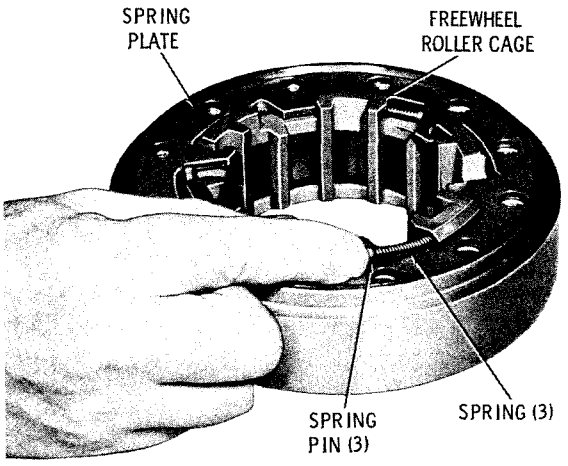


Fig. 6-7. Installing spring and spring pin into roller cage

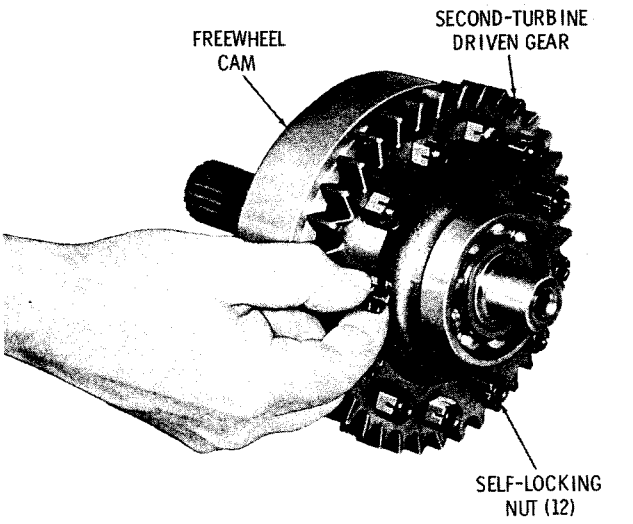


Fig. 6-9. Installing self-locking nut onto freewheel cam bolt

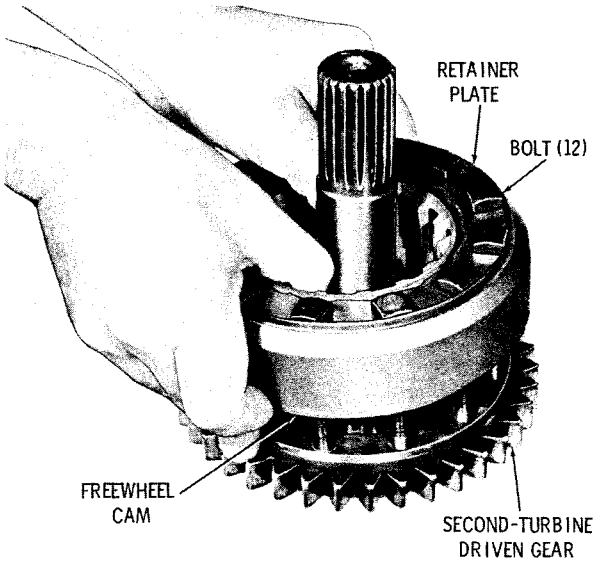


Fig. 6-8. Installing assembled cam onto assembled second-turbine driven gear

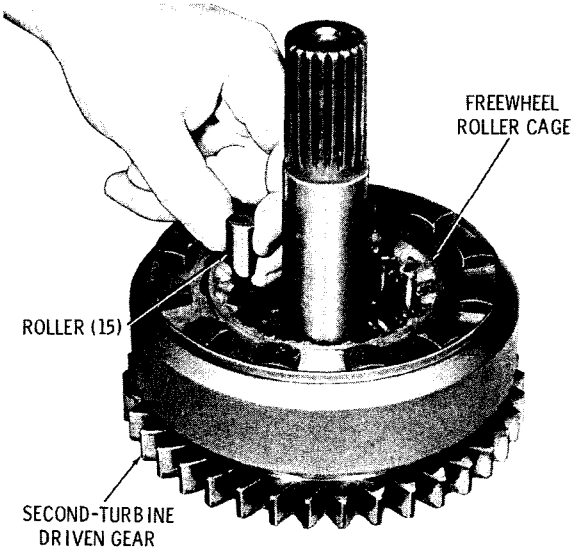


Fig. 6-10. Installing roller into roller cage

(4) Install the three springs and spring pins into the bored ears of the roller cage (fig. 6-7).

(5) Place the retainer plate, flat side first, against the rear face of the assembled cam and cage, and insert the twelve bolts (fig. 6-8). Install the assembled cam onto the assembled second-turbine driven gear.

(6) Secure the assembled parts with twelve self-locking nuts (fig. 6-9). To prevent rotation of the bolt heads, use the tool shown in figure 4-3, or an open-end wrench and tighten the nuts to 41 to 49 pound feet torque.

(7) Install fifteen rollers into the cam pockets; use oil-soluble grease to retain the rollers in the cage (fig. 6-10).

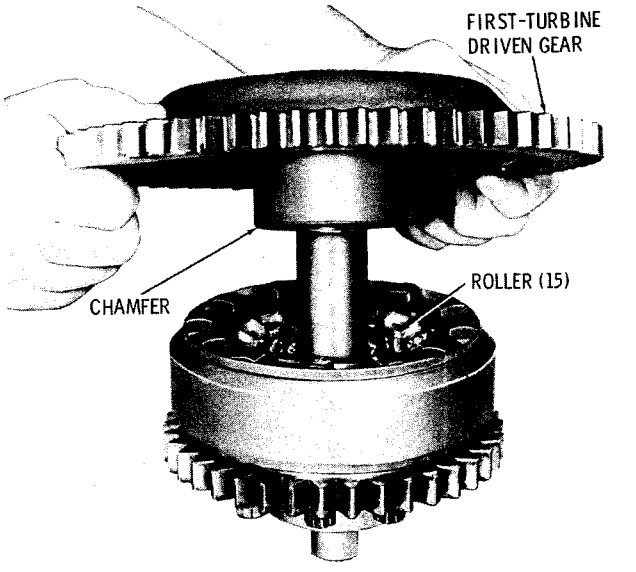


Fig. 6-11. Installing first-turbine driven gear

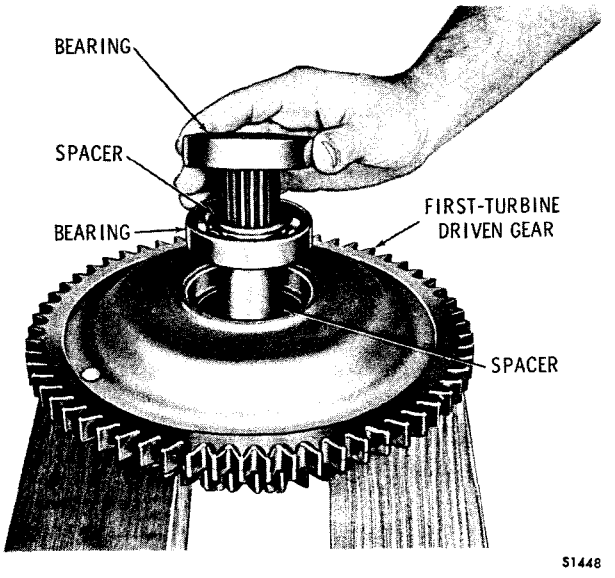


Fig. 6-13. Installing bearings and spacer onto second-turbine driven gear

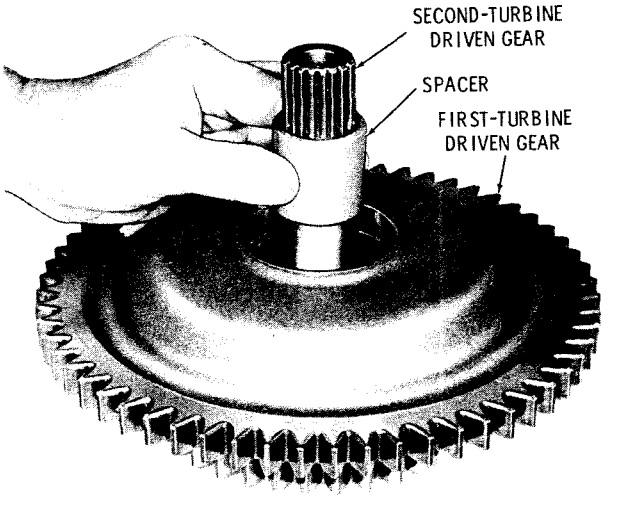


Fig. 6-12. Installing bearing spacer onto second-turbine driven gear

(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. 6-11).

(9) Install the bearing spacer onto the shaft of the second-turbine driven gear (fig. 6-12).

(10) Install the remaining bearings and spacer, as shown in figure 6-13, onto the shaft of the second-turbine driven gear. Accurately center the spacer to prevent it from getting caught on the shaft shoulder. Press the bearings and spacer firmly into place while supporting the second-turbine driven gear.

6-9. TRANSMISSION HOUSING AND OUTPUT DRIVE COMPONENTS (-1 models)

a. Disassembly (B, foldout 7 and A, foldout 14)

(1) Remove plug 7 (B, foldout 7). Do not remove plug 6 except when replacement is necessary. If removal is necessary, measure and record depth of installed plug 6, prior to its removal.

(2) Remove breather 9.

(3) If transmission is equipped with an accessory drive gear, remove oil seal 12.

(4) If transmission is not equipped with an accessory drive gear, remove cup plugs 11 and 12 if replacement is necessary.

(5) Remove six bolts 13 and lockwashers 14 that retain cover 15 and gasket 16. Remove the cover and gasket.

(6) Remove oil check plugs 26 and 27.

(7) Using a puller, remove the oil seal from the front of the transmission housing (fig. 6-14).

(8) Remove the snapring that retains the output shaft bearing in the housing bore (fig. 6-15).

(9) On models having a 1-piece output shaft, use a soft hammer to drive the output shaft forward until the front bearing is free from the housing bore (fig. 6-16). Remove the shaft and bearing, as an assembly from the housing. Remove bearing 6 (A, foldout 14) from the shaft.

(10) On models having a 1-piece output shaft, removal of the output shaft will free the transfer driven gear and spacer 22 (A, foldout 14). Remove the transfer driven gear (fig. 6-17) and remove the spacer from the sump area. Remove lip-type oil seal 25 (A, foldout 14) from the rear of the housing. Remove the output shaft rear bearing from its bore (fig. 6-17). This completes the disassembly procedures for models with a 1-piece output shaft.

(11) On models having a front output disconnect, proceed as outlined in (12) through (20), below.

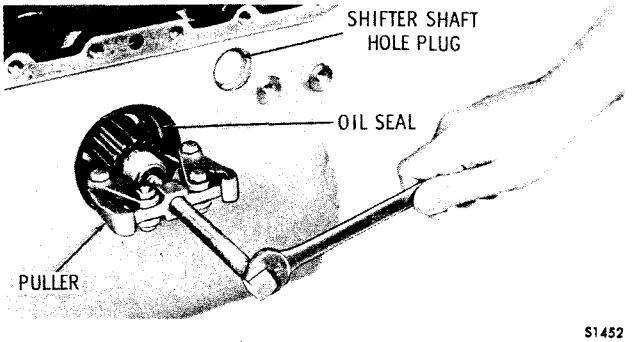


Fig. 6-14. Removing output shaft front oil seal

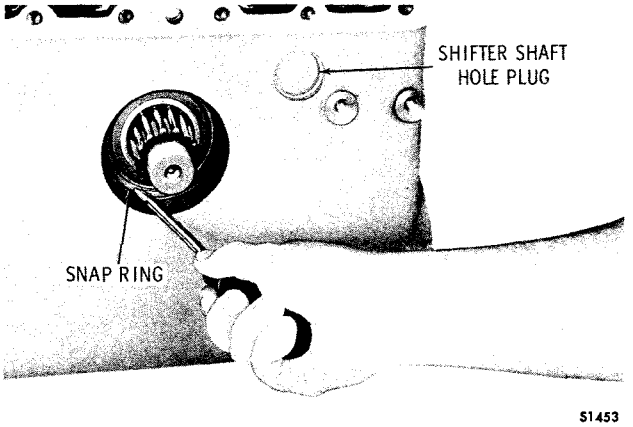


Fig. 6-15. Removing output shaft front bearing snapring

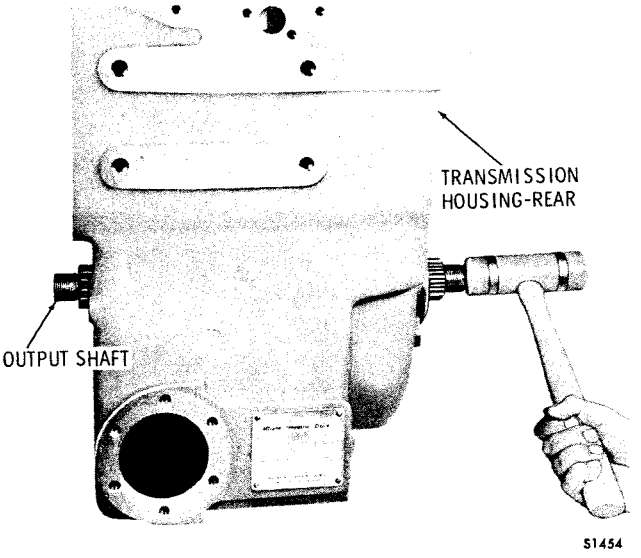


Fig. 6-16. Driving one-piece output shaft forward for removal

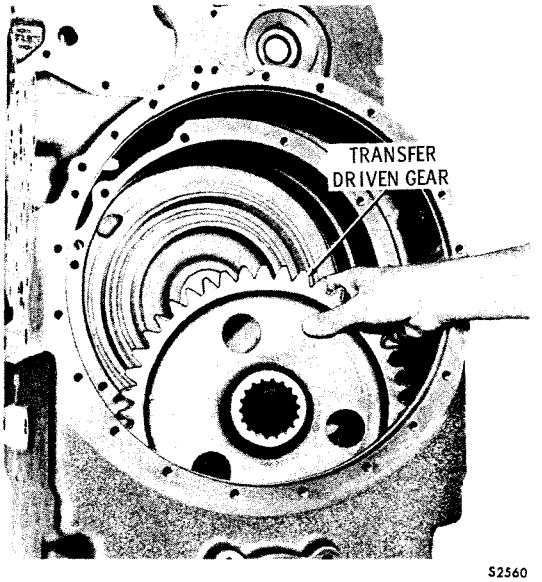


Fig. 6-17 Removing transfer driven gear (one-piece shaft)

(12) Rotate shifter fork shaft counterclockwise to remove it from the front of the transmission housing (fig. 6-18). Removal of the shifter fork shaft will allow the shifter fork to fall into the sump area. Remove the shifter fork. Remove shifter shaft oil seal 13 (A, foldout 14) only if replacement is necessary.

(13) Using a puller, remove oil seal 25 (A, foldout 14) from the rear of the transmission housing. Remove flange spacer 26, if present.

(14) Remove snapring 24 that retains the rear bearing in the housing bore.

(15) 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. 6-19). Remove the rear output shaft and the attached bearing and spacer as an assembly. Remove the bearing only if replacement of the bearing or spacer is necessary. Do not remove bushing 20 (A, foldout 14) from rear output shaft 21 unless replacement is necessary.

(16) Removal of the rear output shaft from the transmission housing will free transfer driven gear 18 and allow spacer 17 to fall into the sump area. Remove the transfer driven gear and remove the fallen spacer from the sump.

(17) Remove the center bearing from its bore in the housing web (fig. 6-20).

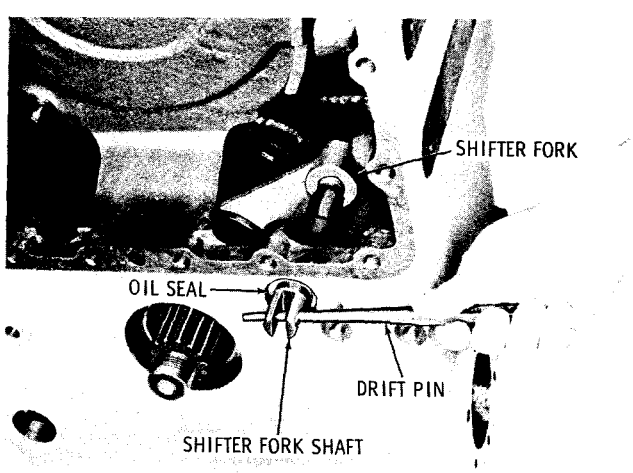


Fig. 6-18. Removing disconnect shifter shaft

(18) Remove the front output shaft and disconnect coupling as an assembly.

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.

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

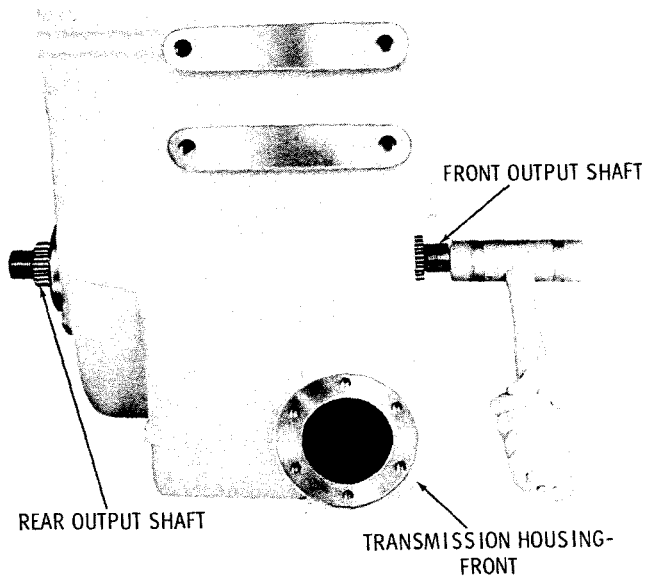


Fig. 6-19. Driving two-piece output shaft rearward for removal

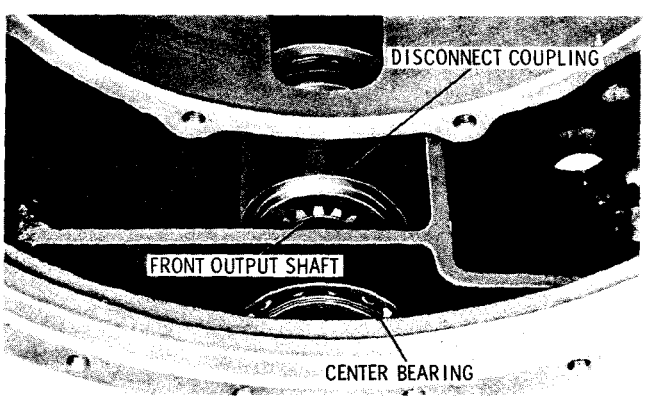


Fig. 6-20. Disconnect coupling, front output shaft, and center bearing

(20) Using a puller which will apply its force to the rear surface of the outer race of bearing 6 (A, foldout 14), draw the bearing from its bore. If a puller is not available, use a drift and tap evenly around the outer race to drive the bearing forward.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 7 and A, foldout 14)

(1) Models having a front output disconnect, proceed as outlined in (3) through (15), below. Then continue with (26) through (31). On models with a 1-piece output shaft, begin with (16), below and continue through (31).

(2) If the front output shaft bearing 6 (A, foldout 14) was removed, replace the bearing, shield side last, into the housing bore. Seat the front bearing firmly against the shoulder in the bore, and install snapring 5 against the bearing outer race.

(3) If lip-type oil seal 4 (A, foldout 14) was removed, apply nonhardening sealant onto the outside diameter of a new seal. Install the seal, spring-loaded lip first, and press it squarely into the bore until it is lightly seated against the counterbore shoulder.

(4) If shifter shaft oil seal 13 (A, foldout 14) was removed, apply nonhardening sealant onto the outside diameter of a new seal. Install the 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.

(5) Install one ball 9 (A, foldout 14), spring 10, and other ball 9 into front output shaft 8. While holding these balls against spring pressure, slide disconnect coupling 11, grooved end first, onto shaft 8 until the rear end of the coupling is flush with the shaft rear splines (disengaged position).

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

(7) Install the output shaft center bearing 16 (A, foldout 14), shield side first, into the web of the transmission housing. Press or tap on the bearing outer race to seat it against the shoulder in the housing web bore.

(8) Install the transfer driven gear into the housing (refer to fig. 6-17).

(9) If bushing 20 (A, foldout 14) was removed from rear output shaft 21, install a new bushing. Press the bushing into the front bore of the shaft until it is recessed 0.160 to 0.200 inch below the shaft end surface.

(10) Install spacer 22 and ball bearing 23, shield side last, onto the rear output shaft. Seat the bearing firmly against the spacer.

(11) Place the spacer at the front side of the transfer driven gear hub (fig. 6-21). Install the assembled rear output shaft, splined end first, through the splined hub of the gear, the spacer, and the center support bearing.

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

(13) Install snapring 24 (A, foldout 14), and tap progressively around its circumference until it snaps into place against the bearing.

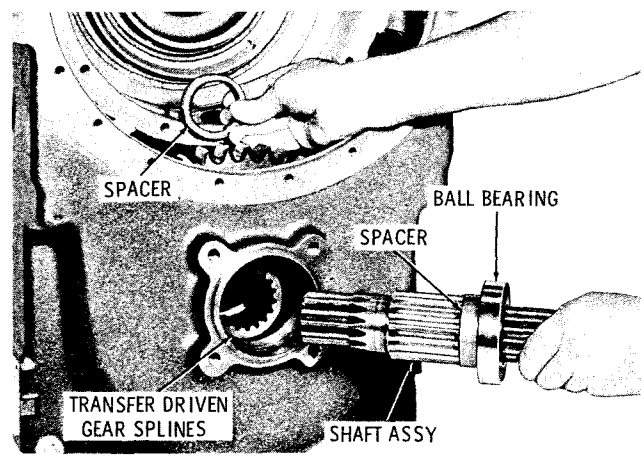


Fig. 6-21. Installing rear output shaft assembly

(14) Apply nonhardening sealant onto the outside diameter of a new lip-type oil seal 25 (A, foldout 14). Install the new seal, spring-loaded lip first, and press it squarely into the bore until it is lightly seated against the counterbore shoulder.

(15) Position the disconnect shifter fork 15 (A, foldout 14) in the groove of the disconnect coupling. 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 (fig. 6-18). Refer to paragraph 3-8c for final adjustment of the shifter fork shaft.

(16) On models having a 1-piece output shaft, install the transfer driven gear into the rear of the housing.

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

(18) Start bearing 6 (A, foldout 14), shield side last, into front bore of the housing.

(19) Install the spacer 22 onto the rear end of the output shaft. Start rear bearing 23, loading groove first, into its bore in the housing, pushing the spacer toward the transfer gear hub.

(20) 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.

(21) At the front of the transmission housing, drive the bearing rearward and seat it firmly against the shoulder in the bore. Install snapring 5 (A, foldout 14) to retain the bearing.

(22) Reseat the rear bearing, if necessary.

(23) Apply nonhardening sealant onto the outside diameter of lip-type oil seal 4 and install the seal, spring-loaded lip first into the front output bore. Press or drive the seal squarely and lightly against the counterbore in the housing.

(24) Apply nonhardening sealant onto the outside diameter of lip-type oil seal 25, and install the seal, spring-loaded lip first, into the rear output bore. Press or drive the seal squarely and lightly against the counterbore in the housing.

(25) If shifter shaft hole plug 12 was removed, install a new plug. Apply nonhardening sealant onto the outside diameter of the new plug. Install the plug, closed end first, and seat it against the shoulder in the housing bore.

(26) Install oil check plugs 26 (B, foldout 7) and 27, if used. Install oil drain plug 17, if removed.

(27) Install gasket 16 and cover 15. Retain with six 3/8-16x7/8 bolts 13 and lockwashers 14. Tighten the bolts to 26 to 32 pound feet torque.

(28) Coat the outer diameter of new seal 12 with nonhardening sealer and install, spring-loaded side first, into the rear of housing 8. Press the seal in until it seats lightly against the shoulder in the housing.

(29) If the transmission is not equipped with an accessory drive gear, install cup plugs 10 and 11 (if removed). Coat the outer diameter of new plugs with nonhardening sealer. Press plug 10 flush, to 0.200 below surface. Press plug 11 against seat in housing.

(30) Install breather 9.

(31) If plug 6 (B, foldout 7) was removed, coat the outer diameter of a new plug with nonhardening sealer and install, closed end first, into the passage at the left-top of the housing. Press the plug to the exact depth recorded when it was removed (a(1), above). Install plug 7.

6-10. TRANSMISSION HOUSING (-3 models)

a. Disassembly (A, foldout 8)

(1) Remove plug 7. Remove plug 6 only if replacement is necessary. If plug 6 must

be removed, accurately measure and record the depth at which it is installed.

(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 (A, foldout 8), and oil level tubes 21 and 22.

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

NOTE

Refer to paragraph 6-2, above.

b. Assembly (A, foldout 8)

(1) Install two plugs 28 (A, foldout 8), plug 23 and plug 24 into the transmission housing.

(2) Install oil level tubes 21 and 22.

(3) Install oil check plugs 19 and 20 (A, foldout 8) into the transmission housing.

(4) Coat the outer diameter of new oil seal 13 with nonhardening sealer and install, spring-loaded lip first, into the rear of the housing 26. Press the seal until it is 0.270 ± 0.015 below the surface adjacent to the bore.

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

(6) Install breather 8.

(7) If plug 6 (A, foldout 8) 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 (a(1), above). Install plug 7.

6-11. CLUTCH PISTON ASSEMBLIES

NOTE

Warming the Teflon sealrings in oil at 150°F will make them easier to remove and install.

a. Disassembly

(1) Do not use sharp-edged or pointed tools to remove Teflon seal rings. 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.

(2) Remove the sealrings. Do not stretch or deform sealrings more than necessary, if they are to be reused.

(3) Remove expanders from grooves in the high- and low-range pistons.

(4) Check three holes in reverse- and forward clutch pistons. One hole should be clear. The other two holes have ball check valves. The balls should be clean and seat properly.

NOTE

Refer to paragraph 6-2, above.

b. Assembly

(1) Install the sealring expanders into the grooves in the high- and low-range clutch pistons. Make sure the free ends of the expander turn away from the sealring (fig. 6-22). The ends of some expanders may require additional bending to insure they turn toward the bottom of the groove.

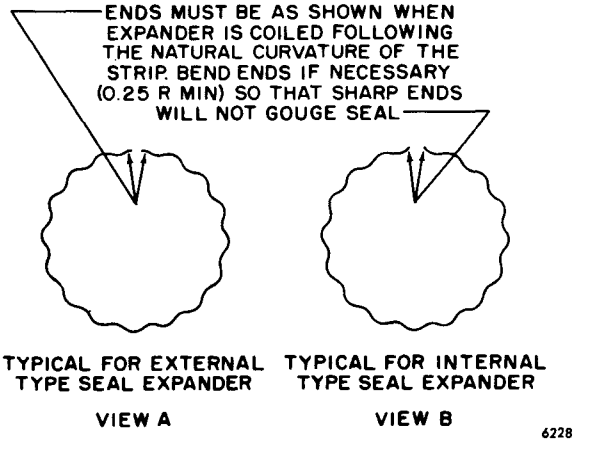


Fig. 6-22. Teflon sealring expanders

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

(3) 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.

(4) Install lip-type sealrings (no expanders required) into the grooves of the forward and reverse clutch pistons. Make sure that the lip of each sealring is toward the oil-pressure side of the piston. Refer also to foldouts 8 and 9 for illustrations of lip direction.

CAUTION

Improperly installed sealrings (lip in wrong direction) will cause improper clutch application or leakage.

(5) After installation, adjust the sealrings in their grooves to center them radially in the piston.

6-12. REVERSE PLANETARY CARRIER ASSEMBLY

a. Disassembly (B, foldout 8)

(1) Disassemble the reverse planetary carrier assembly only if there is evidence of damage or undue wear. The failure of one pinion requires the replacement of all pinions in the carrier assembly.

(2) Drill into the ends of the pinion spindles to weaken the swaging. Use a 3/4-inch drill at the ends swaged to the hub of carrier 14 (B, foldout 8).

CAUTION

Do not drill into the carrier. The spindles are slightly larger than 3/4 inch. Centering the drill accurately will prevent drilling into the carrier.

(3) Position the carrier assembly 8, hub upward in a press. Press out four spindles 15.

(4) Remove the four groups of pinions 10, thrust washers 9 and 12, and rollers 11 from carrier 14.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 8)

(1) Chill spindles 13 in dry ice for at least 1 hour before installing them.

(2) Install a thrust washer 9 (B, foldout 8) onto the alining tool.

NOTE

An alining tool can be made by grinding a used spindle to 0.005 inch undersize.

(3) Coat the bore of a pinion 10 with oil-soluble grease. Install the pinion on the alining tool.

(4) Install twenty-two rollers 11 into the space between the alining tool and pinion 10. Install thrust washer 12 onto pinion 10.

(5) Position carrier 14, hub upward, and install the assembled pinion group in the carrier. Insert the alining tool through the carrier and pinion group to aline the pinion group with the spindle bore in the carrier.

(6) Assemble and install the three remaining pinion groups as outlined in (2) through (5), above.

(7) Install new spindles 13, pressing them to the 0.14-inch (± 0.010) dimension shown in figure 6-23.

(8) Install new spindles 15, pressing them to the 0.14-inch dimension shown in figure 6-23.

(8) Using a swaging tool as shown in figure 6-24, while supporting the opposite

ends of the spindles, press both ends of the spindles to the form shown in figure 6-24.

NOTE

The pinions must rotate freely after the spindles are swaged.

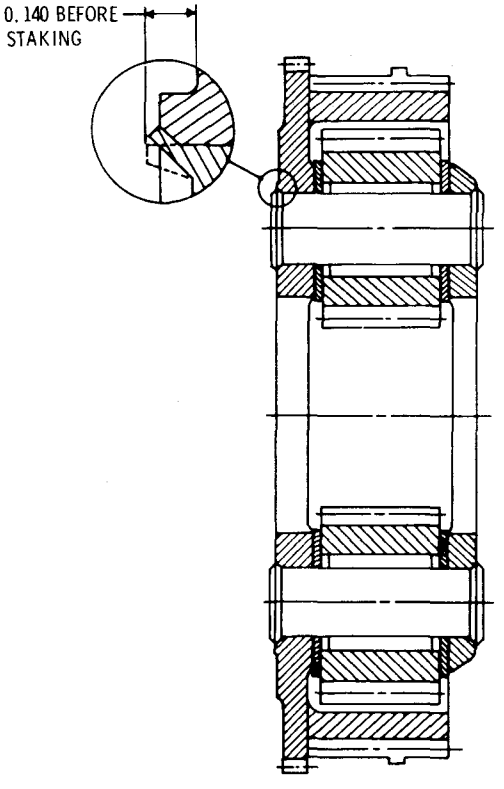


Fig. 6-23. Reverse planetary carrier assembly—cross-sectional view

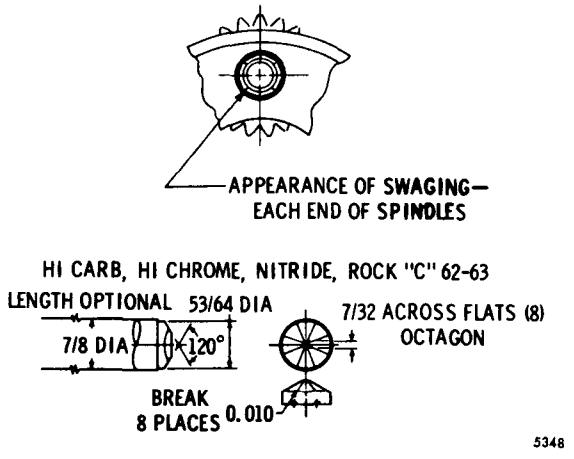


Fig. 6-24. Swaging tool for reverse pinion spindle

6-13. FORWARD PLANETARY CARRIER ASSEMBLY

NOTE

Although forward carrier assemblies differ among transmission models, all have identical pinions, rollers, thrust washers and spindles. The procedures below include instructions for all models. Features applicable to specific models are indicated.

a. Disassembly (A and B, foldout 9; and A, foldout 10)

(1) Disassemble the forward planetary carrier assembly only if there is evidence of damage or undue wear. The failure of one pinion requires the replacement of all pinions in the carrier assembly.

