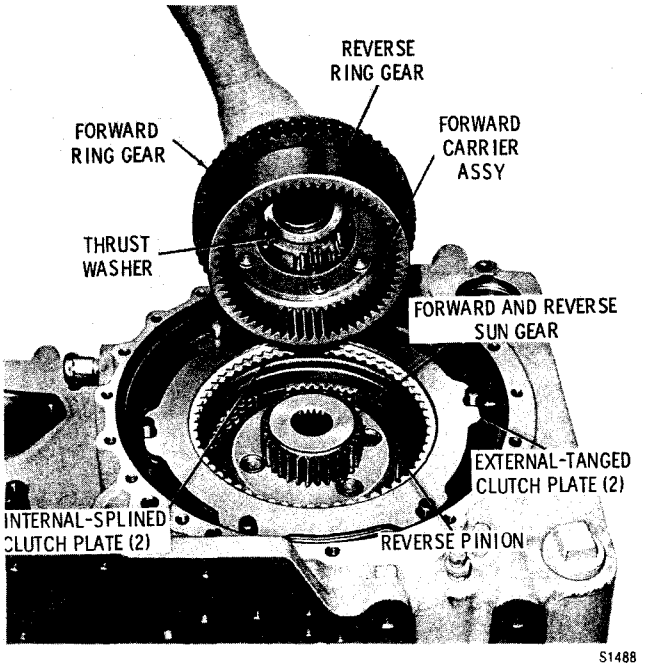


Fig. 7-61. Installing forward planetary carrier assembly and attached parts (TRT-3 overdrive)

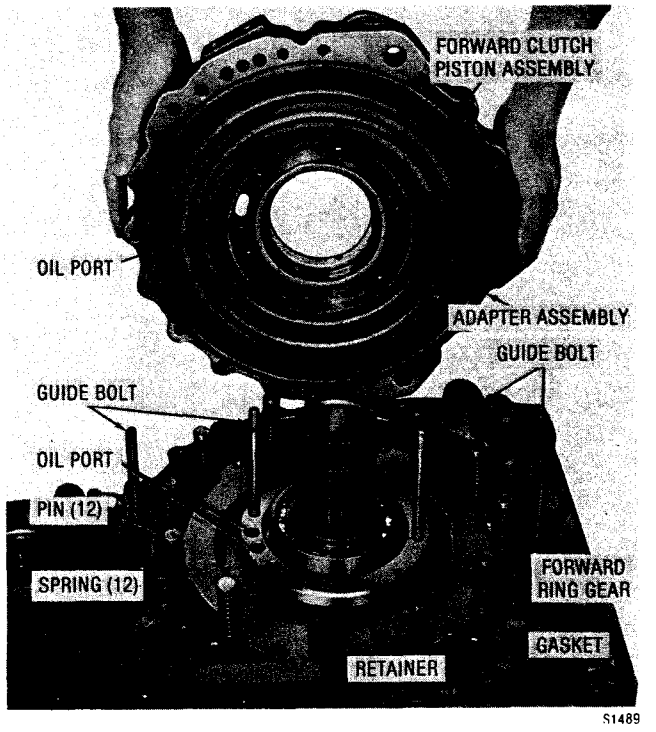


Fig. 7-62. Installing rear housing adapter assembly (TRT-3 underdrive)

(3) Install ring gear 1 (foldout 10,B) onto carrier assembly 3. Retain it with snap-ring 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. 7-61).

(6) Install the forward carrier assembly and attached parts (fig. 7-61). 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. 7-62).

(8) Install twelve clutch piston return springs and pins (fig. 7-62). Install the adapter gasket.

(9) Install headless guide bolts into the retainer and transmission housing as shown in figure 7-62.

(10) Install the forward clutch piston, with sealrings, flat side first, into the adapter assembly (fig. 7-62).

(11) Install the adapter assembly, aligning the oil ports in the retainer and adapter (fig. 7-62).

(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. 7-63). Tighten the bolts to 36-43 lb ft (49-58 N·m).

(13) Remove the two outer guide bolts and 3/8-16 x 2-3/4-inch pulldown bolts which were temporarily installed in step (12). Install the six 3/8-24 x 1-1/4-inch, self-locking bolts 28 (foldout 10,B) into the inner bolt circle. (Remove the inner guide bolts to install the last two self-locking bolts.) Tighten the bolts to 41-49 lb ft (56-66 N·m).

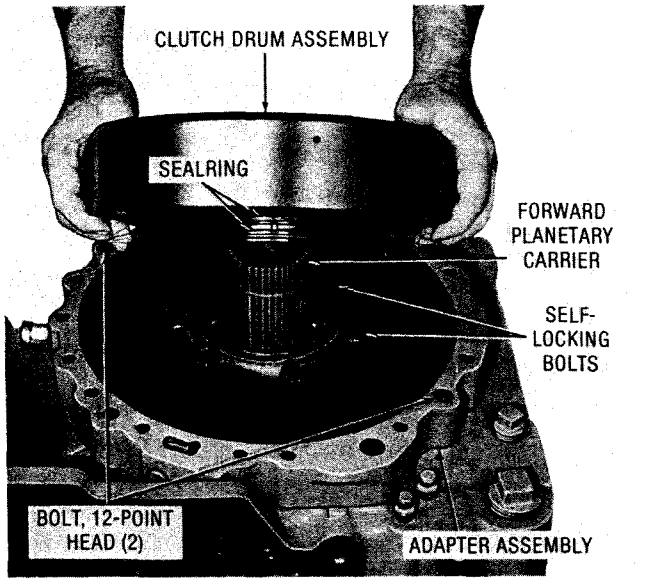


Fig. 7-63. Installing high-range clutch drum assembly (TRT-3 underdrive)

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

NOTE

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

(1) Install two step-joint sealrings 1 (foldout 13,A) into the grooves in the hub of the high-range clutch drum assembly (fig. 7-63). Use oil-soluble grease to retain the sealrings.

(2) Install the high-range clutch drum assembly onto the forward planetary carrier (fig. 7-63).

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

(4) Install low-range planetary sun gear assembly 1 (foldout 13,B), thrust washer 3 upward, onto the forward planetary carrier.

(5) Install one internal-splined clutch plate (fig. 7-64). Install the low-range planetary carrier assembly.

(6) Install the low-range ring gear, positioning ring first, into the clutch plate installed in step (5) (fig. 7-65).

(7) Install two external-splined and two internal-splined, low-range clutch plates, stacked alternately as shown in figure 7-65.

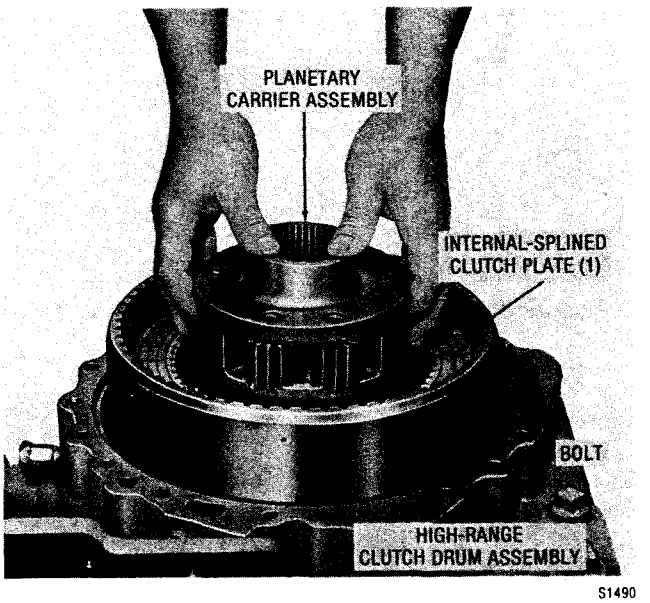


Fig. 7-64. Installing low-range planetary carrier assembly (TRT-3 underdrive)

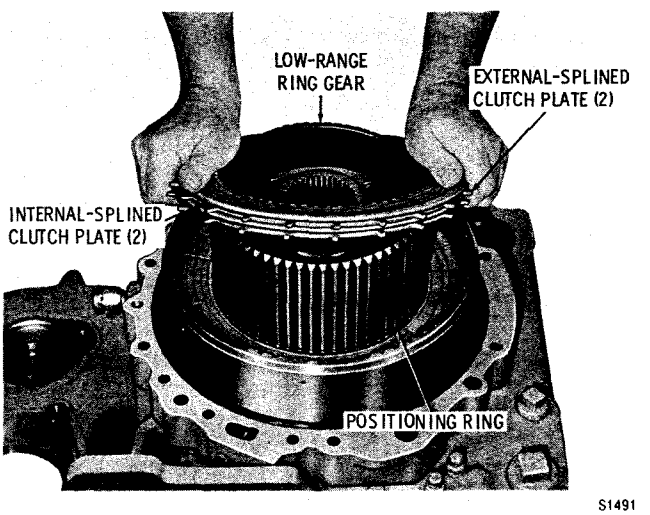


Fig. 7-65. Installing high-range clutch plates (TRT-3 underdrive)

(8) Install high-range clutch backplate 17 (foldout 13,A), flat side first. Retain it with large internal snapring 18.

g. Low-Range Clutch, Rear Housing Assembly (TRT 2221-3, 2421-3 underdrive models)

(1) Install the clutch anchor pin into the rear housing (as rebuilt in paragraph 6-11). Leave the flat-milled end of the pin extending at the inside of the housing (fig. 7-66).

(2) 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. 7-66).

(3) 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. 7-66).

(4) 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 (refer to fig. 7-59).

(5) Suspend the assembled housing on a hoist and install the rear housing gasket. Use oil-soluble grease to retain the gasket (fig. 7-67).

(6) Install the rear housing assembly onto the adapter assembly (fig. 7-67). To align gear teeth and clutch plate splines, rotate the output shaft while lowering the assembly.

(7) Install fifteen 3/8-16 x 2-3/4-inch bolts 4 (foldout 16,B) and lockwashers 3 to retain the rear housing and adapter. Tighten the bolts to 26-32 lb ft (36-43 N·m).

(8) Proceed to paragraph 7-10.

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

(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. 7-68).

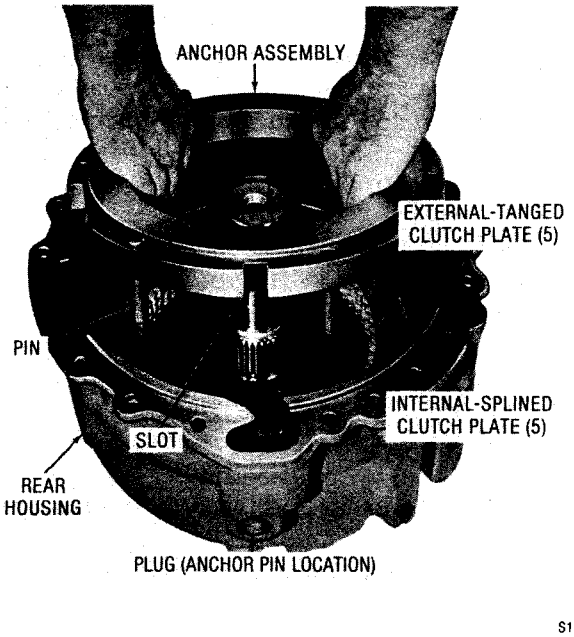


Fig. 7-66. Installing low-range clutch anchor assembly (TRT-3 underdrive)

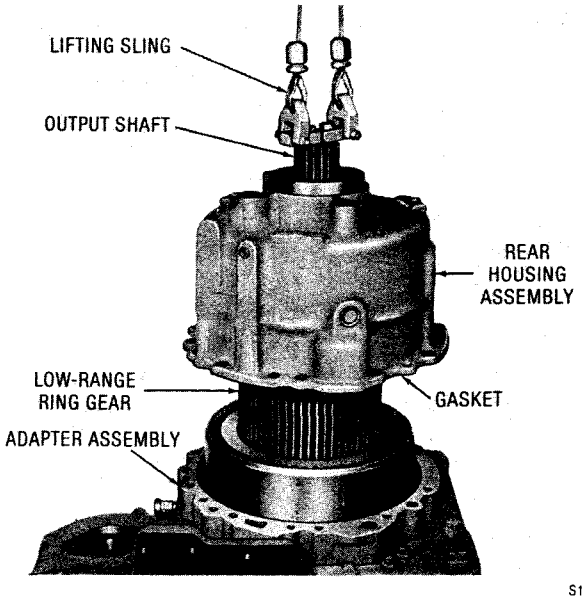


Fig. 7-67. Installing rear housing assembly (TRT-3 underdrive)

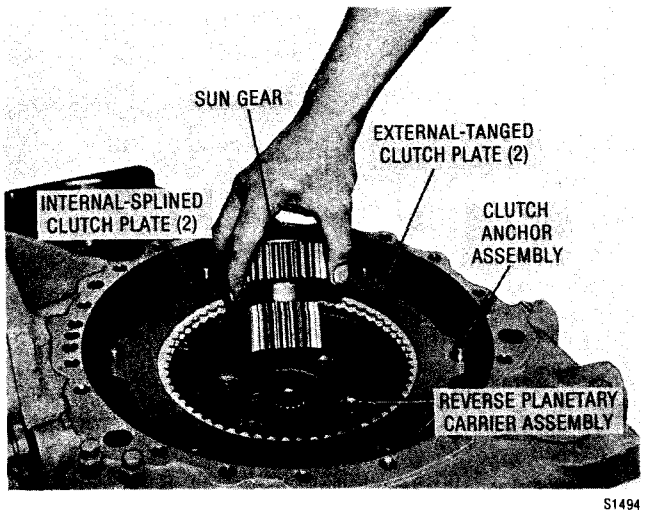


Fig. 7-68. Installing forward-and-reverse sun gear (TRT 2211-3, 2411-3)

(2) Install the forward-and-reverse sun gear into the reverse planetary carrier assembly (fig. 7-68).

(3) Install reverse ring gear 1 (foldout 11,A) 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 steps (3) through (6) 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 piston return springs 22 (foldout 9,B) and twelve pins 23 into the circle of holes in the forward-and-reverse clutch anchor assembly.

(10) Install forward clutch piston 18 (foldout 11,A), with sealrings 19, 20, and 21, into housing 9 (foldout 16,C).

(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 26-32 lb ft (36-43 N·m).

7-10. INSTALLATION OF TURBINE GEARING, OIL SUCTION TUBE, AND STRAINER

a. Accessory Drive Shaft Assembly

(1) If removed, install bearing 9 (foldout 7,B) onto drive shaft 8 and seat the bearing firmly against the shaft shoulder. Apply Molykote Type G or equivalent into the drive splines of the shaft.

(2) Install the accessory drive shaft and bearing into the transmission housing (fig. 7-69).

b. Turbine Gears, Freewheel Clutch

(1) If the transmission is equipped with a standard-speed, low-gear ratio, proceed to step (2). If the transmissions is equipped with a high-speed, forward-gear ratio, proceed to step (3).

(2) Install the forward-and-reverse sun gear, as shown in figure 7-69. Proceed to step (5).

(3) Install the spacer into the sun gear cavity in the housing wall, as shown in figure 7-70.

(4) After installation, the end of the spacer (fig. 7-70) should be flush with the bearing bore seat (shoulder) in the transmission housing. If the spacer is above the shoulder, this indicates the forward-and-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-and-reverse sun gear to relocate

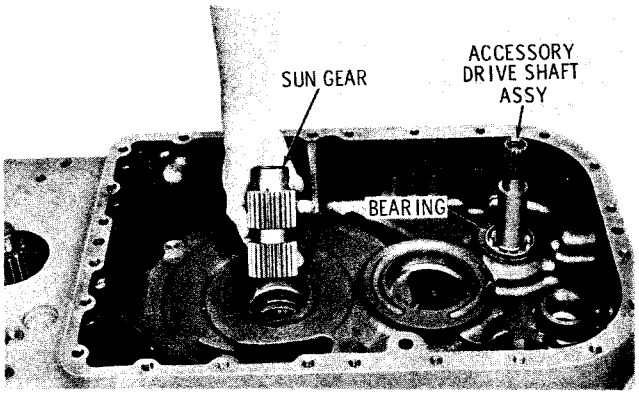


Fig. 7-69. Installing forward-and-reverse sun gear (-1 models)

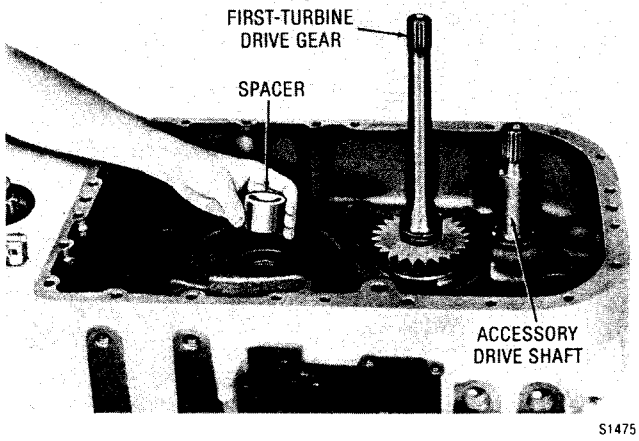


Fig. 7-70. Installing forward-and-reverse sun gear spacer (-1 models)

(center) t h e thrust washer. Reinstall the spacer.

(5) Install the first-turbine drive gear and bearing (as assembled in para 6-10) (fig. 7-71). Install the step-joint sealring into the groove in the drive gear hub. Use oil-soluble grease to retain the sealring in its groove. Install the rear thrust bearing race (flat) and the needle roller bearing onto the drive gear.

(6) Install the turbine-driven gears and freewheel clutch assembly (as assembled in para 6-9) (fig. 7-72). Rotate the assembly to engage t h e second-turbine driven gear splines with those of the forward-and-reverse sun gear (fig. 7-71).

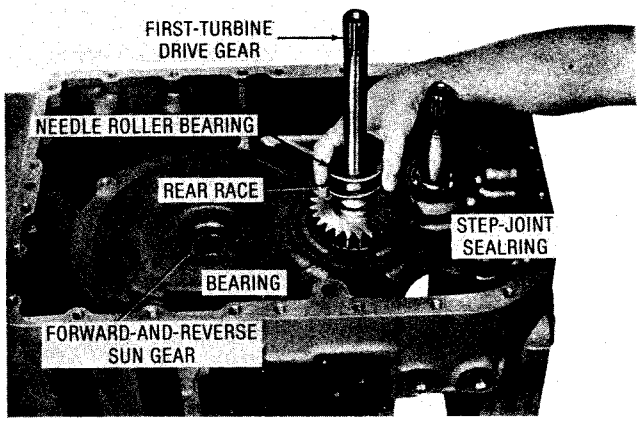


Fig. 7-71. Installing first-turbine drive gear components

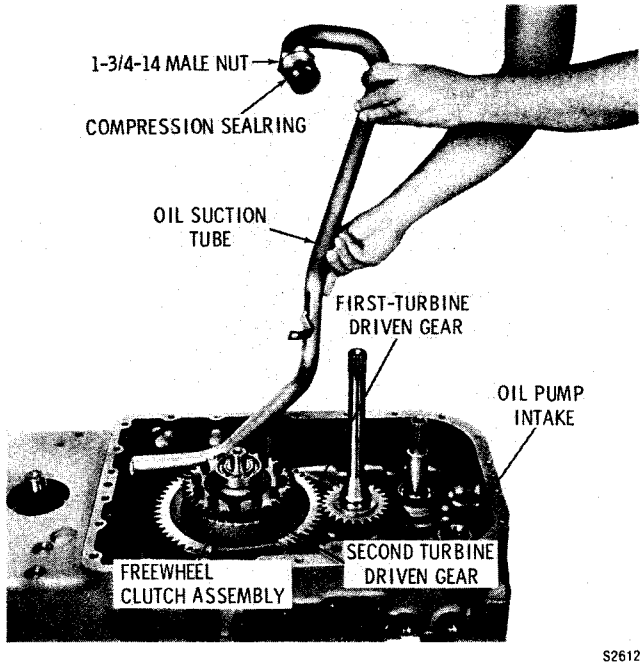


Fig. 7-72. Installing oil suction tube

c. Oil Suction Tube, Oil Strainer

(1) Generously lubricate the oil suction tube compression sealring with transmission fluid (fig. 7-72). Using the fabricated wrench, install the 1-3/4-14 male nut and compression sealring onto the pump end of the oil suction tube. Insert the suction end of the tube into the sump area, and the pump end into the threaded hole at the pump in-

take. Make s u r e the sealring is squarely seated in the intake boss. Install the nut into the boss but do not tighten at this time.

NOTE

For -1 models, proceed to step (2). For -3 models, proceed to step (3).

(2) -1 Models. Install one 3/8-16 x 5/8-inch self-locking bolt to secure the suction tube to the housing but do not tighten at this time (fig. 7-73). Install the oil strainer and gasket (fig. 7-74). Secure the oil strainer with six 3/8-16 x 7/8-inch bolts 20 (foldout 8,B) and lockwashers 21. Tighten the bolts to 26-32 lb ft (36-43 N·m). Install the oil drain plug (fig. 7-74) and tighten it to 33-37 lb ft (45-50 N·m). Then, while holding the suction tube flush with the oil pump mounting surface and using a fabricated wrench, tighten the male nut to 120-150 lb ft (163-204 N·m). Tighten the self-locking bolt, which holds the oil suction tube, to 36-43 lb ft (49-58 N·m). Proceed to step (4).

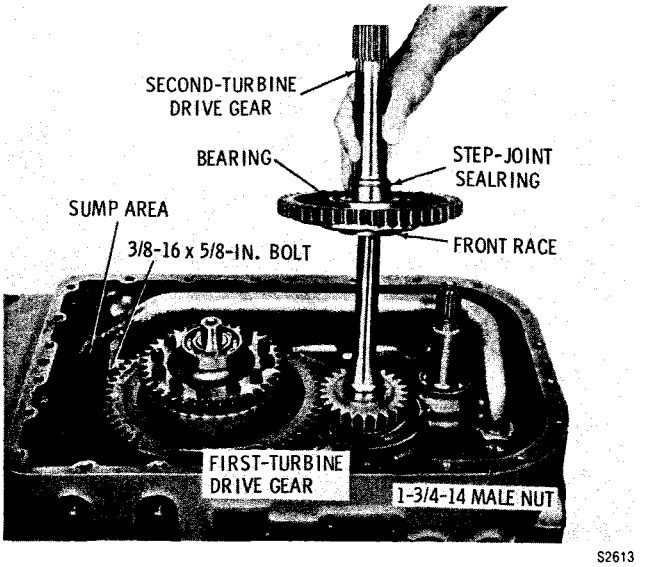


Fig. 7-73. Installing second-turbine drive gear

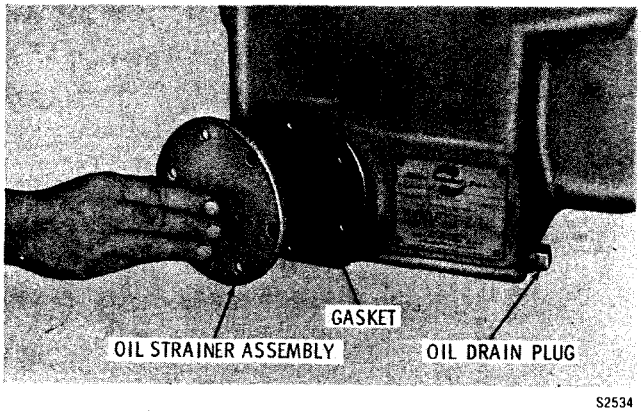


Fig. 7-74. Installing oil strainer and gasket (-1 models)

(3) -3 Models. Install one 5/16-18 x 5/8-inch self-locking bolt to secure the suction tube to the housing but do not tighten at this time (refer to fig. 7-73). Install the oil strainer (fig. 7-75). Install the O-ring gasket onto the strainer cover and install the cover. Secure the cover with two 3/8-16 x 3/4-inch bolts and lockwashers. Tighten the bolts to 26-32 lb ft (36-43 N·m). Install the oil drain plug and tighten it to 33-37 lb ft (45-50 N·m). Then, while holding the suction tube flush with the oil pump mounting surface and using a fabricated wrench, tighten the male nut to 120-150 lb ft (163-204 N·m). Tighten the self-locking bolt, which holds the oil suction tube, to 17-20 lb ft (23-27 N·m). Install baffle plate 29 (foldout 9,A) and retain it with three 5/16-18 x 5/8-inch, self-locking bolts 30. Leave bolt hole for the suction tube bracket. Tighten bolts 30 to 17-20 lb ft (23-27 N·m).

(4) If the ball bearing was removed from the second-turbine drive gear, install a

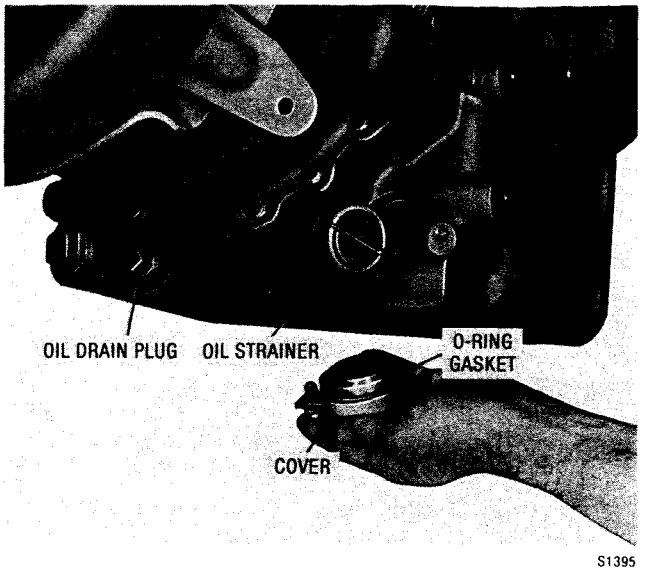


Fig. 7-75. Installing oil strainer and O-ring gasket (-3 models)

new bearing (fig. 7-73). Install the step-joint sealring into its groove near the bearing. Install the front race of the thrust bearing, flange first, onto the bottom (rear) of the drive gear. Use oil-soluble grease to retain the bearing race on the drive gear. Install the second-turbine drive gear and assembled parts onto the first-turbine drive gear (fig. 7-73).

7-11. INSTALLATION OF CONVERTER HOUSING, CONVERTER COMPONENTS

a. Converter Housing

(1) If roller bearing 45 (foldout 7,B) is used with the accessory-driven gear, install the outer race, lip toward the rear, into the main housing bore. It may be necessary to temporarily install the charging pump to maintain bearing race alignment. Install the gasket onto the converter housing splitline (fig. 7-76). Use oil-soluble grease to retain the gasket during installation of the housing. Attach a sling to the converter housing front flange and, while lowering the converter housing (as assembled in para 6-8) onto the transmission housing, guide the accessory-driven gear past the second-turbine drive gear. Seat the converter housing and remove the sling.

