bolts to 48 N·m.
- (3) Lower vehicle.

FUEL SYSTEM

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FUEL DELIVERY

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FUEL DELIVERY

DESCRIPTION

The front wheel drive car uses a plastic fuel tank located rear center of the vehicle.

The Fuel Delivery System consists of: the following items:

- Electric fuel pump module
- Fuel filter
- Tubes/lines/hoses
- Fuel injectors

The in-tank fuel pump module contains the fuel pump. The pump is serviced as part of the fuel pump module. Refer to Fuel Pump Module.

The fuel filter is replaceable, it is mounted on the outside, on top of, the fuel tank. Refer to the Maintenance Schedules in the Introduction section of this manual for recommended fuel filter replacement intervals.

OPERATION

The fuel system provides fuel pressure by an in-tank pump module. The PCM controls the operation of the fuel system by providing battery voltage to the fuel pump through the fuel pump relay. The PCM requires only three inputs and a good ground to operate the fuel pump relay. The three inputs are:

- Ignition voltage
- Crankshaft Position (CKP) sensor
- Camshaft Position (CMP) sensor

DIAGNOSIS AND TESTING - FUEL DELIVERY SYSTEM

(Refer to Appropriate Diagnostic Information)

STANDARD PROCEDURE

STANDARD PROCEDURE - FUEL SYSTEM PRESSURE RELEASE PROCEDURE

(1) Remove Fuel Pump relay from Power Distribution Center (PDC). For location of relay, refer to label on underside of PDC cover.

(2) Start and run engine until it stalls.

(3) Attempt restarting engine until it will no longer run.

(4) Turn ignition key to OFF position.

(5) Return fuel pump relay to PDC.

(6) One or more Diagnostic Trouble Codes (DTC's) may have been stored in PCM memory due to fuel pump relay removal. The DRB III® scan tool must be used to erase a DTC.

STANDARD PROCEDURE - DRAINING FUEL TANK

Two different procedures may be used to drain fuel tank (lowering tank or using DRB scan tool).

The quickest draining procedure involves lowering the fuel tank.

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING FUEL SYSTEM COMPONENTS. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

As an alternative procedure, the electric fuel pump may be activated allowing tank to be drained at fuel rail connection. Refer to DRBIII® scan tool for fuel pump activation procedures. Before disconnecting fuel line at fuel rail, release fuel pressure. Refer to the Fuel System Pressure Release Procedure in this group for procedures. Disconnect the fuel line at the fuel rail and remove the plastic retainer from the fuel rail. Take plastic retainer and install it back into the fuel line from body. Attach end of special test hose tool number 6539 at fuel line connection from the body line. Position opposite end of this hose tool to an approved gasoline draining station. Activate fuel pump and drain tank until empty. When done remove the special test hose tool number 6539 from the body line. Remove the plastic retainer from the special test hose tool number 6539 and reinstall it into the fuel line from the body. Install the fuel line to the fuel rail.

If electric fuel pump is not operating, tank must be lowered for fuel draining. Refer to following procedures.

(1) Remove fuel filler cap.

(2) Perform the Fuel System Pressure Release procedure.

(3) Disconnect negative cable from battery.

(4) Raise vehicle and support.

(5) Certain models are equipped with a separate grounding wire (strap) connecting the fuel fill tube assembly to the body. Disconnect wire by removing screw.

(6) Open fuel fill door and remove screws mounting fuel filler tube assembly to body. Do not disconnect rubber fuel fill or vent hoses from tank at this time.

(7) Place a transmission jack under center of fuel tank. Apply a slight amount of pressure to fuel tank with transmission jack.

(8) Remove fuel tank mounting strap nuts from mounting strap studs.

(9) **Lower the tank just enough so that the filler tube fitting is the highest point of the fuel tank.**

FUEL DELIVERY (Continued)

(10) Remove filler tube from fuel tank. Tank will be drained through this fitting.

WARNING: WRAP SHOP TOWELS AROUND HOSES TO CATCH ANY GASOLINE SPILLAGE.

(11) Drain fuel tank into holding tank or a properly labeled **Gasoline** safety container.

CAUTION: GASOLINE OR GASOLINE VAPORS ARE HIGHLY FLAMMABLE. A FIRE COULD OCCUR IF AN

IGNITION SOURCE IS PRESENT. NEVER DRAIN OR STORE GASOLINE OR DIESEL FUEL IN AN OPEN CONTAINER, DUE TO THE POSSIBILITY OF FIRE OR EXPLOSION.

(12) If fuel pump module removal is necessary, refer to Fuel Pump Module Removal/Installation in this section.

SPECIFICATIONS

TORQUE

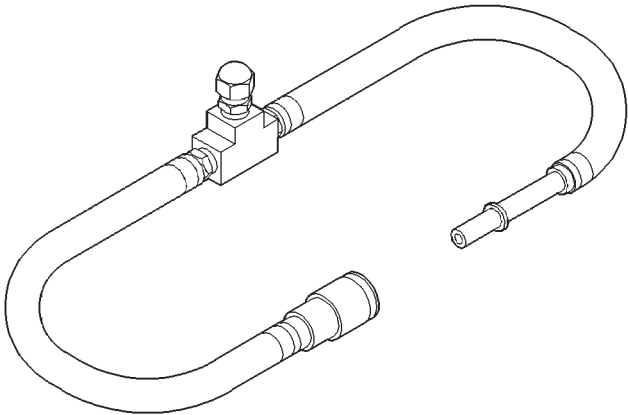
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Accelerator Pedal to Dash Nuts	12	8.8	106
Fuel Pump Module Locknut	55	40	
Fuel Tank strap Bolts	60	44	
Hose Clamps	3		25

FUEL SYSTEM PRESSURE

400 kpa ±34 kpa (58 psi ± 5 psi)

FUEL TANK CAPACITY

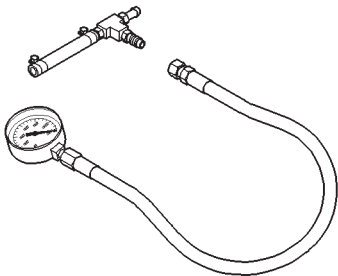
Vehicle	Liters	U.S. Gallons
LH	64	17
Nominal refill capacities are shown. A variation may be observed from vehicle to vehicle due to manufacturing tolerance and refill procedure.		



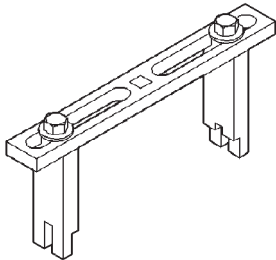
Fuel Pressure Test Adapter 6539

SPECIAL TOOLS

FUEL

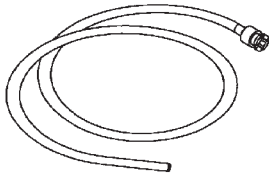
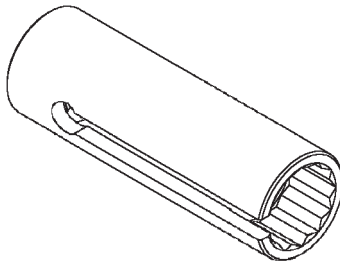
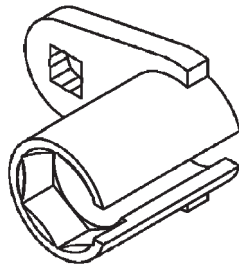


Pressure Gauge Assembly C-4799-B



Spanner Wrench 6856

FUEL DELIVERY (Continued)

**Fuel Line Adapter 1/4****O2S (Oxygen Sensor) Remover/Installer—C-4907****O2S(Oxygen Sensor) Remover/Installer - 8439**

FLOW MANAGEMENT VALVE

DESCRIPTION

It is a plastic valve inline between the fuel tank and the EVAP canister.

OPERATION

The flow management valve meters the flow of fuel vapors to and from the EVAP canister during vehicle run, and refueling. Pressure from the tank during refueling opens the main port valve and allows vapors to the EVAP canister. During vehicle run the vapors are metered through an orifice to the EVAP canister. It also is a liquid separator to keep fuel out of the EVAP canister.

FUEL LEVEL SENDING UNIT / SENSOR

DESCRIPTION

The fuel gauge level sending unit is attached to the side of fuel pump module. The level sensor is a variable resistor.

OPERATION

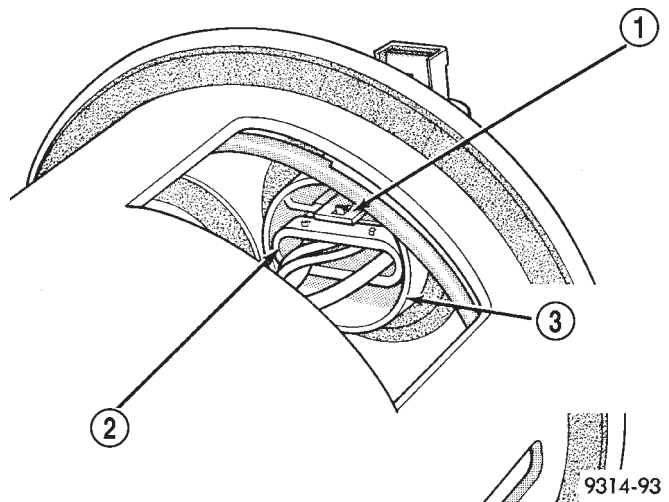
Its resistance changes with the amount of fuel in the tank. The float arm attached to the sensor moves as the fuel level changes.

The fuel level input is used as an input for OBD II. If the fuel level is below 15% or above 85% of total tank capacity several monitors are disabled. There are diagnostics for the level circuit open and shorted.

REMOVAL

Remove fuel pump module. Refer to Fuel Pump Module in this section.

(1) Depress the retaining tab and remove the fuel pump/level sensor connector from the bottom of the fuel pump module electrical connector (Fig. 1).

**Fig. 1 Fuel Pump/Level Sensor Connector**

- 1 - TAB
- 2 - FUEL PUMP/LEVEL SENSOR CONNECTOR
- 3 - BOTTOM OF FUEL PUMP MODULE ELECTRICAL CONNECTOR

FUEL LEVEL SENDING UNIT / SENSOR (Continued)

(2) Remove wire terminal retaining clip from connector (Fig. 2). Note the location of terminals for the level sensor wires (Fig. 3).

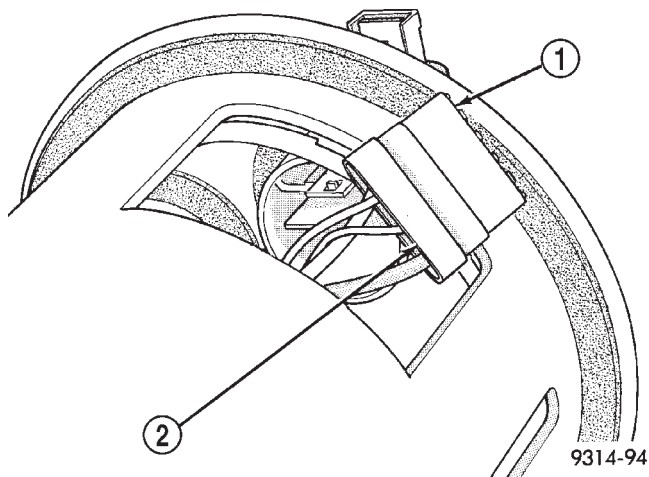


Fig. 2 Wire Terminal Retaining Clip

- 1 - WIRE TERMINAL RETAINING CLIP
- 2 - FUEL PUMP/LEVEL SENSOR CONNECTOR

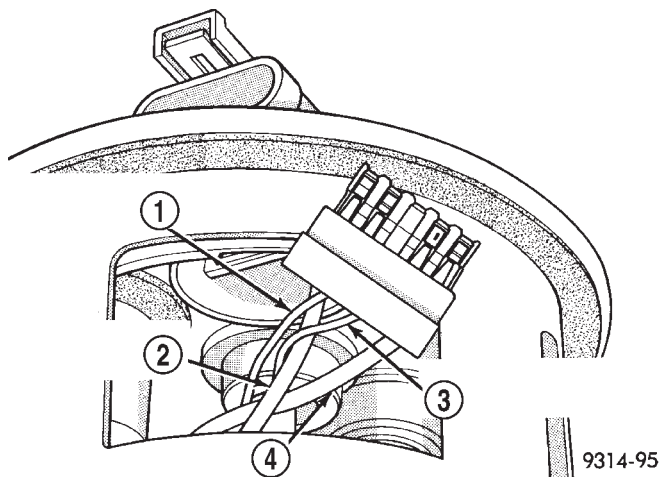


Fig. 3 Wire Terminal Identification

- 1 - LEVEL SENSOR GROUND
- 2 - FUEL PUMP -
- 3 - LEVEL SENSOR SIGNAL
- 4 - FUEL PUMP +

(3) Using special tool 7812 or an equivalent, push level sensor signal and ground terminals out of the connector (Fig. 4).

(4) Insert a screwdriver between the fuel pump module and the top of the level sensor housing (Fig. 5). Push level sensor down slightly.

(5) Slide level sensor wires through standpipe inside fuel pump module (Fig. 6).

(6) Slide level sensor out of installation channel (Fig. 5).

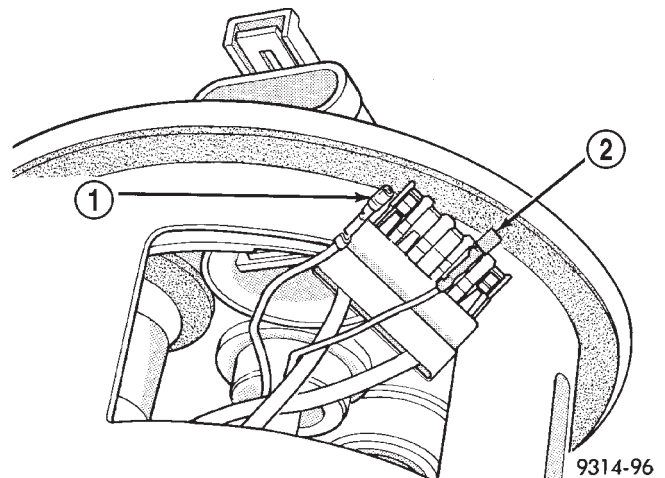


Fig. 4 Level Sensor Signal

- 1 - LEVEL SENSOR GROUND
- 2 - LEVEL SENSOR SIGNAL

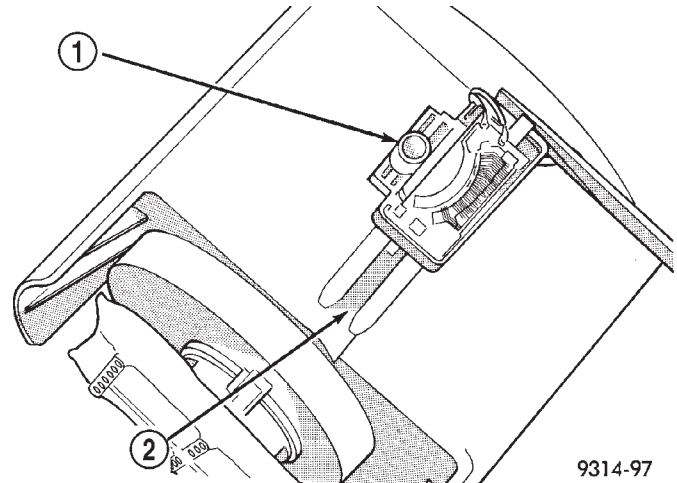


Fig. 5 Fuel Level Sensor Removal

- 1 - LEVEL SENSOR
- 2 - INSTALLATION CHANNEL

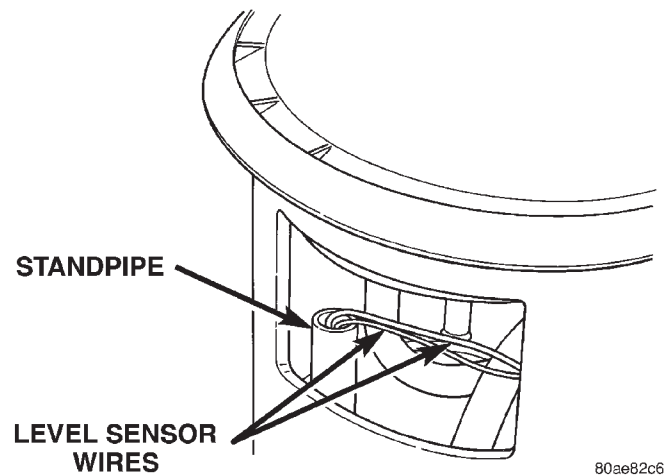
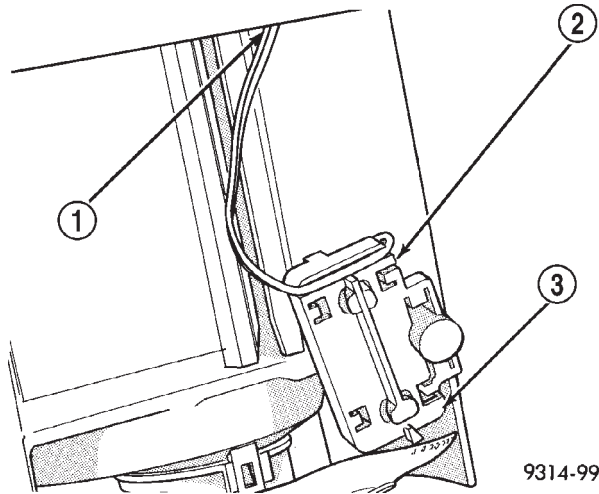


Fig. 6 Standpipe Inside of Module

FUEL LEVEL SENDING UNIT / SENSOR (Continued)

INSTALLATION

- (1) Insert level sensor wires in bottom of standpipe.
- (2) Wrap wires into groove in back of level sensor (Fig. 7).

**Fig. 7 LEVEL SENSOR**

- 1 - STANDPIPE OPENING
- 2 - GROOVE
- 3 - BACK OF LEVEL SENSOR

- (3) While feeding wires into standpipe, slide level sensor up into installation channel until it snaps into place. Ensure tab at bottom of sensor locks in place.
- (4) Install level sensor wires in connector. Push the wires up through the connector and then pull them down until they lock in place. Ensure signal and ground wires are installed in the correct position (Fig. 3).
- (5) Install retaining clip on connector.
- (6) Push fuel pump/level sensor connector up into bottom of fuel pump module electrical connector.
- (7) Install fuel pump module. Refer to Fuel Pump Module in this section.

FUEL LINES

DESCRIPTION - FUEL LINES/HOSES AND CLAMPS

Also refer to Quick-Connect Fittings.

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS OR LINES, THE FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL SYSTEM PRESSURE RELEASE PROCEDURE IN THIS GROUP.

The lines/tubes/hoses used on fuel injected vehicles are of a special construction. This is due to the higher fuel pressures and the possibility of contaminated fuel in this system. If it is necessary to replace these lines/tubes/hoses, only those marked EFM/EFI may be used.

If equipped: The hose clamps used to secure rubber hoses on fuel injected vehicles are of a special rolled edge construction. This construction is used to prevent the edge of the clamp from cutting into the hose. Only these rolled edge type clamps may be used in this system. All other types of clamps may cut into the hoses and cause high-pressure fuel leaks.

Use new original equipment type hose clamps.

STANDARD PROCEDURE - HOSES AND CLAMP

Inspect all hose connections (clamps and quick connect fittings) for completeness and leaks. Replace cracked, scuffed, or swelled hoses. Replace hoses that rub against other vehicle components or show sign of wear.

Fuel injected vehicles use specially constructed hoses. When replacing hoses, only use hoses marked EFM/EFI.

When installing hoses, ensure that they are routed away from contact with other vehicle components that could rub against them and cause failure. Avoid contact with clamps or other components that cause abrasions or scuffing. Ensure that rubber hoses are properly routed and avoid heat sources.

The hose clamps have rolled edges to prevent the clamp from cutting into the hose. Only use clamps that are original equipment or equivalent. Other types of clamps may cut into the hoses and cause high pressure fuel leaks. Tighten hose clamps to 1 N·m (10 in. lbs.) torque.

Inspect all hose connections such as clamps, couplings and fittings to make sure they are secure and leaks are not present. The component should be replaced immediately if there is any evidence of degradation that could result in failure.

Never attempt to repair a plastic fuel line/tube. Replace as necessary.

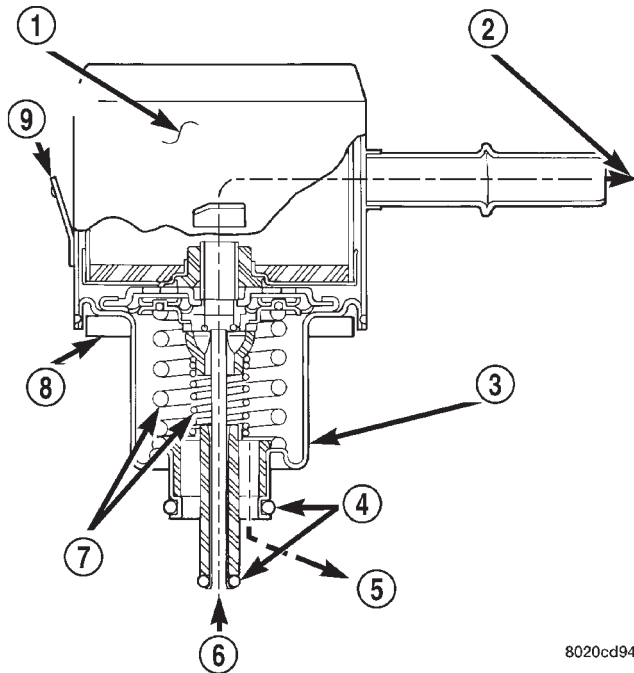
Avoid contact of any fuel tubes/hoses with other vehicle components that could cause abrasions or scuffing. Be sure that the plastic fuel lines/tubes are properly routed to prevent pinching and to avoid heat sources.

FUEL PRESSURE REGULATOR

DESCRIPTION

A combination fuel filter and fuel pressure regulator is used on all gas powered engines. It is located on the top of the fuel pump module.

It contains a diaphragm, calibrated springs and a fuel return valve. The internal fuel filter (Fig. 8) is also part of the assembly.



8020cd94

Fig. 8 Side View - Filter/Regulator

- 1 - INTERNAL FUEL FILTER
- 2 - FUEL FLOW TO FUEL INJECTORS
- 3 - FUEL FILTER/FUEL PRESSURE REGULATOR
- 4 - O-RINGS
- 5 - EXCESS FUEL BACK TO TANK
- 6 - FUEL INLET
- 7 - CALIBRATED SPRINGS
- 8 - RUBBER GROMMET AT PUMP MODULE
- 9 - LOCKING TAB

OPERATION

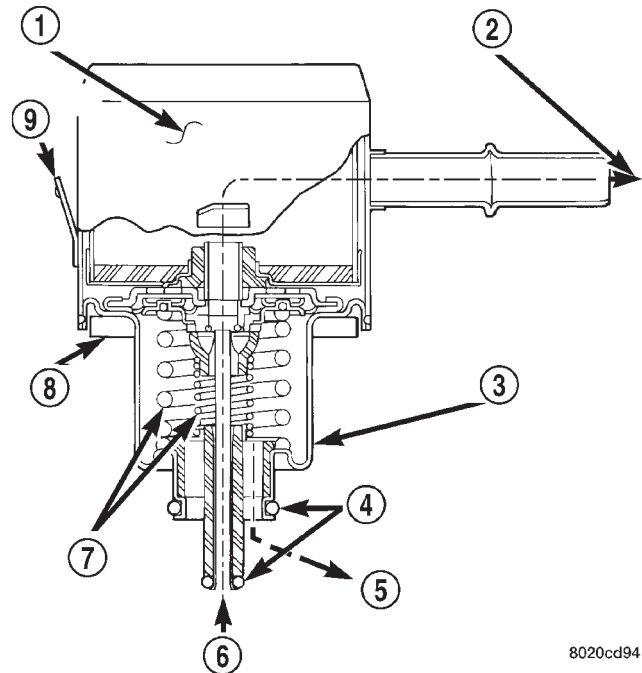
Fuel Pressure Regulator Operation: The pressure regulator is a mechanical device that is calibrated to maintain fuel system operating pressure of approximately 400 kPa (58 psi) at the fuel injectors.

Fuel is supplied to the filter/regulator by the electric fuel pump through an opening tube at the bottom of filter/regulator.

The fuel pump module contains a check valve to maintain some fuel pressure when the engine is not operating. This will help to start the engine (Fig. 9).

If fuel pressure at the pressure regulator exceeds approximately 58 psi, an internal diaphragm closes and excess fuel pressure is routed back into the tank

through the pressure regulator. A separate fuel return line is not used with any gas powered engine.



8020cd94

Fig. 9 Side View - Filter/Regulator

- 1 - INTERNAL FUEL FILTER
- 2 - FUEL FLOW TO FUEL INJECTORS
- 3 - FUEL FILTER/FUEL PRESSURE REGULATOR
- 4 - O-RINGS
- 5 - EXCESS FUEL BACK TO TANK
- 6 - FUEL INLET
- 7 - CALIBRATED SPRINGS
- 8 - RUBBER GROMMET AT PUMP MODULE
- 9 - LOCKING TAB

REMOVAL

(1) Release fuel pressure, Refer to Fuel System Pressure Release Procedure in the Fuel Delivery section.

(2) Remove Fuel Tank refer to the Fuel Tank Removal/Installation in this group.

(3) Lower fuel tank and remove the purge line and vent line.

(4) Disconnect fuel line from pressure regulator.

(5) Push locking tab in from locking slot. Turn pressure regulator to unlock it (Fig. 10).

(6) Pull regulator straight up.

INSTALLATION

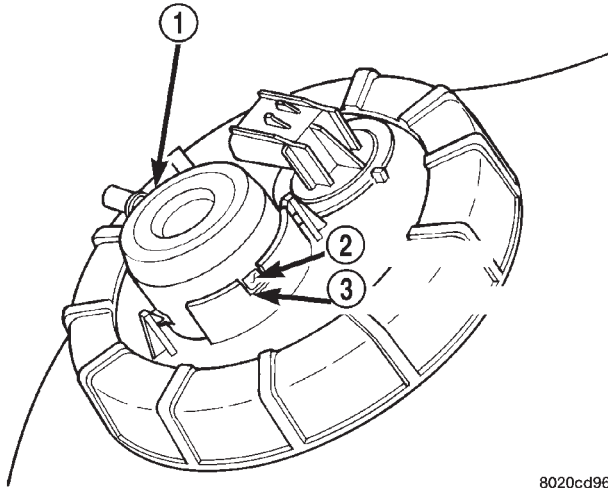
(1) Push regulator down and into place.

(2) Turn fuel pressure regulator to lock it in place (Fig. 10). Make sure the locking tab is in the locking slot.

(3) Connect fuel line to regulator

(4) Raise the fuel tank on the transmission stand.

FUEL PRESSURE REGULATOR (Continued)



8020cd96

Fig. 10 Fuel Pressure Regulator Locking Tab

- 1 - FUEL FILTER/PRESSURE REGULATOR
- 2 - SPRING TAB
- 3 - LOCATING SLOT

- (5) Install fuel pump electrical connector into hole in the body.
- (6) Connect the purge and vent lines.
- (7) Raise tank into position and install tank straps.
- (8) Install the fuel filler tube and tighten the clamp.
- (9) Reposition the stabilizer bar and install bolts.
- (10) Lower vehicle.
- (11) Connect the fuel pump electrical connector that is in the rear seat.
- (12) Install the rear seat.
- (13) Connect the battery cable.
- (14) Fill fuel tank. Use the DRB III® scan tool to pressurize the fuel system. Check for leaks.

FUEL PUMP

DESCRIPTION

The electric fuel pump is located in and is part of the fuel pump module. It is a positive displacement, gerotor type, immersible pump with a permanent magnet electric motor. The fuel pump module is suspended in fuel in the fuel tank.

OPERATION

The pump draws fuel through a strainer and pushes it through the motor to the outlet. The pump contains a check valve. The valve, in the pump outlet, maintains pump pressure during engine off conditions, for a short while. It is normal for fuel pressure to drop to zero after cooldown. The fuel pump relay provides voltage to the fuel pump. The fuel pump has a maximum deadheaded pressure out-

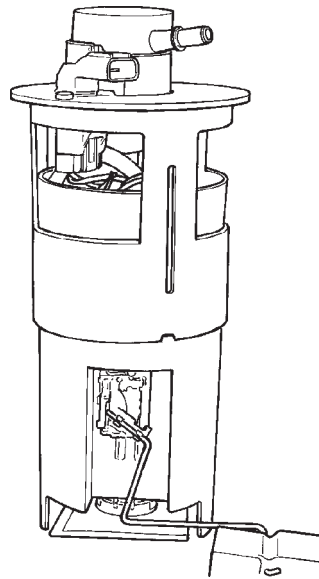
put of approximately 880 kPa (130 psi). The regulator adjusts fuel system pressure to approximately 400 kPa \pm 34 kPa (58 psi \pm 5 psi).

NOTE: Checkvalve maintains volume of fuel in the rail and lines, not pressure.

FUEL PUMP MODULE

DESCRIPTION

The fuel pump module contains the fuel pump, fuel reservoir, level sensor, inlet strainer, and fuel pressure regulator/filter (Fig. 11).



80ad629c

Fig. 11 Fuel Pump Module - Typical

OPERATION

The Chrysler fuel pump module is an in-tank unit with an integral fuel level sensor and pressure regulator (Fig. 12). The pump is driven by a 12 volt DC motor any time the fuel pump relay is energized. Serviceable components on the module include:

- Inlet strainer
- Fuel level sensor
- Fuel Filter/Pressure regulator

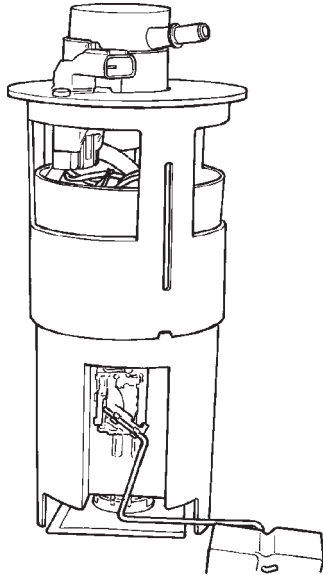
The pump draws fuel through a strainer and pushes it through the motor to the outlet. The pump contains two check valves. One valve relieves internal fuel pump pressure and regulates maximum pump output. The second valve, in the pump outlet, maintains pump pressure during engine off conditions.

The fuel systems use either a positive displacement, gerotor, with a permanent magnet electric motor. This fuel system does not contain the traditional fuel return lines. The regulator contains a calibrated spring which forces a diaphragm against the

FUEL PUMP MODULE (Continued)

fuel filter return port. When pressure exceeds the calibrated amount, the diaphragm retracts, allowing excess pressure and fuel to vent into the tank.

The maximum deadhead pressure is approximately 880 kPa (130 psi). The regulator adjusts fuel system pressure to approximately 400 ± 34 kPa (58 ± 5 psi).



80ad629c

Fig. 12 Fuel Pump Module - Typical

REMOVAL

(1) Release fuel pressure, Refer to Fuel System Pressure Release Procedure in the Fuel Delivery section.

(2) Remove Fuel Tank refer to the Fuel Tank Removal/Installation in this group.

WARNING: THE FUEL RESERVOIR OF THE FUEL PUMP MODULE DOES NOT EMPTY OUT WHEN THE TANK IS DRAINED. THE FUEL IN THE RESERVOIR WILL SPILL OUT WHEN THE MODULE IS REMOVED.

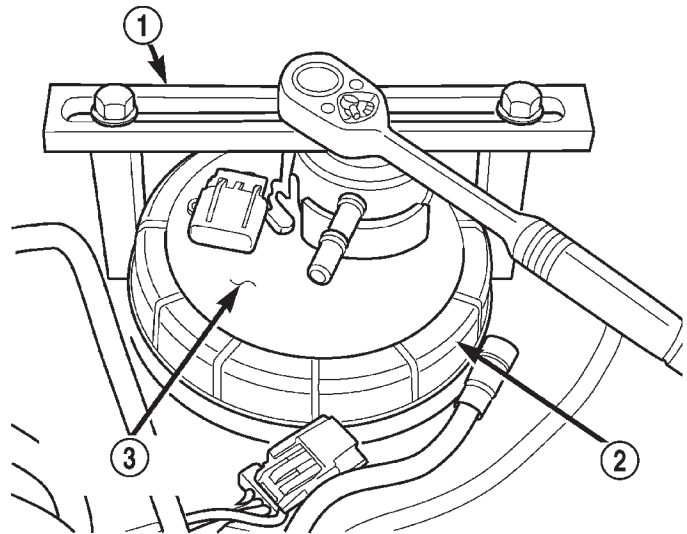
(3) Disconnect fuel line from fuel pump module by depressing quick connect retainers with thumb and fore finger.

(4) Slide fuel pump module electrical connector lock to unlock.

(5) Disconnect the electrical connection from the fuel pump module, by pushing down on connector retainer and pulling connector off of module.

(6) Use Special Tool #6856 to remove fuel pump module locknut (Fig. 13).

(7) Remove fuel pump and O-ring seal from tank. Discard old seal.



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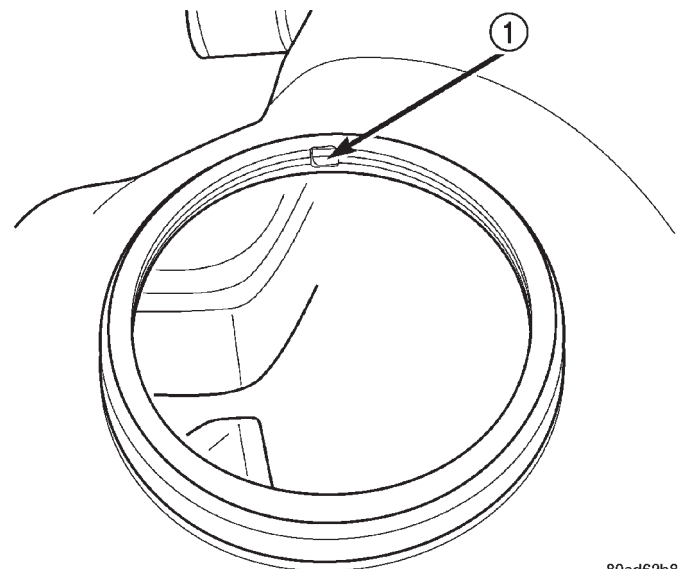
Fig. 13 FUEL TANK LOCKNUT

- 1 - SPECIAL TOOL #6856
- 2 - LOCKING RING
- 3 - FUEL PUMP MODULE

INSTALLATION

(1) Wipe seal area of tank clean and place a new seal in position in the tank opening.

(2) Position fuel pump in the tank. Make sure the alignment tabs on the underside of the fuel pump module flange sits in the notches on the fuel tank (Fig. 14).



80ad62b8

Fig. 14 Fuel Tank Locator

- 1 - LOCATOR NOTCH

FUEL PUMP MODULE (Continued)

(3) Position the locknut over the fuel pump module.

(4) Tighten the locknut using Special Tool #6856 to 55 N·m (40.5 ft. lbs.).

CAUTION: Over tightening the pump lock ring may result in a leak.

(5) Raise the fuel tank on the transmission stand.
(6) Install fuel pump electrical connector into hole in the body.

(7) Connect the purge and vent lines.

(8) Raise tank into position and install tank straps.

(9) Install the fuel filler tube and tighten the clamp.

(10) Reposition the stabilizer bar and install bolts.

(11) Lower vehicle.

(12) Connect the fuel pump electrical connector that is in the rear seat.

(13) Install the rear seat.

(14) Connect the battery cable.

(15) Fill fuel tank. Use the DRB III® scan tool to pressurize the fuel system. Check for leaks.

FUEL RAIL

DESCRIPTION

The fuel rail supplies the necessary fuel to each individual fuel injector and is mounted to the intake manifold.

OPERATION

The fuel pressure regulator is no longer mounted to the fuel rail on any engine. It is now located on the fuel tank mounted fuel pump module. Refer to Fuel Filter/Fuel Pressure Regulator in the Fuel Delivery System section of this group for information. The fuel rail is not repairable.

REMOVAL - 2.7/3.5L

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING FUEL RAIL. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

(1) Release fuel system pressure. Refer to Fuel System Pressure Release Procedure in this section.

(2) Disconnect the negative battery cable.

(3) Remove intake manifold plenum. Refer to the Engine section for information.

(4) Remove intake manifold plenum mounting bolts. Lift Plenum up off of engine. Cover intake

manifold to prevent foreign material from entering engine.

(5) Disconnect fuel supply tube quick connect fitting at the rear of the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.

(6) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder (Fig. 15).

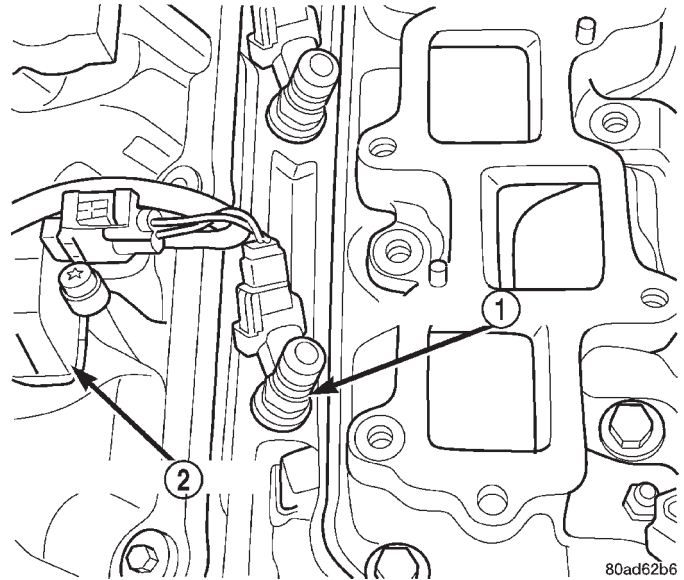


Fig. 15 Injector Electrical Connectors

1 - FUEL INJECTOR

2 - IGNITION COIL

(7) Remove mounting bolts on both sides of fuel rail.

(8) Lift fuel rail straight up off of cylinder head.

(9) Remove retaining clips from fuel injectors at fuel rail.

(10) Remove fuel injector from fuel rail.

INSTALLATION

INSTALLATION - 2.7L

(1) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.

(2) Install retaining clips on fuel injectors.

(3) Push injectors into fuel injector rail until clips are in the correct position.

(4) Position fuel rail over cylinder heads, and push rail into place. Tighten fuel rail mounting bolts to 11 N·m (100 in. lbs.) torque.

(5) Connect the fuel supply tube quick connect fitting to the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.

(6) Connect the electrical connectors to the fuel injectors.

FUEL RAIL (Continued)

- (7) Install intake manifold plenum. Refer to the Engine section for information.
- (8) Connect negative cable to battery.

INSTALLATION - 3.5L

- (1) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.
- (2) Install retaining clips on fuel injectors.
- (3) Push injectors into fuel injector rail until clips are in the correct position.
- (4) Position fuel rail over cylinder heads, and push rail into place. Tighten fuel rail mounting bolts to 28 N·m (250 in. lbs.) torque.
- (5) Connect the fuel supply tube quick connect fitting to the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.
- (6) Connect the electrical connectors to the fuel injectors.
- (7) Install intake manifold plenum. Refer to the Engine section for information.
- (8) Connect negative cable to battery.

FUEL TANK

DESCRIPTION

The fuel tank is constructed of a plastic material. Its main functions are for fuel storage and for placement of the fuel pump module. The tank is made from High density Polyethylene (HDPE) material. If equipped with ORVR (Onboard Refueling Vapor Recovery) it has been added to the fuel tank to control refueling vapor emissions.

OPERATION

All models pass a full 360 degree rollover test without fuel leakage. To accomplish this, fuel and vapor flow controls are required for all fuel tank connections.

All models are equipped with either one or two rollover valves mounted into the top of the fuel tank (or pump module).

An evaporation control system is connected to the rollover valve(s)/control valve (Refer to 25 - EMISSIONS CONTROL/EVAPORATIVE EMISSIONS/ORVR - OPERATION) to reduce emissions of fuel vapors into the atmosphere, when the tank is vented due to vapor expansion in the tank. When fuel evaporates from the fuel tank, vapors pass through vent hoses or tubes to a charcoal canister where they are temporarily held. When the engine is running, the vapors are drawn into the intake manifold. In addition, fuel vapors produced during vehicle refueling are allowed to pass through the vent hoses/tubes to the charcoal canister(s) for temporary storage (prior to being drawn into the intake manifold). All models

are equipped with a self-diagnosing system using a Natural Vacuum Leak Detection (NVLD). Refer to the Emission Control System for additional information.

INLET CHECK VALVE

All vehicles have an inlet check valve on the inside of the fuel tank at the filler inlet

The valve prevents fuel from splashing back on customer during vehicle refueling. The valve is a non-serviceable item.

REMOVAL

- (1) Release fuel pressure, Refer to Fuel System Pressure Release Procedure.
- (2) Disconnect battery cable (Fig. 16).

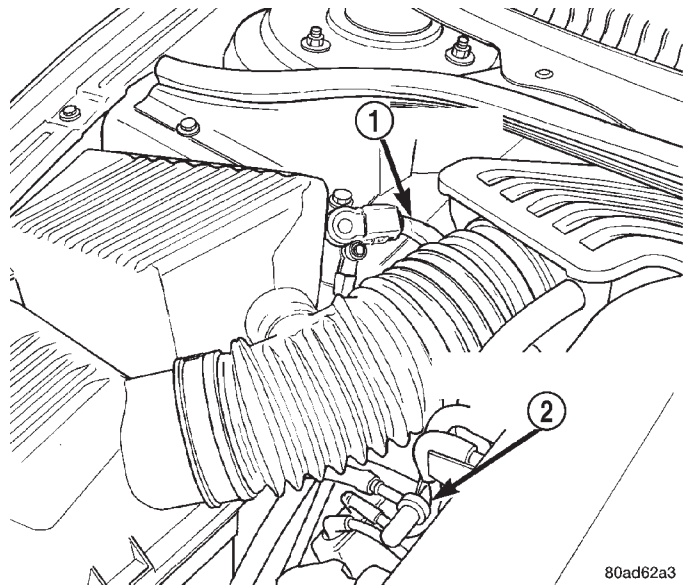


Fig. 16 Battery Cable

- 1 - BATTERY CABLE
- 2 - SERVICE VACUUM SUPPLY TEE

- (3) Remove rear seat, refer to the Body section for more information.

FUEL TANK (Continued)

(4) Disconnect fuel pump electrical connector (Fig. 17).

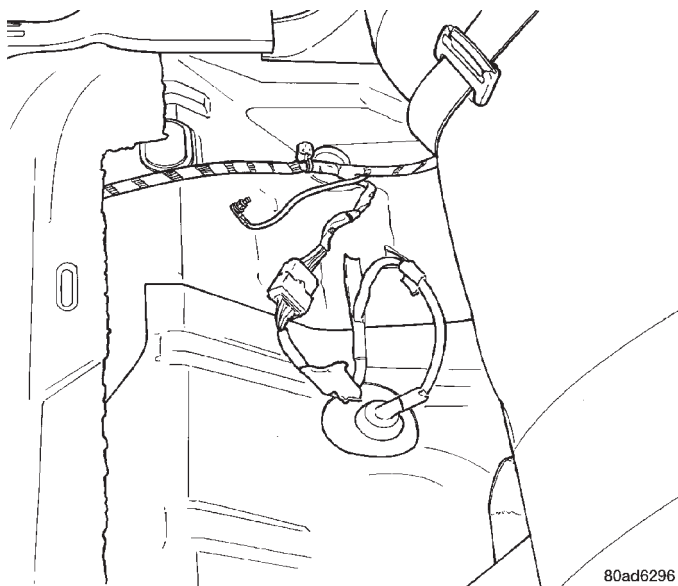


Fig. 17 Electrical Connector

(5) Raise vehicle and support.

NOTE: To drain fuel tank it is best to have less than 1/2 a tank of fuel.

(6) To drain fuel tank, place container under fuel filler tube at fuel tank. Loosen and remove fuel filler tube from fuel tank (Fig. 18). Stick siphon hose into tank at fuel filler tube connection, and drain fuel tank.

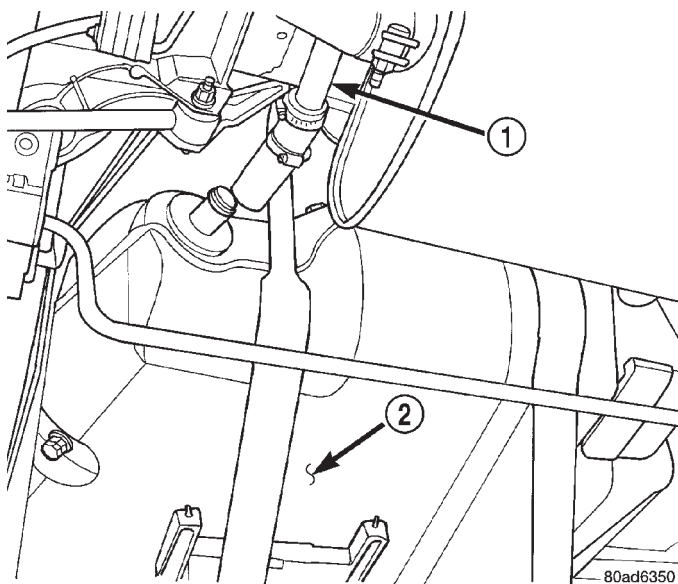


Fig. 18 Fuel Filler Tube

- 1 - FUEL FILLER TUBE
- 2 - FUEL TANK

(7) Loosen the rear stabilizer bar brackets from body. Swing stabilizer bar toward rear of vehicle (Fig. 19) and (Fig. 20).

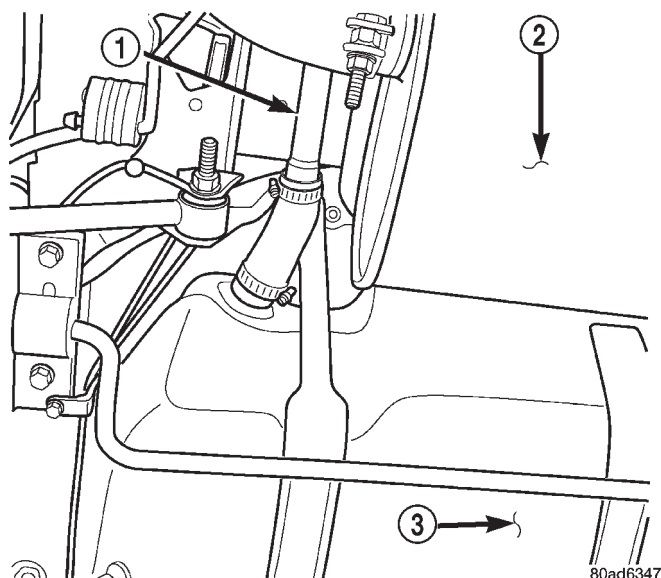


Fig. 19 Stabilizer Bar

- 1 - FILLER TUBE
- 2 - MUFFLER
- 3 - FUEL TANK

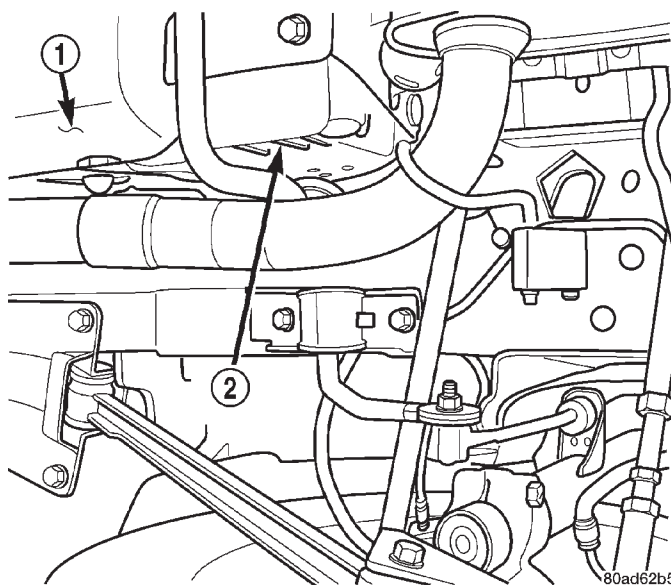


Fig. 20 Stabilizer Bar and EVAP Canister

- 1 - FUEL TANK
- 2 - EVAP CANISTER

FUEL TANK (Continued)

(8) Disconnect fuel and EVAP lines (Fig. 21).

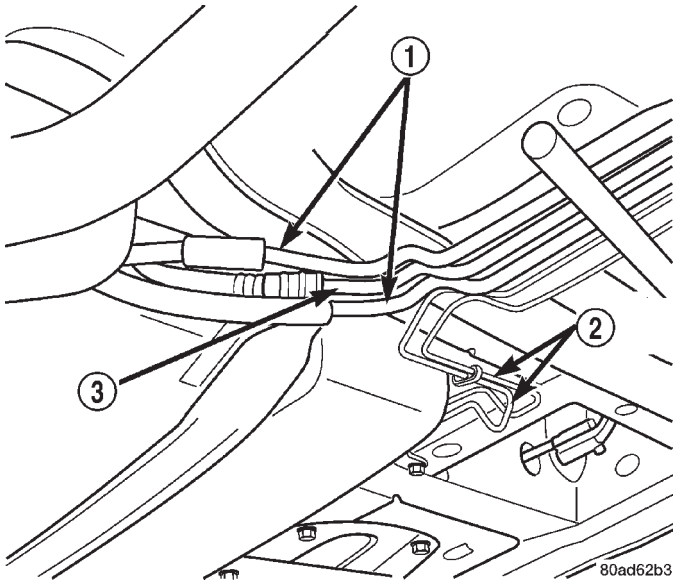


Fig. 21 Fuel and EVAP Lines

- 1 - EVAP LINES
- 2 - BRAKE LINES
- 3 - FUEL LINE

(9) Position transmission jack under fuel tank assembly.

(10) Remove fuel tank straps bolts. Passenger side first.

(11) Lower fuel tank and remove the purge line and vent line.

(12) Remove the wiring harness from the heat shield, if needed (Fig. 22).

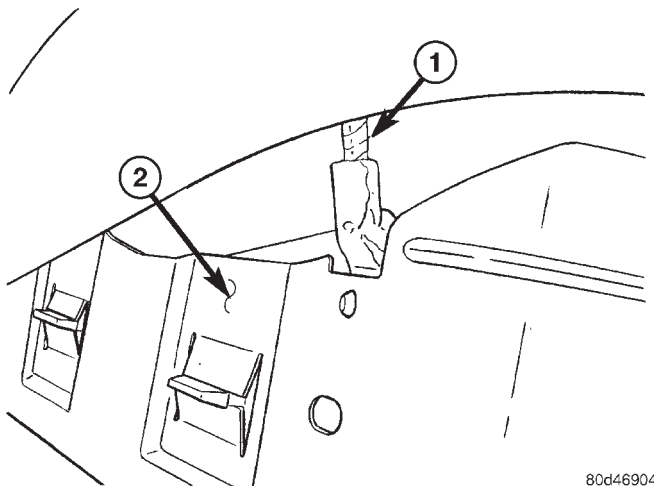


Fig. 22 HARNESS TAB ON HEAT SHIELD

- 1 - Wiring Harness
- 2 - Heat Shield

(13) Lower tank more and remove the wiring harness from fuel tank pin, if needed (Fig. 23).

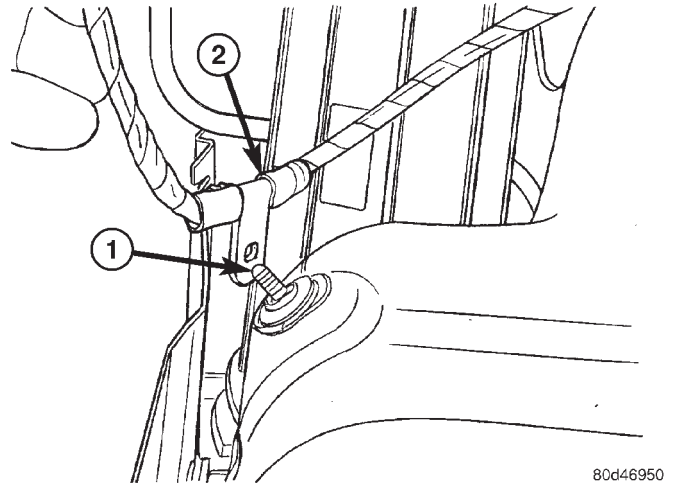


Fig. 23 HARNESS ON TANK PIN

- 1 - Pin
- 2 - Wiring Harness

(14) Remove wiring harness from body.

(15) Remove NVLD filter from mounting location.

(16) Remove fuel tank (Fig. 24).

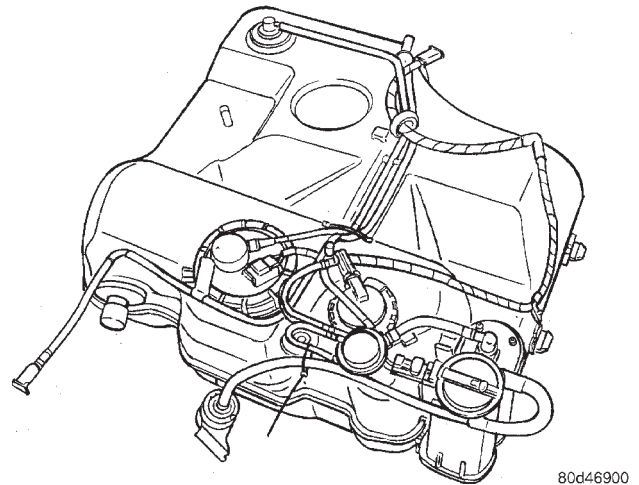


Fig. 24 FUEL TANK

INSTALLATION

(1) Raise the fuel tank on the transmission stand (Fig. 24).

(2) Install fuel pump electrical connector into hole in the body.

(3) Connect wiring harness to fuel tank pin, if removed (Fig. 23).

(4) Connect wiring harness to heat shield, if removed (Fig. 22).

(5) Connect the purge and vent lines (Fig. 21).

(6) Raise tank into position and install tank straps.

(7) Install the fuel filler tube and tighten the clamp (Fig. 18).

(8) Reposition the stabilizer bar and install bolts.

FUEL TANK (Continued)

- (9) Lower vehicle.
- (10) Connect the fuel pump electrical connector that is under the rear seat (Fig. 17).
- (11) Install the rear seat, refer to the Body section for more information.
- (12) Connect the battery cable (Fig. 16).
- (13) Fill fuel tank. Use the DRB scan tool to pressurize the fuel system. Check for leaks.

FUEL TANK FILLER TUBE

REMOVAL

- (1) Disconnect negative cable from battery.
- (2) Drain fuel tank.
- (3) Remove 3 screws from filler neck to quarter panel.
- (4) Raise and support vehicle on host.
- (5) Loosen clamps at filler neck.
- (6) Remove filler neck.

INSTALLATION

- (1) Install filler neck to filler hose.
- (2) Tighten clamps.
- (3) Lower vehicle.
- (4) Install 3 screws to filler neck and quarter panel.
- (5) Fill tank and check for leaks.
- (6) Connect negative cable from battery.

FUEL TANK VENT TUBE

REMOVAL

- (1) Perform fuel system pressure release.
- (2) Disconnect negative cable from battery.
- (3) Drain fuel tank.
- (4) Raise and support vehicle on host.
- (5) Lower fuel tank, refer to Fuel Tank Removal/Installation in this section.
- (6) Remove vent hose from top of tank.
- (7) Remove vent hose from fuel filler neck.

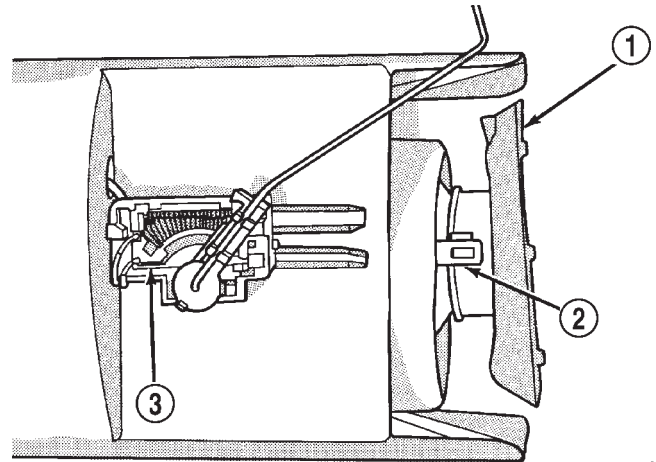
INSTALLATION

- (1) Install vent hose and tighten clamp.
- (2) Install fuel tank, refer to Fuel Tank Removal/Installation in this section.
- (3) Install vent hose to fuel filler neck and tighten clamp.
- (4) Lower vehicle.
- (5) Fill fuel tank and check for leaks.
- (6) Connect negative cable to battery.

INLET FILTER

REMOVAL

- (1) Remove fuel pump module. Refer to Fuel Pump Module Removal in this section.
- (2) Using a thin straight blade screwdriver, pry back the locking tabs on fuel pump reservoir and remove the strainer (Fig. 25).
- (3) Remove strainer O-ring from the fuel pump reservoir body.
- (4) Remove any contaminants in the fuel tank by washing the inside of the fuel tank.



9314-10

Fig. 25 INLET STRAINER

- 1 - INLET STRAINER
- 2 - RETAINING CLIP
- 3 - FUEL LEVEL SENSOR

INSTALLATION

- (1) Lubricate the strainer O-ring with clean engine oil.
- (2) Insert strainer O-ring into outlet of strainer so that it sits evenly on the step inside the outlet.
- (3) Push strainer onto the inlet of the fuel pump reservoir body. Make sure the locking tabs on the reservoir body lock over the locking tangs on the strainer.
- (4) Install fuel pump module. Refer to Fuel Pump Module Installation in this section.

QUICK CONNECT FITTING

STANDARD PROCEDURE - QUICK-CONNECT FITTINGS

REMOVAL

When disconnecting a quick-connect fitting, the retainer will remain on the fuel tube nipple.

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE DISCONNECTING A QUICK-CONNECT FITTINGS. REFER TO THE FUEL PRESSURE RELEASE PROCEDURE.

(1) Perform Fuel Pressure Release Procedure. Refer to the Fuel Pressure Release Procedure in this section.

(2) Disconnect negative cable from battery or auxiliary jumper terminal.

(3) Squeeze retainer tabs together and pull fuel tube/quick-connect fitting assembly off of fuel tube nipple. The retainer will remain on fuel tube.

INSTALLATION

CAUTION: Never install a quick-connect fitting without the retainer being either on the fuel tube or already in the quick-connect fitting. In either case, ensure the retainer locks securely into the quick-connect fitting by firmly pulling on fuel tube and fitting to ensure it is secured.

(1) Using a clean lint free cloth, clean the fuel tube nipple and retainer.

(2) Prior to connecting the fitting to the fuel tube, coat the fuel tube nipple with clean engine oil.

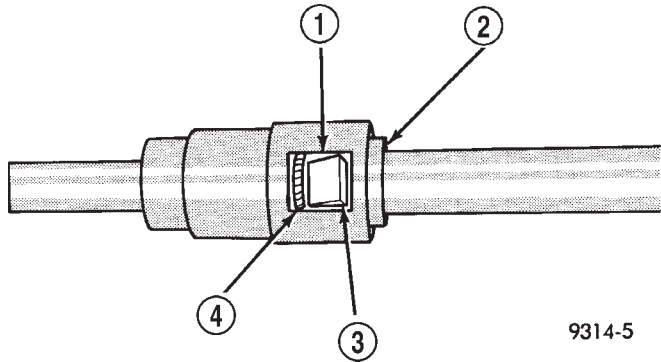
(3) Push the quick-connect fitting over the fuel tube until the **retainer seats and a click is heard**.

(4) The plastic quick-connect fitting has windows in the sides of the casing. When the fitting completely attaches to the fuel tube, the retainer locking ears and the fuel tube shoulder are visible in the windows. If they are not visible, the retainer was not properly installed (Fig. 26). **Do not rely upon the audible click to confirm a secure connection.**

(5) Connect negative cable to battery or auxiliary jumper terminal.

CAUTION: When using the ASD Fuel System Test, the Auto Shutdown (ASD) Relay remains energized for several minutes, until the test is stopped, or until the ignition switch is turned to the Off position.

(6) Use the DRB III® scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.



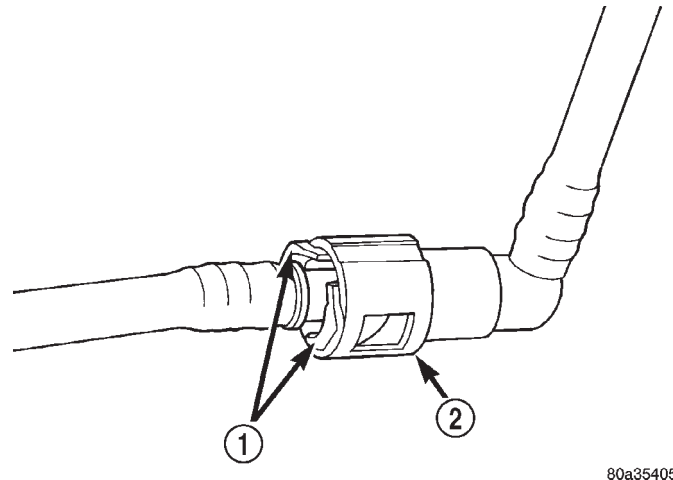
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Fig. 26 Plastic Quick-Connect Fitting/Fuel Tube Connection

- 1 - WINDOW
- 2 - TAB (2)
- 3 - EAR
- 4 - SHOULDER (ON TUBE)

TWO-TAB TYPE FITTING

This type of fitting is equipped with tabs located on both sides of the fitting (Fig. 27). These tabs are supplied for disconnecting the quick-connect fitting from component being serviced.



80a35405

Fig. 27 Typical Two-Tab Type Quick-Connect Fitting

- 1 - TAB(S)
- 2 - QUICK-CONNECT FITTING

CAUTION: The interior components (O-rings, spacers) of this type of quick-connect fitting are not serviced separately, but new plastic retainers are available. Do not attempt to repair damaged fittings or fuel lines/tubes. If repair is necessary, replace the complete fuel tube assembly.

QUICK CONNECT FITTING (Continued)

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS OR LINES, THE FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL PRESSURE RELEASE PROCEDURE IN THIS GROUP.

DISCONNECTION/CONNECTION

(1) Perform fuel pressure release procedure. Refer to Fuel Pressure Release Procedure in this group.

(2) Disconnect negative battery cable from battery or auxiliary jumper terminal.

(3) Clean fitting of any foreign material before disassembly.

(4) To disconnect quick-connect fitting, squeeze plastic retainer tabs (Fig. 27) against sides of quick-connect fitting with your fingers. Tool use is not required for removal and may damage plastic retainer. Pull fitting from fuel system component being serviced. The plastic retainer will remain on component being serviced after fitting is disconnected. The O-rings and spacer will remain in quick-connect fitting connector body.

(5) Inspect quick-connect fitting body and component for damage. Replace as necessary.

CAUTION: When the quick-connect fitting was disconnected, the plastic retainer will remain on the component being serviced. If this retainer must be removed, very carefully release the retainer from the component with two small screwdrivers. After removal, inspect the retainer for cracks or any damage.

(6) Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.

(7) Insert quick-connect fitting to component being serviced and into plastic retainer. When a connection is made, a click will be heard.

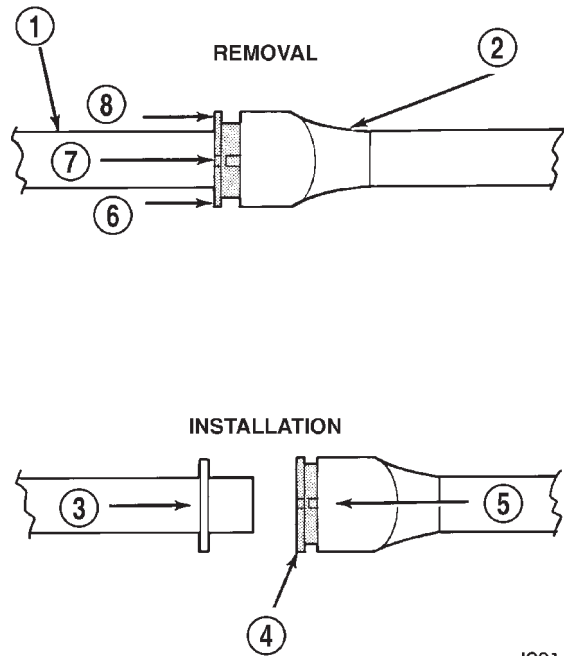
(8) Verify a locked condition by firmly pulling on fuel tube and fitting (15-30 lbs.).

(9) Connect negative cable to battery or auxiliary jumper terminal.

(10) Use the DRB III® scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

PLASTIC RETAINER RING TYPE FITTING

This type of fitting can be identified by the use of a full-round plastic retainer ring (Fig. 28) usually black in color.



J9314-100

Fig. 28 Plastic Retainer Ring Type Fitting

- 1 - FUEL TUBE
- 2 - QUICK CONNECT FITTING
- 3 - PUSH
- 4 - PLASTIC RETAINER
- 5 - PUSH
- 6 - PUSH
- 7 - PUSH
- 8 - PUSH

CAUTION: The interior components (O-rings, spacers, retainers) of this type of quick-connect fitting are not serviced separately. Do not attempt to repair damaged fittings or fuel lines/tubes. If repair is necessary, replace the complete fuel tube assembly.

WARNING: THE FUEL SYSTEM IS UNDER A CONSTANT PRESSURE (EVEN WITH THE ENGINE OFF). BEFORE SERVICING ANY FUEL SYSTEM HOSES, FITTINGS OR LINES, THE FUEL SYSTEM PRESSURE MUST BE RELEASED. REFER TO THE FUEL SYSTEM PRESSURE RELEASE PROCEDURE IN THIS GROUP.

QUICK CONNECT FITTING (Continued)

DISCONNECTION/CONNECTION

(1) Perform fuel pressure release procedure. Refer to Fuel Pressure Release Procedure in this section.

(2) Disconnect negative battery cable from battery or auxiliary jumper terminal.

(3) Clean fitting of any foreign material before disassembly.

(4) To release fuel system component from quick-connect fitting, firmly push fitting towards component being serviced while firmly pushing plastic retainer ring into fitting (Fig. 28). With plastic ring depressed, pull fitting from component. **The plastic retainer ring must be pressed squarely into fitting body. If this retainer is cocked during removal, it may be difficult to disconnect fitting. Use an open-end wrench on shoulder of plastic retainer ring to aid in disconnection.**

(5) After disconnection, plastic retainer ring will remain with quick-connect fitting connector body.

(6) Inspect fitting connector body, plastic retainer ring and fuel system component for damage. Replace as necessary.

(7) Prior to connecting quick-connect fitting to component being serviced, check condition of fitting and component. Clean parts with a lint-free cloth. Lubricate with clean engine oil.

(8) Insert quick-connect fitting into component being serviced until a click is felt.

(9) Verify a locked condition by firmly pulling on fuel tube and fitting (15-30 lbs.).

(10) Connect negative battery cable to battery or auxiliary jumper terminal.

(11) Use the DRB III® scan tool ASD Fuel System Test to pressurize the fuel system. Check for leaks.

FUEL INJECTION

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FUEL INJECTION

OPERATION

OPERATION - INJECTION SYSTEM

All engines used in this section have a sequential Multi-Port Electronic Fuel Injection system. The MPI system is computer regulated and provides precise air/fuel ratios for all driving conditions. The Powertrain Control Module (PCM) operates the fuel injection system.

The PCM regulates:

- Ignition timing
- Air/fuel ratio
- Emission control devices
- Cooling fan
- Charging system
- Idle speed
- Vehicle speed control

Various sensors provide the inputs necessary for the PCM to correctly operate these systems. In addition to the sensors, various switches also provide inputs to the PCM.

The PCM can adapt its programming to meet changing operating conditions.

Fuel is injected into the intake port above the intake valve in precise metered amounts through electrically operated injectors. The PCM fires the injectors in a specific sequence. Under most operating conditions, the PCM maintains an air fuel ratio of 14.7 parts air to 1 part fuel by constantly adjusting injector pulse width. Injector pulse width is the length of time the injector is open.

The PCM adjusts injector pulse width by opening and closing the ground path to the injector. Engine RPM (speed) and manifold absolute pressure (air density) are the **primary** inputs that determine injector pulse width.

OPERATION - MODES OF OPERATION

As input signals to the PCM change, the PCM adjusts its response to output devices. For example, the PCM must calculate a different injector pulse width and ignition timing for idle than it does for Wide Open Throttle (WOT). There are several different modes of operation that determine how the PCM responds to the various input signals.

There are two different areas of operation, OPEN LOOP and CLOSED LOOP.

During OPEN LOOP modes the PCM receives input signals and responds according to preset PCM programming. Inputs from the upstream and downstream heated oxygen sensors are not monitored during OPEN LOOP modes, except for heated oxygen

sensor diagnostics (they are checked for shorted conditions at all times).

During CLOSED LOOP modes the PCM monitors the inputs from the upstream and downstream heated oxygen sensors. The upstream heated oxygen sensor input tells the PCM if the calculated injector pulse width resulted in the ideal air-fuel ratio of 14.7 to one. By monitoring the exhaust oxygen content through the upstream heated oxygen sensor, the PCM can fine tune injector pulse width. Fine tuning injector pulse width allows the PCM to achieve optimum fuel economy combined with low emissions.

For the PCM to enter CLOSED LOOP operation, the following must occur:

- (1) Engine coolant temperature must be over 35°F.
 - If the coolant is over 35°F the PCM will wait 38 seconds.
 - If the coolant is over 50°F the PCM will wait 15 seconds.
 - If the coolant is over 167°F the PCM will wait 3 seconds.
- (2) For other temperatures the PCM will interpolate the correct waiting time.
- (3) O2 sensor must read either greater than 0.745 volts or less than 0.29 volt.
- (4) The multi-port fuel injection systems has the following modes of operation:

- Ignition switch ON (Zero RPM)
- Engine start-up
- Engine warm-up
- Cruise
- Idle
- Acceleration
- Deceleration
- Wide Open Throttle
- Ignition switch OFF

(5) The engine start-up (crank), engine warm-up, deceleration with fuel shutoff and wide open throttle modes are OPEN LOOP modes. Under most operating conditions, the acceleration, deceleration (with A/C on), idle and cruise modes, **with the engine at operating temperature** are CLOSED LOOP modes.

IGNITION SWITCH ON (ZERO RPM) MODE

When the ignition switch activates the fuel injection system, the following actions occur:

- The PCM monitors the engine coolant temperature sensor and throttle position sensor input. The PCM determines basic fuel injector pulse width from this input.
- The PCM determines atmospheric air pressure from the MAP sensor input to modify injector pulse width.

When the key is in the ON position and the engine is not running (zero rpm), the Auto Shutdown (ASD) and fuel pump relays de-energize after approximately

FUEL INJECTION (Continued)

1 second. Therefore, battery voltage is not supplied to the fuel pump, ignition coil, fuel injectors and heated oxygen sensors.

ENGINE START-UP MODE

This is an OPEN LOOP mode. If the vehicle is in park or neutral (automatic transaxles) or the clutch pedal is depressed (manual transaxles) the ignition switch energizes the starter relay. The following actions occur when the starter motor is engaged.

- If the PCM receives the camshaft position sensor and crankshaft position sensor signals, it energizes the Auto Shutdown (ASD) relay and fuel pump relay. If the PCM does not receive both signals within approximately one second, it will not energize the ASD relay and fuel pump relay. The ASD and fuel pump relays supply battery voltage to the fuel pump, fuel injectors, ignition coil, (EGR solenoid and PCV heater if equipped) and heated oxygen sensors.

- The PCM energizes the injectors (on the 69° degree falling edge) for a calculated pulse width until it determines crankshaft position from the camshaft position sensor and crankshaft position sensor signals. The PCM determines crankshaft position within 1 engine revolution.

- After determining crankshaft position, the PCM begins energizing the injectors in sequence. It adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

- When the engine idles within ± 64 RPM of its target RPM, the PCM compares current MAP sensor value with the atmospheric pressure value received during the Ignition Switch On (zero RPM) mode.

Once the ASD and fuel pump relays have been energized, the PCM determines injector pulse width based on the following:

- MAP
- Engine RPM
- Battery voltage
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Throttle position
- The number of engine revolutions since cranking was initiated

During Start-up the PCM maintains ignition timing at 9° BTDC.

ENGINE WARM-UP MODE

This is an OPEN LOOP mode. The following inputs are received by the PCM:

- Manifold Absolute Pressure (MAP)
- Crankshaft position (engine speed)
- Engine coolant temperature
- Inlet/Intake air temperature (IAT)
- Camshaft position

- Knock sensor
- Throttle position
- A/C switch
- Battery voltage
- Vehicle speed
- Speed control
- O2 sensors

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts ignition timing and engine idle speed. Engine idle speed is adjusted through the idle air control motor.

CRUISE OR IDLE MODE

When the engine is at operating temperature this is a CLOSED LOOP mode. During cruising or idle the following inputs are received by the PCM:

- Manifold absolute pressure
- Crankshaft position (engine speed)
- Inlet/Intake air temperature
- Engine coolant temperature
- Camshaft position
- Knock sensor
- Throttle position
- Exhaust gas oxygen content
- A/C control positions
- Battery voltage
- Vehicle speed

The PCM adjusts injector pulse width and controls injector synchronization by turning the individual ground paths to the injectors On and Off.

The PCM adjusts engine idle speed and ignition timing. The PCM adjusts the air/fuel ratio according to the oxygen content in the exhaust gas (measured by the upstream and downstream heated oxygen sensor).

The PCM monitors for engine misfire. During active misfire and depending on the severity, the PCM either continuously illuminates or flashes the malfunction indicator lamp (Check Engine light on instrument panel). Also, the PCM stores an engine misfire DTC in memory, if 2nd trip with fault.

The PCM performs several diagnostic routines. They include:

- Oxygen sensor monitor
- Downstream heated oxygen sensor diagnostics during open loop operation (except for shorted)
- Fuel system monitor
- EGR monitor (if equipped)
- Purge system monitor
- Catalyst efficiency monitor
- All inputs monitored for proper voltage range, rationality.
- All monitored components (refer to the Emission section for On-Board Diagnostics).

FUEL INJECTION (Continued)

The PCM compares the upstream and downstream heated oxygen sensor inputs to measure catalytic convertor efficiency. If the catalyst efficiency drops below the minimum acceptable percentage, the PCM stores a diagnostic trouble code in memory, after 2 trips.

During certain idle conditions, the PCM may enter a variable idle speed strategy. During variable idle speed strategy the PCM adjusts engine speed based on the following inputs.

- A/C sense
- Battery voltage
- Battery temperature or Calculated Battery Temperature
- Engine coolant temperature
- Engine run time
- Inlet/Intake air temperature
- Vehicle mileage

ACCELERATION MODE

This is a CLOSED LOOP mode. The PCM recognizes an abrupt increase in Throttle Position sensor output voltage or MAP sensor output voltage as a demand for increased engine output and vehicle acceleration. The PCM increases injector pulse width in response to increased fuel demand.

- Wide Open Throttle-open loop

DECELERATION MODE

This is a CLOSED LOOP mode. During deceleration the following inputs are received by the PCM:

- A/C sense
- Battery voltage
- Inlet/Intake air temperature
- Engine coolant temperature
- Crankshaft position (engine speed)
- Exhaust gas oxygen content (upstream heated oxygen sensor)
- Knock sensor
- Manifold absolute pressure
- Throttle position sensor
- IAC motor (solenoid) control changes in response to MAP sensor feedback

The PCM may receive a closed throttle input from the Throttle Position Sensor (TPS) when it senses an abrupt decrease in manifold pressure. This indicates a hard deceleration (Open Loop). In response, the PCM may momentarily turn off the injectors. This helps improve fuel economy, emissions and engine braking.

WIDE-OPEN-THROTTLE MODE

This is an OPEN LOOP mode. During wide-open-throttle operation, the following inputs are used by the PCM:

- Inlet/Intake air temperature

- Engine coolant temperature
- Engine speed
- Knock sensor
- Manifold absolute pressure
- Throttle position

When the PCM senses a wide-open-throttle condition through the Throttle Position Sensor (TPS) it de-energizes the A/C compressor clutch relay. This disables the air conditioning system and disables EGR (if equipped).

The PCM adjusts injector pulse width to supply a predetermined amount of additional fuel, based on MAP and RPM.

IGNITION SWITCH OFF MODE

When the operator turns the ignition switch to the OFF position, the following occurs:

- All outputs are turned off, unless 02 Heater Monitor test is being run. Refer to the Emission section for On-Board Diagnostics.
- No inputs are monitored except for the heated oxygen sensors. The PCM monitors the heating elements in the oxygen sensors and then shuts down.

FUEL CORRECTION or ADAPTIVE MEMORIES

DESCRIPTION

In Open Loop, the PCM changes pulse width without feedback from the O2 Sensors. Once the engine warms up to approximately 30 to 35° F, the PCM goes into closed loop **Short Term Correction** and utilizes feedback from the O2 Sensors. Closed loop **Long Term Adaptive Memory** is maintained above 170° to 190° F unless the PCM senses wide open throttle. At that time the PCM returns to Open Loop operation.

OPERATION

Short Term

The first fuel correction program that begins functioning is the short term fuel correction. This system corrects fuel delivery in direct proportion to the readings from the Upstream O2 Sensor.

The PCM monitors the air/fuel ratio by using the input voltage from the O2 Sensor. When the voltage reaches its preset high or low limit, the PCM begins to add or remove fuel until the sensor reaches its switch point. The short term corrections then begin.

The PCM makes a series of quick changes in the injector pulse-width until the O2 Sensor reaches its opposite preset limit or switch point. The process then repeats itself in the opposite direction.

Short term fuel correction will keep increasing or decreasing injector pulse-width based upon the upstream O2 Sensor input. The maximum range of

FUEL INJECTION (Continued)

authority for short term memory is 25% (+/-) of base pulse-width. Short term is violated and is lost when ignition is turned OFF.

Long Term

The second fuel correction program is the long term adaptive memory. In order to maintain correct emission throughout all operating ranges of the engine, a cell structure based on engine rpm and load (MAP) is used.

Ther number of cells varies upon the driving conditions. Two cells are used only during idle, based upon TPS and Park/Neutral switch inputs. There may be two other cells used for deceleration, based on TPS, engine rpm, and vehicle speed. The other twelve cells represent a manifold pressure and an rpm range. Six of the cells are high rpm and the other six are low rpm. Each of these cells is a specific MAP voltage range Typical Adaptive Memory Fuel Cells .

As the engine enters one of these cells the PCM looks at the amount of short term correction being

used. Because the goal is to keep short term at 0 (O2 Sensor switching at 0.5 volt), long term will update in the same direction as short term correction was moving to bring the short term back to 0. Once short term is back at 0, this long term correction factor is stored in memory.

The values stored in long term adaptive memory are used for all operating conditions, including open loop and cold starting. However, the updating of the long term memory occurs after the engine has exceeded approximately 170°-190° F, with fuel control in closed loop and two minutes of engine run time. This is done to prevent any transitional temperature or start-up compensations from corrupting long term fuel correction.

Long term adaptive memory can change the pulse-width by as much as 25%, which means it can correct for all of short term. It is possible to have a problem that would drive long term to 25% and short term to another 25% for a total change of 50% away from base pulse-width calculation.

TYPICAL ADAPTIVE MEMORY FUEL CELLS

	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Open Throttle	Idle	Decel
Vacuum	20	17	13	9	5	0		
Above 1,984 rpm	1	3	5	7	9	11	13 Drive	15
Below 1,984 rpm	0	2	4	6	8	10	12 Neutral	14
MAP volt =	0	1.4	2.0	2.6	3.3	3.9		

Fuel Correction Diagnostics

There are two fuel correction diagnostic routines:

- Fuel System Rich
- Fuel System Lean

A DTC is set and the MIL is illuminated if the PCM detects either of these conditions. This is determined based on total fuel correction, short term times long term.

PROGRAMMABLE COMMUNICATIONS INTERFACE (PCI) BUS

DESCRIPTION

The Programmable Communication Interface Multiplex system (PCI Bus) consist of a single wire. The Body Control Module (BCM) acts as a splice to connect each module and the Data Link Connector (DLC) together. Each module is wired in parallel to the data bus through its PCI chip set and uses its

ground as the bus reference. The wiring is a minimum 20 gage wire.

OPERATION

Various modules exchange information through a communications port called the PCI Bus. The Powertrain Control Module (PCM) transmits the Malfunction Indicator Lamp (Check Engine) On/Off signal and engine RPM on the PCI Bus. The PCM receives the Air Conditioning select input, transaxle gear position inputs over the PCI Bus. The PCM also receives the air conditioning evaporator temperature signal from the PCI Bus.

The following components access or send information on the PCI Bus.

- Instrument Panel
- Body Control Module
- Air Bag System Diagnostic Module
- Full ATC Display Head (if equipped)
- ABS Module

FUEL INJECTION (Continued)

- Transmission Control Module
- Powertrain Control Module
- Travel Module
- SKIM

SYSTEM DIAGNOSIS

OPERATION

The PCM can test many of its own input and output circuits. If the PCM senses a fault in a major system, the PCM stores a Diagnostic Trouble Code (DTC) in memory.

For DTC information see On-Board Diagnostics (Refer to 8 - ELECTRICAL/ELECTRONIC CON-

TROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION).

TORQUE MANAGEMENT

OPERATION

The PCM receives the torque management input from the transmission control module. The PCM receives the input when the transmission shifts gears. In response, the PCM shuts off a number of fuel injectors when the transmission shifts gears.

SPECIFICATIONS

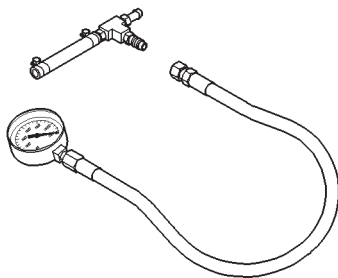
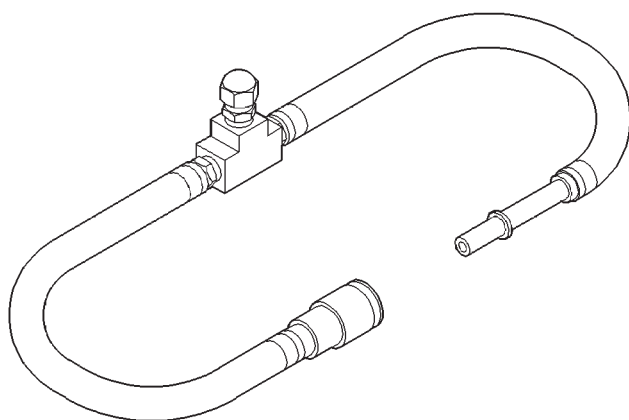
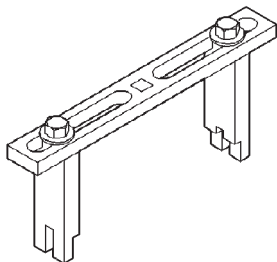
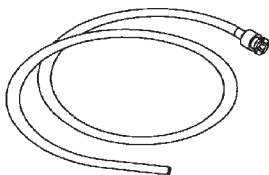
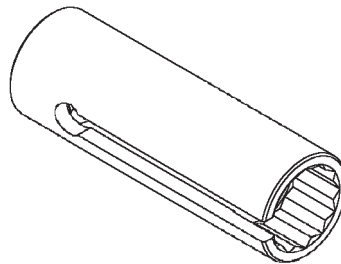
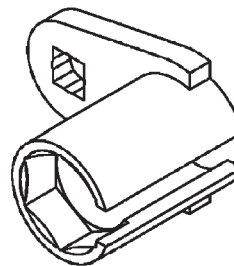
TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Camshaft Position Sensor	12	8.8	105
Crankshaft Position Sensor Mounting Bolts	12	8.8	105
Engine Coolant Temperature Sensor	28	20	
Idle Air Control Motor—2.7L	5.5		49
Idle Air Control Motor—3.5L	7.3		65
Knock Sensor bolt—3.5L	10	7	88.5
Knock Sensor—2.7L	10	7	88.5
Manifold Tuning Valve—3.5L	11.9		105
MAP Sensor—2.7L	4.5		40
MAP Sensor—3.5L	4		35
Oxygen Sensor	28	20	
Powertrain Control Module	4		35
Throttle Body Mounting	11.9		105
Throttle Position Sensor—2.7L	5.1		45
Throttle Position Sensor—3.5L	6.2		55
Short Runner Valve	6.7		60
Fuel Rail Bolts—2.7L	12	8.8	106.2
Fuel Rail Bolts—3.5L	28	20.6	250

FUEL INJECTION (Continued)

SPECIAL TOOLS

FUEL

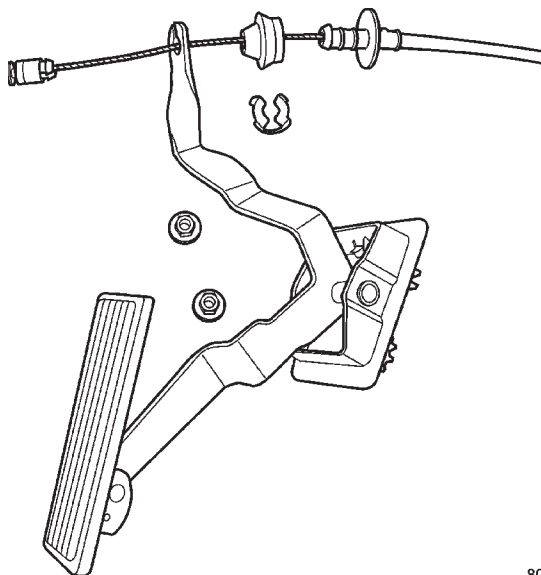
**Pressure Gauge Assembly C-4799-B****Fuel Pressure Test Adapter 6539****Spanner Wrench 6856****Fuel Line Adapter 1/4****O2S (Oxygen Sensor) Remover/Installer—C-4907****O2S(Oxygen Sensor) Remover/Installer - 8439**

ACCELERATOR PEDAL

REMOVAL

(1) Working from the engine compartment, hold the throttle body throttle lever in the wide open position. Remove the throttle cable from the throttle body cam.

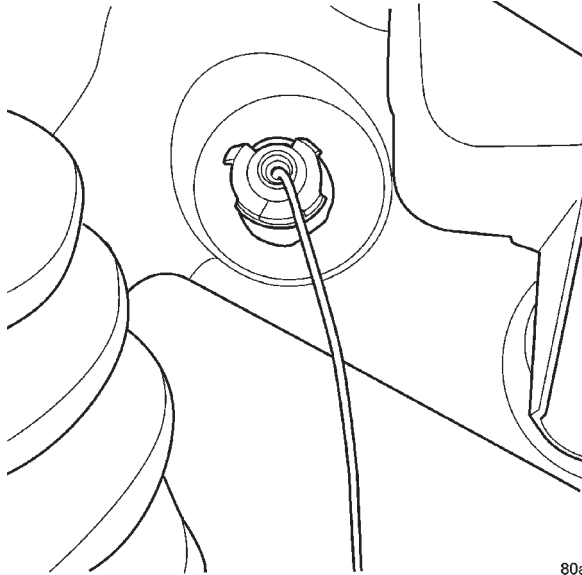
(2) From inside the vehicle, hold up the pedal and remove the cable retainer and throttle cable from the upper end of the pedal shaft (Fig. 1) and (Fig. 2).



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Fig. 1 ACCELERATOR PEDAL AND THROTTLE CABLE

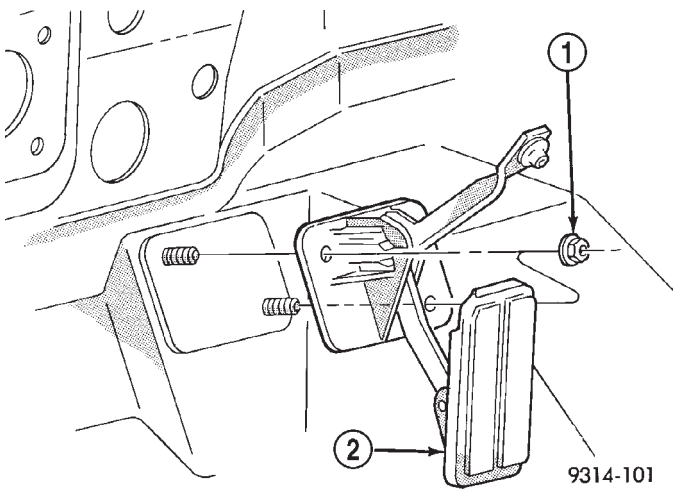
ACCELERATOR PEDAL (Continued)



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Fig. 2 RETAINER CLIP

(3) Working from the passenger compartment, remove nuts from accelerator pedal base (Fig. 3). Remove pedal and base from vehicle.



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Fig. 3 ACCELERATOR PEDAL

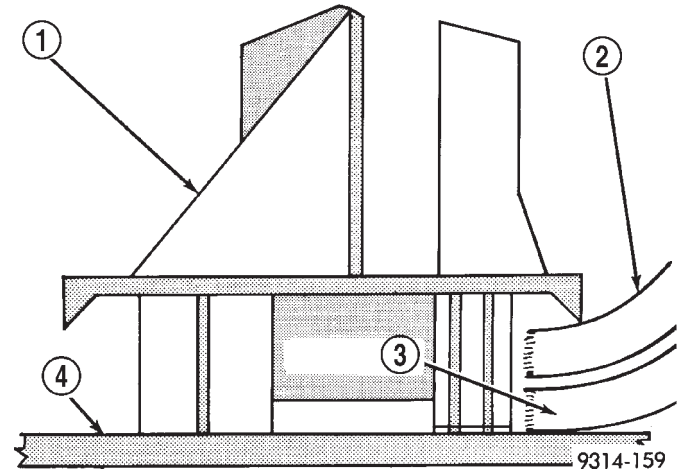
- 1 - MOUNTING NUTS
- 2 - ACCELERATOR PEDAL

INSTALLATION

(1) Position accelerator pedal assembly over studs onto dash panel. Ensure carpet and insulation are trapped between the lip of the pedal base and the floor pan (Fig. 4). Install mounting nuts and tighten to 12 N·m (105 in. lbs.) torque.

(2) From inside the vehicle, hold up the pedal and install the throttle cable and cable retainer in the upper end of the pedal shaft.

(3) From the engine compartment, hold the throttle body lever in the wide open position and install the throttle cable.



9314-159

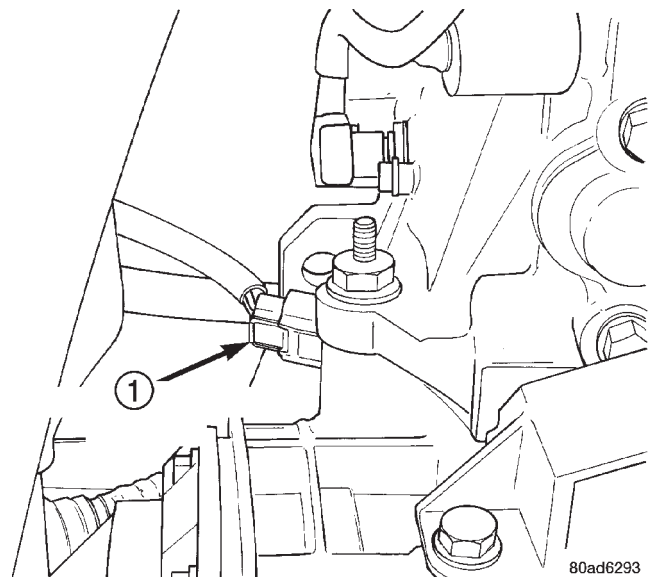
Fig. 4 CARPET AND INSULATION PLACEMENT

- 1 - PEDAL BASE
- 2 - CARPET
- 3 - INSULATION
- 4 - FLOOR PAN

CRANKSHAFT POSITION SENSOR**DESCRIPTION**

The crankshaft sensor is located on the passengers side of the transmission housing, above the differential housing (Fig. 5). The bottom of the sensor is positioned next to the drive plate.

The sensor is a hall effect device combined with an internal magnet. It is also sensitive to steel within a certain distance from it.



80ad6293

Fig. 5 CRANKSHAFT POSITION SENSOR

- 1 - CRANKSHAFT POSITION SENSOR

CRANKSHAFT POSITION SENSOR (Continued)

OPERATION

Engine speed and crankshaft position are provided through the crankshaft position sensor. The sensor generates pulses that are the input sent to the powertrain control module (PCM). The PCM interprets the sensor input to determine the crankshaft position. The PCM then uses this position, along with other inputs, to determine injector sequence and ignition timing.

The crankshaft position sensor detects slots cut into the transmission driveplate extension. There are 3 sets of slots. Two sets contain 4 slots and one set contains 5 slots, for a total of 13 slots (Fig. 6). Basic timing is set by the position of the last slot in each group. Once the Powertrain Control Module (PCM) senses the last slot, it determines which piston will be next at TDC from the camshaft position sensor input. It may take the PCM one engine revolution to determine crankshaft position.

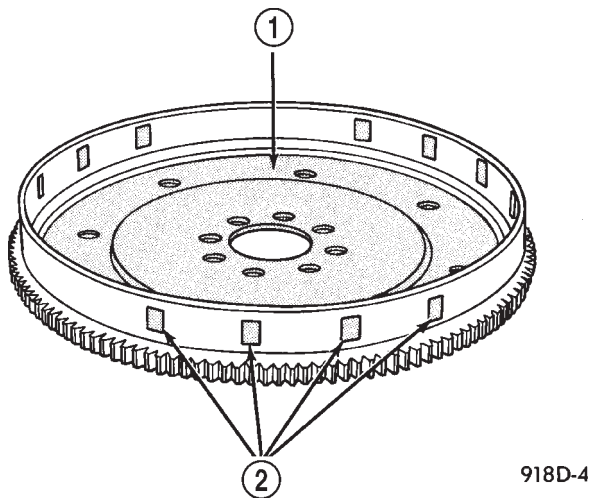


Fig. 6 TIMING SLOTS

- 1 - TORQUE CONVERTER DRIVE PLATE
2 - SLOTS

The PCM uses crankshaft position reference to determine injector sequence and ignition timing. Once the PCM determines crankshaft position, it begins energizing the injectors and coils in sequence.

The PCM uses the Crankshaft Position sensor to calculate the following:

- Engine rpm
- TDC number 1 and 4
- Ignition coil synchronization
- Injector synchronization
- Camshaft-to-crankshaft misalignment (Timing belt skipped 1 tooth or more diagnostic trouble code)

REMOVAL

The crankshaft sensor is located on the passengers side of the transmission housing, above the differential housing. The bottom of the sensor sits above the drive plate.

- (1) Disconnect electrical connector from crankshaft position sensor.
- (2) Remove sensor mounting screw. Remove sensor.

INSTALLATION

The crankshaft sensor is located on the passengers side of the transmission housing, above the differential housing. The bottom of the sensor sits above the drive plate.

- (1) Install sensor and push sensor down until contact is made with the transmission case. While holding the sensor in this position, install and tighten the retaining bolt to 12 N·m (105 in. lbs.) torque.
- (2) Connect electrical connector to crankshaft position sensor.

ENGINE SPEED SENSOR

DESCRIPTION

The PCM receives a signal from the TCM and the transaxle output speed sensor over the bus communication line to indicate vehicle speed on automatic transmission cars. On Manual transmission cars (if equipped) vehicle, a dedicated vehicle speed sensor is connected to the PCM.

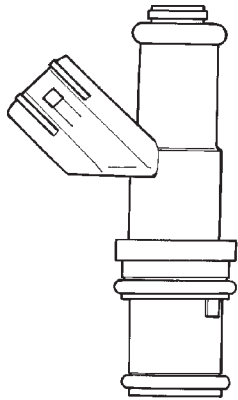
OPERATION

The Transmission Control Module (TCM) supplies the road speed and distance traveled inputs to the PCM. From these inputs and the throttle position sensor input, the PCM determines when a deceleration condition occurs.

FUEL INJECTOR

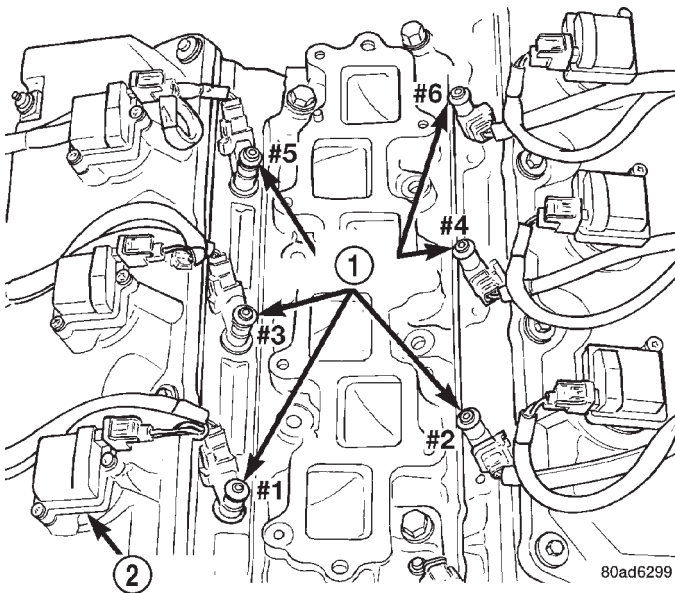
DESCRIPTION

The injectors are positioned in the cylinder heads with the nozzle ends directly above the intake valve port (Fig. 8). The fuel injectors are electrical solenoids (Fig. 7).



80ad6297

Fig. 7 Fuel Injector - Typical



80ad6299

Fig. 8 Fuel Injector Location—Typical

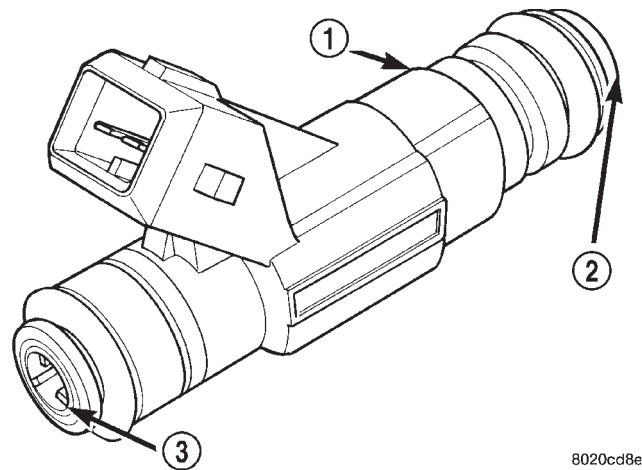
- 1 - FUEL INJECTORS
- 2 - IGNITION COILS

OPERATION

The fuel injectors are 12 volt electrical solenoids (Fig. 9). The injector contains a pintle that closes off an orifice at the nozzle end. When electric current is supplied to the injector, the armature and needle move a short distance against a spring, allowing fuel

to flow out the orifice. Because the fuel is under high pressure, a fine spray is developed in the shape of a hollow cone or two streams. The spraying action atomizes the fuel, adding it to the air entering the combustion chamber. Fuel injectors are not interchangeable between engines.

The PCM provides battery voltage to each injector through the ASD relay. Injector operation is controlled by a ground path provided for each injector by the PCM. Injector on-time (pulse-width) is variable, and is determined by the PCM processing all the data previously discussed to obtain the optimum injector pulse width for each operating condition. The pulse width is controlled by the duration of the ground path provided.



8020cd8e

Fig. 9 FUEL INJECTOR - TYPICAL

- 1 - FUEL INJECTOR
- 2 - NOZZLE
- 3 - TOP (FUEL ENTRY)

REMOVAL

REMOVAL - 2.7L

(1) Release fuel system pressure. Refer to Fuel System Pressure Release Procedure in this section.

(2) Disconnect negative cable to battery.

(3) Remove intake manifold plenum. Refer to the Engine section for information.

(4) Remove intake manifold plenum mounting bolts. Lift Plenum up off of engine. Cover intake manifold to prevent foreign material from entering engine.

(5) Disconnect fuel supply tube quick connect fittings at the rear of intake manifold. Refer to Quick Connect Fittings in the Fuel Delivery Section.

(6) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder

FUEL INJECTOR (Continued)

- (7) Remove electrical connectors from the fuel injectors.
- (8) Remove fuel rail mounting bolts.
- (9) Lift fuel rail straight up off of the cylinder head.
- (10) Remove retaining clips from fuel injectors at fuel rail.
- (11) Remove fuel injectors.
- (12) Repeat for remaining injectors.
- (13) Check injector O-ring for damage. If O-ring is damaged, it must be replaced. Replace the injector clip if it is damaged.

REMOVAL - 3.5L

- (1) Release fuel system pressure. Refer to Fuel System Pressure Release Procedure in this section.
- (2) Disconnect the negative battery cable.
- (3) Remove intake manifold plenum. Refer to the Engine section for information.
- (4) Remove intake manifold plenum mounting bolts. Lift Plenum up off of engine. Cover intake manifold to prevent foreign material from entering engine.
- (5) Disconnect fuel supply tube quick connect fitting at the rear of the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.
- (6) If the injector connectors are not tagged with their cylinder number, tag them to identify the correct cylinder.
- (7) Remove electrical connectors from the fuel injectors.
- (8) Remove mounting bolts on both sides of fuel rail.
- (9) Lift fuel rail straight up off of cylinder head.
- (10) Remove retaining clips from fuel injectors at fuel rail.
- (11) Remove fuel injectors.

INSTALLATION**INSTALLATION - 2.7L**

- (1) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.
- (2) Install fuel injectors.
- (3) Install retaining clips on fuel injectors.
- (4) Push injectors into fuel injector rail until clips are in the correct position.
- (5) Position fuel rail over cylinder head, and push rail into place. Tighten fuel rail mounting bolts to 11 N·m (100 in. lbs.) torque.
- (6) Connect fuel supply tube quick connect fittings at the rear of intake manifold. Refer to Quick Connect Fittings in the Fuel Delivery Section.
- (7) Connect electrical connectors to fuel injectors.

- (8) Install intake manifold plenum. Refer to the Engine section for information.
- (9) Connect negative cable to battery.

INSTALLATION - 3.5L

- (1) Lightly lubricate the fuel injector O-rings with a couple drops of clean engine oil.
- (2) Install retaining clips on fuel injectors.
- (3) Push injectors into fuel injector rail until clips are in the correct position.
- (4) Position fuel rail over cylinder head, and push rail into place. Tighten fuel rail mounting bolts to 28 N·m (250 in. lbs.) torque.
- (5) Connect fuel supply tube quick connect fittings at the rear of the fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section.
- (6) Connect electrical connectors to fuel injectors.
- (7) Install intake manifold plenum. Refer to the Engine section for information.
- (8) Connect the battery cable.

FUEL PUMP RELAY**DESCRIPTION**

The fuel pump relay is located in the PDC. The inside top of the PDC cover has a label showing relay and fuse location.

OPERATION

The fuel pump relay supplies battery voltage to the fuel pump. A buss bar in the Power Distribution Center (PDC) supplies voltage to the solenoid side and contact side of the relay. The fuel pump relay power circuit contains a fuse between the buss bar in the PDC and the relay. The fuse is located in the PDC. Refer to the Wiring Diagrams for circuit information.

The PCM controls the fuel pump relay by switching the ground path for the solenoid side of the relay on and off. The PCM turns the ground path off when the ignition switch is in the Off position. When the ignition switch is in the On position, the PCM energizes the fuel pump. If the crankshaft position sensor does not detect engine rotation, the PCM de-energizes the relay after approximately one second.

IDLE AIR CONTROL MOTOR

DESCRIPTION

The idle air control motor (IAC) attaches to the throttle body (Fig. 10). It is an electric stepper motor.

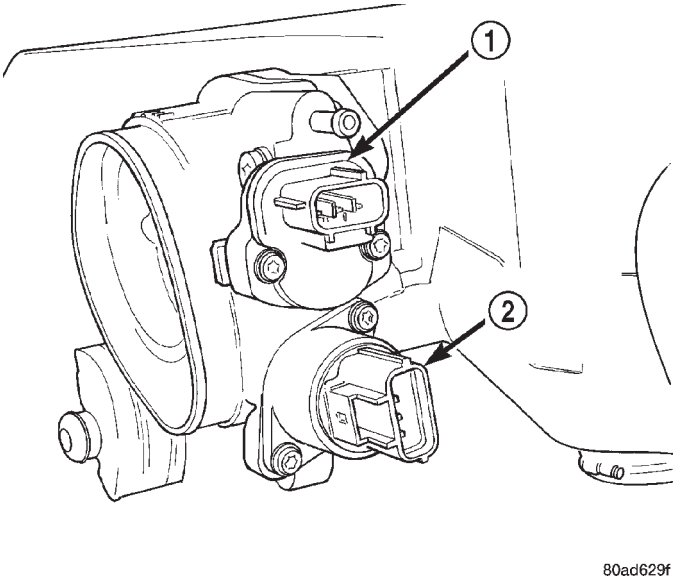


Fig. 10 Idle Air Control Motor

- 1 - THROTTLE POSITION SENSOR
2 - IDLE AIR CONTROL MOTOR

OPERATION

The PCM adjusts engine idle speed through the idle air control motor to compensate for engine load, coolant temperature or barometric pressure changes.

The throttle body has an air bypass passage that provides air for the engine during closed throttle idle. The idle air control motor pintle protrudes into the air bypass passage and regulates air flow through it.

The PCM adjusts engine idle speed by moving the IAC motor pintle in and out of the bypass passage. The adjustments are based on inputs the PCM receives. The inputs are from the throttle position sensor, crankshaft position sensor, coolant temperature sensor, MAP sensor, vehicle speed sensor and various switch operations (brake, park/neutral, air conditioning).

When engine rpm is above idle speed, the IAC is used for the following functions:

- Off-idle dashpot
- Deceleration air flow control
- A/C compressor load control (also opens the passage slightly before the compressor is engaged so that the engine rpm does not dip down when the compressor engages)

Target Idle

Target idle is determined by the following inputs:

- Gear position
- ECT Sensor
- Battery voltage
- Ambient/Battery Temperature Sensor
- VSS
- TPS
- MAP Sensor

REMOVAL

REMOVAL - 2.7L

- (1) Disconnect the negative battery cable.
- (2) Disconnect the IAC electrical connector.
- (3) Remove the IAC mounting screws.
- (4) Remove the IAC.

REMOVAL - 3.5L

- (1) Disconnect the negative battery cable.
- (2) Disconnect the air plenum.
- (3) Disconnect the electrical connector (Fig. 11).
- (4) Remove the mounting screws.
- (5) Remove the IAC.

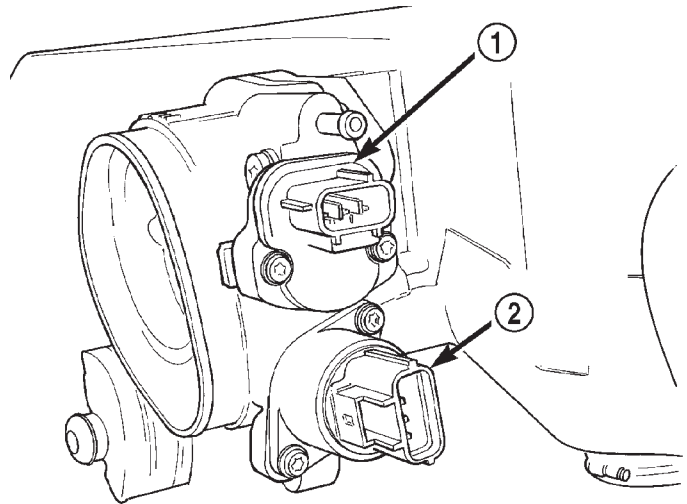


Fig. 11 Idle Air Control Motor

80ad629f

- 1 - THROTTLE POSITION SENSOR
2 - IDLE AIR CONTROL MOTOR

INSTALLATION

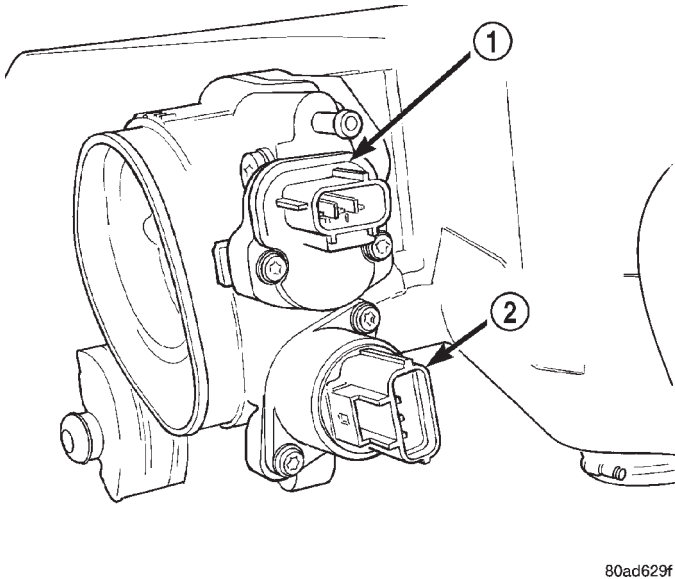
INSTALLATION - 2.7L

- (1) Install the IAC to the throttle body.
- (2) Tighten mounting screws to 5.5 N·m (49 in. lbs.) torque.
- (3) Attach electrical connector to the IAC.
- (4) Connect the negative battery cable.

IDLE AIR CONTROL MOTOR (Continued)

INSTALLATION - 3.5L

- (1) Install the IAC to the throttle body (Fig. 12).
- (2) Tighten mounting screws to 7.3 N·m (65 in. lbs.) torque.
- (3) Attach electrical connector to the IAC.
- (4) Install air plenum and tighten the clamp.
- (5) Connect the negative battery cable.

**Fig. 12 Idle Air Control Motor**

- 1 - THROTTLE POSITION SENSOR
2 - IDLE AIR CONTROL MOTOR

INTAKE AIR TEMPERATURE SENSOR**REMOVAL**

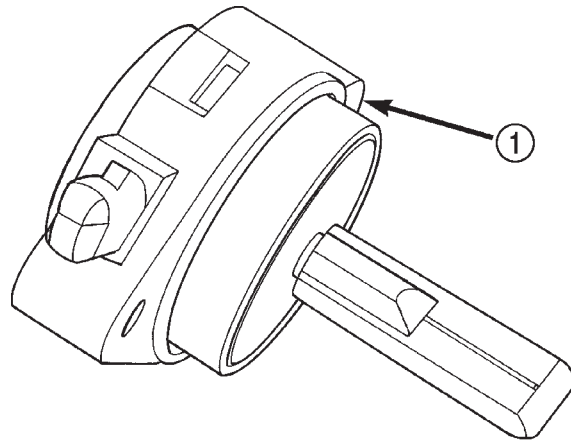
- (1) Remove the negative battery cable.
- (2) Disconnect electrical connector from sensor.
- (3) Remove sensor.

INSTALLATION

- (1) Install sensor. Tighten sensor.
- (2) Attach electrical connector to sensor.
- (3) Install the negative battery cable.

MANIFOLD TUNE VALVE**REMOVAL - 3.5L**

- (1) Disconnect negative battery cable.
- (2) Disconnect electrical connector (Fig. 13).
- (3) Remove manifold tuning valve mounting screws. Remove tuning valve.



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Fig. 13 Manifold Tuning Valve

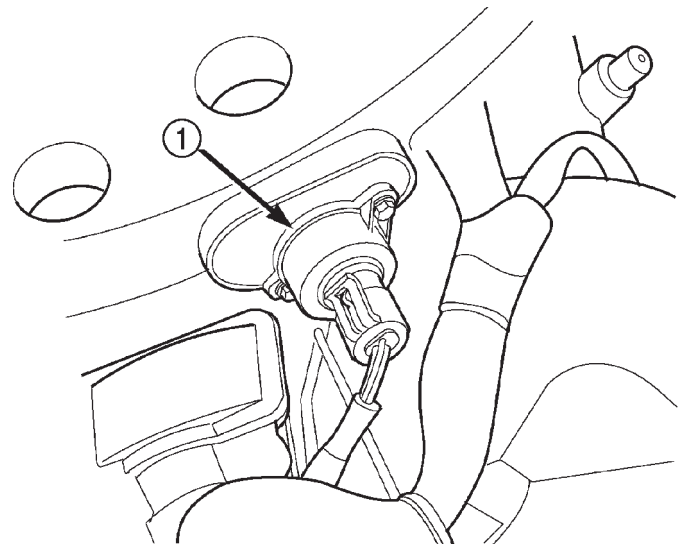
1 - MTV VALVE

INSTALLATION - 3.5L

- (1) Install tuning valve. Tighten mounting screws to 11.9 N·m (105 in. lbs.) torque.
- (2) Install electrical connector.
- (3) Connect negative battery cable.

MAP SENSOR**DESCRIPTION**

The MAP sensor mounts to the driver side of the intake manifold plenum (Fig. 14) or (Fig. 15).

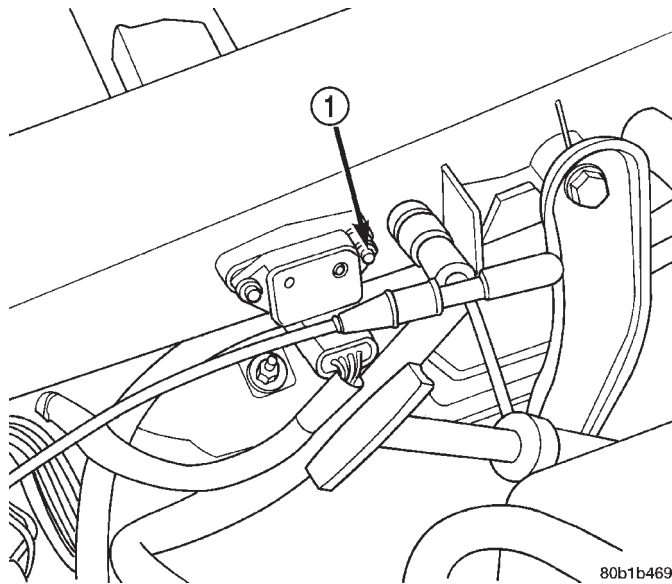


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Fig. 14 MAP SENSOR 2.7L

1 - MAP SENSOR

MAP SENSOR (Continued)

**Fig. 15 MAP SENSOR 3.5L**

1 - MAP/AIR TEMPERATURE SENSOR

OPERATION

The MAP serves as a PCM input, using a silicon based sensing unit, to provide data on the manifold vacuum that draws the air/fuel mixture into the combustion chamber. The PCM requires this information to determine injector pulse width and spark advance. When MAP equals Barometric pressure, the pulse width will be at maximum.

Also like the cam and crank sensors, a 5 volt reference is supplied from the PCM and returns a voltage signal to the PCM that reflects manifold pressure. The zero pressure reading is 0.5V and full scale is 4.5V. For a pressure swing of 0 — 15 psi the voltage changes 4.0V. The sensor is supplied a regulated 4.8 to 5.1 volts to operate the sensor. Like the cam and crank sensors ground is provided through the sensor return circuit.

The MAP sensor input is the number one contributor to pulse width. The most important function of the MAP sensor is to determine barometric pressure. The PCM needs to know if the vehicle is at sea level or is it in Denver at 5000 feet above sea level, because the air density changes with altitude. It will also help to correct for varying weather conditions. If a hurricane was coming through the pressure would be very, very low or there could be a real fair weather, high pressure area. This is important because as air pressure changes the barometric pressure changes. Barometric pressure and altitude have a direct inverse correlation, as altitude goes up barometric pressure goes down. The first thing that happens as the ignition key is rolled on, before reaching the crank position, the PCM powers up, and looks at the MAP voltage, and based upon the voltage it sees,

it knows the current barometric pressure relative to altitude. Once the engine starts, the PCM looks at the voltage again, continuously every 12 milliseconds, and compares the current voltage to what it was at key on. The difference between current and what it was at key on is manifold vacuum.

During key On (engine not running) the sensor reads (updates) barometric pressure. A normal range can be obtained by monitoring known good sensor in your work area.

As the altitude increases the air becomes thinner (less oxygen). If a vehicle is started and driven to a very different altitude than where it was at key On the barometric pressure needs to be updated. Any time the PCM sees Wide Open throttle, based upon TPS angle and RPM it will update barometric pressure in the MAP memory cell. With periodic updates, the PCM can make its calculations more effectively.

The PCM uses the MAP sensor to aid in calculating the following:

- Barometric pressure
- Engine load
- Manifold pressure
- Injector pulse-width
- Spark-advance programs
- Shift-point strategies (F4AC1 transmissions only, via the CCD bus)
- Idle speed
- Decel fuel shutoff

The MAP sensor signal is provided from a single piezoresistive element located in the center of a diaphragm. The element and diaphragm are both made of silicone. As the pressures changes the diaphragm moves causing the element to deflect which stresses the silicone. When silicone is exposed to stress its resistance changes. As manifold vacuum increases, the MAP sensor input voltage decreases proportionally. The sensor also contains electronics that condition the signal and provide temperature compensation.

The PCM recognizes a decrease in manifold pressure by monitoring a decrease in voltage from the reading stored in the barometric pressure memory cell. The MAP sensor is a linear sensor; as pressure changes, voltage changes proportionately. The range of voltage output from the sensor is usually between 4.5 volts at sea level to as low as 0.3 volts at 26 in. of Hg. Barometric pressure is the pressure exerted by the atmosphere upon an object. At sea level on a standard day, no storm, barometric pressure is 29.92 in Hg. For every 100 feet of altitude barometric pressure drops .10 in. Hg. If a storm goes through it can either add, high pressure, or decrease, low pressure, from what should be present for that altitude. You should make a habit of knowing what the average pressure and corresponding barometric pressure is

MAP SENSOR (Continued)

for your area. Always use the Diagnostic Test Procedures Manual for MAP sensor testing.

REMOVAL

REMOVAL - 2.7L

- (1) Remove the negative battery cable.
- (2) Disconnect the electrical connector from the MAP sensor (Fig. 16).
- (3) Remove bolt from sensor.

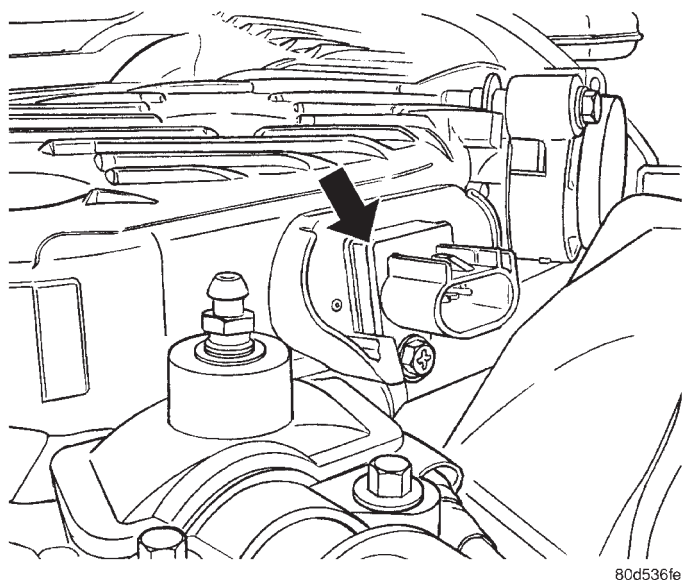


Fig. 16 MAP SENSOR - 2.7L

- (4) Remove sensor.

REMOVAL - 3.5L

- (1) Remove the negative battery cable.
- (2) Disconnect the electrical connector from the MAP sensor.
- (3) Remove bolts from sensor.
- (4) Remove sensor.

INSTALLATION

INSTALLATION - 2.7L

- (1) The sensor mounts onto intake manifold plenum (Fig. 17). Tighten screws to 4.5 N·m (40 in. lbs.) torque.
- (2) Attach electrical connector to sensor (Fig. 16).
- (3) Install the negative battery cable.

INSTALLATION - 3.5L

- (1) Bolt sensor to intake and tighten the bolts to 4 N·m (35 in. lbs.).
- (2) Attach electrical connector to sensor.
- (3) Install the negative battery cable.

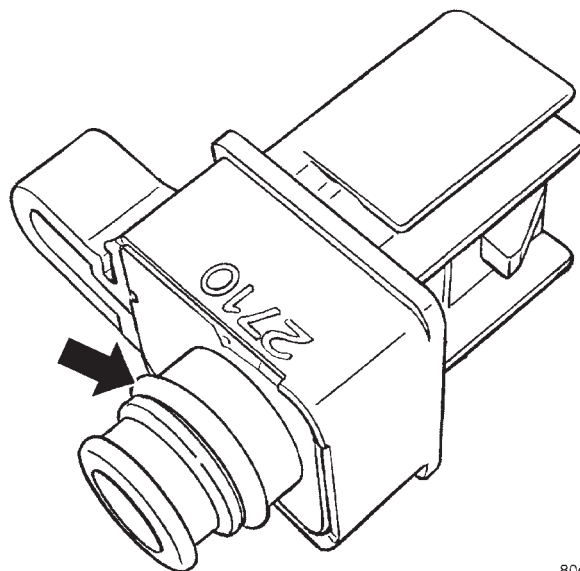


Fig. 17 MAP SENSOR O-RING

O2 SENSOR

DESCRIPTION

The upstream oxygen sensor threads into the outlet flange of the exhaust manifold (Fig. 18) or (Fig. 19).

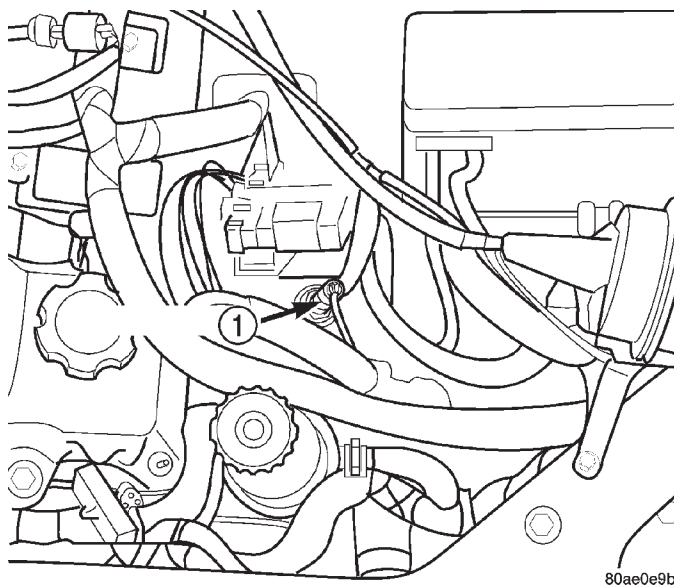
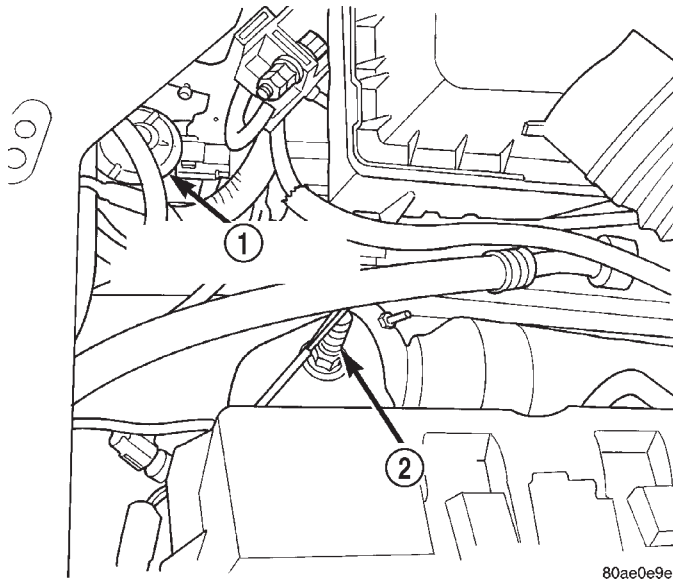


Fig. 18 Upstream Heated Oxygen Sensor 1/1

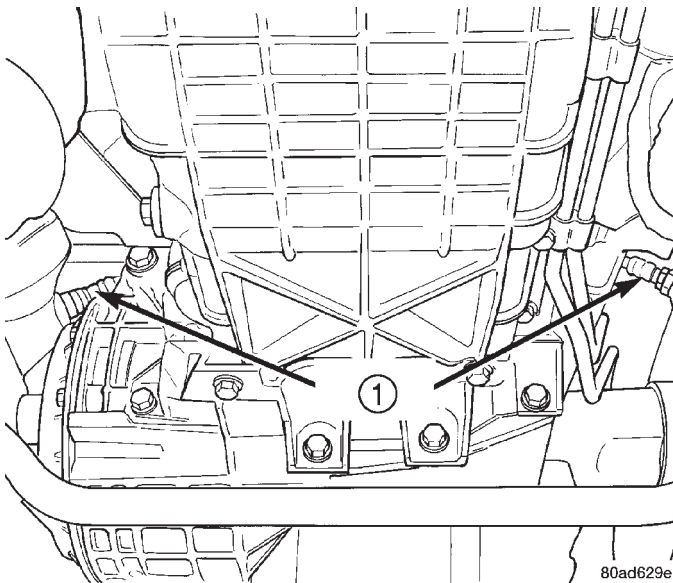
1 - O2 SENSOR

The downstream heated oxygen sensor threads into the outlet pipe at the rear of the catalytic converter (Fig. 20).

O2 SENSOR (Continued)

**Fig. 19 Upstream Heated Oxygen Sensor 1/1**

- 1 - PROPORTIONAL PURGE SOLENOID
2 - O2 SENSOR

**Fig. 20 Downstream Heated Oxygen Sensor 1/2, 2/1**

- 1 - OXYGEN SENSORS

OPERATION

A single sensor ground is used for all O2 sensors (2 sensors on 4 cyl. vehicles and 4 sensors on 6 cyl. vehicles).

As vehicles accumulate mileage, the catalytic converter deteriorates. The deterioration results in a less efficient catalyst. To monitor catalytic converter deterioration, the fuel injection system uses two heated oxygen sensors. One sensor upstream of the catalytic converter, one downstream of the converter.

The PCM compares the reading from the sensors to calculate the catalytic converter oxygen storage capacity and converter efficiency. Also, the PCM uses the upstream heated oxygen sensor input when adjusting injector pulse width.

When the catalytic converter efficiency drops below emission standards, the PCM stores a diagnostic trouble code and illuminates the malfunction indicator lamp (MIL).

The O2 sensors produce voltages from 0 to 1 volt, depending upon the oxygen content of the exhaust gas. When a large amount of oxygen is present (caused by a lean air/fuel mixture, can be caused by misfire and exhaust leaks), the sensors produces a low voltage. When there is a lesser amount of oxygen present (caused by a rich air/fuel mixture, can be caused by internal engine problems) it produces a higher voltage. By monitoring the oxygen content and converting it to electrical voltage, the sensors act as a rich-lean switch.

The oxygen sensors are equipped with a heating element that keeps the sensors at proper operating temperature during all operating modes. Maintaining correct sensor temperature at all times allows the system to enter into closed loop operation sooner. Also, it allows the system to remain in closed loop operation during periods of extended idle.

In Closed Loop operation the PCM monitors the O2 sensors input (along with other inputs) and adjusts the injector pulse width accordingly. During Open Loop operation the PCM ignores the O2 sensor input. The PCM adjusts injector pulse width based on pre-programmed (fixed) values and inputs from other sensors.

The Automatic Shutdown (ASD) relay supplies battery voltage to both the upstream and downstream heated oxygen sensors. The oxygen sensors are equipped with a heating element. The heating elements reduce the time required for the sensors to reach operating temperature. The PCM uses pulse width modulation to control the ground side of the heater to regulate the temperature on 4 cyl. upstream O2 heater only. All other 4 cyl. and 6 cyl. O2 heaters do not use pulse width modulation.

UPSTREAM OXYGEN SENSOR

The input from the upstream heated oxygen sensor tells the PCM the oxygen content of the exhaust gas. Based on this input, the PCM fine tunes the air-fuel ratio by adjusting injector pulse width.

The sensor input switches from 0 to 1 volt, depending upon the oxygen content of the exhaust gas in the exhaust manifold. When a large amount of oxygen is present (caused by a lean air-fuel mixture), the sensor produces voltage as low as 0.1 volt. When there is a lesser amount of oxygen present (rich air-

O2 SENSOR (Continued)

fuel mixture) the sensor produces a voltage as high as 1.0 volt. By monitoring the oxygen content and converting it to electrical voltage, the sensor acts as a rich-lean switch.

The heating element in the sensor provides heat to the sensor ceramic element. Heating the sensor allows the system to enter into closed loop operation sooner. Also, it allows the system to remain in closed loop operation during periods of extended idle.

In Closed Loop, the PCM adjusts injector pulse width based on the upstream heated oxygen sensor input along with other inputs. In Open Loop, the PCM adjusts injector pulse width based on preprogrammed (fixed) values and inputs from other sensors.

DOWNSTREAM OXYGEN SENSOR

The downstream heated oxygen sensor input is used to detect catalytic converter deterioration. As the converter deteriorates, the input from the downstream sensor begins to match the upstream sensor input except for a slight time delay. By comparing the downstream heated oxygen sensor input to the input from the upstream sensor, the PCM calculates catalytic converter efficiency. Also used to establish the upstream O2 goal voltage (switching point).

REMOVAL

REMOVAL - UPSTREAM 1/1, 2/1

The engine uses two heated oxygen sensors, one in each exhaust manifold.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

- (1) Remove the negative battery cable.
- (2) Disconnect the heated oxygen sensor electrical connector.
- (3) Use a socket such as Snap-On YA8875 or a crow foot wrench to remove oxygen sensor (Fig. 21).

REMOVAL - DOWNSTREAM 1/2, 2/2

The O2 sensors are located at the outlet ends of the catalytic converter (Fig. 22).

WARNING: THE EXHAUST MANIFOLD, EXHAUST PIPES AND CATALYTIC CONVERTER BECOME VERY HOT DURING ENGINE OPERATION. ALLOW ENGINE TO COOL BEFORE REMOVING OXYGEN SENSOR.

- (1) Remove the negative battery cable.
- (2) Raise and support the vehicle.

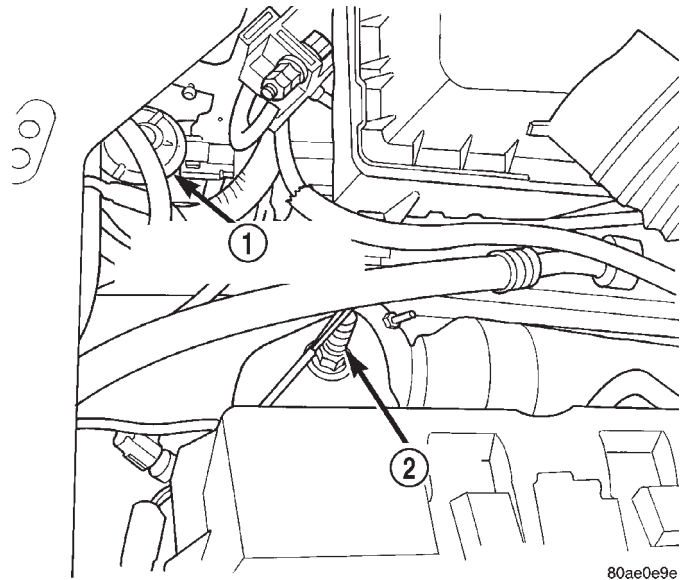


Fig. 21 Upstream Heated Oxygen Sensor 1/1

- 1 - PROPORTIONAL PURGE SOLENOID
2 - O2 SENSOR

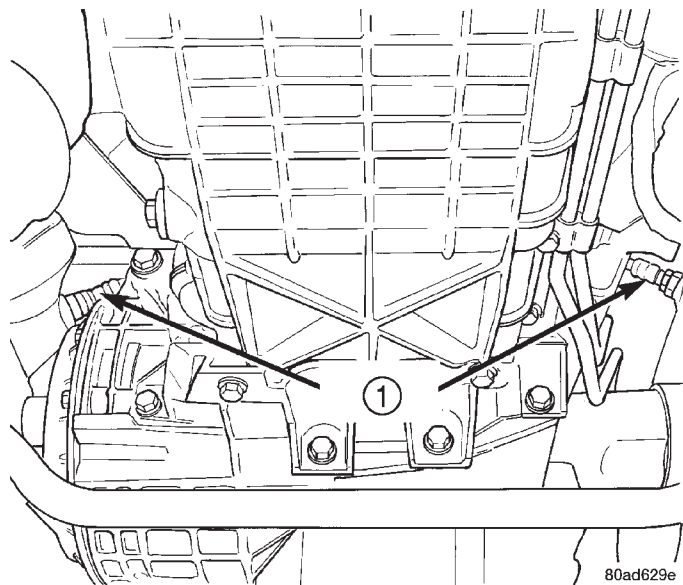


Fig. 22 Downstream Heated Oxygen Sensor 1/2

- 1 - OXYGEN SENSORS

- (3) Disconnect the wire connector from the O2 sensors.

CAUTION: When disconnecting the sensor electrical connector, do not pull directly on wire going into sensor.

- (4) Remove the O2 sensors. Snap-On oxygen sensor wrench (number YA 8875) may be used for removal and installation.

O2 SENSOR (Continued)

INSTALLATION

INSTALLATION - UPSTREAM 1/1, 2/1

The engine uses two heated oxygen sensors, one in each exhaust manifold.

(1) After removing the sensor, the exhaust manifold threads must be cleaned with an 18 mm X 1.5 + 6E tap. If reusing the original sensor, coat the sensor threads with an anti-seize compound such as Loctite 771- 64 or equivalent. New sensors have compound on the threads and do not require an additional coating. Tighten the sensor to 28 N·m (20 ft. lbs.) torque.

(2) Connect the heated oxygen sensor electrical connector.

(3) Install the negative battery cable.

INSTALLATION - DOWNSTREAM 1/2, 2/2

The O2 sensor are located at the outlet ends of the catalytic converter.

Threads of new oxygen sensors are factory coated with anti-seize compound to aid in removal. **DO NOT add any additional anti-seize compound to the threads of a new oxygen sensor.**

(1) Install the O2 sensor. Tighten to 28 N·m (20 ft. lbs.) torque.

(2) Connect the O2 sensor wire connector.

(3) Lower the vehicle.

(4) Install the negative battery cable.

SHORT RUNNER VALVE

DESCRIPTION

It is an electrical actuator attached to the intake manifold (Fig. 23).

OPERATION

The SRV (Fig. 23) system operates under WOT conditions above 5000 rpm to maximize engine performance. When actuated by the PCM, the SRV solenoid energizes, allowing mechanical linkage to redirect the intake air flow to six short runners. The PCM looks for a current spike when actuating the solenoid. If the spike is not present, the PCM sets the DTC.

REMOVAL - 3.5L

- (1) Remove the negative battery cable.
- (2) Remove link.
- (3) Remove electrical connector.
- (4) Remove 3 bolts.
- (5) Remove valve (Fig. 24).

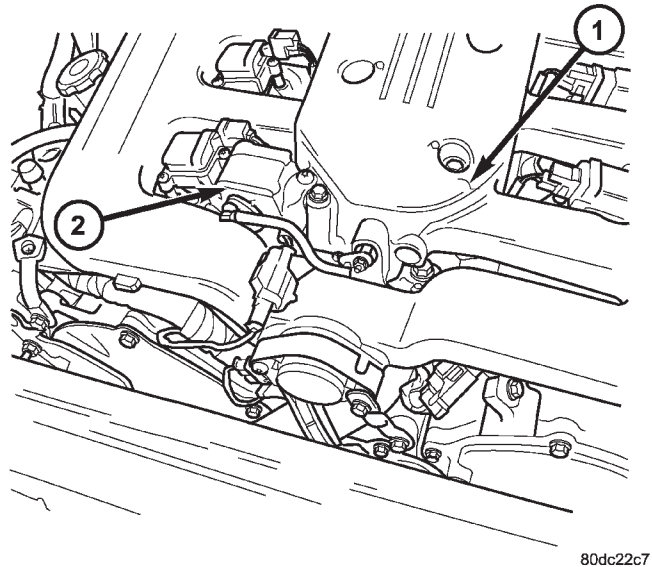


Fig. 23 Short Runner Valve (SRV)

- 1 - INTAKE MANIFOLD
2 - SRV VALVE

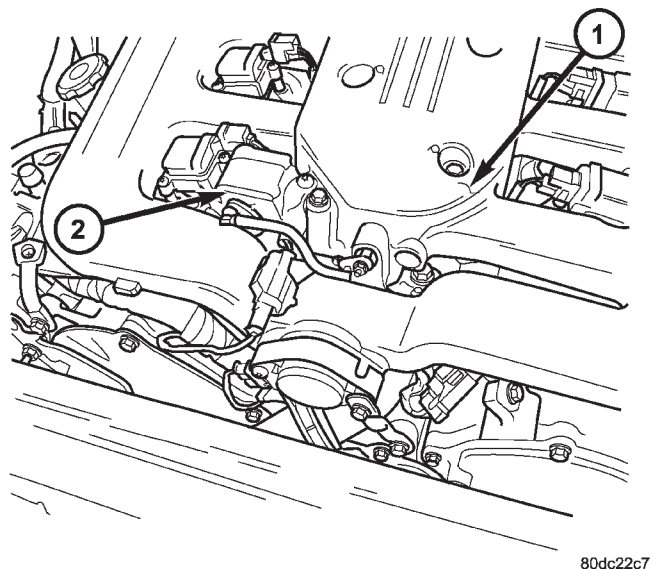


Fig. 24 SHORT RUNNER VALVE (SRV)

- 1 - INTAKE MANIFOLD
2 - SRV VALVE

INSTALLATION - 3.5L

- (1) Install 3 bolts and tighten to 6.7 N·m (60 in. lbs.).
- (2) Install link.
- (3) Install electrical connector.
- (4) Install the negative battery cable.

THROTTLE BODY

DESCRIPTION

The throttle body is located on the intake manifold (Fig. 25) or (Fig. 26). Fuel does not enter the intake manifold through the throttle body. Fuel is sprayed into the manifold by the fuel injectors.

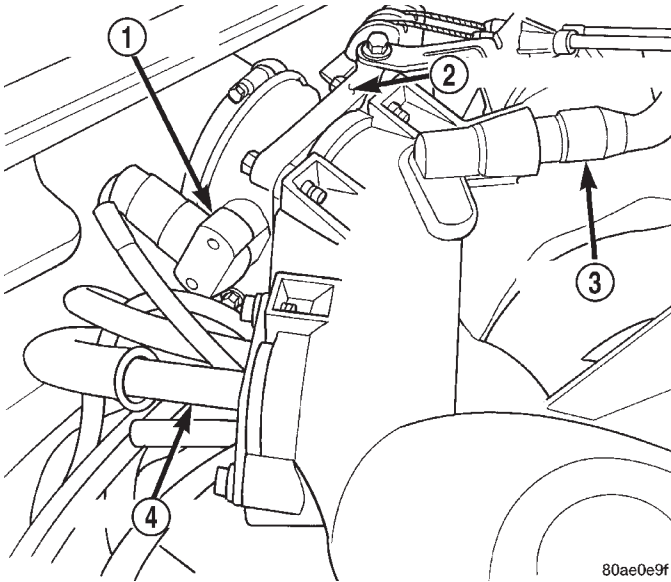


Fig. 25 Throttle Body 2.7L

- 1 - TPS SENSOR
- 2 - THROTTLE BODY
- 3 - PCV VALVE
- 4 - EGR TUBE

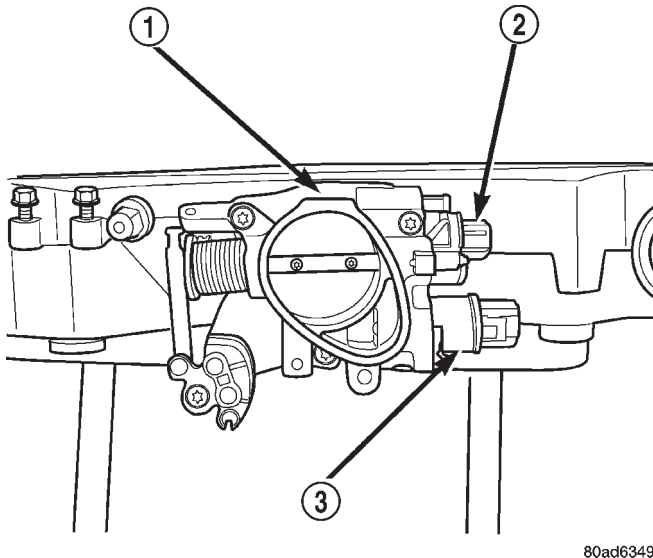


Fig. 26 Throttle Body 3.2/3.5L

- 1 - THROTTLE BODY
- 2 - TPS
- 3 - IAC

OPERATION

Filtered air from the air cleaner enters the intake manifold through the throttle body. The throttle body contains an air control passage controlled by an Idle Air Control (IAC) motor. The air control passage is used to supply air for idle conditions. A throttle valve (plate) is used to supply air for above idle conditions.

Certain sensors are attached to the throttle body. The accelerator pedal cable, speed control cable and transmission control cable (when equipped) are connected to the throttle body linkage arm.

A (factory adjusted) set screw is used to mechanically limit the position of the throttle body throttle plate. **Never attempt to adjust the engine idle speed using this screw.** All idle speed functions are controlled by the PCM.

REMOVAL

REMOVAL - 2.7L

- (1) Disconnect negative cable from battery
- (2) Disconnect air plenum from throttle body.
- (3) Hold throttle lever in wide open position. Remove throttle cable and speed control cables from throttle arm.
- (4) Remove throttle cable bracket.
- (5) Disconnect electrical connectors from throttle body.
- (6) Remove the throttle body support bracket from the bottom of the throttle body.
- (7) Remove 3 throttle body bolts.
- (8) Remove throttle body.
- (9) Clean mating surfaces.

REMOVAL - 3.5L

- (1) Disconnect negative cable from battery
- (2) Remove wiper arms.
- (3) Remove cowl screen.
- (4) Remove cowl plenum.
- (5) Disconnect air plenum from throttle body.
- (6) Remove throttle cable bracket.
- (7) Disconnect electrical connectors.
- (8) Disconnect top vacuum hose.
- (9) Remove the throttle body support bracket from the bottom of the throttle body.
- (10) Remove 3 throttle body bolts.
- (11) Hold throttle lever in wide open position. Remove throttle cable and speed control cables from throttle arm.
- (12) Clean mating surfaces.

THROTTLE BODY (Continued)

INSTALLATION

INSTALLATION - 2.7L

- (1) Install throttle body and bolts.
- (2) Tighten bolts to 11.9 N·m (105 in. lbs.) torque.
- (3) Install the throttle body support bracket to the bottom of the throttle body. Tighten the bolts to 27.1 N·m (20 ft. lbs.) torque.
- (4) Hold throttle lever in wide open throttle position. Install throttle cable and speed control cable.
- (5) Install throttle cable bracket and tighten bolts.
- (6) Install air plenum and tighten clamp.
- (7) Connect negative cable to battery.

INSTALLATION - 3.5L

- (1) Hold throttle lever in wide open throttle position. Install throttle cable and speed control cable.
- (2) Install throttle body and bolts.
- (3) Tighten bolts to 11.9 N·m (105 in. lbs.) torque.
- (4) Install the throttle body support bracket to the bottom of the throttle body. Tighten the bolts to 27.1 N·m (20 ft. lbs.) torque.
- (5) Install vacuum hose.
- (6) Install throttle cable bracket and tighten bolts.
- (7) Install air plenum and tighten clamp.
- (8) Install cowl plenum.
- (9) Install cowl screen.
- (10) Install wiper arms.
- (11) Connect negative cable to battery.

THROTTLE CONTROL CABLE

REMOVAL

(1) Working from the engine compartment, hold the throttle body throttle lever in the wide open position. Pull the cable forward and slide it out of the throttle body cam.

(2) From inside the vehicle, hold up the pedal and remove the cable retainer and throttle cable from the upper end of the pedal shaft (Fig. 1).

(3) Remove retainer clip from throttle cable and grommet at dash panel (Fig. 2).

(4) From the engine compartment, pull the throttle cable out of the dash panel grommet. The grommet should remain in the dash panel.

(5) Remove the throttle cable from throttle bracket by carefully compressing both retaining ears simultaneously. Then gently pull the throttle cable from throttle bracket.

INSTALLATION

(1) From the engine compartment, push the housing end fitting into the dash panel grommet.

(2) Install the cable housing (throttle body end) into the cable mounting bracket on the engine.

(3) From inside the vehicle, hold up the pedal and install throttle cable and cable retainer in the upper end of the pedal shaft (Fig. 1).

(4) At the dash panel, install the cable retainer clip between the end of the throttle cable fitting and grommet (Fig. 2).

(5) From the engine compartment, rotate the throttle lever to wide open and install the throttle cable.

THROTTLE POSITION SENSOR

DESCRIPTION

The throttle position sensor mounts to the side of the throttle body (Fig. 27) or (Fig. 28). The sensor connects to the throttle blade shaft. The TPS is a variable resistor that provides the Powertrain Control Module (PCM) with an input signal (voltage).

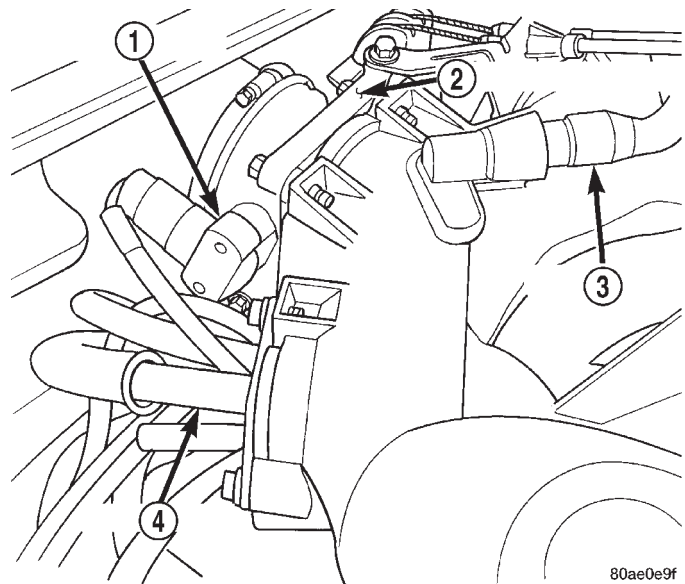


Fig. 27 THROTTLE POSITION SENSOR 2.7L ENGINE

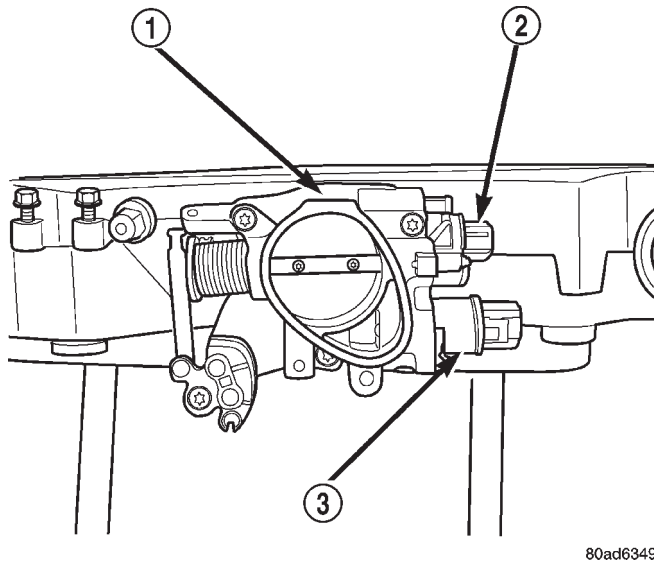
- 1 - TPS SENSOR
- 2 - THROTTLE BODY
- 3 - PCV VALVE
- 4 - EGR TUBE

OPERATION

The signal represents throttle blade position. As the position of the throttle blade changes, the resistance of the TPS changes.

The PCM supplies approximately 5 volts to the TPS. The TPS output voltage (input signal to the powertrain control module) represents throttle blade position. The TPS output voltage to the PCM varies from approximately 0.6 volt at minimum throttle

THROTTLE POSITION SENSOR (Continued)



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Fig. 28 THROTTLE POSITION SENSOR 3.2/3.5L ENGINE

- 1 - THROTTLE BODY
- 2 - TPS
- 3 - IAC

opening (idle) to a maximum of 4.5 volts at wide open throttle.

Along with inputs from other sensors, the PCM uses the TPS input to determine current engine operating conditions. The PCM also adjusts fuel injector pulse width and ignition timing based on these inputs.

REMOVAL

REMOVAL - 2.7L

- (1) Remove the negative battery cable.
- (2) Disconnect the TPS electrical connector (Fig. 29).
- (3) Remove the TPS mounting screws.
- (4) Remove the TPS.

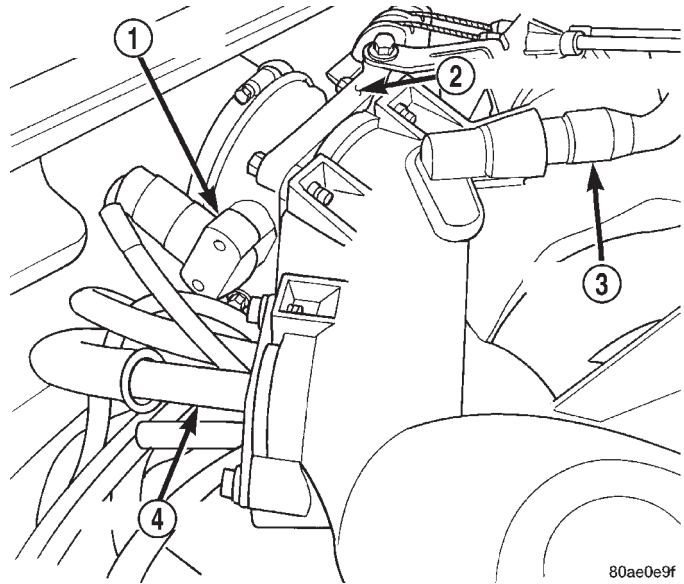
REMOVAL - 3.5L

- (1) Disconnect the negative battery cable.
- (2) Disconnect the air plenum.
- (3) Disconnect the TPS electrical connector (Fig. 28).
- (4) Remove the TPS mounting screws.
- (5) Remove the TPS.

INSTALLATION

INSTALLATION - 2.7L

(1) The throttle shaft end of the throttle body slides into a socket in the TPS. The socket has two tabs inside it. The throttle shaft rests against the tabs. When indexed correctly, the TPS can rotate clockwise a few degrees to line up the mounting



80ae0e9f

Fig. 29 Throttle Position Sensor—2.7L Engine

- 1 - TPS SENSOR
- 2 - THROTTLE BODY
- 3 - PCV VALVE
- 4 - EGR TUBE

screw holes with the screw holes in the throttle body. The TPS has slight tension when rotated into position. If it is difficult to rotate the TPS into position, install the sensor with the throttle shaft on the other side of the tabs in the socket. Tighten mounting screws to 5.1 N·m (45 in. lbs.) torque.

(2) After installing the TPS, the throttle plate should be closed. If the throttle plate is open, install the sensor on the other side of the tabs in the socket.

(3) Attach electrical connector to the TPS.

(4) Install the negative battery cable.

INSTALLATION - 3.5L

(1) The throttle shaft end of the throttle body slides into a socket in the TPS. The socket has two tabs inside it. The throttle shaft rests against the tabs. When indexed correctly, the TPS can rotate clockwise a few degrees to line up the mounting screw holes with the screw holes in the throttle body. The TPS has slight tension when rotated into position. If it is difficult to rotate the TPS into position, install the sensor with the throttle shaft on the other side of the tabs in the socket. Tighten mounting screws to 6.2 N·m (55 in. lbs.) torque.

(2) After installing the TPS, the throttle plate should be closed. If the throttle plate is open, install the sensor on the other side of the tabs in the socket.

(3) Attach electrical connector to the TPS.

(4) Install air plenum and tighten the clamp.

(5) Connect the negative battery cable.

STEERING

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STEERING

DESCRIPTION - POWER STEERING SYSTEM

This vehicle is available with 3 different types of power steering. They are standard, firm-feel, or speed-sensitive variable-effort (speed-proportional) power steering.

The firm-feel steering gear is physically the same as the standard gear used on some models. The difference is internal to the gear. The internal calibration gives the driver a more firm feel at the steering wheel. It is serviced the same as the standard steering gear.

The speed-sensitive variable-effort power steering system, better known as speed-proportional steering, is an electronically controlled, variable-effort type power steering system. The steering gear has an externally mounted control valve which in conjunction with mechanical components varies steering effort at different vehicle speeds. At low speeds lower steering effort is provided to allow ease in steering and parking. At higher speeds, higher effort is provided to give a more firm, responsive steering feel.

The power steering system consists of these major components:

- Power Steering Pump
- Power Steering Gear
- Power Steering Fluid Reservoir
- Power Steering Fluid Supply Hose
- Power Steering Fluid Pressure Hose
- Power Steering Fluid Return Hose
- Power Steering Fluid Cooler

For information on the fluid cooler, reservoir and hoses, refer to POWER STEERING PUMP in this section.

OPERATION - POWER STEERING SYSTEM

Turning of the steering wheel is converted into lateral (side-to-side) travel through the meshing of the helical pinion teeth with the rack teeth within the steering gear. This lateral travel pushes and pulls the tie rods to change the direction of the vehicle's front wheels.

Power assist steering is provided by a belt-driven rotary type pump. It directs fluid through power steering hoses to the power steering gear where it is used to assist the driver's turning effort.

Manual steering control of the vehicle can be maintained if power steering assist is lost. However, under this condition, steering effort is significantly increased.

Refer to POWER STEERING GEAR for information on the operation of the speed-sensitive variable-effort power steering.

WARNING

WARNING: POWER STEERING FLUID, ENGINE COMPONENTS AND EXHAUST SYSTEM MAY BE EXTREMELY HOT IF ENGINE HAS BEEN RUNNING. DO NOT START ENGINE WITH ANY LOOSE OR DISCONNECTED HOSES OR DRIVE BELTS. DO NOT ALLOW HOSES TO TOUCH HOT EXHAUST MANIFOLD OR CATALYST.

CAUTION

CAUTION: During repair procedures requiring the power steering fluid hoses to be disconnected, cap all open ends of the hose connections. This will prevent the entry of foreign material into the components while the power steering hoses are disconnected.

STEERING (Continued)

CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the tire/wheel assembly needs to be reinstalled in the same location it is removed from or the TPM System (sensors) will need to be retrained. Mark each tire/wheel assembly indicating location, prior to its removal. If the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - POWER STEERING FLOW AND PRESSURE TEST

ALL ENGINES

The following procedure is to be used to test the operation of the power steering system on this vehicle. This test will provide the flow rate of the power steering pump along with the maximum relief pressure. This test is to be performed any time a power steering system problem is present to determine if the power steering pump or power steering gear is not functioning properly. The following flow and pressure test is performed using the Power Steering Analyzer Kit, Special Tool 6815 (Fig. 1), hoses, Special Tools 6905 and 6959, and fittings from adapter kit, Special Tool 6893.

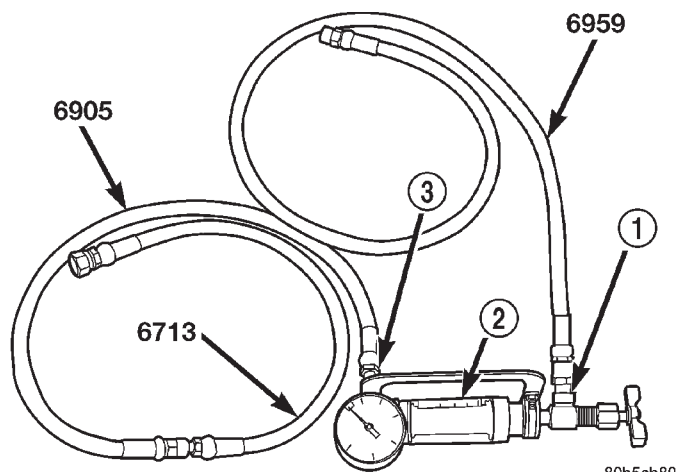


Fig. 1 Power Steering Analyzer With Hoses Installed

- 1 - OUTLET
2 - SPECIAL TOOL 6815
3 - INLET

(1) Assemble hoses on Power Steering Analyzer, Special Tool 6815, as shown. Install Pressure Hose, Special Tool 6905 (in 6893 kit), in the inlet fitting on Power Steering Analyzer. Install Pressure Hose, Special Tool 6713 (in 6815 kit) on Pressure Hose, Special Tool 6905. Install Pressure Hose, Special Tool 6959, in the outlet fitting on Power Steering Analyzer.

Install the following adapters from Adapter Set, Special Tool 6893 (Fig. 2), on the analyzer hose ends:

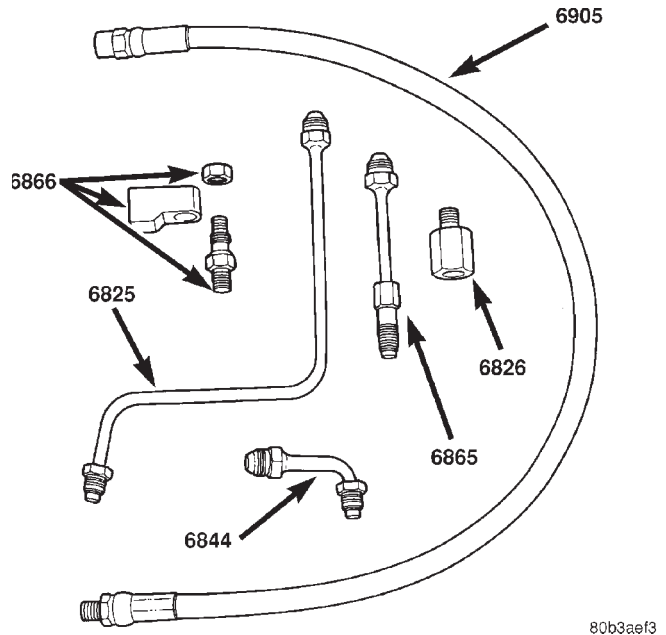


Fig. 2 Power Steering Analyzer Adapters 6893

- **2.7L engine** — Install Adapter Fitting, Special Tool 6844, on Pressure Hose, Special Tool 6713.
- **3.5L engine** — Install Adapter Fitting, Special Tool 6825, on Pressure Hose, Special Tool 6713.
- **All models** — Install Adapter Fitting, Special Tool 6826, on Pressure Hose, Special Tool 6959.

WARNING: TO PREVENT PERSONAL INJURY, SAFETY GOGGLES SHOULD BE WORN AT ALL TIMES WHEN PERFORMING ANY TEST PROCEDURES ON THE POWER STEERING PUMP OR POWER STEERING GEAR.

The following procedure is to be used to test the operation of the power steering system on the vehicle.

- (2) Check belt tension and adjust as necessary.

NOTE: On vehicles with 3.5 liter engines, it may be easier to access the power steering pump pressure fitting from the bottom of the vehicle engine compartment.

- (3) Disconnect the power steering fluid pressure hose from the power steering pump (Fig. 3) (Fig. 4).
- (4) **2.7L engine** — Connect Adapter Fitting, Special Tool 6844 (Fig. 5), attached to pressure hose from inlet (gauge end) of Power Steering Analyzer to the pressure fitting on the power steering pump.
- (5) **3.5L engine** — Connect Adapter Fitting, Special Tool 6825 , attached to pressure hose from inlet (gauge end) of Power Steering Analyzer to the pressure fitting on the power steering pump (Fig. 6).

STEERING (Continued)

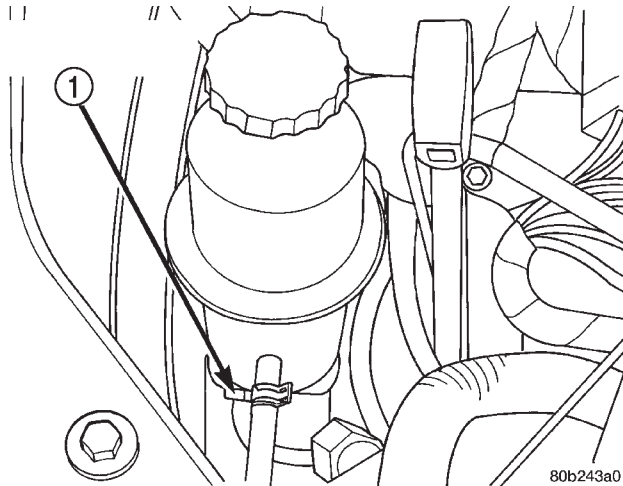


Fig. 3 Pressure Hose Connection To Power Steering Pump (2.7L Engine)

1 - POWER STEERING FLUID PRESSURE HOSE

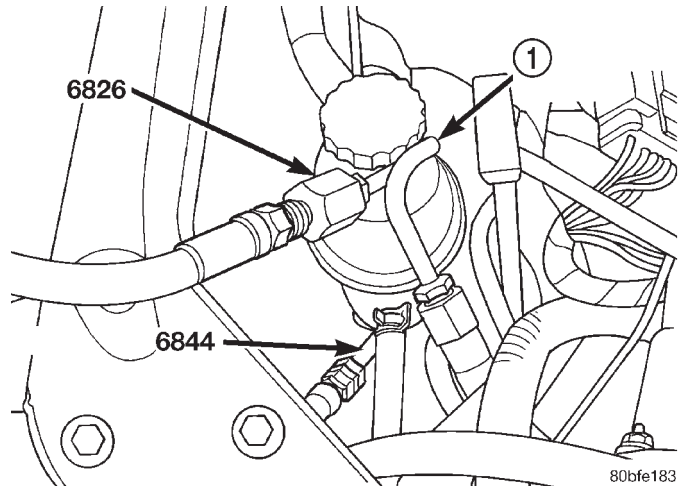


Fig. 5 Analyzer Connected To Power Steering Pump (2.7L Engine)

1 - POWER STEERING FLUID PRESSURE HOSE

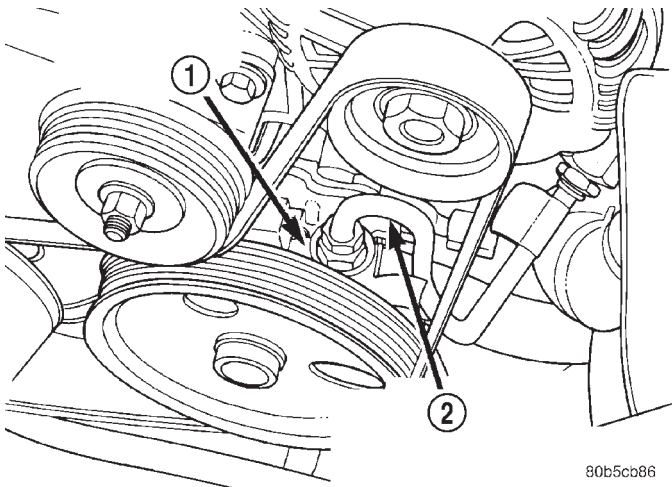


Fig. 4 Pressure Hose Connection To Power Steering Pump (3.5L Engine)

1 - POWER STEERING PUMP
2 - POWER STEERING FLUID PRESSURE HOSE

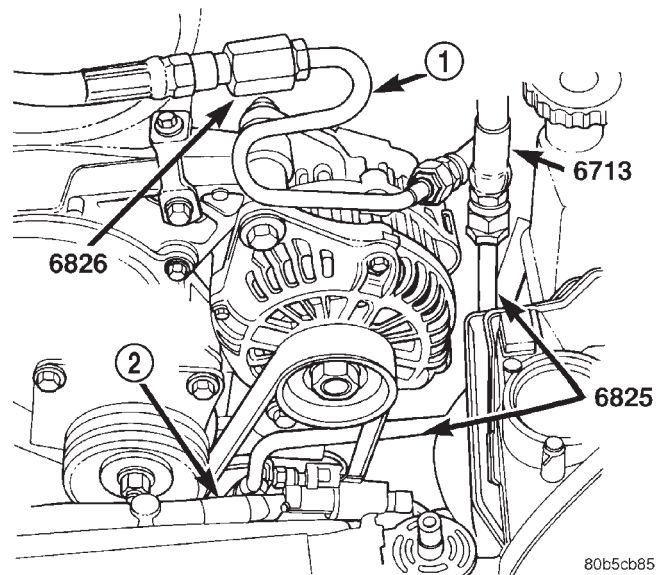


Fig. 6 Analyzer Connected To Power Steering Pump (3.5L Engine)

1 - POWER STEERING PRESSURE HOSE
2 - POWER STEERING PUMP

(6) Connect vehicle power steering fluid pressure hose to Adapter Fitting, Special Tool 6826, which should be already installed in the outlet hose (valve end) of Power Steering Analyzer.

(7) Completely open valve on Power Steering Analyzer.

(8) Start engine and let idle long enough to circulate power steering fluid through the analyzer and hoses, until the air is out of the fluid. Shut off engine.

(9) Check power steering fluid level and add fluid as necessary. Start engine again and let idle.

(10) Gauge should read below 862 kPa (125 psi), if above, inspect the hoses for restrictions and repair as necessary. The initial pressure should be in the range of 345-862 kPa (50-125 psi).

CAUTION: The following test procedure involves testing maximum pump pressure output and flow control valve operation. Do not leave valve closed for more than five seconds as the pump could be damaged.

(11) Close valve fully three times and record highest pressure indicated each time. **All three readings must be above specifications and within 345 kPa (50 psi) of each other.**

STEERING (Continued)

NOTE: Power steering pump maximum relief pressure is 8275 to 8975 kPa (1250 to 1350 psi.).

- Power steering pump pressures above specifications but not within 345 kPa (50 psi) of each other, replace pump.
- Pressures within 345 kPa (50 psi) of each other but below specifications, replace pump.

CAUTION: Do not force the pump to operate against the stops for more than 2 to 4 seconds at a time because, pump damage will result.

(12) Completely open the valve on the Power Steering Analyzer. Turn the steering wheel to the extreme left until the stop in the steering gear is met, then turn the steering wheel to the right until the right stop is met. Record the highest indicated pressure at each position. Compare the recorded readings to the specifications. If the highest recorded output pressure reading against one stop is not within 345 kPa (50 psi) of the highest recorded reading at the other stop, the steering gear is leaking internally and must be replaced.

DIAGNOSIS AND TESTING - STEERING DIAGNOSIS CHARTS

NOTE: There are three diagnosis charts following that cover **POWER STEERING NOISE**, **STEERING WHEEL FEEL**, and **POWER STEERING FLUID**.

POWER STEERING NOISE

CONDITION	POSSIBLE CAUSES	CORRECTION
OBJECTIONABLE HISS OR WHISTLE*	<ol style="list-style-type: none"> 1. Damaged or mispositioned steering column shaft/coupling dash panel seal. 2. Noisy valve in power steering gear. 	<ol style="list-style-type: none"> 1. Reposition or replace steering column shaft/coupling dash panel seal. 2. Replace power steering gear.
RATTLE OR CLUNK	<ol style="list-style-type: none"> 1. Power steering gear loose on front suspension crossmember. 2. Front suspension crossmember mounting fasteners loose at frame. 3. Loose tie rod (outer or inner). 4. Loose lower control arm mounting bolts at front suspension crossmember. 5. Lower control arm pivot bushing worn. 6. Lower control arm tension strut bushing worn. 7. Loose strut assembly mounting fasteners at tower. 8. Power steering fluid pressure hose touching the body of the vehicle. 9. Internal power steering gear noise. 10. Damaged front suspension crossmember. 11. Stabilizer bar link ball joints worn. 	<ol style="list-style-type: none"> 1. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque. 2. Tighten the front suspension crossmember mounting fasteners to the specified torque. 3. Check tie rod pivot points for wear. Replace worn/loose parts as required. 4. Tighten control arm mounting bolts to the specified torques. 5. Replace lower control arm pivot bushing. 6. Replace lower control arm tension strut bushing. 7. Tighten strut assembly fasteners to the specified torque. 8. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing. 9. Replace power steering gear. 10. Replace front suspension crossmember. 11. Replace stabilizer bar link.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
POPPING NOISE	1. Worn outer tie rod.	1. Replace outer tie rod.
CHIRP OR SQUEAL (POWER STEERING PUMP)	1. Loose power steering pump drive belt.	1. Check and adjust power steering pump drive belt to specifications. Replace belt if worn or glazed.
WHINE OR GROWL (POWER STEERING PUMP)**	1. Low fluid level. 2. Power steering hose touching vehicle body or frame. 3. Extreme wear of power steering pump internal components. 4. Loose power steering pump drive belt. 5. Extremely cold temperatures below -18°C (0°F).	1. Fill power steering fluid reservoir to proper level and check for leaks (make sure all air is bled from the system fluid). 2. Adjust hose to proper position by loosening, repositioning, and tightening fitting to specified torque. Do not bend tubing. Replace hose if damaged. 3. Replace power steering pump and flush system as necessary. 4. Check and adjust power steering pump drive belt to specifications. Replace belt if worn or glazed. 5. Noise is typical when starting vehicle in extremely cold temperature. Normal duration of noise at start-up is less than one minute. If noise persists for extended time, verify proper fluid level. If fluid is low, inspect for leaks.
SUCKING AIR SOUND	1. Loose clamp on power steering fluid return hose. 2. Missing O-Ring on power steering hose connection. 3. Low power steering fluid level. 4. Air leak between power steering fluid reservoir and power steering pump.	1. Tighten or replace hose clamp. 2. Inspect connection and replace O-Ring as required. 3. Fill power steering fluid reservoir to proper level and check for leaks. 4. Replace power steering pump (with reservoir).
SQUEAK OR RUBBING SOUND	1. Steering column shroud rubbing. 2. Steering column shaft rubbing. 3. Clockspring noisy. 4. Steering gear internally noisy.	1. Realign shrouds as necessary. 2. Move or realign item rubbing shaft. 3. Remove clockspring. Reinstall wheel. If noise is gone, replace clockspring. 4. Replace steering gear.
SCRUBBING OR KNOCKING NOISE.	1. Incorrect tire or wheel size. 2. Interference between steering gear and other vehicle components. 3. Steering gear internal stops worn excessively allowing tires to be steered excessively far.	1. Replace incorrect size tire or wheel with size used as original equipment. 2. Check for bent or misaligned components and correct as necessary. 3. Replace steering gear.

STEERING (Continued)

* **NOTE:** There is some noise in all power steering systems. One of the most common is a hissing sound evident when turning the steering wheel when at a standstill or when parking and the steering wheel is at the end of its travel. Hiss is a very high frequency noise similar to that experienced while slowly closing a water tap. The noise is present in every valve and results when high veloc-

ity fluid passes valve orifice edges. There is no relationship between this noise and the performance of the steering system.

** **NOTE:** Power steering pump growl results from the development of high pressure fluid flow. Normally this noise level should not be high enough to be objectionable.

STEERING WHEEL FEEL

CONDITION	POSSIBLE CAUSES	CORRECTION
STEERING WHEEL/ COLUMN CLICKING, CLUNKING OR RATTLING.	1. Loose steering coupling pinch bolt. 2. Steering column bearings.	1. Replace pinch bolt and torque to specifications. 2. Replace steering column.
STEERING WHEEL HAS FORE AND AFT LOOSENESS.	1. Steering wheel retaining nut not properly tightened and torqued. 2. Steering column lower bearing spring retainer slipped on steering column shaft.	1. Tighten the steering wheel retaining nut to its specified torque. 2. Replace steering column.
STEERING WHEEL OR DASH VIBRATES DURING LOW SPEED OR STANDSTILL STEERING MANEUVERS.	1. Air in the fluid of the power steering system. 2. Tires not properly inflated. 3. Excessive engine vibration. 4. Loose tie rod end jam nut. 5. Overcharged air conditioning system.	1. Bleed air from system following the power steering pump initial operation service procedure.* 2. Inflate tires to the specified pressure. 3. Ensure that the engine is running properly. 4. Tighten the inner to outer tie rod jam nut to the specified torque. 5. Check air conditioning pump head pressure and correct as necessary.
STEERING CATCHES, STICKS IN CERTAIN POSITIONS OR IS DIFFICULT TO TURN.	1. Low power steering fluid level. 2. Tires not inflated to specified pressure. 3. Lack of lubrication in front suspension control arm ball joints. 4. Worn lower control arm ball joint. 5. Lack of lubrication in steering gear outer tie rod ends.	1. Fill power steering fluid reservoir to specified level and check for leaks. 2. Inflate tires to the specified pressure. 3. Lubricate ball joints if ball joints are not a lubricated-for-life type ball joint. If ball joint is a lubricated-for-life ball joint, replace ball joint or control arm. 4. Replace lower control arm. 5. Lubricate tie rod ends if they are not a lubricated-for-life type. If tie rod end is a lubricated-for-life type, replace tie rod end.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	6. Loose power steering pump drive belt. 7. Faulty power steering pump flow control (Follow Power Steering System Flow and Pressure Test procedure). 8. Excessive friction in steering column or intermediate shaft/coupler. 9. Binding lower control arm ball joint. 10. Excessive friction in power steering gear. 11. Worn/binding seat and bearing in front strut assembly.	6. Tighten the power steering pump drive belt to specifications. If drive belt is worn or glazed, replace belt. 7. Replace power steering pump. 8. Isolate and correct condition. 9. Replace the lower control arm. 10. Replace power steering gear. 11. Replace seat and bearing in front strut assembly.
STIFF, HARD TO TURN, SURGE, MOMENTARY INCREASE IN EFFORT WHEN TURNING.	1. Tires not properly inflated. 2. Low power steering fluid level. 3. Loose power steering pump drive belt. 4. Lack of lubrication in lower control arm ball joints. 5. Low power steering pump pressure (Follow Power Steering System Flow and Pressure Test procedure). 6. High internal leak in power steering gear (Follow Power Steering System Flow and Pressure Test procedure).	1. Inflate tires to specified pressure. 2. Add power steering fluid as required to power steering fluid reservoir to obtain proper level. Check for leaks. 3. Tighten the power steering pump drive belt to specifications. If drive belt is worn or glazed, replace belt. 4. Lubricate ball joints if ball joints are not a lubricated-for-life type ball joint. If ball joint is a lubricated-for-life ball joint, replace lower control arm. 5. Replace the power steering pump as necessary. 6. Replace power steering gear.
STEERING WHEEL DOES NOT RETURN TO CENTER POSITION.	1. Tires not inflated properly. 2. Improper front wheel alignment. 3. Lack of lubrication/binding in front lower control arm ball joints.	1. Inflate tires to specified pressure. 2. Check and adjust wheel alignment as necessary. 3. Lubricate ball joints if ball joints are not a lubricated for life type of ball joint, then inspect ball joint for wear, replace lower control arm as necessary. If ball joint is a lubricated for life ball joint, replace lower control arm.

STEERING (Continued)

CONDITION	POSSIBLE CAUSES	CORRECTION
	4. Steering column coupling joints misaligned. 5. Steering wheel rubbing.** 6. Damaged, mis-positioned or un-lubricated steering column coupler to dash seal.** 7. Binding seat and bearing in front strut assembly. 8. Tight shaft bearing in steering column. 9. Excessive friction in steering column coupling. 10. Excessive friction in power steering gear.	4. Realign steering column coupling joints. 5. Adjust steering column shrouds to eliminate rubbing condition. 6. Replace, reposition, or lubricate dash seal. 7. Replace seat and bearing in front strut assembly. 8. Replace the steering column. 9. Replace steering column coupling. 10. Replace power steering gear.
EXCESSIVE STEERING WHEEL KICKBACK OR TOO MUCH STEERING WHEEL FREE PLAY.	1. Air in the fluid of the power steering system. 2. Power steering gear loose on crossmember. 3. Power steering gear housing isolator bushings worn. 4. Steering column coupling or intermediate shaft worn, broken or loose. 5. Free play in steering column. 6. Worn lower control arm ball joints. 7. Loose steering knuckle-to-ball joint stud pinch bolt. 8. Front wheel bearing loose or worn. 9. Loose outer tie rod end. 10. Worn inner tie rod bushing. 11. Defective steering gear rotary valve.	1. Bleed air from system following the the power steering pump initial operation service procedure.* 2. Inspect power steering gear mounting bolts. Replace as necessary. Tighten to the specified torque. 3. Replace power steering gear housing isolator bushings. 4. Replace steering column coupling or intermediate shaft. 5. Check all components of the steering column and repair or replace as required. 6. Replace lower control arm as required. 7. Inspect pinch bolt, replace as necessary, and tighten to specified torque. 8. Replace hub and bearing or knuckle as necessary. 9. Replace outer tie rod end that has excessive free play. 10. Replace inner tie rod. 11. Replace power steering gear.

* NOTE: Steering shudder can be expected in new vehicles and vehicles with recent steering system repairs. Shudder should dissipate after the vehicle has been driven several weeks.

STEERING (Continued)

**** NOTE:** To evaluate this condition, it may be necessary to disconnect the coupling at the base of the steering column. Turn the steering wheel and feel or listen for internal rubbing in steering column. To avoid damaging the column clockspring, note the following. Before disconnecting coupling, place tires in the straight-ahead position and center steering wheel. Once disconnected, **DO NOT** rotate

steering wheel more than one revolution in either direction and place steering wheel in original location before reconnecting coupling. If this position is lost, the steering column clockspring must be recentered following the procedure found within the procedure for steering column installation in the steering column section.

POWER STEERING FLUID

CONDITION	POSSIBLE CAUSES	CORRECTION
LOW FLUID LEVEL WITH VISIBLE LEAK.	1. Loose power steering hose fittings. 2. Damaged or missing fitting seal, gasket, or O-ring. 3. Power steering fluid cooler leaking. 4. Power steering pump or power steering gear leaking.	1. Tighten the fitting to its specified torque. 2. Replace as necessary. 3. Replace power steering fluid cooler. 4. Repair or replace the leaking component as required.
AERATED FLUID.	1. Low fluid level.* 2. Air leak between power steering fluid reservoir and pump. 3. Cracked power steering pump housing.	1. Fill power steering fluid reservoir to proper level. 2. Inspect for proper sealing. Replace the power steering pump (with reservoir). 3. Replace the power steering pump.
RESERVOIR FLUID OVERFLOW AND FLUID THAT IS MILKY IN COLOR	1. Water contamination.	1. Drain the power steering fluid from the system. Flush the system with fresh clean power steering fluid, drain, then refill to the proper level.

* **NOTE:** Extremely cold temperatures may cause power steering fluid aeration if the power steering fluid level is low.

DIAGNOSIS AND TESTING - SPEED PROPORTIONAL POWER STEERING

Electronic diagnosis of the variable-effort speed-proportional power steering system is done using the DRBIII® scan tool. Refer to Appropriate Diagnostic Information to properly test and diagnosis this steering system.

SPECIFICATIONS

POWER STEERING FASTENER TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Gear Mounting Bolts	58	43	—
Hose Tube Nuts	47	35	—
Pump Discharge Fitting	84	62	—
Pump Mounting Bolts	28	21	250
Reservoir Mounting bolt - 2.7L Pulley Side	13	10	115
Reservoir Mounting bolts - 2.7L Rear	24	18	212
Reservoir Mounting Screws - 3.5L	12	9	105
Tie Rod Adjuster Pinch bolt	38	28	—
Tie Rod Steering Arm Nut	37	27	—
Tie Rod Steering Gear Bolt	100	74	—

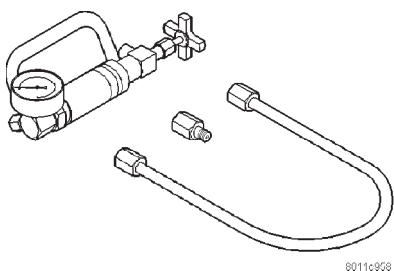
STEERING (Continued)

STEERING COLUMN FASTENER TORQUE

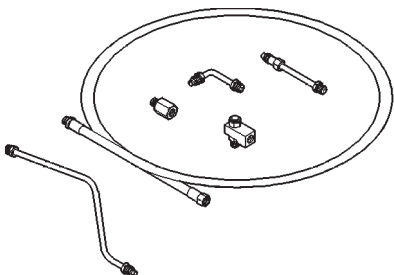
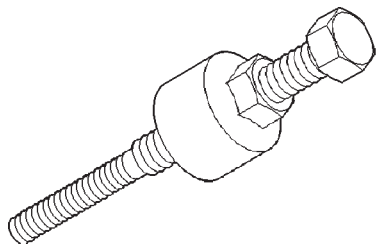
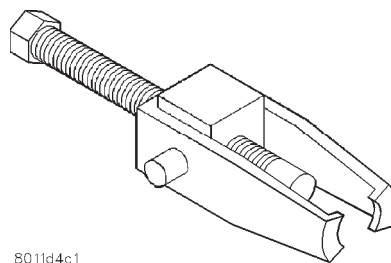
DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Airbag Module Mounting Bolts	8	—	75
Speed Control Switch Screws	1.5	—	13
Steering Column Coupler Pinch Bolt	27	20	240
Steering Column Mounting Bolts	12	—	105
Steering Column Mounting Nuts	12	—	105
Steering Wheel Retaining Nut	61	45	—

SPECIAL TOOLS

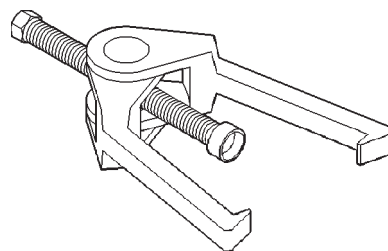
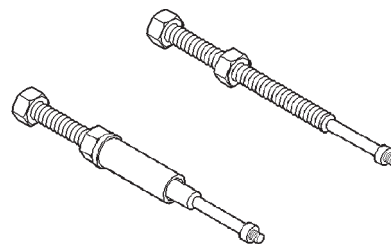
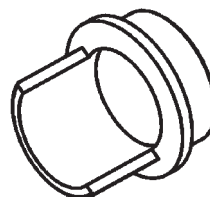
POWER STEERING



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Power Steering Analyzer 6815**Adapters, Power Steering Analyzer 6893****Installer C-4063B**

8011d4c1

Puller C-4333**Puller C-3894-A****Remover/Installer, Steering Shaft Roll Pin 6831A****Remover/Installer, Bushing 8523**

COLUMN

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COLUMN

DESCRIPTION

This vehicle uses a tilt-type steering column (Fig. 1) . Two styles are available, one is for floor shift vehicles and the other is for column shift vehicles.

The steering column used on this vehicle (Fig. 1) , has been designed to be serviced as an assembly; less wiring, switches, clockspring, gear shift lever, shift ignition interlock, brake interlock solenoid (column shift only), shrouds and steering wheel. These components can be serviced without removing the steering column from the vehicle.

BRAKE TRANSMISSION SHIFT INTERLOCK SOLENOID

Column shift vehicles have a brake transmission shift interlock (BTSI) solenoid mounted on the steering column. The BTSI solenoid works in conjunction with the brake lamp switch and will not allow the steering column shift lever to be moved out of the PARK position without the brake pedal being applied. For Description And Operation, Diagnosis And Testing, and Removal And Installation information, refer to the Transaxle section in this service manual.

OPERATION

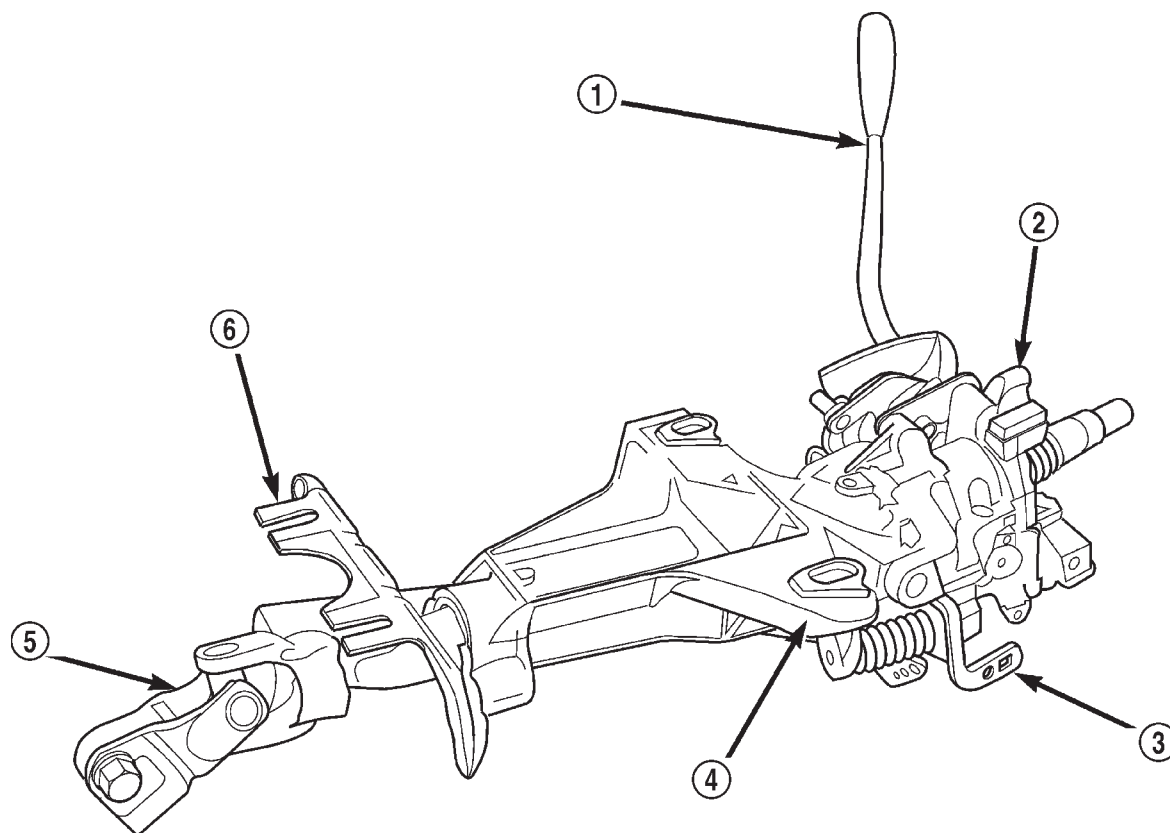
Turning of the steering wheel mounted to the column shaft, is transferred down the shaft, through the upper coupler and intermediate shaft to the power steering gear pinion shaft. The gear then moves the front strut assemblies steering the vehicle.

WARNING

WARNING: BEFORE BEGINNING ANY SERVICE PROCEDURES THAT INVOLVES REMOVING THE AIR BAG. REMOVE AND ISOLATE THE NEGATIVE (-) BATTERY CABLE (GROUND) FROM THE VEHICLE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIR BAG SYSTEM. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIR BAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: WHEN AN UNDEPLOYED AIRBAG MODULE IS TO BE REMOVED FROM THE STEERING WHEEL, DISCONNECT BATTERY GROUND CABLE AND ISOLATE. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR A MINIMUM OF TWO MINUTES, THEN BEGIN AIRBAG REMOVAL.

COLUMN (Continued)



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Fig. 1 Steering Column

- 1 - SHIFT LEVER (COLUMN SHIFT ONLY)
- 2 - TILT HOUSING
- 3 - TILT LEVER

- 4 - STEERING COLUMN MOUNTING BRACKET
- 5 - STEERING COLUMN COUPLER
- 6 - STEERING COLUMN LOWER MOUNTING BRACKET

WARNING: THE AIR BAG SYSTEM IS A SENSITIVE, COMPLEX ELECTRO-MECHANICAL UNIT. BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL THE AIR BAG SYSTEM COMPONENTS YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL DEPLOYMENT OF THE AIR BAG AND POSSIBLE PERSONAL INJURY. THE FASTENERS, SCREWS, AND BOLTS, ORIGINALLY USED FOR THE AIR BAG COMPONENTS, HAVE SPECIAL COATINGS AND ARE SPECIFICALLY DESIGNED FOR THE AIR BAG SYSTEM. THEY MUST NEVER BE REPLACED WITH ANY SUBSTITUTES. ANYTIME A NEW FASTENER IS NEEDED, REPLACE WITH THE CORRECT FASTENERS PROVIDED IN THE SERVICE PACKAGE OR FASTENERS LISTED IN THE PARTS BOOKS. BEFORE SERVICING A STEERING COLUMN EQUIPPED WITH AN AIR BAG, (Refer to 8 - ELECTRICAL/RESTRAINTS - WARNING)

WARNING: WHEN HANDLING AN UNDEPLOYED AIRBAG MODULE DURING SERVICING OF THE STEERING COLUMN THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED. AT NO TIME SHOULD ANY SOURCE OF ELECTRICITY BE PERMITTED NEAR THE INFLATOR ON THE BACK OF THE AIRBAG MODULE. WHEN CARRYING A LIVE MODULE, THE TRIM COVER SHOULD BE POINTED AWAY FROM THE BODY TO MINIMIZE INJURY IF MODULE ACCIDENTLY DEPLOYS. IF AIRBAG MODULE IS PLACED ON A BENCH OR OTHER SURFACE, PLASTIC COVER SHOULD BE FACE UP TO MINIMIZE MOVEMENT IN CASE OF ACCIDENTAL DEPLOYMENT.

WARNING: SAFETY GOGGLES SHOULD BE WORN AT ALL TIMES WHEN WORKING ON STEERING COLUMNS.

COLUMN (Continued)

CAUTION

CAUTIONS

CAUTION: Disconnect the negative (ground) cable from the battery, before servicing any column component.

CAUTION: Do not attempt to remove the pivot pins to disassemble the tilting mechanism. Damage will occur.

DIAGNOSIS AND TESTING - STEERING COLUMN

For diagnosis of conditions relating to the steering column, refer to the steering system diagnosis charts at the beginning of Steering.

The steering column **MUST** be replaced whenever any of the following conditions exist:

- Whenever a vehicle is involved in a collision which deploys the air bag, regardless of the extent of damage done to the vehicle.
- If a vehicle is involved in an impact of the vehicle's front suspension or undercarriage, which results in any type of damage to the front suspension cross-member.
- Under any conditions which result in the steering column assembly or steering column shaft receiving a force great enough to move the steering column or shaft forward or rearward in the vehicle.

REMOVAL - STEERING COLUMN

NOTE: This procedure is to be used when replacing the steering column. It is written to reflect that objective. If the column is to be removed as one assembly, or without removing the steering wheel, the steering wheel must be turned from the straight ahead position to the **RIGHT** 180° and locked in place. Lock the column in this position by removing the key from the key cylinder. This **MUST** be performed before the steering coupler to the gear is disconnected. This is done to prevent the chance of damaging the clockspring. When reconnecting the steering coupler to the intermediate shaft, verify the front wheels have not moved from their position when column was removed. If during column reinstallation, any doubt is present as to whether the clockspring is properly centered, the clockspring centering procedure in step Step 19 **MUST** be performed prior to connecting the steering coupler.

(1) Remove remote ground cable from ground stud on shock tower and isolate ground cable from vehicle by installing isolator on stud (Fig. 2).

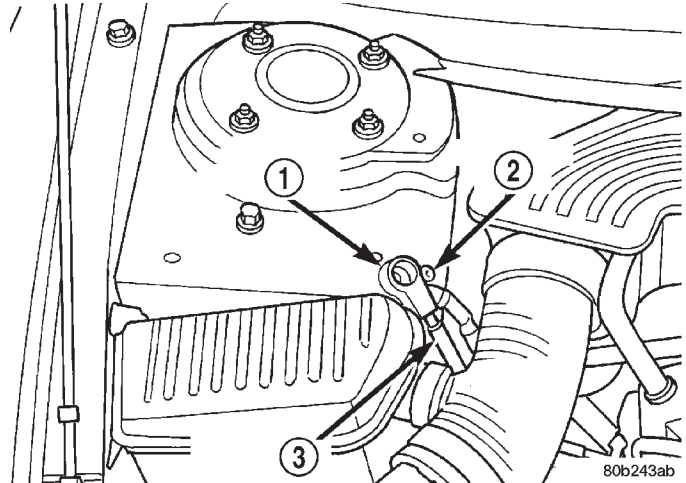


Fig. 2 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
2 - GROUND STUD
3 - GROUND CABLE

(2) Remove the fuse panel cover from the left end of the instrument panel (Fig. 3).

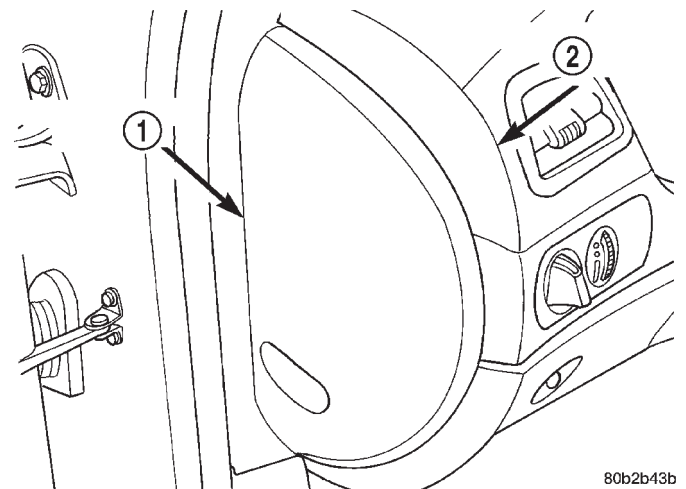


Fig. 3 Fuse Panel Cover

- 1 - FUSE PANEL COVER
2 - INSTRUMENT PANEL

(3) Remove the 2 screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel (Fig. 4).

(4) Remove the lower instrument panel cover. The lower instrument panel cover is attached by retaining clips along the top and right edge.

(5) Remove the wiring harness connector from the trunk release switch in the lower instrument panel cover (Fig. 5).

(6) Remove the parking brake release cable, from the park brake release handle in the lower instrument panel cover (Fig. 6).

COLUMN (Continued)

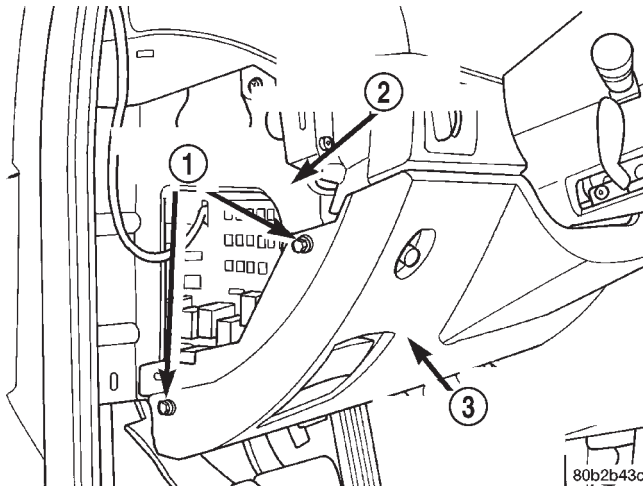


Fig. 4 Lower Instrument Panel Cover Mounting Screws

- 1 - MOUNTING SCREWS
- 2 - INSTRUMENT PANEL BRACKET
- 3 - LOWER INSTRUMENT PANEL COVER

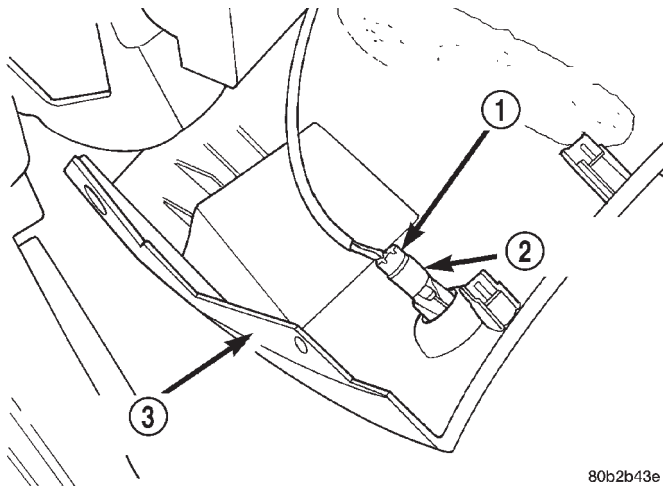


Fig. 5 Trunk Release Wiring

- 1 - WIRING HARNESS CONNECTOR
- 2 - TRUNK RELEASE SWITCH
- 3 - LOWER INSTRUMENT PANEL COVER

(7) Remove the 4 bolts (Fig. 7) mounting the reinforcement (Fig. 7) to the instrument panel. Remove the reinforcement from the instrument panel. Remove the diagnostic connector (Fig. 8) from the reinforcement.

(8) Before beginning removal of steering column assembly from vehicle, be sure front wheels of vehicle are in the STRAIGHT-AHEAD position.

CAUTION: When removing the steering wheel, use care not to damage the steering wheel finish. The wood grain on some steering wheels can be easily marred.

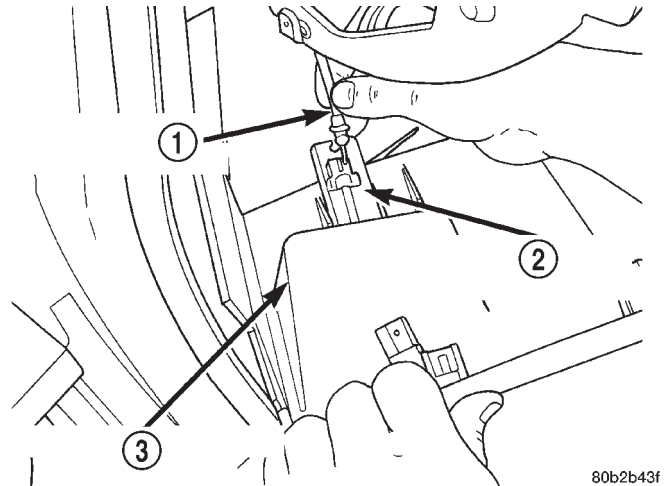


Fig. 6 Park Brake Release Cable

- 1 - PARK BRAKE RELEASE CABLE
- 2 - PARK BRAKE RELEASE HANDLE
- 3 - LOWER INSTRUMENT PANEL COVER

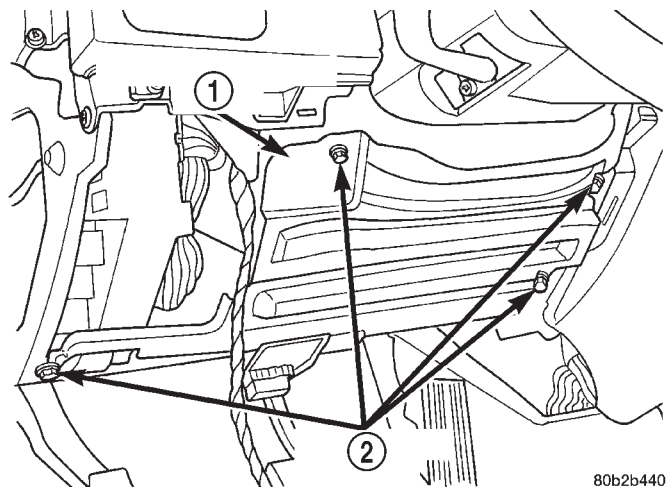


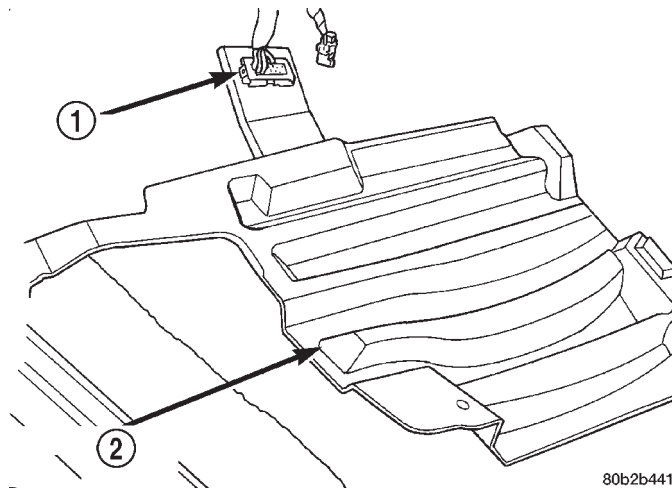
Fig. 7 Reinforcement Panel

- 1 - REINFORCEMENT PANEL
- 2 - MOUNTING BOLTS

(9) Remove the speed control switches (Fig. 9) from the steering wheel. The speed control switches are mounted to the steering wheel by two screws (one screw, each switch) which are accessible from the back side of the steering wheel.

WARNING: WHEN AN UNDEPLOYED AIRBAG IS TO BE REMOVED FROM THE STEERING WHEEL, DISCONNECT BATTERY GROUND CABLE AND ISOLATE. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR TWO MINUTES, THEN BEGIN AIRBAG REMOVAL.

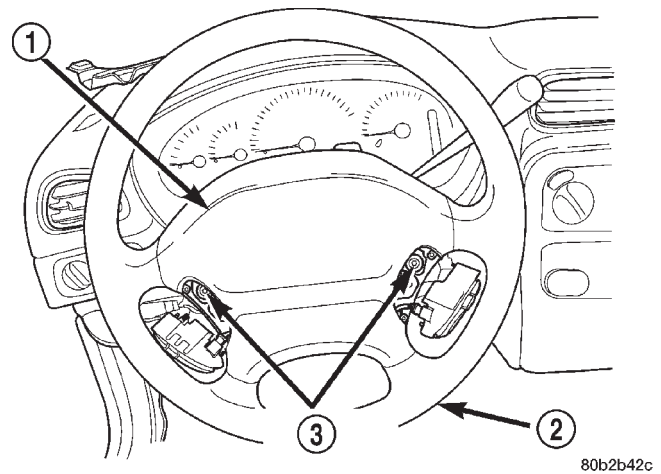
COLUMN (Continued)



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Fig. 8 Diagnostic Connector

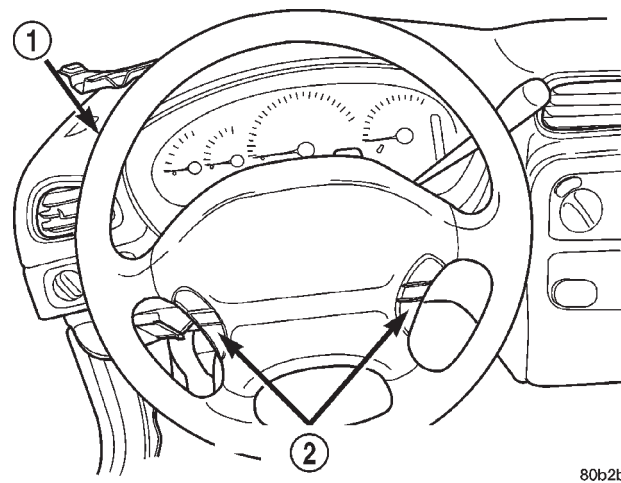
- 1 - DIAGNOSTIC CONNECTOR
- 2 - REINFORCEMENT PANEL



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Fig. 10 Driver Airbag Attaching Bolts

- 1 - DRIVER AIRBAG
- 2 - STEERING WHEEL
- 3 - MOUNTING SCREWS



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Fig. 9 Speed Control Switches

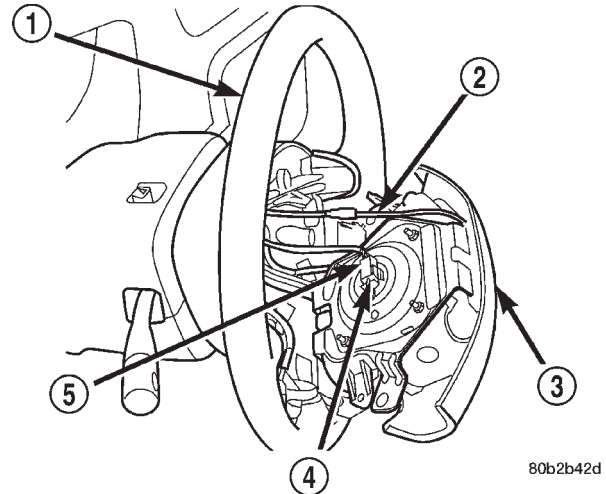
- 1 - STEERING WHEEL
- 2 - SPEED CONTROL SWITCHES

WARNING: WHEN HANDLING AN UNDEPLOYED AIRBAG DURING SERVICE OF THE STEERING COLUMN, THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED. AT NO TIME SHOULD ANY SOURCE OF ELECTRICITY BE PERMITTED NEAR THE INFLATOR ON THE BACK OF THE AIRBAG MODULE. WHEN CARRYING A LIVE MODULE, THE TRIM COVER SHOULD BE POINTED AWAY FROM THE BODY TO MINIMIZE INJURY IF MODULE ACCIDENTLY DEPLOYS. IF AIRBAG MODULE IS PLACED ON A BENCH OR OTHER SURFACE, PLASTIC COVER SHOULD BE FACE UP TO MINIMIZE MOVEMENT IN CASE OF ACCIDENTAL DEPLOYMENT.

(10) Remove the 2 bolts attaching the driver airbag to the steering wheel (Fig. 10).

(11) Remove the driver airbag from the steering wheel.

(12) Disconnect the electrical connector from the back of the airbag (Fig. 11). Connector is removed by pulling it straight out of the airbag. Do not twist the connector when removing it from the airbag.



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Fig. 11 Driver Airbag Electrical Connections

- 1 - STEERING WHEEL
- 2 - HORN SWITCH WIRE
- 3 - DRIVER AIRBAG
- 4 - CONNECTOR LOCK
- 5 - AIRBAG ELECTRICAL CONNECTOR

(13) Remove the horn switch wire from the clockspring horn wire (Fig. 11).

(14) If optional audio control switches are present on the rear of the steering wheel, disconnect the 4-way connector between the clockspring and steering wheel wiring harness.

COLUMN (Continued)

(15) Remove the steering wheel attaching nut from the steering column shaft (Fig. 12).

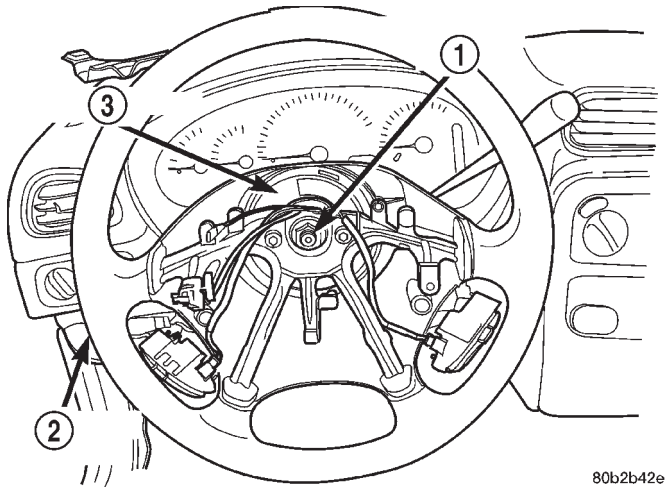


Fig. 12 Steering Wheel Attaching Nut

- 1 - ATTACHING NUT
- 2 - STEERING WHEEL
- 3 - CLOCKSPrING

CAUTION: When installing wheel puller on steering wheel, be sure puller bolts are fully seated in the threaded holes in the steering wheel. If bolts are not fully seated in the threaded holes, threads may be stripped out when removing the steering wheel.

(16) Install puller on steering wheel as shown (Fig. 13).

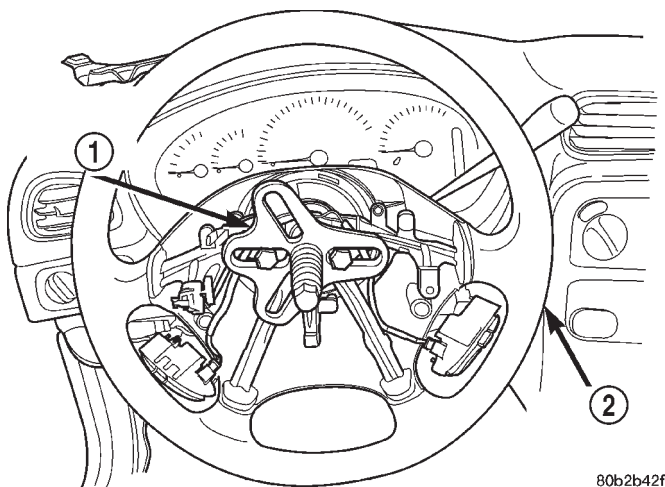


Fig. 13 Puller Installed On Steering Wheel

- 1 - STEERING WHEEL PULLER
- 2 - STEERING WHEEL

CAUTION: Do not bump or hammer on steering wheel or steering column shaft when removing steering wheel from steering column.

(17) Remove steering wheel from steering column shaft.

NOTE: The upper shroud on this steering column is retained to the steering column by a snap fit to the lower shroud. When removing the upper shroud from the steering column lower shroud, **DO NOT** use a hard or sharp tool. This will damage the shrouds. If a tool must be used, use a soft tool such as a trim stick.

(18) Remove the steering column upper shroud from the steering column using the following procedure. First, on the right seam between the upper and lower shrouds, push in on seam at the forward end. When the upper shroud unsnaps, pull the upper shroud upward away from the lower. Repeat this procedure on the opposite side of the column to release the upper shroud from the lower. Remove the upper shroud from the steering column.

(19) Remove the tilt lever (Fig. 14) from the steering column.

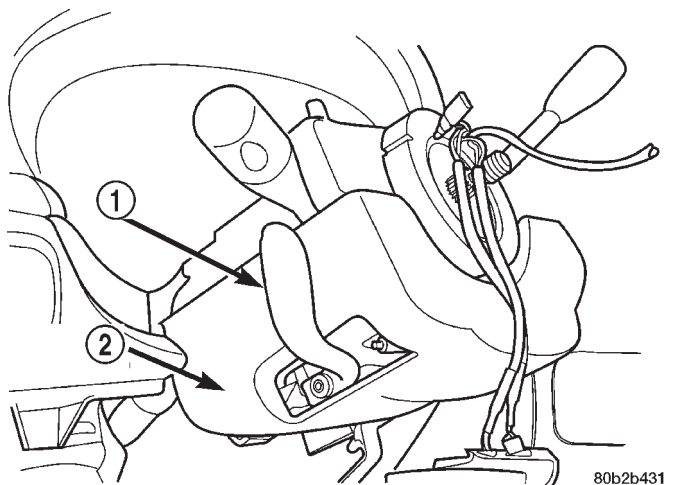


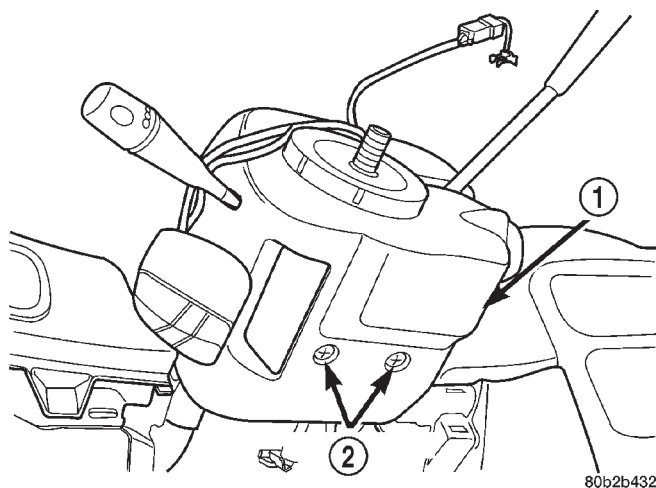
Fig. 14 Tilt Lever

- 1 - TILT LEVER
- 2 - LOWER SHROUD

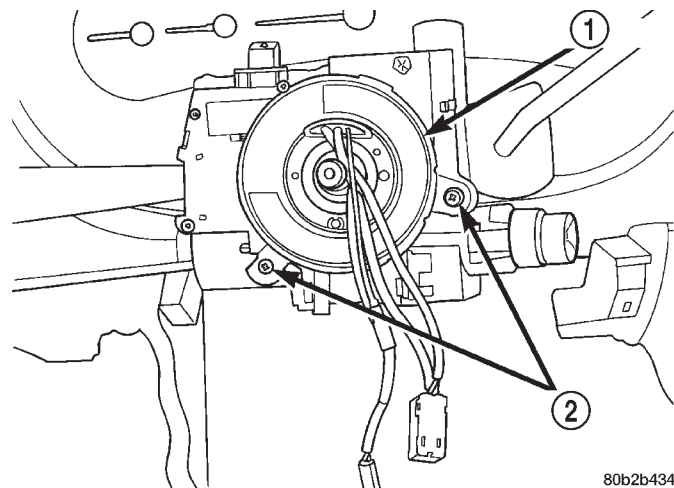
(20) Remove the two screws attaching the lower shroud to the steering column (Fig. 15). Remove the lower shroud from the steering column.

(21) Remove the wiring harness connectors from the clockspring (Fig. 16).

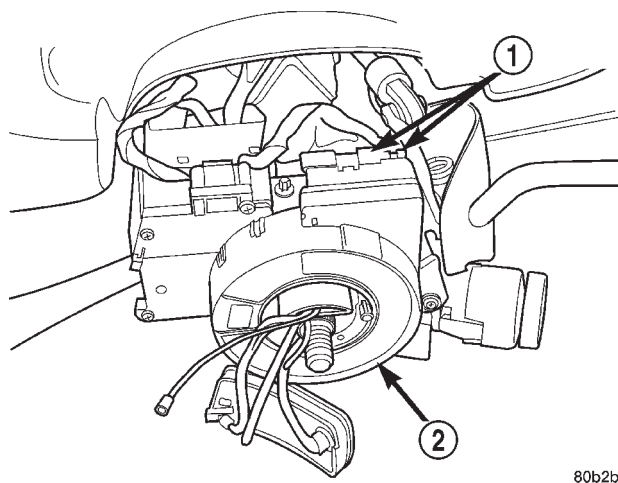
COLUMN (Continued)

**Fig. 15 Lower Shroud Attaching Screws**

- 1 - LOWER SHROUD
2 - MOUNTING SCREWS

**Fig. 17 Clockspring Location**

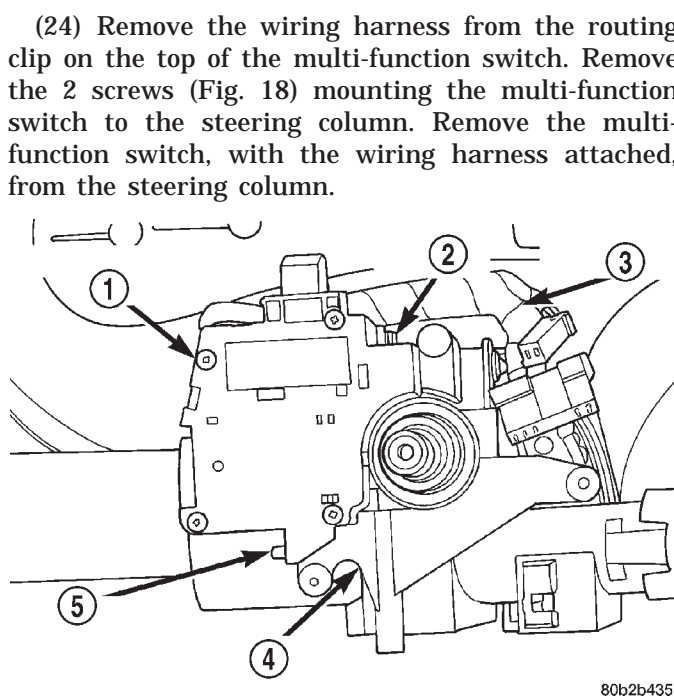
- 1 - CLOCKSPRING
2 - MOUNTING SCREWS

**Fig. 16 Wiring Harness Connection To Clock Spring**

- 1 - WIRING HARNESS CONNECTORS
2 - CLOCKSPRING

(22) Remove the two screws (Fig. 17) mounting the clockspring to the steering column. Remove the clockspring from the steering column.

(23) Disconnect the wire harness connector at the SKIM module. Remove the mounting screw and unclip the module from the key cylinder halo bezel.

**Fig. 18 Multi-Function Switch**

- 1 - MULTIFUNCTION SWITCH
2 - MOUNTING SCREW
3 - WIRING HARNESS
4 - STEERING COLUMN
5 - MOUNTING SCREW

COLUMN (Continued)

(25) Remove the 2 screws (Fig. 19) mounting the ignition switch to the steering column. Remove the ignition switch, with the wiring harness attached, from the steering column.

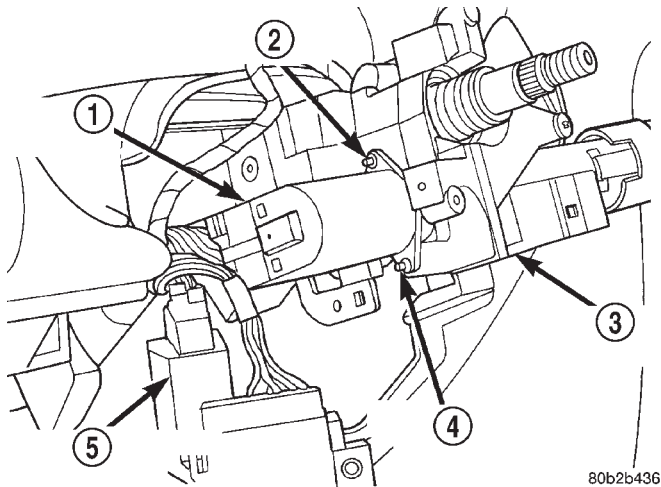


Fig. 19 Ignition Switch Mounting Screws

- 1 - IGNITION SWITCH
- 2 - MOUNTING SCREW
- 3 - STEERING COLUMN
- 4 - MOUNTING SCREW
- 5 - MULTIFUNCTION SWITCH

(26) If the vehicle is equipped with a floor mounted shifter, depress the locking tab on the shifter/ignition interlock cable (Fig. 20) and remove the cable from the key lock housing.

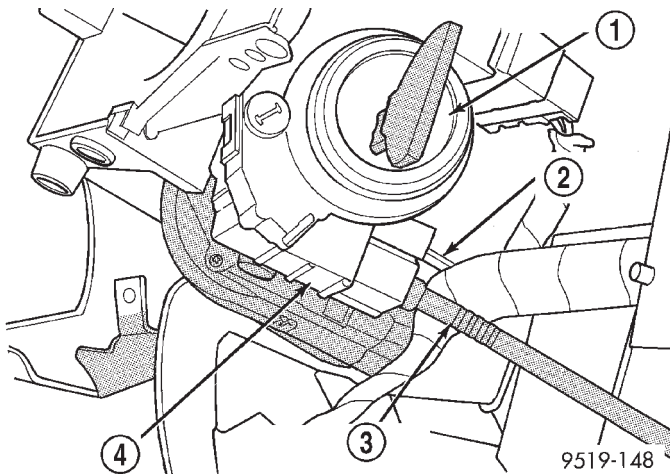


Fig. 20 Shifter/Ignition Cable At Lock Cylinder Housing

- 1 - KEY CYLINDER
- 2 - LOCKING TAB
- 3 - SHIFTER IGNITION INTERLOCK CABLE
- 4 - KEY LOCK HOUSING

(27) If the vehicle is equipped with a steering column mounted shift lever, remove the brake transmission shift interlock (BTSI) solenoid from the shift lever mechanism (Fig. 21). To do so, perform the following:

- (a) Disconnect the wiring harness connector from the solenoid.
- (b) Remove the retainer clip from the end of the solenoid (Fig. 22).
- (c) Slide the solenoid straight off the shift lever mounting stud.

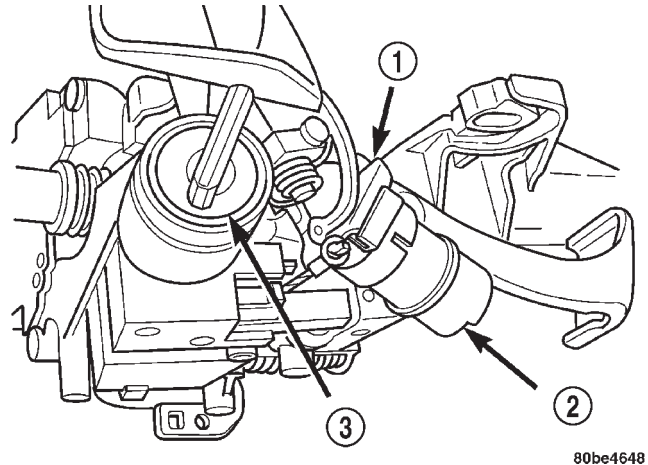


Fig. 21 BTSI

- 1 - SHIFT LEVER BRACKET
- 2 - SOLENOID
- 3 - KEY CYLINDER

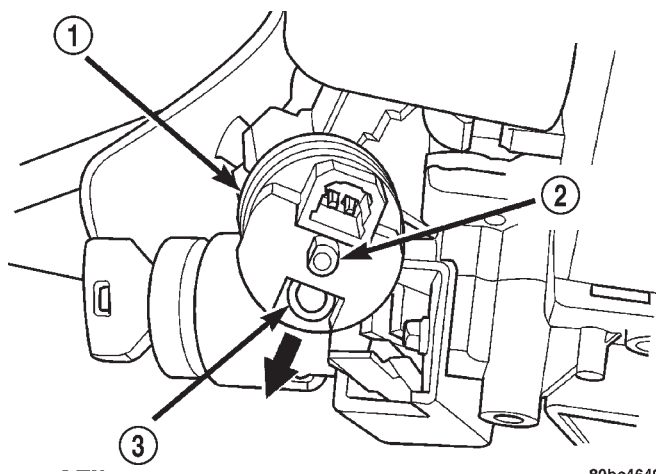


Fig. 22 Solenoid Retainer Clip

- 1 - SOLENOID
- 2 - MOUNTING STUD
- 3 - RETAINER CLIP

COLUMN (Continued)

(28) If the vehicle is equipped with a steering column mounted shift lever, remove the shift cable from the shifter mechanism. Unlock the cable lock, then, the shift cable is removed by inserting a screwdriver between the shift cable and the shifter mechanism and prying the cable off the pin (Fig. 23).

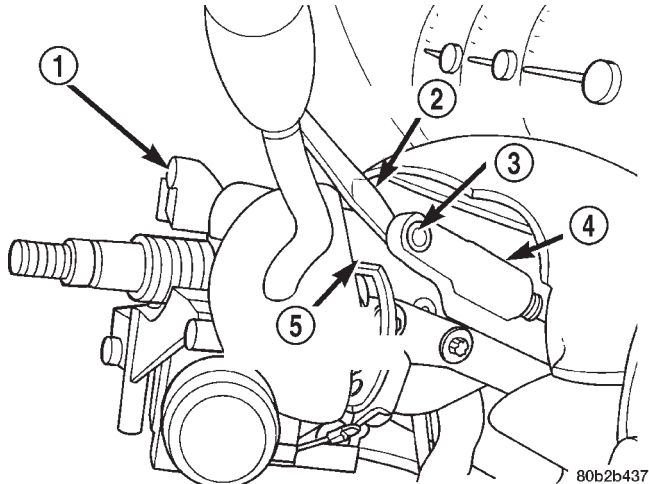


Fig. 23 Shift Cable Removal

- 1 - STEERING COLUMN
- 2 - SCREWDRIVER
- 3 - PIN
- 4 - SHIFT CABLE
- 5 - SHIFTER MECHANISM

(29) Remove the shift cable mounting bracket (Fig. 24) from the steering column. The shift cable mounting bracket is mounted to the steering column by the 2 mounting screws (Fig. 24).

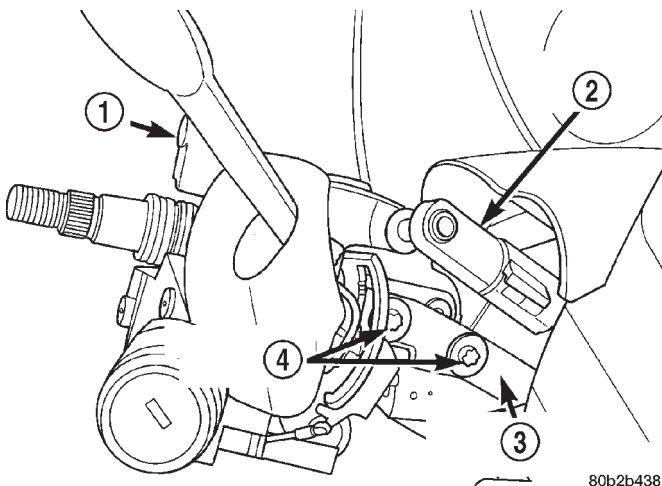


Fig. 24 Shift Cable Bracket Mounting To Steering Column

- 1 - STEERING COLUMN
- 2 - SHIFT CABLE
- 3 - SHIFT CABLE MOUNTING BRACKET
- 4 - MOUNTING SCREWS

(30) Remove the 2 air ducts (Fig. 25) from under the steering column.

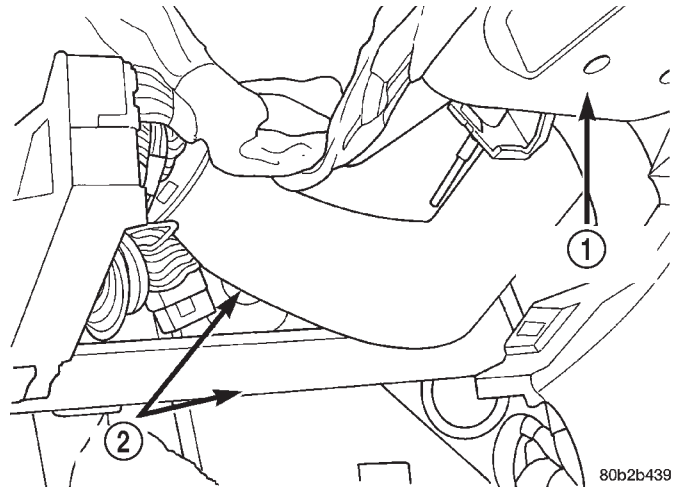


Fig. 25 Air Ducts

- 1 - STEERING COLUMN
- 2 - AIR DUCTS

(31) Remove retaining pin in steering column coupler pinch bolt (Fig. 26). Remove the pinch bolt from the steering column coupler. The pinch bolt nut is caged to coupler and is not removable. Separate the steering column flex coupler from steering intermediate shaft.

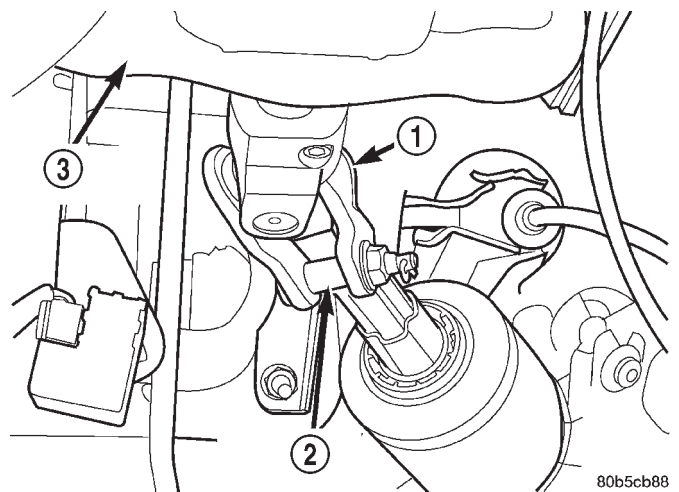


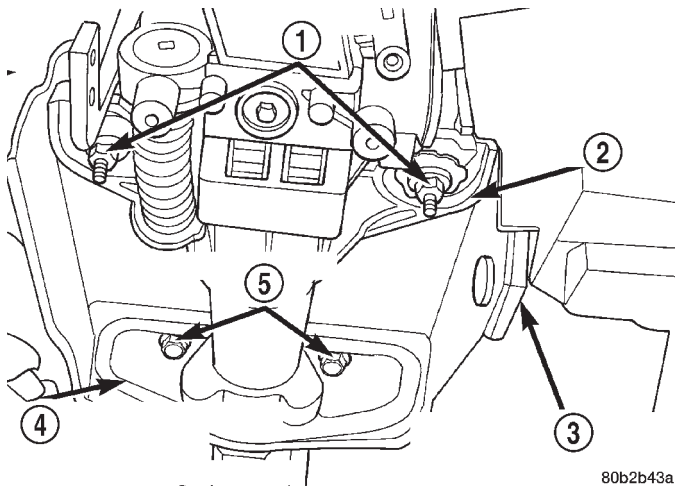
Fig. 26 Steering Column Coupler

- 1 - COUPLER
- 2 - PINCH BOLT
- 3 - STEERING COLUMN

(32) Remove the 2 steering column upper mounting bracket to support bracket nuts (Fig. 27). Then loosen the 2 bolts attaching the steering column lower mounting bracket to support bracket (Fig. 27).

(33) Remove the steering column from the support bracket by pulling it rearward, then out of the car.

COLUMN (Continued)

**Fig. 27 Steering Column Mounting**

- 1 - MOUNTING NUTS
- 2 - STEERING COLUMN UPPER MOUNTING BRACKET
- 3 - STEERING COLUMN SUPPORT BRACKET
- 4 - STEERING COLUMN LOWER MOUNTING BRACKET
- 5 - MOUNTING BOLTS

INSTALLATION - STEERING COLUMN

(1) Install the steering column on the steering column support bracket. Loosely install the two steering column attaching nuts.

(2) Loosely tighten the two steering column upper mounting nuts (Fig. 27) to hold the steering column in place. Center the steering column in place, side to side, then install the two lower mounting bolts (Fig. 27). Then equally tighten both steering column upper mounting nuts until upper steering column mounting bracket is seated against support bracket. Tighten the four steering column bracket to support bracket fasteners to 12 N·m (105 in. lbs.), tightening the upper mounting nuts first, then the lower mounting bolts.

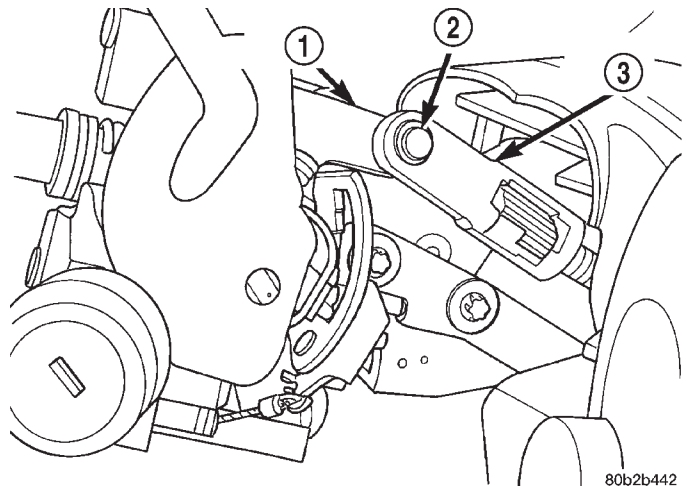
(3) Assemble the intermediate steering shaft to the steering column flex coupler (Fig. 26). Tighten the coupler pinch bolt nut to a torque of 27 N·m (240 in. lbs.). Be sure to install steering coupler pinch bolt retaining pin.

(4) Install the two air ducts under the steering column (Fig. 25).

(5) If the vehicle is equipped with a floor shifter, install the shifter/ignition interlock cable (Fig. 20) in the lock cylinder housing.

(6) Install the shift cable mounting bracket (Fig. 24) on the steering column. The shift cable mounting bracket is mounted to the steering column by the two mounting screws.

(7) If the vehicle is equipped with a steering column mounted shift lever, first verify that the shift lever is locked in the park position. Then, install the shift cable on the shifter mechanism (Fig. 28). The shift cable must be fully inserted onto the pin of the shifter mechanism.

**Fig. 28 Installed Shift Cable**

- 1 - SHIFTER MECHANISM
- 2 - PIN
- 3 - SHIFT CABLE

(8) If the vehicle is equipped with a steering column mounted shift lever, install the brake transmission interlock solenoid on the shift lever mechanism. To do so, perform the following:

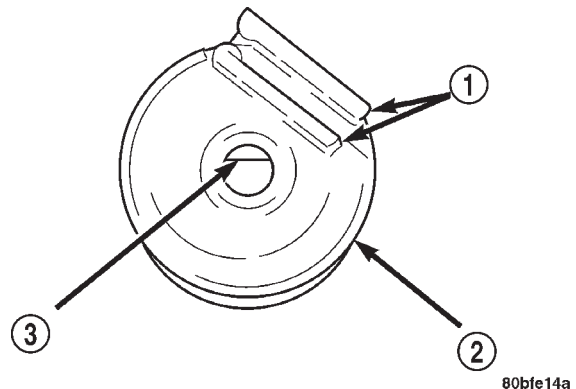
(a) Align the flat inside the solenoid (Fig. 29) with the flat on the shift lever mounting stud.

(b) Slide the solenoid completely onto the shift lever mounting stud aligning the plastic guide formed into the solenoid housing with the flange on the shift lever mechanism bracket (Fig. 30).

(c) Install the retainer clip until it snaps into place in the slot cut into the shift lever mounting stud (Fig. 31).

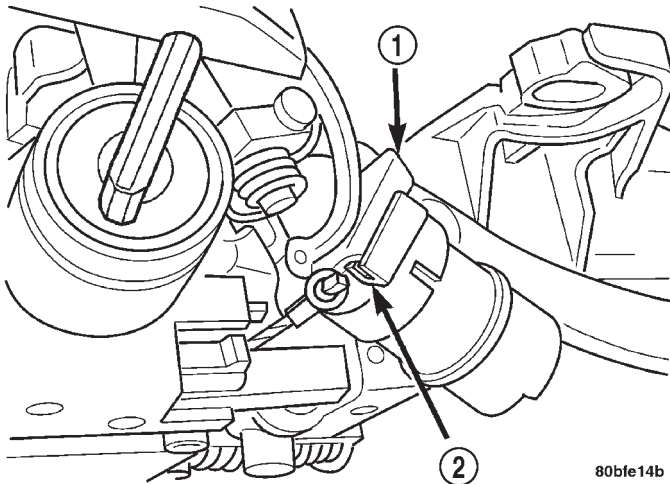
(d) Verify the solenoid is locked in place and will not slide off the mounting stud.

(e) Connect the wiring harness connector to the solenoid.

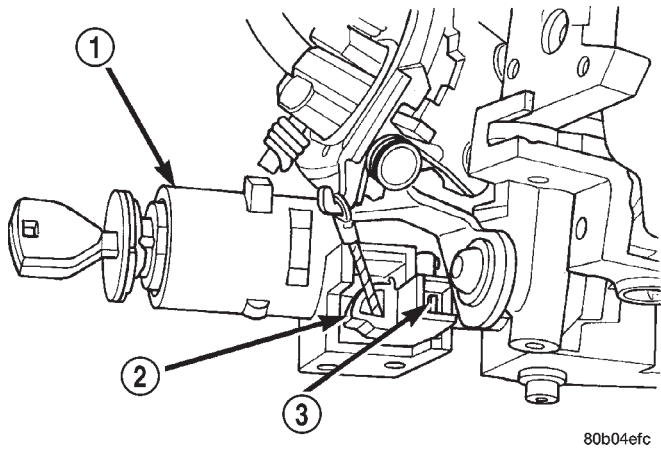
**Fig. 29 Flat Inside BTSI Solenoid**

- 1 - GUIDES
- 2 - SOLENOID
- 3 - FLAT

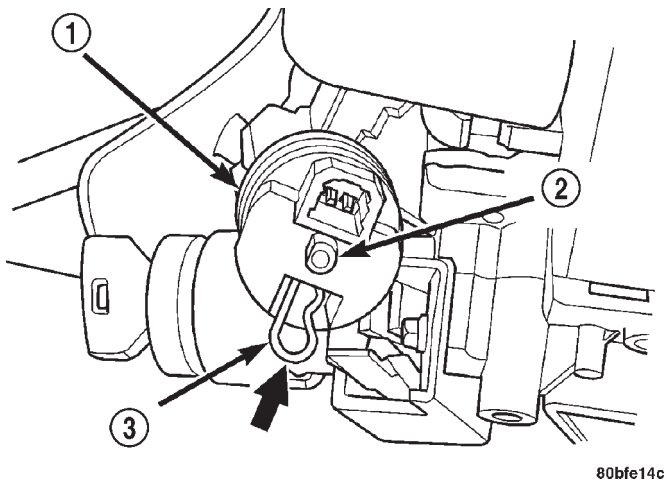
COLUMN (Continued)

**Fig. 30 Guide And Flange Alignment**

- 1 - BRACKET FLANGE
2 - GUIDE

**Fig. 32 Ignition Interlock Adjustment Tab**

- 1 - LOCK CYLINDER HOUSING
2 - INTERLOCK CASSETTE
3 - ADJUSTMENT TAB

**Fig. 31 Solenoid Retainer Clip Installation**

- 1 - SOLENOID
2 - MOUNTING STUD
3 - RETAINER CLIP

(9) Install the ignition switch on the steering column. Install and securely tighten the 2 screws (Fig. 19) mounting the ignition switch to the steering column.

(10) If the vehicle is equipped with a steering column mounted shift lever and if a new ignition shift interlock cassette has been installed, the interlock system must be adjusted. Adjust the interlock system by pushing in on the adjustment tab until it stops (Fig. 32). The adjustment tab will click as it moves into position. Ensure the tab is fully depressed.

(11) Install the multi-function switch on the steering column. Install and securely tighten the two screws (Fig. 18) mounting the multi-function switch to the steering column. Install the clockspring wiring

harness on the routing clip on the top of the multi-function switch.

(12) Clip the SKIM module over the key cylinder halo bezel and attach it to the steering column with its mounting screw. Connect the wiring harness to the module.

(13) Install the clockspring on the steering column. Install and securely tighten the two screws (Fig. 17) mounting the clockspring to the steering column.

(14) Install the wiring harness connectors (Fig. 16) on the clockspring.

(15) If removed, install the trim ring for the key cylinder on the lock cylinder housing.

(16) Install the lower shroud (Fig. 15) on the steering column. Install and securely tighten the 2 screws attaching the lower shroud to the steering column.

(17) Install the tilt lever (Fig. 14) on the steering column.

(18) Install the upper shroud on the steering column by snapping it onto the lower shroud.

CAUTION: If any doubt is present as to whether the clockspring is properly centered, This clockspring centering procedure **MUST** be performed prior to installing steering wheel assembly. If clockspring is not centered it may be overextended, causing clockspring assembly to become inoperative. The yellow centering indicator must be present in the centering window of the clockspring and the arrow on the clockspring must be pointing at the drive pin.

(19) Center the clock spring using the following procedure.

- Depress the plastic locking pin to disengage clockspring locking mechanism.

COLUMN (Continued)

- Keeping locking mechanism disengaged, rotate the clockspring rotor in the **CLOCKWISE DIRECTION** to the end of the travel. Do not apply excessive torque.

- From the end of clockwise travel, slowly rotate the rotor in the counterclockwise direction until yellow appears in the centering window of clockspring. When yellow appears in the centering window the arrow on the clockspring will be pointing at the drive pin on clock spring rotor.

- Engage the clockspring locking mechanism.

CAUTION: When installing the steering wheel, use care not to damage the steering wheel finish. The wood grain on some steering wheels can be easily marred.

CAUTION: Do not install steering wheel by driving it onto the shaft. Pull steering wheel down onto steering column shaft using **ONLY** the steering wheel retaining nut.

(20) Feed the clockspring wiring leads through the steering wheel (Fig. 12). Position steering wheel on shaft of steering column, making sure the master serration in the wheel hub and on the steering column shaft line up.

(21) Install steering wheel to steering column shaft retaining nut (Fig. 12) and tighten until the steering wheel is fully installed on the shaft. Tighten steering wheel retaining nut to a torque of 61 N·m (45 ft. lbs.).

(22) Turn the key cylinder to the unlock position, unlocking the steering column shaft.

(23) Connect the horn switch wiring lead from the clockspring to the driver airbag horn switch wiring lead (Fig. 11).

(24) Install the airbag electrical lead into connector on back of driver airbag (Fig. 11). **Be sure electrical connector from clockspring is securely latched into driver airbag connector.**

(25) If optional audio control switches are present on the rear of the steering wheel, connect the 4-way connector lead from the clockspring to the steering wheel wiring harness lead. Once connected, place the connector in back cover formation located at the 12 O'clock position.

CAUTION: The fasteners, screws, and bolts, originally used for the airbag components are specifically designed for the airbag system. They must never be replaced with any substitutes. Anytime a new fastener is needed, replace only with correct fasteners provided in service packages or fasteners listed in the parts book.

NOTE: Make sure steering wheel and airbag module are in the right-side-up position before installing airbag module on steering wheel.

(26) Install the airbag module on steering wheel. Install only the two original or correct replacement airbag module attaching bolts (Fig. 10). Tighten the two airbag module attaching bolts to a torque of 8 N·m (75 in. lbs.).

(27) Connect the speed control wiring leads to the speed control switches.

(28) Install the speed control switches in the steering wheel (Fig. 9). Install the screws attaching the speed control switches to the steering wheel. Tighten the screws to a torque of 1.5 N·m (13 in. lbs.).

(29) Install the diagnostic connector on the reinforcement (Fig. 8).

(30) Install the reinforcement on the instrument panel (Fig. 7). Install the four bolts mounting the reinforcement to the instrument panel.

(31) Install the parking brake release cable on the parking brake release handle in the lower instrument panel cover (Fig. 6).

(32) Install the wiring harness connector on the trunk release switch in the lower instrument panel cover (Fig. 5).

(33) Install the lower instrument panel cover.

(34) Install the two screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel (Fig. 4).

(35) Install the fuse panel cover on the left end of the instrument panel (Fig. 3).

CAUTION: When reconnecting the battery terminals on a vehicle that has had the airbag module removed, ensure that no occupants are in the vehicle, then perform the following procedure.

(36) Using the following procedure, reconnect the remote ground cable on the shock tower ground stud.

- Connect DRBIII® scan tool to diagnostic connector below the column.

- Turn ignition key to ON position. Exit vehicle with the DRBIII® scan tool.

- Ensuring that there are no occupants in the vehicle, connect negative cable to negative post of the battery.

- Using the DRBIII® scan tool, read and record active fault codes. Also read and record any stored fault codes. Refer to Appropriate Body Diagnostic Information if any faults are found.

- Erase stored faults if there are no active fault codes. If problems remain, fault codes will not erase.

- From the passenger side of the vehicle, turn ignition key to OFF and then ON observing instrument cluster airbag lamp. It should go on for six to

COLUMN (Continued)

eight seconds, then go out. This will indicate that the airbag system is functioning normally.

- If airbag warning lamp fails to light, blinks on and off or goes on and stays on, there is an airbag system malfunction. Refer to Appropriate Body Diagnostic Information to diagnose the system malfunction.

(37) Test the operation of the horn, lights and any other functions that are steering column operated. If applicable, reset the radio and the clock.

(38) Road test vehicle to ensure proper operation of the steering system and the speed control system.

IGNITION SWITCH

REMOVAL

The ignition switch attaches to the lock cylinder housing on the end opposite the lock cylinder. For ignition switch terminal and circuit identification, refer to the Wiring Diagrams section.

- (1) Disconnect negative cable from battery.
- (2) Remove tilt lever attaching screw. Remove lever.
- (3) Remove upper and lower cover from steering column.
- (4) Remove Sentry Key Immobilizer Module (SKIM) if equipped. Refer to the Power Door Locks section for removal.
- (5) Remove multi-function switch.
- (6) Disconnect electrical connector from ignition switch (Fig. 33).
- (7) Remove Ignition switch mounting screws. Remove switch.

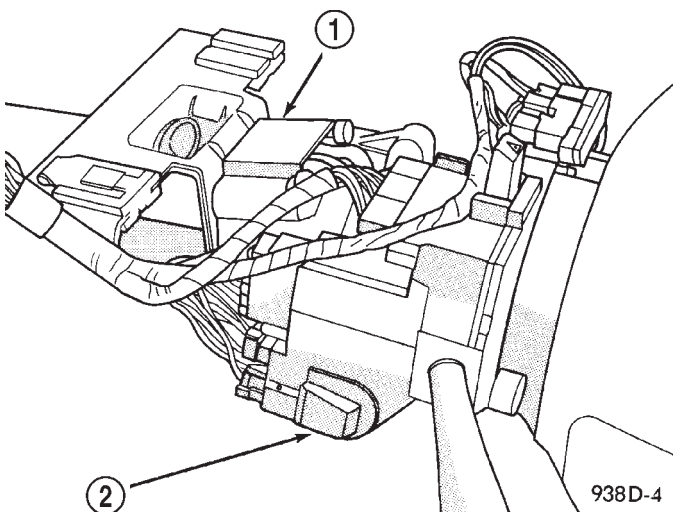


Fig. 33 Ignition Switch Removal/Installation

- 1 - STEERING COLUMN
2 - IGNITION SWITCH

INSTALLATION

The ignition switch attaches to the lock cylinder housing on the end opposite the lock cylinder. For ignition switch terminal and circuit identification, refer to the Wiring Diagrams section.

(1) A tab on the ignition switch indexes to a notch in the lock cylinder housing (Fig. 34). Also, a slot in the end of the ignition switch fits over the shaft in the end of the lock cylinder housing. Use the ignition key to rotate the lock cylinder to align the ignition switch with lock cylinder housing.

(2) Install and tighten ignition switch mounting screws.

(3) Attach electrical connector to ignition switch.

(4) Install multi-function switch.

(5) Install SKIM if equipped, refer to the Power Door Locks section for installation.

(6) Install upper and lower cover on steering column.

(7) Install tilt lever.

(8) Connect negative cable to battery.

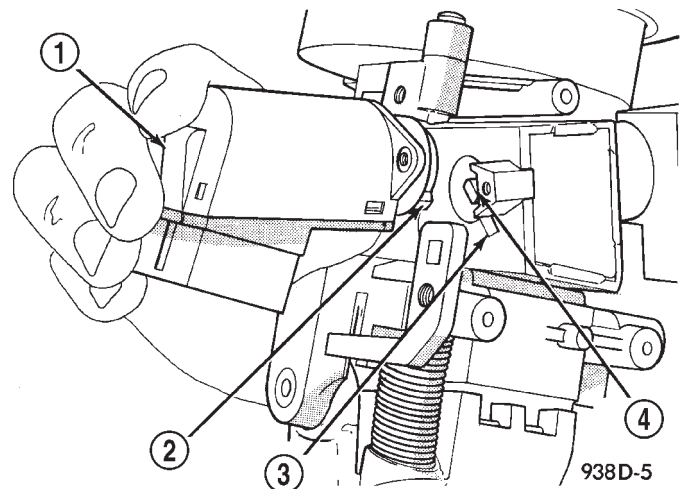


Fig. 34 Ignition Switch Alignment

- 1 - IGNITION SWITCH
2 - TAB
3 - NOTCH
4 - SHAFT

INTERMEDIATE SHAFT

DIAGNOSIS AND TESTING - STEERING COLUMN INTERMEDIATE SHAFT

The steering column (to steering gear) intermediate shaft has an integrated lower coupler with universal joint. The entire assembly **MUST** be replaced whenever any of the following conditions exist.

- Whenever a vehicle is involved in a collision which deploys the airbag, regardless of the extent of damage done to the vehicle.

INTERMEDIATE SHAFT (Continued)

• If a vehicle is involved in an impact of the vehicle's front suspension or undercarriage, which results in any type of damage to the front crossmember.

• Under any conditions which result in the steering column assembly or steering column shaft receiving a force great enough to move the steering column or shaft forward or rearward in the vehicle.

Inspect the intermediate shaft and integrated coupler for the following conditions:

- Seized bearing
- Loose bearing stake
- Bearing not seated properly

The steering column intermediate shaft **MUST** be replaced as an entire assembly if a problem condition is found.

KEY/LOCK CYLINDER

DESCRIPTION

The lock cylinder is inserted in the end of the housing opposite the ignition switch.

OPERATION

The ignition key rotates the cylinder to 5 different detents (Fig. 35) :

- Accessory
- Off (lock)
- Unlock
- On/Run
- Start

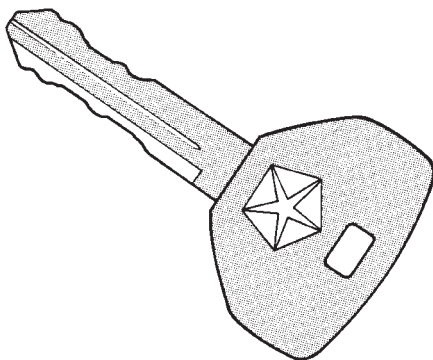
● UNLOCK

● ON/RUN

● START

● OFF

● ACCESSORY



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Fig. 35 IGNITION LOCK CYLINDER DETENTS

REMOVAL

The lock cylinder is inserted in the end of the housing opposite the ignition switch. The ignition key rotates the cylinder to 5 different detents:

- (1) Disconnect negative cable from battery.
- (2) Remove the tilt lever attaching screw. Remove lever.

(3) Remove the upper and lower covers from the steering column.

(4) Turn the ignition key to the run position. When ignition switch is in the run position, the lock cylinder retaining tab will depress.

(5) Depress tab and slide lock cylinder out of housing (Fig. 36).

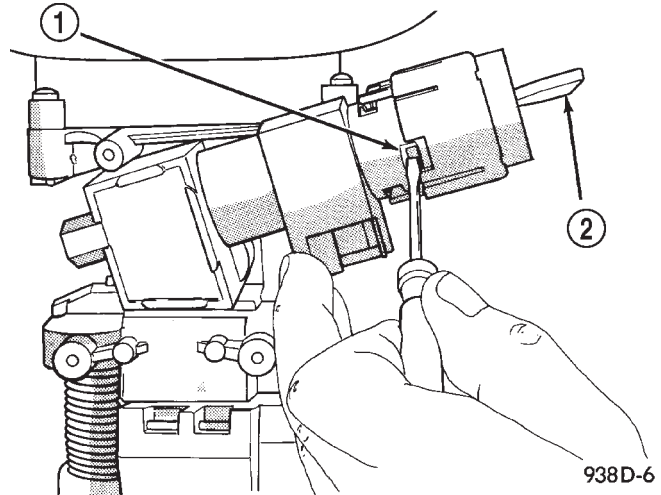


Fig. 36 Lock Cylinder Removal

1 - TAB

2 - KEY IN RUN POSITION

INSTALLATION

The lock cylinder is inserted in the end of the housing opposite the ignition switch. The ignition key rotates the cylinder to 5 different detents:

(1) Install key in lock cylinder. Turn key to run position (retaining tab on lock cylinder can be depressed).

(2) The shaft at the end of the lock cylinder aligns with the socket in the end of the housing. To align the socket with the lock cylinder, ensure the socket is in the Run position (Fig. 37).

(3) Align the lock cylinder with the grooves in the housing. Slide the lock cylinder into the housing until the tab sticks through the opening in the housing (Fig. 38).

(4) Turn key to Off position. Remove key.

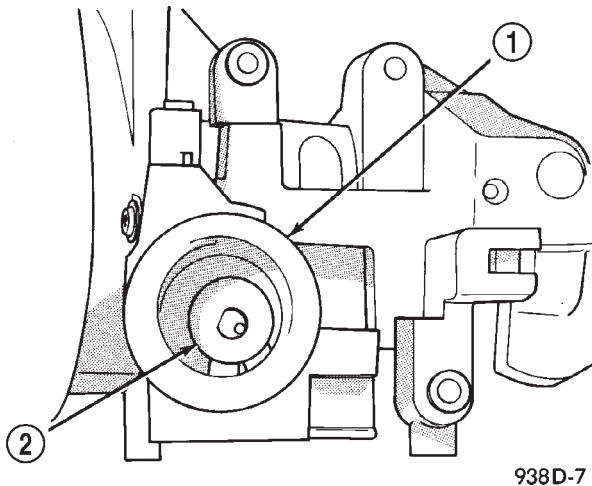
(5) If the vehicle has column shift and a new lock cylinder was used, install and adjust a new interlock cassette. Refer to Ignition Interlock in this section. If the vehicle has a floor shift, adjust the interlock cable when the lock cylinder is replaced. Refer to the Floor Shift Interlock Adjustment procedure in the Transmission section..

(6) Install upper and lower cover on steering column.

(7) Install tilt lever.

(8) Connect negative cable to battery.

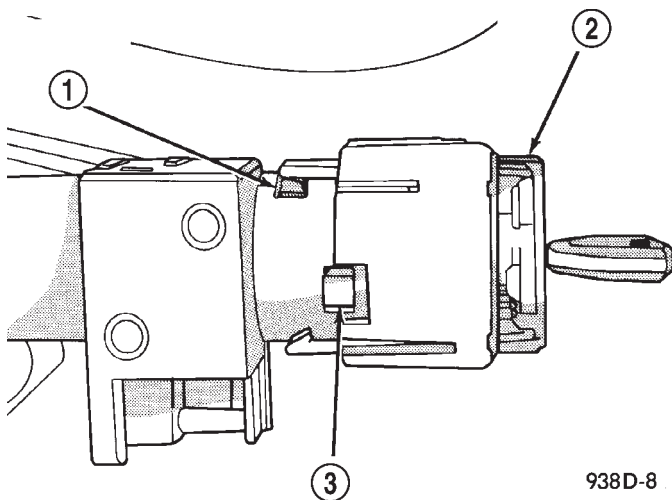
KEY/LOCK CYLINDER (Continued)



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Fig. 37 Socket in Lock Cylinder Housing

- 1 - LOCK CYLINDER HOUSING
2 - SOCKET IN RUN POSITION



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Fig. 38 Lock Cylinder Installation

- 1 - LOCK CYLINDER HOUSING
2 - LOCK CYLINDER
3 - TAB

STEERING COUPLING

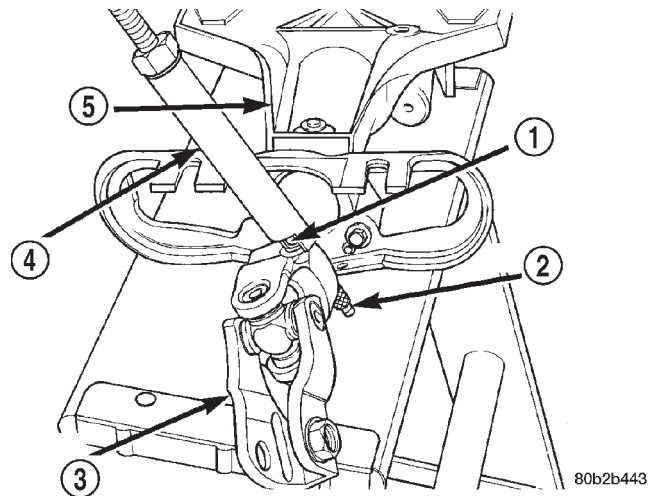
DIAGNOSIS AND TESTING - STEERING COLUMN SHAFT UPPER COUPLER

If the steering column shaft upper coupler is diagnosed to be defective due to any of the following conditions: seized bearing, loose bearing stake or a bearing not fully seated in the yoke of the coupler assembly, the coupler can be serviced as a separate component of the steering column assembly.

REMOVAL

(1) Remove steering column assembly from vehicle. Refer to the Steering Column Removal.

(2) Install Puller, Special Tool 6831-A, through center of roll pin in flex coupler and install knurled nut (Fig. 39).



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Fig. 39 Removing Roll Pin

- 1 - ROLL PIN
2 - KNURLED NUT
3 - FLEX COUPLER
4 - SPECIAL TOOL 6831-A
5 - STEERING COLUMN

(3) While holding hex on end threaded rod, tighten the nut on threaded rod of Puller, Special Tool 6831-A. This will pull the roll pin out of the coupler.

(4) Remove the coupler from the steering column shaft

INSTALLATION

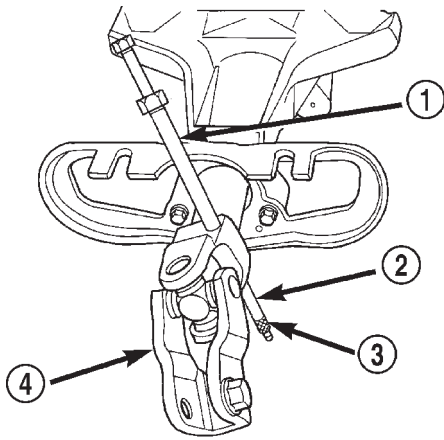
(1) Start roll pin into coupler prior to installing coupler on steering column shaft. Install roll pin into coupler just far enough to square roll pin to hole in flex coupler. If roll pin is installed too far, coupler will not slide onto steering column shaft.

(2) Install coupler on steering shaft until correctly positioned to allow roll pin to be installed in coupler.

(3) Install Puller, Special Tool 6831-A, through center of roll pin and install knurled nut (Fig. 40).

(4) Using Puller, Special Tool, 6831-A, (Fig. 40) install roll pin into the coupler until spring pin is fully installed through both sides of the coupler.

STEERING COUPLING (Continued)



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Fig. 40 Tool Set-Up For Installing Roll Pin

- 1 - SPECIAL TOOL 6831-A
 2 - ROLL PIN
 3 - KNURLED NUT
 4 - FLEX COUPLER

STEERING WHEEL

REMOVAL

- (1) Place the front road wheels in the straight-ahead position, then:
 - (a) Rotate the steering wheel one-half turn (180 degrees) to the right (clockwise).
 - (b) Lock column in place with the ignition cylinder lock.
- (2) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (3) Wait two minutes for the reserve capacitor to discharge before removing non-deployed airbag.

CAUTION: When removing the steering wheel, use care not to damage the steering wheel finish. The wood grain on some steering wheels can be easily marred.

- (4) Remove speed control switches and connectors.
- (5) Remove the driver airbag attaching bolts on the front of the steering wheel.
- (6) Lift driver airbag, disconnect the airbag and horn wire connectors, then remove airbag.
- (7) If optional audio control switches are present on the rear of the steering wheel, disconnect the 4-way connector between the clockspring and steering wheel wiring harness.
- (8) Remove steering wheel retaining nut.
- (9) Remove steering wheel with steering wheel puller. While removing steering wheel, take care to feed the wires gently through the opening in the steering wheel armature.

INSTALLATION

- (1) Confirm that:
 - The steering wheel position is a half turn (180 degrees) to the right (clockwise).
 - The column is locked with the ignition cylinder lock.
 - Check that the turn signal stalk is in the neutral position.

CAUTION: When installing the steering wheel, use care not to damage the steering wheel finish. The wood grain on some steering wheels can be easily marred.

- (2) Pull all wires through the larger opening of the hub area on the wheel. Install steering wheel ensuring the flats on hub align with the clockspring. Ensure leads do not get pinched under the steering wheel.
- (3) Install retaining nut, and torque it to 61 N·m (45 ft.lbs.).
- (4) Route speed control wires through the slots in the steering wheel back cover.
- (5) Connect the horn lead wire and the airbag lead wire to the airbag module.
- (6) If optional audio control switches are present on the rear of the steering wheel, connect the 4-way connector lead from the clockspring to the steering wheel wiring harness lead. Once connected, place the connector in back cover formation located at the 12 O'clock position.
- (7) Install the drivers airbag and torque bolts to 8 N·m (75 in. lbs.).
- (8) Connect the speed control wires to the switches and install switches. Torque screws to 1.5 N·m (13 in. lbs.).

WARNING: DO NOT CONNECT THE BATTERY NEGATIVE CABLE REMOTE TERMINAL AT THIS TIME. REFER TO ELECTRICAL, RESTRAINTS, AIRBAG SYSTEM TEST FOR PROCEDURE.

STEERING COLUMN GEAR
SHIFT LEVER

REMOVAL

- (1) Remove the fuse panel cover from the left end of the instrument panel (Fig. 41).
- (2) Remove the 2 screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel (Fig. 42).
- (3) Remove the lower instrument panel cover. The lower instrument panel cover is attached by retaining clips along the top and right edge.

STEERING COLUMN GEAR SHIFT LEVER (Continued)

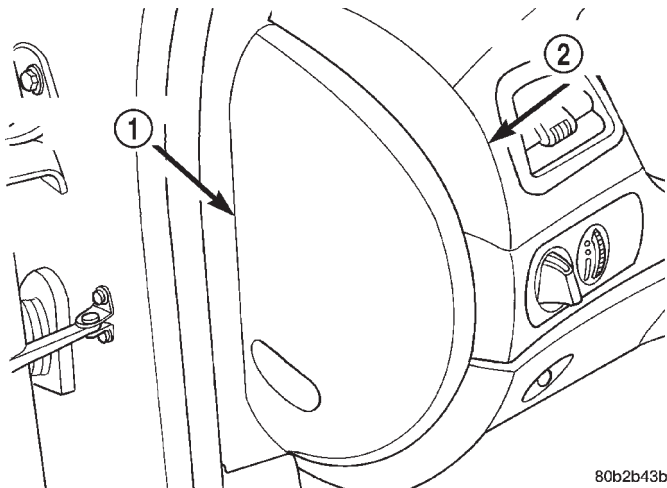


Fig. 41 Fuse Panel Cover

- 1 - FUSE PANEL COVER
- 2 - INSTRUMENT PANEL

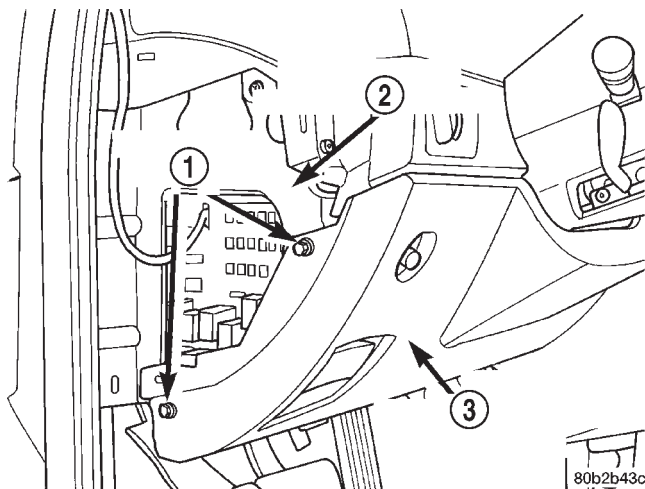


Fig. 42 Lower Instrument Panel Cover Mounting Screws

- 1 - MOUNTING SCREWS
- 2 - INSTRUMENT PANEL BRACKET
- 3 - LOWER INSTRUMENT PANEL COVER

(4) Remove the tilt lever and the upper and lower steering column shrouds from steering column assembly (Fig. 43). Then remove center outlet bezel.

(5) Remove the brake transmission shift interlock (BTSI) solenoid from the shift lever mechanism (Fig. 44). To do so, perform the following:

(a) Disconnect the wiring harness connector from the solenoid.

(b) Remove the retainer clip from the end of the solenoid (Fig. 45).

(c) Slide the solenoid straight off the shift lever mounting stud.

(6) Remove the gear shift cable from the attaching pin on the shift lever assembly.

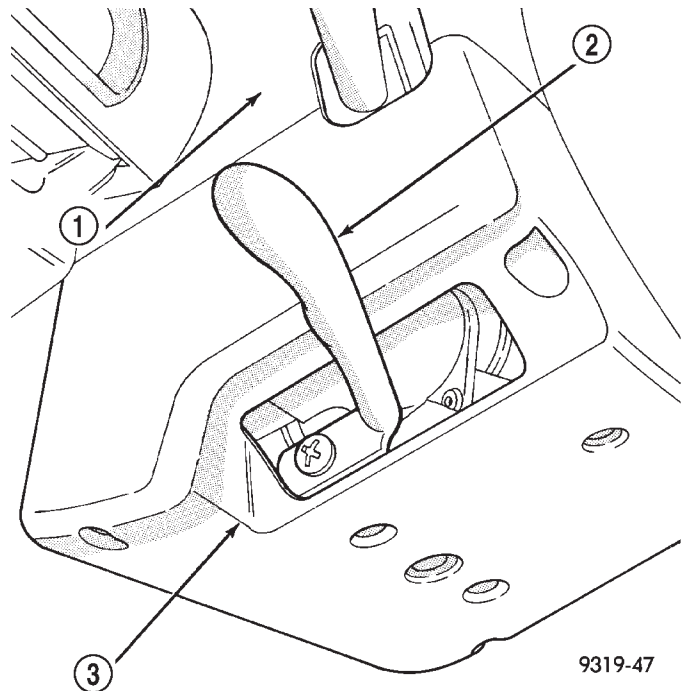


Fig. 43 Tilt Lever And Upper And Lower Shrouds

- 1 - UPPER SHROUD
- 2 - TILT LEVER
- 3 - LOWER SHROUD

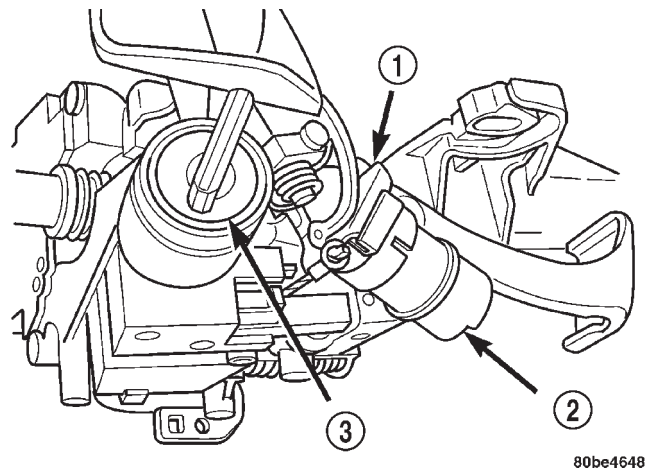


Fig. 44 BTSI

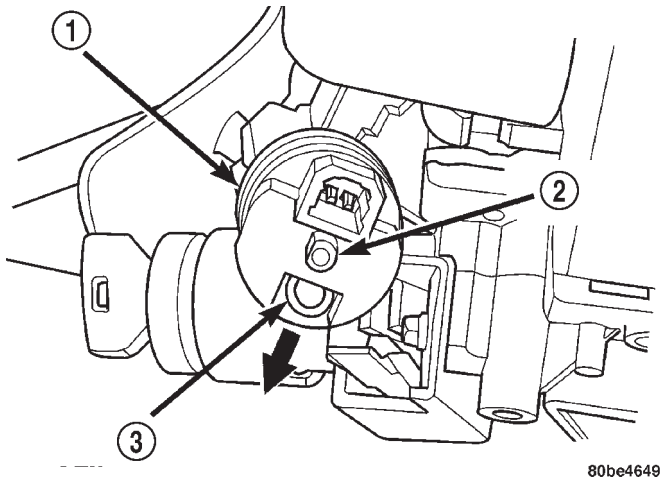
- 1 - SHIFT LEVER BRACKET
- 2 - SOLENOID
- 3 - KEY CYLINDER

(7) Unlock shift cable adjuster.

(8) Remove the 3 Torx® head screws attaching the shift lever assembly to the steering column tilt housing (Fig. 46), then remove shift lever assembly from tilt housing and unhook the ignition interlock cable from shift lever assembly (Fig. 46).

(9) Remove the interlock cassette from the steering column and discard it.

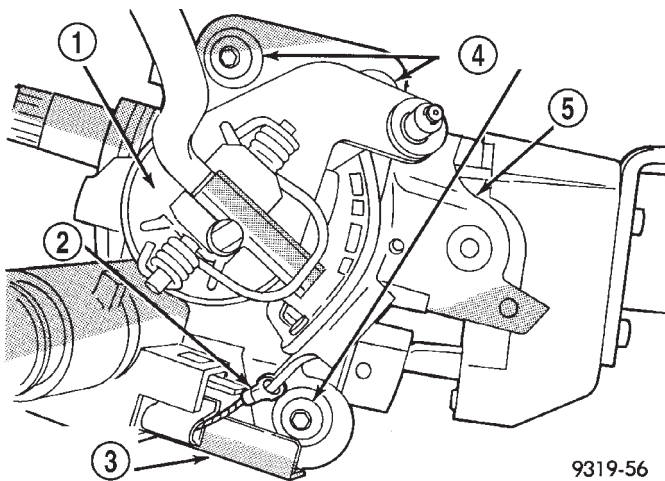
STEERING COLUMN GEAR SHIFT LEVER (Continued)



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Fig. 45 Solenoid Retainer Clip

- 1 - SOLENOID
- 2 - MOUNTING STUD
- 3 - RETAINER CLIP



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Fig. 46 Shift Lever Assembly Attachment

- 1 - SHIFTER ASSEMBLY
- 2 - CABLE
- 3 - INTERLOCK CASSETTE
- 4 - SHIFTER ASSEMBLY ATTACHING SCREWS
- 5 - TILT HOUSING

NOTE: A new interlock cassette must be installed when a new shift lever assembly is installed.

INSTALLATION

(1) Install new shift lever assembly on tilt housing of steering column. Install and securely tighten the 3 Torx® head screws attaching shift lever assembly to tilt housing.

(2) Install the gear shift cable onto the cable attaching pin on shift lever assembly.

(3) Lock the gear shift cable adjuster.

(4) Install the brake transmission interlock solenoid on the shift lever mechanism. To do so, perform the following:

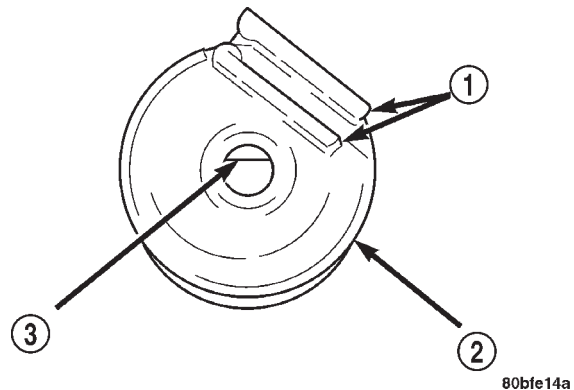
(a) Align the flat inside the solenoid (Fig. 47) with the flat on the shift lever mounting stud.

(b) Slide the solenoid completely onto the shift lever mounting stud aligning the plastic guide formed into the solenoid housing with the flange on the shift lever mechanism bracket (Fig. 48).

(c) Install the retainer clip until it snaps into place in the slot cut into the shift lever mounting stud (Fig. 49).

(d) Verify the solenoid is locked in place and will not slide off the mounting stud.

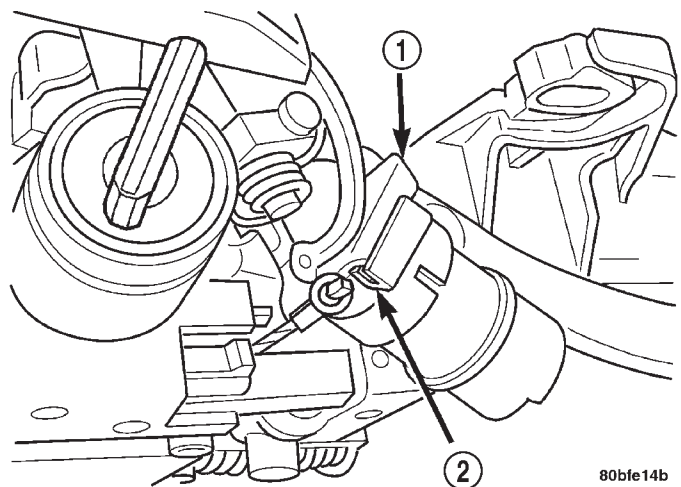
(e) Connect the wiring harness connector to the solenoid.



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Fig. 47 Flat Inside BTIS Solenoid

- 1 - GUIDES
- 2 - SOLENOID
- 3 - FLAT

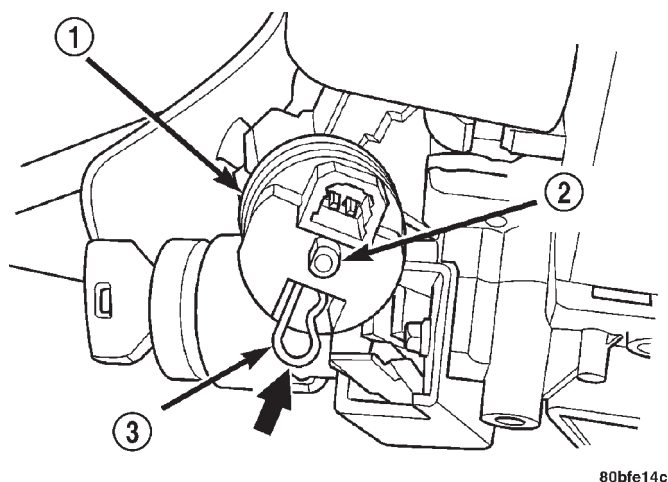


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Fig. 48 Guide And Flange Alignment

- 1 - BRACKET FLANGE
- 2 - GUIDE

STEERING COLUMN GEAR SHIFT LEVER (Continued)

**Fig. 49 Solenoid Retainer Clip Installation**

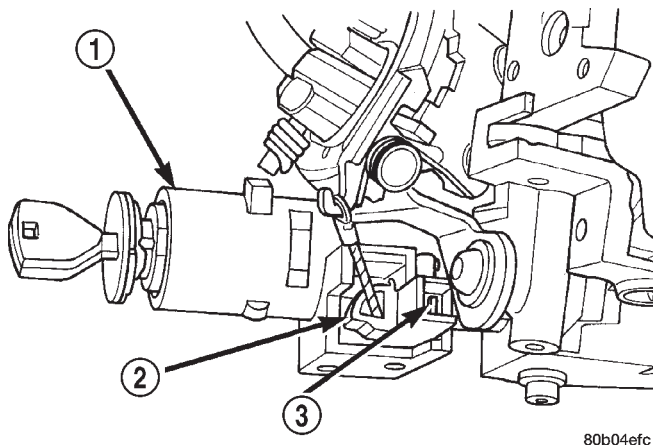
- 1 - SOLENOID
- 2 - MOUNTING STUD
- 3 - RETAINER CLIP

(5) Install cable from the new ignition interlock cassette onto the interlock lever of the shift lever assembly (Fig. 46).

(6) With the shift lever assembly in the PARK position and ignition key extracted from ignition switch, install the new interlock cassette into steering column. Be sure interlock cassette locking tab is securely latched.

(7) Adjust the ignition interlock system by pushing in on the adjustment tab until it stops (Fig. 50). The

adjustment tab will click as it moves into position. Ensure the tab fully depressed.

**Fig. 50 Ignition Interlock Adjustment Tab**

- 1 - LOCK CYLINDER HOUSING
- 2 - INTERLOCK CASSETTE
- 3 - ADJUSTMENT TAB

(8) Install upper and lower shroud on steering column assembly (Fig. 43).

(9) Install tilt lever (Fig. 43).

(10) Install the lower instrument panel cover.

(11) Install the 2 screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel (Fig. 42).

(12) Install the fuse panel cover on the left end of the instrument panel (Fig. 41).

GEAR

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GEAR

DESCRIPTION

DESCRIPTION - POWER STEERING GEAR

This vehicle is equipped with a rack-and-pinion power steering gear (Fig. 1). The gear is a center-take-off type gear. Center-take-off means that the tie rods are connected to the steering gear via a rack guide located at the center of the gear.

The power steering gear is mounted on the crossmember behind the engine. The steering column intermediate shaft connects to the pinion shaft of the gear. The outer ends of the outer tie rods attach to steering arms on the suspension's front struts.

Three different power steering gears are available:

- A base gear
- A firm feel gear, and
- A speed proportional gear

The base gear and firm feel gear are serviced the same. The speed proportional steering gear is physically very similar to the standard gear except for the solenoid control valve extending from its housing. The solenoid control valve can be serviced separately. For information on the speed proportional power steering gear or its individual components, refer to Speed Proportional Steering Gear.

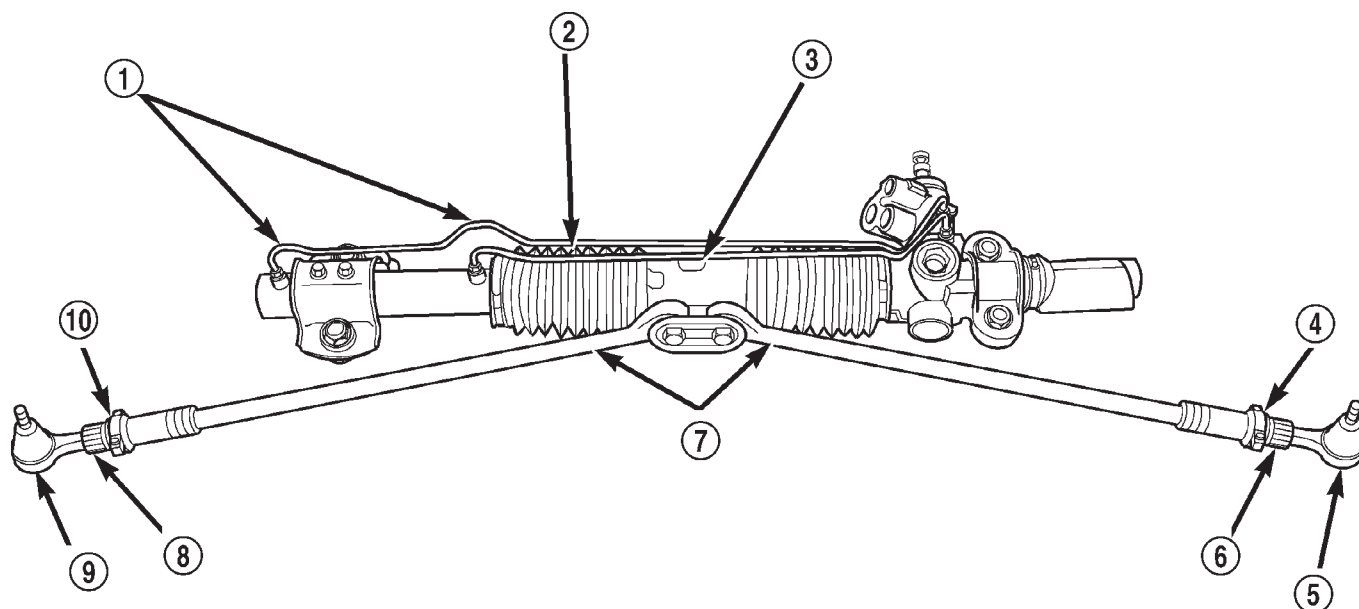
NOTE: The power steering gear should not be serviced or adjusted. If a malfunction or oil leak occurs, the complete steering gear needs to be replaced.

DESCRIPTION - SPEED PROPORTIONAL STEERING GEAR

Available on certain models of this vehicle is an electronically controlled, speed-sensitive, variable-effort rack and pinion power steering system. This system is better known as speed-proportional power steering.

The speed proportional power steering gear mounts in the same location as the standard power steering gear. It is mounted on the crossmember behind the engine. Externally, the main difference between a speed proportional power steering gear and a standard power steering gear is the presence of a solenoid control valve on the gear housing (Fig. 2).

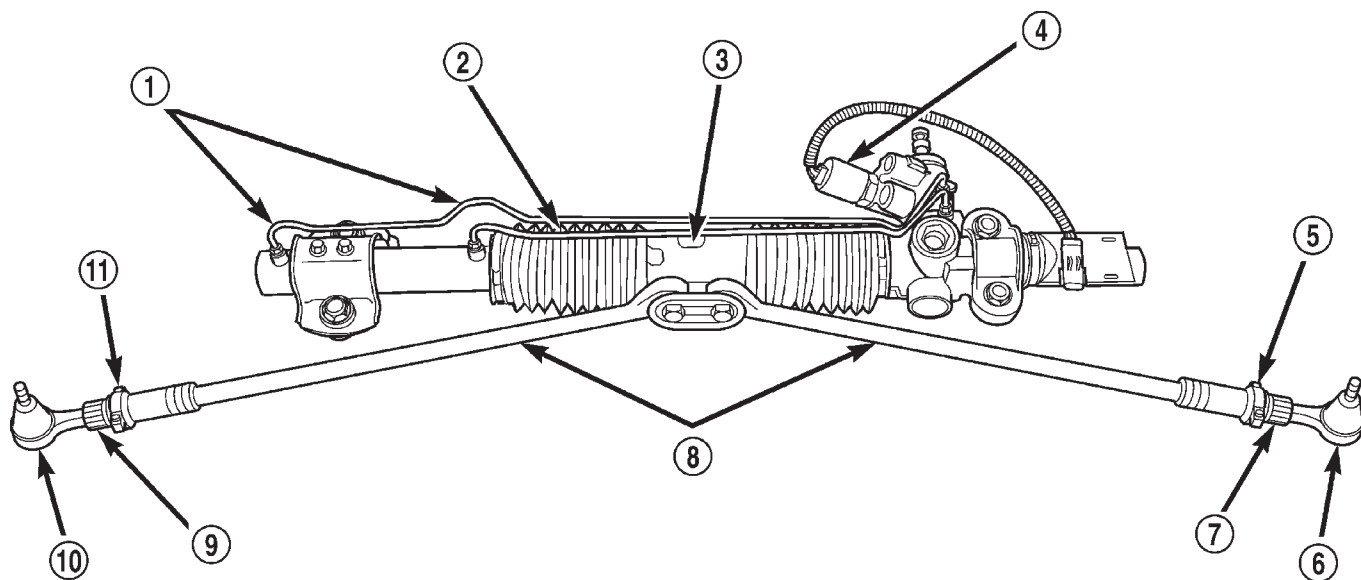
GEAR (Continued)



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Fig. 1 Power Steering Gear

- | | |
|-----------------------------------|-----------------------|
| 1 - STEERING GEAR FLUID LINES | 6 - ADJUSTMENT SLEEVE |
| 2 - STEERING GEAR BOOT | 7 - INNER TIE ROD |
| 3 - RACK AND PINION STEERING GEAR | 8 - ADJUSTMENT SLEEVE |
| 4 - CLAMP | 9 - TIE ROD END |
| 5 - TIE ROD END | 10 - CLAMP |



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Fig. 2 Variable-Assist Speed-Proportional Power Steering Gear

- | | |
|-----------------------------------|-----------------------|
| 1 - STEERING GEAR FLUID LINES | 7 - ADJUSTMENT SLEEVE |
| 2 - STEERING GEAR BOOT | 8 - INNER TIE ROD |
| 3 - RACK AND PINION STEERING GEAR | 9 - ADJUSTMENT SLEEVE |
| 4 - SOLENOID CONTROL VALVE | 10 - TIE ROD END |
| 5 - CLAMP | 11 - CLAMP |
| 6 - TIE ROD END | |

GEAR (Continued)

OPERATION

OPERATION - POWER STEERING GEAR

Turning of the steering wheel is converted into lateral (side-to side) travel through the meshing of the helical pinion teeth with the rack teeth located in the steering gear. This lateral travel pushes and pulls the tie rods to change the direction of the vehicle's front wheels.

Power assist is provided by a pump and is controlled by an open-center, rotary type control valve. It directs fluid to either side of the gear's integral steering rack piston. Depending on the rotation of the steering wheel, more fluid pressure is directed to one side of the rack piston compared to the other.

Road feel is controlled by the diameter of a torsion bar which initially steers the vehicle. As steering effort increases, as in a turn, the torsion bar twists causing relative rotary motion between the rotary valve body and valve spool. This movement restricts fluid flow to one side of the integral rack piston and redirects fluid behind the other side of the integral rack piston, building up hydraulic pressure, thus assisting in the turning effort.

OPERATION - SPEED PROPORTIONAL STEERING GEAR

The speed-proportional power steering system reduces the steering effort required by the driver for low speed driving and parking maneuvers. Also, at higher speeds, more steering effort is required providing a more firm, responsive feel to the steering system and driver.

With the engine running and the vehicle speed between 0 km/h (0 mph) and approximately 32 km/h (20 mph), minimum steering effort is required. Between approximately 32 km/h (20 mph) and 100 km/h (60 mph), power steering effort will gradually increase based upon vehicle speed. Above approximately 100 km/h (60 mph), maximum steering effort is provided by the speed proportional steering system.

Variable-effort power steering is provided by controlling power steering fluid pressure at the power steering gear. A solenoid control valve located on the steering gear (Fig. 2) is used to control power steering gear return fluid pressure. The pressure is controlled by varying the size of an orifice.

The variable-assist speed-proportional solenoid control valve is controlled by the Body Control Module (BCM). The BCM receives the vehicle speed signal sent from the Powertrain Control Module (PCM). Upon receiving the vehicle speed signal from the PCM, the BCM converts that speed signal into an electrical current usable by the solenoid control valve

for controlling the variable effort of the power steering system.

REMOVAL - POWER STEERING GEAR

(1) Remove the battery ground cable from the ground stud on the shock tower and isolate the ground cable by installing the cable isolator on the ground stud (Fig. 3).

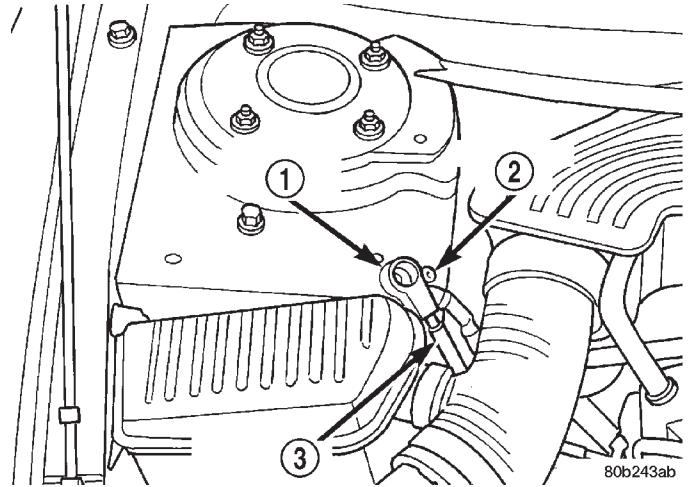


Fig. 3 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

(2) Position the front tires of the vehicle so that they are facing Straight-Ahead.

(3) Using a steering wheel holding clamp (Fig. 4), lock the steering wheel from rotating.

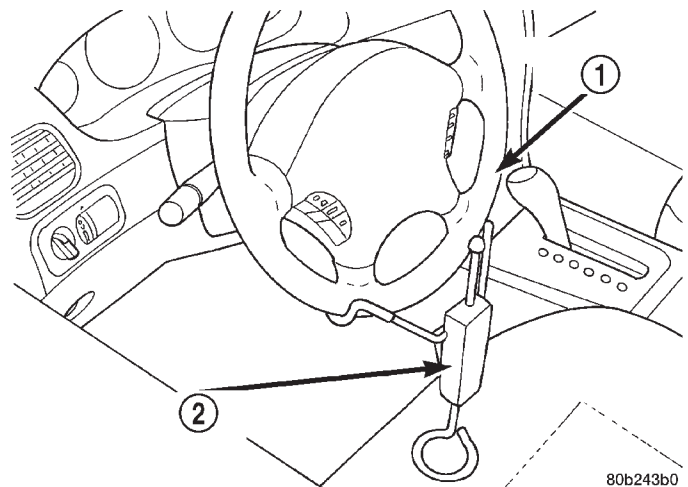


Fig. 4 Steering Wheel Lock Installed (Typical)

- 1 - STEERING WHEEL
- 2 - STEERING WHEEL CLAMP

GEAR (Continued)

CAUTION: Before removing the steering column coupler from the intermediated steering shaft be sure the steering wheel is locked from rotating (Fig. 4). If the steering wheel is allowed to rotate freely after it is disconnected from the intermediated shaft, the clockspring will be damaged and will need to be replaced.

(4) Remove the retaining pin and the coupler bolt from the steering column coupler (Fig. 5). Separate the intermediate steering shaft from the steering column coupler.

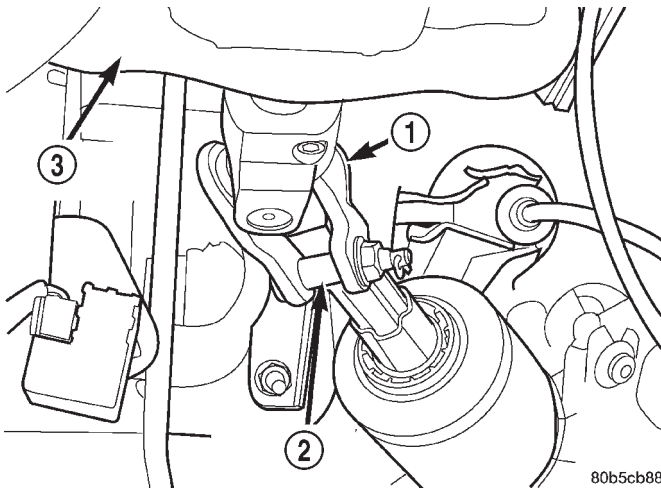


Fig. 5 Steering Column Coupler

- 1 - COUPLER
- 2 - PINCH BOLT
- 3 - STEERING COLUMN

(5) Raise the vehicle on a frame contact hoist until the front tires of the vehicle are just off the floor. See Hoisting in Lubrication and Maintenance.