(2) Drill into the ends of the pinion spindles to weaken the swaging. Use a 1/2-inch drill at the spindle end which is most accessible.

CAUTION

Do not drill into the carrier. The diameter of the spindles is slightly more than 1/2 inch. Centering the drill accurately will prevent drilling into the carrier.

(3) Position the carrier, drilled end of spindles upward, in a press. Press the six spindles out of the carrier.

(4) Remove pinion, roller and thrust washer groups and put each in a separate container.

(5) On TRT 2221-3, 2421-3 models, if bushing 4 or 31 (B, foldout 9) requires replacement, remove it from the carrier.

NOTE

Refer to paragraph 6-2, above.

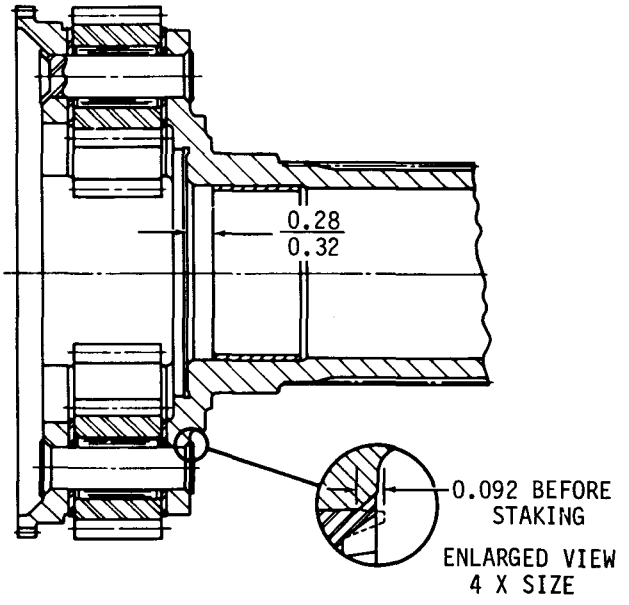


Fig. 6-25. Forward planetary carrier assembly—cross-sectional view

b. Assembly (A and B, foldout 9; A, foldout 10)

NOTE

Chill spindles in dry ice for at least 1 hour before installing them.

(1) In TRT 2221-3, 2421-3 models, if bushing 4 or 31 (B, foldout 9) was removed, install a new bushing into the carrier assembly. Press it to the 0.28- to 0.32-inch dimension shown in figure 6-25.

(2) Make a pinion alining tool by grinding a used spindle 0.005 inch undersize.

(3) Install a thrust washer 7 (B, foldout 9) onto the alining tool.

(4) Coat the inside diameters of pinions 9 with oil-soluble grease. Install a pinion onto the alining tool.

(5) Install twenty rollers 8 into the space between the bore of pinion 9 and the alining tool. Install a second thrust washer 10 onto pinion 9.

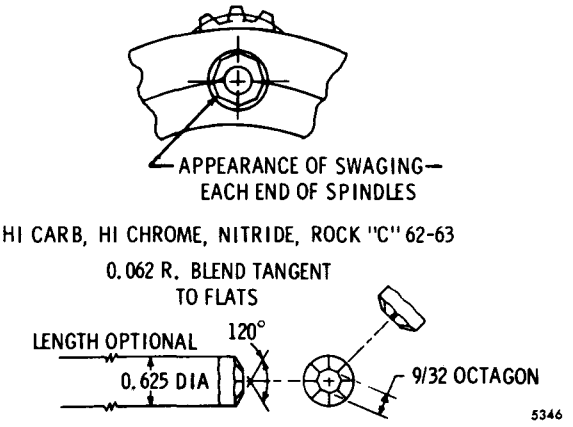


Fig. 6-26. Swaging tool for forward, low- and high-range pinion spindles

(6) Install the assembled pinion group into carrier 5.

(7) Assemble and install the five remaining pinion groups as outlined in (3) through (6), above. Aline the groups with the spindle bores in the carrier.

(8) Position the carrier assembly, hub or shaft upward, in a press and install spindles 6 to the 0.092 dimension shown in figure 6-25.

(9) Using a swaging tool as shown in figure 6-26, press both ends of the spindles to the form shown, while supporting the opposite ends.

NOTE

Pinions must rotate freely in the carrier after the spindles are swaged.

6-14. HIGH-RANGE PLANETARY CARRIER ASSEMBLY (-1 models), or LOW-RANGE PLANETARY CARRIER ASSEMBLY (-3 underdrive models)

a. Disassembly (A, foldout 11)

(1) Disassemble the low-range planetary carrier assembly only if there is evidence of damage or undue wear. The failure of one pinion will require the replacement of all the pinions in the assembly.

(2) Drill into the ends of spindles 9 (A, foldout 11) to weaken the staking. Use a 1/2-inch drill at the ends of the spindles nearer the carrier hub.

CAUTION

Do not drill into the carrier. The diameter of the spindles is slightly more than 1/2 inch. Centering the drill accurately will prevent drilling into the carrier.

(3) Position the carrier, drilled ends of spindles upward, in a press. Press the six spindles 9 out of the carrier.

(4) Remove the six pinion, roller and thrust washer groups, and place them in separate containers.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (A, foldout 11)

NOTE

Chill spindles 9 in dry ice for at least 1 hour before installing them in the carrier.

(1) Install a thrust washer 6 onto the alining tool made for assembling the forward carrier (para 6-13b(2), above).

(2) Coat the bores of pinions 7 with oil-soluble grease. Install a pinion onto the alining tool.

(3) Install sixteen rollers 8 into the space between the bore of pinion 7 and the alining tool. Install a second thrust washer 10 onto the pinion.

(4) Install the assembled pinion group into carrier 5, positioned flat side downward. Aline the pinion group with the spindle bore in the carrier.

(5) Assemble and install the five remaining pinion groups as outlined in (1) through (4), above.

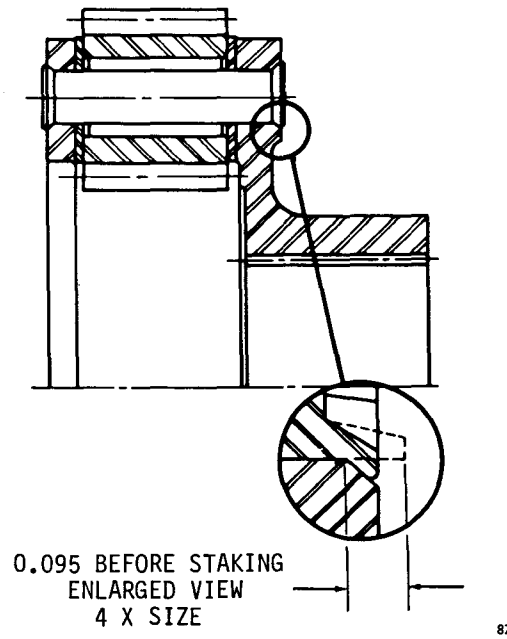


Fig. 6-27. Low-range planetary carrier assembly—cross-sectional view

(6) Position the carrier assembly, flat side downward, in a press. Install six spindles 9 to the 0.095-inch dimension, shown in figure 6-27.

(7) Using a swaging tool, as shown in figure 6-26, press both ends of spindles to the form shown, while supporting the opposite ends.

NOTE

Pinions must rotate freely in the carrier after the spindles are swaged.

6-15. HIGH-RANGE PLANETARY CARRIER ASSEMBLY (TRT 2221-3, 2421-3 overdrive models)

a. Disassembly (B, foldout 12)

(1) The high-range planetary carrier assembly should be disassembled only if there is evidence of damage or undue wear. Failure of one pinion will require the replacement of all six pinions as a set.

(2) Drill into the ends of spindles 20 to weaken the staking. Use a 1/2-inch drill at the ends of the spindles which are opposite the splined hub of the carrier.

CAUTION

Do not drill into the carrier. The diameter of the spindles is slightly more than 1/2 inch. Centering the drill accurately will prevent drilling into the carrier.

(3) Position the carrier, drilled ends of spindles upward, in a press. Press six spindles 20 out of the carrier.

(4) Remove the six pinion, roller and thrust washer groups and place them in separate containers.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 12)

NOTE

Chill spindles 20 (B, foldout 12) in dry ice for at least 1 hour before installing them in the carrier.

(1) Install a thrust washer 24 onto the pinion alining tool made for assembling the forward carrier (6-13b(2), above).

(2) Coat the bores of pinions 23 with oil-soluble grease. Install a pinion onto the alining tool.

(3) Install twenty rollers 22 into the space between the bore of pinion 23 and the alining tool. Install a second thrust washer 21 onto the pinion.

(4) Install the assembled pinion group into carrier 19. Aline the pinion groups with the spindle bores in the carrier.

(5) Assemble and install the five remaining planetary pinion groups as outlined in (1) through (4), above.

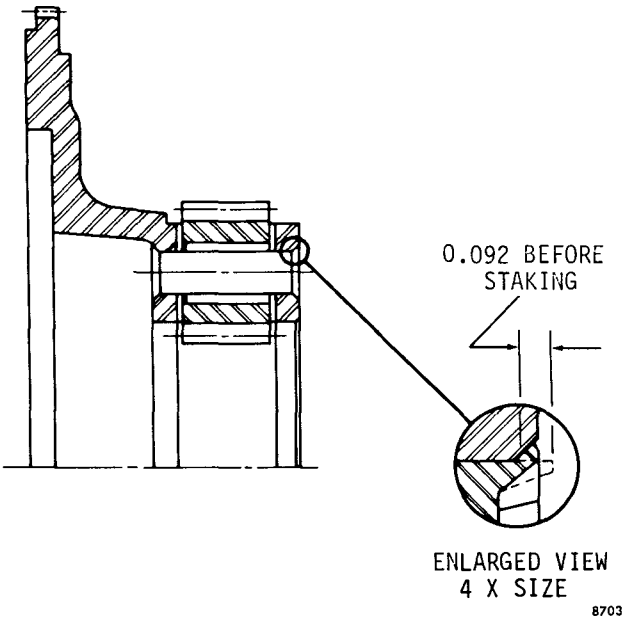


Fig. 6-28. High-range planetary carrier assembly—cross-sectional view

(6) Position the carrier assembly, splined hub downward, in a press. Install six spindles 20 to the 0.092-inch dimension shown in figure 6-28.

(7) Using a swaging tool, as shown in figure 6-26, press both ends of the spindles to the form shown, while supporting the opposite ends.

NOTE

Pinions must rotate freely in the carrier after the spindles are swaged.

6-16. FIRST-TURBINE DRIVE GEAR AND BEARING ASSEMBLY

NOTE

Not all bearings are installed with Loctite. If the bearing can be easily pressed from the drive gear, remove the bearing. If unusual resistance is encountered, refer to a, below.

a. Disassembly (B, foldout 6)

(1) Heat the inner race of bearing 29 to 450°F and press first-turbine drive gear 28 from the bearing.

(2) Discard bearing 29 and clean the journal of gear 28.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 3)

(1) Apply Loctite Retaining Compound (Loctite Corp., Newington, Conn.) 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 2 hours at room temperature.

6-17. HIGH-RANGE CLUTCH ANCHOR ASSEMBLY (-1 models), or LOW-RANGE CLUTCH ANCHOR ASSEMBLY (-3 underdrive models)

a. Disassembly (A, foldout 11 or A, foldout 12)

(1) Disassemble anchor assembly 12 (A, foldout 11) only if parts replacement is necessary.

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

NOTE

Refer to paragraph 6-2, above.

b. Assembly (A, foldout 11 or A, foldout 12)

NOTE

Chill pins 14 and 15 (A, foldout 11) in dry ice for at least 1 hour before installing them in anchor 13.

(1) Position anchor 13, flat (rear) side upward, 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 in until they project 1.56 inches above the flat surface 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. Leave them projecting 1.56 inches above the flat surface of anchor 13.

6-18. HIGH-RANGE CLUTCH ANCHOR ASSEMBLY (-3 overdrive models)

a. Disassembly (A, foldout 13)

(1) Disassemble anchor assembly 3 only if parts replacement is necessary.

(2) Position the anchor assembly, pins downward, in a press. Press pins 5 and 6 out of anchor 4.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (A, foldout 13)

NOTE

Chill pins 5 and 6 in dry ice for at least 1 hour before installing them in anchor 4.

(1) Position anchor 4, flat (front) side downward, in a press.

(2) Press two (longer) pins 5 into the holes at each side of the large cutout in anchor 4 which is nearer the clutch anchor pin slot. Leave the pins projecting 1.56 inches above the surface into which they are installed.

NOTE

Longer pins 5 project slightly at the front of anchor 4. They prevent snapring 2 from rotating.

(3) Press four (shorter) pins 6 into the remaining holes. Leave the pins projecting 1.56 inches above the surface into which they are installed.

6-19. REAR HOUSING ADAPTER ASSEMBLY

NOTE

Both -1 and -3 models are covered below.

a. Disassembly (B, foldout 9 and B, foldout 10)

(1) Remove two plugs 25 (B, foldout 9) from adapter 26 (-3 models only).

(2) Remove sleeve 27 from adapter 26 only if replacement is necessary.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 9 and B, foldout 10)

(1) If the sleeve was removed from the center bore of the adapter, install a new one as outlined in (2) through (4), below.

(2) Position sleeve 27 (B, foldout 9), internal chamfer first, into the front (ball bearing bore side) of adapter 26.

(3) Press the sleeve in (rearward) until its forward (unchamfered) end is flush with, or to 0.010 inch below, the shoulder against which the ball bearing assembly 22 seats.

(4) Install two plugs 25 into adapter 26 (-3 models only).

6-20. OUTPUT TRANSFER DRIVE GEAR (-1 models)

a. Disassembly (B, foldout 10)

(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.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 10)

(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.

6-21. CLUTCH DRUM ASSEMBLY

NOTE

Although this assembly differs dimensionally among models, arrangement and procedures are identical.

a. Disassembly (B, foldout 10; B, foldout 11; B, foldout 12)

(1) Position the drum assembly in a press. Depress the inner diameter of the piston return spring. Remove the snapring which retains the spring (fig. 6-29). Remove the spring.

(2) Remove the clutch piston assembly (fig. 6-29).

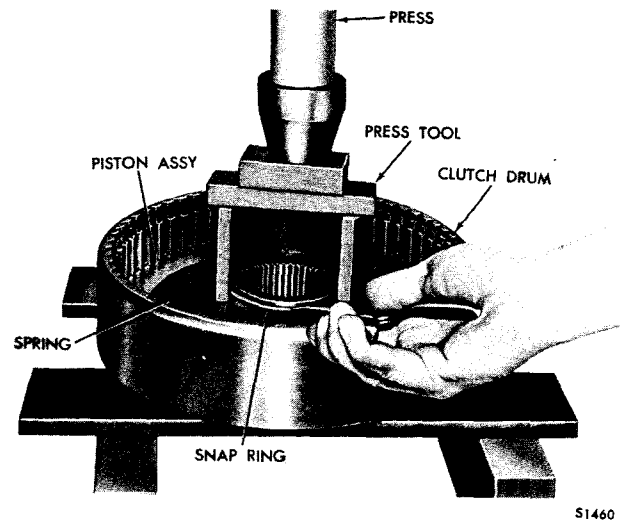


Fig. 6-29. Removing (or installing) piston return spring

(3) Rebuild the clutch piston assembly, as outlined in paragraph 6-11, above.

(4) Remove hook-type sealring 18 (B, foldout 10) from the hub of drum 15.

(5) Do not remove dowel pins 14 from drum 15.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 10; B, foldout 11; B, foldout 12)

(1) Install hook-type sealring 18 (B, foldout 10) onto the hub of drum 15.

(2) Install piston 19, as assembled in paragraph 6-11, above.

(3) Position the clutch drum in a press and install the piston return spring, concave side downward, onto clutch drum hub (fig. 6-29).

(4) Depress the inner diameter of the piston return spring and install the snapring (fig. 6-29).

6-22. TRANSFER DRIVE GEAR SLEEVE ASSEMBLY

a. Disassembly (B, foldout 10)

(1) Disassemble sleeve assembly 22 only if parts replacement is necessary.

(2) Remove bushing 23 from sleeve 24. If the bushing must be cut out, do not damage the sleeve bore.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 10)

(1) Install bushing 23 into the larger bore of sleeve 24. Press it in until the front (outer) end of the bushing is 0.30 inch below the end (front) of sleeve 24.

(2) The bushing is prebored to give the proper inside diameter when installed.

6-23. TRANSMISSION REAR HOUSING ASSEMBLY (TRT 2221-1, 2421-1)

a. Disassembly (B, foldout 13)

(1) The only operations required are the removal, if replacement is necessary, of welch plug 13 and pipe plug 14.

(2) 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.

NOTE

Refer to paragrah 6-2, above.

b. Assembly (B, foldout 13)

(1) If welch plug 13 was removed, coat the outer circumference of a new plug with nonhardening sealer. Press or drive the plug, closed end first, into the 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.

6-24. TRANSMISSION REAR HOUSING ASSEMBLY (TRT 2221-3, 2421-3)

a. Disassembly (C, foldout 13)

(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) Remove snapring 6 (-3 overdrive models only).

(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 (C, foldout 13)

(1) Install pipe plug 14, and plug 15 (if used).

(2) If plug 13 was removed, coat the outer circumference of a 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) Install snapring 6 onto shaft 7 (-3 overdrive models only).

(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) Coat the outer circumference of a new oil seal 11 with nonhardening sealer and start it, spring-loaded lip first, into the rear bore of housing 2. Seat it lightly against the shoulder in the housing bore.

6-25. TRANSMISSION REAR HOUSING ASSEMBLY (TRT 2211-3, 2411-3)

a. Disassembly (D, foldout 13)

(1) Remove baffle 6 (not used on some assemblies).

(2) Remove oil seal 7.

(3) Remove tube 8 only if replacement is necessary (not used on some assemblies).

(4) Remove snapring 22 (A, foldout 10) and bearing 23.

(5) Remove plug 2 (D, foldout 13).

NOTE

Refer to paragraph 6-2, above.

b. Assembly (D, foldout 13)

(1) Install plug 2 into housing 9.

(2) Install bearing 23 (A, foldout 10) and snapring 22 into the housing.

(3) If tube 8 (D, foldout 13) 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 assemblies).

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

(5) Coat the outer circumference of 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 until the baffle outer (rear) end is 0.060 to 0.090 inch below the rear surface of housing 9.

6-26. OIL PUMP ASSEMBLY

a. Disassembly (fig. 6-30)

(1) Remove the pump cover and the cover gasket.

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

(3) Inspect the needle bearings. If replacement is necessary, remove them from the driven gear.

(4) Inspect dowel pin which is pressed into the pump body. Remove it only if replacement is necessary.

NOTE

The dowel pin can be removed by clamping it in a vise and twisting the pump body.

(5) Inspect the oil seal. If replacement is necessary, remove the seal by driving or pressing it toward the rear (accessory mounting face) of the pump. If the driven gear shaft, pump body, drive gear or driven gear require replacement, a new pump assembly must be used.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (fig. 6-30)

(1) If the oil seal was removed, coat the outer circumference of the new seal with nonhardening sealer. Install the 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.

(2) If the dowel pin was removed, press a new pin into pump body. The pin is properly installed when it projects 0.41 to 0.43 inch above the front surface of the pump body.

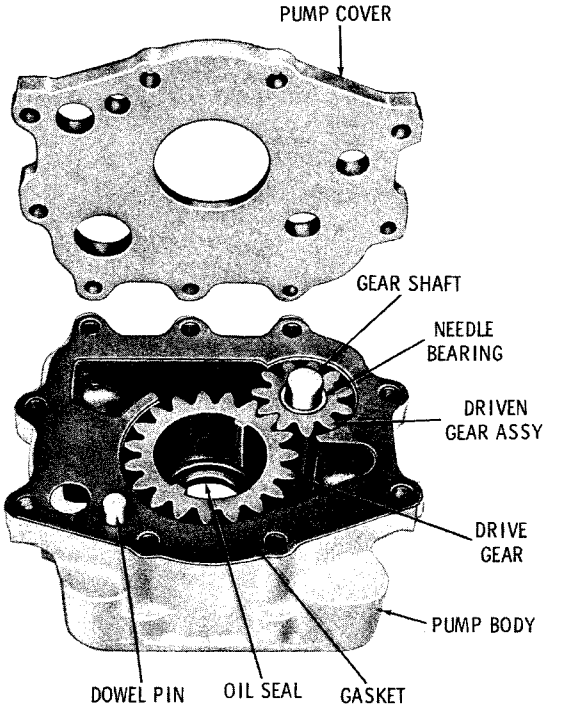


Fig. 6-30. Oil pump assembly

(3) If the needle bearing(s) were removed from the driven gear, install new bearing(s) so that the replacer tool rests against the part number end of bearing race. Press each bearing flush with, to 0.020 inch below, the end surface of the driven gear.

(4) Install the driven gear assembly over the gear shaft and into the pump body. Also install the drive gear into the pump body.

NOTE

When properly installed, end faces of both gears will project 0.002 to 0.003 inch above the front surface of the pump body (measured before gasket is installed). If end faces of the gears are below the flush line of the pump body, the pump will not perform satisfactorily and should be replaced.

(5) 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. CONTROL VALVE ASSEMBLY

NOTE

A variety of valve assemblies are used among the various models. Procedures below which are not common to all models are indicated by notes preceding the procedures.

a. Disassembly (B, foldout 15)

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

(2) Remove plug 18 and gasket 17. Remove trimmer plug 16, springs 15 and 14, and retainer 13.

(3) Remove plug 34. Remove plug 33 and gasket 32.

(4) On models having clutch cutoff control (items 19 through 25, and 45, 46) follow the procedures outlined in (5) through (8), below.

(5) Remove plug 25 (hydraulic brake actuated) or plug 46 (air brake actuated) and gasket 23.

(6) Remove plug 21 (hydraulic brake actuated) with sealring 23 and cup 25. Separate these parts.

(7) Remove plug 45 (air brake actuated) with sealring 22. Remove the sealring from the plug.

(8) Remove clutch cutoff valve 20 and spring 19.

(9) On models having inching control (items 35 through 44), follow the procedures outlined in (10) through (15), below.

(10) Remove valve stop 35. Clean paint and dirt away from the valve body in the area of oil seal 44.

(11) Insert a bolt through the linkage pin hole in inching control valve 40. Grasp the bolt in a vise. Using a soft hammer, drive the control valve body off the valve. This will remove the valve and items 41 through 44.

(12) Clean the outer end of valve 40 to permit seal 44 and plug 43 to be easily removed. Remove seal 44, plug 43, sealring 42 and spring 41.

(13) Remove spring 39 from control valve body 9.

(14) Insert a small screwdriver, from the inner (mounting) side of the valve body assembly and push inching regulator valve 37 forward to release valve stop 38. Remove the valve stop.

(15) Remove inching regulator valve 37 and spring 36.

(16) Clean the stem of selector valve 27 to permit it to easily pass through oil seal 26.

(17) Remove plug 29, gasket 30, one spring 31 and one ball 28.

(18) At inner (mounting) side of valve body 9, remove valve stop 12 (2-speed models) or two valve stops 12 (1-speed models).

(19) Push selector valve 27 forward in valve body 9, and withdraw it from the front of the valve body. This will free the remaining ball 28 and spring 31. Remove these.

(20) Do not remove oil seal 26 unless replacement is necessary.

(21) Do not remove ball 10 or ball retainer 11 from valve body 9 unless parts replacement is necessary.

NOTE

Refer to paragraph 6-2, above.

b. Assembly (B, foldout 15)

(1) During assembly, check to insure that all valves move freely by their own weight within their bores.

(2) If ball 10 and retainer 11 were removed, install a new ball and retainer. The cupped side of the retainer must be outward. Press the retainer in until it is flush with, to 0.010 inch below, the surrounding surface.

(3) If oil seal 26 was removed, coat the outer circumference of a new seal with nonhardening sealer and install it, spring-loaded lip first, into valve body 9. Press it in until it is flush with, or to 0.030 inch below, the surrounding surface.

(4) Install one spring 31 and one ball 28. Depress the ball against the spring and install selector valve 27, stem first, into the front of valve body 9. Work the stem of the valve carefully through oil seal 26 to avoid damaging the seal.

(5) Install the remaining ball 28 and spring 31. Install gasket 30 and detent plug 29.

(6) Install gasket 32, plug 33 and plug 34.

(7) Position selector valve 27 at neutral (central) position and install valve stop 12 at location(s) shown in figure 6-31.

(8) Install main-pressure regulator valve 8 (B, foldout 15), gasket 7 and plug 6.

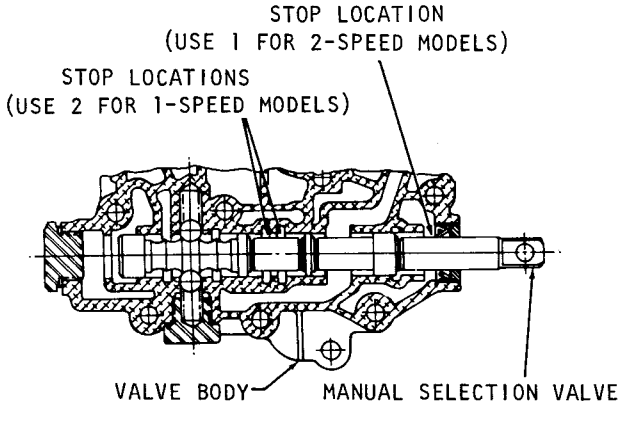


Fig. 6-31. Location of manual selector valve stops for various models

(9) Install spring retainer 13, cupped side first, onto the rear stem of valve 8. Install springs 14 and 15.

(10) Install trimmer plug 16, gasket 17 and plug 18.

(11) In assemblies having clutch cutoff control (items 19 through 25, and 45 and 46), follow the procedures outlined in (12) through (15), below.

(12) Install spring 19 and valve 20.

(13) Install sealring 22 and cup 24, cupped side out, onto plug 21 (hydraulic brake-actuated cutoff valve).

(14) Install plug 21, cup first, into the front (smooth bore) of plug 25 (hydraulic brake-actuated cutoff valve). Install plug 25 and gasket 23 into valve body 9.

(15) On models which have air brake-actuated cutoff valve, install sealring 22 onto plug 45. Install plug 45, grooved end first, into the front (smooth bore) of plug 46. Install gasket 23 and plug 46 into valve body 9.

(16) In assemblies having inching control (items 35 through 44), follow the procedures outlined in (17) through (21), below.

(17) Install spring 36 and valve 37. Using a small screwdriver, push valve 37 forward and install valve stop 38 to retain valve 37 against spring 36.

(18) Install valve 40 and spring 41.

(19) Install sealring 42 onto plug 43.

(20) Install plug 43, larger bore first, over the stem of valve 40. Push plug 43 in until it seats, hold it against spring 41 and install stop 35 to retain plug 43.

(21) Coat the outer circumference of a new oil seal 44 with nonhardening sealer and install it, spring-loaded lip first, over the stem of valve 40. Press the seal in until it is flush with, to 0.030 inch below, the rear surface of valve body 9.

6-28. TORQUE VALUES — ILLUSTRATED

Figure 6-32, which follows, shows the torque values for threaded fasteners visible in the illustration.

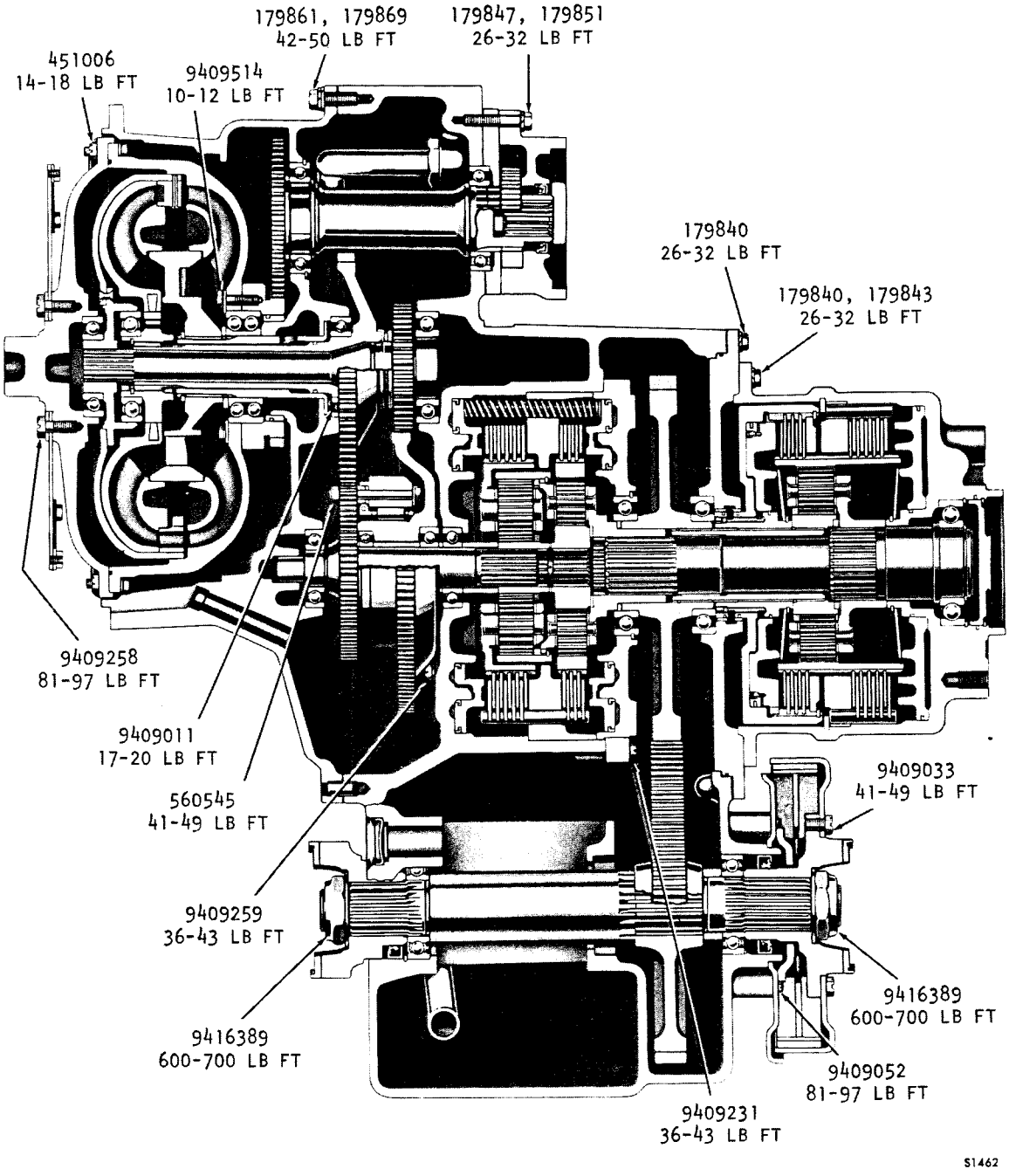


Fig. 6-32. Torque values for threaded fasteners

Section 7. ASSEMBLY OF TRANSMISSION FROM SUBASSEMBLIES

7-1. SCOPE OF SECTION 7

a. Models Covered. The procedures in this section describe the assembly of all TRT 2001 transmissions from the parts removed in Section 5 and the subassemblies rebuilt in Section 6.

b. Assembly Sequence. This section is divided into groups. Each group is identified with the models to which the procedures apply. Procedures not applicable to the transmission being assembled may be disregarded and assembly continued with the next applicable procedure.

