

Fig. VI-26. Reverse planetary carrier assembly—cross section

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spacer over the ground sleeve bolts (fig. VI-25). The bolts are unevenly spaced, as are the cutouts in the spacer. The cutouts must index with the bolt heads.

18. REVERSE PLANETARY CARRIER ASSEMBLY - REBUILD

a. Disassembly (item 9, A, foldout 9, and refer to fig. VI-26)

(1) Position the carrier assembly, hub assembly upward, on a drill press table.

(2) Using a 3/4-inch (19 mm) twist drill, centered accurately, drill the end of each pinion spindle to weaken the staking.

Caution: Do not drill into the metal of the hub assembly.

(3) Support the carrier assembly, at each spindle bore, on a press bed.

(4) Press the four spindles out of the carrier. Discard the spindles.

Note: Handle the assembly carefully after the first spindle is removed to avoid dropping the pinion components which are freed.

(5) Remove the hub assembly from the carrier.

(6) Remove a pinion, two thrust washers, and 22 rollers from each of the four pinion locations.

Note: Put each pinion group into a separate container and identify it with the location from which it was removed.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (item 9, A, foldout 9, and refer to fig. VI-26).

(1) Make a pinion alining tool by grinding or turning a chamfer on one end of a 6-inch (152.4 mm) length of 3/4-inch (19 mm), cold-rolled steel shafting.

(2) Coat the bore of each pinion with oil-soluble grease.

(3) Holding the alining tool in one hand, install one thrust washer 12 (A, foldout 9) and then a pinion 13 onto the alining tool.

Note: Pinions must be replaced only in matched sets. Never mix new pinions with used pinions.

(4) Install 22 rollers 14 into the bore of the pinion.

(5) Install a thrust washer 16 onto the pinion.

(6) Grasp the assembled pinion group at the washers and withdraw the alining tool.

(7) Slip the assembled pinion group into its proper location in the carrier.

Note: The carrier should be positioned front (flat) side downward at this time.

(8) Repeat procedures (3) through (7), above, for the remaining pinion groups.

(9) Position the hub assembly, front side downward, and install the carrier assembly into it. Align the spindle bores of the carrier and hub, and the pinion groups, by inserting the alining tool at each spindle location.

(10) Press new pinion spindles through the carrier, pinions, and hub assembly until they project 0.140 inch (3.6 mm) from the hub assembly (see inset detail of fig. VI-26).

(11) Stake both ends of the spindles with the tool shown in fig. VI-26.

Note: Check the pinions for free rotation after the spindles are staked. The pinions must not bind.

19. **FORWARD AND REVERSE, HIGH- AND LOW-RANGE CLUTCH ANCHOR ASSEMBLIES - REBUILD**

Note: The clutch anchor assemblies 21 (A, foldout 9) or 54 (A, foldout 10) for the forward and reverse clutches, and for high- and low-range clutches are identical. The instructions below apply to either.

a. Disassembly (item 21, A, foldout 9)

(1) Do not disassemble anchor assembly 21 unless parts replacement is necessary.

(2) If parts replacement is necessary, position the anchor assembly, flat side upward, in a press and remove six pins 23 from anchor 22.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (item 21, A, foldout 9)

(1) Position anchor 22, flat side upward, on a press bed.

(2) Coat the pin holes in anchor 22 with white lead.

(3) Press six pins 23 into anchor 22 until they project 0.960 inch (24.4 mm) above the flat surface of the anchor.

20. **LOW-RANGE PLANETARY CARRIER ASSEMBLY - REBUILD**

Note: Not used in CRT 3321 models.

a. Disassembly (item 70, A, foldout 10, and refer to fig. VI-27)

(1) Position the carrier assembly, hub upward, on a drill press table.

(2) Using a 1/2-inch (12.7 mm) twist

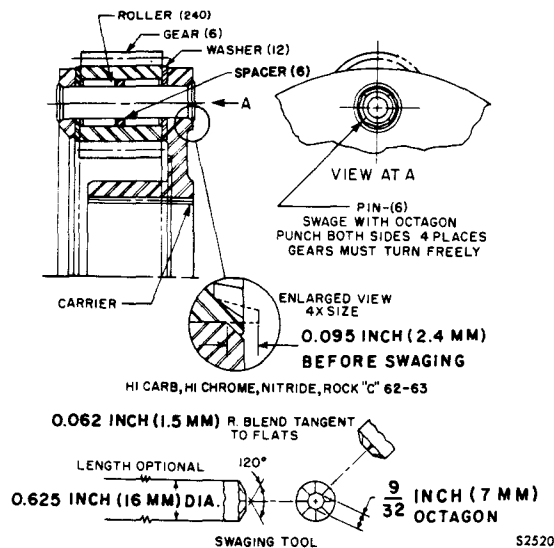


Fig. VI-27. Low-range planetary carrier assembly—cross section

drill, centered accurately, drill the end of each pinion spindle to weaken the staking.

Caution: Do not drill into the metal of the carrier.

(3) Support the carrier assembly at each spindle bore, on a press bed.

(4) Press the six spindles out of the carrier. Discard the spindles.

(5) Remove a pinion, two thrust washers, a spacer and 40 rollers from each of the six pinion locations. Put each pinion group into a separate container and identify it with its location in the carrier.

Note: Some models have 16 long rollers instead of 40 short rollers and a spacer.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to section IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (item 70, A, foldout 10, and refer to fig. VI-27)

(1) Make a pinion alining tool by grinding or turning a chamfer on one end of a six-inch length of 1/2-inch (12.7 mm), cold-rolled steel shafting.

(2) Coat the bore of each pinion with oil-soluble grease.

(3) Holding the alining tool in one hand, install a thrust washer 72 (A, foldout 10) and then a pinion 73 onto the alining tool.

Note: Pinions must be replaced only in matched sets. Never mix new pinions with used pinions.

(4) Install 20 rollers 74 into the bore of the pinion (some models use 16 long rollers).

(5) Install a spacer 75 and 20 more rollers 76 (some models have 16 long rollers and do not use spacer 75.) Install a thrust washer 77.

(6) Grasp the assembled pinion group at the thrust washers and withdraw the alining tool.

(7) Slip the assembled pinion group into its proper location in the carrier.

Note: The carrier should be positioned hub upward at this time.

(8) Repeat procedures (3) through (7), above, for the remaining pinion groups. Align the pinion groups in the carrier by inserting the alining tool in each spindle bore.

(9) Press new spindles through the carrier and pinions until they project 0.095 inch (2.4 mm) from the inner ends of the countersinks in the pinion bores at the rear of the carrier (see inset detail of fig. VI-27).

(10) Stake both ends of the spindles into the countersinks of the carrier.

Note: Check the pinions for free rotation after the spindles are staked. The pinions must not bind.

21. CLUTCH PISTON ASSEMBLIES AND HIGH-RANGE CLUTCH HOUSING — REBUILD

a. Disassembly of High-range Clutch Housing and Piston Assembly (items 43 thru 48, A, foldout 10). Remove the clutch piston

assembly from the clutch housing. The housing may be bumped on a flat surface to dislodge the piston.

Note: Clutch piston seals (polyacrylate) which do not have expanders can be replaced by identical seals (if serial number is below 34480) or with Teflon seals and expanders. Clutch piston seals (Teflon) which have expanders under them must be replaced by identical seals.

b. Removal of Polyacrylate Seals (no expanders). Inner and outer seals in the clutch pistons may be removed as desired and reused if necessary.

c. Removal of Teflon Seals and Expanders. When Teflon seals are removed, they must be replaced with new seals and expanders. Remove the seals and expanders if inspection

reveals that replacement is necessary.

Caution: Do not destroy discarded Teflon seals by burning. Toxic gases are produced when Teflon is burned.

d. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

e. Installation of Teflon Seals and Expanders

(1) Install the expander into the seal ring groove so that its ends bend toward the bottom of the groove.

Note: Some expanders may require additional bending to cause them to point toward the bottom of the groove.

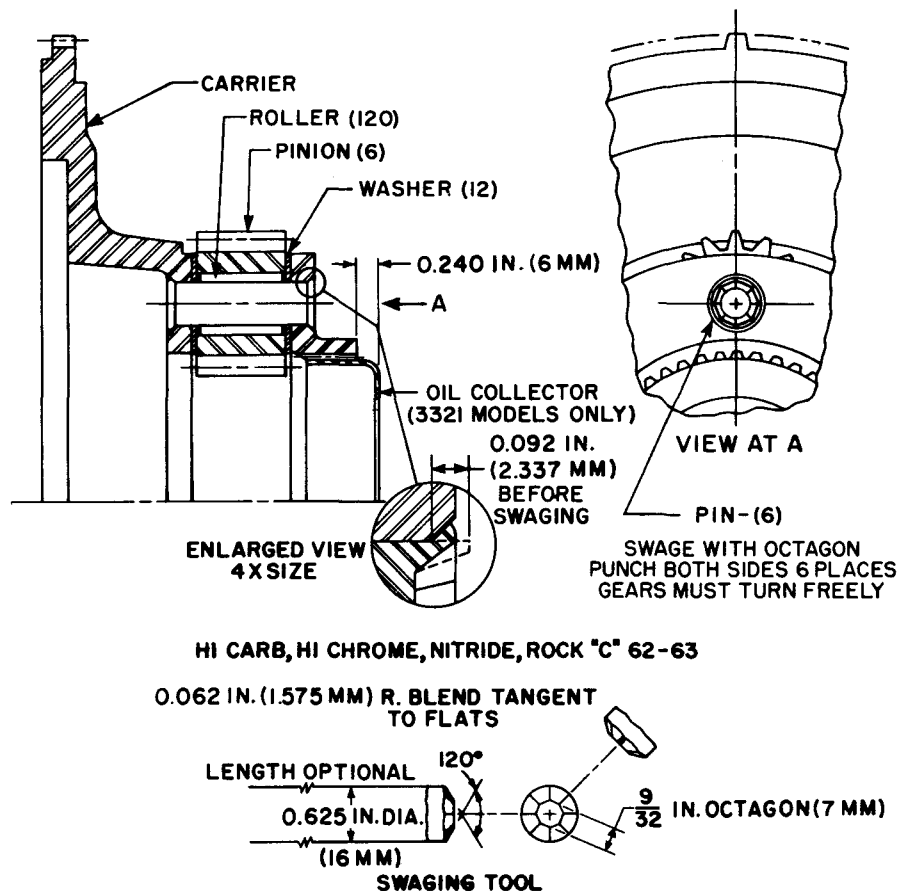


Fig. VI-28. High-range planetary carrier assembly—cross section

(2) While holding the expander in the groove, start the seal ring into the groove at a point diametrically opposite the expander ends. No lubrication is necessary for installation.

(3) Install the seal by hand. Tools or instruments might damage the seal.

Caution: Do not stretch the seal any more than is necessary for installation.

(4) Center the piston in the piston bore when installing it, to prevent seal damage.

Caution: Be extremely careful to avoid scratching, nicking, or distorting a Teflon seal.

f. Installation of Polyacrylate Seals (no expanders). Install seal ring into its groove.

g. Assembly of High-range Clutch Housing and Piston Assembly (items 43 thru 48, A, foldout 10)

(1) Lubricate the seal rings and the piston housing.

(2) Install the piston assembly, flat side first, into the piston housing.

22. HIGH-RANGE PLANETARY CARRIER ASSEMBLY - REBUILD

a. Disassembly (item 33, A, foldout 10, and refer to fig. VI-28)

Note: On later CRT 3331 models, low-range sun gear 41 must be pressed from carrier assembly 33 before pinions can be replaced.

(1) Position carrier assembly, splined flange downward, on a drill press table. Using a 1/2-inch (12.7 mm) twist drill, centered accurately, drill the end of each pinion spindle to weaken the staking.

Caution: Do not drill into the metal of the carrier.

(2) Support the carrier assembly at each spindle bore, on a press bed. Press the six spindles out of the carrier. Discard the spindles.

(3) Remove a pinion, two thrust washers and 20 rollers from each of the six pinion locations.

Note: Put each pinion group into a separate container and identify it with the location from which it was removed.

(4) CRT 3321 models include an oil collector 40 (A, foldout 10). This collector need not be removed from carrier 34 unless replacement is necessary.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (item 33, A, foldout 10, and refer to fig. VI-28)

(1) On CRT 3321 models, if oil collector 40 (A, foldout 10) was removed from carrier 34, install a new collector. Press it, open side first, into the rear of the carrier, until it projects 0.240 inch (6 mm) from the rear of the carrier.

(2) A pinion alining tool as described in 20c(1), above, is required for operations outlined below.

(3) Coat the bore of each pinion with oil-soluble grease.

Note: Pinions must be replaced only in matched sets. Do not mix new pinions with used pinions.

(4) Holding the alining tool in one hand, install a thrust washer 35 (A, foldout 10) and then a pinion 36 onto the alining tool. Install 20 rollers 37 into the bore of the pinion. Install a thrust washer 39 onto the pinion.

(5) Grasp the assembled pinion group at the thrust washers, withdraw the alining tool, and slip the assembled pinion group into its proper location in the carrier.

Note: The carrier should be positioned, splined flange downward, at this time.

(6) Repeat procedures (4) through (8), above, for the remaining pinion groups. Align the pinion groups in the carrier by inserting the aligning tool into each spindle bore.