(6) Remove caps from both wiper arms at the attachment to the pivots to expose the wiper arm attaching nut. Remove the nut attaching each wiper arm to its pivot (Fig. 6).

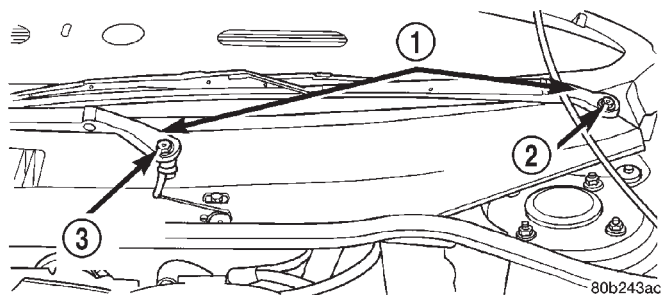


Fig. 6 Wiper Arm Attachment To Pivot

- 1 - WIPER ARMS
- 2 - ATTACHING NUT
- 3 - ATTACHING NUT

(7) Remove the wiper arms from the pivots. Wiper arms are removed from the pivots by rocking them back and force on the pivots until they can be pulled off the pivots.

(8) Remove the wiper module cover and cowl cover from the vehicle (Fig. 7).

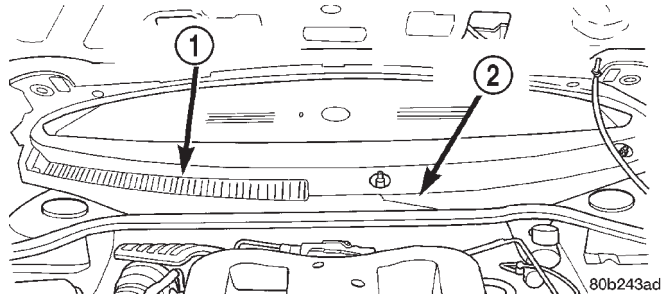


Fig. 7 Wiper Module And Cowl Cover

- 1 - COWL COVER
- 2 - WIPER MODULE COVER

(9) Remove the eight bolts attaching the cowl reinforcement to the strut towers and the one bolt attaching the wiper module to the reinforcement (Fig. 8). Remove the reinforcement from the vehicle.

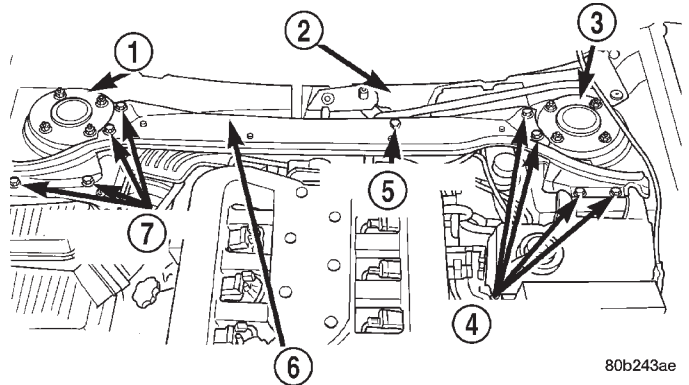


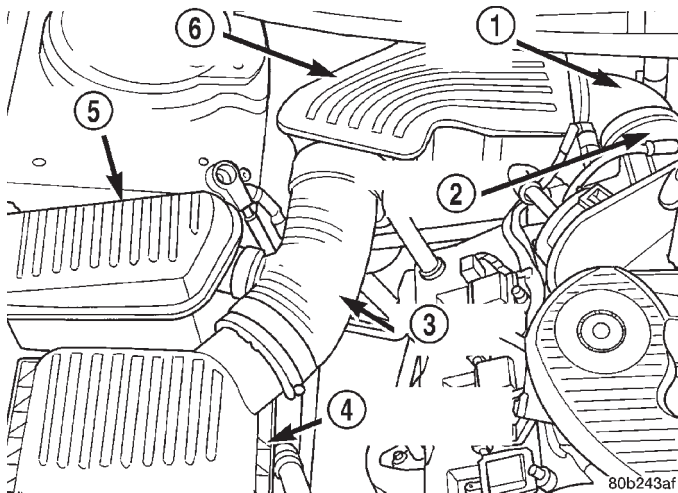
Fig. 8 Reinforcement Attachment To Vehicle

- 1 - RIGHT STRUT TOWER
- 2 - WIPER MODULE
- 3 - LEFT STRUT TOWER
- 4 - ATTACHING BOLTS
- 5 - ATTACHING BOLT
- 6 - REINFORCEMENT
- 7 - ATTACHING BOLTS

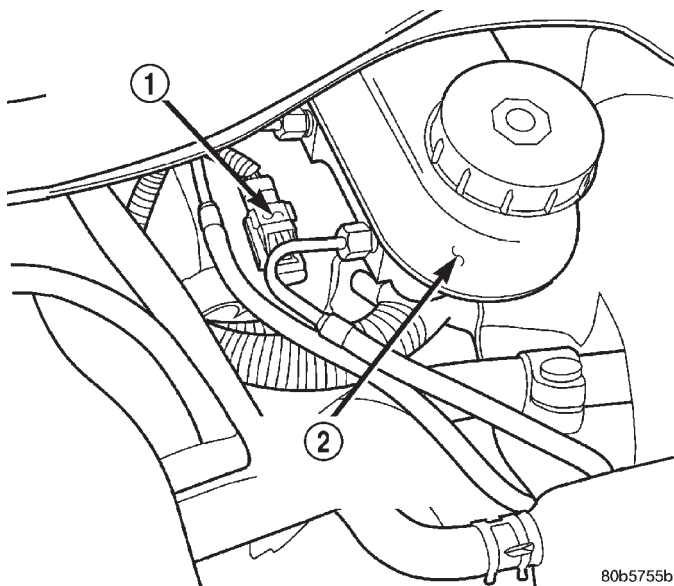
(10) Remove the in-line resonator and inlet hose (Fig. 9) from the throttle body and air let hose coming from the lid of the air cleaner housing.

(11) If the steering gear being removed from the vehicle is a speed proportional steering gear, disconnect the wiring harness connector from the solenoid control valve electrical connector. The connector is located on the steering gear end cap below the brake master cylinder. (Fig. 10).

GEAR (Continued)

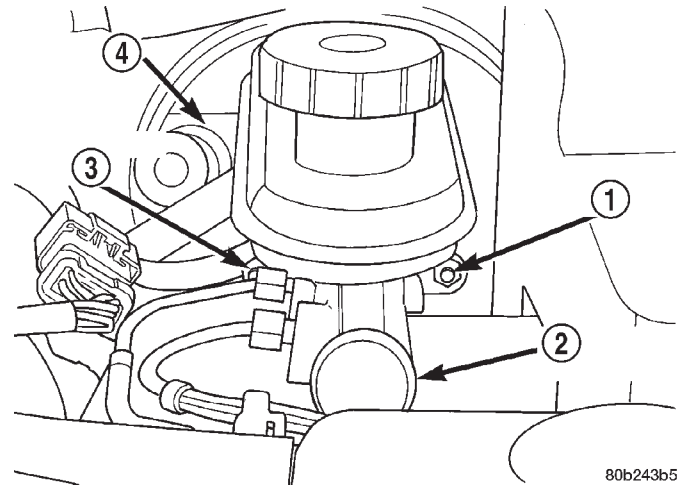
**Fig. 9 In-Line Resonator And Air Inlet Hose**

- 1 - AIR INLET HOSE
- 2 - THROTTLE BODY
- 3 - AIR INLET HOSE
- 4 - AIR CLEANER HOUSING LID
- 5 - RESONATOR
- 6 - IN-LINE RESONATOR

**Fig. 10 Wiring Harness**

- 1 - SPEED PROPORTIONAL STEERING SOLENOID CONNECTOR
- 2 - MASTER CYLINDER RESERVOIR

(12) Remove the two nuts mounting the master cylinder to the vacuum booster (Fig. 11).

**Fig. 11 Master Cylinder To Vacuum Booster Mounting**

- 1 - MOUNTING NUT
- 2 - MASTER CYLINDER
- 3 - MOUNTING NUT
- 4 - VACUUM BOOSTER

(13) Disconnect the brake fluid level switch connector on the side of the master cylinder fluid reservoir.

(14) Remove the master cylinder with the brake tubes connected from the power brake vacuum booster. Carefully position the master cylinder in an upright position on the left side valve cover of the engine.

CAUTION: Do not allow brake fluid to leak onto painted surfaces. Paint damage may occur.

(15) Remove the vacuum supply hose to the power brake vacuum booster at the check valve in the vacuum booster. Position the vacuum hose out of the way.

(16) Bend back the retaining tabs on the mounting plate for the tie rod to steering gear mounting bolts (Fig. 12).

(17) Remove the bolts, mounting plate and washers attaching the tie rods to the steering gear (Fig. 13). Lay the tie rods on top of the transaxle bell housing.

NOTE: The following step should be done to prevent excessive spilling of power steering fluid when the power steering fluid lines are removed from the steering gear.

GEAR (Continued)

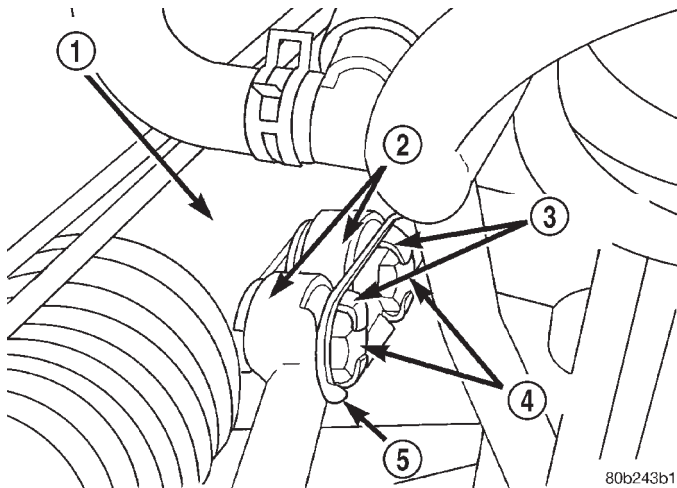


Fig. 12 Tie Rod Attachment Bolt Retaining Tabs

- 1 - STEERING GEAR
- 2 - TIE RODS
- 3 - RETAINING TABS
- 4 - BOLTS
- 5 - PLATE

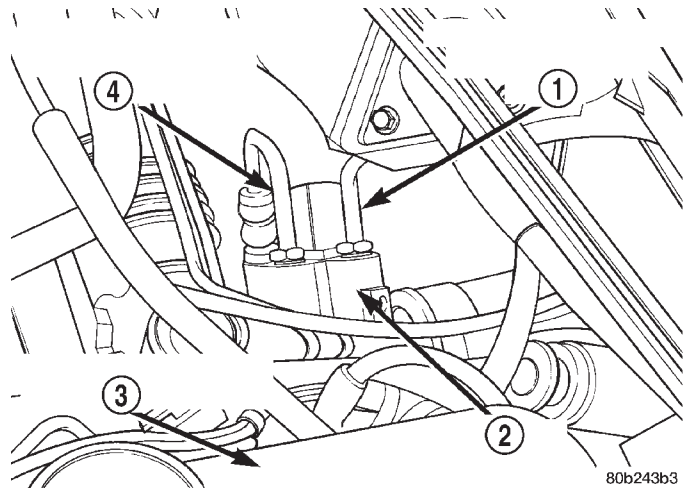


Fig. 14 Power Steering Hose Connections At Steering Gear

- 1 - POWER STEERING FLUID RETURN HOSE
- 2 - STEERING GEAR
- 3 - MASTER CYLINDER FLUID RESERVOIR
- 4 - POWER STEERING FLUID PRESSURE HOSE

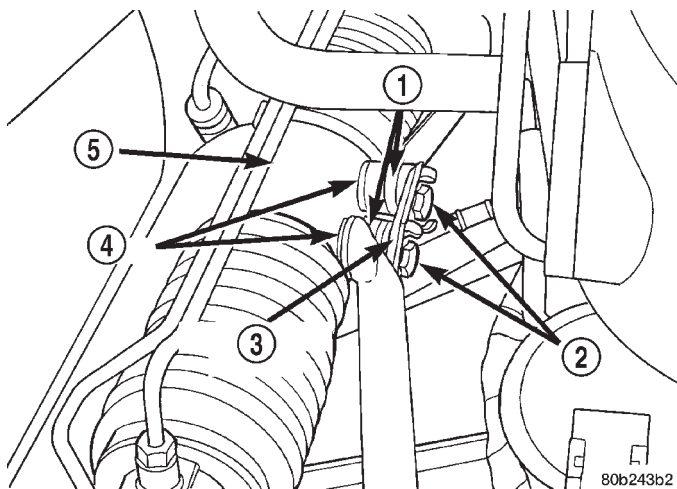


Fig. 13 Tie Rod To Steering Gear Attaching Bolts

- 1 - TIE RODS
- 2 - BOLTS
- 3 - MOUNTING PLATE
- 4 - WASHERS
- 5 - STEERING GEAR

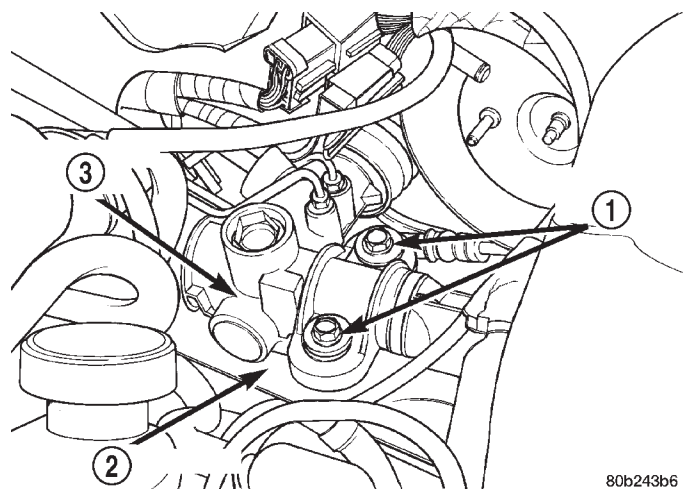


Fig. 15 Steering Gear Attachment To Crossmember (Left Side)

- 1 - MOUNTING BOLTS
- 2 - CORSSMEMBER
- 3 - STEERING GEAR

(18) Using a siphon pump, remove as much power steering fluid as possible from the power steering fluid reservoir.

(19) Remove the power steering fluid pressure hose and return hose from the steering gear (Fig. 14).

(20) Remove the two bolts attaching the left side of the steering gear to the crossmember (Fig. 15).

(21) Remove the two bolts attaching the steering gear's right side mounting bracket to the crossmember (Fig. 16).

NOTE: It may be necessary to loosen the two mounting bolts (Fig. 17) attaching the right mounting bracket to the steering gear in order to clear the air conditioning lines.

(22) Slide steering gear and intermediate shaft forward into the engine compartment to allow access to the roll pin retaining the intermediate shaft flex coupler to the steering gear shaft.

(23) Using roll pin Remover, Special Tool 6831A, remove roll pin from flex joint of intermediate shaft

GEAR (Continued)

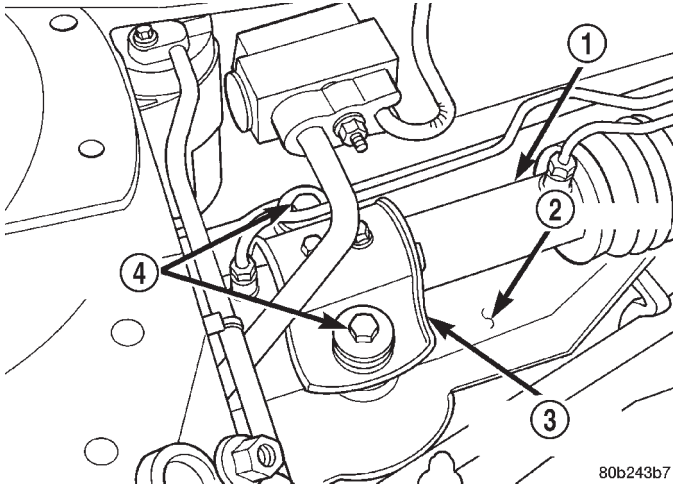


Fig. 16 Steering Gear Attachment To Crossmember (Right Side)

- 1 - STEERING GEAR
- 2 - CROSSMEMBER
- 3 - MOUNTING BRACKET
- 4 - MOUNTING BOLTS

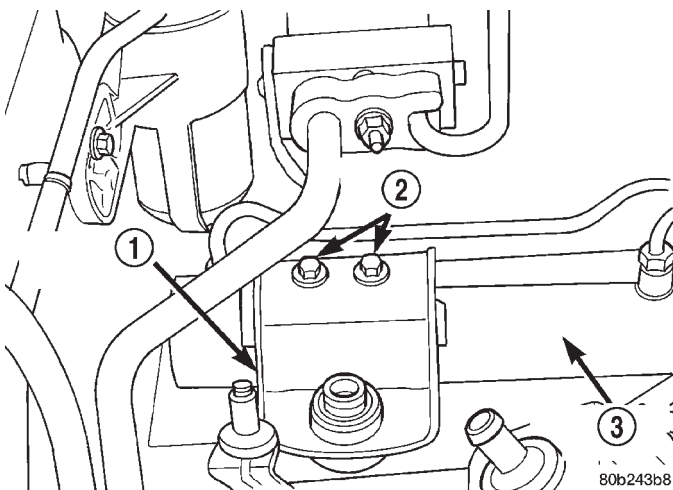


Fig. 17 Steering Gear Mounting Bracket

- 1 - MOUNTING BRACKET
- 2 - MOUNTING BOLTS
- 3 - STEERING GEAR

(Fig. 18). Roll pin is removed from coupler using following procedure:

- (a) Remove knurled nut from small end of tool.
- (b) Insert small end of Remover through center of roll pin, then install and hand tighten knurled nut.
- (c) Position sleeve of removal tool on flex joint as shown (Fig. 18).
- (d) While holding threaded shaft of tool from turning, tighten nut, pulling roll pin out of flex joint.

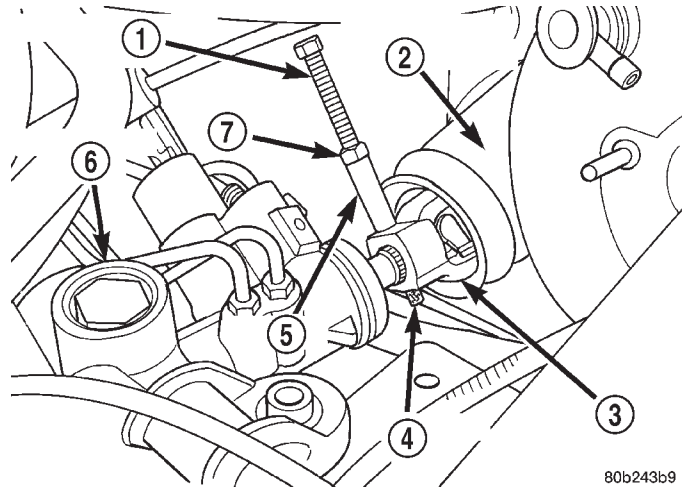


Fig. 18 Steering Coupler Roll Pin

- 1 - SPECIAL TOOL 6831-A
- 2 - DASH PANEL SEAL & BOOT
- 3 - FLEX JOINT
- 4 - KNURLED NUT
- 5 - SLEEVE
- 6 - STEERING GEAR
- 7 - NUT

(24) Separate the intermediate steering shaft from the steering gear.

(25) Raise vehicle.

(26) Remove the right front tire/wheel.

(27) Remove the nut (Fig. 19) attaching the tie rod end to the steering arm on the right strut.

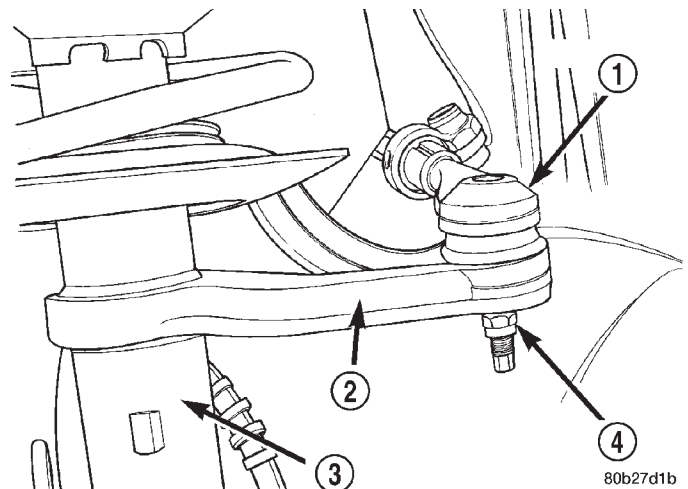


Fig. 19 Tie Rod End Attachment To Strut

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - NUT

GEAR (Continued)

(28) Remove the tie rod end from the steering arm of the strut using Puller, Special Tool C-3894-A (Fig. 20).

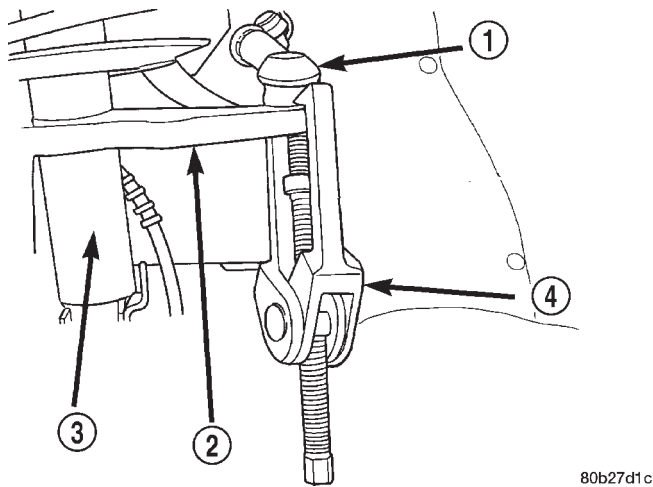


Fig. 20 Removing Outer Tie Rod From Steering Arm

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - C-3894A

(29) Remove the tie rod from the vehicle.

NOTE: If the vehicle is equipped with a 2.7 liter engine, rotate the front of the left front tire/wheel as far outward as possible (Fig. 21). This is necessary to have the required clearance to allow the removal of the steering gear from a vehicle with this engine application.

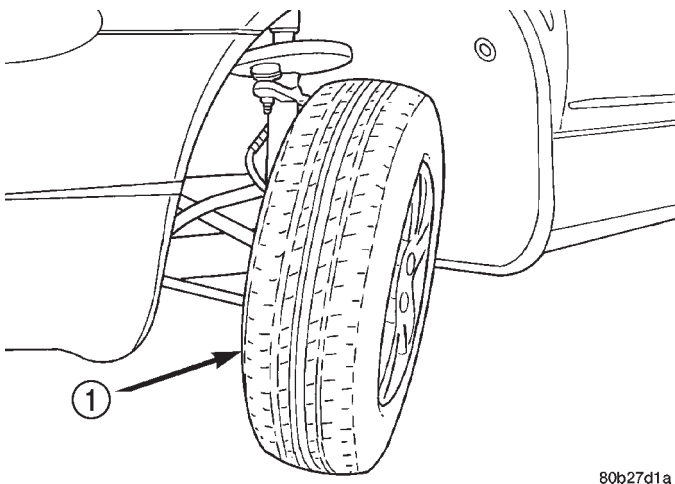


Fig. 21 Required Tire Position

- 1 - LEFT FRONT TIRE

(30) Remove the steering gear from the vehicle using the following steps.

(a) Slide the end of the steering gear through the tie rod hole in the right side inner fender (Fig. 22). Steering gear needs to be slid through tie rod hole until about half of the steering gear is through the hole (Fig. 22).

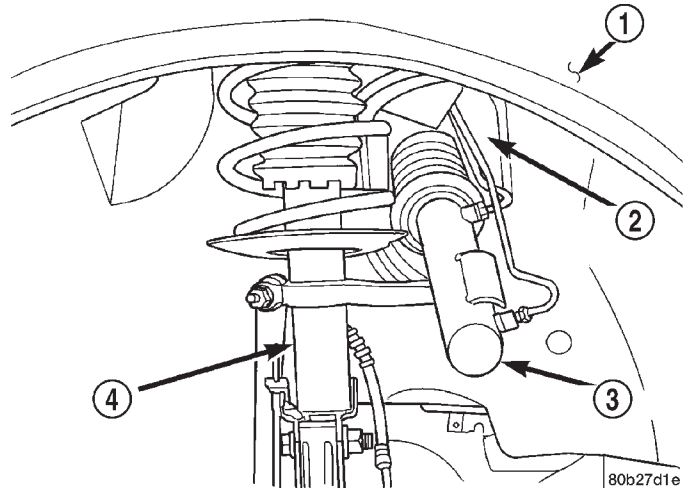


Fig. 22 Steering Gear Through Tie Rod Hole

- 1 - FENDER
- 2 - TIE ROD HOLE
- 3 - STEERING GEAR
- 4 - STRUT

(b) Lift the left end of the steering gear upward, with the steering gear positioned as shown, between the back of the engine and the front of the cowl (Fig. 23).

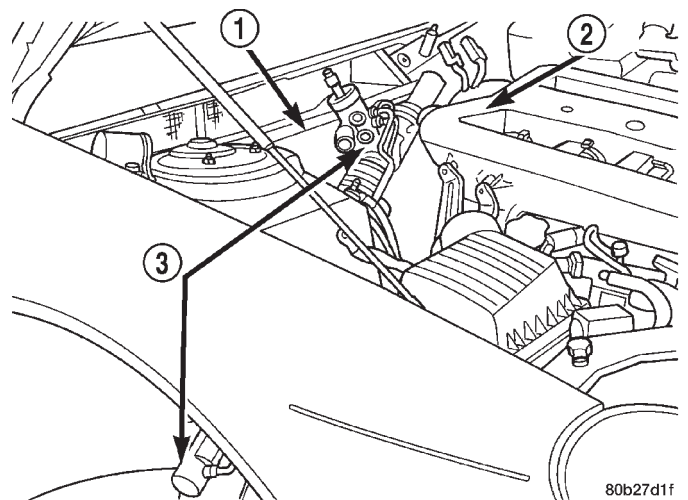


Fig. 23 Steering Gear Positioned For Removal

- 1 - COWL
- 2 - ENGINE
- 3 - STEERING GEAR

(c) To remove the steering gear from the vehicle, pull the steering gear toward the passenger side of the vehicle out from between the cowl and the engine.

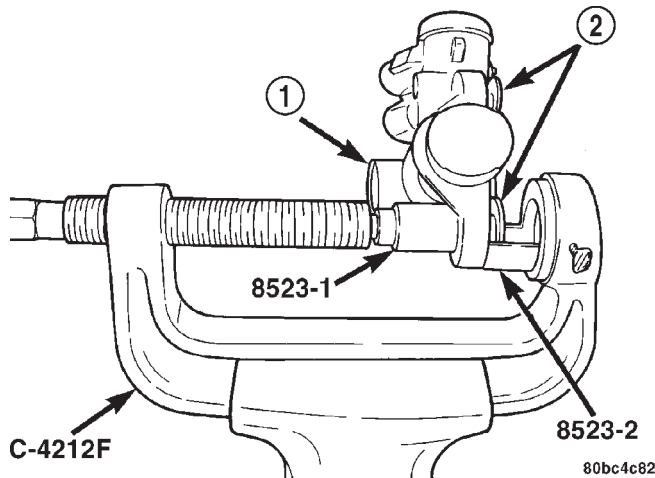
GEAR (Continued)

DISASSEMBLY - POWER STEERING GEAR (HOUSING BUSHINGS)

The power steering gear must be removed from the vehicle for the bushings to be serviced. Refer to REMOVAL in this section.

(1) Install the Receiver, Special Tool 8523-2, into the cup of the Ball Joint Press, Special Tool C-4212F, and tighten the set screw. Install the Driver, Special Tool 8523-1, on the tip of the Ball Joint Press screw drive.

(2) Place the power steering gear housing against the Receiver (Fig. 24). Tighten the screw drive until the Driver contacts the outer circumference of the bushing evenly (Fig. 24). Continue to tighten the screw drive until the bushing is pressed completely out of the steering gear housing.

**Fig. 24 Removing Bushing**

- 1 - POWER STEERING GEAR HOUSING
- 2 - BUSHINGS

(3) Back off the screw drive and remove the power steering gear from the Receiver.

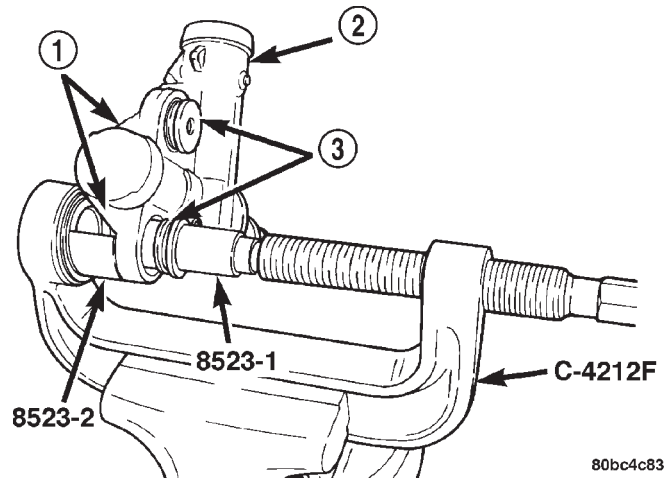
(4) Repeat the above procedure on the other power steering gear housing bushing.

ASSEMBLY- POWER STEERING GEAR (HOUSING BUSHINGS)

(1) Install the Receiver, Special Tool 8523-2, into the cup of the Ball Joint Press, Special Tool C-4212F, and tighten the set screw. Install the Driver, Special Tool 8523-1, on the tip of the Ball Joint Press screw drive.

(2) Place the steering gear housing against the Receiver in a way that the Receiver does not come in contact with the support ribs on the gear housing (Fig. 25). Start the bushing in the bottom of the housing and tighten the screw drive until the Driver contacts the bushing retainer washer (Fig. 25). Slowly tighten the screw drive until the bushing bot-

toms in the recessed area of the steering gear housing.



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Fig. 25 Installing Bushing

- 1 - SUPPORT RIBS
- 2 - POWER STEERING GEAR HOUSING
- 3 - BUSHINGS

(3) Back off the Ball Joint Press screw drive and remove the power steering gear from the press.

(4) Repeat the above procedure on the other power steering gear housing bushing.

INSTALLATION - POWER STEERING GEAR

NOTE: When the original or a replacement steering gear is being installed in vehicle, be sure the tie rod attachment at the steering gear is in the center of steering gear travel.

(1) Install the steering gear in the vehicle using the reverse sequence of the removal steps.

NOTE: If the vehicle is equipped with a 2.7 Liter engine, position the left front tire so it is facing straight forward.

(2) Install the right tie rod through the tie rod hole in the inner fender.

(3) Install the outer tie rod on the steering arm of the right strut. Install the tie rod to steering arm attaching nut (Fig. 19). Tighten the attaching nut to a torque of 37 N·m (27 ft. lbs.).

(4) Install the right side tire/wheel.

(5) Install and tighten wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(6) Lower the vehicle until the front tires are just clear of the floor.

(7) Install the intermediate steering shaft on the steering gear.

GEAR (Continued)

(8) Using roll pin Installer, Special Tool 6831A, install the roll pin in the flex joint of the intermediate shaft (Fig. 26). Roll pin is installed in coupler using the following procedure:

- Remove knurled nut from small end of tool.
- Insert small end of removal tool through center of roll pin and then install and hand tighten knurled nut.
- Position sleeve of removal tool on flex joint as shown (Fig. 26).
- While holding threaded shaft of tool from turning, tighten nut pulling roll pin into flex joint.
- Center roll pin in flex joint. Do not over-install roll pin.

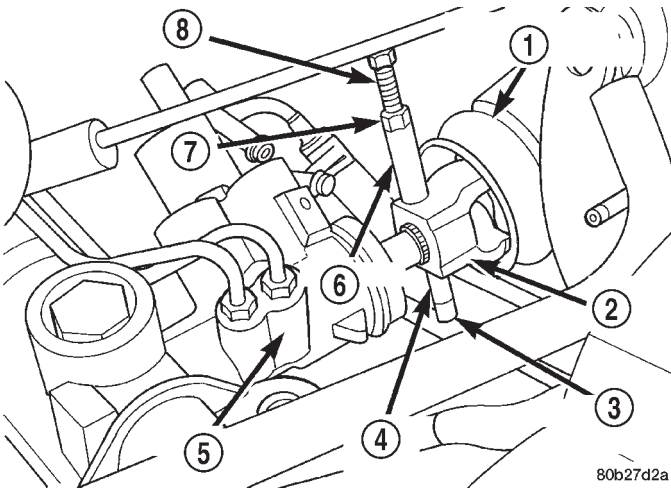


Fig. 26 Steering Coupler Roll Pin Installation

- DASH PANEL SEAL AND BOOT
- FLEX JOINT
- KNURLED NUT
- ROLL PIN
- STEERING GEAR
- SLEEVE
- NUT
- SPECIAL TOOL 6831A

(9) Slide steering gear and intermediate shaft back into dash panel sealing boot. Align the steering gear mounting holes with its mounting holes in crossmember.

(10) Loosely install the bolts mounting the left side of the steering gear to the crossmember (Fig. 15).

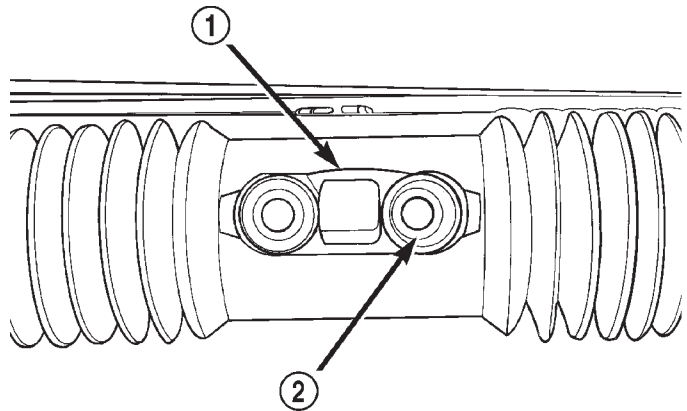
CAUTION: Tightening the steering gear to crossmember mounting bolts to the proper torque is very important.

(11) Install the bolts mounting the right side mounting bracket for the steering gear to the crossmember (Fig. 16). Tighten the mounting bolts to a torque of 58 N·m (43 ft. lbs.).

(12) Tighten the bolts mounting the left side of the steering gear to the crossmember to a torque of 58 N·m (43 ft. lbs.).

(13) If previously loosened, tighten the bolts mounting the steering gear mounting bracket to the right side of the steering gear (Fig. 17) to a torque of 37 N·m (27 ft. lbs.).

CAUTION: Before installing tie rods on steering gear be sure the tie rod spacer block inside the steering gear bellows (boot) (Fig. 27) is correctly aligned with the bolt holes in the rack of the steering gear and the steering gear bellows.



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Fig. 27 Tie Rod Spacer Block

- STEERING GEAR BOOT
- SPACER BLOCK

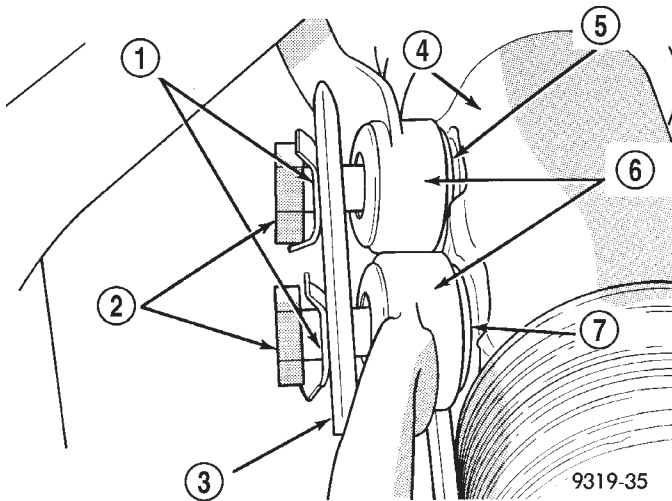
(14) Attach power steering fluid pressure, and return lines into proper ports of the steering gear (Fig. 14). Tighten both power steering hose tube nuts to a torque of 47 N·m (35 ft. lbs.).

(15) If equipped with speed proportional steering, connect the wiring harness connector to the solenoid control valve electrical connector (Fig. 10).

(16) Align center take off on steering gear with the tie rod assemblies. Install tie rod attaching bolts and washers into steering gear assembly. **Be sure washers are installed between tie rods and steering gear (Fig. 28).** Tighten the tie rod to steering gear bolts to a torque of 100 N·m (74 ft. lbs.).

CAUTION: After tie rod attaching bolts are torqued, bend the retaining plate tabs against heads of the attaching bolts (Fig. 12).

GEAR (Continued)

**Fig. 28 Tie Rod Attachment**

- 1 - RETAINING TABS
- 2 - BOLTS
- 3 - RETAINING PLATE
- 4 - STEERING GEAR
- 5 - WASHER
- 6 - TIE RODS
- 7 - WASHER

(17) Install the vacuum hose for the power brake booster on intake manifold vacuum port. Install hose clamp on vacuum hose.

(18) Install the master cylinder on the power brake vacuum booster. Install the two nuts attaching the master cylinder to the booster. Tighten the master cylinder mounting nuts to a torque of 28 N·m (250 in. lbs.).

(19) Connect wire connector to the brake fluid level switch on the side of the master cylinder fluid reservoir.

(20) Install the in-line resonator and inlet hose (Fig. 9) on the throttle body and air inlet hose coming from the lid of the air cleaner housing.

(21) Install the cowl reinforcement on the vehicle (Fig. 8). Install the eight bolts attaching the reinforcement to the strut towers. Install the bolt attaching the wiper module to the reinforcement.

(22) Install the covers (Fig. 7) over the wiper module and the cowl. Install and securely tighten the attaching screws.

(23) Install the wiper arms (Fig. 6) on the pivots. Install and securely tighten the wiper arm to pivot attaching nuts. Install the caps on the wiper arms covering the pivot nuts.

(24) Install the intermediate shaft onto the steering column shaft. Install steering column coupler pinch bolt (Fig. 5) and tighten to a torque of 28 N·m (21 ft. lbs.). Install the pinch bolt nut retaining pin in pinch bolt.

(25) Remove the holding clamp from the steering wheel (Fig. 4).

(26) Install the battery ground cable onto the ground stud on the shock tower.

(27) Perform Power Steering Pump Initial Operation procedure to properly refill and bleed power steering system. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(28) Lower vehicle.

(29) Adjust front toe. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

SPEED PROPORTIONAL STEERING SOLENOID

DESCRIPTION - SOLENOID CONTROL VALVE

The solenoid control valve is mounted on the speed proportional power steering gear housing (Fig. 2).

OPERATION - SOLENOID CONTROL VALVE

Variable-effort power steering is provided by controlling power steering fluid pressure at the power steering gear. A solenoid control valve located on the steering gear (Fig. 2) is used to control power steering gear return fluid pressure. The pressure is controlled by varying the size of an orifice.

The variable-assist speed-proportional solenoid control valve is controlled by the Body Control Module (BCM). The BCM receives the vehicle speed signal sent from the Powertrain Control Module (PCM). Upon receiving the vehicle speed signal from the PCM, the BCM converts that speed signal into an electrical current usable by the solenoid control valve for controlling the variable effort of the power steering system.

The solenoid control valve is a serviceable component of the variable-effort, speed-proportional power steering gear assembly.

REMOVAL - SOLENOID CONTROL VALVE

(1) Disconnect the solenoid control valve electrical connector from the wiring harness at the power steering gear end cap below the brake master cylinder (Fig. 29).

(2) Unclip the connector from the gear end cap.

(3) Remove the power steering pressure hose (Fig. 30) from the power steering gear.

(4) Remove the power steering return hose (Fig. 30) from the power steering gear.

(5) Using a 1-5/16 inch crow foot (Fig. 31), loosen the solenoid control valve. Then, by hand, remove the solenoid control valve from the power steering gear.

SPEED PROPORTIONAL STEERING SOLENOID (Continued)

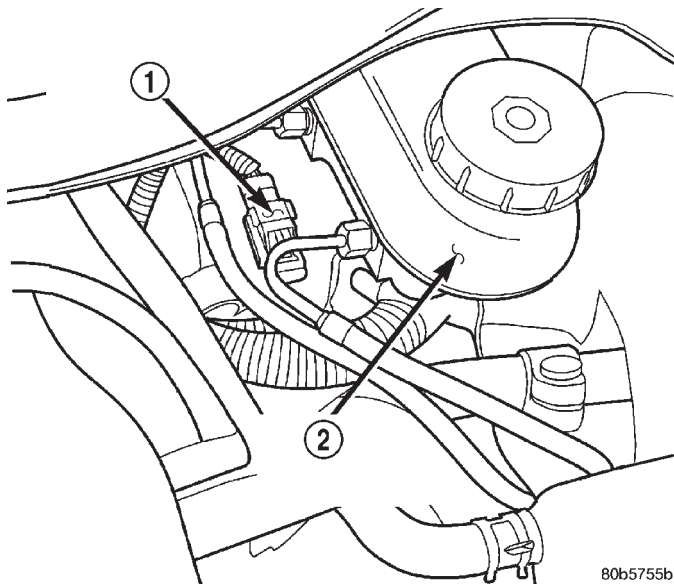


Fig. 29 Wiring Harness

- 1 - SPEED PROPORTIONAL STEERING SOLENOID CONNECTOR
- 2 - MASTER CYLINDER RESERVOIR

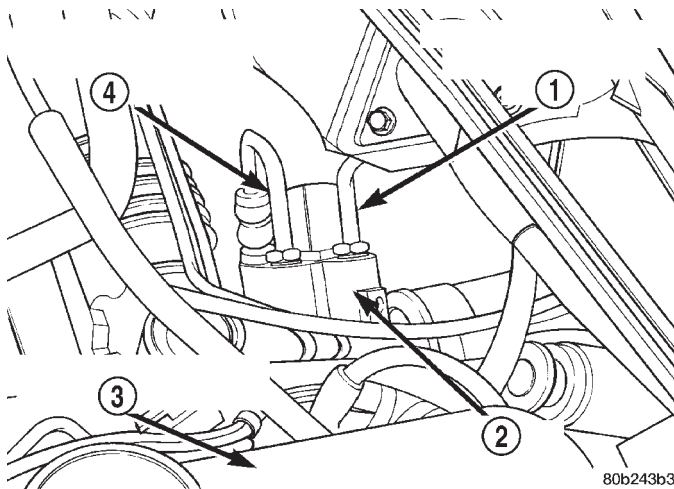


Fig. 30 Power Steering Hose Connections At Steering Gear

- 1 - POWER STEERING FLUID RETURN HOSE
- 2 - STEERING GEAR
- 3 - MASTER CYLINDER FLUID RESERVOIR
- 4 - POWER STEERING FLUID PRESSURE HOSE

INSTALLATION - SOLENOID CONTROL VALVE

(1) Inspect the O-ring seals on the solenoid control valve to be sure they are not damaged. If the O-rings are not damaged, moisten the O-rings using **only** fresh clean Mopar Power Steering Fluid, or equivalent.

(2) Install the solenoid control valve into the steering gear by hand until it is fully seated into the steering gear.

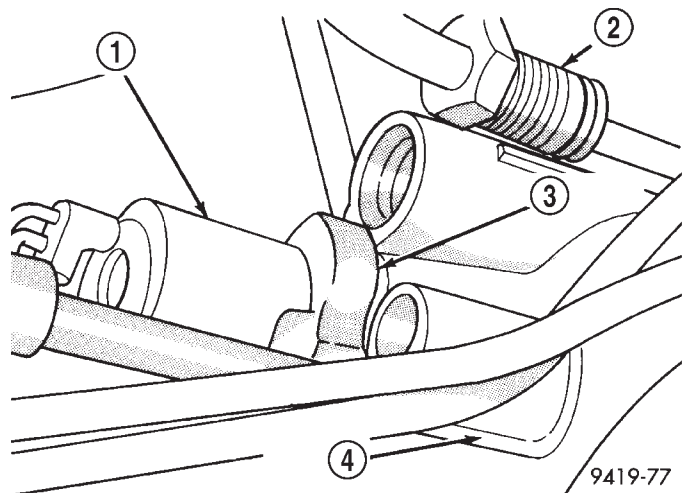


Fig. 31 Loosening Solenoid Control Valve

- 1 - SOLENOID CONTROL VALVE
- 2 - RETURN HOSE
- 3 - 15/16 CROW FOOT
- 4 - STEERING GEAR

(3) Using the 1-5/16 inch crow foot as shown (Fig. 32), tighten the solenoid control valve to a torque of 14 N·m (124 in. lbs.).

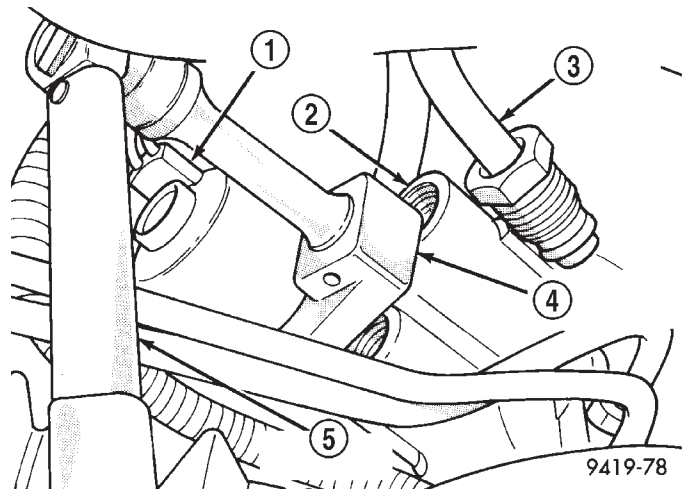


Fig. 32 Torquing Solenoid Control Valve

- 1 - SOLENOID CONTROL VALVE
- 2 - STEERING GEAR
- 3 - POWER STEERING RETURN HOSE
- 4 - 15/16 CROW FOOT
- 5 - TORQUE WRENCH

(4) Reconnect the power steering hoses at the gear (Fig. 30). Tighten both hose tube nuts to 31 N·m (275 in. lbs.).

(5) Route the solenoid control valve wire harness over the top of the gear and clip it into place on the gear end cap.

SPEED PROPORTIONAL STEERING SOLENOID (Continued)

(6) Connect the wiring harness connector. **Be sure the wiring harness connector seal is in good condition before installing the connector in the control module.**

(7) Road test vehicle, referring to the test indicated in the Appropriate Diagnostic Information, to confirm correct operation of the variable-assist speed-proportional power steering gear.

TIE ROD - INNER

REMOVAL - INNER TIE ROD

(1) Remove the battery ground cable from the ground stud on the shock tower and isolate the ground cable by installing the cable isolator on the ground stud (Fig. 33).

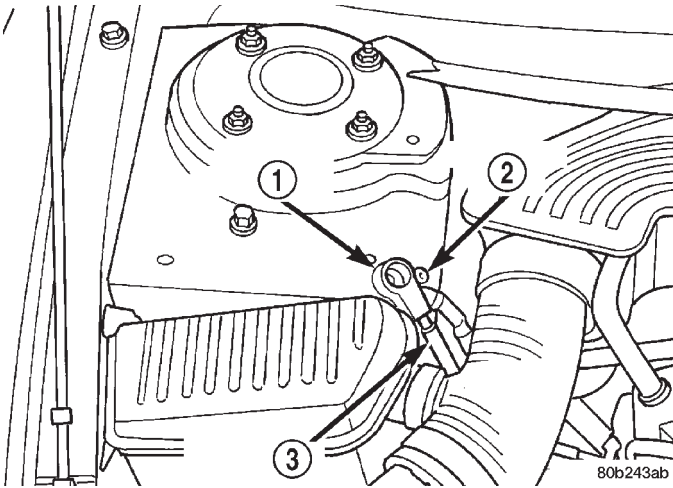


Fig. 33 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

(2) Remove caps from both wiper arms at the attachment to the pivots to expose the wiper arm attaching nut. Remove the nut attaching each wiper arm to its pivot (Fig. 34).

(3) Remove the wiper arms from the pivots. Wiper arms are removed from the pivots by rocking them back and force on the pivots until they can be pulled off the pivots.

(4) Remove the wiper module cover and cowl cover from the vehicle (Fig. 35).

(5) Remove the 8 bolts attaching the reinforcement to the strut towers and the 1 bolt attaching the wiper module to the reinforcement (Fig. 36). Remove the reinforcement from the vehicle.

(6) Remove the in-line resonator and inlet hose from the throttle body and air let hose coming from the lid of the air cleaner housing (Fig. 37).

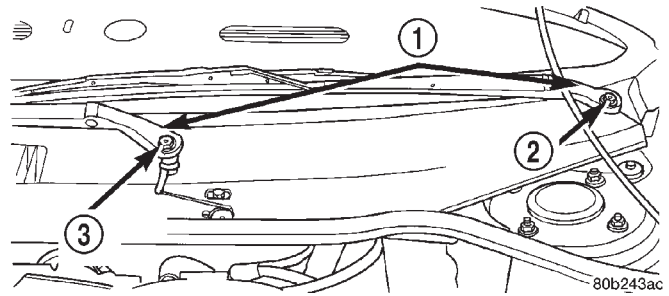


Fig. 34 Wiper Arm Attachment To Pivot

- 1 - WIPER ARMS
- 2 - ATTACHING NUT
- 3 - ATTACHING NUT

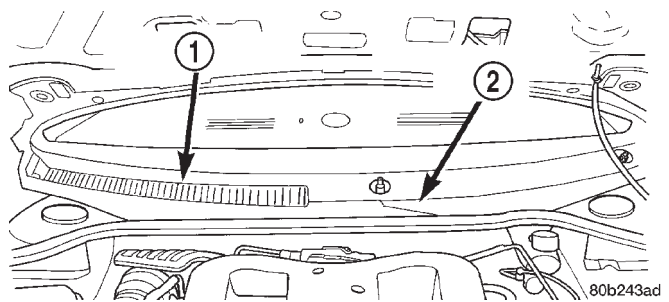


Fig. 35 Wiper Module And Cowl Cover

- 1 - COWL COVER
- 2 - WIPER MODULE COVER

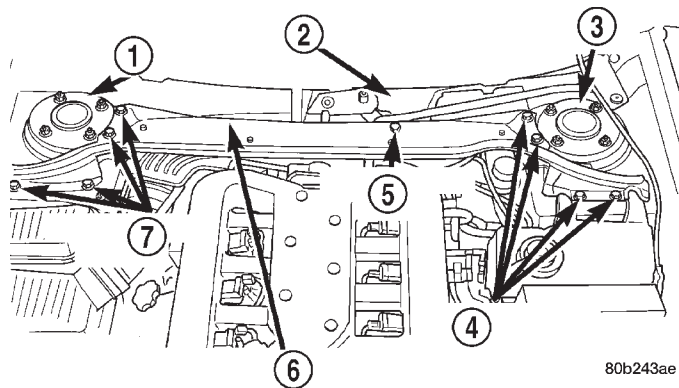


Fig. 36 Reinforcement Attachment To Vehicle

- 1 - RIGHT STRUT TOWER
- 2 - WIPER MODULE
- 3 - LEFT STRUT TOWER
- 4 - ATTACHING BOLTS
- 5 - ATTACHING BOLT
- 6 - REINFORCEMENT
- 7 - ATTACHING BOLTS

(7) Raise the vehicle on a frame contact hoist until the front tires of the vehicle are just off the floor. See Hoisting in Lubrication And Maintenance.

(8) Remove front wheel and tire assembly from side requiring repair.

TIE ROD - INNER (Continued)

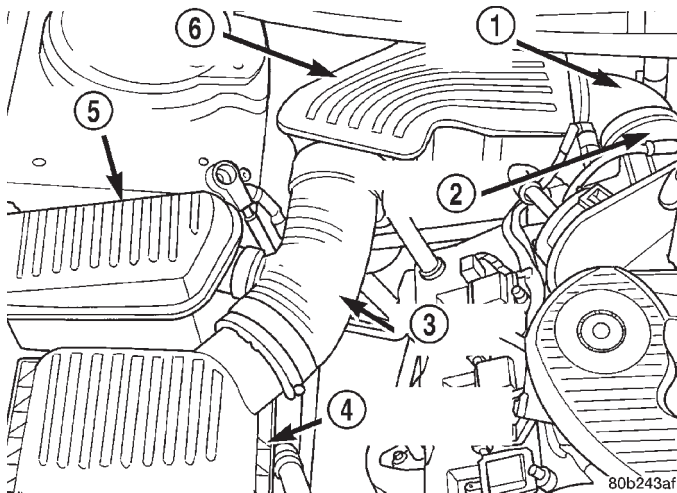


Fig. 37 In-Line Resonator And Air Inlet Hose

- 1 - AIR INLET HOSE
- 2 - THROTTLE BODY
- 3 - AIR INLET HOSE
- 4 - AIR CLEANER HOUSING LID
- 5 - RESONATOR
- 6 - IN-LINE RESONATOR

(9) Remove the nut attaching the outer tie rod end to the steering arm on the strut (Fig. 38).

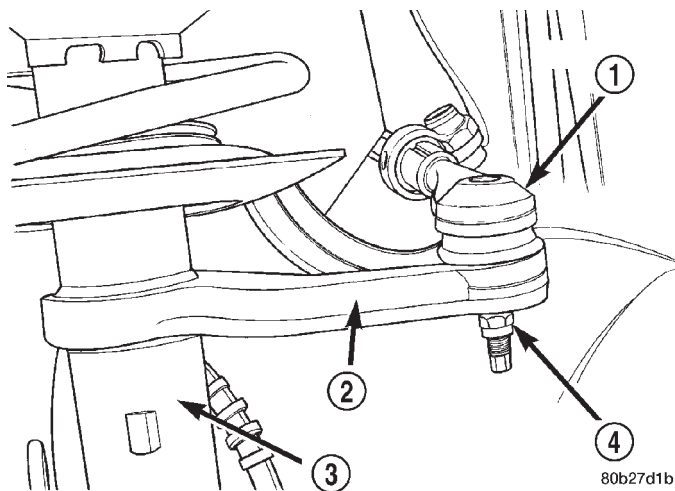


Fig. 38 Tie Rod End Attachment To Strut

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - NUT

(10) Remove the tie rod end from the steering arm of the strut using Puller, Special Tool C-3894-A (Fig. 39).

(11) Turn the steering wheel all the way to the full right position.

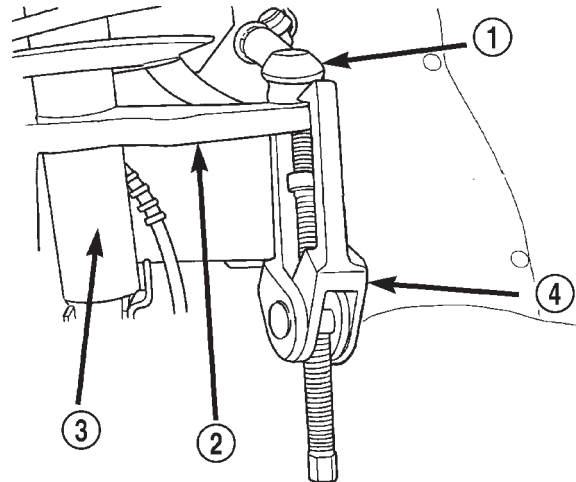


Fig. 39 Removing Outer Tie Rod From Steering Arm

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - C-3894A

(12) Bend back the retaining tabs on the mounting plate for the tie rod to steering gear mounting bolts (Fig. 40).

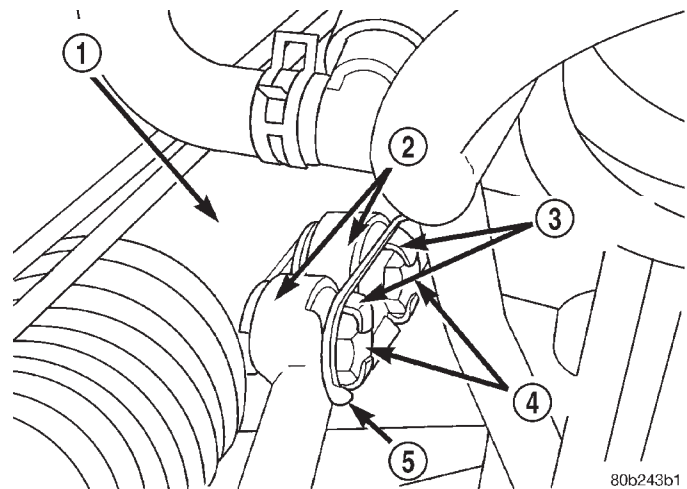


Fig. 40 Tie Rod Attachment Bolt Retaining Tabs

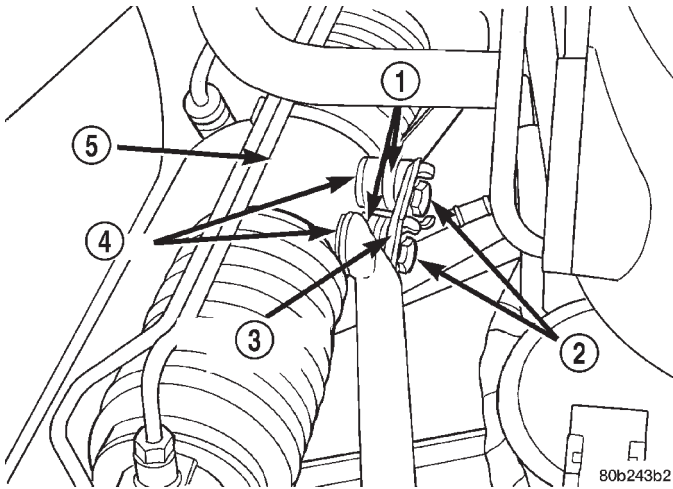
- 1 - STEERING GEAR
- 2 - TIE RODS
- 3 - RETAINING TABS
- 4 - BOLTS
- 5 - PLATE

(13) Remove the bolt fastening the inner tie rod requiring service to the steering gear (Fig. 41). Be careful not to loose the washer behind the tie rod.

(14) Loosen the bolt fastening the opposite inner tie rod to the gear, but do not fully remove it.

(15) Rotate the loose end of the mounting plate out of the way.

TIE ROD - INNER (Continued)

**Fig. 41 Tie Rod To Steering Gear Attaching Bolts**

- 1 - TIE RODS
- 2 - BOLTS
- 3 - MOUNTING PLATE
- 4 - WASHERS
- 5 - STEERING GEAR

(16) Remove the tie rod assembly from the vehicle through the wheel opening.

(17) Loosen the pinch bolt at the outer to inner tie rod adjustment sleeve.

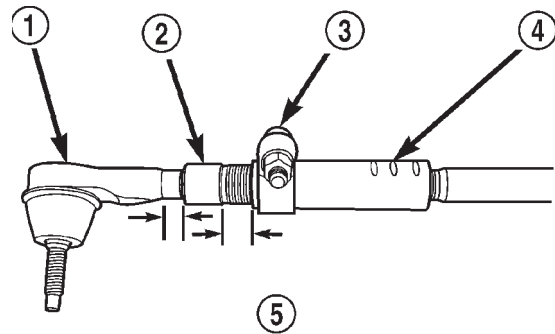
(18) Remove outer tie rod from adjustment sleeve and inner tie rod.

INSTALLATION - INNER TIE ROD

(1) Install the outer tie rod into the adjustment sleeve on the inner tie rod. Screw the tie rod in until the exposed thread length on the outer tie rod is equal to the exposed threads on the adjuster. Make sure no more than 20 mm thread length is exposed on either the tie rod or the adjuster sleeve (Fig. 42). **Do not tighten the adjustment pinch bolt at this time.**

CAUTION: When setting the front Toe on the vehicle, the maximum dimension of exposed threads allowed on the adjuster and outer tie rod cannot exceed the distance shown in (Fig. 42). If the maximum distance is exceeded, inadequate retention of either the adjuster or the outer tie rod can result. This condition can cause separation of the outer tie rod end from the inner tie rod. Ensure that adjustment sleeve pinch bolts are torqued to the required specification when Toe setting procedure is completed.

(2) Install the tie rod assembly through the tie rod hole in the wheel opening inner fender.



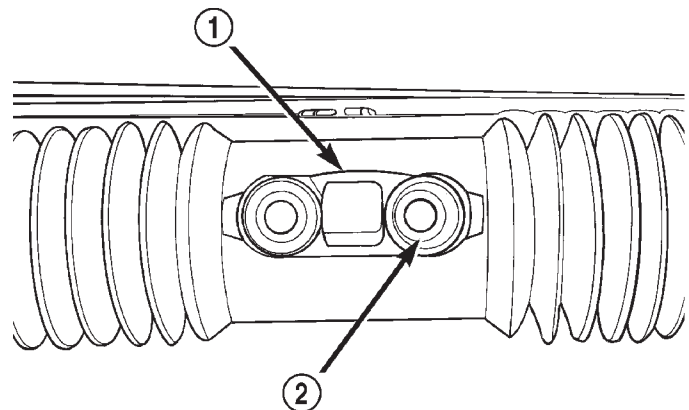
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Fig. 42 Tie Rod Thread Engagement Requirements

- 1 - OUTER TIE ROD
- 2 - ADJUSTER
- 3 - PINCH BOLT
- 4 - INNER TIE ROD
- 5 - ALLOWABLE THREADS EXPOSED ON OUTER TIE ROD AND ADJUSTER IS A MAXIMUM OF 20 MILLIMETERS. REFER TO AREA INDICATED ABOVE ON THE OUTER TIE ROD AND ADJUSTER.

(3) Install the outer tie rod on the steering arm of the strut. Install the tie rod steering arm nut (Fig. 38). **Do not tighten the nut at this time.**

CAUTION: Before installing tie rod on steering gear be sure the tie rod spacer block inside the steering gear bellows (boot) is correctly aligned with the bolt holes in the rack of the steering gear and the steering gear bellows (Fig. 43).



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Fig. 43 Tie Rod Spacer Block

- 1 - STEERING GEAR BOOT
- 2 - SPACER BLOCK

(4) Align the inner tie rod with the mounting hole in the center take off on steering gear. Rotate the mounting plate into position over the tie rod. Install

TIE ROD - INNER (Continued)

tie rod attaching bolt through tie rod and washer into steering gear. **Be sure washer is installed between tie rod and steering gear as shown (Fig. 44). Tighten both tie rod to steering gear bolts to a torque of 100 N·m (74 ft. lbs.).**

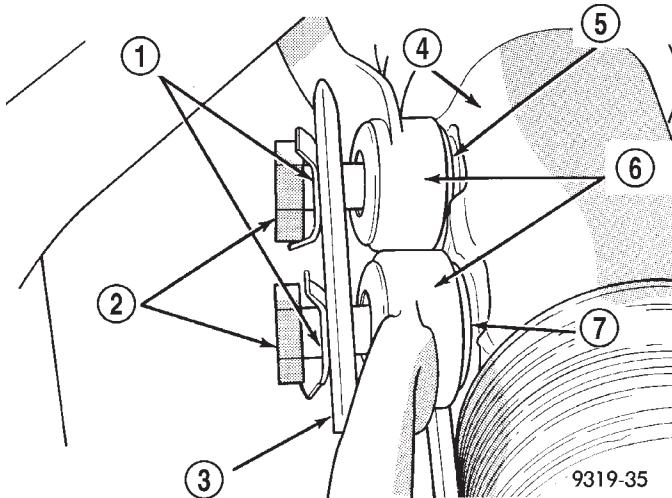


Fig. 44 Tie Rod Attachment

- 1 - RETAINING TABS
- 2 - BOLTS
- 3 - RETAINING PLATE
- 4 - STEERING GEAR
- 5 - WASHER
- 6 - TIE RODS
- 7 - WASHER

(5) Bend retaining tabs against heads of tie rod attaching bolts (Fig. 40).

(6) Place the front wheels in the straight-ahead position.

(7) Tighten the outer tie rod steering arm nut to a torque of 37 N·m (27 ft. lbs.).

(8) Install the wheel and tire assembly. Install and tighten wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(9) Lower the vehicle.

(10) Install the in-line resonator and inlet hose on the throttle body and air inlet hose coming from the lid of the air cleaner housing (Fig. 37).

(11) Install the reinforcement on the vehicle (Fig. 36). Install the 8 bolts attaching the reinforcement to the strut towers. Install the bolt attaching the wiper module to the reinforcement.

(12) Install the covers over the wiper module and the cowl (Fig. 35). Install and securely tighten the attaching screws.

(13) Install the wiper arms on the pivots (Fig. 34). Install and securely tighten the wiper arm to pivot attaching nuts. Install the caps on the wiper arms covering the pivot nuts.

(14) Install the battery ground cable onto the ground stud on the shock tower and install nut.

(15) Adjust front toe. Refer to Wheel Alignment in Suspension.

TIE ROD - OUTER

DIAGNOSIS AND TESTING - OUTER TIE ROD SOCKET END PLAY

NOTE: When measuring tie rod socket end play, the total weight of the vehicle must be supported by the tires and suspension of the vehicle. Do not support the vehicle by other than a drive-on hoist or an alignment rack.

(1) Position the vehicle on a drive on hoist or an alignment rack so that the tires are supporting the total weight of the vehicle.

(2) Raise hoist or alignment rack so that the tie rod is positioned at eye level.

(3) Mount a dial indicator to the front strut assembly (Fig. 45).

(4) Install a U-bolt having an inside dimension of 2 inches and a length of 3 inches (minimum) on the tie rod end and steering arm of strut as shown in (Fig. 45). Hand tighten nuts on U-bolt enough to just hold U-bolt in place.

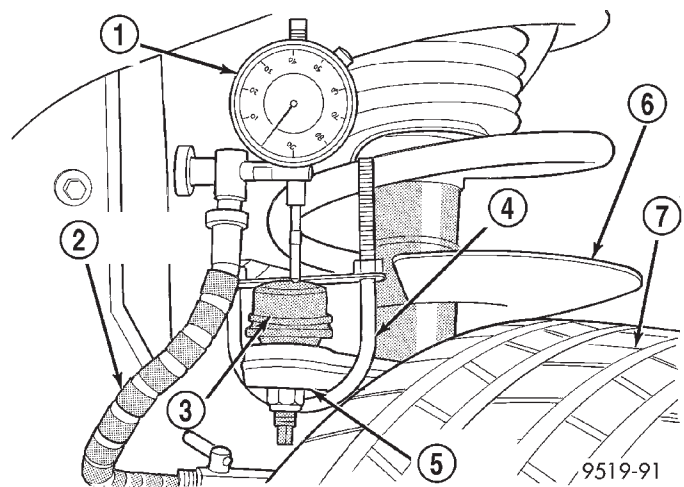


Fig. 45 Checking Tie Rod Socket

- 1 - DIAL INDICATOR
- 2 - DIAL INDICATOR MOUNT
- 3 - TIE ROD
- 4 - U-BOLT
- 5 - STEERING ARM
- 6 - FRONT STRUT
- 7 - TIRE

(5) Position dial indicator in center of tie rod as shown in (Fig. 45). Zero the dial indicator gauge.

TIE ROD - OUTER (Continued)

(6) Equally tighten both nuts on the U-bolt until a torque of 2.7 N·m (24 in. lbs.) is achieved on each nut.

(7) Note the tie rod socket end play. New ball joint end play should not be greater than 0.100 inches. Used ball joint end play should not be greater than 0.190. If end play for a ball joint in service (Used) is greater than the specification listed, the ball joint will require replacement.

REMOVAL - OUTER TIE ROD

(1) Raise vehicle on jackstands or centered on a frame contact hoist. See Hoisting in Lubrication and Maintenance.

(2) Remove tire and wheel assembly.

(3) Loosen the pinch bolt at the outer to inner tie rod adjustment sleeve (Fig. 46).

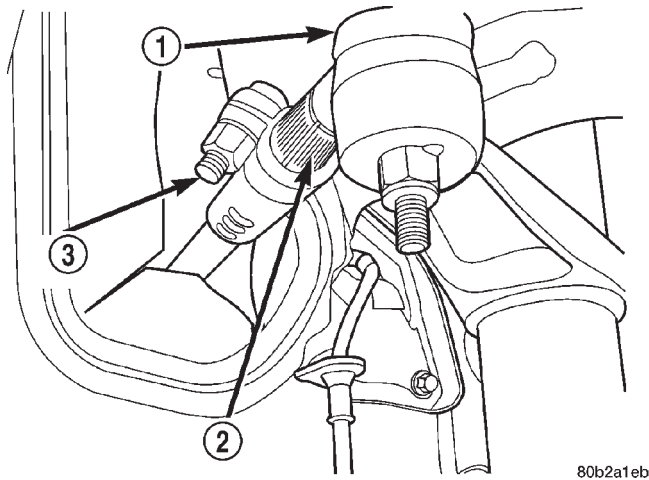


Fig. 46 Tie Rod Adjustment Sleeve Pinch Bolt

- 1 - OUTER TIE ROD
- 2 - ADJUSTMENT SLEEVE
- 3 - PINCH BOLT

(4) Remove the outer tie rod to strut steering arm attaching nut (Fig. 47).

(5) Remove the outer tie rod from the steering arm using Puller, Special Tool C-3894-A (Fig. 48).

(6) Remove outer tie rod from adjustment sleeve.

INSTALLATION - OUTER TIE ROD

(1) Install the outer tie rod into the adjustment sleeve. **Do not tighten the adjustment pinch bolt at this time.**

(2) Install the outer tie rod into the steering arm on front strut. Install tie rod to steering arm attaching nut (Fig. 47). Tighten the attaching nut a torque of 37 N·m (27 ft. lbs.).

(3) Install the tire and wheel assembly.

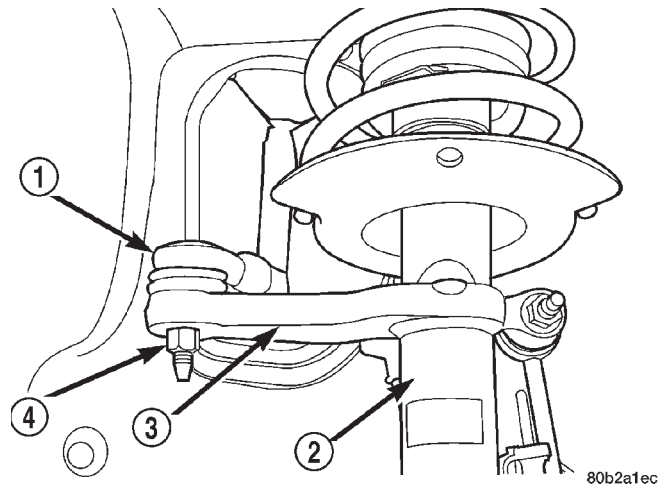


Fig. 47 Tie Rod Nut

- 1 - OUTER TIE ROD
- 2 - STRUT
- 3 - STEERING ARM
- 4 - NUT

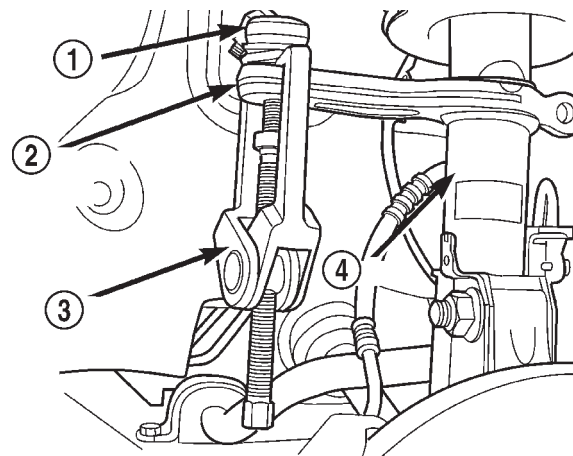


Fig. 48 Removing Outer Tie Rod From Steering Arm

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - SPECIAL TOOL C-3894A
- 4 - STRUT

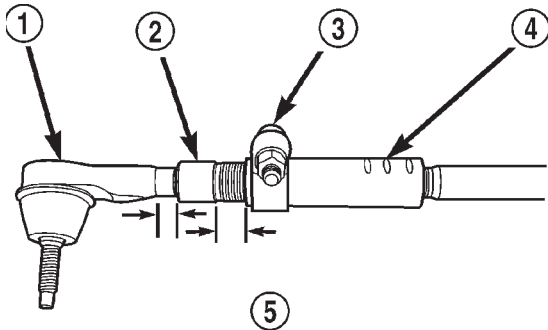
(4) Install and tighten the wheel mounting nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(5) Lower vehicle.

TIE ROD - OUTER (Continued)

CAUTION: When setting the front Toe on the vehicle, the maximum dimension of exposed threads allowed on the adjuster and outer tie rod cannot exceed the distance shown in (Fig. 49). If the maximum distance is exceeded, inadequate retention of either the adjuster or the outer tie rod can result. This condition can cause separation of the outer tie rod end from the inner tie rod. Ensure that adjuster sleeve pinch bolts are torqued to the required specification when Toe setting procedure is completed.

(6) Check the front wheel toe setting on vehicle and make required changes. **When making front wheel toe adjustments, be sure the maximum exposed thread requirements (Fig. 49) are not exceeded.**



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Fig. 49 Tie Rod Thread Engagement Requirements

- 1 - OUTER TIE ROD
- 2 - ADJUSTER
- 3 - PINCH BOLT
- 4 - INNER TIE ROD
- 5 - ALLOWABLE THREADS EXPOSED ON OUTER TIE ROD AND ADJUSTER IS A MAXIMUM OF 20 MILLIMETERS. REFER TO AREA INDICATED ABOVE ON THE OUTER TIE ROD AND ADJUSTER.

CAUTION: When torquing the adjuster pinch bolt, the following procedure must be followed to ensure adequate retention of the adjuster is obtained. Not following this procedure, could result in the Toe Setting Adjustment changing and/or the separation of the outer tie rod from the inner tie rod.

(7) After completion of the tie rod end installation and the toe adjustment procedure, tighten adjuster pinch bolt (Fig. 49) to a torque of 38 N·m (28 ft. lbs.). Make sure the outer tie rod maintains correct perpendicular orientation while tightening the adjuster pinch bolt.

BUSHING - INNER TIE ROD

REMOVAL - INNER TIE ROD BUSHING

NOTE: When servicing inner tie rod bushings, replacement of both inner tie rod bushings is recommended.

(1) Remove the battery ground cable from the ground stud on the shock tower and isolate the ground cable by installing the cable isolator on the ground stud (Fig. 50).

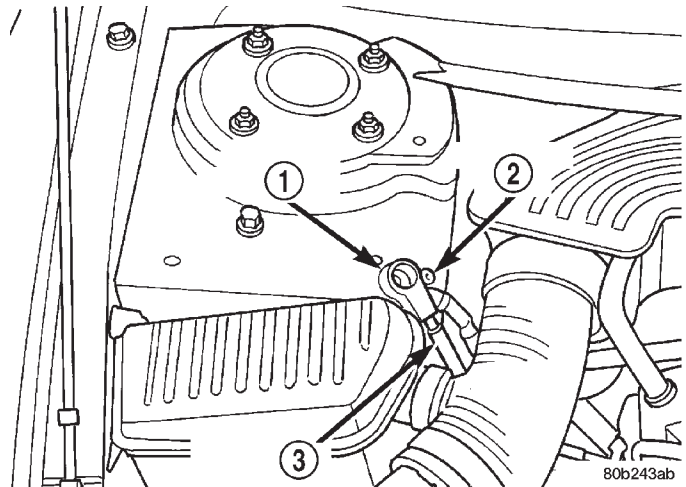


Fig. 50 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

(2) Remove caps from both wiper arms at the attachment to the pivots to expose the wiper arm attaching nut. Remove the nut attaching each wiper arm to its pivot (Fig. 51).

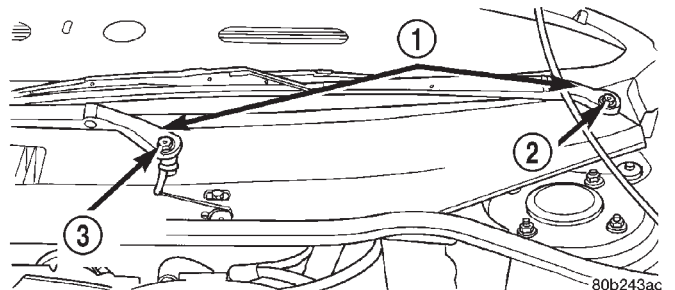


Fig. 51 Wiper Arm Attachment To Pivot

- 1 - WIPER ARMS
- 2 - ATTACHING NUT
- 3 - ATTACHING NUT

BUSHING - INNER TIE ROD (Continued)

(3) Remove the wiper arms from the pivots. Wiper arms are removed from the pivots by rocking them back and force on the pivots until they can be pulled off the pivots.

(4) Remove the wiper module cover and cowl cover from the vehicle (Fig. 52).

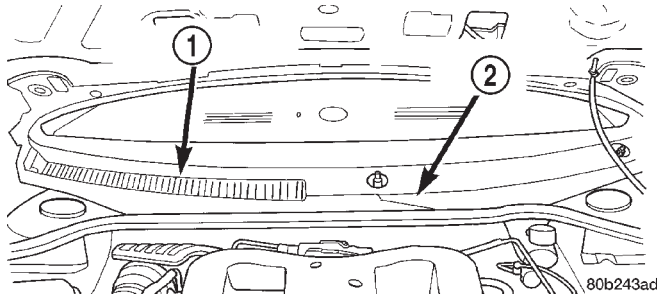


Fig. 52 Wiper Module And Cowl Cover

- 1 - COWL COVER
- 2 - WIPER MODULE COVER

(5) Remove the eight bolts attaching the cowl reinforcement to the strut towers and the one bolt attaching the wiper module to the reinforcement (Fig. 53). Remove the reinforcement from the vehicle.

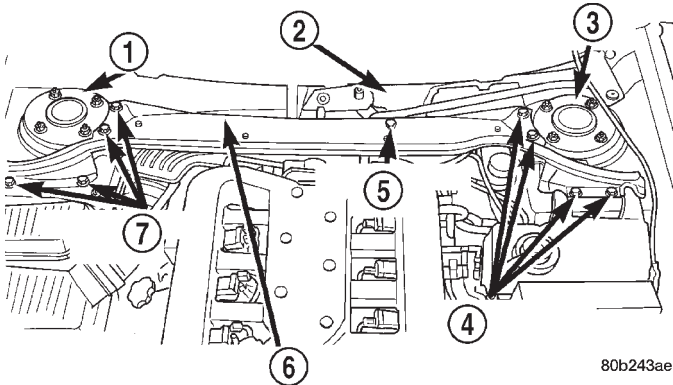


Fig. 53 Reinforcement Attachment To Vehicle

- 1 - RIGHT STRUT TOWER
- 2 - WIPER MODULE
- 3 - LEFT STRUT TOWER
- 4 - ATTACHING BOLTS
- 5 - ATTACHING BOLT
- 6 - REINFORCEMENT
- 7 - ATTACHING BOLTS

(6) Remove the in-line resonator and inlet hose from the throttle body and air let hose coming from the lid of the air cleaner housing (Fig. 54).

(7) Raise the vehicle on a frame contact hoist until the front tires of the vehicle are just off the floor. See Hoisting in Lubrication And Maintenance.

(8) Remove front wheel and tire assembly from side requiring repair (both sides are recommended).

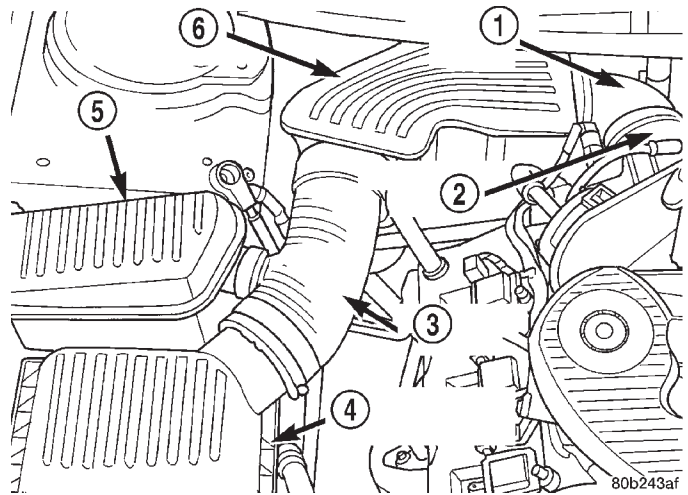


Fig. 54 In-Line Resonator And Air Inlet Hose

- 1 - AIR INLET HOSE
- 2 - THROTTLE BODY
- 3 - AIR INLET HOSE
- 4 - AIR CLEANER HOUSING LID
- 5 - RESONATOR
- 6 - IN-LINE RESONATOR

(9) Remove the nut attaching the outer tie rod end to the steering arm on the strut (Fig. 55).

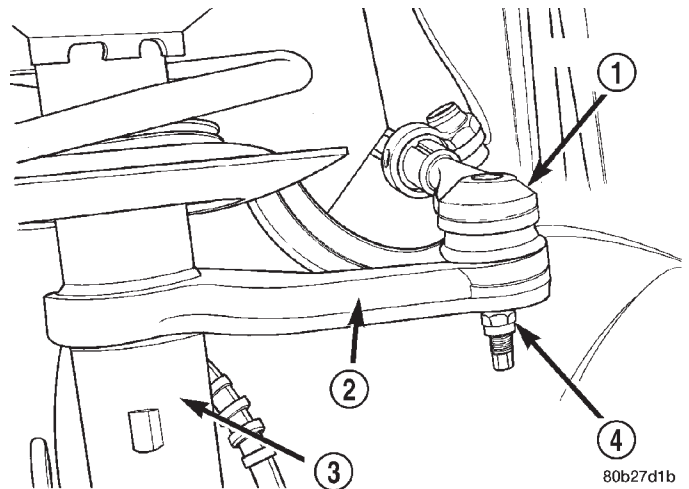


Fig. 55 Tie Rod End Attachment To Strut

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - NUT

(10) Remove the tie rod end from the steering arm of the strut using Puller, Special Tool C-3894-A (Fig. 56).

(11) Turn the steering wheel all the way to the full-right position.

(12) Bend back the retaining tabs on the mounting plate for the tie rod to steering gear mounting bolts (Fig. 57).

BUSHING - INNER TIE ROD (Continued)

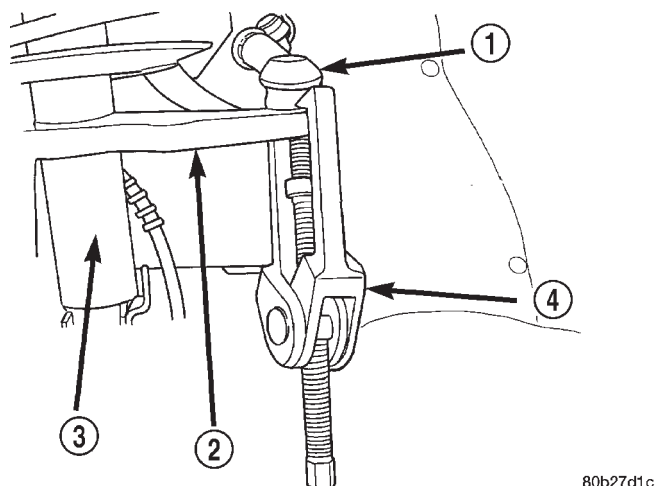


Fig. 56 Removing Outer Tie Rod From Steering Arm

- 1 - TIE ROD END
- 2 - STEERING ARM
- 3 - STRUT
- 4 - C-3894A

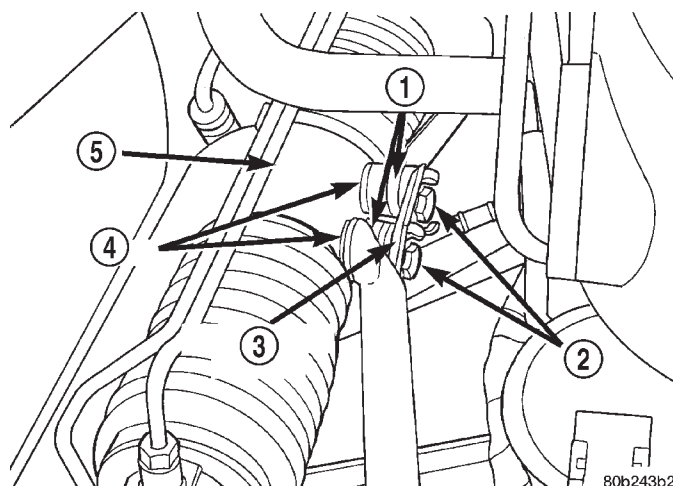


Fig. 58 Tie Rod To Steering Gear Attaching Bolts

- 1 - TIE RODS
- 2 - BOLTS
- 3 - MOUNTING PLATE
- 4 - WASHERS
- 5 - STEERING GEAR

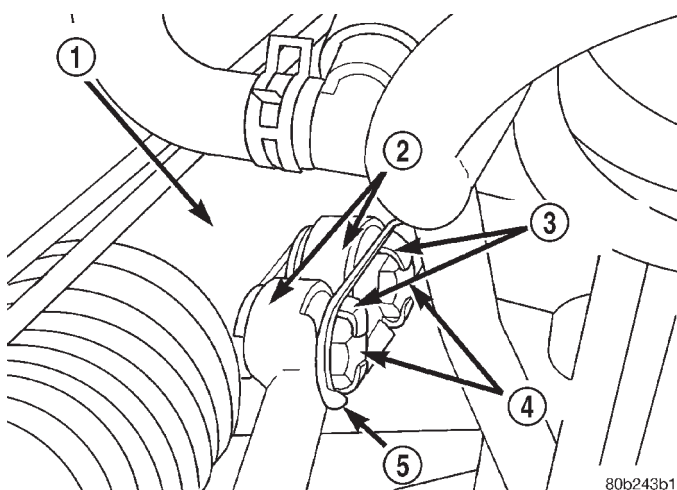


Fig. 57 Tie Rod Attachment Bolt Retaining Tabs

- 1 - STEERING GEAR
- 2 - TIE RODS
- 3 - RETAINING TABS
- 4 - BOLTS
- 5 - PLATE

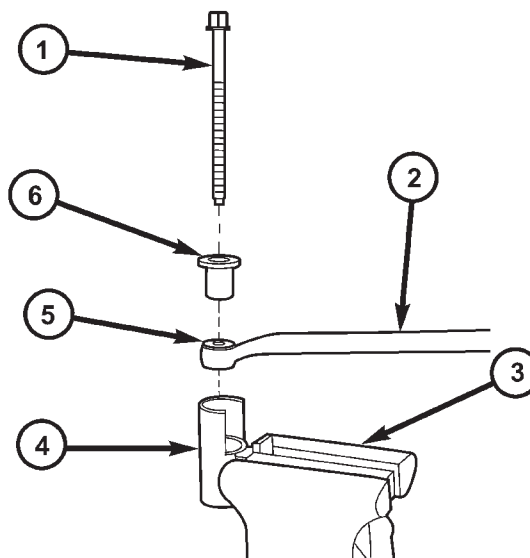


Fig. 59 Special Tool 8438 Set Up For Removal

- 1 - 8438-3 (SCREW)
- 2 - INNER TIE ROD
- 3 - VISE
- 4 - 8438-1 (RECEIVER)
- 5 - BUSHING
- 6 - 8438-4 (REMOVER/INSTALLER)

(13) Remove the bolt fastening the inner tie rod to the steering gear (Fig. 58). Be careful not to loose the washer behind the tie rod.

(14) Loosen the bolt fastening the opposite inner tie rod to the gear, but do not fully remove it.

(15) Rotate the loose end of the mounting plate out of the way.

(16) Remove the tie rod assembly from the vehicle through the wheel opening.

(17) Mount Receiver, Special tool 8438-1, in a vise as shown (Fig. 59).

(18) Assemble Special Tool 8438 in the following manner to remove the bushing from the inner tie rod.

BUSHING - INNER TIE ROD (Continued)

(a) Place the inner tie rod bushing end in the Receiver as shown (Fig. 59).

(b) Place Remover/Installer, Special Tool 8438-4, with the small end down on top of the bushing (Fig. 59).

(c) Insert Screw, Special Tool 8438-3, through the Remover/Installer and tie rod bushing, until it threads into the bottom of the Receiver.

(d) Using hand tools, tighten the Screw until it bottoms out. The bushing is now removed from the inner tie rod.

(19) Remove the Screw, then remove the Remover/Installer, tie rod and bushing from the Receiver.

INSTALLATION - INNER TIE ROD BUSHING

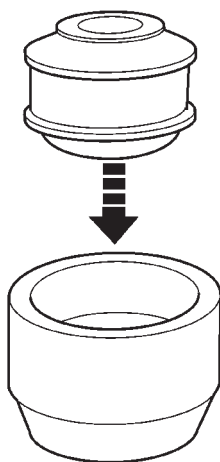
NOTE: When servicing inner tie rod bushings, replacement of bushings on both inner tie rods is recommended.

(1) Using Mopar® Silicone Spray Lubricant, spray bushing, inner tie rod end, and inside of Sizer, Special Tool 8438-2.

CAUTION: Do not use petroleum based rubber bushing installation lubricant. Premature bushing failure may occur.

NOTE: The inner tie rod bushing is symmetrical. There is no designated top or bottom.

(2) Place NEW bushing in the bore of Sizer as shown (Fig. 60). Slide bushing all the way into the Sizer bore.



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Fig. 60 Bushing Installation Into 8438-2 (Sizer)

(3) With the Receiver, Special Tool 8438-1, mounted in the vise as shown (Fig. 61), assemble the Special Tool 8438 in the following manner to install the new bushing.

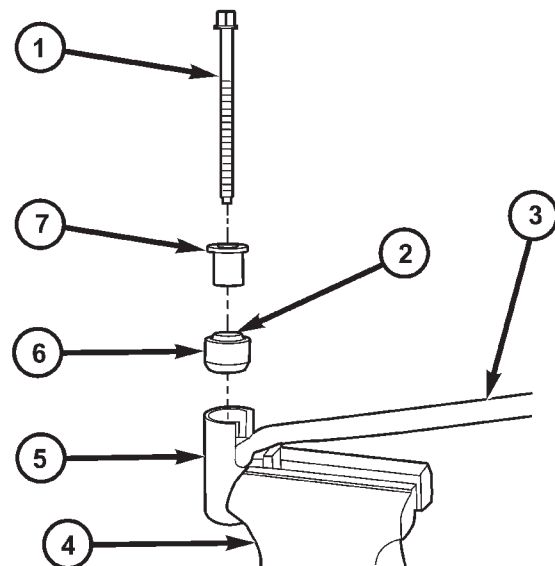
(a) Place the inner tie rod end in Receiver as shown (Fig. 61).

(b) Place the Sizer (with bushing) on top of the tie rod bushing bore with the tapered end facing downward.

(c) Place Remover/Installer, Special Tool 8438-4, with the small end down on top of the bushing (Fig. 61).

(d) Insert Screw, Special Tool 8438-3, through the Remover/Installer, bushing (in Sizer) and tie rod, until it threads into the bottom of the Receiver.

(e) Using hand tools, tighten the Screw, pushing the bushing out of Sizer, into the inner tie rod end. Tighten the Screw until it bottoms in the tool. Do not overtighten.



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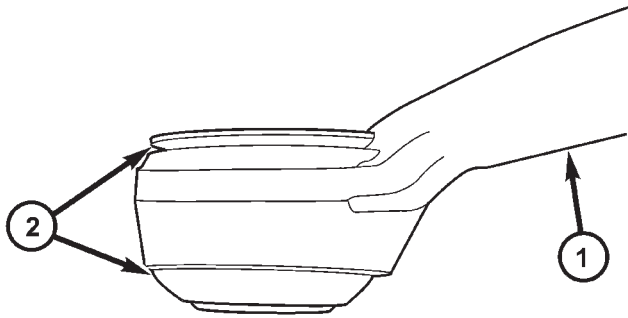
Fig. 61 Special Tool 8438 Set Up For Installation

- 1 - 8438-3 (SCREW)
- 2 - BUSHING
- 3 - INNER TIE ROD
- 4 - VISE
- 5 - 8438-1 (RECEIVER)
- 6 - 8438-2 (SIZER)
- 7 - 8438-4 (REMOVER/INSTALLER)

(4) Remove the Screw, Remover/Installer and Sizer, then remove the tie rod from the Receiver.

(5) Inspect the bushing. It will appear slightly off-center in the tie rod (Fig. 62). This is a normal condition.

BUSHING - INNER TIE ROD (Continued)



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Fig. 62 Correctly Installed Bushing

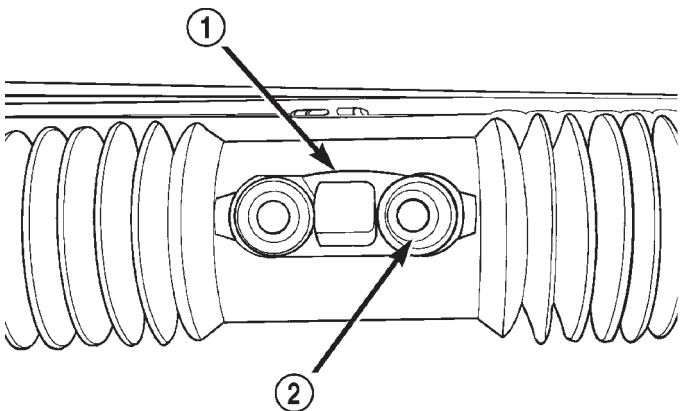
- 1 - INNER TIE ROD
- 2 - BUSHING OFF-CENTER

NOTE: Before installing the tie rod assembly back in the vehicle, loosen the tie rod adjustment pinch bolt and verify the adjustment sleeve is freed-up. This will ease toe adjustment which must be set at the end of this procedure.

(6) Install the tie rod assembly through the tie rod hole in the wheel opening inner fender.

(7) Install the outer tie rod on the steering arm of the strut. Install the tie rod steering arm nut (Fig. 55). **Do not tighten the nut at this time.**

CAUTION: Before installing tie rod on steering gear be sure the tie rod spacer block inside the steering gear bellows (boot) is correctly aligned with the bolt holes in the rack of the steering gear and the steering gear bellows (Fig. 63).

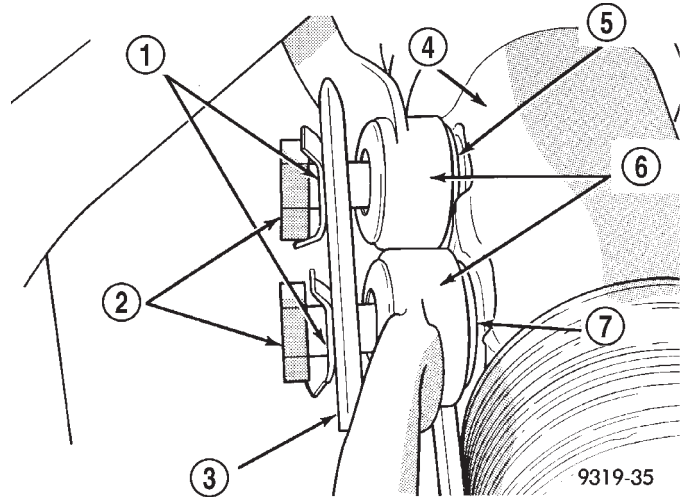


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Fig. 63 Tie Rod Spacer Block

- 1 - STEERING GEAR BOOT
- 2 - SPACER BLOCK

(8) Align the inner tie rod with the mounting hole in the center take off on steering gear. Rotate the mounting plate into position over the tie rod. Install tie rod attaching bolt through tie rod and washer into steering gear. **Be sure washer is installed between tie rod and steering gear as shown (Fig. 64).**



9319-35

Fig. 64 Tie Rod Attachment

- 1 - RETAINING TABS
- 2 - BOLTS
- 3 - RETAINING PLATE
- 4 - STEERING GEAR
- 5 - WASHER
- 6 - TIE RODS
- 7 - WASHER

NOTE: It is recommended that the opposite inner tie rod's bushing be removed and replaced at this time. Refer to Removal.

(9) Tighten both tie rod to steering gear bolts to a torque of 100 N·m (74 ft. lbs.).

(10) Bend retaining tabs against heads of tie rod attaching bolts (Fig. 57).

(11) Place the front wheels in the straight-ahead position.

(12) Tighten the outer tie rod steering arm nut to a torque of 37 N·m (27 ft. lbs.).

(13) Install the wheel and tire assembly. Install and tighten wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 135 N·m (100 ft. lbs.).

(14) Lower the vehicle.

(15) Install the in-line resonator and inlet hose on the throttle body and air inlet hose coming from the lid of the air cleaner housing (Fig. 54).

BUSHING - INNER TIE ROD (Continued)

(16) Install the reinforcement on the vehicle (Fig. 53). Install the eight bolts attaching the cowl reinforcement to the strut towers. Install the bolt attaching the wiper module to the reinforcement.

(17) Install the covers over the wiper module and the cowl (Fig. 52). Install and securely tighten the attaching screws.

(18) Install the wiper arms on the pivots (Fig. 51). Install and securely tighten the wiper arm to pivot attaching nuts. Install the caps on the wiper arms covering the pivot nuts.

(19) Install the battery ground cable onto the ground stud on the shock tower and install nut.

(20) Adjust front toe. Refer to Wheel Alignment in Suspension.

PUMP

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PUMP

DESCRIPTION

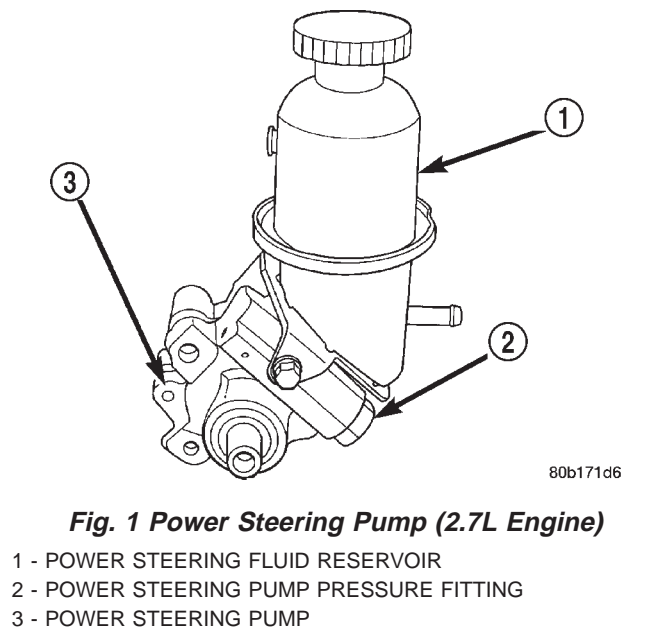
Hydraulic pressure for the operation of the power steering system is provided by a belt driven rotary power steering pump. The power steering pump is a constant flow rate and displacement vane type pump. Vehicles equipped with the 2.7 liter engine use a power steering pump that has an integral reservoir for the power steering fluid (Fig. 1). Vehicles equipped with the 3.5 liter engine use a power steering pump (Fig. 2) that has a remotely mounted reservoir for the power steering fluid.

Both power steering pumps mount to the front of the engine on the driver's side.

The service procedures for the power steering pump are limited to the areas and components listed below.

- Power steering fluid reservoirs, related components and attaching hardware.
- Power steering pump pulley.

No repair procedures are to be done on the internal components of the power steering pump. Repair of a power steering fluid leak from any area of the power steering pump is not allowed.



PUMP (Continued)

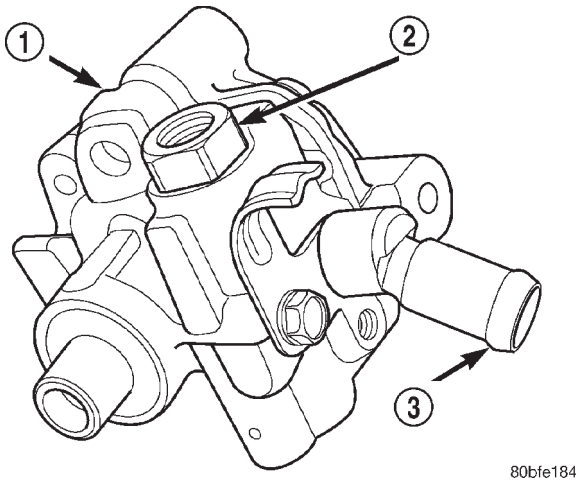


Fig. 2 Power Steering Pump (3.5L Engine)

- 1 - POWER STEERING PUMP
- 2 - PUMP PRESSURE FITTING
- 3 - FLUID SUPPLY FITTING

OPERATION

The Power steering pump operates as follows. A belt driven pulley turns a shaft which drives a rotor. Rectangular pumping vanes carried by the shaft driven rotor move the fluid from the intake to the cam ring pressure cavities. As the rotor begins to turn, centrifugal force throws the vanes against the inside surface of the cam ring to pickup residual oil. This oil is then forced into the high pressure area. As more oil is picked up by the vanes, the additional oil is forced into the cavities of the thrust plate through two crossover holes in the cam ring and pressure plate. The crossover holes empty into the high pressure area between the pressure plate and the housing end cover.

When the high pressure area of the power steering pump is filled with power steering fluid, the fluid flows under the vanes in the rotor slots, forcing the vanes to follow the inside oval surface of the cam ring. As the vanes reach the restricted area of the cam ring, oil is forced out from between the vanes. When excess oil flow is generated during high-speed operation, a regulated amount of oil returns to the pump intake side through a flow control valve. The flow control valve reduces the power required to drive the pump and holds down temperature build-up.

When steering conditions exceed maximum pressure requirements, such as turning the wheels against the stops, the pressure built up in the steering gear also exerts pressure on the spring end of the flow control valve. The end of the valve houses the pressure relief valve. High pressure lifts the relief valve ball from its seat and allows oil to flow through a trigger orifice located in the outlet fitting. This

reduces pressure on the spring end of the flow control valve which then opens and allows the oil to return to the intake side of the pump. This action limits maximum pressure output of the pump to a safe level.

Under normal power steering pump operating conditions, the pressure requirements of the pump are below maximum, causing the pressure relief valve to remain closed.

In the event of a power steering pump drive belt failure, manual steering control of the vehicle can still to be maintained. However, under these conditions, steering effort will significantly increase.

STANDARD PROCEDURE - POWER STEERING PUMP INITIAL OPERATION

WARNING: THE FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING COMPONENTS.

CAUTION: Use only Mopar® ATF+4 Automatic Transmission Fluid (MS-9602). Do not overfill.

Wipe the power steering fluid reservoir and filler cap clean. Check the level of the power steering fluid in the reservoir. The power steering fluid level should be between MAX. COLD and MIN. COLD when the fluid is at a normal ambient temperature of approximately 32°C to 43°C (90°F to 110°F).

(1) Fill the pump fluid reservoir to the proper level and let the fluid settle for at least two (2) minutes.

(2) Start the engine and let run for a few seconds. Then turn the engine off.

(3) Add fluid if necessary. Repeat the above procedure until the fluid level remains constant after running the engine.

(4) Raise the front wheels off the ground.

(5) Start the engine. Slowly turn the steering wheel right and left, lightly contacting the wheel stops for less than 2 seconds at a time.

(6) Add power steering fluid if necessary.

(7) Lower the vehicle and turn the steering wheel slowly from lock to lock.

(8) Stop the engine. Check the fluid level and refill as required.

(9) If the fluid is extremely foamy, allow the vehicle to stand a few minutes and repeat the above procedure.

(10) Lower the vehicle.

PUMP (Continued)

REMOVAL

REMOVAL - PUMP (2.7L ENGINE)

(1) Remove the battery ground cable from the ground stud on the shock tower and isolate the ground cable by installing the cable isolator on the ground stud (Fig. 3).

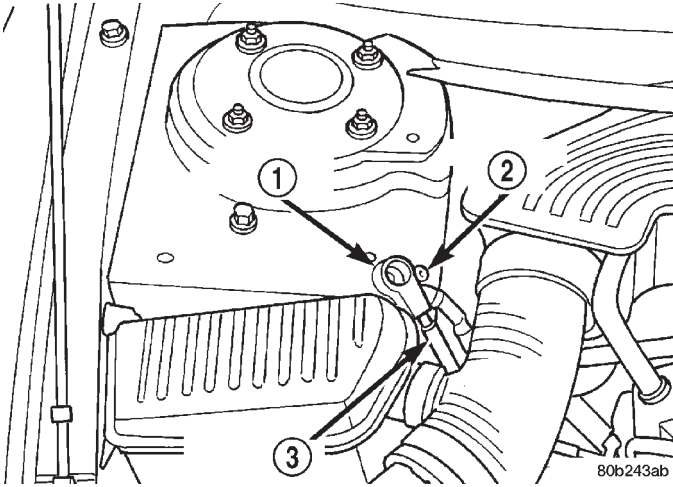


Fig. 3 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

NOTE: The following step should be done to prevent excessive spilling of power steering fluid when the power steering fluid lines are removed from the power steering pump.

(2) Using a siphon pump, remove as much power steering fluid as possible from the power steering fluid reservoir.

CAUTION: When removing the power steering fluid supply hose from the nipple on the power steering fluid reservoir, do not use excessive force. The will result in the nipple being broken off of the power steering fluid reservoir.

(3) Remove the power steering fluid return hose from the power steering fluid reservoir (Fig. 4).

(4) Let power steering fluid drain from the power steering fluid reservoir and power steering pump.

(5) Install a cap on the open nipple of the power steering fluid reservoir to prevent power steering fluid from spilling when removing the power steering pump.

(6) Remove the power steering fluid pressure hose from the pressure fitting on the power steering pump (Fig. 5).

(7) Let remaining power steering fluid drain from the power steering pump.

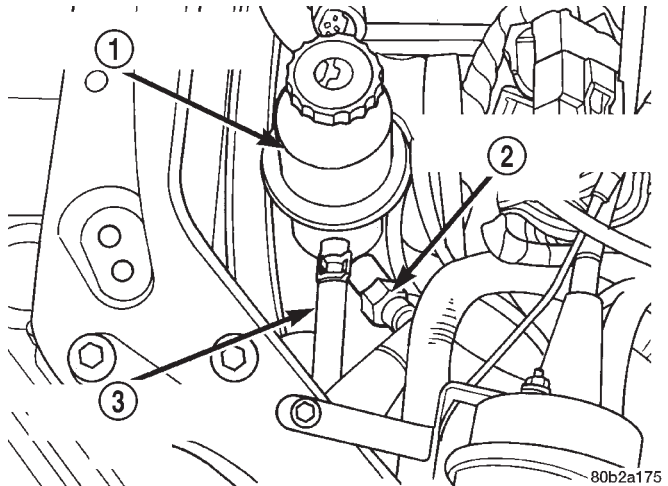


Fig. 4 Return Hose At Reservoir

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - POWER STEERING FLUID PRESSURE HOSE
- 3 - POWER STEERING FLUID RETURN HOSE

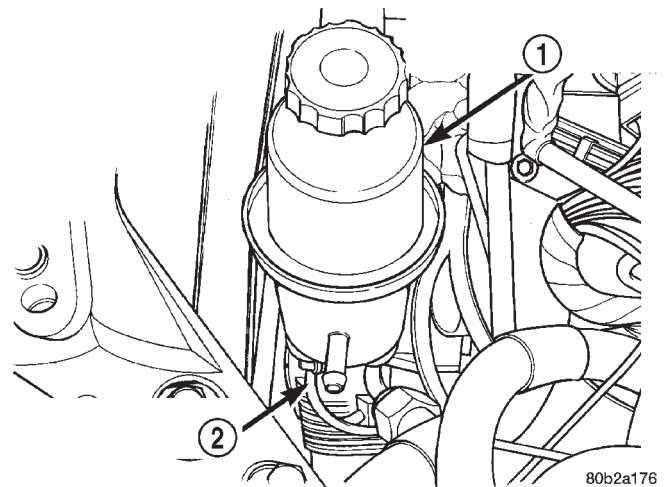


Fig. 5 Pressure Hose At Pump

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - POWER STEERING FLUID PRESSURE HOSE

(8) Loosen the lock-nut (Fig. 6) on the front of the pulley for the serpentine drive belt tensioner.

(9) Using the adjustment bolt (Fig. 6) remove the tension from the drive belt for the power steering pump.

(10) Remove the drive belt from the power steering pump pulley.

NOTE: Access for the power steering pump mounting bolts is through the holes in the face of the power steering pump pulley.

(11) Remove the 3 bolts attaching the power steering pump to the power steering pump mounting bracket.

PUMP (Continued)

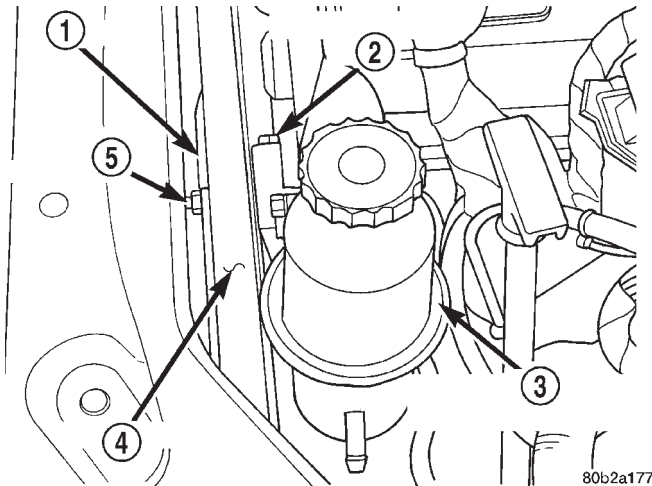


Fig. 6 Drive Belt Tensioner Lock-Nut And Adjustment Bolt

- 1 - PULLEY
- 2 - ADJUSTMENT BOLT
- 3 - POWER STEERING FLUID RESERVOIR
- 4 - DRIVE BELT
- 5 - LOCK-NUT

NOTE: The following step must be performed to have the space necessary to remove the power steering pump from the mounting bracket.

(12) Insert a screwdriver between the power steering pump and the sleeve in the tensioner bracket (Fig. 7). Using the screwdriver push the sleeve forward in the tensioner bracket until it is flush with the back side of the tensioner bracket (Fig. 7).

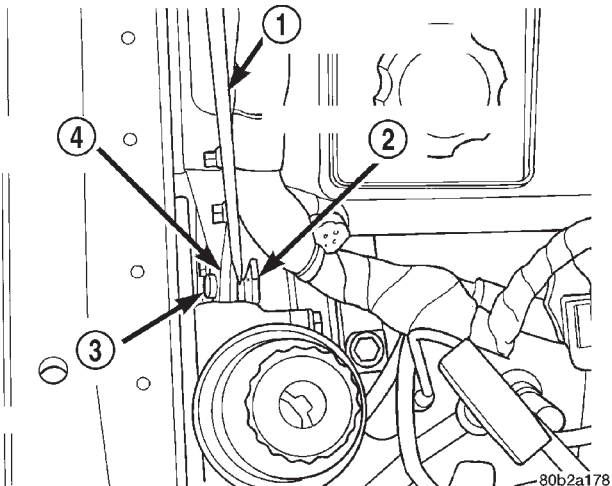


Fig. 7 Tensioner Bracket To Power Steering Pump Sleeve

- 1 - SCREWDRIVER
- 2 - POWER STEERING PUMP
- 3 - SLEEVE
- 4 - TENSIONER BRACKET

(13) Remove the power steering pump, power steering fluid reservoir and pulley as an assembly from the engine. Power steering pump is removed from the top of the engine.

(14) Transfer the required parts from the removed power steering pump to the replacement power steering pump. See Disassembly and Assembly in this section.

REMOVAL - PUMP (3.5L ENGINE)

(1) Remove the battery ground cable from the ground stud on the shock tower and isolate the ground cable by installing the cable isolator on the ground stud (Fig. 8).

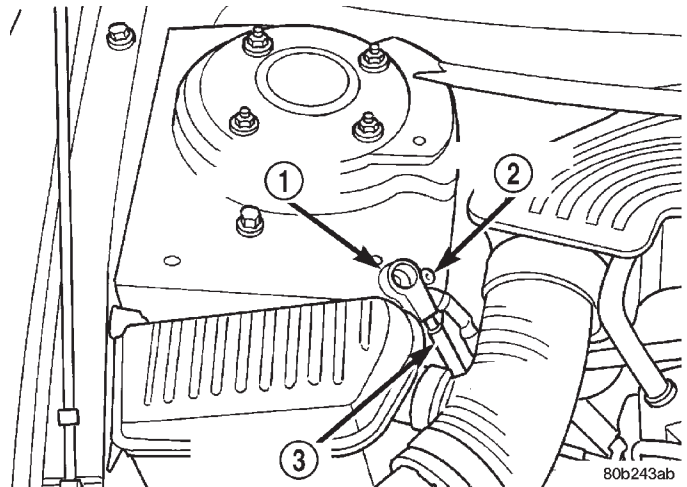


Fig. 8 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

NOTE: The following step should be done to prevent excessive spilling of power steering fluid when the power steering fluid lines are removed from the power steering pump.

(2) Using a siphon pump, remove as much power steering fluid as possible from the power steering fluid reservoir.

(3) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(4) Remove the power steering fluid supply hose (Fig. 9) from the supply fitting on the power steering pump.

(5) Let power steering fluid drain from the power steering fluid reservoir and power steering pump.

(6) Install a cap on the open nipple of the power steering fluid reservoir to prevent power steering fluid from spilling when removing the power steering pump.

PUMP (Continued)

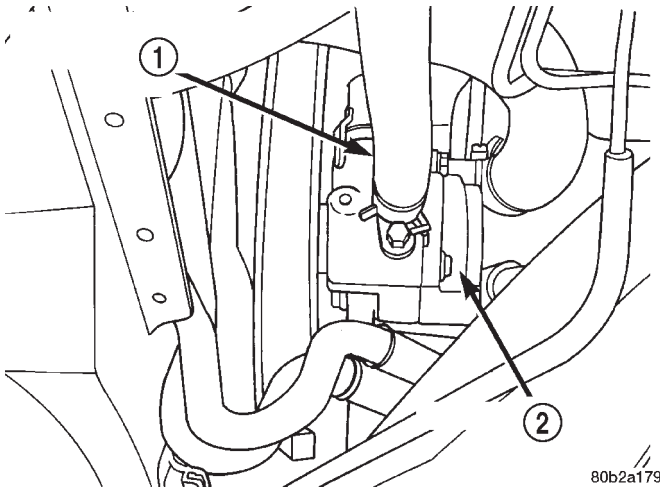


Fig. 9 Power Steering Fluid Supply Hose At Power Steering Pump

- 1 - POWER STEERING FLUID SUPPLY HOSE
- 2 - POWER STEERING PUMP

(7) Remove the power steering fluid pressure hose (Fig. 10) from the pressure fitting on the power steering pump.

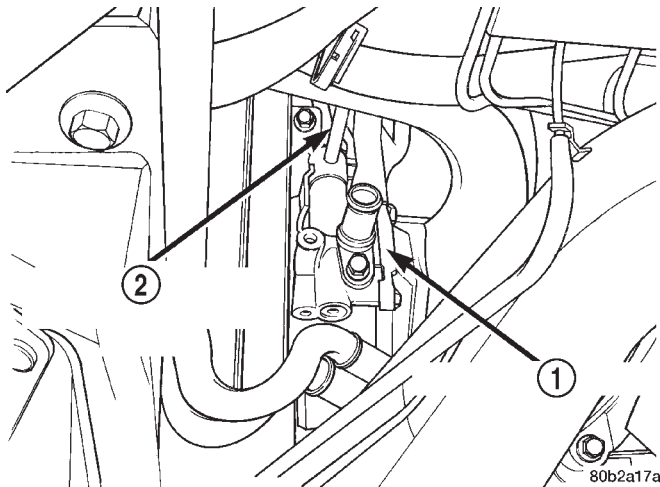


Fig. 10 Pressure Hose At Power Steering Pump

- 1 - POWER STEERING PUMP
- 2 - POWER STEERING FLUID PRESSURE HOSE

(8) Let remaining power steering fluid drain from the power steering pump.

(9) Loosen the lock-nut (Fig. 11) on the front of the pulley for the serpentine drive belt tensioner.

(10) Using the adjustment bolt (Fig. 11) remove the tension from the drive belt for the power steering pump.

(11) Remove the drive belt from the power steering pump pulley.

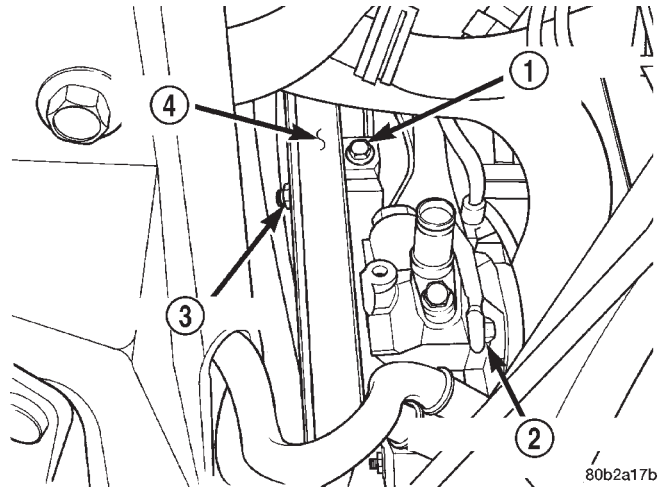


Fig. 11 Drive Belt Tensioner Lock-Nut And Adjustment Bolt

- 1 - ADJUSTMENT BOLT
- 2 - POWER STEERING PUMP
- 3 - LOCK-NUT
- 4 - DRIVE BELT

NOTE: Access for the power steering pump mounting bolts is through the holes in the face of the power steering pump pulley.

(12) Remove the 3 bolts attaching the power steering pump to the power steering pump mounting bracket.

(13) Remove the power steering pump from the engine. The power steering pump and pulley are removed as an assembly from the engine. The power steering pump is removed from the bottom of the engine between the radiator lower support and the cradle (Fig. 12).

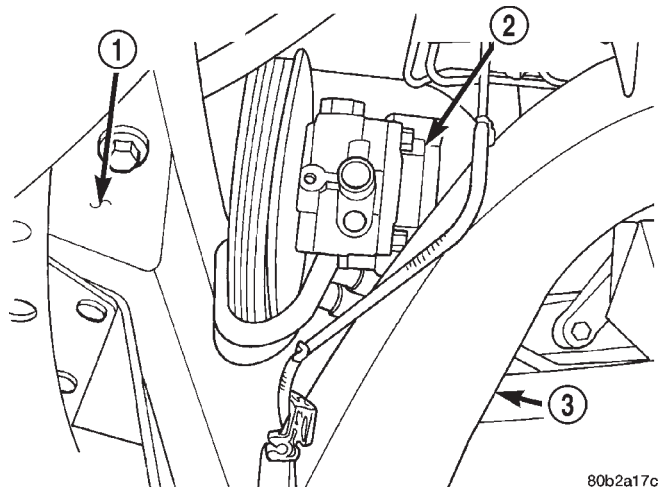


Fig. 12 Power Steering Pump Remove/Install

- 1 - RADIATOR LOWER SUPPORT
- 2 - POWER STEERING PUMP
- 3 - CRADLE

PUMP (Continued)

(14) Transfer the required parts from the removed power steering pump to the replacement power steering pump. See Disassembly and Assembly in this section.

DISASSEMBLY - PUMP (PULLEY)

CAUTION: When mounting the power steering pump in the vise do not clamp the pump in the vise by the body of the power steering pump.

(1) Mount the power steering pump in a vise using the mounting bosses for the power steering pump (Fig. 13).

NOTE: Do not press or hammer on the shaft of the power steering pump in an attempt to remove the pulley. This will damage the internal components of the power steering pump.

(2) Remove the power steering pump pulley from the power steering pump shaft using Puller, Special Tool C-4333 (Fig. 13).

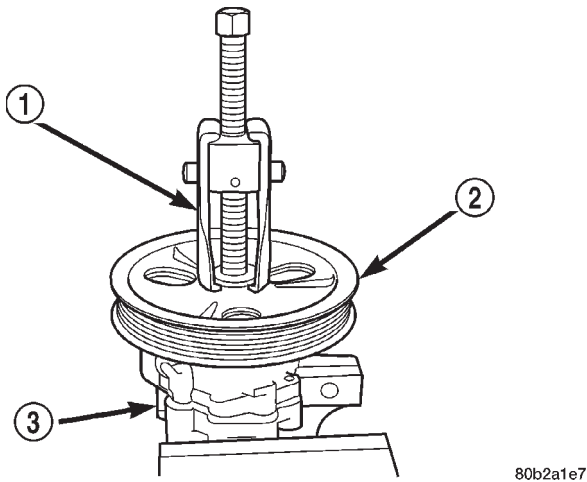


Fig. 13 Power Steering Pump Pulley Removal

- 1 - SPECIAL TOOL C-4333
- 2 - POWER STEERING PUMP PULLEY
- 3 - POWER STEERING PUMP

ASSEMBLY - PUMP (PULLEY)

NOTE: Do not press or hammer on the shaft of the power steering pump in an attempt to install the pulley. This will damage the internal components of the power steering pump.

(1) Place the power steering pump pulley on the end of the power steering pump shaft. Make sure the pulley is installed squarely on the end of the shaft.

CAUTION: When installing the pulley on the power steering pump, Spacer, Special Tool 6936, **MUST** be used. The spacer provides for the correct pulley location on the power steering pump to provide correct accessory drive belt alignment. The alignment is critical in controlling accessory drive belt noise. It also prevents the pulley from contacting the power steering pump when it is installed, causing power steering pump or pulley damage.

(2) Install Spacer, Special Tool 6936, into the hub of the power steering pump pulley (Fig. 14).

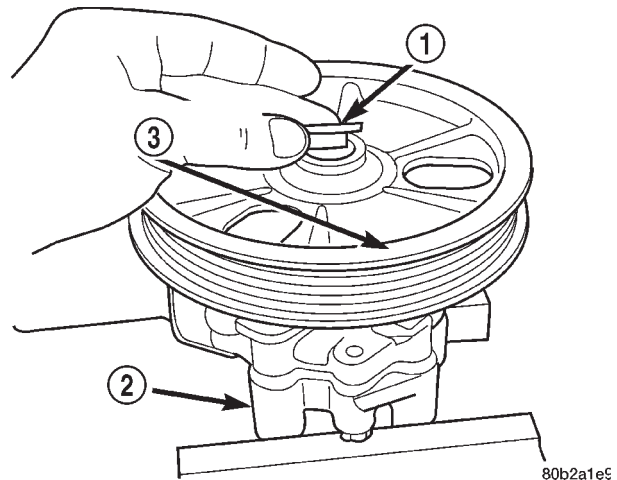


Fig. 14 Spacer Installed In Power Steering Pump Pulley

- 1 - SPECIAL TOOL 6936
- 2 - POWER STEERING PUMP
- 3 - POWER STEERING PUMP PULLER

(3) Insert the Pulley Installer, Special Tool C-4063, (without adapters) through hole in spacer. Thread the Installer into the end of the power steering pump shaft (Fig. 15). Tighten the installer into pump shaft.

(4) Holding the Pulley Installer with one wrench so it will not rotate, turn hex nut down threaded rod of installer pushing the pulley onto the shaft of the power steering pump (Fig. 15). Ensure that the tool and the pulley remain aligned with the pump shaft so pulley does not become cocked on shaft.

(5) Continue to push pulley onto shaft of power steering pump until Pulley Installer will no longer turn. This will ensure the spacer provided is fully seated against the front of the power steering pump shaft.

(6) Remove the Pulley Installer from the shaft of the power steering pump. Remove the Spacer from the hub of the power steering pump pulley.

(7) Verify the pulley turns properly on the pump shaft.

PUMP (Continued)

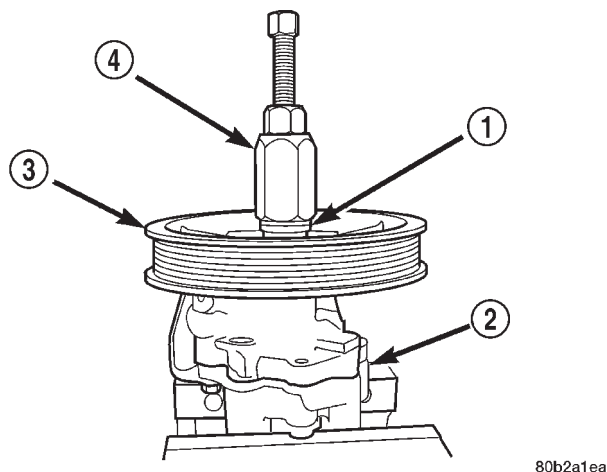


Fig. 15 Installing Power Steering Pump Pulley

- 1 - SPECIAL TOOL 6936
- 2 - POWER STEERING PUMP
- 3 - PULLEY
- 4 - SPECIAL TOOL C-4063

INSTALLATION

INSTALLATION - PUMP (2.7L ENGINE)

(1) Install the power steering pump back in the mounting bracket using the reverse sequence of its removal.

NOTE: The long mounting bolt for the power steering pump is installed in the location where the sleeve is in the tensioner bracket.

(2) Loosely install the 3 bolts mounting the power steering pump to the mounting bracket.

NOTE: When tightening the power steering pump mounting bolt going through the sleeve (Fig. 7) be sure the sleeve is fully seated against the power steering pump.

(3) Tighten the power steering pump mounting bolts to a torque of 28 N·m (250 in. lbs.).

(4) Install the drive belt on the power steering pump pulley. Refer to Cooling for required installation and tensioning procedure.

(5) Securely tighten the lock-nut on the pulley of the drive belt tensioner (Fig. 6).

(6) Install the power steering pressure hose in the pressure fitting of the power steering pump (Fig. 5). Tighten the power steering fluid pressure hose tube nut to a torque of 47 N·m (35 ft. lbs.).

(7) Install the power steering fluid return hose on the power steering fluid reservoir. **When installing the hose clamp on the power steering fluid return hose be sure the clamp is installed past**

the upset bead on the nipple of the power steering fluid reservoir.

(8) Connect the battery ground cable onto the ground stud located on the strut tower.

(9) Perform Power Steering Pump Initial Operation procedure to properly refill and bleed power steering system. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

INSTALLATION - PUMP (3.5L ENGINE)

(1) Install the power steering pump back in the mounting bracket using the reverse sequence of its removal (Fig. 12).

(2) Loosely install all 3 bolts mounting the power steering pump to the mounting bracket.

(3) Tighten the power steering pump mounting bolts to a torque of 28 N·m (250 in. lbs.).

(4) Install the drive belt on the power steering pump pulley. Refer to Cooling for required installation and tensioning procedure.

(5) Securely tighten the lock-nut on the pulley of the drive belt tensioner (Fig. 11).

(6) Install the power steering pressure hose on the pressure fitting of the power steering pump (Fig. 10). Tighten the power steering fluid pressure hose tube nut to a torque of 47 N·m (35 ft. lbs.).

(7) Install the power steering fluid supply hose onto the supply fitting on power steering pump (Fig. 9). **When installing the hose clamp on the power steering fluid return hose be sure the clamp is installed past the upset bead on the nipple of the power steering fluid reservoir.**

(8) Lower vehicle.

(9) Connect the battery ground cable onto the ground stud located on the strut tower.

(10) Perform Power Steering Pump Initial Operation procedure to properly refill and bleed power steering system. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

SPECIFICATIONS

POWER STEERING PUMP FLOW

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Flow At 1500 RPM And Minimum Pressure	8.0 – 9.5 Liters/Min. 2.1 – 2.5 GPM
Control Valve Relief Pressure	8618 – 9308 kPa 1250 – 1350 psi

FLUID

STANDARD PROCEDURE - POWER STEERING FLUID LEVEL CHECKING

WARNING: FLUID LEVEL SHOULD BE CHECKED WITH ENGINE OFF TO PREVENT INJURY FROM MOVING PARTS.

Wipe off the power steering fluid reservoir so that it is free of dirt (Fig. 16) (Fig. 17). Check the fill level of the fluid in the reservoir according to the markings on the side of the reservoir. Measure the MAX. COLD/MIN. COLD fluid levels when the fluid is at normal ambient temperature, approximately 32°C to 43°C (90°F to 110°F). Add fluid as necessary and do not overfill. **Use only Mopar® ATF+4 Automatic Transmission Fluid in this power steering system.**

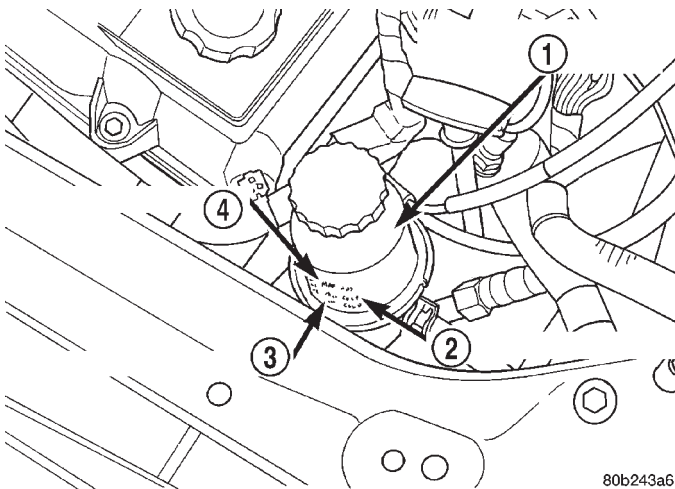


Fig. 16 Fluid Reservoir (2.7L ENGINE)

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - MAX. COLD LEVEL
- 3 - MIN. COLD LEVEL
- 4 - MAX. HOT LEVEL

FLUID COOLER

DESCRIPTION

All models of this vehicle are equipped with a cooler for the power steering system fluid (Fig. 18). The power steering fluid cooler is located at the front of the vehicle. It is mounted to the radiator lower support just forward of the air-conditioning condenser and just rearward of the front fascia (Fig. 18). The cooler is positioned so it is in the air flow through the front fascia of the vehicle.

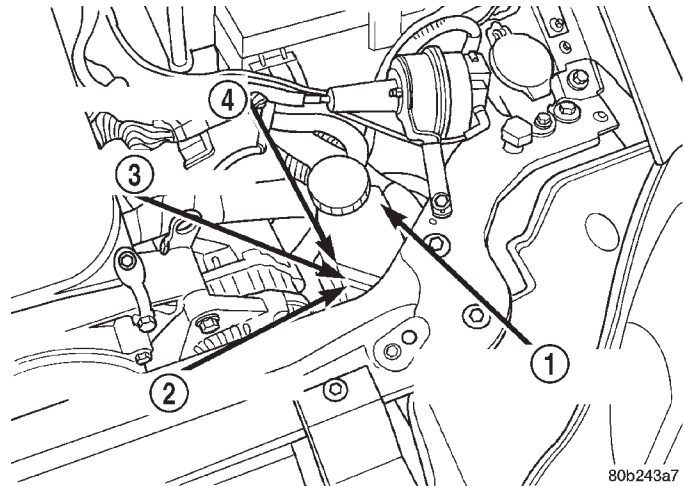


Fig. 17 Fluid Reservoir (3.5L Engine)

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - MIN. COLD LEVEL
- 3 - MAX. COLD LEVEL
- 4 - MAX. HOT LEVEL

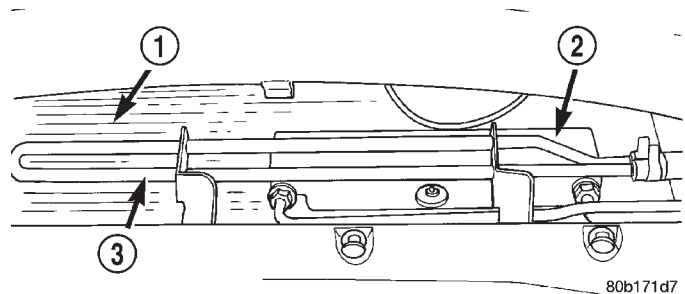


Fig. 18 Power Steering Fluid Cooler

- 1 - AIR-CONDITIONING CONDENSOR
- 2 - TRANSMISSION OIL COOLER
- 3 - POWER STEERING OIL COOLER

OPERATION

The purpose of the power steering fluid cooler is to keep the temperature of the power steering system fluid from rising to a level that would affect the performance of the power steering system.

The cooler used on this vehicle is referred to as a fluid-to-air type cooler. This means that the air flow across the tubes of the cooler is used to extract the heat from the cooler which it has absorbed from the power steering fluid flowing through it. The cooler is placed in series with the power steering fluid return line, between the steering gear and the power steering fluid reservoir. This lowers the temperature of the power steering fluid prior to it entering the power steering fluid reservoir where it is resupplied to the power steering pump.

FLUID COOLER (Continued)

REMOVAL

(1) Using a siphon pump, remove as much power steering fluid as possible from the power steering fluid reservoir.

(2) Raise vehicle using a frame contact type hoist or supported using jack stands. See Hoisting in Lubrication And Maintenance.

(3) 300M only - The front fascia will require removal to access the power steering cooler. See Frames and Bumpers.

(4) Remove the hose clamp from the lower hose at the power steering fluid cooler (Fig. 19). Remove the lower hose from the power steering fluid cooler. Drain remaining power steering fluid from the hoses and the power steering fluid cooler.

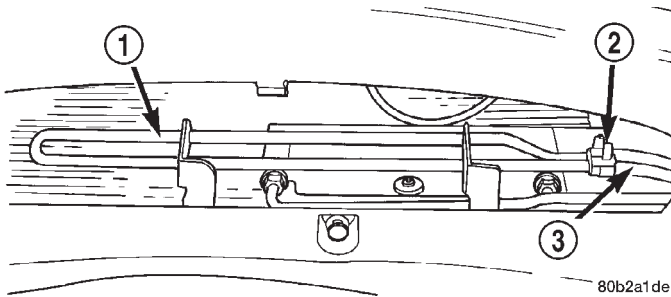


Fig. 19 Lower Hose At Power Steering Fluid Cooler

- 1 - POWER STEERING FLUID COOLER
- 2 - HOSE CLAMP
- 3 - LOWER HOSE

(5) Remove the hose clamp and upper hose (Fig. 20) from the power steering fluid cooler.

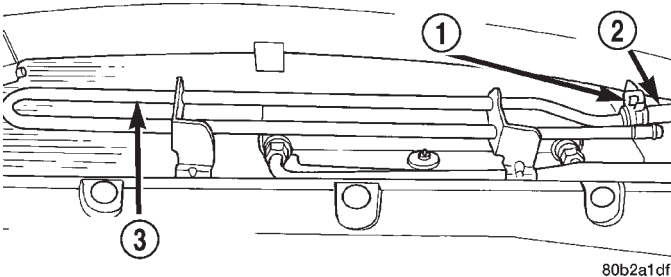


Fig. 20 Upper Hose At Power Steering Fluid Cooler

- 1 - HOSE CLAMP
- 2 - UPPER HOSE
- 3 - POWER STEERING FLUID COOLER

(6) Remove the 6 clips (Fig. 21) mounting the air dam to the radiator lower support.

(7) Remove the 2 nuts (Fig. 22) attaching the power steering fluid cooler to the radiator lower crossmember.

(8) Remove the power steering fluid cooler from the radiator lower crossmember.

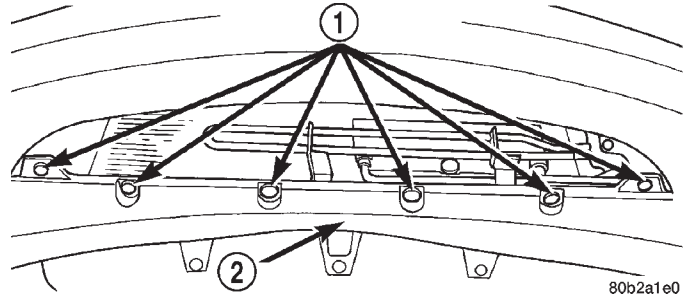


Fig. 21 Air Dam Retaining Clips

- 1 - RETAINING CLIPS
- 2 - AIR DAM

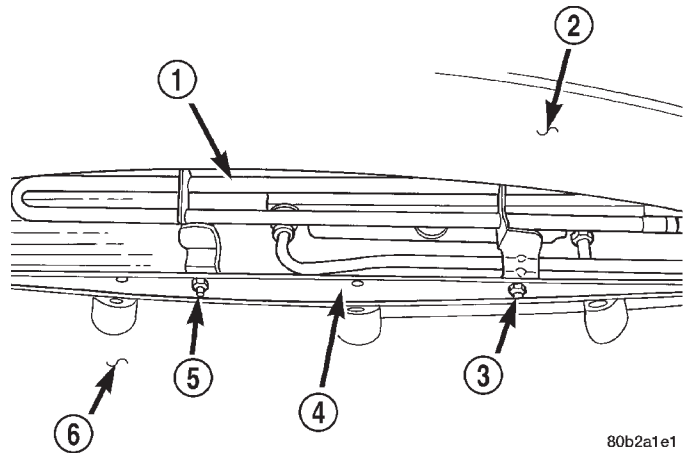


Fig. 22 Cooler Attachment

- 1 - POWER STEERING FLUID COOLER
- 2 - FASCIA
- 3 - NUT
- 4 - RADIATOR LOWER SUPPORT
- 5 - NUT
- 6 - AIR DAM

INSTALLATION

(1) Install the power steering fluid cooler on the radiator lower crossmember.

(2) Install the 2 nuts (Fig. 22) attaching the power steering fluid cooler to the radiator lower crossmember. Tighten the attaching nuts to a torque of 10 N·m (89 in. lbs.)

(3) Install the air dam on the radiator lower support. Attach the air dam to the radiator lower support using **new** retaining clips.

(4) Install power steering fluid hoses (Fig. 20) and (Fig. 19) on the power steering fluid cooler. **Be sure hose clamps are installed on hose past the upset bead on the power steering cooler.**

(5) 300M only - Reinstall front fascia.

(6) Lower the vehicle to a point where front tires are just off the ground.

(7) Perform Power Steering Pump Initial Operation procedure (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE).

HOSES

DESCRIPTION

The power steering fluid hoses connect the components of the power steering system.

The power steering fluid supply hose (3.5L engine only) is a special rubber hose that connects the power steering fluid reservoir to the power steering pump. The hose is secured at each end using a standard adjustable clamp.

The power steering fluid pressure hose is a high pressure hose that connects the power steering pump to the gear. At both ends of the flexible hose portion are steel fittings. A tube nut fitting with an O-ring is used at each end to connect it to either the power steering pump or the gear.

The power steering fluid return hose is a special rubber hose that connects the power steering gear and the power steering fluid cooler, back to the fluid reservoir. A standard tube nut fitting with an O-ring is used to connect it to the power steering gear. The hose is secured to the cooler and reservoir using standard adjustable clamps.

OPERATION

The power steering fluid hoses transfer fluid from one power steering system component to the next.

REMOVAL - PRESSURE AND RETURN HOSES

(1) Remove the battery ground cable from the ground stud on the shock tower and isolate the ground cable by installing the cable isolator on the ground stud (Fig. 23).

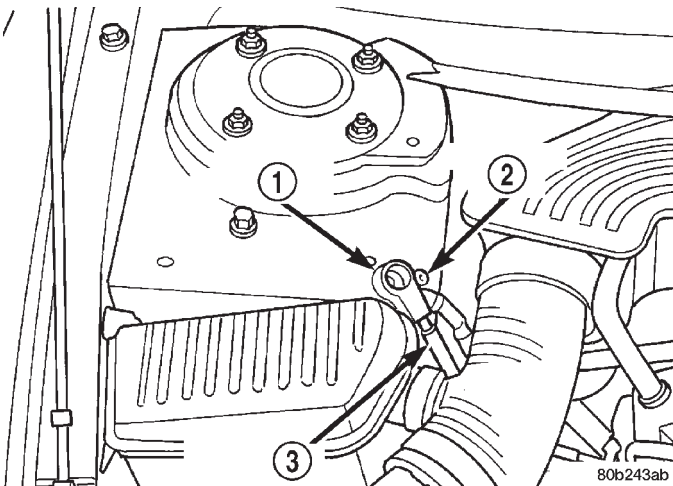


Fig. 23 Correctly Isolated Remote Ground Cable

- 1 - CABLE ISOLATOR
- 2 - GROUND STUD
- 3 - GROUND CABLE

(2) Position the front tires of the vehicle so that they are facing straight-ahead.

(3) Raise the vehicle on a frame contact type hoist until the front tires of the vehicle are just off the floor. See Hoisting in the Lubrication and Maintenance section of this manual for the required lifting procedure to be used for this vehicle.

(4) Remove caps from both wiper arms at the attachment to the pivots to expose the wiper arm attaching nuts. Remove the nut (Fig. 24) attaching each wiper arm to its pivot

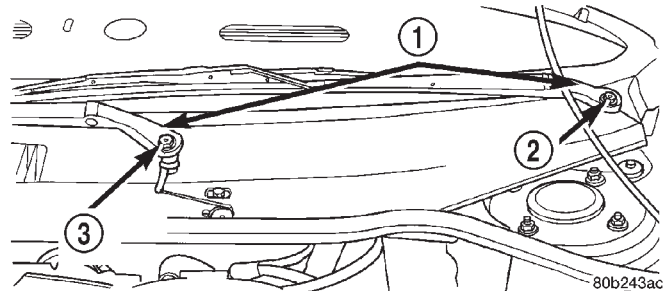


Fig. 24 Wiper Arm Attachment To Pivot

- 1 - WIPER ARMS
- 2 - ATTACHING NUT
- 3 - ATTACHING NUT

(5) Remove the wiper arms from the pivots. Wiper arms are removed from the pivots by rocking them back and force on the pivots until they can be pulled off the pivots.

(6) Remove the wiper module cover and cowl cover (Fig. 25).

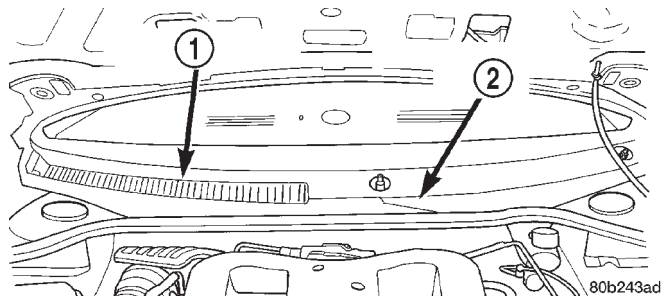


Fig. 25 Wiper Module And Cowl Cover

- 1 - COWL COVER
- 2 - WIPER MODULE COVER

(7) Remove the 8 bolts, attaching the reinforcement (Fig. 26) to the strut towers and the 1 bolt (Fig. 26) attaching the wiper module to the reinforcement. Remove the reinforcement from the vehicle.

(8) Remove the in-line resonator and inlet hose (Fig. 27) from the throttle body and air let hose coming from the lid of the air cleaner housing.

HOSES (Continued)

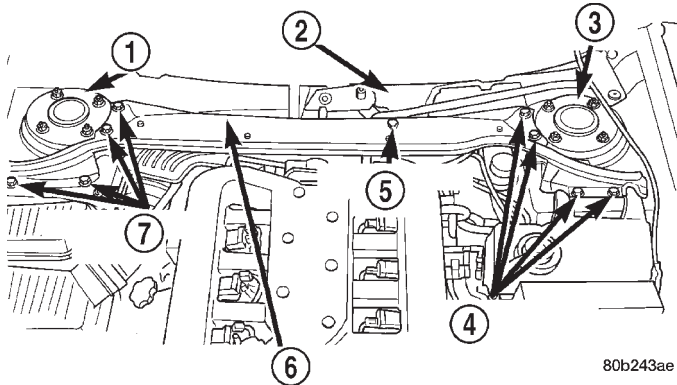


Fig. 26 Reinforcement Attachment To Vehicle

- 1 - RIGHT STRUT TOWER
- 2 - WIPER MODULE
- 3 - LEFT STRUT TOWER
- 4 - ATTACHING BOLTS
- 5 - ATTACHING BOLT
- 6 - REINFORCEMENT
- 7 - ATTACHING BOLTS

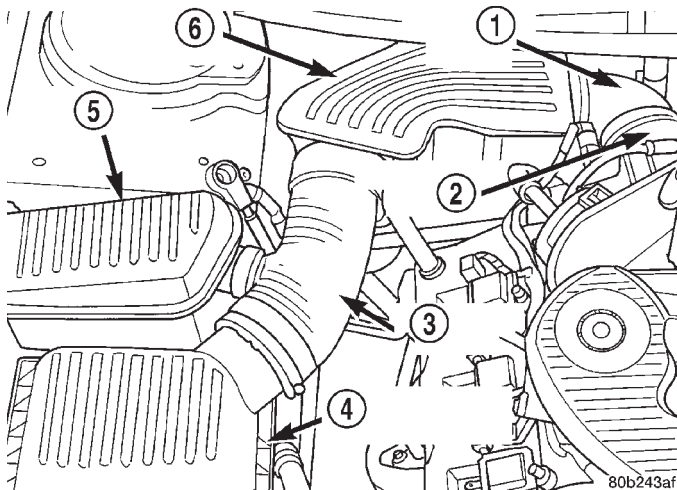


Fig. 27 In-Line Resonator And Air Inlet Hose

- 1 - AIR INLET HOSE
- 2 - THROTTLE BODY
- 3 - AIR INLET HOSE
- 4 - AIR CLEANER HOUSING LID
- 5 - RESONATOR
- 6 - IN-LINE RESONATOR

NOTE: When locking the steering wheel, the front tires of the vehicle are to be facing straight ahead.

(9) Using a steering wheel clamp (Fig. 28), lock the steering wheel from rotating.

CAUTION: Before removing the steering column coupler from the intermediated steering shaft be sure the steering wheel is locked from rotating (Fig. 28). If the steering wheel is allowed to rotate freely

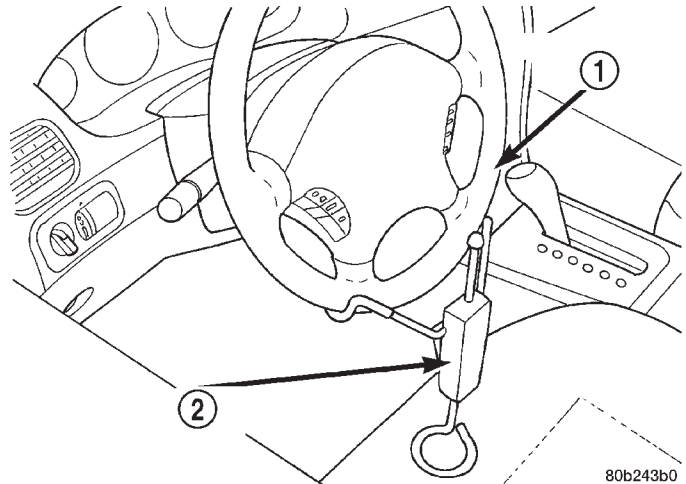


Fig. 28 Steering Wheel Lock Installed (Typical)

- 1 - STEERING WHEEL
- 2 - STEERING WHEEL CLAMP

after it is disconnected from the intermediated shaft, the clockspring will be damaged and will need to be replaced.

(10) Remove the retaining pin and the coupler bolt from the steering column coupler (Fig. 29). Separate the intermediate steering shaft from the steering column coupler.

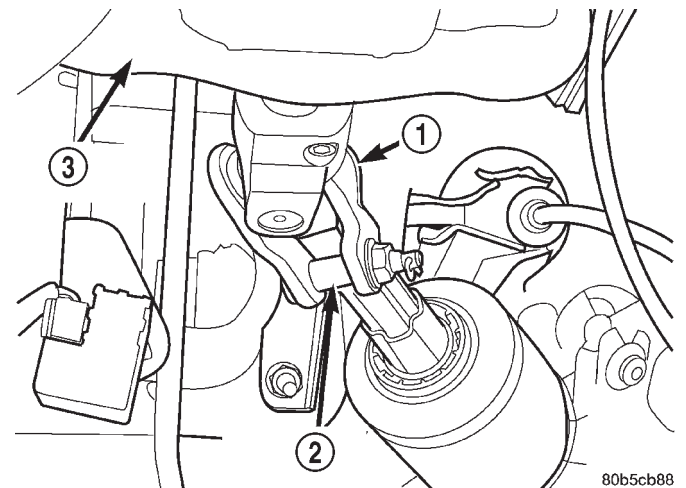


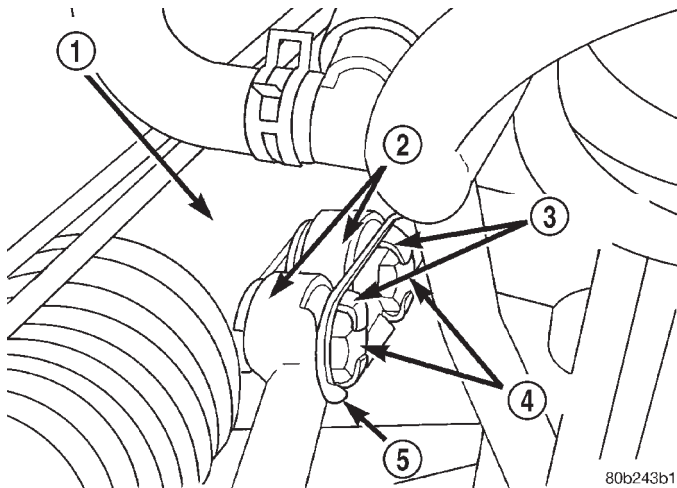
Fig. 29 Steering Column Coupler

- 1 - COUPLER
- 2 - PINCH BOLT
- 3 - STEERING COLUMN

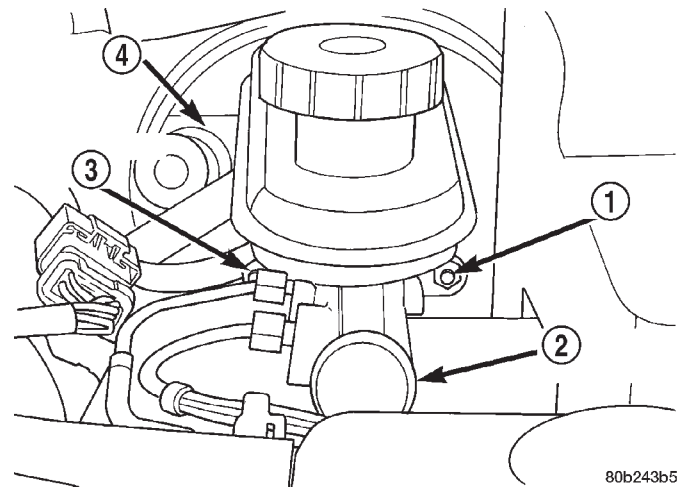
(11) Bend back the retaining tabs on the mounting plate for the tie rod to steering gear mounting bolts (Fig. 30).

(12) Remove the bolts, mounting plate and washers attaching the tie rods to the steering gear (Fig. 31). Lay the tie rods on top of the transaxle bell housing.

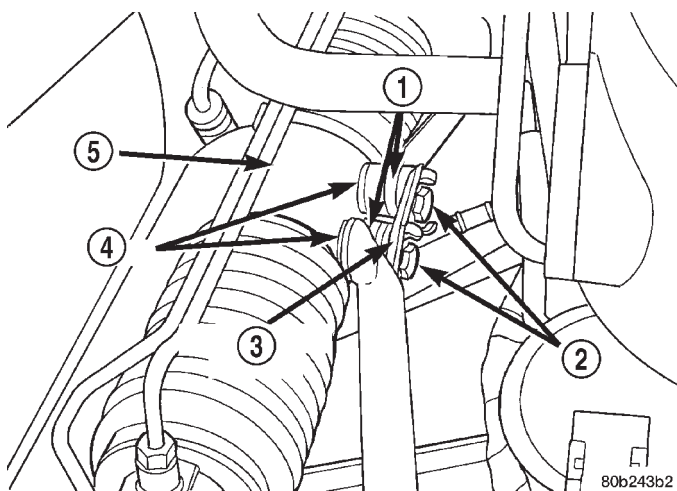
HOSES (Continued)

**Fig. 30 Tie Rod Attachment Bolt Retaining Tabs**

- 1 - STEERING GEAR
- 2 - TIE RODS
- 3 - RETAINING TABS
- 4 - BOLTS
- 5 - PLATE

**Fig. 32 Master Cylinder To Vacuum Booster Mounting**

- 1 - MOUNTING NUT
- 2 - MASTER CYLINDER
- 3 - MOUNTING NUT
- 4 - VACUUM BOOSTER

**Fig. 31 Tie Rod To Steering Gear Attaching Bolts**

- 1 - TIE RODS
- 2 - BOLTS
- 3 - MOUNTING PLATE
- 4 - WASHERS
- 5 - STEERING GEAR

NOTE: The following step should be done to prevent excessive spilling of power steering fluid when the power steering fluid lines are removed from the steering gear.

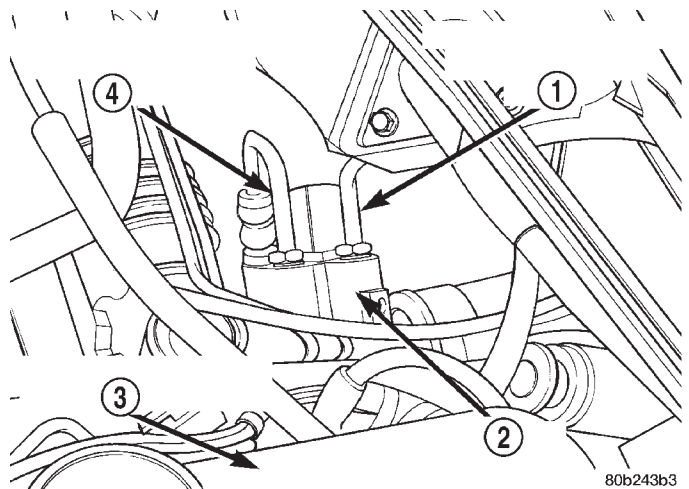
(13) Using a siphon pump, remove as much power steering fluid as possible from the power steering fluid reservoir.

(14) Remove the 2 nuts mounting the master cylinder to the vacuum booster (Fig. 32).

(15) Remove the master cylinder with the brake tubes connected, from the vacuum booster. Carefully position the master cylinder in an upright position on the left side valve cover of the engine.

(16) Remove the vacuum supply hose to the vacuum booster at the check valve in the vacuum booster. Position the vacuum hose out of the way.

(17) Remove the power steering fluid pressure hose and return hose from the steering gear (Fig. 33).

**Fig. 33 Power Steering Hose Connections At Steering Gear**

- 1 - POWER STEERING FLUID RETURN HOSE
- 2 - STEERING GEAR
- 3 - MASTER CYLINDER FLUID RESERVOIR
- 4 - POWER STEERING FLUID PRESSURE HOSE

HOSES (Continued)

(18) Remove the 2 bolts attaching the left side of the steering gear to the crossmember (Fig. 34).

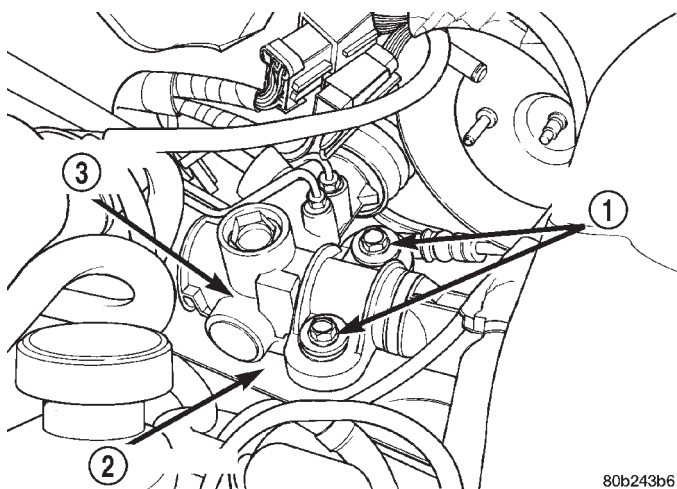


Fig. 34 Steering Gear Attachment To Crossmember (Left Side)

- 1 - MOUNTING BOLTS
- 2 - CORSSMEMBER
- 3 - STEERING GEAR

(19) Remove the 2 bolts attaching the steering gears right side mounting bracket to the crossmember (Fig. 35).

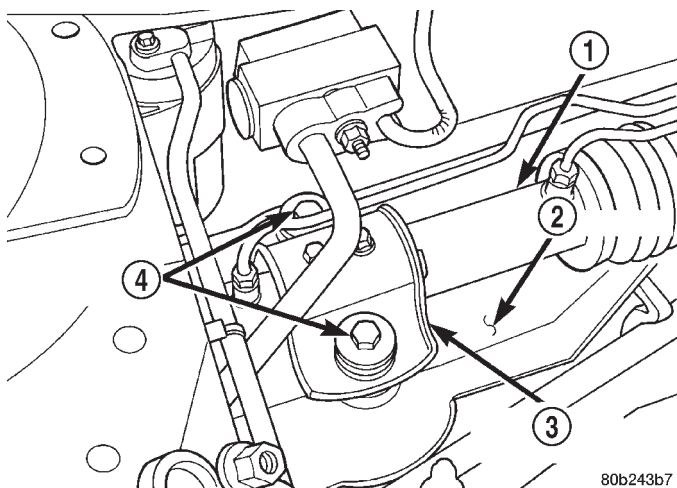


Fig. 35 Steering Gear Attachment To Crossmember (Right Side)

- 1 - STEERING GEAR
- 2 - CROSSMEMBER
- 3 - MOUNTING BRACKET
- 4 - MOUNTING BOLTS

(20) Move the steering gear to clear the pressure and return lines.

(21) Remove the bolts mounting the power steering hoses to the left frame rail (Fig. 36).

(22) Raise vehicle.

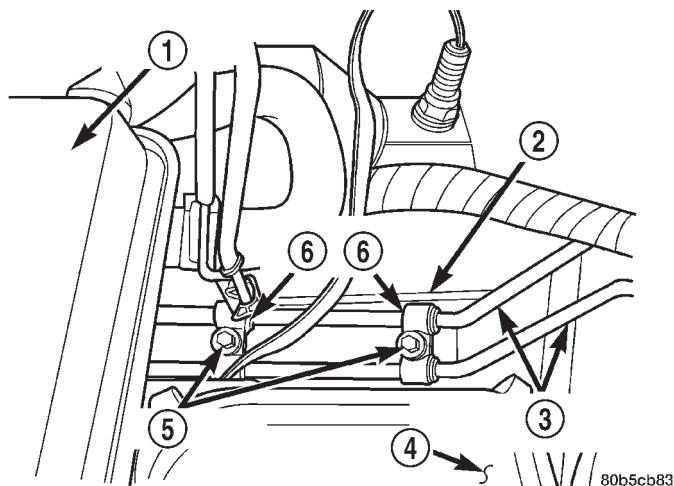


Fig. 36 Power Steering Hose To Frame Rail Mounting

- 1 - COOLANT RECOVERY BOTTLE
- 2 - FRAME RAIL
- 3 - POWER STEERING FLUID TUBES
- 4 - LEFT STRUT TOWER
- 5 - BOLTS
- 6 - ROUTING CLIPS

(23) 300M only — The front fascia will require removal to access the power steering cooler. See Frames and Bumpers.

(24) Remove the power steering fluid return hose from the power steering fluid cooler (Fig. 37). Let the remaining power steering fluid drain out of the return hose and the power steering fluid cooler.

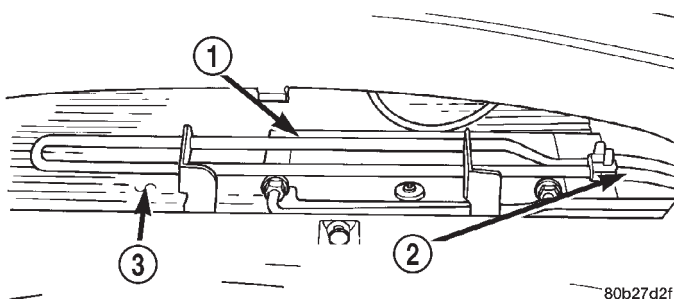


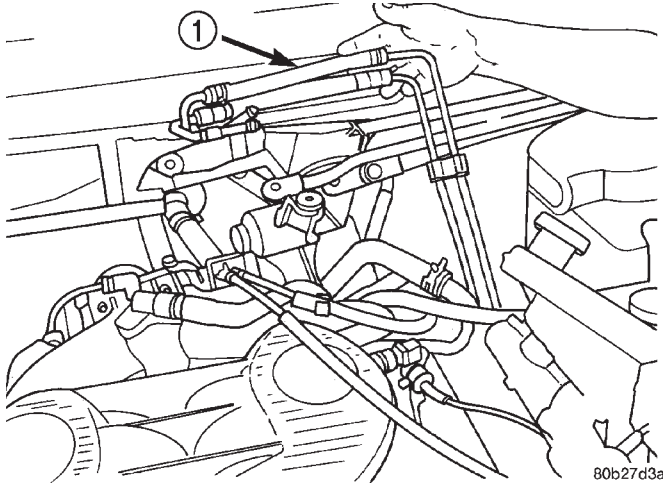
Fig. 37 Power Steering Return Hose At Cooler

- 1 - POWER STEERING FLUID COOLER
- 2 - POWER STEERING FLUID RETURN HOSE
- 3 - AIR CONDITIONING CONDENSER

(25) Lower the vehicle.

(26) Remove the power steering fluid hoses from the vehicle. The power steering fluid hoses are removable from the back of the engine compartment (Fig. 38).

HOSES (Continued)

**Fig. 38 Power Steering Hose Removal/Installation**

1 - POWER STEERING FLUID HOSES

INSTALLATION - PRESSURE AND RETURN HOSES

(1) Install the power steering hoses into the vehicle using the reverse of the removal procedure.

(2) Raise the vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Install the power steering fluid return hose on the power steering fluid cooler (Fig. 37). **Be sure the hose clamp is installed past the upset bead on the power steering fluid cooler.**

(4) 300M only — Reinstall front fascia.

(5) Lower the vehicle until the tires are just clear of the floor

(6) Install the power steering hoses onto the left frame rail by installing the routing clip bolts (Fig. 36). Tighten the bolts to 10 N·m (89 in. lbs.).

(7) Slide steering gear and intermediate shaft back into dash panel sealing boot. Align the steering gear mounting holes with its mounting holes in crossmember.

(8) Loosely install the bolts mounting the left side of the steering gear to the crossmember (Fig. 34).

CAUTION: Tightening the steering gear to crossmember mounting bolts to the proper torque is very important.

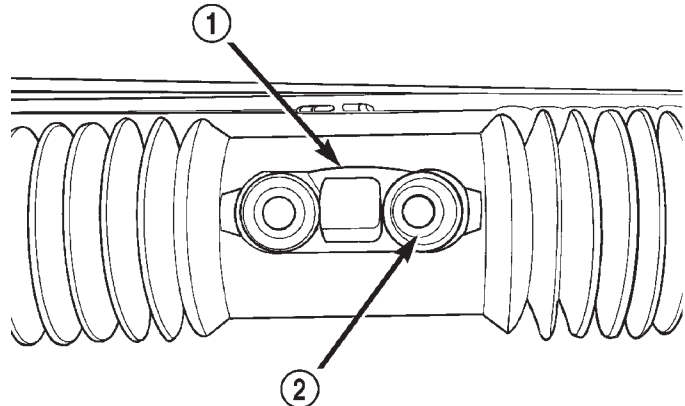
(9) Install the bolts mounting the right side mounting bracket for the steering gear to the crossmember (Fig. 35). Tighten the mounting bolts to a torque of 58 N·m (43 ft. lbs.).

(10) Tighten the bolts mounting the left side of the steering gear to the crossmember (Fig. 34) to a torque of 58 N·m (43 ft. lbs.).

(11) Attach power steering fluid, pressure and return lines into proper ports of the steering gear

(Fig. 33). Tighten both power steering hose tube nuts to a torque of 47 N·m (35 ft. lbs.).

CAUTION: Before installing tie rods on steering gear be sure the tie rod spacer block inside the steering gear bellows (Fig. 39) is correctly aligned with the bolt holes in the rack of the steering gear and the steering gear bellows.

**Fig. 39 Tie Rod Spacer Block**

1 - STEERING GEAR BOOT

2 - SPACER BLOCK

(12) Align center take-off on steering gear with the tie rod assemblies. Install tie rod attaching bolts and washers into steering gear. **Be sure washers are installed between tie rods and steering gear (Fig. 40).** Tighten the tie rod-to-steering gear bolts to a torque of 100 N·m (74 ft. lbs.).

CAUTION: After tie rod attaching bolts are torqued, bend retaining plate tabs against heads of attaching bolts (Fig. 30).

(13) Install the vacuum hose for the vacuum booster on intake manifold vacuum port. Install hose clamp on vacuum hose.

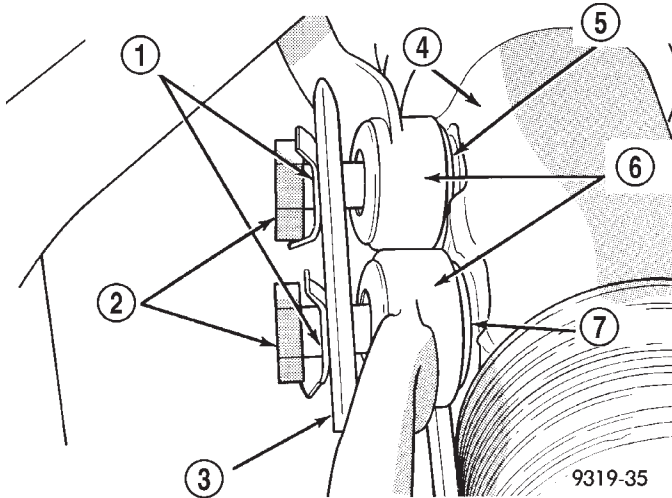
(14) Install the master cylinder on the vacuum booster. Install the two nuts attaching the master cylinder to the vacuum booster. Tighten the master cylinder mounting nuts to a torque of 28 N·m (250 in. lbs.).

(15) Remove the clamp from the steering wheel (Fig. 28).

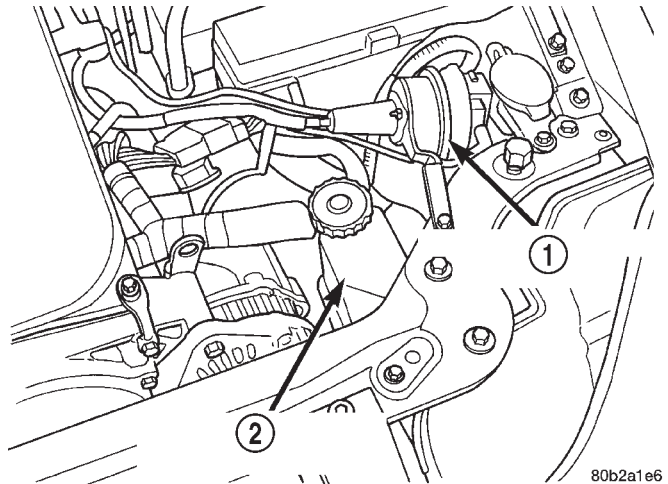
(16) Install the intermediate shaft onto the steering column shaft. Install steering column coupler pinch bolt (Fig. 29) and tighten to a torque of 28 N·m (21 ft. lbs.). Install the pinch bolt nut retaining pin in pinch bolt.

(17) Install the cowl reinforcement on the vehicle (Fig. 26). Install the eight bolts attaching the rein-

HOSES (Continued)

**Fig. 40 Tie Rod Attachment**

- 1 - RETAINING TABS
- 2 - BOLTS
- 3 - RETAINING PLATE
- 4 - STEERING GEAR
- 5 - WASHER
- 6 - TIE RODS
- 7 - WASHER

**Fig. 41 Power Steering Fluid Reservoir (3.5L Engine)**

- 1 - SPEED CONTROL SERVO
- 2 - POWER STEERING FLUID RESERVOIR

forcement to the strut towers. Install the bolt attaching the wiper module to the reinforcement.

(18) Install the in-line resonator and inlet hose on the throttle body and air let hose coming from the lid of the air cleaner housing (Fig. 27).

(19) Install the covers over the wiper module and the cowl (Fig. 25). Install and securely tighten the attaching screws.

(20) Install the wiper arms on the pivots (Fig. 24). Install and securely tighten the wiper arm to pivot attaching nuts. Install the caps on the wiper arms covering the pivot nuts.

(21) Install the battery ground cable onto the ground stud on the shock tower.

(22) Perform Power Steering Pump Initial Operation procedure. (Refer to 19 - STEERING/PUMP - STANDARD PROCEDURE)

(23) Lower vehicle.

(24) Adjust front toe as necessary. (Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - STANDARD PROCEDURE)

RESERVOIR

DESCRIPTION

Vehicles equipped with the 2.7 liter engine use a power steering pump that has an integral reservoir (Fig. 1). Vehicles equipped with the 3.5 liter engine use a power steering pump that has a remotely mounted reservoir (Fig. 41).

OPERATION

The power steering fluid reservoir stores fluid for the power steering system.

REMOVAL

REMOVAL - RESERVOIR (2.7L ENGINE)

The 2.7 liter engine uses a power steering fluid reservoir that is integral to the power steering pump. To replace the power steering fluid reservoir used on this power steering pump the power steering pump will need to be removed from the engine.

(1) Remove the power steering pump from the engine. (Refer to 19 - STEERING/PUMP - REMOVAL)

(2) Remove the 3 bolts (Fig. 42) mounting the power steering fluid reservoir to the power steering pump.

(3) Separate the power steering fluid reservoir from the power steering pump (Fig. 43). The reservoir is separated from the power steering pump by pulling it straight out of the pump.

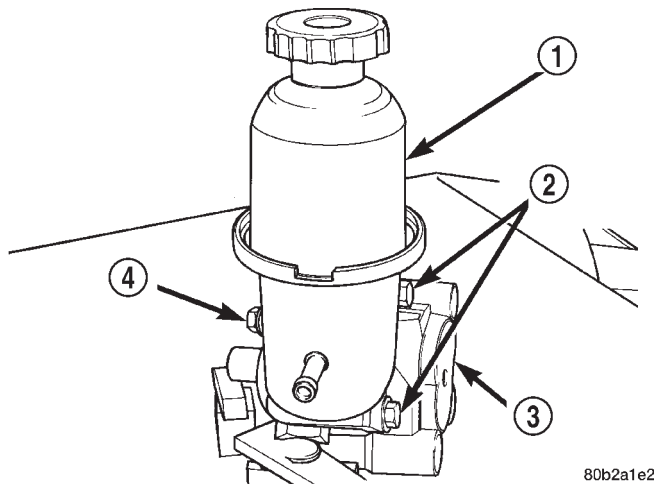
REMOVAL - RESERVOIR (3.5L ENGINE)

(1) Remove the cap and siphon as much fluid as possible out of the reservoir (Fig. 44).

(2) Raise vehicle. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(3) Remove the power steering return hose from the side of the power steering fluid reservoir. Remove the power steering fluid supply hose going to the power steering pump from the bottom of the power

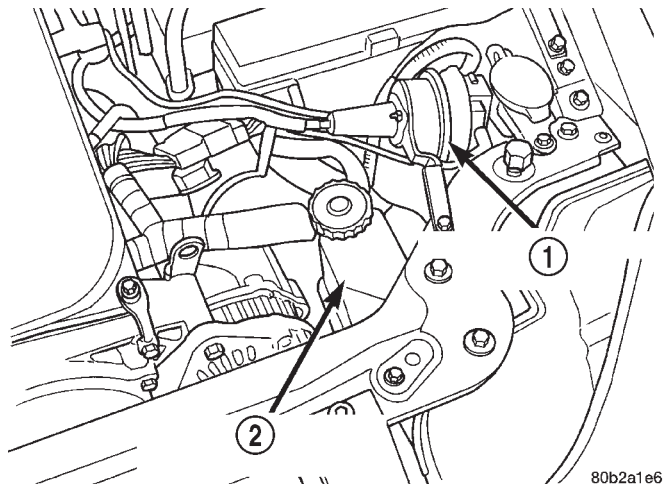
RESERVOIR (Continued)



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Fig. 42 Fluid Reservoir To Pump Mounting

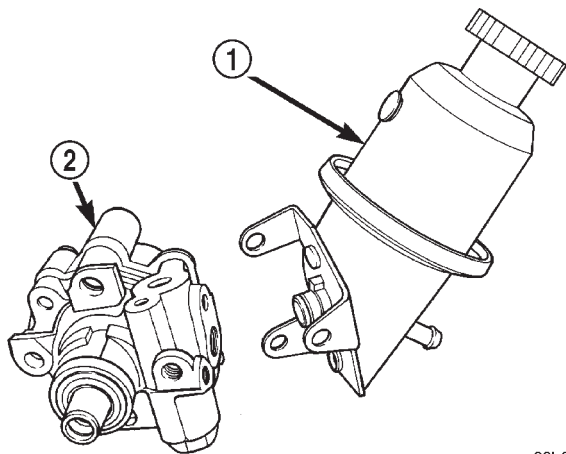
- 1 - POWER STEERING FLUID RESERVOIR
- 2 - MOUNTING BOLTS
- 3 - POWER STEERING PUMP
- 4 - MOUNTING BOLT



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Fig. 44 Power Steering Fluid Reservoir (3.5L Engine)

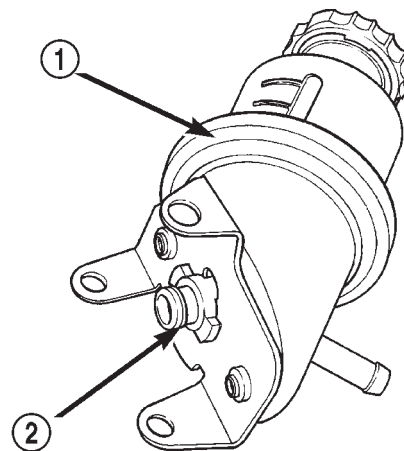
- 1 - SPEED CONTROL SERVO
- 2 - POWER STEERING FLUID RESERVOIR



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Fig. 43 Fluid Reservoir Removal/Installation

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - POWER STEERING PUMP



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Fig. 45 Reservoir O-Ring Seal

- 1 - POWER STEERING FLUID RESERVOIR
- 2 - O-RING

steering fluid reservoir. Let power steering fluid drain from hoses and reservoir.

(4) Lower the vehicle.

(5) Remove the power steering fluid reservoir from the mounting bracket by rotating the rear of the reservoir toward the engine and out of the bracket.

INSTALLATION

INSTALLATION - RESERVOIR (2.7L ENGINE)

(1) Lubricate the O-ring seal on the power steering fluid reservoir (Fig. 45) with fresh clean power steering fluid.

(2) Install the power steering fluid reservoir on the power steering pump (Fig. 43). The reservoir is installed on the pump by pressing the nipple of the reservoir straight into the pump without twisting or rotating the reservoir.

(3) Install and securely tighten the three bolts mounting the power steering fluid reservoir to the power steering pump. Tighten bolt on pulley side to 13 N·m (115 in. lbs.). Tighten bolts on rear to 24 N·m (212 in. lbs.).

(4) Install the power steering pump on the engine. (Refer to 19 - STEERING/PUMP - INSTALLATION)

RESERVOIR (Continued)

INSTALLATION - RESERVOIR (3.5L ENGINE)

(1) Install the power steering fluid reservoir into the mounting bracket. Be sure the retaining tab on the bracket is holding the reservoir in the bracket. Fasten screw to 12 N·m (105 in. lbs.).

(2) Raise vehicle.

(3) Install the power steering return hose onto the nipple on the side of the power steering fluid reservoir. Install the power steering fluid supply hose going to the power steering pump, on the bottom nipple of the power steering fluid reservoir. Install the

hose clamps, being sure they are past the hose retention beads on reservoir nipples.

(4) Lower vehicle.

(5) Fill the power steering pump reservoir to correct fluid level. (Refer to 19 - STEERING/PUMP/FLUID - STANDARD PROCEDURE)

(6) Start engine and turn steering wheel several times from stop to stop to bleed air from fluid in system. Stop engine, check fluid level and inspect system for leaks.

TRANSAXLE

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42LE AUTOMATIC TRANSAXLE

DESCRIPTION

The 42LE (Fig. 1) is a four-speed transaxle that is a conventional hydraulic/mechanical assembly with an integral differential, and is controlled with adaptive electronic controls and monitors. The hydraulic system of the transaxle consists of the transaxle fluid, fluid passages, hydraulic valves, and various line pressure control components. An input clutch assembly which houses the underdrive, overdrive, and reverse clutches is used. It also utilizes separate holding clutches: 2nd/4th gear and Low/Reverse. The primary mechanical components of the transaxle consist of the following:

- Three multiple disc input clutches
- Two multiple disc holding clutches
- Four hydraulic accumulators
- Two planetary gear sets
- Hydraulic oil pump
- Valve body
- Solenoid/Pressure switch assembly
- Integral differential assembly

Control of the transaxle is accomplished by fully adaptive electronics. Optimum shift scheduling is accomplished through continuous real-time sensor

feedback information provided to the Powertrain Control Module (PCM).

The PCM is the heart of the electronic control system and relies on information from various direct and indirect inputs (sensors, switches, etc.) to determine driver demand and vehicle operating conditions. With this information, the PCM can calculate and perform timely and quality shifts through various output or control devices (solenoid pack, transmission control relay, etc.).

The PCM also performs certain self-diagnostic functions and provides comprehensive information (sensor data, DTC's, etc.) which is helpful in proper diagnosis and repair. This information can be viewed with the DRB scan tool.

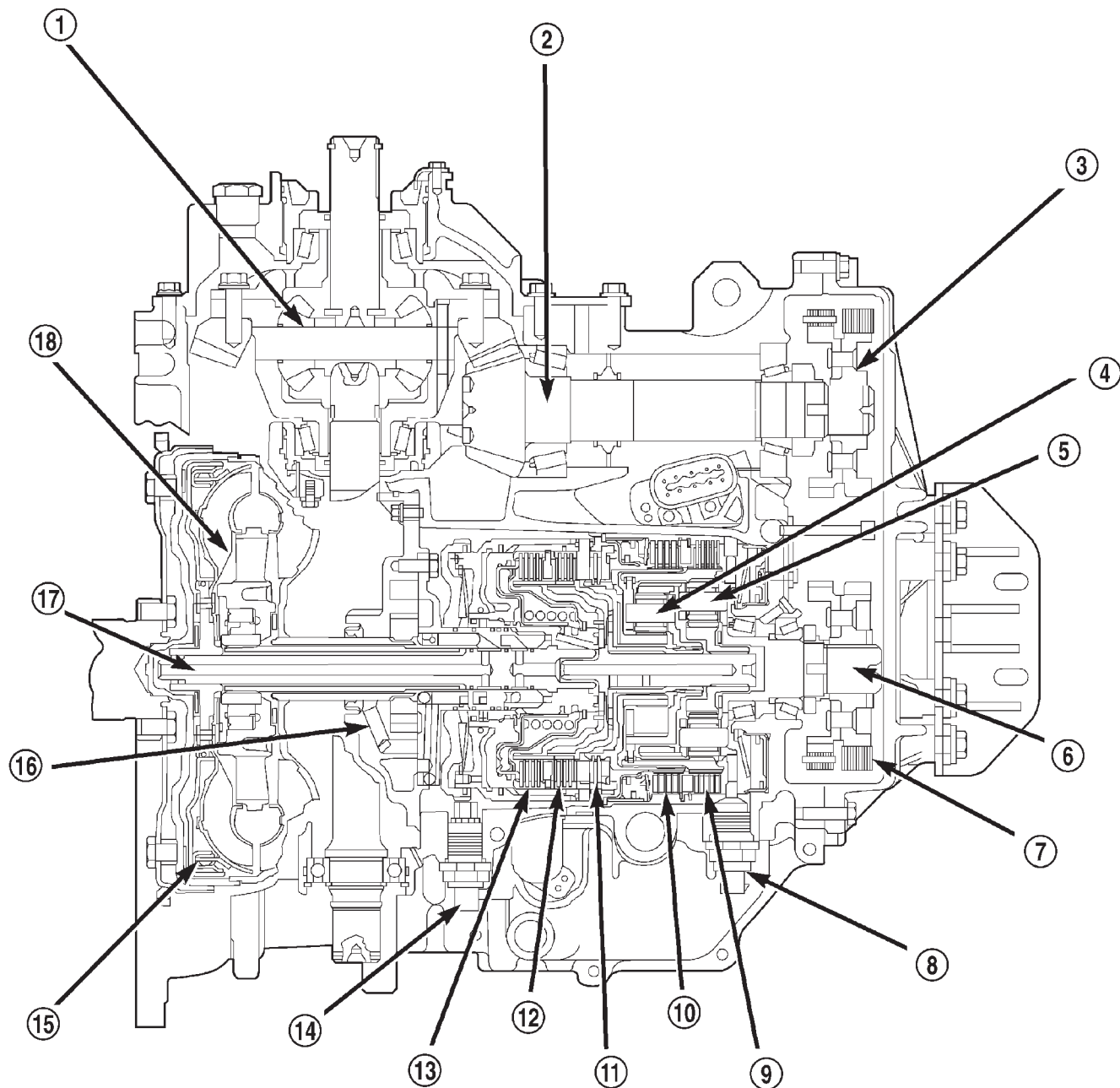
TRANSAXLE IDENTIFICATION

The 42LE transaxle identification code is a series of digits printed on a bar-code label that is fixed to the transaxle case as shown in (Fig. 2).

For example, the identification code K 821 1125 1316 can be broken down as follows:

- K = Kokomo Transmission Plant
- 821 = Last three digits of the transaxle part number
- 1125 = Build date
- 1316 = Build sequence number

42LE AUTOMATIC TRANSAXLE (Continued)

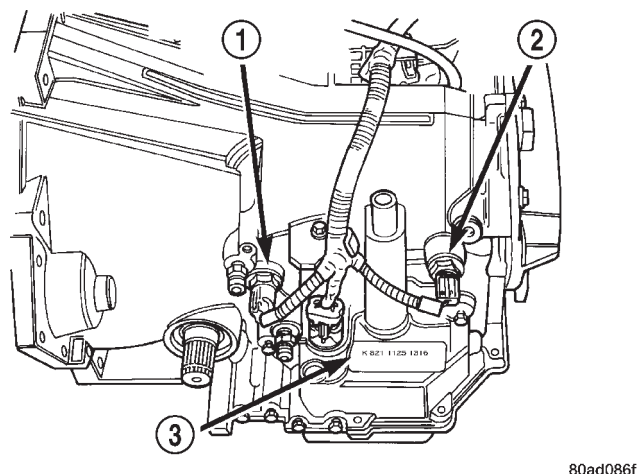


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Fig. 1 42LE Transaxle

- | | | |
|--------------------------|-------------------------|-------------------------|
| 1 - DIFFERENTIAL | 7 - OUTPUT GEAR | 13 - UNDERDRIVE CLUTCH |
| 2 - TRANSFER SHAFT | 8 - OUTPUT SPEED SENSOR | 14 - INPUT SPEED SENSOR |
| 3 - TRANSFER GEAR | 9 - LOW/REVERSE CLUTCH | 15 - CONVERTER CLUTCH |
| 4 - FRONT PLANET CARRIER | 10 - 2/4 CLUTCH | 16 - OIL PUMP |
| 5 - REAR PLANET CARRIER | 11 - REVERSE CLUTCH | 17 - INPUT SHAFT |
| 6 - OUTPUT SHAFT | 12 - OVERDRIVE CLUTCH | 18 - TORQUE CONVERTER |

42LE AUTOMATIC TRANSAXLE (Continued)



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Fig. 2 Transaxle Identification Label

- 1 - INPUT SPEED SENSOR
2 - OUTPUT SPEED SENSOR
3 - IDENTIFICATION TAG

Depending on date of manufacture, some transaxles will utilize a new identification label located in the same location as shown in (Fig. 2). This label can be broken down as follows (Fig. 3):

If the tag is not legible or missing, the "PK" number, which is stamped into the transaxle case, can be referred to for identification. This number differs slightly in that it contains the entire transaxle part number, rather than the last three digits.

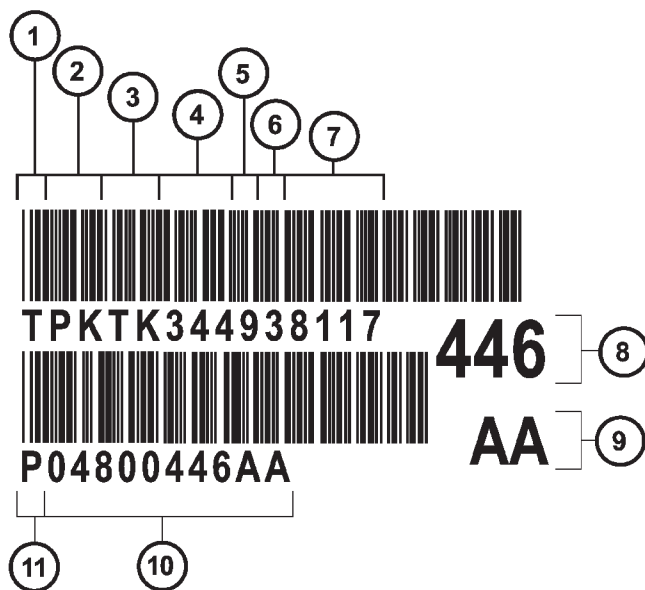
OPERATION

Transmission output is directed to an integral differential by a transfer gear system in the following input-to-output ratios:

First	2.84 : 1
Second	1.57 : 1
Third	1.00 : 1
Overdrive	0.69 : 1
Reverse	2.21 : 1

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - 42LE GENERAL DIAGNOSIS**

CAUTION: Before attempting any repair on the 42LE Four Speed Automatic Transaxle, always check for proper shift linkage adjustment. Also check for diagnostic trouble codes with the DRB scan tool and the 42LE Transaxle Diagnostic Procedure Manual.

**Fig. 3 Identification Label Breakdown**

- 1 - T=TRACEABILITY
2 - SUPPLIER CODE (PK=KOKOMO)
3 - COMPONENT CODE (TK=KOKOMO TRANSMISSION)
4 - BUILD DAY (344=DEC. 9)
5 - BUILD YEAR (9=1999)
6 - LINE/SHIFT CODE (3=3RD SHIFT)
7 - BUILD SEQUENCE NUMBER
8 - LAST THREE OF P/N
9 - NIK
10 - TRANSAXLE PART NUMBER
11 - P=PART NUMBER

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42LE automatic transaxle malfunctions may be caused by these general conditions:

- Poor engine performance
- Improper adjustments
- Hydraulic malfunctions
- Mechanical malfunctions
- Electronic malfunctions

When diagnosing a problem always begin with recording the complaint. The complaint should be defined as specific as possible. Include the following checks:

- Temperature at occurrence (cold, hot, both)
 - Dynamic conditions (acceleration, deceleration, upshift, cornering)
 - Elements in use when condition occurs (what gear is transaxle in during condition)
 - Road and weather conditions
 - Any other useful diagnostic information.
- After noting all conditions, check the easily accessible variables:
- Fluid level and condition
 - Shift linkage adjustment

42LE AUTOMATIC TRANSAXLE (Continued)

- Diagnostic trouble code inspection

Then perform a road test to determine if the problem has been corrected or that more diagnosis is necessary. If the problem exists after the preliminary tests and corrections are completed, hydraulic pressure checks should be performed.

DIAGNOSIS AND TESTING - ROAD TEST

Prior to performing a road test, verify that the fluid level, fluid condition, and linkage adjustment have been approved.

During the road test, the transaxle should be operated in each position to check for slipping and any variation in shifting.

If the vehicle operates properly at highway speeds, but has poor acceleration, the converter stator over-

running clutch may be slipping. If acceleration is normal, but high throttle opening is needed to maintain highway speeds, the converter stator clutch may have seized. Both of these stator defects require replacement of the torque converter and thorough transaxle cleaning.

Slipping clutches can be isolated by comparing the "Elements in Use" chart with clutch operation encountered on a road test. This chart identifies which clutches are applied at each position of the selector lever.

A slipping clutch may also set a DTC and can be determined by operating the transaxle in all selector positions.

ELEMENTS IN USE AT EACH POSITION OF SELECTOR LEVER

Shift Lever Position	INPUT CLUTCHES			HOLDING CLUTCHES	
	Underdrive	Overdrive	Reverse	2/4	Low/Reverse
P - PARK					X
R - REVERSE			X		X
N - NEUTRAL					X
OD - OVERDRIVE					
First	X				X
Second	X			X	
Direct	X	X			
Overdrive		X		X	
D - DRIVE*					
First	X				X
Second	X			X	
Direct	X	X			
L - LOW*					
First	X				X
Second	X			X	
Direct	X	X			

* Vehicle upshift and downshift speeds are increased when in these selector positions.

The process of elimination can be used to detect any unit which slips and to confirm proper operation of good units. Road test analysis can diagnose slipping units, but the cause of the malfunction cannot be determined. Practically any condition can be caused by leaking hydraulic circuits or sticking valves.

DIAGNOSIS AND TESTING - HYDRAULIC PRESSURE TESTS

Pressure testing is a very important step in the diagnostic procedure. These tests usually reveal the cause of most transaxle problems.

Before performing pressure tests, be certain that fluid level and condition, and shift cable adjustments have been checked and approved. Fluid must be at operating temperature (150 to 200 degrees F).

42LE AUTOMATIC TRANSAXLE (Continued)

Install an engine tachometer, raise vehicle on hoist which allows front wheels to turn, and position tachometer so it can be read.

Using special adapters (L-4559), attach 300 psi gauge(s) (C-3293SP) to port(s) required for test being conducted.

Test port locations are shown in (Fig. 4).

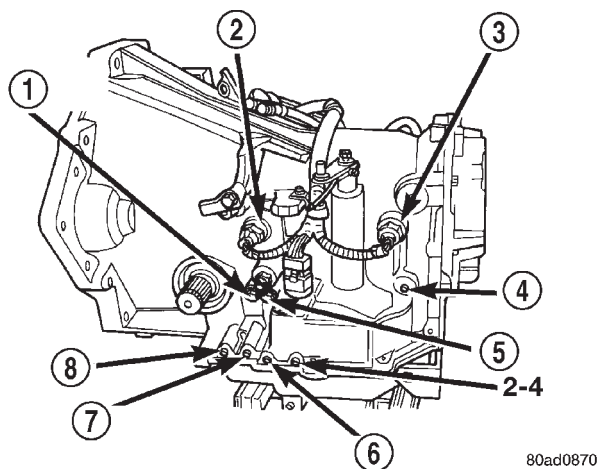


Fig. 4 Pressure Taps

- 1 - TORQUE CONVERTER CLUTCH OFF
- 2 - TURBINE SPEED SENSOR
- 3 - OUTPUT SPEED SENSOR
- 4 - LOW/REVERSE
- 5 - REVERSE
- 6 - UNDERDRIVE
- 7 - TORQUE CONVERTER CLUTCH ON
- 8 - OVERDRIVE

TEST ONE-SELECTOR IN L (1st Gear)

NOTE: This test checks pump output, pressure regulation and condition of the low/reverse clutch hydraulic circuit and shift schedule.

- (1) Attach pressure gauge to the low/reverse clutch tap.
- (2) Move selector lever to the L position.
- (3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed to 20 mph.
- (4) Low/reverse clutch pressure should read 115 to 145 psi.

TEST TWO-SELECTOR IN DRIVE (Second Gear)

NOTE: This test checks the underdrive clutch hydraulic circuit as well as the shift schedule.

- (1) Attach gauge to the underdrive clutch tap.
- (2) Move selector lever to the 3 position.

(3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 30 mph.

(4) In second gear the underdrive clutch pressure should read 110 to 145 psi.

TEST TWO A-SELECTOR IN OD (Fourth Gear)

NOTE: This test checks the underdrive clutch hydraulic circuit as well as the shift schedule.

- (1) Attach gauge to the underdrive clutch tap.
- (2) Move selector lever to the OD position.
- (3) Allow wheels to rotate freely and increase throttle opening to achieve an indicated speed of 40 mph.
- (4) Underdrive clutch pressure should read below 5 psi. If not, than either the solenoid assembly or controller is at fault.

TEST THREE-SELECTOR IN OVERDRIVE (Third and Second Gear)

NOTE: This test checks the overdrive clutch hydraulic circuit as well as the shift schedule.

- (1) Attach gauge to the overdrive clutch tap.
- (2) Move selector lever to the OD position.
- (3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 20 mph.
- (4) Overdrive clutch pressure should read 74 to 95 psi.
- (5) Move selector lever to the 3 position and increase indicated vehicle speed to 30 mph.
- (6) The vehicle should be in second gear and overdrive clutch pressure should be less than 5 psi.

TEST FOUR-SELECTOR IN OD (Fourth Gear)

NOTE: This test checks the 2/4 clutch hydraulic circuit.

- (1) Attach gauge to the 2/4 clutch tap.
- (2) Move selector lever to the OD position.
- (3) Allow vehicle front wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 30 mph. Vehicle should be in fourth gear.
- (4) The 2/4 clutch pressure should read 75 to 95 psi.

TEST FIVE-SELECTOR IN OVERDRIVE (Fourth Gear, CC on)

NOTE: These tests check the torque converter clutch hydraulic circuit.

42LE AUTOMATIC TRANSAXLE (Continued)

- (1) Attach gauge to the torque converter clutch off pressure tap.
- (2) Move selector lever to the overdrive position.
- (3) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 50 mph. Vehicle should be in 4th gear, CC on.

CAUTION: Both wheels must turn at the same speed.

- (4) Torque converter clutch off pressure should be less than 5 psi.
- (5) Now attach the gauge to the torque converter clutch on pressure tap.
- (6) Move selector to the overdrive position.
- (7) Allow vehicle wheels to turn and increase throttle opening to achieve an indicated vehicle speed of 50 mph.
- (8) Verify the torque converter clutch is applied mode using the RPM display of the DRB scan tool.
- (9) Torque converter clutch on pressure should be 60-90 psi.

TEST SIX-SELECTOR IN REVERSE

NOTE: This test checks the reverse clutch hydraulic circuit.

- (1) Attach gauge to the reverse and low/reverse clutch tap.
- (2) Move selector lever to the reverse position.
- (3) Read reverse clutch pressure with output stationary (foot on brake) and throttle opened to achieve 1500 rpm.
- (4) Reverse and low/reverse clutch pressure should read 165 to 235 psi.

TEST RESULT INDICATIONS

- (1) If proper line pressure is found in any one test, the pump and pressure regulator are working properly.
- (2) Low pressure in all positions indicates a defective pump, a clogged filter, or a stuck pressure regulator valve.
- (3) Clutch circuit leaks are indicated if pressures do not fall within the specified pressure range.
- (4) If the overdrive clutch pressure is greater than 5 psi in Step 6 of Test Three, a worn reaction shaft seal ring or a defective solenoid assembly is indicated.
- (5) If the underdrive clutch pressure is greater than 5 psi in Step 4 of Test Two-A, a defective solenoid/pressure switch assembly or controller is the cause.

ALL PRESSURE SPECIFICATIONS ARE PSI (ON HOIST, WITH FRONT WHEELS FREE TO TURN)

Gear Selector Position		Actual Gear	PRESSURE TAPS						
			Under-drive Clutch	Over-drive Clutch	Reverse Clutch	Torque Converter Clutch Off	Torque Converter Clutch On	2/4 Clutch	Low/ Reverse Clutch
PARK 0 mph	*	PARK	0-2	0-5	0-2	60-110	45-100	0-2	115-145
REVERSE 0 mph	*	REVERSE	0-2	0-7	165-235	50-100	35-85	0-2	165-235
NEUTRAL 0 mph	*	NEUTRAL	0-2	0-5	0-2	60-110	45-100	0-2	115-145
L 20 mph	#	FIRST	110-145	0-5	0-2	60-110	45-100	0-2	115-145
3 30 mph	#	SECOND	110-145	0-5	0-2	60-110	45-100	115-145	0-2
3 45 mph	#	DIRECT	75-95	75-95	0-2	60-90	45-80	0-2	0-2
OD 30 mph	#	OVERDRIVE	0-2	75-95	0-2	60-90	45-80	75-95	0-2
OD 50 mph	#	OVERDRIVE WITH TCC	0-2	75-95	0-2	0-5	60-95	75-95	0-2
* Engine Speed at 1500 rpm # CAUTION: Both front wheels must be turning at same speed.									

42LE AUTOMATIC TRANSAXLE (Continued)

DIAGNOSIS AND TESTING - CLUTCH AIR PRESSURE TESTS

Inoperative clutches can be located by substituting air pressure for fluid pressure. The clutches may be tested by applying air pressure to their respective passages after the valve body has been removed. Use Special Tool 6599-1 and 6599-2 to perform test (Fig. 5).

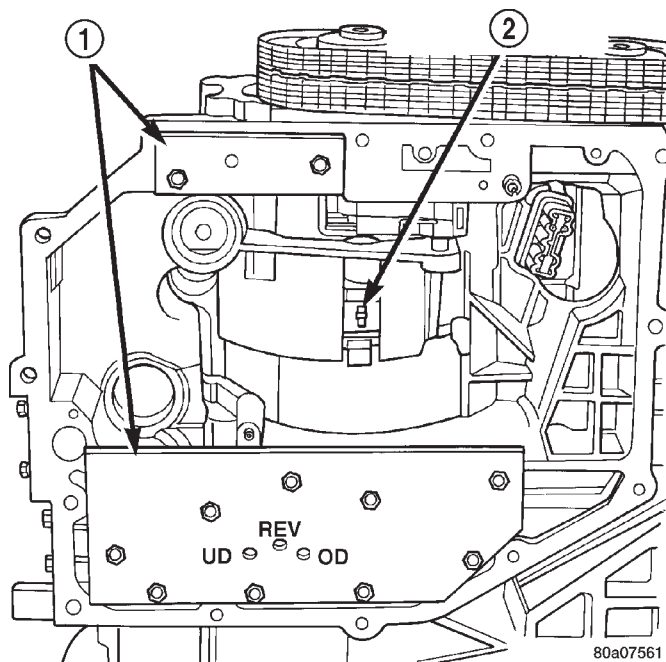


Fig. 5 Air Pressure Test Plate

- 1 - AIR PRESSURE TEST PLATES
- 2 - 2/4 CLUTCH RETAINER HOLE

To make air pressure tests, proceed as follows:

NOTE: The compressed air supply must be free of all dirt and moisture. Use a pressure of 30 psi.

Remove oil pan and valve body. See Valve body recondition.

Apply air pressure to the holes in the special tool, one at a time.

Listen for the clutch to apply. It will give a slight thud sound. If a large amount of air is heard escaping, the transaxle must be removed from vehicle, disassembled and all seals inspected.

OVERDRIVE CLUTCH

Apply air pressure to the overdrive clutch apply passage and watch for the push/pull piston to move forward. The piston should return to its starting position when the air pressure is removed.

UNDERDRIVE CLUTCH

Because this clutch piston cannot be seen, its operation is checked by function. Air pressure is applied to the low/reverse or the 2/4 clutches. This locks the output shaft. Use a piece of rubber hose wrapped around the input shaft and a pair of clamp-on pliers to turn the input shaft. Next apply air pressure to the underdrive clutch (Fig. 6). The input shaft should not rotate with hand torque. Release the air pressure and confirm that the input shaft will rotate.

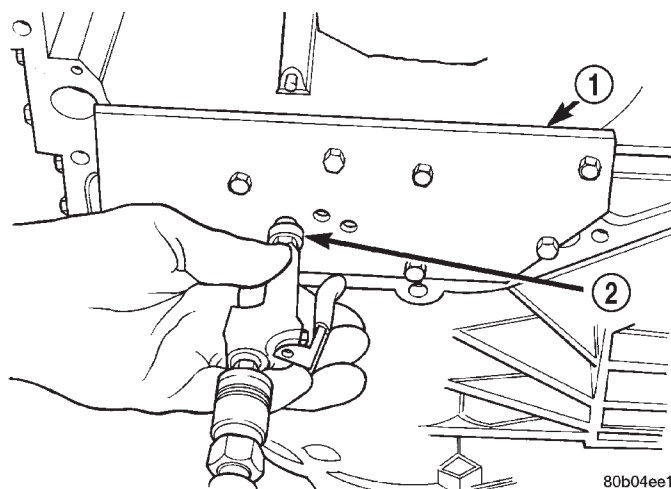


Fig. 6 Testing Underdrive Clutch

- 1 - AIR PRESSURE TEST PLATE 6599-1
- 2 - AIR NOZZLE

REVERSE CLUTCH

Apply air pressure to the reverse clutch apply passage and watch for the push/pull piston to move rearward. The piston should return to its starting position when the air pressure is removed.

2/4 CLUTCH

Apply air pressure to the feed hole located on the 2/4 clutch retainer. Look in the area where the 2/4 piston contacts the first separator plate and watch carefully for the 2/4 piston to move rearward. The piston should return to its original position after the air pressure is removed.

LOW/REVERSE CLUTCH

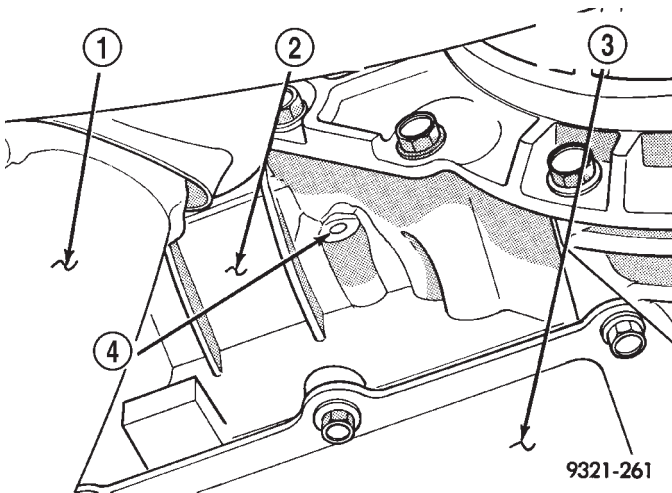
Apply air pressure to the low/reverse clutch feed hole passage. Look in the area where the low/reverse piston contacts the first separator plate. Watch carefully for the piston to move forward. The piston should return to its original position after the air pressure is removed.

42LE AUTOMATIC TRANSAXLE (Continued)

DIAGNOSIS AND TESTING - FLUID LEAKAGE

The 42LE is a dual sump transaxle. The transaxle uses both automatic transaxle fluid (ATF) for the main sump and hypoid gear lube for the differential sump. When diagnosing a leak, it is important to distinguish which type of fluid is leaking. Factory fill ATF is dyed red, while differential hypoid oil is brown in color and has a distinctive odor.

There are two seals at the boundary of the two sumps. There is a weep hole in the right side of the transaxle case (Fig. 7) which vents the area between the two seals. If oil is leaking from the weep hole, there is at least one seal leaking. Never plug the weep hole to correct a leaking condition. Plugging the weep hole could result in contaminating one or both transaxle sumps, low oil level, poor transaxle performance or transaxle failure. In order to correctly repair this type of leak the transaxle must be removed from the vehicle and both transfer shaft seals replaced.

**Fig. 7 Weep Hole Location**

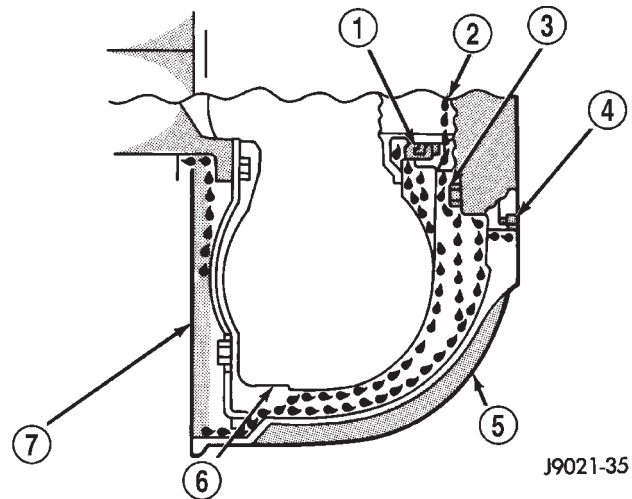
- 1 - RIGHT EXHAUST PIPE
- 2 - TRANSAXLE CASE
- 3 - TRANSAXLE OIL PAN
- 4 - WEEP HOLE

FLUID LEAKAGE-TORQUE CONVERTER HOUSING AREA

When diagnosing converter housing fluid leaks, three actions must be taken before repair:

- (1) Verify proper transmission fluid level.
- (2) Verify that the leak originates from the converter housing area and is transmission fluid.
- (3) Determine the true source of the leak.

Fluid leakage at or around the torque converter area may originate from an engine oil leak (Fig. 8). The area should be examined closely. Factory fill fluid is red and, therefore, can be distinguished from engine oil.

**Fig. 8 Converter Housing Leak Paths**

- 1 - PUMP SEAL
- 2 - PUMP VENT
- 3 - PUMP BOLT
- 4 - PUMP GASKET
- 5 - CONVERTER HOUSING
- 6 - CONVERTER
- 7 - REAR MAIN SEAL LEAK

Some suspected converter housing fluid leaks may not be leaks at all. They may only be the result of residual fluid in the converter housing, or excess fluid spilled during factory fill, or fill after repair. Converter housing leaks have several potential sources. Through careful observation, a leak source can be identified before removing the transmission for repair.

Pump seal leaks tend to move along the drive hub and onto the rear of the converter (Fig. 8). Pump o-ring or pump body leaks follow the same path as a seal leak. Pump attaching bolt leaks are generally deposited on the inside of the converter housing and not on the converter itself. Pump seal or gasket leaks usually travel down the inside of the converter housing (Fig. 8).

TORQUE CONVERTER LEAKAGE

Possible sources of torque converter leakage are:

- Torque converter weld leaks at the outside diameter weld (Fig. 9).
- Torque converter hub weld (Fig. 9).

FLUID LEAKAGE—DIFFERENTIAL HOUSING AREA

The differential uses Mopar® 75w-90 Fuel Saving petroleum based hypoid gear lube. It can be distinguished from ATF by its brown color (ATF is dyed red). Also gear lube has a distinctive odor (hypoid smell).

42LE AUTOMATIC TRANSAXLE (Continued)

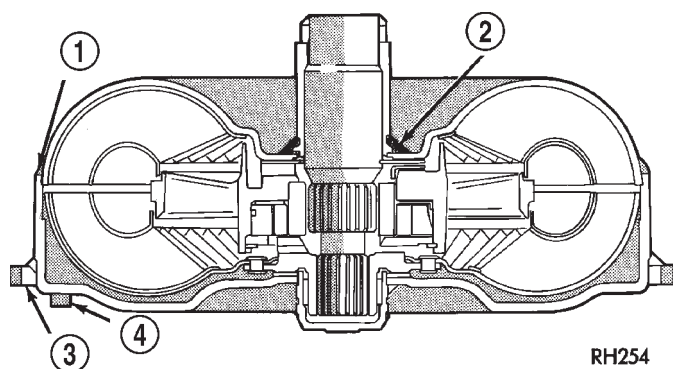


Fig. 9 Converter Leak Points—Typical

- 1 - OUTSIDE DIAMETER WELD
- 2 - TORQUE CONVERTER HUB WELD
- 3 - STARTER RING GEAR
- 4 - LUG

(1) If it is suspected that the leakage is gear lube, check the differential for proper fluid level. High oil level can result in leakage from the differential vent.

CAUTION: A crushed vent baffle will cause oil to leak from vent hose.

(2) If fluid level is correct, add 1/4 to 1/2 ounce of leak detecting florescent dye to the differential.

(3) Clean the suspect area of the transaxle with solvent.

(4) Road test the vehicle until the leak reoccurs.

(5) Using a black light determine the source of the leak and repair as required.

(6) Do not add oil dye to both the ATF sump and the differential sump at the same time. This can cause confusion when trying to pinpoint a leak source.

STANDARD PROCEDURE - ALUMINUM THREAD REPAIR

Damaged or worn threads in the aluminum transaxle case and valve body can be repaired by the use of Heli-Coils, or equivalent. This repair consists of drilling out the worn-out damaged threads. Then tap the hole with a special Heli-Coil tap, or equivalent, and installing a Heli-Coil insert, or equivalent, into the hole. This brings the hole back to its original thread size.

Heli-Coil, or equivalent, tools and inserts are readily available from most automotive parts suppliers.

REMOVAL

NOTE:

When a transaxle failure has contaminated the fluid, the oil cooler(s) must be flushed (Refer to 7 -

COOLING/TRANSMISSION - STANDARD PROCEDURE). The cooler bypass valve in the transaxle must be inspected and/or replaced also. The torque converter must also be replaced with an exchange unit. This will ensure that metal particles or sludged oil are not later transferred back into the reconditioned (or replaced) transaxle.

NOTE: If the Torque Converter is being replaced, it is necessary to restart the TCC Break-In Strategy. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

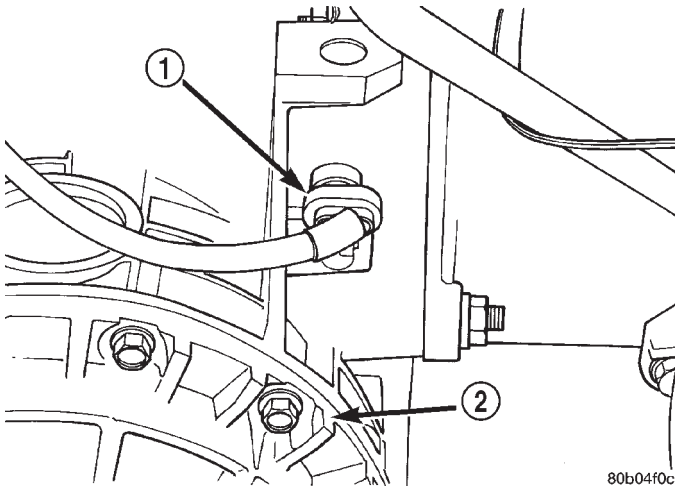
The transaxle can be removed **without** having to remove the engine.

- (1) Disconnect battery.
- (2) Remove wiper blades.
- (3) Remove right and left wiper module covers.
- (4) Remove steel cowl/strut support.

CAUTION: Be careful of sharp edges around cowl/wiper area.

- (5) Remove engine air inlet tube.
- (6) Remove transaxle harness connectors at cowl area.
- (7) Remove upper bell housing stud nuts from bell housing studs. Detach heater hose tube and throttle body support bracket.
- (8) Remove upper bell housing studs.
- (9) Lift vehicle on hoist.
- (10) Loosen clamps at intersection of rear exhaust system to front catalytic converter pipes.
- (11) Separate rear exhaust from left catalytic converter pipe and right extension pipe.
- (12) Remove rear exhaust system.
- (13) Remove nuts retaining exhaust pipes to transmission mount.
- (14) Loosen clamp at right extension at right catalytic converter. Remove right extension.
- (15) Disconnect crankshaft position sensor connector and remove sensor (Fig. 10). The sensor is located on the upper right side of the transaxle bell housing.
- (16) Remove dipstick tube.
- (17) Disconnect the gear selector cable from the transaxle.
- (18) Disconnect transmission range sensor connector. Disconnect input and output speed sensor connector.
- (19) Disconnect and plug transaxle cooler lines at the transaxle.
- (20) Remove lower control arm pinch bolts.
- (21) Pry lower control arms down and out of steering knuckles.

42LE AUTOMATIC TRANSAXLE (Continued)

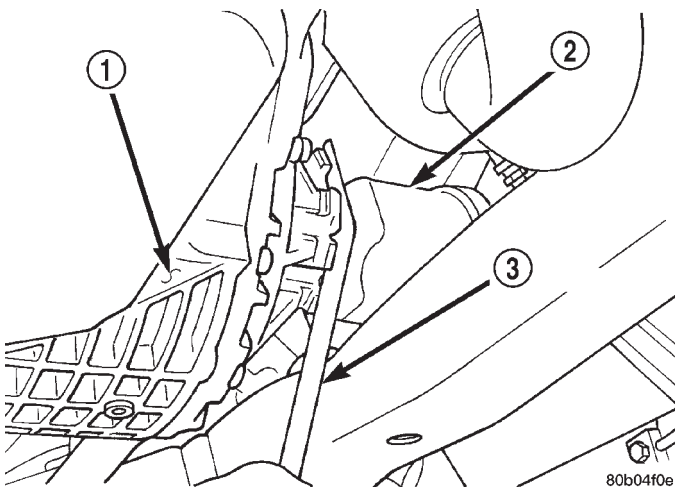
**Fig. 10 Crankshaft Position Sensor Location**

- 1 - CRANKSHAFT POSITION SENSOR
2 - DIFFERENTIAL COVER

CAUTION: Do not allow drive shaft or CV joint to hang freely. Internal joint damage may occur if allowed to hang freely.

CAUTION: Drive shaft retainer clips and seals located on the stub shafts must be replaced before reinstalling drive shafts.

(22) Using a pry bar, disconnect the inner tripod joints from the transaxle (Fig. 11).

**Fig. 11 Half Shaft Removal**

- 1 - TRANSAXLE DIFFERENTIAL
2 - DRIVE SHAFT
3 - PRY BAR

(23) Pull bottom of knuckles and drive shafts outward to allow clearance during transaxle removal. The drive shafts do not have to be completely removed from the vehicle. **Do not allow the inner tripod joints to hang unsupported or joint damage may occur.**

(24) Disconnect O2 sensor wiring and remove left catalytic converter pipe.

(25) Unbolt starter assembly. Do not disconnect wiring or completely remove the starter from the vehicle. Allow the starter to sit between the engine and the frame.

(26) Remove engine oil pan collar.

(27) Remove torque converter bolts. The torque converter is indexed to the flex plate. Mark the torque converter location to ensure that the torque converter is reinstalled correctly.

CAUTION: The drive plate to torque converter bolts and the drive plate to crankshaft bolts must not be reused. Install new bolts whenever these bolts are removed.

(28) Place a transmission jack under the transaxle. Secure the transaxle to the jack.

(29) Raise transaxle slightly to relieve the weight on the rear transaxle mount.

NOTE: Bolts for the crossmember bridge are different lengths, side to side.

(30) Remove rear crossmember bridge bolts.

(31) Remove rear mount adapter plate mounting bolts.

(32) Remove the rear crossmember bridge, mount, and adapter plate as an assembly.

(33) Lower the rear of the transaxle to gain access to the bell housing bolts.

(34) Remove side bell housing bolts.

(35) Remove dipstick tube from transaxle. Be prepared to plug the dipstick hole when removing dipstick to prevent fluid from spilling out of the transaxle.

(36) Disconnect solenoid/pressure switch assembly connector at top of transaxle.

(37) The transaxle can now be lowered from the vehicle.

DISASSEMBLY

NOTE: If the transaxle is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the Quick Learn Procedure using the DRBIII® Scan Tool (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE).

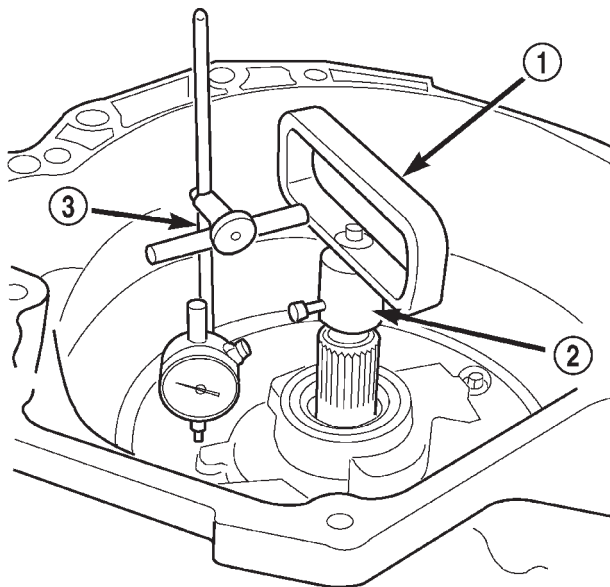
42LE AUTOMATIC TRANSAXLE (Continued)

Before disassembling transaxle, move the shift lever clockwise as far as it will go and then remove the shift lever.

NOTE: Tag all clutch pack assemblies, as they are removed, for reassembly identification.

CAUTION: Do not intermix clutch discs or plates as the unit might then fail.

(1) Measure input shaft end play using Tool 8266. Set up Tool 8266 and a dial indicator as shown in (Fig. 12). Move input shaft in and out to obtain end play reading. End play specifications are 0.13 to 0.64 mm (0.005 to 0.025 inch). Record indicator reading for reference when reassembling the transaxle. If endplay exceeds the specified range, the #4 thrust plate needs to be inspected and changed if necessary.

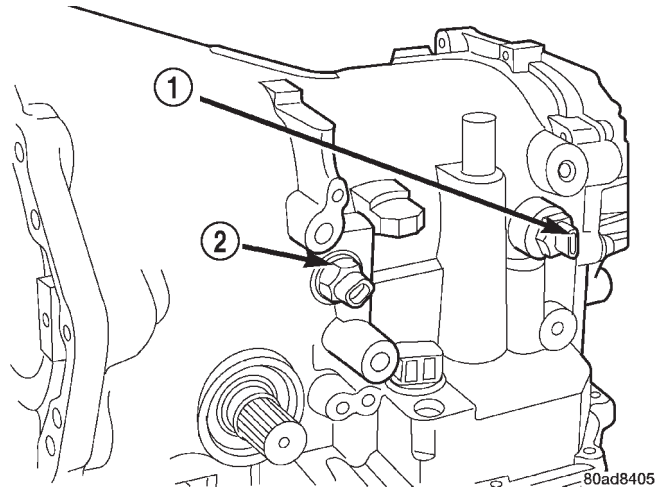


80bcd18

Fig. 12 Measure Input Shaft End Play Using Tool 8266—Typical

- 1 - TOOL 8266-8
- 2 - TOOL 8266-2
- 3 - TOOL C-3339

(2) Remove input and output speed sensors (Fig. 13).

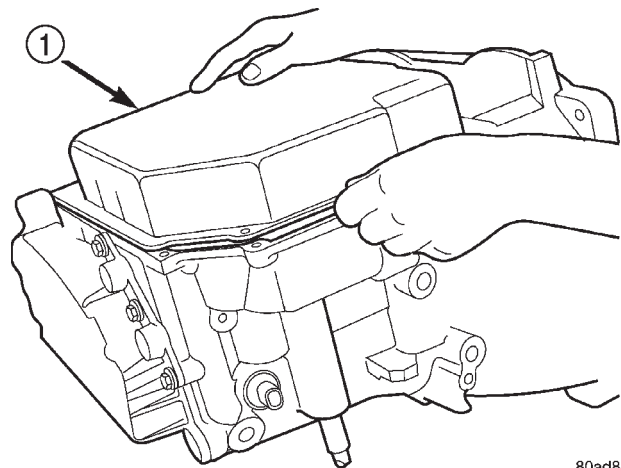


80ad8405

Fig. 13 Remove Input and Output Speed Sensors

- 1 - OUTPUT SPEED SENSOR
- 2 - INPUT SPEED SENSOR

(3) Remove transaxle oil pan (Fig. 14).



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Fig. 14 Remove Transaxle Oil Pan

- 1 - TRANSAXLE OIL PAN

42LE AUTOMATIC TRANSAXLE (Continued)

(4) Remove transaxle oil filter (Fig. 15).

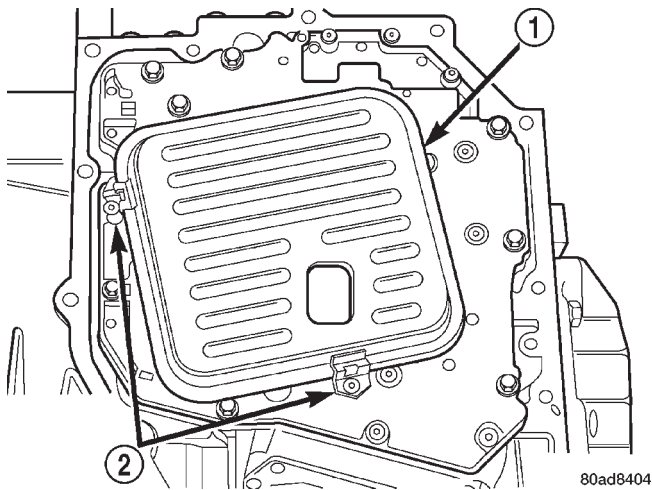


Fig. 15 Remove Transaxle Oil Filter

- 1 - TRANSAXLE FILTER
- 2 - FILTER RETAINING CLIPS

(5) Remove seven valve body-to-case bolts (Fig. 16).

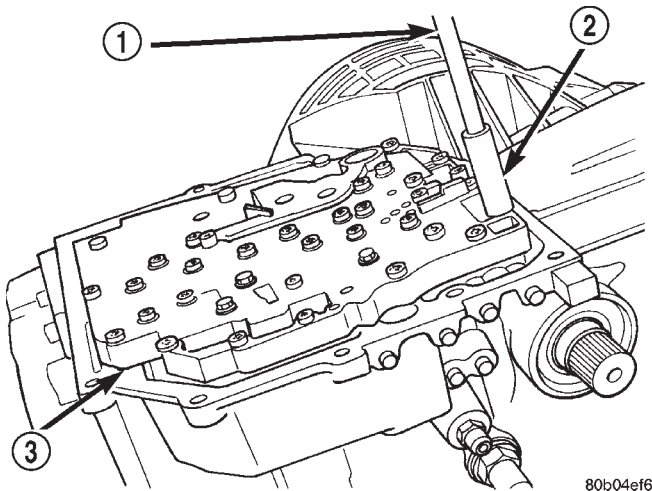


Fig. 16 Remove Valve Body Bolts (17)

- 1 - EXTENSION
- 2 - SOCKET
- 3 - VALVE BODY

CAUTION: Do not handle the valve body by the manual shaft. Damage could result.

(6) Remove valve body from transaxle (Fig. 17).

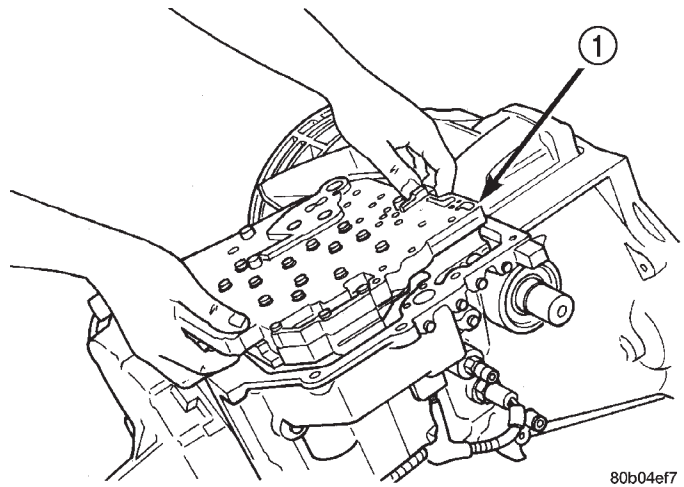


Fig. 17 Remove Valve Body From Transaxle

- 1 - VALVE BODY

NOTE: For valve body recondition procedure, (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/VALVE BODY - DISASSEMBLY).

(7) Remove underdrive accumulator and spring (Fig. 18) (Fig. 20).

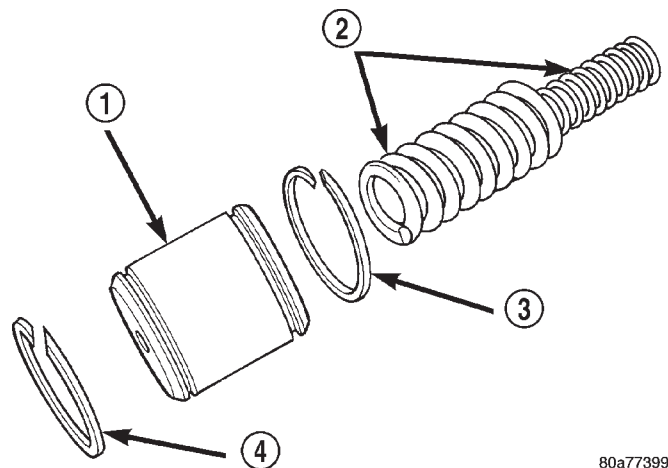


Fig. 18 Remove Underdrive Accumulator and Springs

- 1 - ACCUMULATOR PISTON (UNDERDRIVE)
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING

42LE AUTOMATIC TRANSAXLE (Continued)

(8) Remove overdrive accumulator and springs (Fig. 19) (Fig. 20).

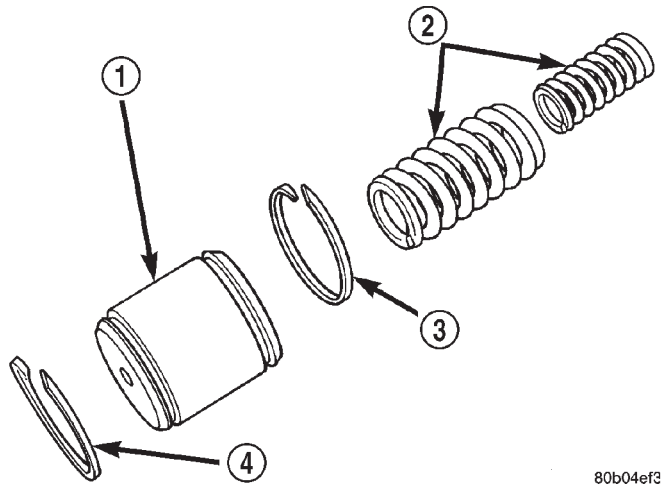


Fig. 19 Remove Overdrive Accumulator and Springs

- 1 - OVERDRIVE ACCUMULATOR PISTON
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING

CAUTION: Tag the springs for the Overdrive Accumulator so that they are not confused with the springs in the Low/Reverse Accumulator.

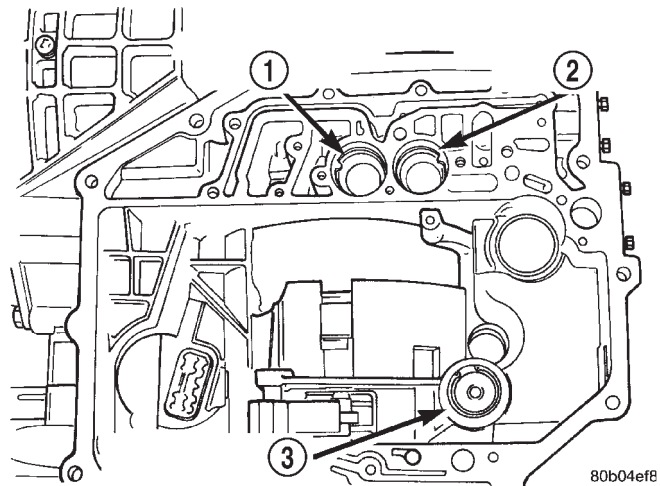


Fig. 20 Accumulator Location

- 1 - OVERDRIVE ACCUMULATOR LOCATION
- 2 - UNDERDRIVE ACCUMULATOR LOCATION
- 3 - LOW/REVERSE ACCUMULATOR

(9) Remove the low/reverse accumulator snap ring (Fig. 21).

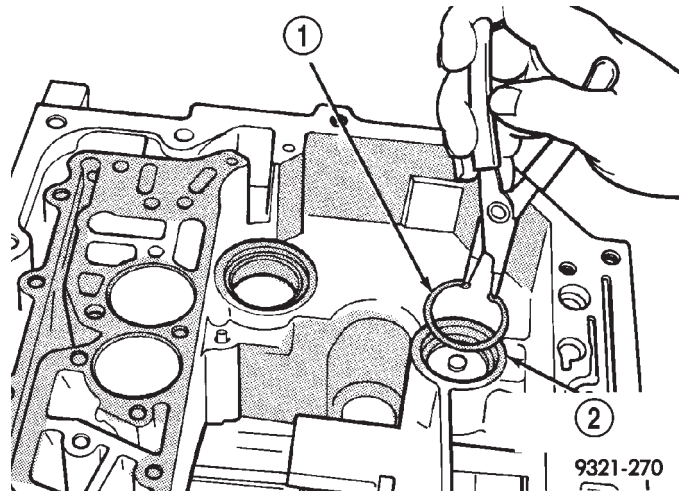


Fig. 21 Remove Low/Reverse Accumulator

- 1 - SNAP RING
- 2 - LOW/REVERSE ACCUMULATOR

(10) Remove the low/reverse accumulator plug (Fig. 22).

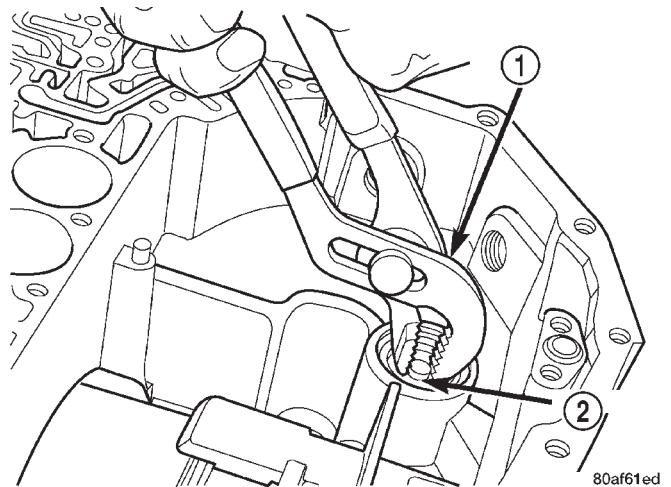


Fig. 22 Remove Low/Reverse Accumulator Plug

- 1 - ADJUSTABLE PLIERS
- 2 - PLUG

42LE AUTOMATIC TRANSAXLE (Continued)

(11) Remove low/reverse accumulator piston and springs (Fig. 23) (Fig. 24).

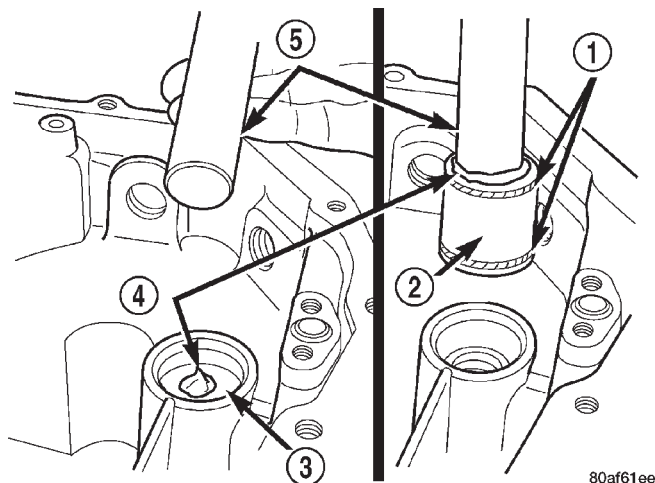


Fig. 23 Remove Low/Reverse Accumulator Piston

- 1 - SEAL RINGS
- 2 - PISTON
- 3 - PISTON
- 4 - PETROLATUM
- 5 - SUITABLE TOOL

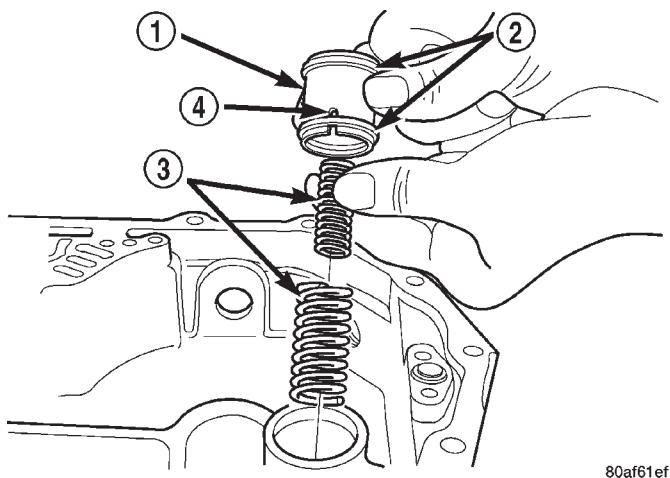


Fig. 24 Low/Reverse Accumulator Components

- 1 - ACCUMULATOR PISTON
- 2 - SEAL RINGS
- 3 - RETURN SPRINGS
- 4 - (NOTE NOTCH)

(12) Remove long stub shaft bearing snap ring (Fig. 25).

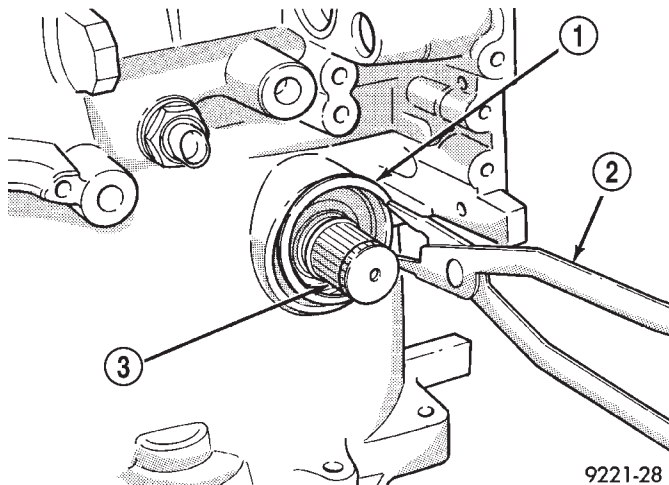


Fig. 25 Remove Long Stub Shaft Snap Ring

- 1 - SNAP RING
- 2 - SNAP RING PLIERS
- 3 - LONG STUB SHAFT

(13) Remove long stub shaft and bearing from bellhousing using Tools 8420A and C-3752 (Fig. 26).

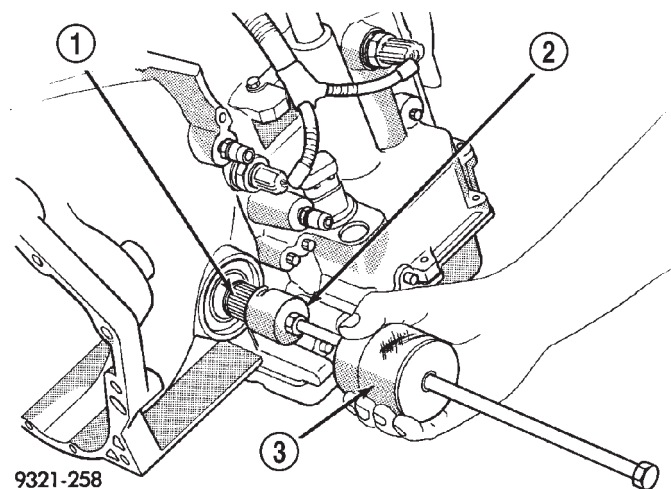


Fig. 26 Remove Long Stub Shaft From Bellhousing

- 1 - LONG STUB SHAFT
- 2 - SPECIAL TOOL 8420A
- 3 - SLIDE HAMMER C-3752

42LE AUTOMATIC TRANSAXLE (Continued)

(14) Remove oil pump-to-case bolts (Fig. 27).

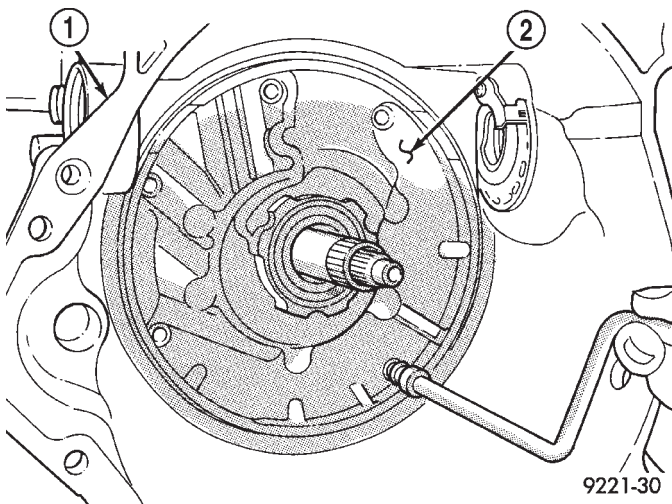


Fig. 27 Remove Oil Pump Attaching Bolts

- 1 - BELLHOUSING
2 - OIL PUMP

(15) Remove oil pump using C-3752 Pullers (Fig. 28).

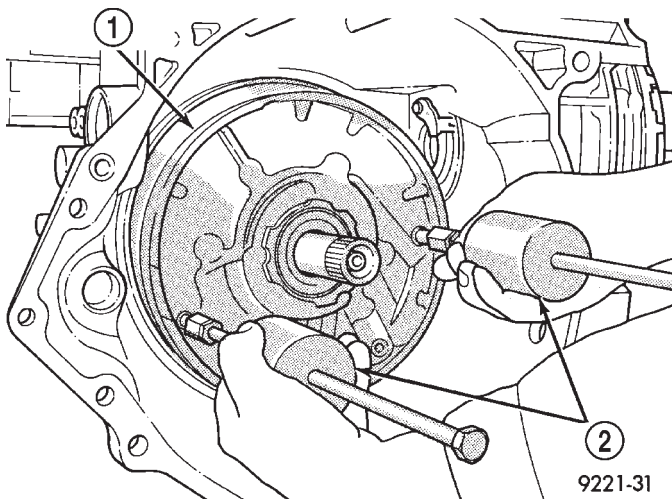


Fig. 28 Oil Pump Pullers

- 1 - OIL PUMP
2 - PULLERS

(16) Remove oil pump while pushing in on input shaft (Fig. 29).

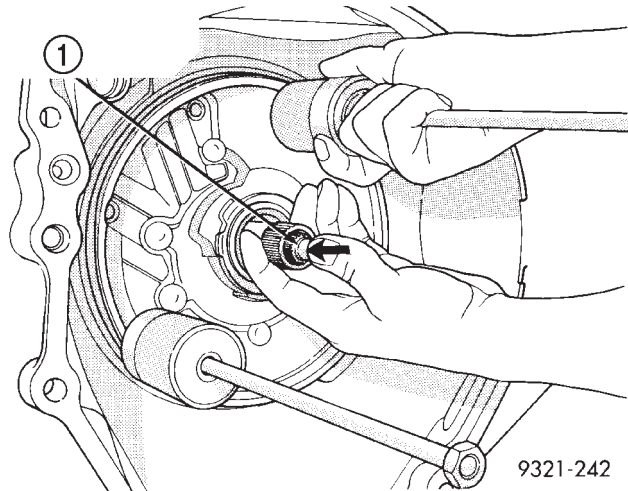


Fig. 29 Remove Oil Pump

- 1 - "PUSH IN" ON INPUT SHAFT WHILE REMOVING PUMP

(17) Remove oil pump gasket (Fig. 30).

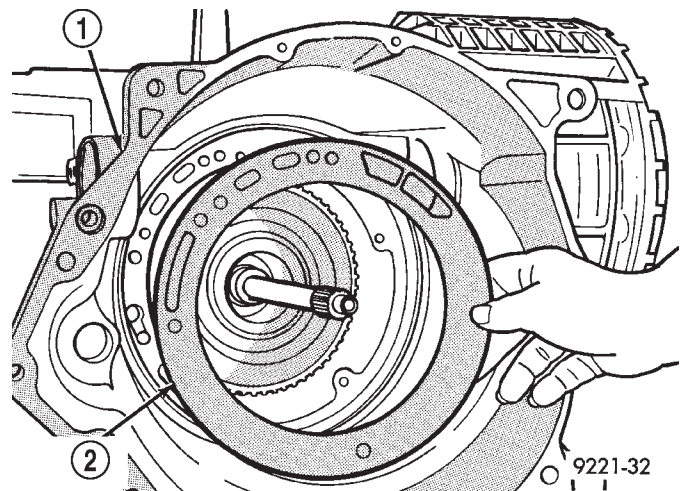


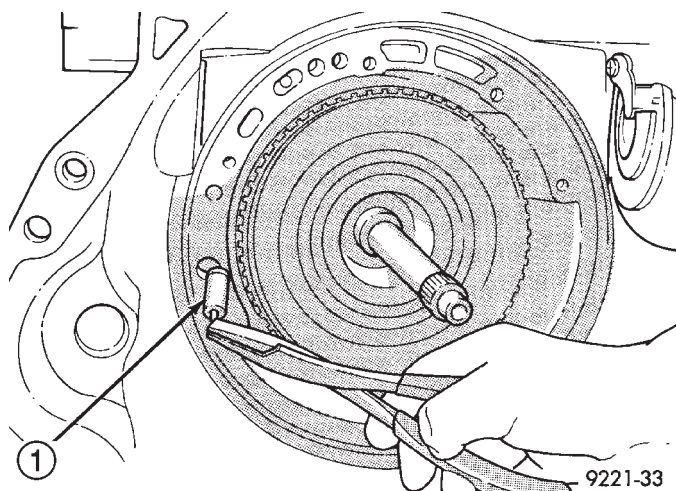
Fig. 30 Remove Oil Pump Gasket

- 1 - BELL HOUSING
2 - OIL PUMP GASKET

CAUTION: By-pass valve must be replaced if transmission failure occurs.

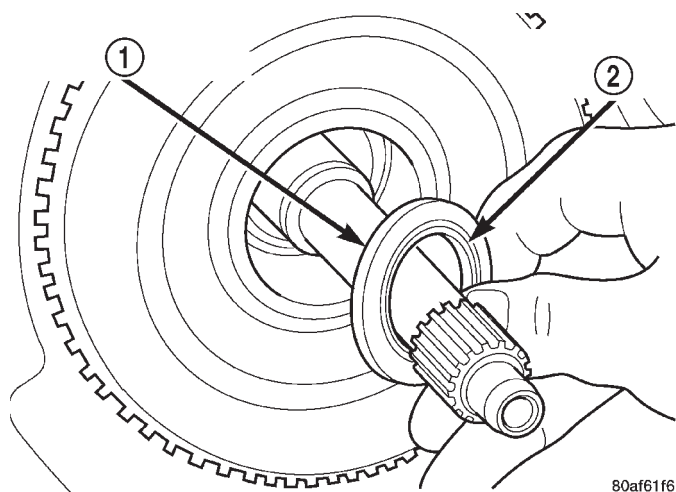
42LE AUTOMATIC TRANSAXLE (Continued)

(18) Remove cooler by-pass valve (Fig. 31).

**Fig. 31 Remove By-Pass Valve**

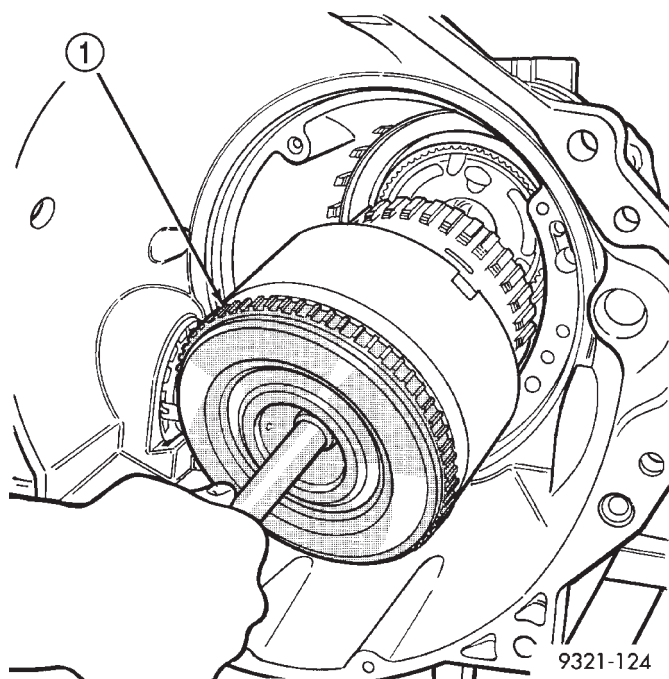
1 - BYPASS VALVE

(19) Remove #1 caged needle bearing (Fig. 32).

**Fig. 32 Remove No. 1 Caged Needle Bearing**

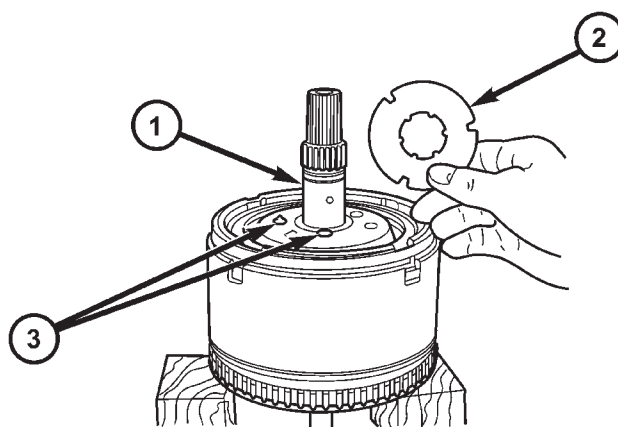
1 - #1 CAGED NEEDLE BEARING
 2 - NOTE: TANGED SIDE OUT

(20) Remove input clutch assembly (Fig. 33).

**Fig. 33 Remove Input Clutch Assembly**

1 - INPUT CLUTCH ASSEMBLY

(21) Remove #4 thrust plate (Fig. 34).

**Fig. 34 No. 4 Thrust Plate**

1 - OVERDRIVE SHAFT ASSEMBLY
 2 - #4 THRUST PLATE (SELECT)
 3 - PETROLATUM (FOR RETENTION)

42LE AUTOMATIC TRANSAXLE (Continued)

(22) Remove front sun gear assembly and #4 thrust washer (if still in place) (Fig. 35).

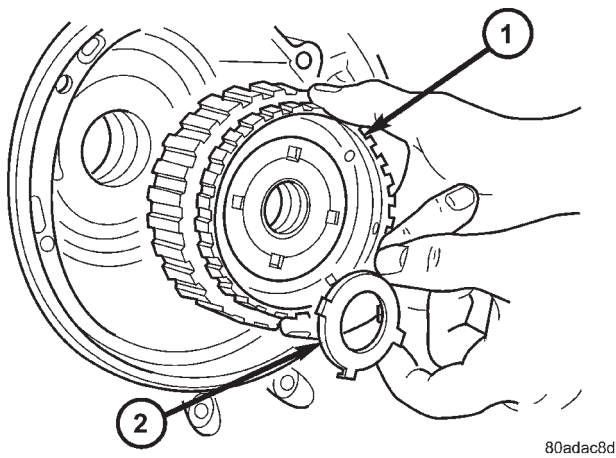


Fig. 35 Remove Front Sun Gear Assembly

- 1 - FRONT SUN GEAR ASSEMBLY
2 - #4 THRUST WASHER (FOUR TABS)

(23) Remove front carrier/rear annulus and #6 needle bearing (Fig. 36).

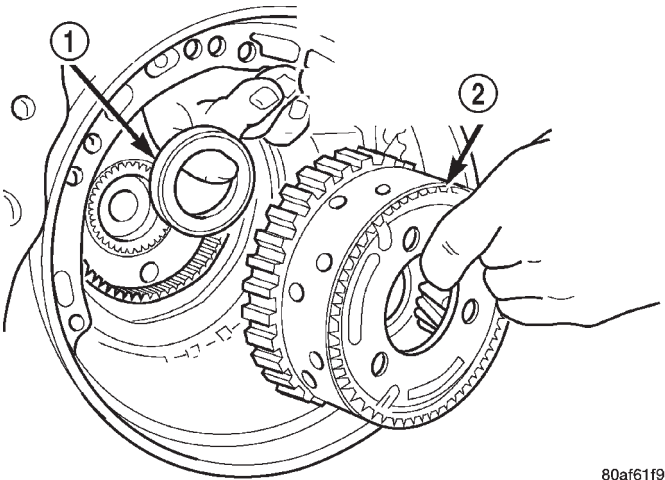


Fig. 36 Remove Front Carrier/Rear Annulus

- 1 - #6 NEEDLE BEARING
2 - FRONT CARRIER AND REAR ANNULUS ASSEMBLY (TWIST AND PULL OR PUSH TO REMOVE OR INSTALL).

(24) Remove rear sun gear and #7 needle bearing (Fig. 37) (Fig. 38).

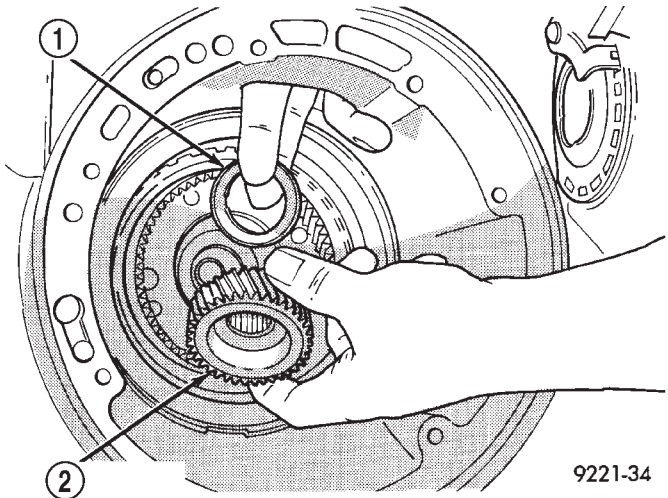


Fig. 37 Remove Rear Sun Gear

- 1 - #7 NEEDLE BEARING
2 - REAR SUN GEAR

NOTE: The number seven needle bearing has three antireversal tabs and is common with the number five and number two position. The orientation should allow the bearing to seat flat against the rear sun gear (Fig. 38). A small amount of petroleum can be used to hold the bearing to the rear sun gear.

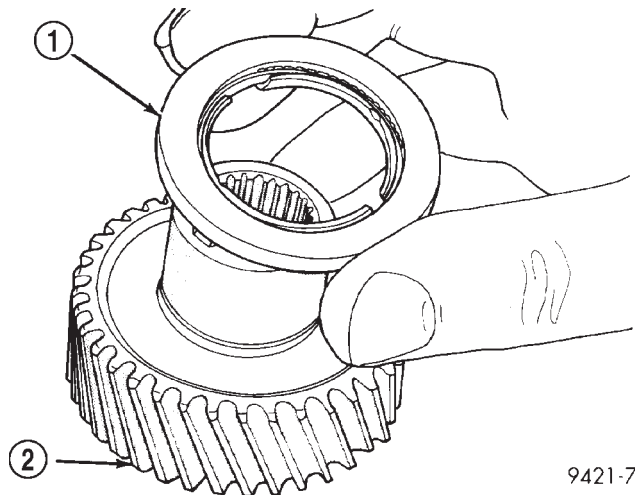


Fig. 38 Number 7 Bearing

- 1 - #7 BEARING
2 - REAR SUN GEAR

42LE AUTOMATIC TRANSAXLE (Continued)

(25) Install and load Tool 5058 to remove 2/4 clutch retainer snap ring (Fig. 39).

**COMPRESS JUST ENOUGH
TO REMOVE OR INSTALL
SNAP RING**

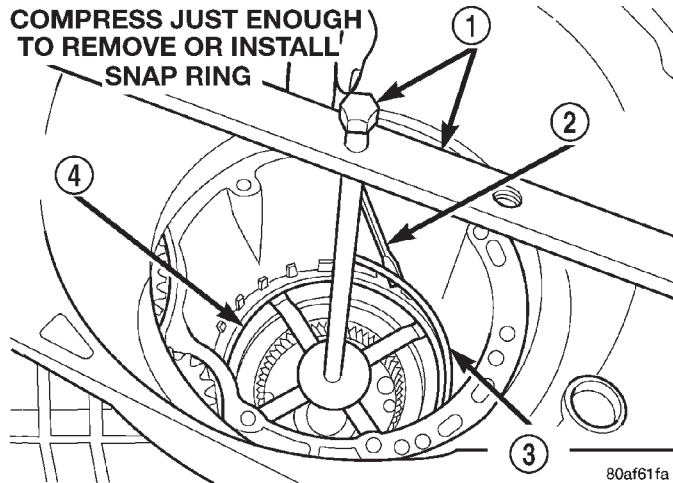


Fig. 39 Remove 2/4 Clutch Retainer Snap Ring

- 1 - TOOL 5058
- 2 - SCREWDRIVER
- 3 - SNAP RING
- 4 - 2/4 CLUTCH RETAINER

(26) Remove 2/4 clutch retainer (Fig. 40) (Fig. 41).

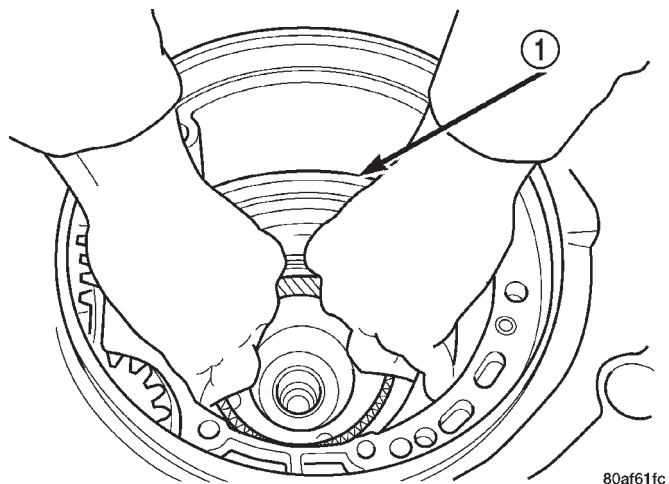


Fig. 40 Remove 2/4 Clutch Retainer

- 1 - 2/4 CLUTCH RETAINER

(27) Remove 2/4 clutch return spring (Fig. 42).

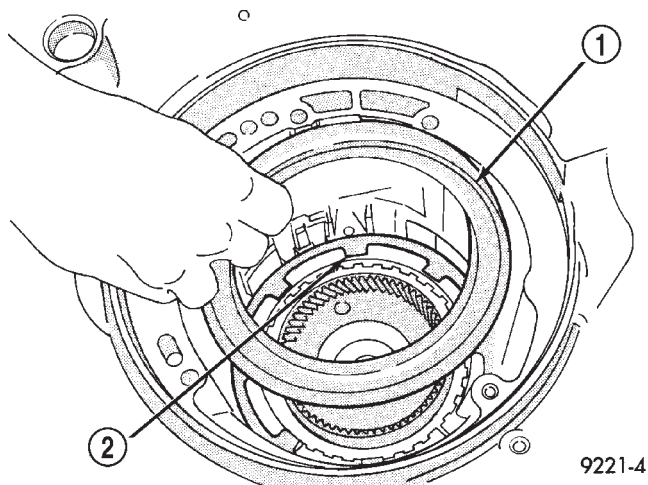


Fig. 41 2/4 Clutch Retainer

- 1 - 2/4 CLUTCH RETAINER
- 2 - 2/4 CLUTCH RETURN SPRING

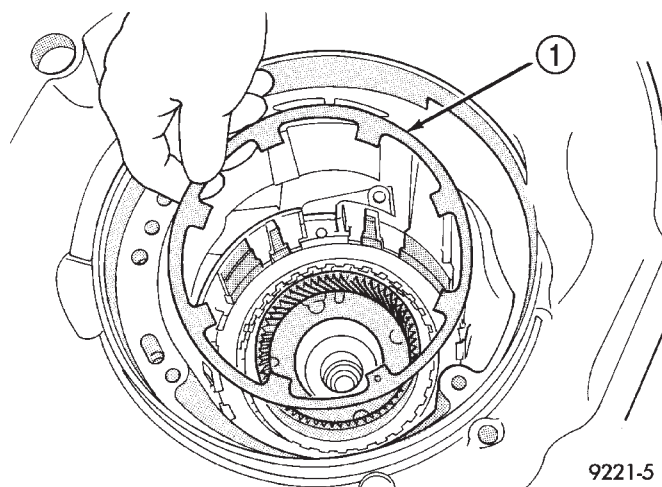


Fig. 42 Remove 2/4 Clutch Return Spring

- 1 - 2/4 CLUTCH RETURN SPRING

42LE AUTOMATIC TRANSAXLE (Continued)

(28) Remove 2/4 clutch pack (Fig. 43).

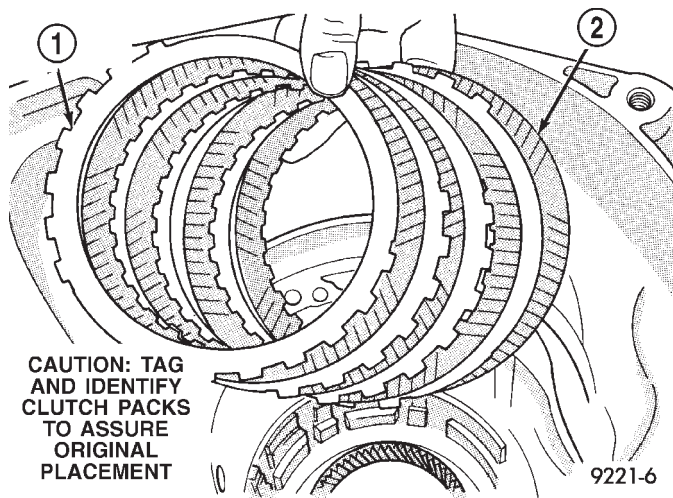


Fig. 43 Remove 2/4 Clutch Pack

- 1 - CLUTCH PLATE (4)
- 2 - CLUTCH DISC (4)

(29) Remove tapered snap ring (Fig. 44).

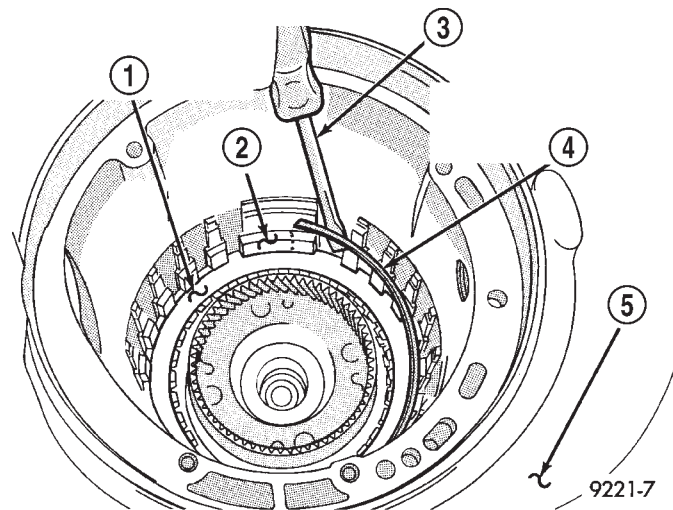


Fig. 44 Remove Tapered Snap Ring

- 1 - LOW/REVERSE CLUTCH REACTION PLATE
- 2 - LONG TAB
- 3 - SCREWDRIVER
- 4 - LOW/REVERSE TAPERED SNAP RING (TAPERED SIDE UP)
- 5 - OIL PAN FACE

(30) Remove low/reverse reaction plate (Fig. 45).

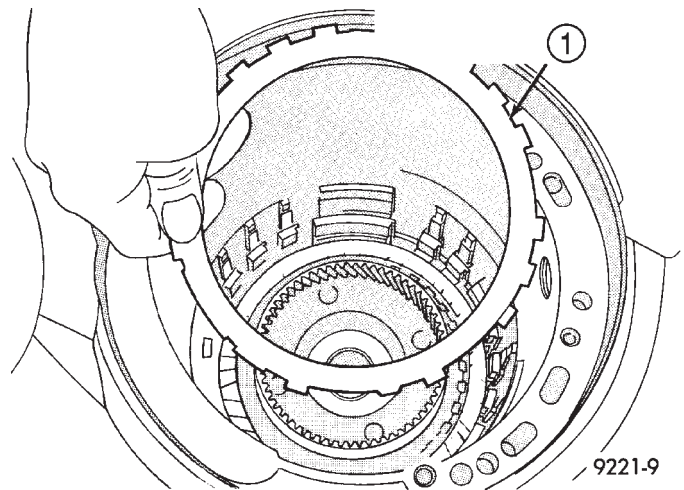


Fig. 45 Remove Low/Reverse Reaction Plate

- 1 - LOW/REVERSE REACTION PLATE (FLAT SIDE UP)

(31) Remove one (1) low/reverse clutch disc to facilitate snap ring removal (Fig. 46).

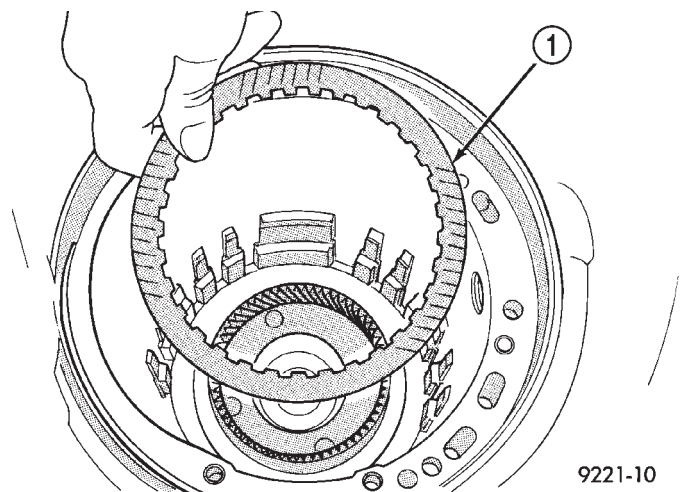


Fig. 46 Remove One Disc

- 1 - ONE DISC FROM LOW/REVERSE CLUTCH

42LE AUTOMATIC TRANSAXLE (Continued)

(32) Remove low/reverse reaction plate snap ring (Fig. 47).

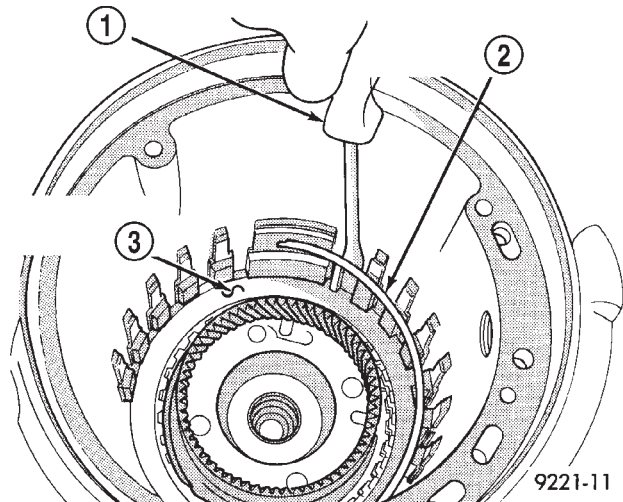


Fig. 47 Remove Low/Reverse Reaction Plate Snap Ring

- 1 - SCREWDRIVER
2 - LOW/REVERSE REACTION PLATE FLAT SNAP RING
3 - DO NOT SCRATCH CLUTCH PLATE

(33) Remove low/reverse clutch pack (Fig. 48).

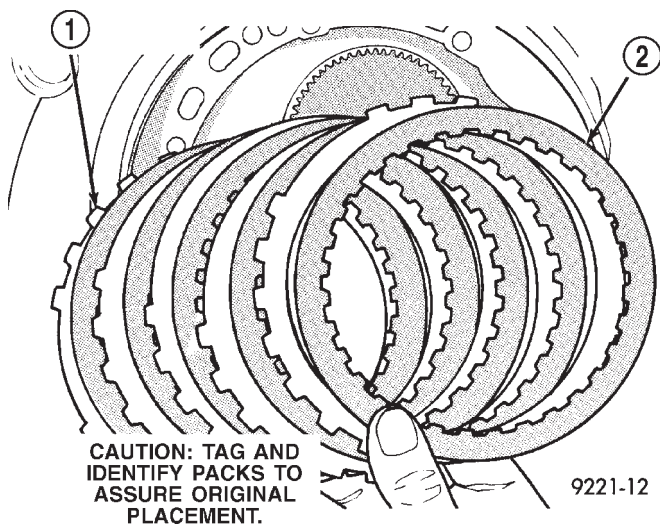


Fig. 48 Remove Low/Reverse Clutch Pack

- 1 - CLUTCH PLATES (5)
2 - CLUTCH DISCS (5)

(34) Remove chain cover (Fig. 49).

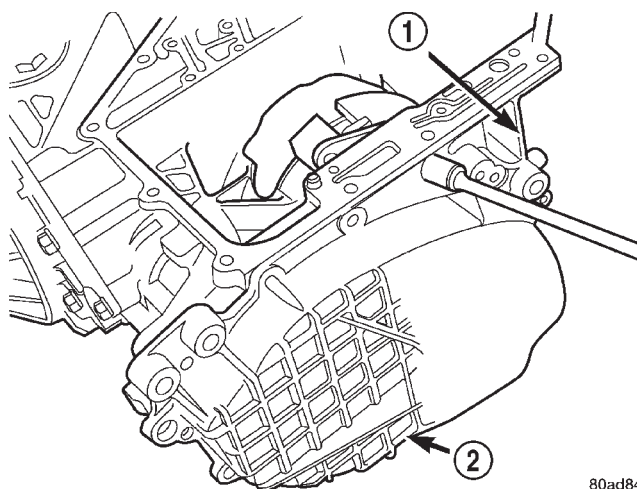


Fig. 49 Remove Chain Cover

- 1 - TRANSAXLE CASE
2 - CHAIN COVER

(35) Stand trans upright on bellhousing.

(36) Remove chain oiler (Fig. 50).

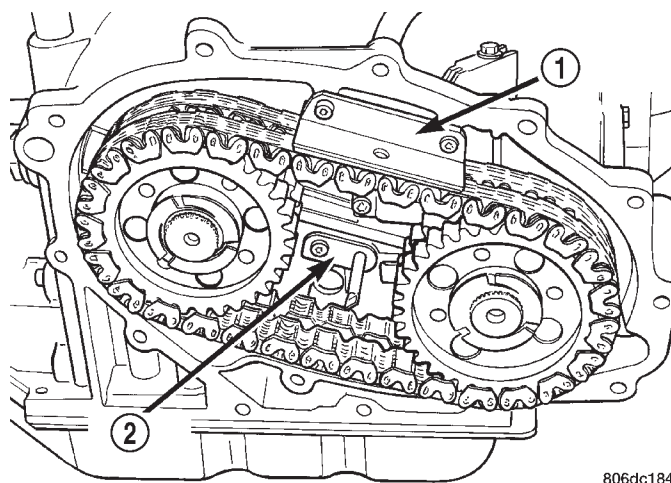


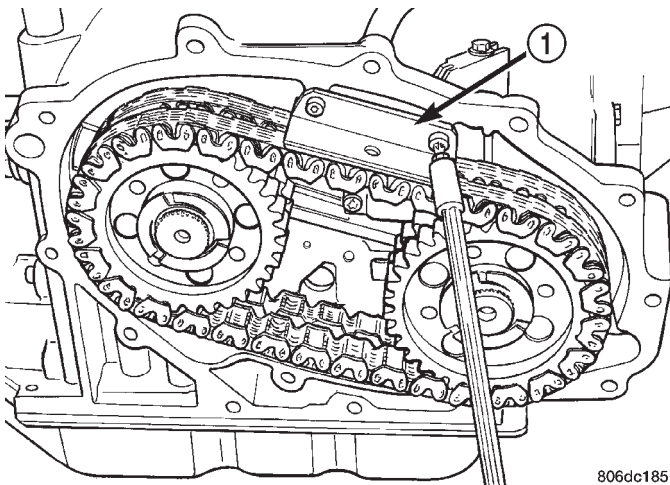
Fig. 50 Remove Chain Oiler

- 1 - CHAIN SNUBBER
2 - CHAIN OILER

CAUTION: Be sure to reinstall the chain snubber and chain oiler when reassembling.

42LE AUTOMATIC TRANSAXLE (Continued)

(37) Remove chain snubber (Fig. 51).

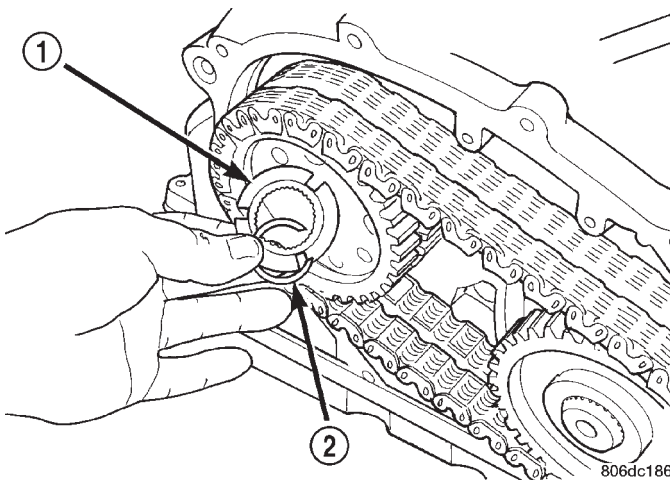


806dc185

Fig. 51 Remove Chain Snubber

1 - CHAIN SNUBBER

(38) Remove transfer and output shaft sprocket snap rings and wave washers (Fig. 52) (Fig. 53).

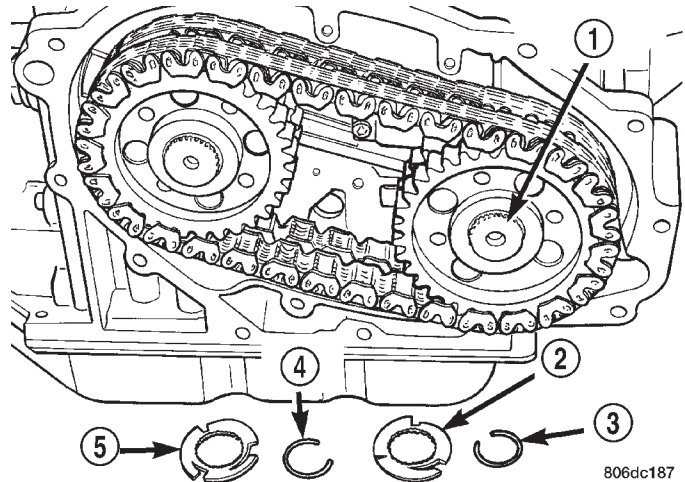


806dc186

Fig. 52 Remove Output Shaft Sprocket Snap Ring and Wave Washer

1 - WAVE WASHER
2 - SNAP RING

CAUTION: The chain sprockets have a slip fit onto the shafts. Apply only a slight amount of pressure to the chain spreader to release the chain pressure. If chain sprockets are not spread slightly, removal or installation will be difficult. Overspreading of the chain sprockets will also make sprocket removal difficult.

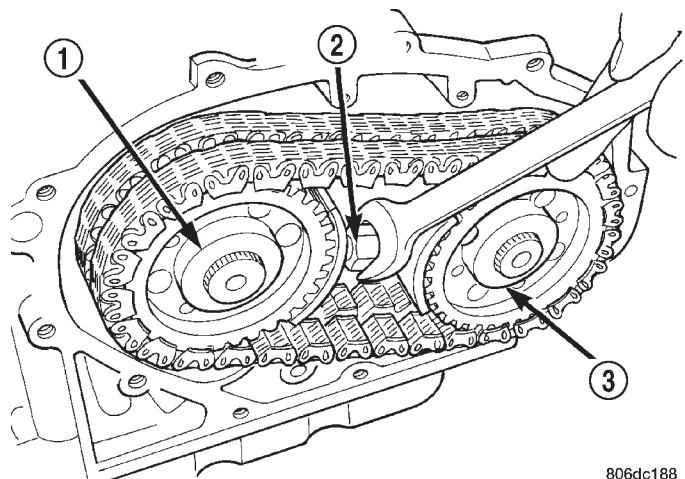


806dc187

Fig. 53 Remove Transfer Shaft Sprocket Snap Ring and Wave Washer

1 - TRANSFER SHAFT
2 - WAVE WASHER
3 - SNAP RING
4 - SNAP RING
5 - WAVE WASHER

(39) Install Tool 6550 and apply a light amount of pressure to facilitate removal (Fig. 54).



806dc188

Fig. 54 Install Chain Spreader

1 - OUTPUT SPROCKET
2 - SPECIAL TOOL 6550
3 - TRANSFER SPROCKET

42LE AUTOMATIC TRANSAXLE (Continued)

(40) Remove transfer chain and sprockets as an assembly (Fig. 55).

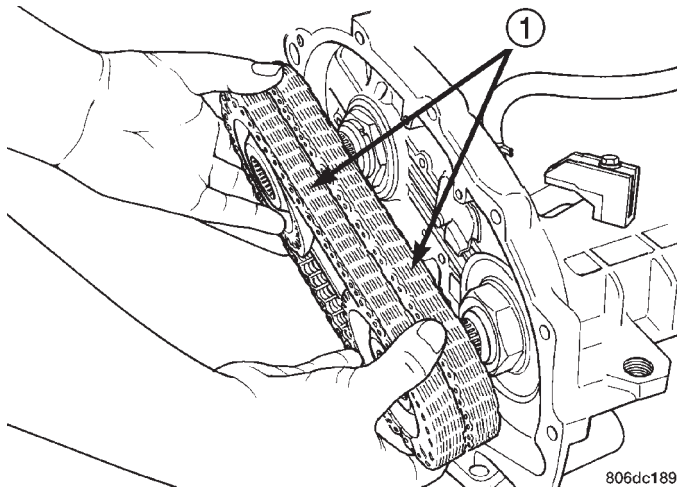


Fig. 55 Remove Chain and Both Sprockets as an Assembly

1 - CHAINS

(41) Remove output shaft sprocket spacer (Fig. 56).

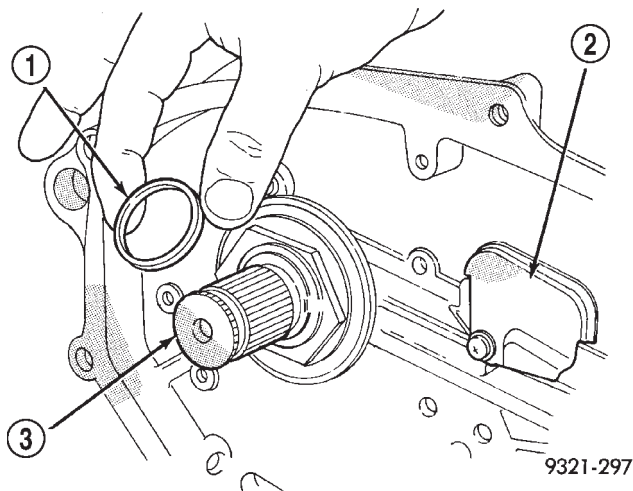


Fig. 56 Output Sprocket Spacer

1 - OUTPUT SPROCKET SPACER
2 - VENT BAFFLE
3 - OUTPUT SHAFT

(42) Remove main sump baffle from transaxle case (Fig. 57).

CAUTION: Failure to grind and open stakes of the output shaft nut and transfer shaft nut will result in thread damage to the shafts during nut removal.

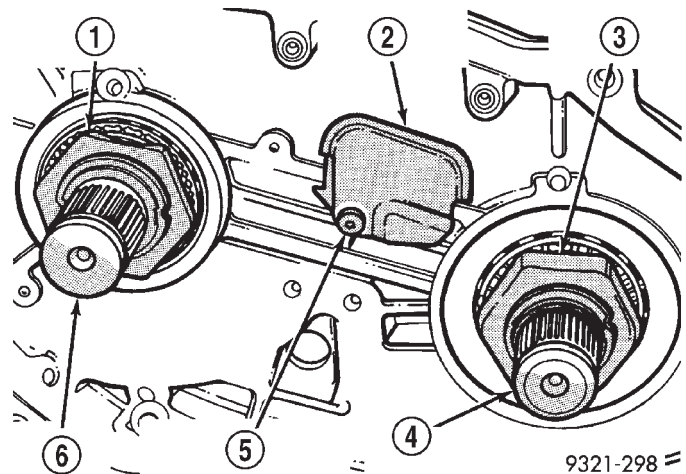


Fig. 57 Main Sump Vent Baffle Location

1 - OUTPUT SHAFT NUT
2 - MAIN SUMP VENT BAFFLE
3 - TRANSFER SHAFT NUT
4 - TRANSFER SHAFT
5 - VENT BAFFLE RETAINING SCREW
6 - OUTPUT SHAFT

WARNING: WEAR SAFETY GOGGLES WHILE GRINDING STAKE NUTS.

(43) Using a die grinder or equivalent, grind the stakes in the shoulder of the shaft nuts as shown in (Fig. 58) (Fig. 59). Do not grind all the way through the nut and into the shaft. There are two stakes on each nut.

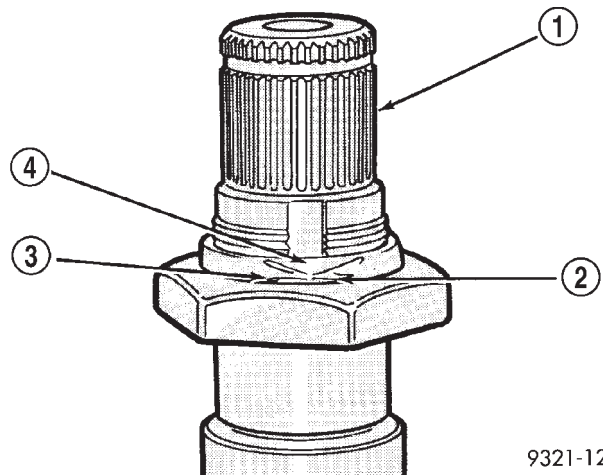
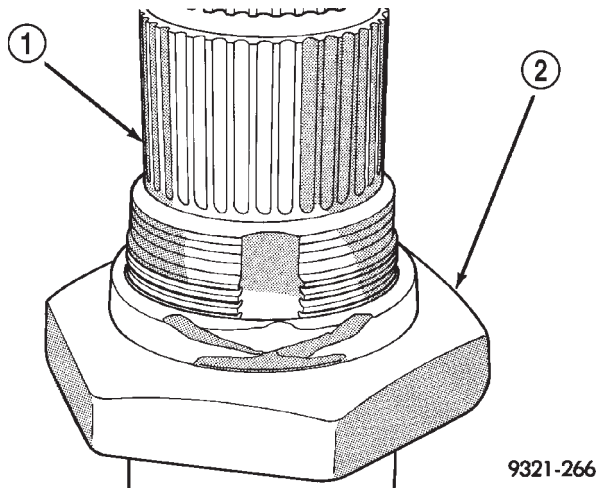


Fig. 58 Grinding Stakes

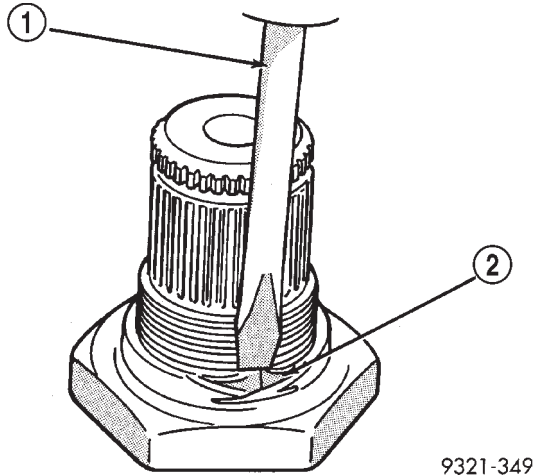
1 - TRANSFER SHAFT
2 - GRIND HERE
3 - GRIND HERE
4 - NUT STAKE

42LE AUTOMATIC TRANSAXLE (Continued)

**Fig. 59 Stake Grinding Pattern**

- 1 - TRANSFER SHAFT
2 - TRANSFER SHAFT NUT

(44) Using a small chisel, carefully open stakes on nut (Fig. 60).

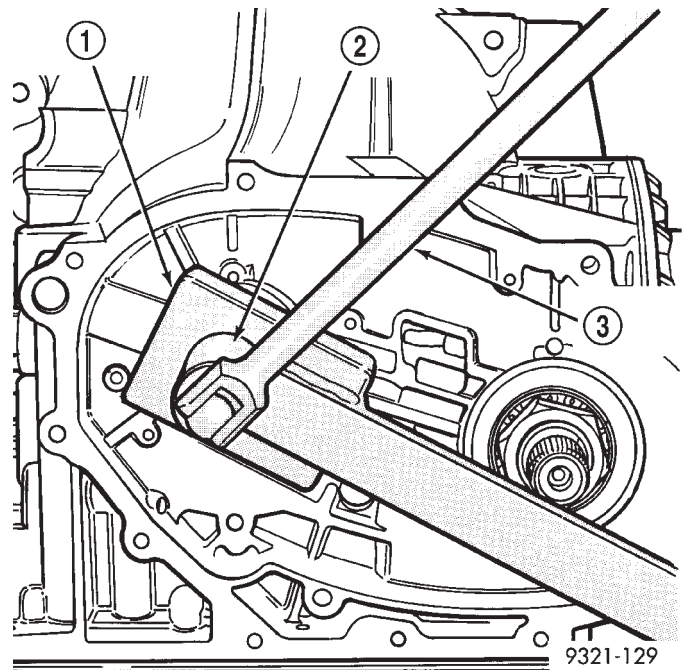
**Fig. 60 Opening Nut Stakes**

- 1 - CHISEL
2 - NUT STAKE

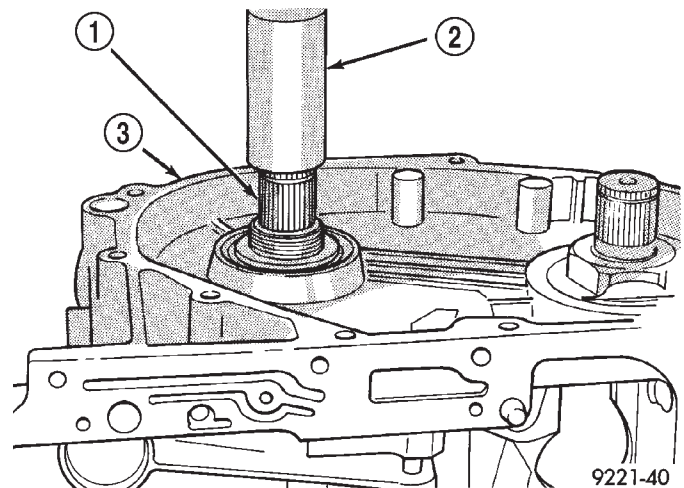
(45) Use special tool 6497 and 6498 to remove the transfer shaft nut or the output shaft nut (Fig. 61).

(46) Remove output shaft from case using a shop press (Fig. 62).

Use special tool 6596 with a shop press to remove front output shaft bearing cup (Fig. 63).

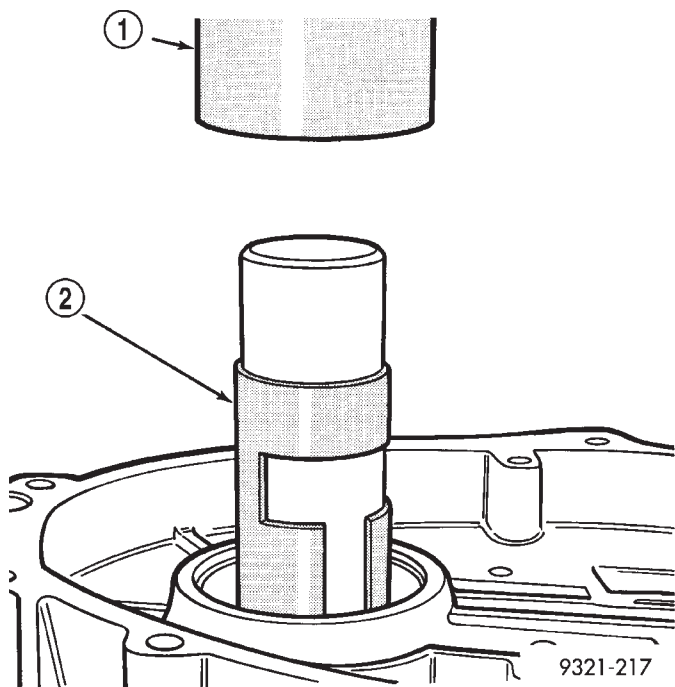
**Fig. 61 Remove Output Shaft Nut**

- 1 - SPECIAL TOOL 6497
2 - SPECIAL TOOL 6498
3 - BREAKER BAR

**Fig. 62 Use Arbor Press to Remove Output Shaft from Case**

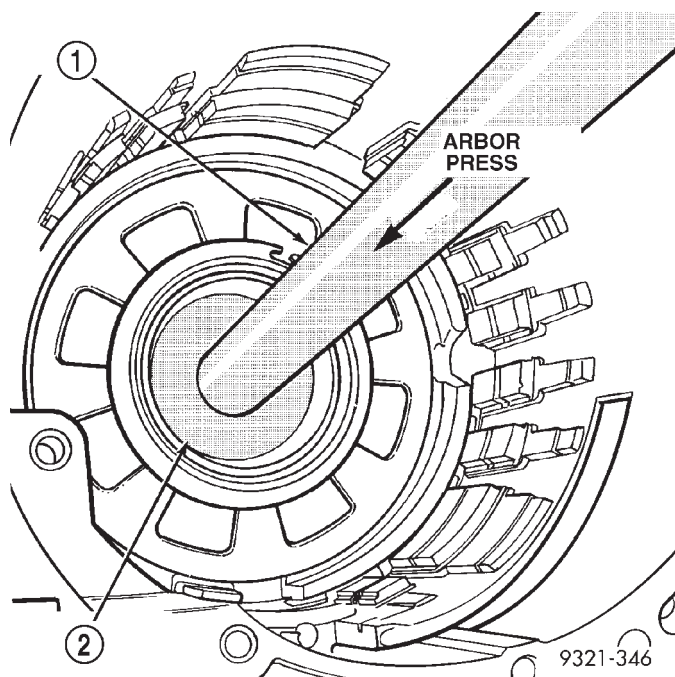
- 1 - OUTPUT SHAFT
2 - ARBOR PRESS
3 - TRANSAXLE CASE

42LE AUTOMATIC TRANSAXLE (Continued)

**Fig. 63 Remove Front Bearing Cup**

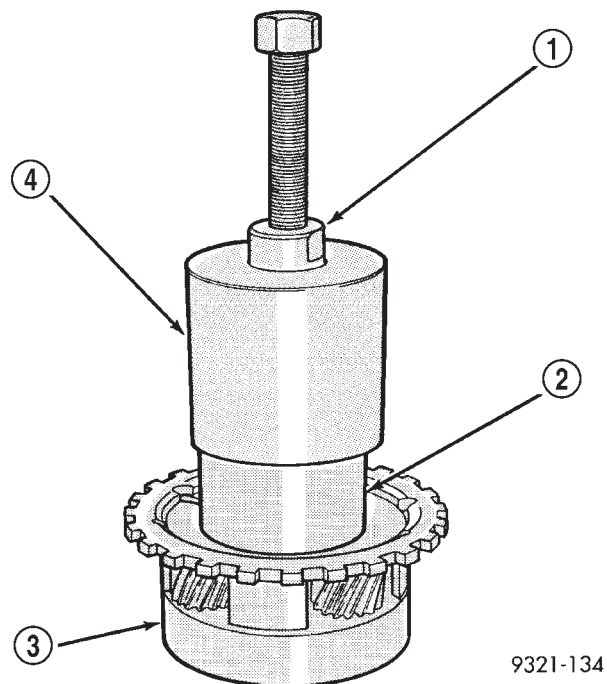
- 1 - ARBOR PRESS
2 - SPECIAL TOOL 6596

(47) Use special tool 6597 and handle C-4171 and C-4171-2 to press rear output shaft bearing cup rearward (Fig. 64).

