VEHICLE SPEED CONTROL SYSTEM

CONTENTS

GENERAL INFORMATION

INTRODUCTION

The vehicle speed control system is electronically controlled and vacuum operated. The system is designed to operate between approximately 35 and 85 mph (56 and 137 km/h). Following are general descriptions of the major components in the speed control system. For diagnosis of the entire speed control system, refer to the appropriate Powertrain Diagnostic Procedures service manual and the DRB scan tool. Refer to Group 8W, Wiring Diagrams for complete circuit descriptions and wiring diagrams.

DESCRIPTION AND OPERATION

SPEED CONTROL SERVO

The speed control servo is located in the engine compartment, mounted to a bracket on the right inner fender. The servo unit consists of a solenoid valve body, a vacuum servo and the mounting bracket. 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.

SPEED CONTROL SWITCHES

Two separate speed control switch modules are mounted on the steering wheel to the left and right side of the driver's airbag module. Within the two switch modules, five **momentary** contact switches, supporting seven different speed control functions are used. The outputs from these switches are filtered into one input. The Powertrain Control Module (PCM) determines which output has been applied through **resistive multiplexing.** The input circuit voltage is measured by the PCM to determine which switch function has been selected.

A speed control indicator lamp, located on the instrument panel cluster is energized by the PCM via the CCD Bus. This occurs when speed control system power has been turned ON, and the engine is running.

The two switch modules are labeled: ON/OFF, SET, RESUME/ACCEL, CANCEL and COAST. Refer to the owner's manual for more information on speed control switch functions and setting procedures. The individual switches cannot be repaired. If one individual switch fails, the switch module must be replaced.

STOP LAMP SWITCH

Vehicles equipped with the speed control option use a dual function stop lamp switch. The switch is mounted in the same location as the conventional stop lamp switch, on the brake pedal mounting bracket under the instrument panel. The PCM monitors the state of the dual function stop lamp switch. Refer to Group 5, Brakes for more information on stop lamp switch service and adjustment procedures.

DESCRIPTION AND OPERATION (Continued)

SERVO CABLE

The speed control servo cable is connected between the speed control vacuum servo diaphragm and the throttle body control linkage. This cable causes the throttle control linkage to open or close the throttle valve in response to movement of the vacuum servo diaphragm.

POWERTRAIN CONTROL MODULE (PCM)

The speed control electronic control circuitry is integrated into the Powertrain Control Module (PCM). The PCM is located in the engine compartment behind the coolant recovery tank. The PCM speed control functions are monitored by the On-Board Diagnostics (OBD). 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 certain failures it detects. See On-Board Diagnostic Test For Speed Control System in this group for more information. The PCM cannot be repaired and must be replaced if faulty.

VACUUM RESERVOIR

The vacuum reservoir is mounted below the battery tray. The reservoir contains a one-way check valve to trap engine vacuum in the reservoir. 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.

VEHICLE SPEED SENSOR

The Vehicle Speed Sensor (VSS) is a pulse generator mounted to an adapter near the transmission output shaft. The sensor is driven through the adapter by a speedometer pinion gear. The VSS pulse signal is monitored by the PCM speed control circuitry to determine vehicle speed and to maintain speed control set speed. Refer to the appropriate Powertrain Diagnostic Procedures manual for diagnosis and testing of this component. Refer to Group 14, Fuel System for removal/installation procedures.

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 system. The cause of any speedometer problems should be corrected before proceeding. Refer to Group 8E, Instrument Panel and Gauges for speedometer diagnosis.

If a road test verifies a system problem and the speedometer operates properly, check for:

- A Diagnostic Trouble Code (DTC). If a flash lamp code 15, 34 or 77 exists at the Check Engine Lamp (MIL), conduct tests per the Powertrain Diagnostic Procedures service 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.
- Loose or leaking vacuum hoses or connections.
- Secure attachment of both ends of the speed control servo cable.
- Smooth operation of throttle linkage and throttle body air valve.
- 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.

