Section 5. DISASSEMBLY OF TRANSMISSION

5-1. SCOPE

The procedures of this section describe the disassembly of the TT, TTB, TRT 2001 Series transmissions into subassemblies. Disassembly of the subassemblies is described in Section 6. Refer to the cross sections (foldouts 1 through 5) for the functional location of parts. Refer to the exploded views (foldouts 6 through 18) for parts identification.

5-2. PREPARATION FOR DISASSEMBLY

a. General Information. Refer to Sections 4 and 8 for general disassembly information as follows:

Paragraph	Title
4-3	Tools, Equipment
4-4	Replacement Parts
4-5	Careful Handling
4-6	Cleaning, Inspection
4-9	Tight-fit Flanges
8-1	Wear Limits Data
8-2	Spring Data

b. Lifting, Handling. All Allison Twin-Turbine transmissions have two 3/4-10 tapped holes in the top of the transmission housing. Eye bolts may be installed into these holes to provide a means of supporting or positioning the transmission housing during disassembly (fig. 5-1).

5-3. SERVICING OF VEHICLE-MOUNTED TRANSMISSION

a. Some Servicing Without Removal. The TT, TTB, and TRT Series transmissions are designed so many service operations may be accomplished without removing the transmission from the vehicle. The disassembly procedures in the manual, however, relate to operations with the transmission removed.

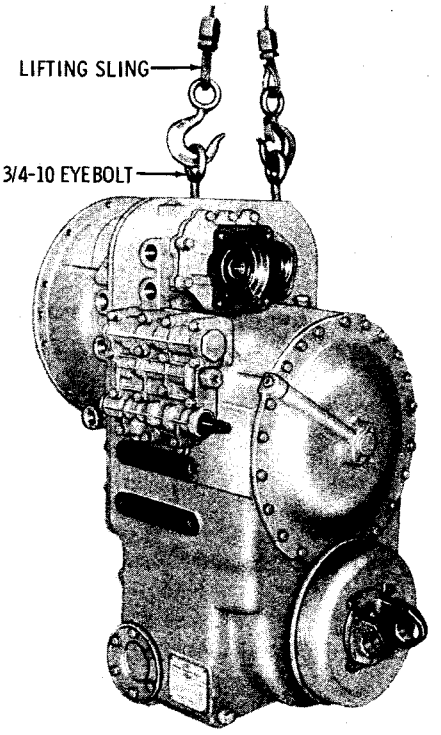


Fig. 5-1. Lifting transmission

b. Accessibility. Accessibility of the transmission in the vehicle, the nature of the service required, and other factors will determine the advisability of performing major operations without removing the transmission. Procedures for disassembly are essentially the same, but the position of the transmission may cause some inconvenience at times. In general, if the construction of the vehicle provides room, all external subassemblies and all components which can be removed from the rear of the transmission may be serviced.

5-4. REMOVAL OF EXTERIOR COMPONENTS (all models)

a. External Thermostat. If present, remove external thermostat assembly 31 (foldout 7, B). If rebuild is necessary, follow the instructions with the new external thermostat kit.

b. Oil Pump Drive Coupling. If the transmission is equipped with adapter drive coupling 18 (foldout 18,A), remove the coupling.

c. Oil Strainer Assembly.

(1) -1 Models. Remove the oil drain plug. Remove the six bolts and lockwashers that retain the oil strainer assembly (fig. 5-2). Remove the oil strainer and gasket.

(2) -3 Models. Remove the oil drain plug. Remove two bolts and lockwashers which retain the strainer cover. Remove the cover and sealring (fig. 5-3). Remove the strainer.

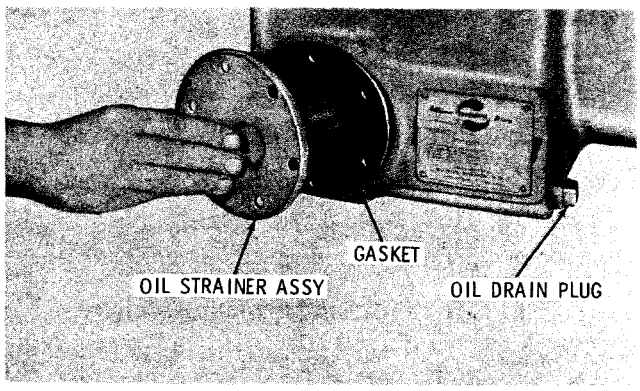


Fig. 5-2. Removing oil strainer and gasket (-1 models)

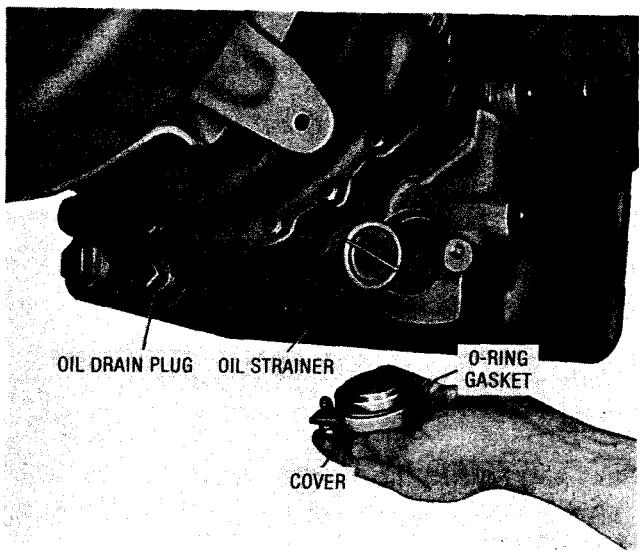


Fig. 5-3. Removing oil strainer and gasket (-3 models)

d. Output Flanges, Parking Brake

(1) Depending on the model, the rear output flange may be in a position behind or in front of the parking brake. If the flange is behind the brake, remove the attaching hardware and flange.

(2) Remove the four (fig. 5-4) or eight (fig. 5-5) self-locking bolts that retain the parking brake drum. Remove the drum.

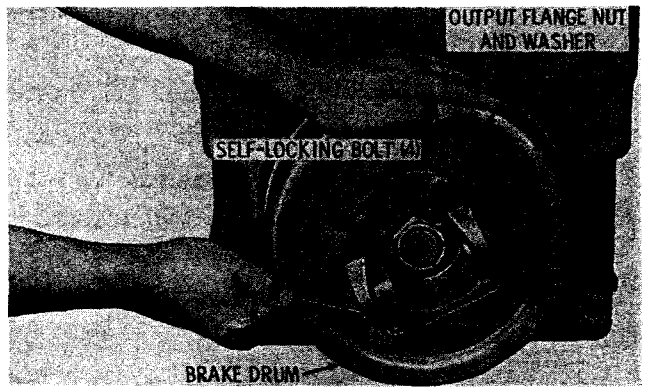


Fig. 5-4. Removing parking brake drum bolts (-1 models)

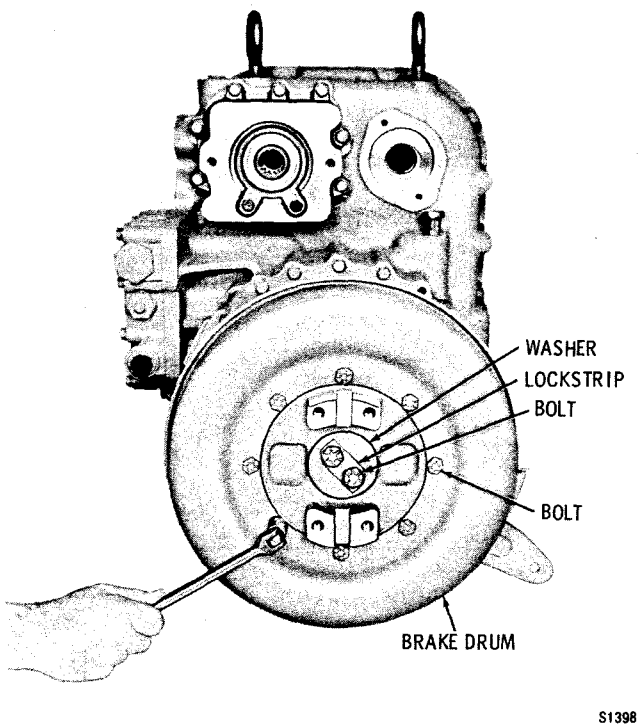


Fig. 5-5. Removing parking brake drum bolts (-3 models)

(3) If the output flange has not yet been removed, remove the attaching hardware and flange (fig. 5-6).

(4) If the model is equipped with a front output flange, remove the attaching hardware and flange.

(5) If present, remove sealrings 3 and 37 (foldout 17,A).

(6) Remove brake shoe return springs 5 or 16 (foldout 17,B) and brake shoes and linings 4 or 15, roller 3 or 14, and cam lever 6 or 17. Remove four self-locking bolts 7 or three bolts 20 and lockwashers 21 and remove brake backplate 2, 8, or 13. Refer to figure 5-7. Remove spacer 33 (foldout 17,A), if present, from the output shaft.

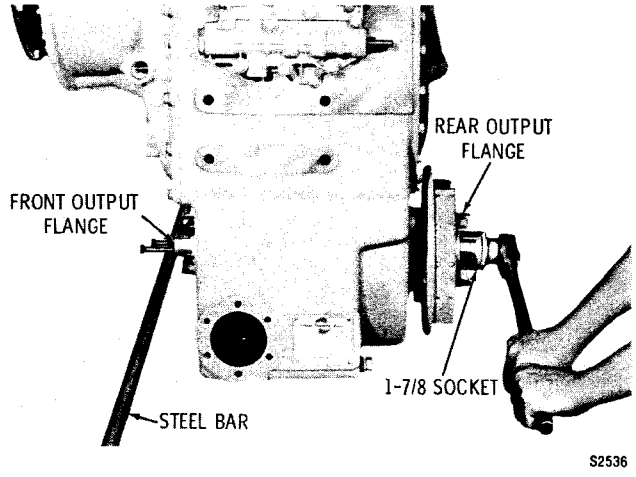


Fig. 5-6. Removing rear output flange nut

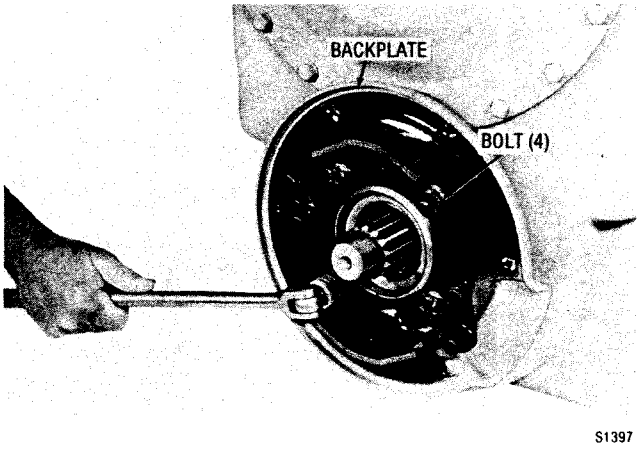


Fig. 5-7. Removing parking brake backplate bolts (-1 models)

e. Control Valve Assembly

(1) Remove fifteen 2-1/2 inch bolts and lockwashers and one hidden 1-inch bolt and lockwasher that attach the control valve body to the transmission housing (fig. 5-8).

(2) If present, remove bracket 28 (foldout 18,B).

(3) Remove the control valve body and gasket (fig. 5-9). Refer to paragraph 6-3 for the control valve assembly rebuild instructions.

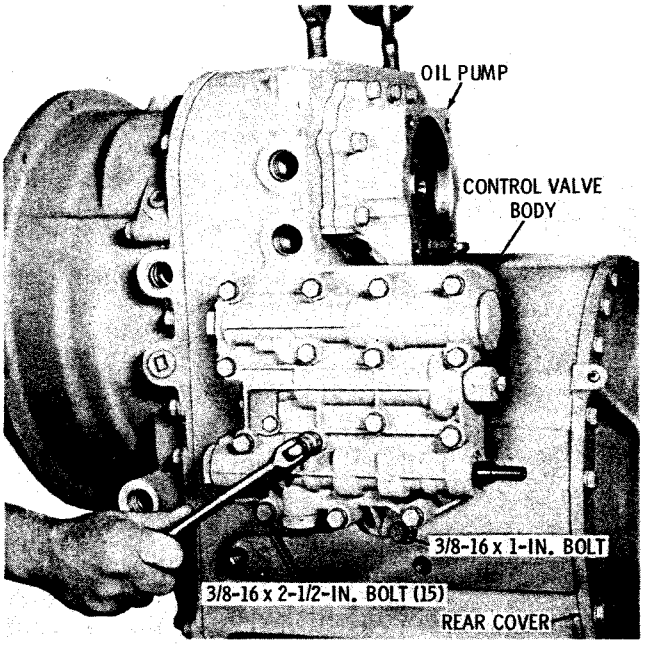


Fig. 5-8. Removing valve body bolts

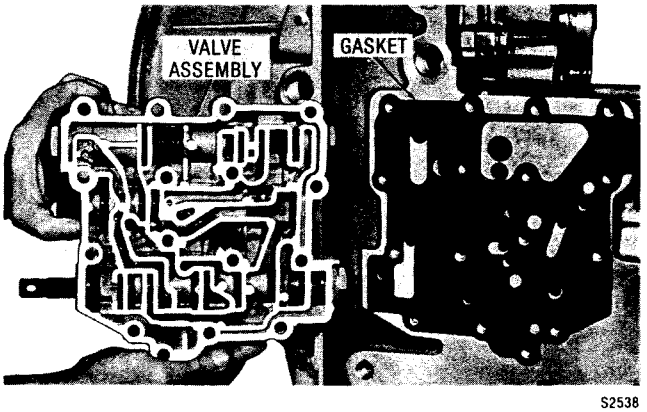


Fig. 5-9. Removing valve body and gasket

5-5. REMOVAL OF INPUT COMPONENTS

NOTE

Position the transmission on its rear surface. Do not allow the transmission to rest on the speedometer drive assembly, if present, or the output shaft.

For direct-mount models with flex disk, proceed to paragraph 5-5a. For direct-mount models with drive ring, proceed to paragraph 5-5b. For remote-mount models, proceed to paragraph 5-5c.

a. Direct Mount (flex disk)

(1) Remove the six self-locking bolts and plate that retain the flex disk assembly (fig. 5-10).

(2) Remove the flex disk plate and flex disk assembly consisting of three flex disks and a disk and washer assembly (fig. 5-10). If present, remove plates 2 and 4 (foldout 6,B).

(3) Remove the twenty-four self-locking nuts that retain the torque converter drive cover (fig. 5-11).

(4) Attach a sling and remove torque converter drive cover (fig. 5-12). Ball bearing 1 (foldout 7,A) may remain in the torque converter drive cover; if so, remove the bearing.

(5) Proceed to paragraph 5-6.

b. Direct Mount (drive ring)

(1) Remove sealring 10 (foldout 6,B) and twenty-four self-locking nuts 11 from torque converter drive cover 12. Remove the torque converter drive cover. Ball bearing 1 (foldout 7,A) may remain in the cover; if so, remove the bearing.

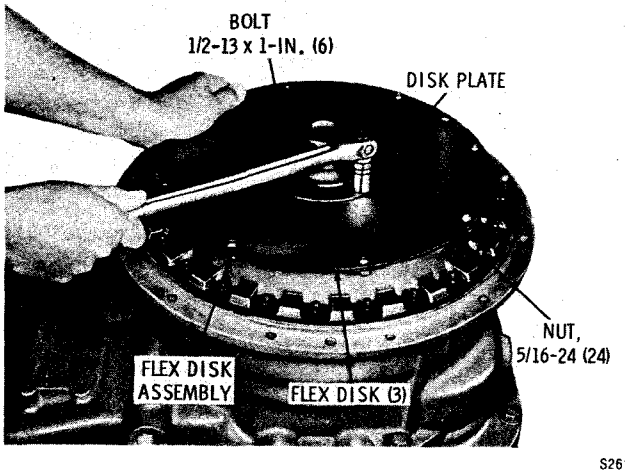


Fig. 5-10. Removing flex disk bolts

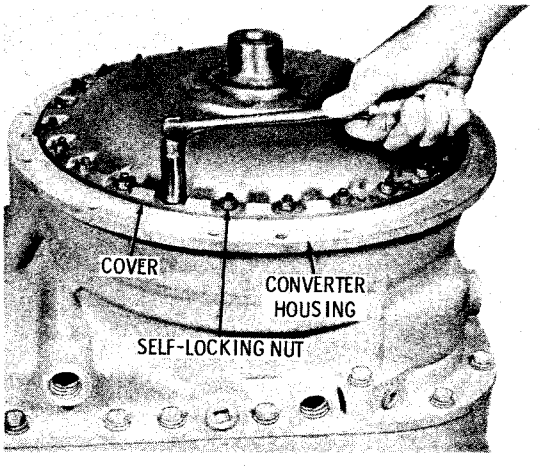


Fig. 5-11. Removing torque converter drive cover nuts

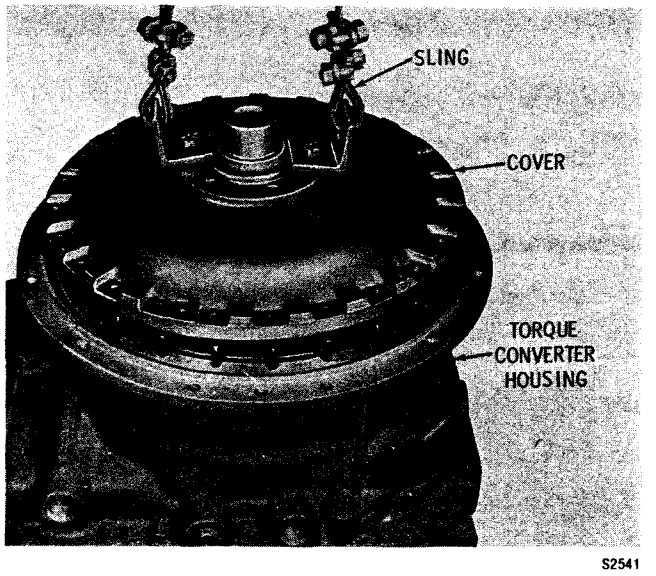


Fig. 5-12. Removing torque converter drive cover

(2) Converter drive ring 8 (foldout 6,B) and eight twelve-point bolts 9 will remain with the engine. Remove the bolts and drive ring only if necessary.

(3) Proceed to paragraph 5-6.

c. Remote Mount

(1) Remove the attaching hardware and input flange. If present, remove sealring 3 (foldout 6,A) from the shaft.

(2) Remove twelve bolts 12 (foldout 6,A), nuts 22, and lockwashers 21, and remove transmission front cover 13 and gasket 14. Refer to paragraph 6-4 for the front cover rebuild instructions.

(3) Remove the twenty-four self-locking nuts 19 (foldout 6,A) that retain torque converter drive cover 20 or 24. Remove the torque converter drive cover and attached input shaft 18 or 23 and bearing 15, as an assembly. Refer to paragraph 6-5 for the torque converter drive cover rebuild instructions.

5-6. REMOVAL OF TORQUE CONVERTER COMPONENTS AND HOUSING

a. Torque Converter Components

(1) Using two screwdrivers, and lifting straight upward, remove the first- and second-turbine assembly (fig. 5-13). Do not disassemble this unit unless necessary. If necessary, refer to paragraph 6-6 for turbine assembly rebuild instructions. Remove the sealring, if present, from the torque converter pump assembly.

(2) Remove the snapring that retains the converter stator and remove the stator from the converter ground sleeve (fig. 5-14).

(3) Remove the stator spacer from the converter ground sleeve (fig. 5-15).

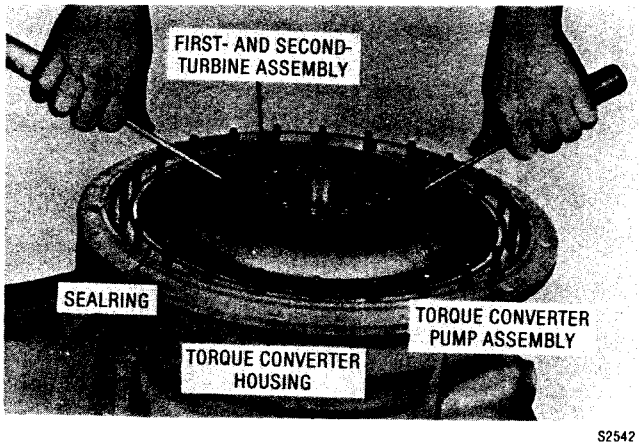


Fig. 5-13. Removing first- and second-turbine assembly

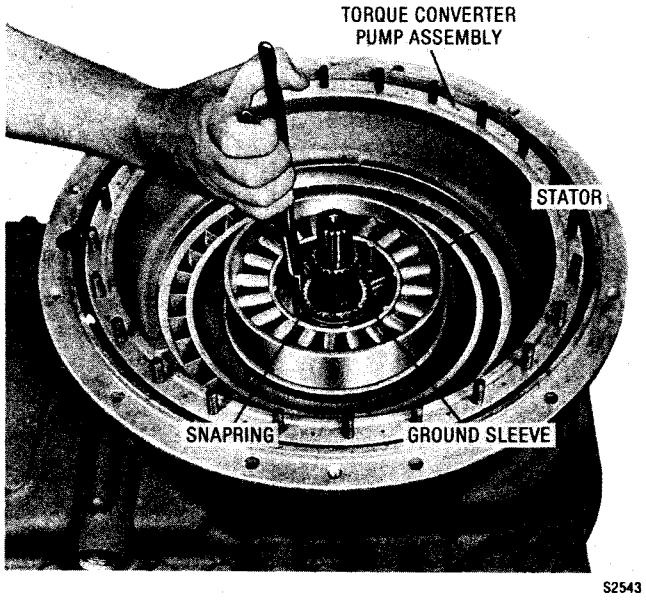


Fig. 5-14. Removing stator snapring

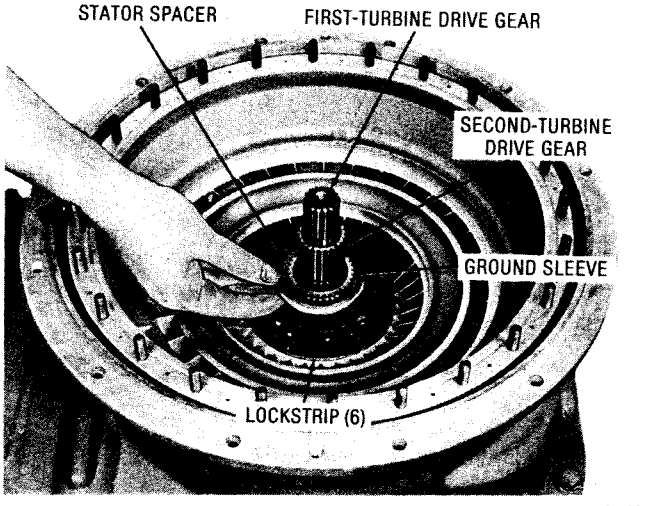


Fig. 5-15. Removing stator spacer

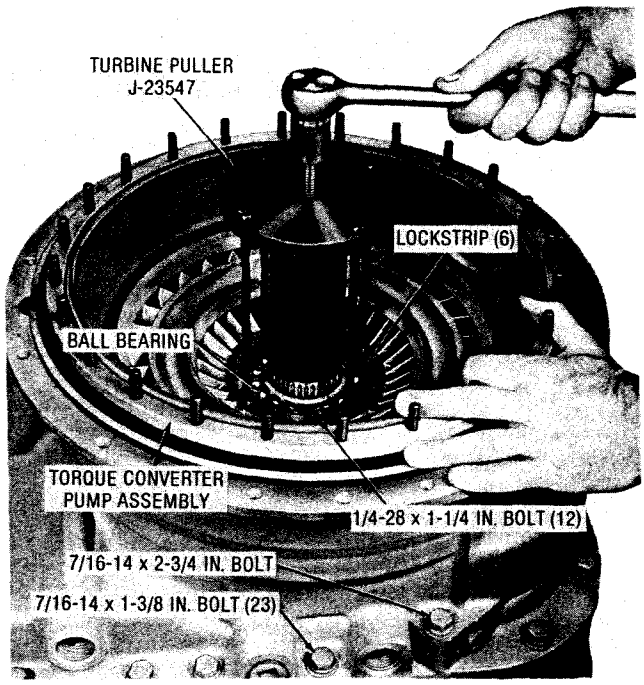


Fig. 5-16. Removing torque converter pump assembly

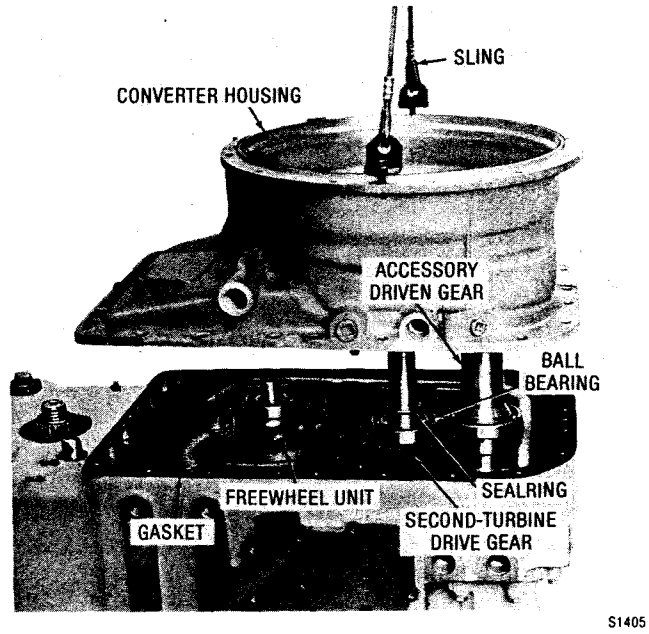


Fig. 5-17. Removing torque converter housing assembly

(4) Straighten the tabs of the lockstrips at four places equidistant around the pump hub and remove four of the twelve bolts (fig. 5-16). Install puller J-23547, making sure the puller sleeve rests on the converter ground sleeve and extends above the end of the first-turbine drive gear shaft. Tighten the puller screw.

(5) When the converter pump bearing has been drawn from its seat on the ground sleeve, remove the puller.

(6) Remove the torque converter pump and reinstall the four bolts removed in step (4). If further disassembly is planned, refer to paragraph 6-7 for converter pump rebuild instructions. If disassembly is not necessary, tighten the four 1/4-28 x 1-1/4-inch bolts to 10-12 lb ft (14-16 N·m), and bend the lockstrip tabs against the replaced bolts.

b. Torque Converter Housing

(1) Remove the twenty-four bolts, lockwashers, and plain washers that attach the converter housing to the transmission main housing (fig. 5-16).

(2) Attach a sling to the converter housing flange (fig. 5-17). Apply slight tension on the sling and using a soft hammer, bump the torque converter housing away from the transmission main housing.

WARNING

Do not allow second-turbine drive gear and freewheel unit to remain with the converter housing. The second-turbine drive gear could fall unexpectedly and cause damage or injury.

CAUTION

When converter housing has cleared the transmission housing approximately 1-1/2 inches (35 mm), check to ensure that the second-turbine drive gear and freewheel unit remain with the transmission housing. If the freewheel unit is raised with

the torque converter housing, the oil suction tube could be damaged. If necessary, use two long screwdrivers to pry the free-wheel front bearing from the converter housing. On units equipped with an internal thermostat, do not pry against bypass tube 30 (foldout 7,B).

(3) Remove the torque converter housing and attached parts (fig. 5-17). Remove the gasket. Refer to paragraph 6-8 for converter housing rebuild instructions.

5-7. REMOVAL OF TORQUE CONVERTER TURBINE GEARING AND OIL SUCTION TUBE

a. Turbine Gears and Freewheel Clutch

(1) Remove the second-turbine drive gear and attached parts (fig. 5-17). Remove the step-joint sealring from the drive gear shaft. Thrust race 25 (foldout 7,B) may remain on the hub of the second-turbine drive gear. If so, remove the race.

(2) Remove the ball bearing from the second-turbine drive gear only if replacement is necessary (fig. 5-17).

NOTE

On some models, it may be necessary to remove the oil suction tube prior to removal of the freewheel unit. Refer to paragraph 5-7c.

(3) Remove the first-turbine driven gear and the second-turbine driven gear and freewheel unit as an assembly (fig. 5-17). Refer to paragraph 6-9 for freewheel unit rebuild instructions.

(4) If the transmission is equipped to provide a standard speed low-gear ratio, remove the forward-and-reverse sun gear as shown in figure 5-18. If the transmission is equipped with a high speed low-gear ratio, forward-and-reverse sun gear 16 (foldout 9,B) cannot be removed as shown (fig. 5-18) but must be removed from the rear of the transmission; however, spacer 8 (foldout 9,B) is accessible and should be removed from the sun gear cavity.

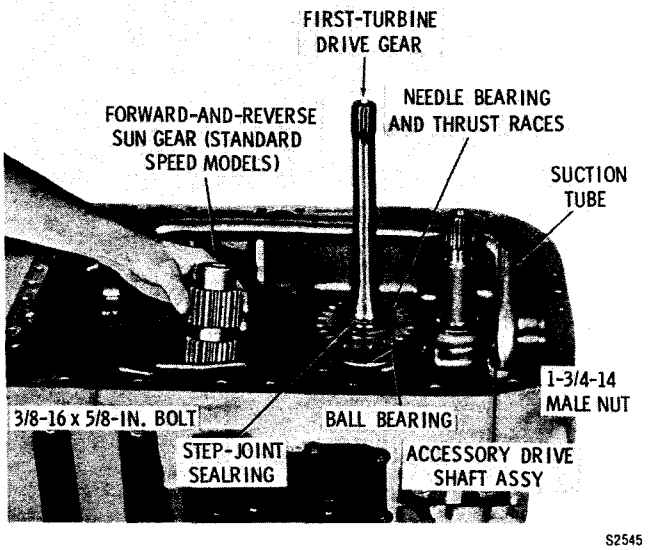


Fig. 5-18. Removing forward-and-reverse sun gear (models with standard speed ratio)

(5) Remove the needle roller bearing, two thrust races, and step-joint sealring from the first-turbine drive gear (fig. 5-18). Remove the first-turbine drive gear and ball bearing as an assembly. Do not remove the bearing unless replacement is necessary. If necessary, refer to paragraph 6-10 for rebuild instructions.

b. Accessory Drive Shaft. Remove the accessory drive shaft (fig. 5-18). Remove bearing 9 (foldout 7,B) from accessory drive shaft 8 only if replacement is necessary.

c. Oil Suction Tube. If present, remove three self-locking bolts 30 and bolt 31 (foldout 9,A) which retain oil baffle plate 29. Remove the baffle plate. Using a fabricated wrench, remove the male nut that retains the oil suction tube at the top of the housing (fig. 5-18). If present, remove self-locking bolt 1 (foldout 8,B) at the suction tube support. Remove the suction tube, and remove the male nut and compression sealring.

NOTE

Disassembly paragraphs are as follows:

Model	Para
TT 2221-1, 2421-1	5-8, 5-10, 5-12, 5-13, 5-14
TTB 2221-1, 2421-1	5-9, 5-10, 5-12, 5-13, 5-14
TRT -1	5-11, 5-12, 5-13, 5-14
TRT -3	5-11, 5-12, 5-13

5-8. REMOVAL OF REAR COVER AND HIGH-RANGE CLUTCH PISTON HOUSING (TT 2221-1, 2421-1)

NOTE

Models without converter-driven PTO, proceed to paragraph 5-8a. Models with converter-driven PTO, proceed to paragraph 5-8c.

a. Rear Cover Assembly (TT 2221-1, 2421-1 without converter-driven PTO)

(1) Position the transmission on wood blocks, front splitline downward. Remove the nineteen bolts and lockwashers that attach the rear cover to the transmission housing (fig. 5-19). Remove the rear cover and gasket. Remove sealring 2 (foldout 16,D) from the rear cover. Remove pipe plug 3 or 33 only if replacement is necessary.

(2) If the transmission is equipped with a speedometer drive assembly, remove two bolts 15 and lockwashers 14. Remove speedometer drive sleeve assembly 10, gasket 9, speedometer drive adapter 8, and gasket 7 from rear cover 4. Remove lip-type oil seal 11 and washer 12 from drive sleeve 13 only if replacement is necessary.

b. High-Range Clutch Piston Housing (TT 2221-1, 2421-1 without converter-driven PTO)

(1) Straighten the locktabs, and remove the six bolts that attach the high-range clutch piston housing to the transfer drive gear (fig. 5-20). Remove the bolts and locktabs.

(2) Using two screwdrivers, pry the high-range clutch piston housing and attached parts from the transfer drive gear (fig. 5-21). Refer to paragraph 6-11 for the high-range clutch piston housing rebuild instructions.

(3) Proceed to paragraph 5-10.

c. Rear Cover Assembly (TT 2221-1, 2421-1 with converter-driven PTO)

(1) Using a 1-1/4-inch socket wrench, loosen but do not remove self-locking nut 29

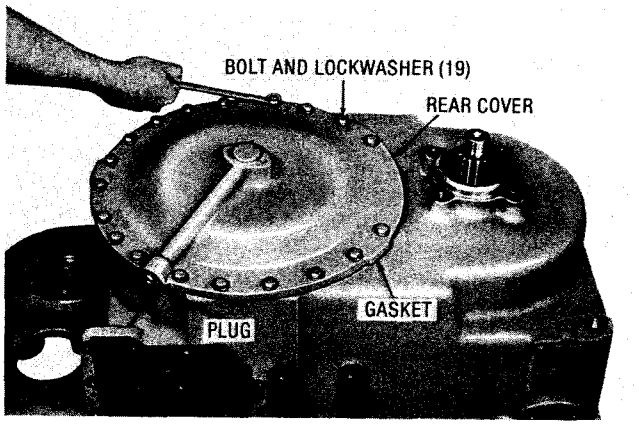


Fig. 5-19. Removing transmission rear cover (TT 2221-1, 2421-1 without converter-driven PTO)

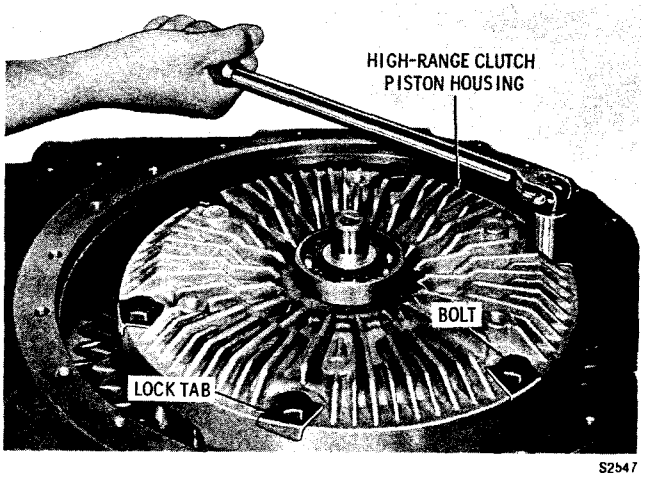


Fig. 5-20. Removing high-range clutch piston housing bolts (TT 2221, 2421-1 without converter-driven PTO)

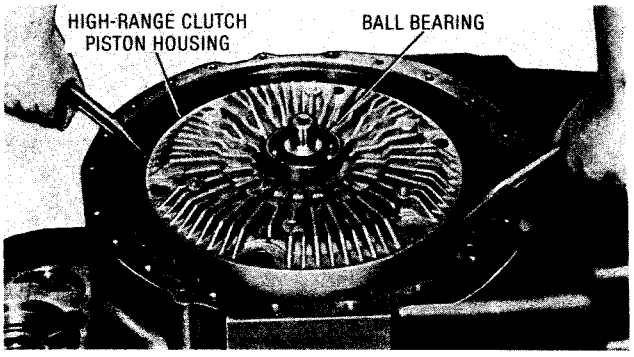


Fig. 5-21. Removing high-range clutch piston housing (TT 2221-1, 2421-1 without converter-driven PTO)

(foldout 16,D). Remove nineteen bolts 30 and lockwashers 31. Attach a hoist to PTO output flange 27. Remove rear PTO cover assembly 22, PTO shaft 17, and attached parts as a unit. Remove gasket 1 and sealring 2.

(2) Remove self-locking nut 29, flange retaining washer 28, and PTO output flange 27. Refer to paragraph 6-20 for rear PTO cover assembly rebuild instructions.

d. High-Range Clutch Piston Housing (TT 2221-1, 2421-1 with converter-driven PTO)

(1) Remove two step-joint sealrings 38 (foldout 11,B) from high-range piston housing 37. Straighten six locktabs 31, and remove six bolts 30 and the locktabs.

(2) Pry high-range clutch piston housing 37 (and attached parts) from transfer drive gear assembly 2. Refer to paragraph 6-11 for clutch piston housing rebuild instructions.

(3) Proceed to paragraph 5-10.

5-9. REMOVAL OF REAR COVER, INTERNAL BRAKE, AND HIGH-RANGE CLUTCH PISTON HOUSING (TTB 2221-1, 2421-1 models)

NOTE

Models with converter-driven PTO, proceed to paragraph 5-9a.

Models without converter-driven PTO, proceed to paragraph 5-9b.

a. Rear Cover Assembly (TTB 2221-1, 2421-1, with converter-driven PTO)

(1) Using a 1-1/4-inch socket wrench, loosen but do not remove the PTO flange retaining nut (fig. 5-22). Remove the eighteen bolts and lockwashers that retain the rear cover assembly. Spring force will push the rear cover upward.

(2) Attach a sling to the PTO flange (fig. 5-23). Remove the rear cover assembly, PTO shaft, and attached parts as a unit. Refer to paragraph 6-21 for rear cover assembly rebuild instructions.

(3) Proceed to paragraph 5-9c.

b. Rear Cover Assembly (TTB 2221-1, 2421-1, without converter-driven PTO)

(1) Remove the eighteen bolts and lockwashers that retain the rear cover assembly (refer to fig. 5-22). Spring force will push the rear cover upward.

(2) Attach a sling to the bolt flange of the rear cover, and remove the rear cover and attached parts. Refer to paragraph 6-21 for rear cover assembly rebuild instructions.

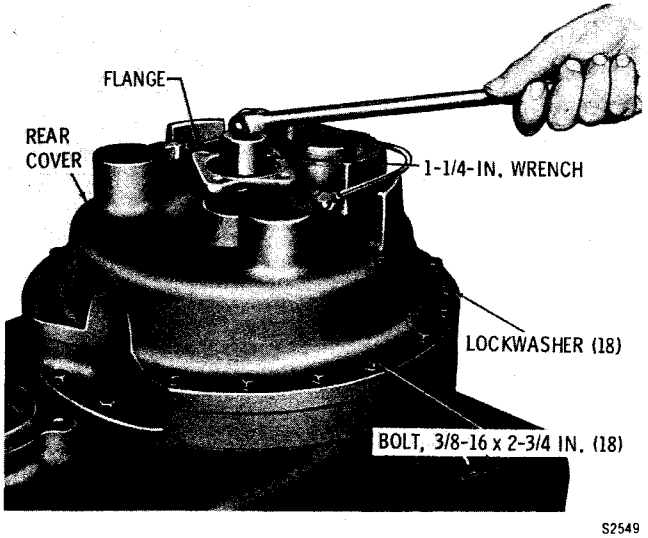


Fig. 5-22. Removing power takeoff flange nut (TTB 2221-1, 2421-1 with converter-driven PTO)

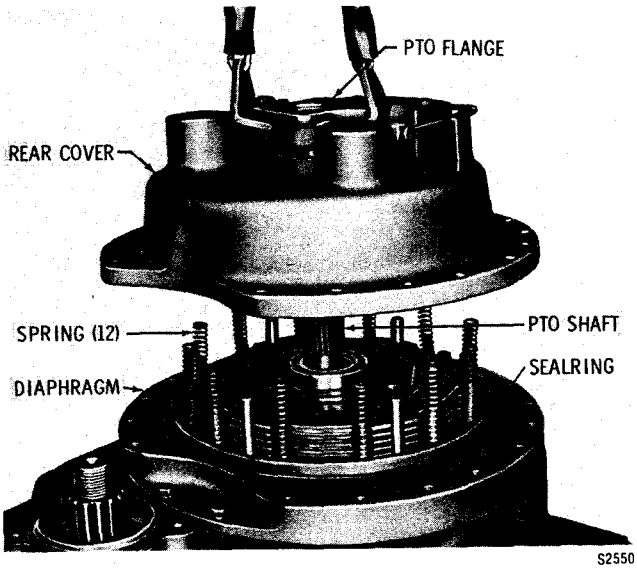


Fig. 5-23. Removing rear cover assembly (TTB 2221-1, 2421-1 with converter-driven PTO)

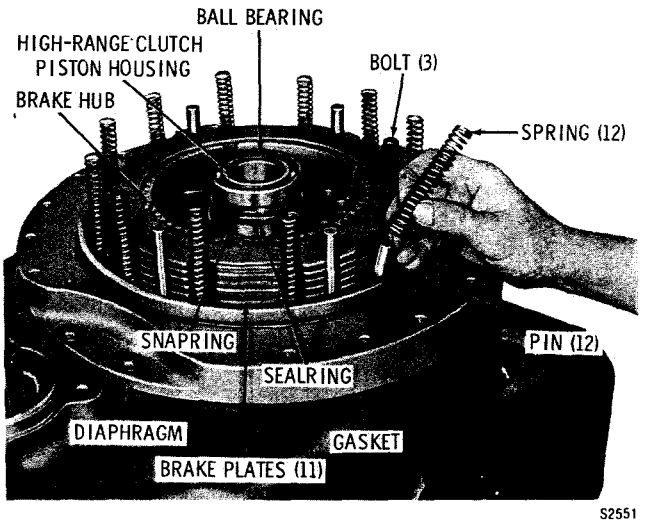


Fig. 5-24. Removing brake return springs and guide pins (TTB 2221-1, 2421-1)

c. Internal Brake Components (TTB 2221-1, 2421-1)

(1) Remove twelve brake return springs and twelve guide pins from the recesses in the diaphragm (fig. 5-24). Remove the eleven brake plates from the brake hub. Remove the ball bearing from the hub of the high-range clutch piston housing.

(2) Remove the step-joint sealring from the brake hub (fig. 5-24). Remove the snapring that retains the brake hub, and remove the brake hub. Remove the sealring from the diaphragm.