**Fig. 64 Remove Rear Bearing Cup**

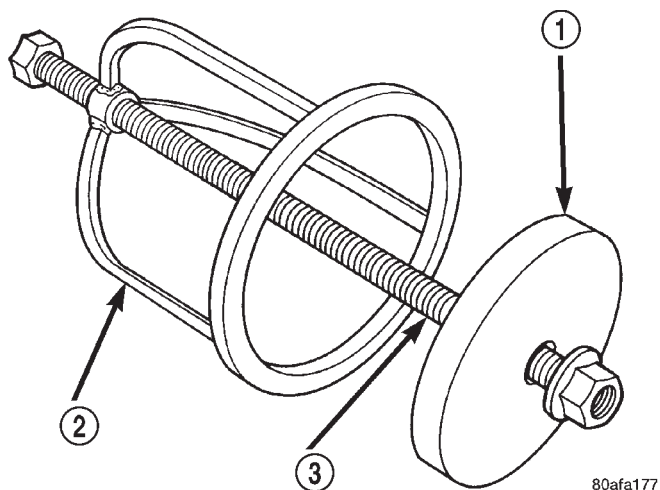
- 1 - SPECIAL TOOL 4171 AND 4171-2
2 - SPECIAL TOOL 6597

(48) Remove rear carrier front bearing cone (Fig. 65).

**Fig. 65 Remove Rear Carrier Front Bearing Cone**

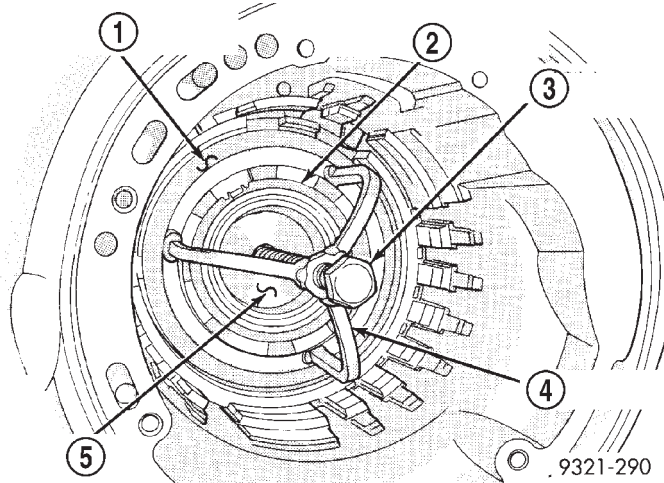
- 1 - SPECIAL TOOL 5048-1
2 - SPECIAL TOOL 6545
3 - REAR CARRIER
4 - SPECIAL TOOL 5048

(49) Install and load compressor (Fig. 66) as shown in (Fig. 67).

**Fig. 66 Low/Reverse Spring Compressor Tool**

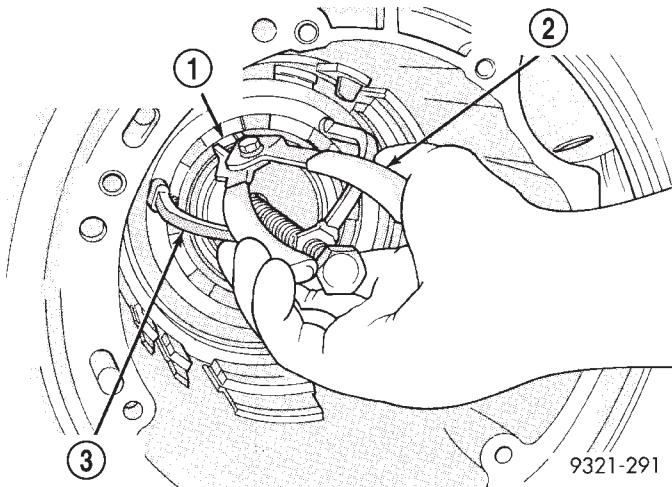
- 1 - TOOL 6057
2 - TOOL 5059
3 - TOOL 5058-3

42LE AUTOMATIC TRANSAXLE (Continued)

**Fig. 67 Compressor Tool in Use**

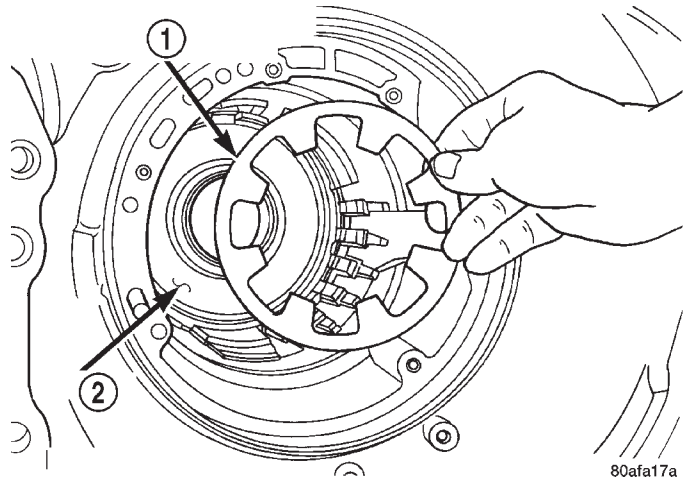
- 1 - LOW/REVERSE CLUTCH RETURN SPRING
- 2 - SNAP RING (INSTALL AS SHOWN)
- 3 - TOOL 5058A-3
- 4 - TOOL 5059A
- 5 - SPECIAL TOOL 6057

(50) Remove snap ring (Fig. 68).

**Fig. 68 Remove Snap Ring**

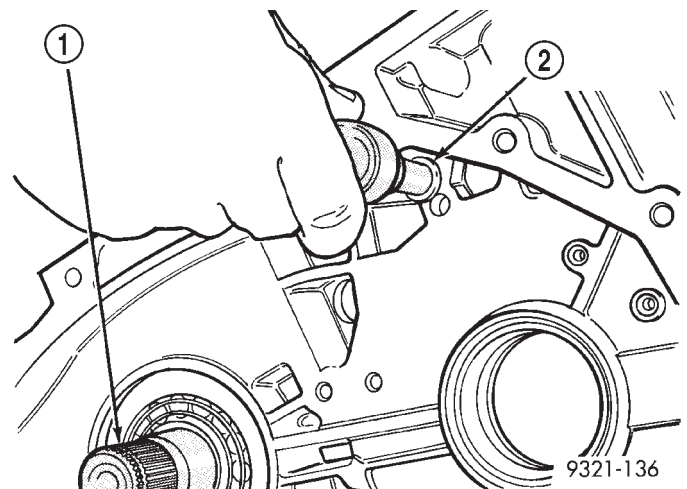
- 1 - SNAP RING OPENING MUST BE BETWEEN SPRING LEVERS (AS SHOWN)
- 2 - SNAP RING PLIERS
- 3 - SPECIAL TOOL 5059A

(51) Remove low/reverse piston belleville spring (Fig. 69).

**Fig. 69 Low/Reverse Piston Belleville Spring**

- 1 - LOW/REVERSE PISTON RETURN SPRING
- 2 - PISTON

(52) Remove park sprag pivot retaining screw (Fig. 70).

**Fig. 70 Remove Parking Sprag Pivot Retaining Screw**

- 1 - TRANSFER SHAFT
- 2 - PARKING SPRAG PIVOT RETAINING SCREW

42LE AUTOMATIC TRANSAXLE (Continued)

(53) Drive out anchor shaft using suitable punch (Fig. 71).

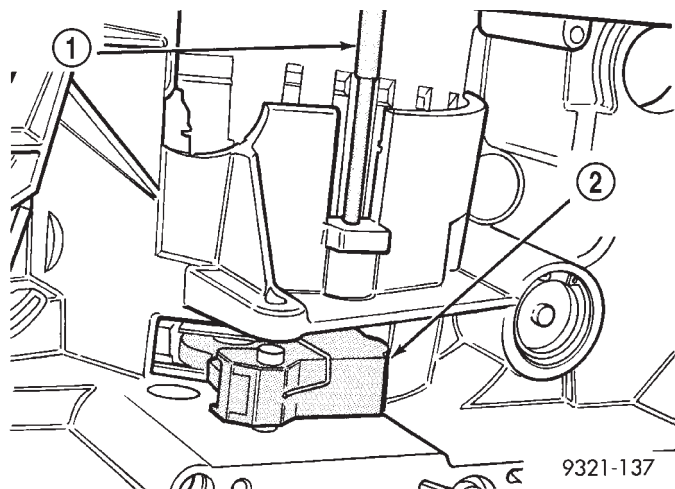


Fig. 71 Anchor Shaft Removal

- 1 - PIN PUNCH
- 2 - GUIDE BRACKET ASSEMBLY

(54) Remove guide bracket pivot shaft (Fig. 72). Inspect all components (Fig. 73) for wear and replace if necessary.

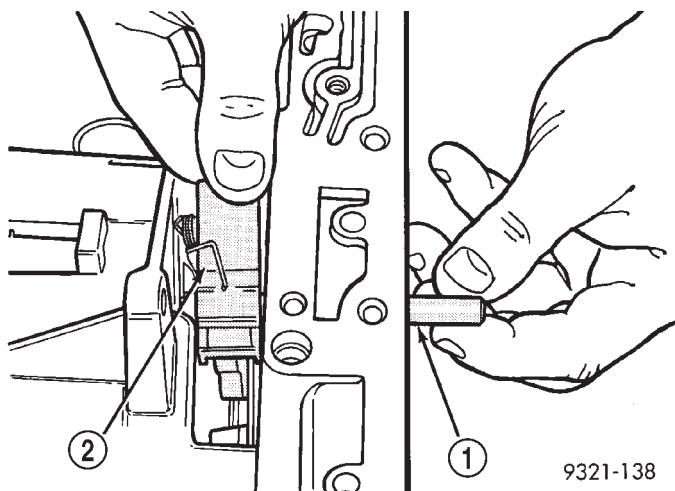


Fig. 72 Remove Guide Bracket Pivot Shaft

- 1 - PIVOT PIN
- 2 - GUIDE BRACKET ASSEMBLY

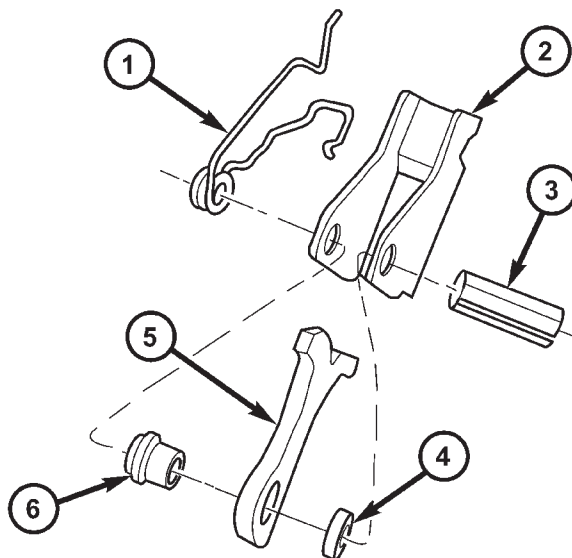


Fig. 73 Guide Bracket Disassembled

- 1 - ANTIRATCHET SPRING
- 2 - GUIDE BRACKET
- 3 - SPLIT SLEEVE
- 4 - SPACER
- 5 - PAWL
- 6 - STEPPED SPACER

(55) Remove low/reverse clutch piston (Fig. 74).

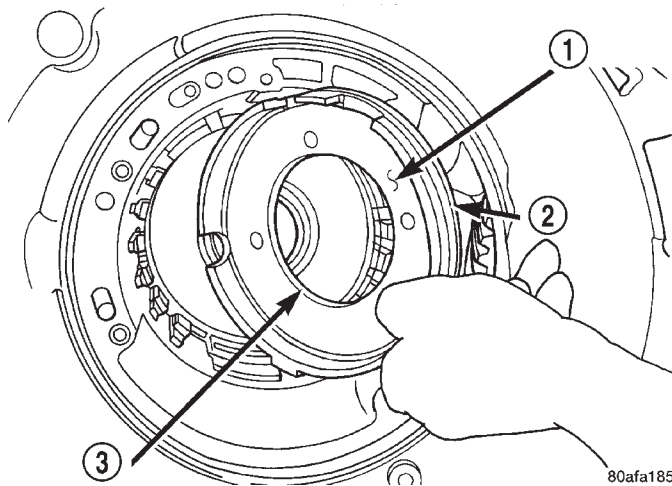


Fig. 74 Remove Low/Reverse Clutch Piston

- 1 - LOW/REVERSE CLUTCH PISTON
- 2 - D-RING SEAL
- 3 - D-RING SEAL

42LE AUTOMATIC TRANSAXLE (Continued)

(56) Remove low/reverse piston retainer screws (Fig. 75).

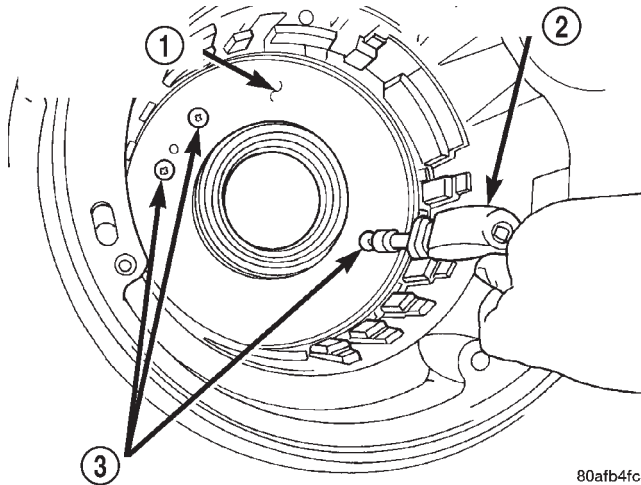


Fig. 75 Remove Piston Retainer-to-Case Screws

- 1 - LOW/REVERSE CLUTCH PISTON RETAINER
- 2 - SCREWDRIVER
- 3 - TORX-LOC SCREWS

(57) Remove low/reverse piston retainer (Fig. 76).

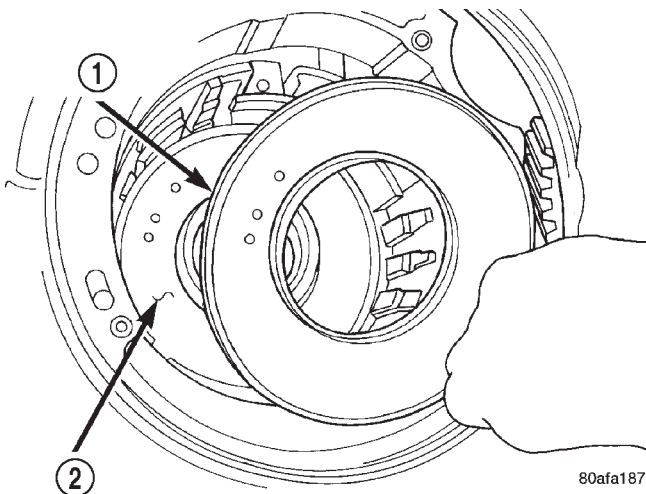


Fig. 76 Remove Piston Retainer

- 1 - LOW/REVERSE CLUTCH PISTON RETAINER
- 2 - GASKET

(58) Remove low/reverse piston retainer gasket (Fig. 77).

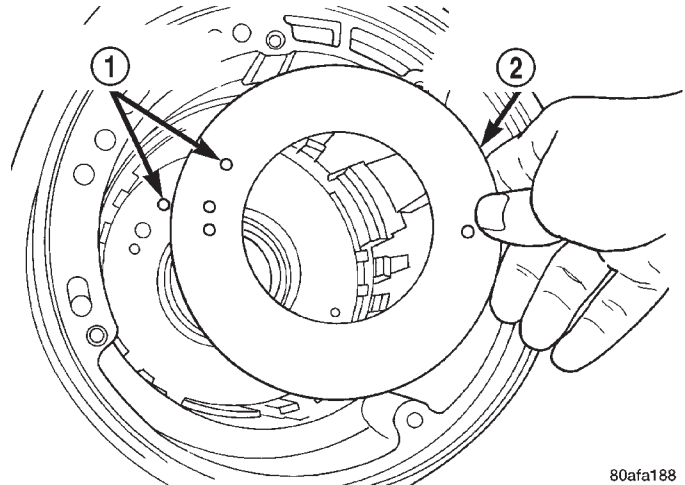


Fig. 77 Remove Piston Retainer Gasket

- 1 - GASKET HOLES MUST LINE UP
- 2 - LOW/REVERSE CLUTCH PISTON RETAINER GASKET

ASSEMBLY

NOTE: If the transaxle assembly is being reconditioned (clutch/seal replacement) or replaced, it is necessary to perform the Quick Learn Procedure using the DRBIII® Scan Tool (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE).

(1) Install the output bearing cups, use Special Tool # 5050A (Fig. 78).

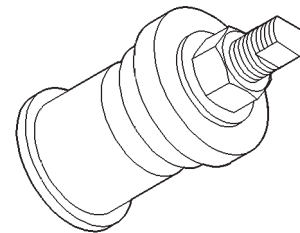
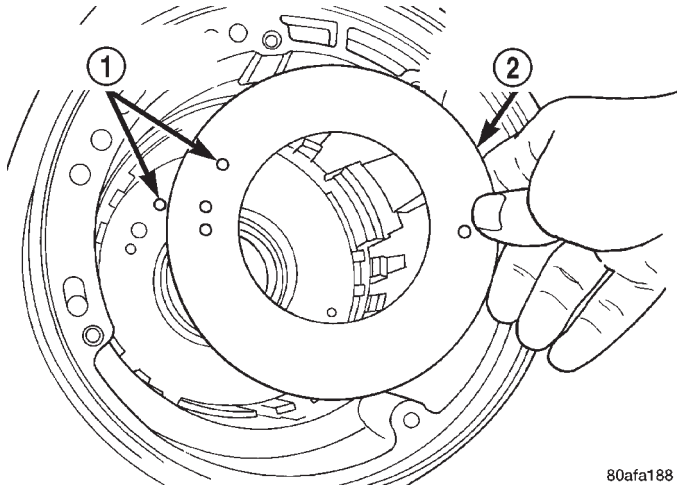


Fig. 78 Bearing Cup Installation Special Tool 5050A

42LE AUTOMATIC TRANSAXLE (Continued)

(2) Install low/reverse piston retainer gasket (Fig. 79).

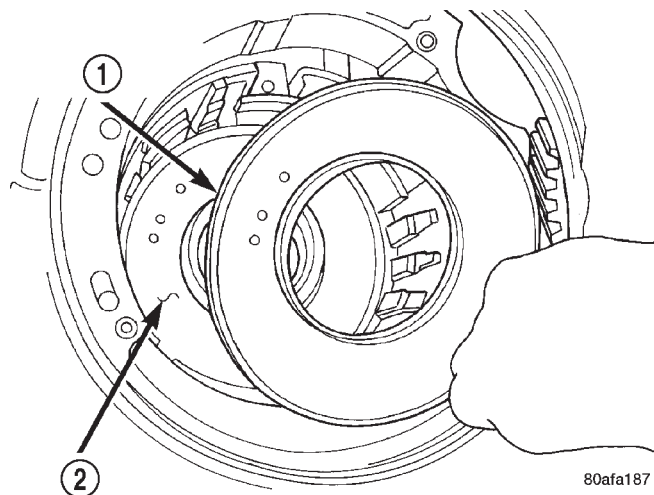


80afa188

Fig. 79 Install Piston Retainer Gasket

- 1 - GASKET HOLES MUST LINE UP
- 2 - LOW/REVERSE CLUTCH PISTON RETAINER GASKET

(3) Install low/reverse piston retainer (Fig. 80).

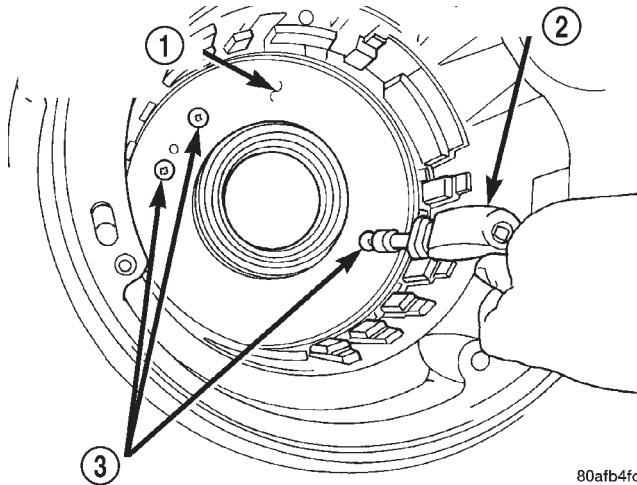


80afa187

Fig. 80 Install Piston Retainer

- 1 - LOW/REVERSE CLUTCH PISTON RETAINER
- 2 - GASKET

(4) Install low/reverse piston retainer-to-case screws (Fig. 81) and torque to 5 N·m (45 in. lbs.).

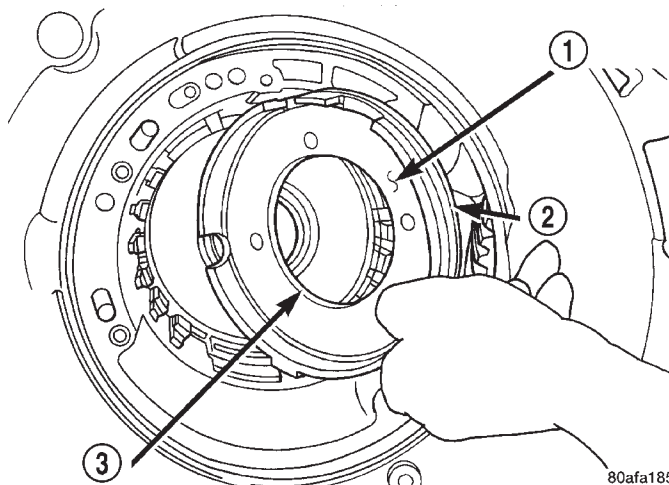


80afb4fc

Fig. 81 Install Retainer Attaching Screws

- 1 - LOW/REVERSE CLUTCH PISTON RETAINER
- 2 - SCREWDRIVER
- 3 - TORX-LOC SCREWS

(5) Install low/reverse clutch piston (Fig. 82).



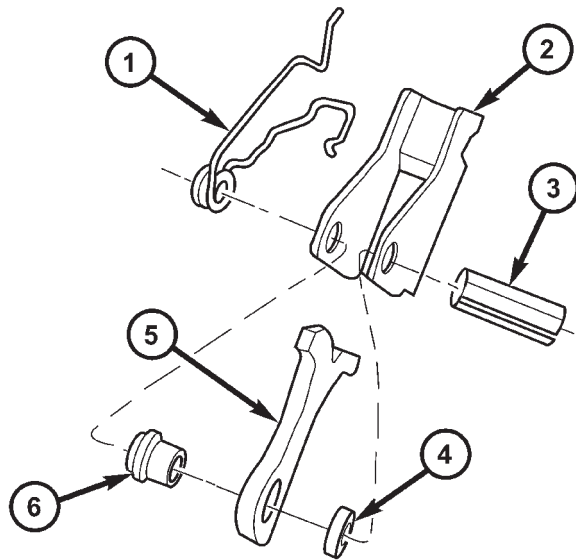
80afa185

Fig. 82 Install Low/Reverse Clutch Piston

- 1 - LOW/REVERSE CLUTCH PISTON
- 2 - D-RING SEAL
- 3 - D-RING SEAL

42LE AUTOMATIC TRANSAXLE (Continued)

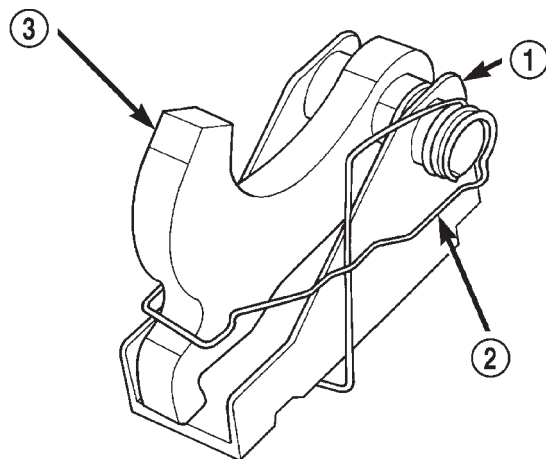
(6) Assemble guide bracket assembly as shown in (Fig. 83) (Fig. 84).



80adacf0

Fig. 83 Guide Bracket Disassembled

- 1 - ANTIRATCHET SPRING
- 2 - GUIDE BRACKET
- 3 - SPLIT SLEEVE
- 4 - SPACER
- 5 - PAWL
- 6 - STEPPED SPACER

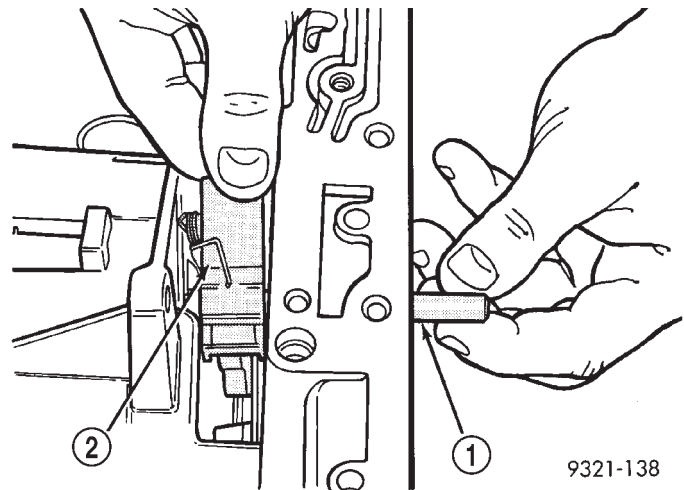


80b89910

Fig. 84 Guide Bracket

- 1 - GUIDE BRACKET
- 2 - ANTIRATCHET SPRING (MUST BE ASSEMBLED AS SHOWN)
- 3 - PAWL

(7) Install guide bracket pivot shaft (Fig. 85).



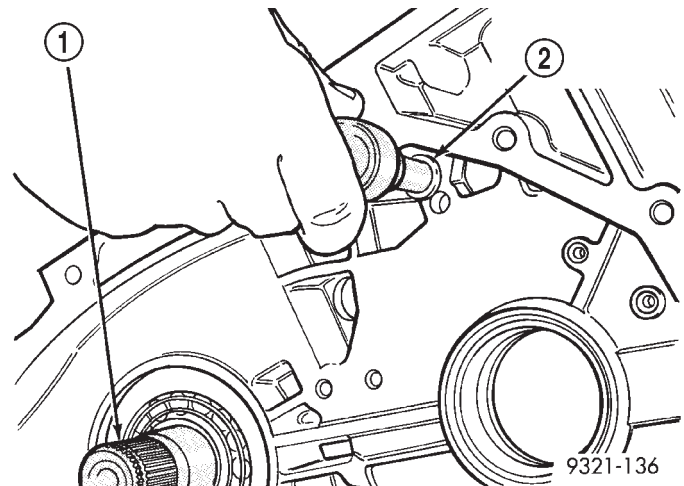
9321-138

Fig. 85 Install Guide Bracket Pivot Shaft

- 1 - PIVOT PIN
- 2 - GUIDE BRACKET ASSEMBLY

CAUTION: When installing, be sure guide bracket and split sleeve touch the rear of the transaxle case.

(8) Install park sprag pivot retaining screw (Fig. 86) and torque to 5 N·m (45 in. lbs.).



9321-136

Fig. 86 Install Parking Sprag Pivot Retaining Screw

- 1 - TRANSFER SHAFT
- 2 - PARKING SPRAG PIVOT RETAINING SCREW

42LE AUTOMATIC TRANSAXLE (Continued)

(9) Install low/reverse piston belleville spring into position (Fig. 87).

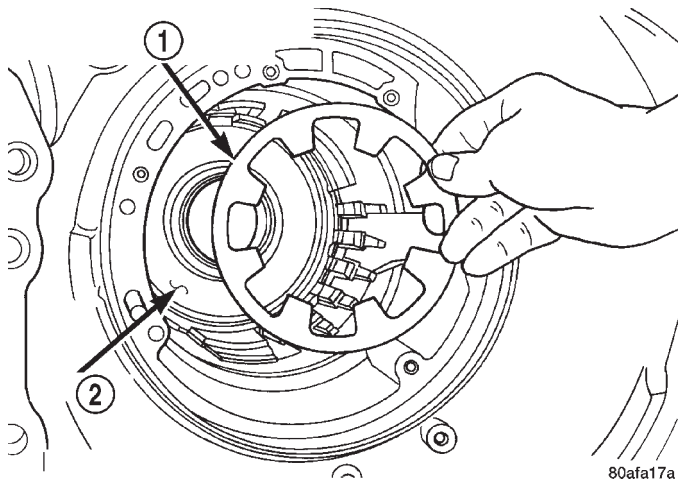


Fig. 87 Install Low/Reverse Piston Return Spring

- 1 - LOW/REVERSE PISTON RETURN SPRING
- 2 - PISTON

(10) Install and load low/reverse spring compressor tool as shown in (Fig. 88) (Fig. 89) to facilitate snap ring installation.

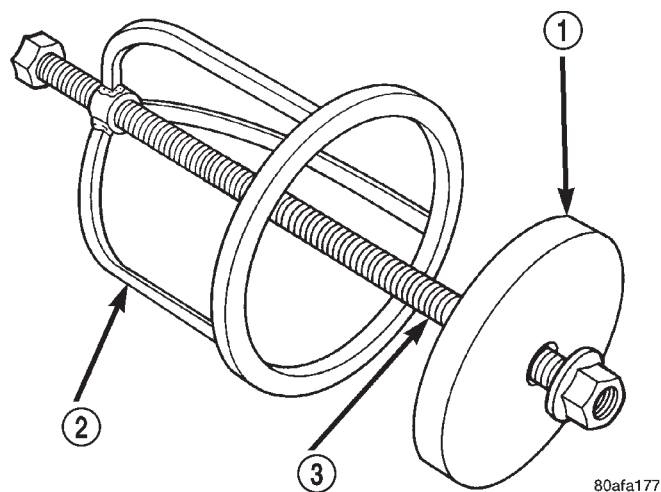


Fig. 88 Low/Reverse Spring Compressor Tool

- 1 - TOOL 6057
- 2 - TOOL 5059
- 3 - TOOL 5058-3

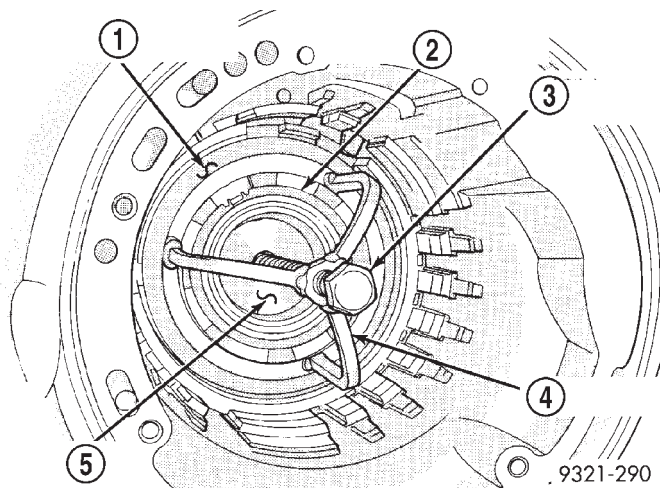


Fig. 89 Compressor Tool Installed

- 1 - LOW/REVERSE CLUTCH RETURN SPRING
- 2 - SNAP RING (INSTALL AS SHOWN)
- 3 - TOOL 5058A-3
- 4 - TOOL 5059A
- 5 - SPECIAL TOOL 6057

(11) Install snap ring and remove compressor tool (Fig. 90).

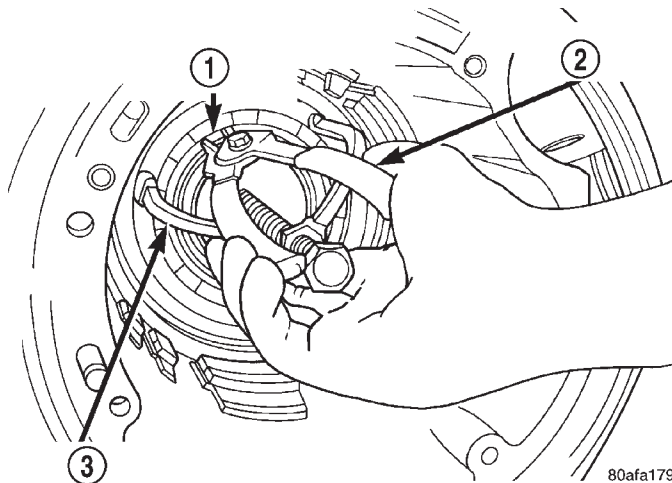


Fig. 90 Install Snap Ring

- 1 - SNAP RING OPENING MUST BE BETWEEN SPRING LEVERS (AS SHOWN)
- 2 - SNAP RING PLIERS
- 3 - TOOL 6057

42LE AUTOMATIC TRANSAXLE (Continued)

(12) Install rear carrier front bearing cone (Fig. 91).

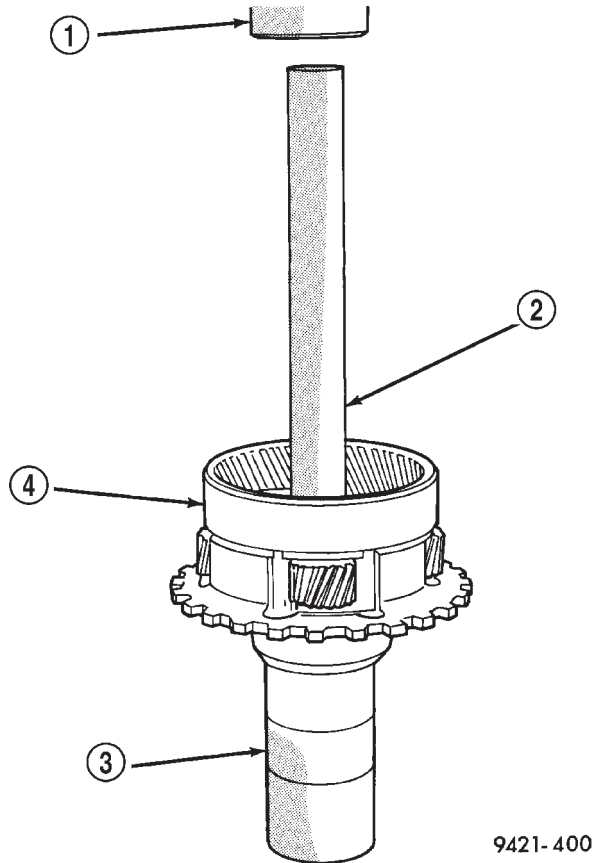


Fig. 91 Install Rear Carrier Front Bearing Cone

- 1 - ARBOR PRESS
- 2 - SPECIAL TOOL C-4171
- 3 - SPECIAL TOOL 6052
- 4 - REAR CARRIER

(13) Check output bearing preload. **Output bearing preload must be checked and/or adjusted if any of the following items have been replaced:**

- Output shaft (rear carrier assembly)
- Output shaft bearings
- Transaxle case

(a) **PRELOAD CHECK/SHIM SELECTION:** Install rear output shaft bearing cone and special tool 6618A (Fig. 92).

(b) Install special tool 6618A (Fig. 93). Lightly tighten retaining screws. Screws should be below the plate surface, but do not snug screws.

(c) Turn case over on arbor press so that the plate is resting on the press base. **CAUTION: The output shaft will extend through the hole of tool 6618A. Ensure your press table has clearance for the output shaft.**

(d) Install shim on output shaft (Fig. 94). Apply small amount of petrolatum onto the shim to hold it in place. Use the original shim as a starting point. If original shim is not available, use the thickest shim available. Refer to Output Shaft Rear Shim Chart for available sizes.

(e) Install output shaft/rear carrier into rear bearing. The shaft must be pressed into position. Use special tool MD-998911 (Disc) and C-4171 and C4171-2 (Handle) to press shaft into rear bearing (Fig. 95).

(f) **Do not re-use old transfer shaft nut or output shaft nut because the removed stake weakens the nut flange.** Using special tools 6497 and 6498, install new output shaft nut. Do not reuse old output shaft nut. Tighten new output shaft nut to 271 N·m (200 ft. lbs.).

(g) Check the turning torque of the output shaft (Fig. 96). The shaft should have 1 to 8 in. lbs. of turning torque. If the turning torque is **higher than 8 in. lbs.**, install a thicker shim. If turning torque is **less than 1 in. lb.**, install a thinner shim. Make sure there is no end play.

(h) The new nut must be staked after the correct turning torque is obtained (Fig. 97) (Fig. 98). Use special tool 6639 to stake output shaft nut and special tool 6589 to stake transfer shaft. **CAUTION: Failure to stake shaft nuts could allow the nuts to back-off during use.**

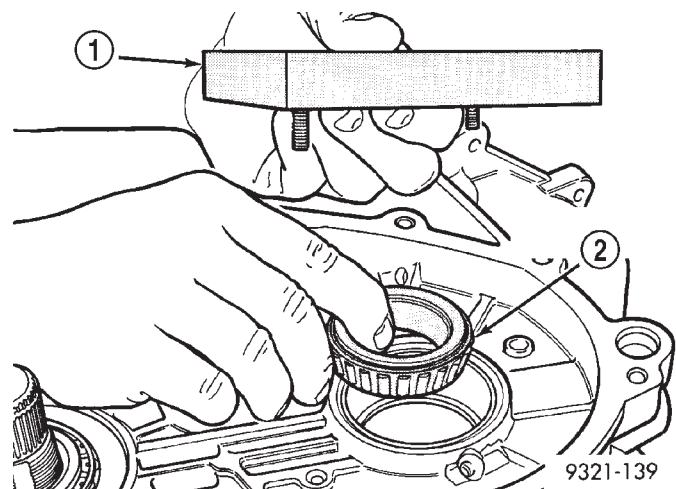


Fig. 92 Bearing Installation

- 1 - SPECIAL TOOL 6618-A
- 2 - REAR OUTPUT SHAFT BEARING

42LE AUTOMATIC TRANSAXLE (Continued)

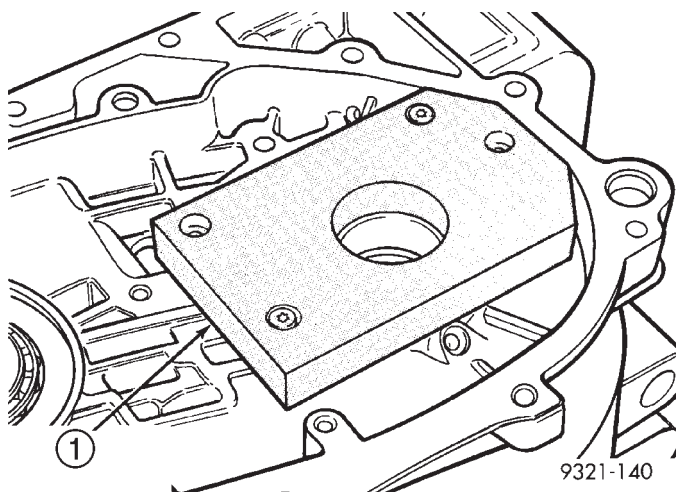


Fig. 93 Special Tool Installed

1 - SPECIAL TOOL 6618-A

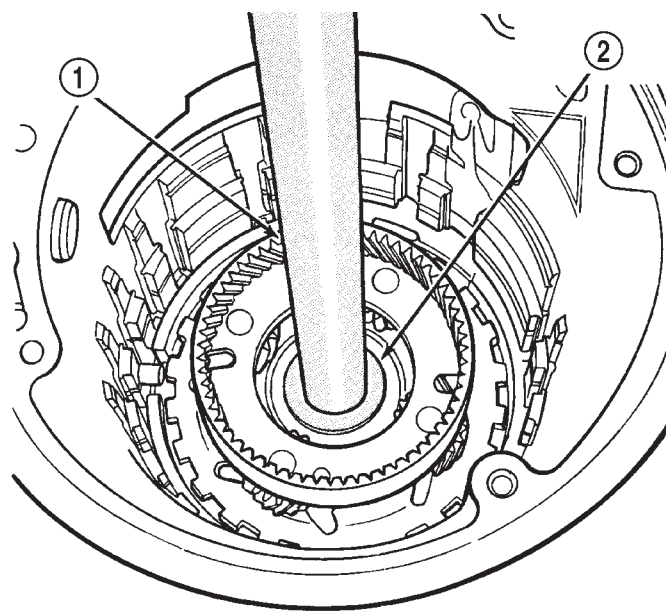


Fig. 95 Press Shaft Into Case

1 - SPECIAL TOOL C-4171 AND C-4171-2
2 - SPECIAL TOOL MD-998911

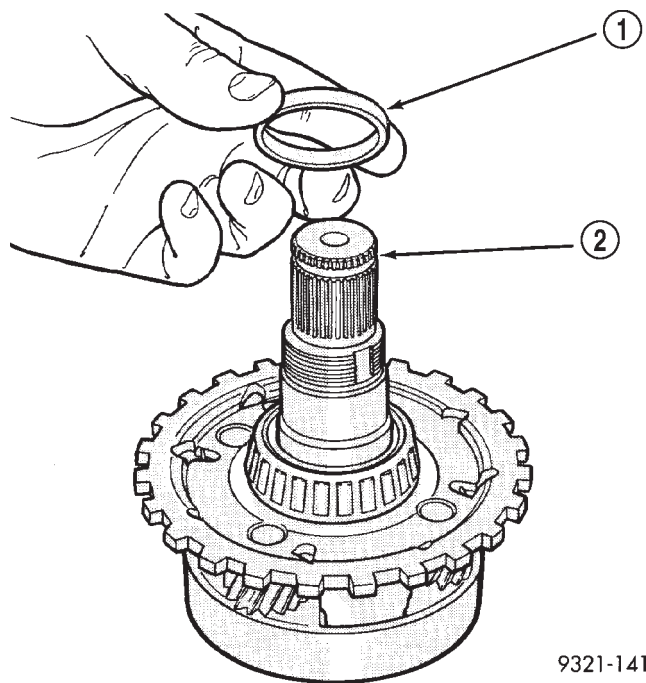


Fig. 94 Shim Installation

1 - SHIM
2 - OUTPUT SHAFT

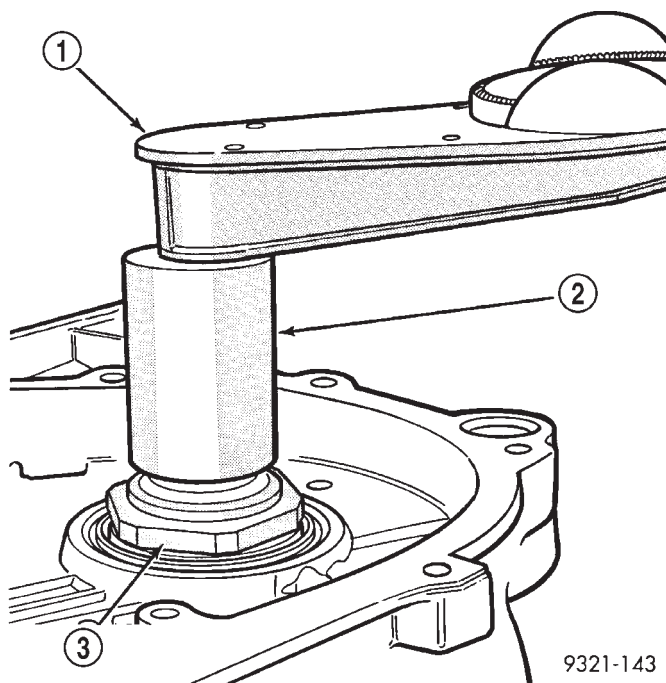
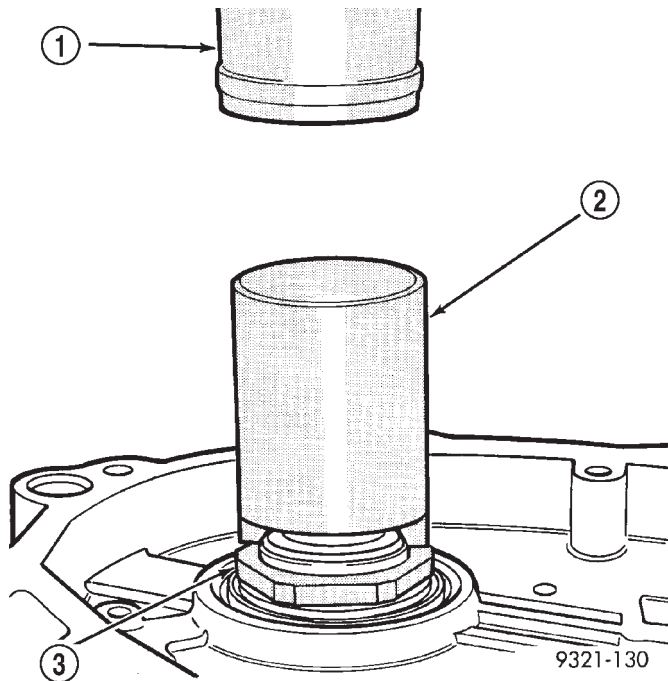


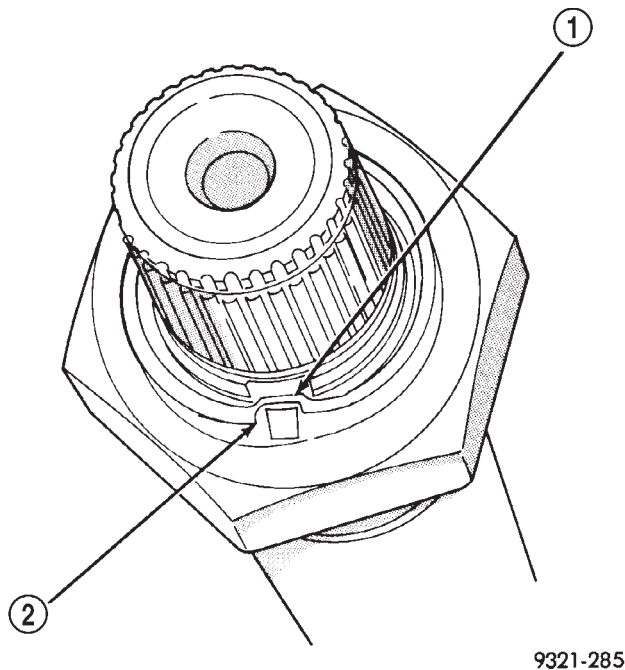
Fig. 96 Checking Turning Torque

1 - TORQUE WRENCH
2 - SPECIAL TOOL 6498
3 - OUTPUT SHAFT NUT

42LE AUTOMATIC TRANSAXLE (Continued)

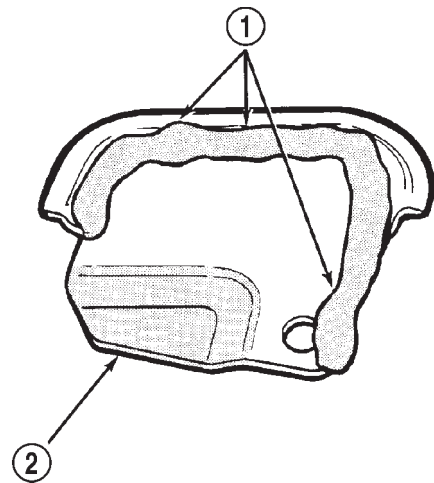
**Fig. 97 Staking Output Shaft Nut**

- 1 - ARBOR PRESS
- 2 - STAKING TOOL
- 3 - NEW NUT

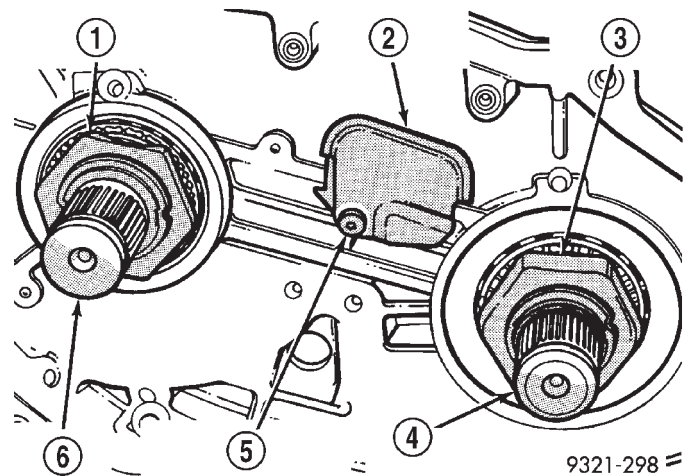
**Fig. 98 Properly Staked Nut**

- 1 - BOTTOMED IN SLOT
- 2 - CORRECTLY STAKED NUT

(14) Apply Mopar® ATF RTV (MS-GF41) as shown in (Fig. 99). Install main sump baffle to transaxle case (Fig. 100) and torque screw to 5 N·m (45 in. lbs.).

**Fig. 99 Properly Applied Sealant**

- 1 - SEALANT
- 2 - BACK SIDE OF VENT BAFFLE

**Fig. 100 Main Sump Vent Baffle Location**

- 1 - OUTPUT SHAFT NUT
- 2 - MAIN SUMP VENT BAFFLE
- 3 - TRANSFER SHAFT NUT
- 4 - TRANSFER SHAFT
- 5 - VENT BAFFLE RETAINING SCREW
- 6 - OUTPUT SHAFT

CAUTION: When reinstalling drive chains, the blue link must face outward.

(15) Install output sprocket spacer (Fig. 101).

42LE AUTOMATIC TRANSAXLE (Continued)

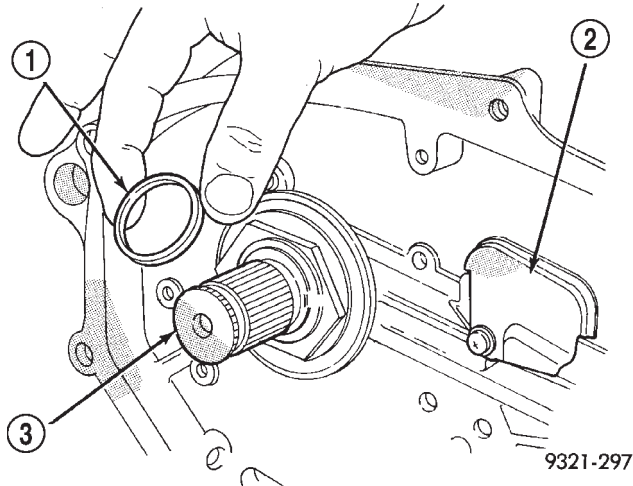


Fig. 101 Output Sprocket Spacer

- 1 - OUTPUT SPROCKET SPACER
- 2 - VENT BAFFLE
- 3 - OUTPUT SHAFT

CAUTION: The chain sprockets have a slip fit onto the shafts. Apply only a slight amount of pressure to the chain spreader to release the chain pressure. If chain sprockets are not spread slightly, installation will be difficult.

(16) Install transfer chain and sprockets to transfer shaft and output shaft (Fig. 102).

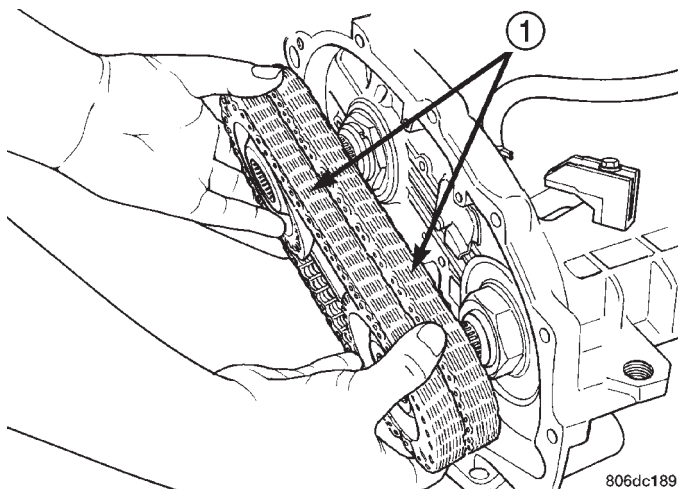


Fig. 102 Install Chains and Both Sprockets as an Assembly

- 1 - CHAINS

(17) Remove chain spreader (Fig. 103).

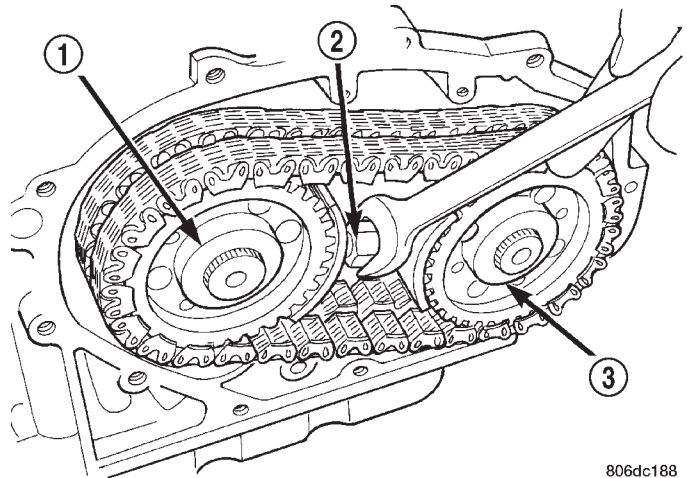


Fig. 103 Remove Chain Spreader

- 1 - OUTPUT SPROCKET
- 2 - SPECIAL TOOL 6550
- 3 - TRANSFER SPROCKET

(18) Install transfer shaft sprocket snap rings and wave washers (Fig. 104) (Fig. 105).

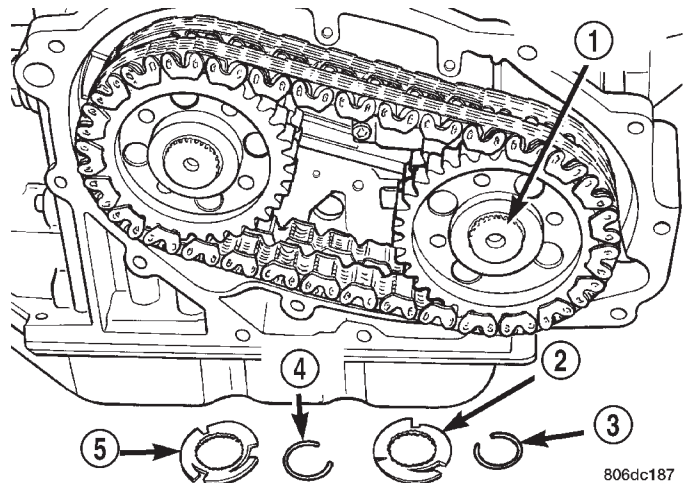


Fig. 104 Install Transfer Shaft Sprocket Snap Ring and Wave Washer

- 1 - TRANSFER SHAFT
- 2 - WAVE WASHER
- 3 - SNAP RING
- 4 - SNAP RING
- 5 - WAVE WASHER

CAUTION: Be sure to reinstall the chain snubber and chain oiler when reassembling.

42LE AUTOMATIC TRANSAXLE (Continued)

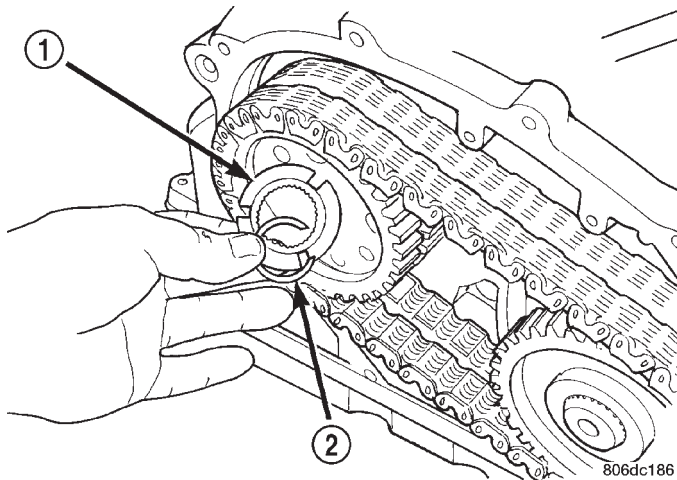


Fig. 105 Install Output Shaft Sprocket Snap Ring and Wave Washer

- 1 - WAVE WASHER
2 - SNAP RING

(19) Install transfer chain snubber (Fig. 106) and torque screws to 5 N·m (45 in. lbs.).

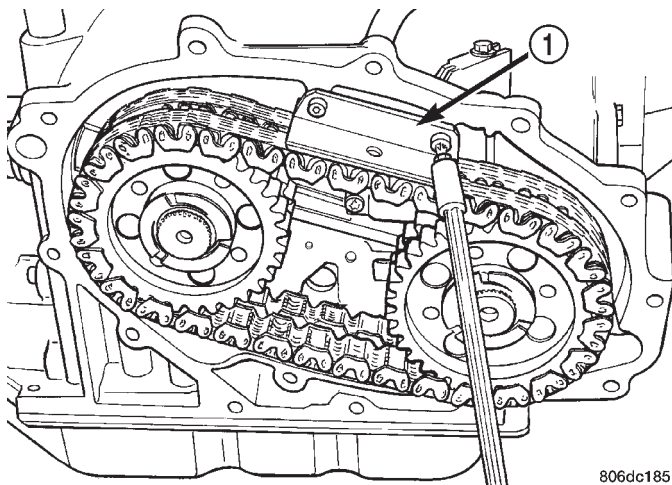


Fig. 106 Install Chain Snubber

- 1 - CHAIN SNUBBER

(20) Install chain oiler (Fig. 107) and torque screw to 5 N·m (45 in. lbs.).

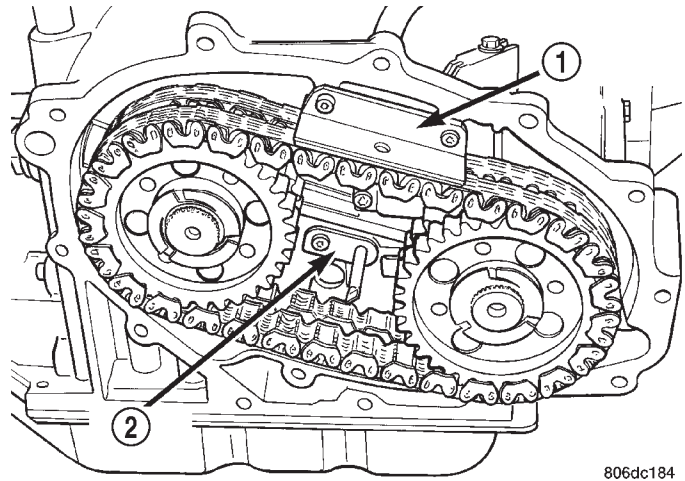


Fig. 107 Install Chain Oiler

- 1 - CHAIN SNUBBER
2 - CHAIN OILER

(21) Stand trans upright on bellhousing

(22) Install chain cover (Fig. 108). **Chain cover must be free of old sealant, dirt and oil before applying new sealant.** Apply a 1/8 inch bead of Mopar® ATF RTV (MS-GF41) to flange of cover.

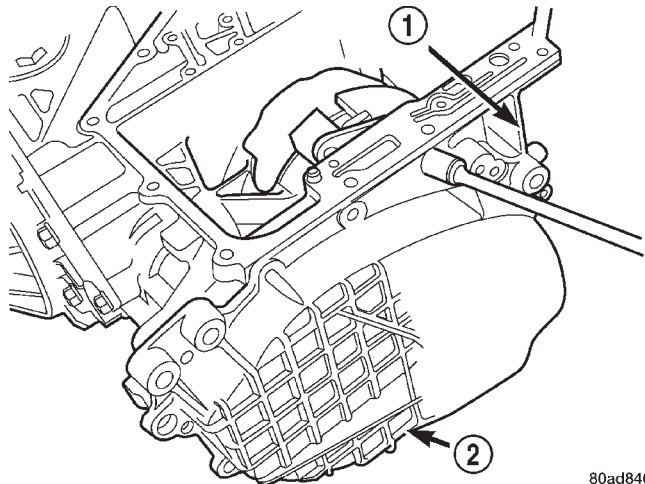


Fig. 108 Install Chain Cover

- 1 - TRANSAXLE CASE
2 - CHAIN COVER

42LE AUTOMATIC TRANSAXLE (Continued)

(23) Install low/reverse clutch pack (Fig. 109). Leave uppermost disc out to facilitate snap ring installation.

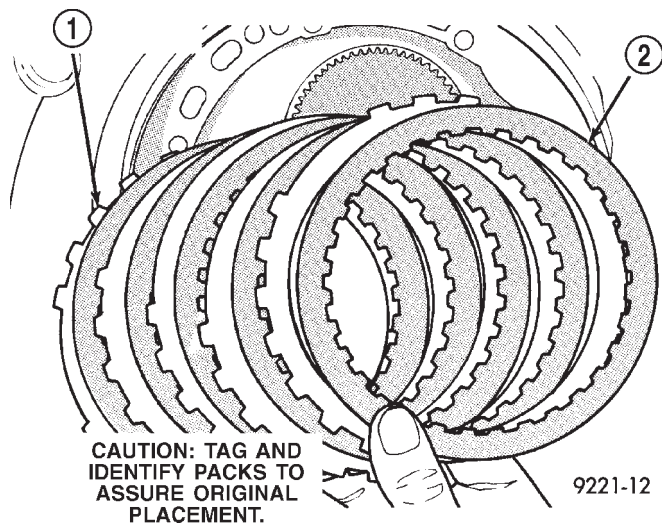


Fig. 109 Install Low/Reverse Clutch Pack

- 1 - CLUTCH PLATES (5)
- 2 - CLUTCH DISCS (5)

(24) Install low/reverse reaction plate snap ring (Fig. 110).

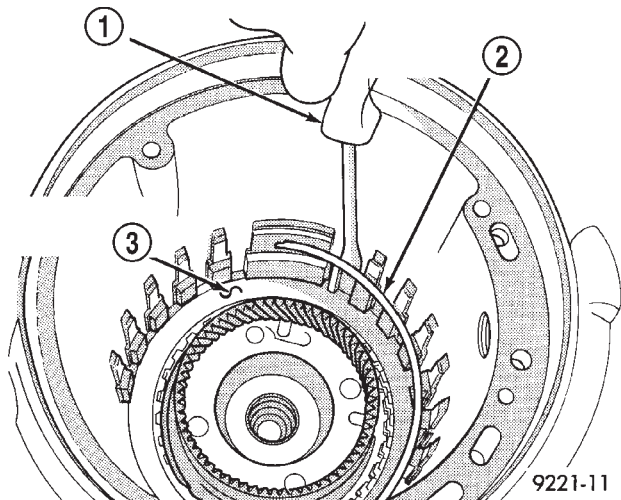


Fig. 110 Install Low/Reverse Reaction Plate Snap Ring

- 1 - SCREWDRIVER
- 2 - LOW/REVERSE REACTION PLATE FLAT SNAP RING
- 3 - DO NOT SCRATCH CLUTCH PLATE

(25) Install one low/reverse clutch disc (Fig. 111).

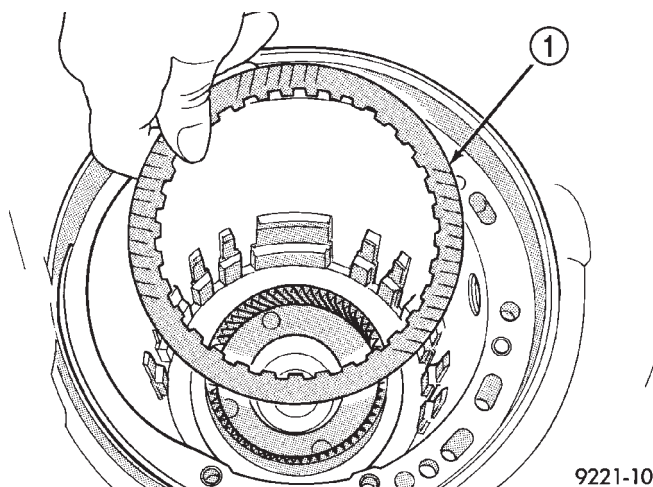


Fig. 111 Install One Disc

- 1 - ONE DISC FROM LOW/REVERSE CLUTCH

(26) Install low/reverse reaction plate with flat side up (Fig. 112).

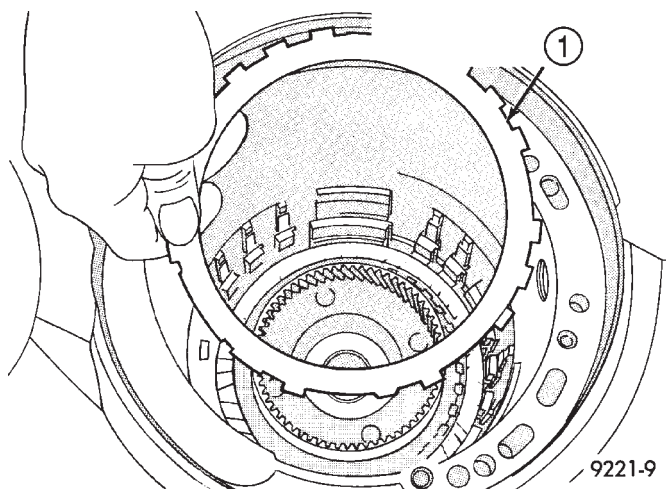


Fig. 112 Install Low/Reverse Reaction Plate

- 1 - LOW/REVERSE REACTION PLATE (FLAT SIDE UP)

42LE AUTOMATIC TRANSAXLE (Continued)

(27) Install tapered snap ring (tapered side out) as shown in (Fig. 113) (Fig. 114).

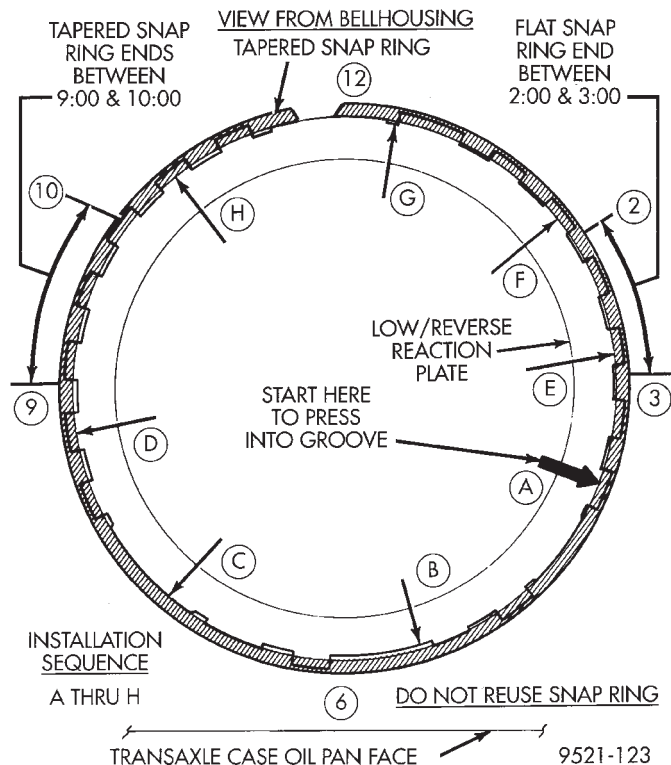


Fig. 113 Tapered Snap Ring Instructions

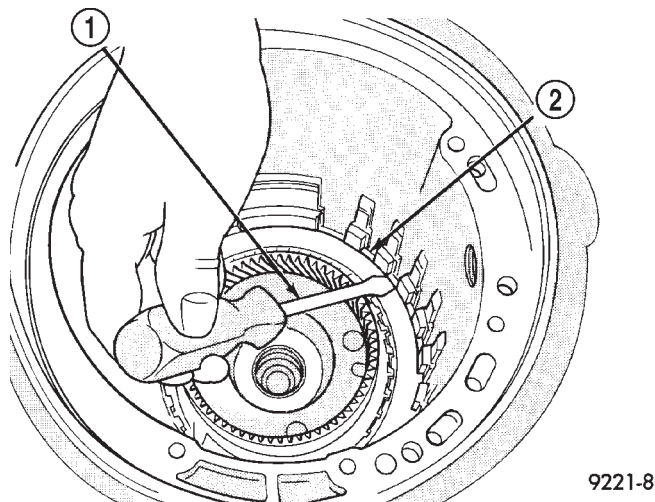


Fig. 114 Snap Ring Installed

- 1 - SCREWDRIVER
2 - TAPERED SNAP RING (INSTALL AS SHOWN)

(28) Measure low/reverse clutch pack. Set up dial indicator as shown in (Fig. 115). Press down clutch pack with finger and zero dial indicator. Record measurement in four (4) places and take average reading. **Low/Reverse clutch pack clearance is 0.86 to 1.52 (0.034 to 0.060 inch).**

USE HOOK TOOL TO RAISE ONE CLUTCH DISC

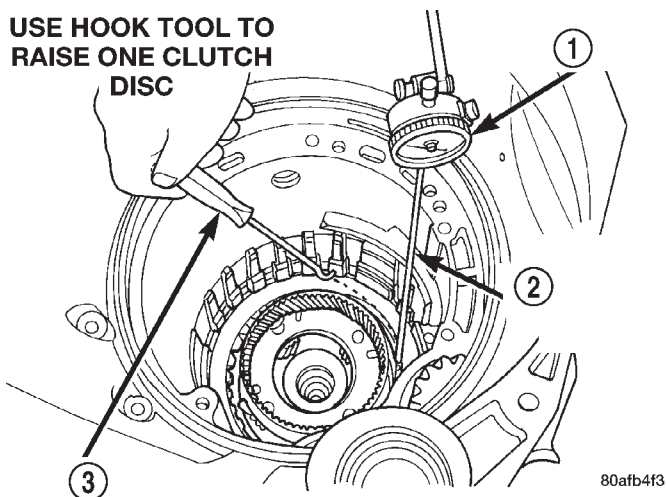


Fig. 115 Check Low/Reverse Clutch Clearance

- 1 - DIAL INDICATOR
2 - DIAL INDICATOR TIP TOOL 6268
3 - HOOK TOOL

(29) Select the proper low/reverse reaction plate to achieve specifications:

LOW/REVERSE REACTION PLATE CHART

PART NUMBER	THICKNESS
4799846AA	5.88 mm (.232 in.)
4799847AA	6.14 mm (.242 in.)
4799848AA	6.40 mm (.252 in.)
4799849AA	6.66 mm (.262 in.)
4799855AA	6.92 mm (.273 in.)

(30) Install 2/4 clutch pack (Fig. 116). Stagger 2/4 clutch disc pads as shown in (Fig. 117).

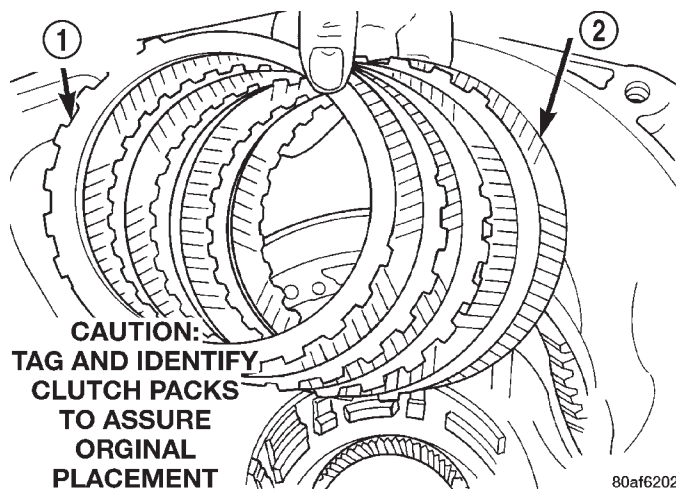


Fig. 116 Install 2/4 Clutch Pack

- 1 - CLUTCH PLATE (4)
2 - CLUTCH DISC (4)

42LE AUTOMATIC TRANSAXLE (Continued)

NOTE: When installing the 2-4 clutch plates and discs, the orientation should be alternated so the pilot pads of adjacent plates do not align, refer to (Fig. 117).

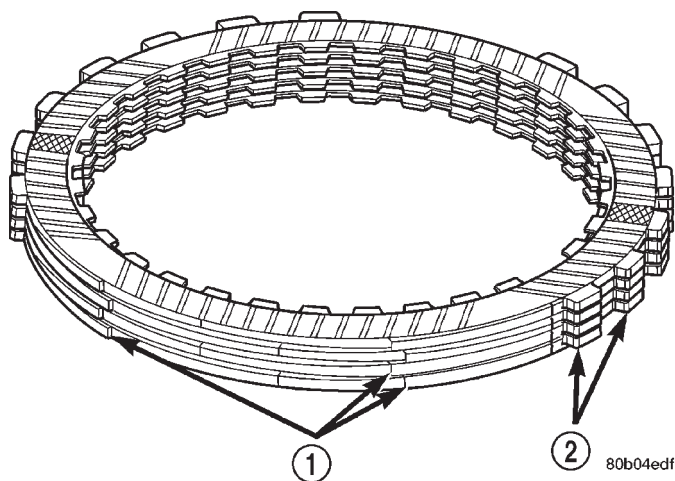


Fig. 117 Stagger 2/4 Clutch Plate Pads

- 1 - PILOT PADS
- 2 - LUGS

(31) Install 2/4 clutch belleville spring (Fig. 118) (Fig. 119).

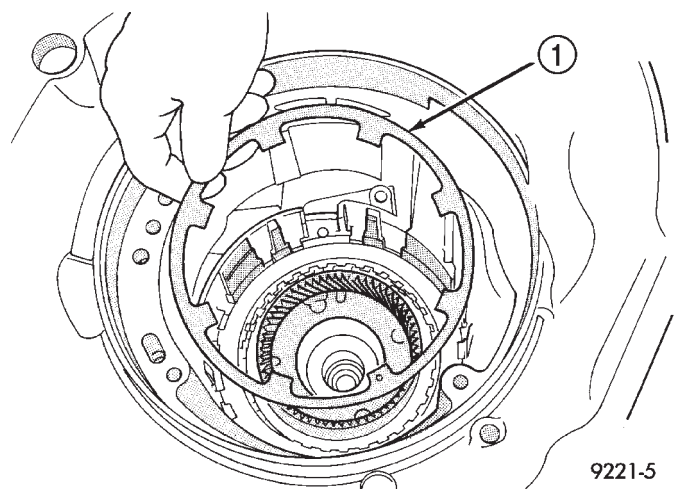


Fig. 118 Install 2/4 Clutch Return Spring

- 1 - 24 CLUTCH RETURN SPRING

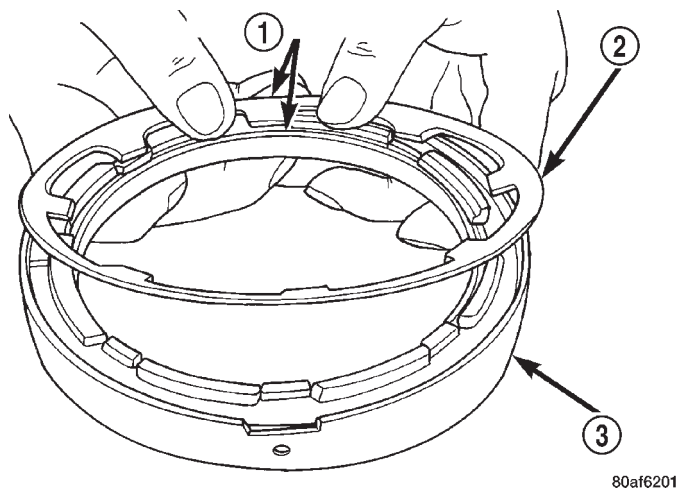


Fig. 119 Proper Orientation of 2/4 Clutch

- 1 - NOTE POSITION
- 2 - RETURN SPRING
- 3 - 2/4 CLUTCH RETAINER

(32) Install 2/4 clutch retainer (Fig. 120).

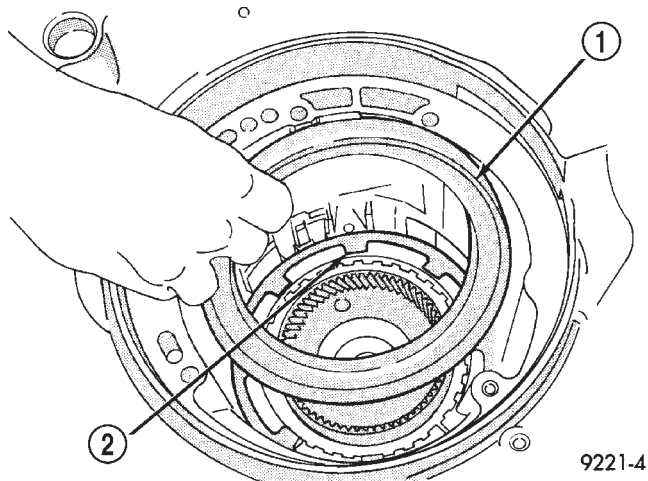


Fig. 120 Install 2/4 Clutch Retainer

- 1 - 24 CLUTCH RETAINER
- 2 - 24 CLUTCH RETURN SPRING

42LE AUTOMATIC TRANSAXLE (Continued)

(33) Set up Tool 5058 as shown in (Fig. 121). Compress 2/4 clutch just enough to facilitate snap ring installation.

COMPRESS JUST ENOUGH
TO REMOVE OR INSTALL
SNAP RING

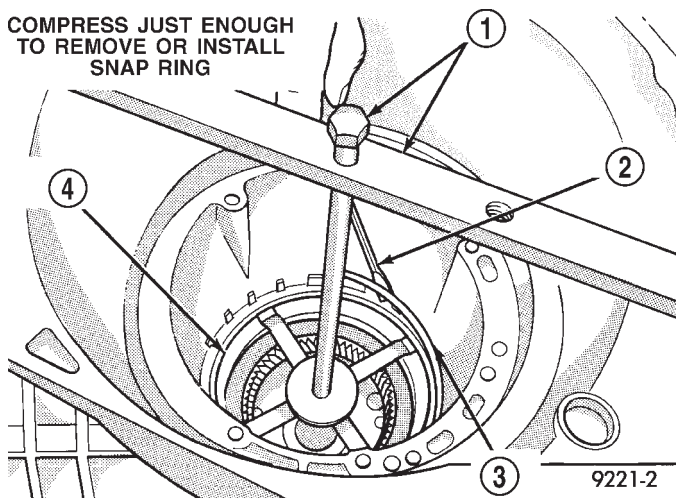


Fig. 121 Install 2/4 Clutch Retainer Snap Ring

- 1 - TOOL 5058
- 2 - SCREWDRIVER
- 3 - SNAP RING
- 4 - 2/4 CLUTCH RETAINER

(34) **Measure 2/4 clutch clearance:** Set up dial indicator as shown in (Fig. 122). Press down clutch pack with finger and zero dial indicator. Record measurement in four (4) places and take average reading. **The 2/4 clutch pack clearance is 0.76 to 2.64 mm (0.030 to 0.104 inch).** If not within specifications, the clutch is not assembled properly. **There is no adjustment for the 2/4 clutch clearance.**

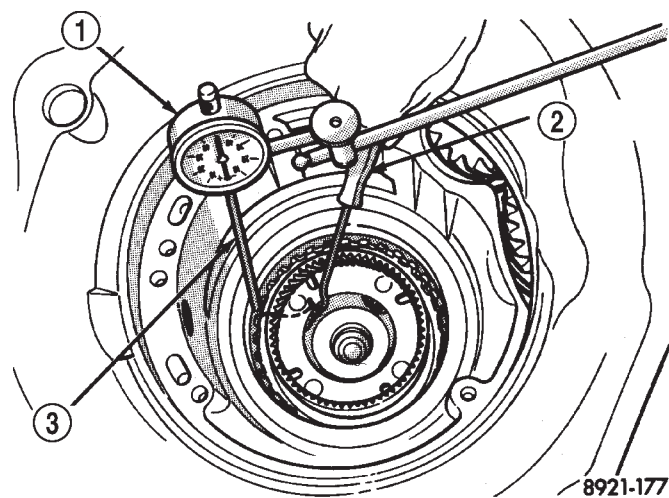


Fig. 122 Check 2/4 Clutch Clearance

- 1 - DIAL INDICATOR
- 2 - HOOK TOOL
- 3 - DIAL INDICATOR TIP TOOL 6268

(35) Install the #7 needle bearing to the rear sun gear (Fig. 123). **The number 7 needle bearing has three antireversal tabs and is common with the number 5 and number 2 position. The orientation should allow the bearing to seat flat against the rear sun gear. A small amount of petrolatum can be used to hold the bearing to the rear sun gear.**

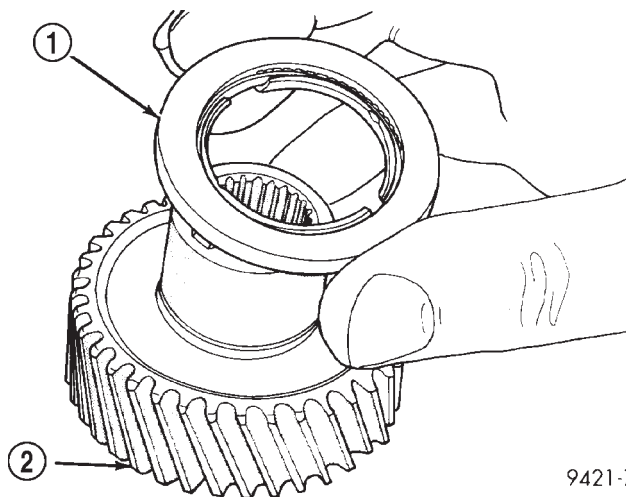


Fig. 123 Number 7 Bearing

- 1 - #7 BEARING
- 2 - REAR SUN GEAR

(36) Install rear sun gear and #7 needle bearing (Fig. 124).

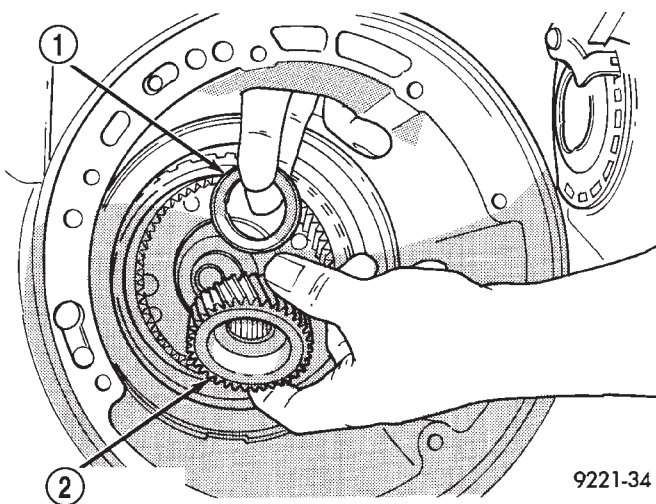


Fig. 124 Install Rear Sun Gear

- 1 - #7 NEEDLE BEARING
- 2 - REAR SUN GEAR

42LE AUTOMATIC TRANSAXLE (Continued)

(37) Install front carrier/rear annulus assembly and #6 needle bearing (Fig. 125).

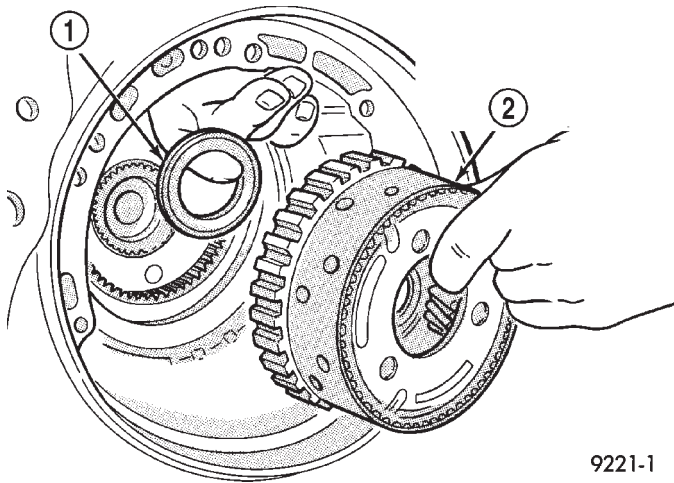


Fig. 125 Install Front Carrier/Rear Annulus Assy.

- 1 - #6 NEEDLE BEARING
2 - FRONT CARRIER AND REAR ANNULUS ASSEMBLY (TWIST AND PULL OR PUSH TO REMOVE OR INSTALL).

(38) Install front sun gear assembly and #4 thrust washer (Fig. 126).

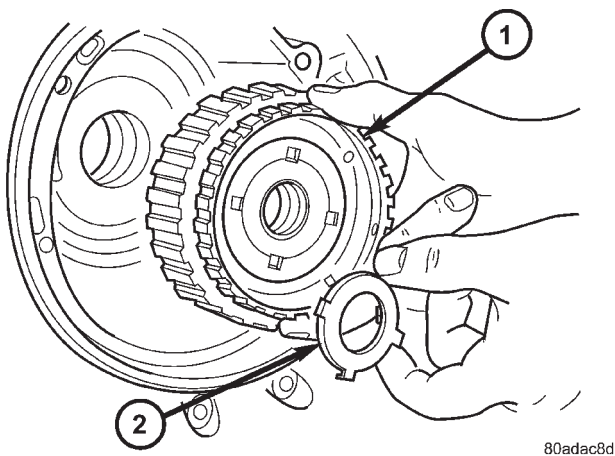


Fig. 126 Install Front Sun Gear Assembly

- 1 - FRONT SUN GEAR ASSEMBLY
2 - #4 THRUST WASHER (FOUR TABS)

(39) **Determine proper #4 thrust plate thickness.**

(a) Select the thinnest #4 thrust plate thickness.

(b) Install #4 thrust plate (Fig. 127) using petrolatum to hold into position.

(c) Install input clutch assembly. Ensure the input clutch assembly is completely seated by viewing position through input speed sensor hole (Fig. 128). **If view through input speed sensor hole is not as shown in (Fig. 128), the input clutches assembly is not seated properly.**

(d) Remove the oil pump o-ring (Fig. 129) and install oil pump and gasket to transaxle. **Use screw-in dowels or phillips-head screwdrivers to align pump to case. Be sure to reinstall O-ring on oil pump after selecting the proper No. 4 thrust plate.**

(e) Measure the input shaft end play with the transaxle in the vertical position. This will ensure that the measurement will be accurate.

(f) Set up and measure endplay using End Play Set 8266 and Dial Indicator Set C3339 as shown in (Fig. 130).

(g) Measure input shaft end play. **Input shaft end play must be .005 to .025 inch.** For example, if end play reading is 0.055 inch, select No. 4 Thrust Plate which is 0.071 to 0.074 thick. This should provide an input shaft end play reading of 0.020 inch, which is within specifications.

(h) See chart to select the proper No. 4 thrust plate.

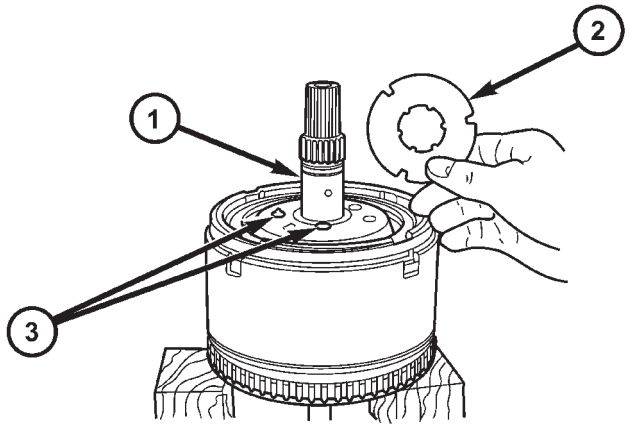
NO. 4 THRUST PLATE CHART

PART NUMBER	THICKNESS
3836237AB	1.73mm (0.068 in.)
4431666AB	1.80mm (0.071 in.)
3836238AB	1.96mm (0.077 in.)
4431667AB	2.03mm (0.080 in.)
3836239AB	2.16mm (0.085 in.)
4431668AB	2.24mm (0.088 in.)
3836240AB	2.39mm (0.094 in.)
4431669AB	2.46mm (0.097 in.)
3836241AB	2.62mm (0.103 in.)
4446670AB	2.67mm (0.105 in.)
4446671AB	2.90mm (0.114 in.)

42LE AUTOMATIC TRANSAXLE (Continued)

(i) Remove oil pump, gasket, and input clutch assembly to gain access to and install proper #4 thrust plate.

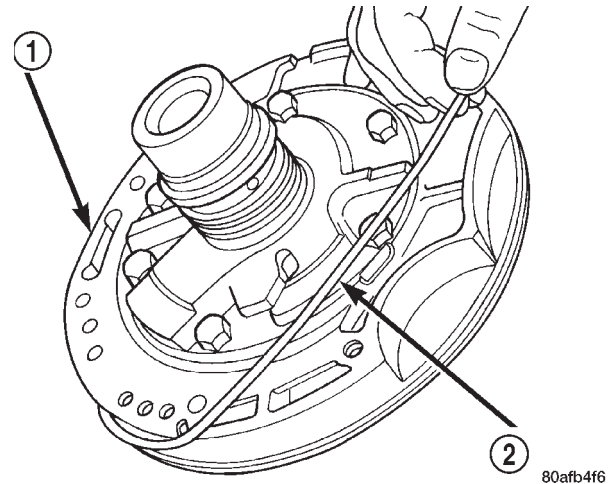
CAUTION: If view through input speed sensor hole is not as shown in (Fig. 128), the input clutches assembly is not seated properly.



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Fig. 127 No. 4 Thrust Plate

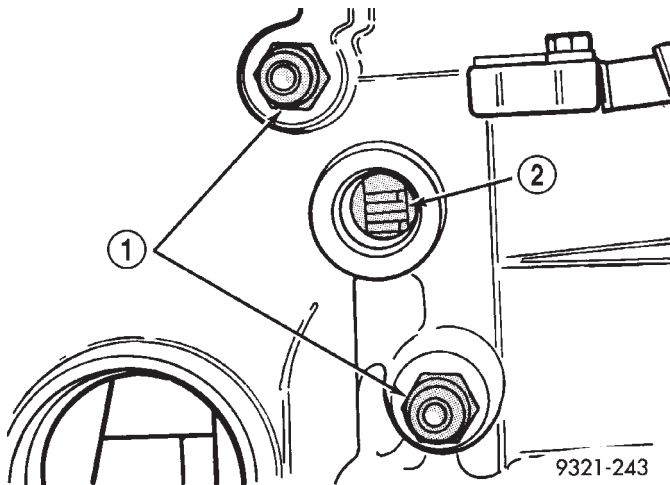
- 1 - OVERDRIVE SHAFT ASSEMBLY
- 2 - #4 THRUST PLATE (SELECT)
- 3 - PETROLATUM (FOR RETENTION)



80afb4f6

Fig. 129 Remove Oil Pump O-Ring

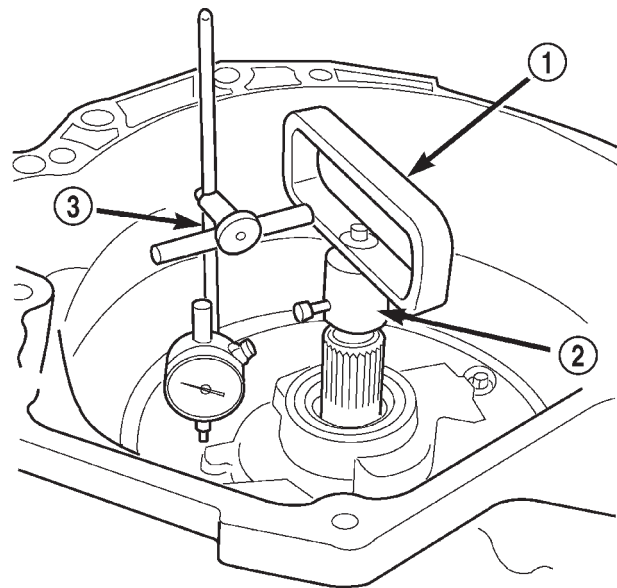
- 1 - OIL PUMP ASSEMBLY
- 2 - O-RING



9321-243

Fig. 128 View Through Turbine Speed Sensor Hole

- 1 - TRANSAXLE COOLER LINE
- 2 - TURBINE SPEED SENSOR HOLE



80bcd18

Fig. 130 Measure Input Shaft End Play Using Tool 8266—Typical

- 1 - TOOL 8266-8
- 2 - TOOL 8266-2
- 3 - TOOL C-3339

42LE AUTOMATIC TRANSAXLE (Continued)

(40) Install input clutch assembly with proper thrust plate (Fig. 131).

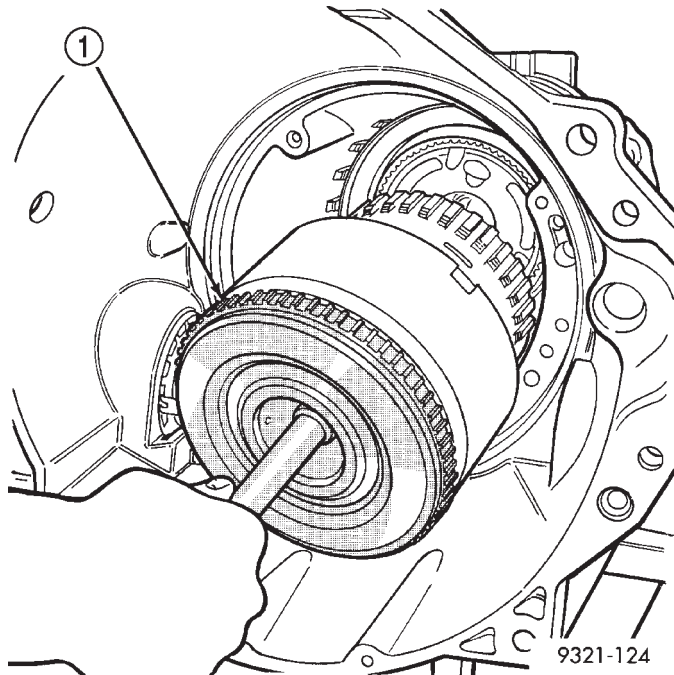


Fig. 131 Install Input Clutch Assembly

1 - INPUT CLUTCH ASSEMBLY

(41) Install #1 caged needle bearing (Fig. 132).

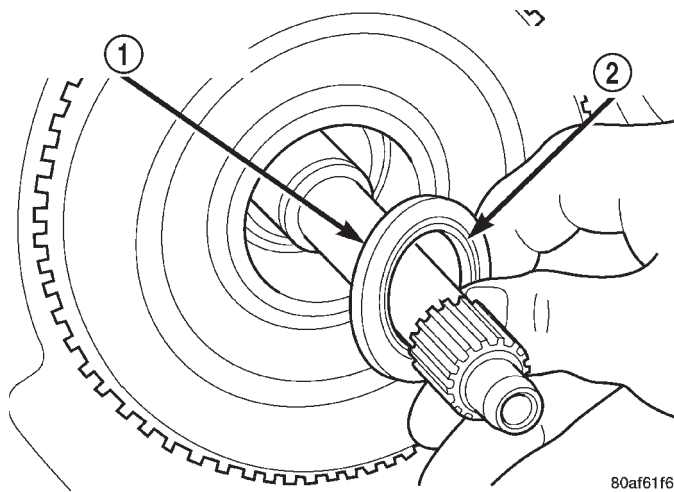


Fig. 132 Install Caged Needle Bearing

1 - #1 CAGED NEEDLE BEARING
2 - NOTE: TANGED SIDE OUT

(42) Replace cooler by-pass valve if transmission failure has occurred (Fig. 133).

CAUTION: By-pass valve must be replaced if transmission failure occurs.

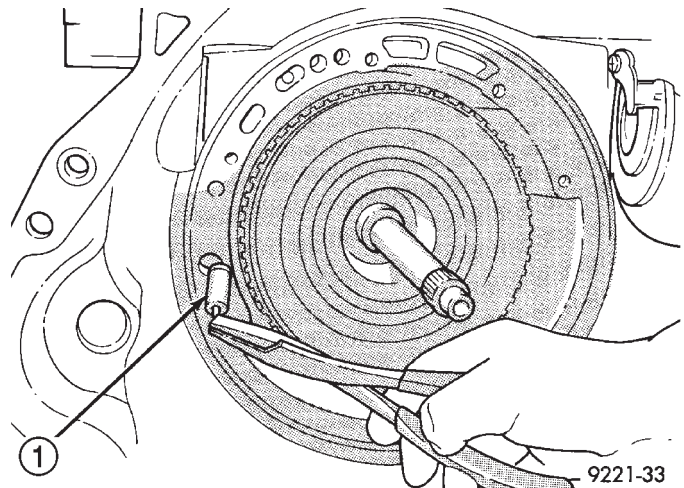


Fig. 133 Install By-Pass Valve

1 - BYPASS VALVE

NOTE: To align oil pump, gasket, and case during installation, use threaded dowels or phillips screw-drivers.

(43) Install oil pump gasket (Fig. 134).

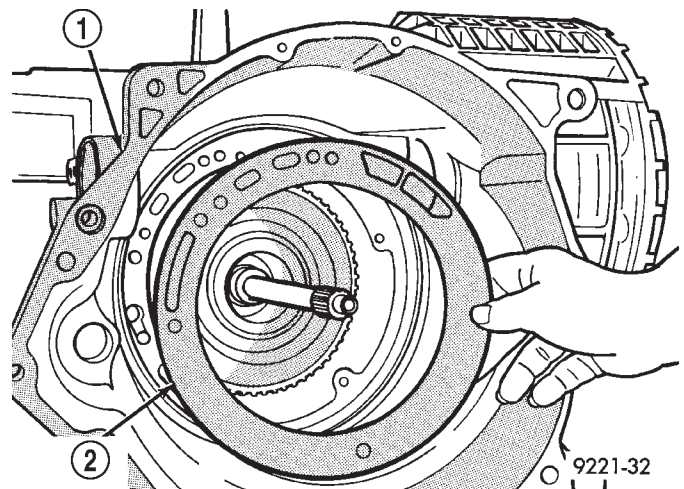


Fig. 134 Install Oil Pump Gasket

1 - BELL HOUSING
2 - OIL PUMP GASKET

42LE AUTOMATIC TRANSAXLE (Continued)

(44) Install oil pump and torque oil pump-to-case bolts to 28 N·m (250 in. lbs.) (Fig. 135).

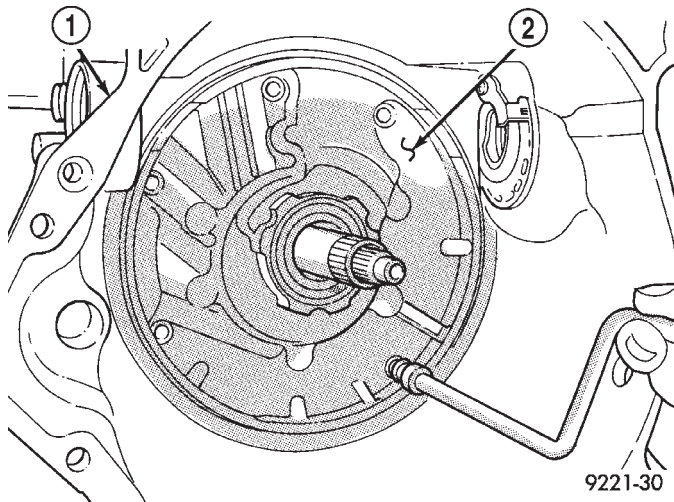


Fig. 135 Install Oil Pump Attaching Bolts

- 1 - BELLHOUSING
- 2 - OIL PUMP

(45) Install long stub shaft and bearing to housing (Fig. 136).

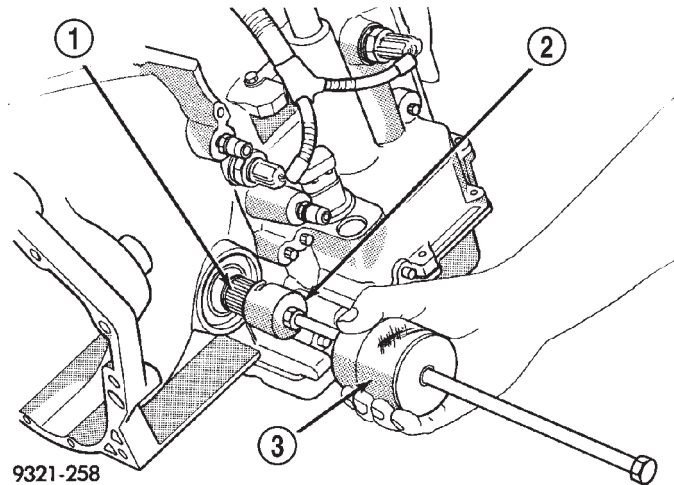


Fig. 136 Install Long Stub Shaft To Bellhousing

- 1 - LONG STUB SHAFT
- 2 - SPECIAL TOOL 8420A
- 3 - SLIDE HAMMER C-3752

NOTE: Install new halfshaft retainer clips.

(46) Install long stub shaft bearing retaining snap ring (Fig. 137). Replace halfshaft retainer clips.

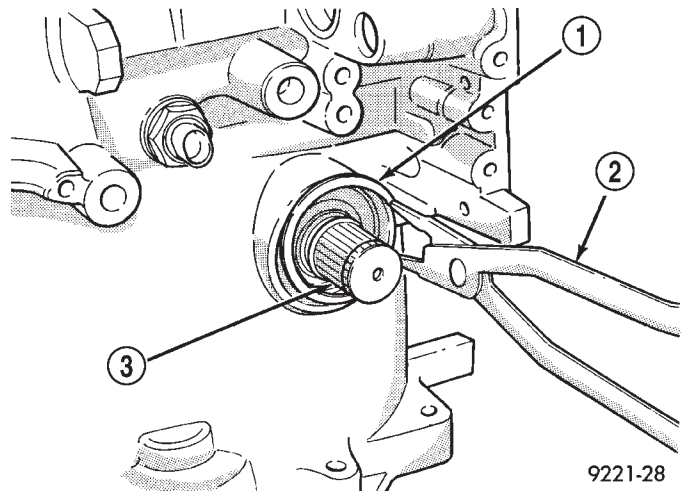


Fig. 137 Install Long Stub Shaft Snap Ring

- 1 - SNAP RING
- 2 - SNAP RING PLIERS
- 3 - LONG STUB SHAFT

(47) Install low/reverse accumulator as shown in (Fig. 138).

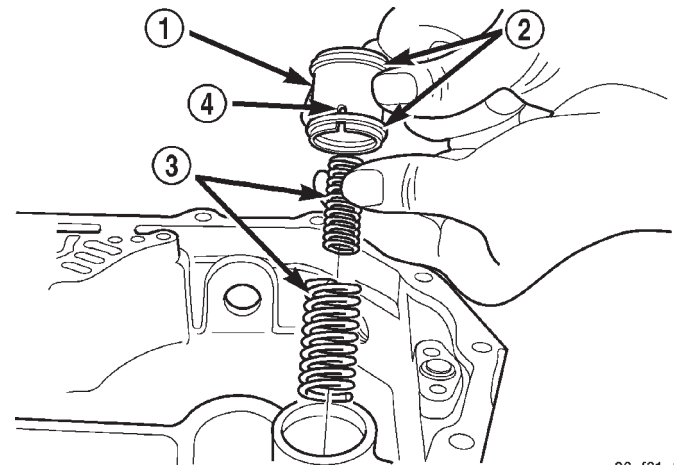


Fig. 138 Install Low/Reverse Accumulator

- 1 - ACCUMULATOR PISTON
- 2 - SEAL RINGS
- 3 - RETURN SPRINGS
- 4 - (NOTE NOTCH)

42LE AUTOMATIC TRANSAXLE (Continued)

(48) Install low/reverse accumulator plug (Fig. 139).

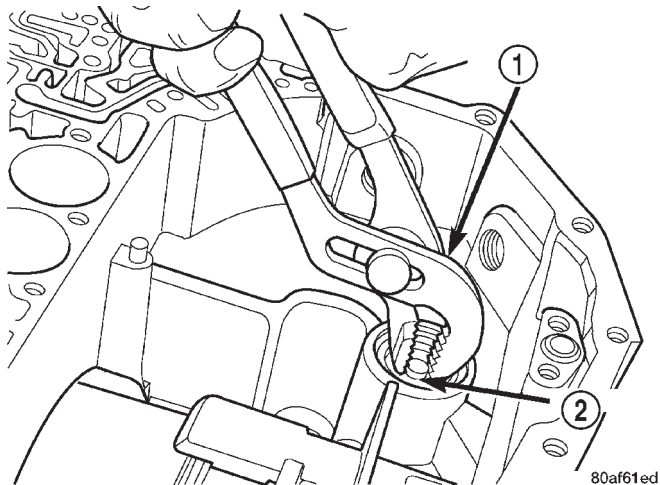


Fig. 139 Install Low/Reverse Accumulator Plug (Cover)

- 1 - ADJUSTABLE PLIERS
- 2 - PLUG

(50) Install underdrive and overdrive accumulators as shown in (Fig. 141) (Fig. 142) (Fig. 143).

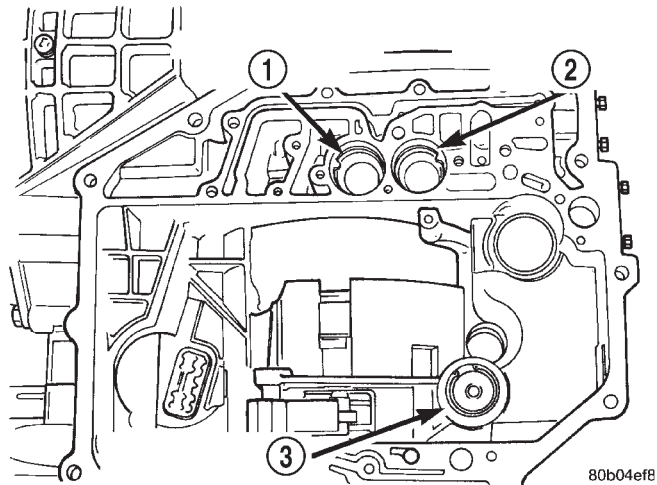


Fig. 141 Accumulator Locations

- 1 - OVERDRIVE ACCUMULATOR LOCATION
- 2 - UNDERDRIVE ACCUMULATOR LOCATION
- 3 - LOW/REVERSE ACCUMULATOR

(49) Install low/reverse accumulator snap ring (Fig. 140).

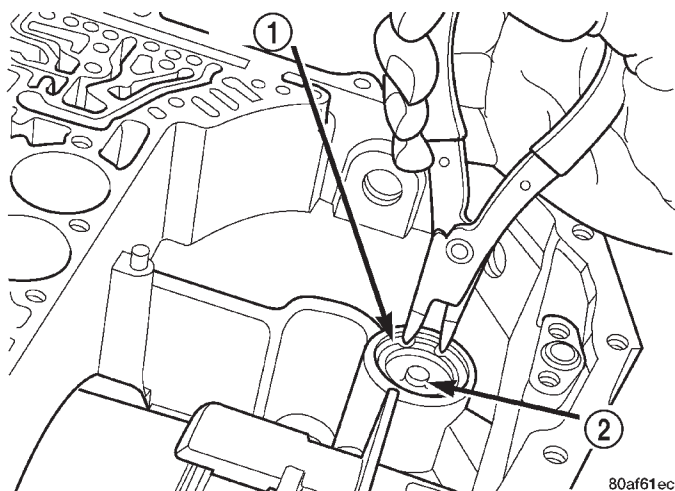


Fig. 140 Install Low/Reverse Accumulator Snap Ring

- 1 - SNAP RING
- 2 - PLUG

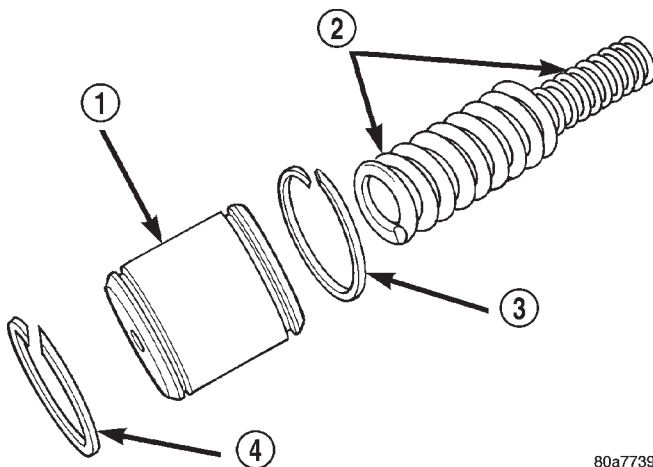
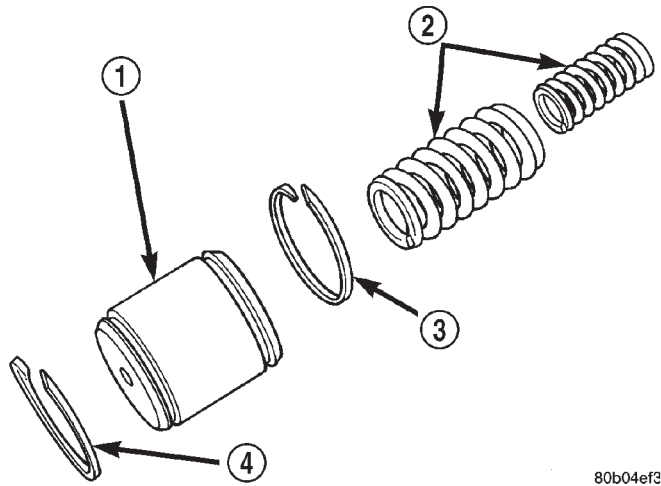


Fig. 142 Install Underdrive Accumulator and Springs

- 1 - ACCUMULATOR PISTON (UNDERDRIVE)
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING

42LE AUTOMATIC TRANSAXLE (Continued)



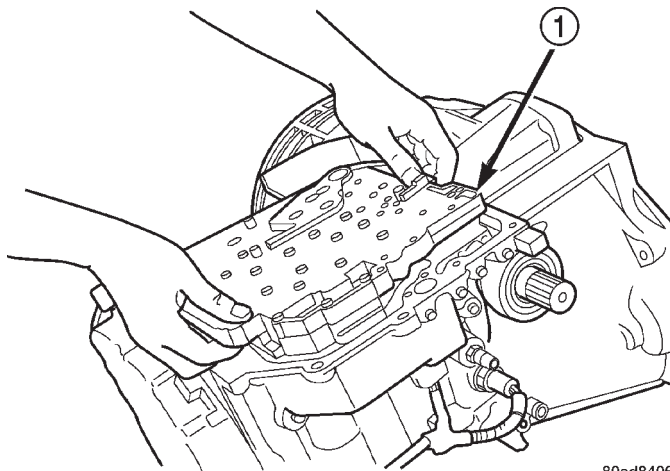
80b04ef3

Fig. 143 Install Overdrive Accumulator and Springs

- 1 - OVERDRIVE ACCUMULATOR PISTON
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING

CAUTION: Do not handle the valve body by the manual shaft. Damage could result.

(51) Install valve body into place as shown in (Fig. 144).



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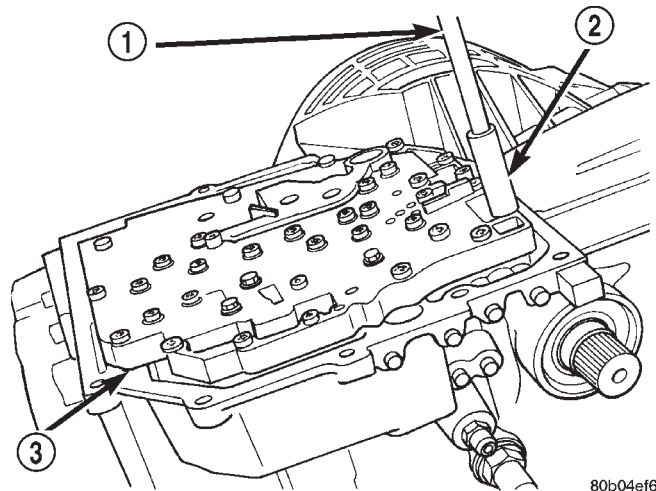
Fig. 144 Install Valve Body To Transaxle

- 1 - VALVE BODY

(52) Install seven (7) valve body-to-case bolts (Fig. 145) and torque to 12 N·m (105 in. lbs.).

(53) Install transaxle oil filter (Fig. 146).

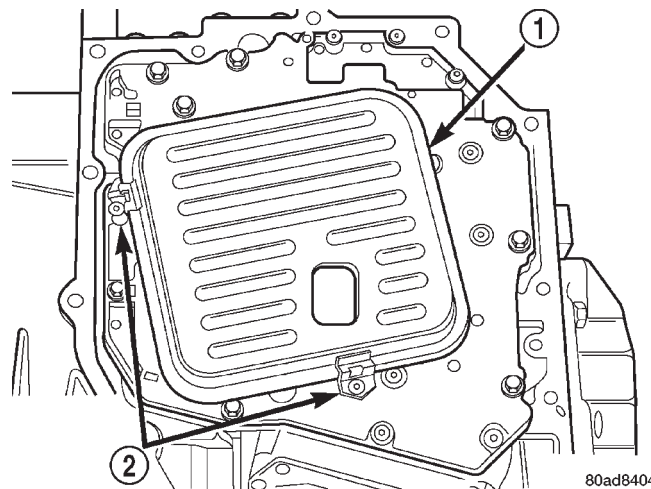
(54) Install transaxle oil pan (Fig. 147) with a bead of Mopar® ATF RTV (MS-GF41). Torque oil pan-to-case bolts to 23 N·m (17 ft. lbs.).



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Fig. 145 Install Valve Body Bolts (7)

- 1 - EXTENSION
- 2 - SOCKET
- 3 - VALVE BODY



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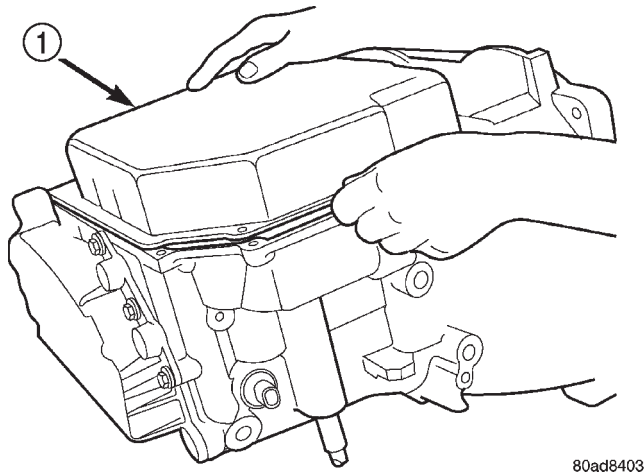
Fig. 146 Install Transaxle Oil Filter

- 1 - TRANSAXLE FILTER
- 2 - FILTER RETAINING CLIPS

Install both speed sensors from transaxle case (Fig. 148). Torque speed sensors to 27 N·m (20 ft. lbs.).

(55) As a final check of the transaxle, measure the input shaft end play. This will indicate when a #4 thrust plate change is required. The number 4 thrust plate is located behind the overdrive clutch hub. Attach a dial indicator to transaxle bell housing with its plunger seated against end of input shaft (Fig. 149). Move input shaft in and out to obtain end play reading. End play specifications are 0.13 to 0.64 mm (0.005 to 0.025 inch). If not within specifications, make the necessary thrust plate adjustment.

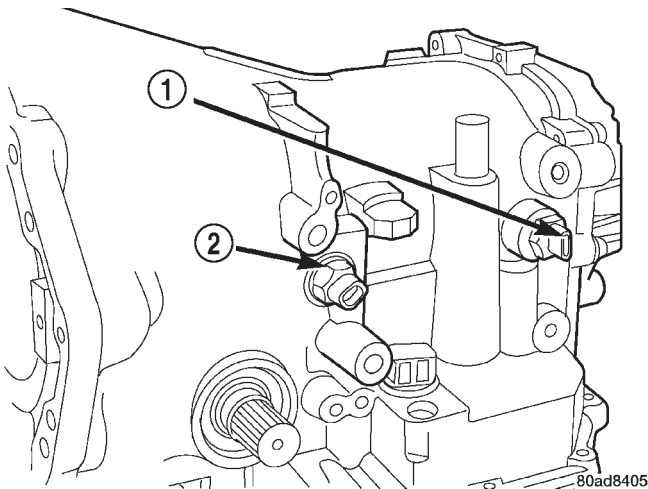
42LE AUTOMATIC TRANSAXLE (Continued)



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Fig. 147 Install Transaxle Oil Pan

1 - TRANSAXLE OIL PAN



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Fig. 148 Install Input and Output Speed Sensors

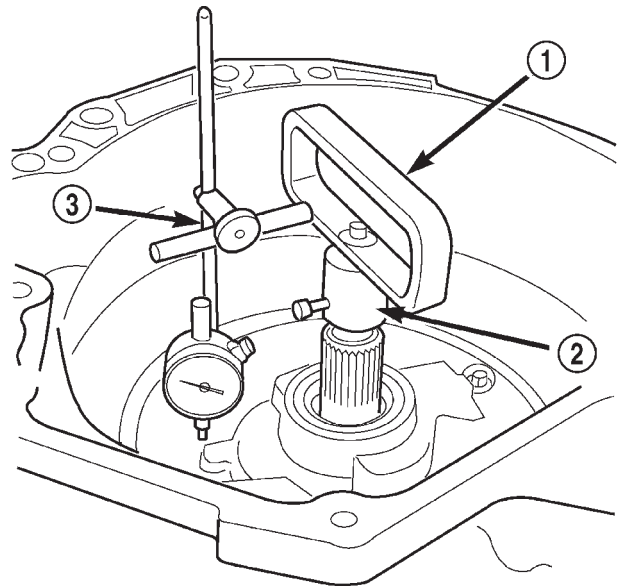
1 - OUTPUT SPEED SENSOR
2 - INPUT SPEED SENSOR

INSTALLATION

NOTE: If the Torque Converter assembly is being replaced, it is necessary to restart the TCC Break-In Strategy. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

(1) When installing transaxle, reverse the removal procedure.

CAUTION: To prevent damage to the structural collar, hand tighten all fasteners. This will ensure that the collar is flush against transmission and oil pan before torquing to specifications.



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Fig. 149 Measure Input Shaft End Play Using Tool 8266—Typical

1 - TOOL 8266-8
2 - TOOL 8266-2
3 - TOOL C-3339

(2) If the torque converter is being replaced, apply a light coating of grease to the crankshaft pilot hole.

(3) Inspect the drive plate for cracks before reinstalling transaxle. If any cracks are found replace the drive plate. Do not attempt to repair a cracked drive plate.

CAUTION: The bolts for the torque converter are a new short-headed design. Bolts from previous year vehicles cannot be used.

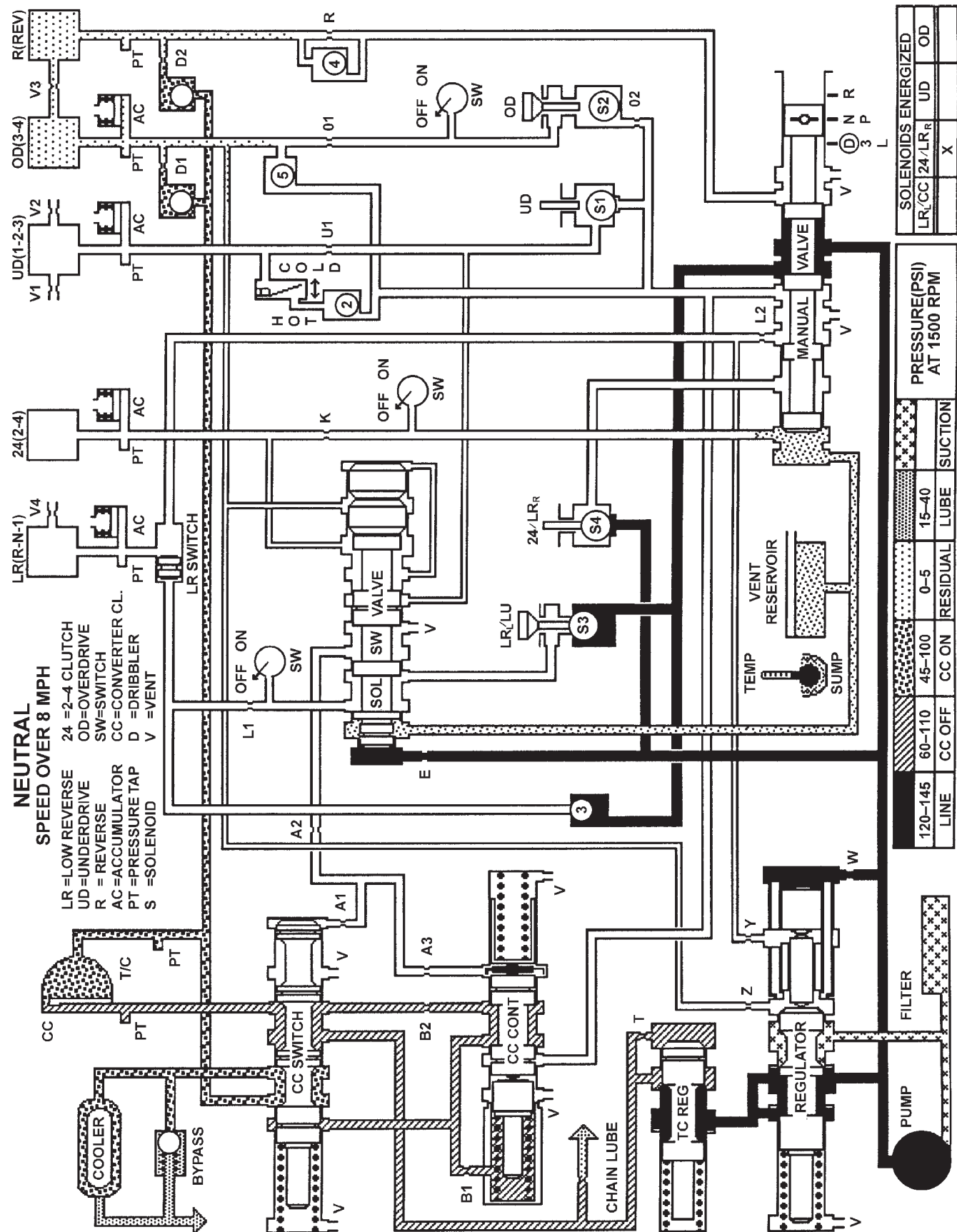
(4) Always use new torque converter to drive plate bolts.

NOTE: If the transaxle assembly, PCM, solenoid pack or clutch plates have been replaced, perform the Quick Learn Procedure. This program will allow the transmission control module to compensate for any parts replaced in the electronic transaxle system.

(5) Check and/or adjust gearshift cable.

(6) Refill transaxle with Mopar ATF+4 (Automatic Transmission Fluid) Type 9602.

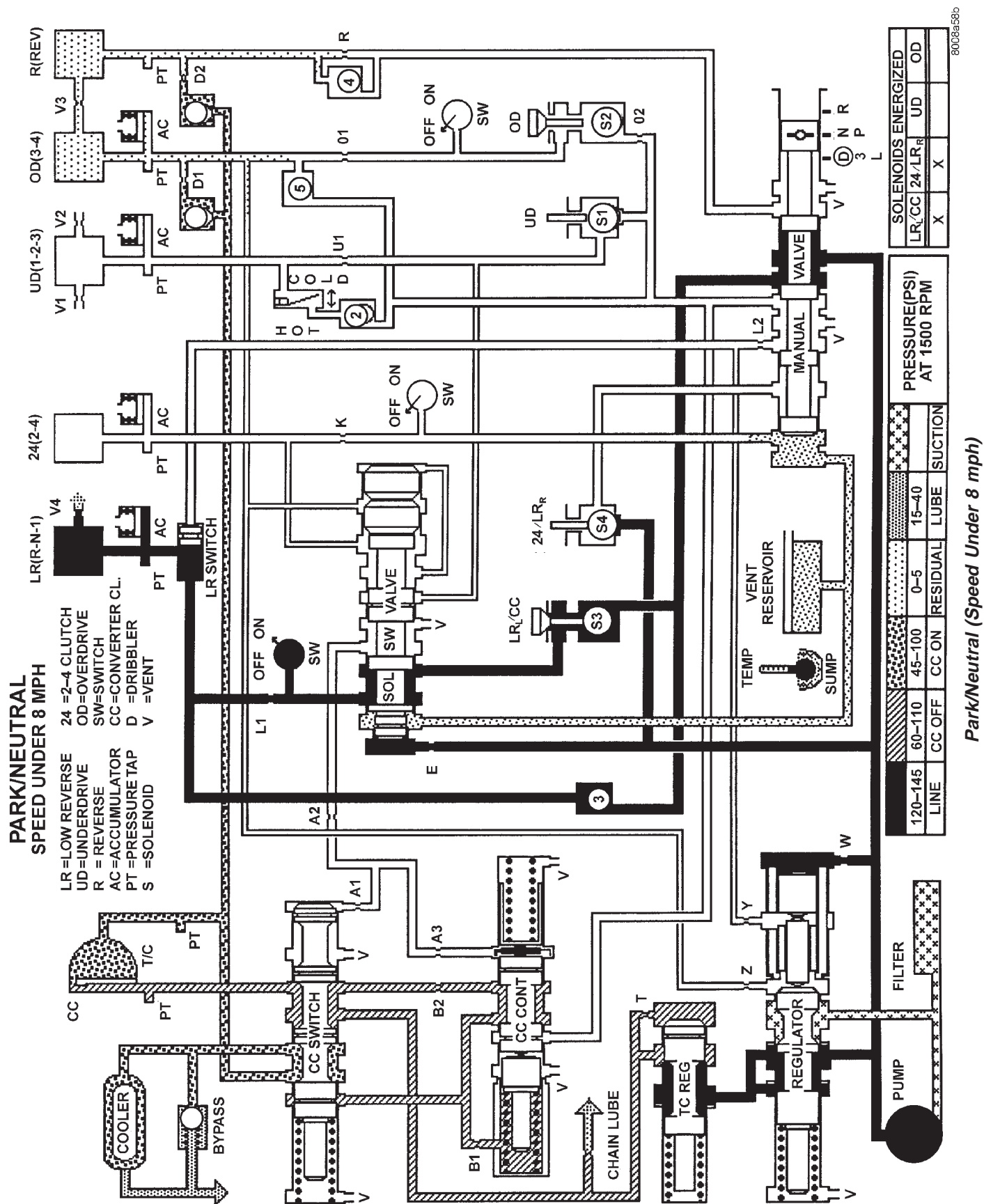
SCHEMATICS AND DIAGRAMS - 42LE TRANSAXLE



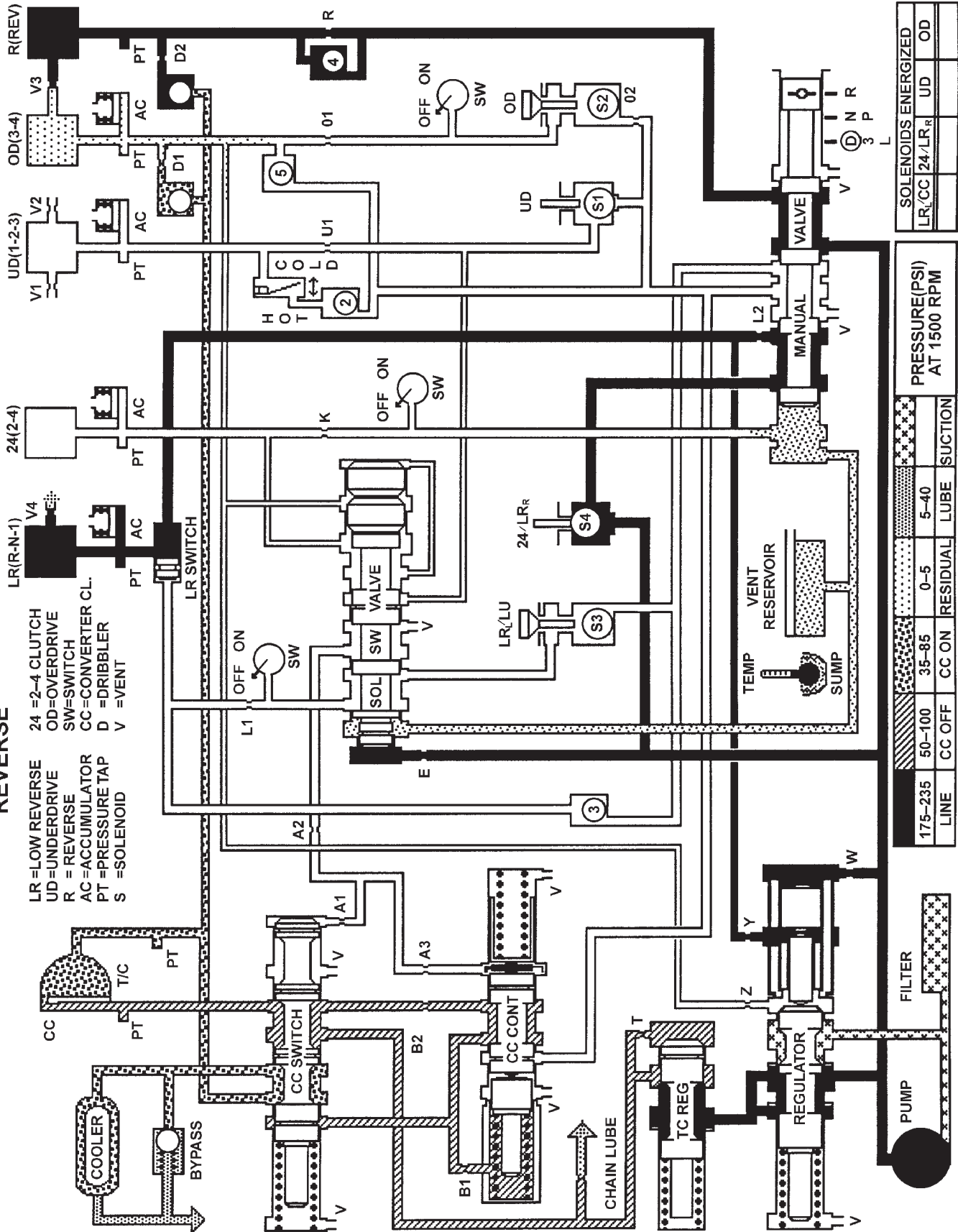
Neutral (Speed Over 8 mph)

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42LE AUTOMATIC TRANSAXLE (Continued)

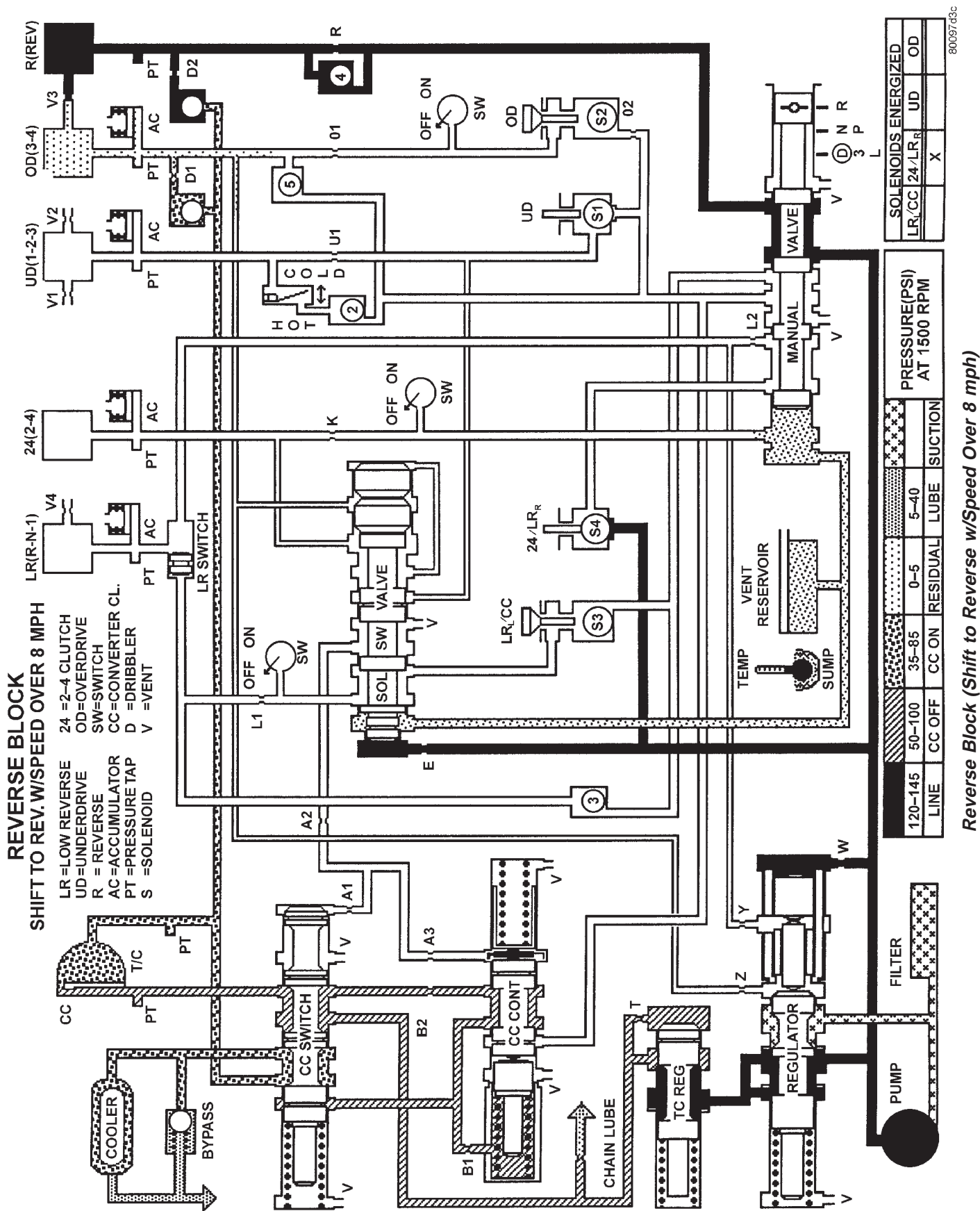


REVERSE



Reverse

42LE AUTOMATIC TRANSAXLE (Continued)



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FIRST GEAR



30097d3e

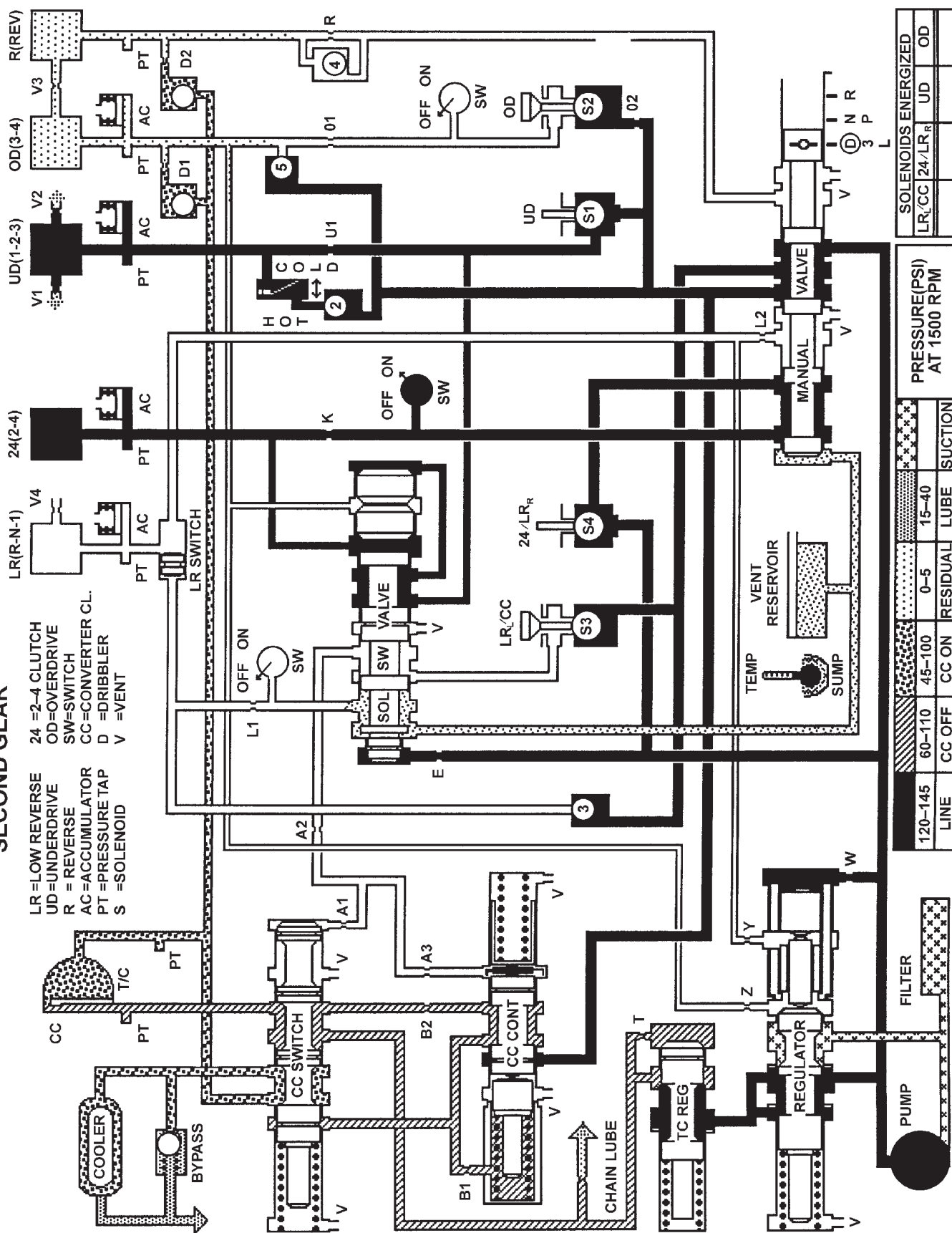
First Gear

42LE AUTOMATIC TRANSAXLE (Continued)

SECOND GEAR

LR=LOW REVERSE
UD=UNDERDRIVE
R = REVERSE
AC=ACCUMULATOR
PT=PRESSURE TAP
S =SOLENOID

24 =2-4 CLUTCH
OD=OVERDRIVE
SW=SWITCH
CC=CONVERTER CL.
D =DRIBBLER
V =VENT



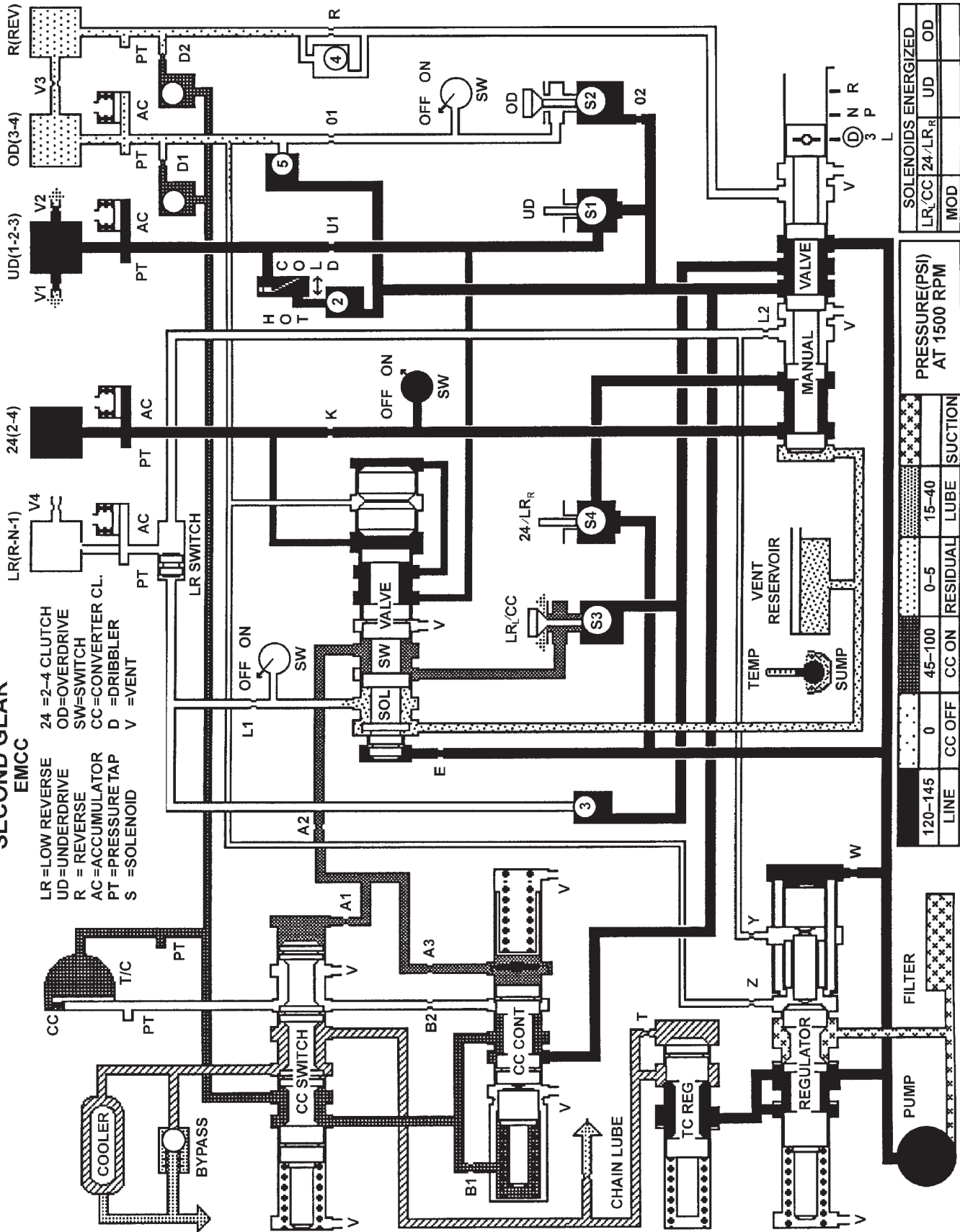
PRESSURE (PSI) AT 1500 RPM				SOLENOIDS ENERGIZED			
LINE	CC OFF	CC ON	RESIDUAL	LUBE	LR _L /CC	24/LR _R	UD OD
120-145	60-110	45-100	0-5	15-40			

Second Gear

80097d3f

SECOND GEAR EMCC

LR=LOW REVERSE
UD=UNDERDRIVE
R = REVERSE
AC=ACCUMULATOR
PT=PRESSURE TAP
S =SOLENOID
24 =2-4 CLUTCH
OD=OVERDRIVE
SW=SWITCH
CC=CONVERTER CL.
D =DRIBBLER
V =VENT



PRESSURE (PSI) AT 1500 RPM				SOLENOIDS ENERGIZED			
LINE	CC OFF	CC ON	RESIDUAL	LUBE	SUCTION	LR/CC	24/LR
120-145	0	45-100	0-5	15-40			
OD							
UD							
MOD							

Second Gear (EMCC)

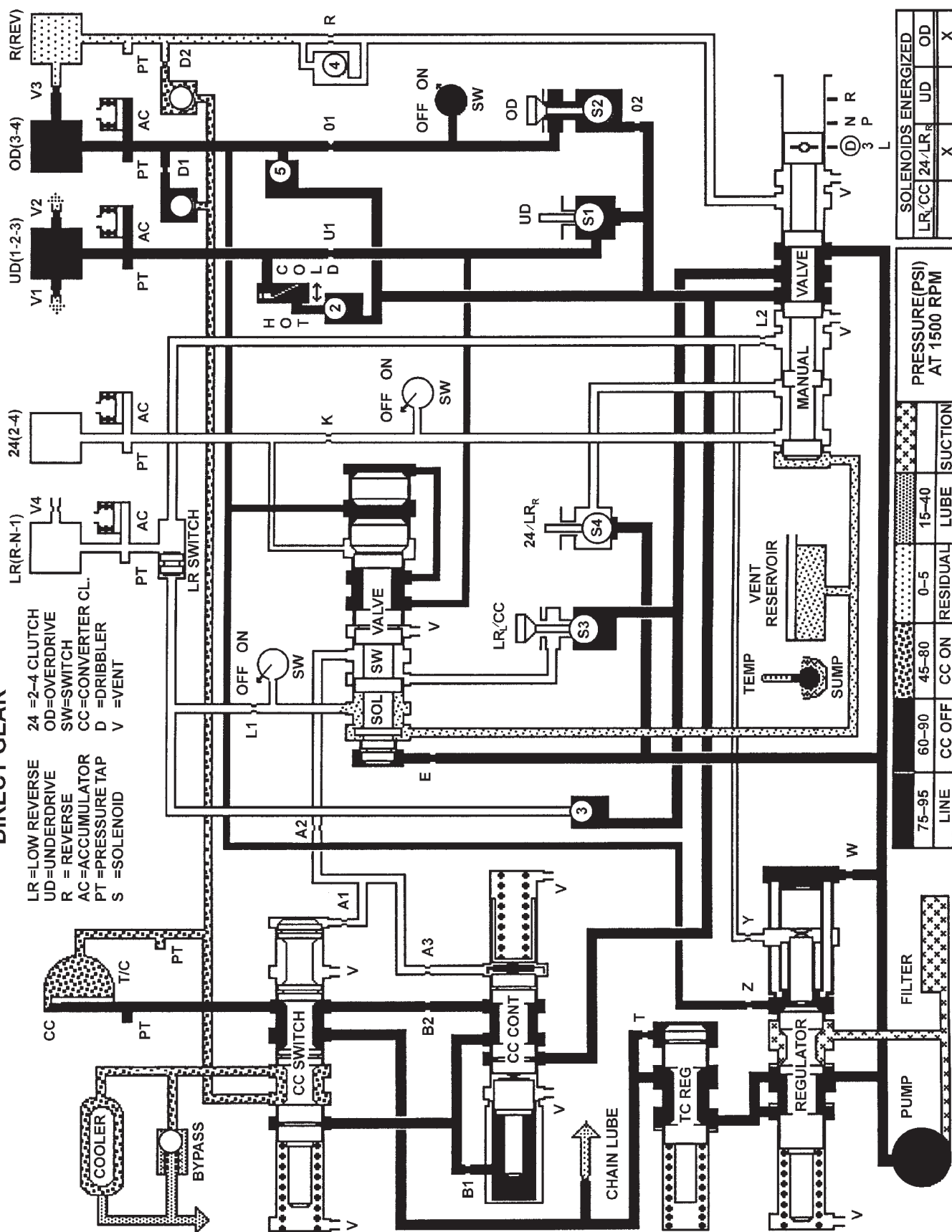
80097440

42LE AUTOMATIC TRANSAXLE (Continued)

DIRECT GEAR

LR=LOW REVERSE
UD=UNDERDRIVE
R = REVERSE
AC=ACCUMULATOR
PT =PRESSURE TAP
S =SOLENOID

24 =2-4 CLUTCH
OD=OVERDRIVE
SW=SWITCH
CC=CONVERTER CL.
D =DRIBBLER
V =VENT



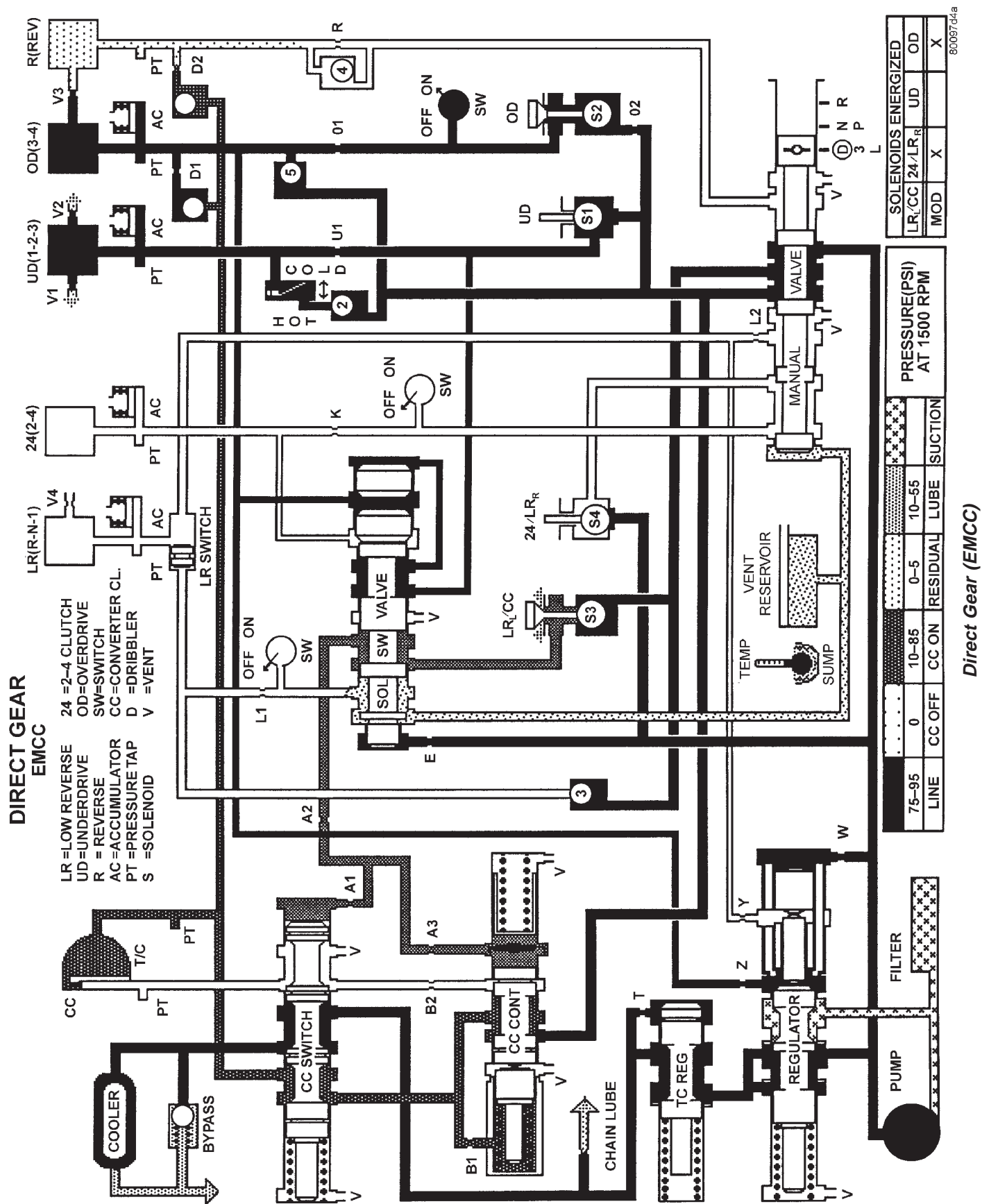
SOLENOIDS ENERGIZED			
LR/CC	24/LR _R	UD	OD
	X		X

PRESSURE (PSI) AT 1500 RPM			
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75-95	60-90	45-80	0-5
			15-40

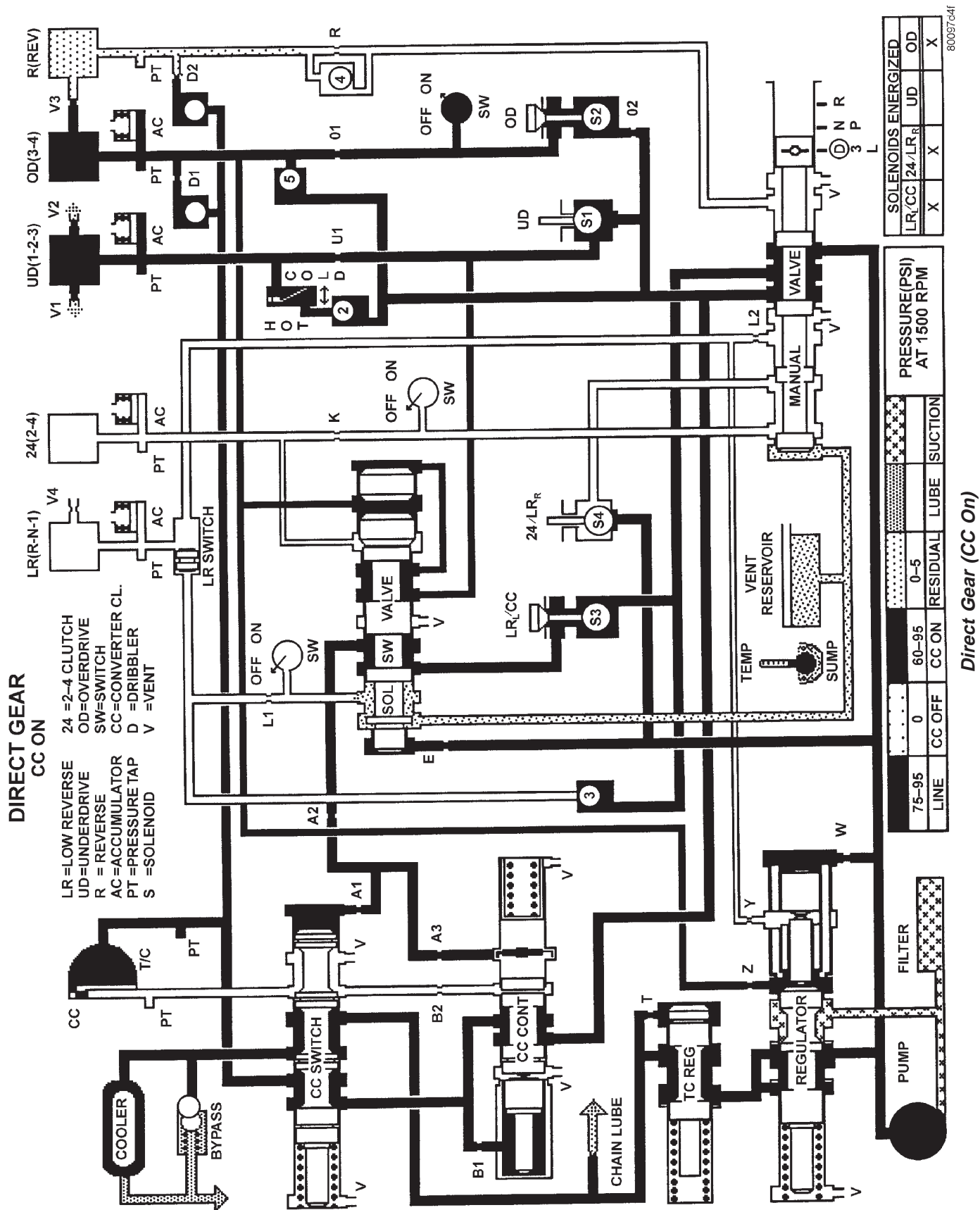
Direct Gear

80097443

42LE AUTOMATIC TRANSAXLE (Continued)



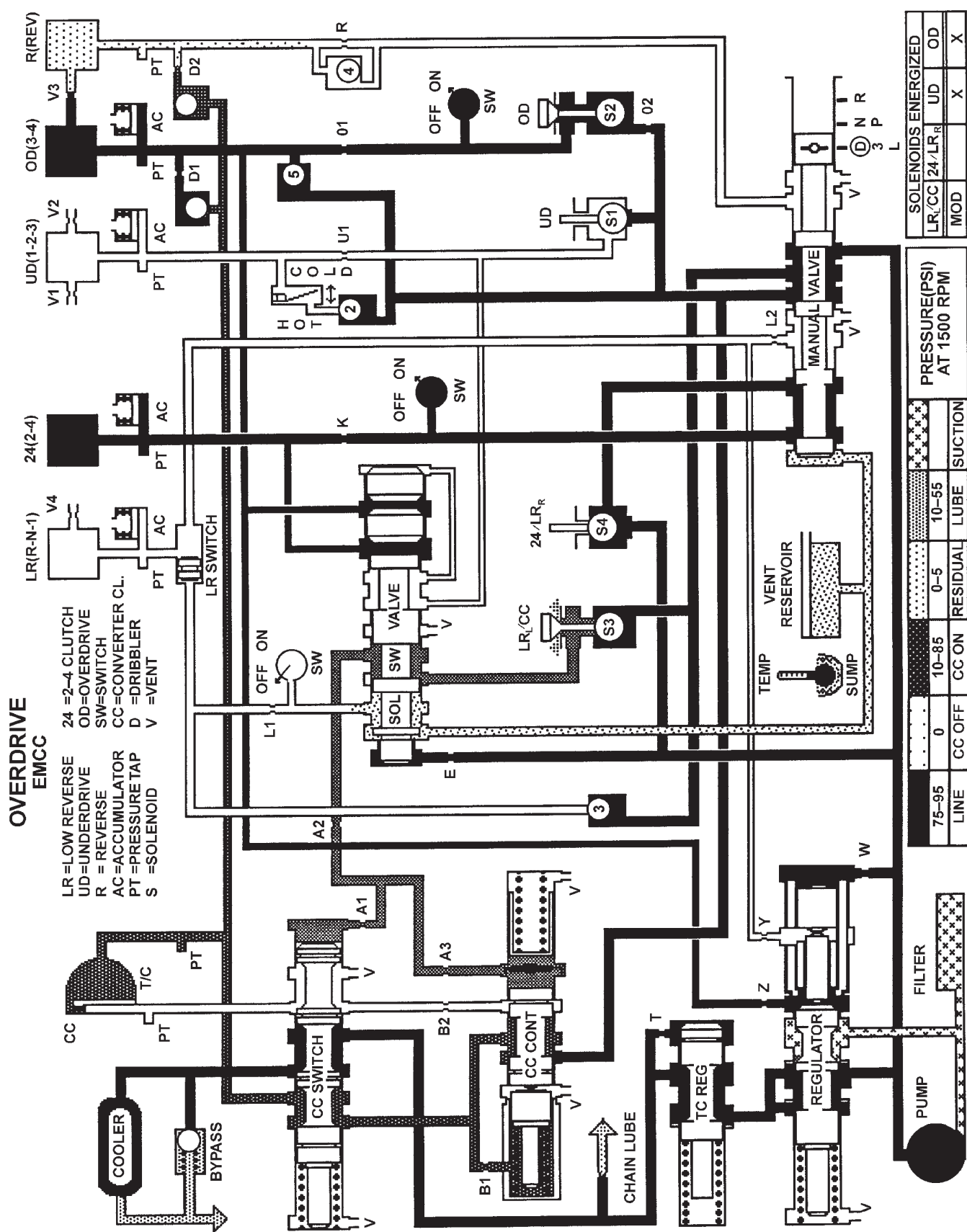
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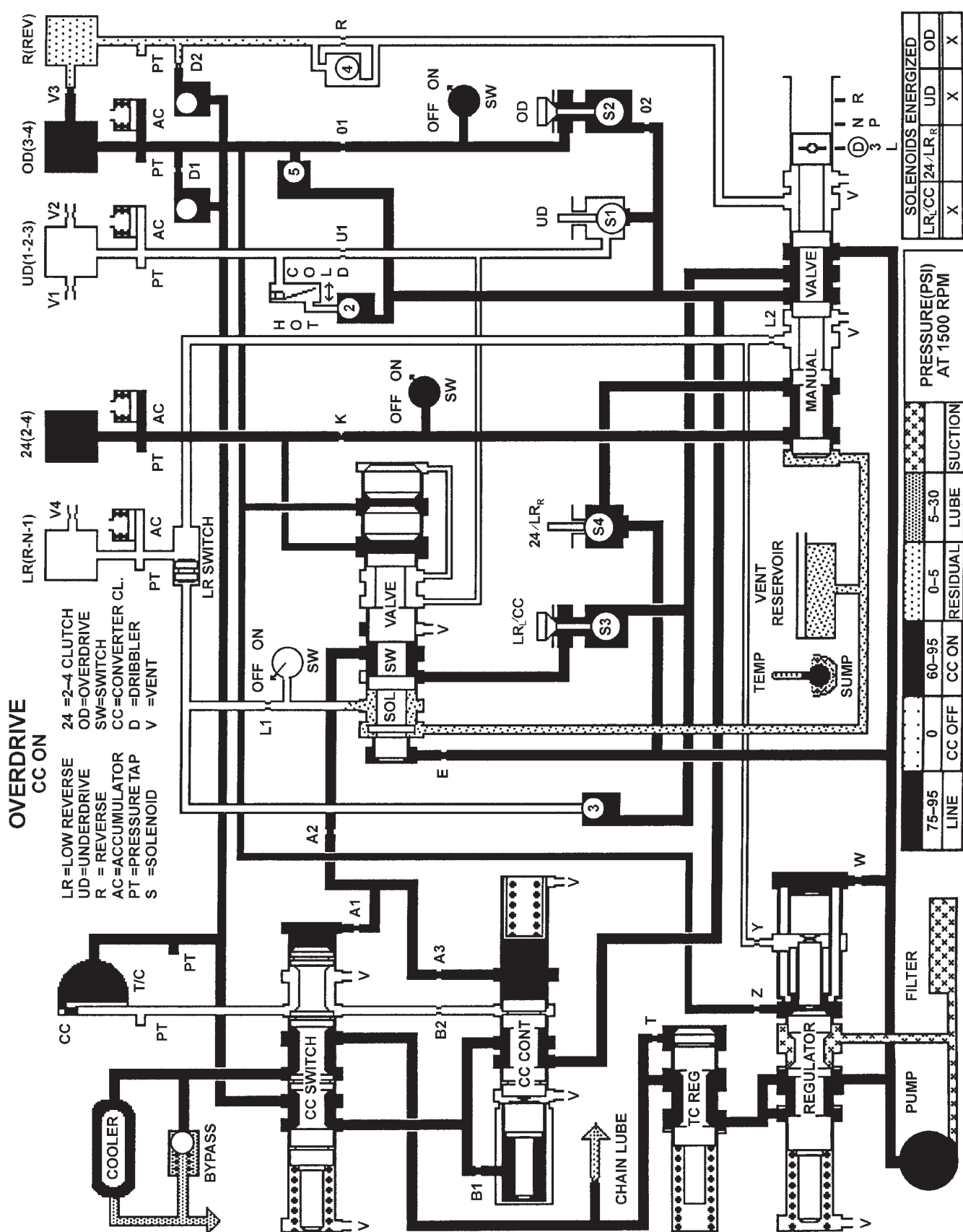
80097d50



42LE AUTOMATIC TRANSAXLE (Continued)



80097451



Overdrive (CC On)

42LE AUTOMATIC TRANSAXLE (Continued)

SPECIFICATIONS

42LE AUTOMATIC TRANSAXLE

GENERAL SPECIFICATIONS

Transaxle Type	Four-Speed Automatic, Longitudinally Mounted, Electronically Controlled, Fully Adaptive, Electronically Modulated Torque Converter, Integrated Differential with Unique Oil Sump
Lubrication Method	Pump (internal - external gear-type)
Cooling Method	Water Heat Exchanger and/or Air-to-Oil Heat Exchanger

GEAR RATIOS

1st Gear	2.84:1
2nd Gear	1.57:1
3rd Gear (Direct)	1.00:1
4th Gear (Overdrive)	0.69:1
Reverse Gear	2.21:1

BEARING PRELOAD (DRAG TORQUE)

Description	Metric	Standard
Differential Assembly	0.8-3.4 N·m	7-30 in. lbs.
Output Shaft	0.22-0.903 N·m	1-8 in. lbs.
Transfer Shaft	0.22-0.903 N·m	1-8 in. lbs.
Overall Drag at Output Hub	1.12-6.77 N·m	10-60 in. lbs.

CLUTCH PACK

Description	Metric	Standard
Low/Reverse Clutch (Select Reaction Plate)	0.89-1.04 mm	0.035-0.060 in.
Two/Four Clutch (No Select)	0.76-2.64 mm	0.030-0.104 in.
Reverse Clutch (Select Snap Ring)	0.89-1.37 mm	0.035-0.054 in.
Overdrive Clutch (No Select)	1.07-3.25 mm	0.042-0.128 in.
Underdrive Clutch (Select Reaction Plate)	0.94-1.50 mm	0.037-0.059 in.

DIFFERENTIAL

Description	Metric	Standard
Backlash	0.14-0.27 mm	0.0045-0.0105 in.
Assembly Preload	0.8-3.4 N·m	7-30 in. lbs.

42LE AUTOMATIC TRANSAXLE (Continued)

FLUID, TRANSMISSION & DIFFERENTIAL

Location	Type	Metric Capacity	Standard Capacity
Transmission Sump	Mopar® ATF+4 Type 9602	9.29L	9.81 Qts.
Differential Sump	Mopar® Fuel Saving 75W-90 Petroleum-Based Hypoid Gear Lube	0.95L	32 oz.

INPUT SHAFT

Description	Metric	Standard
End Play	0.12-0.63 mm	0.005-0.025 in.

OIL PUMP CLEARANCES

DESCRIPTION	METRIC	STANDARD
Outer Gear-to-Crescent	0.060-0.298 mm	0.0023-0.0117 in.
Inner Gear-to-Crescent	0.093-0.385 mm	0.0036-0.0151 in.
Outer Gear-to-Pocket	0.089-0.202 mm	0.0035-0.0079 in.
Outer Gear Side Clearance	0.020-0.046 mm	0.0008-0.0018 in.
Inner Gear Side Clearance	0.020-0.046 mm	0.0008-0.0018 in.

TRANSFER SYSTEM

Description	Metric	Standard
Sprocket Height Variance	± 0.457 mm	± 0.018 in.

TORQUE SPECIFICATIONS

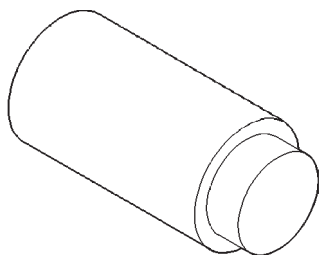
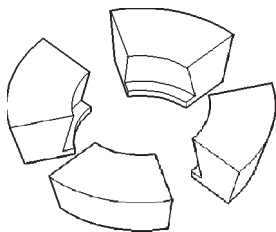
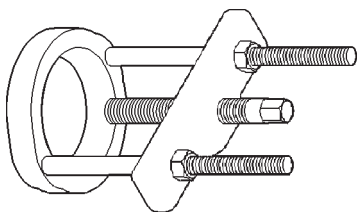
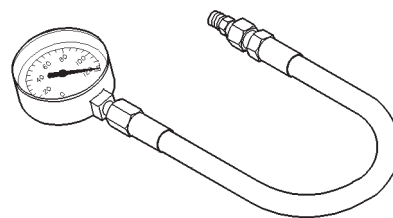
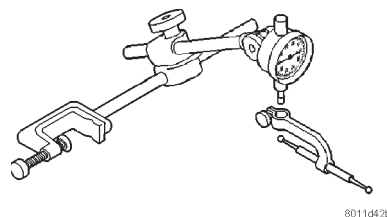
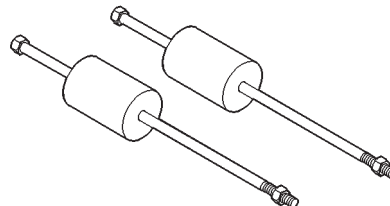
Description	N-m	Ft. Lbs.	In. Lbs.
Bolt, Converter-to-Driveplate	88	65	
Bolt, Differential Assembly Partial	8		71
Bolt, Differential Case Cover	28		250
Bolt, Differential Ring Gear-to-Case	95	70	
Bolt, Differential Vent Baffle	5		45
Bolt, Driveplate-to-Crankshaft	95	70	
Bolt, End Cover-to-Case	28		250
Bolt, Fluid Filter-to-Valve Body	5		45
Bolt, L/R Clutch Retainer-to-Case	5		45
Bolt, Main Sump Vent	5		45
Bolt, Manual Valve Lever-to-Manual Valve	5		45
Bolt, Oil Pan-to-Case	23	17	
Bolt, Oil Pump-to-Case	28		250
Bolt, Park Sprag Retainer	5		45
Bolt, Reaction Shaft Support Halves	28		250
Bolt, Snubber	5		45

42LE AUTOMATIC TRANSAXLE (Continued)

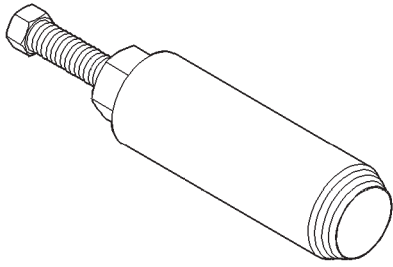
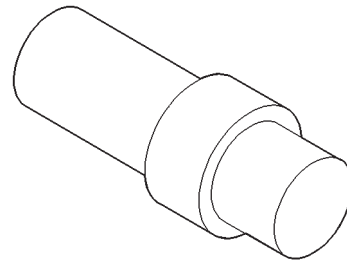
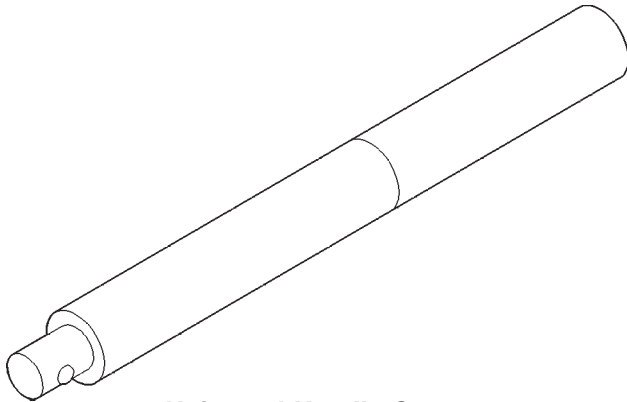
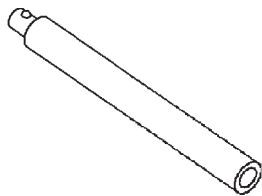
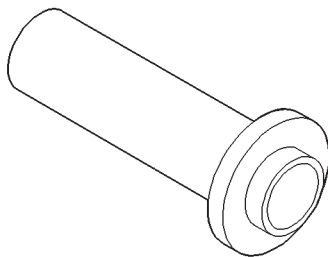
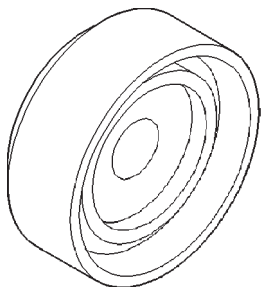
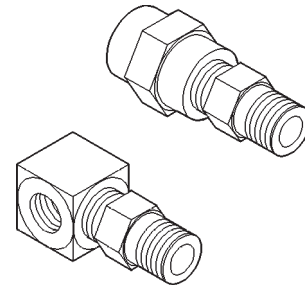
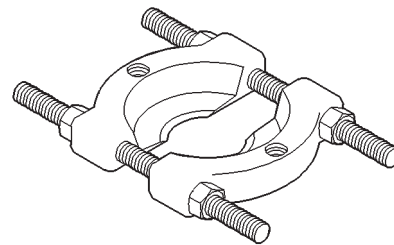
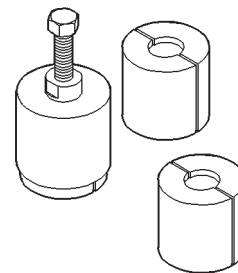
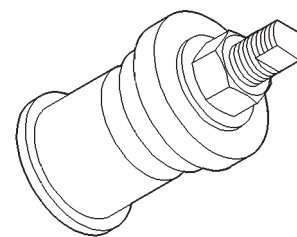
Description	N-m	Ft. Lbs.	In. Lbs.
Bolt, Solenoid/Pressure Switch Assy-to-Valve Body	6		53
Bolt, Valve Body-to-Case	12		105
Bolt, Valve Body-to-Transfer Plate	5		45
Connector, Solenoid/Pressure Switch Assembly	6		53
Fitting, Cooler Line	18		155
Nut, Output Shaft	271	200	
Nut, Transfer Shaft Stake	271	200	
Plug, Differential Drain	7		62
Plug, Differential Fill	47	35	
Plug, Pressure Tap	6		53
Sensor, Input Speed-to-Case	27	20	
Sensor, Output Speed-to-Case	27	20	
Vent, Differential	11		100
Vent, Main Sump	11		100

SPECIAL TOOLS

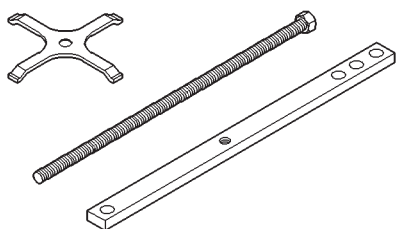
42LE AUTOMATIC TRANSAXLE

**Puller Press Extension C-293-3****Adapter Blocks C-293-48****Puller Press C-293-PA****Pressure Gauge (High) C-3293SP****Dial Indicator C-3339****Slide Hammer C-3752**

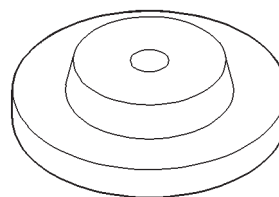
42LE AUTOMATIC TRANSAXLE (Continued)

**Seal Puller C-3981B****Adapter C-4996****Universal Handle C-4171****Handle Extension C-4171-2****Seal Installer C-4193A****Installer C-4340****Adapter Set L-4559****Bearing Splitter P-334****Puller Set 5048****Installer 5050A**

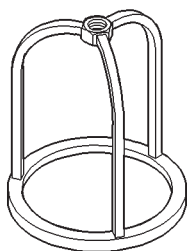
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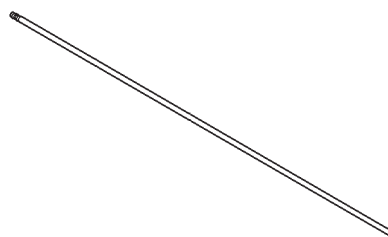
Compressor 5058A



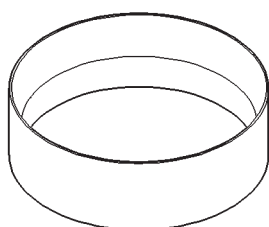
Disk 6057



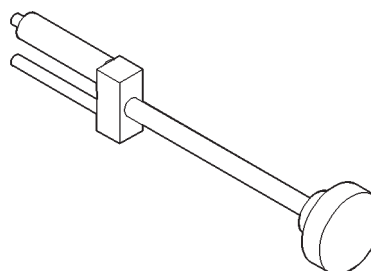
Compressor 5059-A



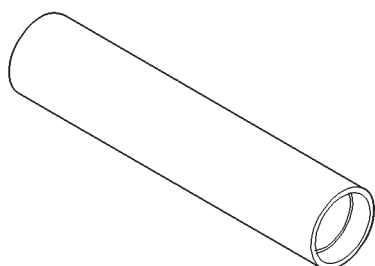
Tip 6268



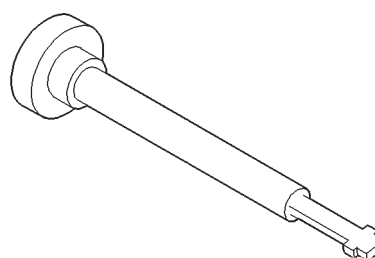
Installer 5067



Remover/Installer 6301

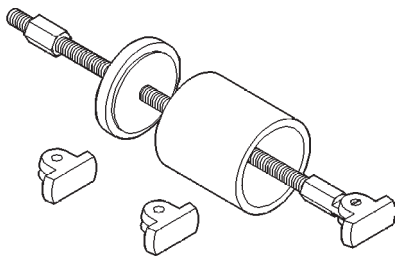
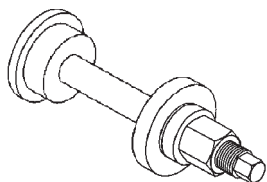
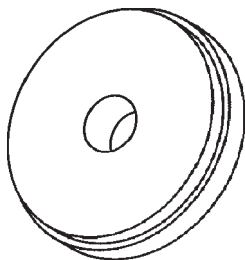
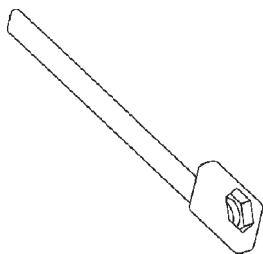
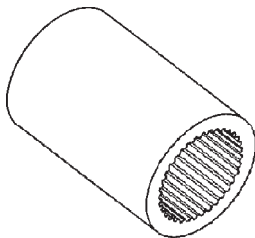
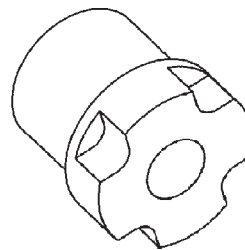
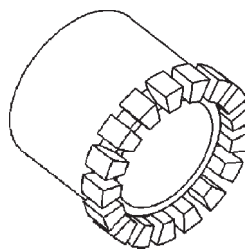
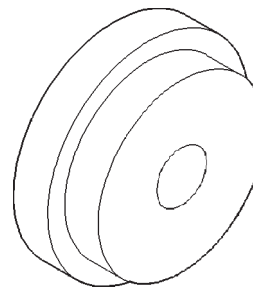
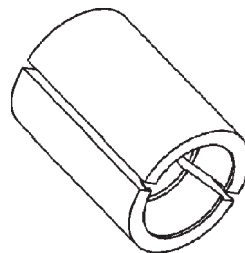
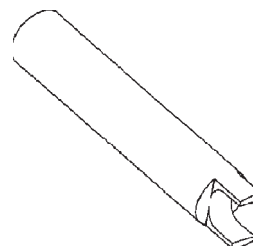


Installer 6052

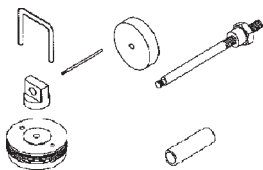


Remover/Installer 6302

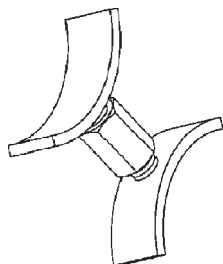
42LE AUTOMATIC TRANSAXLE (Continued)

**Remover 6310****Installer 6494****Remover 6495****Wrench 6497****Wrench 6498****Remover 6502B****Wrench 6503****Installer 6522****Puller Jaws 6545****Turning Fork 6548**

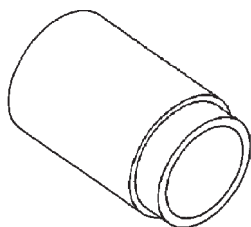
42LE AUTOMATIC TRANSAXLE (Continued)



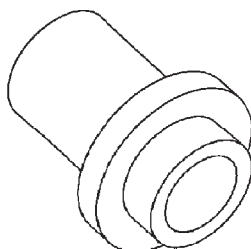
Pinion Gauge Tool Set 6549



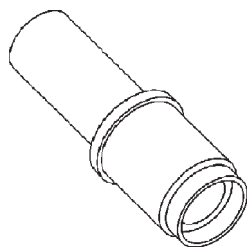
Remover 6550



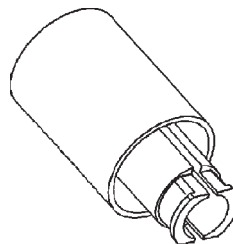
Installer 6558



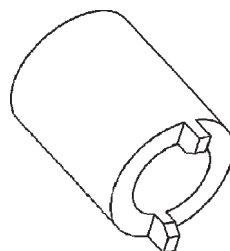
Installer 6560



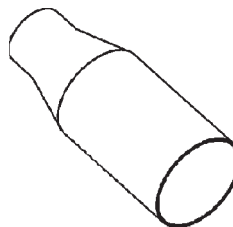
Seal Installer 6567A



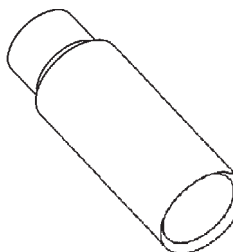
Remover 6577



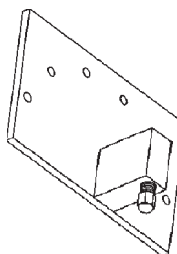
Staking Tool 6589



Seal Protector 6591

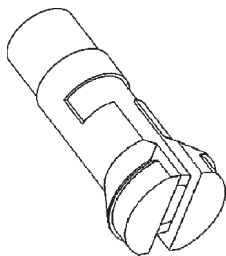
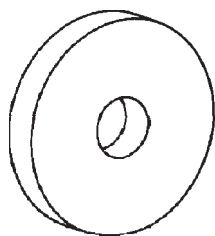
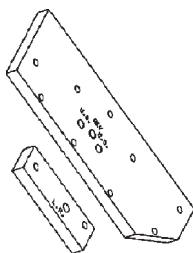
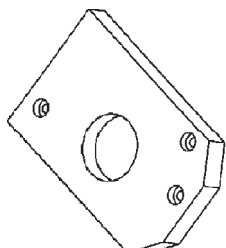
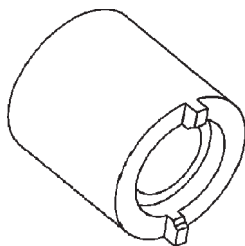
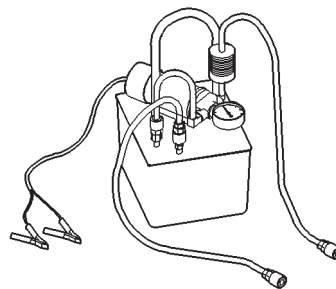
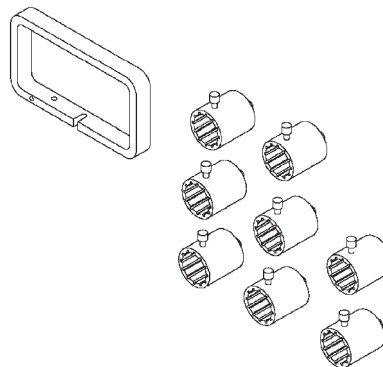
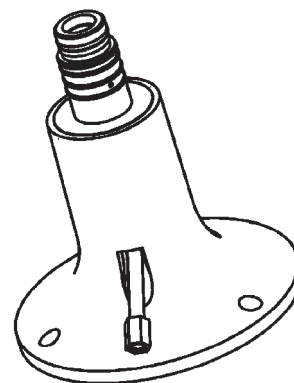
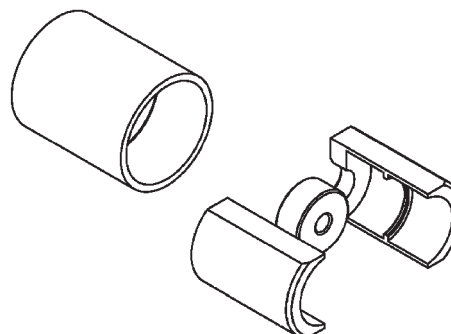


Seal Protector 6592



Fixture 6595

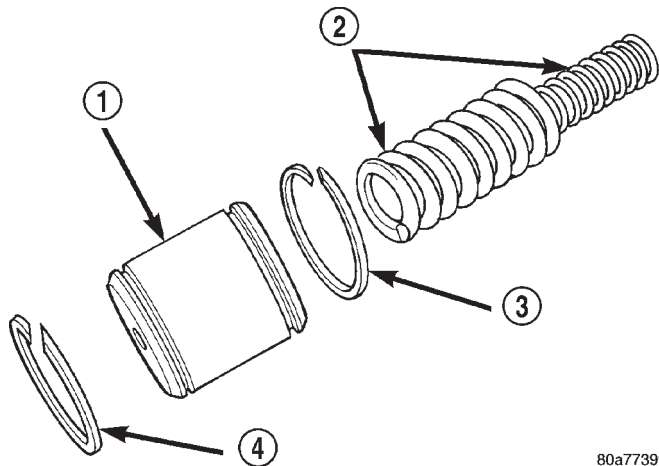
42LE AUTOMATIC TRANSAXLE (Continued)

**Remover 6596****Remover 6597****Plate Set 6599****Support Plate 6618A****Staking Tool 6639****Cooler Flusher 6906****End Play Set 8266****Pressure Fixture 8391****Remover 8420A**

ACCUMULATOR

DESCRIPTION

The 42LE underdrive, overdrive, low/reverse, and 2/4 clutch hydraulic circuits each contain an accumulator. An accumulator assembly typically consists of a piston, seals, return spring(s), and a cover or plug (Fig. 150).



80a77399

Fig. 150 Accumulator Assembly—Typical

- 1 - ACCUMULATOR PISTON (UNDERDRIVE)
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING

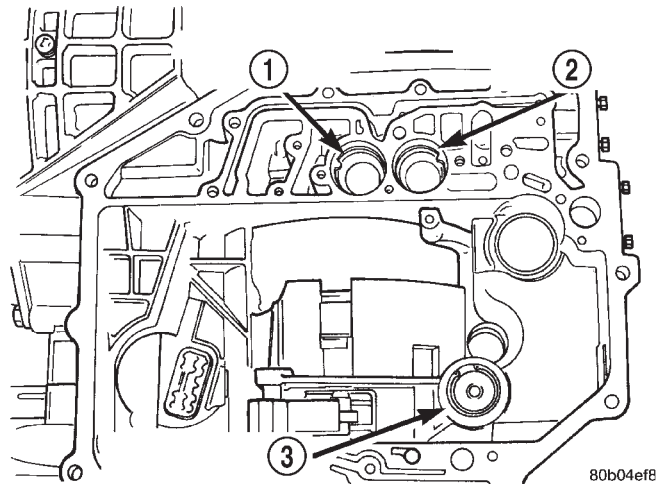
The overdrive and underdrive accumulators are located within the transaxle case, and are retained by the valve body (Fig. 151).

The low reverse accumulator (Fig. 151) is also located within the transaxle case, but the assembly is retained by a cover and a snap-ring.

The 2/4 accumulator is located in the valve body. It is retained by a cover and retaining screws (Fig. 152).

OPERATION

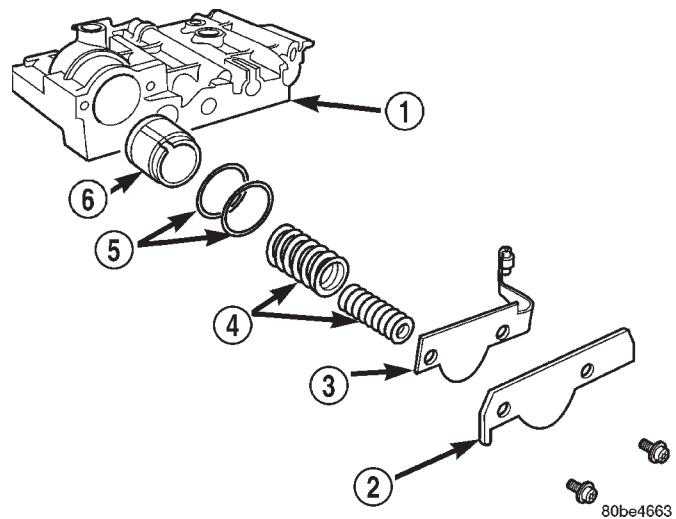
The function of an accumulator is to cushion the application of a frictional clutch element. When pressurized fluid is applied to a clutch circuit, the application force is dampened by fluid collecting in the respective accumulator chamber against the piston and spring(s). The intended result is a smooth, firm clutch application.



80b04ef8

Fig. 151 Overdrive, Underdrive and Low/Reverse Accumulator Location

- 1 - OVERDRIVE ACCUMULATOR LOCATION
- 2 - UNDERDRIVE ACCUMULATOR LOCATION
- 3 - LOW/REVERSE ACCUMULATOR



80be4663

Fig. 152 2/4 Accumulator Assembly

- 1 - VALVE BODY
- 2 - RETAINER PLATE
- 3 - DETENT SPRING
- 4 - SPRINGS
- 5 - SEALS
- 6 - PISTON

AUTOSTICK SWITCH

DESCRIPTION

Autostick is a driver-interactive transmission feature that offers manual gear shifting capability to provide you with more control. Autostick allows you to maximize engine braking, eliminate undersirable upshifts and downshifts, and improve overall vehicle performance. This system can also provide you with more control during passing, city driving, cold slippery conditions, mountain driving, trailer towing, and many other situations.

OPERATION

Autostick is a driver-interactive transaxle feature that offers manual gear shifting capability. When the shifter is moved into the Autostick position, the transaxle remains in whatever gear it was using before Autostick was activated. Moving the shifter to the left (towards the driver) causes a downshift and moving to the right (towards the passenger) causes an upshift. The instrument cluster will illuminate the selected gear. The vehicle can be launched in 1st, 2nd, or 3rd gear while in the Autostick mode. The speed control is operable in 3rd and 4th gear Auto-

stick mode. Speed control will be deactivated if the transaxle is shifted to 2nd gear. Shifting into OD position cancels the Autostick mode, and the transaxle resumes the OD shift schedule.

DEACTIVATION

The autostick feature will be deactivated if one of the following conditions occur:

- DTC P0706–Check Shifter Signal—usually accompanied by all PRNDL lights turning on in Park and Neutral. This will result in a DTC P0706 if three such errors are detected after any one “key-on”.
- DTC P0951–Autostick Input Circuit
- DTC P1797–Manual Shift Overheat–(Transmission oil temperature >275° F) or (Engine coolant temperature >255° F).

Acceptable powertrain temperature must be achieved to reactivate Autostick after a high temperature fault:

- Transmission Oil Temperature <255° F
- Engine Coolant Temperature <240° F

AUTOMATIC OVERRIDES

For safety, durability, and driveability, some shifts are executed automatically or prevented.

AUTOMATIC SHIFTS WILL OCCUR UNDER THE FOLLOWING CONDITIONS

TYPE OF SHIFT	APPROXIMATE SHIFT POINT	
	2.7L	3.5L
4-3 coast downshift	13 mph	13 mph
3-2 coast downshift	9 mph	9 mph
2-1 coast downshift	5 mph	5 mph
1-2 upshift	6300 engine rpm	6600 engine rpm
2-3 upshift	6300 engine rpm	6600 engine rpm
4-3 kickdown shift	13-47 mph w/sufficient throttle	13-47 mph w/sufficient throttle

MANUAL SHIFTS ARE NOT PERMITTED UNDER THE FOLLOWING CONDITIONS

TYPE OF SHIFT	APPROXIMATE SHIFT POINT
3-4 upshift	Below 15 mph
3-2 downshift	Above 74 mph @ closed throttle or 70 mph otherwise
2-1 downshift	Above 41 mph @ closed throttle or 38 mph otherwise

BEARINGS

ADJUSTMENTS

BEARING ADJUSTMENT PROCEDURES

Take extreme care when removing and installing bearing cups and cones. **Use only an arbor press for installation**, as a hammer may not properly align the bearing cup or cone. Burrs or nicks on the bearing seat will give a false end play reading, while gauging for proper shims. Improperly seated bearing cup and cones are subject to low-mileage failure.

Bearing cups and cones should be replaced if they show signs of pitting or heat distress.

If distress is seen on either the cup or bearing rollers, both cup and cone must be replaced.

NOTE: Bearing end play and drag torque specifications must be maintained to avoid premature bearing failures.

Used (original) bearing may lose up to 50 percent of the original drag torque after break-in.

NOTE: All bearing adjustments must be made with no other component interference or gear intermesh, except the transfer gear bearing.

Oil all bearings before checking turning torque.

MASTER SHIM CHART

Use this chart as a reference guide when selecting the shims needed for the:

- Transfer Shaft
- Output Shaft
- Output Sprocket
- Pinion

BEARINGS (Continued)

TRANSFER SHAFT REAR SHIMS	
3.53 - 3.55	4.13 - 4.15
3.56 - 3.58	4.16 - 4.18
3.59 - 3.61	4.19 - 4.21
3.62 - 3.64	4.22 - 4.24
3.65 - 3.67	4.25 - 4.27
3.68 - 3.70	4.28 - 4.30
3.71 - 3.73	4.31 - 4.33
3.74 - 3.76	4.34 - 4.36
3.77 - 3.79	4.37 - 4.39
3.80 - 3.82	4.40 - 4.42
3.83 - 3.85	4.43 - 4.45
3.86 - 3.88	4.46 - 4.48
3.89 - 3.91	4.49 - 4.51
3.92 - 3.94	4.52 - 4.54
3.95 - 3.97	4.55 - 4.57
3.98 - 4.00	4.58 - 4.60
4.01 - 4.03	4.61 - 4.63
4.04 - 4.06	4.64 - 4.66
4.07 - 4.09	4.67 - 4.69
4.10 - 4.12	

PINION HEAD SHIMS	
0.681 - 0.707	0.924 - 0.950
0.708 - 0.734	0.951 - 0.977
0.735 - 0.761	0.978 - 1.004
0.762 - 0.788	1.005 - 1.031
0.789 - 0.815	1.032 - 1.058
0.816 - 0.842	1.059 - 1.085
0.843 - 0.869	1.086 - 1.112
0.870 - 0.896	1.113 - 1.139
0.897 - 0.923	

OUTPUT SHAFT REAR SHIMS	
5.17 - 5.19	5.62 - 5.64
5.20 - 5.22	5.65 - 5.67
5.23 - 5.25	5.68 - 5.70
5.26 - 5.28	5.71 - 5.73
5.29 - 5.31	5.74 - 5.76
5.32 - 5.34	5.77 - 5.79
5.35 - 5.37	5.80 - 5.82
5.38 - 5.40	5.83 - 5.85
5.41 - 5.43	5.86 - 5.88
5.44 - 5.46	5.89 - 5.91
5.47 - 5.49	5.92 - 5.94
5.50 - 5.52	5.95 - 5.97
5.53 - 5.55	5.98 - 6.00
5.56 - 5.58	6.01 - 6.03
5.59 - 5.61	6.04 - 6.06

OUTPUT SPROCKET SPACER SHIMS	
2.64 - 2.84	3.48 - 3.68
2.85 - 3.05	3.69 - 3.89
3.06 - 3.26	3.90 - 4.10
3.27 - 3.47	4.11 - 4.31

DRIVING CLUTCHES

DESCRIPTION

Three hydraulically applied input clutches are used to drive planetary components. The underdrive, overdrive, and reverse clutches are considered input clutches and are contained within the input clutch assembly (Fig. 153). The input clutch assembly also contains:

- Input shaft
- Input hub
- Clutch retainer
- Underdrive piston
- Overdrive/reverse piston
- Overdrive hub
- Underdrive hub

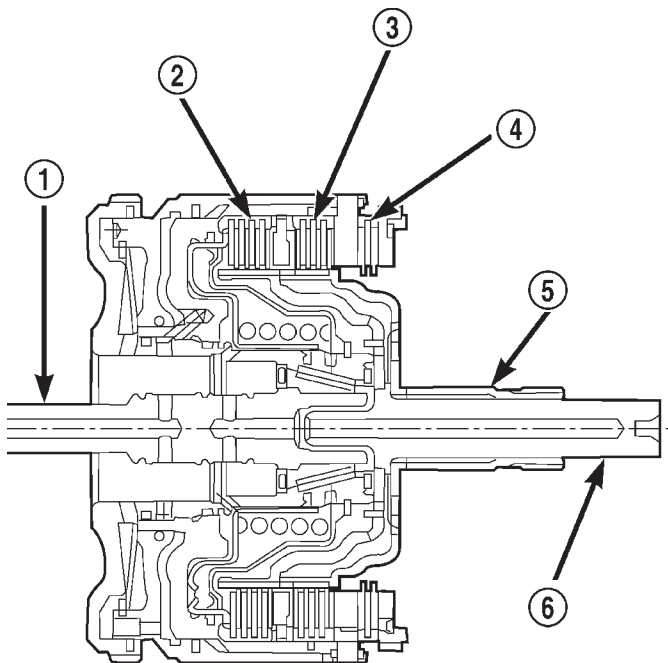


Fig. 153 Input Clutch Assembly

- 1 - INPUT SHAFT
- 2 - UNDERDRIVE CLUTCH
- 3 - OVERDRIVE CLUTCH
- 4 - REVERSE CLUTCH
- 5 - OVERDRIVE SHAFT
- 6 - UNDERDRIVE SHAFT

OPERATION

The three input clutches are responsible for driving different components of the planetary geartrain.

NOTE: (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - DIAGNOSIS AND TESTING) for a collective view of which clutch elements are applied at each position of the selector lever.

UNDERDRIVE CLUTCH

The underdrive clutch is hydraulically applied in first, second, and third (direct) gears by pressurized fluid against the underdrive piston. When the underdrive clutch is applied, the underdrive hub drives the rear sun gear.

OVERDRIVE CLUTCH

The overdrive clutch is hydraulically applied in third (direct) and overdrive gears by pressurized fluid against the overdrive/reverse piston. When the overdrive clutch is applied, the overdrive hub drives the front planet carrier.

REVERSE CLUTCH

The reverse clutch is hydraulically applied in reverse gear only by pressurized fluid against the overdrive/reverse piston. When the reverse clutch is applied, the front sun gear assembly is driven.

FINAL DRIVE

DESCRIPTION

The 42LE differential is a conventional open design. It consists of a hypoid type ring and pinion set, and a differential case. The differential case consists of pinion and side gears, and a pinion shaft. The differential case is supported in the transaxle by tapered roller bearings (Fig. 154).

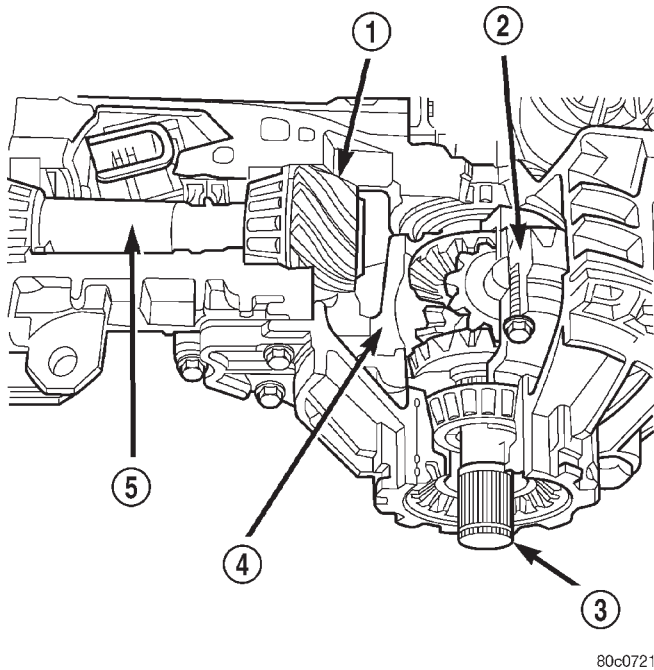
OPERATION

The differential assembly is driven by the transfer shaft by way of the differential ring gear. The ring gear drives the differential case, and the case drives the driveshafts through the differential gears. The differential pinion and side gears are supported in the case by thrust washers and a pinion shaft. Differential pinion and side gears make it possible for front tires to rotate at different speeds while cornering.

DISASSEMBLY

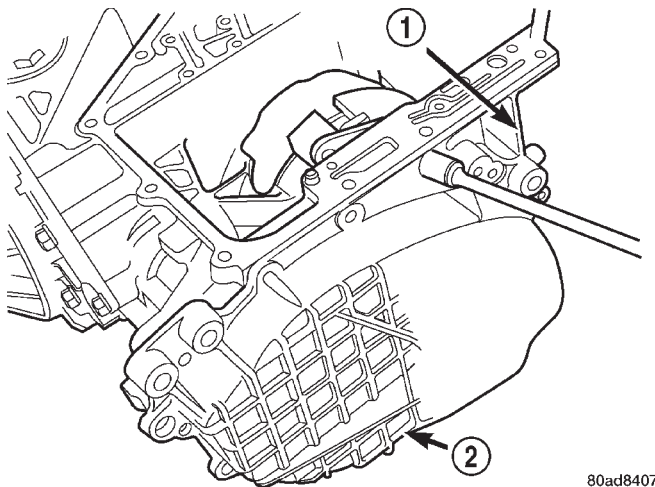
The valve body and solenoid wiring connector must be removed from the transaxle in order to service the transaxle differential. The transfer shaft cannot be removed with the valve body in place. Remove the valve body assembly from the transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/VALVE BODY - REMOVAL)

FINAL DRIVE (Continued)

**Fig. 154 Differential Assembly**

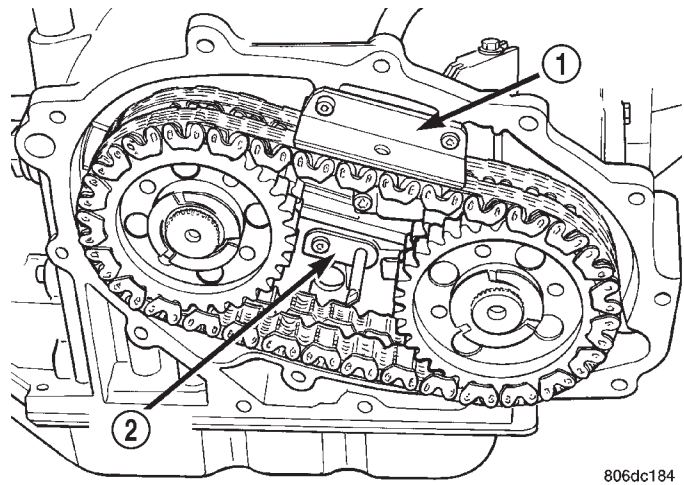
- 1 - PINION GEAR
- 2 - RING GEAR
- 3 - SHORT STUB SHAFT
- 4 - DIFFERENTIAL CASE ASSEMBLY
- 5 - TRANSFER SHAFT

(1) Remove transfer chain cover (Fig. 155).

**Fig. 155 Remove Chain Cover**

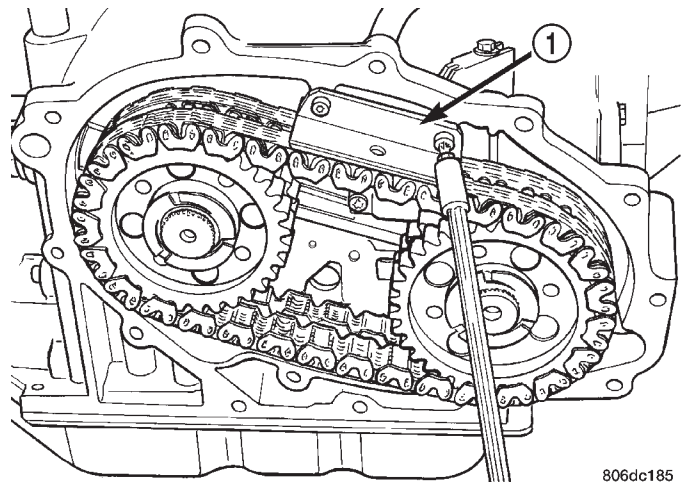
- 1 - TRANSAXLE CASE
- 2 - CHAIN COVER

(2) Remove chain oiler (Fig. 156).

**Fig. 156 Remove Chain Oiler**

- 1 - CHAIN SNUBBER
- 2 - CHAIN OILER

(3) Remove chain snubber (Fig. 157).

**Fig. 157 Remove Chain Snubber**

- 1 - CHAIN SNUBBER

(4) Remove output shaft sprocket snap ring and wave washer (Fig. 158).

(5) Remove transfer shaft sprocket snap ring and wave washer (Fig. 159).

FINAL DRIVE (Continued)

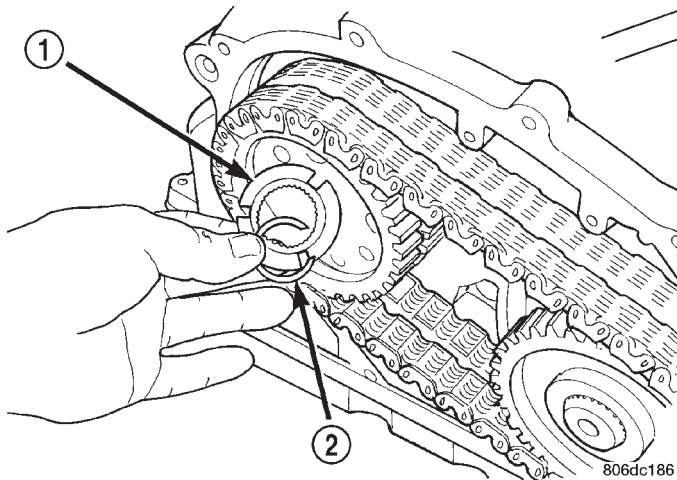


Fig. 158 Remove Output Shaft Sprocket Snap Ring and Wave Washer

- 1 - WAVE WASHER
- 2 - SNAP RING

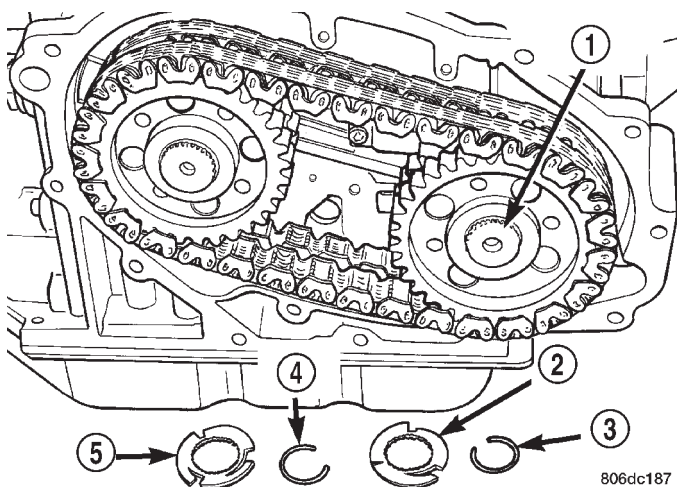


Fig. 159 Remove Transfer Shaft Sprocket Snap Ring and Wave Washer

- 1 - TRANSFER SHAFT
- 2 - WAVE WASHER
- 3 - SNAP RING
- 4 - SNAP RING
- 5 - WAVE WASHER

CAUTION: The chain sprockets have a slip fit onto their shafts. Apply only a slight amount of pressure to the chain spreader to release the chain pressure. If chain sprockets are not spread slightly removal or installation will be difficult. Overspreading of the chain sprocket will also make sprocket removal difficult.

(6) Install chain spreader 6550 and expand to facilitate sprocket and chain removal (Fig. 160).

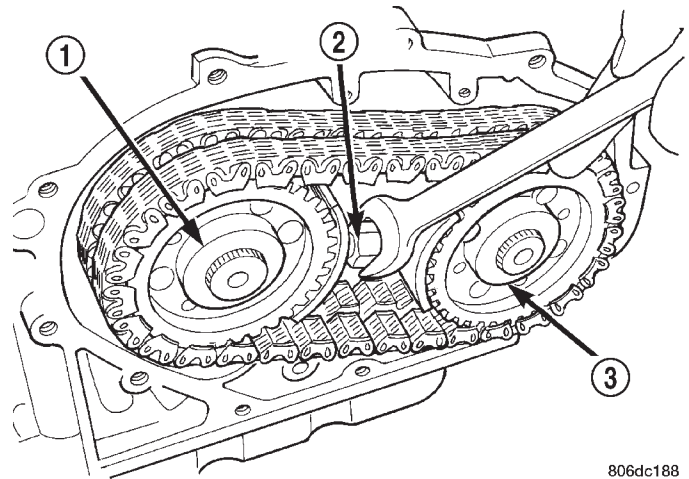


Fig. 160 Install Chain Spreader

- 1 - OUTPUT SPROCKET
- 2 - SPECIAL TOOL 6550
- 3 - TRANSFER SPROCKET

(7) Remove chains and sprockets as an assembly (Fig. 161).

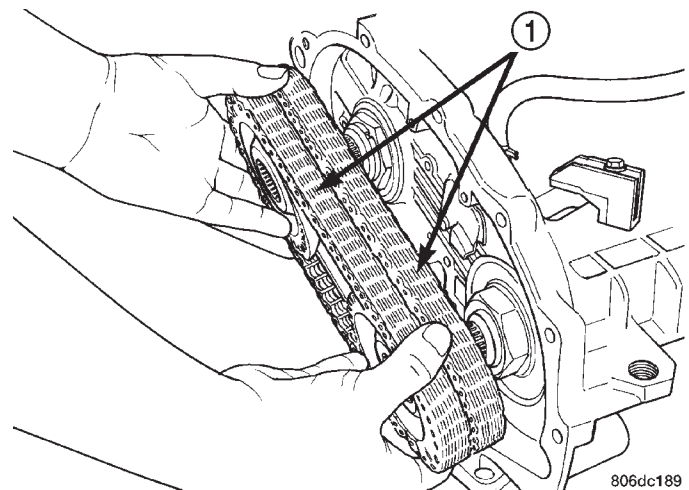


Fig. 161 Remove Chains and Sprockets as an Assembly

- 1 - CHAINS

CAUTION: To ensure proper gear ratio, verify that the correct chain and sprocket ratio is selected.

CAUTION: When reinstalling drive chains, the blue link must face outward.

FINAL DRIVE (Continued)

(8) Using suitable snap ring pliers, remove long stub shaft snap ring (Fig. 162).

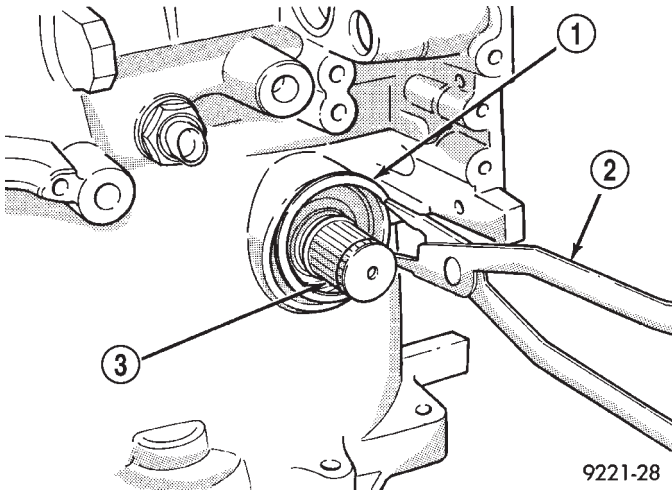


Fig. 162 Remove Long Stub Shaft Snap Ring

- 1 - SNAP RING
- 2 - SNAP RING PLIERS
- 3 - LONG STUB SHAFT

(9) Using slide hammer C-3752 and remover 8420A, remove long stub shaft from transaxle (Fig. 163).

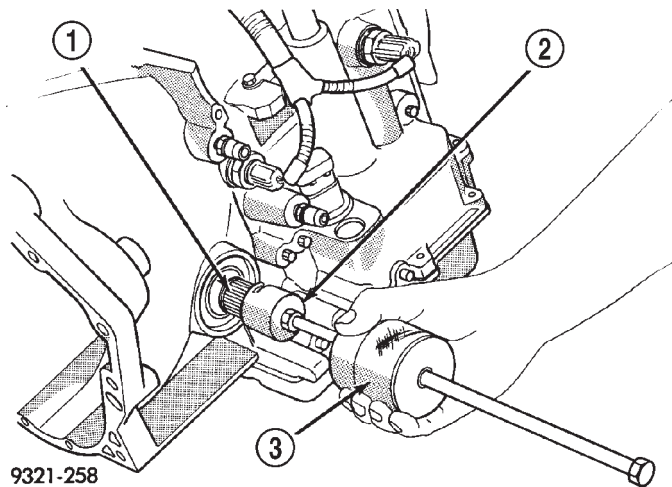


Fig. 163 Remove Long Stub Shaft

- 1 - LONG STUB SHAFT
- 2 - SPECIAL TOOL 8420A
- 3 - SLIDE HAMMER C-3752

CAUTION: Driveshaft retainer clips and seals located on the stub shafts must be replaced before reinstalling halfshafts.

(10) Remove inner differential adjuster lock (Fig. 164).

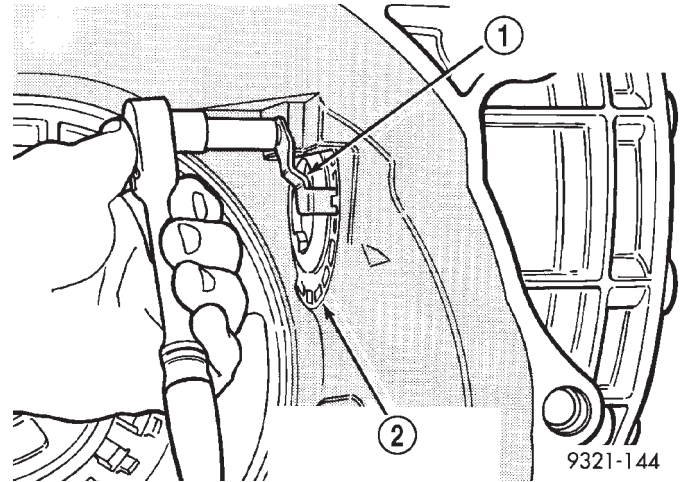


Fig. 164 Remove Inner Differential Adjuster Lock

- 1 - INNER DIFFERENTIAL ADJUSTER LOCK
- 2 - INNER DIFFERENTIAL ADJUSTER

(11) Remove differential outer adjuster lock (Fig. 165).

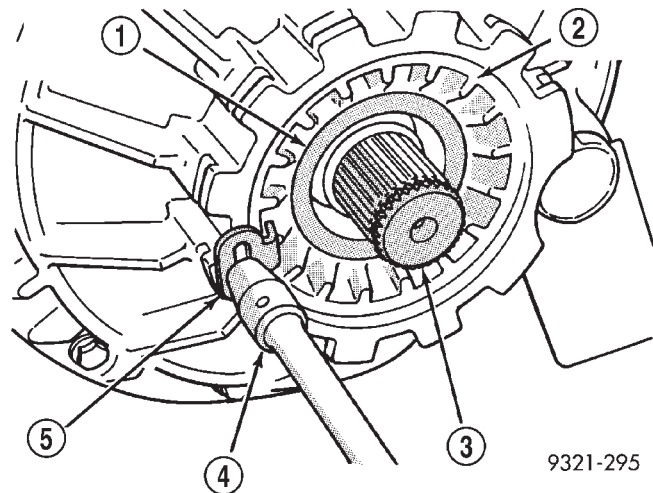


Fig. 165 Remove Outer Adjuster Lock

- 1 - OIL SEAL
- 2 - OUTER ADJUSTER
- 3 - STUB SHAFT
- 4 - SOCKET
- 5 - ADJUSTER LOCK

FINAL DRIVE (Continued)

(12) Loosen outer adjuster (Fig. 166).

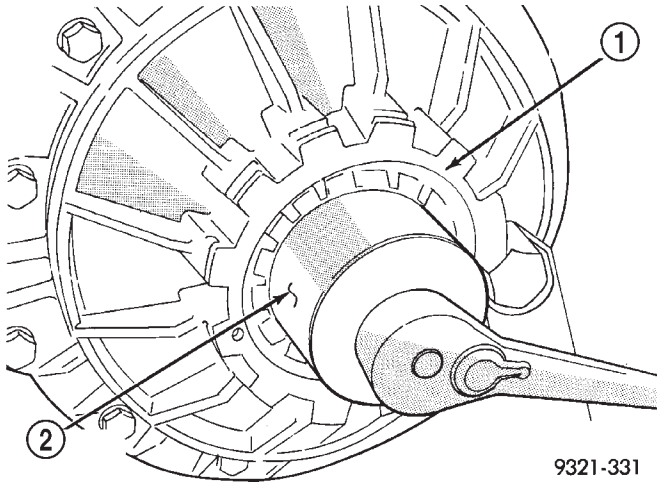


Fig. 166 Loosen Outer Adjuster

- 1 - OUTER ADJUSTER
- 2 - SPECIAL TOOL 6503

(13) Remove differential side cover, and carrier/ring gear assembly (Fig. 167). If differential disassembly is not required, refer to Step 14.

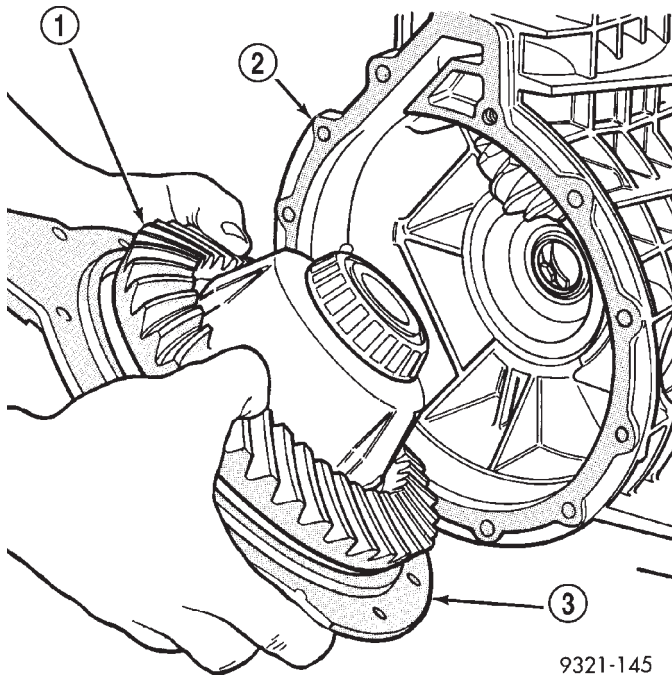


Fig. 167 Remove Differential Side Cover, Carrier and Ring Gear Assembly

- 1 - RING GEAR
- 2 - TRANSAXLE CASE
- 3 - SIDE COVER

DIFFERENTIAL DISASSEMBLY

(1) Remove ring gear-to-carrier bolts (Fig. 168).

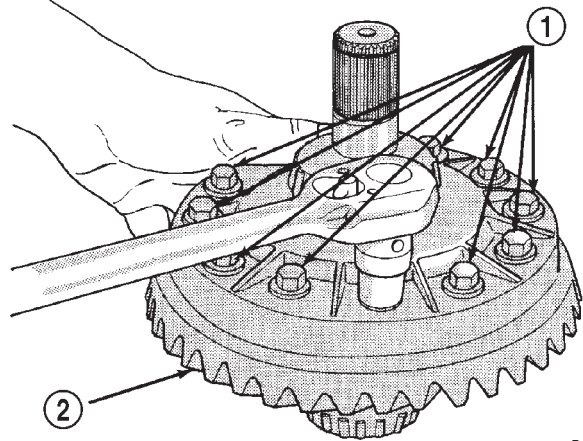


Fig. 168 Remove Ring Gear Bolts

- 1 - RING GEAR BOLTS
- 2 - RING GEAR

(2) Using a plastic or soft-tipped hammer, tap ring gear off of carrier (Fig. 169).

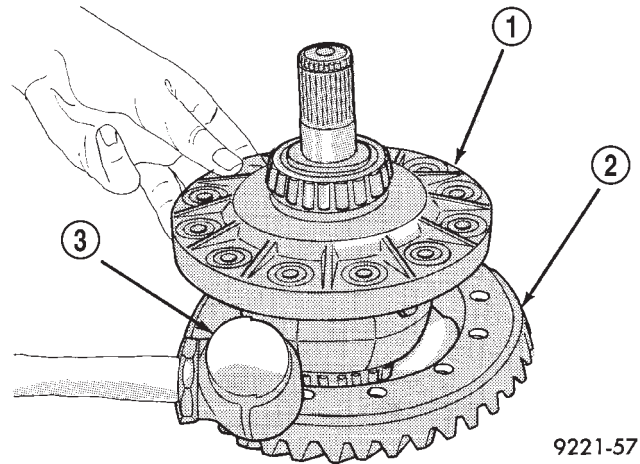
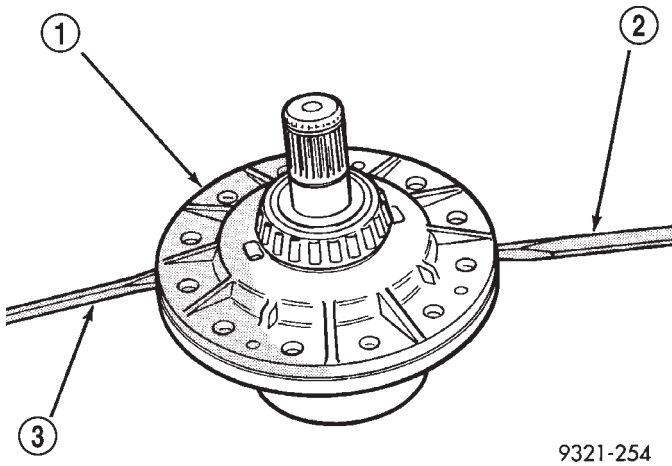


Fig. 169 Tap Off Ring Gear

- 1 - DIFFERENTIAL CARRIER
- 2 - RING GEAR
- 3 - PLASTIC MALLET

FINAL DRIVE (Continued)

(3) Using suitable pry tools, pry differential carrier apart (Fig. 170).

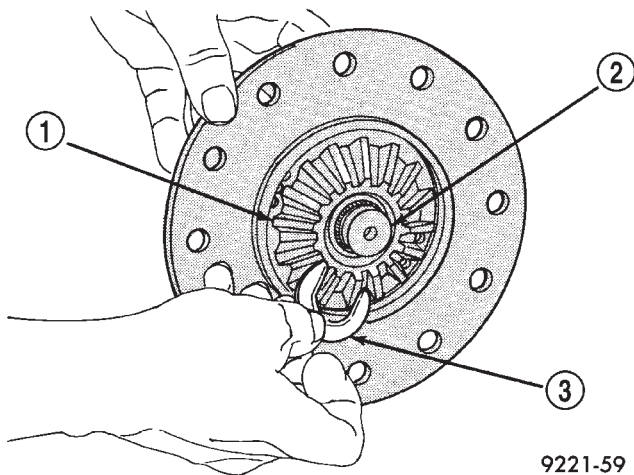


9321-254

Fig. 170 Pry Differential Carrier Apart

- 1 - DIFFERENTIAL CARRIER
- 2 - PRY TOOL
- 3 - PRY TOOL

(4) Remove stub shaft C-clip (Fig. 171).

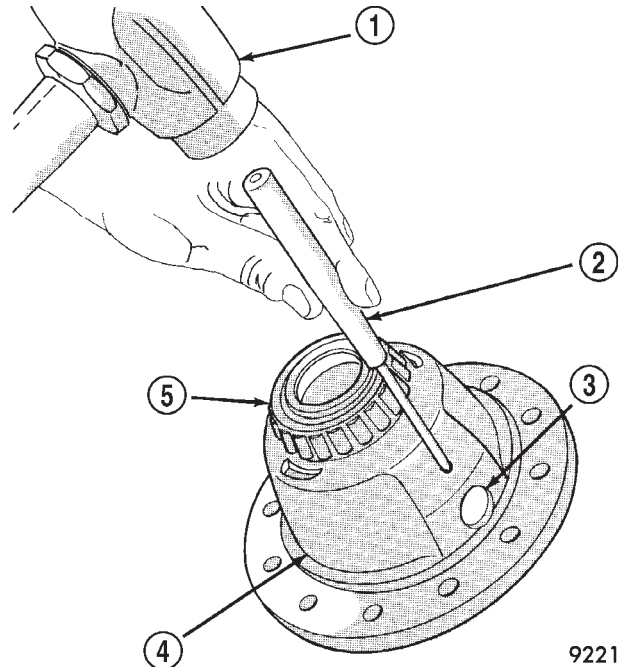


9221-59

Fig. 171 Remove C-Clip

- 1 - SIDE GEAR
- 2 - STUB SHAFT
- 3 - "C" CLIP

(5) Using a suitable punch, remove pinion shaft roll pin (Fig. 172).

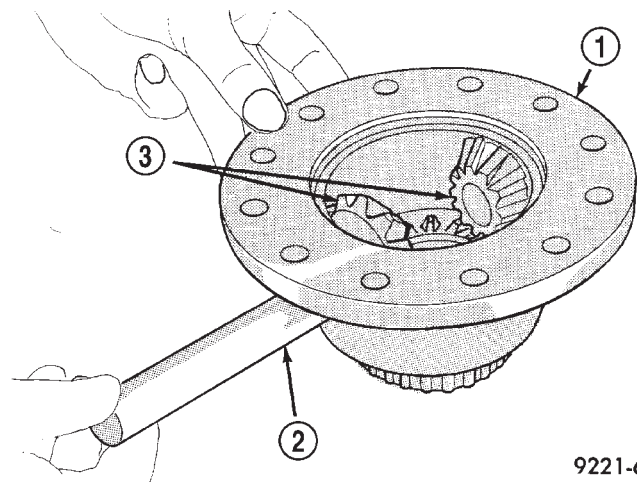


9221-60

Fig. 172 Remove Pinion Shaft Roll Pin

- 1 - HAMMER
- 2 - PIN PUNCH
- 3 - PINION SHAFT
- 4 - DIFFERENTIAL CARRIER
- 5 - DIFFERENTIAL BEARING

(6) Remove differential pinion shaft. Remove pinion and side gears (Fig. 173).



9221-61

Fig. 173 Slide Out Differential Pinion Shaft and Remove Pinion Gears and Side Gears

- 1 - DIFFERENTIAL CARRIER
- 2 - PINION SHAFT
- 3 - SIDE GEARS

FINAL DRIVE (Continued)

(7) Using tool C-293-PA, adapters C-293-48, and adapter C-4996, remove differential carrier bearings (Fig. 174).

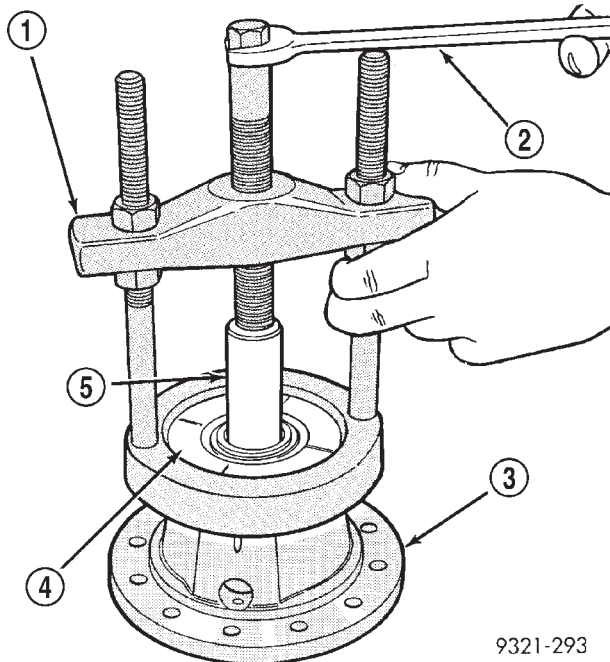


Fig. 174 Carrier Bearing Removal

- 1 - SPECIAL TOOL C-293 PA
- 2 - WRENCH
- 3 - DIFFERENTIAL CARRIER
- 4 - SPECIAL TOOL JAWS (4) C-293-48
- 5 - SPECIAL TOOL C-4996

(14) Remove inner adjuster (Fig. 175).

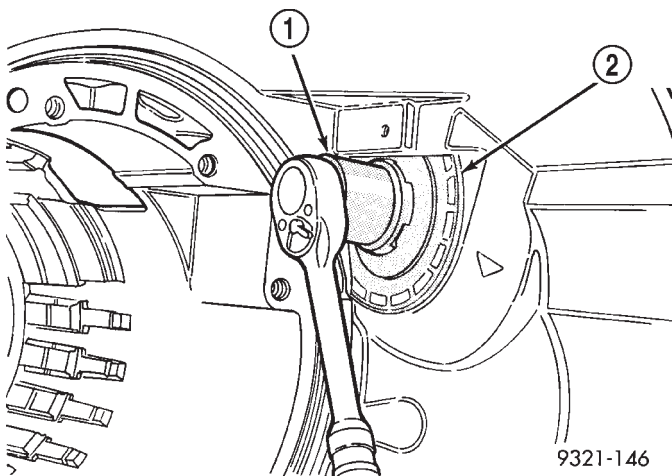


Fig. 175 Remove Inner Adjuster By Turning Clockwise

- 1 - SPECIAL TOOL 6502-B
- 2 - INNER DIFFERENTIAL ADJUSTER

(15) Remove differential vent baffle (Fig. 176).

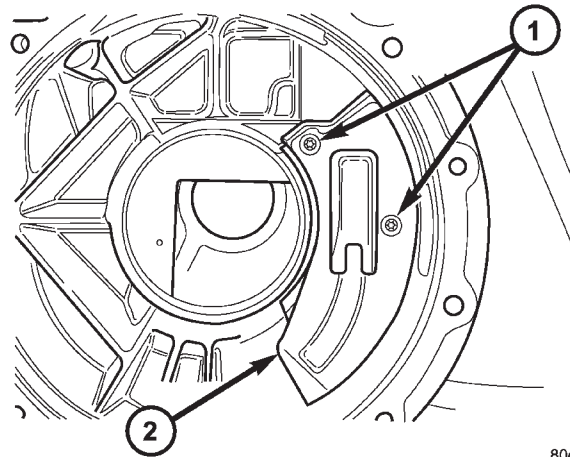


Fig. 176 Differential Vent Baffle

- 1 - RETAINING SCREWS
- 2 - VENT BAFFLE W/SHIELD

CAUTION: Failure to grind and open stakes on the transfer shaft nut will result in thread damage to transfer shaft during nut removal.

WARNING: WEAR SAFETY GOGGLES WHILE GRINDING STAKE NUTS.

(16) Using a die grinder or equivalent, grind the stakes in the shoulder of the shaft nut as shown in (Fig. 177) and (Fig. 178). Do not grind through the transfer shaft nut into the shaft. There are two stakes on the nut.

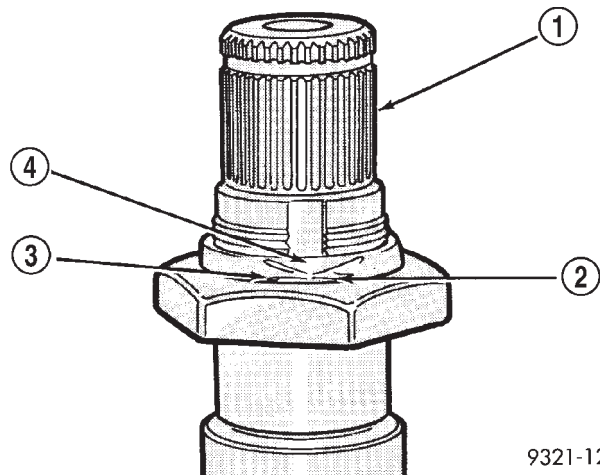
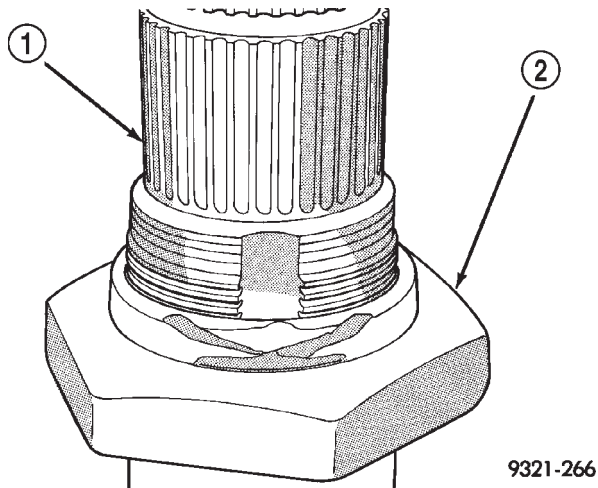


Fig. 177 Grinding Stakes

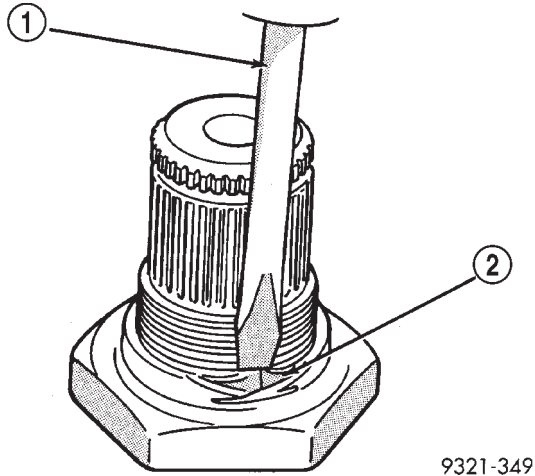
- 1 - TRANSFER SHAFT
- 2 - GRIND HERE
- 3 - GRIND HERE
- 4 - NUT STAKE

FINAL DRIVE (Continued)

**Fig. 178 Stake Grinding Pattern**

- 1 - TRANSFER SHAFT
2 - TRANSFER SHAFT NUT

(17) Using a small chisel, carefully open stakes on nut (Fig. 179)

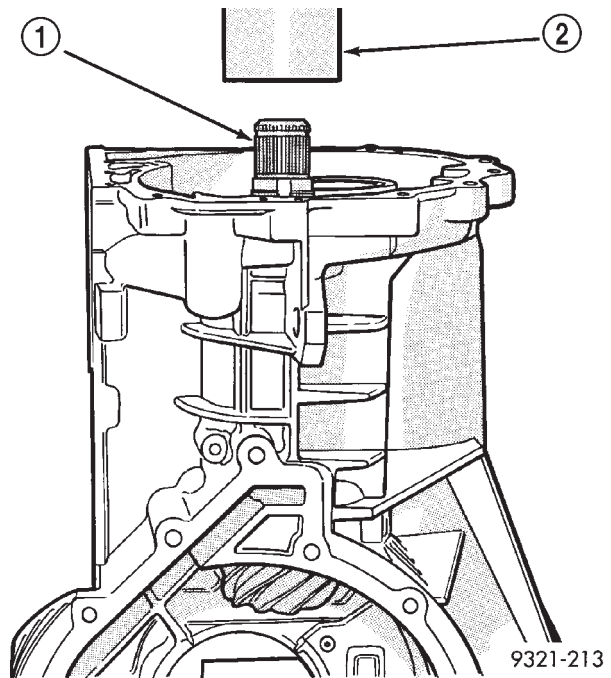
**Fig. 179 Opening Nut Stakes**

- 1 - CHISEL
2 - NUT STAKE

(18) Remove the transfer shaft nut (Fig. 180).

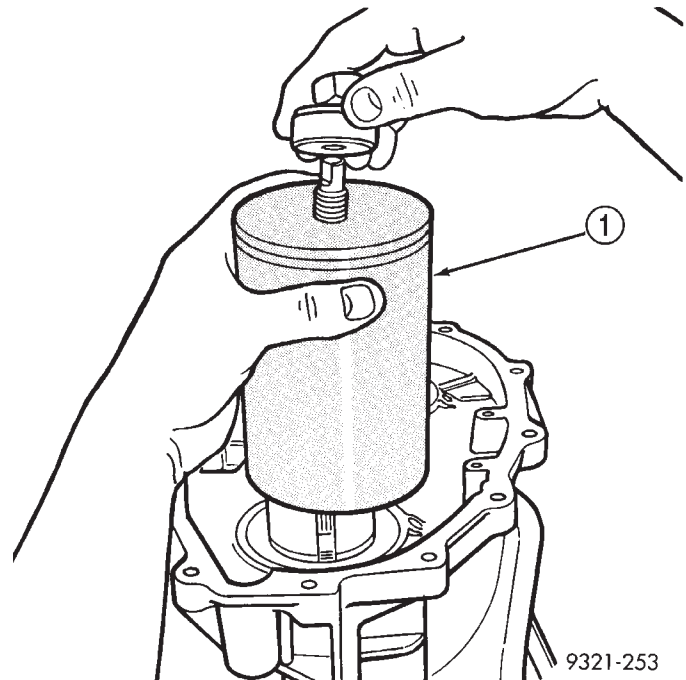
CAUTION: Do not reuse old transfer shaft nut because the removed stake weakens the nut flange.

CAUTION: The transfer shaft cannot be removed from the case at this time.

**Fig. 180 Press Transfer Shaft Downward to Remove Rear Cone**

- 1 - TRANSFER SHAFT
2 - ARBOR PRESS

(19) Install special tool 6577 to remove rear transfer bearing cup (Fig. 181).

**Fig. 181 Transfer Bearing Cup Removal**

- 1 - SPECIAL TOOL 6577

FINAL DRIVE (Continued)

(20) Remove transfer shaft preload shim (Fig. 182). If transfer shaft bearings are to be reused, the original shim must also be reused.

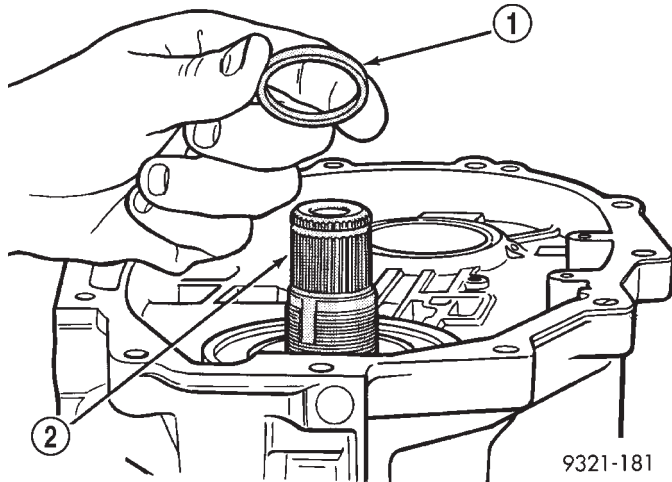


Fig. 182 Preload Shim Removal

- 1 - TRANSFER SHAFT PRELOAD SHIM
- 2 - TRANSFER SHAFT

(21) Remove transfer shaft assembly from case (Fig. 183).

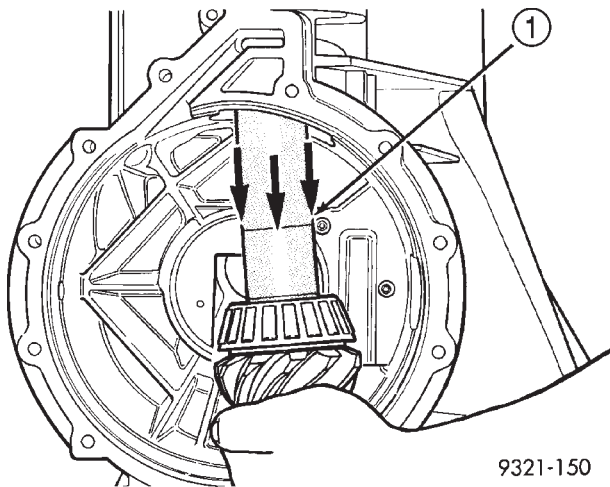
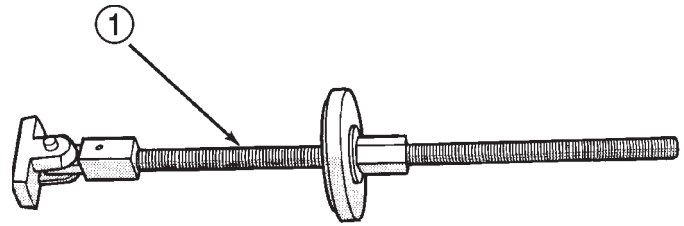


Fig. 183 Remove Transfer Shaft Assembly From Case

- 1 - TRANSFER SHAFT

CAUTION: If the transfer shaft is removed from the transaxle case for any reason, both seals must be replaced.

(22) Remove transfer shaft seals using special tool 6310 and foot 6310-9 (Fig. 184). Do not reuse old seals. The seals will be pulled out the rear of the case.



9321-252

Fig. 184 Transfer Shaft Seal Remover

- 1 - SPECIAL TOOL 6310

(23) Remove the front transfer shaft bearing cup using special tool 6495 and handle C-4171 (Fig. 185). Use a press with special tools to remove cup.

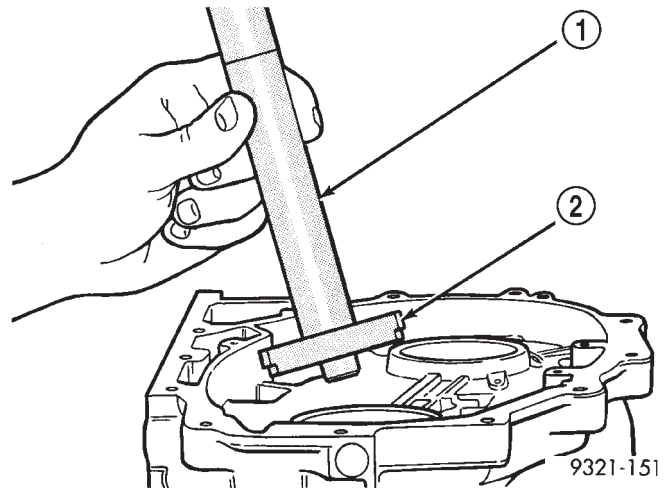


Fig. 185 Front Transfer Shaft Cup Removal

- 1 - SPECIAL TOOL C-4171
- 2 - SPECIAL TOOL 6495

(24) Support special tool P-334 on press table so that pinion head of transfer shaft can be pressed through table (Fig. 186).

ASSEMBLY

ASSEMBLY / BEARING ADJUSTMENT PROCEDURE

The following steps will determine the correct shim thickness required to obtain proper pinion depth. All special tools described in this procedure must be used to obtain correct results.

FINAL DRIVE (Continued)

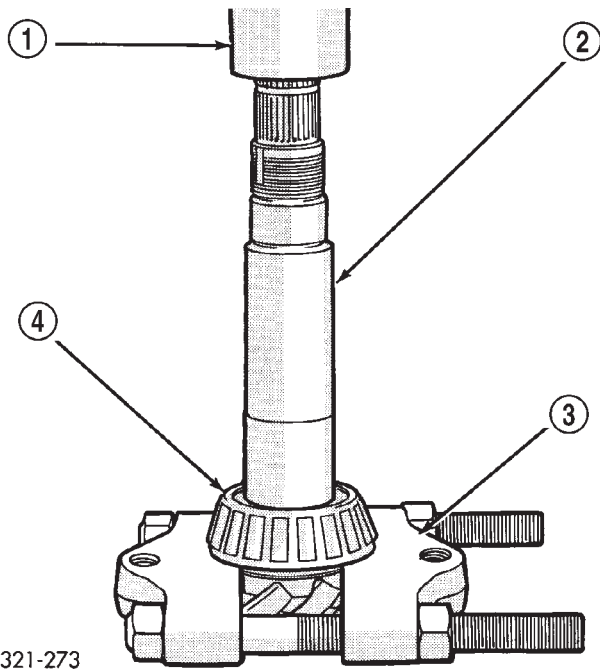


Fig. 186 Remove Front Transfer Shaft Bearing And Pinion Depth Shim

- 1 - ARBOR PRESS
- 2 - TRANSFER SHAFT
- 3 - SPECIAL TOOL P-334
- 4 - FRONT TRANSFER SHAFT BEARING

CAUTION: Failure to adjust pinion depth correctly could cause gear noise or transaxle failure.

(1) Install front transfer shaft bearing cup (Fig. 187). The transfer shaft bearing cup must be installed before making pinion depth measurement. Use special tool 6494 to install bearing cup. There are no shims located behind this bearing cup.

CAUTION: The bearing cup is seated in the case correctly if there is no clearance between the bottom of the bearing cup and case. If a 0.001" or 0.002" feeler gauge does not fit, the bearing cup is completely seated into transaxle case.

(2) Install centering block (special tool 6549-2) into the transaxle case (Fig. 188). Screw centering block into inner adjuster hole of case until it bottoms. The pegs on the special tool are only used for installation. Orientation with in the case is not required.

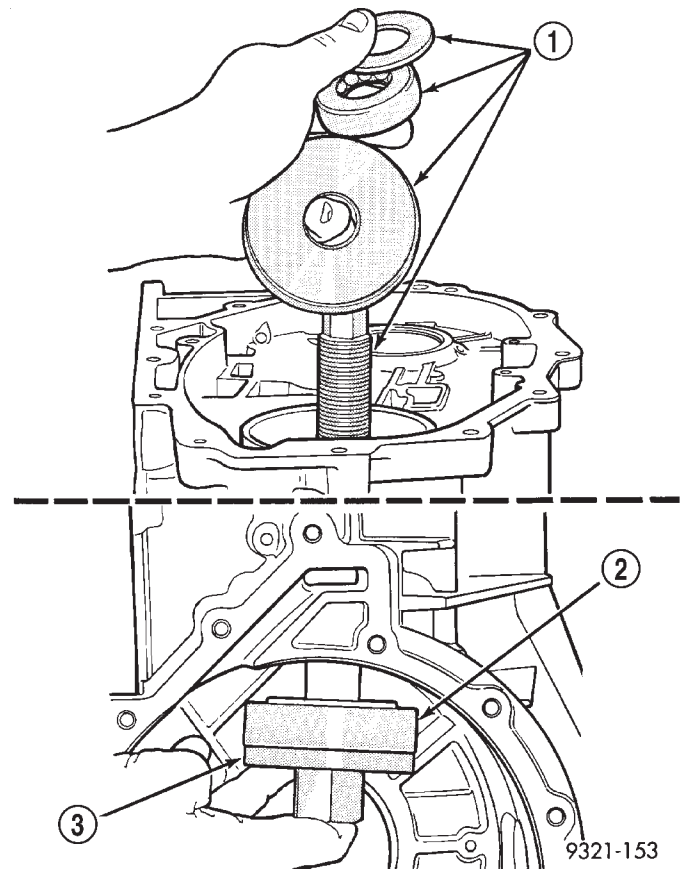


Fig. 187 Install Front Transfer Shaft

- 1 - SPECIAL TOOL 6494
- 2 - BEARING CUP
- 3 - SPECIAL TOOL 6494

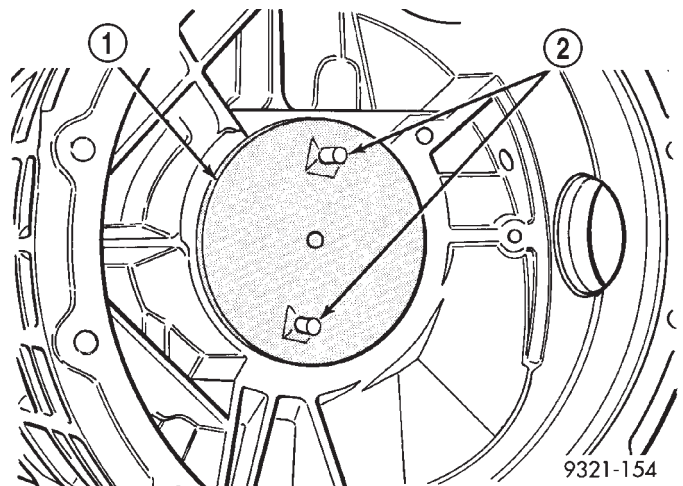


Fig. 188 Installing Centering Block

- 1 - SPECIAL TOOL 6549-2
- 2 - TOOL INSTALLATION AND REMOVAL PEGS

FINAL DRIVE (Continued)

(3) Install new front bearing (actual bearing to be used during reassembly) onto gauge disc (special tool 6549-3) (Fig. 189).

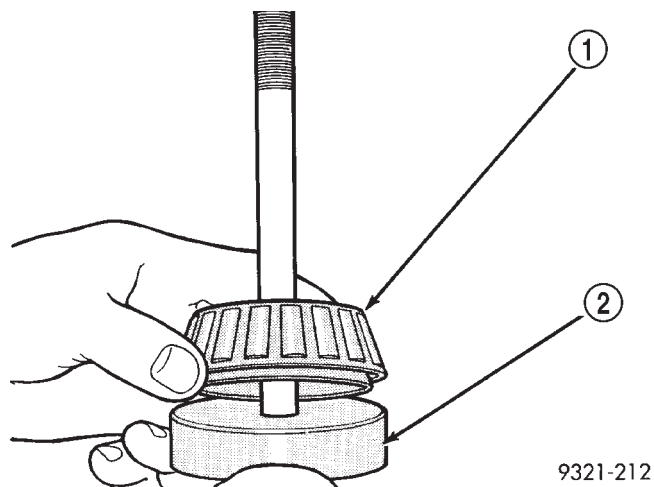


Fig. 189 Gauge Disc and Bearing

- 1 - FRONT TRANSFER SHAFT BEARING
2 - SPECIAL TOOL 6549-3

(4) Install gauge disc and bearing into case using gauge disc rod Tool 6549-4 (Fig. 190).

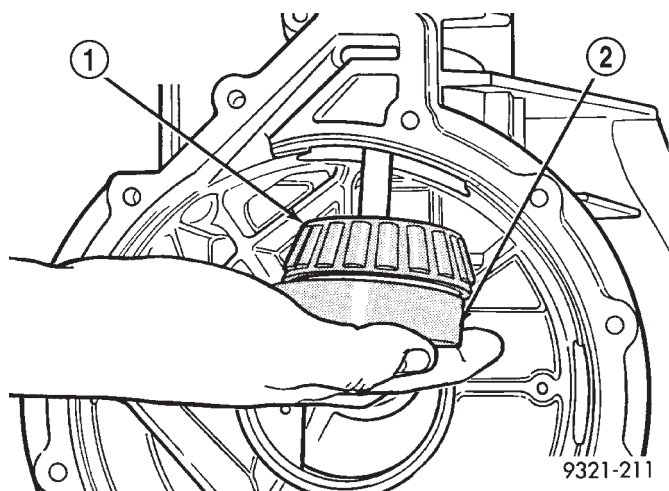


Fig. 190 Installing Gauge Disc with

- 1 - FRONT TRANSFER SHAFT BEARING
2 - SPECIAL TOOL 6549-3

(5) Install centering disc (special tool 6494-2) onto gauge disc rod (Fig. 191).

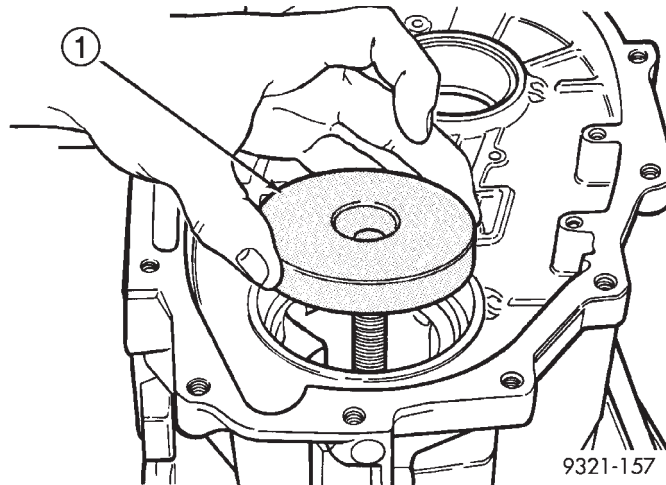


Fig. 191 Disc Installation

- 1 - SPECIAL TOOL 6494-2

(6) Install centering nut Tool 6549-5 as shown in (Fig. 192).

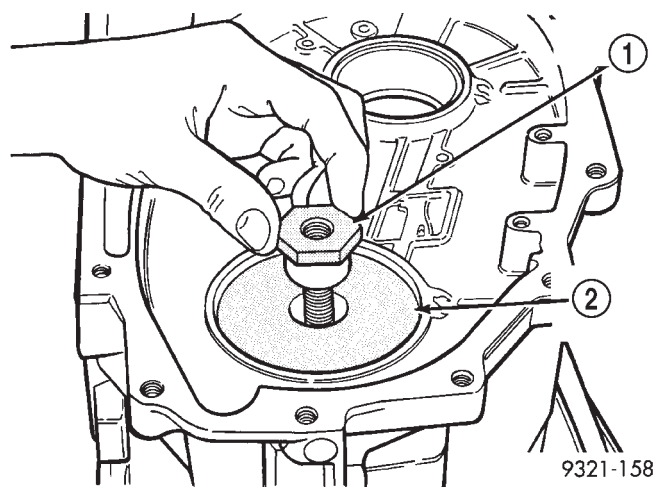


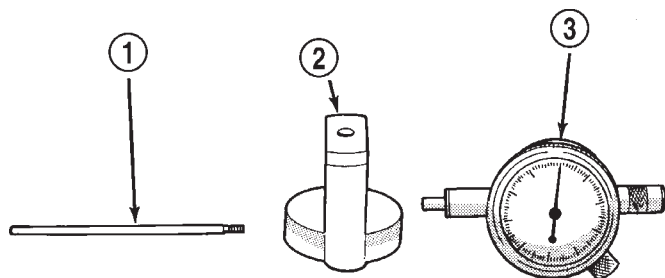
Fig. 192 Installing Centering Nut

- 1 - CENTERING NUT
2 - CENTERING DISC (6494-2)

FINAL DRIVE (Continued)

(7) Hand tighten centering nut until all play in the tool has been removed.

(8) Install dial indicator into locating block Tool 6549-1. Then screw extension rod onto dial indicator (Fig. 193).

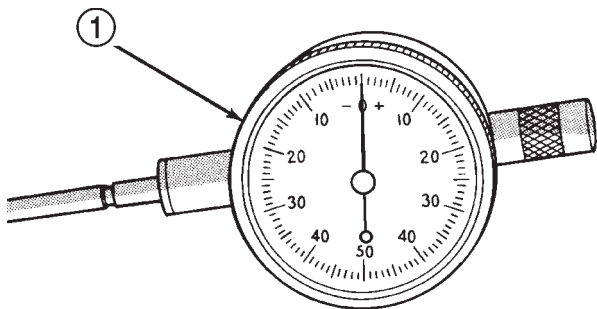


9321-332

Fig. 193 Dial indicator, Locating Block and Extension Rod

- 1 - EXTENSION ROD SPECIAL TOOL
- 2 - LOCATING BLOCK SPECIAL TOOL
- 3 - DIAL INDICATOR

NOTE: The dial indicator used to make this measurement must have a face that shows 0-50-0 (Special Tool C-3339) readings (Fig. 194). All steps from this point forward will reflect this assumption. This will give you proper shim thickness.

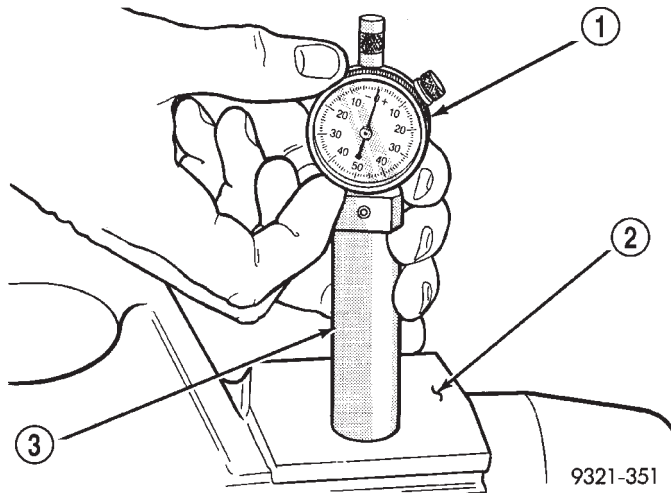


9321-333

Fig. 194 0-50-0 Dial Indicator

- 1 - DIAL INDICATOR

(9) Before making a pinion depth measurement the dial indicator must be zeroed. This is done by placing the dial indicator in the zeroing fixture (special tool 6549-6). Then place the zeroing fixture on a flat surface. Adjust the dial face so the pointer on the dial indicator lines up with the zero (Fig. 195).

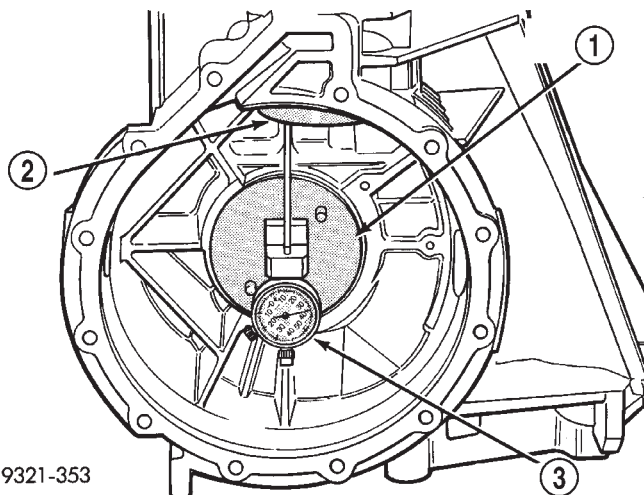


9321-351

Fig. 195 Zero Dial Indicator

- 1 - DIAL INDICATOR
- 2 - FLAT SURFACE
- 3 - ZEROING FIXTURE

(10) Compress the dial indicator slightly and insert dial indicator pin into centering block (Fig. 196).



9321-353

Fig. 196 Mounting Dial Indicator to Centering Block

- 1 - CENTERING BLOCK
- 2 - GAUGE DISC
- 3 - DIAL INDICATOR

FINAL DRIVE (Continued)

(11) Pivot dial indicator back and forth (Fig. 197) on centering pin to obtain the shortest distance measurement. **This will be the lowest number reading on dial indicator.** Record the number obtained. Now rotate the gauge disc clockwise 1/3 of a turn and recheck readings. Record number obtained. Rotate the gauge disc another 1/3 of a turn clockwise and take another reading. Average the three readings. Record this pinion depth measurement. If the readings differ by more than two thousandths recheck gauge disc installation, it may have been installed slightly cocked.

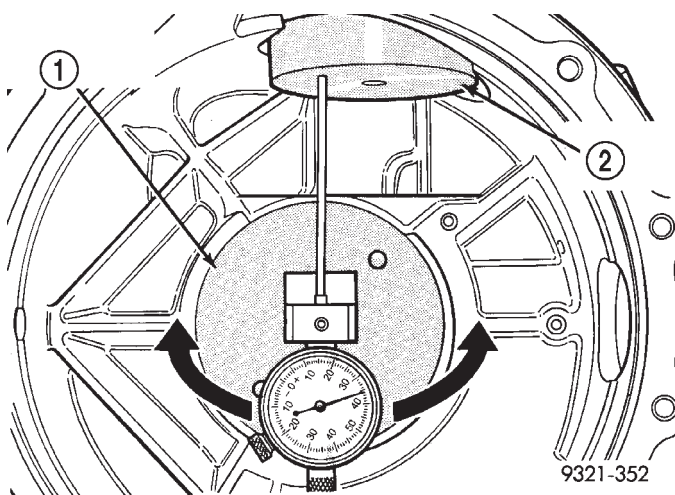


Fig. 197 Pivot Dial Indicator

- 1 - CENTERING BLOCK
2 - GAUGE DISC

(12) To determine the required shim thickness, the pinion depth measurement must be adjusted. The pinion shim adjustment number is the first of seven digits ink stamped on the shank of the transfer shaft (Fig. 198). Using the adjustment factor chart, convert the adjustment number to the corresponding adjustment factor. Utilizing the pinion depth measurement obtained in Step 11, add or subtract the adjustment factor to calculate the required shim thickness. Refer to pinion head shim chart for shim selections. This is the shim that will be installed between the transfer shaft pinion head and the front transfer shaft bearing. Refer to the following examples for further explanation:

(13) Example 1 in (MM):

- Measured pinion shim depth: 0.789mm
- Adjustment number on transfer shaft: +2
- Adjustment factor (mm): -0.051mm
- Shim size needed: $0.789 - 0.051 = \mathbf{0.738mm}$

(14) Example 2 in (IN):

- Measured pinion shim depth: 0.032in
- Adjustment number on transfer shaft: -1
- Adjustment factor (in): +0.001

- Shim size needed: $0.032 + 0.001 = \mathbf{0.033in}$

ADJUSTMENT NUMBER	ADJUSTMENT FACTOR mm	ADJUSTMENT FACTOR in
3	-0.076	-0.003
2	-0.051	-0.002
1	-0.025	-0.001
0	0.000	0.000
-1	0.025	0.001
-2	0.051	0.002
-3	0.076	0.003

9421-72

ADJUSTMENT FACTOR CHART

SHIM THICKNESS	
MM	INCH
0.681 - 0.707	0.0265 - 0.0275
0.708 - 0.734	0.0276 - 0.0286
0.735 - 0.761	0.0286 - 0.0296
0.762 - 0.788	0.0297 - 0.0307
0.789 - 0.815	0.0307 - 0.0317
0.816 - 0.842	0.0318 - 0.0328
0.843 - 0.869	0.0328 - 0.0338
0.871 - 0.896	0.0339 - 0.0349
0.897 - 0.923	0.0349 - 0.0359
0.924 - 0.951	0.0360 - 0.0370
0.951 - 0.977	0.0370 - 0.0381
0.978 - 1.004	0.0381 - 0.0391
1.005 - 1.031	0.0391 - 0.0402
1.032 - 1.058	0.0402 - 0.0412
1.059 - 1.085	0.0413 - 0.0423
1.086 - 1.112	0.0423 - 0.0433
1.113 - 1.139	0.0434 - 0.0444

9421-67

PINION HEAD SHIM CHART

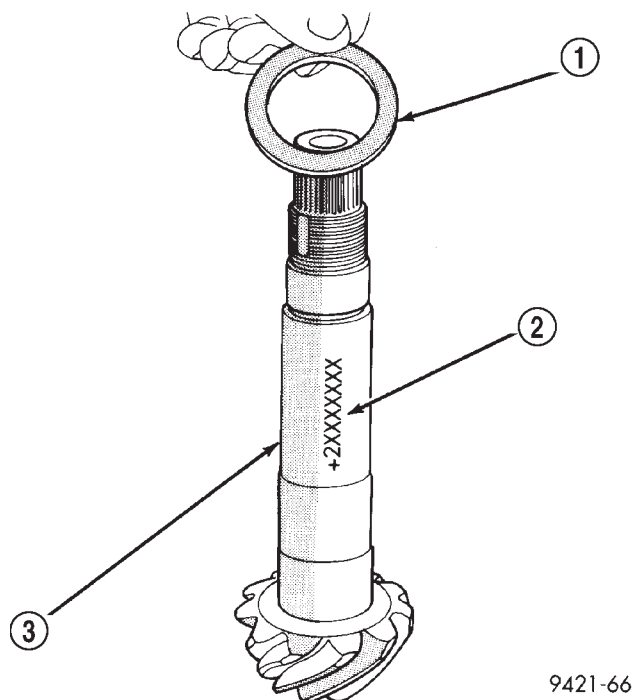
(15) Remove dial indicator, gauge disc and centering block from transaxle.

(16) Install shim selected in Step 12 of this procedure onto the transfer shaft (Fig. 198).

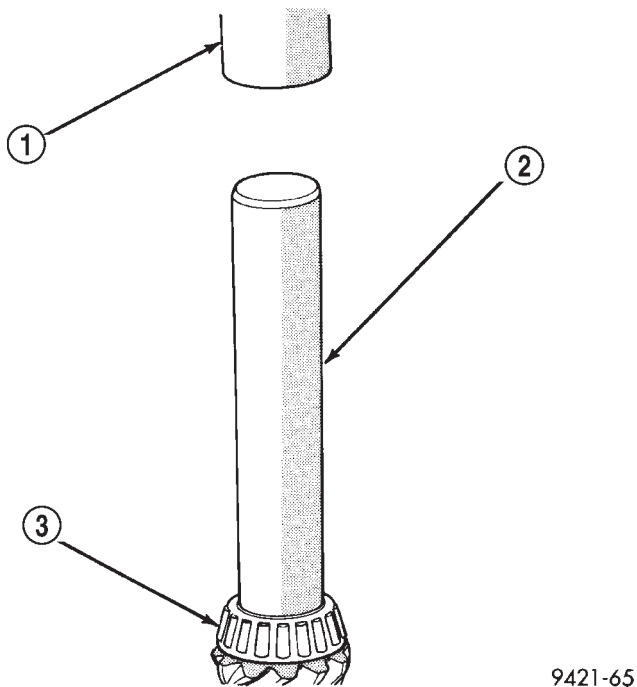
(17) Press front transfer shaft bearing onto transfer shaft (special tool 6052). The shim must be in place before pressing on bearing (Fig. 199).

(18) At this point the pinion depth has been determined and the shim has been installed onto the transfer shaft. Before the pinion is installed into the transaxle case, bearing preload must be determined for the differential bearings. The following steps must be performed before the pinion is installed.

FINAL DRIVE (Continued)

**Fig. 198 Shim Installation**

- 1 - PINION DEPTH SHIM
- 2 - ADJUSTMENT FACTOR
- 3 - TRANSFER SHAFT

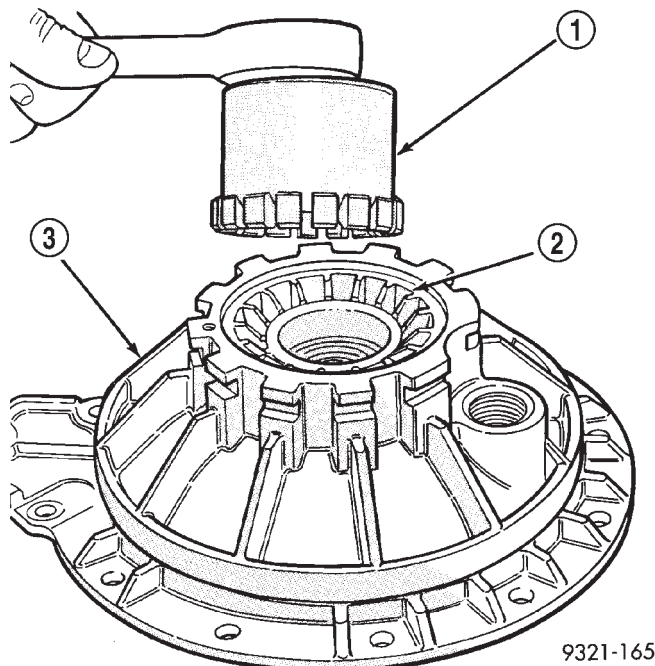
**Fig. 199 Bearing Installation**

- 1 - ARBOR PRESS
- 2 - SPECIAL TOOL 6052
- 3 - FRONT TRANSFER SHAFT BEARING

(19) The following steps will determine how many foot pounds are required on the outer differential adjuster to obtain the correct turning torque.

CAUTION: Failure to set differential bearing preload correctly may cause bearing failure, gear noise and/or axle shaft seal failure.

(20) Remove outer adjuster with special tool 6503 (Fig. 200).

**Fig. 200 Outer Adjuster Removal**

- 1 - SPECIAL TOOL 6503
- 2 - OUTER DIFFERENTIAL ADJUSTER
- 3 - SIDE COVER

(21) Remove old stub shaft seals. Press inner adjuster seal out with special tool 6502B. Press outer adjuster seal out with special tool 6558.

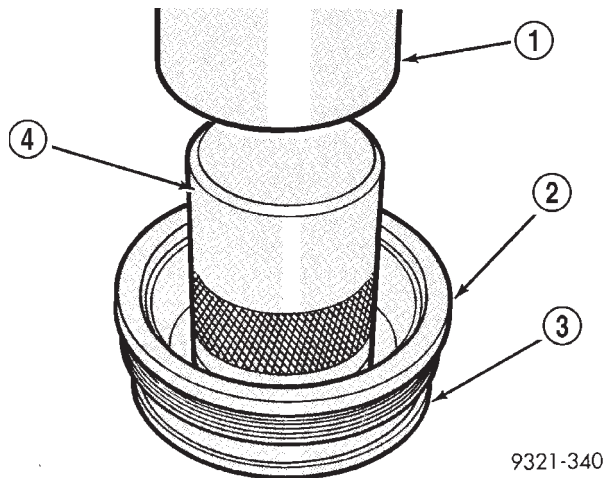
(22) Install new stub shaft seals in both adjusters using special tool 6558 (Fig. 201).

NOTE: To remove inner and outer adjuster races, use Tool 6062-A. To install inner and outer adjuster races, use Tool 6522 and Tool C-4171.

(23) Lube adjuster threads and O-ring with gear oil before installing. Failure to lube threads will result in thread damage to the adjuster and trans-axle case.

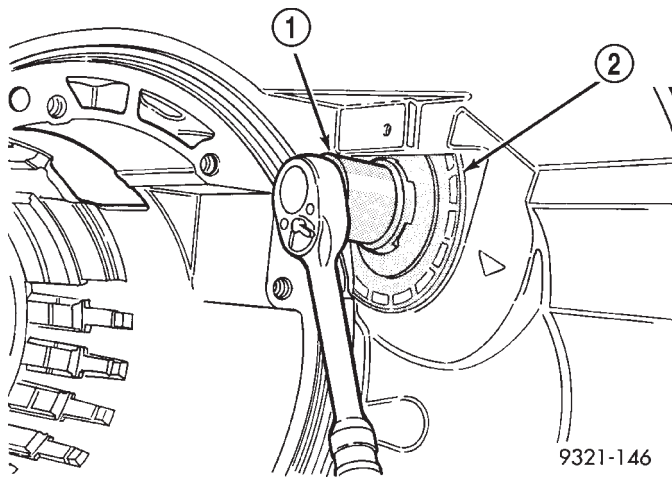
(24) Screw in the inner adjuster using special tool 6502B (Fig. 202). The inner adjuster should be screwed in until under-flush with inside of the case (viewed from differential side).

FINAL DRIVE (Continued)

**Fig. 201 Axle Shaft Seal Installation**

- 1 - ARBOR PRESS
- 2 - OUTER DIFFERENTIAL ADJUSTER
- 3 - O-RING
- 4 - SPECIAL TOOL 6558

If differential was not disassembled, refer to Step 25.

**Fig. 202 Inner Adjuster Installation**

- 1 - SPECIAL TOOL 6502-B
- 2 - INNER DIFFERENTIAL ADJUSTER

DIFFERENTIAL ASSEMBLY

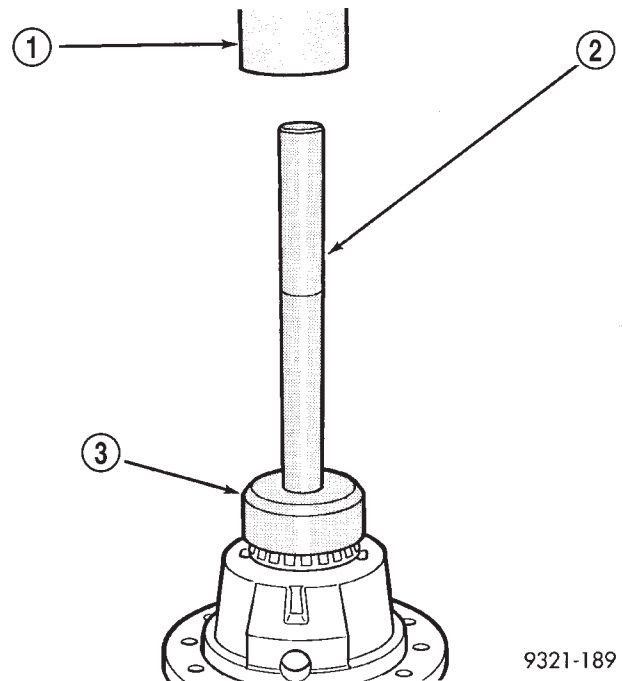
(1) Install differential carrier bearings using an arbor press, driver handle C-4171, and Tool C-4340 (Fig. 203).

(2) Install differential pinion and side gears, and pinion shaft (Fig. 204).

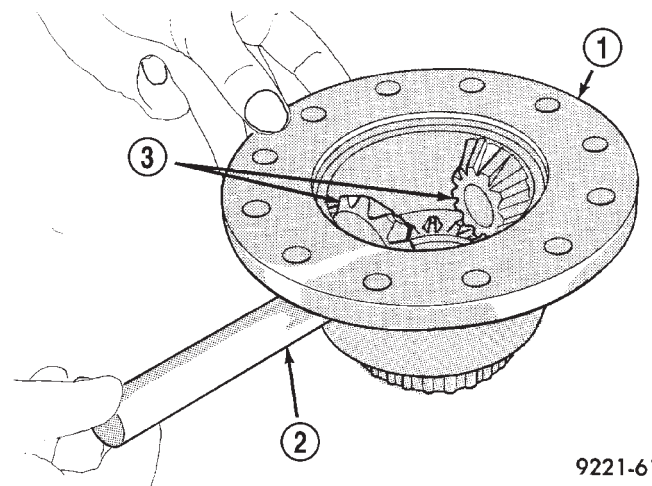
CAUTION: Use a new roll pin upon reassembly.

(3) Install pinion shaft roll pin (Fig. 205).

(4) Install side gear, stub shaft, and c-clip to differential support plate (Fig. 206).

**Fig. 203 Carrier Bearing Installation**

- 1 - ARBOR PRESS
- 2 - HANDLE C-4171
- 3 - SPECIAL TOOL C-4340

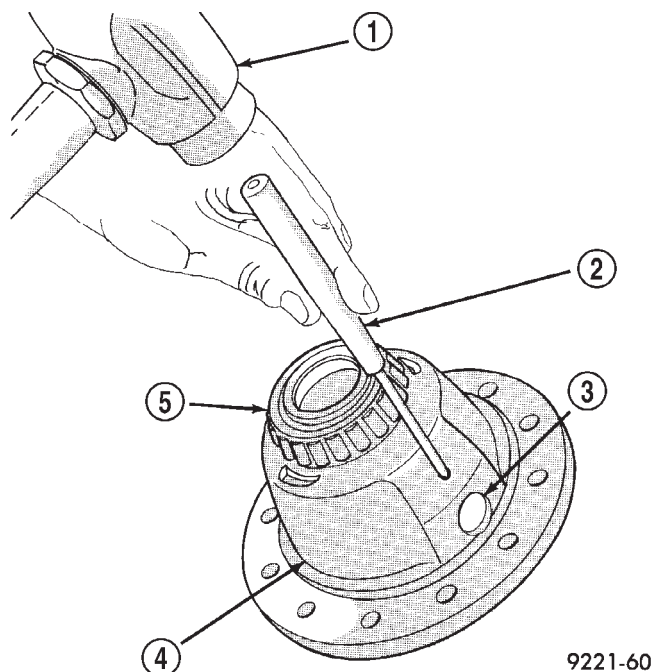
**Fig. 204 Install Differential Pinion Shaft and Remove Pinion Gears and Side Gears**

- 1 - DIFFERENTIAL CARRIER
- 2 - PINION SHAFT
- 3 - SIDE GEARS

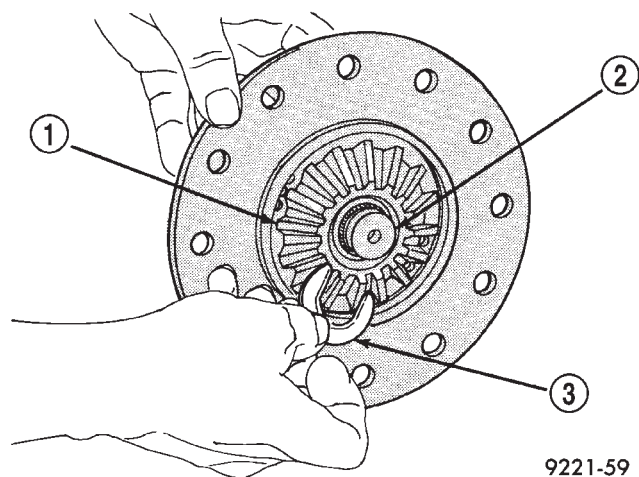
CAUTION: Ring gear bolts are not reusable. When reassembling, use new bolts.

CAUTION: When assembling differential halves, line up notches on side of carrier.

FINAL DRIVE (Continued)

**Fig. 205 Install Pinion Shaft Roll Pin**

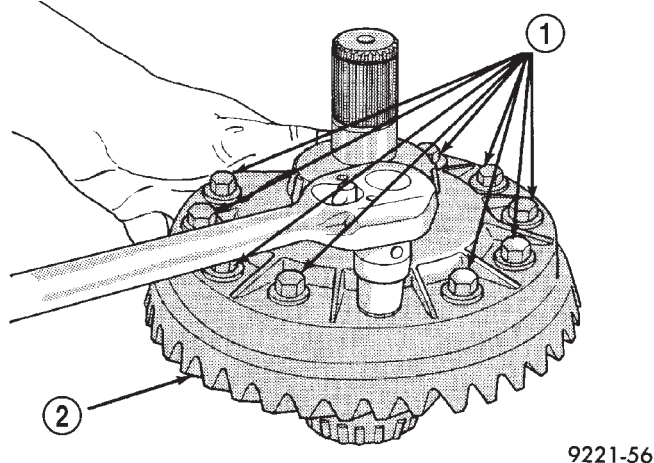
- 1 - HAMMER
- 2 - PIN PUNCH
- 3 - PINION SHAFT
- 4 - DIFFERENTIAL CARRIER
- 5 - DIFFERENTIAL BEARING

**Fig. 206 Install Side Gear, Stub Shaft, and C-Clip**

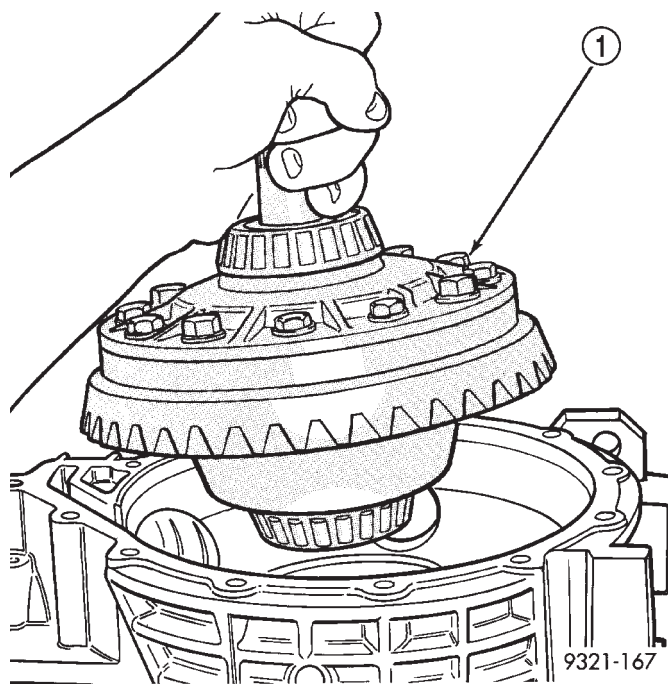
- 1 - SIDE GEAR
- 2 - STUB SHAFT
- 3 - "C" CLIP

(5) Assemble support plate to differential. Install ring gear and NEW bolts. Torque bolts to 95 N·m (70 ft. lbs.) (Fig. 207).

(25) Install differential assembly into the transaxle case (Fig. 208).

**Fig. 207 Install Ring Gear Bolts**

- 1 - RING GEAR BOLTS
- 2 - RING GEAR

**Fig. 208 Differential Assembly Installation**

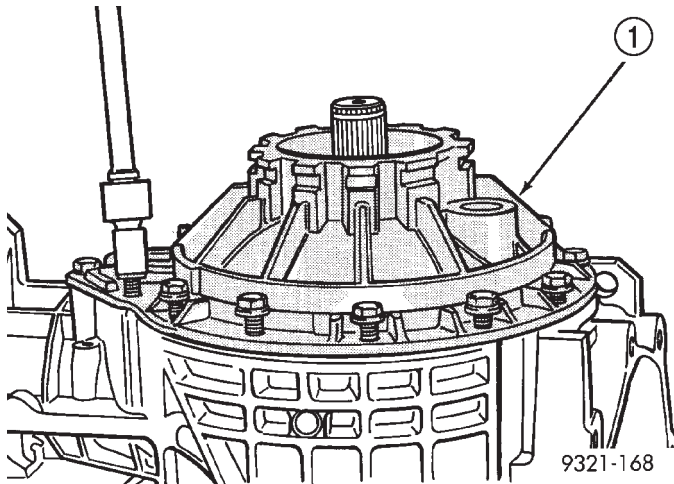
- 1 - DIFFERENTIAL ASSEMBLY

(26) Install differential cover (Fig. 209). Do not apply silicone sealant at this time. All bolts should be installed and tightened.

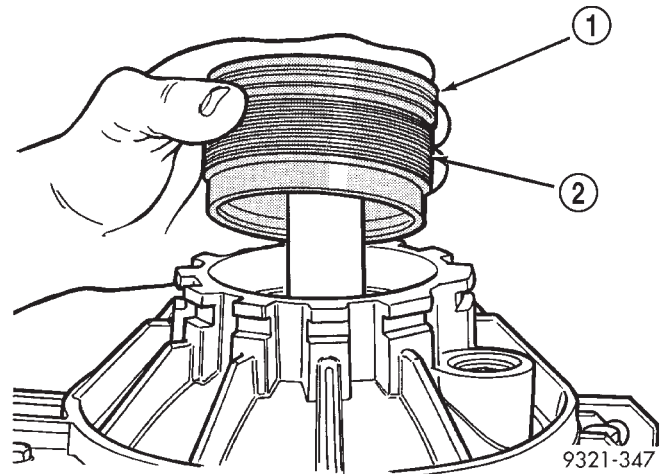
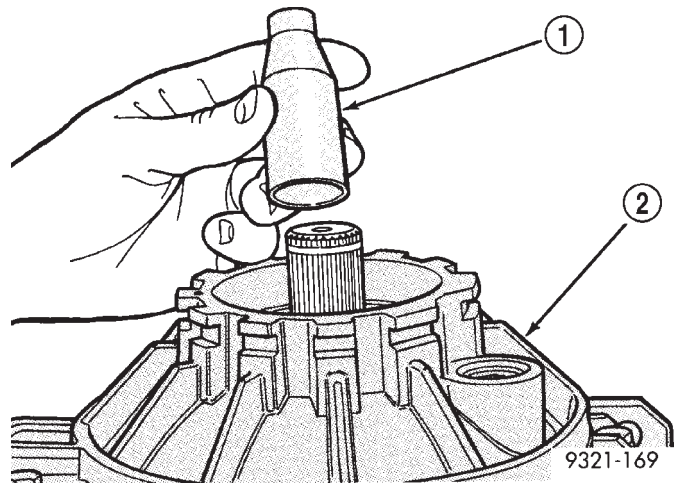
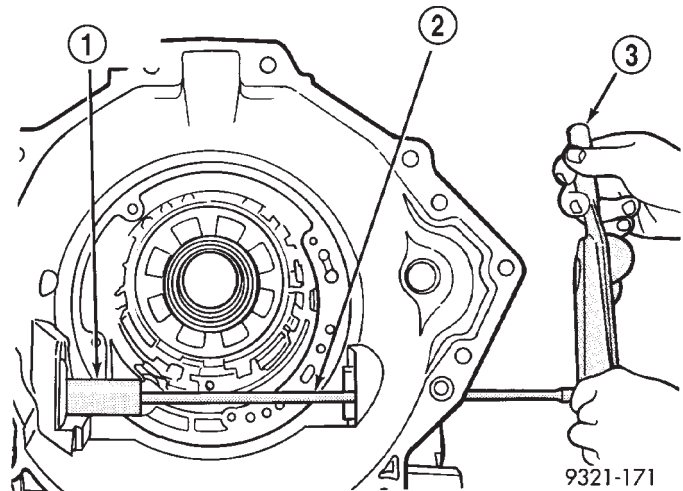
(27) Install seal protector (special tool 6591) as shown in (Fig. 210). Apply a thin film of gear oil on the protector.

CAUTION: Lube threads and O-ring on adjuster before installing. Failure to do so will result in thread damage to the adjuster and transaxle case.

FINAL DRIVE (Continued)

**Fig. 209 Differential Cover Installation**

1 - SIDE COVER

**Fig. 211 Outer Adjuster Installation**1 - O-RING
2 - OUTER ADJUSTER**Fig. 210 Seal Protector**1 - SEAL PROTECTOR (6591)
2 - SIDE COVER**Fig. 212 Special Tool 6548**1 - SPECIAL TOOL 6548
2 - 1/4" EXTENSION
3 - TORQUE WRENCH

(28) Screw on outer adjuster and tighten adjuster down finger tight (Fig. 211).

(29) Insert special tool 6548 (Fig. 212). This tool will be used to check turning torque of the differential assembly.

CAUTION: Differential bearings must be seated before taking turning torque readings. This is done by rotating the differential three or four turns in both directions.

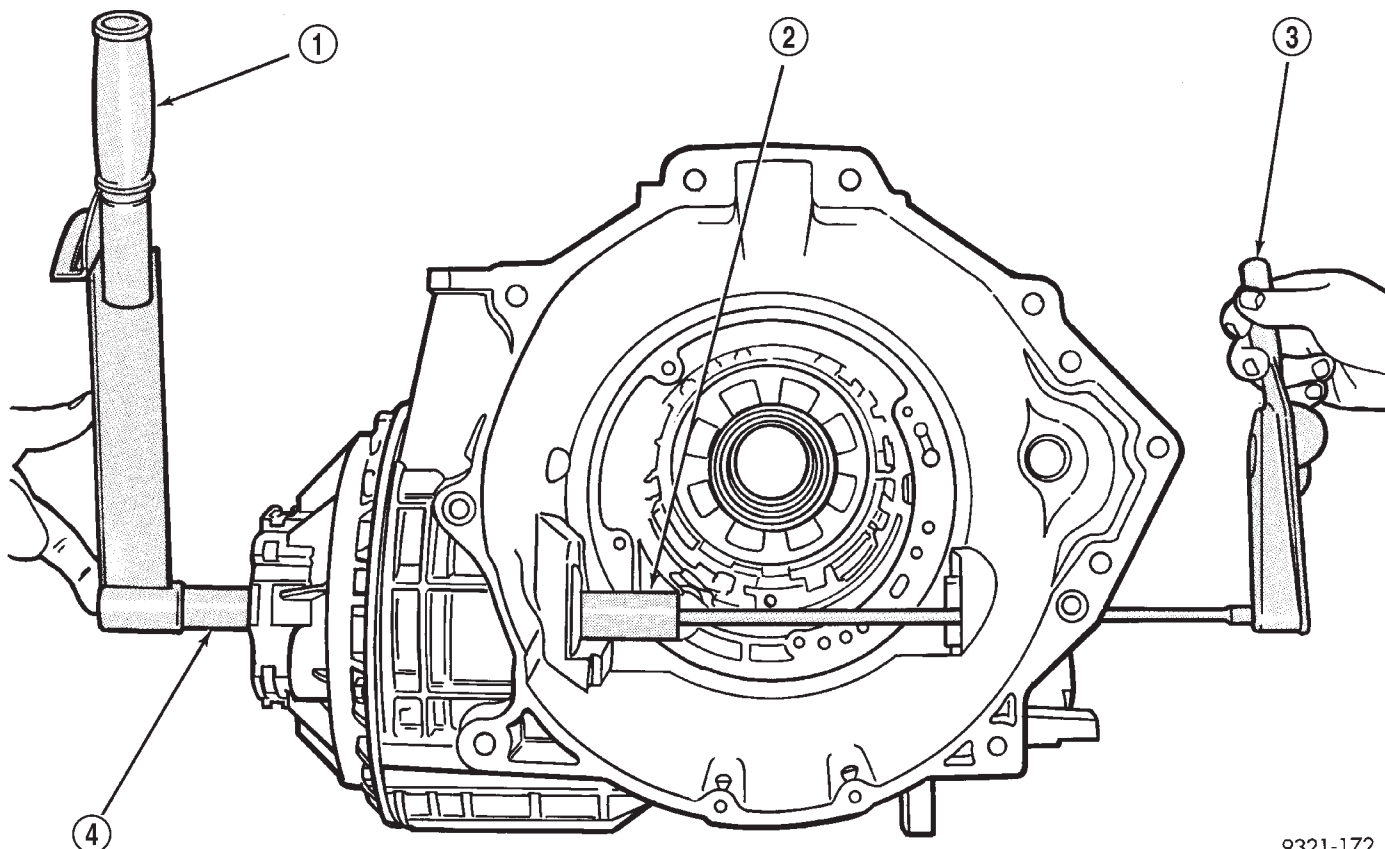
CAUTION: Turning torque of 19 to 23 in. lbs. can only be obtained when using new bearings. Do not attempt to obtain this turning torque with used bearings.

(30) Tighten outer adjuster with tool 6503 until 19 to 23 in. lbs. of turning torque is obtained on tool 6548. **Record how many foot pounds were required on the outer adjuster to obtain the correct turning torque** (Fig. 213). Record the foot pound reading. The reading that you are recording will be used in Step 54 of this procedure.

(31) Remove the differential cover, differential carrier assembly and inner adjuster.

(32) At this point the amount of torque required on the outer differential adjuster has been determined. The transfer shaft can now be installed into the transaxle case. Perform the following steps to install transfer shaft into transaxle case.