ON-BOARD DIAGNOSTICS TEST FOR SPEED CONTROL SYSTEM

GENERAL INFORMATION

The Powertrain Control Module (PCM) monitors critical input and output circuits of the speed control 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 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 DTC's from memory after 40 engine warm–up cycles if the problem does not occur again. The DRB scan tool may also be used to erase a DTC.

Diagnostic trouble codes are the results of a system or circuit failure, but do not directly identify the failed component or components.

DIAGNOSTIC TROUBLE CODES

The technician can display a DTC in three different ways:

DIAGNOSIS AND TESTING (Continued)

- a two-digit number flashed on the Malfunction Indicator (Check Engine) Lamp
- a two-digit number displayed on the vehicle odometer
- a description of the DTC can be read using the DRB scan tool

Refer to the following Speed Control System Diagnostic Trouble Code chart for DTC's which apply to the speed control system. Refer to the Powertrain Diagnostic Procedures manual and DRB scan tool to diagnose an on-board diagnostic system trouble code.

OBTAINING DIAGNOSTIC TROUBLE CODES

USING DRB SCAN TOOL

WARNING: APPLY PARKING BRAKE AND/OR BLOCK WHEELS BEFORE PERFORMING ANY TEST ON AN OPERATING ENGINE.

(1) Connect the DRB scan tool to the 16–way data link (diagnostic) connector. This connector is located in the passenger compartment, below and to the left of steering column.

(2) Turn the ignition switch on, access Read Fault Screen. Record all the DTC's shown on the DRB scan tool. Observe the malfunction indicator (check engine) lamp on the instrument panel. The lamp should light for 2 seconds then go out (bulb check).

(3) To erase DTC's, use the Erase Trouble Code data screen on the DRB scan tool.

USING THE MALFUNCTION INDICATOR LAMP (MIL)

(1) Cycle the ignition key On - Off - On - Off - On within 5 seconds.

(2) Count the number of times the MIL (check engine lamp) on the instrument panel flashes on and off. The number of flashes represents the trouble code. There is a slight pause between the flashes representing the first and second digits of the code. Longer pauses separate individual two digit trouble codes.

An example of a flashed DTC is as follows:

(3) Lamp flashes 1 time, pauses, and then flashes 5 more times. This indicates a DTC code number 15.

(4) Lamp flashes 5 times, pauses, and flashes 5 more times. This indicates a DTC code number 55. A DTC 55 will always be the last code to be displayed. This indicates the end of all stored codes.

(5) To erase DTC's, use the Erase Trouble Code data screen on the DRB scan tool.

USING THE VEHICLE ODOMETER

(1) Cycle the ignition key On - Off - On - Off - On within 5 seconds.

(2) After a short pause, the mileage shown on the vehicles digital odometer will be temporarily deleted. After this occurs, read the DTC number displayed on the odometer. Each two–digit number will be displayed with a slight delay between numbers.

(3) A DTC number 55 will always be the last code to be displayed. This indicates the end of all stored codes. After code 55 has been displayed, the odometer will return to its normal mode.

(4) To erase DTC's, use the Erase Trouble Code data screen on the DRB scan tool.

DIAGNOSIS AND TESTING (Continued)

SPEED CONTROL SYSTEM DIAGNOSTIC TROUBLE CODE DESCRIPTIONS

MIL CODE	GENERIC SCAN TOOL CODE	HEX CODE	DRB SCAN TOOL DISPLAY	DESCRIPTION OF DIAGNOSTIC TROUBLE CODE
12*			Battery Disconnect	Direct battery input to PCM was disconnected within the last 50 Key-on cycles.
15**	P0500	23	No Vehicle Speed Sensor Signal	No vehicle speed sensor signal detected during road load conditions.
	or			
	P0720	A6	Low Output Spd Sensr RPM, Above 15 MPH	Output shaft speed is less than 60 rpm with vehicle speed above 15 MPH
34**		0F	Speed Control Solenoid Circuits	An open or shorted condition detected in the speed control vacuum or vent solenoid circuits
	or			
		57	Speed Control Switch Always Low	Speed control switch input below the minimum acceptable voltage.
	or			
		56	Speed Control Switch Always High	Speed control switch input above the maximum acceptable voltage.
55*				Completion of fault code display on Check Engine lamp.
77**		52	S/C Power Ckt	No power at speed control circuit

* Check Engine Lamp (MIL) will not illuminate during engine operation if this Diagnostic Trouble Code was recorded. Cycle Ignition key as described in manual and observe code flashed by Check Engine lamp.

