

TRANSMISSION AND TRANSFER CASE

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AX15 MANUAL TRANSMISSION

GENERAL INFORMATION

AX 15 MANUAL TRANSMISSION

The AX 15 is a 5-speed, synchromesh, manual transmission. Fifth gear is an overdrive range with a ratio of 0.79:1. The shift mechanism is integral and mounted in the shift tower portion of the adapter housing (Fig. 1).

TRANSMISSION IDENTIFICATION

The AX 15 identification code numbers are on the bottom surface of the transmission gear case (Fig. 2).

The first number is year of manufacture. The second and third numbers indicate month of manufacture. The next series of numbers is the transmission serial number.

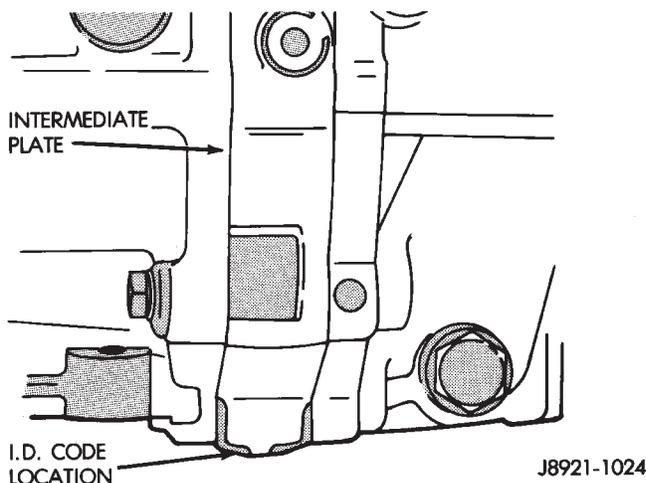


Fig. 2 Identification Code Number Location

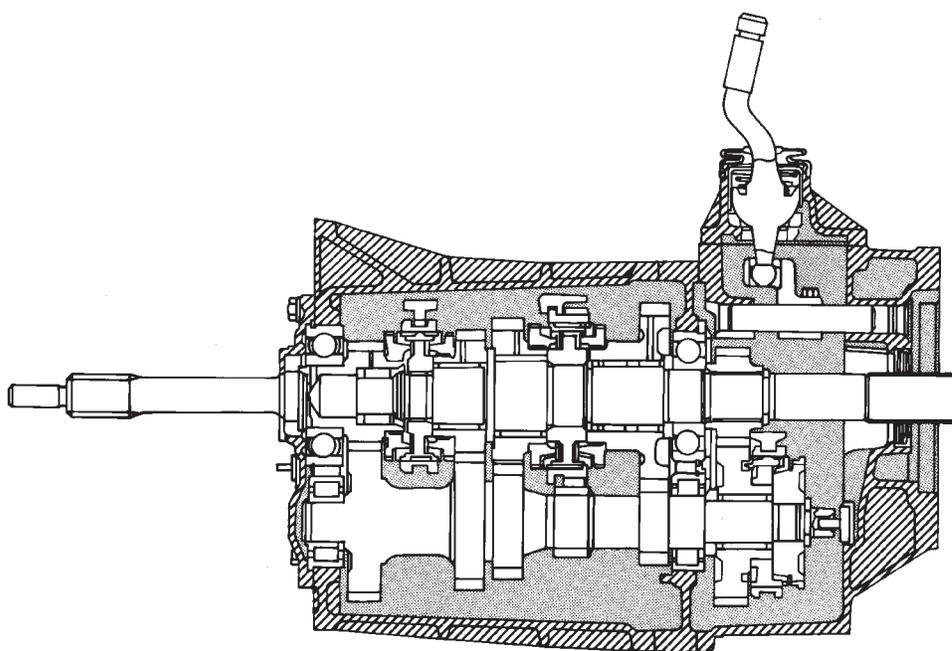


Fig. 1 AX 15 Manual Transmission

GENERAL INFORMATION (Continued)

TRANSMISSION SHIFT PATTERN

The AX 15 shift pattern is shown in (Fig. 3). First and second and third and fourth gear ranges are in line for improved shifting. Fifth and reverse gear ranges are also in line at the extreme right of the pattern (Fig. 3).

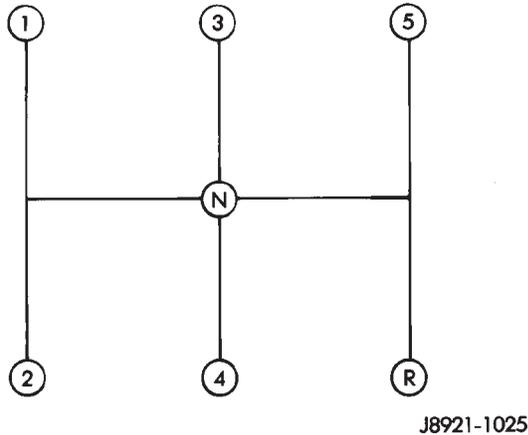


Fig. 3 AX 15 Shift Pattern

The AX 15 is equipped with a reverse lockout mechanism. The shift lever must be moved through the Neutral detent before making a shift to reverse.

TRANSMISSION LUBRICANT

Recommended lubricant for AX 15 transmissions is Mopar 75W-90, API Grade GL-5 gear lubricant, or equivalent.

Correct lubricant level is from the bottom edge, to no more than 6 mm (1/4 in.) below the bottom edge of the fill plug hole.

Approximate dry fill lubricant capacity is:

- 3.10 liters (3.27 qts.) in 4-wheel drive models

TRANSMISSION SWITCH AND PLUG LOCATIONS

The fill plug is at the driver side of the gear case (Fig. 4).

The drain plug and backup light switch are on the passenger side of the gear case (Fig. 5).