FINAL DRIVE (Continued)



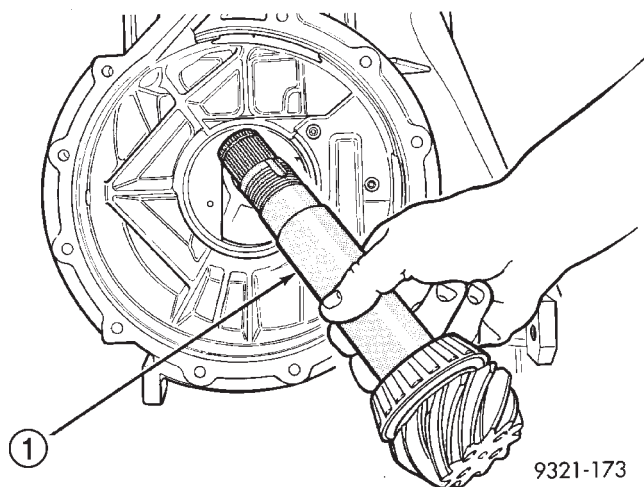
9321-172

Fig. 213 Determining Turning Torque

1 - FT. LBS. TORQUE WRENCH
2 - SPECIAL TOOL 6548

3 - IN. LBS. TORQUE WRENCH
4 - SPECIAL TOOL 6503

(33) Install transfer shaft into transaxle case (Fig. 214).



9321-173

Fig. 214 Transfer Shaft Installation

1 - TRANSFER SHAFT

CAUTION: Bottom of support fixture must be flush with face of bell housing. If the support fixture is not flush, the seals and rear transfer shaft bearing cup will be pressed in cocked.

(34) Install transfer shaft support fixture (special tool 6595) (Fig. 215).

(35) Install transfer shaft seal protector (special tool 6592) (Fig. 216). Apply thin film of gear oil to protector.

(36) Apply a small amount of lube to seal lips and install front transfer shaft seal. The serrated edges must face toward the rear of the transaxle (Fig. 217).

(37) Install seal with special tool 6567A (Fig. 218). Use a press to install seal. The installation tool will set the seal depth. Do not use a hammer to install seal. The seal may be damaged if installed with a hammer.

FINAL DRIVE (Continued)

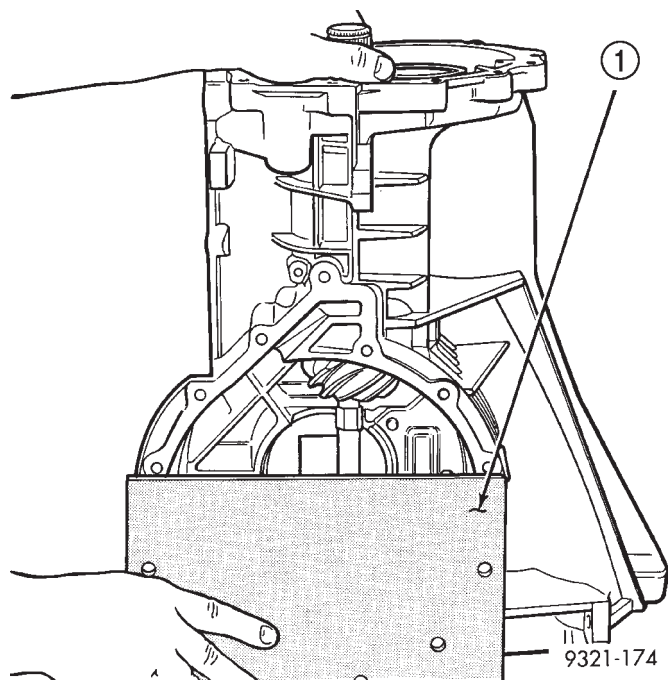


Fig. 215 Transfer Shaft Support Fixture

1 - SUPPORT FIXTURE (6595)

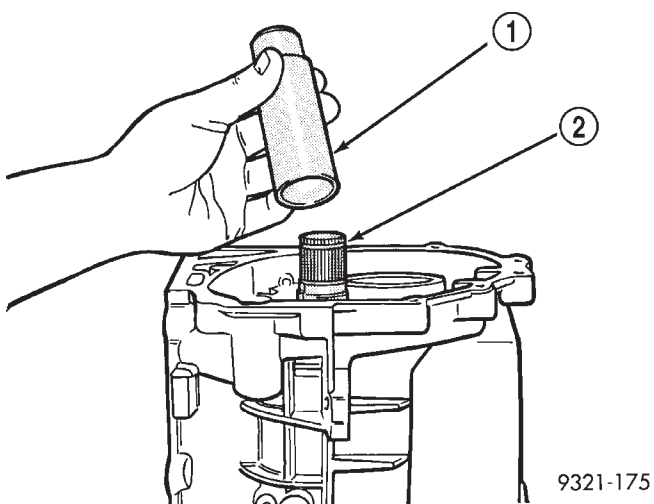


Fig. 216 Seal Protector Installation

1 - SEAL PROTECTOR
2 - TRANSFER SHAFT

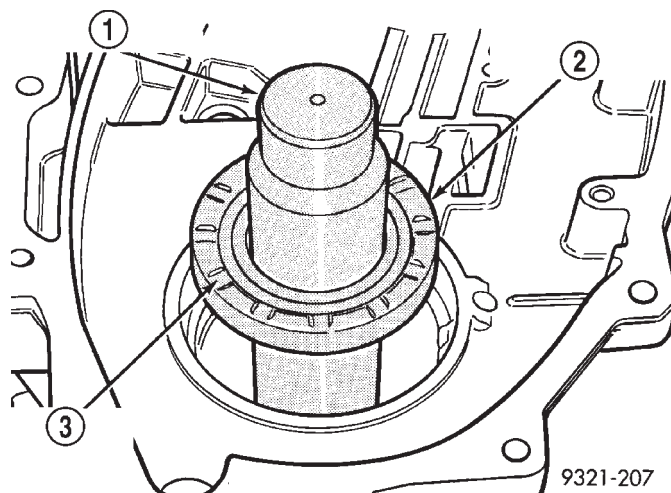


Fig. 217 Correct Seal Orientation

1 - SEAL PROTECTOR
2 - FRONT TRANSFER SHAFT SEAL
3 - SERRATED SIDE REARWARD

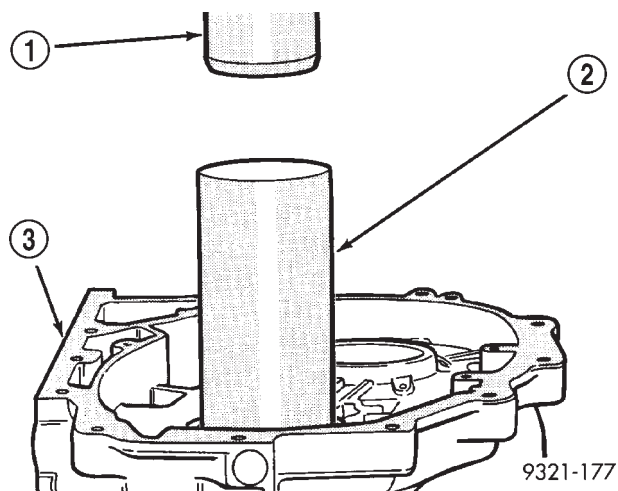


Fig. 218 Seal Installation

1 - ARBOR PRESS
2 - SEAL INSTALLER (6567A)
3 - TRANSAXLE CASE

FINAL DRIVE (Continued)

(38) Install rear transfer shaft seal. The seal must be installed so that the spring side of the seal faces the installation tool (Fig. 219). Use the same special tool (6567A) to install the seal. The installation tool will set the seal depth. Use a press to install this seal. Do not use a hammer.

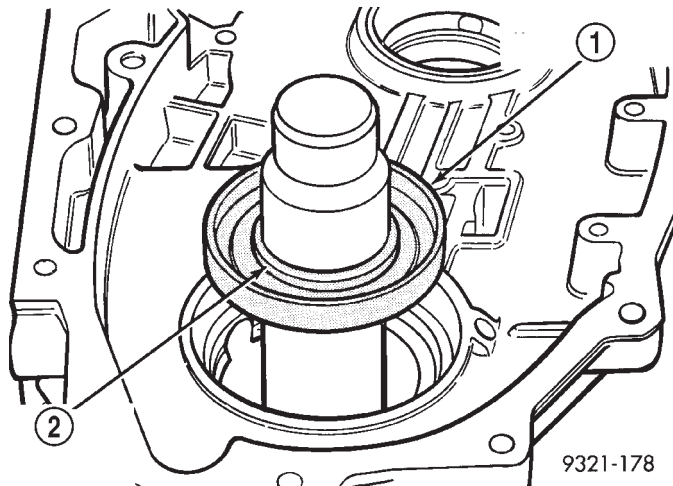


Fig. 219 Correct Seal Orientation

- 1 - REAR TRANSFER SHAFT SEAL
- 2 - SPRING SIDE OUTWARD

(39) Install rear transfer shaft cup into case (Fig. 220).

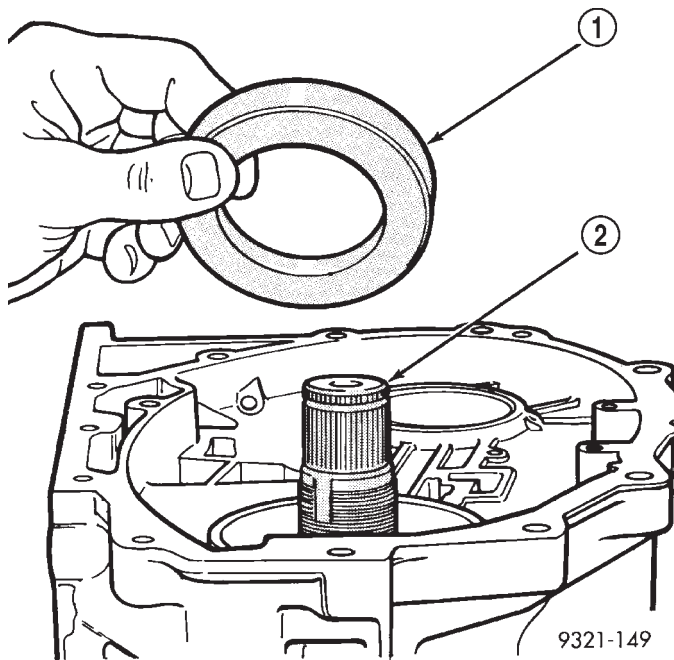


Fig. 220 Rear Transfer Bearing Cup

- 1 - REAR TRANSFER BEARING CUP
- 2 - TRANSFER SHAFT

CAUTION: Properly seated cups are essential in correctly setting bearing preload.

(40) Use special tool 6560 to press cup into case (Fig. 221).

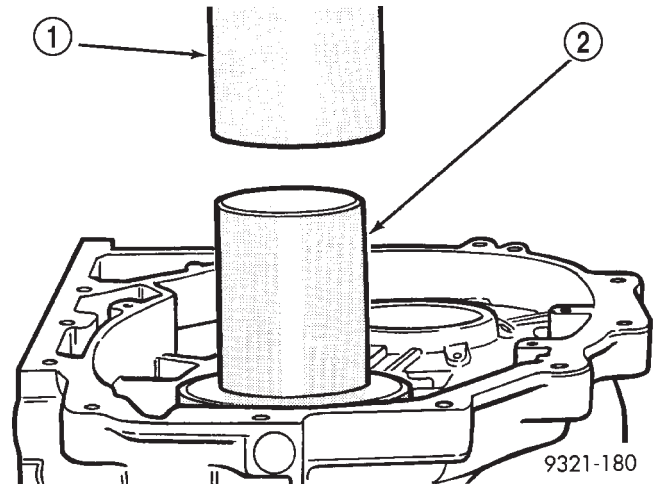


Fig. 221 Rear Transfer Shaft Cup Installation

- 1 - ARBOR PRESS
- 2 - SPECIAL TOOL 6560

(41) Install Transfer shaft preload shim (Fig. 222). Use the original shim that was taken out of transaxle if possible. If original shim is not available, use the thickest shim as a starting point. Refer to Transfer Shaft Rear Shim Chart for available sizes.

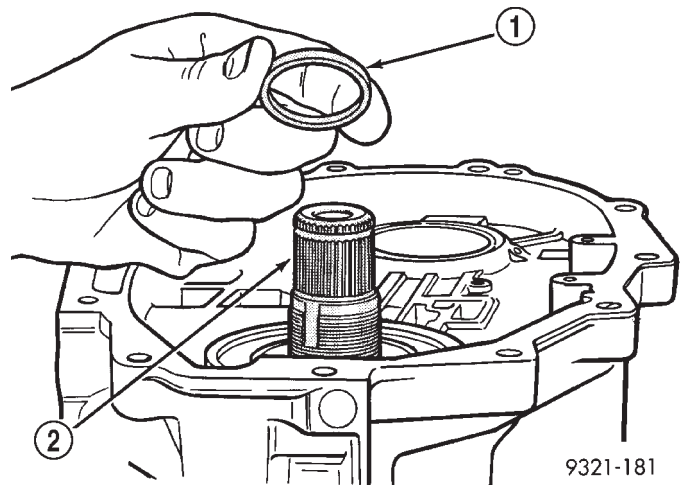


Fig. 222 Transfer Preload Shim Installation

- 1 - TRANSFER SHAFT PRELOAD SHIM
- 2 - TRANSFER SHAFT

FINAL DRIVE (Continued)

3.53 - 3.55 mm	4.13 - 4.15 mm
3.56 - 3.58 mm	4.16 - 4.18 mm
3.59 - 3.61 mm	4.19 - 4.21 mm
3.62 - 3.64 mm	4.22 - 4.24 mm
3.65 - 3.67 mm	4.25 - 4.27 mm
3.68 - 3.70 mm	4.28 - 4.30 mm
3.71 - 3.73 mm	4.31 - 4.33 mm
3.74 - 3.76 mm	4.34 - 4.36 mm
3.77 - 3.79 mm	4.37 - 4.39 mm
3.80 - 3.82 mm	4.40 - 4.42 mm
3.83 - 3.85 mm	4.43 - 4.45 mm
3.86 - 3.88 mm	4.46 - 4.48 mm
3.89 - 3.91 mm	4.49 - 4.51 mm
3.92 - 3.94 mm	4.52 - 4.54 mm
3.95 - 3.97 mm	4.55 - 4.57 mm
3.98 - 4.00 mm	4.58 - 4.60 mm
4.01 - 4.03 mm	4.61 - 4.63 mm
4.04 - 4.06 mm	4.64 - 4.66 mm
4.07 - 4.09 mm	4.67 - 4.69 mm
4.10 - 4.12 mm	

9421-69

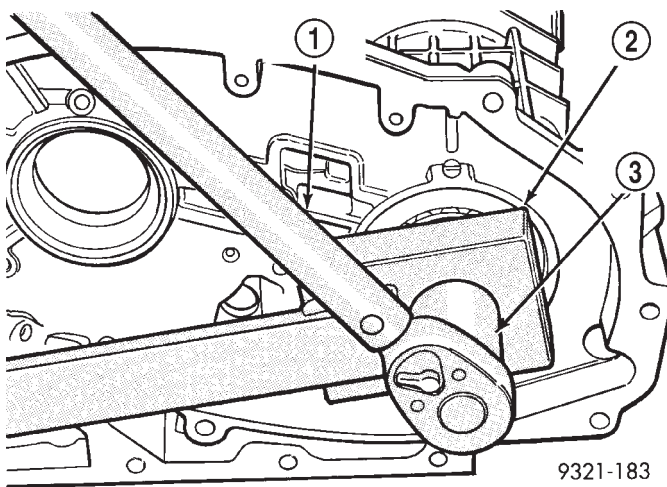
Transfer Shaft Rear Shim Chart

(42) Install rear transfer shaft cone. Press cone on transfer shaft using Tool 6560.

(43) Remove transfer shaft support fixture (special tool 6595).

CAUTION: Always use a new transfer shaft nut. Do not reuse old transfer shaft nut.

(44) Install a new transfer shaft nut (Fig. 223). Tighten nut to 271 N·m (200 ft. lbs.). Use special tools 6497 holder and 6498 shaft socket to tighten nut.



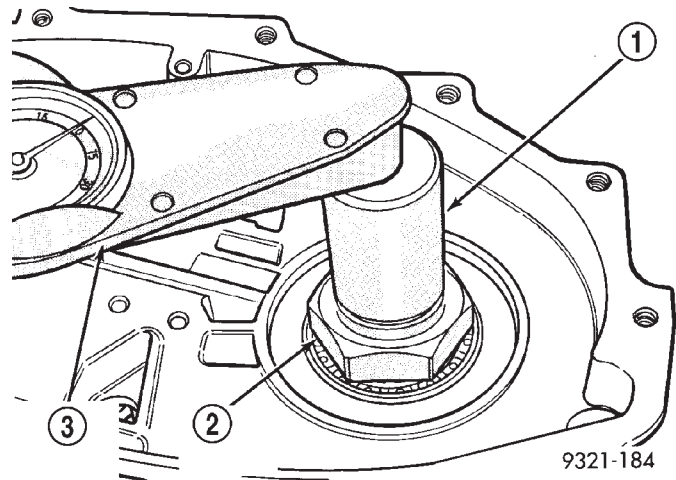
9321-183

Fig. 223 Transfer Shaft Nut Installation

- 1 - TORQUE WRENCH
- 2 - HOLDER (6497)
- 3 - SHAFT SOCKET (6498)

CAUTION: Failure to set the transfer shaft turning torque correctly may cause transfer shaft bearings or seals to fail. Be sure transfer shaft does not have end play. If end play exists, install a thinner preload shim.

(45) Check the turning torque of the transfer shaft using a torque wrench (Fig. 224). The turning torque should be 0.5 to 1.3 N·m (5 to 12 in. lbs.). If the turning torque is too high, install a thicker transfer shaft preload shim. If the turning torque is too low, install a thinner transfer shaft preload shim.



9321-184

Fig. 224 Checking Turning Torque

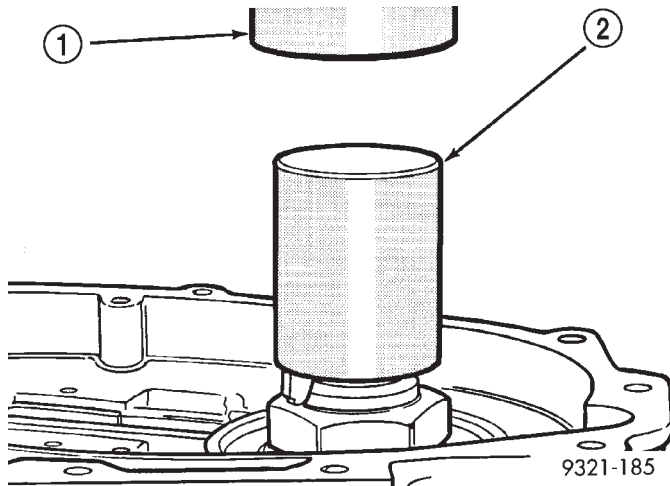
- 1 - SOCKET (6498)
- 2 - TRANSFER SHAFT NUT
- 3 - IN. LBS. TORQUE WRENCH

CAUTION: A press and special tool 6589 must be used when staking the transfer shaft nut. Do not use a hammer and the special tool to stake nut. If a hammer is used; seal, bearing, and/or tool damage may result. Also the stake will not be seated against the shaft correctly. This will allow the nut to loosen.

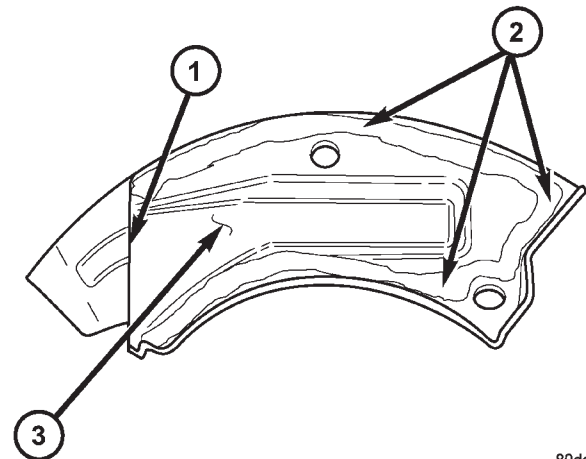
(46) After the correct turning torque is obtained, use special tool 6589 to stake the new transfer shaft nut (Fig. 225) (Fig. 226). Be sure that the tool arms line up with slots in the transfer shaft. Use a press with the special tool to make the stakes in the nut.

CAUTION: Failure to stake the transfer shaft nut correctly may allow the nut to loosen during trans-axle operation. This will cause transaxle failure.

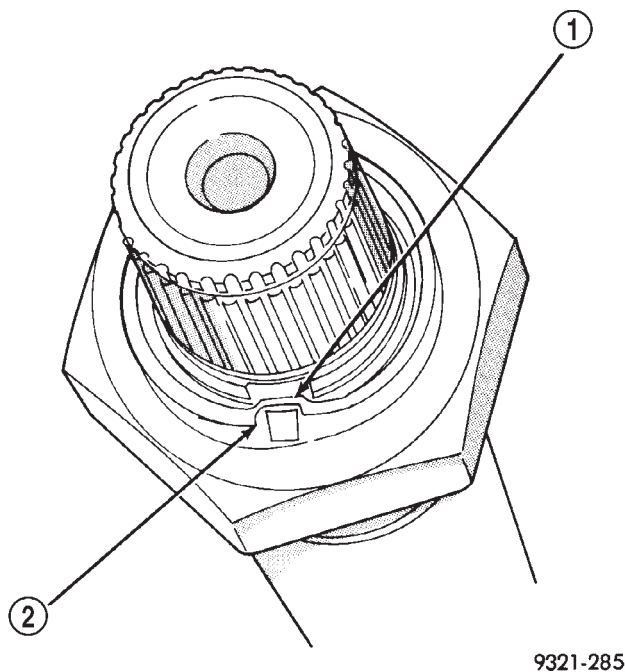
FINAL DRIVE (Continued)

**Fig. 225 Staking New Nuts**

- 1 - ARBOR PRESS
2 - STAKING TOOL (6589)

**Fig. 227 Vent Baffle Installation**

- 1 - NO SEALER ON THIS EDGE
2 - APPLY SEALER
3 - VENT BAFFLE

**Fig. 226 Correctly Staked Nut**

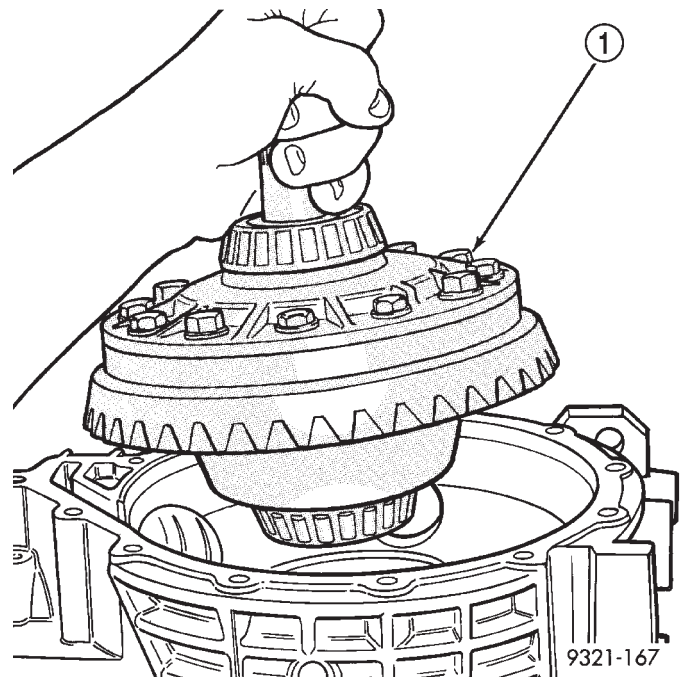
- 1 - BOTTOMED IN SLOT
2 - CORRECTLY STAKED NUT

(47) At this point the transfer shaft, new oil seals, pinion depth and transfer shaft preload have been set. The following steps will set the backlash between the transfer shaft and the ring gear.

(48) Install vent baffle. Apply sealer as shown in (Fig. 227).

(49) Install new inner adjuster O-ring. Lube inner adjuster threads and O-ring. Then install inner adjuster flush with differential side of case.

(50) Install differential assembly (with ring gear attached) into transaxle case (Fig. 228).

**Fig. 228 Differential Assembly Installation**

- 1 - DIFFERENTIAL ASSEMBLY

FINAL DRIVE (Continued)

(51) Transfer shaft to ring gear backlash should be 0.006" to 0.009" thousands of an inch. To get the backlash close enough to measure, perform the following steps. Hold the transfer shaft with one hand and rock the ring gear back and forth (Fig. 229). You should feel some backlash between the gears. If no backlash is felt use special tool 6502B to turn the inner adjuster so that it raises the differential assembly. This will increase backlash. If there is too much backlash, use special tool 6502B to turn the inner adjuster so that it lowers the differential assembly. This will decrease backlash. Recheck the backlash after each adjustment.

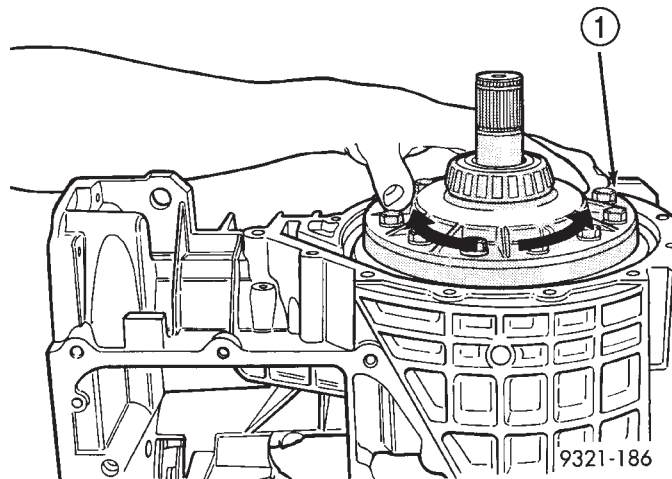


Fig. 229 Rocking Ring Gear Back and Forth

1 - DIFFERENTIAL ASSEMBLY

(52) Apply a 1/8 inch bead of sealant to differential cover flange. Then install differential cover with sealant (Fig. 230) and tighten cover bolts.

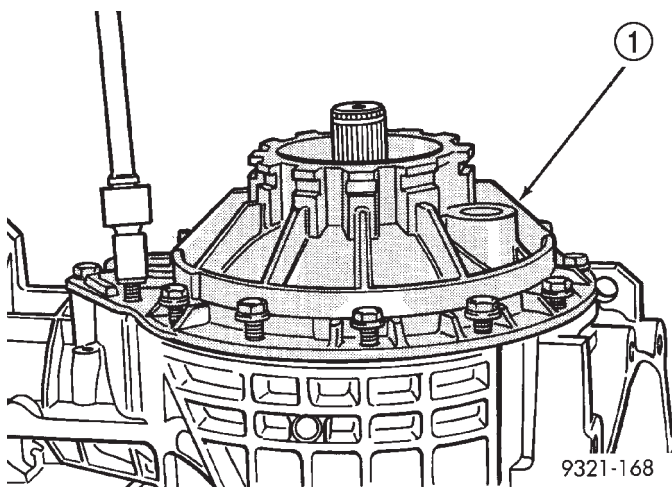


Fig. 230 Differential Cover Installation

1 - SIDE COVER

(53) Install seal protector (special tool 6591) on shaft (Fig. 231).

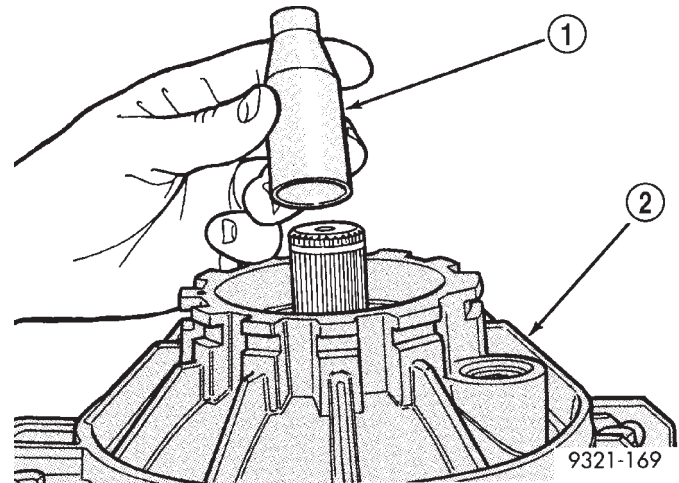


Fig. 231 Seal Protector

1 - SEAL PROTECTOR (6591)

2 - SIDE COVER

CAUTION: Lube threads and O-ring on adjuster before installing. Failure to do so will result in thread damage to the adjuster and differential cover.

(54) Install outer adjuster with new O-ring (Fig. 232). Torque the outer adjuster (special tool 6503) to the torque reading recorded in Step 30. Then seat bearings by turning differential three or four revolutions in both directions. Tighten adjuster a second time to same torque recorded in Step 30. Again reseal bearings. Repeat this sequence until correct adjuster torque is maintained.

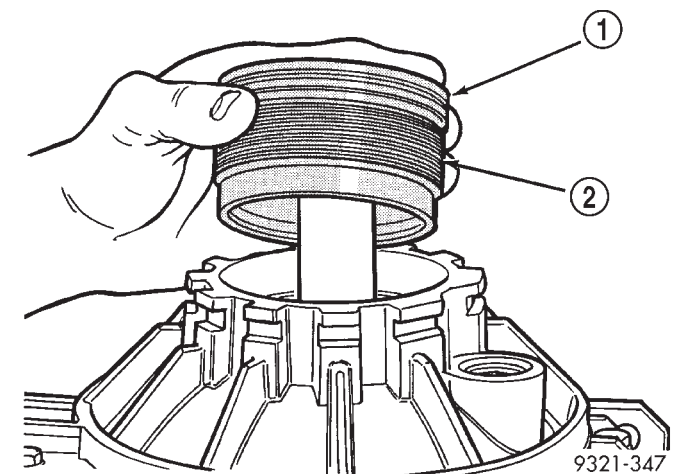


Fig. 232 Outer Adjuster Installation

1 - O-RING

2 - OUTER ADJUSTER

FINAL DRIVE (Continued)

(55) To check and/or adjust backlash, remove the inspection plug from the top of the differential. Install dial indicator as shown in (Fig. 233). The tip of the dial indicator must be perpendicular against one of the ring gear teeth. Hold transfer shaft with locking pliers. Move ring gear back and forth with special tool 6548. Read the amount of backlash with dial indicator. Backlash should be 0.006" to 0.009" thousands of an inch.

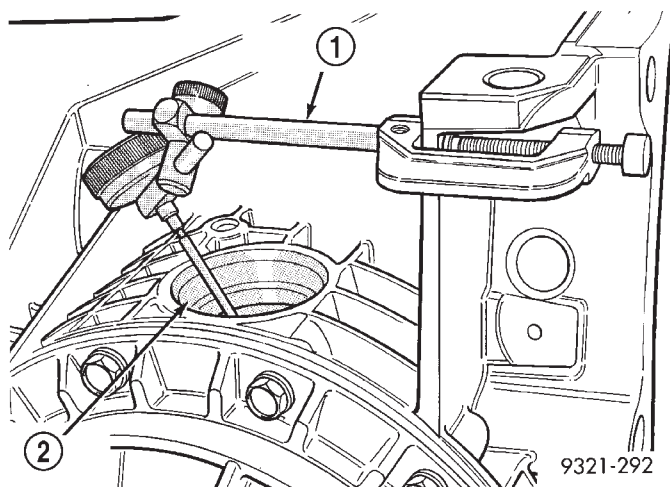


Fig. 233 Dial Indicator Installation

- 1 - DIAL INDICATOR KIT C-3339
2 - ACCESS HOLE

(56) If there is too much backlash, loosen the outer adjuster with special tool 6503. Then turn the inner adjuster so that it **moves away from the ring gear**. After adjusting the inner adjuster, retighten the outer adjuster to the torque recorded in Step 30. The inner adjuster should be turned in small increments.

(57) If there is not enough backlash, loosen the outer adjuster with special tool 6503. Then turn the inner adjuster so that it **moves towards the ring gear**. After adjusting the inner adjuster, retighten the outer adjuster to the torque recorded in Step 30. The inner adjuster should be turned in small increments.

(58) Once backlash is within specifications, recheck backlash in four spots on the ring gear 90 degrees apart. All four readings should be within specifications.

(59) Install inner and outer adjuster locking brackets.

(60) Install new inspection plug. Use a wooden block to tap inspection plug into place.

(61) Fill differential. It is easier to fill the differential prior to installing the transaxle back into the vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/FLUID - STANDARD PROCEDURE)

FLUID

STANDARD PROCEDURE

STANDARD PROCEDURE - FLUID LEVEL AND CONDITION CHECK

NOTE: The transmission and differential have separate oil sumps. The transmission sump requires automatic transmission fluid. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION) for proper fluid required for this transaxle. The differential sump requires petroleum based hypoid gear lube. (Refer to LUBRICATION & MAINTENANCE/FLUID TYPES - DESCRIPTION) for proper fluid required for this differential.

TRANSMISSION SUMP

FLUID LEVEL CHECK

The transmission sump has a dipstick to check oil similar to most automatic transmissions. It is located on the left side of the engine. Be sure to wipe all dirt from dipstick handle before removing.

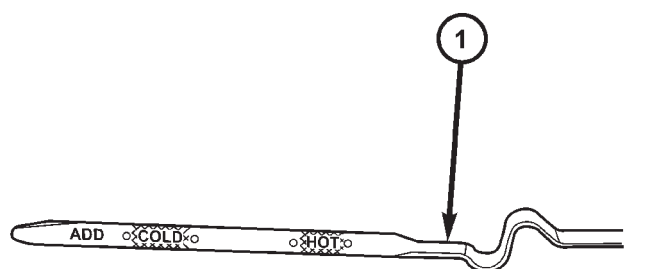
The torque converter fills in both the P Park and N Neutral positions. Place the selector lever in P Park to be sure that the fluid level check is accurate. **The engine should be running at idle speed for at least one minute, with the vehicle on level ground.** At normal operating temperature (approximately 82 C. or 180 F.), the fluid level is correct if it is in the HOT region (cross-hatched area) on the oil level indicator (Fig. 234). The fluid level should be in COLD region at 80° F fluid temperature. Adjust fluid level as necessary. Use only Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602).

FLUID LEVEL CHECK USING DRB

NOTE: Engine and Transaxle should be at normal operating temperature before performing this procedure.

- (1) Start engine and apply parking brake.
- (2) Connect DRBIII® scan tool and select transmission.
- (3) Select sensors.
- (4) Read the transmission temperature value.
- (5) Compare the fluid temperature value with the chart.
- (6) Adjust transmission fluid level shown on the dipstick according to the chart (Fig. 235). Use only Mopar® ATF+4 Automatic Transmission Fluid (MS 9602).
- (7) Check transmission for leaks.

FLUID (Continued)



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Fig. 234 Fluid Level Indicator

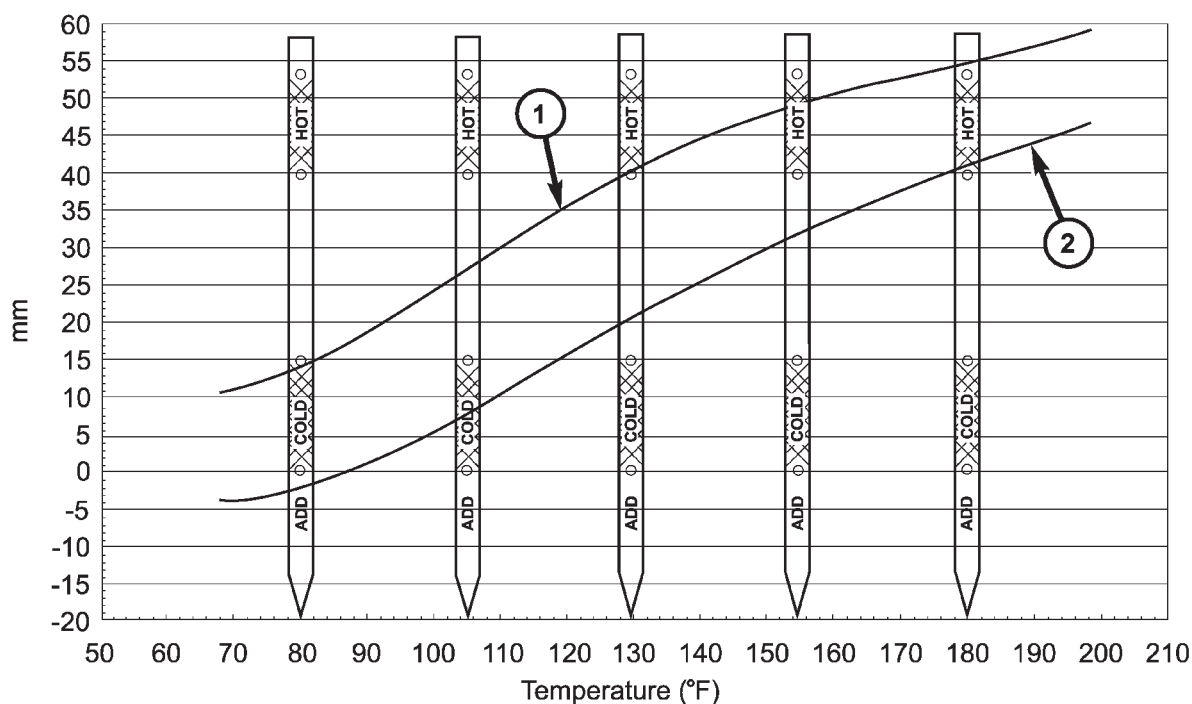
1 - FLUID LEVEL INDICATOR

Low fluid level can cause a variety of conditions because it allows the pump to take in air along with the fluid. As in any hydraulic system, air bubbles make the fluid spongy, therefore, pressures will be low and build up slowly.

Improper filling can also raise the fluid level too high. When the transaxle has too much fluid, the gears churn up foam and cause the same conditions which occur with a low fluid level.

In either case, air bubbles can cause overheating and/or fluid oxidation, and varnishing. This can interfere with normal valve, clutch, and accumulator operation. Foaming can also result in fluid escaping from the transaxle vent where it may be mistaken for a leak.

Along with fluid level, it is important to check the condition of the fluid. When the fluid smells burned, and is contaminated with metal or friction material particles, a complete transaxle recondition is needed.



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Fig. 235 42LE Fluid Temperature Chart

1 - MAX. LEVEL

2 - MIN. LEVEL

FLUID (Continued)

Be sure to examine the fluid on the dipstick closely. If there is any doubt about its condition, drain out a sample for a double check.

Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602) when new is red in color. The ATF is dyed red so it can be identified from other fluids used in the vehicle such as engine oil or antifreeze. The red color is not permanent and is not an indicator of fluid condition. As the vehicle is driven, the ATF will begin to look darker in color and may eventually become brown. **This is normal.** ATF+4 also has a unique odor that may change with age. Consequently, **odor and color cannot be used to indicate the fluid condition or the need for a fluid change.**

After the fluid has been checked, seat the dipstick fully to seal out water and dirt.

DIFFERENTIAL SUMP

The differential sump is checked separately from the transmission. A fill plug located on the side of the transaxle must be removed to check fluid level. The fluid should be within 9 mm (.375 in.) of the bottom of the fill hole. The differential capacity is 0.95 liters (32 ounces). Adjust if needed. Use Mopar® Fuel Saving 75w-90 Petroleum Based Hypoid Gear Lubricant.

Inspect the differential area during engine oil changes for any leaks. If leakage is present, determine the source of the leak and repair as required. Remove the fill plug and verify the proper level. Adjust if needed. Use Mopar® Fuel Saving 75w-90 Petroleum Based Hypoid Gear Lubricant.

STANDARD PROCEDURE - FLUID/FILTER SERVICE

NOTE: Refer to the maintenance schedules, or the vehicle owner's manual, for the recommended maintenance (fluid/filter change) intervals for this transaxle.

NOTE: The 42LE Transaxle has separate transmission and differential fluid sumps. Only fluids of the type labeled Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602) should be used in the transaxle sump. A filter change should be made at the time of the transmission oil change. The magnet (on the inside of the oil pan) should also be cleaned with a clean, dry cloth.

NOTE: If the transaxle is disassembled for any reason, the fluid and filter should be changed.

FLUID/FILTER SERVICE (RECOMMENDED)

(1) Raise vehicle on a hoist (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE). Place a drain container with a large opening, under transaxle oil pan.

(2) Loosen pan bolts and tap the pan at one corner to break it loose allowing fluid to drain, then remove the oil pan.

(3) Install a new filter and o-ring on bottom of the valve body and tighten retaining screws to 5 N·m (40 in. lbs.).

(4) Clean the oil pan and magnet. Reinstall pan using new Mopar Silicone Adhesive sealant. Tighten oil pan bolts to 19 N·m (165 in. lbs.).

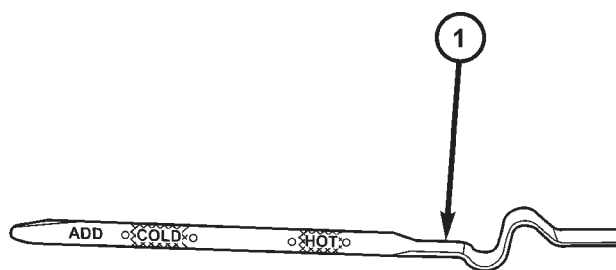
(5) Pour four quarts of Mopar® ATF+4 (Automatic Transmission Fluid) Type 9602 through the dipstick opening.

(6) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(7) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the lowest mark on the dipstick (Fig. 236).

(8) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F). (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/FLUID - STANDARD PROCEDURE).

(9) To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the dipstick opening.



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Fig. 236 Fluid Level Indicator

1 - FLUID LEVEL INDICATOR

FLUID (Continued)

ALTERNATIVE MAINTENANCE METHODS

TRANSAXLE FLUID EXCHANGER METHOD

CAUTION: The use of any fluid exchanger that introduces additives into the transaxle is not recommended.

(1) To perform the transaxle fluid exchange, the transaxle must be at operating temperature. Drive the vehicle until it reaches full operating temperature.

(2) Obtain a suitable transaxle fluid exchanger and verify the tank is clean and dry.

(3) Fill the tank to the recommended fill capacity with Mopar® ATF+4 Type 9602.

(4) Connect the machine to the vehicle following the manufacturers instructions. Perform the exchange procedure following the instructions provided with the machine.

(5) Once machine has completed the fluid exchange, check the fluid level and condition and fill to proper level with Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602). (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/FLUID - STANDARD PROCEDURE).

NOTE: Verify that the transaxle cooler lines are tightened to proper specifications. Cooler line torque specification is 2 N•m (18 in. lbs.).

DIPSTICK TUBE FLUID SUCTION METHOD

(1) When performing the fluid suction method, make sure the transaxle is at full operating temperature.

(2) To perform the dipstick tube fluid suction method, use a suitable fluid suction device (Vacula™ or equivalent).

(3) Insert the fluid suction line into the dipstick tube.

NOTE: Verify that the suction line is inserted to the lowest point of the transaxle oil pan. This will ensure complete evacuation of the fluid in the pan.

(4) Follow the manufacturers recommended procedure and evacuate the fluid from the transaxle.

(5) Remove the suction line from the dipstick tube.

(6) Pour four quarts of Mopar® ATF+4 (Automatic Transmission Fluid—Type 9602) through the dipstick opening.

(7) Start engine and allow to idle for at least one minute. Then, with parking and service brakes applied, move selector lever momentarily to each position, ending in the park or neutral position.

(8) Check the transaxle fluid level and add an appropriate amount to bring the transaxle fluid level to 3mm (1/8 in.) below the lowest mark on the dipstick (Fig. 236).

(9) Recheck the fluid level after the transaxle has reached normal operating temperature (180°F). (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/FLUID - STANDARD PROCEDURE)

(10) To prevent dirt from entering transaxle, make certain that dipstick is fully seated into the dipstick opening.

STANDARD PROCEDURE - DIFFERENTIAL SUMP DRAIN AND REFILL

DRAIN

(1) Raise vehicle on hoist (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

(2) Remove differential drain plug located on the bottom of the differential housing. Allow the fluid to drain into an oil drain pan.

(3) Remove differential fill plug located on the differential side cover. This will assist the flow of fluid from the drain plug hole.

FILL

(1) Install drain plug into differential housing. Tighten drain plug to 7 N•m (60 in. lbs.)

(2) Fill differential with Mopar® Fuel Saving 75W-90 petroleum based hypoid gear lubricant. The fluid should be level with the bottom of the fill hole. The differential capacity is 0.95 liters (32 ounces).

CAUTION: Overfilling the differential can result in oil foaming and/or oil loss from the differential vent.

(3) Install differential fill plug. Tighten fill plug to 47 N•m (35 ft. lbs.).

GEAR SHIFT CABLE - COLUMN

REMOVAL

(1) Place vehicle in park, and turn ignition key to the "LOCK" position (Fig. 237) .

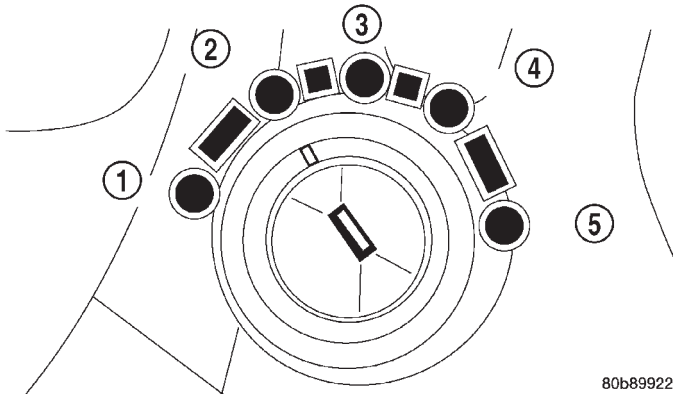


Fig. 237 Ignition Key/Switch Positions

- 1 - ACC
- 2 - LOCK
- 3 - OFF
- 4 - ON/RUN
- 5 - START

(2) Remove under panel silencer/duct assembly (Fig. 238) .

(3) Remove column cover screws (Fig. 239) .

(4) Tilt column down and remove upper half of column cover (Fig. 240) .

(5) Tilt the column to the uppermost position and remove the tilt lever (Fig. 241).

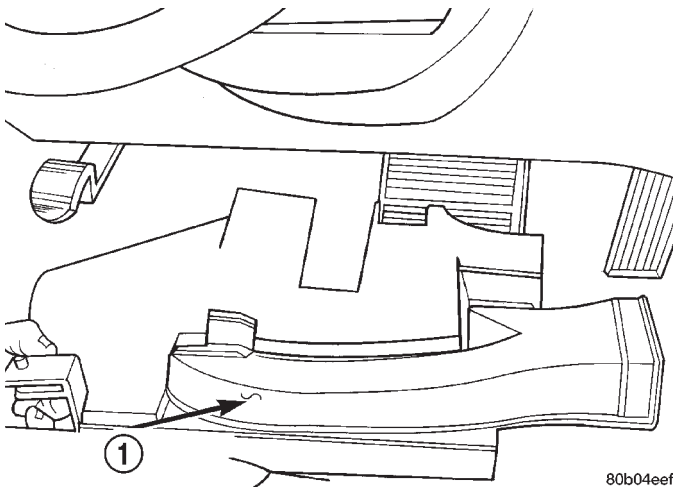


Fig. 238 Panel Removal/Installation

- 1 - SILENCER/DUCT ASSEMBLY

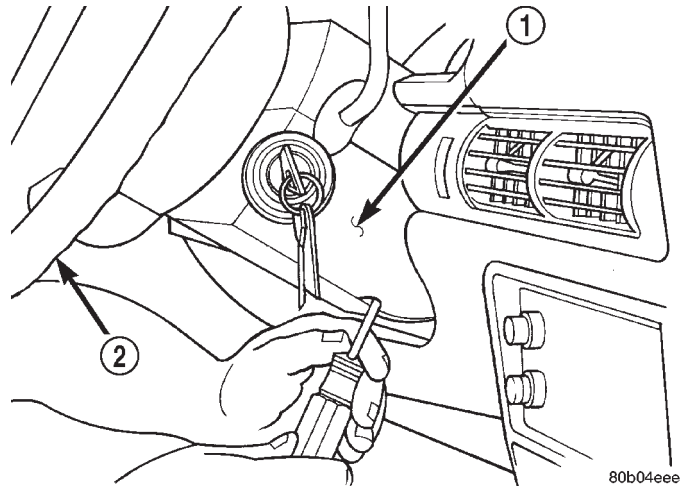


Fig. 239 Lower Column Cover Screw Removal

- 1 - LOWER COLUMN COVER
- 2 - STEERING WHEEL

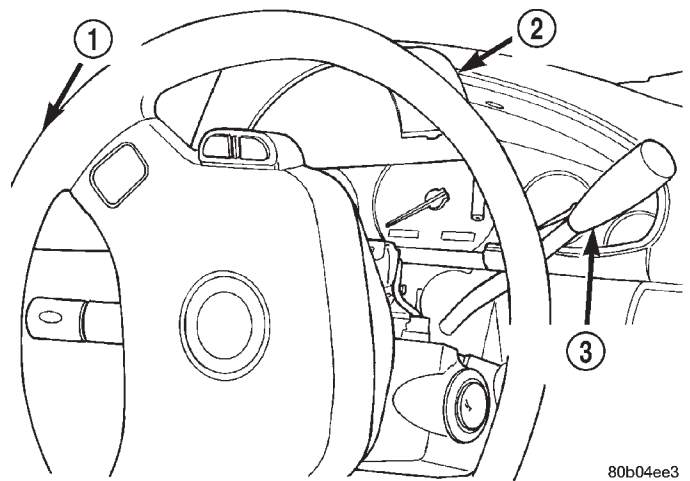
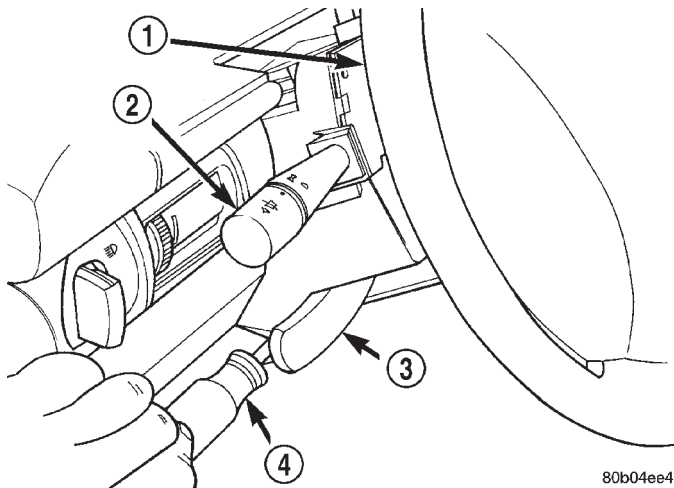


Fig. 240 Upper Column Removal/Installation

- 1 - STEERING WHEEL
- 2 - UPPER COLUMN COVER
- 3 - GEAR SHIFT HANDLE

GEAR SHIFT CABLE - COLUMN (Continued)

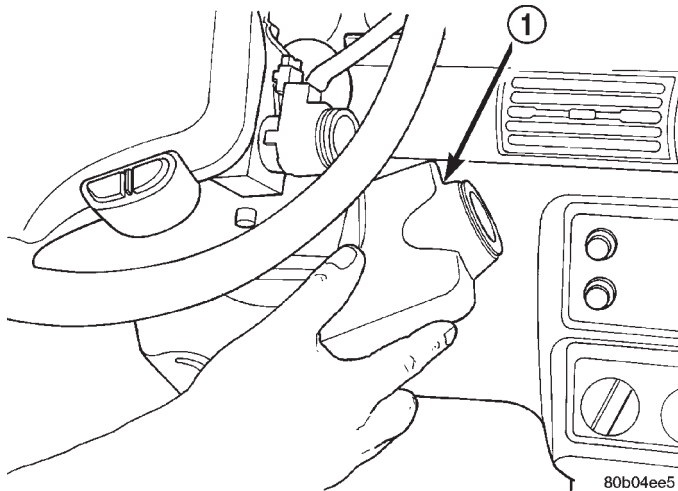


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Fig. 241 Tilt Lever Screw Removal/Install

- 1 - STEERING WHEEL
- 2 - TURN SIGNAL LEVER
- 3 - TILT LEVER
- 4 - SCREWDRIVER

(6) Remove the ignition key and remove lower column cover (Fig. 242).



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Fig. 242 Lower Column Cover Removal/Insta

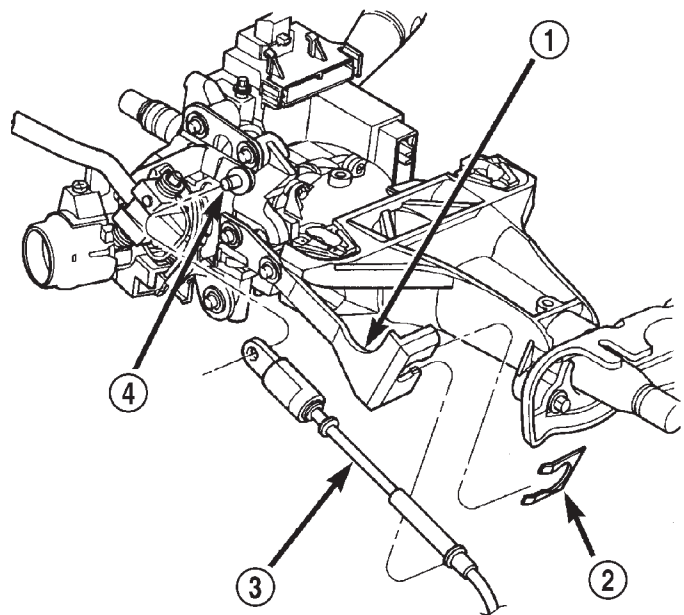
- 1 - LOWER COLUMN COVER

(7) Remove cable from shift pin (Fig. 243).

(8) Remove cable retainer clip from shift cable conduit bracket (Fig. 243).

CAUTION: Column must be tilted fully upward to remove cable retainer clip.

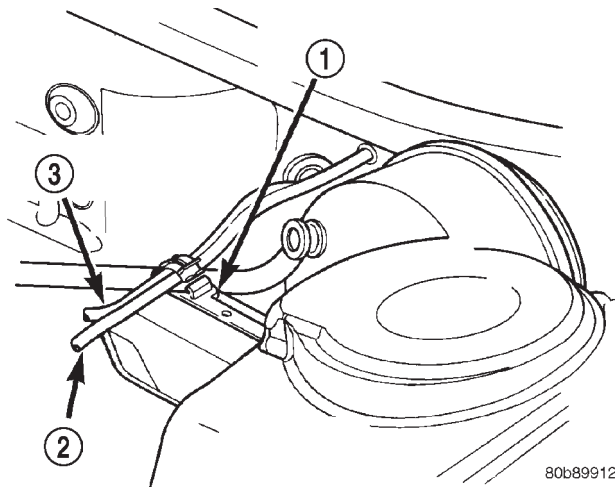
(9) Raise hood. From inside the engine compartment, remove the gear shift cable from the cable bracket (Fig. 244).



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Fig. 243 Column Gear Shift Cable—Re

- 1 - CONDUIT BRACKET
- 2 - RETAINER CLIP
- 3 - GEARSHIFT CABLE
- 4 - SHIFT PIN



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Fig. 244 Throttle/Gearshift Cable Bracket

- 1 - CABLE BRACKET
- 2 - GEARSHIFT CABLE
- 3 - THROTTLE CABLE

(10) Unseat the cable grommet from the firewall (Fig. 246) and pull the shift cable from the interior of the vehicle.

(11) Raise vehicle on hoist and unbolt fill tube bracket. Rotate fill tube to gain access to the integrated shift cable clamp.

(12) Disconnect cable from routing bracket as shown in (Fig. 245).

GEAR SHIFT CABLE - COLUMN (Continued)

(13) Remove shift cable retaining nut and slide cable assy. off of mounting stud (Fig. 246) .

(14) Disconnect shifter cable from shift lever assembly at transaxle (Fig. 246) .

(15) Remove cable from vehicle.

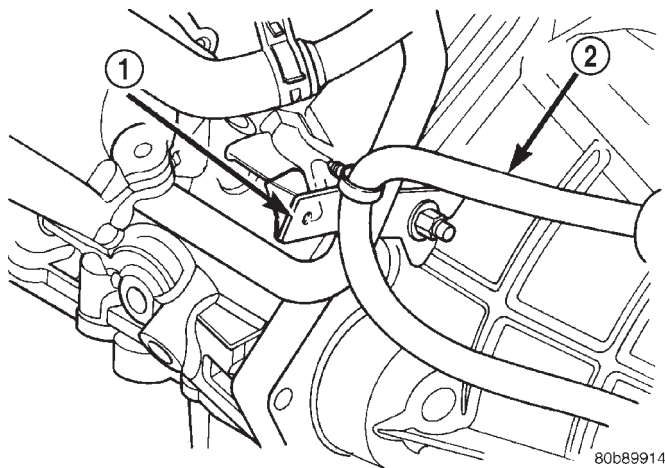


Fig. 245 Cable Routing Bracket—(3.2)

- 1 - BRACKET
- 2 - CABLE

INSTALLATION

(1) Make sure transaxle shift lever is in "park." This is the most rearward position. Verify park sprag is fully engaged by rotating either a tire or an axle shaft.

(2) Position cable in vehicle and connect cable end to the transaxle shift lever (Fig. 246) .

(3) Verify that the washer (Fig. 246) is still in place on the cable mounting stud. Install cable to transaxle and tighten nut to 28 N·m (250 in. lbs.).

(4) Rotate fill tube to original location. Install and tighten fill tube bracket bolt.

(5) Install cable "push pin" into bracket as shown in (Fig. 245) .

(6) Route transaxle shift cable through hole in dash panel (Fig. 246) (Fig. 247) .

(7) Lubricate cable grommet with a synthetic lubricant (or equivalent) and secure to hole. Verify that it is seated by pulling outward on cable.

(8) Install cable into throttle/gearshift cable bracket (Fig. 244) .

(9) Inside the vehicle, route the gearshift between the left a/c duct and the left lower heat duct (Fig. 247) and up to the steering column.

(10) Tilt steering column all the way up and make sure shift lever is still in "park."

(11) Connect transaxle shift cable to shift cable conduit bracket and secure with new clip (Fig. 243) .

(12) Attach shift cable to attaching stud (pin) (Fig. 243) by snapping into place.

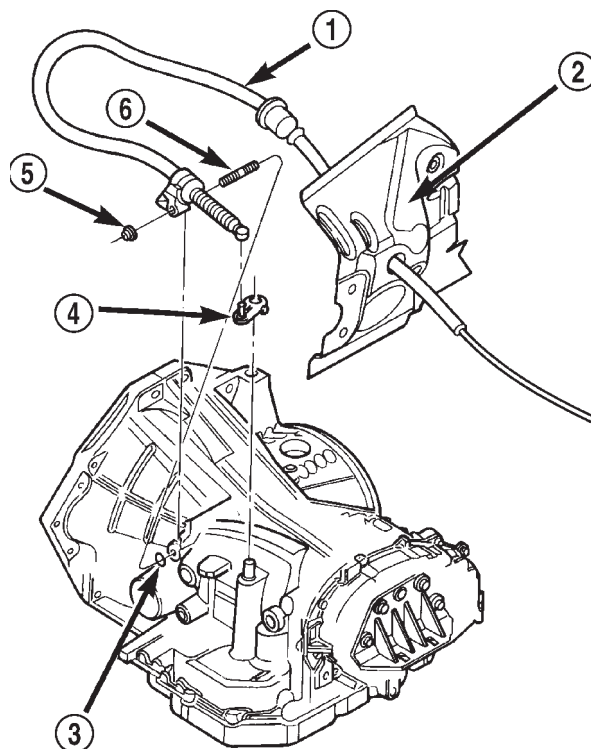


Fig. 246 Gearshift Cable Removal

- 1 - CABLE
- 2 - FIREWALL
- 3 - WASHER
- 4 - SHIFT LEVER
- 5 - NUT
- 6 - STUD

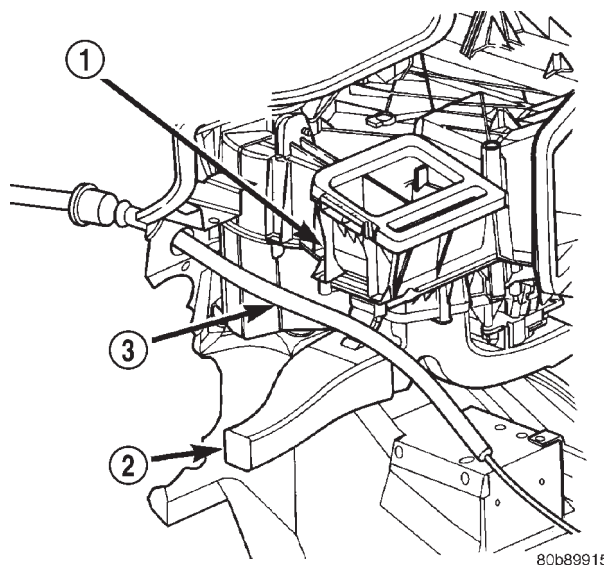


Fig. 247 Shift Cable Routing

- 1 - LH A/C DUCT OUTLET
- 2 - LH LOWER HEAT DUCT
- 3 - GEARSHIFT CABLE

GEAR SHIFT CABLE - COLUMN (Continued)

(13) Move the steering column to full tilt downward. Put the column shifter in park with key removed.

(14) Adjust cable by rotating the adjuster into lock position (Fig. 248) . The adjuster will click when lock is fully adjusted.

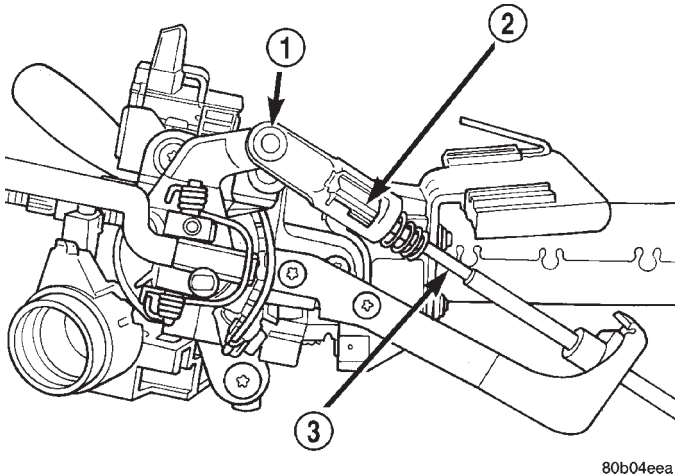


Fig. 248 Shift Cable Adjuster Lock

- 1 - SHIFTER PIN
- 2 - CABLE ADJUSTER LOCK
- 3 - SHIFT CABLE

(15) Reinstall upper and lower steering column shrouds (Fig. 240) (Fig. 242) . Then install under-panel silencer/duct.

(16) Check shifter for proper operation. It should operate smoothly without binding. The engine starter should crank in park or Neutral positions only.

ADJUSTMENTS

ADJUSTMENT

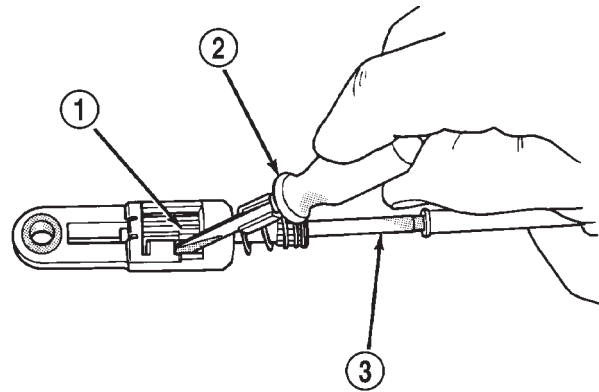
The gearshift cable should be adjusted if any of the following repairs or situations are encountered:

- Transaxle replacement.
- Valve body repair.
- Shift cable replacement.
- Column shifter replacement.
- When there is no cranking in Park or Neutral.

If the following conditions are encountered, the interlock cable is out of adjustment. Refer to Interlock Cable Adjustment procedure.

- When the transaxle can be shifted without the key in the ignition.
- If the key can be removed with the shifter in reverse.
- When the key cannot be removed with the shifter in the park position.

(1) Remove upper steering column shroud.
(2) Rotate cable adjuster into unlock position. Use a straight blade screwdriver to unlock adjuster (Fig. 249).



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Fig. 249 Cable Lock Mechanism

- 1 - CABLE ADJUSTER LOCK
- 2 - SCREWDRIVER
- 3 - SHIFT CABLE

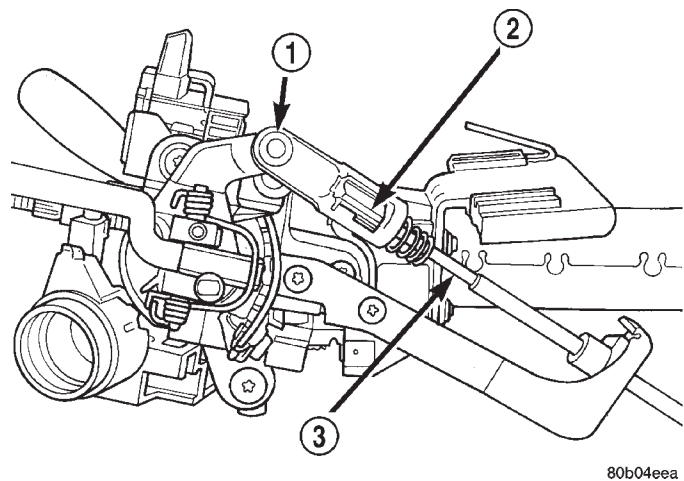
(3) Make sure that the transaxle shift lever (at transaxle) is in the Park position. This is the most rearward position. Verify park sprag is fully engaged.

CAUTION: Park sprag must be engaged when adjusting linkage. Rock vehicle back and forth to ensure that park sprag is fully engaged.

(4) Tilt the steering column to the full down position.

(5) Place shifter in the park position with the key removed.

(6) Adjust by rotating adjuster into lock position (Fig. 250).



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Fig. 250 Shift Cable Adjuster Lock

- 1 - SHIFTER PIN
- 2 - CABLE ADJUSTER LOCK
- 3 - SHIFT CABLE

(7) Reinstall upper steering column shroud.

GEAR SHIFT CABLE - COLUMN (Continued)

(8) Check shifter for proper operation. It should operate smoothly without binding. The vehicle should crank in Park or Neutral only.

GEAR SHIFT CABLE - FLOOR

REMOVAL

(1) Using suitable size allen wrench, remove the shift handle retaining screw (Fig. 251) .

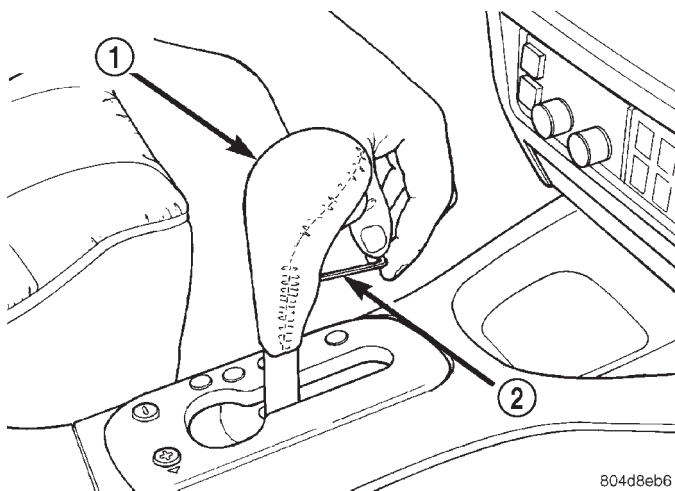


Fig. 251 Shift Handle Retaining Screw

- 1 - GEARSHIFT KNOB
- 2 - HEX WRENCH

- (2) Remove shift handle from shifter assy.
- (3) Remove console bezel from vehicle.
- (4) Loosen nut on shift cable adjust lever (Fig. 252)

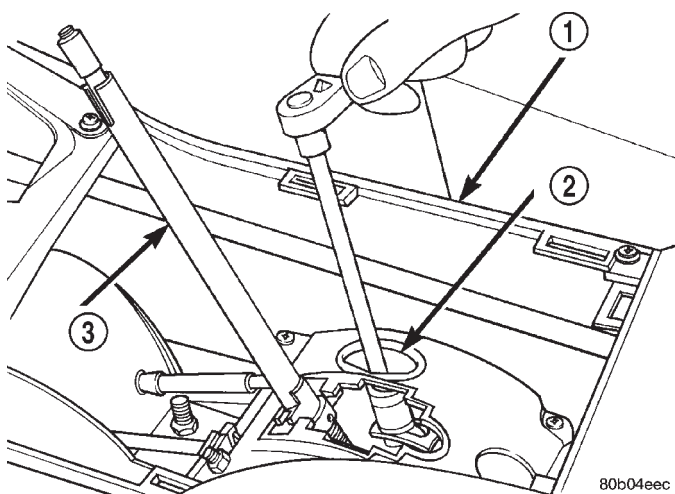


Fig. 252 Shift Cable Adjust Lever Nut

- 1 - CONSOLE
- 2 - ACCESS HOLE
- 3 - SHIFTER HANDLE

(5) Remove retaining clip from shift cable conduit bracket (Fig. 253) .

(6) Disconnect shifter cable from cable attach stud (pin) (Fig. 253) .

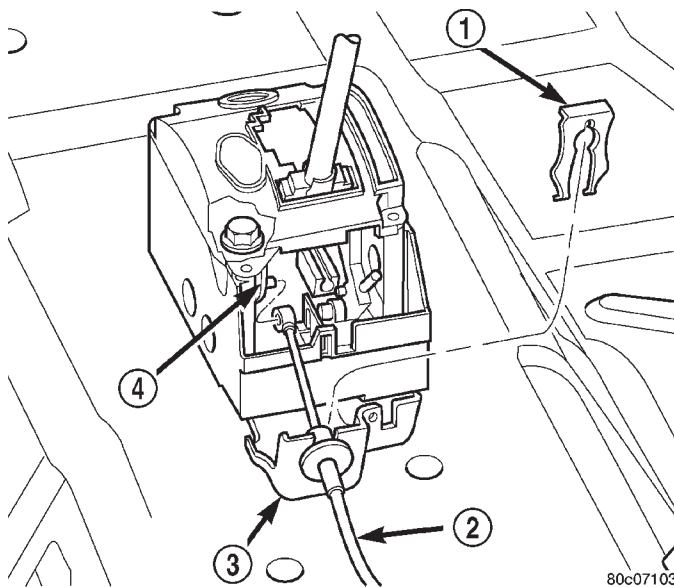


Fig. 253 Floor Gearshift Cable Removal/In

- 1 - CUP
- 2 - CABLE
- 3 - CONDUIT BRACKET
- 4 - PIN

(7) Remove cable from center console routing. Leave flat on floor for ease of removal.

(8) Raise hood. Remove gearshift cable from throttle/gearshift cable bracket (Fig. 254)

(9) Unseat cable grommet at firewall and remove cable from interior of vehicle (Fig. 255) .

(10) Raise vehicle on hoist and disconnect fill tube bracket from transaxle. Rotate fill tube to gain access to shift cable clamp.

(11) Remove cable from routing bracket (Fig. 256) .

(12) Remove cable-to-transaxle nut and slide cable off of stud (Fig. 255) .

(13) Disconnect shifter cable from shift lever assembly at transaxle (Fig. 255) .

(14) Remove cable from underneath vehicle.

INSTALLATION

(1) Make sure transaxle shift lever is in "Park." This is the most rearward position. Verify park sprag is fully engaged by rotating either a tire or an axle shaft.

(2) Position cable in vehicle and connect cable end to the transaxle shift lever (Fig. 255) .

(3) Verify that the washer (Fig. 255) is still in place on the cable mounting stud. Install cable to transaxle and tighten nut to 28 N·m (250 in. lbs.).

GEAR SHIFT CABLE - FLOOR (Continued)

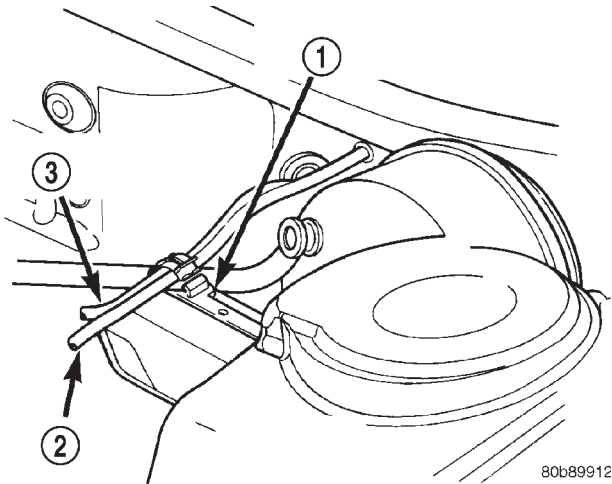


Fig. 254 Throttle/Gearshift Cable Bracket

- 1 - CABLE BRACKET
- 2 - GEARSHIFT CABLE
- 3 - THROTTLE CABLE

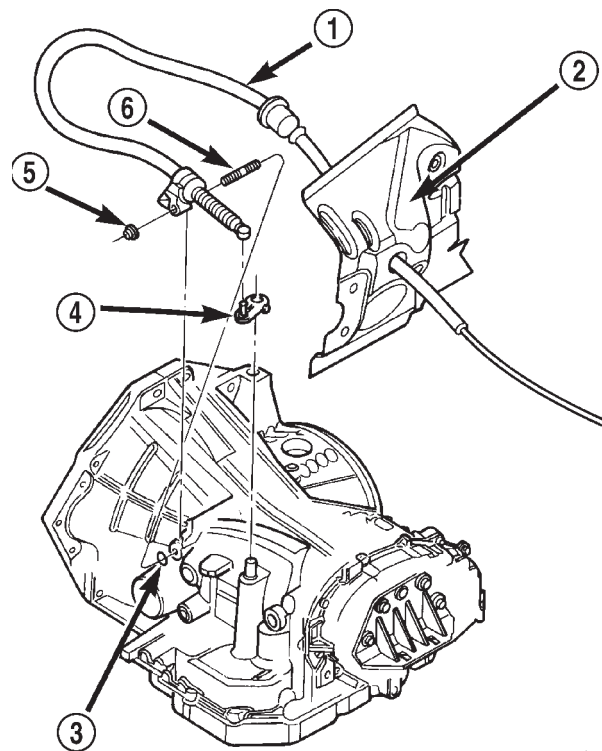


Fig. 255 Gearshift Cable Removal

- 1 - CABLE
- 2 - FIREWALL
- 3 - WASHER
- 4 - SHIFT LEVER
- 5 - NUT
- 6 - STUD

(4) Rotate fill tube to original location. Install and tighten fill tube bracket bolt.

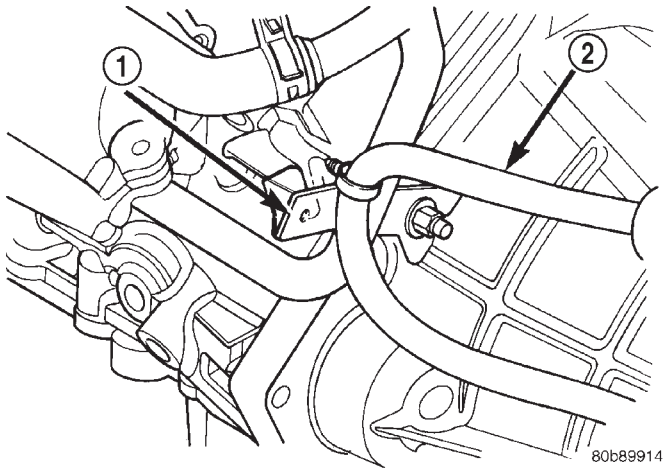


Fig. 256 Cable Routing Bracket—(3.2)

- 1 - BRACKET
- 2 - CABLE

(5) Install cable “push pin” into bracket as shown in (Fig. 254) .

(6) Route transaxle shift cable through hole in dash panel (Fig. 255) (Fig. 257) .

(7) Lubricate cable grommet with a synthetic lubricant (or equivalent) and secure to hole. Verify that it is seated by gently pulling outward on cable.

(8) Install cable into throttle/gearshift cable bracket (Fig. 254) .

(9) Inside the vehicle, route the gearshift cable between the left a/c duct and the left lower heat duct (Fig. 257) and towards the gearshift mechanism.

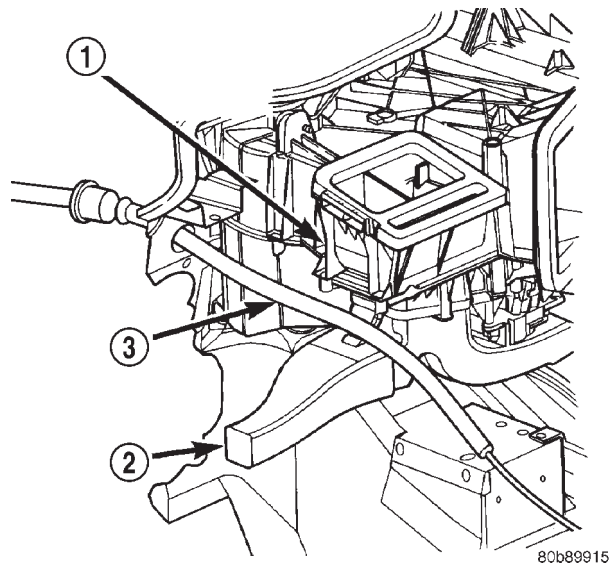


Fig. 257 Shift Cable Routing

- 1 - LH A/C DUCT OUTLET
- 2 - LH LOWER HEAT DUCT
- 3 - GEARSHIFT CABLE

GEAR SHIFT CABLE - FLOOR (Continued)

(10) Route cable through hole in shifter conduit bracket and attach to cable attaching shift pin by snapping into place (Fig. 253) .

(11) Install a new clip onto the cable at the shifter bracket (Fig. 253) .

(12) Tighten the adjuster nut (Fig. 252) .

(13) Reinstall console bezel and shifter handle. Firmly press the shifter handle downward and tighten the screw (Fig. 251) .

(14) Check shifter for proper operation. It should operate smoothly without binding. The starter should crank in Park or Neutral only.

ADJUSTMENTS

ADJUSTMENT

The gearshift cable should be adjusted if any of the following repairs or situations are encountered:

- Transaxle replacement.
- Valve body repair.
- Shift cable replacement.
- Floor shifter replacement
- When there is no cranking in park or neutral.

If the following conditions are encountered, the interlock cable is out of adjustment. Refer to Interlock Cable Adjustment procedure.

- When the transaxle can be shifted without the key in the ignition.
- If the key can be removed with the shifter in reverse.
- When the key cannot be removed with the shifter in the park position.

(1) Remove shifter handle and console bezel.

(2) Loosen nut on shifter cable adjuster (Fig. 258).

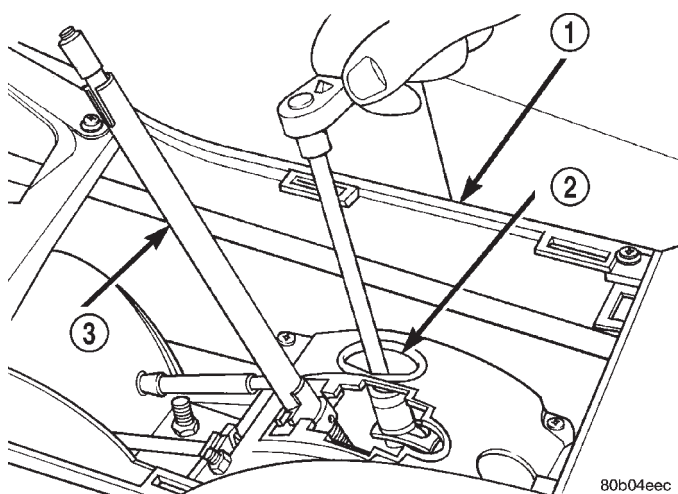


Fig. 258 Shift Cable Adjust Lever Nut

- 1 - CONSOLE
- 2 - ACCESS HOLE
- 3 - SHIFTER HANDLE

(3) Make sure that the transaxle shift lever (at transaxle) is in the Park position. This is the most rearward position. Verify park sprag is fully engaged.

CAUTION: Park sprag must be engaged when adjusting linkage. Rock vehicle back and forth to ensure that park sprag is fully engaged.

(4) Place shifter in park position.

(5) Place ignition in lock with key removed.

(6) Tighten adjuster nut at shifter to 225 in. lbs.

(7) Reinstall console bezel and shifter handle.

(8) Check shifter for proper operation. It should operate smoothly without binding. The vehicle should crank in Park or Neutral only.

HOLDING CLUTCHES

DESCRIPTION

Two hydraulically applied multi-disc clutches are used to hold planetary geartrain components stationary while the input clutches drive others. The 2/4 and Low/Reverse clutches are considered holding clutches and are contained at the rear of the transaxle case. (Fig. 259).

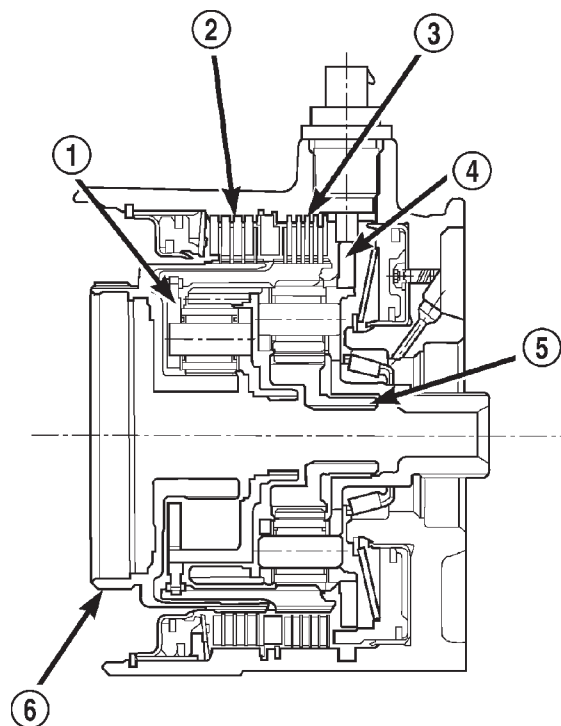
OPERATION

NOTE: (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - DIAGNOSIS AND TESTING) for a collective view of which clutch elements are applied at each position of the selector lever.

2/4 CLUTCH

The 2/4 clutch is hydraulically applied in second and fourth gears by pressurized fluid against the 2/4 clutch piston. When the 2/4 clutch is applied, the front sun gear assembly is held or grounded to the transaxle case.

HOLDING CLUTCHES (Continued)



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Fig. 259 2/4 and Low/Reverse Clutches

- 1 - FRONT PLANET CARRIER/REAR ANNULUS
- 2 - 2/4 CLUTCH
- 3 - L/R CLUTCH
- 4 - REAR PLANET CARRIER/FRONT ANNULUS
- 5 - REAR SUN GEAR
- 6 - FRONT SUN GEAR ASSEMBLY

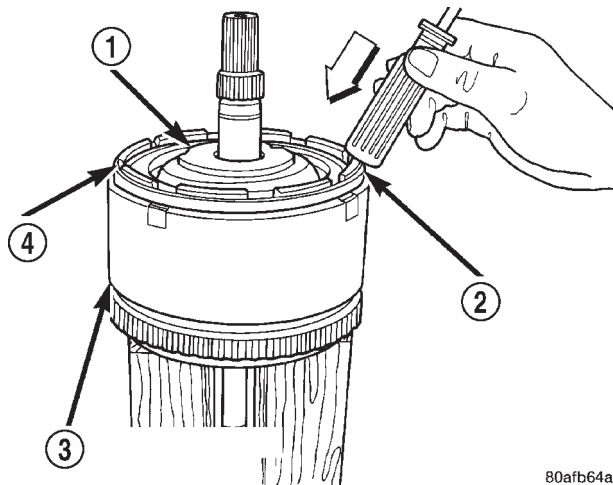
LOW/REVERSE CLUTCH

The Low/Reverse clutch is hydraulically applied in park, reverse, neutral, and first gears by pressurized fluid against the Low/Reverse clutch piston. When the Low/Reverse clutch is applied, the front planet carrier/rear annulus assembly is held or grounded to the transaxle case.

INPUT CLUTCH ASSEMBLY**DISASSEMBLY**

(1) Mount input clutch assembly to Input Clutch Pressure Fixture (Tool 8391).

(2) Tap down reverse clutch reaction plate to release pressure from snap ring (Fig. 260).

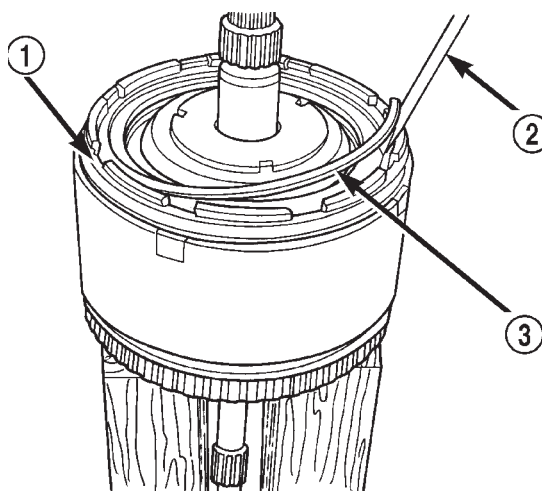


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Fig. 260 Tapping Reaction Plate

- 1 - #4 THRUST PLATE (SELECT)
- 2 - TAP DOWN REVERSE CLUTCH REACTION PLATE TO REMOVE OR INSTALL SNAP RING
- 3 - INPUT CLUTCH RETAINER
- 4 - REVERSE CLUTCH REACTION PLATE

(3) Remove reverse clutch snap ring (Fig. 261).



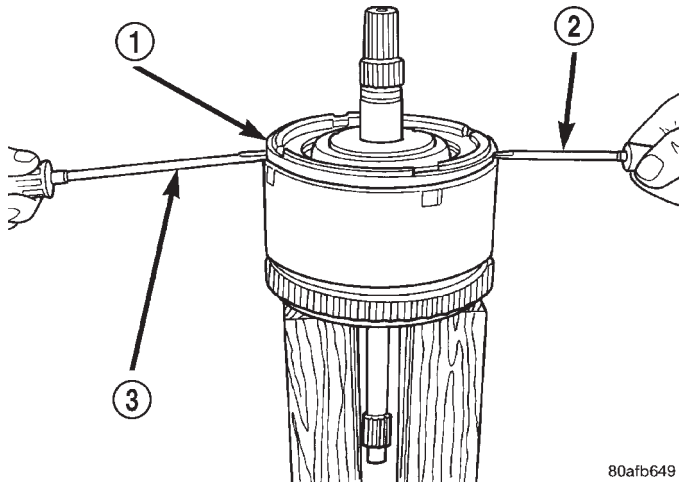
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Fig. 261 Reverse Clutch Snap Ring

- 1 - REACTION PLATE
- 2 - SCREWDRIVER
- 3 - REVERSE CLUTCH SNAP RING (SELECT)

INPUT CLUTCH ASSEMBLY (Continued)

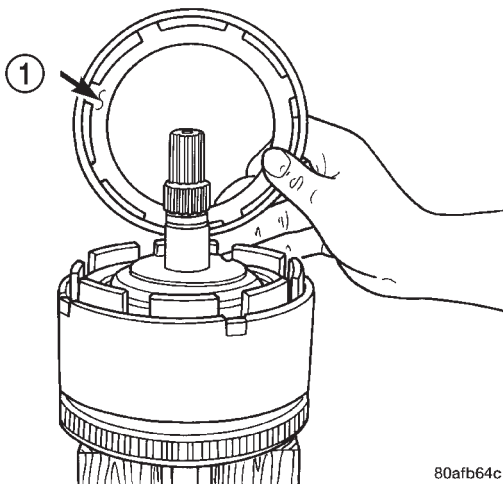
(4) Pry up and remove reverse clutch reaction plate (Fig. 262) (Fig. 263).



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Fig. 262 Pry Reverse Clutch Reaction Plate

- 1 - REVERSE CLUTCH REACTION PLATE
- 2 - SCREWDRIVER
- 3 - SCREWDRIVER



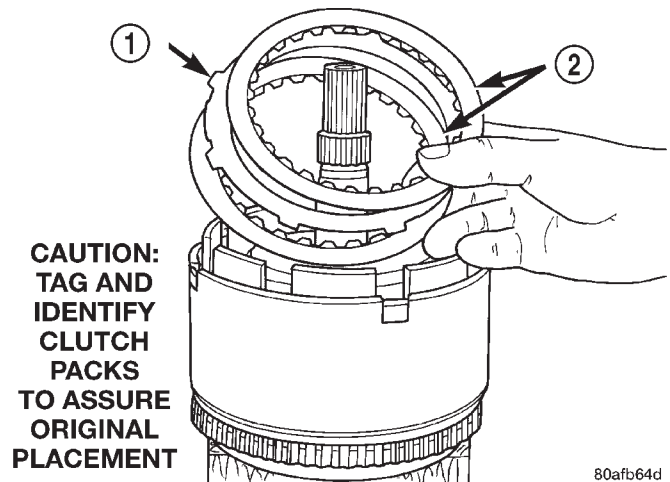
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Fig. 263 Reverse Clutch Reaction Plate

- 1 - REVERSE CLUTCH REACTION PLATE (INSTALL FLAT SIDE DOWN)

(5) Remove the reverse clutch pack (two fibers/one steel) (Fig. 264).

NOTE: Tag reverse clutch pack for reassembly identification.

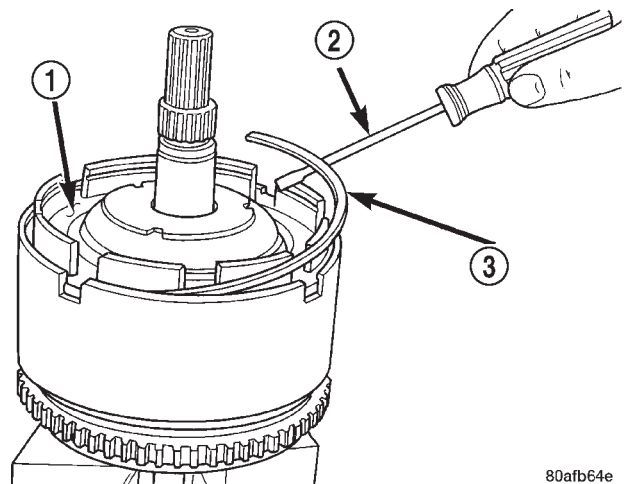


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Fig. 264 Reverse Clutch Pack

- 1 - REVERSE CLUTCH PLATE
- 2 - REVERSE CLUTCH DISC

(6) Remove the OD/Reverse reaction plate snap ring (Fig. 265).



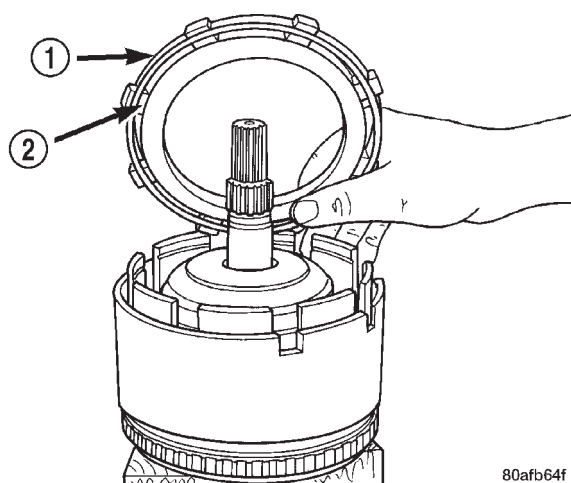
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Fig. 265 OD/Reverse Pressure Plate Snap Ring

- 1 - OD/REVERSE PRESSURE PLATE
- 2 - SCREWDRIVER
- 3 - OD/REVERSE PRESSURE PLATE SNAP RING

INPUT CLUTCH ASSEMBLY (Continued)

(7) Remove OD/Reverse pressure plate (Fig. 266).

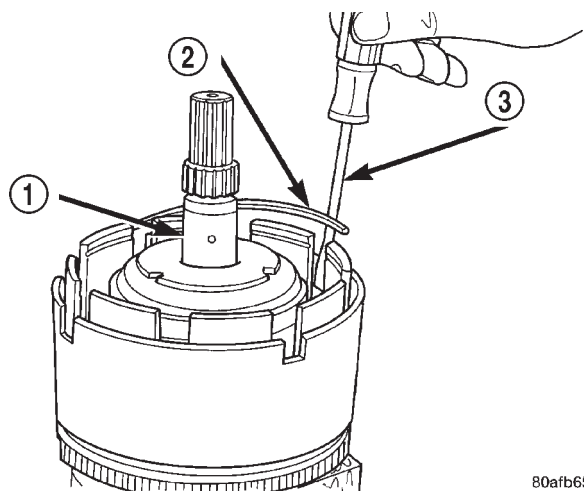


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Fig. 266 OD/Reverse Reaction Plate

- 1 - OD/REVERSE PRESSURE PLATE (STEP SIDE DOWN)
2 - (STEP SIDE DOWN)

(8) Remove OD/Reverse reaction plate wave snap ring (Fig. 267).



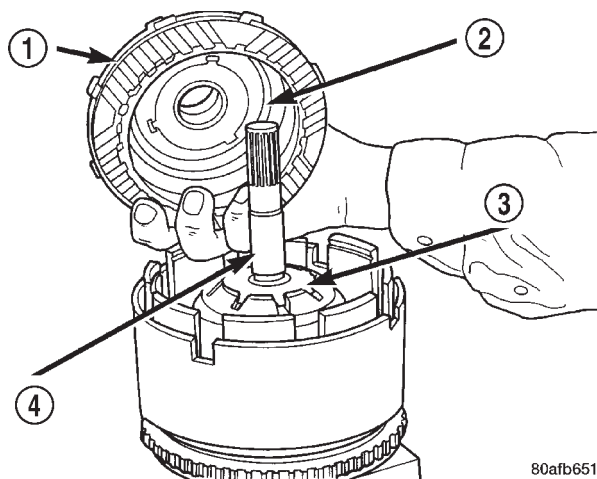
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Fig. 267 Waved Snap Ring

- 1 - OVERDRIVE SHAFT ASSEMBLY
2 - OD/REVERSE CLUTCH WAVED SNAP RING
3 - SCREWDRIVER

(9) Remove OD shaft/hub and OD clutch pack (Fig. 268) (Fig. 269).

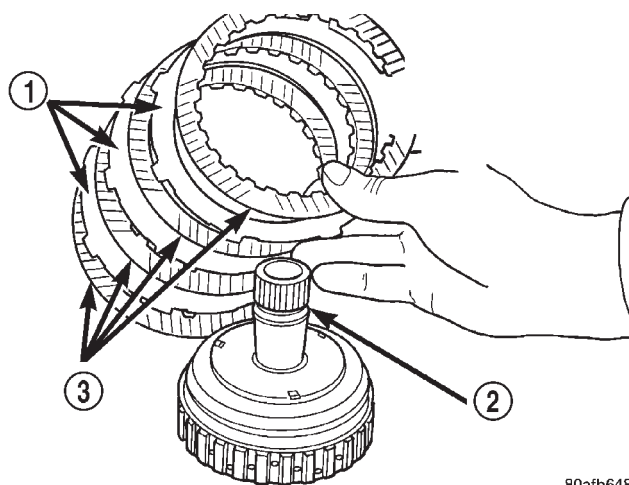
NOTE: Tag overdrive clutch pack for reassembly identification.



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Fig. 268 Remove OD Clutch Pack

- 1 - OVERDRIVE SHAFT ASSEMBLY AND OD CLUTCH PACK
2 - #3 THRUST PLATE
3 - #3 THRUST WASHER
4 - UNDERDRIVE SHAFT ASSEMBLY



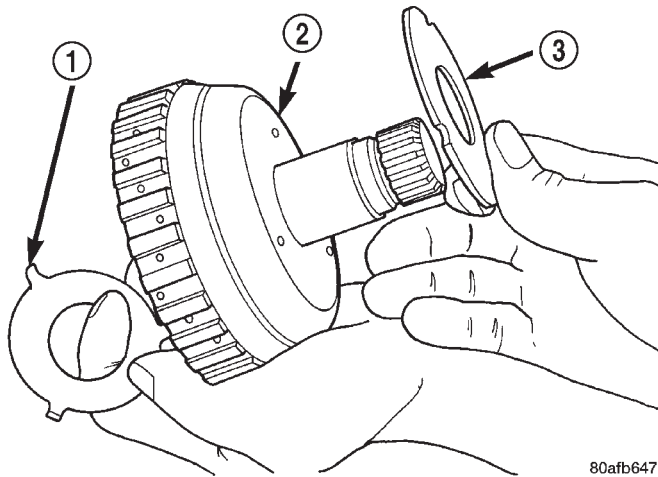
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Fig. 269 Overdrive Clutch Pack

- 1 - OVERDRIVE CLUTCH PLATE
2 - OVERDRIVE SHAFT ASSEMBLY
3 - OVERDRIVE CLUTCH DISC

INPUT CLUTCH ASSEMBLY (Continued)

(10) Remove and inspect #3 & #4 thrust washers (Fig. 270).

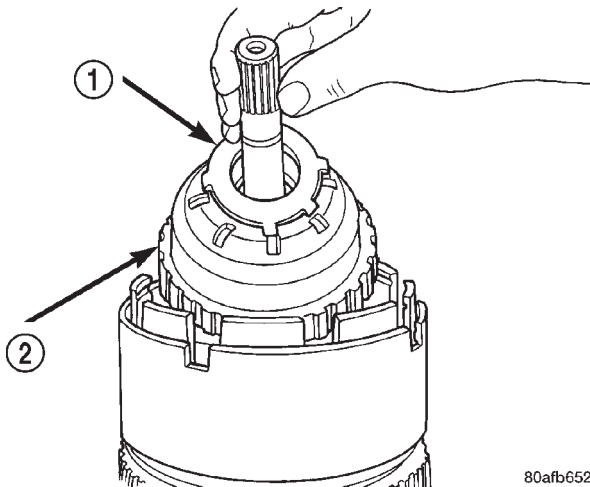


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Fig. 270 #3 & 4 Thrust Washers

- 1 - #3 THRUST PLATE (3 TABS)
- 2 - OD SHAFT ASSEMBLY
- 3 - #4 THRUST PLATE (3 SLOTS)

(11) Remove the underdrive shaft assembly (Fig. 271).

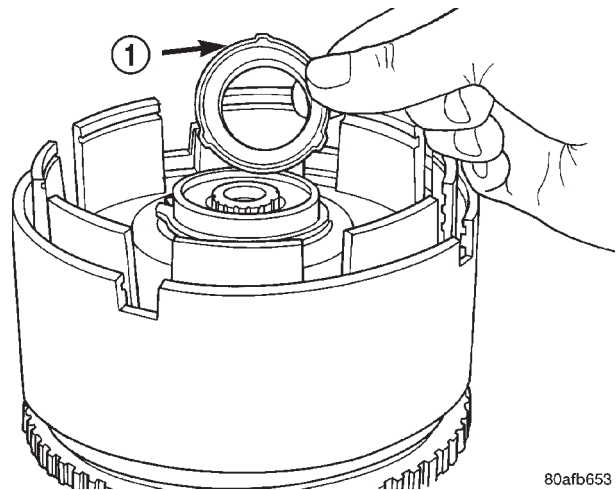


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Fig. 271 Underdrive Shaft Assembly

- 1 - #3 THRUST WASHER (5 TABS)
- 2 - UNDERDRIVE SHAFT ASSEMBLY

(12) Remove the #2 needle bearing (Fig. 272).



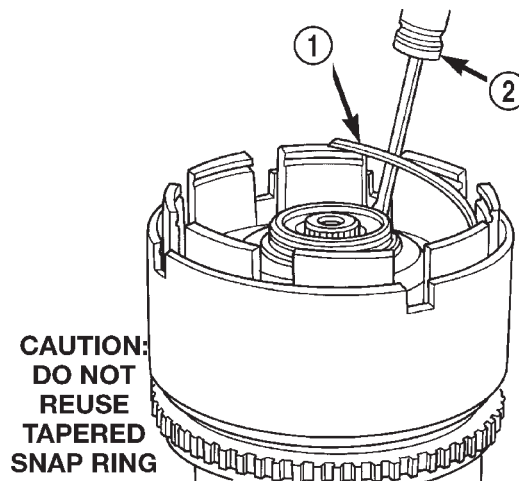
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Fig. 272 No. 2 Needle Bearing

- 1 - #2 NEEDLE BEARING (NOTE 3 TABS)

NOTE: The OD/UD Reaction Plate, Snap Rings, and Input Clutch Retainer is not interchangeable with previous year 41TE components. The snap rings are thicker and the position of the ring lands have changed.

(13) Remove the OD/UD reaction plate tapered snap ring (Fig. 273).



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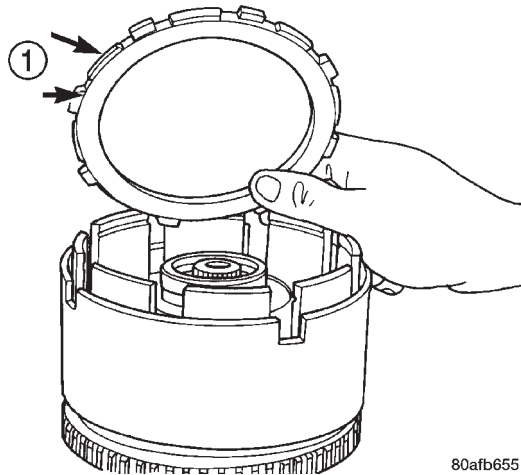
Fig. 273 Tapered Snap Ring

- 1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE TAPERED SNAP RING
- 2 - SCREWDRIVER (DO NOT SCRATCH REACTION PLATE)

INPUT CLUTCH ASSEMBLY (Continued)

NOTE: The OD/UD clutch reaction plate has a step on both sides. Install the OD/UD clutches reaction plate tapered step side up.

(14) Remove the OD/UD reaction plate (Fig. 274).

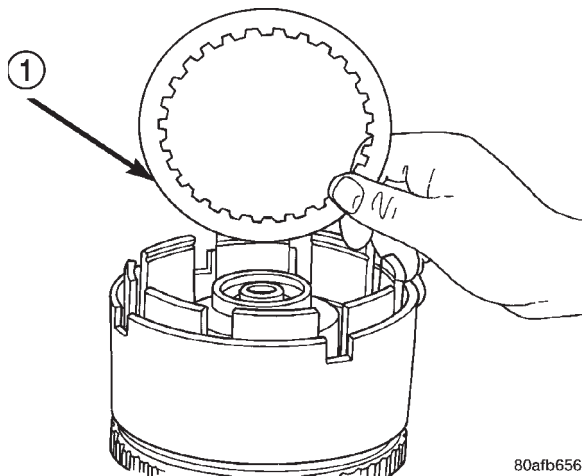


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Fig. 274 OD/UD Reaction Plate

1 - OD/UD CLUTCH REACTION PLATE (STEP SIDE DOWN)

(15) Remove the first UD clutch disc (Fig. 275).

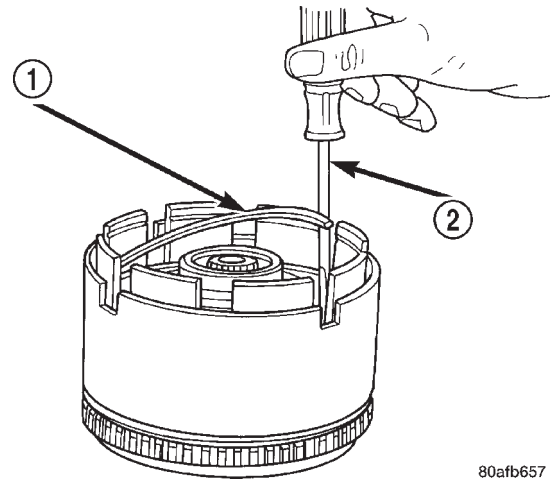


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Fig. 275 Remove Last UD Clutch Disc

1 - ONE UNDERDRIVE CLUTCH DISC

(16) Remove the UD clutch flat snap ring (Fig. 276).



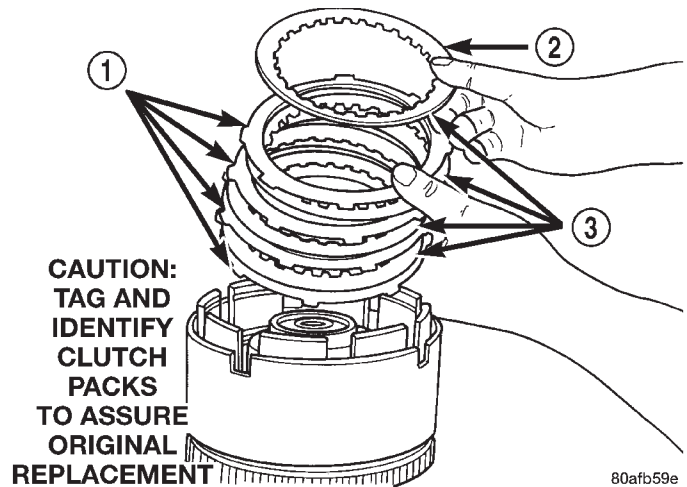
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Fig. 276 UD Clutch Flat Snap Ring

1 - UNDERDRIVE CLUTCH REACTION PLATE FLAT SNAP RING
2 - SCREWDRIVER

NOTE: Tag underdrive clutch pack for reassembly identification.

(17) Remove the UD clutch pack (Fig. 277).



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CAUTION:
TAG AND
IDENTIFY
CLUTCH
PACKS
TO ASSURE
ORIGINAL
REPLACEMENT

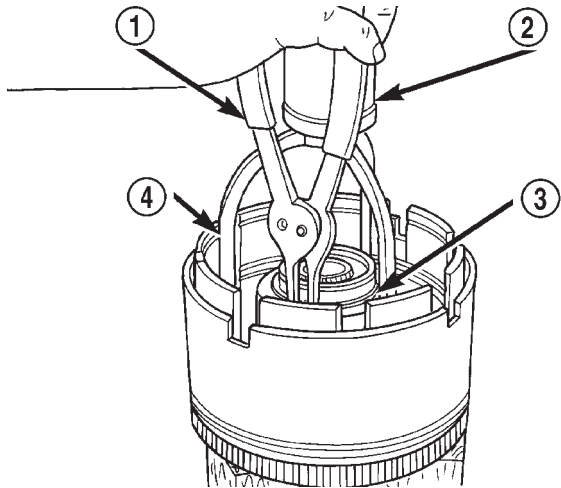
Fig. 277 Underdrive Clutch Pack

1 - CLUTCH PLATE
2 - ONE UD CLUTCH DISC
3 - CLUTCH DISC

INPUT CLUTCH ASSEMBLY (Continued)

CAUTION: Compress return spring just enough to remove or install snap ring.

(18) Using Tool 5059A and an arbor press, compress UD clutch piston enough to remove snap ring (Fig. 278) (Fig. 279).

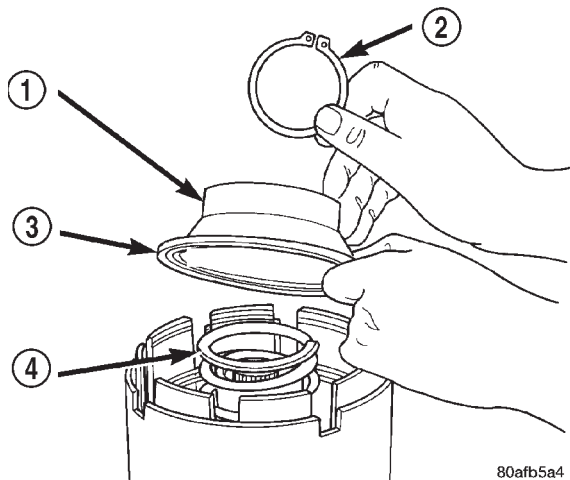


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Fig. 278 UD Spring Retainer Snap Ring

- 1 - SNAP RING PLIERS
- 2 - ARBOR PRESS RAM
- 3 - SNAP RING
- 4 - SPECIAL TOOL 5059A

(19) Remove spring retainer (Fig. 279).

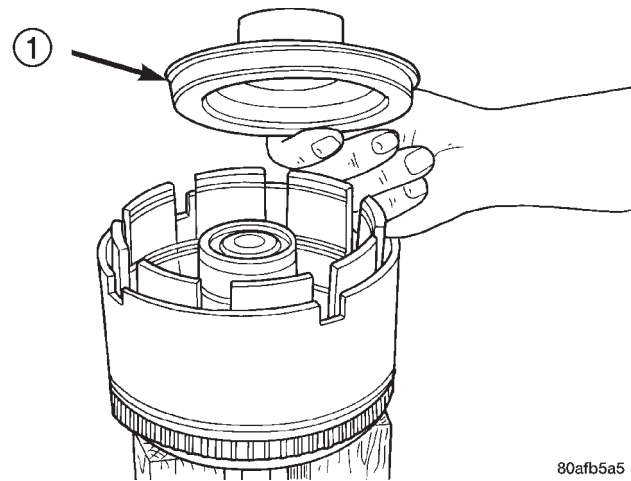


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Fig. 279 UD Return Spring and Retainer

- 1 - UNDERDRIVE SPRING RETAINER
- 2 - SNAP RING
- 3 - SEAL
- 4 - PISTON RETURN SPRING

(20) Remove UD clutch piston (Fig. 280).

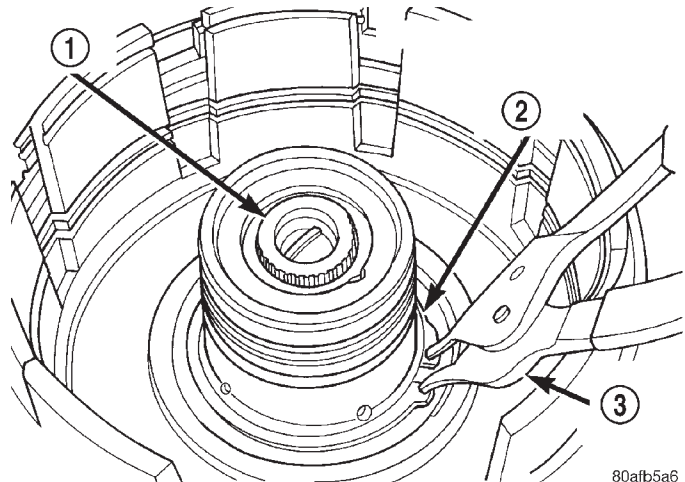


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Fig. 280 Underdrive Clutch Piston

- 1 - PISTON

(21) Remove input hub tapered snap ring (Fig. 281).



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Fig. 281 Input Hub Tapered Snap Ring

- 1 - INPUT SHAFT
- 2 - INPUT HUB SNAP RING (TAPERED SIDE UP WITH TABS IN CAVITY)
- 3 - SNAP RING PLIERS

INPUT CLUTCH ASSEMBLY (Continued)

(22) Tap on input hub with soft faced hammer and separate input hub from OD/Reverse piston and clutch retainer (Fig. 282) (Fig. 283).

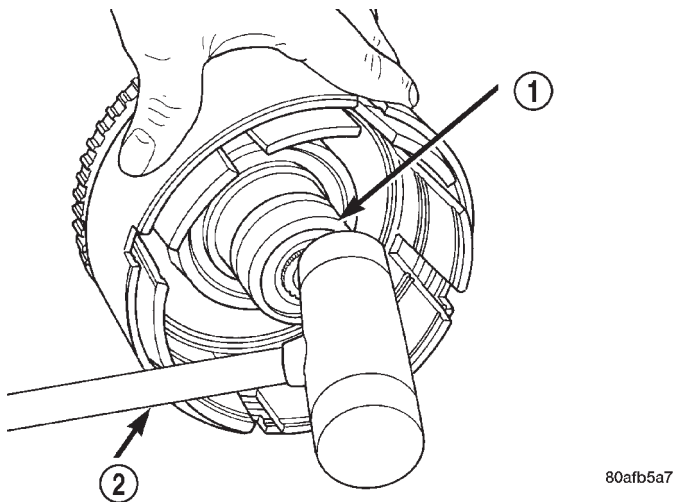


Fig. 282 Tap on Input Hub

- 1 - INPUT SHAFT AND HUB ASSEMBLY
- 2 - PLASTIC HAMMER

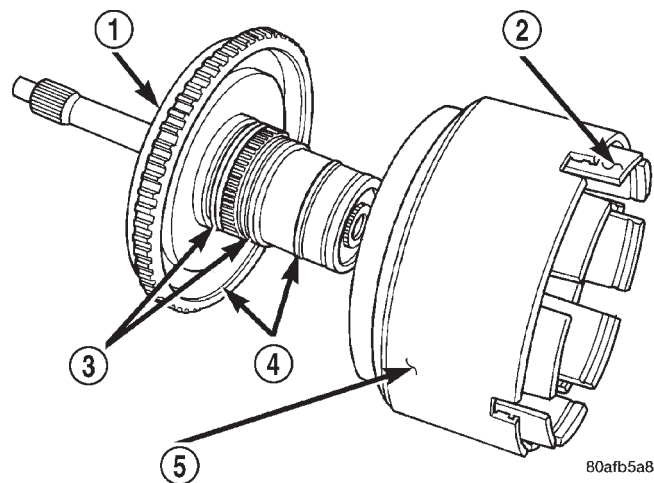


Fig. 283 Input Hub Removed

- 1 - INPUT SHAFT AND HUB ASSEMBLY
- 2 - INPUT CLUTCH RETAINER
- 3 - O-RING
- 4 - SEAL
- 5 - OVERDRIVE/REVERSE PISTON

(23) Separate clutch retainer from OD/Reverse piston (Fig. 284).

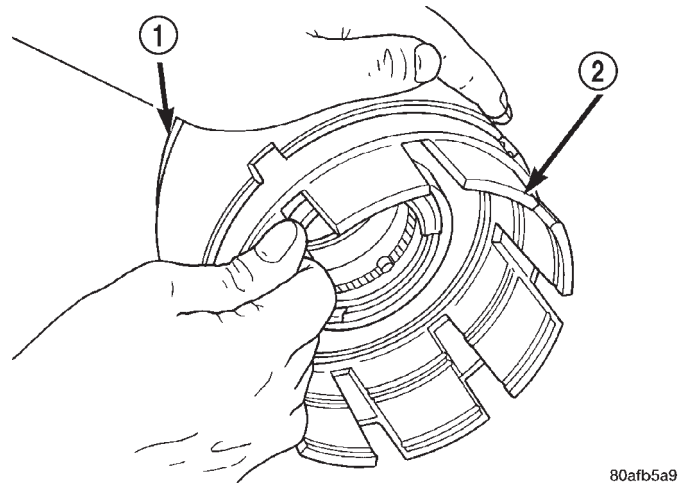


Fig. 284 Pull Retainer from Piston

- 1 - OVERDRIVE/REVERSE PISTON
- 2 - INPUT CLUTCH RETAINER

(24) Using Tool 6057 and an arbor press, compress return OD/Reverse piston return spring just enough to remove snap ring (Fig. 285) (Fig. 286).

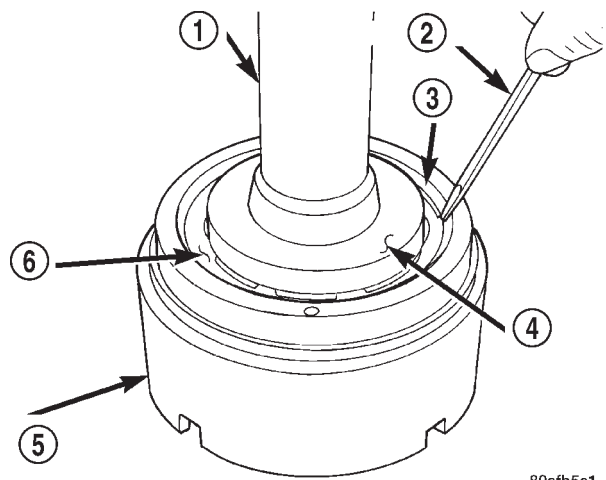
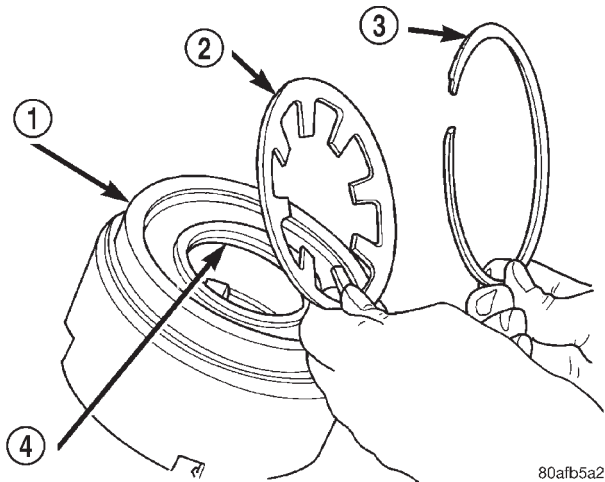


Fig. 285 Install Snap Ring

- 1 - ARBOR PRESS RAM (COMPRESS RETURN SPRING JUST ENOUGH TO REMOVE OR INSTALL SNAP RING)
- 2 - SCREWDRIVER
- 3 - SNAP RING
- 4 - SPECIAL TOOL 6057
- 5 - OD/REVERSE PISTON
- 6 - RETURN SPRING

INPUT CLUTCH ASSEMBLY (Continued)

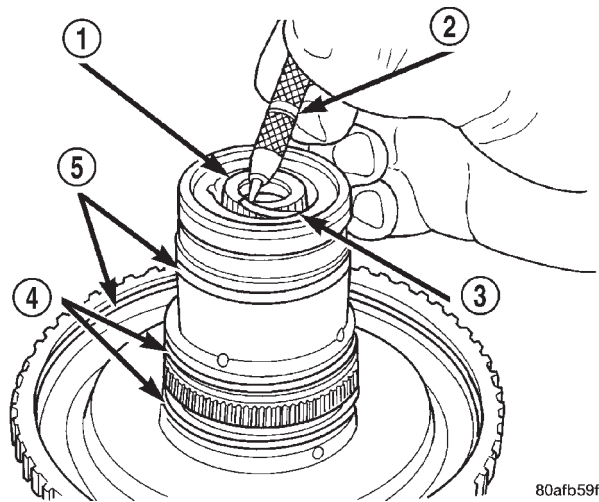


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Fig. 286 Return Spring and Snap Ring

- 1 - OD/REVERSE PISTON
- 2 - RETURN SPRING
- 3 - SNAP RING
- 4 - O-RING

(25) Remove input shaft to input clutch hub snap ring (Fig. 287).

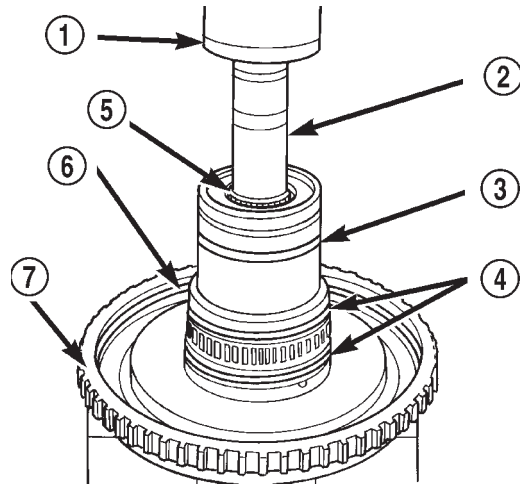


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Fig. 287 Remove Input Shaft Snap Ring

- 1 - INPUT SHAFT
- 2 - SHARP-POINTED TOOL
- 3 - SNAP RING
- 4 - O-RINGS
- 5 - SEALS

(26) Using a suitably sized socket and an arbor press, remove input shaft from input shaft hub (Fig. 288).



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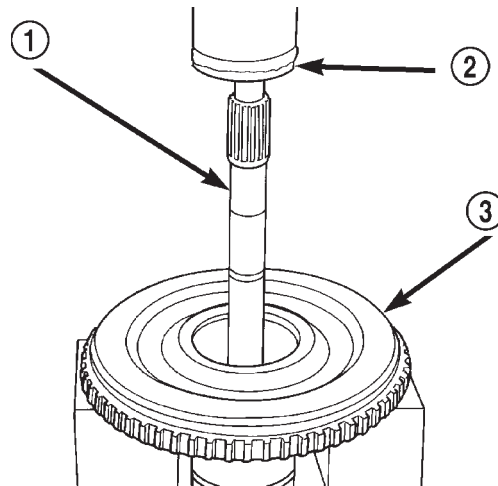
Fig. 288 Remove Input Shaft

- 1 - ARBOR PRESS RAM
- 2 - SOCKET
- 3 - SEAL
- 4 - O-RINGS
- 5 - INPUT SHAFT
- 6 - SEAL
- 7 - INPUT CLUTCH HUB

ASSEMBLY

Use petrolatum on all seals to ease assembly of components.

(1) Using an arbor press, install input shaft to input shaft hub (Fig. 289).



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Fig. 289 Install Input Shaft

- 1 - INPUT SHAFT
- 2 - ARBOR PRESS RAM
- 3 - INPUT CLUTCH HUB

INPUT CLUTCH ASSEMBLY (Continued)

(2) Install input shaft snap ring (Fig. 290).

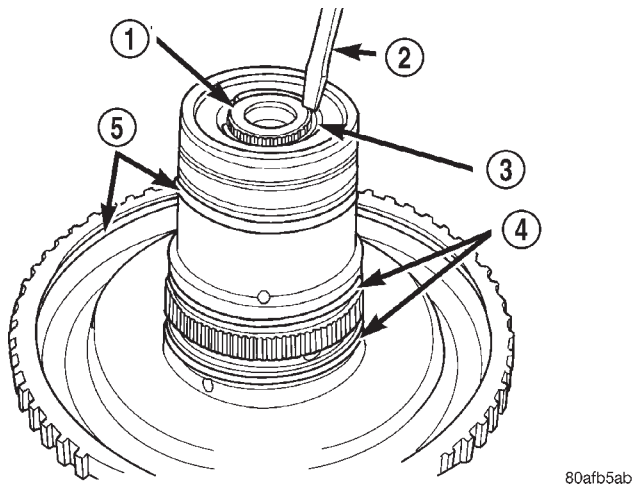


Fig. 290 Install Input Shaft Snap Ring

- 1 - INPUT SHAFT
- 2 - SCREWDRIVER (DO NOT SCRATCH BEARING SURFACE)
- 3 - SNAP RING
- 4 - O-RINGS
- 5 - SEALS

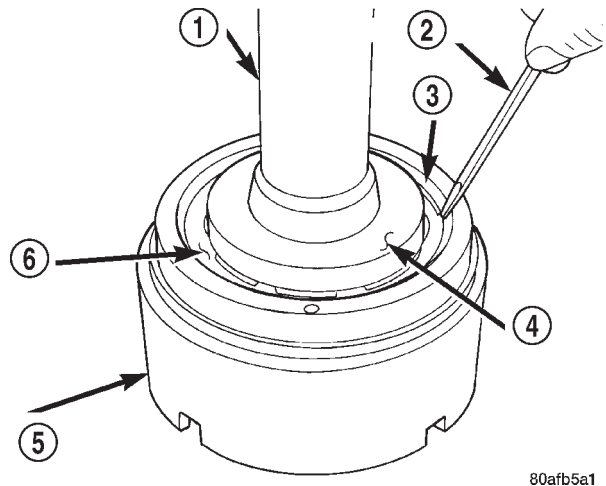


Fig. 292 Install Snap Ring

- 1 - ARBOR PRESS RAM (COMPRESS RETURN SPRING JUST ENOUGH TO REMOVE OR INSTALL SNAP RING)
- 2 - SCREWDRIVER
- 3 - SNAP RING
- 4 - SPECIAL TOOL 6057
- 5 - OD/REVERSE PISTON
- 6 - RETURN SPRING

(3) Using an arbor press and Tool 6057, Install OD/Reverse piston return spring and snap ring (Fig. 291) (Fig. 292).

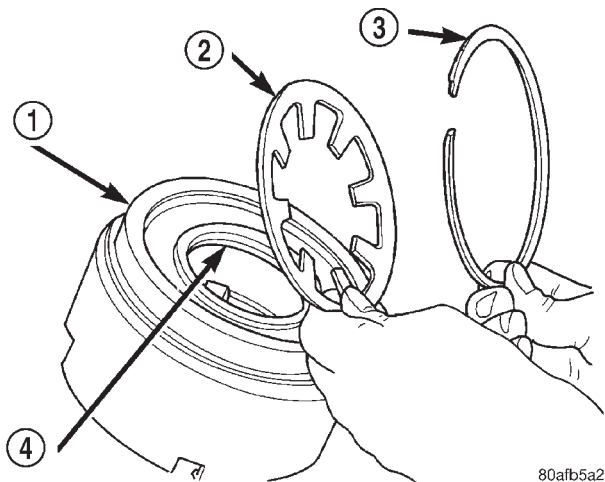


Fig. 291 Return Spring and Snap Ring

- 1 - OD/REVERSE PISTON
- 2 - RETURN SPRING
- 3 - SNAP RING
- 4 - O-RING

(4) Install the OD/Reverse piston assembly to the input clutch retainer as shown in (Fig. 293).

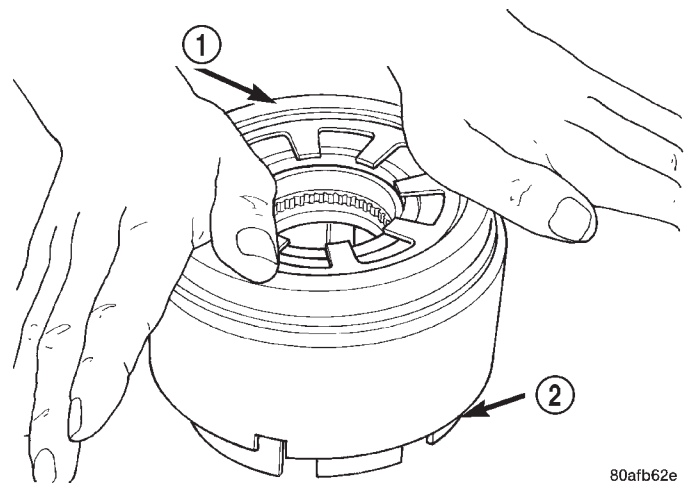


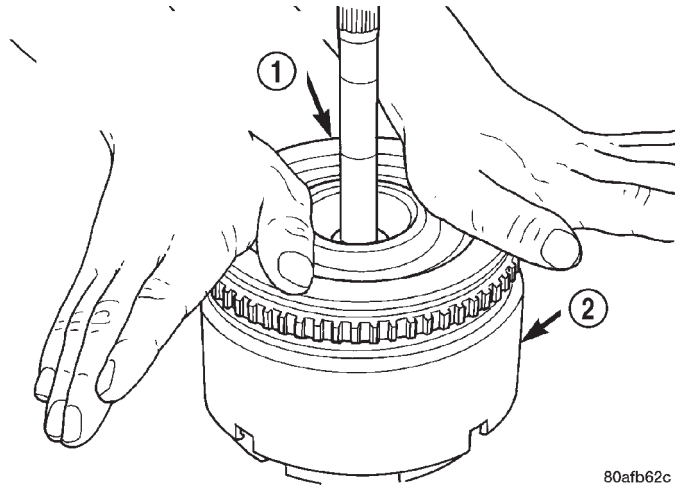
Fig. 293 Install OD/Reverse Piston

- 1 - PUSH DOWN TO INSTALL OVERDRIVE/REVERSE PISTON
- 2 - INPUT CLUTCHES RETAINER

NOTE: The OD/UD Reaction Plate, Snap Rings, and Input Clutch Retainer are not interchangeable with previous year 41TE components. The snap rings are thicker and the position of the ring lands have changed.

INPUT CLUTCH ASSEMBLY (Continued)

(5) Install the input hub/shaft assembly to the OD/Reverse piston/clutch retainer assembly. (Fig. 294).

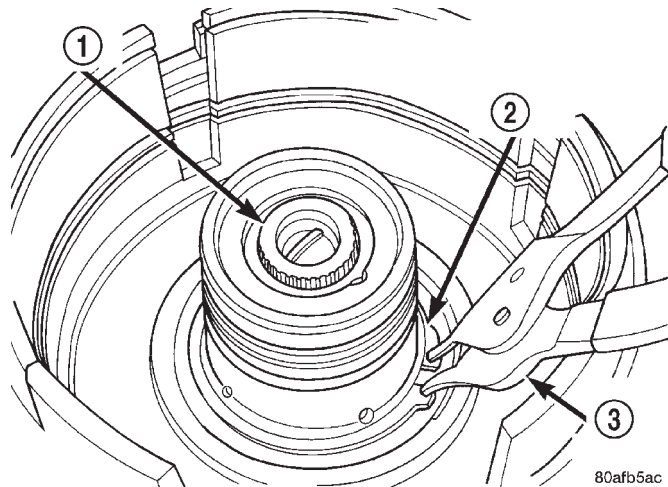


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Fig. 294 Install Input Shaft Hub Assembly

- 1 - PUSH DOWN TO INSTALL INPUT SHAFT HUB ASSEMBLY (ROTATE TO ALIGN SPLINES)
2 - OD/REV. PISTON

(6) Install input hub tapered snap ring (Fig. 295). **Make sure snap ring is fully seated.**

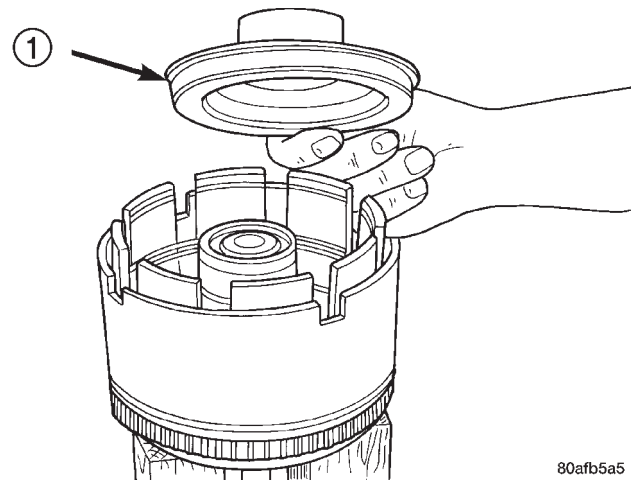


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Fig. 295 Install Input Hub Tapered Snap Ring

- 1 - INPUT SHAFT
2 - INPUT HUB SNAP RING (TAPERED SIDE UP WITH TABS IN CAVITY)
3 - SNAP RING PLIERS

(7) Install UD clutch piston (Fig. 296).

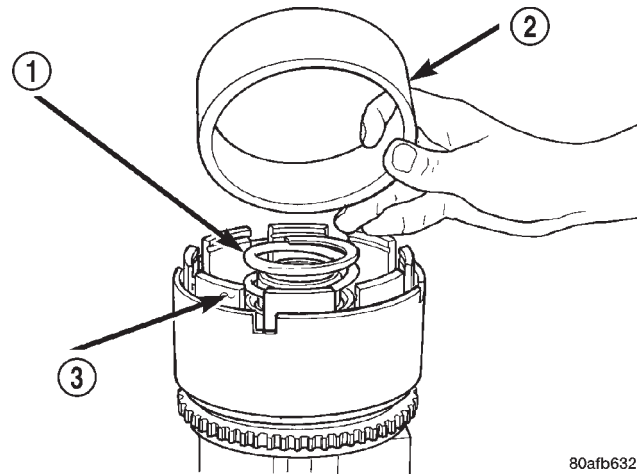


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Fig. 296 Underdrive Clutch Piston

- 1 - PISTON

(8) Install UD piston return spring and Tool 5067 as shown in (Fig. 297).



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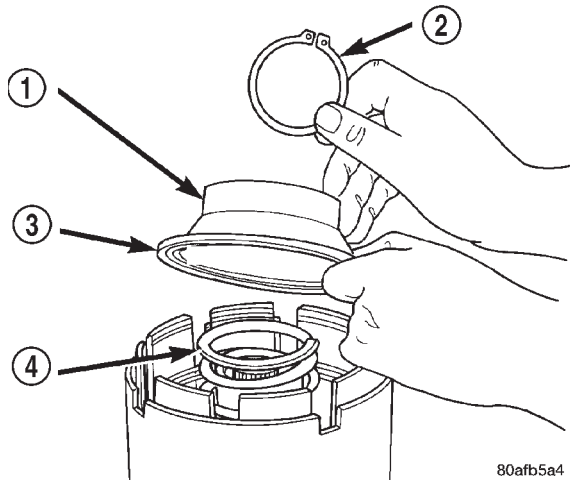
Fig. 297 Seal Compressor Special Tool 5067

- 1 - PISTON RETURN SPRING
2 - SPECIAL TOOL 5067
3 - INPUT CLUTCH RETAINER

INPUT CLUTCH ASSEMBLY (Continued)

(9) Using Tool 5059A and an arbor press, install the UD spring retainer and snap ring. (Fig. 298) (Fig. 299) Compress just enough to install snap ring.

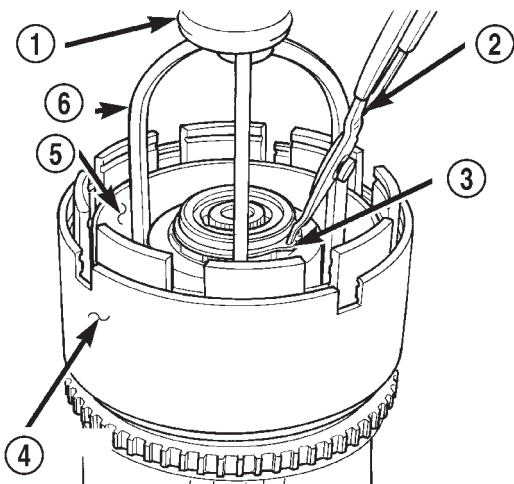
CAUTION: Compress return spring just enough to install snap ring.



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Fig. 298 UD Return Spring and Retainer

- 1 - UNDERDRIVE SPRING RETAINER
- 2 - SNAP RING
- 3 - SEAL
- 4 - PISTON RETURN SPRING

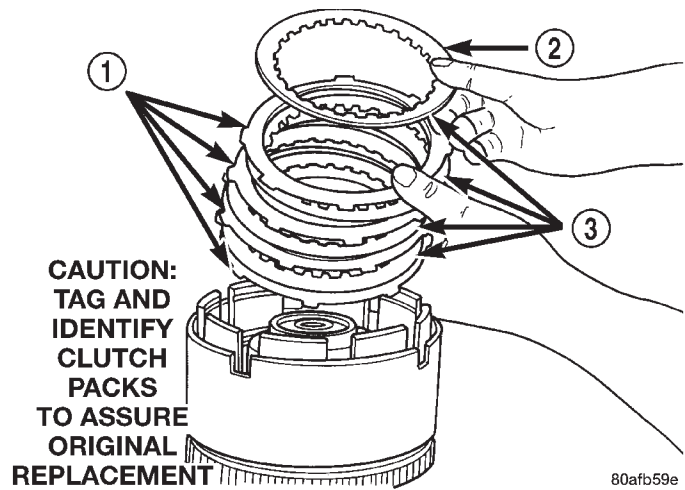


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Fig. 299 Install UD Spring Retainer and Snap Ring

- 1 - ARBOR PRESS RAM
- 2 - SNAP RING PLIERS
- 3 - SNAP RING
- 4 - OD/REVERSE PISTON
- 5 - TOOL 5067
- 6 - TOOL 5059A

(10) Install the UD clutch pack (four fibers/four steels) (Fig. 300). Leave the top disc out until after the snap ring is installed.

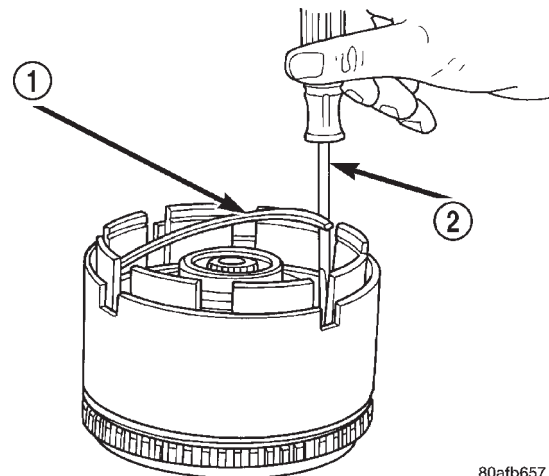


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Fig. 300 Underdrive Clutch Pack

- 1 - CLUTCH PLATE
- 2 - ONE UD CLUTCH DISC
- 3 - CLUTCH DISC

(11) Install the UD clutch flat snap ring (Fig. 301).



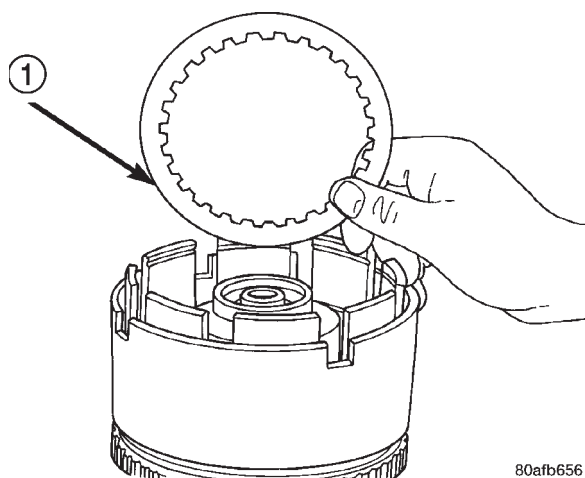
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Fig. 301 UD Clutch Flat Snap Ring

- 1 - UNDERDRIVE CLUTCH REACTION PLATE FLAT SNAP RING
- 2 - SCREWDRIVER

INPUT CLUTCH ASSEMBLY (Continued)

(12) Install the last UD clutch disc (Fig. 302).

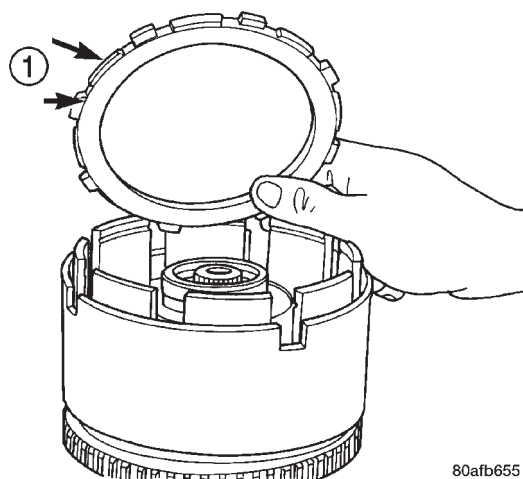


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Fig. 302 Install Last UD Clutch Disc

1 - ONE UNDERDRIVE CLUTCH DISC

(13) Install the OD/UD clutch reaction plate and snap ring (Fig. 303) (Fig. 304). The OD/UD clutches reaction plate has a step on both sides. Install the OD/UD clutches reaction plate tapered step side up.



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Fig. 303 OD/UD Reaction Plate

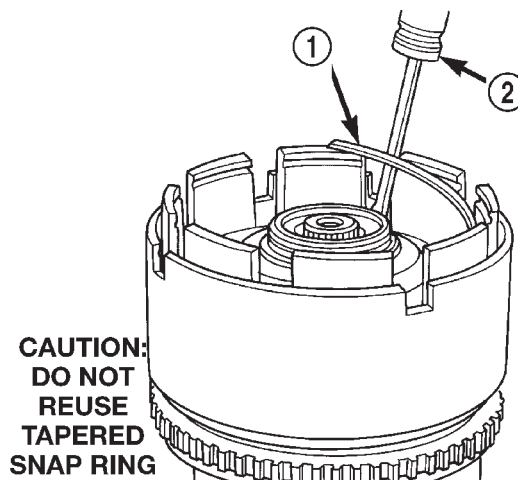
1 - OD/UD CLUTCH REACTION PLATE (STEP SIDE DOWN)

NOTE: Snap ring ends must be located within one finger of the input clutch hub. Be sure that snap ring is fully seated, by pushing with screwdriver, into snap ring groove all the way around.

(14) Seat tapered snap ring to ensure proper installation (Fig. 305).

(15) Install input clutch assembly to the Input Clutch Pressure Fixture–Tool 8391 (Fig. 306).

(16) Set up dial indicator on the UD clutch pack as shown in (Fig. 307).

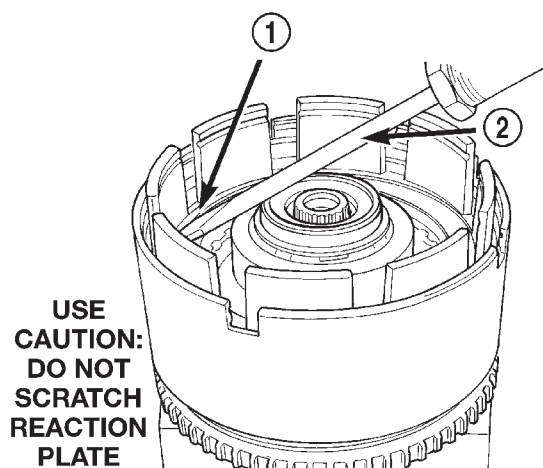


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Fig. 304 Tapered Snap Ring

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE
TAPERED SNAP RING

2 - SCREWDRIVER (DO NOT SCRATCH REACTION PLATE)



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Fig. 305 Seating Tapered Snap

1 - OVERDRIVE/UNDERDRIVE CLUTCHES REACTION PLATE
TAPERED SNAP RING

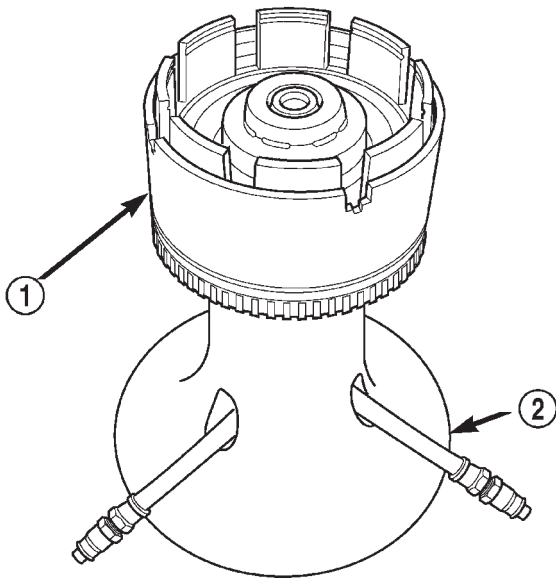
2 - SCREWDRIVER

(17) Using moderate pressure, press down and hold (near indicator) the UD clutch pack with screwdriver or suitable tool and zero dial indicator (Fig. 308). When releasing pressure on clutch pack, indicator reading should advance 0.005–0.010.

CAUTION: Do not apply more than 30 psi (206 kPa) to the underdrive clutch pack.

(18) Apply 30 psi (206 kPa) to the underdrive hose on Tool 8391 and measure UD clutch clearance. Measure and record UD clutch pack measurement in four (4) places, 90° apart.

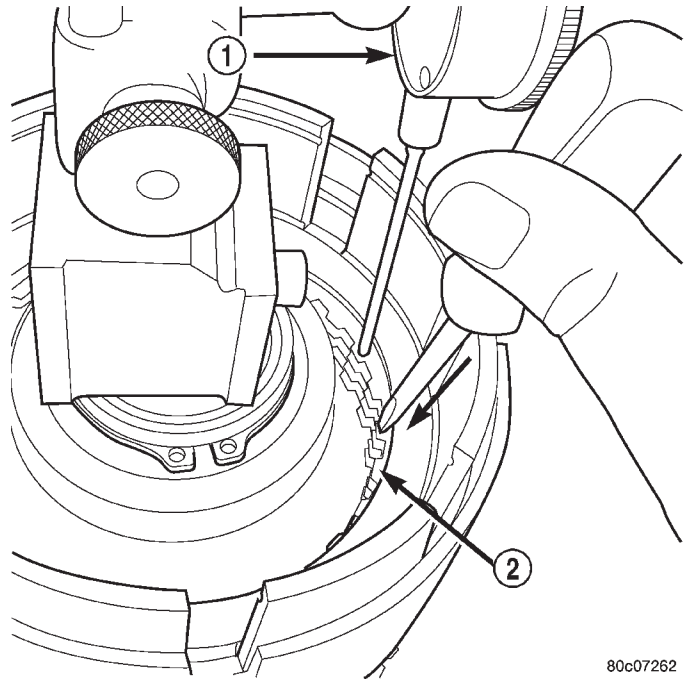
INPUT CLUTCH ASSEMBLY (Continued)



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Fig. 306 Input Clutch Assembly on Pressure Fixture Tool 8391

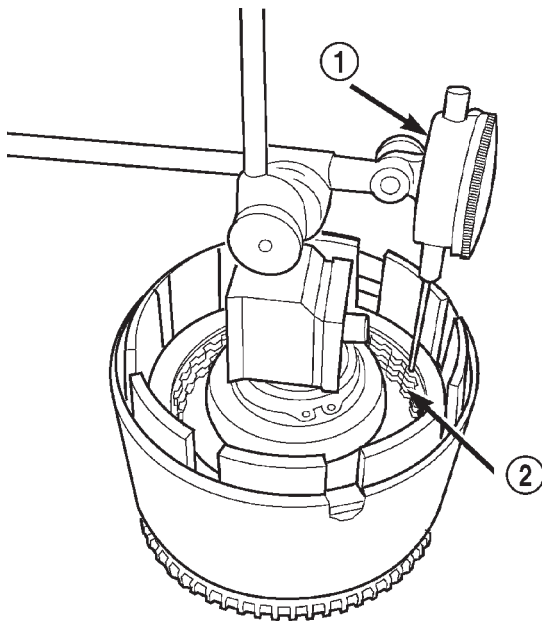
- 1 - INPUT CLUTCH ASSEMBLY
- 2 - INPUT CLUTCH PRESSURE FIXTURE 8391



80c07262

Fig. 308 Press Down on UD Clutch Pack and Zero Dial Indicator

- 1 - DIAL INDICATOR
- 2 - UNDERDRIVE CLUTCH



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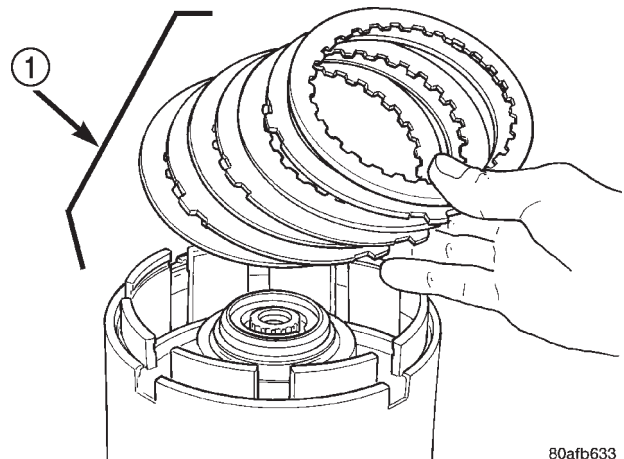
Fig. 307 Set Up Dial Indicator to Measure UD Clutch Clearance

- 1 - DIAL INDICATOR
- 2 - UNDERDRIVE CLUTCH

(19) Take average of four measurements and compare with UD clutch pack clearance specification. **Underdrive clutch pack clearance must be 0.94-1.50 mm (0.037-0.059 in.).**

(20) If necessary, select the proper reaction plate to achieve specifications:

(21) Install the OD clutch pack (four fibers/three steels) (Fig. 309).



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Fig. 309 Install OD Clutch Pack

- 1 - OVERDRIVE CLUTCH PACK

INPUT CLUTCH ASSEMBLY (Continued)

(22) Install OD reaction plate waved snap ring (Fig. 310).

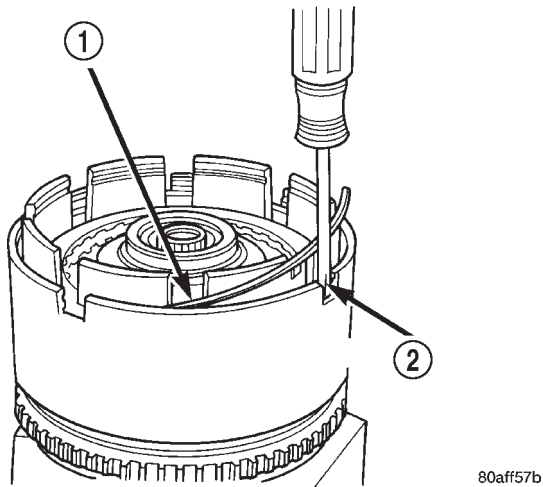


Fig. 310 Install Waved Snap Ring

- 1 - OVERDRIVE REACTION PLATE WAVED SNAP RING
2 - SCREWDRIVER

(23) Install the OD/Reverse reaction plate with large step down (towards OD clutch pack) (Fig. 311).

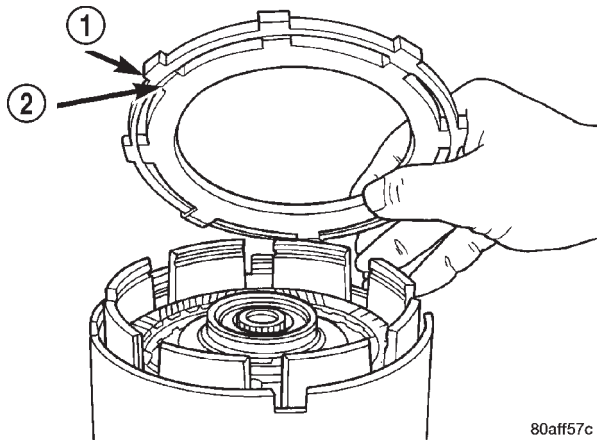


Fig. 311 OD/Reverse Reaction Plate

- 1 - OVERDRIVE/REVERSE PRESSURE PLATE
2 - (STEP SIDE DOWN)

(24) Install OD reaction plate flat snap ring (Fig. 312).

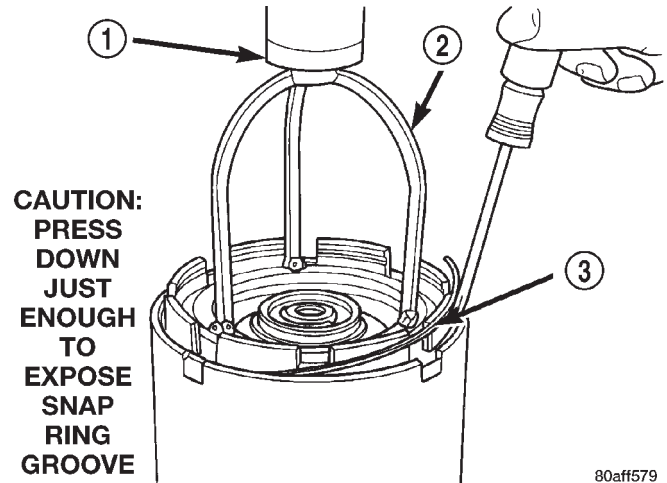


Fig. 312 Install Flat Snap Ring

- 1 - ARBOR PRESS RAM
2 - TOOL 5059A
3 - FLAT SNAP RING

(25) Measure OD clutch pack clearance. Set up dial indicator on top of the OD/Reverse reaction plate as shown in (Fig. 313).

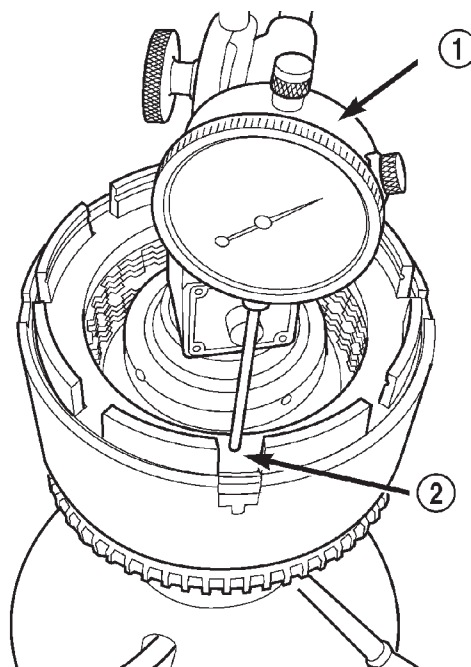


Fig. 313 Measure OD Clutch Pack Clearance

- 1 - DIAL INDICATOR
2 - OD/REVERSE PRESSURE PLATE

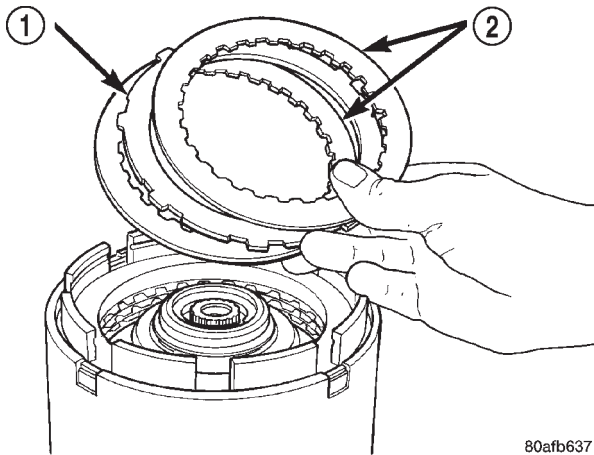
INPUT CLUTCH ASSEMBLY (Continued)

(26) Zero dial indicator and apply 30 psi (206 kPa) air pressure to the overdrive clutch hose on Tool 8391. Measure and record OD clutch pack measurement in four (4) places, 90° apart.

(27) Take average of four measurements and compare with OD clutch pack clearance specification. **The overdrive (OD) clutch pack clearance is 1.07-3.25 mm (0.042-0.128 in.).**

If not within specifications, the clutch is not assembled properly. There is no adjustment for the OD clutch clearance.

(28) Install reverse clutch pack (two fibers/one steel) (Fig. 314).

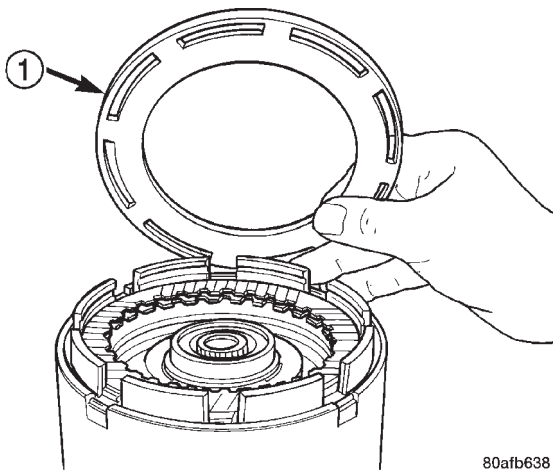


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Fig. 314 Install Reverse Clutch Pack

- 1 - REVERSE CLUTCH PLATE
- 2 - REVERSE CLUTCH DISCS

(29) Install reverse clutch reaction plate with the flat side down towards reverse clutch (Fig. 315).

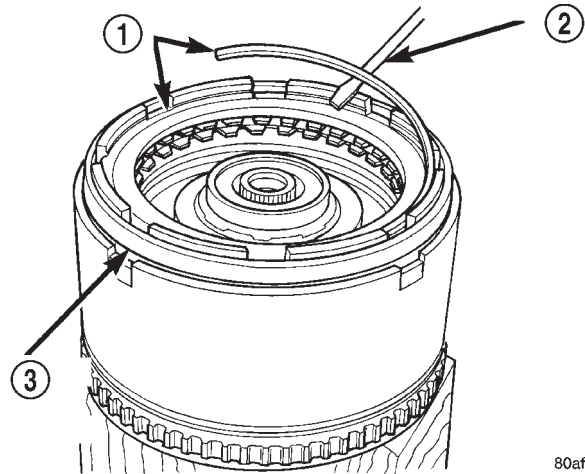


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Fig. 315 Install Reaction Plate

- 1 - REVERSE CLUTCH REACTION PLATE (FLAT SIDE DOWN)

(30) Tap reaction plate down to allow installation of the reverse clutch snap ring. Install reverse clutch snap ring (Fig. 316).

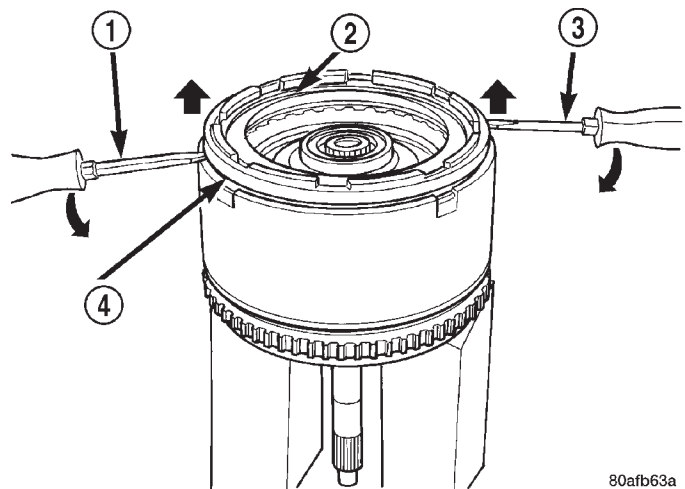


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Fig. 316 Install Reverse Clutch Snap Ring

- 1 - REVERSE CLUTCH SNAP RING (SELECT)
- 2 - SCREWDRIVER
- 3 - REVERSE CLUTCH REACTION PLATE

(31) Pry up reverse reaction plate to seat against snap ring (Fig. 317).



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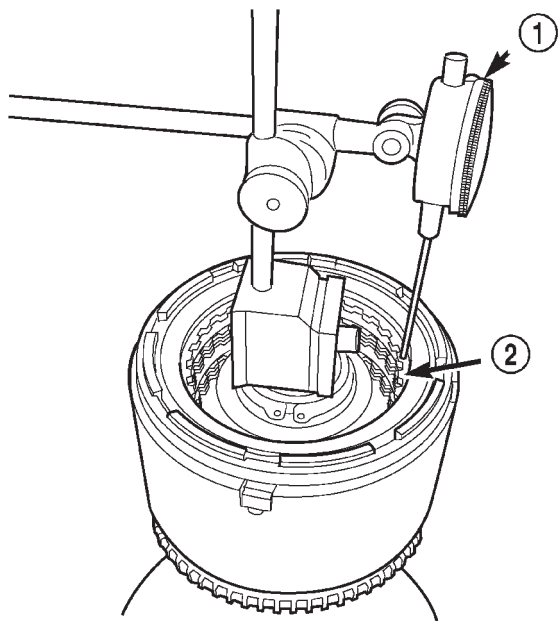
Fig. 317 Pry Up Reaction Plate

- 1 - SCREWDRIVER
- 2 - SNAP RING
- 3 - SCREWDRIVER
- 4 - MUST RAISE REVERSE REACTION PLATE TO RAISE SNAP RING

(32) Set up a dial indicator on the reverse clutch pack as shown in (Fig. 318).

(33) Using moderate pressure, press down and hold (near indicator) reverse clutch disc with screwdriver or suitable tool and zero dial indicator (Fig. 319). When releasing pressure, indicator should advance 0.005-0.010. as clutch pack relaxes.

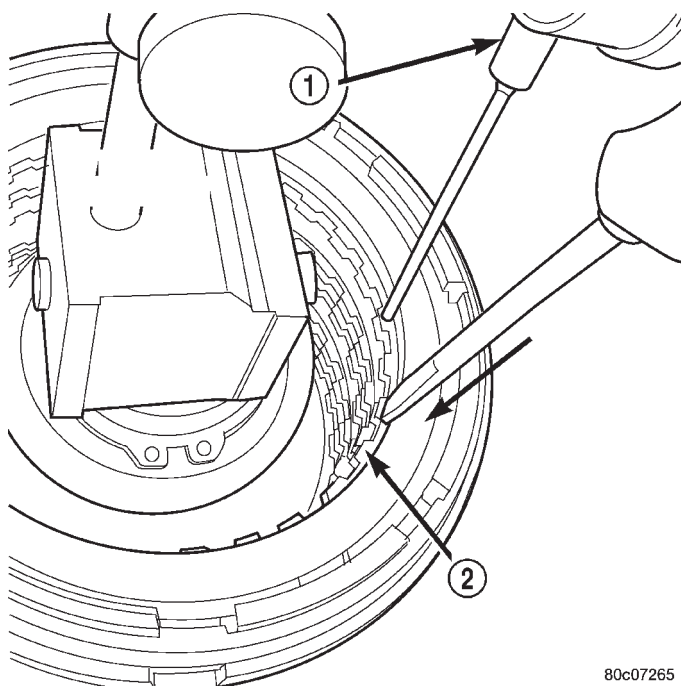
INPUT CLUTCH ASSEMBLY (Continued)



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Fig. 318 Measure Reverse Clutch Pack Clearance

- 1 - DIAL INDICATOR
2 - REVERSE CLUTCH



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Fig. 319 Press Down on Reverse Clutch and Zero Indicator

- 1 - DIAL INDICATOR
2 - REVERSE CLUTCH

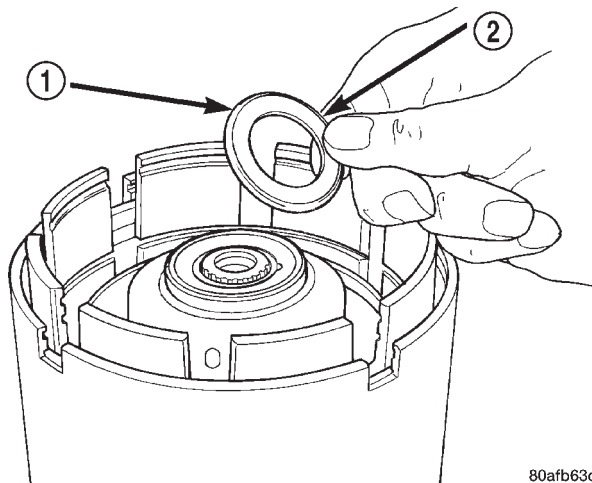
(34) Apply 30 psi (206 kPa) air pressure to the reverse clutch hose on Tool 8391. Measure and record

reverse clutch pack measurement in four (4) places, 90° apart.

(35) Take average of four measurements and compare with reverse clutch pack clearance specification. **The reverse clutch pack clearance is 0.89-1.37 mm (0.035-0.054 in.).** Select the proper reverse clutch snap ring to achieve specifications:

(36) To complete the assembly, reverse clutch and overdrive clutch must be removed.

(37) Install the #2 needle bearing (Fig. 320).

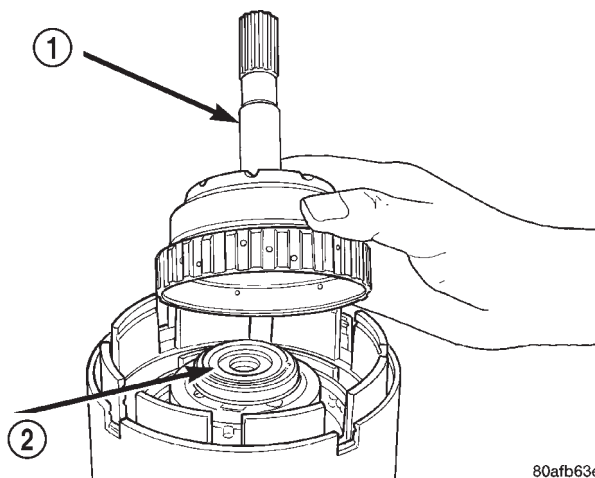


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Fig. 320 Install No. 2 Needle Bearing

- 1 - #2 NEEDLE BEARING (NOTE 3 SMALL TABS)
2 - TABS UP

(38) Install the underdrive shaft assembly (Fig. 321).



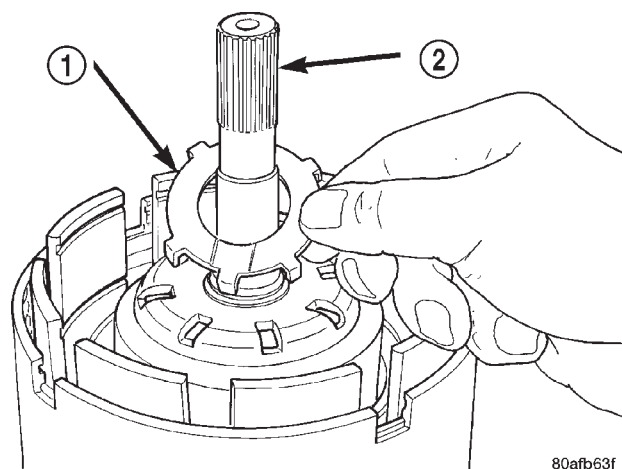
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Fig. 321 Install Underdrive Shaft Assembly

- 1 - UNDERDRIVE SHAFT ASSEMBLY
2 - #2 NEEDLE BEARING

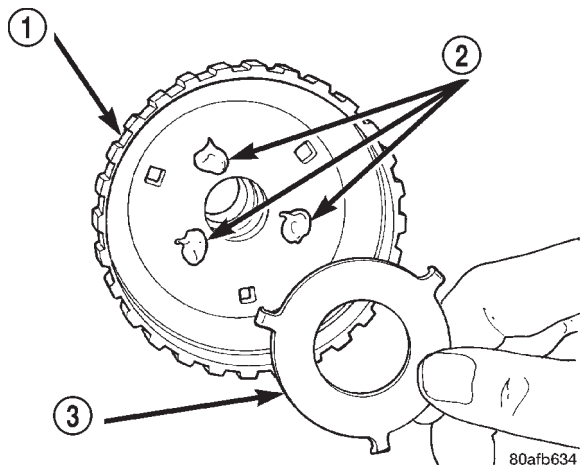
(39) Install the #3 thrust washer to the underdrive shaft assembly. Be sure five tabs are seated properly (Fig. 322).

INPUT CLUTCH ASSEMBLY (Continued)

**Fig. 322 Install No. 3 Thrust Washer**

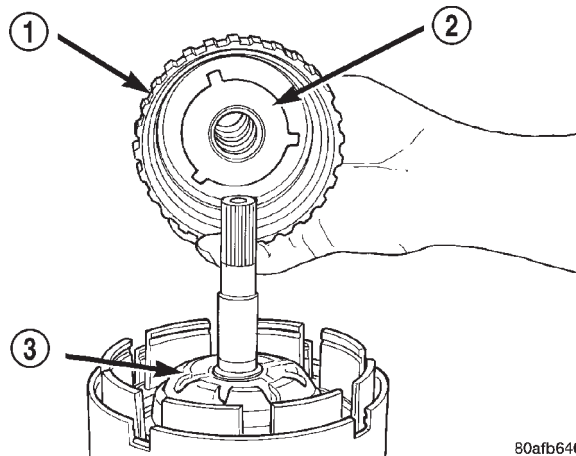
- 1 - #3 THRUST WASHER (NOTE 5 TABS)
2 - UNDERDRIVE SHAFT ASSEMBLY

(40) Install the #3 thrust plate to the bottom of the overdrive shaft assembly. Retain with petrolatum or transmission assembly gel (Fig. 323).

**Fig. 323 Install No. 3 Thrust Plate**

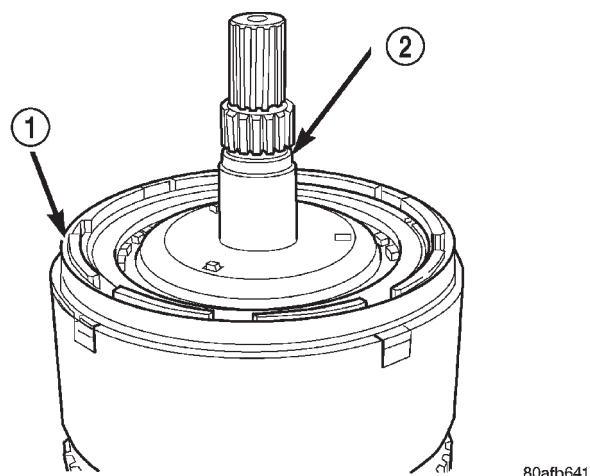
- 1 - OVERDRIVE SHAFT ASSEMBLY
2 - DABS OF PETROLATUM (FOR RETENTION)
3 - #3 THRUST PLATE (NOTE 3 TABS)

(41) Install the overdrive shaft assembly (Fig. 324).

**Fig. 324 Install Overdrive Shaft Assembly**

- 1 - OVERDRIVE SHAFT ASSEMBLY
2 - #3 THRUST PLATE
3 - #3 THRUST WASHER

(42) Reinstall overdrive and reverse clutch as shown (Fig. 325). **Rechecking these clutch clearances is not necessary.**

**Fig. 325 Input Clutch Assembly**

- 1 - INPUT CLUTCH ASSEMBLY
2 - OVERDRIVE SHAFT ASSEMBLY

OIL PUMP

DESCRIPTION

The oil pump is located in the pump housing inside the bell housing of the transaxle case. The oil pump assembly (Fig. 326) consists of an inner and outer gear, a housing, and a cover that also serves as the reaction shaft support.

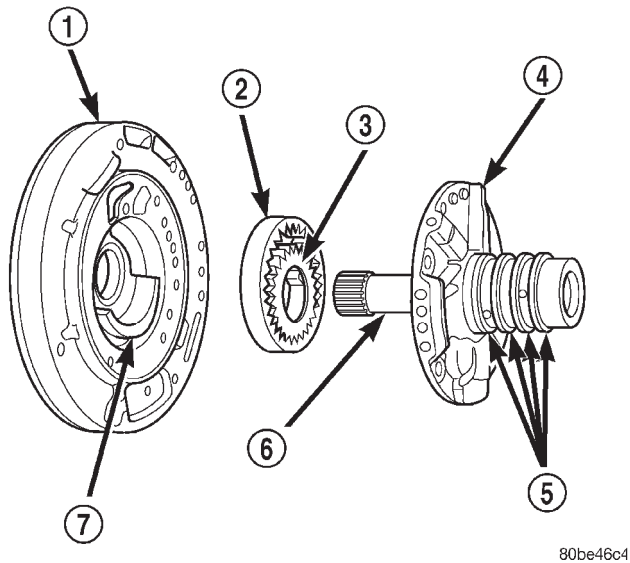


Fig. 326 Oil Pump Assembly

- 1 - PUMP HOUSING
- 2 - OUTER PUMP GEAR
- 3 - INNER PUMP GEAR
- 4 - REACTION SHAFT SUPPORT
- 5 - SEAL RINGS (4)
- 6 - REACTION SHAFT
- 7 - CRESCENT

OPERATION

As the torque converter rotates, the converter hub rotates the inner and outer gears. As the gears rotate, the clearance between the gear teeth increases in the crescent area, and creates a suction at the inlet side of the pump. This suction draws fluid through the pump inlet from the oil pan. As the clearance between the gear teeth in the crescent area decreases, it forces pressurized fluid into the pump outlet and to the valve body.

STANDARD PROCEDURE - OIL PUMP VOLUME CHECK

Measuring oil pump output volume will determine if sufficient flow to the transmission oil cooler exists, and whether or not an internal transmission failure is present.

Verify that transmission fluid is at the proper level. Refer to Fluid Level and Condition in this Group. If adding fluid is necessary, fill to the proper level with Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602). The following procedure is to check oil pump output volume:

(1) Disconnect the **To cooler** line at the oil cooler inlet and place a collecting container under the disconnected line (Fig. 327).

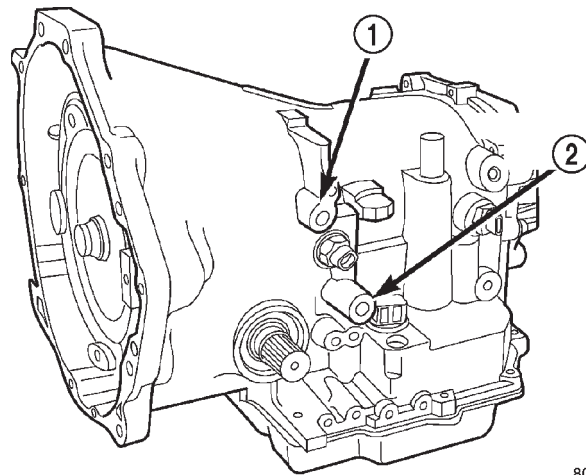


Fig. 327 Cooler Line Location

- 1 - FROM TRANSAXLE COOLER
- 2 - TO TRANSAXLE COOLER

CAUTION: With the fluid set at the proper level, fluid collection should not exceed (1) quart or internal damage to the transmission may occur.

(2) Start engine and run **at curb idle speed**, with the shift selector in neutral.

(3) If one quart of ATF is collected in 20 seconds or less, flow is within acceptable limits. If fluid flow is intermittent or it takes more than 20 seconds to collect one quart of ATF, refer to Hydraulic Pressure Tests in this Group.

(4) Inspect the cooler hose for damage. Replace if necessary.

(5) Connect the **To cooler** hose to the oil cooler inlet and torque clamp to 2 N·m (20 in. lbs.) torque.

(6) Refill the transaxle to proper level with Mopar® ATF+4 (Automatic Transmission Fluid-Type 9602).

OIL PUMP (Continued)

DISASSEMBLY

When disassembling the transaxle it is necessary to inspect the oil pump for wear and damage.

- (1) Remove the reaction shaft support bolts.
- (2) Remove reaction shaft support from pump housing (Fig. 328).

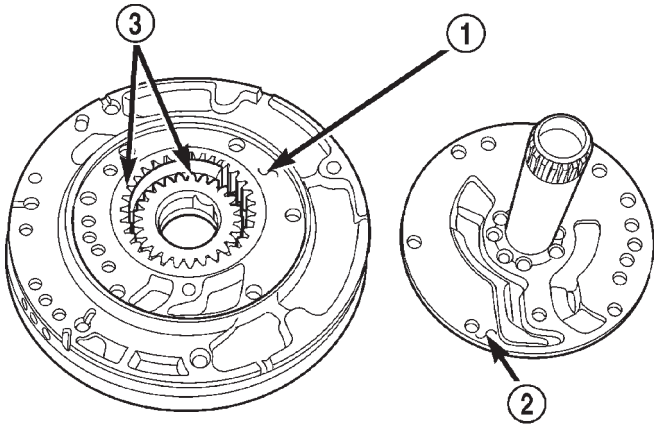


Fig. 328 Reaction Shaft Support

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- 1 - PUMP HOUSING
- 2 - REACTION SHAFT SUPPORT
- 3 - PUMP GEARS

- (3) Remove the pump gears (Fig. 329) and check for wear and damage on pump housing and gears.

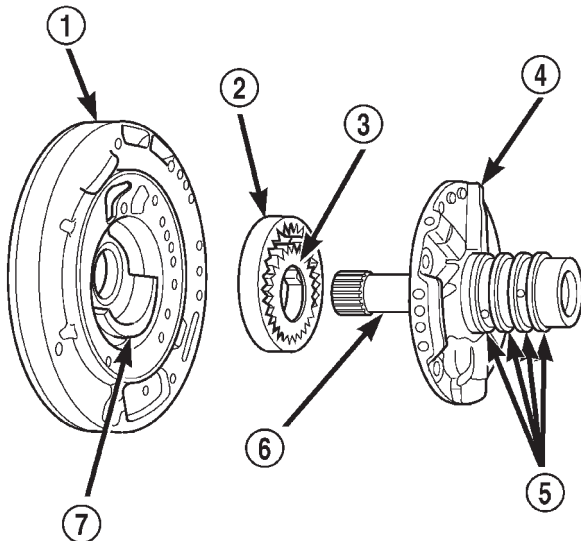


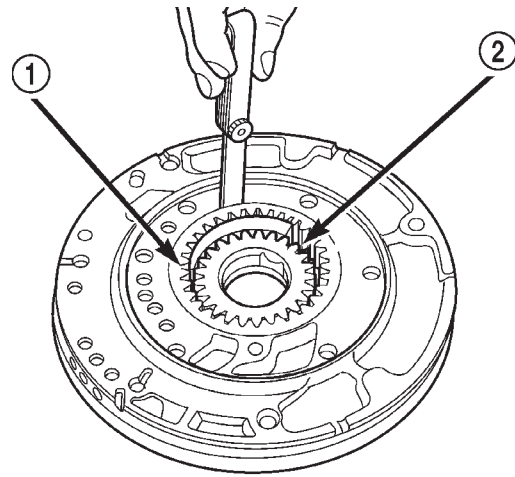
Fig. 329 Oil Pump Assembly

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- 1 - PUMP HOUSING
- 2 - OUTER PUMP GEAR
- 3 - INNER PUMP GEAR
- 4 - REACTION SHAFT SUPPORT
- 5 - SEAL RINGS (4)
- 6 - REACTION SHAFT
- 7 - CRESCENT

- (4) Re-install the gears and check clearances.

- (5) Measure the clearance between the outer gear and the pump pocket (Fig. 330). Clearance should be 0.089–0.202 mm (0.0035–0.0079 in.).



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Fig. 330 Measure Outer Gear to Pocket

- 1 - OUTER GEAR
- 2 - POCKET

- (6) Measure clearance between outer gear and crescent. Clearance should be 0.060–0.298 mm (0.0023–0.0117 in.).

- (7) Measure clearance between inner gear and crescent. Clearance should be 0.093–0.385 mm (0.0036–0.0151 in.).

- (8) Position an appropriate piece of Plastigage across both pump gears.

- (9) Align the Plastigage to a flat area on the reaction shaft support housing.

- (10) Install the reaction shaft to the pump housing. Tighten the bolts to 27 N·m (20 ft. lbs.).

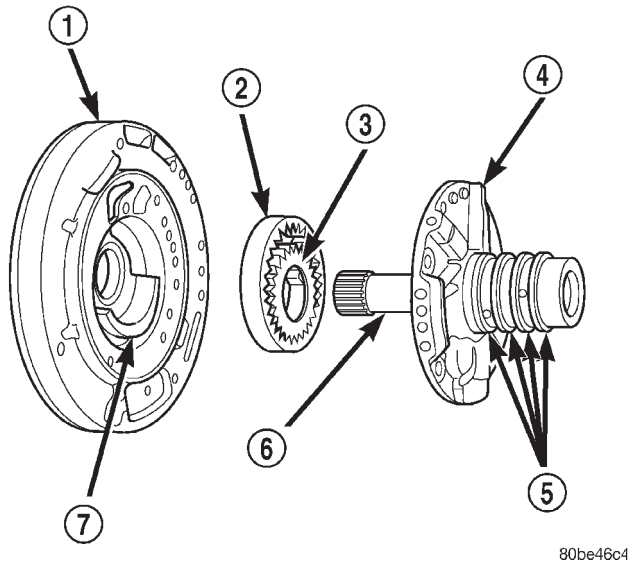
- (11) Remove bolts and carefully separate the housings. Measure the Plastigage following the instructions supplied.

- (12) Clearance between outer gear side and the reaction shaft support should be 0.020–0.046 mm (0.0008–0.0018 in.). Clearance between inner gear side and the reaction shaft support should be 0.020–0.046 mm (0.0008–0.0018 in.).

OIL PUMP (Continued)

ASSEMBLY

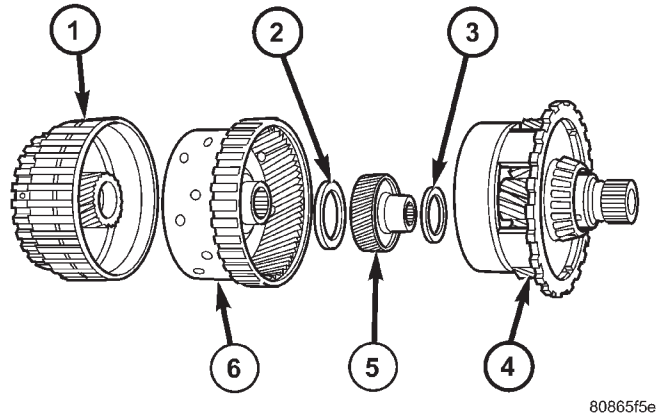
- (1) Assemble oil pump as shown in (Fig. 331)
- (2) Install and torque reaction shaft support-to-oil pump housing bolts to 28 N·m (20 ft. lbs.) torque.

**Fig. 331 Oil Pump Assembly**

- 1 - PUMP HOUSING
- 2 - OUTER PUMP GEAR
- 3 - INNER PUMP GEAR
- 4 - REACTION SHAFT SUPPORT
- 5 - SEAL RINGS (4)
- 6 - REACTION SHAFT
- 7 - CRESCENT

PLANETARY GEARTRAIN**DESCRIPTION**

The planetary geartrain is located between the input clutch assembly and the rear of the transaxle case. The planetary geartrain consists of two sun gears, two planetary carriers, two annulus (ring) gears, and one output shaft (Fig. 332).

**Fig. 332 Planetary Geartrain**

- 1 - FRONT SUN GEAR ASSEMBLY
- 2 - #6 THRUST BEARING
- 3 - #7 THRUST BEARING
- 4 - REAR CARRIER FRONT ANNULUS ASSEMBLY
- 5 - REAR SUN GEAR
- 6 - FRONT CARRIER REAR ANNULUS ASSEMBLY

OPERATION

The planetary geartrain utilizes two planetary gear sets that connect the transmission input shaft to the output shaft. Input and holding clutches drive or lock different planetary members to change output ratio or direction.

SEAL - STUB SHAFT (LONG)

REMOVAL

If it has been diagnosed that the long stub shaft seal is leaking, the following procedure can be used to replace failed seal. This procedure will allow the replacement of the seals without having to set backlash and measure differential bearing turning torque.

CAUTION: The differential bearings and the differential adjusters must be reused in order to use this procedure. If any of the items listed above require replacement, this procedure cannot be used. Refer to Differential Recondition section of this manual.

(1) Remove transaxle from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL).

(2) Remove long stub shaft from transaxle (Fig. 333).

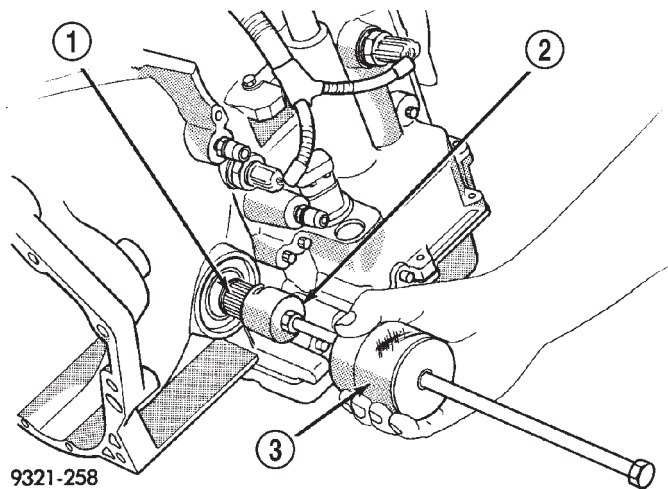


Fig. 333 Long Stub Shaft Removal

- 1 - LONG STUB SHAFT
- 2 - SPECIAL TOOL 8420A
- 3 - SLIDE HAMMER C-3752

To replace the long stub shaft bearing, install stub shaft in soft-jawed vise. Remove the stub shaft bearing C-clip (Fig. 334). Install bearing splitter onto the shaft. Install Special Tool # P-334 under the bearing. Using a shop press, remove the bearing from the stub shaft (Fig. 335).

To install the stub shaft bearing, position new bearing onto the stub shaft. Install stub shaft into shop press. Position Special Tool # 6558 above bearing. Press bearing onto shaft (Fig. 336).

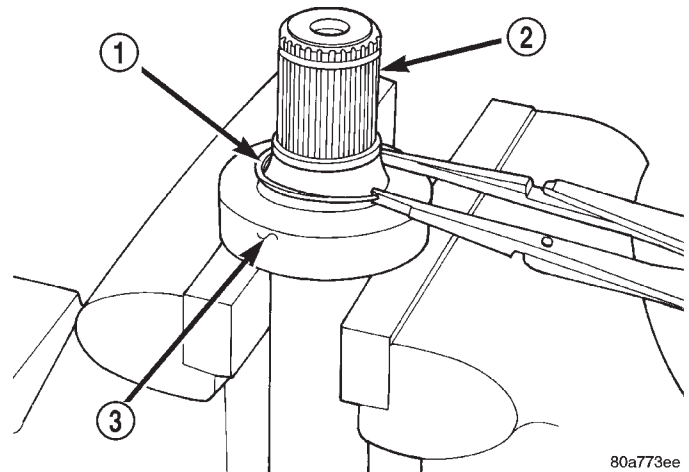


Fig. 334 Stub Shaft Bearing C-clip

- 1 - C-CLIP
- 2 - LONG STUB SHAFT
- 3 - STUB SHAFT BEARING

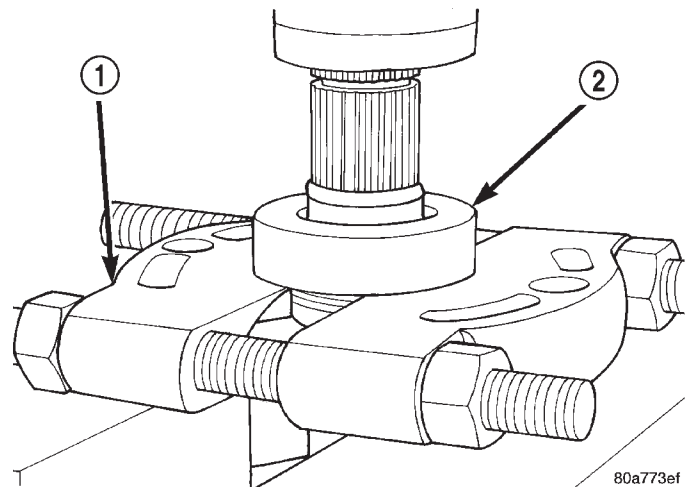
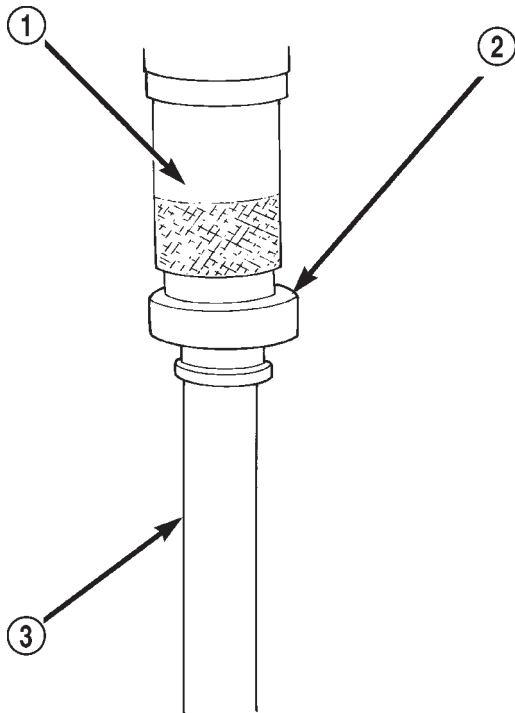


Fig. 335 Remove Stub Shaft Bearing C-clip

- 1 - BEARING SPLITTER
- 2 - STUB SHAFT BEARING

SEAL - STUB SHAFT (LONG) (Continued)

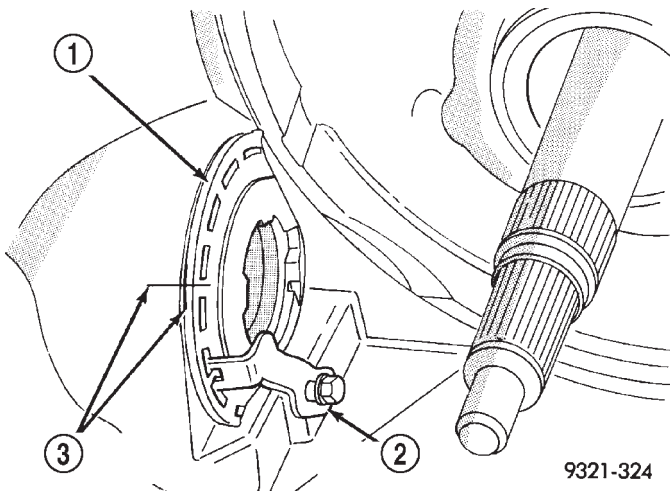


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Fig. 336 Install Bearing Onto Shaft

- 1 - TOOL 6558
- 2 - STUB SHAFT BEARING
- 3 - STUB SHAFT

(3) Index the inner differential adjuster with a cross hair as shown in (Fig. 337).



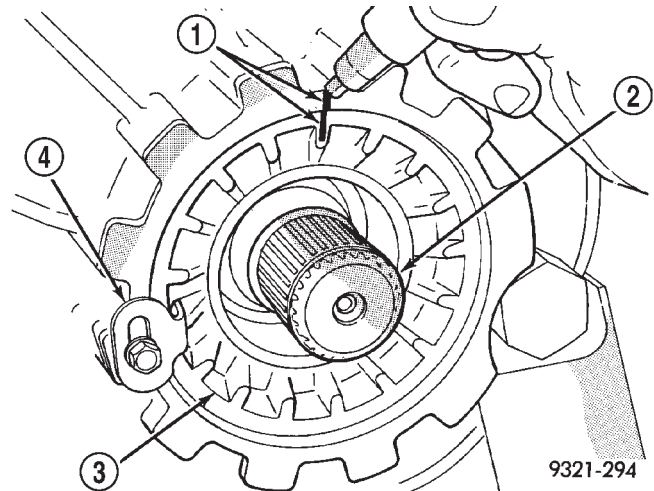
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Fig. 337 Indexing Inner Adjuster

- 1 - INNER ADJUSTER
- 2 - ADJUSTER LOCK
- 3 - CROSS HAIR MARKS

CAUTION: If short stub shaft has corrosion, use caution when removing differential cover. Inspect seal and shaft for damage after removal of cover. Replace shaft and/or seal as required.

(4) Index outer adjuster (Fig. 338). Remove lock bracket and back out adjuster exactly one revolution. Then remove differential cover.



9321-294

Fig. 338 Indexing Outer Adjuster

- 1 - INDEXING MARKS
- 2 - STUB SHAFT
- 3 - OUTER ADJUSTER
- 4 - ADJUSTER LOCK

(5) Remove The inner adjuster lock bracket. Then remove the inner adjuster.

CAUTION: Keep the inner adjuster for reinstallation.

INSTALLATION

(1) Lube inner adjuster threads with gear oil and reinstall to the cross haired index marks.

(2) Install the differential carrier. Then install stub shaft seal protector.

(3) Install the differential cover/outer adjuster assembly with sealant applied. Install and tighten differential cover bolts.

(4) Tighten the outer adjuster 3/4 of a turn. Seat bearings by turning differential carrier three or four turns in both directions. Finish tightening the adjuster 1/4 turn to its index mark (original location).

(5) Reinstall long stub shaft, fill differential with fluid and reinstall transaxle.

(6) After installing transaxle check transmission side fluid level.

SEAL - STUB SHAFT (SHORT)

REMOVAL

The following procedure can be used to replace the short stub shaft seal without having to remove the transaxle from the vehicle. If the adjuster or bearing located behind the adjuster require replacement, do not use this procedure.

- (1) Place vehicle in neutral and lift vehicle on hoist.
- (2) Remove short driveshaft.
- (3) Index the outer adjuster (Fig. 339).

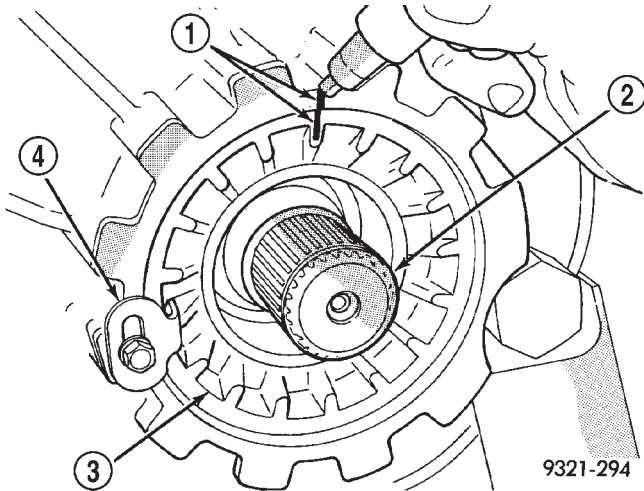


Fig. 339 Indexing Outer Adjuster

- 1 - INDEXING MARKS
- 2 - STUB SHAFT
- 3 - OUTER ADJUSTER
- 4 - ADJUSTER LOCK

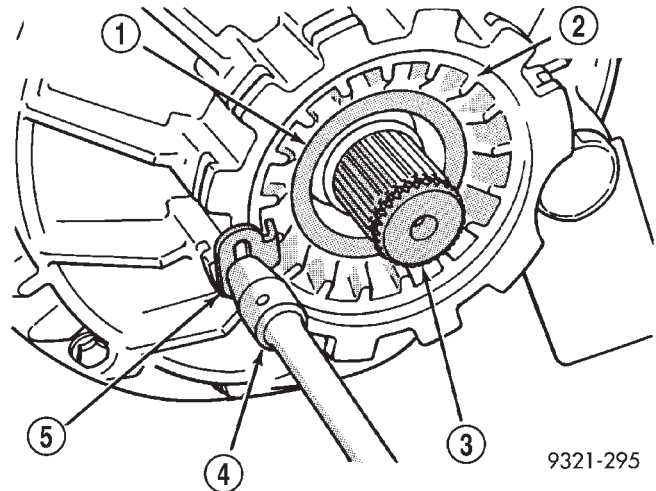


Fig. 340 Outer Adjuster Lock Removal

- 1 - OIL SEAL
- 2 - OUTER ADJUSTER
- 3 - STUB SHAFT
- 4 - SOCKET
- 5 - ADJUSTER LOCK

- (4) Remove outer adjuster lock (Fig. 340).
- (5) Using special tool 6503 loosen outer adjuster, then retighten to the index mark using a torque wrench. Record the amount of torque required to return the index marks to their original location. Remove the adjuster.

- (6) Use special tool 6558 to remove old seal and install new seal (Fig. 341).

- (7) Inspect stub shaft for corrosion (Fig. 342). If corrosion exists, wrap stub shaft with wax paper and install seal protector over wax paper.

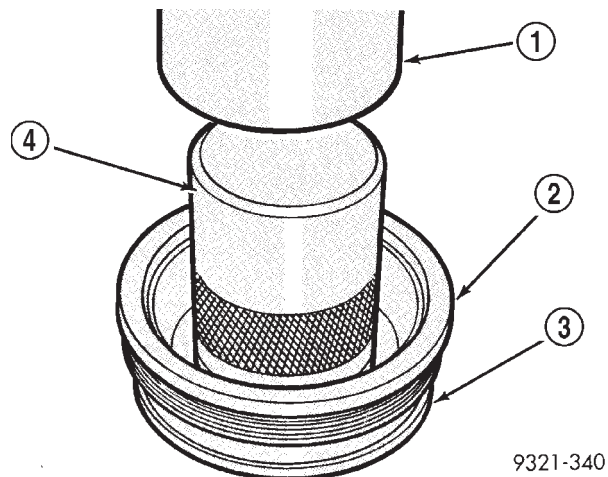
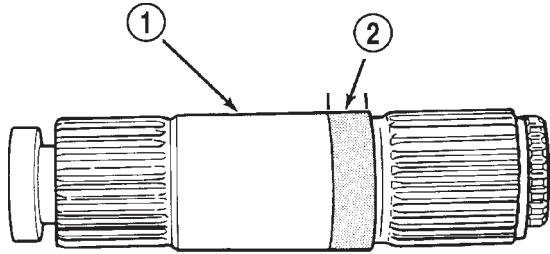


Fig. 341 Seal Removal and Installation

- 1 - ARBOR PRESS
- 2 - OUTER DIFFERENTIAL ADJUSTER
- 3 - O-RING
- 4 - SPECIAL TOOL 6558

SEAL - STUB SHAFT (SHORT) (Continued)



9321-296

Fig. 342 Stub Shaft Corrosion

- 1 - STUB SHAFT
2 - CORROSION AREA

INSTALLATION

- (1) Lube O-ring, threads on adjuster, seal protector and seal lips with gear oil before installing.
- (2) Install outer adjuster into transaxle case and tighten adjuster within 10 ft. lbs. of the torque reading recorded in step five.
- (3) Rotate ring gear three or four revolutions in both directions to seat differential bearings.
- (4) Continue tightening outer adjuster until index marks line up (original location).
- (5) Install adjuster lock.
- (6) Install new driveshaft retaining circlip and O-ring on stub shaft. Then reinstall driveshaft.
- (7) Check fluid level in differential and adjust as required.
- (8) Road test and recheck for leaks as required.

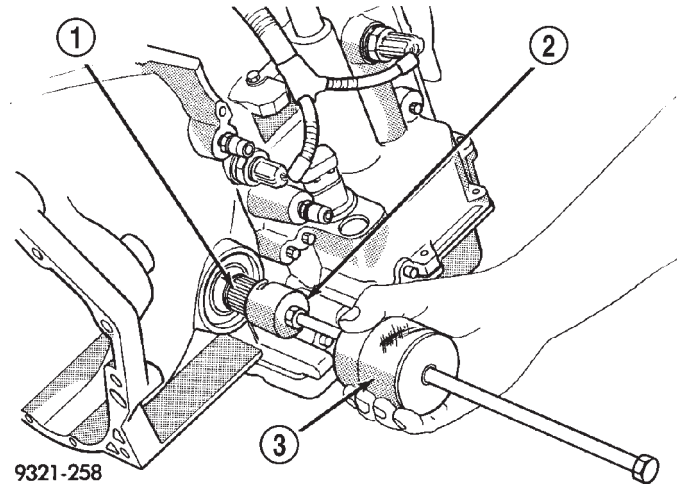
SEAL - TRANSFER SHAFT**REMOVAL**

If it has been diagnosed that one or both of the transfer shaft seals are leaking, the following procedure can be used to replace failed seals. This procedure will allow the technician to replace the seals without having to set backlash and measure differential bearing turning torque.

CAUTION: The transfer shaft rear shim, bearing cups and cones, differential bearings and the differential adjusters must be reused to use this procedure. If any of the items listed above require replacement, refer to Differential Recondition section of this manual.

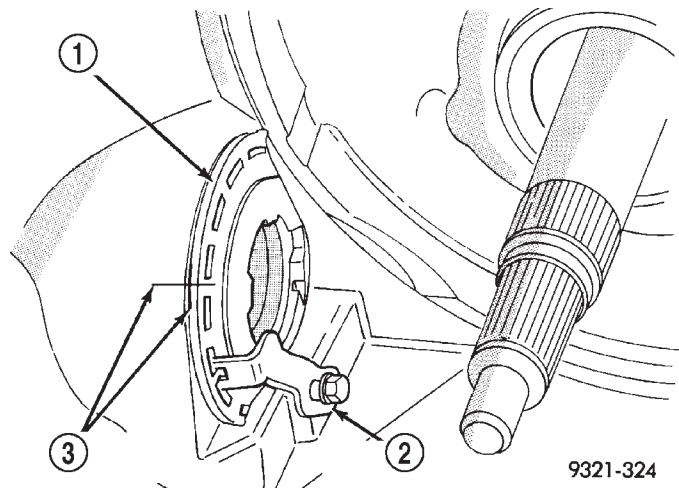
- (1) Remove transaxle from vehicle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL).
- (2) Remove valve body from transaxle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/VALVE BODY - REMOVAL).

- (3) Remove solenoid connector from transaxle case.
- (4) Remove long stub shaft from transaxle (Fig. 343).

**Fig. 343 Long Stub Shaft Removal**

- 1 - LONG STUB SHAFT
2 - SPECIAL TOOL 8420A
3 - SLIDE HAMMER C-3752

- (5) Index the inner differential adjuster with a cross hair as shown in (Fig. 344).

**Fig. 344 Indexing Inner Adjuster**

- 1 - INNER ADJUSTER
2 - ADJUSTER LOCK
3 - CROSS HAIR MARKS

CAUTION: If short stub shaft has corrosion, use caution when removing differential cover. Inspect seal and shaft for damage after removal of cover. Replace shaft and/or seal as required.

SEAL - TRANSFER SHAFT (Continued)

(6) Index outer adjuster (Fig. 345). Remove lock bracket and back out adjuster exactly one revolution. Then remove differential cover.

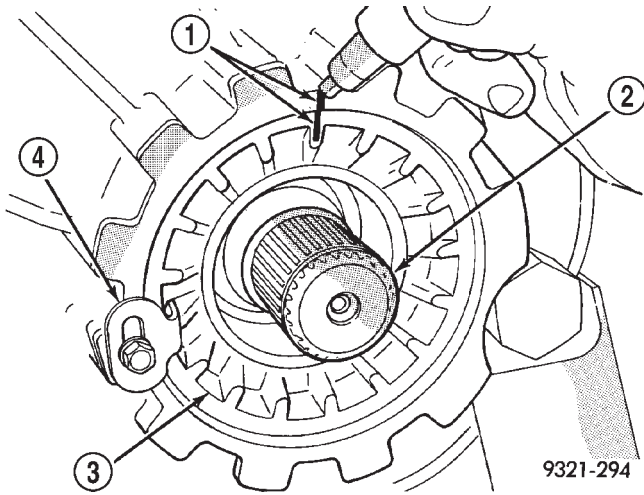


Fig. 345 Indexing Outer Adjuster

- 1 - INDEXING MARKS
- 2 - STUB SHAFT
- 3 - OUTER ADJUSTER
- 4 - ADJUSTER LOCK

(7) Remove The inner adjuster lock bracket. Then remove the inner adjuster.

CAUTION: Keep the inner adjuster for reinstallation.

(8) Remove the transfer shaft nut, rear cone, rear cup, oil baffle, rear shim, transfer shaft and transfer shaft seals. Refer to appropriate procedures within this section for detailed removal and installation procedures if required.

CAUTION: Keep rear shim and rear bearing cup cone for reinstallation.

INSTALLATION

(1) Install transfer shaft, transfer shaft seals, oil baffle, rear cup, rear shim, rear cone and a new nut. Refer to appropriate procedures within this section for detailed removal and installation procedures if required.

(2) Install a new o-ring onto the inner adjuster.

(3) Lube inner adjuster threads and o-ring with gear oil and reinstall to the cross haired index marks.

(4) Reinstall the inner adjuster locking bracket.

(5) Install the differential carrier. Install stub shaft seal protector.

(6) Install the differential cover/outer adjuster assembly with Mopar Silicone Sealant applied. Install and tighten differential cover bolts.

(7) Tighten the outer adjuster 3/4 of a turn. Seat bearings by turning differential carrier three or four turns in both directions. Finish tightening the adjuster 1/4 turn to its index mark (original location).

(8) Reinstall the outer adjuster locking bracket.

SEAL - OIL PUMP

REMOVAL

The transaxle must be removed from the vehicle to replace this oil seal.

(1) Remove the transaxle from the vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL).

(2) Remove the torque converter from the transaxle bellhousing.

(3) Use special tool C-3981B to remove oil pump seal (Fig. 346).

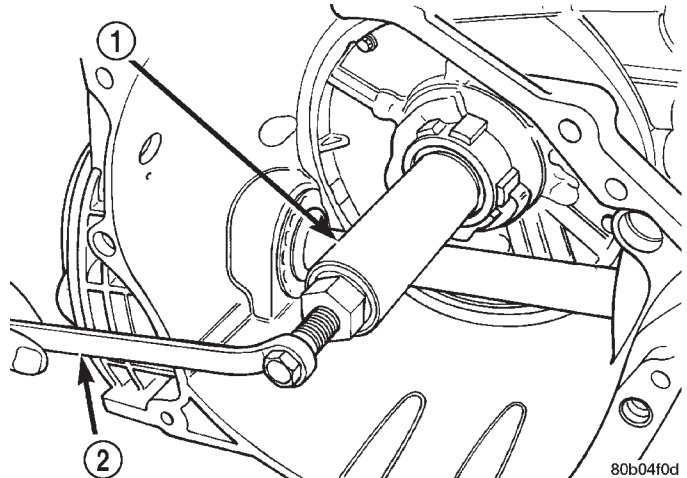


Fig. 346 Oil Seal Removal

- 1 - SPECIAL TOOL C-3981B
- 2 - WRENCH

INSTALLATION

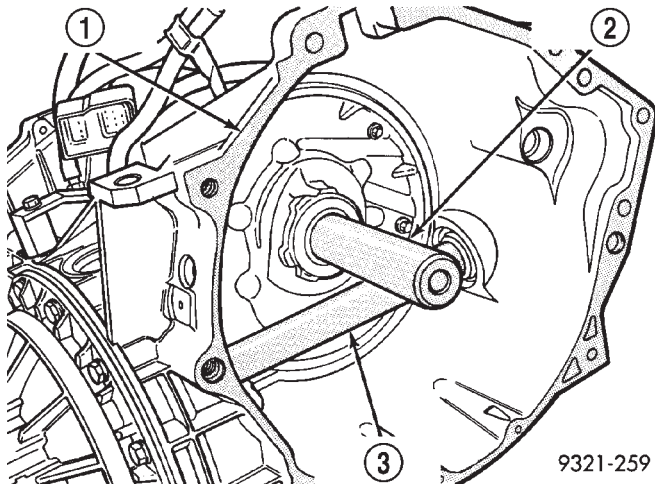
(1) Clean and inspect oil pump seal seat. Then install seal using special tool C-4193A (Fig. 347).

(2) Clean and inspect torque converter hub. If nicks, scratches or hub wear are found, torque converter replacement will be required.

CAUTION: If the torque converter is being replaced, apply a light coating of grease to the crankshaft pilot hole. Also inspect the engine drive plate for cracks. If any cracks are found replace the drive plate. Do not attempt to repair a cracked drive plate. Always use new torque converter to drive plate bolts.

(3) Apply a light film of transmission oil to the torque converter hub and oil seal lips. Then install

SEAL - OIL PUMP (Continued)

**Fig. 347 Oil Seal Installation**

- 1 - TRANSAXLE BELL HOUSING
- 2 - SPECIAL TOOL C-4193A
- 3 - LONG STUB SHAFT

torque converter into transaxle. Be sure that the hub lugs mesh with the front pump lugs when installing.

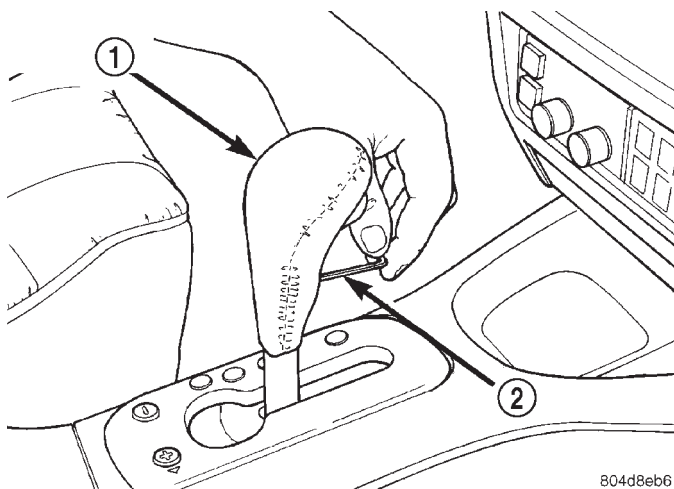
- (4) Reinstall the transaxle into the vehicle.

SHIFT INTERLOCK CABLE

REMOVAL

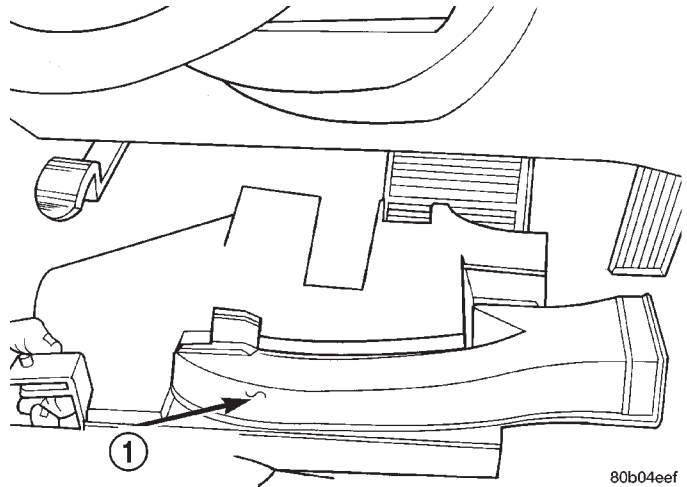
NOTE: Floor Shift Models

- (1) Using suitable size allen wrench, remove the gearshift knob retaining screw (Fig. 348).

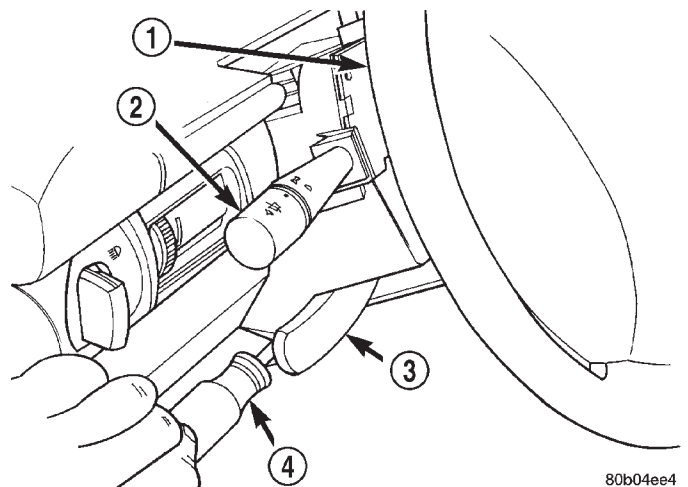
**Fig. 348 Shift Handle Retaining Screw**

- 1 - GEARSHIFT KNOB
- 2 - HEX WRENCH

- (2) Remove gearshift knob from shifter assy.
- (3) Remove console bezel from vehicle.
- (4) Remove under panel silencer/duct assembly (Fig. 349).
- (5) Remove column cover screws.
- (6) Tilt column down and remove upper half of column cover.
- (7) Tilt the column to the uppermost position and remove the tilt lever (Fig. 350).

**Fig. 349 Panel Removal/Installation**

- 1 - SILENCER/DUCT ASSEMBLY

**Fig. 350 Tilt Lever Screw Removal/Install**

- 1 - STEERING WHEEL
- 2 - TURN SIGNAL LEVER
- 3 - TILT LEVER
- 4 - SCREWDRIVER

SHIFT INTERLOCK CABLE (Continued)

(8) Remove the ignition key and remove lower column cover (Fig. 351).

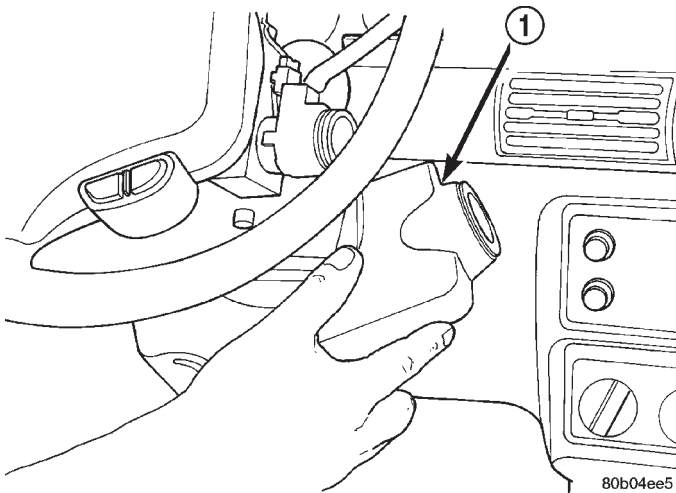


Fig. 351 Lower Column Cover Removal/Installation

1 - LOWER COLUMN COVER

(9) Remove the interlock cable from the shifter housing. Slide the cable out of the groove in the interlock lever (Fig. 352).

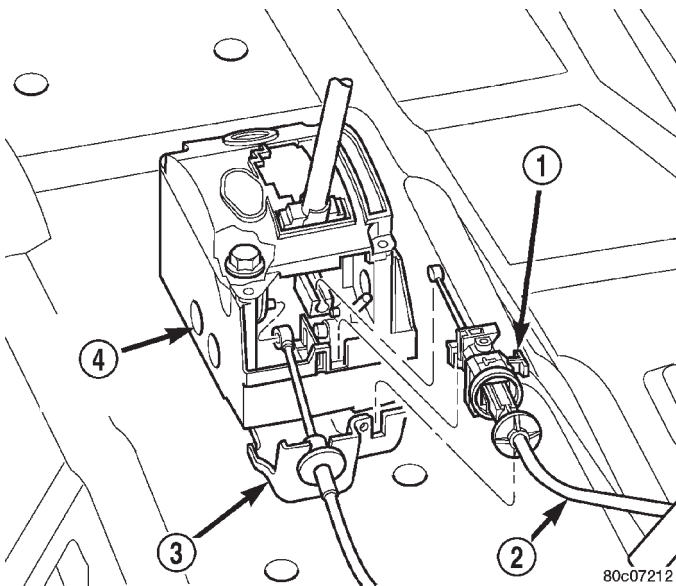


Fig. 352 Interlock Cable Removal/Installation

1 - LOCKING CLIP
2 - INTERLOCK CABLE
3 - BRACKET
4 - SHIFTER ASSEMBLY

(10) Disconnect the BTSI solenoid connector.

(11) Depress the lock tab (Fig. 353) on the interlock cable and pull the cable out of the lock cylinder housing (Fig. 354).

(12) Remove interlock cable. Note cable routing so it can be installed in the same manner.

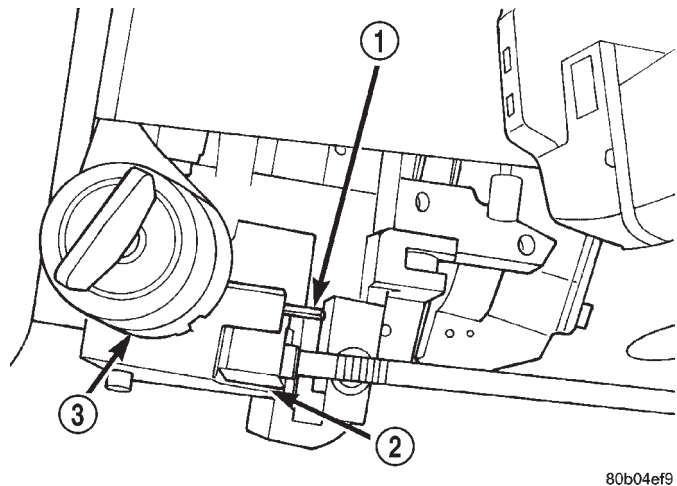


Fig. 353 Interlock Cable Locking Tab

1 - TAB
2 - INTERLOCK CABLE
3 - LOCK CYLINDER HOUSING

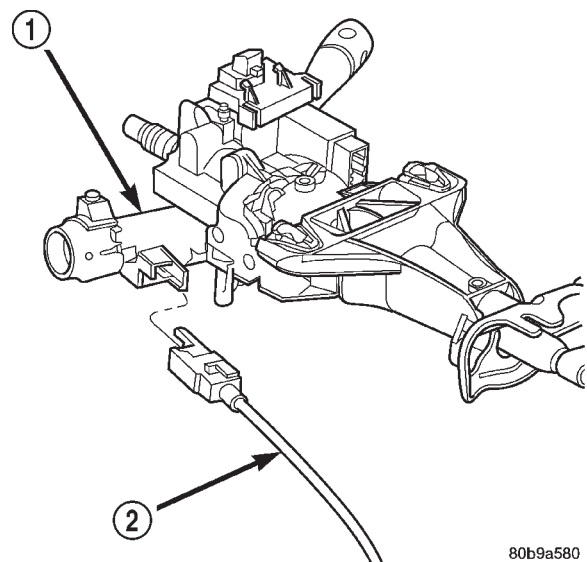


Fig. 354 Interlock Cable Removal/Installation

1 - LOCK CYLINDER HOUSING
2 - INTERLOCK CABLE

INSTALLATION

(1) Ensure ignition switch is in the "ON/RUN" position (Fig. 355).

(2) Route the interlock cable into position as previously removed.

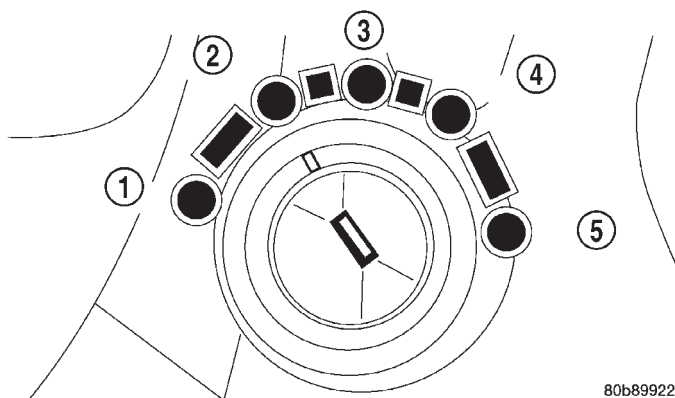
(3) Slide the steering column end of the interlock cable into the lock cylinder housing until it snaps into place (Fig. 354).

(4) Connect BTSI solenoid connector.

(5) Turn the ignition key to the "LOCK" position (Fig. 355).

(6) Put the shifter in the PARK position.

SHIFT INTERLOCK CABLE (Continued)



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Fig. 355 Ignition Key/Switch Positions

- 1 - ACC
- 2 - LOCK
- 3 - OFF
- 4 - ON/RUN
- 5 - START

(7) Slide the interlock cable core wire into the groove on the lever (Fig. 352). Ensure the cable end seats in the groove.

(8) Slip the cable into the shifter housing until it snaps into place.

(9) Ensure the shift lever remains in PARK. Move the ignition key to the "LOCK" position and remove the key. Tilt the steering column to the full UP position.

(10) If the interlock cable is being replaced, remove the lock pin. Allow the cable to adjust itself to the correct position. Tighten the locking clip (Fig. 352) by pushing it down.

(11) If the interlock cable is being re-used, the lock pin will not exist. Free adjustment by pulling outward on locking clip. The cable will index itself to the correct position. Tighten the locking clip by pushing it down.

(12) Insert the ignition key and verify the ignition interlock adjustment/operation. Refer to Description and Operation to determine intended operation. If adjustment is necessary, refer to Adjustments.

(13) Install the bezel on the shifter console.

(14) Install gearshift knob (Fig. 348).

(15) Install upper and lower covers from the steering column.

(16) Install tilt lever (Fig. 350).

(17) Install the lower silencer panel (Fig. 349).

ADJUSTMENTS

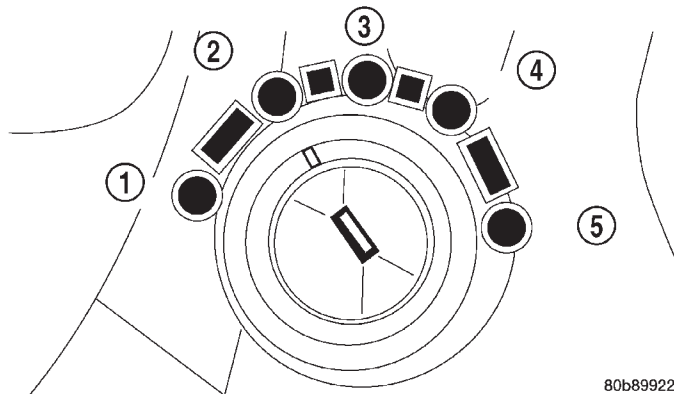
ADJUSTMENT - INTERLOCK CABLE

- (1) Remove the shifter handle.
- (2) Remove the console bezel.

(3) Move the gear shifter to PARK and the ignition key to the LOCK position (Fig. 356).

(4) If the interlock cable is being replaced, remove the pin to allow cable to "self adjust." Press locking clip (Fig. 357) by hand to secure adjustment.

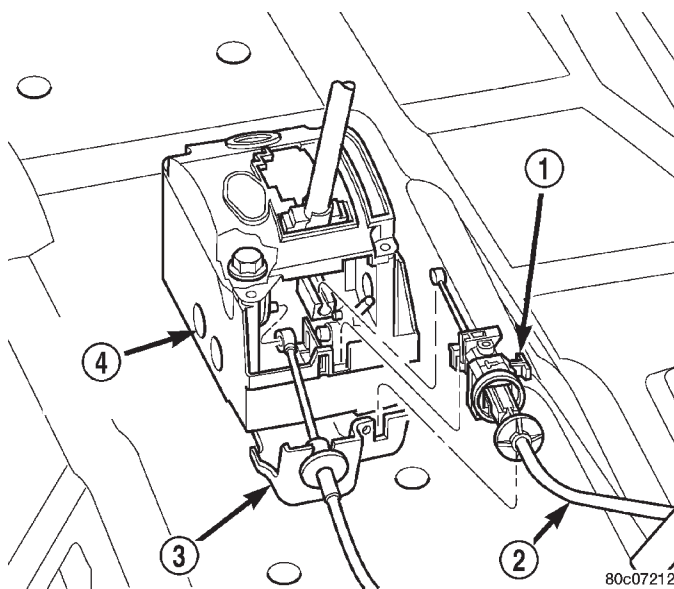
(5) If the interlock cable is not being replaced, the pin will not exist. Loosen the locking clip (Fig. 357) on the interlock cable to allow cable to "self adjust." Press locking clip (Fig. 357) by hand to secure adjustment.



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Fig. 356 Ignition Key/Switch Positions

- 1 - ACC
- 2 - LOCK
- 3 - OFF
- 4 - ON/RUN
- 5 - START



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Fig. 357 Interlock Cable Removal/Installation

- 1 - LOCKING CLIP
- 2 - INTERLOCK CABLE
- 3 - BRACKET
- 4 - SHIFTER ASSEMBLY

SHIFT INTERLOCK CABLE (Continued)

ACTION	EXPECTED RESPONSE
1. Turn key to the "OFF" position.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON/RUN" position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON/RUN" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the "LOCK" or "ACC" position.	4. Key cannot be returned to the "LOCK" or "ACC" position.
5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).
6. With the key removed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

- (6) Install the bezel on the shifter console.
- (7) Install shifter handle.

SHIFT INTERLOCK MECHANISM

REMOVAL

The interlock cassette slides into the housing behind the lock cylinder (Fig. 358). The cable at the rear of the cassette attaches to a locking arm on the shifter mechanism. **The column shift interlock system is only adjusted after installing a new cassette. It can't be adjusted more than once. If the system operates incorrectly, install and adjust a new interlock cassette.**

- (1) Depress the tab on the top of the cassette.
- (2) Slide the interlock cassette out of the housing.
- (3) Remove the cable from the locking arm on the shifter mechanism.

INSTALLATION

The interlock cassette slides into the housing behind the lock cylinder (Fig. 358). The cable at the rear of the cassette attaches to a locking arm on the shifter mechanism. **The column shift interlock system is only adjusted after installing a new cassette. It can't be adjusted more than once. If the system operates incorrectly, install and adjust a new interlock cassette.**

- (1) Ensure the latch rotates freely on the shifter gate (Fig. 359).

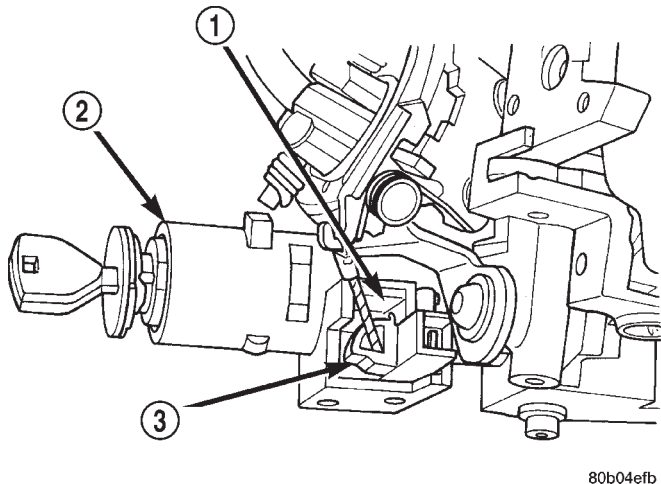


Fig. 358 Ignition Interlock Cassette–Column Shift

- 1 - RELEASE TAB
- 2 - LOCK CYLINDER
- 3 - INTERLOCK CASSETTE

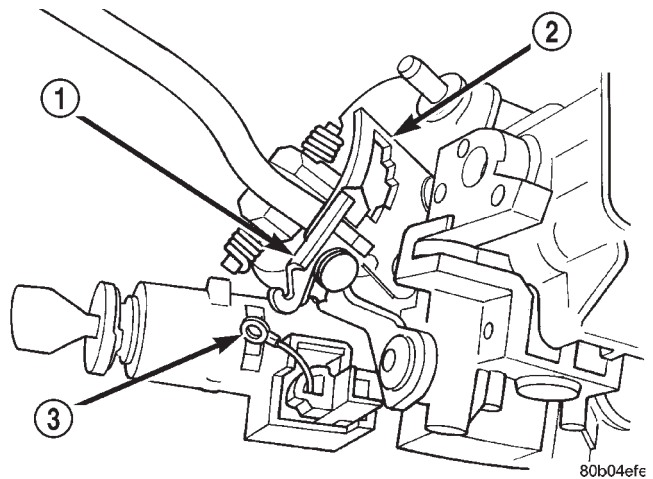
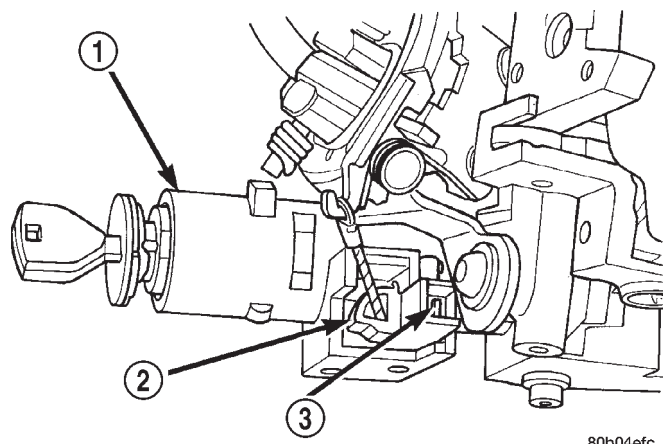


Fig. 359 Latch and Shifter Gate

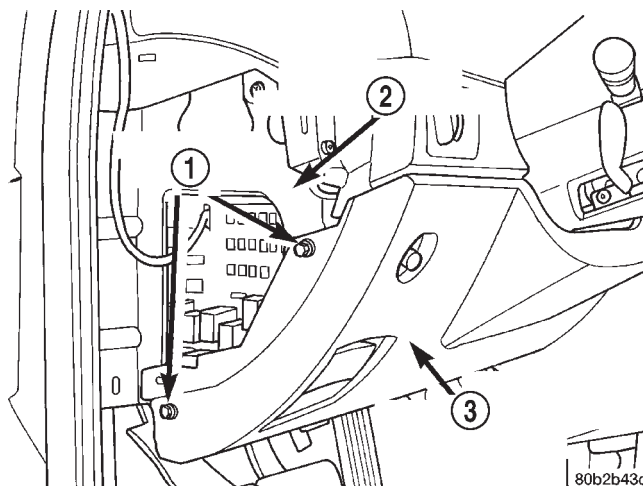
- 1 - LATCH
- 2 - SHIFTER GATE
- 3 - CASSETTE CABLE

- (2) With the shifter in Park and the key removed, install the cable over the hook on locking arm of the shifter mechanism.
- (3) Slide the cassette into the housing until it locks in place.
- (4) To adjust the interlock system, push the adjustment tab in until it stops (Fig. 360). The adjustment tab will click as it moves into position. Ensure the tab is fully depressed.

SHIFT INTERLOCK MECHANISM (Continued)

**Fig. 360 Ignition Interlock Adjustment Tab**

- 1 - LOCK CYLINDER HOUSING
- 2 - INTERLOCK CASSETTE
- 3 - ADJUSTMENT TAB

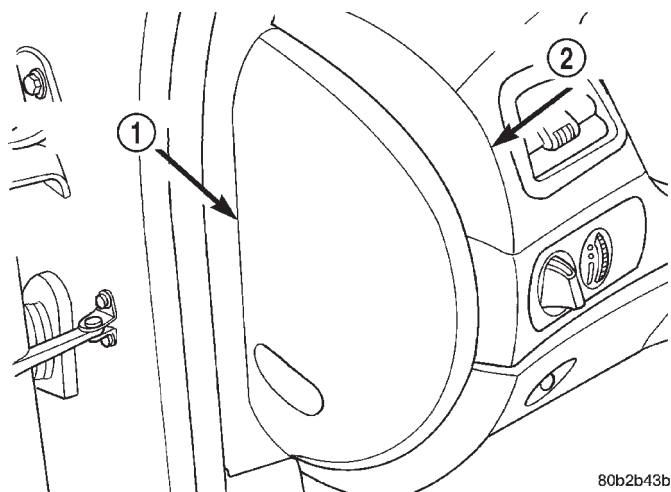
**Fig. 362 Lower Instrument Panel Cover Mounting**

- 1 - MOUNTING SCREWS
- 2 - INSTRUMENT PANEL BRACKET
- 3 - LOWER INSTRUMENT PANEL COVER

SHIFT INTERLOCK SOLENOID

REMOVAL

(1) Remove the fuse panel cover from the left end of the instrument panel (Fig. 361) .

**Fig. 361 Fuse Panel Cover**

- 1 - FUSE PANEL COVER
- 2 - INSTRUMENT PANEL

(2) Remove the two screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel (Fig. 362) .

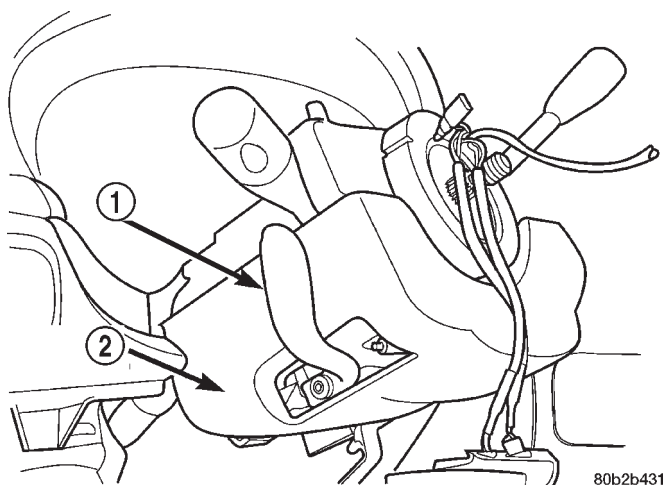
(3) Remove the lower instrument panel cover. The lower instrument panel cover is attached by retaining clips along the top and right edge.

NOTE: The upper shroud on this steering column is retained to the steering column by a snap fit to the lower shroud. When removing the upper shroud

from the steering column lower shroud, **DO NOT** use a hard or sharp tool. This will damage the shrouds. If a tool must be used, use a soft tool such as a trim stick.

(4) Remove the steering column upper shroud from the steering column using the following procedure: First, on the right seam between the upper and lower shrouds, push in on seam at the forward end. When the upper shroud unsnaps, pull the upper shroud upward away from the lower. Repeat this procedure on the opposite side of the column to release the upper shroud from the lower. Remove the upper shroud from the steering column.

(5) Remove the tilt lever (Fig. 363) from the steering column.

**Fig. 363 Tilt Lever**

- 1 - TILT LEVER
- 2 - LOWER SHROUD

SHIFT INTERLOCK SOLENOID (Continued)

(6) Remove the 2 screws attaching the lower shroud to the steering column (Fig. 364) . Remove the lower shroud from the steering column.

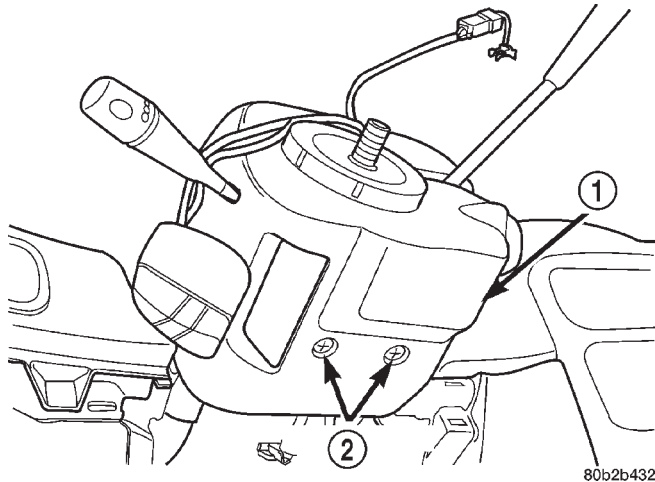


Fig. 364 Lower Shroud Attaching Screws

- 1 - LOWER SHROUD
- 2 - MOUNTING SCREWS

(7) Disconnect the wiring harness connector from the brake transmission shift interlock (BTSI) solenoid (Fig. 365) .

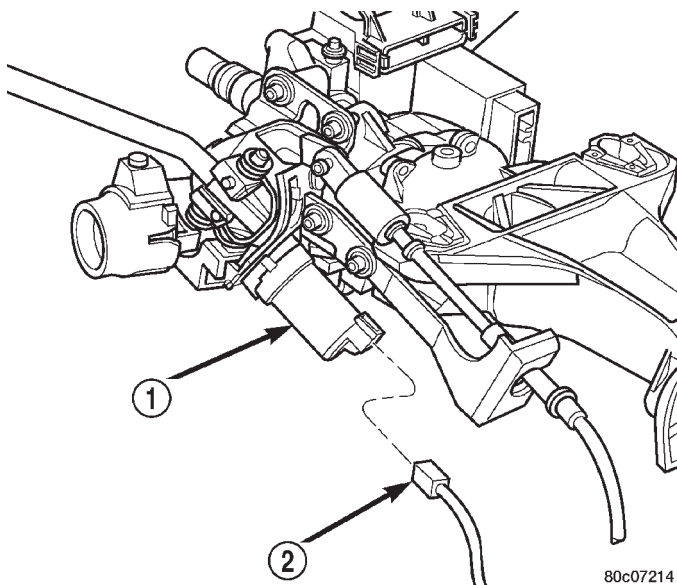


Fig. 365 Solenoid Connector

- 1 - BTSI SOLENOID
- 2 - CONNECTOR

(8) Remove the retainer clip from the end of the BTSI solenoid (Fig. 366) .

(9) Slide the BTSI solenoid straight off the shift lever mounting stud.

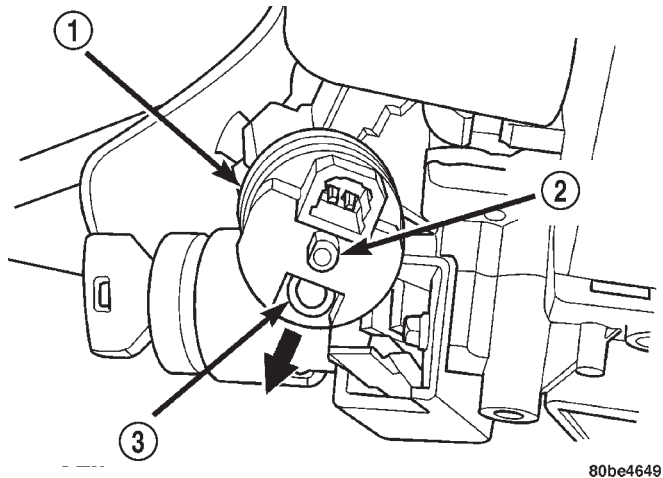


Fig. 366 Solenoid Retainer Clip

- 1 - SOLENOID
- 2 - MOUNTING STUD
- 3 - RETAINER CLIP

INSTALLATION

(1) Align the flat inside the brake transmission shift interlock (BTSI) solenoid (Fig. 367) with the flat on the shift lever mounting stud.

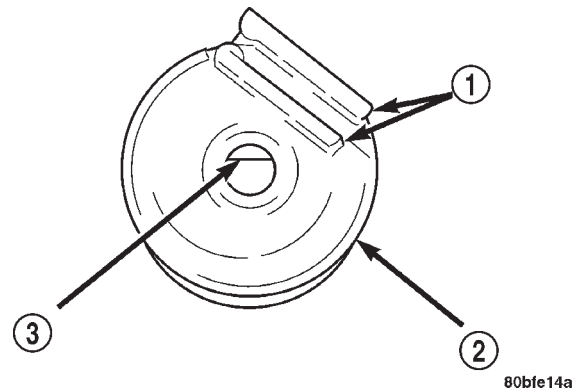


Fig. 367 Flat Inside BTSI Solenoid

- 1 - GUIDES
- 2 - SOLENOID
- 3 - FLAT

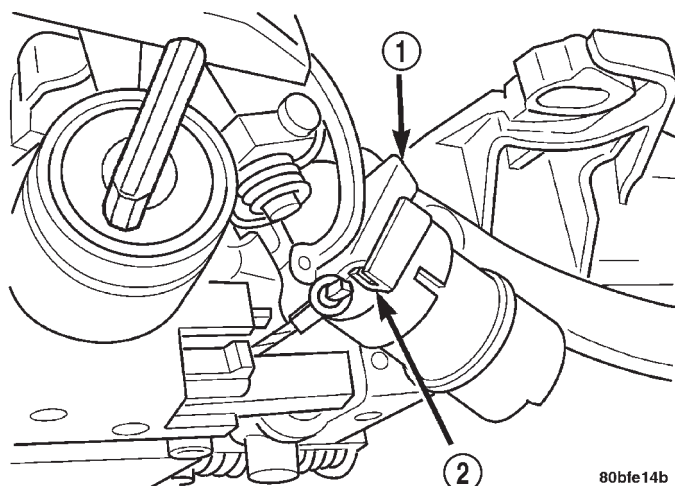
(2) Slide the solenoid completely onto the shift lever mounting stud aligning the plastic guide formed into the solenoid housing with the flange on the shift lever mechanism bracket (Fig. 368).

(3) Install the retainer clip until it snaps into place in the slot cut into the shift lever mounting stud (Fig. 369).

(4) Verify the BTSI solenoid is locked in place and will not slide off the mounting stud.

(5) Connect the wiring harness connector to the BTSI solenoid.

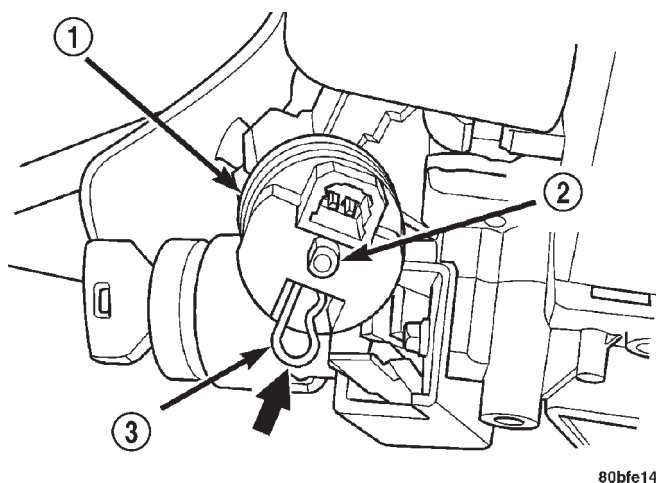
SHIFT INTERLOCK SOLENOID (Continued)



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Fig. 368 Guide And Flange Alignment

- 1 - BRACKET FLANGE
2 - GUIDE



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Fig. 369 Solenoid Retainer Clip Installation

- 1 - SOLENOID
2 - MOUNTING STUD
3 - RETAINER CLIP

(6) Verify the BTSI is operating properly. With the ignition on (engine not running) and the parking brake applied, try shifting the transmission shift lever out of the PARK position with and without the brake pedal being applied. The shift lever should only shift out of PARK with the brake pedal being depressed.

(7) Install the lower shroud (Fig. 364) on the steering column. Install and securely tighten the 2 screws attaching the lower shroud to the steering column.

(8) Install the tilt lever (Fig. 363) on the steering column.

(9) Install the upper shroud on the steering column by snapping it onto the lower shroud.

(10) Install the lower instrument panel cover.

(11) Install the two screws behind the fuse panel cover attaching the lower instrument panel cover to the instrument panel (Fig. 362).

(12) Install the fuse panel cover on the left end of the instrument panel (Fig. 361).

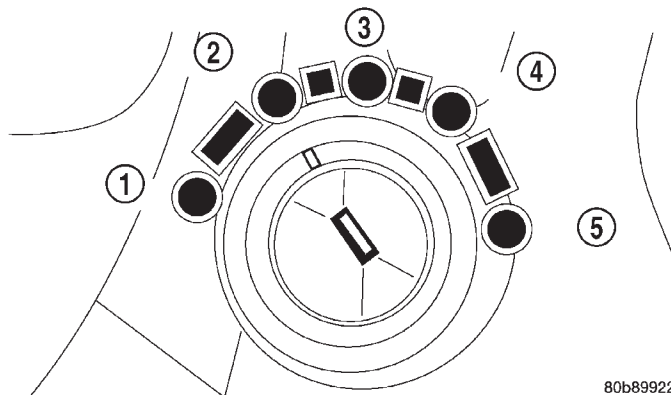
SHIFT INTERLOCK SYSTEM

DESCRIPTION

FLOOR

The Brake Transmission Shifter/Ignition Interlock (BTSI) is a cable and solenoid operated system that prevents the transmission gear shifter from being moved out of PARK without a driver in place.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 370) and brake pedal positions.



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Fig. 370 Ignition Key/Switch Positions

- 1 - ACC
2 - LOCK
3 - OFF
4 - ON/RUN
5 - START

SHIFT INTERLOCK SYSTEM (Continued)

COLUMN

Vehicles equipped with a column shifter utilize a brake transmission shift interlock (BTSI) solenoid, which prevents the transmission gear shifter from being moved out of PARK without a driver in place (Fig. 371).

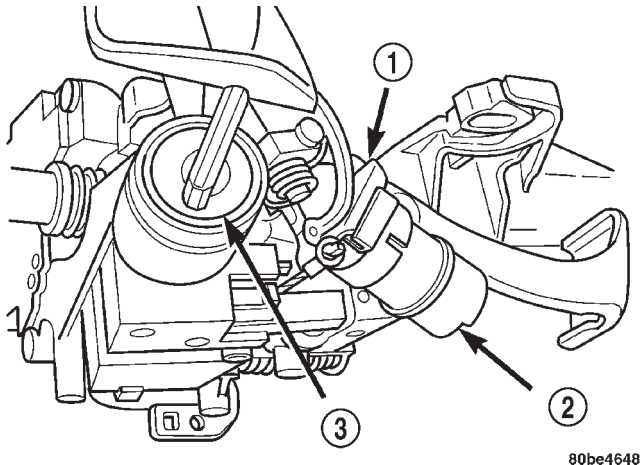


Fig. 371 BTSI

- 1 - SHIFT LEVER BRACKET
- 2 - SOLENOID
- 3 - KEY CYLINDER

OPERATION

The Brake Transmission Shifter/Ignition Interlock (BTSI) is engaged whenever the ignition switch is in the LOCK or ACCESSORY position (Fig. 372). An additional electrically activated feature will prevent shifting out of the PARK position unless the brake pedal is depressed at least one-half inch. A magnetic holding device integral to the interlock cable is energized when the ignition is in the ON/RUN position. When the key is in the ON/RUN position and the brake pedal is depressed, the shifter is unlocked and will move into any position. The interlock system also prevents the ignition switch from being turned to the LOCK or ACCESSORY position, unless the shifter is in the gated PARK position.

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

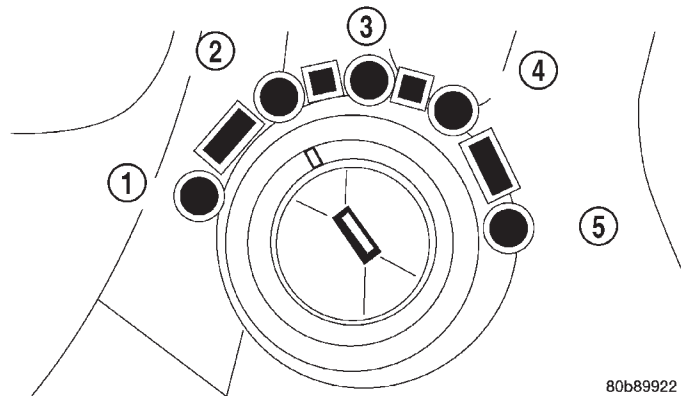


Fig. 372 Ignition Key/Switch Positions

- 1 - ACC
- 2 - LOCK
- 3 - OFF
- 4 - ON/RUN
- 5 - START

ACTION	EXPECTED RESPONSE
1. Turn key to the "OFF" position.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON/RUN" position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON/RUN" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the "LOCK" or "ACC" position.	4. Key cannot be returned to the "LOCK" or "ACC" position.
5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).
6. With the key removed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

SHIFT INTERLOCK SYSTEM (Continued)

**DIAGNOSIS AND TESTING - BRAKE/
TRANSMISSION SHIFT INTERLOCK SYSTEM****FLOOR SHIFT MODELS**

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 373) and brake pedal positions.

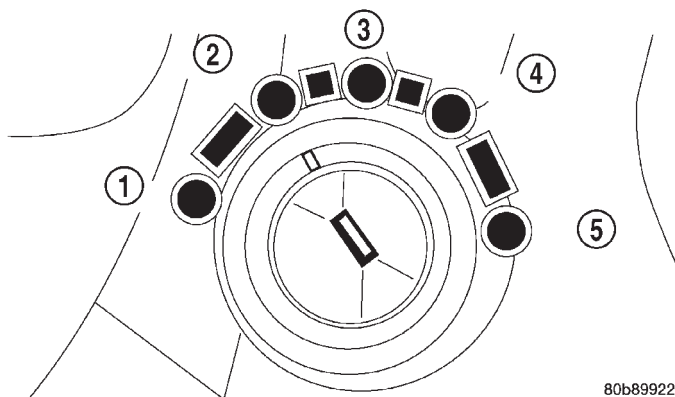


Fig. 373 Ignition Key/Switch Positions

- 1 - ACC
- 2 - LOCK
- 3 - OFF
- 4 - ON/RUN
- 5 - START

ACTION	EXPECTED RESPONSE
1. Turn key to the "OFF" position.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON/RUN" position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON/RUN" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the "LOCK" or "ACC" position.	4. Key cannot be returned to the "LOCK" or "ACC" position.
5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).
6. With the key removed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

If the floor shifter cannot be moved out of the PARK position, refer to Shifter Locked In Place below. If the shift lever can be shifted out of PARK without the brake pedal depressed, refer to Circuit Test below.

SHIFTER LOCKED IN PLACE

(1) Remove the instrument panel cover below the steering column, then remove the steering column shrouds to gain access to the brake transmission shift interlock (BTSI) solenoid. The solenoid is part of the interlock cable assembly.

(2) Disconnect the wire connector from the rear of the BTSI solenoid.

(3) Insert the ignition key and turn it to the ON position.

(4) With the brakes applied, try moving the shifter out of the PARK position.

- If the lever now moves freely in and out of PARK, perform the Circuit Test below.

- If the shift lever still does not move from the PARK position, remove the BTSI solenoid from the shift lever assembly.

If the shift lever now moves freely in and out of the park position, the BTSI solenoid is faulty and the interlock cable must be replaced. If the shift lever still does not move from the park position, the problem is in the shift lever assembly or the ignition interlock cassette.

CIRCUIT TEST

(1) Check the system fuse in the junction block (An open or blown fuse would allow the shift lever to be moved in and out of the PARK position without the brake pedal applied).

(2) Remove the instrument panel cover below the steering column, then remove the steering column shrouds to gain access to the brake transmission shift interlock (BTSI) solenoid.

(3) Disconnect the wire connector from the rear of the BTSI solenoid.

(4) Insert the ignition key and turn it to the ON position.

(5) Back-probe the wire connector's terminal number 2 with a test light. The test light should illuminate. If not, there is an open or short in the ignition feed circuit leading to the BTSI solenoid. Repair the open or short.

(6) Next, back-probe the wire connector with a test light, placing the test light in series between the two wires. At this point, the test light should illuminate. If not, there is an open in the ground circuit or brake lamp switch. Repair the open or replace brake lamp switch as necessary.

(7) Depress the brake pedal. The test light should go out. If it does not, there is a short in the ground

SHIFT INTERLOCK SYSTEM (Continued)

circuit or brake lamp switch. Repair the short or replace brake lamp switch as necessary.

(8) Reconnect the wire connector to the solenoid.

If the circuit passes the above test and the shifter can still be moved freely in and out of PARK without the brake pedal depressed, replace the interlock cable.

COLUMN SHIFT MODELS

The following chart describes the normal operation of the Brake Transmission Shift Interlock (BTSI) system. If the "expected response" differs from the vehicle's response, then system repair and/or adjustment is necessary.

Refer to the following chart that expected shifter response, depending on ignition key/switch (Fig. 374) and brake pedal positions.

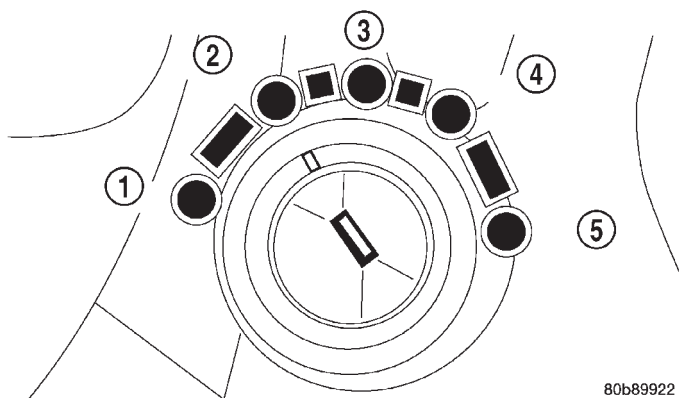


Fig. 374 Ignition Key/Switch Positions

- 1 - ACC
- 2 - LOCK
- 3 - OFF
- 4 - ON/RUN
- 5 - START

ACTION	EXPECTED RESPONSE
1. Turn key to the "OFF" position.	1. Shifter CAN be shifted out of park.
2. Turn key to the "ON/RUN" position.	2. Shifter CANNOT be shifted out of park.
3. Turn key to the "ON/RUN" position and depress the brake pedal.	3. Shifter CAN be shifted out of park.
4. Leave shifter in any gear and try to return key to the "LOCK" or "ACC" position.	4. Key cannot be returned to the "LOCK" or "ACC" position.
5. Return shifter to "PARK" and try to remove the key.	5. Key can be removed (after returning to "LOCK" position).

ACTION	EXPECTED RESPONSE
6. With the key removed, try to shift out of "PARK".	6. Shifter cannot be shifted out of "PARK".
NOTE: Any failure to meet these expected responses requires system adjustment or repair.	

If the floor shifter cannot be moved out of the PARK position, refer to Shifter Locked In Place below. If the shift lever can be shifted out of PARK without the brake pedal depressed, refer to Circuit Test below.

SHIFT LEVER LOCKED IN PLACE

(1) Remove the instrument panel cover below the steering column, then remove the steering column shrouds to gain access to the brake transmission shift interlock (BTSI) solenoid.

(2) Disconnect the wire connector from the rear of the BTSI solenoid.

(3) Insert the ignition key and turn it to the ON position.

(4) With the brakes applied, try shifting the transmission shift lever out of the PARK position.

- If the lever now moves freely in and out of PARK, perform the Circuit Test below.

- If the shift lever still does not move from the PARK position, remove the BTSI solenoid from the shift lever assembly.

If the shift lever now moves freely in and out of the park position, the BTSI solenoid is faulty and must be replaced. If the shift lever still does not move from the park position, the problem is in the shift lever assembly or the ignition interlock cassette.

CIRCUIT TEST

(1) Check the system fuse in the junction block (An open or blown fuse would allow the shift lever to be moved in and out of the PARK position without the brake pedal applied).

(2) Remove the instrument panel cover below the steering column, then remove the steering column shrouds to gain access to the brake transmission shift interlock (BTSI) solenoid.

(3) Disconnect the wire connector from the rear of the BTSI solenoid.

(4) Insert the ignition key and turn it to the ON position.

(5) Back-probe the wire connector's terminal number 2 with a test light. The test light should illuminate. If not, there is an open or short in the ignition feed circuit leading to the BTSI solenoid. Repair the open or short.

(6) Next, back-probe the wire connector with a test light, placing the test light in series between the two wires. At this point, the test light should illuminate. If not, there is an open in the ground circuit or brake

SHIFT INTERLOCK SYSTEM (Continued)

lamp switch. Repair the open or replace brake lamp switch as necessary.

(7) Depress the brake pedal. The test light should go out. If it does not, there is a short in the ground circuit or brake lamp switch. Repair the short or replace brake lamp switch as necessary.

(8) Reconnect the wire connector to the solenoid.

If the circuit passes the above test and the shift lever can still be moved freely in and out of PARK without the brake pedal depressed, replace the BTSI solenoid.

SHIFT MECHANISM

REMOVAL

- (1) Remove shifter handle and console bezel.
- (2) If equipped with Autostick, disconnect the Autostick switch connector.
- (3) Loosen adjuster nut on shifter adjuster (Fig. 375).

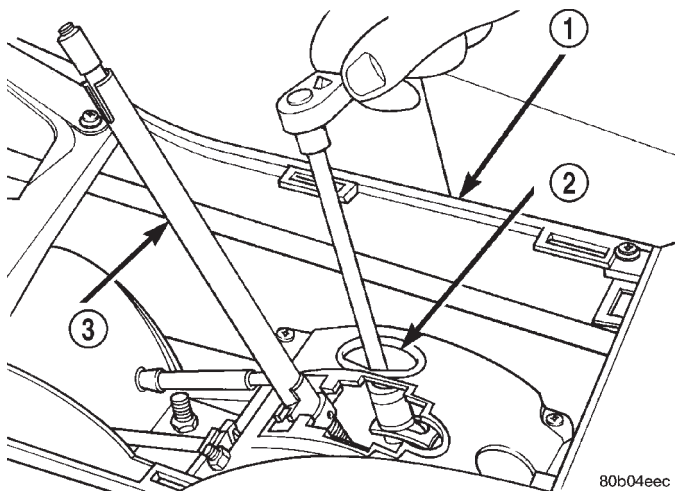


Fig. 375 Shift Cable Adjust Lever Nut

- 1 - CONSOLE
- 2 - ACCESS HOLE
- 3 - SHIFTER HANDLE

(4) Disconnect shifter cable from shift pin (Fig. 376) and disconnect cable from shifter assembly bracket.

(5) Disconnect interlock cable from shifter base slot (Fig. 377). Be careful not to break tab on interlock cable conduit end fitting.

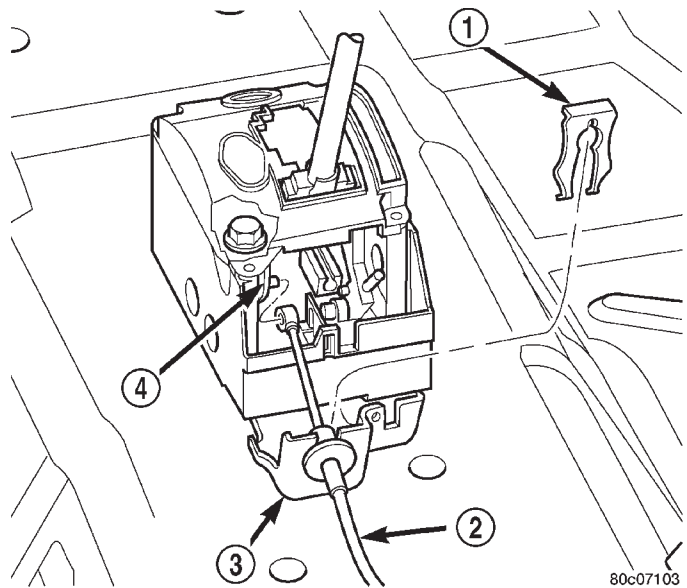


Fig. 376 Floor Gearshift Cable Removal/Installation

- 1 - CUP
- 2 - CABLE
- 3 - CONDUIT BRACKET
- 4 - PIN

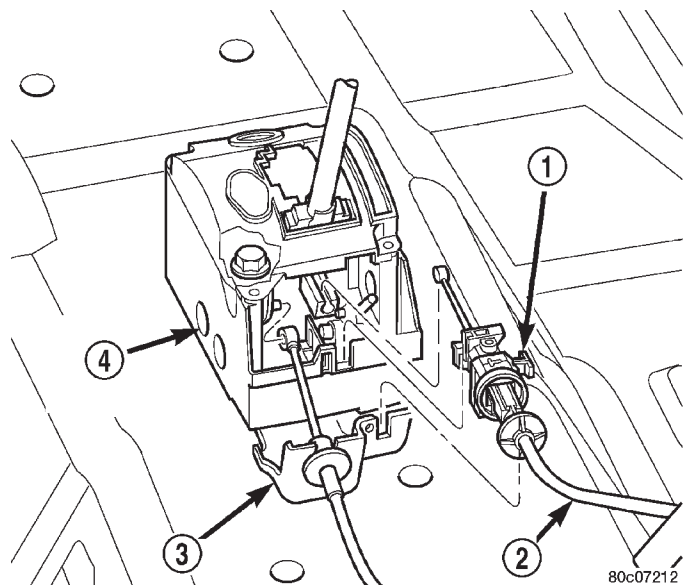


Fig. 377 Interlock Cable Removal/Installation

- 1 - LOCKING CLIP
- 2 - INTERLOCK CABLE
- 3 - BRACKET
- 4 - SHIFTER ASSEMBLY

SHIFT MECHANISM (Continued)

(6) Remove the five floor pan attaching nuts from the shifter base and shift cable bracket (Fig. 378).

(7) Remove shifter assembly from vehicle (Fig. 378).

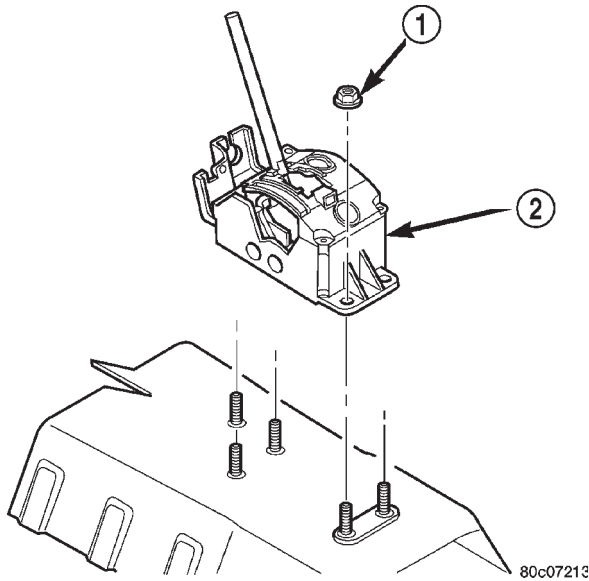


Fig. 378 Shifter Assembly Removal/Installation

- 1 - NUT
2 - SHIFTER ASSEMBLY

INSTALLATION

- (1) Install shifter assembly (Fig. 378) .
- (2) Install five shifter/cable bracket to floor pan nuts and tighten to 31 N·m (23 ft. lbs.).
- (3) Make sure shift lever and transaxle are in "Park."

CAUTION: Park sprag must be engaged when adjusting linkage. Rock vehicle back and forth to ensure that park sprag is fully engaged.

- (4) With the ignition in the lock position, attach shift cable eyelet to shift pin (Fig. 376) .
- (5) Install shift cable to shifter assembly bracket (Fig. 376) .
- (6) Slip interlock cable core wire into interlock adjustment lever groove (Fig. 377) . Make sure the interlock cable slug is seated in the groove.
- (7) Slip interlock cable conduit end fitting into bracket and snap into place (Fig. 377) .
- (8) If equipped with Autostick, connect the Autostick connector.
- (9) Adjust gear shift and interlock cables.

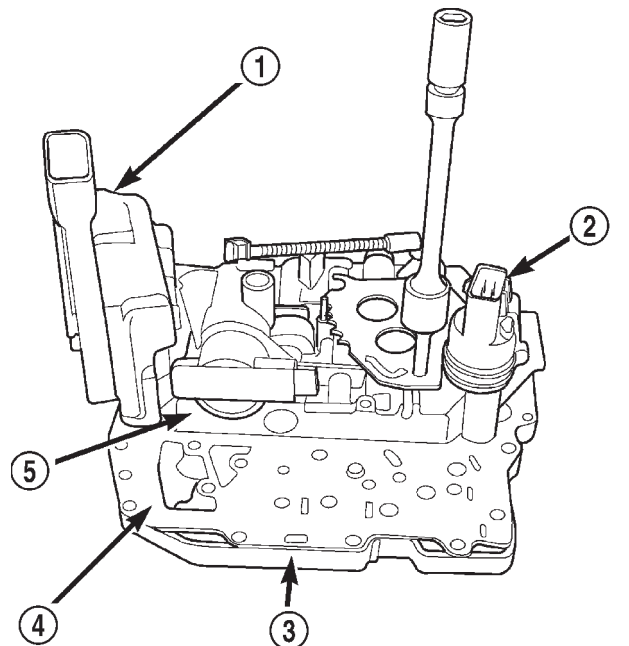
NOTE: Gearshift and interlock cables **MUST** be adjusted. Refer to the Adjustments section in this Group for the correct procedures.

SOLENOID/PRESSURE SWITCH ASSY

DESCRIPTION

The Solenoid/Pressure Switch Assembly (Fig. 379) is inside the transaxle and mounted to the valve body assembly. The assembly consists of four solenoids that control hydraulic pressure to the L/R, 2/4, OD, and UD friction elements (transaxle clutches), and the torque converter clutch. The reverse clutch is controlled by line pressure from the manual valve in the valve body. The solenoids are contained within the Solenoid/Pressure Switch Assembly, and can only be serviced by replacing the assembly.

The solenoid assembly also contains pressure switches that monitor and send hydraulic circuit information to the PCM. Likewise, the pressure switches can only be serviced by replacing the assembly.



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Fig. 379 Valve Body Assembly

- 1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - TRS
3 - TRANSFER PLATE
4 - SEPARATOR PLATE
5 - VALVE BODY

OPERATION

SOLENOIDS

The solenoids receive electrical power from the Transmission Control Relay through a single wire. The PCM energizes or operates the solenoids individually by grounding the return wire of the solenoid

SOLENOID/PRESSURE SWITCH ASSY (Continued)

needed. When a solenoid is energized, the solenoid valve shifts, and a fluid passage is opened or closed (vented or applied), depending on its default operating state. The result is an apply or release of a frictional element.

The 2/4 and UD solenoids are normally applied, which allows fluid to pass through in their relaxed or "off" state. By design, this allows transaxle limp-in (P,R,N,2) in the event of an electrical failure.

The continuity of the solenoids and circuits are periodically tested. Each solenoid is turned on or off depending on its current state. An inductive spike should be detected by the pcm during this test. If no spike is detected, the circuit is tested again to verify the failure. In addition to the periodic testing, the solenoid circuits are tested if a speed ratio or pressure switch error occurs.

PRESSURE SWITCHES

The PCM relies on three pressure switches to monitor fluid pressure in the L/R, 2/4, and OD hydraulic circuits. The primary purpose of these switches is to help the PCM detect when clutch circuit hydraulic failures occur. The range for the pressure switch closing and opening points is 11-23 psi. Typically the switch opening point will be approximately one psi lower than the closing point. For example, a switch may close at 18 psi and open at 17 psi. The switches are continuously monitored by the PCM for the correct states (open or closed) in each gear as shown in the following chart:

PRESSURE SWITCH STATES

GEAR	L/R	2/4	OD
R	OP	OP	OP
P/N	CL	OP	OP
1st	CL	OP	OP
2nd	OP	CL	OP
D	OP	OP	CL
OD	OP	CL	CL

OP = OPEN

CL = CLOSED

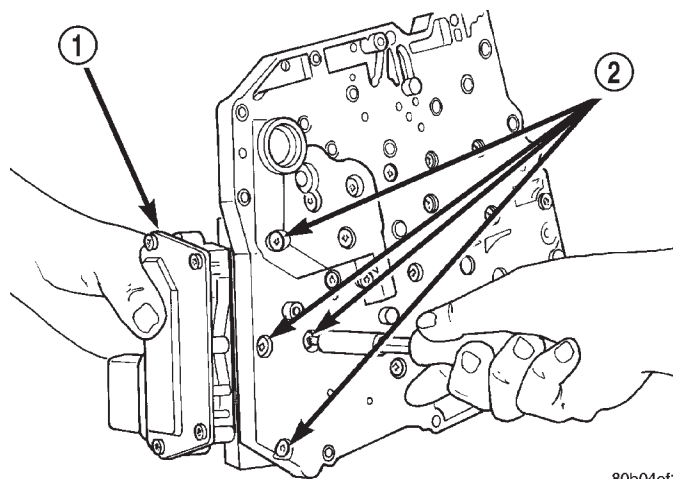
A Diagnostic Trouble Code (DTC) will set if the PCM senses any switch open or closed at the wrong time in a given gear.

The PCM also tests the 2/4 and OD pressure switches when they are normally off (OD and 2/4 are tested in 1st gear, OD in 2nd gear, and 2/4 in 3rd gear). The test simply verifies that they are operational, by looking for a closed state when the corresponding element is applied. Immediately after a shift into 1st, 2nd, or 3rd gear with the engine speed above 1000 rpm, the PCM momentarily turns on element pressure to the 2/4 and/or OD clutch circuits to identify that the appropriate switch has closed. If it doesn't close, it is tested again. If the switch fails to close the second time, the appropriate Diagnostic Trouble Code (DTC) will set.

REMOVAL

NOTE: If the Solenoid/Pressure Switch Assembly is being replaced, the Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

- (1) Raise vehicle on hoist.
- (2) Remove valve body assembly from transaxle. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/VALVE BODY - REMOVAL)
- (3) Remove Solenoid/Pressure Switch Assembly retaining screws from solenoid (Fig. 380).



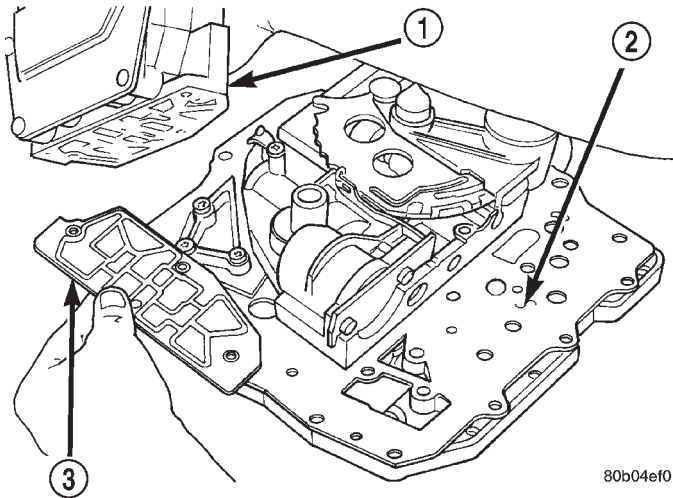
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Fig. 380 Solenoid Retaining Screws

- 1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - RETAINING SCREWS

SOLENOID/PRESSURE SWITCH ASSY (Continued)

(4) Remove Solenoid/Pressure Switch Assembly and screen from valve body (Fig. 381).



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Fig. 381 Solenoid/Pressure Switch Assembly and Screen

- 1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - VALVE BODY
3 - SCREEN

INSTALLATION

NOTE: If the Solenoid/Pressure Switch assembly is being replaced, the Quick Learn Procedure must be performed. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

- (1) Install Solenoid/Pressure Switch Assembly and screen to the separator and transfer plates (Fig. 381).
- (2) Install and tighten retaining screws (Fig. 380) to 6 N·m (35 in. lbs.) torque.
- (3) Install valve body. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/VALVE BODY - INSTALLATION)

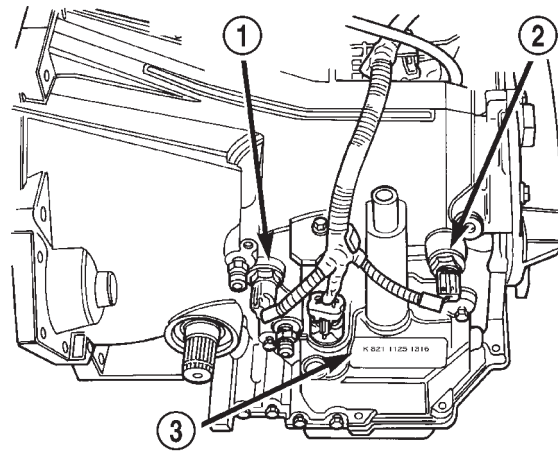
SPEED SENSOR - INPUT

DESCRIPTION

The Input Speed Sensor is a two-wire magnetic pickup device that generates AC signals as rotation occurs. It is threaded into the transaxle case (Fig. 382), sealed with an o-ring (Fig. 383), and is considered a primary input to the Powertrain Control Module (PCM).

OPERATION

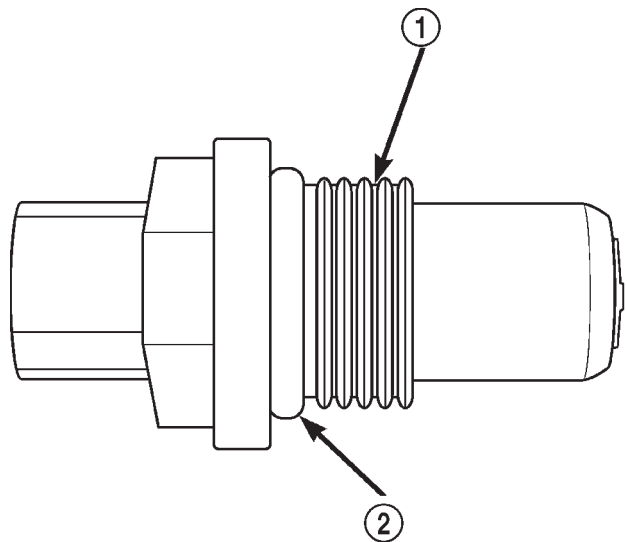
The Input Speed Sensor provides information on how fast the input shaft is rotating. As the teeth of the input clutch hub pass by the sensor coil (Fig.



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Fig. 382 Transaxle Identification Label

- 1 - INPUT SPEED SENSOR
2 - OUTPUT SPEED SENSOR
3 - IDENTIFICATION TAG



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Fig. 383 O-Ring Location

- 1 - INPUT SPEED SENSOR
2 - O-RING

384), an AC voltage is generated and sent to the PCM. The PCM interprets this information as input shaft rpm.

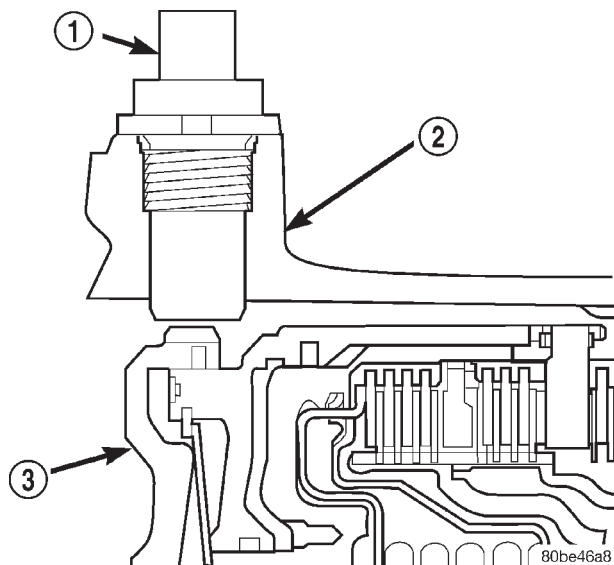
The PCM compares the input speed signal with output speed signal to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

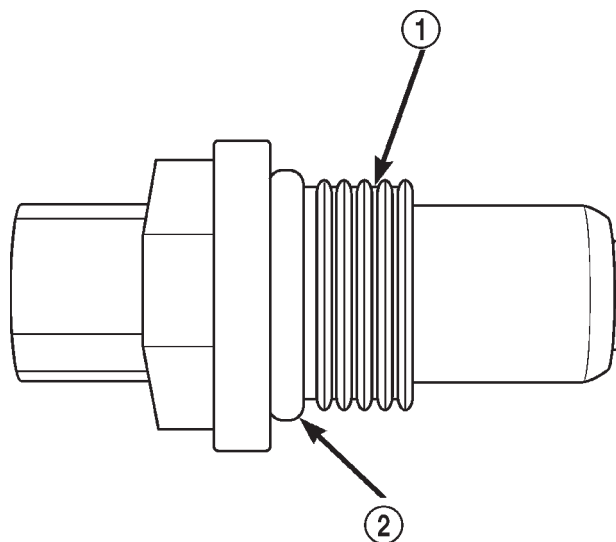
The PCM also compares the input speed signal and the engine speed signal to determine the following:

- Torque converter clutch slippage
- Torque converter element speed ratio

SPEED SENSOR - INPUT (Continued)

**Fig. 384 Sensor Relation to Input Clutch**

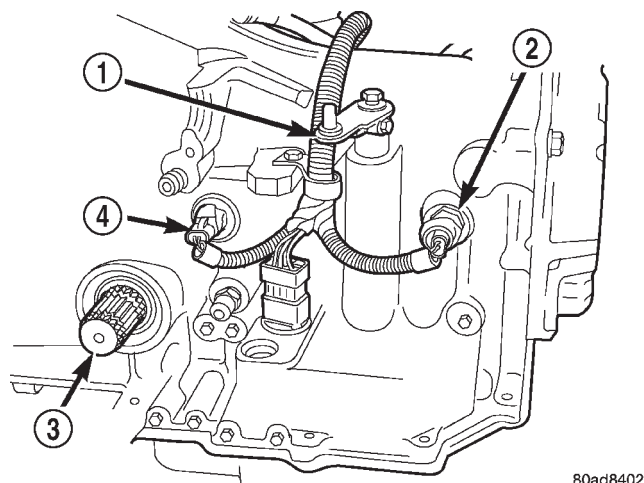
- 1 - INPUT SPEED SENSOR
- 2 - TRANSAXLE CASE
- 3 - INPUT CLUTCH HUB

**Fig. 386 O-Ring Location**

- 1 - INPUT SPEED SENSOR
- 2 - O-RING

REMOVAL

(1) Disconnect the input speed sensor connector (Fig. 385).

**Fig. 385 Speed Sensor/Connector Location**

- 1 - MANUAL SHIFT LEVER
- 2 - OUTPUT SPEED SENSOR
- 3 - LONG STUB SHAFT
- 4 - INPUT SPEED SENSOR

(2) Unscrew and remove the input speed sensor.
 (3) Inspect the speed sensor o-ring and replace if necessary (Fig. 386).

INSTALLATION

- (1) Verify o-ring is installed into position (Fig. 386).
- (2) Install and tighten input speed sensor to 27 N·m (20 ft. lbs.) torque.
- (3) Connect speed sensor connector (Fig. 385).
- (4) Connect battery negative cable.

SPEED SENSOR - OUTPUT**DESCRIPTION**

The Output Speed Sensor is a two-wire magnetic pickup device that generates an AC voltage signal as rotation occurs. It is threaded into the transaxle case (Fig. 387), sealed with an o-ring (Fig. 388), and is considered a primary input to the Powertrain Control Module (PCM).

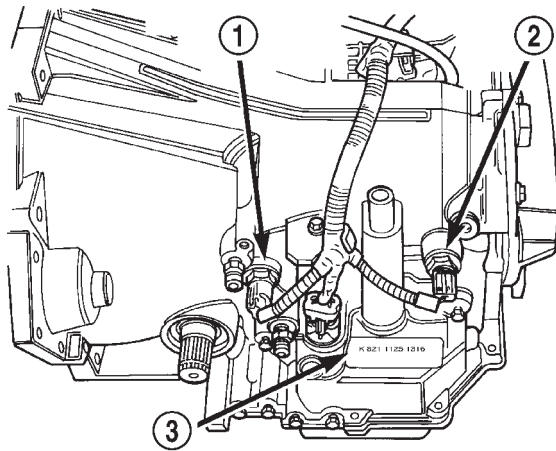
OPERATION

The Output Speed Sensor provides information on how fast the output shaft is rotating. As the rear planetary carrier park pawl lugs pass by the sensor coil (Fig. 389), an AC voltage is generated and sent to the PCM. The PCM interprets this information as output shaft rpm.

The PCM compares the input and output speed signals to determine the following:

- Transmission gear ratio
- Speed ratio error detection
- CVI calculation

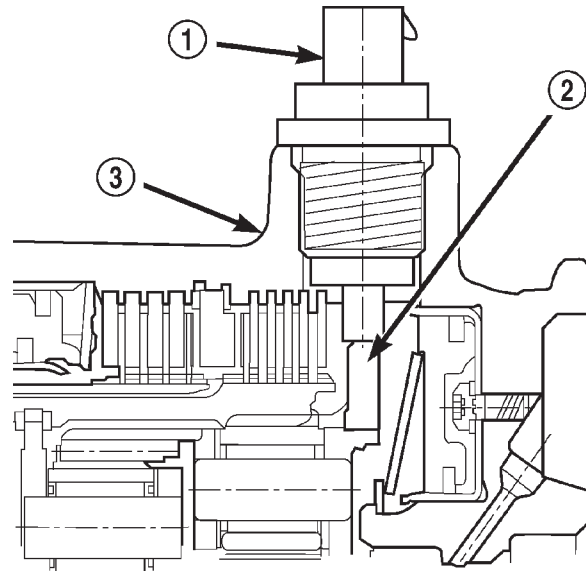
SPEED SENSOR - OUTPUT (Continued)



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Fig. 387 Speed Sensor Location

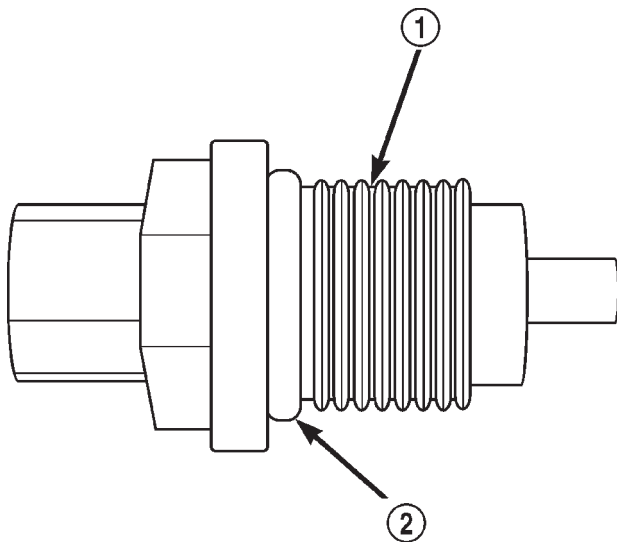
- 1 - INPUT SPEED SENSOR
- 2 - OUTPUT SPEED SENSOR
- 3 - IDENTIFICATION TAG



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Fig. 389 Sensor Relation to Planet Carrier Park Pawl Lugs

- 1 - OUTPUT SPEED SENSOR
- 2 - REAR PLANET CARRIER/OUTPUT SHAFT ASSEMBLY
- 3 - TRANSAXLE CASE



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Fig. 388 O-Ring Location

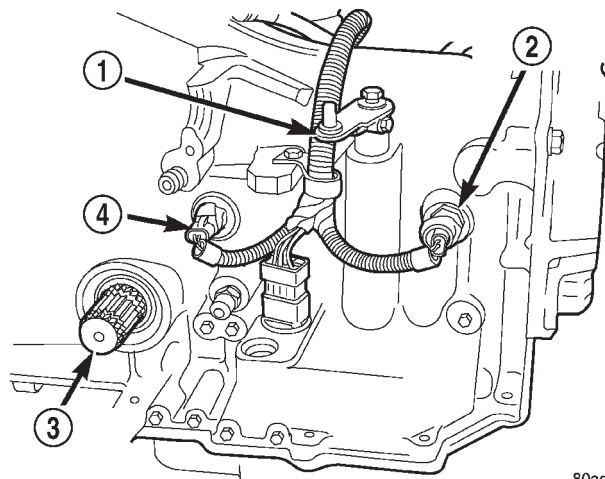
- 1 - OUTPUT SPEED SENSOR
- 2 - O-RING

VEHICLE SPEED SIGNAL

The vehicle speed signal is calculated from the Output Speed Sensor. The PCM converts the OSS signal into a roughly 8000 pulse per mile vehicle speed signal (using pinion factor information programmed into its memory), and sends it to the PCM. The PCM, in turn, sends the vehicle speed message across the PCI bus to the Instrument Cluster to display vehicle speed to the driver.

REMOVAL

(1) Disconnect the output speed sensor connector (Fig. 390) .



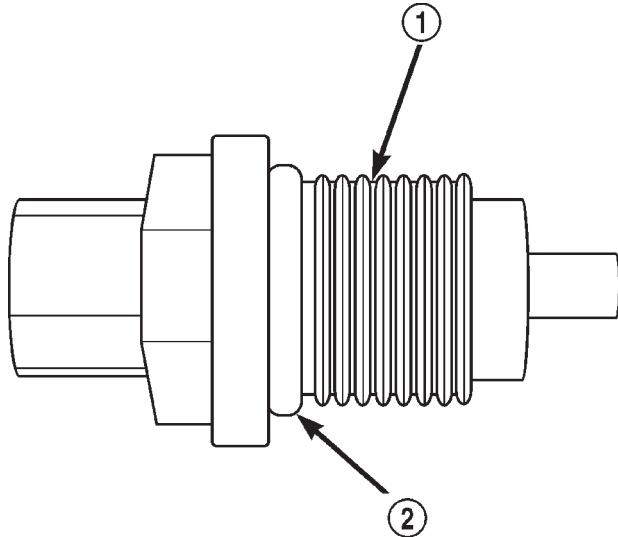
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Fig. 390 Speed Sensor/Connector Location

- 1 - MANUAL SHIFT LEVER
- 2 - OUTPUT SPEED SENSOR
- 3 - LONG STUB SHAFT
- 4 - INPUT SPEED SENSOR

(2) Unscrew and remove the output speed sensor.
 (3) Inspect the speed sensor o-ring and replace if necessary (Fig. 391) .

SPEED SENSOR - OUTPUT (Continued)



80be46b9

Fig. 391 O-Ring Location

1 - OUTPUT SPEED SENSOR

2 - O-RING

INSTALLATION

- (1) Verify o-ring is installed into position (Fig. 391).
- (2) Install and tighten output speed sensor to 27 N·m (20 ft. lbs.) torque.
- (3) Connect speed sensor connector (Fig. 390).
- (4) Connect battery negative cable.

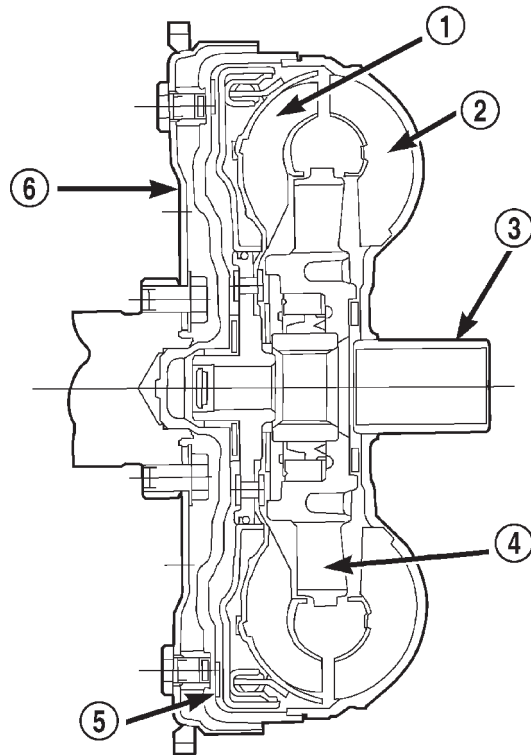
TORQUE CONVERTER**DESCRIPTION**

The torque converter is located in the bellhousing area of the transaxle, between the engine and transaxle. The torque converter is a fluid coupling that transmits torque from the engine drive plate to the input shaft of the transaxle. The torque converter consists of four main components (Fig. 392):

- Impeller
- Turbine
- Stator
- Converter Clutch assembly

OPERATION

The converter impeller (driving member), which is integral to the converter housing and bolted to the engine drive plate, rotates at engine speed. The converter turbine (driven member), which reacts from fluid pressure generated by the impeller, rotates and turns the transmission input shaft.



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Fig. 392 Torque Converter Assembly

1 - TURBINE

2 - IMPELLER

3 - HUB

4 - STATOR

5 - CONVERTER CLUTCH DISC

6 - DRIVE PLATE

Torque is transmitted by fluid passing through curved vanes in both the impeller and turbine. Since the coupling is produced by transmission fluid, the turbine can slip or turn slower than the impeller.

The stator contains a one-way overrunning clutch, which free-wheels when the impeller and turbine are rotating at the same speed. However, the stator stops when speed reduction or torque increase take place. When the stator stops, it changes the direction of the fluid leaving the turbine vanes. This directs fluid back into the impeller with greater force, resulting in torque multiplication.

The torque converter clutch is hydraulically operated and controlled by the TCM. It consists of a piston and a frictional disc that form a direct mechanical link between the impeller and turbine when slippage is inefficient or unnecessary.

The torque converter hub drives the transmission oil pump.

TORQUE CONVERTER (Continued)

REMOVAL

NOTE: If torque conveter assembly is being replaced, it is necessary to restart the TCC Break-In Strategy. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

(1) Remove transmission and torque converter from vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - REMOVAL).

(2) Place a suitable drain pan under the converter housing end of the transmission.

CAUTION: Verify that transmission is secure on the lifting device or work surface, the center of gravity of the transmission will shift when the torque converter is removed creating an unstable condition. The torque converter is a heavy unit. Use caution when separating the torque converter from the transmission.

(3) Pull the torque converter forward until the center hub clears the oil pump seal.

(4) Separate the torque converter from the transmission.

INSTALLATION

NOTE: If torque conveter is being replaced, it is necessary to restart the TCC Break-In Strategy. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

Check converter hub and drive notches for sharp edges, burrs, scratches, or nicks. Polish the hub and notches with 320/400 grit paper or crocus cloth if necessary. The hub must be smooth to avoid damaging the pump seal at installation.

(1) Lubricate converter hub and oil pump seal lip with transmission fluid.

(2) Place torque converter in position on transmission.

CAUTION: Do not damage oil pump seal or bushing while inserting torque converter into the front of the transmission.

(3) Align torque converter to oil pump seal opening.

(4) Insert torque converter hub into oil pump.

(5) While pushing torque converter inward, rotate converter until converter is fully seated in the oil pump gears.

(6) Check converter seating with a scale and straightedge (Fig. 393). Surface of converter lugs should be 1/2 in. to rear of straightedge when converter is fully seated.

(7) If necessary, temporarily secure converter with C-clamp attached to the converter housing.

(8) Install the transmission in the vehicle (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - INSTALLATION)

(9) Fill the transmission with the recommended fluid

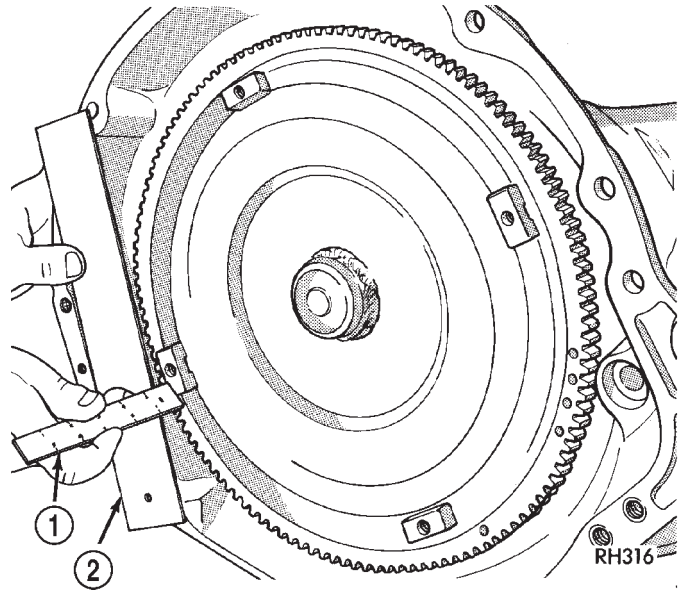


Fig. 393 Checking Torque Converter Seating

1 - SCALE

2 - STRAIGHTEDGE

(10) If torque conveter was replaced, it is necessary to reset the TCC Break-In Strategy. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/TRANSMISSION CONTROL MODULE - STANDARD PROCEDURE)

TRANSFER SYSTEM

INSPECTION

The need to replace the transfer chains because of excessive wear is unlikely. If chain length is suspected to be long, perform the following procedure to measure the chain length:

(1) Insert a screwdriver into the 18 mm hole with the screwdriver **ABOVE** the chains (Fig. 394).