(3) Remove the three bolts and lockwashers that retain the diaphragm on the transmission housing (fig. 5-24). Remove the diaphragm assembly and gasket. Refer to paragraph 6-16 for diaphragm assembly rebuild instructions.

d. High-Range Clutch Piston Housing (TTB 2221-1, 2421-1)

(1) Straighten the six locktabs and remove the six bolts and locktabs that attach the high-range clutch piston housing to the transfer drive gear (fig. 5-25). Remove the

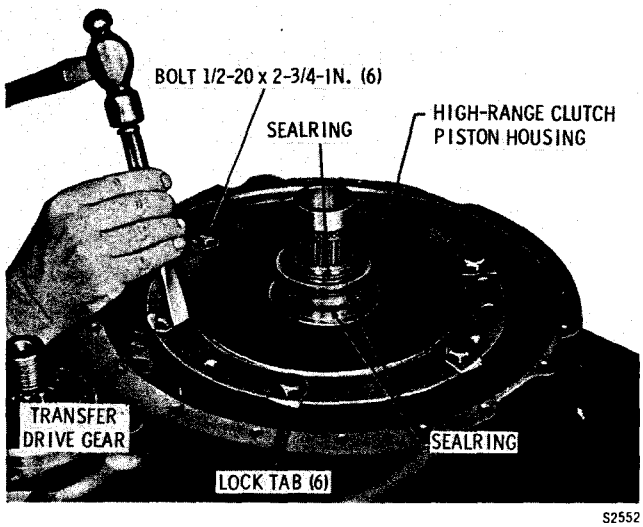


Fig. 5-25. Flattening piston housing bolt tabs (TTB 2221-1, 2421-1)

two step-joint sealrings and the O-ring seal from the hub of the high-range clutch piston housing.

(2) Pry the high-range clutch piston housing from the transfer drive gear, and remove it as an assembly. Refer to paragraph 6-11 for clutch piston housing rebuild instructions.

5-10. REMOVAL OF HIGH-RANGE AND FORWARD CLUTCH, GEARING (TT, TTB 2221-1, 2421-1)

a. High-Range Clutch Assembly and Transfer Drive Gear

(1) For models without a converter-driven PTO, remove the high-range clutch and hub assembly from the transfer drive gear (fig. 5-26). For models with a converter-driven PTO, remove, as an assembly, the high-range clutch and hub 10 (foldout 11,B or 15,A) from the transfer drive gear. Refer to paragraph 6-13 for high-range clutch and hub assembly rebuild instructions.

(2) Remove the snapring from the forward planetary carrier, and remove the transfer drive gear assembly (fig. 5-26). Refer to paragraph 6-17 for the transfer drive gear rebuild instructions.

b. Forward Clutch and Planetary

(1) Replace two of the ten self-locking bolts that retain the forward clutch piston housing with two 3/8-16 x 2-1/2-inch bolts removed from the control valve assembly in 5-3e (fig. 5-27). Install the bolts at opposite sides of the piston housing to restrain the spring force.

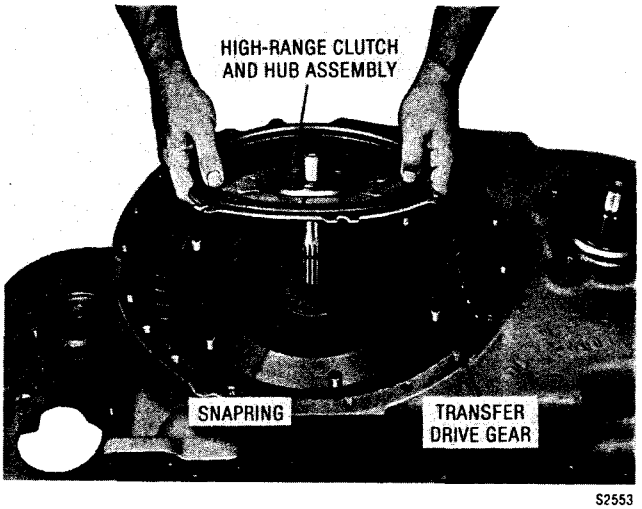


Fig. 5-26. Removing high-range clutch and hub assembly (TT, TTB 2221-1, 2421-1 without converter-driven PTO)

(2) Remove the remaining eight self-locking bolts and plain washers (if present) which retain the forward clutch piston housing (fig. 5-27). Then loosen the two restraining bolts evenly and remove them.

(3) Remove the forward clutch piston housing and piston as an assembly (fig. 5-28). Remove the forward clutch piston

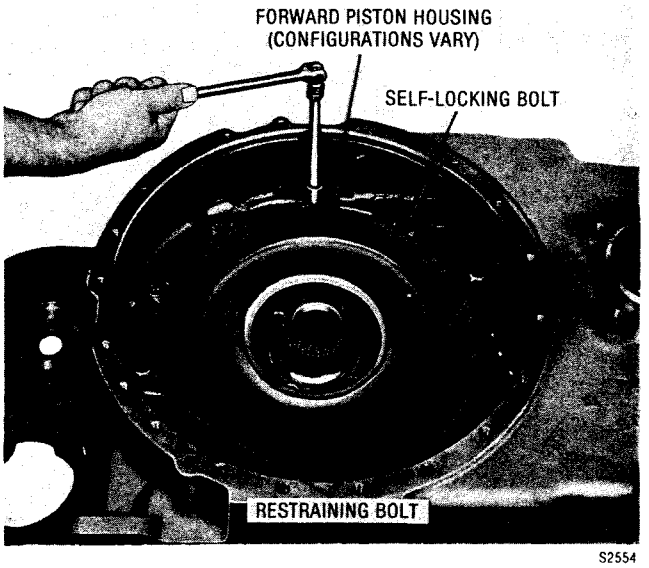


Fig. 5-27. Removing forward clutch piston housing bolts (TT, TTB 2221-1, 2421-1)

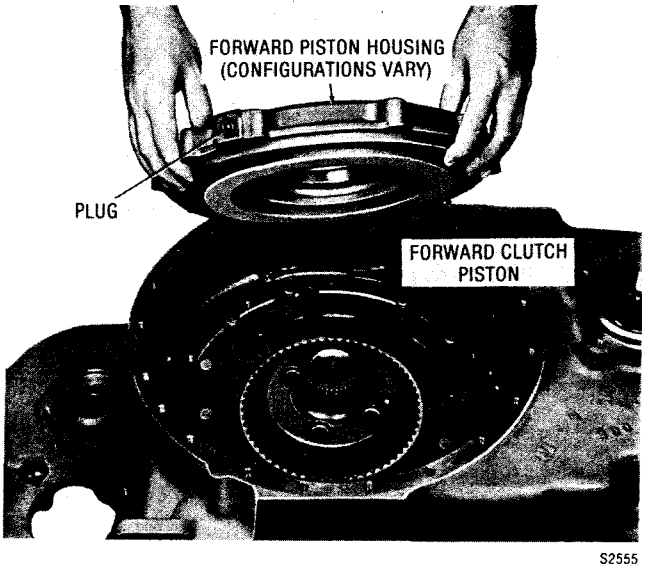


Fig. 5-28. Removing forward clutch piston housing and piston (TT, TTB 2221-1, 2421-1)

from the piston housing. Refer to paragraph 6-12 for clutch piston assembly rebuild instructions.

(4) Do n o t remove the socket-head plug from the forward clutch piston housing unless necessary for replacement, or cleaning of the oil passage (fig. 5-28).

(5) Remove the forward planetary carrier assembly, ring gear, f o u r clutch plates, and the attached reverse ring gear as a unit (fig. 5-29). Remove thrust washer 2 (foldout 10,A) from the carrier, if present.

(6) Separate the clutch plates and forward ring gear from the planetary carrier assembly. Remove the twelve piston return springs and guide pins, and remove the remaining four forward clutch plates from the clutch anchor assembly (fig. 5-29).

(7) Remove the snapring that retains the reverse ring gear on the forward planetary carrier assembly (fig. 5-30). Refer to paragraph 6-25 for the planetary carrier assembly rebuild instructions.

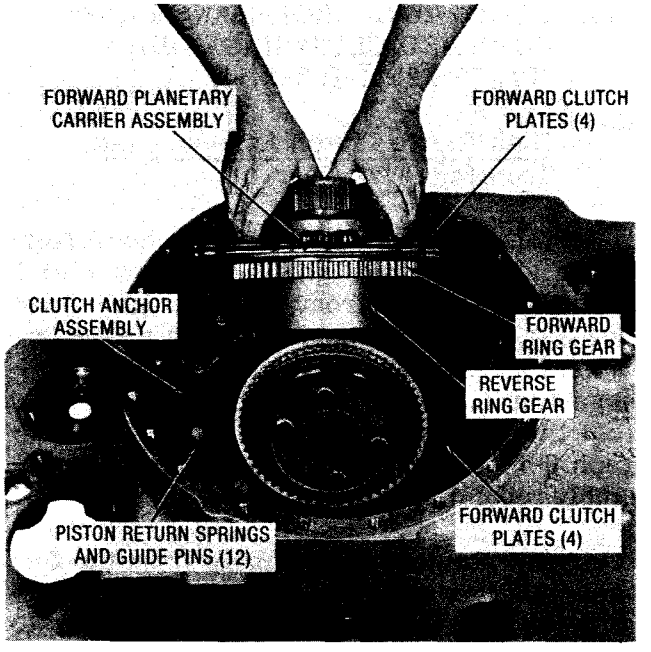


Fig. 5-29. Removing forward planetary carrier assembly (TT, TTB 2221-1, 2421-1)

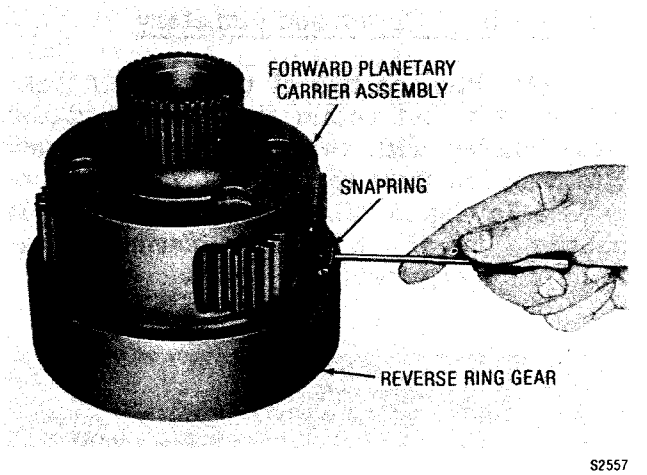


Fig. 5-30. Removing snapring from reverse ring gear (TT, TTB 2221-1, 2421-1)

5-11. REMOVAL OF REAR HOUSING, HIGH- AND LOW-RANGE CLUTCHES, PLANETARY, AND ADAPTER (TRT -1, TRT -3)

NOTE

Disassembly subparagraphs are as follows:

Model	Para
TRT 2221-1, 2421-1	5-11a
TRT 2221-3, 2421-3 with underdrive	5-11b
TRT 2221-3, 2421-3 with overdrive	5-11c
TRT 2211-3, 2411-3	5-11d

a. TRT 2221-1, 2421-1

(1) Position the transmission, front downward, and remove seventeen short bolts, three long bolts, and lockwashers (fig. 5-31).

(2) Remove the rear housing and internal parts in the rear housing, as a unit (fig. 5-32). Remove the gasket.

(3) Position rear housing 2 (foldout 16,A) on blocks. Remove snapring 11 which holds oil retainer 10 in the rear housing. Remove the oil retainer, sealring 9, and internal snapring 8 which retains rear bearing 6 in the housing.

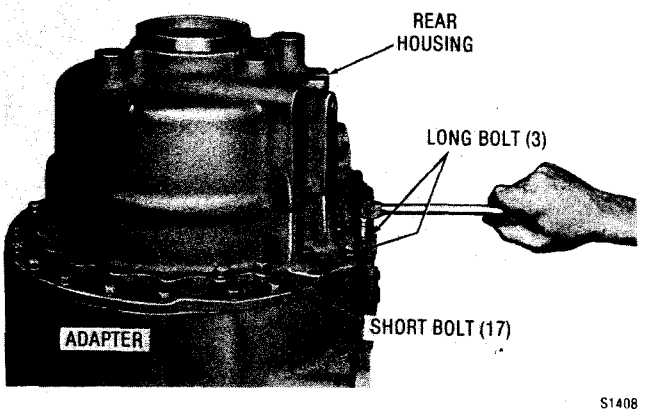


Fig. 5-31. Removing rear housing bolts (TRT 2221-1, 2421-1)

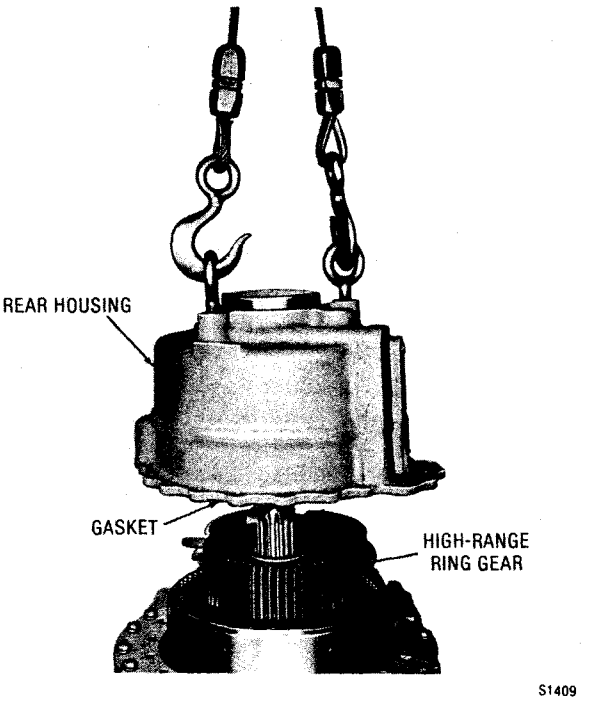


Fig. 5-32. Removing transmission rear housing assembly (TRT 2221-1, 2421-1)

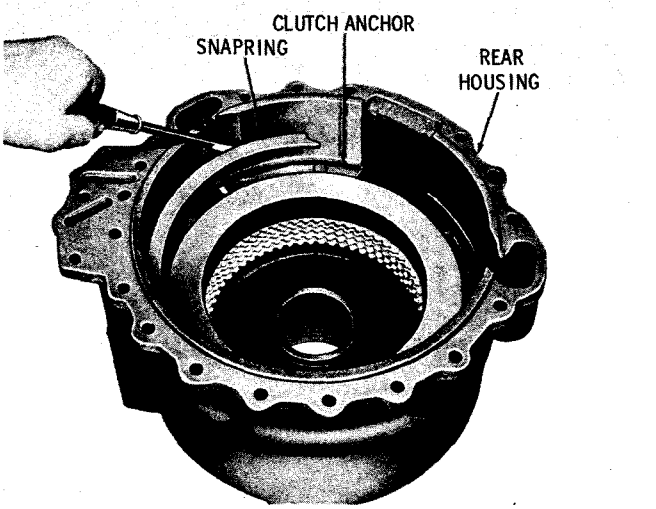


Fig. 5-33. Removing clutch anchor snapring (TRT 2221-1, 2421-1)

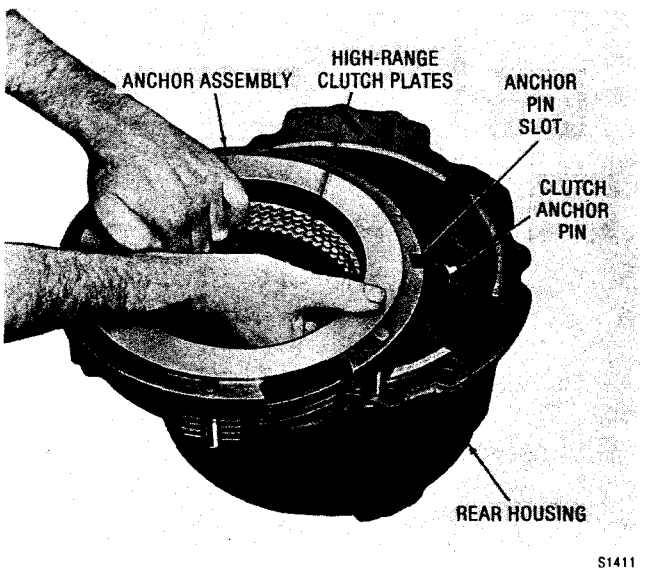


Fig. 5-34. Removing high-range clutch anchor and plates (TRT 2221-1, 2421-1)

(4) Using a soft hammer, tap shaft 5 (foldout 16,A) rearward to remove the shaft from t h e housing. Remove snapring 7 and rear bearing 6 from the shaft, if replacement is necessary.

(5) Remove t h e internal snapring which retains the high-range clutch anchor assembly (fig. 5-33).

(6) Grasp the high-range clutch pack a n d anchor assembly together and remove the assembly from the rear housing (fig. 5-34). Separate the parts. Refer to paragraph 6-14 for rebuild of the clutch anchor assembly. Remove t h e clutch anchor pin (fig. 5-35). Refer to paragraph 6-11 for rebuild of the housing assembly.

(7) Lift the high-range planetary carrier assembly out of the ring gear (fig. 5-36). Refer to paragraph 6-25 for rebuild of t h e planetary carrier assembly. Remove the sun gear a n d thrust washer assembly. Remove

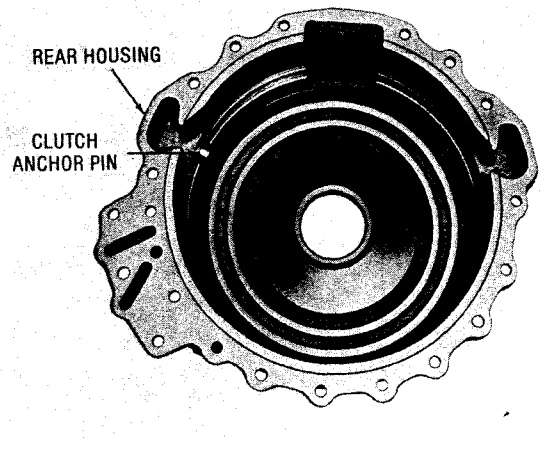


Fig. 5-35. Rear housing and piston assembly (TRT 2221-1, 2421-1)

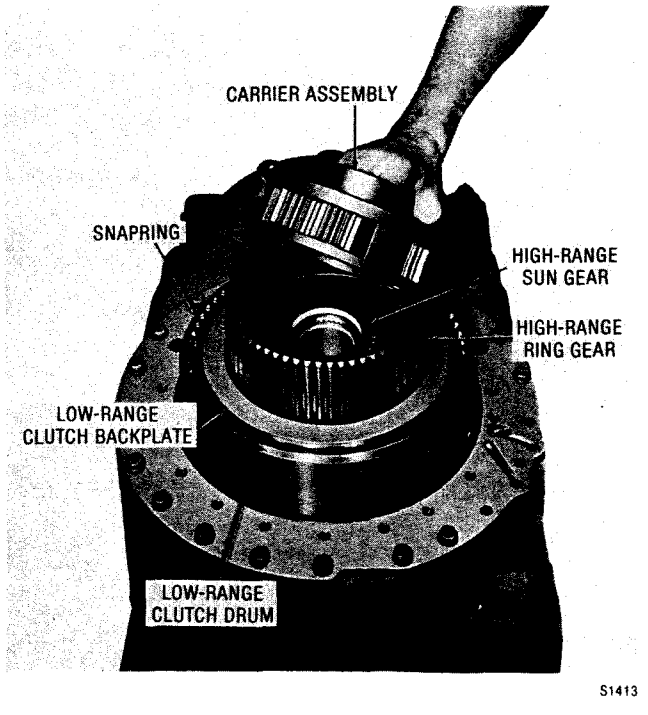


Fig. 5-36. Removing high-range planetary carrier assembly (TRT 2221-1, 2421-1)

the thrust washer only if it is worn or damaged.

(8) Remove the internal snapring which retains low-range clutch backplate (fig. 5-36).

(9) Lift out the ring gear, bringing with it the backplate, three internal-splined

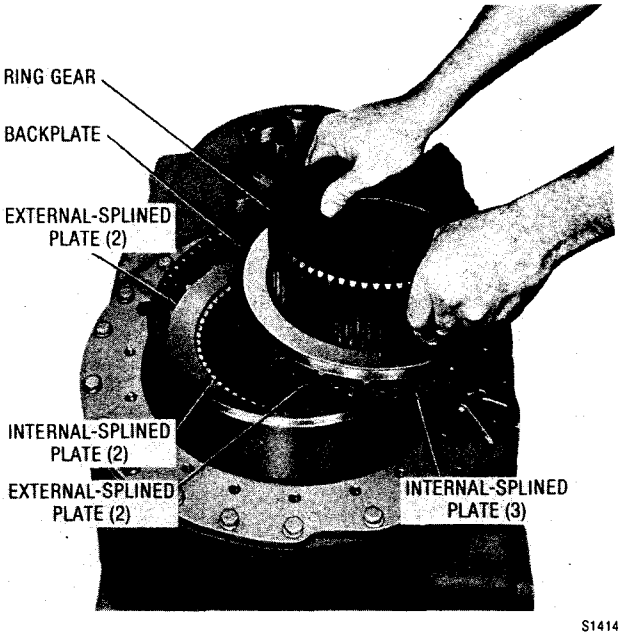


Fig. 5-37. Removing high-range ring gear and low-range clutch plates (TRT 2221-1, 2421-1)

Fig. 5-38. Removing high-range sun gear sleeve snapring (TRT 2221-1, 2421-1)

plates, and two external-tanged plates (fig. 5-37). Remove the two remaining clutch plates.

(10) Remove the snapring from the splined sleeve (fig. 5-38).

(11) Lift the low-range piston housing assembly o u t of the adapter assembly (fig. 5-39). Remove the two step-joint Teflon sealrings from the hub of the housing. Refer to

paragraph 6-11 for rebuild of the piston housing assembly.

(12) Remove sixteen bolts 10 (foldout 12,A) and lockwashers 11 which retain the rear housing adapter assembly 7.

(13) Remove the rear housing adapter assembly. Remove sealring 6 and gasket 5 from the adapter. Refer to paragraph 6-15 for rebuild of the rear housing adapter assembly.

(14) Remove the transfer drive gear and sun gear sleeve assembly (fig. 5-40). Remove the sleeve from the gear and the snapring from the sleeve. Refer to paragraph 6-19 for rebuild of the sleeve assembly, and to paragraph 6-18 for rebuild of the output transfer drive gear.

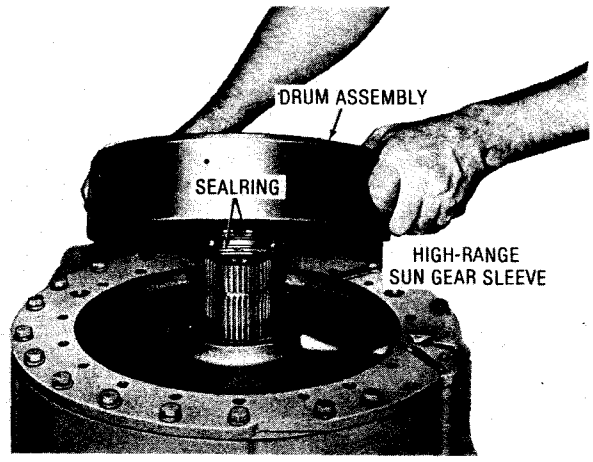


Fig. 5-39. Removing low-range clutch drum assembly (TRT 2221-1, 2421-1)

Fig. 5-40. Removing transfer drive gear and sun gear sleeve

(15) The forward carrier thrust washer may remain either with the transfer drive gear or with the forward planetary carrier. Remove the thrust washer.

(16) Proceed to paragraph 5-12.

b. TRT 2221-3, 2421-3, Models With Underdrive

(1) Position the transmission, front downward, and remove fifteen bolts and lockwashers which retain the rear housing to the adapter (fig. 5-41).

(2) Lift the output shaft, rear housing, and attached parts from the adapter (fig. 5-42). Remove the gasket.

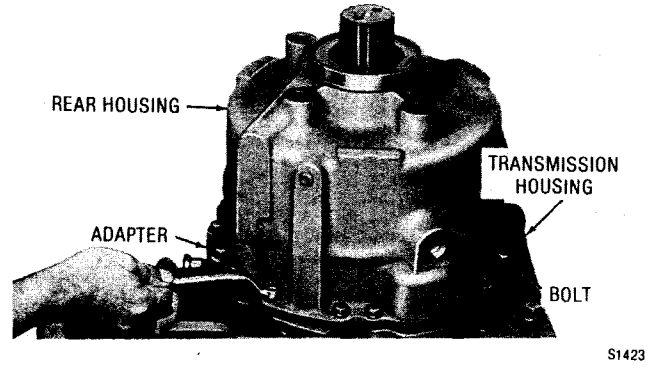


Fig. 5-41. Removing rear housing bolts (TRT 2221-3, 2421-3 with underdrive)

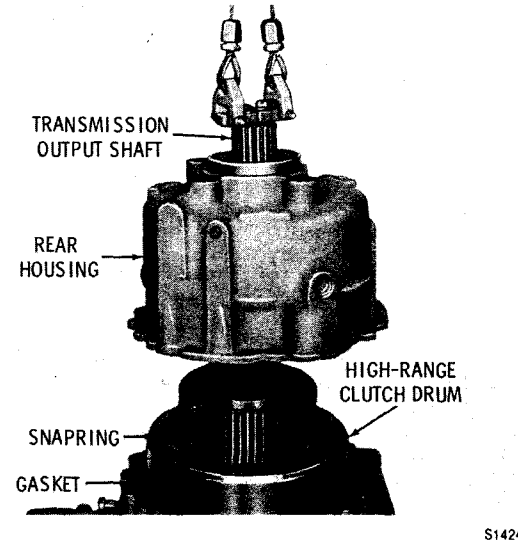


Fig. 5-42. Removing rear housing (TRT 2221-3, 2421-3 with underdrive)

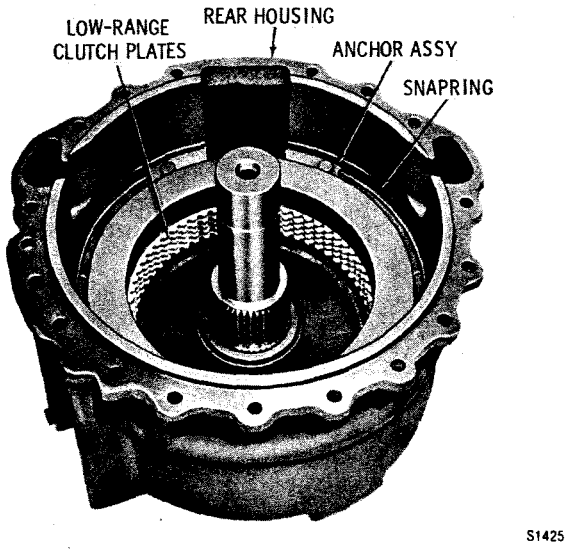


Fig. 5-43. Rear housing and low-range clutch (TRT 2221-3, 2421-3 with underdrive)

(3) Position the rear housing, rear downward, and remove the large snapring that retains the clutch anchor assembly (fig. 5-43).

(4) Remove the clutch anchor assembly, five external-tanged clutch plates, and five internal-splined clutch plates as an assembly (fig. 5-43). Separate the plates from the anchor assembly. Refer to paragraph 6-14 for rebuild of the clutch anchor assembly.

(5) Remove the clutch anchor pin (fig. 5-44). Do not remove the welch plug from the anchor pin hole in the housing.

(6) Refer to paragraph 6-11 for rebuild of the housing assembly.

(7) Remove the internal snapring which retains the high-range clutch backplate (fig. 5-45).

(8) Remove the low-range ring gear, backplate, two internal-splined clutch plates, and one external-tanged clutch plate as a unit (fig. 5-46). Remove the low-range planetary carrier assembly. Refer to paragraph 6-25 for rebuild of the planetary carrier assembly. Remove the two remaining clutch plates.

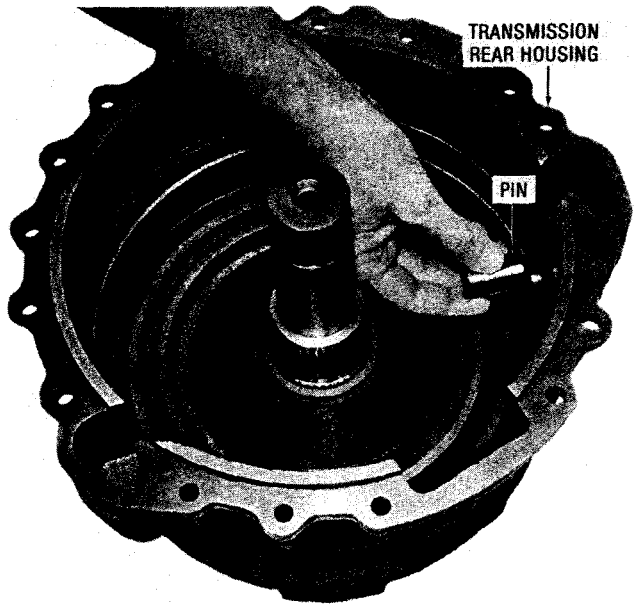


Fig. 5-44. Removing clutch anchor pin (TRT 2221-3, 2421-3 with underdrive)

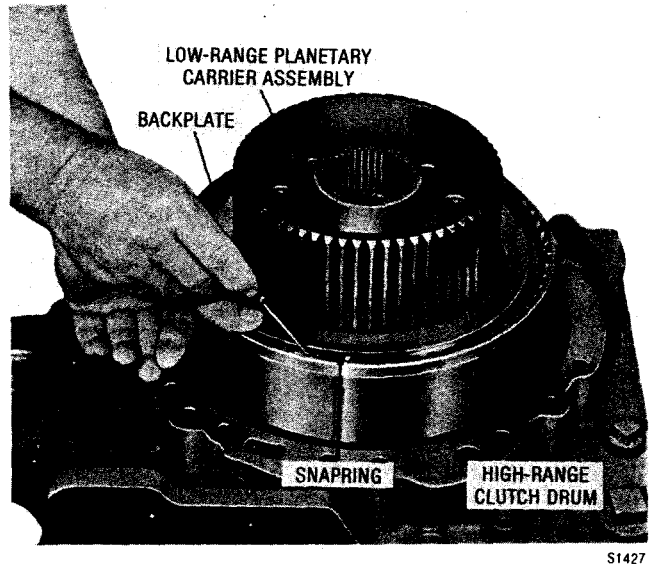


Fig. 5-45. Removing high-range clutch backplate snapring (TRT 2221-3, 2421-3 with underdrive)

(9) Remove the low-range planetary sun gear (fig. 5-47). Remove the snapring from the hub of the forward planetary carrier.

(10) Remove the high-range piston housing assembly (fig. 5-48). Remove the

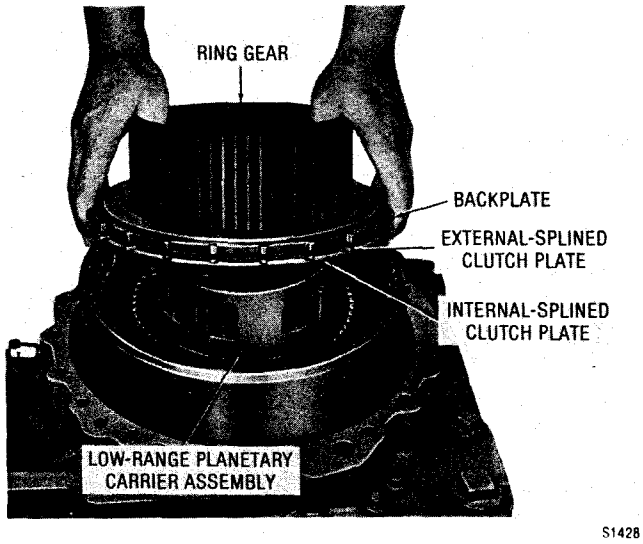


Fig. 5-46. Removing low-range planetary ring gear (TRT 2221-3, 2421-3 with underdrive)

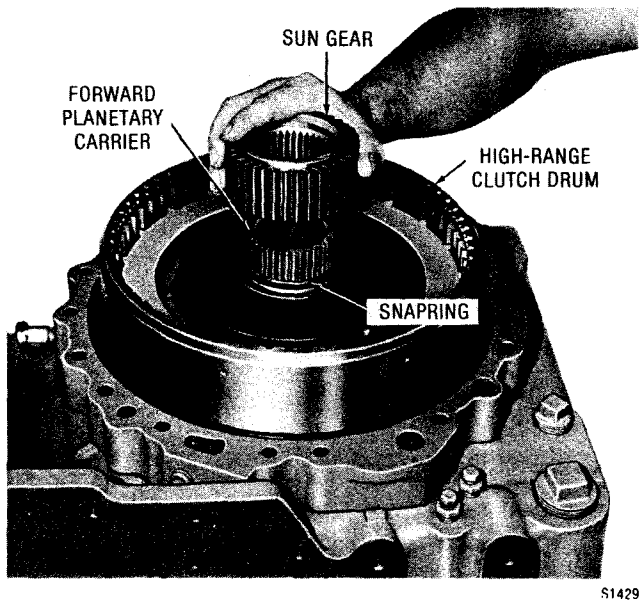


Fig. 5-47. Removing low-range planetary sun gear (TRT 2221-3, 2421-3 with underdrive)

two step-joint Teflon sealrings from the hub of the drum. Refer to paragraph 6-11 for rebuild of the housing assembly.

(11) The adapter assembly (fig. 5-48) compresses the piston return springs. Loosen the two recessed bolts (12-point heads) evenly while holding the adapter against spring force.

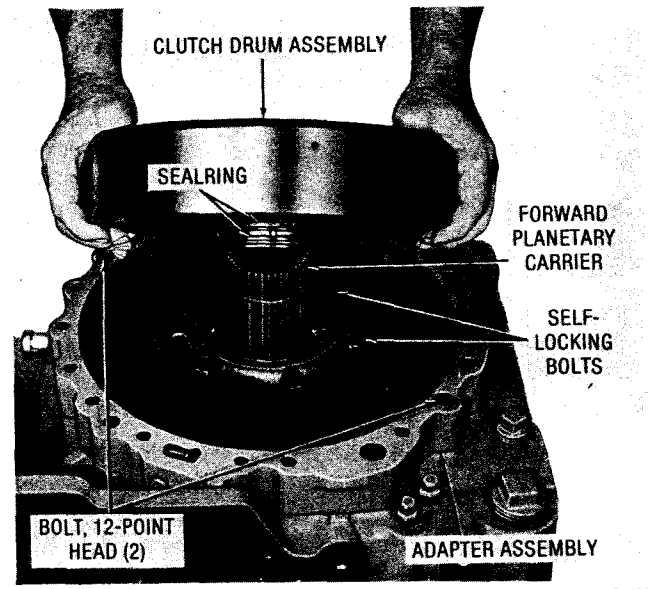


Fig. 5-48. Removing high-range clutch drum assembly (TRT 2221-3, 2421-3 with underdrive)

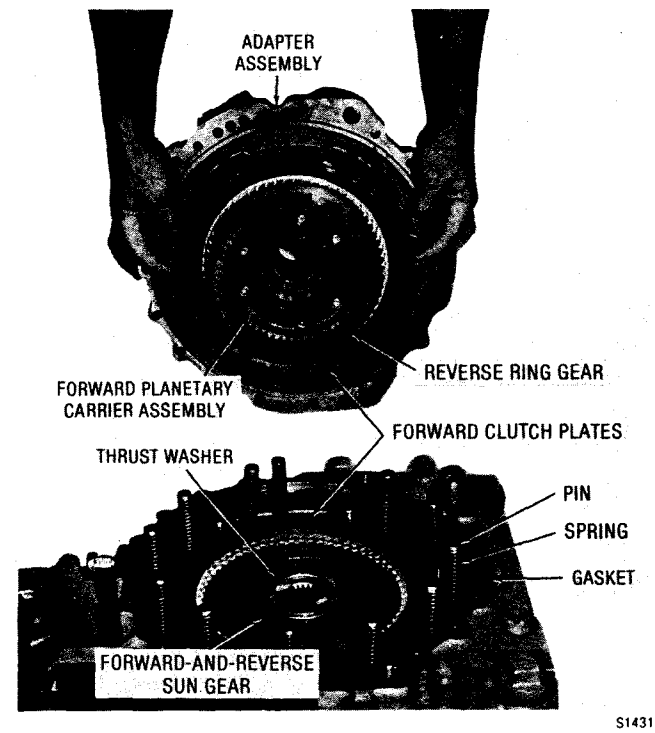


Fig. 5-49. Removing adapter assembly and attached parts (TRT 2221-3, 2421-3 with underdrive)

(12) Remove the adapter assembly, forward planetary carrier assembly, and other attached parts as a unit (fig. 5-49).

(13) Remove six self-locking bolts 28 (foldout 10,B). Remove adapter assembly 24. Refer to paragraph 6-15 for rebuild of the rear housing adapter assembly.

(14) Remove forward clutch piston 17 with sealrings 18, 19, and 20. Refer to paragraph 6-12 for rebuild of the clutch piston assembly.

(15) Remove bearing 22 by using a puller bolted to retainer 21.

(16) Remove ring gear 14 and two clutch plates 15 and 16. Remove snapring 11 and separate ring gear 1 from carrier assembly 3. Refer to paragraph 6-25 for rebuild of the planetary carrier assembly.

(17) Remove the piston return springs and pins, four clutch plates, the forward-and-reverse sun gear and thrust washer, and the adapter gasket (fig. 5-49).

(18) Proceed to paragraph 5-12.

c. TRT 2221-3, 2421-3, Models With Overdrive

(1) Remove fifteen bolts and lockwashers which retain the rear housing (fig. 5-50).

(2) Attach a lifting sling to the output shaft and remove the rear housing, high-range clutch, and output shaft as a unit (fig. 5-51).

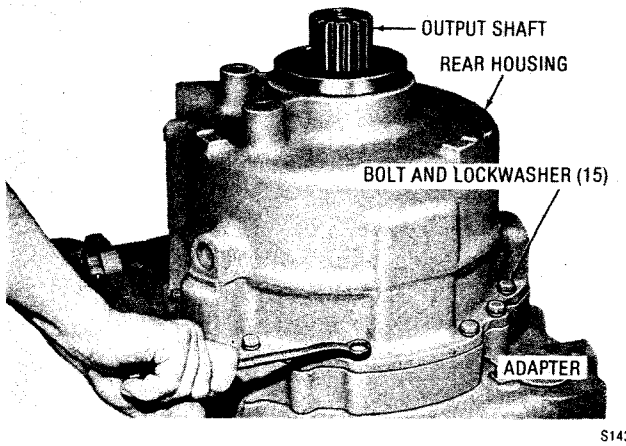


Fig. 5-50. Removing rear housing bolts (TRT 2221-3, 2421-3 with overdrive)

(3) Remove the rear housing gasket. Remove the lifting sling.

(4) Position the rear housing, rear downward, and remove internal snapring 2 (foldout 14,B) which retains the high-range clutch anchor assembly. Remove anchor assembly 3. Refer to paragraph 6-14 for rebuild of the clutch anchor assembly.

(5) Remove the high-range planetary ring gear and the three clutch plates which come with it (fig. 5-52). Remove the three clutch plates remaining in the housing.

(6) Remove clutch anchor pin 12 (foldout 16,B). Do not remove the welch plug in the anchor pin hole at the outside of the housing.

(7) Refer to paragraph 6-11 for rebuild of the housing.

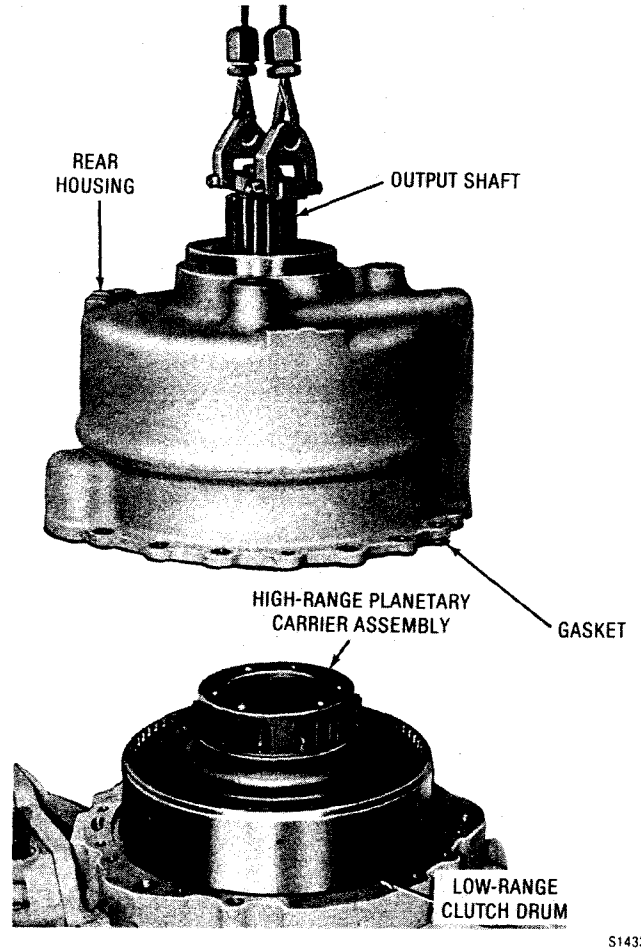


Fig. 5-51. Removing rear housing and attached parts (TRT 2221-3, 2421-3 with overdrive)

(8) Remove the high-range planetary sun gear (fig. 5-53). Remove the internal snapring which retains the high-range planetary carrier assembly.

