

C6 Automatic Transmission

SECTION 17-10

APPLIES TO E-150 — E-250 — E-350, F-150 — F-250 — F-350 (4x2) (4x4) AND BRONCO

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DESCRIPTION

C6-Transmission

The C6 transmission is a three speed unit capable of providing automatic upshifts and downshifts through the three forward gear ratios. The transmission is also capable of providing manual selection of first and second gears.

Fig. 1 shows the location of the converter, front pump, clutches, gear train and most of the internal parts used in the C6 transmission. The identification tag (Fig. 2), is attached to the intermediate servo lower front cover bolt. The first line on the tag shows the transmission model prefix and suffix. A number appearing after the suffix indicates that the internal parts in the transmission have been changed after initial production start-up. For example, a PGD-BN model transmission that has been changed internally would read PGD-BN1. Both transmissions are basically the same, but some service parts in the PGN-BN transmission are slightly different than the PGD-BN1 transmission. **Therefore, it is important that the codes on the transmission identification tag be checked when ordering parts or making inquiries about the transmission.**

The hydraulic control system schematic is shown in Fig. 3. The converter housing and the fixed splines which engage the splined outside diameter of the low-reverse clutch steel plates, are both cast integrally into the case.

Only one (intermediate) band is used in the C6 transmission. This along with the forward clutch is used to obtain intermediate gear.

Vacuum Regulator Valve (VRV)

Refer to Fig. 4

The Vacuum Regulator Valve (VRV) is used on E-250—E-350 and F-250—F-350 vehicles equipped with 6.9L diesel engines.

On 6.9L diesel engine trucks equipped with a C-6 automatic transmission a Vacuum Regulator Valve (VRV) is incorporated to provide a vacuum signal which is proportional to the throttle position to the vacuum diaphragm of the transmission. The VRV is necessary to provide a vacuum signal to the C-6 transmission because the diesel engine has no vacuum. The VRV is bolted to the fuel injection pump and is actuated by the throttle lever.

A constant vacuum source is supplied to the VRV by an engine driven vacuum pump which also delivers vacuum to other accessories. The VRV regulates an output vacuum signal to the transmission's vacuum diaphragm which is proportional to the throttle position. As the throttle is opened, the regulated vacuum from the VRV drops.

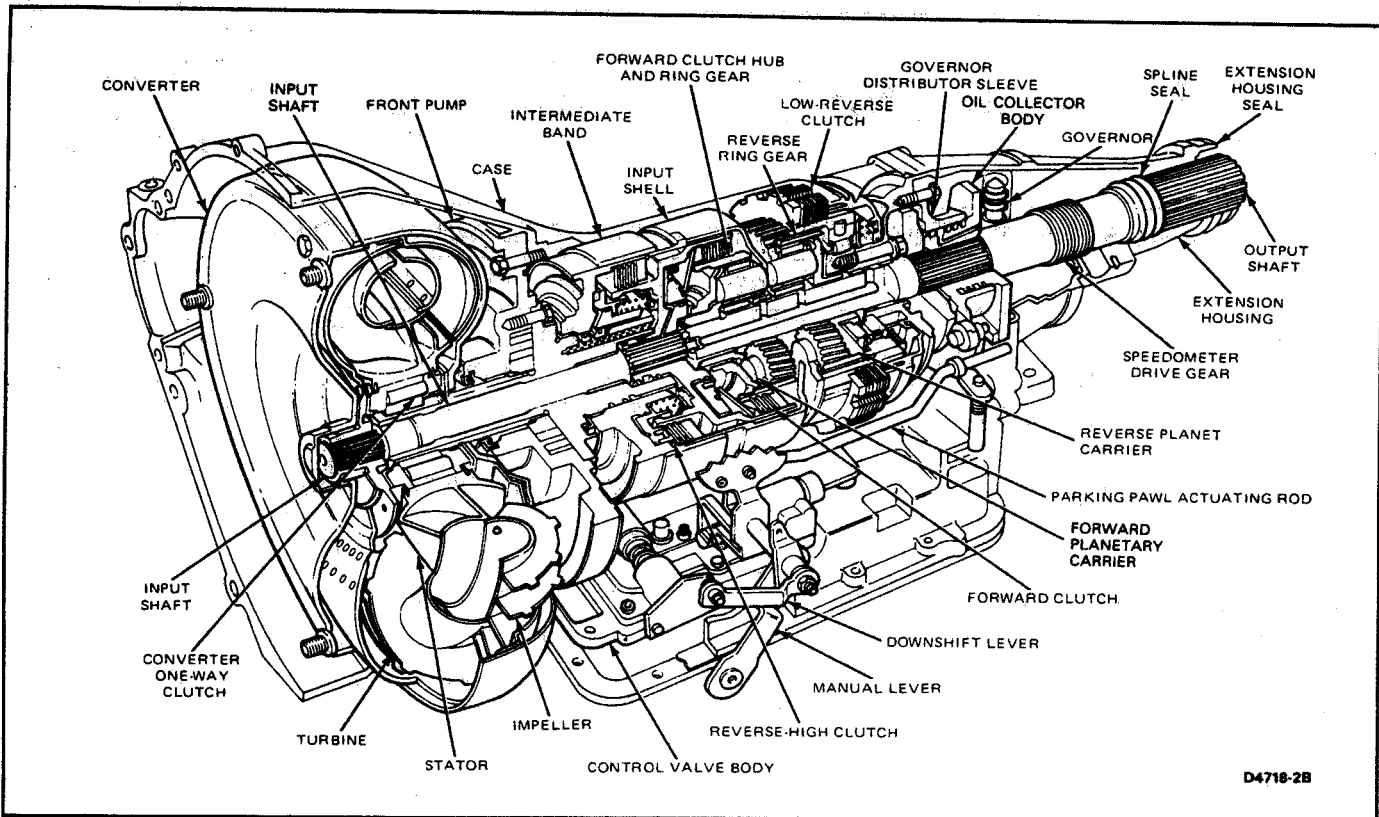


FIG. 1 C6 Automatic Transmission—Sectional

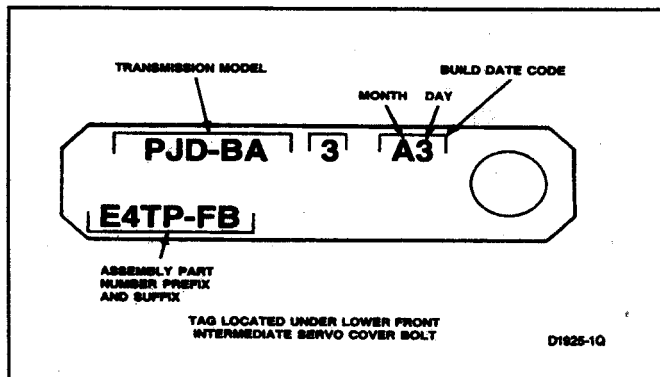


FIG. 2 Identification Tag

Should a malfunction occur in the VRV, the valve will cause a 0 vacuum signal to be sent to the diaphragm which will cause delayed and harsh shifts to occur.

Anytime delayed or harsh up-shifts are encountered, the performance of the VRV should be checked prior to performing any transmission repairs. Should the VRV be replaced or the fuel injection pump be removed, the VRV must be adjusted to specifications.

DIAGNOSIS AND TESTING

Refer to Section 17-01, General Automatic Transmission Service.

ADJUSTMENTS

The only adjustments on the transmission are the intermediate band and the NEUTRAL START switch (and the Vacuum Regulator Valve on vehicles equipped with 6.9L diesel engines).

On vehicles equipped with 6.9L Diesel Engines, the Vacuum Regulator Valve (VRV), which is located on the fuel injector pump must be properly adjusted to regulate vacuum to the transmission vacuum diaphragm.

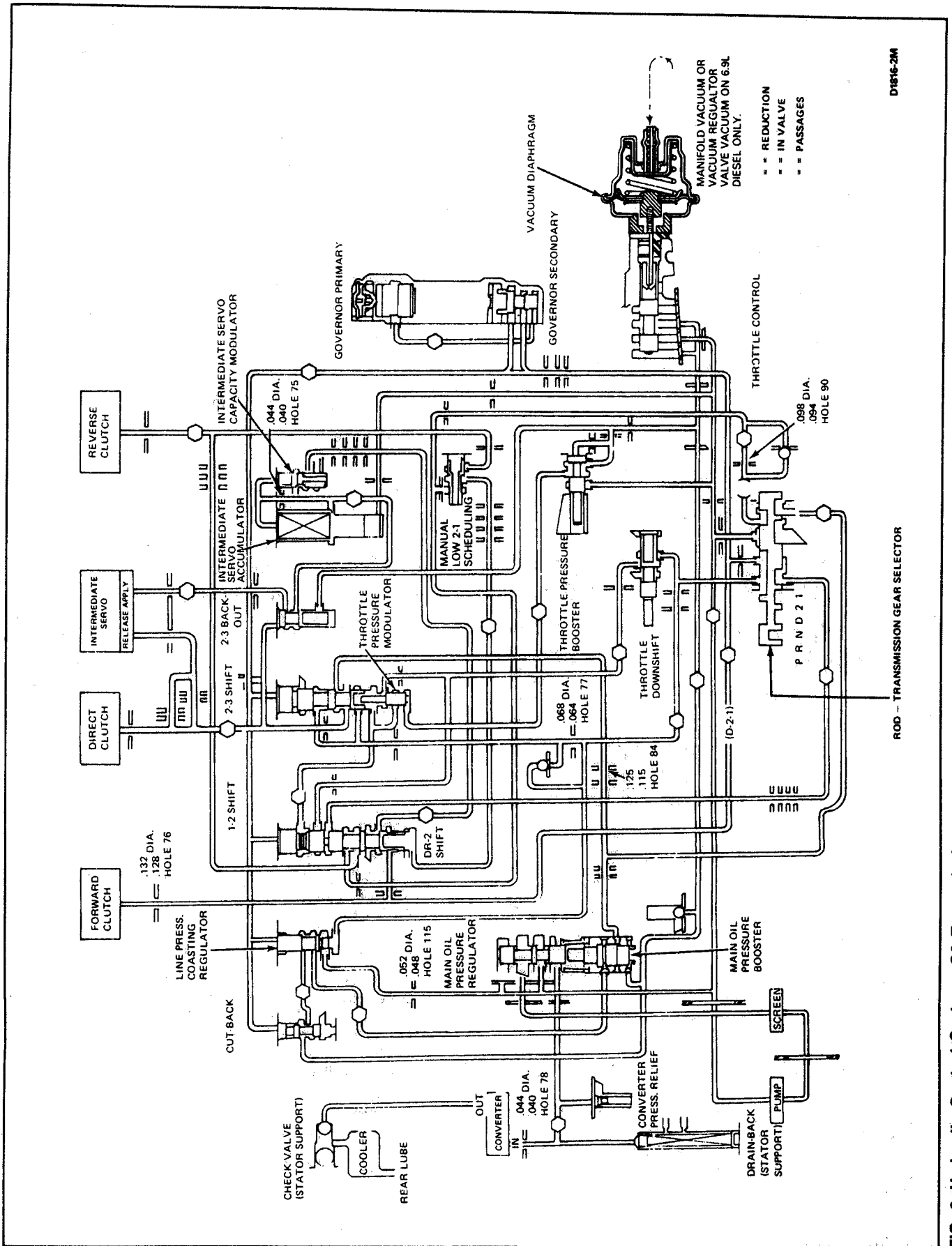
To prevent damage to the transmission and to assure proper band adjustment, it is essential that the tools and procedures described here are used whenever the band is adjusted.

Intermediate Band Adjustment

1. Raise the vehicle on a hoist or jack stands.
2. Clean all the dirt from the band adjusting screw. Remove and discard locknut.
3. Install a new locknut and tighten the adjusting screw to 14 N·m (10 ft-lbs) torque (Fig. 5).
4. **Back off the adjusting screw exactly 1-1/2 turns.**
5. Hold the adjusting screw from turning and tighten the locknut to 48-61 N·m (35-40 ft-lbs).
6. Lower the vehicle.

Align Neutral Start Switch

1. Apply the parking brake.
2. With the manual linkage properly adjusted, loosen the two switch attaching bolts (Fig. 26).
3. Place the transmission manual lever in NEUTRAL. Rotate the switch and insert the gauge pin (No. 43 drill shank end) into the gauge pin holes of the switch. The gauge pin has to be inserted a full 12.303mm 31/64 inch into the three holes of the switch (Fig. 28).



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FIG. 3 Hydraulic Control System—C6 Transmission

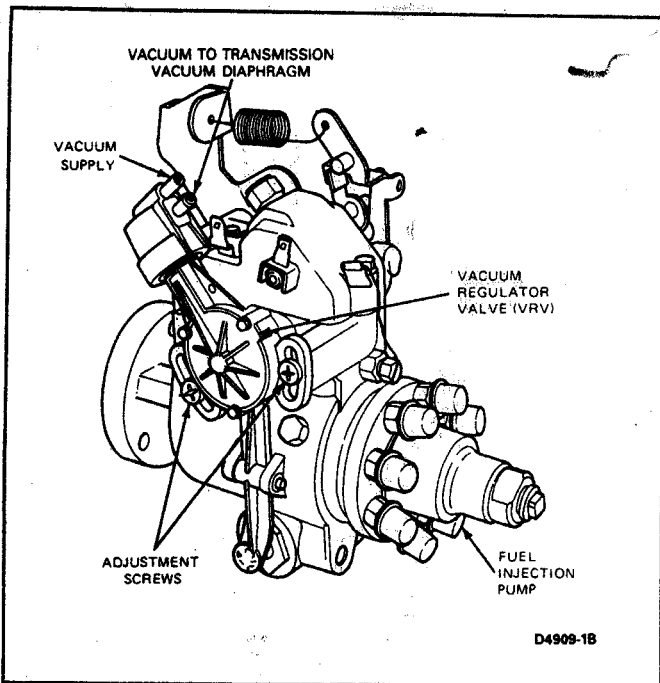


FIG. 4 Vacuum Regulator Valve (VRV)—E-250—E-350, F-250—F-350 with 6.9L Diesel Engine

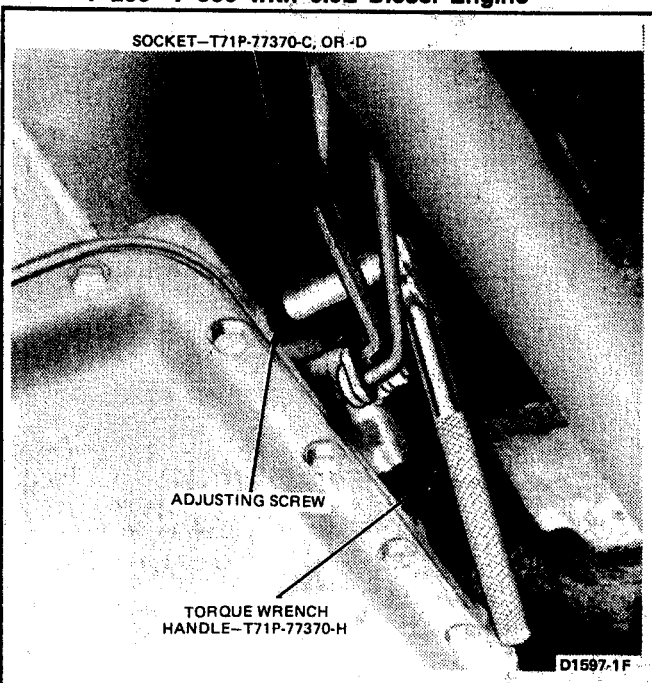


FIG. 5 Adjusting Intermediate Band

4. Tighten the two neutral start switch attaching bolts to 6.5-8.0 N·m (55-75 in-lbs). Remove the gauge pin from the switch.
5. Check the operation of the switch. The back up lamps should operate only with the transmission selector lever in **REVERSE**. The vehicle should start only with the transmission selector lever in **PARK** and **NEUTRAL**.

Vacuum Regulator Valve (VRV) Operational Check and Adjustment

(Vehicles Equipped with 6.9L Diesel Engine only)

Refer to Fig. 4

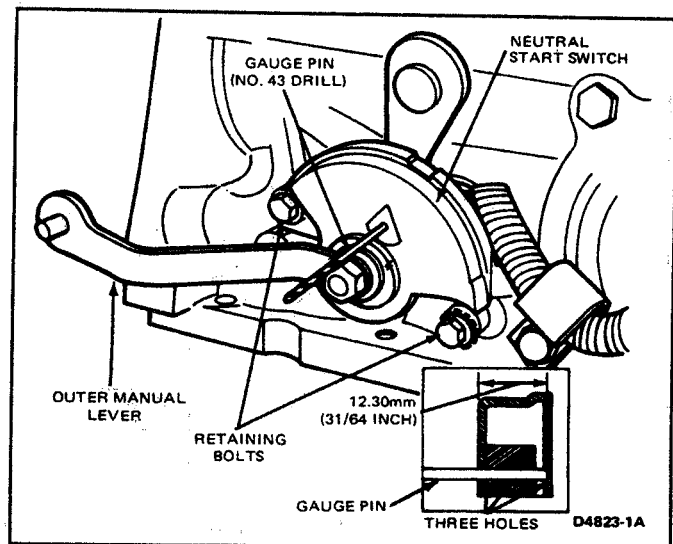


FIG. 6 Neutral Start and Back Up Lamp Switch

To check the VRV for proper operation and to adjust, the engine must not be running (TURNED OFF).

1. Disconnect the two port vacuum connector from the VRV located on the left side of the fuel injection pump.
2. Remove the throttle cable from the throttle lever on the right side of the fuel injection pump.
3. Remove the throttle return spring. Install the end of the spring over the throttle lever ball stud and the other end over the throttle cable support bracket. Insert the gage block, T83T-7B200-AH (0.515 inch), between the pump boss and the throttle wide-open stop (Fig. 7). With the spring in this position, spring force will hold the throttle lever stop against the gage block.
4. Attach a vacuum pump to the upper port of the VRV (vacuum supply side).
5. Attach a vacuum gage to the lower port of the VRV, labeled TRANS on the VRV.
6. Apply 20 inches of vacuum to the VRV and maintain. It will be necessary to pump the vacuum up as it bleeds off. The vacuum gage attached to the lower port of the VRV should indicate 7 inches of vacuum \pm 1/2 inch. If the vacuum reading is not correct, adjust the VRV.
7. To adjust, loosen the two adjustment screws that attach the VRV to the fuel injection pump (Fig. 4). Rotate the VRV until the proper vacuum is obtained. Tighten the two adjusting screws to 8-10.5 N·m (75-90 in-lbs) when the proper vacuum reading is obtained. If the VRV can not be adjusted to obtain the proper vacuum, replace the VRV and repeat procedure in Step 3.
8. Remove the gage block.
9. Reattach the throttle return spring and throttle cable.
10. Again apply 20 inches of vacuum to the VRV and maintain. The vacuum gage must indicate at least 13 inches (throttle at idle position). If the vacuum gage indicates less than 13 inches the VRV must be replaced and the new VRV adjusted per the above procedures.

11. After making the check or adjustment, remove the vacuum pump and gage from the VRV and reattach the vacuum connector.
12. Start engine and check throttle operation and check transmission shifts.