** Check Engine Lamp (MIL) will be illuminated during engine operation if this Diagnostic Trouble Code was recorded.

DIAGNOSIS AND TESTING (Continued)

SPEED CONTROL ELECTRICAL TEST

Two different test methods may be used to check the electronic speed control system. One involves using the DRB scan tool. If this test method is desired, refer to the appropriate Powertrain Diagnostic Procedures service manual.

The other test method will involve the use of a volt/ohm meter. The volt/ohm meter method is described within the tests on the following pages. Refer to Group 8W, Wiring Diagrams for speed control electrical schematics and connector location.

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.

When electrical connections are removed, corrosion should be removed from electrical terminals and a light coating of Mopar Multi-Purpose Grease, or equivalent, should be applied.

Inspect connectors for damaged terminals. A poor electrical connection can cause a complete or intermittent malfunction. For this reason, a poor connection may be misdiagnosed as a component malfunction.

VEHICLE SPEED SENSOR

For diagnosis and testing of the Vehicle Speed Sensor (VSS), refer to the appropriate Powertrain Diagnostic Procedures service manual. Also refer to the DRB scan tool.

SPEED CONTROL SWITCHES

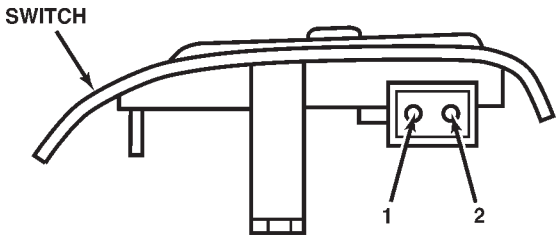
For complete speed control system diagnosis, refer to the appropriate Powertrain Diagnostic Procedures manual. To test each of the speed control switches only, refer to the following:

WARNING: BEFORE ATTEMPTING TO DIAGNOSE, REMOVE OR INSTALL ANY AIRBAG SYSTEM OR RELATED STEERING WHEEL AND STEERING COLUMN COMPONENTS, YOU MUST FIRST DISCONNECT AND ISOLATE THE BATTERY NEGATIVE (GROUND) CABLE. WAIT 2 MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. FAILURE TO DO SO COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE PERSONAL INJURY.

(1) Disconnect negative battery cable. Wait 2 minutes for airbag system capacitor to discharge.

(2) Remove the two speed control switch modules from steering wheel. Refer to the removal/installation section for procedures.

(3) Check continuity of each individual speed control switch module as shown in chart (Fig. 1). If OK, reinstall switch. If not OK, replace switch module assembly.



SWITCH POSITION	RESISTANCE BETWEEN PINS 1 AND 2
ON	909 ohms +/- 9 ohms
SET	6650 ohms +/- 66 ohms
RESUME/ACCEL	15,400 ohms +/- 154 ohms
CANCEL	0 ohms (CLOSED CIRCUIT)
COAST	2940 ohms +/- 29 ohms

80a53490

Fig. 1 Speed Control Switch Continuity

STOP LAMP SWITCH

For continuity checks and switch adjustment, refer to Group 5, Brakes.

VACUUM SUPPLY TEST

(1) Disconnect vacuum hose at speed control servo and install a vacuum gauge into the disconnected hose.

(2) Start engine and observe gauge at idle. Vacuum gauge should read at least ten inches of mercury.