TRANSMISSION GEAR RATIOS

AX 15 gear ratios are:

First gear	3.83:1
Second gear	2.33:1
Third gear	1.44:1
Fourth gear	1.00:1
Fifth gear	0.79:1
Reverse	4.22:1

TRANSMISSION ASSEMBLY INFORMATION

Lubricate the transmission components with gear lubricant during assembly. Use petroleum jelly to

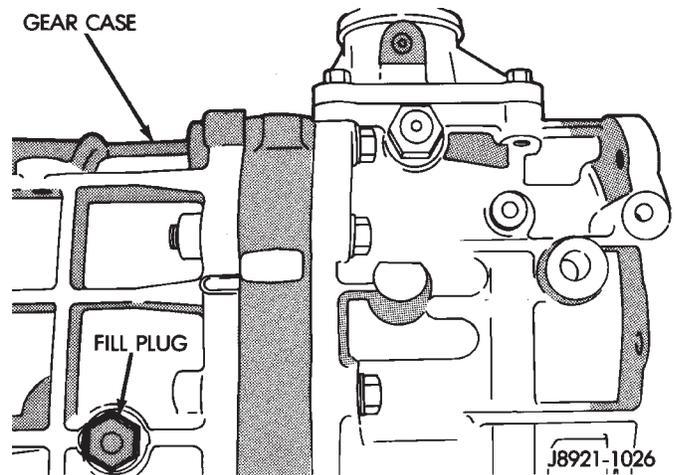


Fig. 4 Fill Plug Location

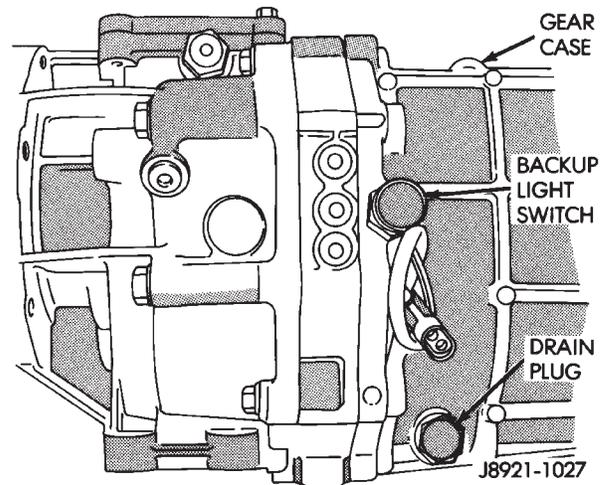


Fig. 5 Drain Plug/Backup Light Switch Location

lubricate seal lips and/or hold parts in place during installation.

DIAGNOSIS AND TESTING

LOW LUBRICANT LEVEL

A low transmission lubricant level is generally the result of a leak, inadequate lubricant fill, or an incorrect lubricant level check.

Leaks can occur at the mating surfaces of the gear case, intermediate plate and adapter or extension housing, or from the front/rear seals. A suspected leak could also be the result of an overfill condition.

Leaks at the rear of the extension or adapter housing will be from the housing oil seals. Leaks at component mating surfaces will usually be the result of inadequate sealer, gaps in the sealer, incorrect bolt tightening, or use of a non-recommended sealer.

A leak at the front of the transmission will be from either the front bearing retainer or retainer seal. Lubricant may be seen dripping from the clutch

DIAGNOSIS AND TESTING (Continued)

housing after extended operation. If the leak is severe, it may also contaminate the clutch disc causing slip, grab and chatter.

Transmissions filled from air or electrically powered lubricant containers can be under filled. This generally happens when the container delivery mechanism is improperly calibrated. Always check the lubricant level after filling to avoid an under fill condition.

A correct lubricant level check can only be made when the vehicle is level; use a drive-on hoist to ensure this. Also allow the lubricant to settle for a minute or so before checking. These recommendations will ensure an accurate check and avoid an under-or-over fill condition.

HARD SHIFTING

Hard shifting is usually caused by a low lubricant level, improper or contaminated lubricants, component damage, incorrect clutch adjustment, or by a damaged clutch pressure plate or disc.

Substantial lubricant leaks can result in gear, shift rail, synchro and bearing damage. If a leak goes undetected for an extended period, the first indications of a problem are usually hard shifting and noise.

Incorrect or contaminated lubricants can also contribute to hard shifting. The consequence of using non-recommended lubricants is noise, excessive wear, internal bind and hard shifting.

Improper clutch release is a frequent cause of hard shifting. Incorrect adjustment or a worn, damaged pressure plate or disc can cause incorrect release. If the clutch problem is advanced, gear clash during shifts can result.

Worn or damaged synchro rings can cause gear clash when shifting into any forward gear. In some new or rebuilt transmissions, new synchro rings may tend to stick slightly causing hard or noisy shifts. In most cases, this condition will decline as the rings wear-in.

TRANSMISSION NOISE

Most manual transmissions make some noise during normal operation. Rotating gears can generate a mild whine that may only be audible at extreme speeds.

Severe, obviously audible transmission noise is generally the result of a lubricant problem. Insufficient, improper, or contaminated lubricant can promote rapid wear of gears, synchros, shift rails, forks and bearings. The overheating caused by a lubricant problem, can also lead to gear breakage.

REMOVAL AND INSTALLATION

TRANSMISSION

REMOVAL

1. Disconnect the battery negative cable.
2. Remove the shifter boot and shifter.
3. Raise the vehicle on a hoist.
4. Drain the transmission fluid (Fig. 6).

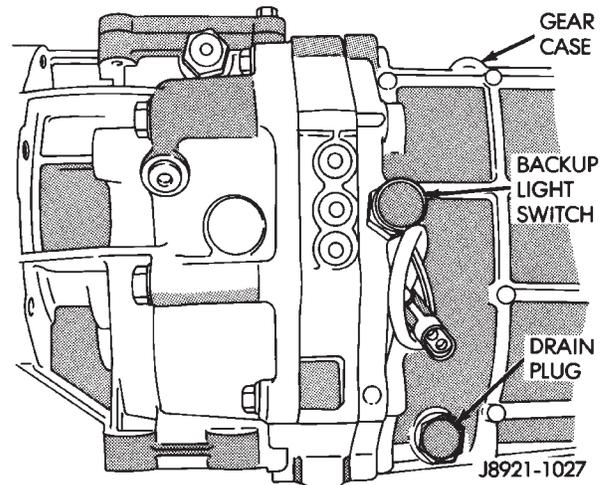


Fig. 6 Drain Plug and Backup Light Switch Location

5. Support the engine and transmission with an adjustable jack stand.
6. Remove exhaust pipe and heat shield.
7. Mark the front and rear propeller shafts for installation alignment (Fig. 7).