REMOVAL AND INSTALLATION

Transmission

F-150—F-250—F-350 (4x2) (4x4) and Bronco

Removal

1. Drive the vehicle on a hoist, but do not raise at this time. Disconnect neutral switch wire at the plug connector.
2. Remove the two upper converter housing-to-engine bolts.
3. Raise the vehicle on a hoist or stands.
4. Place the drain pan under the transmission fluid pan. Starting at the rear of the pan and working toward the front, loosen the attaching bolts and allow the fluid to drain. Finally remove all of the pan attaching bolts except two at the front, to allow the fluid to further drain. With fluid drained, install two bolts on the rear side of the pan to temporarily hold it in place.
5. Remove the converter drain plug access cover from the lower end of the converter housing.
6. Remove the converter-to-flywheel attaching nuts. Place a wrench on the crankshaft pulley attaching bolt to turn the converter to gain access to the nuts.
7. With the wrench on the crankshaft pulley attaching bolt, turn the converter to gain access to the converter drain plug. Place a drain pan under the

- converter to catch the fluid and remove the plug. After the fluid has been drained, re-install the plug.
8. On (4x2) applications disconnect the driveshaft from the rear axle and slide shaft rearward from the transmission. Install a seal installation tool in the extension housing to prevent fluid leakage.
9. Disconnect the speedometer cable from the extension housing.
10. Disconnect the downshift and manual linkage rods from the levers at the transmission.
11. Disconnect the oil cooler lines from the transmission.
12. Remove the vacuum hose from the vacuum diaphragm unit. Remove the vacuum line from the retaining clip.
13. Disconnect the cable from the terminal on the starter motor. Remove the three attaching bolts and remove the starter motor.
14. On F-150—F-350 (4x4) and Bronco vehicles, remove the transfer case. Refer to Section 16-82, New Process Gear 208 Transfer Case or Section 16-86, Borg Warner 1345 Transfer Case.
15. Remove the two engine rear support and insulator assembly-to-attaching bolts (Fig. 8).
16. Remove the two engine rear support and insulator assembly-to-extension housing attaching bolts (Fig. 8).
17. Remove the six bolts securing the No. 2 crossmember to the frame side rails (Fig. 8).
18. Raise the transmission with a transmission jack and remove the crossmember.
19. Secure the transmission to the jack with the safety chain.
20. Remove the remaining converter housing-to-engine attaching bolts.
21. Move the transmission away from the engine. Lower the jack and remove the converter and transmission assembly from under the vehicle.

Installation

1. Tighten the converter drain plug to 11-37 N·m (18-28 ft-lbs).
2. Position the converter on the transmission making sure the converter drive flats are fully engaged in the pump gear.
3. With the converter properly installed, place the transmission on the jack. Secure the transmission to the jack with the chain.
4. Rotate the converter until the studs and drain plug are in alignment with their holes in the flywheel.
5. Move the converter and transmission assembly forward into position, using care not to damage the flywheel and the converter pilot. **The converter must rest squarely against the flywheel. This indicates that the converter pilot is not binding in the engine crankshaft. Do not allow converter drive flats to disengage from pump gear.**
6. Install and tighten the converter housing-to-engine attaching bolts to 55-67 N·m (40-50 ft-lbs) on gasoline engines and 67-87 N·m (50-65 ft-lbs) on diesel engines.

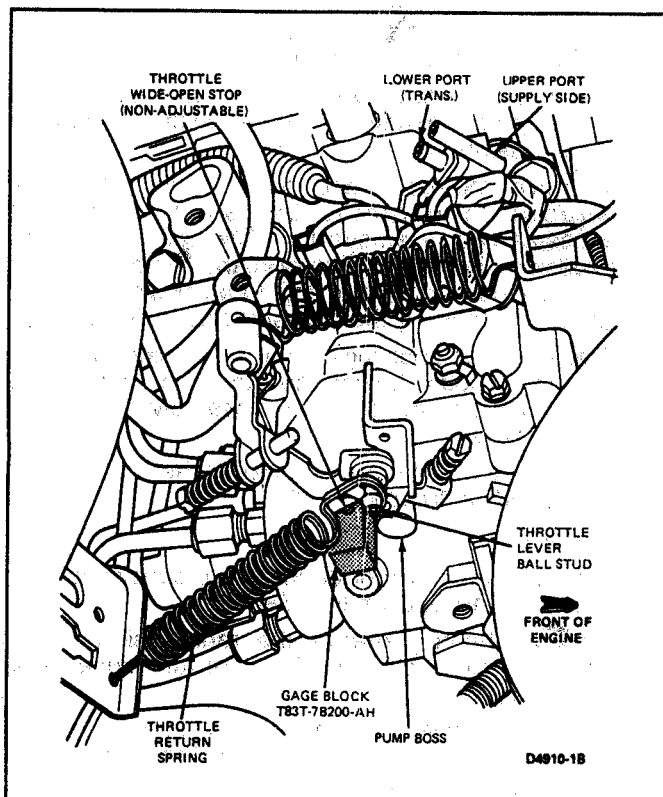


FIG. 7 VRV Gage Block Installation

7. Remove the transmission jack safety chain from around the transmission.
8. Position the No. 2 crossmember to the frame side rails. Install and tighten the attaching bolts to specifications as listed at the end of this Section.
9. Install transfer case on F-150—F-250 (4x4) and Bronco. Refer to Section 16-82, New Process Gear 208 Transfer Case or Section 16-86, Borg Warner 1345 Transfer Case.
10. Position the engine rear support and insulator assembly above the crossmember. Install the rear support and insulator assembly-to-extension housing mounting bolts and tighten the bolts to specifications as listed at the end of this Section.
11. Lower the transmission and remove the jack.
12. Secure the engine rear support and insulator assembly to the crossmember with the attaching bolts and tighten them to specifications as listed at the end of this Section.
13. Connect the vacuum line to the vacuum diaphragm making sure that the line is in the retaining clip.
14. Connect the oil cooler lines to the transmission.
15. Connect the downshift and manual linkage rods to their respective levers on the transmission. Refer to Section 17-02 Shift Control Linkage, Removal and Installation
16. Connect the speedometer cable to the extension housing.
17. Secure the starter motor in place with the attaching bolts. Connect the cable to the terminal on the starter.
18. Install a new O-ring on the lower end of the transmission filler tube and insert the tube in the case.
19. Secure the converter-to-flywheel attaching nuts and tighten them to 28-40 N·m (20-30 ft-lbs).
20. Install the converter housing access cover and secure it with the attaching bolts.
21. Connect the driveshaft.
22. Adjust the shift linkage as required. Refer to Section 17-02, Shift Control Linkage.
23. Lower the vehicle. Then install the two upper converter housing- to-engine bolts and tighten them to 55-67 N·m (40-50 ft-lbs) on gasoline engines and 67-87 N·m (50-65 ft-lbs) on diesel engines.
24. Connect neutral switch wire to plug connector.
25. Make sure the drain pan is securely attached, and fill the transmission to the correct level with the specified fluid.
5. Remove the bolt securing the filler tube to the engine.
6. Raise the vehicle on a hoist.
7. Place the drain pan under the transmission fluid pan. Starting at the rear of the pan and working toward the front, loosen the attaching bolts and allow the fluid to drain. Finally remove all of the pan attaching bolts except two at the front, to allow the fluid to further drain. With fluid drained, install two bolts on the rear side of the pan to temporarily hold it in place.
8. Remove the converter drain plug access cover from the lower end of the converter housing.
9. Remove the converter-to-flywheel attaching nuts. Place a wrench on the crankshaft pulley attaching bolt to turn the converter to gain access to the nuts.
10. With the wrench on the crankshaft pulley attaching bolt, turn the converter to gain access to the converter drain plug. Place a drain pan under the converter to catch the fluid. Then, remove the plug. With fluid drained, re-install the plug.
11. Disconnect the driveshaft.
12. Remove fluid filler tube.
13. Disconnect the starter cable at the starter. Remove the starter- to-converter housing attaching bolts and remove the starter.
14. Position an appropriate engine support bar to the frame and engine oil pan flanges.
15. Disconnect the cooler lines from the transmission. Disconnect the vacuum line from the vacuum diaphragm unit. Remove the vacuum line from the retaining clip at the transmission.
16. Remove the speedometer driven gear from the extension housing.
17. Disconnect the manual and downshift linkage rods from the transmission control levers.
18. Position a transmission jack to support the transmission. Install the safety chain to hold the transmission.
19. Remove the bolts and nuts securing the rear support and insulator assembly to the crossmember. Remove the six bolts retaining the crossmember to the side rails and remove the two support gussets. Raise the transmission with the jack and remove the crossmember (Fig. 9).
20. Remove the remaining converter housing-to-engine attaching bolts. Lower the jack and remove the converter and transmission assembly from under the vehicle.
21. Remove the converter and mount the transmission in a holding fixture.

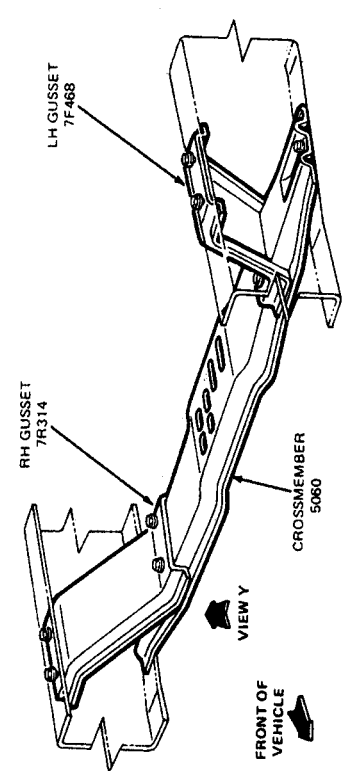
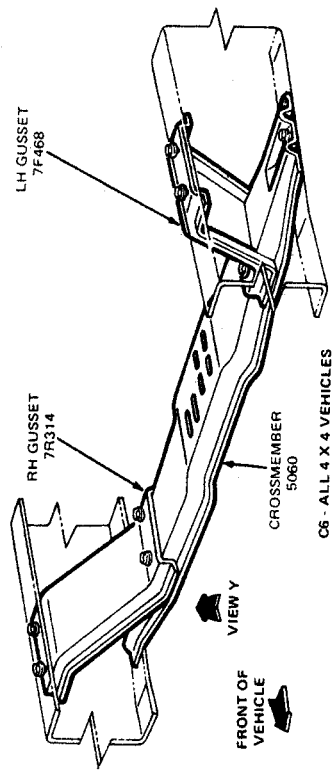
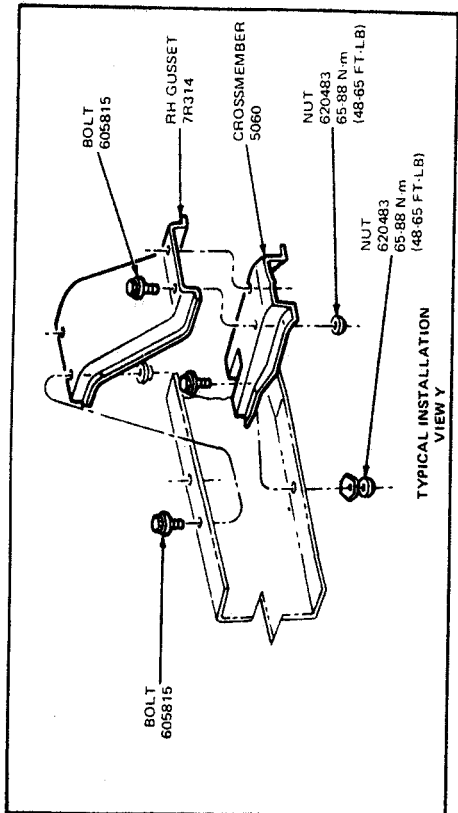
E-150—E-250—E-350

Removal

1. Working from inside the vehicle, remove the engine compartment cover.
2. Disconnect the neutral start switch wires at the plug connector.
3. If the vehicle is equipped with a V-8 engine, remove the flexhose from the air cleaner heat tube.
4. Remove the upper converter housing-to-engine attaching bolts (three bolts on 6-cylinder engine; four bolts on 8-cylinder engines).

Installation

1. Tighten the converter drain plug to specification as listed at the end of this Section.
2. Position the converter on the transmission making sure the converter drive flats are fully engaged in the pump gear.
3. With the converter properly installed, place the transmission on the jack. Secure the transmission to the jack with the safety chain.
4. Rotate the converter until the studs and drain plug are in alignment with their holes in the flywheel.



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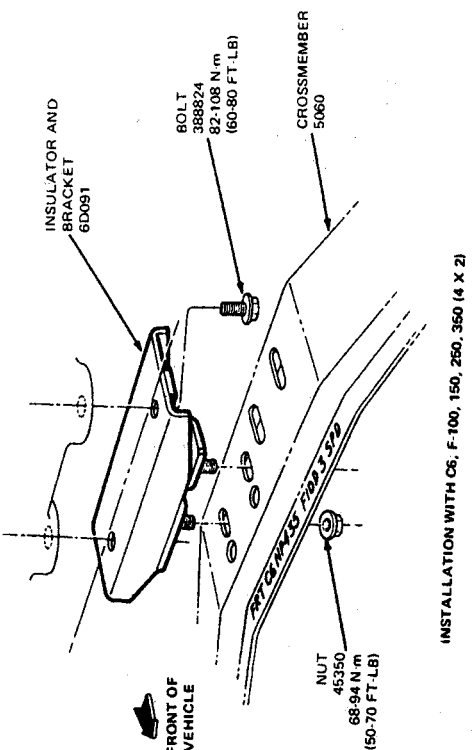
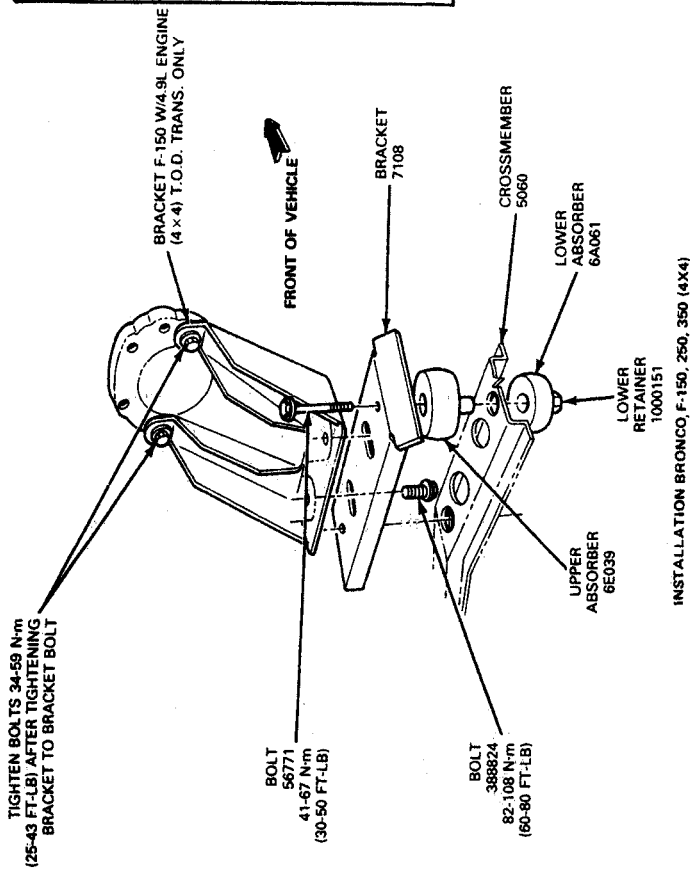


FIG. 8 Crossmember Installation F-150—F-250—F-350 (4x2)(4x4) and Bronco

5. Move the converter and transmission assembly forward into position, using care not to damage the flywheel and the converter pilot.

The converter must rest squarely against the flywheel. This indicates that the converter pilot is not binding in the engine crankshaft. Do not allow converter drive flats to disengage from pump gear.

6. Install the lower converter housing-to-engine attaching bolts. Tighten the bolts to 55-67 N·m (40-50 ft-lbs) on gasoline engines and 67-87 N·m (50-65 ft-lbs) on diesel engines. Install the converter-to-flywheel attaching nuts. Tighten the nuts to 28-40 N·m (20-30 ft-lbs).
7. Install the crossmember. Install the rear support and insulator assembly-to-crossmember attaching bolts and nuts. Tighten the bolts to specifications as listed at the end of this Section.
8. Remove the safety chain and remove the jack from under the vehicle. Remove the engine support bar.
9. Install a new O-ring on the lower end of the transmission filler tube and insert the tube and dipstick in the case.
10. Connect the vacuum line to the vacuum diaphragm making sure the line is secured in the retaining clip.
11. Connect the cooler lines to the transmission.
12. Install the speedometer driven gear into the extension housing. Tighten the attaching bolt to specifications as listed at the end of this Section.
13. Connect the transmission linkage rods to the transmission control levers. When making transmission control attachments new retaining ring and grommet should always be used (see Removal and Installation in Section 17-02, Shift Control Linkage). Note precautions necessary to prevent grommet damage. Attach the shift rod to the steering column shift lever (refer to Fig. 2, Section 17-02, Shift Control Linkage). Align the flats of the adjusting stud with the flats of the rod slot and insert the stud through the rod. Assemble the adjusting stud nut and washer to a loose fit. Perform a linkage adjustment as outlined in Section 17-02, Shift Control Linkage.
14. Install the converter housing access cover and tighten the attaching bolts to 17-21 N·m (12-16 ft-lbs).
15. Position the starter into the converter housing and install the attaching bolts. Tighten the bolts to 55-67 N·m (40-50 ft-lbs) on gasoline engines and 67-87 N·m (50-65 ft-lbs) on diesel engines. Install the starter cable.
16. Install the driveshaft.
17. Lower the vehicle.
18. Install the upper converter housing-to-engine attaching bolts. Tighten the bolts to specifications as listed at the end of this Section.
19. On V-8 engines, install the flex hose to the air cleaner heat tube. Install the bolt that retains the filler tube to the cylinder block.
20. Connect the neutral start switch wires at the plug connector.
21. Fill the transmission to the proper level with the specified fluid.
22. Raise the vehicle and check for transmission fluid leakage. Make sure the transmission fluid pan is securely attached. Lower the vehicle and adjust the downshift and manual linkage. Refer to Section 17-02, Shift Control Linkage.
23. Install the engine compartment cover.

Control Valve Body

Refer to Figs. 17 and 27.

Removal

1. Raise the vehicle on a hoist or jack stands.
2. Place a drain pan under the transmission and loosen the bolts holding the transmission pan to drain the fluid from the transmission.
3. Remove the transmission pan attaching bolts from both sides and the rear to allow the fluid to drain further. Finally, remove the remainder of the attaching bolts. Remove the pan and gasket. Remove and discard the nylon shipping plug from the pan. This plug is used to retain transmission fluid within the transmission during shipment and should be discarded when the oil pan is removed.
4. Remove the valve body attaching bolts and remove the valve body from the case.

Installation

1. Position the valve body to the case making sure that the selector and downshift levers are engaged. Install and tighten the attaching bolts to 11-14 N·m (95-125 in.-lbs).
2. Clean the transmission pan and gasket surfaces thoroughly.
3. Using a new pan gasket, install attaching bolts securing the pan to the transmission case. Tighten the attaching bolts to 10.5-17 N·m (8-12 ft-lbs).
4. Lower the vehicle and fill the transmission to the correct level with the specified fluid.

Intermediate Servo

(Refer to Fig. 10).

Removal

1. Raise the vehicle on a hoist or stands.
2. Remove the bolts that secure the engine rear support to the transmission extension rear support and insulator assembly to the crossmember.
3. Remove the two crossmember-to-frame attaching bolts, and the bolts attaching the gussets to the crossmember if so equipped.
4. Raise the transmission high enough to remove the weight from the crossmember and remove the crossmember.
5. Disconnect the muffler inlet pipe from the exhaust manifolds and allow the pipe to hang.
6. Place a drain pan under the servo. Remove the bolts that attach the servo cover to the transmission case.
7. Remove the cover, piston, spring and gasket from the case, screwing the band adjusting screw inward as the piston is removed. This places enough tension on the band to keep the struts properly engaged in the band end notches while the piston is removed.