(3) If vacuum is less than ten inches of mercury, determine source of leak. Check vacuum line to engine for leaks. Also check actual engine intake manifold vacuum. If manifold vacuum does not meet this requirement, check for poor engine performance and repair as necessary.

(4) If vacuum line to engine is not leaking, check for leak at reservoir. Disconnect vacuum line at reservoir and connect a hand-operated vacuum pump to reservoir fitting. Reservoir vacuum should not bleed off. If vacuum is being lost, replace reservoir.

SPEED CONTROL SERVO

For complete speed control system diagnosis, refer to the appropriate Powertrain Diagnostic Procedures manual. To test the speed control servo only, refer to the following:

DIAGNOSIS AND TESTING (Continued)

The engine must be started and running for the following voltage tests.

(1) Start engine.

(2) Disconnect 4–way electrical connector at servo (Fig. 2).

(3) Turn speed control switch to ON position.

(4) Check for battery voltage at pin–3 of wiring harness 4–way connector (Fig. 3). This is the 12 volt feed from the stoplamp switch. When the brake pedal is depressed, voltage should not be present at pin–3. If voltage is not present with brake pedal **not** depressed, check for continuity between servo and stop lamp switch. Also check stop lamp switch adjustment. Refer to Group 5, Brakes for procedures.

(5) Connect a small gauge jumper wire between the disconnected servo harness 4–way connector pin–3, and pin–3 on the servo. Check for battery voltage at pins–1, 2 and 4 of the servo. If battery voltage is not at these pins, replace the servo.

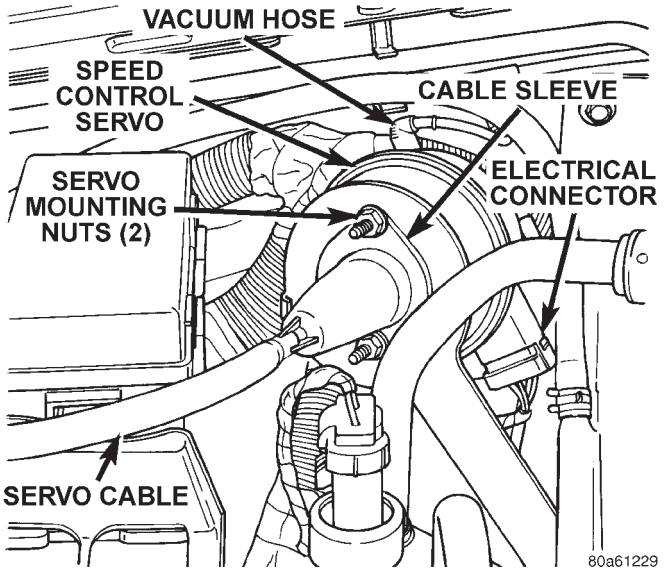


Fig. 2 Servo Electrical Connector Location

(6) Turn ignition switch to OFF position. Check for continuity between disconnected servo harness 4–way connector pin–4 and a good ground. There should be continuity. If not OK, repair open circuit to ground as required.

POWERTRAIN CONTROL MODULE (PCM)

For complete PCM diagnosis of the speed control system, refer to the DRB scan tool and the appropriate Powertrain Diagnostic Procedures service manual.

OVERSHOOT/UNDERSHOOT ON SPEED CONTROL SET

If the operator repeatedly presses and releases the set button with their foot off of the accelerator (a “lift foot set” to begin speed control operation), the vehicle may accelerate and exceed the desired set speed by up to 5 MPH (8 km/h) and then decelerate to less than the desired set speed before finally achieving the desired set speed.