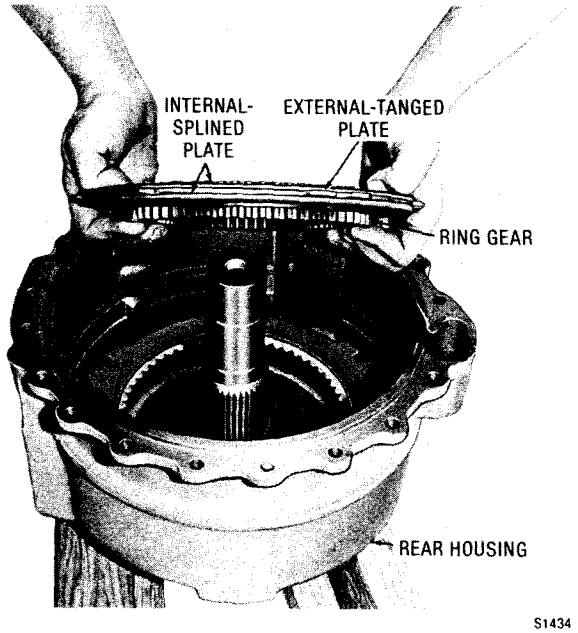


Fig. 5-52. Removing high-range planetary ring gear and three clutch plates (TRT 2221-3, 2421-3 with overdrive)

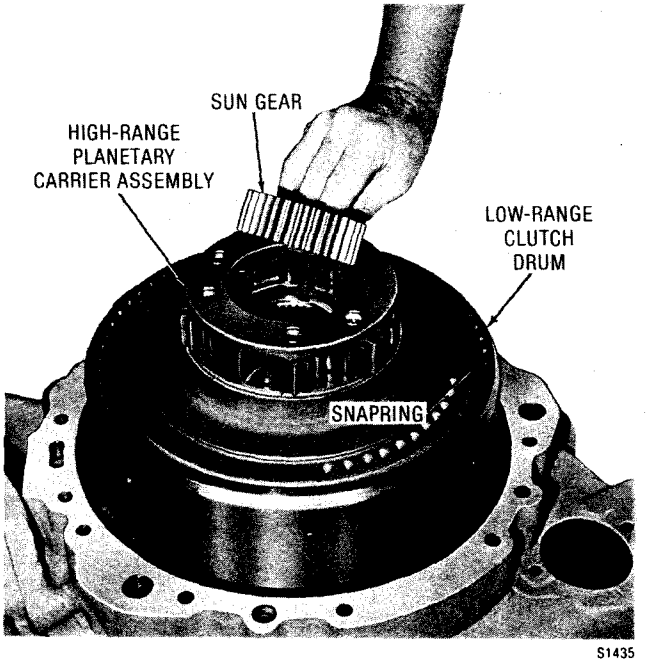


Fig. 5-53. Removing high-range planetary sun gear (TRT 2221-3, 2421-3 with overdrive)

(9) Remove the high-range planetary carrier assembly (fig. 5-53). Refer to paragraph 6-25 for rebuild of the planetary carrier assembly.

(10) Remove low-range clutch hub 15 (foldout 14,A). Remove the roller bearing assembly consisting of two races and a bearing assembly (items 12, 13, and 14).

(11) Remove five internal-splined clutch plates 16 and four external-splined clutch plates 17. Remove the snapring which retains the low-range piston housing.

(12) Remove the low-range piston housing and its attached parts (fig. 5-54). Remove two step-joint Teflon sealrings from the hub of the clutch drum. Refer to paragraph 6-11 for rebuild of the piston housing assembly.

(13) The adapter assembly (fig. 5-54) compresses the piston return springs. Loosen the two recessed bolts (12-point heads) evenly while holding the adapter against spring force.

(14) Remove the adapter assembly and its attached parts (fig. 5-55). Remove the adapter gasket and sun gear thrust

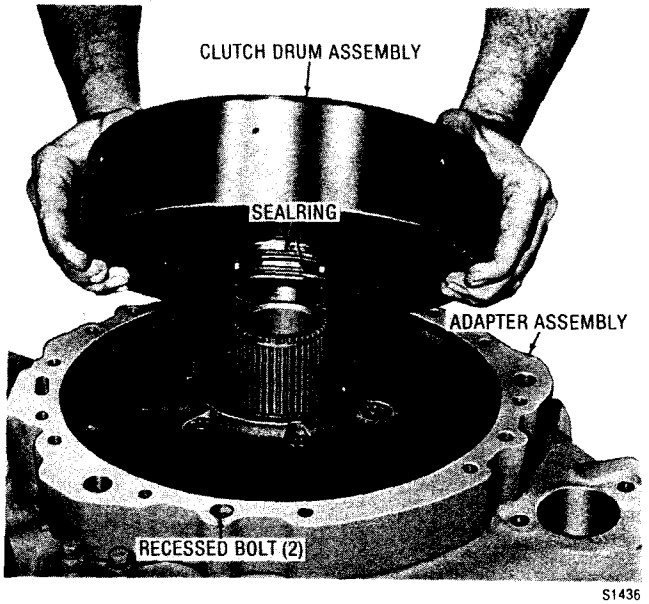


Fig. 5-54. Removing low-range clutch drum (TRT 2221-3, 2421-3 with overdrive)

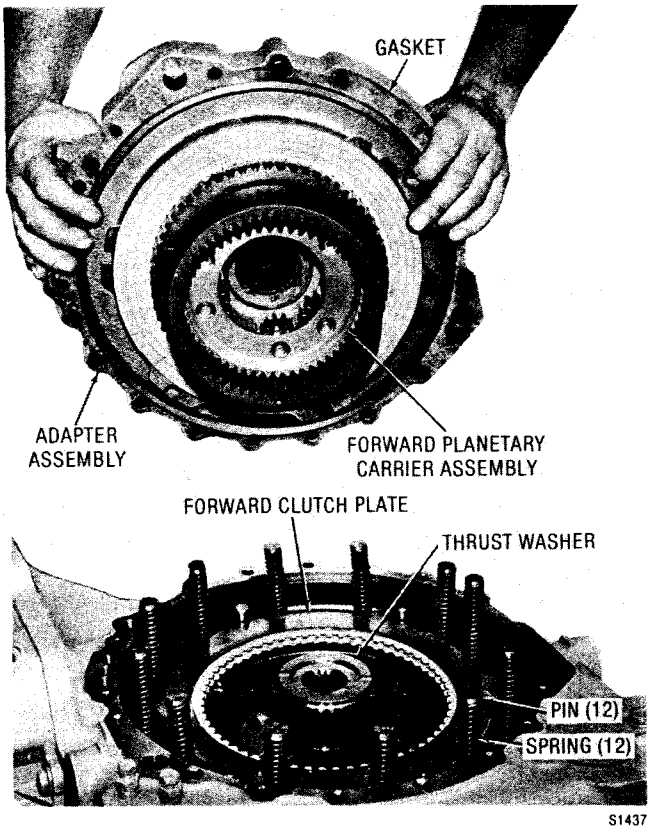


Fig. 5-55. Removing adapter assembly and attached parts (TRT 2221-3, 2421-3 with overdrive)

washer (if it remained in the forward planetary carrier).

(15) Remove the forward-and-reverse planetary sun gear and thrust washer (fig. 5-55). Remove twelve piston return springs and pins.

(16) Remove four forward clutch plates remaining in the transmission (fig. 5-55).

(17) Remove six self-locking bolts 28 (foldout 10,B). Remove adapter assembly 24. Refer to paragraph 6-15 for rebuild of the rear housing adapter assembly.

(18) Remove forward clutch piston 17 (foldout 10,B) with sealrings 18, 19, and 20. Refer to paragraph 6-12 for rebuild of the clutch piston.

(19) Remove bearing 22 (foldout 10,B) by using a puller bolted to retainer 21.

(20) Remove ring gear 14 and two clutch plates 15 and 16. Remove snapring 11 and separate ring gear 1 from carrier assembly 31. Refer to paragraph 6-25 for rebuild of the planetary carrier assembly.

(21) Proceed to paragraph 5-12.

d. TRT 2211-3, 2411-3

(1) Position the transmission, front downward, and remove eighteen bolts 4 (foldout 16,C) and lockwashers 3 that retain rear housing 9 to the transmission housing.

(2) Remove rear housing assembly 5, tapping the output shaft with a soft hammer, if necessary, to keep it from coming out with the housing.

(3) Remove gasket 1 (foldout 16,C).

(4) Remove the forward clutch piston with sealrings, items 18 through 21 (foldout 11,A), from the housing. Remove spacers 12 and 24 from the housing. Refer to paragraph 6-24 for rebuild of the rear housing assembly.

(5) Remove twelve piston return springs 22 (foldout 9,B) and pins 23.

(6) Remove forward planetary ring gear 15 (foldout 11,A) and clutch plates 16 and 17, as a unit. Separate the plates from the ring gear. Remove the remaining two internal-splined clutch plates 13 and two external-tanged clutch plates 14.

(7) Remove forward planetary carrier assembly 3 and reverse planetary ring gear 1 as a unit. Remove snapring 10 and separate the ring gear from the carrier. Refer to paragraph 6-25 for rebuild of the planetary carrier assembly.

(8) Remove thrust washer 2 (foldout 11,A) from the bore of forward planetary carrier assembly 3 or from sun gear 16 (foldout 9,B).

(9) Remove forward-and-reverse sun gear 16.

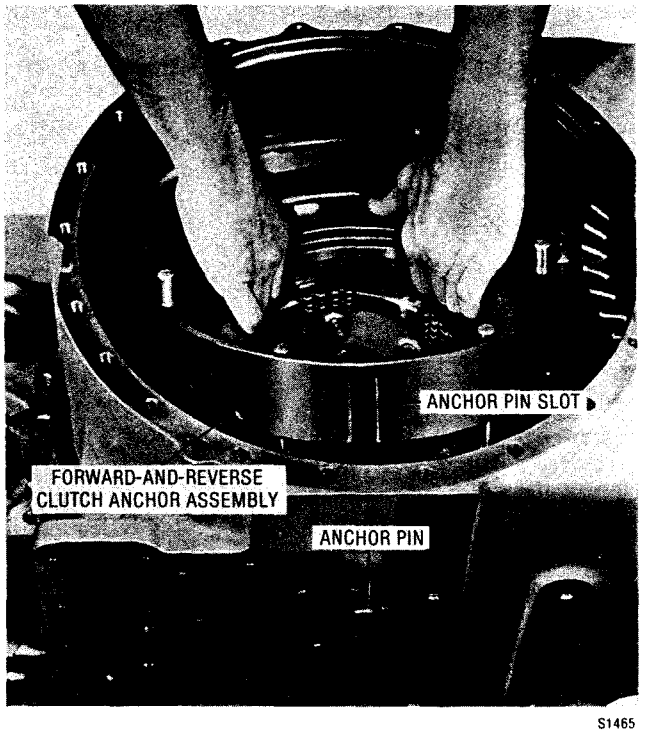


Fig. 5-56. Removing forward-and-reverse clutch anchor assembly

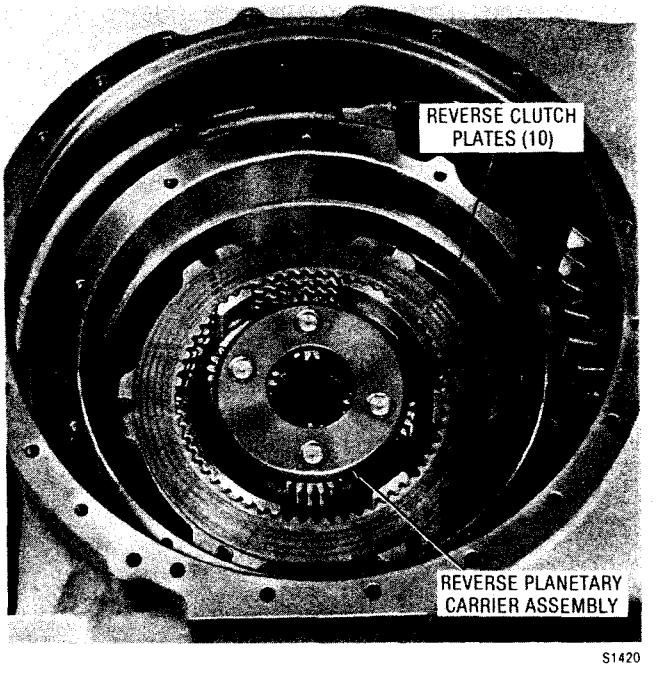


Fig. 5-57. Reverse planetary carrier assembly and clutch plates

5-12. REMOVAL OF REVERSE CLUTCH AND PLANETARY (All Models)

a. Remove the forward-and-reverse clutch anchor assembly (fig. 5-56). Do not remove six clutch anchor pins 21 (foldout 9,B) from anchor 20. Remove the anchor pin from the valve body mounting pad (fig. 5-56).

b. Remove the reverse planetary carrier assembly and one internal-splined clutch plate as a unit (fig. 5-57). Separate the clutch plate from the carrier assembly. Refer to paragraph 6-25 for the reverse planetary carrier assembly rebuild instructions. Remove the remaining nine reverse clutch plates from the transmission housing.

c. Remove the reverse clutch piston from its bore in the transmission housing (fig. 5-58). Refer to paragraph 6-12 for clutch piston rebuild instructions.

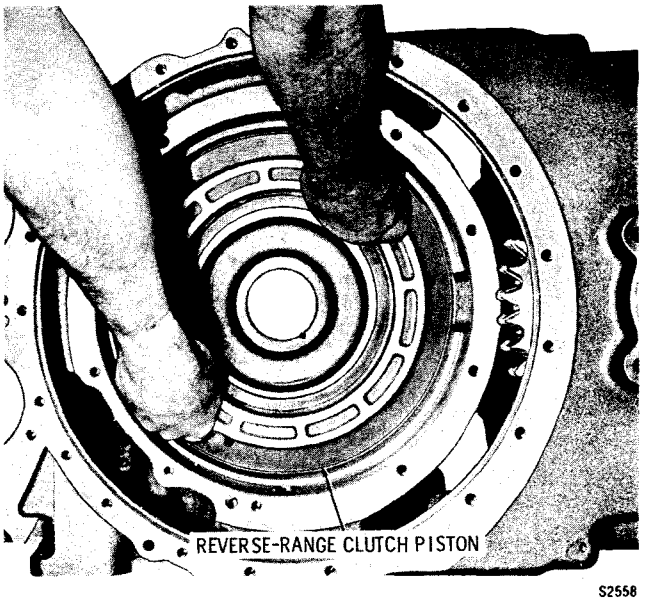


Fig. 5-58. Removing reverse clutch piston

5-13. REMOVAL OF OIL PUMP

a. Remove the bolts and lockwashers that attach the oil pump to the transmission housing (fig. 5-59).

b. Remove the oil pump and gasket, pump cover, and cover gasket as an assembly. Do not separate the oil pump components unless inspection or parts replacement is necessary. Refer to paragraph 6-26 for oil pump rebuild instructions.

NOTE

This concludes the disassembly of -3 models into subassem-

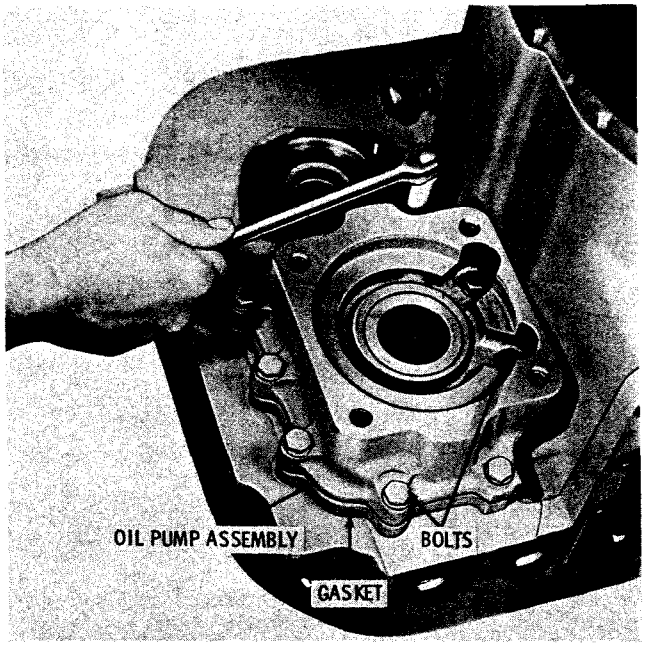


Fig. 5-59. Removing oil pump assembly

blies. For rebuild of the -3 transmission housing, refer to paragraph 6-28. For -1 models, proceed with paragraph 5-14.

5-14. REMOVAL OF OUTPUT COMPONENTS AND TRANSFER DRIVEN GEAR (TT, TTB, TRT 2221-1, 2421-1)

NOTE

Models with front and rear outputs without output disconnect, proceed to paragraph 5-14a. Models with front and rear outputs with output disconnect, proceed to paragraph 5-14b. Models with rear output only, proceed to paragraph 5-14c.

a. One-piece Output Shaft (outputs at front and rear)

(1) Using a puller, remove the oil seal from the front of the transmission housing (fig. 5-60).

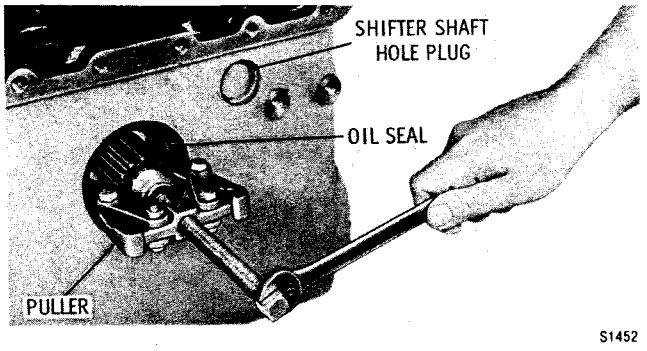


Fig. 5-60. Removing output shaft front oil seal (-1 models with one-piece output shaft)

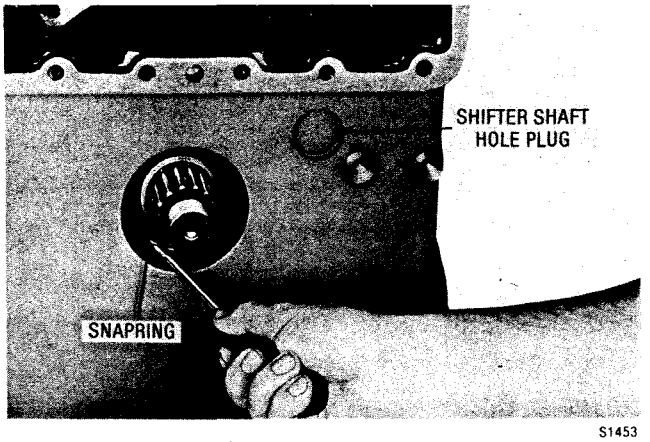


Fig. 5-61. Removing output shaft front bearing snapring (-1 models with one-piece output shaft)

(2) Remove the snapring that retains the front output shaft bearing in the housing bore (fig. 5-61). Do not remove the shifter shaft hole plug unless replacement is necessary.

(3) Using a soft hammer, drive the output shaft forward until the front bearing is free from the housing bore (fig. 5-62).

(4) Remove the output shaft and front bearing as an assembly (fig. 5-63). Remove the front bearing from the output shaft.

(5) Removal of the output shaft will free transfer driven gear 23 and spacer 27 (foldout 17,A). Remove the transfer driven gear (fig. 5-64) and remove the spacer from

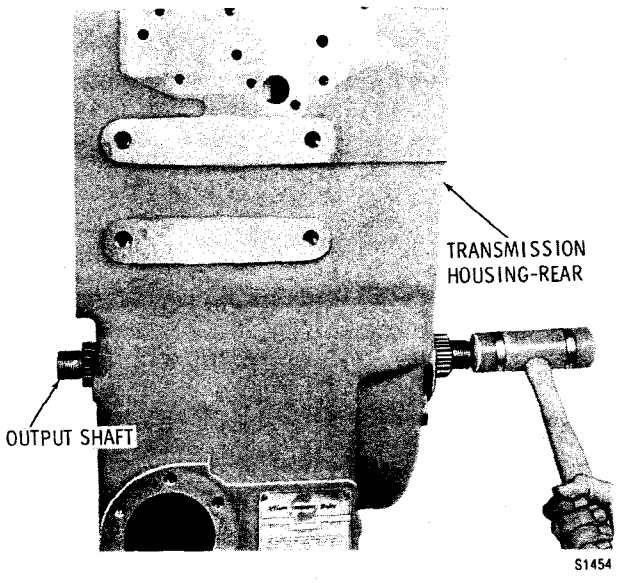


Fig. 5-62. Loosening output shaft front bearing (-1 models with one-piece output shaft)

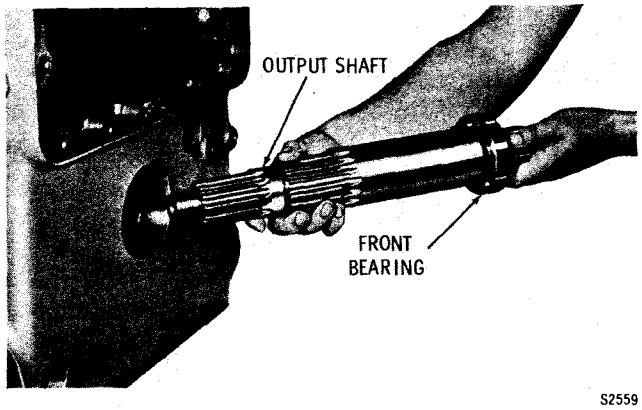


Fig. 5-63. Removing output shaft (-1 models with one-piece output shaft)

the sump area. Remove lip-type oil seal 30 (foldout 17,A) from the rear of the housing. Remove the output shaft rear bearing from its bore (fig. 5-64).

(6) Remove remaining parts from the transmission housing only if part replacement or additional servicing is required. Refer to paragraph 6-27 for the transmission housing rebuild instructions.

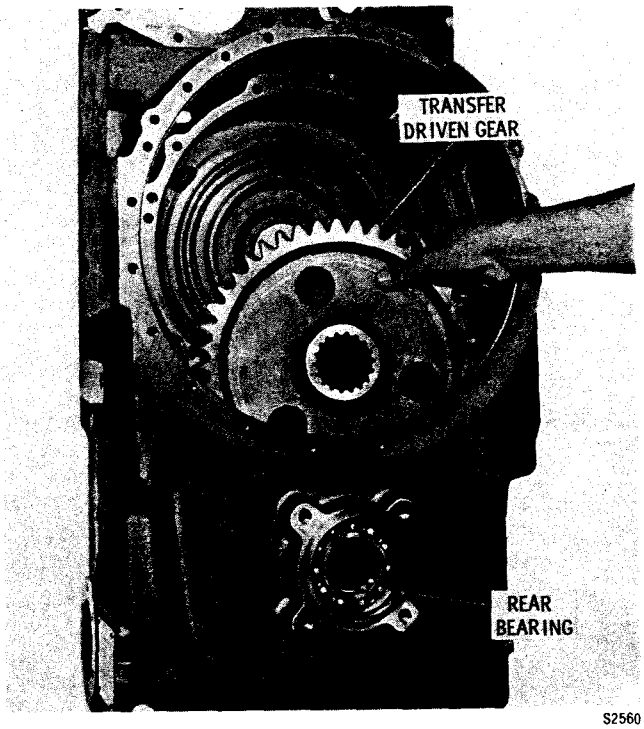


Fig. 5-64. Removing transfer driven gear (-1 models with one-piece output shaft)

b. Two-piece Output Shaft (with output disconnect)

CAUTION

If only the output shaft seal needs to be replaced, do not remove the output disconnect shifter shaft. Removal of the output disconnect shifter shaft allows the shifter fork to drop into the sump area, and partial disassembly of the transmission is required to reinstall the output disconnect shifter components. Remove and discard the failed output shaft seal. Install a new seal. Press it lightly against the shoulder in the bore.

(1) Rotate shifter fork shaft counterclockwise to remove it from the front of the transmission housing (fig. 5-65). Removal of the shifter fork shaft will allow the shifter fork to fall into the sump area. Remove the shifter fork. Remove the shifter shaft oil seal.

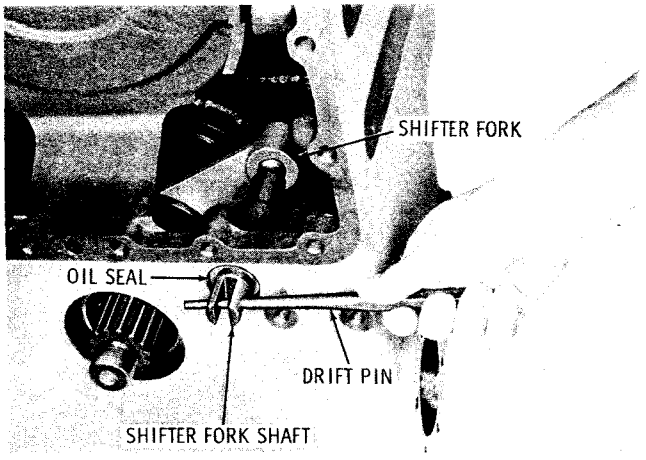


Fig. 5-65. Removing disconnect shifter shaft (-1 models with output disconnect)

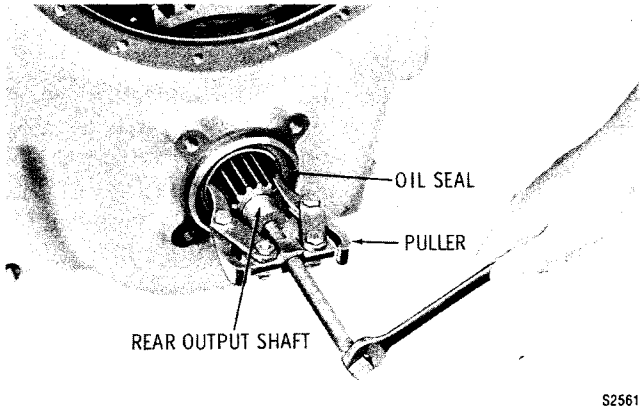


Fig. 5-66. Removing rear output shaft oil seal (-1 models with output disconnect or with no front output)

(2) Using a puller, remove the oil seal from the rear of the transmission housing (fig. 5-66).

(3) Remove the snapring that retains the rear bearing in the housing bore (fig. 5-67).

(4) Using a soft hammer, drive the front output shaft rearward until the bearing on the rear output shaft is free from the housing bore (fig. 5-68). Remove the rear output shaft and the attached bearing and spacer as an assembly (fig. 5-69). Remove the bearing only if replacement of the bearing or spacer is necessary. Do not remove bushing 22 (foldout 17,A) from rear output shaft 23 unless replacement is necessary.

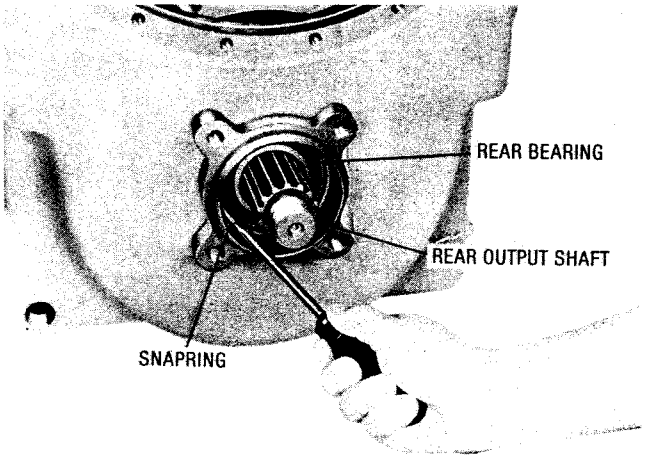


Fig. 5-67. Removing rear output shaft bearing snapring (-1 models with output disconnect or with no front output)

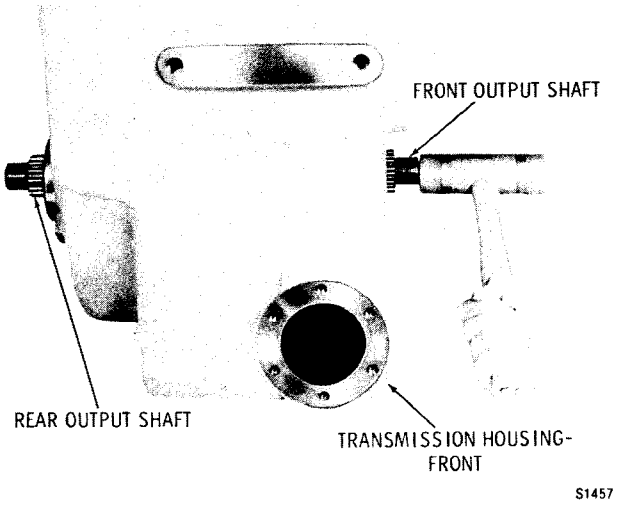


Fig. 5-68. Driving output shaft rearward (-1 models with output disconnect)

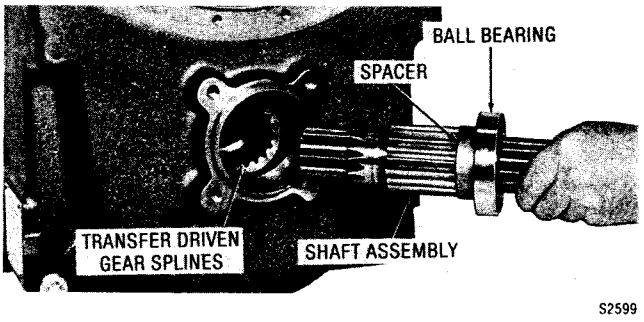


Fig. 5-69. Removing rear output shaft assembly (-1 models with output disconnect)

(5) Removal of the rear output shaft from the transmission housing will free transfer driven gear 23 and allow spacer 22 to fall

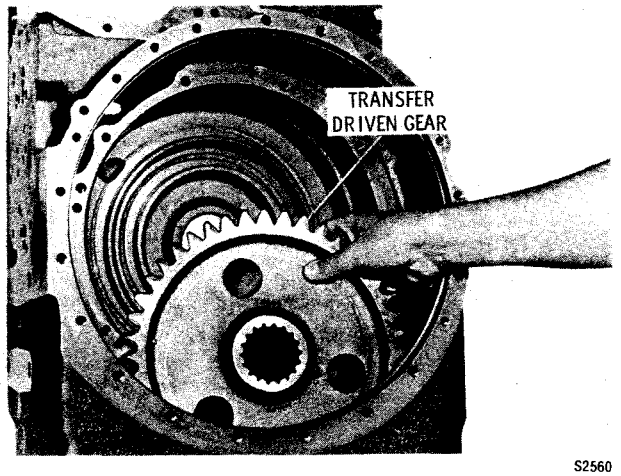


Fig. 5-70. Removing transfer driven gear (-1 models with output disconnect or with no front output)

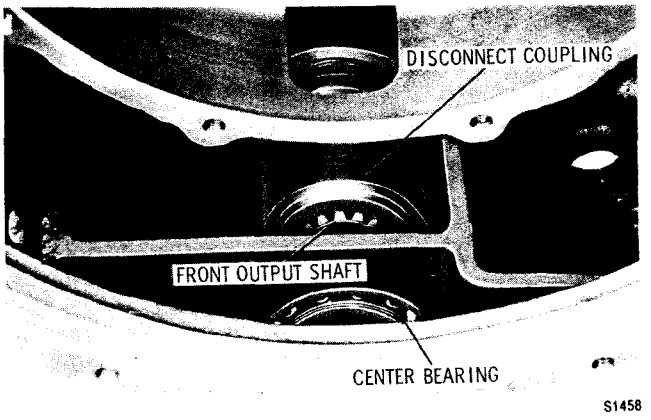


Fig. 5-71. Disconnect coupling, front output shaft, and center bearing (-1 models with output disconnect)

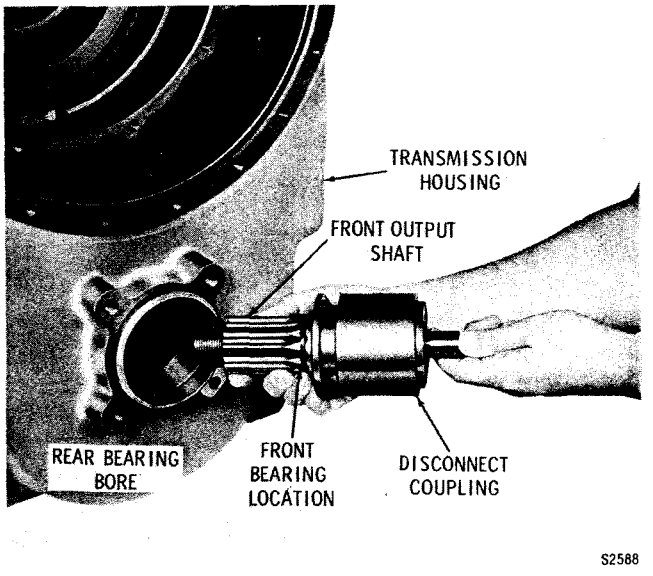


Fig. 5-72. Removing front output shaft and disconnect coupling (-1 models with output disconnect)

i n t o the sump area. Remove the transfer driven gear (fig. 5-70), and remove the fallen spacer from the sump.

(6) Remove the center bearing from its bore in the housing web (fig. 5-71).

(7) Remove the front output shaft and disconnect coupling as an assembly (fig. 5-72).

NOTE

A spring and two detent balls will be released when the disconnect coupling is removed from the front output shaft. Drape a shop towel over the assembly to prevent possible loss of the balls.

(8) Remove the disconnect coupling from the front output shaft, and place the two detent balls and spring in a parts receptacle.

(9) Using a puller, remove the oil seal from the front of the transmission housing.

(10) Remove the snapring and output shaft bearing (refer to fig. 5-61) only if replacement is necessary. If necessary, remove the snapring and, using a puller which will apply its force to the rear surface of the outer race, draw the bearing from its bore. If such a puller is not available, use a drift and tap evenly around the outer race to drive the bearing forward.

(11) Remove remaining parts from the transmission housing only if p a r t replacement or additional servicing is required. Refer to paragraph 6-27 for the transmission housing rebuild instructions.

c. Rear Output Shaft (no front output)

(1) Using a puller, remove the oil seal from the rear of the transmission housing (fig. 5-66).

(2) Remove the snapring that retains the rear bearing in the housing bore (fig. 5-67).

(3) Remove plug 8 (foldout 17,A) from the front output shaft orifice in the housing. If necessary, remove plug 16 from the front of the housing. Using a drift, drive rear output shaft 26 rearward until bearing 28 is free in its bore. Remove rear output shaft 26, spacer 27, and bearing 28 as an assembly. Remove the bearing only if replacement of the bearing or spacer is necessary.

(4) Removal of the rear output shaft from the transmission housing will free transfer driven gear 23 and allow spacer 22 to fall into the sump area. Remove the transfer driven gear (fig. 5-70), and remove the fallen spacer from the sump.

(5) Remove bearing 21 (foldout 17,A) from its bore in the housing web.

(6) Remove the remaining parts from the transmission housing only if part replacement or additional servicing is required. Refer to paragraph 6-27 for the transmission housing rebuild instructions.

Section 6. REBUILD OF SUBASSEMBLIES

6-1. SCOPE

This section contains the rebuild procedures for the subassemblies which were removed in Section 5. The rebuild procedures refer to photographs and to exploded-view foldouts in the back of this manual.

6-2. GENERAL INFORMATION FOR SUBASSEMBLY REBUILD

Refer to Sections 4 and 8 for general overhaul information as follows:

Paragraph	Title
4-3	Tools, Equipment
4-4	Replacement Parts
4-5	Careful Handling
4-6	Cleaning, Inspection
4-7	Assembly Procedures
4-11	Torque Specifications
8-1	Wear Limits Data
8-2	Spring Data

6-3. CONTROL VALVE BODY ASSEMBLY

a. Disassembly (foldout 18,B)

(1) Remove plug 6 and gasket 7 that retain main-pressure regulator valve 8 and remove the valve.

(2) Remove plug 18 and gasket 17 that retain trimmer plug 16. Remove trimmer plug 16, main-pressure regulator spring 14, spring retainer 13, and trimmer spring 15.

(3) Remove main-pressure check plug 36. Remove clutch signal pressure plug 54. Remove gasket 53 from plug 54. Remove selector valve plug 35 and gasket 34.

NOTE

For models with air-actuated clutch cutoff, proceed to step (4). For models with hydraulic-actuated clutch cutoff, proceed to step (5). For models with inching control, proceed to steps (6) through (12).

(4) Models with air-actuated clutch cutoff. Remove retainer plug 50 and gasket 23. Remove cutoff valve plug 49 from retainer plug 50. Remove sealring 22 from cutoff plug 49. Remove clutch cutoff valve 20 and valve spring 19 from control valve body 9. Proceed to step (13).

(5) Models with hydraulic-actuated clutch cutoff. Remove retainer plug 25 and gasket 23. Remove cutoff valve plug 21 from retainer plug 25. Remove sealring 22 and cup 24 from cutoff valve plug 21. Remove clutch cutoff valve 20 and valve spring 19 from control valve body 9. Proceed to step (13).

(6) Models with inching control. Remove valve stop 37. Clean the paint and dirt away from the valve body in the area of oil seal 46.

(7) If present, remove snapring 47 or retainer ring 48.

(8) Clean the outer stem of valve 42 to permit seal 46 and plug 45 to be easily removed. Insert a bolt through the linkage pin hole in inching control valve 42, and pull the valve from its bore in valve body 9. If seal 46 prevents removal of inching valve 42, break the sealant bond between the seal OD and the valve bore by driving a wood drift against the seal case.

(9) Remove seal 46, plug 45, sealring 44, and spring 43.

(10) Remove spring 41 from control valve body 9.

(11) Insert a small screwdriver from the inner (mounting) side of the valve body assembly and push inching regulator valve 39 forward to release valve stop 40. Remove valve stop 40.

(12) Remove inching regulator valve 39 and spring 38.

(13) All models. Remove plug 31 and gasket 32, and remove one spring 33 and ball 30.

NOTE

Before removing stop(s) 12, take note of the location of the stop(s). This will assist reassembly. Refer to figure 6-1.

(14) At the inner (mounting) side of control valve body 9, remove valve stop(s) 12 from range selector valve 29 or 52.

(15) If present, remove snapring 27.

(16) Insert a bolt through the linkage pin hole in selector valve 29 or 52. Being careful not to loose detent balls 30, pull the selector valve and seal 26 from the bore and remove them from control valve body 9. If seal 26 prevents removal of selector valve 29 or 52, break the sealant bond between seal OD and the valve bore by driving a wood drift against the seal case. Remove the seal from the selector valve. Remove the remaining detent ball 30 and spring 33, which were freed during removal of the selector valve.

(17) Do not remove retainer plug 11 and ball 10 from control valve body 9 unless parts replacement is necessary.

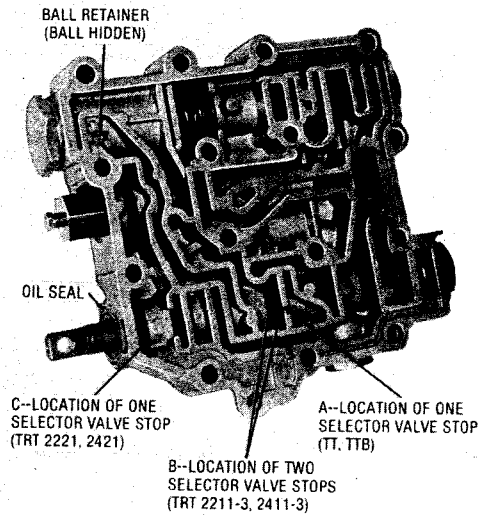


Fig. 6-1. Control valve body assembly--mounting side

(18) Remove plugs 51 and 55 if necessary.

b. Assembly (foldout 18,B)

NOTE

Before beginning assembly, refer to step (9) for possible rework of valve body 9.

NOTE

At assembly, all spool valves, when dry, must move freely, by their own weight, within their bores.

(1) If the retainer plug and ball were removed from the control valve body, install a new ball and retainer (fig. 6-1). Place the retainer plug, open end upward, over the ball. Press the retainer plug to a depth of 0.000-0.010 inch (0.25 mm) below the surface of the three supporting bosses.

(2) Install one spring 33 (foldout 18,B) and detent ball 30 into control valve body 9. Depress the ball against the spring, and install selector valve 29 or 52, linkage end last, through the seal bore of the control valve body.

(3) Install the remaining detent ball 30 and spring 33; install gasket 32 and plug 31 to retain the ball and spring. Tighten the plug to 60-70 lb ft (82-94 N·m).

(4) Position the selector valve in the middle detent position (neutral). Refer to figure 6-1 and install the selector valve stop(s) as follows:

Models	No. of Stops	Location
TT, TTB	1	A
TRT 2211, 2411	2	B
TRT 2221, 2421	1	C

(5) For models without a groove in valve body 9 for snapring 27, apply Loctite Retaining Compound No. 75 (or equivalent) onto the outer circumference of the new selector valve oil seal. Install the seal, manu-

facturer's identification numbers outward, over the linkage end of the selector valve into its bore (fig. 6-1). Press the seal into the bore to a location ±0.010 inch (0.25 mm) from the bottom of the chamfer.

(6) For models with a groove in valve body 9 for snapring 27, apply a light coat of Loctite Retaining Compound No. 75 (or equivalent) onto the outer circumference of new selector valve oil seal 26. Being careful not to load up the snapring groove with retaining compound, install seal 26, with the manufacturer's identification numbers outward, to a depth that clears the snapring groove. Clean out the snapring groove and install snapring 27.

(7) Install main-pressure regulator valve 8 (foldout 18,B), and install gasket 7 and plug 6. Tighten plug 6 to 80-90 lb ft (109-122 N·m). Install gasket 53 and plug 54. Tighten plug 54 to 30-40 lb ft (41-54 N·m).

(8) Install plugs 36, 51, and 55. Tighten the plugs to 10-12 lb ft (14-16 N·m). Install gasket 34 onto plug 35 and install the plug. Tighten plug 35 to 80-90 lb ft (109-122 N·m).

(9) Refer to figure 6-2. If main pressure regulator valve 8 (foldout 18,B) is of the earlier design, spring retainer 13 must be used. If valve 8 is of the later design, no spring retainer is used. If a later design replacement valve is to be used in an earlier valve body, rework is required (fig. 6-2).

(10) If required, install spring retainer 13, concave side first, onto the stem end of main-pressure regulator valve 8. Install main-pressure regulator spring 14, trimmer spring 15, and trimmer plug 16 into the valve bore. Install gasket 17 and plug 18. Tighten plug 18 to 90-100 lb ft (123-135 N·m).

NOTE

For models with inching control, proceed to steps (11) through (16). For models with hydraulic-actuated clutch cutoff control, proceed to step (17). For models with air-actuated clutch cutoff, proceed to step (18).