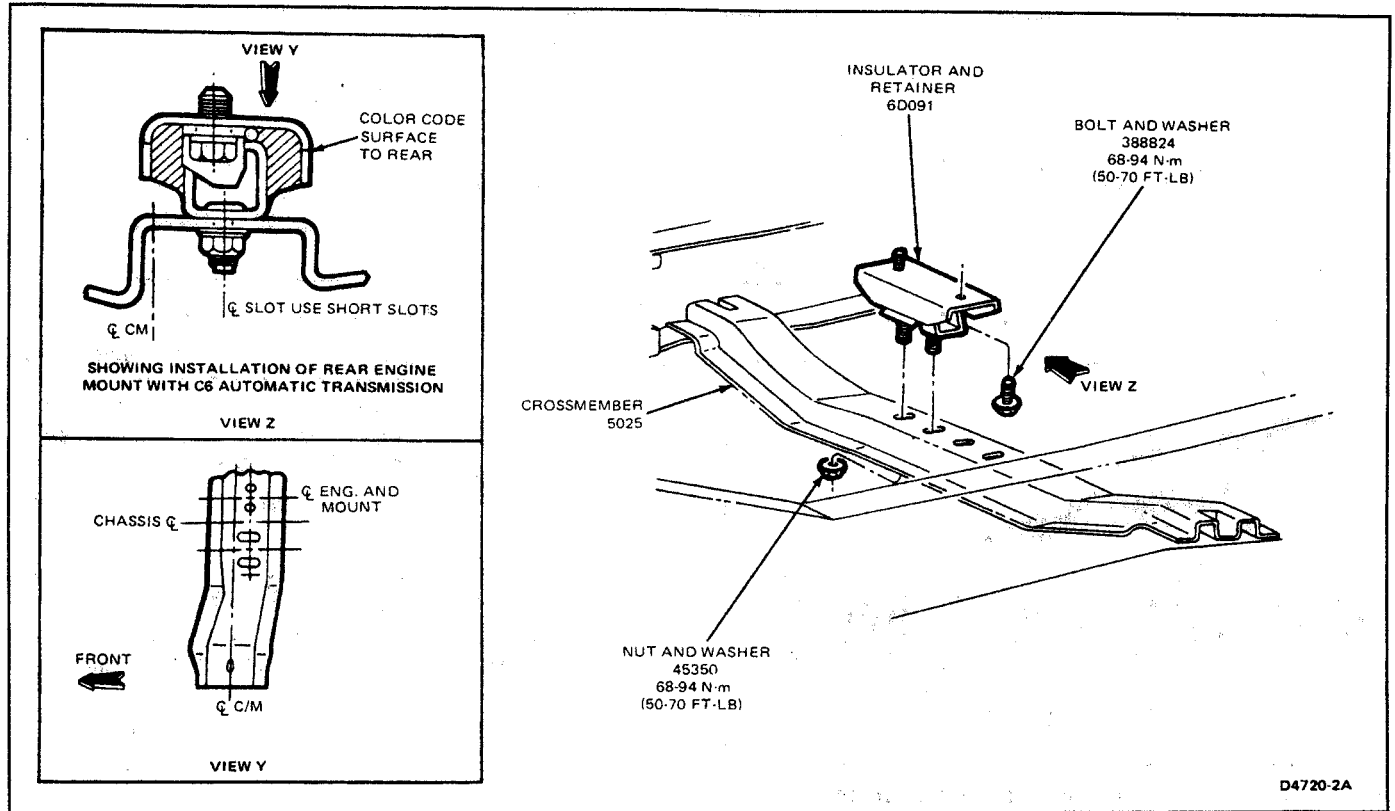


FIG. 9 Crossmember Installation—E-150—E-250—E-350

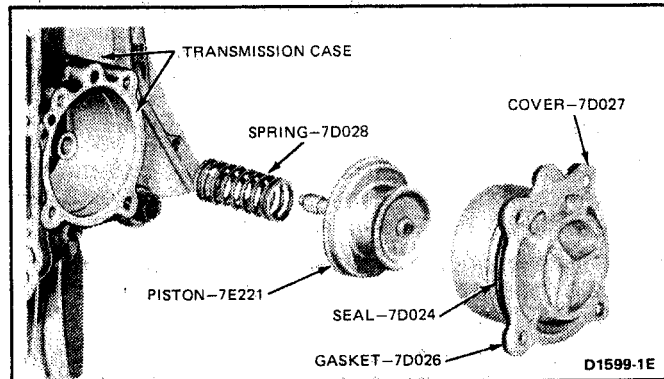


FIG. 10 Intermediate Servo Disassembled—Typical

8. Apply air pressure to the port in the servo cover to remove the piston and rod.
9. Replace the complete piston and rod assembly if the piston or piston sealing lips are damaged, (Fig. 10).
10. Remove the seal from the cover.

Installation

1. Dip the new seal in transmission fluid.
2. Install a new seal on the cover.
3. Coat new gasket with petroleum jelly, and position on the servo cover.
4. Dip the piston in transmission fluid and install it in the cover.
5. Position the servo spring on the piston rod.
6. Insert the servo piston and cover in the case and secure the cover to the case with the attaching bolts, taking care to back off the band adjusting

screw as the cover bolts are tightened 19-27 N·m (14-20 ft-lbs). **Make sure that the service identification tag is in place.**

7. Connect the muffler inlet pipe to the exhaust manifolds.
8. Raise the transmission high enough to install the crossmember. Secure the crossmember to the rear support with the attaching bolts. Lower the transmission as required to install the crossmember to frame and gussets attaching bolts. Tighten the attaching bolts to specifications as listed at the end of this Section.
9. Remove the jack from the transmission. Adjust the band as detailed in the Adjustment portion of this Section.
10. Lower the vehicle and replenish the fluid as required. Refer to Section 17-01 General Automatic Transmission Service.

Extension Housing Bearing or Bushing and Rear Seal

E-150—E-350, F-150—F-350 and Bronco

Removal

1. Raise the vehicle and disconnect the drive shaft at the transmission.
2. When only the rear seal needs replacing, carefully remove it with a tapered chisel or the tools, T50T-100-A and TOOL-1175-AC, shown in Fig. 11. Remove the bushing using Tool T77L-7697-D as shown in Fig. 12. **Use the bushing remover carefully so that the spline seal is not damaged.**

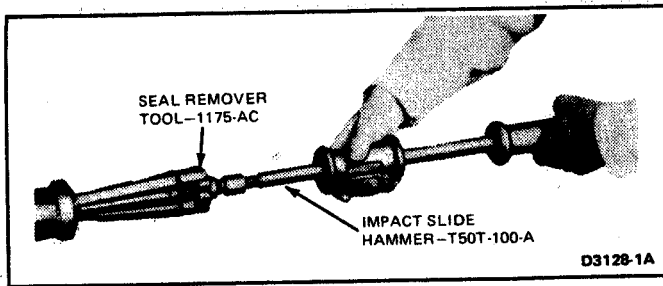


FIG. 11 Removing Extension Housing Seal

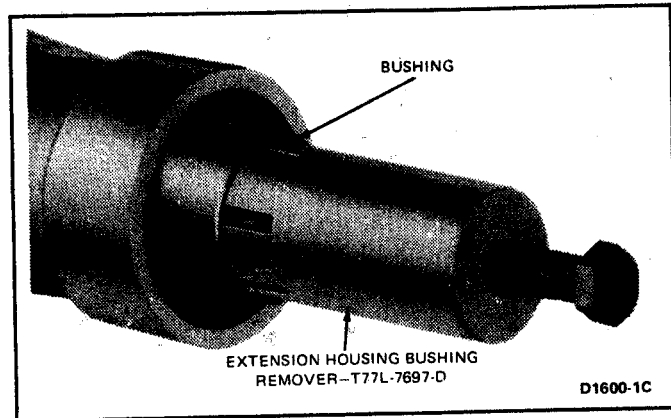


FIG. 12 Removing Extension Housing Bushing

Installation

1. When installing a new bushing use the special tool T77L-7697-C shown in Fig. 13.
2. Before installing a new seal, inspect the sealing surface of the universal joint yoke for scores. If scores are found, replace the yoke.
3. Inspect the counterbore of the housing for burrs. Remove burrs with crocus cloth.
4. Install the seal into the housing with tool T61L-7657-B shown in Fig. 14. The seal should be firmly seated in the bore. Coat the inside diameter of the end of the seal with Multi-Purpose Long-Life Lubricant, C1AZ-19590-B (ESA-M1C75-B) or an equivalent lubricant.
5. Coat the front universal joint spline with Multi-Purpose Long-Life Lubricant C1AZ-19590-B (ESA-M1C75-B) or an equivalent lubricant and install the drive shaft.

Extension Housing

E-100—E-350, F-100—F-350 and Bronco

Removal

1. Raise the vehicle on a hoist or stands.

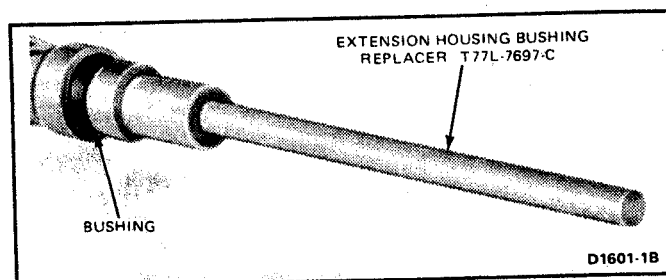


FIG. 13 Installing Extension Housing Bushing

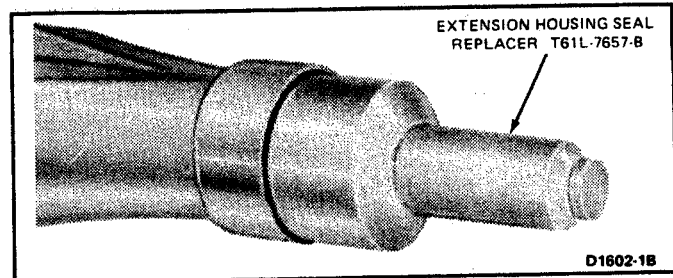


FIG. 14 Installing Extension Housing Seal

2. Disconnect the driveshaft from the rear axle flange and remove it from the transmission. On 4x4 vehicles, remove the transfer case. Refer to Section 16-82, New Process Gear 208 Transfer Case or 16-86, Borg Warner 1345 Transfer Case.
3. Disconnect the speedometer cable from the extension housing.
4. Remove the engine rear support and insulator assembly-to-extension housing attaching bolts.
5. Place a jack under the transmission and raise it just enough to remove the weight from the engine rear support.
6. Remove the bolts that secure the engine rear support to the crossmember and remove the support.
7. Place a drain pan under the rear of the transmission case.
8. Lower the transmission and remove the extension housing attaching bolts. Slide the extension housing off the output shaft and allow the fluid to drain.

Installation

1. Clean the mounting surface on the transmission case and on the extension housing. Position a new gasket on the transmission case.
2. Hold the extension housing in place and secure it with the attaching bolts. Tighten bolts to 34-47 N·m (25-35 ft-lbs).
3. Raise the transmission high enough to position the engine rear support on the crossmember.
4. Secure the support to the crossmember with the attaching bolts and nuts. Tighten the bolts to specification as listed at the end of this Section.
5. Lower the transmission and remove the jack. Install the engine rear support-to-extension housing attaching bolts. Tighten bolts to specification as listed at the end of this Section. On 4x4 vehicles, install the transfer case. Refer to Section 16-82 or 16-86.
6. Secure the speedometer cable to the extension housing with the attaching bolt.
7. Install the drive shaft and lower the vehicle to the floor.
8. Fill the transmission to the correct level with the specified fluid.

Governor

Removal

1. Remove the extension housing as outlined in this Section of the manual.

2. Remove the four governor body-to-oil-collector attaching bolts (Fig. 15).
3. Remove the governor from the collector body flange.
4. Refer to the Disassembly and Assembly Section of this Section for Governor repair operations.

Installation

1. Secure the governor (Fig. 15) to the oil collector flange with the attaching bolts. Tighten the bolts to 10.5-13.5 N·m (90-120 in.-lbs).
2. Re-install the extension housing as outlined in this Section.

DISASSEMBLY AND ASSEMBLY

Transmission

Refer to Fig. 39.

Before removing any of the subassemblies, thoroughly clean the outside of the transmission to prevent dirt from entering the mechanical parts.

During the repair of the subassemblies, certain general instructions which apply to all units of the transmission must be followed. Following these instructions will avoid unnecessary repetition.

Handle all transmission parts carefully to avoid nicking or burring the bearing or mating surfaces. Lubricate all internal parts of the transmission with clean automatic transmission fluid before assembly.

Do not use any other lubricants except on gaskets and thrust washers. These may be coated with petroleum jelly to facilitate assembly. Always use new gaskets and seals when assembling a transmission. Refer to Section 17-01, General Automatic Transmission Service for Cleaning and Inspection Procedures.

Tighten all bolts and screws to the recommended torque as outlined in specifications at end of this Section.

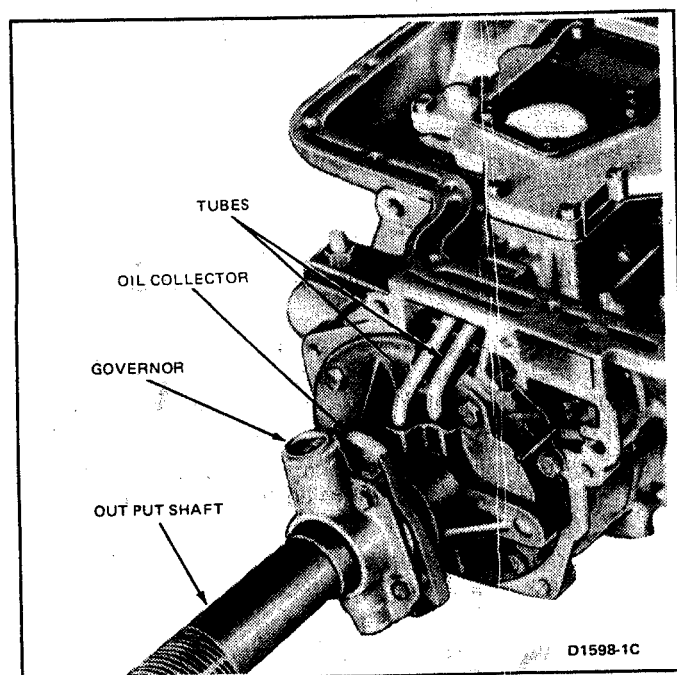


FIG. 15 Governor Installed

Disassembly

1. Remove the converter, and mount the transmission in holding fixture Rotunda Model 014-00106 or equivalent, (Fig. 16).
2. Remove the 17 fluid pan attaching bolts. Remove the pan and gasket.
3. Remove the eight valve body attaching bolts. Lift the valve body (Fig. 17) from the transmission case.
4. Attach a dial indicator TOOL-4201-C or equivalent to the front pump as shown in Fig. 18. Install Tool T61L-7657-B in the extension housing to center the output shaft.
5. Pry the gear train to the rear of the case and at the same time, press the input shaft inward until it bottoms, (Fig. 18). Set the dial indicator to read zero.
6. Pry the gear train forward, (Fig. 18), and note the amount of gear train end play on the dial indicator. Record the end play to facilitate assembling the

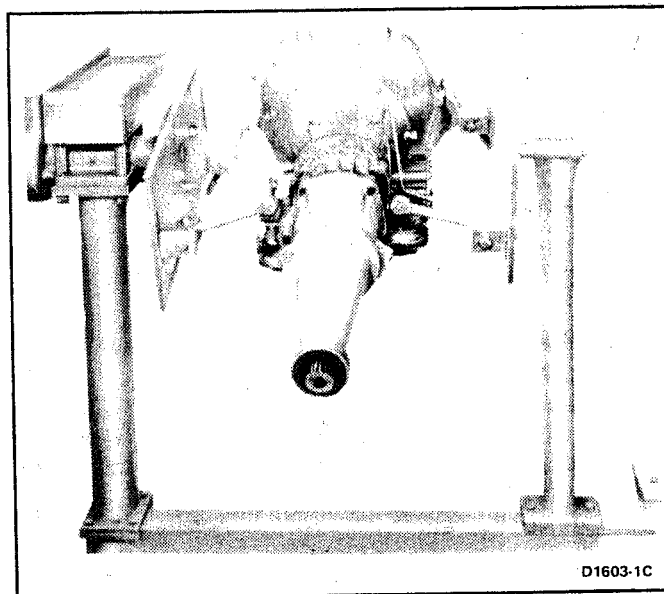


FIG. 16 Transmission Mounted in Holding Fixture

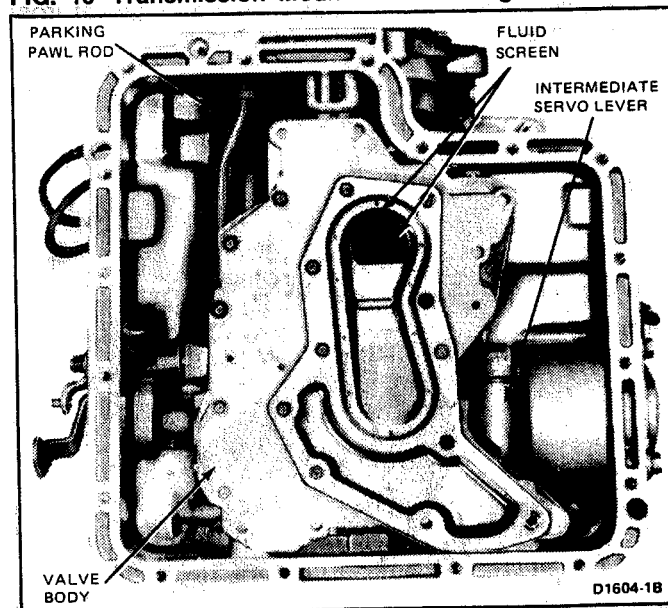


FIG. 17 Transmission With Pan Removed

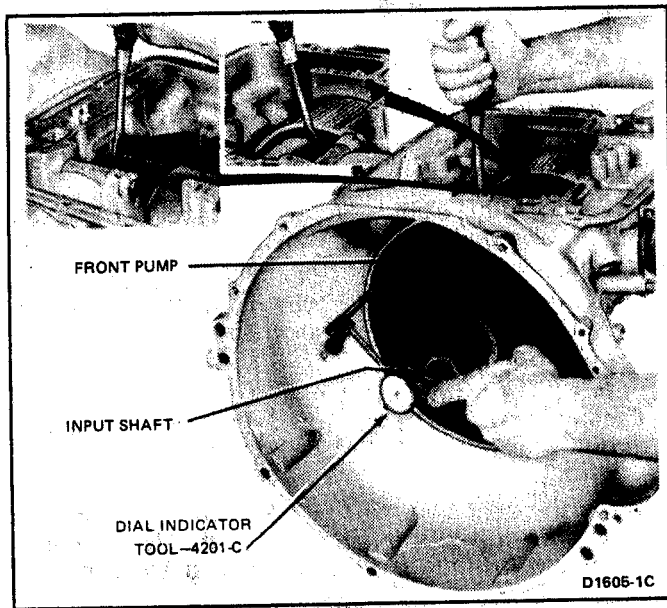


FIG. 18 Checking Gear Train End Play

transmission. Remove the dial indicator from the pump and the tool from the extension housing.