7-2. DIVISION BY MODELS

a. Paragraph 7-3, below, outlines the initial assembly procedures, for TRT 2221-1 and 2421-1 models, required to build up the transmission to the point where the remaining assembly procedures are common to all models.

b. Paragraph 7-4, below, outlines the initial assembly procedures, for TRT 2211-3, 2411-3, 2221-3 and 2421-3 models, required to build up the transmission to the point where the remaining assembly procedures are common to all models. Options and features which differ within the -3 models are noted and may be passed over when not applicable.

c. Paragraph 7-5, below, outlines the assembly and installation of the torque converter gearing, converter housing, converter, and input drive components for all models.

d. Paragraph 7-6, below, outlines the installation of external components and subassemblies and the completion of the assembly of all models.

e. Paragraph 7-7, below, outlines certain procedures and methods which must be applied when the reverse-clutch and planetary are installed while the transmission (any model) is in the vehicle.

7-3. INITIAL ASSEMBLY OF TRT 2221-1 AND 2421-1 TRANSMISSIONS

a. Installation of Forward, Reverse Clutches and Planetaries

(1) Install the reverse clutch piston assembly, flat side first, after checking to insure that the lip of each sealring is in its proper position (fig. 7-1).

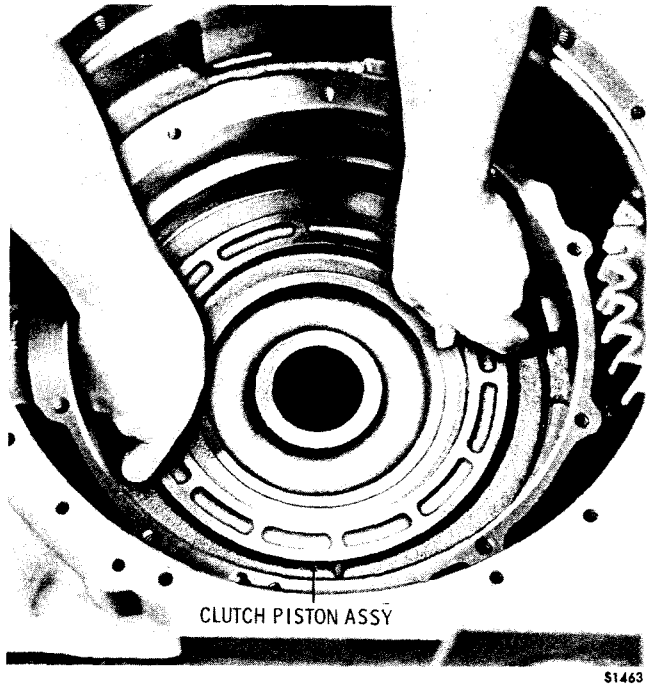


Fig. 7-1. Installing reverse clutch piston assembly

(2) Refer to the note following (4), below. Beginning with an external-tanged plate, and alternating with internal-splined plates, install five external-tanged and four internal-splined reverse clutch plates (fig. 7-2).

(3) Install the remaining internal-splined plate onto the reverse planetary carrier assembly, behind the positioning ring on the clutch hub. Install the carrier assembly (fig. 7-2), engaging the hub splines in the internal-splined plates installed in (2), above.

(4) Install the clutch anchor pin (fig. 7-3). Leave the anchor pin projecting from the housing (so that the anchor assembly may be rotated).

NOTE

The anchor pin may be installed at the inside of the transmission housing prior to operation (2), above, if the control valve assembly is in place.

(5) Install the forward and reverse clutch anchor assembly, longer ends of pins first. Engage the pins with the slots in the tangs of the reverse clutch plates (fig. 7-3). Aline the anchor pin slot with the anchor pin. Be sure that all five external-tanged plates are engaged with the pins. Push the anchor pin into the housing to engage the anchor assembly.

(6) Install the forward and reverse sun gear 15 (B, foldout 8) into the reverse planetary carrier assembly.

(7) Beginning with an internal-splined plate and alternating with external-tanged plates, install two internal-splined plates 12 (A, foldout 9) and two external-tanged plates 13. The external tangs must engage the clutch anchor pins.

(8) Install carrier assembly 3 into ring gear 1 and retain it with snapring 11.

(9) Install sun gear thrust washer 2 (A, foldout 9) into the forward carrier assembly, using oil-soluble grease to retain it.

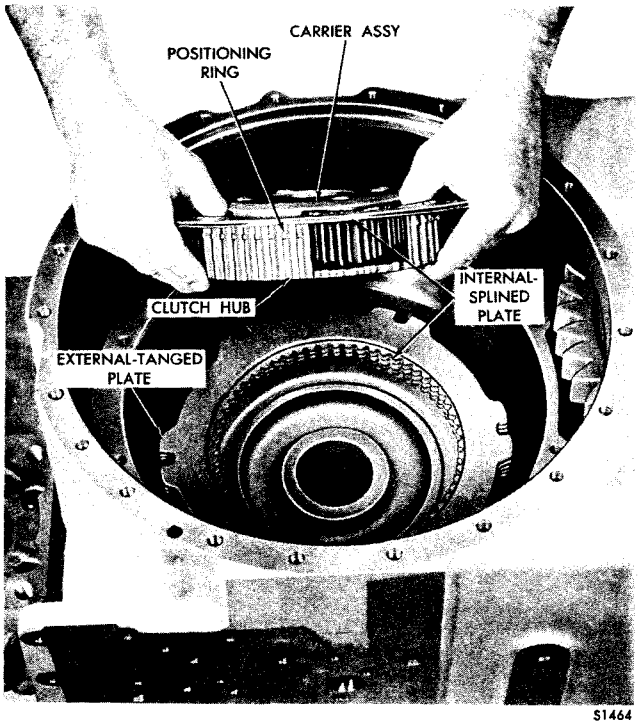


Fig. 7-2. Installing reverse clutch plates and planetary carrier assembly

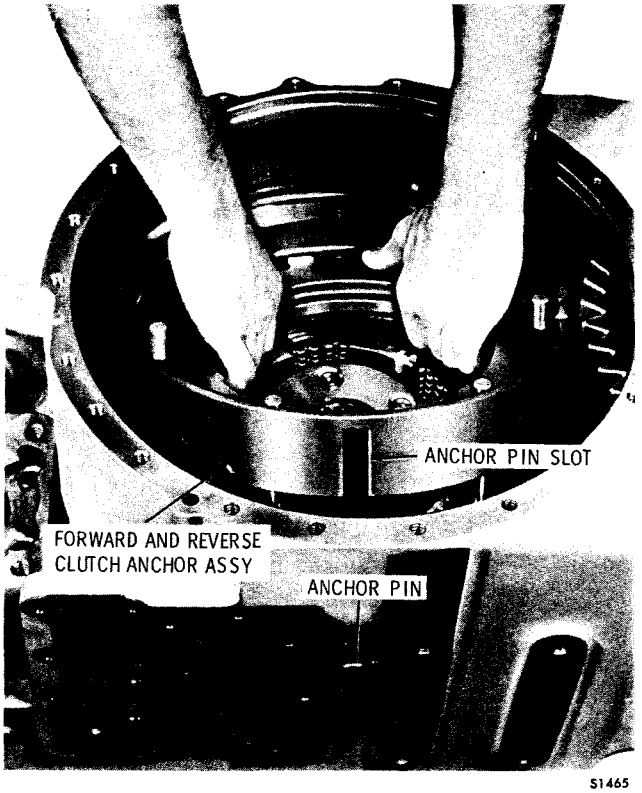


Fig. 7-3. Installing forward and reverse clutch anchor assembly

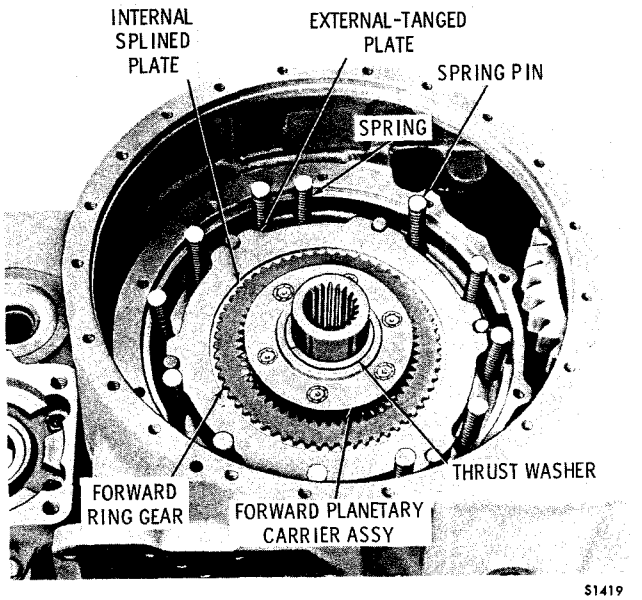


Fig. 7-4. Forward clutch and planetary, clutch piston springs, and spring pins installed

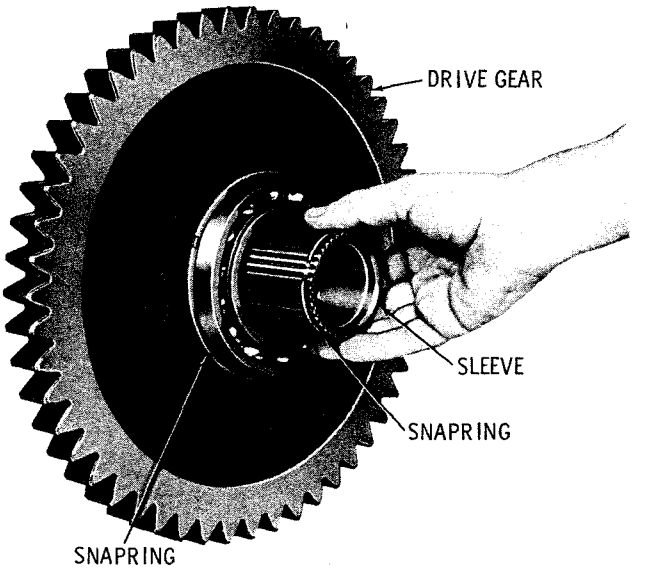


Fig. 7-5. Installing high-range sun gear sleeve into transfer drive gear

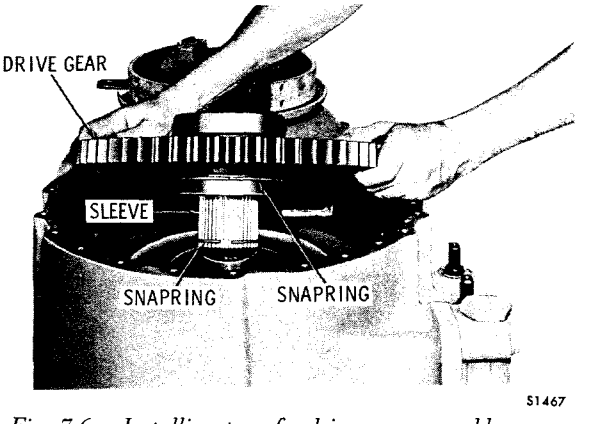


Fig. 7-6. Installing transfer drive gear assembly

(10) Install the parts assembled in (8) and (9), above, meshing the reverse ring gear with the reverse pinions (fig. 7-4). Install ring gear 14 (A, foldout 9), longer ends of external splines first (toward front of transmission), onto the forward carrier assembly. The external splines of the ring gear must engage the internal-splined plates installed in (7), above.

(11) Install the remaining internal-splined clutch plate and then the remaining external-tanged plate (fig. 7-4).

(12) Install the thrust washer onto the hub of the forward planetary carrier (fig. 7-4).

(13) Install twelve clutch piston return springs and pins (springs first) into openings around the forward clutch plates (fig. 7-4).

b. Installation of Forward Piston Housing, Transfer Drive Gear and Adapter Assembly

(1) Install forward clutch piston 17 (A, foldout 9), with sealrings properly positioned, into housing 21. Check to insure that plug 23 is in place in housing 21.

(2) Install the forward clutch piston housing and retain it with ten 3/8-16 x 1 1/2-inch, self-locking bolts 22. Tighten the bolts to 36 to 43 pound feet torque.

(3) 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. 7-5).

(4) Install the transfer drive gear and splined sleeve, bearing with snapring first, onto the forward planetary carrier (fig. 7-6).

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

(6) Install the sixteen 3/8-16 x 1 1/8 bolts, with lockwashers, to retain the adapter (fig. 7-8). Tighten the bolts to 26 to 32 pound feet torque.

c. Installation of Low-range Clutch, High-range Planetary

(1) Install two Teflon step-joint sealrings 12 (B, foldout 10) into the grooves in the front hub of low-range clutch drum 15. Use oil-soluble grease to retain them.

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.

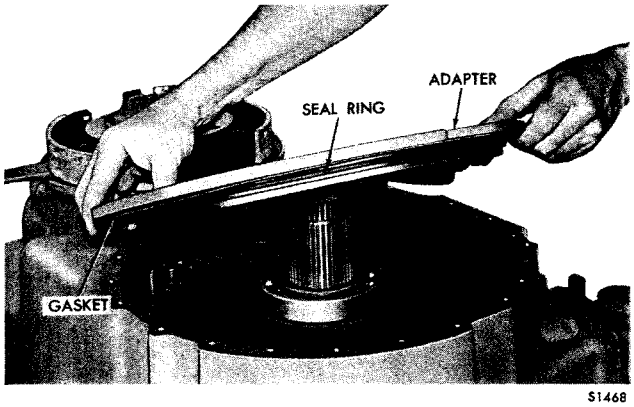


Fig. 7-7. Installing rear housing adapter (-1 model)

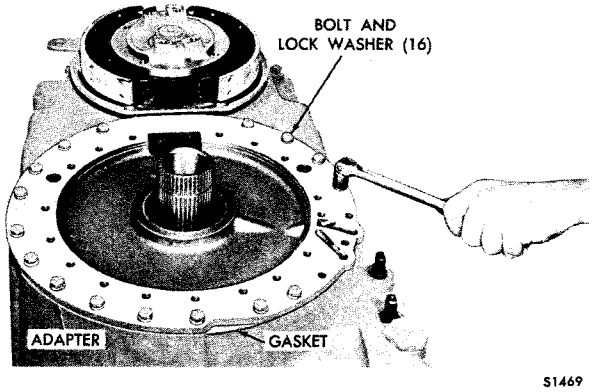


Fig. 7-8. Installing rear housing adapter bolts (-1 model)

(2) Install low-range clutch drum assembly 13 onto the high-range sun gear sleeve (fig. 5-24).

(3) Install snapring 25 (B, foldout 10) 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. 7-9). Install the high-range ring 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. 7-10).

(6) Install the low-range clutch back plate, flat side first, into the low-range clutch drum (fig. 7-10).

(7) Install the internal snapring which retains the clutch back plate (fig. 7-11).

(8) Install the high-range planetary sun gear, thrust washer upward, onto the splines of the sun gear sleeve (fig. 7-11).

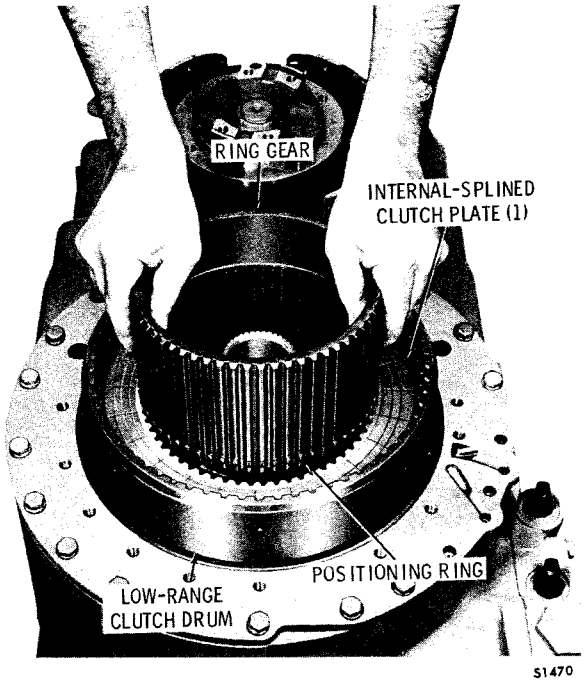


Fig. 7-9. Installing high-range ring gear (-1 model)

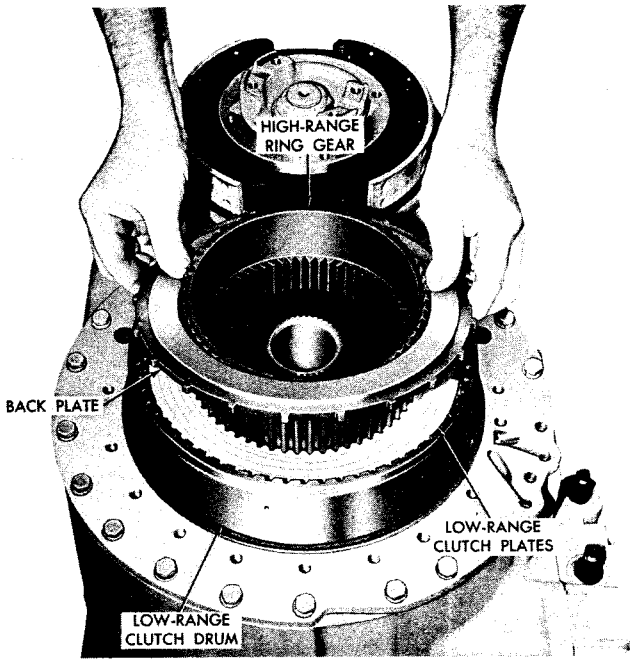


Fig. 7-10. Installing low-range clutch back plate (-1 model)

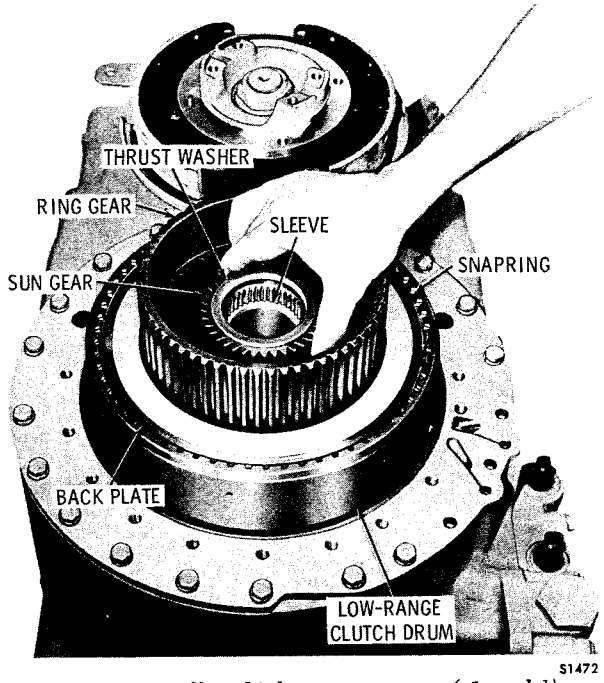


Fig. 7-11. Installing high-range sun gear (-1 model)

(9) Install high-range planetary carrier assembly into high-range ring gear (fig. 5-21).

d. Installation of High-range Clutch, Rear Housing

(1) Install the high-range clutch piston, with sealrings and expanders, flat side first, into the rear housing assembly (fig. 7-12).

(2) Install the piston return spring, convex side upward. Depress the inner diameter of the spring and install the snapring which retains it (fig. 7-12).

(3) Install the clutch anchor pin, leaving the flat-milled end extending at the inside of the housing (fig. 7-12).

(4) Position the high-range clutch anchor assembly 12 (A, foldout 11), pins upward 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.

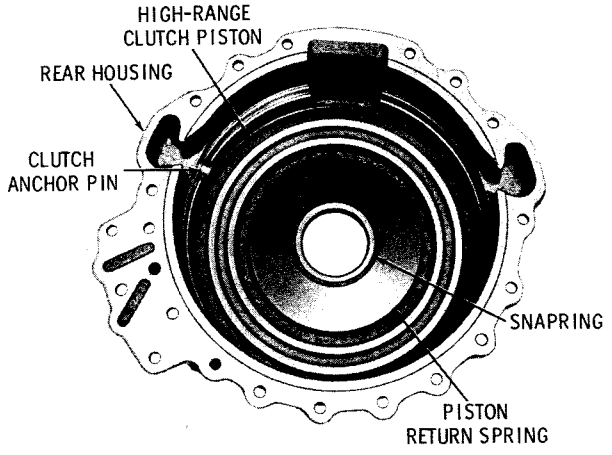


Fig. 7-12. Rear housing and piston assembly (-1 model)

(5) Grasp the entire anchor and plate assembly to hold the parts together. Install the anchor and plates into the rear housing, alining the anchor pin slot with the clutch anchor pin (fig. 7-13).

(6) Install the heavy internal snapring which retains the clutch anchor (fig. 5-18). Note the position of the ends of the snapring in relation to the two slightly extended pins in the anchor.

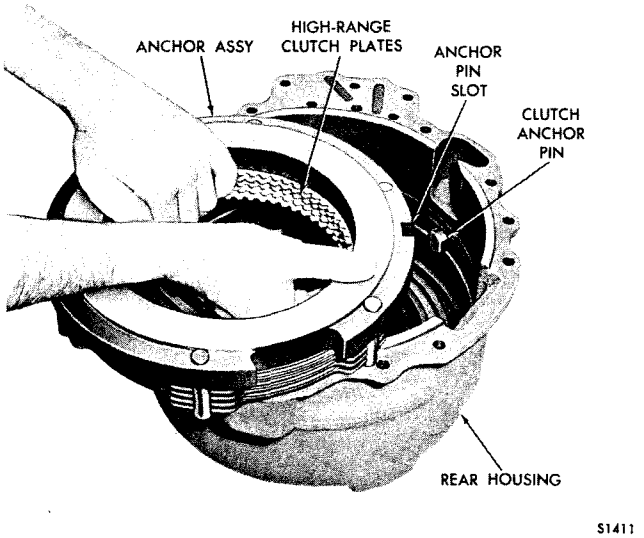


Fig. 7-13. Installing high-range clutch anchor and plates (-1 model)

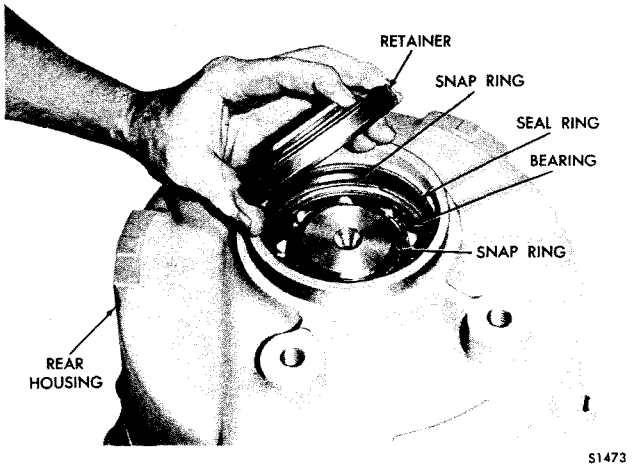


Fig. 7-14. Installing oil retainer (-1 model)

(7) If bearing 6 (B, foldout 13) 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.

(8) Install the internal snapring which retains the shaft rear bearing (fig. 7-14).

(9) Install the sealring into the groove in the rear bore of the rear housing (fig. 7-14). Install the retainer, chamfered side first.

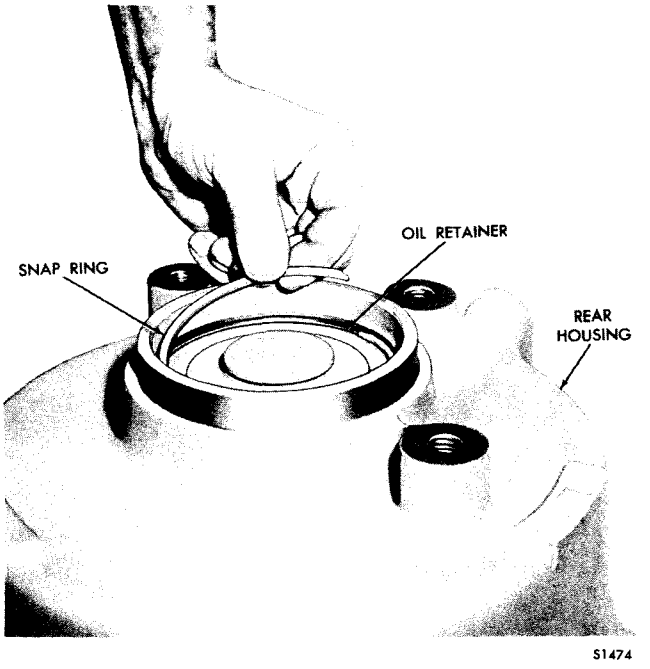


Fig. 7-15. Installing oil retainer snapring (-1 model)

(10) Install the snapring which holds the oil retainer in the rear of the rear housing (fig. 7-15).

(11) Install the rear housing gasket onto the rear housing, using oil-soluble grease to retain it. Install the rear housing onto the transmission (fig. 5-17).

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.

(12) 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. 5-16). Tighten the bolts to 26 to 32 pound feet torque.

e. Installation of Oil Suction Tube, Converter Transfer Gears and Freewheel Clutch

(1) Position the transmission, rear downward and block in a level position. Install bearing 9 (B, foldout 6) onto accessory drive shaft 8. Apply Molykote Type G, or equivalent, into the output splines. Install the shaft into the transmission housing (fig. 7-16).

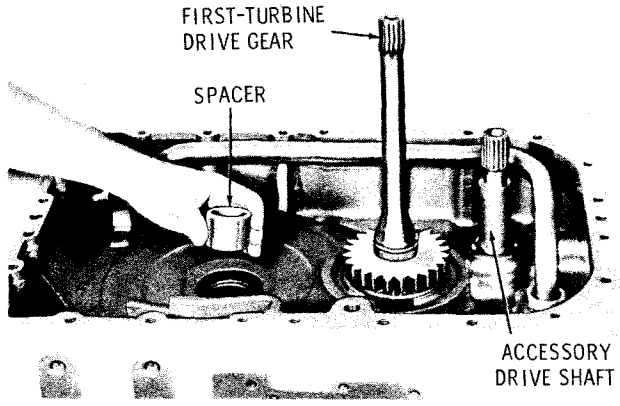


Fig. 7-16. Installing forward and reverse sun gear spacer (-1 model)

(2) Install nut 3 (B, foldout 7) and seal onto the upper end of suction tube 2. Install the tube into the housing. Install one 3/8-16 x 5/8-inch, self-locking bolt 1 to secure the suction tube to the housing, but do not tighten at this time. Tighten the nut 3 to 120 to 150 pound feet torque. Tighten the bolt to 36 to 43 pound feet torque.

(3) Install first-turbine drive gear and bearing as a unit (fig. 7-16).

(4) Install the forward and reverse sun gear spacer (fig. 7-16).

NOTE

After installation, the end of the spacer should be flush with the bearing bore seat (shoulder) in the transmission housing. If the spacer is above the shoulder, this indicates the forward-reverse sun gear thrust washer is not seated properly. To reseat the thrust washer, remove the spacer and use a suitable probe through the forward-reverse sun gear to relocate (center) the thrust washer. Reinstall the spacer.

(5) Install the assembled freewheel unit and converter driven gears (fig. 7-17).

(6) Install the thicker thrust race, roller bearing, and then the thinner thrust race, flat side first, onto the first-turbine drive gear (fig. 7-17). Install the step-joint sealring into the groove in the drive gear shaft. Refer to the note following c(1), above.

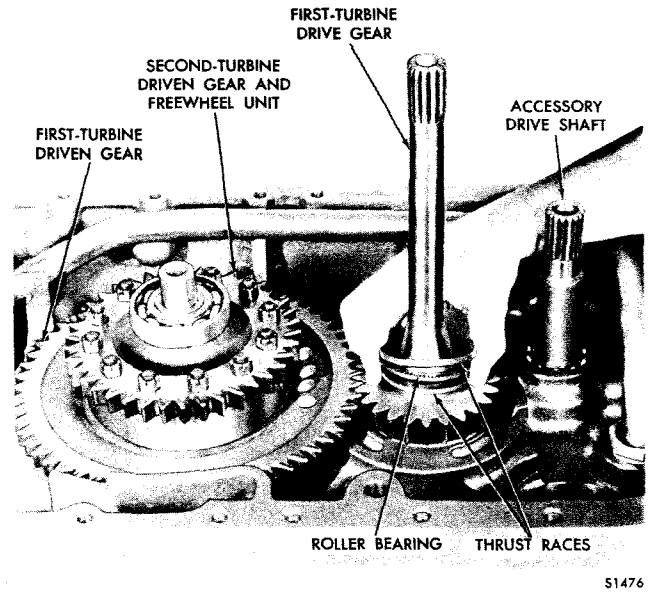


Fig. 7-17. Installing thrust washer and bearing onto first-turbine drive gear (-1 model)

(7) Be sure the step-joint sealring is in place on the shaft of the first-turbine drive gear, and install the assembled second-turbine drive gear (fig. 5-14). Install the step-joint sealring onto the second-turbine drive gear.

NOTE

Continue assembly of TRT 2221-1 and 2421-1 transmissions with paragraph 7-5, below.

7-4. INITIAL ASSEMBLY OF TRT 2211-3, 2411-3, 2221-3 AND 2421-3 TRANSMISSIONS

a. Installation of Reverse Clutch and Planetary (all -3 models)

(1) Follow the instructions in 7-3a(1) through (4), above. Install the clutch anchor pin, letting it project from the housing (so that anchor can be rotated).

(2) Install forward and reverse clutch anchor assembly, longer ends of pins first. Engage the pins with the slots in the external-tanged clutch plates. Aline the slot in the anchor with the clutch anchor pin (fig. 7-18). Push the anchor pin inward, to engage the slot in the anchor.

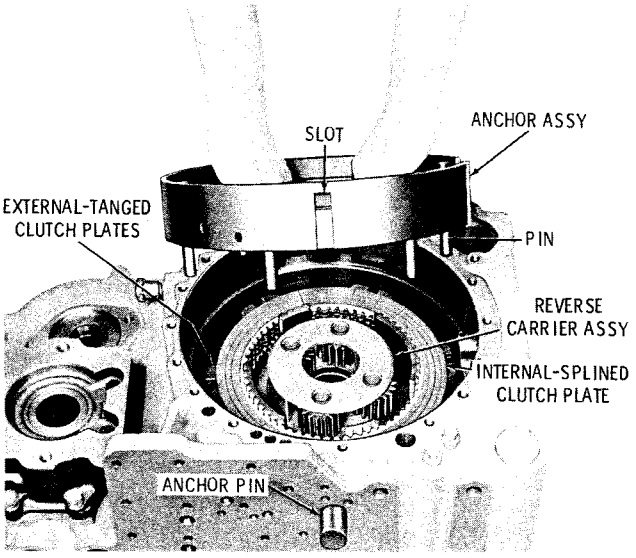


Fig. 7-18. Installing forward and reverse clutch anchor assembly (-3 model)

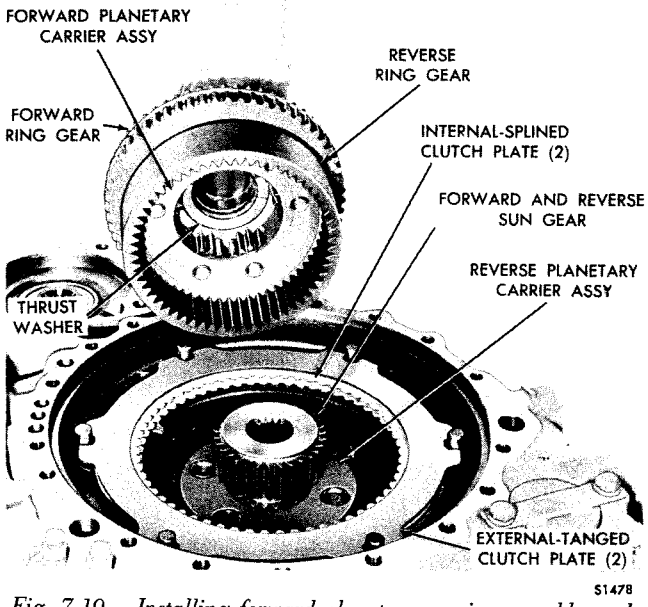


Fig. 7-19. Installing forward planetary carrier assembly and attached parts (-3 model)

b. Installation of 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-splined plates and two external-tanged plates (fig. 7-19).