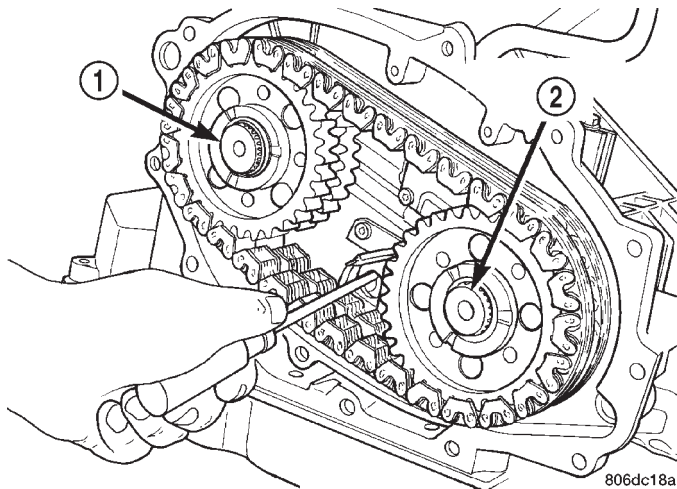


Fig. 394 Screwdriver Placement

- 1 - OUTPUT SHAFT
- 2 - TRANSFER SHAFT

(2) Pry the chains down at the center of the chains.

(3) Butt a scale against the snubber and mark the scale at the bottom of the chains (Fig. 395).

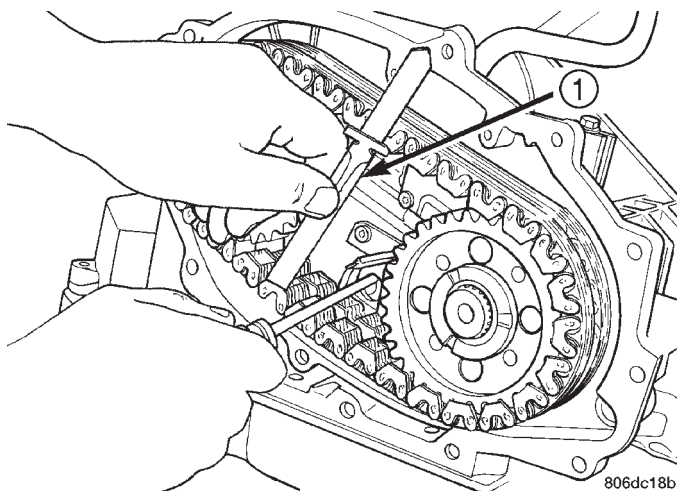


Fig. 395 Chain Measurement

- 1 - SCALE

(4) Insert a screwdriver into the 18 mm hole with the screwdriver **BELOW** the chains (Fig. 396). An assistant may be needed to perform this step.

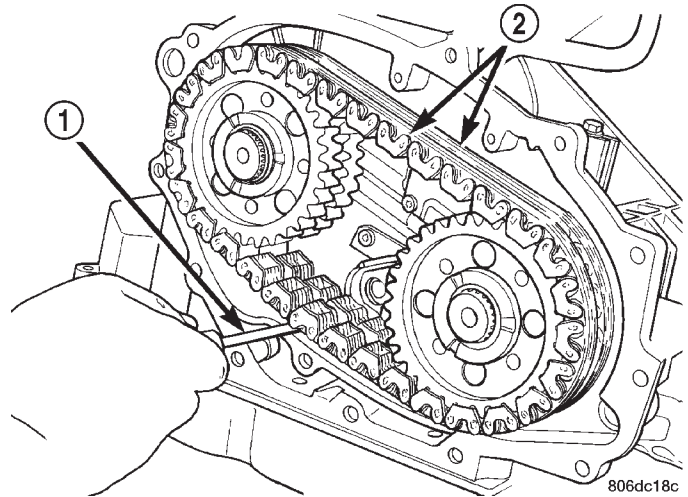


Fig. 396 Screwdriver Placement

- 1 - PRY TOOL
- 2 - CHAINS

(5) Pry the chains up at the center of the chain.

(6) Butt a scale against the snubber and place a second mark on the scale at the bottom of the chains (Fig. 397).

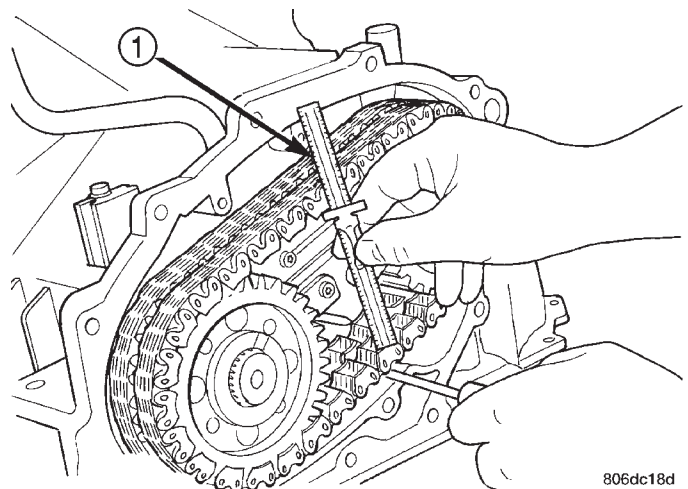


Fig. 397 Chains Measurement

- 1 - SCALE

(7) Measure the distance between the two marks placed on the scale (Fig. 398). If the two marks on the scale are more than one inch apart, replace the drive chains.

TRANSFER SYSTEM (Continued)

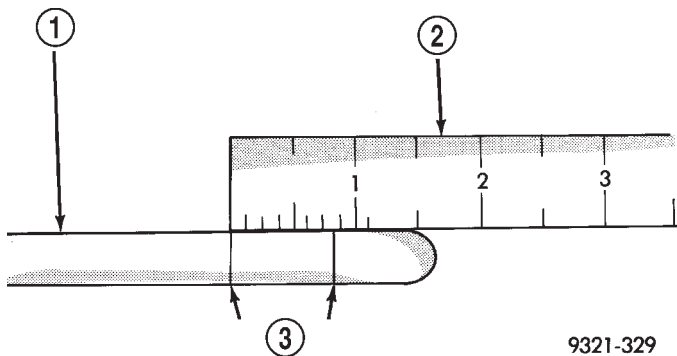


Fig. 398 Measuring Marks on Scale

- 1 - SCALE
- 2 - RULER
- 3 - MARKS PLACED ON SCALE

ADJUSTMENTS

DRIVE SPROCKET HEIGHT ADJUSTMENT PROCEDURE

A spacer beneath the output sprocket is used to position the output sprocket in line with the transfer sprocket. The sprocket must be within 0.015" of each other. In order to do this operation, install original spacer over the output shaft. If original spacer is not available, use the thickest available shim as a starting point. Refer to Output Sprocket Spacer Chart for available sizes. Then install the two sprockets without the chain.

OUTPUT SPROCKET SPACER CHART

2.64 - 2.84 mm	2.48 - 3.68 mm
2.85 - 3.05 mm	3.69 - 3.89 mm
3.06 - 3.26 mm	3.90 - 4.10 mm
3.27 - 3.47 mm	4.11 - 4.31 mm

The chain sprockets are not reversible. Check the height difference using a straight edge (special tool 6311 or equivalent) and a set of feeler gauges.

If the output sprocket is lower than transfer sprocket, add the amount measured to the shim that was installed (Fig. 399).

If the output sprocket is higher than transfer sprocket, subtract the amount measured to the shim that was installed (Fig. 400).

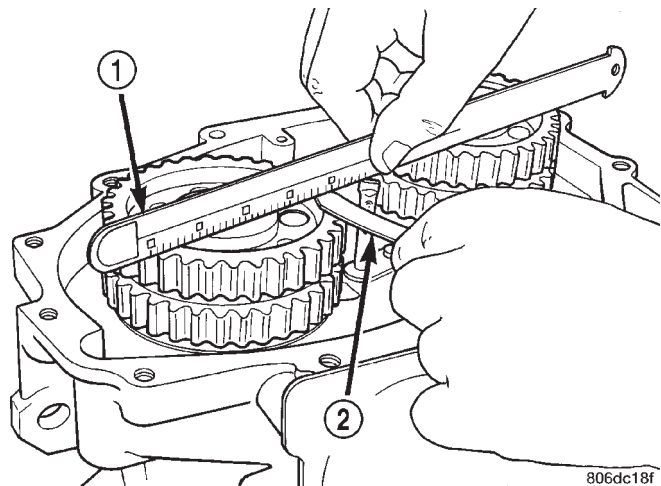


Fig. 399 Checking Sprocket Height

- 1 - STRAIGHT EDGE
- 2 - FEELER GAUGE

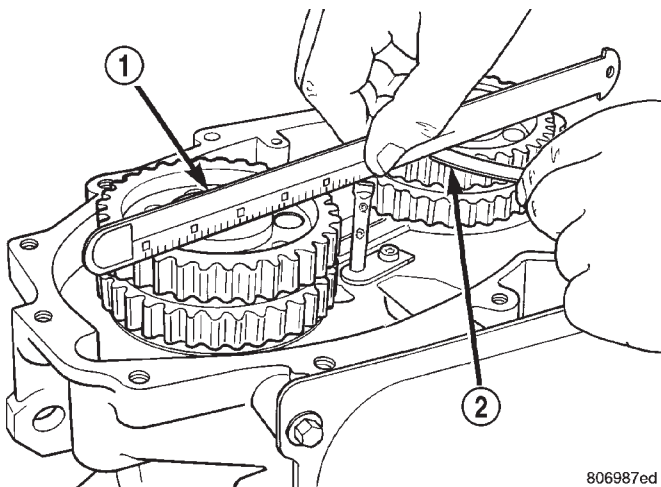


Fig. 400 Checking Sprocket Height

- 1 - STRAIGHT EDGE
- 2 - FEELER GAUGE

TRANSMISSION CONTROL RELAY

DESCRIPTION

The transmission control relay is located in the Power Distribution Center (PDC) on the left side of the engine compartment (Fig. 401) .

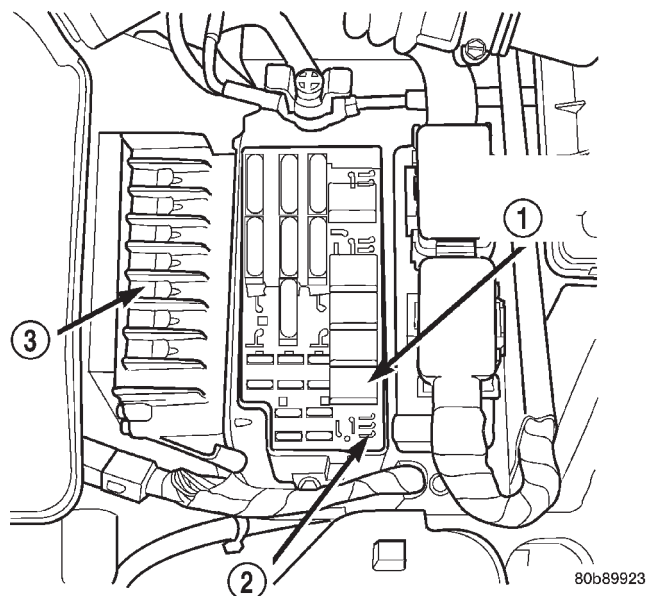


Fig. 401 Transmission Control Relay Locat

- 1 - TRANSMISSION CONTROL RELAY
- 2 - PDC
- 3 - TCM

OPERATION

The relay is supplied fused B+ voltage, energized by the PCM, and is used to supply power to the solenoid pack when the transmission is in normal operating mode. When the relay is "off", no power is supplied to the solenoid pack and the transmission is in "limp-in" mode. After a controller reset (ignition key turned to the "run" position or after cranking engine), the PCM energizes the relay. Prior to this, the PCM verifies that the contacts are open by checking for no voltage at the switched battery terminals. After this is verified, the voltage at the solenoid pack pressure switches is checked. After the relay is energized, the PCM monitors the terminals to verify that the voltage is greater than 3 volts.

TRANSMISSION RANGE SENSOR

DESCRIPTION

The Transmission Range Sensor (TRS) is mounted to the top of the valve body inside the transaxle and can only be serviced by removing the valve body assembly. The electrical connector extends through the transaxle case (Fig. 402).

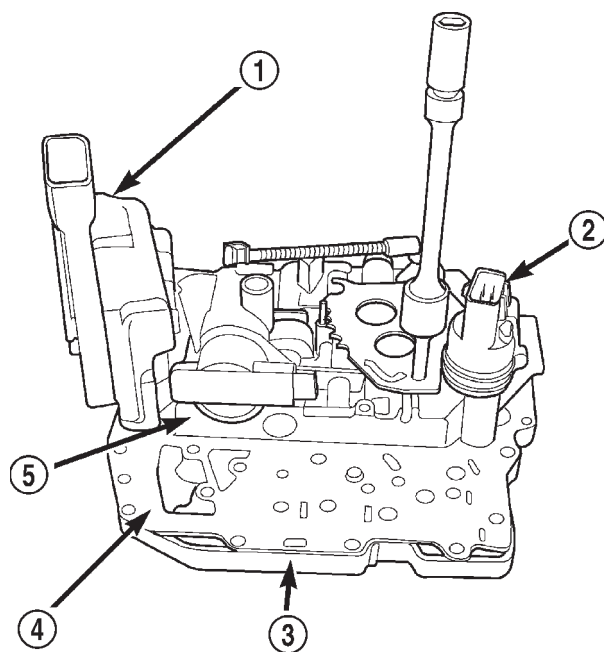


Fig. 402 Valve Body Assembly

- 1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
- 2 - TRS
- 3 - TRANSFER PLATE
- 4 - SEPARATOR PLATE
- 5 - VALVE BODY

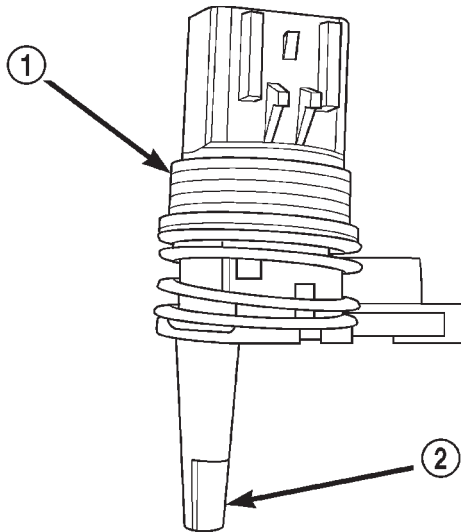
The Transmission Range Sensor (TRS) has four switch contacts that monitor shift lever position and send the information to the PCM.

The TRS also has an integrated temperature sensor (thermistor) that communicates transaxle temperature to the PCM (Fig. 403).

OPERATION

The Transmission Range Sensor (TRS) (Fig. 402) communicates shift lever position (SLP) to the PCM as a combination of open and closed switches. Each shift lever position has an assigned combination of switch states (open/closed) that the PCM receives from four sense circuits. The PCM interprets this information and determines the appropriate transaxle gear position and shift schedule.

TRANSMISSION RANGE SENSOR (Continued)



80be46cC

Fig. 403 Transmission Temperature Sensor

- 1 - TRANSMISSION RANGE SENSOR
2 - TEMPERATURE SENSOR

Since there are four switches, there are 16 possible combinations of open and closed switches (codes). Seven of these codes are related to gear position and three are recognized as “between gear” codes. This results in six codes which should never occur. These are called “invalid” codes. An invalid code will result in a DTC, and the PCM will then determine the shift lever position based on pressure switch data. This allows reasonably normal transmission operation with a TRS failure.

TRS SWITCH STATES

SLP	T42	T41	T3	T1
P	CL	CL	CL	OP
R	CL	OP	OP	OP
N	CL	CL	OP	CL
OD	OP	OP	OP	CL
3 (AS)	OP	OP	CL	OP
L	CL	OP	CL	CL

TRANSMISSION TEMPERATURE SENSOR

The TRS has an integrated thermistor (Fig. 403) that the PCM uses to monitor the transmission's sump temperature. Since fluid temperature can affect transmission shift quality and converter lock up, the PCM requires this information to determine which shift schedule to operate in. The PCM also monitors this temperature data so it can energize the vehicle cooling fan(s) when a transmission “overheat” condition exists. If the thermistor circuit fails, the PCM will revert to calculated oil temperature usage.

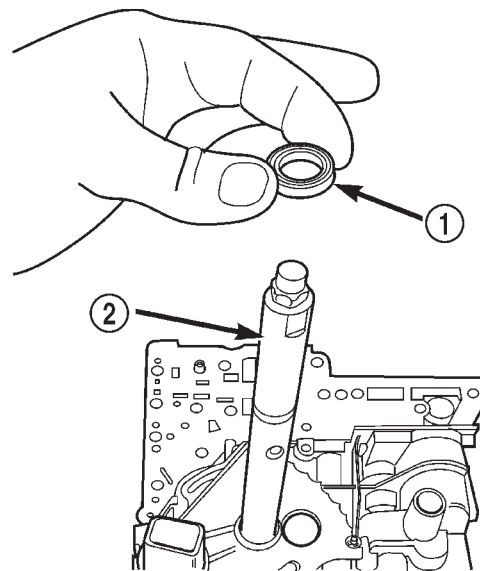
CALCULATED TEMPERATURE

A failure in the temperature sensor or circuit will result in calculated temperature being substituted for actual temperature. Calculated temperature is a predicted fluid temperature which is calculated from a combination of inputs:

- Battery (ambient) temperature
- Engine coolant temperature
- In-gear run time since start-up

REMOVAL

- (1) Disconnect the TRS connector.
- (2) Remove valve body assembly from vehicle. Refer to Valve Body removal and Installation in this group.
- (3) Remove the manual shaft seal (Fig. 404) .



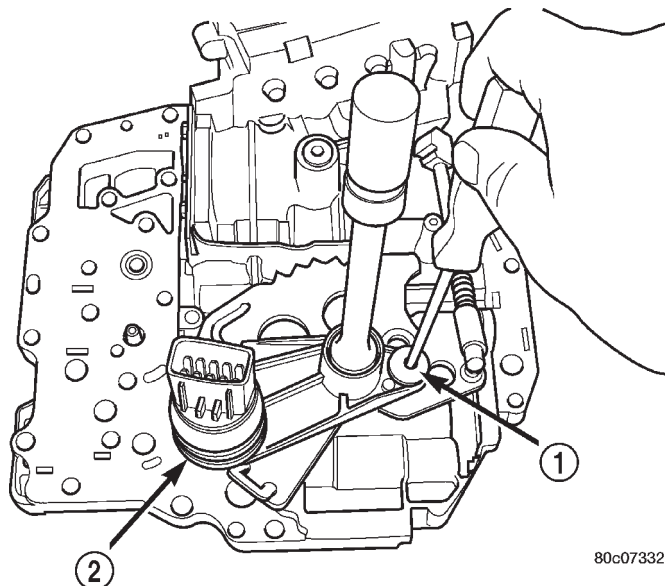
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Fig. 404 Manual Shaft Seal—Typical

- 1 - SEAL
2 - MANUAL SHAFT

TRANSMISSION RANGE SENSOR (Continued)

(4) Remove manual shaft/TRS retaining screw (Fig. 405) .



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Fig. 405 Manual Shaft Retaining Screw

- 1 - SCREW
2 - TRS

(5) Slide TRS off of manual valve shaft.

INSTALLATION

- (1) Install the TRS to the manual shaft. Make sure TRS locating pin rests in manual valve bore slot.
- (2) Install the TRS/manual shaft retaining screw and torque to 5 N·m (45 in. lbs.) torque (Fig. 405) .
- (3) Install the manual shaft seal (Fig. 404) .
- (4) Install valve body to transaxle. Refer to Valve Body Removal and Installation in this group.

VALVE BODY

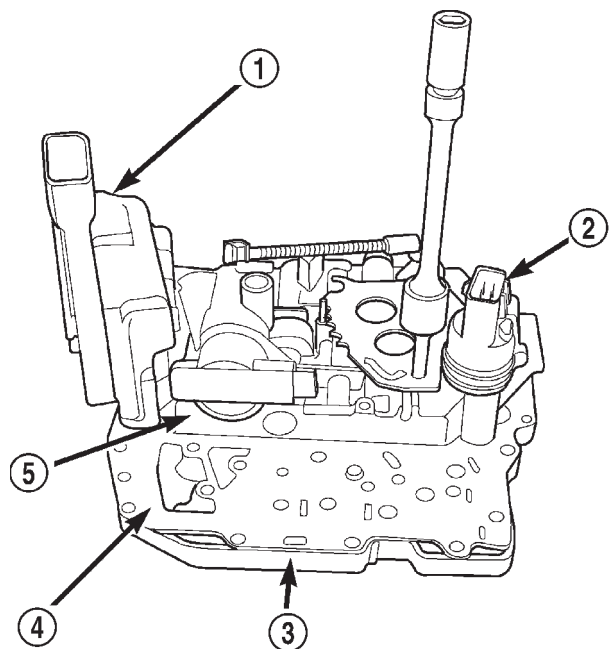
DESCRIPTION

The valve body assembly (Fig. 406) consists of a cast aluminum valve body, a separator plate, and transfer plate. The valve body contains valves and check balls that control fluid delivery to the torque converter clutch, solenoid/pressure switch assembly, and frictional clutches.

Also mounted to the valve body assembly are the solenoid/pressure switch assembly and the transmission range sensor (Fig. 406).

The valves contained within the valve body include the following (Fig. 407):

- Regulator valve
- Solenoid switch valve
- Manual valve
- Converter clutch switch valve



80c07300

Fig. 406 Valve Body Assembly

- 1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - TRS
3 - TRANSFER PLATE
4 - SEPARATOR PLATE
5 - VALVE BODY

- Converter clutch control valve
- Torque converter regulator valve
- Low/Reverse switch valve

In addition, the valve body also contains the thermal valve, #2, 3, 4 & 5 check balls and the 2/4 accumulator assembly. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/VALVE BODY - DISASSEMBLY).

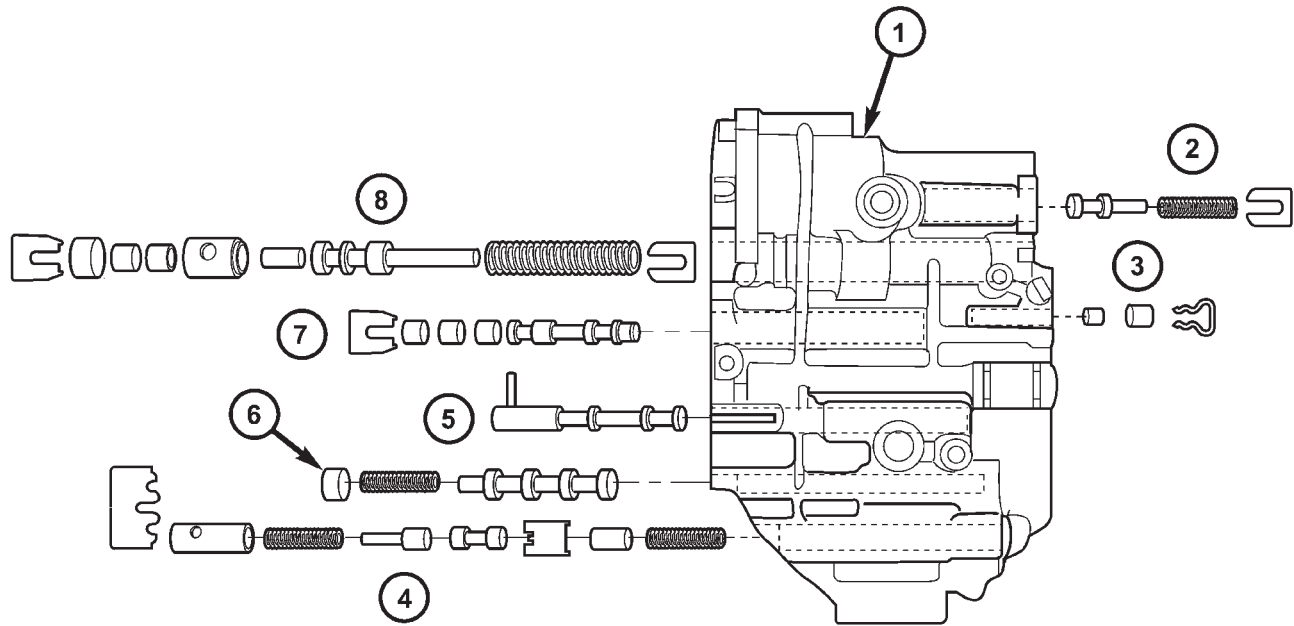
OPERATION

NOTE: (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE - SCHEMATICS AND DIAGRAMS) for a visual aid in determining valve location, operation and design.

REGULATOR VALVE

The regulator valve controls hydraulic pressure in the transaxle. It receives unregulated pressure from the pump, which works against spring tension to maintain oil at specific pressures. A system of sleeves and ports allows the regulator valve to work at one of three predetermined pressure levels. Regulated oil pressure is also referred to as "line pressure."

VALVE BODY (Continued)



80865f21

Fig. 407 Valve Body—Exploded

- | | |
|------------------------------------|-----------------------------------|
| 1 - VALVE BODY | 5 - MANUAL VALVE |
| 2 - T/C REGULATOR VALVE | 6 - CONVERTER CLUTCH SWITCH VALVE |
| 3 - L/R SWITCH VALVE | 7 - SOLENOID SWITCH VALVE |
| 4 - CONVERTER CLUTCH CONTROL VALVE | 8 - REGULATOR VALVE |

SOLENOID SWITCH VALVE

The solenoid switch valve controls line pressure from the LR/CC solenoid. In one position, it allows the low/reverse clutch to be pressurized. In the other, it directs line pressure to the converter control and converter clutch valves.

MANUAL VALVE

The manual valve is operated by the mechanical shift linkage. Its primary responsibility is to send line pressure to the appropriate hydraulic circuits and solenoids. The valve has three operating ranges or positions.

CONVERTER CLUTCH SWITCH VALVE

The main responsibility of the converter clutch switch valve is to control hydraulic pressure applied to the front (off) side of the converter clutch piston. Line pressure from the regulator valve is fed to the torque converter regulator valve. The pressure is then directed to the converter clutch switch valve and to the front side of the converter clutch piston. This pressure pushes the piston back and disengages the converter clutch.

CONVERTER CLUTCH CONTROL VALVE

The converter clutch control valve controls the back (on) side of the torque converter clutch. When the controller energizes or modulates the LR/CC solenoid to apply the converter clutch piston, both the converter clutch control valve and the converter control valve move, allowing pressure to be applied to the back side of the clutch.

T/C REGULATOR VALVE

The torque converter regulator valve slightly regulates the flow of fluid to the torque converter.

LOW/REVERSE SWITCH VALVE

The low/reverse clutch is applied from different sources, depending on whether low (1st) gear or reverse is selected. The low/reverse switch valve alternates positions depending on from which direction fluid pressure is applied. By design, when the valve is shifted by fluid pressure from one channel, the opposing channel is blocked. The switch valve alienates the possibility of a sticking ball check, thus providing consistent application of the low/reverse clutch under these operating conditions.

VALVE BODY (Continued)

REMOVAL

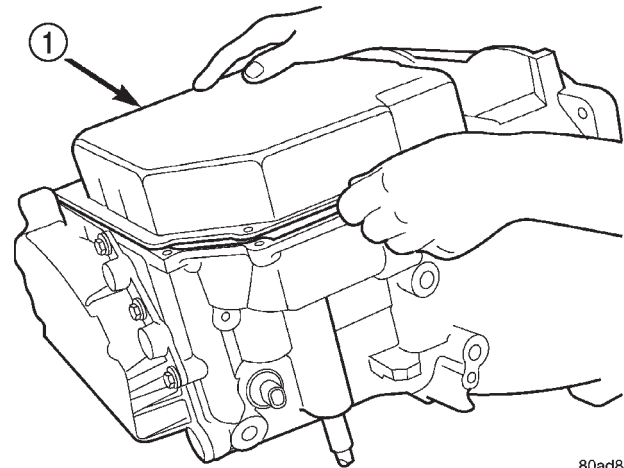
NOTE: If valve body is being reconditioned or replaced, it is necessary to perform the Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

(1) Disconnect the TRS wiring connector. The solenoid wiring connector can remain attached to the case.

(2) Disconnect the shift cable from the shift lever (at the transaxle).

(3) Move the shift lever clockwise as far as it will go. This should be one position past the L position. Then remove the shift lever.

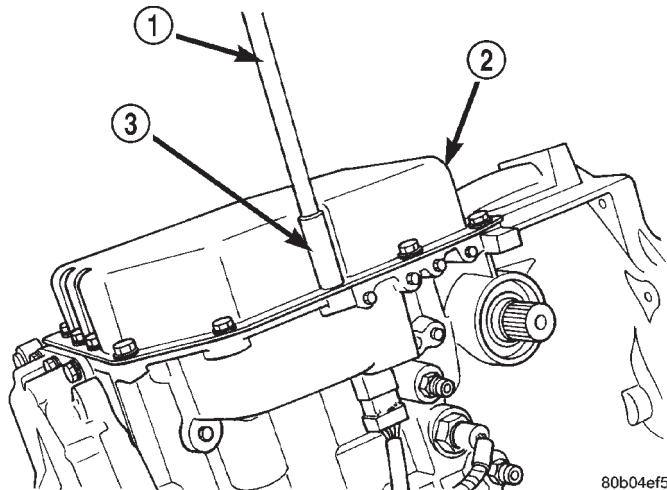
(4) Remove transaxle pan bolts (Fig. 408).



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Fig. 409 Transaxle Oil Pan

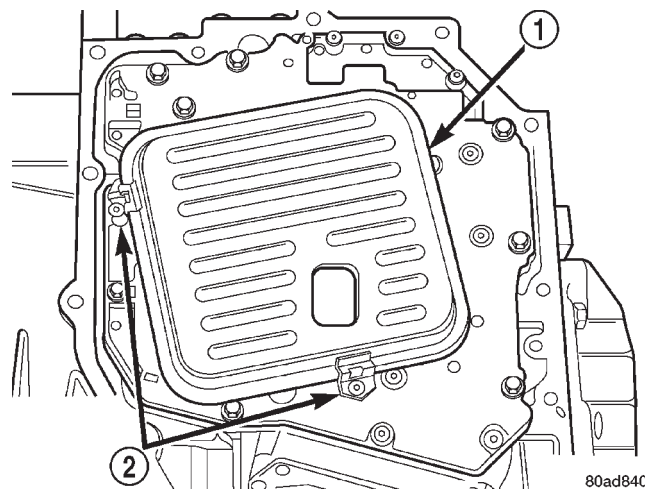
1 - TRANSAXLE OIL PAN



80b04ef5

Fig. 408 Transaxle Oil Pan Bolts

1 - EXTENSION
2 - TRANSAXLE OIL PAN
3 - SOCKET



80ad8404

Fig. 410 Transaxle Oil Filter

1 - TRANSAXLE FILTER
2 - FILTER RETAINING CLIPS

(5) Remove transaxle oil pan (Fig. 409). When reinstalling oil pan be sure that pan flange is clean and oil free. Apply a 1/8 inch bead of Mopar Silicone Sealer onto oil pan flange before installing.

(6) Remove oil filter from valve body (Fig. 410). It is held in place by two clips.

CAUTION: The 42LE transaxle oil filter is not interchangeable with the 41TE transaxle filter. Installation of a 41TE oil filter in a 42LE may cause transaxle damage.

VALVE BODY (Continued)

(7) Remove valve body bolts-to-case (Fig. 411).

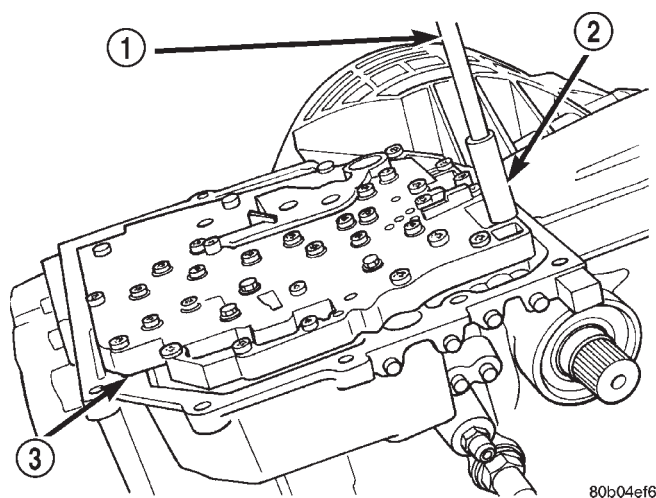


Fig. 411 Valve Body Bolts

- 1 - EXTENSION
- 2 - SOCKET
- 3 - VALVE BODY

(8) Carefully remove valve body assembly from transaxle (Fig. 412). (Fig. 415)

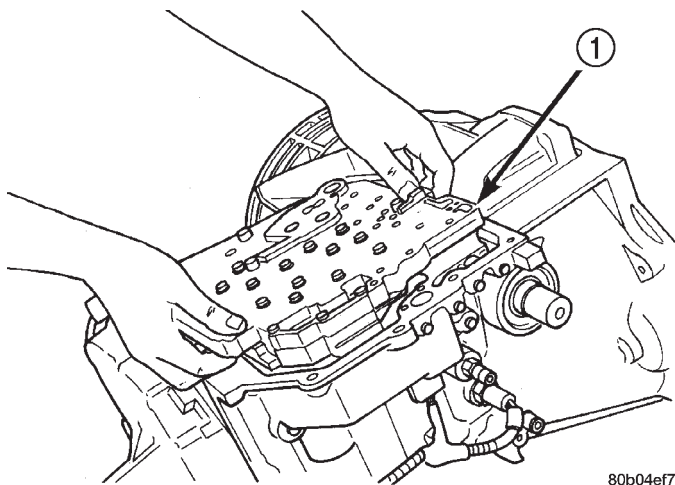
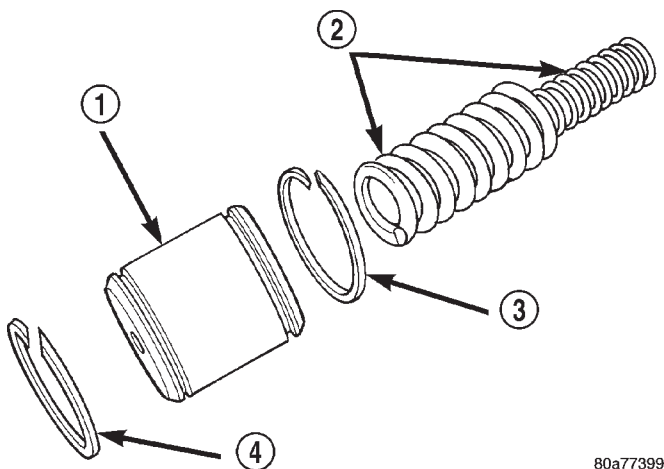


Fig. 412 Valve Body From Transaxle

- 1 - VALVE BODY

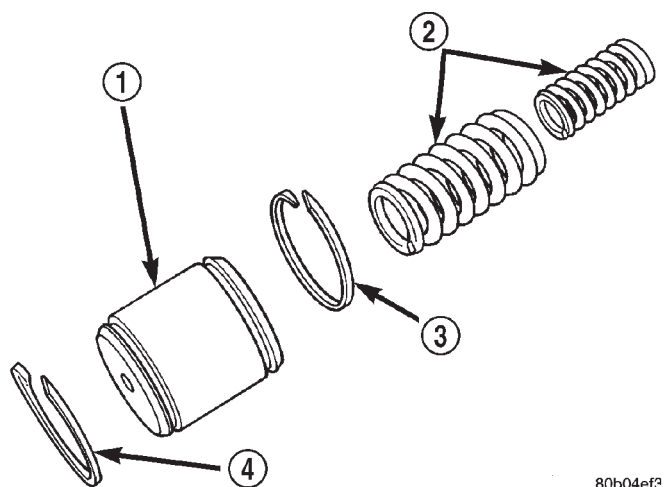
CAUTION: The overdrive and underdrive accumulators and springs may fall out when removing the valve body (Fig. 413) (Fig. 414) (Fig. 415).



80a77399

Fig. 413 Accumulator Assembly—Typical

- 1 - ACCUMULATOR PISTON (UNDERDRIVE)
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING



80b04ef3

Fig. 414 Overdrive Accumulator and Springs

- 1 - OVERDRIVE ACCUMULATOR PISTON
- 2 - RETURN SPRINGS
- 3 - SEAL RING
- 4 - SEAL RING

VALVE BODY (Continued)

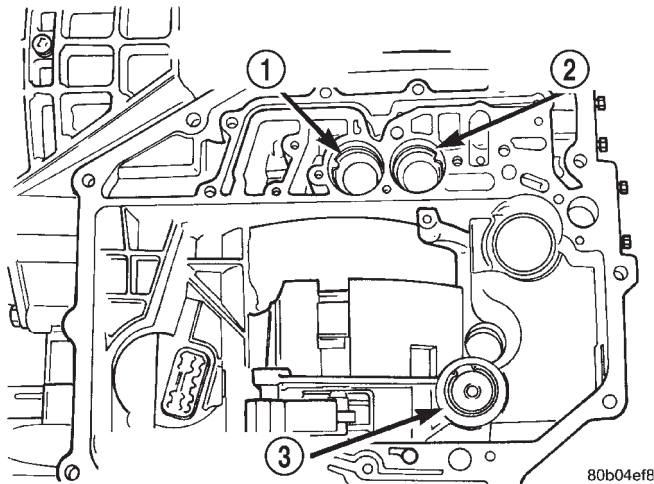


Fig. 415 Overdrive, Underdrive and Low/Reverse Accumulator Location

- 1 - OVERDRIVE ACCUMULATOR LOCATION
- 2 - UNDERDRIVE ACCUMULATOR LOCATION
- 3 - LOW/REVERSE ACCUMULATOR

DISASSEMBLY

NOTE: If the valve body is being reconditioned or replaced, it is necessary to perform the Quick Learn Procedure using the DRBIII® Scan Tool (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/ POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

- (1) Remove manual shaft seal.
- (2) Remove manual shaft screw (Fig. 416).

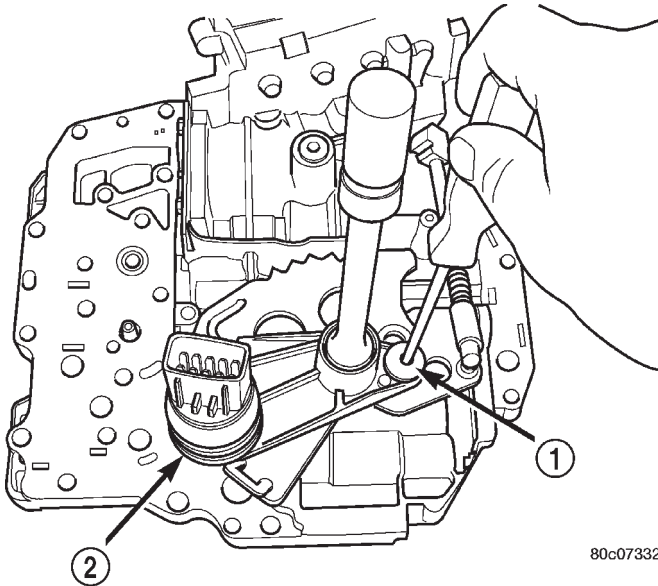


Fig. 416 Manual Shaft Retaining Screw

- 1 - SCREW
- 2 - TRS

- (3) Remove Transmission Range Sensor (TRS) and manual shaft (Fig. 417).

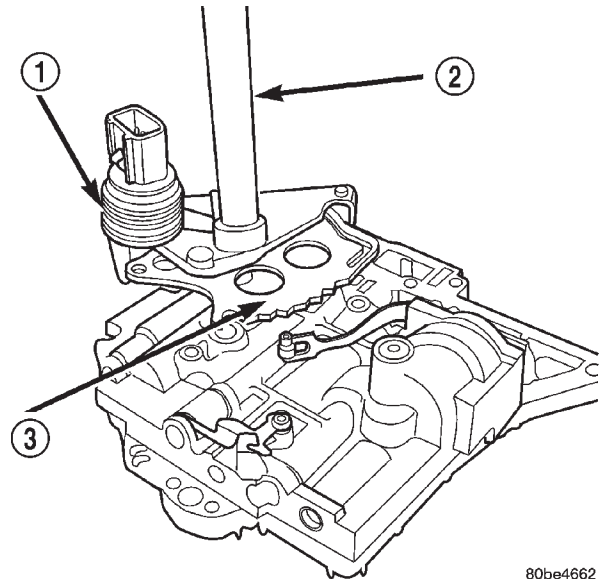


Fig. 417 Manual Shaft/Rooster Comb and Transmission Range Sensor

- 1 - TRANSMISSION RANGE SENSOR
- 2 - MANUAL SHAFT
- 3 - ROOSTER COMB

- (4) Remove Solenoid/Pressure Switch Assembly from valve body (Fig. 418).

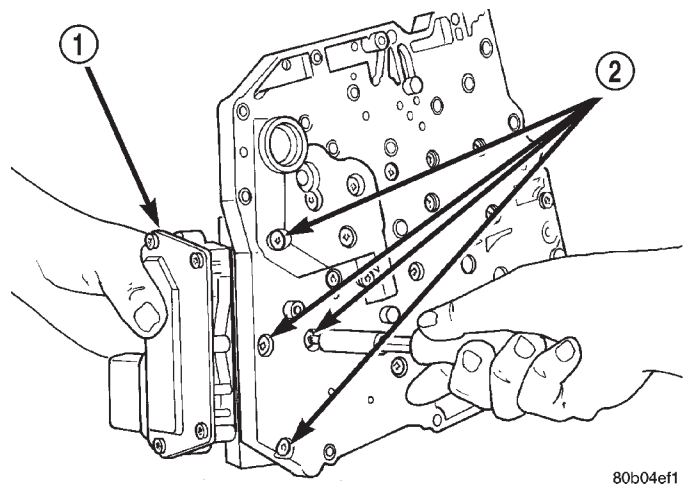


Fig. 418 Solenoid Retaining Screws

- 1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
- 2 - RETAINING SCREWS

VALVE BODY (Continued)

(5) Remove valve body stiffener plate (Fig. 419).

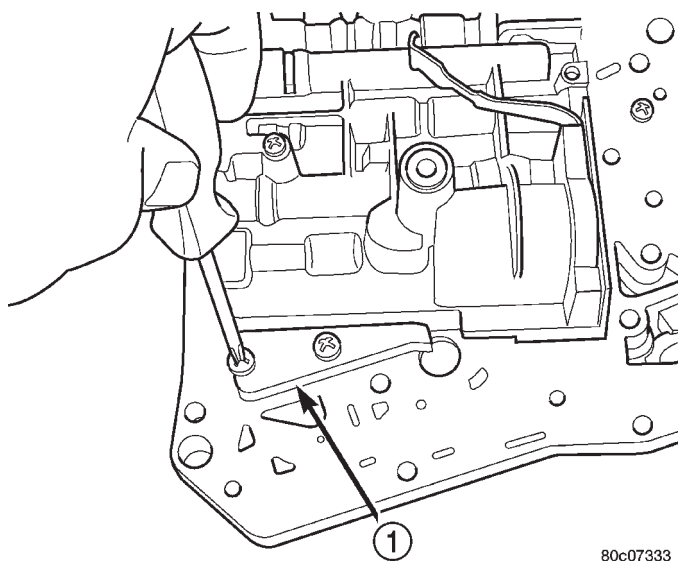


Fig. 419 Remove Stiffener Plate

1 - STIFFENER PLATE

(6) Invert valve body assembly and remove transfer plate-to-valve body screws (Fig. 420).

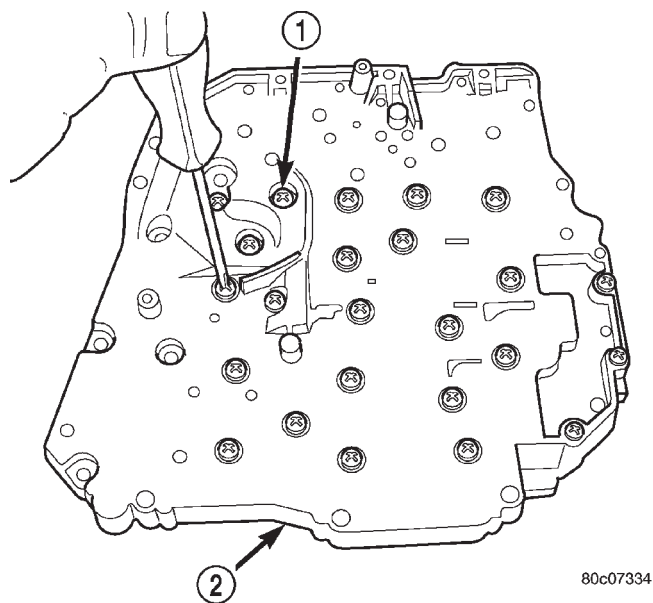


Fig. 420 Remove Transfer Plate-to-Valve Body Screws

1 - SCREW (24)
2 - TRANSFER PLATE

(7) Remove transfer/separator plate from valve body (Fig. 421)

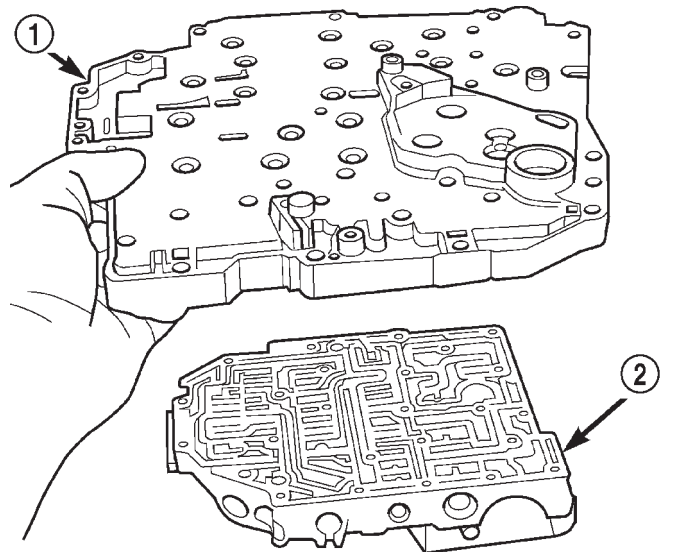


Fig. 421 Remove Transfer Plate to Valve Body

1 - TRANSFER PLATE
2 - VALVE BODY

(8) Remove separator plate-to-transfer plate screws (Fig. 422).

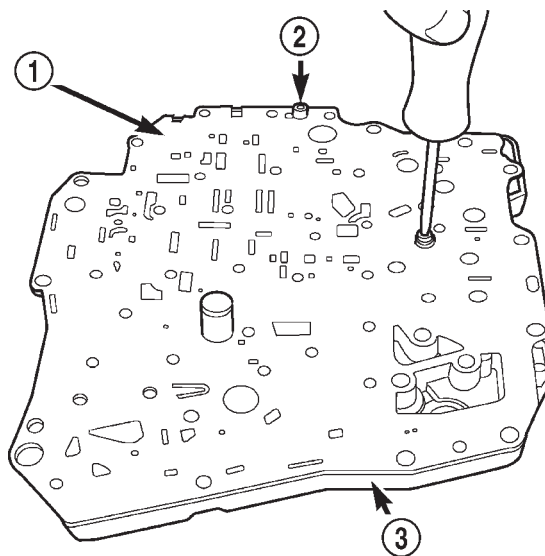
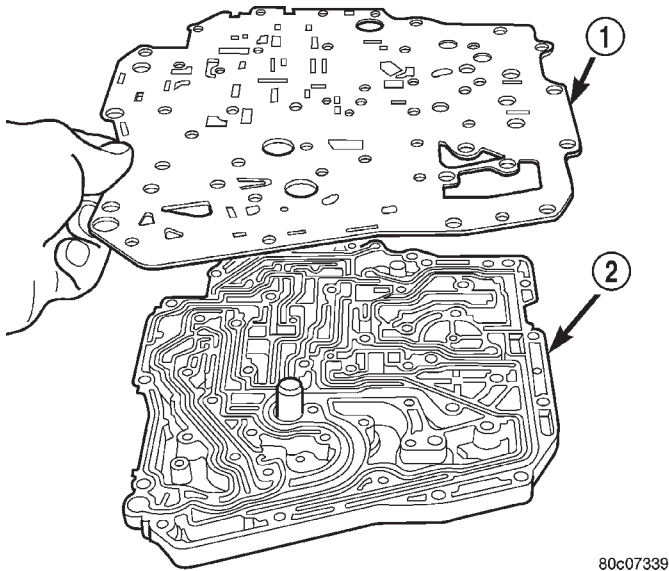


Fig. 422 Remove Separator Plate-to-Transfer Plate Screws

1 - SEPARATOR PLATE
2 - SCREW (2)
3 - TRANSFER PLATE

VALVE BODY (Continued)

(9) Remove separator plate from transfer plate (Fig. 423).

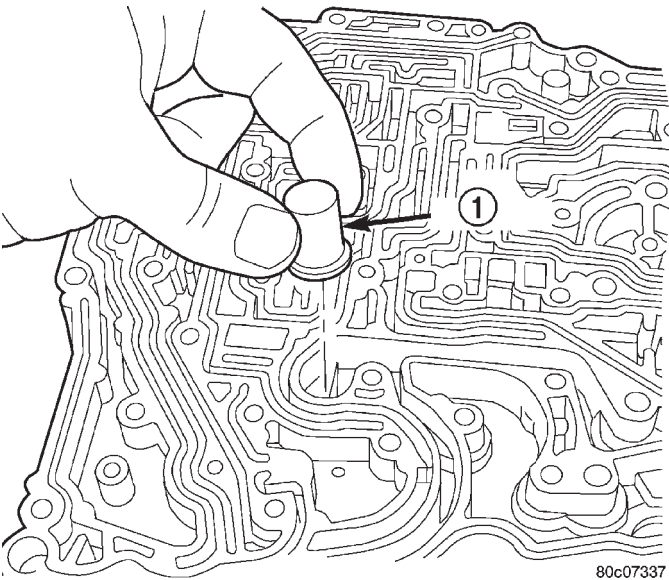


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Fig. 423 Remove Separator Plate to Transfer Plate

- 1 - SEPARATOR PLATE
2 - TRANSFER PLATE

(10) Remove oil screen (Fig. 424) from transfer plate.

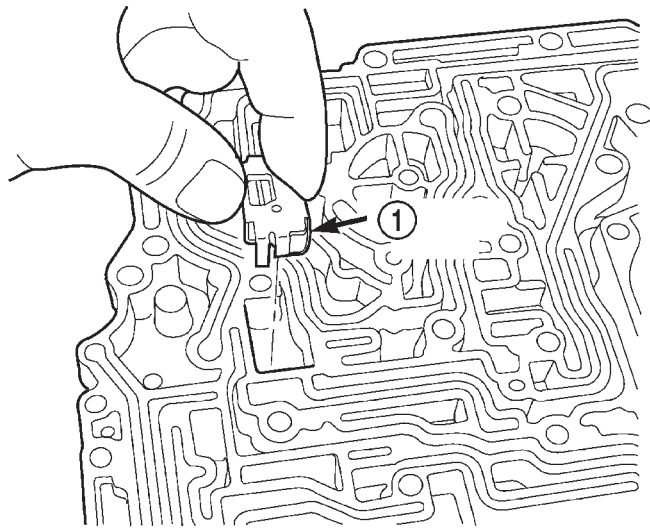


80c07337

Fig. 424 Remove Oil Screen to Transfer Plate

- 1 - OIL SCREEN

(11) Remove thermal valve (Fig. 425) from transfer plate.



80c07338

Fig. 425 Remove Thermal Valve to Transfer Plate

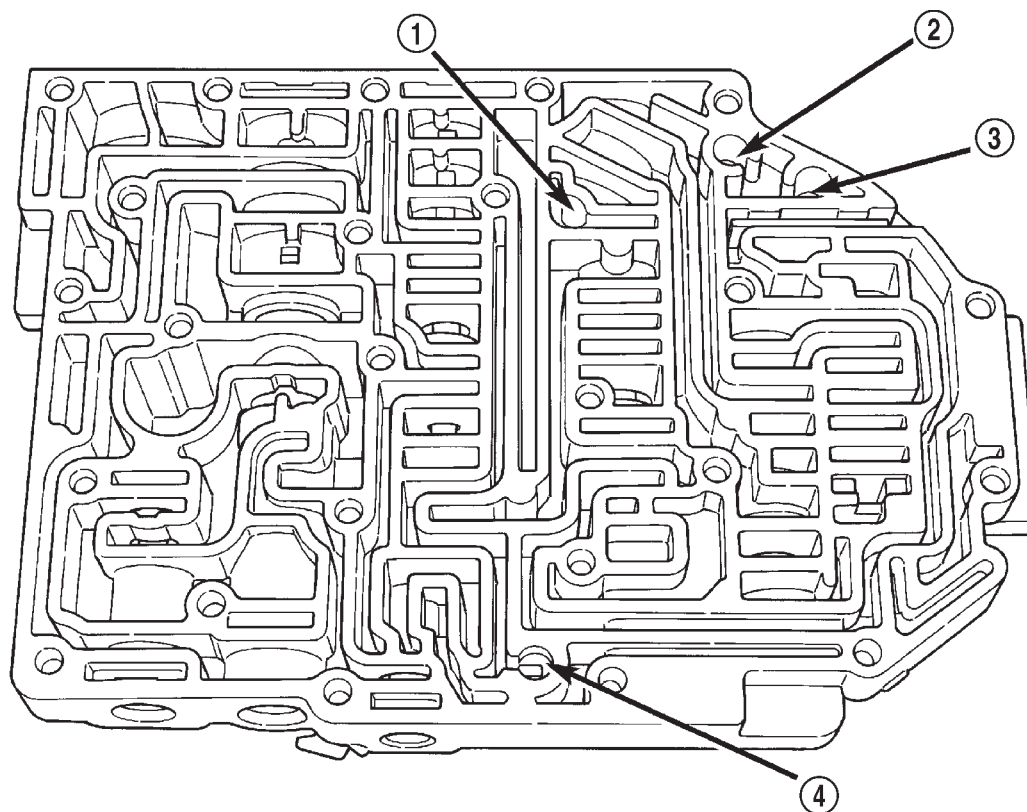
- 1 - THERMAL VALVE

(12) Remove valve body check balls. Note their location for assembly ease (Fig. 426).

(13) Remove 2/4 accumulator assembly as shown in (Fig. 427).

(14) Remove dual retainer plate from valve body. Use special tool 6301 to remove plate (Fig. 428).

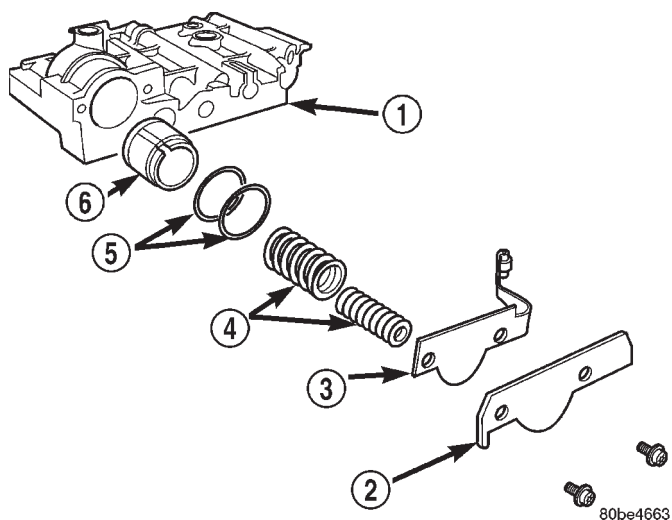
VALVE BODY (Continued)

**Fig. 426 Ball Check Location**

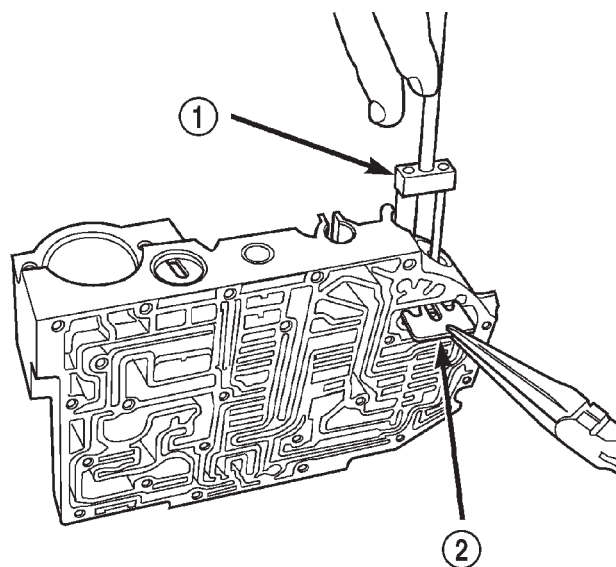
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- 1 - (#4) BALL CHECK LOCATION
2 - (#2) BALL CHECK LOCATION

- 3 - (#5) BALL CHECK LOCATION
4 - (#3) BALL CHECK LOCATION

**Fig. 427 2/4 Accumulator Assembly**

- 1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - SPRINGS
5 - SEALS
6 - PISTON



80be4700

Fig. 428 Remove Dual Retainer Plate using Tool 6301

- 1 - TOOL 6301
2 - RETAINER

VALVE BODY (Continued)

(15) Remove regulator valve spring retainer (Fig. 429).

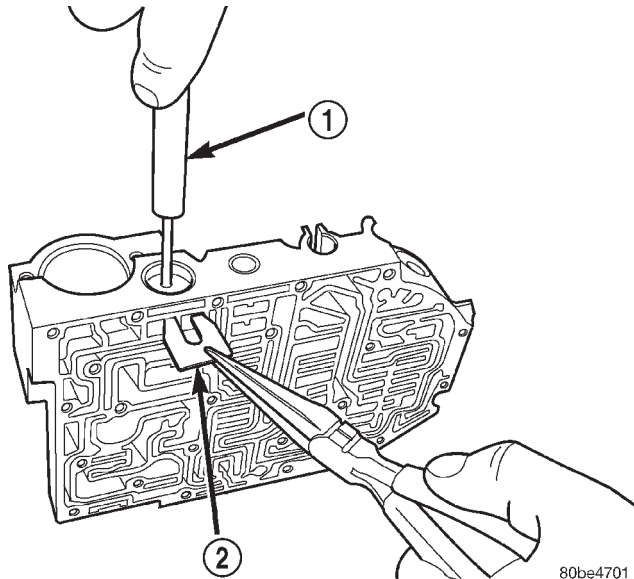


Fig. 429 Remove Regulator Valve Spring Retainer using Tool 6302

1 - TOOL 6302
2 - RETAINER

(16) Remove remaining retainers as shown in (Fig. 430).

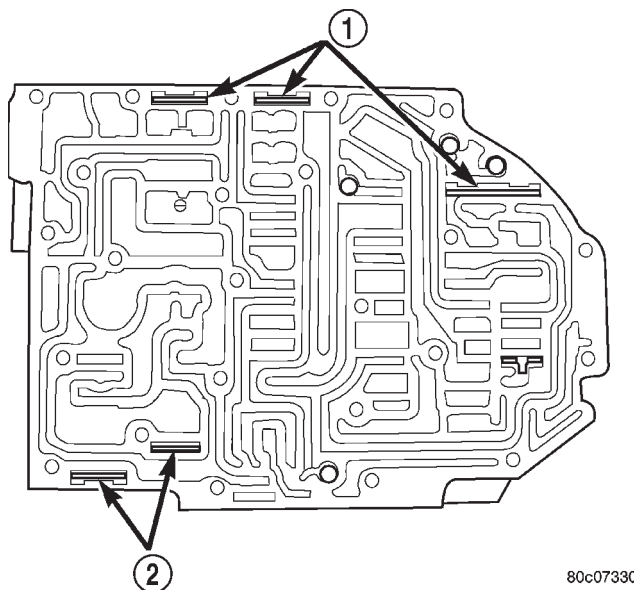


Fig. 430 Valve Retainer Location

1 - RETAINER
2 - RETAINER

(17) Remove valves and springs as shown in (Fig. 431).

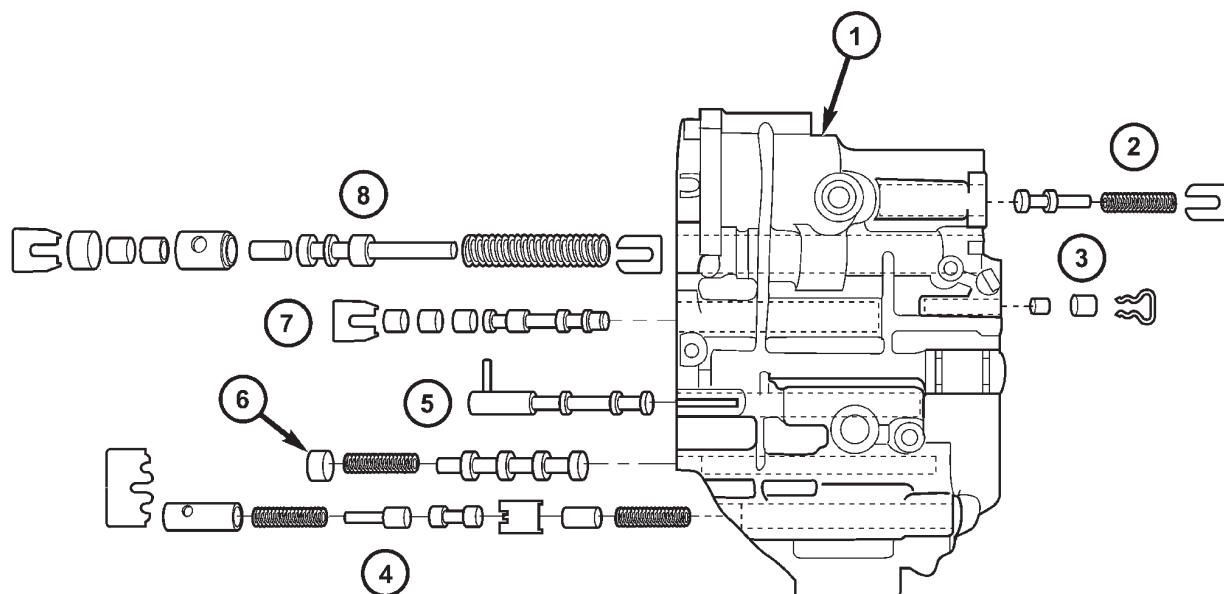
(18) Cleanliness through entire disassembly and assembly of the valve body cannot be overemphasized. When disassembling, each part should be washed in a suitable solvent, then dried by compressed air. **Do not wipe parts with shop towels.** All mating surfaces in the valve body are accurately machined; therefore, careful handling of all parts must be exercised to avoid nicks or burrs.

ASSEMBLY

NOTE: If the valve body assembly is being reconditioned or replaced, it is necessary to perform the Quick Learn Procedure using the DRBIII® Scan Tool. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

(1) Install valves and springs as shown in (Fig. 432).

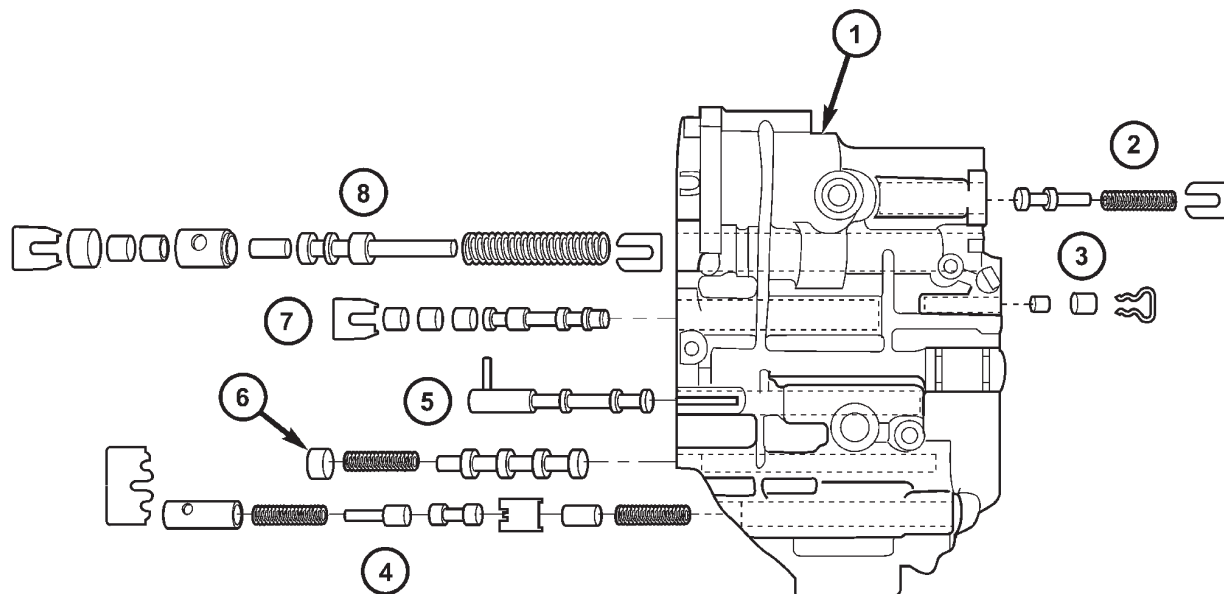
VALVE BODY (Continued)



80865f21

Fig. 431 Valve Body Assembly

- | | |
|------------------------------------|-----------------------------------|
| 1 - VALVE BODY | 5 - MANUAL VALVE |
| 2 - T/C REGULATOR VALVE | 6 - CONVERTER CLUTCH SWITCH VALVE |
| 3 - L/R SWITCH VALVE | 7 - SOLENOID SWITCH VALVE |
| 4 - CONVERTER CLUTCH CONTROL VALVE | 8 - REGULATOR VALVE |



80865f21

Fig. 432 Valve Body Assembly

- | | |
|------------------------------------|-----------------------------------|
| 1 - VALVE BODY | 5 - MANUAL VALVE |
| 2 - T/C REGULATOR VALVE | 6 - CONVERTER CLUTCH SWITCH VALVE |
| 3 - L/R SWITCH VALVE | 7 - SOLENOID SWITCH VALVE |
| 4 - CONVERTER CLUTCH CONTROL VALVE | 8 - REGULATOR VALVE |

VALVE BODY (Continued)

(2) Install regulator valve spring retainer (Fig. 433).

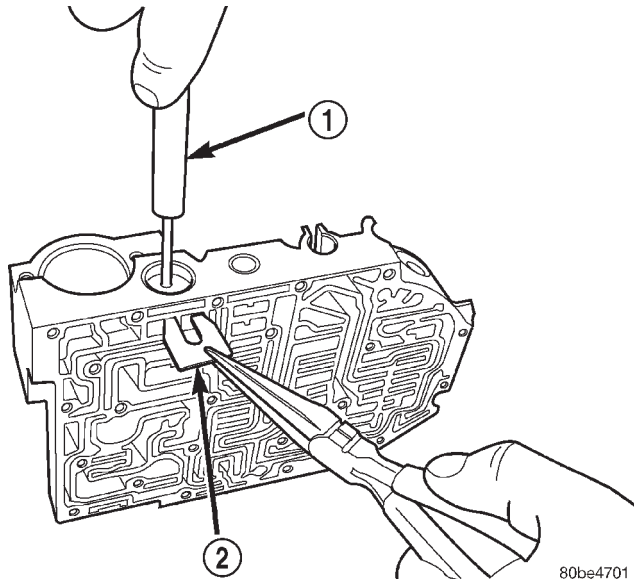


Fig. 433 Install Regulator Valve Spring Retainer using Tool 6302

- 1 - TOOL 6302
2 - RETAINER

(3) Install dual retainer plate using Tool 6301 (Fig. 434).

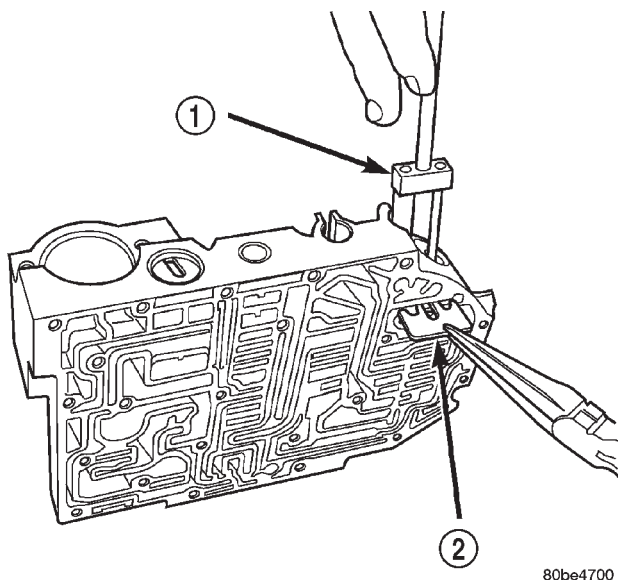


Fig. 434 Install Dual Retainer Plate using Tool 6301

- 1 - TOOL 6301
2 - RETAINER

(4) Verify that all retainers are installed as shown in (Fig. 435). Retainers should be flush or below valve body surface.

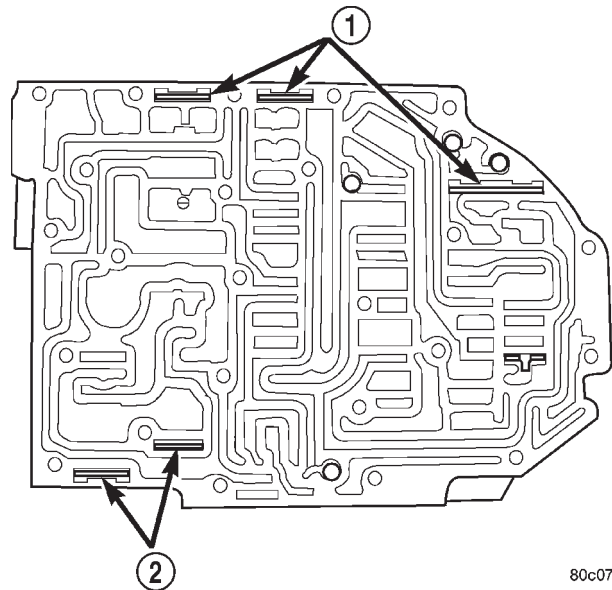


Fig. 435 Valve Retainer Location

- 1 - RETAINER
2 - RETAINER

(5) Install 2/4 Accumulator components as shown in (Fig. 436). Torque 2/4 Accumulator retainer plate to 5 N·m (45 in. lbs.).

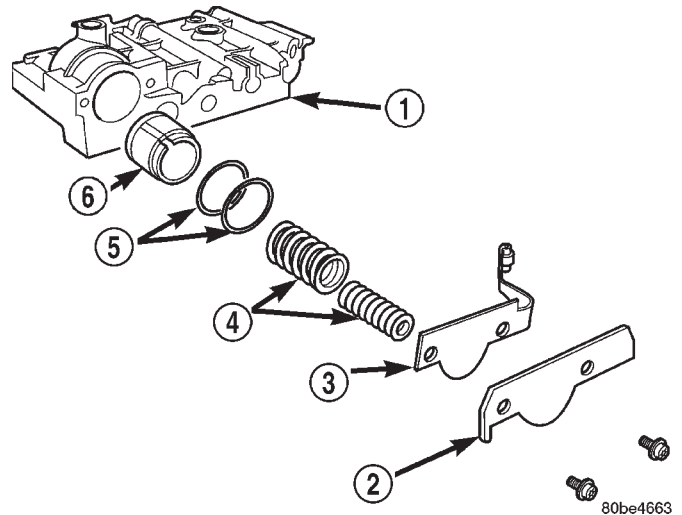
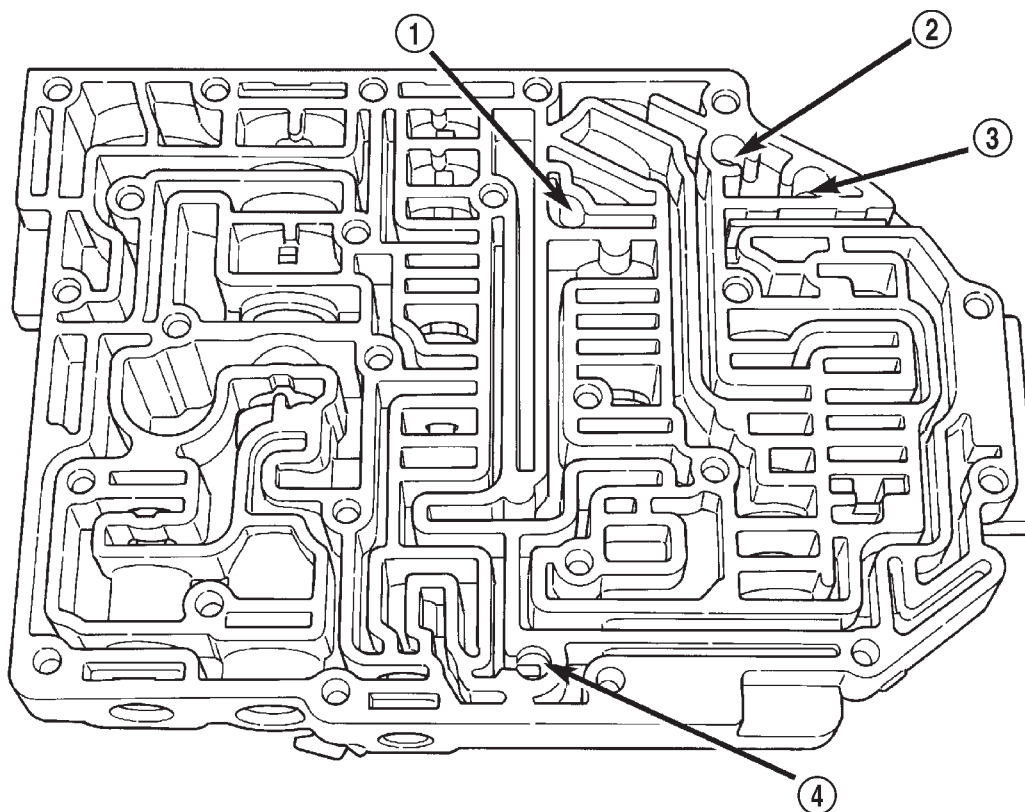


Fig. 436 2/4 Accumulator Assembly

- 1 - VALVE BODY
2 - RETAINER PLATE
3 - DETENT SPRING
4 - SPRINGS
5 - SEALS
6 - PISTON

(6) Install check balls into position as shown in (Fig. 437). If necessary, secure them with petrolatum or transmission assembly gel for assembly ease.

VALVE BODY (Continued)



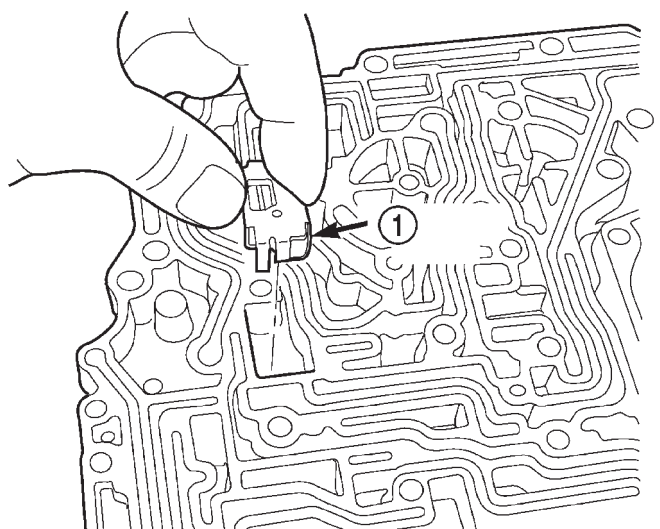
80c07030

Fig. 437 Ball Check Location

1 - (#4) BALL CHECK LOCATION
2 - (#2) BALL CHECK LOCATION

3 - (#5) BALL CHECK LOCATION
4 - (#3) BALL CHECK LOCATION

(7) Install thermal valve to the transfer plate (Fig. 438).

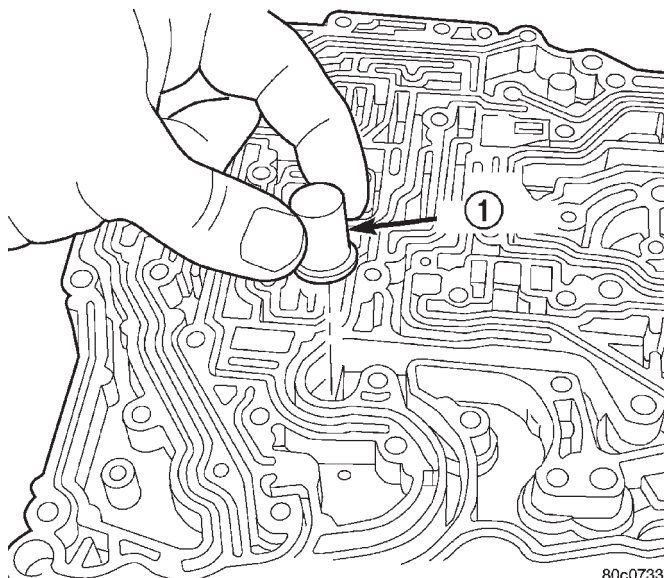


80c07338

Fig. 438 Install Thermal Valve to Transfer Plate

1 - THERMAL VALVE

(8) Install oil screen to transfer plate (Fig. 439).



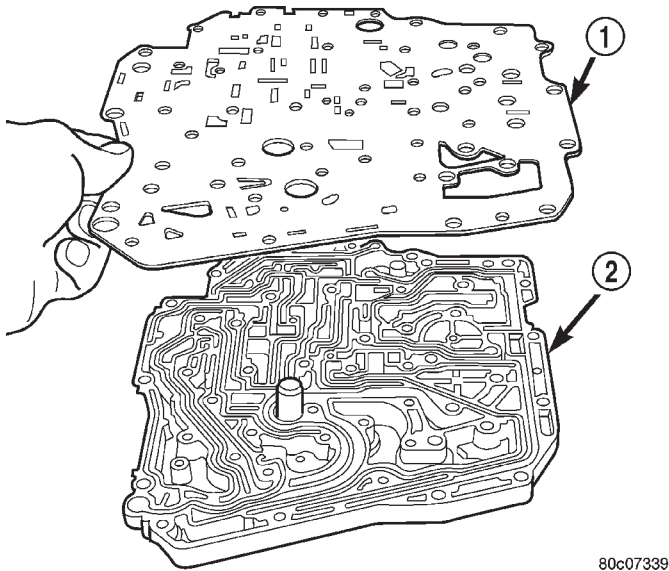
80c07337

Fig. 439 Install Oil Screen to Transfer Plate

1 - OIL SCREEN

VALVE BODY (Continued)

(9) Install separator plate to transfer plate (Fig. 440).

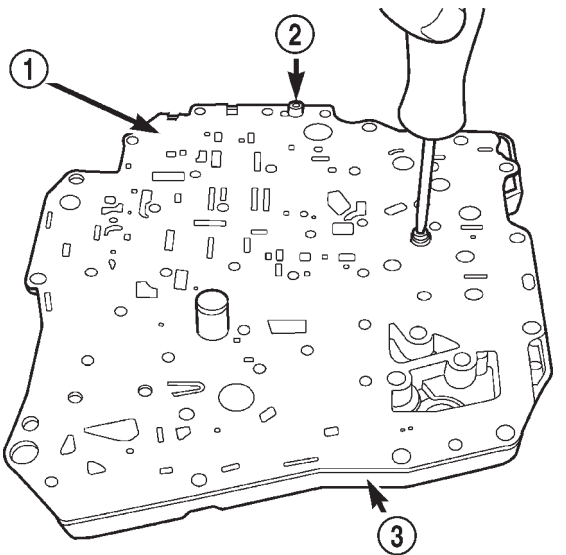


80c07339

Fig. 440 Install Separator Plate to Transfer Plate

- 1 - SEPARATOR PLATE
2 - TRANSFER PLATE

(10) Install the two separator plate-to-transfer plate screws (Fig. 441).

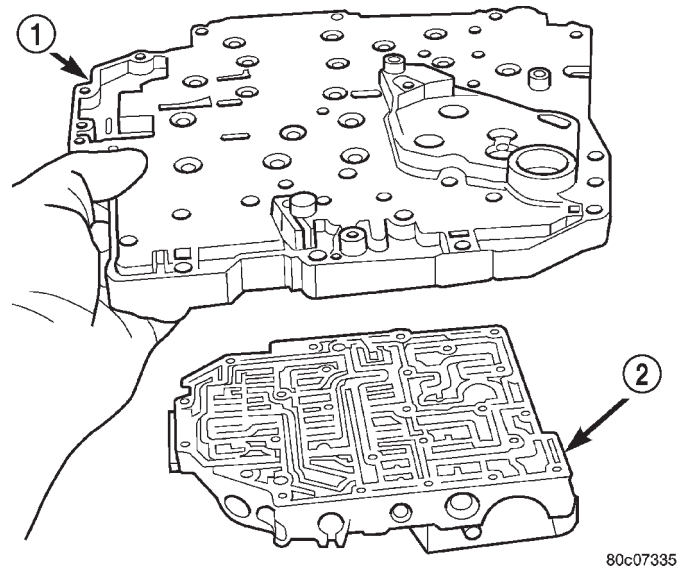


80c07336

Fig. 441 Install Separator Plate-to-Transfer Plate Screws

- 1 - SEPARATOR PLATE
2 - SCREW (2)
3 - TRANSFER PLATE

(11) Install the transfer plate to the valve body (Fig. 442).

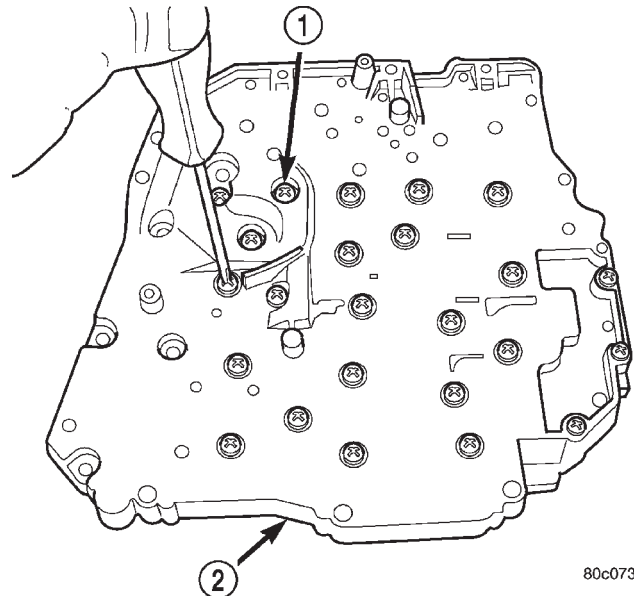


80c07335

Fig. 442 Install Transfer Plate to Valve Body

- 1 - TRANSFER PLATE
2 - VALVE BODY

(12) Install the transfer plate-to-valve body screws (Fig. 443) and torque to 5 N·m (45 in. lbs.).



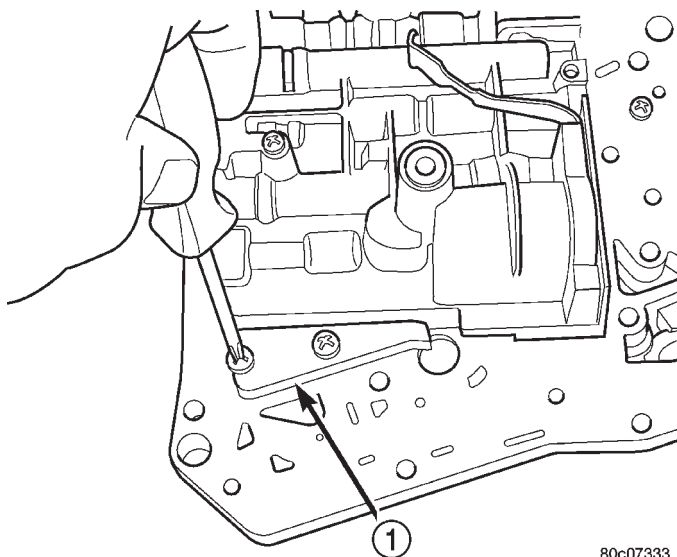
80c07334

Fig. 443 Install Transfer Plate-to-Valve Body Screws

- 1 - SCREW (24)
2 - TRANSFER PLATE

VALVE BODY (Continued)

(13) Install the stiffener plate (Fig. 444).

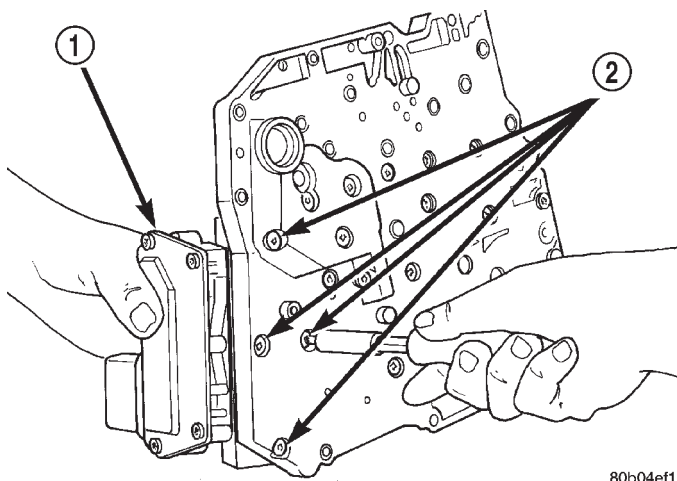


80c07333

Fig. 444 Install Stiffener Plate

1 - STIFFENER PLATE

(14) Install the solenoid/pressure switch assembly and to the transfer plate (Fig. 445) and torque to 6 N·m (35 in. lbs.).

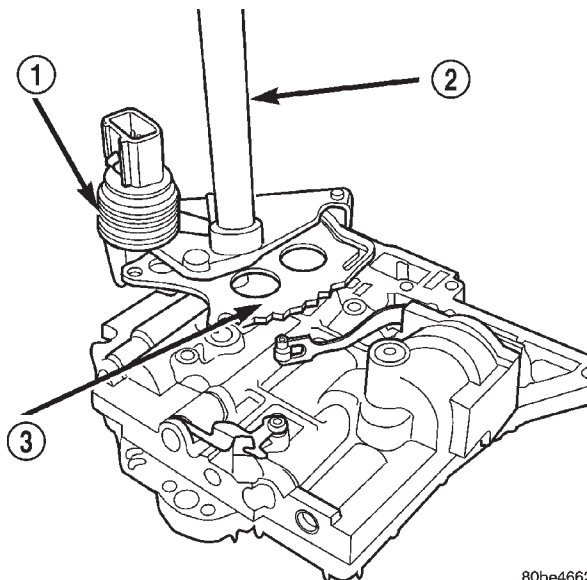


80b04ef1

Fig. 445 Solenoid Retaining Screws

1 - SOLENOID/PRESSURE SWITCH ASSEMBLY
2 - RETAINING SCREWS

(15) Install the manual shaft/rooster comb and transmission range sensor to the valve body (Fig. 446).

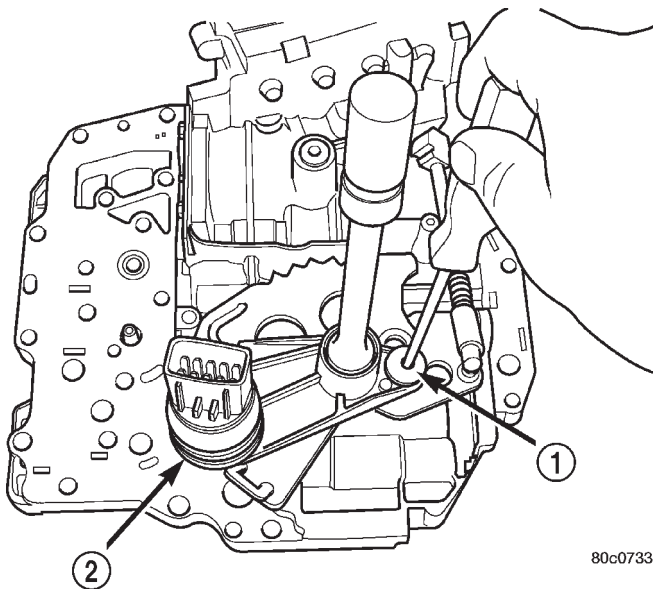


80be4662

Fig. 446 Manual Shaft/Rooster Comb and Transmission Range Sensor

1 - TRANSMISSION RANGE SENSOR
2 - MANUAL SHAFT
3 - ROOSTER COMB

(16) Install the TRS/manual shaft retaining screw (Fig. 447) and torque to 5 N·m (45 in. lbs.).



80c07332

Fig. 447 Manual Shaft Retaining Screw

1 - SCREW
2 - TRS

(17) Install manual shaft seal.

VALVE BODY (Continued)

INSTALLATION

(1) Install valve body into position and start bolts. Torque valve body to transaxle case bolts (Fig. 448) to 12 N·m (105 in. lbs.) torque.

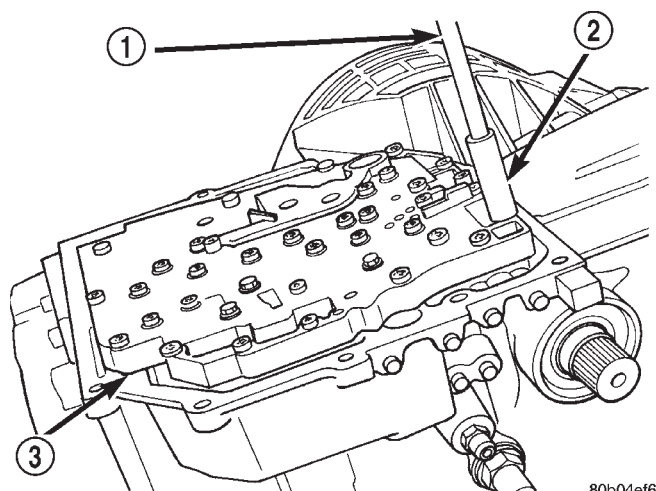


Fig. 448 Valve Body Bolts

- 1 - EXTENSION
- 2 - SOCKET
- 3 - VALVE BODY

- (2) Install transaxle oil filter (Fig. 449).
- (3) Make sure oil pan and case rail are clean and dry. Install an 1/8" bead of RTV to the transaxle oil pan and install to case. Tighten bolts (Fig. 450) to 23 N·m (17 ft. lbs.).
- (4) Lower vehicle and connect the TRS connector.
- (5) Connect solenoid/pressure switch assembly connector.
- (6) Lower vehicle.
- (7) Fill transaxle with ATF+4 (Automatic Transmission Fluid-Type MS-9602). Verify proper fluid level. (Refer to 21 - TRANSMISSION/TRANSAXLE/AUTOMATIC - 42LE/FLUID - STANDARD PROCEDURE)

NOTE: If the valve body has been reconditioned or replaced, it is necessary to perform the Quick Learn Procedure. (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - STANDARD PROCEDURE)

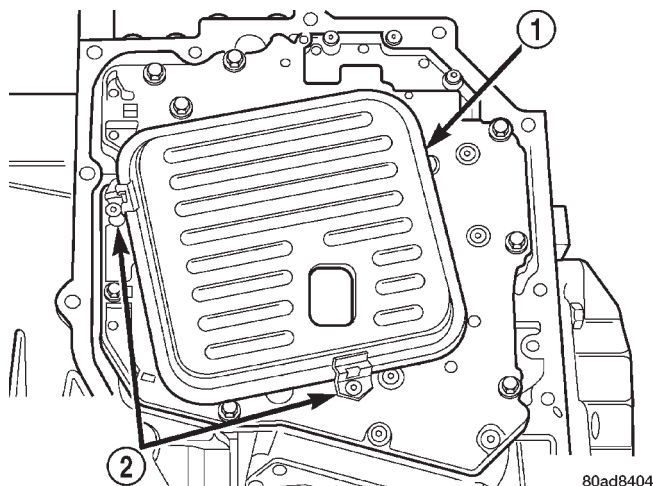


Fig. 449 Transaxle Oil Filter

- 1 - TRANSAXLE FILTER
- 2 - FILTER RETAINING CLIPS

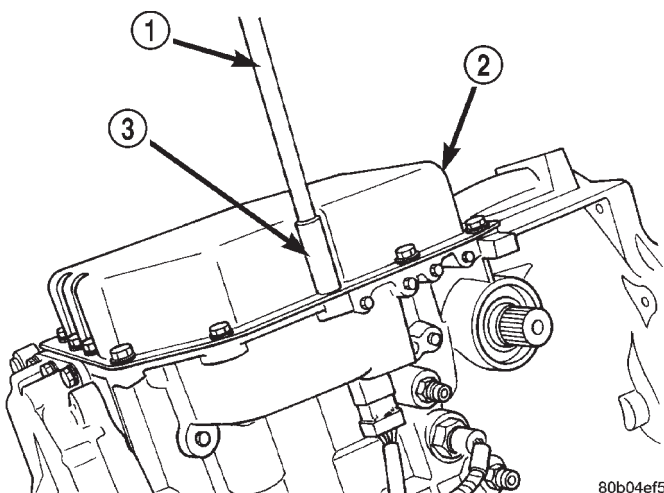


Fig. 450 Transaxle Oil Pan Bolts

- 1 - EXTENSION
- 2 - TRANSAXLE OIL PAN
- 3 - SOCKET

TIRES/WHEELS

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TIRES/WHEELS

DIAGNOSIS AND TESTING - TIRE AND WHEEL VIBRATION

Tire and wheel imbalance, runout and force variation can cause vehicles to exhibit steering wheel vibration.

VISUAL INSPECTION

Visual inspection of the vehicle is recommended prior to road testing or performing any other procedure. Raise vehicle on a suitable hoist. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

Inspect for the following:

- Verify correct (OEM) wheel and tire, as well as correct wheel weights. Aluminum wheels require unique wheel weights. They are designed to fit the contour of the wheel (Fig. 1).
- Inspect tires and wheels for damage, mud packing and unusual wear; correct as necessary.
- Check and adjust tire air pressure to the pressure listed on the label attached to the rear face of the driver's door.

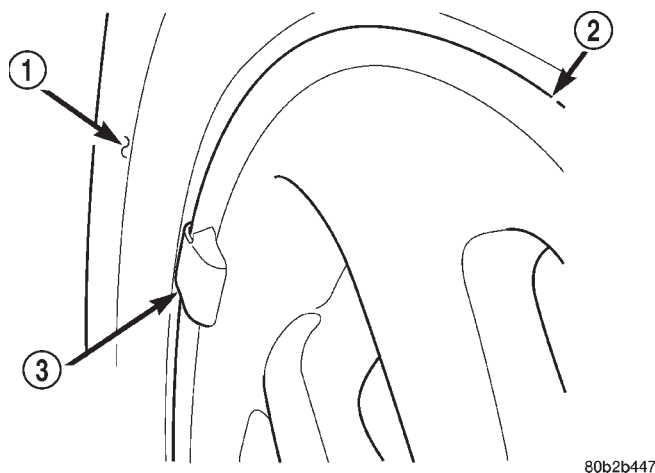


Fig. 1 Aluminum Wheel Weight

- 1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

ROAD TEST

Road test vehicle on a smooth road for a least five miles to warm tires (remove any flat spots). Lightly place hands on steering wheel at the 10:00 and 2:00 positions while slowly sweeping up and down from 90 to 110 km/h (55 to 70 mph) where legal speed limits allow.

Observe the steering wheel for:

- Visual Nibble (oscillation: clockwise/counter-clockwise, usually due to tire imbalance)

- Visual Buzziness (high frequency, rapid vibration up and down)

To rule out vibrations due to brakes or powertrain:

- Lightly apply brakes at speed; if vibration occurs or is enhanced, vibration is likely due to causes other than tire and wheel assemblies.
- Shift transmission into neutral while vibration is occurring; if vibration is eliminated, vibration is likely due to causes other than tire and wheel assemblies.

For brake vibrations, (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

For powertrain vibrations, (Refer to 3 - DIFFERENTIAL & DRIVELINE - DIAGNOSIS AND TESTING).

For tire and wheel assembly vibrations, continue with this diagnosis and testing procedure.

TIRE AND WHEEL BALANCE

(1) Balance the tire and wheel assemblies as necessary following the wheel balancer manufacturer's instructions and using the information listed in Standard Procedure - Tire And Wheel Balance. (Refer to 22 - TIRES/WHEELS - STANDARD PROCEDURE)

(2) Road test the vehicle for at least 5 miles, following the format described in Road Test.

(3) If the vibration persists, continue with this diagnosis and testing procedure.

TIRE AND WHEEL RUNOUT/MATCH MOUNTING

(1) **System Radial Runout.** This on-the-vehicle system check will measure the radial runout including the hub, wheel and tire.

(a) Raise vehicle so tires clear floor. (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE)

(b) Apply masking tape around the circumference of the tire in the locations to be measured (Fig. 2). Do not overlap the tape.

(c) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. System radial runout should not exceed 0.76 mm (0.030 inch) with no tread "dips" or "steps." Tread "dips" and "steps" can be identified by spikes of the dial indicator gauge.

- Tread "dips"; Rapid decrease then increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

- Tread "steps"; Rapid decrease or increase in dial indicator reading over 101.6 mm (4.0 inch) of tread circumference.

(d) If system runout is excessive, re-index the tire and wheel assembly on the hub. Remove

TIRES/WHEELS (Continued)

assembly from vehicle and install it back on the hub two studs over from original mounting position. If re-indexing the tire and wheel assembly corrects or reduces system runout, check hub runout and repair as necessary (Refer to 5 - BRAKES - BASE/HYDRAULIC/MECHANICAL/ROTORS - DIAGNOSIS AND TESTING).

(e) If system runout is still excessive, continue with this diagnosis and testing procedure.

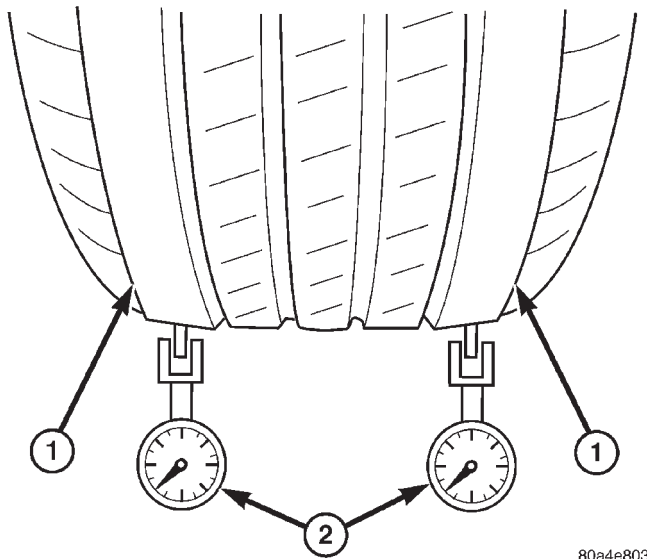


Fig. 2 Radial Runout Measurement

- 1 - MASKING TAPE
2 - DIAL INDICATOR

(2) **Tire and Wheel Assembly Radial Runout.** This radial runout check is performed with the tire and wheel assembly off the vehicle.

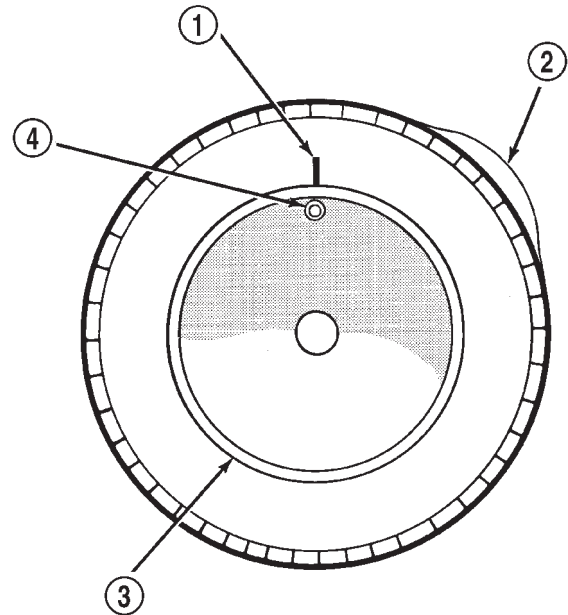
(a) Remove tire and wheel assembly from vehicle and install it on a suitable wheel balancer.

(b) Check system runout using Dial Indicator Set, Special Tool C-3339A with 25-W wheel, or equivalent. Place the end of the indicator against each taped area (one at a time) (Fig. 2) and rotate the tire and wheel. Radial runout should not exceed 0.76 mm (0.030 inch) with no tread "dips" or "steps." Tread "dips" and "steps" can be identified by spikes of the dial indicator gauge.

(c) If runout exceeds limits, mark the original location of the tire on the wheel at the valve stem (Fig. 3). Also, mark the tire and wheel to indicate the original high spot of the assembly and record the runout measurement.

(d) If runout exceeds limits, the tire will need to be dismounted from the wheel to verify wheel vs. tire contribution. Refer to Wheel Runout below.

(3) **Lateral Runout.** Lateral runout for the vehicle system as well as the tire and wheel assembly should be less than 0.76 mm (0.030 inch). The same



J9322-3

Fig. 3 Marking Tire

- 1 - REFERENCE MARK
2 - EXAMPLE HIGH SPOT ON TIRE
3 - WHEEL
4 - VALVE STEM

procedure and theory described for radial runout can also be applied to identify and reduce lateral runout.

(4) **Wheel Runout.** This runout check is performed as follows:

(a) Dismount the tire from the wheel.

(b) Mount the wheel back on the wheel balancer.

(c) Measure radial runout of the wheel at the tire bead seat (Fig. 4). Runout should not exceed 0.254 mm (0.010 inch) for aluminum wheels and 0.508 mm (.020 inch) for steel wheels. Replace the wheel if it exceeds the limit.

(d) Measure lateral runout of the wheel at the tire bead seat (Fig. 5). Runout should not exceed 0.762 mm (0.030 inch) for all wheels. Replace the wheel if it exceeds the limit.

(5) **Match Mounting.** If the wheel runout is within specifications, tire and wheel assembly runout can be improved by re-indexing (match mounting) the tire to the wheel as described below.

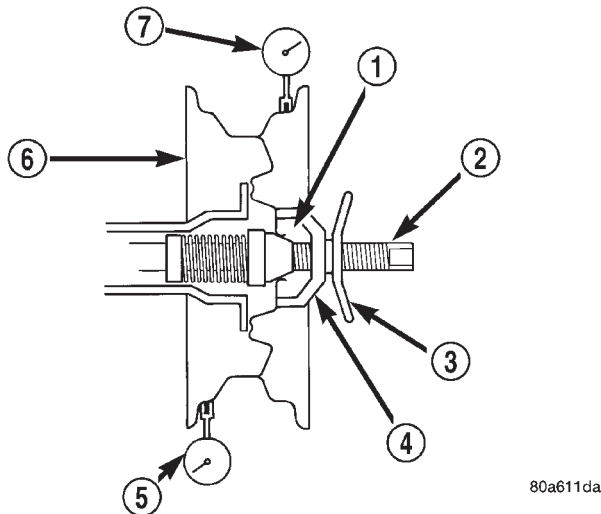
(a) Remount the tire on the rim 180 degrees from its original location (Fig. 6). Ensure the tire bead is properly seated.

(b) Re-measure the total runout. Mark the tire at the high spot and record the measurement.

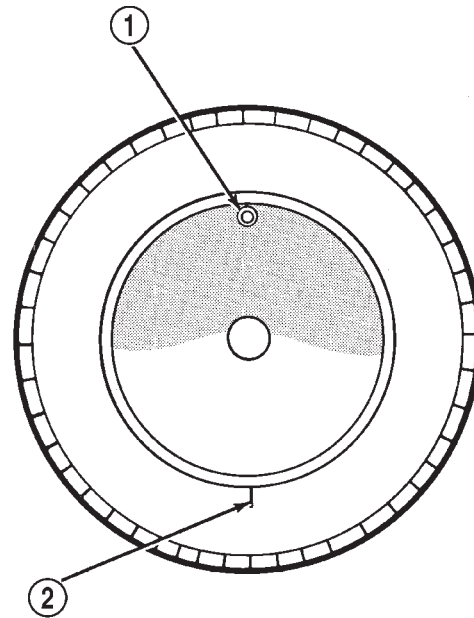
If runout is still excessive, perform the following:

- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the tire, replace the tire.

TIRES/WHEELS (Continued)

**Fig. 4 Checking Radial Runout Of Wheel**

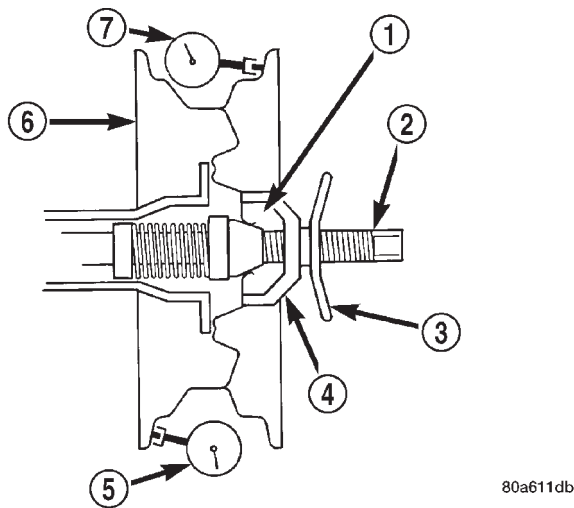
- 1 - MOUNTING CONE
- 2 - SPINDLE SHAFT
- 3 - WING NUT
- 4 - PLASTIC CUP
- 5 - DIAL INDICATOR
- 6 - WHEEL
- 7 - DIAL INDICATOR



J9322-4

Fig. 6 Remount Tire 180 Degrees

- 1 - VALVE STEM
- 2 - REFERENCE MARK

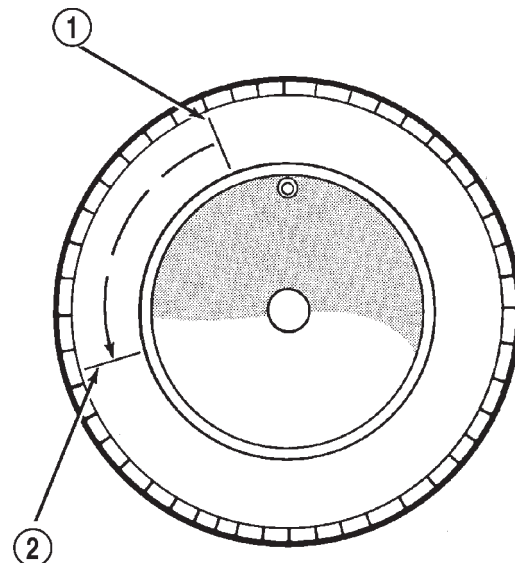
**Fig. 5 Checking Lateral Runout Of Wheel**

- 1 - MOUNTING CONE
- 2 - SPINDLE SHAFT
- 3 - WING NUT
- 4 - PLASTIC CUP
- 5 - DIAL INDICATOR
- 6 - WHEEL
- 7 - DIAL INDICATOR

- If the new high spot is within 102 mm (4.0 inch) of the first high spot on the wheel, the wheel may be out of specification. Refer to Wheel Runout above.

- If the new high spot is NOT within 102 mm (4.0 inch) of either high spot, draw an arrow on the tread

from new high spot toward the original (Fig. 7). Break down the tire and remount it 90 degrees on rim in that direction, then re-measure runout. This will normally reduce the runout to an acceptable amount.



J9322-5

Fig. 7 Remount Tire 90 Degrees In Direction of Arrow

- 1 - 2ND HIGH SPOT ON TIRE
- 2 - 1ST HIGH SPOT ON TIRE

TIRES/WHEELS (Continued)

(6) Once back together, road test the vehicle for at least 5 miles, following the format described in Road Test. If vibration persists, and all components tested are within specification, the tires may have an excessive radial force condition. Radial force variation can only be checked as indicated below. If this equipment is not available, consult with the tire manufacturer.

RADIAL FORCE VARIATION

Radial Force Variation can be checked using the Hunter GSP 9700 Vibration Control System (Wheel Balancer) or equivalent, if available. This type of equipment helps to correct ride disturbances by reducing the radial force variation of an assembly through re-indexing of the tire to wheel.

The equipment manufacturer or DaimlerChrysler Corporation may supply reference values as guidelines. Radial force measurements above the reference value may not always result in a ride disturbance, nor do they automatically mean the assembly components are out of specification. Do not replace components based on radial force values alone. Balancing, runout diagnosis, re-indexing, and subjective road testing must be performed as outlined in previous sections of this diagnosis and testing procedure.

Use the Radial Force equipment to identify suspect assemblies and minimize the radial forces. After all suspect assemblies are optimized, reinstall the assemblies and road test the vehicle. If a disturbance still exists and all other vibration diagnostic procedures have been completed, replace one tire or one wheel at a time, starting with the assembly having the highest force variation. Be sure to minimize each new assembly. Road test the vehicle following each replacement. Continue this process until the disturbance is resolved.

NOTE: When using Radial Force equipment, it is critically important to set proper tire inflation pressure and ensure centering of the wheel on the equipment spindle.

*RADIAL FORCE VARIATION REFERENCE
VALUES*

DESCRIPTION	SPECIFICATION
Total Radial Force Variation (RFV)	Less Than 22 Lbs. \pm 2 Lbs.
Radial First Harmonic (R1H)	Less Than 16 Lbs. \pm 2 Lbs.
Radial Second Harmonic (R2H)	Less Than 12 Lbs. \pm 2 Lbs.

STANDARD PROCEDURE**STANDARD PROCEDURE - TIRE AND WHEEL BALANCE**

NOTE: Balance equipment must be calibrated and maintained per equipment manufacturer's specifications.

Wheel balancing can be accomplished with either on-vehicle or off-vehicle equipment.

NOTE: If using on-vehicle balancing equipment, on the driving axle, remove the opposite wheel and tire assembly.

It is recommended that a two-plane dynamic balancer be used when a wheel and tire assembly requires balancing. A static balancer should only be used when a two-plane balancer is not available.

Balance wheel and tire assemblies dynamically and statically to less than 0.25 ($\frac{1}{4}$) ounce.

For static balancing, find location of heavy spot causing imbalance. Counter balance wheel directly opposite the heavy spot. Determine weight required to counterbalance the area of imbalance. Place half of this weight on the **inner** rim flange and the other half on the **outer** rim flange (Fig. 8).

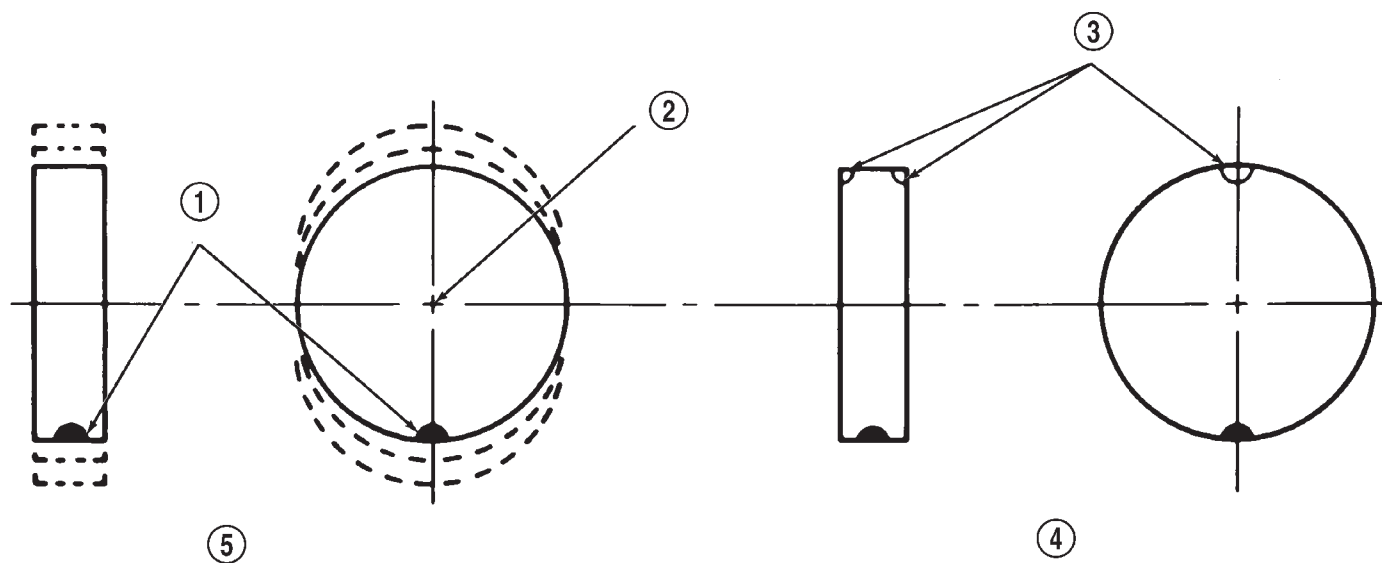
For dynamic balancing, the balance equipment is designed to indicate the location and amount of weight to be applied to both the inner and outer rim flanges (Fig. 9).

The aluminum wheels on this vehicle use a unique wheel weight (Fig. 10). This wheel weight is designed to fit the contoured surface of the wheel (Fig. 10). When balancing an aluminum wheel, this wheel weight must be used. Do not use any other type of wheel weight. It will not properly fit the contour of the wheel.

Always verify the Balance. When using off-vehicle equipment, rotate assembly 180 degrees on balance equipment to verify balance. Variation should not be more than 0.125 ($\frac{1}{8}$) ounce. If variation is more than 0.125 ounce, balancing equipment could be malfunctioning.

If difficult to balance, break down the wheel and tire assembly and check for loose debris inside tire. Prior to disassembly, mark (index) the tire at the valve stem. Use this mark in order to remount the tire in its original orientation with respect to the wheel.

TIRES/WHEELS (Continued)

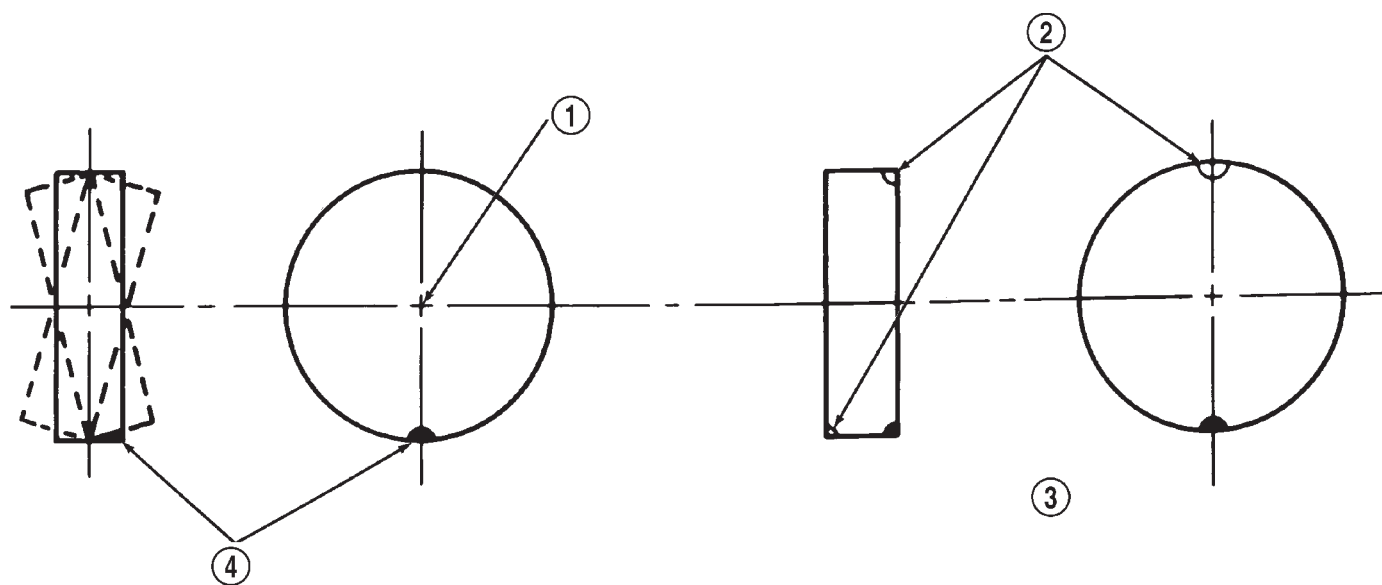


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Fig. 8 Static Unbalance & Balance

- 1 - HEAVY SPOT
- 2 - CENTER LINE OF SPINDLE
- 3 - ADD BALANCE WEIGHTS HERE

- 4 - CORRECTIVE WEIGHT LOCATION
- 5 - TIRE OR WHEEL TRAMP, OR WHEEL HOP



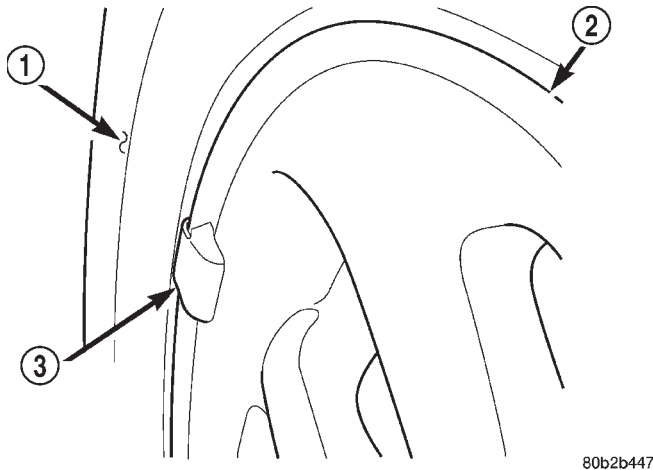
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Fig. 9 Dynamic Unbalance & Balance

- 1 - CENTER LINE OF SPINDLE
- 2 - ADD BALANCE WEIGHTS HERE

- 3 - CORRECTIVE WEIGHT LOCATION
- 4 - HEAVY SPOT WHEEL SHIMMY AND VIBRATION

TIRES/WHEELS (Continued)

**Fig. 10 Aluminum Wheel Weight**

- 1 - TIRE
2 - WHEEL
3 - WHEEL WEIGHT

STANDARD PROCEDURE - TIRE AND WHEEL MATCH MOUNTING

Wheels and tires are match mounted at the factory. This means that the high spot of the tire is matched to the low spot on the wheel rim. This technique is used to reduce runout in the wheel and tire assembly. The high spot on the tire is marked with a paint mark or a bright colored adhesive label on the outboard sidewall. The low spot on the wheel is identified with a label on the outside of the rim and a dot or line in the drop well area of the rim (inside where the tire mounts). If the outside label has been removed, the tire will have to be removed to locate the dot or line on the inside of the rim. The tire can then be match mounted to the tire.

Information on match mounting the tire to the wheel can be found in Tire and Wheel Runout/Match Mounting, items (2) through (5), within Diagnosis And Testing - Tire And Wheel Vibration. (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING)

STANDARD PROCEDURE - TIRE AND WHEEL ROTATION

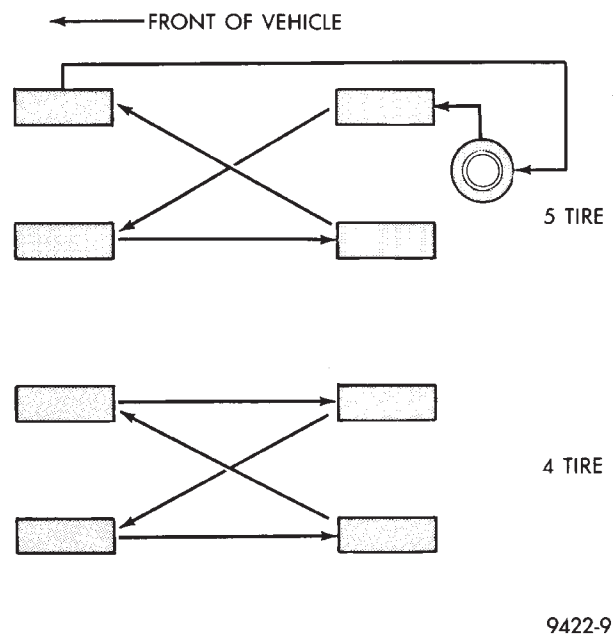
CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the TPM System (sensors) will need to be retrained once the tire and wheel rotation process is completed. Anytime the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

NON-DIRECTIONAL TREAD PATTERN TIRES

Tires on the front and rear axles operate at different loads and perform different functions. For these reasons, they wear at unequal rates, and tend to develop irregular wear patterns. These effects can be reduced by timely rotation of tires. The benefits of rotation are especially worthwhile. Rotation will increase tread life, help to maintain mud, snow, and wet traction levels, and contribute to a smooth, quiet ride.

The suggested rotation method is the forward-cross tire rotation method (Fig. 11). This method takes advantage of current tire industry practice which allows rotation of radial-ply tires. Other rotation methods may be used, but may not have all the benefits of the recommended method.

NOTE: Only the 4 tire rotation method may be used if the vehicle is equipped with a low mileage or temporary spare tire.

**Fig. 11 Forward-Cross Tire Rotation Method****DIRECTIONAL TREAD PATTERN TIRES**

Some vehicles are fitted with special high-performance tires having a directional tread pattern. These tires are designed to improve traction on wet pavement. To obtain the full benefits of this design, the tires must be installed so that they rotate in the correct direction. This is indicated by arrows on the tire sidewalls.

When wheels and tires are being installed, extra care is needed to ensure that this direction of rotation is maintained.

Refer to Owner's Manual for rotation schedule.

TIRES/WHEELS (Continued)

REMOVAL

REMOVAL - TIRE AND WHEEL ASSEMBLY
(ALUMINUM WHEEL)

CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the tire/wheel assembly needs to be reinstalled in the same location it is removed from or the TPM System (sensors) will need to be retrained. Mark each tire/wheel assembly indicating location, prior to its removal. If the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained afterward. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

- (1) Raise the vehicle so the tire and wheel assembly clears ground level.
- (2) Remove the 5 wheel mounting nuts from the studs.
- (3) Remove the tire and wheel from the hub.

REMOVAL - TIRE AND WHEEL ASSEMBLY
(STEEL WHEEL)

- (1) Raise the vehicle so the tire and wheel assembly clears ground level.
- (2) Noting the location of the valve stem in relationship to the wheel mounting nuts, remove the three wheel mounting nuts securing the wheel cover to the wheel and hub (Fig. 12).

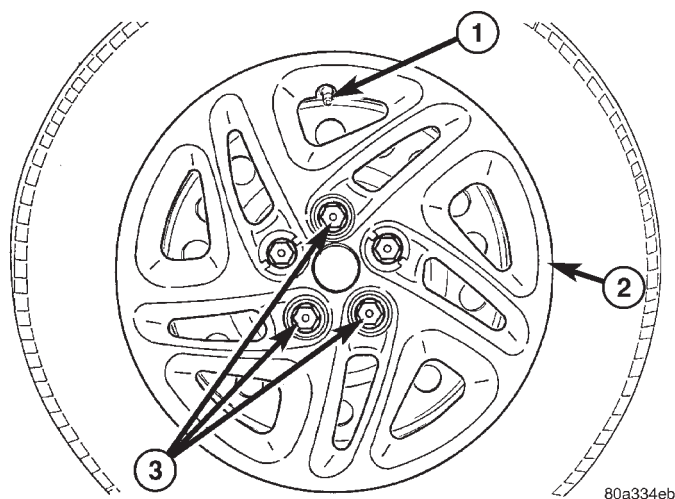


Fig. 12 Wheel Mounting Nuts Securing Wheel Cover

- 1 - VALVE STEM
- 2 - BOLT-ON WHEEL COVER
- 3 - NUTS SECURING WHEEL COVER

CAUTION: When removing the wheel cover, do not pry the wheel cover from the wheel. This can result

in damage to the wheel cover. The wheel cover is removed by pulling it off the wheel by hand.

(3) Grasp the wheel cover at the edges in line with the remaining installed wheel mounting nuts and pull straight outward from the wheel. This will pop the wheel cover retaining tabs over the two remaining wheel nuts, removing the wheel cover from the vehicle.

(4) Remove the two remaining wheel mounting nuts from the hub's studs.

(5) Remove the wheel and tire from the hub.

DISASSEMBLY - TIRE AND WHEEL ASSEMBLY
WITH TPM

(Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - REMOVAL)

ASSEMBLY - TIRE AND WHEEL ASSEMBLY
WITH TPM

(Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - INSTALLATION)

INSTALLATION

INSTALLATION - TIRE AND WHEEL ASSEMBLY
(ALUMINUM WHEEL)

CAUTION: If the vehicle is equipped with the Tire Pressure Monitoring (TPM) System, the tire/wheel assembly needs to be reinstalled in the same location it is removed from or the TPM System (sensors) will need to be retrained. Mark each tire/wheel assembly indicating location, prior to its removal. If the tire/wheel assemblies are switched, rotated or replaced, the TPM System needs to be retrained afterward. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

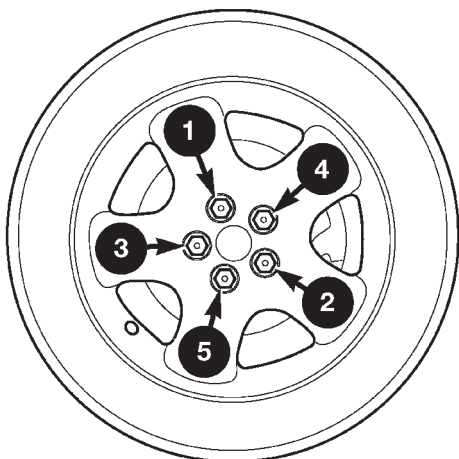
NOTE: Never use oil or grease on studs or wheel mounting nuts.

(1) Position the tire and wheel assembly on the wheel mounting studs using the hub pilot as a guide. Place and hold the wheel flush up against the mounting surface.

(2) Loosely install all 5 wheel mounting nuts. Lightly snug the wheel nuts, then progressively tighten them in the proper sequence (Fig. 13). Tighten wheel mounting nuts to 135 N·m (100 ft. lbs.).

(3) Lower the vehicle.

TIRES/WHEELS (Continued)



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Fig. 13 Tightening Sequence**INSTALLATION - TIRE AND WHEEL ASSEMBLY (STEEL WHEEL)**

NOTE: Never use oil or grease on studs or wheel mounting nuts.

(1) Position the tire and wheel assembly on the wheel mounting studs using the hub pilot as a guide. Place and hold the wheel flush up against the mounting surface.

NOTE: Wheel mounting nuts must be installed on the studs as shown (Fig. 14) to allow proper installation of the wheel cover.

(2) Using the valve stem as an index placed at the 12 O'clock position, install and **lightly tighten** two wheel mounting nuts on the studs located at the 2 O'clock and 10 O'clock positions as shown (Fig. 14).

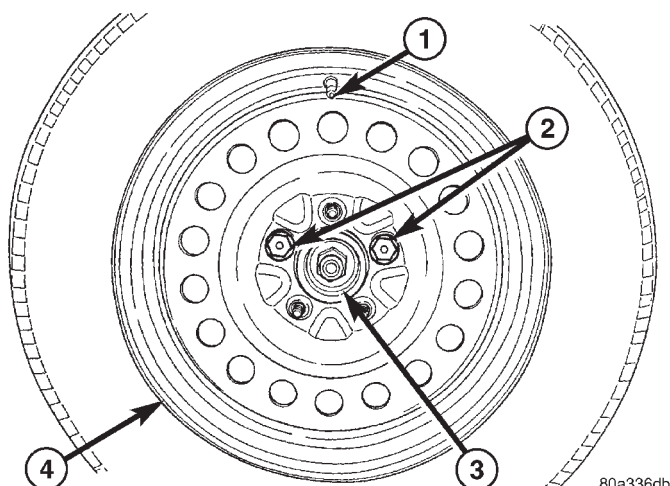
(3) Place the wheel cover on the wheel in the following fashion:

(a) Align the valve notch in the wheel cover with the valve stem on the wheel.

(b) At the same time, align the two holes in the wheel cover having the retaining tabs with the two installed wheel nuts (Fig. 15).

(c) Press in on center of wheel cover until wheel cover retaining tabs push past and engage rear of previously installed wheel mounting nuts (Fig. 15). This will hold the wheel cover in place.

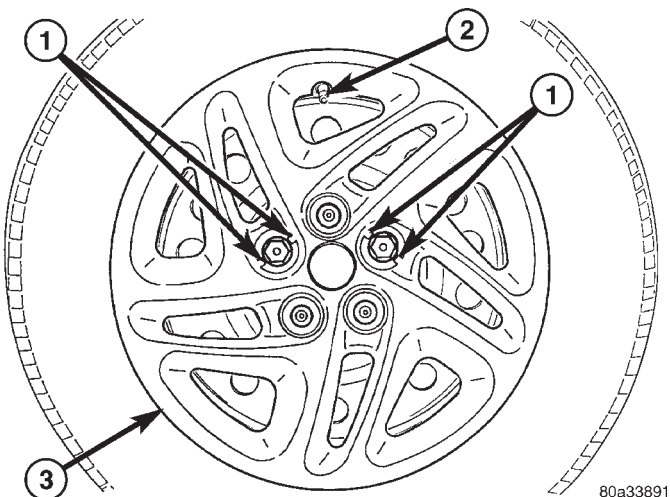
(4) Install and **lightly tighten** the three remaining wheel mounting nuts, securing the wheel cover in place (Fig. 12).



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Fig. 14 Two Wheel Mounting Nuts Installed

- 1 - VALVE STEM
- 2 - NUTS
- 3 - HUB
- 4 - WHEEL



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Fig. 15 Wheel Cover Installation Over Two Nuts

- 1 - RETAINING TABS
- 2 - VALVE STEM
- 3 - WHEEL COVER

(5) Progressively tighten all five wheel mounting nuts in the proper sequence (Fig. 16). Tighten wheel nuts to a torque of 135 N·m (100 ft. lbs.).

(6) Lower the vehicle.

TIRES/WHEELS (Continued)

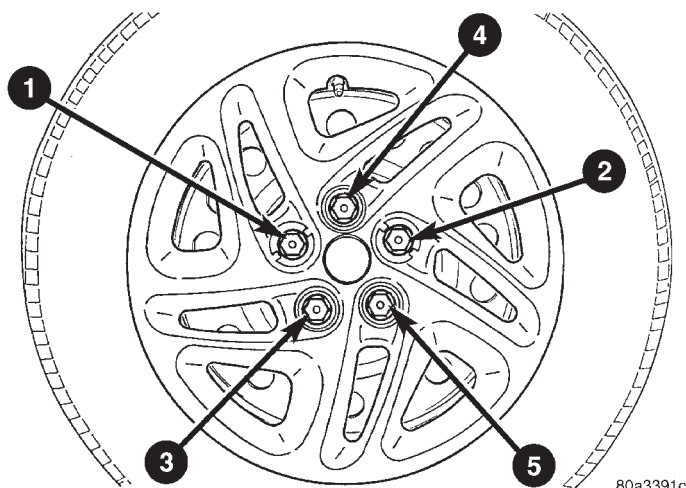


Fig. 16 Tightening Sequence

TIRE PRESSURE MONITORING (TPM)

DESCRIPTION

Some versions of this vehicle are equipped with a Tire Pressure Monitoring (TPM) system. It monitors air pressure in all five tires (includes **full-size** spare).

There is a sensor (transmitter) in each of the vehicle's five wheels. The system alerts the driver when tire pressure falls outside predetermined thresholds (pressure too low or too high). A message is then displayed on the Electronic Vehicle Information Center (EVIC) located in the overhead console. Tire air pressures in the four road wheels are displayed on the EVIC when chosen. Pressure in the spare tire, although monitored, is not displayed on the EVIC.

For further information, refer to the Owners Manual or the appropriate diagnostic information.

OPERATION

The Tire Pressure Monitoring (TPM) system uses wireless technology to monitor tire air pressure levels. Sensors, mounted to each road wheel as part of the valve stem, transmit tire pressure readings to a receiver located in the overhead console. These transmissions occur once every minute at speeds over 20 mph (32 km/h). The tire pressure status is shown on the Electronic Vehicle Information Center (EVIC) display upon demand. The Tire Pressure Monitoring system remains active even if it is not displayed in the EVIC.

If any road tire pressure has exceeded the low or high pressure threshold (refer to chart below), the TPM system will display a message on the EVIC and sound a chime. It will then go into the tire pressure display screen and flash the pressure value of the

tire that is low or high. This will be displayed for the rest of the ignition cycle, or until either the C/T, MENU, STEP or RESET button is pressed.

If a road tire is replaced by the spare, the TPM system will detect the swap automatically (after the ignition has been cycled) and display "SPARE SWAP DETECTED" along with a chime (This could take up to 10 minutes with the vehicle speed above 20 mph (32 km/h)).

For further information, refer to the Owners Manual or the Appropriate Diagnostic Information.

NOTE: TPM thresholds have been established for the original tire size equipped on the vehicle.

TPM THRESHOLD PRESSURES

DESCRIPTION	300M	300M SPECIAL
High Pressure Threshold	45 PSI (310 kPa)	45 PSI (310 kPa)
Placard Pressure (Cold)	30 PSI (207 kPa)	34 PSI (234 kPa)
Low Pressure Threshold	24 PSI (165 kPa)	28 PSI (193 kPa)

WARNING

WARNING:: DO NOT USE THE EVIC DISPLAY TO MONITOR AIR PRESSURE CHANGES WHILE ADJUSTING AIR PRESSURE IN THE TIRES. THE TPM SYSTEM CANNOT BE EXPECTED TO FUNCTION AS A REAL TIME TIRE PRESSURE GAUGE. THERE CAN BE A DELAY BETWEEN THE INSTANT THE AIR PRESSURE IS ADJUSTED IN A TIRE AND WHEN THE SYSTEM UPDATES THE DISPLAY.

CAUTION

CAUTION:: TPM thresholds have been established for the original tire size equipped on the vehicle. Use original size tires only to maintain system accuracy.

CAUTION:: The use of tire sealants is strictly prohibited for vehicles equipped with the Tire Pressure Monitoring system. Tire sealants can clog tire pressure sensors.

SENSOR - TPM

DESCRIPTION

On vehicles equipped with Tire Pressure Monitoring, one tire pressure sensor is mounted to each wheel (including spare) (Fig. 19). Each sensor has an internal battery that lasts up to 10 years. The battery is not serviceable. At the time of battery failure, the sensor must be replaced. The serviceable components of the tire pressure sensor are:

- Sensor-To-Wheel Grommet
- Valve Stem Cap
- Valve Stem Core

Valve stem caps and cores are specifically designed for the tire pressure monitoring sensors. Although similar to standard valve stem caps and cores, they are different.

CAUTION: Do not use a standard valve stem cap or core in a tire pressure sensor. Always use the original equipment style sensor cap and core.

CAUTION: Do not try to install a tire pressure sensor in a steel wheel or aftermarket wheel. Use only in original style factory wheels.

OPERATION

Tire pressure sensors are battery operated. They transmit tire pressure data once every minute at speeds above 20 mph (32 km/h) or up to once every hour when stationary (parked). For additional information, refer to Appropriate Diagnostic Information.

CAUTION

CAUTION:: The use of tire sealants is strictly prohibited for vehicles equipped with the Tire Pressure Monitoring system. Tire sealants can clog tire pressure sensors.

CAUTION: Tire pressure sensor valve stem caps and cores are specially designed for the sensors. Due to risk of corrosion, do not use a standard valve stem cap or core in a tire pressure sensor in place of the original equipment style sensor cap and core.

CAUTION: Do not attempt to install a tire pressure sensor in a steel wheel or aftermarket wheel. Use tire pressure sensors in original style factory wheels only.

CAUTION: Do not reuse the original Sensor-To-Wheel Grommet when installing a pressure sensor. Always use a new grommet and properly torque the sensor nut to specifications. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - INSTALLATION)

DIAGNOSIS AND TESTING - TIRE PRESSURE SENSOR

NOTE: Tire pressure may increase from 2 to 6 psi (14 to 41 kPa) during normal driving conditions. **DO NOT** reduce this normal pressure build up.

If a fault in the system is detected, always check air pressure in the tires first with a known accurate air gauge and correct the inflation pressure as necessary. If any tire is low, inspect **all** tires.

NOTE: If a tire and wheel rotation is not followed by the retrain procedure, the system will not properly inform the driver with the correct vehicle location for a low or high pressure tire. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

If gauge-read pressure in the tires does not reflect the data on the EVIC, retrain the sensors, then reevaluate (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE). If the gauge-read readings at each tire still do not reflect the EVIC data, check the accuracy of the air gauge (What is the accuracy tolerance of the gauge being used?). If the gauge used is known to be accurate and one or more gauge readings still do not reflect the EVIC readings, but the remaining gauge readings do, replace the pressure sensor(s) at the suspect wheels. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - REMOVAL)

Refer to the appropriate diagnostic information for complete diagnosis of the Tire Pressure Monitoring System.

STANDARD PROCEDURE - TIRE PRESSURE SENSOR RETRAIN

WARNING: DEATH OR SERIOUS INJURY CAN OCCUR IF MAGNETICALLY SENSITIVE DEVICES ARE EXPOSED TO THE RELEARN MAGNET. MAGNETS CAN AFFECT PACEMAKERS.

SENSOR - TPM (Continued)

CAUTION: Never attempt to train more than one vehicle at a time. System is capable of reading tire pressure sensor transmissions from other nearby vehicles while in train mode.

Each time a wheel rotation or tire pressure sensor replacement occurs the tire pressure sensors must be retrained. This is necessary to inform the Electronic Vehicle Information Center (EVIC) that a sensor change was made and the new locations of the sensors. Retraining is accomplished through the EVIC used in conjunction with a Re-learn Magnet, Special Tool 8821.

NOTE: Use the following procedure to retrain all five (5) tire pressure sensors. No attempt should be made to retrain individual sensors.

- (1) Open decklid and remove spare tire stowage cover.
- (2) Retrieve Re-learn Magnet, Special Tool 8821.
- (3) Press MENU Button on EVIC until "RETRAIN TIRE SENSORS - NO" is displayed.
- (4) Press STEP button to select "YES".

NOTE: There is a 60 second timer for training the first sensor and a 30 second timer between training the remaining sensors. If either of these timers expire, the EVIC will abort the training procedure.

NOTE: If at any time the EVIC display reads "TRAINING ABORTED", move the vehicle ahead at least one foot and repeat the entire retraining procedure.

- (5) Press MENU button to start retraining. Display will read "TRAIN LEFT FRONT TIRE"

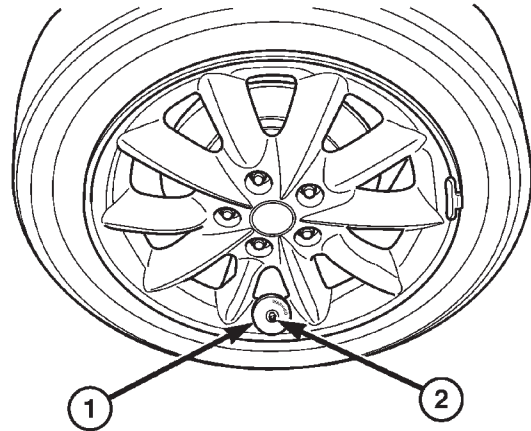
NOTE: The order for retraining all five sensors is:

- Left Front
- Right Front
- Right Rear
- Left Rear
- Spare

- (6) Starting at left front tire, place Re-learn Magnet over valve stem (Fig. 17). Within approximately 5 seconds, vehicle horn will chirp indicating training complete for that particular sensor. Remove the magnet.

- (7) Repeat step (6) on remaining sensors as indicated by EVIC until all five TPM sensors positions are trained.

- (8) Once EVIC displays "TRAINING COMPLETE", pressing either STEP, C/T, RESET or MENU button will exit training routine.



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Fig. 17 Magnet Placement Over Valve Stem

- 1 - RE-LEARN MAGNET
- 2 - VALVE STEM

REMOVAL

- (1) Remove tire and wheel assembly from vehicle. (Refer to 22 - TIRES/WHEELS - REMOVAL)

CAUTION: The cap used on this valve stem contains an O-ring seal to prevent contamination and moisture from entering the valve stem. Retain this valve stem cap for reuse. Do not substitute a regular valve stem cap in its place.

CAUTION: The valve stem used on this vehicle is made of aluminum and the core is nickel plated brass. The original valve stem core must be reinstalled and not substituted with a valve stem core made of a different material. This is required to prevent corrosion in the valve stem caused by the different metals.

- (2) Dismount tire from wheel following tire changer manufacturers instructions while paying special attention to the following to avoid damaging the pressure sensor:

- (a) When breaking the tire bead loose from the wheel rim, avoid using the Bead Breaker in the area of the sensor. That includes both front and rear beads of the tire.

- (b) When preparing to dismount the tire from the wheel, carefully insert the mounting/dismounting tool at the valve stem $\pm 10^\circ$ (Fig. 18), then proceed to dismount the tire from the wheel. Use this process on both the upper and lower tire beads.

- (3) Using a thin wall socket, remove special nut retaining sensor to wheel (Fig. 19).

- (4) Remove sensor from wheel (Fig. 19).

SENSOR - TPM (Continued)

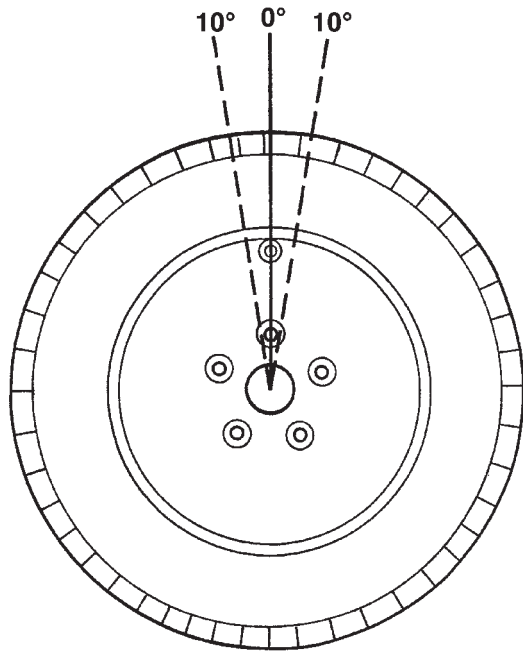


Fig. 18 Start Mount/Dismount Tool Within 10 Degrees Of Valve Stem

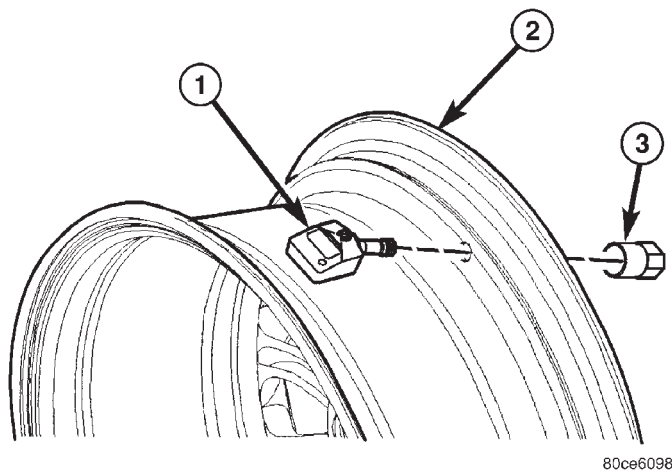


Fig. 19 Sensor Mounting To Wheel

- 1 - TIRE PRESSURE SENSOR
- 2 - WHEEL
- 3 - NUT

INSTALLATION

NOTE: Before reinstalling a tire pressure sensor, replace sealing grommet at base of valve stem.

(1) Wipe area clean where sensor sealing grommet contacts wheel. Make sure surface of wheel is not damaged.

(2) Install sensor in wheel as shown (Fig. 19). Do not attempt to mount sensor otherwise, damage may occur.

(3) Using a thin wall socket, install special sensor nut (Fig. 19). Tighten nut to 4 N·m (35 in. lbs.) torque.

CAUTION: Over-torquing the sensor nut by as little as 12 N·m (106 in. lbs.) may result in sensor separation from the valve stem. Under this condition, the sensor may still function, however, the condition should be corrected immediately.

(4) Mount tire on wheel following tire changer manufacturers instructions, paying special attention to the following to avoid damaging tire pressure sensor:

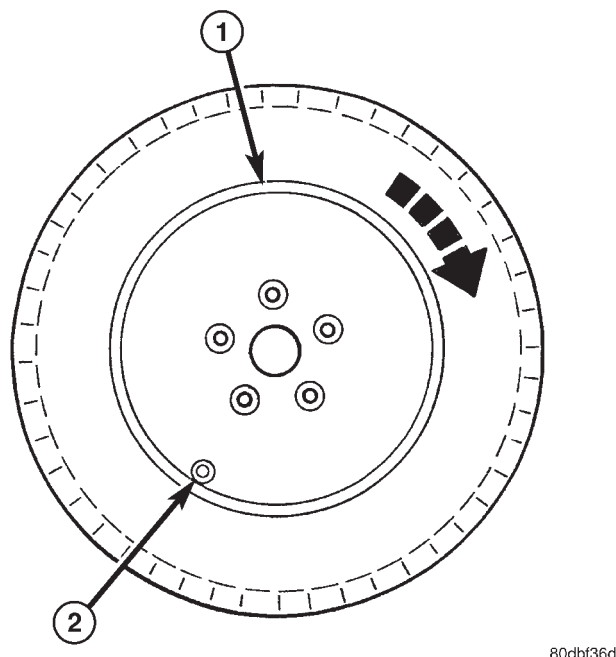
(a) Rotating Wheel Tire Changers- Once the wheel is mounted to the changer, position the sensor valve stem approximately 210° from the head of the changer in a clockwise direction before rotating the wheel (also in a clockwise direction) to mount the tire (Fig. 20). Use this procedure on both the upper and lower tire beads.

(b) Rotating Tool Tire Changers - Position the wheel on the changer so that the sensor valve stem is located approximately 210° clockwise from the installation end of the mounting/dismounting tool once the tool is mounted for tire installation (Fig. 21). Make sure the sensor is clear of the lower bead breaker area to avoid damaging the sensor when the breaker rises (Fig. 21). Rotate the tool in a counterclockwise direction to mount the tire. Use this procedure on both the upper and lower tire beads.

(5) Install wheel and tire assembly on vehicle. (Refer to 22 - TIRES/WHEELS - INSTALLATION)

(6) Retrain tire pressure sensors. (Refer to 22 - TIRES/WHEELS/TIRE PRESSURE MONITORING/SENSOR - STANDARD PROCEDURE)

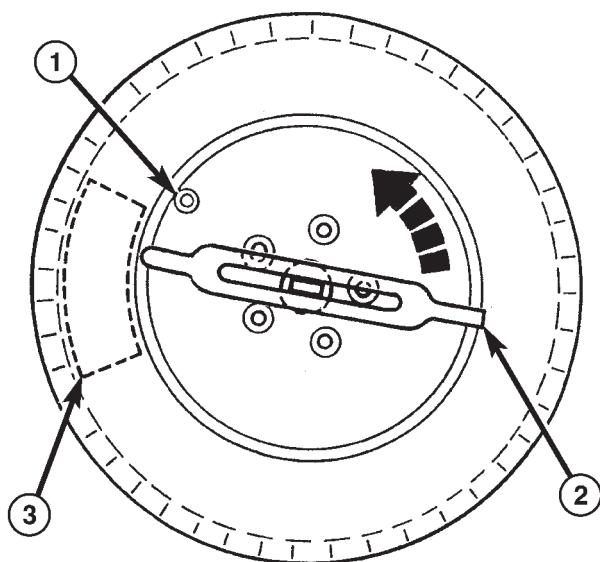
SENSOR - TPM (Continued)



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Fig. 20 Mounting Tire Using Rotating Wheel Machine

- 1 - HEAD OF CHANGER LOCATED HERE
2 - VALVE STEM



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Fig. 21 Mounting Tire Using Rotating Tool Machine

- 1 - VALVE STEM
2 - INSTALLATION END OF MOUNTING/DISMOUNTING TOOL
3 - BEAD BREAKER (KEEP CLEAR OF SENSOR)

TIRES

DESCRIPTION

DESCRIPTION - TIRE

Tires are designed and engineered for each specific vehicle. They provide the best overall performance for normal operation. The ride and handling characteristics match the vehicle's requirements. With proper care they will give excellent reliability, traction, skid resistance, and tread life.

Driving habits have more effect on tire life than any other factor. Careful drivers will obtain, in most cases, much greater mileage than severe use or careless drivers. A few of the driving habits which will shorten the life of any tire are:

- Rapid acceleration
- Severe application of brakes
- High-speed driving
- Taking turns at excessive speeds
- Striking curbs and other obstacles
- Operating vehicle with over or under inflated tire pressures

Radial ply tires are more prone to irregular tread wear. It is important to follow the tire rotation interval shown in the section on Tire Rotation. This will help to achieve a greater tread-life potential.

TIRE IDENTIFICATION

Tire type, size, load index and speed rating are encoded in the letters and numbers imprinted on the side wall of the tire. Refer to the Tire Identification chart to decipher the code. For example purposes, the tire size P225/60 R 16 97 T is used in the chart. An All Season type tire will also have either M + S, M & S or M - S (indicating mud and snow traction) imprinted on the side wall. An Extra or Light Load marking "XL" or "LL" may also be listed on the side wall. The absence of an "XL" or "LL" marking infers a standard load tire.

TIRES (Continued)

TIRE IDENTIFICATION

P	TIRE TYPE (Not present on all tires)	P - Passenger T - Temporary C - Commercial LT - Light Truck
225	SECTIONAL WIDTH	SHOWN IN MILLIMETERS
60	ASPECT RATIO	SECTIONAL HEIGHT ÷ SECTIONAL WIDTH (Refer to Aspect Ratio Figure 22)
R	CONSTRUCTION TYPE	R - RADIAL B - BIAS BELTED D - DIAGONAL (BIAS)
16	WHEEL DIAMETER	SHOWN IN INCHES
97	LOAD INDEX	*
T	SPEED RATING	*

* **NOTE:** Consult the tire manufacturer regarding any questions on tire specifications or capabilities.

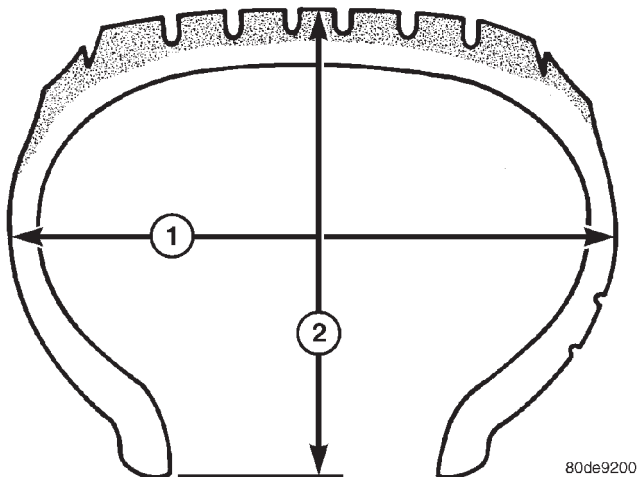


Fig. 22 Tire Aspect Ratio

- 1 - SECTIONAL WIDTH
2 - SECTIONAL HEIGHT

TIRE CHAINS

Refer to the owners manual supplied with the vehicle to determine whether the use of tire chains is permitted on this vehicle.

DESCRIPTION - RADIAL-PLY TIRES

Radial-ply tires improve handling, tread life and ride quality, and decrease rolling resistance.

Radial-ply tires must always be used in sets of four. Under no circumstances should they be used on the front only. They may be mixed with temporary spare tires when necessary. A maximum speed of 80 km/h (50 mph) is recommended while a temporary spare is in use.

Radial-ply tires have the same load-carrying capacity as other types of tires of the same size. They also use the same recommended inflation pressures.

The use of oversized tires, either in the front or rear of the vehicle, can cause vehicle drive train failure. This could also cause inaccurate wheel speed signals when the vehicle is equipped with Antilock Brakes.

The use of tires from different manufactures on the same vehicle is NOT recommended. The proper tire pressure should be maintained on all four tires.

DESCRIPTION - REPLACEMENT TIRES

WARNING: FAILURE TO EQUIP THE VEHICLE WITH TIRES HAVING ADEQUATE SPEED CAPABILITY CAN RESULT IN SUDDEN TIRE FAILURE.

It is recommended that tires equivalent to the original equipment tires be used when replacement is needed.

Failure to use equivalent replacement tires may adversely affect the safety and handling of the vehicle.

The original equipment tires provide a proper combination of many characteristics such as:

- Ride
- Noise
- Handling
- Durability
- Tread life
- Traction
- Rolling resistance
- Speed capability

The use of tires smaller than the minimum tire size approved for the vehicle can result in tire overloading and failure.

Use tires that have the approved load rating for the vehicle and never overload them. Failure to equip the vehicle with tires having adequate speed capability can result in sudden tire failure and loss of vehicle control.

The use of oversize tires may cause interference with vehicle components. Under extremes of suspension and steering travel, interference with vehicle components may cause tire damage.

TIRES (Continued)

DESCRIPTION - SPARE TIRE (TEMPORARY)

The compact temporary spare tire is designed for emergency use only. The original tire should be repaired or replaced at the first opportunity, then reinstalled. Do not exceed speeds of 80 km/h (50 mph) when using the temporary spare tire. Refer to Owner's Manual for complete details.

DIAGNOSIS AND TESTING**DIAGNOSIS AND TESTING - TIRE NOISE**

Unusual tire noise can be associated with tire and wheel vibration or irregular tire wear. For vibration, (Refer to 22 - TIRES/WHEELS - DIAGNOSIS AND TESTING). For irregular tire wear, (Refer to 22 - TIRES/WHEELS/TIRES - DIAGNOSIS AND TESTING).

DIAGNOSIS AND TESTING - TIRE/VEHICLE LEAD

(Refer to 2 - SUSPENSION/WHEEL ALIGNMENT - DIAGNOSIS AND TESTING)

DIAGNOSIS AND TESTING - TIRE WEAR PATTERNS

Under inflation will cause wear on the shoulders of tire. Over inflation will cause wear at the center of tire.

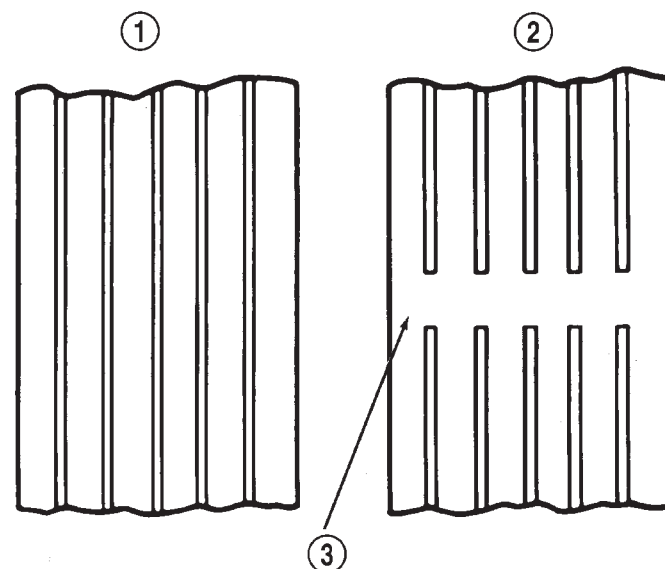
Excessive camber causes the tire to run at an angle to the road. One side of tread is then worn more than the other (Fig. 23).

Excessive toe-in or toe-out causes wear on the tread edges and a feathered effect across the tread (Fig. 23).

DIAGNOSIS AND TESTING - TREAD WEAR INDICATORS

Tread wear indicators are molded into the bottom of the tread grooves. When tread depth is 1.6 mm (1/16 in.), the tread wear indicators will appear as a 13 mm (1/2 in.) band (Fig. 24).

Tire replacement is necessary when indicators appear in two or more grooves or if localized balding occurs.



J8922-5

Fig. 24 Tread Wear Indicators

- 1 - TREAD ACCEPTABLE
- 2 - TREAD UNACCEPTABLE
- 3 - WEAR INDICATOR

CONDITION	RAPID WEAR AT SHOULDERS	RAPID WEAR AT CENTER	CRACKED TREADS	WEAR ON ONE SIDE	FEATHERED EDGE	BALD SPOTS	SCALLOPED WEAR
EFFECT							
CAUSE	UNDER-INFLATION OR LACK OF ROTATION 	OVER-INFLATION OR LACK OF ROTATION 	UNDER-INFLATION OR EXCESSIVE SPEED*	EXCESSIVE CAMBER 	INCORRECT TOE 	UNBALANCED WHEEL 	LACK OF ROTATION OF TIRES OR WORN OR OUT-OF-ALIGNMENT SUSPENSION.
CORRECTION	ADJUST PRESSURE TO SPECIFICATIONS WHEN TIRES ARE COOL ROTATE TIRES			ADJUST CAMBER TO SPECIFICATIONS	ADJUST TOE-IN TO SPECIFICATIONS	DYNAMIC OR STATIC BALANCE WHEELS	ROTATE TIRES AND INSPECT SUSPENSION SEE GROUP 2

*HAVE TIRE INSPECTED FOR FURTHER USE.

Fig. 23 Tire Wear Patterns

RN797

TIRES (Continued)

STANDARD PROCEDURE

STANDARD PROCEDURE - TIRE INFLATION PRESSURES

The specified tire pressures have been chosen to provide safe operation, vehicle stability, and a smooth ride. The proper tire pressure specification can be found on the Tire Inflation Pressure Label provided with the vehicle (usually on the rear face of the driver's door).

A quality air pressure gauge is recommended to check tire air pressure. Tire pressure should be checked cold once per month. Check tire pressure more frequently when the weather temperature varies widely. Tire pressure will decrease when the outdoor temperature drops. After checking the air pressure, replace valve cap finger tight.

Inflation pressures specified on the Tire Inflation Pressure Label are always the cold inflation pressure of the tire. Cold inflation pressure is obtained after the vehicle has not been operated for at least 3 hours, or the vehicle is driven less than one mile after being inoperative for 3 hours. Tire inflation pressures may increase from 2 to 6 pounds per square inch (psi) during operation. Do not reduce this normal pressure buildup.

Improper inflation can cause:

- Uneven wear patterns
- Reduced tread life
- Reduced fuel economy
- Unsatisfactory ride
- The vehicle to drift.

WARNING: OVER OR UNDER INFLATED TIRES CAN AFFECT VEHICLE HANDLING. THE TIRE CAN FAIL SUDDENLY, RESULTING IN LOSS OF VEHICLE CONTROL.

Under inflation causes rapid shoulder wear, tire flexing, and can result in tire failure (Fig. 25).

Over inflation causes rapid center wear and loss of the tire's ability to cushion shocks (Fig. 26).

STANDARD PROCEDURE - TIRE PRESSURE FOR HIGH SPEED OPERATION

DaimlerChrysler Corporation advocates driving at safe speeds within posted speed limits. Speed capacity of a tire is a function of the tire speed rating, inflation pressure and vehicle axle weight. Where speed limits allow the vehicle to be driven at high speeds, correct tire inflation pressure is very important. Vehicles loaded to maximum capacity should not be driven at continuous speeds over 120 km/h (75 mph). Never exceed the maximum speed capacity of the tire. For information on tire identification and

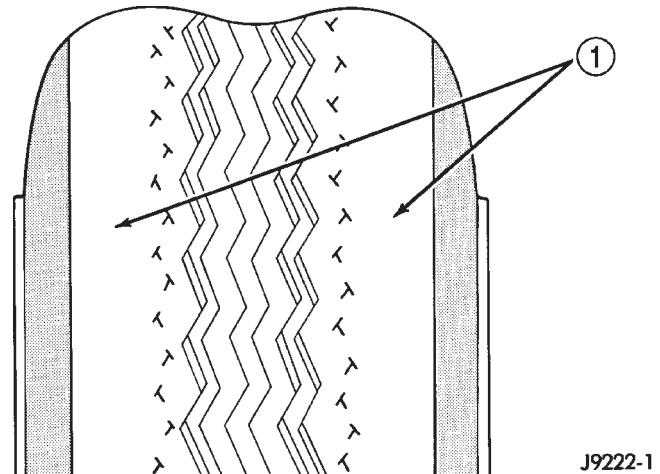


Fig. 25 Under Inflation Wear

1 - THIN TIRE TREAD AREAS

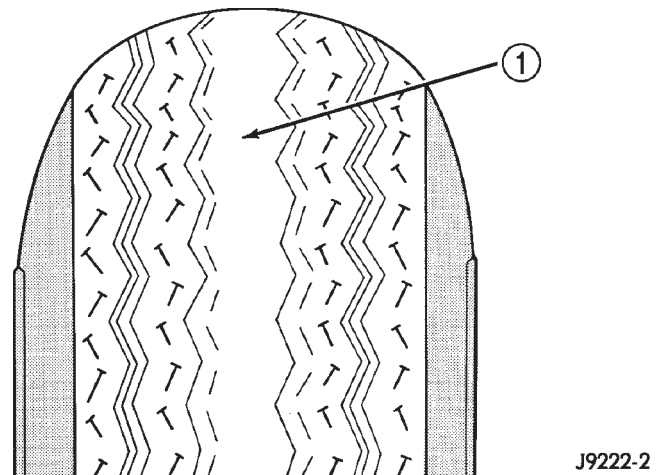


Fig. 26 Over Inflation Wear

1 - THIN TIRE TREAD AREA

speed ratings, (Refer to 22 - TIRES/WHEELS/TIRES - DESCRIPTION).

STANDARD PROCEDURE - TIRE LEAK REPAIRING

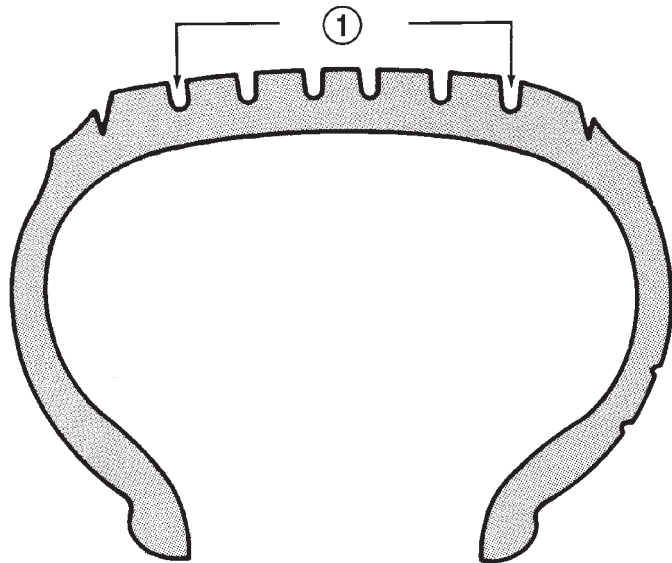
For proper repairing, a radial tire must be removed from the wheel. Repairs should only be made if the defect, or puncture, is in the tread area (Fig. 27). The tire should be replaced if the puncture is located in the sidewall.

Deflate tire completely before attempting to dismount the tire from the wheel. **Use a lubricant such as a mild soap solution when dismounting or mounting tire.** Use tools free of burrs or sharp edges which could damage the tire or wheel rim.

Before mounting tire on wheel, make sure all rust is removed from the rim bead and repaint if necessary.

TIRES (Continued)

Install wheel on vehicle, and progressively tighten the 5 wheel nuts to a torque of 135 N·m (100 ft. lbs.).



J8922-6

Fig. 27 Tire Repair Area

1 - REPAIRABLE AREA

CLEANING - TIRES

Before delivery of a vehicle, remove the protective coating on the tires with white sidewalls or raised white letters. To remove the protective coating, apply warm water and let it soak for a few minutes. Afterwards, scrub the coating away with a soft bristle brush. Steam cleaning may also be used to remove the coating.

CAUTION: DO NOT use gasoline, mineral oil, oil-based solvent or a wire brush for cleaning.

WHEELS

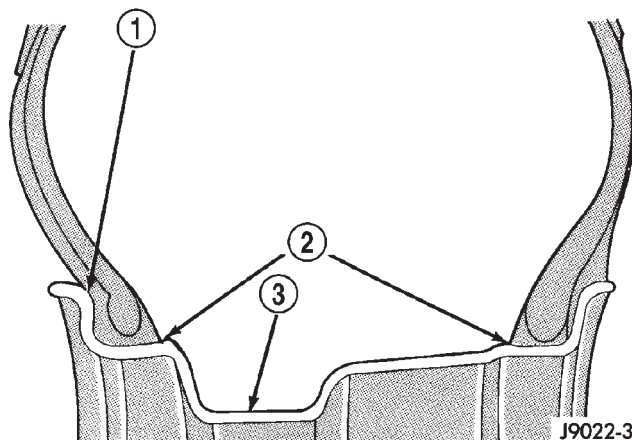
DESCRIPTION

Original equipment wheels are designed for proper operation at all loads up to the specified maximum vehicle capacity.

All models use steel or cast aluminum drop center wheels. Every wheel has raised sections between the rim flanges and rim drop well called safety humps (Fig. 28).

Initial inflation of the tires forces the bead over these raised sections. In case of air loss the raised sections help hold the tire in position on the wheel until the vehicle can be brought to a safe stop.

Cast aluminum wheels require special balance weights to fit on the rim flange of the wheel and special wheel clamps for the alignment equipment.



J9022-3

Fig. 28 Safety Rim

1 - FLANGE
2 - RIDGE
3 - WELL

The wheel studs and nuts are designed for specific wheel applications and must be replaced with equivalent parts. Do not use replacement parts of lesser quality or of a substitute design. All aluminum and some steel wheels have wheel stud nuts with an enlarged nose. This enlarged nose is necessary to ensure proper retention of the wheels.

Before installing a wheel, remove any buildup of corrosion on the wheel mounting surface.

WARNING: INSTALLING WHEELS WITHOUT GOOD METAL-TO-METAL CONTACT COULD CAUSE LOOSENING OF WHEEL LUG NUTS. THIS COULD ADVERSELY AFFECT THE SAFETY AND HANDLING OF YOUR VEHICLE.

DIAGNOSIS AND TESTING - WHEEL INSPECTION

Inspect wheels for:

- Excessive runout
- Dents, cracks or irregular bends
- Damaged wheel stud (lug) holes
- Air Leaks

NOTE: Do not attempt to repair a wheel by hammering, heating or welding.

If a wheel is damaged, an original equipment replacement wheel should be used. When obtaining replacement wheels, they should be equivalent in load carrying capacity. The diameter, width, offset, pilot hole and bolt circle of the wheel should be the same as the original wheel.

WHEELS (Continued)

WARNING: FAILURE TO USE EQUIVALENT REPLACEMENT WHEELS MAY ADVERSELY AFFECT THE SAFETY AND HANDLING OF THE VEHICLE.

WARNING: REPLACEMENT WITH USED WHEELS IS NOT RECOMMENDED. THE SERVICE HISTORY OF THE WHEEL MAY HAVE INCLUDED SEVERE TREATMENT OR VERY HIGH MILEAGE. THE RIM COULD FAIL WITHOUT WARNING.

CLEANING - ALUMINUM WHEEL CARE

Chrome plated and painted aluminum wheels should be cleaned regularly using mild soap and water to maintain their luster and to prevent corrosion.

Care must be taken in the selection of tire and wheel cleaning chemicals and equipment to prevent damage to the wheels. Any of the "DO NOT USE" items listed below WILL damage chrome plated and painted aluminum wheels.

DO NOT USE:

- any abrasive metal cleaner
- any abrasive cleaning pad or brush
- any cleaner that contains an acid (this will immediately react with and discolor the chromium surface)
- chrome polish (unless it is buffed off immediately after application)
- oven cleaner
- a car wash that uses carbide-tipped wheel cleaning brushes

SPECIFICATIONS

WHEEL

SPECIFICATIONS

DESCRIPTION	SPECIFICATION
Wheel Mounting (Lug) Nut Hex Size	19 mm
Wheel Mounting Stud Size	M12 x 1.5 mm

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
TPM Sensor Mounting Nut	4	—	35
Wheel Mounting (Lug) Nut	135	100	—

WHEEL COVER

DESCRIPTION

This vehicle uses a bolt-on type wheel cover (Fig. 29).

This bolt-on wheel cover cannot be removed from the wheel until three of the five wheel mounting nuts shown are removed (Fig. 29). The bolt-on wheel cover can then be removed with the remaining two wheel nuts tightened in place.

REMOVAL

(1) Noting the location of the valve stem in relationship to the wheel mounting nuts, remove the three wheel mounting nuts securing the wheel cover to the wheel and hub (Fig. 29).

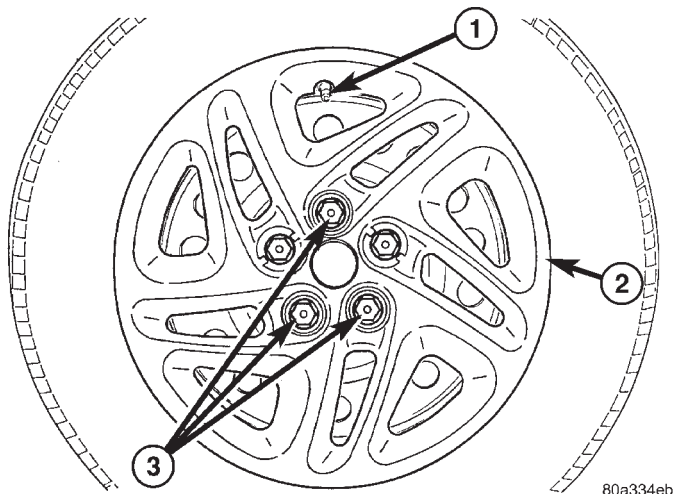


Fig. 29 Wheel Mounting Nuts Securing Wheel Cover

- 1 - VALVE STEM
- 2 - BOLT-ON WHEEL COVER
- 3 - NUTS SECURING WHEEL COVER

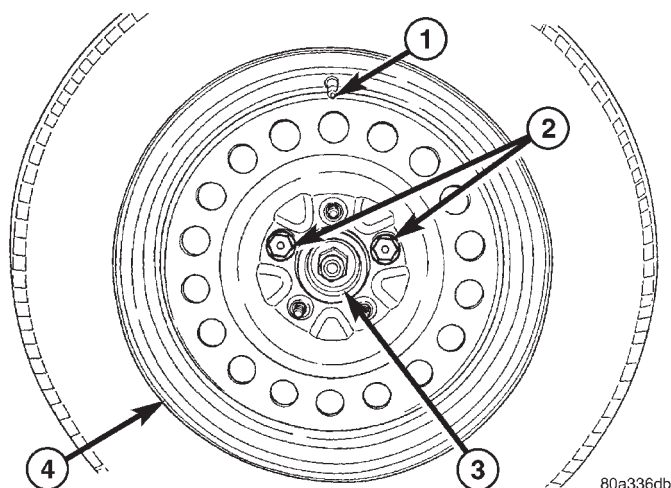
CAUTION: When removing the wheel cover, do not pry the wheel cover from the wheel. This can result in damage to the wheel cover. The wheel cover is removed by pulling it off the wheel by hand.

(2) Grasp the wheel cover at the edges in line with the remaining installed wheel nuts and pull straight outward from the wheel. This will pop the wheel cover retaining tabs over the two remaining wheel nuts, removing the wheel cover from the wheel.

INSTALLATION

NOTE: Wheel mounting nuts must be installed on the studs as shown to allow installation of the wheel cover (Fig. 30).

WHEEL COVER (Continued)

**Fig. 30 Two Wheel Mounting Nuts Installed**

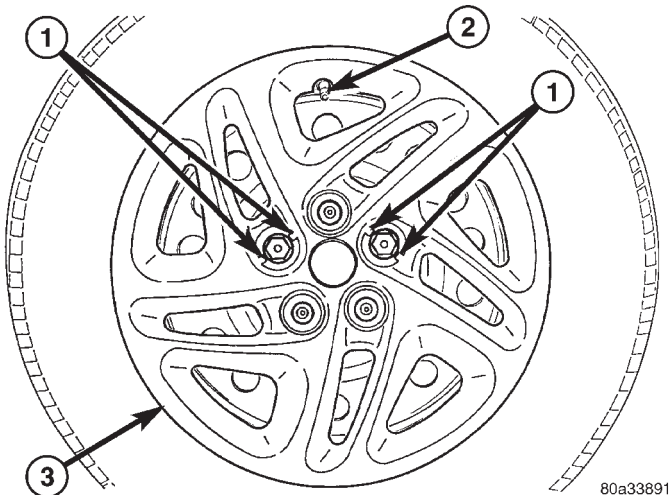
- 1 - VALVE STEM
- 2 - NUTS
- 3 - HUB
- 4 - WHEEL

(1) Place the wheel cover on the wheel in the following fashion:

(a) Align the valve notch in the wheel cover with the valve stem on the wheel.

(b) At the same time, align the two holes in the wheel cover having the retaining tabs with the two installed wheel nuts (Fig. 31).

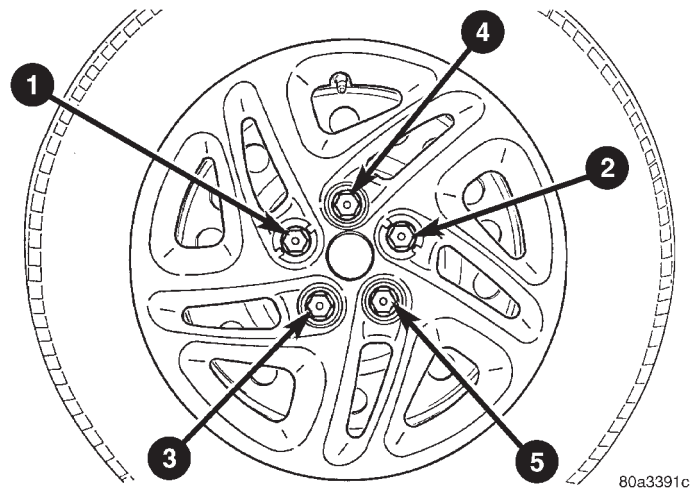
(c) Press in on center of wheel cover until wheel cover retaining tabs push past and engage rear of previously installed wheel mounting nuts (Fig. 31). This will hold the wheel cover in place.

**Fig. 31 Wheel Cover Installation Over Two Nuts**

- 1 - RETAINING TABS
- 2 - VALVE STEM
- 3 - WHEEL COVER

(2) Install and **lightly tighten** the three remaining wheel mounting nuts, securing the wheel cover in place (Fig. 29).

(3) Tighten all five wheel mounting nuts in the proper sequence (Fig. 32). Tighten wheel nuts to a torque of 135 N·m (100 ft. lbs.).

**Fig. 32 Tightening Sequence**

WHEEL MOUNTING STUDS - FRONT

REMOVAL

(1) Raise vehicle on jackstands or centered on a frame contact type hoist. See Hoisting in the Lubrication and Maintenance section.

(2) Remove the 2 guide pin bolts mounting the caliper assembly to the steering knuckle (Fig. 33). Remove the caliper from the front steering knuckle. Refer to Disc Brake Caliper in the Brake section for the caliper removal procedure.

(3) Remove rotor from hub by pulling it straight off wheel mounting studs (Fig. 34).

(4) Install a lug nut on the wheel stud to be removed from the hub and bearing assembly (Fig. 35) so the threads on stud are even with end of lug nut. Install Remover, Special Tool C-4150, on hub and bearing assembly flange and wheel stud (Fig. 35).

(5) Tighten down on special tool to push wheel stud out of the hub and bearing assembly. When shoulder of wheel stud is past flange, remove special tool from hub and bearing assembly. Remove lug nut from stud and remove wheel stud from flange.

INSTALLATION

(1) Install wheel stud into of hub and bearing assembly from the rear. Install washers on wheel stud, then install a wheel lug nut on stud with flat side of lug nut against washers (Fig. 36).

WHEEL MOUNTING STUDS - FRONT (Continued)

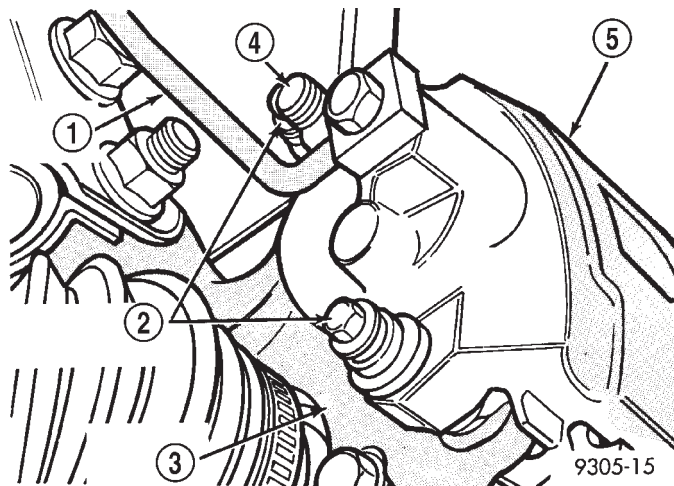


Fig. 33 Caliper Guide Pin Bolts

- 1 - BRAKE LINE
- 2 - CALIPER GUIDE PIN BOLTS
- 3 - STEERING KNUCKLE
- 4 - BLEEDER SCREW
- 5 - CALIPER ASSEMBLY

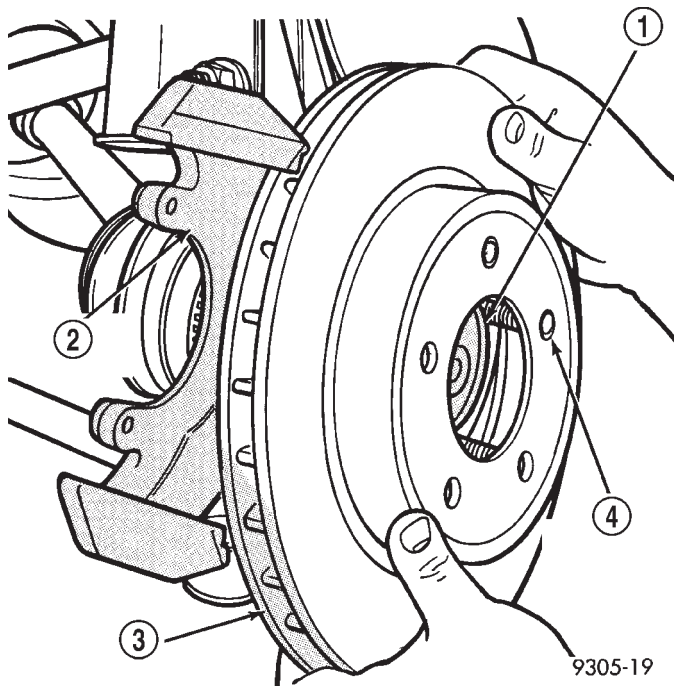


Fig. 34 Brake Rotor

- 1 - HUB
- 2 - STEERING KNUCKLE
- 3 - BRAKE ROTOR (DISC)
- 4 - WHEEL MOUNTING STUD

(2) Tighten the wheel lug nut, pulling the wheel stud into the flange of the hub and bearing assembly. When the head of the stud is fully seated against the bearing flange, remove lug nut and washers from wheel stud.

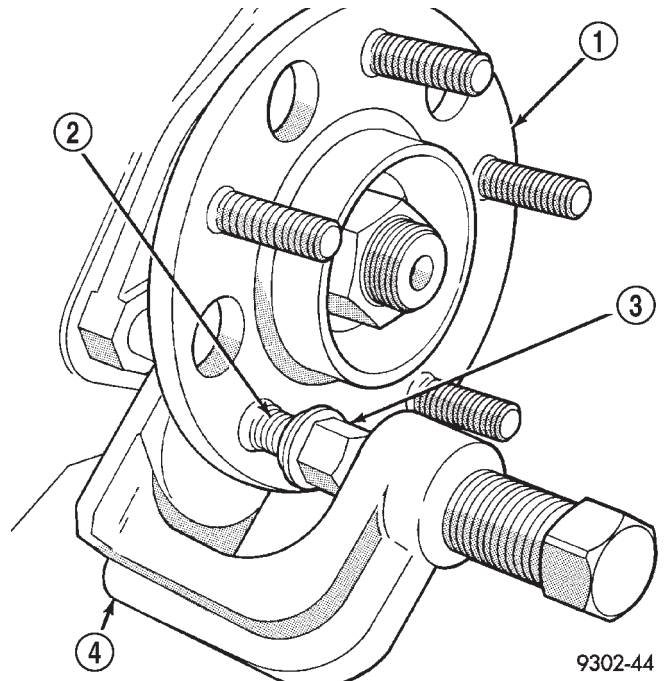


Fig. 35 Removing Wheel Stud From Hub And Bearing

- 1 - HUB/BEARING ASSEMBLY
- 2 - WHEEL STUD
- 3 - LUG NUT
- 4 - SPECIAL TOOL C-4150

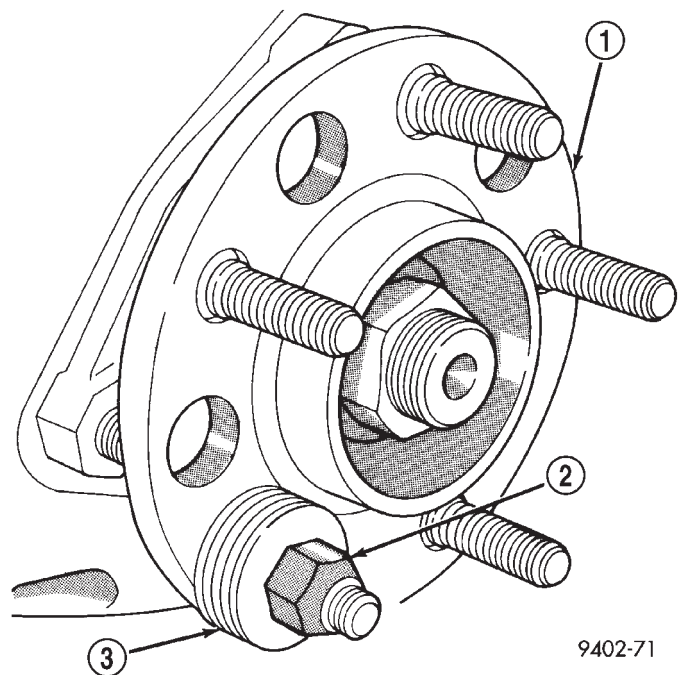


Fig. 36 Installing Wheel Stud Into Hub And Bearing

- 1 - HUB/BEARING ASSEMBLY
- 2 - WHEEL LUG NUT
- 3 - WASHERS

WHEEL MOUNTING STUDS - FRONT (Continued)

(3) Install the rotor on the hub and bearing assembly (Fig. 34).

(4) Install disc brake caliper back over brake rotor and align with caliper mounting holes on steering knuckle. Refer to the Brake section for the caliper installation procedure. Install the caliper to steering knuckle guide pin bolts (Fig. 33) and tighten to a torque of 19 N·m (168 in. lbs.).

(5) Install wheel and tire assembly on vehicle. Tighten the wheel mounting stud nuts in proper sequence until all nuts are torqued to half specification. Then repeat the tightening sequence to the full specified torque of 129 N·m (95 ft. lbs.).

(6) Lower the vehicle to the ground.

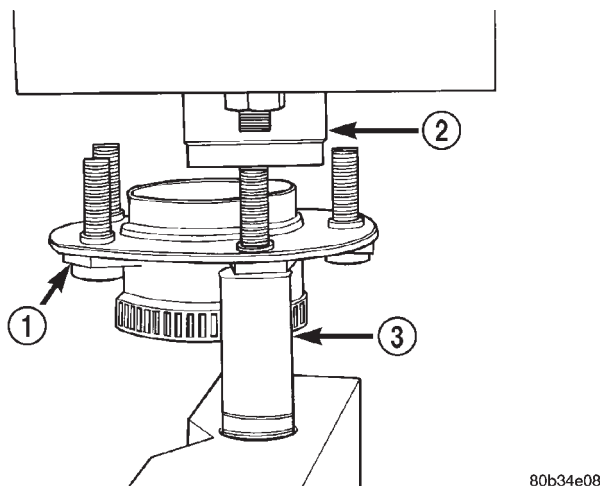


Fig. 37 Wheel Stud Removal

- 1 - HUB AND BEARING ASSEMBLY
- 2 - PRESS RAM
- 3 - 21mm IMPACT SOCKET

WHEEL MOUNTING STUDS - REAR

REMOVAL

CAUTION: DO NOT hammer studs out of the hub flange. If a stud is removed by hammering it out of the bearing flange, damage to the hub and bearing assembly will occur leading to premature bearing failure.

(1) Remove the hub and bearing from the vehicle. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - REMOVAL)

CAUTION: Take care to keep hub and bearing assembly from falling during stud removal. Damage to the hub and bearing could result.

(2) Position the hub and bearing assembly under a hydraulic press ram, supported by a 21 mm deep-well impact socket under the stud to be replaced (Fig. 37).

(3) Press the stud out of the hub flange and into the socket well.

(4) Remove the hub and bearing assembly from the press.

(5) Remove the stud from the socket.

INSTALLATION

CAUTION: DO NOT hammer studs into the hub flange. If a stud is installed in such a manner, damage to the hub and bearing assembly may occur leading to premature bearing failure.

(1) Install wheel stud into stud hole in hub and bearing assembly.

(2) Position the hub and bearing assembly face down with stud pointing down into the well of the 21 mm socket. The hydraulic press ram must line up with the stud (Fig. 38).

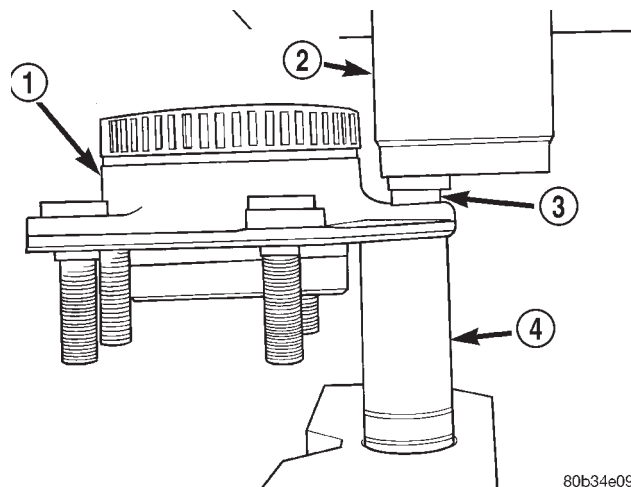


Fig. 38 Wheel Stud Installation

- 1 - HUB AND BEARING ASSEMBLY
- 2 - PRESS RAM
- 3 - WHEEL STUD
- 4 - 21mm IMPACT SOCKET

(3) Press the stud into the hub flange until it bottoms.

(4) Remove the hub and bearing assembly from the press.

(5) Install the hub and bearing on the vehicle. (Refer to 2 - SUSPENSION/REAR/HUB / BEARING - INSTALLATION)

BODY

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BODY

DESCRIPTION - VEHICLE IDENTIFICATION

Throughout this group, references to the DaimlerChrysler Corporation vehicle family identification code are used when describing a procedure that is unique to that vehicle. Refer to Introduction Group of this manual for detailed information on vehicle identification. If a procedure is common to all vehicles covered in this manual, no reference will be made to a vehicle family code.

WARNING

SAFETY PRECAUTIONS AND WARNINGS

WARNING: USE A OSHA APPROVED BREATHING FILTER WHEN SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.

AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.

DO NOT STAND UNDER A HOISTED VEHICLE THAT IS NOT PROPERLY SUPPORTED ON SAFETY STANDS. PERSONAL INJURY CAN RESULT.

CAUTION: When holes must be drilled or punched in an inner body panel, verify depth of space to the outer body panel, electrical wiring, or other compo-

nents. Damage to vehicle can result.

Do not weld exterior panels unless combustible material on the interior of vehicle is removed from the repair area. Fire or hazardous conditions, can result.

Always have a fire extinguisher ready for use when welding.

Disconnect the negative (-) cable clamp from the battery when servicing electrical components that are live when the ignition is OFF. Damage to electrical system can result.

Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.

Do not use harsh alkaline based cleaning solvents on painted or upholstered surfaces. Damage to finish or color can result.

Do not hammer or pound on plastic trim panel when servicing interior trim. Plastic panels can break.

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - WATER LEAKS

Water leaks can be caused by poor sealing, improper body component alignment, body seam porosity, missing plugs, or blocked drain holes. Centrifugal and gravitational force can cause water to drip from a location away from the actual leak point, making leak detection difficult. All body sealing points should be water tight in normal wet-driving conditions. Water flowing downward from the front of

BODY (Continued)

the vehicle should not enter the passenger or luggage compartment. Moving sealing surfaces will not always seal water tight under all conditions. At times, side glass or door seals will allow water to enter the passenger compartment during high pressure washing or hard driving rain (severe) conditions. Overcompensating on door or glass adjustments to stop a water leak that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After completing a repair, water test vehicle to verify leak has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE WATER LEAK TESTS

Verify that floor and body plugs are in place, body drains are clear, and body components are properly aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

WATER LEAK TESTS

WARNING: DO NOT USE ELECTRIC SHOP LIGHTS OR TOOLS IN WATER TEST AREA. PERSONAL INJURY CAN RESULT.

When the conditions causing a water leak have been determined, simulate the conditions as closely as possible.

- If a leak occurs with the vehicle parked in a steady light rain, flood the leak area with an open-ended garden hose.
- If a leak occurs while driving at highway speeds in a steady rain, test the leak area with a reasonable velocity stream or fan spray of water. Direct the spray in a direction comparable to actual conditions.
- If a leak occurs when the vehicle is parked on an incline, hoist the end or side of the vehicle to simulate this condition. This method can be used when the leak occurs when the vehicle accelerates, stops or turns. If the leak occurs on acceleration, hoist the front of the vehicle. If the leak occurs when braking, hoist the back of the vehicle. If the leak occurs on left turns, hoist the left side of the vehicle. If the leak occurs on right turns, hoist the right side of the vehicle. For hoisting recommendations (Refer to LUBRICATION & MAINTENANCE/HOISTING - STANDARD PROCEDURE).

WATER LEAK DETECTION

To detect a water leak point-of-entry, do a water test and watch for water tracks or droplets forming on the inside of the vehicle. If necessary, remove interior trim covers or panels to gain visual access to the leak area. If the hose cannot be positioned without being held, have someone help do the water test.

Some water leaks must be tested for a considerable length of time to become apparent. When a leak appears, find the highest point of the water track or drop. The highest point usually will show the point of entry. After leak point has been found, repair the leak and water test to verify that the leak has stopped.

Locating the entry point of water that is leaking into a cavity between panels can be difficult. The trapped water may splash or run from the cavity, often at a distance from the entry point. Most water leaks of this type become apparent after accelerating, stopping, turning, or when on an incline.

MIRROR INSPECTION METHOD

When a leak point area is visually obstructed, use a suitable mirror to gain visual access. A mirror can also be used to deflect light to a limited-access area to assist in locating a leak point.

BRIGHT LIGHT LEAK TEST METHOD

Some water leaks in the luggage compartment can be detected without water testing. Position the vehicle in a brightly lit area. From inside the darkened luggage compartment inspect around seals and body seams. If necessary, have a helper direct a drop light over the suspected leak areas around the luggage compartment. If light is visible through a normally sealed location, water could enter through the opening.

PRESSURIZED LEAK TEST METHOD

When a water leak into the passenger compartment cannot be detected by water testing, pressurize the passenger compartment and soap test exterior of the vehicle. To pressurize the passenger compartment, close all doors and windows, start engine, and set heater control to high blower in HEAT position. If engine can not be started, connect a charger to the battery to ensure adequate voltage to the blower. With interior pressurized, apply dish detergent solution to suspected leak area on the exterior of the vehicle. Apply detergent solution with spray device or soft bristle brush. If soap bubbles occur at a body seam, joint, seal or gasket, the leak entry point could be at that location.

DIAGNOSIS AND TESTING - WIND NOISE

Wind noise is the result of most air leaks. Air leaks can be caused by poor sealing, improper body component alignment, body seam porosity, or missing plugs in the engine compartment or door hinge pillar areas. All body sealing points should be airtight in normal driving conditions. Moving sealing surfaces will not always seal airtight under all conditions. At times, side glass or door seals will allow wind noise to be

BODY (Continued)

noticed in the passenger compartment during high cross winds. Over compensating on door or glass adjustments to stop wind noise that occurs under severe conditions can cause premature seal wear and excessive closing or latching effort. After a repair procedure has been performed, test vehicle to verify noise has stopped before returning vehicle to use.

VISUAL INSPECTION BEFORE TESTS

Verify that floor and body plugs are in place and body components are aligned and sealed. If component alignment or sealing is necessary, refer to the appropriate section of this group for proper procedures.

ROAD TESTING WIND NOISE

(1) Drive the vehicle to verify the general location of the wind noise.

(2) Apply 50 mm (2 in.) masking tape in 150 mm (6 in.) lengths along weatherstrips, weld seams or moldings. After each length is applied, drive the vehicle. If noise goes away after a piece of tape is applied, remove tape, locate, and repair defect.

POSSIBLE CAUSE OF WIND NOISE

- Moldings standing away from body surface can catch wind and whistle.
- Gaps in sealed areas behind overhanging body flanges can cause wind-rushing sounds.
- Misaligned movable components.
- Missing or improperly installed plugs in pillars.
- Weld burn through holes.

STANDARD PROCEDURE

STANDARD PROCEDURE - PLASTIC BODY PANEL REPAIR

There are many different types of plastics used in today's automotive environment. We group plastics in three different categories: Rigid, Semi-Rigid, and Flexible. Any of these plastics may require the use of an adhesion promoter for repair. These types of plastic are used extensively on DaimlerChrysler Motors vehicles. Always follow repair material manufacturer's plastic identification and repair procedures.

Rigid Plastics:

Examples of rigid plastic use: Fascias, Hoods, Doors, and other Body Panels, which include SMC, ABS, and Polycarbonates.

Semi-Rigid Plastics:

Examples of semi-rigid plastic use: Interior Panels, Under Hood Panels, and other Body Trim Panels.

Flexible Plastics:

Examples of flexible plastic use: Fascias, Body Moldings, and upper and lower Fascia Covers.

Repair Procedure:

The repair procedure for all three categories of plastics is basically the same. The one difference is the material used for the repair. The materials must be specific for each substrate, rigid repair material for rigid plastic repair, semi-rigid repair material for semi-rigid plastic repair and flexible repair material for flexible plastic repair.

Adhesion Promoter/Surface Modifier:

Adhesion Promoters/Surface Modifiers are required for certain plastics. All three categories may have plastics that require the use of adhesion promoter/surface modifiers. Always follow repair material manufacturer's plastic identification and repair procedures.

SAFETY PRECAUTION AND WARNINGS

WARNING:

- **EYE PROTECTION SHOULD BE USED WHEN SERVICING COMPONENTS. PERSONAL INJURY CAN RESULT.**
- **USE AN OSHA APPROVED BREATHING MASK WHEN MIXING EPOXY, GRINDING, AND SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.**
- **AVOID PROLONGED SKIN CONTACT WITH RESIN, PETROLEUM, OR ALCOHOL BASED SOLVENTS. PERSONAL INJURY CAN RESULT.**
- **DO NOT VENTURE UNDER A HOISTED VEHICLE THAT IS NOT PROPERLY SUPPORTED ON SAFETY STANDS. PERSONAL INJURY CAN RESULT.**

NOTE:

- **When holes must be drilled or cut in body panels, verify locations of internal body components and electrical wiring. Damage to vehicle can result.**
- **Do not use abrasive chemicals or compounds on undamaged painted surfaces around repair areas. Damage to finish can result.**

BODY (Continued)

RIGID, SEMI-RIGID, AND FLEXIBLE PLASTIC PARTS TYPES

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
ASA	ACRYLONITRILE STYRENE ACRYLITE	LURAN S	CONSOLES, GRILLES
ABS	ACRYLONITRILE BUTADIENE STYRENE	TERLURAN	"A" PILLARS, CONSOLES, GRILLES
ABS/PC	ABS/PC ALLOY	PULSE, PROLOY, BAYBLEND	DOORS, INSTRUMENT PANELS
ABS/PVC	ABS/PV ALLOY	PROLOY, PULSE, LUSTRAN, CYCLOVIN	DOOR PANELS, GRILLES, TRIM
BMC	BULK MOLDING COMPOUND	BMC	FENDER EXTENSIONS
EMA	EHTYLENE METHYL ACRYLATE/IONOMER	SURLYN, EMA, IONOMER	BUMPER GUARDS, PADS
METTON	METTON	METTON	GRILLES, KICK PANELS, RUNNING BOARDS
MPPO	MODIFIED POLYPHENYLENE OXIDE	MPPO	SPOILER ASSEMBLY
PA	POLYAMID	ZYTEL, VYDYNE, PA, MINLON	FENDERS, QUARTER PANELS
PET	THERMOPLASTIC POLYESTER	RYNITE	TRIM
PBT/PPO	PBT/PPO ALLOY	GERMAX	CLADDINGS
PBTP	POLYBUTYLENE THEREPHTHALATE	PBT, PBTP, POCAN, VALOX	WHEEL COVERS, FENDERS, GRILLES
PBTP/EEBC	POLYBUTYLENE THEREPHTHALATE/EEBC ALLOY	BEXLOY, "M", PBTP/EEBC	FASCIAS, ROCKER PANEL, MOLDINGS
PC	POLYCARBONATE	LEXAN, MERLON, CALIBRE, MAKROLON PC	TAIL LIGHT LENSES, IP TRIM, VALANCE PANELS
PC/ABS	PC/ABS ALLOY	GERMAX, BAY BLENDS, PULSE	DOORS, INSTRUMENT PANELS
PPO	POLYPHENYLENE OXIDE	AZDEL, HOSTALEN, MARLEX, PRFAX, NORYL, GTX, PPO	INTERIOR TRIM, DOOR PANELS, SPLASH SHIELDS, STEERING COLUMN SHROUD
PPO/PA	POLYPHENYLENE/ POLYAMID	PPO/PA, GTX 910	FENDERS, QUARTER PANELS
PR/FV	FIBERGLASS REINFORCED PLASTIC	FIBERGLASS, FV, PR/FV	BODY PANELS
PS	POLYSTYRENE	LUSTREX, STYRON, PS	DOOR PANELS, DASH PANELS
RTM	RESIN TRANSFER MOLDING COMPOUND	RTM	BODY PANELS
SMC	SHEET MOLDED COMPOUND	SMC	BODY PANELS
TMC	TRANSFER MOLDING COMPOUND	TMC	GRILLES

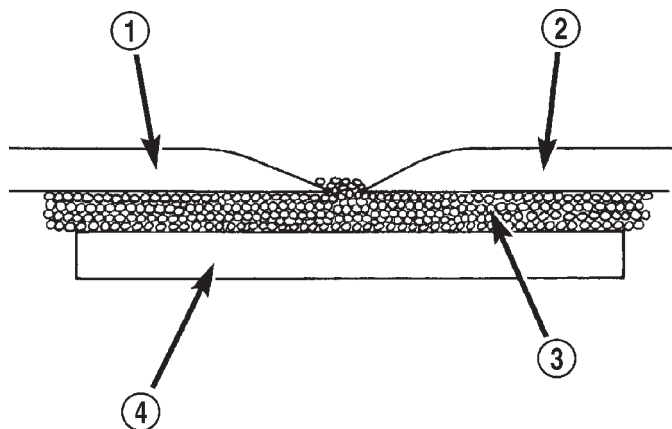
BODY (Continued)

CODE	FAMILY NAME	COMMON TRADE NAME	TYPICAL APPLICATION
UP	UNSATURATED POLYESTER (THERMOSETTING)	SMC, BMC, TMC, ZMC, IMC, XSMC, UP	GRILLE OPENING PANEL, LIFTGATES, FLARESIDE FENDERS, FENDER EXTENSIONS
EEBC	ETHER/ESTER BLOCKED CO-POLYMER	EEBC	BUMPERS
EEBC/PBTP	EEBC/POLYBUTYLENE TEREPHTHALATE	EEBC, PBTP, BEXLOY	BUMPER, ROCKER PANELS
EMPP	ETHYLENE MODIFIED POLYPROPYLENE	EMPP	BUMPER COVERS
EPDM	ETHYLENE/ PROPPROPYLENE DIENE MONOMER	EPDM, NORDEL, VISTALON	BUMPERS
EPM	ETHYLENE/ PROPPROPYLENE CO-POLYMER	EPM	FENDERS
MPU	FOAM POLYURETHANE	MPU	SPOILERS
PE	POLYETHYLENE	ALATHON, DYLAN, LUPOLEN, MARLEX	-
PP	POLYPROPYLENE (BLENDS)	NORYL, AZDEL, MARLOX, DYLAN, PRAVEX	INNER FENDER, SPOILERS, KICK PANELS
PP/EPDM	PP/EPDM ALLOY	PP/EPDM	SPOILERS, GRILLES
PUR	POLYURETHANE	COLONELS, PUR, PU	FASCIAS, BUMPERS
PUR/PC	PUR/PC ALLOY	TEXIN	BUMPERS
PVC	POLYVINYL CHLORIDE	APEX, GEON, VINYLITE	BODY MOLDINGS, WIRE INSULATION, STEERING WHEELS
RIM	REACTION INJECTED MOLDED POLYURETHANE	RIM, BAYFLEX	FRONT FASCIAS, MODULAR WINDOWS
RRIM	REINFORCED REACTION INJECTED MOLDED	PUR, RRIM	FASCIAS, BODY PANELS, BODY TRIMS
TPE	THERMO POLYETHYLENE	TPE, HYTREL, BEXLOY-V	FASCIAS, BUMPERS, CLADDINGS
TPO	THERMOPOLYOLEFIN	POLYTROPE, RENFLEX, SANTOPRENE, VISAFLEX, ETA, APEX, TPO, SHIELDS, CLADDINGS	BUMPERS, END CAPS, TELCAR, RUBBER, STRIPS, SIGHT, INTERIOR B POST
TPP	THERMO-POLYPROPYLENE	TPP	BUMPERS
TPU	THERMOPOLYURETHANE, POLYESTER	TPU, HYTREL, TEXIN, ESTANE	BUMPERS, BODY SIDE, MOLDINGS, FENDERS, FASCIAS

BODY (Continued)

PANEL SECTIONING

If it is required to section a large panel for a plastic repair, it will be necessary to reinforce the panel (Fig. 1). To bond two plastic panels together, a reinforcement must overlap both panels. The panels must be "V'd" at a 20 degree angle. The area to be reinforced should be washed, then sanded. Be sure to wipe off any excess soap and water when finished. Lightly sand or abrade the plastic with an abrasive pad or sandpaper. Blow off any dust with compressed air or wipe with a clean dry rag.



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Fig. 1 PANEL SECTIONING

- 1 - EXISTING PANEL
- 2 - NEW PANEL
- 3 - PANEL ADHESIVE
- 4 - BONDING STRIP

When bonding plastic panels, Follow repair material manufacturers recommendations. Be sure that enough adhesive has been applied to allow squeeze out and to fill the full bond line. Once the pieces have been brought together, do not move them until the adhesive is cured. The assembly can be held together with clamps, rivets, etc. A faster cure can be obtained by heating with a heat lamp or heat gun. After the parts have been bonded and have had time to cure, rough sand the seam and apply the final adhesive filler to the area being repaired. Smooth the filler with a spreader, wooden tongue depressor, or squeegee. For fine texturing, a small amount of water can be applied to the filler surface while smoothing. The cured filler can be sanded as necessary and, as a final step, cleanup can be done with soapy water. Wipe the surface clean with a dry cloth allowing time for the panel to dry before moving on with the repair.

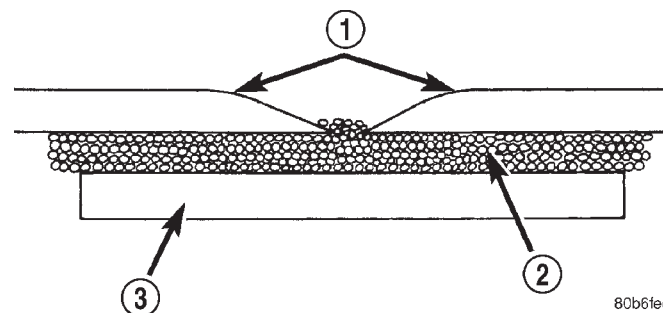
PANEL REINFORCEMENT

Structural repair procedures for rigid panels with large cracks and holes will require a reinforcement

backing. Reinforcements can be made with several applications of glass cloth saturated with structural adhesive. Semi-rigid or flexible repair materials should be used for semi-rigid or flexible backing reinforcement (Fig. 2) and (Fig. 3). Open meshed fiberglass dry wall tape can be used to form a reinforcement. The dry wall tape allows the resin to penetrate through and make a good bond between the panel and the adhesive. Structurally, the more dry wall tape used, the stronger the repair.

Another kind of repair that can be done to repair large cracks and holes is to use a scrap piece of similar plastic and bond with structural adhesive. The reinforcement should cover the entire break and should have a generous amount of overlap on either side of the cracked or broken area.

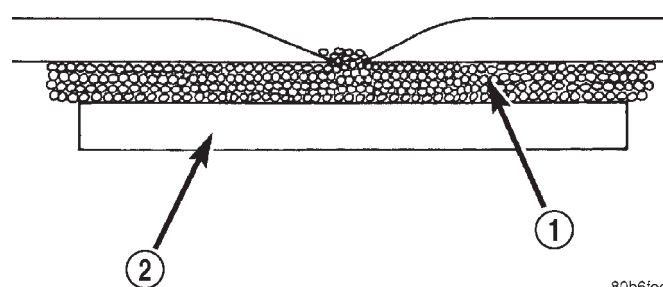
When repairing plastic, the damaged area is first "V'd" out, or beveled. Large bonding areas are desirable when repairing plastic because small repairs are less likely to hold permanently. Beveling the area around a crack at a 20 degree angle will increase the bonding surface for a repair (Fig. 4). It is recommended that sharp edges be avoided because the joint may show through after the panel is refinished.



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Fig. 2 SOFTENED EDGES

- 1 - SOFTENED EDGES
- 2 - PANEL ADHESIVE
- 3 - BONDING STRIP

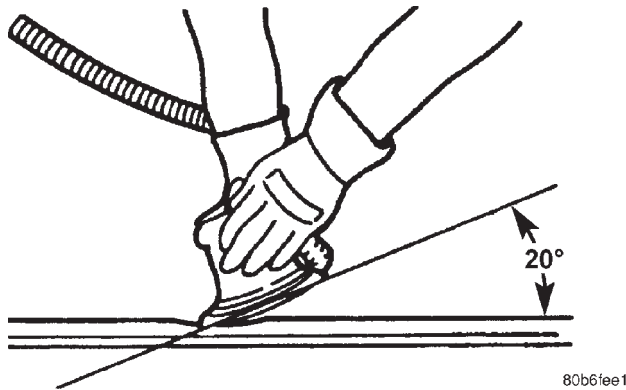


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Fig. 3 PANEL REINFORCEMENT

- 1 - PANEL ADHESIVE
- 2 - REINFORCEMENT

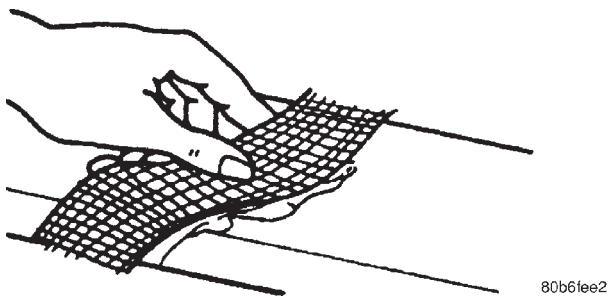
BODY (Continued)

**Fig. 4 BEVELING ANGLE - 20 DEGREE**

- Panel repair for both flexible and rigid panels are basically the same. The primary difference between flexible panel repair and rigid panel repair is in the adhesive materials used (Fig. 5).

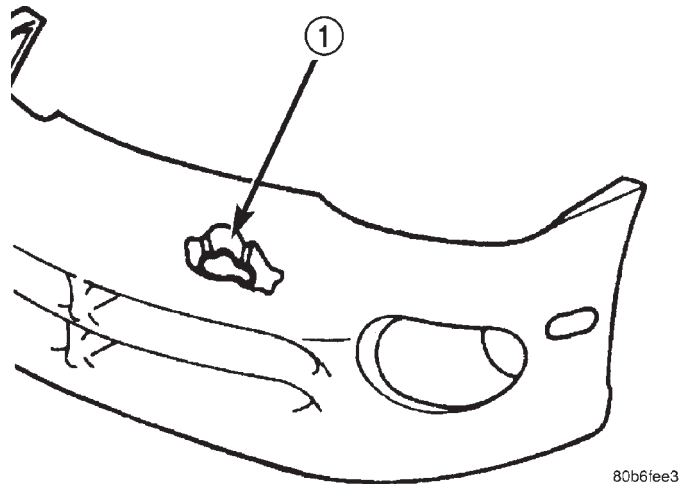
- The technician should first decide what needs to be done when working on any type of body panel. One should determine if it is possible to return the damage part to its original strength and appearance without exceeding the value of the replacement part.

- When plastic repairs are required, it is recommended that the part be left on the vehicle when every possible. That will save time, and the panel will remain stationary during the repair. Misalignment can cause stress in the repair areas and can result in future failure.

**Fig. 5 FIBERGLASS TAPE****VISUAL INSPECTION**

Composite materials can mask the severity of an accident. Adhesive bond lines, interior structure of the doors, and steel structures need to be inspected carefully to get a true damage assessment. Close inspection may require partial removal of interior trim or inner panels.

Identify the type of repair: Puncture or Crack - Damage that has penetrated completely through the panel. Damage is confined to one general area; a panel section is not required. However, a backer panel, open fiberglass tape, or matted material must be bonded from behind (Fig. 7) (Fig. 6).

**Fig. 6 DAMAGE COMPONENT**

1 - PUNCTURE

PANEL SURFACE PREPARATION

If a body panel has been punctured, cracked, or crushed, the damaged area must be removed from the panel to achieve a successful repair. All spider web cracks leading away from a damaged area must be stopped or removed. To stop a running crack in a panel, drill a 6 mm (0.250 in.) hole at the end of the crack farthest away from the damage. If spider web cracks can not be stopped, the panel would require replacement. The surfaces around the damaged area should be stripped of paint and freed from wax and oil. Scuff surfaces around repair area with 360 grit wet/dry sandpaper, or equivalent, to assure adhesion of repair materials.

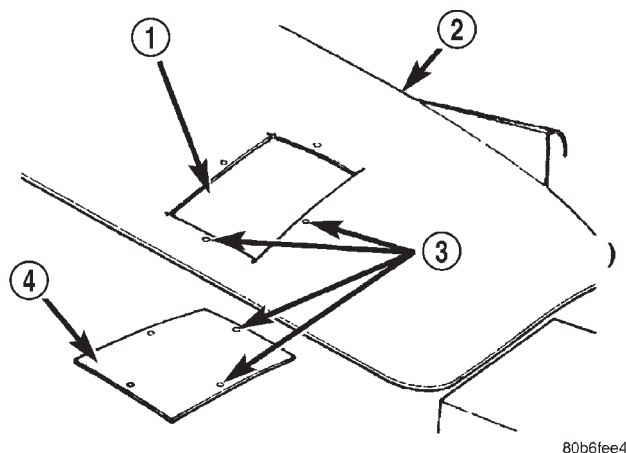
PATCHING PANELS

An panel that has extensive puncture type damage can be repaired by cutting out the damaged material (Fig. 7). Use a suitable reciprocating saw or cut off wheel to remove the section of the panel that is damaged. The piece cut out can be used as a template to shape the new patch. It is not necessary to have access to the back of the panel to install a patch. Bevel edges of cutout at 20 degrees to expose a larger bonding area on the outer side. This will allow for an increased reinforcement areas.

PANEL PATCH FABRICATIONS

A patch can be fabricated from any rigid fiberglass panel that has comparable contour with the repair area. Lift gates and fenders can be used to supply patch material. If existing material is not available or compatible, a patch can be constructed with adhesive and reinforcement mesh (dry wall tape). Perform the following operation if required:

BODY (Continued)

**Fig. 7 DAMAGED PANEL CUTOUT AND PATCH**

- 1 - CUTOUT
- 2 - DAMAGED BODY PANEL
- 3 - 4 MM (0.160 IN.) HOLES
- 4 - PATCH CUT TO SIZE

(1) Cover waxed paper or plastic with adhesive backed nylon mesh (dry wall tape) larger than the patch required (Fig. 8).

(2) Tape waxed paper or plastic sheet with mesh to a surface that has a compatible contour to the repair area.

(3) Apply a liberal coat of adhesive over the reinforcement mesh (Fig. 8). If necessary apply a second or third coat of adhesive and mesh after first coat has cured. The thickness of the patch should be the same as the repair area.

(4) After patch has cured, peel waxed paper or plastic from the back of the patch.

(5) If desired, a thin film coat of adhesive can be applied to the back of the patch to cover mesh for added strength.

PANEL PATCH INSTALLATION

(1) Make a paper or cardboard pattern the size and shape of the cutout hole in the panel.

(2) Trim 3 mm (0.125 in.) from edges of pattern so patch will have a gap between connecting surfaces.

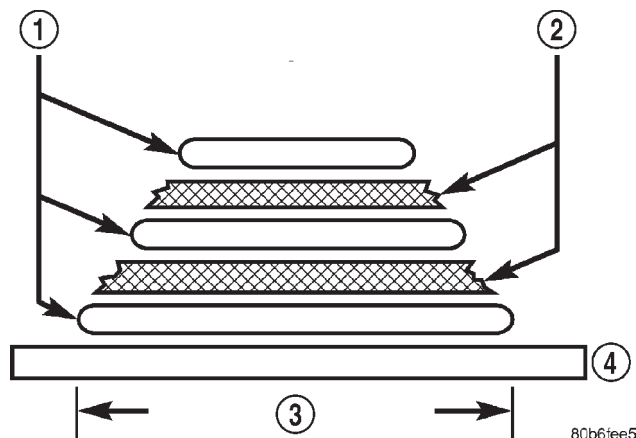
(3) Using the pattern as a guide, cut the patch to size.

(4) Cut scrap pieces of patch material into 50 mm (2 in.) squares to use as patch supports to sustain the patch in the cutout.

(5) Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) in from edge of cutout hole (Fig. 7).

(6) Drill 4 mm (0.160 in.) holes 13 mm (0.5 in.) away from edge of patch across from holes drilled around cutout.

(7) Drill 3 mm (0.125 in.) holes in the support squares 13 mm (0.5 in.) from the edge in the center of one side.

**Fig. 8 FABRICATED PANEL**

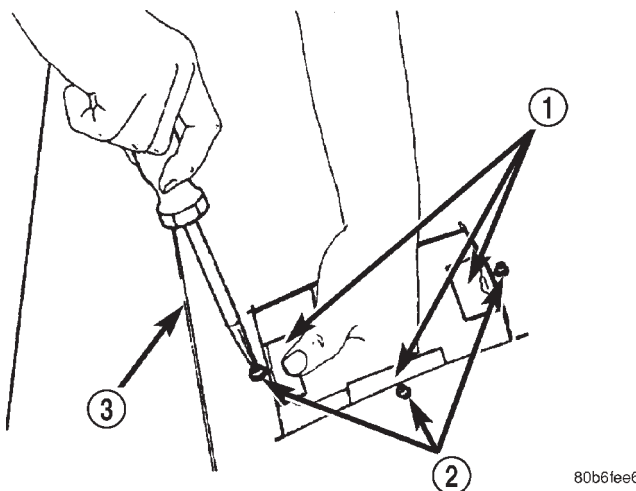
- 1 - STRUCTURAL ADHESIVE
- 2 - FIBERGLASS CLOTH OR FIBERGLASS MESH TAPE
- 3 - WIDTH OF V-GROOVE
- 4 - WAXED PAPER

(8) Scuff the backside of the body panel around the cutout hole with a scuff pad or sandpaper.

(9) Mix enough adhesive to cover one side of all support squares.

(10) Apply adhesive to cover one side of all support squares.

(11) Using number 8 sheet metal screws, secure support squares to back side of body panel with adhesive sandwiched between the panel and squares (Fig. 9).

**Fig. 9 SECURE SUPPORT SQUARES TO BODY PANEL**

- 1 - SUPPORT SQUARES
- 2 - SCREWS
- 3 - DAMAGED BODY PANEL

BODY (Continued)

(12) Position patch in cutout against support squares and adjust patch until the gap is equal along all sides (Fig. 10).

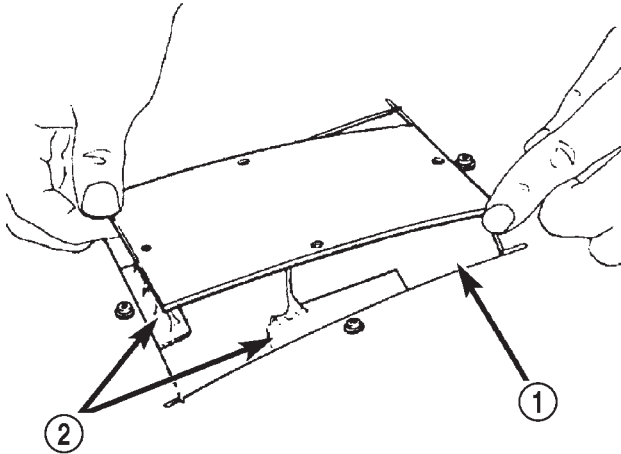
(13) Drill 3 mm (0.125 in.) holes in the support squares through the pre-drilled holes in the patch.

(14) Apply a coat of adhesive to the exposed ends of the support squares (Fig. 11).

(15) Install screws to hold the patch to support squares (Fig. 12). Tighten screws until patch surface is flush with panel surface.

(16) Allow adhesive to cure, and remove all screws.

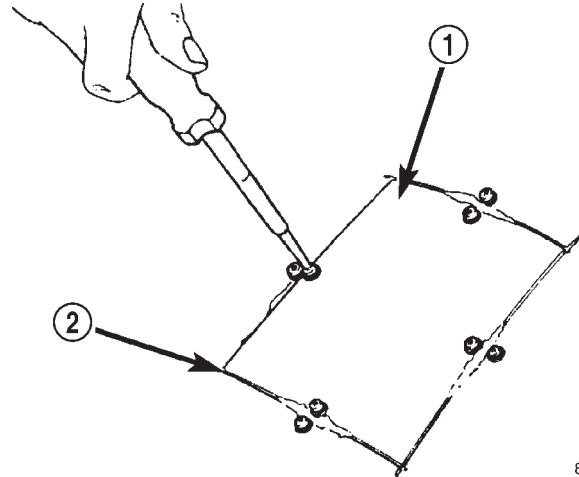
(17) Using a 125 mm (5 in.) 24 grit disc grinder, grind a 50 mm (2 in.) to 75 mm (3 in.) wide and 2 mm (0.080 in.) deep path across the gaps around the patch (Fig. 13). With compressed air, blow dust from around patch.



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Fig. 10 POSITION PATCH IN CUTOUT AND ALIGN

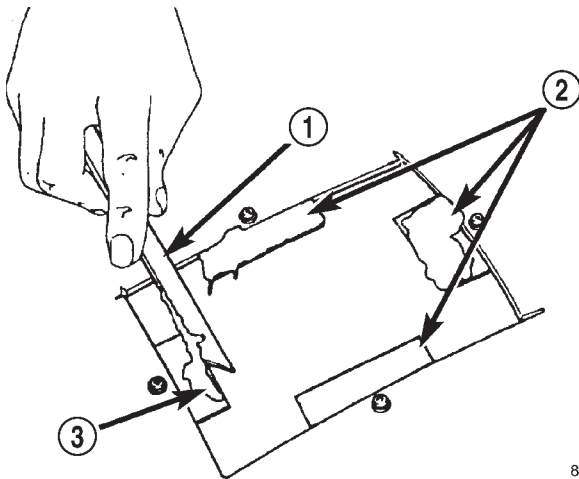
- 1 - CUTOUT
2 - SUPPORT SQUARES



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Fig. 12 INSTALL SCREWS

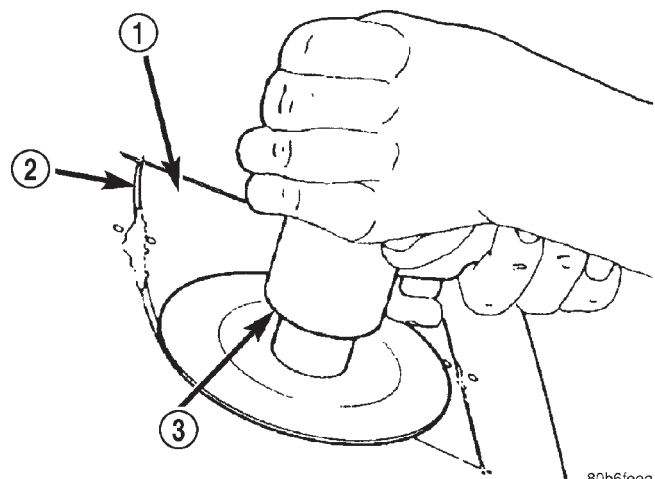
- 1 - PATCH
2 - GAP



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Fig. 11 APPLY ADHESIVE TO SUPPORT SQUARES

- 1 - APPLICATOR
2 - SUPPORT SQUARES
3 - ADHESIVE



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Fig. 13 GRIND SURFACE

- 1 - PATCH
2 - GAP
3 - DISC GRINDER

BODY (Continued)

(18) Apply adhesive backed nylon mesh (dry wall tape) over gaps around patch (Fig. 14).

(19) Mix enough adhesive to cover the entire patch area.

(20) Apply adhesive over the mesh around patch, and smooth epoxy with a wide spreader to reduce finish grinding. Use two to three layers of mesh and adhesive to create a stronger repair (Fig. 15).

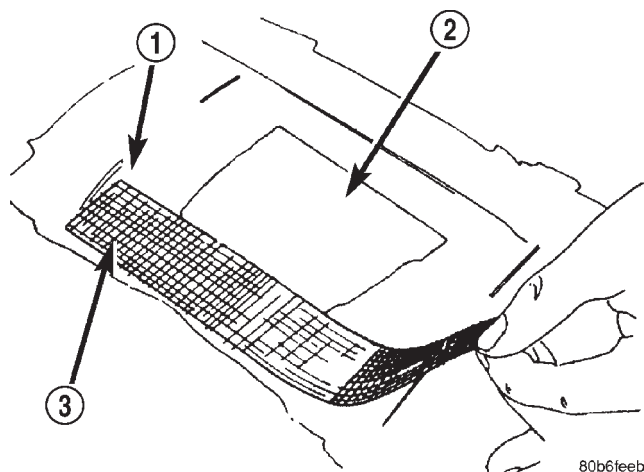


Fig. 14 COVER GAPS WITH MESH

- 1 - GROUND DOWN AREA
- 2 - PATCH
- 3 - MESH

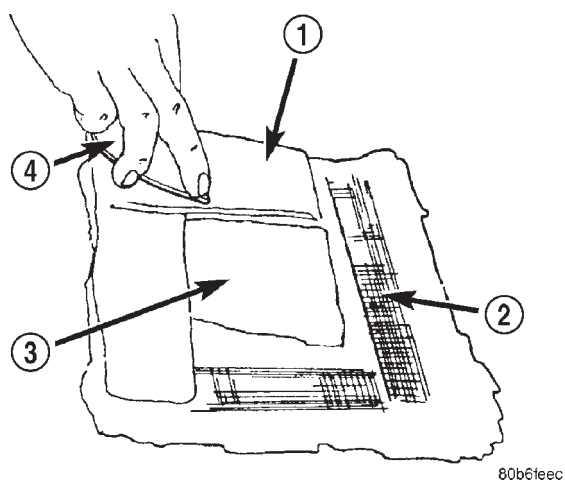


Fig. 15 COVER MESH WITH ADHESIVE

- 1 - ADHESIVE
- 2 - MESH
- 3 - PATCH
- 4 - SPREADER

PATCHED PANEL SURFACING

After patch panel is installed, the patch area can be finished using the same methods as finishing other types of body panels. If mesh material is exposed in the patched area, grind surface down, and

apply a coat of high quality rigid plastic body filler. Prime, block sand, and paint as required.

STANDARD PROCEDURE - HEAT STAKING

(1) Remove trim panel.

(2) Bend or move the trim panel components at the heat staked joints. Observe the heat staked locations and/or component seams for looseness.

(3) Heat stake the components.

(a) If the heat staked or component seam location is loose, hold the two components tightly together and using a soldering gun with a flat tip, melt the material securing the components together. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

(b) If the heat staked material is broken or missing, use a hot glue gun to apply new material to the area to be repaired. The panels that are being heat staked must be held together while the applying the glue. Once the new material is in place, it may be necessary to use a soldering gun to melt the newly applied material. Do not over heat the affected area, damage to the exterior of the trim panel may occur.

(4) Allow the repaired area to cool and verify the repair.

(5) Install trim panel.

SPECIFICATIONS

BODY LUBRICATION

LUBRICATION REQUIREMENTS

Body mechanisms and linkages should be inspected, cleaned, and lubricated, as required, to maintain ease of operation and to provide protection against rust and wear. When performing other under hood services, the hood latch release mechanism and safety catch should be inspected, cleaned, and lubricated. During the winter season, external door lock cylinders should be lubricated to assure proper operation when exposed to water and ice.

Prior to the application of any lubricant, the parts concerned should be wiped clean to remove dust and grit. If necessary, a suitable solvent can be used to clean the item to be lubricated. After lubricating a component, any excess oil or grease should be removed.

LUBRICANT APPLICATION

DOOR LOCK CYLINDERS

(1) Apply a small amount of lubricant directly into the lock cylinder.

(2) Apply a small amount of lubricant to the key.

BODY (Continued)

(3) Insert key into lock cylinder and cycle the mechanism from the locked to the unlocked position.

NOTE: Do not add more lubricant.

(4) Cycle the lock cylinder mechanism several times to allow the lubricant to flow throughout the cylinder.

(5) Wipe all lubricant from exterior of lock cylinder and key.

ALL OTHER BODY MECHANISMS

(1) Clean component as described above.

(2) Apply specified lubricant to all pivoting and sliding contact areas of component.

LUBRICANT USAGE

ENGINE OIL

- Door Hinges – Hinge Pin and Pivot Contact Areas

- Hood Hinges – Pivot Points
- Liftgate Hinges

MOPAR® SPRAY WHITE LUBE OR EQUIVALENT

- Door Check Straps
- Liftgate Latches
- Liftgate Prop Pivots
- Ash Receiver
- Fuel Filler Door Remote Control Latch Mechanism
- Parking Brake Mechanism
- Sliding Seat Tracks
- Liftgate Latch

MOPAR® Multipurpose GREASE OR EQUIVALENT

- All Other Hood Mechanisms

MOPAR® LOCK CYLINDER LUBRICANT OR EQUIVALENT

- Door Lock Cylinders
- Liftgate Lock Cylinder

TORQUE SPECIFICATIONS -

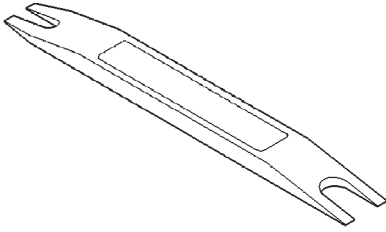
DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Front seat track to floor pan bolts	61	45	
Front seat inboard pivot bolt	40	30	
Front seat recliner to seat cushion frame	12	9	
Front seat track to cushion frame bolt	12	9	
Front seat back	40	30	

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
Front seat back to seat cushion	30	22	
Front seat arm rest - 60/40	12	9	
Front arm rest - 50/50 split	25	18	
Front seat back recliner to seat back	12	9	
Front seat belt buckle anchor nut	40	29	
Front seat belt retractor bolt	38	28	
Front seat belt buckle anchor bolt	40	29	
Front door hinge to hinge pillar bolt	28	21	
Front door hinge to door nuts and bolt	28	21	
Front door latch striker	28	20	
Front seat rear outboard seat track to floor pan bolts	28	20	
Front strut tower to tower brace bolts	38	28	
Decklid latch striker	22	16	
Door hinge bolt and nut	28	21	
Door hinge double ended stud	14		120
Hood latch release cable handle to the cowl side	2.3 to 3.4		20 to 30
Hood latch to crossmember	22.6 to 33.9		200 to 300
Hood hinges	22.6 to 33.9		200 to 300
Rear Child Tether anchor	20	15	
Rear door glass to regulator bolt	11		105
Rear seat arm rest to seat back with ski pass	5		46
Rear seat back and belts to floor	44	32	
Rear seat back 40 section to collar section	60	44	
Rear seat back 60 section	16	12	
Rear seat back collar assembly	60	44	
Rear door hinge to B-pillar bolt	28	20	
Rear door hinge to door bolt	28	20	
Rear door latch striker	28	20	
Sunroof module to roof panel	11		97

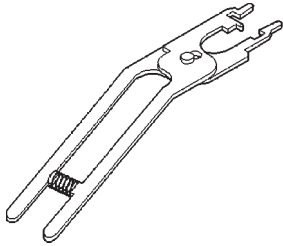
BODY (Continued)

SPECIAL TOOLS

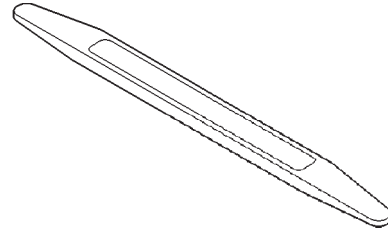
BODY



Remover, Moldings C-4829



Pliers, Headliner Clip C-6967



Stick, Trim C-4755

DECKLID

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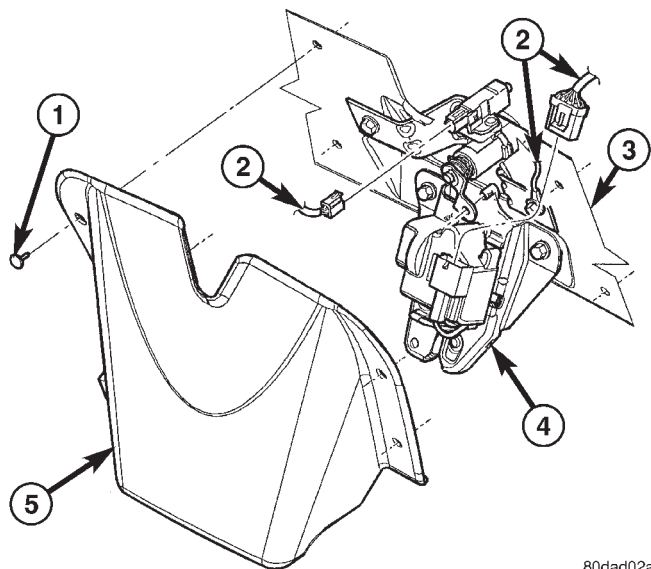
COVER

REMOVAL

- (1) Release decklid latch and open decklid.
- (2) Remove the grab handle, if equipped.
- (3) Remove push pin fasteners attaching decklid latch cover to decklid (Fig. 1).
- (4) Remove decklid latch cover from vehicle.

INSTALLATION

- (1) Place decklid latch cover in position on vehicle (Fig. 1).
- (2) Install push pin fasteners attaching decklid cover to decklid.
- (3) Install grab handle, if equipped.



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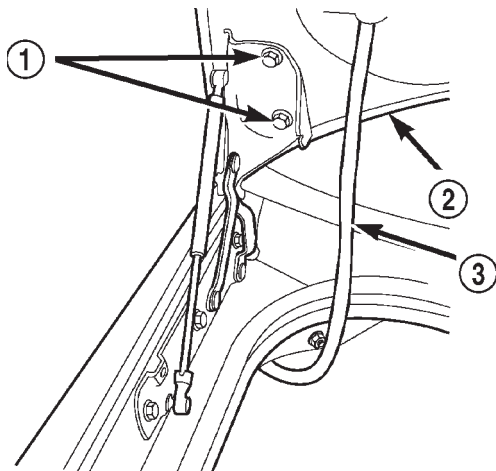
Fig. 1 DECKLID LATCH COVER

- 1 - PUSH PIN
- 2 - DECKLID WIRING
- 3 - DECKLID
- 4 - DECKLID LATCH ASSEMBLY
- 5 - DECKLID LATCH COVER

DECKLID

REMOVAL

- (1) Release decklid latch and open decklid.
- (2) Mark hinge locations on inside of decklid to aid installation.
- (3) Disconnect the wire harness connector, if equipped.
- (4) Remove bolts attaching top of hinge to decklid.
- (5) Remove bolts attaching bottom of hinge to decklid (Fig. 2).
- (6) With aid from a helper, remove decklid from vehicle.



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Fig. 2 DECKLID

- 1 - REMOVE BOLTS
- 2 - DECKLID
- 3 - WIRE HARNESS

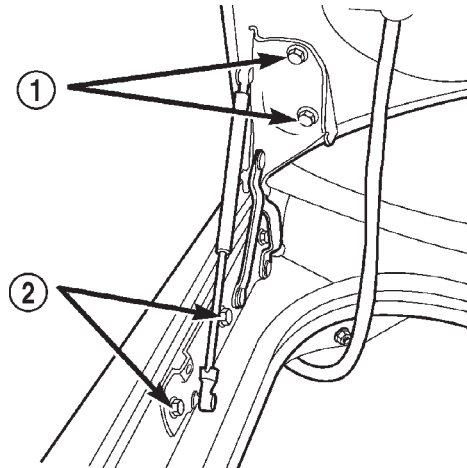
INSTALLATION

- (1) With aid from a helper, place decklid in position on vehicle.
- (2) Install bolts attaching bottom of hinge to decklid.
- (3) Install bolts to attach top of hinge to decklid.
- (4) Connect wire harness connector.
- (5) Align decklid to achieve equal spacing on all sides and flush across gaps.
- (6) Verify decklid operation and sealing.

HINGE

REMOVAL

- (1) Open decklid.
- (2) Support decklid with a suitable prop device or block.
- (3) Remove hinge bolts (Fig. 3).
- (4) Remove hinge from vehicle.



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Fig. 3 DECKLID GAS PROP

- 1 - UPPER HINGE BOLTS
- 2 - LOWER HINGE BOLTS

INSTALLATION

- (1) Place hinge in position on vehicle.
- (2) Install hinge bolts.
- (3) Verify decklid operation and alignment.

LATCH

REMOVAL

- (1) Open decklid.
- (2) Remove fasteners attaching decklid lining or latch cover to rear of decklid as necessary.
- (3) Remove bolts attaching decklid latch to decklid (Fig. 4), (Fig. 5) or (Fig. 6).
- (4) Remove decklid latch from decklid.
- (5) Disconnect power lock connector from latch solenoid.
- (6) Disconnect decklid ajar switch connector from latch.
- (7) Remove latch from vehicle.

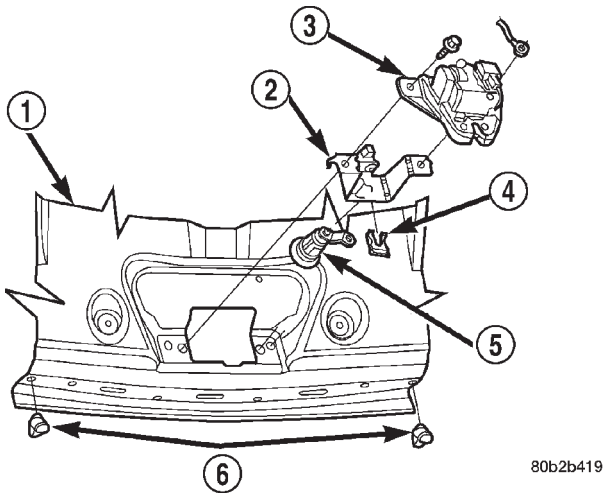


Fig. 4 DECK LID LATCH - CONCORDE

- 1 - TRUNK LID
- 2 - TRUNK LID CYLINDER BRACKET
- 3 - TRUNK LID LATCH
- 4 - LOCK SET
- 5 - TRUNK LID LOCK CYLINDER
- 6 - TRUNK LID OVER SLAM BUMPERS

INSTALLATION

- (1) Place latch in position on vehicle.
- (2) Connect decklid ajar switch connector on latch.
- (3) Connect power lock connector on latch solenoid.
- (4) Place decklid latch in position on decklid.
- (5) Install bolts to attach decklid latch to decklid.
- (6) Adjust decklid latch for proper decklid to quarter panel alignment and weatherstrip sealing.
- (7) Install fasteners to attach decklid lining or latch cover to rear of decklid.
- (8) Verify decklid latch operation.

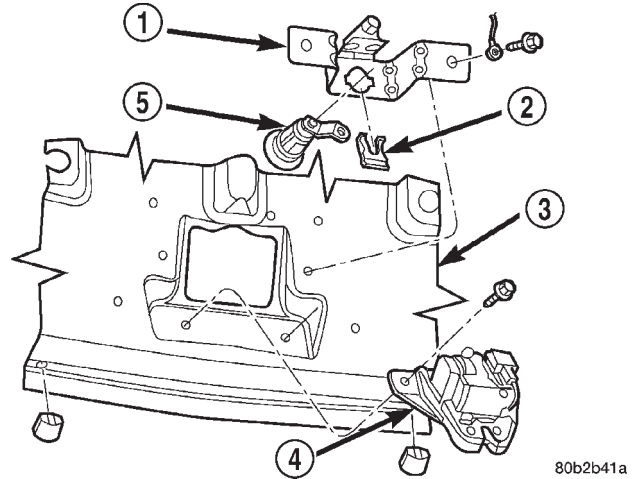


Fig. 5 DECK LID LATCH - INTREPID

- 1 - LOCK CYLINDER BRACKET
- 2 - LOCK SET
- 3 - TRUNK LID
- 4 - TRUNK LID LATCH
- 5 - TRUNK LOCK CYLINDER

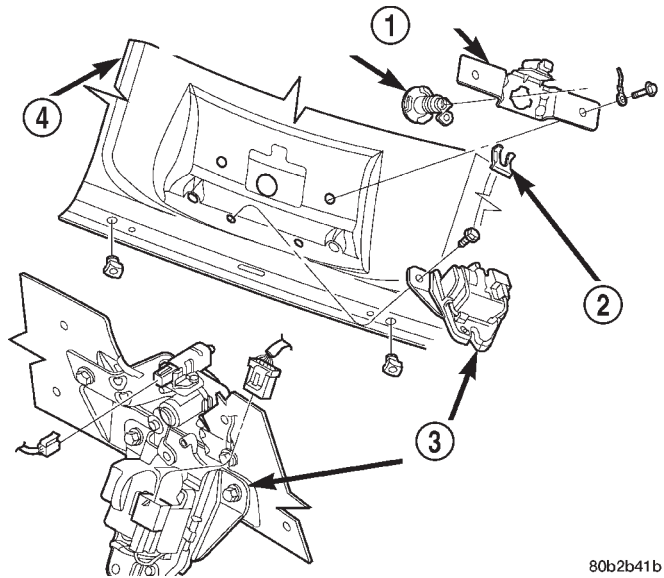


Fig. 6 DECK LID LATCH - 300M

- 1 - LOCK CYLINDER BRACKET AND LOCK CYLINDER
- 2 - LOCK SET
- 3 - TRUNK LID LATCH
- 4 - TRUNK LID

LATCH STRIKER

REMOVAL

- (1) Open decklid.
- (2) Remove trunk liner as necessary.
- (3) Remove bolts attaching latch striker (Fig. 7).
- (4) Remove latch striker from vehicle.

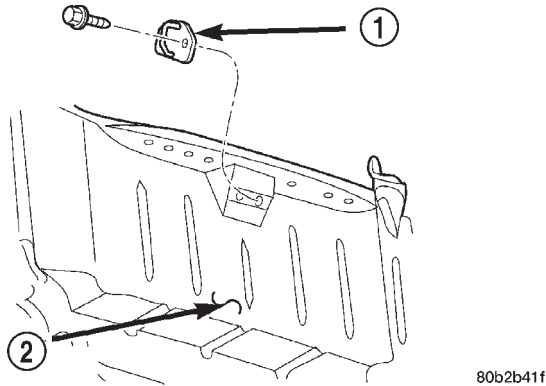


Fig. 7 DECKLID LATCH STRIKER

- 1 - TRUNK LIP LATCH STRIKER
2 - TRUNK COMPARTMENT

INSTALLATION

- (1) Place latch striker in position.
- (2) Install bolts attaching latch striker.
- (3) Verify decklid operation and alignment.
- (4) Place decklid liner in position.

LOCK CYLINDER

REMOVAL

- (1) Open decklid.
- (2) Remove fasteners attaching decklid lining to rear of decklid.
- (3) Remove bolts attaching decklid latch to decklid (Fig. 4), (Fig. 5) or (Fig. 6).
- (4) Remove decklid latch from decklid.
- (5) Disconnect power lock connector from latch solenoid.
- (6) Disconnect decklid ajar switch connector from latch.
- (7) Remove latch from vehicle.
- (8) Remove decklid lock set.
- (9) Remove decklid lock cylinder.

INSTALLATION

- (1) Install decklid lock cylinder.
- (2) Install decklid lock set.
- (3) Place latch in position on vehicle.
- (4) Connect decklid ajar switch connector on latch.
- (5) Connect power lock connector on latch solenoid.
- (6) Place decklid latch in position on decklid.
- (7) Install bolts to attach decklid latch to decklid.
- (8) Adjust decklid latch for proper decklid to quarter panel alignment and weatherstrip sealing.
- (9) Install fasteners to attach decklid lining to rear of decklid.
- (10) Verify decklid latch operation.

EMERGENCY RELEASE CABLE

REMOVAL

- (1) Remove the decklid cover. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/COVER - REMOVAL)
- (2) Unclip cable and handle assembly (Fig. 8).

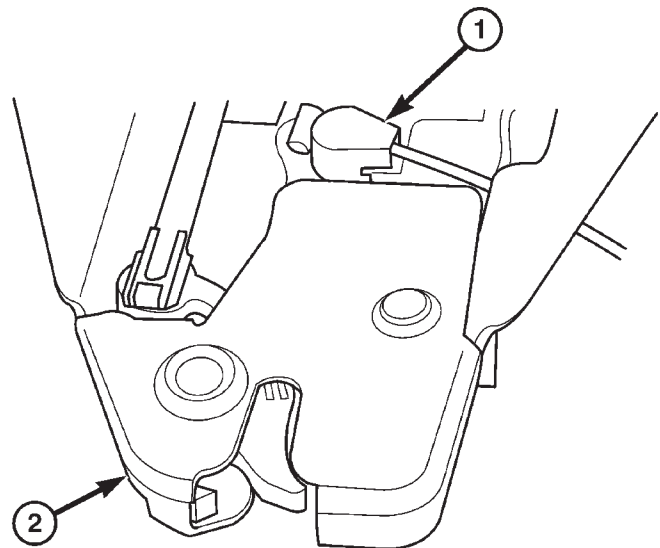


Fig. 8 EMERGENCY RELEASE CABLE

- 1 - RELEASE CABLE CLIP
2 - DECKLID LATCH

INSTALLATION

- (1) Clip emergency release cable onto the latch.
- (2) Install the decklid cover. (Refer to 23 - BODY/DECKLID/HATCH/LIFTGATE/TAILGATE/COVER - INSTALLATION)

SLAM BUMPER

REMOVAL

- (1) Open decklid.
- (2) Pull slam bumper from decklid.
- (3) Remove slam bumper from decklid.

INSTALLATION

- (1) Place slam bumper in position on decklid.
- (2) Push slam bumper into decklid.
- (3) Verify decklid alignment.

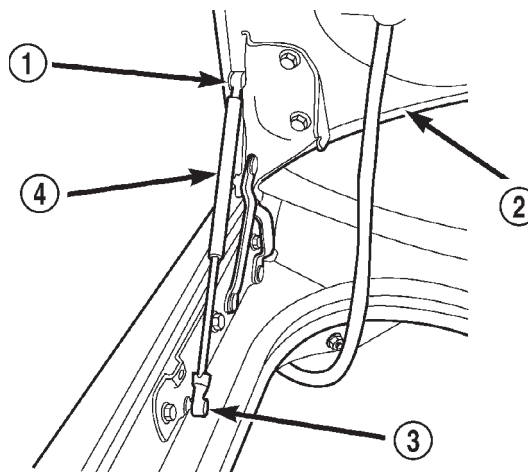
SUPPORT CYLINDER

REMOVAL

- (1) Open decklid.
- (2) Support decklid with a suitable prop device.
- (3) Remove gas prop lock caps on each end (Fig. 9).
- (4) Remove gas prop from vehicle.

INSTALLATION

- (1) Place gas prop in position on vehicle.
- (2) Install the lock caps on the gas prop.
- (3) Verify decklid operation.



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Fig. 9 DECKLID GAS PROP

- 1 - LOCK CAP
- 2 - DECKLID
- 3 - LOCK CAP
- 4 - GAS PROP

DOOR - FRONT

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DOOR - FRONT

DESCRIPTION

The front and rear door on all LH models require the same basic service procedures regardless of door trim configuration. The art used in this section is typical and features only one of the current production models.

CHECK STRAP

REMOVAL

- (1) Place door glass in the full up position.
- (2) Remove door trim panel.(Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (3) Remove watershield as necessary.
- (4) Remove bolts attaching check strap to door end frame and body.
- (5) Remove check strap from vehicle (Fig. 1).

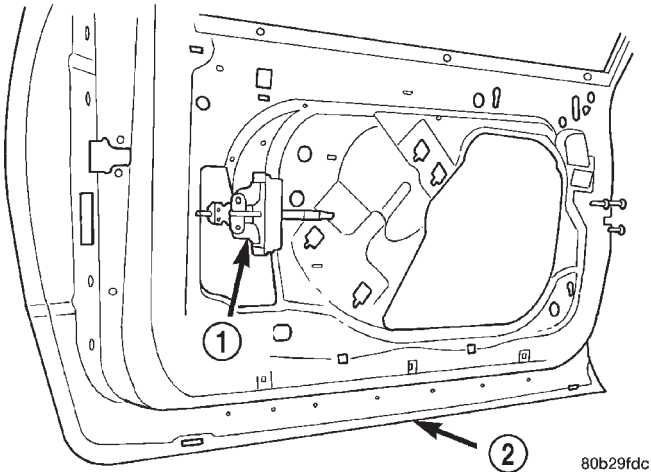


Fig. 1 FRONT DOOR CHECK STRAP

- 1 - CHECK STRAP
- 2 - FRONT DOOR

CHECK STRAP (Continued)

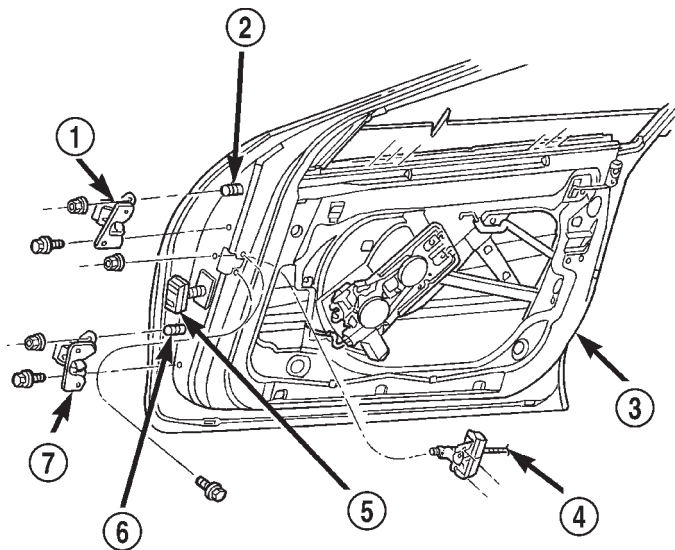
INSTALLATION

- (1) Place check strap in position on vehicle.
- (2) Install bolts attaching check strap to door end frame and body.
- (3) Install watershield.
- (4) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

DOOR

REMOVAL

- (1) Open front door.
- (2) Mark location of hinge on door end frame.
- (3) Disengage clips attaching wire harness connector and boot to hinge pillar.
- (4) Remove connector from hinge pillar.
- (5) Disengage clip attaching wire connector together on hinge pillar side of the connector.
- (6) Remove door wire harness from instrument panel harness.
- (7) Disengage door check stop from pin on upper door hinge.
- (8) Support door on suitable lifting device.
- (9) Remove bolt and nut attaching lower hinge to door end frame (Fig. 2).
- (10) Steady door on lifting device and remove bolt and nut attaching upper hinge to door end frame.
- (11) Remove door from vehicle.

**Fig. 2 FRONT DOOR AND HINGE**

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- 1 - UPPER HINGE
- 2 - DOUBLE ENDED STUD
- 3 - FRONT DOOR
- 4 - CHECK STRAP
- 5 - DOOR WIRE HARNESS CONNECTOR
- 6 - DOUBLE ENDED STUD
- 7 - LOWER HINGE

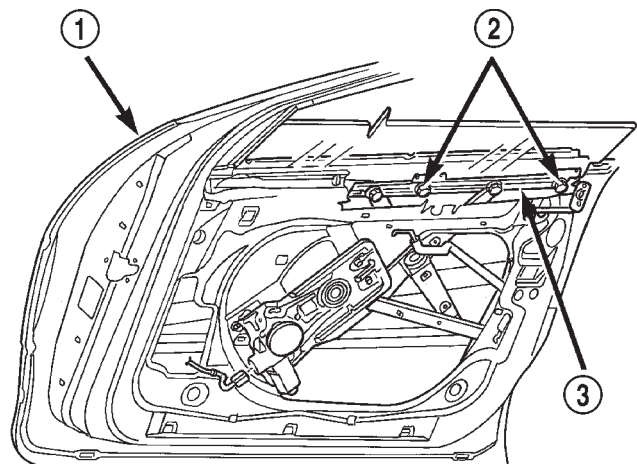
INSTALLATION

- (1) Place door in position on vehicle.
- (2) Engage door onto pin on upper door hinge.
- (3) Steady door on lifting device and install bolt and nut attaching upper hinge to door end frame. Tighten the hinge bolt and nut to 28 N·m (21 ft. lbs.) torque. If the double ended stud is loosen or replaced tighten the stud to 14 N·m (10 ft. lbs.) torque.
- (4) Install bolt and nut attaching lower hinge to door end frame.
- (5) Verify door alignment and operation.
- (6) Connect door wire harness to instrument panel wire harness.
- (7) Attach check strap.
- (8) Align door to achieve equal spacing to surrounding body panels. Panels should be flush across all gaps. If door needs to be aligned (damages or hinge replacement) and can not be achieved, may be necessary to remove the double ended stud and replaced it with a bolt. This may allow extra movement to achieve the proper alignment.

DOOR GLASS

REMOVAL

- (1) Remove flag cover, door trim panel, water shield as necessary, and pull cup support bracket. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (2) Connect power window switch and lower window 150 mm (6 in.) from full up position.
- (3) Loosen nuts attaching regulator roller channel to glass and lift plates.
- (4) Slide roller channel rearward to allow lift plate nuts to pass through key hole slots in channel (Fig. 3).

**Fig. 3 FRONT DOOR GLASS**

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- 1 - FRONT DOOR
- 2 - LIFT PLATE NUTS
- 3 - GLASS ROLLER CHANNEL

DOOR GLASS (Continued)

- (5) Remove glass from roller channel.
- (6) Raise glass upward and out of the opening at top of door.

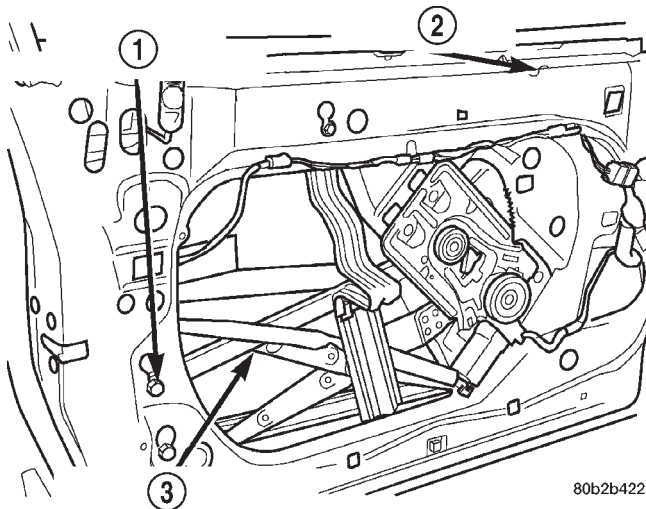
INSTALLATION

- (1) Lower glass into opening at top of door.
- (2) Place glass in position against roller channel.
- (3) Insert lift plate nuts into key hole slots in roller channel and slide channel forward to locked position.
- (4) Tighten nuts to attach regulator roller channel to glass and lift plates.
- (5) Install pull cup support bracket, water shield, door trim panel, and flag cover. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

ADJUSTMENTS

ADJUSTMENT

- (1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (2) Remove watershield as necessary.
- (3) Loosen fastener attaching scissor channel to door panel at rear of access hole (Fig. 4).
- (4) Position glass in run weatherstrips to achieve smooth operation and proper fit.
- (5) Push glass aft and apply slight downward pressure on scissor channel and tighten screw.
- (6) Tighten all fasteners.
- (7) Install watershield.
- (8) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

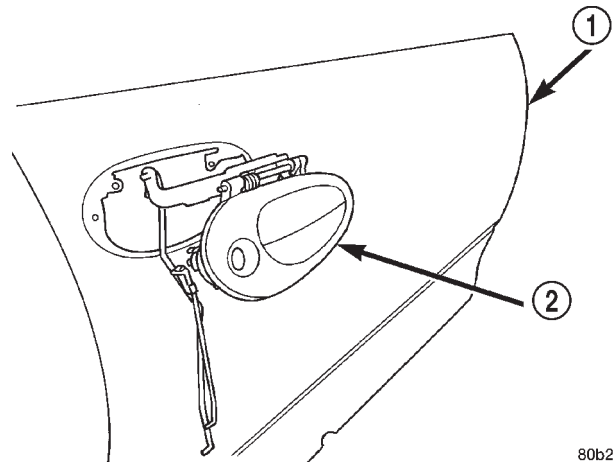
**Fig. 4 FRONT DOOR GLASS ADJUSTMENT**

- 1 - DOOR GLASS ADJUSTMENT POINT
- 2 - FRONT DOOR
- 3 - SCISSOR CHANNEL

EXTERIOR HANDLE

REMOVAL

- (1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (2) Remove water shield as necessary.
- (3) Remove door glass.
- (4) Disengage clips holding latch release link and lock link to door at latch.
- (5) Disconnect links from latch.
- (6) Remove screws attaching handle to door through access hole in door inner pane (Fig. 5).
- (7) Remove door handle from door.



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Fig. 5 OUTSIDE FRONT DOOR HANDLE

- 1 - FRONT DOOR
- 2 - DOOR HANDLE

INSTALLATION

- (1) Place door handle in position on door.
- (2) Install screws attaching to handle to door.
- (3) Insert links into clips on latch.
- (4) Engage clips attaching latch release link and lock link to door latch.
- (5) Verify door latch handle operation.
- (6) Install door glass.
- (7) Install water shield.
- (8) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

HINGE

REMOVAL

REMOVAL

- (1) Mark location of hinge on hinge pillar.
- (2) Remove bolt and nut attaching hinge to front door.
- (3) Remove bolts attaching hinge to hinge pillar (Fig. 6).
- (4) Remove hinge from vehicle.

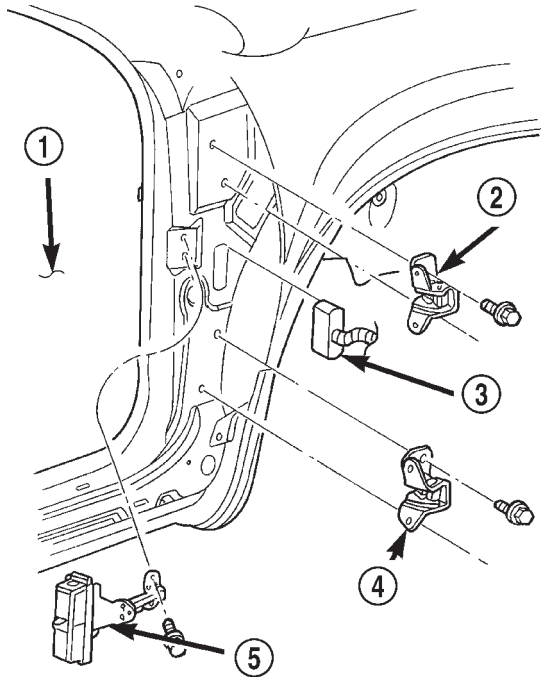


Fig. 6 FRONT DOOR HINGES

- 1 - FRONT OPENING
- 2 - UPPER HINGE
- 3 - DOOR WIRE HARNESS CONNECTOR
- 4 - LOWER HINGE
- 5 - CHECK STRAP

REMOVAL - DOOR HINGE DOUBLE ENDED STUD

- (1) Remove door hinge.
- (2) To remove double ended stud, double nut stud and back stud out of door frame. If stud is broken, use locking pliers on the shoulder of the double ended stud and back stud out of door frame (Fig. 7).

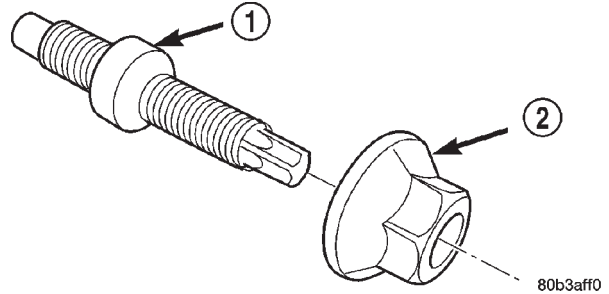


Fig. 7 DOOR HINGE DOUBLE ENDED STUD

- 1 - DOUBLE ENDED STUD
- 2 - NUT

INSTALLATION

INSTALLATION

- (1) Place hinge in position on vehicle.
- (2) Install bolt and nut attaching hinge to hinge pillar. Tighten the hinge bolt to 28 N·m (250 in lbs.) torque.
- (3) Install bolt and nut attaching hinge to front door. Tighten the hinge bolt and nut to 28 N·m (250 in lbs.) torque. If the double ended stub is removed or replaced tighten the stud to 14 N·m (120 in. lbs.) torque.
- (4) Verify door alignment and operation, adjust as necessary.

INSTALLATION - DOOR HINGE DOUBLE ENDED STUD

NOTE: Replacement hinge studs have thread sealer on threads. When reusing original studs, use Mopar® Lock and Seal Adhesive or equivalent on stud threads.

- (1) Install double ended stud into the door frame. Tighten the double ended stud to 14 N·m (120 in. lbs.) torque.
- (2) Install hinge. Tighten the hinge bolt and nut to 28 N·m (250 in lbs.) torque.
- (3) Verify door alignment and operation, adjust as necessary.

LATCH

REMOVAL

- (1) Close door glass.
- (2) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (3) Remove water shield as necessary.
- (4) Remove rear glass channel.
- (5) Disconnect lock button link from door latch.
- (6) Disconnect lock cylinder link from door latch.
- (7) Disconnect outside door handle link from door latch.
- (8) Remove screws holding door latch to door end frame (Fig. 8).
- (9) Remove latch from door.

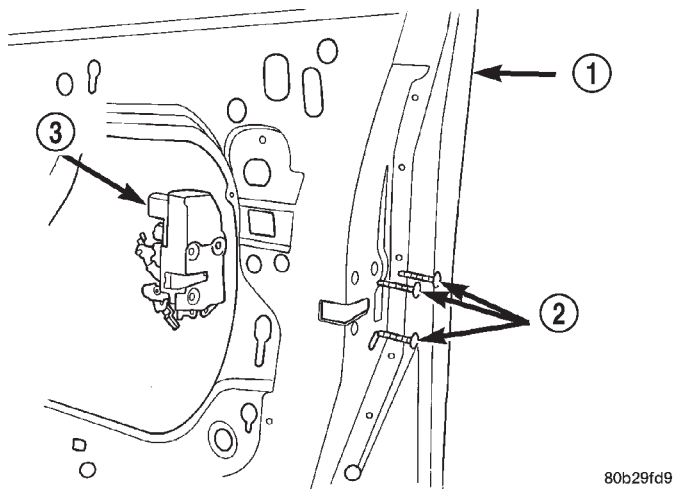


Fig. 8 FRONT DOOR LATCH

- 1 - FRONT DOOR
2 - SCREWS
3 - DOOR LATCH

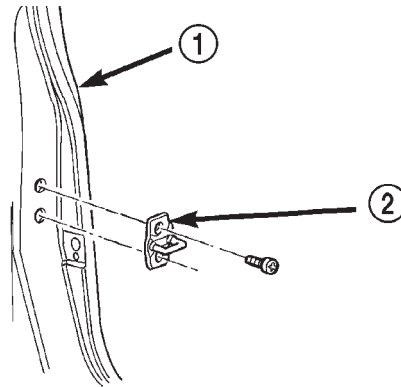
INSTALLATION

- (1) Place latch in position in door.
- (2) Install screws attaching door latch to door end frame.
- (3) Connect outside door handle link to door latch.
- (4) Connect lock cylinder link to door latch.
- (5) Connect door lock button link to door latch.
- (6) Install rear glass channel.
- (7) Verify latch operation.
- (8) Install watershield.
- (9) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

LATCH STRIKER

REMOVAL

- (1) Open front door.
- (2) Mark location of door latch striker on B-pillar to assist installation alignment.
- (3) Remove bolts holding striker to B-pillar (Fig. 9).
- (4) Remove door latch striker from vehicle.



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Fig. 9 FRONT DOOR LATCH STRIKER

- 1 - B-PILLAR
2 - DOOR LATCH STRIKER

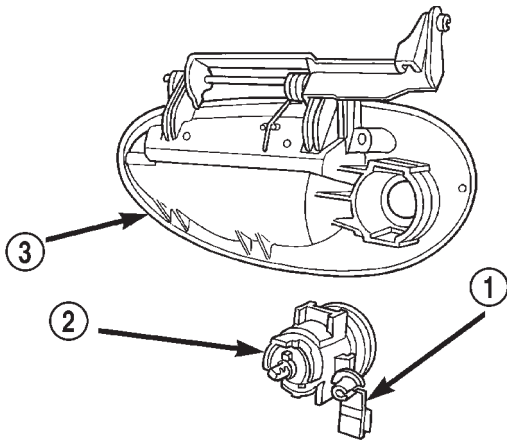
INSTALLATION

- (1) Place door latch striker in position on vehicle.
- (2) Install bolts attaching striker to B-pillar.
- (3) Verify alignment and operation of door, adjust as necessary.

LOCK CYLINDER

REMOVAL

- (1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (2) Remove water shield, as necessary
- (3) Raise door glass.
- (4) Disengage clip holding lock link to lock cylinder.
- (5) Disconnect link from lock cylinder.
- (6) Disconnect clip attaching lock cylinder to door handle.
- (7) Pull lock cylinder from door handle (Fig. 10).



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Fig. 10 DOOR LOCK CYLINDER

- 1 - CLIP
2 - LOCK CYLINDER
3 - DOOR HANDLE

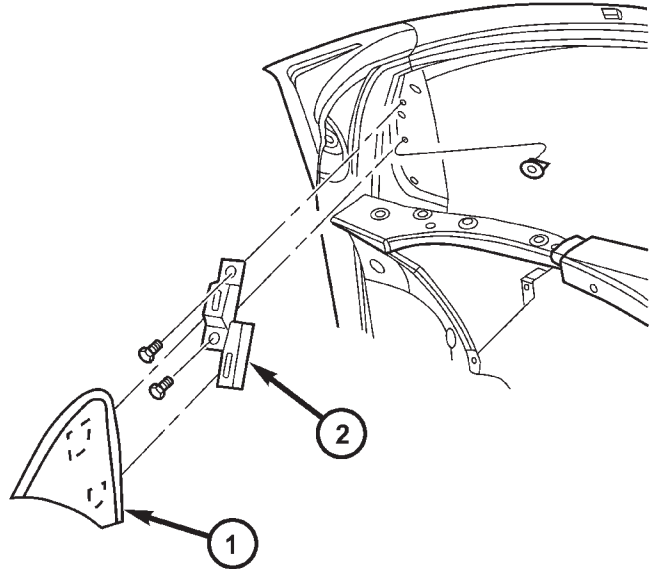
INSTALLATION

- (1) Push lock cylinder into socket on door handle.
- (2) Insert link into clip on lock cylinder.
- (3) Engage clip to fasten lock link to lock cylinder.
- (4) Verify lock operation.
- (5) Install watershield.
- (6) Install door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

SIDE VIEW MIRROR FLAG

REMOVAL

- (1) Pull cover, release clips and remove (Fig. 11).
- (2) Remove the bolts and remove the bracket, if necessary.



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Fig. 11 MIRROR FLAG COVER W/O SPEAKER

- 1 - FRONT DOOR COVER W/O SPEAKER
2 - FRONT DOOR BRACKET

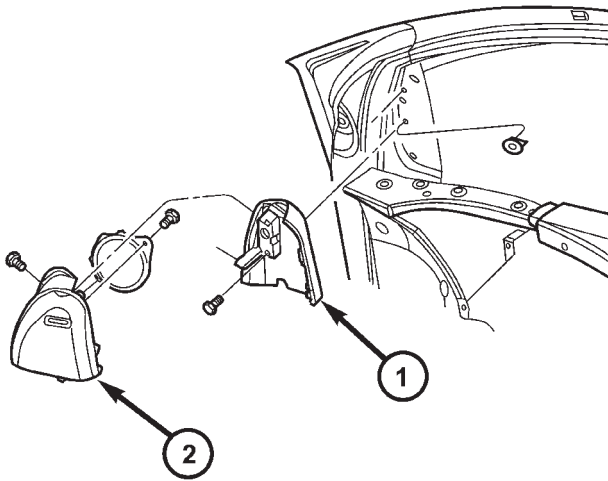
INSTALLATION

- (1) If previously removed, install the door bracket and bolts.
- (2) Install the cover and engage the clips (Fig. 11).

SIDE VIEW MIRROR FLAG

REMOVAL - WITH SPEAKER

- (1) Open the front door.
- (2) Remove fasteners attaching the front door flag enclosure cover to the door. Remove speaker from cover, if necessary (Fig. 12).
- (3) Remove fasteners attaching the front door flag enclosure plate to front door, if necessary.



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Fig. 12 MIRROR FLAG ENCLOSURE

- 1 - FRONT DOOR ENCLOSURE PLATE
2 - FRONT DOOR WITH SPEAKER COVER

INSTALLATION - WITH SPEAKER

- (1) Install fasteners attaching the front door flag enclosure plate to front door.
- (2) Install speaker to front door flag enclosure cover, if necessary.
- (3) Install fasteners attaching the front door flag enclosure cover to the door.

TRIM PANEL

REMOVAL

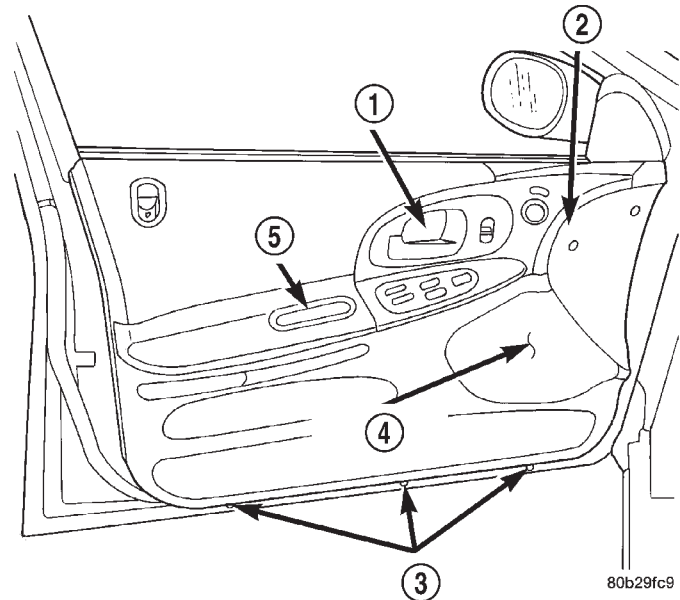
CAUTION: Do not pry on door trim panel, damage to trim panel will result.

- (1) Remove speaker flag and housing.
- (2) Remove speaker grille by inserting trim tool at the rear of the grille and disengaging tabs holding to trim panel. Remove grille (Fig. 13).

- (3) Open trim plug from the pull cup and remote bezel by inserting a small flat blade tool into the notch and lifting up.
- (4) Remove three screws from bottom of door.
- (5) Remove screw in pull cup.
- (6) Remove screw in remote bezel.
- (7) Remove two screws in the instrument panel interface area.
- (8) Remove three screws in the speaker area.

NOTE: Door trim clips are reusable up to three times, then should be replaced.

- (9) Using a trim tool, disengage the two retainer clips at rear of panel from the door trim panel to the sheet metal inner panel.
- (10) Raise trim panel up to disengage from the belt being careful to hold the panel securely.
- (11) Disconnect the linkage from the remote handle assembly (Fig. 14).
- (12) Disconnect the power mirror switch.
- (13) Disconnect the power door lock switch wire connector.
- (14) Disconnect the power window switch wire connector.
- (15) Disconnect the radio speaker wire connector.
- (16) Disconnect wiring harness clips from trim panel.
- (17) Disconnect the courtesy lamp, if equipped.
- (18) Remove trim panel from vehicle.

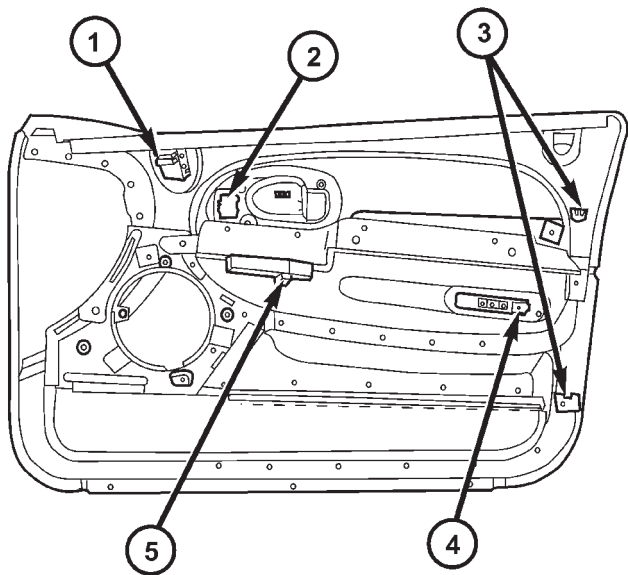


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Fig. 13 FRONT DOOR TRIM PANEL - TYPICAL

- 1 - REMOTE BEZEL
2 - I/P INTERFACE
3 - SCREWS
4 - SPEAKER GRILLE
5 - PULL CUP

TRIM PANEL (Continued)



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Fig. 14 INNER FRONT DOOR TRIM PANEL - TYPICAL

- 1 - POWER MIRROR SW.
- 2 - POWER DOOR LOCK SWITCH
- 3 - RETAINER CLIPS
- 4 - COURTESY LAMP
- 5 - POWER WINDOW SWITCH

INSTALLATION

- (1) Place door trim panel in position.
- (2) Install wire harness clips into door trim panel.
- (3) Connect the courtesy lamp, if equipped.
- (4) Connect the radio speaker wire connector.
- (5) Connect the power window switch wire connector.
- (6) Connect the power door lock switch wire connector.
- (7) Connect the power mirror switch wire connector.
- (8) Connect the linkage to the handle assembly.
- (9) Hook door trim panel over the sheet metal flange.
- (10) Insert the forward four way alignment guide into position. Insert the rearward two way alignment guide into position.
- (11) Engage rear retaining clips to attach door trim panel to inner sheet metal panel, up to three ratchet clicks.
- (12) Install three screws in the speaker area.
- (13) Install two screws in the instrument panel interface area.
- (14) Install screw in the remote bezel, and close trim plug.
- (15) Install screw in pull cup, and close trim plug.

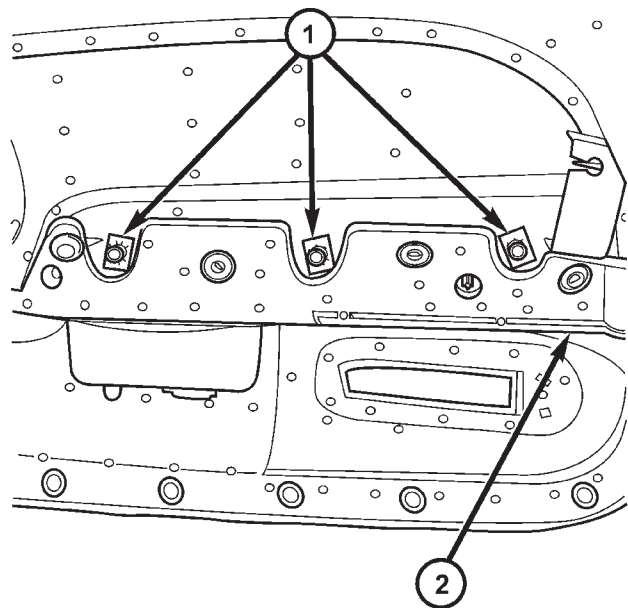
(16) Install three screws to the bottom of the door. Tighten all screws to 1.3 to 1.9 N-m (12 to 17 in. lbs.) torque.

(17) Place speaker grille in position on trim panel.

TRIM PANEL - WOOD TRIM

REMOVAL - WOOD TRIM

- (1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (2) Remove and discard the retainer clips (Fig. 15)
- (3) Remove the wood trim from the trim panel. (Fig. 16)



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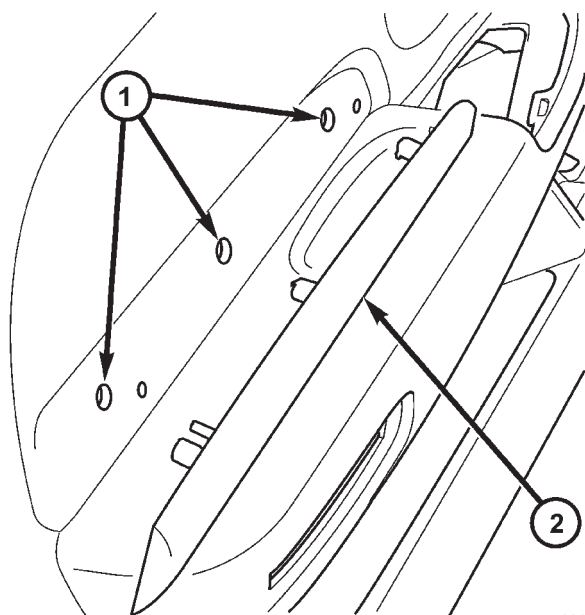
Fig. 15 WOOD TRIM CLIPS - TYPICAL

- 1 - RETAINER CLIPS
- 2 - TRIM PANEL

INSTALLATION - WOOD TRIM

- (1) Install wood trim into mounting hole of the trim panel (Fig. 16).
- (2) Install new retainer clips and seat fully (Fig. 15).
- (3) Install the door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

TRIM PANEL - WOOD TRIM (Continued)



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Fig. 16 WOOD TRIM - TYPICAL

- 1 - MOUNTING HOLES
2 - WOOD TRIM

WATERDAM

REMOVAL

- (1) Remove door trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)
- (2) Carefully remove by pulling water dam from door inner panel.
- (3) Pull watershield around umbrella clips in sheet metal inner panel.

INSTALLATION

- (1) Position watershield on door inner panel. Ensure that the water dam locator holes align and watershield is over the umbrella clips.
- (2) Press inward on areas with adhesive to attach dam to inner door. Ensure that the dam is sealed.
- (3) Install trim panel. (Refer to 23 - BODY/DOOR - FRONT/TRIM PANEL - INSTALLATION)

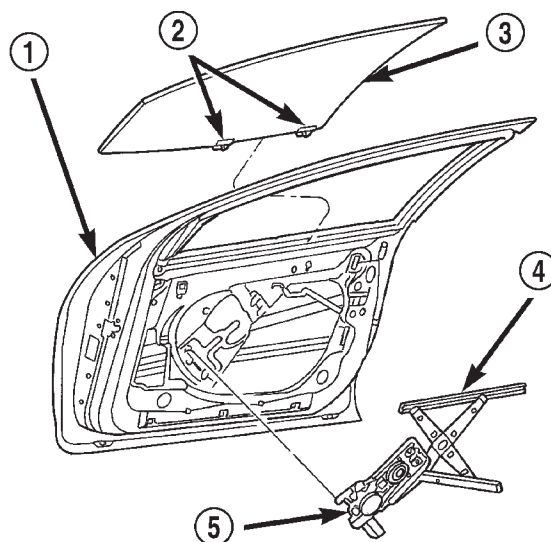
WINDOW REGULATOR

REMOVAL

- (1) Remove flag cover, door trim panel, water shield as necessary, and pull cup support bracket. (Re-

fer to 23 - BODY/DOOR - FRONT/TRIM PANEL - REMOVAL)

- (2) Slide glass from regulator roller channel.
- (3) Disconnect power window motor wire connector.
- (4) Loosen bolt attaching regulator support brace to door panel.
- (5) Remove screw and bolt heads from keyhole slots in door panel.
- (6) Loosen bolts attaching regulator to door panel.
- (7) Remove regulator from door panel.
- (8) Slide regulator rearward and rotate forward end of roller channel through access hole in door panel (Fig. 17).



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Fig. 17 WINDOW REGULATOR

- 1 - FRONT DOOR
2 - LIFT PLATES
3 - GLASS
4 - GLASS ROLLER CHANNEL
5 - WINDOW REGULATOR

INSTALLATION

- (1) Insert roller channel through access hole in door panel.
- (2) Insert bolt heads on regulator through key hold slots in door panel.
- (3) Tighten bolts attaching regulator to door panel.
- (4) Tighten bolt to attach regulator support brace to door panel.
- (5) Tighten screw to attach regulator scissor channel to door panel.
- (6) Connect power window motor wire connector.
- (7) Lower door glass on to regulator roller channel.
- (8) Align glass and verify operation.
- (9) Install pull cup support bracket, water shield, door trim panel and flag cover.

DOORS - REAR

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DOORS - REAR

DESCRIPTION

The front and rear door on all LH models require the same basic service procedures regardless of door trim configuration. The art used in this section is typical and features only one of the current production models.

CHECK STRAP

REMOVAL

- (1) Close door glass.
- (2) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)
- (3) Remove watershield as necessary.
- (4) Remove bolt and nut attaching check strap to door end and body.
- (5) Remove check strap from vehicle (Fig. 1).

INSTALLATION

- (1) Place check strap in position on vehicle.
- (2) Install bolt and nut attaching check strap to door end and body.

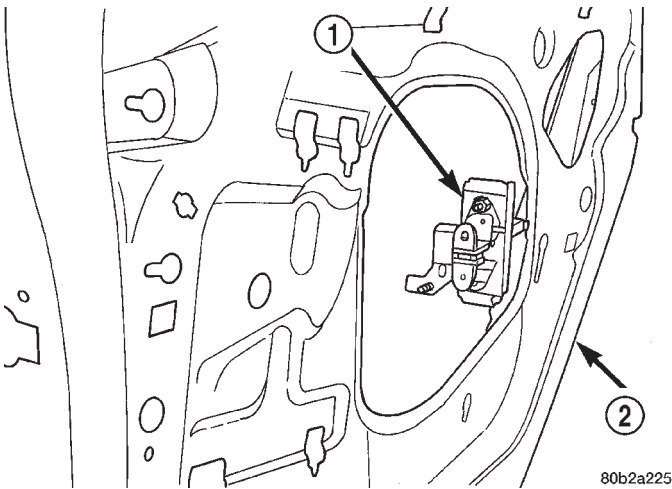


Fig. 1 REAR DOOR CHECK STRAP

- 1 - CHECK STRAP
- 2 - REAR DOOR

- (3) Verify check strap operation.
- (4) Install watershield.
- (5) Install door trim panel.(Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION)

DOOR

REMOVAL

- (1) Open rear door.
- (2) Mark location of hinge on door end frame.
- (3) Disengage clips holding wire harness connector and boot to hinge pillar.
- (4) Remove connector from hinge pillar.
- (5) Disengage clip attaching wire connector together on hinge pillar side of the connector.
- (6) Remove door wire harness from instrument panel harness.
- (7) Disengage door check stop from pin on upper door hinge.
- (8) Support door on suitable lifting device.
- (9) Remove bolt and nut attaching lower hinge to door end frame (Fig. 2).
- (10) Steady door on lifting device and remove bolt and nut attaching upper hinge to door end frame.
- (11) Remove door from vehicle.

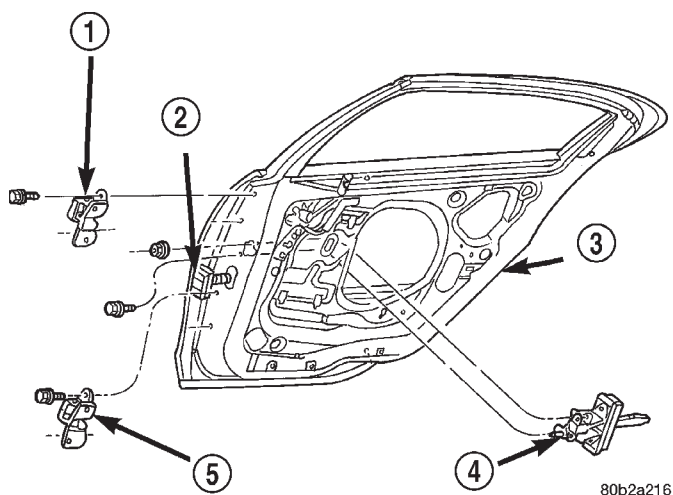


Fig. 2 REAR DOOR

- 1 - UPPER HINGE
 2 - DOOR WIRE HARNESS CONNECTOR
 3 - REAR DOOR
 4 - CHECK STRAP
 5 - LOWER HINGE

INSTALLATION

- (1) Place door in position on vehicle.
- (2) Engage door onto pin on upper door hinge.
- (3) Steady door on lifting device and install bolt and nut attaching upper hinge to door end frame. Tighten the hinge bolt and nut to 28 N·m (250 in. lbs.) torque. If the double ended stud is loosen or replaced tighten the stud to 14 N·m (120 in. lbs.) torque.
- (4) Install bolt and nut attaching lower hinge to door end frame.
- (5) Verify door alignment and operation.

(6) Connect door wire harness to instrument panel wire harness.

(7) Attach check strap.

(8) Align door to achieve equal spacing to surrounding body panels. Panels should be flush across all gaps. If door needs to be aligned (damages or hinge replacement) and can not be achieved, may be necessary to remove the double ended stud and replaced it with a bolt. This may allow extra movement to achieve the proper alignment.

DOOR GLASS

REMOVAL

- (1) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)
- (2) Remove watershield as necessary.
- (3) Raise door glass to gain access to roller channel to glass fasteners through holes in inner door panel.
- (4) Loosen lift plate nuts attaching regulator roller channel to glass (Fig. 3).
- (5) Slide roller channel rearward to allow lift plate nuts to pass through key hole slots in channel.
- (6) Remove glass from roller channel.
- (7) Raise glass upward and out of the opening at top of door.

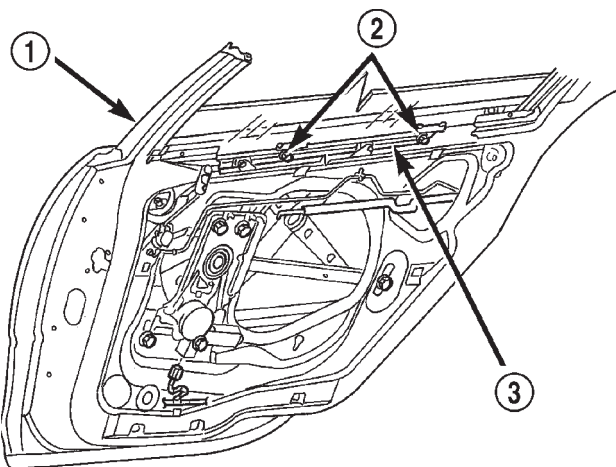


Fig. 3 REAR DOOR GLASS

- 1 - REAR DOOR
 2 - LIFT PLATE NUTS
 3 - GLASS ROLLER CHANNEL

INSTALLATION

- (1) Lower glass into opening at top of door.
- (2) Place glass in position against roller channel.
- (3) Insert lift plate nuts into key hole slots in roller channel and slide channel forward to locked position.

DOOR GLASS (Continued)

- (4) Tighten nuts to attach regulator roller channel to glass and lift plate.
- (5) Install upper trim retainer channel.
- (6) Install watershield.
- (7) Install door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION)

ADJUSTMENTS

ADJUSTMENT

- (1) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)
- (2) Remove watershield as necessary.
- (3) Loosen fastener attaching scissor channel to door panel at rear of access hole (Fig. 4).
- (4) Position glass in run weatherstrips to achieve smooth operation and proper fit.
- (5) Push glass aft and apply slight downward pressure on scissor channel and tighten screw.
- (6) Tighten all fasteners.
- (7) Install watershield.
- (8) Install door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION)

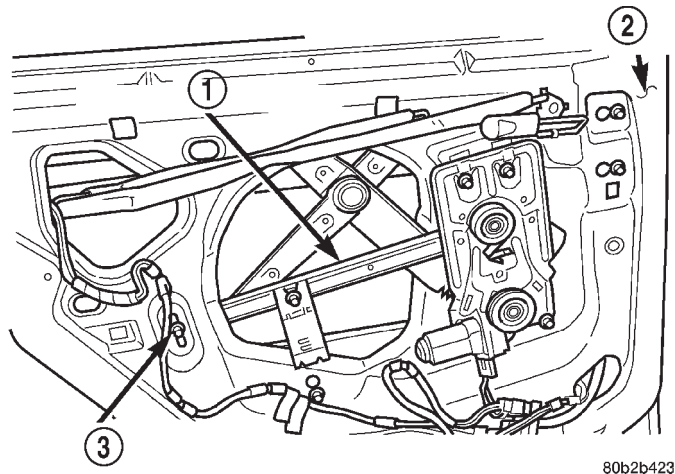


Fig. 4 REAR DOOR GLASS ADJUSTMENT

- 1 - SCISSOR CHANNEL
- 2 - REAR DOOR
- 3 - DOOR GLASS ADJUSTMENT

HINGE

REMOVAL

- (1) Mark outline of hinge on B-pillar and door end frame.
- (2) Remove nut and bolt attaching hinge to B-pillar. Refer to Rear Door Removal procedure.
- (3) Remove bolts attaching hinge to door end frame (Fig. 5).
- (4) Remove hinge from door.