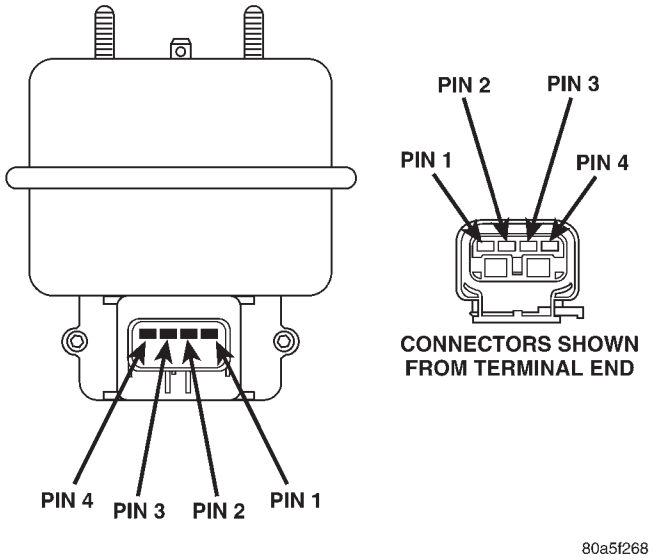


Fig. 3 Servo 4–Way Harness Connector

The Speed Control has an adaptive strategy that compensates for vehicle-to-vehicle variations in speed control cable lengths. When the speed control is set with the vehicle operators foot off of the accelerator pedal, the speed control thinks there is excessive speed control cable slack and adapts. If the lift foot sets are continually used, the speed control overshoot/undershoot condition will develop.

To “unlearn” the overshoot/undershoot condition, the vehicle operator has to press and release the set button while maintaining the desired set speed with the accelerator pedal (not decelerating or accelerating), and then turn the cruise control switch to the OFF position (or press the CANCEL button if equipped) after waiting 10 seconds. This procedure must be performed approximately 10–15 times to completely unlearn the overshoot/undershoot condition.

REMOVAL AND INSTALLATION

SPEED CONTROL SERVO

REMOVAL

(1) Disconnect negative battery cable at battery.

(2) Disconnect vacuum hose at servo (Fig. 4).

(3) Unplug electrical connector at servo (Fig. 4).

(4) Remove 2 mounting nuts holding servo cable sleeve to bracket (Fig. 4).

(5) Pull speed control cable sleeve away from servo to expose cable retaining clip.

(6) Block throttle to full open position.

REMOVAL AND INSTALLATION (Continued)

(7) Remove clip attaching cable to servo.
(8) Remove servo from mounting bracket.

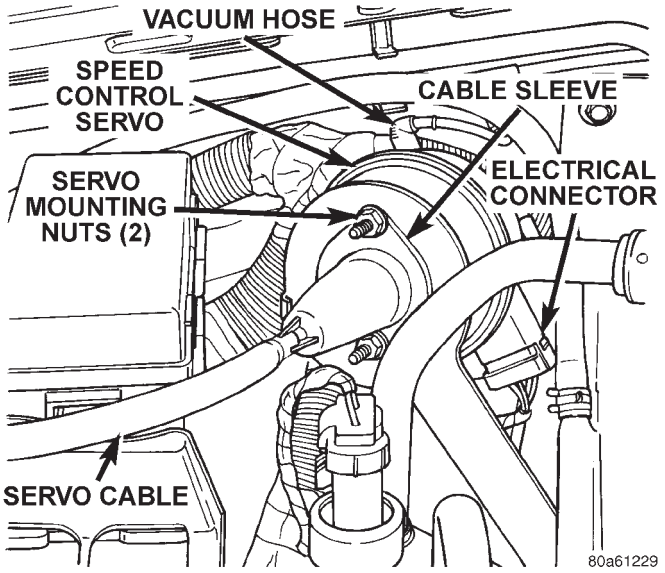


Fig. 4 Speed Control Servo

INSTALLATION

(1) Position servo to mounting bracket.
(2) Block throttle to full open position to align hole in cable connector with hole in servo pin. Install cable-to-servo retaining clip.
(3) Install servo mounting nuts and tighten to 8.5 N·m (75 in. lbs.).
(4) Connect vacuum hose at servo.
(5) Connect electrical connector at servo.
(6) Remove throttle block.
(7) Connect negative battery cable to battery.