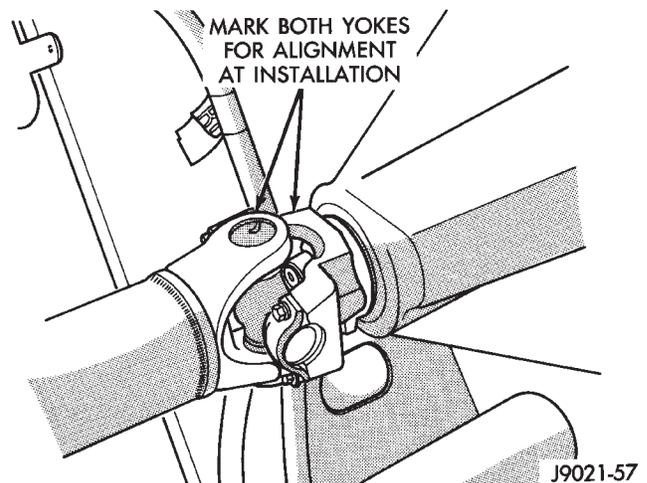
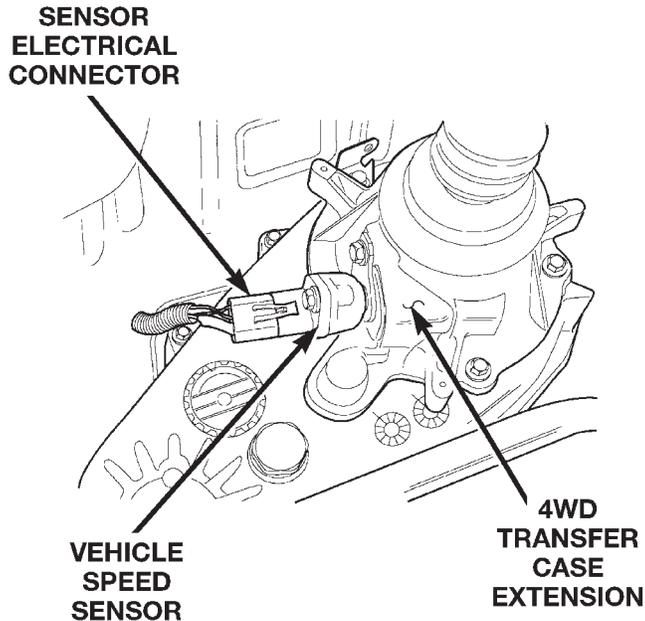


Fig. 7 Marking Propeller Shaft and Axle Yoke

8. Remove the front propeller shaft.
9. Remove the rear propeller shaft.
10. Remove the transmission skid plate.

REMOVAL AND INSTALLATION (Continued)

11. Disconnect the transfer case linkage and vehicle speed sensor electrical connector and vent tube hose (Fig. 8).



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Fig. 8 Vehicle Speed Sensor

12. Reposition the adjustable jackstand under the engine.

13. Place a transmission jack under the transmission and secure the transmission with safety chains.

14. Remove the rear transmission mount.

15. Remove the rear crossmember.

16. Remove the transfer case assembly. Refer to Transfer Case removal later in this Group.

17. Lower the engine and transmission no more than 7.6 cm.

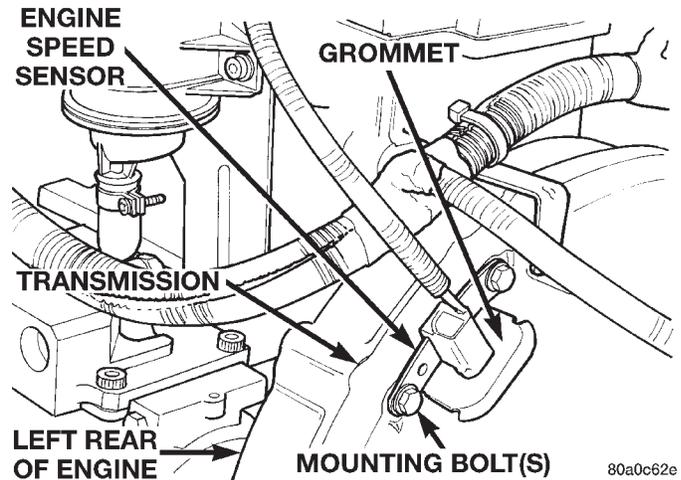
18. Remove the two (2) upper and two (2) mid clutch housing to engine bolts.

19. Remove the engine speed sensor (crankshaft position sensor) (Fig. 9).

20. Remove the clutch slave cylinder from the clutch housing.

21. Remove the lower transmission bolts.

22. Remove the transmission assembly from the vehicle.



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Fig. 9 Engine Speed Sensor

INSTALLATION

1. Mount the transmission on a transmission jack and secure the transmission with safety chains.

2. Install the transmission to the vehicle (Fig. 10).

3. Install the two (2) lower transmission bolts. Tighten the bolts to 74.6 N·m.

4. Install the clutch slave cylinder to the clutch housing.

5. Install the engine speed sensor (crankshaft position sensor) to the vehicle (Fig. 9).

6. Install the two (2) upper clutch housing to engine bolts. Tighten the bolts to 36.6 N·m.

7. Install the two (2) mid clutch housing to engine bolts. Tighten the bolts to 58.3 N·m.

8. Raise the engine and transmission with the adjustable jackstand.

9. Install the transfer case assembly. Refer to Transfer Case installation later in this Group.

10. Install the rear crossmember.

11. Install the rear transmission mount.

12. Connect the transfer case linkage and vehicle speed sensor electrical connector and vent tube (Fig. 8).

13. Install the transmission skid plate.

14. Align and install the front and rear propeller shafts.

15. Install the exhaust pipe and heat shield.

REMOVAL AND INSTALLATION (Continued)