(7) Press new spindles through the carrier and pinions until they project 0.092 inch (2.3 mm) from the bottoms of the countersinks at the rear of the carrier (see inset detail of fig. VI-28).

(8) Stake both ends of the spindle with the tool shown in fig. VI-28.

Note: Check the pinions for free rotation after the spindles are staked. The pinions must not bind.

(9) On later CRT 3331 models, chill the low-range sun gear for one hour in "dry" ice. Press the sun gear into the high-range planetary carrier. Seat it firmly to ensure that the gear is square with the carrier.

23. TRANSMISSION MAIN SHAFT ASSEMBLY - REBUILD

Note: Several transmission main shafts have been used in the various transmission models. The extent of rebuild varies with the shafts. The applicability of the procedures below are indicated by the subparagraph titles in a and c, below.

a Disassembly (items 15, 16, 18, 19 and 26, A, foldout 10)

(1) All models. Remove the front snap ring 14 only if replacement is necessary.

(2) 3321-1 models. Remove ball bearing 17 if replacement is necessary.

(3) 3331-1 models with upper-rear output disconnect. Remove bearing assembly 24 only if replacement is necessary. Remove orifice plug 21 only if replacement is necessary.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (items 15, 16, 18, 19 and 26, A, foldout 10)

(1) All models. Install snap ring 14 into the front groove of the main shaft.

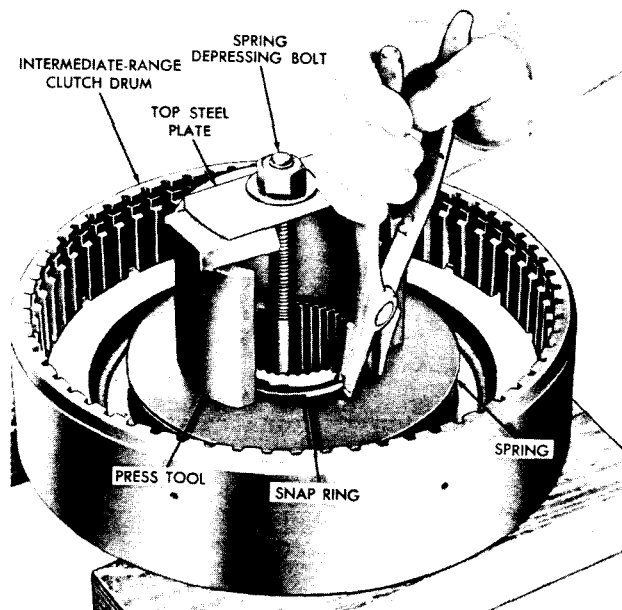


Fig. VI-29. Removing (or installing) return spring snap ring

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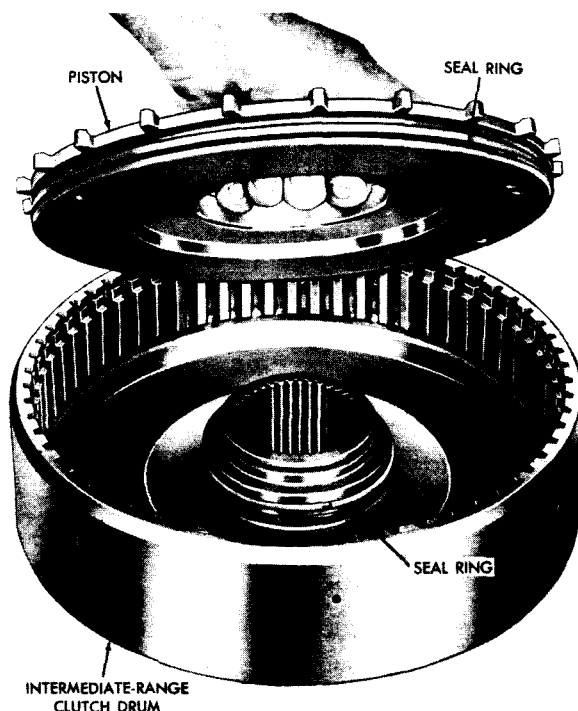


Fig. VI-30. Removing (or installing) intermediate-range clutch piston assembly

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(2) 3321-1 models. Press ball bearing 17 onto the projection at the front of shaft 16. Press until the bearing seats firmly.

(3) 3331-1 models with upper-rear output disconnect. Press orifice plug 21, orificed end first, into the rear of shaft 20 until it is 1.80 to 1.86 inches (46 to 47 mm) below the extreme rear of the shaft. Press needle bearing assembly 24 into the rear of shaft 20 until it is flush or to 0.010 inch (0.25 mm) below the rear surface of the shaft. Press on the numbered end of the bearing.

24. INTERMEDIATE-RANGE CLUTCH DRUM ASSEMBLY - REBUILD

a. Disassembly (item 2, A, foldout 10)

(1) Remove two hook-type seal rings 1, from the hub of clutch drum 4.

(2) Improvise a puller (or use a press) which will depress the piston return spring. Remove the snap ring which retains the spring (fig. VI-29).

(3) Remove the piston return spring and the piston assembly (fig. VI-30). The piston assembly can be dislodged by bumping the clutch drum on a flat wood surface.

Note: Refer to para 21, above, for rebuild of the piston assembly.

(4) Remove the hook-type seal ring from the inner hub of the clutch drum (fig. VI-30).

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (item 2, A, foldout 10)

(1) Install the hook-type seal ring onto the inner hub of the clutch drum (fig. VI-30).

(2) Lubricate the hook-type seal ring and the outer circumference of the piston. Install the piston assembly, flat side first, into the clutch drum (fig. VI-30).

(3) Install the piston return spring, con-

cave (cupped) side first, onto the piston (fig. VI-29).

(4) Improvise a puller (or use a press) to depress the clutch spring. Install the snap ring (fig. VI-29).

(5) Install two hook-type seal rings 1 (A, foldout 10) into the grooves on the front hub of clutch drum 4.

25. FORWARD PLANETARY CARRIER ASSEMBLY - REBUILD

a. Disassembly (item 37, A, foldout 9, and refer to fig. VI-31)

(1) Position the carrier assembly, hub upward, on a drill press table.

(2) Using a 1/2-inch (12.7 mm) twist drill, centered accurately, drill the end of each pinion spindle to weaken the staking.

Caution: Do not drill into the metal of the carrier.

(3) Support the carrier assembly at each spindle bore, on a press bed.

(4) Press the six spindles out of the carrier. Discard the spindles.

(5) Remove a pinion, two thrust washers, and 20 rollers from each of the six pinion locations.

Note: Put each pinion group into a separate container and identify it with the location from which it was removed.

(6) If bushing 44 (A, foldout 9) requires replacement, press or drive the bushing out of the carrier, toward the front (flat end) of the carrier. Do not damage the bore of the carrier.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

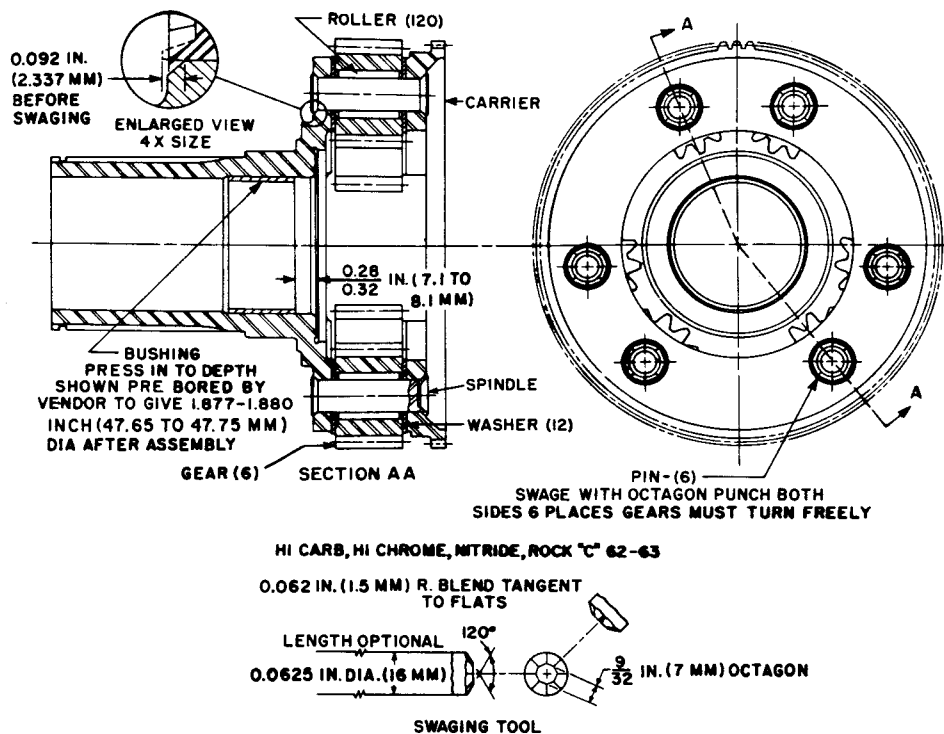


Fig. VI-31. Forward planetary carrier assembly—cross section

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c. Assembly (item 37, A, foldout 9, and refer to fig. VI-31)

(1) If the bushing was removed from the hub of the carrier, install a new bushing. Press it into the carrier to the depth shown in fig. VI-31.

(2) A pinion alining tool as described in 20c(1), above, is required for operations outlined below.

(3) Coat the bore of each pinion with oil-soluble grease.

(4) Holding the alining tool in one hand, install a thrust washer 42 (A, foldout 9) and then a pinion 40 onto the alining tool.

Note: Pinions must be replaced only in matched sets. Do not mix new pinions and used pinions.

(5) Install 20 rollers 41 into the bore of the pinion.

(6) Install a thrust washer 39 onto the pinion.

(7) Grasp the assembled pinion group at the thrust washers and withdraw the alining tool.

(8) Slip the assembled pinion group into its proper location in the carrier.

Note: The carrier should be positioned hub upward at this time.

(9) Repeat procedures (4) through (8), above, for the remaining five pinion groups. Align the pinion groups in the carrier by inserting the alining tool into each spindle bore.

(10) Press new spindles through the carrier and pinions until they project 0.092 inch from the bottoms of the countersinks at the front of the carrier (see inset detail of fig. VI-31).

(11) Stake both ends of the spindles with the tool shown in fig. VI-31.

Note: Check the pinions for free rotation after the spindles are staked. The pinions must not bind.

26. TRANSMISSION HOUSING ASSEMBLY - REBUILD

a. Disassembly (items 24 thru 27, A, foldout 9, and items 2 and 5, B, foldout 9)

(1) Remove breather assembly 2 (B, foldout 9). Refer to sect. III, para 1b.

(2) Remove four self-locking bolts 27 (A, foldout 9) which retain split retainers 26.

(3) Tap the rear side of ball bearing 25 to dislodge the bearing and split retainers 26. Remove the bearing and retainers (fig. VI-32).

Note: The ball bearing assembly and retainers may have been damaged by removal of the forward carrier assembly (refer to sect. V, para 2n(2) and caution note following). Rigid inspection is necessary to determine if these parts may be reused.

(4) Do not remove the steel hub 24 (A, foldout 9) from the housing unless replacement is necessary. If removal is necessary, press or drive the hub toward the front of the housing.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (items 24 thru 27, A, foldout 9, and items 2 and 5, B, foldout 9)

(1) If the steel hub 24 (A, foldout 9) was removed from the housing, install two 3/8-16 headless guidebolts into opposite bearing retainer bolt holes. Coat the outer circumference of the hub with white lead. Install the hub, alining the hub and housing bolt holes. Press or drive the hub into the housing until it is firmly seated. Remove the guide bolts.

(2) Engage the bearing retainers in the groove in the ball bearing outer race and install the bearing (fig. VI-32). Tap the bearing evenly into its bore. Aline the holes in the retainers with those in the hub and housing.

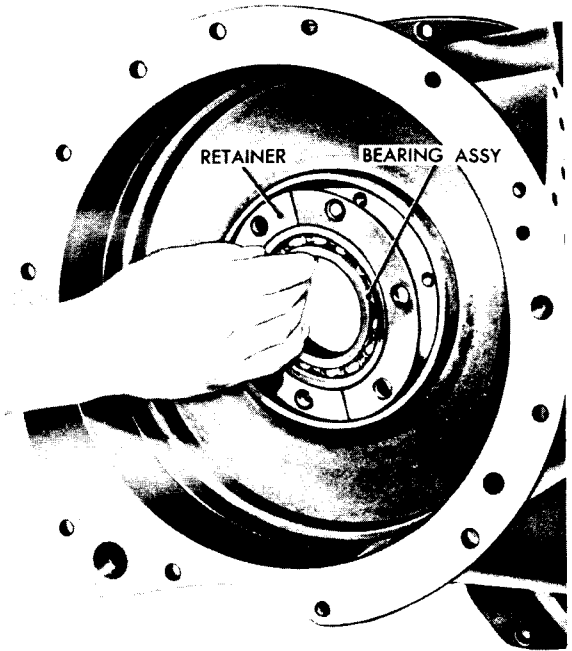


Fig. VI-32. Removing (or installing) bearing and retainer

(3) Install four self-locking bolts 27, (A, foldout 9) to fasten the retainers. The bolts are installed in the retainer end holes; the center holes are left open.

(4) Install the breather assembly near the top of the valve body mounting pad on the left side of the transmission housing.