(2) To attach the converter housing, install one 7/16-14 x 2-3/4-inch bolt, twenty-three 7/16-14 x 1-3/8-inch bolts, twenty-four 7/16-inch flat washers, and twenty-four 7/16-inch lockwashers (fig. 7-77). Tighten the bolts to 42-50 lb ft (57-67 N·m).

b. Converter Components

(1) Check to ensure that the step-joint sealring (installed in para 6-8) is firmly seated in the converter housing sleeve (fig. 7-77). For models with a dry converter housing, check to be sure the diaphragm oil seal is packed with high-temperature grease.

(2) Install the torque converter pump (as assembled in para 6-7) onto the converter ground sleeve (fig. 7-78). Install the splined

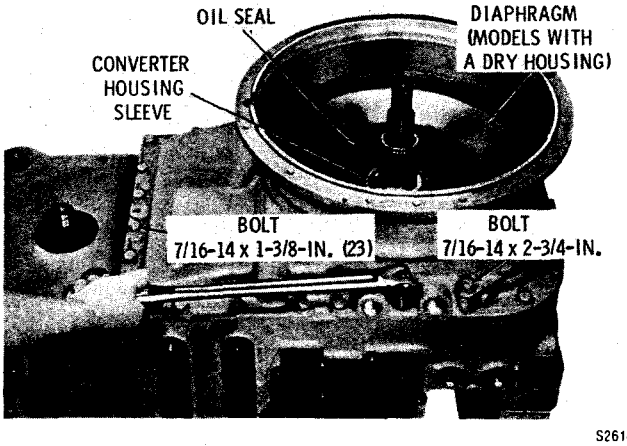


Fig. 7-77. Installing torque converter housing bolts

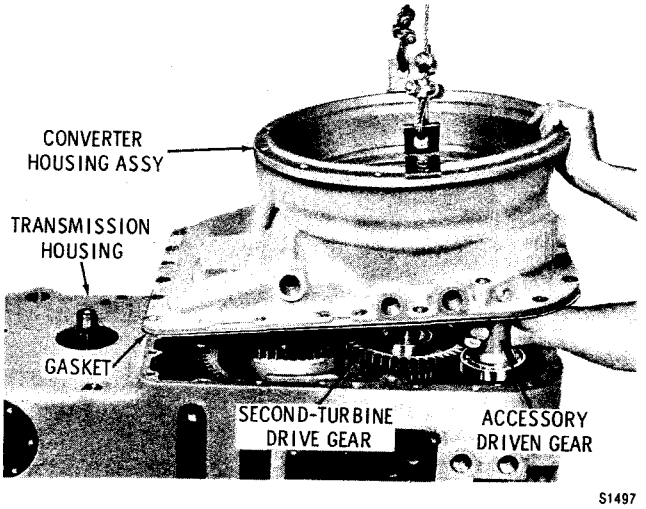


Fig. 7-76. Installing torque converter housing assembly

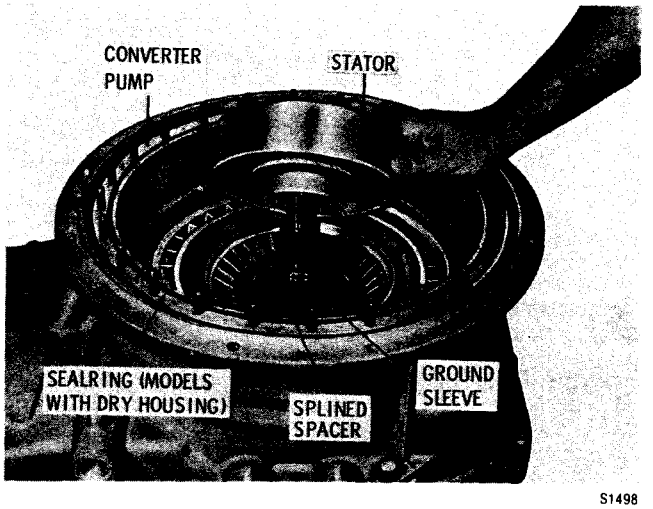


Fig. 7-78. Installing torque converter stator

spacer. Install the stator, hub projection first, onto the ground sleeve.

(3) For models with a dry converter housing, install the sealring into the groove in the converter pump splitline. The sealring used on models with a dry housing has a rectangular cross-section--0.113-0.123 x 0.133-0.143 in. (2.88-3.12 x 3.38-3.63 mm), and will fit into the groove in the converter pump either way. The sealring must be installed with the 0.133-0.143 inch (3.38-3.63 mm) dimension in the clamp direction (fig. 7-79) in order to provide adequate seal. (The O.D. of the sealring may be marked with white paint.) Fill in the remaining sealring groove area with petrolatum.

(4) Install the snapring onto the converter ground sleeve to retain the stator (fig. 7-80). Install the first- and second-turbine assembly (as assembled in para 6-6) onto the turbine drive-gear shafts.

7-12. INSTALLATION OF INPUT COMPONENTS

NOTE

Direct-mount models with flex disks, proceed to paragraph 7-12a. Direct-mount models with a drive ring, proceed to paragraph 7-12b. Remote-mount models, proceed to paragraph 7-12c.

a. Direct Mount (flex disk)

(1) Install the torque converter drive cover (fig. 7-81).

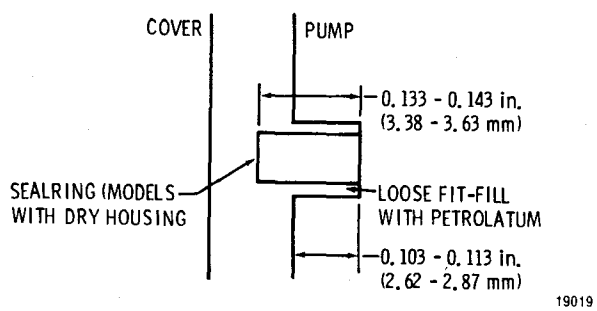


Fig. 7-79. Assembly of converter pump sealring

(2) Install twenty-four 5/16-24, self-locking nuts to retain the cover (fig. 7-82). Tighten the nuts to 14-18 lb ft (19-24 N·m).

(3) Install the flex disk and washer assembly, washer side first, into the hub of

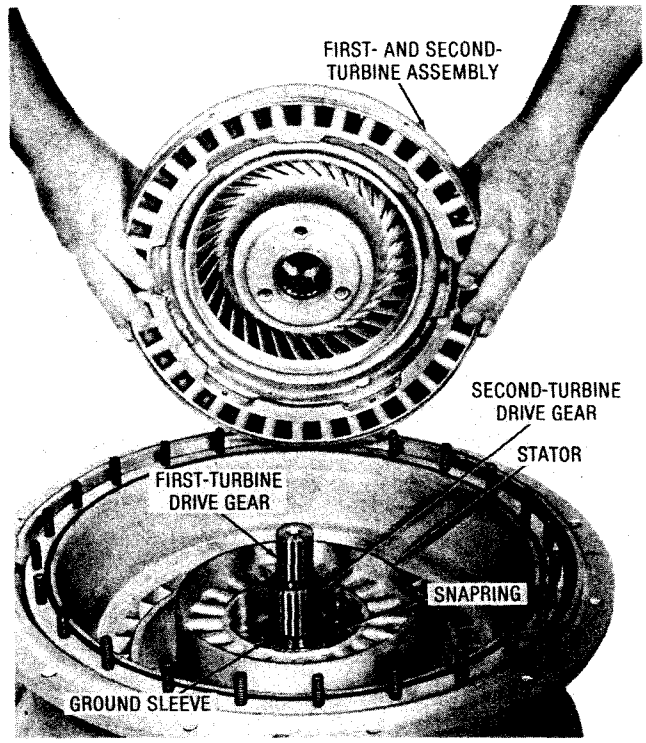


Fig. 7-80. Installing first-and-second turbine assembly

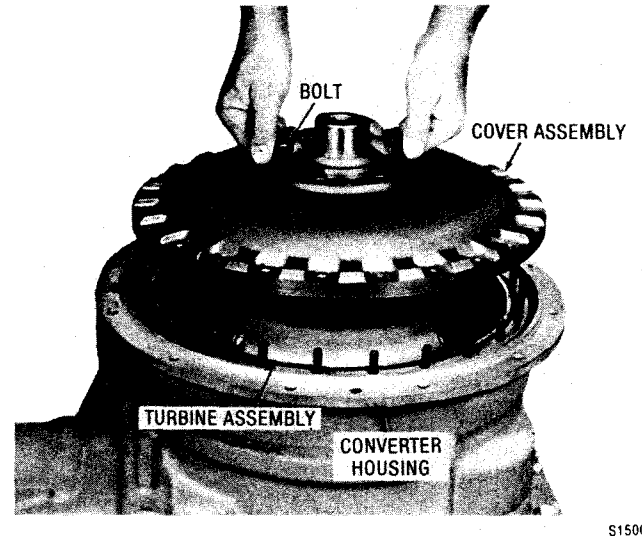


Fig. 7-81. Installing torque converter drive cover—direct mount

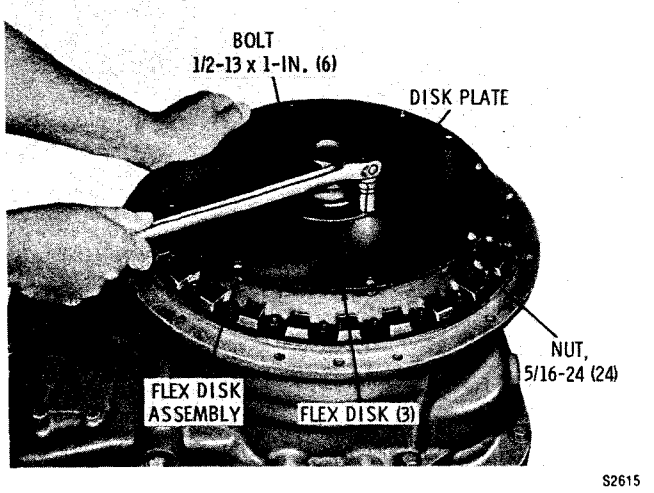


Fig. 7-82. Installing flex disk assembly (direct mount)

the converter cover (fig. 7-82). Install flex disk plate 4 (foldout 6,B), if applicable. Assemble the three flex disks so the cone of each will be parallel to the flex disk and washer assembly and install the three disks as an assembly (fig. 7-82). Install the disk plate and align all the disk holes with the tapped holes in the converter drive cover. Install six 1/2-13 x 7/8-inch, self-locking bolts and tighten them to 81-97 lb ft (110-131 N·m).

(4) If the transmission is equipped with a wet converter housing, gasket 13 (foldout 6,B) must be used when the transmission is attached to the engine housing. Proceed to paragraph 7-13.

b. Direct Mount (drive ring)

(1) Install torque converter drive cover 12 (foldout 6,B). Install twenty-four 5/16-24, self-locking nuts 11 to retain torque converter cover 12. Tighten the nuts to 14-18 lb ft (19-24 N·m).

(2) Lubricate sealring 10 with a high quality molybdenum disulfide grease, and install it into the groove behind the splines on converter drive cover 12.

(3) Apply sealer (Permatex No. 3 or equivalent) to drive ring 8 and to the drive ring mounting face on the engine flywheel or drive disk (also to gasket 13, if used). Install converter drive ring 8 and attach it with eight 3/8-16 x 1-1/4-inch, 12-point bolts 9. Tighten the bolts to 36-43 lb ft (49-58 N·m). Pack the spaces between the internal teeth of drive ring 8 with molybdenum disulfide grease. Fill the spaces between the teeth completely, but do not use an excessive amount of grease. Proceed to paragraph 7-13.

c. Remote Mount (foldout 6,A)

(1) Install torque converter drive cover 20 or 24 and attached parts (as assembled in para 6-5) onto the converter pump. Install twenty-four 5/16-24 self-locking nuts 19 to retain the cover. Tighten the nuts to 14-18 lb ft (19-24 N·m).

(2) Install gasket 14 onto the converter housing front splitline. Install transmission front cover 13 with oil seal 11 (as assembled in para 6-4) and secure it with twelve 3/8-24 x 2-inch bolts 12, lockwashers 21, and 3/8-24 nuts 22. Tighten the nuts to 33-40 lb ft (45-54 N·m).

(3) Install spacer 3, if required. Install coupling assembly 8 or input flange 9 or 10 onto input shaft 18 or 23. Refer to paragraph 4-9b for instructions for installation, shim pack selection, and torque requirements.

7-13. INSTALLATION OF EXTERIOR COMPONENTS

a. External Thermostat. If required, install external thermostat kit 33 (foldout 7,B).

b. Oil Pump

(1) Install the gasket and oil pump assembly onto the pump mounting pad (fig. 7-83).

(2) Retain the pump with two 3/8-16 x 3-inch bolts, seven 3/8-16 x 2-inch bolts, and nine lockwashers (fig. 7-84). Tighten the bolts to 26-32 lb ft (36-43 N·m).

NOTE

If the pump assembly has a two-bolt, SAE C mounting pad, install six 3/8-16 x 2-inch bolts, three 3/8-16 x 3-inch bolts, and

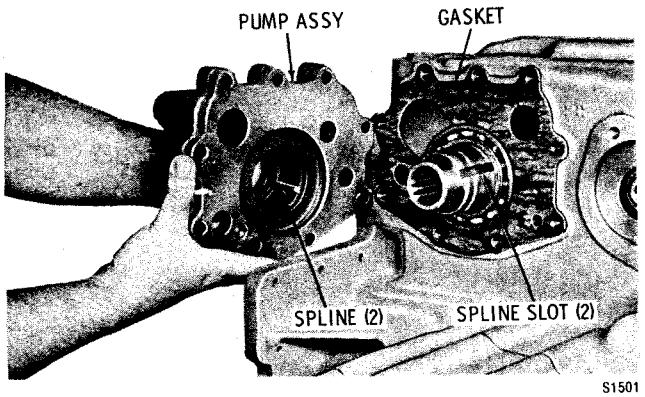


Fig. 7-83. Installing oil pump assembly

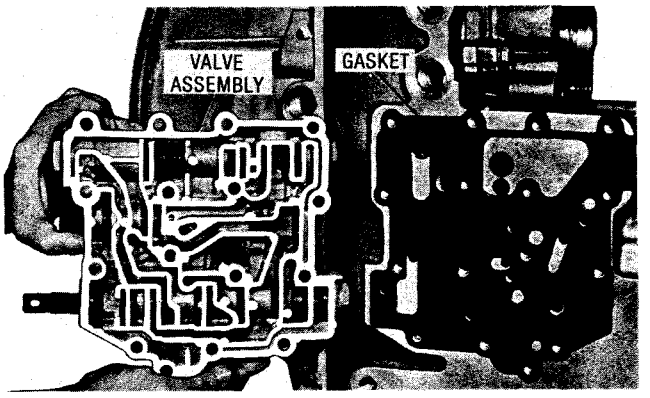


Fig. 7-85. Installing control valve body assembly

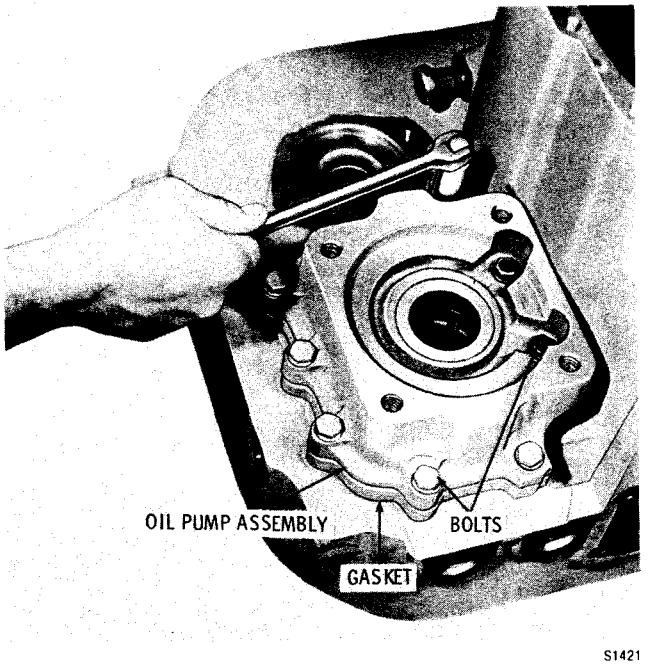


Fig. 7-84. Installing oil pump assembly

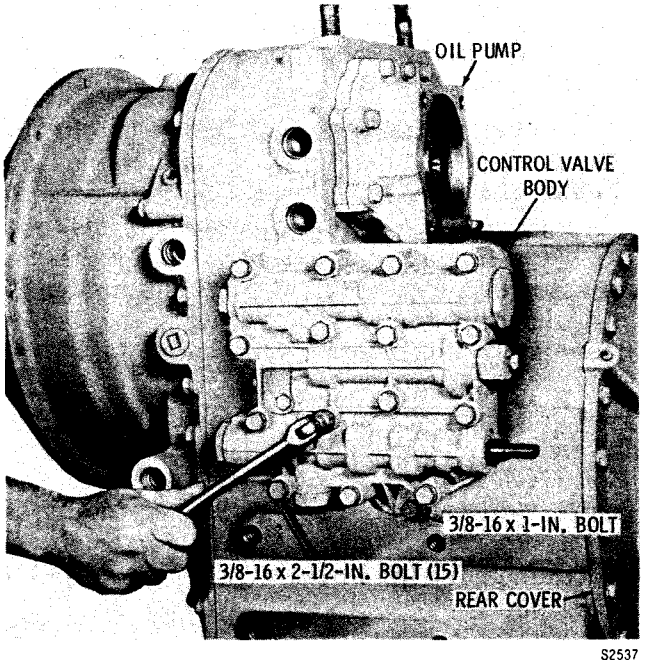


Fig. 7-86. Installing valve body bolts

n i n e lockwashers. Tighten these bolts to 26-32 lb ft (36-43 N·m).

c. Oil Pump Drive Coupling. If the transmission is equipped with adapter drive coupling 18 (foldout 18,A), replace the coupling. Apply molybdenum disulfide grease (Molykote Type G or equivalent) o n t o 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.

d. Control Valve Body

(1) Remove the temporarily installed bolt and washer from the valve body mounting pad (refer to fig. 7-17). Install the valve body gasket a n d retain it with oil-soluble grease (fig. 7-85). Install the control valve body assembly.

(2) Install fifteen 3/8-16 x 2-1/2-inch bolts with lockwashers and one hidden 3/8-16 x 1-inch bolt and lockwasher (fig. 7-86). Progressing from the center of the valve body

outward, tighten the bolts evenly to 26-32 lb ft (36-43 N·m).

e. Parking Brake, Output Flanges

(1) Install the brake backplate onto its mounting pad (fig. 7-87). Install and tighten the bolts. Refer to foldout 17,B.

Model	Back-plate	Bolts	Torque lb ft (N·m)
TT, TRT-1	2	7 (4)	81-97 (110-131)
TTB	8	7 (4)	81-97 (110-131)
TRT-3	13	20 (3) with lock-washers	117-140 (159-189)

(2) Install the spacer roller onto the backplate lever, and install the cam lever (fig. 7-88).

(3) Install two brake shoes (fig. 7-89). Install the two springs into the brake shoe holes away from the backplate. Install spacer 33 (foldout 17,A), if used, onto the output shaft. If flange 31, 32, or 34 is used, install the rear output flange. Install shaft sealring 37, making sure that it is well seated in the cavity between the shaft and flange. (Sealring not used in some models.) Refer to paragraph 4-9b for instructions for flange installation and torque requirements.

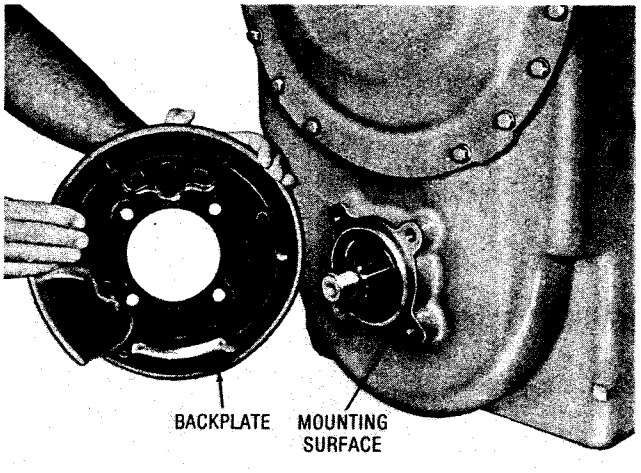


Fig. 7-87. Installing parking brake backplate

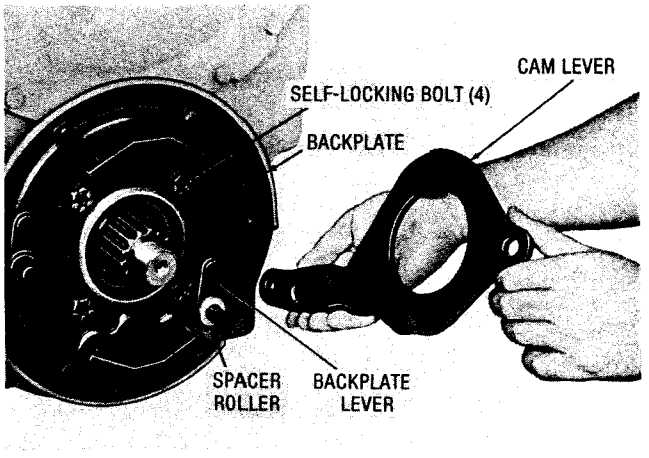


Fig. 7-88. Installing brake apply arm

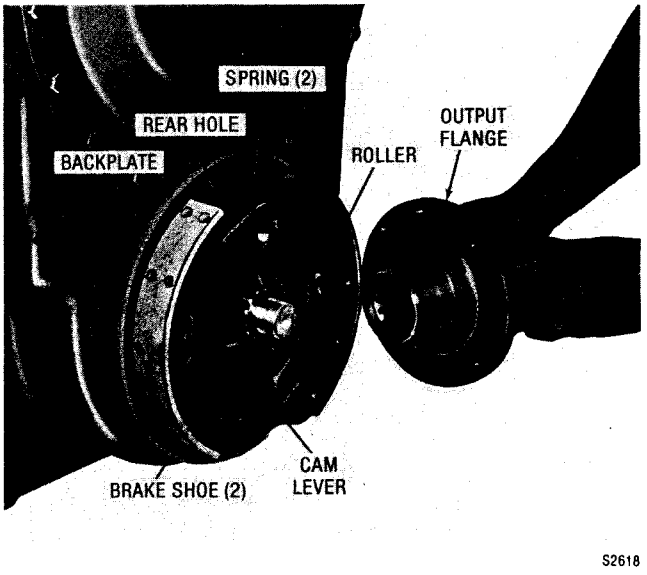


Fig. 7-89. Installing rear output flange

(4) For transmission equipped with output flanges 35 or 36 (foldout 17,A), install the flange into brake drum 9 or 18 (foldout 17,B) and retain it with 3/8-24 self-locking bolts. Tighten the bolts to 41-49 lb ft (56-66 N·m) and install the assembly onto the output shaft. Refer to paragraph 4-9b for instructions for installation and torque requirements.

(5) If flange 31 or 32 (foldout 17,A) is used, install the brake drum onto the output flange (fig. 7-90); then rotate the drum 90°. For -1 models, attach the brake drum with four 3/8-24 x 5/8-inch, self-locking bolts (fig.

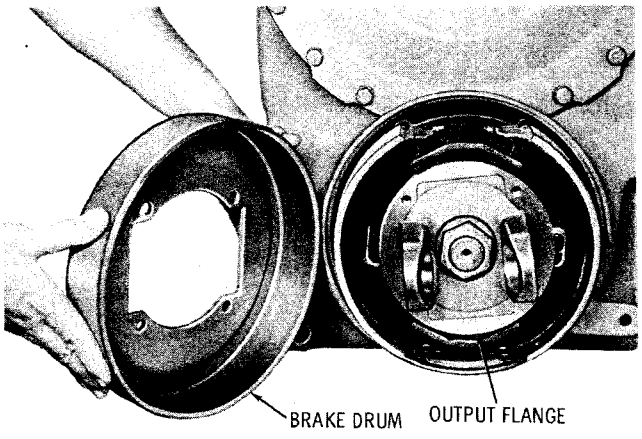


Fig. 7-90. Installing parking brake drum

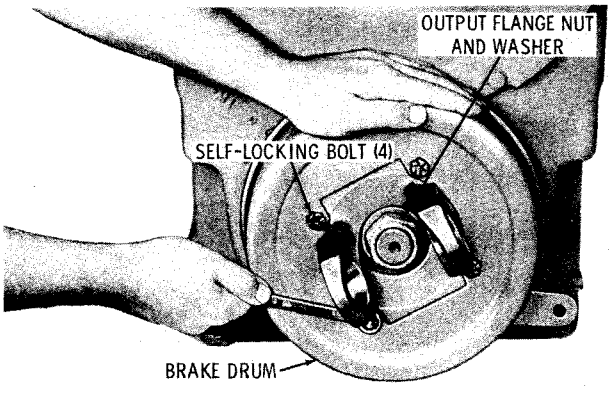


Fig. 7-91. Installing parking brake drum (some -1 models)

7-91). For -3 models, install eight 3/8-24 x 3/4-inch self-locking bolts (fig. 7-92). Tighten the bolts to 41-49 lb ft (56-66 N·m).

(6) For -1 models, install spacer 5 (foldout 17,A), if used, onto the output shaft and install the front output flange (fig. 7-93). Install shaft sealring 3 (foldout 17,A), making sure that it is well seated in the cavity between the shaft and flange. (Sealring is not used in some models.) Refer to paragraph 4-9b for instructions for flange installation and torque requirements.

(7) Tighten PTO flange retaining nut 29 (foldout 16,D) to 275-325 lb ft (373-440 N·m).