7. Remove the vacuum diaphragm, valve rod and the throttle valve from the bore in the rear of the case. Slip the input shaft out of the front pump.
8. Remove the front pump attaching bolts. Pry the gear train forward as shown in Fig. 19 to remove the pump.
9. Loosen the band adjustment screw and remove the two struts.
10. Rotate the band 90 degrees counterclockwise to align the ends with the slot in the case (Fig. 20). Slide the band off the reverse-high clutch drum.
11. Remove the forward part of the gear train as an assembly as shown in Fig. 21.
12. Remove the bolts that attach the servo cover to the transmission case.
13. Remove the cover, piston, spring and gasket from the case.

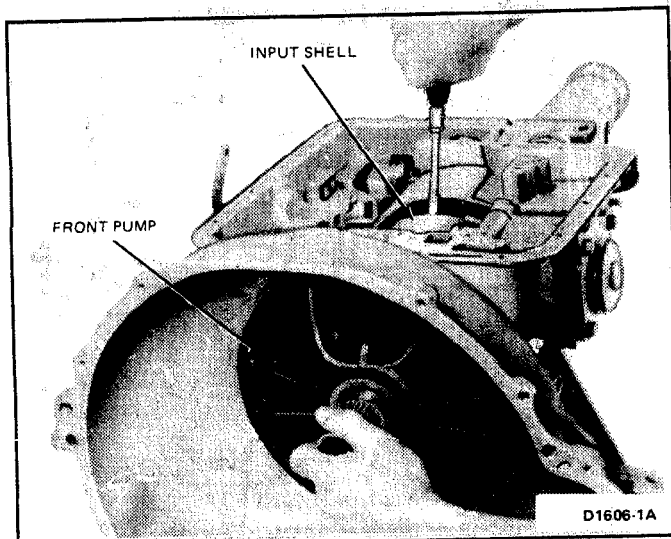


FIG. 19 Removing Front Pump

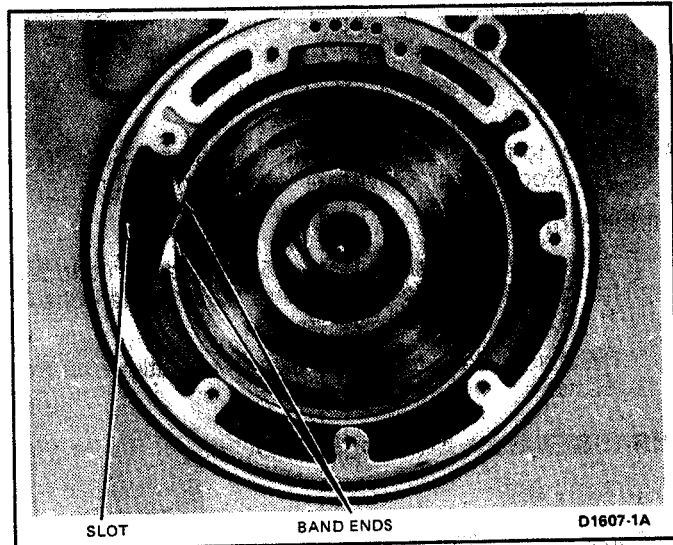


FIG. 20 Removing or Installing Band

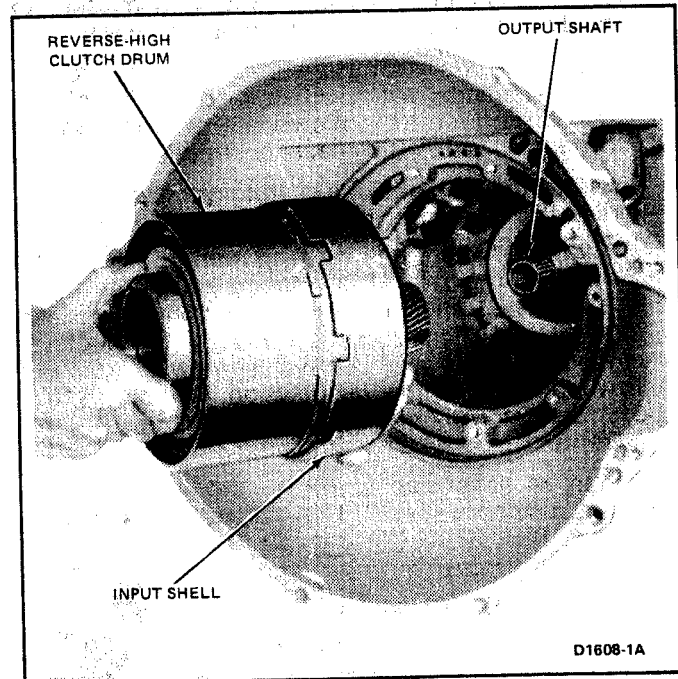


FIG. 21 Removing or Installing Forward Part of Gear Train

14. Remove the large snap ring that secures the reverse planet carrier in the low-reverse clutch hub. Lift the thrust washers and planet carrier from the drum.
15. Remove the snap ring, (Fig. 22), that secures the reverse ring gear and hub on the output shaft. Slide the ring gear and hub off the shaft. Remove the thrust washer.
16. Rotate the low-reverse clutch hub in a clockwise direction and at the same time, withdraw it from the case.
17. Remove the reverse clutch snap ring from the case, then remove the clutch discs, plates and pressure plate from the case.
18. Remove the extension housing attaching bolts from the case. Remove the extension housing and gasket.

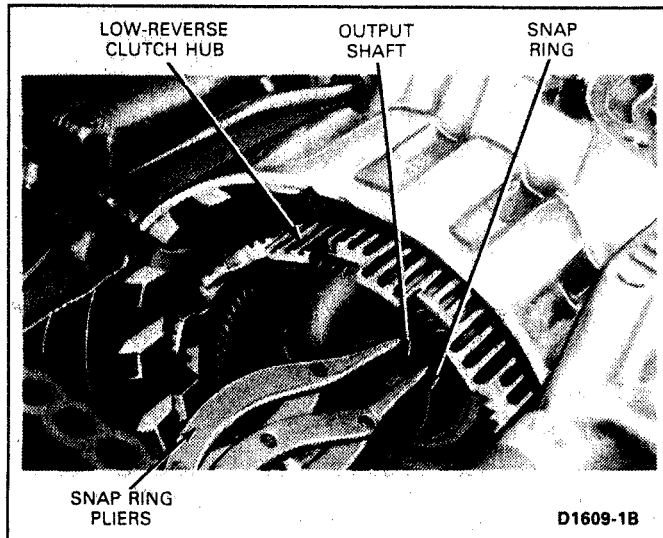


FIG. 22 Removing or Installing Reverse Ring Gear Hub, Snap Ring

19. Slide the output shaft (with governor and oil collector) assembly from the transmission case.
20. Remove the distributor sleeve attaching bolts and remove the sleeve, parking pawl gear and the thrust washer.

If the thrust washer is staked in place, use a sharp chisel and cut off the metal from behind the thrust washer. Be sure to clean the rear of the case with air pressure or a suitable solvent to remove any metal particles.

21. Compress the reverse clutch piston release spring with Tool T65L-77515-A (Fig. 23). Remove the snap ring. Remove the tool and the springs and retainer assembly.
22. Remove the one-way clutch inner race attaching bolts from the rear of the case. Remove the inner race from inside of the case.
23. Remove the low-reverse clutch piston from the case using TOOL-7000-DE as shown in Fig. 24.

Assembly

1. Place the transmission case in a holding fixture.
2. Tap the low-reverse piston into place in the case with a clean rubber hammer.
3. Hold the one-way clutch inner race in position and install the attaching bolts. Tighten bolts to 25-33 N·m (18-25 ft-lbs).

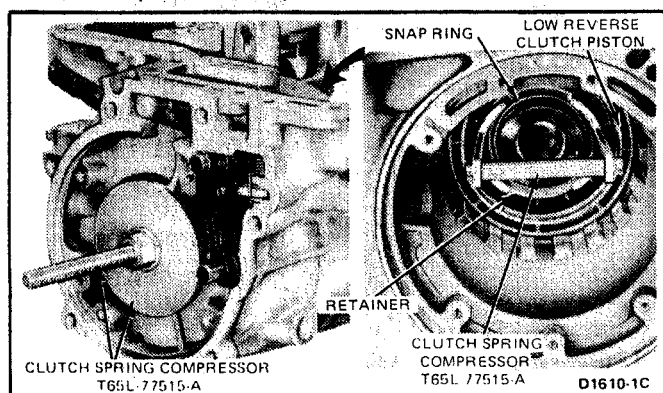


FIG. 23 Compressing Reverse Clutch Springs

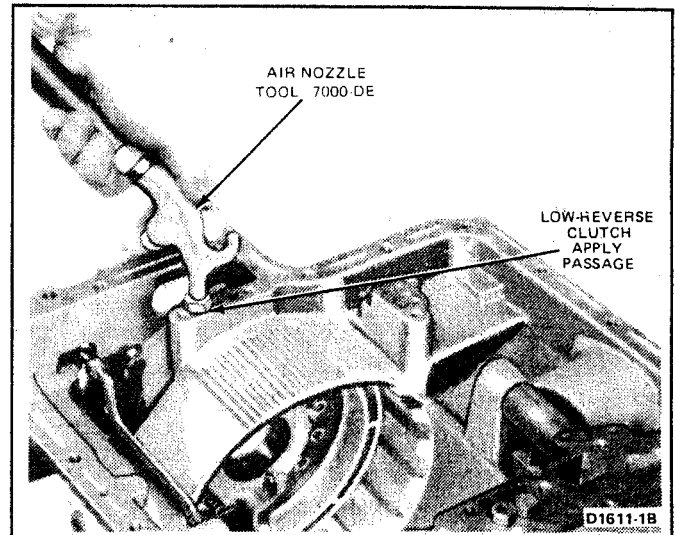


FIG. 24 Removing Low-Reverse Clutch Piston

4. Install the low-reverse clutch return spring and retainer assembly in the clutch piston.
5. Position the retainer snap ring in place on the one-way clutch inner race.
6. Install the compressing tool T65L-77515-A shown in Fig. 23 and compress the springs just enough to install the low-reverse clutch piston snap ring.
7. Install the snap ring, then remove the compressing tool.
8. Place the transmission case on the bench with the front end facing downward.
9. Position the parking gear thrust washer and the gear on the case (Fig. 32). **Do not re-stake the thrust washer.**
10. Position the collector and tubes in place on the rear of the case. Install the attaching bolts and tighten to 17-21 N·m (12-16 ft-lbs).
11. Install the output shaft, and governor as an assembly.
12. Place a new gasket on the rear of the transmission case. Position the extension housing on the case and install the attaching bolts. Tighten the attaching bolts to 34-47 N·m (25-35 ft-lbs). Install the vent tube.
13. Place the transmission case in the holding fixture.
14. Coat new gasket with petroleum jelly and position them on the servo cover.
15. Position the servo spring on the piston rod.
16. Insert the servo piston rod in the case. Install the servo cover with the attaching bolts, making sure that the identification tag is in place. Tighten the attaching bolts to 19-27 N·m (14-20 ft-lbs).
17. Align the low-reverse clutch hub and one-way clutch with the inner race at the rear of the case. Rotate the low-reverse clutch hub clockwise while applying pressure to seat it on the inner race.
18. Install the low-reverse clutch plates, starting with the wave plate next to the piston and following with steel and friction plates alternately. Retain them with petroleum jelly. If new composition plates are being used, soak them in clean transmission fluid,

DEXRON® II - Series D (ESP-M2C166-H, XT-2-QDX, or equivalent), for fifteen minutes before installation. Install the pressure plate and the snap ring. Test the operation of the low-reverse clutch by applying air pressure at the clutch pressure apply hole in the case.

19. Install the reverse planet ring gear thrust washer and the ring gear and hub assembly. Insert the snap ring in the groove on the output shaft.
20. Assemble the front and rear thrust washers onto the reverse planet assembly; retain with petroleum jelly. Insert the assembly into the ring gear and install the snap ring.
21. Set the reverse-high clutch assembly on the bench, with the front end facing down. Install the thrust washer on the rear end of the reverse-high clutch assembly. Retain the thrust washer with petroleum jelly and insert the splined end of forward clutch into the open end of the reverse-high clutch with splines engaging the direct clutch friction plates (Fig. 39).
22. Install the thrust washers and retain them with petroleum jelly, on the front end of the forward planet ring gear and hub. Insert the ring gear into the forward clutch.
23. Install the thrust washer on the front end of the forward planet assembly. Retain the washer with petroleum jelly and insert the assembly into the ring gear. Install the input shell and sun gear assembly.
24. Install the reverse-high clutch assembly, forward clutch assembly, forward planet assembly and drive input shell, and sun gear as an assembly into the transmission case.
25. Insert the intermediate band into the case around the reverse-high clutch drum. Install the struts and tighten the band adjusting screw sufficiently to retain the band.
26. Place a selective thickness bronze thrust washer on the rear shoulder of the stator support and retain it with petroleum jelly. If the end play was not within specification when checked prior to disassembly, replace the washer with one of proper thickness. Refer to specifications at the end of this Section for selective thrust washer thicknesses.

Using two 5/16-inch bolts three inches long, make two alignment studs. Cut the heads from the bolts and grind a taper on the cut end. Temporarily install the two studs opposite each other in the mounting holes of the case. Slide a new gasket onto the studs. Position pump on case, being careful not to damage the large seal on the outside diameter of the pump housing, (removing the aligning studs).

Install six of the seven mounting bolts and tighten to 22-40 N·m (16-30 ft-lbs).

27. Adjust the intermediate band as detailed under Adjustments and install the input shaft with the long splined end inserted into the forward clutch assembly.
28. Install Tool 4201-C at the seventh pump mounting bolt (Fig. 16) and check the transmission end play as in steps 4, 5 and 6 of Disassembly. (See specifications at the end of this Section.) Remove the tool.

Install the seventh pump mounting bolt and tighten to 22-40 N·m (16-30 ft-lbs).

29. Install the main control on the case, making sure that the levers engage the valves properly and tighten the attaching bolts to 11-14 N·m (95-125 in.-lbs). Install the primary throttle valve, rod, and the vacuum diaphragm in the case. Tighten the diaphragm attaching bolt to 17-21 N·m (12-16 ft-lbs).
30. Install a new pan gasket and the pan. Tighten the bolts to 10.5-17 N·m (8-12 ft-lbs).
31. Install the converter assembly.
32. Install the transmission in the vehicle as detailed under Removal and Installation.

Control Valve Body

Disassembly

The valve body-to-screen gasket should not be cleaned in a degreaser solvent or any type of detergent solution when disassembling the main control. To clean the gasket, wipe it off with a lint-free cloth.

1. Remove the nine screws that attach the screen to the lower valve body (Fig. 25) and remove screen and gasket (Fig. 26).
2. Remove the five upper-to-lower valve body and hold-down plate attaching screws. Remove the seven attaching screws from the underside of the lower valve body (Fig. 25).
3. Separate the bodies and remove the separator plate and gasket. **Be careful not to lose the check valves and springs.** Remove and clean the separator plate screen if necessary (Fig. 26).
4. Remove the manual valve retaining pin from the upper valve body (Fig. 27).
5. Slide the manual valve (Fig. 27) out of the valve body.
6. Cover the downshift valve bore with a finger, then working from the underside of the body remove the downshift valve retainer. Remove the spring and downshift valve (Fig. 27).
7. Apply hand pressure on the pressure boost valve sleeve end and remove the sleeve retaining clip from the under side of the body. Slowly release hand pressure and remove the sleeve and the pressure boost valve. Remove the two springs, the spring retainer and the main regulator valve from the bore.
8. Apply pressure on the throttle boost valve retaining plate and remove the two attaching screws. Slowly release the pressure and remove plate, throttle pressure boost valve and spring, and the manual low 2-1 scheduling valve and spring from the body (Fig. 27).
9. Apply pressure on the remaining valve retaining plate and remove the eight attaching screws.
10. Hold the valve body so that the plate is facing upward. Slowly release the pressure and remove the plate.
11. Remove the spring and the intermediate servo modulator valve (Fig. 27) from the valve body.
12. Remove the intermediate servo accumulator valve and springs.
13. Remove the 2-3 back-out valve and spring.
14. Remove the 2-3 shift valve, spring and the throttle modulator valve.