27. REAR (UPPER OR LOWER) OUTPUT DISCONNECT ASSEMBLY - REBUILD

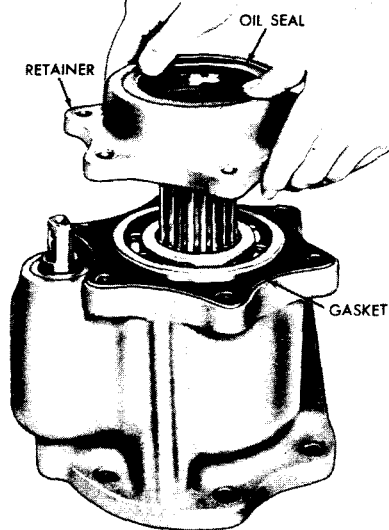
a. Disassembly (items 5 through 18, A, foldout 12)

(1) Remove six bolts and lock washers which secure the rear bearing retainer. Remove the retainer and gasket (fig. VI-33).

(2) Remove the oil seal from the retainer only if replacement is necessary.

(3) Remove the shifter fork shaft by unscrewing it (counterclockwise) and lifting it out (fig. VI-34).

(4) Remove snap ring 25 (A, foldout 10),



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Fig. VI-33. Removing (or installing) bearing retainer

or 50 (B, foldout 11), needle bearing inner race 23 (A, foldout 10) or 49 (B, foldout 11), and thrust washer 10 (A, foldout 12) from output shaft 14.

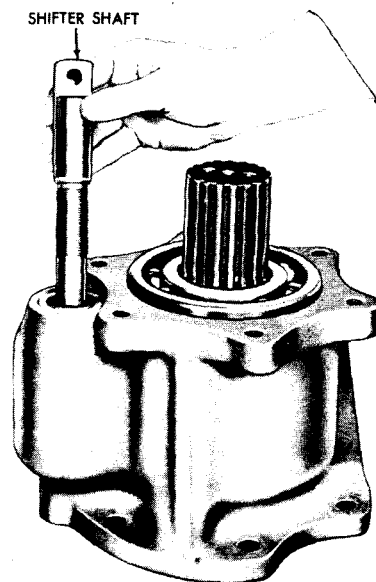
Note: If race 23 (A, foldout 10) or 49 (B, foldout 11) is too tight on shaft 14 (A, foldout 12) to be easily removed, coupling 11 can be pushed rearward (toward bearing 15) to provide room to install a puller over thrust washer 10. The puller will remove washer 10 and race 23 (A, foldout 10) or 49 (B, foldout 11) at the same time.

(5) Press or drive against the front (smaller) end of the output shaft to dislodge the ball bearing from the housing. Remove the shaft and bearing, and the detent balls and spring (fig. VI-35).

(6) Remove the ball bearing from the shaft only if replacement is necessary (fig. VI-36).

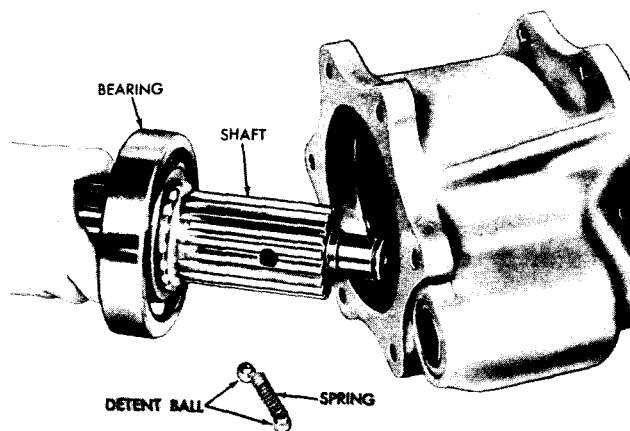
(7) Disengage the shifter coupling from the shifter fork and remove the coupling from the rear of the housing (fig. VI-37).

(8) Remove the shifter fork from the housing (fig. VI-38).



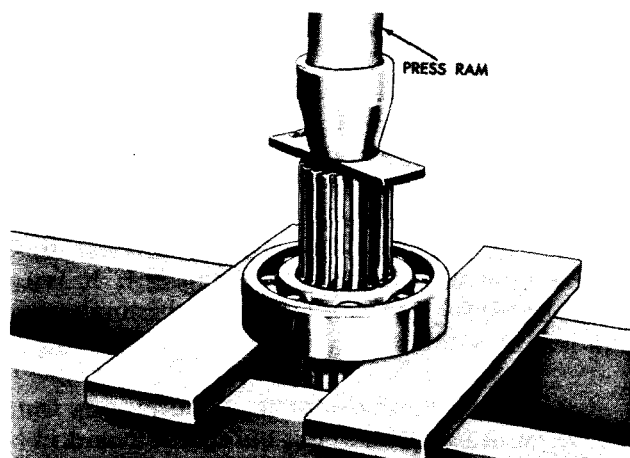
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Fig. VI-34. Removing shifter fork shaft



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Fig. VI-35. Removing shaft and bearing from housing



S1643

Fig. VI-36. Removing ball bearing from rear output disconnect shaft

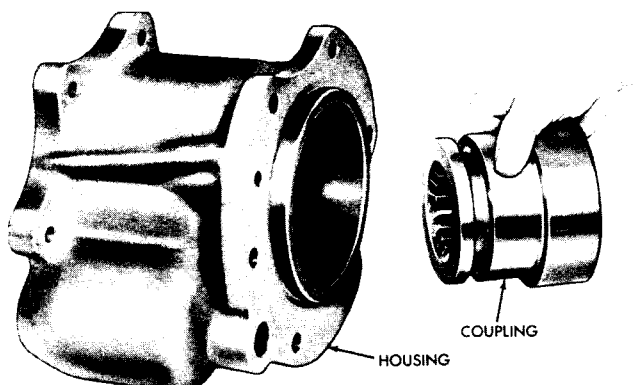


Fig. VI-37. Removing (or installing) shifter coupling^{S2772}

(9) Do not remove the shifter fork shaft seal from the housing unless replacement is necessary.

Note: Removal will destroy the oil seal.

b. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

c. Assembly (items 5 through 18, A, foldout 12)

(1) If oil seal 7 was removed from housing 5, press in a new seal. The seal is installed spring-loaded end first and pressed to seat lightly in the housing.

(2) Install the shifter fork in the housing (fig. VI-38).

Note: The longer side of the threaded boss must be installed toward the rear (input end) of the housing.

(3) Install the shifter coupling, smaller end first, into the rear of the housing (fig. VI-37).

(4) Engage the shifter fork with the groove in the coupling. Install the shifter fork shaft, threading it (clockwise) into the shifter fork until the shifter fork is centered on the threaded portion of the shaft (fig. VI-39).

(5) If the ball bearing has been removed from the output shaft, install the shaft in the bearing and press it until its shoulder seats against the bearing inner race (fig. VI-40).

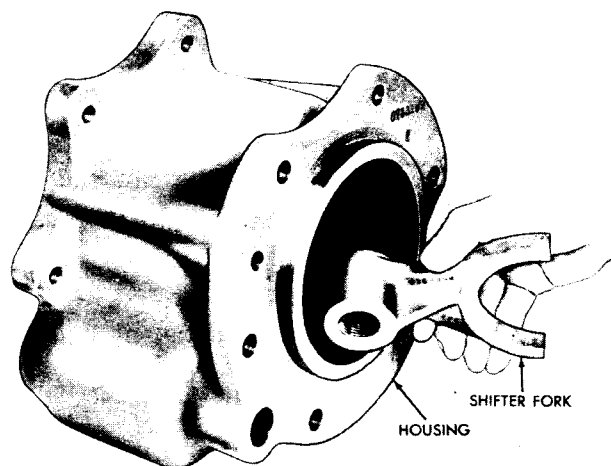


Fig. VI-38. Removing (or installing) shifter fork^{S2471}

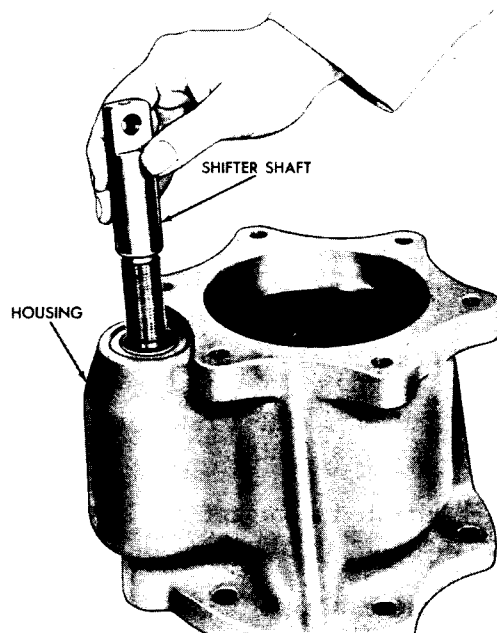


Fig. VI-39. Installing shifter fork shaft^{S3054}

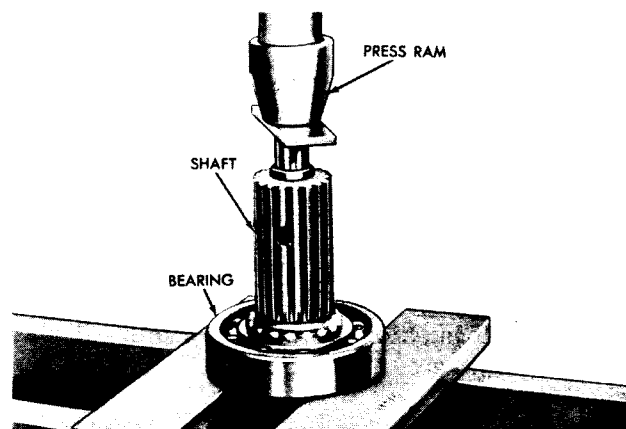


Fig. VI-40. Installing output shaft into ball bearing^{S3055}

(6) Position the housing, rear downward, supporting the shifter coupling on a sleeve or blocks approximately 1 1/2 inches (38 mm) high.

Note: The blocks or sleeve must be positioned to allow the output shaft room to pass through.

(7) Install the detent spring into the hole through the shaft. Hold the detent balls in place and install the output shaft into the shift coupling (fig. VI-41). Push the shaft downward until the detent balls are retained by the coupling.

(8) Continue to push or tap on the shaft until the detent balls snap into the first detent groove in the coupling. Remove the blocking under the coupling and tap the ball bearing outer race until it seats in the housing.

(9) Install thrust washer 10 (A, foldout 12), needle bearing inner race 23 (A, foldout 10) or 49 (B, foldout 11) and snap ring 25 (A, foldout 10) or 50 (B, foldout 11) onto the rear of shaft 14 (A, foldout 12).

(10) If oil seal 18 was removed from retainer 17, install a new oil seal. Press the seal, spring-loaded side first, into the retainer until it seats lightly.

(11) Install the gasket and bearing retainer on the housing (fig. VI-33).

(12) Install six bolts 20 (A, foldout 12) and lock washers 19 to secure the retainer.

28. REAR OUTPUT SHAFTS - REBUILD

a. Disassembly of Standard Rear Output Shaft Assembly (item 41, B, foldout 11)

(1) Remove bearing 53 from the shaft 43 only if replacement is necessary. Remove the spacer 52 if the bearing is removed.

(2) If bushing 42 must be replaced, remove it, being careful to avoid damaging the shaft bore.

Note: The bushing may be removed

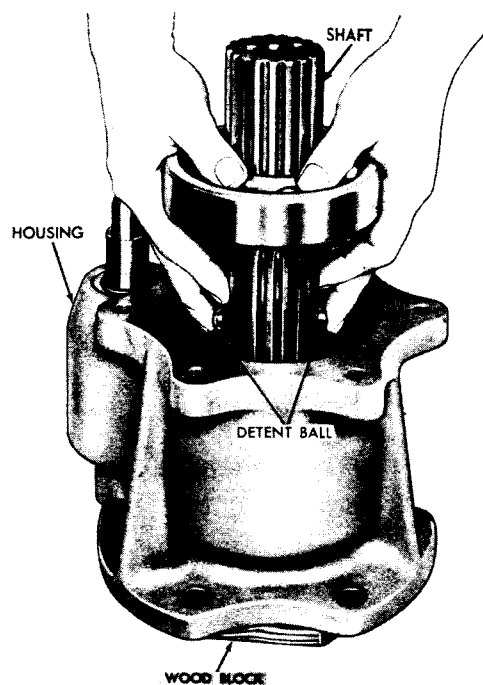


Fig. VI-41. Installing output shaft

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by using a puller, cutting it out, or by filling it with heavy grease and driving a hard wood dowel into its center.

b. Disassembly of Output Shaft Used with Lower-rear Output Disconnect Assembly (item 44, B, foldout 11)

(1) Follow instructions in a(1) and (2), above.

(2) Remove the needle bearing assembly 48 from the rear of shaft 46 only if replacement is necessary.

Note: The bearing must be destroyed and the outer shell collapsed to remove it.

c. Cleaning, Inspection, Wear Limits. Refer to sect. IV, para 5 for cleaning and inspection procedures. Refer to sect. IV, para 8 and to sect. VIII for wear limits information.

d. Assembly of Standard Rear Output Shaft Assembly (item 41, B, foldout 11)

(1) If bushing 42 (B, foldout 11) was re-

moved, install a new bushing. Press the bushing into the front of the shaft until it is 0.160 to 0.200 inch (4 to 5 mm) below the extreme front surface of the shaft.