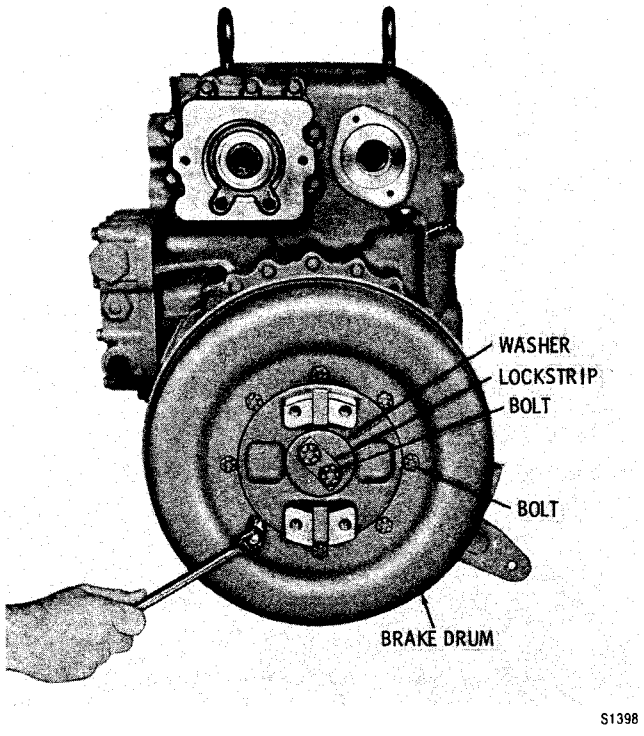


Fig. 7-92. Installing parking brake drum (-3 models)

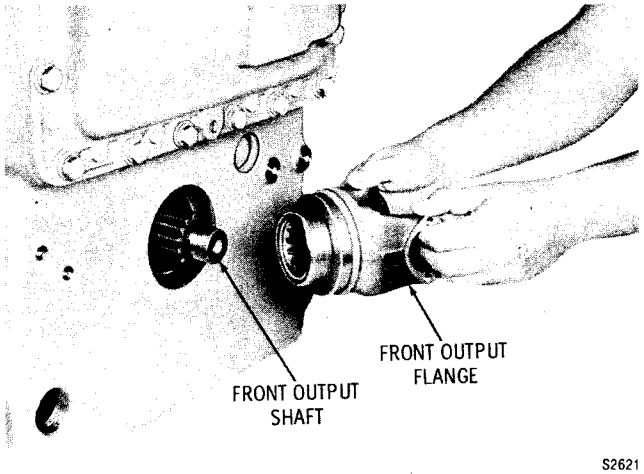


Fig. 7-93. Installing front output flange

7-14. ASSEMBLY TECHNIQUES FOR VEHICLE-MOUNTED TRANSMISSIONS

a. Similar Procedures. Components are installed into the transmission in the vehicle by methods similar to those usd when the transmission is removed. The methods and

sequence outlined in the manual are a general guide but may require some variation because of positioning and space limitations.

b. Clutch Installation

(1) Special care is required to install clutch assemblies into a transmission mounted in the vehicle. Make sure that all clutch plates are properly engaged with their mating components and that all clutch springs are properly positioned.

(2) The reverse clutch requires that the clutch components be installed as an assembled unit. The assembly of the reverse clutch components results in a clutch and planetary unit similar to that shown in figure 7-94.

(3) Using two wires or cords, tie the clutch plates to the clutch anchor assembly by passing the wires or cords over the opposite tangs of the clutch plates, around the inner side of the anchor pins, and through the adjacent holes in the anchor (fig. 7-94). Secure the wire or cord ends at the under (rear) side of the clutch anchor.

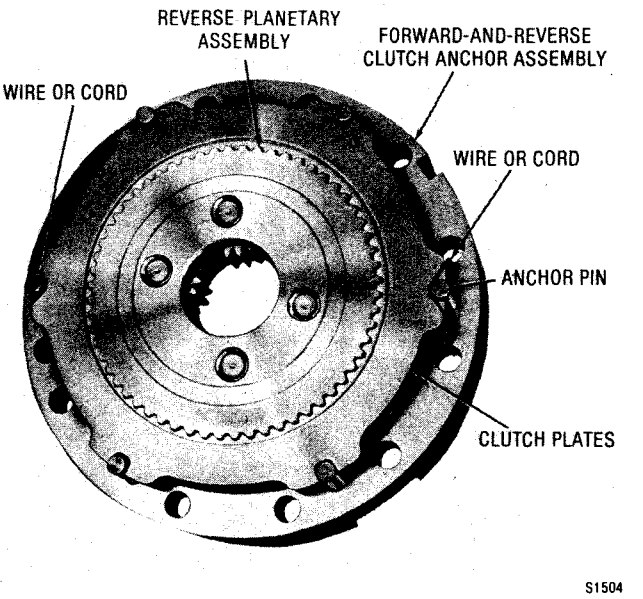


Fig. 7-94. Reverse clutch plates and planetary wired in position on forward-and-reverse clutch anchor

(4) Install the entire assembly, clutch plates first, into the rear of the transmission, engaging the anchor pin slot with the anchor in the transmission housing. Remove the wires or cords and continue with the assembly procedures as applicable.

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. Table 8-1 lists the wear limits data and is referenced to the exploded view (foldouts 6 through 18) in the back of the manual.

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 and, 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.

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. 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. 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 (0.12 mm). The sides of the groove into which the sealrings fit should be smooth--50 microinch (1.25 micrometers) equivalent, and square with the axis of rotation within 0.002 inch (0.05 mm). A new sealring should be installed if the groove is reworked or if there is wear on the sealring outside the diameter.

8-2. SPRING DATA

a. 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 Spring Data Table 8-2.

b. Inspection criteria (load versus height) and identification characteristics of the springs are presented in Table 8-2. The spring data are keyed to the exploded views (foldouts 6 through 18) in the back of the manual.

NOTE

When more than one spring part member is listed for the same location, refer to parts catalog SA 1248 to determine which spring is used for your specific assembly number.

Table 8-1. WEAR LIMITS

Illustration	Description	Wear Limit in.	Wear Limit (mm)
Foldout 7,B	TORQUE CONVERTER HOUSING AND TURBINE DRIVE GEARS		
25	Thrust bearing front race, min thickness	0.028	0.71
27	Thrust bearing rear race, min thickness	0.120	3.04
Foldout 8,A	TURBINE DRIVEN GEARS AND FREEWHEEL CLUTCH		
9, 23	* Freewheel roller, min diameter	0.4980	12.65
12, 26	* Freewheel cam, max surface wear	0.003	0.07
28	* First-turbine driven gear hub, min OD	3.0327	77.02
Foldout 9,B	REVERSE CLUTCH AND PLANETARY		
5, 17	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
6, 18	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
	** Clutch pack, min thickness	1.185	30.09
11	Pinion, max end play in carrier 15	0.055	1.39
20	Clutch anchor, max face wear		
	reverse face	0.020	0.50
	forward face	0.020	0.50
Foldout 10,A	FORWARD CLUTCH AND PLANETARY (-1 MODELS)		
2	Thrust washer, min thickness	0.125	3.17
7, 14, 21	Pinion, max end play in carrier	0.055	1.39
24	Thrust washer, min thickness	0.089	2.26
26	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
27	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	** Clutch pack, min thickness		
	6-plate pack	0.681	17.29
	8-plate pack	0.908	23.06

* 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 (0.25 mm). (Determine cam surface wear by measuring depth of groove caused by roller contact in the cam pocket.)

** Total of individual plate thicknesses. Replace plates having the most wear with new plates to increase pack thickness.

Table 8-1. WEAR LIMITS (cont)

Illustration	Description	Wear Limit in.	Wear Limit (mm)
Foldout 10,B	FORWARD CLUTCH AND PLANETARY (TRT 2221-3, 2421-3)		
2	Thrust washer, min thickness	0.087	2.20
4, 31	Bushing, min ID	1.885	47.87
9, 36	Pinion, max end play in carrier	0.055	1.39
12, 15	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
13, 16	Clutch plate:		
	min thickenss	0.097	2.46
	max cone	0.030	0.76
27	Adapter sleeve	no scoring permissible	
	* Clutch pack, min thickness	0.691	17.55
Foldout 11,A	FORWARD CLUTCH AND PLANETARY (TRT 2211-3, 2411-3)		
2	Thrust washer, min thickness	0.125	3.17
8	Pinion, max end play in carrier 4	0.055	1.39
13, 16	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
14, 17	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	* Clutch pack, min thickness	0.691	17.55
Foldout 11,B	HIGH-RANGE CLUTCH AND PISTON HOUSING (TT MODELS)		
3	Transfer drive gear, max face wear	0.020	0.50
8, 13	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
9	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	* Clutch pack, min thickness	0.357	9.06
	Max diametral clearance between:		
10, 12	high-range clutch hub and		
23, 33	bushing in piston housing		
	24, 34, 36, or 37	0.005	0.12
18	Sealring, min thickness	0.0880	2.23
19	Piston, max face wear	0.020	0.50
27, 29	Sealring, min thickness	0.0875	2.22

* Total of individual plate thicknesses. Replace plates having the most wear with new plates to increase pack thickness.

Table 8-1. WEAR LIMITS (cont)

Illustration	Description	Wear Limit in.	(mm)
Foldout 12,A	LOW-RANGE CLUTCH AND TRANSFER DRIVE GEAR (TRT-1 MODELS)		
9	Adapter sleeve	no scoring permissible	
19	Clutch piston, max face wear	0.010	0.25
23	Sleeve bushing, max ID	2.008	51.00
26, 29	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
27, 30	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
31	Backplate, max face wear	0.010	0.25
	* Clutch pack, min thickness	0.841	21.36
Foldout 12,B	HIGH-RANGE CLUTCH AND PLANETARY (TRT-1 MODELS)		
1	High-range sun gear assembly, min thickness	1.718	43.63
7	Pinion, max end play in carrier 5	0.055	1.39
13	Anchor, max face wear (rear)	0.020	0.50
16	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
17	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	* Clutch pack, min thickness	1.135	28.82
Foldout 13,A	HIGH-RANGE CLUTCH, LOW-RANGE RING GEAR (TRT 2211-3, 2421-3 UNDERDRIVE)		
8	Clutch piston, max face wear	0.010	0.25
12, 15	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
13, 16	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
17	Backplate, max face wear	0.010	0.25
	* Clutch pack, min thickness	0.595	15.11
Foldout 13,B	LOW-RANGE CLUTCH AND PLANETARY (TRT 2221-3, 2421-3 UNDERDRIVE)		
1	Low-range sun gear assembly, min thickness	1.718	43.63

* Total of individual plate thicknesses. Replace plates having the most wear with new plates to increase pack thickness.

Table 8-1. WEAR LIMITS (cont)

Illustration	Description	Wear Limit in.	Wear Limit (mm)
Foldout 13,B (cont)	LOW-RANGE CLUTCH AND PLANETARY (TRT 2221-3, 2421-3 UNDERDRIVE) (cont)		
7	Pinion, max end play in carrier 5	0.055	1.39
13	Clutch anchor, max face wear (rear)	0.020	0.50
16	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
17	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	* Clutch pack, min thickness	1.185	29.09
Foldout 14,A	LOW-RANGE CLUTCH, HIGH-RANGE PLANETARY		
8	Clutch piston, max face wear	0.010	0.25
12	Thrust bearing race, min thickness	0.028	0.71
14	Thrust bearing race, min thickness	0.182	4.62
16	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
17	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
19	Carrier, max face wear (front)	0.010	0.25
23	Pinion, max end play in carrier 19	0.055	1.39
	* Clutch pack, min thickness	1.108	28.14
Foldout 14,B	HIGH-RANGE CLUTCH, PLANETARY SUN AND RING GEARS		
4	Clutch anchor, max face wear (rear)	0.020	0.50
7, 10	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
8, 11	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	* Clutch pack, min thickness	0.721	18.31
Foldout 15,A	HIGH-RANGE CLUTCH AND PISTON HOUSING (TTB MODELS)		
3	Transfer drive gear, max face wear	0.020	0.50
8, 13	Clutch plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30

* Total of individual plate thicknesses. Replace plates having the most wear with new plates to increase pack thickness.

Table 8-1. WEAR LIMITS (cont)

Illustration	Description	Wear Limit in.	Wear Limit (mm)
Foldout 15,A (cont)	HIGH-RANGE CLUTCH AND PISTON HOUSING (TTB MODELS) (cont)		
9	Clutch plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
	* Clutch pack, min thickness	0.357	9.06
18	Sealring, min thickness	0.880	2.23
19	Piston, max face wear	0.020	0.50
	Max diametral clearance between:		
12	high-range clutch hub and		
34	bushing in piston housing 35	0.005	0.12
Foldout 15,B	INTERNAL BRAKE AND REAR COVER (TTB MODELS)		
14	Brake plate:		
	min thickness	0.097	2.46
	max cone	0.030	0.76
15	Brake plate:		
	min thickness	0.130	3.30
	max cone	0.012	0.30
	* Brake pack, min thickness	1.232	31.29
38	Rear cover, brake cylinder bores, max ID	1.6290	41.37
Foldout 17,A	OUTPUT SHAFTS AND DISCONNECT ASSEMBLY		
	Max diametral clearance between:		
13	front output shaft and		
25	bushing in output shaft 26	0.010	0.25
Foldout 18,A	OIL PUMP ASSEMBLIES		
3	Cover	no scoring permissible	
12	Driven gear shaft, min OD	0.749	19.02
Foldout 18,B	CONTROL VALVE ASSEMBLIES		
8	Valve, max clearance in body 9	0.004	0.10
16	Plug, max clearance in body 9	0.0035	0.09
20	Valve, max clearance in body 9	0.004	0.10
21	Valve plug, max clearance in plug 25	0.004	0.10
29, 39, 42	Valve, max clearance in body 9	0.003	0.07
45	Valve plug, max clearance in body 9	0.004	0.10
49	Valve plug, max clearance in plug 50	0.004	0.10
52	Valve, max clearance in body 9	0.003	0.07

* Total of individual plate thicknesses. Replace plates having the most wear with new plates to increase pack thickness.

Table 8-2. SPRING DATA

Fold-out	Ref.	Spring	Part No.	Color Code	No. Coils	Wire dia in. (mm)	Spring OD in. (mm)	Free Length in. (mm)	Length Under Load in. (mm)	Length Under Load lb. (N)
7,B	19	Lubrication pressure regulator valve	6773689	No color	13.5	0.048 (1.22)	0.403 (10.24)	1.44 (36.6)	1.00 (25.4)	5.6-6.8 (25-30)
7,B	22	Converter pressure regulator valve	6773551	Solid red, white stripe	10	0.080 (2.03)	0.468 (11.89)	1.21 (30.7)	1.00 (25.4)	23.4-28.6 (105-127)
			6880795	Solid light blue	12	0.067 (1.70)	0.434 (11.02)	1.55 (39.4)	1.02 (25.9)	31.4-34.6 (140-153)
8,A	7,21	Freewheel clutch	6774681	No color	19	0.041 (1.04)	0.251 (6.38)	1.22 (31.0)	1.00 (25.4)	5.3-6.3 (24-28)
			6833973	No color	26	0.033 (0.84)	0.175 (4.44)	1.41 (35.8)	1.14 (29.0)	6.1-7.2 (28-32)
			6835343	No color	27	0.033 (0.84)	0.185 (4.70)	1.50 (38.1)	1.14 (29.0)	6.1-7.2 (28-32)
9,B	22	Reverse, low-range clutch piston return	6772068	No color	37	0.105 (2.67)	0.625 (15.88)	5.51 (140.0)	4.18 (106.2)	44.8-49.6 (200-220)
			6775437	Green stripe	37.5	0.105 (2.67)	0.625 (15.88)	6.13 (155.7)	4.80 (121.9)	45.1-49.9 (201-222)
11,B	17	High-range clutch piston return	6756134	No color	Belleville spring		5.14 (130.6)	0.28 (7.1)	- -	- -
12,A	20	Low-range clutch piston return	6759491	No color	Belleville spring		6.70 (170.2)	0.27 (6.9)	- -	- -
12,B	19	High-range clutch piston return	6759491	No color	Belleville spring		6.70 (170.2)	0.27 (6.9)	- -	- -
13,A	9	High-range clutch piston return	6759491	No color	Belleville spring		6.70 (170.2)	0.27 (6.9)	- -	- -
13,B	19	Low-range clutch piston return	6759491	No color	Belleville spring		6.70 (170.2)	0.27 (6.9)	- -	- -
14,A	9	Low-range clutch piston return	6777032	No color	Belleville spring		6.70 (170.2)	0.27 (6.9)	- -	- -
14,B	13	High-range clutch piston return	6777032	No color	Belleville spring		6.70 (170.2)	0.27 (6.9)	- -	- -
15,A	17	High-range clutch piston return	6756134	No color	Belleville spring		5.14 (130.6)	0.28 (7.1)	- -	- -

Table 8-2. SPRING DATA (cont)

Fold-out	Ref.	Spring	Part No.	Color Code	No. Coils	Wire dia in. (mm)	Spring OD in. (mm)	Free Length in. (mm)	Length Under Load in. (mm)	Length Under Load lb. (N)
15,B	11	Hydraulic brake return (TTB models)	6758503	No color	20	0.092 (2.34)	0.625 (15.88)	3.20 (81.3)	2.38 (60.5)	27.9-34.1 (125-151)
			6765710	No color	18.5	0.080 (2.03)	0.625 (15.88)	3.04 (77.2)	2.08 (52.8)	18.9-23.1 (85-102)
			6831441	No color	20	0.080 (2.03)	0.622 (15.80)	3.86 (98.0)	2.94 (74.7)	16.7-20.3 (75-90)
17,A	15	Disconnect detent	6773464	No color	14	0.062 (1.57)	0.353 (8.97)	1.32 (33.5)	1.15 (29.2)	11.9-14.5 (53-64)
17,B	5	Parking brake shoe-to-shoe*	9027076	Solid black	12	0.072 (1.83)	0.500 (12.70)	- -	2.62 (66.5)	20.0* (89)
17,B	16	Parking brake shoe-to-shoe*	6758260	Solid black	18	0.142 (3.61)	0.812 (20.62)	4.00 (101.6)	4.62 (117.3)	60.0-75.0* (267-333)
18,B	14	Main-pressure regulator valve: 135-170 psi (931-1172 kPa)	6833211	Green stripe	18.5	0.127 (3.23)	0.772 (19.61)	3.62 (91.9)	2.50 (63.5)	90.0-102.0 (401-453)
			6834941	No color	17	0.125 (3.18)	0.768 (19.51)	3.62 (91.9)	2.50 (63.5)	90.0-102.0 (401-453)
			6835377	Blue stripe	17	0.118 (3.00)	0.754 (19.15)	3.61 (91.7)	2.50 (63.5)	80.0-90.0 (356-400)
		160-195 psi (1104-1344 kPa)	6835705	No color	16	0.125 (3.18)	0.765 (19.43)	3.64 (92.5)	2.50 (63.5)	100.0-110.0 (445-489)
			6885165	Solid white	17.6	0.128 (3.25)	0.777 (19.74)	3.66 (93.0)	2.50 (63.5)	100.0-110.0 (445-489)
18,B	15	Trimmer	6773593	No color	10	0.131 (3.33)	1.120 (28.45)	2.90 (73.7)	2.38 (60.5)	25.6-31.2 (114-138)
			6830365	No color	8	0.128 (3.25)	1.110 (28.19)	2.58 (65.5)	1.43 (36.3)	72.2-82.2 (322-365)

*Tension spring

Table 8-2. SPRING DATA (cont)

Fold-out	Ref.	Spring	Part No.	Color Code	No. Coils	Wire dia in. (mm)	Spring OD in. (mm)	Free Length in. (mm)	Length Under Load in. (mm)	Length Under Load lb. (N)
18,B	19	Clutch cutoff valve: 130 psi (896 kPa)	6765710	No color	18.5	0.080 (2.03)	0.625 (15.88)	3.04 (77.2)	2.08 (52.8)	18.9-23.1 (85-102)
			6831441	No color	20	0.080 (2.03)	0.622 (15.80)	3.86 (98.0)	2.94 (74.7)	16.7-20.3 (75-90)
		250 psi (1724 kPa)	6758503	No color	20	0.092 (2.34)	0.625 (15.88)	3.20 (81.3)	2.38 (60.5)	27.9-34.1 (125-151)
			23017350	Solid yellow, green end	20	0.092 (2.34)	0.625 (15.88)	3.20 (81.3)	2.03 (51.6)	39.6-48.4 (177-215)
		400 psi (2758 kPa)	6830366	Solid white	16.5	0.112 (2.84)	0.625 (15.88)	2.72 (69.1)	2.04 (51.8)	71.0-86.6 (316-385)
18,B	33	Selector valve detent	6769251	No color	10	0.062 (1.57)	0.480 (12.19)	1.14 (29.0)	0.78 (19.8)	13.6-14.0 (61-62)
			6770253	White stripe	11	0.054 (1.37)	0.480 (12.19)	1.24 (31.5)	0.78 (19.8)	7.6-8.4 (34-37)
			6833934	Solid white, orange stripe	10	0.054 (1.37)	0.490 (12.45)	1.47 (37.3)	0.080 (20.3)	11.9-13.1 (53-58)
18,B	38	Inching regulator front	6770298	No color	14.6	0.041 (1.04)	0.384 (9.75)	1.28 (32.5)	0.78 (19.8)	3.93-4.07 (17.5-18.1)
			6772046	No color	15.5	0.085 (2.16)	0.810 (20.57)	3.75 (95.2)	1.95 (49.5)	25.2-27.8 (113-123)
18,B	41	Inching regulator rear	6774595	No color	21.5	0.072 (1.83)	0.585 (14.86)	3.80 96.5)	2.00 (50.8)	25.2-27.8 (113-123)
			6838473	No color	26.4	0.090 (2.29)	0.620 (15.75)	4.29 (109.0)	2.50 (63.5)	41.9-51.1 (187-227)
18,B	43	Inching valve return	6774594	No color	17	0.120 (3.05)	1.105 (28.07)	5.75 (146.0)	4.04 (102.6)	28.5-31.5 (127-140)

Section 9. OWNER ASSISTANCE AND SERVICE LITERATURE

9-1. OWNER ASSISTANCE

The satisfaction and goodwill of the owners of Allison transmissions are of primary concern to Detroit Diesel Allison, its distributors, and their dealers.

As an owner of an Allison transmission, you have service locations throughout the U.S. and Canada, plus many outlets worldwide that are prepared and eager to meet your parts and service needs with:

- Expert service by trained personnel
- Emergency service 24 hours a day in many areas
- Complete parts support
- Sales teams to help determine your power requirements
- Product information and literature

We recognize, however, that despite the best intentions of everyone concerned, misunderstandings may occur. Normally, any such situation that arises in connection with the sale, operation, or service of your transmission will be handled by the distributor or dealer in your area (check the Yellow Pages for the Detroit Diesel Allison service outlet nearest you).

To further assure your complete satisfaction, we have developed the following three-step procedure to be followed in the event you have a problem that has not been handled satisfactorily.

Step One—Discuss your problem with a member of management from the distributorship or dealership. Frequently, complaints are the result of a breakdown in communication and can quickly be resolved by a member of management. If you have already discussed the problem with the Sales or Service Manager, contact the General Manager. If your problems originate with a dealer, explain the matter to a management member of the distributorship with whom the dealer has his service agreement.

Step Two—When it appears that your problem cannot readily be resolved at the distributor level without additional assistance, contact the Detroit Diesel Allison Regional Office nearest you listed below:

EASTERN REGION
9 Sylvan Way
P.O. Box 3001
Parsippany, New Jersey 07054 USA
Phone: (201) 993-4047
TWX: 710-998-0563

SOUTHEASTERN REGION
5730 Glenridge Drive, NE
Atlanta, Georgia 30328 USA
Phone: (404) 257-3640
TWX: 810-751-8141

GREAT LAKES REGION
Suite 365
New Center One Building
3031 W. Grand Blvd.
P.O. Box 33122 (N65)
Detroit, Michigan 48232 USA
Phone: (313) 556-5400
TWX: 810-221-6283

MIDWESTERN REGION
475 Alexis R. Shuman Blvd.
Naperville, Illinois 60566 USA
Phone: (312) 961-6750
TWX: 910-651-3032

SOUTHWESTERN REGION
General Motors Building
130 E. Carpenter Freeway
Irving, Texas 75062 USA
Phone: (214) 659-5070
TWX: 910-860-5063

WESTERN REGION
Suite 2700
39465 Paseo Padre Parkway
Fremont, California 94538 USA
Phone: (415) 498-5200
TWX: 910-381-6105

CANADA
Diesel Division - GM of Canada Ltd.
P. O. Box 5990
600 Clarke Road
London, Ontario N6A 4L6, Canada
Phone: (519) 452-5000
Telex: 064-5850
TWX: 610-352-0269

LATIN AMERICAN REGION
Detroit Diesel Allison
Gables Center, suite 321
95 Merrick Way
Coral Gables, Florida 33144 USA
Phone: (305) 446-4900
Telex: 810-848-7061

EUROPEAN REGION
Detroit Diesel Allison - Europe
Div. of GM Continental, S.A. Nederland
Parmentierplein 1, 3088 GN Rotterdam
Mail: P. O. Box 5061
3008 AB Rotterdam, Netherlands
Phone: 010-290-000
Telex: 28355 GMCNL

ASIA REGION
Detroit Diesel Allison
Div. of GM Oversea Corp.
15 Benoi Sector
Jurong Town, Singapore 2262
Phone: (65) 265-4697 or (65) 261-0801
Telex: RS 21608 A/B GM SING

MIDDLE EAST/AFRICA REGION
Detroit Diesel Allison
Athens Towers, "A" Bldg., 6th Floor
Messoghion 2/4
Athens 610, Greece
Phone: (30) 1-770-6669
(30) 1-778-5344
(30) 1-778-7281
Telex: 215759 DDA

PACIFIC REGION
Detroit Diesel Allison - Australia
Div. of GM Overseas Corp.
Princes Highway, P. O. Box 163
Dandenong, Victoria 3175
Australia
Phone: (61) 3-797-7911
Telex: AA30792

Step Three—If you are still not satisfied, present the entire matter in writing or by phone to the product headquarters:

Allison Transmission Operations: Manager Off-Highway Transmissions Service, Detroit Diesel Allison, P. O. Box 894, Indianapolis, Indiana 46206. Phone: (317) 242-3549.

The inclusion of all pertinent information will assist the Home Office in expediting the matter. If an additional review by the Home Office of all the facts involved indicates that some further action can be taken, the Regional Office will be so instructed.

If at this point your problem is still not resolved to your satisfaction, call or write: Manager Transmission Service, Indianapolis Operations (317) 242-3547 or Director Transmission Sales, Indianapolis Operations, (317) 242-3584.

When contacting the Regional or Home Office, please keep in mind that ultimately your problem will likely be resolved at the distributorship or dealership utilizing their facilities, equipment, and personnel. Therefore, it is suggested that you follow the above steps in sequence when experiencing a problem.

Your purchase of a Detroit Diesel Allison product is greatly appreciated, and it is our sincere desire to assure complete satisfaction.

9-2. SERVICE LITERATURE

Additional service literature is available for the owner who takes pride in his equipment. These books provide fully illustrated instructions for the maintenance, service, overhaul, and parts support of your transmission. To ensure that you get maximum performance and service life from your unit, see your dealer or distributor for the following publications. Check the Yellow Pages under Transmissions — Truck or Engines — Diesel for your nearest authorized service outlet.

TT, TTB, TRT 2001
Transmission Publications

1200, 1400, 2000 Series
Parts Catalog SA 1248

TT, TTB, TRT 2001, 3000, 4000
Operators Manual SA 1278

9-3. FACTORY SERVICE "INFO"

Detroit Diesel Allison maintains factory service "INFO" telephone lines to respond to customer needs on a timely basis when the normal channels of communications a r e not available. "INFO" lines, created as part of Detroit Diesel Allison's customer response effort, are open between 8:00 a.m. and 4:30 p.m. (local time).