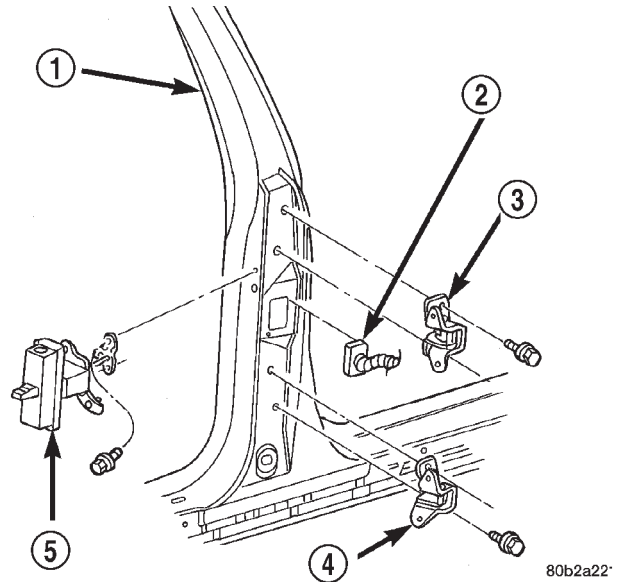


Fig. 5 REAR DOOR HINGE

- 1 - B-PILLAR
- 2 - DOOR WIRE HARNESS CONNECTOR
- 3 - UPPER HINGE
- 4 - LOWER HINGE
- 5 - CHECK STRAP

INSTALLATION

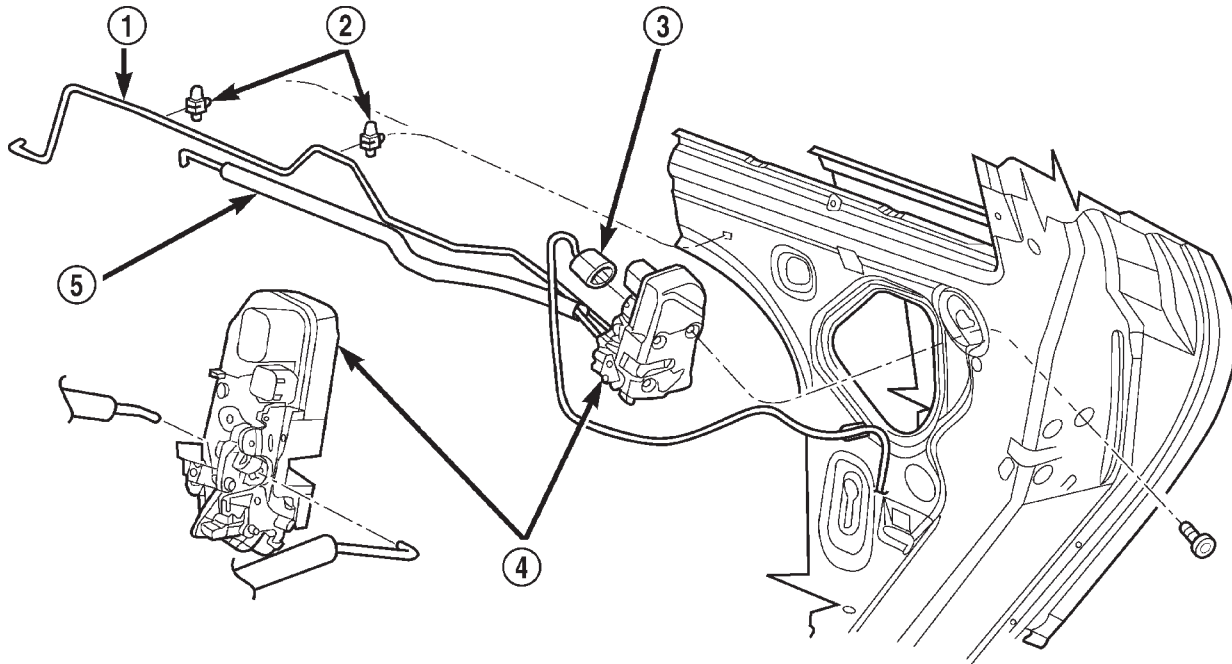
- (1) Align hinge to marks on door end frame.
- (2) Place hinge in position on door.
- (3) Install bolts attaching hinge to door end frame.
- (4) Align hinge to marks on B-pillar.
- (5) Install nut and bolt attaching hinge to B-pillar.
- (6) Verify door alignment and operation, adjust as necessary.

LATCH

REMOVAL

- (1) Close door glass.
- (2) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)
- (3) Remove rear glass channel.
- (4) Disconnect lock button link from door latch.
- (5) Disconnect outside door handle link from door latch.
- (6) Remove screws attaching door latch to door end frame (Fig. 6).
- (7) Remove latch from door.

LATCH (Continued)



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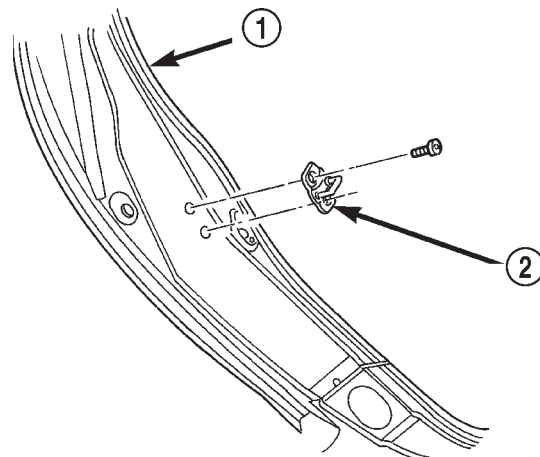
Fig. 6 REAR DOOR LATCH

- 1 - TO LOCK BUTTON
- 2 - CLIPS
- 3 - WIRE CONNECT

- 4 - REAR DOOR LATCH
- 5 - TO DOOR HANDLE

INSTALLATION

- (1) Place latch in position in door.
- (2) Install screws attaching door latch to door end frame.
- (3) Connect outside door handle link to door latch.
- (4) Connect lock button link to door latch.
- (5) Install rear glass channel.
- (6) Verify door latch operation.
- (7) Install door trim panel.(Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION)



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Fig. 7 REAR DOOR LATCH STRIKER

- 1 - C-PILLAR
- 2 - DOOR LATCH STRIKER

LATCH STRIKER**REMOVAL**

- (1) Open rear door.
- (2) Mark location of door latch striker on C-pillar to assist installation alignment.
- (3) Remove bolts holding striker to C-pillar (Fig. 7).
- (4) Remove door latch striker from vehicle.

INSTALLATION

- (1) Place door latch striker in position on vehicle.
- (2) Install bolts attaching striker to C-pillar.
- (3) Align striker to marked location on C-pillar and tighten bolts.

- (4) Verify alignment and operation of door, adjust as necessary.

TRIM PANEL

REMOVAL

CAUTION: Do not pry on door trim panel, damage to trim panel will result.

- (1) Open trim plug from the pull cup and remote bezel by inserting a small flat blade tool into the notch and lifting up.
- (2) Remove screw in the pull cup.
- (3) Remove screw in remote bezel.
- (4) Remove three screws from the bottom edge of door (Fig. 8).

NOTE: Clips are reusable up to three times.

- (5) Using a trim tool, disengage the retaining clips from the door trim panel to the sheet metal inner panel, two clips at the rear of panel and one at the front of the panel (Fig. 9).

- (6) Raise trim panel up over the door flange and being careful to hold the panel securely.

- (7) Disconnect the remote linkage from the door remote handle.

- (8) Remove the wire connect from the rear door speaker, if equipped.

- (9) Disconnect power window switch wire connector.

- (10) Disconnect wiring harness clips from the trim panel.

- (11) Disconnect the courtesy lamp, if equipped.

- (12) Remove trim panel from door.

INSTALLATION

- (1) Place trim panel in position on door.

- (2) Connect the courtesy lamp.

- (3) Connect the wiring harness clips to the trim panel.

- (4) Connect the power window switch wire harness connector.

- (5) Connect the rear door speaker wire connect.

- (6) Connect the remote handle linkage.

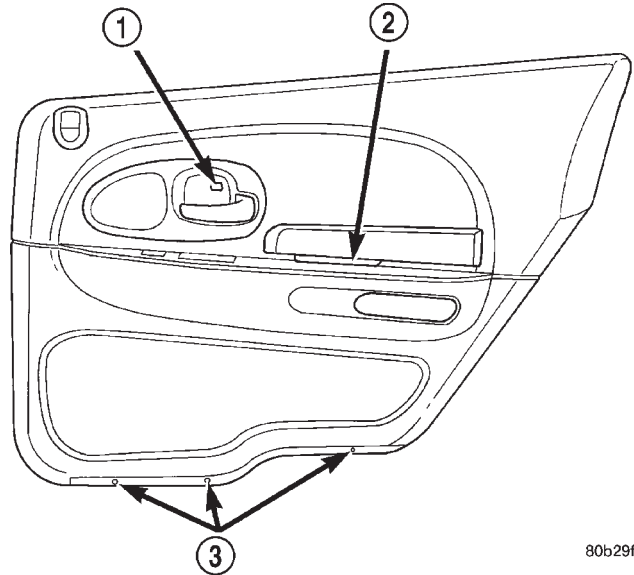
- (7) Hook the trim panel over the sheet metal flange.

- (8) Insert the forward four way alignment guide into position. Insert the rearward two way alignment guide into position.

- (9) Engage the three retaining clips to attach door trim panel to door sheet metal inner panel, up to three ratchet clicks.

- (10) Install three screws to the bottom of the door. Tighten all screws 1.3 to 1.9 N·m (12 to 17 in. lbs.) torque.

- (11) Install screw in the remote bezel and close the trim plug.



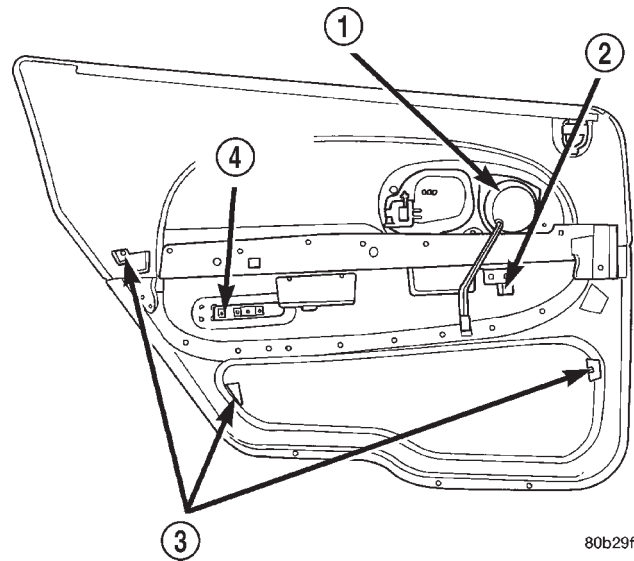
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Fig. 8 REAR DOOR TRIM PANEL - TYPICAL

1 - REMOTE BEZEL

2 - PULL CUP

3 - SCREWS



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Fig. 9 REAR DOOR INNER TRIM PANEL - TYPICAL

1 - REAR DOOR SPEAKER

2 - POWER WINDOW SWITCH

3 - RETAINER CLIPS

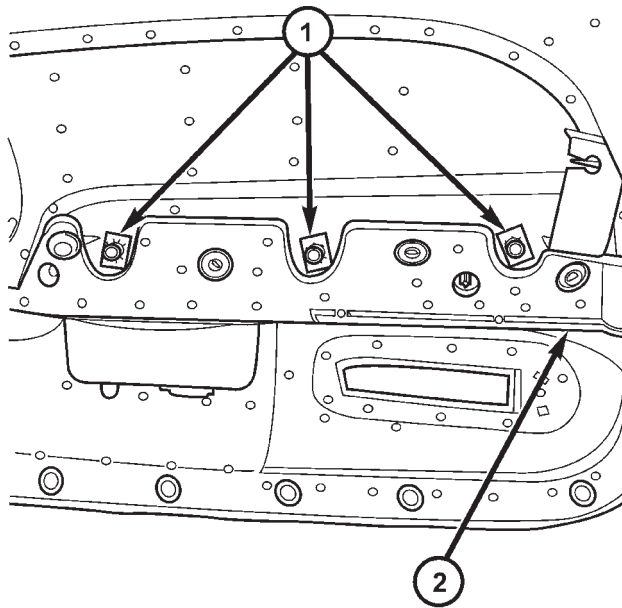
4 - COURTESY LAMP

- (12) Install screw in pull cup, and close the trim plug.

TRIM PANEL - WOOD TRIM

REMOVAL - WOOD TRIM

- (1) Remove door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)
- (2) Remove and discard the retainer clips (Fig. 10)
- (3) Remove the wood trim from the trim panel. (Fig. 11)



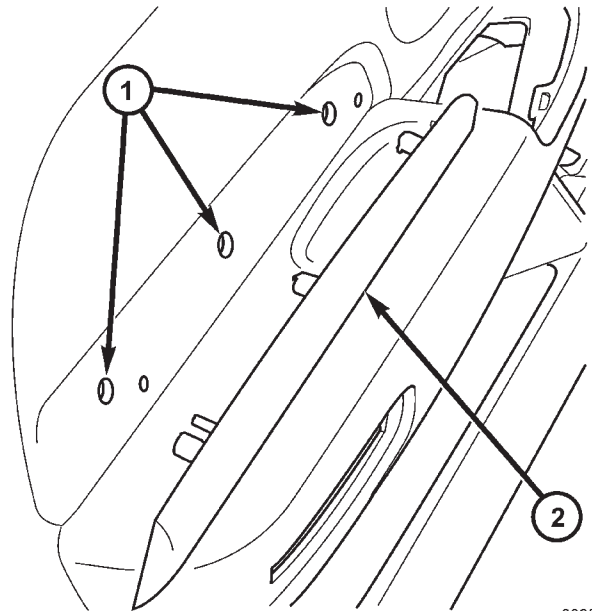
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Fig. 10 WOOD TRIM CLIPS - TYPICAL

- 1 - RETAINER CLIPS
2 - TRIM PANEL

INSTALLATION - WOOD TRIM

- (1) Install wood trim into mounting hole of the trim panel (Fig. 11).
- (2) Install new retainer clips and seat fully (Fig. 10).
- (3) Install the door trim panel. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - INSTALLATION)



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Fig. 11 WOOD TRIM - TYPICAL

- 1 - MOUNTING HOLES
2 - WOOD TRIM

SAIL PANEL

REMOVAL

- (1) Open the rear door.
- (2) Using a trim stick, release clip attaching sail panel to the door.
- (3) Remove sail panel.

INSTALLATION

- (1) Position sail panel on door.
- (2) Press on sail panel to engage clips.

WINDOW REGULATOR

REMOVAL

(1) Remove flag cover, door trim panel, water shield as necessary, and pull cup support bracket. (Refer to 23 - BODY/DOORS - REAR/TRIM PANEL - REMOVAL)

(2) Slide glass from regulator roller channel (Fig. 12).

(3) Disconnect power window motor wire connector.

(4) Loosen screw attaching regulator scissor channel to door panel.

(5) Remove screw and bolt heads from keyhole slots in door panel.

(6) Loosen bolt attaching regulator support brace to door panel.

(7) Loosen bolts attaching regulator to door panel.

(8) Remove regulator from door panel.

(9) Slide regulator rearward and rotate forward end of roller channel through access hole in door panel.

INSTALLATION

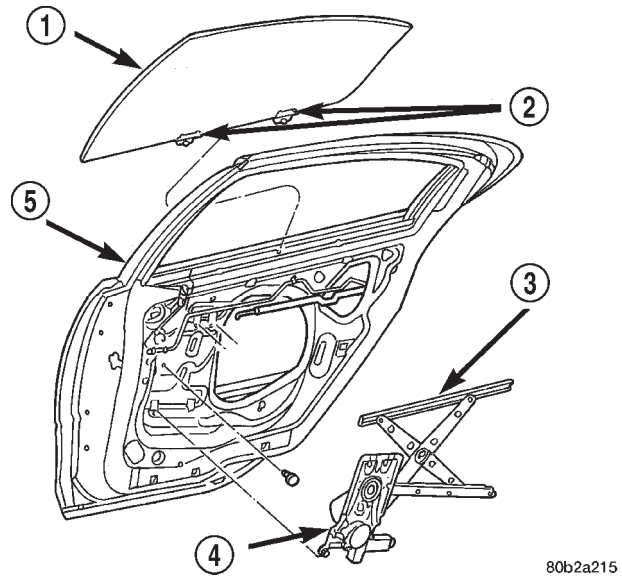
(1) Insert roller channel through access hole in door panel.

(2) Insert bolt and screw heads through key hole slots in door panel.

(3) Tighten bolts attaching regulator to door panel.

(4) Tighten bolt to attach regulator support brace to door panel.

(5) Tighten screw to attach regulator scissor channel to door panel.



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Fig. 12 REAR DOOR WINDOW REGULATOR

- 1 - GLASS
- 2 - LIFT PLATES
- 3 - GLASS ROLLER CHANNEL
- 4 - WINDOW REGULATOR
- 5 - REAR DOOR

- (6) Connect power window motor wire connector.
- (7) Lower door glass on to regulator roller channel.
- (8) Align glass and verify operation.
- (9) Install pull cup support bracket, water shield, door trim panel and flag cover.

EXTERIOR

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BODY SIDE MOLDINGS

REMOVAL

(1) Warm the effected stick on molding and body metal to approximately 38° C (100° F) using a suitable heat lamp or heat gun.

(2) Pull stick on molding from painted surface.

(3) Remove adhesive tape residue from painted surface of vehicle.

INSTALLATION

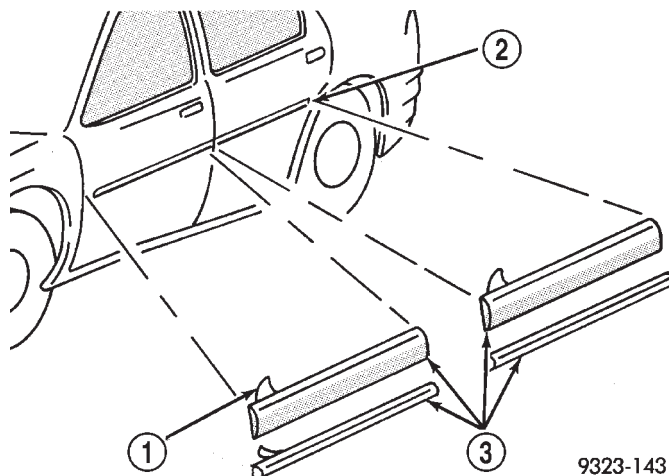
(1) If molding is to be reused, remove tape residue from molding. Clean back of molding with Mopar® Super Kleen solvent or equivalent. Wipe molding dry with lint free cloth. Apply new body side molding (two sided adhesive) tape to back of molding.

(2) Clean body surface with Mopar® Super Kleen solvent or equivalent. Wipe surface dry with lint free cloth.

(3) Apply a length of masking tape on the body, parallel to the top edge of the molding to use as a guide, if necessary. (Fig. 1)

(4) Remove protective cover from tape on back of molding. Apply molding to body below the masking tape guide.

(5) Remove masking tape guide and heat body and molding, see step one. Firmly press molding to body surface to assure adhesion.



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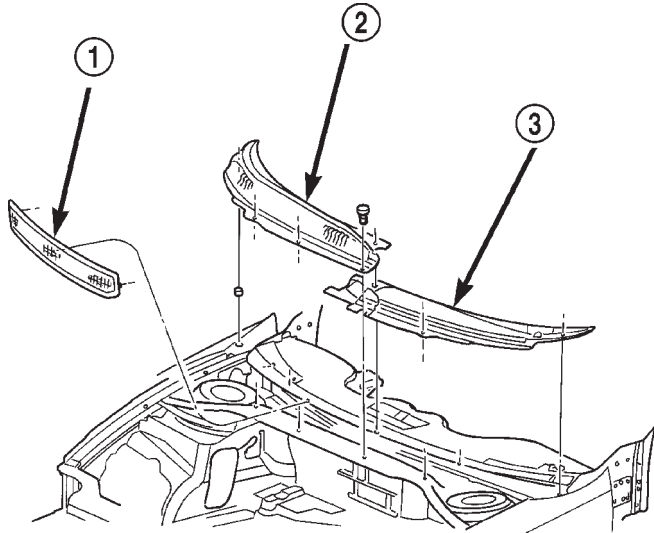
Fig. 1 BODY SIDE MOLDING

- 1 - PROTECTIVE COVER
- 2 - MASKING TAPE GUIDE
- 3 - MOLDINGS

COWL GRILLE AND SCREEN

REMOVAL

- (1) Release hood latch and open hood.
- (2) Remove wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - REMOVAL)
- (3) Remove screws attaching cowl screen at the windshield and under hood (Fig. 2).
- (4) Remove cowl screen from vehicle.



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Fig. 2 COWL SCREEN

- 1 - PLENUM COWL SCREEN
2 - COWL SCREEN RIGHT
3 - COWL SCREEN LEFT

INSTALLATION

- (1) Place cowl screen in position on vehicle.
- (2) Install cowl screen screws, starting at fender moving inboard.
- (3) Install wiper arms. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/WIPER ARMS - INSTALLATION)

EXTERIOR NAME PLATES

REMOVAL

REMOVAL - DOUBLE SIDED TAPE

- (1) Mark reference points before removing.
- (2) Using a heat gun gently apply heat in a circular motion to loosen the adhesive bond.
- (3) Using a nonmetallic prying device, such as a plastic or wood trim stick gently pry up at corners and remove.
- (4) Clean off all traces of adhesive or double sided tape from the panel with a general purpose adhesive remover.

REMOVAL - ADHESIVES

- (1) Mark reference points before removing.
- (2) Using a heat gun gently apply heat in a circular motion to loosen the adhesive bond.
- (3) With your fingernail lift up and peel away badging/tape from panel, using a heat gun as you go.
- (4) Clean off all traces of adhesive from the panel(s) with a general purpose adhesive remover.

INSTALLATION

INSTALLATION - DOUBLE SIDED TAPE

- (1) Clean panel surface with isopropyl alcohol.
- (2) Align badging to reference points.
- (3) Install and press securely to full adhesive contact
- (4) Clean away any reference points.

INSTALLATION - ADHESIVES

- (1) Clean panel surface with isopropyl alcohol.
- (2) Remove paper carrier and align badging/tape to reference points or adjacent panel.
- (3) Install and press securely, using a plastic spreader to eliminate all air bubbles.
- (4) Remove top protective carrier.
- (5) Clean away any reference points.

FRONT STRUT TOWER TO TOWER BRACE

REMOVAL

- (1) Open hood.
- (2) Remove the cowl screen.
- (3) Mark bolt locations on front strut tower to tower brace.
- (4) Remove attaching bolts from the brace (Fig. 3).
- (5) Remove front strut tower to tower brace from vehicle.
- (6) For replacement remove weatherstrip.

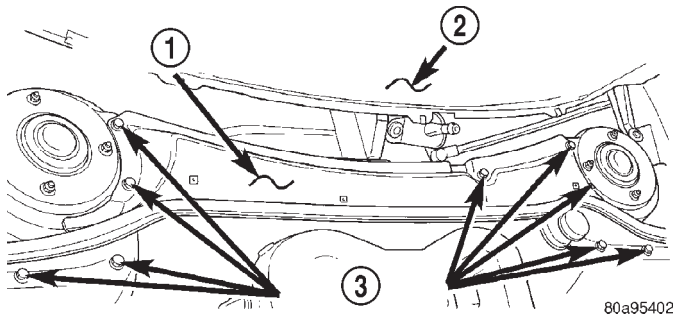


Fig. 3 COWL SUPPORT

- 1 - COWL SUPPORT
2 - WINDSHIELD
3 - SUPPORT FASTENERS

INSTALLATION

- (1) Place in position the front strut tower to tower brace.
- (2) Install front strut tower to tower brace attaching bolts. Check bolt alignment marks.
- (3) Tighten the bolts to 38 N·m (28 ft. lbs.) torque.
- (4) Install cowl screen.

GRILLE

REMOVAL

REMOVAL - CONCORDE

- (1) Open hood.
- (2) Remove fascia.
- (3) Remove two screws attaching foam.
- (4) Remove ten attaching grille clips.
- (5) Remove grille.

REMOVAL - 300 M - UPPER

- (1) Open hood.
- (2) Remove fascia.
- (3) Drill out rivets attaching cross bracket to grille.
- (4) Remove upper grille six attaching clips.
- (5) Remove grille.

REMOVAL - 300 M - LOWER

- (1) Open hood.
- (2) Remove fascia.
- (3) Remove two screws attaching foam.
- (4) Remove lower grille eight attaching clips.
- (5) Remove grille.

INSTALLATION

INSTALLATION - CONCORDE

- (1) Place grille into position on vehicle.
- (2) Install ten attaching grille clips.
- (3) Install two screws attaching foam.
- (4) Install fascia.
- (5) Close hood and check alignment of the grille.

INSTALLATION - 300 M - UPPER

- (1) Place grille into position on vehicle.
- (2) Install six attaching grille clips.
- (3) Install rivets attaching cross bracket to grille.
- (4) Install two screws attaching foam.
- (5) Install fascia.
- (6) Close hood and check alignment of the grille.

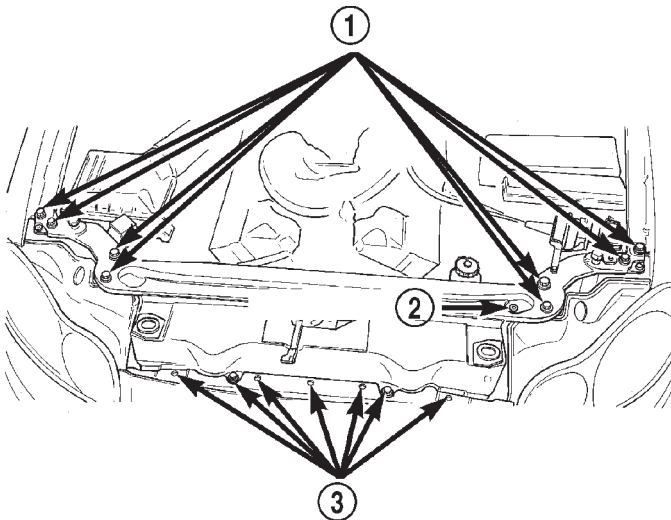
INSTALLATION - 300 M - LOWER

- (1) Place grille into position on vehicle.
- (2) Install eight attaching grille clips.
- (3) Install two screws attaching foam.
- (4) Install fascia.
- (5) Check alignment of the grille.

GRILLE OPENING REINFORCEMENT

REMOVAL

- (1) Open hood.
- (2) Mark bolt locations on the upper radiator closure panel.
- (3) Remove bolts attaching windshield washer bottle and speed control servo, if equipped (Fig. 4).
- (4) Remove headlamp jackscrews both sides.
- (5) Remove fasteners attaching upper bumper fascia.
- (6) Remove bolts attaching the forward edge of upper radiator closure panel.
- (7) Remove bolts attaching upper radiator closure panel.
- (8) Disconnect hood latch cable from hood latch.
- (9) Remove upper radiator closure panel from vehicle.
- (10) For replacement of upper radiator closure panel, remove hood latch, and any other hardware.



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Fig. 4 UPPER RADIATOR CLOSURE

- 1 - ATTACHING BOLTS
2 - JACKSCREW
3 - FASTENERS

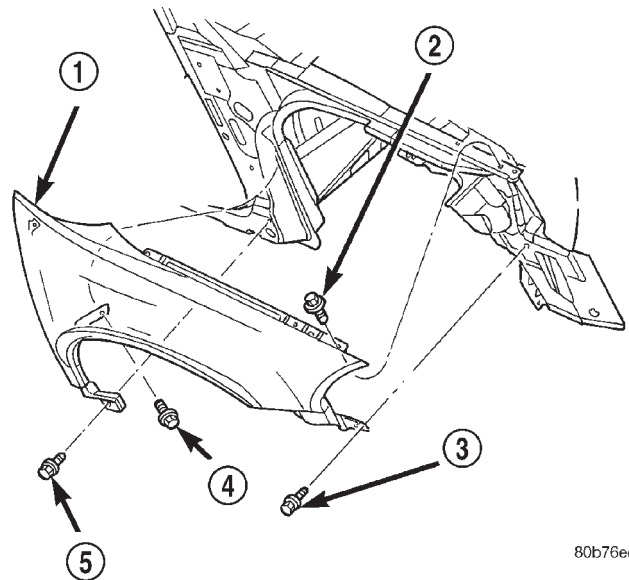
INSTALLATION

- (1) Place in position the upper radiator closure panel.
- (2) Connect hood latch cable to hood latch.
- (3) Install bolts attaching upper radiator closure panel. Check bolt alignment marks.
- (4) Install bolts attaching the forward edge of upper radiator closure panel.
- (5) Install fasteners attaching upper bumper fascia.
- (6) Install headlamp jackscrews both sides.
- (7) Check hood latch operation.

FRONT FENDER

REMOVAL

- (1) Remove headlamp housing.
- (2) Remove splash shield to fascia plastic rivets.
- (3) Remove splash shield to sill cladding.
- (4) First remove fender bolt to lower cowl.
- (5) Next drill a 30 mm (1 1/16 in.) hole in the splash shield to access the upper cowl bolt. Remove bolt.
- (6) Then loosen fender bolt to upper cowl.
- (7) Pull fascia away from fender.
- (8) Remove bolts to lower radiator closure panel.
- (9) Support the hood and disconnect hood prop rod.
- (10) From inside engine compartment, remove bolts attaching fender to upper rail.
- (11) Remove fender from vehicle (Fig. 5).



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Fig. 5 FENDER

- 1 - FRONT FENDER
2 - TO UPPER RAIL
3 - TO RADIATOR CLOSURE PANEL
4 - TO LOWER COWL
5 - TO UPPER COWL

INSTALLATION

- (1) Place fender in position on vehicle.
- (2) From inside engine compartment, install bolts to attach fender to upper rail.
- (3) Connect hood prop rod and support the hood
- (4) Install fender bolts to lower radiator closure panel.
- (5) Place fascia into position.
- (6) Tighten fender bolt to the upper cowl. Use plug that come with fender to fill drilled hole in splash shield.
- (7) Install fender bolt to lower cowl.

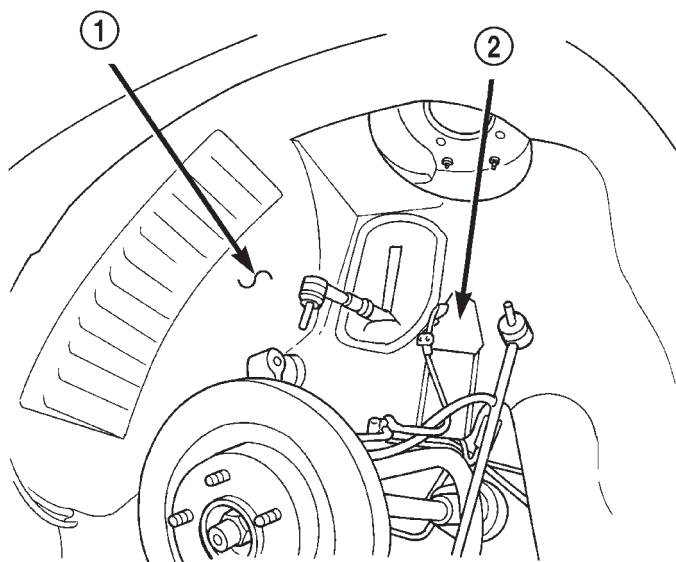
FRONT FENDER (Continued)

- (8) Install splash shield plastic rivets to sill cladding.
- (9) Install splash shield plastic rivets to fascia.
- (10) Install headlamp assembly.
- (11) Check fender for flush and gap.

WHEELHOUSE SPLASH SHIELD

REMOVAL

- (1) Hoist and support vehicle on safety stands.
- (2) Remove front wheel.
- (3) Remove strut assembly from vehicle. (Refer to 2 - SUSPENSION/FRONT/STRUT - REMOVAL)
- (4) Remove screws attaching speed sensor bracket (Fig. 6). Move bracket to access speed sensor wire connector.
- (5) Disconnect speed sensor wire connector.
- (6) Remove fasteners attaching splash shield to inner wheelhouse.
- (7) Remove splash shield from vehicle.



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Fig. 6 WHEELHOUSE SPLASH SHIELD

- 1 - SPLASH SHIELD
2 - SPEED SENSOR BRACKET

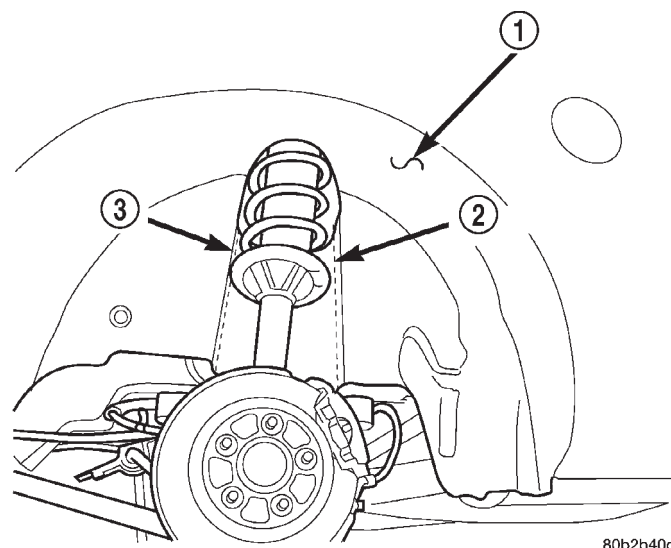
INSTALLATION

- (1) Place splash shield into position.
- (2) Install fasteners to attach splash shield.
- (3) Connect speed sensor wire connector.
- (4) Install screws attaching speed sensor bracket.
- (5) Install strut assembly. (Refer to 2 - SUSPENSION/FRONT/STRUT - INSTALLATION)
- (6) Install front wheel.
- (7) Lower vehicle.

REAR WHEELHOUSE SPLASH SHIELD

REMOVAL

- (1) Hoist and support vehicle on safety stands.
- (2) Remove rear wheel.
- (3) Remove fasteners attaching splash shield. (Fig. 7)
- (4) The shock tower area will have to be cut out of the splash shield. This will ease the removal or installation of the splash shield.
- (5) Remove splash shield from vehicle.



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Fig. 7 REAR WHEELHOUSE SPLASH SHIELD

- 1 - REAR WHEELHOUSE SPLASH SHIELD
2 - CUT LINE
3 - CUT LINE

INSTALLATION

- (1) Place splash shield in position on vehicle with the shock tower cut out.
- (2) Install fasteners to hold splash shield place.
- (3) Install rear wheel.
- (4) Lower vehicle.

SIDE VIEW MIRROR

REMOVAL

- (1) Remove side view mirror cover.
- (2) Remove the door trim panel.
- (3) Disconnect power window mirror motor wire connector, if so equipped.
- (4) Disengage wire harness grommet from mirror flag, if so equipped.
- (5) Remove nuts attaching side view mirror to mirror flag.
- (6) Remove side view mirror from vehicle.

SIDE VIEW MIRROR (Continued)

INSTALLATION

- (1) Feed power mirror wire harness through hole in mirror flag and seat grommet. Do not pull on wire harness to seat grommet.
- (2) Position side view mirror to vehicle.
- (3) Install nuts attaching side view mirror to mirror flag.
- (4) Engage push pin fastener attaching power mirror wire connector to inner door panel, if so equipped.
- (5) Engage power mirror motor wire connector, if so equipped.
- (6) Install side view mirror cover.

SIDE VIEW MIRROR GLASS**REMOVAL**

WARNING: ALWAYS WEAR EYE AND HAND PROTECTION WHEN SERVICING THE MIRROR ASSEMBLY. FAILURE TO OBSERVE THESE WARNINGS MAY RESULT IN PERSONAL INJURY FROM BROKEN GLASS.

- (1) Carefully pull/pry the broken glass holder from the mirror assembly.
- (2) Disconnect the heated mirror electrical connectors from the terminals on the mirror glass holder, if equipped.

INSTALLATION

CAUTION: It is important to make sure the motor is square to the glass holder (attaching fingers) prior

to glass holder attachment, otherwise the glass holder could be installed incorrectly causing poor retention and possible repeat failure.

- (1) Position the new mirror glass holder to the mirror assembly.

NOTE: Position the mirror glass holder so that the moisture drain hole on the mirror glass holder assembly is facing downward.

- (2) Align the mirror glass holder's attaching fingers to the mirror motor housing.

NOTE: Ensure that the protective rubber cover of the mirror motor housing is positioned correctly around the bottom of the fingers area.

- (3) Using one hand, firmly press the mirror glass holder assembly into place while at the same time supporting the housing assembly from the backside with the other hand.

NOTE: Pressure must be applied equally over the center portion of the mirror to engage the mirror glass holder's attaching fingers to the corresponding fingers on the housing assembly. One or more clicks may be heard when finger engagement takes place.

- (4) Verify retention of the mirror glass holder assembly by gently pulling outward on the mirror glass holder.

HOOD

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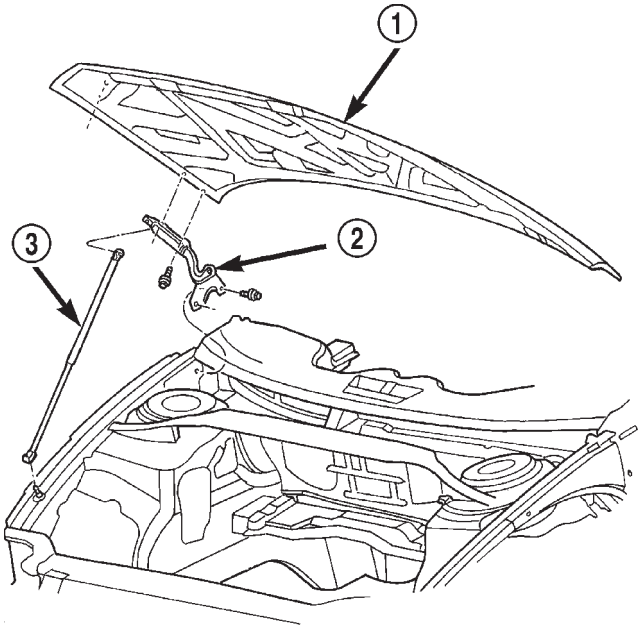
HINGE

REMOVAL

- (1) Support hood on the side that requires hinge replacement.
- (2) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to provide reference marks for installation.
- (3) Remove the gas prop lock caps on the hinge side.
- (4) Remove the gas prop from the hinge.
- (5) Remove bolts attaching hood to hinge.
- (6) Remove bolts attaching hood hinge to vertical wall of load beam and remove hinge from vehicle (Fig. 1). To gain access to the lower left hood hinge the wiper motor assembly will have to be removed. (Refer to 8 - ELECTRICAL/WIPERS/WASHERS/FRONT WIPER MOTOR - REMOVAL)

INSTALLATION

- (1) If necessary, paint new hinge before installation.
- (2) Place hinge in position on vehicle.
- (3) Install bolts attaching hood hinge to vertical wall of load beam.
- (4) Install bolts attaching hood to hinge. When installing hood hinge, align all marks and secure bolts. The hood should be aligned to 4 mm (0.160 in.) gap to the front fenders and flush across the top surfaces along fenders. Hinge can be adjusted up or down by hinge to body attaching bolts to achieve proper hood height.
- (5) Align all marks and tighten bolts to 22.6 to 33.9 N·m (200 to 300 in. lbs.) torque. The hood should be aligned to 4 mm (0.160 in.) gap to the front fenders and flush across the top surfaces along fenders.



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Fig. 1 HOOD HINGE

- 1 - HOOD
- 2 - HOOD HINGE
- 3 - GAS PROP

- (6) Place gas prop in position on vehicle.
- (7) Install the lock cap on the gas prop.
- (8) Install wiper motor assembly.(Refer to 8 - ELECTRICAL/WIPERS/WASHERS/FRONT WIPER MOTOR - INSTALLATION)
- (9) Remove support from under hood and verify hood operation.

HOOD

REMOVAL

- (1) Raise hood to full up position.
- (2) Mark all bolt and hinge attachment locations with a grease pencil or other suitable device to provide reference marks for installation.
- (3) Remove the top bolts attaching hood to hinge and loosen the bottom bolts until they can be removed by hand (Fig. 2).
- (4) With assistance from a helper at the opposite side of the vehicle to support the hood, remove bottom bolts attaching hood to hinge. Remove the hood from the vehicle.

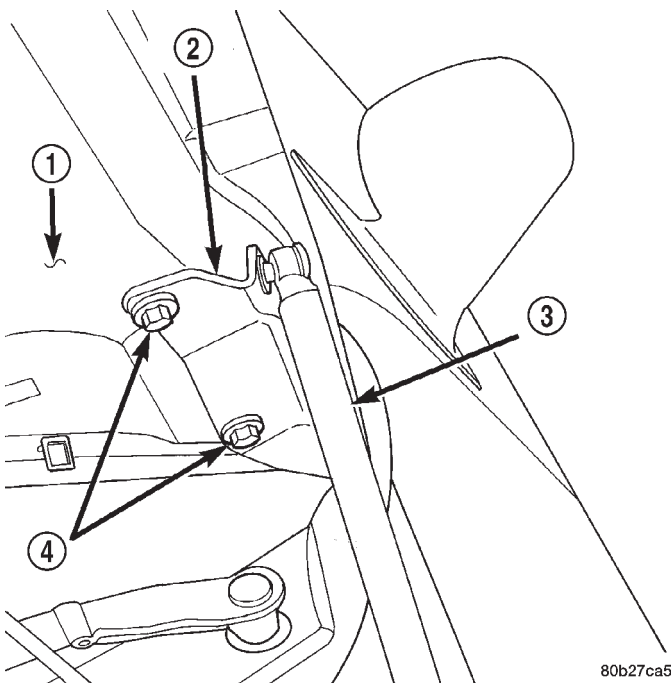


Fig. 2 HOOD

- 1 - HOOD
- 2 - HOOD HINGE
- 3 - GAS PROP
- 4 - BOLTS

INSTALLATION

- (1) Place hood in position on vehicle. With assistance from a helper at the opposite side of the vehicle to support the hood, install bottom bolts attaching hood to hinge finger tight.
- (2) Install top bolts to attach hood to hinge finger tight. When installing hood, align all marks and secure bolts. The hood should be aligned to 4 mm (0.160 in.) gap to the front fenders and flush across the top surfaces along fenders.
- (3) Position bolts at marks and tighten bolts to 22.6 to 33.9 N·m (200 to 300 in. lbs.) torque. The hood should

be aligned to 4 mm (0.160 in.) gap to the front fenders and flush across the top surfaces along fenders.

- (4) Verify hood operation and alignment.

LATCH

REMOVAL

- (1) Release hood latch and open hood.
- (2) Remove nuts attaching hood latch to crossmember (Fig. 3) or (Fig. 4).
- (3) Remove hood latch from crossmember.
- (4) Disconnect hood release cable from hood latch.

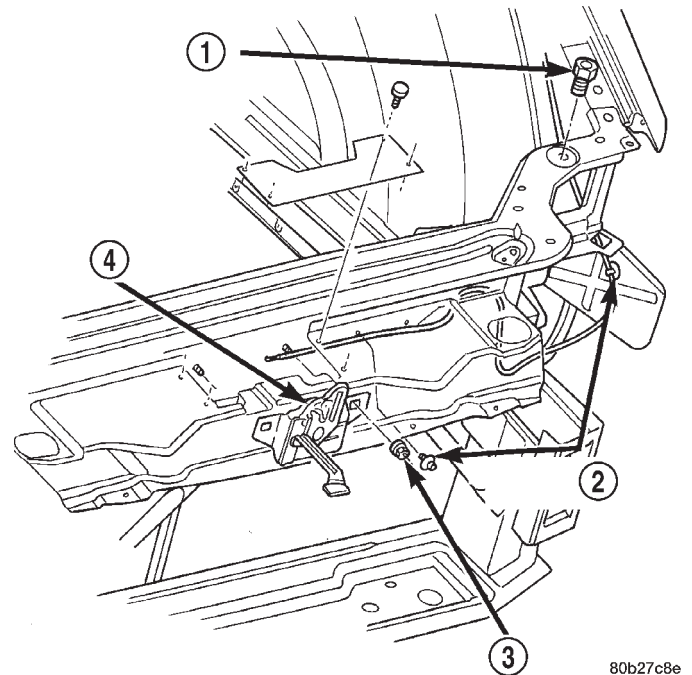


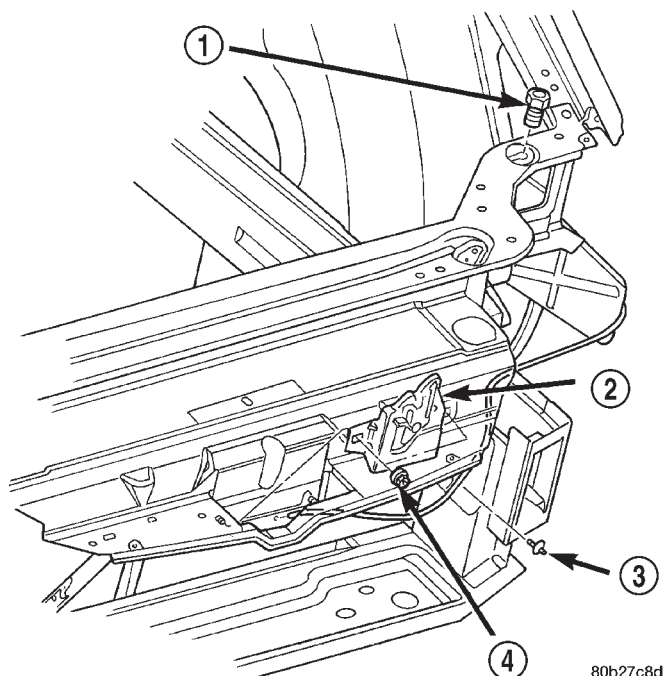
Fig. 3 HOOD LATCH - CONCORDE/300M

- 1 - HOOD BUMPER ADJUSTER
- 2 - HOOD RELEASE CABLE CLIPS
- 3 - NUTS
- 4 - HOOD LATCH

INSTALLATION

- (1) Connect hood release cable to hood latch.
- (2) Place hood latch in position on crossmember.
- (3) Install nuts attaching hood latch to crossmember. Tighten nuts to 22.6 to 33.9 N·m (200 to 300 in. lbs.) torque.
- (4) Verify hood latch operation before closing hood.

LATCH (Continued)

**Fig. 4 HOOD LATCH - INTREPID**

- 1 - HOOD BUMPER ADJUSTER
- 2 - HOOD LATCH
- 3 - RELEASE CABLE CLIP
- 4 - NUTS

LATCH RELEASE CABLE

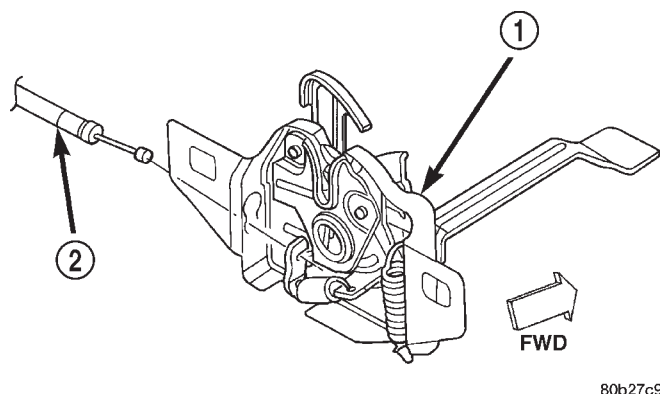
REMOVAL

(1) Release hood latch by using the inside release, if still functioning. If not reach up through the bottom of the fascia opening and release the latch pawl lever.

(2) Disconnect hood release cable ferrule and cable end from hood latch assembly (Fig. 5) or (Fig. 6).

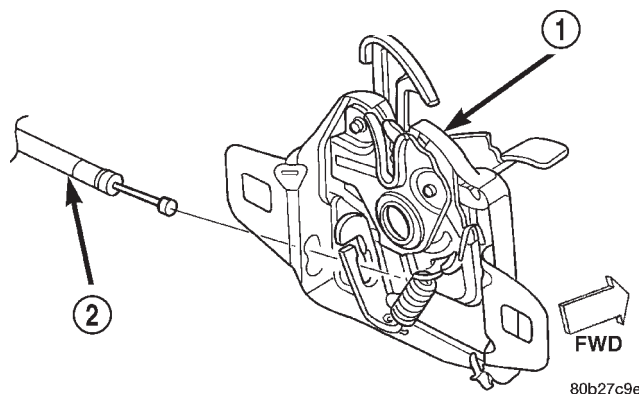
(3) Remove left cowl side trim panel.

(4) Remove screws attaching hood latch release cable handle to the cowl side.

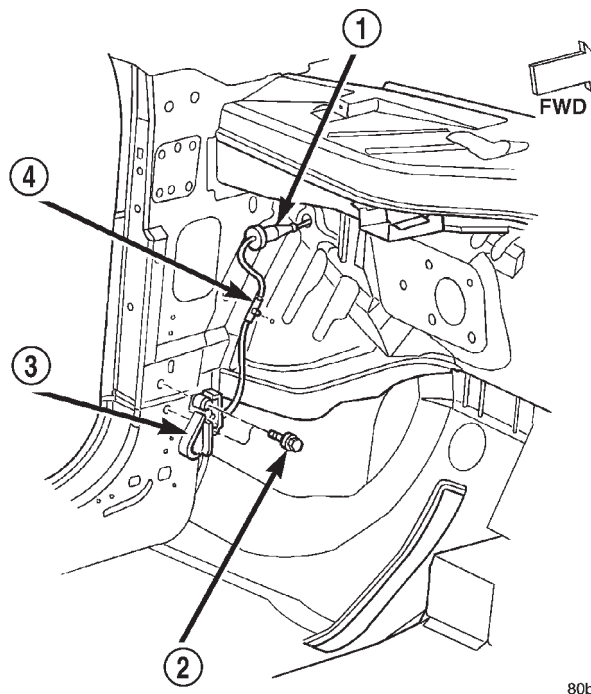
**Fig. 5 HOOD RELEASE CABLE - CONCORDE/300M**

- 1 - HOOD LATCH
- 2 - HOOD RELEASE CABLE

- (5) Remove left wheel splash shield.
- (6) Disengage release cable from routing clips.
- (7) Roll carpet back to expose cable.
- (8) Release taped on cable clip from dash liner (Fig. 7).
- (9) Release the rubber grommet from the dash panel. Pull cable through the dash panel access hole.
- (10) Remove cable from vehicle.

**Fig. 6 HOOD RELEASE CABLE - INTREPID**

- 1 - HOOD LATCH
- 2 - HOOD RELEASE CABLE

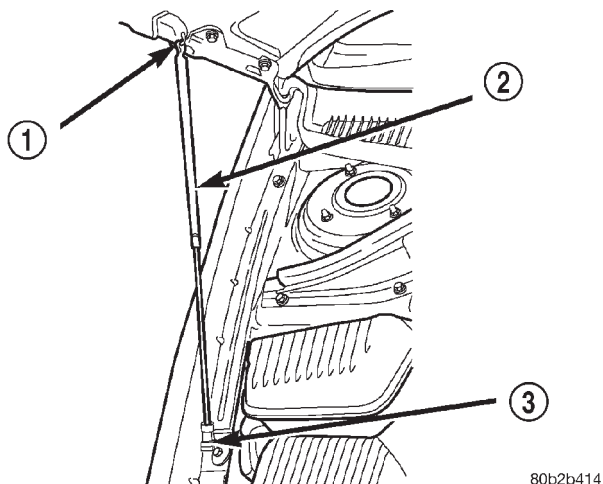
**Fig. 7 HOOD RELEASE HANDLE**

- 1 - RUBBER GROMMET
- 2 - SCREWS
- 3 - HOOD RELEASE HANDLE
- 4 - HOOD RELEASE CABLE

LATCH RELEASE CABLE (Continued)

INSTALLATION

- (1) Place cable in position on vehicle.
- (2) Push cable through access hole in dash panel.
- (3) Install release cable rubber grommet into access hole in dash panel.
- (4) Install screws attaching hood latch release cable handle to the cowl side. Tighten screws to 2.3 to 3.4 N·m (20 to 30 in. lbs.) torque.
- (5) Install cable clips.
- (6) Place carpet into position.
- (7) Install left wheel splash shield.
- (8) Install left cowl side trim panel.
- (9) Connect hood release cable ferrule and cable end to hood latch.
- (10) Verify hood latch operation before closing hood.



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Fig. 8 HOOD GAS PROP

- 1 - LOCK CAP
2 - GAS PROP
3 - LOCK CAP

SUPPORT CYLINDER

REMOVAL

- (1) Open hood.
- (2) Support hood with a suitable prop device.
- (3) Remove gas prop lock caps on each end (Fig. 8).
- (4) Remove gas prop from vehicle.

INSTALLATION

- (1) Place gas prop in position on vehicle.
- (2) Install the lock caps on the gas prop.

- (3) Verify hood lid operation.

INSTRUMENT PANEL

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CLUSTER BEZEL

REMOVAL

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 1).

(2) Remove the instrument panel left end cap.

(3) Remove steering column shroud cover.

(4) Tilt the steering column down into the lowest position.

(5) Remove one screw (Concorde/300M) to cluster bezel

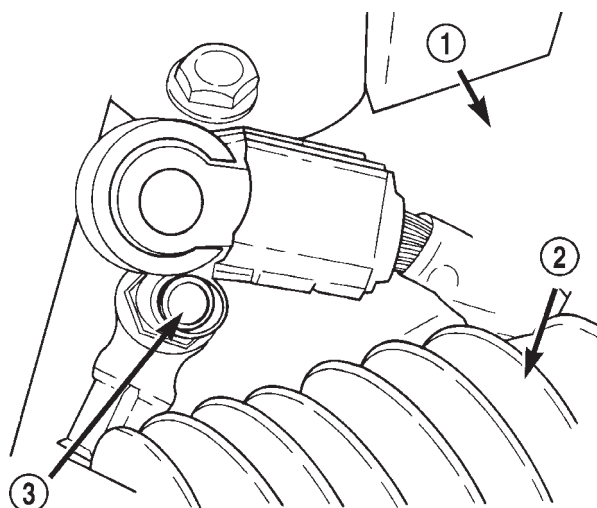
(6) Remove the items to expose bezel mounting screws. Items vary depending on model.

(7) Remove two screws over upper cluster bezel in instrument panel brow area and all remaining attaching screws.

(8) Using a trim stick (special tool #C-4755), gently pry out on the instrument panel cluster bezel, disconnect headlamp switch connector, and remove.

INSTALLATION

(1) Connect headlamp switch connector. Place the cluster bezel into position and snap it into place firmly.



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Fig. 1 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

(2) Install the two screws over upper cluster bezel in instrument panel brow area and all remaining attaching screws.

CLUSTER BEZEL (Continued)

(3) Install the items covering the bezel mounting screws.

(4) Install the one screw (Concorde/300M) to cluster bezel

To service any instrument cluster component, the instrument cluster must be removed from the instrument panel. Use the following procedure:

(5) Tilt the steering column down into the highest position.

(6) Install the steering column shroud cover.

(7) Install the instrument panel left end cap.

(8) Connect the negative battery cable remote terminal to the remote battery post (Fig. 1).

DASH SILENCER

REMOVAL

(1) Remove all parts mounting through the dash silencer (Refer to 23 - BODY/INTERIOR/CROSS CAR BEAM - REMOVAL), (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL), (Refer to 19 - STEERING/COLUMN - REMOVAL), (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/PEDAL - REMOVAL), (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/ACCELERATOR PEDAL -

REMOVAL), (Refer to 23 - BODY/INTERIOR/CROSS CAR BEAM - REMOVAL) and etc.

(2) Feed electrical wires back through the silencer wiring pass through holes (Fig. 2).

(3) Remove fasteners attaching silencer to the dash and side cowls.

(4) Remove silencer from vehicle.

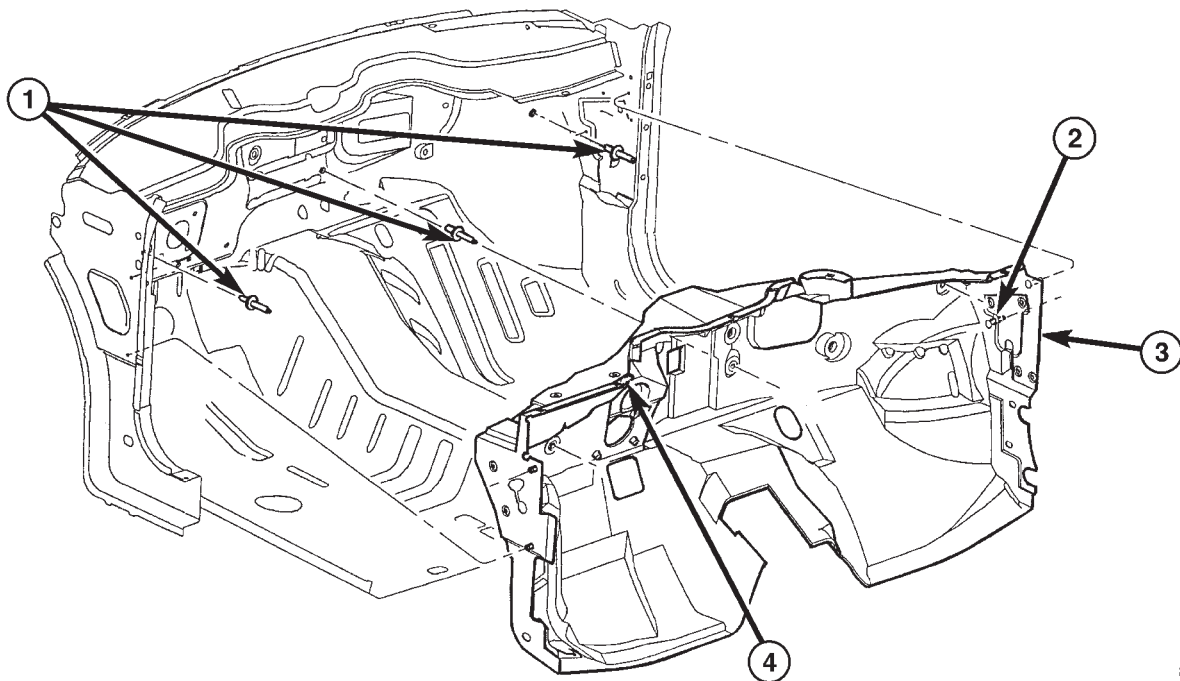
INSTALLATION

(1) Position silencer to dash panel and cowl panels (Fig. 2).

(2) Push retainers over previously installed studs on the dash panel.

(3) Attach silencer with push pins to the side cowl and clips to the top cowl/dash weld flange.

(4) Install all other parts removed (Refer to 23 - BODY/INTERIOR/CROSS CAR BEAM - INSTALLATION), (Refer to 14 - FUEL SYSTEM/FUEL INJECTION/ACCELERATOR PEDAL - INSTALLATION), (Refer to 5 - BRAKES/HYDRAULIC/MECHANICAL/PEDAL - INSTALLATION), (Refer to 19 - STEERING/COLUMN - INSTALLATION) (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION), (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION) and etc.



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Fig. 2 DASH SILENCER

1 - PUSH PINS
2 - CLIPS

3 - DASH STUDS
4 - SILENCER

GLOVE BOX

REMOVAL

- (1) Remove the four screws at bottom of glove box door.
- (2) Open the glove box door and slide sidewalls inboard to remove the door/box assembly from instrument panel.
- (3) Place the glove box on a cloth to protect the door surface.
- (4) Remove the nine screws from backside of the door.
- (5) Separate the inner and outer door.
- (6) Remove one screw to the latch.
- (7) Remove latch from outer door.

NOTE: If the glove box door is going to be left off for an extended period of time, the Ignition Off Draw (IOD) fuse should be pulled to maintain battery condition.

INSTALLATION

- (1) Install latch from outer door.
- (2) Install one screw to the latch.
- (3) Place the inner and outer door together.
- (4) Install the nine screws to the backside of the door.
- (5) Slide sidewalls inboard to install the door/box assembly into instrument panel.
- (6) Install the four screws at bottom of glove box door to instrument panel.

GLOVE BOX LATCH

REMOVAL

- (1) Remove the four screws at bottom of glove box door.
- (2) Open the glove box door and slide sidewalls inboard to remove the door/box assembly from instrument panel.
- (3) Place the glove box on a cloth to protect the door surface.
- (4) Remove the nine screws from backside of the door.
- (5) Separate the inner and outer door.
- (6) Remove one screw to the latch.
- (7) Remove latch from outer door.

NOTE: If the glove box door is going to be left off for an extended period of time, the Ignition Off Draw (IOD) fuse should be pulled to maintain battery condition.

INSTALLATION

- (1) Install latch from outer door.
- (2) Install one screw to the latch.
- (3) Place the inner and outer door together.
- (4) Install the nine screws to the backside of the door.
- (5) Slide sidewalls inboard to install the door/box assembly into instrument panel.
- (6) Install the four screws at bottom of glove box door to instrument panel.

INSTRUMENT PANEL ASSEMBLY

REMOVAL

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY INSTRUMENT PANEL OR COMPONENT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY. ALLOW SYSTEM CAPACITOR TO DISCHARGE FOR 2 MINUTES.

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 1).
- (2) Remove one Allen screw to shifter knob.
- (3) Remove left and right instrument panel end covers.

NOTE: On 300M vehicles, the center bezel must be removed prior to the shifter bezel.

- (4) 300M, remove center bezel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL).
- (5) Using a trim stick (special tool #C-4755) or equivalent, gently pry up on shifter bezel.
- (6) Disconnect two wire connectors, one illumination bulb socket, and remove.
- (7) Remove two screws from lower instrument panel cover (outside end) and disconnect deck lid release switch wiring connector. Pull rearward on lower instrument panel cover releasing clips. Remove cable to brake release handle. Pull rearward and remove cover from vehicle.
- (8) On six passenger vehicles, remove the lower floor bin and proceed with Step 14 (Refer to 23 - BODY/INSTRUMENT PANEL/STORAGE BIN - REMOVAL).
- (9) On five passenger vehicles, use trim stick or equivalent to gently remove center bezel (Refer to 23

INSTRUMENT PANEL ASSEMBLY (Continued)

- BODY/INSTRUMENT PANEL/STORAGE BIN - REMOVAL).

(10) Disconnect wire connectors to the HVAC control and traction control switch and remove bezel from vehicle.

(11) Remove two screws to left console side cover, pull outboard and remove from vehicle.

(12) Lower glove box door to floor by pinching sides together, towards each other. Remove two screws to right console side cover, pull outboard and remove from vehicle.

(13) Remove two front bracket screws and two screws inside console storage bin to remove console.

(14) Remove two nuts attaching center lower instrument panel to floor tunnel bracket (Fig. 3).

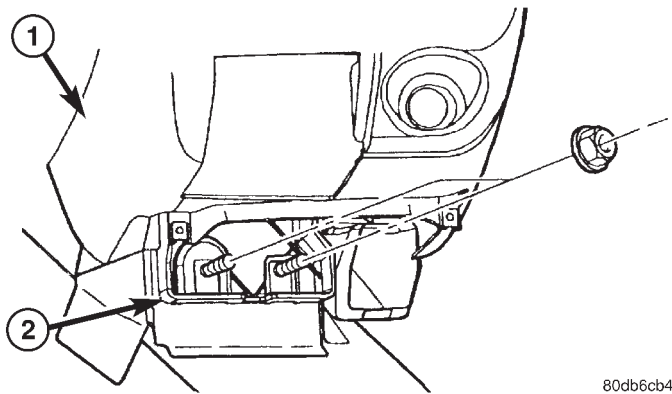


Fig. 3 INSTRUMENT PANEL CENTER STACK RETAINER

1 - INSTRUMENT PANEL

2 - INSTRUMENT PANEL CENTER STACK RETAINER

(15) Remove four bolts to steel steering column reinforcement from bottom of lower instrument panel cover and disconnect 16-way Diagnostic Link Connector (DLC) from steel reinforcement (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).

(16) Remove one screw to the steering column mounting plate (Fig. 4).

(17) Remove one screw to left floor duct/silencer pad and remove from vehicle.

(18) Remove steering column from vehicle.

(a) Remove column shrouds.

(b) Disconnect shift interlock cable at ignition switch.

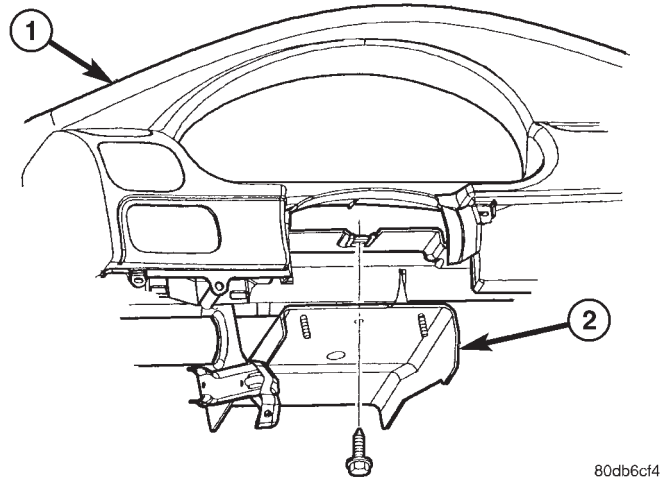
(c) Disconnect column wiring.

(d) Disconnect under column duct section and remove from vehicle.

(e) Disconnect and remove left panel A/C outlet duct.

(f) Remove four column mounting bolts at brake pedal support bracket.

(g) Lower steering column to floor.



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Fig. 4 STEERING COLUMN MOUNTING PLATE

1 - INSTRUMENT PANEL

2 - STEERING COLUMN MOUNTING PLATE

(19) Disconnect two harness connectors to the HVAC housing, the Airbag Control Module (ACM), and two ground eyelets left of the floor tunnel near the bulkhead.

(20) Using a trim stick or equivalent, gently pry out on the left and right A-pillar trim moldings, and slide rearward to remove.

(21) Using a trim stick or equivalent, gently pry up on the instrument panel top cover and remove by gently pulling toward the rear of vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).

(22) Remove one screw retaining each left and right scuff plate. Using a trim stick or equivalent, gently pry up on left and right scuff plates and remove from vehicle.

(23) Remove three screws to right and left side cowl side kick panels and remove from vehicle (Fig. 5).

(24) Remove right side under dash silencer/pad.

(25) Disconnect the two right side harness connectors to radio antenna and amplifier DIN cable.

(26) Disconnect the left side harness connectors to junction block and Body Control Module (BCM).

(27) Remove eight remaining instrument panel retaining screws to body.

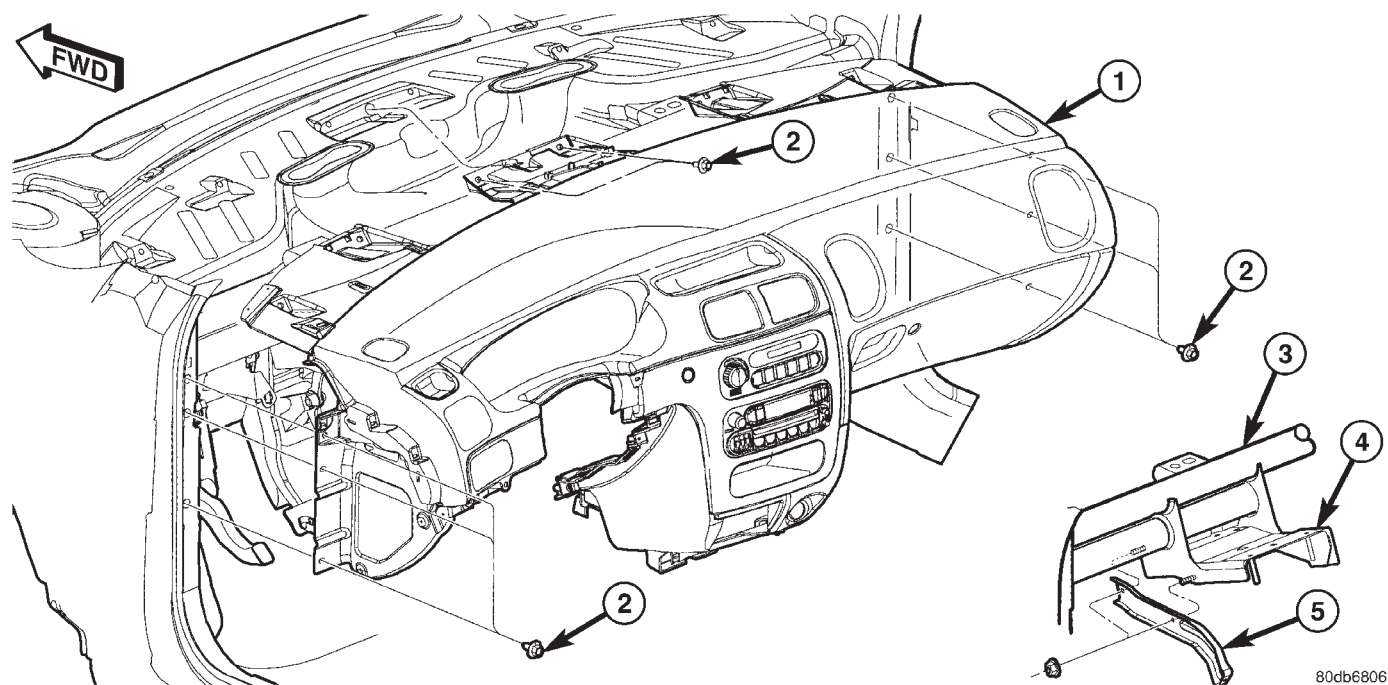
(28) Pull rearward on instrument panel.

(29) Make sure that all harnesses are free and clear from snagging.

(30) With the help of an assistant, remove instrument panel from vehicle and place on bench.

(31) If replacing instrument panel and pad assembly, transfer all parts to new assembly. Refer to (Fig. 6), (Fig. 7), and (Fig. 8).

INSTRUMENT PANEL ASSEMBLY (Continued)

**Fig. 5 INSTRUMENT PANEL REMOVAL**

- 1 - INSTRUMENT PANEL
- 2 - ATTACHING SCREWS
- 3 - CROSS CAR BEAM

- 4 - STEERING COLUMN MOUNTING PLATE
- 5 - INSTRUMENT PANEL COLUMN BRACKET

INSTALLATION

(1) If replacing instrument panel and pad assembly, transfer all parts to new assembly (Fig. 6), (Fig. 7), and (Fig. 8).

(2) With the help of an assistant, place instrument panel into vehicle into the approximate mounting position (Fig. 5).

(3) Make sure that all harnesses are free and clear from snagging.

(4) Install eight instrument panel retaining screws to body.

(5) Connect the left side harness connectors to junction block and Body Control Module (BCM).

(6) Connect the two right side harness connectors to radio antenna and amplifier DIN cable.

(7) Install the right side under dash silencer/pad.

(8) Place the right and left cowl side kick panels into position and install the three retaining screws.

(9) Place the right and left scuff plates into position and firmly press them into place. Install the one screw retaining each left and right scuff plate.

(10) Place the instrument panel top cover into position and firmly snap into place (Fig. 5).

(11) Place the right and left A-pillar trim moldings into place starting from the rear and firmly snap into place.

(12) Connect the two harness connectors to the HVAC housing, the Airbag Control Module (ACM),

and two ground eyelets left of the floor tunnel near the bulkhead.

(13) Install the steering column:

(a) Raise steering column into position at brake pedal support bracket.

(b) Install the four column mounting bolts at brake pedal support bracket.

(c) Place the left panel A/C outlet duct into position and firmly snap into place.

(d) Place the under column duct section into position and firmly snap into place.

(e) Connect column wiring.

(f) Connect shift interlock cable at ignition switch.

(g) Install the steering column shrouds.

(14) Install one screw attaching instrument panel to the steering column mounting plate (Fig. 4).

(15) Place the left floor duct/silencer pad into position and install the one retaining screw.

(16) Connect the 16-way Diagnostic Link Connector (DLC) to the steel reinforcement.

(17) Install the four bolts to steel reinforcement at the bottom of lower instrument panel cover.

(18) Install the two nuts attaching center lower instrument panel to floor tunnel bracket. On six passenger vehicles go to Step 25 (Fig. 3).

(19) Install the two front bracket screws and two screws inside console storage bin to console.

INSTRUMENT PANEL ASSEMBLY (Continued)

(20) Place the right console side cover into position and firmly snap into place. Install the two screws to right console side cover.

(21) Raise glove box door to by pinching sides together, towards each other.

(22) Place the left console side cover into position and firmly snap into place. Install the two screws to the left console side cover.

(23) Connect wire connectors to HVAC control and traction control switch.

(24) On five passenger vehicles, place instrument panel center bezel into position and firmly snap into place (Refer to 23 - BODY/INSTRUMENT PANEL/STORAGE BIN - INSTALLATION).

(25) On six passenger vehicles, install the lower floor bin (Refer to 23 - BODY/INSTRUMENT PANEL/STORAGE BIN - INSTALLATION).

(26) Connect decklid release switch wiring connector, install the cable to brake release handle. Place

the left lower instrument panel cover into position and firmly snap into place. Install the two screws to the lower instrument panel cover (outside end).

(27) Connect two wire connectors and one illumination bulb socket.

(28) Place shifter bezel into position and firmly snap into place.

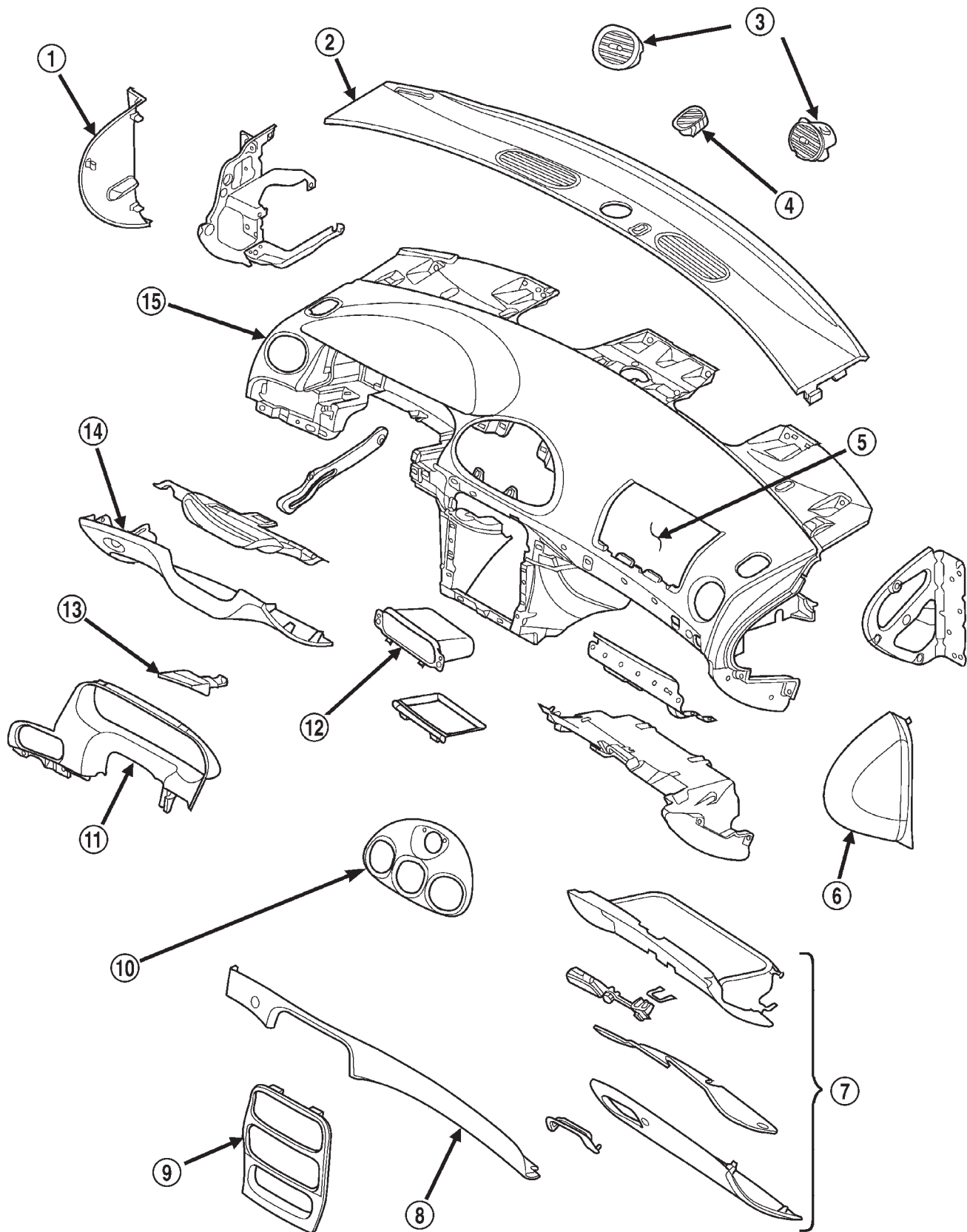
NOTE: On 300M vehicles, the shifter bezel must be installed prior to the center bezel being installed.

(29) Install left and right instrument panel end covers by placing into position and firmly snapping into place.

(30) Install the one Allen screw to shifter knob.

(31) Connect the negative battery cable remote terminal to the remote battery post (Fig. 1).

INSTRUMENT PANEL ASSEMBLY (Continued)



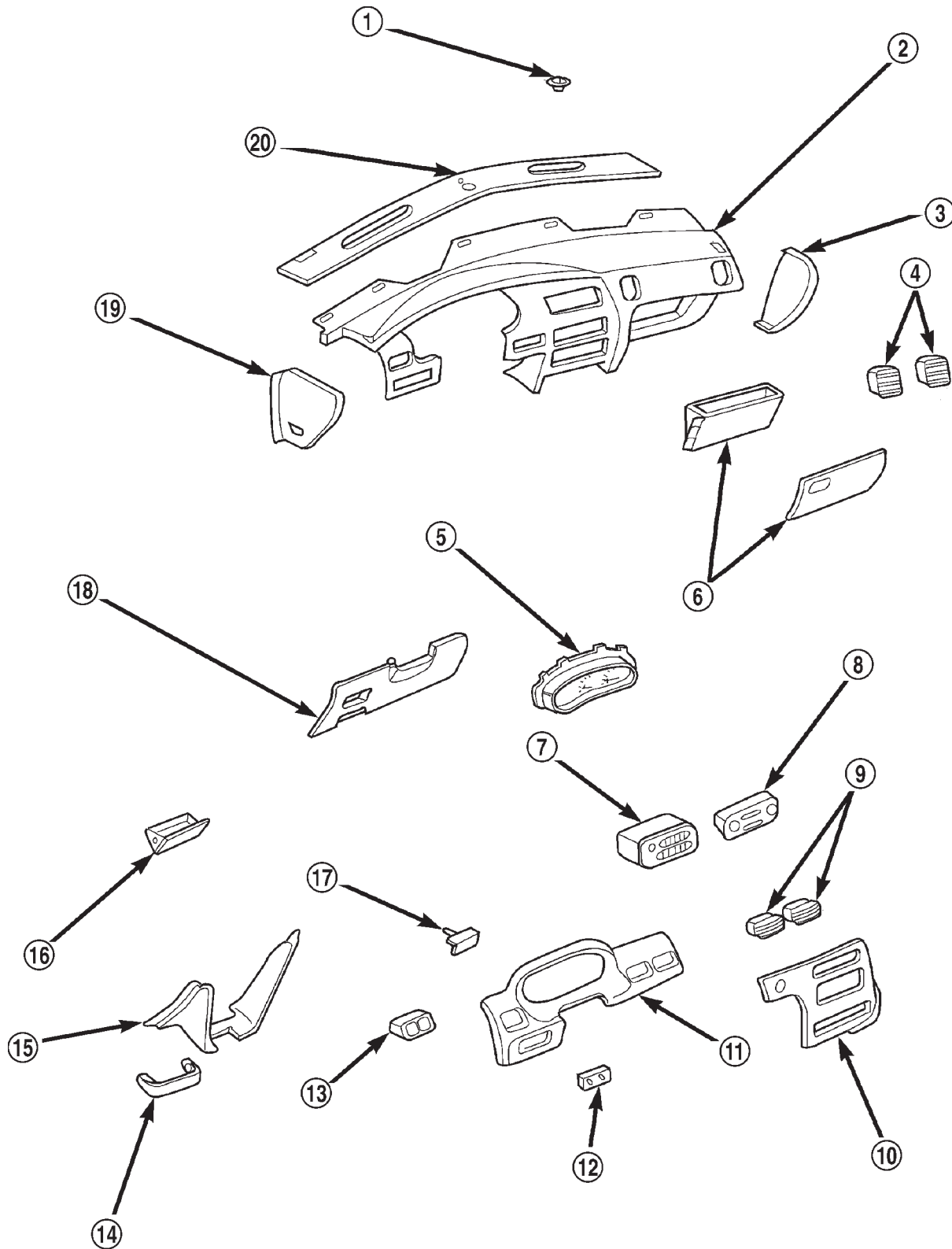
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Fig. 6 INSTRUMENT PANEL COMPONENTS - 300M

INSTRUMENT PANEL ASSEMBLY (Continued)

- | | |
|--|--|
| 1 - BEZEL, INSTRUMENT PANEL END CAP | 9 - BEZEL, INSTRUMENT PANEL TRIM-CENTER |
| 2 - COVER, UPPER INSTRUMENT PANEL | 10 - BEZEL, INSTRUMENT PANEL AIR DISTRIBUTION OUTLET |
| 3 - LOUVER, AIR OUTLET | 11 - BEZEL, INSTRUMENT CLUSTER |
| 4 - LOUVER/DEMISTER SIDE WINDOW | 12 - STORAGE COMPARTMENT CUBBY BOX |
| 5 - MODULE, PASSENGER SIDE AIRBAG | 13 - LEVER, PARKING BRAKE |
| 6 - BEZEL, INSTRUMENT PANEL END CAP | 14 - COVER, LOWER INSTRUMENT PANEL-LEFT SIDE |
| 7 - GLOVE BOX ASSEMBLY, INSTRUMENT PANEL | 15 - INSTRUMENT PANEL ASSEMBLY |
| 8 - BEZEL, INSTRUMENT PANEL UPPER RIGHT TRIM | |
-

INSTRUMENT PANEL ASSEMBLY (Continued)



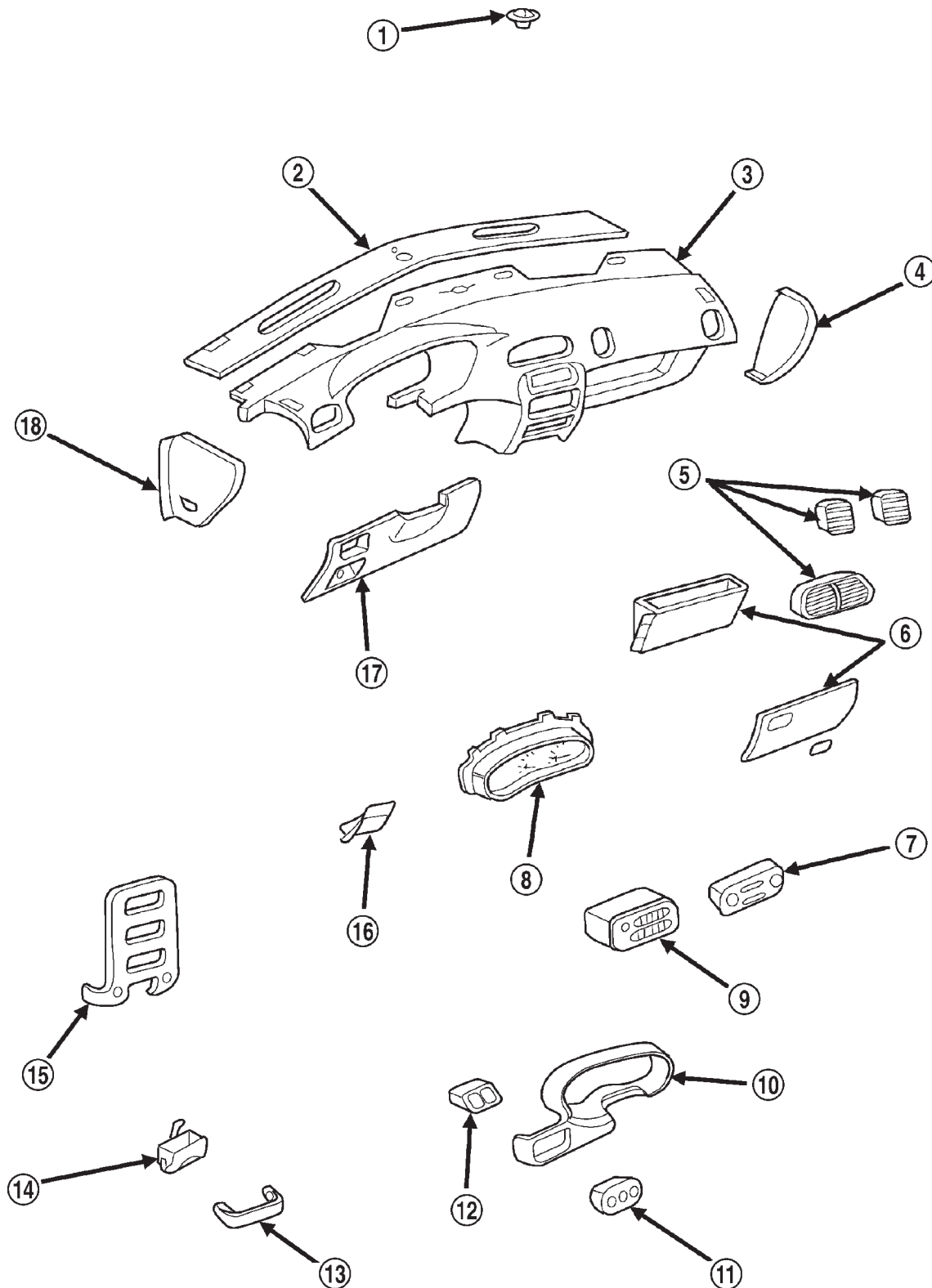
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Fig. 7 INSTRUMENT PANEL COMPONENTS - INTREPID

INSTRUMENT PANEL ASSEMBLY (Continued)

1 - SPEAKER, INSTRUMENT PANEL CENTER	11 - BEZEL INSTRUMENT CLUSTER
2 - INSTRUMENT PANEL ASSEMBLY	12 - SWITCH HEADLAMP
3 - BEZEL, INSTRUMENT PANEL END CAP	13 - LOUVER, AIR OUTLET
4 - LOUVER, AIR OUTLET	14 - COVER, INSTRUMENT PANEL CENTER SUPPORT/BIN (6 PASS. ONLY)
5 - HOUSING INSTRUMENT CLUSTER	15 - 6 PASS. ONLY
6 - GLOVE BOX ASSEMBLY	16 - ASH RECEIVER
7 - RADIO	17 - LEVER, PARKING BRAKE
8 - CONTROL ASSEMBLY, INSTRUMENT PANEL	18 - COVER, LOWER INSTRUMENT PANEL
9 - LOUVER, AIR OUTLET	19 - BEZEL, INSTRUMENT PANEL END CAP
10 - BEZEL, INSTRUMENT PANEL TRIM-CENTER	20 - COVER, UPPER INSTRUMENT PANEL

INSTRUMENT PANEL ASSEMBLY (Continued)



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Fig. 8 INSTRUMENT PANEL COMPONENTS - CONCORDE

INSTRUMENT PANEL ASSEMBLY (Continued)

- | | |
|---|--|
| <ul style="list-style-type: none"> 1 - SPEAKER, INSTRUMENT PANEL CENTER 2 - COVER, UPPER INSTRUMENT PANEL 3 - INSTRUMENT PANEL ASSEMBLY 4 - BEZEL, INSTRUMENT PANEL END CAP 5 - LOUVER, AIR OUTLET 6 - GLOVE BOX ASSEMBLY 7 - CONTROL ASSEMBLY, INSTRUMENT PANEL 8 - HOUSING, INSTRUMENT CLUSTER 9 - RADIO | <ul style="list-style-type: none"> 10 - BEZEL, INSTRUMENT CLUSTER 11 - SWITCH, HEADLAMP 12 - LOUVER, AIR OUTLET 13 - COVER, INSTRUMENT PANEL CENTER SUPPORT/BIN (6 PASS. ONLY) 14 - ASH RECEIVER 15 - BEZEL, INSTRUMENT PANEL TRIM - CENTER 16 - LEVER, PARKING BRAKE 17 - COVER, LOWER INSTRUMENT PANEL 18 - BEZEL, INSTRUMENT PANEL END CAP |
|---|--|

INSTRUMENT PANEL CENTER BEZEL

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 1).
- (2) Remove ash receiver (if applicable).
- (3) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on center trim bezel. Disconnect wiring connectors to HVAC controls, cigar lighter/auxiliary power outlet and traction control switch (if equipped) (Fig. 9).
- (4) Remove instrument panel center trim bezel.

NOTE: The traction control switch, HVAC control head and cigar lighter/auxiliary power outlet must be transferred to new bezel if being replaced.

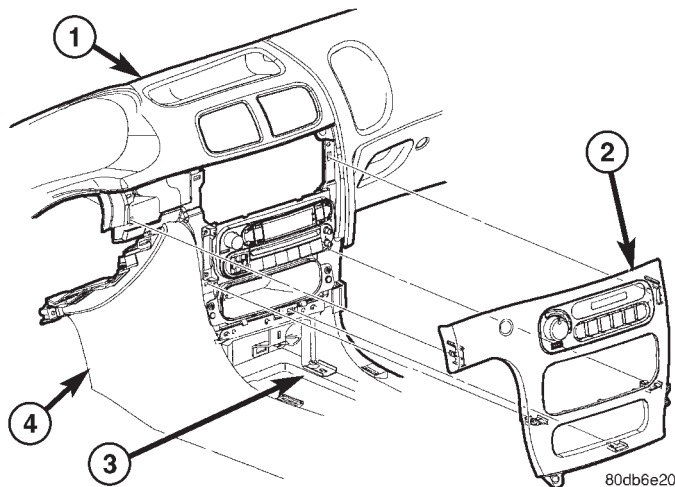


Fig. 9 INSTRUMENT PANEL CENTER UPPER BEZEL

- 1 - INSTRUMENT PANEL
- 2 - INSTRUMENT PANEL BEZEL
- 3 - CONSOLE
- 4 - CONSOLE SIDE PANEL

INSTALLATION

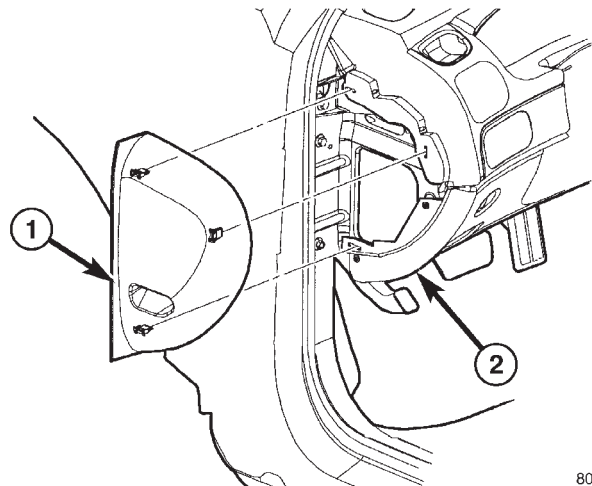
- (1) Connect wiring connectors to HVAC controls, cigar lighter/auxiliary power outlet and traction control switch (if equipped).

- (2) Place the instrument panel center trim bezel into position and firmly snap into place (Fig. 9).
- (3) Install the ash receiver (if equipped).
- (4) Connect the negative battery cable remote terminal to the remote battery post (Fig. 1).

INSTRUMENT PANEL END CAP

REMOVAL

- (1) Open the left door and pull on the access handle to disengage the end cap clips. Fuse diagram is located inside the left end cap. Fuse Access is under the left end cap (Fig. 10).
- (2) Open the right door and remove the right end cover by inserting a trim stick (special tool #C-4755), between cap and instrument panel to disengage clips.



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Fig. 10 INSTRUMENT PANEL END COVER

- 1 - INSTRUMENT PANEL END COVER
- 2 - INSTRUMENT PANEL

INSTALLATION

- (1) Pull body mounted weatherstrip form fence along the side of the instrument panel.
- (2) Align the end cap with the retaining slots in instrument panel and firmly snap into place (Fig. 10).

INSTRUMENT PANEL END CAP (Continued)

- (3) Engage weatherstrip along the header and down the A-pillar.
- (4) Verify weatherstrip sealing.
- (5) Close door.

INSTRUMENT PANEL
SILENCER

REMOVAL

- (1) Remove the retaining screw to the instrument panel.
- (2) Maneuver part and bracket off of the center floor distribution duct.
- (3) Remove the silencer/duct.

INSTALLATION

- (1) Install the silencer/duct.
- (2) Maneuver part and bracket on to the center floor distribution duct.
- (3) Install the retaining screw to the instrument panel.

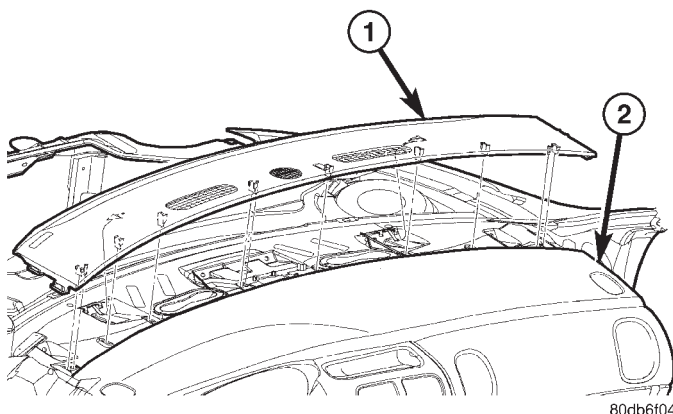
INSTRUMENT PANEL TOP
COVER

REMOVAL

- (1) Using a trim stick (special tool #C-4755) or equivalent, pry out the left and right A-pillar moldings, slide rearward and remove (Fig. 11).
- (2) Using a trim stick or equivalent, slip each end of the instrument panel top cover up to disengaging clips.
- (3) Lift rear edge of the top cover using a trim stick along the rear edge of the instrument panel top cover.
- (4) Slide the instrument panel top cover rearward to disengaging the eight clips.
- (5) Remove the instrument panel top cover from vehicle.

INSTALLATION

- (1) Place the instrument panel top cover into position over the slots for the retaining clips, slide forward and firmly snap into place (Fig. 11).
- (2) Firmly push down on the rear of the instrument panel top cover to engage clips.
- (3) Place the left and right A-pillar moldings into position over the retaining clip slots, slide forward and firmly snap into place.

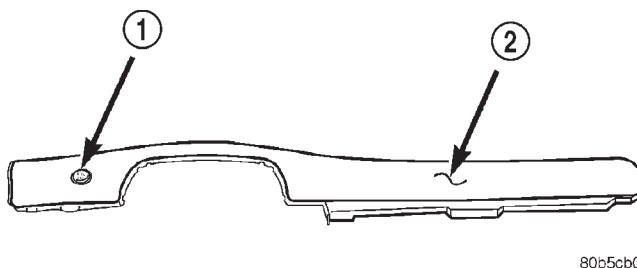
**Fig. 11 INSTRUMENT PANEL TOP COVER**

- 1 - INSTRUMENT PANEL TOP COVER
2 - INSTRUMENT PANEL

UPPER RIGHT TRIM
BEZEL(300M)

REMOVAL

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 1).
- (2) Using a trim stick (special tool #C-4755) or equivalent, gently pry out on center instrument panel bezel.
- (3) Open glove box and remove four screws along bottom edge of trim bezel.
- (4) Remove one screw in center bezel area.
- (5) Loosen the lower right edge of steering column cover, then loosen upper right corner of steering column cover.
- (6) Using a trim stick or equivalent, gently pry bezel away from the instrument panel and disconnect the traction control switch connector.
- (7) Remove upper right trim bezel from vehicle (Fig. 12).

**Fig. 12 UPPER RIGHT TRIM BEZEL**

- 1 - TRACTION CONTROL SWITCH
2 - UPPER RIGHT TRIM BEZEL

UPPER RIGHT TRIM BEZEL(300M) (Continued)

INSTALLATION

(1) Position upper right trim bezel over slots in instrument panel and firmly snap into place. If equipped with traction control, connect connector.

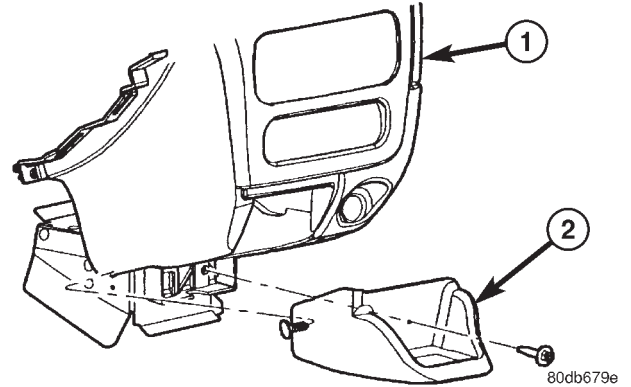
(2) Tighten the lower right edge of steering column cover, then tighten upper right corner of steering column cover.

(3) Install the one screw in center bezel area.

(4) Install the four screws along bottom edge of trim bezel and close glove box.

(5) Position center instrument panel bezel over slots and firmly snap into place.

(6) Connect the negative battery cable remote terminal to the remote battery post (Fig. 1).

**Fig. 13 CENTER FLOOR BIN**

1 - INSTRUMENT PANEL

2 - INSTRUMENT PANEL FLOOR BIN

STORAGE BIN - 5 PASSENGER VEHICLES**REMOVAL**

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 1).

(2) Remove ash receiver (if applicable).

(3) Using a trim stick (special tool #C-4755), gently pry out on center trim bezel. Disconnect wiring connectors to HVAC controls, cigar lighter/auxiliary power outlet and traction control switch (if equipped).

(4) Remove instrument panel center trim bezel.

(5) Remove two retaining screws to the storage bin and remove.

INSTALLATION

(1) Install the two retaining screws to the storage bin.

(2) Install the instrument panel center trim bezel.

(3) Connect wiring connectors to HVAC controls, cigar lighter/auxiliary power outlet and traction control switch (if equipped).

(4) Firmly snap the center trim bezel into place.

(5) Install the ash receiver (if applicable).

(6) Connect the negative battery cable remote terminal to the remote battery post (Fig. 1).

STORAGE BIN - 6 PASSENGER VEHICLES**REMOVAL**

(1) Remove one screw and one push pin to the lower instrument panel (Fig. 13).

(2) Pull rearward and remove the floor bin.

INSTALLATION

(1) Place the instrument panel bin into position and firmly snap into place.

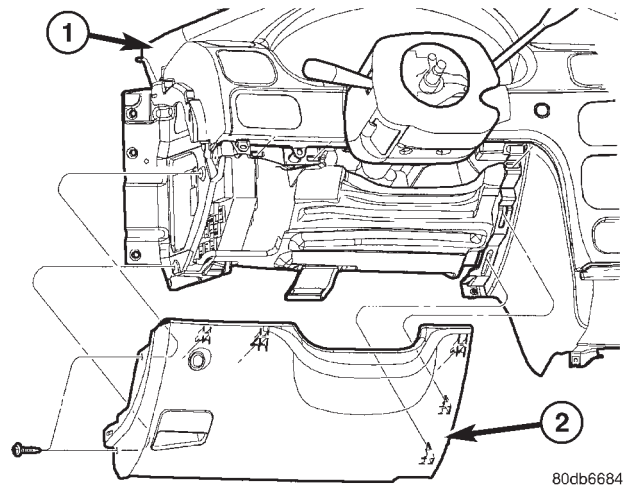
(2) Install one screw and one push pin to the lower instrument panel.

STEERING COLUMN COVER**REMOVAL**

(1) Remove the left end cover.

(2) Remove two screws attaching steering column cover (Fig. 14).

(3) Pull rearward on steering column cover to release the retaining clips on the top and right edge.

**Fig. 14 STEERING COLUMN COVER**

1 - INSTRUMENT PANEL

2 - STEERING COLUMN COVER

STEERING COLUMN COVER (Continued)

INSTALLATION

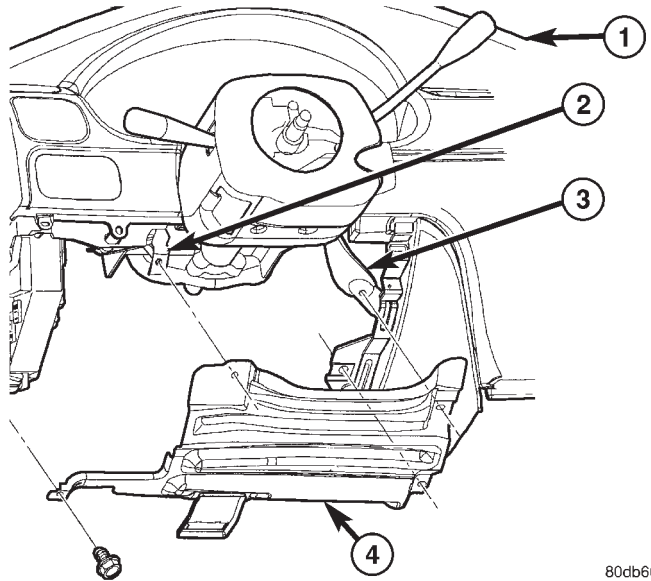
- (1) Place steering column cover into position (Fig. 14).
- (2) Push on steering column cover till retaining clips lock into position.
- (3) Install two attaching screws to the side of the steering column cover.
- (4) Install end cover.

STEERING COLUMN COVER REINFORCEMENT**REMOVAL**

- (1) Remove steering column cover (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - REMOVAL).
- (2) Remove four bolts attaching steering column cover reinforcement (Fig. 15).
- (3) Remove diagnostic connector from the steering column cover reinforcement.
- (4) Remove steering column cover reinforcement from vehicle.

INSTALLATION

- (1) Place steering column cover reinforcement in position.
- (2) Connect diagnostic connector to the steering column cover reinforcement.
- (3) Install the four bolts attaching steering column cover reinforcement (Fig. 15).



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Fig. 15 STEERING COLUMN COVER REINFORCEMENT

- 1 - INSTRUMENT PANEL
- 2 - STEERING COLUMN BRACKET
- 3 - CROSS CAR BEAM
- 4 - STEERING COLUMN COVER REINFORCEMENT

- (4) Install steering column cover (Refer to 23 - BODY/INSTRUMENT PANEL/STEERING COLUMN OPENING COVER - INSTALLATION).

INTERIOR

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A-PILLAR TRIM

REMOVAL

- (1) Remove instrument panel end cap.
- (2) Disengage clips attaching trim to A-pillar by pulling on trim (Fig. 1).
- (3) Slide A-pillar trim rearward, to disengaging from instrument panel top cover.
- (4) Remove A-pillar trim from vehicle.

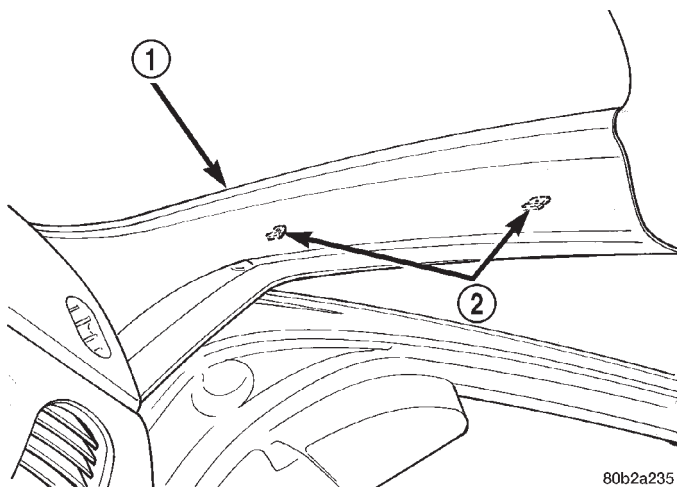


Fig. 1 A-PILLAR TRIM

- 1 - A-PILLAR TRIM
2 - CLIPS

INSTALLATION

- (1) Slide A-pillar trim forward ensuring that the trim engages with the instrument panel top cover.
- (2) Engage clips to attach trim to A-pillar.
- (3) Install instrument panel end cap.

ASSIST HANDLE

REMOVAL

- (1) Pull and hold assist handle down.
- (2) Remove screws attaching assist handle to roof (Fig. 2).
- (3) Remove assist handle from vehicle.

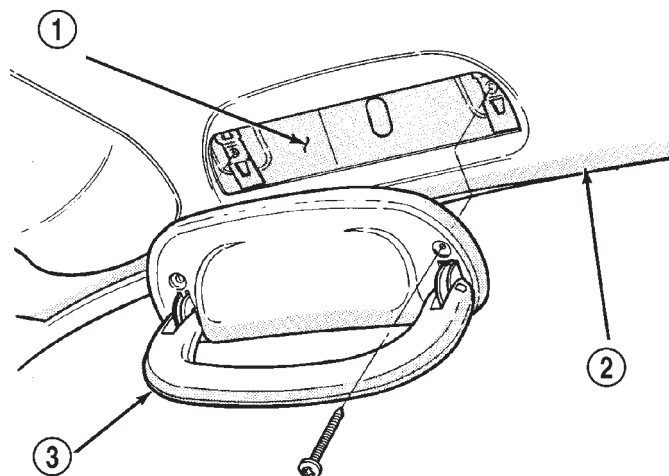
INSTALLATION

- (1) Place assist handle in position on vehicle.
- (2) Install screws to attach assist handle to roof.

BODY VENT

REMOVAL

- (1) Open decklid.
- (2) Move trunk carpet to access the air exhauster in the right/left rear corner of the trunk (Fig. 3).

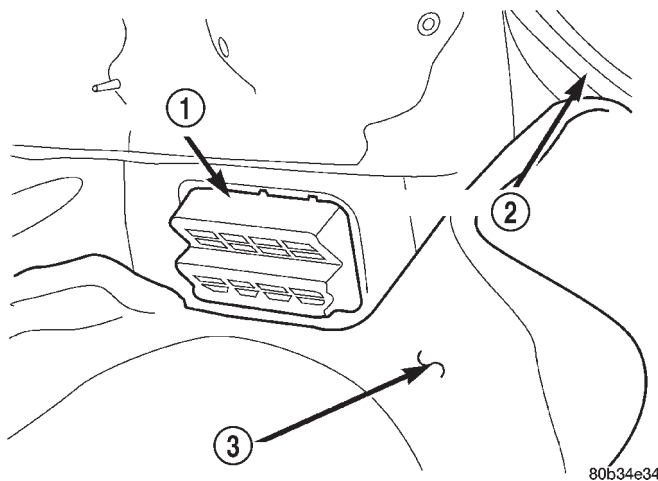


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Fig. 2 FRONT ASSIST HANDLE

- 1 - ROOF
2 - HEADLINING
3 - ASSIST HANDLE

- (3) From inside trunk push the air exhauster outward to release clips.
- (4) Reach under fascia and pull air exhauster outward from trunk side panel.
- (5) Remove air exhauster from vehicle.



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Fig. 3 AIR EXHAUSTER

- 1 - AIR EXHAUSTER
2 - REAR TRUNK FENCE
3 - TRUNK CARPET

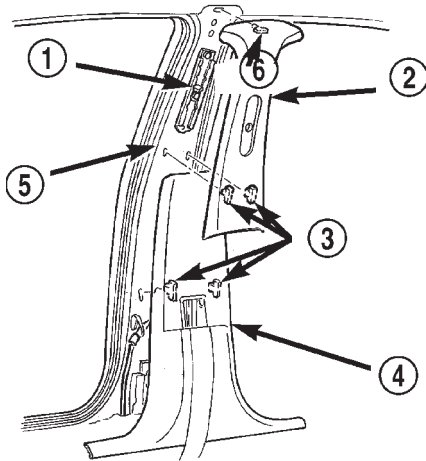
INSTALLATION

- (1) Place air exhauster in position. Ensure that the locator tab is aligned.
- (2) Engage the upper half of the air exhauster then push the lower half in until the clips click into place.
- (3) Install trunk carpet into position.

B-PILLAR LOWER TRIM

REMOVAL

- (1) Remove seat belt height adjuster knob.
- (2) Remove upper B-pillar trim.
- (3) Remove bolt attaching seat belt to floor below B-pillar (Fig. 4).
- (4) Remove access door from above seat belt slot on B-pillar trim.
- (5) Disengage clips attaching lower trim to B-pillar.
- (6) Slide seat belt through the B-pillar trim.
- (7) Remove B-pillar trim from vehicle.



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Fig. 4 B-PILLAR LOWER AND UPPER TRIM

- 1 - SHOULDER HARNESS ADJUSTER
- 2 - UPPER B-PILLAR TRIM
- 3 - CLIPS
- 4 - LOWER B-PILLAR TRIM
- 5 - B-PILLAR
- 6 - CLIP

INSTALLATION

- (1) Slide seat belt through the B-pillar trim.
- (2) Place B-pillar trim in position on vehicle.
- (3) Engage clips attaching lower trim to B-pillar.
- (4) Install access door above seat belt slot on B-pillar trim.
- (5) Install bolt attaching seat belt to floor below B-pillar.
- (6) Install upper B-pillar trim.
- (7) Install seat belt height adjuster knob.
- (8) Refit weatherstrip.

B-PILLAR UPPER TRIM

REMOVAL

- (1) Disengage shoulder belt turning loop cover.
- (2) Remove bolt attaching turning loop to shoulder belt height adjuster.
- (3) Remove turning loop from adjuster.
- (4) Remove adjuster knob.
- (5) Disengage clips attaching upper trim to B-pillar (Fig. 4).
- (6) Remove B-pillar trim from vehicle.

INSTALLATION

- (1) Place B-pillar trim in position on vehicle.
- (2) Engage clips attaching upper trim to B-pillar.
- (3) Place shoulder belt turning loop in position on adjuster.
- (4) Install bolt attaching turning loop to shoulder belt height adjuster.
- (5) Install shoulder belt turning loop cover.
- (6) Refit weatherstrip.

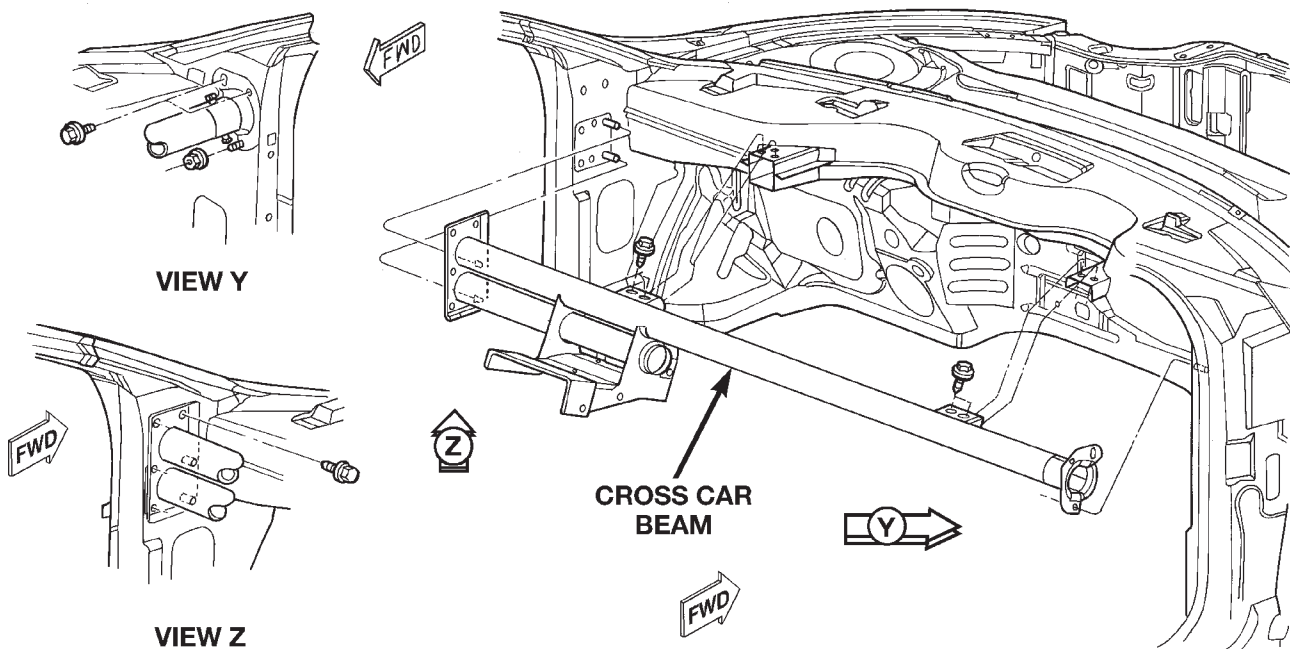
CROSS CAR BEAM

REMOVAL

- (1) Remove steering column and instrument panel from vehicle.
- (2) Remove fasteners attaching cross car beam to plenum in both locations (Fig. 5).
- (3) Remove left side fasteners attaching the cross car beam to cowl side panel.
- (4) Remove right side fasteners attaching the cross car beam to cowl side panel.
- (5) Remove cross car beam from vehicle.

INSTALLATION

- (1) Place cross car beam in position in vehicle.
- (2) Install right side fasteners attaching the cross car beam to cowl side panels.
- (3) Install left side fasteners attaching the cross car beam to cowl side panels.
- (4) Install fasteners to plenum in both locations.
- (5) Install steering column and instrument panel.



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Fig. 5 CROSS CAR BEAM

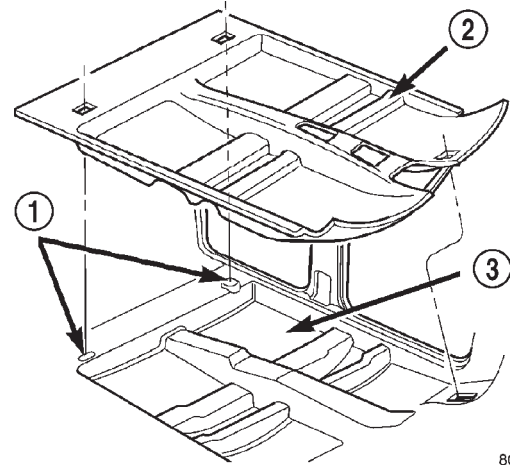
CARPETS

REMOVAL

- (1) Remove floor mats.
- (2) Remove door sill trim covers.
- (3) Remove cowl side trim covers.
- (4) Remove front seats.
- (5) Remove bolts attaching front seat belt lower anchors to floor below B-pillar trim panels.
- (6) Remove center console, if equipped.
- (7) Remove rear seat cushion.
- (8) Remove gas pedal bracket.
- (9) Remove carpet fasteners.
- (10) Remove carpet from vehicle (Fig. 6).

INSTALLATION

- (1) Place carpet in proper position on floor of vehicle.
- (2) Install carpet fasteners.
- (3) Using double back tape or hook and loop, secure carpet strap behind the instrument panel center support bracket.
- (4) Install cowl side trim covers.
- (5) Install door sill trim covers.
- (6) Install rear seat cushion.
- (7) Install gas pedal bracket.
- (8) Install center console, if equipped.
- (9) Install bolts to attach seat belt lower anchors to floor below B-pillar trim panels.
- (10) Install front seats.
- (11) Install floor mats.



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Fig. 6 FLOOR CARPET

- 1 - REAR SEAT HOLDDOWN CUPS
- 2 - FLOOR CARPET
- 3 - FLOOR

CENTER CONSOLE ARMREST LID ASSEMBLY

REMOVAL

- (1) Open armrest lid.
- (2) Remove lid attaching screws.
- (3) Remove lid from console.

INSTALLATION

- (1) Place lid in position.
- (2) Install screws attaching lid to console.
- (3) Check operation of lid.

CENTER CONSOLE BEZEL

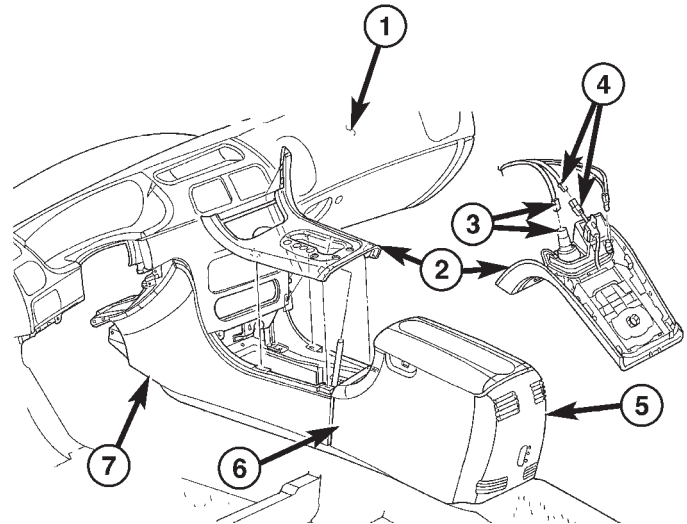
REMOVAL

NOTE: The Transmission Range Indicator Lamp (electroluminescent) is not serviceable. Replace Floor Console Panel for replacement of the lamp.

- (1) Set park brake and place gear selector in neutral.
- (2) Remove instrument panel center bezel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - REMOVAL)
- (3) Loosen set screw attaching gear shift knob to gear shift.
- (4) Remove gear shift knob from gear shift.
- (5) Disengage clips attaching bezel to floor console (Fig. 7), or (Fig. 8).
- (6) Disconnect the power outlet, if equipped.
- (7) Disconnect the transmission range indicator illumination connector.
- (8) Remove bezel from vehicle.

INSTALLATION

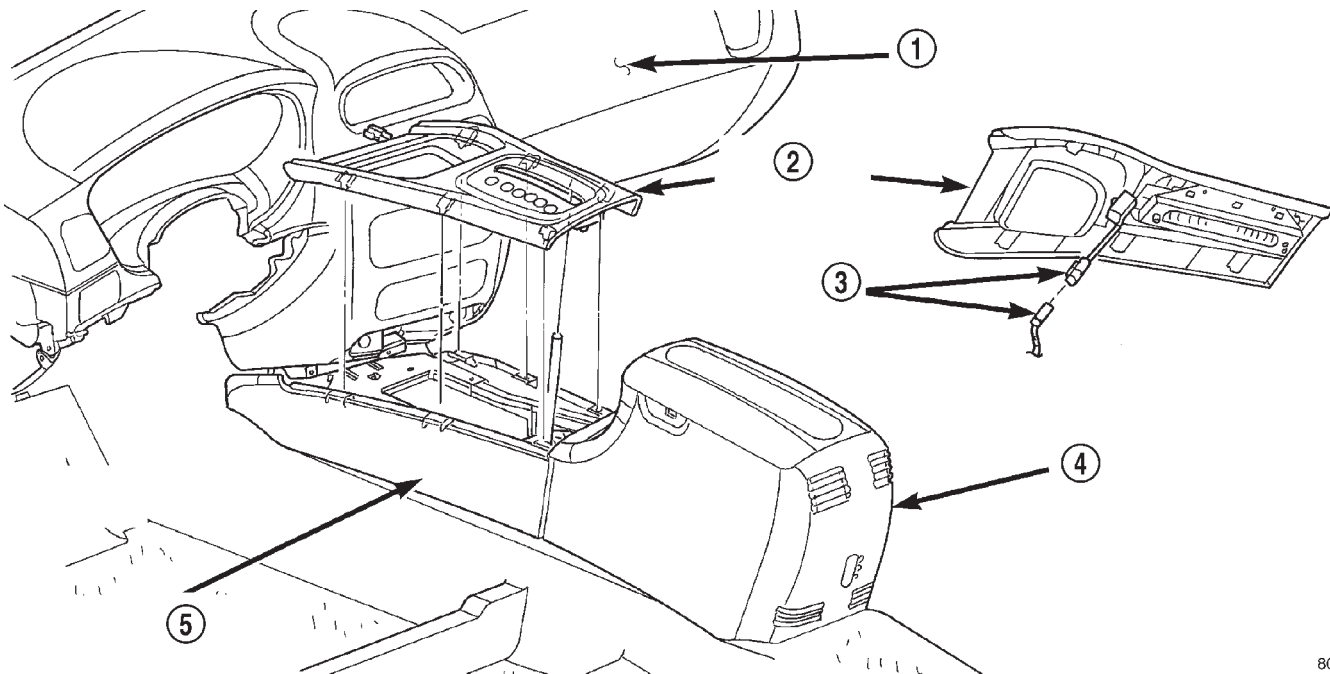
- (1) Connect the transmission range indicator illumination connector.
- (2) Connect power outlet, if equipped.
- (3) Place bezel in position on vehicle.
- (4) Engage clips attaching bezel to floor console.



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Fig. 8 FRONT FLOOR CONSOLE SIDE PANELS - INTREPID SHOWN - 300M SIMILAR

- 1 - INSTRUMENT PANEL
- 2 - FLOOR CONSOLE BEZEL
- 3 - POWER OUTLET/CIGAR LIGHTER CONNECTORS
- 4 - TRANSMISSION RANGE INDICATOR ILLUMINATION CONNECTORS
- 5 - REAR END CAP
- 6 - FLOOR CONSOLE
- 7 - FRONT FLOOR CONSOLE PANEL



80b46c33

Fig. 7 FLOOR CONSOLE BEZEL - CONCORDE

- 1 - INSTRUMENT PANEL
- 2 - FLOOR CONSOLE SHIFT BEZEL
- 3 - TRANSMISSION RANGE INDICATOR ILLUMINATION CONNECTORS
- 4 - REAR BEZEL
- 5 - FLOOR CONSOLE

CENTER CONSOLE BEZEL (Continued)

(5) Install instrument panel center bezel. (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL CENTER BEZEL - INSTALLATION)

(6) Push gear shift knob onto gear shift.

(7) Tighten set screw attaching gear shift knob to gear shift.

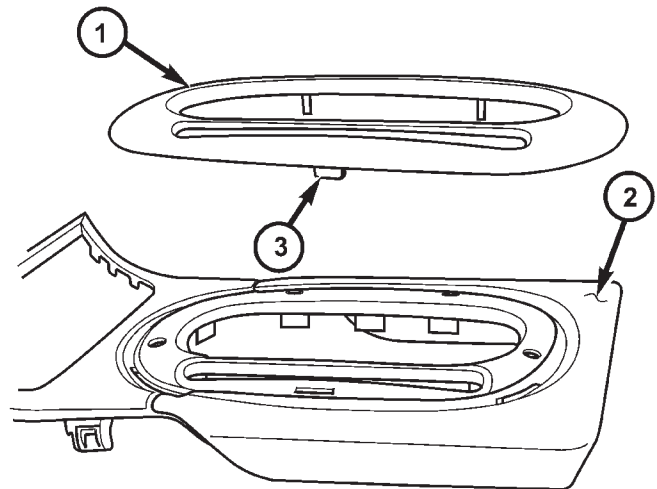
CENTER CONSOLE BEZEL - WOOD TRIM

REMOVAL - WOOD TRIM

(1) Remove the center console bezel. (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE BEZEL - REMOVAL)

(2) Remove the nuts (Fig. 9).

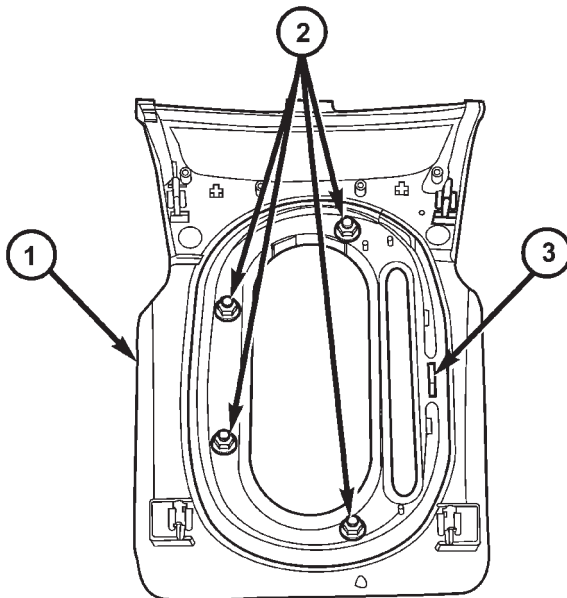
(3) Remove the wood trim from the bezel (Fig. 10).



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Fig. 10 WOOD TRIM MOUNTING

- 1 - CONSOLE BEZEL GENUINE WOOD TRIM
- 2 - CONSOLE BEZEL
- 3 - LOCKING TAB



809fb847

Fig. 9 CONSOLE BEZEL WOOD TRIM

- 1 - CENTER CONSOLE BEZEL
- 2 - NUTS
- 3 - LOCKING TAB

INSTALLATION - WOOD TRIM

(1) Attach the wood trim to the bezel.

CAUTION: Do not over tighten the nuts or damage to the wood trim may occur.

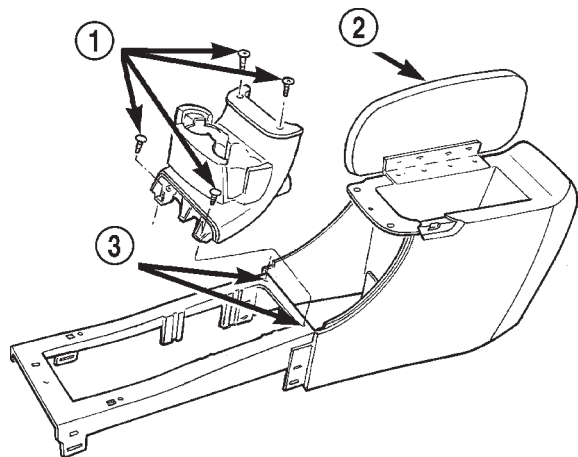
(2) Install the nuts.

(3) Install the center console bezel. (Refer to 23 - BODY/INTERIOR/CENTER CONSOLE BEZEL - INSTALLATION)

CENTER CONSOLE CUPHOLDER ASSEMBLY

REMOVAL - CONCORD

- (1) Remove shift knob.
- (2) Remove floor console shift bezel (Fig. 7).
- (3) Raise console armrest lid.
- (4) Remove screws at top and bottom of cup attaching assembly (Fig. 11).
- (5) Lift up and forward to remove assembly.



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Fig. 11 FLOOR CONSOLE CUP HOLDER ASSEMBLY

- 1 - SCREWS
- 2 - ARMREST LID
- 3 - SCREW HOLES

INSTALLATION

- (1) Place cup attaching into floor console and align screw holes.
- (2) Install upper and lower screws.
- (3) Lower console armrest lid.
- (4) Install floor console shift bezel.
- (5) Install shift knob.

CENTER CONSOLE LID LATCH

REMOVAL

- (1) Open armrest lid.
- (2) Remove latch attaching screws.
- (3) Remove latch from console.

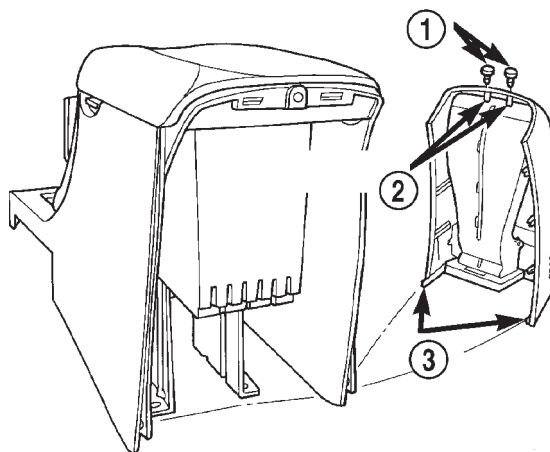
INSTALLATION

- (1) Place latch in position.
- (2) Install screws attaching latch to console.
- (3) Check operation of latch.

CENTER CONSOLE REAR BEZEL

REMOVAL

- (1) Disengage tabs on sides at bottom (Fig. 12)
- (2) Open arm rest lid and remove rear end cap attaching screws.
- (3) Remove rear bezel.



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Fig. 12 FLOOR CONSOLE END CAP

- 1 - FASTENERS
- 2 - LOCATOR PINS
- 3 - TABS

INSTALLATION

- (1) Align rear end cap in position on console.
- (2) Install rear end cap attaching screws.
- (3) Push forward at the bottom to lock tabs in position.

CENTER CONSOLE SIDE PANELS

REMOVAL

REMOVAL - CONCORD

- (1) Remove shift knob.
- (2) Remove floor console shift bezel (Fig. 7).
- (3) For right side panel, open the glove box door and remove side panel screws
- (4) For left side panel, remove steering column cover and side panel screws.
- (5) Disengage clips from floor console.
- (6) Remove floor console side panel(s).

CENTER CONSOLE SIDE PANELS (Continued)

REMOVAL

- (1) Remove shift knob.
- (2) Remove console shift bezel (Fig. 8).
- (3) To remove right side panel, open glove box and remove side panel attaching screws.
- (4) To remove left side panel, remove steering column cover and remove side panel attaching screws.
- (5) Disengage clips from center console.
- (6) Remove floor console side panel.

INSTALLATION**INSTALLATION - CONCORD**

- (1) Place front floor console side panel in position on vehicle.
- (2) Press on the side panel to seat clips.
- (3) Install side panel(s) screws.
- (4) Install floor console shift bezel.
- (5) Install shift knob.

INSTALLATION

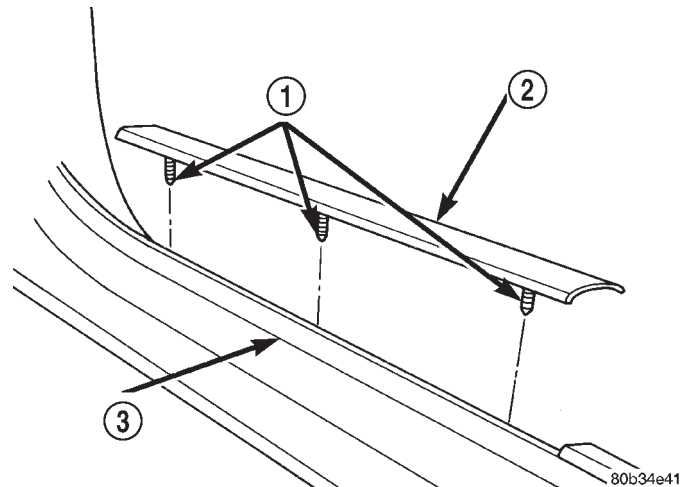
- (1) Place front floor console side panel in position on vehicle.
- (2) Press on the side panel to seat clips.
- (3) Install attaching screws.
- (4) Install floor console shift bezel.
- (5) Install shift knob.

DOOR SILL TRIM**REMOVAL**

The door sills are attached with push pin fasteners

- (1) Remove fasteners attaching door sill trim to sill panel (Fig. 13).

- (2) Remove sill trim from vehicle.

**Fig. 13 DOOR SILL TRIM**

- 1 - FASTENERS
2 - DOOR SILL TRIM
3 - DOOR OPENING SILL

INSTALLATION

- (1) Place sill trim in position on vehicle.
- (2) Install fasteners to attach door sill trim to sill panel.

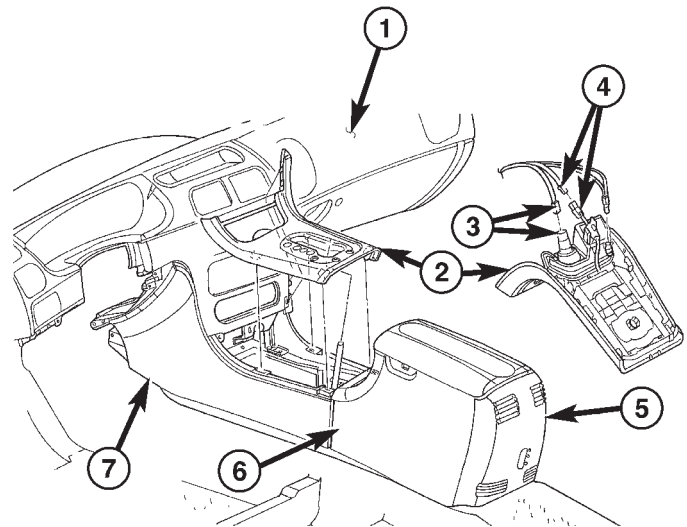
FLOOR CONSOLE

REMOVAL

- (1) Remove shift knob.
- (2) Remove floor console shift bezel.
- (3) Remove side panels (Fig. 14), or (Fig. 15).
- (4) Disconnect the electrical connectors.
- (5) Remove fasteners attaching forward bracket to instrument panel.
- (6) Remove fasteners attaching bottom of console storage bin to rear mounting bracket (Fig. 16).
- (7) Remove floor console from vehicle.

INSTALLATION

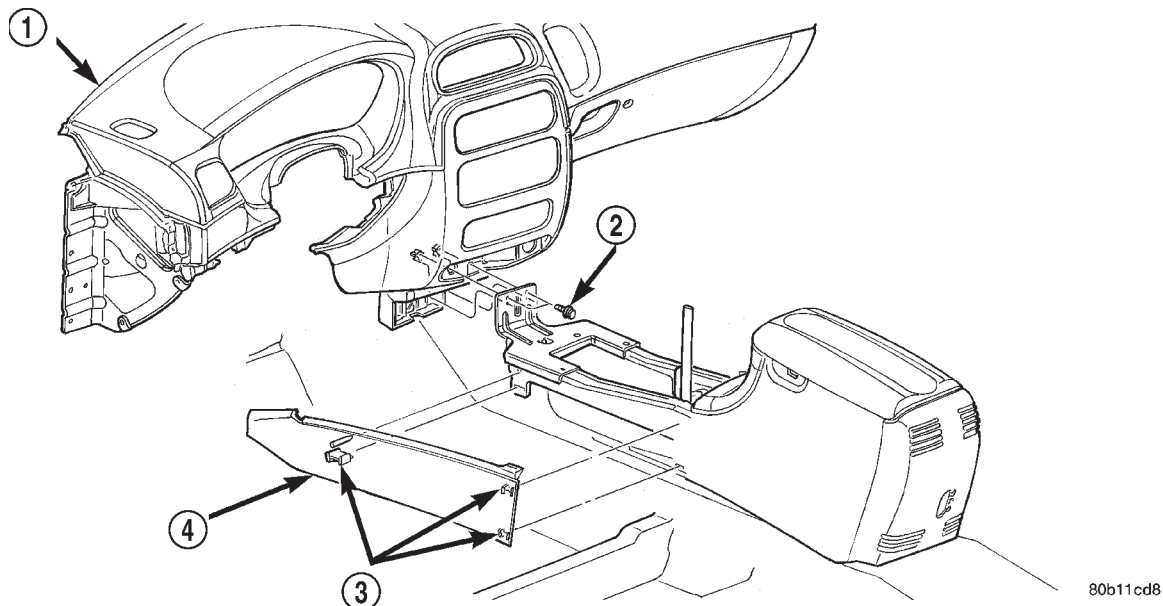
- (1) If power tap wire harness was removed reattach the harness with tape, along the indicated markings.
- (2) If previously removed, install the power outlet tap. (Refer to 8 - ELECTRICAL/POWER DISTRIBUTION/CIGAR LIGHTER OUTLET - INSTALLATION)
- (3) Place center console in position on vehicle.
- (4) Install fasteners attaching forward bracket to instrument panel.



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Fig. 15 FRONT FLOOR CONSOLE SIDE PANELS

- 1 - INSTRUMENT PANEL
- 2 - FLOOR CONSOLE BEZEL
- 3 - POWER OUTLET/CIGAR LIGHTER CONNECTORS
- 4 - TRANSMISSION RANGE INDICATOR ILLUMINATION CONNECTORS
- 5 - REAR END CAP
- 6 - FLOOR CONSOLE
- 7 - FRONT FLOOR CONSOLE PANEL



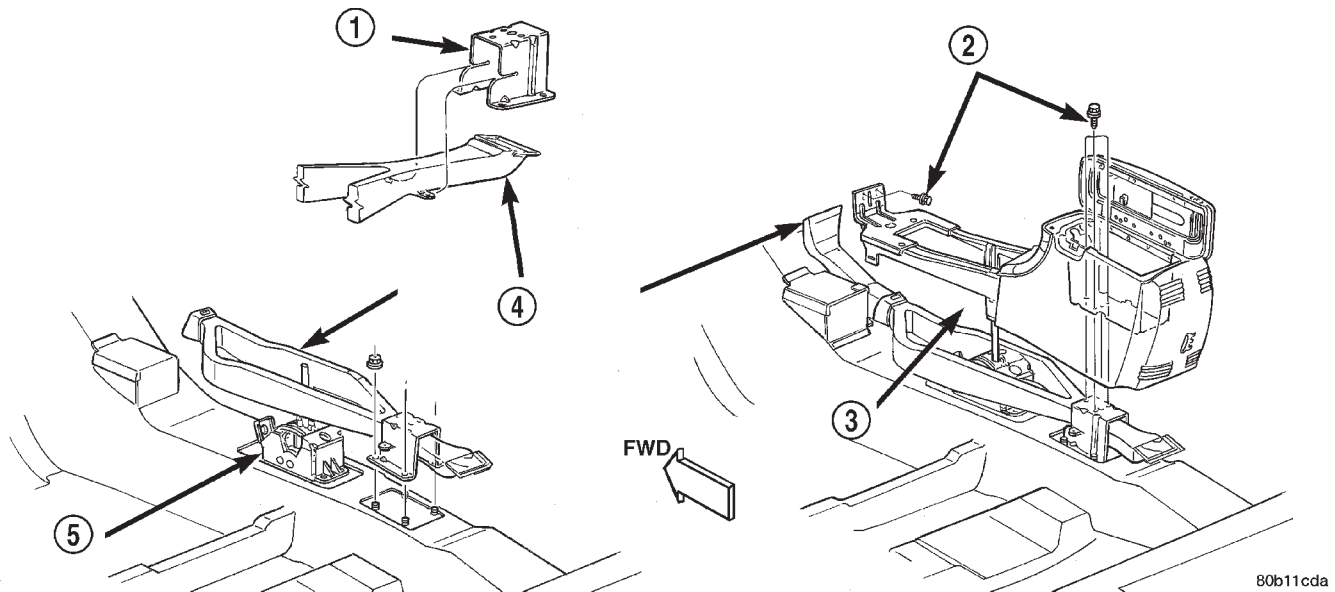
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Fig. 14 FRONT FLOOR CONSOLE SIDE PANELS - CONCORDE

- 1 - INSTRUMENT PANEL
- 2 - FASTENERS

- 3 - CLIPS
- 4 - SIDE PANEL

FLOOR CONSOLE (Continued)

**Fig. 16 FLOOR CONSOLE**

- 1 - CONSOLE BRACKET
- 2 - FASTENERS
- 3 - FLOOR CONSOLE

- 4 - FLOOR CONSOLE DUCT
- 5 - SHIFTER ASSEMBLY

- (5) Install fasteners attaching bottom of console storage bin to rear mounting bracket.
- (6) Connect the electrical connectors.
- (7) Install side panels.
- (8) Install center console shift bezel.
- (9) Install shift knob.

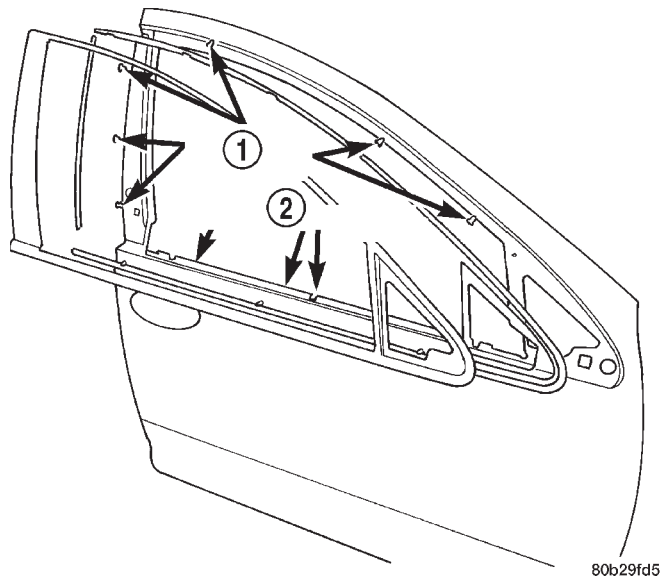
FRONT DOOR WINDOW FRAME MOLDING

REMOVAL

- (1) Remove flag trim, speaker, door trim panel, watershield as necessary, and mirror.
- (2) Remove door glass run weatherstrip as necessary to gain access to applique fasteners.
- (3) Remove screws attaching molding to window frame (Fig. 17).
- (4) Remove molding from door.

INSTALLATION

- (1) Place molding in position on door.
- (2) Install screws attaching molding to window frame.
- (3) Install door glass run weatherstrip.
- (4) Install the mirror, water shield, door trim panel, speaker and flag trim.

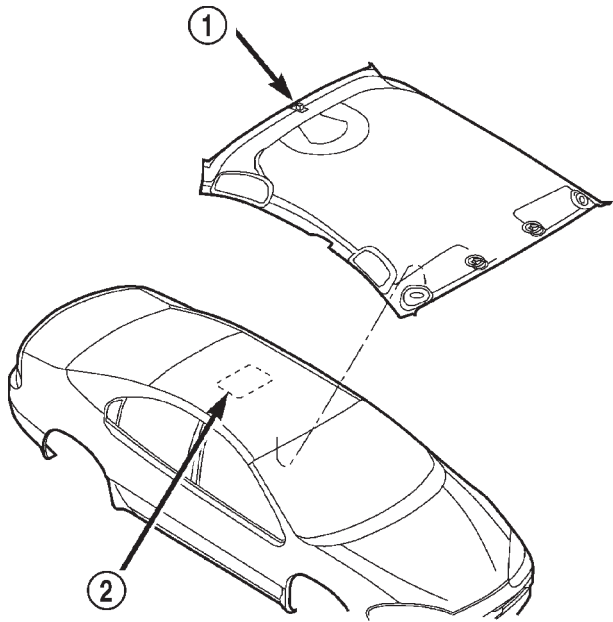
**Fig. 17 FRONT DOOR FRAME WINDOW**

- 1 - REMOVE SCREWS
- 2 - LOOSEN HALFWAY

HEADLINER

REMOVAL

- (1) Remove front passenger seat for ease of removal of headliner.
- (2) Remove right and left A-pillar trim panels.
- (3) Remove right and left sun visors and retainers.
- (4) Remove overhead console or front interior lights.
- (5) Disconnect wire harness along A-pillar and wire connector to the fuse panel.
- (6) Remove upper B-pillar trim panels.
- (7) Remove front and rear assist handles.
- (8) Remove quarter trim upper panels partial, keeping belt attached.
- (9) Fully recline seat.
- (10) Disengage rear headliner locating clip, using Headliner Clip Pliers, Special Tool C-6967.
- (11) Pull headliner down, beginning from the rear. The back side of the headliner is glue bonded to the structural membrane and must be overcome.



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Fig. 18 HEADLINER

- 1 - REAR CLIP
2 - MEMBRANE

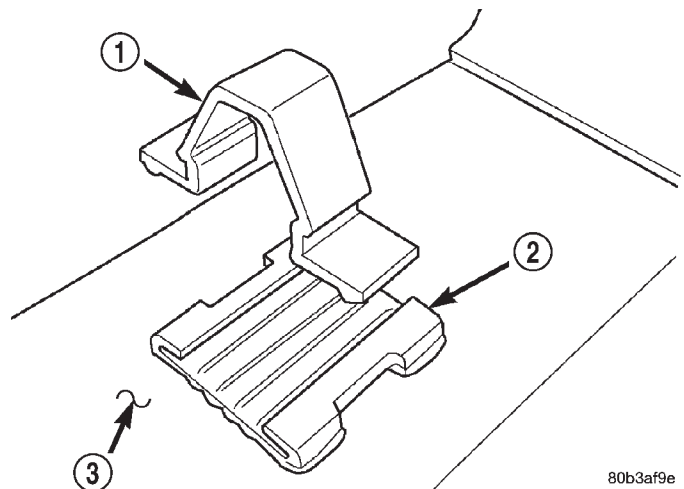
NOTE: No special tools are required to release the membrane from the headliner. Pull down use hand force only to release the membrane.

- (12) Remove headliner from vehicle through the rear door, using two people (Fig. 18).
- (13) Ensure that the rear locator flexible clip is removed from the roof steel. Install rear locator flexible clip into the base located on the headliner before installing the headliner (Fig. 19).

INSTALLATION

NOTE: DO NOT remove headliner membrane from vehicle. No additional use of any additional adhesives is needed.

- (1) Place headliner in proper position in vehicle.
- (2) Engage the locator flexible clip to attach headliner to roof above rear window and press on the membrane to ensure contact.
- (3) Install upper right and left quarter trim panels.
- (4) Install front and rear assist handles.
- (5) Install upper right and left B-pillar trim panels.
- (6) Install wire harness along A-pillar and connect wire connector to the fuse panel.
- (7) Install overhead console or front interior lights
- (8) Install right and left sun visors and retainers.
- (9) Install right and left A-pillar trim panels.
- (10) Install seat, and return seats to up the right position.



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Fig. 19 LOCATOR FLEXIBLE CLIP

- 1 - FLEXIBLE CLIP
2 - BASE
3 - HEADLINER

- (11) Engage the hook and loop patch fasteners around the sun roof opening.

ROOF STRUCTURAL MEMBRANE

REMOVAL

- (1) Remove headliner.
- (2) Remove roof support membrane, using a Molding Removal Tool, 3-M p/n 08978.
- (3) Carefully pull down corner of roof structural membrane enough to insert molding removal tool between roof panel and adhesive. Activate air chisel, while keeping the blade at an angle, ensuring not to flex the roof panel. Evenly separate the adhesive strips from the roof panel until the structural membrane is removed.

NOTE: USE EXTREME CARE WHEN PULLING ON THE STRUCTURAL MEMBRANE, THE ROOF PANEL WILL DENT/DING/CREASE/FLEX AND CAUSE PERMANENT DAMAGE.

- (4) Using a razor blade scraper tool, scrape off remaining adhesive residue.

INSTALLATION

- (1) Place headliner in vehicle allowing it to rest in a down position on the seats.
- (2) Outside of the vehicle, using the adhesive supplied, apply five 10 mm (0.39 inch) diameter beads of adhesive within the printed black lines or at the center of membrane strips for the length of the new structural membrane, stopping 38 mm (1.5 inches) before each end (Fig. 20).

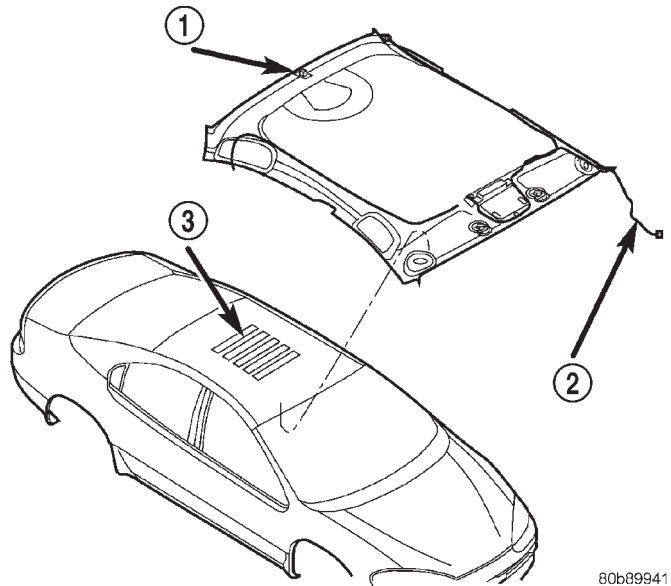
NOTE: ADHESIVE MUST BE APPLIED UNIFORMLY IN 10 mm (0.39 INCHES) BEADS. TOO MUCH OR TOO LITTLE ADHESIVE WILL CAUSE ROOF PANEL TO WARP AS ADHESIVE CURES.

- (3) Apply a 25 mm (1.0 inch) diameter hot glue spot to each location where the glue bond between the headliner and structural membrane had previously been broken free. This bond is not critical to performance but allows the membrane to remain in place while the headliner is installed.

- (4) Place the structural membrane, adhesive side up, onto the headliner over the glue spots to attach the membrane to the headliner.

- (5) Install headlining in proper position in vehicle.

NOTE: IT IS NOT NECESSARY TO APPLY LOCAL PRESSURE IN THE AREA OF THE STRUCTURAL MEMBRANE, THE SHAPE AND STIFFNESS OF THE HEADLINER WILL PROVIDE PROPER PRESSURE TO ALLOW THE ADHESIVE TO CURE PROPERLY.



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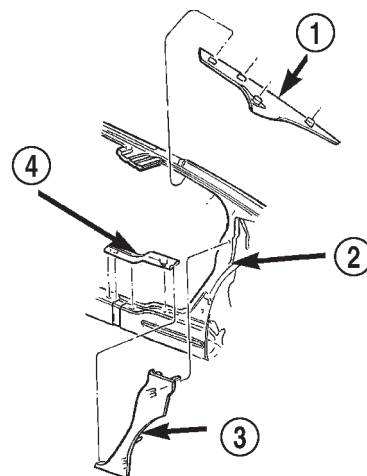
Fig. 20 MEMBRANE STRIPS

- 1 - REAR CLIP
- 2 - WIRE HARNESS
- 3 - STRUCTURAL MEMBRANE

LOWER QUARTER TRIM

REMOVAL

- (1) Remove rear seat cushion and back.
- (2) Pull upper quarter trim from panel (Fig. 21).
- (3) Remove sill trim as necessary to clear quarter trim removal path.
- (4) Disengage clips attaching lower quarter trim to inner quarter trim from vehicle.
- (5) Remove quarter trim from vehicle.



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Fig. 21 LOWER QUARTER TRIM

- 1 - UPPER QUARTER TRIM
- 2 - QUARTER PANEL
- 3 - LOWER QUARTER TRIM
- 4 - DOOR SILL TRIM

LOWER QUARTER TRIM (Continued)

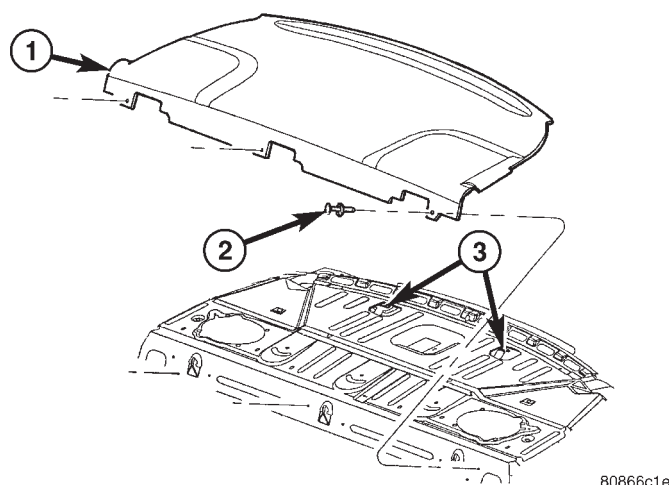
INSTALLATION

- (1) Place quarter trim in position on vehicle.
- (2) Engage clips attaching lower quarter trim to inner quarter panel.
- (3) Install upper quarter trim.
- (4) Install sill trim.
- (5) Install rear seat cushion and back.

REAR SHELF TRIM PANEL

REMOVAL

- (1) Remove seat cushion and back.
- (2) Remove quarter trim lower and upper trim panels.
- (3) Remove center seat belt anchor bolt.
- (4) Remove push pin fasteners.
- (5) Pull rear shelf trim panel away from rear glass to disengage clips (Fig. 22).
- (6) Disengage CHMSL wire connector, if equipped.
- (7) Feed center seat belt and bezel through rear shelf trim panel
- (8) Remove rear shelf trim panel from vehicle.



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Fig. 22 PARCEL SHELF TRIM PANEL

- 1 - REAR SHELF TRIM
- 2 - PUSH PIN FASTENER
- 3 - CLIP LOCATION

INSTALLATION

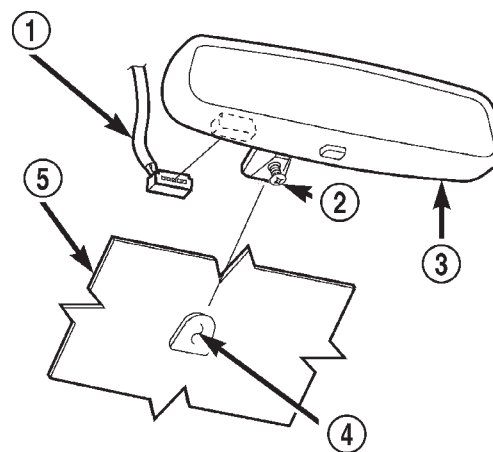
- (1) Place rear shelf trim panel in position in vehicle.
- (2) Feed center seat belt and bezel through rear trim panel.
- (3) Connect CHMSL wire connector.
- (4) Push parcel shelf trim rearward toward rear glass and engage clips.
- (5) Insert push pin fasteners into position.
- (6) Install quarter trim lower and upper panels.

- (7) Install center seat belt anchor bolt. Tighten to 40 N·m (29 ft. lbs.) torque.
- (8) Install seat back and cushion.

REAR VIEW MIRROR

REMOVAL

- (1) If equipped, disconnect mirror harness connector.
- (2) Loosen the mirror base setscrew (Fig. 23).
- (3) Slide the mirror base upward and off the bracket.



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Fig. 23 REAR VIEW MIRROR

- 1 - CONNECTOR
- 2 - SCREW
- 3 - REAR VIEW MIRROR
- 4 - SUPPORT BUTTON
- 5 - WINDSHIELD

INSTALLATION

INSTALLATION

- (1) Position the mirror base at the bracket and slide it downward onto the support bracket (Fig. 23).
- (2) Tighten the setscrew 1 N·m (15 in. lbs.) torque.
- (3) If equipped, connect mirror harness connector.

INSTALLATION - REARVIEW MIRROR
SUPPORT BRACKET

- (1) Mark the position for the mirror bracket on the outside of the windshield glass with a wax pencil.
- (2) Clean the bracket contact area on the glass. Use a mild powdered cleanser on a cloth saturated with isopropyl (rubbing) alcohol. Finally, clean the glass with a paper towel dampened with alcohol.
- (3) Sand the surface on the support bracket with fine grit-sandpaper. Wipe the bracket surface clean with a paper towel.

REAR VIEW MIRROR (Continued)

(4) Apply accelerator to the surface on the bracket according to the following instructions:

- Crush the vial to saturate the felt applicator.
- Remove the paper sleeve.
- Apply accelerator to the contact surface on the bracket.
- Allow the accelerator to dry for five minutes.
- Do not touch the bracket contact surface after the accelerator has been applied.

(5) Apply adhesive accelerator to the bracket contact surface on the windshield glass. Allow the accelerator to dry for one minute. Do not touch the glass contact surface after the accelerator has been applied.

(6) Install the bracket according to the following instructions:

- Apply one drop of adhesive at the center of the bracket contact-surface on the windshield glass.
- Apply an even coat of adhesive to the contact surface on the bracket.
- Align the bracket with the marked position on the windshield glass.
- Press and hold the bracket in place for at least one minute.

NOTE: Verify that the mirror support bracket is correctly aligned, because the adhesive will cure rapidly.

(7) Allow the adhesive to cure for 8-10 minutes. Remove any excess adhesive with an alcohol-dampened cloth.

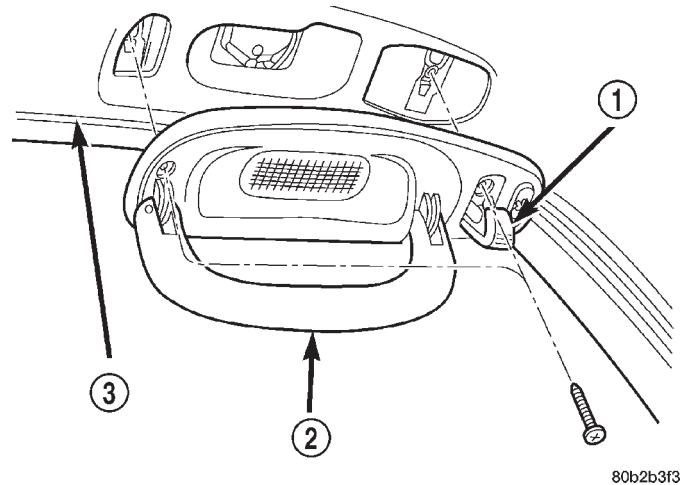
(8) Allow the adhesive to cure for an additional 8-10 minutes before installing the mirror.

REAR SEAT GRAB HANDLE/ READING LAMP

REMOVAL

- Pull down coat hook.
- Remove screw attaching assist handle to roof from behind coat hook.

- Pull and hold assist handle down.
- Remove front screw attaching assist handle to roof (Fig. 24).
- Remove assist handle from roof.
- Disengage clips attaching reading lamp socket to back of assist handle base.
- Disconnect reading lamp switch from slot on back of assist handle base.
- Remove assist handle from vehicle.



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Fig. 24 REAR ASSIST HANDLE AND READING LAMP

- COAT HOOK
- ASSIST HANDLE
- HEADLINING

INSTALLATION

- Place assist handle in position on vehicle.
- Connect reading lamp switch into slot on back of assist handle base.
- Engage clips attaching reading lamp socket to back of assist handle base.
- Place assist handle in position on roof.
- Pull and hold assist handle down.
- Install front screw attaching assist handle to roof.
- Install screw behind coat hook attaching assist handle to roof.

SUN VISOR

REMOVAL

All vehicles with driver and passenger side air bags must have a colored coded five Bullet point airbag warning label applied to the sun visor, verify label availability and ensure the label is installed.

- (1) Remove screw attaching inboard visor retainer to over head. (Fig. 25).
- (2) Remove screws attaching outboard visor pivot base to roof.
- (3) Disconnect visor vanity lamp wire connector, if equipped.
- (4) Remove visor from vehicle.

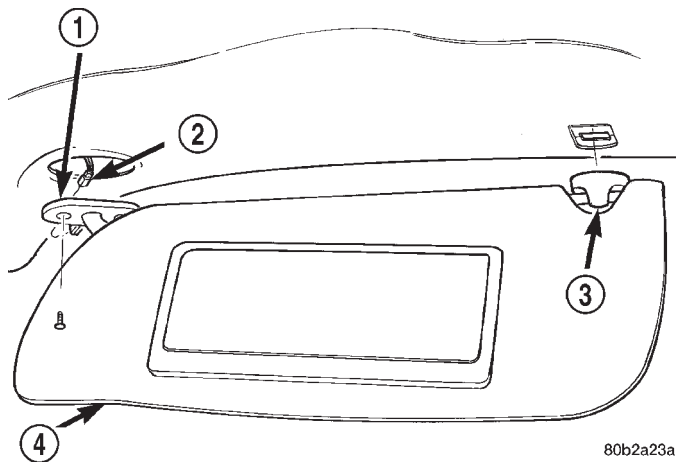


Fig. 25 SUN VISOR

- 1 - VISOR PIVOT BASE
- 2 - WIRE CONNECT
- 3 - RETAINER
- 4 - VISOR

INSTALLATION

All vehicles with driver and passenger side airbags must have a colored coded five bullet point airbag warning label applied to the sun visor, verify label availability and ensure the label is installed.

- (1) Engage visor vanity lamp wire connector, if equipped.
- (2) Place visor in position on header.
- (3) Install screws attaching outboard visor pivot base to over head.
- (4) Install screw attaching inboard visor retainer to over head.

TRUNK LINING

REMOVAL

- (1) Remove rear seat cushion and back.
- (2) Remove fasteners at forward edge along wheel-housing
- (3) Remove spare tire board, jack, and tire.
- (4) Remove fasteners at back panel and sides.
- (5) Remove carpet.

INSTALLATION

- (1) Fold carpet and load into position in the trunk.
- (2) Install fasteners at back and sides panel.
- (3) Install spare tire board, jack, and tire.
- (4) Install fasteners at forward edge along wheel-housing
- (5) Install rear seat back and cushion.

UPPER QUARTER TRIM

REMOVAL

- (1) Disengage clips attaching upper quarter trim to inner quarter panel (Fig. 21).

NOTE: Start at top forward area of trim and pull inboard.

- (2) Remove seat cushion.
- (3) Remove lower seat belt anchor nut.
- (4) Slide seat belt through trim panel.
- (5) Remove upper quarter trim from vehicle.

INSTALLATION

- (1) Slide belt through trim panel.
- (2) Place upper quarter trim in position on vehicle.
- (3) Engage clips attaching upper quarter trim to inner quarter panel.

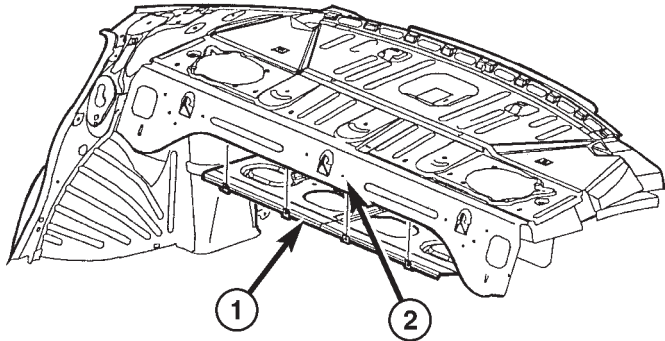
NOTE: Start at lower attachments first and work up.

- (4) Install seat belt anchor nut.
- (5) Install seat cushion.

UNDER REAR SHELF SILENCER

REMOVAL

- (1) Remove fasteners attaching silencer to lower shelf sheet metal (Fig. 26).
- (2) Remove silencer from vehicle.



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Fig. 26 UNDER REAR SHELF SILENCER

- 1 - UNDER SHELF SILENCER
- 2 - SHELF PANEL

INSTALLATION

- (1) Place silencer in position on vehicle (Fig. 26).
- (2) Install fasteners attaching silencer to the lower shelf sheet metal.

WHEELHOUSE SILENCER

REMOVAL

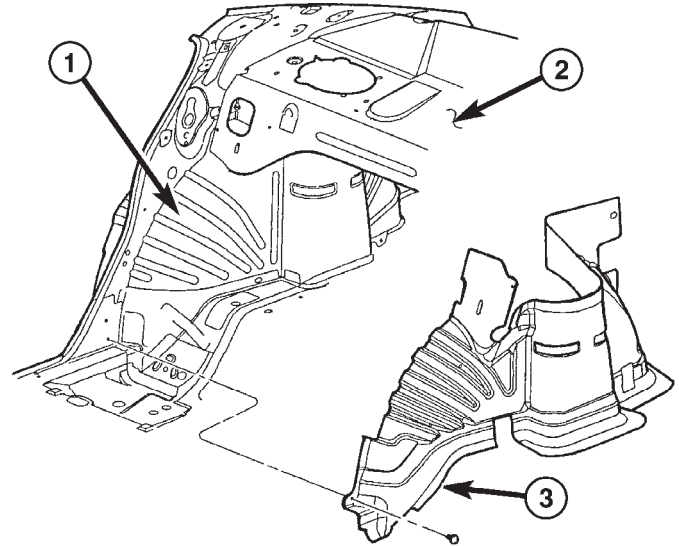
- (1) Remove rear seat back (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL).

- (2) Remove lower quarter trim (Refer to 23 - BODY/INTERIOR/LOWER QUARTER TRIM - REMOVAL).

- (3) Remove front trunk push pin and fold trunk carpet down.

- (4) Remove fasteners attaching silencer to wheel house.

- (5) Remove silencer from vehicle (Fig. 27).



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Fig. 27 WHEELHOUSE SILENCER

- 1 - WHEEL HOUSE
- 2 - REAR SHELF PANEL
- 3 - WHEEL HOUSE SILENCER

INSTALLATION

- (1) Place silencer into position on the wheel house (Fig. 27).

- (2) Install fasteners attaching silencer to wheel house.

- (3) Install lower quarter trim (Refer to 23 - BODY/INTERIOR/LOWER QUARTER TRIM - INSTALLATION).

- (4) Install rear seat back (Refer to 23 - BODY/SEATS/REAR SEAT BACK - INSTALLATION).

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DESCRIPTION 77		DESCRIPTION 77	
PAINT CODE			
DESCRIPTION 77			

PAINT

SPECIFICATIONS - COLOR CODE CHARTS

EXTERIOR COLORS

EXTERIOR COLOR	DAIMLERCHRYSLER CODE	EXTERIOR COLOR	DAIMLERCHRYSLER CODE
BLACK CLEARCOAT	DX8	INFERNO RED TINTED PEARLCOAT	WEL
BRIGHT SILVER METALLIC CLEARCOAT	WS2	LIGHT ALMOND PEARL METALLIC CLEARCOAT	ZKJ
CINNAMON GLAZE METALLIC CLEARCOAT	VLB	ONYX GREEN PEARLCOAT	YJR
DARK GARNET RED PEARLCOAT	XRV	STEEL BLUE PEARLCOAT	XBQ
DEEP SAPPHIRE BLUE CLEARCOAT	YBW	STONE WHITE CLEARCOAT	SW1

INTERIOR COLORS

INTERIOR COLOR	DAIMLERCHRYSLER CODE	INTERIOR COLOR	DAIMLERCHRYSLER CODE
DARK SLATE GREY	DV	SANDSTONE	T5
DARK SLATE GREY/LIGHT TAUPE	DV/L2	TAUPE	L5
DARK TAUPE/ LIGHT TAUPE	L5/L2		

BASECOAT/CLEARCOAT FINISH

DESCRIPTION

On most vehicles a two-part paint application (basecoat/clearcoat) is used. Color paint that is applied to primer is called basecoat. The clearcoat protects the basecoat from ultraviolet light and provides a durable high-gloss finish.

CAUTION: Do not use abrasive chemicals or compounds on painted surfaces. Damage to finish can result.

Do not use harsh alkaline based cleaning solvents on painted surfaces. Damage to finish or color can result.

PAINT CODE

DESCRIPTION

Exterior vehicle body colors are identified on the Body Code plate. (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION). The paint code is also identified on the Vehicle Safety Certification Label which is located on the drivers door shut face. The first digit of the paint code listed on the vehicle indicates the sequence of application, i.e.: P = primary coat, Q = secondary coat. The codes listed in the Color Code Chart are used for manufacturing purposes.

PAINT SURFACE TOUCH-UP

DESCRIPTION

When a painted metal surface has been scratched or chipped, it should be touched up as soon as possible to avoid corrosion. For best results, use Mopar® Scratch Filler/Primer, Touch Up Paints and Clear Top Coat. (Refer to VEHICLE DATA/VEHICLE INFORMATION/BODY CODE PLATE - DESCRIPTION).

WARNING: USE A OSHA APPROVED BREATHING MASK WHEN SPRAYING PAINT OR SOLVENTS IN A CONFINED AREA. PERSONAL INJURY CAN RESULT.

TOUCH UP PROCEDURE

(1) Scrape loose paint and corrosion from inside scratch or chip.

(2) Clean affected area with Mopar® Tar/Road Oil Remover, and allow to dry.

(3) Fill the inside of the scratch or chip with a coat of filler/primer. Do not overlap primer onto good surface finish. The applicator brush should be wet enough to puddle-fill the defect without running. Do not stroke brush applicator on body surface. Allow the filler/primer to dry hard.

(4) Cover the filler/primer with color touch up paint. Do not overlap touch up color onto the original color coat around the scratch or chip. Butt the new color to the original color, if possible. Do not stroke applicator brush on body surface. Allow touch up paint to dry hard.

(5) On vehicles without clearcoat, the touch up color can be lightly finesse sanded (1500 grit) and polished with rubbing compound.

(6) On vehicles with clearcoat, apply clear top coat to touch up paint with the same technique as described in Step 4. Allow clear top coat to dry hard. If desired, Step 5 can be performed on clear top coat.

WARNING: AVOID PROLONGED SKIN CONTACT WITH PETROLEUM OR ALCOHOL – BASED CLEANING SOLVENTS. PERSONAL INJURY CAN RESULT.

FINESSE SANDING/BUFFING & POLISHING

DESCRIPTION

Minor acid etching, orange peel, or smudging in clearcoat or single-stage finishes can be reduced with light finesse sanding, hand buffing, and polishing. **If the finish has been finesse sanded in the past, it cannot be repeated. Finesse sanding operation should be performed by a trained automotive paint technician.**

CAUTION: Do not remove clearcoat finish, if equipped. Basecoat paint must retain clearcoat for durability.

SEATS

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SEATS

SPECIFICATIONS - TORQUE

TORQUE SPECIFICATIONS

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Front seat track to floor pan bolts	61	45	—
Front seat inboard and outboard pivot bolts	30	23	—
Front seat recliner to seat cushion frame	12	9	—
Front seat track to cushion frame bolt	12	9	—
Front seat back	40	30	—
Front seat back to seat cushion	30	22	—
Front seat back recliner to seat back	8	—	71
Front seat rear outboard seat track to floor pan bolts	28	20	—
Front seat airbag module to seat back frame	7	—	62
Rear seat center seat belt retractor to shelf	60	44	—

FRONT ARMREST

REMOVAL - 50/50 SPLIT

- (1) Move the driver seat full forward and the passenger seat full rearward.
- (2) Open arm rest lid (Fig. 1).
- (3) Remove access retaining nut cover.
- (4) Remove arm rest retaining nut.
- (5) Slide arm rest off of bracket (Fig. 2).

INSTALLATION - 50/50 SPLIT

- (1) Slide arm rest on bracket.
- (2) Install arm rest nut. Tighten nut to 25 N·m (18 ft. lbs.) torque.
- (3) Install access retaining nut cover.
- (4) Reposition the seats.

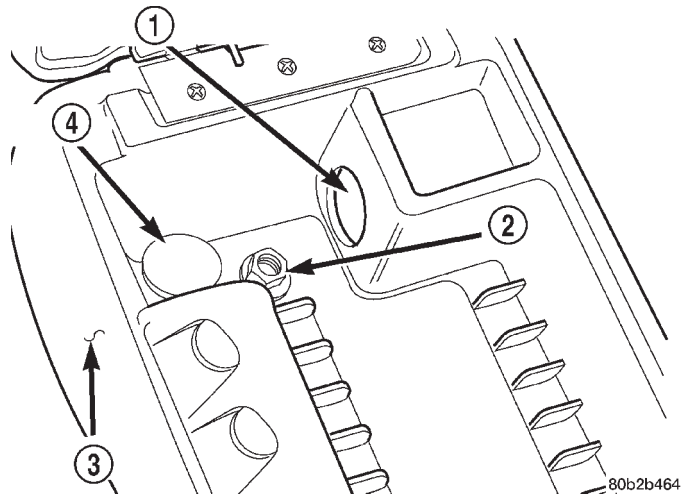
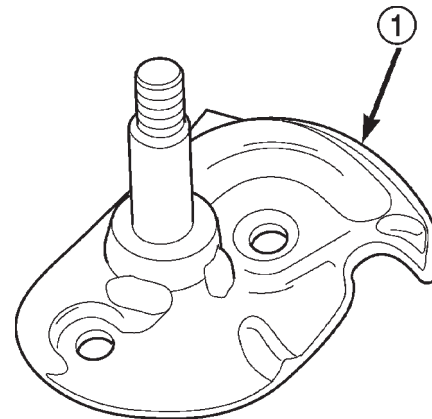


Fig. 1 ARM REST ACCESS HOLE

- 1 - REMOVE ACCESS HOLE
2 - NUT
3 - ARM REST
4 - COVER



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Fig. 2 ARM REST BRACKET

- 1 - ARMREST BRACKET

HEADREST

REMOVAL

REMOVAL

- (1) Lower head restraint slightly.
- (2) Insert a stiff wire into the hole on the right hand side head restraint sleeve/guide and push to release latch (Fig. 3).
- (3) At the same time, press the button on the head restraint sleeve/guide left hand side and pull upward to release the head restraint.
- (4) Remove head restraint from seat back.

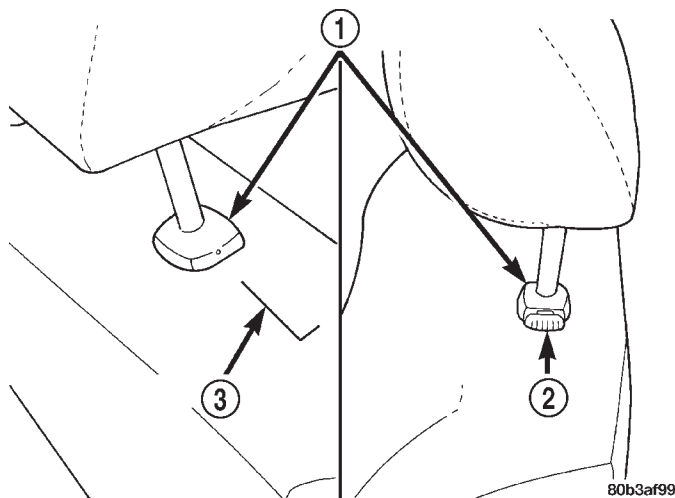


Fig. 3 HEAD RESTRAINT REMOVAL

- 1 - SLEEVE GUIDE
- 2 - BUTTON
- 3 - STIFF WIRE

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

- (1) Disconnect the remote negative battery cable.
- (2) If fully extended, lower head restraint slightly.
- (3) Insert a stiff wire into the hole on the right hand side head restraint sleeve/guide and push to release latch (Fig. 4).
- (4) At the same time, press the button on the head restraint sleeve/guide and pull upward to release the head restraint.
- (5) Remove head restraint from seat back.

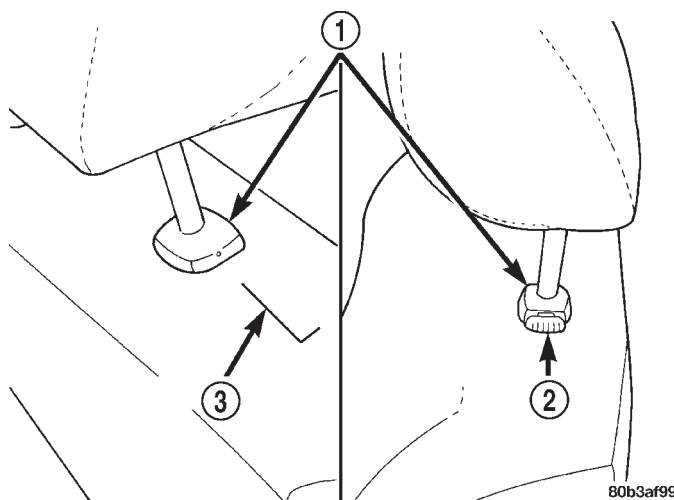


Fig. 4 HEAD RESTRAINT REMOVAL

- 1 - SLEEVE GUIDE
- 2 - BUTTON
- 3 - STIFF WIRE

INSTALLATION

INSTALLATION

- (1) Place head restraint in position.
- (2) Push head restraint down into the lock position.
- (3) Raise head restraint to ensure it locks at the last stop.

INSTALLATION - AIRBAG EQUIPPED

- (1) Place head restraint in position.
- (2) Push head restraint down into the lock position.
- (3) Raise head restraint to ensure it locks at the last stop.
- (4) Connect the remote negative battery cable.

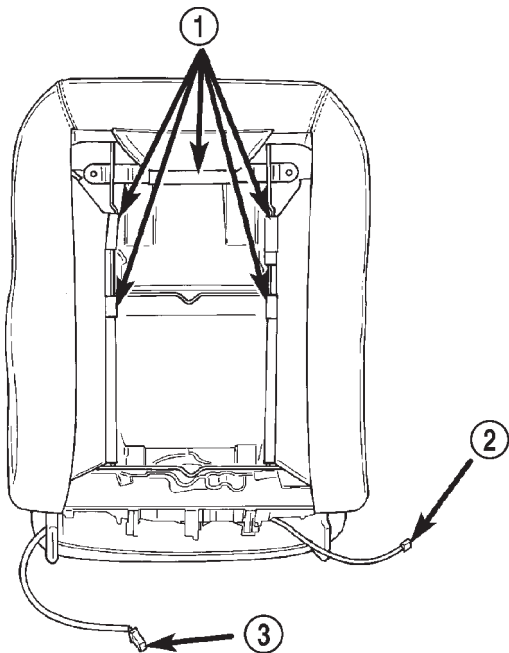
HEADREST SLEEVE - AIRBAG EQUIPPED

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

- (1) Disconnect the remote negative battery cable.
- (2) Remove the head restraint from the seat back (Refer to 23 - BODY/SEATS/HEADREST - REMOVAL) .
- (3) Remove the back panel from the seat back.
- (4) Disengage upper J-strap from seat back trim cover. (Fig. 5)
- (5) Working through the rear of seat back, depress the two head restraint guide sleeve retaining tabs and pull guide straight up and out of the seat back.



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Fig. 5 TRIM COVER J-STRAP POSITION & ORIENTATION

- 1 - TRIM COVER J-STRAPS
- 2 - SEAT HEATER WIRE HARNESS
- 3 - SEAT AIRBAG WIRE HARNESS

INSTALLATION - AIRBAG EQUIPPED

NOTE: The head restraint guide sleeve equipped with height adjustment button is always installed on the left side of the seat back.

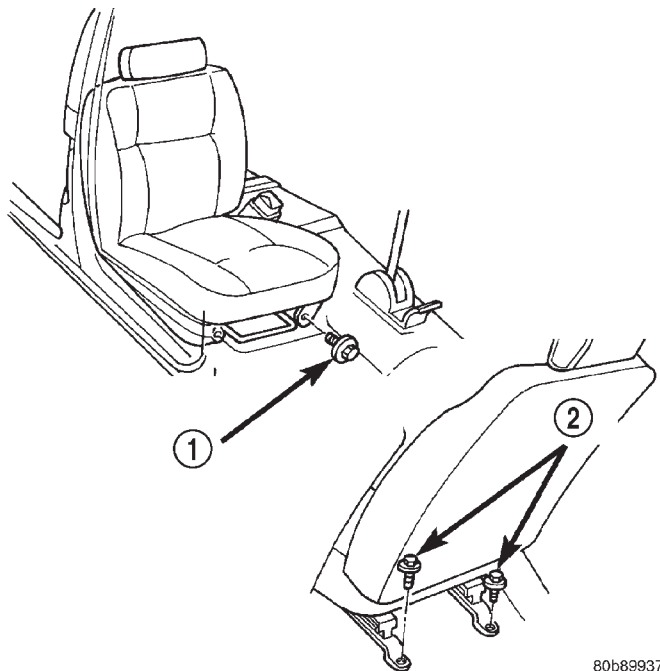
- (1) Install guides in seat back making sure they are snapped in place.
- (2) Install J-strap retainer.
- (3) Install the back panel on the seat back.
- (4) Install the head restraint on the seat back (Refer to 23 - BODY/SEATS/HEADREST - INSTALLATION) .
- (5) Connect the remote negative battery cable.

FRONT SEAT

REMOVAL

REMOVAL

- (1) Position seat far enough forward to gain access to rear mount bolts on floor.
- (2) Remove bolts attaching rear of seat track to floor (Fig. 6).
- (3) Move seat rearward.
- (4) Remove bolts attaching front of the seat track to floor kick up.
- (5) Disconnect front seat wire harness connector from body harness connector, if equipped.
- (6) Remove front seat from vehicle.



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Fig. 6 FRONT SEAT REMOVAL

- 1 - FRONT BOLTS
- 2 - REAR BOLTS

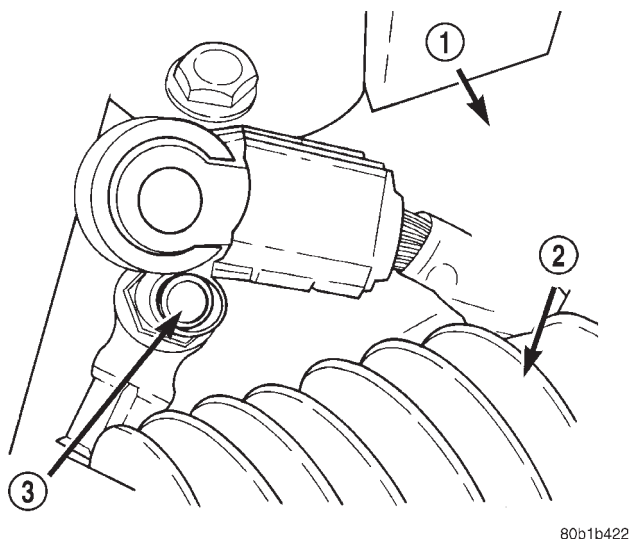
FRONT SEAT (Continued)

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

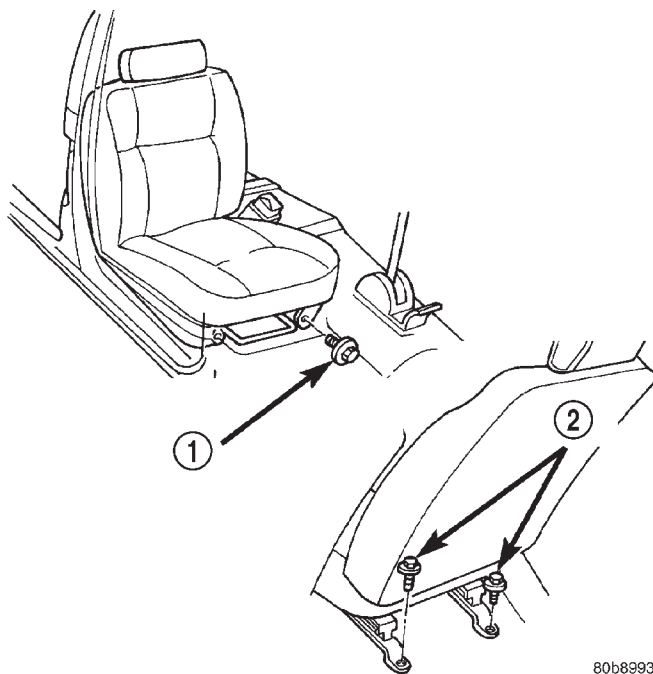
- (1) Position the seat far enough forward to allow removal of the rear retaining bolts.
- (2) Disconnect and isolate the remote negative battery cable (Fig. 7).
- (3) Remove bolts attaching rear of seat track to floor.
- (4) Remove bolts attaching front of the seat track to floor kick up (Fig. 8).
- (5) Tilt seat upward to access and disconnect the front seat wire harness connector from body harness connector.
- (6) Disconnect airbag wire harness connector by first sliding connector lock to the "unlocked" position, then depress connector retaining tab and pull straight apart.
- (7) Remove front seat from vehicle.



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Fig. 7 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL



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Fig. 8 FRONT SEAT RETAINING BOLTS

- 1 - FRONT BOLTS
- 2 - REAR BOLTS

INSTALLATION

INSTALLATION

NOTE: Ensure that the seat tracks are rearward

- (1) Place front seat in position in vehicle.
- (2) Connect front seat wire harness connector to body harness connector.
- (3) Install bolts to attach front of seat track to the floor kick up. Tighten bolts to 61 N·m (45 ft. lbs.) torque.
- (4) Move seat forward and install bolts attaching rear of seat track to the floor. Tighten bolts to 61 N·m (45 ft. lbs.) torque.
- (5) Verify front seat operation.

INSTALLATION - AIRBAG EQUIPPED

- (1) Place front seat in position in vehicle.
- (2) Connect front seat wire harness connector to body harness connector.
- (3) Connect airbag wire harness connector. Be certain airbag connector is secure and locking tab is in the "locked" position before installing seat retaining bolts.
- (4) Install bolts attaching the front of seat track to the floor kick up. Tighten bolts to 61 N·m (45 ft. lbs.) torque.
- (5) Install bolts attaching rear of seat track to the floor. Tighten bolts to 61 N·m (45 ft. lbs.) torque.

FRONT SEAT (Continued)

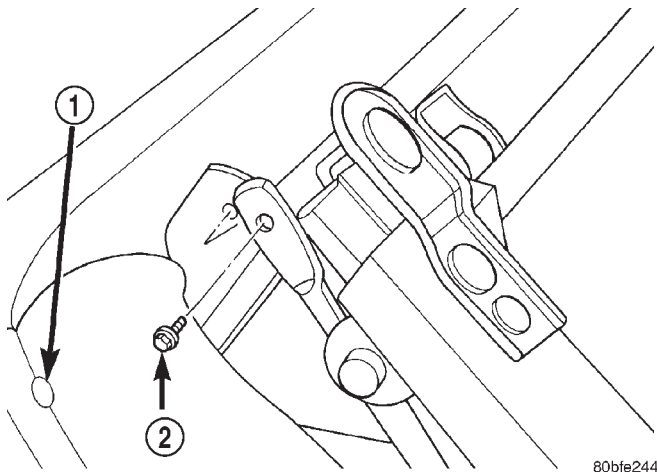
- (6) Connect the remote negative battery cable.
- (7) Using the DRB III Scan Tool erase all DTC's and perform airbag system diagnostics.
- (8) Verify front seat operation.

FRONT SEAT BACK

REMOVAL

REMOVAL

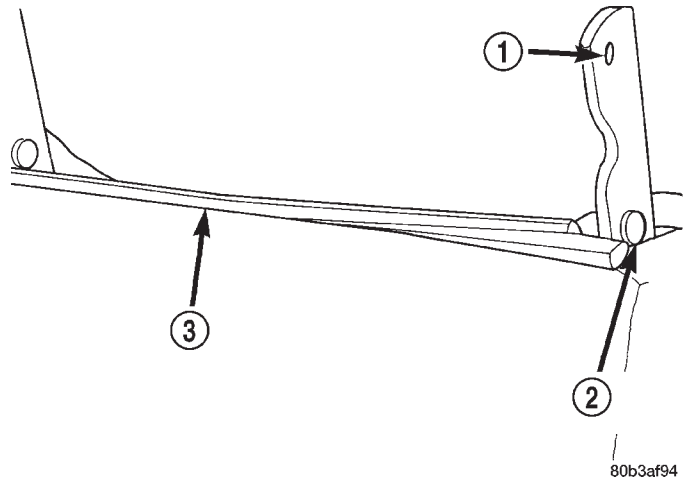
- (1) Remove front seat from vehicle (Refer to 23 - BODY/SEATS/FRONT SEAT - REMOVAL).
- (2) Remove front seat cushion side shields (Refer to 23 - BODY/SEATS/SEAT SIDE SHIELD - REMOVAL).
- (3) Remove bolts attaching recliner to seat back cushion frame (Fig. 9).
- (4) Remove inboard and outboard pivot bolts (Fig. 10).
- (5) Disconnect any electrical connectors to the seat back, if equipped.
- (6) Remove seat back from seat cushion.

**Fig. 9 RECLINER ATTACHING BOLT**

- 1 - PIVOT BOLT
- 2 - RECLINER BOLT

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

**Fig. 10 REMOVE SEAT BACK**

- 1 - RECLINER BOLT HOLE
- 2 - SEAT BACK BOLT HOLE
- 3 - J-STRAP RETAINER

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

- (1) Position seat forward enough to allow removal of the rear seat track to floor pan bolts.
- (2) Disconnect and isolate the remote negative battery cable (Fig. 11).
- (3) Remove the front seat from the vehicle. Refer to the procedure in this group.
- (4) Remove the front seat cushion side shields. Refer to the procedure in this group.
- (5) Disengage push pin and disconnect the yellow airbag wire harness connector located on the bottom of the seat cushion pan.
- (6) Disengage push pin and disconnect the heated seat element wire connector also located on the cushion pan.
- (7) Remove bolts attaching recliner to seat back cushion frame (Fig. 12).
- (8) Remove inboard and outboard pivot bolts connecting the seat cushion to the seat back.
- (9) Feed wire harnesses between the seat track and cushion pan and remove seat back from seat cushion.
- (10) Remove necessary components from seat back for reuse if possible. Refer to the procedures in this group.

INSTALLATION

INSTALLATION

NOTE: Do not reuse the recliner assembly attaching bolts.

FRONT SEAT BACK (Continued)

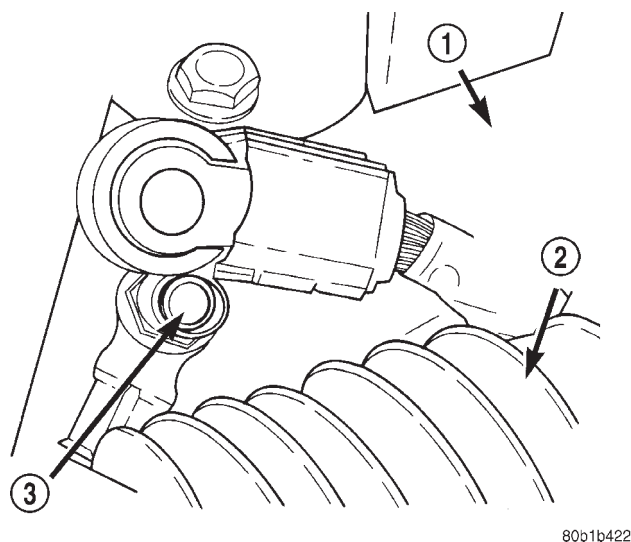


Fig. 11 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

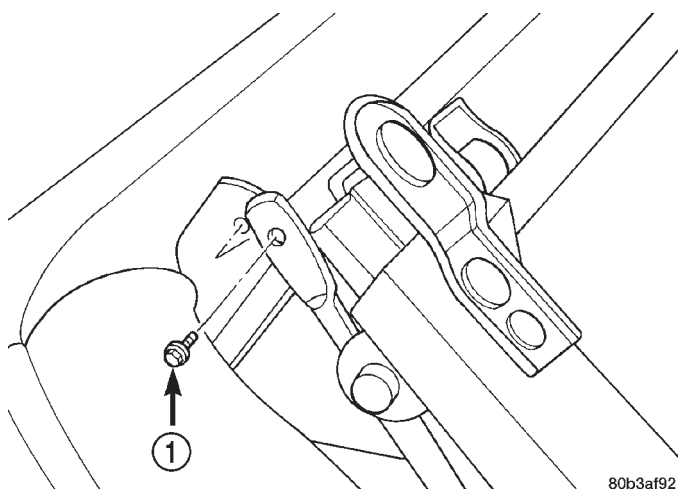


Fig. 12 RECLINER ATTACHING BOLTS

- 1 - RECLINER BOLT

- (1) Position seat back on cushion.
- (2) Connect electrical connectors to the seat back, if equipped.
- (3) Install inboard pivot bolt. Tighten bolts to 30 N·m (22 ft. lbs.) torque.
- (4) Install bolts attaching recliner to seat back frame. Tighten bolts to 8 N·m (71 in. lbs.) torque.
- (5) Install front seat cushion side shields (Refer to 23 - BODY/SEATS/SEAT SIDE SHIELD - INSTALLATION).
- (6) Install front seat in vehicle (Refer to 23 - BODY/SEATS/FRONT SEAT - INSTALLATION).

INSTALLATION - AIRBAG EQUIPPED

(1) Position the assembled seat back and feed wire harness down into lower seat cushion (Fig. 13). Be certain harness is routed along the leading edge of seat frame.

(2) Install inboard and outboard pivot bolts. Tighten bolt to 30 N·m (23 ft. lbs.) torque.

CAUTION: Do not reuse recliner assembly attaching bolts. Due to the nylon coating on these bolts they are not reusable.

(3) Install bolts attaching recliner to seat back frame (Fig. 12). Tighten bolts to 8 N·m (71 in. lbs.) torque.

(4) Connect airbag wire harness connector and secure push pin. Be certain connector is securely connected.

(5) Connect heated seat element connector and secure push pin.

(6) Install seat cushion side shields. Refer to the procedure in this group.

(7) Install seat in vehicle. Refer to the procedure in this group.

(8) Connect the negative battery cable.

(9) Using the DRB III Scan Tool erase all DTC's and perform airbag system diagnostics.

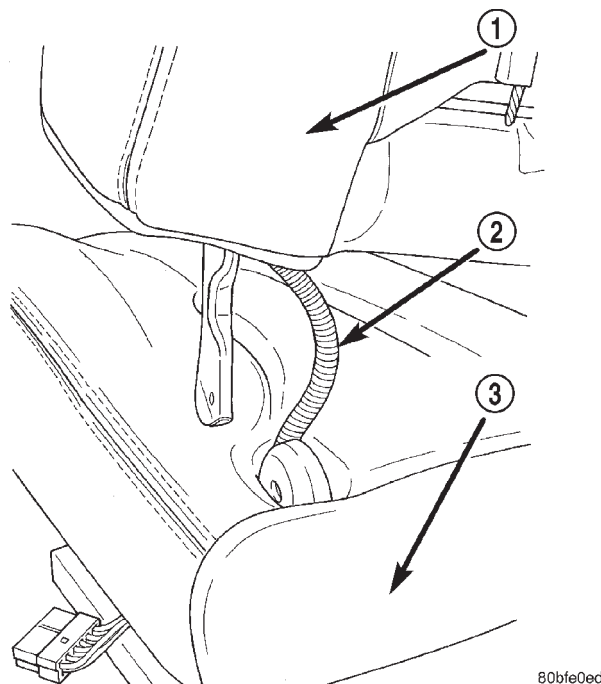


Fig. 13 SEAT BACK WIRE HARNESS

- 1 - FRONT SEAT BACK
- 2 - SEAT AIRBAG WIRE HARNESS
- 3 - FRONT SEAT CUSHION

FRONT SEAT BACK COVER

REMOVAL

REMOVAL

- (1) Remove head restraint (Refer to 23 - BODY/SEATS/ARMREST - FRONT - REMOVAL).
- (2) Remove front seat back (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - REMOVAL).
- (3) Remove lumbar support handle, if equipped.
- (4) Disengage the J-strap retainer (Fig. 10).
- (5) Roll cover upward to hog rings. Cut hog rings to free cover (Fig. 14).
- (6) Roll cover to top of cushion and remove head restraint sleeve guides.
- (7) Remove cover from seat back.

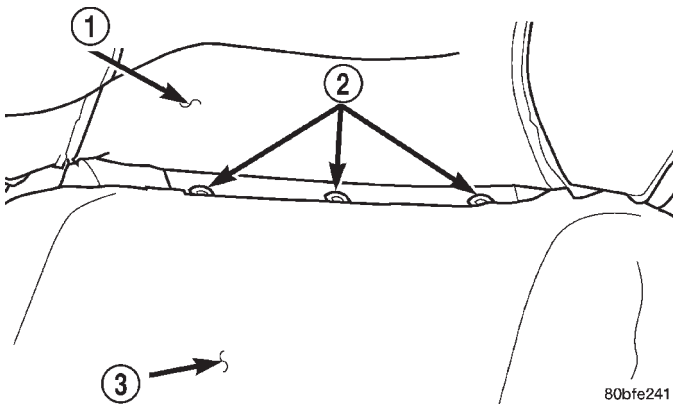


Fig. 14 FRONT SEAT BACK HOG RINGS

- 1 - SEAT COVER
- 2 - HOG RINGS
- 3 - BACK PAD

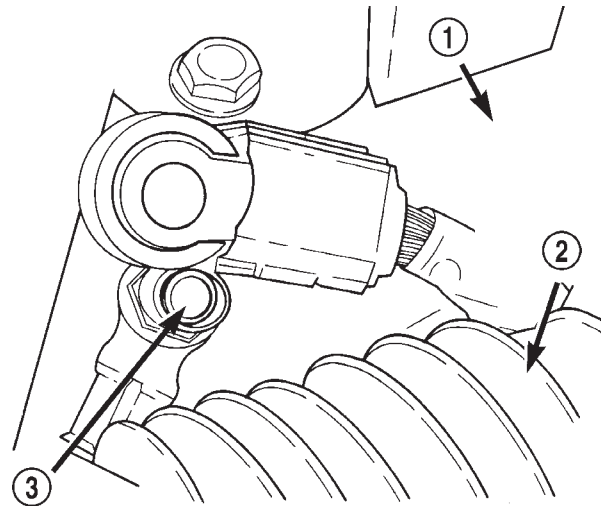
REMOVAL - AIRBAG EQUIPPED

CAUTION: DO NOT REPLACE A DEPLOYED AIRBAG. IF SEAT AIRBAG HAS BEEN DEPLOYED THE ENTIRE SEAT OR SEAT BACK MUST BE REPLACED.

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

- (1) Disconnect and isolate the negative battery cable (Fig. 15).



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Fig. 15 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL

- (2) Remove the front seat from the vehicle. Refer to the procedure in this group.
- (3) Remove the front seat head restraint. Refer to the procedure in this group.
- (4) Remove the front seat back panel. Refer to the procedure in this group.
- (5) Remove the head restraint guide sleeves from the seat back. Refer to the procedure in this group.
- (6) Remove the front seat cushion side shield. Refer to the procedure in this group.
- (7) Release all J-strap retaining clips (Fig. 16).
- (8) Remove the outboard recliner attaching bolt (Fig. 17). This will allow access to the seat back heating element wire harness.
- (9) Disconnect heating element wire connector.
- (10) Disconnect seat airbag module electrical connector at the module. Slide the yellow locking tab down to release lock function. Then depress the two retaining tangs (located on the sides of the connector) and pull straight out (Fig. 18).
- (11) Remove the seat airbag module retaining nuts and plastic shield, if equipped. Carefully slide module from nylon sleeve (Fig. 18).

CAUTION: During module removal, be certain not to tear nylon sleeve. This will adversely affect the function of the airbag system.

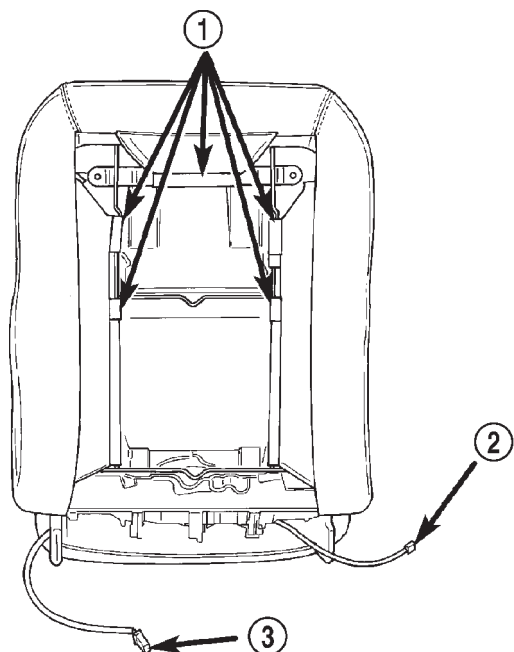
- (12) Remove seat back foam and cover from frame.

FRONT SEAT BACK COVER (Continued)

(13) Disengage velcro from cover. With one hand, hold velcro that is glued to seat back foam. With the other hand, grasp opposite velcro strip and pull apart to separate. This will prevent tearing velcro out of seat back foam.

(14) Pull cover up far enough to access the remaining three hog rings. Cut hog rings from cover.

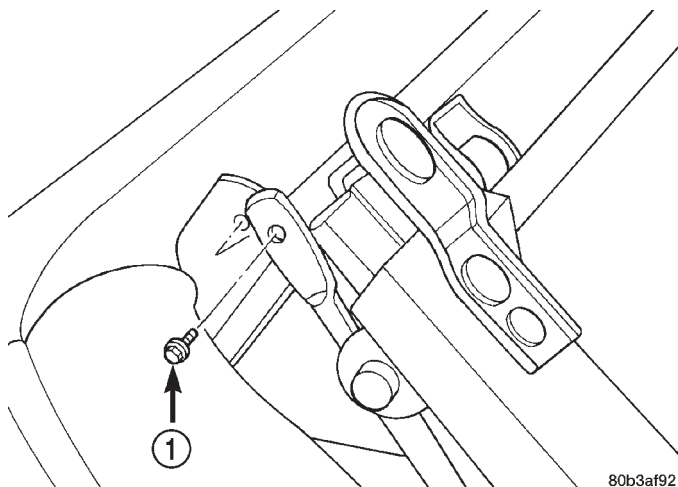
(15) Remove cover from seat back foam.



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Fig. 16 SEAT BACK J-STRAP POSITION & ORIENTATION

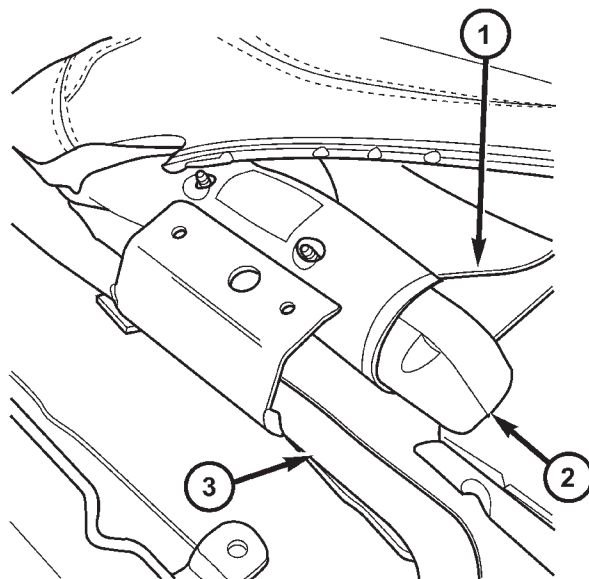
- 1 - TRIM COVER J-STRAPS
- 2 - SEAT HEATER WIRE HARNESS
- 3 - SEAT AIRBAG WIRE HARNESS



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Fig. 17 RECLINER PIVOT BOLT

- 1 - RECLINER BOLT



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Fig. 18 AIRBAG MODULE INSTALLATION

- 1 - Airbag Module Nylon Sleeve
- 2 - Airbag Module
- 3 - Seat Back Frame

INSTALLATION

INSTALLATION

NOTE: Do not reuse the recliner assembly attaching bolts.

- (1) Position cover at the top of seat back.
- (2) Carefully roll cover down to the area that hog rings are to be installed.
- (3) Install hog rings.
- (4) Roll cover downward.
- (5) Engage the J-strap retainer
- (6) Install lumbar support handle, if equipped.
- (7) Install new head restraint sleeve guides.
- (8) Install front seat back (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - INSTALLATION).
- (9) Install head restraint (Refer to 23 - BODY/SEATS/ARMREST - FRONT - INSTALLATION).
- (10) Check seat back operation.

INSTALLATION - AIRBAG EQUIPPED

- (1) Position cover on seat back foam.
- (2) Carefully roll cover down to the area that hog rings are to be installed. Install hog rings.
- (3) Roll cover downward, fastening velcro as you go.
- (4) Position seat back foam and cover on frame.

FRONT SEAT BACK COVER (Continued)

CAUTION: Seat Airbag Module Must Be Installed In Nylon Sleeve. Failure To Do So Will Adversely Affect Function Of Airbag System.

(5) Carefully slide the seat airbag module in nylon sleeve (Fig. 18), install retaining nuts and plastic shield if equipped (Fig. 19). Torque the nuts to 7 N·m (62 in. lbs.).

(6) Connect seat airbag module electrical connector (Fig. 16). Be certain yellow locking tab is in the locked position after connection is made. Upon connection completion, double check connection by trying to disconnect without releasing yellow lock. If connector cannot be removed connection is secure.

(7) Connect heating element wire connector.

(8) Install the outboard recliner attaching bolt (Fig. 17). Torque the bolt to 8 N·m (71 in. lbs.).

(9) Engage J-strap retaining clips.

(10) Install the front seat cushion side shield. Refer to the procedure in this group.

(11) Install the head restraint guide sleeves in the seat back. Refer to the procedure in this group.

(12) Install the front seat back panel. Refer to the procedure in this group.

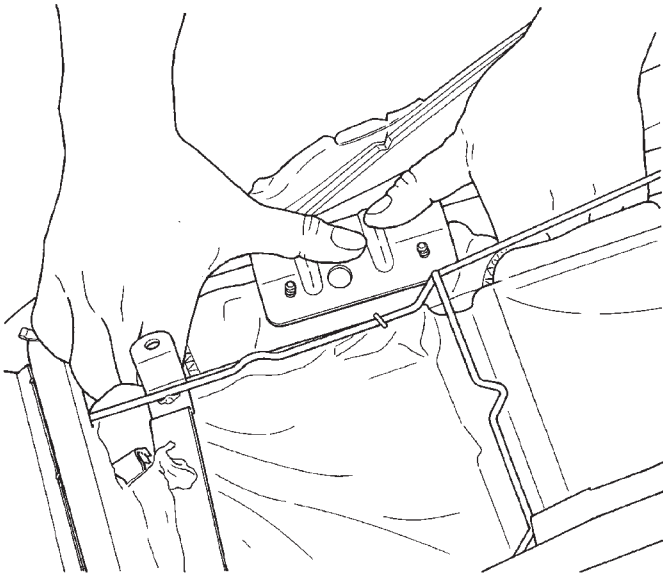
(13) Install the front seat head restraint. Refer to the procedure in this group.

(14) Install the front seat in the vehicle. Refer to the procedure in this group.

(15) Connect the negative battery cable.

(16) Using the DRB III® Scan Tool erase all DTC's and perform airbag system diagnostics.

(17) Check trim cover fit and finish and verify seat operation.



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Fig. 19 INSTALLING SEAT AIRBAG MODULE ON SEAT BACK FRAME

SEAT BACK PANEL

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

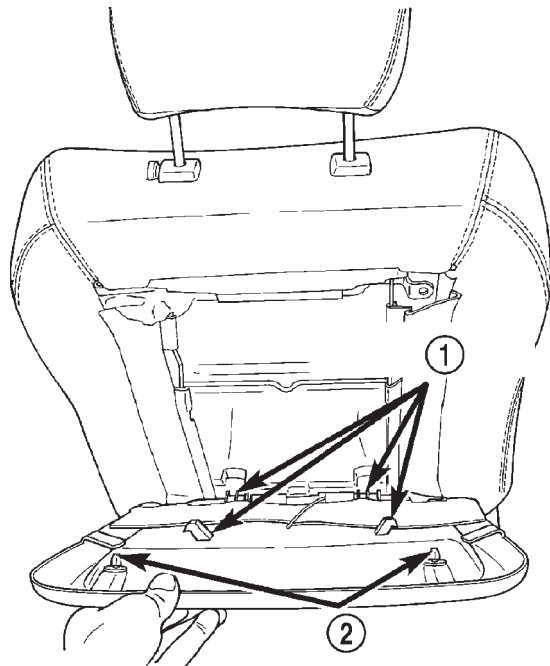
WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

(1) Disconnect and isolate the remote negative battery cable.

(2) Using a flat bladed trim tool, insert between upper portion of seat back cover and seat back panel. Gently pry panel away from seat back to free push pins.

(3) Grasp the middle edge portion of back panel and push inboard while pulling sharply to release retaining tabs (Fig. 20).

(4) Remove back panel from seat back frame.



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Fig. 20 BACK PANEL MOUNTING

1 - BACK PANEL RETAINING TABS

2 - BACK PANEL RETAINING PUSHINS

SEAT BACK PANEL (Continued)

INSTALLATION - AIRBAG EQUIPPED

CAUTION: Always install new push pins in the upper mounting location of back panel. Failure to do so could adversely affect the airbag system.

(1) Starting at the bottom, line up back panel retaining tabs and new push pins. Then push sharply to snap in place.

(2) Check back panel fit and finish. Run a finger down the sides of back panel to be certain panel fits tight to the rear of trim cover.

CAUTION: Be certain seat back panel is properly secured in place. Failure to do so could adversely affect the airbag system.

(3) Connect the negative battery cable.

FRONT SEAT CUSHION

REMOVAL

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

(1) Remove track and recliner assembly (Refer to 23 - BODY/SEATS/SEAT TRACK & RECLINER ASSEMBLY - REMOVAL).

(2) Remove front seat back (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - REMOVAL).

(3) Disconnect seat cushion heater element connector, if equipped.

(4) Disconnect wire harness fasteners from cushion frame (Fig. 21).

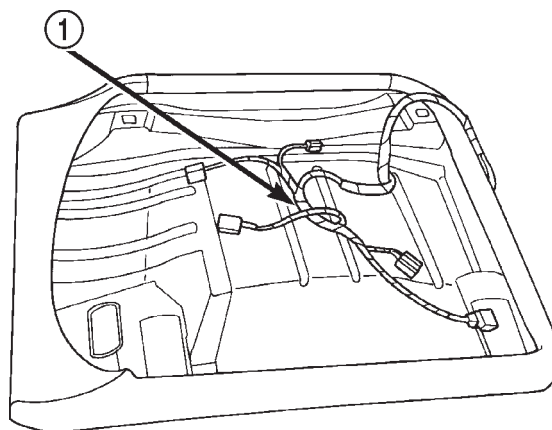
(5) Remove seat cushion (Fig. 22).

INSTALLATION

(1) Install wire harness fasteners to cushion frame (Fig. 21).

(2) Connect seat cushion heater element connector, if equipped.

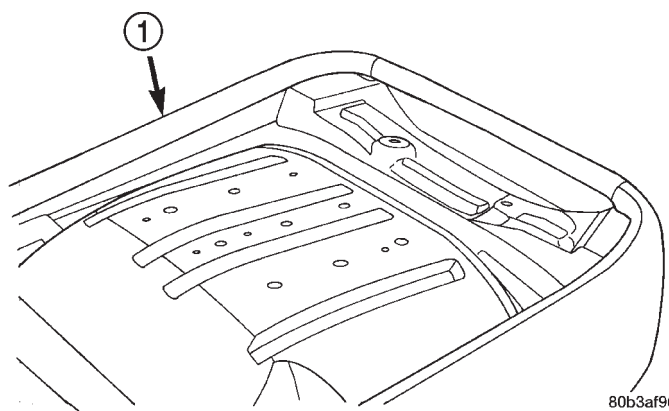
(3) Install track and recliner assembly (Refer to 23 - BODY/SEATS/SEAT TRACK & RECLINER ASSEMBLY - INSTALLATION).



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Fig. 21 FRONT SEAT CUSHION WIRE HARNESS

1 - WIRE HARNESS



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Fig. 22 FRONT SEAT CUSHION

1 - FRONT SEAT CUSHION

(4) Install front seat back (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - INSTALLATION).

FRONT SEAT CUSHION COVER

REMOVAL - HEATED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

FRONT SEAT CUSHION COVER (Continued)

- (1) Remove track and recliner assembly (Refer to 23 - BODY/SEATS/SEAT TRACK & RECLINER ASSEMBLY - REMOVAL).
- (2) Disconnect seat cushion heater element harness connectors from seat pan.
- (3) Remove seat back (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - REMOVAL).
- (4) Disengage J-strap attaching seat cover from the seat cushion frame (Fig. 23).
- (5) Peel cover from foam and foam from frame access the hog rings (Fig. 24).
- (6) Cut hog rings attaching seat cover seat cushion.
- (7) Route seat function switches through access hole on outboard side of seat cushion.
- (8) Remove seat cushion cover from seat cushion.

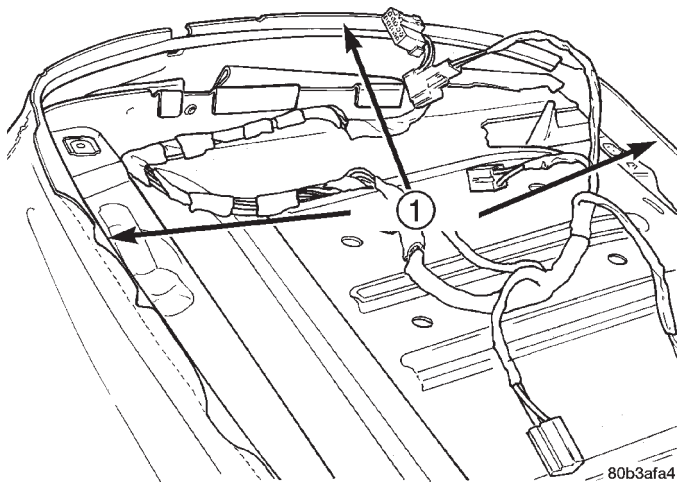


Fig. 23 FRONT SEAT CUSHION J- STRAP

1 - J-STRAP

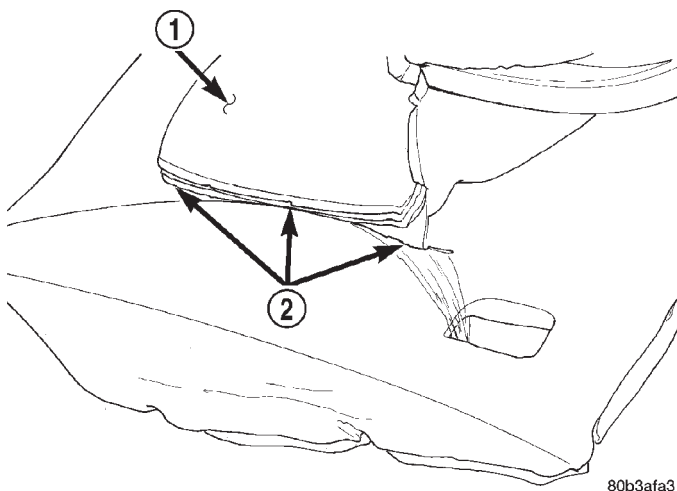


Fig. 24 SEAT CUSHION COVER

1 - SEAT COVER
2 - HOG RINGS

INSTALLATION - HEATED

- (1) Position seat cover on cushion. Ensure to reposition seat anti squeak sheet to frame, if equipped.
- (2) Route seat function switches through access hole on outboard side of seat cushion. (Fig. 25)
- (3) Align seat cover with cushion alignment indentations.
- (4) Engage seat cushion heater element connector.
- (5) Install hog rings.
- (6) Engage J-strap attaching seat cover to front of seat cushion frame.
- (7) Install seat back (Refer to 23 - BODY/SEATS/FRONT SEAT BACK - INSTALLATION).
- (8) Connect seat cushion heater element harness connectors from seat pan.
- (9) Install track and recliner assembly (Refer to 23 - BODY/SEATS/SEAT TRACK & RECLINER ASSEMBLY - INSTALLATION).

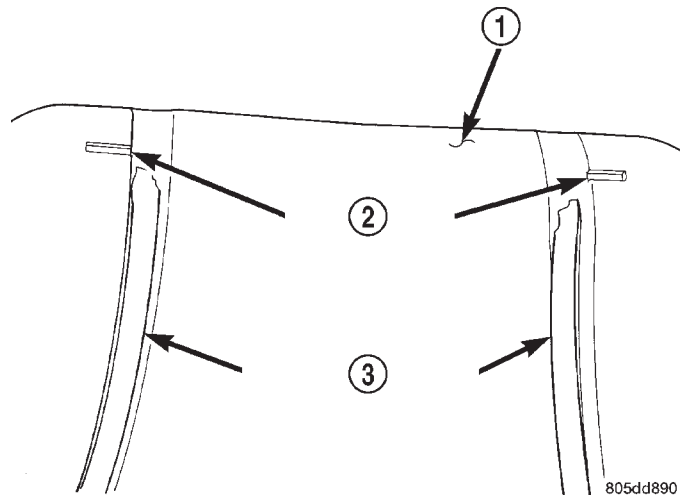


Fig. 25 SEAT CUSHION ALIGNMENT INDENTATIONS

1 - SEAT CUSHION
2 - ALIGNMENT INDENTATIONS
3 - HOOK AND LOOP FASTENER

SEAT SIDE SHIELD

REMOVAL

REMOVAL - NON AIRBAG

- (1) Remove front seat from vehicle (Refer to 23 - BODY/SEATS/Front SEAT - REMOVAL).
- (2) Remove screws attaching seat cushion side shield to the bottom and side of seat cushion (Fig. 26) and (Fig. 27).
- (3) Remove shield from seat
- (4) Disconnect switch wire connectors, if equipped.
- (5) Remove seat switches, if equipped.

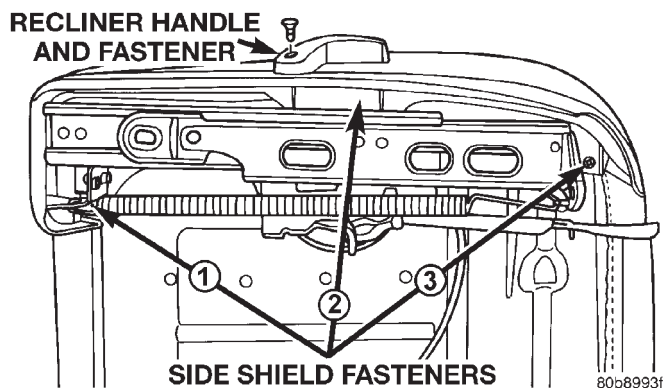


Fig. 26 BOTTOM VIEW OF SIDE SHIELD AND TIGHTENING SEQUENCE

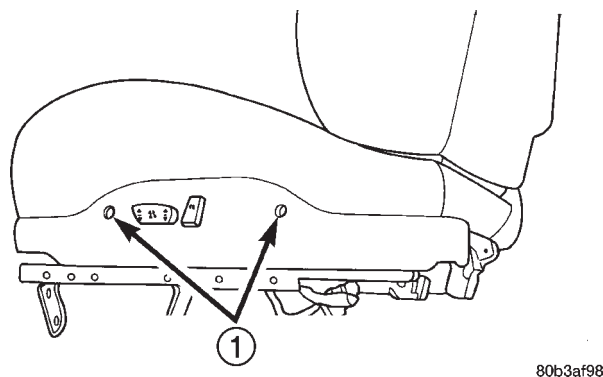


Fig. 27 SIDE VIEW OF SIDE SHIELD

1 - SIDESHIELD FASTENERS

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: IF EQUIPPED WITH AIRBAG, AFTER THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE DISCONNECTING OR REMOVING ANY AIRBAG SYSTEM COMPONENTS.

- (1) Disconnect and isolate the remote negative battery cable.
- (2) Remove seat from vehicle. Refer to the procedure in this group.
- (3) Remove screws attaching seat cushion side shield to the bottom and side of seat cushion (Fig. 26) and (Fig. 27).
- (4) Remove shield from seat
- (5) Disconnect switch wire connectors, if equipped.
- (6) Remove seat switches, if equipped.

INSTALLATION

INSTALLATION - NON AIRBAG

- (1) Transfer seat switches, if equipped.
- (2) Connect switch wire connectors to cushion side shield, if equipped.
- (3) Place shield in position on seat cushion.
- (4) Install screws attaching seat cushion side shield. Tighten screws in sequence, refer to (Fig. 26).
- (5) Install front seat (Refer to 23 - BODY/SEATS/Front SEAT - INSTALLATION).

INSTALLATION - AIRBAG EQUIPPED

- (1) Transfer seat switches, if equipped.
- (2) Connect switch wire connectors to cushion side shield, if equipped.
- (3) Place shield in position on seat cushion.
- (4) Install screws attaching seat cushion side shield. Tighten screws in sequence, refer to (Fig. 26).
- (5) Install seat. Tighten front screws to 61 N·m (45 ft. lbs.) and the rear screws to 61 N·m (45 ft. lbs.) torque.
- (6) Connect the remote negative battery cable.

LUMBAR SUPPORT

REMOVAL

The front seat lumbar support is not service separately. The front seat back frame will need to be replaced.

SEAT TRACK & RECLINER ASSEMBLY

REMOVAL

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

- (1) Remove seat cushion side shield (Refer to 23 - BODY/SEATS/SEAT SIDE SHIELD - REMOVAL).
- (2) Remove bolts attaching seat back recliner to seat back frame on each side of seat (Fig. 28).
- (3) Remove bolts attaching seat adjuster to cushion pan (Fig. 29).
- (4) Disconnect wire harness fasteners from cushion pan.
- (5) Remove seat adjuster from seat cushion.

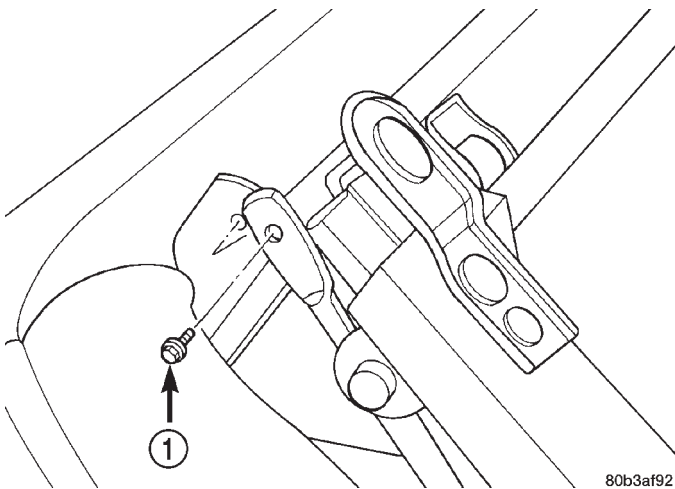


Fig. 28 RECLINER PIVOT BOLT

1 - RECLINER BOLT

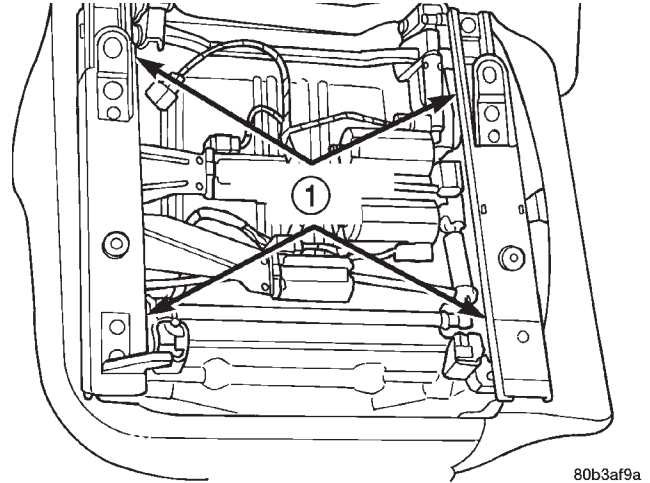


Fig. 29 FRONT SEAT TRACK - TYPICAL

1 - ATTACHING BOLTS

INSTALLATION

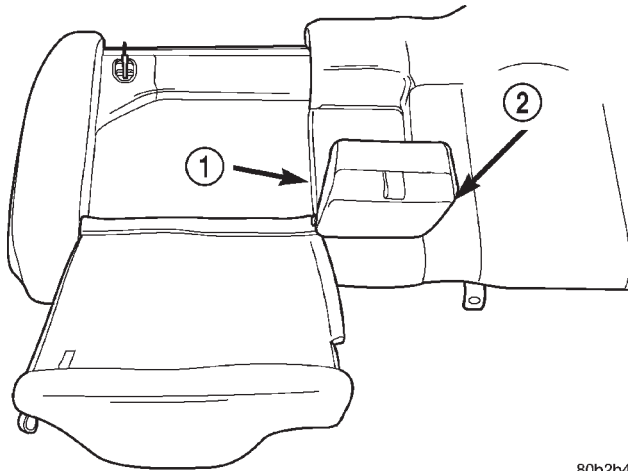
- (1) Place seat adjuster in position on seat cushion pan.
- (2) Connect wire harness fasteners to the cushion pan.
- (3) Install bolts attaching seat adjuster to cushion pad.
- (4) Install seat back.
- (5) Install bolt attaching seat back recliner to seat back on each side of seat. Tighten bolt to 8 N·m (71 in. lbs.) torque.
- (6) Install the seat cushion side shields (Refer to 23 - BODY/SEATS/SEAT SIDE SHIELD - INSTALLATION).

REAR ARMREST

REMOVAL

REMOVAL - 60/40

- (1) Fold down 40 side rear seat back.
- (2) Remove arm rest bolt (Fig. 30).
- (3) Remove retaining C-clip.
- (4) Remove arm rest.



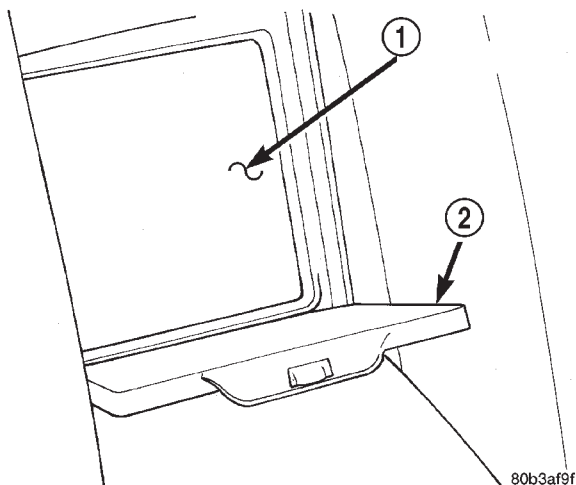
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Fig. 30 REAR SEAT ARM REST - 60/40

- 1 - BOLT
- 2 - RETAINING C-CLIP

REMOVAL - REAR SKI/PASS

- (1) Remove rear seat back (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL). (Fig. 31)
- (2) Remove silencer panel fasteners on the back of seat back (Fig. 32).

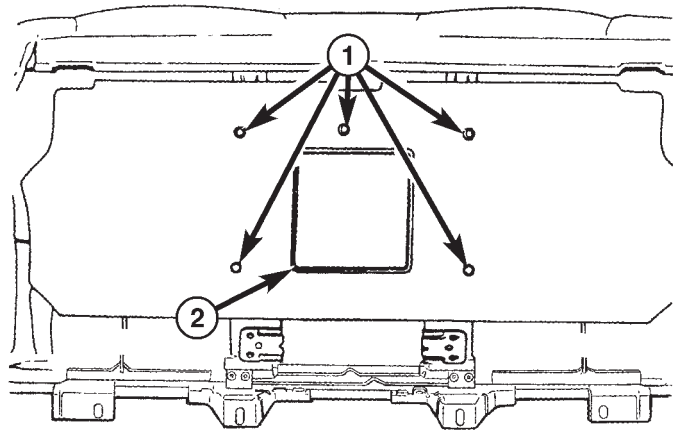


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Fig. 31 ARM REST WITH SKI PASS

- 1 - SKI PASS
- 2 - DOOR

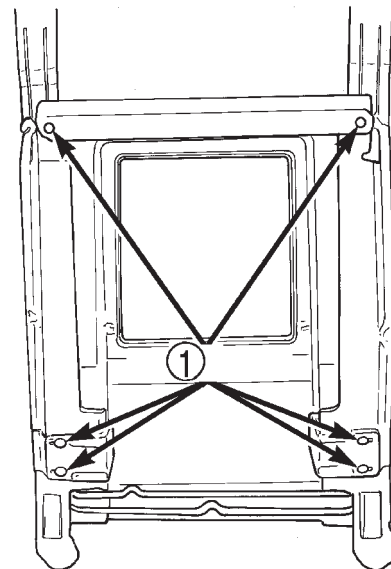
- (3) Remove silencer panel.
- (4) Remove fasteners attaching arm rest to seat back (Fig. 33).
- (5) Remove arm rest (Fig. 34).



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Fig. 32 REAR SEAT SILENCER

- 1 - FASTENERS
- 2 - SKI PASS



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Fig. 33 REAR SEAT ARM REST WITH SKI PASS

- 1 - FASTENERS

INSTALLATION

INSTALLATION - 60/40

- (1) Place arm rest in bracket.
- (2) Install arm rest bolt. Tighten to 12 N-m (9 ft. lbs.) torque.
- (3) Install retaining C-clip.
- (4) Reposition the seats.

REAR ARMREST (Continued)

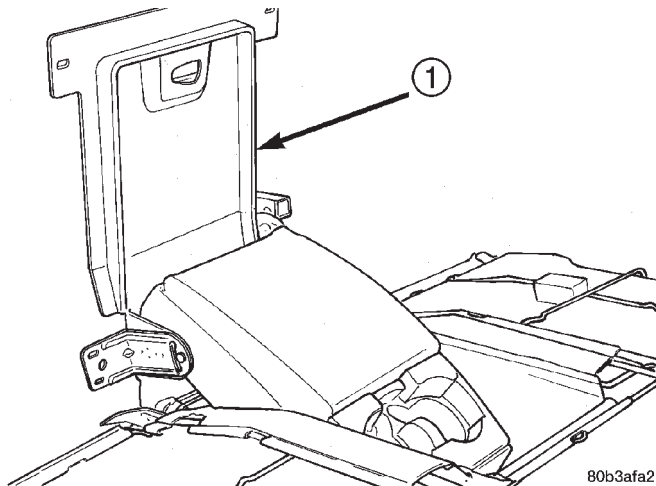


Fig. 34 ARM REST REMOVAL

1 - ARM REST WITH SKI PASS

INSTALLATION - REAR SKI/PASS

- (1) Place arm rest into position.
- (2) Install fasteners attaching arm rest to seat back. Tighten fasteners to 5 N·m (45 in. lbs.) torque.
- (3) Install silencer fasteners. Use new fasteners.
- (4) Install seat back (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL).

REAR SEAT BACK

REMOVAL

REMOVAL

- (1) Remove rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - REAR - REMOVAL).
- (2) Remove inboard nuts attaching rear seat back and belts to floor and outboard bolts attaching seat back to floor (Fig. 35).

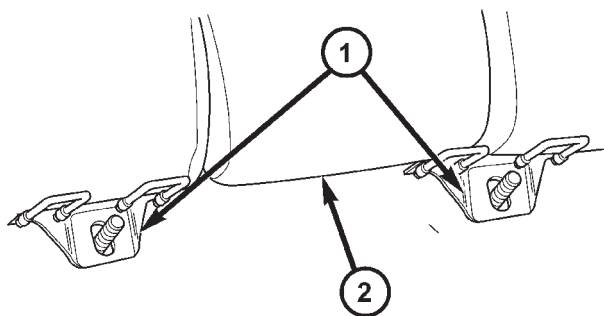


Fig. 35 REAR SEAT BACK

1 - REAR SEAT BACK MOUNTS
2 - REAR SEAT BACK
3 - REAR SEAT BELTS

- (3) Pull bottom of seat back out to slide rear seat back mounts off studs. Push rear seat back upward to disengage hooks at top of seat back.
- (4) Remove rear seat back from vehicle.

REMOVAL - 40 SECTION

- (1) Remove seat back collar assembly (Refer to 23 - BODY/SEATS/REAR SEAT BACK - COLLAR ASSEMBLY - REMOVAL). (Fig. 36)
- (2) Remove bolt attaching 40 section (Fig. 37).
- (3) Slide seat back 40 section off pin and remove from the collar assembly (Fig. 38).

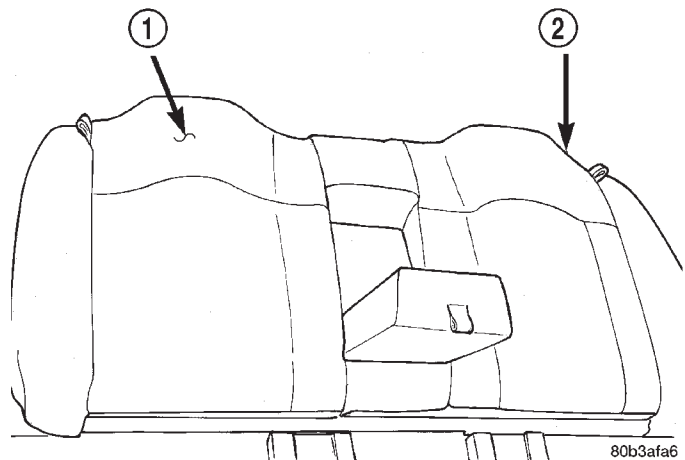


Fig. 36 Collar Assembly

1 - 40 SECTION
2 - 60 SECTION

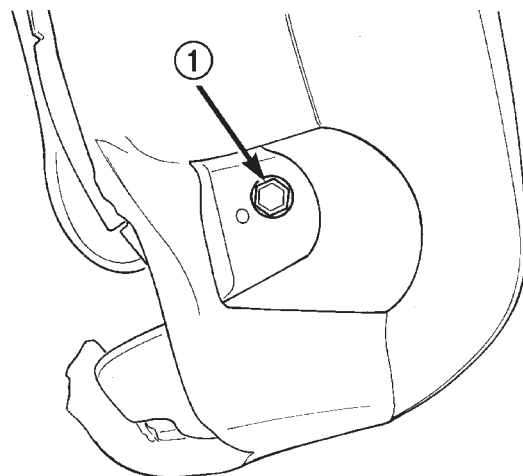
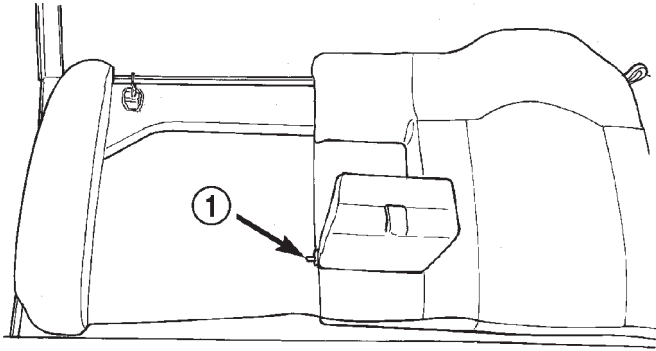


Fig. 37 Remove 40 Section Seat Back

1 - ATTACHING BOLT

REAR SEAT BACK (Continued)



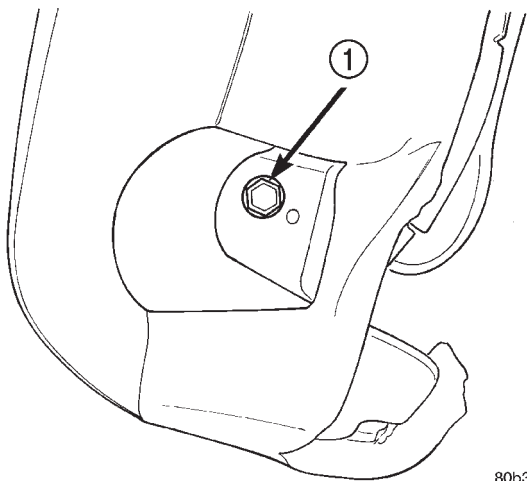
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Fig. 38 40 Section Pivot Pin

1 - PIN

REMOVAL - 60 SECTION

- (1) Remove seat back collar assembly (Refer to 23 - BODY/SEATS/REAR SEAT BACK COLLAR ASSEMBLY - REMOVAL).
- (2) Remove bolt attaching 40 seat section.
- (3) Remove the 40 seat section.
- (4) Remove bolt attaching 60 seat section (Fig. 39).
- (5) Slide seat back 60 section off pivot bracket and remove from the collar assembly.



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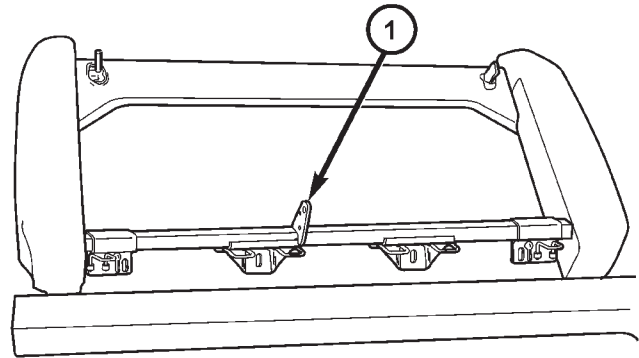
Fig. 39 REAR SEAT BACK 60 SECTION

1 - ATTACHING BOLT

REMOVAL - 60/40 SEAT COLLAR ASSEMBLY

- (1) Remove rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION REAR - REMOVAL).
- (2) Remove nuts attaching rear seat back collar assembly.
- (3) Remove rear seat back collar assembly.
- (4) Remove the 40 seat section from the rear seat back collar assembly.

- (5) Remove the 60 seat section from the rear seat back collar assembly (Fig. 40).



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Fig. 40 REAR SEAT BACK COLLAR

1 - PIVOT BRACKET

INSTALLATION**INSTALLATION**

- (1) Place rear seat back in position in vehicle.
- (2) Engage hooks at top of seat back.
- (3) Install inboard nuts and outboard bolts attaching rear seat back and belts to floor. Tighten to 40 N·m (29 ft. lbs.) torque.
- (4) Install rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION - REAR - INSTALLATION).

INSTALLATION - 40 SECTION

- (1) Place seat back 40 section on pin.
- (2) Install bolt attaching 40 section seat back to collar section. Tighten bolt to 16 N·m (12 ft. lbs.) torque.
- (3) Install seat back collar assembly (Refer to 23 - BODY/SEATS/REAR SEAT BACK - COLLAR ASSEMBLY - INSTALLATION).

INSTALLATION - 60 SECTION

- (1) Install the 60 seat section on pivot bracket.
- (2) Install bolt attaching 60 seat section. Tighten bolt to 16 N·m (12 ft. lbs.) torque.
- (3) Install the 40 seat section on pin.
- (4) Install bolt attaching 40 seat section. Tighten bolt to 16 N·m (12 ft. lbs.) torque.
- (5) Install seat back collar assembly (Refer to 23 - BODY/SEATS/REAR SEAT BACK COLLAR ASSEMBLY - INSTALLATION).

REAR SEAT BACK (Continued)

INSTALLATION - 60/40 SEAT COLLAR ASSEMBLY

- (1) Install the 60 seat section from the rear seat back collar assembly.
- (2) Install the 40 seat section from the rear seat back collar assembly.
- (3) Place the rear seat back collar assembly in position in vehicle.
- (4) Install nuts and bolts attaching rear seat back collar assembly. Tighten nuts and bolts to 40 N-m (29 ft. lbs.) torque.
- (5) Install the rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION REAR - INSTALLATION).

REAR SEAT BACK COVER

REMOVAL

- (1) Remove rear seat back (Refer to 23 - BODY/SEATS/REAR SEAT BACK - REMOVAL).
- (2) Pull cover over edges of the foam.
- (3) Cut hog rings to free cover.
- (4) Remove rear seat back cover from seat back.

INSTALLATION

- (1) Position seat back cover on seat back.
- (2) Install hog ring on right side listing pocket of cover to foam, starting in the middle and lining up the die cuts in the listing pocket with the hog ring windows in the foam (three places).
- (3) Repeat for the left side listing pocket of cover.
- (4) Place cover seams in salvage trenches of foam.
- (5) Roll corners and edges of cover over foam.
- (6) Flip seat over making sure cover is pulled up over frame on all corners. Push top, bottom, inside, outside, corners of the foam into the cover and engage J-strap retainers.
- (7) Install rear seat back (Refer to 23 - BODY/SEATS/REAR SEAT BACK - INSTALLATION).

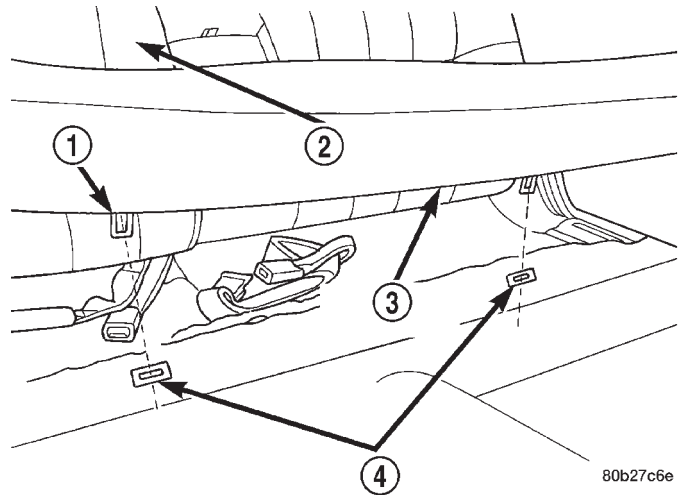
REAR SEAT CUSHION

REMOVAL

- (1) Pull upward at forward edge of cushion each retainer loop of the rear seat cushion to disengage retainer loops from cups in floor (Fig. 41).
- (2) Remove rear seat cushion from vehicle.

INSTALLATION

- (1) Place rear seat cushion in position.
- (2) Engage retainer loops into cup on floor kick up.
- (3) Push downward at forward edge at each retainer loop of the rear seat cushion to engage retainers.



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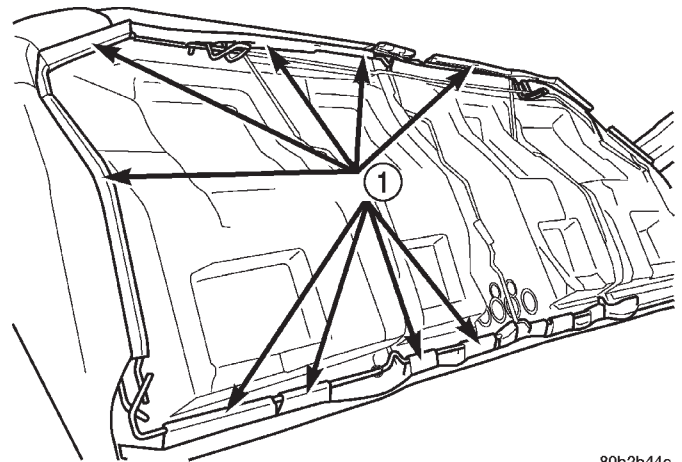
Fig. 41 REAR SEAT CUSHION

- 1 - RETAINER LOOP
- 2 - REAR SEAT BACK
- 3 - REAR SEAT CUSHION
- 4 - CUPS

REAR SEAT CUSHION COVER

REMOVAL

- (1) Remove rear seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION REAR - REMOVAL).
- (2) Disengage the J-strap retainers (Fig. 42).
- (3) Cut hog rings to free cover (Fig. 43).
- (4) Remove seat cushion cover from seat cushion.



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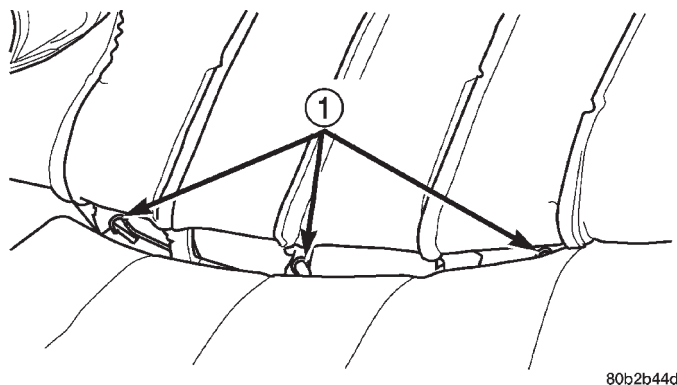
Fig. 42 REAR SEAT CUSHION COVER J-STRAPS

- 1 - J-STRAPS

INSTALLATION

- (1) Position seat cushion cover on cushion.
- (2) Install hog rings to seat cover.
- (3) Engage the J-strap retainers.
- (4) Steam wrinkles from seat cushion, if necessary.

REAR SEAT CUSHION COVER (Continued)



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Fig. 43 REAR SEAT CUSHION COVER HOG RING

1 - HOG RINGS

(5) Install seat cushion (Refer to 23 - BODY/SEATS/SEAT CUSHION REAR - INSTALLATION).

SEAT ADJUSTERS

REMOVAL - AIRBAG EQUIPPED

WARNING: DISCONNECT AND ISOLATE THE NEGATIVE BATTERY CABLE REMOTE TERMINAL BEFORE BEGINNING ANY FRONT SEAT REMOVAL OR INSTALLATION PROCEDURE. THIS WILL DISABLE THE AIRBAG SYSTEM. FAILURE TO DISCONNECT THE BATTERY COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: ONCE THE NEGATIVE CABLE IS DISCONNECTED WAIT FOR 2 MINUTES BEFORE REMOVING ANY AIRBAG SYSTEM COMPONENTS.

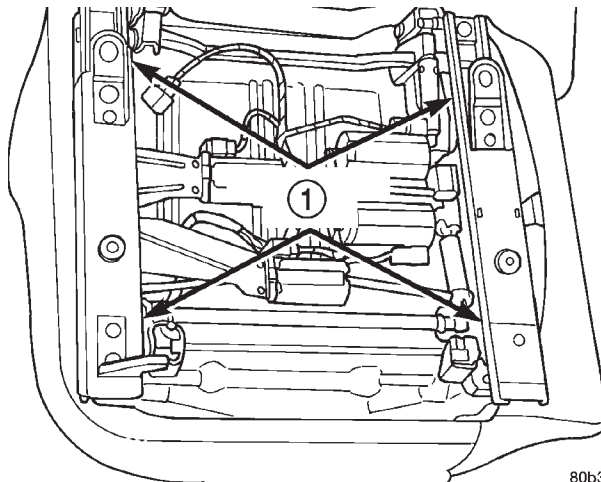
(1) Disconnect and isolate the remote negative battery cable.

(2) Remove the front seat back. Refer to the procedure in this group.

(3) Remove bolts attaching seat adjuster to cushion pan (Fig. 44).

(4) Disconnect wire harness from cushion pan.

(5) Remove seat adjuster from seat cushion.



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Fig. 44 FRONT SEAT TRACK - TYPICAL

1 - ATTACHING BOLTS

INSTALLATION - AIRBAG EQUIPPED

(1) Place seat adjuster in position on seat cushion pan.

(2) Connect wire harness to the cushion pan.

(3) Install bolts attaching seat adjuster to cushion pad.

(4) Install seat back. Refer to the procedure in this group.

(5) Install bolt to attach seat back recliner to seat back on each side of seat. Tighten bolt to 8 N·m (71 in. lbs.) torque.

(6) Connect the negative battery cable.

(7) Using the DRB III® Scan Tool erase all DTC's and perform airbag system diagnostics.

STATIONARY GLASS

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STATIONARY GLASS

DESCRIPTION

Windshields and selected stationary glass are structural members of the vehicle. The windshield glass is bonded to the windshield frame with urethane adhesive.

BACKLITE

REMOVAL

- (1) Remove upper quarter trim panel (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - REMOVAL).
- (2) Disconnect the wire connectors from rear window defogger, and rear window mounted radio antenna, if so equipped.

WARNING: WEAR EYE AND HAND PROTECTION WHEN HANDLING SAFETY GLASS. PERSONAL INJURY CAN RESULT.

CAUTION: Do not damage body or trim finish when cutting out glass or applying fence primer.

- (3) Cut the urethane around the perimeter of the rear window glass. Refer to Windshield section of this group for proper procedures.
- (4) Remove the rear window from the vehicle.

INSTALLATION

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN WINDSHIELD BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

- (1) Clean inside of rear window with ammonia based glass cleaner and lint free cloth.
- (2) Apply Glass Prep adhesion promoter 25 mm (1 in.) wide around perimeter of rear window encapsu-

- lation (not to the glass) and wipe with clean/dry lint free cloth until no streaks are visible.
- (3) Apply Glass Primer 25 mm (1 in.) wide around perimeter of rear window encapsulation (not to the glass). Allow at least three minutes drying time.
- (4) Using a razor knife, remove as much original urethane as possible. Do not damage paint on rear window fence.
- (5) Apply pinch weld primer 15 mm (.75 in.) wide around the rear window fence. Allow at least three minutes drying time.
- (6) Apply a 10 mm (0.4 in.) bead of urethane to the encapsulation (Fig. 1).
- (7) With the aid of a helper, position the rear window over the opening.
- (8) Slowly lower rear window glass to the roof fence opening and engage over the two flanges located on the roof fence. Guide the encapsulation into proper position as necessary. Remove the backing paper from the tape on lower appendage and

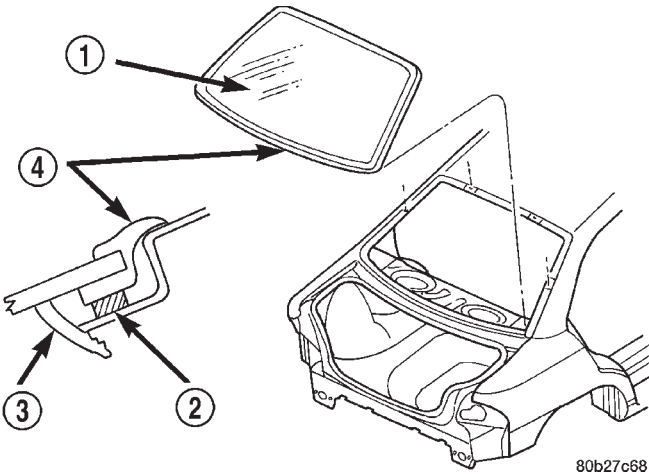


Fig. 1 REAR WINDOW GLASS - TYPICAL

- 1 - REAR WINDOW GLASS
- 2 - URETHANE
- 3 - CLIP
- 4 - MOLDING

BACKLITE (Continued)

push rear window inward till flush to roof line and C-pillars (Intrepid).

(9) Clean excess urethane from exterior with Mopar® Super Kleen or equivalent.

(10) Connect rear window defogger wiring connector, and rear window mounted radio antenna connector, if so equipped.

(11) Install upper quarter trim panel (Refer to 23 - BODY/INTERIOR/UPPER QUARTER TRIM - INSTALLATION).

(12) After urethane has cured, water test rear window to verify repair. Verify rear window defogger operation, (Refer to 8 - ELECTRICAL/HEATED GLASS/REAR WINDOW DEFOGGER GRID - DIAGNOSIS AND TESTING) .

WINDSHIELD

DESCRIPTION

WARNING: DO NOT OPERATE THE VEHICLE WITHIN 24 HOURS OF WINDSHIELD INSTALLATION. IT TAKES AT LEAST 24 HOURS FOR URETHANE ADHESIVE TO CURE. IF IT IS NOT CURED, THE WINDSHIELD MAY NOT PERFORM PROPERLY IN AN ACCIDENT.

URETHANE ADHESIVES ARE APPLIED AS A SYSTEM. USE GLASS CLEANER, GLASS PREP SOLVENT, GLASS PRIMER, PVC (VINYL) PRIMER AND PINCH WELD (FENCE) PRIMER PROVIDED BY THE ADHESIVE MANUFACTURER. IF NOT, STRUCTURAL INTEGRITY COULD BE COMPROMISED.

DAIMLERCHRYSLER DOES NOT RECOMMEND GLASS ADHESIVE BY BRAND. TECHNICIANS SHOULD REVIEW PRODUCT LABELS AND TECHNICAL DATA SHEETS, AND USE ONLY ADHESIVES THAT THEIR MANUFACTURES WARRANT WILL RESTORE A VEHICLE TO THE REQUIREMENTS OF FMVSS 212. TECHNICIANS SHOULD ALSO INSURE THAT PRIMERS AND CLEANERS ARE COMPATIBLE WITH THE PARTICULAR ADHESIVE USED.

BE SURE TO REFER TO THE URETHANE MANUFACTURER'S DIRECTIONS FOR CURING TIME SPECIFICATIONS, AND DO NOT USE ADHESIVE AFTER ITS EXPIRATION DATE.

VAPORS THAT ARE EMITTED FROM THE URETHANE ADHESIVE OR PRIMER COULD CAUSE PERSONAL INJURY. USE THEM IN A WELL-VENTILATED AREA.

SKIN CONTACT WITH URETHANE ADHESIVE SHOULD BE AVOIDED. PERSONAL INJURY MAY RESULT.

ALWAYS WEAR EYE AND HAND PROTECTION WHEN WORKING WITH GLASS.

CAUTION: Protect all painted and trimmed surfaces from coming in contact with urethane or primers. Be careful not to damage painted surfaces when removing moldings or cutting urethane around windshield.

OPERATION

The windshield is attached to the window frame with urethane adhesive. The urethane adhesive is applied cold and seals the surface area between the window opening and the glass. The primer adheres the urethane adhesive to the windshield.

It is difficult to salvage a windshield during the removal operation. The windshield is part of the structural support for the roof. The urethane bonding used to secure the windshield to the fence is difficult to cut or clean from any surface. If the moldings are set in urethane, it would also be unlikely they could be salvaged. Before removing the windshield, check the availability of the windshield and moldings from the parts supplier.

REMOVAL

The urethane adhesive holding the windshield to the opening pinch weld (fence) can be cut using a sharp cold knife from the exterior of the vehicle. Using the cold knife method is effective if the windshield is already broken. If the glass must be salvaged, cutting the urethane adhesive from the interior of the vehicle using a reciprocating or oscillating power knife is recommended.

(1) Remove inside rear view mirror (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - REMOVAL).

(2) Remove cowl cover (Refer to 23 - BODY/EXTERIOR/COWL GRILLE AND SCREEN - REMOVAL).

(3) Remove drip rail weatherstrips as necessary to gain access to screws holding windshield side moldings (Fig. 2). Pull outward on molding at the bottom of A-pillars using pliers.

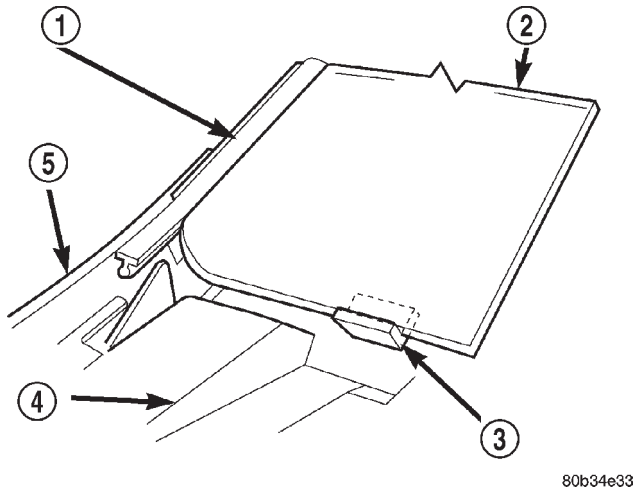
(4) Cut urethane bonding from around windshield using a suitable sharp cold knife. A pneumatic cutting device can be used if available. (Fig. 3)

(5) Remove windshield from vehicle.

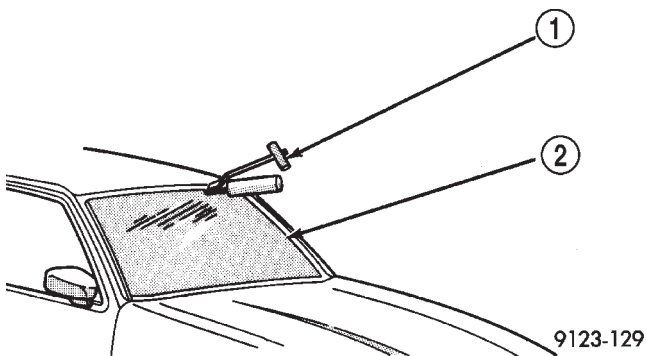
INSTALLATION

The urethane adhesive holding the windshield to the opening pinch weld (fence) can be cut using a sharp cold knife from the exterior of the vehicle. Using the cold knife method is effective if the windshield is already broken. If the glass must be salvaged, cutting the urethane adhesive from the interior of the vehicle using a reciprocating or oscillating power knife is recommended.

WINDSHIELD (Continued)

**Fig. 2 Windshield Moldings**

- 1 - MOLDING
- 2 - WINDSHIELD
- 3 - FOAM BLOCK
- 4 - COWL
- 5 - FENDER

**Fig. 3 Cut Urethane**

- 1 - COLD KNIFE
- 2 - WINDSHIELD

CAUTION: Open the left front door glass before installing windshield to avoid pressurizing the passenger compartment. If a door is slammed before urethane bonding is cured, water leaks can result. Allow the urethane at least 24 hours to cure before returning the vehicle to use.

To avoid stressing the replacement windshield, the urethane bonding material on the windshield fence should be smooth and consistent to the shape of the replacement windshield. The support spacers should be cleaned and properly installed on weld studs or repair screws at bottom of windshield opening.

(1) Place replacement windshield into position and center in the opening against the support spacers.

(2) Verify the glass lays evenly against the pinch weld fence at the sides, top and bottom of the replacement windshield. If not, the pinch weld fence must be formed to the shape of the new glass.

(3) Mark the glass at the support spacers with a grease pencil or pieces of masking tape and ink pen to use as a reference for installation (Fig. 4).

(4) Remove replacement windshield from windshield opening.

(5) Position the windshield inside up on a suitable work surface with two padded, wood 10 cm by 10 cm by 50 cm (4 in. by 4 in. by 20 in.) blocks, placed parallel 75 cm (2.5 ft.) apart (Fig. 5).

WARNING: DO NOT USE SOLVENT BASED GLASS CLEANER TO CLEAN WINDSHIELD BEFORE APPLYING GLASS PREP AND PRIMER. POOR ADHESION CAN RESULT.

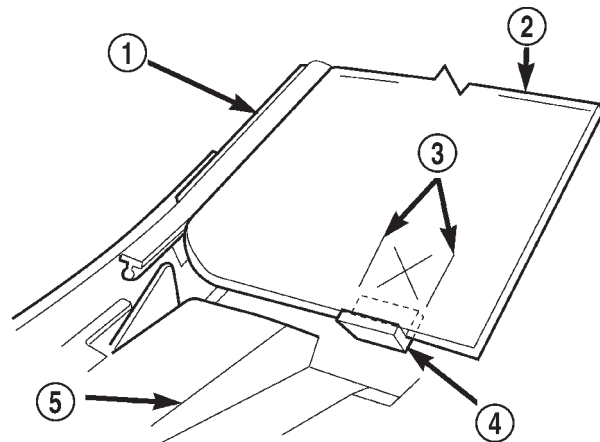
(6) Clean inside of windshield with ammonia based glass cleaner and lint free cloth.

(7) Apply molding to top edge of windshield.

(8) Apply Glass Prep adhesion promoter 25 mm (1 in.) wide around perimeter of windshield and wipe with clean/dry lint free cloth until no streaks are visible.

(9) Apply Glass Primer 25 mm (1 in.) wide around perimeter of windshield. Allow at least three minutes drying time.

(10) Using a razor knife, remove as much original urethane as possible. Do not damage paint on windshield fence.

**Fig. 4 Center Windshield and Mark at Support Spacers**

- 1 - A-PILLAR
- 2 - WINDSHIELD
- 3 - MARKS
- 4 - FOAM BLOCK
- 5 - COWL

WINDSHIELD (Continued)

(11) Apply pinch weld primer 15 mm (.75 in.) wide around the windshield fence. Allow at least three minutes drying time.

(12) If a low viscosity urethane adhesive is used, install compression spacers on the fence around the windshield opening (Fig. 6).

(13) Apply a 10 mm (0.4 in.) bead of urethane along center line of windshield fence.

(14) With the aid of a helper, position the windshield over the windshield opening. Align the reference marks at the bottom of the windshield to the support spacers.

(15) Slowly lower windshield glass to windshield opening fence. Guide the molding into proper position as necessary. Push windshield inward molding is flush to roof line and A-pillars (Fig. 7).

(16) Clean excess urethane from exterior with Mopar® Super Kleen or equivalent.

(17) Apply 150 mm (6 in.) lengths of 50 mm (2 in.) masking tape spaced 250 mm (10 in.) apart to hold molding in place until urethane cures.

(18) Install A-pillar moldings (Refer to 23 - BODY/INTERIOR/A-PILLAR TRIM - INSTALLATION).

(19) Install cowl cover (Refer to 23 - BODY/EXTERIOR/COWL GRILLE AND SCREEN - INSTALLATION).

(20) Install inside rear view support bracket (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - INSTALLATION).

(21) Install inside rear view mirror (Refer to 23 - BODY/INTERIOR/REAR VIEW MIRROR - INSTALLATION).

(22) After urethane has cured, remove tape strips and water test windshield to verify repair.

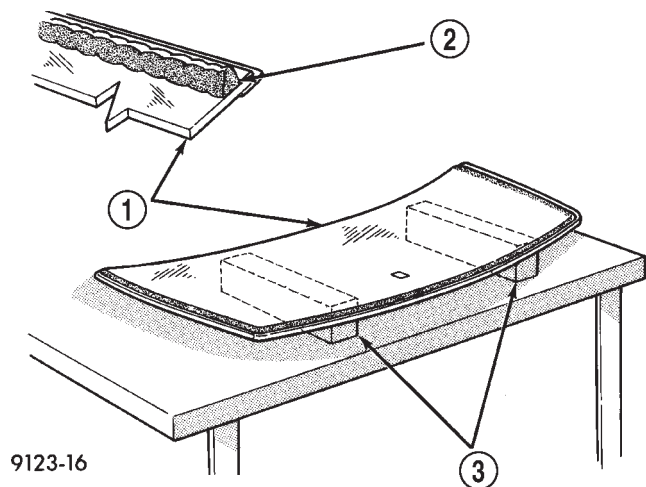


Fig. 5 Work Surface Set up and Molding

- 1 - WINDSHIELD AND MOULDINGS
- 2 - URETHANE BEAD AROUND GLASS 7mm (.3 in.) FROM EDGE
- 3 - BLOCKS

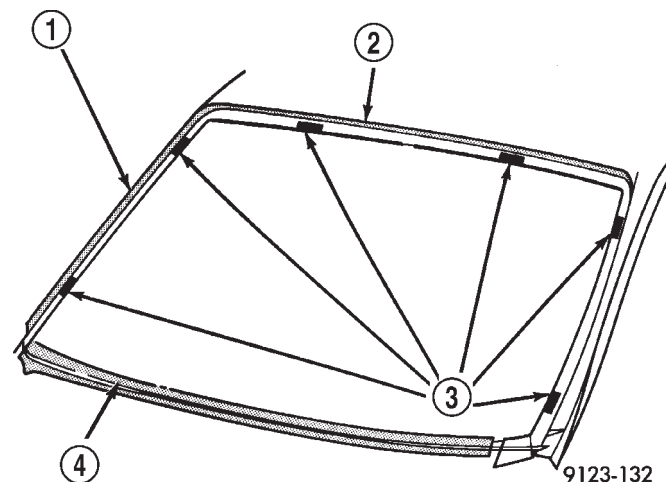


Fig. 6 Position Urethane Compression Spacers

- 1 - A-PILLAR
- 2 - ROOF PANEL
- 3 - SPACERS
- 4 - WINDSHIELD OPENING

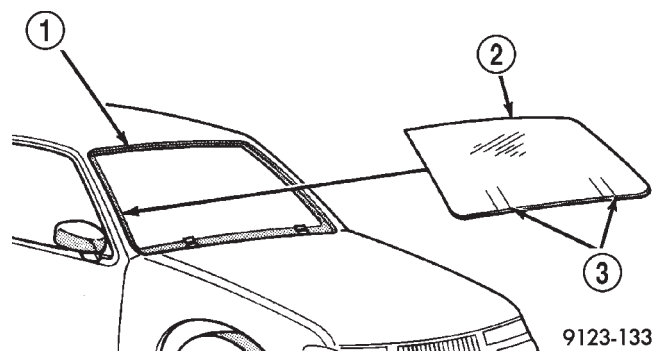


Fig. 7 Lower Windshield Into Position

- 1 - FENCE
- 2 - WINDSHIELD WITH URETHANE APPLIED
- 3 - REFERENCE MARKS

SUNROOF

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SUNROOF

DESCRIPTION

WARNING: Keep fingers and other body parts out of sunroof opening at all times.

The sunroof features a power sliding glass panel and a sunshade which can be manually positioned anywhere along its travel, rearward of glass panel front edge.

OPERATION

The sunroof is electrically operated from a two switches located on the windshield header, rearward of the map lamp. To operate the sunroof the ignition switch must be in the On/Run position. One switch (CLOSE) is a push button type and used too close the sunroof. Pressing and holding the CLOSE button, the sunroof will fully close. If the CLOSE button is released prior to the sunroof reaching the fully closed position, the sunroof will stop in that position. The other switch (OPEN/VENT) is a rocker type for opening and venting the sunroof. Pressing and releasing the OPEN button once the sunroof will express open and the wind deflector will raise. If the button is pressed a second time the sunroof will stop in that position. To open the sunroof from the vent position, push and hold the open button. The sunroof will not express open until you have passed through the full closed position. The OPEN button may be released and the sunroof will continue to open in the express

open feature. If the VENT button is pressed and held while the sunroof is in the open position, the sunroof will travel to the close position and then to the vent position. Releasing the button at anytime during the travel will cause the sunroof to stop at that current position.

DIAGNOSIS AND TESTING

Before beginning sunroof diagnostics verify that all other power accessories are in proper operating condition. Refer to Sunroof Diagnostic Chart for possible causes. If not, a common electrical problem may exist. Refer to Wiring Diagram Information, of this publication for circuit, splice and component descriptions. Check the condition of the circuit protection (20 amp high current fuse (battery feed) located in the Power Distribution Center (PDC). Check the cover of the PDC for location of the fuse. The ten amp fuse (ignition feed) located in cavity 14 of the Junction Block). Inspect all wiring connector pins for proper engagement and continuity. Check for battery voltage at battery and ignition pins of the power sunroof express module wiring connector. Refer to Wiring Diagram Information, for circuit information. The controller will not operate at less than 10 volts. Check the ground at the sunroof express module.

Before beginning diagnosis for wind noise or water leaks, verify that the problem was not caused by releasing the control switch before the was sunroof fully closed. The sunroof module has a water management system. During washing high-pressure water may be forced between the glass panel seal and the roof opening. Normally this water will drain.

SUNROOF (Continued)

However, when some type of drying blower system is used, like those found in automatic car washes, the water may not have a chance to drain before the blower forces air between the seal and the roof open-

ing. This causes the water to blow over the edge of the module and onto the headlining.

Refer to (Fig. 1) Sunroof Assembly for exploded view of the sunroof.

SUNROOF DIAGNOSIS CHART

SYMPTOM	POSSIBLE CAUSE
Sunroof motor inoperative.	Faulty control switch. Faulty circuit ground between sunroof express module, drive motor, control switch, and body harness. Faulty power circuit between sunroof express module, drive motor, switch, and body harness. Faulty sunroof drive motor. Faulty sunroof express module. Faulty sunroof drive motor connector.
Audible whine when switch is depressed, sunroof does not operate.	Faulty sunroof drive motor. Binding cable.
Audible clicking or ratcheting when switch is pressed, sunroof does not operate.	Broken or worn drive cable. Worn drive motor gear. Mechanisms not synchronized.
Sunroof vents and opens, but does not close.	Binding cable. Faulty circuit. Faulty control switch. Faulty sunroof express module. Faulty drive motor.
Sunroof vents, but does not open.	Binding linkage. Faulty circuit. Faulty switch. Faulty sunroof controller. Faulty drive motor.
Sunroof does not vent	Binding cable. Faulty circuit. Faulty control switch. Faulty sunroof express module.
Sunroof water leak.	Drain tubes clogged or kinked. Glass panel improperly adjusted. Faulty glass panel seal.
Wind noise from sunroof.	Front of glass panel too high or rear too low. Glass panel not centered in opening. Faulty glass panel seal.
Rattles from open sunroof while driving	Loose or broken attaching hardware. Worn or broken mechanism.
Rattles from closed sunroof while driving	Loose or broken attaching hardware. Worn or broken mechanism

SUNROOF (Continued)

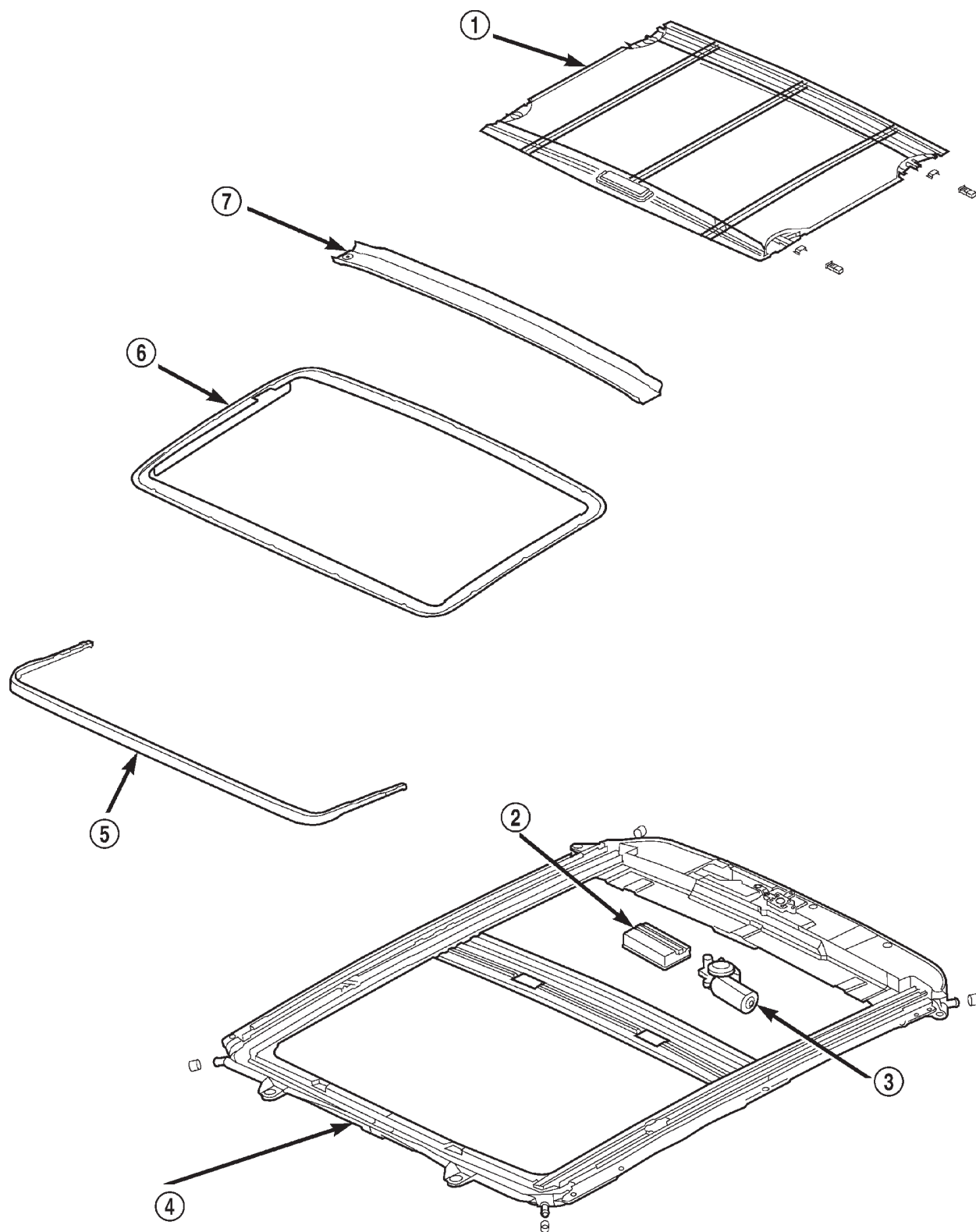


Fig. 1 SUNROOF ASSEMBLY

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1 - SUNSHADE
4 - FRAME ASSEMBLY
7 - DRAIN CHANNEL

2 - EXPRESS MODULE
5 - WIND DEFLECTOR

3 - DRIVE MOTOR
6 - GLASS PANEL

HOUSING ASSEMBLY

REMOVAL

(1) Remove headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(2) Disconnect the drain tubes from sunroof housing (Fig. 2).

(3) Loosen fasteners attaching sunroof housing assembly.

(4) With the aid of a helper, remove fasteners attaching sunroof housing assembly to roof panel.

INSTALLATION

(1) With the Glass panel in the fully closed position.

(2) With the aid of a helper, raise rear end of sunroof housing assembly and guide into position and start fasteners.

(3) Tighten the fasteners attaching the sunroof module to roof panel. Tighten the fasteners to 8.5 to 9 N·m (75 to 80 in. lbs.) torque.

(4) Connect the drain tubes to the sunroof housing.

(5) With the aid of a helper move the headliner through the rear door into position.

(6) Engage headliner rear locating clip.

(7) Connect sunroof harness connector at the C-post.

(8) Connect wire harness connector along A-post to fuse panel.

(9) Connect mirror wiring connector.

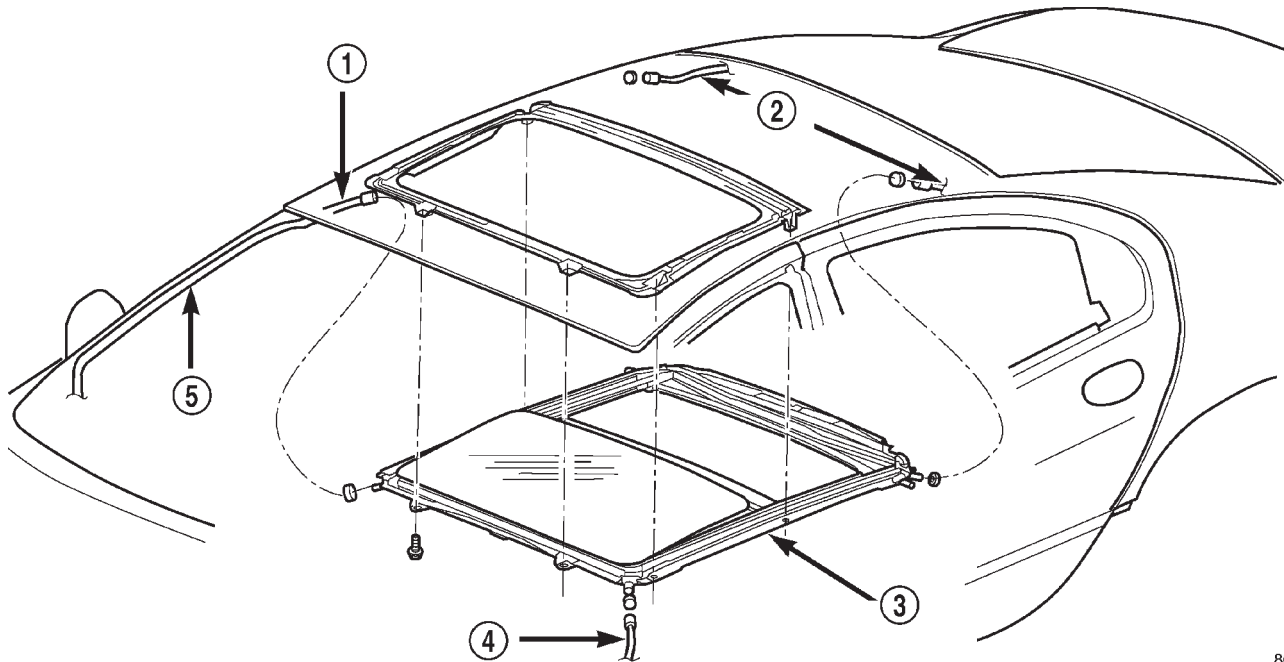
(10) Connect wire harness connector along A-post to fuse panel.

(11) Connect battery negative cable.

(12) Move both front seats into proper position.

(13) Test sunroof operation, adjust as necessary.

(14) Finish installing the headliner. Ensure that door weatherstrips are in position (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).



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Fig. 2 SUNROOF HOUSING ASSEMBLY REMOVAL

1 - DRAIN HOSE

2 - DRAIN HOSE

3 - SUN ROOF FRAME ASSEMBLY

4 - DRAIN HOSE

5 - A-PILLAR

DRIVE MOTOR

REMOVAL

NOTE:

The sunroof system is timed from the factory so that the motor shuts off automatically when the sunroof window reaches a certain position. Extreme care must be taken when removing the motor, timing may be thrown off causing possible damage to the sunroof system. Anytime the motor is removed from the sunroof assembly the sunroof glass panel must be in the **FULLY CLOSED POSITION** or the unit will be out of time. The drive motor cannot be reset to the park position after being removed. Refer to sunroof timing.

- (1) Move glass panel to the fully closed position.
- (2) Disconnect the control switch wire connector.
- (3) Remove headliner as necessary to gain access to sunroof drive motor (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
- (4) Disconnect the drive motor wire harness connectors (Fig. 3).

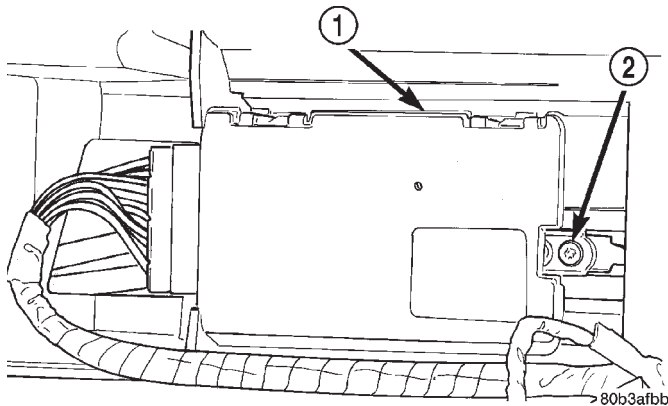


Fig. 3 SUNROOF DRIVE MOTOR AND EXPRESS MODULE

- 1 - EXPRESS MODULE
2 - SCREW

- (5) Remove drive motor fasteners and remove motor from the sunroof housing.

INSTALLATION

(1) Ensure that the glass panel is in the fully closed position before mounting the motor. If motor fails with the window in the open position the sunroof glass panel timing will have to be timed. The new motor comes in the fully closed position and with a gage for setting cable timing. Refer to Sunroof Glass Panel Timing.

- (2) Place drive motor into position on the sunroof housing and install fasteners. (Fig. 3)

- (3) Set headliner into position.
- (4) Connect express module, drive motor, and control switch wire connectors.
- (5) Test sunroof operation, adjust as necessary.
- (6) Finish installing the headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
- (7) Connect the control switch wire connector.

GLASS PANEL

REMOVAL

- (1) Slide sunshade rearward to the open position.
- (2) Move the glass panel to the fully closed position.
- (3) Remove the four attaching screws (Fig. 4).
- (4) Lift off glass panel and remove from vehicle.

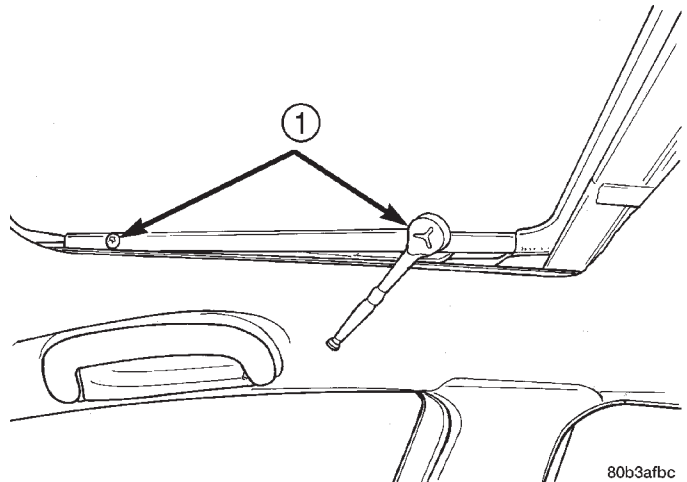


Fig. 4 SUNROOF GLASS PANEL REMOVAL

- 1 - ATTACHING SCREW

INSTALLATION

- (1) Position glass panel, centered to opening.
- (2) Start the four attaching screws.
- (3) Tighten screws.
- (4) Verify sunroof operation and alignment. Check fit and adjust as necessary, refer to Sunroof Glass Panel Adjustment for proper procedures.

ADJUSTMENTS

ADJUSTMENT

- (1) Move the sunshade rearward to the open position.
- (2) Move the sunroof glass panel to the fully closed position.
- (3) Loosen the forward screws on each side enough to make the front adjustment.

GLASS PANEL (Continued)

(4) Adjust the front of the sunroof glass panel 1 mm (1/32 inch) below the top surface of the roof panel.

(5) Tighten the front two screws.

(6) Loosen the rear screws on each side enough to make the rear adjustment.

(7) Adjust the rear of the sunroof glass panel 1 mm (1/32 inch) above the top surface of the roof panel.

(8) Tighten the rear two screws.

(9) Check for proper fit. If not OK, repeat glass panel adjustment.

ADJUSTMENT - SUNROOF GLASS PANEL TIMING

Sunroof Drive Cable Timing

NOTE: A gage comes with the new motor.

(1) If the glass panel was not in the fully closed position, when the sunroof drive motor was removed, the sunroof glass panel needs to be timed, before the new motor is installed.

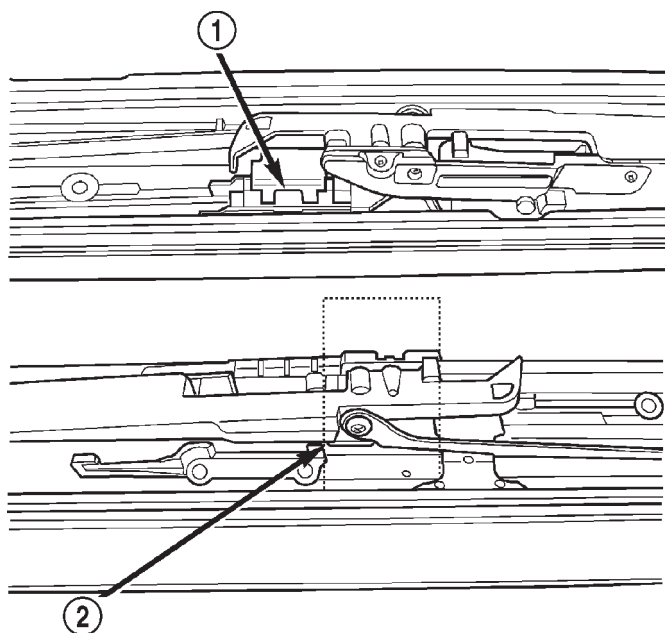
(2) Remove sunroof glass panel.

(3) Set gage into the track near the rear of the opening between the move driver slide and the bracket (Fig. 5).

(4) Move the driver slide forward or aft to get proper setting.

(5) Repeat the operation on the other side.

(6) Install sunroof drive motor.



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Fig. 5 SUNROOF DRIVE CABLE TIMING

- 1 - MOVE DRIVER SLIDE FORWARD/AFT
2 - GAGE

HOUSING DRAIN HOSE

REMOVAL

FRONT HOSES

(1) Move glass panel to the fully closed position.
(2) Disconnect the control switch and wire connector.

(3) Remove headliner as necessary (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Remove side kick cowl panel.

(5) Disconnect drain hose clips from body holes (Fig. 6) and/or (Fig. 7).

(6) Drain any liquid from hose connection, if necessary.

(7) Remove old hoses between trim and metal and replace with new.

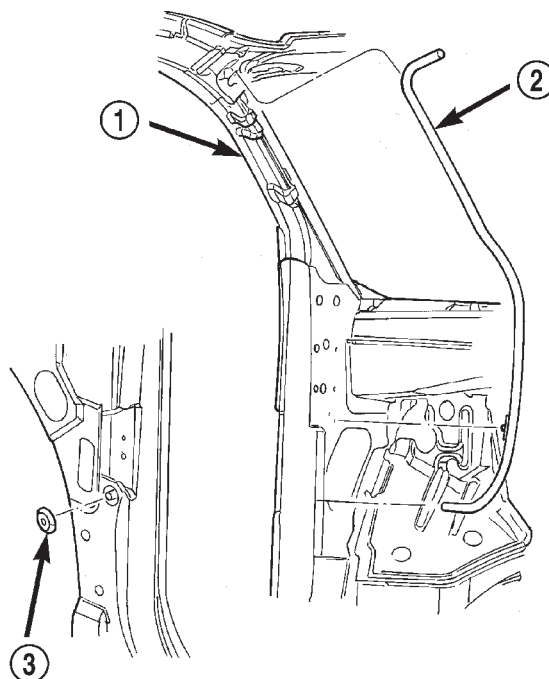
(8) Work the hose back and forth to loosen.

(9) Attach the end of the old hose to the end of the new hose.

(10) Pull the old hose down and through instrument panel dragging new hose with it, until end of new hose is near grommet on side cowl.

(11) Remove drain grommet from sheet metal.

(12) Remove old hose from new hose.

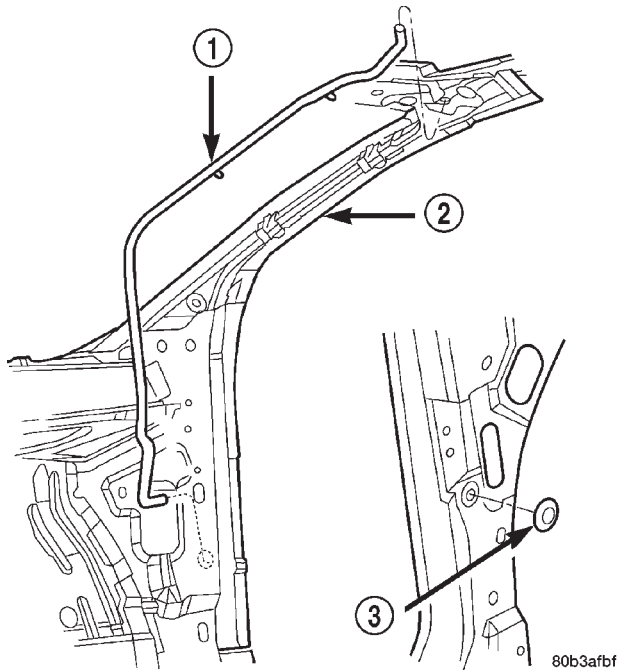


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Fig. 6 FRONT

- 1 - A-PILLAR
2 - DRAIN HOSE
3 - GROMMET

HOUSING DRAIN HOSE (Continued)

**Fig. 7 FRONT RIGHT**

- 1 - DRAIN HOSE
2 - A-PILLAR
3 - GROMMET

REAR HOUSING HOSE

- (1) Move glass panel to the fully closed position.
- (2) Disconnect the control switch and wire connector.

(3) Remove headliner as necessary (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).

(4) Remove rear shelf panel (Refer to 23 - BODY/INTERIOR/REAR SHELF TRIM PANEL - REMOVAL).

(5) Disconnect the end of the drain tube from the rubber grommet at the end of the drain tube closest to the rear window of the vehicle (Fig. 8).

(6) Drain any liquid from hose connection, if necessary.

(7) Disconnect the top end of the drain hose from the sunroof housing drain nipple.

(8) Remove drain hose clips from the body holes.

INSTALLATION**FRONT HOSES**

(1) Insert end of new hose into drain grommet and replace grommet into sheet metal (Fig. 6) and/or (Fig. 7).

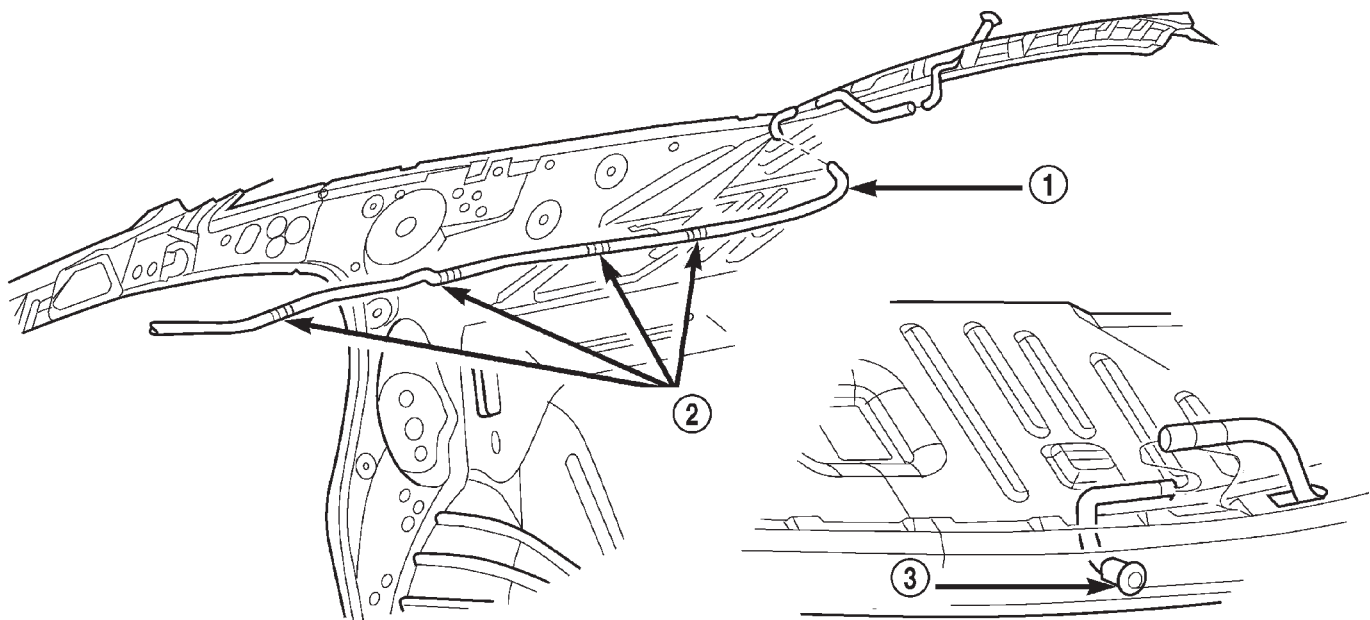
(2) Attach hose upper clips into holes in sheet metal.

(3) Engage upper flair end of hose into sunroof module drain nipple and secure with ratchet clamp.

REAR HOUSING HOSE

(1) Using the proper drain hose (there is a right and left side rear hose) attach drain hose clips to body holes, with the flair at the top towards the sunroof nipple.

(2) Connect top flair end of the drain hose to the sunroof housing drain nipple with the ratchet clamp (Fig. 8).