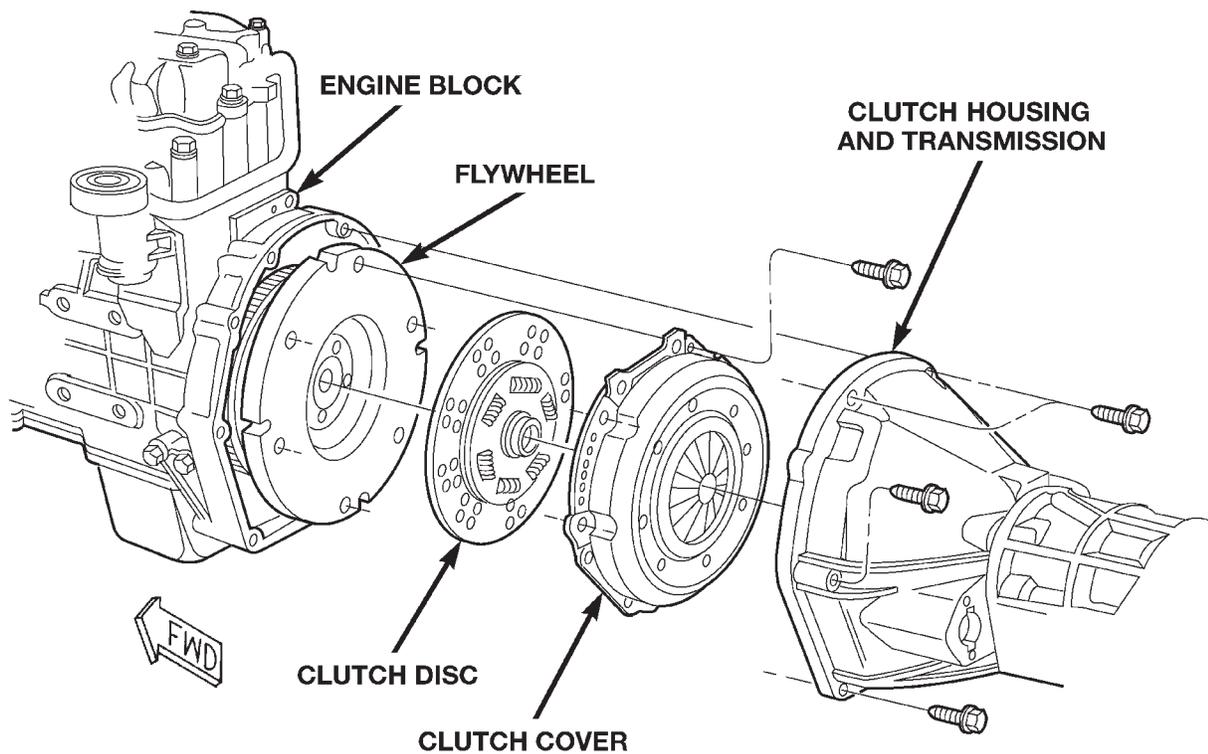


Fig. 10 Transmission to Engine Mounting

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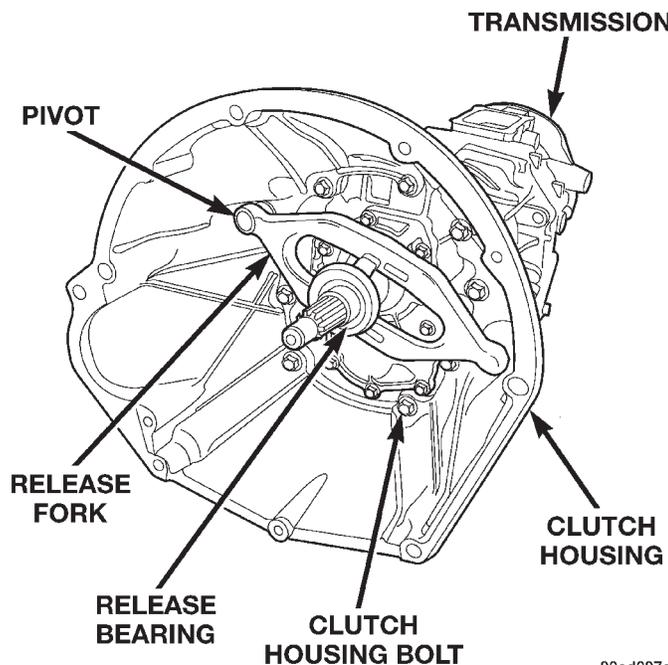


Fig. 11 Clutch Housing to Transmission

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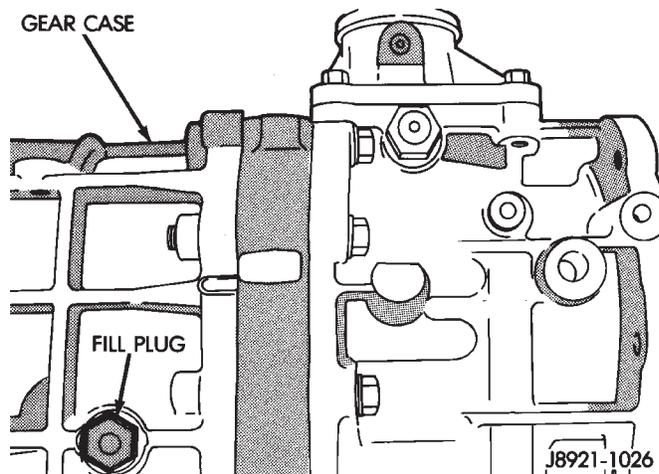


Fig. 12 Fill Plug Location

- 16. Remove the transmission jack.
- 17. Fill the transmission with the proper fluid (Fig. 12).

- 18. Remove the adjustable jackstand from under the engine.
- 19. Lower the vehicle from the hoist.
- 20. Install the shifter boot and shifter.
- 21. Reconnect the battery negative cable.

SPECIFICATIONS

TORQUE

DESCRIPTION	TORQUE
Clutch Housing to Engine Top (2) Bolts	36.6 N·m (27 ft. lbs.)
Clutch Housing to Engine Mid-Point (2) Bolts	58.3 N·m (43 ft. lbs.)
Clutch Housing to Engine Bottom (2) Bolts	74.6 N·m (55 ft. lbs.)
Clutch Housing to Transmission bolts	38.0 N·m (28 ft. lbs.)
Transfer Case to Transmission Attaching Nuts	35 N·m (26 ft. lbs.)
Propeller Shaft Bolts	26.5 N·m (19.5 ft. lbs.)

NV231 TRANSFER CASE

GENERAL INFORMATION

NV231 TRANSFER CASE

The NV231 is a part-time transfer case with a low range reduction gear system. The NV231 has three operating ranges plus a Neutral position. A low range system provides a reduction ratio for increased low speed torque capability.

The input gear is splined to the transmission output shaft. The input gear drives the mainshaft through the planetary assembly and range hub. The front output shaft is operated by a drive chain that connects the shaft to a drive sprocket on the mainshaft. The drive sprocket is engaged/disengaged by the mode fork, which operates the mode sleeve and hub. The sleeve and hub are not equipped with a synchronizer mechanism for shifting.

The geartrain is mounted in two aluminum case halves attached with bolts. The mainshaft front and rear bearings are mounted in aluminum retainer housings bolted to the case halves.