SPEED CONTROL SWITCHES

REMOVAL

WARNING: BEFORE BEGINNING ANY AIRBAG SYSTEM COMPONENT REMOVAL OR INSTALLATION, REMOVE AND ISOLATE THE NEGATIVE (-) CABLE FROM THE BATTERY. THIS IS THE ONLY SURE WAY TO DISABLE THE AIRBAG SYSTEM. THEN WAIT TWO MINUTES FOR SYSTEM CAPACITOR TO DISCHARGE BEFORE FURTHER SYSTEM SERVICE. FAILURE TO DO THIS COULD RESULT IN ACCIDENTAL AIRBAG DEPLOYMENT AND POSSIBLE INJURY.

(1) Disconnect and isolate negative battery cable.
(2) Remove airbag module. Refer to Group 8M, Passive Restraint Systems for procedures.
(3) Remove electrical connector at switch.
(4) Remove switch-to-steering wheel mounting screw (Fig. 5).
(5) Remove switch.

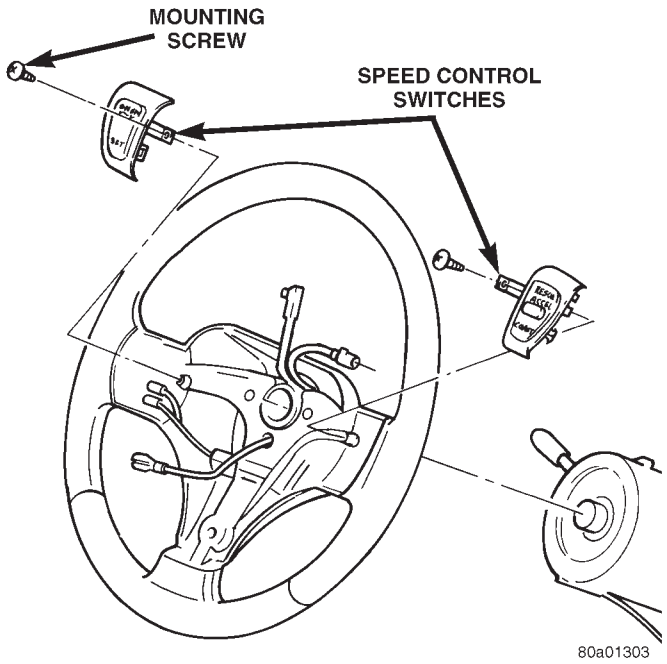


Fig. 5 Speed Control Switches

INSTALLATION

(1) Install switch and mounting screw.
(2) Tighten screw to 1.5 N·m (15 in. lbs.) torque.
(3) Install electrical connector to switch.
(4) Install airbag module. Refer to Group 8M, Passive Restraint Systems for procedures.
(5) Connect negative battery cable.

STOP LAMP SWITCH

Refer to Stop Lamp Switch in Group 5, Brakes for removal/installation and adjustment procedures.

SERVO CABLE

REMOVAL

(1) Disconnect negative battery cable at battery.
(2) 4.0L Engine: Using finger pressure only, remove speed control cable connector at throttle body bellcrank pin by pushing connector off the bellcrank towards the drivers side of vehicle (Fig. 6). **DO NOT try to pull connector off perpendicular to the bellcrank pin. Connector will be broken.**
(3) 5.2L/5.9L Engines: Using finger pressure only, remove speed control cable connector at throttle body bellcrank by pushing connector rearward off the bellcrank pin (Fig. 7). **DO NOT try to pull connector off perpendicular to the bellcrank pin. Connector will be broken.**
(4) 4.0L Engine: Remove cable from cable guide at top of valve cover.
(5) Squeeze 2 tabs on sides of speed control cable at throttle body mounting bracket (locking plate) and push out of bracket.