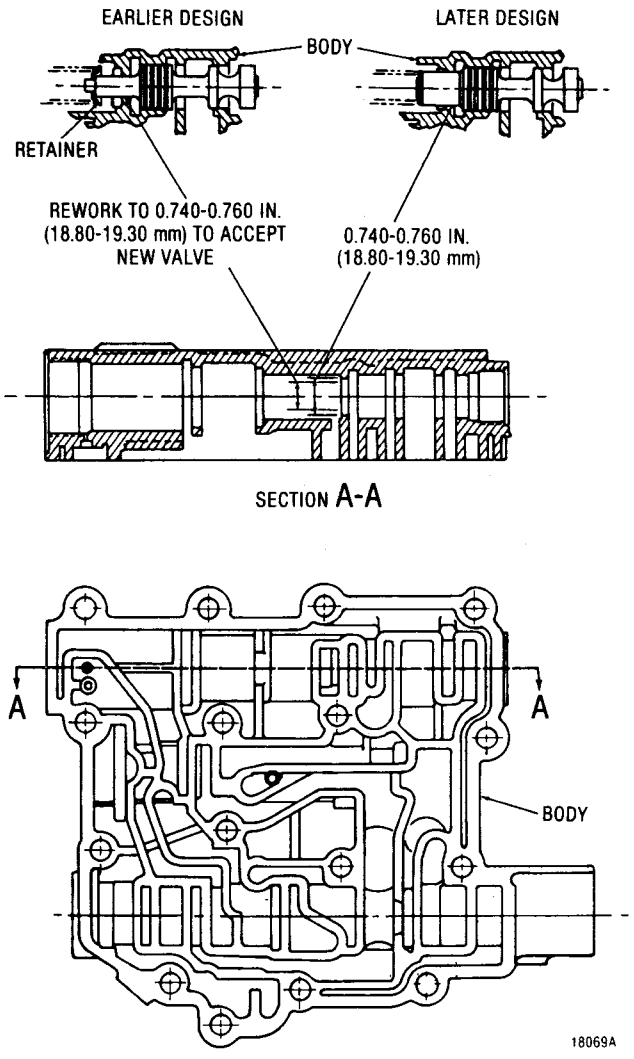


Fig. 6-2. Control valve body rework area (earlier models with new valve)

(11) Models with inching control. Install spring 38 and valve 39. Using a small screwdriver, push valve 39 forward and install valve stop 40 to retain valve 39 against spring 38.

(12) Install spring 41, valve 42, and spring 43.

(13) Install sealring 44 onto plug 45.

(14) Install plug 45, larger bore first, over the stem of valve 42. Push plug 45 in until it seats, hold it against spring 43, and install stop 37 to retain plug 45.

(15) For models without a groove in valve body 9 for snapring 47, apply Loctite

Retaining Compound No. 75 (or equivalent) onto the outer circumference of new oil seal 46. Install the new seal, manufacturer's identification numbers outward, over the stem of valve 42. Press the seal to a location ±0.010 inch (0.25 mm) from the bottom of the chamfer. Install push-on retaining ring 48.

(16) For models with a groove in valve body 9 for snapring 47, apply a light coat of Loctite Retaining Compound No. 75 (or equivalent) onto the outer circumference of new oil seal 46. Being careful not to load up the snapring groove with retaining compound, install seal 46, manufacturer's identification numbers outward, to a depth that clears the snapring groove. Install snapring 47.

(17) Models with hydraulic-actuated clutch cutoff. Assemble valve spring 19 onto clutch cutoff valve 20 and install the assembly, spring first, into valve body 9. Install sealring 22 onto cutoff valve plug 21. Install cup 24, small diameter first, onto the stemmed end of the cutoff valve plug. Lubricate and install the assembled cutoff valve plug, cup first, into the smooth bore end of retainer plug 25. Install retainer plug 25 and gasket 23. Tighten plug 25 to 60-70 lb ft (82-94 N·m). Cover the exposed orifice in the retainer plug until the hydraulic brake line is to be attached.

(18) Models with air-actuated clutch cutoff. Assemble valve spring 19 onto clutch cutoff valve 20 and install them, spring first, into valve body 9. Install sealring 22 onto cutoff valve plug 49. Lubricate and install the assembled cutoff valve plug, sealring first, into the smooth bore end of retainer plug 50. Install retainer plug 50 and gasket 23. Tighten plug 50 to 60-70 lb ft (82-94 N·m). Cover the exposed orifice in the retainer plug until the air-actuated cylinder assembly is to be connected.

6-4. TRANSMISSION FRONT COVER

a. Disassembly (foldout 6,A). If replacement of oil seal 11 is necessary, drive the seal out of the front of front cover 13.

b. Assembly (foldout 6,A)

(1) Install seal 11, spring-loaded lip first, straight into the bore in front cover 13.

(2) If the transmission is equipped with input shaft 18, press oil seal 11 into cover 13 until it bottoms lightly against the bore shoulder. If the transmission is equipped with input shaft 23, press oil seal 11 into cover 13 to a depth of 0.230-0.290 inch (5.9-7.3 mm) below the lead chamfer in the bore.

6-5. TORQUE CONVERTER DRIVE COVER

a. Disassembly (foldout 6,A)

(1) Using a puller, remove bearing 15 from input shaft 18 or 23.

(2) Straighten the ears of lockstrips 17, and remove six bolts 16. Remove input shaft 18 from torque converter drive cover 20, or input shaft 23 from torque converter drive cover 24.

b. Assembly (foldout 6,A)

(1) Install input shaft 23 onto torque converter drive cover 24, or input shaft 18 onto torque converter drive cover 20. Install three new lockstrips 17 and six 1/2-13 x 1-1/8-inch bolts 16. Tighten the bolts to 67-80 lb ft (91-108 N·m). Bend corners of lockstrips 17 against the heads of bolts 16.

(2) Install shielded bearing 15, shield side upward, onto input shaft 18 or install plain bearing 15, manufacturer's identification upward, onto input shaft 23. Press the bearing firmly to a seat against the shoulder of the input shaft.

6-6. FIRST- AND SECOND-TURBINE ASSEMBLY

a. Disassembly (foldout 7,A)

(1) Locate the index marks (V-groove) in the outer rims of the first-turbine support and the first turbine (fig. 6-3). Make sure these marks are well de-

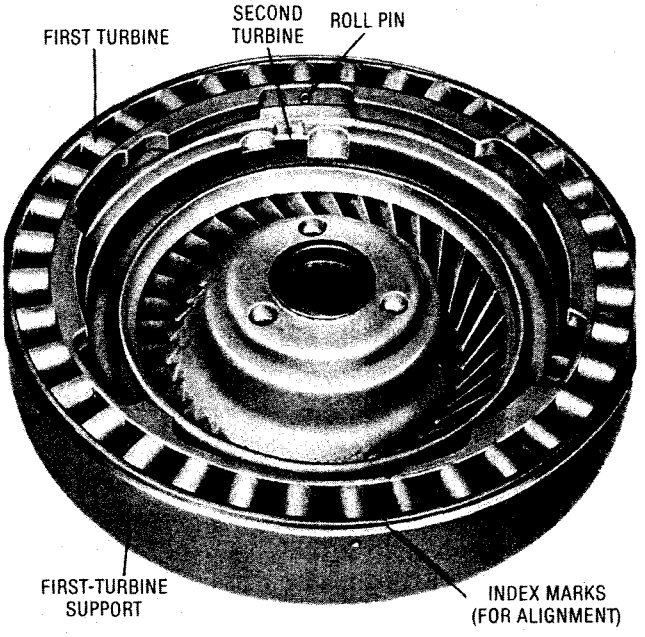


Fig. 6-3. First- and second-turbine assembly

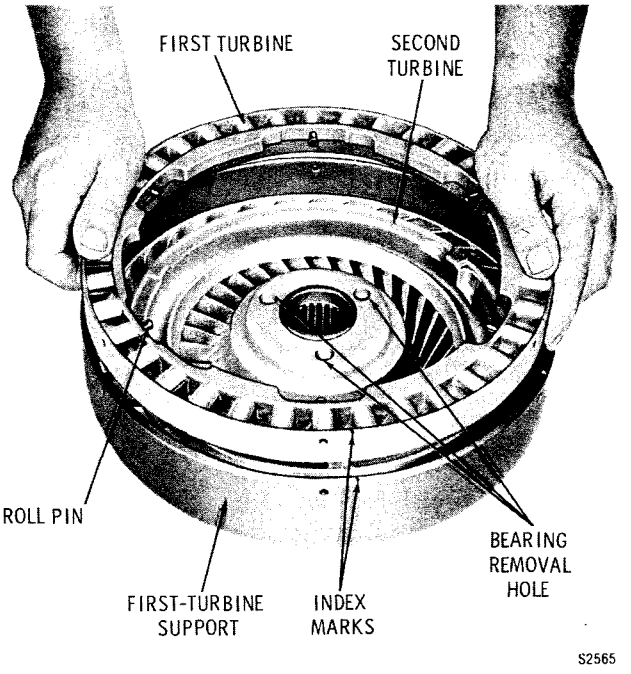


Fig. 6-4. Removing (or installing) first turbine

fined in both parts. If the marks are not prominent, deepen them to 0.040 inch (1 mm) (maximum) before continuing with disassembly.

(2) Drive (but do not remove) the six (or nine) roll pins inward toward the hub until they clear the holes in the first-turbine support (fig. 6-3). Remove the roll pins only if replacement is necessary.

(3) Remove the first turbine from its support (fig. 6-4). Remove the second turbine and its bearing from the first-turbine support.

(4) If replacement is necessary, remove bearing 8 (foldout 7,A) from second turbine 6 by pressing lengths of drill rod through the three removal holes in the hub of second turbine 6. Remove snapring 7 from second turbine 6 only if replacement is necessary.

(5) If replacement is necessary, remove bearing 1 from first-turbine support 3 by pressing lengths of drill rod through the removal holes in the hub of first-turbine support 3.

b. Assembly (foldout 7,A)

(1) If removed, install bearing 1. Position the bearing, manufacturer's identification outward, and press it firmly to a seat against the hub of support 3.

(2) If removed, install bearing 8. Position the bearing, manufacturer's identification outward, and press the bearing firmly to a seat against the hub of second turbine 6. If snapring 7 was removed, install its replacement.

(3) Install the second-turbine (and bearing) into the first-turbine support (fig. 6-4).

(4) Install the first turbine into the first-turbine support and align the V-groove index marks (fig. 6-4).

(5) Drive the six (or nine) roll pins outward to a depth of 0.000-0.030 inch (0.76 mm) below the outer surface of the first-turbine support (fig. 6-3).

6-7. TORQUE CONVERTER PUMP

a. Disassembly (fig. 6-5)

(1) Straighten the ears of the six lockstrips. Remove the twelve bolts that attach the pump retainer and input accessory drive gear to the torque converter pump. Remove the six lockstrips, pump retainer, input accessory drive gear, and bearing. Remove gasket 17 (foldout 7,A) or O-ring 21, if present.

(2) Inspect the twenty-four special bolts around the circumference of the pump. Remove any defective bolts by pressing them from the pump flange.

b. Assembly (fig. 6-5)

(1) If any of the special bolts were removed from the pump, install their replacements. Align the flat side of the bolt head next to the pump and press the new bolt into place.

(2) Using drive tool J-23723-6, install double-row ball bearing 18 (foldout 7,A), loading notch upward, into accessory drive gear 19.

(3) Place gasket 17 or sealring 21 onto input accessory drive gear 19. Install converter pump 15 onto drive gear 19, bearing 18, and gasket 17 or O-ring 21, aligning the bolt holes in the pump with those in the gear and gasket, if used.

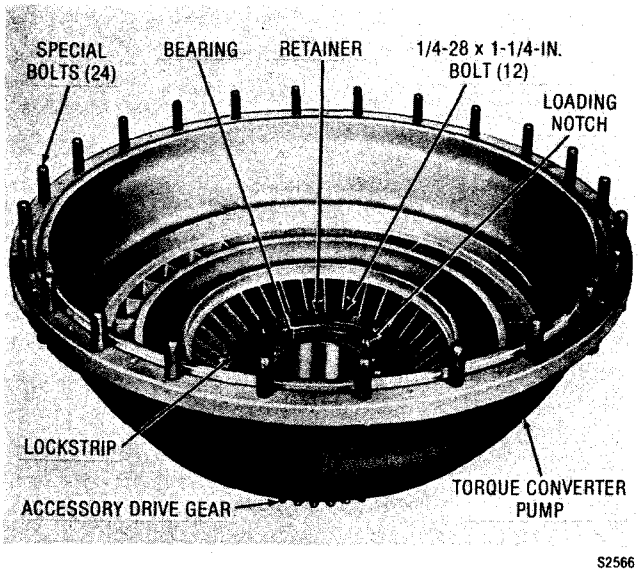


Fig. 6-5. Torque converter pump assembly

(4) Install pump retainer 14, and install six lockstrips 13 and twelve 1/4-28 x 1-1/4-inch bolts 12. Tighten the bolts to 10-12 lb ft (14-16 N·m). Bend the lockstrip ears against the bolt heads (fig. 6-5).

6-8. TORQUE CONVERTER HOUSING

a. Disassembly (foldout 7,B)

NOTE

If the transmission does not include the diaphragm shown in figure 6-6, begin disassembly at step (5).

(1) "Dry" converter housings. If the transmission has a "dry" converter housing, it will have a pressed steel diaphragm and oil seal (fig. 6-6). These must be removed before the accessory gearing can be removed. Removal of the diaphragm destroys the diaphragm and seal.

(2) To remove the diaphragm, cut a slit through the diaphragm, as shown in figure 6-6. Insert a hooked tool into the slit and pry the metal above the slit outward. This will push the metal below the slit inward. Deforming the diaphragm in this manner will reduce its outside diameter and allow the diaphragm to be lifted from the converter housing.

(3) Clean the bore from which the diaphragm was removed. A smooth, clean bore will prevent leakage after the new diaphragm has been installed.

(4) Remove the cup plug from the converter housing only if replacement is necessary (fig. 6-6). If necessary, drive the plug from its bore, and clean the bore from which the plug was removed.

(5) All models. Remove step-joint sealring 50 (foldout 7,B) from converter housing sleeve 40. If replacement is necessary,

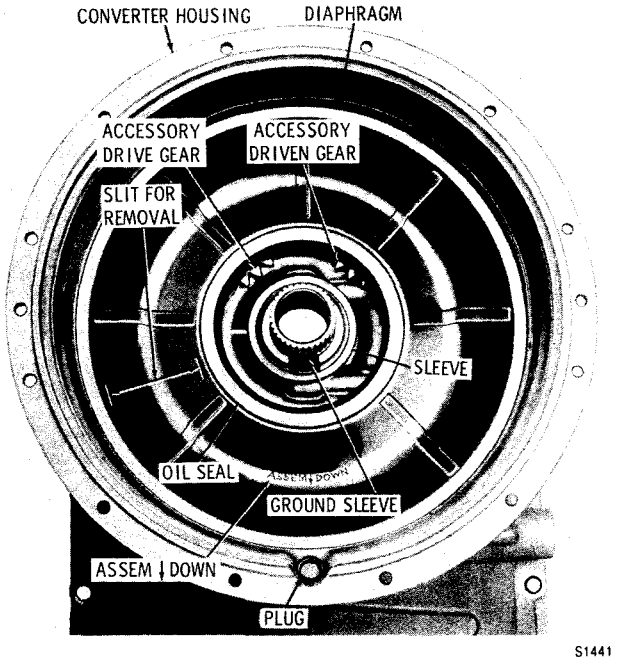


Fig. 6-6. Torque converter housing—front view (models with "dry" converter housing)

remove sleeve 40 from the front of converter housing 38.

(6) At the rear of the converter housing, remove the snapring that retains the outer race of the accessory-driven gear bearing (fig. 6-7). Tap the accessory-driven gear forward and remove it and the attached parts from the housing.

(7) Remove the outer race and rollers of bearing 12 (foldout 7,B). Press the inner race of bearing 12 from accessory-driven gear 2. Remove snapring 11 and bearing 10 or separable bearing 45.

(8) On transmissions equipped with an accessory drive gear, remove the snapring from the accessory gear bearing (fig. 6-7). Tap the accessory drive gear forward and remove it and the attached parts from the housing.

(9) Remove snapring 7 (foldout 7,B) and bearing 6 from accessory drive gear 1.

(10) Use care during this operation to prevent damage to the protruding converter pressure regulator valve 23 or lubrication bypass tube 30, if present. If replacement of the ground sleeve is necessary, remove the four attaching bolts and press the sleeve from the converter housing (fig. 6-7).

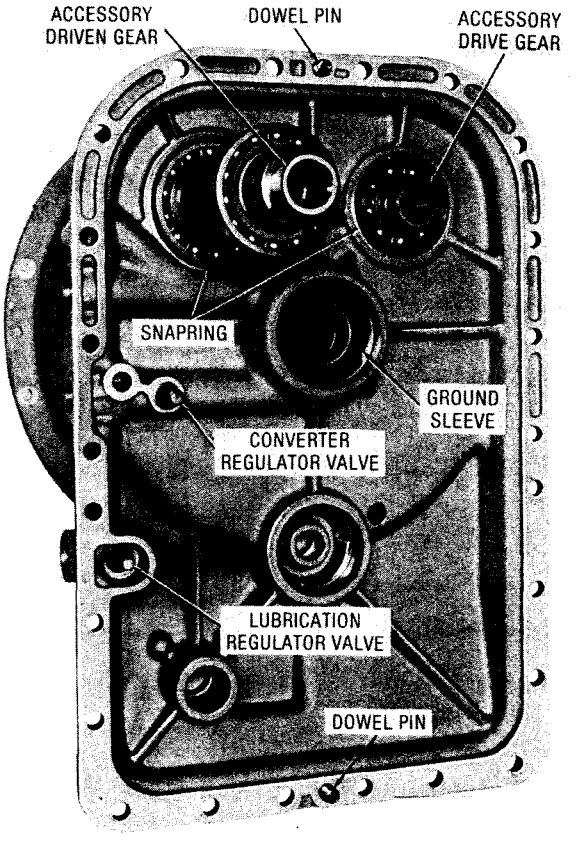


Fig. 6-7. Torque converter housing--rear view

(11) If converter pressure regulator valve spring 22 (foldout 7,B) is not colored light blue or if other replacement is necessary, drive pin 21 rearward with a pin drift and remove spring 22 and valve 23.

(12) If the lubrication regulator valve components 18, 19, and 20 require replacement, remove them by twisting pin 18 from the converter housing.

(13) If the transmission is equipped with an internal thermostat, remove lubrication bypass tube 30 and thermostat assembly 31. Remove sealring 33 from thermostat assembly 32.

(14) Do not remove plugs 37 or 39 unless necessary for cleaning or replacement. Do not remove dowel pins 41 unless necessary for replacement.

b. Assembly (foldout 7,B)

(1) If plug 37 was removed, replace it. Tighten it to 33-37 lb ft (45-50 N·m). If plug 39 was removed, replace it. Tighten it to 23-27 lb ft (32-36 N·m). If dowel pins 41 were removed, install new dowel pins. Press the pins to a height of 0.430-0.450 inch (10.92-11.43 mm) above the housing splitline.

(2) If the transmission is equipped with an internal thermostat assembly, install lubrication bypass tube 30 into the rear face of converter housing 38. Install sealring 33 onto the thermostat and install thermostat assembly 32 into the converter housing, as shown in figure 6-8.

(3) If lubrication regulator valve 20 (foldout 7,B) was removed, install spring 19 and valve 20 onto guide pin 18. Install the assembled parts, pressing pin 18 into housing 38 to a depth of 0.000-0.010 inch (0.25 mm) below the housing splitline. Refer to the Note below step (4).

(4) If converter pressure regulator valve 23 was removed, install spring 22 (spring 22 must be light blue) and valve 23 onto guide pin 21. Install the assembled parts, pressing pin 21 to a height of 1.16-1.18 inches (29.4-29.9 mm) above the top of the valve.

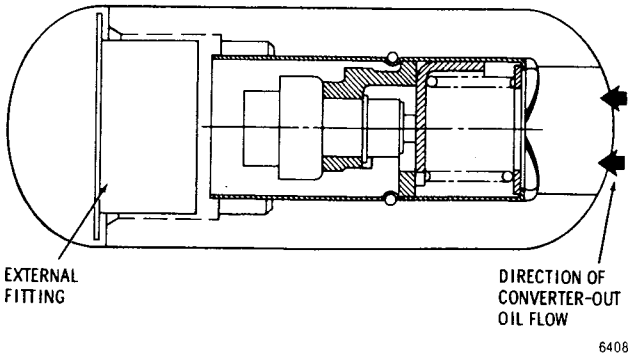


Fig. 6-8. Installation of thermostat assembly

NOTE

If the press fit of pins 18 or 21 is not satisfactory, clean the bore and pin of all oil residue and apply Loctite Grade B (Loctite Corp., Newington, Conn.) or equivalent to the bore and mating surface of the pin. Install the pin as described. Allow the sealant to cure for two hours at room temperature.

(5) If ground sleeve 13 was removed, chill the replacement sleeve in dry ice for at least 1 hour. Align the bolt holes in ground sleeve 13 with those in housing 38, and press the sleeve to a firm seat against the rear of the housing. Install four 5/16-18 x 3/4-inch, self-locking bolts 14, and tighten them to 17-20 lb ft (24-27 N·m).

(6) If the transmission is equipped with accessory drive gear 1, install bearing 6, with snapring groove away from the gear. Install snapring 7 to retain bearing 6.

(7) Install accessory drive gear 1 and bearing (outer race snapring removed) into the front of housing 38. Install the snapring onto the outer race of the bearing.

(8) Install bearing 10 or the outer race and rollers of bearing 45, with its snapring groove away from the gear, onto accessory-driven gear 2. If bearing 45 is used, install the bearing inner race, flanged side away from the gear. Install snapring 11 to retain the bearing. Press bearing 12 inner race, flange first, against the rearward seat on accessory-driven gear 2. Install the outer race and rollers of bearing 12.

(9) Install accessory-driven gear 2 and assembled bearings (outer race snapring removed) into the front of housing 38. Install the snapring onto the outer race of bearing 10 or 45.

(10) If converter housing sleeve 40 was removed from housing 38, install a new sleeve. Heat the sleeve for ease of replacement. Press converter housing sleeve 40,

sealring groove last, onto the hub of housing 38. Seat the sleeve firmly against the shoulder on the hub. Install stepjoint sealring 50 into the groove in the converter housing sleeve. Retain the sealring with oil-soluble grease.

NOTE

This completes procedures for "wet" torque converter housings. For "dry" torque converter housings, proceed to step (11).

(11) "Dry" converter housings. Coat the outer diameter of a new diaphragm and seal assembly with nonhardening sealer and start it, convex side first and arrow pointing toward bottom of transmission, into the front of the converter housing (fig. 6-6). Using two soft hammers (one driving against the other or a block of wood contoured to the circumference of the diaphragm), drive the diaphragm assembly onto its seat in the housing bore. Move the driver evenly around the circumference, driving only slightly at each position.

(12) If plug 49 (foldout 7,B) was removed, coat the outer diameter of the new plug with nonhardening sealer. Drive plug 49, flat side first, into the converter housing, and seat it against the shoulder in the bore.

6-9. TURBINE-DRIVEN GEARS AND FREEWHEEL CLUTCH

a. Disassembly (foldout 8,A)

(1) Press the second-turbine driven gear out of the assembled unit (fig. 6-9). This will free spacers 29 and 31 (foldout 8,A) and bearing 32 which may be removed. Remove fifteen rollers 9 or 23, also freed.

(2) Remove bearing 30 from gear 28. Remove twelve nuts 2 or 16 from bolts 14 or 27.

(3) Using a screwdriver, pry cam assembly 10 or 24 away from gear 3 or 17. Remove spring plate 5 or 19 and roller cage 8 or

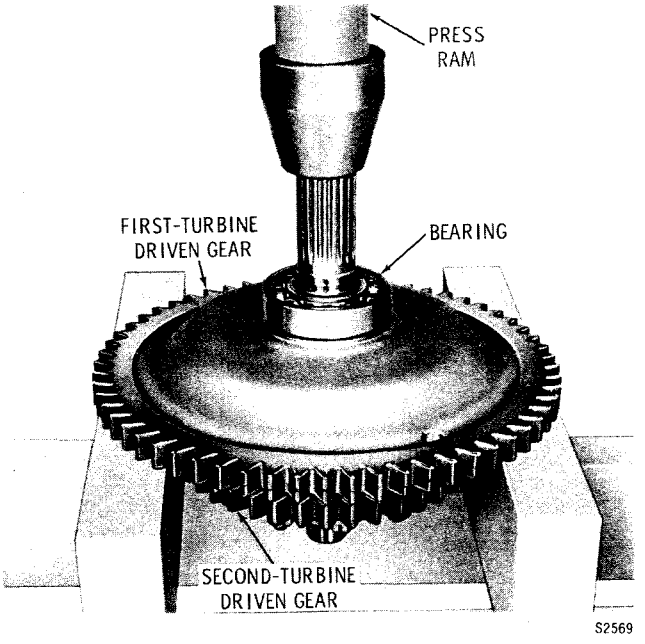


Fig. 6-9. Pressing second-turbine driven gear assembly from freewheel clutch assembly

22. Remove three spring pins 6 or 20 and springs 7 or 21 from the roller cage. Remove bolts 14 or 27 and retainer plate 13 (if present). Remove roll pin 11 or 25 from cam 12 or 26 if replacement is necessary.

(4) If replacement is necessary, remove bearings 1 or 15 and 4 or 18 from gear 3 or 17.

b. Assembly (foldout 8,A)

(1) If bearings 1 or 15 and 4 or 18 were removed from gear 3 or 17, install the bearings by pressing them against the shoulders on the gear.

(2) Install the roll pin into the cam and press it to the bottom of the bore (fig. 6-10).

(3) Insert the roller cage into the freewheel cam, and align the index marks on the cam and cage as shown in figure 6-10. Install the spring retainer plate onto the cam, indexing the small hole with the roll pin.

(4) Install the three springs and spring pins into the bored ears of the roller cage (fig. 6-11).

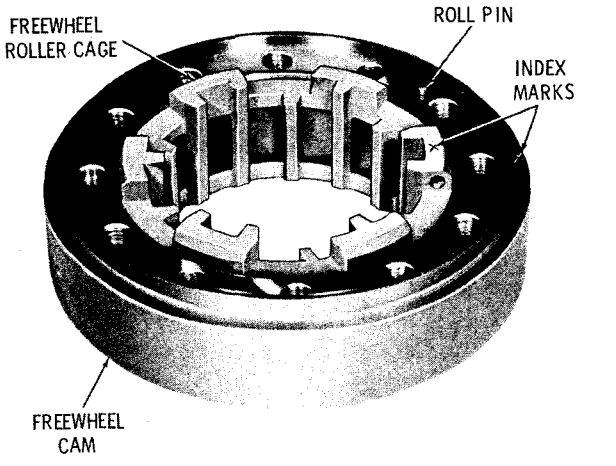


Fig. 6-10. Freewheel roller cage installed in freewheel cam

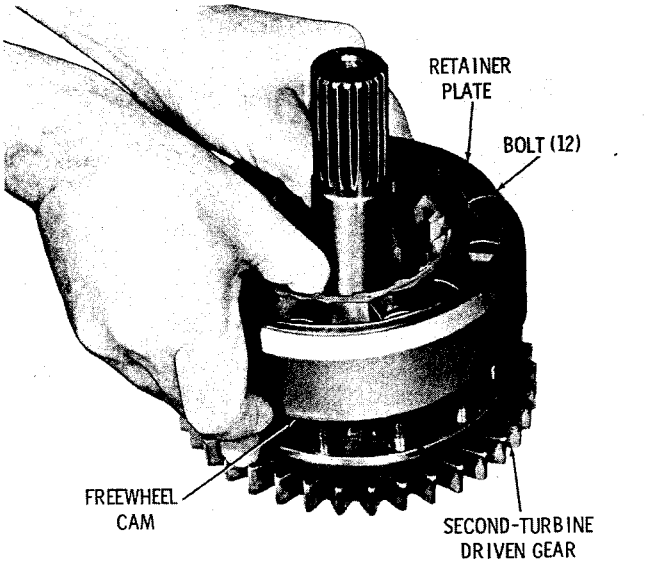


Fig. 6-12. Installing assembled cam onto assembled second-turbine driven gear

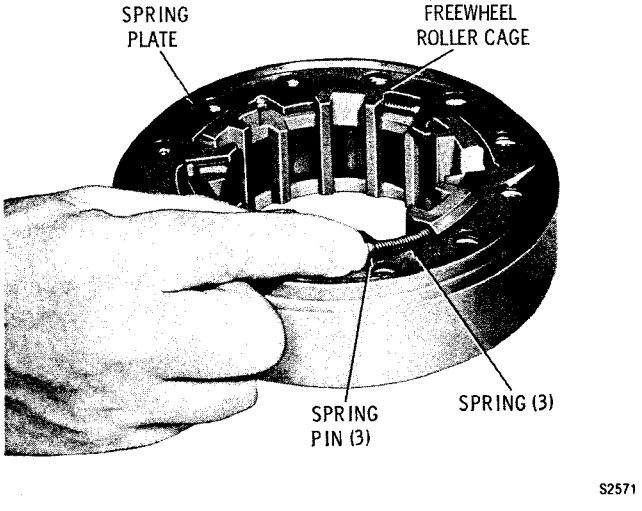


Fig. 6-11. Installing spring and spring pin into roller cage

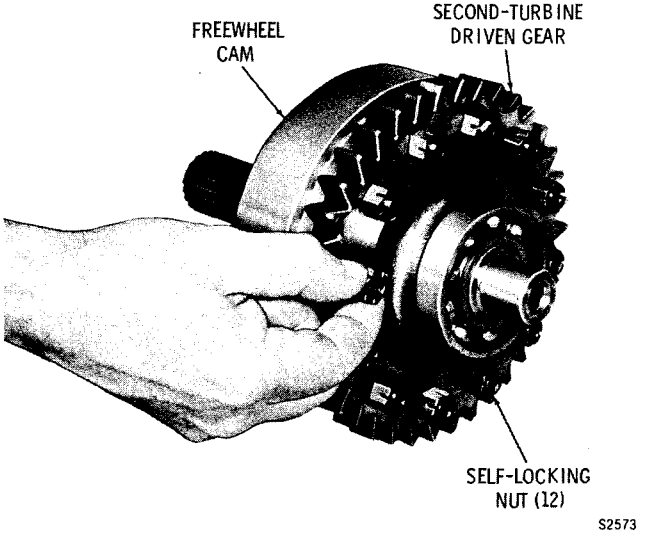


Fig. 6-13. Installing self-locking nut onto freewheel cam bolt

(5) If applicable to the model, place retainer plate 13 (foldout 8,A), flat side first, against the rear face of the assembled cam and cage. Insert twelve bolts 14 or 27. Install the assembled cam onto the assembled second-turbine driven gear (fig. 6-12).

(6) Secure the assembled parts with twelve self-locking nuts (fig. 6-13). To prevent rotation of the bolt heads, use a fabricated wrench or an open-end wrench, and tighten the nuts to 41-49 lb ft (56-66 N·m).

(7) Install fifteen rollers into the cam pockets; use oil-soluble grease to retain the rollers in the cage (fig. 6-14).

(8) Install the first-turbine driven gear by placing the lead chamfer on the gear hub against rollers, and while pressing downward, rotate the first-turbine driven gear in a counterclockwise direction (fig. 6-15).

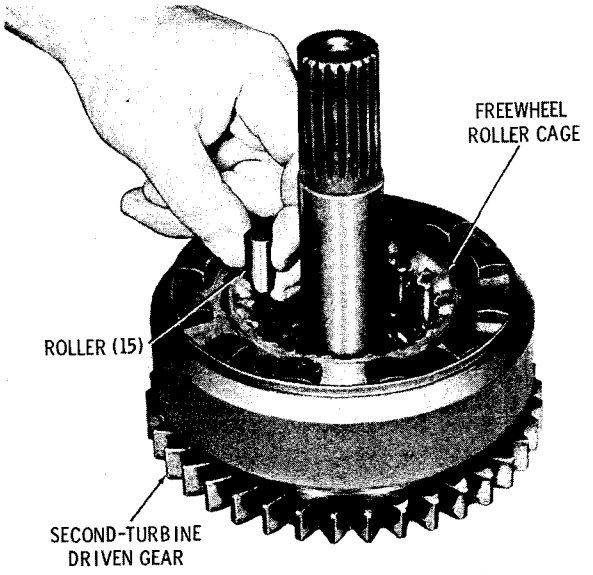


Fig. 6-14. Installing roller into roller cage

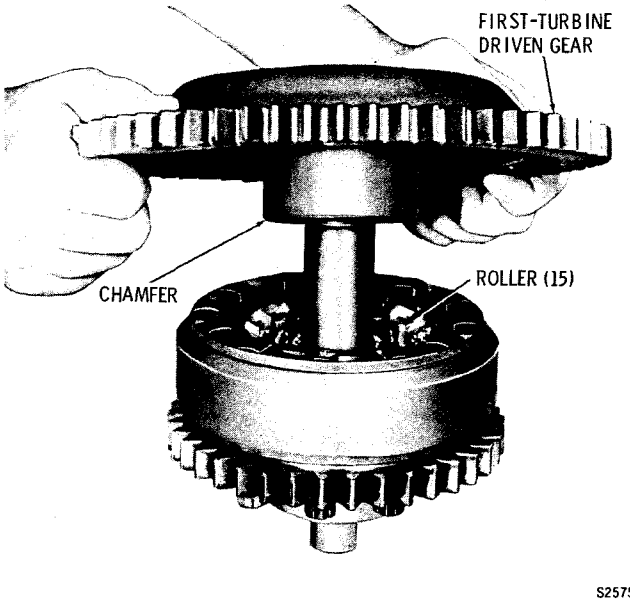


Fig. 6-15. Installing first-turbine driven gear

(9) Install the bearing spacer onto the shaft of the second-turbine driven gear (fig. 6-16).

(10) Install the remaining bearings and spacer, as shown in figure 6-17, onto the shaft of the second-turbine driven gear. Accurately center the spacer to prevent it from getting caught on the shaft shoulder. Press

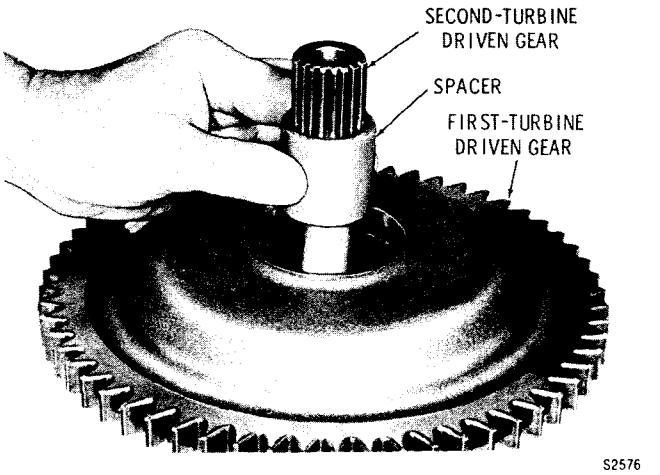


Fig. 6-16. Installing bearing spacer onto second-turbine driven gear

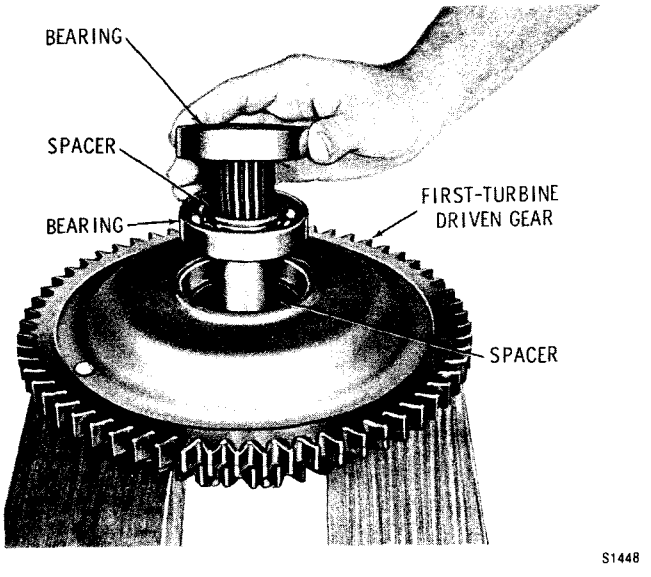


Fig. 6-17. Installing bearings and spacer onto second-turbine driven gear

the bearings and spacer firmly into place while supporting the second-turbine driven gear.

6-10. FIRST-TURBINE DRIVE GEAR AND BEARING ASSEMBLY

a. Disassembly (foldout 7,B)

(1) If bearing 29 can be easily pressed from first-turbine drive gear 28, remove the

bearing. If unusual resistance is encountered, heat the inner race of bearing 29 to 450°F (232°C) and press first-turbine drive gear 28 from the bearing.

(2) If the bearing did not easily press from the drive gear, discard bearing 29 and clean the journal of gear 28.

b. Assembly (foldout 7,B)

(1) Apply Loctite Retaining Compound, or equivalent, to the ID of new bearing 29 and its journal on first-turbine drive gear 28.

(2) Press bearing 29 firmly against its seat on first-turbine drive gear 28. Allow assembled parts to cure for two hours at room temperature.

6-11. CLUTCH PISTON HOUSING

NOTE

These procedures will rebuild any of the assemblies listed in Table 6-1.

Table 6-1. PISTON HOUSING ASSEMBLIES

	FOLDOUT	HOUSING	PISTON	SEALRING (EXPANDER)	HOOK-TYPE SEALRING	SPRING	SNAPRING
High-Range Clutch Piston Housing							
TT	11,B	24, 34, 36, 37	19	20 (21), 39	18	17	16
TTB	15,A	22, 35	19	20 (21), 38	18	17	16
TRT -1	12,B; 16,A	2	23	21 (20)	22	19	18
TRT -3 w/underdrive	13,A	4	8	6 (5)	7	9	10
TRT -3 w/overdrive	14,B; 16,B	2	17	15 (14)	16	13	12
Low-Range Clutch Piston Housing							
TRT -1	12,A	15	19	17 (16)	18	20	21
TRT -3 w/underdrive	13,B; 16,B	2	23	21 (20)	22	19	18
TRT -3 w/overdrive	14,A	4	8	6 (5)	7	9	10

a. Disassembly

NOTE

For high-range clutch piston housing, if the transmission is equipped with a speedometer drive assembly, proceed to step (1). Otherwise, proceed to step (2).

(1) Speedometer drive models, high-range. Remove sealrings 27 and 29 (foldout 11,B), and drive pin 25 from the hub of high-range clutch piston housing 24. Remove speedometer drive shaft 26 and bearing 28 from the high-range clutch piston housing.

(2) If present, remove the bearing from the housing.

(3) Position the piston and housing, piston side up, in a press. Use care to prevent damage to the assembly. Depress the belleville spring and remove the snapring (fig. 6-18).

(4) Remove the piston and sealring (and expander, if present) from the piston housing. Refer to paragraph 6-12 for clutch piston rebuild instructions.

(5) Remove the hook-type sealring from the inner hub of the housing.

(6) Remove the bushing and sleeve from the piston housing only if replacement is necessary.

b. Assembly

(1) If a bushing was removed from the housing, install a new bushing. Press the new bushing to a depth of 0.040-0.080 inch (1.01-2.03 mm) below the face of the hub. If a sleeve was removed, install a new sleeve. Press the new sleeve against the shaft shoulder.

(2) Install the hook-type sealring onto the inner hub of the housing. Install the piston, with sealring (and expander) in place (as assembled in para 6-12), into the housing.

(3) Install the belleville spring, convex side up, onto the piston. Place the assembled parts, piston side upward, in a press. Depress the spring and install the snapring (fig. 6-18).

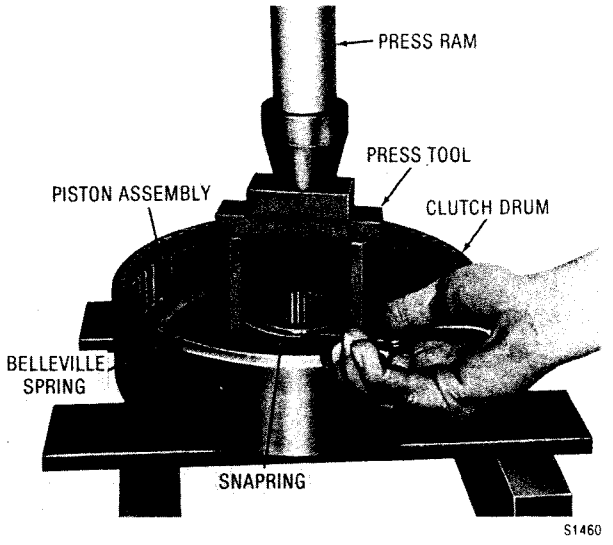


Fig. 6-18. Removing (or installing) piston return spring (typical configuration)

(4) If a bearing was removed from the rear hub of the housing, install the bearing.

(5) If the transmission is equipped with a speedometer drive assembly, install sealrings 27 and 29 (foldout 11,B) onto the hub of high-range piston housing 24. Install speedometer drive shaft 26 into the rear hub of piston housing 24. Install pin 25 through the hub of the piston housing and drive shaft. Press the pin to a depth of 0.020-0.040 inch (0.51-1.01 mm) below the surface of the piston housing hub.

(6) For TRT 2221-1, 2421-1 models, refer to paragraph 6-22 for rebuild of the rear housing; for TRT 2221-3, 2421-3, paragraph 6-23.

6-12. CLUTCH PISTON ASSEMBLIES

NOTE

Warming Teflon sealrings in oil at 150°F (65°C) will make them easier to remove and install.

a. Disassembly

(1) Do not use sharp-edged or pointed tools to remove Teflon sealrings. Rather,

slip a very thin, flat blade into piston groove between the sealring and side of the groove and work the seal out of the groove until it can be grasped with the fingers. Remove and discard the sealring.

(2) Remove the expander, if present, from the groove in the piston.

(3) Check for the presence of three holes in the piston. One hole should be clear. The other two holes have ball check valves. The ball should be clean and seat properly.

(4) If the balls need to be replaced, pry the retainer plugs from the piston and remove the balls. Discard the retainer plugs and balls.

b. Assembly

(1) If the retainer plugs and balls were removed, replace them in accordance with the instructions contained in the parts kit. (See Parts Catalog SA 1248.)

(2) For pistons that use an expander with the sealring, install the expander into the groove in the piston. Make sure the free ends of the expander turn away from the sealring (fig. 6-19). The ends of some expanders may require additional bending to ensure they turn toward the bottom of the groove.