(2) If spacer 52 and bearing 53 were removed from shaft 43, install them. Install spacer 52 onto the rear of shaft 43. Install bearing 53, and press it until it seats on spacer 52.

e. Assembly of Output Shaft Used with Lower-rear Output Disconnect Assembly (item 44, B, foldout 11)

(1) Follow instructions in d(1) and (2), above.

(2) If needle bearing assembly 48 was removed, install a new one. Press on the numbered end of the bearing and press it flush with or to 0.010 inch (0.25 mm) below the extreme rear surface of the shaft.

Service Information Notes

Section VII ASSEMBLY OF TRANSMISSION SUBASSEMBLIES

1. PREPARATION FOR ASSEMBLY

a. Scope of Sect. VII

(1) This section covers the assembly of the transmission from subassemblies which were removed as outlined in sect. V and rebuilt as outlined in sect. VI, and the detail parts removed as outlined in sect. V.

(2) The procedures for assembly, outlined below, are arranged so that any model, with any optional equipment, may be assembled in logical sequence by following the instructions in the order given. Simply disregard the paragraphs which do not apply to the transmission being assembled and go on to the next paragraph which does apply.

b. Lubrication of Components at Assembly

(1) To insure that components will be adequately lubricated when the transmission is initially put into service after rebuild, all clutch plates, bearings, bushings, gears, seals, shafts and other moving parts must be generously oiled when installed. Unless otherwise instructed, the oil should be the operating fluid recommended for the transmission.

(2) Lubrication of bronze-faced clutch plates is especially important. These should be soaked in transmission fluid for at least 2 minutes immediately prior to installation.

2. ASSEMBLY OF CRT 3321-1 OR CRT 3331-1 TRANSMISSION

a. Transfer Housing Assembly Components - Installation

Note: If the transfer housing is equipped with a one-piece output shaft, refer to paragraph 4, below.

(1) If the front-output disconnect shaft oil seal 27 (A, foldout 11) was removed, install a new seal, spring-loaded side first into the transfer housing. Press the seal slightly below the surface adjacent to the seal bore in the housing.

Note: On models which do not include a front-output disconnect, a plug 28 is installed and pressed in until it bottoms.

(2) Install drain, oil check, and filler plugs into the housing.

(3) Position the transfer housing, front downward, and level it with blocks (fig. VII-1).

(4) Install the rear output shaft front bearing assembly (fig. VII-1).

Note: Transmissions which have a heavy-duty output shaft include a spacer 39 (B, foldout 11). This spacer must be installed ahead of the bearing assembly.

(5) Install the transfer driven gear into the housing. The long side of the hub must be toward the front of the housing (down). Position the gear on the rear bearing (fig. VII-1).

(6) Install the rear output shaft assembly (fig. VII-2). Tap the shaft until the spacer seats on the gear.

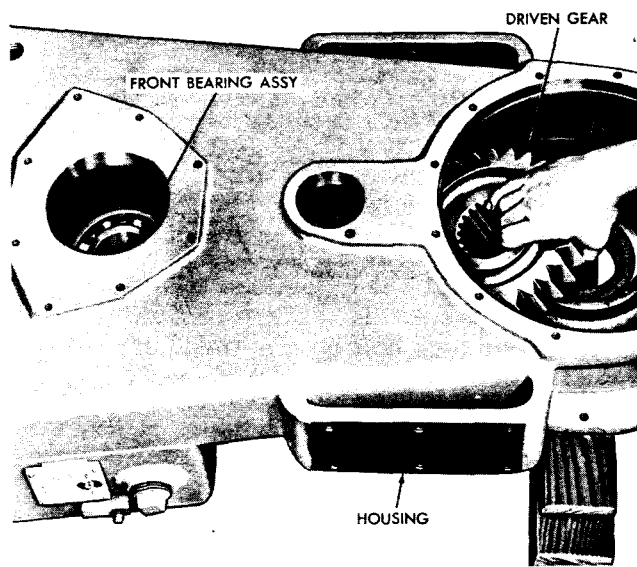


Fig. VII-1. Installing output transfer driven gear

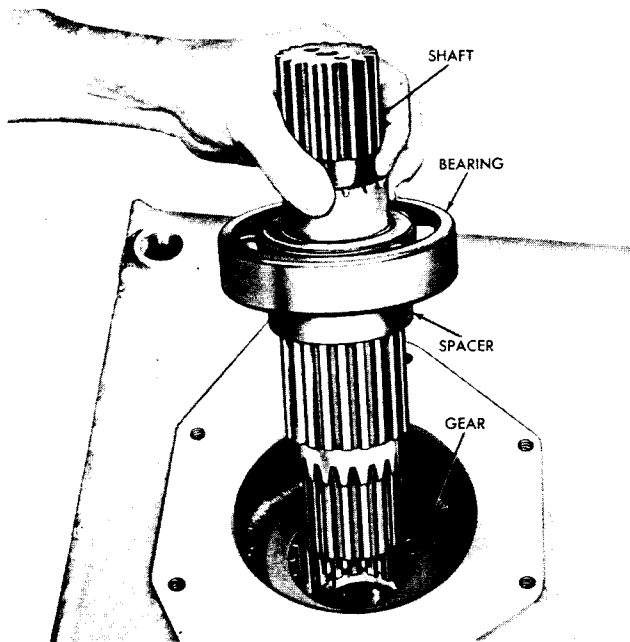


Fig. VII-2. Installing rear output shaft assembly 52433

(7) If oil seal 44 (A, foldout 12) was removed from bearing retainer 45, install a new seal. Press the seal, spring-loaded side first, into the rear of the retainer. Position the seal at approximately the center of the seal bore depth.

Note: On models which do not have a rear output, a pressed steel cap is installed in the rear of the retainer. If it was removed, press a new cap into the retainer until it bottoms. Assemblies which include a lower-rear output disconnect assembly do not have an oil seal in the retainer (adapter). Such an adapter is not installed at this time (refer to p, below).

(8) Install the gasket, bearing retainer, and bolts and lock washers which retain them.

Note: Older transmissions have eight bolts and lock washers; newer models have six.

(9) If the bearing was removed from the transfer idler gear (fig. VII-3) install the bearing by pressing it into the gear to snap ring. Install a second snap ring (fig. VII-3).

(10) Install the idler gear spacer and idler gear, manufacturer's number on the

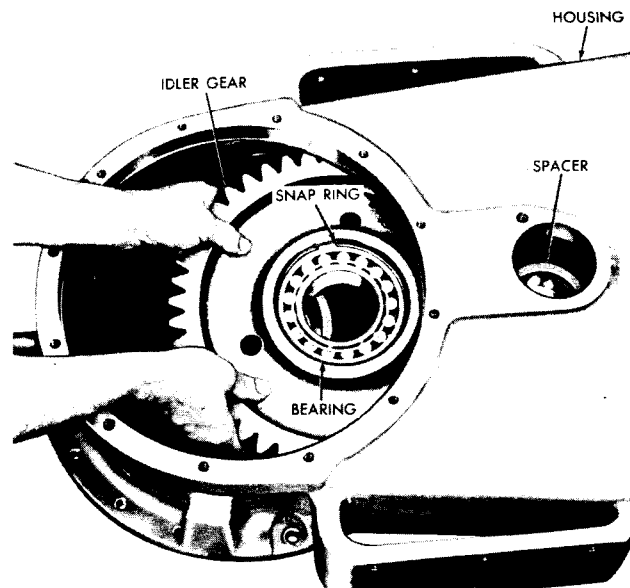


Fig. VII-3. Installing (or removing) transfer idler gear 52435

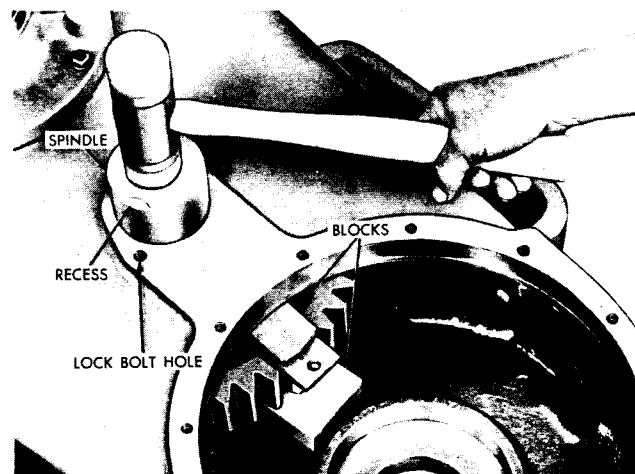


Fig. VII-4. Installing idler gear spindle 52436

bearing toward front of housing (down). Aline them with the spindle bore (fig. VII-3).

(11) Chill the idler gear spindle for two hours in "dry ice" for ease of assembly. Install the spindle, alining the milled recess with the lock bolt hole in the housing.

Note: The blocks illustrated are necessary only for weld-fabricated housings which tend to spring when the spindle is driven in.

(12) Do not install the bolt, thick flat washer, and lock washer which retain the idler gear spindle at this time.

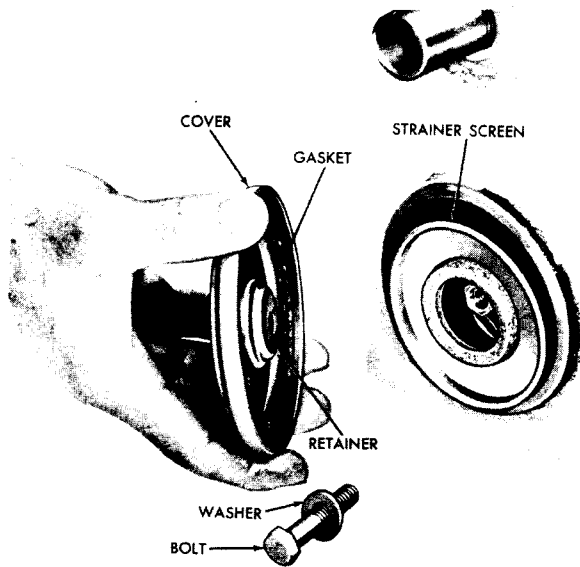


Fig. VII-5. Installing (or removing) oil strainer components in welded housing ^{S2439}

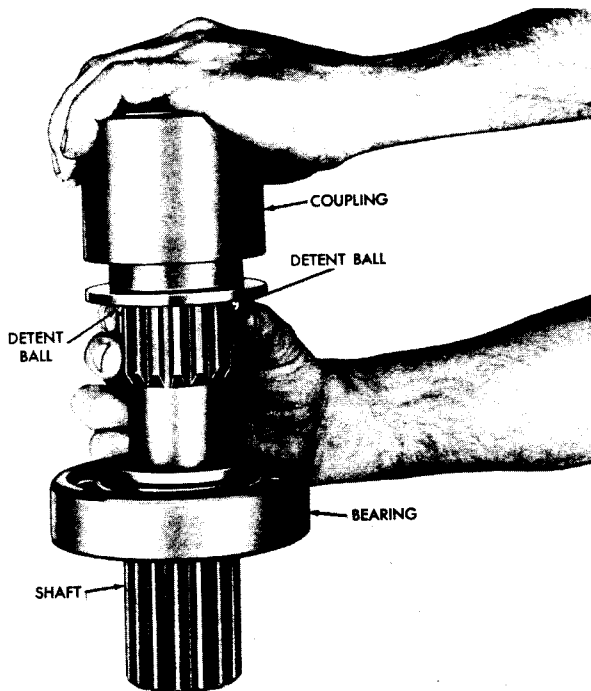


Fig. VII-6. Installing coupling onto front-output shaft ^{S2440}

(13) If ball bearing assemblies 25 and 27 (B, foldout 11) was removed, press them onto the hub of gear 26.

(14) Install the output drive gear. Install the gasket and drive gear cover (fig. V-27).

(15) Position the transfer housing upright and install the oil strainer components (fig. VII-5).

Caution: Do not exceed 10 pound feet (13.5 N·m) torque when tightening the strainer cover bolt.

Note: Fig. VII-5 illustrates the weld-fabricated housing. For installation of strainer components into the cast housing, refer to (29), below, and to 29 through 32 (B, foldout 10).

Note: Procedures (16) through (22) and (27), below, do not apply to assemblies which have a cap on the front output shaft bearing retainer.

(16) If the ball bearing assembly was removed from the front output shaft, press the bearing onto the shaft until it seats firmly against the shoulder on the shaft (fig. VII-6).

(17) On assemblies which do not include front output disconnect controls, install snap ring 18 (A, foldout 11) into the central inner groove of coupling 17.

(18) Install detent spring 21 (A, foldout 11) and detent balls 20 and 22 into the hole through the front output shaft (fig. VII-6).

(19) Install the coupling onto the shaft, pushing it onto the shaft until the detent balls engage the first (front) detent groove (fig. VII-6).

(20) Install the shifter fork into the housing (fig. VII-7).

Note: The shifter fork is offset. It should be installed so that the forked end is angled toward the front of the housing.

Hold the shifter fork (by reaching into the housing access hole) and install the assembled front output shaft. Engage the groove in the coupling with the shifter fork (fig. VII-7).

Note: The spacer illustrated in fig. VII-7 must be installed previous to installing the output shaft in those assemblies which include a heavy-duty shaft.