OPERATING RANGES

Transfer case operating ranges are:

- 2WD (2-wheel drive)
- 4x4 (4-wheel drive)
- 4 Lo (4-wheel drive low range)

The 2WD range is for use on any road surface at any time.

The 4x4 and 4 Lo ranges are for off road use only. They are not for use on hard surface roads. The only exception being when the road surface is wet or slippery or covered by ice and snow.

The low range reduction gear system is operative in 4 Lo range only. This range is for extra pulling power in off road situations. Low range reduction ratio is 2.72:1.

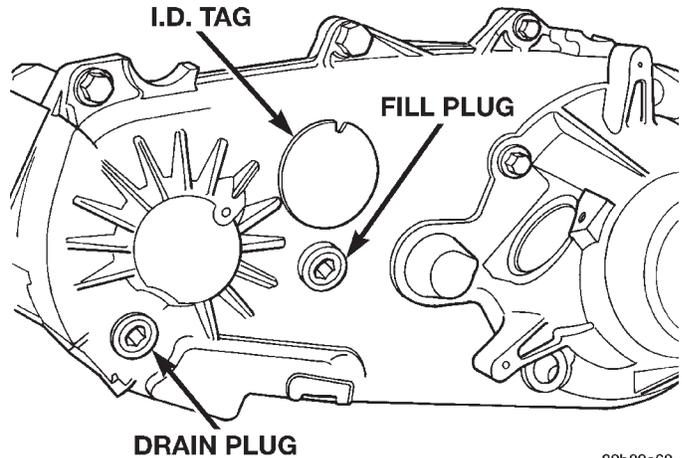
SHIFT MECHANISM

Operating ranges are selected with a floor mounted shift lever. The shift lever is connected to the transfer case range lever by an adjustable linkage rod. A straight line shift pattern is used. Range positions are marked on the shifter bezel cover plate.

TRANSFER CASE IDENTIFICATION

A circular ID tag is attached to the rear case of each transfer case (Fig. 1). The ID tag provides the transfer case model number, assembly number, serial number, and low range ratio.

The transfer case serial number also represents the date of build.



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Fig. 1 Fill/Drain Plug And I.D. Tag Locations

RECOMMENDED LUBRICANT AND FILL LEVEL

Recommended lubricant for the NV231 transfer case is Mopar® Dexron II, or ATF Plus 3, type 7176. Approximate lubricant fill capacity is 1.2 liters (2.5 pints).

The fill and drain plugs are both in the rear case (Fig. 1). Correct fill level is to the bottom edge of the fill plug hole. Be sure the vehicle is level to ensure an accurate fluid level check.

DIAGNOSIS AND TESTING

NV231 DIAGNOSIS

DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
Transfer case difficult to shift or will not shift into desired range.	<ol style="list-style-type: none"> 1) Vehicle speed too great to permit shifting. 2) If vehicle was operated for an extended period in 4H mode on dry surface, driveline torque load may cause difficulty. 3) Transfer case shift linkage binding. 4) Insufficient or incorrect lubricant. 5) Internal transfer case components binding, worn, or damaged. 	<ol style="list-style-type: none"> 1) Slow vehicle and shift into desired range. 2) Stop vehicle and shift transfer case to Neutral position. Transfer case can then be shifted to the desired mode. 3) Repair or replace linkage as necessary. 4) Drain and refill transfer case with the correct type and quantity of lubricant. 5) Repair or replace components as necessary.
Transfer case noisy in all drive modes.	<ol style="list-style-type: none"> 1) Insufficient or incorrect lubricant. 	<ol style="list-style-type: none"> 1) Drain and refill transfer case with the correct type and quantity of lubricant.
Transfer case noisy while in, or jumps out of, 4L mode.	<ol style="list-style-type: none"> 1) Transfer case not completely engaged in 4L position. 2) Transfer case shift linkage out of adjustment. 3) Transfer case shift linkage loose or binding. 4) Range fork damaged, inserts worn, or fork is binding on the shift rail. 5) Low range gear worn or damaged. 	<ol style="list-style-type: none"> 1) Slow vehicle, shift transfer case to the Neutral position, and then shift into the 4L mode. 2) Adjust linkage as necessary. 3) Repair, replace, or tighten linkage components as necessary. 4) Repair or replace components as necessary. 5) Repair or replace components as necessary.
Lubricant leaking from transfer case seals or vent.	<ol style="list-style-type: none"> 1) Transfer case overfilled. 2) Transfer case vent closed or restricted. 3) Transfer case seals damaged or installed incorrectly. 	<ol style="list-style-type: none"> 1) Drain lubricant to the correct level. 2) Clean or replace vent as necessary. 3) Replace suspect seal.
Abnormal tire wear.	<ol style="list-style-type: none"> 1) Extended operation in 4H mode on dry surfaces, 	<ol style="list-style-type: none"> 1) Operate vehicle in 2H mode on dry surfaces.

REMOVAL AND INSTALLATION

TRANSFER CASE

REMOVAL

- (1) Shift transfer case into Neutral.
- (2) Raise vehicle.
- (3) Drain transfer case lubricant.
- (4) Mark front and rear propeller shaft yokes for alignment reference.
- (5) Support transmission with jack stand.
- (6) Remove rear crossmember and skid plate, if equipped.
- (7) Disconnect front/rear propeller shafts at transfer case.
- (8) Disconnect vehicle speed sensor wires.
- (9) Disconnect transfer case linkage rod from range lever.
- (10) Disconnect transfer case vent hose (Fig. 2) and indicator switch harness, if necessary.
- (11) Support transfer case with transmission jack.
- (12) Secure transfer case to jack with chains.
- (13) Remove nuts attaching transfer case to transmission.
- (14) Pull transfer case and jack rearward to disengage transfer case.
- (15) Remove transfer case from under vehicle.