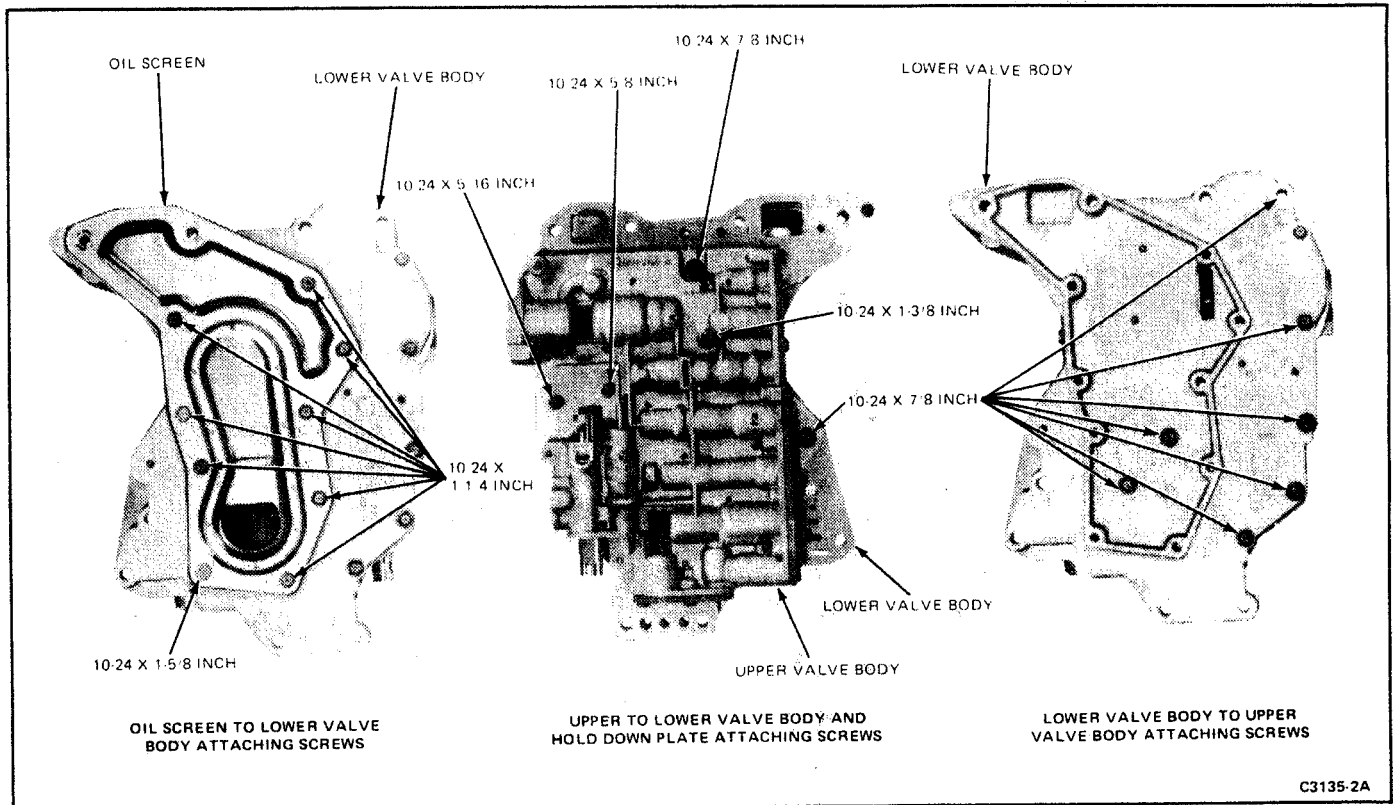


FIG. 25 Control Valve Body and Screen Attaching Screws

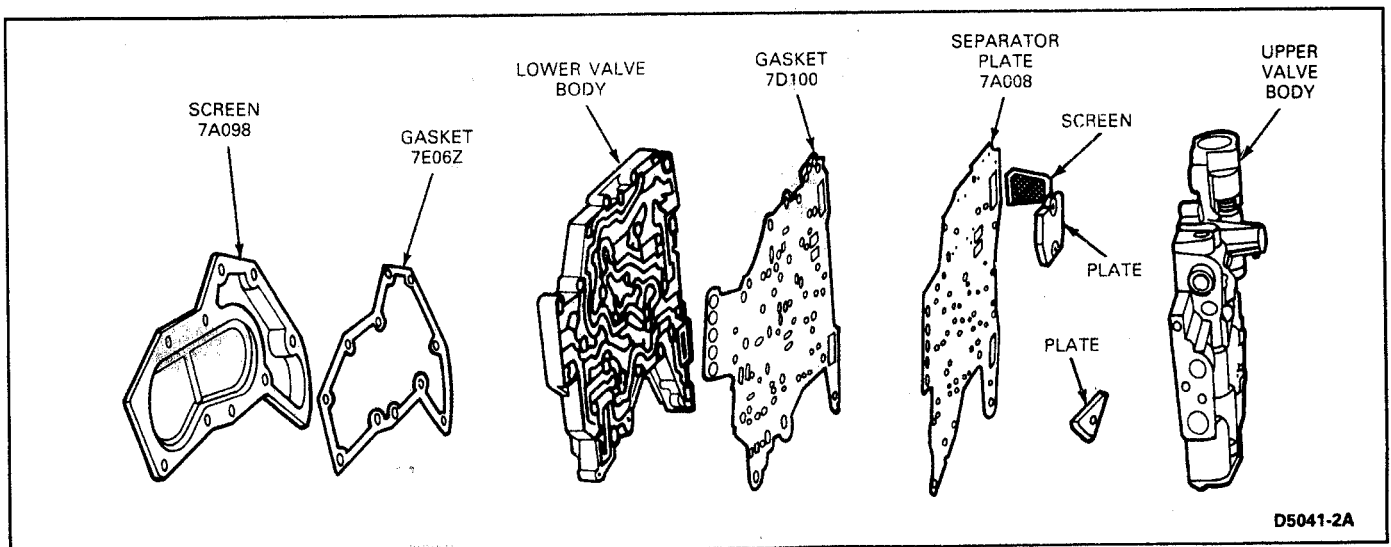


FIG. 26 Upper and Lower Valve Bodies Disassembled

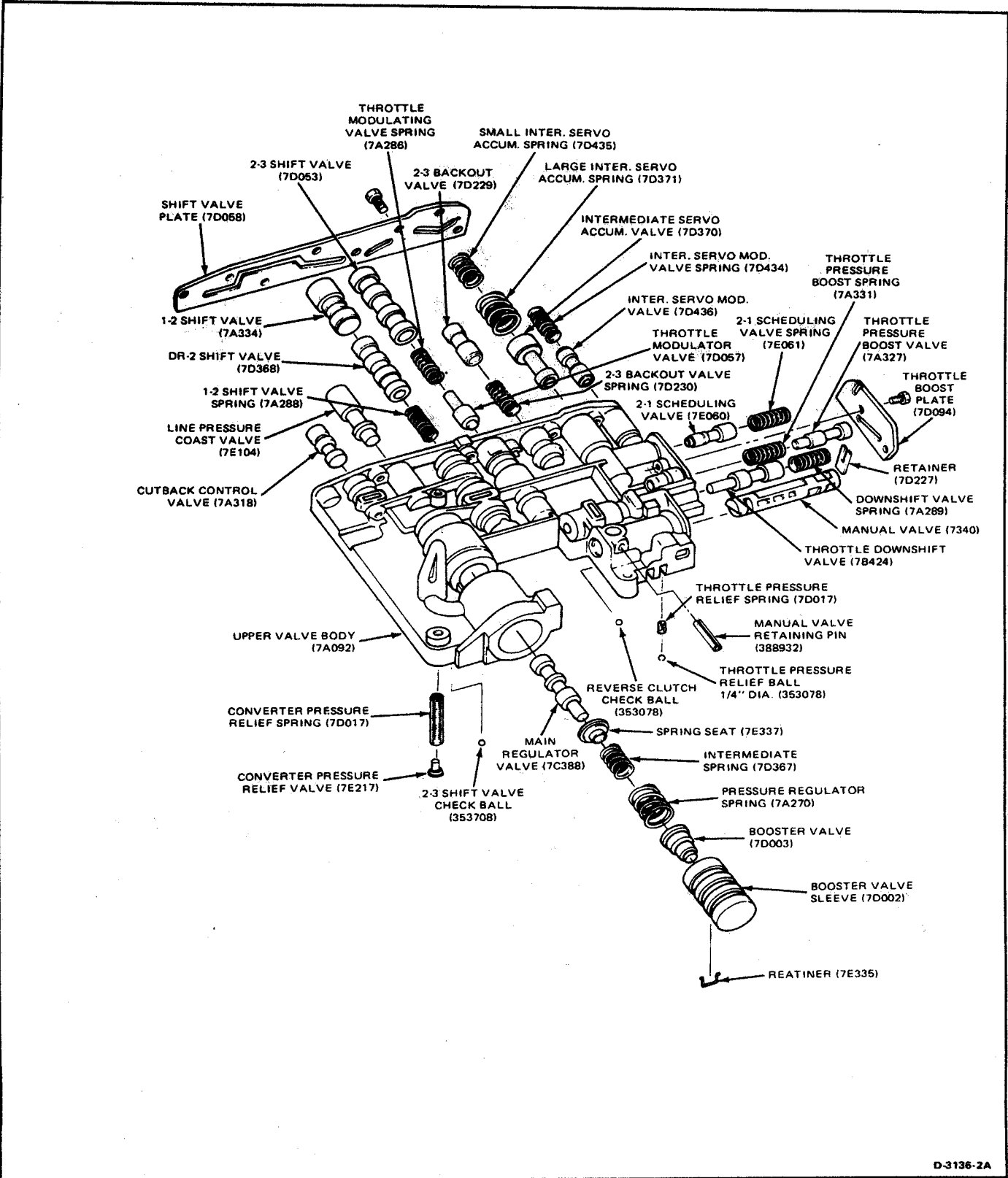
15. Remove the 1-2 shift valve, DR-2 shift valve and the spring from the valve body.
16. Remove the line pressure coasting regulator valve, (Fig. 27) from the body.
17. Remove the cutback control valve to complete the disassembly of the control valve.

Assembly

1. Place the downshift valve and spring in the valve body. Compress the spring and install the retainer from the underside of the body (Fig. 28).
2. Place the valve body on a clean surface with the passage side facing up. Place the converter relief valve spring in its bore (Fig. 28). Coat the converter

pressure relief valve with petroleum jelly and place it on top of the spring. Place the 2-3 shift valve check ball in its cavity. Place the throttle pressure relief valve spring in its bore (Fig. 28). Coat the throttle pressure relief valve check ball with petroleum jelly and place it on top of the spring.

3. Install the separator screen in the separator plate if it was previously removed. **Be sure the screen tabs are flush with the separator plate surface.** Carefully position the separator plate and new gasket on the lower valve body. Place the two hold-down plates on the separator plate and install the attaching screws finger tight.



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FIG. 27 Upper Valve Body Disassembled

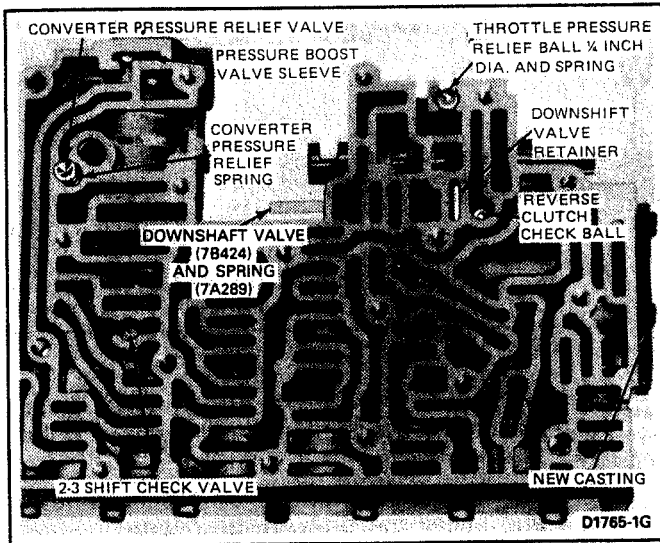


FIG. 28 Downshift Valve and Spring, Converter Pressure Relief Valve, Throttle Pressure Relief Valve, and 2-3 Shift Check Valve Locations

4. Place the lower body and plate assembly on the upper valve body (Fig. 25) and install the attaching screws finger tight.
5. Install the oil screen screws loosely, without the screen, to properly align the upper and lower valve bodies, gasket and separator plate.
6. Tighten the two bolts that are covered by the screen to 5.0-6.2 N·m (40-55 in.-lbs).
7. Remove the oil screen attaching screws and place the gasket and oil screen in position on the lower valve body. Re-install the screen attaching screws (Fig. 25).
8. Tighten all the valve body and screen attaching screws to 5.0-6.2 N·m (40-55 in.-lbs).
9. Place the cutback control valve (Fig. 27) and the line pressure coasting regulator valve in the valve body.
10. Place the one spring, DR-2 shift valve and the 1-2 shift valve in the body.
11. Place the throttle modulator valve and spring and the 2-3 shift valve in the valve body.
12. Place the spring and the 2-3 backout valve in the valve body.
13. Place the two springs and the intermediate servo accumulator valve in the valve body.
14. Place the intermediate servo modulator valve and spring in the body.
15. Carefully place the valve retaining plate on the body and secure it with the eight attaching screws. Tighten the two hex washer head screws to 2.5-5.0 N·m (20-45 in.-lbs). Tighten the remaining six screws to 2.5-4.5 N·m (20-40 in.-lbs).
16. Place the throttle pressure boost valve and spring in the valve body. Place the manual low 2-1 scheduling valve and spring in the valve body and install the retaining plate. Tighten the attaching screws to 2.5-5.0 N·m (20-45 in.-lbs).
17. Place the spring retainer on the stem of the main regulator valve so that the retainer flange is next to the valve shoulder. Place the main regulator valve, spring retainer, two springs, pressure boost valve

and sleeve in the bore. Apply hand pressure on the end of the pressure boost valve sleeve and install the spring clip retainer in the groove on the under side of the body so that the clip is inserted into the end groove in the sleeve. Be sure that the pressure boost valve sleeve is free in its bore.

18. Place the manual valve in the valve body and install the retaining pin in the body.

Intermediate Servo

(Refer to Fig. 10).

Disassembly

1. Apply air pressure to the port in the servo cover to remove the piston and rod.
2. Replace the complete piston and rod assembly if the piston or piston sealing lips are unserviceable or damaged.
3. Remove the seal and gasket from the cover.

Assembly

1. Dip the new seals in transmission fluid.
2. Install new seal and gasket on the cover.
3. Dip the piston in transmission fluid and install it in the cover.

Governor

Disassembly

1. Remove the governor body attaching bolts and remove the governor.
2. Remove the snap ring that secures the governor oil collector body on the output shaft (Fig. 29) and slide it off the front of the shaft.
3. Remove the seal rings from the oil collector body.

Assembly

1. Carefully install new seal rings on the oil collector body.
2. Working from the front end of the output shaft, slide the governor oil collector body into place on the shaft. Install the snap ring to secure it. Make sure that the snap ring is seated in the groove.
3. Position the governor assembly on the oil collector body (Fig. 29) and secure with the attaching screws. Tighten screws to 10.5-13.5 N·m (90-120 in.-lbs).

Downshift and Manual Linkage

Disassembly

1. Remove the nut and lockwasher that secures the outer downshift lever to the transmission and remove the lever.
2. Slide the inner downshift lever assembly out from the inside of the case (Fig. 30). Remove the seal from the recess in the manual lever shaft.
3. Remove the two bolts retaining the neutral start switch, and remove the switch, (Fig. 6).
4. Remove the C-ring securing the parking pawl actuating rod to the manual lever. Remove the rod from the case.
5. Remove the nut securing the inner manual lever to the shaft. Remove the inner lever from the shaft. Slide the outer lever and shaft from the case.

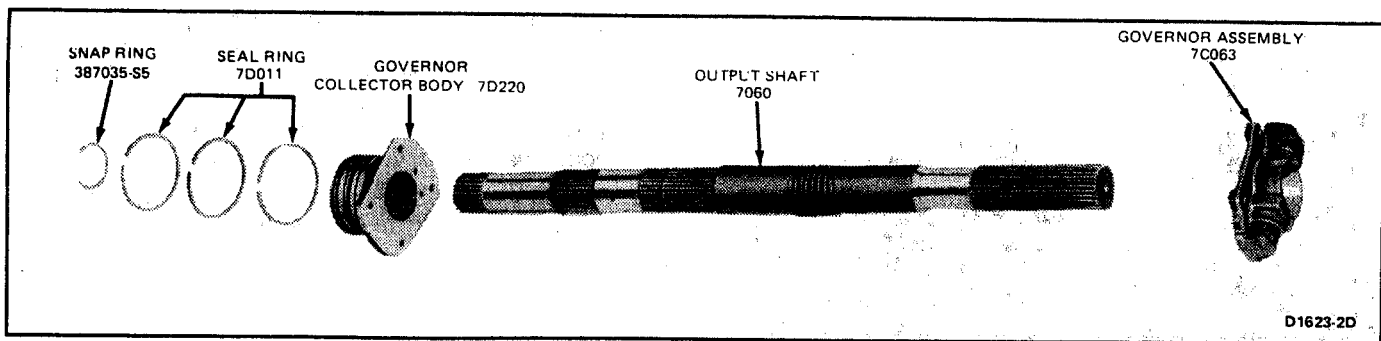


FIG. 29 Output Shaft Disassembled

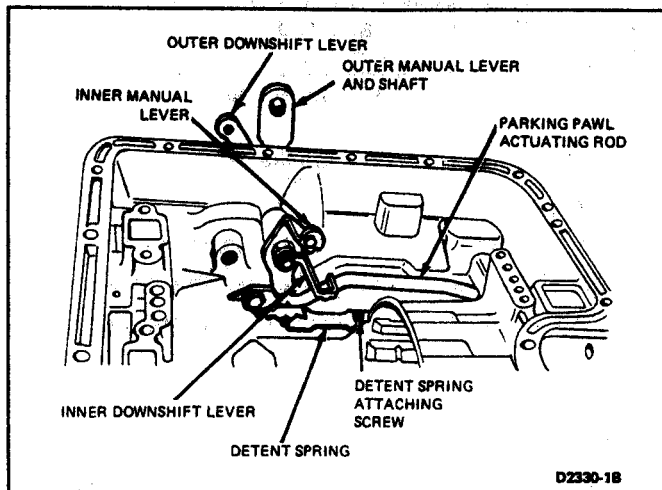


FIG. 30 Downshift and Manual Linkage

- Remove the seal from the case with Tools T59L-100-B, Slide Hammer and T58L-101-A, Puller Attachment.

Assembly

- Dip the new seal in transmission fluid and install it in the case using TOOL-77288 as shown in Fig. 31.
- Slide the outer manual lever and shaft in the transmission case.
- Position the inner lever on the shaft, making sure the leaf spring roller is positioned in the inner manual lever detent. Install the attaching nut.

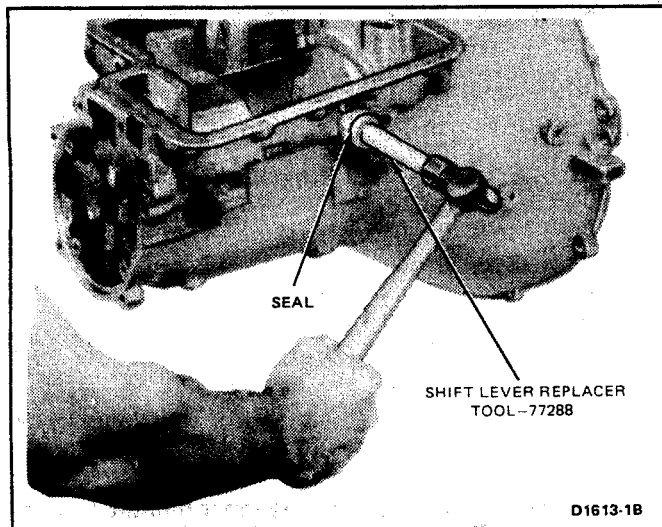


FIG. 31 Installing Manual Lever Seal

Tighten the nut to 41-54 N·m (30-40 ft-lbs). Install the parking pawl actuating rod and secure it to the inner manual lever with a C-ring.

- Slide the neutral-start switch on the outer lever shaft and install the bolts in the case.
- With the transmission manual lever in neutral, rotate the switch and install the gauge pin (No. 43 drill) into the gauge pin hole (Fig. 6). Tighten the bolts to 6.5-8.0 N·m (55-75 in.-lbs).
- Install a new downshift lever seal in the recess of the outer lever shaft. Slide the downshift lever and shaft into position.
- Place the outer downshift lever on the shaft and secure it with a lockwasher and nut. Tighten nut to 17-21 N·m (12-16 ft-lbs).

Parking Pawl Linkage

Disassembly

- Remove the bolts securing the parking pawl guide plate to the case (Fig. 32). Remove the plate.
- Remove the spring, parking pawl and shaft from the case.
- Working from the pan mounting surface, drill a 1/8 inch diameter hole through the center of the cupped plug. Pull the plug from the case with a wire hook.
- Unhook the end of the spring from the park plate slot to relieve the tension.

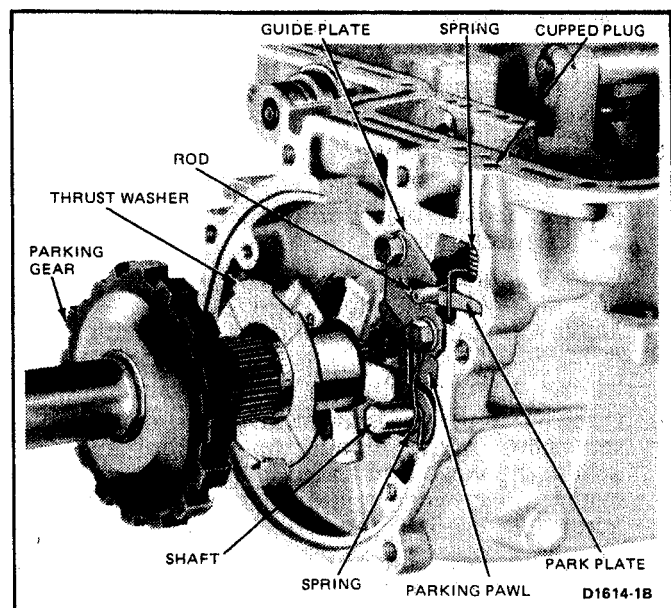


FIG. 32 Parking Pawl Mechanism

- Thread a 1/4-20 inch or 8-32 x 1-1/4 inch screw (Fig. 33) into the park plate shaft. Pull the shaft from the case with the screw. Remove the spring and park plate.

Assembly

- Position the spring and park plate in the case and install the shaft. Place the end of the spring into the slot of the park plate.
- Install a new cupped plug to retain the shaft.
- Install the parking pawl shaft in the case. Slip the parking pawl and spring into place on the shaft.
- Position the guide plate on the case, making sure that the actuating rod is seated in the slot of the plate. Secure the plate with two bolts and lockwashers. Tighten bolts to 17-21 N·m (12-16 ft-lbs).