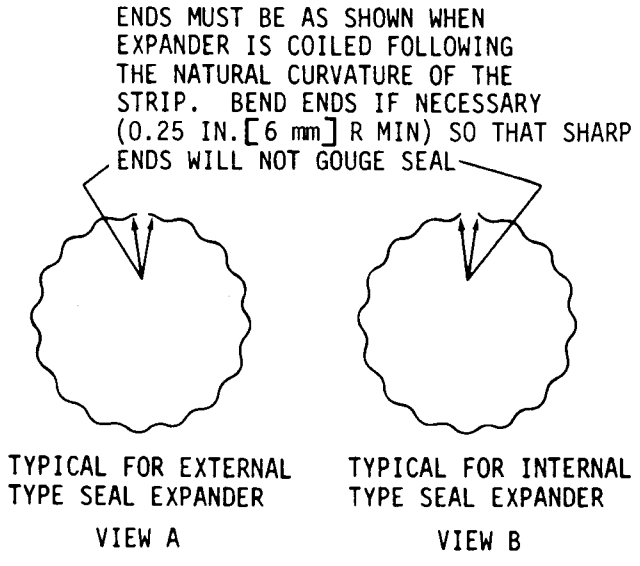


Fig. 6-19. Typical expanders for teflon sealrings

(3) Oil the installed expander and sealring. Start the sealring into the piston groove at a point directly opposite the gap in the expander.

(4) Carefully work the sealring into the groove, compressing the expander while moving both directions from the starting point to the expander gap location. Do not stretch or distort the sealring more than absolutely necessary.

(5) For sealrings that do not require expanders, install the lip-type sealring into the groove of the piston. Make sure that the lip of the sealring is toward the oil-pressure side of the piston. Refer to the exploded-view foldout for illustrations of lip directions.

CAUTION

Clutch application or leakage will occur if sealrings are improperly installed (lip in wrong direction).

(6) After installation, adjust the sealring in the groove to center it radially in the piston.

6-13. HIGH-RANGE CLUTCH AND HUB (TT, TTB)

a. Disassembly (foldout 11,B for TT; or foldout 15,A for TTB)

(1) Position the assembly so that nuts 6 and lockstrips 7 are upward. If the transmission is not equipped with a power takeoff, remove snapring 11 from hub 12.

(2) Flatten the corners of six lockstrips 7 and remove twelve nuts 6. Remove twelve bolts 15 and washers 14.

(3) Separate hub 10 or 12 from clutch plates 8, 9, and 13.

b. Assembly (foldout 11,B for TT; or foldout 15,A for TTB)

(1) Assemble twelve flat washers 14 onto twelve 5/16-24 x 7/8-inch, self-locking bolts 15. Install bolts 15 into clutch plate 13.

(2) Install clutch hub 10 or 12 onto the bolt and clutch plate assembly. Note that the long end of hub 10 or the unsplined end of hub 12 should be at the same side of clutch plate 13 as washers 14.

(3) Install external-tanged plate 9 onto the front side of clutch plate 13. Install clutch plate 8 onto the front side of external-tanged plate 9, engaging bolts 15.

(4) Install six lockstrips 7 and twelve 5/16-24 nuts 6. Tighten the nuts to 14-18 lb ft (19-24 N·m), and bend the lockstrip corners against the bolt heads.

(5) On models using hub 12, install snapring 11 into its groove on the splined shaft.

6-14. CLUTCH ANCHOR (TRT 2221-1, 2421-1, 2221-3, 2421-3)

NOTE

These procedures are for anchor assembly 12 (foldout 12,B), anchor assembly 12 (foldout 13,B), or anchor assembly 3 (foldout 14,B). Callouts are for foldout 12,B unless otherwise noted.

a. Disassembly

(1) Disassemble anchor assembly 12 only if parts replacement is necessary.

(2) Position the assembly, pins downward, in a press. Press pins 14 and 15 out of anchor 13.

b. Assembly

NOTE

Chill pins 14 and 15 in dry ice for at least 1 hour before installing them into anchor 13.

CAUTION

For anchor 13 (foldout 12,B or 13,B), the flat side of the anchor faces the rear of the transmission. For anchor 4 (foldout 14,B), the flat side of the anchor faces the front of the transmission.

(1) Position the anchor front side downward, in a press. Install two (longer) pins 15 at each side of the large cutout in the outer perimeter of anchor 13. Press the pins to a height of 1.55-1.57 inches (39.4-39.8 mm) above the rear face of the anchor.

NOTE

Longer pins 15 project slightly at the front side of anchor 13. They prevent snapring 11 from rotating.

(2) Press four (shorter) pins 14 into the remaining holes to a height of 1.55-1.57 inches (39.4-39.8 mm) above the rear face of anchor 13.

6-15. ADAPTER ASSEMBLY (TRT)

a. Disassembly

(1) Remove sleeve 27 (foldout 10,B) from adapter 26 or sleeve 9 (foldout 12,A) from adapter 8 only if replacement is necessary.

(2) -3 models. Remove two plugs 25 (foldout 10,B) from adapter 26.

b. Assembly

(1) If removed, position sleeve 27 (foldout 10,B) or sleeve 9 (foldout 12,A), internal chamfer first, into the front (ball bearing bore side) of the adapter.

(2) Press the sleeve (rearward) until its forward (unchamfered) end is to a depth of 0.000-0.010 inch (0.25 mm) below the shoulder against which the ball bearing assembly seats.

(3) -3 models. Install two plugs 25 (foldout 10,B) into adapter 26. Tighten the plugs to 8-10 lb ft (11-13 N·m).

6-16. INTERNAL BRAKE DIAPHRAGM (TTB)

a. Disassembly (foldout 15,B)

(1) Remove plug 3 from diaphragm 4.

(2) Position diaphragm assembly 2, pins upward, in a press. Support the area of the hub surrounding sleeve 5 and press the sleeve from the hub of the diaphragm. Do not remove pins 6.

b. Assembly (foldout 15,B)

(1) Position diaphragm 4, rear side downward, in a press. (Rear side of diaphragm has the recess for two bolts.) Support the hub area around the center bore on a sleeve having a slightly larger inside diameter than the bore of the diaphragm.

(2) Install sleeve 5, chamfered inside diameter end last, into the hub bore of diaphragm 4. Press the sleeve until the chamfered inside diameter end is to a depth of 0.075-0.085 inch (1.90-2.15 mm) below the front mounting surface (outer bolt circle) of the diaphragm.

(3) Install plug 3 into diaphragm assembly 2. Tighten the plug 14-16 lb ft (19-21 N·m).

6-17. TRANSFER DRIVE GEAR (TT, TTB)

a. Disassembly (foldout 11,B for TT; foldout 15,A for TTB)

(1) If bearing replacement is necessary, pull bearing 1 from transfer drive gear assembly 2.

(2) If the drive pins require replacement, press pins 4 from transfer drive gear 3.

b. Assembly (foldout 11,B for TT; foldout 15,A for TTB)

(1) If pins 4 were removed, place transfer drive gear 3, hub downward, in a press and install new pins. Press the pins to a height of 0.74-0.76 inch (18.8-19.3 mm).

(2) If bearing 1 was removed from transfer drive gear assembly 2, install a new bearing, outer snapring first, onto the gear hub. Seat the bearing firmly against the shoulder on the gear hub.

6-18. TRANSFER DRIVE GEAR (TRT -1)

a. Disassembly (foldout 12,A)

(1) Remove the bearings from gear 3 only if parts replacement is necessary.

(2) Remove the snapring from bearing assembly 1. Using a bearing puller, remove bearings 1 and 4 from gear 3.

b. Assembly (foldout 12,A)

(1) Press bearing 4, manufacturer's number outward, onto the splined hub of gear 3. Seat it firmly against the hub shoulder.

(2) Press bearing 1, outer snapring groove toward gear, onto the smooth-bore hub of gear 3. Seat it firmly against the hub shoulder.

(3) Install the external snapring into the groove in the outer race of bearing assembly 1.

6-19. TRANSFER DRIVE GEAR SLEEVE ASSEMBLY (TRT -1)

a. Disassembly (foldout 12,A). If necessary for replacement, remove bushing 23 from sleeve 24. If the bushing must be cut out, do not damage the sleeve bore.

b. Assembly (foldout 12,A). Install bushing 23 into the larger bore of sleeve 24. Press it in until the front (outer) end of the bushing is at a depth of 0.29-0.31 inch (7.4-7.8 mm) below the end (front) of sleeve 24. (The bushing is prebored to give the proper inside diameter when installed.)

6-20. REAR PTO COVER ASSEMBLY (TT)

a. Disassembly (foldout 16,D)

(1) Tap PTO shaft assembly 17 forward from rear PTO cover assembly 22. Re-

move snapring 16 from the shaft assembly. Do not remove pin 18 from shaft 19 unless replacement is necessary.

(2) Remove snapring 20 from rear PTO cover 24 and remove bearing 21. Remove sleeve 23 only if replacement is necessary.

(3) Remove dust shield 26 and lip-type sealring 25 from rear of cover 24, and remove plug 32.

b. Assembly (foldout 16,D)

(1) Install the PTO oil seal and dust shield as shown in figure 6-20. Install plug 32 (foldout 16,D). If the plug is 1/8-in. NPTF, tighten the plug to 10-12 lb ft (14-16 N·m). If the plug is 3/8-in. NPTF, tighten the plug to 18-22 lb ft (25-29 N·m).

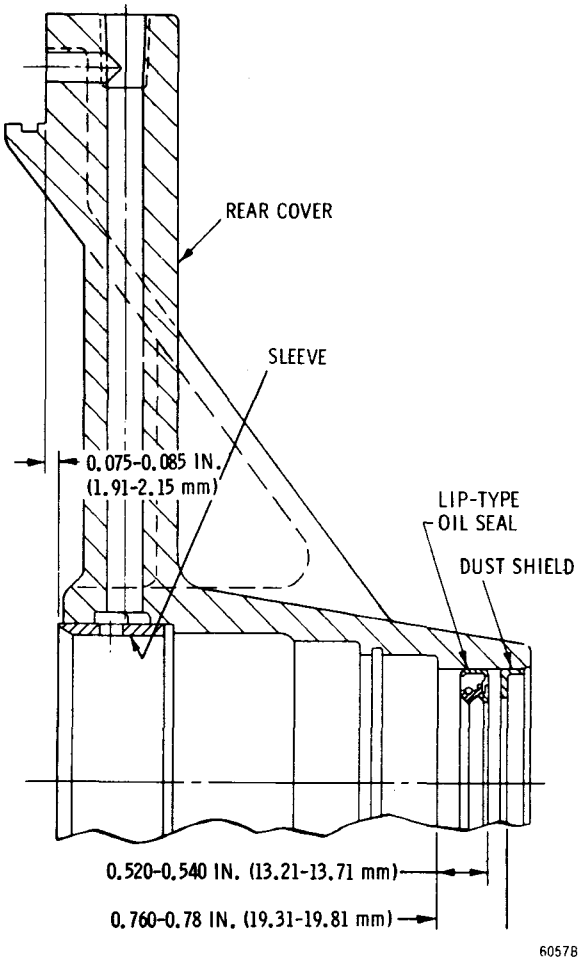


Fig. 6-20. Oil and dust shield installation (TT with converter-driven PTO)

(2) If sleeve 23 was removed, install a new sleeve, beveled OD first, into PTO cover 24. Press the sleeve to the dimension shown in figure 6-20. Install bearing 21 (foldout 16,D) and snapring 20 into PTO cover 24.

(3) If pin 18 was removed from shaft 19, install a new pin, straight outer diameter first, into the shaft. Press the pin to a height of 0.810-0.830 inch (20.58-21.08 mm) from the front end surface of the shaft.

(4) Install snapring 16 onto shaft assembly 17 and install the shaft, threaded end first, through bearing 21 and into PTO cover assembly 22. Seat the shoulder of the shaft against the bearing.

6-21. REAR COVER ASSEMBLY (TTB)

a. Disassembly (foldout 15,B)

NOTE

For models with converter-driven PTO, proceed to step (1). For models without converter-driven PTO, proceed to step (3).

(1) Position the rear cover assembly on its side on a bench and remove flange retaining self-locking nut 43, flange retaining washer 42, and output flange 41.

(2) Tap the PTO shaft forward and remove it from the rear cover assembly (fig. 6-21). Remove the snapring from the shaft. Remove the pin only if replacement is necessary.

(3) Position the rear cover so that the mounting flange is upward and remove the snapring that retains the brake-apply plate assembly (fig. 6-22). Remove the brake-apply plate assembly. Do not disassemble the apply plate assembly unless it does not meet the minimum press force of 400 pounds (1780 N) during the readjustment procedure described in step (4).

(4) The brake apply plate assembly (fig. 6-23) must be readjusted to the setting established when the transmission was new, so that the automatic adjustment for brake

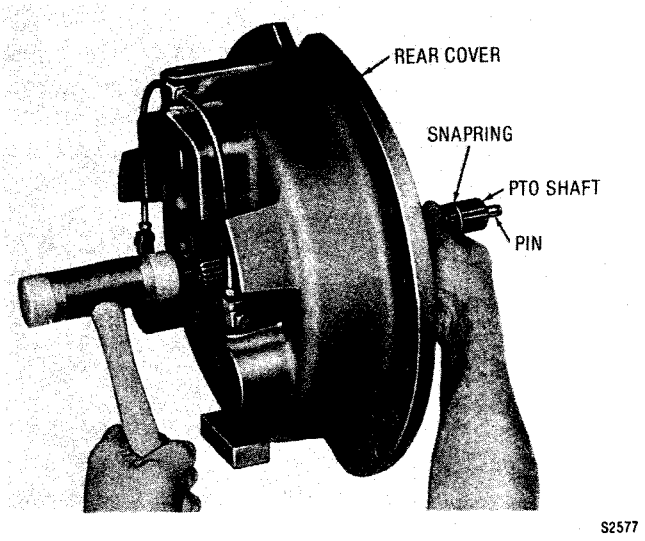


Fig. 6-21. Removing PTO shaft from rear cover (TTB)

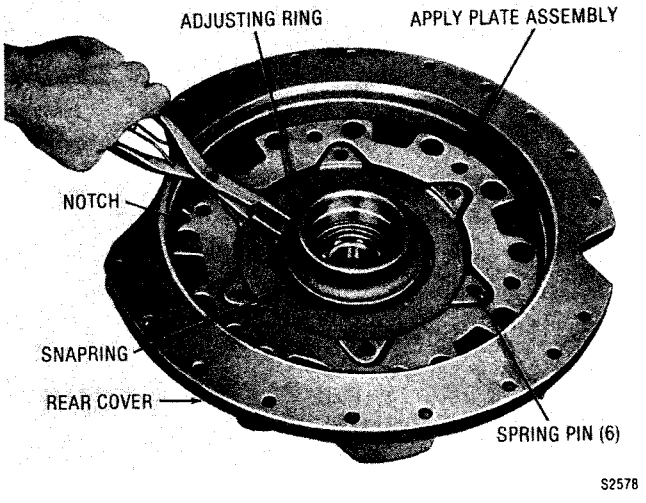


Fig. 6-22. Removing (or installing) brake-apply plate snapring (TTB)

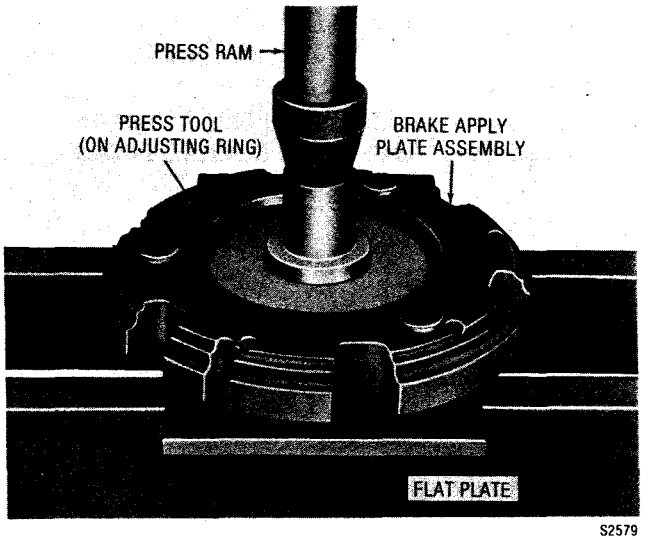


Fig. 6-23. Pressing brake adjusting ring flush with apply-plate surface (TTB)

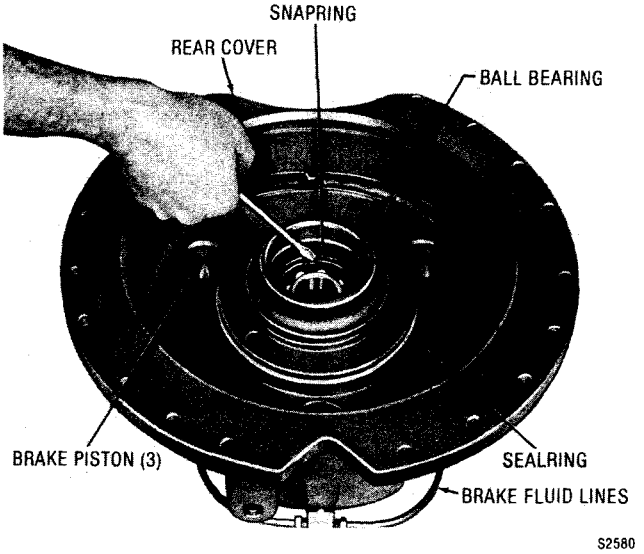


Fig. 6-24. Removing snapring from rear bearing bore (TTB)

wear and proper release clearance are provided. This adjustment is made by positioning the apply plate assembly, front downward, in a press on a smooth, flat plate (fig. 6-23).

(5) Press brake adjusting ring 21 (fold-out 15,B) downward until its front surface is flush with the front surface of brake-apply plate 23. If the adjusting ring moves with the application of less than 400 pounds (1780 N) force of the press, heat breakdown of spring pins 22 is indicated, and the pins must be replaced.

(6) If replacement of spring pins 22 is necessary, press adjusting ring 21 from brake-apply plate 23. Remove s i x spring pins 22 from adjusting ring 21.

(7) If present, remove the snapring that retains the ball bearing and remove the bearing from the rear cover (fig. 6-24). Remove the Teflon sealring from the inner hub. Note the location of the three brake pistons.

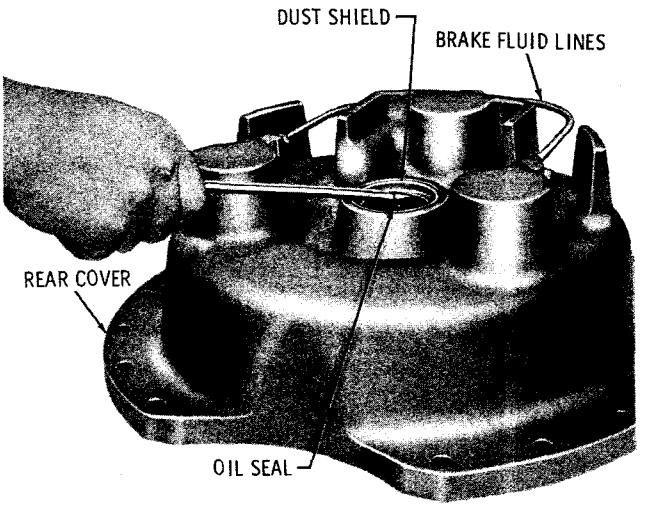


Fig. 6-25. Removing dust shield from rear cover (TTB)

(8) Position the rear cover so that it rests on the mounting flange and remove the dust shield and oil seal (fig. 6-25). Or remove plug 44 (foldout 15,B), if necessary. Remove the brake fluid lines and fittings.

(9) Using forced air at each brake fluid port, remove the brake pistons and related parts from their bores (fig. 6-26). Each piston bore contains a piston 26 (foldout 15,B), sealring 25, piston cup 27, and expander assembly 28. Remove sealrings 25 from pistons 26.

b. Assembly (foldout 15,B)

(1) Pack the inside diameter groove of oil seal 39 with high temperature grease, MIL-G-3545A or equivalent. Install oil seal 39 and dust shield 40 into rear cover 38 in the positions shown in figure 6-27. Or, apply a nonhardening sealer and install plug 44 (foldout 15,B).

(2) Lubricate the brake piston components with hydraulic brake fluid prior to installation into their bores. Install the three expander assemblies, brake piston cups (flat side upward), and brake pistons (flat side first), with sealrings assembled, into the three bores in the rear cover (fig. 6-28).

(3) Install a new Teflon sealring, outer lip upward, into the groove in the inner hub of the rear cover (fig. 6-28). Install the bearing and snapring into the rear cover.

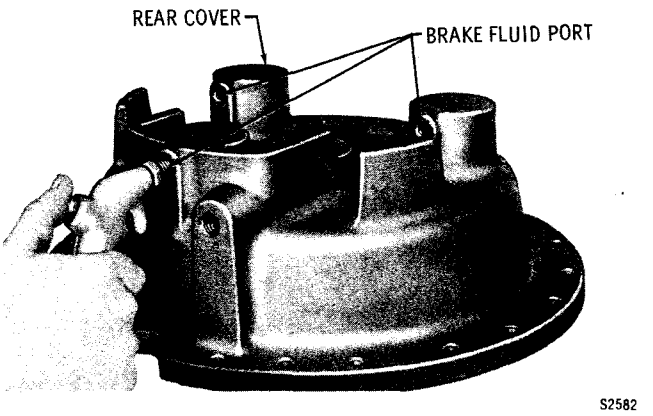


Fig. 6-26. Removing brake pistons from rear cover (TTB)

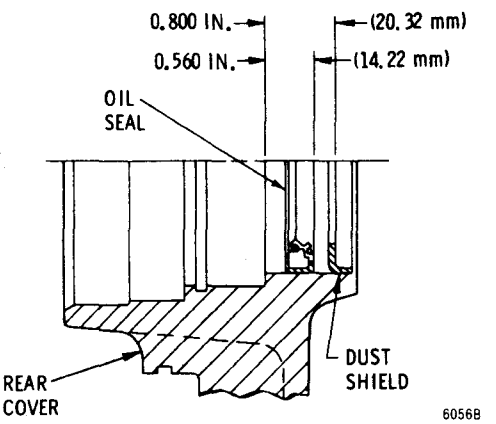


Fig. 6-27. Oil and dust shield installation (TTB with converter-driven PTO)

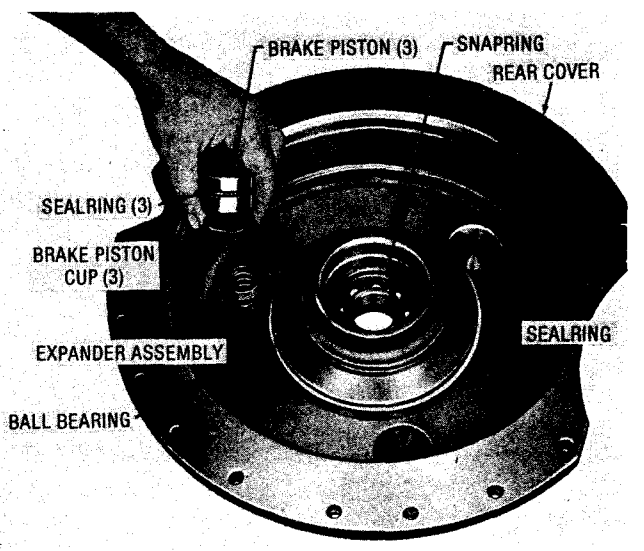


Fig. 6-28. Installing brake piston components in rear cover (TTB)

(4) If removal of six spring pins 22 (foldout 15,B) was not necessary, proceed to step (6).

CAUTION

It is essential that ring 21 be parallel to plate 23 and that pins 22 not be distorted or damaged during installation.

(5) If removal of six spring pins 22 (foldout 15,B) was necessary, install six new pins into apply plate 23. Press the pins to a seat against the bottom of their bores. Press adjusting ring 21 onto pins 22 until the front surface of ring 21 is at a height of 0.000-0.010 inch (0.25 mm) above the front surface of apply plate 23.

(6) Install brake-apply plate assembly 20 into rear cover 38. Align the small notch in the plate with the cast lug located at the bottom of the cover bore (fig. 6-22). Install the snapring to retain the brake-apply plate in the rear cover.

(7) Install the brake fluid lines and fittings (fig. 6-25). Tighten the fittings to 275-325 lb ft (373-440 N·m).

NOTE

This completes procedures for repair of this subassembly for models without converter-driven PTO. For models with converter-driven PTO, proceed with step (8).

(8) If pin 29 (foldout 15,A) was removed from PTO shaft 30, install a new pin, straight outer diameter first, to a height of 0.810-0.830 inch (20.57-21.08 mm) from the front end surface of the shaft. Install snapring 27 onto PTO shaft assembly 28.

(9) Install PTO shaft assembly 28, threaded end first, into the assembled rear cover and seat the shaft in bearing 32 within the assembled rear cover.

(10) Install output flange 41 (foldout 15,B) and flange retaining washer 42 onto output shaft assembly 28 (foldout 15,A). Apply molybdenum disulfide grease (Molykote Type G or equivalent) onto the threads of flange retaining nut 43 (foldout 15,B) and install the nut. Do not tighten the nut at this time.

6-22. TRANSMISSION REAR HOUSING ASSEMBLY (TRT 2221-1, 2421-1)

a. Disassembly (foldout 16,A). If replacement is necessary, remove welch plug 13 and pipe plug 14. To remove plug 13, insert a punch from the inside of housing 2, through the clutch anchor pin hole, and drive out plug 13. Clean the bore from which it was removed.

b. Assembly (foldout 16,A)

(1) If welch plug 13 was removed, coat the new plug with nonhardening sealer. Press or drive the plug, closed end first, into housing 2 until its outer end is even with the inner end of the chamfer in the bore.

(2) If plug 14 was removed, install it into the threaded opening in the housing. Tighten plug 14 to 8-10 lb ft (11-13 N·m).

6-23. TRANSMISSION REAR HOUSING ASSEMBLY (TRT 2221-3, 2421-3)

a. Disassembly (foldout 16,B)

(1) Remove oil seal 11 and internal snapring 9.

(2) Using a soft hammer, drive output shaft 5 or 7 rearward and out of housing 2.

(3) If present, remove snapring 6.

(4) Remove bearing 8 from shaft 5 or 7, if replacement is necessary.

(5) If replacement is necessary, remove plug 13 by inserting a punch through the clutch anchor pin bore inside housing 2 and driving the plug out.

(6) Remove pipe plug 14, and plug 15 (if used).

b. Assembly (foldout 16,B)

(1) Install 1/4-inch pipe plug 14. Tighten plug 14 to 8-10 lb ft (11-13 N·m). If used, install 3/8-inch plug 15. Tighten plug 15 to 12-16 lb ft (17-21 N·m).

(2) If plug 13 was removed, coat the new plug with nonhardening sealer. Install it, closed end first, into the clutch anchor pin bore in housing 2. Press or drive the plug in until its outer end is even with the inner end of the chamfer in the bore.

(3) Install bearing 8 onto shaft 5 or 7 and seat it firmly against the shaft shoulder.

(4) If removed, install snapring 6 onto shaft 7.

(5) Install the assembled output shaft and bearing, unsplined end first, into the rear of housing 2. Tap on the outer race of bearing 8 to seat it against the housing shoulder. Install snapring 9.

(6) Install oil seal 11, spring-loaded lip first, into the rear bore of housing 2. Seat it lightly against the shoulder in the housing bore.

6-24. TRANSMISSION REAR HOUSING ASSEMBLY (TRT 2211-3, 2411-3)

a. Disassembly (foldout 16,C)

(1) If present, remove baffle 6.

(2) Remove oil seal 7.

(3) If present, remove tube 8 only if replacement is necessary.

(4) Remove snapring 22 (foldout 11,A) and bearing 23.

(5) Remove plug 2 (foldout 16,C).

b. Assembly (foldout 16,C)

(1) Install plug 2 into housing 9. Tighten plug 2 to 4-5 lb ft (5.5-6.7 N·m).

(2) Install bearing 23 (foldout 11,A) and snapring 22 into the housing.

(3) If tube 8 (foldout 16,C) was removed, coat the larger end of the tube with nonhardening sealer and install it, smaller end first, through the rear bore of housing 9. Press the tube into its bore until the upper end of the tube is even with the lower edge of the countersink in the bore (tube not used in some models).

(4) Press a new seal 7, spring-loaded lip first, into the rear of housing 9. Seat it lightly against the shoulder in the housing bore.

(5) Coat baffle 6 (not used in some models) with nonhardening sealer. Install the baffle, convex side first, into the housing. Press it into the housing bore to a depth of 0.060-0.090 inch (1.52-2.28 mm) below the rear surface of housing 9.

6-25. PLANETARY CARRIER ASSEMBLY

NOTE

Planetary pinions are a matched set. If one pinion requires replacement, the remaining pinions must also be replaced. Also, new needle bearings, thrust washers, and spindles should be installed any time a planetary carrier assembly is being rebuilt.

a. Disassembly (Table 6-2)

(1) Use Table 6-2 to determine the data for the specific planetary assembly which is to be disassembled.

CAUTION

Do not drill into the carrier. The diameter of spindles is slightly more than the diameter of the drill (Table 6-2, K). Centering the drill accurately will prevent drilling into the carrier.

Table 6-2. PLANETARY ASSEMBLIES

A	B	C	D	E	F G	H	I	J	K		L		M	N
									Drill Size to Remove Pinions		Spindle Dimension Before Swaging ± 0.010 in. (0.25 mm)			
Planetary	Models	Fold-out	Carrier	Spindles	Thrust Washers	Pinions (Matched Set)	Pinion Bearing Rollers	Bushing	1/2 in. (12.7 mm)	3/4 in. (19 mm)	Height	Depth	Figure 6-29 Showing Spindle Dimension Before Swaging	Figure 6-30 Swaging Tools 1 and 2
Reverse	All	9,B	15	14 (4)	10 (4) 13 (4)	11 (4)	12 (88) (22 ea)	—		X	0.140 in. (3.56 mm)	—	1	1
Forward (Low)	TT, TTB, TRT -1	10,A	9	4 (4)	5 (4) 8 (4)	7 (4)	6 (88) (22 ea)	—		X	—	0.180 in. (4.57 mm)	2	1
Forward	TRT -1	10,A	16	11 (6)	12 (6) 15 (6)	14 (6)	13 (120) (20 ea)	—	X		0.092 in. (2.33 mm)	—	3	2
Forward (Low)	TT, TTB	10,A	23	18 (6)	19 (6) 22 (6)	21 (6)	20 (120) (20 ea)	—	X		0.092 in. (2.33 mm)	—	3	2
Forward	TRT 2221-3, 2421-3 w/underdrive	10,B	5	6 (6)	7 (6) 10 (6)	9 (6)	8 (120) (20 ea)	4	X		0.092 in. (2.33 mm)	—	4	2
Forward	TRT 2221-3, 2421-3 w/overdrive	10,B	32	33 (6)	34 (6) 37 (6)	36 (6)	35 (120) (20 ea)	31	X		0.092 in. (2.33 mm)	—	4	2
Forward	TRT 2211-3, 2411-3	11,A	4	5 (6)	6 (6) 9 (6)	8 (6)	7 (120) (20 ea)	—	X		0.092 in. (2.33 mm)	—	3	2
High	TRT -1	12,B	5	9 (6)	6 (6) 10 (6)	7 (6)	8 (96) (16 ea)	—	X		0.095 in. (2.41 mm)	—	5	2
Low	TRT 2221-3, 2421-3 w/underdrive	13,B	5	9 (6)	6 (6) 10 (6)	7 (6)	8 (96) (16 ea)	—	X		0.095 in. (2.41 mm)	—	5	2
High	TRT 2221-3, 2421-3 w/overdrive	14,A	19	20 (6)	21 (6) 24 (6)	23 (6)	22 (120) (20 ea)	—	X		0.092 in. (2.33 mm)	—	6	2

(2) Use the size drill indicated in Table 6-2, K. Drill into the ends of the pinion spindles (Table 6-2, E), to weaken the swage.

(3) Refer to figure 6-29. Place the carrier assembly (Table 6-2, D) in a press and press out a spindle.

(4) Remove two thrust washers (Table 6-2, F and G), the pinion (Table 6-2, H), and the pinion rollers (Table 6-2, I).

(5) Repeat steps (3) and (4), for removal of the remaining pinion assemblies.

(6) If present, and replacement is necessary, remove the bushing (Table 6-2, J).

b. Assembly (Table 6-2)

(1) If removed, install the bushing (Table 6-2, J) to the depth shown in figure 6-29, View 4.

(2) Chill the new spindles (Table 6-2, E) in dry ice for one hour, or heat the carrier (Table 6-2, D) in an oil bath or oven to 300-350°F (150-176°C).

NOTE

An aligning tool can be made by grinding a used spindle to 0.005-inch (0.13 mm) undersize.

(3) Install a thrust washer (Table 6-2, F) on a spindle aligning tool.

(4) Coat the bore of the pinion (Table 6-2, H) with oil-soluble grease and install the pinion onto the aligning tool.

(5) Install the pinion rollers (Table 6-2, I) into the space between the aligning tool and the pinion bore. Install the second thrust washer (Table 6-2, G) onto the pinion.

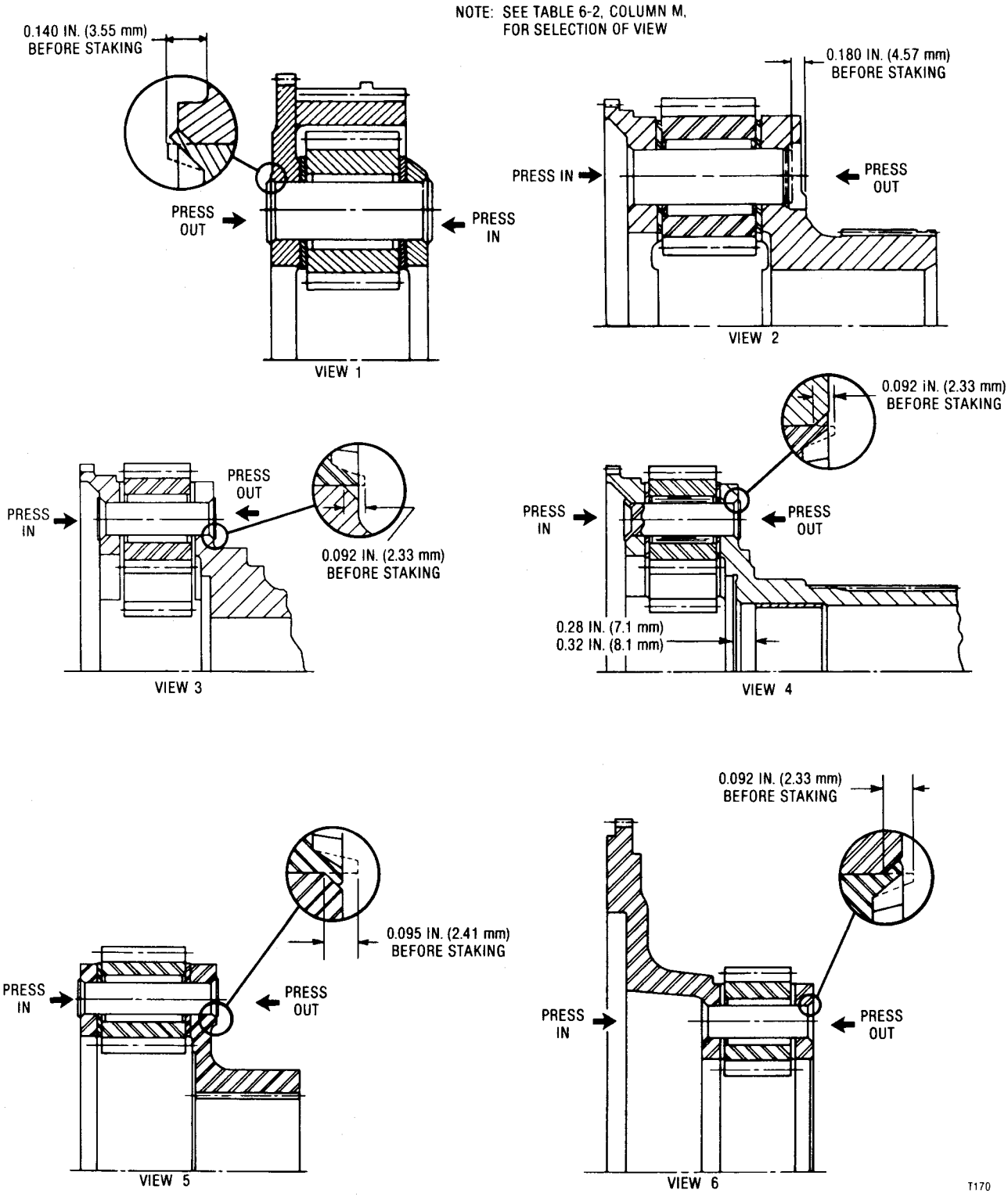


Fig. 6-29. Planetary assembly spindle installation

(6) Remove the aligning tool and install the assembled pinion parts into the planetary carrier (Table 6-2, D). Insert the aligning tool to center the assembled pinion parts with the bore in the carrier.

(7) Refer to figure 6-29. Place the carrier assembly into a press, remove the aligning tool, and start a spindle (Table 6-2, E) into the pinion bore.

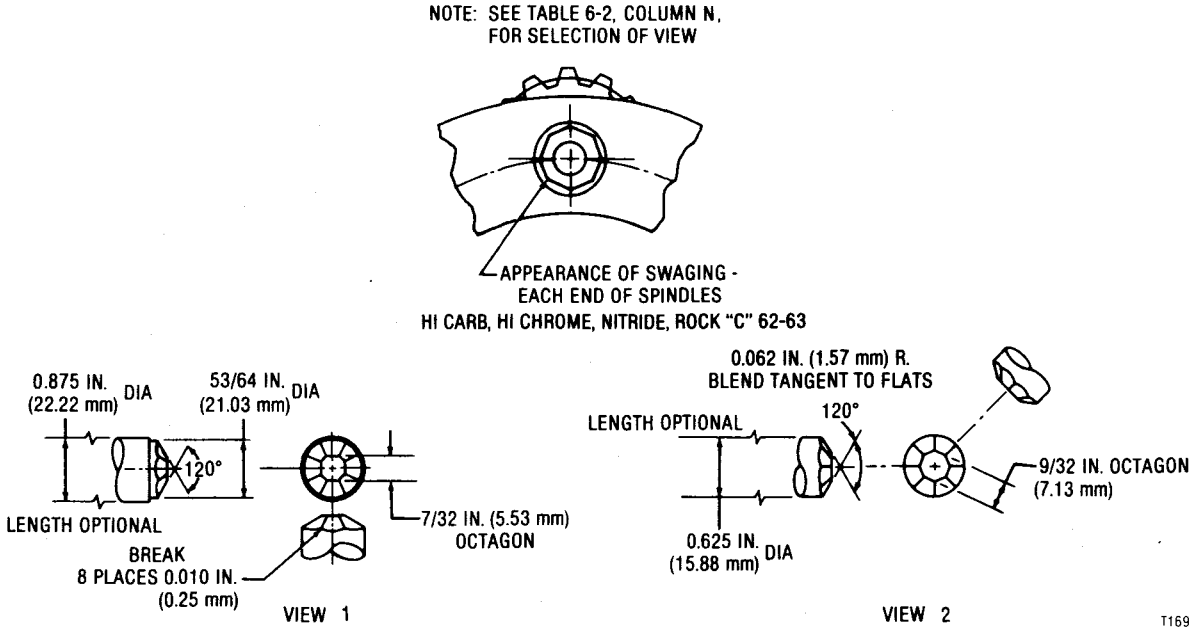


Fig. 6-30. Swaging tools

(8) Press the spindle into the bore to the indicated dimension. Refer to Table 6-2, L and M, and to figure 6-29.

(9) Refer to Table 6-2, N and to figure 6-30. Support the spindle and swage it securely at both ends with an octagon punch. The pinion must rotate freely after assembly.

(10) Install the remaining pinion assemblies in the same manner as described in steps (3) through (9).

(11) If chilled spindles were installed, apply a coating of oil around the spindles to inhibit rust.

6-26. OIL PUMP

a. Disassembly

(1) Remove the pump cover and gasket (fig. 6-31).

(2) Remove the drive gear and driven gear assembly.

(3) If necessary, remove the needle bearings from the driven gear.

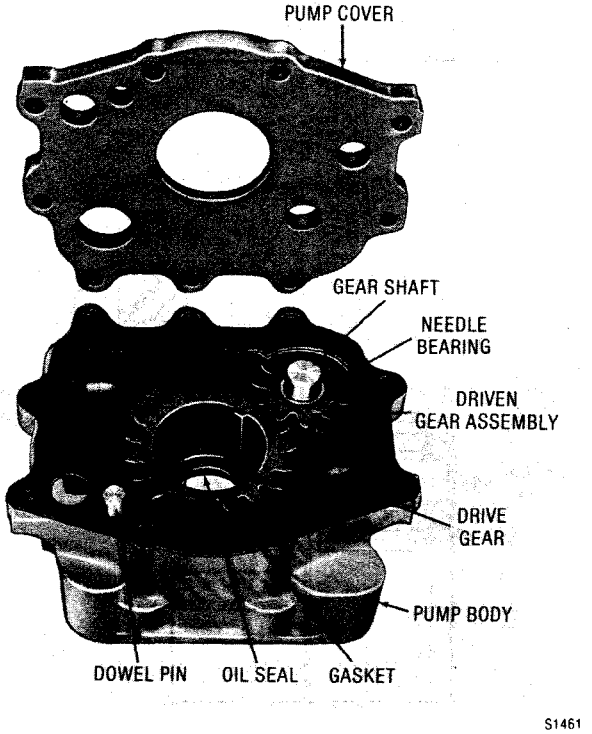


Fig. 6-31. Oil pump assembly

(4) If necessary for replacement, remove the dowel pin by clamping it in a vise and twisting the pump body.