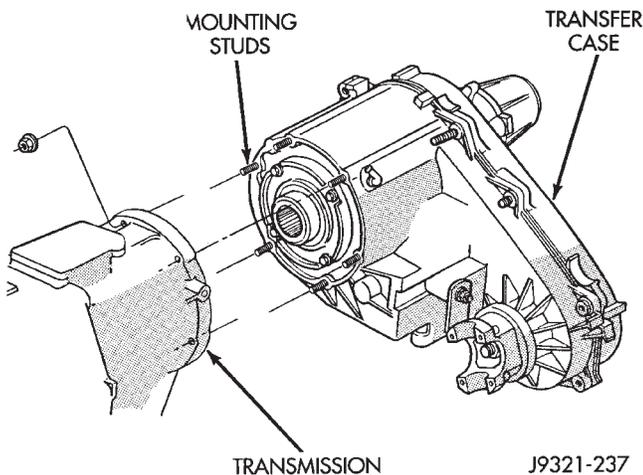


Fig. 2 Transfer Case Mounting

INSTALLATION

- (1) Mount transfer case on a transmission jack.
- (2) Secure transfer case to jack with chains.
- (3) Position transfer case under vehicle.

(4) Align transfer case and transmission shafts and install transfer case on transmission.

(5) Install and tighten transfer case attaching nuts to 35 N·m (Fig. 2).

(6) Connect vehicle speed sensor wires, and vent hose.

(7) Connect indicator switch harness to transfer case switch, if necessary. Secure wire harness to clips on transfer case.

(8) Align and connect propeller shafts. Tighten shaft attaching bolts to 26.5 N·m torque.

(9) Fill transfer case with correct fluid. Refer to Recommended Lubricant And Fill Level section for proper fluid and capacity.

(10) Install rear crossmember and skid plate, if equipped. Tighten crossmember bolts.

(11) Remove transmission jack and support stand.

(12) Connect shift rod to transfer case range lever.

(13) Adjust transfer case shift linkage.

(14) Lower vehicle and verify transfer case shift operation.

SHIFT LEVER

REMOVAL

- (1) Shift transfer case into 4L.
- (2) Remove transfer case shifter knob cap.
- (3) Remove nut holding shifter knob to shift lever.
- (4) Remove shifter knob.
- (5) Raise and support vehicle.
- (6) Loosen adjusting trunnion lock bolt and slide shift rod out of trunnion (Fig. 3). If rod lacks enough travel to come out of trunnion, push trunnion out of shift lever.
- (7) Remove bolts holding shift lever to transmission.
- (8) Separate shift lever from vehicle.

INSTALLATION

(1) Position shift lever on transmission. Use care when passing the shift lever through the shifter boot to prevent damage to the shifter boot.

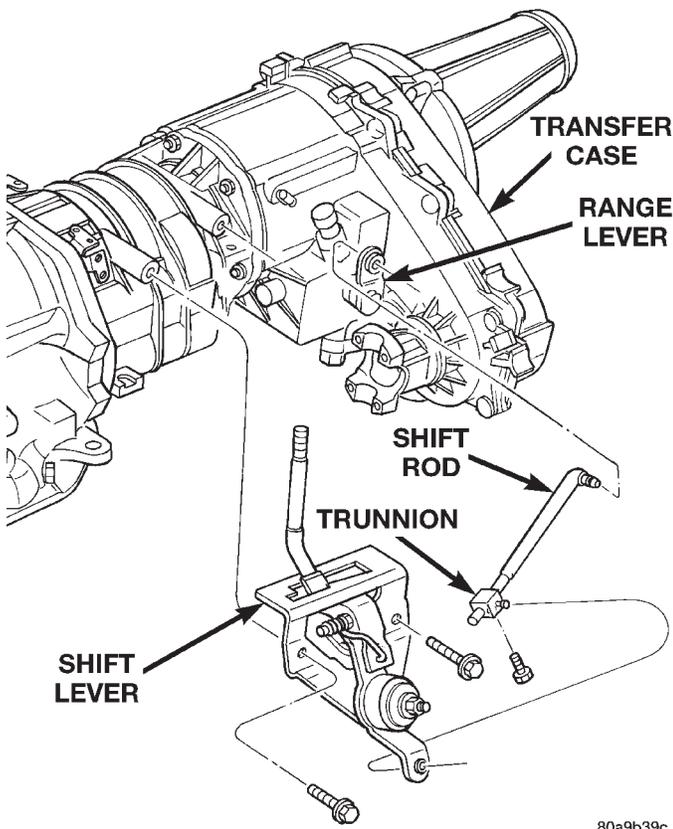
(2) Install bolts to hold shift lever to transmission.

(3) Install trunnion to shift lever, if necessary.

(4) Install shift rod to trunnion, if necessary.

(5) Move shift lever and transfer case to 4L position.

REMOVAL AND INSTALLATION (Continued)



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Fig. 3 Shift Lever

- (6) Tighten trunnion lock bolt.
- (7) Lower vehicle.
- (8) Install shift knob on shift lever.
- (9) Install nut to hold shifter knob to shift lever.
- (10) Install shifter knob cap.
- (11) Verify transfer case operation.

SPEEDOMETER**REMOVAL**

- (1) Raise vehicle.
- (2) Disconnect wires from vehicle speed sensor.
- (3) Remove adapter clamp and screw (Fig. 4).
- (4) Remove speed sensor and speedometer adapter as an assembly.
- (5) Remove speed sensor retaining screw and remove sensor from adapter.
- (6) Remove speedometer pinion from adapter. Replace pinion if chipped, cracked, or worn.

(7) Inspect sensor and adapter O-rings (Fig. 4). Remove and discard O-rings if worn or damaged.

(8) Inspect terminal pins in speed sensor. Clean pins with Mopar® electrical spray cleaner if dirty or oxidized. Replace sensor if faulty, or if pins are loose, severely corroded, or damaged.

INSTALLATION AND INDEXING

(1) Thoroughly clean adapter flange and adapter mounting surface in housing. Surfaces must be clean for proper adapter alignment and speedometer operation.

(2) Install new O-rings on speed sensor and speedometer adapter (Fig. 4), if necessary.

(3) Lubricate sensor and adapter O-rings with transmission fluid.

(4) Install vehicle speed sensor in speedometer adapter. Tighten sensor attaching screw to 2-3 N·m (15-27 in. lbs.) torque.

(5) Install speedometer pinion in adapter.

(6) Count number of teeth on speedometer pinion. Do this before installing assembly in housing. Then lubricate pinion teeth with transmission fluid.

(7) Note index numbers on adapter body (Fig. 5). These numbers will correspond to number of teeth on pinion.

(8) Install speedometer assembly in housing.

(9) Rotate adapter until required range numbers are at 6 o'clock position. Be sure range index numbers correspond to number of teeth on pinion gear.

(10) Install speedometer adapter clamp and retaining screw. Tighten clamp screw to 10-12 N·m (90-110 in. lbs.) torque.