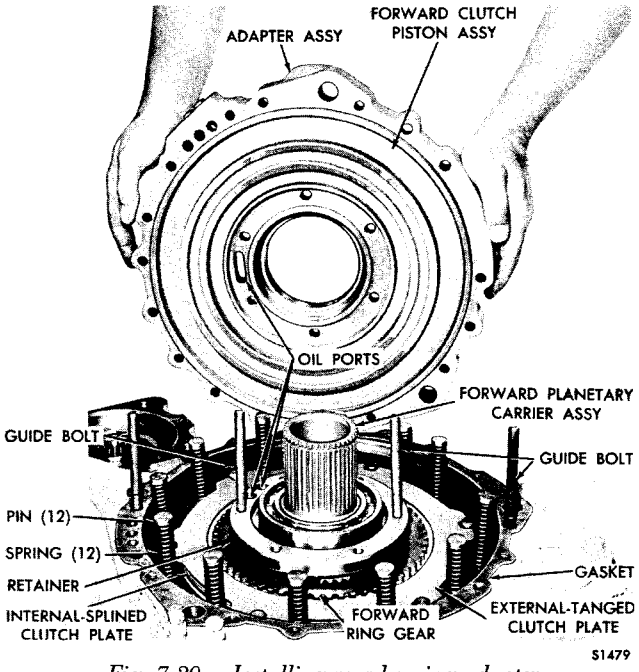


Fig. 7-20. Installing rear housing adapter assembly (-3 overdrive model)

(2) Install the forward and reverse sun gear into the reverse planetary carrier assembly (fig. 7-19).

(3) Install ring gear 1 (B, foldout 9) onto carrier assembly 30. Retain it with snapring 11. Install ring gear 14, longer ends of external splines first, onto carrier assembly 31.

(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. 7-19).

(6) Install the forward carrier assembly, as assembled in (3), (4) and (5), above, meshing its teeth with those of the reverse carrier pinions and the forward sun gear (fig. 7-19). Also, mesh the external splines of the forward ring gear with the installed internal-splined clutch plates.

(7) Next, install another internal-splined clutch plate and another external-tanged plate above the positioning ring on the forward ring gear (fig. 7-20).

(8) Install twelve clutch piston return springs and twelve pins (fig. 7-20).

(9) Install the adapter gasket onto the transmission housing (fig. 7-20). Install headless guide bolts at the four positions shown in figure 7-20.

(10) Install forward clutch piston, with sealrings, flat side first, into the rear housing adapter assembly (fig. 7-20).

(11) Install adapter assembly, alining oil ports in the adapter and retainer (fig. 7-20).

(12) Install two 3/8-16 x 2 3/4-inch bolts temporarily to pull adapter assembly down against piston return springs (fig. 7-21).

(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. 7-21). Remove the two outer guide bolts and the temporary pull-down bolts. Tighten the 12-point-head bolts to 36 to 43 pound feet torque.

(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 to 49 pound feet torque.

c. Installation of Low-range Clutch, High-range Planetary (TRT 2221-3, 2421-3 overdrive models)

(1) Install two step-joint sealrings 1 (B, foldout 12) into the grooves in the hub of low-range clutch drum assembly 2. Use oil-soluble grease to retain them. Refer to the note following paragraph 7-3c(1), above.

(2) Install the low-range clutch drum assembly.

(3) Install the snapring which retains the clutch drum assembly on the forward carrier (fig. 7-22). Install two bearing races and bearing assembly (fig. 7-22). 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. 7-23).

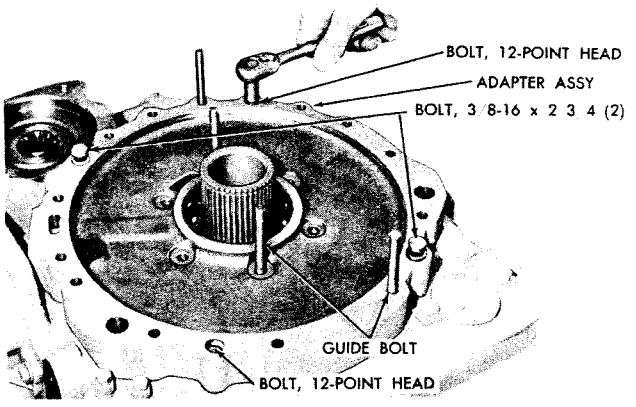


Fig. 7-21. Installing adapter assembly bolts (-3 overdrive model)

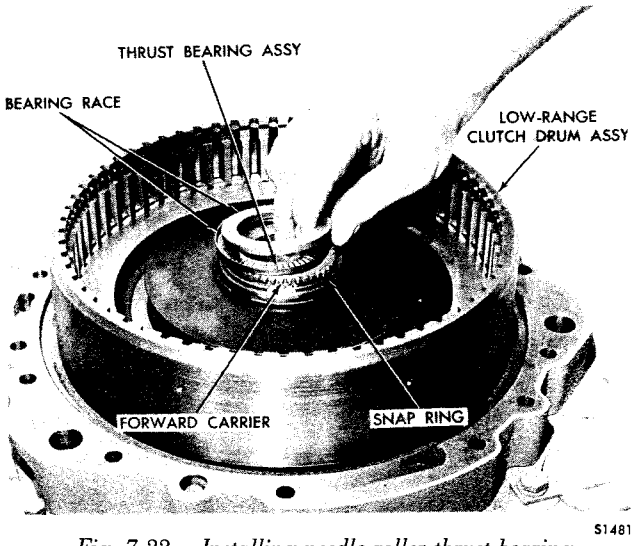


Fig. 7-22. Installing needle roller thrust bearing assembly (-3 overdrive model)

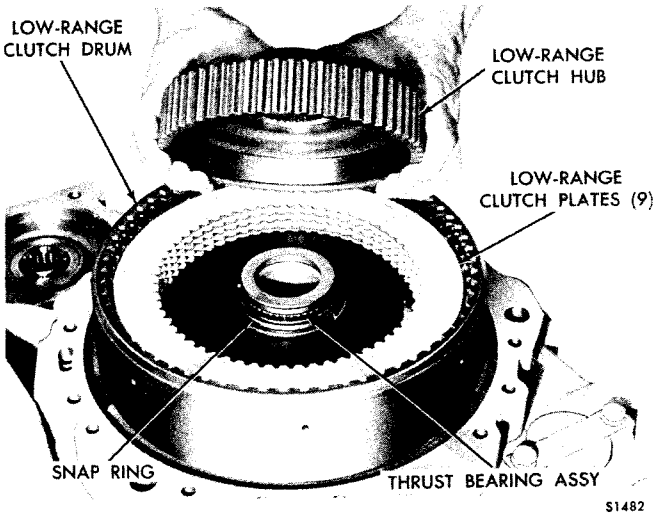


Fig. 7-23. Installing low-range clutch hub (-3 overdrive model)

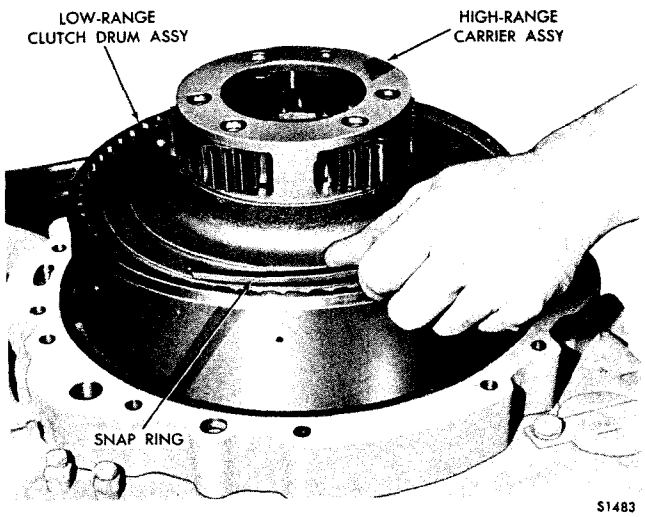


Fig. 7-24. Installing snapring retaining high-range planetary carrier assembly (-3 overdrive model)

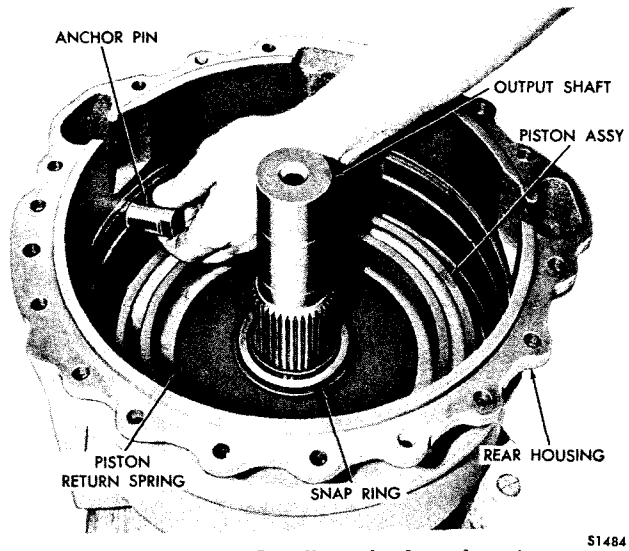


Fig. 7-25. Installing clutch anchor pin (-3 overdrive model)

(5) Install the low-range clutch hub, engaging its splines with those of the internal-splined clutch plates (fig. 7-23). 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. 7-24).

(7) Install high-range planetary sun gear 1 (A, foldout 13), meshing its teeth with the high-range planetary pinions.

d. Installation of High-range Clutch, Rear Housing (TRT 2221-3, 2421-3 overdrive models)

(1) Position rear housing, rear downward, on blocks. Install the high-range clutch piston, with expanders and sealrings, flat side first, into the rear housing (fig. 7-25).

(2) Install the piston return spring, convex side upward, onto the piston. Depress the inner diameter of the spring and install the snapring which retains it (fig. 7-25).

(3) Install clutch anchor pin (fig. 7-25).

(4) 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. 7-26).

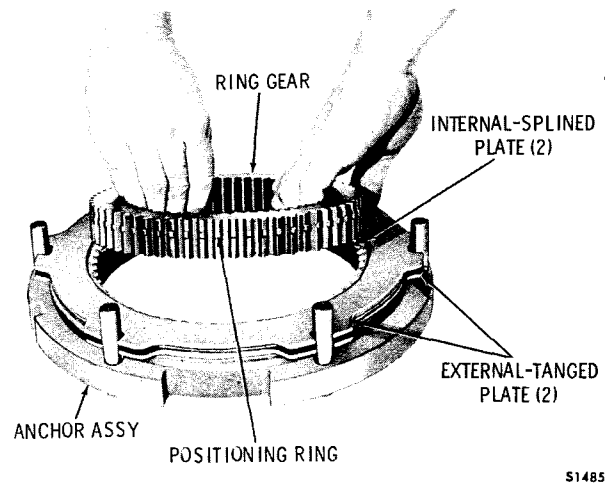


Fig. 7-26. Assembling high-range clutch and anchor (-3 overdrive model)

(5) Install the high-range planetary ring gear, longer ends of external splines first, into the internal-splined clutch plates (fig. 7-26).

(6) Install another internal-splined and another external-tanged clutch plate onto the assembly made in (4) and (5), above.

(7) Grasp the entire clutch assembly, invert it, and install it into the rear housing (fig. 7-27). Engage the slot in the anchor with the anchor pin in the housing.

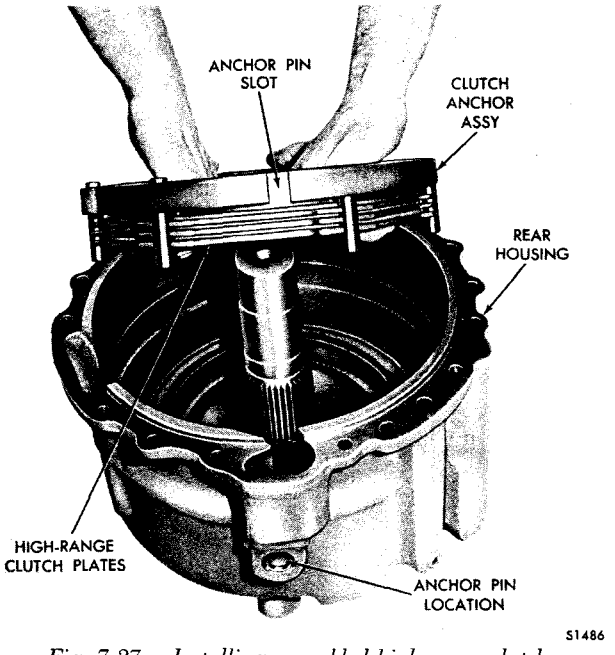


Fig. 7-27. Installing assembled high-range clutch (-3 overdrive model)

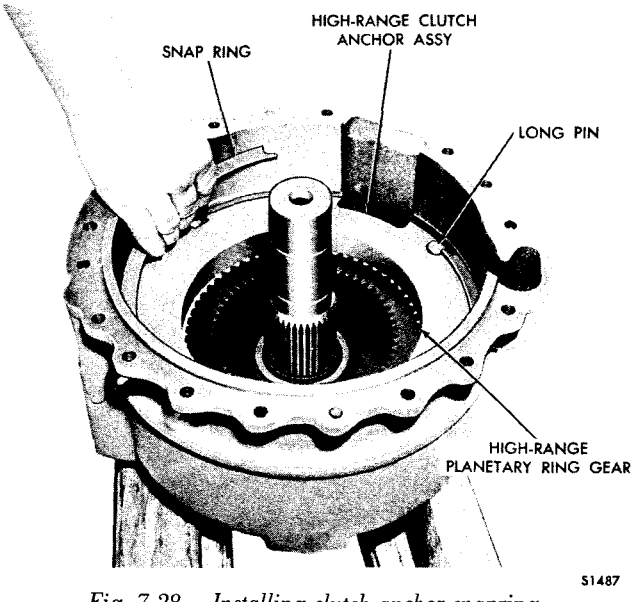


Fig. 7-28. Installing clutch anchor snapring (-3 overdrive model)

(8) Install the heavy internal snapring to retain the high-range clutch anchor assembly (fig. 7-28). Note the relation of the ends of the snapring to the two long pins extending through the anchor.

(9) Suspend the assembled rear housing on a hoist and install the gasket, using oil-soluble grease to retain it (fig. 5-41).

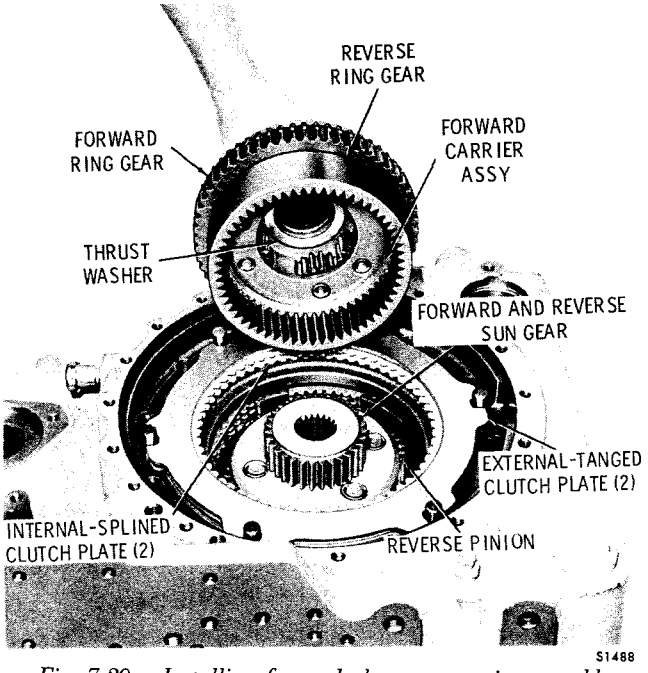


Fig. 7-29. Installing forward planetary carrier assembly and attached parts (-3 overdrive model)

(10) Install the rear housing assembly, rotating the output shaft to aline splines and gear teeth. Install fifteen 3/8-16 x 2 3/4-inch bolts 4 (C, foldout 13) with lockwashers 3 to retain the housing and adapter. Tighten the bolts to 26 to 32 pound feet torque.

e. Installation of 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. 7-29).

(2) Install the forward and reverse sun gear into the reverse planetary carrier assembly (fig. 7-29).

(3) Install ring gear 1 (B, foldout 9) onto carrier assembly 3. Retain it with snapring 11. Install ring gear 14, longer ends of external splines first, onto carrier assembly 3.

(4) Install retainer 21, flat side first, onto the rear of carrier assembly 3. Install bearing assembly 22 against the shoulder at the rear of carrier assembly 3.

(5) Install the thrust washer into the forward planetary carrier assembly, using oil-soluble grease to retain it (fig. 7-29).

(6) Install the forward carrier assembly and attached parts (fig. 7-29). Rotate the carrier and ring gears until all gear teeth and clutch plate splines are engaged.

(7) Install another internal-splined, and another external-tanged clutch plate onto the forward ring gear, above the positioning ring (fig. 7-30).

(8) Install twelve clutch piston return springs and pins (fig. 7-30). Install the adapter gasket.

(9) Install headless guide bolts into the retainer and transmission housing as shown in figure 7-30.

(10) Install the forward clutch piston, with sealrings, flat side first, into the adapter assembly (fig. 7-30).

(11) Install the adapter assembly, alining the oil ports in the retainer and adapter (fig. 7-30).

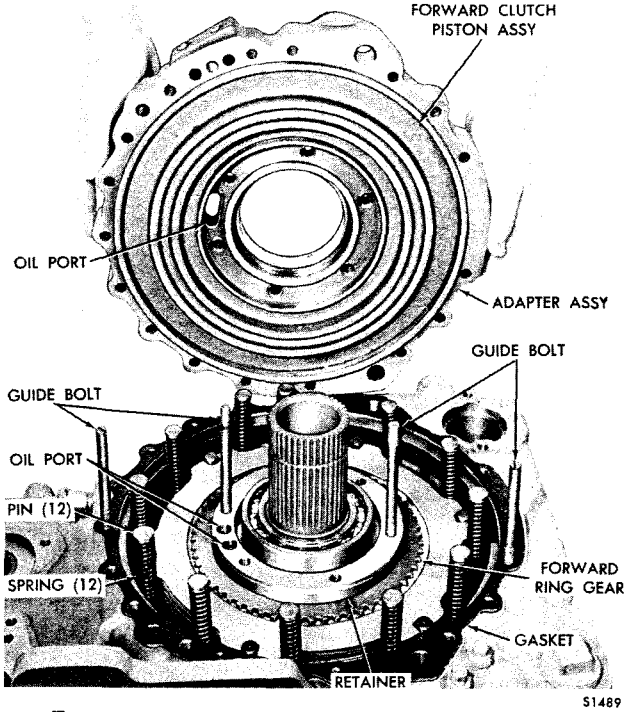


Fig. 7-30. Installing rear housing adapter assembly (-3 underdrive model)

(12) Install two 3/8-16 x 2 3/4-inch bolts at opposite sides of the adapter assembly to pull the adapter down against the clutch piston return springs. Install the two 3/8-16 x 1 3/4-inch, 12-point-head bolts (fig. 7-31). Tighten the bolts to 36 to 43 pound feet torque.

(13) Remove the two outer guide bolts and 3/8-16 x 2 3/4-inch pulldown bolts which were temporarily installed in (12), above. Install the six 3/8-24 x 1 1/4-inch, self-locking bolts 28 (B, foldout 9) into the inner bolt circle. (Remove the inner guide bolts to install the last two self-locking bolts.) Tighten the bolts to 41 to 49 pound feet torque.

f. Installation of High-range Clutch, Low-range Planetary (TRT 2221-3, 2421-3 underdrive models)

(1) Install the two step-joint sealrings 1 (B, foldout 11) into the grooves in the hub of the high-range clutch drum assembly (fig. 5-38). Use oil-soluble grease to retain the sealrings. Refer to the note following paragraph 7-3c(1), above.

(2) Install the high-range clutch drum assembly 2 (B, foldout 11) onto the forward planetary carrier.

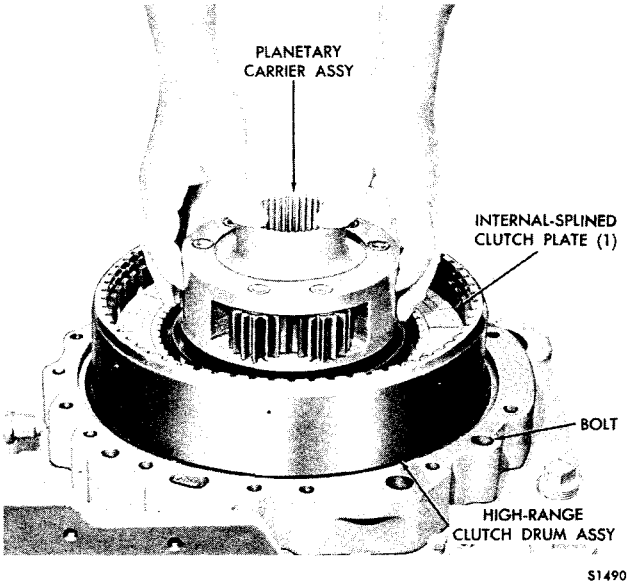


Fig. 7-31. Installing low-range planetary carrier assembly (-3 underdrive model)

(3) Install the snapring which retains the high-range clutch drum on the forward planetary carrier.

(4) Install the low-range planetary sun gear, thrust washer upward, onto the forward planetary carrier.

(5) Install one internal-splined clutch plate (fig. 7-31). Install the low-range planetary carrier assembly.

(6) Install the low-range ring gear, positioning ring first, into the clutch plate installed in (5), above. (Also see fig. 7-31.)

(7) Install two external-splined and two internal-splined, low-range clutch plates, stacked alternately as shown in figure 7-32.

(8) Install high-range clutch back plate 17 (B, foldout 11), flat side first. Retain it with the large internal snapring 18.

g. Installation of Low-range Clutch, Rear Housing Assembly (-3 underdrive models)

(1) Install the low-range clutch piston 23 (A, foldout 12), with expanders and sealrings, flat side first, into the rear housing.

(2) Install piston return spring 19 (A, foldout 12), convex side upward, depress its inner diameter and install snapring 18, which retains it.

(3) Install the clutch anchor pin into the rear housing.

(4) Beginning with an external-tanged clutch plate, alternately stack five external-tanged and five internal-splined plates on the face of the low-range clutch piston in the housing (fig. 7-33).

(5) Install the low-range clutch anchor assembly, engaging the anchor pins with the slots in the external-tanged clutch plates, and the slot in the anchor with the anchor pin in the rear housing (fig. 7-33).

(6) Install the heavy internal snapring which retains the low-range clutch anchor assembly. Note the relation of the ends of the snapring to the two anchor pins which extend slightly above the anchor surface (fig. 7-28).

(7) Suspend the assembled housing on a hoist and install the rear housing gasket. Use oil-soluble grease to retain the gasket (fig. 7-34).

(8) Install the rear housing assembly onto the adapter assembly (fig. 7-34). To aline gear teeth and clutch plate splines, rotate the output shaft while lowering the assembly.

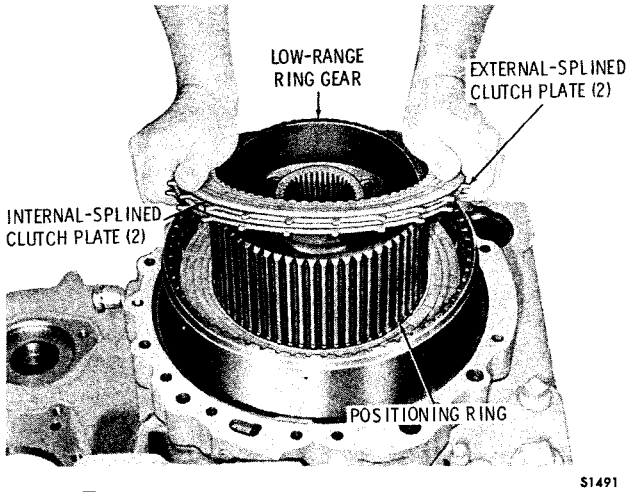


Fig. 7-32. Installing high-range clutch plates (-3 underdrive model)

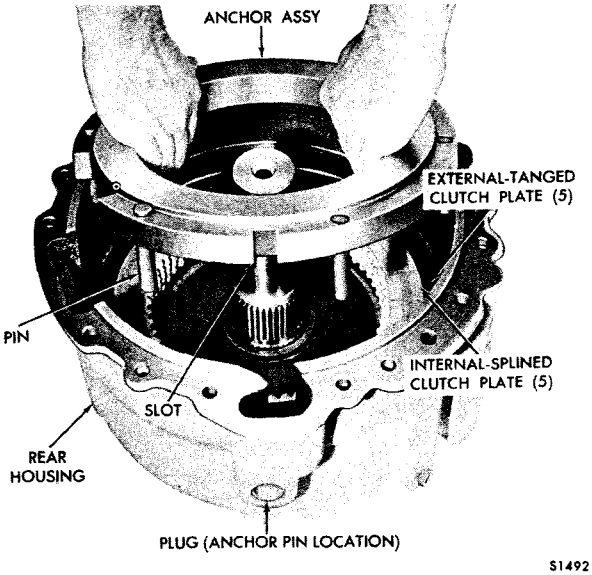


Fig. 7-33. Installing low-range clutch anchor assembly (-3 underdrive model)

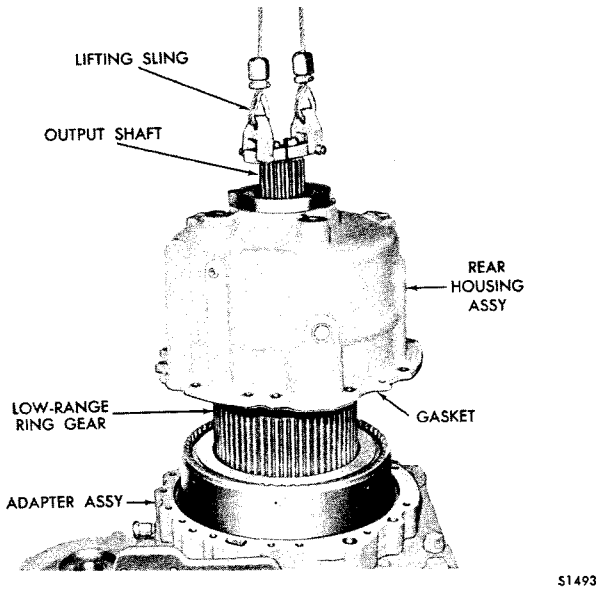


Fig. 7-34. Installing rear housing assembly (-3 underdrive model)

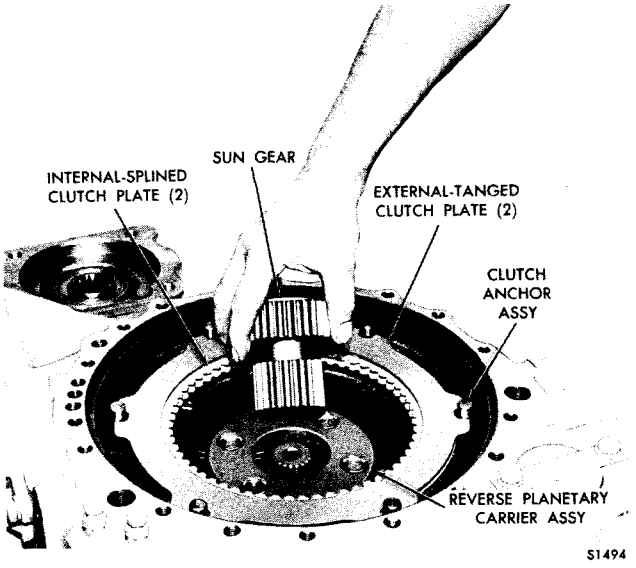


Fig. 7-35. Installing forward and reverse sun gear (-3 model)

(9) Install fifteen 3/8-16 x 2 3/4-inch bolts 4 (C, foldout 13) and lockwashers 3 to retain the rear housing and adapter. Tighten the bolts to 26 to 32 pound feet torque.

h. Installation of Forward Planetary, Clutch, Rear Housing (TRT 2211-3, 2411-3 models)

(1) Beginning with an internal-splined forward clutch plate, alternately install two internal-splined plates and two external-tanged plates onto the forward and reverse clutch anchor assembly (fig. 7-35).

(2) Install the forward and reverse sun gear into the reverse planetary carrier assembly (fig. 7-35).

(3) Install reverse ring gear 1 (A, foldout 10) onto carrier assembly 3. Retain it with snapring 10.

(4) Install bearing 11 onto the rear of carrier assembly 3, pressing it to seat on the shoulder of the carrier.

(5) Install bearing spacer 12 against bearing 11.

(6) Install thrust washer 2 into the front of carrier assembly 3, retaining it with oil-soluble grease. Install forward ring gear 15, longer splines first, onto the carrier assembly.

(7) Install the carrier assembly, as assembled in (3) through (6), above, into the transmission. Rotate the carrier shaft and forward ring gear to mesh gears and clutch plate splines.

(8) Install one internal-splined clutch plate 16 and then one external-tanged clutch plate 17 onto those previously installed.

(9) Install twelve clutch piston return springs 21 (B, foldout 8) and twelve pins 22 into the circle of holes in the forward and reverse clutch anchor assembly.

(10) Install forward clutch piston 18 (A, foldout 10), with sealrings 19, 20, and 21, into housing assembly 5 (D, foldout 13).

(11) Install gasket 1 onto the front flange of housing 9.

(12) Install housing assembly 5 onto the transmission and retain it with eighteen 3/8-16 x 1 3/4-inch bolts 4 and lockwashers 3. Tighten the bolts to 26 to 32 pound feet torque.

i. Installation of Oil Suction Tube, Converter Transfer Gears and Freewheel Clutch (all -3 models)

(1) If the transmission is equipped with an accessory drive, install bearing 9 (B, foldout 6) onto shaft 8. Apply Molykote Type G, or equivalent, into the output splines of the shaft. Install the assembled unit into the transmission housing (fig. 7-17).

(2) Install first-turbine drive gear and bearing (as assembled in para 6-16) into the housing (fig. 7-36).

(3) Install the step-joint sealring into the groove in the hub of the first-turbine drive gear (fig. 7-36). Refer to the note following 7-3c(1), above.

(4) Install the forward and reverse sun gear spacer (fig. 7-36). Center the spacer on the sun gear.

NOTE

After installation, the end of the spacer should be flush with the bearing bore seat (shoulder) in the transmission housing. If the spacer is above the shoulder, this indicates the forward-reverse sun gear thrust washer is not seated properly. To reseat the thrust washer, remove the spacer and use a suitable probe through the forward-reverse sun gear to relocate (center) the thrust washer. Reinstall the spacer.

(5) Install the assembled freewheel clutch and the turbine driven gear assembly (fig. 7-36).

(6) Install the baffle plate and retain it with three 5/16-18 x 5/8-inch, self-locking bolts. Leave bolt hole for suction tube bracket (fig. 7-37). Tighten the bolts to 17 to 20 pound feet torque.

(7) Install sealring 2 (A, foldout 8), nut 3 and sealring 4 onto oil suction tube 1. Install the tube and assembled parts into the transmission housing and retain it with one 5/16-18 x 5/8-inch self-locking bolt (fig. 7-37), but do not tighten at this time. Tighten the nut to 120 to 150 pound feet torque. Tighten the bolt to 17 to 20 pound feet torque.