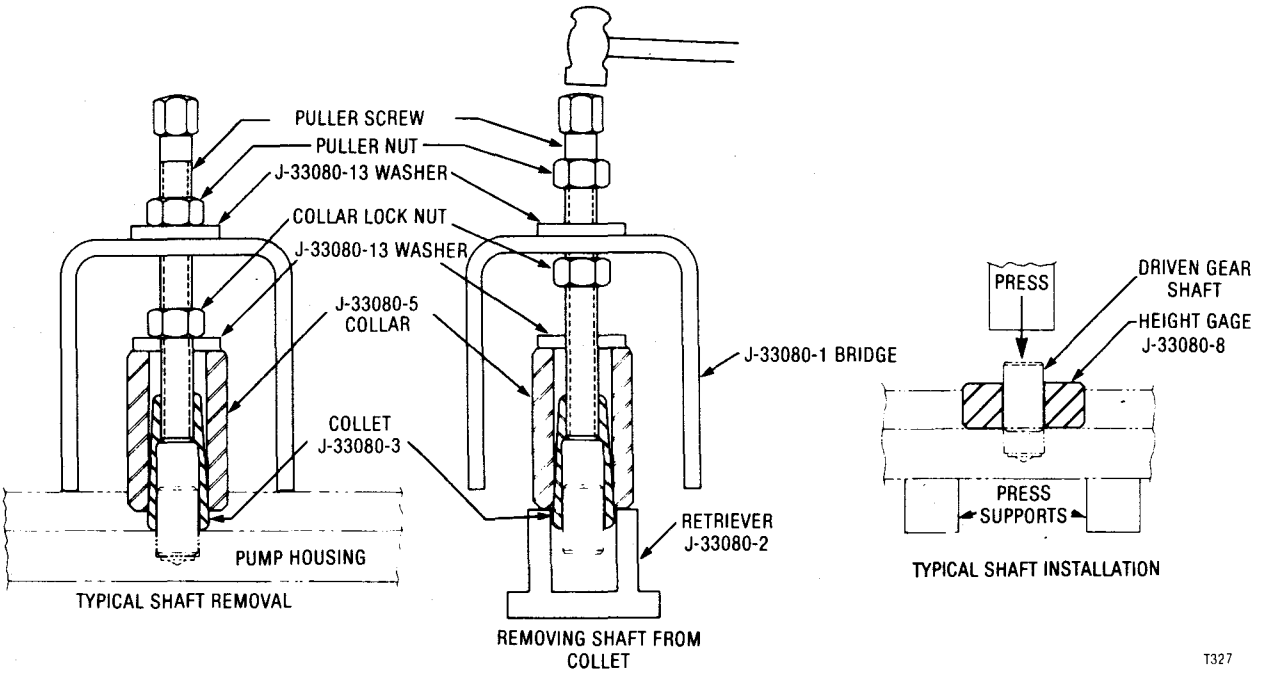


Fig. 6-32. Removal and installation of pump driven gear shaft

(5) If present, remove the oil seal by driving or pressing it toward the rear (accessory mounting face) of the pump.

(6) If replacement of the driven gear shaft is necessary, remover assembly J-33080 may be used.

(7) Assemble the puller over the shaft as shown in figure 6-32 with collet J-33080-3.

(8) Tighten the collar locknut until the collar is secured against the collet and onto the shaft that is to be removed (fig. 6-33).

(9) Retain the puller screw (fig. 6-32) with a wrench while tightening the puller nut to remove the shaft. If the collet does not pull the shaft, repeat steps (8) and (9) and apply additional torque to the collet locknut.

(10) To remove the shaft from the collet, back off the collar locknut and puller nut, position the collar over retriever J-33080-2 (fig. 6-34), and tap the top of the puller screw with a hammer (fig. 6-32).

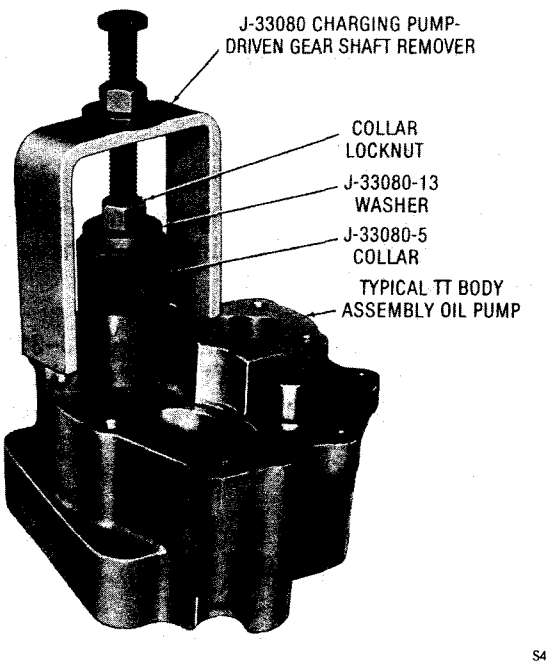


Fig. 6-33. J-33080 shaft remover in place

(11) If the pump body, drive gear, or driven gear requires replacement, a new pump assembly must be used.

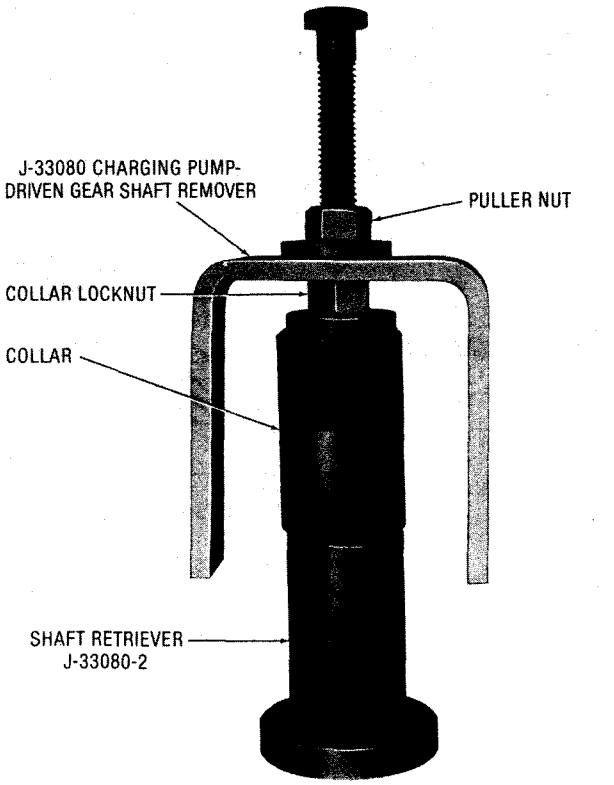


Fig. 6-34. Removing shaft from collet

b. Assembly

(1) If the driven gear shaft was removed, support the charging pump housing in a press (fig. 6-32).

(2) Position height gage J-33080-8 over the driven gear shaft bore in the pump housing and place the new shaft into the gage; chamfer on the shaft will engage into the housing bore.

(3) Press the shaft until it is flush with the height gage (fig. 6-35).

(4) Install a new seal, spring-loaded lip first, into the rear of the pump body. Press the seal until it seats lightly on the shoulder in the body bore (fig. 6-31).

(5) If the dowel pin was removed, press a new pin to a height of 0.41-0.43 inch (1.04-1.09 mm) above the front surface of the pump body.

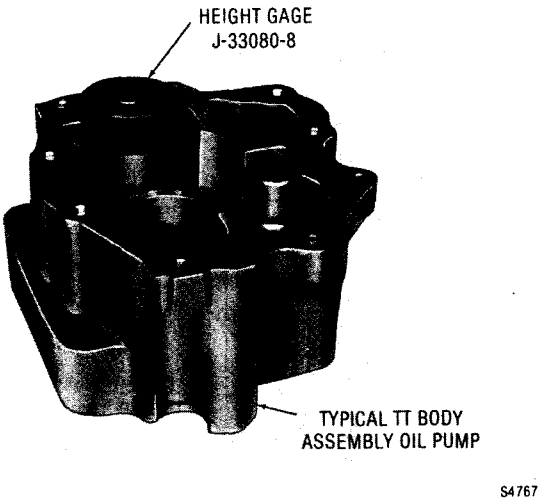


Fig. 6-35. Height gage J-33080-8 in place

(6) If the needle bearings were removed from the driven gear, install new bearings so that the replacer tool rests against the part number end of the bearing race. Press each bearing to a depth of 0.000-0.020 inch (0.50 mm) below the end surface of the driven gear.

(7) Install the driven gear assembly over the gear shaft and into the pump body. Install the drive gear into the pump body. When properly installed, the end faces of both gears will project 0.002-0.003 inch (0.05-0.07 mm) above the front surface of the pump body (measured before gasket is installed). If the end faces of the gears are below the flush line of the pump body, the pump will not perform satisfactorily and should be replaced.

(8) Apply a liberal amount of oil onto the pump gears and install the cover gasket and cover. Position the pump assembly front upward, until ready for installation onto the transmission housing.

6-27. TRANSMISSION HOUSING (TT, TTB, TRT -1)

a. Disassembly (foldout 8,B)

(1) Remove six bolts 13 and lockwashers 14, and remove core hole cover 15 and gasket 16.

(2) Remove plug 7, but do not remove filter plug 6 unless replacement is necessary. If necessary, measure and record the depth of installed plug 6 prior to removal of the plug.

(3) Remove breather 9.

(4) If the transmission is equipped with an accessory drive gear, remove lip-type oil seal 11. If the transmission is not equipped with an accessory drive gear, remove cup plugs 10 and 12 only if replacement is necessary.

(5) If present, remove plugs 17 and 25, and plug 30 and washer 29.

(6) Remove oil level plugs 26 and 27 from the front face of housing 8.

(7) If present, remove cup plug 28.

(8) Do not remove nameplate 18 and drive screws 19 unless a new nameplate with the correct data stamped on it is available for replacement.

b. Assembly (foldout 8,B)

(1) If nameplate 18 was removed, install the new nameplate (with the correct information stamped on it). Secure the nameplate with four No. 4 x 1/4-inch drive screws 19.

(2) If oil level plugs 26 and 27 were removed, replace them. Tighten the plugs to 14-16 lb ft (19-21 N·m).

(3) If cup plugs 10, 12, or 28 were removed, install new plugs, closed end first, into housing 8. Press each plug against the shoulder in its bore. If lip-type oil seal 11 was removed, install a new seal, spring-loaded lip first, into the rear face of housing 8. Press the seal to a depth of 0.2575-0.2825 inch (6.541-7.175 mm) below the surface adjacent to the bore.

(4) Install breather 9 and tighten it sufficiently to prevent leakage.

(5) Install washer 29 and plug 30. Install drain plug 17. Tighten both plugs 17 and 30 to 33-37 lb ft (45-50 N·m). Install oil filler plug 25. Tighten plug 25 sufficiently to prevent leakage.

(6) If plug 6 was removed, apply non-hardening sealant onto the outside diameter of the new plug. Install the new plug, closed end first, into the passage. Press the plug to the exact depth recorded prior to removal in paragraph 6-27a(2). Install plug 7 and tighten it to 33-37 lb ft (45-50 N·m).

(7) Install core hole cover gasket 16 and cover 15. Retain them with six 3/8-16 x 7/8-inch bolts 13 and lockwashers 14. Tighten the bolts to 26-32 lb ft (36-43 N·m).

6-28. TRANSMISSION HOUSING (TRT -3)

a. Disassembly (foldout 9,A)

(1) Remove plug 7. If plug 6 must be removed, accurately measure and record the depth at which it is installed. Remove plug 6 only if replacement is necessary.

(2) Remove breather 8.

(3) If the transmission is equipped with an accessory drive gear, remove oil seal 13. If the transmission is not equipped with an accessory drive gear, remove cup plugs 9 and 12 if replacement is necessary.

(4) Remove oil check plugs 19 and 20, and oil level tubes 21 and 22.

(5) Remove plugs 23 and 24. If plugs 28 are used, remove them only if necessary.

(6) Do not remove nameplate 10 and drive screws 11 unless a new nameplate with the correct data stamped on it is available for replacment.

b. Assembly (foldout 9,A)

(1) If nameplate 10 was removed, install the new nameplate (with the correct information stamped on it). Secure the nameplate with four No. 4 x 1/4-inch drive screws 11.

(2) Install two plugs 28, plug 23, and plug 24 into the transmission housing. Tighten the plugs sufficiently to prevent leakage.

(3) Install oil level tubes 21 and 22.

(4) Install oil check plugs 19 and 20 into the transmission housing. Tighten the plugs sufficiently to prevent leakage.

(5) Install a new oil seal 13, spring-loaded lip first, into the rear of housing 26. Press the seal to a depth of 0.255-0.285 inch (6.48-7.23 mm) below the surface adjacent to the bore.

(6) If the transmission is not equipped with an accessory drive gear, install new cup plugs 9 and 12.

(7) Install breather 8 and tighten it sufficiently to prevent leakage.

(8) If plug 6 was removed, coat the outer diameter of a new plug with nonhardening sealer and install, closed end first, into the top of housing 26. Press the plug to the exact depth recorded when it was removed in paragraph 6-28a (1). Install plug 7 and tighten it to 33-37 lb ft (45-50 N·m).

Section 7. ASSEMBLY OF TRANSMISSION

7-1. SCOPE

a. The assembly procedures in this section describe the assembly of the transmission from subassemblies. Refer to the cross-sections of the transmissions (foldouts 1 through 5) for functional location of parts. Refer to parts exploded views (foldouts 6 through 18) for parts identification.

b. Illustrations may not, in some areas, show the specific model being serviced. However, the procedure represented will be correct.

c. Assembly techniques for vehicle-mounted transmissions are presented in paragraph 7-14.

NOTE

Assembly paragraphs are as follows:

Model	Paragraphs
TT 2221-1, 2421-1	7-2, 7-3, 7-4, 7-5, 7-7, 7-10 through 7-14
TTB 2221-1, 2421-1	7-2, 7-3, 7-4, 7-5, 7-6, 7-10 through 7-14
TRT 2221-1, 2421-1	7-2, 7-3, 7-4, 7-8, 7-10 through 7-14
TRT-3	7-2, 7-9, 7-10 through 7-14

7-2. GENERAL INFORMATION FOR ASSEMBLY OF TRANSMISSION

Refer to Section 4 for general assembly information as follows:

Paragraph	Title
4-3	Tools, Equipment
4-4	Replacement Parts
4-5	Careful Handling
4-7	Assembly Procedures
4-9	Tight-fit Flanges
4-11	Torque Specifications
8-1	Wear Limits Data
8-2	Spring Data

7-3. INSTALLATION OF OUTPUT COMPONENTS, TRANSFER-DRIVEN GEAR (-1 models)

NOTE

For -1 models with front and rear outputs without output disconnect, proceed to paragraph 7-3a. For -1 models with front and rear output with output disconnect, proceed to paragraph 7-3b. For -1 models with rear output only, proceed to paragraph 7-3c.

a. One-Piece Output Shaft

(1) Install the transfer-driven gear into the rear of the housing (fig. 7-1).

(2) If shifter shaft hole plug was removed, install a new plug (fig. 7-2). Apply nonhardening sealant onto the outside diameter of the new plug. Install the plug, closed

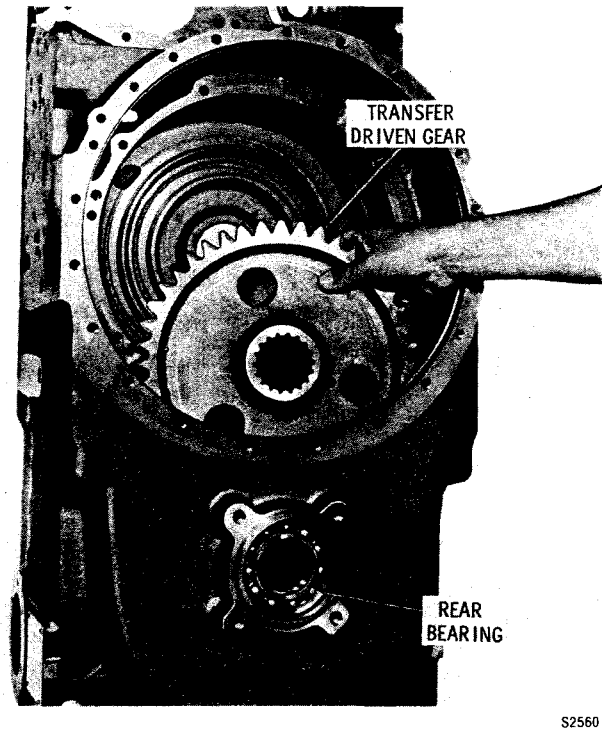
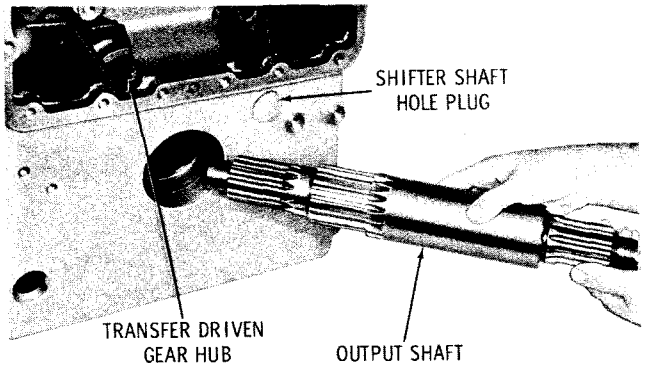
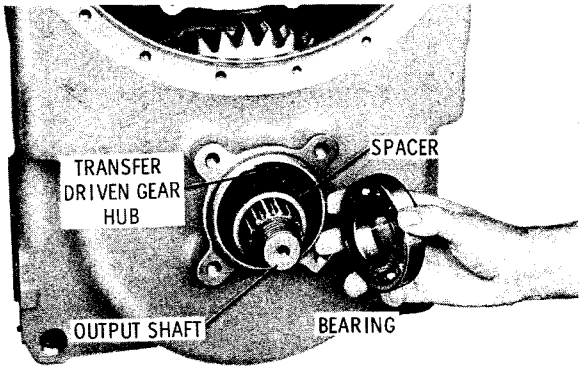


Fig. 7-1. Installing transfer-driven gear (-1 models)



S2585

Fig. 7-2. Installing output shaft (-1 models with one-piece shaft, with outputs at front and rear)



S2586

Fig. 7-3. Installing output shaft rear bearing and spacer (-1 models)

end first, and seal it against the shoulder in the housing bore.

(3) Install the output shaft, double-splined end first, through the front of the housing and the splined hub of the transfer-driven gear (fig. 7-2).

(4) Start bearing 11 (foldout 17,A), the shield side last, into the front bore of the housing.

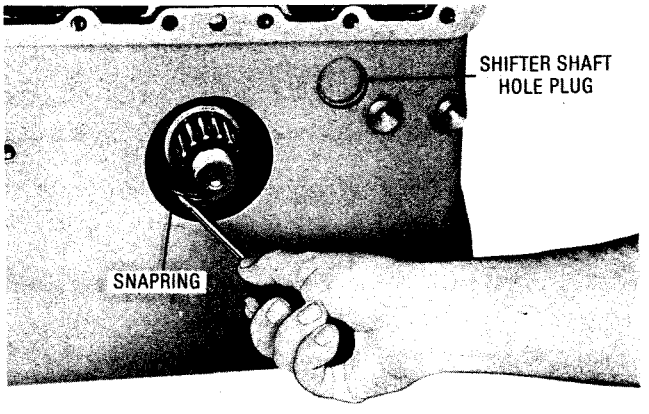
(5) Install the spacer onto the rear end of the output shaft (fig. 7-3). Start the rear bearing, loading groove first, into its bore in the housing, pushing the spacer toward the transfer gear hub.

(6) Supporting the shaft at the front end surface, drive the rear bearing and spacer forward until they are firmly seated against the transfer gear hub.

(7) At the front of the transmission housing, drive the bearing rearward and seat it firmly against the shoulder in the bore. Install the snapring to retain the bearing (fig. 7-4).

(8) Reseat the rear bearing, if necessary.

(9) Install lip-type oil seal 9 (foldout 17,A), spring-loaded lip first, into the front output bore. Press or drive the seal squarely and lightly against the counterbore in the housing.



S1453

Fig. 7-4. Installing output shaft front bearing snapring (-1 models)

(10) Install lip-type oil seal 30, spring-loaded lip first, into the rear output bore. Press or drive the seal squarely and lightly against the counterbore in the housing.

(11) Proceed to paragraph 7-4.

b. Two-piece Output Shaft

(1) If the front output shaft bearing was removed, replace the bearing, shield side last, into the housing bore (fig. 7-5). Seat the front bearing firmly against the shoulder in the bore, and install the snapring against the bearing outer race.

(2) Install a new output shaft oil seal, spring-loaded lip first, and press it squarely into the bore until it is lightly seated against the counterbore shoulder (fig. 7-5).

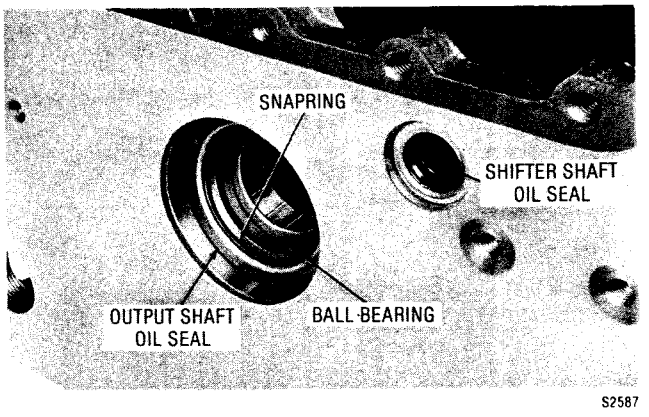


Fig. 7-5. Output shaft front bearing and sealring (-1 models)

(3) Install a new shifter shaft oil seal, spring-loaded lip first, and press it squarely into the bore at the front of the housing, until it is lightly seated against the counterbore shoulder.

(4) Install one ball 14 (foldout 17,A), spring 15, and another ball 14 into front output shaft 13. While holding these balls against the spring pressure, slide disconnect coupling 20, grooved end first, onto shaft 13 until the rear end of the coupling is flush with the shaft rear splines (disengaged position) (fig. 7-6).

(5) Install the front output shaft and assembled disconnect coupling, threaded end first, into the rear output shaft bearing bore (fig. 7-6). Support the inner race of the front output bearing (fig. 7-5), and seat the shoulder of the front output shaft against the bearing.

(6) Install the output shaft center bearing, shield side first, into the web of the transmission housing (fig. 7-7). Press or tap on the bearing outer race to seat it against the shoulder in the housing web bore.

(7) Install the transfer-driven gear (fig. 7-8).

(8) If bushing 25 (foldout 17,A) was removed from rear output shaft 26, install a new bushing. Press the bushing into the front bore of the shaft to a depth of 0.160-0.200 inch (4.06-5.08 mm) below the shaft end surface.

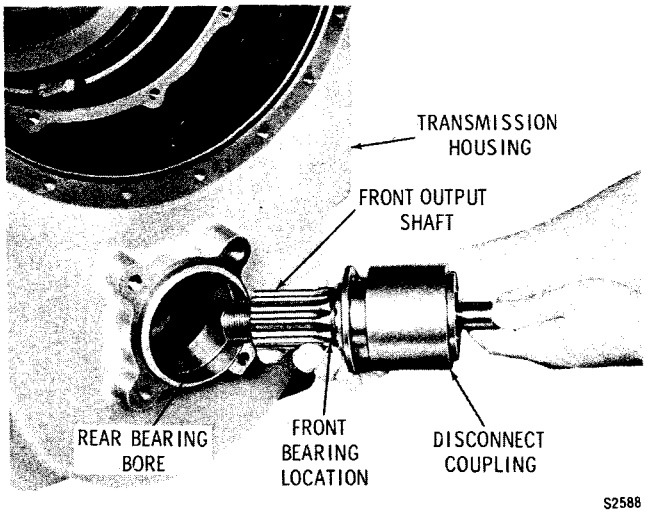


Fig. 7-6. Installing front output shaft and disconnect coupling (-1 models with two-piece output shaft)

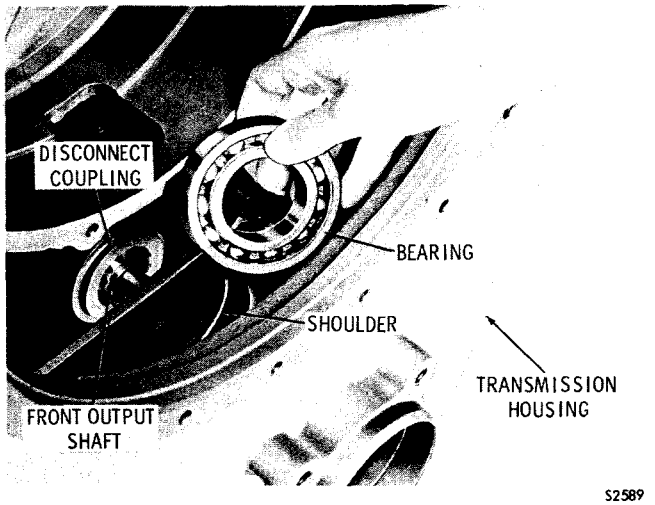


Fig. 7-7. Installing output shaft center bearing (-1 models with two-piece output shaft)

(9) If bearing 28 or spacer 27 were removed from rear output shaft assembly 24, replace them. Install spacer 27 and bearing 28, shield side last, onto the shaft. Seat the bearing firmly against the spacer.

(10) Place the spacer at the front side of the transfer-driven gear hub (fig. 7-9). Install the assembled rear output shaft, splined end first, through the splined hub of

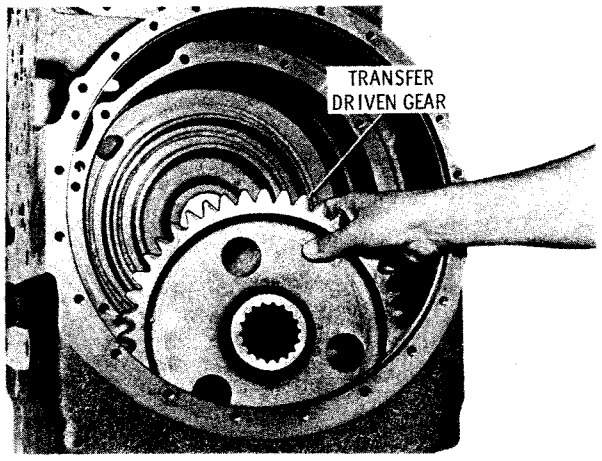


Fig. 7-8. Installing transfer-driven gear (-1 models)

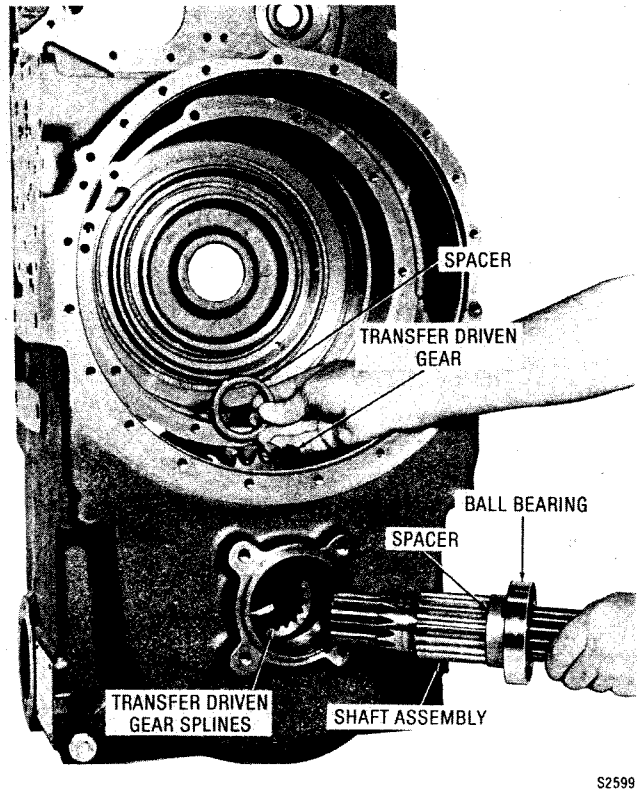


Fig. 7-9. Installing rear output shaft assembly (-1 models with two-piece or rear output shaft)

the gear, the spacer, and the center support bearing.

(11) Support the transfer-driven gear and drive the rear output shaft assembly and

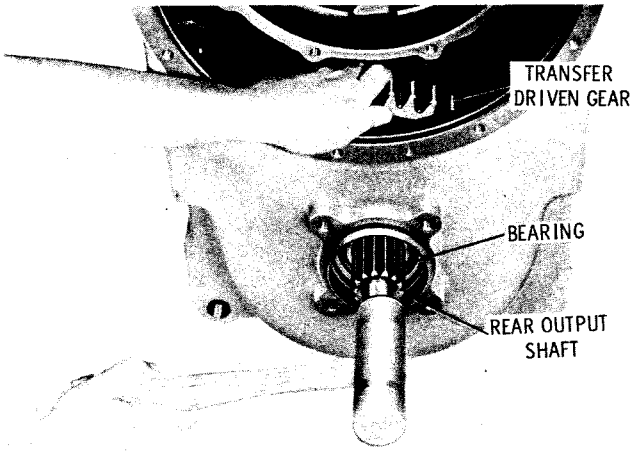


Fig. 7-10. Seating rear output shaft in housing (-1 models with two-piece or rear output shaft)

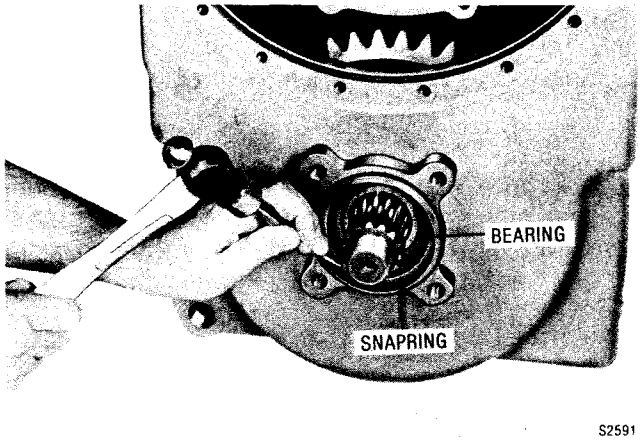


Fig. 7-11. Installing rear output shaft snapring (-1 models with two-piece or rear output shaft)

bearing forward (fig. 7-10). If necessary, reseat the rear bearing by driving on its inner race until the outer race clears the snapring groove in the bore.

(12) Install the snapring and tap progressively around its circumference until it snaps into place against the bearing (fig. 7-11).

(13) Install the new rear output lip-type oil seal, spring-loaded lip first, and press it squarely into the bore until it is lightly seated against the counterbore shoulder (fig. 7-12).

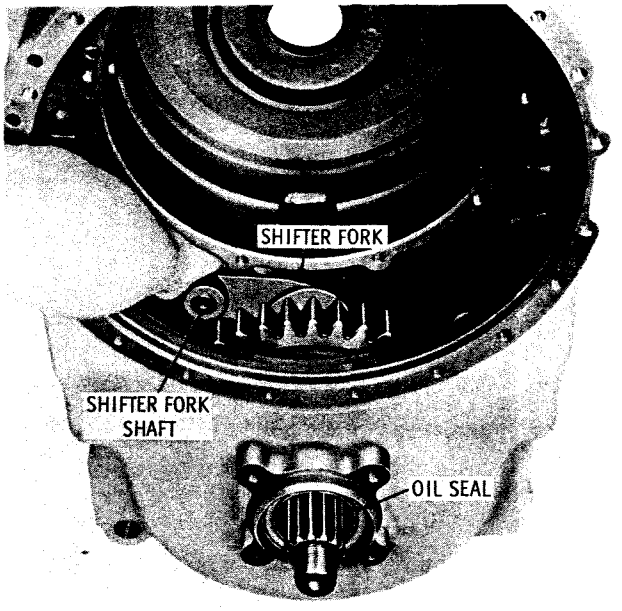


Fig. 7-12. Installing disconnect shifter fork and shaft (-1 models with two-piece output shaft)

(14) Position the disconnect shifter fork in the groove of the disconnect coupling (fig. 7-12). While holding the fork in position, install the shifter fork shaft, threaded end first, through the oil seal in the front of the housing and fully engage the threads in the shifter fork. Refer to paragraph 3-9c for final adjustment of the shifter fork shaft.

(15) Proceed to paragraph 7-4.

c. Rear Output Shaft (no front output)

(1) Install bearing 21 (foldout 17,A), shield side first, into the web of the transmission housing (refer to fig. 7-7). Press or tap on the bearing outer race to seat it against shoulder in the housing web bore.

(2) Install the transfer-driven gear (fig. 7-8).

(3) If bearing 28 (foldout 17,A) or spacer 27 were removed from rear output shaft 26, replace them. Install spacer 27 and bearing 28, shield side last, onto the shaft. Seat the bearing firmly against the spacer.

(4) Place the spacer at the front side of the transfer-driven gear hub (fig. 7-9). Install the assembled rear output shaft, splined end first, through the splined hub of the gear, the spacer, and the bearing installed in the housing web.

(5) Support the transfer-driven gear, and drive the assembled rear output shaft forward (fig. 7-10). If necessary, reseat the rear bearing by driving on its inner race until the outer race clears the snapring groove in the bore.

(6) Install the snapring and tap progressively around its circumference until it snaps into place against the bearing (fig. 7-11).

(7) Install the new rear output lip-type oil seal, spring-loaded lip first, and press it squarely into the bore until it is lightly seated against counterbore shoulder (refer to fig. 7-12).

(8) Apply nonhardening sealant onto the smaller outside diameter of plug 8 (foldout 17,A) and install the plug into the front output orifice. Press the plug into the bore until its flange is firmly seated against the front surface of the housing.

(9) If shifter shaft hole plug 16 was removed, apply nonhardening sealant onto the outside diameter of the plug. Install the plug, closed end first, and seat it against the shoulder in the housing bore.

7-4. INSTALLATION OF REVERSE AND FORWARD CLUTCHES, GEARING (All -1 Models)

a. Reverse Clutch, Planetary

(1) Position the transmission housing on blocks on its front splitline (fig. 7-13). Install the reverse clutch piston with sealrings (as assembled in para 6-12) into the transmission housing.

NOTE

For vehicle-mounted transmissions, refer to paragraph 7-14.

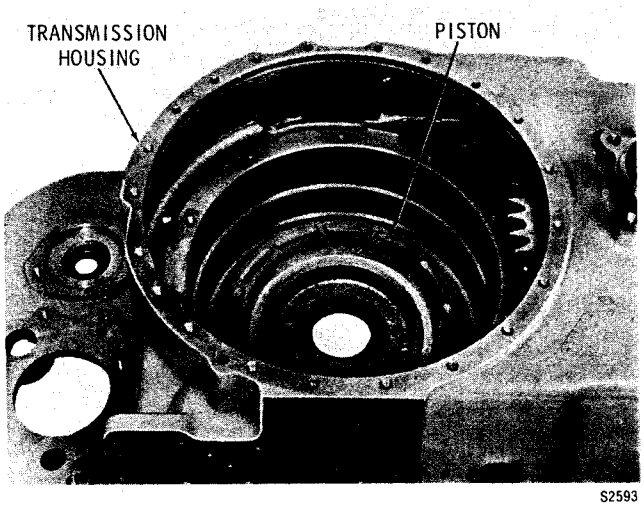


Fig. 7-13. Reverse clutch piston installed

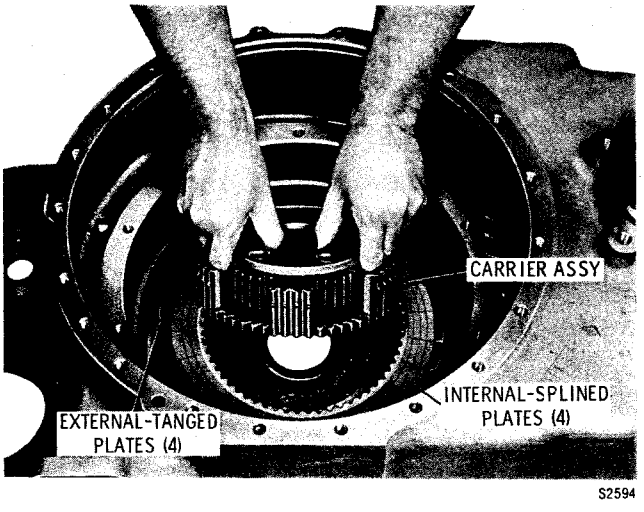


Fig. 7-14. Installing reverse planetary carrier assembly

(2) Beginning with an external-tanged clutch plate, alternately install four external-tanged clutch plates and four internal-splined clutch plates o n t o the reverse piston (fig. 7-14). Install the reverse planetary carrier assembly, long splines first, into the reverse plates.

(3) Install one external-tanged plate and one internal-splined plate onto the reverse planetary carrier assembly (fig. 7-15).

(4) If transmission is equipped with a high-speed, forward ratio, install sun gear 16 (foldout 9,B), small end first, into the reverse planetary carrier assembly.

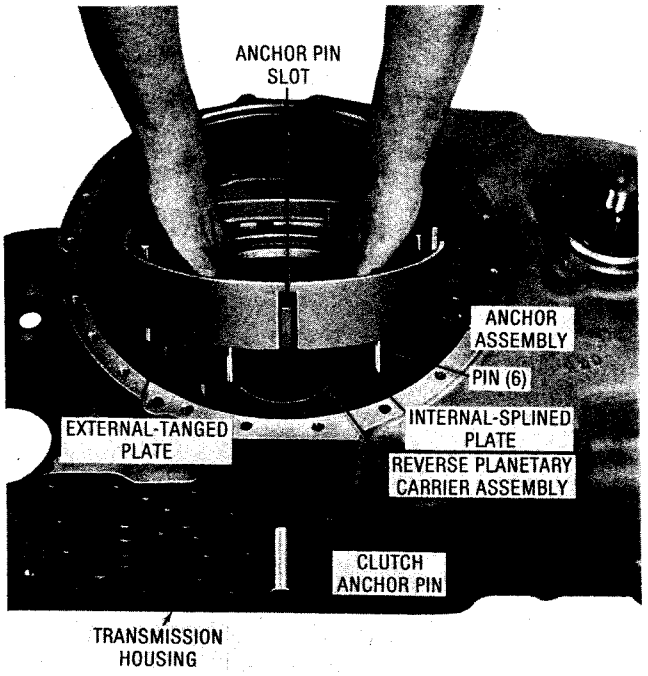


Fig. 7-15. Installing forward-and-reverse clutch anchor assembly

(5) Align t h e slots of the five reverse, external-tanged clutch plates to receive the pins in the clutch anchor assembly (fig. 7-15). Install the clutch anchor pin into the control valve mounting pad on the left side of the transmission housing. Aligning the anchor pin slot with the clutch anchor pin hole within the transmission housing, install the forward-and-reverse clutch anchor assembly, longer ends of pins downward, and engage the slots of the five external-tanged clutch plates. Be sure that the six notches of the five external-tanged plates are engaged by the six anchor pins in the anchor assembly. (Listen for a sound of the assembly seating when the plates are aligned.)

(6) Push the clutch anchor pin into the slot in the forward-and-reverse clutch anchor assembly (fig. 7-15). Temporarily install a 3/8-16 x 1-inch bolt and a flat washer to retain the anchor pin during subsequent assembly operations. (Refer to fig. 7-17.)

b. Forward Clutch and Planetary

(1) Assemble t h e forward planetary carrier assembly onto the reverse ring gear (fig. 7-16).

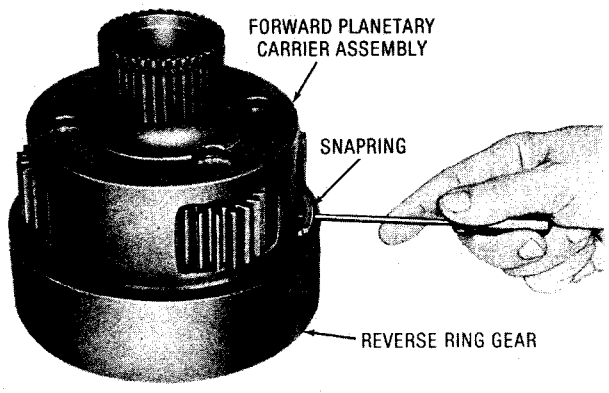


Fig. 7-16. Installing snapring into reverse ring gear

(2) If the transmission is equipped with a high-speed, forward ratio, install thrust washer 2 (foldout 10,A) into the inner hub of six-pinion, forward carrier 3. Apply oil-soluble grease to retain the washer during installation of the carrier.

(3) Install the assembled reverse ring gear and forward planetary carrier, engaging the reverse ring gear teeth with the planetary pinion teeth (fig. 7-17).

(4) Place an external-tanged plate between two internal-splined plates and install them as a unit onto the flat side of the forward ring gear (fig. 7-18). Install the assembled clutch plates and ring gear, flat side first, onto the forward planetary carrier assembly, and engage the slots of the external-tanged plate onto the six clutch anchor pins.

(5) Starting with an external-tanged clutch plate, alternately install three external-tanged clutch plates and two internal-splined clutch plates onto the forward ring gear (fig. 7-19).

(6) Install the twelve piston return springs and spring guide pins into the holes in the clutch anchor assembly (fig. 7-19).

(7) If plug 39 (foldout 10,A) was removed from forward clutch piston housing 37, replace it. Apply nonhardening sealant onto the plug threads and install the plug into the

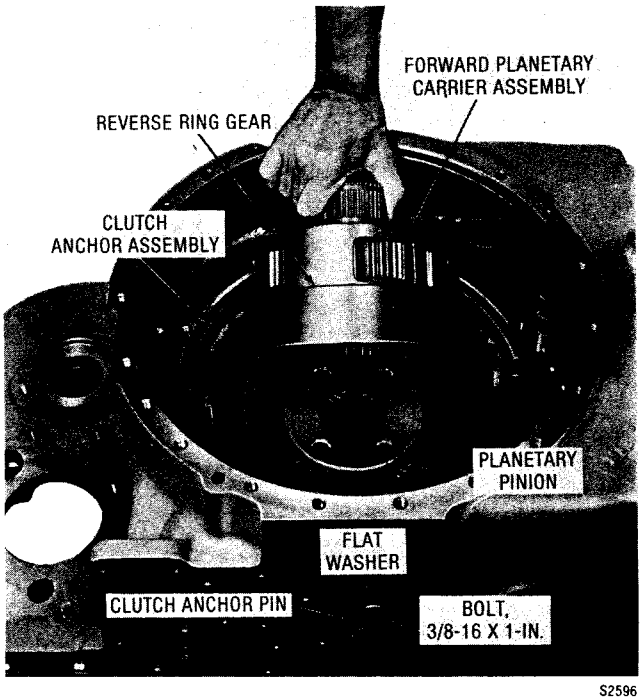


Fig. 7-17. Installing forward planetary carrier assembly and reverse ring gear

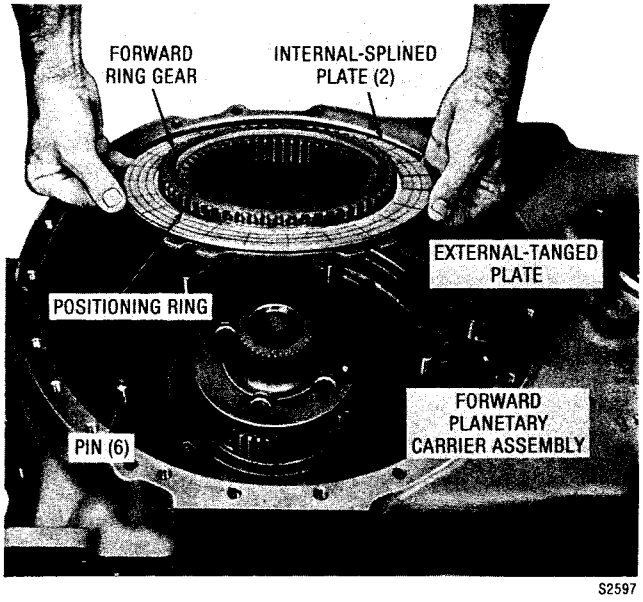


Fig. 7-18. Installing forward ring gear and three clutch plates

housing. Tighten the plug to 14-16 lb ft (19-21 N·m).