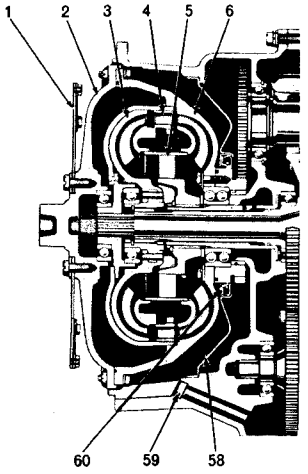
For Allison Transmission information, the number is:

(317) 242-INFO

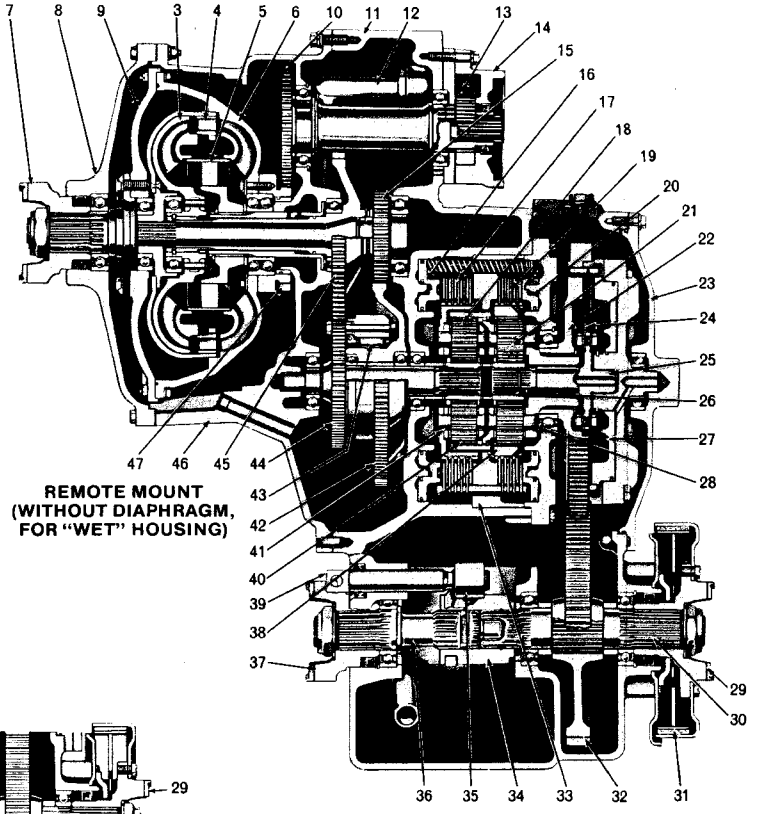
For off hours and times when all "INFO" lines are busy, telephone answering equipment will provide the opportunity for the caller to leave a name and phone number for a prompt return call or call back on the next business day.

As a reminder, the service "INFO" lines are not intended to bypass the normal channels of communication, but rather to provide direct factory assistance when normal contacts are not available. Therefore, you are urged to use the three-step procedure outlined under "Owner Assistance" prior to using the service "INFO" telephone line(s).

1 - Flex disk drive assembly
2 - Torque converter cover
3 - Second turbine
4 - First turbine
5 - Torque converter stator
6 - Torque converter pump
7 - Input flange
8 - Transmission front cover
9 - Torque converter drive cover
10 - Accessory-driven gear
11 - Transmission housing
12 - Oil suction tube
13 - Oil pump
14 - Accessory pump mounting pad
15 - First-turbine drive gear
16 - Reverse clutch piston
17 - Reverse clutch
18 - Reverse planetary pinion
19 - Forward (low-range) clutch
20 - Forward (low-range) piston
21 - Forward (low-range) planetary pinion
22 - Transfer drive gear
23 - Transmission rear cover
24 - High-range clutch
25 - High-range clutch hub
26 - Forward-and-reverse sun gear
27 - High-range piston
28 - Forward (low-range) planetary carrier assembly
29 - Rear output flange
30 - Rear output shaft
31 - Parking brake
32 - Transfer-driven gear
33 - Forward-and-reverse clutch anchor
34 - Disconnect coupling
35 - Disconnect shifter fork
36 - Front output shaft
37 - Front output flange
38 - Forward (low-range) ring gear
39 - Disconnect shifter shaft
40 - Reverse ring gear
41 - Reverse planetary carrier assembly
42 - First-turbine driven gear
43 - Freewheel clutch
44 - Second-turbine driven gear
45 - Second-turbine drive gear
46 - Torque converter housing
47 - Accessory drive gear
48 - Converter-driven PTO output flange
49 - Converter-driven PTO shaft
50 - Internal brake
51 - Brake-apply plate
52 - Brake piston
53 - Rear cover plug
54 - Diaphragm
55 - Output-driven PTO output shaft
56 - One-piece output shaft
57 - Shifter shaft hole plug
58 - Converter diaphragm
59 - Plug
60 - Oil seal

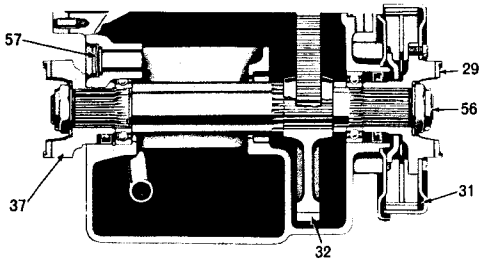


DIRECT MOUNT
(WITH DIAPHRAGM,
FOR "DRY" HOUSING)

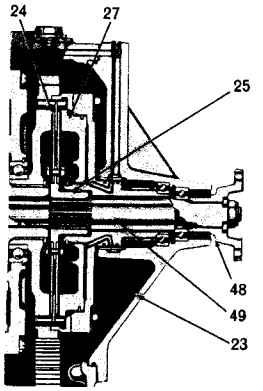


REMOTE MOUNT
(WITHOUT DIAPHRAGM,
FOR "WET" HOUSING)

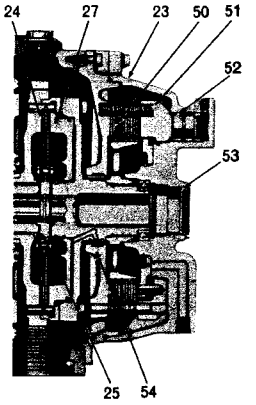
TWO-PIECE OUTPUT SHAFT



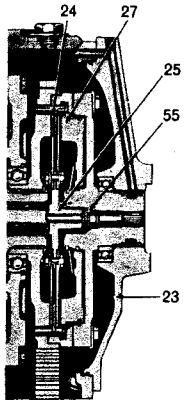
ONE-PIECE OUTPUT SHAFT



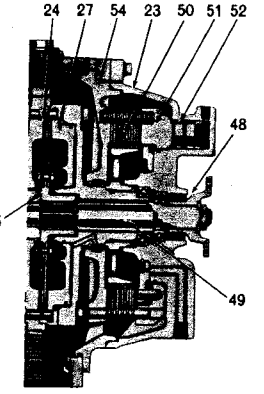
TT WITH CONVERTER
DRIVEN PTO



TTB WITHOUT PTO



TT WITH OUTPUT
DRIVEN PTO

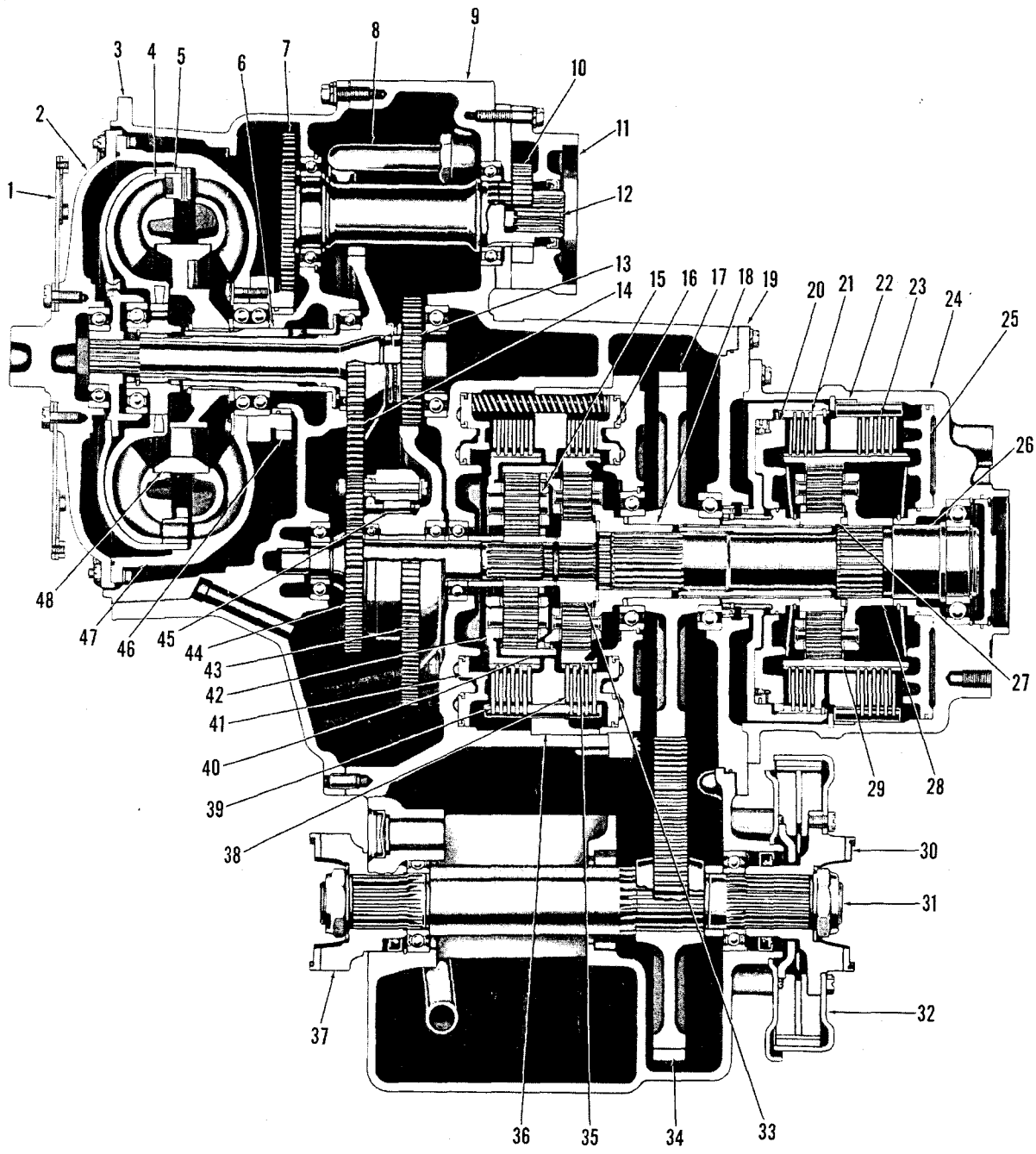


TTB WITH CONVERTER
DRIVEN PTO

S2622

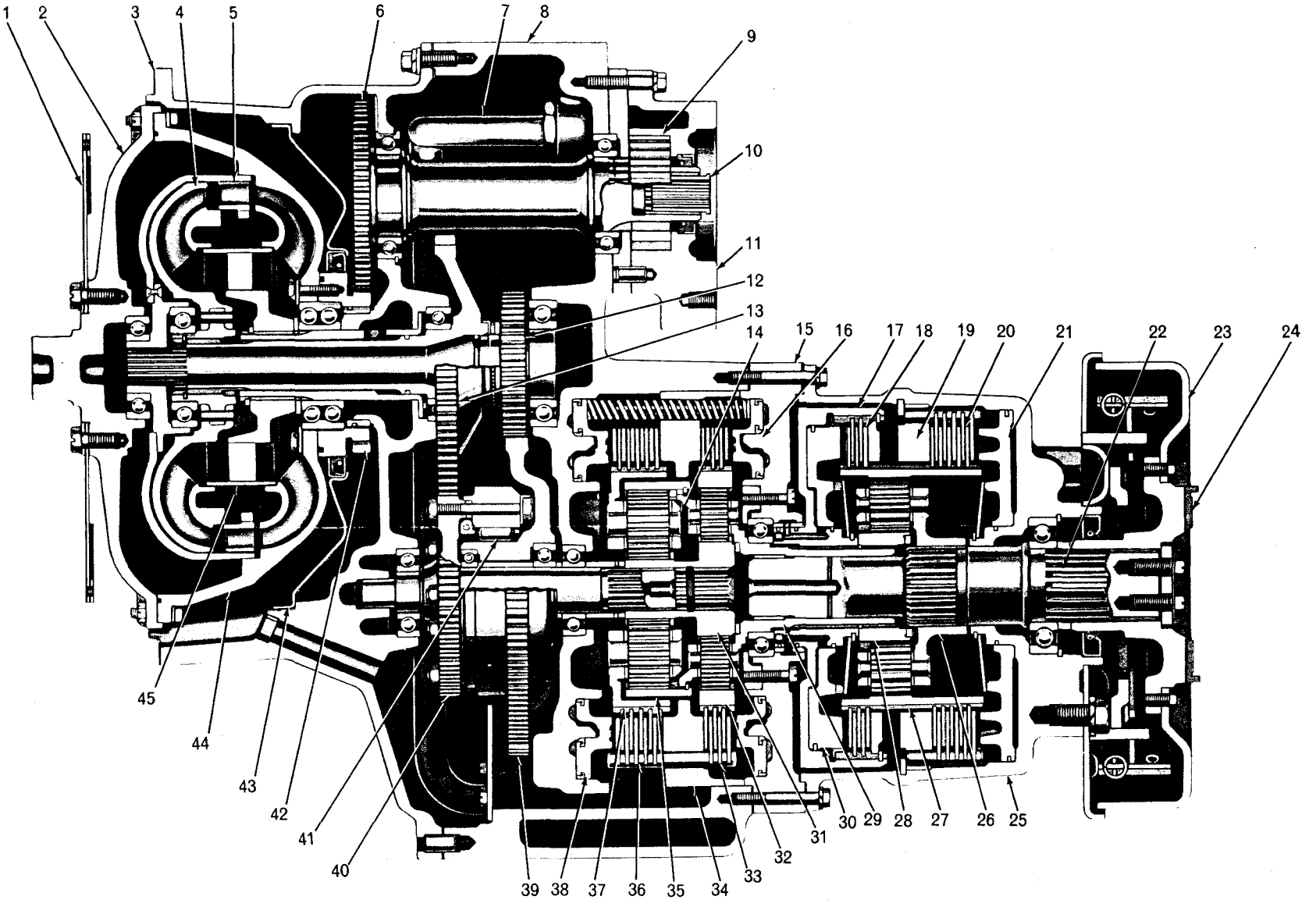
Foldout 1. TT 2001 and TTB 2001 Series transmissions

1 - Flex disk drive
2 - Torque converter cover
3 - Torque 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-and-reverse sun gear
34 - Transfer driven gear
35 - Forward ring gear
36 - Forward-and-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



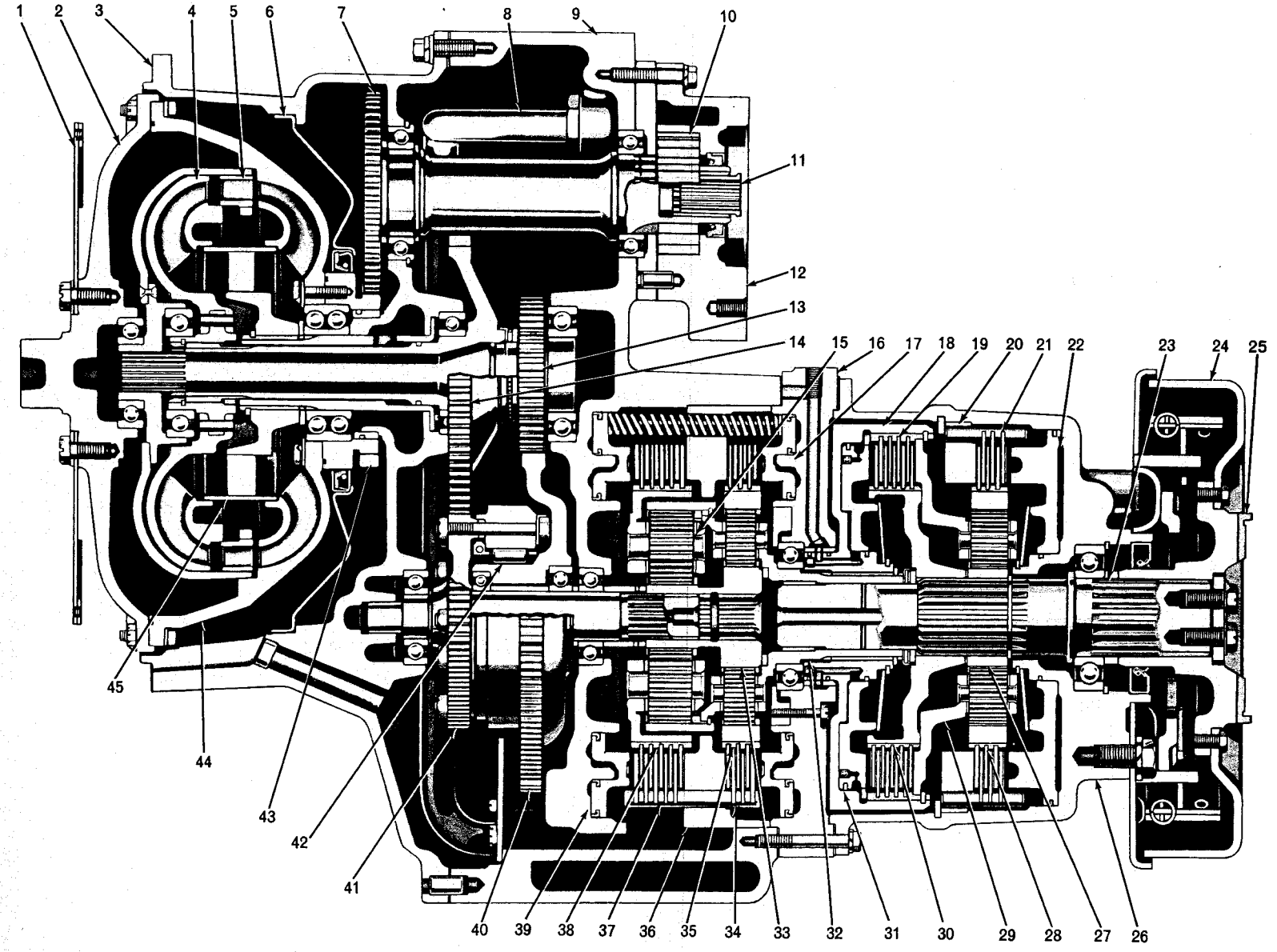
Foldout 2. TRT 2421-1 Transmission

1 - Flex disk drive
2 - Torque converter cover
3 - Torque 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-and-reverse sun gear
32 - Forward ring gear
33 - Forward clutch
34 - Forward-and-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 - Torque converter pump
45 - Torque converter stator

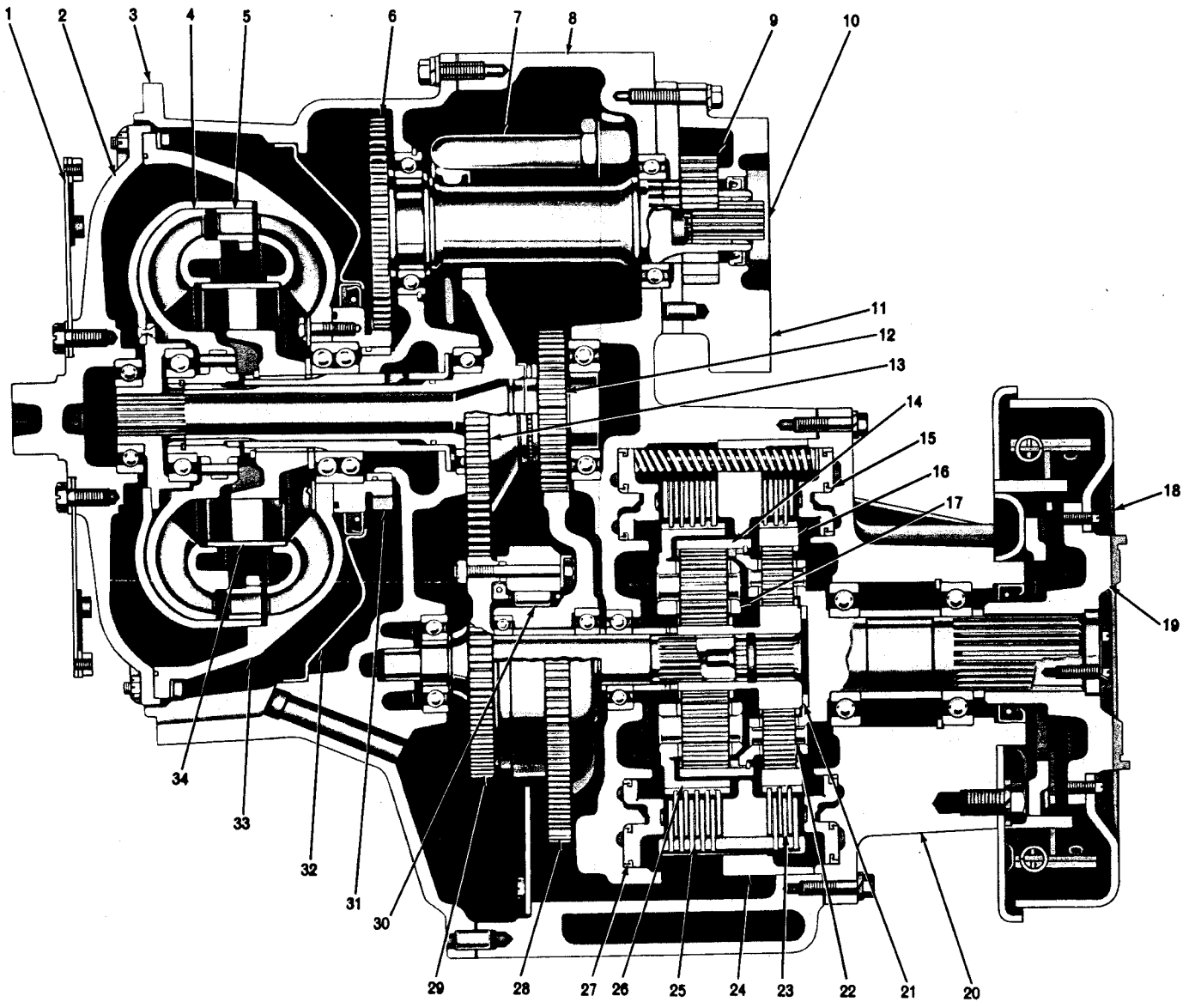


Foldout 3. TRT 2221-3 Transmission (with underdrive)

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



1 - Flex disk drive
2 - Torque converter cover
3 - Torque 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-and-reverse sun gear
22 - Forward planetary carrier
23 - Forward clutch
24 - Forward-and-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 - Freewheel clutch
31 - Accessory drive gear
32 - Diaphragm
33 - Torque converter pump
34 - Torque converter stator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A

1 - Flange retaining nut, 1-1/4-12 (nylon insert) A
2 - Flange washer
3 - Flange spacer
4 - Self-locking bolt, 3/8-24 x 1-1/8 in. (2) B
5 - Lockstrip
6 - Flange retaining washer
7 - Shim (as required)
0.025-in. (0.63-mm) thick
0.005-in. (0.13-mm) thick
8 - Torqmatic coupling assembly
9 - Flange (Mechanics 5C)
10 - Flange (Mechanics 6C)
11 - Oil seal
12 - Bolt, 3/8-24 x 2 in. (12)
13 - Transmission front cover
14 - Front cover gasket
15 - Ball bearing
16 - Bolt, 1/2-13 x 1-1/8 in. (6) C
17 - Lockstrip (3)
18 - Input shaft
19 - Self-locking nut, 5/16-24 (24) D
20 - Torque converter drive cover
21 - Lockwasher, 3/8 in. (12)
22 - Nut, 3/8-24 (12) E
23 - Input shaft
24 - Torque converter drive cover

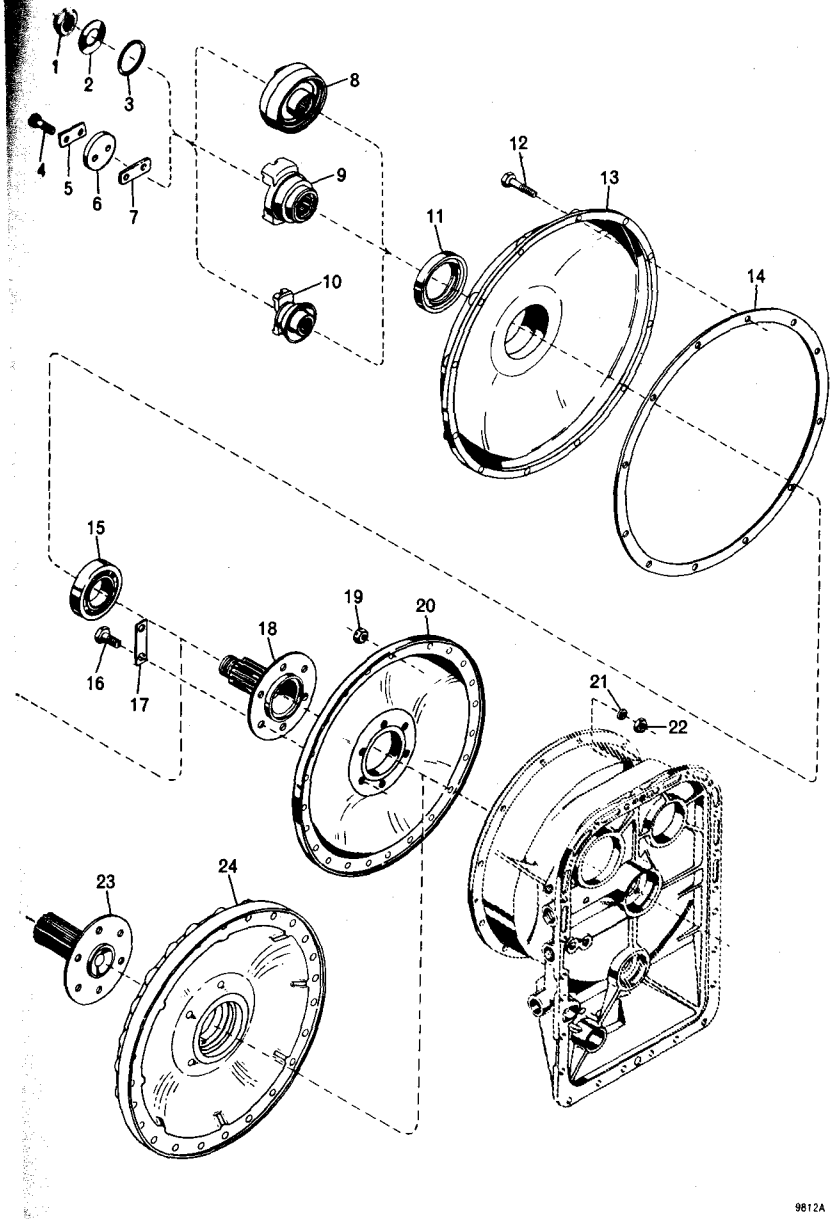
Torque	lb ft	N·m
A	450-700	611-949
B	41-49	56-66
C	67-80	91-108
D	14-18	19-24
E	33-40	45-54