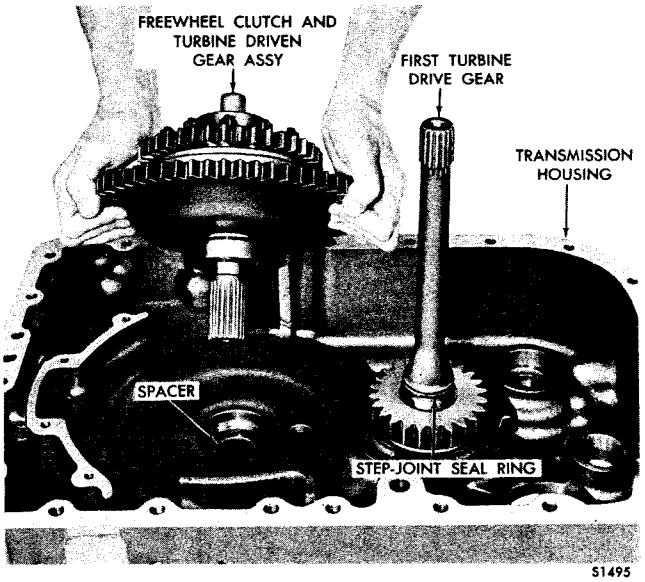


Fig. 7-36. Installing freewheel clutch and turbine driven gear assembly (-3 model)

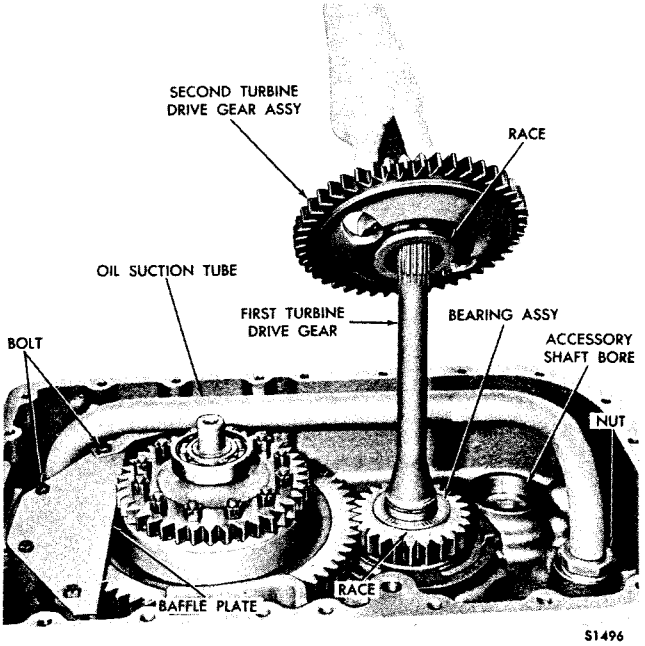


Fig. 7-37. Installing second-turbine driven gear assembly (-3 model)

(8) Install the thicker thrust bearing race and needle thrust bearing assembly onto the first-turbine drive gear (fig. 7-37).

(9) Install the thinner thrust bearing race, concave side first, onto the second-turbine drive gear (fig. 7-37). Use oil-soluble grease to retain it.

(10) Install the second-turbine drive gear assembly onto the first-turbine drive gear (fig. 7-37). Be sure that the step-joint sealring is in its groove on the first-turbine drive gear.

NOTE

Continue assembly of TRT 2211-3, 2411-3, 2221-3 and 2421-3 transmissions with paragraph 7-5, below.

7-5. INSTALLATION OF CONVERTER HOUSING, CONVERTER AND INPUT COMPONENTS (ALL MODELS)

a. Installation of Torque Converter Housing

NOTE

Before installing the housing, be certain that the step-joint sealring is in place on the shaft of the second-turbine drive gear.

(1) Install the gasket onto the converter housing splitline. Use oil-soluble grease to retain the gasket during installation of the housing (fig. 7-38). Attach a sling to the housing front flange and, while lowering the converter housing onto the transmission housing, guide the accessory driven gear past the second-turbine drive gear. Seat the converter housing and remove the sling.

(2) Retain the converter housing with one 7/16-14 x 2 3/4-inch bolt 44 (B, foldout 6), twenty three 7/16-14 x 1 3/8-inch bolts 3, twenty four 7/16-inch flatwashers 5 and 42, and twenty four 7/16-inch lockwashers 4 and 43. Tighten the bolts to 42 to 50 pound feet torque.

b. Installation of Torque Converter Components

(1) Check to be sure that step-joint sealring 20 (A, foldout 6) is in its groove in sleeve 40 (B, foldout 6). Install the torque converter pump assembly, meshing the accessory drive gear with the driven gear. Use a sleeve over the ground sleeve, against the inner race of the pump bearing to seat the bearing.

(2) Install the stator spacer and stator, hub projection first, onto the ground sleeve (fig. 7-39).

(3) Install the snapring onto the converter ground sleeve to retain the stator (fig. 7-40). Install the first-and-second turbine assembly onto the turbine drive gear shafts.

(4) If the transmission is equipped with a dry converter housing, install the sealring into the groove in the converter pump splitline (fig. 7-41).

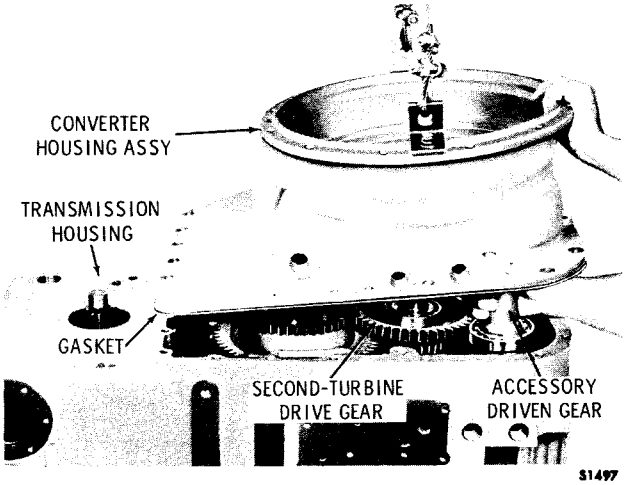


Fig. 7-38. Installing torque converter housing assembly

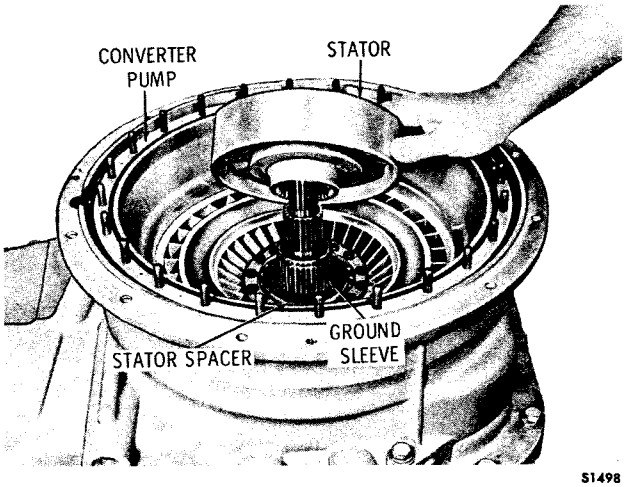


Fig. 7-39. Installing torque converter stator

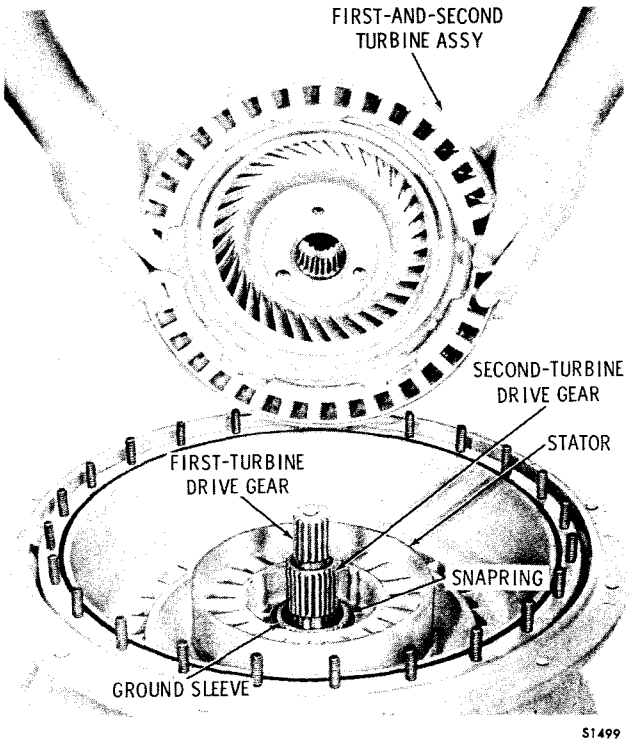


Fig. 7-40. Installing first- and -second turbine assembly

c. Installation of Input Drive Components (direct mount)

(1) Install the torque converter drive cover (fig. 7-41).

(2) Install twenty four 5/16-24, self-locking nuts 4 (B, foldout 5) to retain the cover. Tighten the nuts to 14 to 18 pound feet torque.

(3) There are two types of direct-mount drives. One type employs a flex disk (items 6 through 9 in B, foldout 5). The other type employs a drive ring (items 1, 2 and 3). For the flex disk, follow (4), below. For the drive ring, follow (5) and (6), below.

(4) Install flex disk assembly 9, attached nuts first (toward rear). Assemble and install three flex disks 8 so that the cone of the flex disks will be parallel with cone of the disk assembly. Aline the holes in all disks and install the flex disk plate 7. Retain the assembled parts with six 1/2-13 x 7/8-inch, self-locking bolts 6 and tighten them to 81 to 97 pound feet torque.

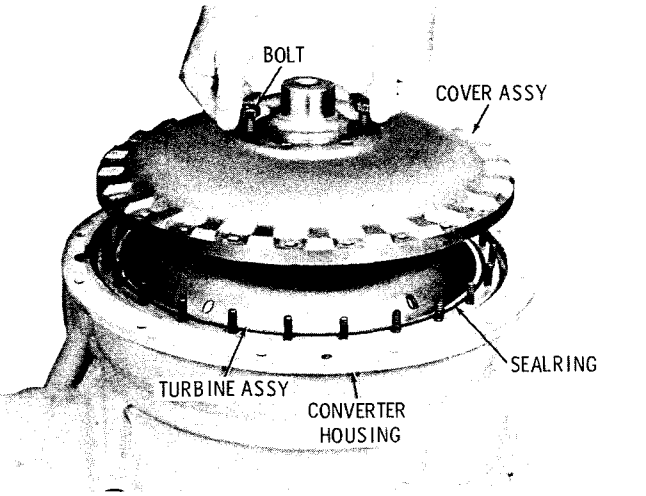


Fig. 7-41. Installing torque converter cover assembly

(5) Install sealring 3 onto drive cover 5 (after lubricating it with grease specified in (6), below). The seal fits into a groove behind the drive teeth. Apply sealer (Permatex no. 3 or equivalent) to drive ring 1 and to the drive ring mounting face on the engine flywheel or drive disk (also to gasket, if used). Bolt drive ring 1 to the engine flywheel or drive disk, using eight bolts 2. Tighten the bolts to 36 to 43 pound feet torque.

(6) Pack the spaces between the internal teeth of drive ring 1 with a high quality molybdenum disulphide grease (Allison P/N 6769877 or equivalent). Fill the teeth completely, but do not use an excessive amount of grease.

NOTE

The grease used must not attack Buna or Polyacrylate (seal material). Mobil-Grease Special with molybdenum disulphide, or equivalent, is recommended.

d. Installation of Input Drive Components (remote mount)

(1) Install the torque converter drive cover 17 or 23 (A, foldout 5) onto the torque converter pump. Retain it with twenty four 5/16-24 self-locking nuts 17. Tighten the nuts to 14 to 18 pound feet torque.

(2) Press bearing 13, shield side up, onto input shaft 16 or 22 against the shaft shoulder.

(3) Install the assembled input shaft onto the torque converter drive cover. Install three lockstrips 15 (A, foldout 5) and six 1/2-13 x 1 1/8-inch bolts 14 to retain the input shaft. Tighten the bolts to 67 to 80 pound feet torque. Bend corners of lockstrips against each bolt head.

(4) Install gasket 12 onto the converter housing front flange.

(5) Install transmission front cover 11 with seal 9, onto the converter housing. Install twelve 3/8-24 x 2-inch bolts 10, from front to rear and retain them with twelve 3/8 lockwashers 19 and twelve 3/8-24 nuts 20. Tighten the nuts to 33 to 40 pounds feet torque.

(6) Install coupling assembly 6 or input flange 7 or 8 onto input shaft 16 or 22. Refer to paragraph 4-8b and c.

(7) The input flanges are retained with either two self-locking bolts (used with input shaft 22) or one self-locking nut and washer (used with input shaft 16). If input shaft 22 is used, retain the input flange with flange retaining washer 5, lockstrip 4, and two self-locking bolts 3. Tighten the bolts to 41 to 49 pound feet torque, and bend the ears of the lockstrip against the bolt heads. If input shaft 16 is used, apply molybdenum disulfide grease (Molykote Type G, or equivalent) onto the shaft threads and install flange washer 2 and self-locking nut 1. Tighten the nut to 600 to 700 pound feet torque while holding the flange or coupling to prevent it from rotating.

7-6. INSTALLATION OF EXTERIOR COMPONENTS (ALL MODELS)

a. Installation of Oil Pump

(1) Install the oil pump assembly and oil pump gasket onto the pump mounting pad (fig. 7-42).

(2) Retain the pump with seven 3/8-16 x 2-inch bolts 3 (A, foldout 15), two 3/8-16 x 3 bolts 5 and nine lockwashers 2 and 6. Tighten the bolts to 26 to 32 pound feet torque.

NOTE

Some pumps use six short, and three long bolts to retain the pump.

(3) If the transmission is equipped with adapter drive coupling 4 (A, foldout 15), apply molybdenum disulfide grease (Molykote Type G or equivalent) onto the coupling splines and the mating splines of the pump. Install the drive coupling into the pump and retain it temporarily with a strip of tape.

b. Installation of Control Valve

(1) Remove the temporarily installed bolt and washer from the valve body mounting pad. Install the valve body gasket and retain it with oil-soluble grease (fig. 7-43). Install the control valve body assembly.

(2) Install fifteen 3/8-16 x 2 1/2-inch bolts 4 (B, foldout 15), one 3/8-16 x 1-inch bolt 3, and sixteen 3/8 lockwashers 2. Progressing from the center of the valve body outward, tighten the bolts evenly to half torque then to 26 to 32 pound feet full torque.

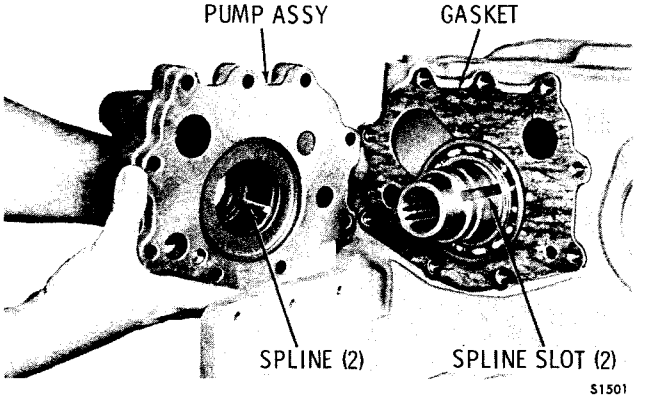


Fig. 7-42. Installing oil pump assembly

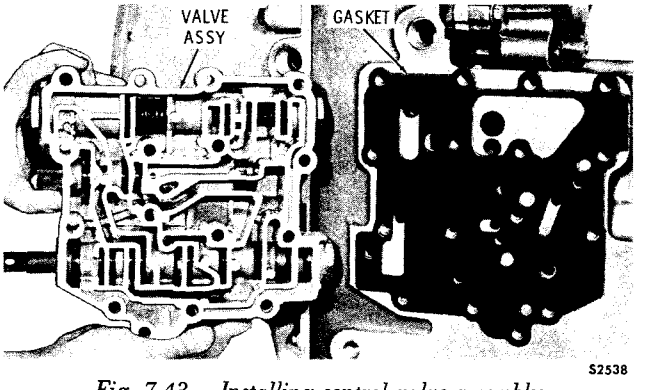


Fig. 7-43. Installing control valve assembly

c. Installation of Flanges, Parking Brake (-3 models)

(1) Install back plate assembly 2 (C, foldout 14). Retain with three 5/8-11 x 1 1/4-inch bolts 15 and lockwashers 16. Tighten the bolts to 117 to 140 pound feet torque.

(2) Install roller 3 and apply lever 6.

(3) Install brake shoes 4 (C, foldout 14) and springs 5 and 7.

(4) Install spacer 25 (A, foldout 10) on TRT 2211-3 or 2411-3 models or spacer 10 (C, foldout 13) on TRT 2221-3 or 2421-3 models.

(5) Install rear output flange 14 (C, foldout 14). Refer also to paragraph 4-8b and c for flange installation procedures.

NOTE

On some transmissions with a parking brake, the brake drum must be attached to the front of the output flange prior to installing the flange.

(6) On TRT 2221-3 and 2421-3 models only, install shims 10 (C, foldout 14) as required, flange washer 11, lockstrip 13 and two 1/2-20 x 1 1/4-inch self-locking bolts 12. Tighten the bolts to 96 to 115 pound feet torque. Bend the corner of lockstrip 13 against the heads of bolts 12. Refer also to paragraph 4-8b and c for flange installation.

(7) On TRT 2211-3 and 2411-3 models only, install flange washer 11, lockstrip 13 and two 3/8-24 x 1 1/8-inch self-locking bolts 12. Tighten the bolts to 41 to 49 pound feet torque. Bend a corner of lockstrip 13 against the head of each bolt 12.

(8) Install brake drum 8 (C, foldout 14) and retain with eight 3/8-24 x 3/4-inch self-locking bolts 9. Tighten the bolts to 41 to 49 pound feet torque.

d. Installation of Flanges, Parking Brake (-1 models)

(1) Install back plate 2 (B, foldout 14) and retain with four 1/2-13 x 7/8-inch self-locking bolts. Tighten the bolts to 81 to 97 pound feet torque.

(2) Install roller 3 (B, foldout 14) and apply lever 6.

(3) Install brake shoes 4 and springs 5.

(4) On models that do not have a parking brake, install spacer 26 (A, foldout 14).

(5) Install rear output flange 11 (B, foldout 14). Refer also to paragraph 4-8b for flange installation procedures.

NOTE

Some models require that the brake drum be installed on the flange, before the flange is installed. For these models, install flange 11 (B, foldout 14) into brake drum 7 and retain with four 3/8-24 x 5/8-inch, self-locking bolts. Tighten the bolts to 41 to 49 pound feet torque and install the assembled flange and drum onto the output shaft.

(6) Apply molybdenum disulfide grease (Molykote Type G or equivalent) onto the threads of 1 1/4-12 flange retaining nut 9 (B, foldout 14) and install washer 10 and nut 9 onto the output shaft. Attach an improvised holder to the flange and tighten the nut to 600 to 700 pound feet torque.

(7) Install brake drum 7 (B, foldout 14) onto the output flange and retain it with four 3/8-24 x 5/8-inch, self-locking bolts. Tighten the bolts to 41 to 49 pound feet torque.

(8) Install front output flange 3 (A, foldout 14). Refer to paragraph 4-8b for flange installation procedures.

(9) Apply molybdenum disulfide grease (Molykote Type G or equivalent) onto the threads of 1 1/4-12 flange retaining nut 1 (A, foldout 14) and install washer 2 and nut 1 onto the front output shaft. Attach an improvised holder to the flange and tighten the nut to 600 to 700 pound feet torque.

e. Installation of Oil Strainer

(1) On -3 model transmissions, install the oil strainer 14 (A, foldout 8). Install

the sealring 15 onto the oil strainer cover 16. Install the cover and retain with two 3/8-16 x 3/4-inch bolts 18 and lockwashers 17. Tighten the bolts evenly to 26 to 32 pound feet torque.

(2) On -1 model transmissions, install gasket 23 (B, foldout 7) and oil strainer 22. Install six 3/8-16 x 7/8-inch bolts 20 and lockwashers 21. Tighten the bolts to 26 to 32 pound feet torque.

7-7. INSTALLATION OF REVERSE CLUTCH, PLANETARY (TRANSMISSION IN VEHICLE)

a. Installation into TRT 2221-1, 2421-1 Transmissions

(1) Install the reverse clutch piston, with expanders and sealrings, flat side first, into the rear of the transmission (fig. 7-44).

(2) Install the anchor pin into the anchor pin hole at the inside of transmission housing (fig. 7-44).

(3) Position the forward and reverse clutch anchor assembly 18 (B, foldout 8), the longer ends of the pins (front) upward. Install one internal-splined clutch plate 17, and then one external-tanged clutch plate 16.

(4) Install the reverse planetary carrier assembly 8, open (rear) side first, onto the two clutch plates. Install the remaining four internal-splined and four external-tanged plates 5 and 6 alternately, beginning with plate 6.

(5) The assembly outlined in (3) and (4), above, results in the clutch and planetary unit shown in figure 7-45.

(6) Using two wires or cords, tie the clutch plates to the clutch anchor assembly by passing the wires or cords over opposite tangs of the clutch plates, around the inner sides of pins, and through the adjacent holes in the anchor. Twist the wire ends or tie the cord ends at the under (rear) side of the clutch anchor (fig. 7-45).

(7) Install the entire unit, clutch plates first, into the rear of the transmission, engaging the anchor pin slot with the anchor pin in the transmission.

(8) Install forward and reverse sun gear spacer 7 (B, foldout 8) over the splined shaft at the center of the installed clutch and planetary unit.

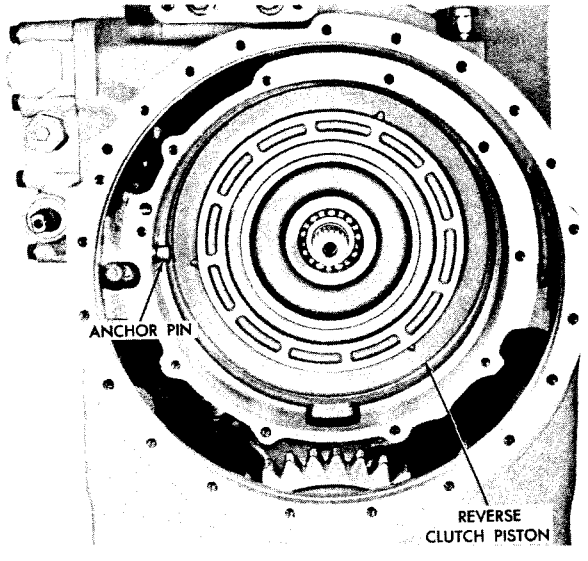


Fig. 7-44. Reverse piston and clutch anchor pin installed

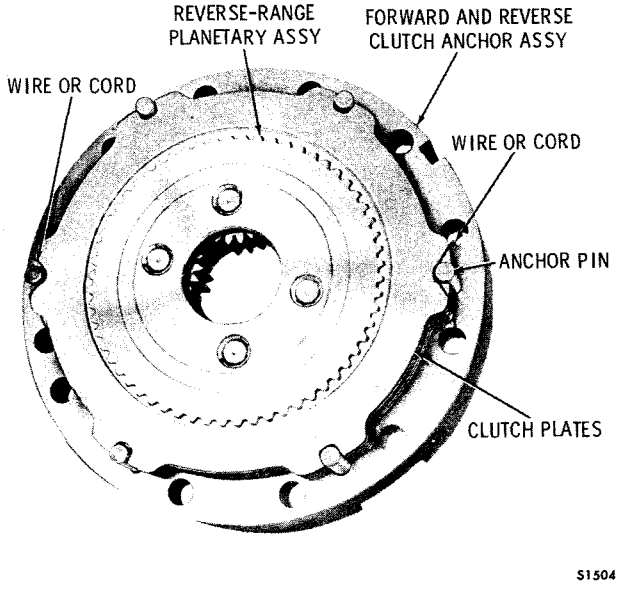


Fig. 7-45. Reverse clutch and planetary assembled for installation into transmission in vehicle

(9) Remove the wires or cords which held the assembly together during installation.

NOTE

After the procedures in (1) through (9), above, continue with assembly as outlined in the paragraph applicable to the model being serviced.

b. Installation of Clutch and Planetary Components into Other Models. Figures 7-44 and 7-45 and a, above, cover procedures specifically for TRT 2221-1 and 2421-1 transmissions. For all other TRT models, follow the same procedures, although the appearance may differ slightly.

Section 8. WEAR LIMITS AND SPRING DATA

8-1. WEAR LIMITS DATA

a. Maximum Variations. The wear limits information in this section shows the maximum wear at which components are expected to function satisfactorily.

b. Cleaning, Inspection. Parts must be clean to permit effective inspection for wear or damage. Refer to paragraph 4-6.

c. Bearings, Bearing Journals, Bores. The application of bearings to any product is based on the recommendations of the bearing manufacturer. Therefore, no diametral dimensional deviation should be permitted in the bearing or mated parts. Bearings should be carefully checked for signs of distress before reinstalling in the transmission.

d. Gears. Gears should be inspected for load pattern and signs of distress. Any distress indicates a possible future failure, and the reuse of such gears should be the decision of the individual customer, based on experience. Backlash cannot be used to establish critical wear of a gear. The backlash tolerances are of such nature that a gear usually pits, scuffs, scores, or galls long before the gear wear becomes critical.

e. Splines. Unless severe, spline wear is not considered detrimental except where it affects tightness of an assembly such as driveline flanges. Here, again, backlash cannot be used to establish critical wear because both mating parts must be concentrically located to obtain accurate measurement of backlash.

f. Hook-type Sealrings. Sides of the sealring should be smooth (maximum wear 0.005 inch). The sides of the groove into which the sealrings fit should be smooth (50 microinch equivalent), and square with the axis of rotation within 0.002 inch. A new sealring should be installed if grooves are reworked, or sealring outside diameter wear causes the possibility of a closed gap between sealring hooks when the ring is installed.

8-2. WEAR LIMITS CHART

The chart which follows lists the wear limits data and is referenced to the exploded views (foldouts 5 through 15) in the back of the manual.

8-3. SPRING DATA

Springs must be clean to permit effective inspection. Springs should be replaced if there are signs of overheating, wear due to rubbing adjacent parts, or permanent set. Discard springs which do not meet the load-height specifications in the spring chart.

8-4. SPRING CHART

Inspection criteria (load versus height) and identification characteristics of springs are presented in the chart following the wear limits chart. The spring chart data are keyed to the exploded views (foldouts 5 through 15) in the back of the manual.

WEAR LIMITS CHART

Illustration	Description	Part Number	Wear Limit	Cone (max)
B, foldout 6	TORQUE CONVERTER HOUSING AND TURBINE DRIVE GEARS			
25	Thrust bearing race thickness	8619652	0.028	
27	Thrust bearing race thickness	8619650	0.120	
A, foldout 7	TURBINE DRIVEN GEARS AND FREEWHEEL CLUTCH			
9	*Freewheel roller diameter	7451288	0.4980	
12	*Freewheel cam surface wear	6838275 6774678	0.005	
15	*First-turbine driven gear hub outside diameter	6774671	0.003 3.0377	
B, foldout 8	REVERSE-RANGE CLUTCH AND PLANETARY			
5, 16	Clutch plate thickness	6837690	0.097	0.030
6, 17	Clutch plate thickness	6830221	0.130	0.012
10	Pinion end play in carrier 14	6769716	0.055	
19	Clutch anchor face wear (front or rear)	6777661	0.020	
	Minimum clutch pack thickness		1.185	
A, foldout 9	FORWARD CLUTCH AND PLANETARY (TRT 2221-1, 2421-1)			
2	Thrust washer thickness	6776578	0.125	
7	Pinion end play in carrier 9	6769715	0.055	
10	Thrust washer thickness	6776877	0.089	
12, 15	Clutch plate thickness	6830221	0.130	0.012
13, 16	Clutch plate thickness	6837690	0.097	0.030
	Minimum clutch pack thickness		0.691	
B, foldout 9	FORWARD CLUTCH AND PLANETARY (TRT 2221-3, 2421-3)			
2	Thrust washer thickness	6757233	0.087	
4, 31	Bushing ID	6757227	1.885	
9	Pinion end play in carrier 5	6769715	0.055	
12, 15	Clutch plate thickness	6830221	0.130	0.012
13, 16	Clutch plate thickness	6837690	0.097	0.030
27	Adapter sleeve—no scoring permissible	6775520		
36	Pinion end play in carrier 32	6769715	0.055	
	Minimum clutch pack thickness		0.691	

*Total wear of freewheel parts (2 x roller wear + sum of cam surface wear at two opposing points + gear hub wear) must not exceed 0.010 inch. (Determine cam surface wear by measuring depth of groove caused by roller contact in the cam pocket.)