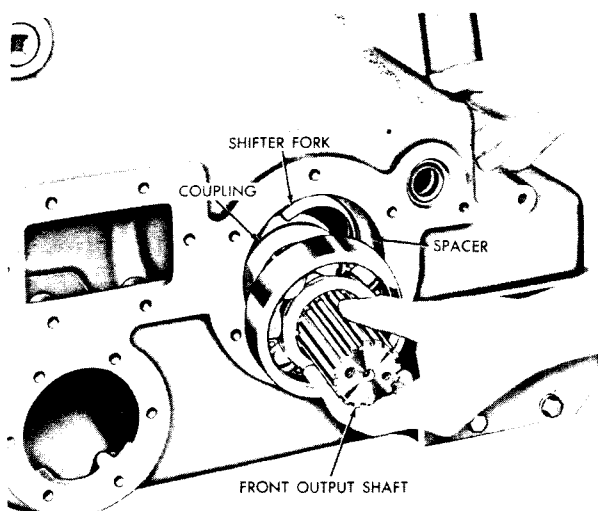


Fig. VII-7. Installing (or removing) front-output shaft and related components S2505

(21) Tap the output shaft into the housing until the bearing seats in the housing (or against the spacer).

Caution: Some models include a heavy-duty front output shaft coupling, detent spring and detent balls but do not include the shifter fork and shaft. It is mandatory (to assure operation of the front-output shaft) that the coupling be engaged at assembly.

(22) Install the output disconnect shifter shaft (by rotating it clockwise) and access plug (fig. VII-8).

(23) Install the bearing retainer gasket (fig. VII-8).

(24) If the oil seal was removed from the retainer (fig. VII-8), install a new seal. Press the seal, spring-loaded side first, into the front of the retainer. On models which have a heavy-duty output shaft, press the seal until it seats lightly in the retainer. When a standard output shaft is used, press the seal until it is approximately in the center of the seal bore depth. If a cap 6 (A, foldout 11) was removed, press a new cap into the retainer until it bottoms.

(25) Install the bearing retainer, aligning the holes in the retainer with those in the housing (fig. VII-8).

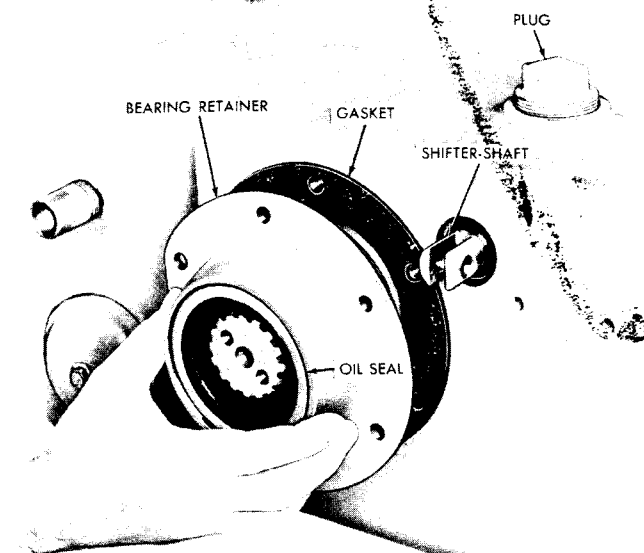


Fig. VII-8. Installing front-output shaft bearing retainer S2442

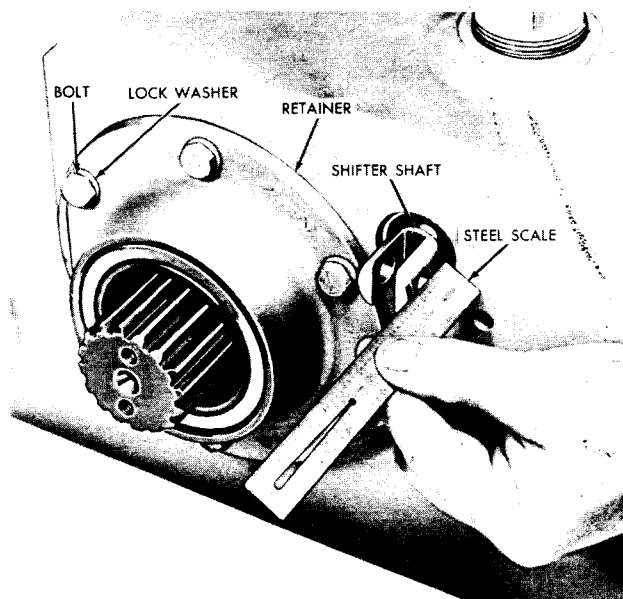


Fig. VII-9. Measuring adjustment of disconnect shaft S2443

(26) Install the six bolts and lock washers which secure the retainer (fig. VII-9).

(27) Push the shifter shaft all the way into the housing while rotating the output shaft. When the coupling engages the second detent, measure the distance from the housing to the center of the pin hole in the shaft. Adjust the shaft, by rotating it, until the measured distance is approximately $\frac{5}{8}$ inch (16 mm) (fig. VII-9).

(28) On assemblies which have a cast housing, install the gaskets, inspection covers and retaining bolts and lock washers (fig. V-25).

(29) On assemblies which have a cast housing, install the oil strainer gasket and oil strainer. Secure it with six bolts and lock washers (fig. V-25).

(30) Install the output flange (fig. V-25).

Note: Spacer 12 (A, foldout 11) must be installed before the flange when a heavy-duty output shaft is used. Refer to sect. IV, para 7b for instructions for installing interference-fit flanges.

(31) Install retainer washer 3, (A, foldout 11), lock strip 2, and two bolts 1. Bend the lock strip against the bolt heads.

Note: Shims 5 must be installed between the output shaft and retainer washer 3 when a heavy-duty output shaft is used. Install shims as required to allow 0.008 to 0.012 inch (0.2 to 0.3 mm) space between the retainer washer and the shim pack.

(32) If the transmission is equipped with an upper- or lower-rear output disconnect, it will be installed later. Refer to p or q, below.

(33) Install the hook-type seal ring into the groove at the front of the transfer housing (fig. VII-10).

(34) Install the low-range clutch piston assembly (fig. VII-10).

Note: Procedures (33) and (34), above, apply only to CRT 3331-1 models.

b. Forward Planetary and Related Components - Installation

(1) Position the transmission housing assembly, front upward, and install the forward clutch piston assembly (fig. VII-11).

(2) Install one external-tanged and one

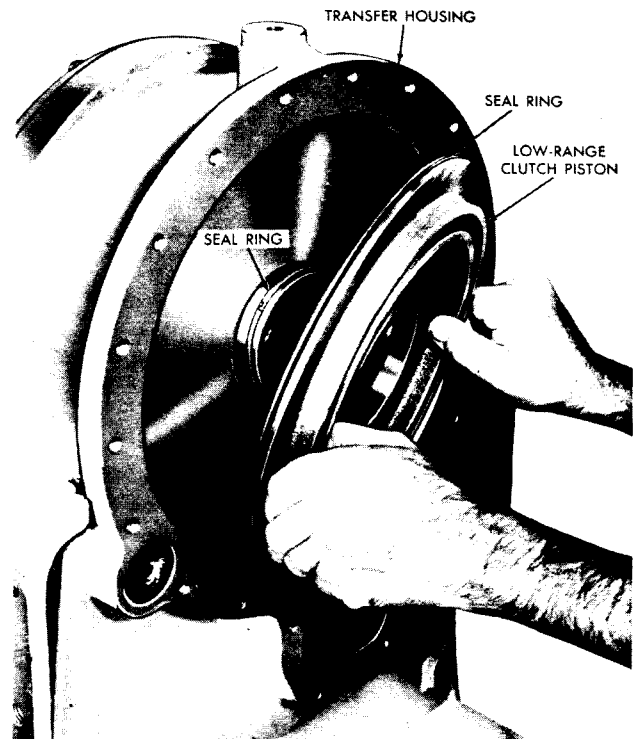


Fig. VII-10. Installing low-range clutch piston 52444

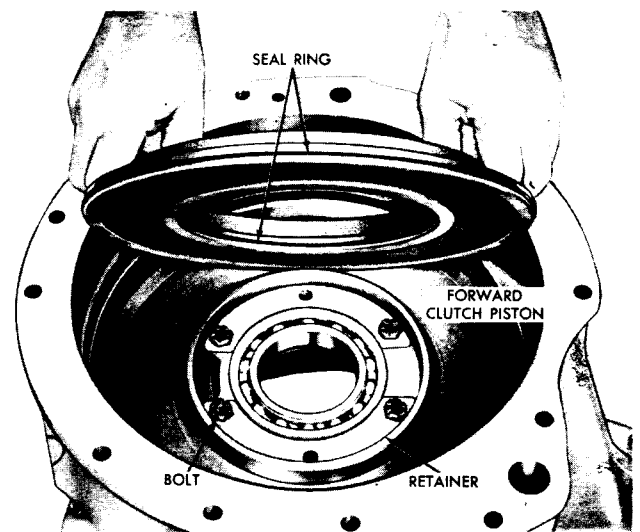


Fig. VII-11. Installing forward clutch piston assembly 52446

internal-splined forward clutch plate. Install the forward planetary ring gear, shorter splines facing down (fig. VII-12).

(3) Install the reverse-range planetary carrier ring gear 45 (A, foldout 9) onto the forward carrier assembly 37. Install snap ring 36 to retain it.

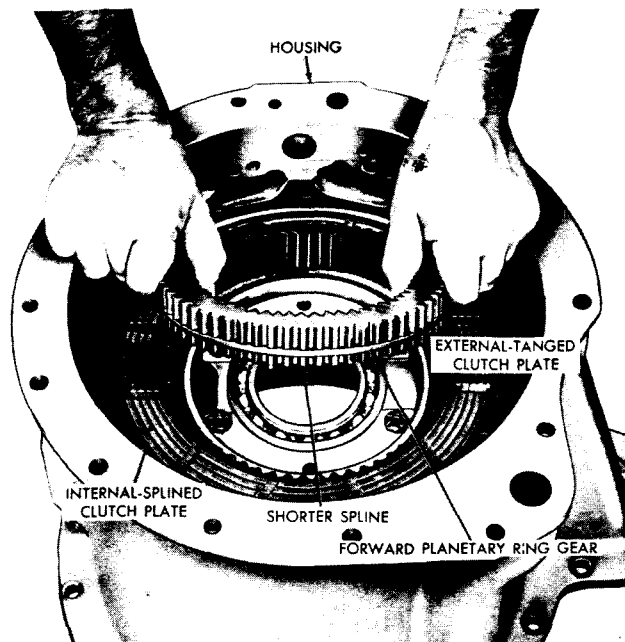


Fig. VII-12. Installing forward planetary ring gear ^{S2447}

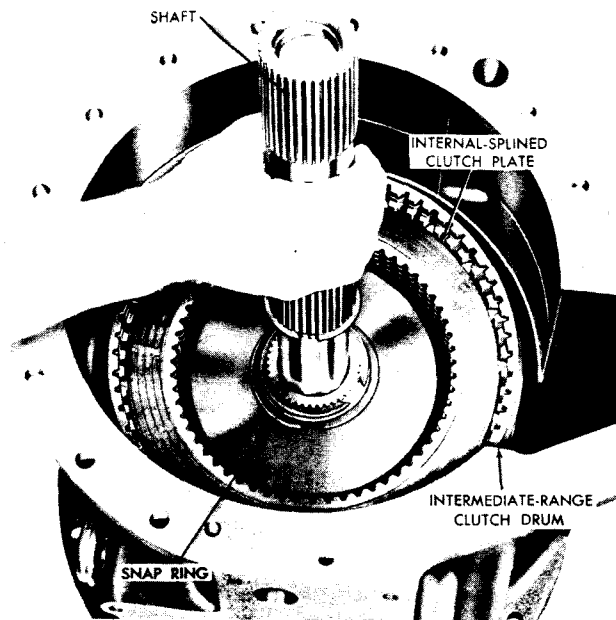


Fig. VII-14. Installing (or removing) transmission main-shaft assembly ^{S2506}

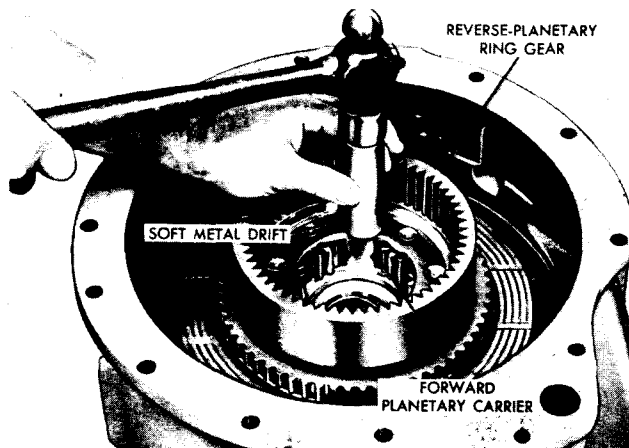


Fig. VII-13. Installing forward planetary carrier assembly ^{S2448}

(4) Install the forward carrier assembly and, with a soft metal drift, seat it in its ball bearing (fig. VII-13).

Caution: Mesh the carrier pinions with the ring gear teeth before driving the carrier into place.

c. Intermediate-range Components – Installation

(1) Position the transmission housing, front downward, and install the intermediate-range clutch drum (fig. VII-14).