B

1 - Self-locking bolt, 1/2-13 x 7/8 in. (6) A
2 - Flex disk plate
3 - Flex disk (3)
4 - Flex disk plate
5 - Flex disk and washer assembly
6 - Self-locking nut, 5/16-24 (24) B
7 - Torque converter drive cover
8 - Converter drive ring
9 - Twelve-point bolt, 3/8 x 1-1/4 in. (8) C
10 - Sealring
11 - Self-locking nut, 5/16-24 (24) B
12 - Torque converter drive cover
13 - Gasket

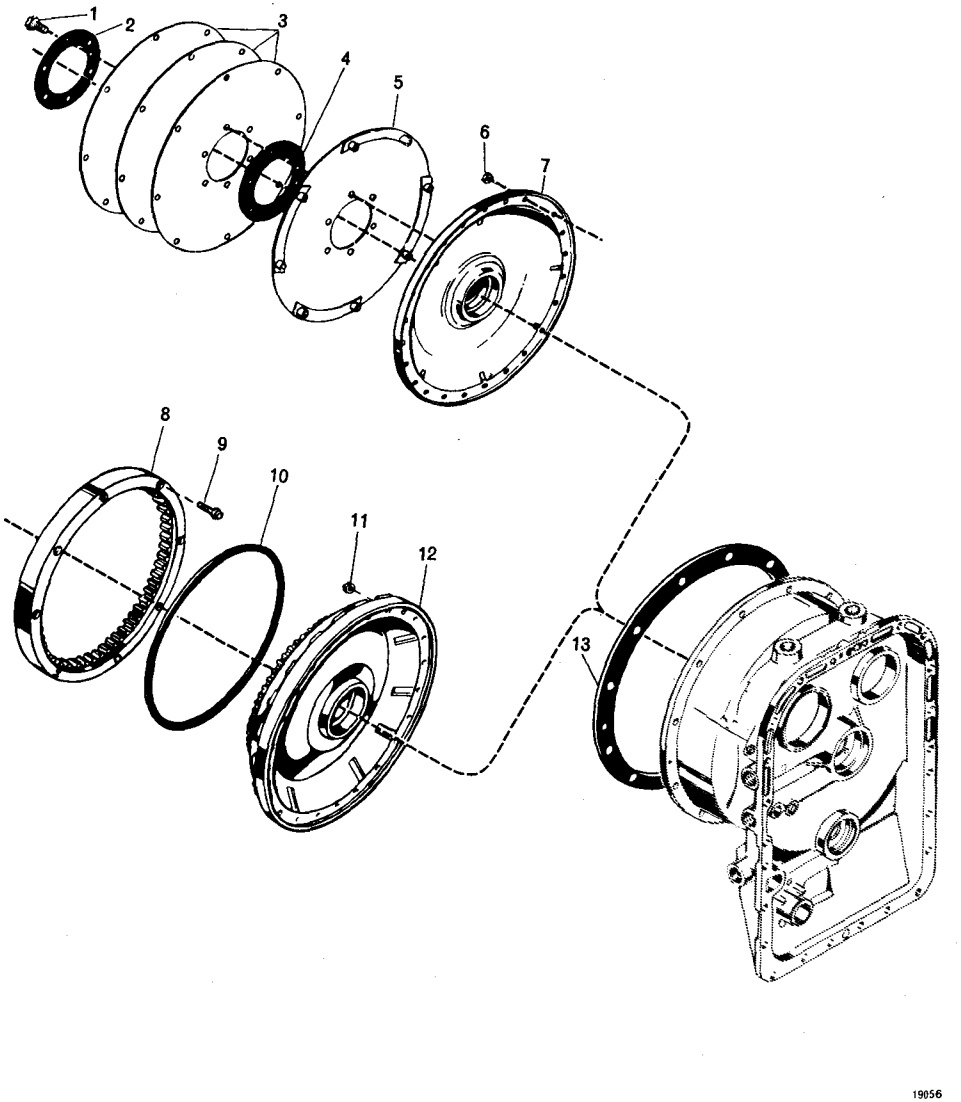
Torque	lb ft	N·m
A	81-97	110-131
B	14-18	19-24
C	36-43	49-58

A



Foldout 6,A. Transmission front cover and remote-mount input drive

B



Foldout 6,B. Transmission direct-mount input drive

A

1 - Ball bearing
2 - First turbine and support assembly
3 - First-turbine support
4 - First turbine
5 - First-turbine roll pin
TT, TTB, TRT 2211, 2221 (6)
TT, TTB, TRT 2411, 2421 (9)
6 - Second turbine
7 - Internal snapring
8 - Ball bearing
9 - External snapring
10 - Torque converter stator
11 - Spacer
12 - Bolt, 1/4-28 x 1-1/4 in. (12) A
13 - Lockstrip (6)
14 - Torque converter pump retainer
15 - Torque converter pump assembly
16 - Special bolt, 5/16-24 x 1.30 in. (24)
17 - Torque converter pump gasket
18 - Double-row ball bearing
19 - Input accessory drive gear
20 - Sealring*
21 - Sealring

*Not used with "wet" housings

Torque	lb ft	N·m
A	10-12	14-16

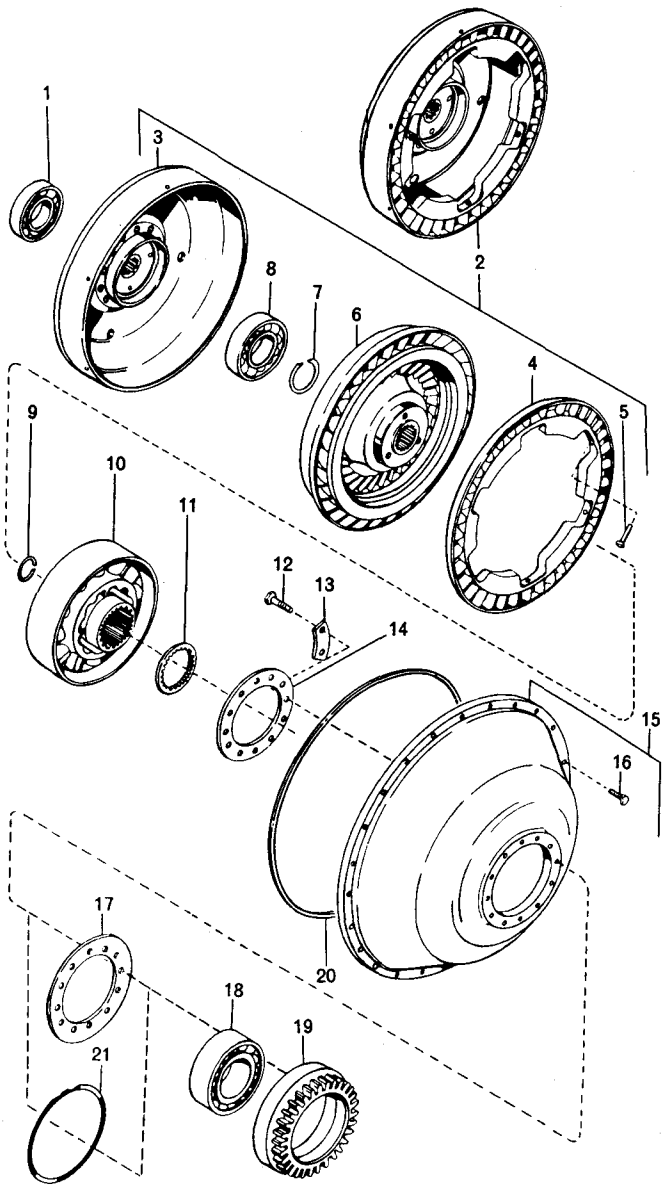
B

1 - Accessory drive gear
2 - Accessory-driven gear
3 - Bolt, 7/16-14 x 1-3/8 in. (23) A
4 - Lockwasher (23)
5 - Flat washer (23)
6 - Ball bearing
7 - External snapring
8 - Accessory drive shaft
9 - Ball bearing
10 - Ball bearing (standard duty)
11 - External snapring
12 - Ball bearing
13 - Converter ground sleeve
14 - Self-locking bolt,
5/16-18 x 3/4 in. (4) B
15 - Step-joint sealring
16 - Ball bearing
17 - Second-turbine drive gear
18 - Lubrication regulator valve guide pin
19 - Lubrication regulator valve spring
20 - Lubrication regulator valve
21 - Converter pressure regulator 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 kit
32 - Thermostat assembly
33 - Sealring
34 - Connector
35 - Adapter
36 - Converter housing assembly
37 - Pipe plug, 3/4 in. NPTF C
38 - Converter housing
39 - Plug, 1/2-14 PTF D
40 - Converter housing sleeve
41 - Dowel pin (2)
42 - Flat washer, 7/16 in.
43 - Lockwasher, 7/16 in.
44 - Bolt, 7/16-14 x 2-3/4 in. A
45 - Roller bearing (heavy duty)
46 - Diaphragm assembly*
47 - Oil seal*
48 - Diaphragm*
49 - Cup plug*
50 - Step-joint sealring

*Used with "dry" housings

Torque	lb ft	N·m
A	42-50	57-67
B	17-20	24-27
C	33-37	45-50
D	23-27	32-36

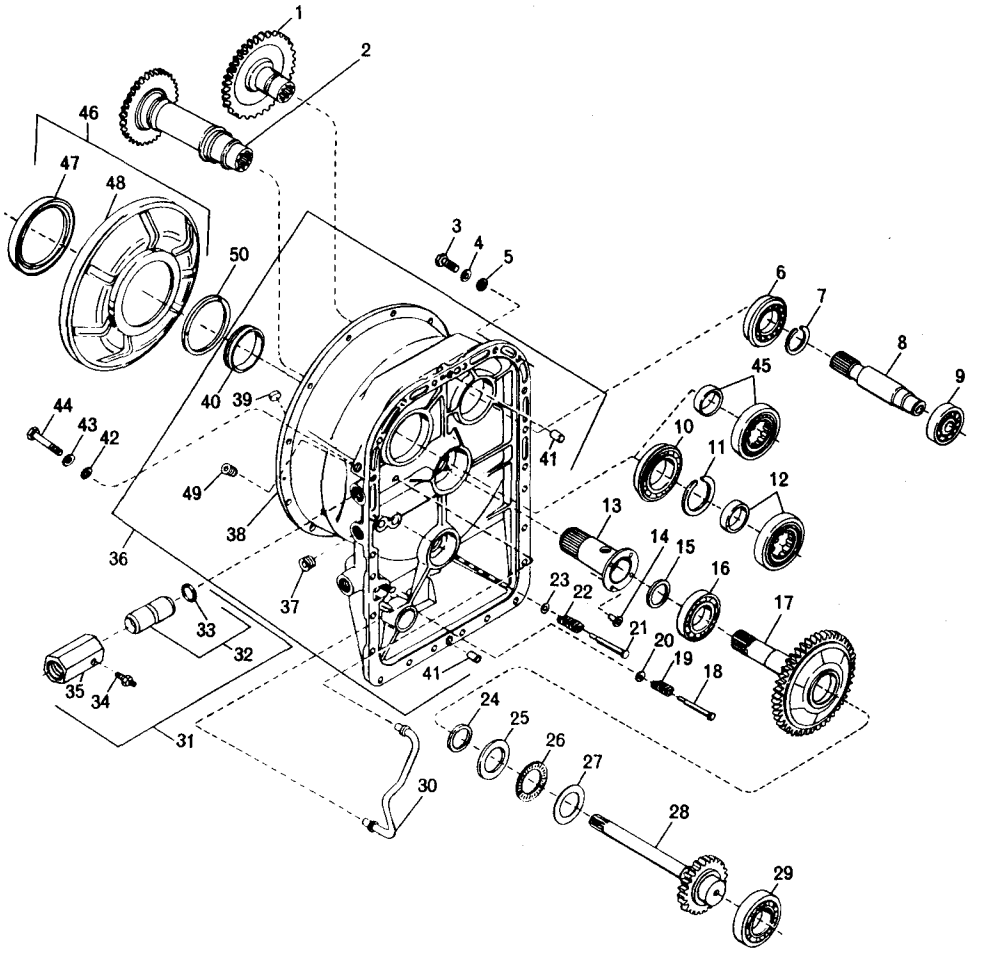
A



63778

Foldout 7,A. Torque converter

B



63780

Foldout 7,B. Torque converter housing and turbine drive gears

A

1 - Ball bearing
2 - Self-locking nut, 3/8-24 (12) A
3 - Second-turbine driven gear
4 - Ball bearing
5 - Spring retainer plate
6 - Spring pin (3)
7 - Spring (3)
8 - Freehweel roller cage
9 - Freewheel roller (15)
10 - Freewheel cam assembly
11 - Roll pin
12 - Freewheel cam
13 - Retainer plate
14 - Square-head bolt (12)
15 - Ball bearing
16 - Self-locking nut, 3/8-24 (12) A
17 - Second-turbine driven gear
18 - Ball bearing
19 - Spring retainer plate
20 - Spring pin (3)
21 - Spring (3)
22 - Freewheel roller cage
23 - Freewheel roller (15)
24 - Freewheel cam assembly
25 - Roll pin
26 - Freewheel cam
27 - Square-head bolt (12)
28 - First-turbine driven gear
29 - Bearing spacer
30 - Ball bearing
31 - Bearing spacer
32 - Ball bearing

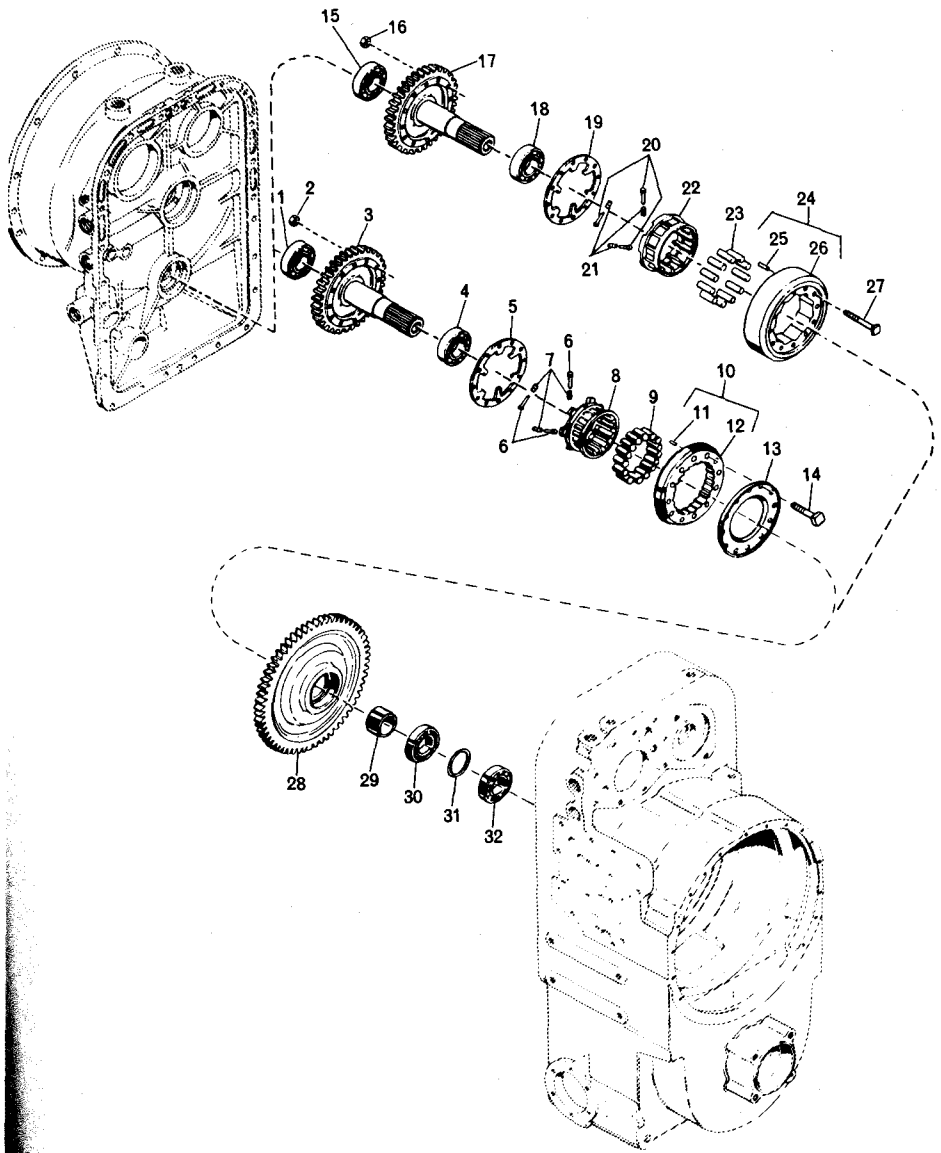
Torque	lb ft	N·m
A	41-49	56-66

B

1 - Self-locking bolt, 3/8-16 x 5/8 in. A
2 - Suction tube
3 - Male nut, 1 3/4-14 B
4 - Suction tube compression sealring
5 - Transmission housing gasket
6 - Remote filter plug
7 - Plug, 3/4-14 NPTF C
8 - Transmission housing
9 - Breather
10 - Cup plug
11 - Oil seal
12 - Accessory drive cup plug
13 - Bolt, 3/8-16 x 7/8 in. (6) D
14 - Lockwasher, 3/8 in. (6)
15 - Core hole cover
16 - Gasket
17 - Drain plug, 3/4-14 NPTF C
18 - Nameplate
19 - Drive screw, no. 4 x 1/4 in. (4)
20 - Bolt, 3/8-16 x 7/8 in. (6) D
21 - Lockwasher, 3/8 in. (6)
22 - Oil strainer assembly
23 - Gasket
24 - Anchor pin
25 - Oil filler plug
26 - Add-level oil plug, 1/4-18 NPTF E
27 - Full-level oil plug, 1/4-18 NPTF E
28 - Cup plug
29 - Flat washer
30 - Plug C

Torque	lb ft	N·m
A	36-43	49-58
B	120-150	163-204
C	33-37	45-50
D	26-32	36-43
E	14-16	19-21

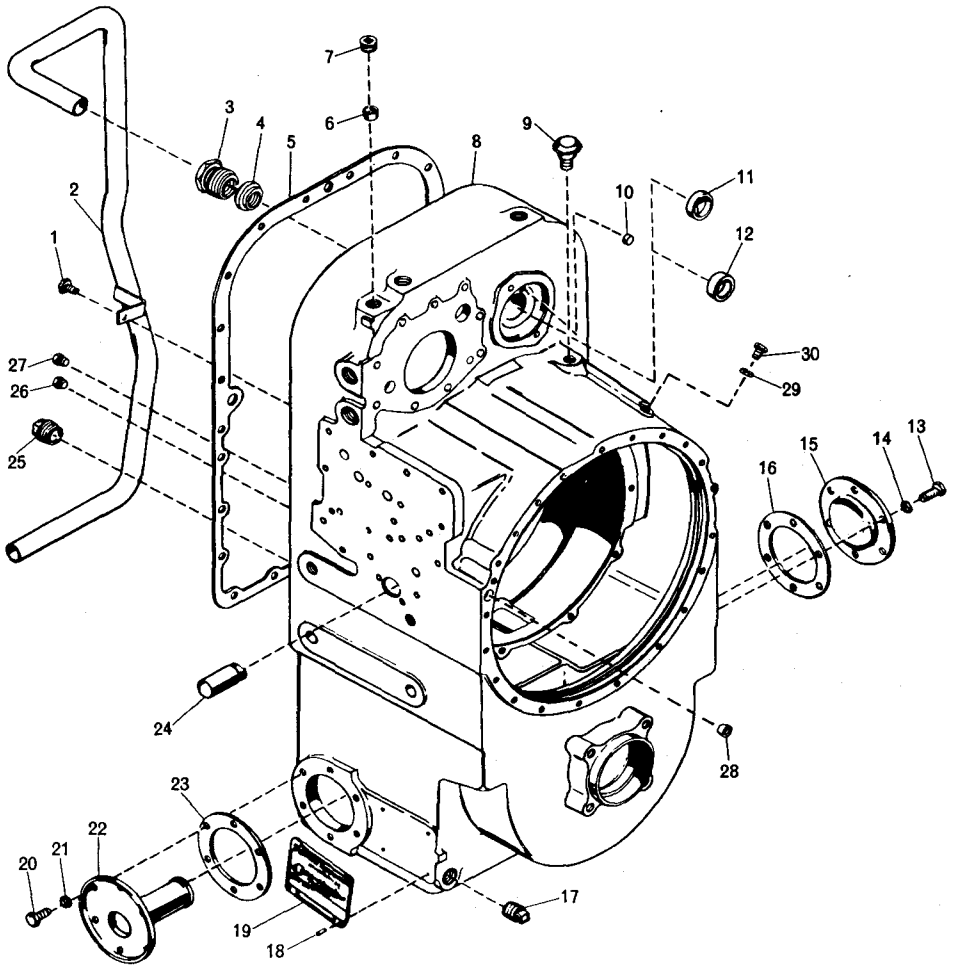
A



3803C

Foldout 8,A. Turbine driven gears and freewheel clutch

B



6382D

Foldout 8,B. Transmission housing (-1 models)

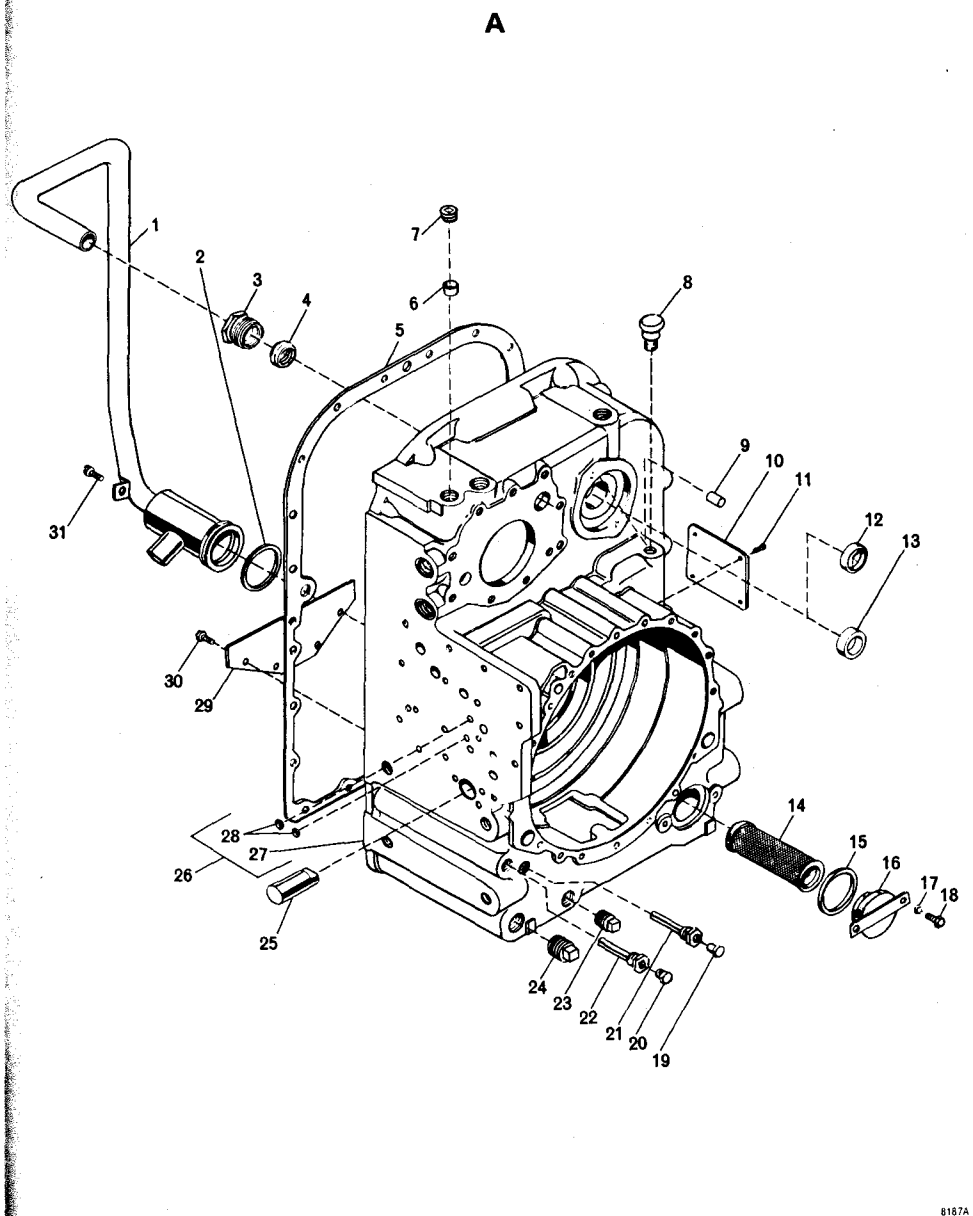
A

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

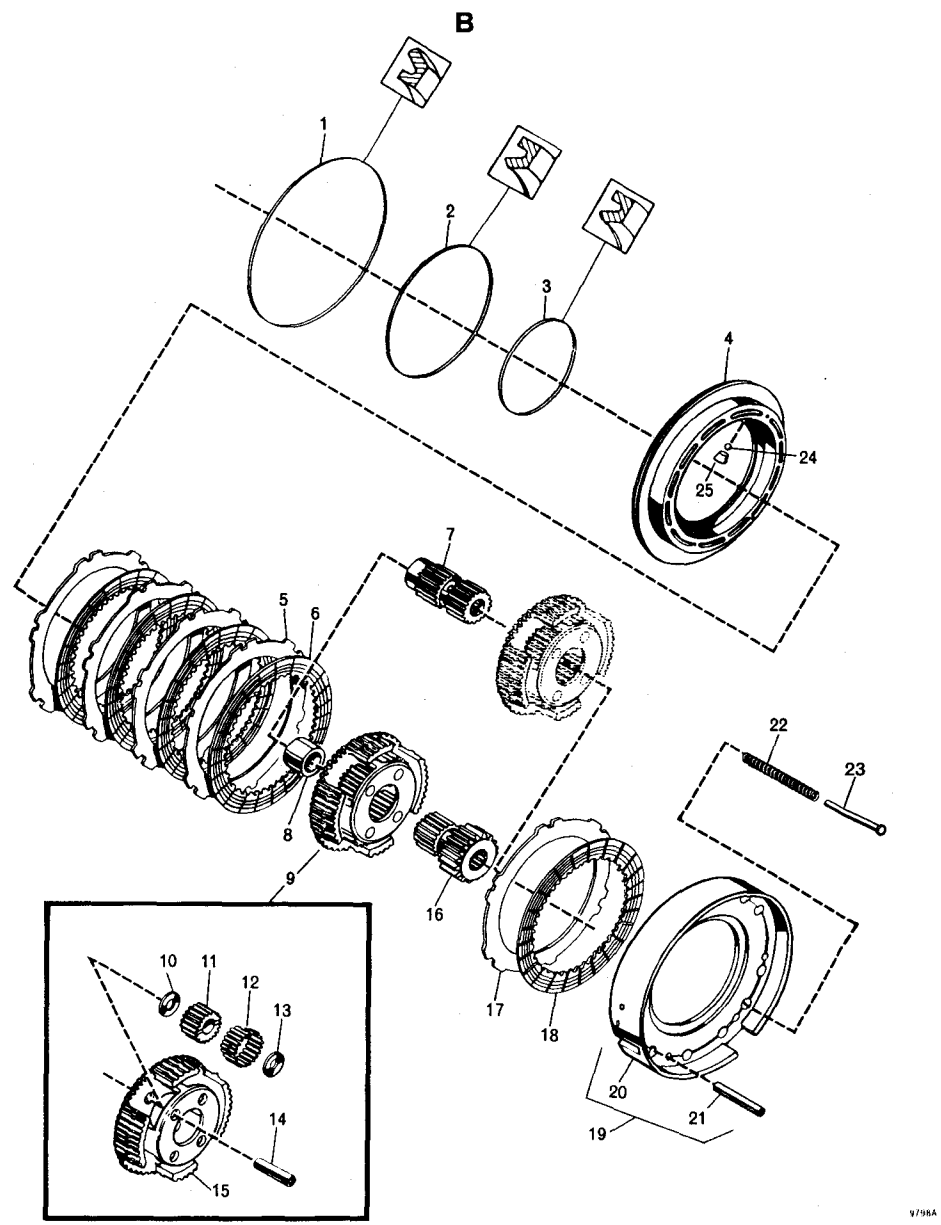
Torque	lb ft	N·m
A	120-150	163-204
B	33-37	45-50
C	26-32	36-43
D	Tighten sufficiently to prevent leakage	
E	17-20	23-27