WEAR LIMITS CHART — Continued

Illustration	Description	Part Number	Wear Limit	Cone (max)
A, foldout 10	FORWARD CLUTCH AND PLANETARY (TRT 2211-3, 2411-3)			
2	Thrust washer thickness	6776578	0.125	
8	Pinion end play in carrier 4	6769715	0.055	
13, 16	Clutch plate thickness	6830221	0.130	0.012
14, 17	Clutch plate thickness	6837690	0.097	0.030
	Minimum clutch pack thickness		0.691	
B, foldout 10	LOW-RANGE CLUTCH AND TRANSFER DRIVE GEAR			
9	Adapter sleeve—No scoring permissible	6775520		
19	Clutch piston face wear	6768283	0.010	
22	Sleeve bushing ID	6776875	2.008	
26, 29	Clutch plate thickness	6830221	0.130	0.012
27, 30	Clutch plate thickness	6837422	0.097	0.030
31	Backplate face wear	6775481	0.010	
	Minimum clutch pack thickness		0.841	
A, foldout 11	HIGH-RANGE CLUTCH AND PLANETARY			
1	High-range sun gear assy thickness	6775804	1.718	
7	Pinion end play in carrier 5	6771478	0.055	
13	Anchor face wear (rear)	6775494	0.020	
16	Clutch plate thickness	6830221	0.130	0.012
17	Clutch plate thickness	6837690	0.097	0.030
	Minimum clutch pack thickness		1.135	
B, foldout 11	HIGH-RANGE CLUTCH, LOW-RANGE RING GEAR			
8	Clutch piston face wear	6768283	0.010	
12, 15	Clutch plate thickness	6830221	0.130	0.012
13, 16	Clutch plate thickness	6837690	0.097	0.030
17	Back plate face wear	6775481	0.010	
	Minimum clutch pack thickness		0.595	

continued on next page

WEAR LIMITS CHART — Continued

Illustration	Description	Part Number	Wear Limit	Cone (max)
A, foldout 12	LOW-RANGE CLUTCH AND PLANETARY			
1	Low-range sun gear assy thickness	6775804	1.718	
7	Pinion end play in carrier 5	6771478	0.055	
13	Clutch anchor face wear (rear)	6775494	0.020	
16	Clutch plate thickness	6830221	0.130	0.012
17	Clutch plate thickness	6837690	0.097	0.030
	Minimum clutch pack thickness		1.185	
B, foldout 12	LOW-RANGE CLUTCH, HIGH-RANGE PLANETARY			
8	Clutch piston face wear	6770894	0.010	
12	Thrust bearing race thickness	8619652	0.028	
14	Thrust bearing race thickness	6777053	0.182	
16	Clutch plate thickness	6830221	0.130	0.012
17	Clutch plate thickness	6837422	0.097	0.030
19	Carrier face wear (front)	6777030	0.010	
23	Pinion end play in carrier 19	6769715	0.055	
	Minimum clutch pack thickness		1.108	
A, foldout 13	HIGH-RANGE CLUTCH, PLANETARY SUN AND RING GEARS			
4	Clutch anchor face wear (rear)	6777035	0.020	
7, 10	Clutch plate thickness	6830221	0.130	0.012
8, 11	Clutch plate thickness	6837690	0.097	0.030
	Minimum clutch pack thickness		0.721	
A, foldout 14	OUTPUT SHAFTS AND DISCONNECT CONTROL			
	Diametral clearance between:			
8	front output shaft and	6773471		
20	bushing in output shaft 21	6756835	0.010	
A, foldout 15	OIL PUMP ASSEMBLY			
8	Cover at gear face (no scoring permissible)	6777354	0.001	
17	Driven gear shaft diameter	6776428	0.749	

WEAR LIMITS CHART — Continued

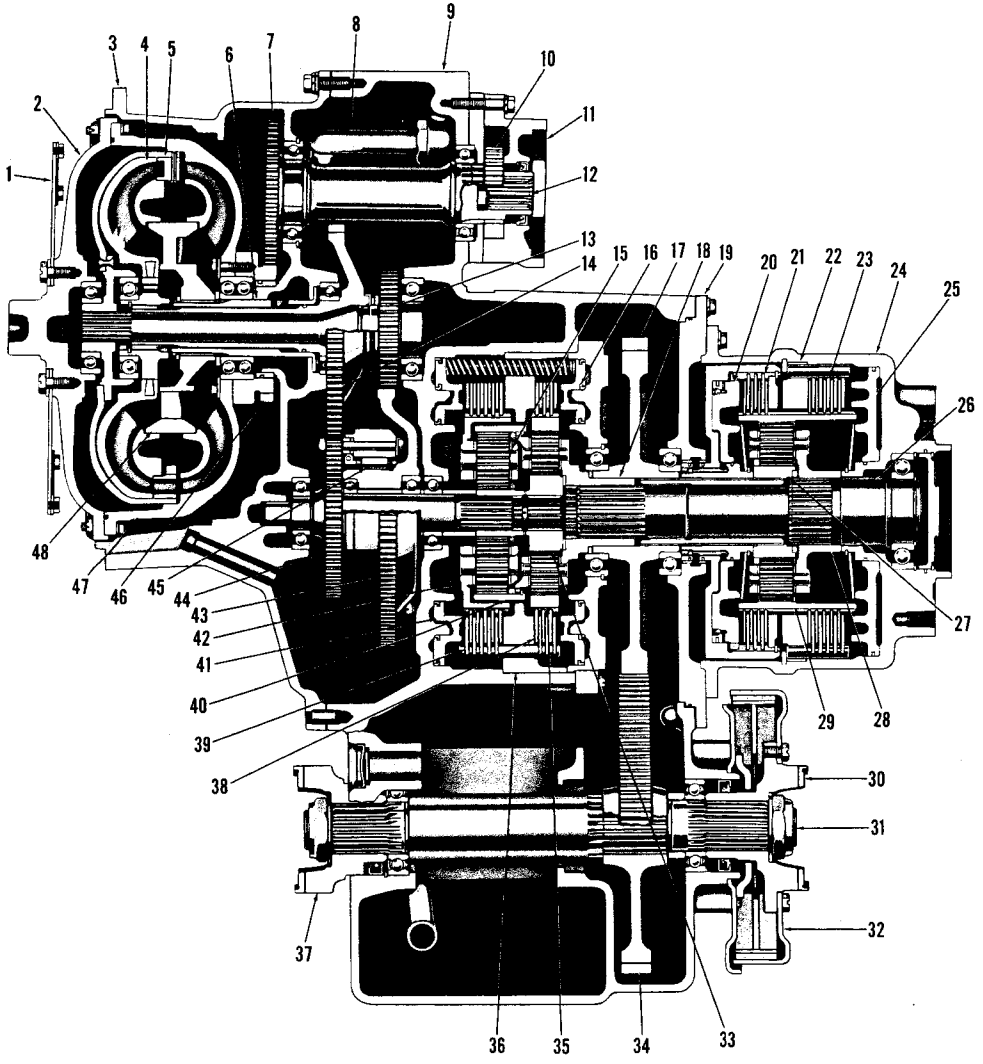
Illustration	Description	Part Number	Wear Limit	Cone (max)
B, foldout 15	VALVE BODY ASSEMBLIES			
8	Valve clearance in body 9	6831187	0.004	
16	Plug clearance in body 9	6835502	0.0035	
20	Valve clearance in body 9	6837700	0.004	
21	Valve plug clearance in plug 25	6771914	0.004	
27	Valve clearance in body 9	6831189	0.003	
37	Valve clearance in body 9	6774599	0.003	
40	Valve clearance in body 9	6838472	0.003	
		6774598	0.003	
45	Valve plug clearance in plug 46	6758305	0.004	

SPRING CHART

Fold-out	Ref	Spring	Part No.	No. coils	Diameter of wire	Outside diameter	Free length	under load Length	under load Pounds
B, 6	22	Lubrication regulator valve	6773689	13.5	0.047	0.403	1.44	1.00	5.58 to 6.82
B, 6	25	Converter regulator valve	6773551	10	0.080	0.468	1.21	1.00	23.4 to 28.6
A, 7	7	Freewheel clutch	6835343	27	0.033	0.185	1.50	1.14	6.59 to 6.71
B, 8	23	Forward, reverse clutch	*6775437	37.5	0.105	0.625	6.13	4.80	45.1 to 49.9
		piston return							
B, 10	20	Low-range clutch piston return	6759491	Belleville spring		6.700	0.27		
A, 11	19	High-range clutch piston return	6759491	Belleville spring		6.700	0.27		
B, 11	9	High-range clutch piston return	6759491	Belleville spring		6.700	0.27		
A, 12	19	Low-range clutch piston return	6759491	Belleville spring		6.700	0.27		
B, 12	9	Low-range clutch piston return	6777032	Belleville spring		6.700	0.27		
A, 13	13	High-range clutch piston return	6777032	Belleville spring		6.700	0.27		
A, 14	10	Disconnect detent	6773464	14	0.062	0.353	1.32	1.15	11.88 to 14.52
B, 15	14	Main-pressure regulator valve:							
		138-165 range	**6835377	17	0.118	0.754	3.61	2.50	80 to 90
		165-195 range	6835705	16	0.125	0.787	3.60	2.50	96 to 106
B, 15	15	Trimmer	6830365	8	0.128	1.11	2.58	1.43	72.20 to 82.20
B, 15	19	Clutch cutoff valve (130 psi)	6765710	18.5	0.080	0.625	3.04	2.08	18.9 to 23.1
B, 15	19	Clutch cutoff valve (250 psi)	6758503	20	0.091	0.625	3.20	2.38	27.9 to 34.1
B, 15	19	Clutch cutoff valve (400 psi)	6830366	14.5	0.112	0.625	2.72	2.04	74.8 to 82.8
B, 15	31	Selector valve detent	6770253	11	0.054	0.480	1.24	0.78	7.84 to 8.16
B, 15	36	Inching regulator front spring	6770298	14.6	0.041	0.384	1.28	0.78	3.93 to 4.07
B, 15	36	Inching regulator rear spring	6838473	26.4	0.089	0.618	4.29	2.50	41.85 to 51.15
B, 15	39	Inching regulator rear spring	6774595	21.5	0.072	0.585	3.80	2.00	25.2 to 27.8
B, 15	41	Inching valve return	6774594	17	0.120	1.105	5.75	4.04	28.5 to 31.5

*Color coded green
**Color coded blue

1 - Flex disk drive
2 - Torque converter cover
3 - Converter housing
4 - Second turbine
5 - First turbine
6 - Converter ground sleeve
7 - Accessory driven gear
8 - Oil suction tube
9 - Transmission housing
10 - Oil pump drive gear
11 - Accessory mounting pad
12 - Accessory drive splines
13 - First-turbine drive gear
14 - Second-turbine drive gear
15 - Reverse planetary carrier
16 - Forward clutch piston
17 - Transfer drive gear
18 - Forward planetary carrier
19 - Adapter
20 - Low-range clutch piston
21 - Low-range clutch
22 - High-range clutch anchor
23 - High-range clutch
24 - Rear housing
25 - High-range clutch piston
26 - Output shaft
27 - High-range sun gear
28 - High-range planetary carrier
29 - High-range ring gear
30 - Rear output flange
31 - Transmission output shaft
32 - Parking brake
33 - Forward, reverse sun gear
34 - Transfer driven gear
35 - Forward ring gear
36 - Forward, reverse clutch anchor
37 - Front output flange
38 - Forward clutch
39 - Reverse clutch
40 - Reverse ring gear
41 - Reverse clutch piston
42 - Reverse clutch hub
43 - First-turbine driven gear
44 - Second-turbine driven gear
45 - Freewheel clutch
46 - Accessory drive gear
47 - Converter pump
48 - Converter stator

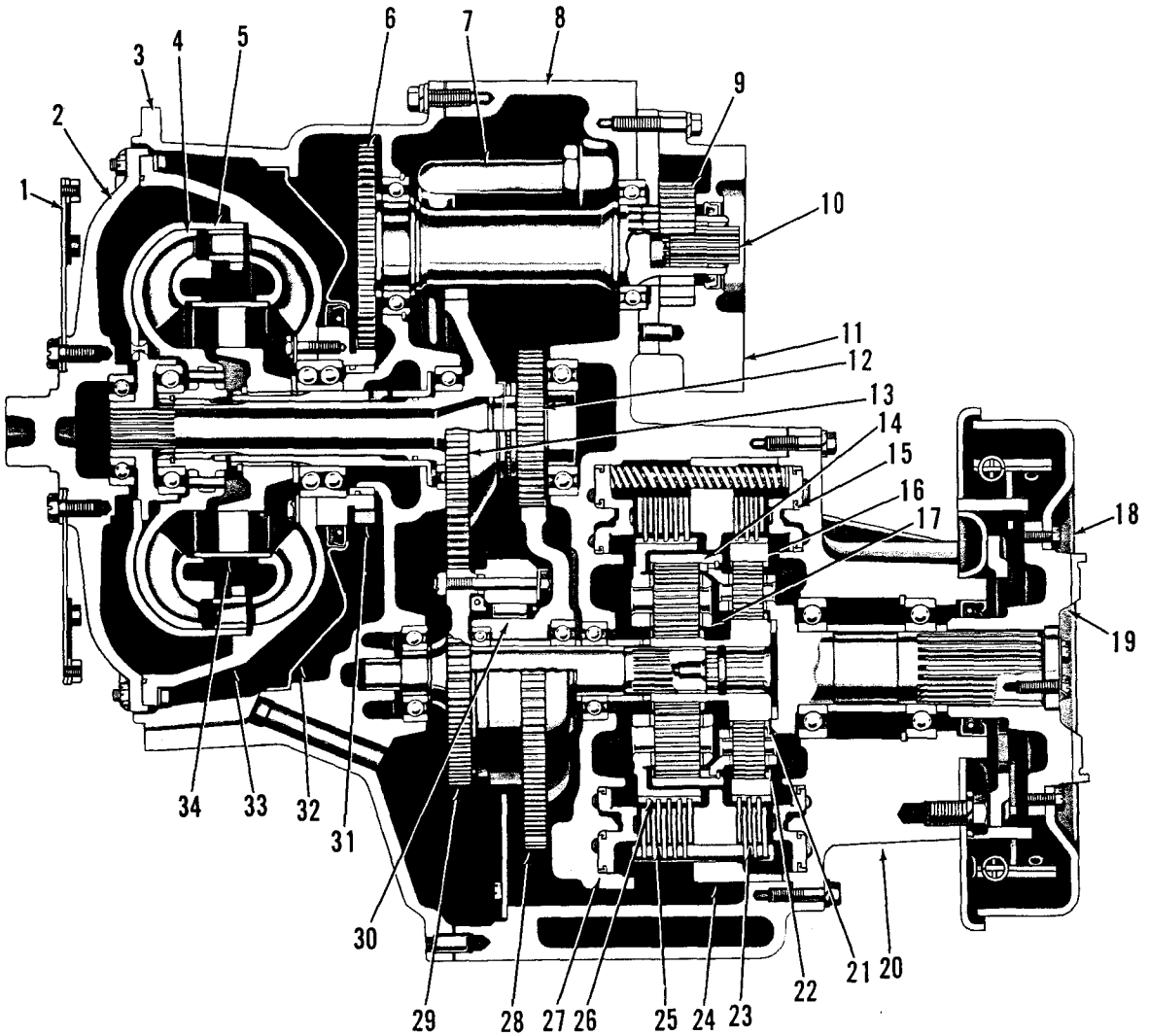


S1505

Foldout 1. TRT 2421-1 Powershift transmission—cross-sectional view

1 - Flex disk drive
2 - Converter cover
3 - Converter housing
4 - Second turbine
5 - First turbine
6 - Accessory driven gear
7 - Oil suction tube
8 - Transmission housing
9 - Oil pump drive gear
10 - Accessory drive coupling
11 - Accessory mounting pad
12 - First-turbine drive gear
13 - Second-turbine drive gear
14 - Reverse ring gear
15 - Forward clutch piston
16 - Forward ring gear
17 - Reverse planetary carrier
18 - Parking brake
19 - Output flange
20 - Rear housing
21 - Forward, reverse sun gear
22 - Forward planetary carrier
23 - Forward clutch
24 - Forward, reverse clutch anchor
25 - Reverse clutch
26 - Reverse clutch hub
27 - Reverse clutch piston
28 - First-turbine driven gear
29 - Second-turbine driven gear
30 - Free wheel clutch
31 - Accessory drive gear
32 - Diaphragm
33 - Converter pump
34 - Converter stator

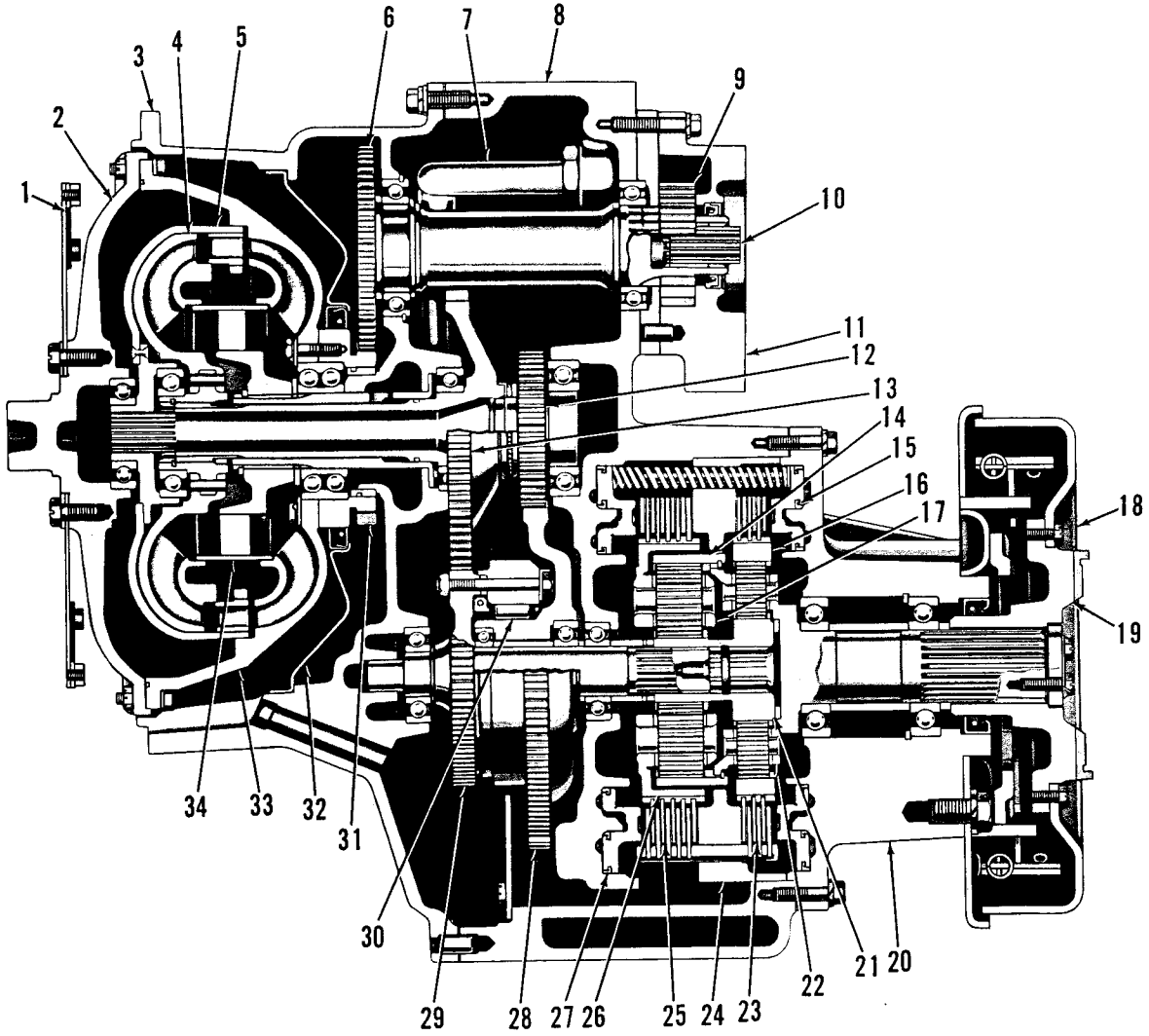
FOLDOUT 2



S1506

Foldout 2. TRT 2211-3 Powershift transmission—cross-sectional view

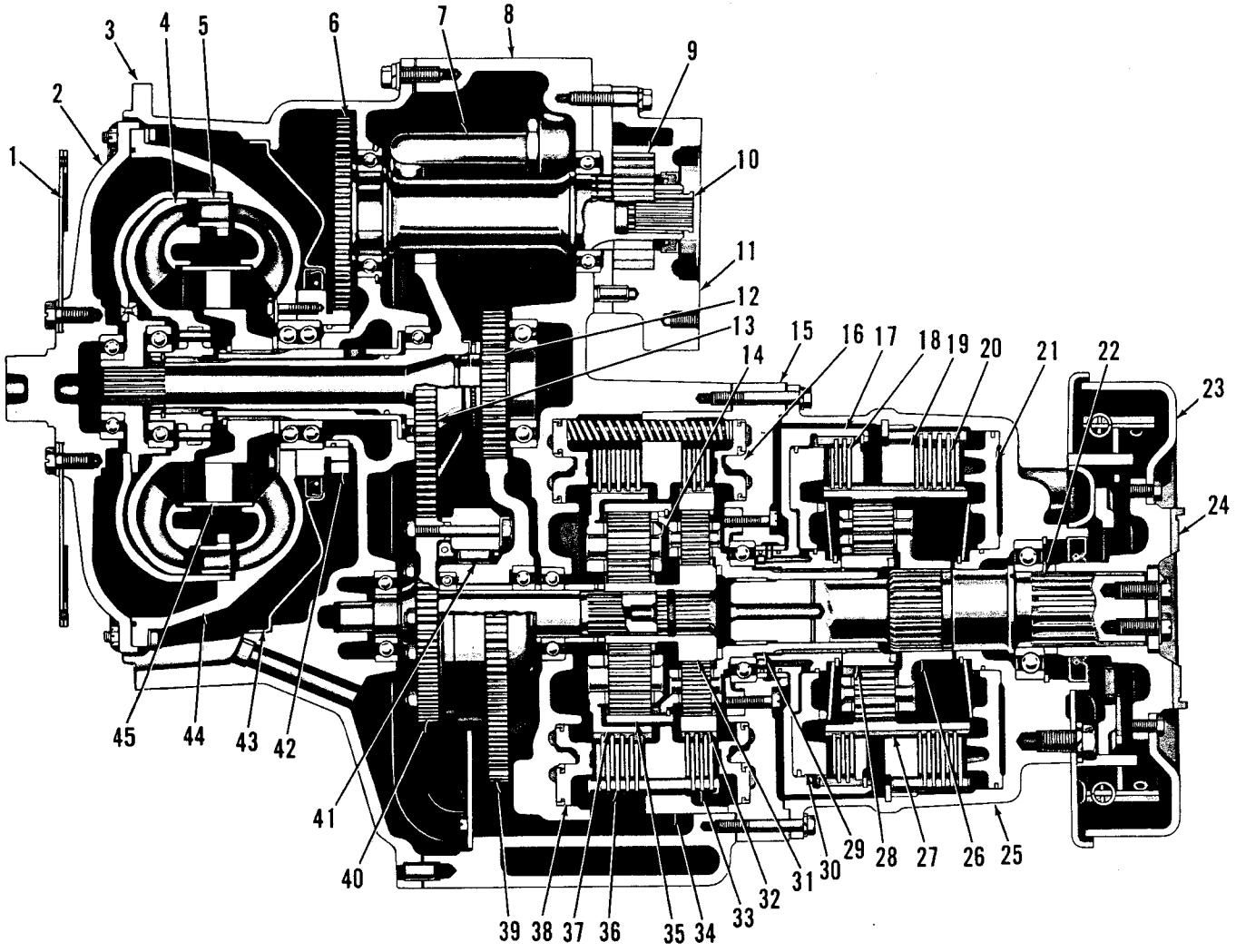
1 - Flex disk drive
2 - Converter cover
3 - Converter housing
4 - Second turbine
5 - First turbine
6 - Accessory driven gear
7 - Oil suction tube
8 - Transmission housing
9 - Oil pump drive gear
10 - Accessory drive coupling
11 - Accessory mounting pad
12 - First-turbine drive gear
13 - Second-turbine drive gear
14 - Reverse ring gear
15 - Forward clutch piston
16 - Forward ring gear
17 - Reverse planetary carrier
18 - Parking brake
19 - Output flange
20 - Rear housing
21 - Forward, reverse sun gear
22 - Forward planetary carrier
23 - Forward clutch
24 - Forward, reverse clutch anchor
25 - Reverse clutch
26 - Reverse clutch hub
27 - Reverse clutch piston
28 - First-turbine driven gear
29 - Second-turbine driven gear
30 - Free wheel clutch
31 - Accessory drive gear
32 - Diaphragm
33 - Converter pump
34 - Converter stator



S1507

Foldout 3. TRT 2221-3 Powershift transmission (underdrive)—cross-sectional view

1 - Flex disk drive
2 - Converter cover
3 - Converter housing
4 - Second turbine
5 - First turbine
6 - Accessory driven gear
7 - Oil suction tube
8 - Transmission housing
9 - Oil pump drive gear
10 - Accessory drive coupling
11 - Accessory mounting pad
12 - First-turbine drive gear
13 - Second-turbine drive gear
14 - Reverse planetary carrier
15 - Rear output housing adapter
16 - Forward clutch piston
17 - High-range clutch drum
18 - High-range clutch
19 - Low-range clutch anchor
20 - Low-range clutch
21 - Low-range clutch piston
22 - Transmission output shaft
23 - Parking brake
24 - Output flange
25 - Rear housing
26 - Low-range planetary carrier
27 - Low-range ring gear
28 - Low-range sun gear
29 - Forward planetary carrier
30 - High-range clutch piston
31 - Forward, reverse sun gear
32 - Forward ring gear
33 - Forward clutch
34 - Forward, reverse clutch anchor
35 - Reverse ring gear
36 - Reverse clutch
37 - Reverse clutch hub
38 - Reverse clutch piston
39 - First-turbine driven gear
40 - Second-turbine driven gear
41 - Freewheel clutch
42 - Accessory drive gear
43 - Diaphragm
44 - Converter pump
45 - Converter stator



S1508

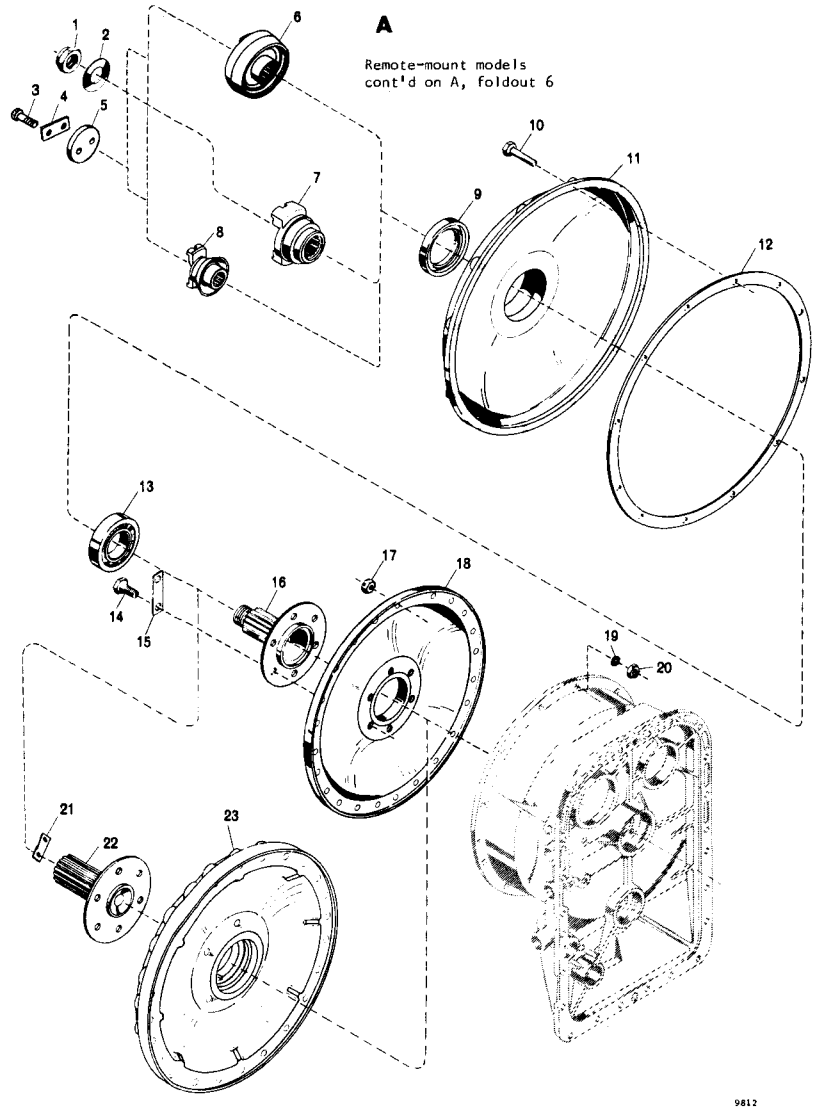
Foldout 4. TRT 2221-3 Powershift transmission (overdrive)—cross-sectional view

A

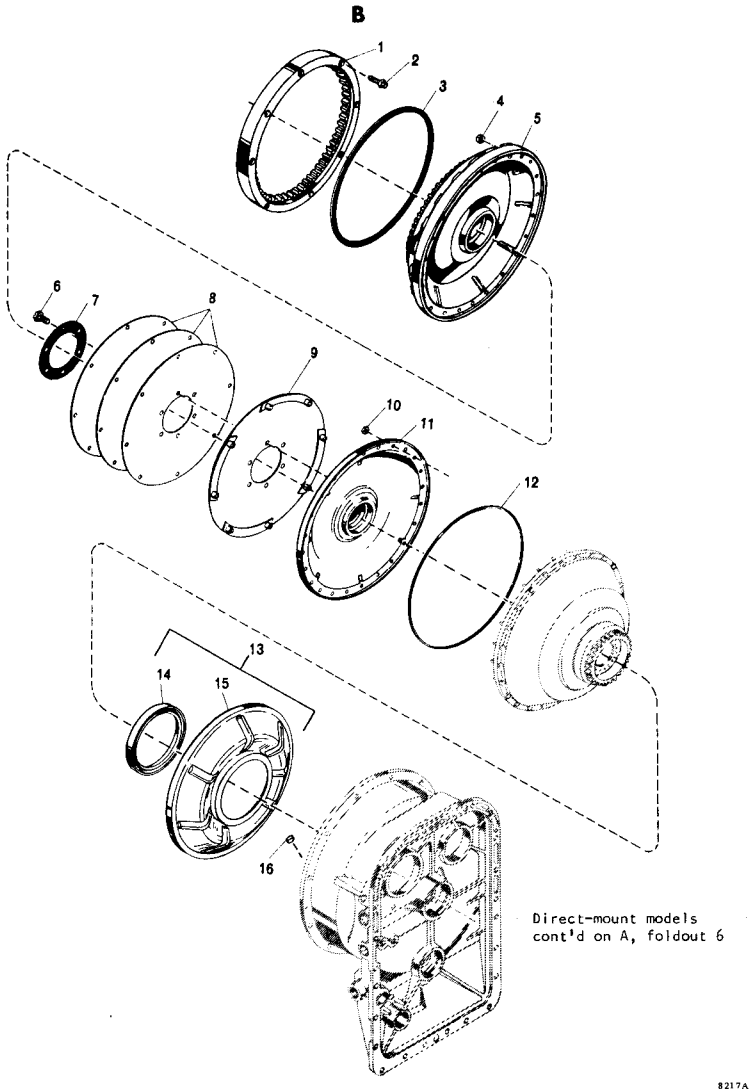
1 - Flange retaining nut
2 - Flange washer
3 - Bolt, 3/8-24 x 1 1/8 (2)
4 - Lockstrip
5 - Flange washer
6 - Torqmatic coupling assembly
7 - Flange
8 - Flange assembly
9 - Seal
10 - Bolt, 3/8-24 x 2 (12)
11 - Transmission front cover
12 - Front cover gasket
13 - Ball bearing
14 - Bolt, 1/2-13 x 1 1/8 (6)
15 - Lockstrip (3)
16 - Input shaft, external threaded
17 - Self-locking nut, 5/16-24 (24)
18 - Torque converter cover
19 - Lockwasher, 3/8 (12)
20 - Nut, 3/8-24 (12)
21 - Shim, 0.005 and 0.025 thk (AR)
22 - Input shaft, internal threaded
23 - Torque converter cover

B

1 - Converter drive ring
2 - Twelve-point bolt, 3/8-16 x 1 1/4 (8)
3 - Sealring
4 - Nut, 5/16-24 (24)
5 - Torque converter cover
6 - Self-locking bolt, 1/2-13 x 7/8 (6)
7 - Flex disk plate
8 - Flex disk (3)
9 - Flex disk assembly
10 - Nut, 5/16-24 (24)
11 - Torque converter cover
12 - Sealring
13 - Converter diaphragm assembly
14 - Oil seal
15 - Converter diaphragm
16 - Plug



A, foldout 5. Transmission front cover and remote imput drive—exploded view



B, foldout 5. Gear and flex disk input drives and diaphragm—exploded view

1 - Ball bearing
2 - First-and-second turbine assembly
3 - First-turbine support
4 - First turbine
5 - Pin:
    TRT 2201 models (6)
    TRT 2401 models (9)
6 - Ball bearing
7 - Internal snapring
8 - Second turbine
9 - External snapring
10 - Torque converter stator

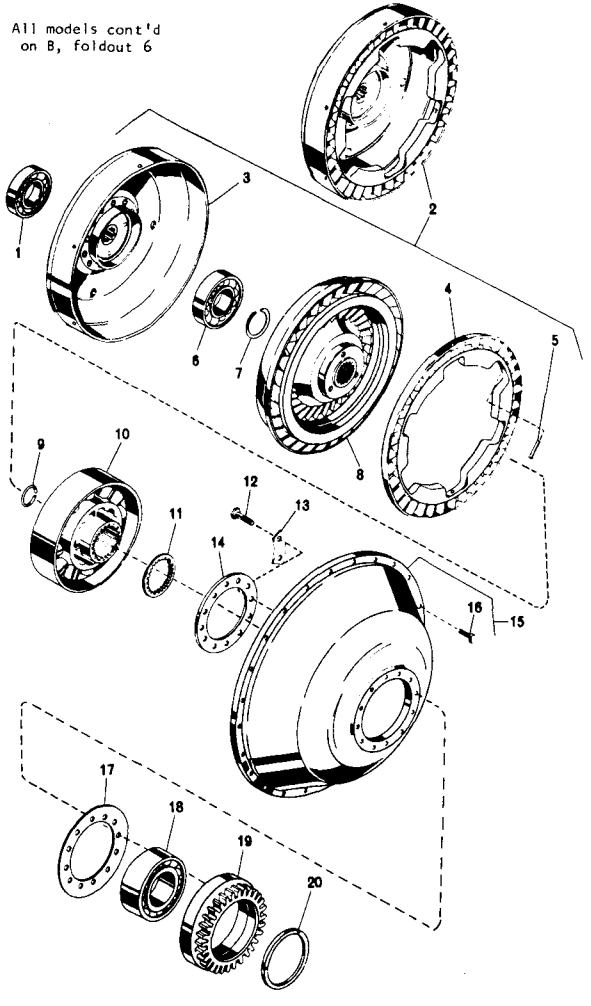
A

11 - Spacer
12 - Bolt, 1/4-28 x 1 1/4 (12)
13 - Lockstrip (6)
14 - Torque converter pump bearing retainer
15 - Torque converter pump assembly
16 - Bolt, 5/16-24 x 1.30 (24)
17 - Torque converter pump gasket
18 - Double-row ball bearing
19 - Input accessory drive gear
20 - Step-joint sealring