Servo Apply Lever

Disassembly

- Working from inside of the transmission case, carefully drive on the servo apply lever shaft to remove the cup plug. The shaft (Fig. 34) can be withdrawn from the case by hand.

Assembly

- Hold the servo apply lever in position and install the new shaft.
- Using the fabricated tool shown in Fig. 34, drive the cup plug into position in the case. Be sure the plug is flush with the shoulder of the counterbore. The cup plug may be coated with Threadlock and Sealer, EOAZ-19554-A (ESE-M2G204-A) or equivalent, before installation.

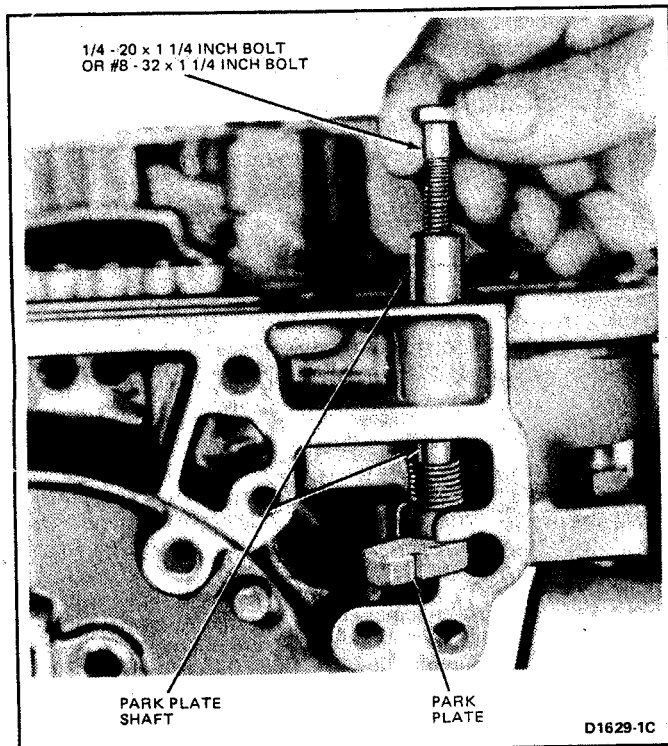


FIG. 33 Removing Park Plate

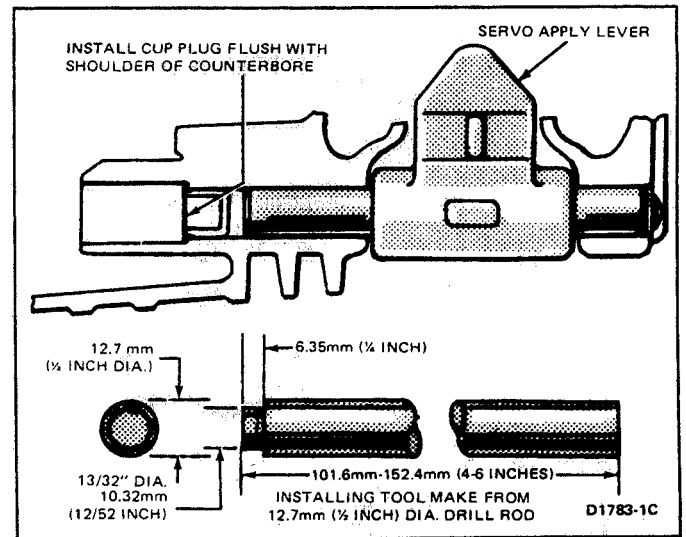


FIG. 34 Servo Apply Lever Installation

Front Pump

The front seal can be replaced after the pump has been installed on the transmission using T50T-100-A and TOOL-1175-AC for removal, and Tool T63L-77837-A for installation (Figs. 35 and 36).

Disassembly

- Remove the two seal rings and the selective thrust washer (Fig. 37).
- Remove the large square-cut seal from the outside diameter of the pump housing.
- Remove the five bolts that secure the stator support to the pump housing. Lift the support from the housing.
- Remove the drive and the driven gear from the housing.
- If the pump housing bushing is worn or damaged, replace it using the handle and Tool T66L-7003-C2 shown in Fig. 38.

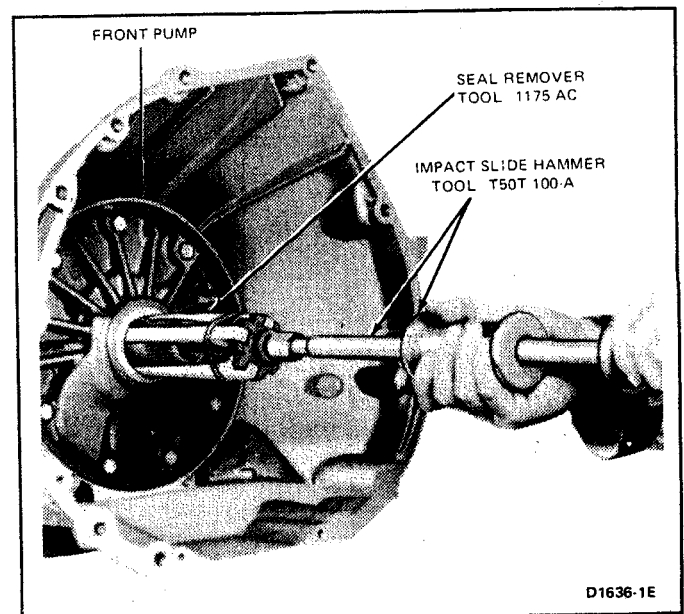


FIG. 35 Removing Front Pump Seal

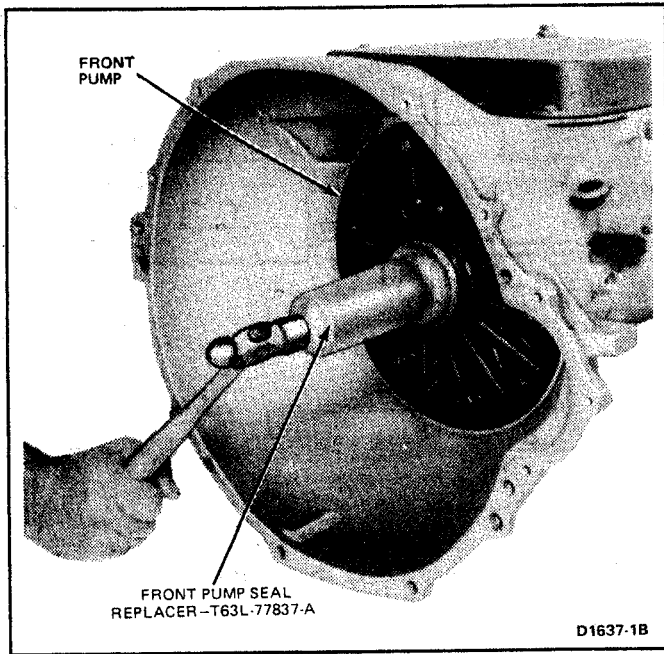


FIG. 36 Installing Front Pump Seal

Place the new bushing in position, making sure the half moon slot in the bushing is on top and in line with the oil lube hole near the seal bore. Press the bushing in 1.52-2.03mm (0.060-0.080 inch) below the front face of the bushing bore. Use Tool T66L-7003-C2 and handle to seat the bushing properly. After assembly, the half moon slot must be in past the lube hole to provide proper lubrication.

Assembly

1. Install the drive and driven gears in the pump housing. Each gear has either an identification mark or chamfered teeth on one face. The identification mark or the chamfered surface on each gear must be installed toward the front of the pump housing.
2. Position the stator support in the pump housing and install the five attaching bolts. Tighten bolts to 17-21 N·m (12-16 ft-lbs).

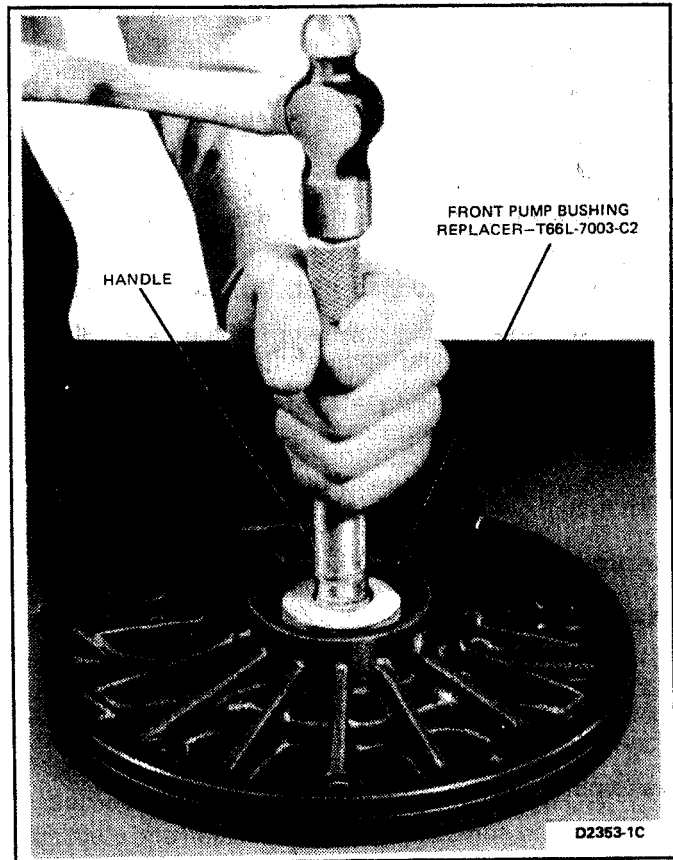


FIG. 38 Replacing Front Pump Housing Bushing

3. Carefully install two new seal rings on the stator support. Make sure that the ends of the rings are engaged to lock them in place. Install a new square-cut seal on the outside diameter of the pump housing.
4. Install the selective thrust washer. Make sure that the correct thickness selective washer is being used to obtain the specified end play. Refer to Specifications at end of this Section.
5. Place the pump on the converter, making sure that

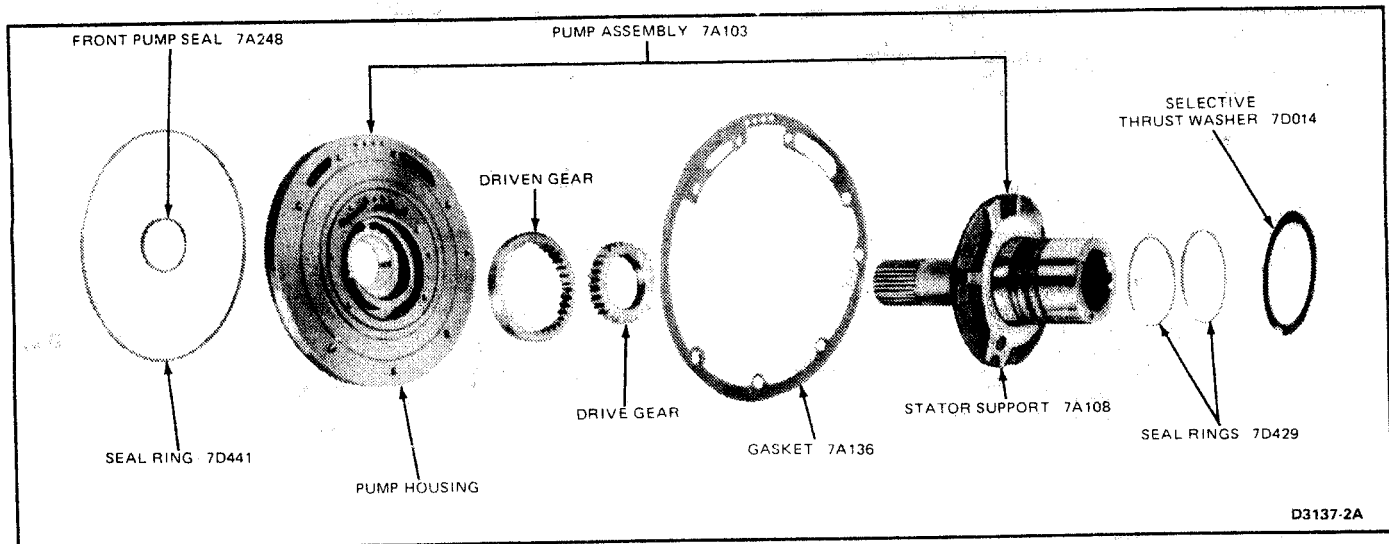


FIG. 37 Front Pump Disassembled

the drive gear engages the converter hub. Rotate the pump to make sure that the gears rotate freely.

Reverse-High Clutch

Disassembly

1. Separate the drive train as shown in Fig. 39. Remove the pressure plate snap ring as shown in Fig. 40.
2. Remove the pressure plate and the drive and driven (internal and external spline) clutch plates (Fig. 41).
3. Install Clutch Spring Compressor, Tool T65L-77515-A (Fig. 42) on the reverse-high clutch drum. Make sure that the legs clear the snap ring enough to remove it. Remove both snap rings and remove the tool.
4. Remove the spring retainer and the piston return springs.
5. Apply air pressure to the piston apply hole in the clutch hub using TOOL-7000-DE (Fig. 43) and remove the piston.
6. Remove the piston outer seal from the piston and the inner seal from the clutch drum (Fig. 41).
7. Remove the front and rear bushings from the clutch drum if they are worn or damaged. To remove the front bushing, use a cape chisel and cut along the bushing seam until the chisel breaks through the bushing wall. Pry the loose ends of the bushing up with an awl and remove the bushing. To remove the rear bushing, use Tool T69L-7D044-A shown in Fig. 44, and press the bushing from the drum.

Assembly

1. If the clutch drum bushings were removed, position the drum in a press and press new bushings into the drum with the Tool T69L-7D044-A shown in Figs. 44 and 45.
2. Dip the new seals in transmission fluid and install one on the drum and one on the piston.
3. Install the piston in the clutch drum.
4. Position the piston return springs in the piston sockets (Fig. 46). Place the spring retainer on the springs.
5. Install Clutch Spring Compressor, Tool T65L-77515-A (Fig. 42) and compress the springs. Make certain that the spring retainer is centered while compressing the springs. Install the snap ring. **Before releasing the pressure on the tool, make certain that the snap ring is positioned inside of the four snap ring guides on the spring retainer.**
6. Clutch plate usage varies with each model, refer to the specifications at end of this Section for the number of plates required. Dip the clutch plates in clean transmission fluid. Install the clutch plates alternately starting with a steel drive (internal) plate (Fig. 39). When new composition clutch plates are used, soak the plates in automatic transmission fluid, (Spec. ESP-M2C116-H) or equivalent, for 15 minutes before they are assembled.
7. After all clutch plates have been installed, position the pressure plate in the clutch drum. Install the pressure plate (selective) snap ring.
8. With a feeler gauge, check the clearance between the pressure plate and snap ring (Fig. 47).

9. The pressure plate should be held downward as the clearance is checked. The clearance should be 0.558-0.914mm (0.022-0.036 inch). If the clearance is not within specifications, selective thickness snap rings are available in the following thicknesses: 1.42-1.52mm (0.056-0.060 inch), 1.65-1.75mm (0.065-0.069 inch), 1.87-1.98mm (0.074-0.078 inch), 2.10-2.20mm (0.083-0.087 inch), 2.33-2.43mm (0.092-0.096 inch), 2.79-2.89mm (0.110-0.114 inch) and 3.25-3.35mm (0.128-0.132 inch). Install the correct size snap ring and re-check the clearance.

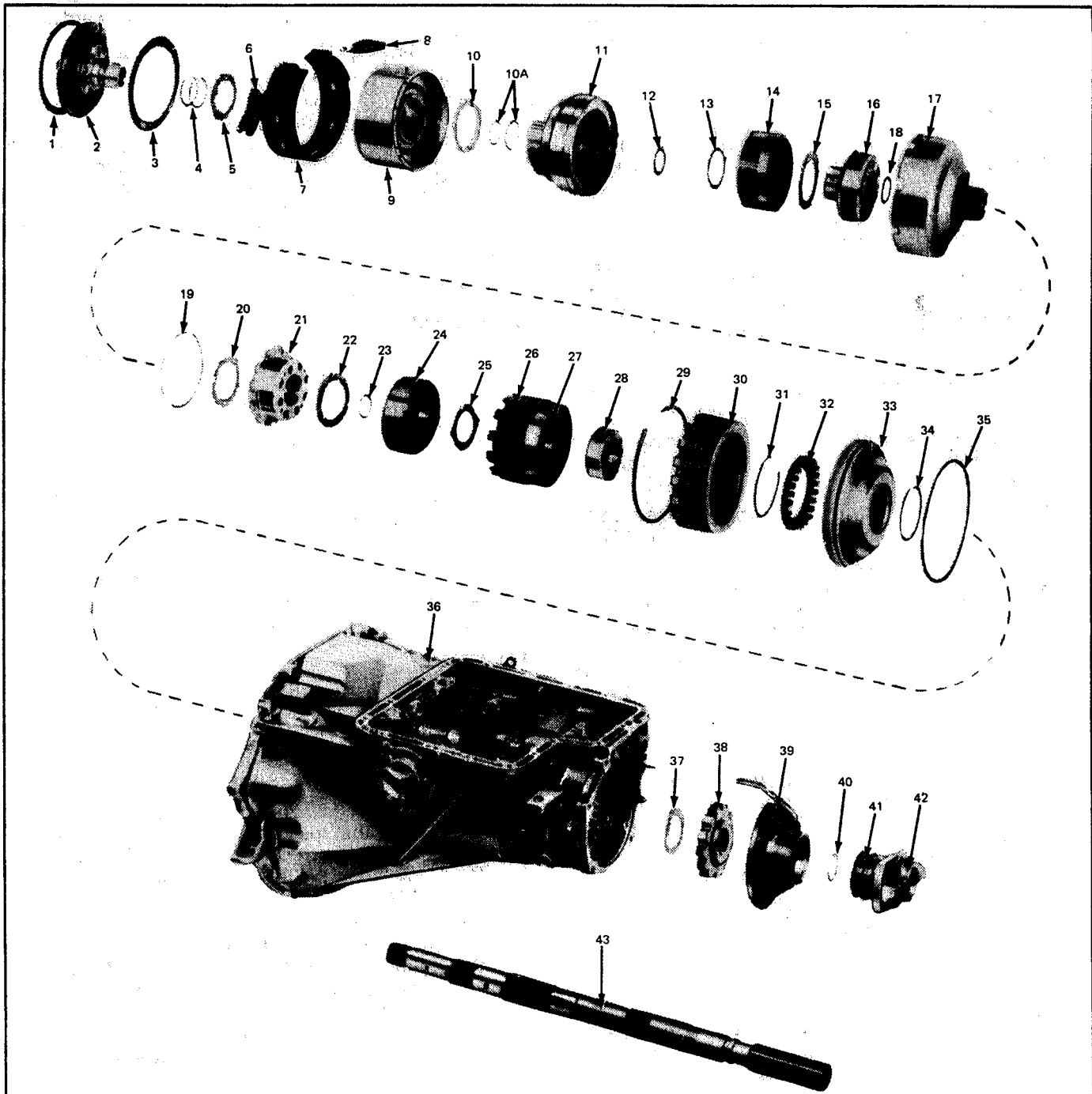
Forward Clutch

Disassembly

1. Remove the clutch pressure plate snap ring (Fig. 48).
2. Remove the rear pressure plate, the drive and driven plates, wave plate, and the forward pressure plate from the clutch hub (Fig. 49).
3. Remove the snap ring (Fig. 50) that secures the disc spring in the clutch cylinder. Remove the disc spring using Tool T65L-77515-A.
4. Apply air pressure to the clutch cylinder using TOOL-7000-DE (Fig. 51) to remove the piston.
5. Remove the seal from the piston and the seal from the clutch hub (Fig. 49).