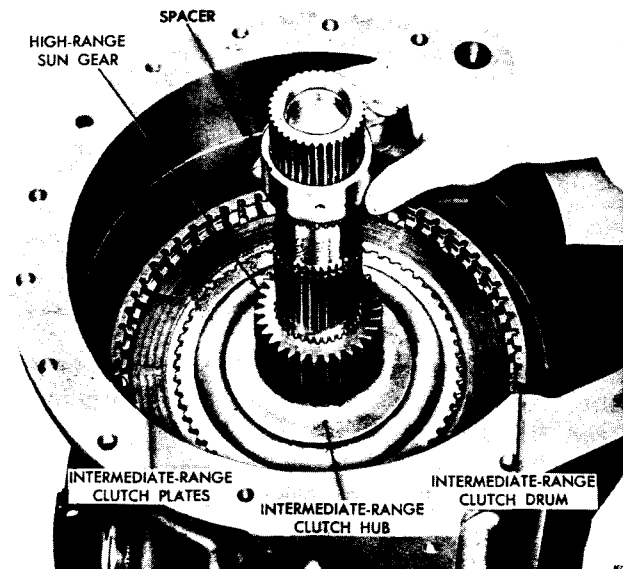


Fig. VII-15. Installing spacer onto high-range sun gear ^{S2507}

(2) Install the snap ring which retains the intermediate-range clutch drum to the hub of the forward planetary carrier (fig. VII-14).

(3) Install four internal-splined and three external-splined intermediate-range clutch plates. Begin with an internal-splined plate and alternate the plates (fig. VII-14).

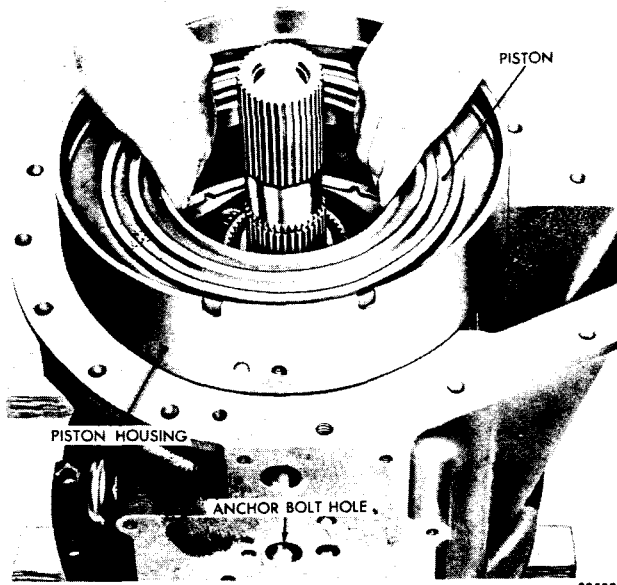


Fig. VII-16. Installing (or removing) high-range clutch piston housing and piston

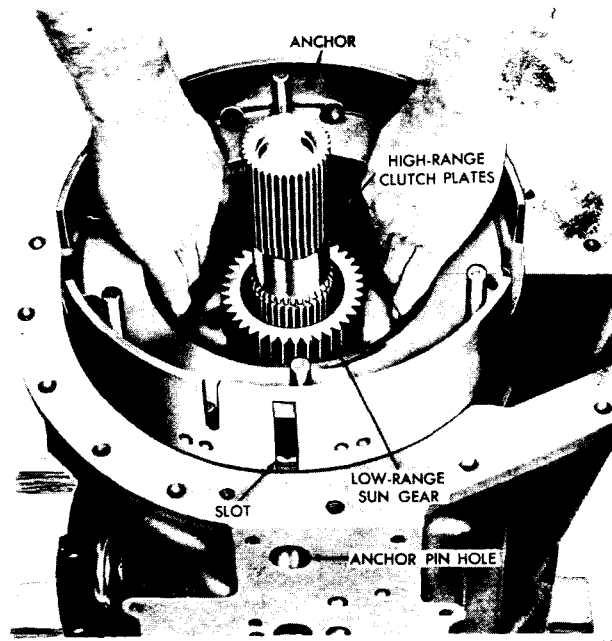


Fig. VII-17. Installing (or removing) high-low-range clutch anchor assembly

(4) Install the transmission main shaft (fig. VII-14).

(5) Install the intermediate-range clutch hub (fig. VII-15).

d. High-range Components – Installation

(1) Install the high-range planetary sun gear (fig. VII-15).

(2) Install the spacer (or snap ring – see note below) onto the high-range planetary sun gear.

Note: The spacer in procedure (2), above, is used prior to Serial No. 24029. Effective with Serial No. 24029, a snap ring is used instead of the spacer.

(3) Install the high-range planetary carrier assembly (fig. V-21). On later CRT 3331 models, the low-range sun gear is installed with the high-range carrier. (Refer to para 6-22.)

(4) Install the large snap ring which retains the carrier assembly (fig. V-21).

(5) Install the high-range clutch piston and housing assembly (fig. VII-16).

(6) Align the tapped hole in the piston housing with the anchor hole in the transmission housing and install the bolt and lock washer which retains the housing (fig. VII-16).

(7) Install one external-tanged and one internal-splined high-range clutch plate (fig. V-20).

(8) Install the high-range planetary ring gear, shorter splines down, and engage the ring gear splines with the clutch plate splines (fig. V-20).

(9) Install the remaining high-range clutch plates. Begin with an external-tanged plate and alternate the plates until two external-tanged and two internal-splined plates are installed on the two plates previously installed in (7), above.

e. Low-range Components – Installation

Note: For CRT 3321-1 models, only procedures (2), (4) and (9), are applicable.

(1) Install the low-range sun gear (fig. VII-17). On later CRT 3331 models, the sun gear is installed with the high-range carrier. (Refer to para 6-22.)

(2) Install the high- and low-range clutch anchor assembly, aligning the anchor

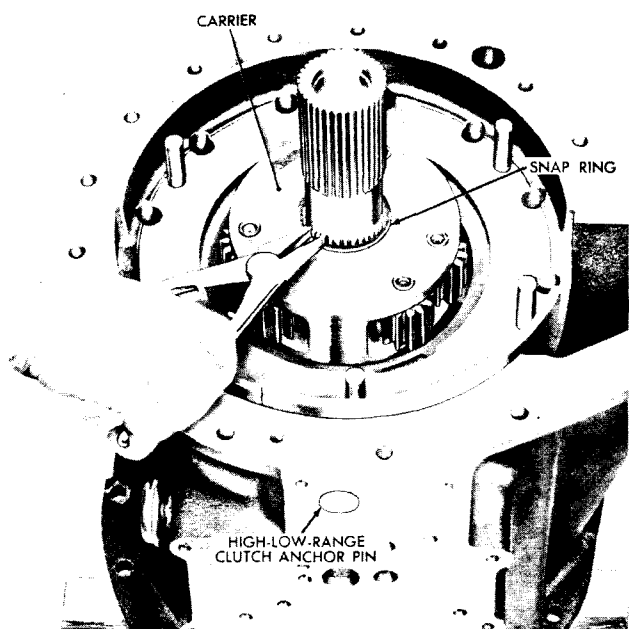


Fig. VII-18. Installing snap ring which retains low-range carrier assembly

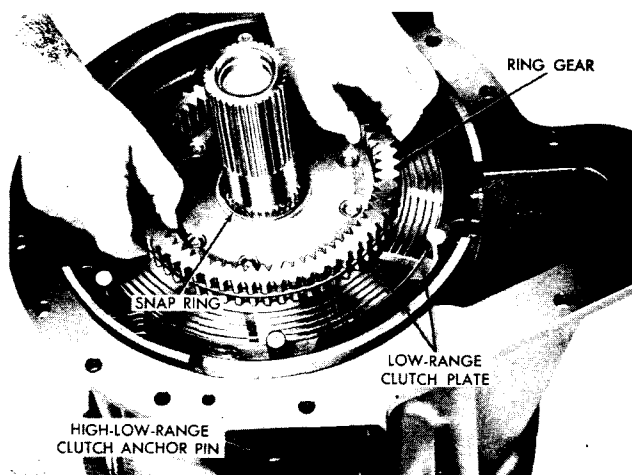


Fig. VII-19. Installing (or removing) low-range ring gear

slot with the anchor pin hole in the housing (fig. VII-17).

Note: The shorter ends of the pins in the anchor must engage the external tangs of the low-range clutch plates.

(3) Install the thrust washer, with the chamfer down, in the low-range planetary carrier assembly (fig. V-19).

(4) Install the low-range clutch anchor pin (fig. VII-18).

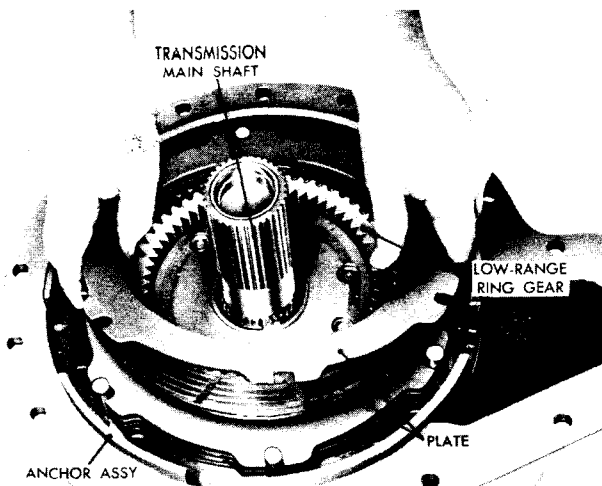


Fig. VII-20. Installing last low-range clutch plate

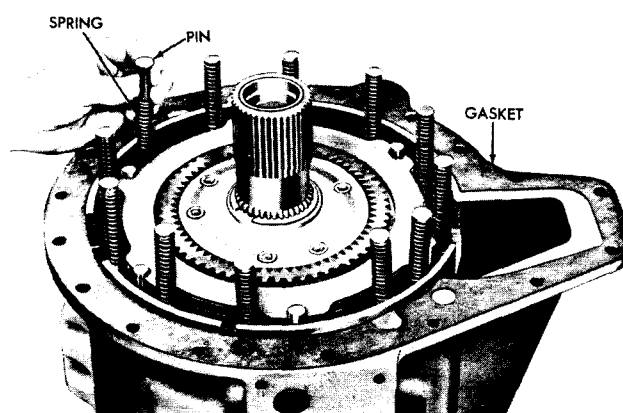


Fig. VII-21. Installing clutch piston return springs and guide pins

(5) Install the carrier assembly and retain it with the snap ring (fig. VII-18).

(6) Install four internal-splined and three external-tanged low-range clutch plates. Begin with an internal-splined plate, alternate the plates, ending with an internal-splined plate (fig. VII-19).

(7) Install the low-range planetary ring gear, long splines down, into the splines of the clutch plates (fig. VII-19).

Note: When the ring gear is properly installed, the retaining ring will rest on the top clutch plate.

(8) Install another external-tanged plate, another internal-splined plate and the remaining external-tanged plate (fig. VII-20).

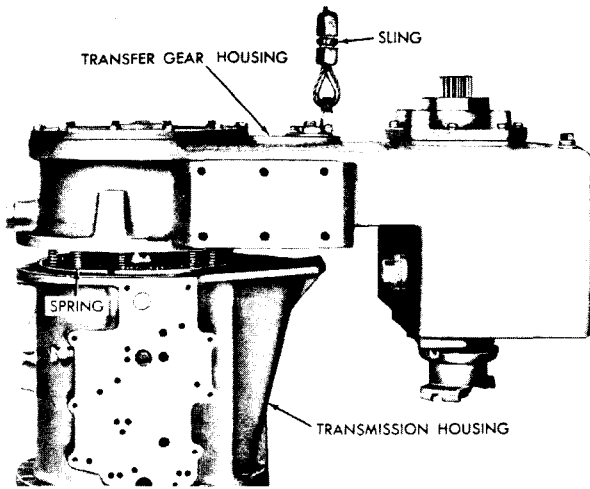


Fig. VII-22. Installing transfer gear housing onto transmission housing

S2461

(9) Install the transmission housing rear gasket. Install 12 springs and pins (fig. VII-21).

Note: In 3321-1 models, position spacer 69 (A, foldout 10) centrally on the heads of the pins.

f. Transmission Housing-to-Transfer Case Assembly - Installation

(1) Hoist the assembled transfer case assembly, supported by a bolt installed in the idler spindle lock bolt hole (fig. VII-22).

Note: It may be necessary to hold the low-range clutch piston of 3331-1 transmissions in position in the transfer housing during this operation and until the transfer housing is lowered onto the transmission housing.

(2) Position the transfer housing assembly over the transmission housing carefully and lower it. Keep the transfer housing horizontal (fig. VII-22).

(3) Install 18 bolts and lock washers which fasten the two housings together. Pressing downward on the transfer housing to compress the clutch piston return springs will assist in starting the first few bolts. Tighten all of the bolts evenly.