B

1 - Piston sealring
2 - Piston sealring
3 - Piston sealring
4 - Reverse clutch piston
5 - External-tanged, reverse clutch plate (4)
6 - Internal-splined, reverse clutch plate (4)
7 - Forward-and-reverse sun gear (standard-speed low gear)
8 - Spacer
9 - Reverse planetary carrier assembly
10 - Thrust washer (4)
11 - Planetary pinion (matched set of 4)
12 - Pinion roller (88)
13 - Thrust washer (4)
14 - Spindle (4)
15 - Reverse planetary carrier
16 - Forward-and-reverse sun gear (high speed, low gear)
17 - External-tanged reverse clutch plate
18 - Internal-splined reverse clutch plate
19 - Forward-and-reverse clutch anchor assembly
20 - Forward-and-reverse clutch anchor
21 - Anchor pin (6)
22 - Piston return spring (12)
23 - Return spring guide pin (12)
24 - Check ball, white (2)
25 - Retainer (2)



Foldout 9,A. Transmission housing (-3 models)



Foldout 9,B. Reverse clutch and planetary

A

1 - Reverse ring gear
2 - Thrust washer
3 - Forward planetary carrier assembly
4 - Spindle (4)
5 - Thrust washer (4)
6 - Pinion roller (88)
7 - Pinion (matched set of 4)
8 - Thrust washer (4)
9 - Forward planetary carrier
10 - Forward planetary carrier assembly
11 - Spindle (6)
12 - Thrust washer (6)
13 - Pinion roller (120)
14 - Pinion (matched set of 6)
15 - Thrust washer (6)
16 - Forward planetary carrier
17 - Forward planetary carrier assembly
18 - Spindle (6)
19 - Thrust washer (6)
20 - Pinion roller (120)
21 - Pinion (matched set of 6)
22 - Thrust washer (6)
23 - Forward planetary carrier
24 - Thrust washer
25 - Internal snapring
26 - Internal-splined low-range clutch plate (4)
27 - External-tanged low-range clutch plate (4)
28 - Forward ring gear
29 - Forward clutch piston assembly
30 - Check ball and retainer kit
31 - Check ball, white (2)
32 - Retainer (2)
33 - Forward clutch piston
34 - Piston sealring
35 - Piston sealring
36 - Piston sealring
37 - Forward clutch piston housing
38 - Self-locking bolt (10) A
3/8-16 x 1-1/2-in. (earlier models)*
3/8-16 x 1-3/4-in. (later models)
39 - Plug, 1/4-18 PTF B

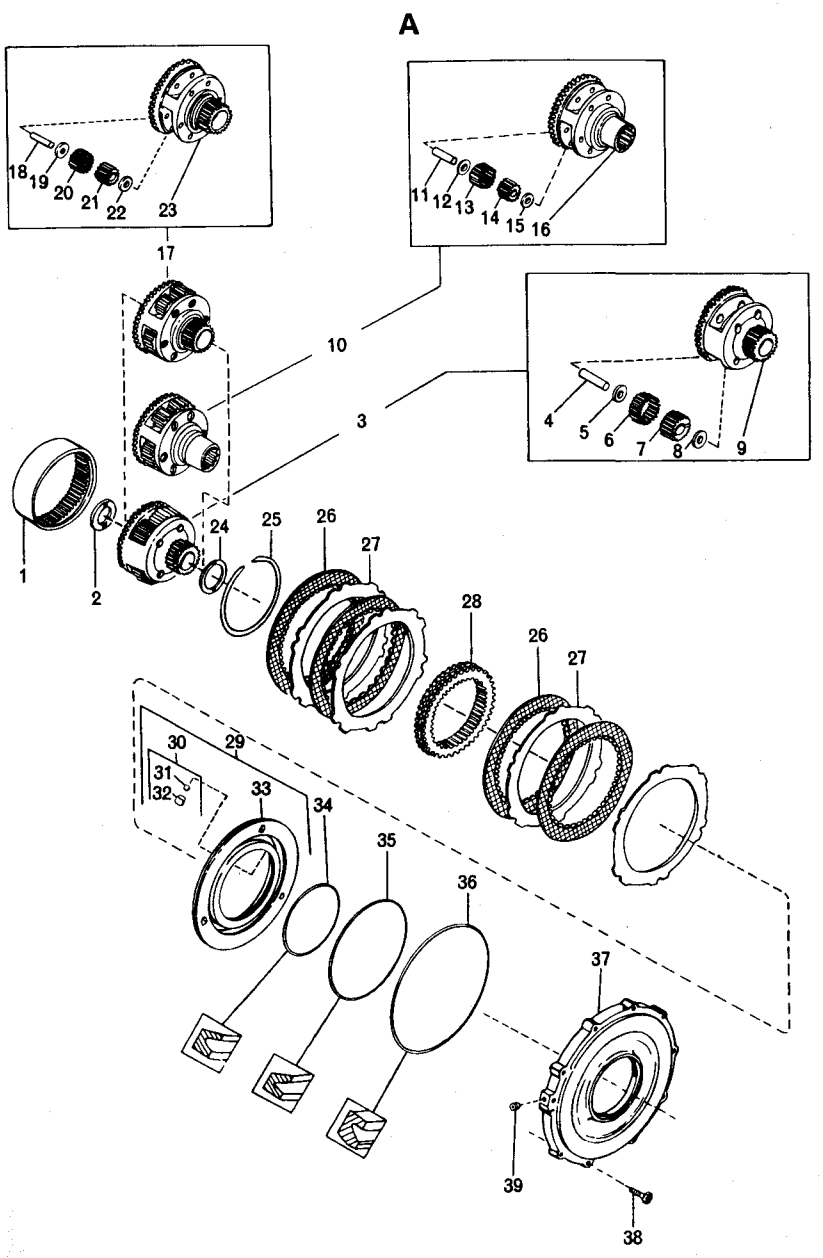
*Used with flat washers

Torque	lb ft	N·m
A	36-43	49-58
B	14-16	19-21

B

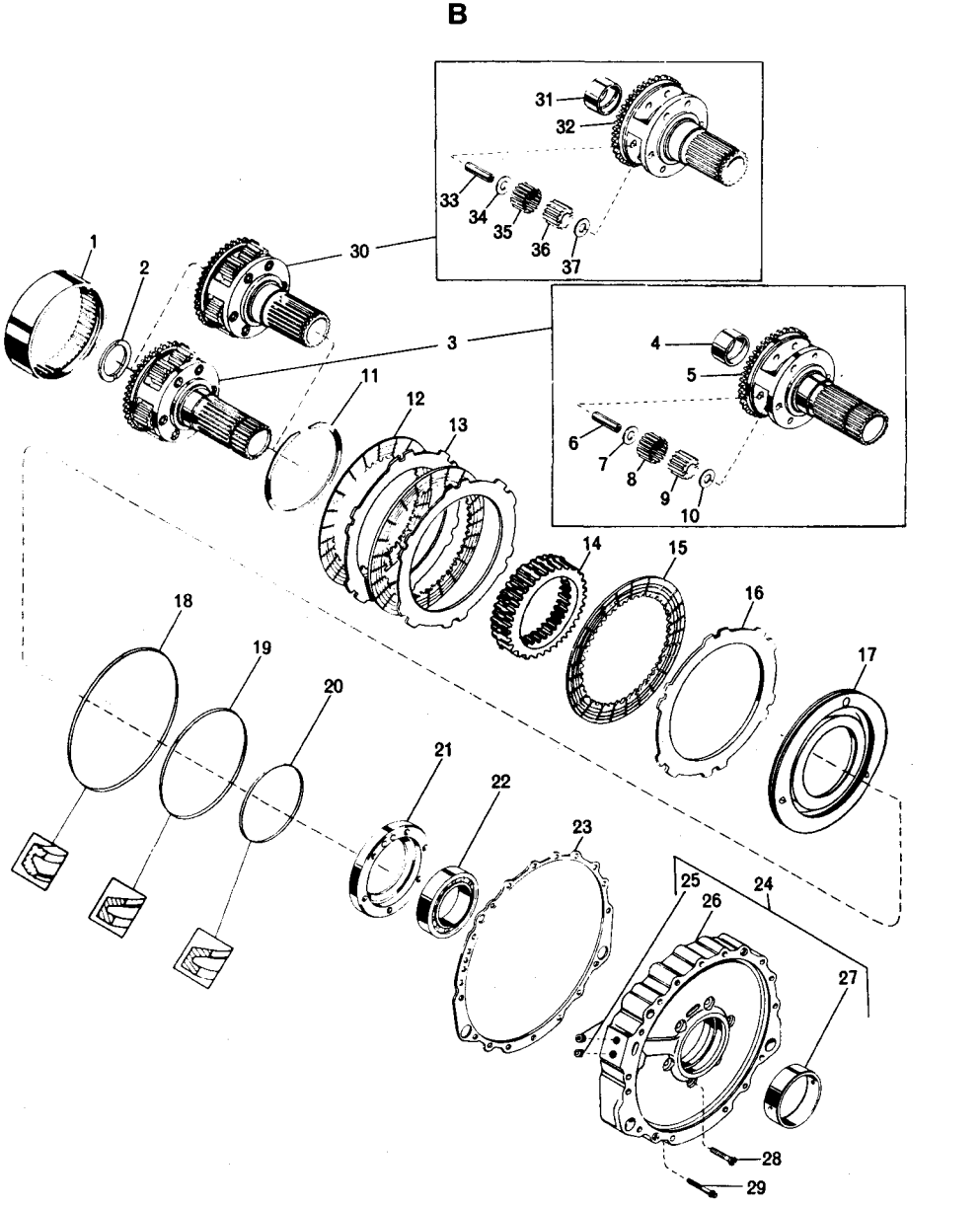
1 - Reverse planetary ring gear
2 - Thrust washer
3 - Forward planetary carrier assembly
4 - Bushing
5 - Forward planetary carrier
6 - Spindle (6)
7 - Thrust washer (6)
8 - Roller (120)
9 - Pinion (matched set of 6)
10 - Thrust washer (6)
11 - Internal snapring
12 - Internal-splined clutch plate (2)
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 in. (2) A
26 - Adapter
27 - Sleeve
28 - Self-locking bolt, 3/8-24 x 1-1/4 in. (6) B
29 - Twelve-point bolt, 3/8-16 x 1-3/4 in. (2) C
30 - Forward planetary carrier assembly
31 - Bushing
32 - Forward planetary carrier
33 - Spindle (6)
34 - Thrust washer (6)
35 - Roller (120)
36 - Pinion (matched set of 6)
37 - Thrust washer (6)

Torque	lb ft	N·m
A	8-10	11-13
B	41-49	56-66
C	36-43	49-58



1354

Foldout 10,A. Forward clutch and planetary (-1 models)



9850

Foldout 10,B. Forward clutch and planetary (TRT 2221-3, 2421-3)

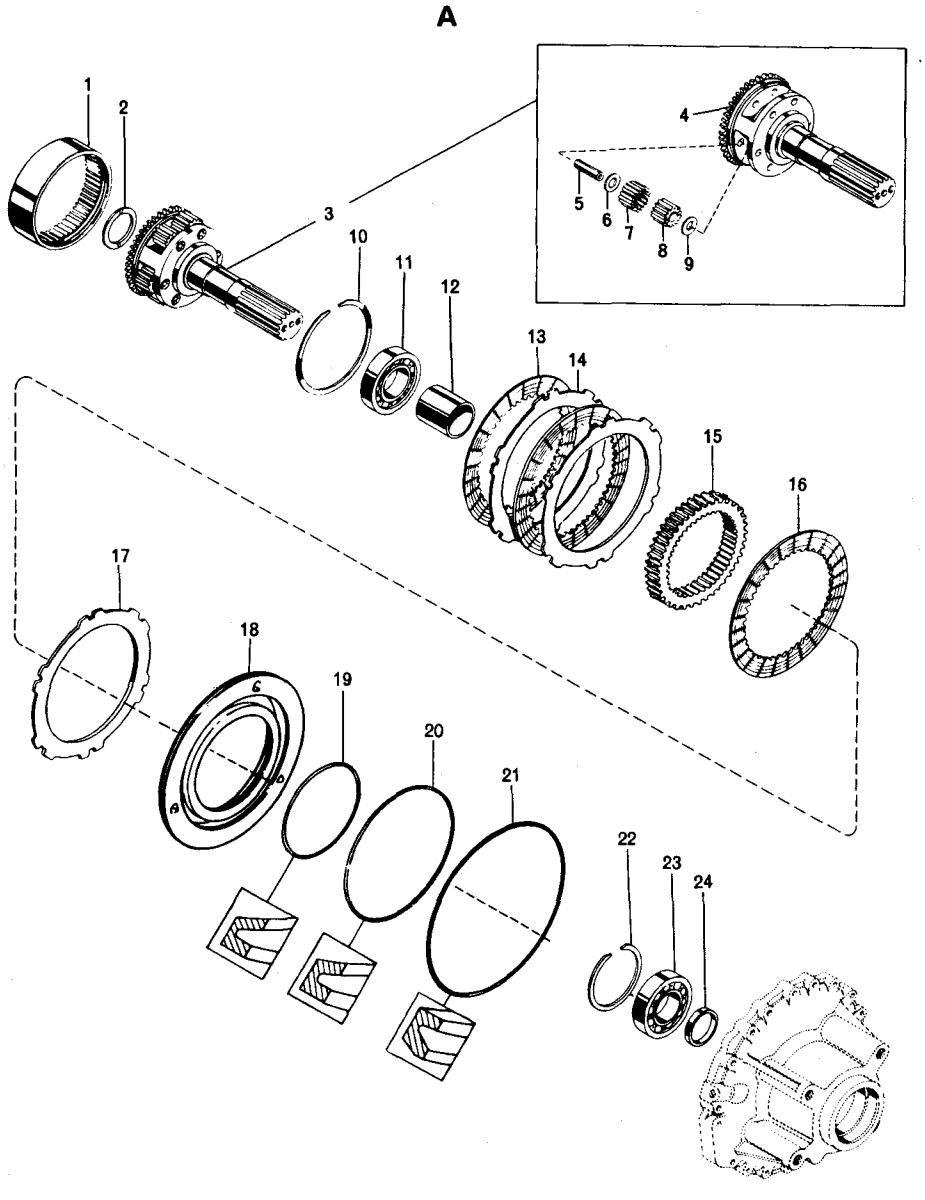
A

1 - Reverse planetary ring gear
2 - Thrust washer
3 - Forward planetary carrier assembly
4 - Forward planetary carrier
5 - Spindle (6)
6 - Thrust washer (6)
7 - Roller (120)
8 - Pinion (matched set of 6)
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

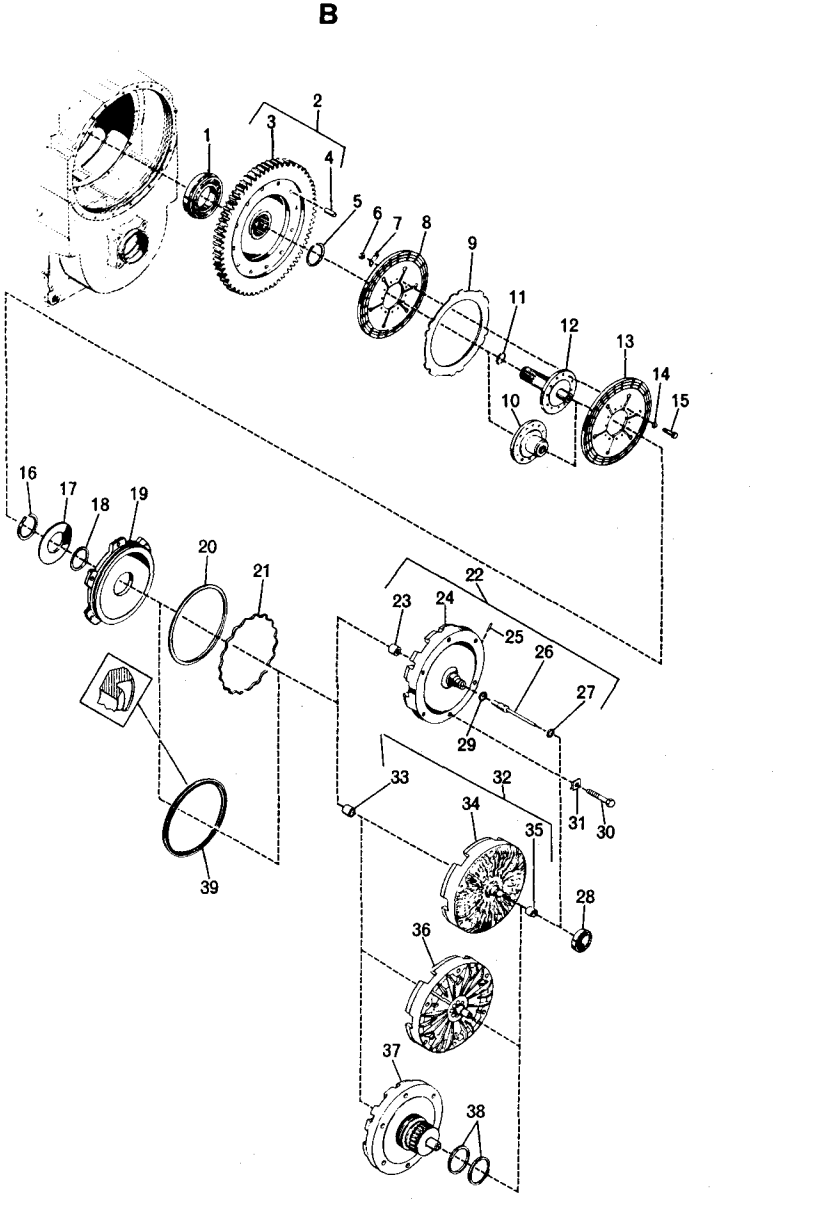
B

1 - Ball bearing
2 - Transfer drive gear assembly
3 - Transfer drive gear
4 - Pin (6)
5 - External snapring
6 - Nut, 5/16-24 (12) A
7 - Lockstrip (6)
8 - High-range clutch plate
9 - High-range, external-tanged clutch plate
10 - High-range clutch hub (PTO)
11 - External snapring
12 - High-range clutch hub
13 - High-range clutch plate
14 - Flat washer (12)
15 - Self-locking bolt, 5/16-24 x 7/8 in. (12)
16 - External snapring
17 - High-range clutch piston return spring
18 - Hook-type sealring
19 - High-range clutch piston
20 - Sealring
21 - Sealring expander
22 - High-range clutch piston housing assembly (speedometer drive)
23 - Bushing
24 - High-range clutch piston housing
25 - Pin
26 - Speedometer drive shaft
27 - Hook-type sealring
28 - Ball bearing
29 - Hook-type sealring
30 - Bolt, 1/2-20 x 2-3/4 in. (6) B
31 - Lock tab (6)
32 - High-range clutch piston housing assembly (earlier models)
33 - Bushing
34 - High-range clutch piston housing
35 - Sleeve
36 - High-range clutch piston housing assembly (later models)
37 - High-range clutch piston housing (PTO without brake)
38 - Step-joint sealring (2)
39 - Sealring

Torque	lb ft	N·m
A	14-18	19-24
B	83-100	113-135



Foldout 11,A. Forward clutch and planetary (TRT 2211-3, 2411-3)



Foldout 11,B. High-range clutch and piston housing (TT models)

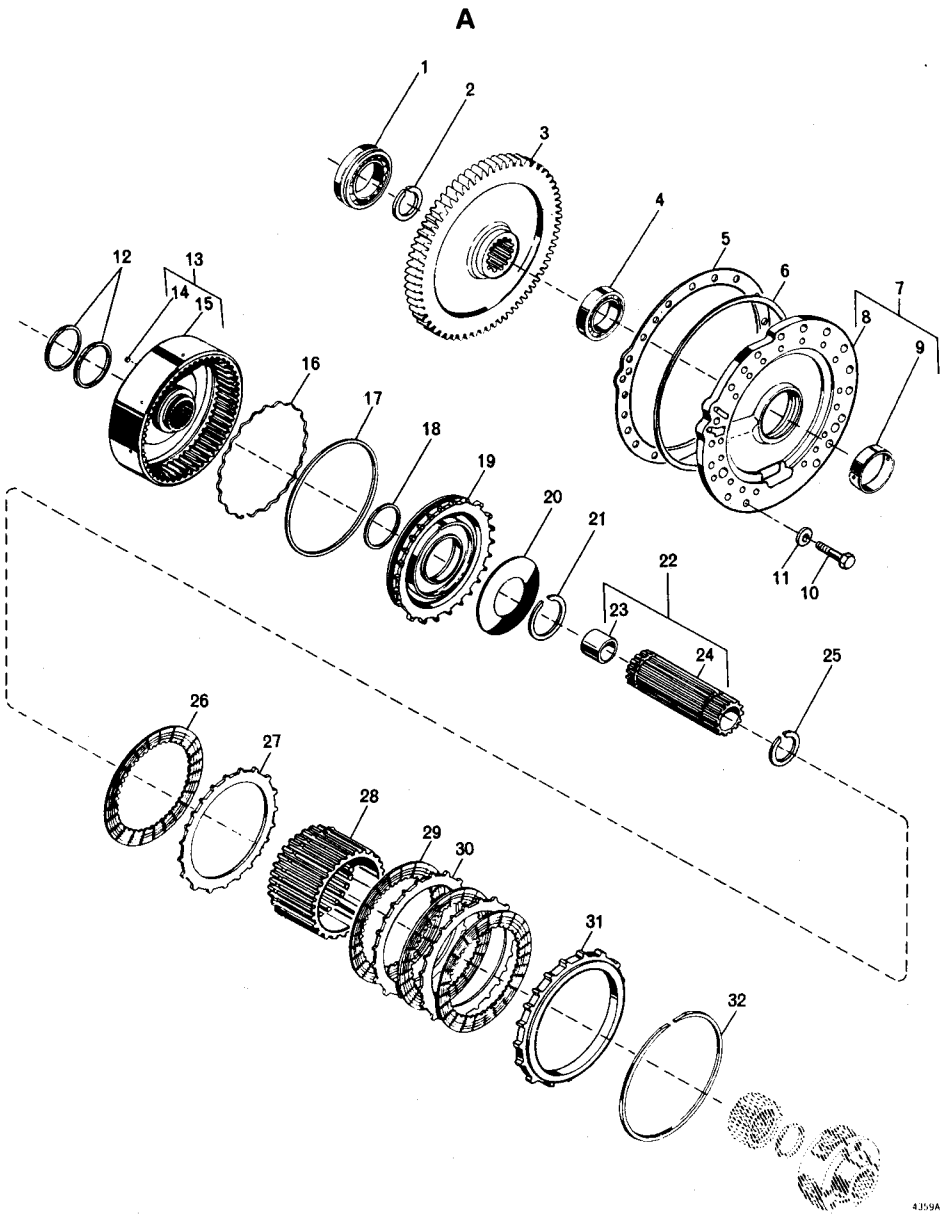
A

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 in. (16) A
11 - Lockwasher, 3/8 in. (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 ring gear
29 - Internal-splined clutch plate (3)
30 - External-splined clutch plate (2)
31 - Low-range clutch backplate
32 - Internal snapring

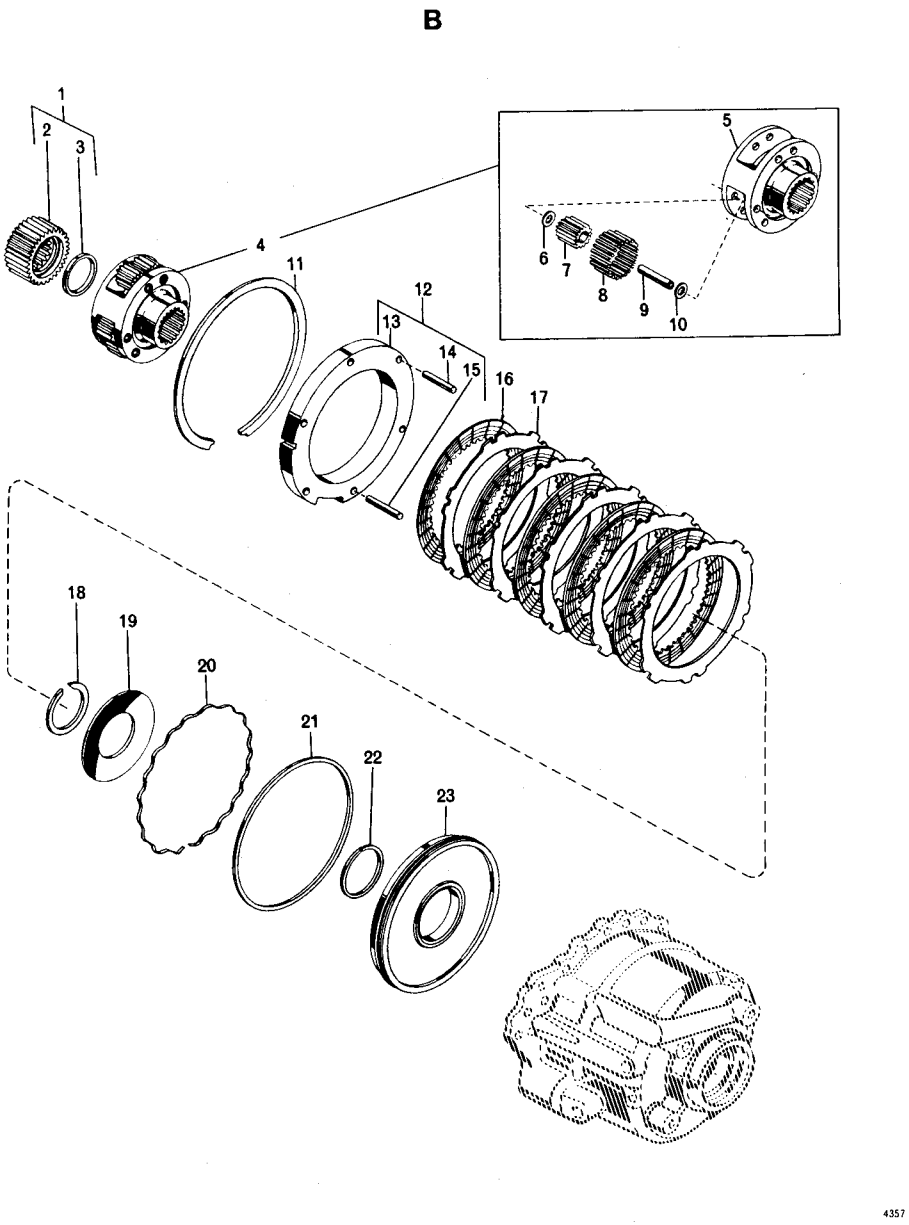
Torque	lb ft	N·m
A	26-32	36-43

B

1 - High-range planetary sun gear assembly
2 - Sun gear
3 - Thrust washer
4 - High-range planetary carrier assembly
5 - High-range planetary carrier
6 - Thrust washer (6)
7 - Pinion (matched set of 6)
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