B

1 - Accessory drive gear
2 - Accessory driven gear
3 - Bolt, 7/16-14 x 1 3/8 (23)
4 - Lockwasher, 7/16 (23)
5 - Flat washer, 7/16 (23)
6 - Ball bearing
7 - External snapring
8 - Accessory drive shaft
9 - Ball bearing
10 - Ball bearing
11 - External snapring
12 - Ball bearing
13 - Converter ground sleeve
14 - Self-locking bolt, 5/16-18 x 3/4 (4)
15 - Step-joint sealring
16 - Ball bearing
17 - Second-turbine drive gear
18 - Valve guide pin
19 - Lubrication regulator valve spring
20 - Lubrication regulator valve
21 - Valve guide pin
22 - Converter pressure regulator valve spring
23 - Converter pressure regulator valve
24 - Step-joint sealring
25 - Thrust race
26 - Thrust roller bearing
27 - Thrust race
28 - First-turbine drive gear
29 - Ball bearing
30 - Lubrication bypass tube
31 - External thermostat adapter assembly
32 - Thermostat adapter
33 - Connector
34 - Thermostat assembly
35 - Sealring
36 - Converter housing assembly
37 - Pipe plug, 3/4 NPTF
38 - Converter housing
39 - Plug, 1/2-14 PTF
40 - Converter housing sleeve
41 - Converter housing dowel pin (2)
42 - Flat washer, 7/16
43 - Lockwasher, 7/16
44 - Bolt, 7/16-14 x 2 3/4

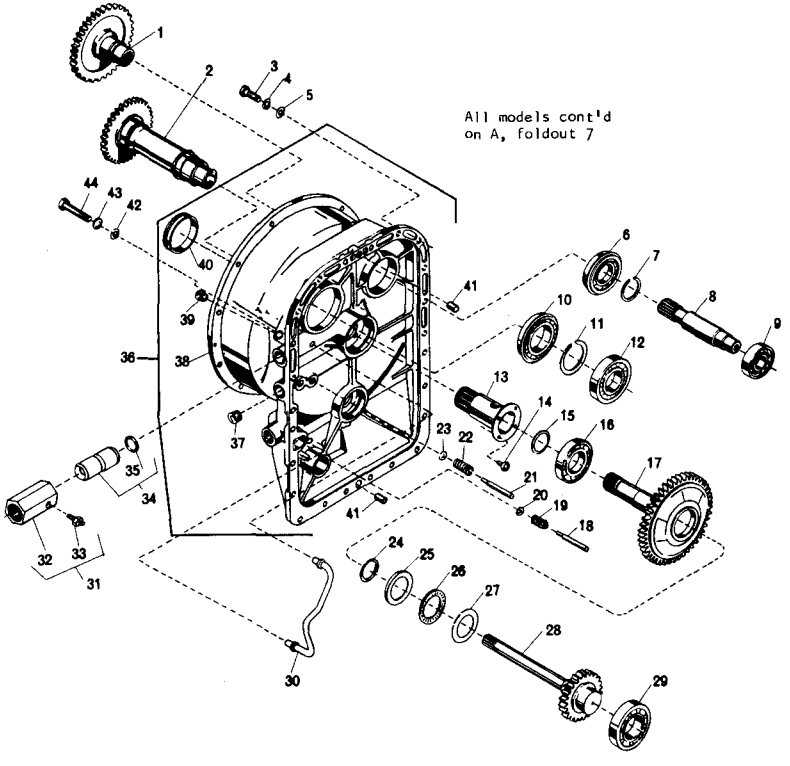
A



6377A

A, foldout 6. Torque converter—exploded view

B



6378A

B, foldout 6. Torque converter housing—exploded view

1 - Ball bearing
2 - Self-locking nut, 3/8-24 (12)
3 - Second-turbine driven gear
4 - Ball bearing
5 - Spring retainer plate
6 - Spring guide pin (3)
7 - Spring (3)
8 - Freewheel rooler cage
9 - Freewheel roller (15)
10 - Freewheel cam assembly

A

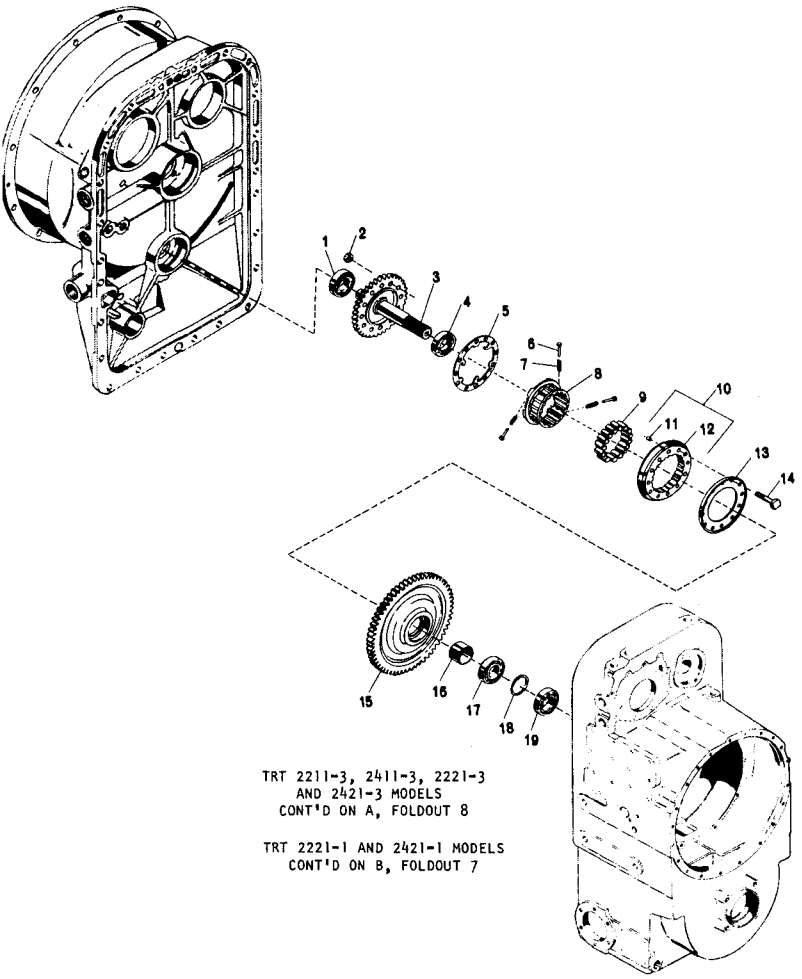
11 - Index pin
12 - Freewheel cam
13 - Retainer plate
14 - Square-head bolt, 3/8-24 x 3 (12)
15 - First-turbine driven gear
16 - Bearing spacer
17 - Ball bearing
18 - Bearing spacer
19 - Ball bearing

1 - Self-locking bolt, 3/8-16 x 5/8
2 - Suction tube
3 - Male nut, 1 3/4-14
4 - Sealring
5 - Transmission housing gasket
6 - Remote filter plug
7 - Plug, 3/4-14 NPTF
8 - Transmission housing
9 - Breather
10 - Cup plug
11 - Accessory drive cup plug
12 - Oil seal
13 - Bolt, 3/8-16 x 7/8 (6)
14 - Lockwasher, 3/8 (6)

B

15 - Core hole cover
16 - Gasket
17 - Drain plug, 3/4-14 NPTF
18 - Drive screw, no. 4 x 1/4 (4)
19 - Nameplate
20 - Bolt, 3/8-16 x 7/8 (6)
21 - Lockwasher, 3/8 (6)
22 - Oil strainer assembly
23 - Gasket
24 - Anchor pin
25 - Oil filler plug
26 - Oil level add plug
27 - Oil level full plug

A



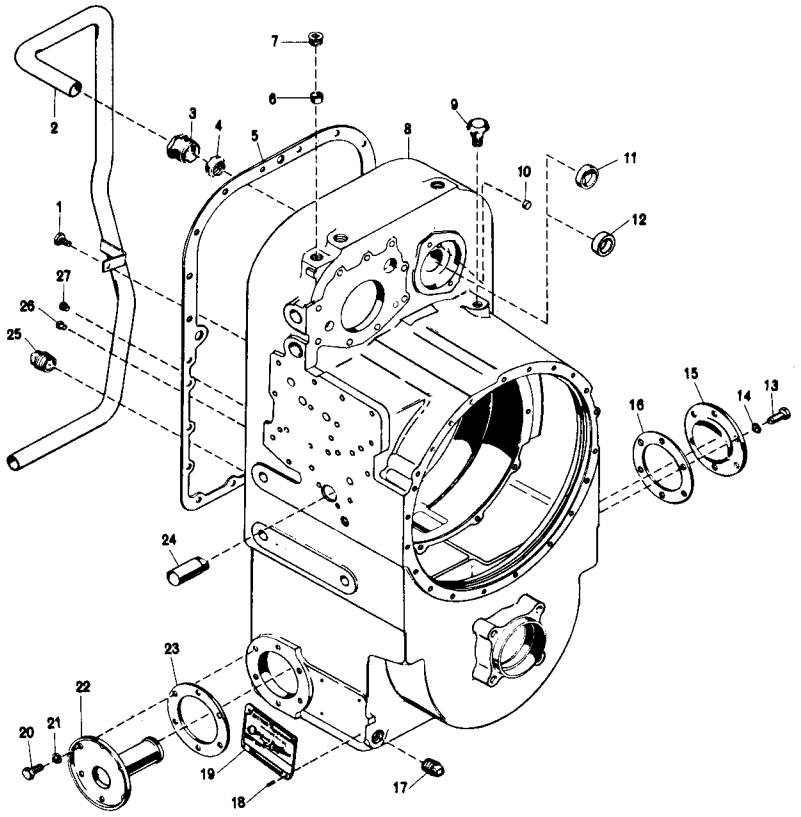
TRT 2211-3, 2411-3, 2221-3
AND 2421-3 MODELS
CONT'D ON A, FOLDOUT 8

TRT 2221-1 AND 2421-1 MODELS
CONT'D ON B, FOLDOUT 7

6622B

A, foldout 7. Turbine driven gears and freewheel unit—exploded view

B



TRT 2221-1 AND 2421-1 MODELS
CONT'D ON B, FOLDOUT 8

6382C

B, foldout 7. Transmission housing (-1 model)—exploded view

A

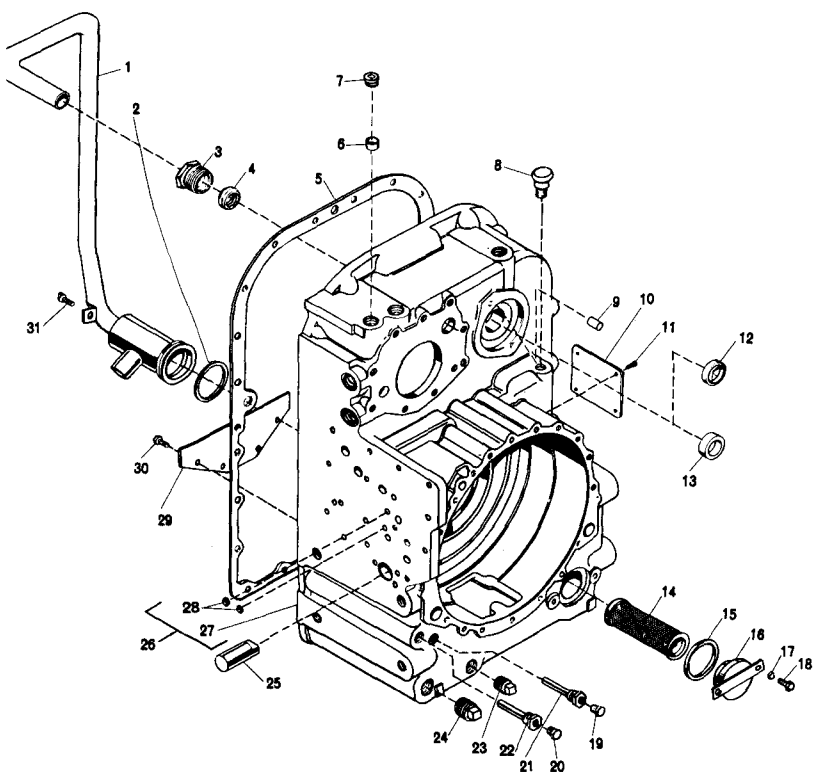
1 - Oil suction tube
2 - Sealring
3 - Male nut, 1 3/4-14
4 - Sealring
5 - Transmission housing gasket
6 - Remote filter plug
7 - Plug, 3/4-14 NPTF
8 - Breather
9 - Cup plug
10 - Nameplate
11 - Drive screw, no. 4 x 1/4 (4)
12 - Accessory drive cup plug
13 - Oil seal
14 - Oil strainer
15 - Sealring
16 - Oil strainer cover
17 - Lockwasher, 3/8 (2)
18 - Bolt, 3/8-16 x 3/4 (2)
19 - Oil level add plug
20 - Oil level full plug
21 - Oil level tube
22 - Oil level tube
23 - Oil drain plug, 3/4 NPTF
24 - Oil filler plug
25 - Anchor pin
26 - Transmission housing assembly
27 - Transmission housing
28 - Plug (2)
29 - Baffle plate
30 - Self-locking bolt, 5/16-18 x 5/8 (3)
31 - Self-locking bolt, 5/16-18 x 5/8

B

1 - Piston sealring
2 - Piston sealring
3 - Piston sealring
4 - Reverse clutch piston
5 - External-tanged clutch plate (4)
6 - Internal-splined clutch plate (4)
7 - Spacer
8 - Reverse planetary carrier assembly
9 - Thrust washer (4)
10 - Pinion (matched set of 4)
11 - Roller (88)
12 - Thrust washer (4)
13 - Spindle (4)
14 - Reverse planetary carrier
15 - Forward and reverse sun gear
16 - External-tanged clutch plate
17 - Internal-splined clutch plate
18 - Forward and reverse clutch anchor assembly
19 - Anchor
20 - Pin (6)
21 - Piston return spring (12)
22 - Return spring pin (12)

A

TRT 2211-3, 2411-3, 2221-3 and 2421-3 models cont'd on B, foldout 8

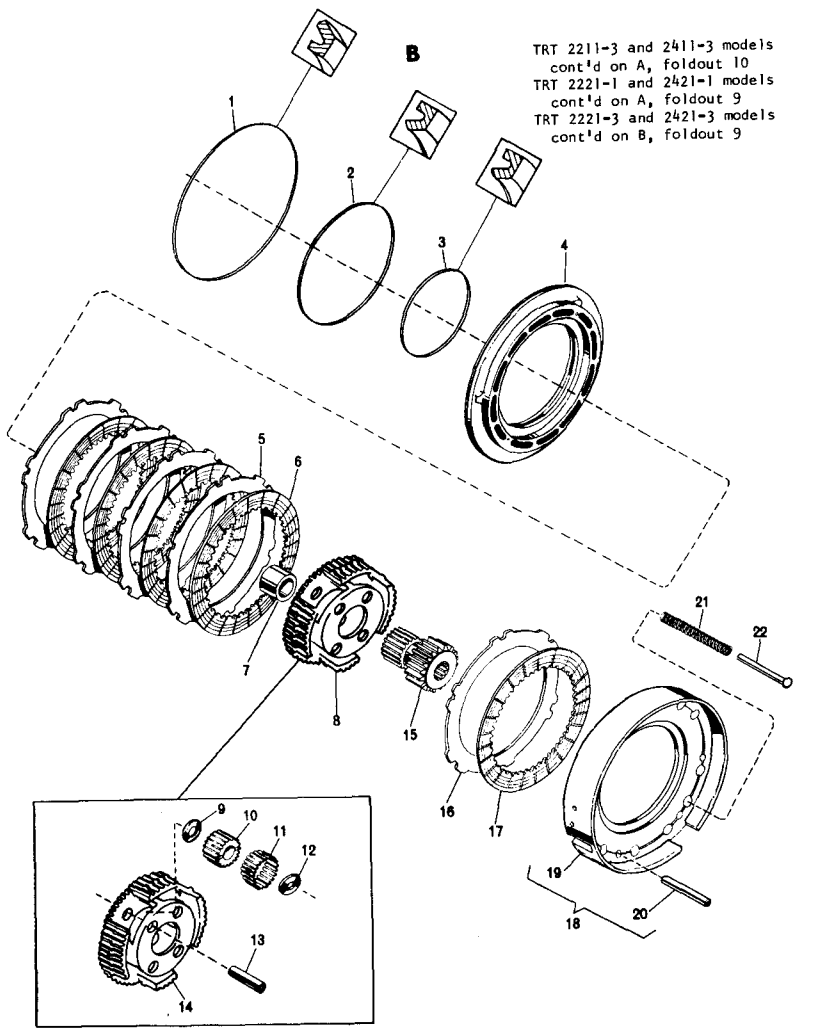


8187A

A, foldout 8. Transmission housing (-3 model)—exploded view

B

TRT 2211-3 and 2411-3 models cont'd on A, foldout 10
TRT 2221-1 and 2421-1 models cont'd on A, foldout 9
TRT 2221-3 and 2421-3 models cont'd on B, foldout 9



9798

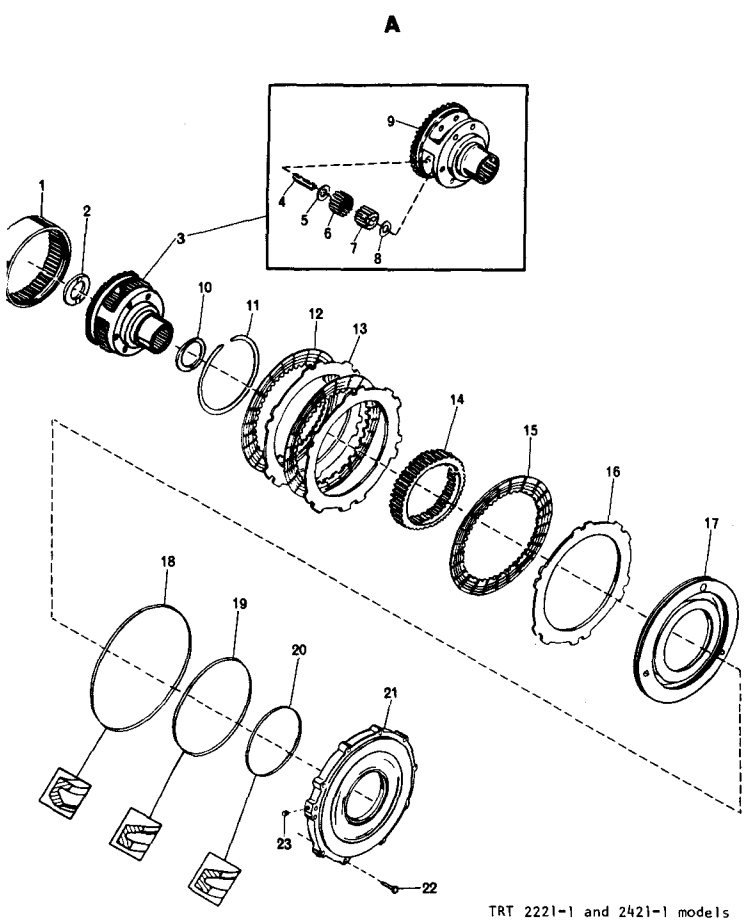
B, foldout 8. Reverse clutch and planetary—exploded view

A

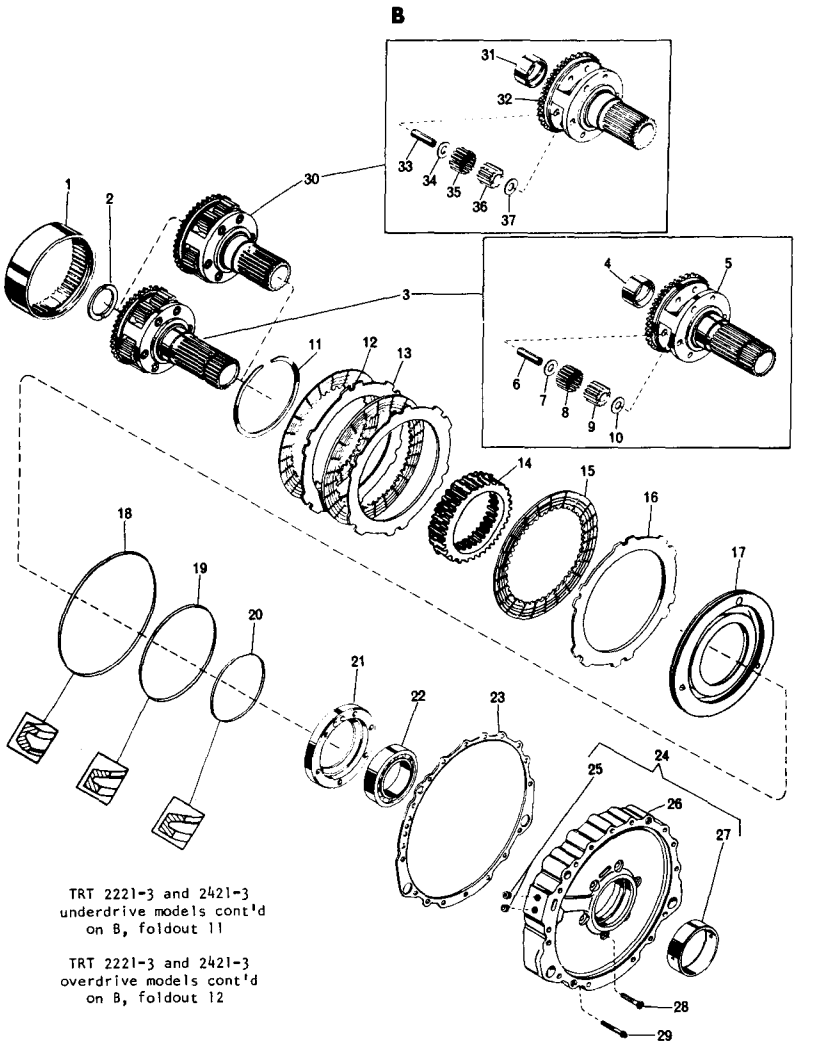
1 - Reverse planetary ring gear
2 - Thrust washer
3 - Forward planetary carrier assembly
4 - Spindle (6)
5 - Thrust washer (6)
6 - Roller (120)
7 - Pinion (matched set of 6)
8 - Thrust washer (6)
9 - Carrier
10 - Thrust washer
11 - Internal snapring
12 - Internal-splined clutch plate (2)
13 - External-tanged clutch plate (2)
14 - Forward planetary ring gear
15 - Internal-splined clutch plate
16 - External-tanged clutch plate
17 - Forward clutch piston
18 - Piston sealring
19 - Piston sealring
20 - Piston sealring
21 - Forward clutch piston housing
22 - Self-locking bolt, 3/8-16 x 1 1/2 (10)
23 - Plug, 1/8

B

1 - Reverse planetary ring gear
2 - Thrust washer
3 - Forward planetary carrier assembly (underdrive model)
4 - Bushing
5 - Carrier
6 - Spindle (6)
7 - Thrust washer (6)
8 - Roller (120)
9 - Pinion (matched set of six)
10 - Thrust washer (6)
11 - Internal snapring
12 - Internal-splined clutch plate (2)
13 - External-tanged clutch plate (2)
14 - Forward planetary ring gear
15 - Internal-splined clutch plate
16 - External-tanged clutch plate
17 - Forward clutch piston
18 - Piston sealring
19 - Piston sealring
20 - Piston sealring
21 - Bearing retainer
22 - Ball bearing
23 - Adapter gasket
24 - Adapter assembly
25 - Plug, 1/4 (2)
26 - Adapter
27 - Sleeve
28 - Self-locking bolt, 3/8-24 x 1 1/4 (6)
29 - Twelve-point bolt, 3/8-16 x 1 3/4 (2)
30 - Forward planetary carrier assembly (overdrive model)
31 - Bushing
32 - Carrier
33 - Spindle (6)
34 - Thrust washer (6)
35 - Roller (120)
36 - Pinion (matched set of six)
37 - Thrust washer (6)



A, foldout 9. Forward clutch and planetary (-1 model)—exploded view



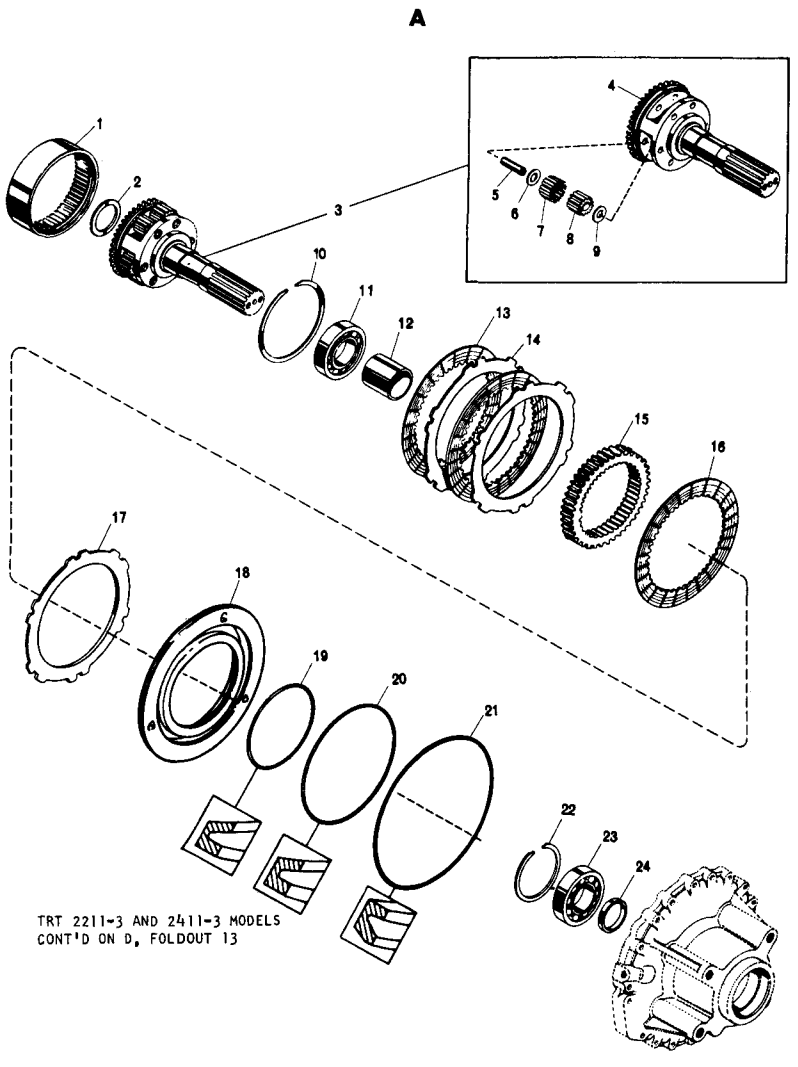
B, foldout 9. Forward clutch and planetary (TRT 2221-3, 2121-3)—exploded view

A

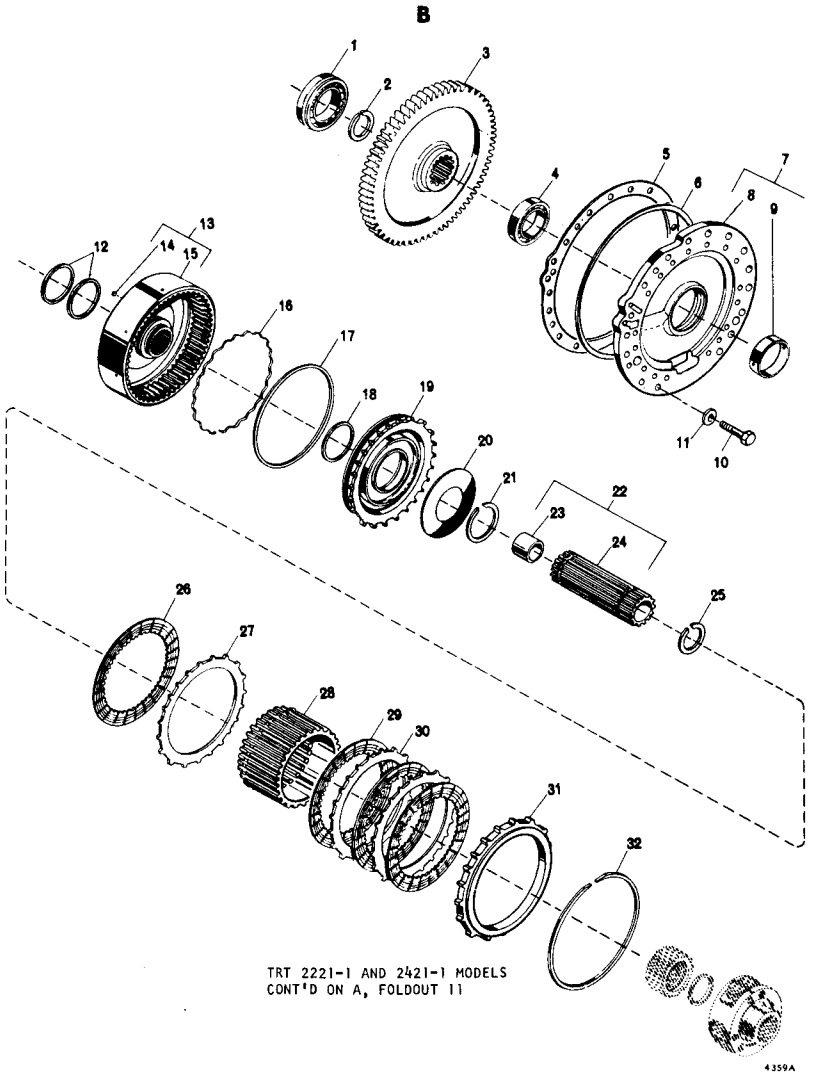
1 - Reverse planetary ring gear
2 - Thrust washer
3 - Forward planetary carrier assembly
4 - Carrier
5 - Spindle (6)
6 - Thrust washer (6)
7 - Roller (120)
8 - Pinion (matched set of six)
9 - Thrust washer (6)
10 - Internal snapring
11 - Ball bearing
12 - Spacer
13 - Internal-splined clutch plate (2)
14 - External-tanged clutch plate (2)
15 - Forward planetary ring gear
16 - Internal-splined clutch plate
17 - External-tanged clutch plate
18 - Forward clutch piston
19 - Piston sealring
20 - Piston sealring
21 - Piston sealring
22 - Internal snapring
23 - Ball bearing
24 - Spacer

B

1 - Ball bearing
2 - External snapring
3 - Transfer drive gear
4 - Ball bearing
5 - Adapter gasket
6 - Adapter sealring
7 - Adapter assembly
8 - Adapter
9 - Sleeve
10 - Bolt, 3/8-16 x 1 1/8 (16)
11 - Lockwasher, 3/8 (16)
12 - Sealring (2)
13 - Low-range clutch drum assembly
14 - Pin (4)
15 - Clutch drum
16 - Sealring expander
17 - Clutch piston outer sealring
18 - Clutch piston inner sealring
19 - Low-range clutch piston
20 - Clutch piston return spring
21 - External snapring
22 - Sleeve assembly
23 - Bushing
24 - Sleeve
25 - External snapring
26 - Internal-splined clutch plate
27 - External-splined clutch plate
28 - High-range clutch ring gear
29 - Internal-splined clutch plate (3)
30 - External-splined clutch plate (2)
31 - Low-range clutch back plate
32 - Internal snapring