Assembly

1. Dip two new seals in transmission fluid. Install the smaller seal on the clutch hub and the lip seal on the clutch piston.
2. Install the clutch piston and lip seal with Lip Seal Protector, T77L-77548-A, (Fig. 52).
3. Position the installation tool into the forward clutch cylinder, so that the bore of the tool is aligned with the piston bore in the cylinder. Press the piston into the cylinder until it bottoms in the bore. Remove the installation tool.
4. Make sure that the steel pressure ring is in the groove on the piston. **Position the disc spring in the cylinder with the dished face downward.** Install the spring as shown in Fig. 50 so that the pressure ring and spring are in contact. Secure the disc with the retaining snap ring.
5. Install the forward pressure plate with the flat side up and the beveled side downward. Dip the clutch plates in clean transmission fluid (Specification DEXRON® II Series D or equivalent). Next, install the wave plate, then a steel plate and a composition driven plate. Install the remaining plates in this sequence (Fig. 49).
Refer to the Specification at end of this Section for the number of plates required. The last plate installed will be the rear pressure plate. Install the snap ring and make certain that it seats fully in the groove.
6. With a feeler gauge, check the clearance between the snap ring and the pressure plate (Fig. 53). Downward pressure on the plate should be maintained when making this check. Clearance should be 0.533-1.168mm (0.021-0.046 inch).
7. If the clearance is not within specifications, selective snap rings are available in the following thicknesses: 1.42-1.52mm (0.056-0.060 inch), 1.65-



- 1. FRONT PUMP SEAL RING - 7D441
- 2. FRONT PUMP - 7A103
- 3. GASKET - 7A136
- 4. SEAL RINGS
- 5. NUMBER 1 THRUST WASHER (SELECTIVE)
- 6. STRUT INTERMEDIATE BRAKE BAND - 7D029
- 7. INTERMEDIATE BRAKE BAND ASSEMBLY - 7D029
- 8. STRUT INTERMEDIATE BRAKE BAND ANCHOR - 7D430
- 9. REVERSE HIGH CLUTCH ASSEMBLY
- 10. NUMBER 2 THRUST WASHER
- 10a. FORWARD CLUTCH SEAL RINGS

- 11. FORWARD CLUTCH ASSEMBLY
- 12. NUMBER 3 THRUST WASHER NEEDLE BEARING
- 13. NUMBER 4 THRUST WASHER
- 14. FORWARD PLANET RING AND HUB ASSEMBLY - 7D392
- 15. NUMBER 5 THRUST WASHER
- 16. FORWARD PLANET ASSEMBLY - 7A298
- 17. INPUT SHELL - 7D064 AND SUN GEAR ASSEMBLY - 7D063
- 18. NUMBER 6 THRUST WASHER NEEDLE BEARING
- 19. SNAP RING
- 20. NUMBER 7 THRUST WASHER
- 21. REVERSE PLANET ASSEMBLY 7D006

- 22. NUMBER 8 THRUST WASHER
- 23. REVERSE RING GEAR AND HUB RETAINING RING
- 24. REVERSE RING GEAR - 7A153 AND HUB - 7D164
- 25. NUMBER 9 THRUST WASHER
- 26. LOW-REVERSE CLUTCH HUB - 7B067
- 27. ONE-WAY CLUTCH - 7A089
- 28. ONE-WAY CLUTCH INNER RACE - 7D171
- 29. SNAP RING
- 30. LOW-REVERSE CLUTCH
- 31. SNAP RING

- 32. LOW-REVERSE PISTON RETURN SPRING AND RETAINER - 7D406
- 33. LOW-REVERSE PISTON - 7D402
- 34. INNER SEAL
- 35. OUTER SEAL
- 36. CASE - 7005
- 37. NUMBER 10 THRUST WASHER
- 38. PARKING GEAR - 7A233
- 39. GOVERNOR DISTRIBUTOR SLEEVE - 7C232
- 40. SNAP RING
- 41. GOVERNOR COLLECTOR - 7D220
- 42. GOVERNOR - 7C063
- 43. OUTPUT SHAFT - 7060

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FIG. 39 Drive Train Disassembled—Typical

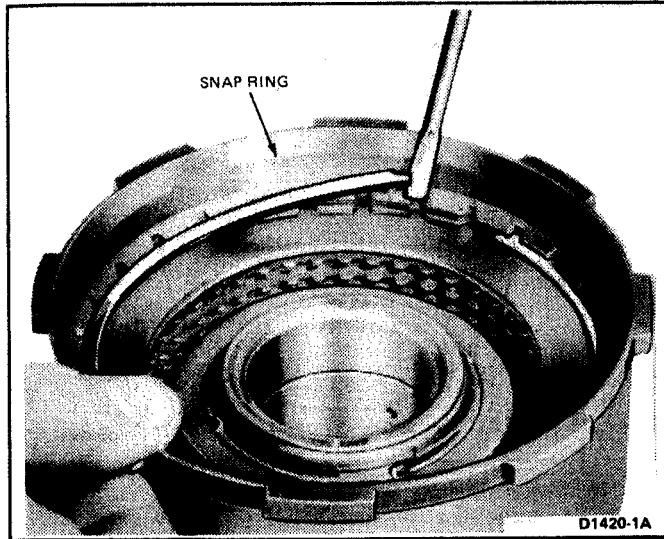


FIG. 40 Removing or Installing Reverse-High Clutch Pressure Plate Snap Ring

1.75mm (0.065-0.069 inch), 1.87-1.98mm (0.074-0.078 inch), 2.10-2.20mm (0.083-0.087 inch), 2.33-2.43mm (0.092-0.096 inch), 2.79-2.89mm (0.110-0.114 inch) and 3.25-3.35mm (0.128-0.132 inch). Insert the correct size snap ring and recheck the clearance.

Input Shell and Sun Gear

Disassembly

1. Remove the rear snap ring from the sun gear as shown in Fig. 54.
2. Remove the thrust washer wear plate from the input shell and sun gear (Fig. 55).
3. Working from inside the input shell remove the sun gear. Remove the snap ring from the gear.

Assembly

1. Install the forward snap ring on the forward end (short end) of the sun gear (Fig. 55). Working from inside the input shell, slide the sun gear and snap ring into place making sure that the longer end is at the rear (Fig. 55).
2. Place the thrust washer wear plate on the sun gear and install the rear snap ring.

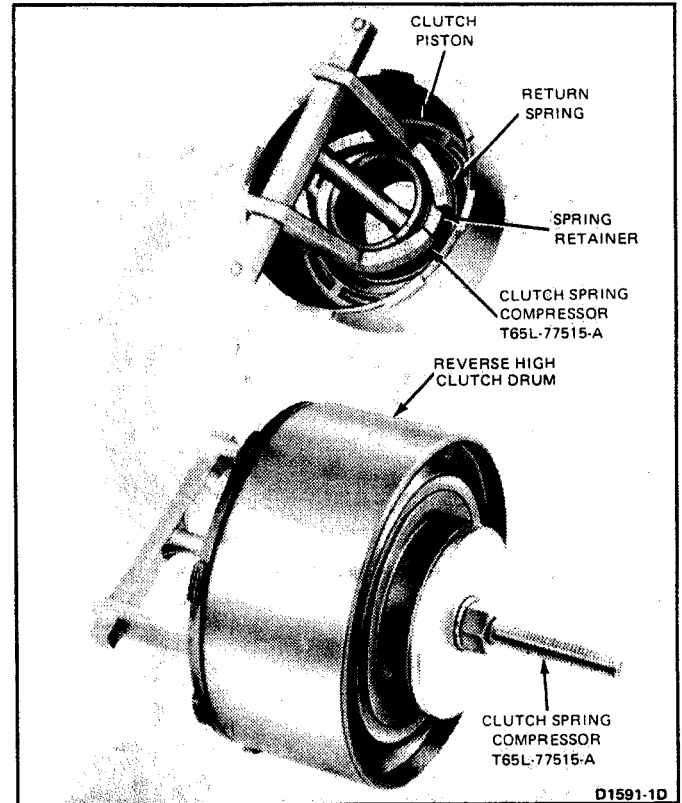


FIG. 42 Removing or Installing Reverse-High Clutch Piston Snap Ring

Output Shaft Hub and Ring Gear

Disassembly

1. Remove the hub snap ring (Fig. 56) from the ring gear.
2. Lift the hub from the ring gear.

Assembly

1. Position the hub in the ring gear.
2. Secure the hub with the snap ring. Make certain that the snap ring is fully engaged with the groove.

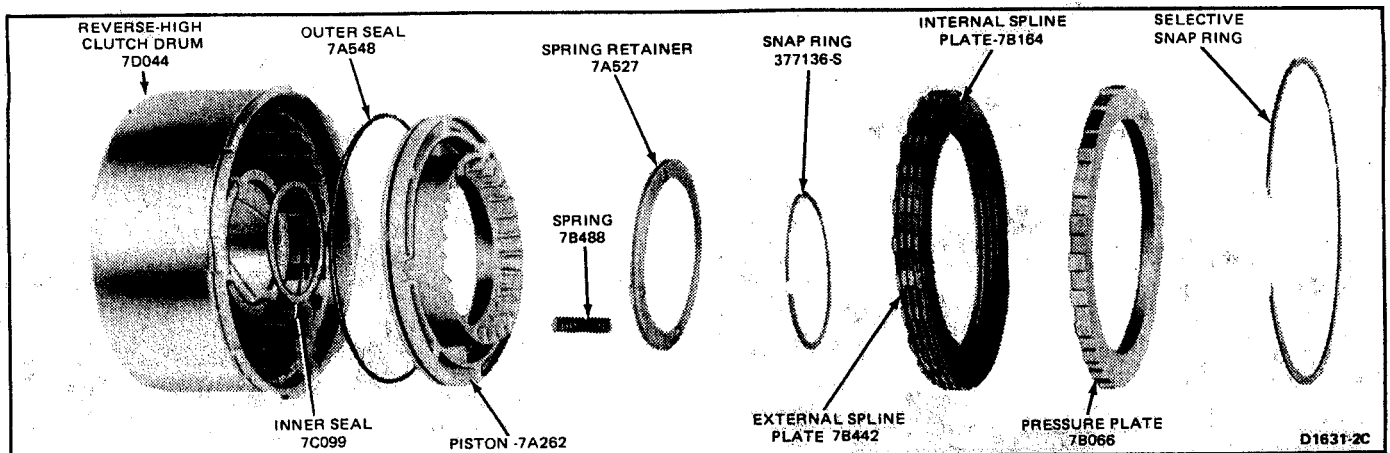


FIG. 41 Reverse-High Clutch Disassembled

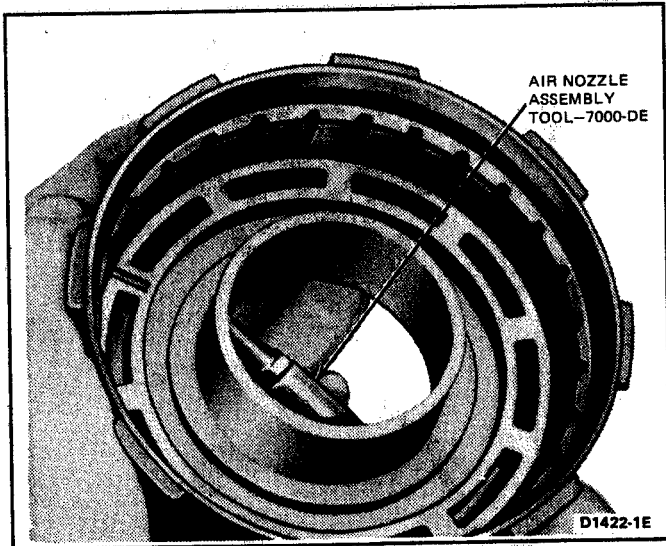


FIG. 43 Removing Reverse-High Clutch Piston

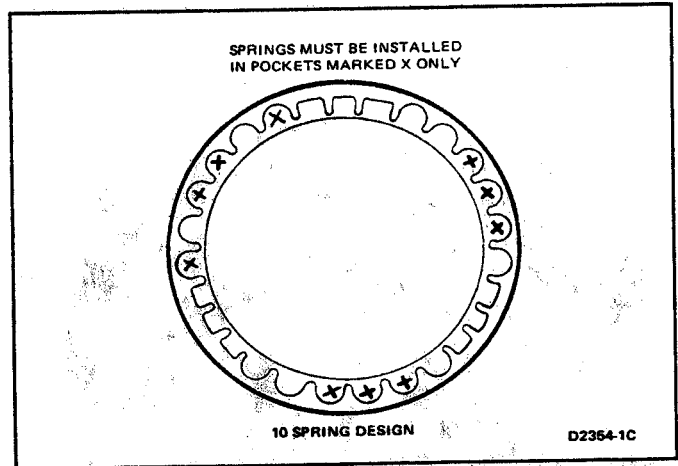


FIG. 46 Reverse-High Clutch Piston Return Spring Locations

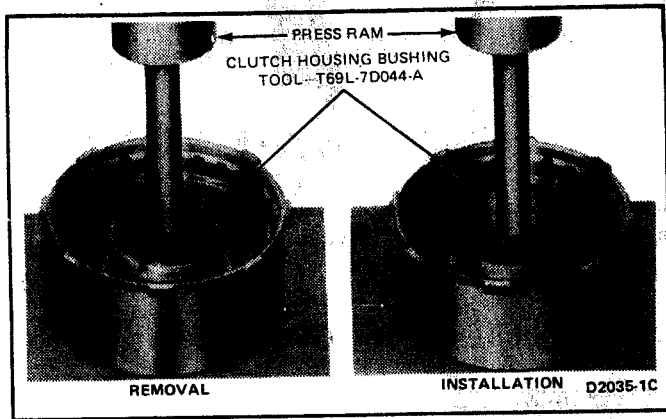


FIG. 44 Replacing Reverse-High Clutch Rear Bushing

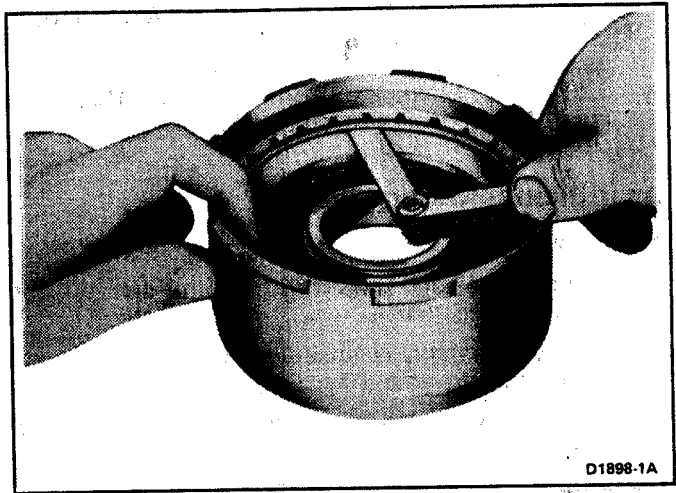


FIG. 47 Checking Reverse-High Clutch Snap Ring Clearance

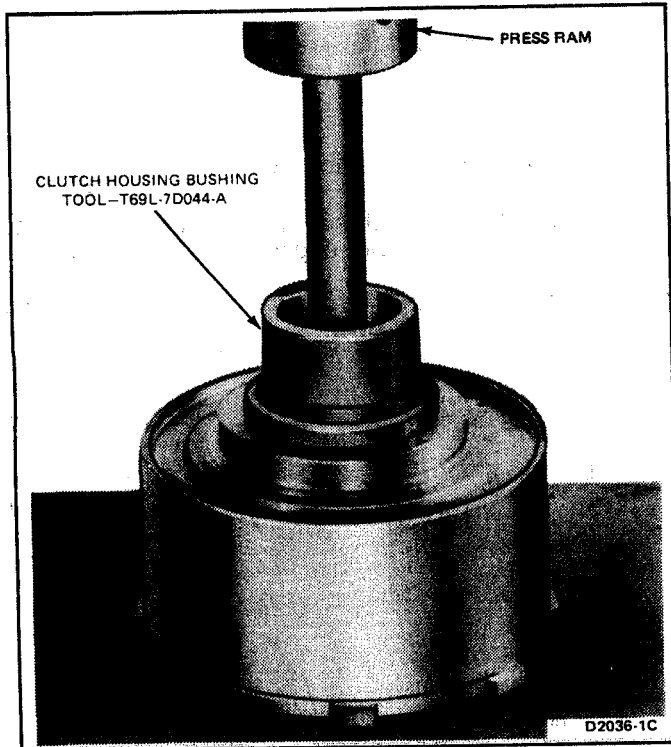


FIG. 45 Installing Reverse-High Clutch Front Bushing

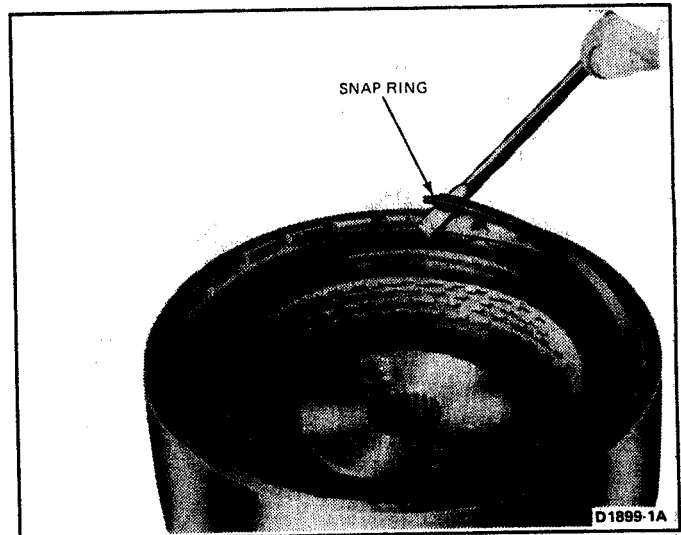


FIG. 48 Removing Forward Clutch Pressure Plate Snap Ring

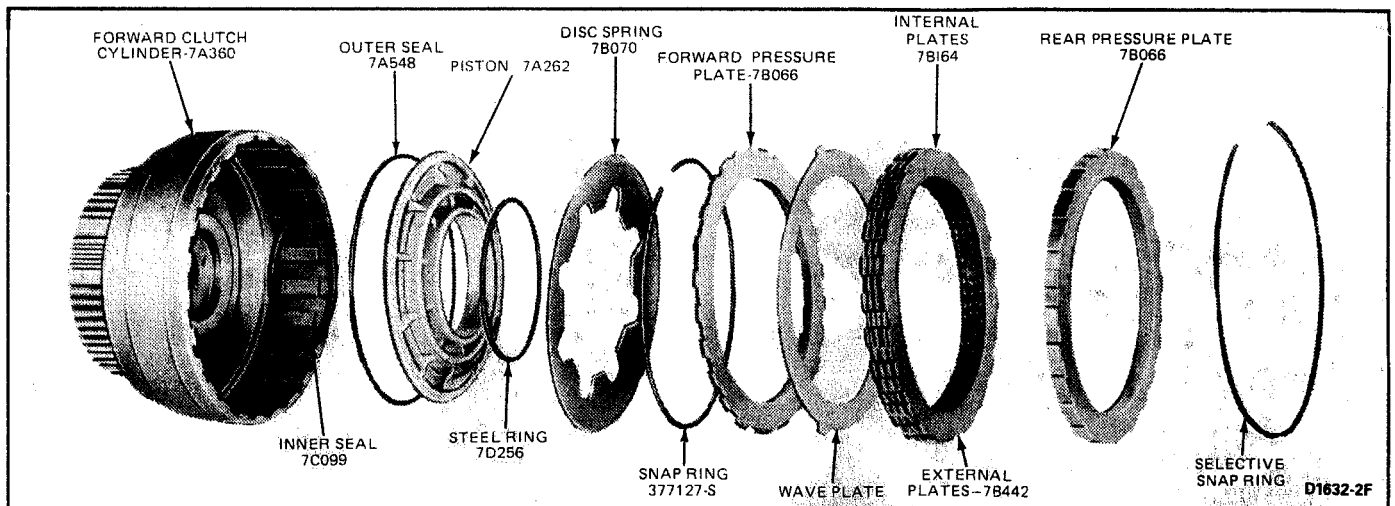


FIG. 49 Forward Clutch Disassembled

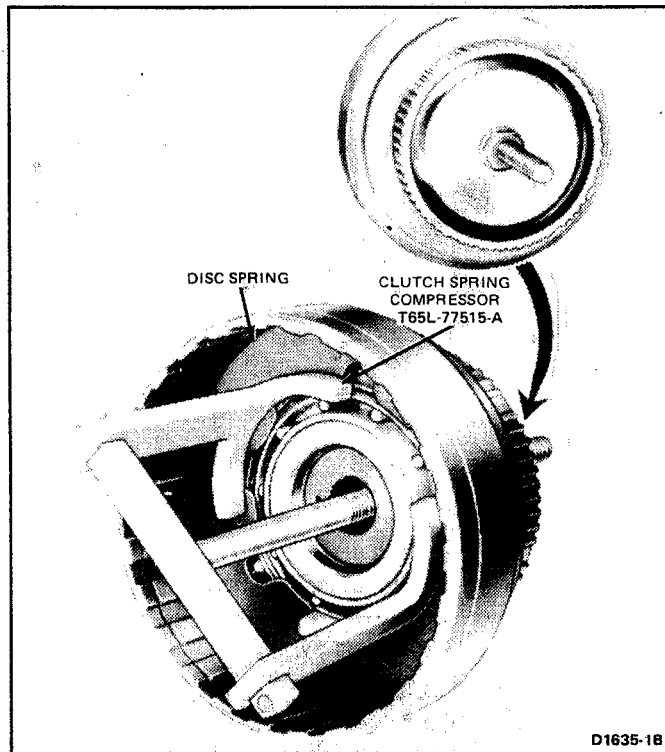


FIG. 50 Removing or Installing Disc Spring

One-Way Clutch

Disassembly

1. Remove the snap ring and bushing from the rear of the low-reverse clutch hub (Fig. 57).
2. Remove the rollers from the spring assembly and lift the spring assembly from the hub.
3. Remove the remaining snap ring from the hub.