Foldout 12,A. Low-range clutch and transfer drive gear (TRT-1 models)



Foldout 12,B. High-range clutch and planetary (TRT-1 models)

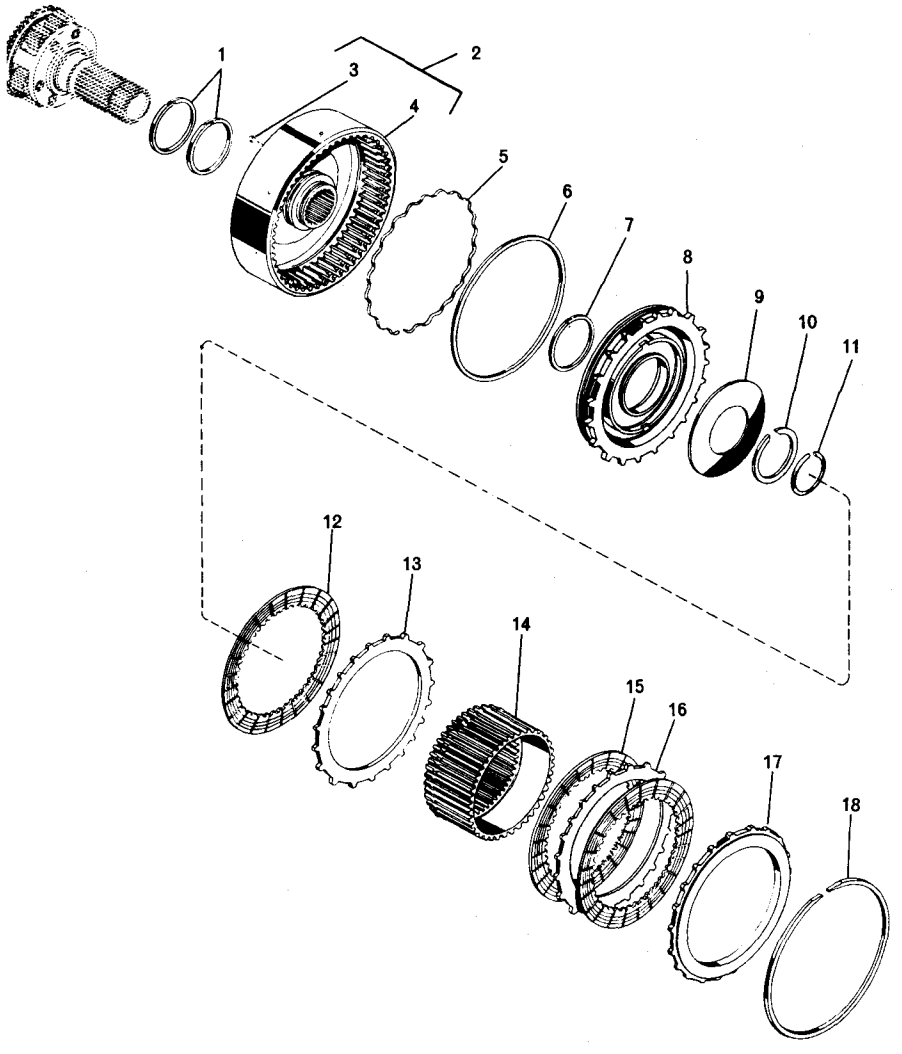
A

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 ring gear
15 - Internal-splined clutch plate (2)
16 - External-splined clutch plate
17 - High-range clutch backplate
18 - Internal snapring

B

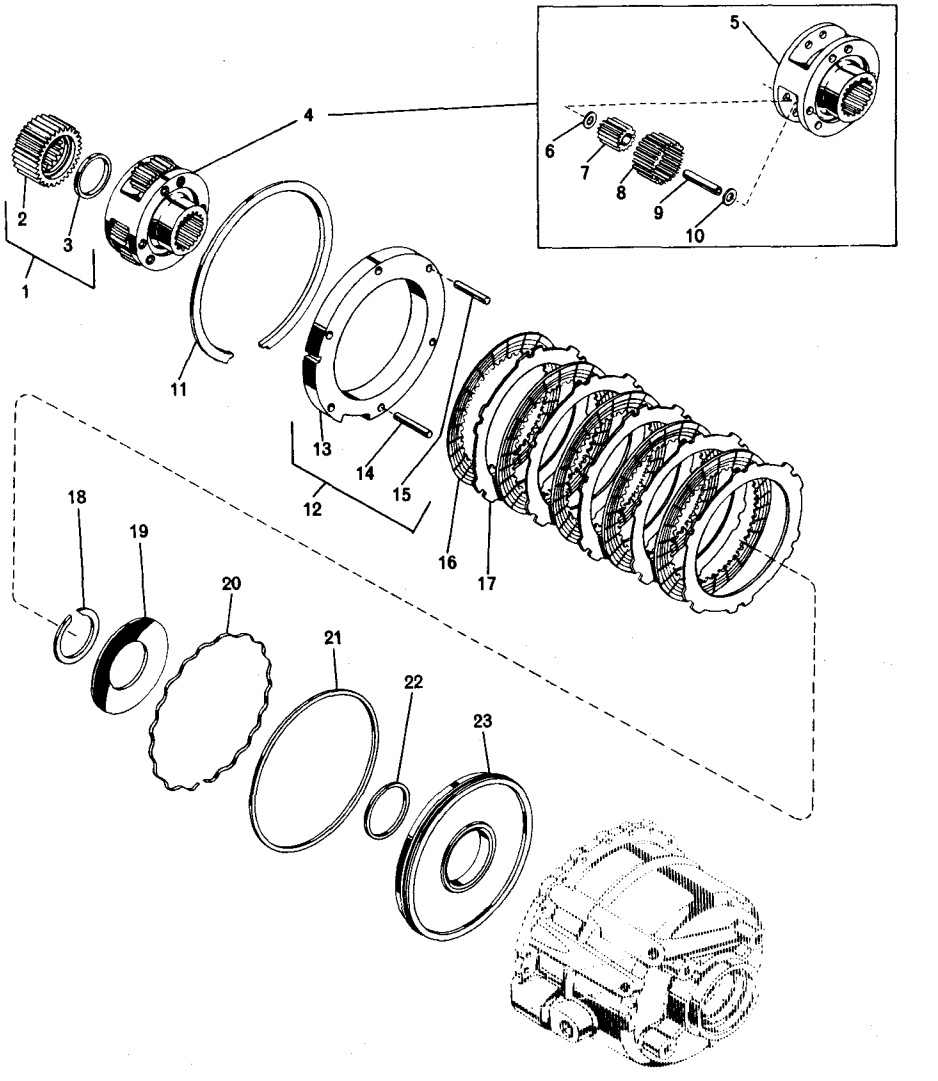
1 - Low-range planetary sun gear assembly
2 - Sun gear
3 - Thrust washer
4 - Low-range planetary carrier assembly
5 - Low-range planetary carrier
6 - Thrust washer (6)
7 - Pinion (matched set of 6)
8 - Roller (96)
9 - Spindle (6)
10 - Thrust wasehr (6)
11 - Internal snapring
12 - Low-range clutch anchor 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

A



Iout 13,A. High-range clutch, low-range ring gear (TRT 2221-3, 2421-3 with underdrive)

B



Foldout 13,B. Low-range clutch and planetary (-3 models with underdrive)

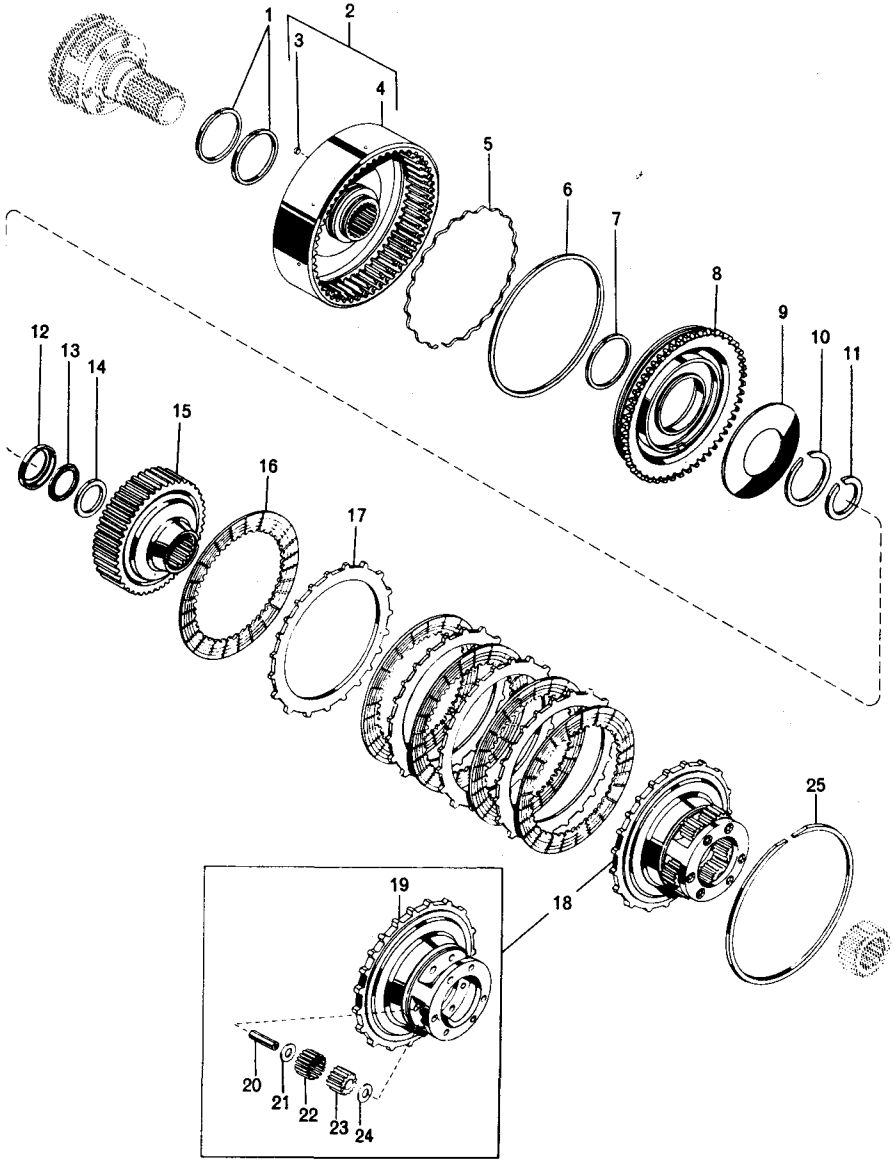
A

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 race
13 - Roller bearing
14 - Bearing 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 - High-range planetary carrier
20 - Spindle (6)
21 - Thrust washer (6)
22 - Roller (120)
23 - Pinion (matched set of 6)
24 - Thrust washer (6)
25 - Internal snapring

B

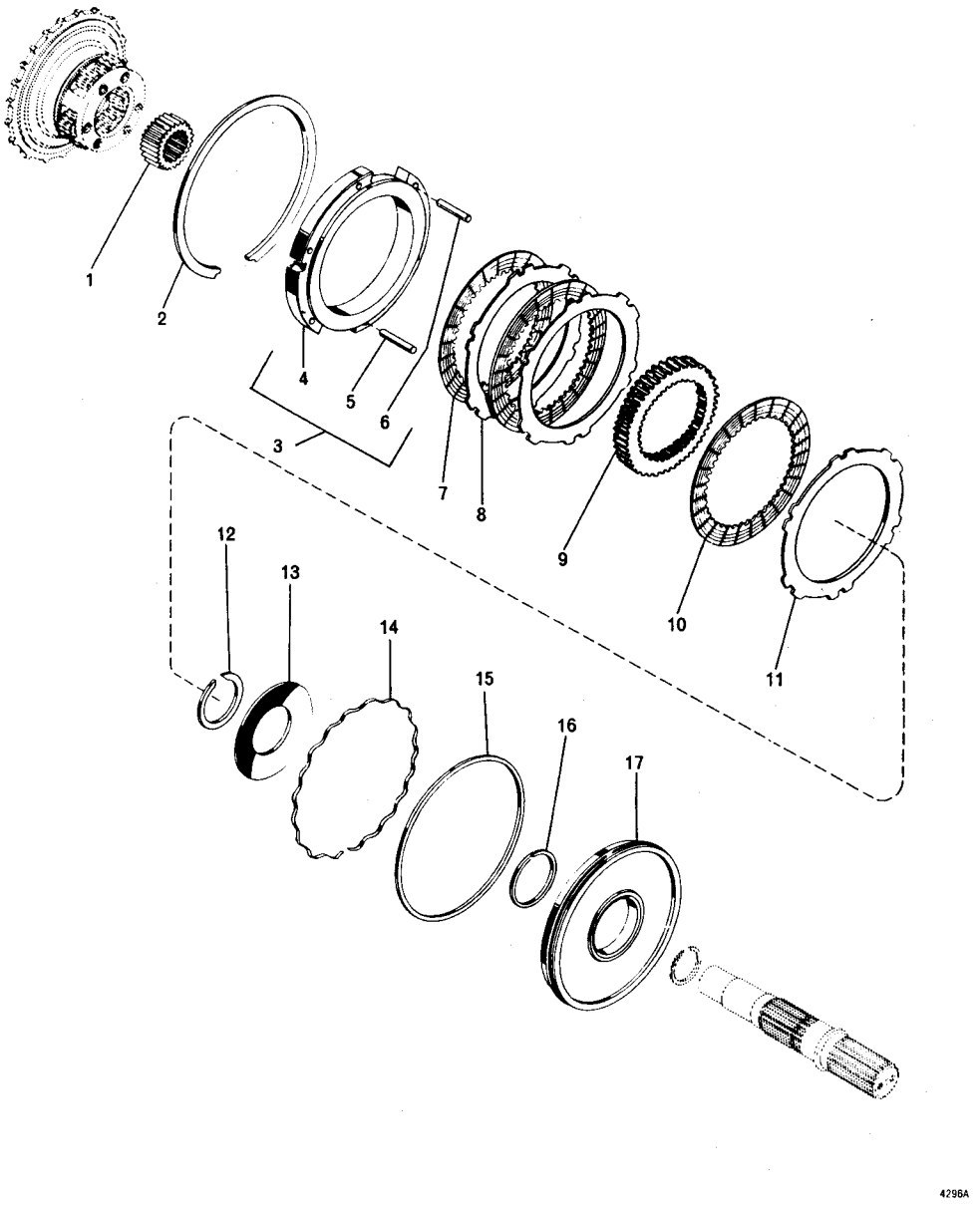
1 - High-range planetary sun gear
2 - Internal snapring
3 - High-range clutch anchor assembly
4 - Anchor
5 - Pin (long) (2)
6 - Pin (short) (4)
7 - Internal-splined clutch plate (2)
8 - External-tanged clutch plate (2)
9 - High-range ring gear
10 - Internal-splined clutch plate
11 - External-tanged clutch 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

A



Foldout 14,A. Low-range clutch, high-range planetary (-3 models with overdrive)

B



Foldout 14,B. High-range clutch, planetary sun and ring gears (-3 models with overdrive)

A

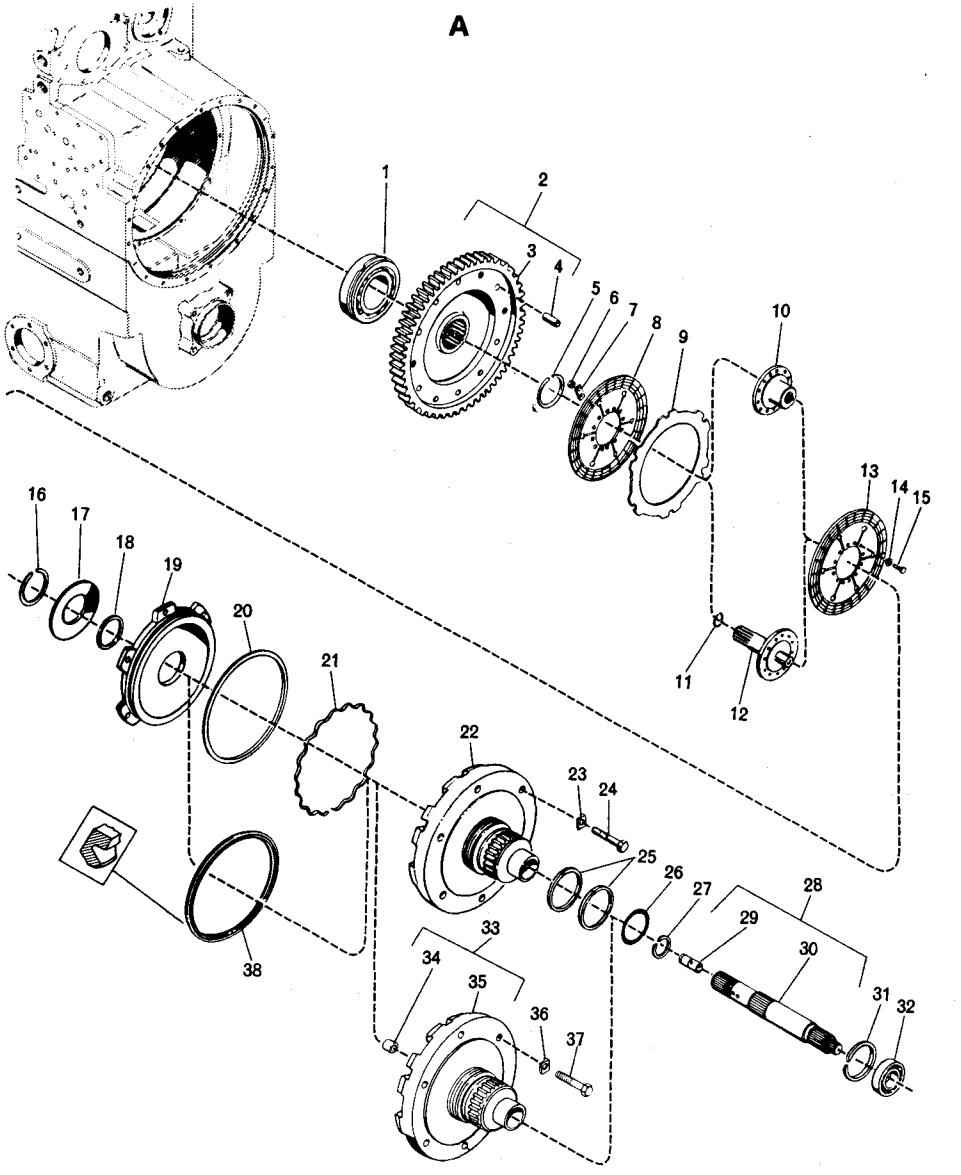
1 - Ball bearing
2 - Transfer drive gear assembly
3 - Transfer drive gear
4 - Pin (6)
5 - External snapring
6 - Nut, 5/16-24 (12) A
7 - Lockstrip (6)
8 - High-range clutch plate
9 - High-range, external-tanged clutch plate
10 - High-range clutch hub (models with converter-driven PTO)
11 - External snapring
12 - High-range clutch hub
13 - High-range clutch plate
14 - Flat washer (12)
15 - Self-locking bolt, 5/16-24 x 7/8 in. (12)
16 - External snapring
17 - Piston return spring
18 - Hook-type sealring
19 - High-range clutch piston
20 - Sealring
21 - Sealring expander
22 - High-range clutch piston housing (PTO)
23 - Lock tab (6)
24 - Bolt, 1/2-20 x 2-3/4 in. (6) B
25 - Step-joint sealring (2)
26 - O-ring seal
27 - External snapring
28 - PTO shaft assembly
29 - Pin
30 - PTO shaft
31 - Internal snapring
32 - Ball bearing
33 - High-range clutch piston housing assembly
34 - Bushing
35 - High-range clutch piston housing
36 - Lock tab (6)
37 - Bolt, 1/2-20 x 2-3/4 in. (6) B
38 - Sealring

Torque	lb ft	N·m
A	14-18	19-24
B	83-100	113-135

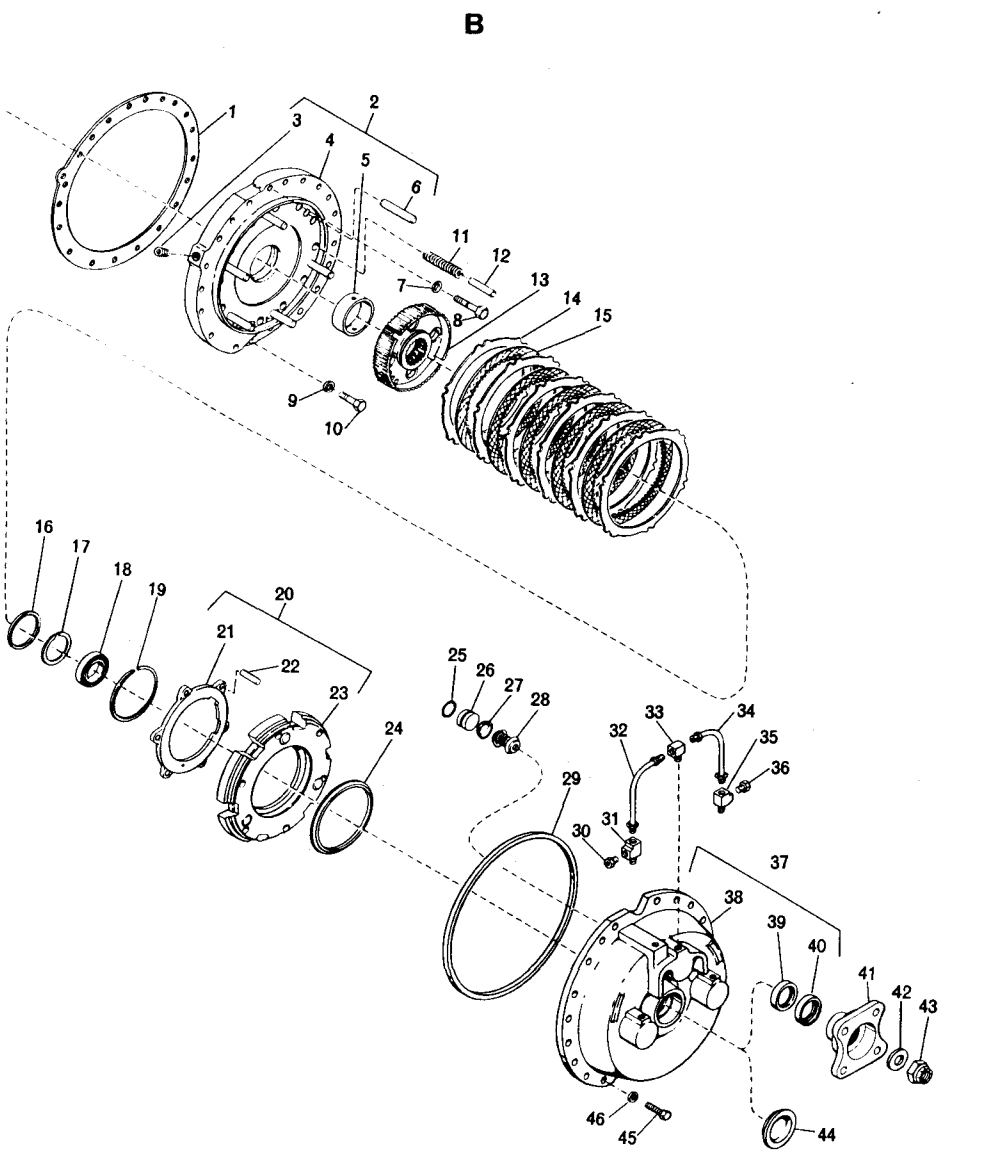
B

1 - Gasket
2 - Diaphragm assembly
3 - Pipe plug, 1/4 in. NPTF A
4 - Diaphragm
5 - Sleeve
6 - Pin (6)
7 - Lockwasher, 3/8 in.
8 - Bolt, 3/8-16 x 2 in. B
9 - Lockwasher, 3/8 in. (2)
10 - Bolt, 3/8-16 x 1-1/8 in. (2) B
11 - Brake return spring (12)
12 - Spring guide pin (12)
13 - Brake hub
14 - External-tanged brake plate (6)
15 - Internal-splined brake plate (5)
16 - Step-joint sealring
17 - External snapring
18 - Ball bearing
19 - External snapring
20 - Brake-apply plate assembly
21 - Brake adjusting ring
22 - Spring pin (6)
23 - Brake-apply plate
24 - Sealring
25 - Sealring (3)
26 - Brake piston (3)
27 - Brake piston cup (3)
28 - Expander assembly (3)
29 - Sealring
30 - Plug, 7/16-20 C
31 - Brake manifold fitting C
32 - Brake manifold
33 - Brake manifold fitting C
34 - Brake manifold
35 - Brake manifold fitting C
36 - Plug, 7/16-20 C
37 - Rear cover assembly (PTO)
38 - Rear cover
39 - Lip-type oil seal
40 - Dust shield
41 - PTO output flange
42 - Flange retaining washer
43 - Self-locking nut, 7/8-14 C
44 - Plug
45 - Bolt, 3/8-16 x 2-3/4 in. (18) B
46 - Lockwasher, 3/8 in. (18)