(11) Connect wires to vehicle speed sensor.

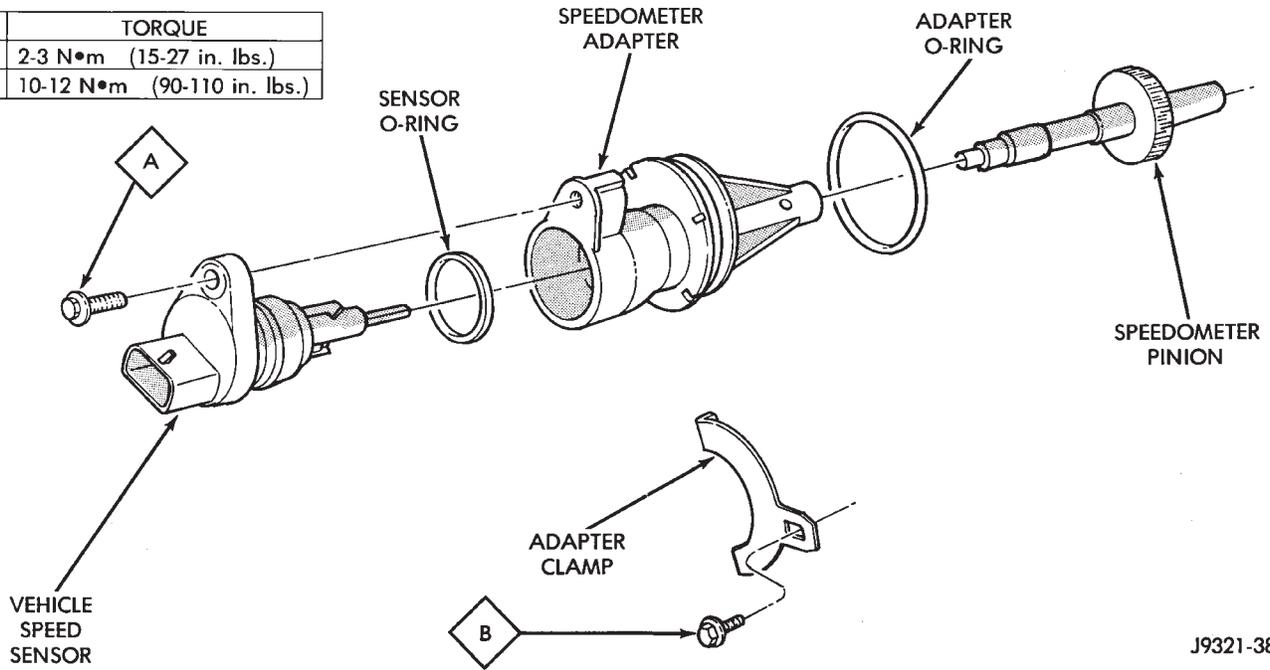
(12) Lower vehicle and top off transmission fluid level if necessary.

FRONT OUTPUT SHAFT SEAL**REMOVAL**

- (1) Raise vehicle.
- (2) Remove front propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.
- (3) Remove front output shaft yoke.
- (4) Remove seal from front case with pry tool (Fig. 6).

REMOVAL AND INSTALLATION (Continued)

ITEM	TORQUE
A	2-3 N•m (15-27 in. lbs.)
B	10-12 N•m (90-110 in. lbs.)



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Fig. 4 Speedometer Components

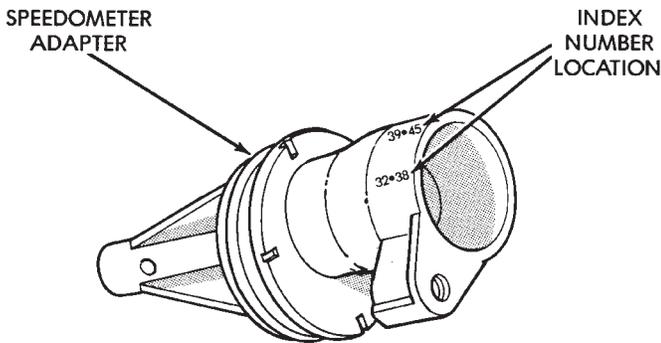
INSTALLATION

- (1) Install new front output seal in front case with Installer Tool 8143 as follows:
 - (a) Place new seal on tool. Garter spring on seal goes toward interior of case.
 - (b) Start seal in bore with light taps from hammer (Fig. 7). Once seal is started, continue tapping seal into bore until installer tool seats against case.

REAR RETAINER BUSHING AND SEAL

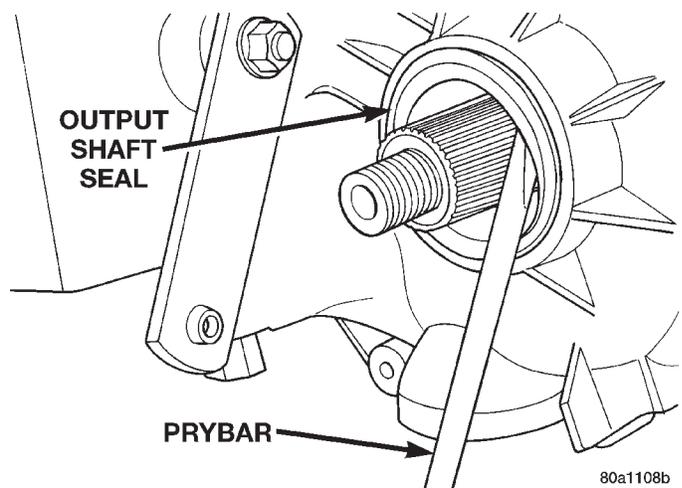
REMOVAL

- (1) Raise vehicle.
- (2) Remove rear propeller shaft. Refer to Group 3, Differential and Driveline, for proper procedure.
- (3) Using a suitable pry tool or slide-hammer mounted screw, remove the rear retainer seal.
- (4) Using Remover 6957, remove bushing from rear retainer (Fig. 8).