(8) Install the forward clutch piston with sealrings (as assembled in para 6-12),

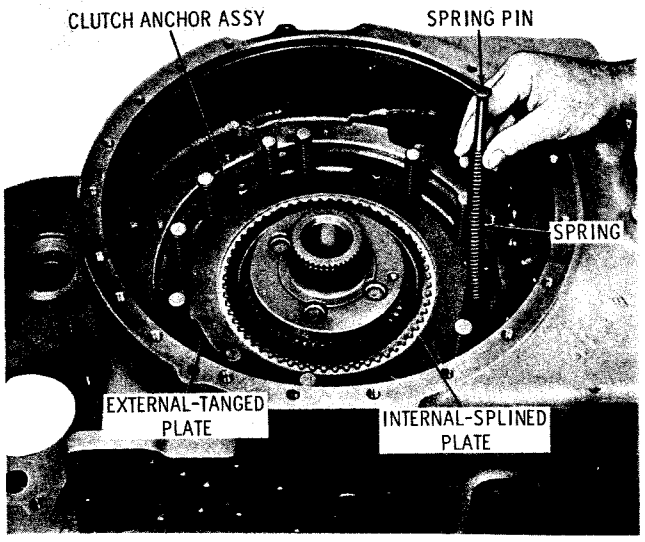


Fig. 7-19. Installing piston return springs and guide pins

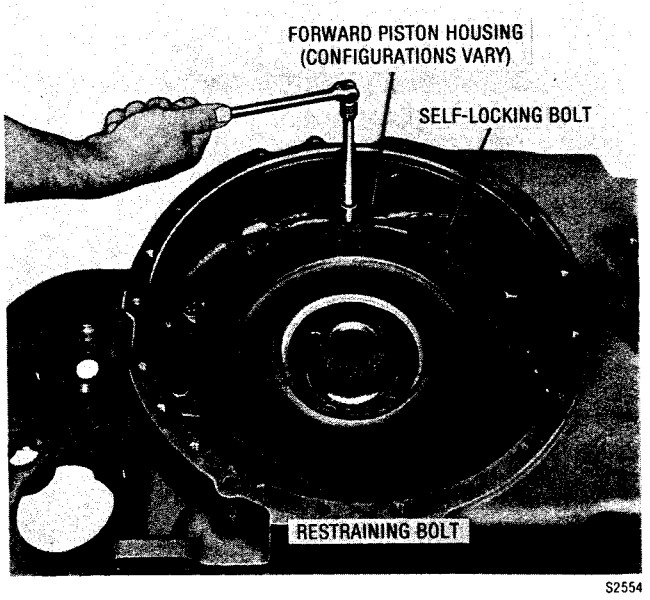


Fig. 7-21. Installing forward clutch piston housing bolts

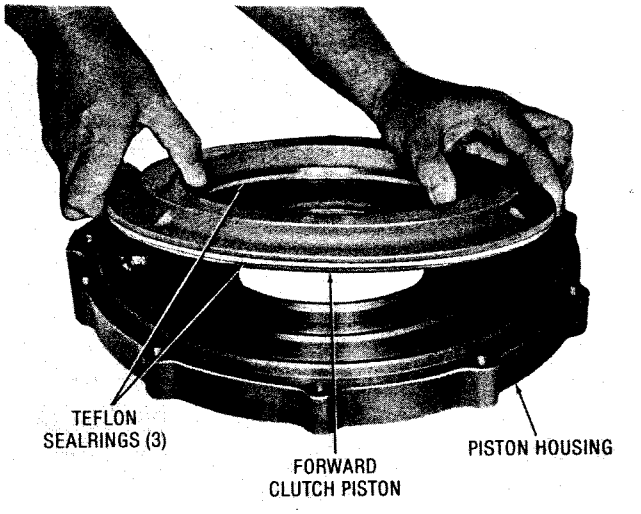


Fig. 7-20. Installing forward clutch piston into piston housing

flat side first, into the forward clutch piston housing (fig. 7-20).

(9) Install the forward clutch piston housing and piston assembly. For earlier models, install flat washers and eight of ten 3/8-16 x 1-1/2-inch self-locking bolts (fig. 7-21). For later models, install eight of ten 3/8-16 x 1-3/4-inch self-locking bolts. Use two of the longer valve body mounting bolts (3/8-16 x 2-1/2-inch) to draw the piston housing down sufficiently to engage the piston housing bolts. Remove the two draw bolts and install the two remaining flat washers (earlier models) and self-locking bolts. Tighten the bolts to 36-43 lb ft (49-58 N·m).

(10) For TRT-1 models, proceed to paragraph 7-8.

7-5. INSTALLATION OF TRANSFER DRIVE GEAR, HIGH-RANGE CLUTCH (TT, TTB)

a. Transfer Drive Gear

(1) Install the transfer drive gear (as assembled in para 6-17), bearing first, onto the splined hub of the forward planetary carrier (fig. 7-22).

(2) Using a suitable hook-type tool, raise the forward planetary carrier sufficiently to expose the snapring groove in the splined hub, and install the snapring (fig. 7-23).

b. High-Range Clutch and Hub Assembly

(1) If the model is equipped with a power takeoff, install the high-range clutch

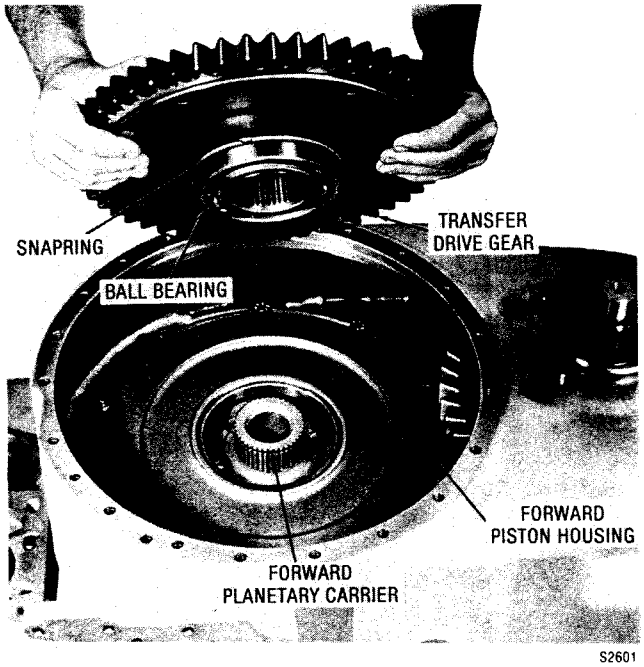


Fig. 7-22. Installing transfer drive gear assembly (TT, TTB)

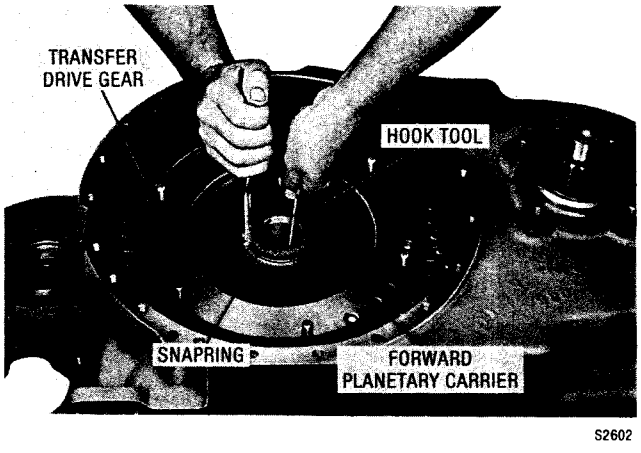


Fig. 7-23. Installing transfer drive gear snapring (TT, TTB)

hub assembly (as assembled in para 6-13) onto the transfer drive g e a r (fig. 7-24).

(2) If the model is not equipped with a power takeoff, install the high-range clutch and hub assembly (as assembled in para 6-13), splined end of shaft first, into the hub of the transfer drive gear (fig. 7-25).

(3) For TT models, proceed to paragraph 7-7.

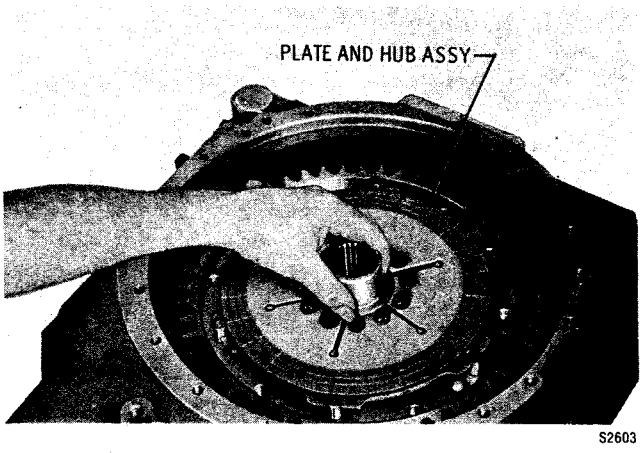


Fig. 7-24. Installing high-range clutch plate and hub assembly (TT, TTB models with power takeoff)

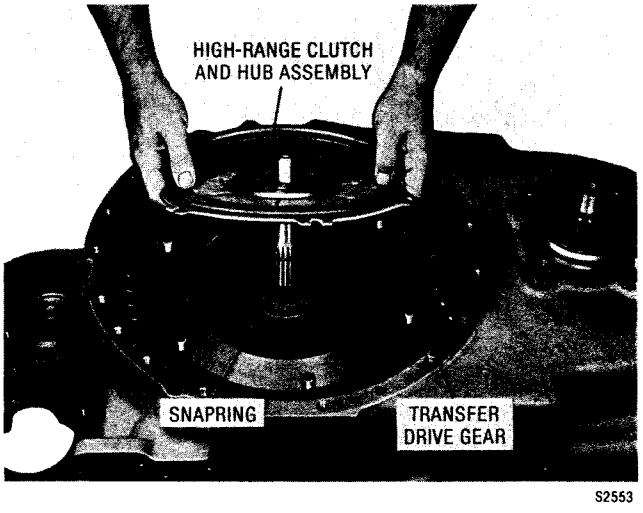


Fig. 7-25. Installing high-range clutch and hub assembly (TT, TTB models without power takeoff)

7-6. INSTALLATION OF HIGH-RANGE CLUTCH PISTON HOUSING, INTERNAL BRAKE, REAR COVER — TTB

a. High-range Clutch Piston Housing

(1) A l i g n the bolt holes in piston housing 22 or 35 (foldout 15,A) with those in transfer drive gear 3, and install the high-range clutch piston housing (as assembled in para 6-11) onto the transfer d r i v e gear. Using a soft hammer, seat the piston housing in the counterbore of the gear.

(2) Install six 1/2-20 x 2-3/4-inch bolts 24 or 37 and locktabs 23 or 36 to retain piston housing 22 or 35. Tighten the bolts to 83-100 lb ft (113-135 N·m). Bend the locktabs against the bolt heads. Install the step-joint sealrings 25 and one O-ring 26 onto the hub of the piston housing.

b. Internal Brake Components

(1) Install the gasket onto the diaphragm (as assembled in para 6-16) and install the diaphragm onto the transmission housing (fig. 7-26). Install two 3/8-16 x 1-1/8-inch bolts, one 3/8-16 x 2-inch bolt, and three lockwashers to retain the diaphragm. Tighten the bolts to 26-32 lb ft (35-43 N·m).

(2) Install the sealring onto the diaphragm (fig. 7-27). Install the brake hub onto the splined hub of the high-range clutch piston housing. Retain the brake hub with a snapring.

(3) Beginning with an external-tanged brake plate, alternately install six external-tanged plates and five internal-splined plates onto the diaphragm and brake hub (fig. 7-28). Be sure that the slots of the external-tanged plates engage the six anchor pins in the diaphragm.

(4) Install the ball bearing onto the hub of the high-range clutch piston housing (fig. 7-29).

(5) Install the twelve brake return springs, flared end first, into the recesses in the diaphragm. Twist the springs counterclockwise to seat them in the recesses and drop the twelve guide pins into the springs.

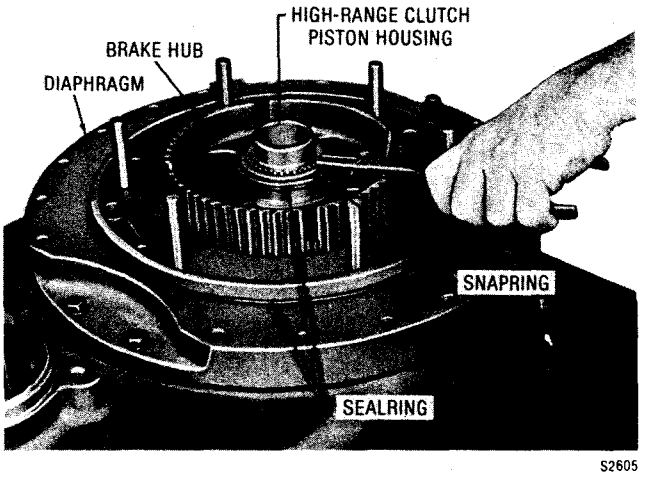


Fig. 7-27. Installing brake hub snapring (TTB)

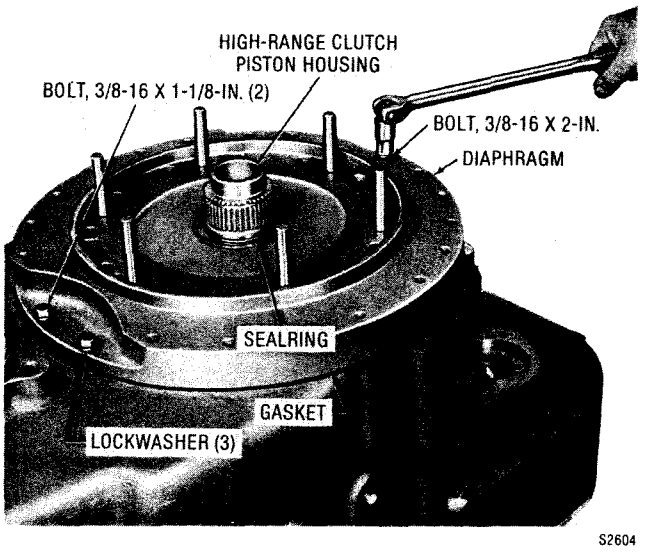


Fig. 7-26. Installing diaphragm bolts (TTB)

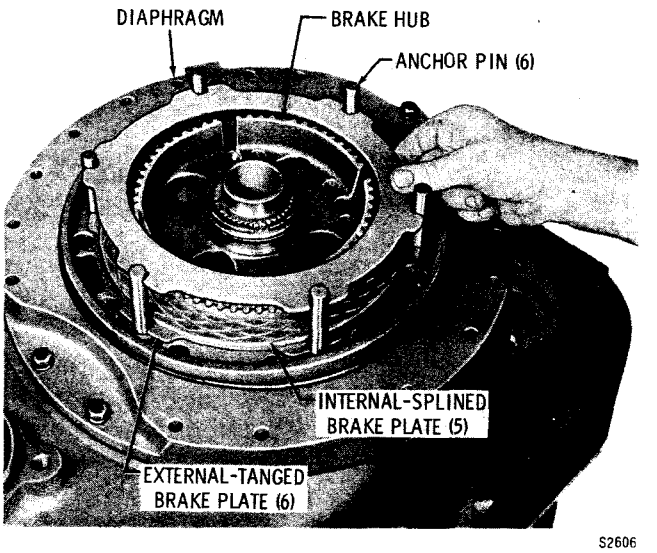


Fig. 7-28. Installing brake plates (TTB)

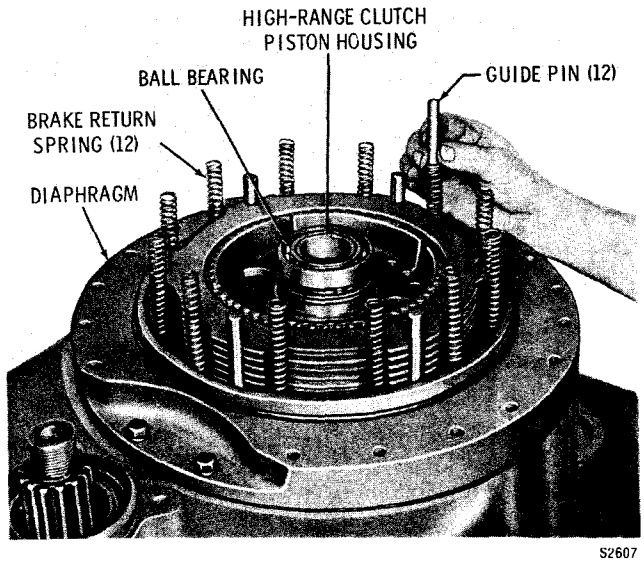


Fig. 7-29. Installing brake return spring guide pins (TTB)

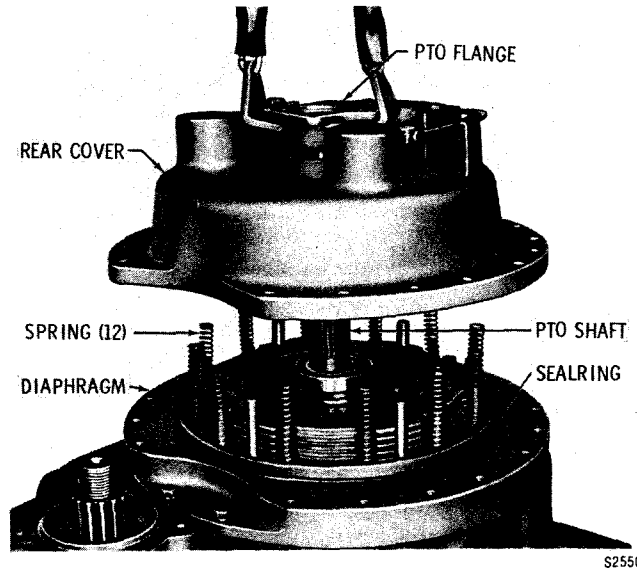


Fig. 7-30. Installing rear cover assembly (TTB)

c. Rear Cover (TTB without converter-driven PTO)

NOTE

For TTB models with converter-driven PTO, proceed to paragraph 7-6d.

(1) Attach a sling to the bolt circle flange of the rear cover assembly (as assembled in para 6-21). Hoist the assembly into position over the transmission in a manner similar to that shown in figure 7-30.

(2) Check to ensure that all of the brake return springs are straight and aligned, and that the sealring is in place on the diaphragm (fig. 7-30).

(3) Lower the assembly to within approximately 1-1/4 inches (32 mm) of the diaphragm and check "by feel" to ensure that each brake return spring will enter its recess in the brake-apply plate.

(4) Continue lowering the assembly until it stops its downward travel and its weight is supported by the brake return springs. Remove the sling. Using two 3/8-16 x 3-inch bolts, draw the rear cover assembly down sufficiently to allow the engagement of the proper bolts. Install sixteen 3/8-16 x 2-3/4-inch bolts 45 (foldout 15,B) and lockwashers 46. Remove the two draw bolts, and install the remaining two 3/8-16 x 2-3/4-inch bolts 45 and lockwashers 46. Tighten the eighteen bolts to 26-32 lb ft (35-43 N·m).

(5) Proceed to paragraph 7-7.

d. Rear Cover (TTB with converter-driven PTO)

(1) Attach a sling to the PTO flange of the rear cover assembly (as assembled in para 6-21). Hoist the assembly into position over the transmission, as shown in figure 7-30.

(2) Check to ensure that all of the brake return springs are straight and aligned, and that the sealring is in place on the diaphragm (fig. 7-30).

(3) As the rear cover assembly is lowered, rotate the PTO flange, so that the shaft splines will engage the high-range clutch hub and the forward-and-reverse sun gear.

(4) Lower the assembly to within approximately 1-1/4 inches (32 mm) of the diaphragm and check "by feel" to ensure that each brake return spring will enter its recess in the brake-apply plate. Attach the rear

cover assembly as described in paragraph 7-6c(4).

(5) Proceed to paragraph 7-10.

7-7. INSTALLATION OF HIGH-RANGE CLUTCH PISTON HOUSING, REAR COVER — TT

a. High-range Clutch Piston Housing (TT with converter-driven PTO)

NOTE

For TT models without converter-driven P T O, proceed to paragraph 7-7c.

(1) Install high-range clutch piston housing 37 (foldout 11,B) and attached parts (as assembled in para 6-11) onto transfer drive gear assembly 2. Align the drive pin holes in the piston with the drive pins in the transfer drive gear. Using a soft hammer, seat the piston housing in the counterbore of the transfer drive gear.

(2) Attach the piston housing to the transfer drive gear with six 1/2-20 x 2-3/4-inch bolts 30 and locktabs 31. Tighten the bolts to 83-100 lb ft (113-135 N·m). Bend the locktabs against the bolt heads.

(3) Install two step-joint sealrings 38 into the grooves in the hub of piston housing 37.

b. Rear Cover Assembly (TT with converter-driven PTO)

(1) Lubricate sealring 2 (foldout 16,D) and install it into its groove in rear PTO cover assembly 22 (and attached parts as assembled in para 6-20). Apply oil-soluble grease onto gasket 1 and install the gasket onto the mounting flange of the rear PTO cover assembly.

(2) Install PTO output flange 27 and flange retaining washer 28 onto the threaded end of PTO shaft assembly 17. Apply molybdenum disulfide grease (Molykote Type G or equivalent) onto the threads of 7/8-14 self-locking nut 29 and install the nut onto PTO shaft assembly 17. Do not bring the nut to full torque at this time.

(3) Attach a sling to PTO output flange 27 and hoist the rear PTO cover assembly and attached parts into position over the transmission. While lowering the cover assembly into the transmission, rotate the PTO output flange so that the PTO shaft splines will engage the high-range clutch hub and forward-and-reverse sun gear.

(5) Retain the rear PTO cover assembly with nineteen 3/8-16 x 1-1/8-inch bolts 30 and lockwashers 31. Tighten the bolts to 26-32 lb ft (35-43 N·m). Proceed to paragraph 7-7.

c. High-range Clutch Piston Housing (TT without converter-driven PTO)

(1) Install the high-range clutch piston housing and attached parts (as assembled in para 6-11) onto the transfer drive gear (fig. 7-31). During installation, align and engage the recesses in the piston with the drive pins in the transfer drive gear.

(2) Using a soft hammer, seat the piston housing in the counterbore of the drive gear, and install the six locktabs and six 1/2-

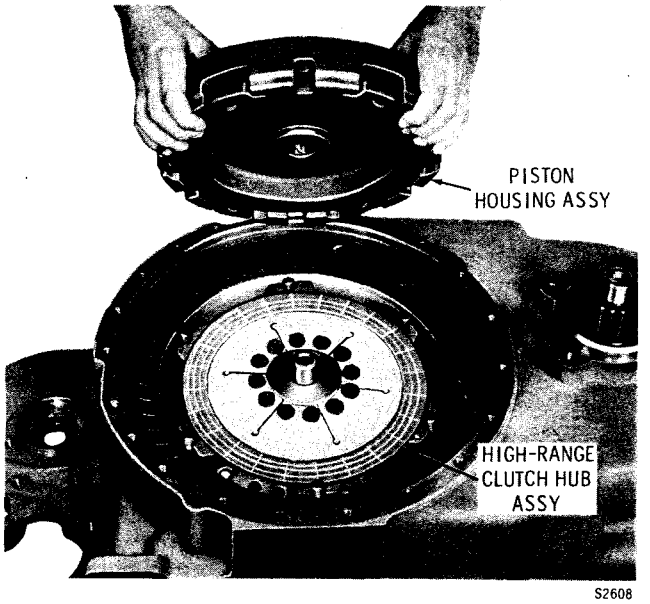


Fig. 7-31. Installing high-range clutch piston housing assembly (TT)

(2) Install six 1/2-20 x 2-3/4-inch bolts 24 or 37 and locktabs 23 or 36 to retain piston housing 22 or 35. Tighten the bolts to 83-100 lb ft (113-135 N·m). Bend the locktabs against the bolt heads. Install the step-joint sealrings 25 and one O-ring 26 onto the hub of the piston housing.

b. Internal Brake Components

(1) Install the gasket onto the diaphragm (as assembled in para 6-16) and install the diaphragm onto the transmission housing (fig. 7-26). Install two 3/8-16 x 1-1/8-inch bolts, one 3/8-16 x 2-inch bolt, and three lockwashers to retain the diaphragm. Tighten the bolts to 26-32 lb ft (35-43 N·m).

(2) Install the sealring onto the diaphragm (fig. 7-27). Install the brake hub onto the splined hub of the high-range clutch piston housing. Retain the brake hub with a snapring.

(3) Beginning with an external-tanged brake plate, alternately install six external-tanged plates and five internal-splined plates onto the diaphragm and brake hub (fig. 7-28). Be sure that the slots of the external-tanged plates engage the six anchor pins in the diaphragm.

(4) Install the ball bearing onto the hub of the high-range clutch piston housing (fig. 7-29).

(5) Install the twelve brake return springs, flared end first, into the recesses in the diaphragm. Twist the springs counterclockwise to seat them in the recesses and drop the twelve guide pins into the springs.

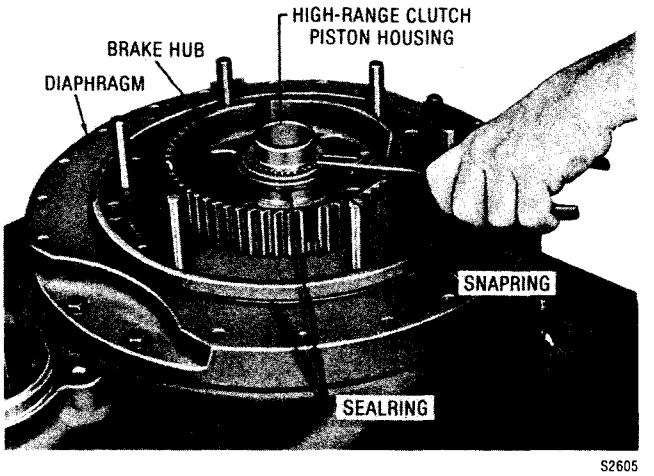


Fig. 7-27. Installing brake hub snapring (TTB)

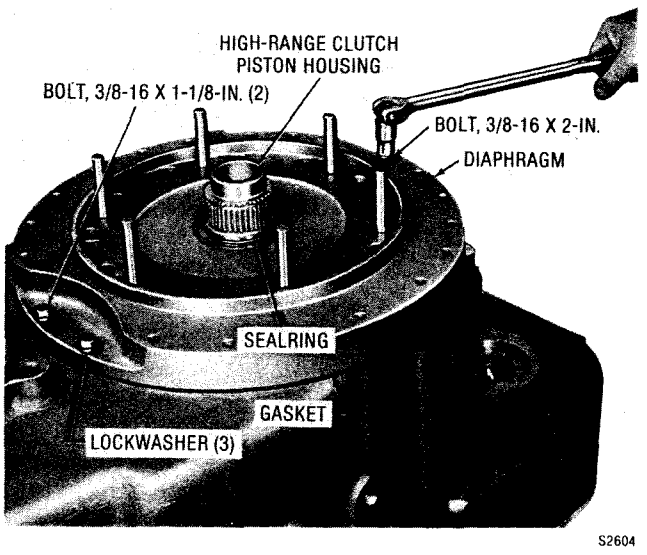


Fig. 7-26. Installing diaphragm bolts (TTB)

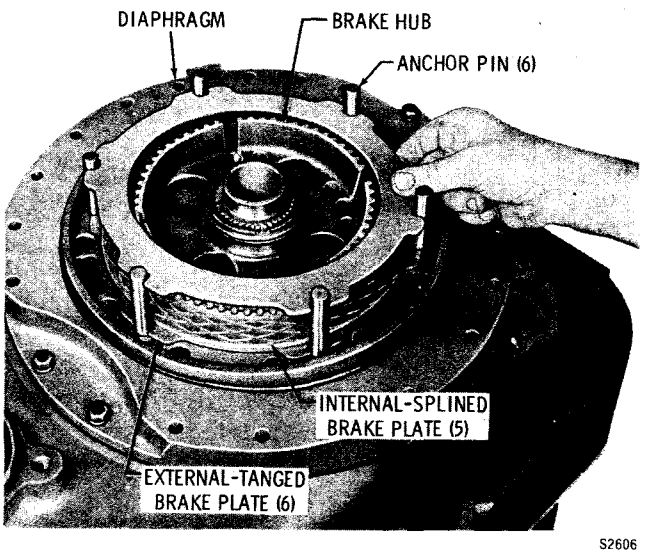


Fig. 7-28. Installing brake plates (TTB)

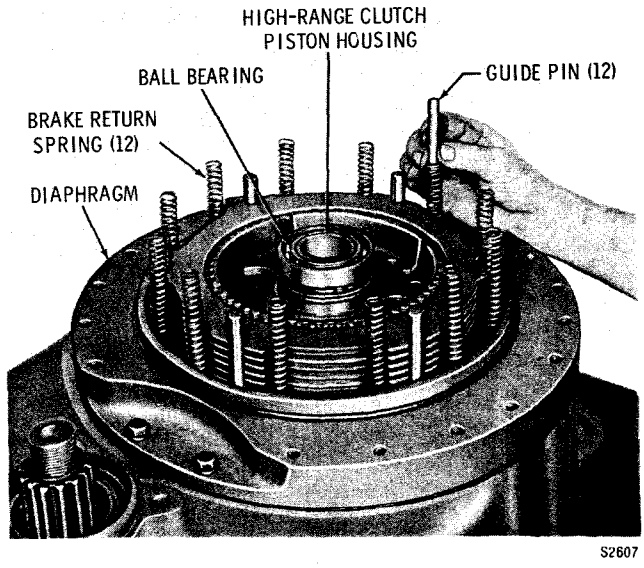


Fig. 7-29. Installing brake return spring guide pins (TTB)

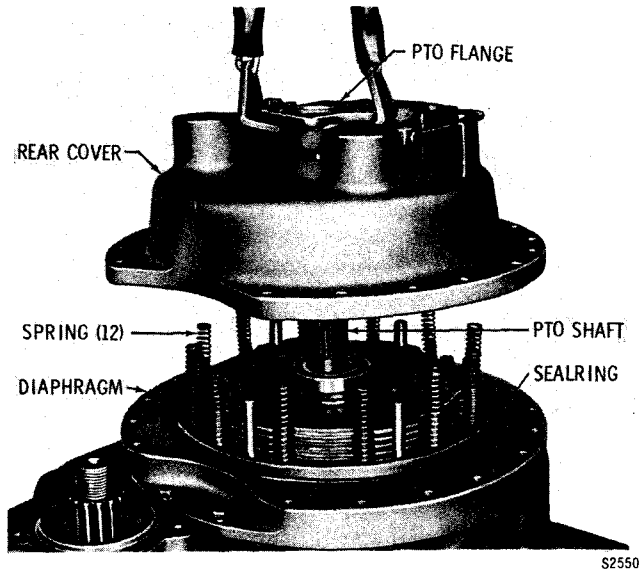


Fig. 7-30. Installing rear cover assembly (TTB)

c. Rear Cover (TTB without converter-driven PTO)

NOTE

For TTB models with converter-driven PTO, proceed to paragraph 7-6d.

(1) Attach a sling to the bolt circle flange of the rear cover assembly (as assembled in para 6-21). Hoist the assembly into position over the transmission in a manner similar to that shown in figure 7-30.

(2) Check to ensure that all of the brake return springs are straight and aligned, and that the sealring is in place on the diaphragm (fig. 7-30).

(3) Lower the assembly to within approximately 1-1/4 inches (32 mm) of the diaphragm and check "by feel" to ensure that each brake return spring will enter its recess in the brake-apply plate.

(4) Continue lowering the assembly until it stops its downward travel and its weight is supported by the brake return springs. Remove the sling. Using two 3/8-16 x 3-inch bolts, draw the rear cover assembly down sufficiently to allow the engagement of the proper bolts. Install sixteen 3/8-16 x 2-3/4-inch bolts 45 (foldout 15,B) and lockwashers 46. Remove the two draw bolts, and install the remaining two 3/8-16 x 2-3/4-inch bolts 45 and lockwashers 46. Tighten the eighteen bolts to 26-32 lb ft (35-43 N·m).

(5) Proceed to paragraph 7-7.

d. Rear Cover (TTB with converter-driven PTO)

(1) Attach a sling to the PTO flange of the rear cover assembly (as assembled in para 6-21). Hoist the assembly into position over the transmission, as shown in figure 7-30.

(2) Check to ensure that all of the brake return springs are straight and aligned, and that the sealring is in place on the diaphragm (fig. 7-30).

(3) As the rear cover assembly is lowered, rotate the PTO flange, so that the shaft splines will engage the high-range clutch hub and the forward-and-reverse sun gear.

(4) Lower the assembly to within approximately 1-1/4 inches (32 mm) of the diaphragm and check "by feel" to ensure that each brake return spring will enter its recess in the brake-apply plate. Attach the rear

cover assembly as described in paragraph 7-6c(4).

(5) Proceed to paragraph 7-10.

7-7. INSTALLATION OF HIGH-RANGE CLUTCH PISTON HOUSING, REAR COVER — TT

a. High-range Clutch Piston Housing (TT with converter-driven PTO)

NOTE

For TT models without converter-driven P T O, proceed to paragraph 7-7c.

(1) Install high-range clutch piston housing 37 (foldout 11,B) and attached parts (as assembled in para 6-11) onto transfer drive gear assembly 2. Align the drive pin holes in the piston with the drive pins in the transfer drive gear. Using a soft hammer, seat the piston housing in the counterbore of the transfer drive gear.

(2) Attach the piston housing to the transfer drive gear with six 1/2-20 x 2-3/4-inch bolts 30 and locktabs 31. Tighten the bolts to 83-100 lb ft (113-135 N·m). Bend the locktabs against the bolt heads.

(3) Install two step-joint sealrings 38 into the grooves in the hub of piston housing 37.

b. Rear Cover Assembly (TT with converter-driven PTO)

(1) Lubricate sealring 2 (foldout 16,D) and install it into its groove in rear PTO cover assembly 22 (and attached parts as assembled in para 6-20). Apply oil-soluble grease onto gasket 1 and install the gasket onto the mounting flange of the rear PTO cover assembly.

(2) Install PTO output flange 27 and flange retaining washer 28 onto the threaded end of PTO shaft assembly 17. Apply molybdenum disulfide grease (Molykote Type G or equivalent) onto the threads of 7/8-14 self-locking nut 29 and install the nut onto PTO shaft assembly 17. Do not bring the nut to full torque at this time.

(3) Attach a sling to PTO output flange 27 and hoist the rear PTO cover assembly and attached parts into position over the transmission. While lowering the cover assembly into the transmission, rotate the PTO output flange so that the PTO shaft splines will engage the high-range clutch hub and forward-and-reverse sun gear.

(5) Retain the rear PTO cover assembly with nineteen 3/8-16 x 1-1/8-inch bolts 30 and lockwashers 31. Tighten the bolts to 26-32 lb ft (35-43 N·m). Proceed to paragraph 7-7.

c. High-range Clutch Piston Housing (TT without converter-driven PTO)

(1) Install the high-range clutch piston housing and attached parts (as assembled in para 6-11) onto the transfer drive gear (fig. 7-31). During installation, align and engage the recesses in the piston with the drive pins in the transfer drive gear.

(2) Using a soft hammer, seat the piston housing in the counterbore of the drive gear, and install the six locktabs and six 1/2-

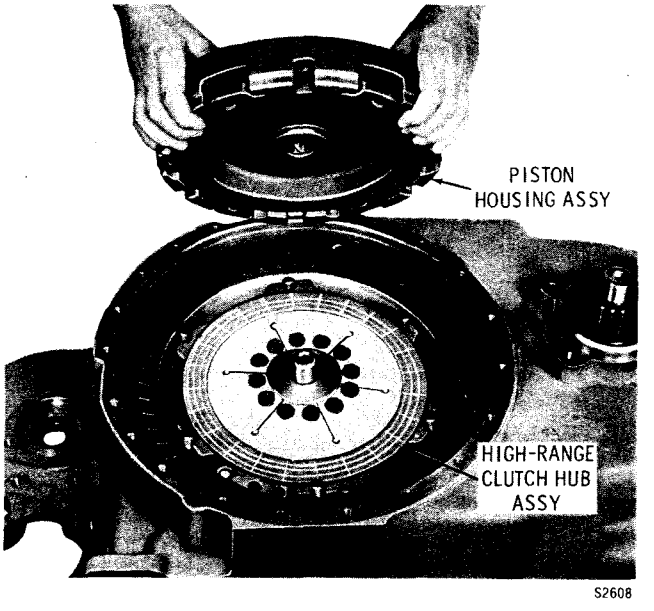


Fig. 7-31. Installing high-range clutch piston housing assembly (TT)

20 x 2-3/4-inch bolts (fig. 7-32). Tighten the bolts to 83-100 lb ft (113-135 N·m). Bend the locktabs against the bolts heads.

d. Rear Cover (TT without converter-driven PTO)

(1) If the transmission is equipped with a speedometer drive assembly, install washer 12 (foldout 16,D) into drive sleeve 13. Install lip-type oil seal 11, metal side first, into drive sleeve 13. Press the seal to a depth of 0.035-0.065 inch (0.88-1.65 mm) below the front surface of the drive sleeve.

(2) Install gasket 7, speedometer drive adapter 8, gasket 9, and sleeve assembly 10 onto rear cover 4. Retain the speedometer components with two 5/16-18 x 2-1/4-inch bolts 15 and lockwashers 14. Tighten the bolts to 13-16 lb ft (18-21 N·m).

(3) If the pipe plug was removed from the rear cover, install the plug (fig. 7-32). If the plug is 1/8-in. NPTF, tighten the plug to 10-12 lb ft (14-16 N·m). If the plug is 3/8-in. NPTF, tighten the plug to 18-22 lb ft (25-29 N·m).

CAUTION

Rear covers having two ribs on the inside of the cover (used with later models) must not be used with piston housings having sixty vanes (used with earlier models) (fig. 7-32).

(4) Lubricate the sealring and install it into the groove in the rear cover pilot diameter (fig. 7-32). Apply oil-soluble grease onto the gasket and install the gasket onto the rear cover pilot diameter. Install the rear cover onto the transmission housing and retain it with nineteen 3/8-16 x 1-1/8-inch bolts and lockwashers. Tighten the bolts to 26-32 lb ft (35-43 N·m).

(5) Proceed to paragraph 7-10.

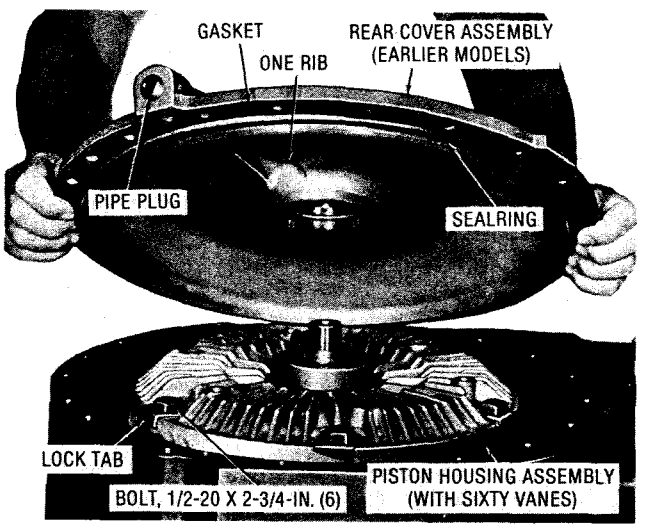


Fig. 7-32. Installing transmission rear cover (TT)

7-8. INSTALLATION OF TRANSFER DRIVE GEAR, HOUSING ADAPTER, LOW-RANGE CLUTCH, HIGH-RANGE CLUTCH (TRT-1)

a. Transfer Drive Gear, Housing Adapter

(1) Install the snapring into the groove nearer the end of the high-range sun gear splined sleeve. Install the sleeve into the transfer drive gear assembly at the side which has a smooth bore in the hub (fig. 7-33).

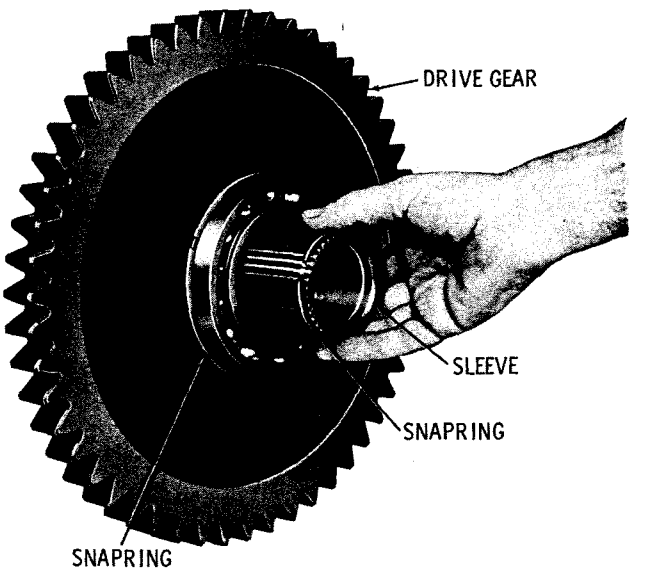


Fig. 7-33. Installing high-range sun gear sleeve into transfer drive gear (TRT-1)

(2) Install the transfer drive gear and splined sleeve, bearing with snapring first, onto the forward planetary carrier (fig. 7-34).

(3) Install the gasket and sealring onto the rear housing adapter assembly. Install the adapter assembly (fig. 7-35).