Torque	lb ft	N·m
A	14-16	19-21
B	26-32	35-43
C	275-325	373-440



Foldout 15,A. High-range clutch and piston housing (TTB models)



Foldout 15,B. Internal brake and rear cover (TTB models)

A

1 - Rear housing gasket
2 - Rear housing
3 - Lockwasher, 3/8 in. (17)
4 - Bolt, 3/8-16 x 1-1/8 in. (17) A
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 in. B
15 - Bolt, 3/8-16 x 1-1/2 in. (3) A
16 - Lockwasher, 3/8 in. (3)

Torque	lb ft	N·m
A	26-32	36-43
B	8-10	11-13

B

1 - Rear housing gasket
2 - Rear housing
3 - Lockwasher, 3/8 in. (15)
4 - Bolt, 3/8-16 x 2-3/4 in. (15) A
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 in. B
15 - Plug, 3/8 in. C

Torque	lb ft	N·m
A	26-32	36-43
B	8-10	11-13
C	12-16	17-21

C

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

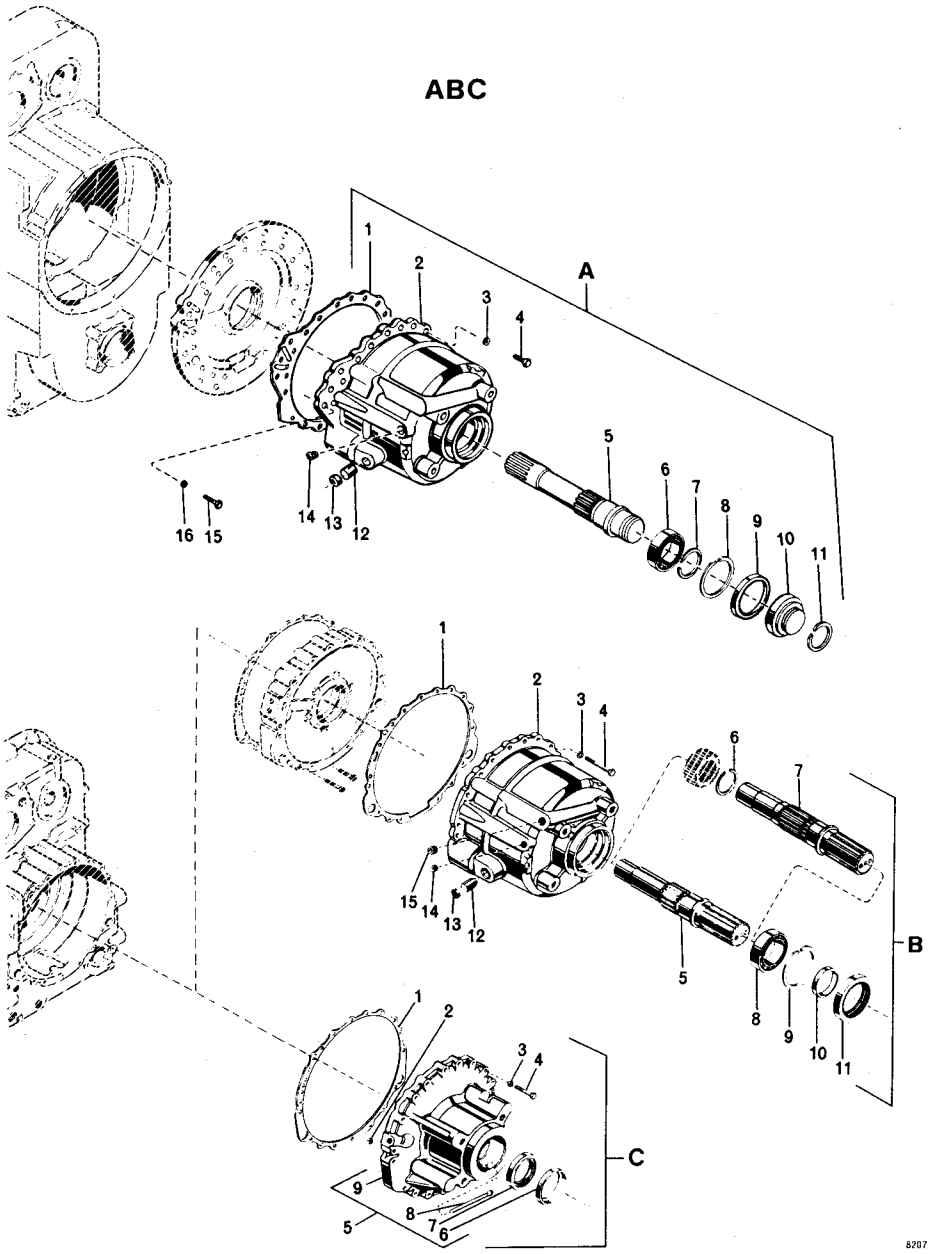
Torque	lb ft	N·m
A	4-5	5.5-6.7
B	26-32	36-43

D

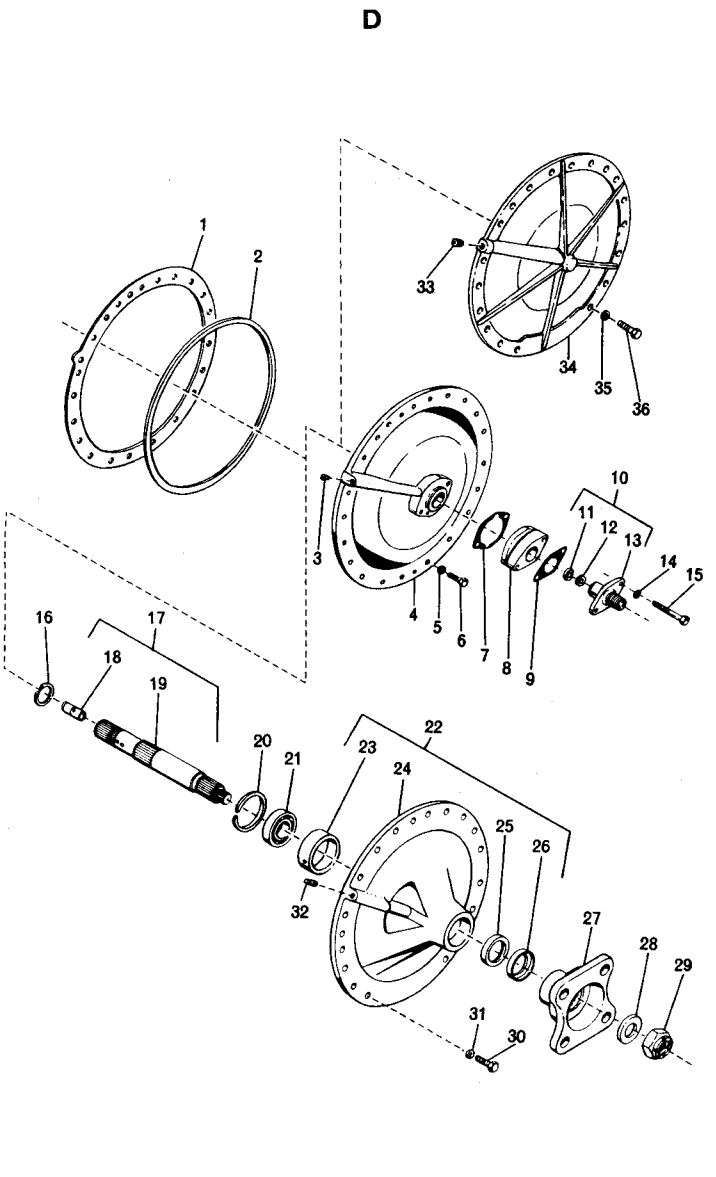
1 - Gasket
2 - Sealring
3 - Pipe plug A
4 - Rear cover (with speedometer drive)
5 - Lockwasher, 3/8 in. (19)
6 - Bolt, 3/8-16 x 1-1/8 in. (19) B
7 - Gasket
8 - Speedometer drive adapter
9 - Gasket
10 - Speedometer drive sleeve assembly
11 - Lip-type oil seal
12 - Washer (cork)
13 - Speedometer drive sleeve
14 - Lockwasher, 5/16 in. (2)
15 - Bolt, 5/16-18 x 2-1/4 in. (2) C
16 - External snapring
17 - PTO shaft assembly
18 - Pin
19 - PTO shaft
20 - Internal snapring
21 - Ball bearing
22 - Rear PTO cover assembly
23 - Sleeve
24 - Rear cover
25 - Lip-type oil seal
26 - Dust shield
27 - PTO output flange
28 - Flange retaining washer
29 - Self-locking nut, 7/8-14 D
30 - Bolt, 3/8-16 x 1-1/8 in. (19) B
31 - Lockwasher, 3/8 in. (19)
32 - Pipe plug A
33 - Pipe plug A
34 - Rear cover
35 - Lockwasher, 3/8 in. (19)
36 - Bolt, 3/8-16 x 1-1/8 in. (19) B

Torque	lb ft	N·m
A	10-12*	14-16*
	18-22**	25-29**
B	26-32	35-43
C	13-16	18-21
D	275-325	373-440

* For 1/8 in. NPTF plugs
** For 3/8 in. NPTF plugs



Foldout 16,A,B,C. Rear housings and output shafts (TRT models)



Foldout 16,D. Rear covers and PTO shaft (TT models)

A

1 - Flange retaining nut, 1-1/4-12 A (nylon insert)
2 - Flange washer
3 - Sealring (use after S/N 23290)
4 - Flange (Mechanics 5C)
5 - Flange spacer
6 - Flange (Type 5N)
7 - Flange (S1480)
8 - Front output shaft orifice plug
9 - Lip-type oil seal
10 - Internal snapring
11 - Ball bearing
12 - Output shaft
13 - Front output shaft
14 - Detent ball (2)
15 - Detent spring
16 - Shifter fork shaft orifice plug
17 - Lip-type oil seal
18 - Shifter fork shaft
19 - Shifter fork
20 - Disconnect coupling
21 - Ball bearing
22 - Spacer
23 - Transfer-driven gear
24 - Rear output shaft assembly
25 - Bushing
26 - Rear output shaft
27 - Spacer
28 - Ball bearing
29 - Internal snapring
30 - Lip-type oil seal
31 - Flange (Type 5N)
32 - Flange (Mechanics 5C)
33 - Spacer
34 - Flange (Mechanics 5C)
35 - Flange (S1480)
36 - Flange (Mechanics 5C)
37 - Sealring (use after S/N 23290)
38 - Flange washer
39 - Flange retaining nut, 1-1/4-12 A (nylon insert)

Torque	lb ft	N·m
A	450-700	611-949

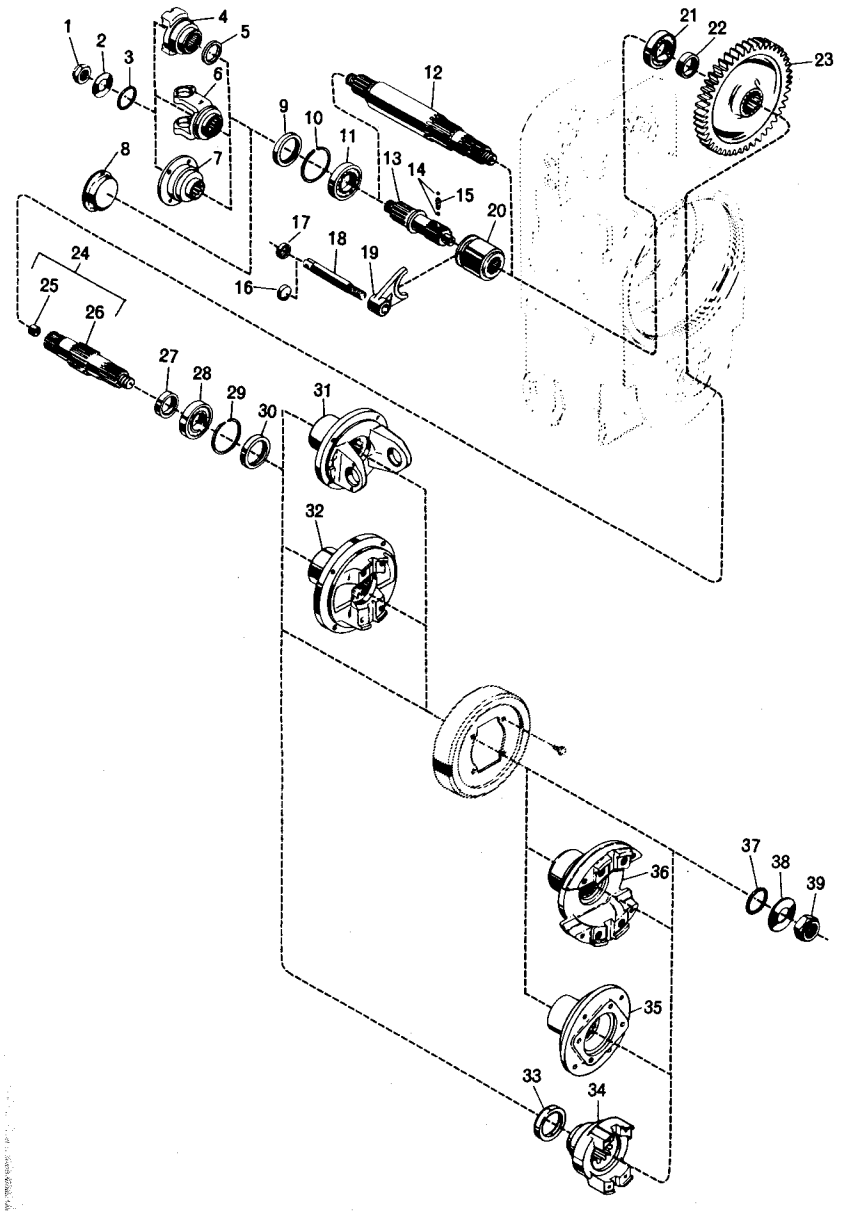
B

1 - Parking brake assembly*
2 - Brake backplate*
3 - Roller*
4 - Brake shoe and lining (2)*
5 - Brake shoe return spring (2)*
6 - Cam lever*
7 - Self-locking bolt, 1/2-13 x 7/8 in. (4) A*
8 - Brake backplate (TTB)
9 - Brake drum*
0 - Self-locking bolt, 3/8-24 x 5/8 in. (4) B*
1 - Self-locking bolt, 3/8-24 x 5/8 in. (4) B*
2 - Parking brake assembly**
3 - Brake backplate**
4 - Roller**
5 - Brake shoe and lining (2)**
16 - Brake shoe return spring (2)**
17 - Cam lever**
18 - Brake drum**
19 - Self-locking bolt, 3/8-24 x 3/4 in. (8) B**
20 - Bolt, 5/8-11 x 1-1/4 in. (3) C**
21 - Lockwasher, 5/8 in. (3)**

Torque	lb ft	N·m
A	81-97	110-131
B	41-49	56-66
C	117-140	159-189

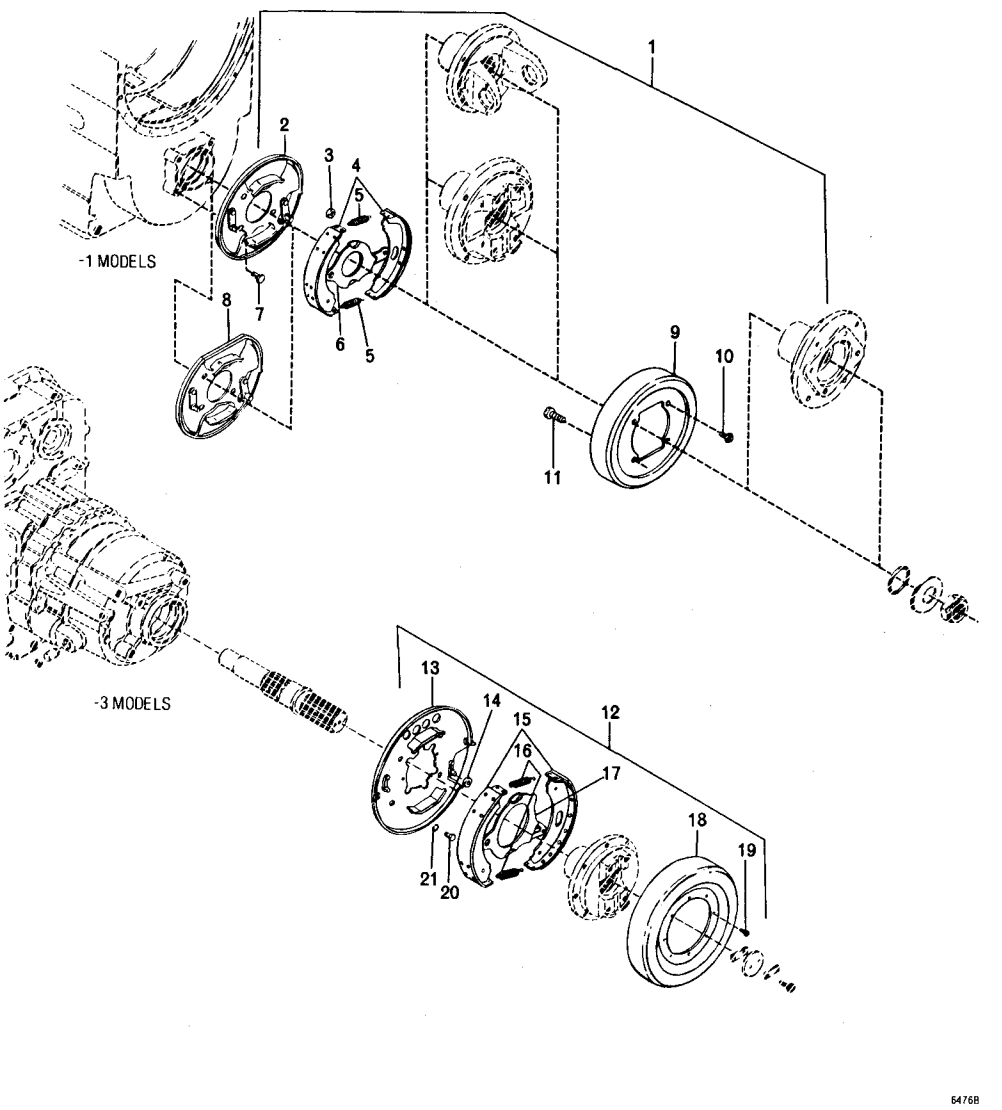
* -1 models
** -3 models

A



Foldout 17,A. Output shafts and disconnect assembly (-1 models)

B



Foldout 17,B. Parking brake

A

1 - Gasket
2 - Oil pump assembly
3 - Oil pump cover
4 - Oil pump cover gasket
5 - Drive gear
6 - Driven gear assembly
7 - Driven gear
8 - Needle bearing (2)
9 - Oil pump body assembly
10 - Oil pump body
11 - Dowel pin
12 - Driven gear shaft
13 - Lip-type oil seal
14 - Lockwasher, 3/8 (7)
15 - Bolt, 3/8-16 x 2 in. A
4-bolt C pad (7)
2-bolt B pad (7)
2-bolt C pad (6)
16 - Lockwasher, 3/8 in. (2)
17 - Bolt, 3/8-16 x 3 in. (2) A
18 - Adapter drive coupling
19 - Bolt, 3/8-16 x 3 in. A
20 - Lockwasher, 3/8 in.

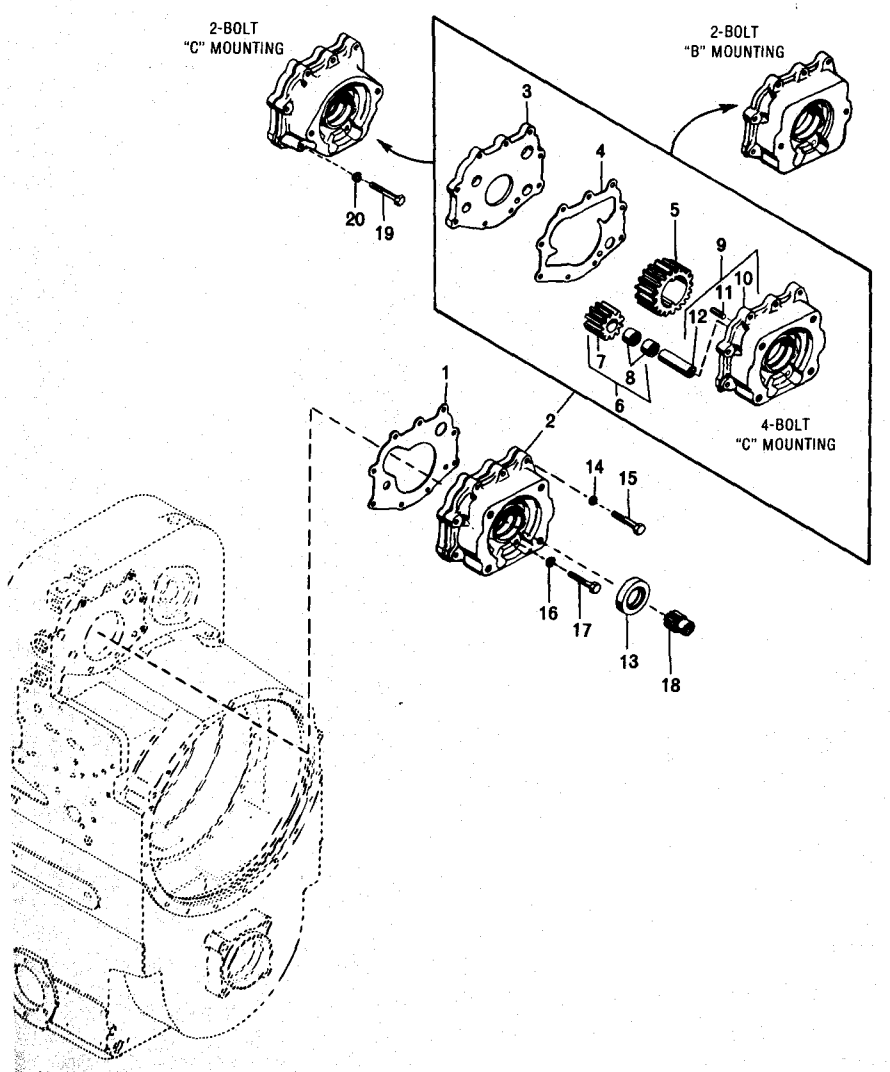
Torque	lb ft	N·m
A	26-32	36-43

B

1 - Control valve body gasket
2 - Lockwasher, 3/8 (16)
3 - Bolt, 3/8-16 x 1 in. A
4 - Bolt, 3/8-16 x 2-1/2 in. (15) A
5 - Control valve body assembly
6 - Plug B
7 - Gasket
8 - Main-pressure regulator valve
9 - Control valve body
10 - Ball
11 - Ball retainer plug
12 - Valve stop
TRT 2211-3 (1)
TRT 2411-3 (2)
13 - Spring retainer (earlier models)
14 - Main-pressure regulator spring
15 - Trimmer spring
16 - Trimmer plug
17 - Gasket
18 - Plug C
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) D
26 - Oil seal
27 - Internal snapring
28 - Bracket
29 - Manual range selector valve (models without neutral start switch)
30 - Detent ball (2)
31 - Plug D
32 - Gasket
33 - Detent spring (2)
34 - Gasket
35 - Plug B
36 - Plug, 1/8 in. E
37 - Inching valve stop
38 - Spring
39 - Inching regulator valve
40 - Regulator valve stop
41 - Inching regulator valve spring
42 - Inching control valve
43 - Valve return spring
44 - Sealring
45 - Plug
46 - Oil seal
47 - Internal snapring
48 - Push-on retaining ring
49 - Cutoff valve plug (air actuated)
50 - Retainer plug (air actuated) D
51 - Plug E
52 - Manual range selector valve (models with neutral start switch)
53 - Gasket
54 - Plug (neutral switch hole) F
55 - Plug, 1/8 in. E

Torque	lb ft	N·m
A	26-32	36-43
B	80-90	109-122
C	90-100	123-135
D	60-70	82-94
E	10-12	14-16
F	30-40	41-54

A



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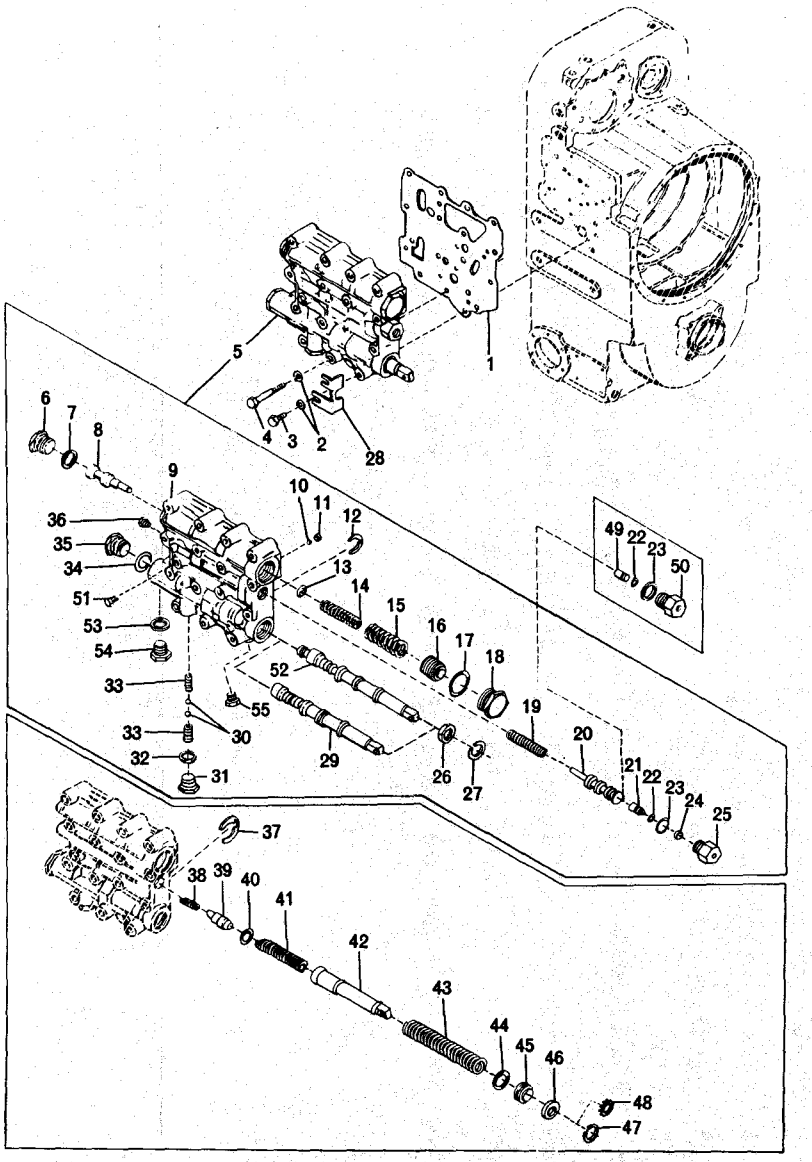
Foldout 18,A. Oil pump assemblies

B



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Foldout 18,B. Control valve assemblies