**Fig. 8 REAR DRAIN HOSE**

- 1 - DRAIN HOSE
2 - HOSE FASTENERS

- 3 - DRAIN GROMMET

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HOUSING DRAIN HOSE (Continued)

- (3) Connect the lower end of the drain tube to the rubber grommet near the rear window of the vehicle.
- (4) Connect the drain hose to the sunroof housing and test drainage.
- (5) Install shelf panel, ensure not to pinch the rubber grommets (Refer to 23 - BODY/INTERIOR/REAR SHELF TRIM PANEL - INSTALLATION).
- (6) Install headliner (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
- (7) Connect the control switch wire connector. Install control switch.
- (8) Test for proper operation of the sunroof.

MODULE ASSEMBLY

REMOVAL

- (1) Move the glass panel to the fully closed position.
- (2) Lower headliner as necessary to gain access to the sunroof express module (Refer to 23 - BODY/INTERIOR/HEADLINER - REMOVAL).
- (3) Disconnect the express module wire harness connectors. (Fig. 3)
- (4) Remove express module screw.
- (5) Remove express module from the keyway by sliding module towards the center of the vehicle.

INSTALLATION

- (1) Insert sunroof express module in the keyway located in the sunroof module and slide the module outward to lock it into position.
- (2) Install the sunroof express module screw.
- (3) Connect the wire connectors to the sunroof express module.
- (4) Install the headliner into position (Refer to 23 - BODY/INTERIOR/HEADLINER - INSTALLATION).
- (5) Test sunroof operation, adjust if necessary.

SUNSHADE

REMOVAL

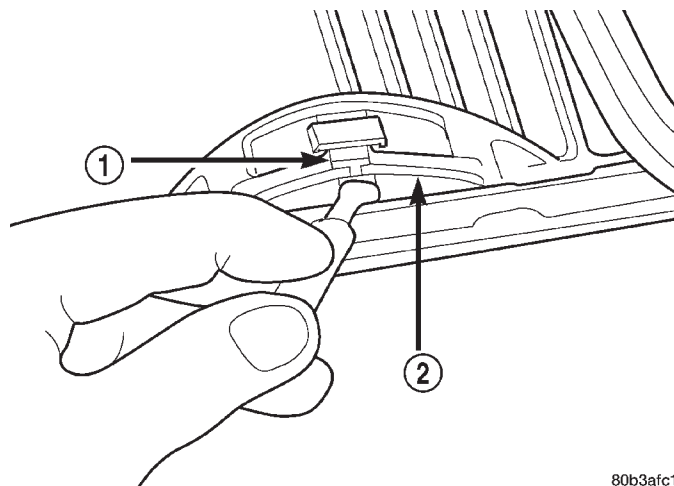
- (1) Open sunroof approximately 90% of the way.
- (2) Push sunshade down until tabs clear glass.
- (3) Move sunshade forward of glass panel.

- (4) Using a flat blade tool, remove front guide blocks from track. By pushing block toward the center of the vehicle (Fig. 9).

- (5) Slide the sunshade forward while lifting the front through the opening until the rear guide blocks are accessible.

CAUTION: Use care not to crease the sunshade when removing or installing.

- (6) Disengage rear guide blocks from track.



80b3afc1

Fig. 9 SUNSHADE GUIDE BLOCK

- 1 - GUIDE BLOCK
- 2 - GUIDE BLOCK SPRING

INSTALLATION

- (1) Install the sunshade from outside of the vehicle with the sunroof 90% open.
- (2) Put rear guide blocks into sunshade guide track.
- (3) Push sunshade back and down through the sunroof opening.
- (4) Using a flat blade tool, put front guide blocks into the sunshade track. By pushing the block towards the center of the vehicle.
- (5) Push sunshade back to the glass panel.
- (6) Push sunshade down until the sunshade clears the glass then move sunshade rearward behind the glass panel.

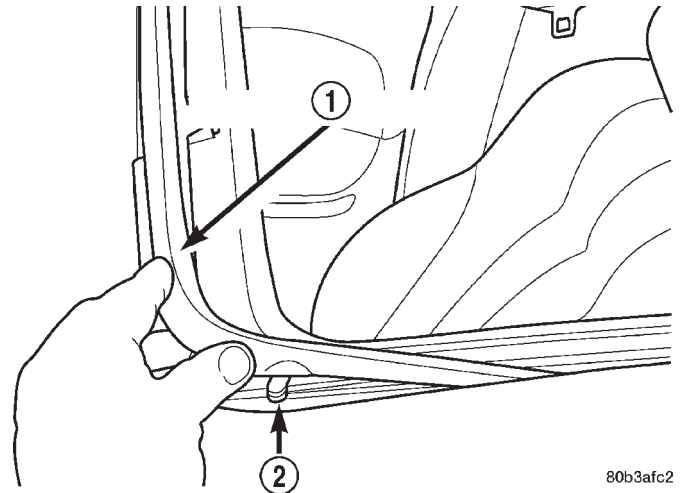
WIND DEFLECTOR

REMOVAL

- (1) Open sunroof glass panel.
- (2) Push down one corner of the wind deflector and let the other corner rise up (Fig. 10).
- (3) Push the low corner towards the opposite side of the vehicle until tab on sunshade clears the body. Then raise the corner up.
- (4) Repeat the procedure to the other corner.
- (5) Lift wind deflector to 90% of the way.
- (6) Push the attaching ends of the deflector to the rear of the vehicle to disengage the deflector.

INSTALLATION

- (1) Place wind deflector at 90% in the vertical position to the sunroof. With the sunroof open.
- (2) Push ends of the deflector towards the front of the vehicle to engage ends.
- (3) Lower wind deflector to normal position.
- (4) Push one corner to the opposite side of the vehicle until tab clears vehicle body and lower deflector for that corner.
- (5) Push the side that was just installed completely down.



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Fig. 10 WIND DEFLECTOR

- 1 - WIND DEFLECTOR
2 - TAB

- (6) Push the opposite corner cross vehicle until tab clears the body. Then lower deflector to position.
- (7) Test sunroof operation.

WEATHERSTRIP/SEALS

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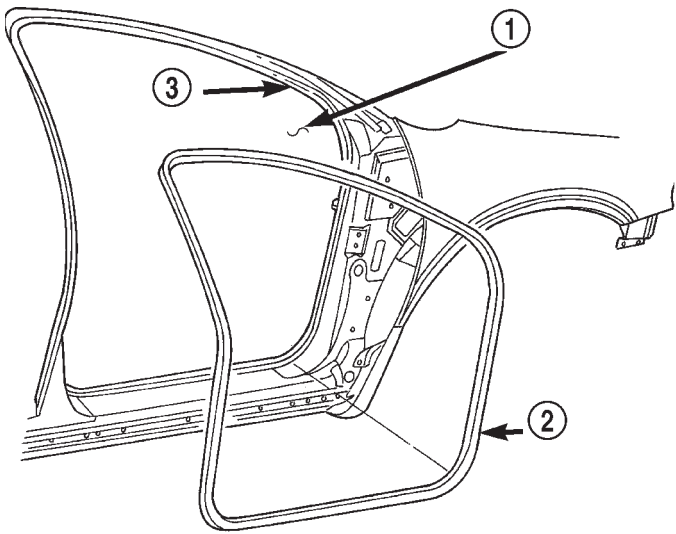
DOOR OPENING WEATHERSTRIP

REMOVAL

- (1) Remove door opening sill plate (Refer to 23 - BODY/INTERIOR/DOOR SILL TRIM - REMOVAL).
- (2) Pull body mounted weatherstrip from fence around door opening (Fig. 1).

INSTALLATION

- (1) Position color dot on weatherstrip at the B-pillar upper corner.
- (2) Engage weatherstrip on the fence at upper B-pillar and work down the B-pillar.
- (3) Engage weatherstrip along the header and down the A-pillar.
- (4) Engage weatherstrip along the sill. There may be slack material work it to the front of the opening.
- (5) Verify weatherstrip sealing.



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Fig. 1 FRONT DOOR BODY MOUNTED WEATHERSTRIP

- 1 - FRONT DOOR OPENING
- 2 - FRONT DOOR BODY MOUNTED WEATHERSTRIP
- 3 - PINCH FLANGE

DRIP RAIL WEATHERSTRIP

REMOVAL

- (1) Open front and rear doors.
- (2) Remove fasteners attaching drip rail weatherstrip to body and fender tip. (Fig. 2).
- (3) Remove drip rail weatherstrip from vehicle.

INSTALLATION

- (1) Place drip rail weatherstrip in position on vehicle.
- (2) Start position clip at the fender tip.
- (3) Press down till holes are align with fastener holes in the body.
- (4) Install fasteners to attach drip rail weatherstrip to roof rail.
- (5) Close doors and verify fit.

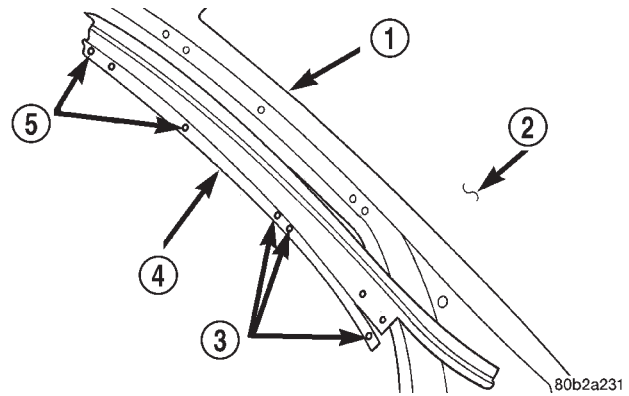


Fig. 2 DRIP RAIL WEATHERSTRIP

- 1 - A-PILLAR
- 2 - WINDSHIELD
- 3 - FASTENERS
- 4 - DRIP RAIL WEATHER-STRIP
- 5 - FASTENERS

FRONT DOOR GLASS RUN WEATHERSTRIP

REMOVAL

- (1) Remove door glass (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - REMOVAL).

- (2) Loosen side view mirror.
- (3) Pull weatherstrip from lower front channel above door latch.
- (4) Pull run weatherstrip from window frame channel (Fig. 3).

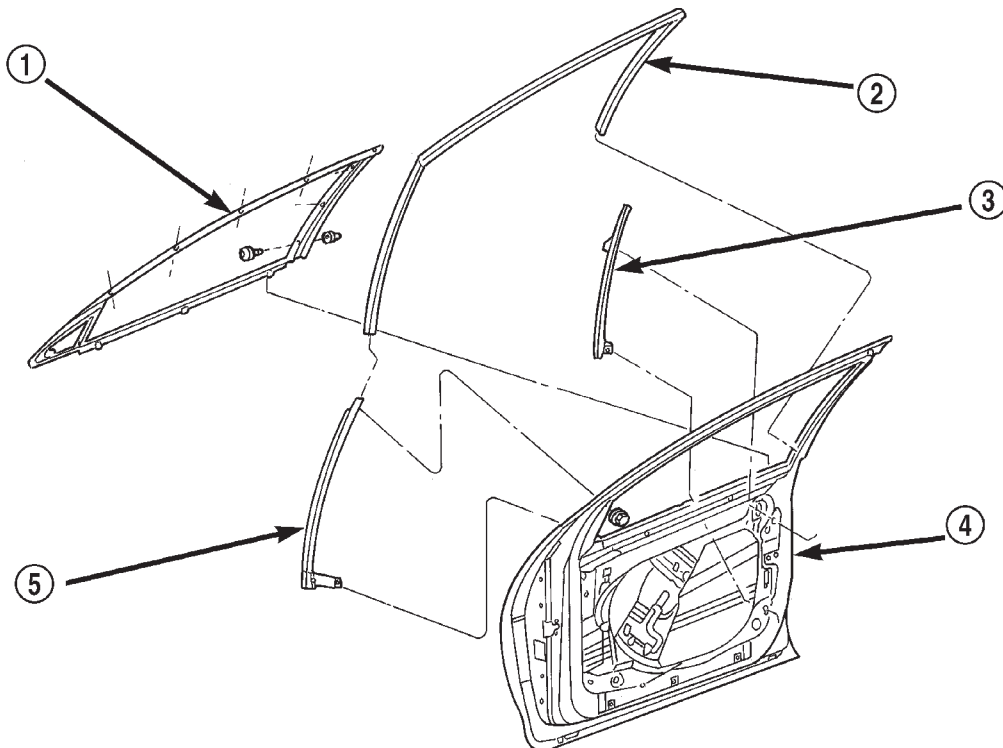


Fig. 3 DOOR GLASS RUN WEATHERSTRIP

- 1 - FRONT DOOR MOLDING
- 2 - GLASS RUN WEATHERSTRIP
- 3 - REAR GLASS RUN CHANNEL
- 4 - FRONT DOOR
- 5 - FRONT GLASS RUN CHANNEL

80b11cce

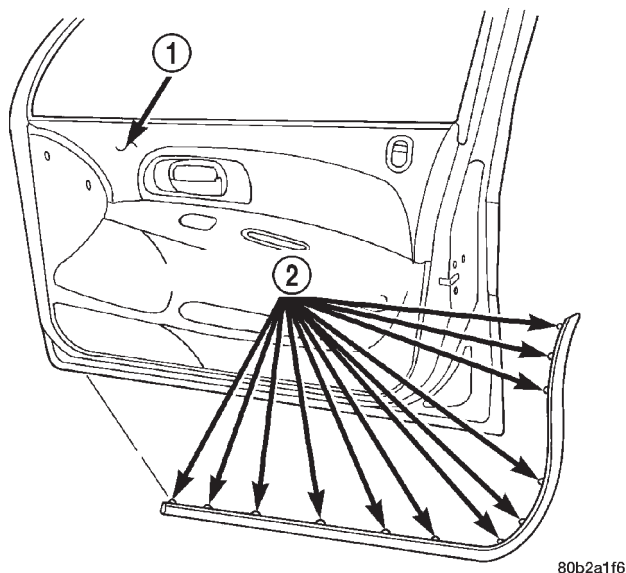
FRONT DOOR GLASS RUN WEATHERSTRIP (Continued)

INSTALLATION

- (1) Clean butyl material from door flange area.
- (2) Place door run weatherstrip in position on window frame channel.
- (3) Push door run weatherstrip into window frame channel.
- (4) Push weatherstrip into lower front channel above door latch.
- (5) Install door glass (Refer to 23 - BODY/DOOR - FRONT/DOOR GLASS - INSTALLATION).
- (6) Tighten side view mirror.

FRONT DOOR MOUNTED WEATHERSTRIP**REMOVAL**

- (1) Using a fork type prying tool, disengage push pin fasteners attaching weatherstrip to lower door (Fig. 4).
- (2) Remove weatherstrip from door.



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Fig. 4 FRONT DOOR MOUNTED WEATHERSTRIP

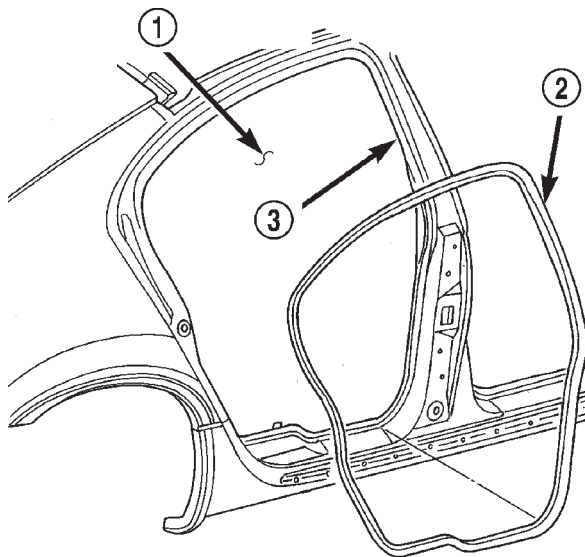
- 1 - FRONT DOOR
2 - PUSH-IN FASTENERS

INSTALLATION

- (1) Place door mounted weatherstrip in position.
- (2) Engage push pin fasteners to attach weatherstrip to lower door.
- (3) Verify door alignment and seal

REAR DOOR BODY MOUNTED WEATHERSTRIP**REMOVAL**

- (1) Remove door opening sill plate (Refer to 23 - BODY/INTERIOR/DOOR SILL TRIM - REMOVAL).
- (2) Pull body mounted weatherstrip from fence around door opening (Fig. 5).



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Fig. 5 REAR DOOR BODY MOUNTED WEATHERSTRIP

- 1 - REAR DOOR OPENING
2 - REAR DOOR BODY MOUNTED WEATHERSTRIP
3 - PINCH FLANGE

INSTALLATION

- (1) Position color dot on weatherstrip at the B-pillar upper corner.
- (2) Engage weatherstrip on the fence at upper B-pillar and work down the B-pillar.
- (3) Engage weatherstrip along the header and down the C-pillar.
- (4) Engage weatherstrip along the sill. There may be slack material, work the slack material to the front of the opening.
- (5) Install the door opening sill plate (Refer to 23 - BODY/INTERIOR/DOOR SILL TRIM - INSTALLATION).
- (6) Verify weatherstrip sealing.

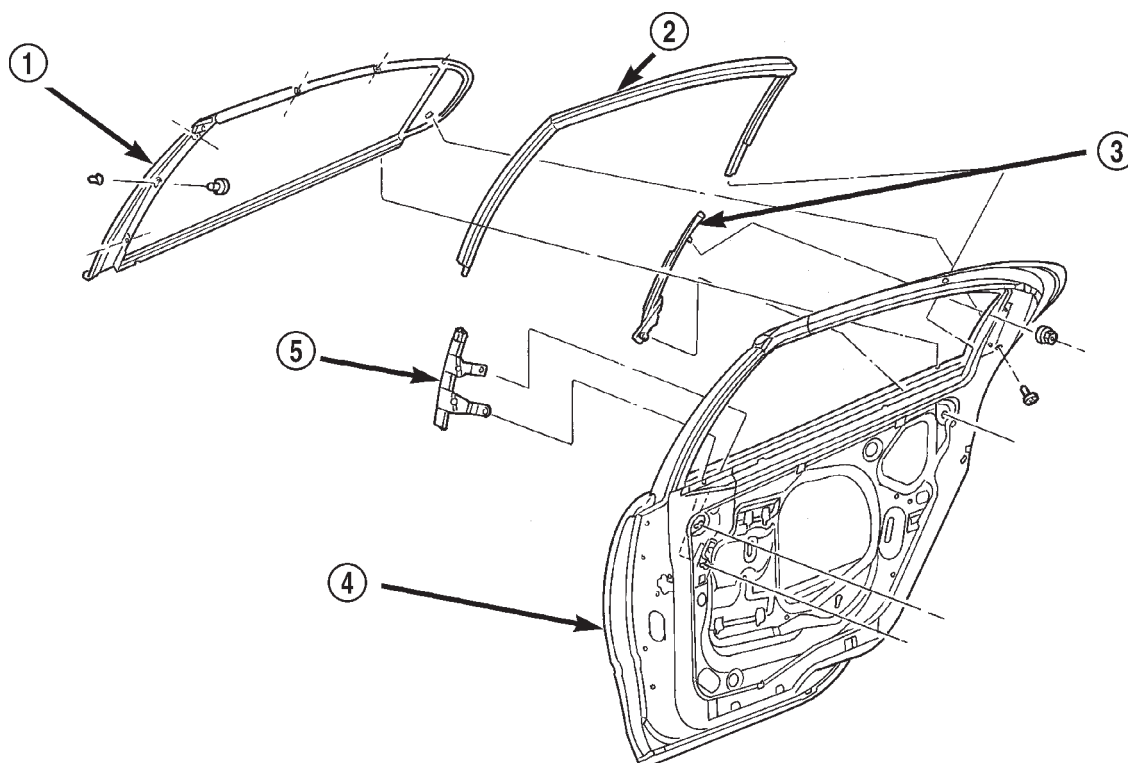
REAR DOOR GLASS RUN WEATHERSTRIP

REMOVAL

- (1) Remove door glass (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - REMOVAL).
- (2) Pull weatherstrip from lower rear channel above door latch (Fig. 6).
- (3) Pull run weatherstrip from window frame channel.

INSTALLATION

- (1) Clean butyl material from door flange area.
- (2) Place door run weatherstrip in position on window frame channel.
- (3) Push door run weatherstrip in position on window frame channel.
- (4) Push weatherstrip into lower rear channel above door latch.
- (5) Install door glass (Refer to 23 - BODY/DOORS - REAR/DOOR GLASS - INSTALLATION).



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Fig. 6 REAR DOOR GLASS RUN

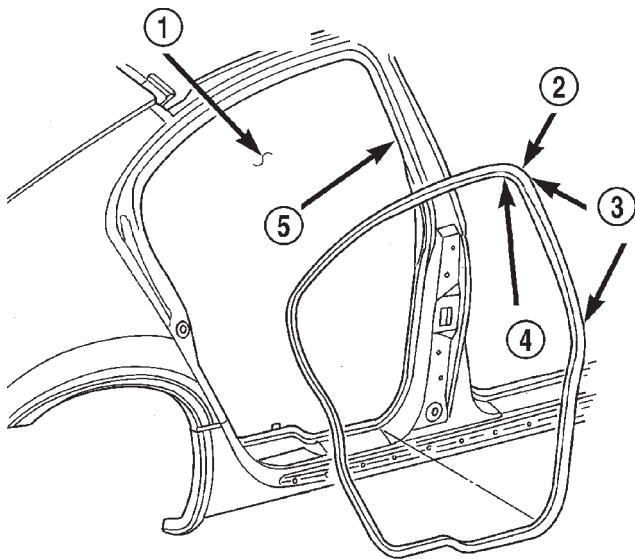
- 1 - REAR DOOR MOLDING
2 - GLASS RUN
3 - REAR GLASS RUN CHANNEL

- 4 - REAR DOOR
5 - FRONT GLASS RUN CHANNEL

REAR DOOR MOUNTED WEATHERSTRIP

REMOVAL

- (1) Using a fork type prying tool, disengage push in fasteners attaching weatherstrip to lower door.
- (2) Remove body mounted weatherstrip from pinch weld around door opening (Fig. 7).



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Fig. 7 REAR DOOR MOUNTED WEATHERSTRIP

- 1 - REAR DOOR OPENING
- 2 - REAR DOOR MOUNTED WEATHERSTRIP
- 3 - SEAL INSERT
- 4 - PAINT DOT
- 5 - PINCH FLANGE

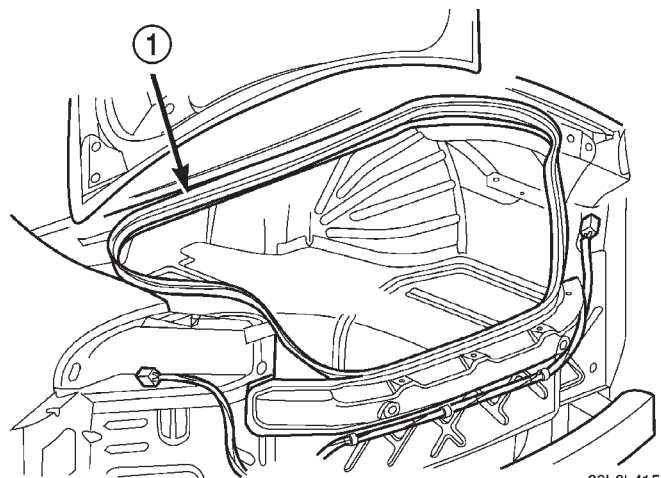
INSTALLATION

- (1) Place door mount weatherstrip in position on door with the paint dot in the upper corner of the B-pillar.
- (2) Install push pin fasteners to attach door mounted weatherstrip to lower door.
- (3) Verify door alignment and seal.

TRUNK OPENING WEATHERSTRIP

REMOVAL

- (1) Open decklid.
- (2) Pull decklid weatherstrip from decklid opening fence (Fig. 8).
- (3) Remove weatherstrip from vehicle.



80b2b415

Fig. 8 DECKLID WEATHERSTRIP - TYPICAL

- 1 - TRUNK LID WEATHERSTRIP

INSTALLATION

- (1) Place weatherstrip in position on vehicle.
- (2) Push decklid weatherstrip onto decklid opening fence with molded joint at striker location.
- (3) Verify decklid operation and sealing.

BODY STRUCTURE

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GAP AND FLUSH

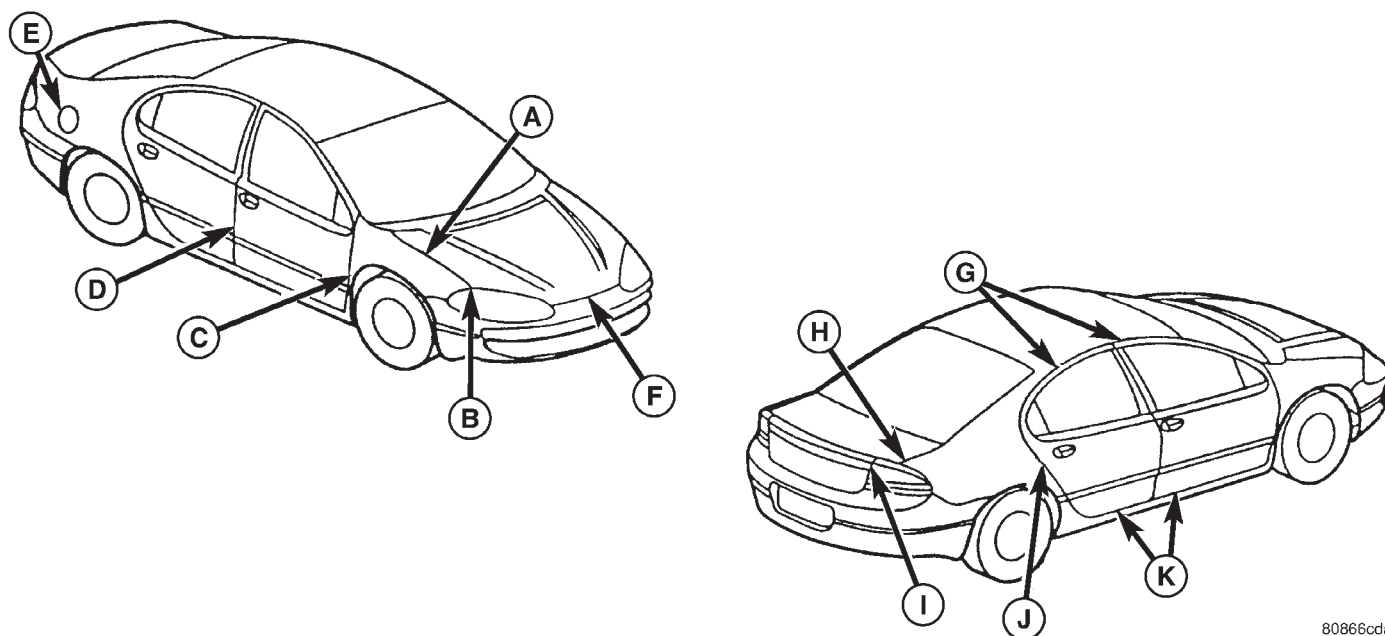
SPECIFICATIONS

BODY GAP AND FLUSH MEASUREMENTS

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GAP AND FLUSH (Continued)

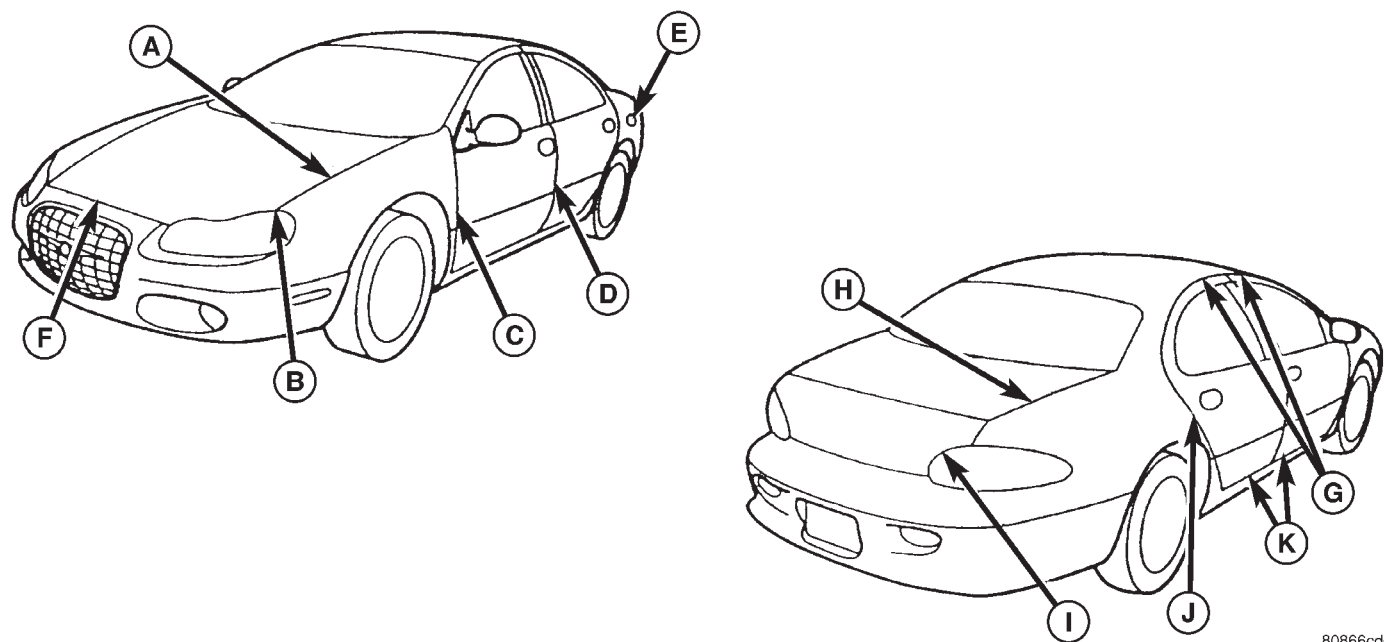


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Fig. 1 BODY GAP AND FLUSH - INTREPID

	LOCATION	GAP	FLUSH
A	Hood to Fender	4.0 +/- 1.0	0 - 1.0
B	Hood to Fender Fore and Aft	0 +/- 1.0	0 +/- 1.0
C	Front Door to Fender	5.0 +/- 1.5	0 - 1.0
D	Rear Door to Front Door	5.0 +/- 1.5	0 - 1.0
E	Fuel Filler Door to Quarter	3.0 +/- 0.75	0 - 1.0
F	Fascia to Hood	5.0 +/- 2.5	0 - 1.5
G	Front and Rear Door to Roof	5.0 +/- 2.5	0 +/- 2.0
H	Deck Lid to Quarter Panel	4.0 +/- 1.5	0 +/- 1.5
I	Taillamp to Applique and Deck Lid	5.0 +/- 1.5	0 +/- 2.0
J	Rear Door to Quarter Panel	5.0 +/- 1.5	0 - 1.0
K	Front Rear Door to Sill	7.0 +/- 2.0	0 - 2.0

GAP AND FLUSH (Continued)



80866cdc

Fig. 2 BODY GAP AND FLUSH - CONCORDE AND 300M

	LOCATION	GAP	FLUSH
A	Hood to Fender	4.0 +/- 1.5	0 +/- 1.5
B	Hood to Fender Fore and Aft	0 +/- 1.0	0 +/- 2.0
C	Front Door to Fender	5.0 +/- 1.5	0 - 1.0
D	Rear Door to Front Door	5.0 +/- 1.5	0 - 1.0
E	Fuel Filler Door to Quarter	3.0 +/- 0.75	0 - 1.5
F	Fascia to Hood	5.0 +/- 1.5	1.0 +/- 1.5
G	Front and Rear Door to Roof	5.0 +/- 1.5	0 - 1.0
H	Deck Lid to Quarter Panel	4.0 +/- 1.5	0 +/-1.0
I	Taillamp to Applique and Deck Lid	5.0 +/- 1.5	NA
J	Rear Door to Quarter Panel	5.0 +/- 1.5	0 - 1.0

OPENING DIMENSIONS

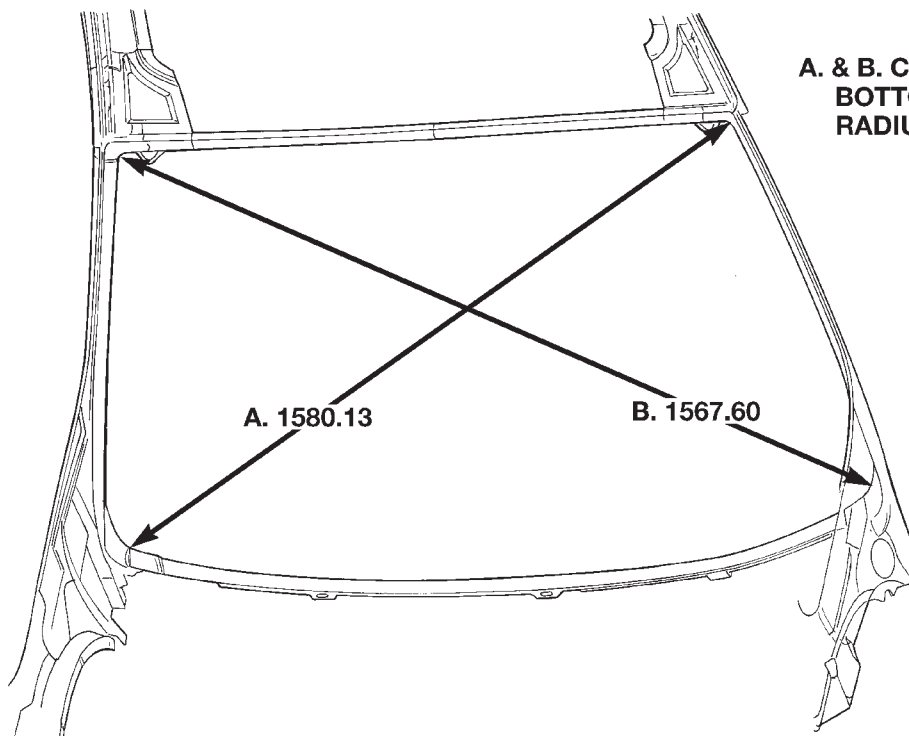
SPECIFICATIONS

BODY OPENING DIMENSION

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REAR DOOR OPENINGS - INTREPID	5
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REAR WINDOW AND TRUNK OPENINGS - INTREPID	7
REAR WINDOW AND TRUNK OPENINGS - 300M	8

OPENING DIMENSIONS (Continued)



A. & B. CENTER OF RADIUS AT BOTTOM TO CENTER OF RADIUS AT TOP.

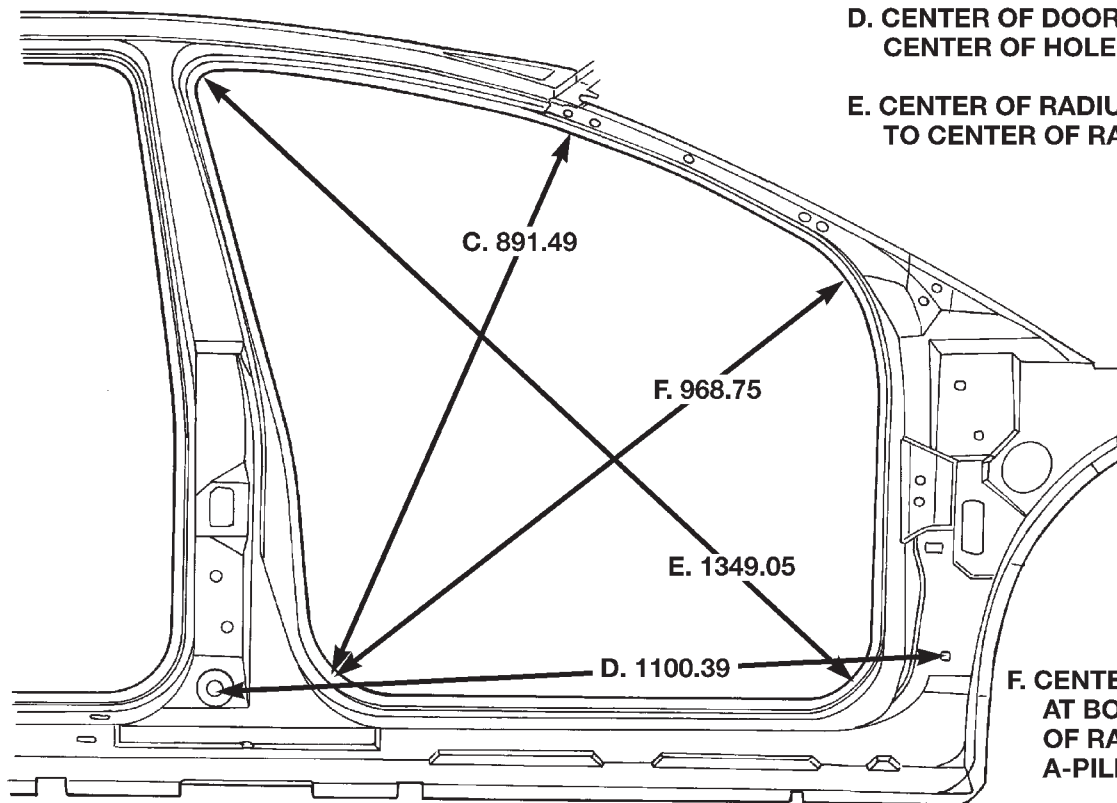
A. 1580.13

B. 1567.60

C. CENTER OF FRONT DOOR LOWER REAR CORNER RADIUS TO FRONT EDGE OF ROOF PANEL AT A-PILLAR.

D. CENTER OF DOOR HINGE BOLT TO CENTER OF HOLE IN B-PILLAR.

E. CENTER OF RADIUS AT BOTTOM TO CENTER OF RADIUS AT TOP.



C. 891.49

F. 968.75

E. 1349.05

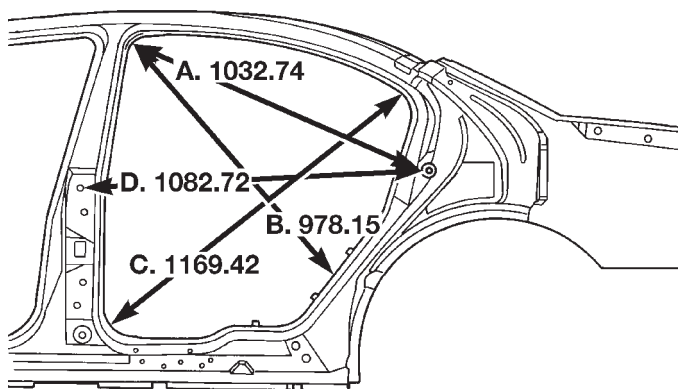
D. 1100.39

F. CENTER OF RADIUS AT BOTTOM TO CENTER OF RADIUS AT LOWER A-PILLAR.

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Fig. 3 WINDSHIELD AND FRONT DOOR OPENINGS

OPENING DIMENSIONS (Continued)



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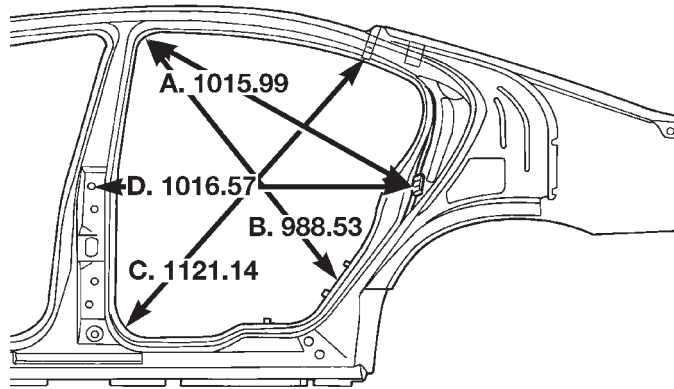
Fig. 4 REAR DOOR OPENINGS - CONCORDE/300M

A - Center of radius at top to door latch hole.

B - Center of radius at bottom to center of radius at top.

C - Center of radius at bottom to edge of quarter panel at C-pillar.

D - Upper rear door hinge rear bolt hole to door latch hole.



80b27cf9

Fig. 5 REAR DOOR OPENINGS - INTREPID

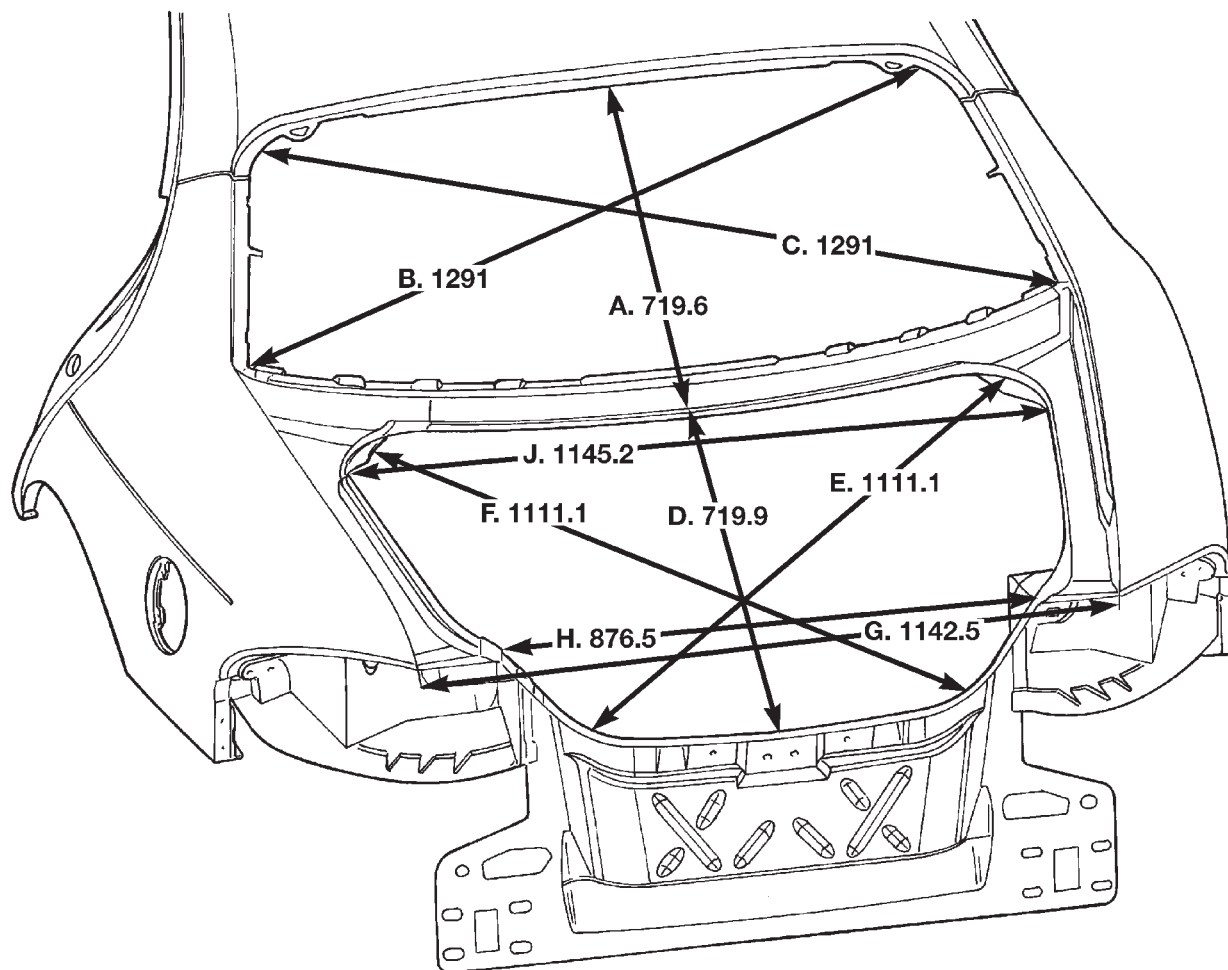
A - Center of radius at top to door latch hole.

B - Center of radius at bottom to center of radius at top.

C - Center of radius at bottom to edge of quarter panel at C-pillar.

D - Upper rear door hinge rear bolt hole to door latch hole.

OPENING DIMENSIONS (Continued)



A. LOWER EDGE OF BACK GLASS UPPER MOUNTING FLANGE TO FRONT OF REAR DECK OPENING WEATHERSTRIP FLANGE.

B. & C. UPPER REAR CORNER OF GLASS MOUNTING FLANGE TO EDGE OF REAR QUARTER PANEL.

D. FRONT DECK OPENING WEATHERSTRIP FLANGE TO DECK OPENING TAILPANEL WEATHERSTRIP FLANGE.

E. & F. CENTER OF DECK OPENING FRONT CORNER RADIUS TO REAR TAILPANEL DECK OPENING RADIUS.

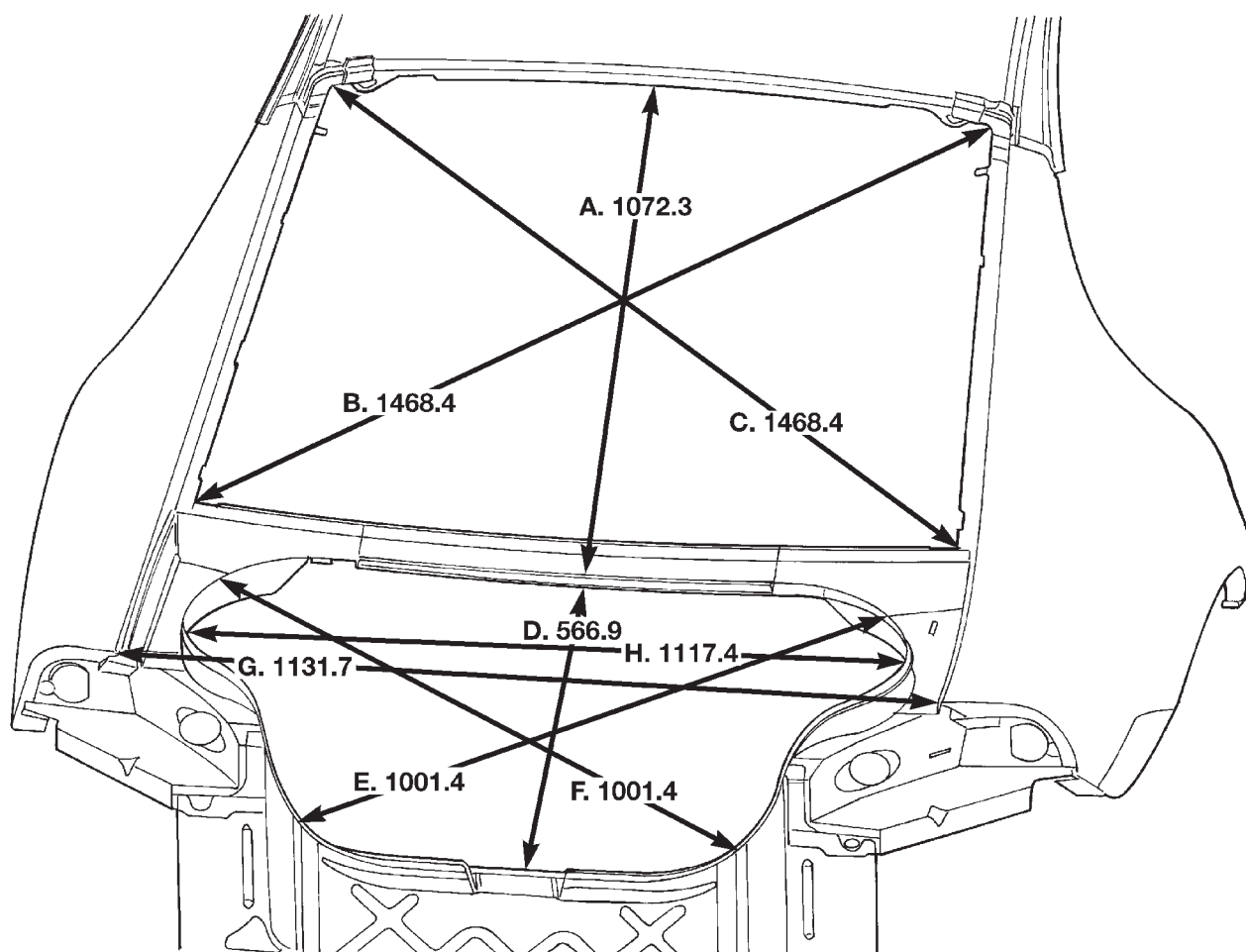
G. REAR TIP OF QUARTER PANELS.

H. REAR EDGE OF TROUGH RAILS.

J. FRONT EDGE OF TROUGH RAILS.

Fig. 6 REAR WINDOW AND TRUNK OPENING - CONCORDE

OPENING DIMENSIONS (Continued)



A. LOWER EDGE OF BACK GLASS UPPER MOUNTING FLANGE TO FRONT OF REAR DECK OPENING WEATHERSTRIP FLANGE.

B. & C. UPPER REAR CORNER OF GLASS MOUNTING FLANGE TO EDGE OF REAR QUARTER PANEL.

D. FRONT DECK OPENING WEATHERSTRIP FLANGE TO DECK OPENING TAILPANEL WEATHERSTRIP FLANGE.

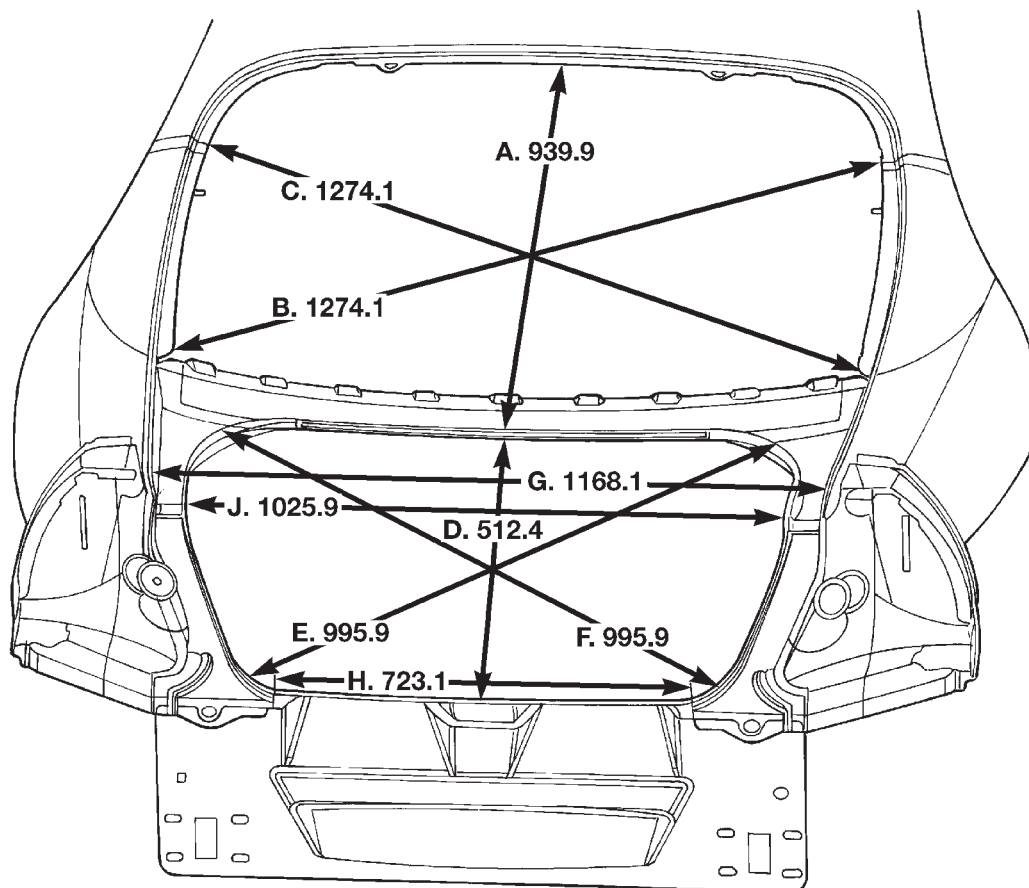
E. & F. CENTER OF DECK OPENING FRONT CORNER RADIUS TO REAR TAILPANEL DECK OPENING RADIUS.

G. REAR TIP OF QUARTER PANELS.

H. REAR EDGE OF TROUGH RAILS.

Fig. 7 REAR WINDOW AND TRUNK OPENINGS - INTREPID

OPENING DIMENSIONS (Continued)



A. LOWER EDGE OF BACK GLASS UPPER MOUNTING FLANGE TO FRONT OF DECK OPENING WEATHERSTRIP FLANGE.

B. & C. UPPER CORNER OF REAR QUARTER PANEL GLASS OPENING TO LOWER GLASS OPENING AT QUARTER PANEL.

D. FRONT DECK OPENING WEATHERSTRIP FLANGE TO DECK OPENING TAILPANEL WEATHERSTRIP FLANGE.

E. & F. CENTER OF DECK OPENING FRONT CORNER RADIUS TO REAR TAILPANEL DECK OF OPENING RADIUS.

G. REAR TIP OF QUARTER PANELS.

H. REAR EDGE OF TROUGH RAILS.

J. FRONT EDGE OF TROUGH RAILS.

Fig. 8 REAR WINDOW AND TRUNK OPENINGS - 300M

SEALER LOCATIONS

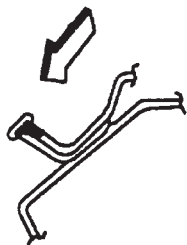
SPECIFICATIONS

SEALER LOCATIONS

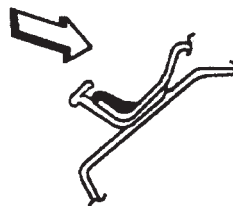
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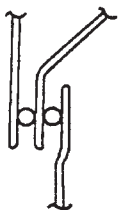
SEALER LOCATIONS (Continued)



HOLD GUN NOZZLE IN DIRECTION OF ARROW IN ORDER TO EFFECTIVELY SEAL METAL JOINTS.



DO NOT HOLD GUN NOZZLE IN DIRECTION OF ARROW. SEALER APPLIED AS SHOWN IS INEFFECTIVE.



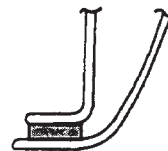
3 METAL THICKNESS



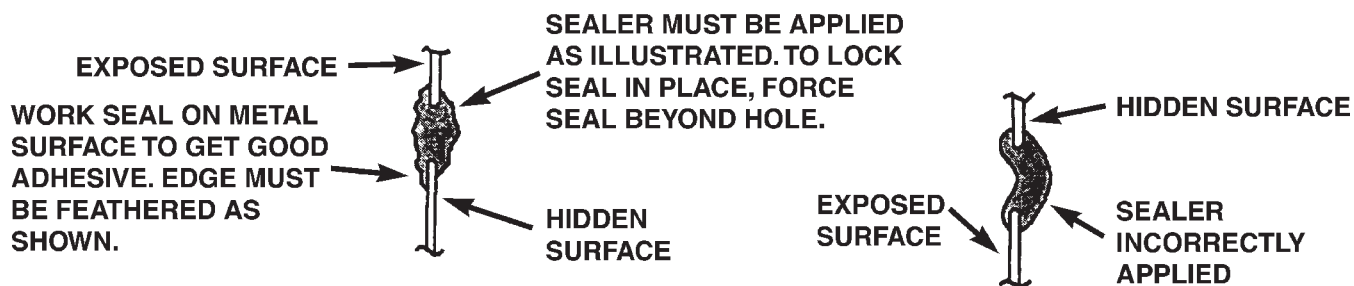
2 METAL THICKNESS



3 METAL THICKNESS



2 METAL THICKNESS







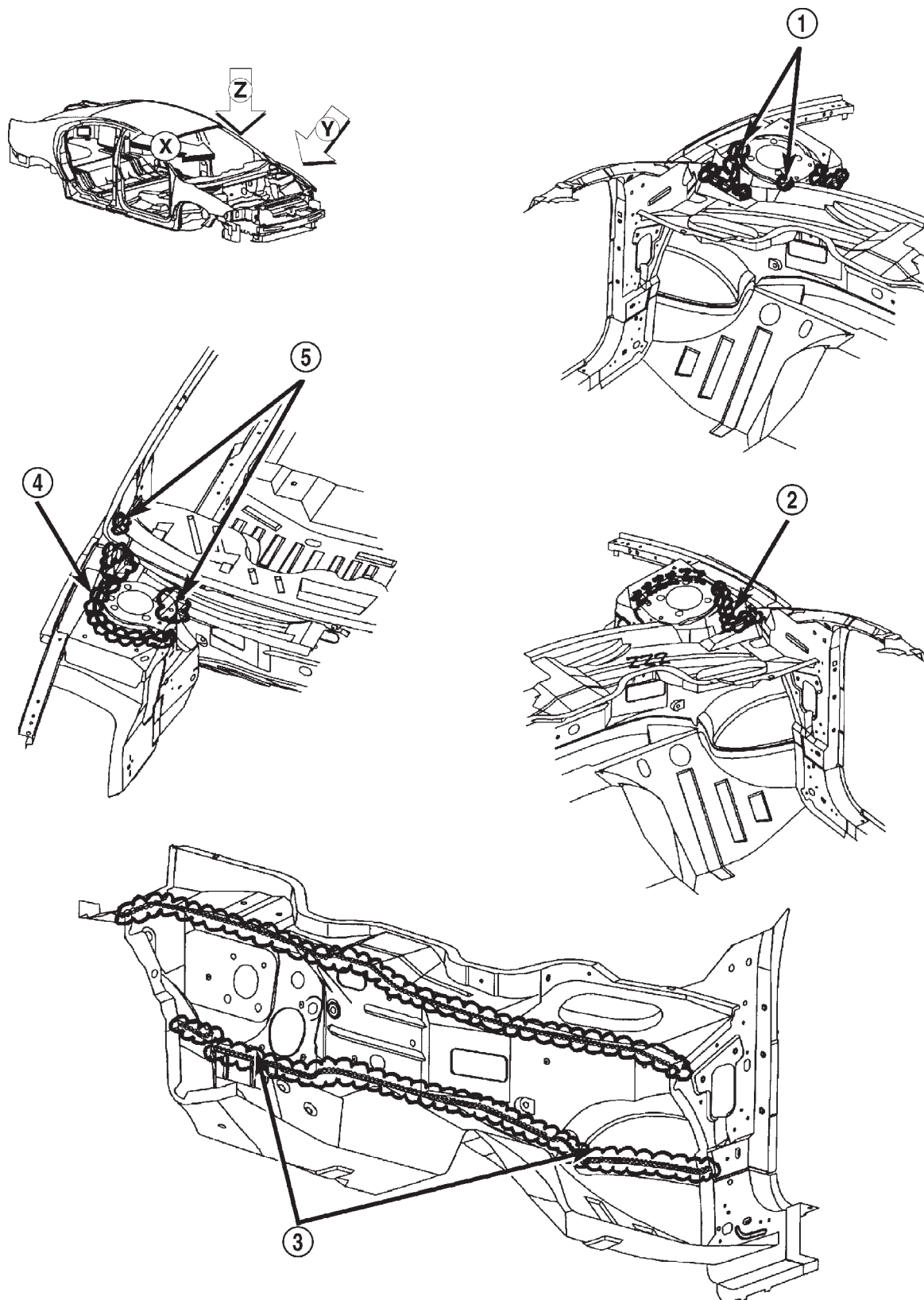
SYMBOLS	
	THUMBGRADEABLE SEALER
	EXTRUDABLE THERMOPLASTIC
	EXPOSED THERMOPLASTIC SEALANT
	HIDDEN SEALANT

Fig. 9 METHODS OF APPLYING AUTO BODY SEALANT

SEALER LOCATIONS (Continued)

**Fig. 10 STRUT TOWER AND COWL AREA**

80b697aa

- 1 - SEALER TO BE BRUSHED INTO SEAMS
- 2 - SEALER TO BE BRUSHED INTO SEAMS
- 3 - SEALER TO BE BRUSHED INTO SEAMS

- 4 - SEALER TO BE BRUSHED INTO SEAMS
- 5 - SEALER TO BE BRUSHED INTO SEAMS

SEALER LOCATIONS (Continued)

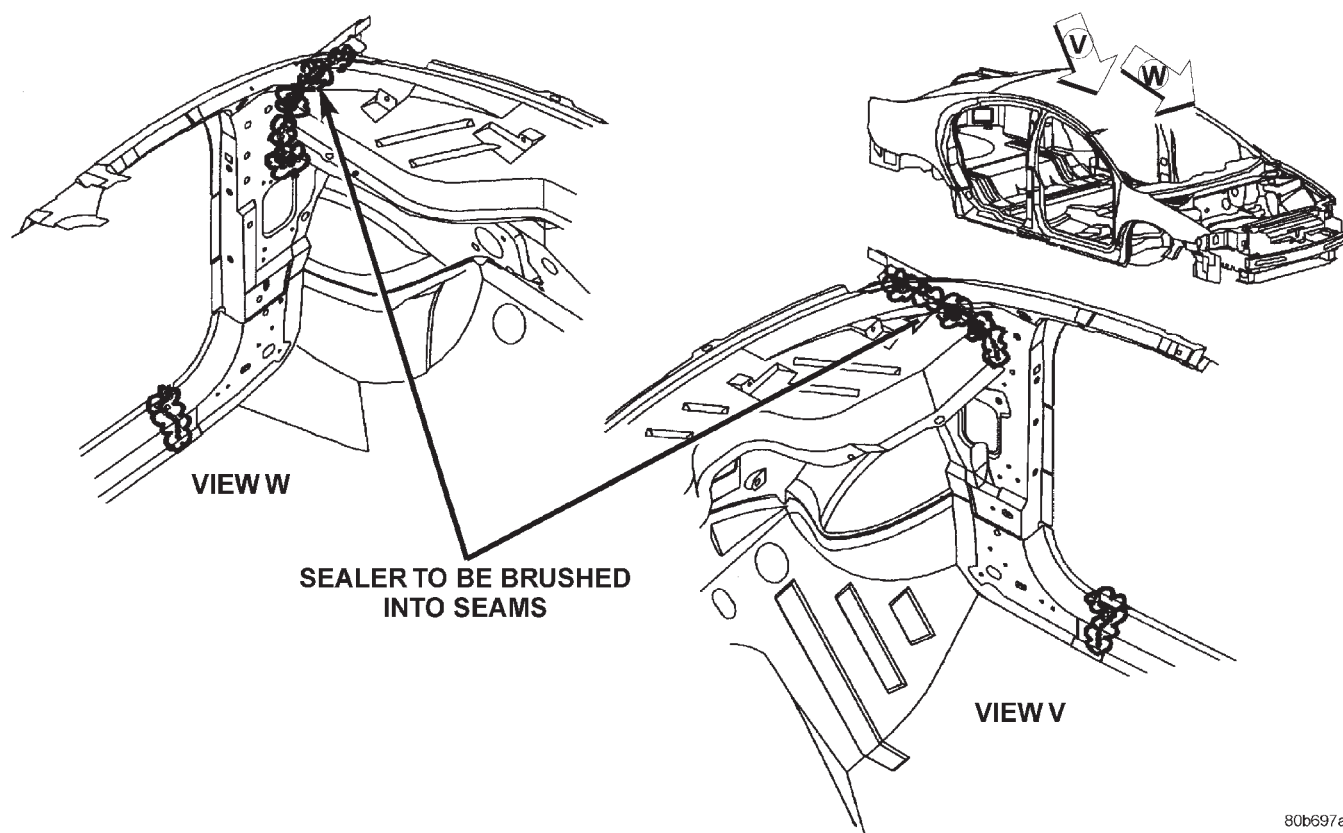
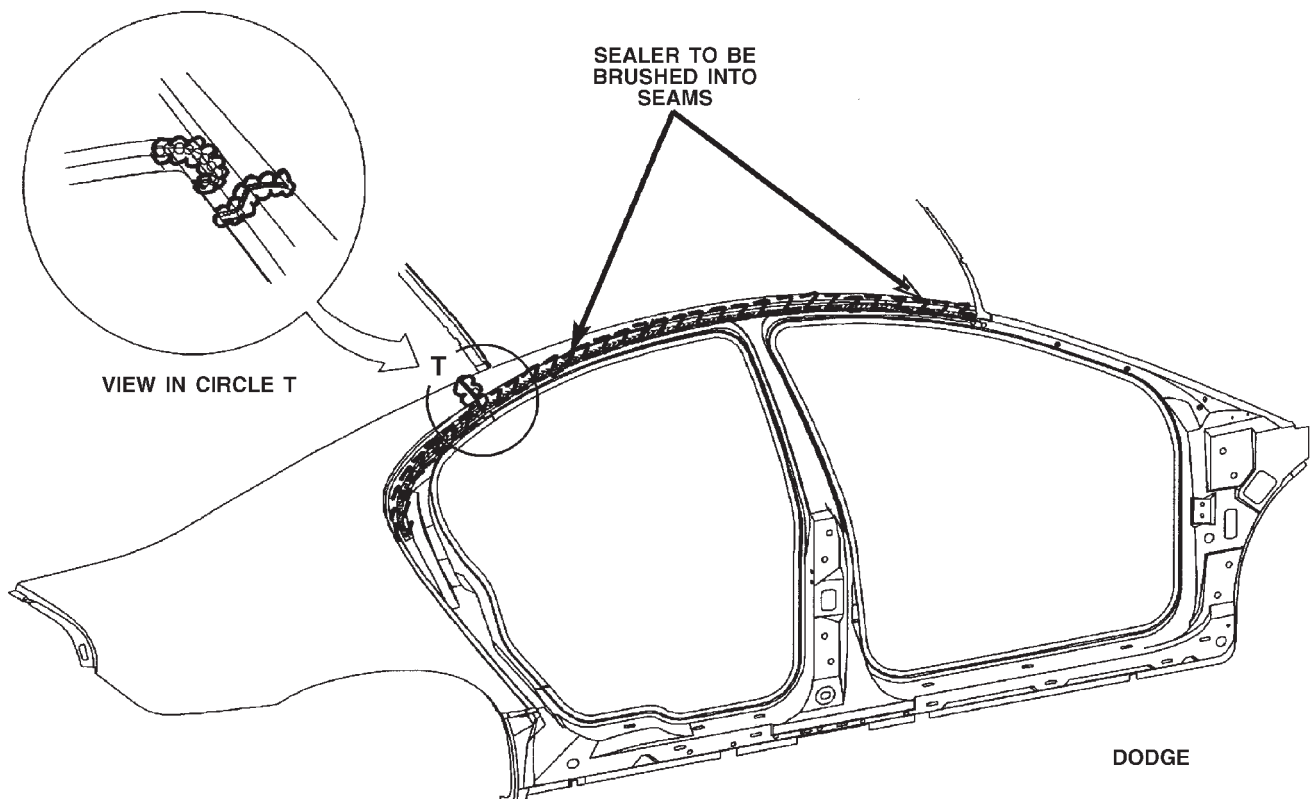
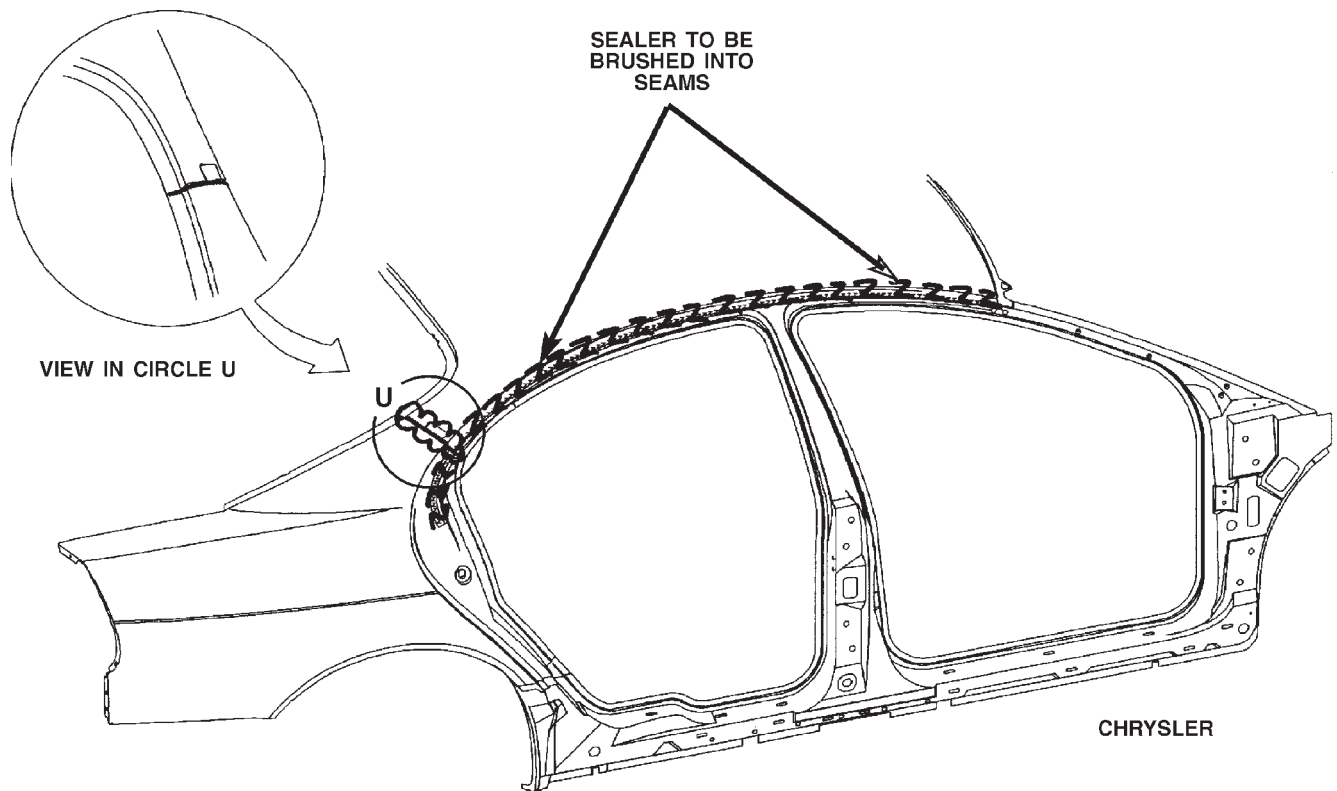


Fig. 11 LOAD BEAM AND COWL AREA

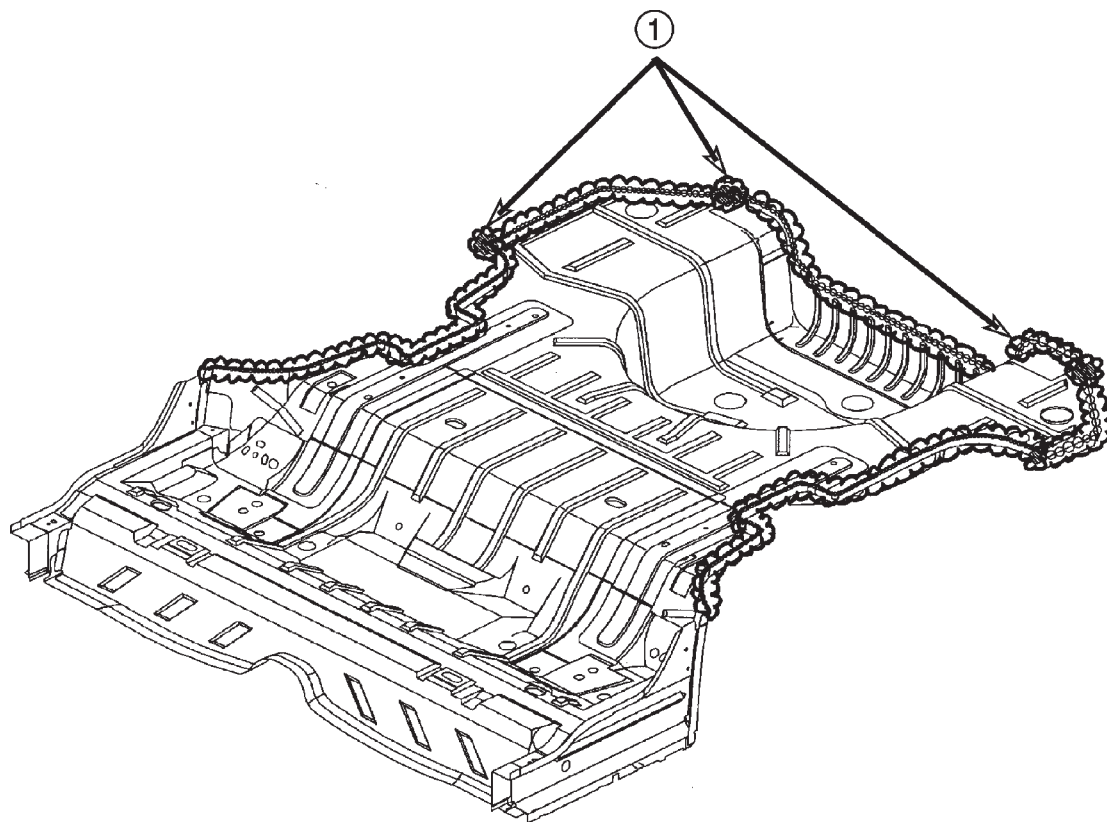
SEALER LOCATIONS (Continued)



80b697ac

Fig. 12 BODY SIDE APERTURE

SEALER LOCATIONS (Continued)



80b697ad

Fig. 13 FLOOR PAN

1 - SEALER TO BE BRUSHED INTO SEAMS

SEALER LOCATIONS (Continued)

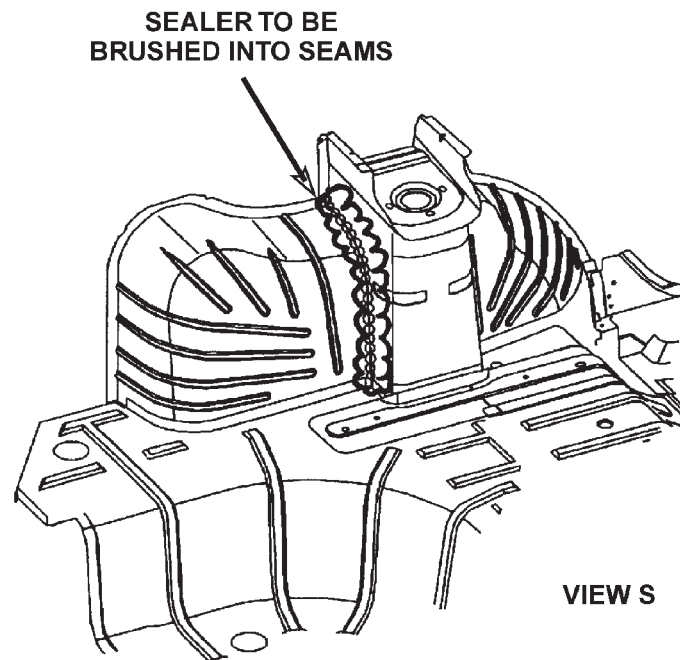
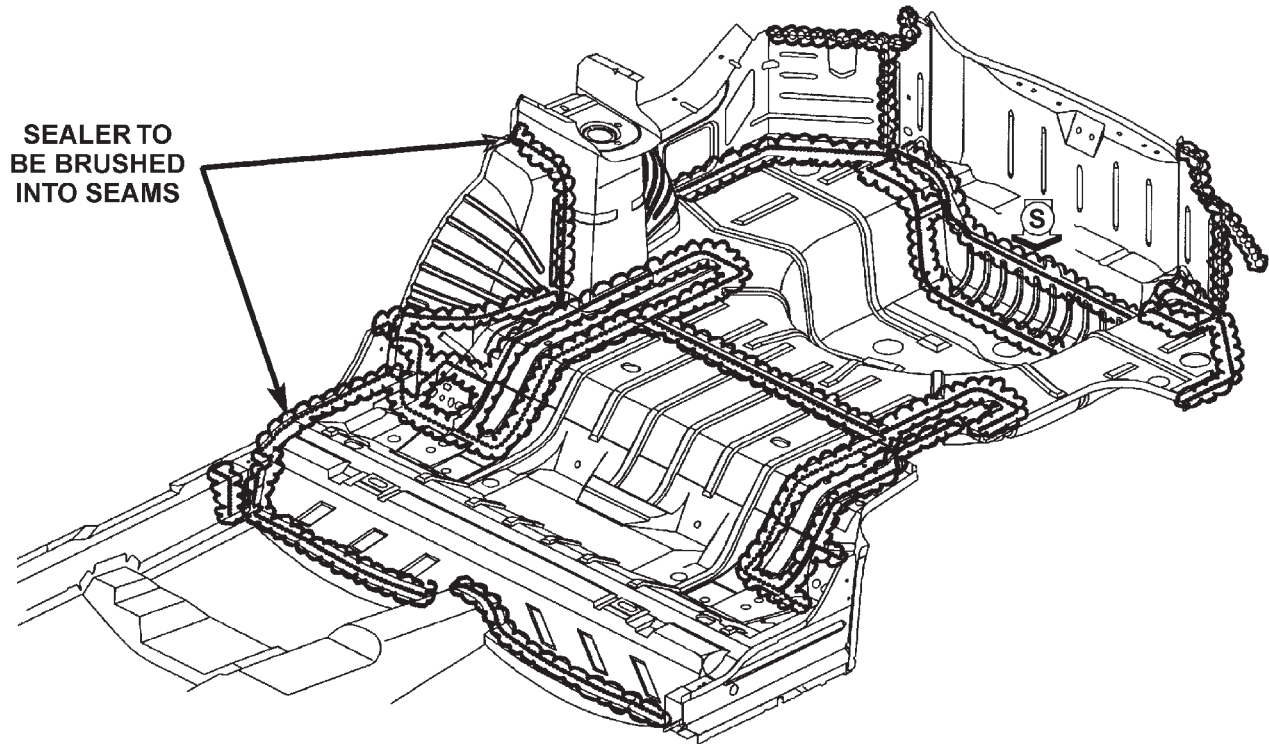
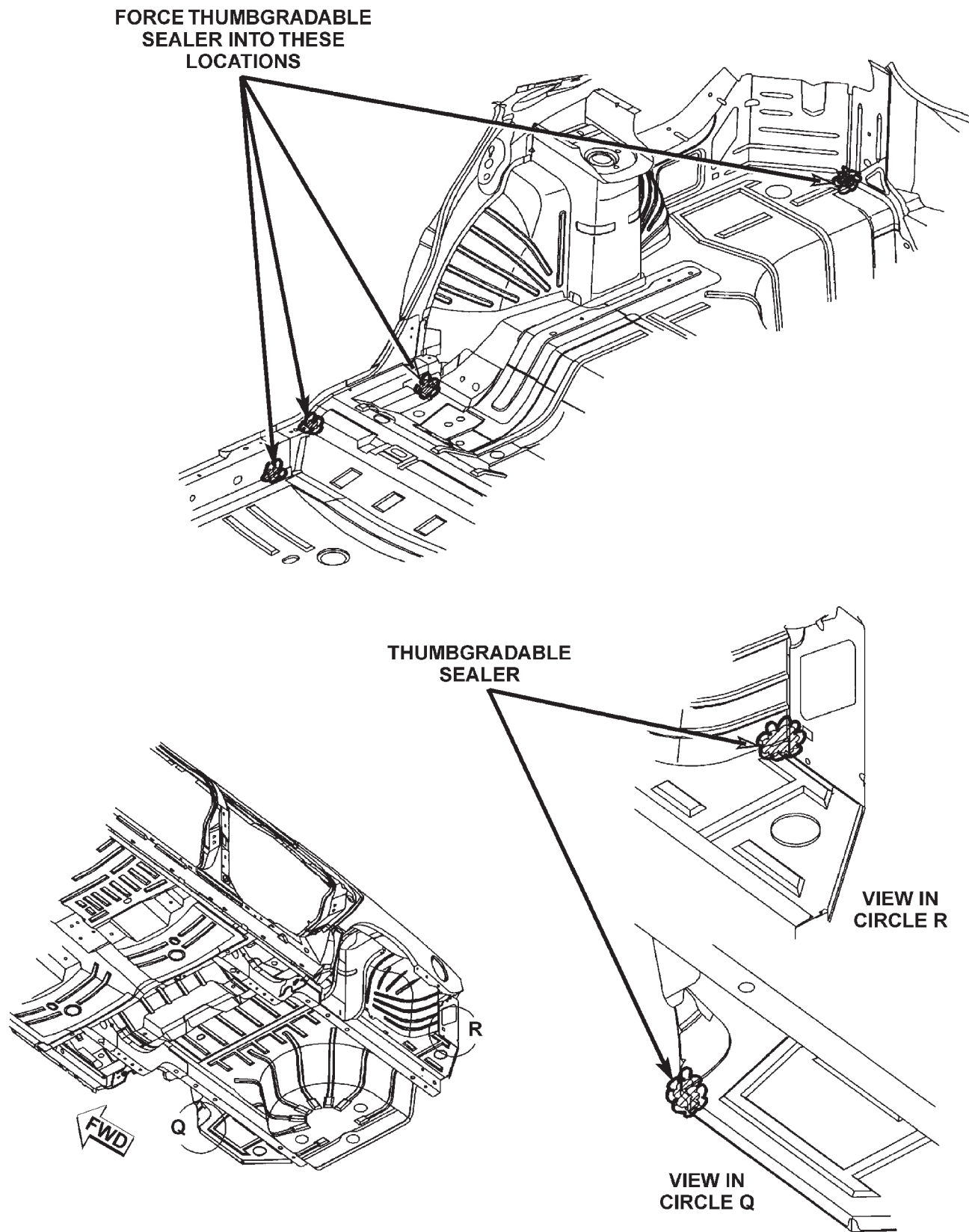


Fig. 14 FLOOR PAN

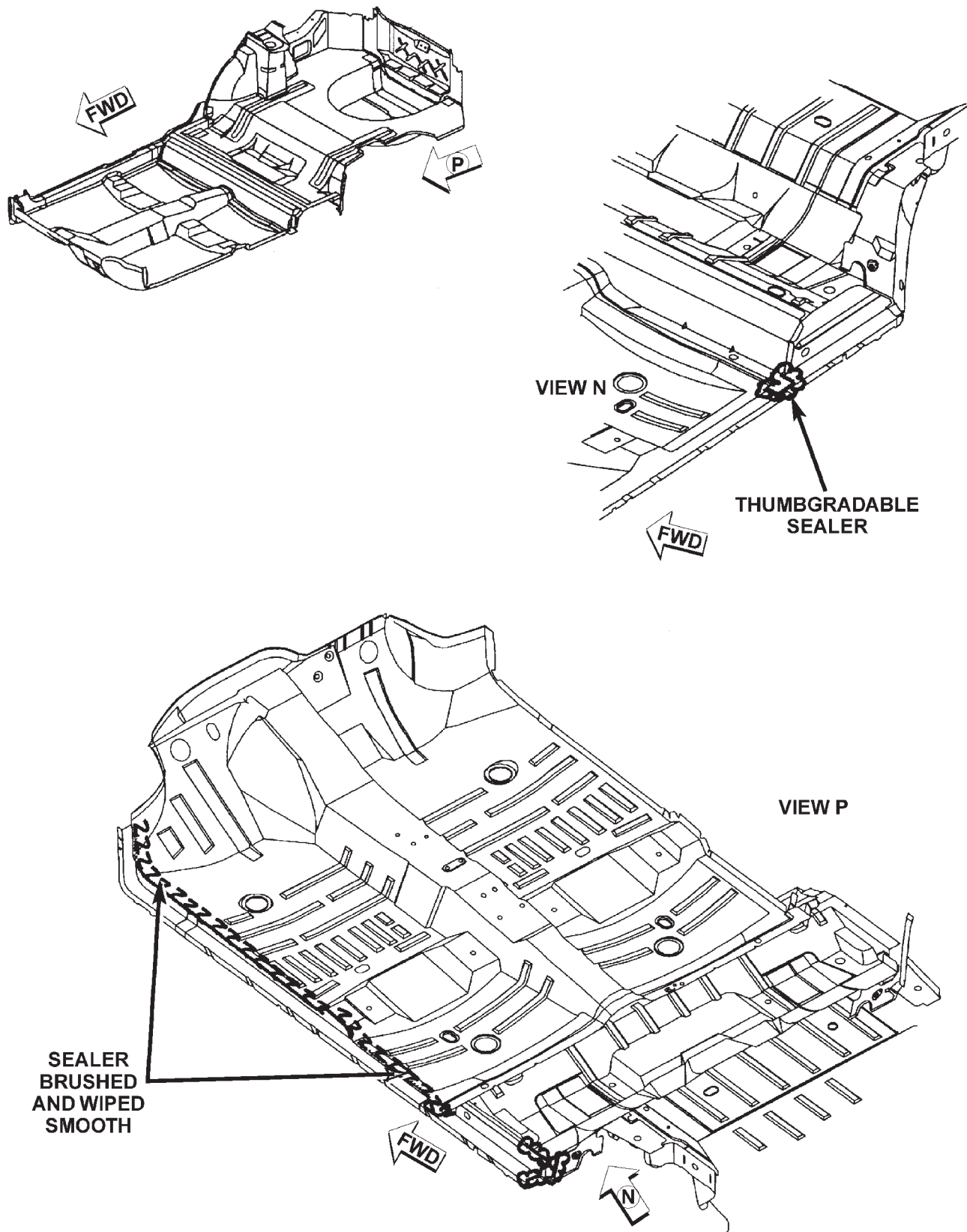
SEALER LOCATIONS (Continued)



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Fig. 15 FLOOR PAN

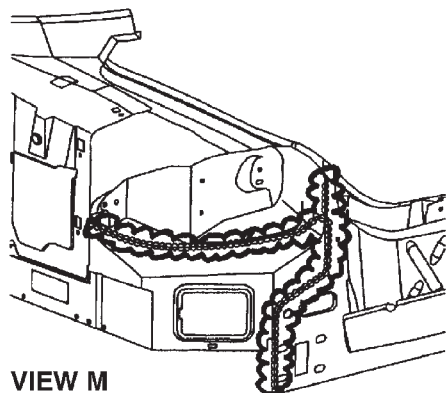
SEALER LOCATIONS (Continued)



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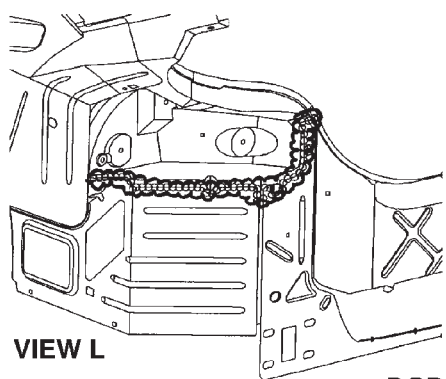
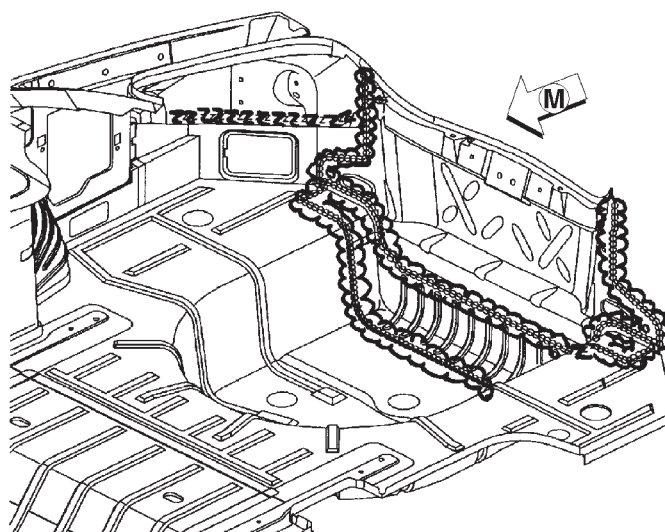
Fig. 16 FLOOR PAN

SEALER LOCATIONS (Continued)



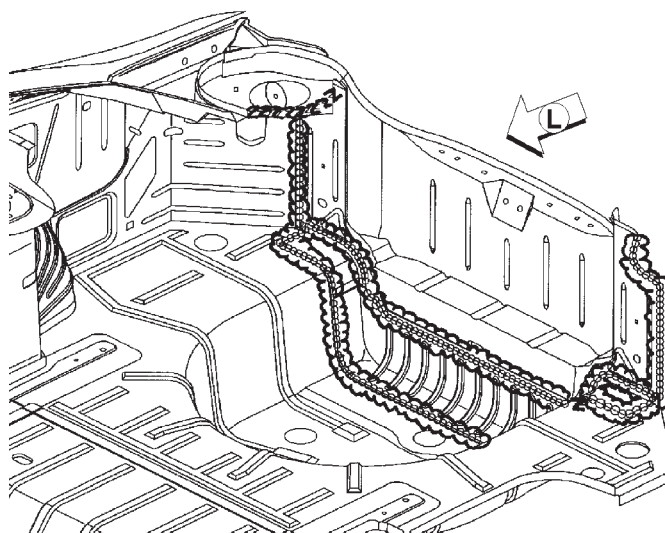
VIEW M

CHRYSLER



VIEW L

DODGE



80b697b1

Fig. 17 REAR TRUNK AREA

SEALER LOCATIONS (Continued)

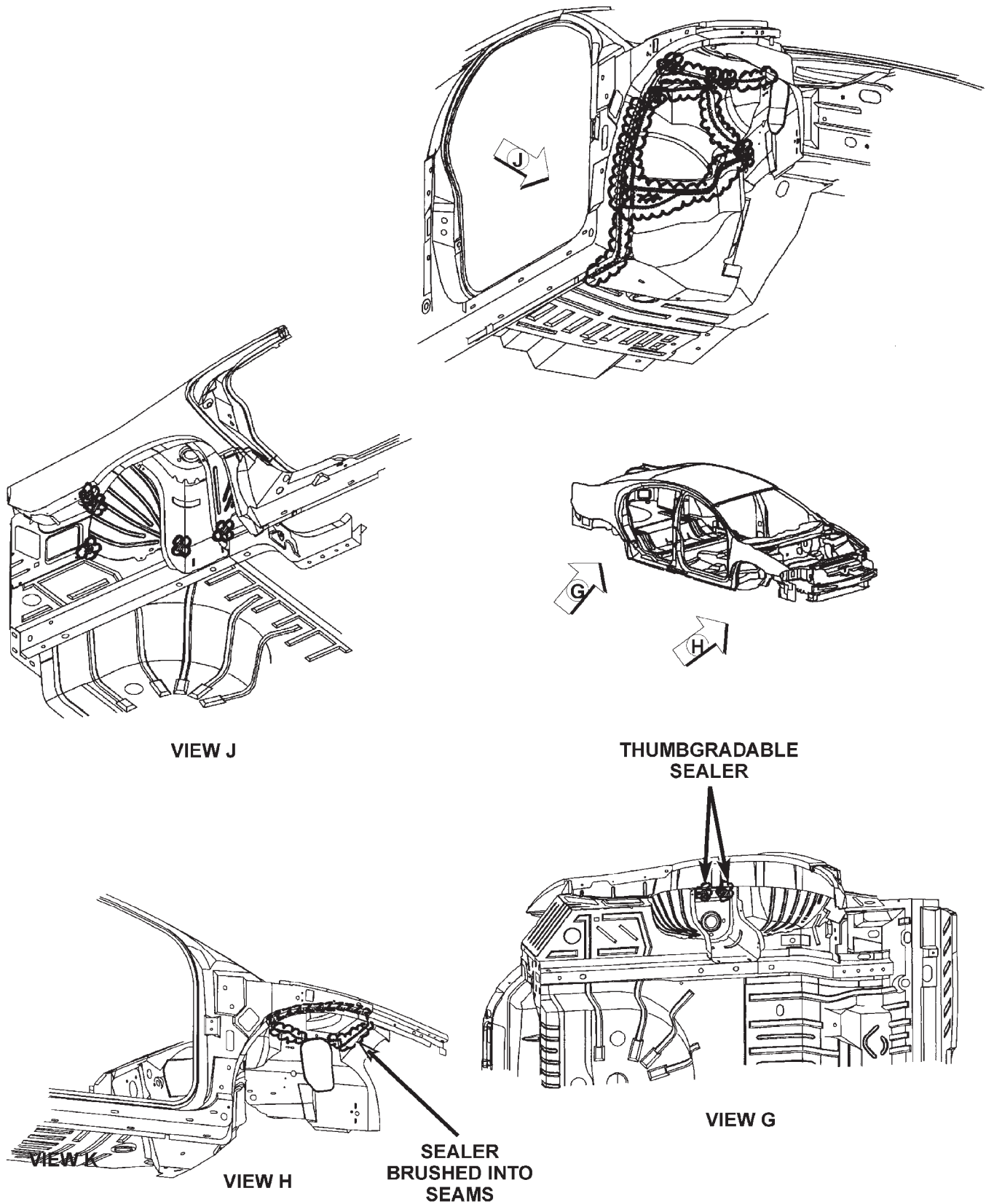
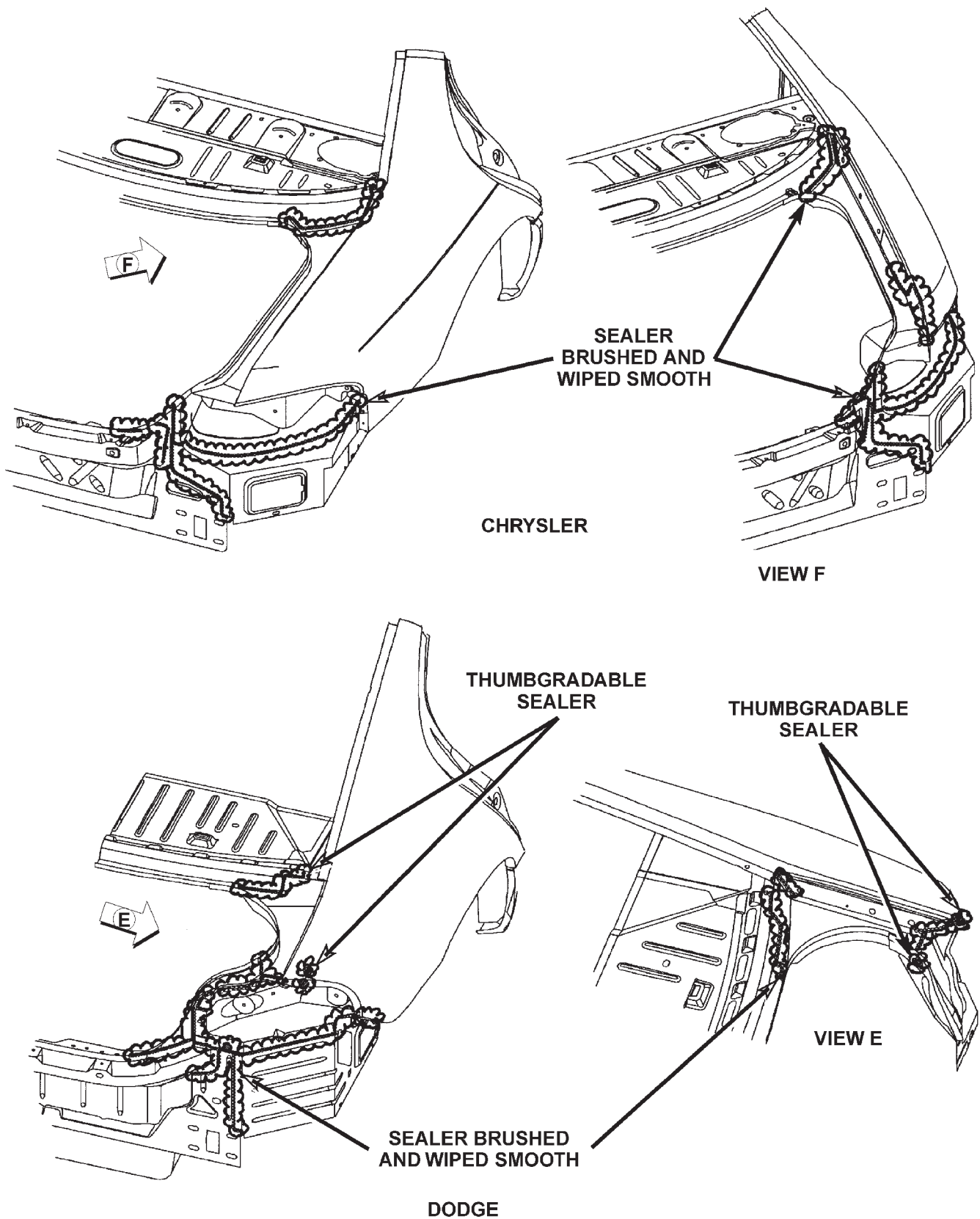


Fig. 18 INNER WHEELHOUSE

SEALER LOCATIONS (Continued)



80b697b3

Fig. 19 REAR QUARTER PANE

SEALER LOCATIONS (Continued)

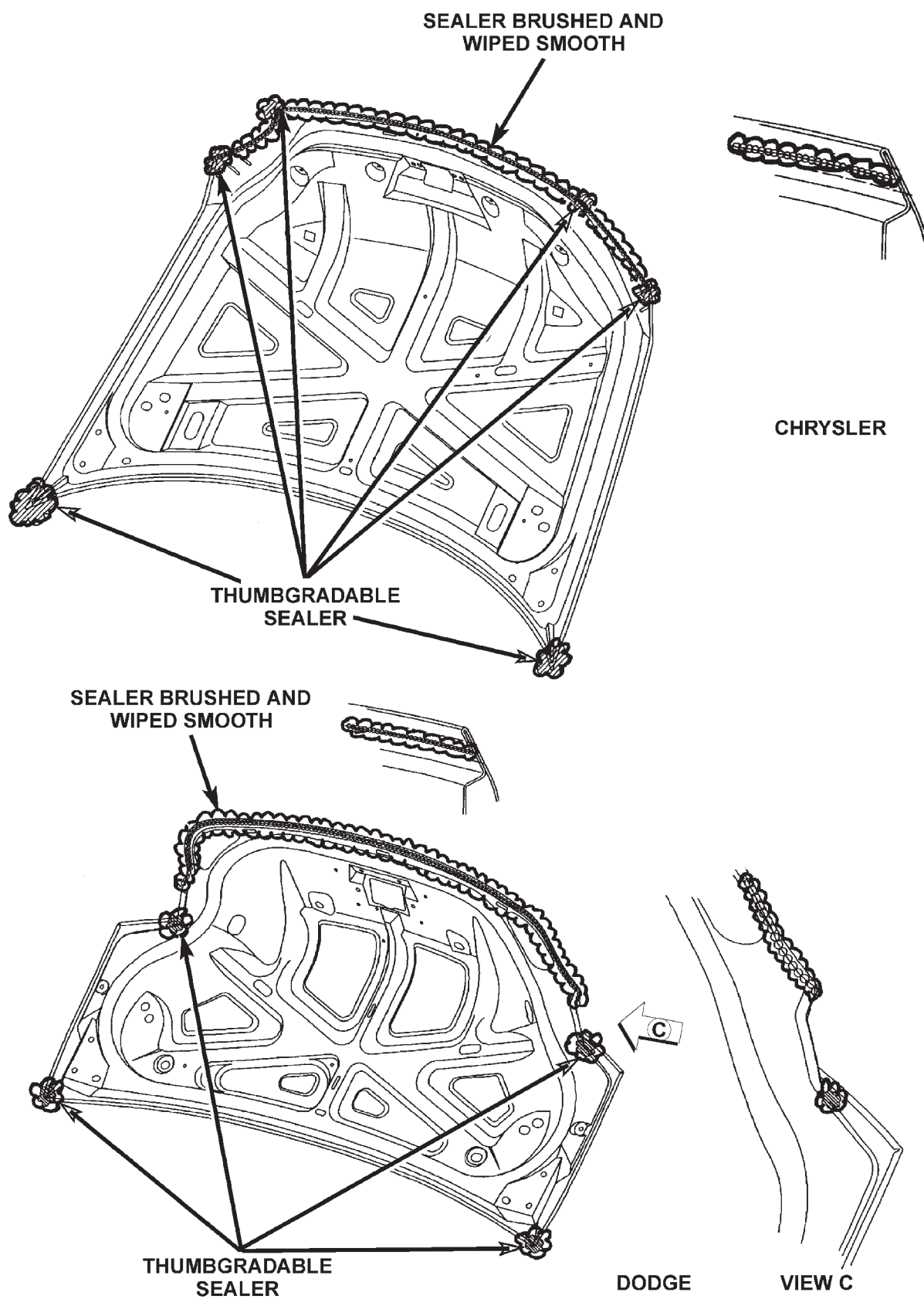


Fig. 20 DECKLID

SEALER LOCATIONS (Continued)

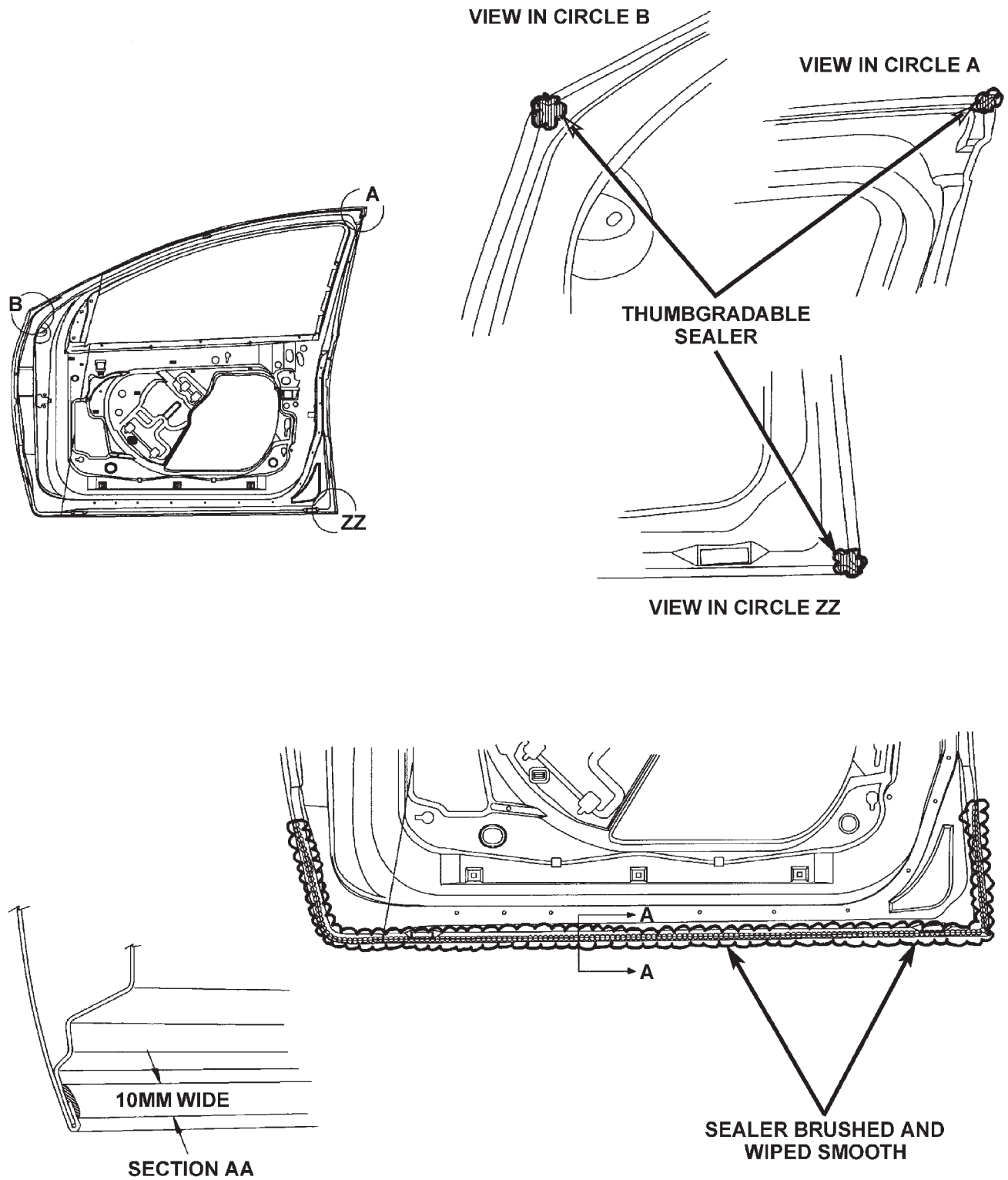
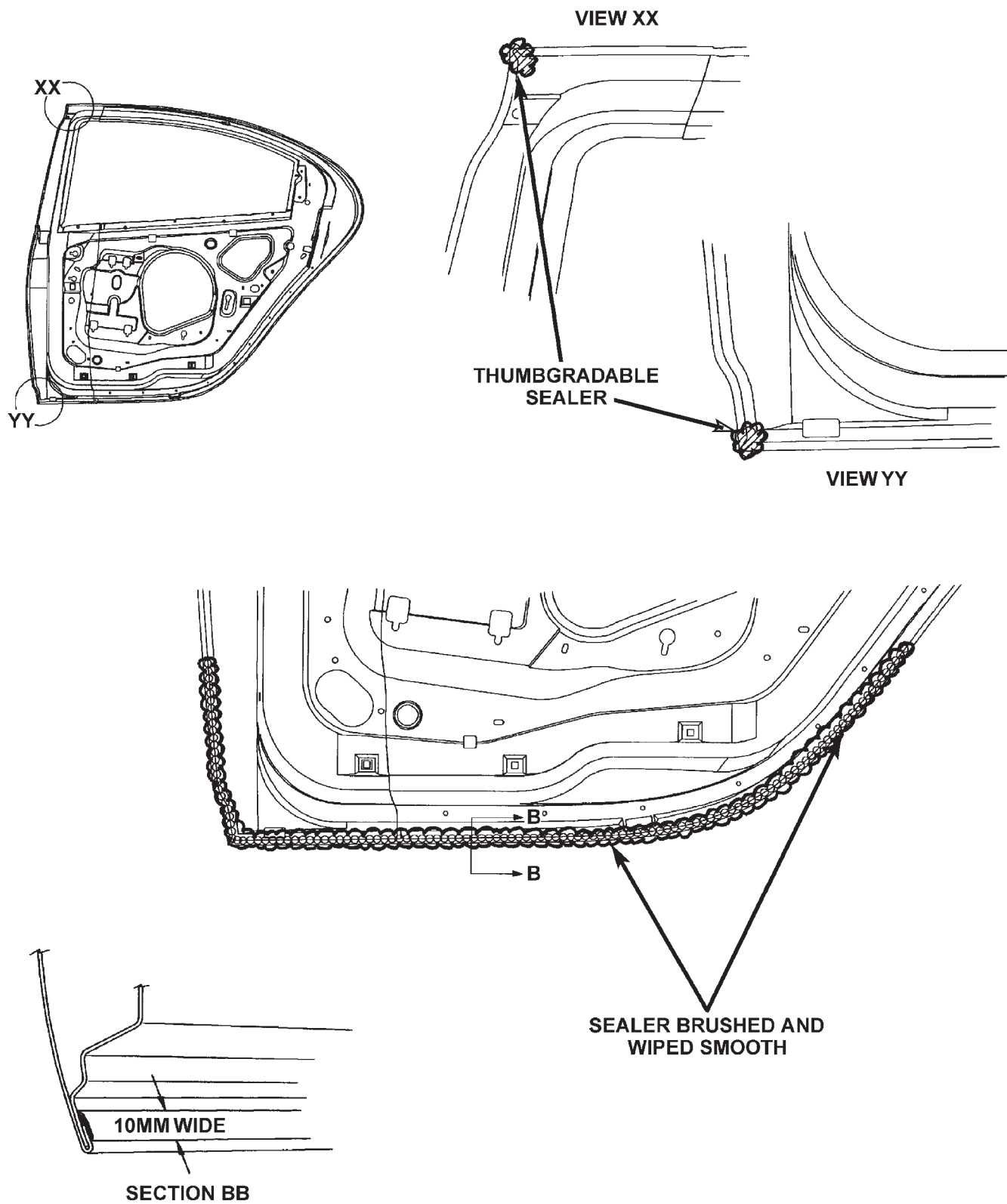


Fig. 21 FRONT DOORS

SEALER LOCATIONS (Continued)



80b697b8

Fig. 22 REAR DOORS

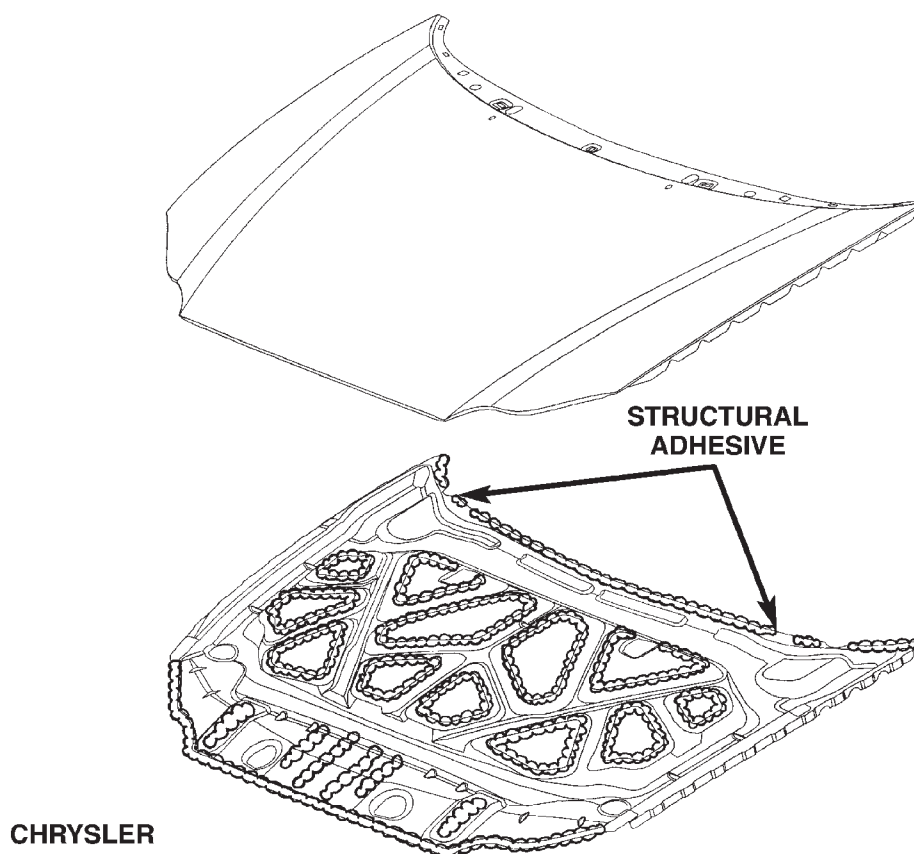
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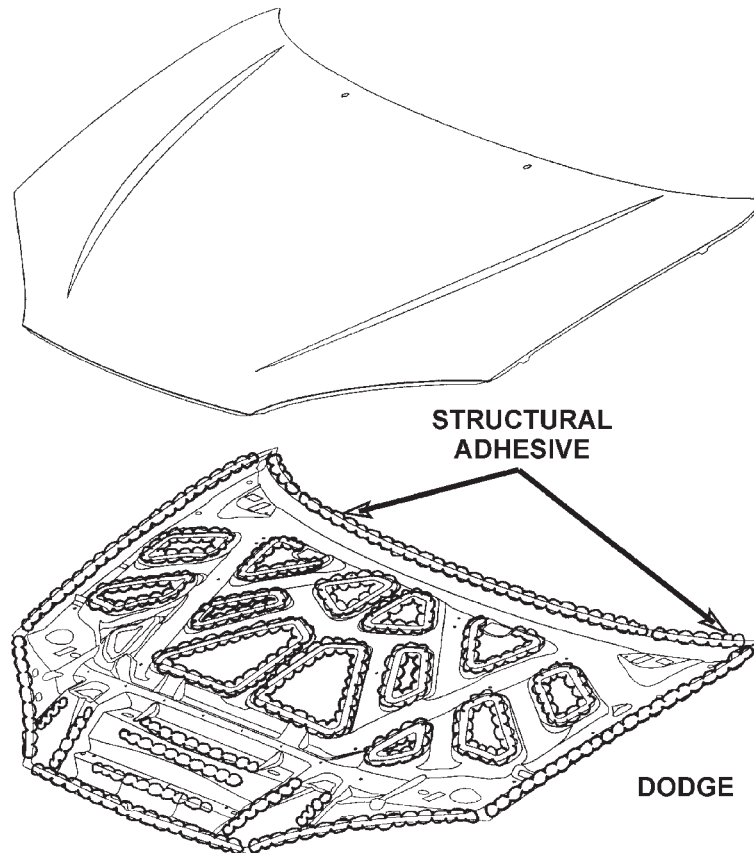
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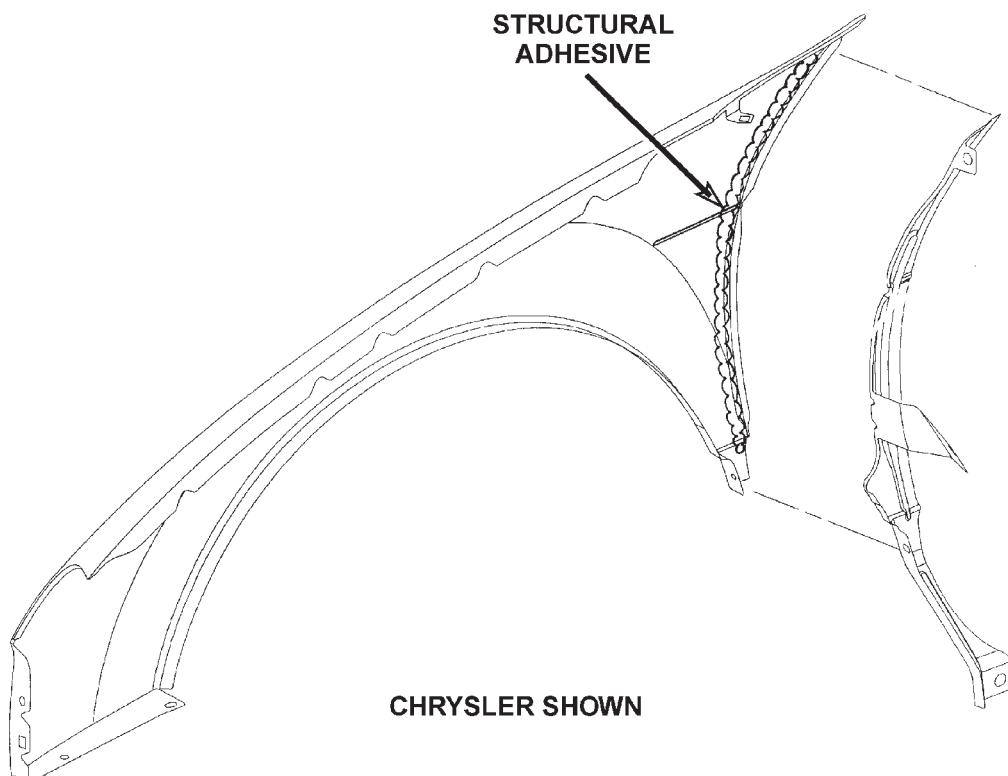
80b697a3

Fig. 23 HOOD - CONCORDE AND 300M

STRUCTURAL ADHESIVE LOCATIONS (Continued)



80b697a4

Fig. 24 HOOD - INTREPID

80b697a5

Fig. 25 FRONT FENDER

STRUCTURAL ADHESIVE LOCATIONS (Continued)

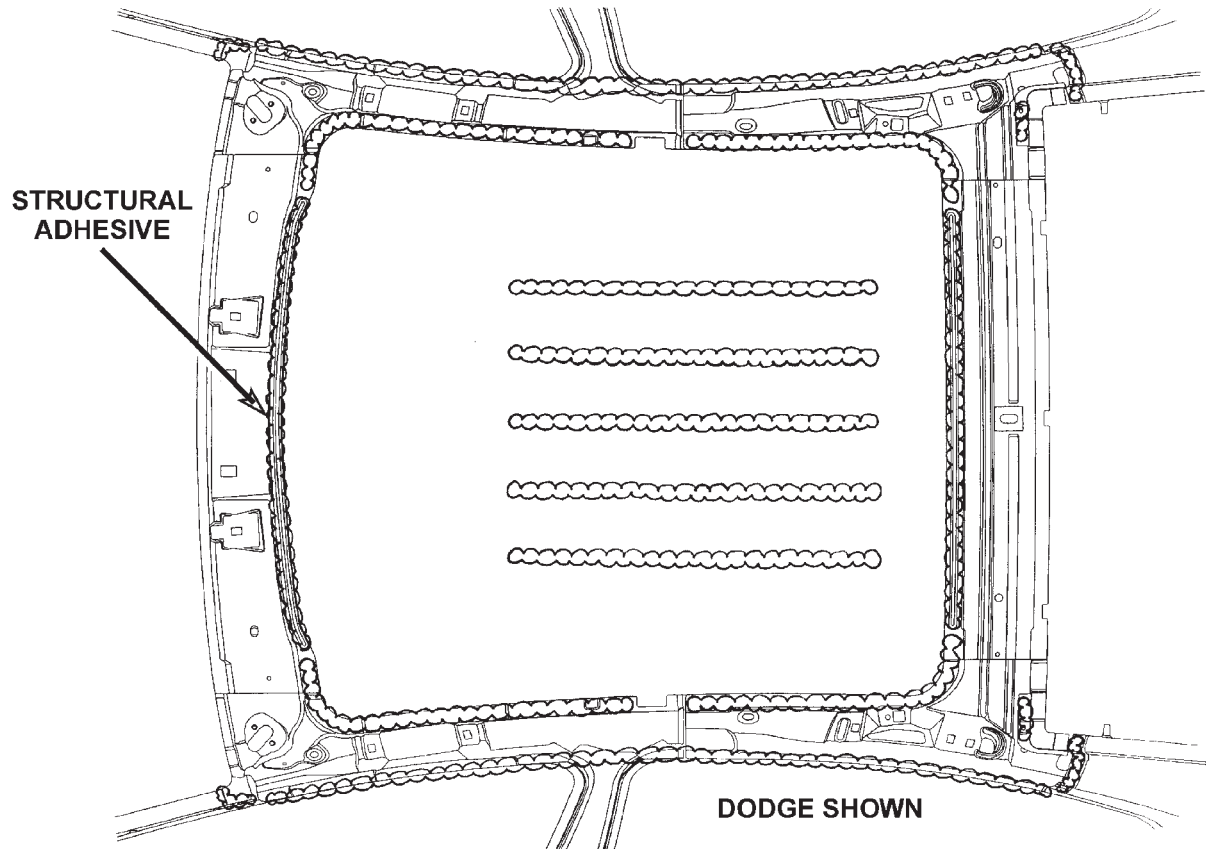


Fig. 26 ROOF

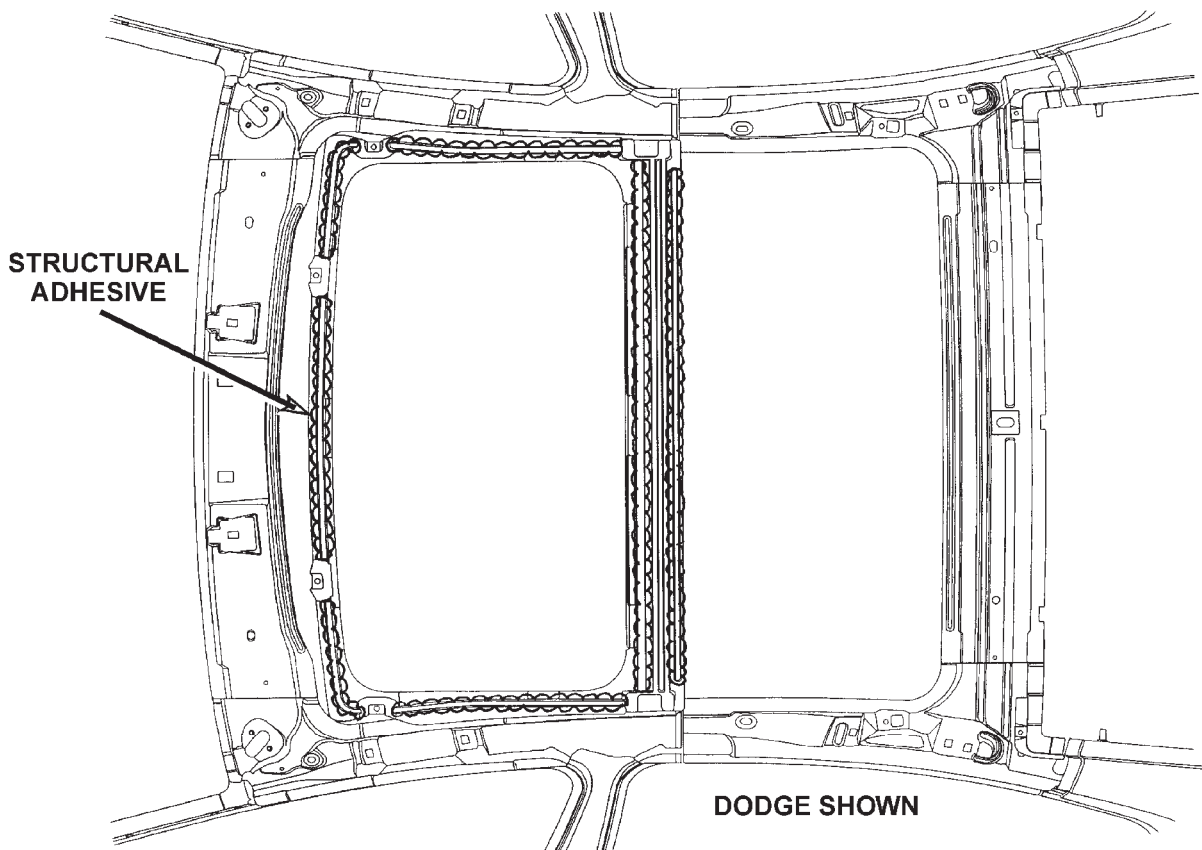
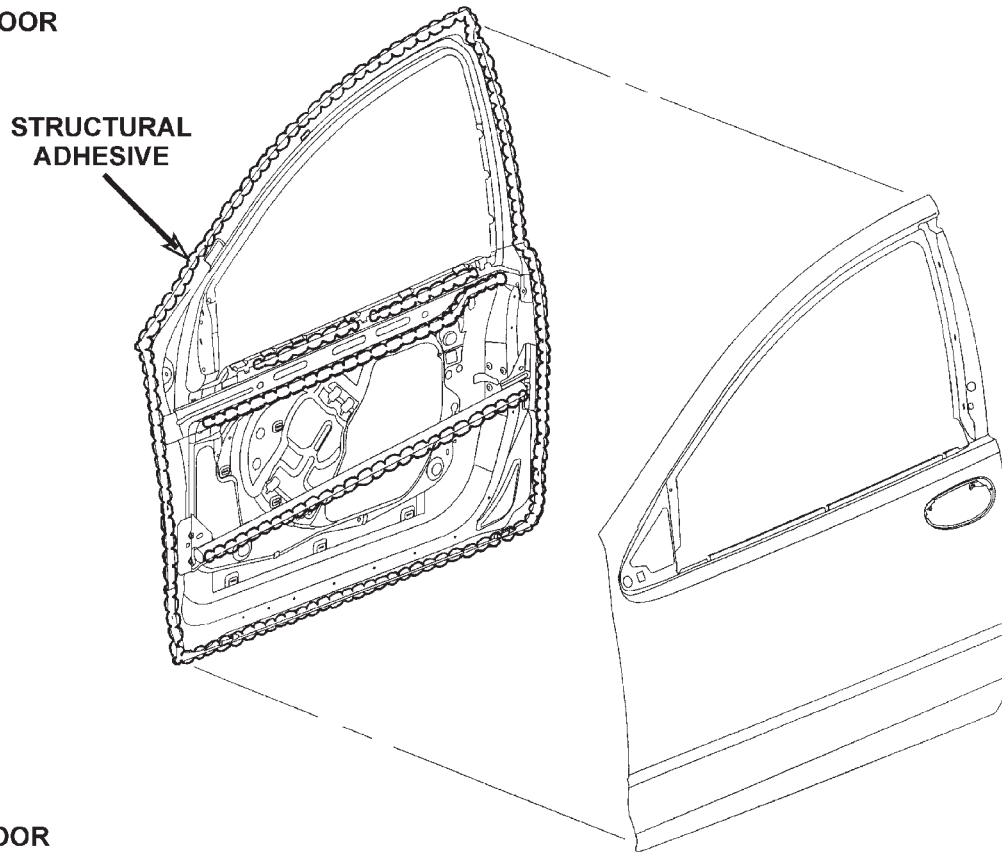


Fig. 27 SUNROOF

STRUCTURAL ADHESIVE LOCATIONS (Continued)

FRONT DOOR



REAR DOOR

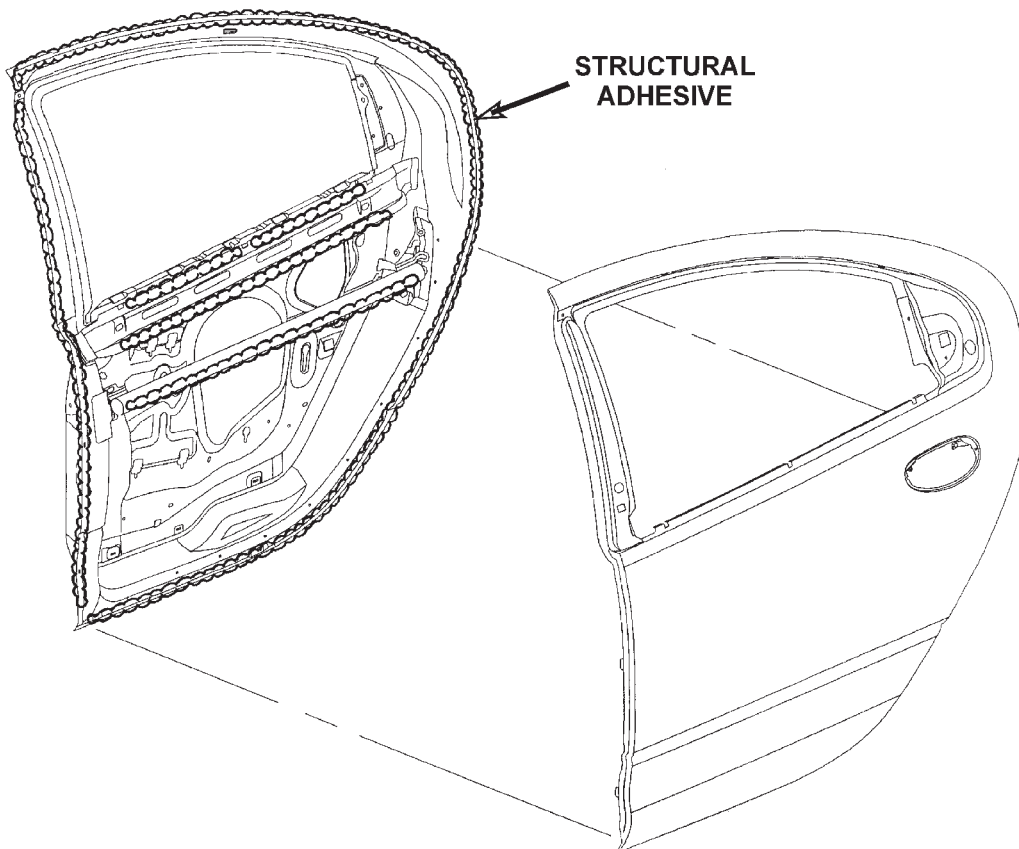


Fig. 28 DOORS

STRUCTURAL ADHESIVE LOCATIONS (Continued)

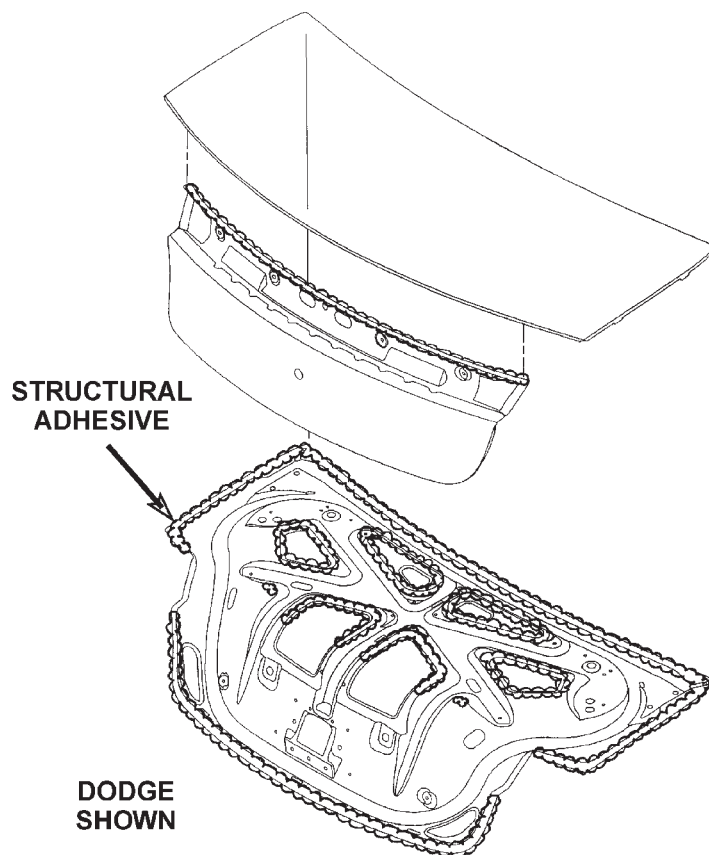
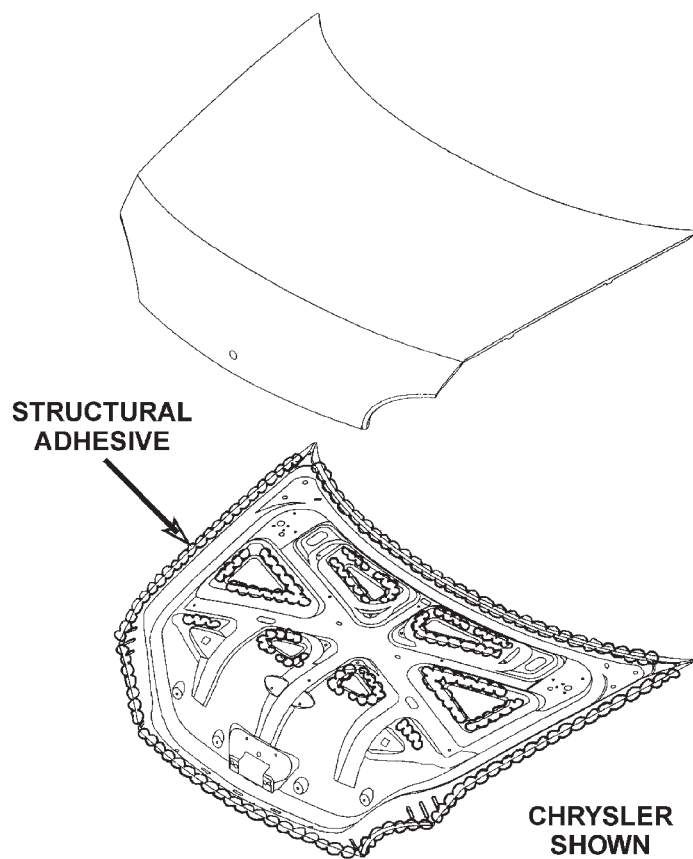


Fig. 29 DECKLID

WELD LOCATIONS

SPECIFICATIONS

WELD LOCATIONS

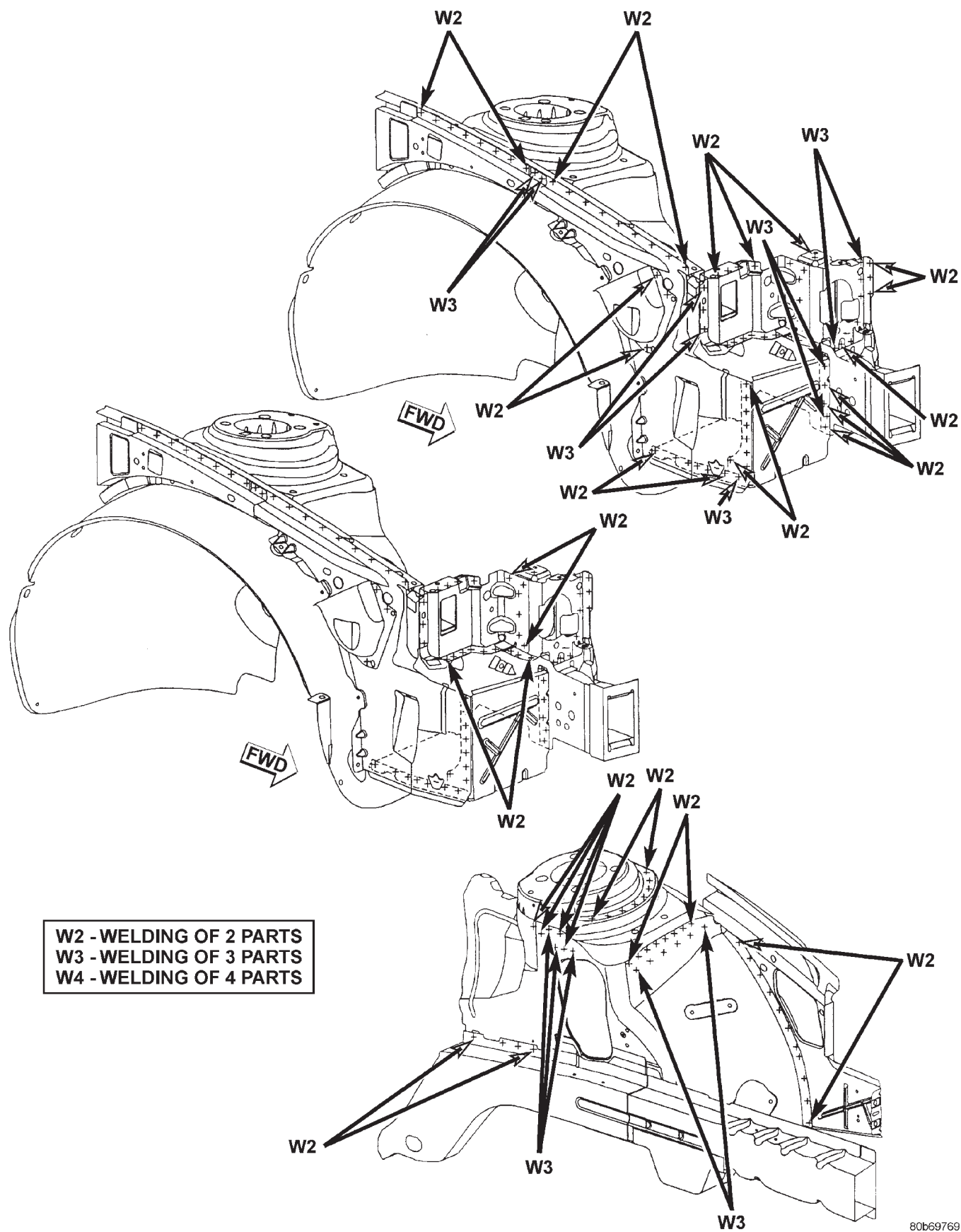
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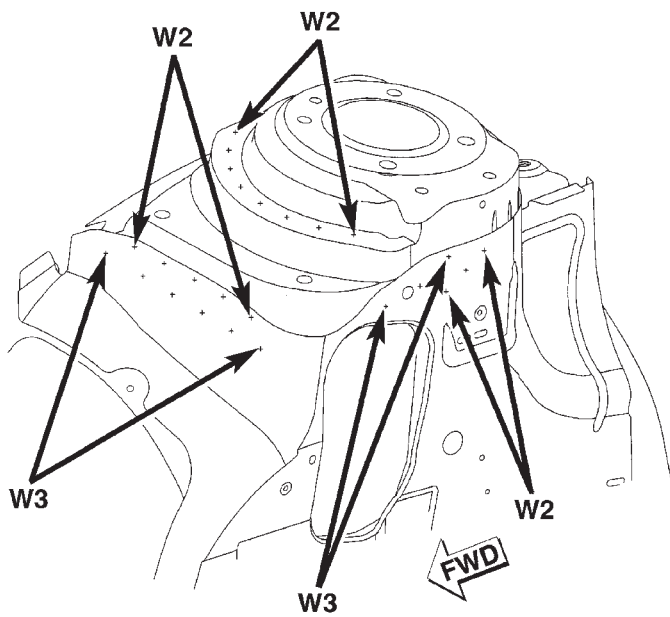
WELD LOCATIONS (Continued)



80b69769

Fig. 30 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

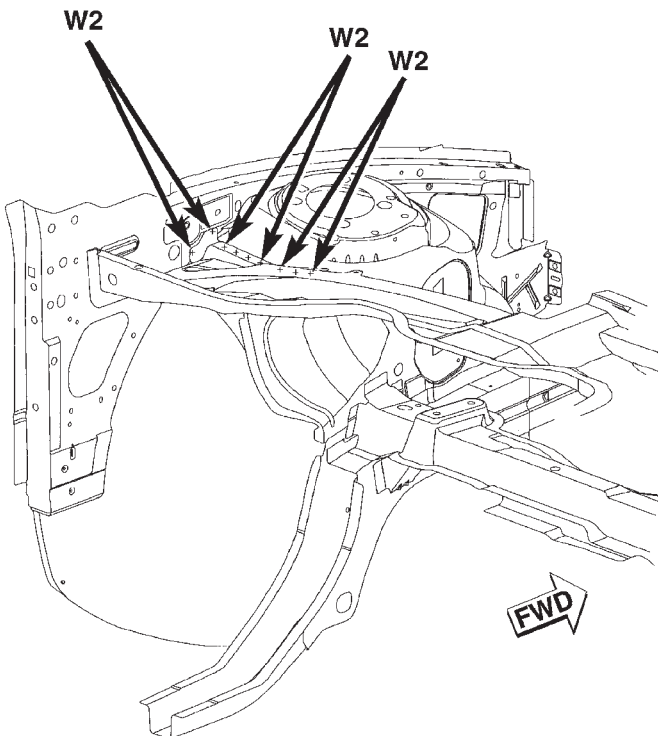
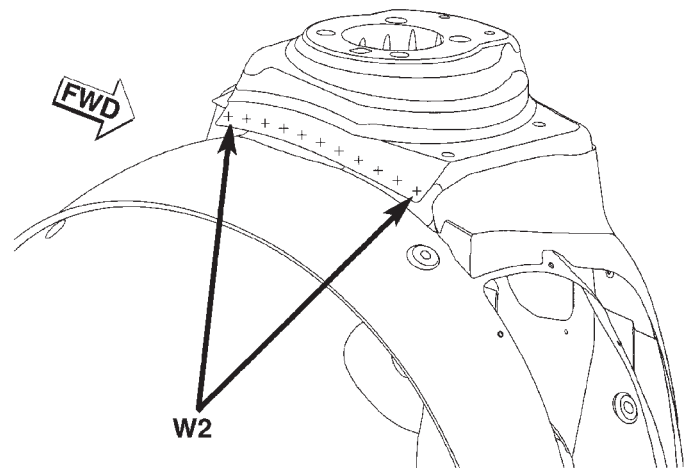


Fig. 31 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)

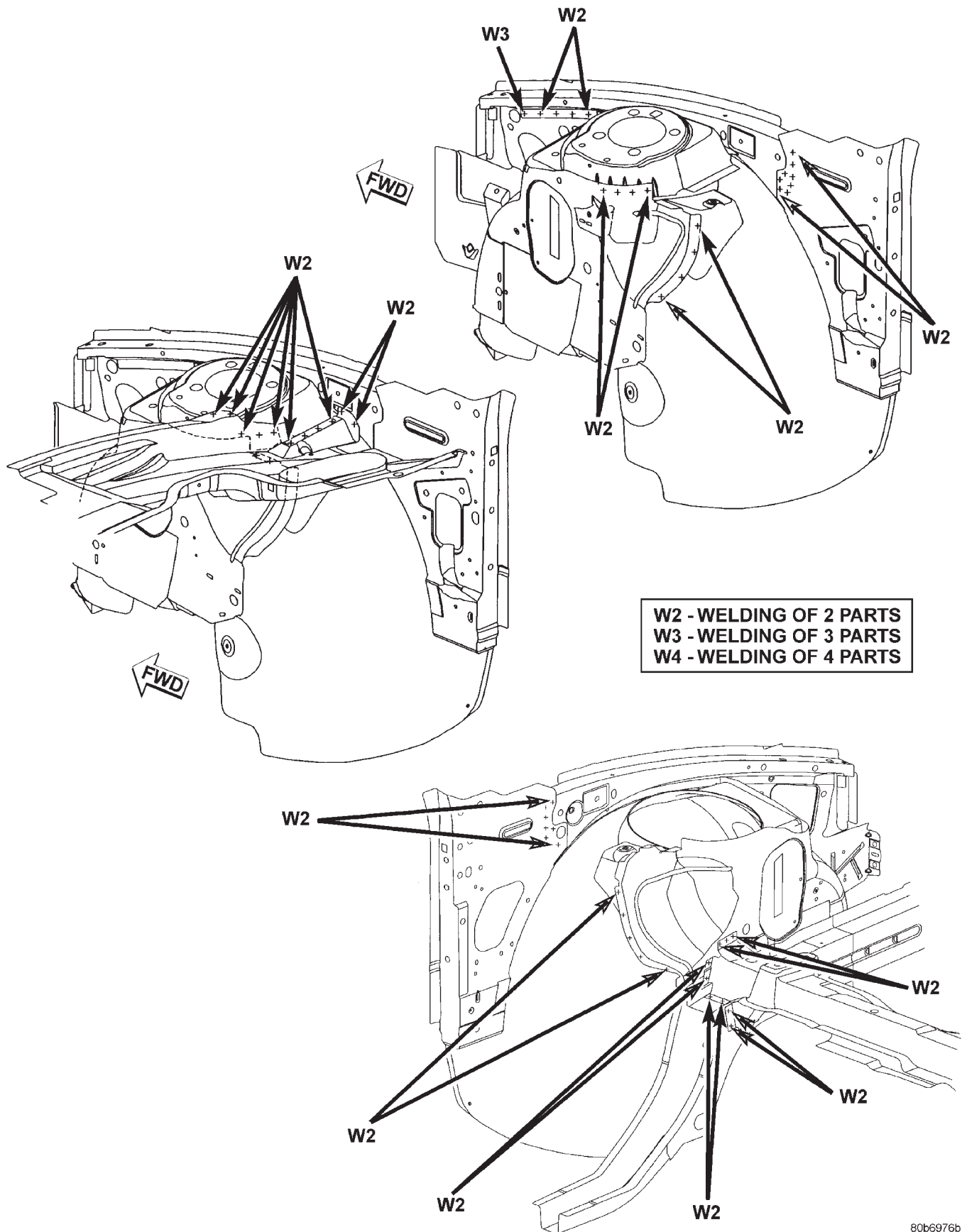
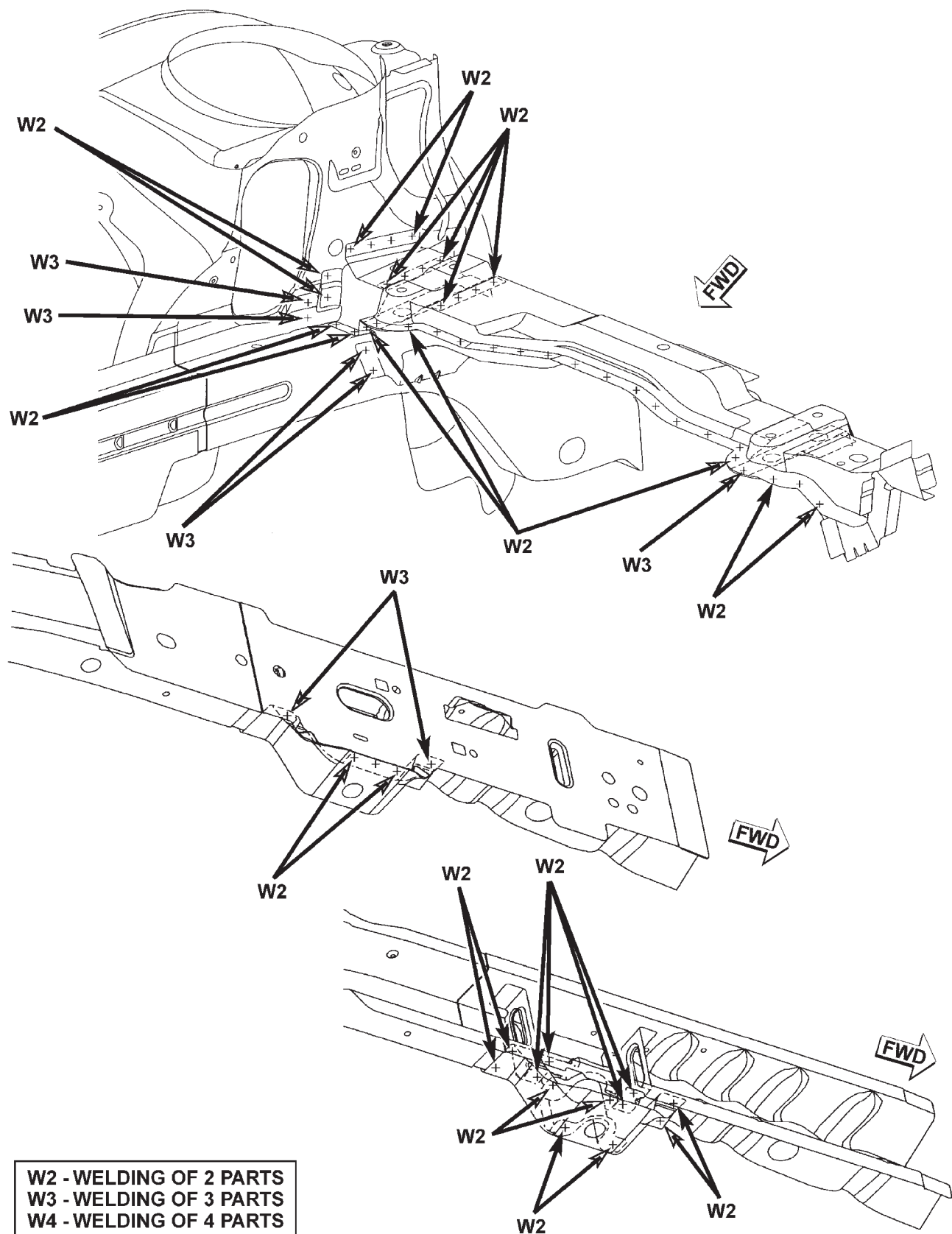


Fig. 32 ENGINE COMPARTMENT

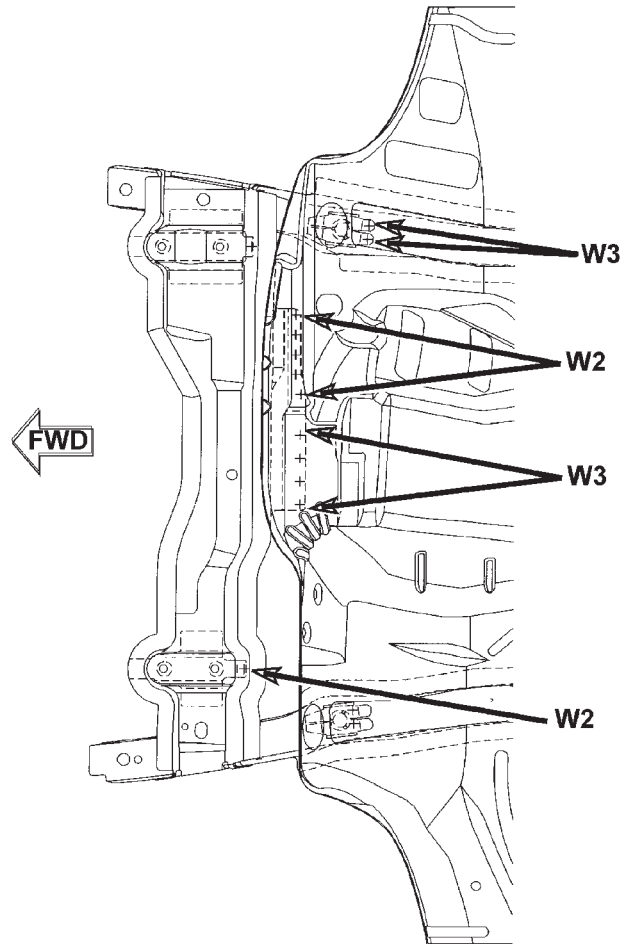
WELD LOCATIONS (Continued)



80b6976c

Fig. 33 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

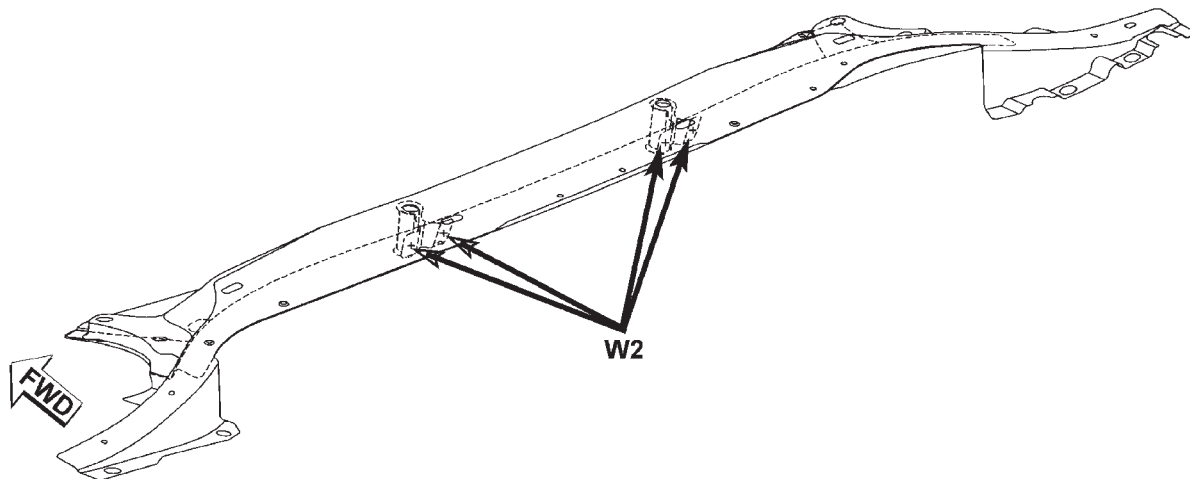
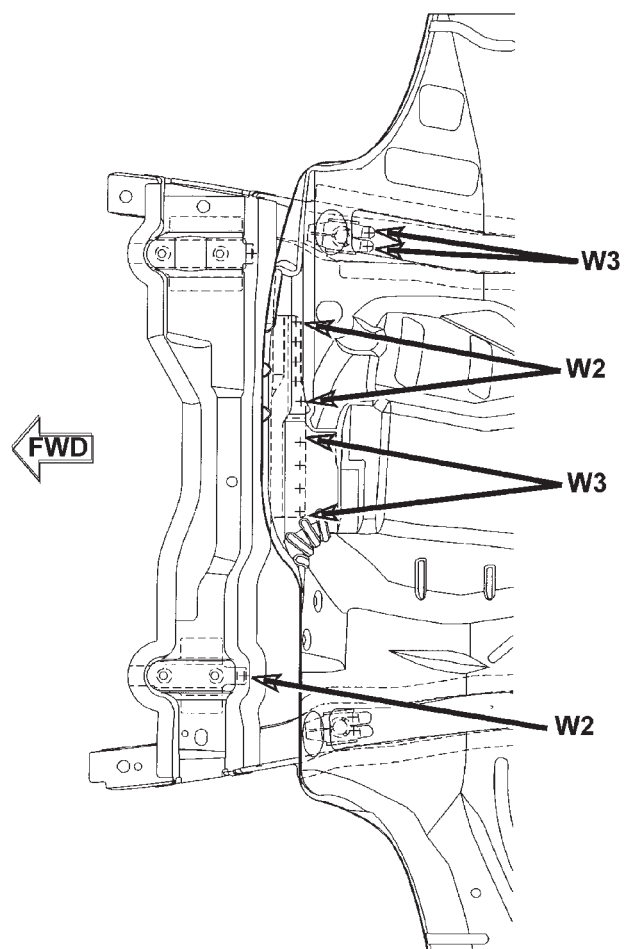


Fig. 34 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

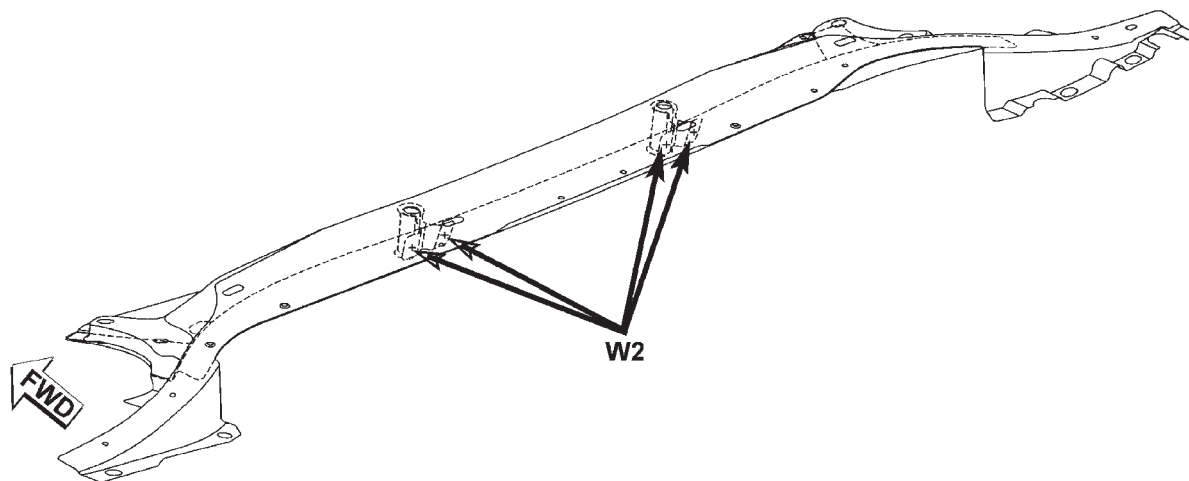


Fig. 35 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)

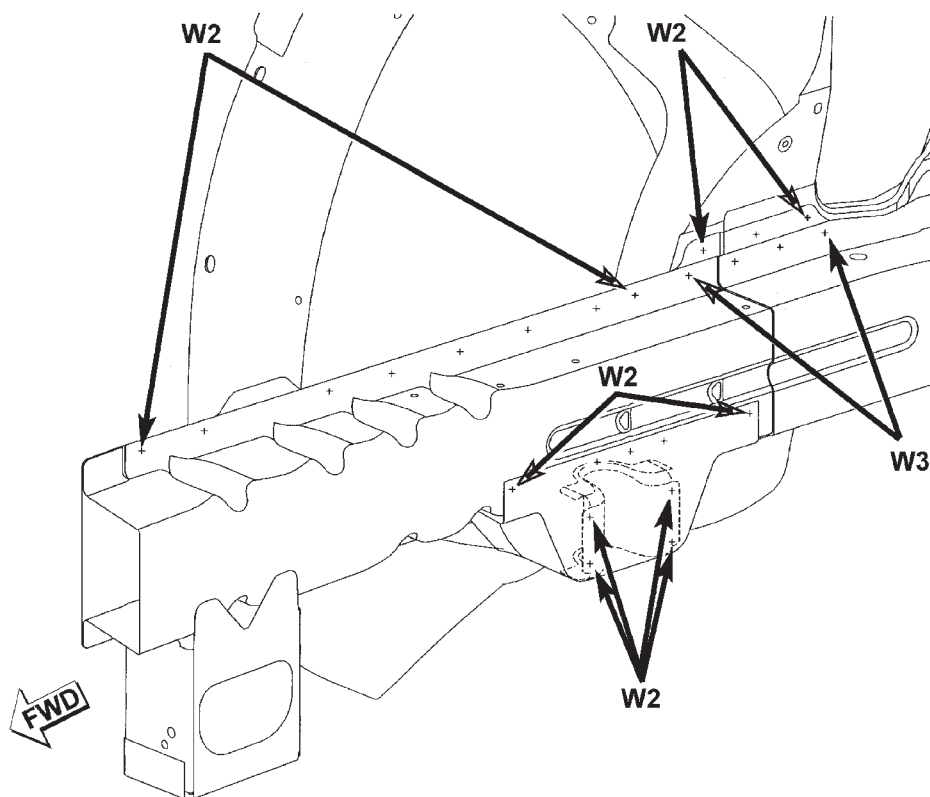
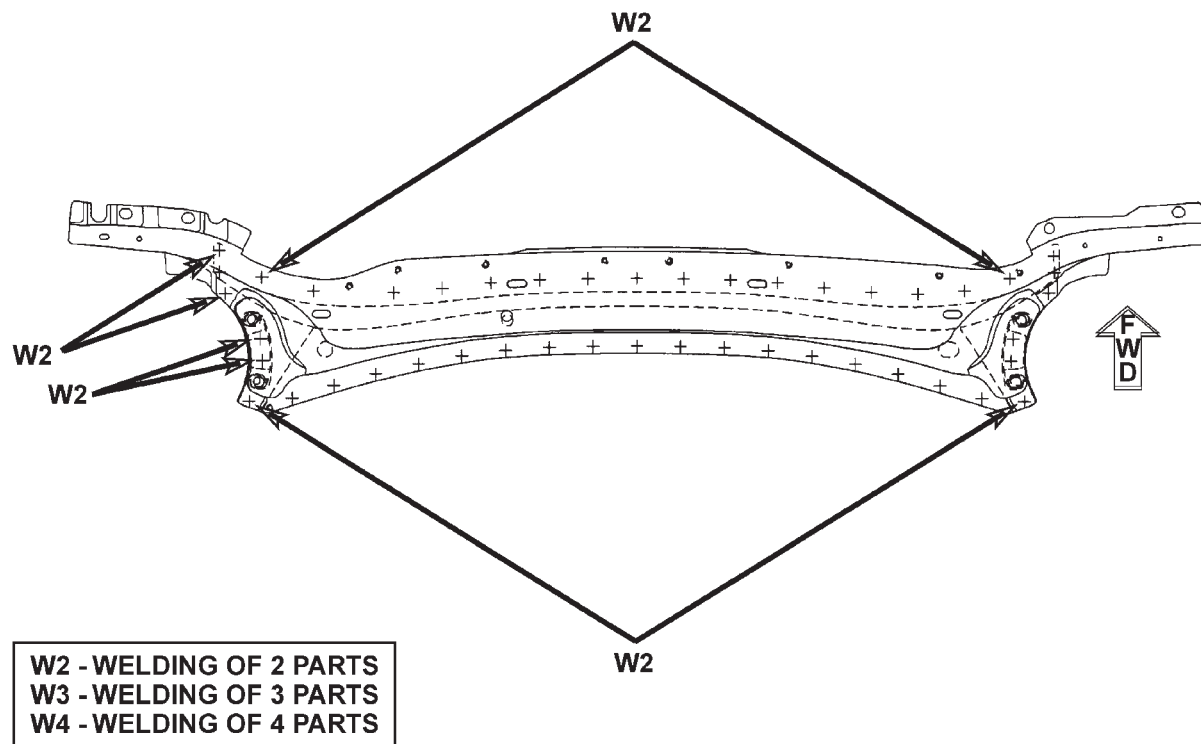
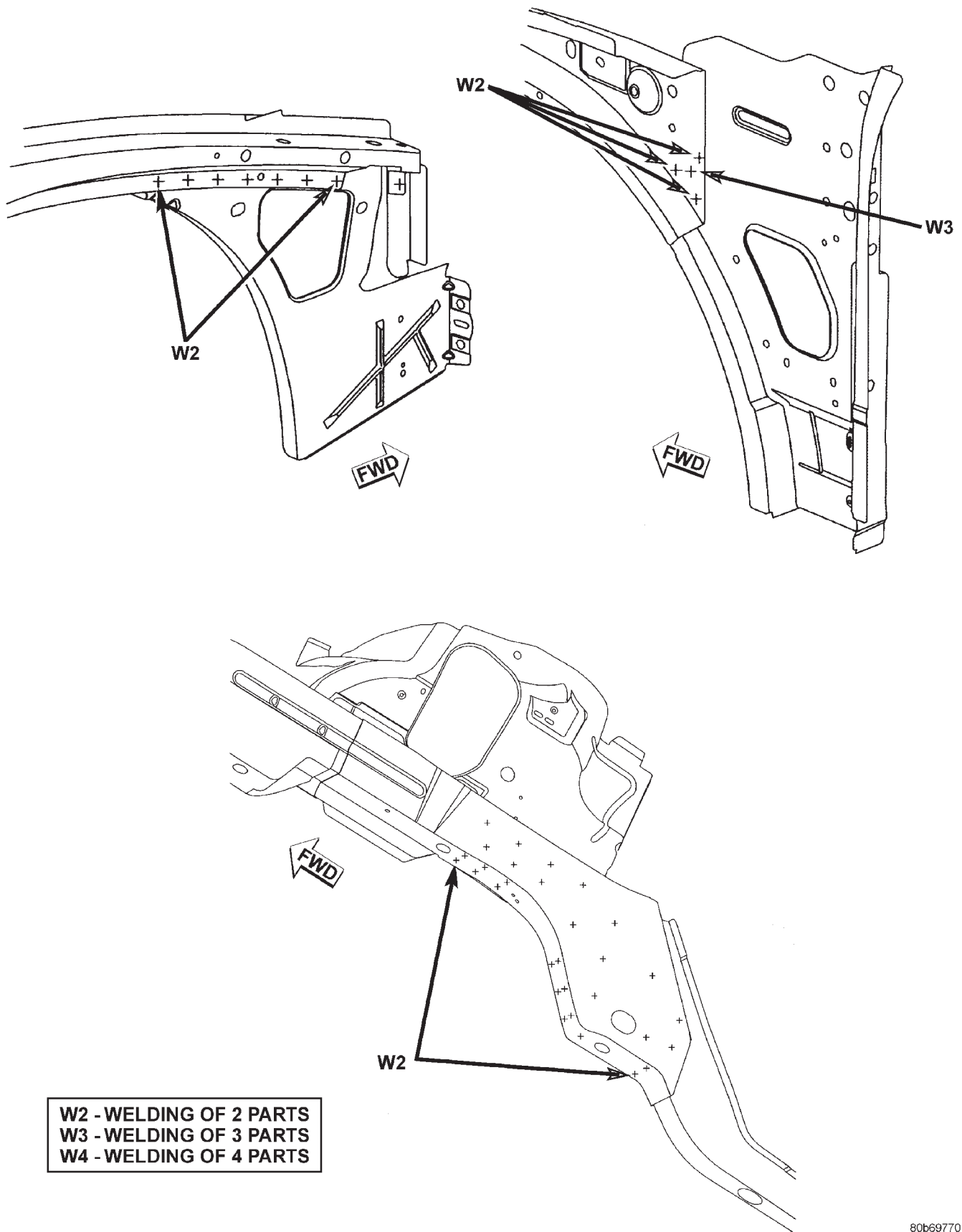


Fig. 36 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)



80b69770

Fig. 37 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)

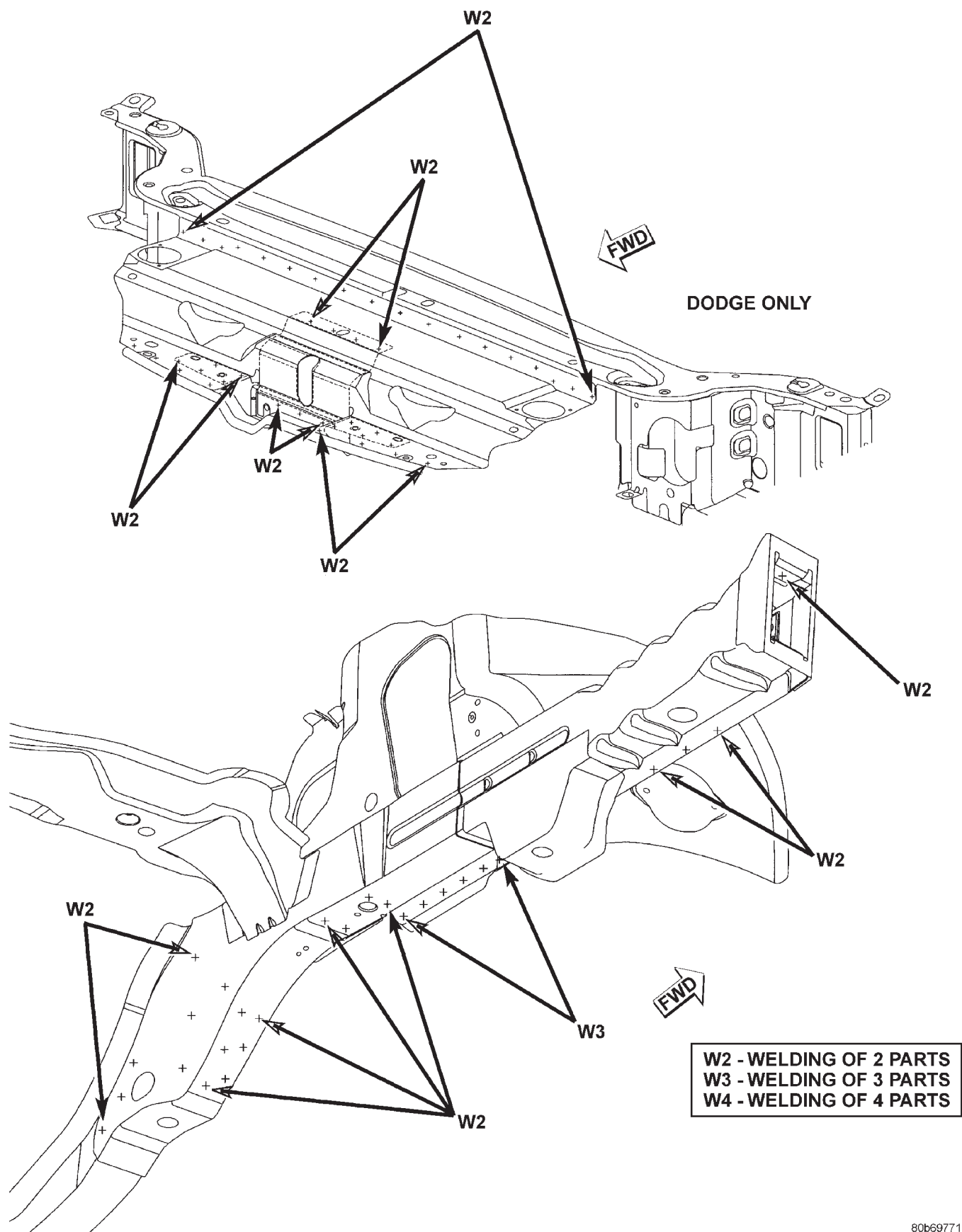


Fig. 38 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

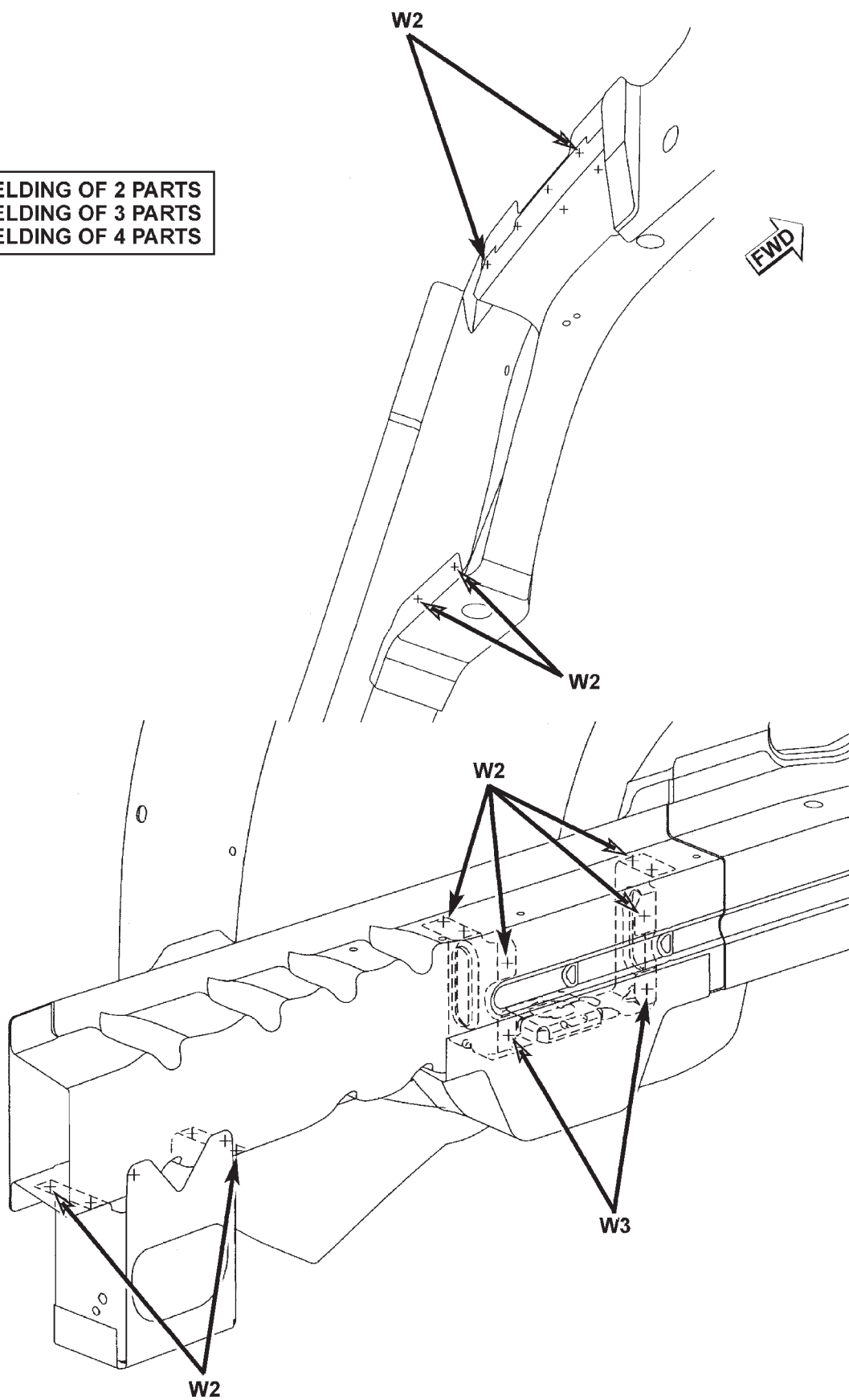


Fig. 39 ENGINE COMPARTMENT

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

FWD

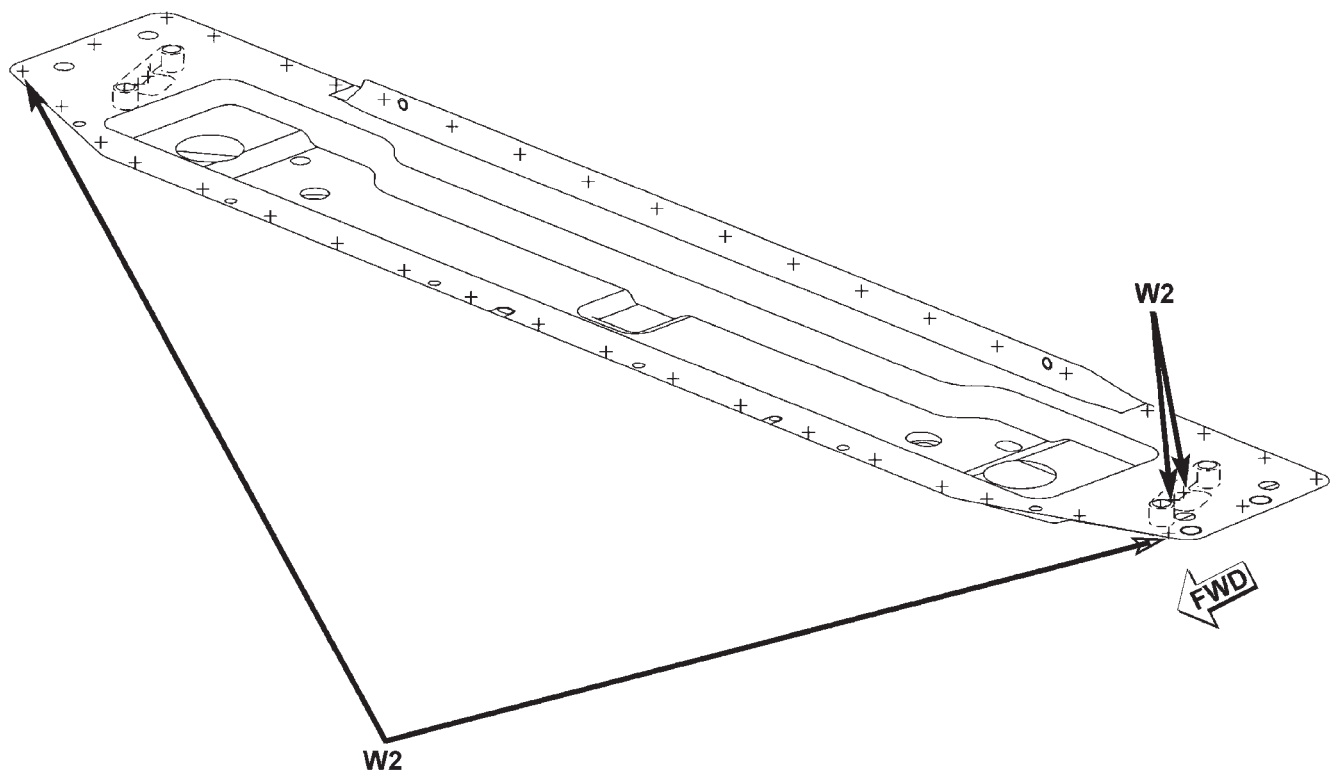
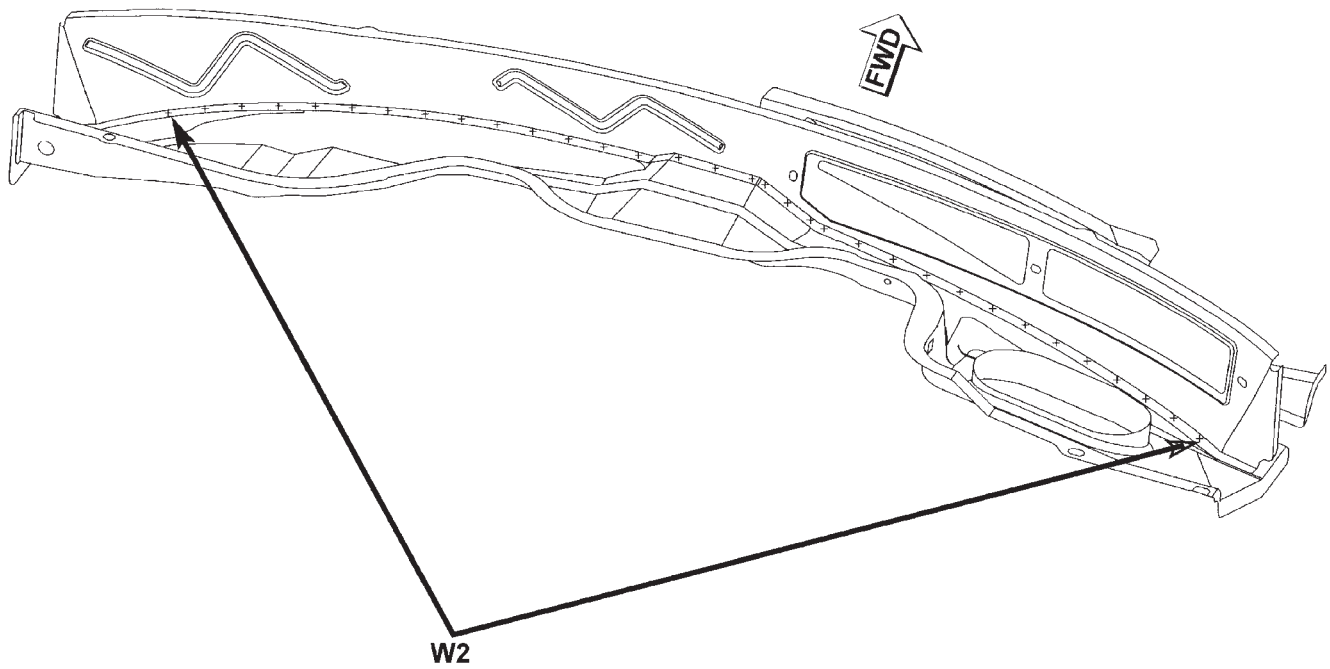


Fig. 40 ENGINE COMPARTMENT

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

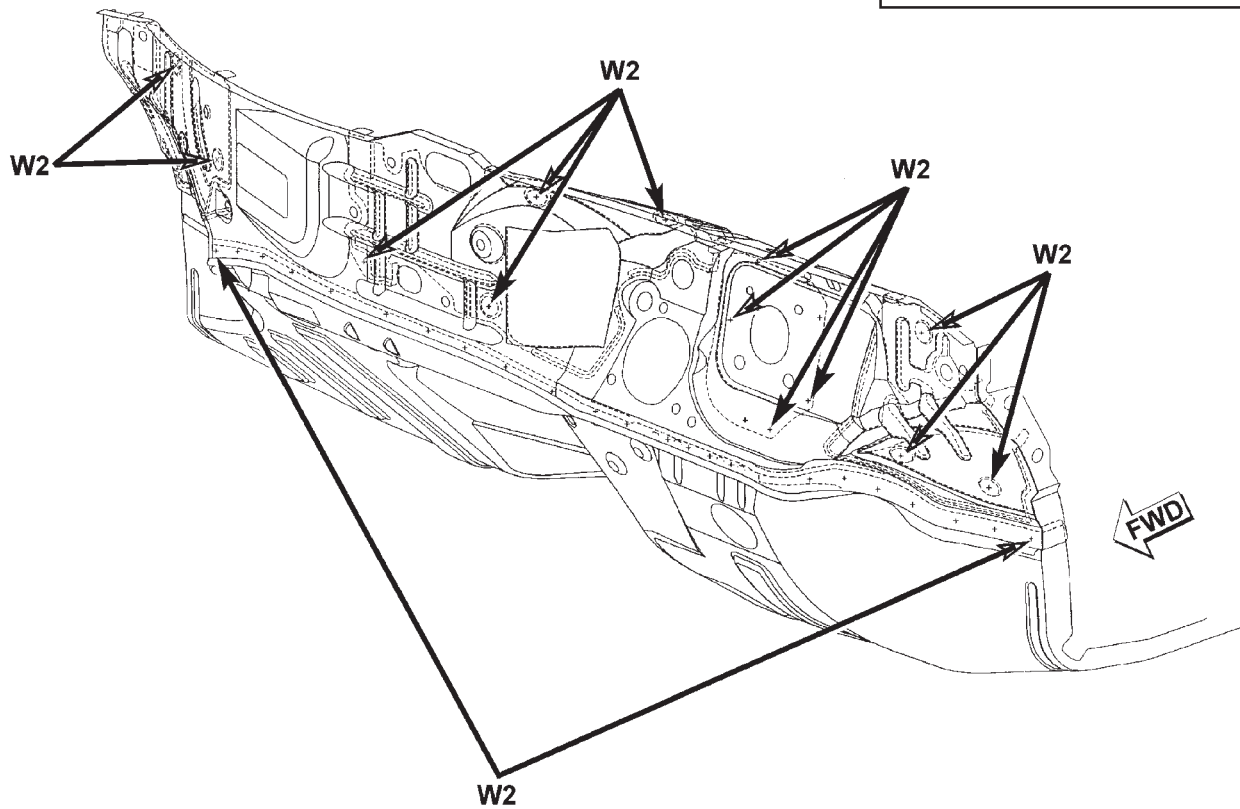
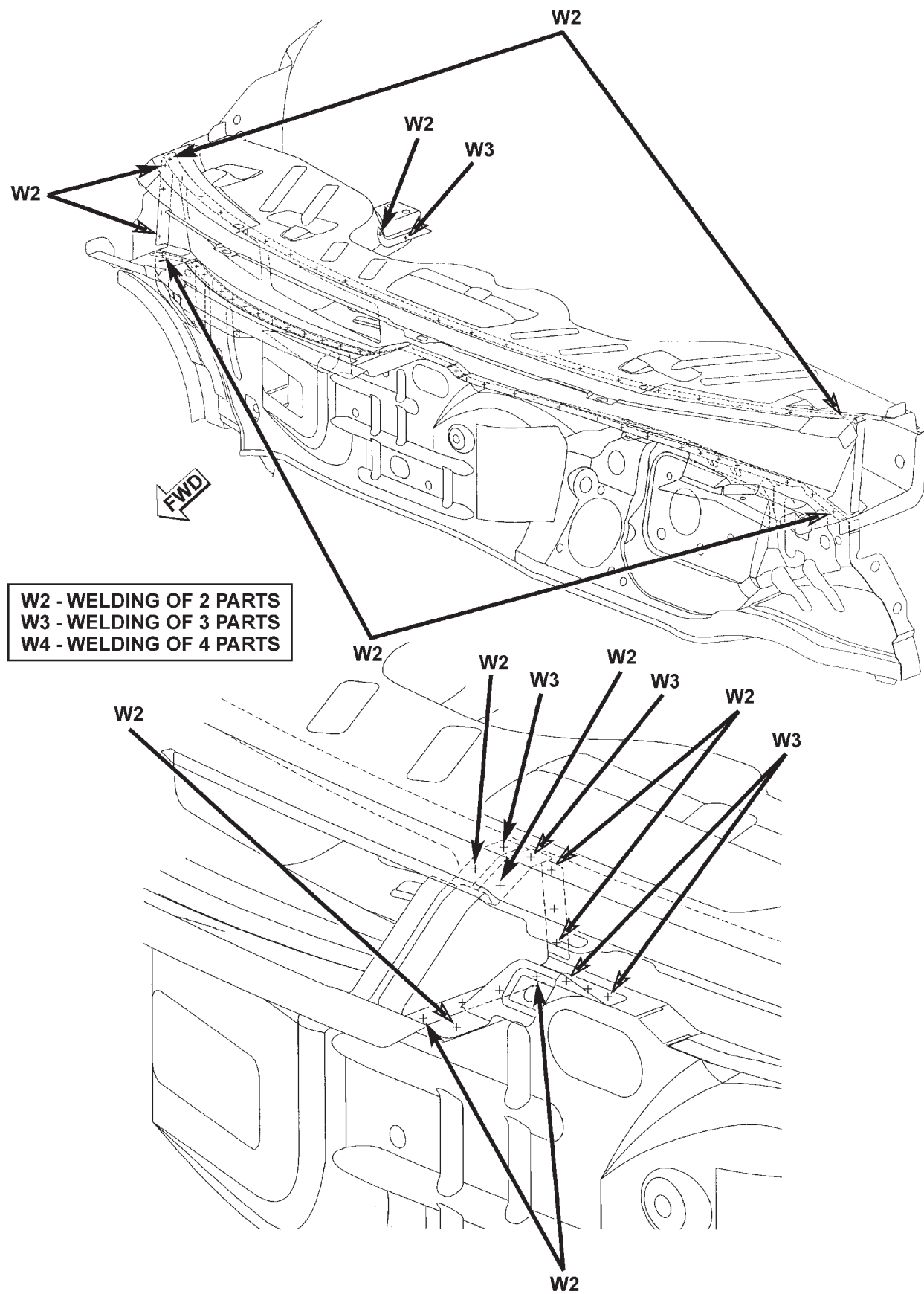


Fig. 41 DASH AND COWL

WELD LOCATIONS (Continued)



WELD LOCATIONS (Continued)



Fig. 43 DASH AND COWL

WELD LOCATIONS (Continued)

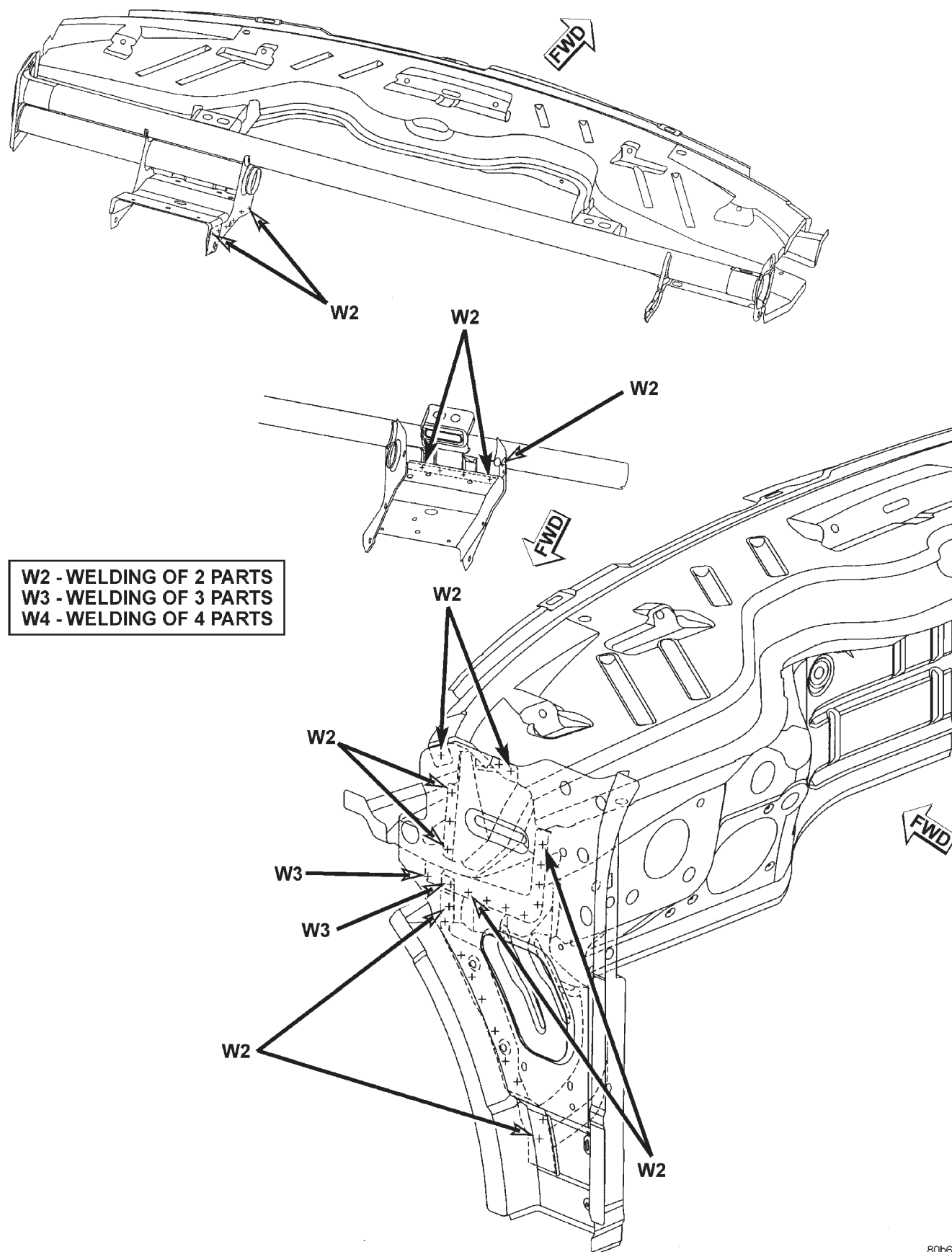
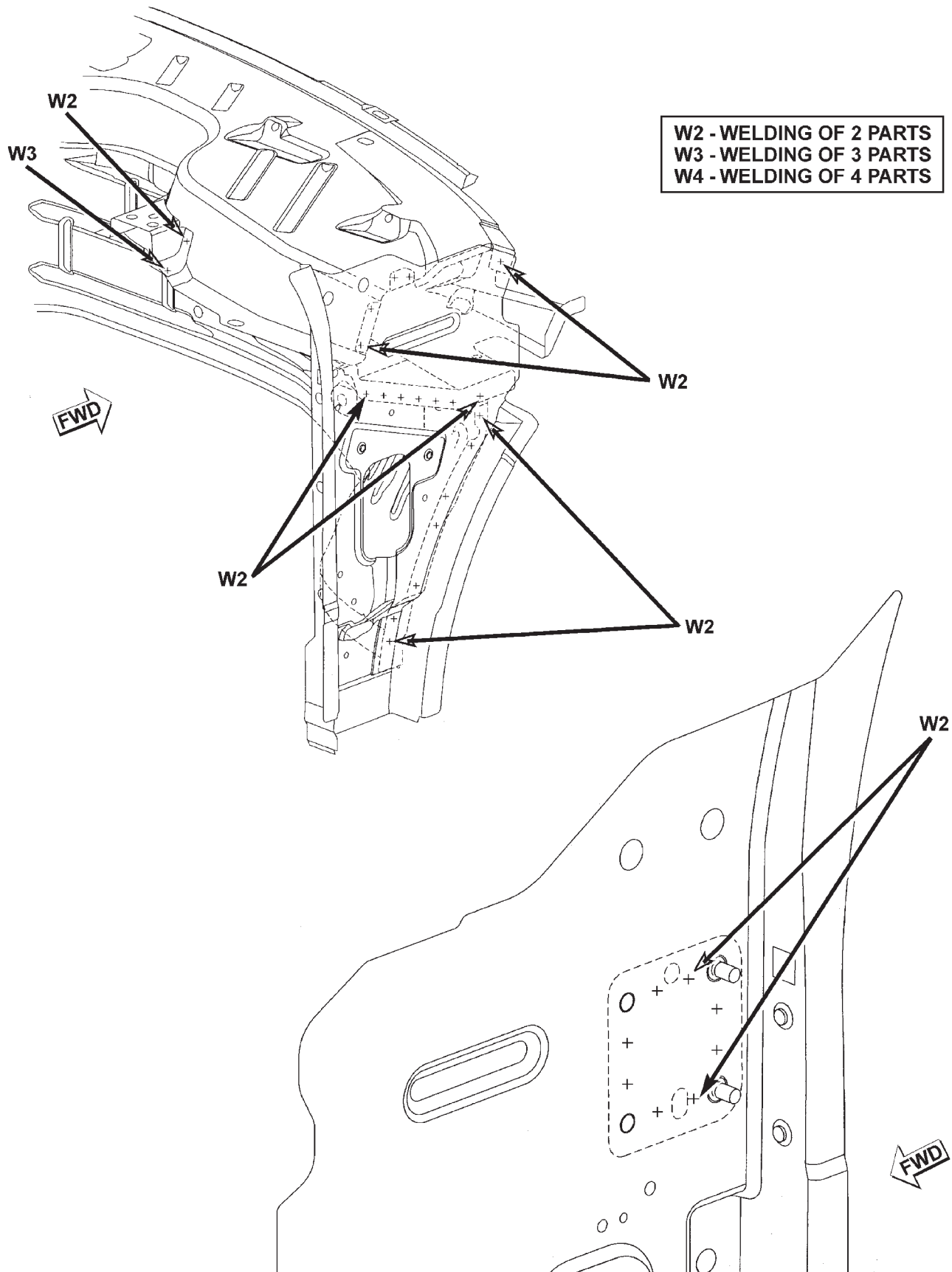


Fig. 44 DASH AND COWL

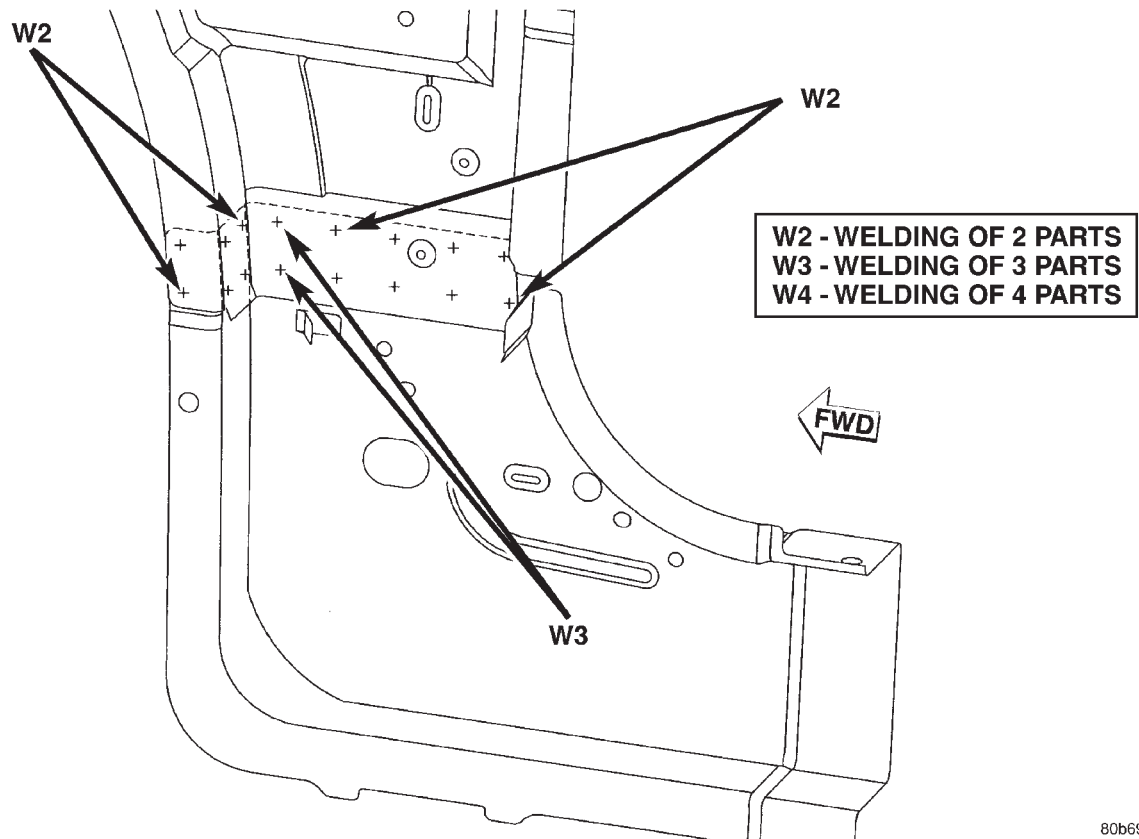
WELD LOCATIONS (Continued)



80b69778

Fig. 45 DASH AND COWL

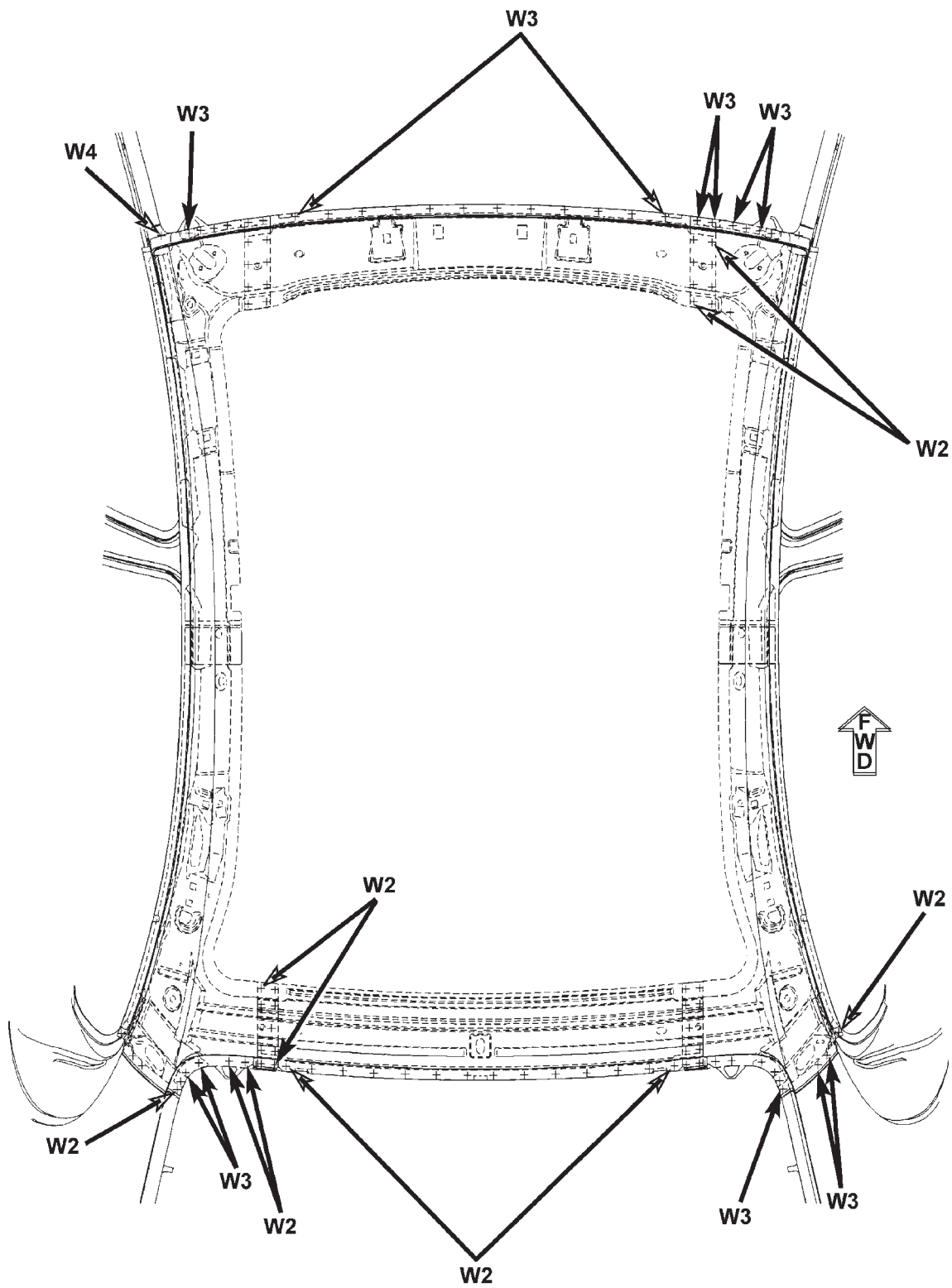
WELD LOCATIONS (Continued)



80b69779

Fig. 46 DASH AND COWL

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

CHRYSLER

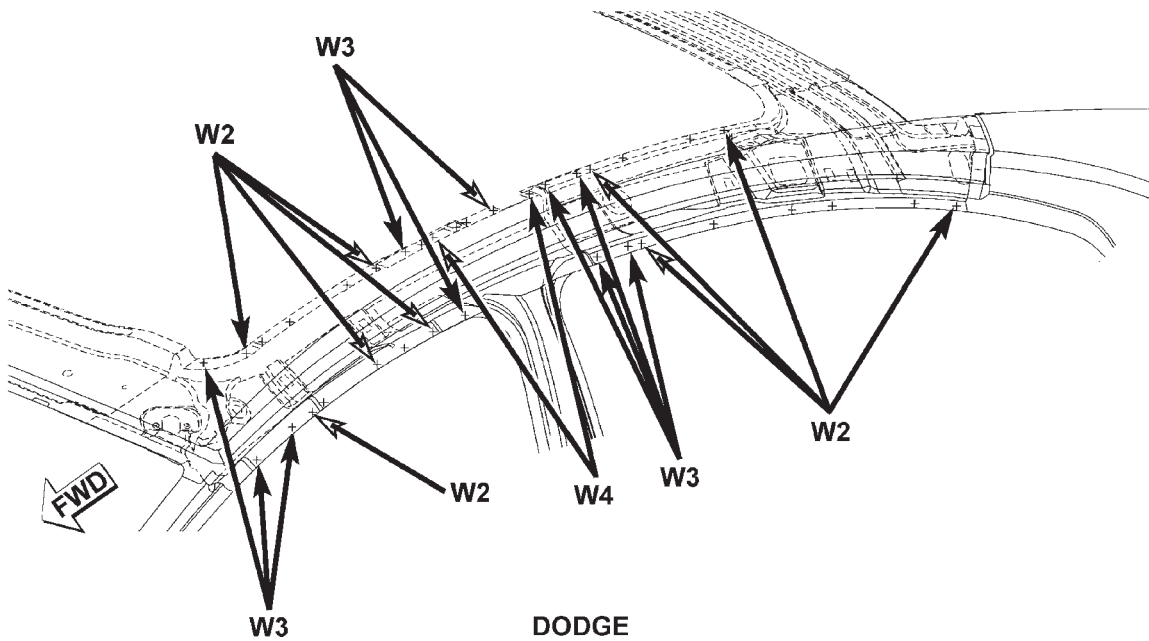
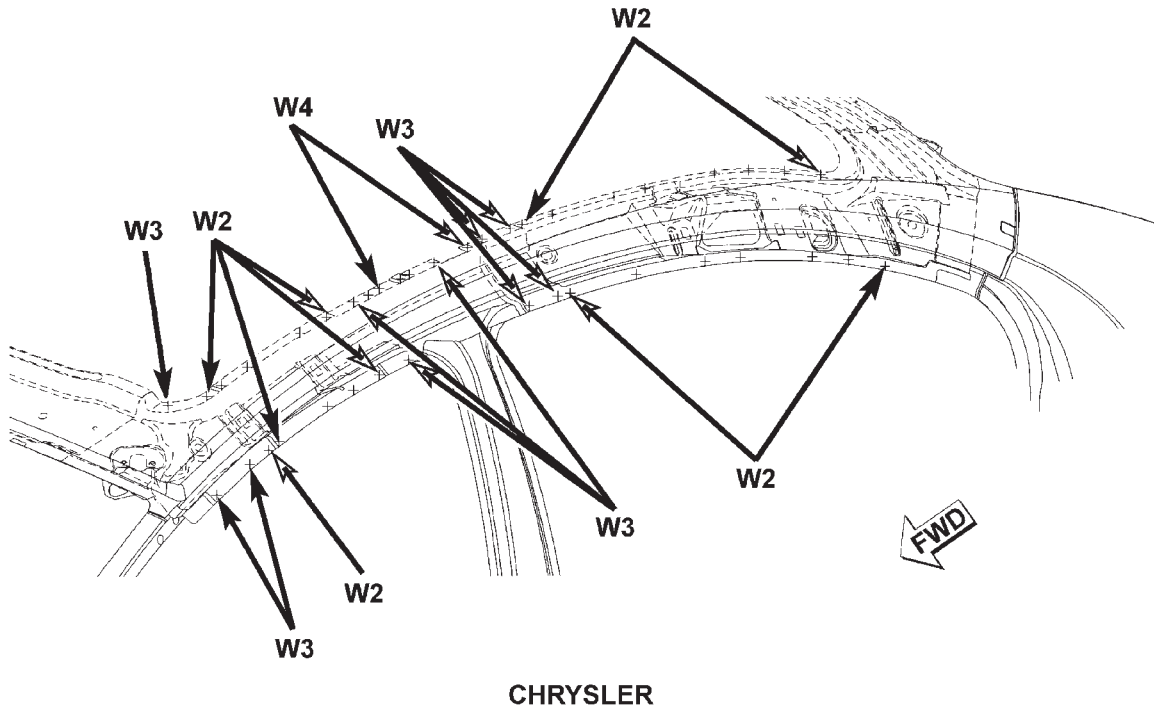
80b6977a

Fig. 47 ROOF PANEL AND ROOF BOWS

This technical drawing illustrates the structural layout of a ship's hull cross-section. The hull is represented by a rectangular frame with rounded corners. The structure is composed of several longitudinal and transverse members. The transverse members are labeled W2, and the longitudinal members are labeled W3. A forward direction indicator, labeled 'FWD', is shown on the right side of the hull, pointing towards the top of the drawing. The drawing also shows various structural details, including rivets, bolts, and internal stiffeners.

DODGE

WELD LOCATIONS (Continued)



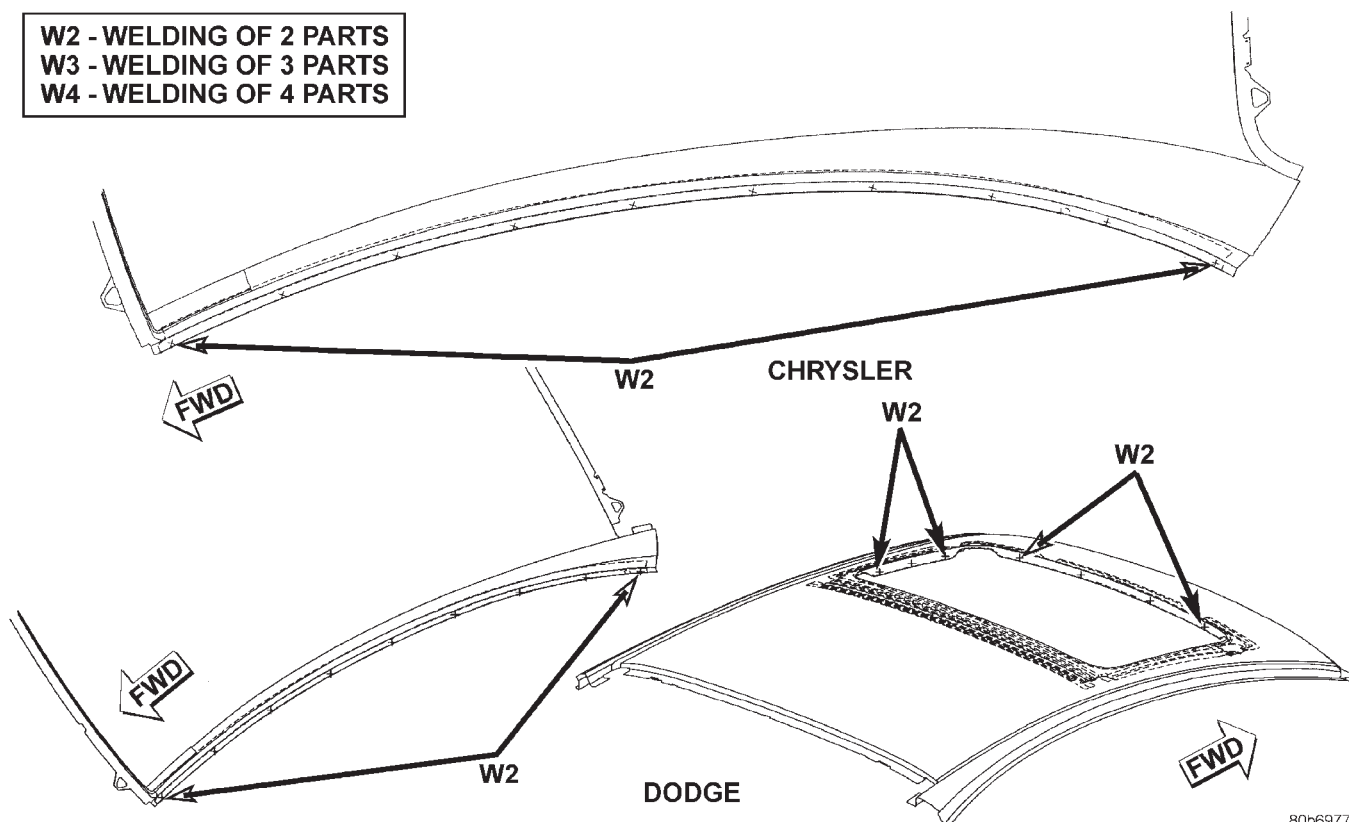
W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

80b6977e

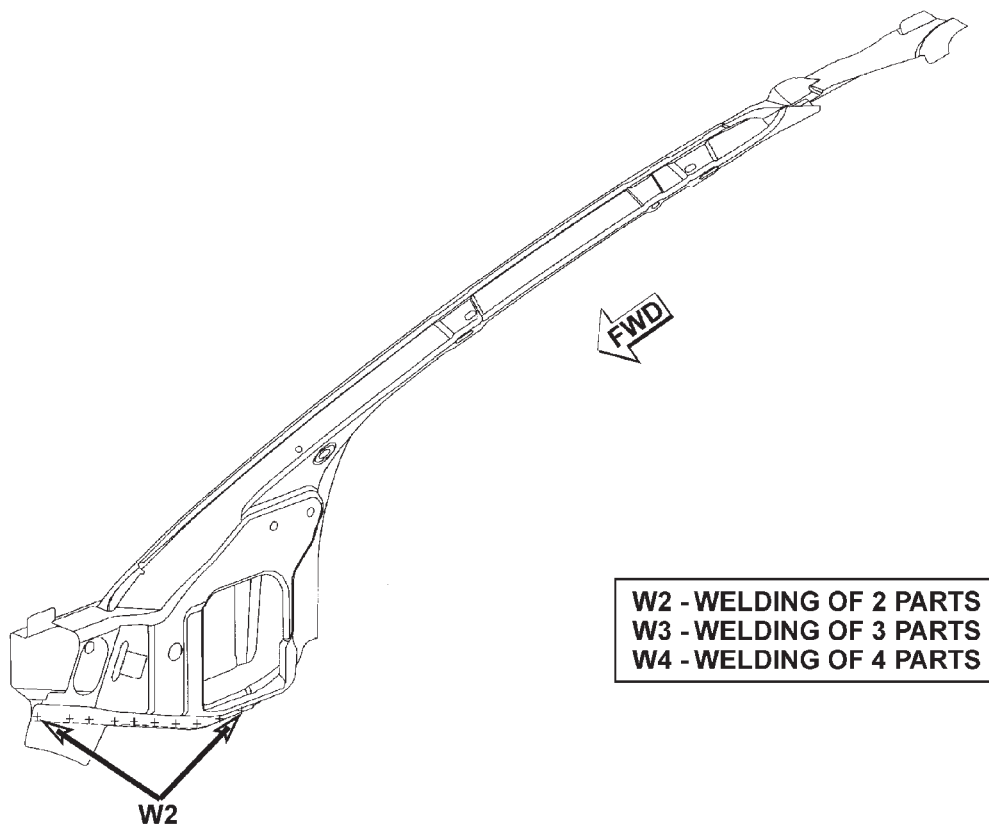
Fig. 49 ROOF PANEL AND ROOF BOWS

WELD LOCATIONS (Continued)

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS



80b6977f

Fig. 50 ROOF PANEL AND ROOF BOWS

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

80b69780

Fig. 51 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

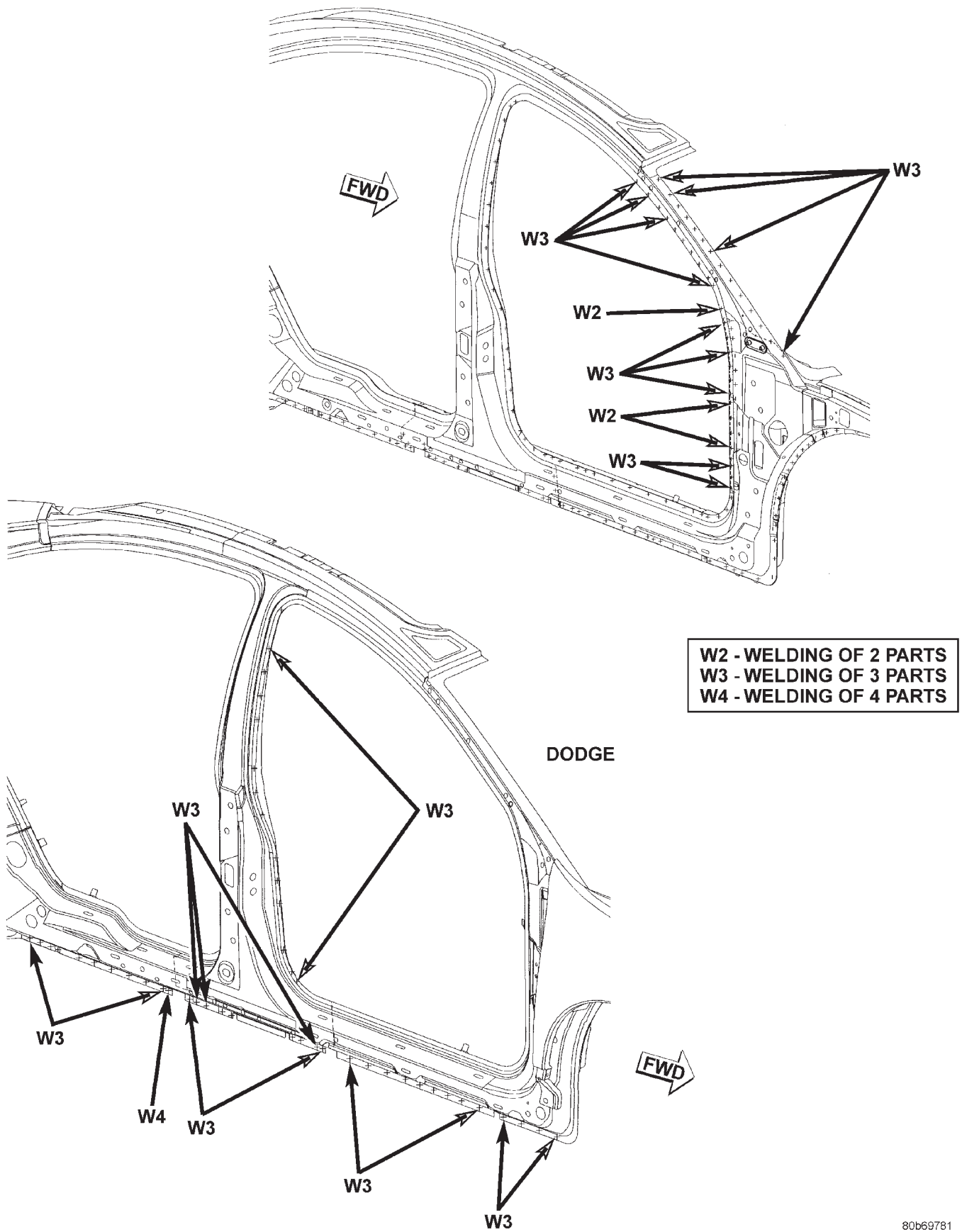


Fig. 52 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

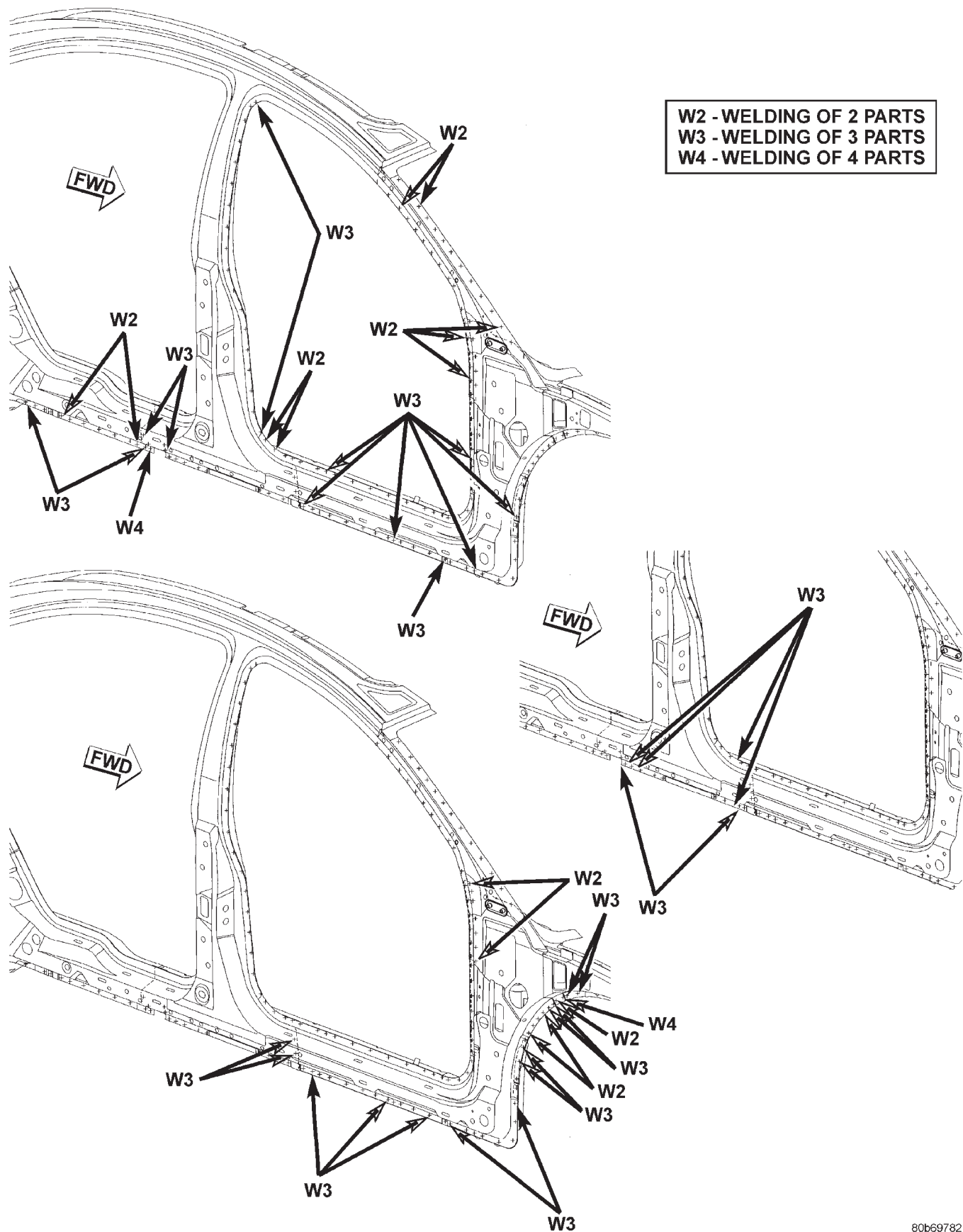


Fig. 53 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

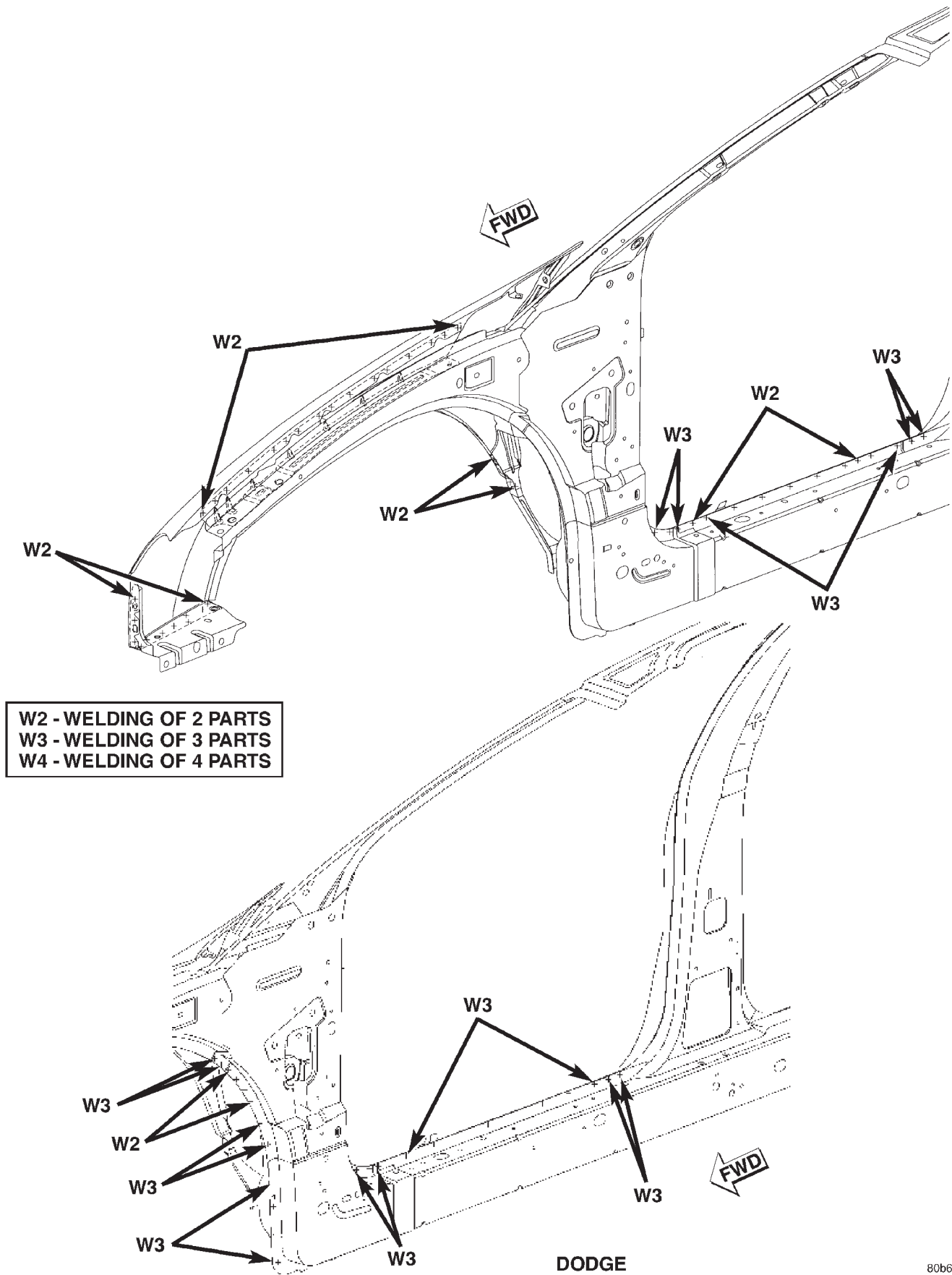
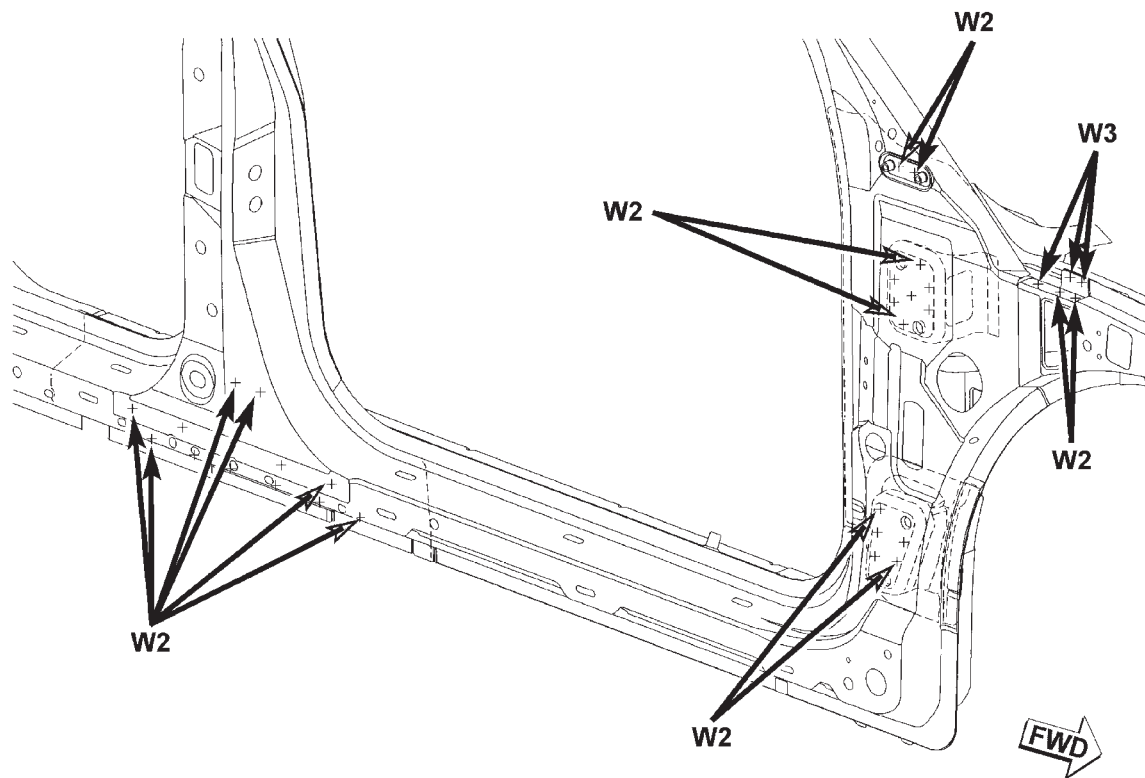


Fig. 54 BODY SIDE APERTURE

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

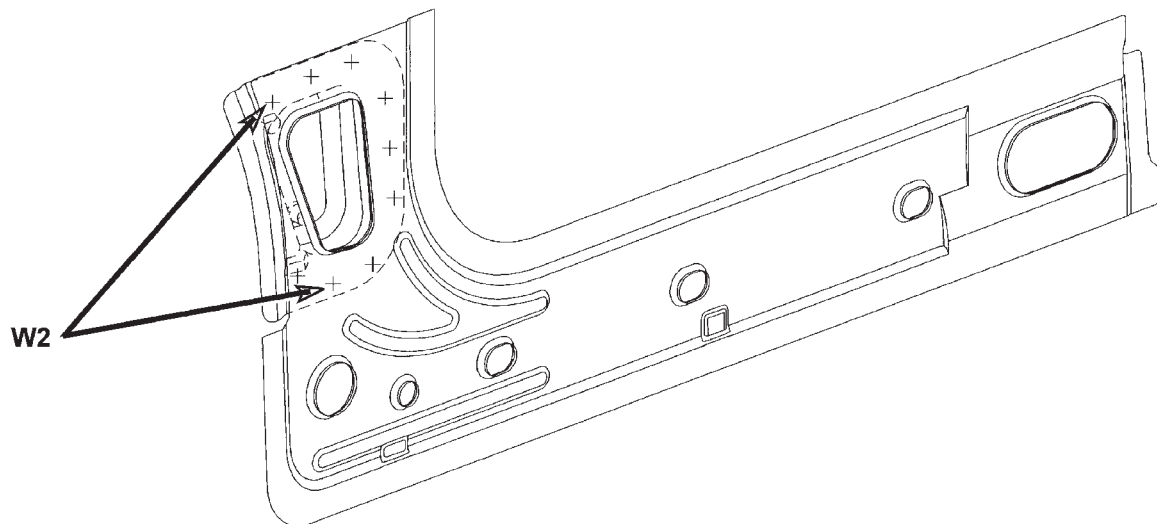


Fig. 55 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

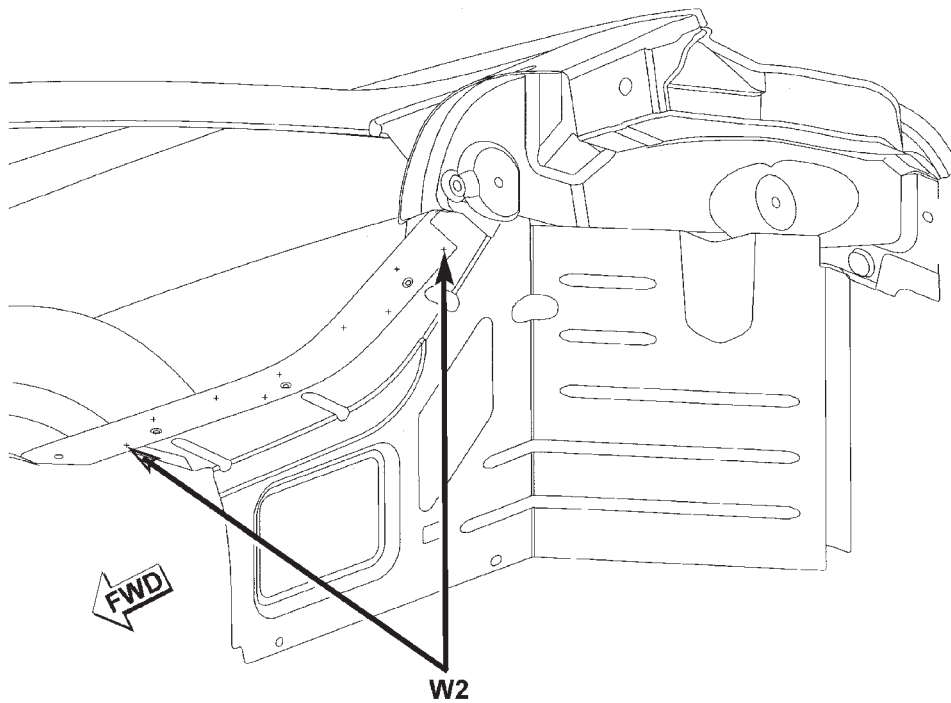
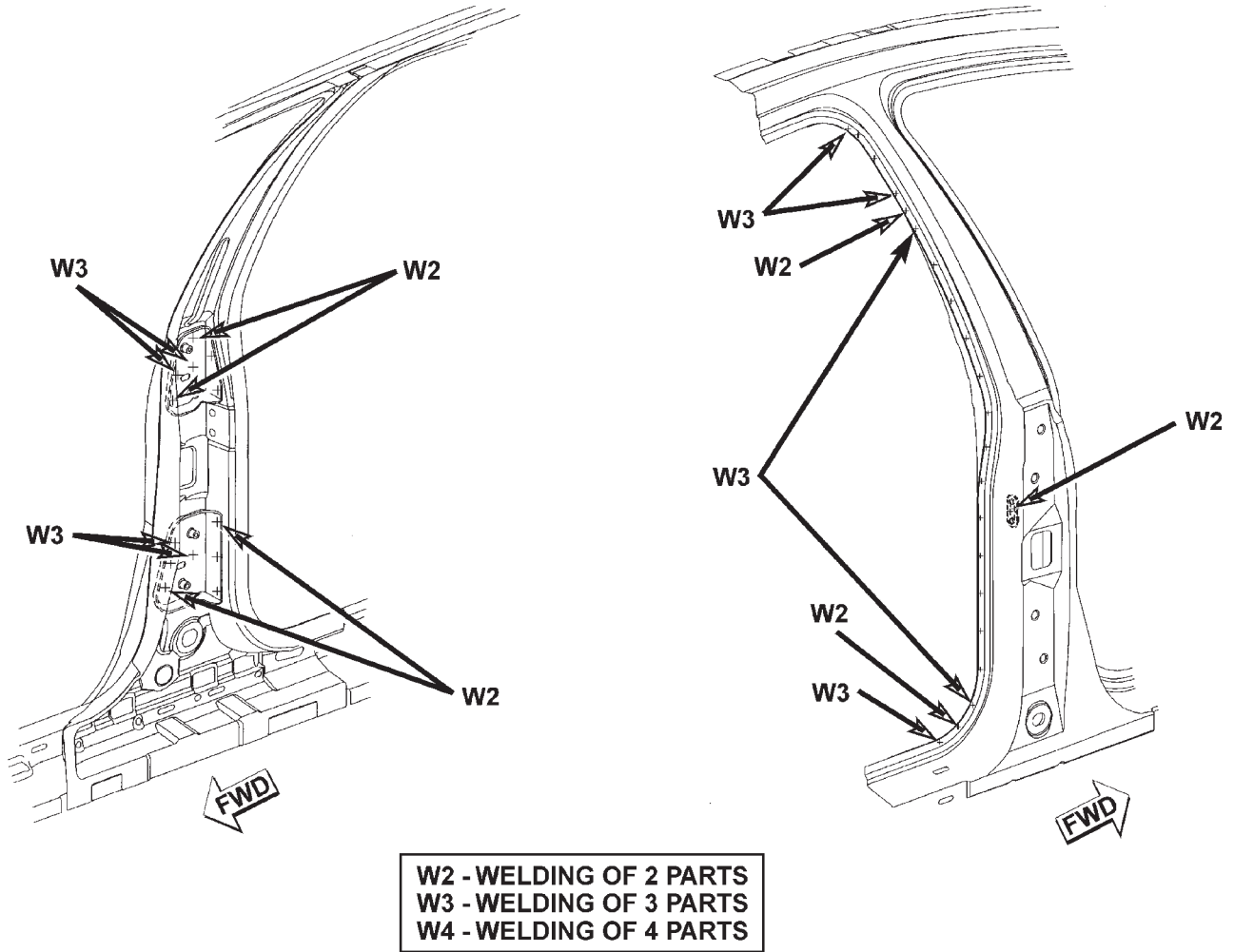


Fig. 56 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

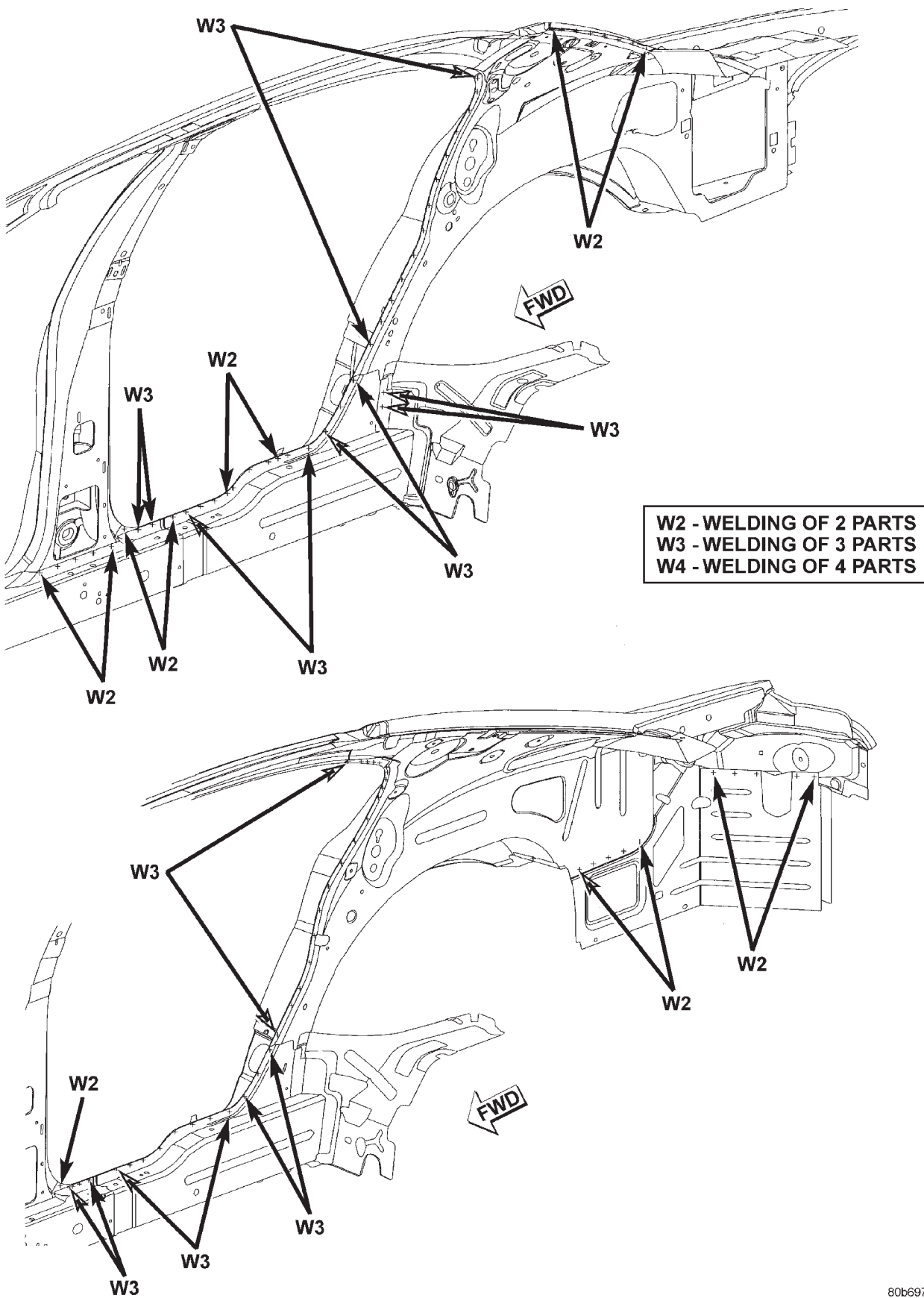


Fig. 57 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

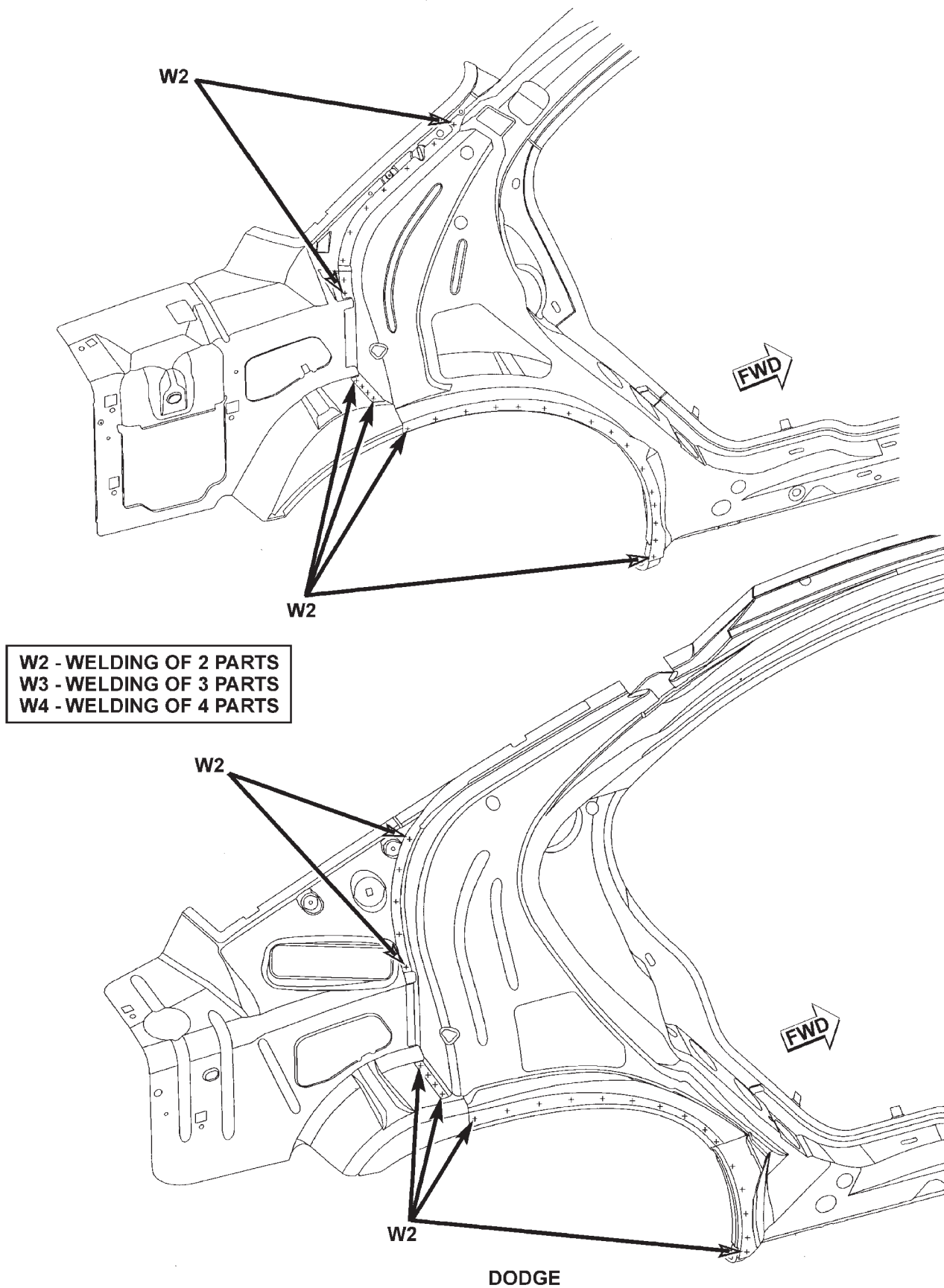
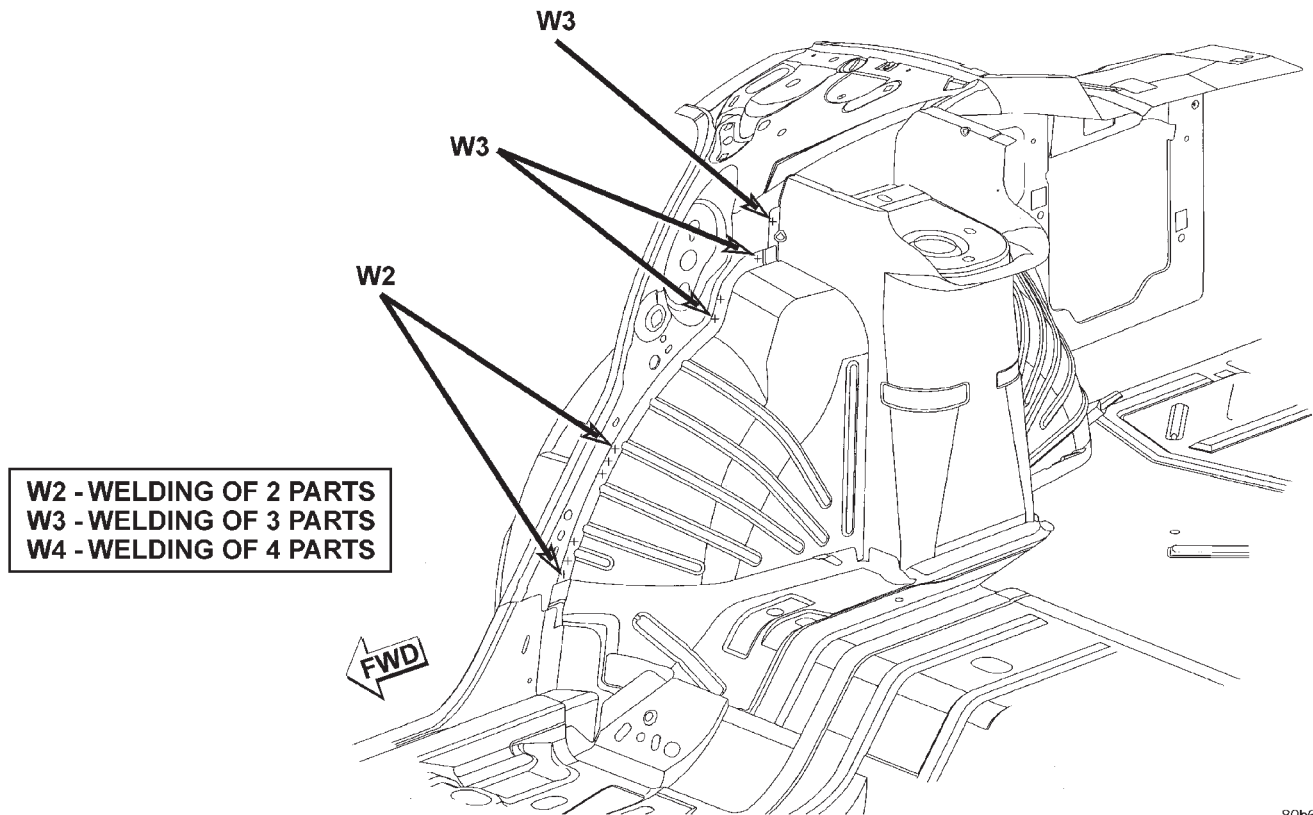
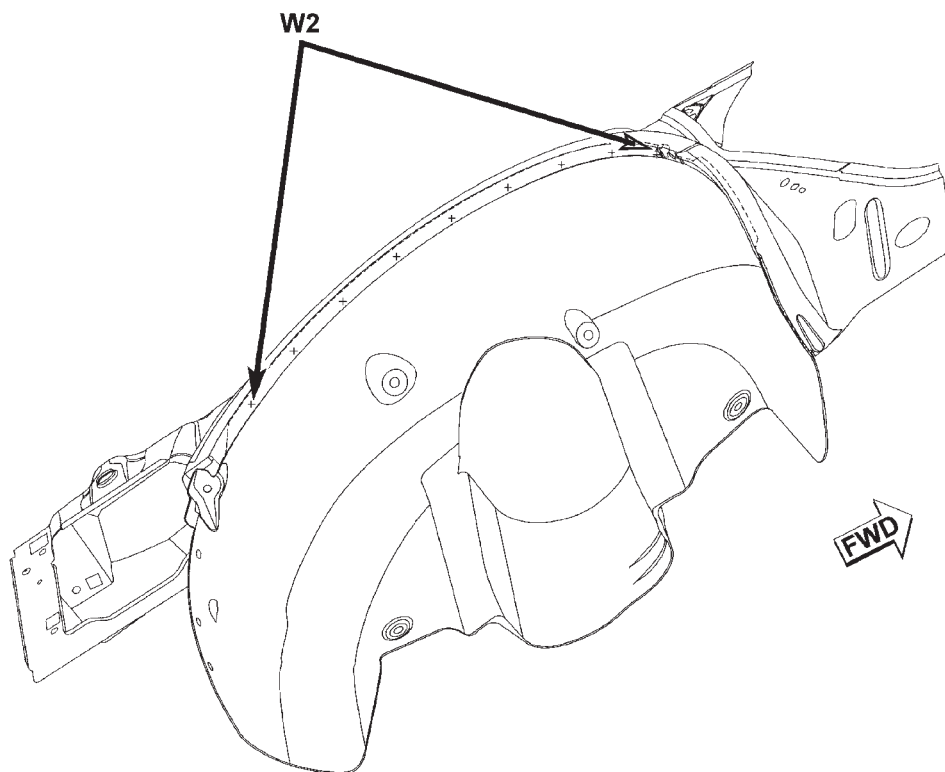


Fig. 58 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

**Fig. 59 BODY SIDE APERTURE**

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

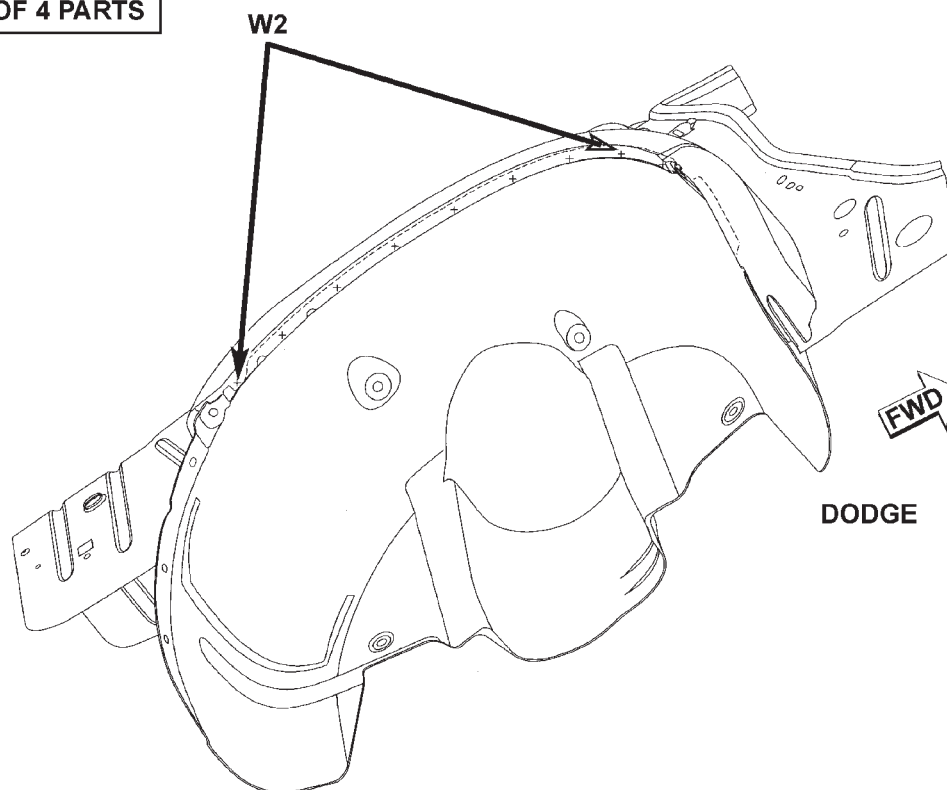
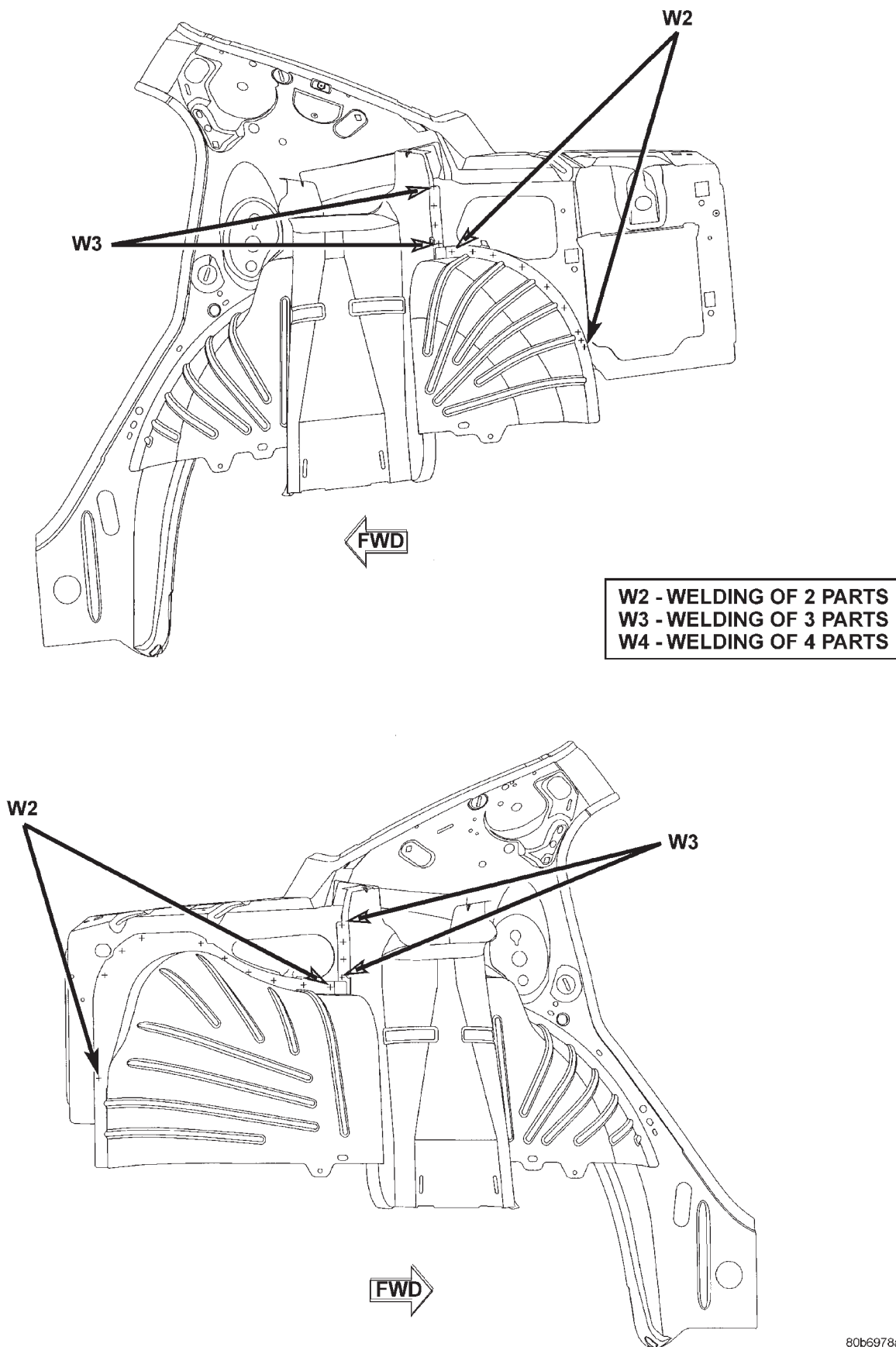


Fig. 60 BODY SIDE APERTURE

WELD LOCATIONS (Continued)



80b6978a

Fig. 61 BODY SIDE APERTURE

WELD LOCATIONS (Continued)

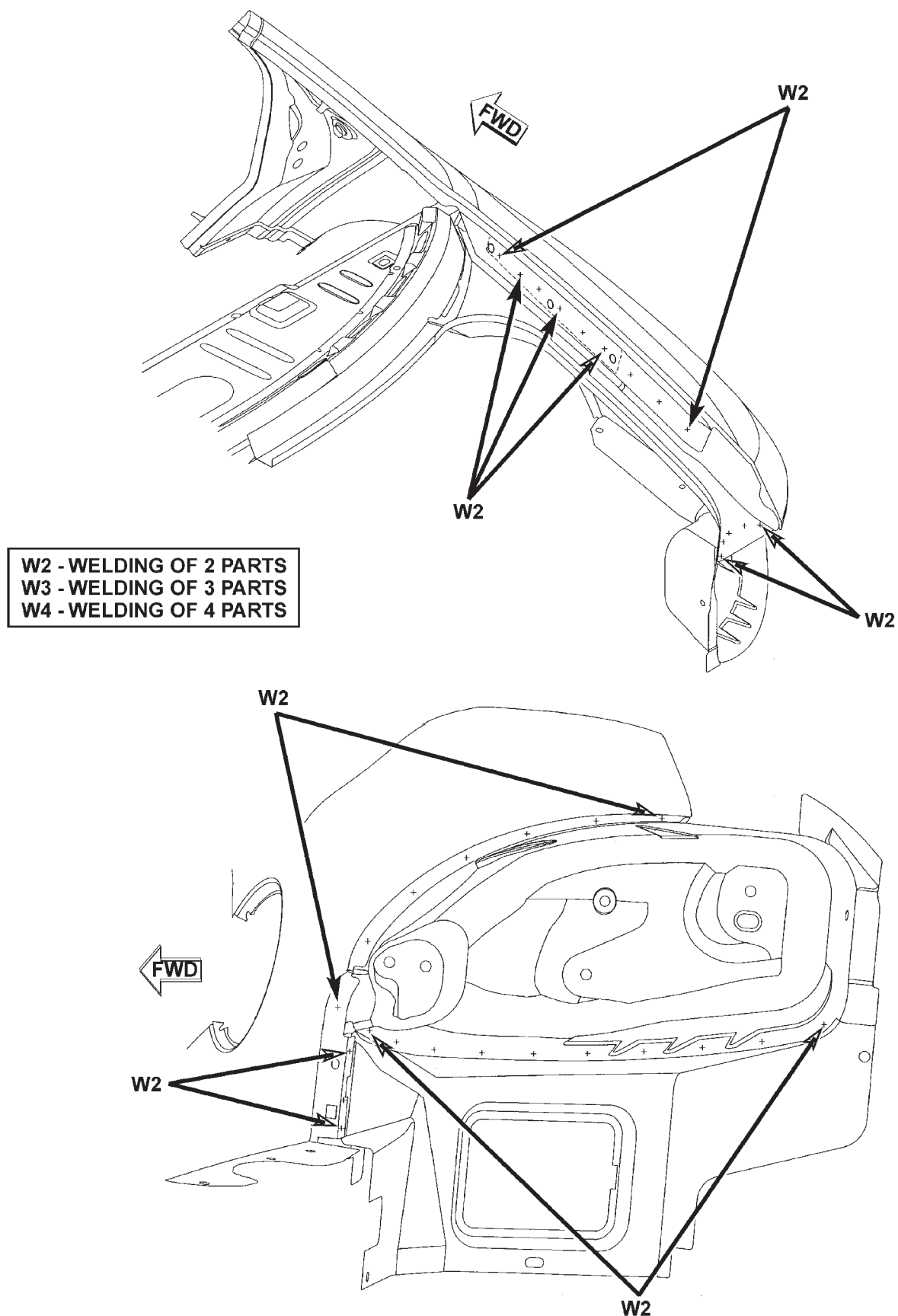
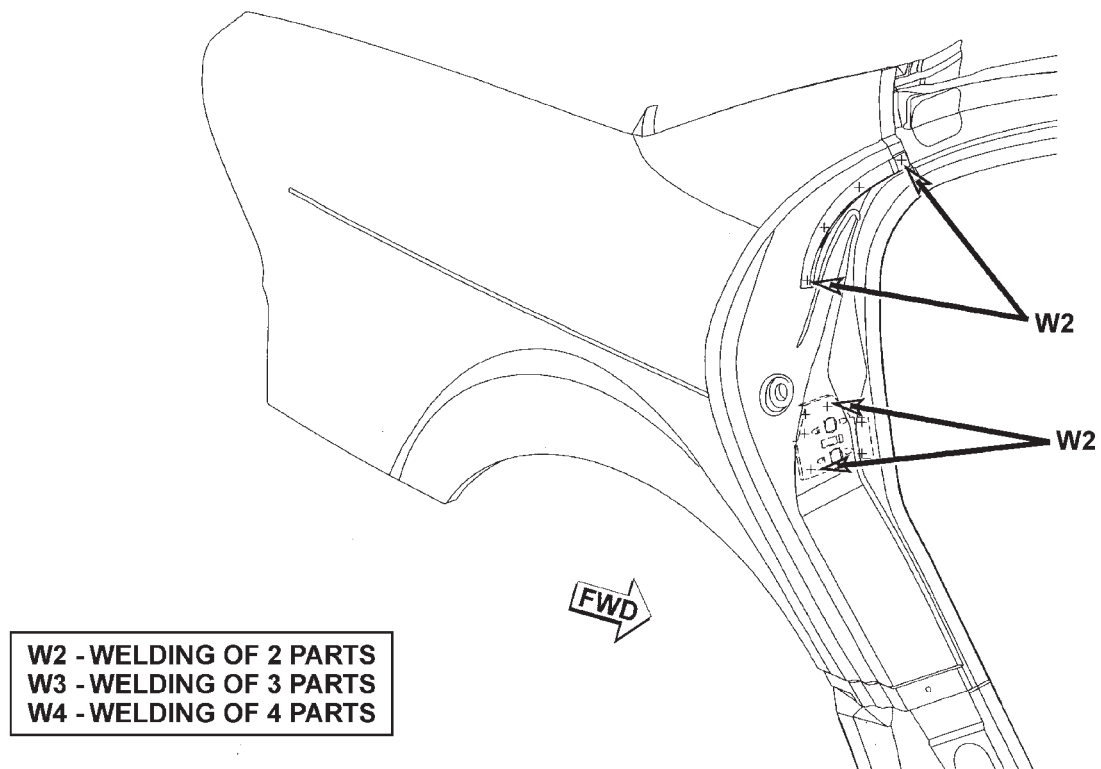


Fig. 62 BODY SIDE APERTURE

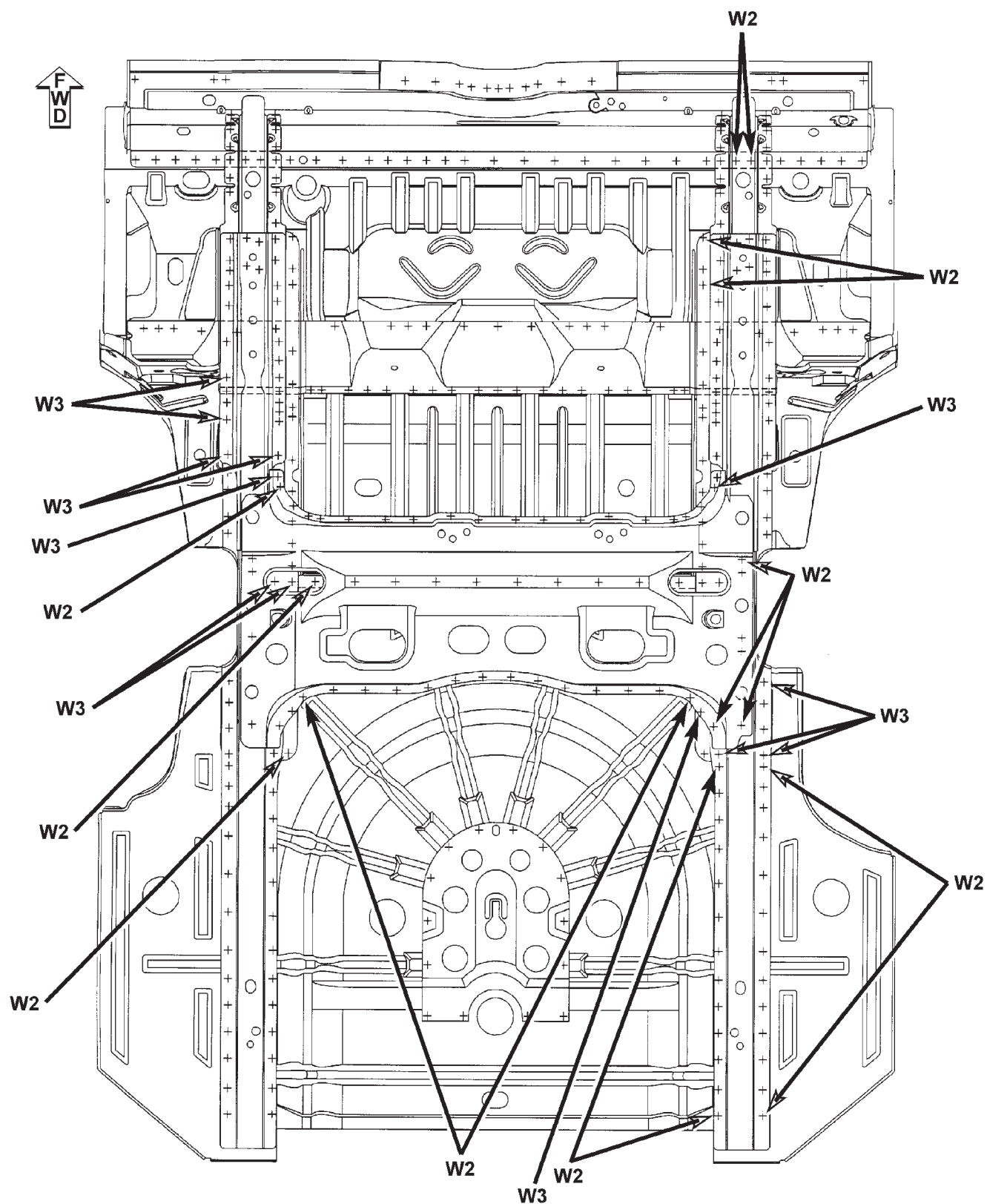
WELD LOCATIONS (Continued)



80b6978c

Fig. 63 BODY SIDE APERTURE

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

Fig. 64 FLOOR PAN

WELD LOCATIONS (Continued)

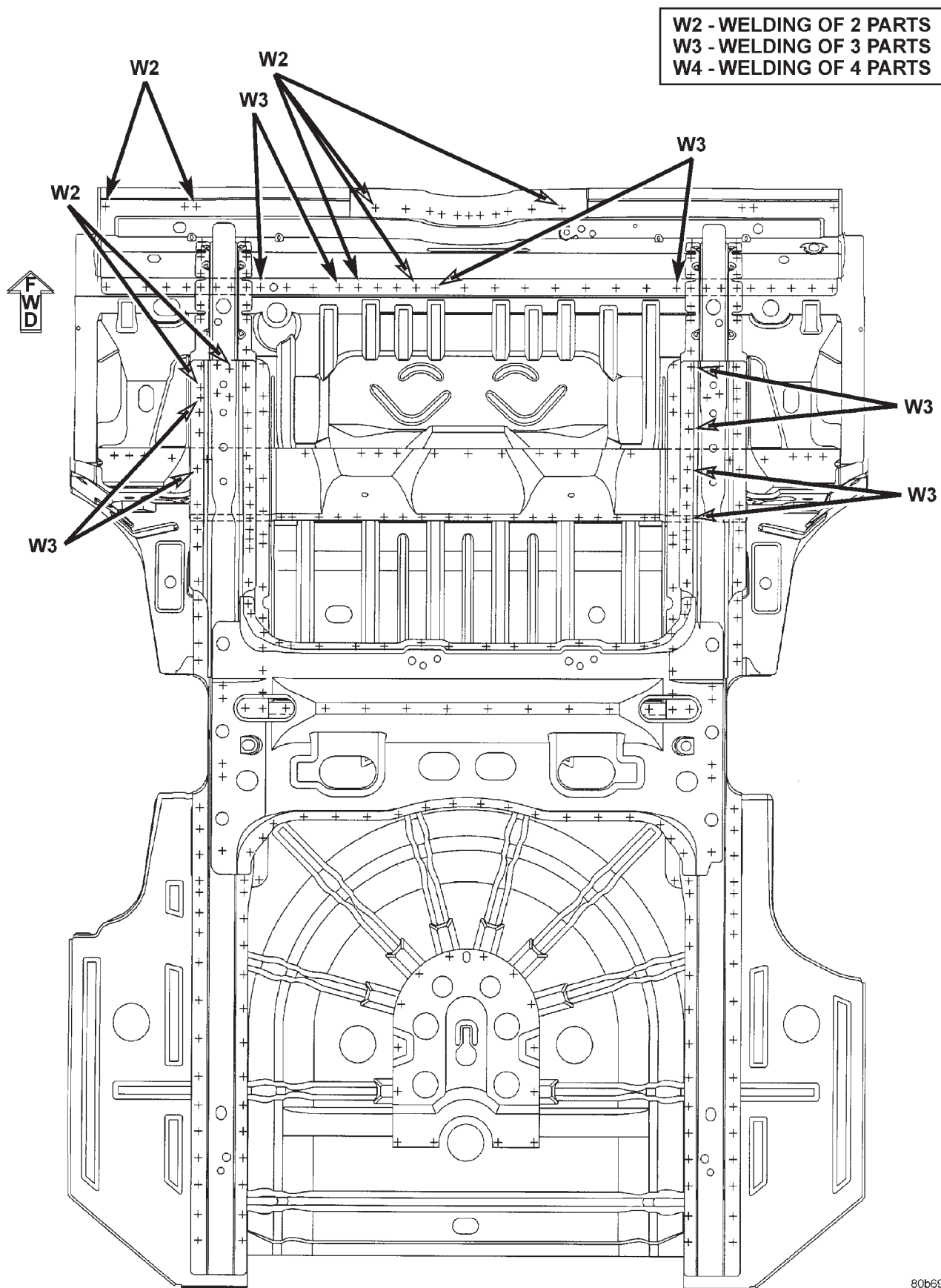


Fig. 65 FLOOR PAN

WELD LOCATIONS (Continued)

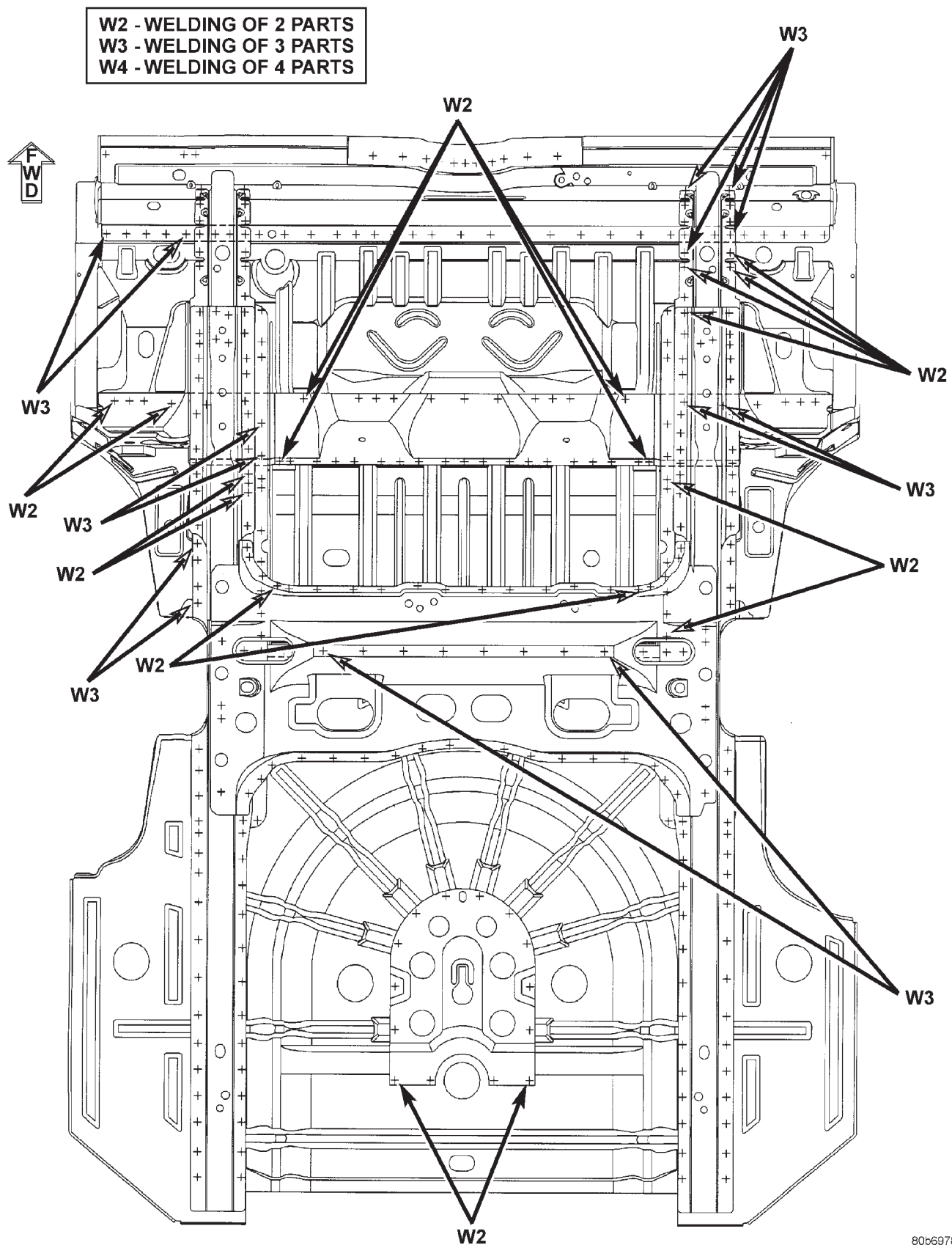
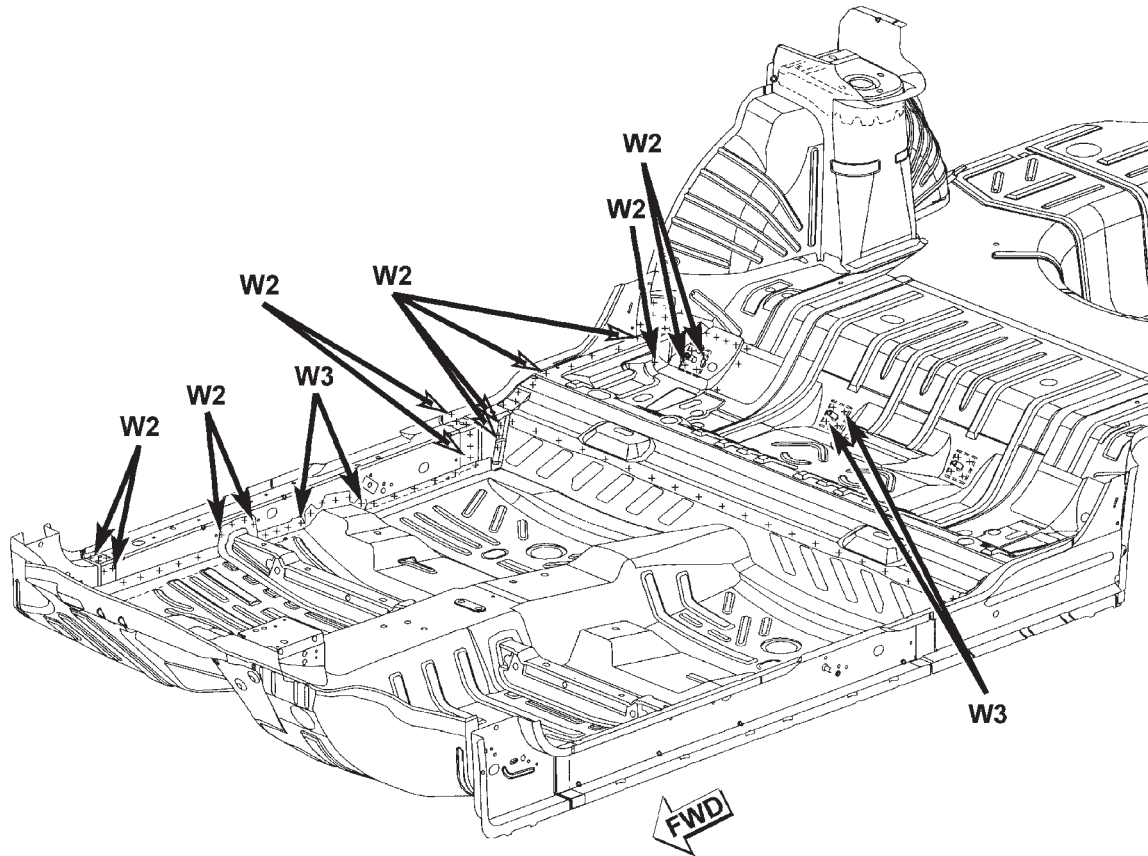


Fig. 66 FLOOR PAN

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

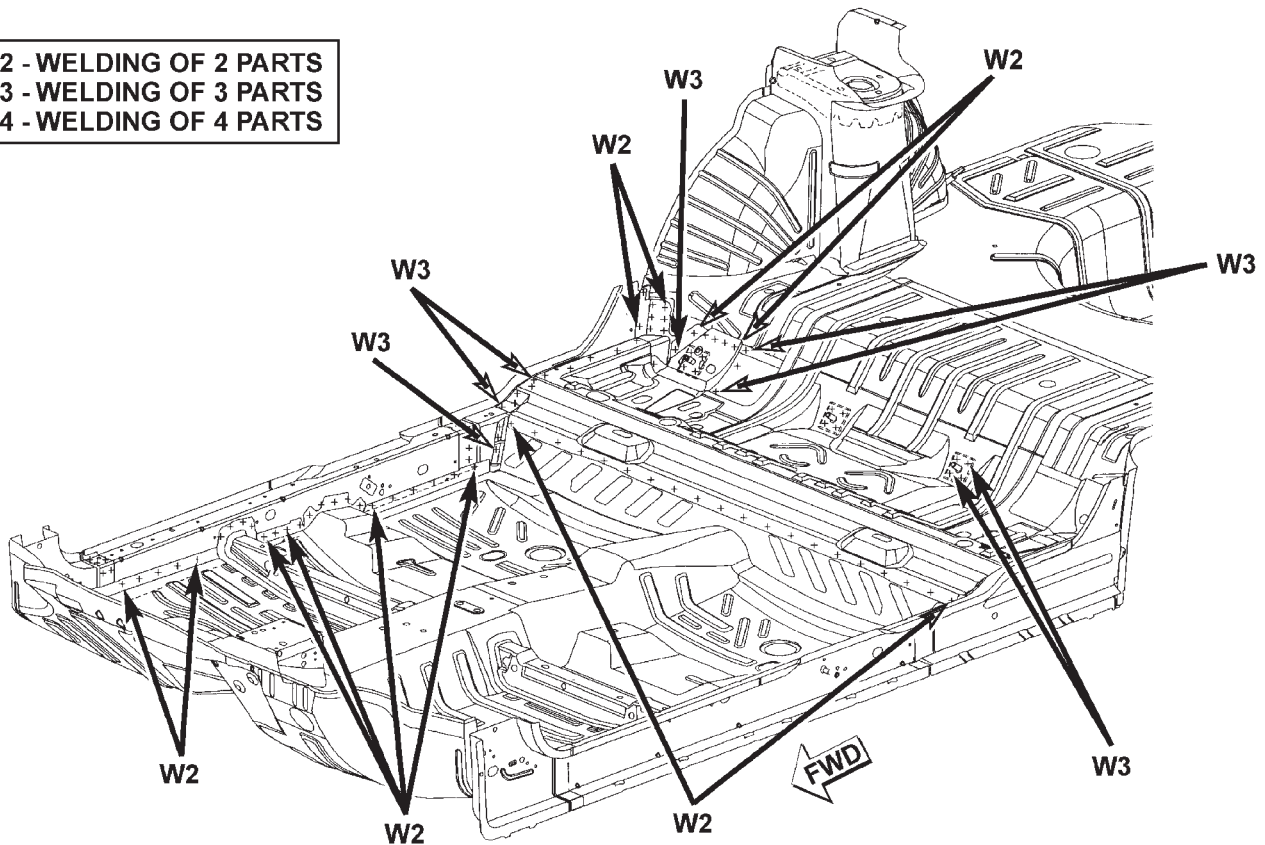
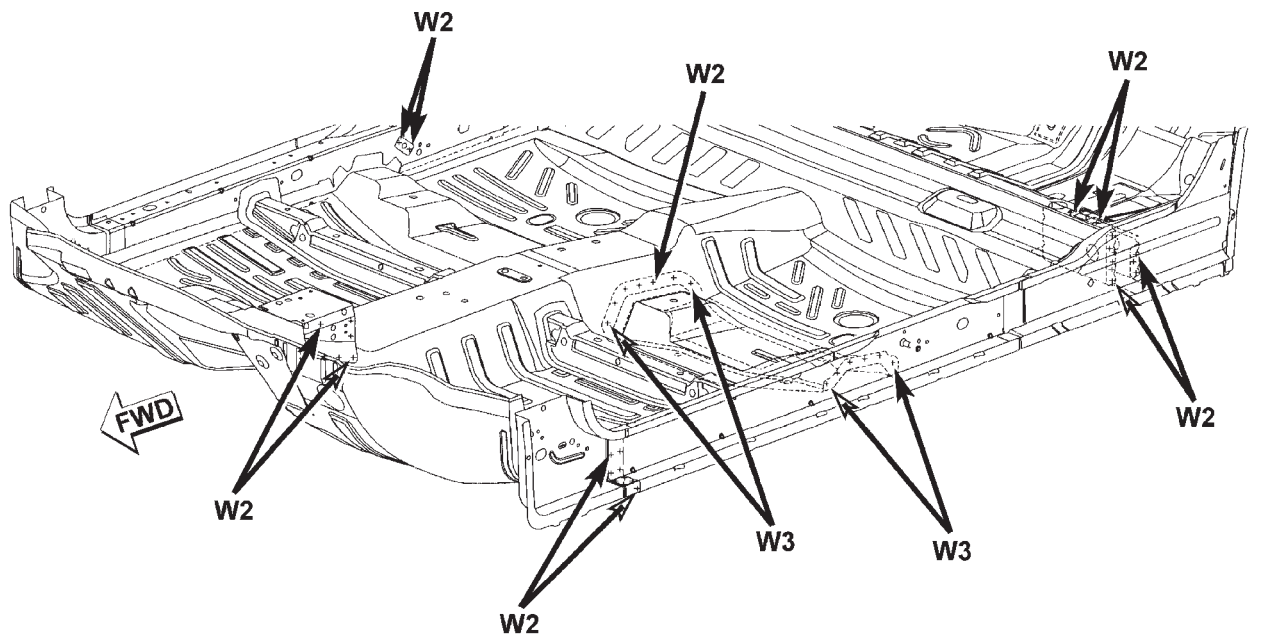


Fig. 67 FLOOR PAN

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

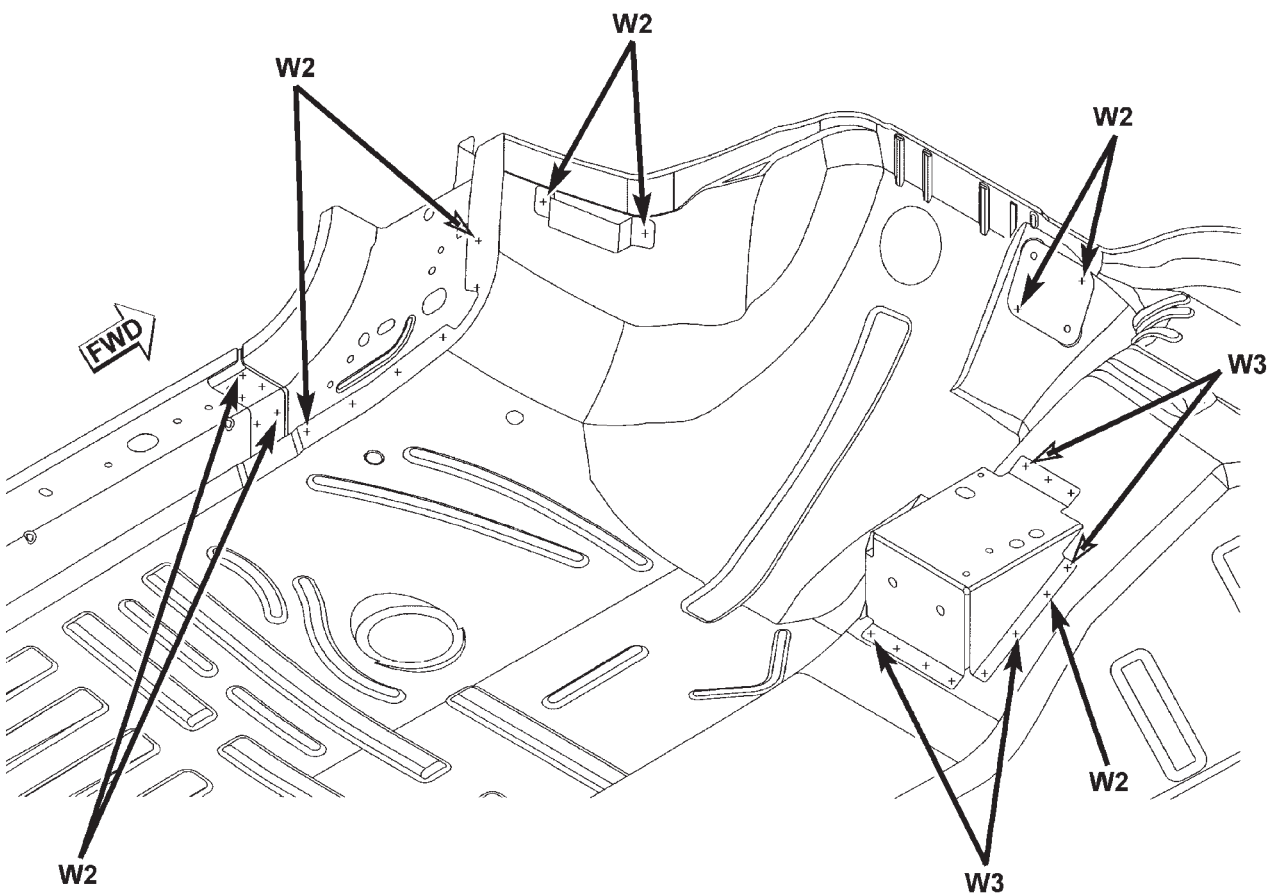


Fig. 68 FLOOR PAN

Diagram illustrating the W2 welding sequence on the rear cross-member. The diagram shows the rear cross-member with various weld points marked by '+' symbols. Arrows indicate the welding sequence, starting from the center and moving outwards. A label 'W2' is placed near the start of the sequence. A 'FWD' arrow points towards the front of the vehicle.