REMOVAL AND INSTALLATION (Continued)

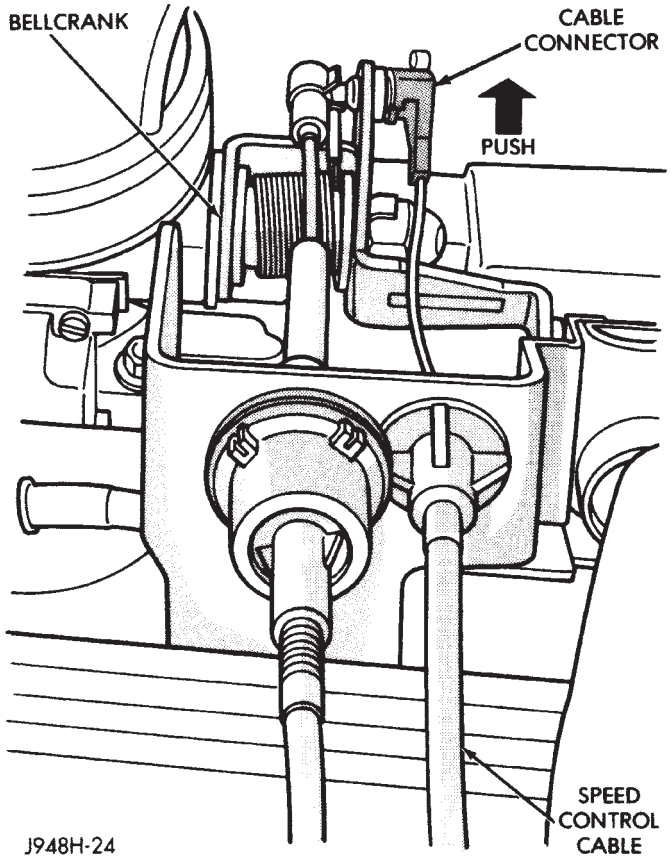


Fig. 6 Cable at Bell Crank—4.0L Engine

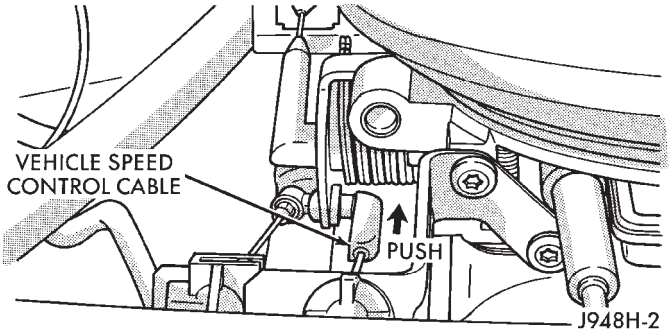


Fig. 7 Cable at Bell Crank—5.2L/5.9LV-8 Engines

(6) Remove servo cable from servo. Refer to Speed Control Servo removal and installation in this group.

INSTALLATION

(1) Install end of cable to speed control servo. Refer to Speed Control Servo removal and installation in this group.

(2) Install cable into throttle body mounting bracket (snaps in).

(3) Install speed control cable connector at throttle body bellcrank pin (snaps on).

(4) Connect negative battery cable at battery.

POWERTRAIN CONTROL MODULE

For Removal/Installation refer to Powertrain Control Module in Group 14, Fuel Injection System.

VACUUM RESERVOIR

REMOVAL

(1) Disconnect both battery cables at battery (negative cable first).

(2) Remove battery holddowns.

(3) Remove battery from battery tray.

(4) Remove 5 bolts securing battery tray.

(5) Pull up battery tray and remove vacuum hose from reservoir (Fig. 8).

(6) Remove 2 screws holding reservoir to battery tray.