(4) Position the transmission assembly in its normal operating position and remove

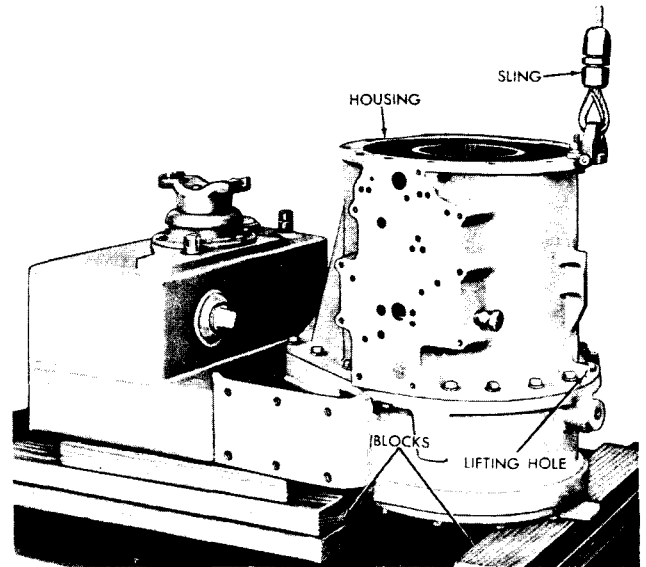


Fig. VII-23. Positioning transmission, rear downward

S2462

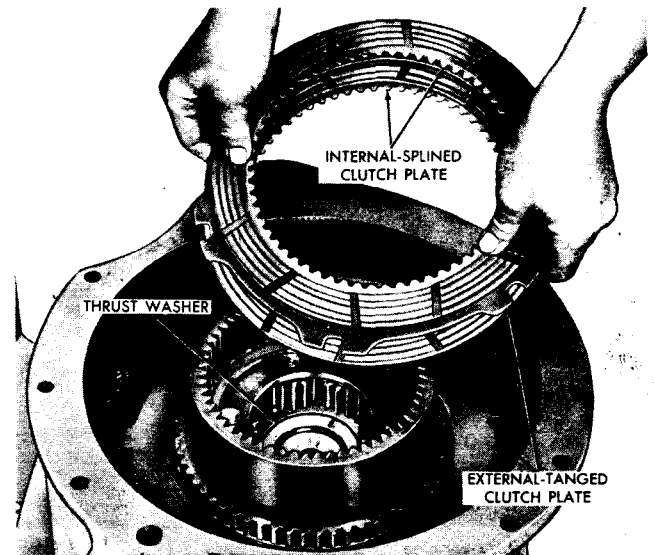


Fig. VII-24. Installing forward clutch plates

S2463

the lifting sling. Install washer 20 (B, foldout 10), washer 21, and bolt 22 to retain the transfer idler gear spindle.

g. Forward and Reverse Components - Installation

(1) Hoist the transmission assembly and position it, rear downward, on blocks (fig. VII-23).

(2) Install the thrust washer into the forward planetary carrier assembly (fig. VII-24).

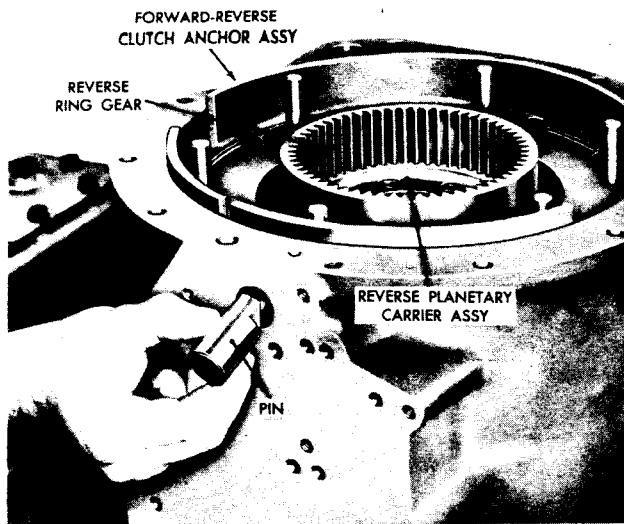


Fig. VII-25. Installing (or removing) forward-reverse clutch anchor pin

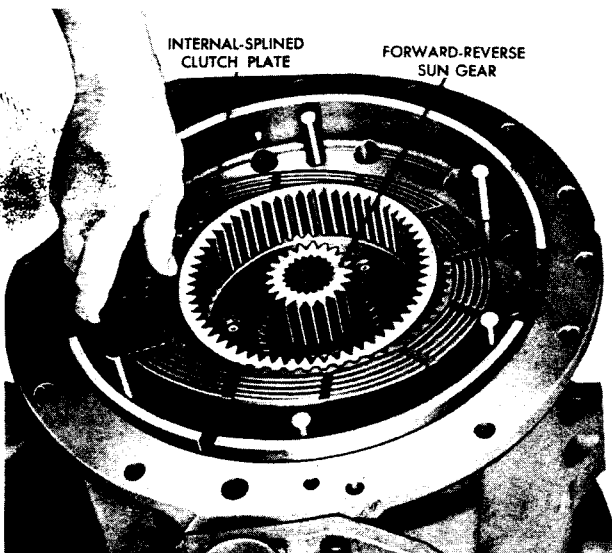


Fig. VII-26. Installing reverse clutch plate

(3) Install an external-tanged forward clutch plate, an internal-splined plate, another external-tanged plate, and the remaining internal-splined plate onto the plates previously installed (fig. VII-24).

(4) Install the forward and reverse clutch anchor assembly, shorter end of pins downward, into the transmission housing (fig. VII-25).

Note: The shorter end of the pins must engage the tangs of the forward clutch plates.

(5) Align the slot in the clutch anchor with the anchor hole in the housing and install the clutch anchor pin (fig. VII-25).

(6) Install the forward and reverse sun gear (fig. VII-26).

(7) Install one internal-splined reverse clutch plate (fig. VII-26).

(8) Install the reverse planetary carrier assembly (fig. V-17). Engage the carrier pinions with both the sun gear and ring gear. Engage the clutch hub with the splines of the plate previously installed (see (7), above).

(9) Install the remaining nine reverse clutch plates, beginning and ending with an external-tanged plate (fig. V-17).

(10) Install the 12 clutch piston return springs and pins, pin heads upward, into the clutch anchor (fig. VII-27).

h. Torque Converter Housing Assembly - Installation

(1) Install the gasket onto the front of the transmission housing (fig. VII-27).

(2) Hoist the torque converter housing into position over the transmission assembly (fig. VII-27).

Caution: The reverse clutch piston and the reverse planetary carrier aluminum spacer may require support to keep them from dropping out of the converter housing assembly.

(3) Install the torque converter housing onto the transmission housing (fig. VII-27). Be sure that the reverse clutch plates, pins and springs, spacer, and piston remain properly in position.

(4) Install 13 bolts and lock washers which retain the converter housing.

i. Torque Converter Components (3-element converter) - Installation

(1) Install the double-row ball bearing assembly, ungrooved end first, into the pump

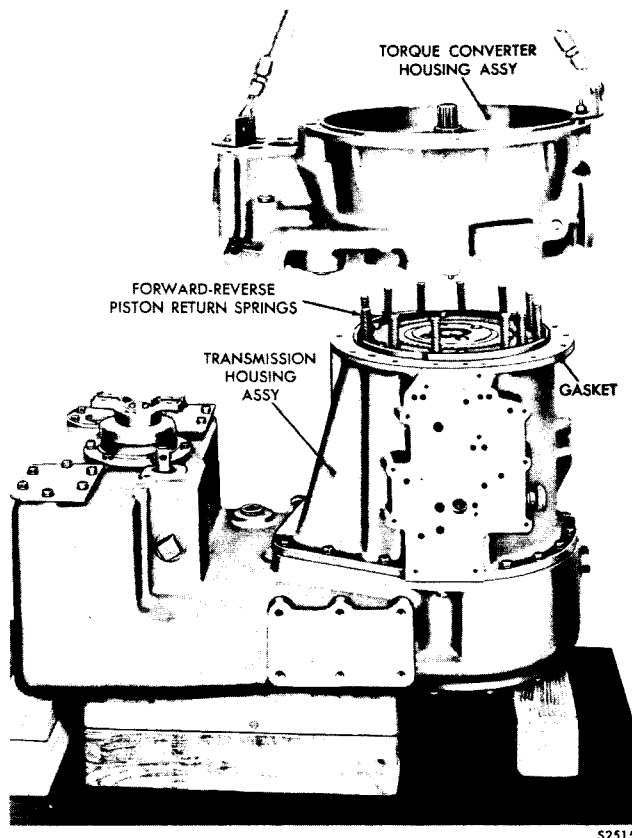


Fig. VII-27. Installing (or removing) torque converter housing assembly

drive gear. Install the bearing and drive gear onto the converter ground sleeve (fig. VII-28).

(2) Install the converter pump gasket and pump assembly onto the bearing and gear (fig. VII-28).

(3) Install three retainer plates, three lock strips, and six self-locking bolts. Tighten the bolts and bend the corners of the lock strips against the bolt heads (fig. VII-29).

(4) Install two internal-splined spacers and the snap ring which retains the pump assembly (fig. VII-29).

(5) If the transmission has a "dry" converter housing (see sect. II, para 2c), install the seal ring into the groove near the outer-bolt circle of the pump assembly (fig. VII-29).

(6) Pickup the assembled stator assembly (refer to sect. VI, para 14) and, while holding the fingers on the freewheel roller race, position the assembly, roller race downward.

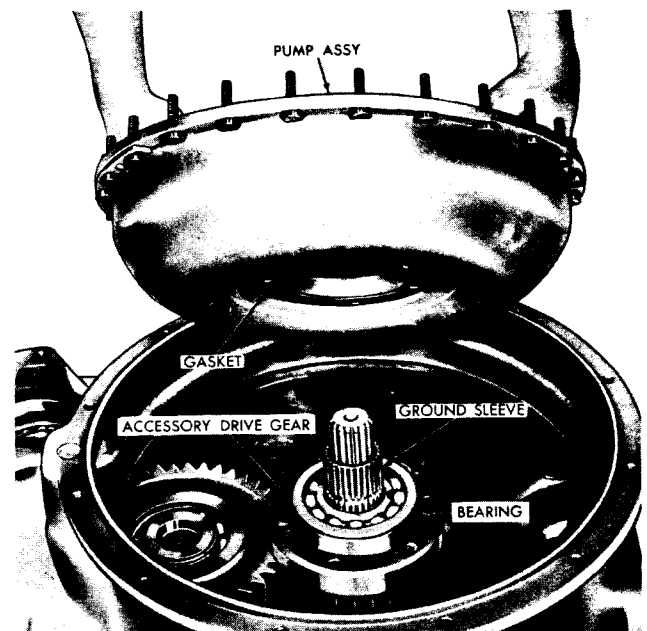


Fig. VII-28. Installing torque converter pump assembly

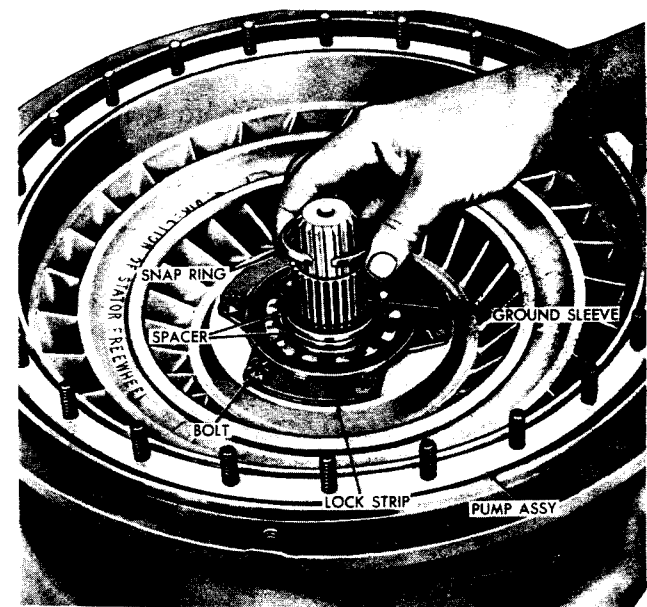


Fig. VII-29. Installing snap ring which retains torque converter pump

Install the stator assembly, removing the fingers from the roller race after the splines of the race engage the splines of the ground sleeve.

Note: Check the stator for rotation. The stator must freewheel in the direction of engine rotation (clockwise), and must lock up when attempting to rotate the stator.

(7) If ball bearing 1 (B, foldout 7) was removed from turbine 2, press the bearing onto the turbine hub until it is firmly seated.

(8) Install the turbine assembly onto the splined end of the converter shaft. Refer to fig. V-14.

j. Torque Converter Components
(4-element converter) - Installation

(1) Install the double-row ball bearing assembly (fig. VII-28) into accessory drive gear. Install the bearing and gear onto the torque converter ground sleeve.

(2) Install the gasket and the torque converter pump assembly onto the bearing and pump drive gear (fig. VII-28).

(3) Install three lock strips and six bolts which retain the pump assembly. Tighten the bolts and bend a corner of each strip against each bolt head (fig. V-16).

(4) Install the spacer onto the torque converter ground sleeve (fig. V-16).

(5) Install the stator thrust washer and the snap ring which retains it (fig. VII-30).

(6) Install the stator freewheel race onto the ground sleeve (fig. VII-30).

(7) If the transmission has a "dry" converter housing (sect. II, para 2c), install the seal ring into the groove near the pump bolt circle (fig. VII-30).