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

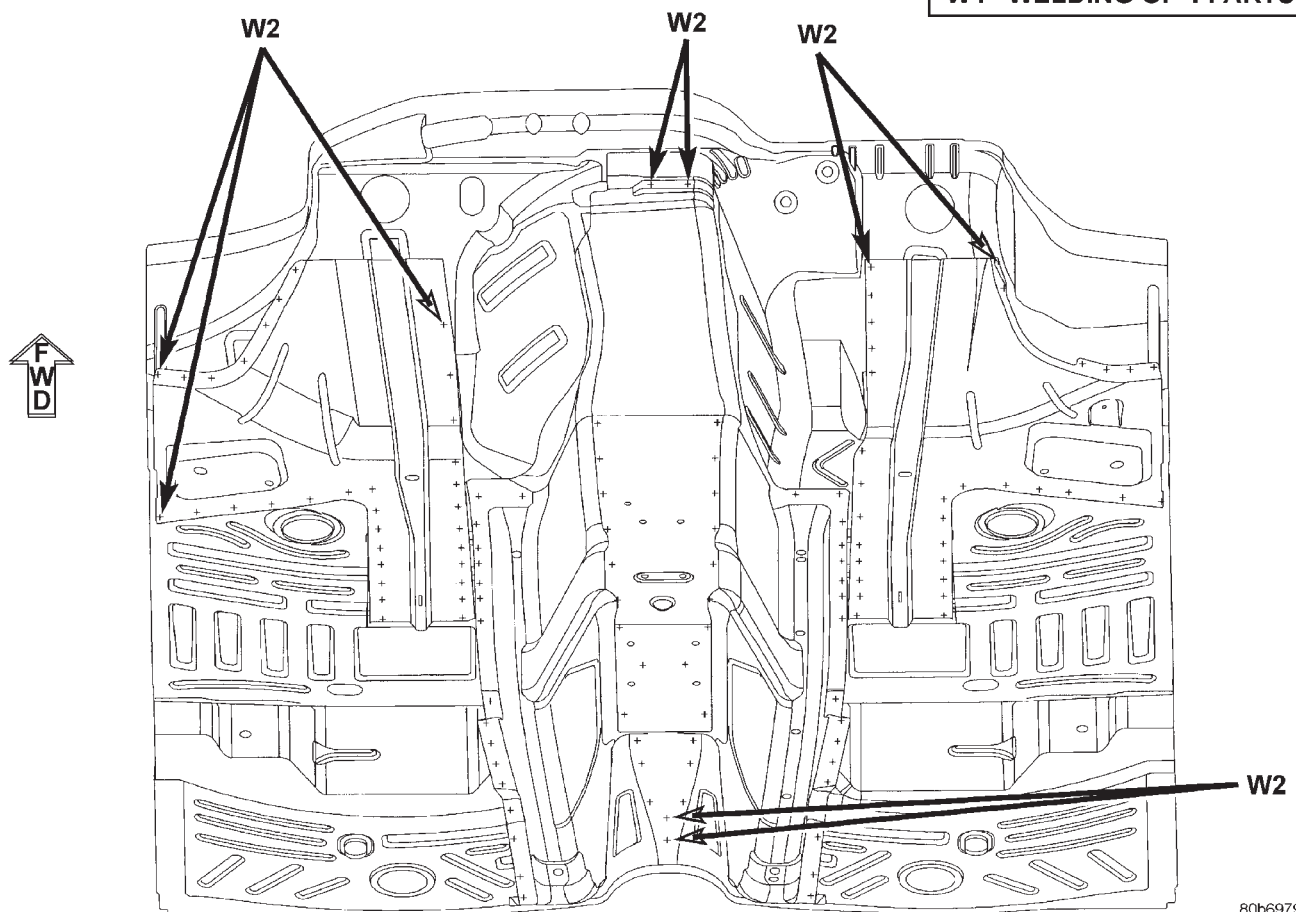
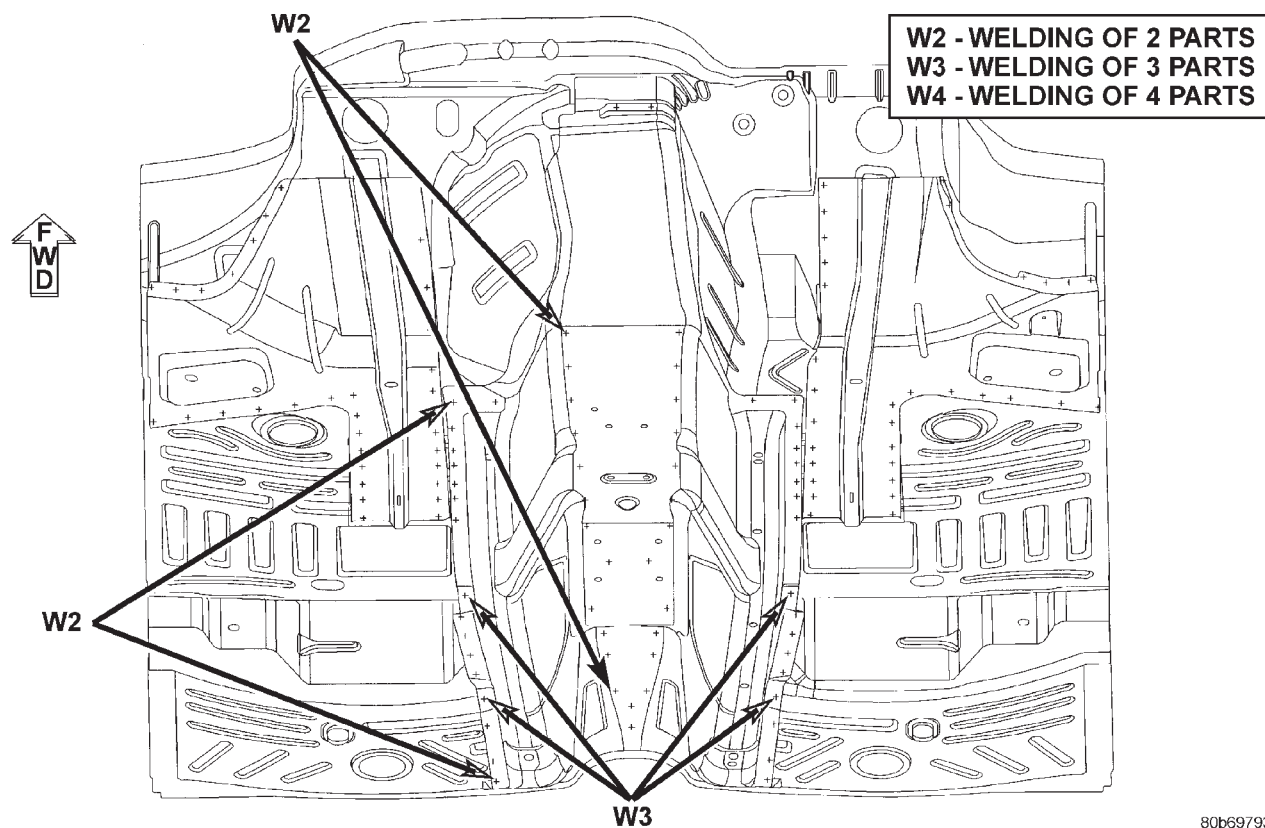


Fig. 69 FLOOR PAN

80b69792

WELD LOCATIONS (Continued)



80b69793

Fig. 70 FLOOR PAN

WELD LOCATIONS (Continued)

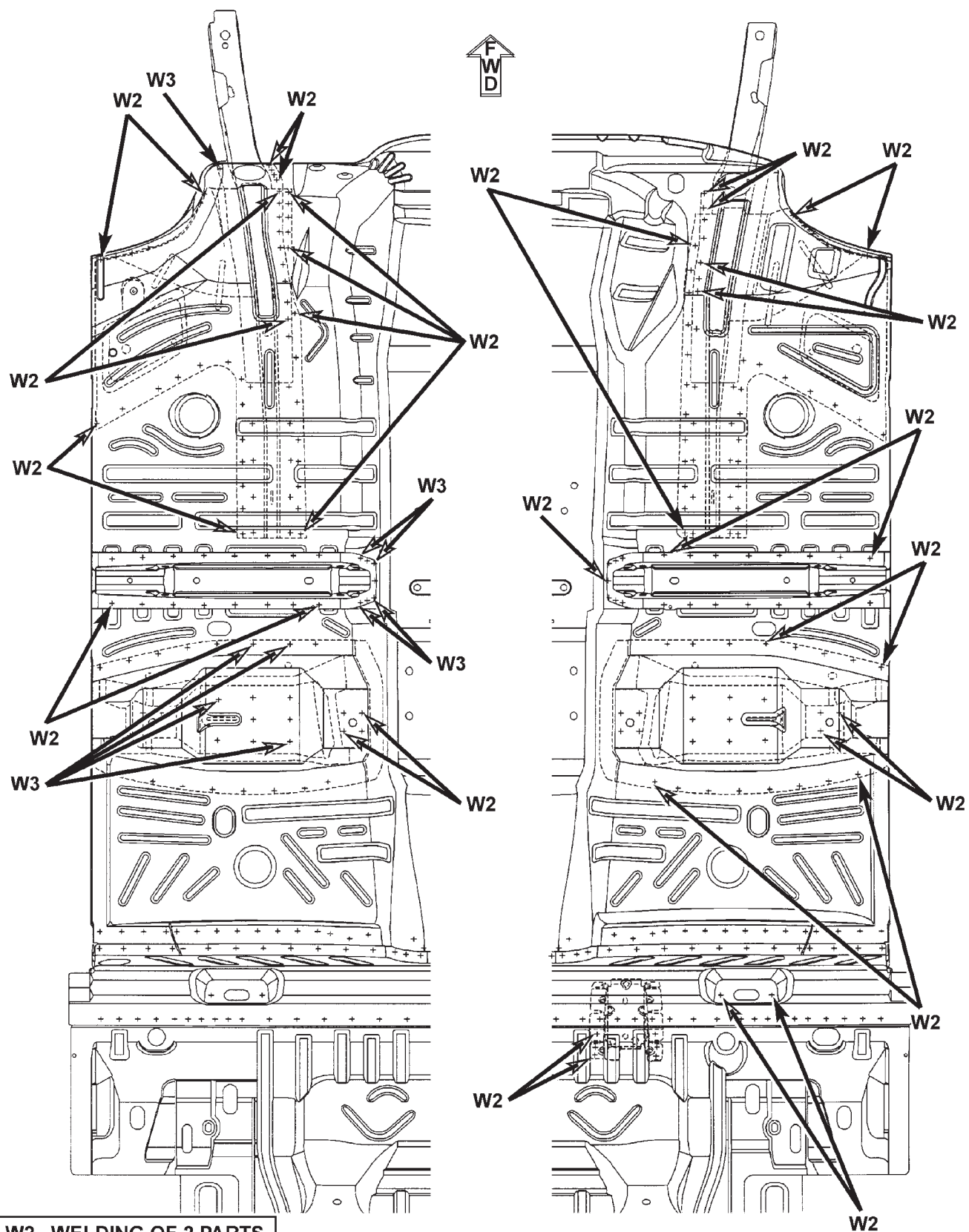


Fig. 71 FLOOR PAN

WELD LOCATIONS (Continued)

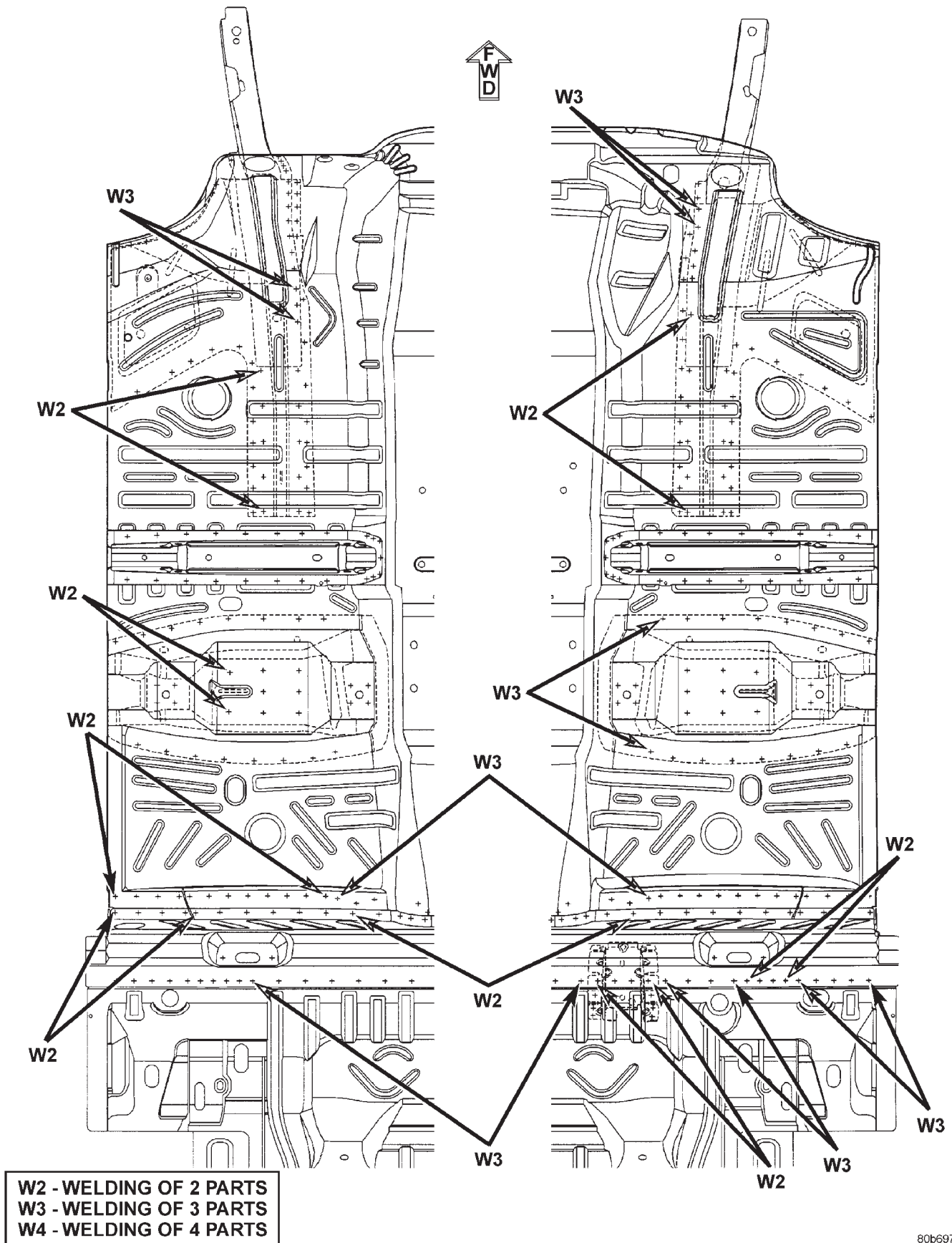
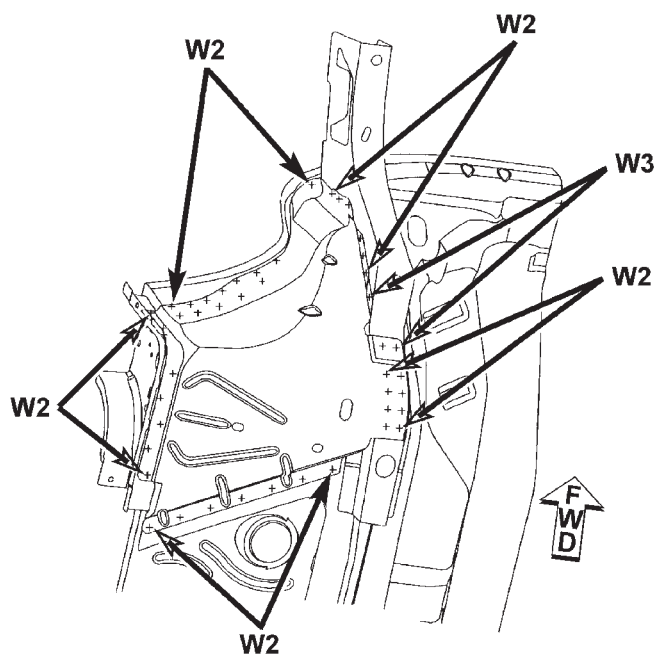
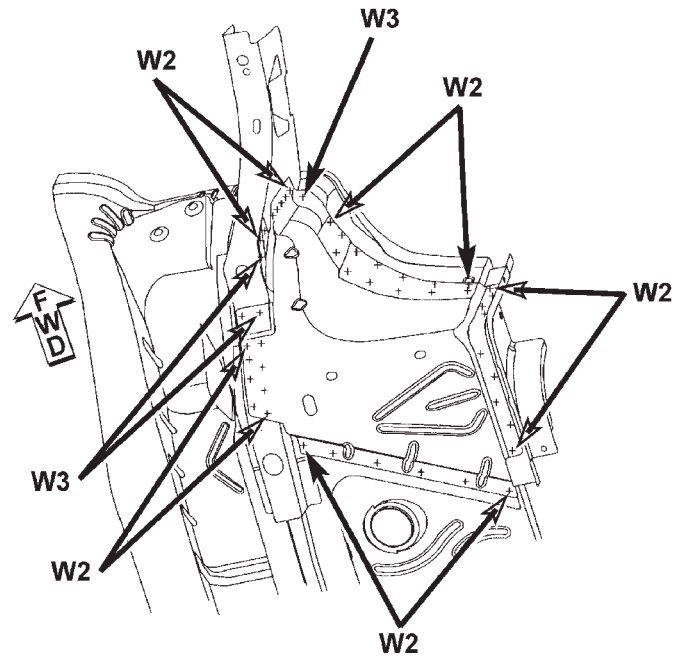


Fig. 72 FLOOR PAN

WELD LOCATIONS (Continued)



RIGHT SIDE



LEFT SIDE

W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS

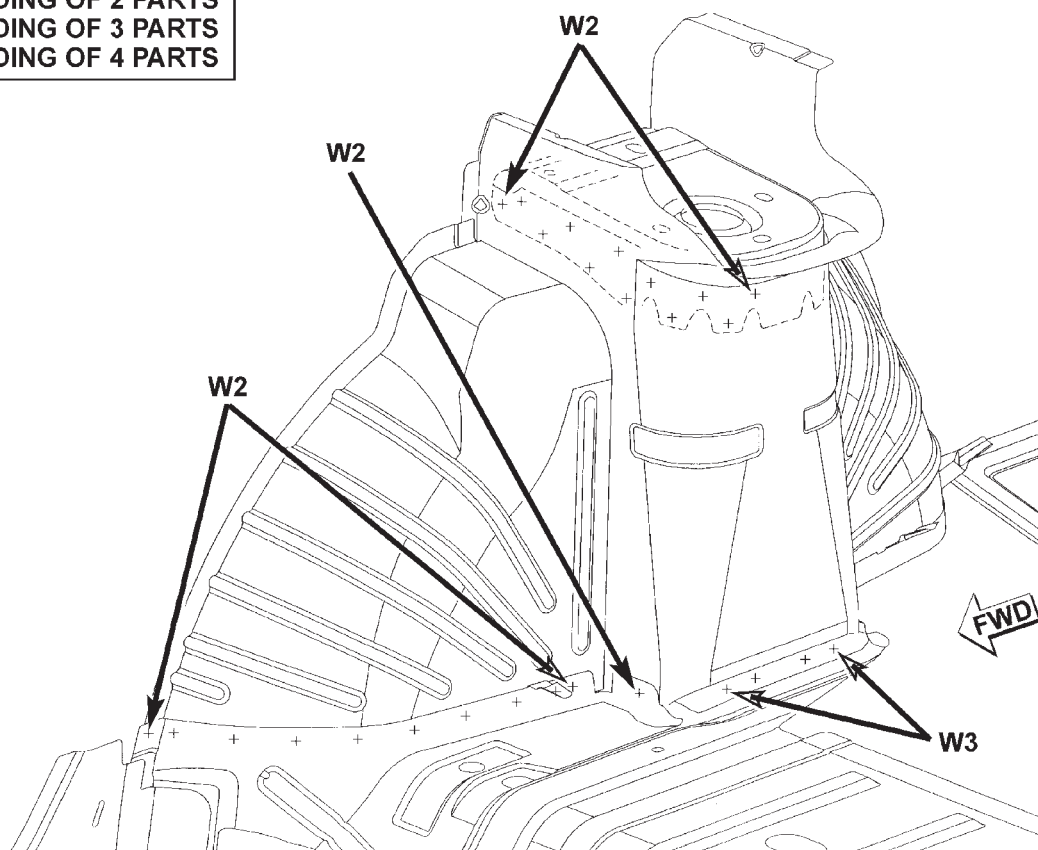
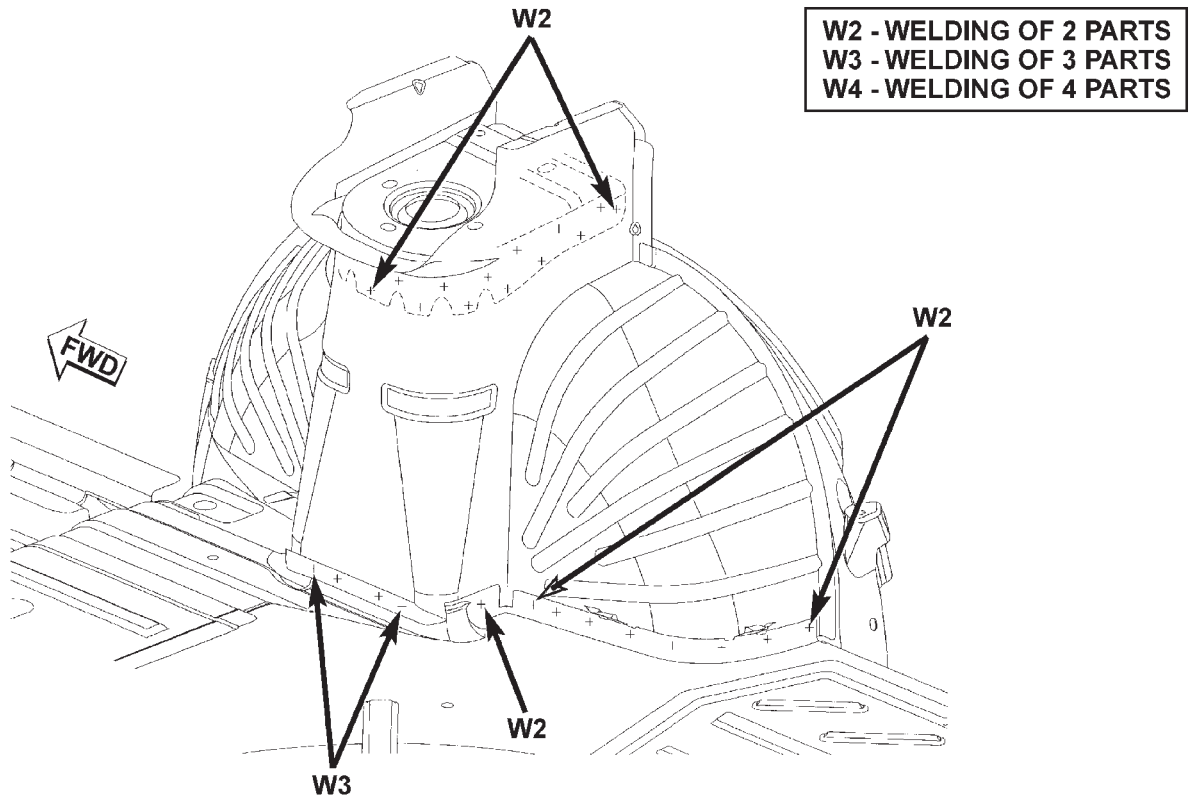


Fig. 73 FLOOR PAN

WELD LOCATIONS (Continued)



80b69797

Fig. 74 FLOOR PAN

WELD LOCATIONS (Continued)

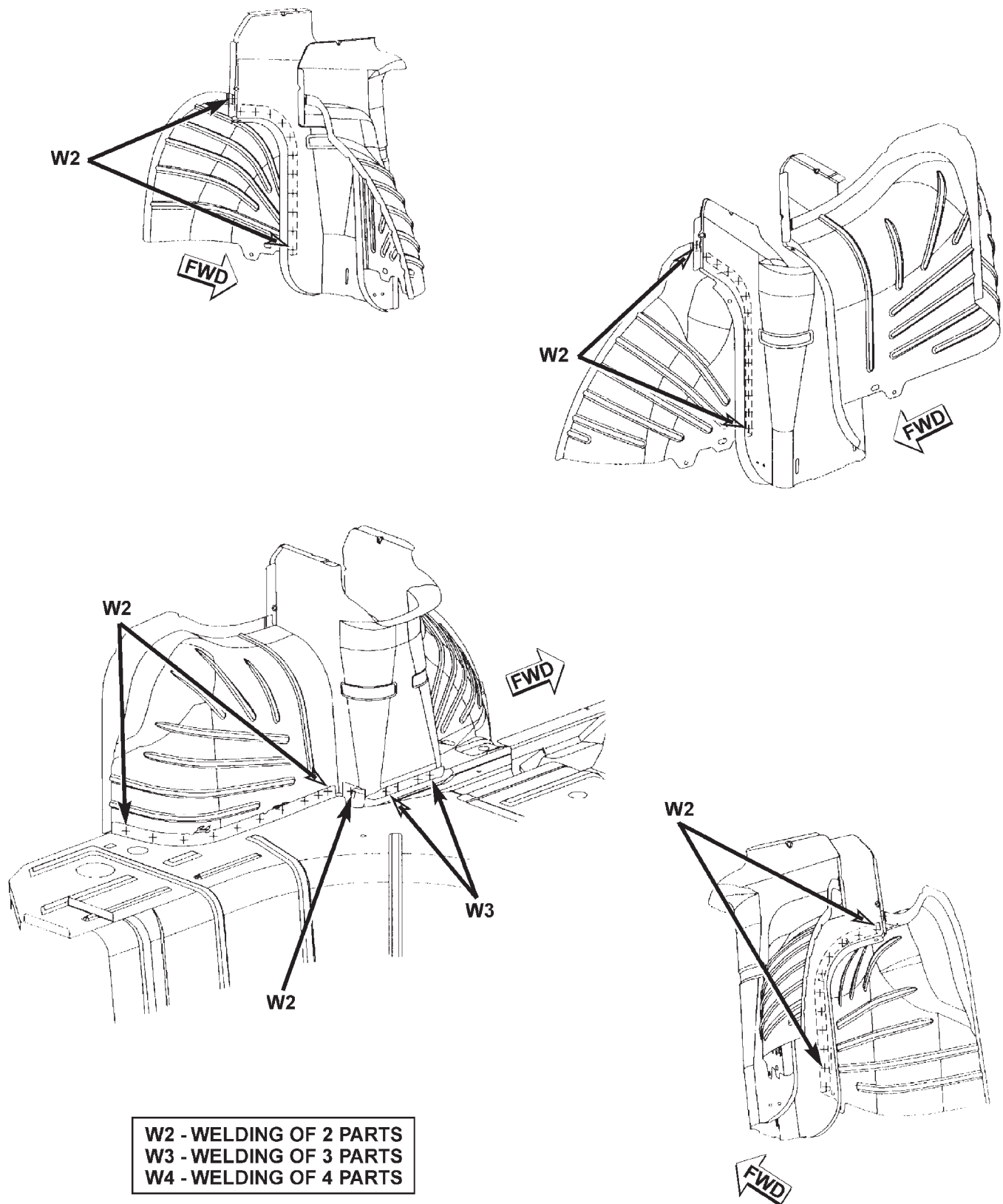


Fig. 75 FLOOR PAN

WELD LOCATIONS (Continued)

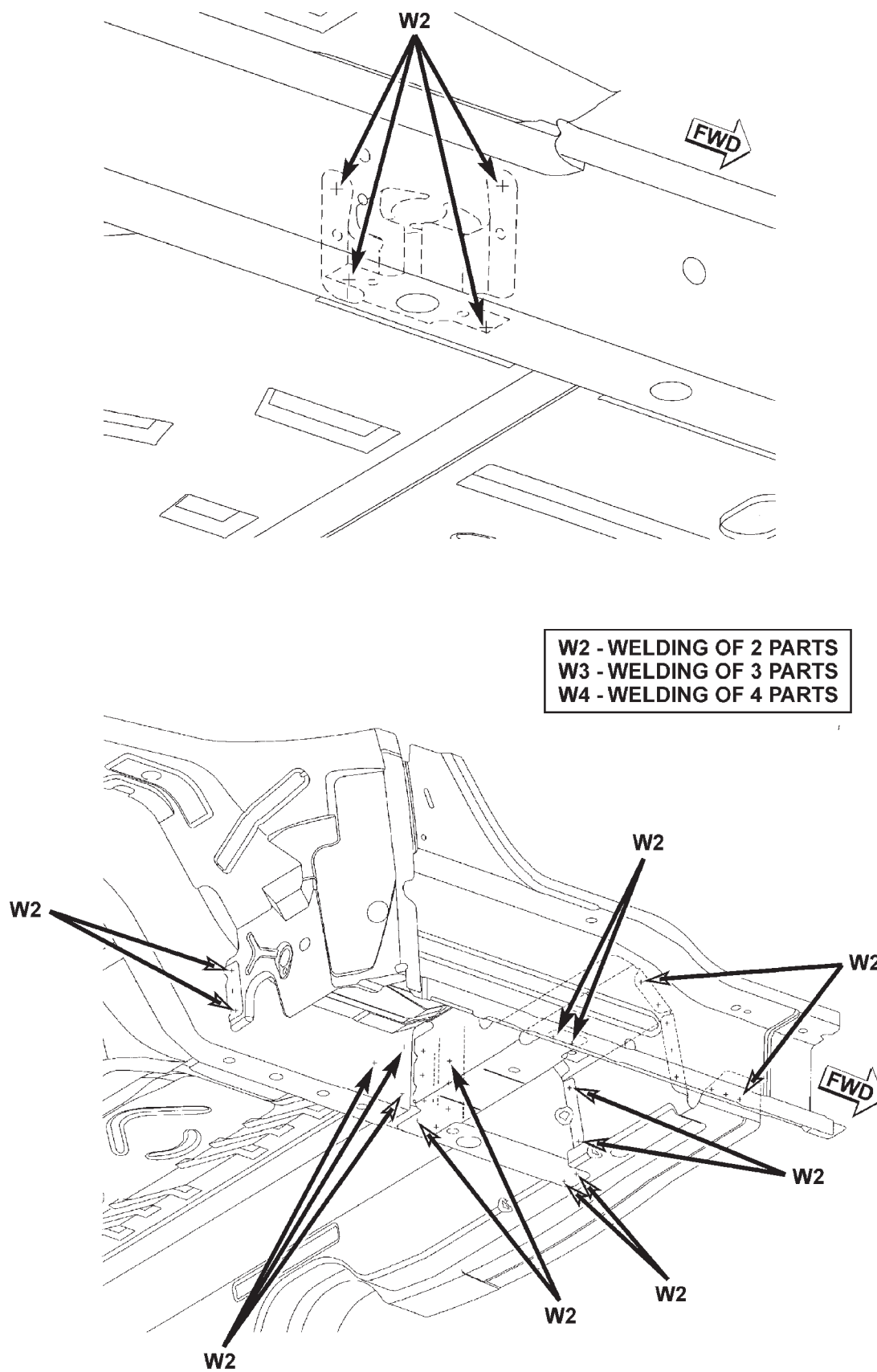
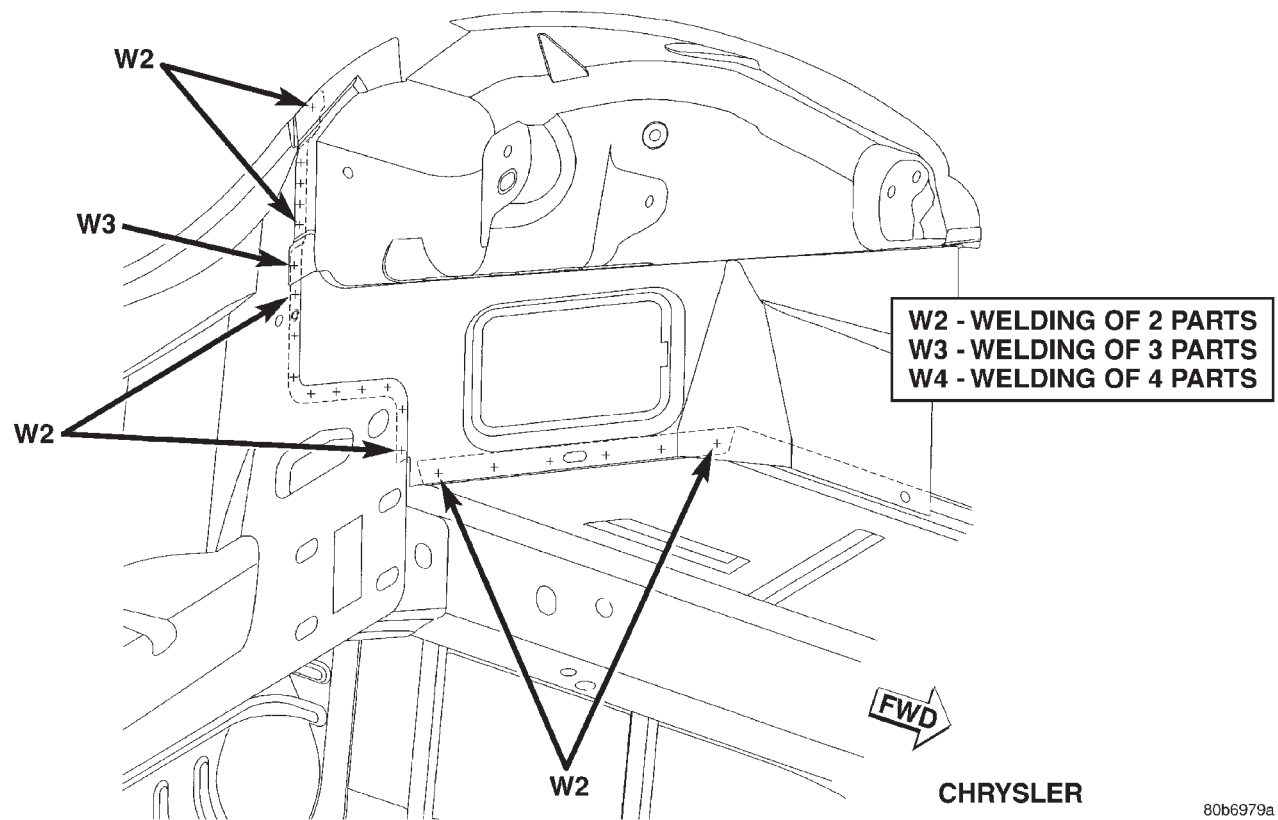
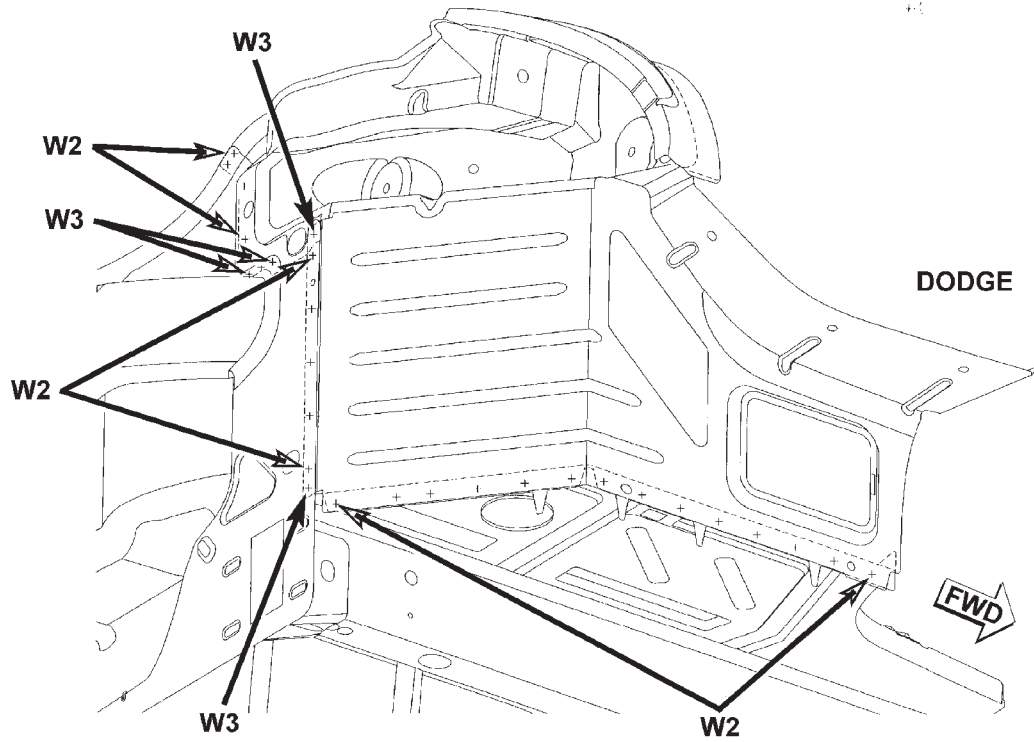


Fig. 76 FLOOR PAN

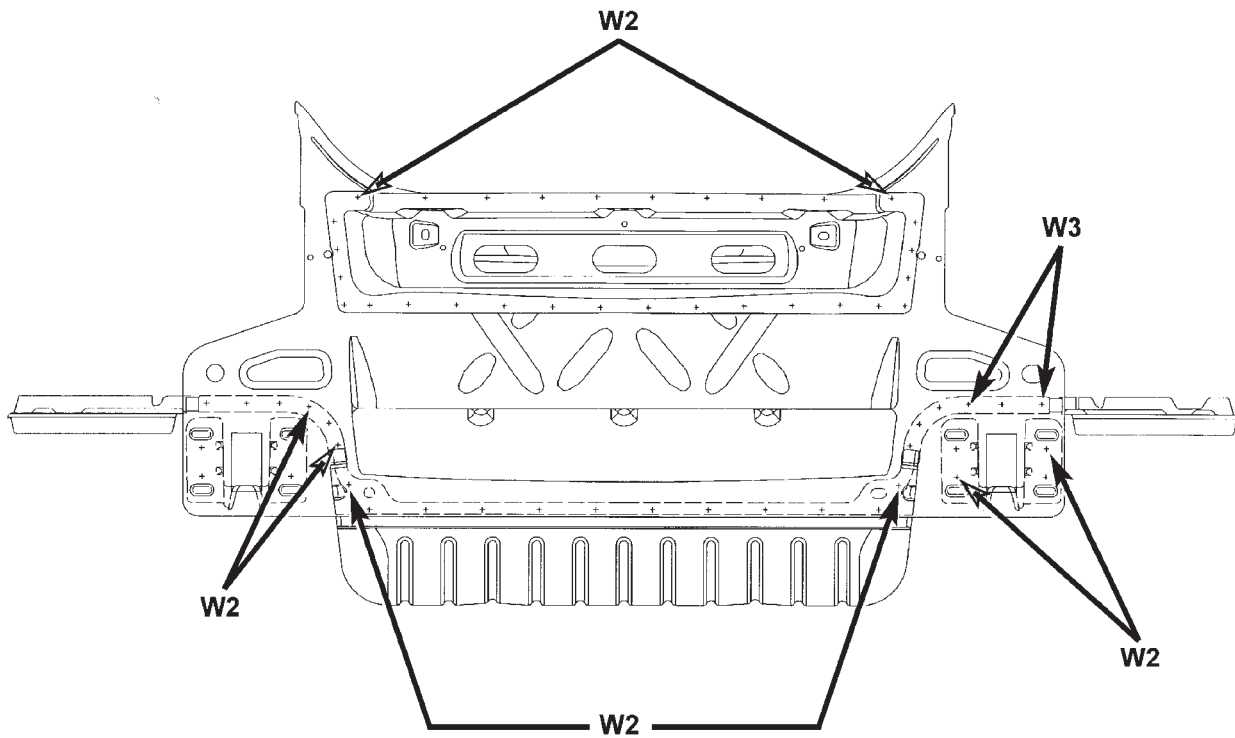
WELD LOCATIONS (Continued)

*Fig. 77 FLOOR PAN*

WELD LOCATIONS (Continued)



W2 - WELDING OF 2 PARTS
W3 - WELDING OF 3 PARTS
W4 - WELDING OF 4 PARTS



CHRYSLER

Fig. 78 FLOOR PAN

80b6979c

Fig. 79 FLOOR PAN

WELD LOCATIONS (Continued)

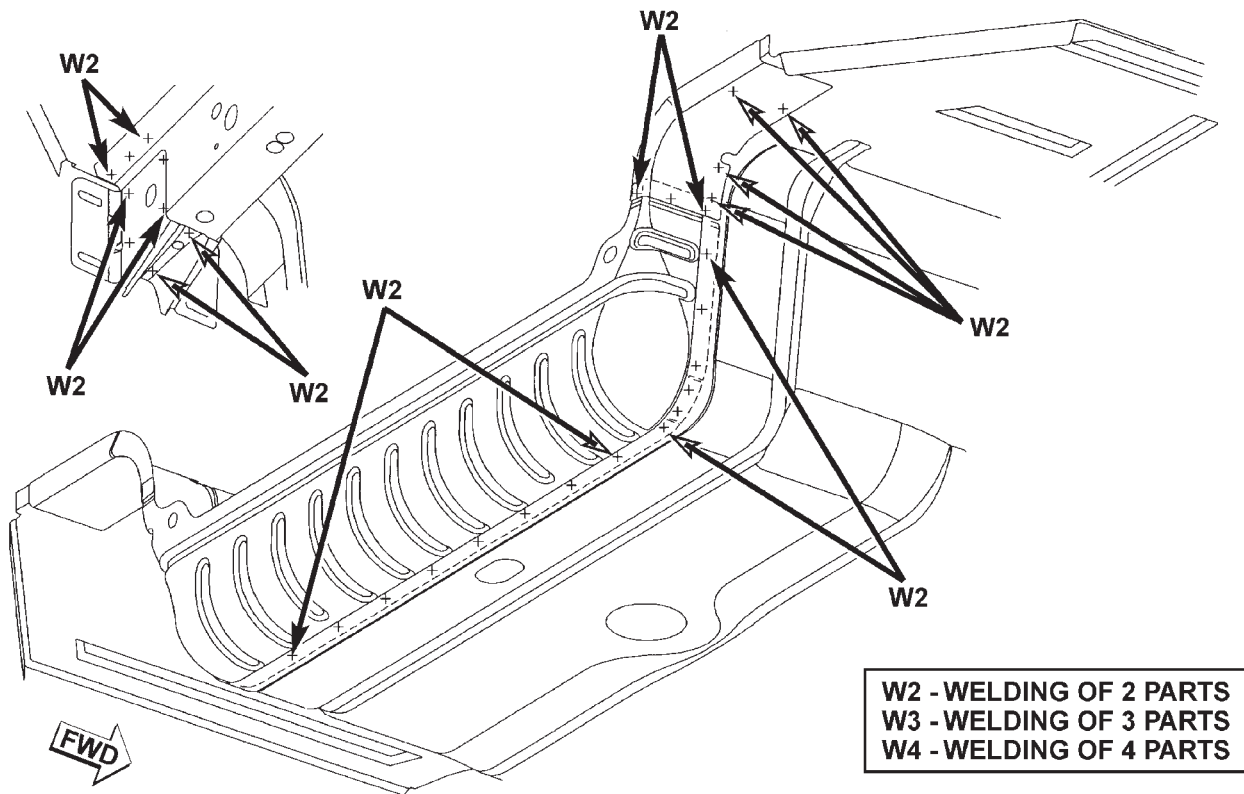


Fig. 80 FLOOR PAN

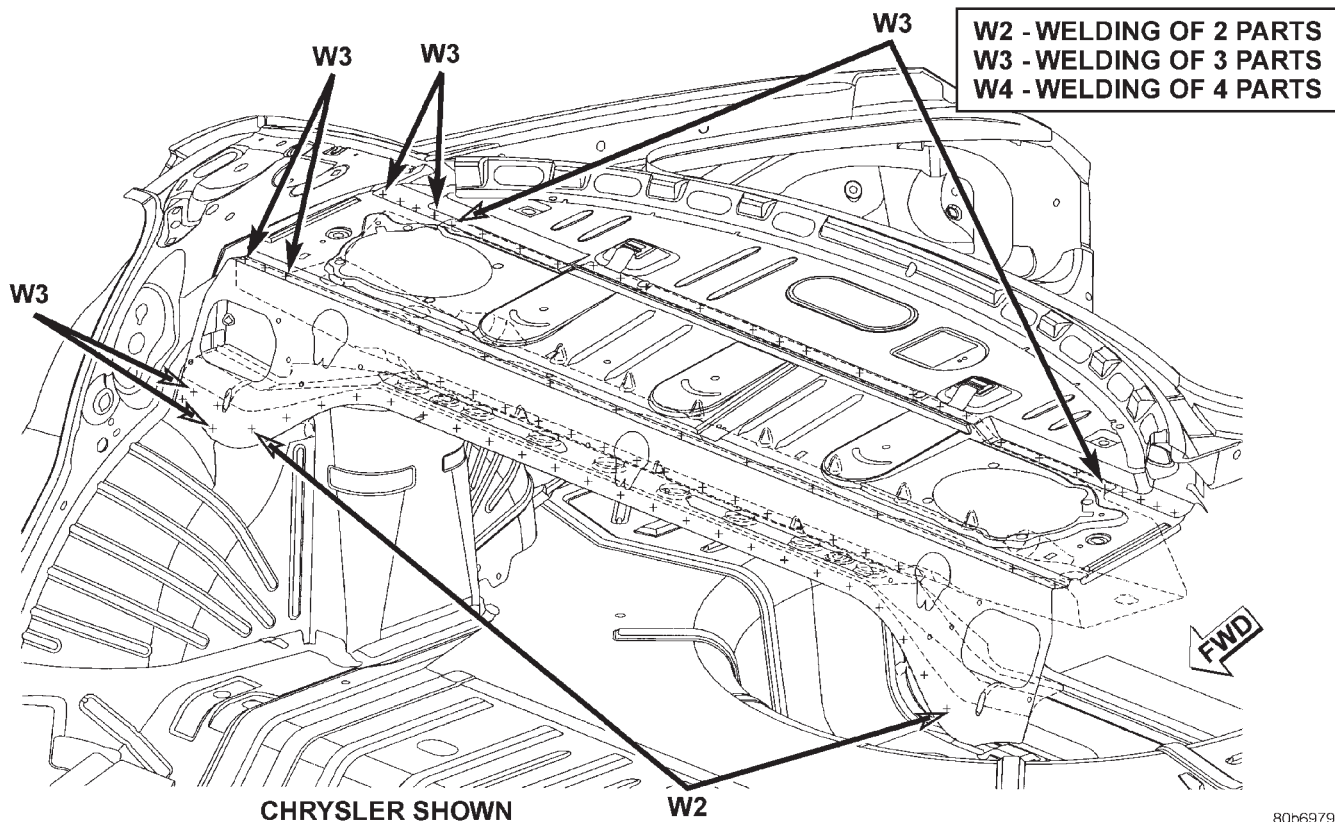


Fig. 81 REAR SHELF

WELD LOCATIONS (Continued)

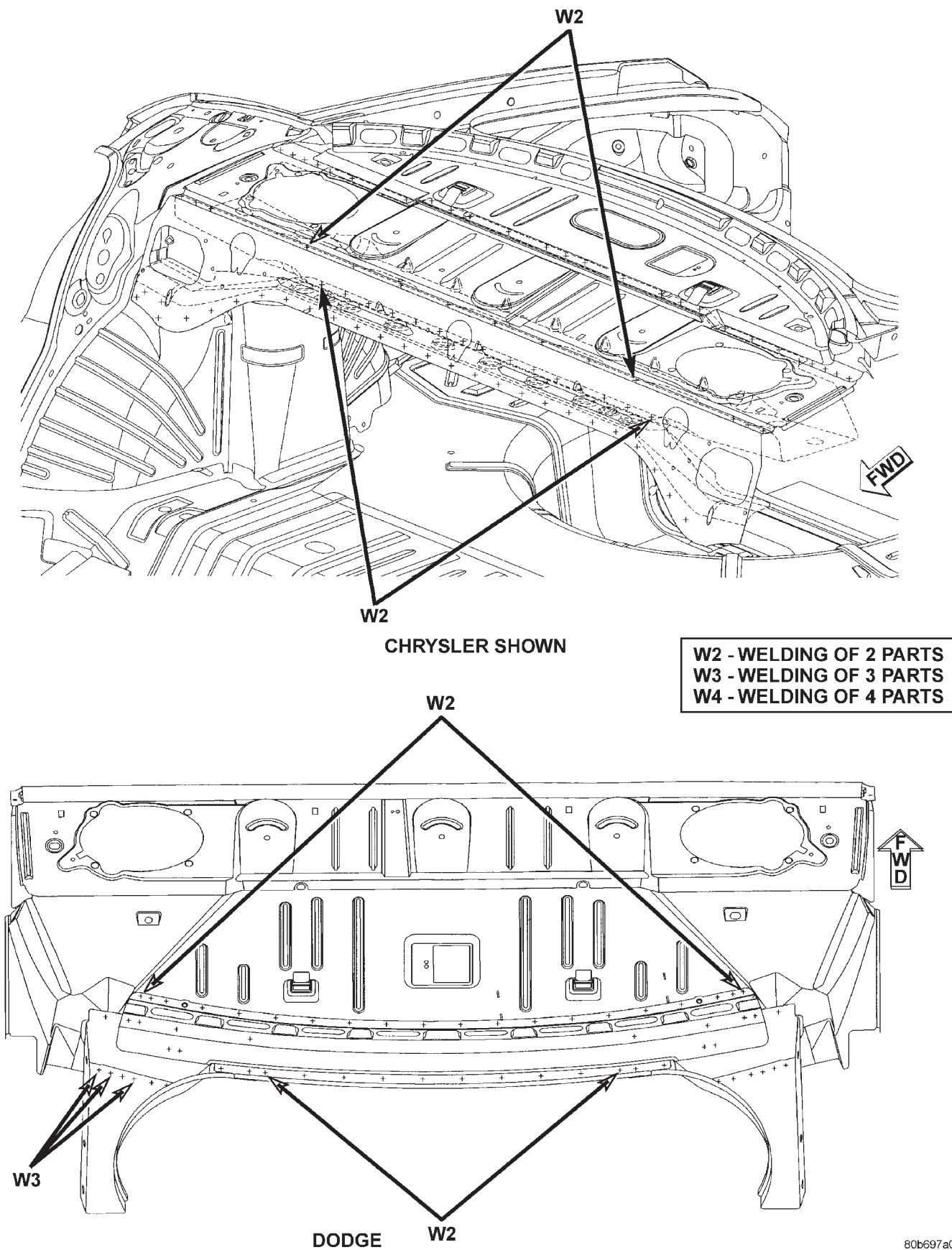


Fig. 82 REAR SHELF

WELD LOCATIONS (Continued)

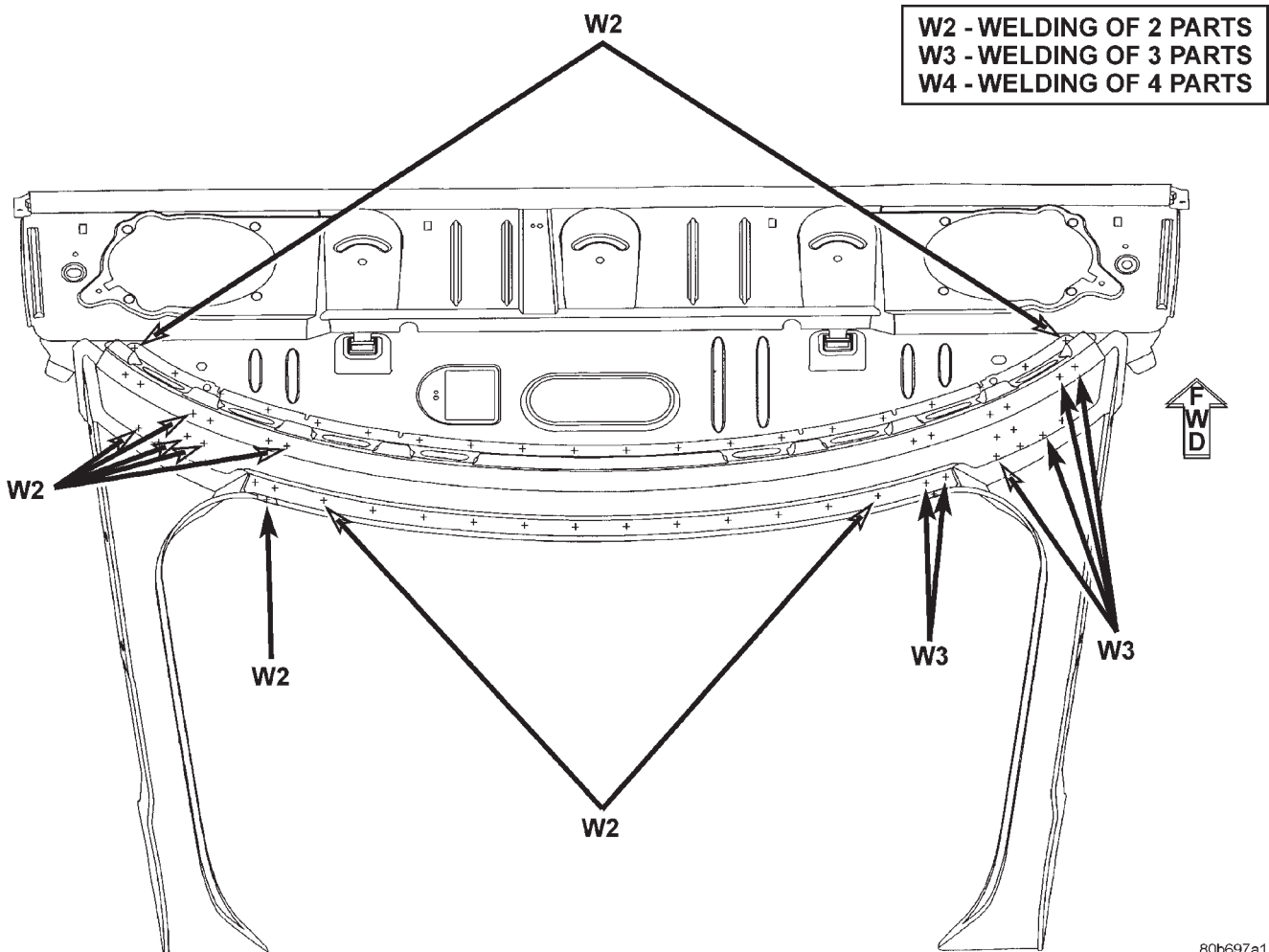
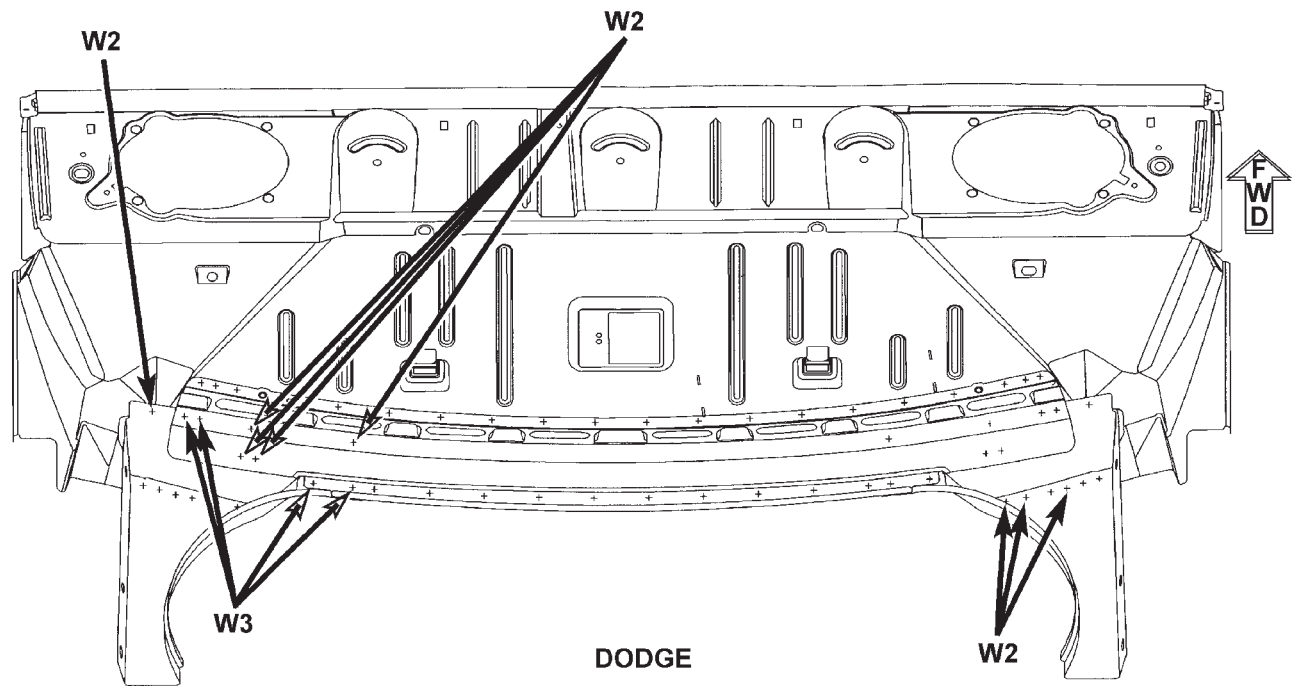


Fig. 83 REAR SHELF

HEATING & AIR CONDITIONING

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HEATING & AIR CONDITIONING

DESCRIPTION - ENGINE COOLING SYSTEM REQUIREMENTS

To maintain the performance level of the HVAC system, the engine cooling system must be properly maintained. Refer to Cooling for more information-(Refer to 7 - COOLING - OPERATION).

The use of a bug screen is not recommended. Any obstructions in front of the radiator or condenser can reduce the performance of the A/C and/or engine cooling system.

WARNING:

DO NOT OPEN COOLING SYSTEM WHEN HOT AS PERSONAL INJURY OR DAMAGE TO VEHICLE MAY RESULT.

OPERATION - ENGINE COOLING SYSTEM REQUIREMENTS

The engine cooling system is designed to develop internal pressure of 97 to 123 kPa (14 to 18 psi). Wait 15 minutes (after the engine is shut off), or until safe temperature and pressure is attained, before opening the cooling system. Refer to Cooling(Refer to 7 - COOLING - OPERATION). Coolant temperature can be checked using the scan tool (DRBIII®).

When additional coolant is needed, it should be added to the coolant pressure bottle. Use only 50/50 mix of Mopar® Antifreeze/Coolant, 5 Year/100,000 Mile Formula (orange in color), or the equivalent and

distilled water. This coolant must not be mixed with other (green in color) coolants. If this occurs, a reduction in the extended service interval will result. Refer to Lubrication and Maintenance for service schedules(Refer to LUBRICATION & MAINTENANCE - SPECIFICATIONS).

CAUTION:

Do not add additional inhibitors, anti-rust products, or soluble oil (sold as “water pump lubricants”). These products may not be compatible with the engine coolant.

Refer to Cooling for cooling system procedures(Refer to 7 - COOLING - STANDARD PROCEDURE).

DIAGNOSIS AND TESTING

DIAGNOSIS AND TESTING - A/C PERFORMANCE TEST

The air conditioning system is designed to remove heat and humidity from the air entering the passenger compartment. The evaporator, located in the HVAC unit, is cooled to temperatures near the freezing point. As warm damp air passes over the fins in the evaporator, moisture in the air condenses to water, dehumidifying the air. High humidity reduces the evaporator's ability to cool the air. During periods of high heat and humidity, an air conditioning system will be less effective. With the a/c heater control set to RECIRC, only air from the passenger compartment passes through the evaporator. As the passenger compartment air dehumidifies, A/C performance levels rise.

HEATING & AIR CONDITIONING (Continued)

PERFORMANCE TEST PROCEDURE

Before performing the following procedure, (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING). Air temperature in test room and in vehicle must be 21° C (70°F) minimum for this test.

NOTE: When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

- (1) Connect a tachometer and manifold gauge set or an A/C Charging/Recycling Station.
- (2) Set controls:

MTC (Manual Temperature Control) System:

- A/C ON
- Panel Recirculation
- Temperature to full cold
- High blower

ATC (Automatic Temperature Control) System:

- Rotate blower knob to high position (full clockwise)

- Set temperature to the LO position
- Push panel mode button
- Push RECIRC (Recirculation) button (A/C and RECIRC symbols should be lit)

NOTE: The word **MANUAL** should appear in the ATC display, confirming that the system is set manually.

(3) Start engine and hold at 1000 rpm with A/C clutch engaged.

(4) Engine should be warmed up with doors and windows closed.

(5) Insert a thermometer in the left center A/C outlet and operate the engine for five minutes. The A/C clutch may cycle depending on ambient conditions.

(6) **With the A/C clutch engaged**, compare the discharge air temperature to the A/C Performance Temperature table.

A/C PERFORMANCE TEMPERATURE AND PRESSURE

AMBIENT TEMPERATURE	21°C (70°F)	26.5°C (80°F)	32.5°C (90°F)	37°C (100°F)	43°C (110°F)
MAXIMUM ALLOWABLE AIR TEMPERATURE AT CENTER LEFT PANEL OUTLET	6°C (42°F)	7°C (45°F)	10°C (50°F)	12°C (54°F)	15°C (59°F)
COMPRESSOR DISCHARGE PRESSURE	1379–1585 kPa (200–230 psi)	1448–1723 kPa (210–250 psi)	1654–1930 kPa (240–280 psi)	1930–2206 kPa (280–320 psi)	2206–2516 kPa (320–365 psi)
COMPRESSOR SUCTION PRESSURE	103–172 kPa (15–25 psi)	139–208 kPa (20–30 psi)	172–241 kPa (25–35 psi)	208–276 kPa (30–40 psi)	241–310 kPa (35–45 psi)

DIAGNOSIS AND TESTING - HEATER PERFORMANCE TEST

PRE-DIAGNOSTIC PREPARATIONS

Check the coolant level, drive belt tension, vacuum line connections, electrical connections, radiator air flow and fan operation. Start engine and allow to warm up to normal temperature.

WARNING: DO NOT REMOVE RADIATOR CAP WHEN ENGINE IS HOT, SEVERE PERSONAL INJURY CAN RESULT.

If vehicle has been run recently, wait until engine is cool before removing cap. Squeeze the radiator

hose to check temperature, and for pressure in the system. If the hose is very firm, allow time to cool down. Place a rag over the cap and turn it to the first safety stop. Allow pressure to escape through the overflow tube. When the system stabilizes, remove the cap completely.

MAXIMUM HEATER OUTPUT: TEST AND ACTION

Engine coolant is provided to the heater system by two 19 mm (3/4 inch inside diameter) heater hoses. With engine idling at normal running temperature, set the control to maximum heat, floor, and high blower setting. Using a test thermometer, check the air temperature coming from the floor outlets. Refer to Temperature Reference Table.

HEATING & AIR CONDITIONING (Continued)

TEMPERATURE REFERENCE TABLE

Ambient Temp.		Minimum Floor	Outlet Temp.
Celsius	Fahrenheit	Celsius	Fahrenheit
15.5°	60°	62.2°	144°
21.1°	70°	63.8°	147°
26.6°	80°	65.5°	150°
32.2°	90°	67.2°	153°

If the floor outlet air temperature is insufficient, refer to Cooling for specifications (Refer to 7 - COOLING - DIAGNOSIS AND TESTING). Both heater hoses should be HOT to the touch (coolant return hose should be slightly cooler than the supply hose). If coolant return hose is much cooler than the supply hose, locate and repair engine coolant flow obstruction in heater system.

POSSIBLE LOCATIONS OR CAUSE OF OBSTRUCTED COOLANT FLOW

- (1) Pinched or kinked heater hoses.
- (2) Improper heater hose routing.
- (3) Plugged heater hoses or supply and return ports at cooling system connections, refer to Cooling.
- (4) Plugged heater core.
- (5) Air locked heater core.
- (6) If coolant flow is verified and outlet temperature is insufficient, a mechanical problem may exist.

POSSIBLE LOCATION OR CAUSE OF INSUFFICIENT HEAT

- (1) Obstructed cowl air intake.
- (2) Obstructed heater system outlets.
- (3) Blend door not functioning properly.

TEMPERATURE CONTROL

If temperature cannot be adjusted with the TEMP knob/button on the control panel, the following could require service:

- (1) Blend door binding.
- (2) Faulty blend door actuator.
- (3) Improper engine coolant temperature.
- (4) Faulty A/C Heater Control. (Refer to Appropriate Diagnostic Information)

DIAGNOSIS AND TESTING - SELF DIAGNOSTICS**DIAGNOSTIC TROUBLE CODES (DTC's)**

Both the Automatic Temperature Control (ATC) and the Manual Temperature Control (MTC) systems are controlled by the Body Control Module (BCM). Both systems can be diagnosed by the DRBIII® scan

tool or the vehicle's own control head display. Refer to the DRBIII® menu for checking Diagnostic Trouble Codes (DTC's). Note that there are three DTC tables. The ATC and MTC DTC table contain faults that are common to both the ATC and the MTC system. The same diagnosis can be used for both systems. The DTC's cover operation of the climate control unit actuators, doors, evaporator temperature sensor, ambient temperature sensor and the A/C refrigerant system. The MTC DTC table covers Fault Codes that are for the MTC Control Head and wiring and are not used on an ATC system. The ATC DTC table has DTC's for ATC Head Communications, In-Car Temperature Sensor and Sun Sensor which are not in a MTC system.

Some conditions of low battery voltage or extremely cold weather can generate a DTC for the climate control system actuators, evaporator probe, in-car temperature sensor (ATC), or ambient temperature sensor, even in a properly operating system. It is recommended that all the DTC's be checked as follows to assure a part is faulty.

Climate Control Sensor DTC Check

- (1) Clear the DTC.
- (2) Operate the HVAC system with the engine running for a minimum of 30 seconds.
- (3) Check for DTC's.
- (4) Perform diagnostics if the DTC appears again. (Refer to Appropriate Diagnostic Information)

Climate Control Actuator Check.

- (1) Clear the DTC.
- (2) Perform HVAC system calibration. (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE - HVAC SYSTEM CALIBRATION)
- (3) Perform diagnostics if the DTC appears again. (Refer to Appropriate Diagnostic Information)

If a DTC does not appear when using the procedures above, check the history of the vehicle for a low battery condition, or ambient temperatures below 40°F. Removing connections without disconnecting the battery may also generate a DTC on a good part. The battery should always be disconnected when servicing electrical parts.

HEATING & AIR CONDITIONING (Continued)

ATC AND MTC DTC'S

CODE	DESCRIPTION
23	BLEND DOOR ACTUATOR FEEDBACK FAILURE
24	MODE DOOR ACTUATOR FEEDBACK FAILURE
25	AMBIENT SENSOR
31	RECIRCULATION DOOR ACTUATOR STALL FAILURE
32	BLEND DOOR ACTUATOR STALL FAILURE
33	MODE DOOR ACTUATOR STALL FAILURE
35	EVAPORATOR SENSOR FAILURE
37	BLEND DOOR ACTUATOR OUTPUT SHORTED TO BATTERY
38	BLEND DOOR ACTUATOR OUTPUT SHORTED TO GROUND
39	MODE DOOR ACTUATOR OUTPUT SHORTED TO BATTERY
40	MODE DOOR ACTUATOR OUTPUT SHORTED TO GROUND
41	RECIRCULATION DOOR ACTUATOR OUTPUT SHORTED TO BATTERY
42	RECIRCULATION DOOR ACTUATOR OUTPUT SHORTED TO GROUND
43	COMMON DOOR OUTPUT SHORTED TO BATTERY
44	COMMON DOOR OUTPUT SHORTED TO GROUND
51	SYSTEM VOLTAGE TOO LOW FOR DOOR CALIBRATION

MTC DTC'S

CODE	DESCRIPTION
45	A/C CONTROL BLEND DOOR INPUT OPEN OR SHORTED TO GROUND
46	A/C CONTROL BLEND DOOR SHORTED TO BATTERY
47	A/C CONTROL - A/C SWITCH FAILURE
48	A/C CONTROL MODE DOOR INPUT SHORTED TO GROUND
49	A/C CONTROL MODE DOOR INPUT SHORTED TO BATTERY
50	A/C CONTROL ELECTRIC BACKLITE (EBL) SWITCH FAILURE

ATC DTC'S

CODE	DESCRIPTION
26	ATC IN-CAR TEMPERATURE THERMISTOR FAILURE
27	ATC IN-CAR SENSOR FAILURE
34	ENGINE TEMPERATURE MESSAGE NOT RECEIVED
36	ATC CONTROL COMMUNICATION FAILURE

TROUBLE CODES FROM THE ATC HEAD

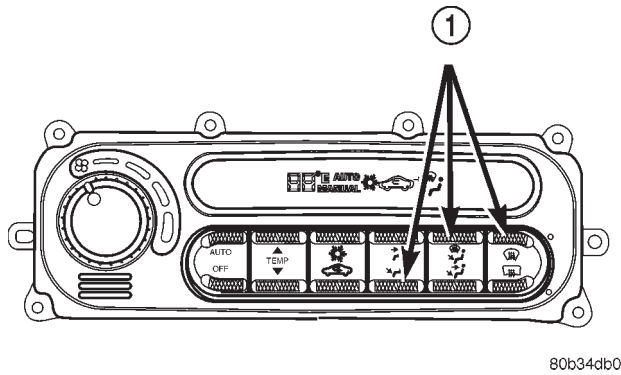
The trouble codes can be checked with the ATC control if a DRBIII® scan tool is not available. The control head can only be placed into the diagnostic mode while the engine is running and the vehicle is not moving. Set the control to a 75° F setting (so there is no confusion with the 23-51 Diagnostic Trouble Codes (DTC's) (Fig. 1).

To place the system into its diagnostic mode, press and hold the Floor, Mix and Defrost buttons (at the same time). The ATC head display will begin to blink. Release the Floor, Mix and Defrost buttons. Once the control head enters the diagnostic mode, the display on the control head will continue to blink. This occurs until it completes its tests and climate control unit door/actuator calibrations. Then it will display any diagnostic trouble codes that are present in the BCM. If there are no diagnostic trouble codes, the system will return to its normal operation as indicated by the temperature symbol (C or F). Diagnostic trouble codes related to the ATC and climate control unit will appear on the display in numerical form. The diagnostic trouble codes are stored in the BCM and can range between 23 and 51. The ATC control can only show one diagnostic trouble code at a time. Under certain circumstances, more than one diagnostic trouble code could be in the memory. To scroll through any additional diagnostic trouble codes, press the Panel Mode button on the ATC control. **It is important that no other knob or button is pushed until all codes are read. Pushing any button except Panel Mode or turning a knob will end the diagnostic test without showing the rest of the trouble codes. There also may be other trouble codes stored in the BCM not related to the Climate Control System. These codes can only be found using the DRBIII® scan tool.**

TROUBLE CODES FROM THE MTC HEAD

The trouble codes can be checked with the MTC head and the Odometer Display of the Mechanical Instrument Cluster if a DRBIII® scan tool is not available. The MTC Head can only be placed into the

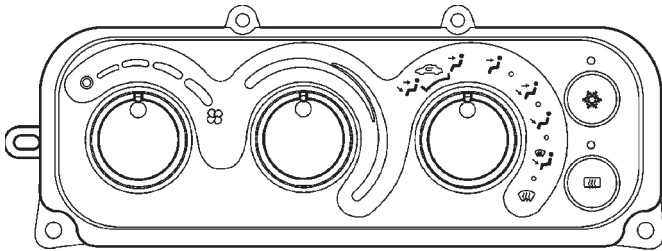
HEATING & AIR CONDITIONING (Continued)

**Fig. 1 ENTERING SELF-DIAGNOSTIC MODE**

1 - PRESS BUTTONS SIMULTANEOUSLY

diagnostic mode while the engine is running and the vehicle is not moving. To place the system into its diagnostic mode, adjust the MTC to the following settings: (Fig. 2)

- (1) The engine must be running with vehicle not moving.
- (2) The Fan Speed set to any speed except OFF.
- (3) The Temperature Knob in full cold (full counterclockwise position).
- (4) The mode knob must be placed in defrost position (full clockwise position).
- (5) The A/C button can be ON or OFF.
- (6) Press and hold the EBL button until the Mechanical Instrument Cluster Odometer display indicates an "AC00". The body control module (BCM) will chime once and the MTC A/C button LED will begin blinking.
- (7) Release the EBL button and wait until the MTC A/C button LED stops blinking. This means that the error check and climate control unit door calibration is complete.

**Fig. 2 MTC CONTROL HEAD**

Diagnostic trouble codes related to the MTC head and the climate control unit will appear on the odometer display in numerical form after the letters "AC". The diagnostic trouble codes are stored in the BCM and can range between 23 and 51. The odometer display will return to normal operation if no trouble codes are found. If a problem is found, then the odometer will display the letters "A/C" followed by the trouble code number. The odometer display can only show one diagnostic trouble code at a time. Under certain circumstances, more than one diagnostic trouble code could be in the memory. To scroll through any additional diagnostic trouble codes, press the A/C button on the MTC head. The BCM will beep each time the A/C button is pushed. Continue pushing the A/C button and recording the trouble code numbers until the odometer returns to normal operation (note the letters AC will disappear). **It is important that no other knob or button is pushed until all codes are read. Pushing any button except the A/C button or turning a knob will end the diagnostic test without showing the rest of the trouble codes. There also may be other trouble codes stored in the BCM not related to the Climate Control System. These codes can only be found using the DRBIII® scan tool.**

ERASING DIAGNOSTIC TROUBLE CODES (DTC's)

Diagnostic trouble codes can be cleared from the memory two ways:

- The DRBIII® scan tool
- Power to the BCM can be disconnected for ten minutes by disconnecting the battery negative remote cable.

If the scan tool is to be used, refer to the Appropriate Diagnostic Information.

CAUTION: Fault code 26 can be created if the in-car sensor thermistor is disconnected while the BCM is operating. This can happen by disconnecting connectors from the BCM or the ATC Control Head when the battery is connected (even if the ignition switch is OFF). To correct, clear the fault code 26 from the BCM.

HEATING & AIR CONDITIONING (Continued)

DIAGNOSIS AND TESTING - ERRATIC OPERATION OF HVAC SYSTEM

Erratic operation of the A/C and heater systems including:

- Lack of cold air
- Lack of hot air
- Unrequested mode change (ATC only)
- No control of mode or temperature control or tapping blend door noise

These symptoms may be accompanied by the following Diagnostic Fault Codes (DTC's):

- Blend door feedback
- Blend door stall
- A/C Control Mode door input shorted to battery
- In-car temp sensor failure
- ATC messages not received
- Mode door stall

Check for the presence of DTC's with the DRB III®. If the symptoms and or DTC's listed above are present, perform the following Repair Procedure:

With the vehicle at room temperature 10 to 27° C (50 to 80° F), pull the M-1 fuse for five minutes to erase any DTC's. Replace the fuse and start the vehicle to recalibrate the HVAC system. Operate the vehicle and A/C heater system to verify that symptoms and or DTC's are gone. If tapping noise or blend stall/feedback DTC's re-occur, additional diagnosis will be required.

STANDARD PROCEDURE - HVAC SYSTEM CALIBRATION

This procedure may be performed on both the ATC and MTC systems.

- (1) Start engine and let run.
- (2) If the vehicle has an ATC system, turn the control head on.
- (3) Set the temperature controls to the full cold position for two minutes.
- (4) Set the temperature controls to the full heat position for five minutes.

SPECIFICATIONS**A/C APPLICATION TABLE-ATC**

Item	Description	Notes
Vehicle	LH - Intrepid, Concorde, 300M, LHS	Automatic Temperature Control (ATC)
System	R134a w/expansion valve	
Compressor	Nippondenso 10PA17	ND-8 PAG oil
Freeze-up Control	2-wire evaporator temp sensor	BCM controlled, clutch OFF < 33° F, resets > 37° F
Low psi Control	A/C pressure transducer, line mounted	opens < 29.4 psi PCM input
High psi Control		opens > 431.0 psi PCM input
Forced Recirc Mode	System forced into Recirc at high pressures	BCM steps HVAC into recirc at 375 psi, steps out at 325 psi
Control head	Automatic ATC type	Programmable Communication Interface (PCI)
Mode Door	Electric actuator	BCM controlled actuators use a common ground
Blend Door	Electric actuator	
Recirculation Door	Electric actuator	
Blower Motor	Controlled via a linear blower controller	Uses pulse width modulation input
Cooling Fans	2 fans, low speed and high speed	PCM controlled fan module via 2 relays
Clutch		
Control	Relay	PCM
Draw	2.2 amps @ 12 V ±0.5V	
Gap	0.014" - 0.026"	
DRB III®		
Reads	TPS, RPM, A/C switch test	
Actuators	Mode doors, clutch and fan relays	

HEATING & AIR CONDITIONING (Continued)

A/C APPLICATION TABLE-MTC

Item	Description	Notes
Vehicle	LH - Intrepid, Concorde, 300M, LHS	manual A/C control
System	R134a w/expansion valve	
Compressor	Nippondenso 10PA17	ND-8 PAG oil
Freeze-up Control	2-wire evaporator temp sensor	BCM controlled, clutch OFF < 33° F, resets > 37° F
Low psi Control	A/C pressure transducer, line mounted	Opens < 29.4 psi PCM input
High psi Control		Opens > 431.0 psi PCM input
Forced Recirc Mode	System forced into Recirc at high pressures	BCM steps HVAC into recirc at 375 psi, steps out at 325 psi
Control Head	Manual type	BCM diagnostics

Item	Description	Notes
Mode Door	Electric actuator	BCM controlled actuators use a common ground
Blend Door	Electric actuator	
Recirculation Door	Electric actuator	
Blower Motor	Hardwired to control head	Resistor block
Cooling Fans	2 fans, low speed and high speed	PCM controlled via 2 relays
Clutch		
Control	Relay	PCM
Draw	2.2 amps @ 12 V \pm 0.5V	
Gap	0.014" - 0.026"	
DRB III®		
Reads	TPS, RPM, A/C switch test	
Actuators	Mode doors, clutch and fan relays	

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	N-m	Ft. Lbs.	In. Lbs.
A/C COMPRESSOR SHAFT BOLT	17.5 \pm 2	13 \pm 2	155 \pm 20
A/C COMPRESOR LINE MANIFOLD FASTENERS	23	17	204
A/C COMPRESSOR TO ENGINE BLOCK BOLTS	28	21	252
A/C CONDENSER TO REFRIG. LINES	23	17	204
A/C EXPANSION VALVE TO EVAPORATOR	23	17	204
A/C EXPANSION VALVE TO LINES	23	17	204
A/C PRESSURE TRANSDUCER	6	4	50
BLOWER MOTOR SCREWS	2.2	1.7	20
DOOR ACTUATOR SCREWS	2.2	1.7	20
HVAC HOUSING SCREWS	2.2	1.7	20
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CONTROLS

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A/C COMPRESSOR CLUTCH

DESCRIPTION

The compressor clutch assembly consists of a stationary electromagnetic coil, a hub bearing and pulley assembly, and a clutch plate. The electromagnetic coil unit and the hub bearing and pulley assembly are each retained on the nose of the compressor front housing with snap rings. The clutch plate is retained with a bolt. These components provide the means to

engage and disengage the compressor from the engine serpentine accessory drive belt.

OPERATION

When the clutch coil is energized, it magnetically draws the clutch into contact with the pulley and drives the compressor shaft. When the coil is not energized, the pulley freewheels on the clutch hub bearing, which is part of the pulley. The compressor clutch and coil are the only serviced parts on the compressor.

A/C COMPRESSOR CLUTCH (Continued)

The compressor clutch engagement is controlled by several components: the a/c heater control head (ATC or MTC), the evaporator temperature sensor, the a/c pressure transducer, the compressor clutch relay, and the Powertrain Control Module (PCM). The PCM may delay compressor clutch engagement for up to thirty seconds. Refer to Electronic Control Modules for more information on the PCM controls.

DIAGNOSIS AND TESTING - COMPRESSOR CLUTCH COIL

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information). The battery must be fully-charged before performing the following tests. Refer to Battery for more information.

(1) Connect an ammeter (0 to 10 ampere scale) in series with the clutch coil terminal. Use a voltmeter (0 to 20 volt scale) with clip-type leads for measuring the voltage across the battery and the compressor clutch coil.

(2) In A/C, mix, defrost and the blower motor switch in the lowest speed position, start the engine and run it at normal idle.

(3) The compressor clutch coil voltage should read within 0.2 volts of the battery voltage. If there is voltage at the clutch coil, but the reading is not within 0.2 volts of the battery voltage, test the clutch coil feed circuit for excessive voltage drop and repair as required. If there is no voltage reading at the clutch coil, use a DRBIII® scan tool and (Refer to Appropriate Diagnostic Information) for testing of the compressor clutch circuit. The following components must be checked and repaired as required before you can complete testing of the clutch coil:

- Fuses in the junction block and the Power Distribution Center (PDC)
- A/C heater control head
- Compressor clutch relay
- A/C pressure transducer
- Evaporator temperature sensor
- Powertrain Control Module (PCM).

(4) The compressor clutch coil is acceptable if the current draw measured at the clutch coil is approximately 2.2 amperes with the electrical system voltage at 11.5 to 12.5 volts. This should only be checked with the work area temperature at 21° C (70° F). If system voltage is more than 12.5 volts, add electrical loads by turning on electrical accessories until the system voltage drops below 12.5 volts.

(a) If the clutch coil current reading is four amperes or more, the coil is shorted and should be replaced.

(b) If the clutch coil current reading is zero, the coil is open and should be replaced.

STANDARD PROCEDURE

INSPECTION

Examine the friction surfaces of the clutch pulley and the front plate for wear. The pulley and front plate should be replaced if there is excessive wear or scoring.

If the friction surfaces are oily, inspect the shaft and nose area of the compressor for oil. Remove the felt from the front cover. If the felt is saturated with oil, the shaft seal is leaking and the compressor must be replaced.

Check the clutch pulley bearing for roughness or excessive leakage of grease. Replace the bearing, if required.

STANDARD PROCEDURE - A/C COMPRESSOR CLUTCH BREAK-IN

After new clutch installation, cycle the A/C clutch 20 times (5 seconds ON and 5 seconds OFF). During this procedure, set the system to the A/C mode, engine rpm at 1500-2000, and high blower speed. This procedure (burnishing) will seat the opposing friction surfaces and provide a higher clutch torque capability.

NOTE: Excessive clutch gap will result in clutch slippage or non-engagement.

REMOVAL

The refrigerant system can remain fully-charged during compressor clutch, pulley, or coil replacement. The compressor clutch can be serviced in the vehicle.

(1) Disconnect and isolate the battery negative cable.

(2) Remove the serpentine drive belt (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL) or (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Unplug the compressor clutch coil wire harness connector.

(4) Remove the bolts that secure the compressor to the mounting bracket.

(5) Remove the compressor from the mounting bracket. Support the compressor in the engine compartment while servicing the clutch.

(6) Remove the compressor shaft bolt (Fig. 1). A band type oil filter removal tool can be placed around the clutch plate to aid in bolt removal.

(7) Tap the clutch plate with a plastic hammer and remove clutch plate and shim(s) (Fig. 2).

CAUTION: Do not use screwdrivers between the clutch plate assembly and pulley to remove front plate as this may damage the front plate assembly.

A/C COMPRESSOR CLUTCH (Continued)

(8) Remove pulley retaining snap ring with Snap Ring Pliers (C-4574), and slide pulley assembly off of compressor (Fig. 3).

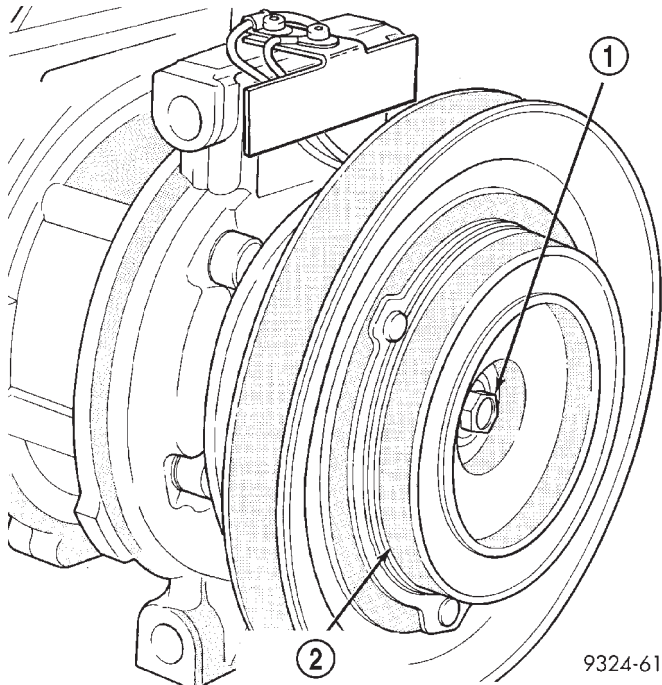


Fig. 1 COMPRESSOR SHAFT BOLT AND CLUTCH PLATE

- 1 - COMPRESSOR SHAFT BOLT
2 - COMPRESSOR CLUTCH PLATE

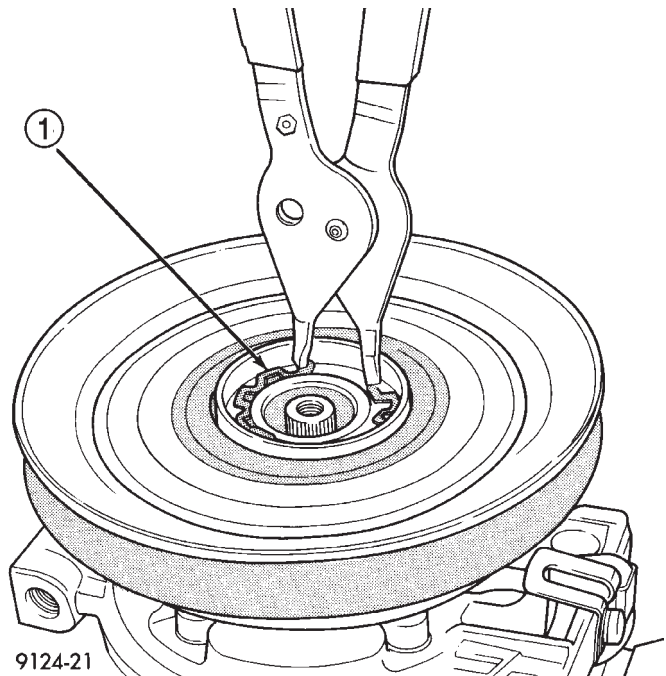


Fig. 3 REMOVING PULLEY SNAP RING

- 1 - SNAP RING

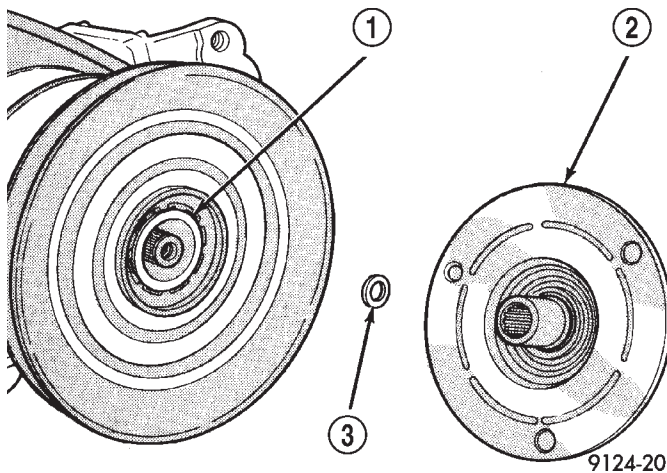


Fig. 2 CLUTCH PLATE AND SHIM(S)

- 1 - COMPRESSOR SHAFT
2 - CLUTCH PLATE
3 - CLUTCH PLATE SHIM

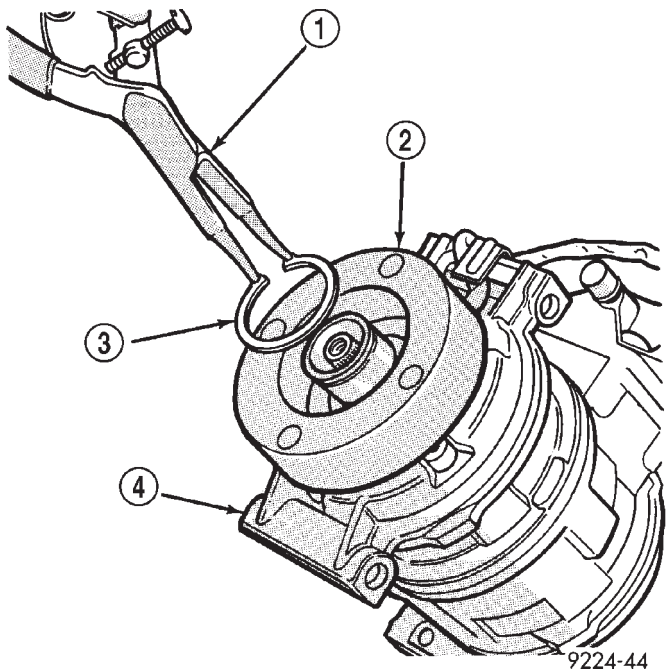


Fig. 4 CLUTCH COIL SNAP RING

- 1 - SNAP RING PLIERS
2 - CLUTCH COIL
3 - SNAP RING
4 - COMPRESSOR

(9) Remove coil wire bracket/ground clip screw and wire harness.

(10) Remove snap ring retaining field coil onto compressor housing (Fig. 4). Slide field coil off of compressor housing.

A/C COMPRESSOR CLUTCH (Continued)

INSTALLATION

(1) Align pin in back of field coil with hole in compressor end housing, and position field coil into place. Make sure that lead wires are properly routed, and fasten the diode and coil wire bracket with retaining screw.

(2) Install field coil retaining snap ring with Snap Ring Pliers (C- 4574). Press snap ring to make sure it is properly seated in the groove.

NOTE: The bevel side of the snap ring must be outward. Also both eyelets must be to the right or left of the pin on the compressor.

CAUTION: If snap ring is not fully seated it will vibrate out, resulting in a clutch failure and severe damage to the front face of the compressor. Do not mar the pulley frictional surface.

(3) Install pulley assembly to compressor. If necessary, tap gently with a block of wood on the friction surface (Fig. 5).

(4) Install pulley assembly retaining snap ring (bevel side outward) with Snap Ring Pliers (C-4574). Press the snap ring to make sure it is properly seated in the groove.

NOTE: The bevel side of the snap ring must be facing outward.

(5) If the original front plate assembly and pulley assembly are to be reused, the old shim(s) can be used. If not, place a trial stack of shims, 2.54 mm (0.10 in.) thick, on the shaft against the shoulder.

(6) Install front plate assembly onto shaft.

(7) If installing a new front plate and/or pulley assembly, the gap between front plate and pulley face must be checked. Use the following procedure:

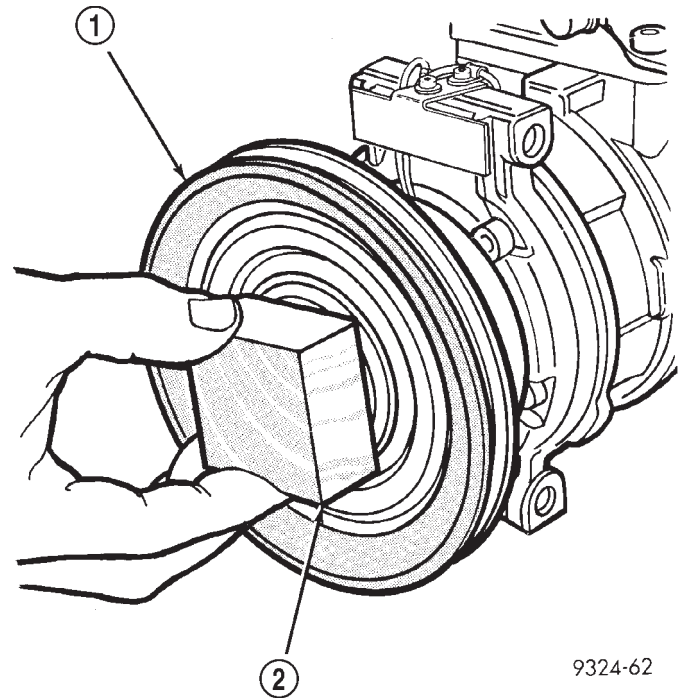
(a) Attach a dial indicator to front plate so that movement of the plate can be measured.

(b) With the dial indicator zeroed on the front plate, energize the clutch and record the amount of movement.

(c) The readings should be 0.35 to 0.65 mm (0.014 to 0.026 in.). If proper reading is not obtained, add or subtract shims until desired reading is obtained.

(8) Install compressor shaft bolt. Tighten to 17.5 ± 2 N·m (155 ± 20 in. lbs.).

NOTE: Shims may compress after tightening shaft nut. Check air gap in four or more places to verify if air gap is still correct. Spin pulley for final check.



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Fig. 5 INSTALLING PULLEY ASSEMBLY

- 1 - PULLEY ASSEMBLY
2 - WOOD BLOCK

(9) Install the accessory drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION) or (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

A/C COMPRESSOR CLUTCH RELAY

DESCRIPTION

The compressor clutch relay is located in the Power Distribution Center (PDC) in the engine compartment. Refer to the PDC label for relay identification and location.

OPERATION

The a/c compressor clutch relay is a electromechanical device that switches battery current to the a/c compressor clutch coil when the Powertrain Control Module (PCM) grounds the coil side of the relay. The PCM responds to inputs from the a/c heater control (Manual Temperature Control, or Automatic Temperature Control), the Body Control Module (BCM), and the a/c pressure transducer.

The compressor clutch relay cannot be repaired and, if faulty or damaged, it must be replaced.

A/C COMPRESSOR CLUTCH RELAY (Continued)

DIAGNOSIS AND TESTING - A/C COMPRESSOR CLUTCH RELAY

RELAY TEST

The compressor clutch relay (Fig. 6) is located in the Power Distribution Center (PDC). Refer to the PDC label for relay identification and location. Remove the relay from the PDC to perform the following tests:

(1) A relay in the de-energized position should have continuity between terminals 87A and 30, and no continuity between terminals 87 and 30. If OK, go to Step 2. If not OK, replace the faulty relay.

(2) Resistance between terminals 85 and 86 (electromagnet) should be 75 ± 5 ohms. If OK, go to Step 3. If not OK, replace the faulty relay.

(3) Connect a battery to terminals 85 and 86. There should now be continuity between terminals 30 and 87, and no continuity between terminals 87A and 30. If OK, see Relay Circuit Test in the Diagnosis and Testing section of this group. If not OK, replace the faulty relay.

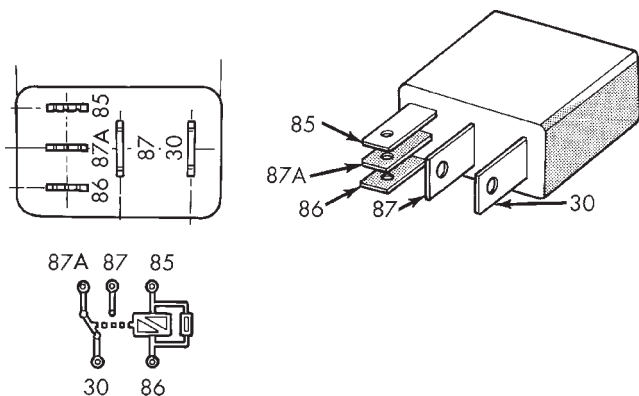


Fig. 6 A/C COMPRESSOR CLUTCH RELAY

- 30 - COMMON FEED
- 85 - COIL GROUND
- 86 - COIL BATTERY
- 87 - NORMALLY OPEN
- 87A - NORMALLY CLOSED

RELAY CIRCUIT TEST

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

(1) The relay common feed terminal cavity (30) is connected to fused battery feed. There should be battery voltage at the cavity for relay terminal 30 at all times. If OK, go to Step 2. If not OK, repair the open circuit to the fuse in the PDC as required.

(2) The relay normally closed terminal (87A) is not used in this application. Go to Step 3.

(3) The relay normally open terminal cavity (87) is connected to the compressor clutch coil. There should be continuity between this cavity and the A/C com-

pressor clutch relay output circuit cavity of the compressor clutch coil wire harness connector. If OK, go to Step 4. If not OK, repair the open circuit as required.

(4) The relay coil battery terminal (86) is connected to the fused ignition switch output (run/start) circuit. There should be battery voltage at the cavity for relay terminal 86 with the ignition switch in the On position. If OK, go to Step 5. If not OK, repair the open circuit to the fuse in the junction block as required.

(5) The coil ground terminal cavity (85) is switched to ground through the Powertrain Control Module (PCM). There should be continuity between this cavity and the A/C compressor clutch relay control circuit cavity of the PCM wire harness connector C (gray) at all times. If not OK, repair the open circuit as required.

REMOVAL

(1) Disconnect and isolate the battery negative cable.

(2) Remove the cover from the Power Distribution Center (PDC) (Fig. 7).

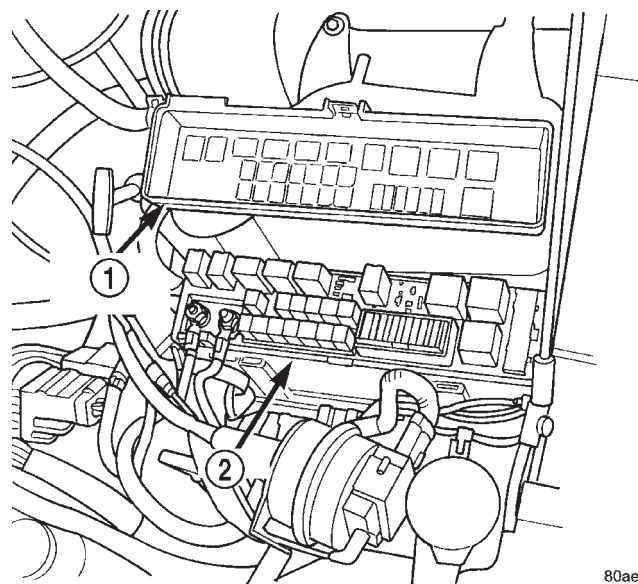


Fig. 7 POWER DISTRIBUTION CENTER (PDC)

- 1 - POWER DISTRIBUTION CENTER COVER
- 2 - POWER DISTRIBUTION CENTER

(3) Refer to the label on the PDC for compressor clutch relay identification and location.

(4) Unplug the compressor clutch relay from the PDC.

A/C COMPRESSOR CLUTCH RELAY (Continued)

INSTALLATION

(1) Install the compressor clutch relay by aligning the relay terminals with the cavities in the PDC and pushing the relay firmly into place.

(2) Install the PDC cover.

(3) Connect the battery negative cable.

(4) Test the relay operation.

A/C HEATER CONTROL

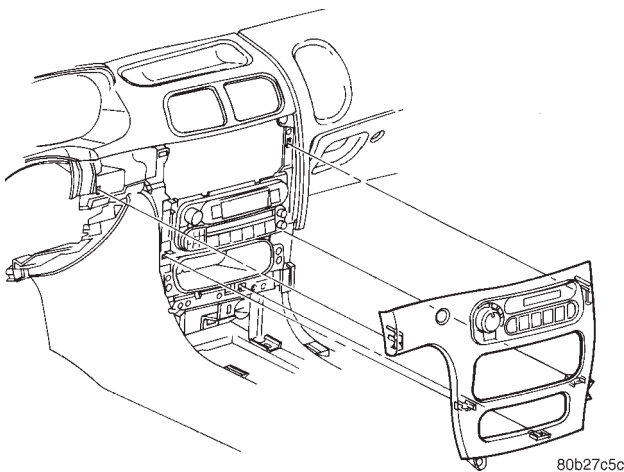
REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove the ash receiver assembly, if necessary.

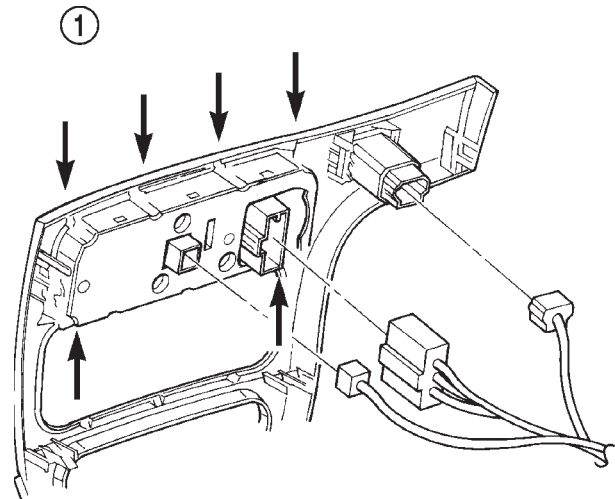
(3) Remove the instrument panel center trim bezel and remove the two electrical connectors from the back of the control head and traction control switch (if equipped) (Fig. 8) and (Fig. 9).



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Fig. 8 INSTRUMENT PANEL CENTER TRIM BEZEL REMOVE/INSTALL

(4) From the back of the center trim bezel, remove the six retaining screws from the a/c heater control head and remove from the bezel.



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Fig. 9 A/C HEATER CONTROL REMOVE/INSTALL

1 - RETAINING SCREWS

INSTALLATION

(1) Place the control into place on the back of the instrument panel center bezel and install the six retaining screws to the a/c heater control.

(2) Connect the two electrical connectors to the back of the control head and traction control switch (if equipped).

(3) Install the instrument panel center bezel.

(4) Install the ash receiver assembly, if necessary.

(5) Connect the negative battery cable remote terminal to the remote battery post.

(6) To allow the BCM to learn the new control head, perform HVAC system calibration. (Refer to 24 - HEATING & AIR CONDITIONING - STANDARD PROCEDURE - HVAC SYSTEM CALIBRATION)

A/C PRESSURE TRANSDUCER

REMOVAL

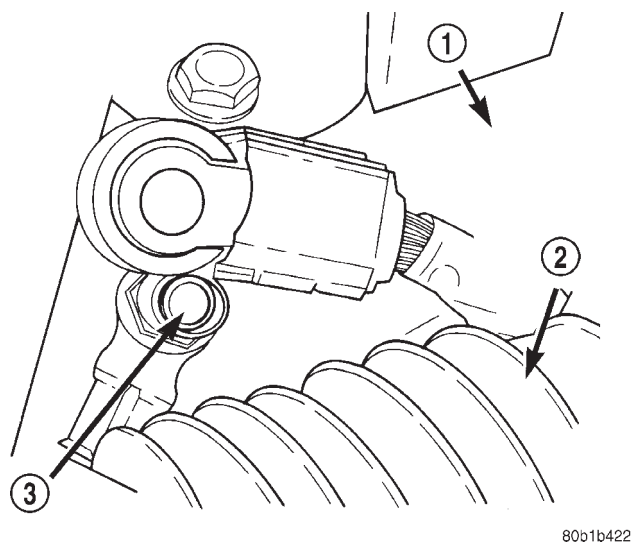
(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Fig. 10).

(2) Disconnect the wire harness connector from the a/c pressure transducer.

CAUTION: A slight release of pressure trapped in the fitting may be experienced. It is not necessary to discharge the refrigerant system.

(3) Remove the transducer with a counterclockwise rotation using a 14 mm open-end wrench.

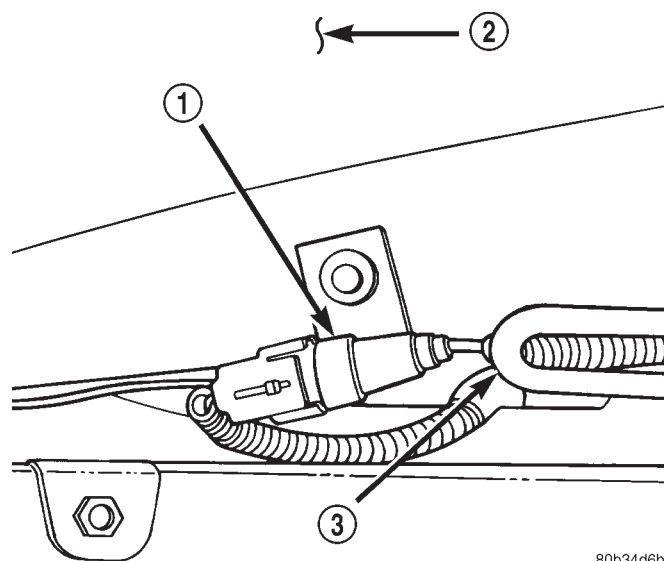
A/C PRESSURE TRANSDUCER (Continued)



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Fig. 10 NEGATIVE BATTERY CABLE REMOTE TERMINAL

- 1 - RIGHT STRUT TOWER
- 2 - AIR CLEANER INLET TUBE
- 3 - REMOTE TERMINAL



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Fig. 11 AMBIENT TEMPERATURE SENSOR LOCATION

- 1 - AMBIENT TEMPERATURE SENSOR
- 2 - FRONT FASCIA
- 3 - POWER STEERING COOLER

INSTALLATION

- (1) Install the a/c pressure transducer on the discharge line fitting and tighten to 6 N·m (50 in. lbs.).
- (2) Plug in the wire harness connector to the a/c pressure transducer.
- (3) Connect the battery negative cable to the remote battery post.

AMBIENT TEMP SENSOR

REMOVAL

The ambient air temperature sensor is located on the inside of the right front bumper beam (Fig. 11). This sensor will inform the ATC system of the ambient temperature outside the vehicle. This sensor is used by the ATC system to adjust blower speed, temperature offsets, evaporator temperatures and mode control.

- (1) Remove sensor mounting screw.
- (2) Disconnect sensor wiring connector.

INSTALLATION

- (1) Connect the sensor wiring harness connector.
- (2) Install the sensor fastener screw and tighten to 2.2 N·m (20 in. lbs.).

POWER MODULE

DESCRIPTION

The blower motor power module is only used in vehicles equipped with Automatic Temperature Control (ATC). It is located on the lower right side of the HVAC unit housing, and is controlled by the Body Control Module (BCM).

OPERATION

The power module receives pulse width modulated (PWM) signals from the BCM. The power module varies voltage to the blower motor for different blower speeds based on the ATC software. There are 14 selectable speeds, while the Auto mode provides 256 variations.

POWER MODULE (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).
- (2) Remove lower right underpanel silencer/duct.
- (3) Disconnect wiring connector to the power module.
- (4) Remove the power module retaining screws.
- (5) Pull the power module out of HVAC housing.

INSTALLATION

- (1) Install the power module in the HVAC housing.
- (2) Install the two screws that secure the power module to the HVAC housing and tighten to 2.2 N·m (20 in. lbs.).
- (3) Plug in the harness connector to the power module.
- (4) Install the lower right underpanel silencer/duct.
- (5) Connect the negative battery cable remote terminal to the remote battery post(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

BLOWER MOTOR RESISTOR BLOCK**DESCRIPTION**

Vehicles with manual air conditioning (non-ATC) systems will have a blower motor resistor block. The resistor block is mounted to the lower right side of the HVAC housing in the passenger compartment, where it can be accessed for service.

The blower motor resistor has multiple resistor wires, each of which will change the resistance in the blower motor ground path to change the blower motor speed. The blower motor switch directs the

ground path through the correct resistor wire to obtain the selected blower motor speed.

The blower motor resistor cannot be repaired and, if faulty or damaged, it must be replaced.

OPERATION

With the blower motor switch in the lowest speed position the ground path for the motor is applied through all of the resistor wires. Each higher speed selected with the blower motor switch applies the blower motor ground path through fewer of the resistor wires, increasing the blower motor speed. When the blower motor switch is in the highest speed position, the blower motor resistor is bypassed and the blower motor receives a direct path to ground.

DIAGNOSIS AND TESTING - BLOWER MOTOR RESISTOR BLOCK

For circuit descriptions and diagrams, (Refer to Appropriate Wiring Information).

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Disconnect and isolate the battery negative cable.
- (2) Unplug the wire harness connector from the blower motor resistor.
- (3) Check for continuity between each of the blower motor switch input terminals of the resistor and the resistor output terminal. In each case there should be continuity. If OK, repair the wire harness circuits between the blower motor switch and the blower motor resistor or blower motor as required. If not OK, replace the faulty blower motor resistor.

BLOWER MOTOR RESISTOR BLOCK (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).
- (2) Remove lower right underpanel silencer/duct.
- (3) Disconnect wiring connector to the blower motor resistor.
- (4) Remove the blower motor resistor retaining screws.
- (5) Remove the blower motor resistor from the HVAC housing.

INSTALLATION

- (1) Install the blower motor resistor in the HVAC housing.
- (2) Install the two screws that secure the blower motor resistor to the HVAC housing and tighten to 2.2 N·m (20 in. lbs.).
- (3) Plug in the harness connector to the blower motor resistor.
- (4) Install the lower right underpanel silencer/duct.
- (5) Connect the negative battery cable remote terminal to the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

EVAPORATOR TEMPERATURE SENSOR

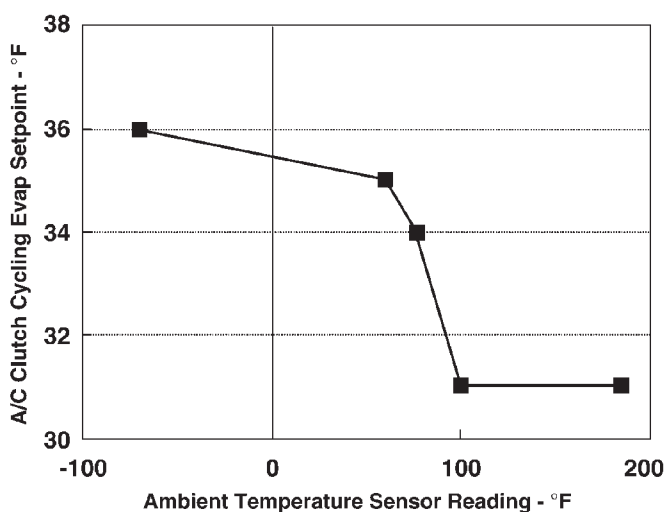
DESCRIPTION

The evaporator temperature sensor is a temperature sensing element located at the coldest point on the face of the evaporator. The evaporator temperature sensor prevents condensate water on the evaporator coil from freezing which can block airflow. The probe is a thermistor inside a metal tube which is wedged between the evaporator fins. The metal tube is tightly held by the evaporator fins so that the ther-

mistor in the tube will detect the temperature of the evaporator. The thermistor will change resistance as the temperature changes.

OPERATION

The Body Control Module (BCM) will send a Programmable Communications Interface (PCI) bus message to the Powertrain Control Module (PCM), which will check engine, coolant temperature, and refrigerant pressure temperature before turning ON the A/C Compressor Clutch. Turning ON the A/C Compressor Clutch will allow the system to cool the evaporator. The BCM will send a message to the PCM when the evaporator temperature becomes too cold. The PCM will then turn OFF the A/C Compressor Clutch, before evaporator freeze up occurs. The DRBIII® scan tool can be used to monitor this operation. The temperature set point at which the clutch is turned OFF varies with the outside ambient temperature. The temperature at which the clutch is turned ON is preset to 2° F above the OFF setpoint mentioned above. Refer to Evaporator Temperature Sensor Set point table and (Fig. 12) for the correct setpoint.



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Fig. 12 EVAPORATOR TEMPERATURE SENSOR SET POINT

EVAPORATOR TEMPERATURE SENSOR SET POINT	
AMBIENT TEMPERATURE SENSOR READING °F (°C)	A/C CLUTCH OFF EVAPORATOR TEMPERATURE SET POINT °F (°C)
185 (85)	31 (-0.5)
100 (37.7)	31 (-0.5)
77 (25)	34 (1.1)
60 (15.5)	35 (1.6)
-70 (-56.6)	36 (2.2)

EVAPORATOR TEMPERATURE SENSOR (Continued)

REMOVAL

(1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).

(2) Remove the right under panel silencer.

(3) Disconnect the wiring connector for the evaporator probe.

(4) At the center of the HVAC housing, locate the evaporator probe access plate. Using a flat blade pry tool, pull back on the locking tab. Twist the access plate counter clockwise one-quarter turn, and push the plate inside the HVAC housing (Fig. 13).

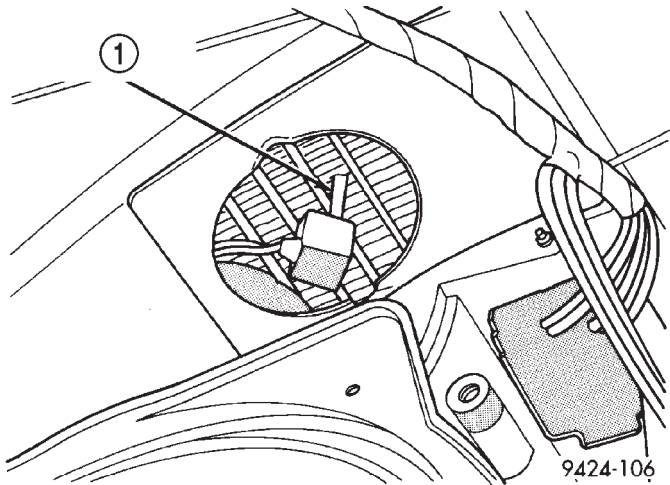


Fig. 13 EVAPORATOR PROBE NEEDLE

1 - EVAPORATOR PROBE

(5) Orient the plate in such a way that allows it to be pulled through the mounting hole, and remove it.

(6) Pull the evaporator probe out of evaporator core.

INSTALLATION

The new probe must not go into the same hole (in the evaporator coil) that the old probe was removed.

(1) The evaporator is manufactured with three holes for probe insertion. Insert the probe in the uppermost hole.

(2) Insert the access plate inside the HVAC housing and orientate it so that the locking tab is one-quarter turn clockwise to where the tab snaps into the HVAC case detent. Note that the plate will be flush with the outside of the HVAC housing.

(3) Turn the plate one-quarter turn counter clockwise to seat the locking tab in the HVAC case detent.

(4) Connect the wiring harness connector for the evaporator probe.

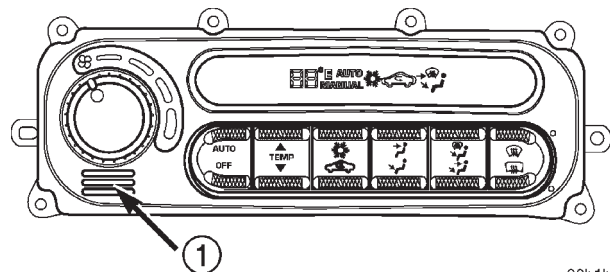
(5) Install the right under panel silencer.

(6) Connect the negative battery cable remote terminal to the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

IN-CAR TEMPERATURE SENSOR

DESCRIPTION

The Automatic Temperature Control (ATC) in-car temperature sensor returns electrical signals to the Body Control Module (BCM). The in-car temperature sensor is used on ATC equipped vehicles only. The in-car temperature sensor is made up of two parts. One part is the in-car sensor aspirator motor assembly, and the second part is a temperature thermistor. The in-car sensor aspirator motor assembly attaches to the back of the ATC Control head (Fig. 14). This assembly has a small fan and a motor which draws air through the intake on the front of the ATC control. The in-car sensor thermistor is located inside of the ATC Control Head. The in-car sensor aspirator motor is part of the ATC Control and not a separate serviceable part. The ATC Control must be replaced if there is a fault relating to the motor. The in-car temperature sensor thermistor is part of the ATC Control and not a separate serviceable part. One must replace the ATC Control if the ATC self-diagnostics indicates a fault code. (Refer to 24 - HEATING & AIR CONDITIONING - DIAGNOSIS AND TESTING - SELF DIAGNOSTICS)



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Fig. 14 ATC IN-CAR TEMPERATURE SENSOR

1 - ATC IN-CAR TEMPERATURE SENSOR

OPERATION

Air drawn from the passenger compartment by the in-car sensor aspirator motor assembly, and flows over the thermistor. The in-car sensor thermistor changes resistance with air temperature. The BCM measures this resistance and calculates the temperature of the air drawn into the ATC Control. The ATC system then makes adjustments to maintain the optimum passenger compartment comfort. Refer to the ATC In-Car Sensor Aspirator Motor Operation table for when the ATC Sensor is operating.

IN-CAR TEMPERATURE SENSOR (Continued)

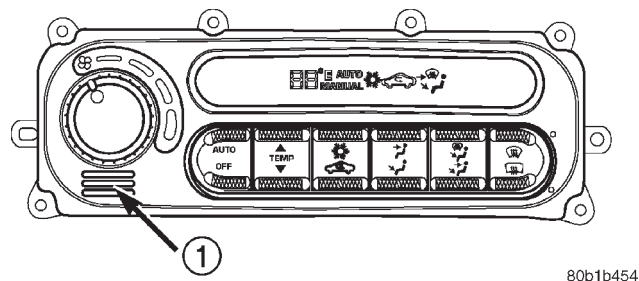
IN-CAR SENSOR ASPIRATOR MOTOR OPERATION	
CONDITION	MOTOR OPERATION
IGNITION SWITCH IS ON	MOTOR ALWAYS OPERATES, EVEN WHEN ATC CONTROL HEAD "OFF" BUTTON IS PUSHED
VEHICLE IS DRIVEN, THEN THE IGNITION SWITCH IS TURNED OFF	MOTOR TURNS OFF WHEN THE IGNITION SWITCH IS TURNED OFF
VEHICLE DOOR IS OPENED, AND LEFT OPEN, WITHOUT TURNING ON THE IGNITION SWITCH	MOTOR WILL TURN ON, AND THEN TURN OFF APPROXIMATELY 2 MINUTES FROM THE TIME THE DOOR WAS OPENED
VEHICLE DOOR IS OPENED, AND THEN CLOSED, WITHOUT TURNING ON THE IGNITION SWITCH	MOTOR WILL TURN ON, AND THEN TURN OFF APPROXIMATELY 2 MINUTES AFTER THE DOOR WAS CLOSED

DIAGNOSIS AND TESTING - IN-CAR SENSOR ASPIRATOR MOTOR

(1) Perform air flow test to check the aspirator motor assembly.

(a) Turn ignition to the ON position and push the OFF button to stop the ATC system airflow. This will make it easier to observe paper in step b.

(b) Place a small piece of newspaper in front of the aspirator motor opening on the ATC control. If the paper sticks to the opening, the in-car sensor aspirator motor is operating properly. The piece of paper should be only large enough to cover the grille opening (Fig. 15).



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Fig. 15 ATC IN-CAR TEMPERATURE SENSOR

1 - GRILLE OPENING

(2) Check if the electrical connection and connector are OK.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

If the ATC in-car temperature sensor (fault 26) is verified to be bad, or if there is a problem with the in-car sensor aspirator motor, then the ATC control must be replaced. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C HEATER CONTROL - REMOVAL)

BLEND DOOR ACTUATOR

DESCRIPTION

The blend door actuator is an electric motor which mechanically positions the blend door. A potentiometer in the actuator allows the BCM (for both manual and ATC systems) to know the exact position of the blend door at all times. The blend door actuator is not serviceable and must be replaced if found to be defective.

REMOVAL

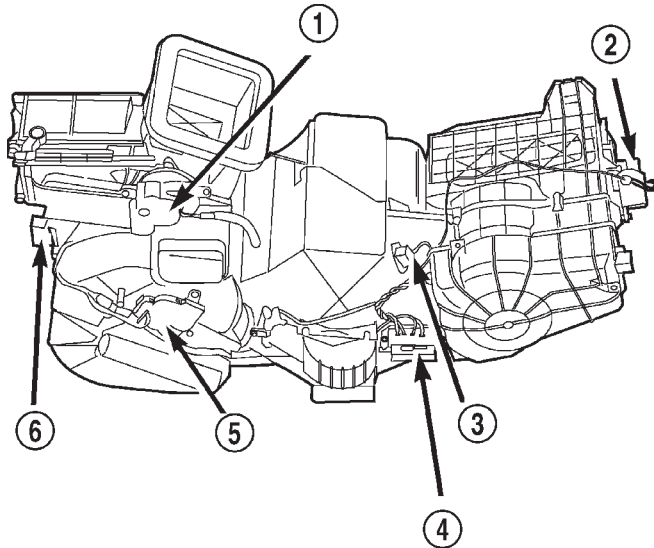
WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).

BLEND DOOR ACTUATOR (Continued)

(2) Remove the left and right underpanel silencer/ducts.

(3) Remove the two screws from the actuator which are accessible from the right side of the center stack (Fig. 16).



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Fig. 16 BLEND DOOR ACTUATOR LOCATION

- 1 - MODE DOOR ACTUATOR
- 2 - RECIRCULATION DOOR ACTUATOR
- 3 - EVAPORATOR TEMPERATURE SENSOR
- 4 - BLOWER MOTOR RESISTOR BLOCK/POWER MODULE
- 5 - BLEND DOOR ACTUATOR
- 6 - HVAC PLENUM CONNECTOR

(4) Remove one screw from actuator on the left side.

(5) Pull the actuator straight down from shaft and disconnect the electrical connection. Upon removal, note the shaft position of the actuator, because the shaft on this motor is keyed. When installing a new actuator, its shaft must be positioned in the same location.

INSTALLATION

(1) Connect the wire harness connector to the blend door actuator.

(2) Install the blend door actuator on the HVAC housing, making sure its keyed shaft is positioned properly.

(3) Install the three fastener screws and tighten to 2.2 N·m (20 in. lbs.).

(4) Install the left and right underpanel silencer/ducts.

(5) Connect the negative battery cable remote terminal to the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

MODE DOOR ACTUATOR

DESCRIPTION

The mode door actuator is an electric motor. It mechanically positions the panel/bi-level door and the floor/defrost door. This actuator contains a potentiometer which allows the BCM (for both manual and ATC systems) to know the exact position of the mode doors at all times. The mode door actuator is not serviceable and must be replaced if found to be defective.

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Open hood and disconnect the negative battery cable remote terminal from the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).

(2) Remove the left and right underpanel ducts.

(3) Remove the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - REMOVAL). Refer to Body for the procedures.

(4) Remove the center floor heat adaptor duct.

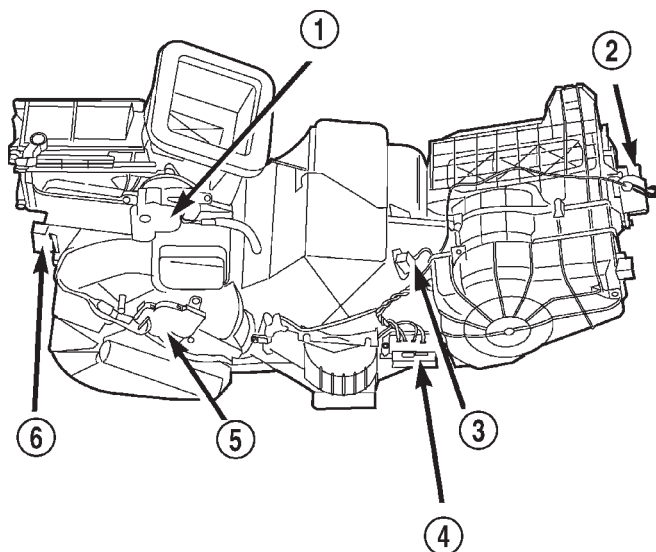
(5) Remove the rear seat heat forward adaptor duct.

(6) Loosen the center support bracket and pry rearward to gain access to the actuator.

(7) Remove the actuator retaining screws. Then pull the actuator straight down. Upon removal, note the shaft position of the actuator, because the shaft on this motor is keyed. When installing a new actuator, its shaft must be positioned in the same location (Fig. 17).

(8) Remove the electrical connection on the actuator.

MODE DOOR ACTUATOR (Continued)



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Fig. 17 MODE DOOR ACTUATOR LOCATION

- 1 - MODE DOOR ACTUATOR
- 2 - RECIRCULATION DOOR ACTUATOR
- 3 - EVAPORATOR TEMPERATURE SENSOR
- 4 - BLOWER MOTOR RESISTOR BLOCK/POWER MODULE
- 5 - BLEND DOOR ACTUATOR
- 6 - HVAC PLENUM CONNECTOR

INSTALLATION

(1) Connect the wire harness connector to the mode door actuator.

(2) Install the mode door actuator on the HVAC housing, making sure its keyed shaft is positioned properly.

(3) Install the three fastener screws and tighten to 2.2 N·m (20 in. lbs.).

(4) Reposition the center support bracket and install fastener. Refer to Body for the procedures.

(5) Install the rear seat heat forward adaptor duct.

(6) Install the center floor heat adaptor duct.

(7) Install the floor console (Refer to 23 - BODY/INTERIOR/FLOOR CONSOLE - INSTALLATION).

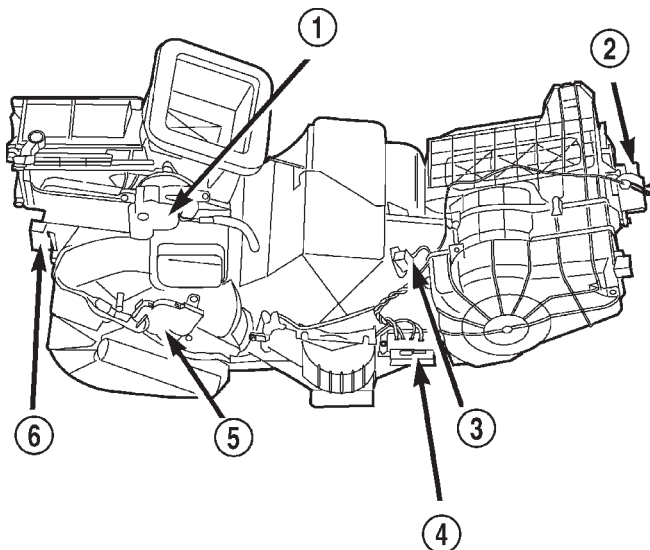
(8) Install the left and right underpanel ducts.

(9) Connect the negative battery cable remote terminal to the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

RECIRCULATION DOOR ACTUATOR**REMOVAL**

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The recirculation door actuator is located on the right side of the heater housing (Fig. 18).



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Fig. 18 RECIRCULATION DOOR ACTUATOR LOCATION

- 1 - MODE DOOR ACTUATOR
- 2 - RECIRCULATION DOOR ACTUATOR
- 3 - EVAPORATOR TEMPERATURE SENSOR
- 4 - BLOWER MOTOR RESISTOR BLOCK/POWER MODULE
- 5 - BLEND DOOR ACTUATOR
- 6 - HVAC PLENUM CONNECTOR

(1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post.

RECIRCULATION DOOR ACTUATOR (Continued)

(2) Remove the instrument panel(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

(3) Remove the actuator retaining screws. Pull the actuator straight off the recirculation door shaft. Upon removal, note the shaft position of the actuator, because the shaft on this motor is keyed. When installing a new actuator, its shaft must be positioned in the same location.

(4) Disconnect the electrical connection.

(5) Remove the recirculation door actuator from vehicle.

INSTALLATION

(1) Connect the wire harness connector to the recirculation door actuator.

(2) Install the recirculation door actuator on the HVAC housing, making sure its keyed shaft is positioned properly.

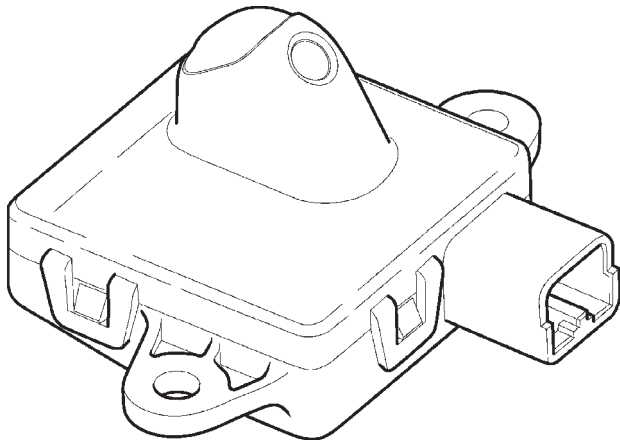
(3) Install the three fastener screws and tighten to 2.2 N·m (20 in. lbs.).

(4) Install the instrument panel(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(5) Connect the negative battery cable remote terminal to the remote battery post.

SUN SENSOR**DESCRIPTION**

The sun sensor is only used on vehicles equipped with Automatic Temperature Control (ATC). The sensor is mounted on the top of the instrument panel below the instrument panel top cover (Fig. 19).



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Fig. 19 ATC SUN SENSOR**OPERATION**

The sun sensor is not a thermistor type sensor but rather a photo diode. For this reason the sun sensor

responds to sun light intensity rather than temperature. It is used to aid in determining proper mode door position, temperature door position and blower speed. The sun sensor is also used to sense day/night conditions for automatic headlight control if so equipped, and has an LED indicator for the vehicle security system.

The sun sensor is not serviceable and must be replaced if found to be defective.

DIAGNOSIS AND TESTING - SUN SENSOR

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

The sun sensor is located so the sun hits the sensor in the same way that it hits the driver and the passenger. It is important that the area in front of the sensor be unobstructed. Check that the following items are not in the way of the sun sensor.

- Windshield wipers that are adjusted too high.
- Stickers on the windshield that are directly in front of the sensor.
- Top cover which is not properly installed. The sun sensor should be 1/4 inch. above the top cover.
- Caps or papers which might cover the sensor.

Some ATC equipped vehicles may exhibit a lack of passenger comfort in sunny weather such as in the early afternoon. Verify that the ATC system is functioning properly. Inspect the location of the sun sensor. The sun sensor must protrude approximately 1/4 inch above the instrument panel top cover to insure proper operation. If the sensor does not protrude 1/4 inch, perform the following procedure:

- Confirm that the top cover is properly installed
- Remove the top cover
- Remove fasteners from sun sensor
- Install one 1/4-20 nut per fastener under the sun sensor so that it is shimmed higher

• Reinstall the sun sensor. Do not overtighten screw. If a longer screw is required, use 8-15x1 inch.

Refer to the proper Diagnostic Information for the electrical test.

SUN SENSOR (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Remove the instrument panel top cover(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - REMOVAL).
- (3) Remove the two Sun Sensor mounting screws.
- (4) Lift the sensor out of the instrument panel and disconnect the wiring.
- (5) Remove the sensor from the vehicle.

INSTALLATION

- (1) Connect the wiring harness connector to the sensor and position in the vehicle.
- (2) Install the two sensor fasteners.
- (3) Install the instrument panel top cover(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL TOP COVER - INSTALLATION).
- (4) Connect the negative battery cable remote terminal to the remote battery post(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

CAUTION: The sun sensor must protrude approximately 1/4 inch above the instrument panel top cover. This will ensure proper operation.

If the sensor does not protrude 1/4 inch, perform the following procedure:

- Confirm that the top cover is properly installed
- Remove the top cover
- Remove fasteners from sun sensor
- Install one 1/4-20 nut per fastener under the sun sensor so that it is shimmed higher
- Reinstall the sun sensor. Do not overtighten screw. If a longer screw is required, use 8-15x1 inch.

DISTRIBUTION

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DISTRIBUTION

DESCRIPTION

DESCRIPTION - HVAC SYSTEM AIRFLOW

The system draws outside air through the cowl opening at the base of the windshield. Then it goes into the plenum chamber above the HVAC unit housing and passes through the evaporator. At this point airflow can be directed either through or around the heater core.

DESCRIPTION - HVAC FORCED
RECIRCULATION

The Body Control Module (BCM) receives a Programmable Communications Interface (PCI) bus message from the Powertrain Control Module (PCM) with the feedback from the A/C Pressure Transducer. The BCM will force the system into the Recirculation mode, reducing the A/C refrigerant pressure under these extreme conditions. The reduced operating pressure offers improved A/C system performance and reduced wear on A/C components.

OPERATION - HVAC SYSTEM AIRFLOW

Airflow temperature can be adjusted by the blend door with the TEMP control on the a/c heater control. After the air passes the blend door, the air flow is then directed from the PANEL, BI-LEVEL (panel and floor), and FLOOR-DEFROST outlets. Air flow velocity can be adjusted with the blower speed selector switch on the a/c heater control.

Ambient air intake can be shut off by closing the recirculation door. This will recirculate the air that is already inside the vehicle. See owners manual for recirculation operation.

BLOWER MOTOR

DESCRIPTION

The blower motor and blower wheel are located in the passenger side end of the HVAC housing, below the glove box module. The blower motor controls the velocity of the air flowing through the HVAC housing by spinning a squirrel cage-type blower wheel within the housing at the selected speed. The blower motor and blower wheel can be serviced from the passenger compartment side of the housing.

OPERATION

The blower motor will only operate when the ignition switch is in the On position, and the a/c heater mode control switch is in any position, except off. The blower motor circuit is protected by a fuse in the junction block. On models with the standard manual temperature control system, the blower motor speed is controlled by regulating the battery feed through the blower motor switch and the blower motor resistor. On models with Automatic Temperature Control (ATC) system, the blower motor speed is controlled by using a linear blower controller with a pulse width modulation input. The blower motor power module adjusts the battery feed voltage to the blower motor, based upon an input from the blower motor switch, through the ATC control module. Pulse width modulation of blower power allows the blower to operate at any speed from stationary, to full speed.

The blower motor and blower motor wheel cannot be repaired, and if faulty or damaged, they must be replaced. The blower motor and blower wheel are not serviced separately and must be replaced as an assembly.

BLOWER MOTOR (Continued)

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

- (1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).
- (2) Remove the lower right under panel duct.
- (3) Remove the blower motor connector from the blower motor resistor block/power module.
- (4) Squeeze the blower motor wiring grommet and push the grommet through the blower motor housing cover.
- (5) Remove the blower motor housing cover.
- (6) Remove the blower motor retaining screws.
- (7) Lower the blower motor from housing.

INSTALLATION

- (1) Install the blower motor in the HVAC housing and tighten the mounting screws to 2.2 N-m (20 in. lbs.).
- (2) Install the blower motor housing cover.
- (3) Position the blower motor wiring grommet in the blower motor housing cover.
- (4) Connect the blower motor harness connector to the blower motor resistor block/power module.
- (5) Install the lower right under panel duct.
- (6) Connect the negative battery cable remote terminal to the remote battery post(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

HVAC HOUSING

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYS-

TEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: REVIEW THE WARNINGS IN THE FRONT OF PLUMBING BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

- (1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post(Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - REMOVAL).
- (2) Remove the instrument panel from vehicle(Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).
- (3) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)
- (4) Drain the engine cooling system(Refer to 7 - COOLING - STANDARD PROCEDURE).
- (5) Remove the air cleaner hose and air distribution duct from the engine.
- (6) Remove the spring type heater hose fasteners at the dash panel and remove the hoses from heater core. Plug the heater core inlet and outlet tubes to prevent anti-freeze from spilling on the vehicle interior during removal. If an appropriate plug cannot be found pull back carpet and use caution when removing the HVAC housing. Keep the heater tubes elevated to prevent spillage of coolant.
- (7) Remove one nut at expansion valve retaining both A/C lines to expansion valve. After removing the lines cap the expansion valve openings and the A/C hose openings. This will prevent any dirt or moisture from entering the refrigerant system during servicing.

CAUTION: The lubricant used in this air conditioning system absorbs moisture readily (similar to brake fluid). Do not leave any portion of the system open for extended periods of time.

- (8) Remove the three retaining nuts from the studs. These studs project through the dash panel into the engine compartment.
- (9) Remove two screws to the defrost duct and remove.
- (10) Remove two nuts, and two screws attaching the HVAC housing to the dash panel.
- (11) Remove four nuts retaining the rear seat heat duct, and remove.

HVAC HOUSING (Continued)

(12) Remove the rear seat heat duct elbow push pin fastener.

(13) Disconnect the HVAC harness connector.

(14) Gently pull the HVAC unit housing rearward from the dash panel, being careful not to spill any coolant into the passenger compartment.

DISASSEMBLY

(1) Remove the HVAC housing from the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL)

(2) Place HVAC housing on a workbench.

(3) Remove the heater core retaining screws. Pull back on the retaining tabs and remove the heater core from the housing.

(4) Remove the recirculation door actuator wiring. Remove the actuator from the recirculation housing. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RECIRCULATION DOOR ACTUATOR - REMOVAL)

(5) Remove the lower distribution housing.

(6) Remove the mode door actuator. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/MODE DOOR ACTUATOR - REMOVAL)

(7) Remove the blend door actuator. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/BLEND DOOR ACTUATOR - REMOVAL)

(8) Remove the recirculation housing screws and clip.

(9) Remove the blower motor wiring at the blower motor resistor block/power module.

(10) Squeeze the blower motor wiring grommet and push the grommet through the blower motor cover.

(11) Remove the blower motor cover.

(12) Remove the blower motor retaining screws and remove the motor.

(13) Remove the blower motor resistor block/power module.

(14) Remove the evaporator temperature probe. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/EVAPORATOR TEMPERATURE SENSOR - REMOVAL)

(15) Remove the vent door seal from the HVAC housing.

(16) Remove the evaporator seal from the HVAC housing.

(17) Remove the upper housing screws and clips.

(18) Separate the upper half of the HVAC housing from the lower half.

(19) Remove the evaporator assembly from the lower housing.

(20) Remove the blend door from the lower housing.

(21) Using a flat blade screwdriver, pinch in the retaining tab at the base of the vent door. Pull up on door and remove it from the HVAC housing.

(22) Remove the mode door actuating cam.

(23) Remove the screw at defrost door actuating arm. Remove the defrost door link from the arm.

(24) Remove the defrost door arm from the lower HVAC housing.

(25) Remove the link and defrost door from the HVAC housing.

(26) Remove the vent door actuating arm from the lower HVAC housing.

ASSEMBLY

(1) Install the vent door actuating arm to the lower HVAC housing.

(2) Install the defrost door link to the defrost door.

(3) Install the defrost door and link into the HVAC housing.

(4) Install the defrost door actuating arm and retaining screw to the HVAC housing.

(5) Install the defrost door link to the actuating arm.

(6) Line up the slots to the pegs on the mode door cam, and install the mode door cam.

(7) Turn the HVAC housing over and snap in the vent door to the vent door arm.

(8) Install the blend door in the HVAC housing.

(9) Install the evaporator into the lower HVAC housing.

(10) Install the upper housing onto the lower housing.

(11) Install the screws that secure the two housing halves to each other and tighten to 2.2 N·m (20 in. lbs.).

(12) Install the evaporator and vent door seals on the HVAC housing.

(13) Insert the evaporator temperature sensor in the evaporator. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/EVAPORATOR TEMPERATURE SENSOR - INSTALLATION) **If the same evaporator is being used, the new probe must not go into the same hole (in the evaporator coil) that the old probe was removed.** The evaporator is manufactured with three holes for probe insertion. Insert the probe in the uppermost hole. If a new evaporator is installed, place the evaporator probe in the same location as on the previous evaporator.

(14) Install the wiring at the evaporator temperature probe.

(15) Install the blower motor resistor block/power module.

(16) Install the blower motor in the HVAC housing. Install the blower motor mounting screws and tighten to 2.2 N·m (20 in. lbs.).

HVAC HOUSING (Continued)

(17) Thread the blower motor wiring through the blower motor cover, and install the blower motor housing cover.

(18) Seat the blower motor wiring grommet in the blower motor housing cover.

(19) Install the blower motor wiring to the blower motor resistor.

(20) Position the recirculation housing to the HVAC housing. Install the retaining screws and clip.

(21) Install the blend door actuator. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ BLEND DOOR ACTUATOR - INSTALLATION)

(22) Install the mode door actuator. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/ MODE DOOR ACTUATOR - INSTALLATION)

(23) Install the lower distribution housing.

(24) Install the recirculation door actuator and wiring. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RECIRCULATION DOOR ACTUATOR - INSTALLATION)

(25) Install heater core in the HVAC housing. Tighten the retaining screws to 2.2 N·m (20 in. lbs.).

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF PLUMBING BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Position the HVAC housing to the dash panel. Be certain that the evaporator condensate drain tube and the mounting studs are inserted into their correct mounting holes.

(2) Connect the HVAC harness connector.

(3) Install the rear seat heat duct elbow push pin fastener.

(4) Position the rear seat heat duct and install the four retainer nuts. Tighten to 2.2 N·m (20 in. lbs.).

(5) Install the two nuts, and two screws attaching the HVAC housing to the dash panel. Tighten to 4.5 N·m (40 in. lbs.).

(6) Position the defrost duct and install the two retainer screws. Tighten to 2.2 N·m (20 in. lbs.).

(7) Install the nuts on the HVAC housing mounting studs on the engine compartment side of the dash panel. Tighten to 7 N·m (60 in. lbs.).

(8) Unplug or remove the tape from liquid and suction lines, and the expansion valve. Connect the lines to the expansion valve and tighten the retaining nut to 23 N·m (17 ft. lbs.).

(9) Install the heater hoses to the heater core and install the spring type hose fasteners and fill the engine cooling system (Refer to 7 - COOLING - STANDARD PROCEDURE).

(10) Install the air cleaner hose and air distribution duct (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).

(11) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(12) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

(13) Install the instrument panel in the vehicle (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).

(14) Connect the negative battery cable remote terminal to the remote battery post (Refer to 8 - ELECTRICAL/BATTERY SYSTEM/CABLES - INSTALLATION).

INSTRUMENT PANEL DEMISTER DUCTS

DESCRIPTION

The side window demisters direct air from the heater assembly through the outlets located on the top corners of the instrument panel, to the side windows.

OPERATION

Side window demisting is performed when the mode selector is on FLOOR, DEFROST, MIX OR BI-LEVEL setting.

PLUMBING

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PLUMBING

DESCRIPTION - REFRIGERANT LINE

The refrigerant lines and hoses are used to carry the refrigerant between the various air conditioning system components. A barrier hose design with a nylon tube, which is sandwiched between rubber layers, is used for the R-134a air conditioning system on this vehicle. This nylon tube helps to further contain the R-134a refrigerant, which has a smaller molecular structure than R-12 refrigerant. The ends of the

refrigerant hoses are made from lightweight aluminum or steel, and commonly use braze-less fittings.

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

PLUMBING (Continued)

OPERATION - REFRIGERANT LINE

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

The refrigerant lines and hoses are coupled with other components of the HVAC system with peanut-block style fittings. A stat-O seal type flat steel gasket with a captured compressible O-ring, is used to mate plumbing lines with A/C components to ensure the integrity of the refrigerant system.

The refrigerant lines and hoses cannot be repaired and, if faulty or damaged, they must be replaced.

WARNING

WARNING: WEAR EYE PROTECTION WHEN SERVICING THE AIR CONDITIONING REFRIGERANT SYSTEM. SERIOUS EYE INJURY CAN RESULT FROM EYE CONTACT WITH REFRIGERANT. IF EYE CONTACT IS MADE, SEEK MEDICAL ATTENTION IMMEDIATELY.

DO NOT EXPOSE REFRIGERANT TO OPEN FLAME. POISONOUS GAS IS CREATED WHEN REFRIGERANT IS BURNED. AN ELECTRONIC TYPE LEAK DETECTOR IS RECOMMENDED.

LARGE AMOUNTS OF REFRIGERANT RELEASED IN A CLOSED WORK AREA WILL DISPLACE THE OXYGEN AND CAUSE SUFFOCATION.

THE EVAPORATION RATE OF REFRIGERANT AT AVERAGE TEMPERATURE AND ALTITUDE IS EXTREMELY HIGH. AS A RESULT, ANYTHING THAT COMES IN CONTACT WITH THE REFRIGERANT WILL FREEZE. ALWAYS PROTECT SKIN OR DELICATE OBJECTS FROM DIRECT CONTACT WITH REFRIGERANT. R-134a SERVICE EQUIPMENT OR VEHICLE A/C SYSTEM SHOULD NOT BE PRESSURE TESTED OR LEAK TESTED WITH COMPRESSED AIR.

SOME MIXTURES OF AIR AND R-134a HAVE BEEN SHOWN TO BE COMBUSTIBLE AT ELEVATED PRESSURES. THESE MIXTURES ARE POTENTIALLY DANGEROUS AND MAY RESULT IN FIRE OR EXPLOSION CAUSING INJURY OR PROPERTY DAMAGE.

ANTIFREEZE IS AN ETHYLENE GLYCOL BASE COOLANT AND IS HARMFUL IF SWALLOWED OR INHALED. SEEK MEDICAL ATTENTION IMMEDIATELY IF SWALLOWED OR INHALED. DO NOT STORE IN OPEN OR UNMARKED CONTAINERS. WASH SKIN AND CLOTHING THOROUGHLY AFTER COMING IN CONTACT WITH ETHYLENE GLYCOL.

KEEP OUT OF REACH OF CHILDREN AND PETS. DO NOT OPEN A COOLING SYSTEM WHEN THE ENGINE IS AT RUNNING TEMPERATURE. PERSONAL INJURY CAN RESULT.

CAUTION**CAUTIONS**

CAUTION: The engine cooling system is designed to develop internal pressure of 97 to 123 kPa (14 to 18 psi). Allow the vehicle to cool a minimum of 15 minutes before opening the cooling system. Refer to Cooling.

The system must be completely empty before opening any fitting or connection in the refrigeration system. Open fittings with caution even after the system has been emptied. If any pressure is noticed as a fitting is loosened, retighten fitting and evacuate the system again.

A good rule for the flexible hose lines is to keep the radius of all bends at least 10 times the diameter of the hose. Sharper bends will reduce the flow of refrigerant. The flexible hose lines should be routed so they are at least 3 inches (80 mm) from the exhaust manifold. Inspect all flexible hose lines to make sure they are in good condition and properly routed.

The use of correct wrenches when making connections is very important. Improper wrenches or improper use of wrenches can damage the fittings. The internal parts of the A/C system will remain stable as long as moisture-free refrigerant and refrigerant oil is used. Abnormal amounts of dirt, moisture or air can upset the chemical stability. This may cause operational troubles or even serious damage if present in more than very small quantities.

When opening a refrigeration system, have everything you will need to repair the system ready. This will minimize the amount of time the system must be opened. Cap or plug all lines and fittings as soon as they are opened. This will help prevent the entrance of dirt and moisture. All new lines and components should be capped or sealed until they are ready to be used.

All tools, including the refrigerant dispensing manifold, the manifold gauge set, and test hoses should be kept clean and dry.

REFRIGERANT SYSTEM HOSES/LINES/TUBES/ PRECAUTIONS

Kinks in the refrigerant tubing or sharp bends in the refrigerant hose lines will greatly reduce the capacity of the entire system.

PLUMBING (Continued)

High pressures are produced in the system when it is operating. Extreme care must be exercised to make sure that all connections are pressure tight. Dirt and moisture can enter the system when it is opened for repair or replacement of lines or components. The refrigerant oil will absorb moisture readily out of the air. This moisture will convert into acids within a closed system.

DIAGNOSIS AND TESTING - REFRIGERANT SYSTEM LEAKS

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

If the refrigerant system is empty or low in refrigerant charge, a leak at any line fitting or component seal is likely. A review of the fittings, lines and components for oily residue is an indication of the leak location. To detect a leak in the refrigerant system, perform one of the following procedures as indicated by the symptoms.

EMPTY REFRIGERANT SYSTEM LEAK TEST

(1) Evacuate the refrigerant system (minimum evacuation time of 15 min.) to the lowest degree of vacuum possible (approx. 28 in Hg.). (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE) Determine if the system holds a vacuum for at least 15 minutes after pump is off. If vacuum is held, a leak is probably not present. If system will not maintain vacuum level, proceed with this procedure.

(2) Prepare a .284 Kg. (10 oz.) refrigerant charge to be injected into the system.

(3) Connect and dispense .284 Kg. (10 oz.) of refrigerant into the evacuated refrigerant system.

(4) Proceed to Step 2 of Low Refrigerant Level Leak Test.

LOW REFRIGERANT LEVEL LEAK TEST

(1) Determine if there is any (R-134a) refrigerant in the system.

(2) Position the vehicle in a wind free work area. This will aid in detecting small leaks.

(3) Bring the refrigerant system up to operating temperature and pressure. This is done by allowing the engine to run for five minutes with the system set to the following:

- Transaxle in Park
- Engine Idling
- A/C Controls Set in 100 percent outside air (Recirculation position)
- Blower switch in the high A/C position

- A/C in the ON position
- Open all windows

CAUTION: A leak detector designed for R-12 refrigerant may not detect leaks in a R-134a refrigerant system. Check specifications on leak detector.

(4) Shut off the vehicle and wait 2 to 7 minutes. Then use an Electronic Leak Detector that is designed to detect R-134a type refrigerant and search for leaks. Fittings, lines, or components that appear to be oily usually indicates a refrigerant leak. To inspect the evaporator core for leaks, insert the leak detector probe into the drain tube opening or a heat duct.

NOTE: If leak is not detected but known to exist, further diagnosis may be necessary using a refrigerant dye and the recovery machine. Refer to recovery machine instructions for proper dye injection procedures.

STANDARD PROCEDURE

STANDARD PROCEDURE - REFRIGERANT SYSTEM SERVICE EQUIPMENT

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

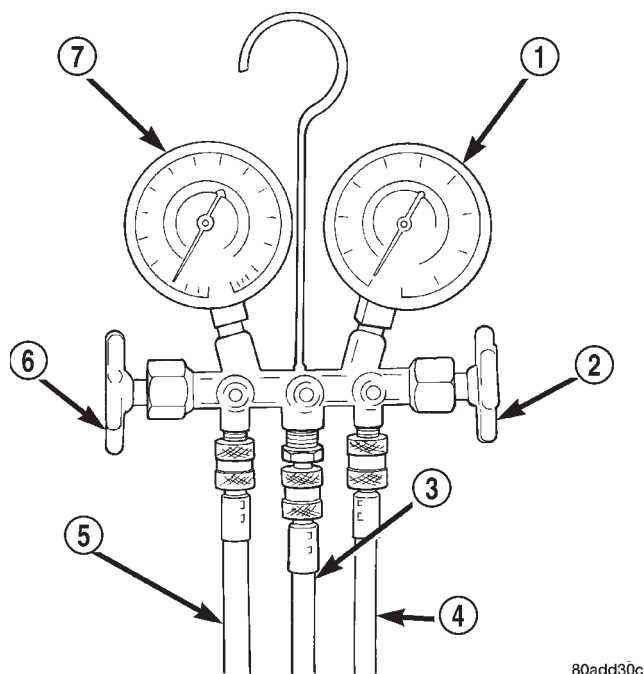
When servicing the air conditioning system, a R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used. Contact an automotive service equipment supplier for refrigerant recovery/recycling/charging equipment. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

A manifold gauge set may be needed with some recovery/recycling/charging equipment (Fig. 1). The service hoses on the gauge set being used should have manual (turn wheel), or automatic back-flow valves at the service port connector ends. This will prevent refrigerant from being released into the atmosphere.

MANIFOLD GAUGE SET CONNECTIONS

CAUTION: Do not use an R-12 manifold gauge set on an R-134a system. The refrigerants are not compatible and system damage will result.

PLUMBING (Continued)



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Fig. 1 MANIFOLD GAUGE SET - TYPICAL

- 1 - HIGH PRESSURE GAUGE
- 2 - VALVE
- 3 - VACUUM/REFRIGERANT HOSE (YELLOW W/ BLACK STRIPE)
- 4 - HIGH PRESSURE HOSE (RED W/ BLACK STRIPE)
- 5 - LOW PRESSURE HOSE (BLUE W/ BLACK STRIPE)
- 6 - VALVE
- 7 - LOW PRESSURE GAUGE

LOW PRESSURE GAUGE HOSE The low pressure hose (Blue with Black stripe) attaches to the suction service port. This port is located on the suction line between the accumulator outlet and the compressor.

HIGH PRESSURE GAUGE HOSE The high pressure hose (Red with Black stripe) attaches to the discharge service port. This port is located on the discharge line between the compressor and the condenser inlet.

RECOVERY/RECYCLING/EVACUATION/CHARGING HOSE The center manifold hose (Yellow, or White, with Black stripe) is used to recover, evacuate, and charge the refrigerant system. When the low or high pressure valves on the manifold gauge set are opened, the refrigerant in the system will escape through this hose.

STANDARD PROCEDURE - REFRIGERANT RECOVERY

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to recover the refrigerant from an R-134a refrigerant system. Refer to the operating instructions supplied by the equipment manufacturer for the proper care and use of this equipment.

STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

NOTE: Special effort must be used to prevent moisture from entering the A/C system oil. Moisture in the oil is very difficult to remove and will cause a reliability problem with the compressor.

If a compressor designed to use R-134a refrigerant is left open to the atmosphere for an extended period of time. It is recommended that the refrigerant oil be drained and replaced with new oil or a new compressor be used. This will eliminate the possibility of contaminating the refrigerant system.

If the refrigerant system has been open to the atmosphere, it must be evacuated before the system can be filled. Moisture and air mixed with the refrigerant will raise the compressor head pressure above acceptable operating levels. This will reduce the performance of the air conditioner and damage the compressor. Moisture will boil at near room temperature when exposed to vacuum. To evacuate the refrigerant system:

NOTE: When connecting the service equipment coupling to the line fitting, verify that the valve of the coupling is fully closed. This will reduce the amount of effort required to make the connection.

(1) Connect a suitable charging station, refrigerant recovery machine, or a manifold gauge set with vacuum pump (Fig. 2).

(2) Open suction and discharge valves and start vacuum pump. The vacuum pump should run a minimum of 45 minutes prior to charge, to eliminate all moisture in system. When suction gauge reads -88 kPa (-26 in. Hg) vacuum or greater for 45 minutes, close all valves and turn off vacuum pump. **If the system fails to reach specified vacuum, the refrigerant system likely has a leak that must be corrected.** If the refrigerant system maintains specified vacuum for at least 30 minutes, start the vacuum pump, open the suction and discharge

PLUMBING (Continued)

valves. Then allow the system to evacuate an additional 10 minutes.

(3) Close all valves. Turn off and disconnect the vacuum pump.

(4) The refrigerant system is prepared to be charged with refrigerant.

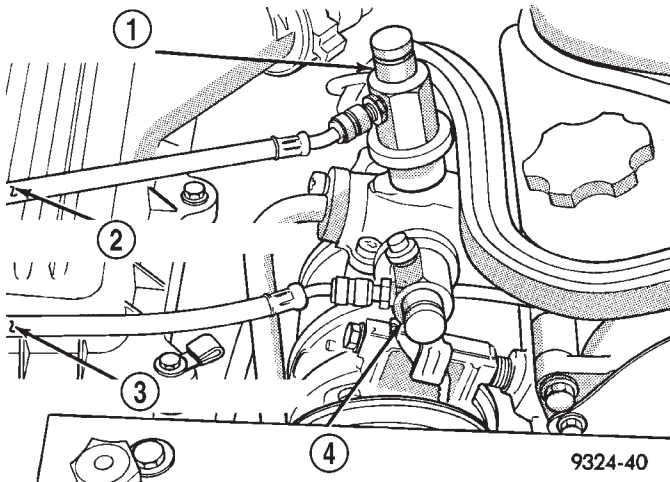


Fig. 2 GAUGE SET OR REFRIGERANT RECOVERY MACHINE HOOKUP (3.2 / 3.5L)

- 1 - HIGH SIDE CONNECTOR
- 2 - TO MANIFOLD GAUGE SET
- 3 - TO MANIFOLD GAUGE SET
- 4 - LOW SIDE CONNECTOR

STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

After the refrigerant system has been tested for leaks and evacuated, a refrigerant charge can be injected into the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - SPECIFICATIONS - CHARGE CAPACITY)

A R-134a refrigerant recovery/recycling/charging station that meets SAE Standard J2210 must be used to charge the refrigerant system with R-134a refrigerant. Refer to the operating instructions supplied by the equipment manufacturer for proper care and use of this equipment.

SPECIFICATIONS

CHARGE CAPACITY

The R-134a refrigerant system charge capacity for this vehicle is 0.71 kilograms (1.56 pounds/25 ounces).

A/C COMPRESSOR

DESCRIPTION

The air conditioning system uses a Nippondenso 10PA17 ten cylinder, double-acting swash plate-type compressor on all models. This compressor has a fixed displacement of 170 cubic centimeters (10.374 cubic inches), and has both the suction and discharge ports located on the cylinder head. A label identifying the use of R-134a refrigerant is located on the compressor. This compressor uses an aluminum swash plate, teflon coated pistons and aluminum cylinder walls. One-way check valves are used to regulate refrigerant flow through the compressor.

CAUTION: A 10PA17 R-12 compressor looks identical to a 10PA17 R134a and will bolt up to this vehicle. It is extremely important that a R-134a compressor is identified prior to using compressor in question. Check tag located on compressor for model number.

OPERATION

The compressor is driven by the engine through an electric clutch, drive pulley and belt arrangement. The compressor is lubricated by refrigerant oil that is circulated throughout the refrigerant system with the refrigerant.

The compressor draws in low-pressure refrigerant vapor from the evaporator through its suction port. It then compresses the refrigerant into a high-pressure, high-temperature refrigerant vapor, which is then pumped to the condenser through the compressor discharge port.

The compressor cannot be repaired. If faulty or damaged, the entire compressor assembly must be replaced. The compressor clutch, pulley and clutch coil are available for service.

DIAGNOSIS AND TESTING - COMPRESSOR NOISE

Excessive noise that occurs when the air-conditioning is being used may be caused by:

- Loose Bolts
- Mounting Brackets
- Loose Compressor Clutch
- Excessive High Refrigerant Operating Pressure

Verify the following before compressor repair is performed:

- (1) Compressor drive belt condition
- (2) Proper refrigerant charge
- (3) Thermal expansion valve (TXV) operating correctly
- (4) Head pressure is normal

A/C COMPRESSOR (Continued)

REMOVAL

The A/C compressor may be unbolted and repositioned without discharging the refrigerant system. Discharging is not necessary if removing the compressor clutch/coil assembly, engine, cylinder head, or alternator.

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Disconnect the negative battery cable remote terminal from the remote battery post.

(2) Loosen and remove the drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL) or (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - REMOVAL).

(3) Disconnect the compressor clutch wire lead.

(4) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(5) Remove the refrigerant lines from the compressor.

(6) If system is going to be left open, plug or cap the open lines.

(7) Remove compressor attaching bolts (Fig. 3) and (Fig. 4).

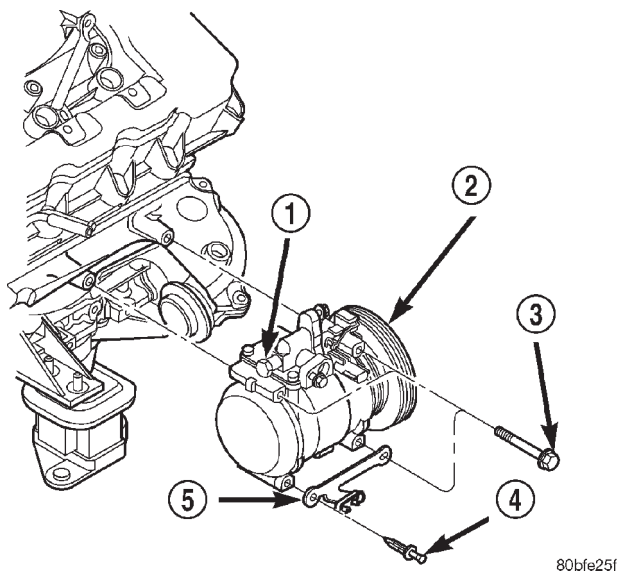


Fig. 3 COMPRESSOR MOUNTING - 2.7L

- 1 - HIGH PRESSURE RELIEF VALVE
- 2 - A/C COMPRESSOR
- 3 - MOUNTING BOLTS
- 4 - PUSH PIN
- 5 - ENGINE OIL COOLER BRACKET

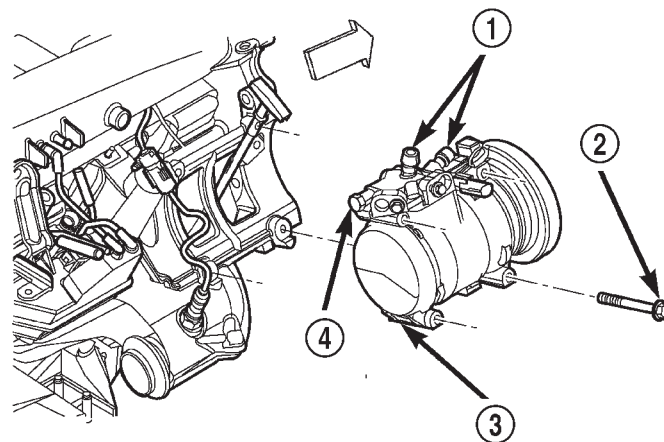


Fig. 4 COMPRESSOR MOUNTING - 3.2L/3.5L

- 1 - SERVICE PORTS
- 2 - MOUNTING BOLTS
- 3 - A/C COMPRESSOR
- 4 - HIGH PRESSURE RELIEF VALVE

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

NOTE: If a replacement compressor is being installed, be certain to check the refrigerant oil level. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - STANDARD PROCEDURE) Use only refrigerant oil of the type recommended for the compressor in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING/REFRIGERANT OIL - DESCRIPTION)

(8) Remove the compressor.

A/C COMPRESSOR (Continued)

(1) Position the a/c compressor in the vehicle and install the attaching bolts. Torque the a/c compressor mounting bolts to 28 N·m (21 ft. lbs.)

(2) Remove the plug or cap from the opened refrigerant line fittings. Install the suction line and discharge line fittings to the manifold on the a/c compressor. Tighten the fasteners to 23 N·m (17 ft. lbs.).

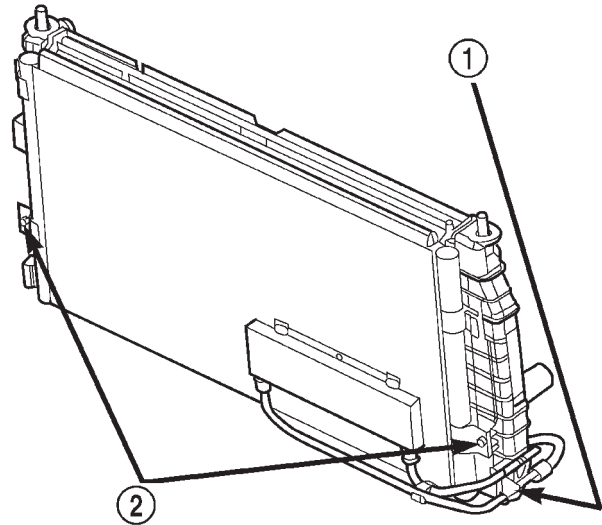
(3) Install the drive belts (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION) or (Refer to 7 - COOLING/ACCESSORY DRIVE/DRIVE BELTS - INSTALLATION).

(4) Connect the a/c compressor clutch coil wire lead.

(5) Connect the negative battery cable remote terminal from the remote battery post.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)



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Fig. 5 A/C CONDENSER TO RADIATOR - 2.7L WITHOUT AUTO STICK

- 1 - TRANSMISSION OIL COOLER LINE MOUNTING BRACKET
2 - A/C CONDENSER TO RADIATOR MOUNTING SCREWS

A/C CONDENSER

REMOVAL

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

The condenser is located between the radiator and the front bumper. The condenser can be serviced without having to drain the cooling system or remove the radiator.

(1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

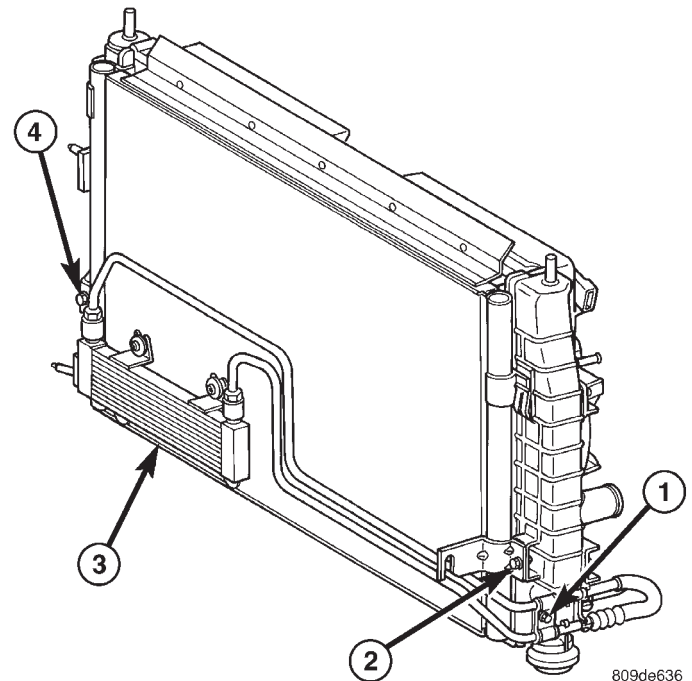
(3) Remove the retainers for the upper radiator core support and place aside (Refer to 7 - COOLING/ENGINE/RADIATOR - REMOVAL).

(4) Undo the auxiliary transmission cooler hose fittings (Do not open the fittings at the Cooler) (Fig. 5) or (Fig. 6).

(5) Remove the screw and retainer bracket for the auxiliary transmission cooler lines.

(6) Remove the discharge line fastener at condenser.

(7) Remove the liquid line fastener at condenser.



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Fig. 6 A/C CONDENSER TO RADIATOR - 3.2/3.5L & 2.7L W/AUTO STICK

- 1 - TRANS COOLER LINE BRACKET SCREW
2 - SCREW - CONDENSER TO RADIATOR
3 - TRANS COOLER
4 - SCREW - CONDENSER TO RADIATOR

(8) Remove two screws retaining the condenser to the radiator.

A/C CONDENSER (Continued)

- (9) Separate the condenser from the radiator.
- (10) Remove the condenser (with auxiliary transmission cooler attached) from the vehicle.
- (11) Cut the auxiliary transmission cooler retaining straps.

NOTE: The new condenser will include new retaining straps for the auxiliary transmission cooler attachment to new condenser assembly.

CAUTION: Avoid bending or breaking condenser inlet tube when lifting radiator/condenser assembly from the vehicle.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

- (1) Install the auxiliary transmission cooler in the same position on the condenser with new retaining straps.
- (2) Install the condenser in the vehicle.
- (3) Install the two screws retaining the condenser to the radiator. Tighten the screws to 10.5 N·m (95 in. lbs.).
- (4) Connect the liquid line to the condenser inlet. Tighten the retaining nut to 23 N·m (17 ft. lbs.).
- (5) Connect the discharge line to the condenser outlet. Tighten the retaining nut to 23 N·m (17 ft. lbs.).
- (6) Install the retainer bracket and screw for the auxiliary transmission cooler lines.
- (7) Connect the auxiliary transmission cooler hose fittings.

- (8) Install the upper radiator core support (Refer to 7 - COOLING/ENGINE/RADIATOR - INSTALLATION).

- (9) Connect the negative battery cable remote terminal to the remote battery post.

- (10) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

- (11) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

A/C DISCHARGE LINE

REMOVAL

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

- (1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post.
- (2) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)
- (3) Disconnect the a/c pressure transducer wire harness (Fig. 7) and (Fig. 8).
- (4) Remove the a/c pressure transducer. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C PRESSURE TRANSDUCER - REMOVAL)
- (5) Disconnect the discharge line at the compressor using an M13 Hex wrench for 2.7L, and a 6 mm allen wrench for 3.2/3.5L.

CAUTION: Cap all lines that are not being replaced and cap the expansion valve tubes.

- (6) Disconnect the discharge line at the A/C condenser using an M13 Hex wrench.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the

A/C DISCHARGE LINE (Continued)

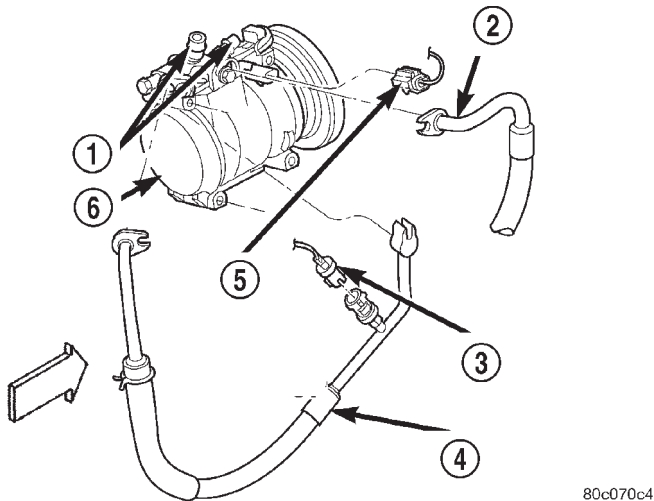


Fig. 7 A/C PRESSURE TRANSDUCER AND DISCHARGE LINE - 3.2L/3.5L

- 1 - SERVICE PORTS
- 2 - SUCTION LINE
- 3 - A/C PRESSURE TRANSDUCER AND CONNECTOR
- 4 - DISCHARGE LINE
- 5 - A/C COMPRESSOR CLUTCH ELECTRICAL CONNECTOR
- 6 - A/C COMPRESSOR

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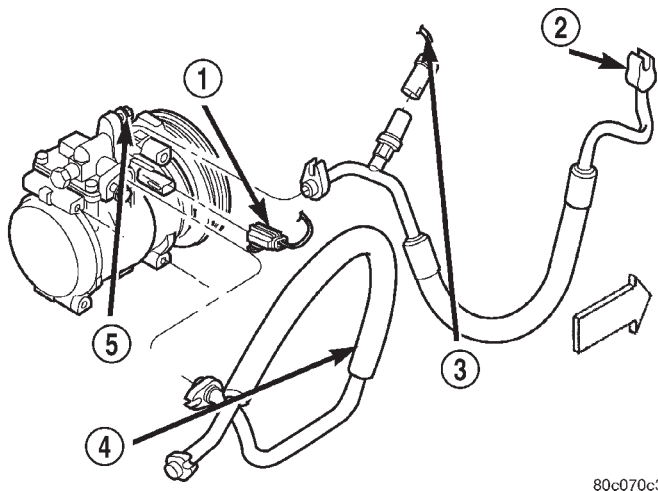


Fig. 8 A/C PRESSURE TRANSDUCER AND DISCHARGE LINE - 2.7L

- 1 - A/C COMPRESSOR CLUTCH ELECTRICAL CONNECTOR
- 2 - DISCHARGE LINE
- 3 - A/C PRESSURE TRANSDUCER AND CONNECTOR
- 4 - SUCTION LINE
- 5 - A/C COMPRESSOR

80c070c3

flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operat-

ing. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

(1) Connect the discharge line at the A/C condenser. Tighten retainer bolt to 23 N·m (17 ft. lbs.).

(2) Connect the discharge line at the compressor. Tighten retainer bolt to 23 N·m (17 ft. lbs.).

(3) Install the a/c pressure transducer. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/A/C PRESSURE TRANSDUCER - INSTALLATION)

(4) Plug the harness connector into the a/c pressure transducer.

(5) Connect the negative battery cable remote terminal to the remote battery post.

(6) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(7) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

LIQUID LINE

REMOVAL

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(2) Remove the engine air inlet tube and the air distribution duct on vehicles equipped with 3.2/3.5 L engines.

(3) Remove the a/c line to the expansion valve fastener using a M13 Hex wrench. Remove the suction line block from the expansion valve, cap the line and swing it out of the way.

CAUTION: Cap off all lines that are not being replaced. Cap/plug the expansion valve and condenser fittings.

(4) Disconnect the liquid line fastener at the receiver/drier (the short receiver/drier to evaporator line may be removed at this step).

LIQUID LINE (Continued)

(5) Disconnect receiver/drier bracket fastener and separate the bracket from the strut panel (there are two hidden plastic fasteners to pry out).

(6) Disconnect the liquid line fastener at the condenser (M13 Hex).

NOTE: The radiator upper crossmember must be removed to access the liquid line fastener. Refer to **Body** for the procedures.

(7) Remove the liquid line mounting clamp fastener located near the service port (Fig. 9).

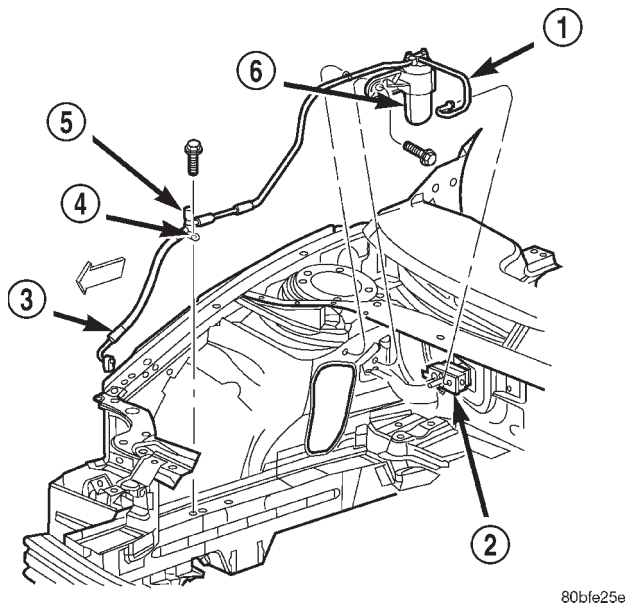


Fig. 9 LIQUID LINES

- 1 - LIQUID LINE
- 2 - EXPANSION VALVE
- 3 - LIQUID LINE
- 4 - MOUNTING CLAMP
- 5 - SERVICE PORT
- 6 - RECEIVER/DRIER AND BRACKET

(8) Disconnect the liquid line fastener at the receiver/drier. Remove the liquid line from the vehicle. Cap off all fittings to prevent moisture from entering the refrigerant system.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

- (1) Place the liquid line in the vehicle.
- (2) Install the liquid line fitting to the receiver/drier. Tighten the fastener to 13.6 N·m (10 ft. lbs.).
- (3) Install the liquid line mounting clamp fastener located near the service port. Tighten the fastener to 6.8 N·m (5 ft. lbs.).
- (4) Install the liquid line fastener at the condenser. Tighten the fastener to 23 N·m (17 ft. lbs.).
- (5) Connect the receiver/drier bracket fastener and the bracket to the strut panel.
- (6) Install the the short receiver/drier to evaporator line. Tighten the fastener to 13.6 N·m (10 ft. lbs.).
- (7) Connect the a/c line to the expansion valve. Tighten the retaining bolt to 23 N·m (17 ft. lbs.).
- (8) Install the engine air inlet tube and the air distribution duct on vehicles equipped with 3.2/3.5 L engines (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).
- (9) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)
- (10) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

SUCTION LINE

REMOVAL

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(2) Remove one M13 nut holding the suction line to the expansion valve (Fig. 10) and (Fig. 11).

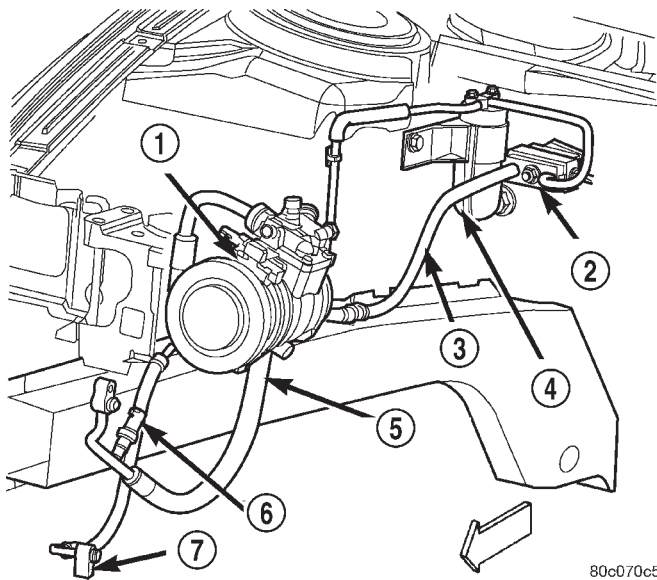


Fig. 10 A/C REFRIGERANT LINES AND EXPANSION VALVE 3.2/3.5 L

- 1 - A/C COMPRESSOR
- 2 - EXPANSION VALVE
- 3 - SUCTION LINE
- 4 - RECEIVER/DRIER
- 5 - DISCHARGE LINE
- 6 - A/C PRESSURE TRANSDUCER
- 7 - LIQUID LINE

CAUTION: Cap all lines that are not being replaced and cap the expansion valve tubes.

(3) Remove the engine air inlet tube and air distribution duct for access to the compressor lines.

(4) Remove the bolt holding the line at the compressor using a 6mm allen wrench (3.2/3.5L), or M10 Hex (2.7L) (Fig. 12) and (Fig. 13).

(5) Remove the line by pulling the rear end of the line up out of the vehicle with the compressor end following through the tie-rod area.

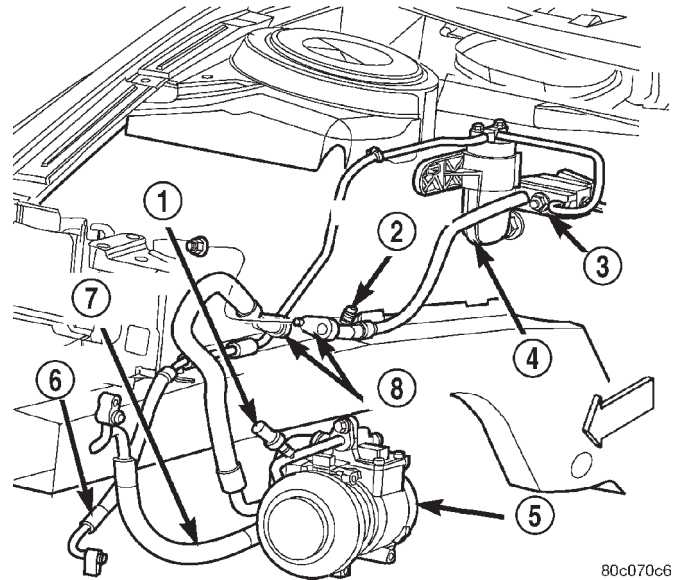


Fig. 11 A/C REFRIGERANT LINES AND EXPANSION VALVE 2.7L

- 1 - A/C PRESSURE TRANSDUCER
- 2 - SERVICE PORT
- 3 - EXPANSION VALVE
- 4 - RECEIVER/DRIER
- 5 - A/C COMPRESSOR
- 6 - LIQUID LINE
- 7 - DISCHARGE LINE
- 8 - SUCTION LINES

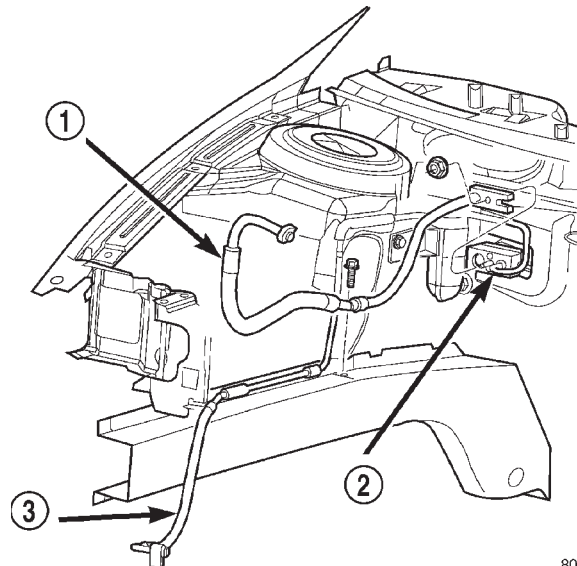
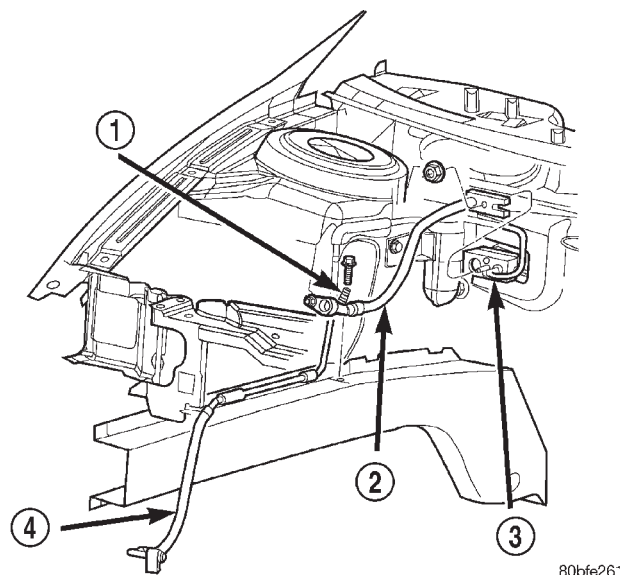


Fig. 12 SUCTION LINE 3.2L/3.5L

- 1 - SUCTION LINE
- 2 - EXPANSION VALVE
- 3 - LIQUID LINE

SUCTION LINE (Continued)

**Fig. 13 SUCTION LINE 2.7L**

- 1 - SERVICE PORT
- 2 - SUCTION LINE
- 3 - EXPANSION VALVE
- 4 - LIQUID LINE

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

(1) Position the suction line in the vehicle.

(2) Install the suction line fitting to the manifold on the compressor. Tighten the mounting bolt to 23 N·m (17 ft. lbs.). On a 2.7L, tighten the mid-line retaining nut and frame rail screw to 7 N·m (5 ft. lbs.).

(3) Install the engine air inlet tube and air distribution duct (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).

(4) Connect the suction line to the expansion valve. Tighten the retaining nut to 23 N·m (17 ft. lbs.).

(5) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(6) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

A/C EVAPORATOR**REMOVAL**

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

The HVAC housing must be removed from the vehicle when replacing the evaporator.

(1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove the HVAC housing from vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL)

(3) Remove the recirculation door actuator (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RECIRCULATION DOOR ACTUATOR - REMOVAL).

(4) Remove the recirculation door and housing.

(5) Remove the upper HVAC housing retaining screws (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - DISASSEMBLY).

A/C EVAPORATOR (Continued)

(6) At the center of the HVAC housing, locate the evaporator probe access plate. Using a flat blade pry tool, pull back on the locking tab. Twist the access plate counter clockwise one-quarter turn, and push the plate inside the HVAC housing.

(7) Remove the upper half of the HVAC housing.

(8) Lift the evaporator out of the lower housing.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

(1) Transfer the evaporator probe to the new evaporator. Place the evaporator probe in the same location as on the previous evaporator(Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/EVAPORATOR TEMPERATURE SENSOR - INSTALLATION).

(2) Place the evaporator in the lower HVAC housing.

(3) Insert the access plate inside the HVAC housing and orientate it so that the locking tab is one-quarter turn clockwise to where the tab snaps into the HVAC case detent. Note that the plate will be flush with the outside of the HVAC housing.

(4) Turn the plate one-quarter turn counter-clockwise to seat the locking tab in the HVAC case detent.

(5) Place the top half of the HVAC housing on the lower half. Tighten fasteners to 2.2 N·m (20 in. lbs.)(Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - ASSEMBLY).

(6) Install the recirculation door and housing on the HVAC housing and tighten the screws to 2.2 N·m (20 in. lbs.).

(7) Install the recirculation door actuator. (Refer to 24 - HEATING & AIR CONDITIONING/CONTROLS/RECIRCULATION DOOR ACTUATOR - INSTALLATION)

(8) Install the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)

(9) Evacuate the A/C system(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

(10) Charge the A/C system(Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE).

A/C EXPANSION VALVE

DESCRIPTION

The "H valve" type thermal expansion valve (TXV) is located at the point where the refrigerant lines join the a/c evaporator on the engine compartment side of the dash panel.

The expansion valve is a factory calibrated unit and cannot be adjusted or repaired. If faulty or damaged, the expansion valve must be replaced.

OPERATION

High-pressure, high temperature liquid refrigerant from the liquid line passes through the expansion valve orifice, converting it into a low-pressure, low-temperature mixture of liquid and gas before it enters the evaporator coil. A temperature sensor in the expansion valve control head monitors the temperature of the refrigerant leaving the evaporator coil through the suction line, and adjusts the orifice size at the liquid line to let the proper amount of refrigerant into the evaporator coil to meet the vehicle cooling requirements. Controlling the refrigerant flow through the evaporator ensures that none of the refrigerant leaving the evaporator is still in a liquid state, which could damage the compressor.

DIAGNOSIS AND TESTING - A/C EXPANSION VALVE

The expansion valve can fail in three different positions (open, closed or restricted). **Note, that in each case, it is defective and requires replacement.**

In an Open Position: this will result in a noisy compressor or no cooling. The cause can be a broken spring, broken ball or excessive moisture in the A/C system. If the spring or ball are found to be defective, replace the expansion valve. If excessive moisture is found in the A/C system, recycle the refrigerant.

A/C EXPANSION VALVE (Continued)

In a Closed Position: There will be low suction pressure and no cooling. This may be caused by a failed power dome or excessive moisture in the A/C system. If the power dome on the expansion valve is found to be defective replace the expansion valve. If excessive moisture is found recycle the refrigerant.

A Restricted Orifice: There will be low suction pressure and no cooling. This may be caused by debris in the refrigerant system. If debris is believed to be the cause, recycle the refrigerant and replace the expansion valve and filter/drier.

REMOVAL

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(2) Remove the engine air inlet tube and the air distribution duct on vehicles equipped with 3.2/3.5 L engine (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - REMOVAL).

(3) Remove one nut to the a/c lines at the expansion valve.

(4) Loosen the bolt at the receiver/drier to pivot the lines away from the expansion valve.

(5) Plug or cap the open end of the refrigerant lines.

(6) Gently pull the a/c line out of the expansion valve.

(7) Remove two #30 torx bolts retaining the expansion valve to the a/c evaporator.

(8) Remove the expansion valve from the vehicle.

CAUTION: Always install new O-rings when replacing the a/c expansion valve.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should

be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

(1) Install the a/c expansion valve on the a/c evaporator. Tighten the fasteners to 23 N·m (17 ft. lbs.).

(2) Connect the lines to the expansion valve and tighten the retaining nut to 23 N·m (17 ft. lbs.).

(3) Tighten the bolt at the receiver/drier to 13.6 N·m (10 ft. lbs.).

(4) Install the engine air inlet tube and the air distribution duct on vehicles equipped with 3.2/3.5 L engine (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).

(5) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)

(6) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

HEATER CORE

REMOVAL

WARNING: ON VEHICLES EQUIPPED WITH AIRBAGS, DISABLE THE AIRBAG SYSTEM BEFORE ATTEMPTING ANY STEERING WHEEL, STEERING COLUMN, OR INSTRUMENT PANEL COMPONENT DIAGNOSIS OR SERVICE. DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE, THEN WAIT TWO MINUTES FOR THE AIRBAG SYSTEM CAPACITOR TO DISCHARGE BEFORE PERFORMING FURTHER DIAGNOSIS OR SERVICE. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. FAILURE TO TAKE THE PROPER PRECAUTIONS COULD RESULT IN AN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

The HVAC housing must be removed from the vehicle to service the heater core.

HEATER CORE (Continued)

(1) Open the hood and disconnect the negative battery cable remote terminal from the remote battery post.

(2) Remove the HVAC unit housing from vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - REMOVAL)

(3) With the HVAC housing out of the vehicle, remove (2) screws retaining the heater core. Then pull the heater core out of the HVAC housing.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Install the heater core in the HVAC housing. Tighten the retaining screws to 2.2 N·m (20 in. lbs.).

(2) Install the HVAC housing in the vehicle. (Refer to 24 - HEATING & AIR CONDITIONING/DISTRIBUTION/HVAC HOUSING - INSTALLATION)

(3) Connect the negative battery cable remote terminal to the remote battery post.

RECEIVER / DRIER

DESCRIPTION

The receiver/drier is located in the engine compartment near the dash panel on the passenger side of the vehicle. The receiver/drier incorporates a sight glass for visual diagnosis of the refrigerant system.

OPERATION

High-pressure liquid refrigerant from the condenser flows into the receiver/drier. A drying agent, called a desiccant, is used to remove any traces of moisture from the refrigerant system. The receiver/drier also performs a filtering action to prevent foreign material in the refrigerant from contaminating the expansion valve. In addition, during periods of high demand air conditioner operation, the receiver/drier acts as a reservoir to store surplus refrigerant.

The A/C refrigerant must be removed from the system before removing the receiver/drier using a refrigerant recovery machine. Replace the receiver/drier if an A/C system is left open for an extended period of time.

The receiver/drier cannot be repaired and, if faulty, must be replaced.

REMOVAL

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE

FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

(1) Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE -REFRIGERANT RECOVERY)

(2) Remove the engine air inlet tube and the air distribution duct on vehicles equipped with 3.2/3.5 liter engine(Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - REMOVAL).

(3) Remove one 8mm hex bolt to the receiver/drier bracket.

(4) Remove the nut retaining the a/c lines to the expansion valve.

(5) Gently pry the receiver/drier bracket out of the strut tower.

(6) Remove one a/c line at the receiver/drier (from the condenser).

(7) Remove the receiver/drier from vehicle.

(8) Remove the small line from the receiver/drier to the expansion valve to install on the new receiver/drier.

NOTE: Always install new O-rings when replacing filter/drier.

(9) Plug or cap liquid line fittings while system is open to prevent moisture intrusion.

INSTALLATION

WARNING: REVIEW THE WARNINGS IN THE FRONT OF THIS SECTION BEFORE PERFORMING THE FOLLOWING OPERATION. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING)

Any kinks or sharp bends in the refrigerant plumbing will reduce the capacity of the entire air conditioning system. Kinks and sharp bends reduce the flow of refrigerant in the system. A good rule for the flexible hose refrigerant lines is to keep the radius of all bends at least ten times the diameter of the hose. In addition, the flexible hose refrigerant lines should be routed so they are at least 80 millimeters (3 inches) from the exhaust manifold.

High pressures are produced in the refrigerant system when the air conditioning compressor is operating. Extreme care must be exercised to make sure that each of the refrigerant system connections is pressure-tight and leak free. It is a good practice to inspect all flexible hose refrigerant lines at least once a year to make sure they are in good condition and properly routed.

NOTE: Upon installation, loosely fit all parts and lines together before individually tightening them to prevent damage.

RECEIVER / DRIER (Continued)

- (1) Install the small line from the receiver/drier to expansion valve on the new receiver/drier.
- (2) Install the receiver/drier in the vehicle.
- (3) Install the a/c line at the receiver/drier. Tighten the fastener to 13.6 N·m (10 ft. lbs.).
- (4) Install the receiver/drier bracket in the strut tower.
- (5) Install the nut retaining the a/c line to the expansion valve. Tighten to 23 N·m (17 ft. lbs.).
- (6) Install the bolt to the receiver/drier bracket.
- (7) Install the engine air inlet tube and the air distribution duct on vehicles equipped with 3.2/3.5 L engine (Refer to 9 - ENGINE/AIR INTAKE SYSTEM/AIR CLEANER ELEMENT - INSTALLATION).
- (8) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)
- (9) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

REFRIGERANT

DESCRIPTION

The refrigerant used in this air conditioning system is a HydroFluoroCarbon (HFC), type R-134a. Unlike R-12, which is a ChloroFluoroCarbon (CFC), R-134a refrigerant does not contain ozone-depleting chlorine. R-134a refrigerant is a non-toxic, non-flammable, clear, and colorless liquefied gas.

Even though R-134a does not contain chlorine, it must be reclaimed and recycled just like CFC-type refrigerants. This is because R-134a is a greenhouse gas and can contribute to global warming.

OPERATION

R-134a refrigerant is not compatible with R-12 refrigerant in an air conditioning system. Even a small amount of R-12 added to an R-134a refrigerant system will cause compressor failure, refrigerant oil sludge or poor air conditioning system performance. In addition, the PolyAlkylene Glycol (PAG) synthetic refrigerant oils used in an R-134a refrigerant system are not compatible with the mineral-based refrigerant oils used in an R-12 refrigerant system.

R-134a refrigerant system service ports, service tool couplers and refrigerant dispensing bottles have all been designed with unique fittings to ensure that an R-134a system is not accidentally contaminated with the wrong refrigerant (R-12). There are also labels posted in the engine compartment of the vehicle and on the compressor identifying to service technicians that the air conditioning system is equipped with R-134a.

REFRIGERANT OIL

DESCRIPTION

The refrigerant oil used in R-134a refrigerant systems is a synthetic-based, PolyAlkylene Glycol (PAG), wax-free lubricant. Mineral-based R-12 refrigerant oils are not compatible with PAG oils, and should never be introduced to an R-134a refrigerant system.

There are different PAG oils available, and each contains a different additive package. The 10PA17 compressor used in this vehicle is designed to use an ND8 PAG refrigerant oil. Use only refrigerant oil of this same type to service the refrigerant system.

OPERATION

After performing any refrigerant recovery or recycling operation, always replenish the refrigerant system with the same amount of the recommended refrigerant oil as was removed. Too little refrigerant oil can cause compressor damage, and too much can reduce air conditioning system performance.

PAG refrigerant oil is much more hygroscopic than mineral oil, and will absorb any moisture it comes into contact with, even moisture in the air. The PAG oil container should always be kept tightly capped until it is ready to be used. After use, recap the oil container immediately to prevent moisture contamination.

STANDARD PROCEDURE - REFRIGERANT OIL LEVEL

It is important to have the correct amount of lubricant in the a/c system to ensure proper lubrication of the compressor. Too little lubricant will result in damage to the compressor. Too much lubricant will reduce the cooling capacity of the system and consequently result in higher discharge air temperatures.

The lubricant used in the compressor is polyalkylene glycol PAG lubricant. Only the refrigerant lubricant approved for use with this vehicle (ND8 PAG oil) should be used to service the system. Do not use any other lubricant. The lubricant container should be kept tightly capped until it is ready for use. Refrigerant lubricant will quickly absorb any moisture it comes in contact with.

It is not necessary to check or add lubricant unless it has been lost. Lubricant loss at the leak point will be evident by the presence of a wet, shiny surface around the leak.

REFRIGERANT OIL LEVEL CHECK

When an air conditioning system is first assembled, all components (except the compressor) are refrigerant oil free. After the system has been charged with (R-134a) refrigerant and operated, the

REFRIGERANT OIL (Continued)

oil in the compressor is dispersed through the lines and components. The evaporator, condenser, and receiver/drier will retain a significant amount of oil. Refer to the A/C Component Refrigerant Oil Capacities table. When a component is replaced, the specified amount of refrigerant oil must be added. When the compressor is replaced, the amount of oil that is retained in the rest of the system must be drained from the replacement compressor. The oil capacity of the system, minus the amount of oil still in the remaining components (refer to the oil capacity chart below) can be measured and poured into the suction port of the compressor. When a line or component has ruptured and oil has escaped, the receiver/drier must be replaced along with the ruptured part.

Example: On an A/C system the evaporator retains 60 ml. (2 oz.). The condenser retains 30 ml. (1 oz.) of oil, and system capacity may be 150 ml. (5.00 oz.) of oil.

150 ml. minus 90 ml. equals 60 ml. (2.00 oz.).

A/C COMPONENT REFRIGERANT OIL CAPACITIES

COMPONENT NAME	ml.	oz.
Total Air Conditioning System	150 ml.	5.00 oz.
Condenser	30 ml.	1.00 oz.
Evaporator	59 ml.	2.00 oz.
Receiver/Drier	30 ml.	1.00 oz.
Line Blown	44 ml.	1.50 oz.
Compressor	Drain and measure the oil from the old compressor. See text.	

CAUTION: The refrigerant oil used in a R-134a A/C system is unique. Use only oils which were designed to work with R-134a refrigerant. The oil designated for this vehicle is ND 8 PAG (polyalkylene glycol).

VERIFY REFRIGERANT ND8 LUBRICANT LEVEL

- Recover the refrigerant from the system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)
- Disconnect the refrigerant lines from the a/c compressor. Cap the open lines to prevent moisture from entering the system.
- Remove the compressor from the vehicle.

(4) From the suction and discharge ports on top of the compressor, drain the lubricant from the compressor.

(5) Add the system capacity minus the capacity of the components that have not been replaced. Refer to the A/C Component Refrigerant Oil Capacities chart above. Add lubricant through the suction and discharge ports on compressor. This is not to exceed 150 ml. (5.00 oz.) in total.

(6) Install the compressor and connect the refrigerant lines. Then evacuate and charge refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE) (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)

(7) Most reclaim/recycling equipment will measure the lubricant being removed. This amount of lubricant should be added back to the system. If a new compressor is being installed, drain lubricant from old compressor, measure the amount drained and discard old lubricant. Drain the lubricant from the new compressor into a clean container. Return the amount of lubricant measured from the old compressor, plus the amount reclaimed from the system back into the new compressor.

SERVICE PORT VALVE CORE

REMOVAL

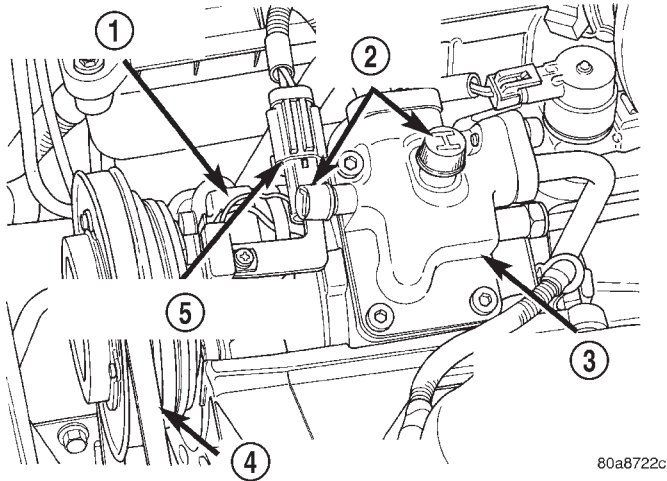
The 3.2 / 3.5L service port valve cores are located on the top of the manifold (High Side) and front side of the manifold (Low Side) (Fig. 14). The 2.7L service port valve ports are located on the A/C liquid line (high side) and suction line (low side).

(1) Remove the valve caps. Recover the refrigerant. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT RECOVERY)

(2) Using a standard valve core tool, remove the valve core. **Be careful to prevent any dirt/debris from entering the valve core opening or getting on the replacement valve core.**

CAUTION: A valve that is not fully seated can lead to damage to the valve during evacuation and charge. This can result in system refrigerant discharge while uncoupling the charge adapters.

SERVICE PORT VALVE CORE (Continued)

**Fig. 14 A/C SYSTEM SERVICE PORTS 3.2L/3.5L**

- 1 - A/C COMPRESSOR
- 2 - A/C SERVICE PORTS
- 3 - COMPRESSOR MANIFOLD
- 4 - A/C DRIVE BELT
- 5 - COMPRESSOR WIRE CONNECTOR

INSTALLATION

NOTE: When assembling the new valve core into the fitting, the core should be oiled with clean ND8 PAG compressor oil.

- (1) Install the new valve core into the fitting.
- (2) Evacuate the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM EVACUATE)
- (3) Charge the refrigerant system. (Refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - STANDARD PROCEDURE - REFRIGERANT SYSTEM CHARGE)
- (4) Install the valve caps.

EMISSIONS CONTROL

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EMISSIONS CONTROL

DESCRIPTION

DESCRIPTION - MONITORED COMPONENT

There are several components that will affect vehicle emissions if they malfunction. If one of these components malfunctions the Malfunction Indicator Lamp (Check Engine) will illuminate.

Some of the component monitors are checking for proper operation of the part. Electrically operated components now have input (rationality) and output (functionality) checks. Previously, a component like the Throttle Position sensor (TPS) was checked by the PCM for an open or shorted circuit. If one of these conditions occurred, a DTC was set. Now there is a check to ensure that the component is working. This is done by watching for a TPS indication of a greater or lesser throttle opening than MAP and engine rpm indicate. In the case of the TPS, if engine vacuum is low and engine rpm is 1600 or greater and the TPS indicates a small throttle opening, a DTC will be set. The same applies to low vacuum and 1600 rpm.

Any component that has an associated limp in will set a fault after 1 trip with the malfunction present.

Refer to the Diagnostic Trouble Codes Description Charts (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWERTRAIN CONTROL MODULE - DESCRIPTION) and the appropriate Powertrain Diagnostic Procedure Manual for diagnostic procedures.

The following is a list of the monitored components:

- Comprehensive Components
- Oxygen Sensor Monitor
- Oxygen Sensor Heater Monitor
- Catalyst Monitor

COMPREHENSIVE COMPONENTS

Along with the major monitors, OBD II requires that the diagnostic system monitor any component that could affect emissions levels. In many cases, these components were being tested under OBD I. The OBD I requirements focused mainly on testing emissions-related components for electrical opens and shorts.

However, OBD II also requires that inputs from powertrain components to the PCM be tested for **rationality**, and that outputs to powertrain components from the PCM be tested for **functionality**. Methods for monitoring the various Comprehensive Component monitoring include:

- (1) Circuit Continuity
 - Open
 - Shorted high
 - Shorted to ground
- (2) Rationality or Proper Functioning
 - Inputs tested for rationality
 - Outputs tested for functionality

NOTE: Comprehensive component monitors are continuous. Therefore, enabling conditions do not apply.

Input Rationality—While input signals to the PCM are constantly being monitored for electrical opens and shorts, they are also tested for rationality. This means that the input signal is compared against other inputs and information to see if it makes sense under the current conditions.

PCM sensor inputs that are checked for rationality include:

- Manifold Absolute Pressure (MAP) Sensor
- Oxygen Sensor (O2S)
- Engine Coolant Temperature (ECT) Sensor
- Camshaft Position (CMP) Sensor
- Vehicle Speed Sensor
- Crankshaft Position (CKP) Sensor

EMISSIONS CONTROL (Continued)

- Intake/inlet Air Temperature (IAT) Sensor
- Throttle Position (TPS) Sensor
- Ambient/Battery Temperature Sensors
- Power Steering Switch
- Oxygen Sensor Heater
- Engine Controller
- Brake Switch
- Leak Detection Pump Switch (if equipped)
- P/N Switch
- Trans Controls

Output Functionality—PCM outputs are tested for functionality in addition to testing for opens and shorts. When the PCM provides a voltage to an output component, it can verify that the command was carried out by monitoring specific input signals for expected changes. For example, when the PCM commands the Idle Air Control (IAC) Motor to a specific position under certain operating conditions, it expects to see a specific (target) idle speed (RPM). If it does not, it stores a DTC.

PCM outputs monitored for functionality include:

- Fuel Injectors
- Ignition Coils
- Torque Converter Clutch Solenoid
- Idle Air Control
- Purge Solenoid
- EGR Solenoid (if equipped)
- LDP Solenoid (if equipped)
- Radiator Fan Control
- Trans Controls

OXYGEN SENSOR (O2S) MONITOR

DESCRIPTION—Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperature 300° to 350°C (572° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. When there is a large amount of oxygen in the exhaust caused by a lean condition, the sensor produces a low voltage, below 450 mV. When the oxygen content is lower, caused by a rich condition, the sensor produces a higher voltage, above 450mV.

The information obtained by the sensor is used to calculate the fuel injector pulse width. The PCM is programmed to maintain the optimum air/fuel ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrous oxide (NOx) from the exhaust.

The O2S is also the main sensing element for the EGR (if equipped), Catalyst and Fuel Monitors.

The O2S may fail in any or all of the following manners:

- Slow response rate (Big Slope)
- Reduced output voltage (Half Cycle)

- Heater Performance

Slow Response Rate (Big Slope)—Response rate is the time required for the sensor to switch from lean to rich signal output once it is exposed to a richer than optimum A/F mixture or vice versa. As the PCM adjusts the air/fuel ratio, the sensor must be able to rapidly detect the change. As the sensor ages, it could take longer to detect the changes in the oxygen content of the exhaust gas. The rate of change that an oxygen sensor experiences is called "Big Slope". The PCM checks the oxygen sensor voltage in increments of a few milliseconds.

Reduced Output Voltage (Half Cycle)—The output voltage of the O2S ranges from 0 to 1 volt. A good sensor can easily generate any output voltage in this range as it is exposed to different concentrations of oxygen. To detect a shift in the A/F mixture (lean or rich), the output voltage has to change beyond a threshold value. A malfunctioning sensor could have difficulty changing beyond the threshold value. Each time the voltage signal surpasses the threshold, a counter is incremented by one. This is called the Half Cycle Counter.

Heater Performance—The heater is tested by a separate monitor. Refer to the Oxygen Sensor Heater Monitor.

OPERATION—As the Oxygen Sensor signal switches, the PCM monitors the half cycle and big slope signals from the oxygen sensor. If during the test neither counter reaches a predetermined value, a malfunction is entered and Freeze Frame data is stored. Only one counter reaching its predetermined value is needed for the monitor to pass.

The Oxygen Sensor Monitor is a two trip monitor that is tested only once per trip. When the Oxygen Sensor fails the test in two consecutive trips, the MIL is illuminated and a DTC is set. The MIL is extinguished when the Oxygen Sensor monitor passes in three consecutive trips. The DTC is erased from memory after 40 consecutive warm-up cycles without test failure.

Enabling Conditions—The following conditions must typically be met for the PCM to run the oxygen sensor monitor:

- Battery voltage
- Engine temperature
- Engine run time
- Engine run time at a predetermined speed
- Engine run time at a predetermined speed and throttle opening
- Transmission in gear and brake depressed (automatic only)
- Fuel system in Closed Loop
- Long Term Adaptive (within parameters)
- Power Steering Switch in low PSI (no load)
- Engine at idle

EMISSIONS CONTROL (Continued)

- Fuel level above 15%
- Ambient air temperature
- Barometric pressure
- Engine RPM within acceptable range of desired idle

Pending Conditions—The Task Manager typically does not run the Oxygen Sensor Monitor if overlapping monitors are running or the MIL is illuminated for any of the following:

- Misfire Monitor
- Front Oxygen Sensor and Heater Monitor
- MAP Sensor
- Vehicle Speed Sensor
- Engine Coolant Temperature Sensor
- Throttle Position Sensor
- Engine Controller Self Test Faults
- Cam or Crank Sensor
- Injector and Coil
- Idle Air Control Motor
- EVAP Electrical
- EGR Solenoid Electrical (if equipped)
- Intake/inlet Air Temperature
- 5 Volt Feed

Conflict—The Task Manager does not run the Oxygen Sensor Monitor if any of the following conditions are present:

- A/C ON (A/C clutch cycling temporarily suspends monitor)
- Purge flow in progress
- Ethanol content learn is taking place and the ethanol used once flag is set (if equipped)

Suspend—The Task Manager suspends maturing a fault for the Oxygen Sensor Monitor if any of the following are present:

- Oxygen Sensor Heater Monitor, Priority 1
- Misfire Monitor, Priority 2

OXYGEN SENSOR HEATER MONITOR

DESCRIPTION—If there is an oxygen sensor (O2S) DTC as well as a O2S heater DTC, the O2S fault MUST be repaired first. After the O2S fault is repaired, verify that the heater circuit is operating correctly.

The voltage readings taken from the O2S are very temperature sensitive. The readings are not accurate below 300°C. Heating of the O2S is done to allow the engine controller to shift to closed loop control as soon as possible. The heating element used to heat the O2S must be tested to ensure that it is heating the sensor properly.

The heater element itself is not tested. The sensor output is used to test the heater by isolating the effect of the heater element on the O2S output voltage from the other effects. The resistance is normally between 100 ohms and 4.5 megaohms. When oxygen sensor temperature increases, the resistance in the

internal circuit decreases. The PCM sends a 5 volts biased signal through the oxygen sensors to ground this monitoring circuit. As the temperature increases, resistance decreases and the PCM detects a lower voltage at the reference signal. Inversely, as the temperature decreases, the resistance increases and the PCM detects a higher voltage at the reference signal. The O2S circuit is monitored for a drop in voltage.

OPERATION—The Oxygen Sensor Heater Monitor begins after the ignition has been turned OFF. The PCM sends a 5 volt bias to the oxygen sensor every 1.6 seconds. The PCM keeps it biased for 35 ms each time. As the sensor cools down, the resistance increases and the PCM reads the increase in voltage. Once voltage has increased to a predetermined amount, higher than when the test started, the oxygen sensor is cool enough to test heater operation.

When the oxygen sensor is cool enough, the PCM energizes the ASD relay. Voltage to the O2 sensor begins to increase the temperature. As the sensor temperature increases, the internal resistance decreases. The PCM continues biasing the 5 volt signal to the sensor. Each time the signal is biased, the PCM reads a voltage decrease. When the PCM detects a voltage decrease of a predetermined value for several biased pulses, the test passes.

The heater elements are tested each time the engine is turned OFF if all the enabling conditions are met. If the monitor fails, the PCM stores a maturing fault and a Freeze Frame is entered. If two consecutive tests fail, a DTC is stored. Because the ignition is OFF, the MIL is illuminated at the beginning of the next key cycle.

Enabling Conditions—The following conditions must be met for the PCM to run the oxygen sensor heater test:

- Engine run time of at least 3 minutes
- Engine run time at a predetermined speed and throttle opening.
- Key OFF power down
- Battery voltage of at least 10 volts
- Sufficient Oxygen Sensor cool down

Pending Conditions—There are not conditions or situations that prompt conflict or suspension of testing. The oxygen sensor heater test is not run pending resolution of MIL illumination due to oxygen sensor failure.

Suspend—There are no conditions which exist for suspending the Heater Monitor.

CATALYST MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide.

EMISSIONS CONTROL (Continued)

Normal vehicle miles or engine misfire can cause a catalyst to decay. A meltdown of the ceramic core can cause a reduction of the exhaust passage. This can increase vehicle emissions and deteriorate engine performance, driveability and fuel economy.

The catalyst monitor uses dual oxygen sensors (O₂S's) to monitor the efficiency of the converter. The dual O₂S strategy is based on the fact that as a catalyst deteriorates, its oxygen storage capacity and its efficiency are both reduced. By monitoring the oxygen storage capacity of a catalyst, its efficiency can be indirectly calculated. The upstream O₂S is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. The PCM calculates the A/F mixture from the output of the O₂S. A low voltage indicates high oxygen content (lean mixture). A high voltage indicates a low content of oxygen (rich mixture).

When the upstream O₂S detects a lean condition, there is an abundance of oxygen in the exhaust gas. A functioning converter would store this oxygen so it can use it for the oxidation of HC and CO. As the converter absorbs the oxygen, there will be a lack of oxygen downstream of the converter. The output of the downstream O₂S will indicate limited activity in this condition.

As the converter loses the ability to store oxygen, the condition can be detected from the behavior of the downstream O₂S. When the efficiency drops, no chemical reaction takes place. This means the concentration of oxygen will be the same downstream as upstream. The output voltage of the downstream O₂S copies the voltage of the upstream sensor. The only difference is a time lag (seen by the PCM) between the switching of the O₂S's.

To monitor the system, the number of lean-to-rich switches of upstream and downstream O₂S's is counted. The ratio of downstream switches to upstream switches is used to determine whether the catalyst is operating properly. An effective catalyst will have fewer downstream switches than it has upstream switches i.e., a ratio closer to zero. For a totally ineffective catalyst, this ratio will be one-to-one, indicating that no oxidation occurs in the device.

The system must be monitored so that when catalyst efficiency deteriorates and exhaust emissions increase to over the legal limit, the MIL (check engine lamp) will be illuminated.

Monitor Operation—To monitor catalyst efficiency, the PCM expands the rich and lean switch points of the heated oxygen sensor. With extended switch points, the air/fuel mixture runs richer and leaner to overburden the catalytic converter. Once the test is started, the air/fuel mixture runs rich and lean and the O₂ switches are counted. A switch is counted when an oxygen sensor signal goes from

below the lean threshold to above the rich threshold. The number of Rear O₂ sensor switches is divided by the number of Front O₂ sensor switches to determine the switching ratio.

The test runs for 20 seconds. As catalyst efficiency deteriorated over the life of the vehicle, the switch rate at the downstream sensor approaches that of the upstream sensor. If at any point during the test period the switch ratio reaches a predetermined value, a counter is incremented by one. The monitor is enabled to run another test during that trip. When the test fails 6 times, the counter increments to 3, a malfunction is entered, and a Freeze Frame is stored, the code is matured and the MIL is illuminated. If the first test passes, no further testing is conducted during that trip.

The MIL is extinguished after three consecutive good trips. The good trip criteria for the catalyst monitor is more stringent than the failure criteria. In order to pass the test and increment one good trip, the downstream sensor switch rate must be less than 45% of the upstream rate. The failure percentages are 59% respectively.

Enabling Conditions—The following conditions must typically be met before the PCM runs the catalyst monitor. Specific times for each parameter may be different from engine to engine.

- Accumulated drive time
- Enable time
- Ambient air temperature
- Barometric pressure
- Catalyst warm-up counter
- Engine coolant temperature
- Vehicle speed
- MAP
- RPM
- Engine in closed loop
- Fuel level

Pending Conditions—

- Misfire DTC
- Front Oxygen Sensor Response
- Front Oxygen Sensor Heater Monitor
- Front Oxygen Sensor Electrical
- Rear Oxygen Sensor Rationality (middle check)
- Rear Oxygen Sensor Heater Monitor
- Rear Oxygen Sensor Electrical
- Fuel System Monitor
- All TPS faults
- All MAP faults
- All ECT sensor faults
- Purge flow solenoid functionality
- Purge flow solenoid electrical
- All PCM self test faults
- All CMP and CKP sensor faults
- All injector and ignition electrical faults
- Idle Air Control (IAC) motor functionality

EMISSIONS CONTROL (Continued)

- Vehicle Speed Sensor
- Brake switch (auto trans only)
- Intake air temperature

Conflict—The catalyst monitor does not run if any of the following are conditions are present:

- EGR Monitor in progress (if equipped)
- Fuel system rich intrusive test in progress
- EVAP Monitor in progress
- Time since start is less than 60 seconds
- Low fuel level-less than 15 %
- Low ambient air temperature
- Ethanol content learn is taking place and the ethanol used once flag is set

Suspend—The Task Manager does not mature a catalyst fault if any of the following are present:

- Oxygen Sensor Monitor, Priority 1
- Oxygen Sensor Heater, Priority 1
- EGR Monitor, Priority 1 (if equipped)
- EVAP Monitor, Priority 1
- Fuel System Monitor, Priority 2
- Misfire Monitor, Priority 2

DESCRIPTION - VEHICLE EMISSION CONTROL INFORMATION LABEL

All models have a Vehicle Emission Control Information (VECI) Label. Chrysler permanently attaches the label in the engine compartment. It cannot be removed without defacing information and destroying the label.

The label contains the vehicle's emission specifications and vacuum hose routings. All hoses must be connected and routed according to the label.

DESCRIPTION - TRIP DEFINITION

A "Trip" means vehicle operation (following an engine-off period) of duration and driving mode such that all components and systems are monitored at least once by the diagnostic system. The monitors must successfully pass before the PCM can verify that a previously malfunctioning component is meeting the normal operating conditions of that component. For misfire or fuel system malfunction, the MIL may be extinguished if the fault does not recur when monitored during three subsequent sequential driving cycles in which conditions are similar to those under which the malfunction was first determined.

Anytime the MIL is illuminated, a DTC is stored. The DTC can self erase only after the MIL has been extinguished. Once the MIL is extinguished, the PCM must pass the diagnostic test for the most recent DTC for 40 warm-up cycles (80 warm-up cycles for the Fuel System Monitor and the Misfire Monitor). A warm-up cycle can best be described by the following:

- The engine must be running

- A rise of 40°F in engine temperature must occur from the time when the engine was started
- Engine coolant temperature must crossover 160°F

- A "driving cycle" that consists of engine start up and engine shut off.

Once the above conditions occur, the PCM is considered to have passed a warm-up cycle. Due to the conditions required to extinguish the MIL and erase the DTC, it is most important that after a repair has been made, all DTC's be erased and the repair verified by running 1-good trip.

OPERATION - NON-MONITORED CIRCUITS

The PCM does not monitor all circuits, systems and conditions that could have malfunctions causing driveability problems. However, problems with these systems may cause the PCM to store diagnostic trouble codes for other systems or components. For example, a fuel pressure problem will not register a fault directly, but could cause a rich/lean condition or misfire. This could cause the PCM to store an oxygen sensor or misfire diagnostic trouble code.

The major non-monitored circuits are listed below along with examples of failures modes that do not directly cause the PCM to set a DTC, but for a system that is monitored.

FUEL PRESSURE

The fuel pressure regulator controls fuel system pressure. The PCM cannot detect a clogged fuel pump inlet filter, clogged in-line fuel filter, or a pinched fuel supply or return line. However, these could result in a rich or lean condition causing the PCM to store an oxygen sensor, fuel system, or misfire diagnostic trouble code.

SECONDARY IGNITION CIRCUIT

The PCM cannot detect an inoperative ignition coil, fouled or worn spark plugs, ignition cross firing, or open spark plug cables. The misfire will however, increase the oxygen content in the exhaust, deceiving the PCM in to thinking the fuel system is too lean. Also misfire detection.

CYLINDER COMPRESSION

The PCM cannot detect uneven, low, or high engine cylinder compression. Low compression lowers O₂ content in the exhaust. Leading to fuel system, oxygen sensor, or misfire detection fault.

EXHAUST SYSTEM

The PCM cannot detect a plugged, restricted or leaking exhaust system. It may set a EGR (if equipped) or Fuel system or O₂S fault.

EMISSIONS CONTROL (Continued)

FUEL INJECTOR MECHANICAL MALFUNCTIONS

The PCM cannot determine if a fuel injector is clogged, the needle is sticking or if the wrong injector is installed. However, these could result in a rich or lean condition causing the PCM to store a diagnostic trouble code for either misfire, an oxygen sensor, or the fuel system.

EXCESSIVE OIL CONSUMPTION

Although the PCM monitors engine exhaust oxygen content when the system is in closed loop, it cannot determine excessive oil consumption.

THROTTLE BODY AIR FLOW

The PCM cannot detect a clogged or restricted air cleaner inlet or filter element.

VACUUM ASSIST

The PCM cannot detect leaks or restrictions in the vacuum circuits of vacuum assisted engine control system devices. However, these could cause the PCM to store a MAP sensor diagnostic trouble code and cause a high idle condition.

PCM SYSTEM GROUND

The PCM cannot determine a poor system ground. However, one or more diagnostic trouble codes may be generated as a result of this condition. The module should be mounted to the body at all times, also during diagnostic.

PCM CONNECTOR ENGAGEMENT

The PCM may not be able to determine spread or damaged connector pins. However, it might store diagnostic trouble codes as a result of spread connector pins.

DESCRIPTION - MONITORED SYSTEMS

There are new electronic circuit monitors that check fuel, emission, engine and ignition performance. These monitors use information from various sensor circuits to indicate the overall operation of the fuel, engine, ignition and emission systems and thus the emissions performance of the vehicle.

The fuel, engine, ignition and emission systems monitors do not indicate a specific component problem. They do indicate that there is an implied problem within one of the systems and that a specific problem must be diagnosed.

If any of these monitors detect a problem affecting vehicle emissions, the Malfunction Indicator (Check Engine) Lamp will be illuminated. These monitors generate Diagnostic Trouble Codes that can be displayed with the a DRBIII® scan tool.

The following is a list of the system monitors:

- EGR Monitor (if equipped)

- Misfire Monitor
- Fuel System Monitor
- Oxygen Sensor Monitor
- Oxygen Sensor Heater Monitor
- Catalyst Monitor
- Evaporative System Leak Detection Monitor (if equipped)

Following is a description of each system monitor, and its DTC.

Refer to the appropriate Powertrain Diagnostics Procedures manual for diagnostic procedures.

OXYGEN SENSOR (O2S) MONITOR

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O2S. The O2S is located in the exhaust path. Once it reaches operating temperatures of 300° to 350°C (572° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. The PCM is programmed to maintain the optimum air/fuel ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrous oxide (NOx) from the exhaust.

The O2S is also the main sensing element for the EGR (if equipped), Catalyst and Fuel Monitors.

The O2S may fail in any or all of the following manners:

- Slow response rate
- Reduced output voltage
- Dynamic shift
- Shorted or open circuits

Response rate is the time required for the sensor to switch from lean to rich once it is exposed to a richer than optimum A/F mixture or vice versa. As the sensor starts malfunctioning, it could take longer to detect the changes in the oxygen content of the exhaust gas.

The output voltage of the O2S ranges from 0 to 1 volt. A good sensor can easily generate any output voltage in this range as it is exposed to different concentrations of oxygen. To detect a shift in the A/F mixture (lean or rich), the output voltage has to change beyond a threshold value. A malfunctioning sensor could have difficulty changing beyond the threshold value.

OXYGEN SENSOR HEATER MONITOR

If there is an oxygen sensor (O2S) DTC as well as a O2S heater DTC, the O2S fault MUST be repaired first. After the O2S fault is repaired, verify that the heater circuit is operating correctly.

EMISSIONS CONTROL (Continued)

Effective control of exhaust emissions is achieved by an oxygen feedback system. The most important element of the feedback system is the O₂S. The O₂S is located in the exhaust path. Once it reaches operating temperatures of 300° to 350°C (572 ° to 662°F), the sensor generates a voltage that is inversely proportional to the amount of oxygen in the exhaust. The information obtained by the sensor is used to calculate the fuel injector pulse width. This maintains a 14.7 to 1 Air Fuel (A/F) ratio. At this mixture ratio, the catalyst works best to remove hydrocarbons (HC), carbon monoxide (CO) and nitrogen oxide (NO_x) from the exhaust.

The voltage readings taken from the O₂S are very temperature sensitive. The readings are not accurate below 300°C. Heating of the O₂S is done to allow the engine controller to shift to closed loop control as soon as possible. The heating element used to heat the O₂S must be tested to ensure that it is heating the sensor properly.

The O₂S circuit is monitored for a drop in voltage. The sensor output is used to test the heater by isolating the effect of the heater element on the O₂S output voltage from the other effects.

EGR MONITOR (if equipped)

The Powertrain Control Module (PCM) performs an on-board diagnostic check of the EGR system.

The EGR monitor is used to test whether the EGR system is operating within specifications. The diagnostic check activates only during selected engine/driving conditions. When the conditions are met, the EGR is turned off (solenoid energized) and the O₂S compensation control is monitored. Turning off the EGR shifts the air fuel (A/F) ratio in the lean direction. The O₂S data should indicate an increase in the O₂ concentration in the combustion chamber when the exhaust gases are no longer recirculated. While this test does not directly measure the operation of the EGR system, it can be inferred from the shift in the O₂S data whether the EGR system is operating correctly. Because the O₂S is being used, the O₂S test must pass its test before the EGR test. Also looks at EGR linear potentiometer for feedback.

MISFIRE MONITOR

Excessive engine misfire results in increased catalyst temperature and causes an increase in HC emissions. Severe misfires could cause catalyst damage. To prevent catalytic convertor damage, the PCM monitors engine misfire.

The Powertrain Control Module (PCM) monitors for misfire during most engine operating conditions (positive torque) by looking at changes in the crankshaft speed. If a misfire occurs the speed of the crankshaft will vary more than normal.

FUEL SYSTEM MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide. The catalyst works best when the air fuel (A/F) ratio is at or near the optimum of 14.7 to 1.

The PCM is programmed to maintain the optimum air/fuel ratio. This is done by making short term corrections in the fuel injector pulse width based on the O₂S output. The programmed memory acts as a self calibration tool that the engine controller uses to compensate for variations in engine specifications, sensor tolerances and engine fatigue over the life span of the engine. By monitoring the actual air-fuel ratio with the O₂S (short term) and multiplying that with the program long-term (adaptive) memory and comparing that to the limit, it can be determined whether it will pass an emissions test. If a malfunction occurs such that the PCM cannot maintain the optimum A/F ratio, then the MIL will be illuminated.

CATALYST MONITOR

To comply with clean air regulations, vehicles are equipped with catalytic converters. These converters reduce the emission of hydrocarbons, oxides of nitrogen and carbon monoxide.

Normal vehicle miles or engine misfire can cause a catalyst to decay. A meltdown of the ceramic core can cause a reduction of the exhaust passage. This can increase vehicle emissions and deteriorate engine performance, driveability and fuel economy.

The catalyst monitor uses dual oxygen sensors (O₂S's) to monitor the efficiency of the converter. The dual O₂S's strategy is based on the fact that as a catalyst deteriorates, its oxygen storage capacity and its efficiency are both reduced. By monitoring the oxygen storage capacity of a catalyst, its efficiency can be indirectly calculated. The upstream O₂S is used to detect the amount of oxygen in the exhaust gas before the gas enters the catalytic converter. The PCM calculates the A/F mixture from the output of the O₂S. A low voltage indicates high oxygen content (lean mixture). A high voltage indicates a low content of oxygen (rich mixture).

When the upstream O₂S detects a lean condition, there is an abundance of oxygen in the exhaust gas. A functioning converter would store this oxygen so it can use it for the oxidation of HC and CO. As the converter absorbs the oxygen, there will be a lack of oxygen downstream of the converter. The output of the downstream O₂S will indicate limited activity in this condition.

As the converter loses the ability to store oxygen, the condition can be detected from the behavior of the downstream O₂S. When the efficiency drops, no

EMISSIONS CONTROL (Continued)

chemical reaction takes place. This means the concentration of oxygen will be the same downstream as upstream. The output voltage of the downstream O₂S copies the voltage of the upstream sensor. The only difference is a time lag (seen by the PCM) between the switching of the O₂S's.

To monitor the system, the number of lean-to-rich switches of upstream and downstream O₂S's is counted. The ratio of downstream switches to upstream switches is used to determine whether the catalyst is operating properly. An effective catalyst will have fewer downstream switches than it has upstream switches i.e., a ratio closer to zero. For a totally ineffective catalyst, this ratio will be one-to-one, indicating that no oxidation occurs in the device.

The system must be monitored so that when catalyst efficiency deteriorates and exhaust emissions increase to over the legal limit, the MIL (Check Engine lamp) will be illuminated.

LEAK DETECTION PUMP MONITOR (if equipped)

The leak detection assembly incorporates two primary functions: it must detect a leak in the evaporative system and seal the evaporative system so the leak detection test can be run.

The primary components within the assembly are: A three port solenoid that activates both of the functions listed above; a pump which contains a switch, two check valves, a spring/diaphragm, and a canister vent valve (CVV) seal which contains a spring loaded vent seal valve.

Immediately after a cold start, between predetermined temperature thresholds limits, the three port solenoid is briefly energized. This initializes the pump by drawing air into the pump cavity and also closes the vent seal. During non test conditions the vent seal is held open by the pump diaphragm assembly which pushes it open at the full travel position. The vent seal will remain closed while the pump is cycling due to the reed switch triggering of the three port solenoid that prevents the diaphragm assembly from reaching full travel. After the brief initialization period, the solenoid is de-energized allowing atmospheric pressure to enter the pump cavity, thus permitting the spring to drive the diaphragm which forces air out of the pump cavity and into the vent system. When the solenoid is energized and de energized, the cycle is repeated creating flow in typical diaphragm pump fashion. The pump is controlled in 2 modes:

Pump Mode: The pump is cycled at a fixed rate to achieve a rapid pressure build in order to shorten the overall test length.

Test Mode: The solenoid is energized with a fixed duration pulse. Subsequent fixed pulses occur when the diaphragm reaches the Switch closure point.

The spring in the pump is set so that the system will achieve an equalized pressure of about 7.5" water. The cycle rate of pump strokes is quite rapid as the system begins to pump up to this pressure. As the pressure increases, the cycle rate starts to drop off. If there is no leak in the system, the pump would eventually stop pumping at the equalized pressure. If there is a leak, it will continue to pump at a rate representative of the flow characteristic of the size of the leak. From this information we can determine if the leak is larger than the required detection limit (currently set at .020" orifice by CARB). If a leak is revealed during the leak test portion of the test, the test is terminated at the end of the test mode and no further system checks will be performed.

The canister vent valve will unseal the system after completion of the test sequence as the pump diaphragm assembly moves to the full travel position.

Evaporative system functionality will be verified by using the stricter evap purge flow monitor. At an appropriate warm idle the LDP will be energized to seal the canister vent. The purge flow will be clocked up from some small value in an attempt to see a shift in the O₂ control system. If fuel vapor, indicated by a shift in the O₂ control, is present the test is passed. If not, it is assumed that the purge system is not functioning in some respect. The LDP is again turned off and the test is ended.

Natural Vacuum Leak Detection (NVLD) (if equipped)

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Next Generation Controller (NGC) starting in 2002 M.Y. This new system replaces the leak detection pump as the method of evaporative system leak detection. This is to detect a leak equivalent to a 0.020" (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the "Gas Law". This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure. In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

A vent valve seals the canister vent during engine off conditions. If the vapor system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determi-

EMISSIONS CONTROL (Continued)

nation by this diagnostic. When the vacuum in the system exceeds about 1" H₂O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the NGC. The NGC, via appropriate logic strategies (described below), utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

The NVLD device is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister. The NVLD assembly may be mounted on top of the canister outlet, or in-line between the canister and atmospheric vent filter. The normally open vacuum switch will close with about 1" H₂O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3" to 6" H₂O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative.

The solenoid actuates the valve to unseal the canister vent while the engine is running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires initial 1.5 amps of current to pull the valve open but after 100 ms. will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

Another feature in the device is a diaphragm that will open the seal in the NVLD with pressure in the evaporative system. The device will "blow off" at about 0.5" H₂O (0.12 KPA) pressure to permit the venting of vapors during refueling. An added benefit to this is that it will also allow the tank to "breathe" during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The device itself has 3 wires: Switch sense, solenoid driver and ground. It also includes a resistor to protect the switch from a short to battery or a short to ground. The NGC utilizes a high-side driver to energize and duty-cycle the solenoid.

DESCRIPTION - HIGH AND LOW LIMITS

The PCM compares input signal voltages from each input device with established high and low limits for the device. If the input voltage is not within limits and other criteria are met, the PCM stores a diagnostic trouble code in memory. Other diagnostic trouble code criteria might include engine RPM limits or input voltages from other sensors or switches that must be present before verifying a diagnostic trouble code condition.

OPERATION

OPERATION - SYSTEM

The Powertrain Control Module (PCM) monitors many different circuits in the fuel injection, ignition, emission and engine systems. If the PCM senses a problem with a monitored circuit often enough to indicate an actual problem, it stores a Diagnostic Trouble Code (DTC) in the PCM's memory. If the code applies to a non-emissions related component or system, and the problem is repaired or ceases to exist, the PCM cancels the code after 40 warmup cycles. Diagnostic trouble codes that affect vehicle emissions illuminate the Malfunction Indicator Lamp (MIL). Refer to Malfunction Indicator Lamp in this section.

Certain criteria must be met before the PCM stores a DTC in memory. The criteria may be a specific range of engine RPM, engine temperature, and/or input voltage to the PCM.

The PCM might not store a DTC for a monitored circuit even though a malfunction has occurred. This may happen because one of the DTC criteria for the circuit has not been met. **For example**, assume the diagnostic trouble code criteria requires the PCM to monitor the circuit only when the engine operates between 750 and 2000 RPM. Suppose the sensor's output circuit shorts to ground when engine operates above 2400 RPM (resulting in 0 volt input to the PCM). Because the condition happens at an engine speed above the maximum threshold (2000 rpm), the PCM will not store a DTC.

There are several operating conditions for which the PCM monitors and sets DTC's. Refer to Monitored Systems, Components, and Non-Monitored Circuits in this section.

NOTE: Various diagnostic procedures may actually cause a diagnostic monitor to set a DTC. For instance, pulling a spark plug wire to perform a spark test may set the misfire code. When a repair is completed and verified, use the DRBIII® scan tool to erase all DTC's and extinguish the MIL.

EMISSIONS CONTROL (Continued)

Technicians can display stored DTC's. Refer to Diagnostic Trouble Codes (Refer to 8 - ELECTRICAL/ELECTRONIC CONTROL MODULES/POWER-TRAIN CONTROL MODULE - DESCRIPTION). For obtaining the DTC information, use the Data Link Connector with the DRBIII® scan tool (Fig. 1).

DRB III® STATE DISPLAY TEST MODE**OPERATION**

The switch inputs to the Powertrain Control Module (PCM) have two recognized states; HIGH and LOW. For this reason, the PCM cannot recognize the difference between a selected switch position versus an open circuit, a short circuit, or a defective switch. If the State Display screen shows the change from HIGH to LOW or LOW to HIGH, assume the entire switch circuit to the PCM functions properly. From the state display screen, access either State Display Inputs and Outputs or State Display Sensors.

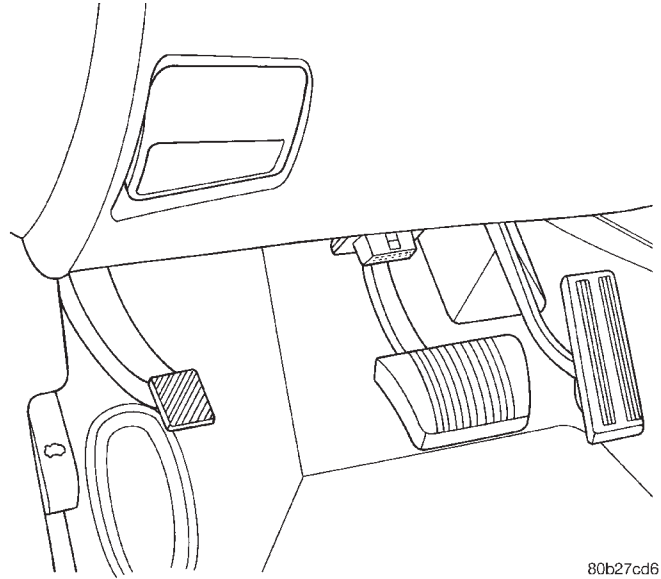


Fig. 1 Data Link Connector

EVAPORATIVE EMISSIONS

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EVAPORATIVE EMISSIONS

OPERATION - EVAPORATION CONTROL SYSTEM

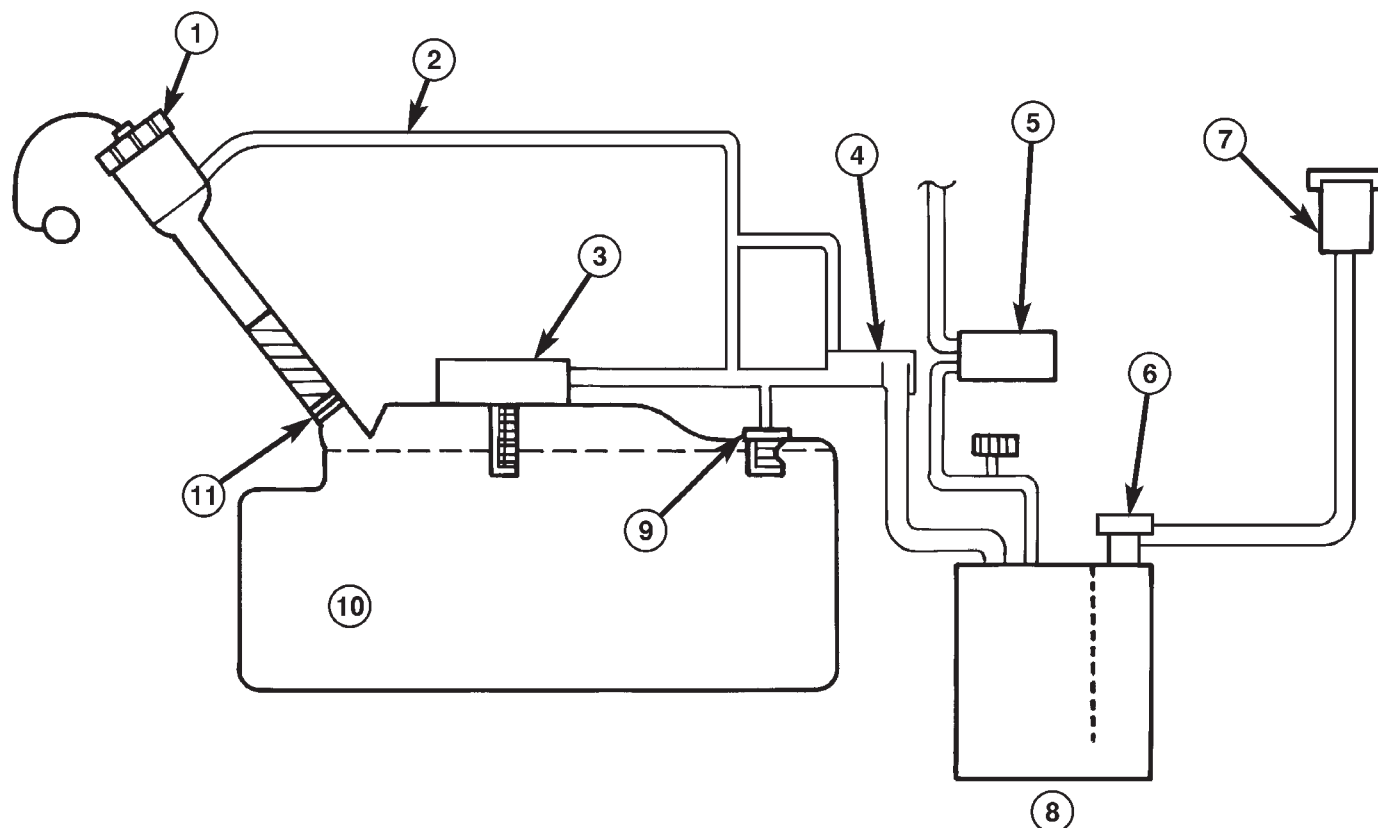
The evaporation control system prevents the emission of fuel tank vapors into the atmosphere. When fuel evaporates in the fuel tank, the vapors pass through vent hoses or tubes to an activated carbon filled evaporative canister. The canister temporarily holds the vapors. The Powertrain Control Module (PCM) allows intake manifold vacuum to draw vapors into the combustion chambers during certain operating conditions (Fig. 1).

All engines use a proportional purge solenoid system. The PCM controls vapor flow by operating the purge solenoid. Refer to Proportional Purge Solenoid in this section.

NOTE: The evaporative system uses specially manufactured hoses. If they need replacement, only use fuel resistant hose. Also the hoses must be able to pass an Ozone compliance test.

NOTE: For more information on Onboard Refueling Vapor Recovery (ORVR), refer to the Fuel Delivery section.

EVAPORATIVE EMISSIONS (Continued)

**Fig. 1 ORVR SYSTEM SCHEMATIC**

80db2c91

- 1 - FUEL CAP
- 2 - RECIRCULATION TUBE
- 3 - CONTROL VALVE
- 4 - FLOW MANAGEMENT VALVE
- 5 - PURGE
- 6 - NVLD ASSMBLY

- 7 - BREATHER ELEMENT
- 8 - CANISTER
- 9 - ROLLOVER VALVE
- 10 - FUEL TANK
- 11 - CHECK VALVE

EVAP/PURGE SOLENOID**DESCRIPTION**

All vehicles use a proportional purge solenoid. The solenoid regulates the rate of vapor flow from the EVAP canister to the throttle body. The PCM operates the solenoid.

OPERATION

During the cold start warm-up period and the hot start time delay, the PCM does not energize the solenoid. When de-energized, no vapors are purged.

The proportional purge solenoid operates at a frequency of 200 hz and is controlled by an engine controller circuit that senses the current being applied to the proportional purge solenoid (Fig. 2) and then adjusts that current to achieve the desired purge flow. The proportional purge solenoid controls the purge rate of fuel vapors from the vapor canister and fuel tank to the engine intake manifold.

REMOVAL

The solenoid attaches to a bracket near the air cleaner. The solenoid will not operate unless it is installed correctly.

- (1) Disconnect electrical connector from solenoid.
- (2) Disconnect vacuum tubes from solenoid.
- (3) Remove solenoid from bracket.

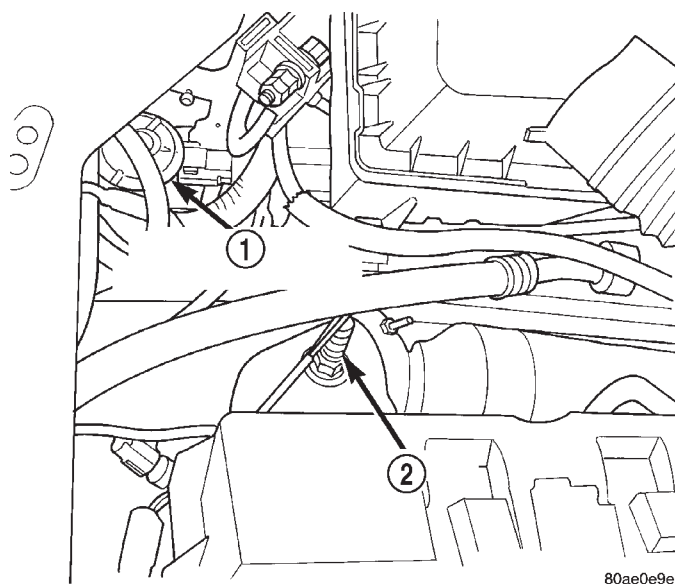
INSTALLATION

The solenoid attaches to a bracket near the air cleaner. The solenoid will not operate unless it is installed correctly.

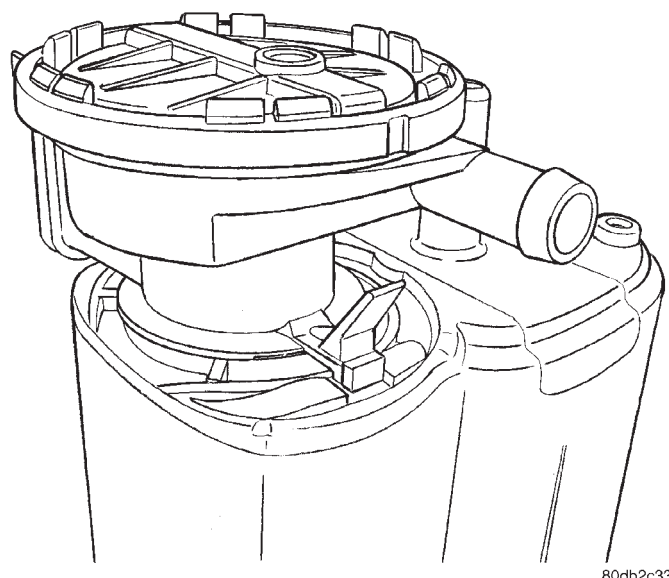
The top of the solenoid has TOP printed on it. The solenoid will not operate unless it is installed correctly.

- (1) Install solenoid on bracket.
- (2) Connect vacuum tube to solenoid.
- (3) Connect electrical connector to solenoid.

EVAP/PURGE SOLENOID (Continued)

**Fig. 2 UPSTREAM HEATED OXYGEN SENSOR 1/1**

- 1 - PROPORTIONAL PURGE SOLENOID
2 - O₂ SENSOR

**Fig. 3 NVLD ASSEMBLY**

FUEL FILLER CAP

DESCRIPTION

The plastic fuel fill cap is threaded/quarter turn onto the end of the fuel filler tube. Its purpose is to retain vapors and fuel in the fuel tank.

OPERATION

The fuel filler cap incorporates a two-way relief valve that is closed to atmosphere during normal operating conditions. The relief valve is calibrated to open when a pressure of 17 kPa (2.5 psi) or vacuum of 2 kPa (0.6 in. Hg) occurs in the fuel tank. When the pressure or vacuum is relieved, the valve returns to the normally closed position.

CAUTION: Remove the fuel filler cap to release fuel tank pressure before disconnecting any fuel system component.

NATURAL VAC LEAK
DETECTION ASSY

DESCRIPTION

The natural Vacuum Leak detection (NVLD) system is mounted on top of the EVAP canister (Fig. 3) that is mounted on the fuel tank.

OPERATION

The Natural Vacuum Leak Detection (NVLD) system is the next generation evaporative leak detection system that will first be used on vehicles equipped with the Next Generation Controller (NGC) starting in 2002 M.Y. This new system replaces the leak detection pump as the method of evaporative system leak detection. This is to detect a leak equivalent to a 0.020" (0.5 mm) hole. This system has the capability to detect holes of this size very dependably.

The basic leak detection theory employed with NVLD is the "Gas Law". This is to say that the pressure in a sealed vessel will change if the temperature of the gas in the vessel changes. The vessel will only see this effect if it is indeed sealed. Even small leaks will allow the pressure in the vessel to come to equilibrium with the ambient pressure. In addition to the detection of very small leaks, this system has the capability of detecting medium as well as large evaporative system leaks.

A vent valve seals the canister vent during engine off conditions. If the vapor system has a leak of less than the failure threshold, the evaporative system will be pulled into a vacuum, either due to the cool down from operating temperature or diurnal ambient temperature cycling. The diurnal effect is considered one of the primary contributors to the leak determination by this diagnostic. When the vacuum in the system exceeds about 1" H₂O (0.25 KPA), a vacuum switch closes. The switch closure sends a signal to the NGC. The NGC, via appropriate logic strategies (described below), utilizes the switch signal, or lack thereof, to make a determination of whether a leak is present.

NATURAL VAC LEAK DETECTION ASSY (Continued)

The NVLD device is designed with a normally open vacuum switch, a normally closed solenoid, and a seal, which is actuated by both the solenoid and a diaphragm. The NVLD is located on the atmospheric vent side of the canister. The NVLD assembly may be mounted on top of the canister outlet, or in-line between the canister and atmospheric vent filter. The normally open vacuum switch will close with about 1" H₂O (0.25 KPA) vacuum in the evaporative system. The diaphragm actuates the switch. This is above the opening point of the fuel inlet check valve in the fill tube so cap off leaks can be detected. Submerged fill systems must have recirculation lines that do not have the in-line normally closed check valve that protects the system from failed nozzle liquid ingestion, in order to detect cap off conditions.

The normally closed valve in the NVLD is intended to maintain the seal on the evaporative system during the engine off condition. If vacuum in the evaporative system exceeds 3" to 6" H₂O (0.75 to 1.5 KPA), the valve will be pulled off the seat, opening the seal. This will protect the system from excessive vacuum as well as allowing sufficient purge flow in the event that the solenoid was to become inoperative.

The solenoid actuates the valve to unseal the canister vent while the engine is running. It also will be used to close the vent during the medium and large leak tests and during the purge flow check. This solenoid requires initial 1.5 amps of current to pull the valve open but after 100 ms. will be duty cycled down to an average of about 150 mA for the remainder of the drive cycle.

Another feature in the device is a diaphragm that will open the seal in the NVLD with pressure in the evaporative system. The device will "blow off" at about 0.5" H₂O (0.12 KPA) pressure to permit the venting of vapors during refueling. An added benefit to this is that it will also allow the tank to "breathe" during increasing temperatures, thus limiting the pressure in the tank to this low level. This is beneficial because the induced vacuum during a subsequent declining temperature will achieve the switch closed (pass threshold) sooner than if the tank had to decay from a built up pressure.

The device itself has 3 wires: Switch sense, solenoid driver and ground. It also includes a resistor to protect the switch from a short to battery or a short to ground. The NGC utilizes a high-side driver to energize and duty-cycle the solenoid.

REMOVAL

- (1) Disconnect the negative battery cable.
- (2) Remove fuel tank, refer to the Fuel Delivery section for Fuel Tank Removal.
- (3) Disconnect the electrical connector from the NVLD assembly.

- (4) Disconnect the hoses from the NVLD assembly (Fig. 5).

- (5) Lift tab on NVLD assembly (Fig. 4) and twist the assembly counterclockwise and pull up to remove from EVAP canister (Fig. 5).

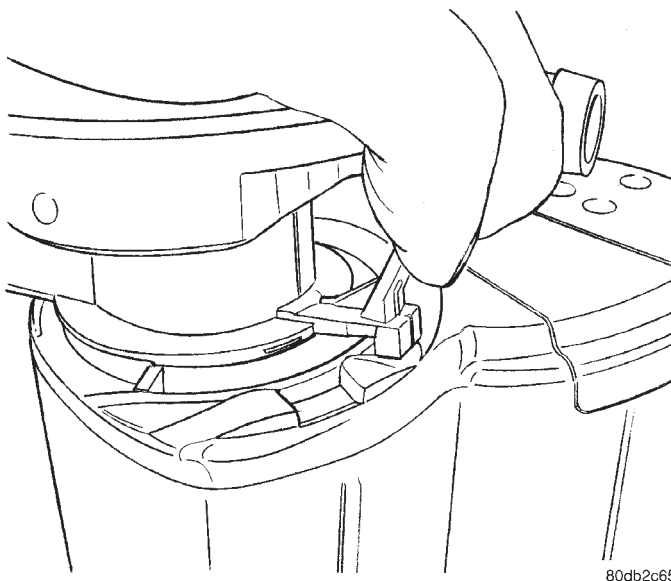


Fig. 4 LOCKING TAB

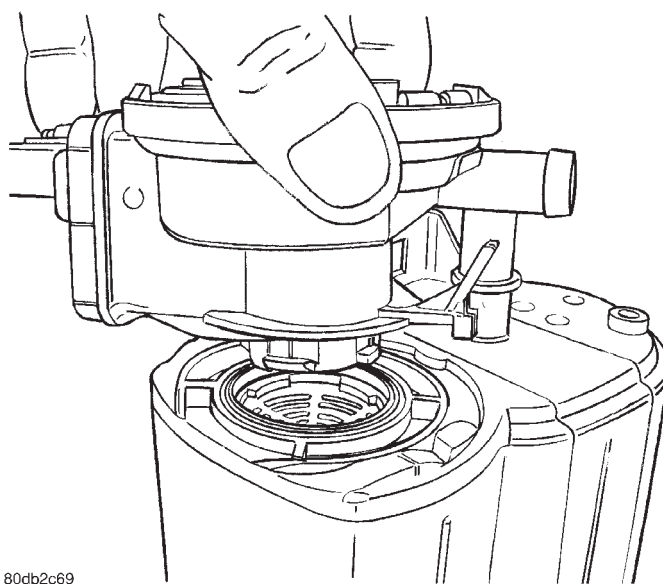


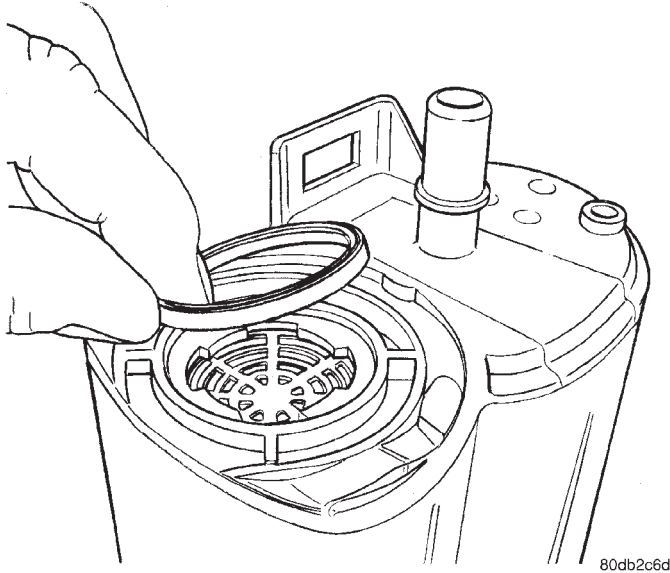
Fig. 5 ASSEMBLY REMOVED

- (6) Remove O-ring from EVAP canister (Fig. 6).

INSTALLATION

- (1) Install O-ring to EVAP canister (Fig. 6).
- (2) Install NVLD assembly (Fig. 4) and twist the assembly clockwise to lock assembly in the EVAP canister (Fig. 5).
- (3) Connect the hoses to the NVLD assembly.
- (4) Connect the electrical connector to the NVLD assembly.

NATURAL VAC LEAK DETECTION ASSY (Continued)

**Fig. 6 O-RING**

- (5) Install fuel tank, refer to the Fuel Delivery section for Fuel Tank Installation.
- (6) Connect the negative battery cable.

ORVR**DESCRIPTION**

Onboard Refueling Vapor Recovery (ORVR) System Schematic and components.

OPERATION

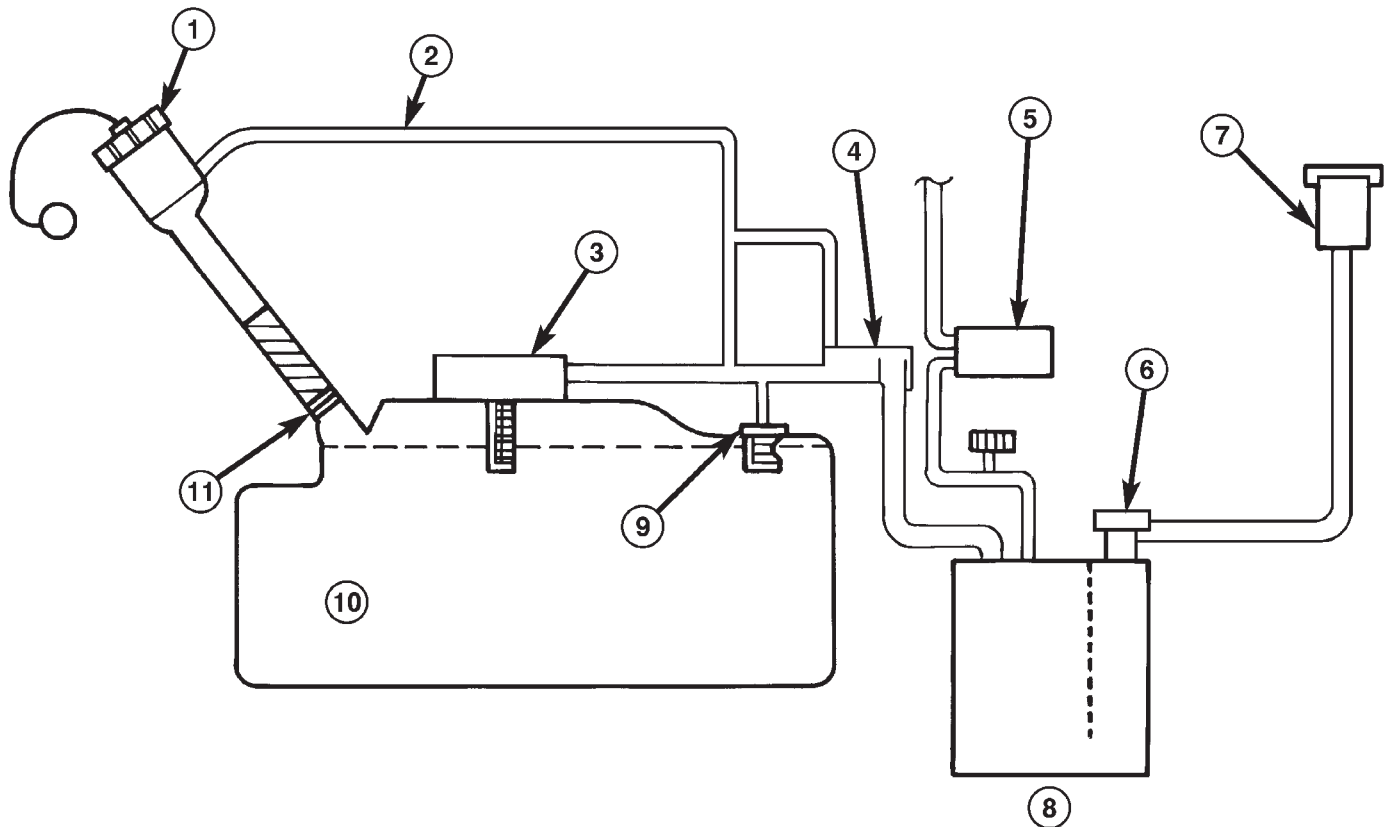
The emission control principle used in the ORVR system is that the fuel flowing into the filler tube (approx. 1" I.D.) creates an aspiration effect which draws air into the fill tube (Fig. 7). During refueling, the fuel tank is vented to the vapor canister to capture escaping vapors. With air flowing into the filler tube, there are no fuel vapors escaping to the atmosphere. Once the refueling vapors are captured by the canister, the vehicle's computer controlled purge system draws vapor out of the canister for the engine to burn. The vapors flow is metered by the purge solenoid so that there is no or minimal impact on driveability or tailpipe emissions.

As fuel starts to flow through the fill tube, it opens the normally closed check valve and enters the fuel tank. Vapor or air is expelled from the tank through the control valve to the vapor canister. Vapor is absorbed in the canister until vapor flow in the lines stops, either following shut-off or by having the fuel level in the tank rise high enough to close the control valve. The control valve contains a float that rises to seal the large diameter vent path to the canister. At this point in the fueling of the vehicle, the tank pressure increase, the check valve closes (preventing tank fuel from spitting back at the operator), and fuel then rises up the filler tube to shut-off the dispensing nozzle.

If the engine is shut-off while the On-Board diagnostics test is running, low level tank pressure can be trapped in the fuel tank and fuel can not be added to the tank until the pressure is relieved. This is due to the leak detection pump closing the vapor outlet from the top of the tank and the one-way check valve not allowing the tank to vent through the fill tube to atmosphere. Therefore, when fuel is added, it will back-up in the fill tube and shut off the dispensing nozzle. The pressure can be eliminated in two ways:

1. Vehicle purge must be activated and for a long enough period to eliminate the pressure.
2. Removing the fuel cap and allowing enough time for the system to vent thru the recirculation tube.

ORVR (Continued)

**Fig. 7 ORVR System Schematic**

80db2c91

- 1 - FUEL CAP
- 2 - RECIRCULATION TUBE
- 3 - CONTROL VALVE
- 4 - FLOW MANAGEMENT VALVE
- 5 - PURGE
- 6 - NVLD ASSEMBLY

- 7 - BREATHER ELEMENT
- 8 - CANISTER
- 9 - ROLLOVER VALVE
- 10 - FUEL TANK
- 11 - CHECK VALVE

PCV HOSE**DESCRIPTION**

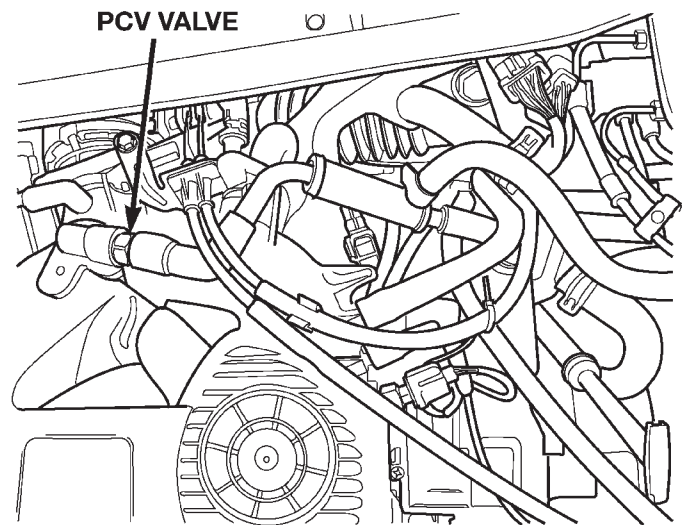
The PCV system has a heat exchanger in the PCV hose that works with the cooling system of the vehicle (Fig. 8) or (Fig. 9).

REMOVAL

- (1) Drain the Cooling system, refer to the Cooling system for more information.
- (2) Remove hose from PCV valve.
- (3) Remove hose from valve cover.
- (4) Remove the 2 heater hoses from heat exchanger in PCV hose.

INSTALLATION

- (1) Install heater hoses to heat exchanger and tighten clamps.
- (2) Install hose to PCV valve.
- (3) Install hose to valve cover.



80c073e3

Fig. 8 PCV - 2.7L

PCV HOSE (Continued)

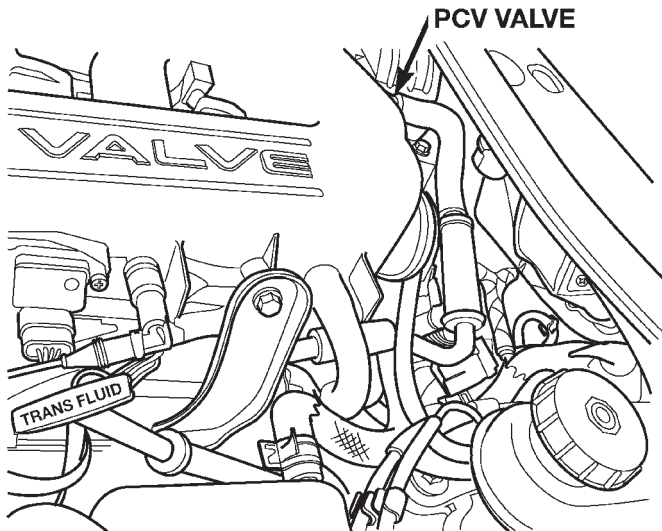


Fig. 9 PCV - 3.2/3.5L

80c073e4

(4) Fill coolant system, refer to the Cooling system for more information.

PCV VALVE

DESCRIPTION

The PCV valve contains a spring loaded plunger. The plunger meters the amount of crankcase vapors routed into the combustion chamber based on intake manifold vacuum (Fig. 10) or (Fig. 11).

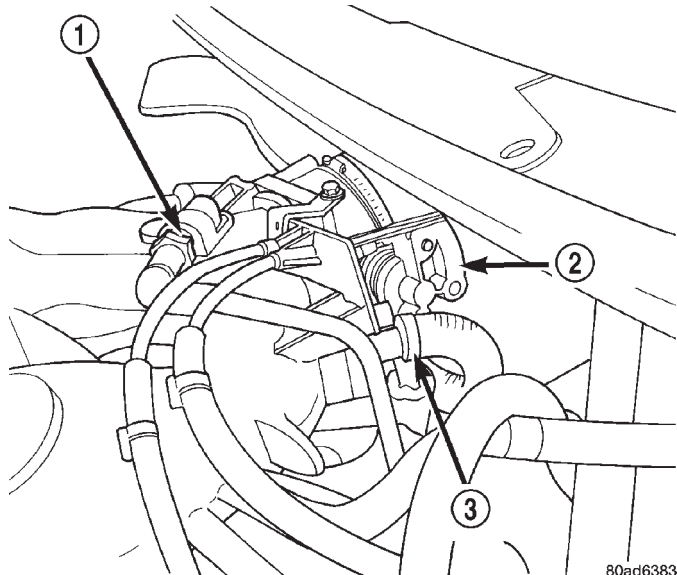


Fig. 10 PCV Valve -2.7L

80ad6383

- 1 - PCV VALVE
- 2 - THROTTLE BODY
- 3 - EGR TUBE

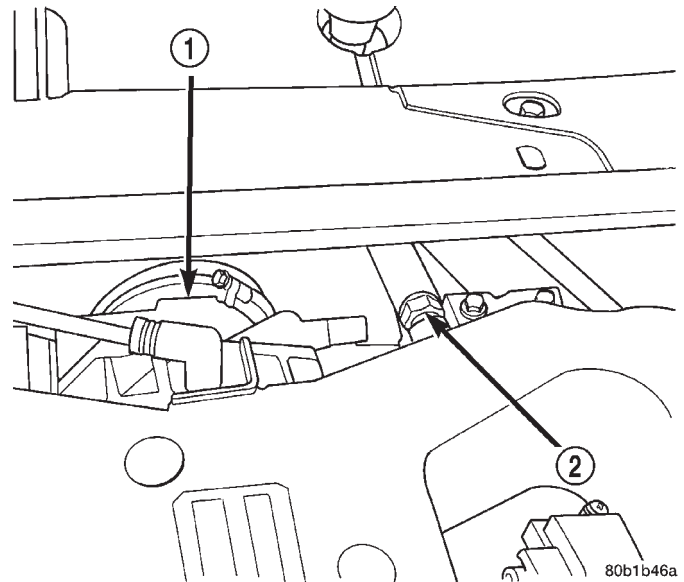


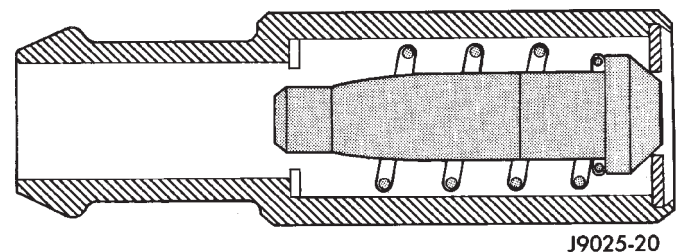
Fig. 11 PCV Valve—3.2/3.5L

80b1b46a

- 1 - THROTTLE BODY
- 2 - PCV VALVE

OPERATION

When the engine is not operating or during an engine backfire, the spring forces the plunger back against the seat. This prevents vapors from flowing through the valve (Fig. 12).



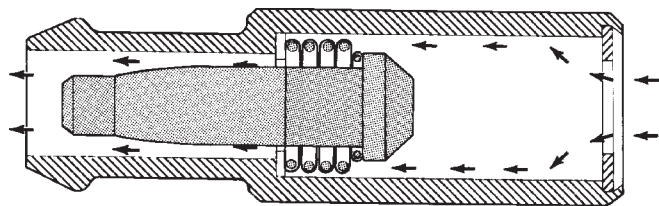
J9025-20

Fig. 12 Engine Off or Engine Backfire No Vapor Flow

When the engine is at idle or cruising, high manifold vacuum is present. At these times manifold vacuum is able to completely compress the spring and pull the plunger to the top of the valve (Fig. 13). In this position there is minimal vapor flow through the valve.

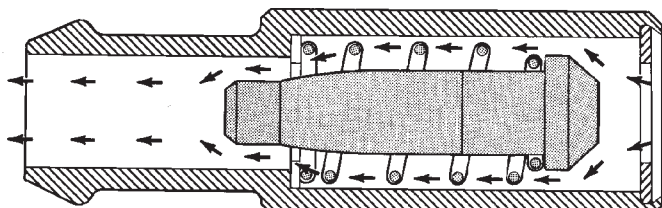
During periods of moderate intake manifold vacuum the plunger is only pulled part way back from the inlet. This results in maximum vapor flow through the valve (Fig. 14).

PCV VALVE (Continued)



J8925-14

Fig. 13 High Intake Manifold Vacuum Minimal Vapor Flow



J8925-15

Fig. 14 Moderate Intake Manifold Vacuum Maximum Vapor Flow

DIAGNOSIS AND TESTING - PCV SYSTEM

WARNING: APPLY PARKING BRAKE AND/OR BLOCK WHEELS BEFORE PERFORMING ANY TEST OR ADJUSTMENT WITH THE ENGINE OPERATING.

(1) With engine idling, remove the hose from the PCV valve. If the valve is not plugged, a hissing noise will be heard as air passes through the valve. A strong vacuum should also be felt when a finger is placed over the valve inlet.

(2) Install hose on PCV valve. Remove the make-up air hose from the air plenum at the rear of the engine. Hold a piece of stiff paper (parts tag) loosely over the end of the make-up air hose.

(3) After allowing approximately one minute for crankcase pressure to reduce, the paper should draw up against the hose with noticeable force. If the engine does not draw the paper against the grommet after installing a new valve, replace the PCV valve hose.

(4) Turn the engine off. Remove the PCV valve from intake manifold. The valve should rattle when shaken.

(5) Replace the PCV valve and retest the system if it does not operate as described in the preceding tests. **Do not attempt to clean the old PCV valve.** If the valve rattles, apply a light coating of Loctite® Pipe Sealant With Teflon to the threads. Thread the PCV valve into the manifold plenum and tighten to 7 N·m (60 in. lbs.) torque.

VAPOR CANISTER

OPERATION

All vehicles use a maintenance free, evaporative (EVAP) canister. Fuel tank vapors vent into the canister. The canister temporarily holds the fuel vapors until intake manifold vacuum draws them into the combustion chamber. The Powertrain Control Module (PCM) purges the canister through the proportional purge solenoid. The PCM purges the canister at pre-determined intervals and engine conditions.

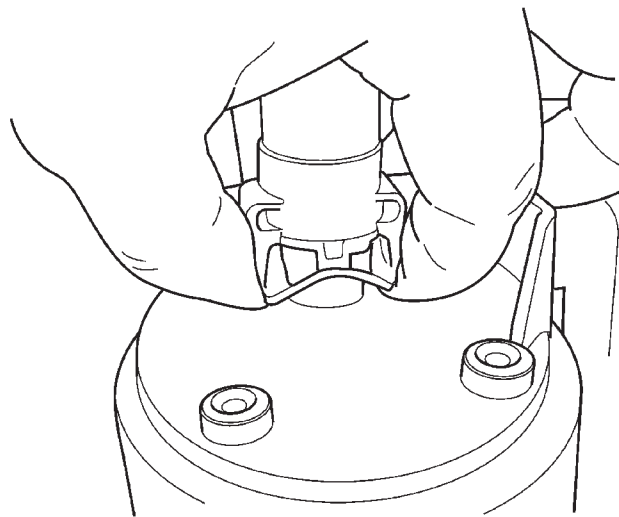
Purge Free Cells

Purge-free memory cells are used to identify the fuel vapor content of the evaporative canister. Since the evaporative canister is not purged 100% of the time, the PCM stores information about the evaporative canister's vapor content in a memory cell.

The purge-free cells are constructed similar to certain purge-normal cells. The purge-free cells can be monitored by the DRB III® Scan Tool. The only difference between the purge-free cells and normal adaptive cells is that in purge-free, the purge is completely turned off. This gives the PCM the ability to compare purge and purge-free operation.

REMOVAL

- (1) Disconnect the negative battery cable.
- (2) Remove the fuel tank, refer to the fuel tank removal in this section
- (3) Disconnect the EVAP hoses from the EVAP canister and the electrical connector (Fig. 15).

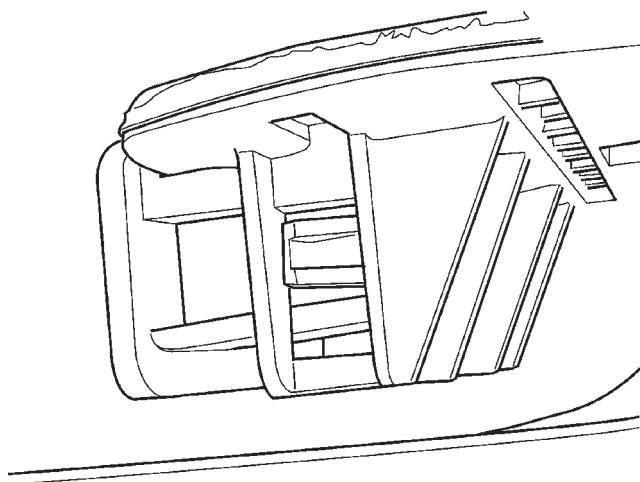


80db2e89

Fig. 15 EVAP CANISTER HOSES

- (4) Squeeze the lower tabs on the EVAP canister to release it (Fig. 16).

VAPOR CANISTER (Continued)

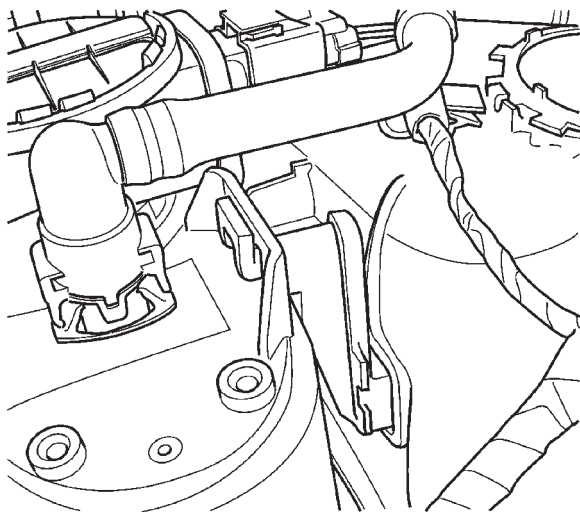


80db2e97

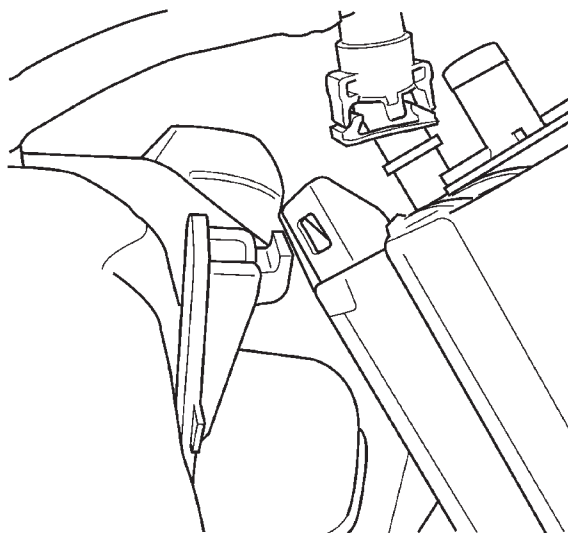
Fig. 16 EVAP CANISTER BOTTOM TABS

(5) Swing the EVAP canister away from the lower bracket.

(6) Lift the EVAP canister up and off the upper mounting tab (Fig. 17) and (Fig. 18).



80db2e9b

Fig. 17 EVAP CANISTER TOP TAB

80db2ea0

Fig. 18 EVAP CANISTER TOP MOUNTING**INSTALLATION**

(1) Install the EVAP canister to the upper mounting bracket (Fig. 17) and (Fig. 18).

(2) Swing EVAP canister into the lower mounting and snap into place (Fig. 16).

(3) Install the hoses to the top of the EVAP canister (Fig. 15).

(4) Connect the electrical connector.

(5) Install the fuel tank, refer to the fuel tank installation section

(6) Connect the negative battery cable.

EXHAUST GAS RECIRCULATION

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EXHAUST GAS
RECIRCULATION

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
EGR valve to cyl. head	31	22.8	275
EGR tube to EGR valve	11		95
EGR tube to intake manifold	11		95
EGR tube to exhaust manifold	31	22.8	275

EGR VALVE

DESCRIPTION

The EGR valve consists of three major components. First there is the pintle, valve seat, and housing which contains and regulates the gas flow. Second there is the armature, return spring, and solenoid coil to provide the operating force to regulate the flow by changing the pintle position. The solenoid coil assembly is in parallel with a diode and connects to the two connectors in the connector assembly. The third major component which senses pintle position and is connected to the three connectors in the electrical connector.

OPERATION

The exhaust gas recirculation flow is determined by the engine controller. For a given set of conditions, the engine controller knows the ideal exhaust gas recirculation flow to optimize NOx and fuel economy as a function of the pintle position. Pintle position is obtained from the position sensor. The engine controller adjusts the duty cycle of 128 Hz power supplied to the solenoid coil to obtain the correct position.

REMOVAL - 3.5L

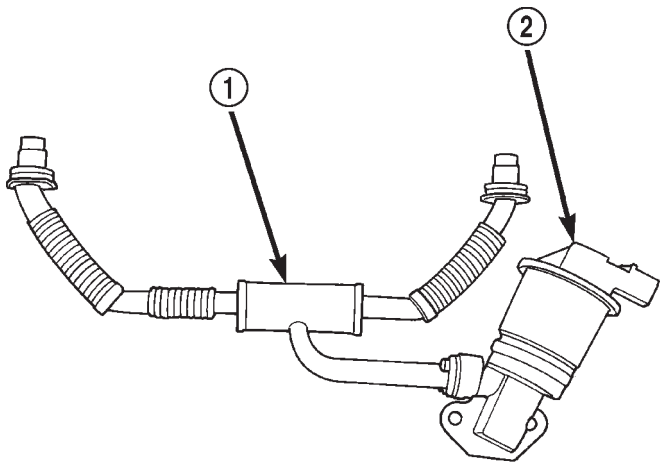


Fig. 1 EGR tube and Valve - 3.2/3.5L

80ad62ab

- 1 - EGR TUBE
- 2 - EGR VALVE

- (1) Disconnect negative battery cable.
- (2) Remove air inlet tube and resonator.

EGR VALVE (Continued)

(3) Disconnect electrical connector from EGR valve.

(4) Remove EGR tube mounting screws at EGR valve (Fig. 1).

The EGR valve attaches to the rear of the right cylinder head.

(5) Remove EGR valve mounting screws.

(6) Clean gasket surfaces. Discard old gasket. If necessary, clean EGR passages.

INSTALLATION - 3.5L

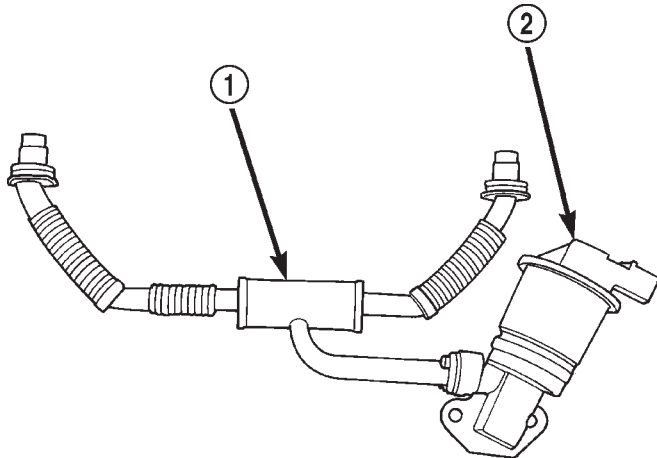


Fig. 2 EGR tube and Valve

80ad62ab

- 1 - EGR TUBE
- 2 - EGR VALVE

(1) Loosely install EGR valve and new gasket on cylinder head (Fig. 2).

(2) Using a new gasket, loosely install the EGR tube and mounting screws.

(3) Tighten EGR valve to cylinder head screws to 31 N·m (275 in. lbs.) torque.

(4) Tighten the EGR tube to EGR valve screws to 11 N·m (95 in. lbs.) torque.

(5) Attach electrical connector to solenoid.

(6) Install air inlet tube and resonator.

(7) Connect negative battery cable.

EGR TUBE - 3.5L

REMOVAL - 3.5L

The EGR tube attaches to the bottom of the intake manifold plenum beside the throttle body (Fig. 4).

(1) Disconnect negative battery cable.

(2) Remove air inlet tube and resonator.

(3) Remove EGR tube mounting clips at intake manifold plenum (Fig. 3).

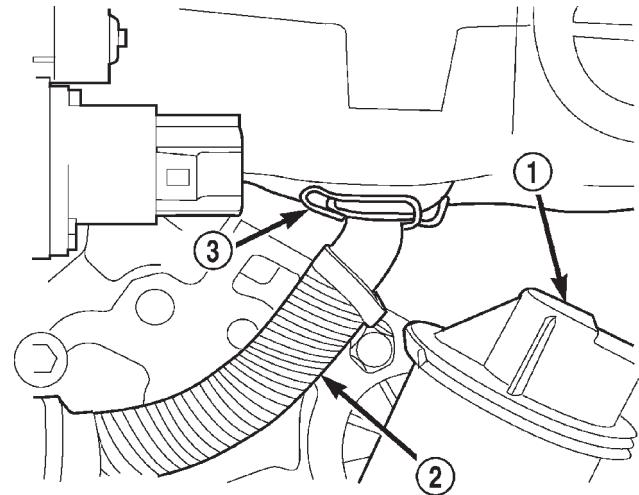
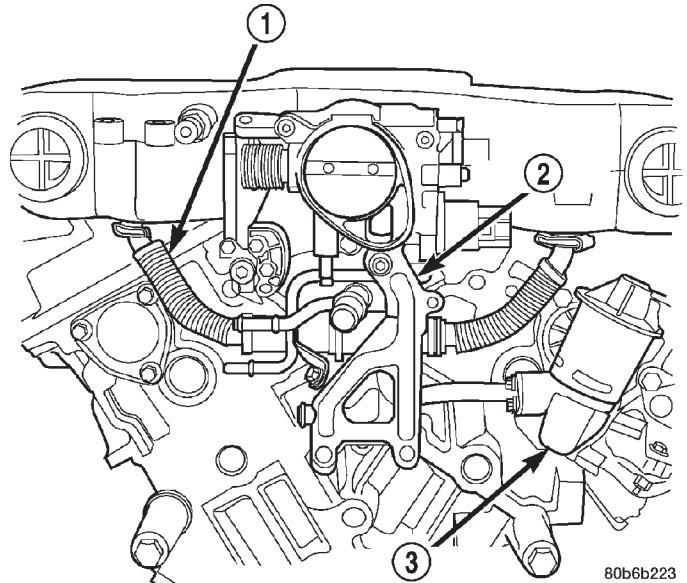


Fig. 3 EGR Tube Clips

80b6b220

- 1 - EGR VALVE
- 2 - EGR TUBE
- 3 - CLIP

(4) Loosen transmission to throttle body bracket (Fig. 4). Remove 2 nuts and 1 bolt and remove bracket off of studs.



80b6b223

Fig. 4 Bracket and EGR Tube

- 1 - EGR TUBE
- 2 - BRACKET
- 3 - EGR VALVE

EGR TUBE - 3.5L (Continued)

(5) Remove EGR tube mounting screws at EGR valve.

When removing EGR upper tube assembly being careful not to drop the silicone rubber seals in the intake manifold. Clean gasket surfaces on the EGR valve. Note that any loose dirt can lodge between the pintle and the seat and cause valve leakage that will give a rough idle and depressed manifold vacuum.

(6) Remove EGR tube.

INSTALLATION - 3.5L

The EGR tube attaches to the bottom of the intake manifold plenum beside the throttle body (Fig. 4).

(1) Install rubber silicone seals on intake manifold end of EGR tube, being careful to be sure silicone rubber seals is correctly installed and undamaged.

(2) Using a new gasket, loosely install the EGR tube into the intake manifold and loosely install EGR tube to EGR valve.

(3) Tighten the EGR tube to EGR valve screws to 11 N·m (95 in. lbs.) torque.

(4) Install clips for the EGR tube to intake manifold plenum (Fig. 5).

(5) Install transmission to throttle body bracket.

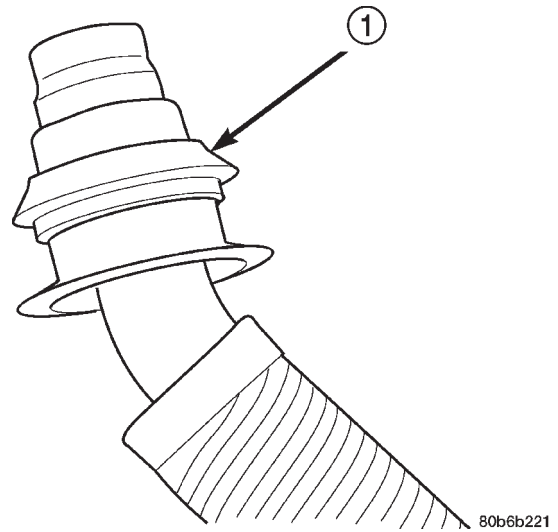


Fig. 5 EGR tube Seal

1 - SILICONE SEAL

(6) Install air inlet tube and resonator.

(7) Connect negative battery cable.

ON-BOARD DIAGNOSTICS

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TASK MANAGER

DESCRIPTION

The PCM is responsible for efficiently coordinating the operation of all the emissions-related components. The PCM is also responsible for determining if the diagnostic systems are operating properly. The software designed to carry out these responsibilities is call the “Task Manager”.

OPERATION

The Task Manager determines when tests happen and when functions occur. Many of the diagnostic steps required by OBD II must be performed under specific operating conditions. The Task Manager software organizes and prioritizes the diagnostic procedures. The job of the Task Manager is to determine if conditions are appropriate for tests to be run, monitor the parameters for a trip for each test, and record the results of the test. Following are the responsibilities of the Task Manager software:

- Test Sequence
- MIL Illumination
- Diagnostic Trouble Codes (DTCs)
- Trip Indicator
- Freeze Frame Data Storage
- Similar Conditions Window

Test Sequence

In many instances, emissions systems must fail diagnostic tests more than once before the PCM illuminates the MIL. These tests are know as ‘two trip monitors.’ Other tests that turn the MIL lamp on after a single failure are known as ‘one trip monitors.’ A trip is defined as ‘start the vehicle and operate it to meet the criteria necessary to run the given monitor.’

Many of the diagnostic tests must be performed under certain operating conditions. However, there are times when tests cannot be run because another test is in progress (conflict), another test has failed (pending) or the Task Manager has set a fault that may cause a failure of the test (suspend).

- Pending

Under some situations the Task Manager will not

run a monitor if the MIL is illuminated and a fault is stored from another monitor. In these situations, the Task Manager postpones monitors **pending** resolution of the original fault. The Task Manager does not run the test until the problem is remedied.

For example, when the MIL is illuminated for an Oxygen Sensor fault, the Task Manager does not run the Catalyst Monitor until the Oxygen Sensor fault is remedied. Since the Catalyst Monitor is based on signals from the Oxygen Sensor, running the test would produce inaccurate results.

- Conflict

There are situations when the Task Manager does not run a test if another monitor is in progress. In these situations, the effects of another monitor running could result in an erroneous failure. If this **conflict** is present, the monitor is not run until the conflicting condition passes. Most likely the monitor will run later after the conflicting monitor has passed.

For example, if the Fuel System Monitor is in progress, the Task Manager does not run the catalyst Monitor. Since both tests monitor changes in air/fuel ratio and adaptive fuel compensation, the monitors will conflict with each other.

- Suspend

Occasionally the Task Manager may not allow a two trip fault to mature. The Task Manager will **suspend** the maturing of a fault if a condition exists that may induce an erroneous failure. This prevents illuminating the MIL for the wrong fault and allows more precise diagnosis.

For example, if the PCM is storing a one trip fault for the Oxygen Sensor and the catalyst monitor, the Task Manager may still run the catalyst Monitor but will suspend the results until the Oxygen Sensor Monitor either passes or fails. At that point the Task Manager can determine if the catalyst system is actually failing or if an Oxygen Sensor is failing.

MIL Illumination

The PCM Task Manager carries out the illumination of the MIL. The Task Manager triggers MIL illumination upon test failure, depending on monitor failure criteria.

TASK MANAGER (Continued)

The Task Manager Screen shows both a Requested MIL state and an Actual MIL state. When the MIL is illuminated upon completion of a test for a good trip, the Requested MIL state changes to OFF. However, the MIL remains illuminated until the next key cycle. (On some vehicles, the MIL will actually turn OFF during the third key cycle) During the key cycle for the third good trip, the Requested MIL state is OFF, while the Actual MIL state is ON. After the next key cycle, the MIL is not illuminated and both MIL states read OFF.

Diagnostic Trouble Codes (DTCs)

With OBD II, different DTC faults have different priorities according to regulations. As a result, the priorities determine MIL illumination and DTC erasure. DTCs are entered according to individual priority. DTCs with a higher priority overwrite lower priority DTCs.

Priorities

- Priority 0 — Non-emissions related trouble codes.
 - Priority 1 — One trip failure of a two trip fault for non-fuel system and non-misfire. (MIL Off)
 - Priority 2 — One trip failure of a two trip fault for fuel system (rich/lean) or misfire. (MIL Off)
 - Priority 3 — Two trip failure for a non-fuel system and non-misfire or matured one trip comprehensive component fault. (MIL On)
 - Priority 4 — Two trip failure or matured fault for fuel system (rich/lean) and misfire or one trip catalyst damaging misfire. Catalyst damage misfire is a 2 trip MIL. The MIL flashes on the first trip when catalyst damage misfire levels are present. (MIL On)
- Non-emissions related failures have no priority. One trip failures of two trip faults have low priority. Two trip failures or matured faults have higher priority. One and two trip failures of fuel system and misfire monitor take precedence over non-fuel system and non-misfire failures.

DTC Self Erasure

With one trip components or systems, the MIL is illuminated upon test failure and DTCs are stored.

Two trip monitors are components requiring failure in two consecutive trips for MIL illumination. Upon failure of the first test, the Task Manager enters a maturing code. If the component fails the test for a second time the code matures and a DTC is set.

After three good trips the MIL is extinguished and the Task Manager automatically switches the trip counter to a warm-up cycle counter. DTCs are automatically erased following 40 warm-up cycles if the component does not fail again.

For misfire and fuel system monitors, the component must pass the test under a Similar Conditions Window in order to record a good trip. A Similar Con-

ditions Window is when engine RPM is within ± 375 RPM and load is within $\pm 20\%$ of when the fault occurred.

NOTE: It is important to understand that a component does not have to fail under a similar window of operation to mature. It must pass the test under a Similar Conditions Window when it failed to record a Good Trip for DTC erasure for misfire and fuel system monitors.

DTCs can be erased anytime with a DRBIII®. Erasing the DTC with the DRBIII® erases all OBD II information. The DRBIII® automatically displays a warning that erasing the DTC will also erase all OBD II monitor data. This includes all counter information for warm-up cycles, trips and Freeze Frame.

Trip Indicator

The **Trip** is essential for running monitors and extinguishing the MIL. In OBD II terms, a trip is a set of vehicle operating conditions that must be met for a specific monitor to run. All trips begin with a key cycle.

Good Trip

The Good Trip counters are as follows:

- Global Good Trip
- Fuel System Good Trip
- Misfire Good Trip
- Alternate Good Trip (appears as a Global Good Trip on DRBIII®)

Trip on DRBIII®

- Comprehensive Components
- Major Monitor
- Warm-Up Cycles

Global Good Trip

To increment a Global Good Trip, the Oxygen sensor and Catalyst efficiency monitors must have run and passed, and 2 minutes of engine run time.

Fuel System Good Trip

To count a good trip (three required) and turn off the MIL, the following conditions must occur:

- Engine in closed loop
- Operating in Similar Conditions Window
- Short Term multiplied by Long Term less than threshold

- Less than threshold for a predetermined time

If all of the previous criteria are met, the PCM will count a good trip (three required) and turn off the MIL.

Misfire Good Trip

If the following conditions are met the PCM will count one good trip (three required) in order to turn off the MIL:

- Operating in Similar Condition Window
- 1000 engine revolutions with no misfire

TASK MANAGER (Continued)

Alternate Good Trip

Alternate Good Trips are used in place of Global Good Trips for Comprehensive Components and Major Monitors. If the Task Manager cannot run a Global Good Trip because a component fault is stopping the monitor from running, it will attempt to count an Alternate Good Trip.

The Task Manager counts an Alternate Good Trip for Comprehensive components when the following conditions are met:

- Two minutes of engine run time, idle or driving
- No other faults occur

The Task Manager counts an Alternate Good Trip for a Major Monitor when the monitor runs and passes. Only the Major Monitor that failed needs to pass to count an Alternate Good Trip.

Warm-Up Cycles

Once the MIL has been extinguished by the Good Trip Counter, the PCM automatically switches to a Warm-Up Cycle Counter that can be viewed on the DRBIII®. Warm-Up Cycles are used to erase DTCs and Freeze Frames. Forty Warm-Up cycles must occur in order for the PCM to self-erase a DTC and Freeze Frame. A Warm-Up Cycle is defined as follows:

- Engine coolant temperature must start below and rise above 160° F
- Engine coolant temperature must rise by 40° F
- No further faults occur

Freeze Frame Data Storage

Once a failure occurs, the Task Manager records several engine operating conditions and stores it in a Freeze Frame. The Freeze Frame is considered one frame of information taken by an on-board data recorder. When a fault occurs, the PCM stores the input data from various sensors so that technicians can determine under what vehicle operating conditions the failure occurred.

The data stored in Freeze Frame is usually recorded when a system fails the first time for two trip faults. Freeze Frame data will only be overwritten by a different fault with a higher priority.

CAUTION: Erasing DTCs, either with the DRBIII®; or by disconnecting the battery, also clears all Freeze Frame data.

Similar Conditions Window

The Similar Conditions Window displays information about engine operation during a monitor. Absolute MAP (engine load) and Engine RPM are stored in this window when a failure occurs. There are two different Similar conditions Windows: Fuel System and Misfire.

FUEL SYSTEM

• **Fuel System Similar Conditions Window** — An indicator that 'Absolute MAP When Fuel Sys Fail' and 'RPM When Fuel Sys Failed' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.

• **Absolute MAP When Fuel Sys Fail** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.

• **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.

• **RPM When Fuel Sys Fail** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.

• **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.

• **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adaptive to calculate the Adaptive Memory Factor for total fuel correction.

• **Upstream O2S Volts** — A live reading of the Oxygen Sensor to indicate its performance. For example, stuck lean, stuck rich, etc.

• **SCW Time in Window (Similar Conditions Window Time in Window)** — A timer used by the PCM that indicates that, after all Similar Conditions have been met, if there has been enough good engine running time in the SCW without failure detected. This timer is used to increment a Good Trip.

• **Fuel System Good Trip Counter** — A Trip Counter used to turn OFF the MIL for Fuel System DTCs. To increment a Fuel System Good Trip, the engine must be in the Similar Conditions Window, Adaptive Memory Factor must be less than calibrated threshold and the Adaptive Memory Factor must stay below that threshold for a calibrated amount of time.

• **Test Done This Trip** — Indicates that the monitor has already been run and completed during the current trip.

MISFIRE

• **Same Misfire Warm-Up State** — Indicates if the misfire occurred when the engine was warmed up (above 160° F).

• **In Similar Misfire Window** — An indicator that 'Absolute MAP When Misfire Occurred' and 'RPM When Misfire Occurred' are all in the same range when the failure occurred. Indicated by switching from 'NO' to 'YES'.

• **Absolute MAP When Misfire Occurred** — The stored MAP reading at the time of failure. Informs the user at what engine load the failure occurred.

TASK MANAGER (Continued)

- **Absolute MAP** — A live reading of engine load to aid the user in accessing the Similar Conditions Window.

- **RPM When Misfire Occurred** — The stored RPM reading at the time of failure. Informs the user at what engine RPM the failure occurred.

- **Engine RPM** — A live reading of engine RPM to aid the user in accessing the Similar Conditions Window.

- **Adaptive Memory Factor** — The PCM utilizes both Short Term Compensation and Long Term Adap-

tive to calculate the Adaptive Memory Factor for total fuel correction.

- **200 Rev Counter** — Counts 0–100 720 degree cycles.

- **SCW Cat 200 Rev Counter** — Counts when in similar conditions.

- **SCW FTP 1000 Rev Counter** — Counts 0–4 when in similar conditions.

- **Misfire Good Trip Counter** — Counts up to three to turn OFF the MIL.

SERVICE MANUAL COMMENTS

What errors(s) have you found?

In order for us to assist you, please include as much details as possible when reporting an error

Comments / Suggestions

☐

Dealership Technician
Dealer Code: _____

Retail Customer

☐

Manual Title, Year, Number and Page: _____

Your Name: _____

Address: _____

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