A, foldout 10. Forward clutch and planetary (TRT 2211-3, 2411-3)—exploded view



B, foldout 10. Low-range clutch and transfer drive gear (-1 model)—exploded view

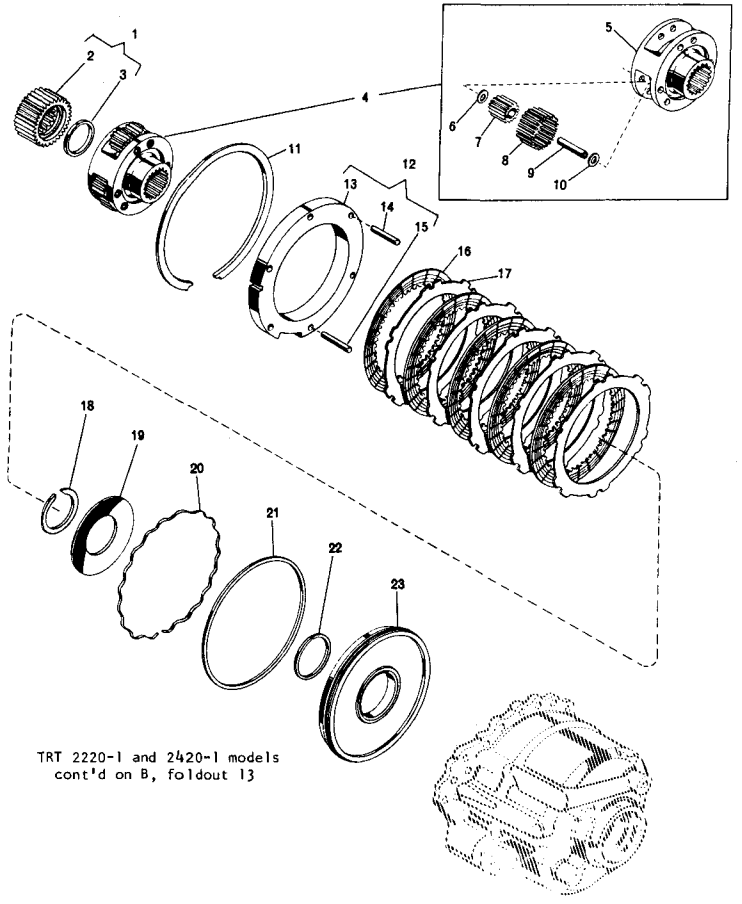
A

1 - High-range planetary carrier sun gear assembly
2 - Sun gear
3 - Thrust washer
4 - High-range planetary carrier assembly
5 - Carrier
6 - Thrust washer (6)
7 - Pinion (matched set of six pinions)
8 - Roller (96)
9 - Spindle (6)
10 - Thrust washer (6)
11 - Internal snapring
12 - High-range clutch anchor assembly
13 - Anchor
14 - Pin (short) (4)
15 - Pin (long) (2)
16 - Internal-splined clutch plate (5)
17 - External-tanged clutch plate (5)
18 - External snapring
19 - Clutch piston return spring
20 - Sealring expander
21 - Clutch piston outer sealring
22 - Clutch piston inner sealring
23 - High-range clutch piston

B

1 - Sealring (2)
2 - High-range clutch drum assembly
3 - Pin (4)
4 - Clutch drum
5 - Sealring expander
6 - Clutch piston outer sealring
7 - Clutch piston inner sealring
8 - High-range clutch piston
9 - Clutch piston return spring
10 - External snapring
11 - External snapring
12 - Internal-splined clutch plate
13 - External-splined clutch plate
14 - Low-range clutch ring gear
15 - Internal-splined clutch plate (2)
16 - External-splined clutch plate
17 - High-range clutch back plate
18 - Internal snapring

A

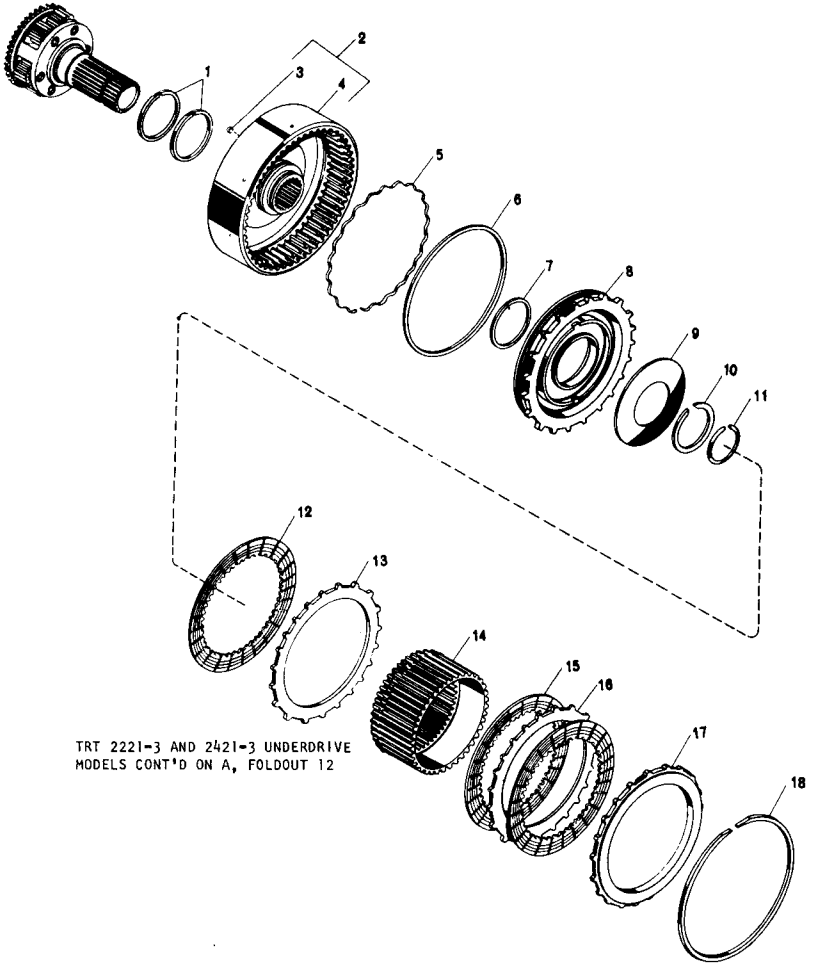


TRT 2220-1 and 2420-1 models
cont'd on B, foldout 13

4357

A, foldout 11. High-range clutch and planetary (-1 model)—exploded view

B



TRT 2221-3 AND 2421-3 UNDERDRIVE
MODELS CONT'D ON A, FOLDOUT 12

4295A

B, foldout 11. High-range clutch, low-range ring gear (TRT 2221-3, 2421-3 underdrive model)—exploded view

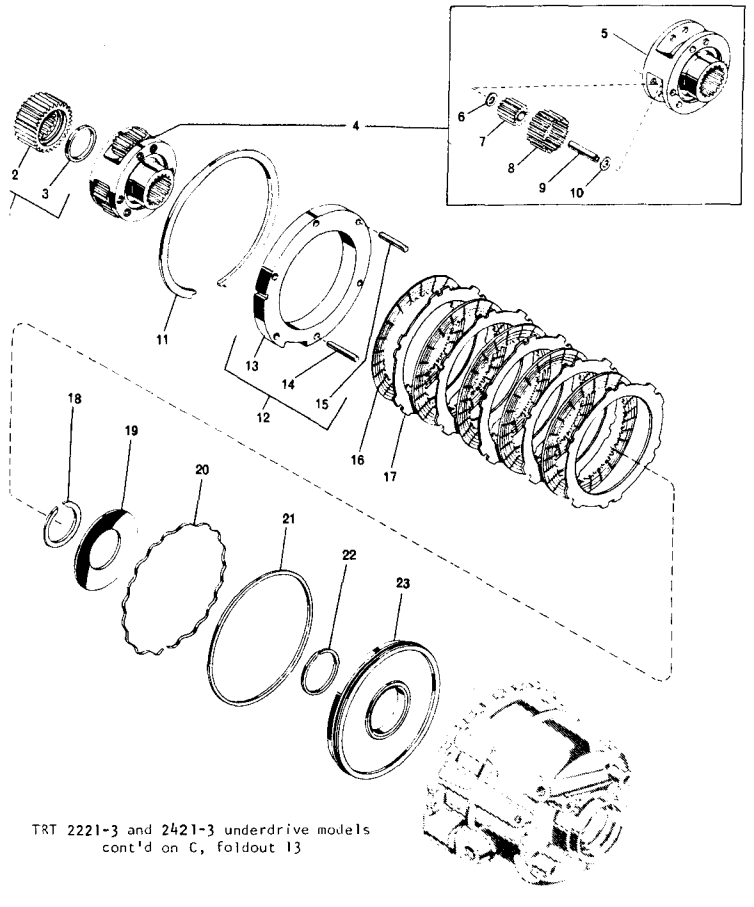
A

1 - Low-range planetary carrier sun gear assembly
2 - Sun gear
3 - Thrust washer
4 - Low-range planetary carrier assembly
5 - Carrier
6 - Thrust washer (6)
7 - Pinion (matched set of six pinions)
8 - Roller (96)
9 - Spindle (6)
10 - Thrust washer (6)
11 - Internal snapring
12 - Low-range clutch anchor assembly
13 - Anchor
14 - Pin (long) (2)
15 - Pin (short) (4)
16 - Internal-splined clutch plate (5)
17 - External-tanged clutch plate (5)
18 - External snapring
19 - Clutch piston return spring
20 - Sealring expander
21 - Clutch piston outer sealring
22 - Clutch piston inner sealring
23 - Low-range clutch piston

B

1 - Sealring (2)
2 - Low-range clutch drum assembly
3 - Pin (4)
4 - Clutch drum
5 - Sealring expander
6 - Clutch piston outer sealring
7 - Clutch piston inner sealring
8 - Low-range clutch piston
9 - Clutch piston return spring
10 - External snapring
11 - External snapring
12 - Bearing front thrust race
13 - Roller thrust race
14 - Bearing rear thrust race
15 - Low-range clutch hub
16 - Internal-splined clutch plate (5)
17 - External-splined clutch plate (4)
18 - High-range planetary carrier assembly
19 - Carrier
20 - Spindle (6)
21 - Thrust washer (6)
22 - Roller (120)
23 - Pinion (matched set of six pinions)
24 - Thrust washer (6)
25 - Internal snapring

A

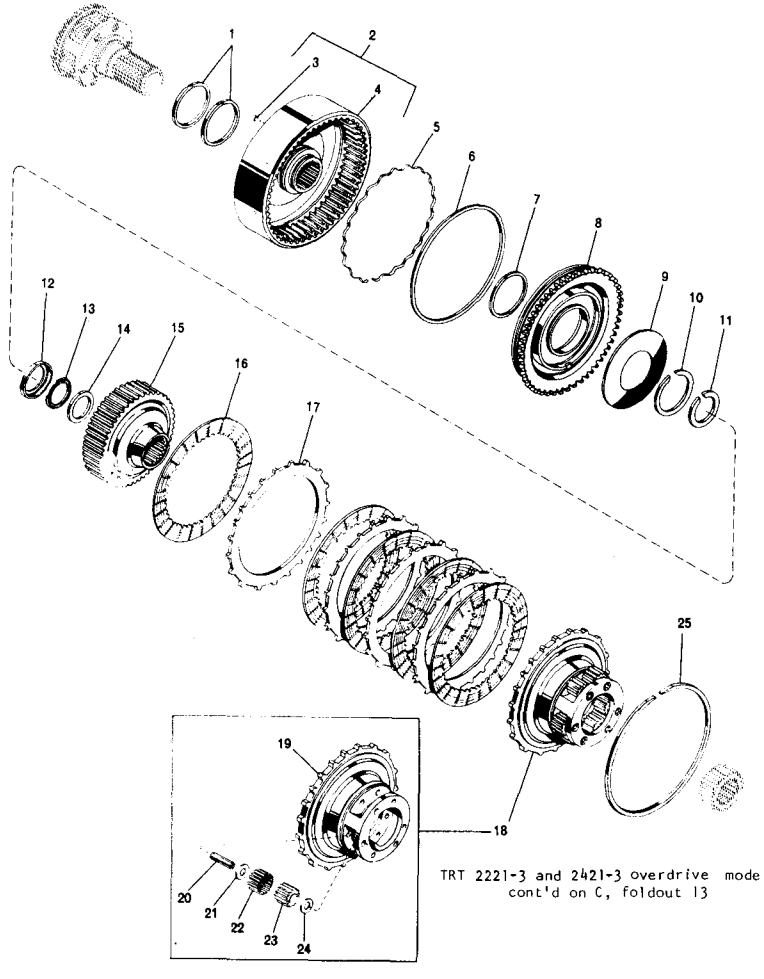


TRT 2221-3 and 2421-3 underdrive models
cont'd on C, foldout 13

4358A

A, foldout 12. Low-range clutch and planetary (-3 underdrive model)—exploded view

B



TRT 2221-3 and 2421-3 overdrive models
cont'd on C, foldout 13

4297

B, foldout 12. Low-range clutch, high-range planetary (-3 overdrive model)—exploded view

A

1 - High-range planetary sun gear
2 - Internal snapring
3 - High-range clutch anchor assembly
4 - Anchor
5 - Pin (long) (2)
6 - Pin (short) (4)
7 - Internal-splined clutch plate (2)
8 - External-tanged clutch plate (2)
9 - High-range planetary ring gear
10 - Internal-splined clutch plate
11 - External-tanged clutch plate
12 - External snapring
13 - Clutch piston return spring
14 - Sealring expander
15 - Clutch piston outer sealring
16 - Clutch piston inner sealring
17 - High-range clutch piston

B

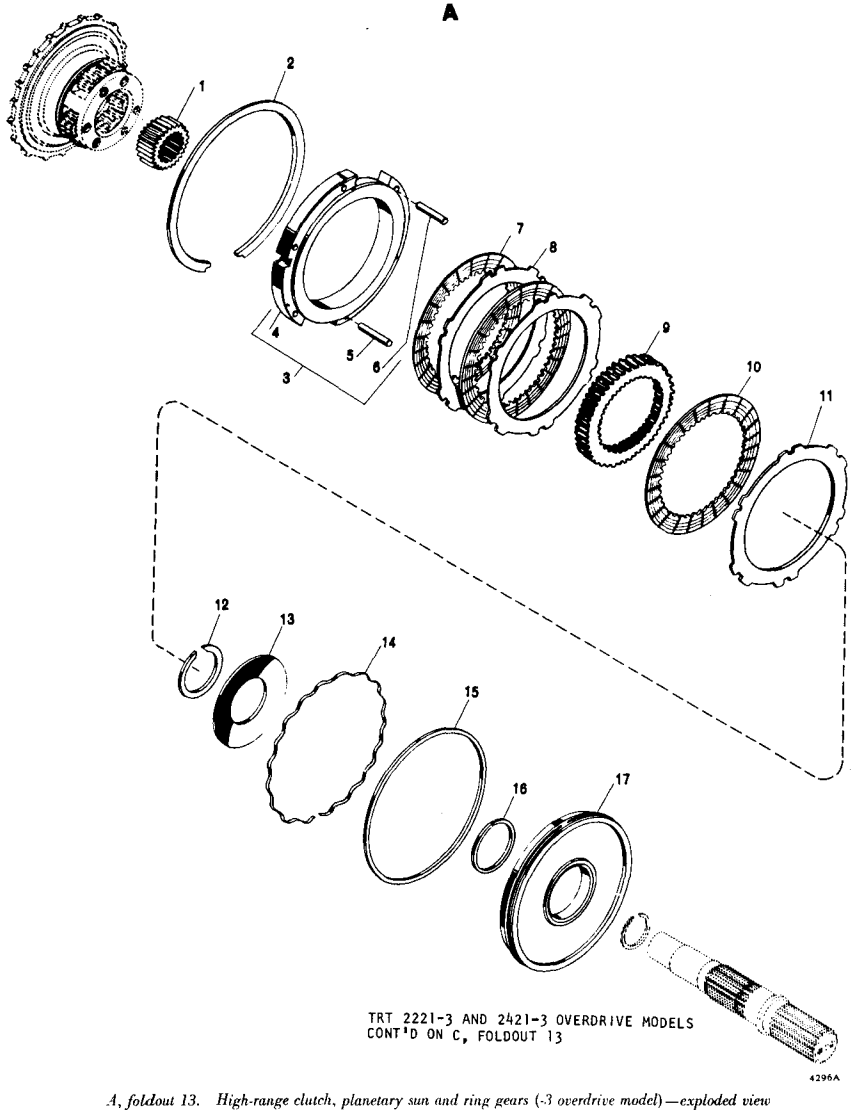
1 - Rear housing gasket
2 - Rear housing
3 - Lockwasher, 3/8 (17)
4 - Bolt, 3/8-16 x 1 1/8 (17)
5 - High- and low-range input shaft
6 - Rear bearing
7 - External snapring
8 - Internal snapring
9 - Sealring
10 - Oil retainer
11 - Internal snapring
12 - Clutch anchor pin
13 - Welch plug
14 - Plug, 1/4
15 - Bolt, 3/8-16 x 1 1/2 (3)
16 - Lockwasher, 3/8 (3)

C

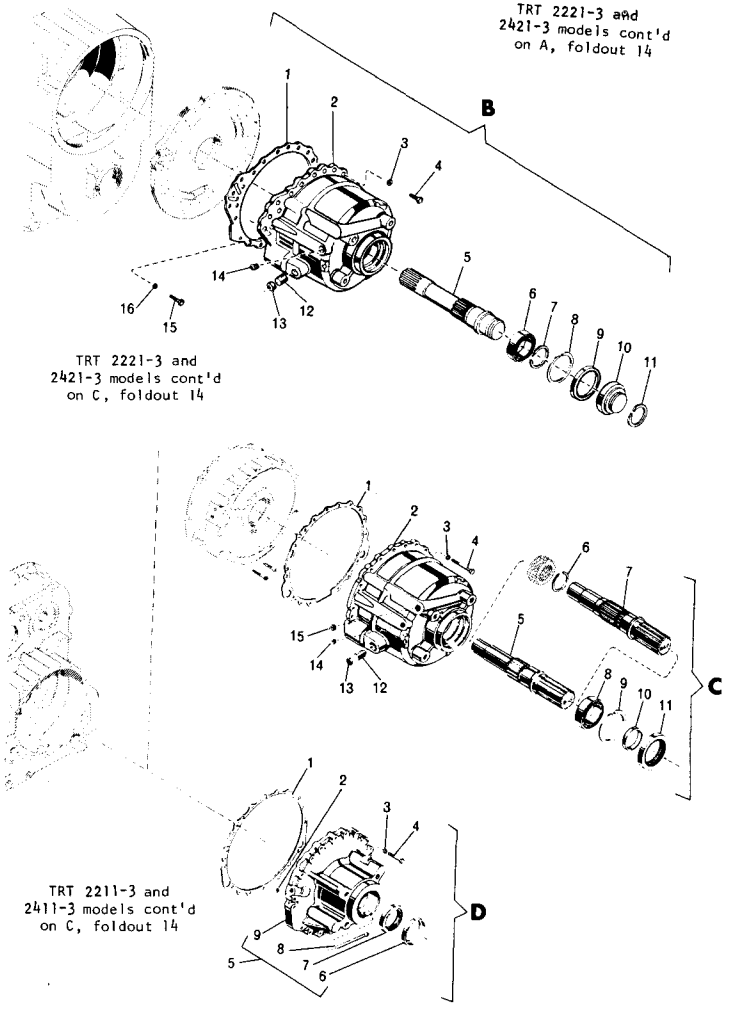
1 - Rear housing gasket
2 - Rear housing
3 - Lockwasher, 3/8 (15)
4 - Bolt, 3/8-16 x 2 3/4 (15)
5 - Output shaft (underdrive models)
6 - External snapring
7 - Output shaft (overdrive models)
8 - Rear bearing
9 - Internal snapring
10 - Spacer
11 - Oil seal
12 - Clutch anchor pin
13 - Welch plug
14 - Plug, 1/4
15 - Plug, 3/8

D

1 - Rear housing gasket
2 - Plug, 1/8
3 - Lockwasher, 3/8 (18)
4 - Bolt, 3/8-16 x 1 3/4 (18)
5 - Rear housing assembly
6 - Baffle
7 - Oil seal
8 - Oil drain tube
9 - Rear housing



A, foldout 13. High-range clutch, planetary sun and ring gears (-3 overdrive model)—exploded view



B, C, D, foldout 13. Rear housings and output shafts

A

1 - Flange nut
2 - Flange washer
3 - Front output flange
4 - Oil seal
5 - Internal snapring
6 - Front bearing
*7 - Output shaft
**8 - Front output shaft
**9 - Detent ball (2)
**10 - Detent spring
**11 - Disconnect coupling
*12 - Welch plug
**13 - Oil seal
**14 - Disconnect shaft
**15 - Disconnect shifter fork
**16 - Center bearing
**17 - Spacer
18 - Transfer driven gear
**19 - Rear output shaft assembly
**20 - Bushing
**21 - Rear output shaft
22 - Spacer
23 - Rear bearing
**24 - Internal snapring
25 - Oil seal
26 - Spacer
27 - Front output orifice plug

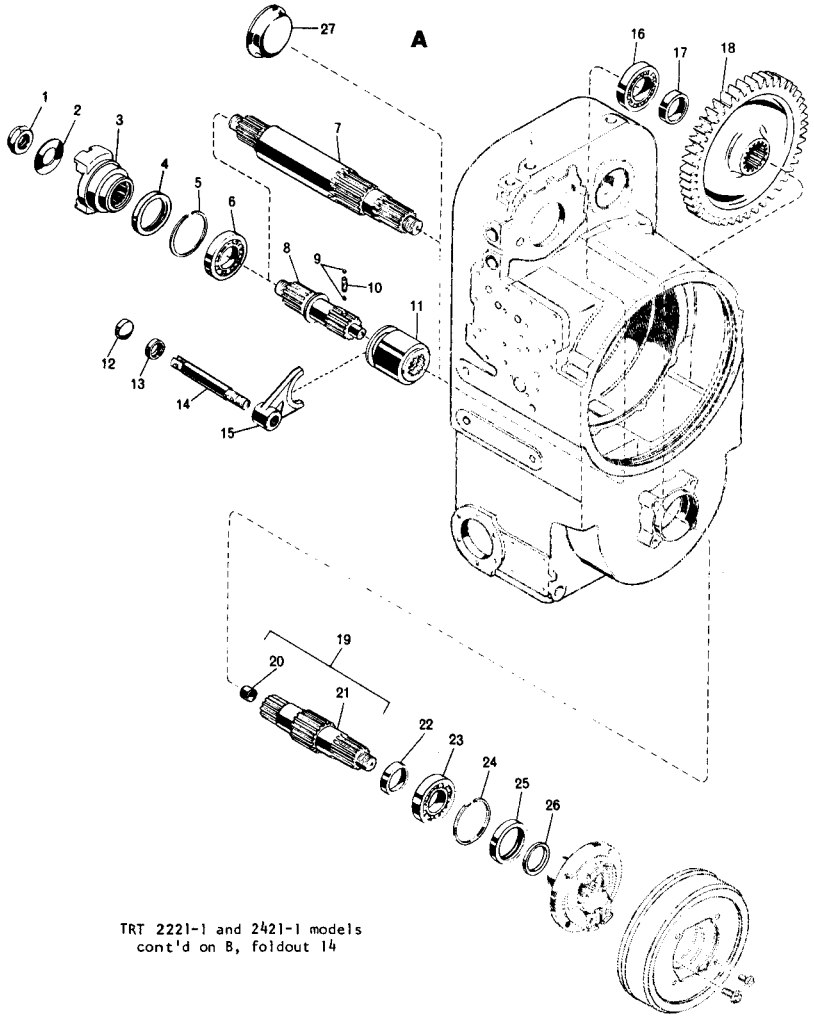
*Used only on models without output disconnect
**Used only on models with output disconnect

B

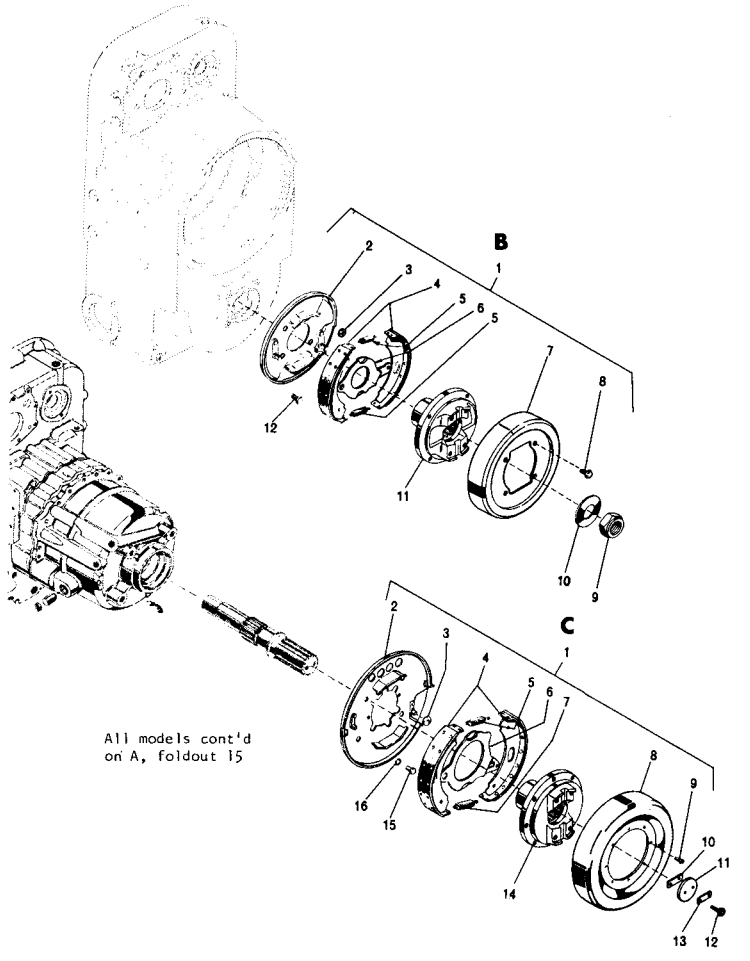
1 - Brake assembly (10 x 1 1/2)
2 - Back plate
3 - Roller
4 - Shoe assembly (2)
5 - Spring (2)
6 - Apply lever
7 - Brake drum
8 - Self-locking bolt, 3/8-24 x 5/8 (4)
9 - Flange nut
10 - Flange washer
11 - Output flange
12 - Self-locking bolt, 1/2-13 x 7/8 (4)

C

1 - Brake assembly (13 x 2 3/8)
2 - Back plate assembly
3 - Roller
4 - Shoe assembly (2)
5 - Spring
6 - Apply lever
7 - Spring
8 - Brake drum
9 - Self-locking bolt, 3/8-24 x 3/4 (8)
10 - Shim, 0.005 and 0.025 thk (AR)
11 - Flange washer
12 - Self-locking bolt, 3/8-24 x 1 1/2 (2) (TRT 2211-3 and 2411-3); Self-locking bolt, 1/2-20 x 1 1/4 (2) (TRT 2221-3 and 2421-3)
13 - Lockstrip
14 - Output flange
15 - Bolt, 5/8-11 x 1 1/4 (3)
16 - Lockwasher, 5/8 (3)



A, foldout 14. Output shafts, transfer driven gear and disconnect control (-1 model)—exploded view



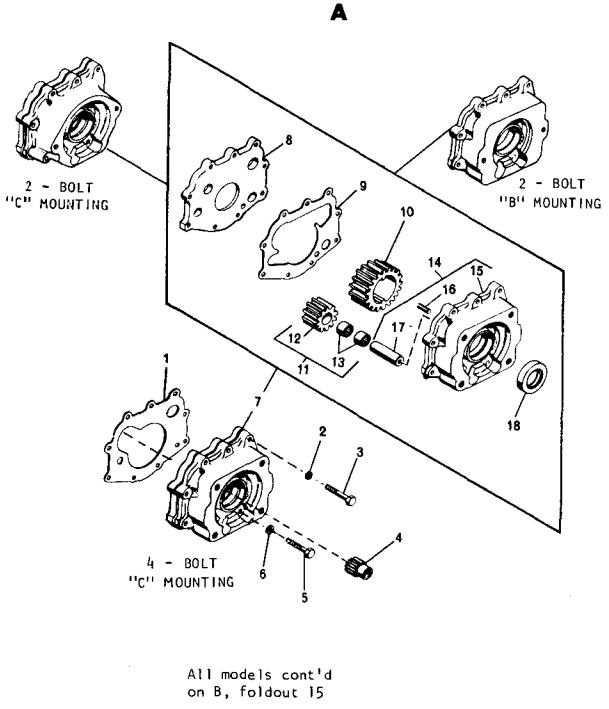
B, C, foldout 14. Brake assemblies—exploded view

A

1 - Oil pump mounting gasket
2 - Lockwasher, 3/8 (7)
3 - Bolt, 3/8-16 x 2
    4-bolt, C pad (7)
    2-bolt, B pad (7)
    2-bolt, C pad (6)
4 - Adapter coupling
5 - Bolt, 3/8-16 x 3
    4-bolt, C pad (2)
    2-bolt, B pad (2)
    2-bolt, C pad (3)
6 - Lockwasher, 3/8 (2)
7 - Oil pump assembly
8 - Cover
9 - Cover gasket
10 - Drive gear
11 - Driven gear assembly
12 - Driven gear
13 - Needle bearing assembly (2)
14 - Oil pump body assembly
15 - Body
16 - Dowel pin
17 - Driven gear shaft
18 - Oil seal

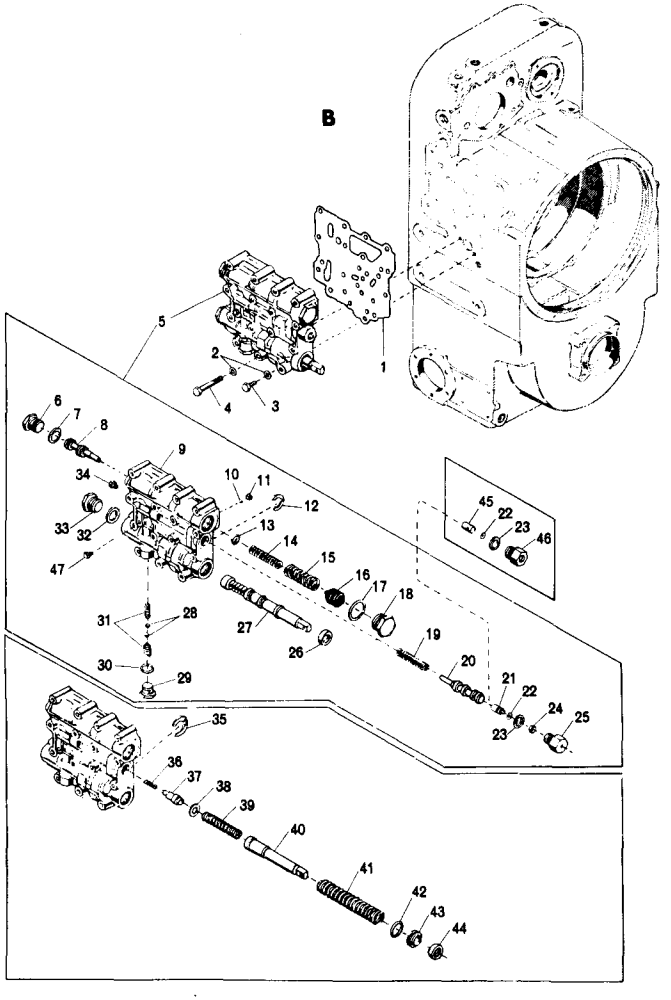
B

1 - Valve body mounting gasket
2 - Lockwasher, 3/8 (16)
3 - Bolt, 3/8-16 x 1
4 - Bolt, 3/8-16 x 2 1/2 (15)
5 - Control valve assembly
6 - Plug
7 - Gasket
8 - Main-pressure regulator valve
9 - Valve body
10 - Ball
11 - Ball retainer
12 - Valve stop (1) in TRT 2221-1, 2421-1, 2221-3 and 2421-3 models; (2) in TRT 2211-3 and 2411-3 models
13 - Spring retainer
14 - Main-pressure regulator spring
15 - Trimmer spring
16 - Trimmer plug
17 - Gasket
18 - Plug
19 - Clutch cutoff valve spring
20 - Clutch cutoff valve
21 - Cutoff valve plug (hydraulic actuated)
22 - Sealring
23 - Gasket
24 - Cup (hydraulic actuated)
25 - Retainer plug (hydraulic actuated)
26 - Oil seal
27 - Manual selector valve
28 - Detent ball (2)
29 - Plug
30 - Gasket
31 - Detent spring (2)
32 - Gasket
33 - Plug
34 - Plug, 1/8
35 - Inching valve stop
36 - Spring
37 - Inching regulator valve
38 - Regulator valve stop
39 - Inching regulator valve spring
40 - Inching control valve
41 - Valve return spring
42 - Sealring
43 - Plug
44 - Oil seal
45 - Cutoff valve plug (air actuated)
46 - Retainer plug (air actuated)
47 - Plug



5269

A, foldout 15. Oil pump assembly—exploded view



63751B

B, foldout 15. Valve body assembly—exploded view