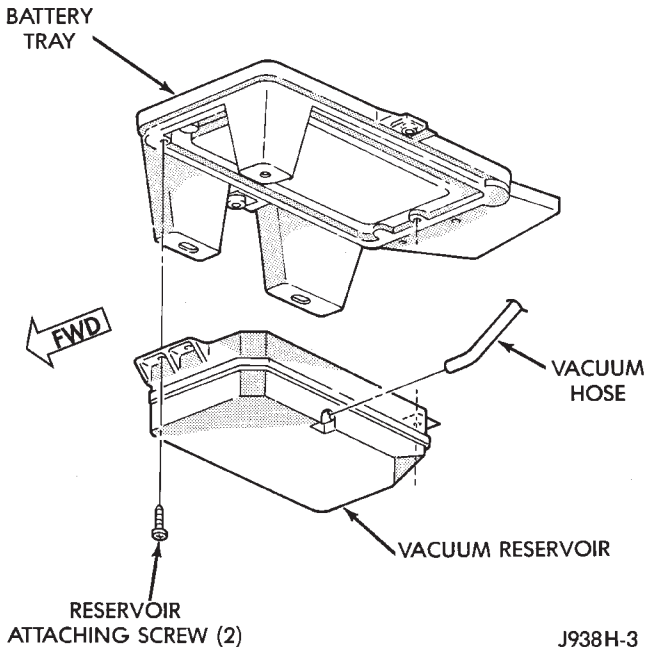


Fig. 8 Vacuum Reservoir

INSTALLATION

(1) Install vacuum reservoir. Tighten bolts (screws) to 3 N·m (30 in. lbs.) torque.

(2) Connect vacuum hose at reservoir.

(3) Install battery tray mounting bolts. Tighten to 10 N·m (90 in. lbs.) torque.

(4) Install battery.

(5) Install battery holddown and bolts. Tighten to 10 N·m (90 in. lbs.) torque.

(6) Install battery cable clamp bolts. Tighten to 8.5 N·m (75 in. lbs.) torque.

VEHICLE SPEED SENSOR

For removal/installation, refer to Vehicle Speed Sensor in Group 14, Fuel System.

SPECIFICATIONS

TORQUE CHART

Description	Torque
Servo Mounting Bracket-to-Servo Nuts	8.5 N·m (75 in. lbs.)
Servo Mounting Bracket-to-Body Nuts	5 N·m (47 in. lbs.)
Switch Module Mounting Screws	1.5 N·m (15 in. lbs.)
Vacuum Reservoir Mounting Bolts	3 N·m (30 in. lbs.)

VEHICLE SPEED CONTROL SYSTEM

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GENERAL INFORMATION

INTRODUCTION

This group covers both Left-Hand Drive (LHD) and Right-Hand Drive (RHD) versions of this model. Whenever feasible, the RHD versions of affected vehicle components have been constructed as mirror-image of the LHD versions. While most of the illustrations used in this group represent only the LHD version, the diagnostic and service procedures outlined can generally be applied to either version. Exceptions to this rule have been clearly identified as LHD or RHD, if a special illustration or procedure was/is required.

The speed control system used with the 2.5L diesel engine is basically identical to the system used with gasoline powered engines. Features unique to the diesel engine will be covered in this section.

- Models equipped with the 2.5L diesel engine do not use a vacuum reservoir to retain engine vacuum for speed control operation. There are no vaccum-operated speed control servos used in vehicles with the 2.5L diesel engine.
- The range of the speed control system operation is restricted to speeds between 56 km/h (35 MPH) to 145 km/h (90 MPH).
- Inputs to the MSA that allow speed control operation are from the vehicle speed sensor and the Speed Control Switch.
- Two separate speed control switch modules are mounted on the steering wheel to the left and right side of the driver's airbag module. Switch features are:

a. Within the two switch modules, five **momentary** contact switches, supporting seven different speed control functions are used.

b. The outputs from these switches are filtered into one input. The MSA determines which output has been applied through **resistive multiplexing.** The input circuit voltage is measured by the MSA to determine which switch function has been selected.

c. A speed control indicator lamp, located on the instrument panel cluster is energized by the MSA via the CCD Bus. This occurs when speed control system power has been turned ON, and the engine is running.

d. The two switch modules are labeled: ON/OFF, SET, RESUME/ACCEL, CANCEL and COAST. Refer to the owner's manual for more information on speed control switch functions and setting procedures. The individual switches cannot be repaired. If one individual switch fails, the switch module must be replaced.