Assembly

1. Install a snap ring in the forward snap ring groove of the low-reverse clutch hub.
2. Place the low-reverse clutch hub on the bench with the forward end down (Fig. 58).
3. Install the one-way clutch spring assembly on top of the snap ring.

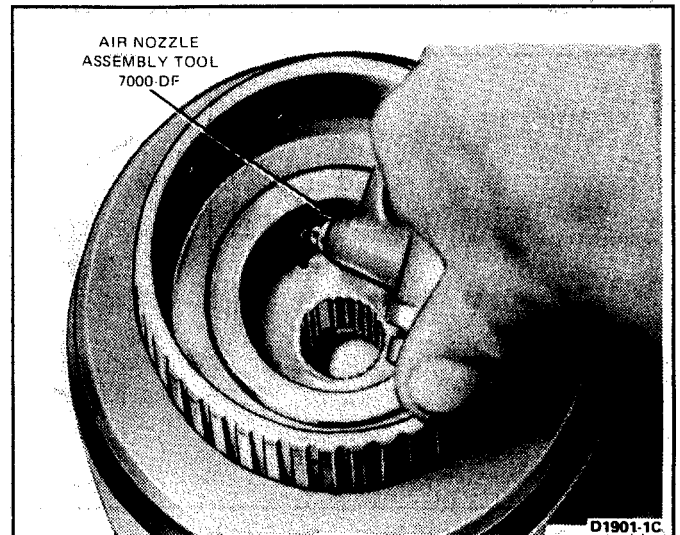


FIG. 51 Removing Forward Clutch Piston



FIG. 52 Installing Forward Clutch Piston and Lip Seal

4. Install a roller into each of the spring assembly compartments (Fig. 57).
5. Install the bushing on top of the spring assembly.

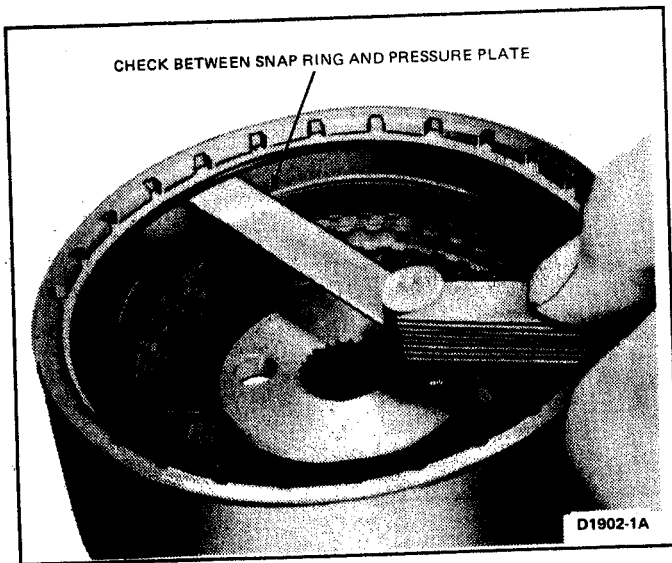


FIG. 53 Checking Forward Clutch Clearance

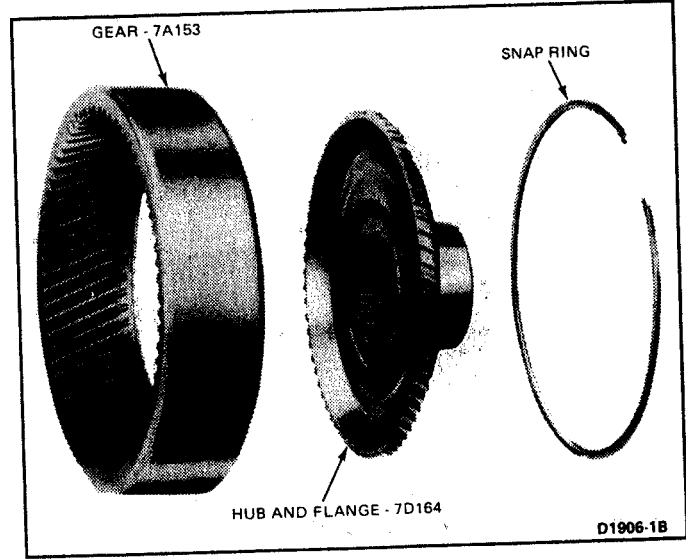


FIG. 56 Output Shaft Hub and Ring Gear

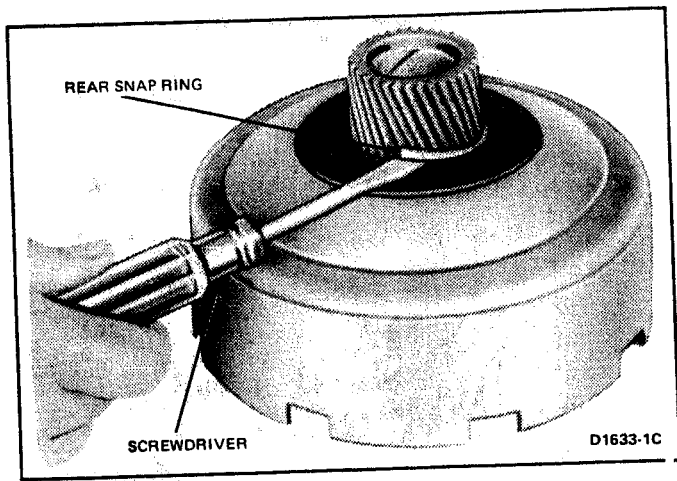


FIG. 54 Removing Sun Gear Snap Ring

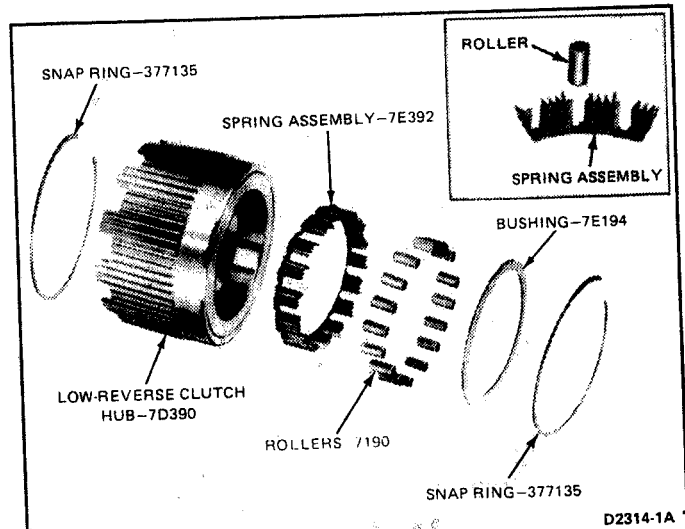


FIG. 57 One-Way Clutch Disassembled

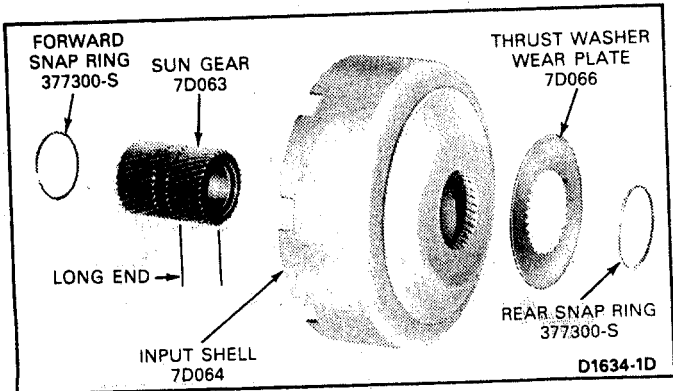


FIG. 55 Input Shell and Sun Gear Disassembled

6. Install the remaining snap ring at the rear of the low-reverse clutch hub to secure the assembly (Fig. 57).

Low-Reverse Clutch Piston

Disassembly

1. Remove the inner and the outer seal from the low-reverse clutch piston (Fig. 39).

Assembly

1. Dip the two new seals in clean transmission fluid.

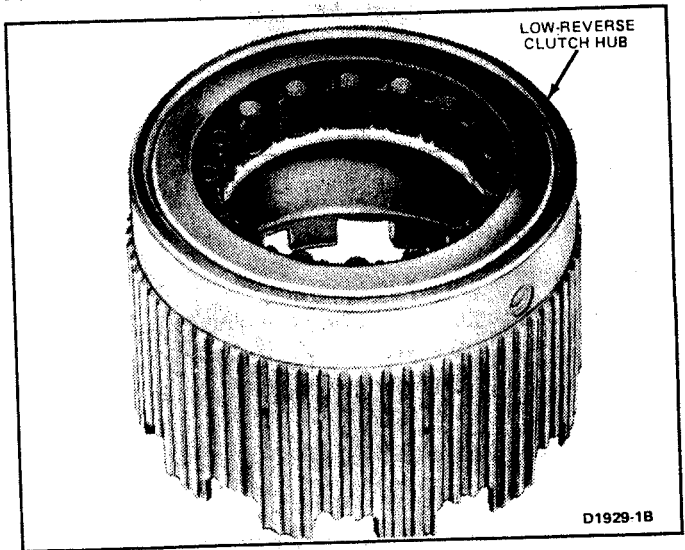


FIG. 58 One-Way Clutch Installed

2. Install the seals on the piston.

SPECIFICATIONS

C6 — TRANSMISSION REFILL CAPACITY

Vehicle	U.S. Quarts	Capacity Imperial Quarts	Liters
F-150 — F-350 (4 x 2), E-150 — E-350	11-3/4	9.4	11.2
F-150 — F-350 (4 x 4), Bronco	13-1/2	10.8	12.7

Use fluid meeting Ford Specification ESP-M2C138-CJ, DEXRON® II, Series D or equivalent.

SELECTIVE THRUST WASHERS (FRONT PUMP SUPPORT)

Identification Color	Thickness	
	MM	Inch
Blue	1.42-1.52	0.056-0.060
Natural (White)	1.85-1.95	0.073-0.077
Red	2.23-2.33	0.088-0.092

TRANSMISSION CLUTCH PLATE USAGE

Transmission Model	Steel	Friction	Clearance	
			MM	Inch
Forward Clutch				
PGD, PJD	4①	4	0.533-1.168	0.021-0.046
High Clutch				
PGD, PJD	3	3	0.558-0.914	0.022-0.036
Reverse Clutch				
PJD	5②	5	—	—
PGD	4②	4	—	—

- ① Plus a waved plate (7E457) next to inner pressure plate.
- ② Plus a waved plate next to the piston.

CLUTCH SNAP RINGS

Part Number	Thickness		Forward	High
	MM	Inch		
377434	1.52-1.42	0.060-0.056	X	X
377126	1.75-1.62	0.069-0.064		X
377127	1.98-1.87	0.078-0.074	X	X
377128	2.20-2.10	0.087-0.083		X
377444	2.43-2.33	0.096-0.092	X	X
386841	2.89-2.79	0.114-0.110	X	
386842	3.35-3.25	0.132-0.128	X	

CHECKS AND ADJUSTMENTS

Operation	Specification
Transmission End Play	0.203-1.117 mm. (0.008-0.044 inch) (Selective Thrust Washers Available)
Torque Converter End Play	New or rebuilt 0.533 mm. (0.021 inch) max. Used 1.016 mm. (0.040 inch) max. ①
Intermediate Band Adjustment	Remove and discard locknut. Install new locknut. Adjust screw to 14 N·m (10 ft-lbs) torque, then back off 1-1/2 turns. Hold screw and tighten locknut to 54 N·m (40 ft-lbs)
Forward Clutch Pressure Plate-to-Snap Ring Clearance	0.533-1.168 mm. (0.021-0.046 inch)
VRV to Transmission Vacuum Diaphragm — 6.9L Diesel	6.9 in Hg Vacuum with gauge block in place. See adjustment procedure.

Selection Snap Ring Thickness	1.42-1.52 mm. (0.056-0.060 inch) 1.62-1.75 mm. (0.064-0.069 inch) 1.87-1.98 mm. (0.074-0.078 inch) 2.10-2.20 mm. (0.083-0.087 inch) 2.33-2.43 mm. (0.092-0.096 inch) 2.79-2.89 mm. (0.110-0.114) 3.25-3.35 mm. (0.128-0.132 inch)
Reverse-High Clutch Pressure Plate-to-Snap Ring Clearance	0.558-0.914 mm. (0.022-0.036 inch)
Selective Snap Ring Thickness	1.42-1.52 mm. (0.056-0.060 inch) 1.62-1.75 mm. (0.064-0.069 inch) 1.87-1.98 mm. (0.074-0.078 inch) 2.10-2.20 mm. (0.083-0.087 inch) 2.33-2.43 mm. (0.092-0.096 inch) 2.79-2.89 mm. (0.110-0.114 inch) 3.25-3.35 mm. (0.128-0.132 inch)

- ① To check end play, exert force on checking tool to compress turbine to cover thrust washer wear plate. Set indicator at zero.

TORQUE LIMITS				Item	(ft-lbs)	N-m	(ft-lbs)	N-m
Converter to Flywheel	20-34	28-45	Converter Drain Plug	8-28	11-37			
Front Pump to Transmission Case	16-30	22-40	Manual Valve Inner Lever to Shaft	30-40	41-54			
Overrunning Clutch Race to Case	18-25	25-33	Downshift Lever to Shaft	12-16	17-21			
Oil Pan to Case	8-12	11-16	Filler Tube to Engine (Econoline-5.0L/5.8L/7.5L)	40-50	54-67			
Stator Support to Pump	12-16	17-21	Filler Tube to Engine (Econoline 4.9L)	33-42	44-56			
Converter Cover to Converter Housing	12-16	17-21	Filler Tube to Engine (Econoline 6.9L)	24-35	32-47			
Guide Plate to Case	12-16	17-21	Transmission to Engine (Diesel Only)	50-65	67-87			
Intermediate Servo Cover to Case	14-20	19-27	Transmission to Engine (All Gasoline Engines)	40-50	55-67			
Diaphragm Assy. to Case	12-16	17-21	Rear Engine Support to Transmission	60-80	80-107			
Distributor Sleeve to Case	12-16	17-21	Rear Engine Support to Transmission	6-12	8.5-16			
Extension Assy. to Transmission Case	25-35	34-47	Plug Case — Throttle Pressure					
Plug — Case Front Pump or Line Pressure	6-12	8.5-16	5/16" Fitting — Cooler Line Connector to Case — Front and Rear (Case Fitting)	18-23	25-32			
Pressure Gauge Tap	6-12	8.5-16	5/16" Tube Nut — Cooler Line to Trans. Case Fitting	12-18	17-24			
Band Adj. Screw Locknut to Case	35-45	48-61				(in-lb)	N-m	
	20-45	2.5-5	Reinforcing Right Side Plate to Lower Body	20-45	2.5-5			
End Plates to Body	20-40	2.5-4.5	Converter Hsg. Cover to Converter Hsg. (7.5L)	30-60	3.5-6.5			
End Plates to Body	20-45	2.5-5	Control Assy. to Case	95-125	11-14			
Inner Downshift Lever Stop	20-45	2.5-5	Gov. Body to Collector Body	90-120	10.5-13.5			
Reinforcement Plate to Body	40-55	5-6.2	Detent Spring to Case	80-120	9.5-13.5			
Screen and Lower to Upper Valve Body	20-45	2.5-5	Rear Engine Support to Frame	40-60	5-6.5			
Shift Valve Plate to Upper Body	40-55	5-6.2	Neutral Switch to Case	55-75	6.5-8			
Upper to Lower Body	75-90	8-10.5						
VRV to Fuel Injector Pump								

CD4721-2B

SPECIAL SERVICE TOOLS

Number	Description
T50T-100-A	Impact Slide Hammer
T59L-100-B	Impact Slide Hammer
T58L-101-A	Puller Attachment
T57L-500-B	Bench Mounted Holding Fixture
TOOL-1175-AC	Seal Remover
TOOL-4201-C	Dial Indicator With Bracketry
TOOL-7000-DD	Rubber Tip For Air Nozzle
TOOL-7000-DE	Air Nozzle Assembly
T66L-7003-C2	Front Pump Bushing Replacer
T67P-7341-A	Shift Linkage Insulator Tool
T84P-7341-A	Shift Linkage Grommet Remover (In-Vehicle)
T84P-7341-B	Shift Linkage Grommet Remover (In-Vehicle)
T61L-7657-B	Extension Housing Seal Replacer
T77L-7697-C	Extension Housing Bushing Replacer
T77L-7697-D	Extension Housing Bushing Remover
T76L-7902-C	Converter Clutch Torquing Tool
T80L-7902-A	End Play Checking Tool
T77L-7902-A	Converter Clutch Holding Tool
T73P-77060-A	Output Shaft Retainer Pliers
TOOL-77288	Shift Lever Seal Replacer
T71P-77370-A	Band Adjustment Torque Wrench Set
T65L-77515-A	Clutch Spring Compressor
T77L-77548-A	Lip Seal Protector
T63L-77837-A	Front Pump Seal Replacer
T83T-7B200-AH	VRV Gage Block
T69L-7D044-A	Clutch Housing Bushing Tool

CD3139-1E

ROTUNDA EQUIPMENT

Model No.	Description
014-00106	Engine/Transmission Stand

CD4912-1B