(4) Install the sixteen 3/8-16 x 1-1/8-inch bolts, with lockwashers, to retain the adapter (fig. 7-36). Tighten the bolts to 26-32 lb ft (36-43 N·m).

b. Low-Range Clutch, High-Range Planetary

NOTE

New Teflon sealrings may require forming by hand to help retain their proper circular shape. Wrap them in a circle around an object about two-thirds the diameter of the groove they fit.

(1) Install two Teflon step-joint sealrings 12 (foldout 12,A) into the grooves in the front hub of low-range clutch drum 15. Use oil-soluble grease to retain them.

(2) Install low-range clutch drum assembly 13 onto the high-range sun gear sleeve (fig. 7-37).

(3) Install snapring 25 (foldout 12,A) into the groove in the high-range sun gear sleeve.

(4) Install one low-range, internal-splined clutch plate into the low-range clutch drum (fig. 7-38). Install the high-range ring

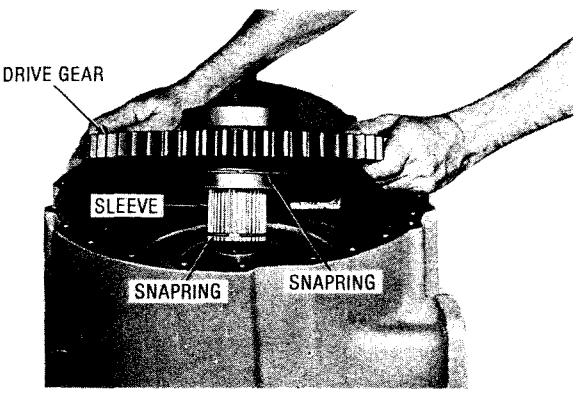


Fig. 7-34. Installing transfer drive gear assembly (TRT-1)

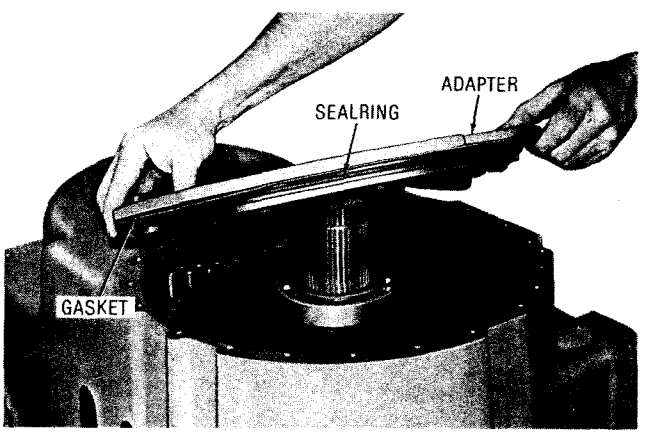


Fig. 7-35. Installing rear housing adapter (TRT-1)

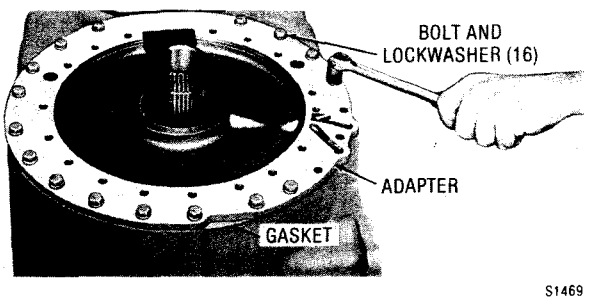


Fig. 7-36. Installing rear housing adapter bolts (TRT-1)

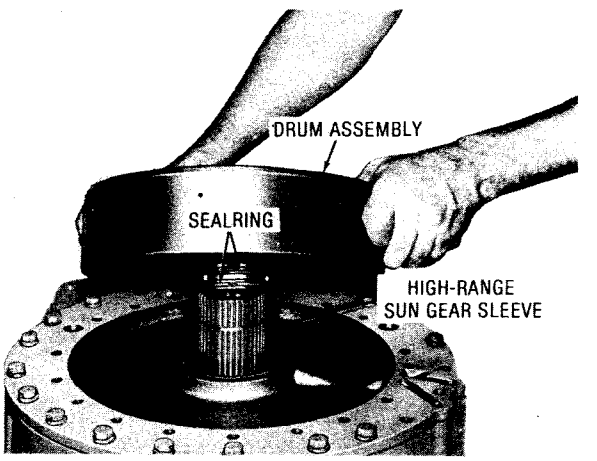


Fig. 7-37. Installing low-range clutch drum assembly (TRT-1)

gear, positioning ring first, into the clutch plate splines.

(5) Beginning with an external-splined plate, alternately install three external- and three internal-splined, low-range clutch plates (fig. 7-39).

(6) Install the low-range clutch backplate, flat side first, into the low-range clutch drum (fig. 7-39).

(7) Install the internal snapring which retains the clutch backplate (fig. 7-40).

(8) Install the high-range planetary sun gear, thrust washer upward, onto the splines of the sun gear sleeve (fig. 7-40).

(9) Install high-range planetary carrier assembly into high-range ring gear (fig. 7-41).

c. High-Range Clutch, Rear Housing

(1) Install the clutch anchor pin into the rear housing (as rebuilt in paragraph 6-11). Leave the flat-milled end of the pin extending at the inside of the housing (fig. 7-42).

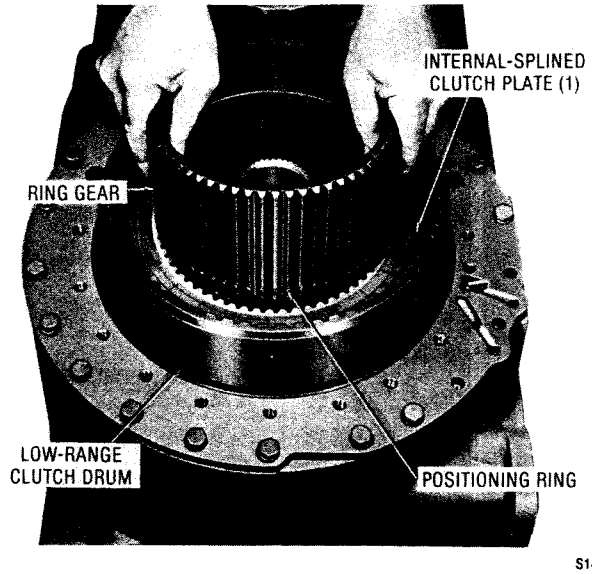


Fig. 7-38. Installing high-range ring gear (TRT-1)

(2) Position the high-range clutch anchor assembly 12 (foldout 12,B), pins up-

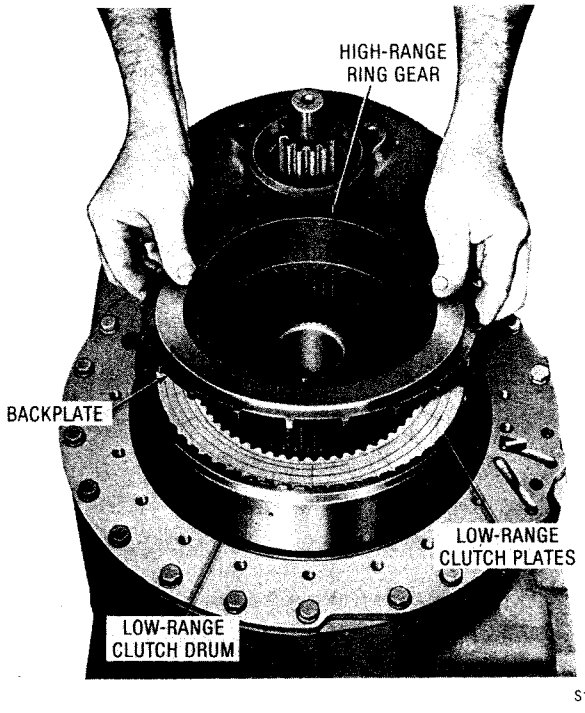


Fig. 7-39. Installing low-range clutch backplate (TRT-1)

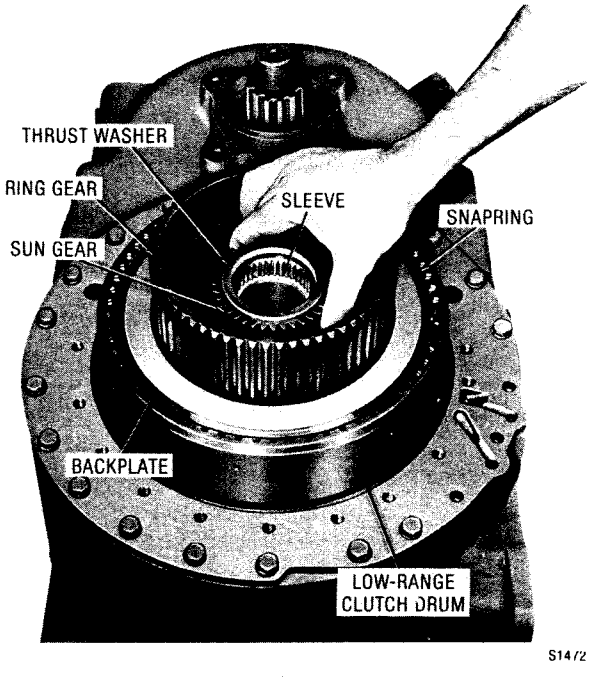


Fig. 7-40. Installing high-range sun gear (TRT-1)

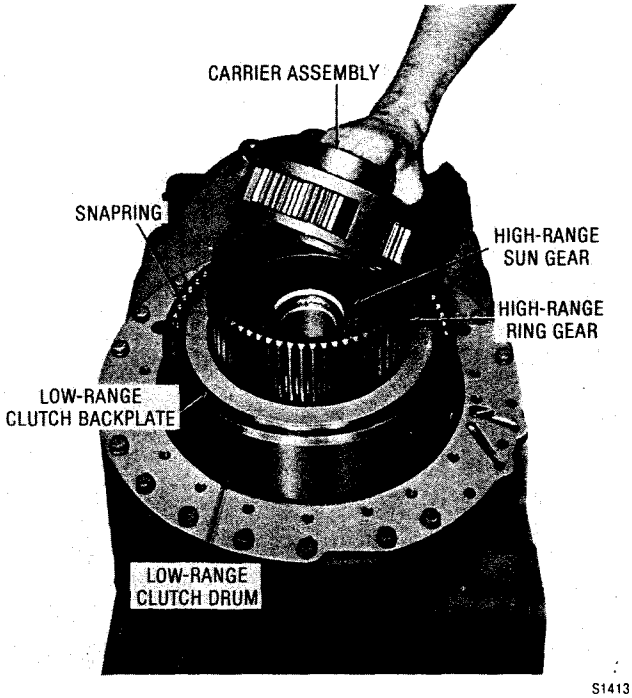


Fig. 7-41. Installing high-range planetary carrier assembly (TRT-1)

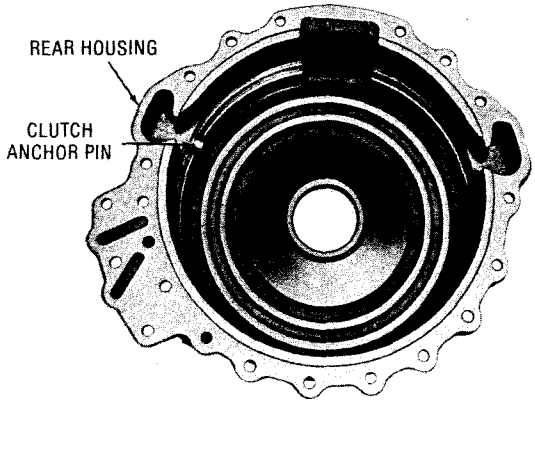


Fig. 7-42. Rear housing and piston assembly (TRT-1)

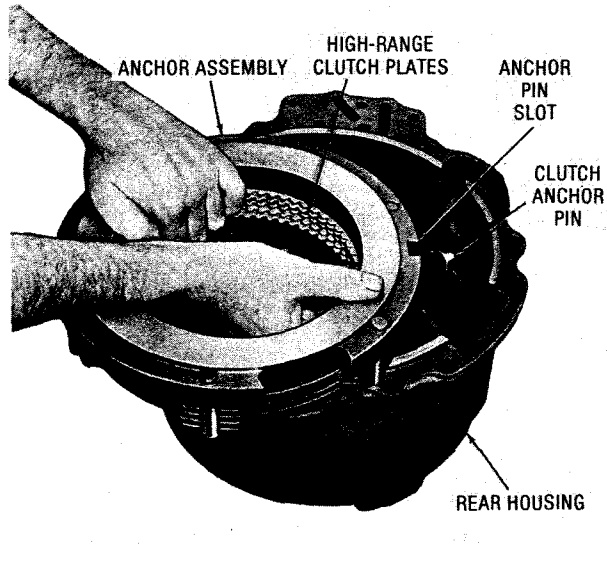


Fig. 7-43. Installing high-range clutch anchor and plates (TRT-1)

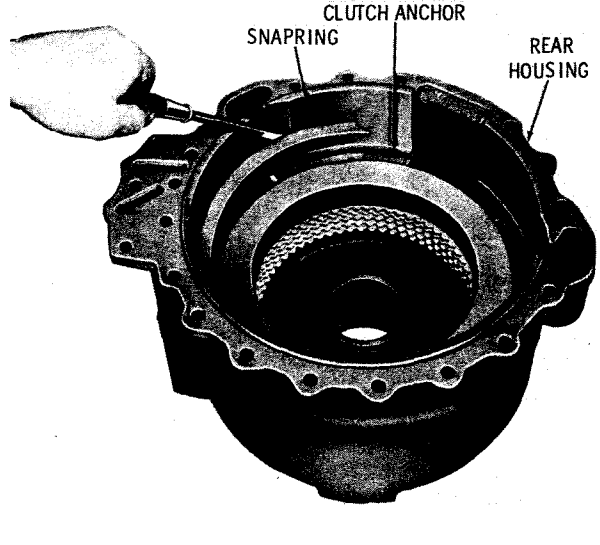


Fig. 7-44. Installing clutch anchor snapring (TRT-1)

ward on a flat surface. Beginning with an internal-splined clutch plate, alternately install five internal-splined and five external-tanged, high-range clutch plates. Engage the external tangs with the clutch anchor pins.

(3) Grasp the entire anchor and plate assembly to hold the parts together. Install the anchor and plates into the rear housing, aligning the anchor pin slot with the clutch anchor pin (fig. 7-43).

(4) Install the heavy internal snapring which retains the clutch anchor (fig. 7-44). Note the position of the ends of the snapring in relation to the two slightly extended pins in the anchor.

(5) If bearing 6 (foldout 16,A) was removed from shaft 5, install the bearing and

snapring 7. Press the assembled shaft and bearing, splined end first, into the rear of housing 2. Seat the bearing against the shoulder in the housing.

(6) Install the internal snapring which retains the shaft rear bearing (fig. 7-45).

(7) Install the sealring into the groove in the rear bore of the rear housing (fig. 7-45). Install the retainer, chamfered side first.

(8) Install the snapring which holds the oil retainer in the rear of the rear housing (fig. 7-46).

(9) Install the rear housing gasket onto the rear housing, using oil-soluble grease to retain it. Install the rear housing onto the transmission (fig. 7-47).

NOTE

Rotate the transmission output shaft slowly to engage the splines of the high-range clutch plates with the splines of the high-range ring gear.

(10) Install three 3/8-16 x 1-1/2-inch bolts and lockwashers, and seventeen 3/8-16 x 1-1/8-inch bolts and lockwashers to retain the rear housing on the adapter (fig. 7-48). Tighten the bolts to 26-32 lb ft (35-43 N·m).

(11) Proceed to paragraph 7-10.

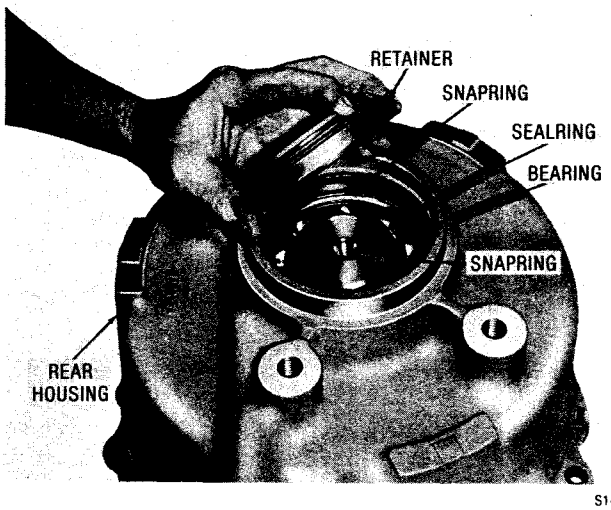


Fig. 7-45. Installing oil retainer (TRT-1)

Fig. 7-46. Installing oil retainer snapring (TRT-1)

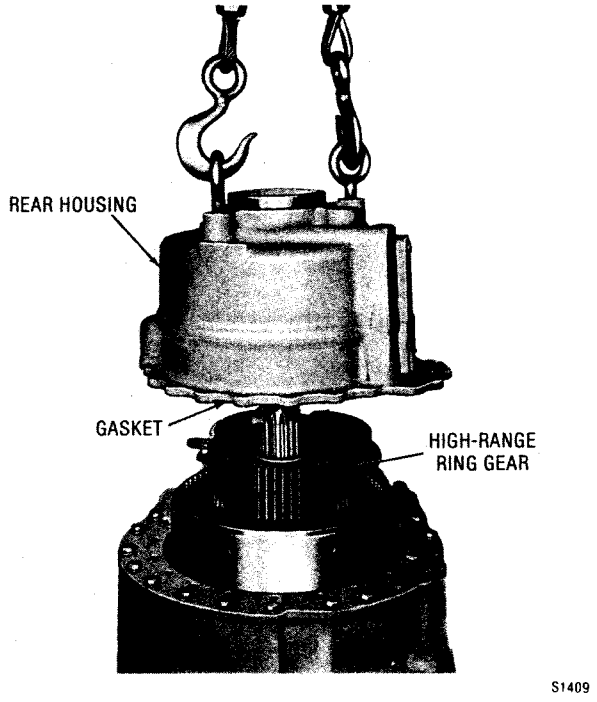


Fig. 7-47. Installing transmission rear housing assembly (TRT-1)

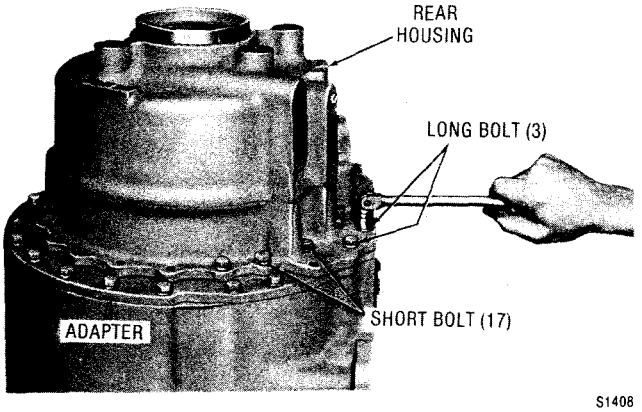


Fig. 7-48. Installing rear housing bolts (TRT-1)

7-9. ASSEMBLY OF TRT-3 MODELS

a. Reverse Clutch and Planetary (TRT-3 models)

(1) Position the transmission housing on blocks on its front splitline (refer to fig. 7-13). Install the reverse clutch piston with sealrings (as assembled in para 6-12) into the transmission housing.

NOTE

For vehicle-mounted transmissions, refer to paragraph 7-14.

(2) Beginning with an external-tanged clutch plate, alternately install four external-tanged clutch plates and four internal-splined clutch plates onto the reverse piston (refer to fig. 7-14). Install the reverse planetary carrier assembly, long splines first, into the reverse plates.

(3) Install one external-tanged plate and one internal-splined plate onto the reverse planetary carrier assembly (refer to fig. 7-15).

(4) Align the slots of the five reverse, external-tanged clutch plates to receive the pins in the clutch anchor assembly (fig. 7-49). Install the clutch anchor pin into the control valve mounting pad on the left side of the transmission housing. Aligning the anchor pin slot with the clutch anchor pin hole within the transmission housing, install the forward-and-reverse clutch anchor assembly, longer ends of the pins downward, and engage the slots of the five external-tanged clutch plates. Be sure that the six notches of the five external-tanged plates are engaged by the six anchor pins in the anchor assembly. (Listen for a sound of the assembly seating when the plates are aligned.)

(5) Push the clutch anchor pin into the slot in the forward-and-reverse clutch anchor assembly (fig. 7-49). Temporarily install a 3/8-16 x 1-inch bolt and a flat washer to retain the anchor pin during subsequent assembly operations (refer to fig. 7-17).

(6) For TRT 2221-3, 2421-3 with overdrive, proceed to paragraph 7-9b. For TRT 2221-3, 2421-3 with underdrive, proceed to paragraph 7-9e. For TRT 2211-3, 2411-3 models, proceed to paragraph 7-9h.

b. Forward Clutch, Planetary and Adapter Assembly (TRT 2221-3, 2421-3 overdrive models)

(1) Beginning with an internal-splined clutch plate, alternately install two internal-

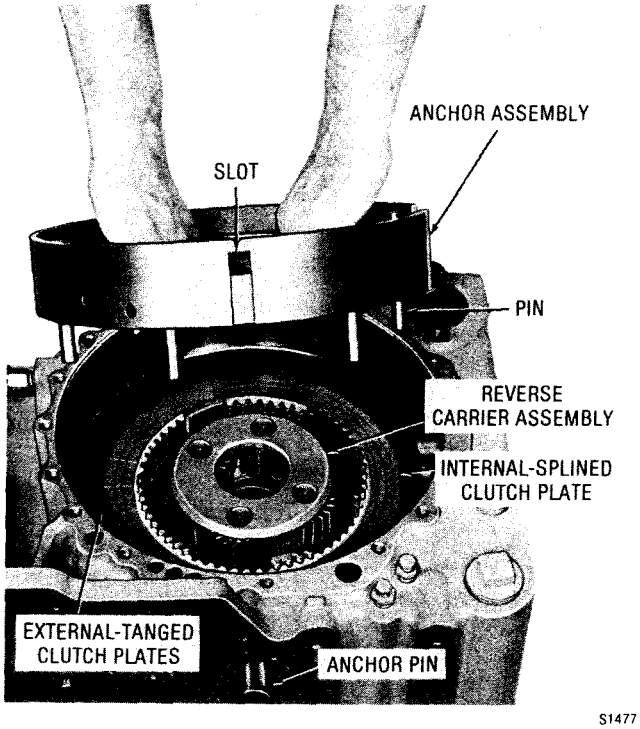


Fig. 7-49. Installing forward-and-reverse clutch anchor assembly (TRT-3)

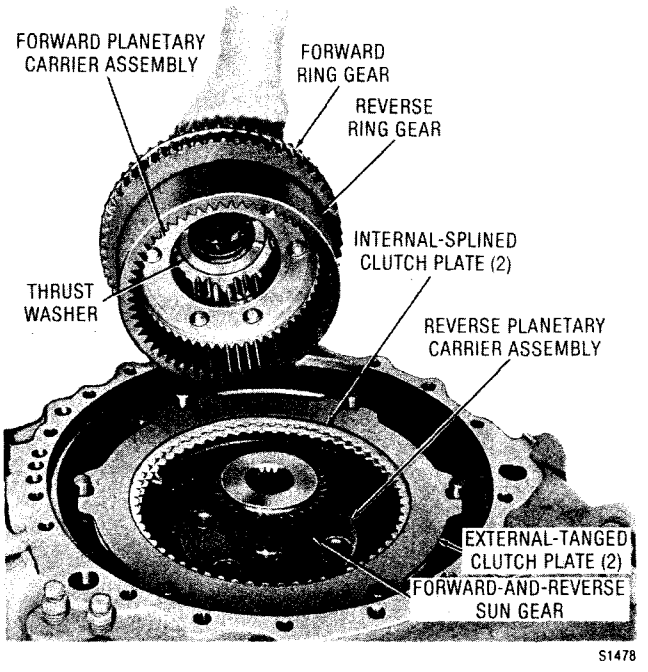


Fig. 7-50. Installing forward planetary carrier assembly and attached parts (TRT-3)

splined plates and two external-tanged plates (fig. 7-50).

(2) Install the forward-and-reverse sun gear into the reverse planetary carrier assembly (fig. 7-50).

(3) Install ring gear 1 (foldout 10,B) onto carrier assembly 30. Retain it with snapring 11. Install ring gear 14, longer ends of external splines first, onto carrier assembly 30.

(4) Install retainer 21, flat side first, onto the rear of carrier assembly 30. Install bearing assembly 22 against the shoulder at rear of carrier assembly 30.

(5) Install the thrust washer into the forward carrier assembly, using oil-soluble grease to retain it (fig. 7-50).

(6) Install the forward carrier assembly, as assembled in steps (3), (4), and (5), meshing its teeth with those of the reverse carrier pinions and the forward sun gear (fig. 7-50). Also, mesh the external splines of the forward ring gear with the installed internal-splined clutch plates.

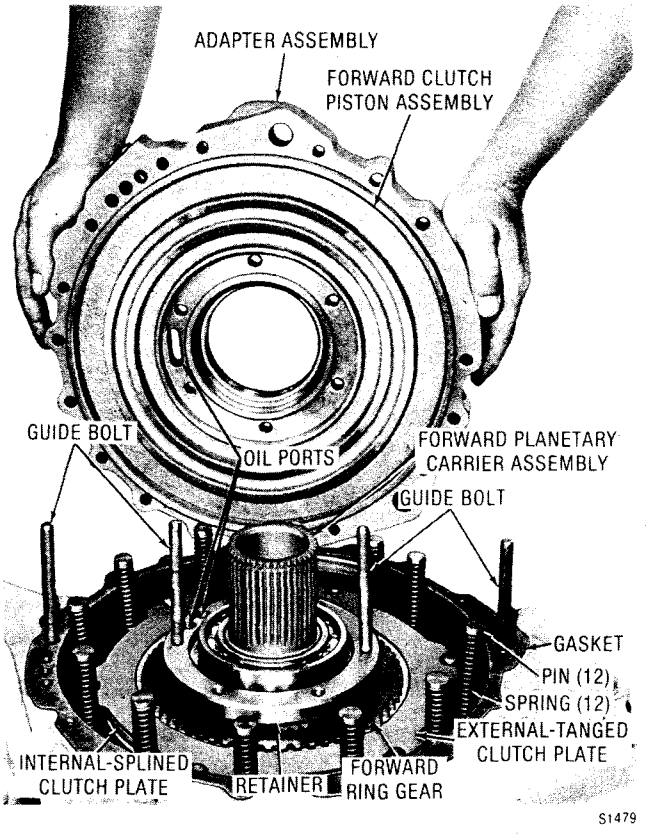


Fig. 7-51. Installing rear housing adapter assembly (TRT-3 overdrive)

(7) Install another internal-splined clutch plate and another external-tanged plate above the positioning ring on the forward ring gear (fig. 7-51).

(8) Install twelve clutch piston return springs and twelve pins (fig. 7-51).

(9) Install the adapter gasket onto the transmission housing (fig. 7-51). Install headless guide bolts at the four positions shown in figure 7-51.

(10) Install forward clutch piston, with sealrings, flat side first, into the rear housing adapter assembly (fig. 7-51).

(11) Install the adapter assembly, aligning oil ports in the adapter and retainer (fig. 7-51).

(12) Install two 3/8-16 x 2-3/4-inch bolts temporarily to pull the adapter assembly down against the piston return springs (fig. 7-52).

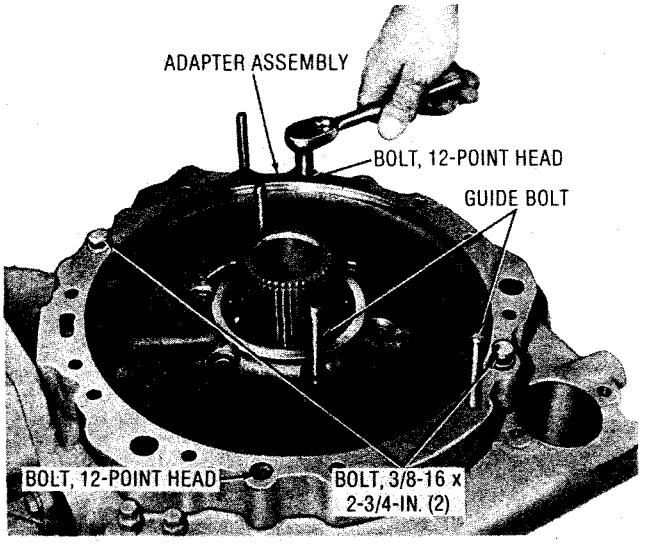


Fig. 7-52. Installing adapter assembly bolts (TRT-3 overdrive)

(13) Install two 3/8-16 x 1-3/4-inch, 12-point-head bolts into the recessed holes at each edge of the adapter assembly (fig. 7-52). Remove the two outer guide bolts and the temporary pull-down bolts. Tighten the 12-point-head bolts to 36-43 lb ft (49-58 N·m).

(14) Install six 3/8-24 x 1-1/4-inch, self-locking bolts into the inner circle of bolt holes. Remove the two inner guide bolts to install the last two bolts. Tighten the bolts to 41-49 lb ft (56-66 N·m).

c. Installation of Low-Range Clutch, High-Range Planetary (TRT 2221-3, 2421-3 overdrive models)

NOTE

New Teflon sealings may require forming by hand to help retain their proper circular shape. Wrap them in a circle around an object about two-thirds the diameter of the groove they fit.

(1) Install two step-joint sealrings 1 (foldout 14,A) into the grooves in the hub of low-range clutch drum assembly 2. Use oil-soluble grease to retain them.

(2) Install the low-range clutch drum assembly.

(3) Install the snapring which retains the clutch drum assembly on the forward carrier (fig. 7-53). Install two bearing races and bearing assembly (fig. 7-53). The thinner, lipped race is installed, flat side first, against the forward carrier hub.

(4) Beginning with an internal-splined clutch plate, alternately install five internal-splined and four external-splined clutch plates (fig. 7-54).

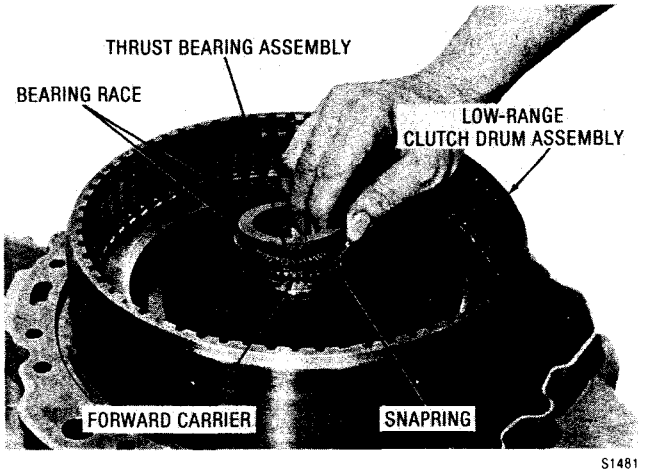


Fig. 7-53. Installing needle roller thrust bearing assembly (TRT-3 overdrive)

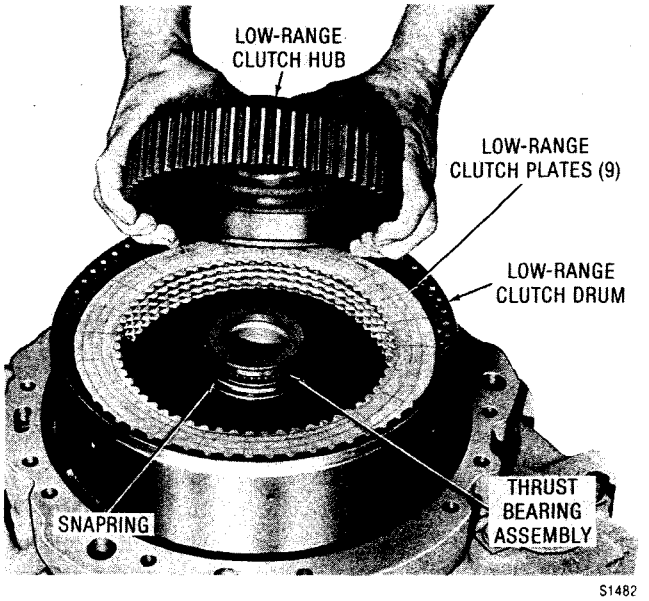


Fig. 7-54. Installing low-range clutch hub (TRT-3 overdrive)

(5) Install the low-range clutch hub, engaging its splines with those of the internal-splined clutch plates (fig. 7-54). Rotate the hub until it is engaged with all five internal-splined plates.

(6) Install the high-range planetary carrier assembly and retain it with an internal snapring (fig. 7-55).

(7) Install high-range planetary sun gear 1 (foldout 14,B), meshing its teeth with the high-range planetary pinions.

d. High-Range Clutch, Rear Housing (TRT 2221-3, 2421-3 overdrive models)

(1) Install the clutch anchor pin into the rear housing (as rebuilt in paragraph 6-11). Leave the flat-milled end of the pin extending at the inside of the housing (fig. 7-56).

(2) Position the high-range clutch anchor assembly, pins upward, on a level surface. Beginning with an internal-splined clutch plate, install alternately two internal-splined and two external-tanged plates (fig. 7-57).

(3) Install the high-range planetary ring gear, longer ends of external splines first, into the internal-splined clutch plates (fig. 7-57).

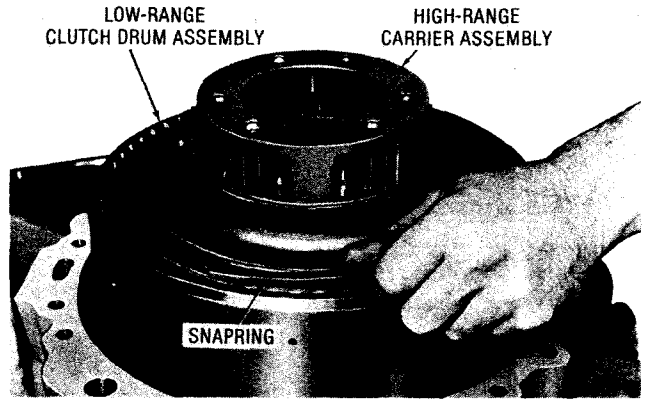


Fig. 7-55 Installing snapring retaining high-range planetary carrier assembly (TRT-3 overdrive)

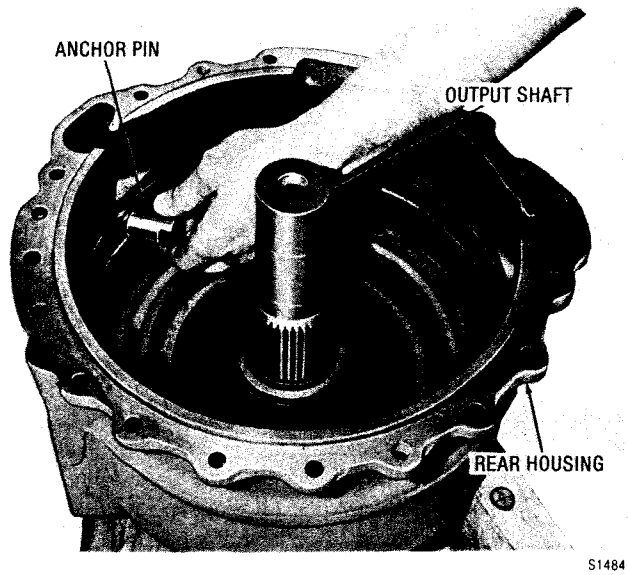


Fig. 7-56. Installing clutch anchor pin (TRT-3 overdrive)

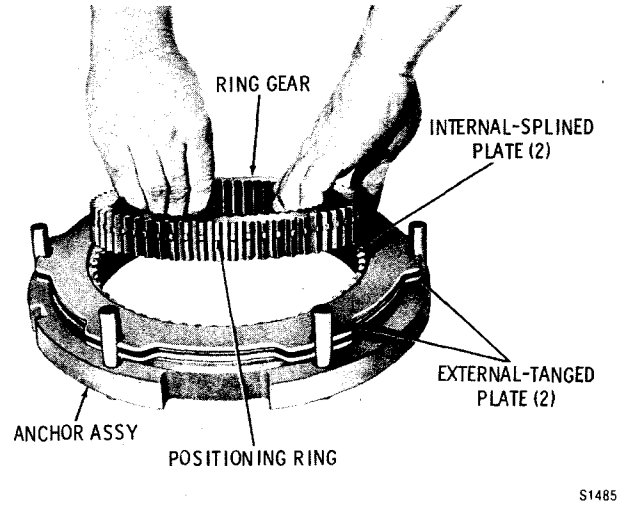


Fig. 7-57. Assembling high-range clutch and anchor (TRT-3 overdrive)

(4) Install another internal-splined and another external-tanged clutch plate onto the assembly made in steps (2) and (3).

(5) Grasp the entire clutch assembly, invert it, and install it into the rear housing (fig. 7-58). Engage the slot in the anchor with the anchor pin in the housing.

(6) Install the heavy internal snapring to retain the high-range clutch anchor assembly (fig. 7-59). Note the relation of the ends

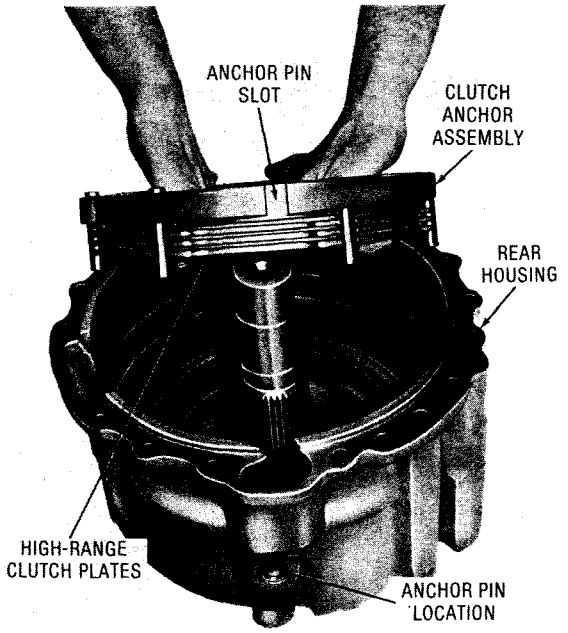


Fig. 7-58. Installing assembled high-range clutch (TRT-3 overdrive)

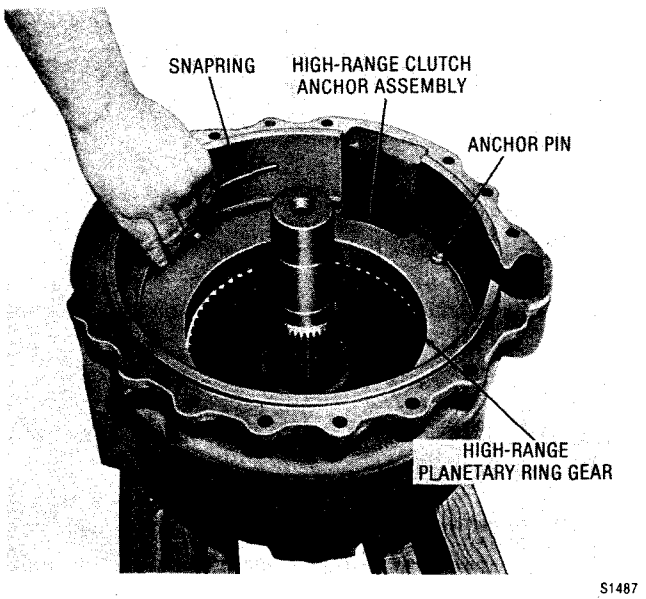


Fig. 7-59. Installing clutch anchor snapring (TRT-3 overdrive)

of the snapring to the two long pins extending through the anchor.

(7) Suspend the assembled rear housing on a hoist. Install the gasket, using oil-soluble grease to retain it (fig. 7-60).

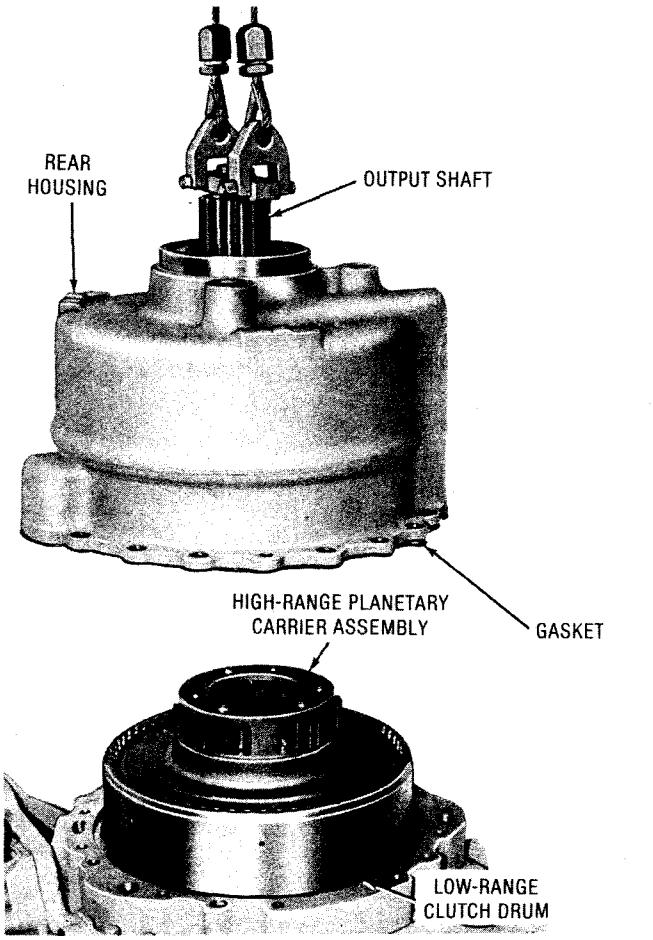


Fig. 7-60. Installing rear housing and attached parts (TRT-3)

(8) Install the rear housing assembly, rotating the output shaft to align the splines and gear teeth. Install fifteen 3/8-16 x 2-3/4-inch bolts 4 (foldout 16,B) with lockwashers 3 to retain the housing and adapter. Tighten the bolts to 26-32 lb ft (36-43 N·m).

(9) Proceed to paragraph 7-10.

e. Forward Clutch, Planetary, and Adapter Assembly (TRT 2221-3, 2421-3 underdrive models)

(1) Beginning with an internal-splined clutch plate, alternately install two internal-splined plates and two external-tanged plates (fig. 7-61).

(2) Install the forward-and-reverse sun gear into the reverse planetary carrier assembly (fig. 7-61).