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Fig. 5 Location Of Index Numbers On Speedometer Adapter



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Fig. 6 Remove Front Output Shaft Seal

REMOVAL AND INSTALLATION (Continued)

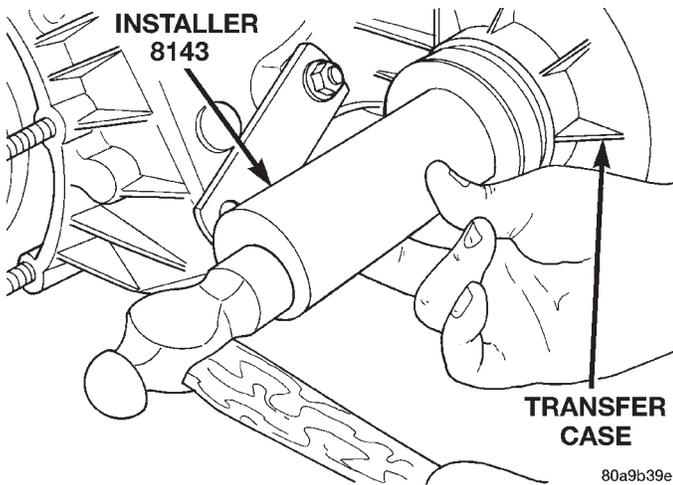


Fig. 7 Front Output Seal Installation

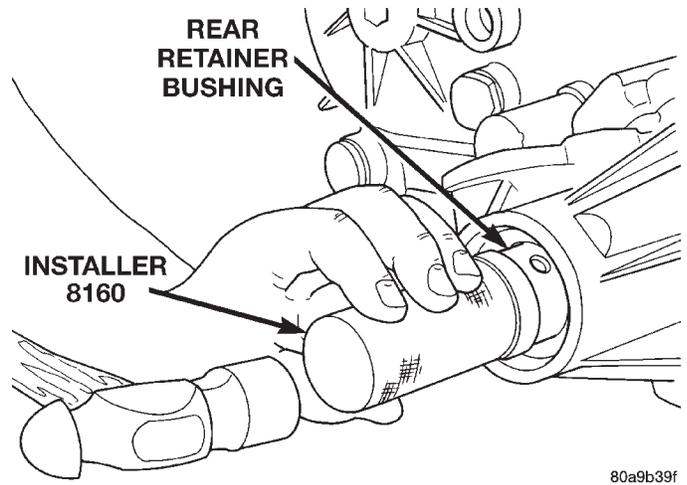


Fig. 9 Rear Retainer Bushing Install

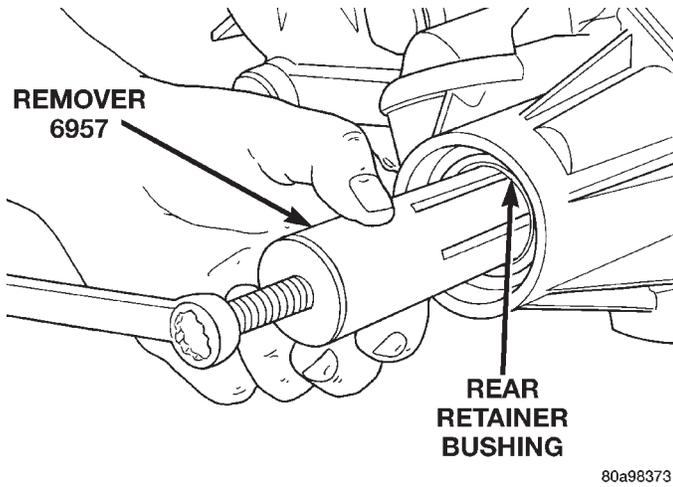


Fig. 8 Rear Retainer Bushing Removal

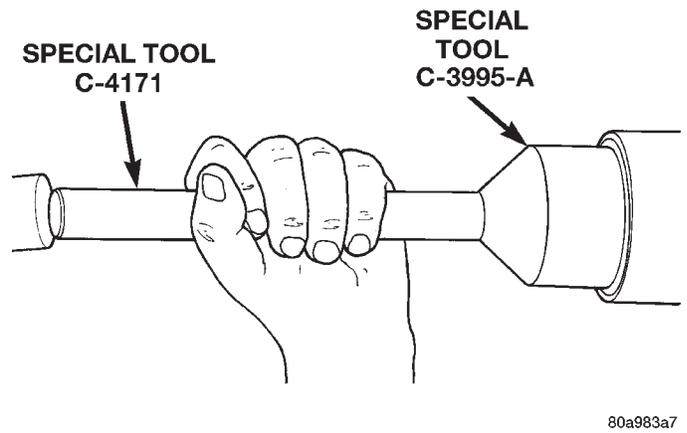


Fig. 10 Install Rear Retainer Seal

INSTALLATION

- (1) Clean fluid residue from sealing surface and inspect for defects.
- (2) Position replacement bushing in rear retainer with fluid port in bushing aligned with slot in retainer.
- (3) Using Installer 8160, drive bushing into retainer until installer seats against case (Fig. 9).
- (4) Using Installer C-3995-A, install seal in rear retainer (Fig. 10).
- (5) Install propeller shaft.
- (6) Verify proper fluid level.
- (7) Lower vehicle.

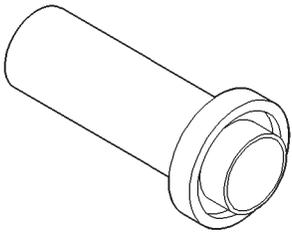
SPECIFICATIONS

TORQUE

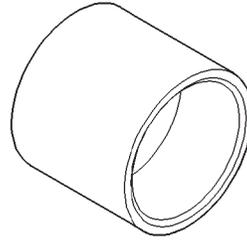
DESCRIPTION	TORQUE
Plug, Drain/Fill	40 N·m
Nuts, Mounting	35 N·m
Switch, Indicator	26 N·m

SPECIAL TOOLS

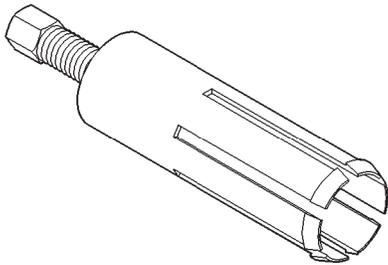
SPECIAL TOOLS—NV231



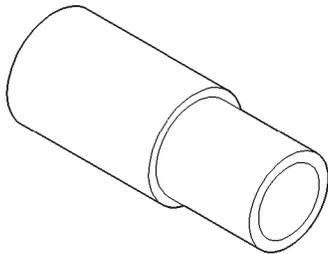
Installer, Seal—8143



Installer, Seal—C-3995-A



Remover, Bushing—6957



Installer, Bushing—8160