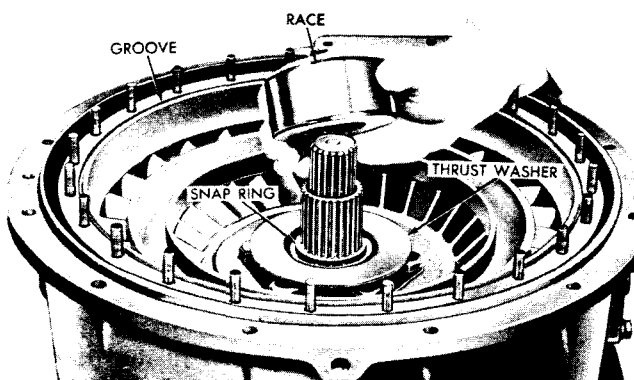


Fig. VII-30. Installing (or removing) freewheel roller race ^{S2516}

(8) Install the second-stator assembly, flat side upward, onto the freewheel race (fig. V-15). Check the stator for rotation. It should freewheel clockwise but lock up counterclockwise.

(9) Install the stator spacing washer (fig. V-15).

(10) Install the first-stator assembly (fig. VII-31). Repeat the check for rotation (see (8), above).

(11) If ball bearing assembly 37 (B, foldout 7) was removed from turbine assembly 36, press it onto the turbine hub until it is firmly seated.

(12) Install the torque converter turbine onto the converter shaft (fig. V-14).

k. Input Drive Components (direct-mount models) - Installation

(1) Install the converter pump cover 20 (A, foldout 7) onto the converter pump.

(2) Install 24 self-locking nuts 19 which retain the cover. To tighten these nuts, insert a bolt into one of the holes in the converter housing flange and brace one wrench against the bolt while tightening the nuts with another wrench. Refer to fig. V-10. (Refer to sect. IV, para 6c, for the remaining assembly procedures required during final installation.)

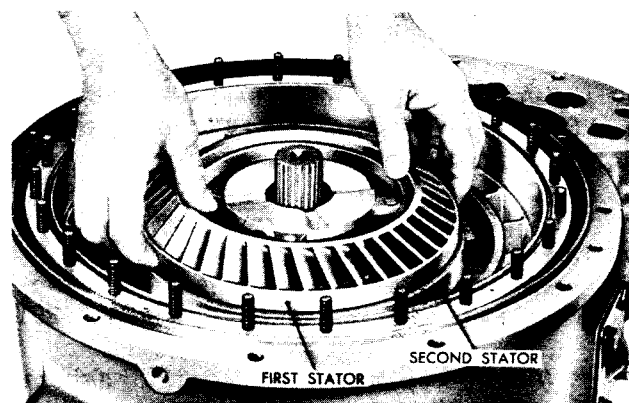


Fig. VII-31. Installing (or removing) first-stator assembly ^{S2517}

1. Input Drive Components (remote-mount models) – Installation

(1) If the input shaft was removed from the pump cover assembly (fig. V-10), install it and retain it with three lock strips and six bolts. Lock the bolts by bending a corner of each lock strip against each bolt head.

(2) If the bearing was removed, install it. Press the bearing until it is seated firmly against the shoulder on the input shaft (fig. V-10).

(3) Install the pump cover and retain it with 24 self-locking nuts. The nuts may be tightened by installing a bolt in the flange of converter housing, bracing a wrench against the bolt, and using a second wrench on the nuts (fig. V-10).

(4) If oil seal 5 (A, foldout 7) was removed from front cover 7, install a new seal. Press the seal, spring-loaded side first, into the bore of the cover. Press the seal to 0.230 to 0.290 inch (5.84 to 7.36 mm) below the bore chamfer.

(5) Install the gasket onto the flange of the converter housing (fig. VII-32).

Note: Check the hole between the two lowest bolt holes in the converter housing flange. A pressed steel plug should block this hole on remote-mount models.

(6) Install the transmission front cover, positioning the thick section of the cover flange toward the bottom of the transmission (fig. VII-32).

(7) Install 12 bolts with their heads toward the front of the transmission. Install 12 nuts and lock washers onto the bolts.

(8) If the transmission is equipped with an input flange that requires shims, select the proper combination of shims 22 (A, foldout 7) to allow 0.005 to 0.009-inch (0.127 to 0.228 mm) space between the retainer washer and the shim pack. (Refer to sect. IV, para 7b for installation instructions for interference-fit flanges.)

(9) Install the flange retainer washer, the lock strip and two self-locking bolts. Bend the lock strip against the bolt heads (fig. V-1).

m. Input Pressure Pump Assembly – Installation

(1) Install the pump gasket (fig. V-8).

(2) If the pump coupling has an external groove, install seal ring 22 (A, foldout 8) into the groove of coupling 24.

(3) Apply Molykote Type G (or equivalent) onto the external and internal splines of coupling 24. Install the coupling onto the pump shaft (fig. V-8).

(4) Install the pump assembly and retain it with six bolts and lock washers (fig. V-8).

n. Speedometer Drive Components – Installation

(1) If a new oil seal 17 (B, foldout 11) is required, press the seal, spring-loaded side outward, into adapter 16.

(2) If a new bearing 21 is required, press the bearing onto shaft 23 and retain it with snap ring 20.

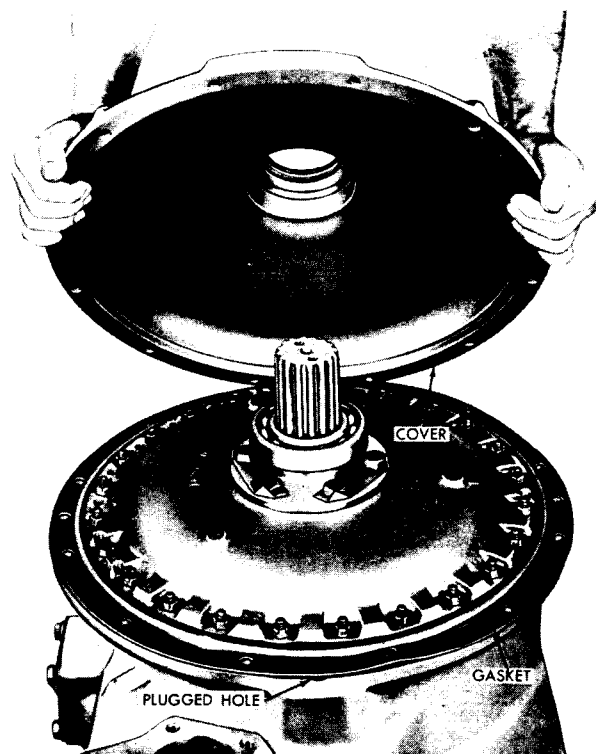


Fig. VII-32. Installing transmission front cover

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(3) Install the assembled bearing and shaft into the bore in the transfer drive gear cover, engaging the drive pin with the slot at the rear of the transmission main shaft.

(4) Install spacer 18 into the bore of the drive gear cover.

(5) Install gasket 19 onto adapter 16 and install the adapter onto the drive gear cover. Retain the cover with four bolts 14 and lock washers 15.

o. Governor Drive Components – Installation

(1) If a new oil seal 9 (B, foldout 11) is required, press the seal, spring-loaded side outward, into adapter 11.

(2) If a new bearing assembly 6 is required, press a new bearing onto shaft 5 and retain it with snap ring 7.

(3) Install the shaft assembly into the rear of the transmission, engaging its splined end with the internal splines of the forward and reverse planetary sun gear.

(4) Install spacer 8 against the bearing on the shaft assembly.

(5) Install gasket 10 onto adapter 11. Install the adapter and retain it with four bolts 12 and lock washers 13.

p. Lower-rear Output Disconnect Components – Installation

(1) Install coupling 9 (A, foldout 12), unsplined outer end first, onto the rear end of the transfer case rear shaft.

(2) Install gasket 26 onto the lip of adapter 27. Install the adapter onto the rear of the transfer case.

(3) Install gasket 4 onto the rear of the disconnect assembly.

(4) Install the disconnect assembly and retain it with six bolts 3 and lock washers 2.

q. Upper-rear Output Disconnect Components – Installation

(1) Install coupling 9 (A, foldout 12), unsplined outer end first, onto the rear of the transmission main shaft.

(2) Install gasket 4 onto the rear of the output disconnect assembly.

(3) Install the disconnect assembly onto the transfer drive gear cover. Retain it with six bolts 1 and lock washers 2.

r. Parking Brake – Installation

(1) Install the brake back plate and retain it with three bolts and lock washers (fig. V-7).

(2) Install the roller on the brake link on the back plate assembly (fig. V-7).

(3) Install the brake cam lever (fig. V-7).

(4) Install the two brake shoe assemblies and brake springs (fig. V-6).

Note: One brake spring fastens in front holes of the shoe; the other in the rear holes.

(5) If the brake drum 36 (A, foldout 12) was removed from the output drive flange 41, install it onto the flange (except those cases where the drum bolts are also used for connecting the drive line).

Note: For installation of the assembled drum and flange, refer to s, below.

s. Rear Output Flange – Installation

(1) Install the rear output flange 41 (A, foldout 12). Refer to sect. IV, para 7b for installation of interference-fit flanges.

(2) Install the flange retainer washer 37, lock strip 38 and two self-locking bolts 39.

(3) Bend a corner of lock strip against each bolt head.

t. External Subassemblies - Installation

(1) Replace any parts required in converter housing drain tube assembly (fig. V-5).

(2) Install the flange gasket onto the converter housing (fig. V-5).

(3) Install the drain tube, hoses, flange, and three clamps as a unit, while the fourth clamp is positioned on the nipple in the transfer case.

(4) Install two bolts and lock washers to retain the flange to the converter housing (fig. V-5).

(5) Spread the rear clamp and install it onto the rear of the rear hose (fig. V-5).

(6) Install the main-pressure regulator valve body gasket onto the converter housing (fig. V-4).

(7) Install the main-pressure regulator valve body assembly (fig. V-4).

(8) Retain the valve body with five bolts and lock washers.

(9) Install the control valve body gasket onto the transmission housing (fig. V-3).

(10) Install the control valve body assembly (fig. V-3).

(11) Install 11 bolts and lock washers to retain the control valve body assembly.

(12) Install the oil cooler core gasket onto the pad at the tap of the converter housing (fig. V-2).

(13) Install the oil cooler core, cover gasket, and cover (fig. V-2).

(14) Install 12 bolts and lock washers to retain the oil cooler assembly.

3. ASSEMBLY OF CRT 3321-3 AND CRT 3331-3 TRANSMISSION

a. Basic Similarities of 3321-1 and 3331-1 Models

(1) Because the 3321-1 and 3331-1 models have major features which are identical to 3321-3 and 3331-3 models, most of the assembly instructions in para 2, above, apply also to the -3 models. The transmissions are identical forward of their mounting to the output section, except for the input pressure pump and method of draining the torque converter housing.

(2) Instead of a gravity oil drain from the torque converter housing as used in the -1 (transfer case) models, the input pressure pump on the -3 models includes a scavenge pump section which returns excess oil to the transmission oil sump through a return tube (fig. I-4).

b. Differences in Output Sections

(1) Because of the differences in construction between the -1 (transfer case) models and the -3 models, additional instructions for assembly of the output section are provided below for -3 models. Therefore, instructions in para 1 and in para 2a through t, above, will apply generally to -3 models. Where they do not apply, proper instructions appear in c through r, below.

(2) To assemble a -3 transmission (fig. I-3), follow the steps outlined. Although references to many assembly procedures will refer to transfer case models, and illustrations will show such models, the referenced procedures will be identical. Referenced instructions for CRT 3321-1 will apply to CRT 3321-3; referenced instructions for CRT 3331-1 will apply to CRT 3331-3.

c. Transmission Sump Adapter Components - Installation

(Refer to the note at the beginning of subparagraph q in sect. V, para 3.)

(1) Install any plugs removed from the transmission sump 23 or 50 (B, foldout 12).

(2) Install two bolts 35 into oil seal plate 34 and install the plate, bolt heads toward the sump, onto the oil suction tube at the upper-right front of the sump.

(3) Install a new oil seal 33 onto the suction tube.

(4) Install the oil sump gasket 51 and oil sump onto adapter 29. Guide bolts 35 through the holes in the adapter.

(5) Install four bolts 54 and lock washers 55 at the front of the adapter.

(6) Install three bolts 31 and lock washers 30 at the rear of the adapter.

(7) Install two nuts 58 and lock washers 57 onto bolts 35.

(8) Install oil strainer 39, retainer 40, gasket 41, cover 42, washer 43 and crown nut 44.

Caution: Do not exceed 10 pound feet (13.6 N·m) torque when tightening crown nut 44.

(9) Install washer 2 into the rear of adapter 29.

(10) Install bearing 3 onto sleeve 4.

(11) Install the assembled bearing and sleeve into the rear of the adapter.

(12) If oil seal 10 was removed from bearing retainer 7, install a new seal. Press the seal, spring-loaded side first, into the rear of the retainer. Press the seal to approximately the center of the bore depth.

(13) Install gasket 6 onto the rear of adapter 29.

(14) Install retainer 7, eight bolts 9 and lock washers 8.

d. Forward Planetary and Related Components—Installation. Follow the instructions in para 2b, above.

e. Intermediate-range Components—Installation. Follow the instructions in para 2c, above.

f. High-range Components—Installation. Follow the instructions in para 2d, above.

g. Low-range Components—Installation. Follow the instructions in para 2e, above.

h. Transmission Housing-to-Oil Sump Adapter—Installation

(1) Install spacer 1 (B, foldout 12), counterbored end first, onto the transmission main shaft.

(2) Hoist the oil sump and adapter, rear end upward, and position it over the transmission housing assembly (fig. VII-22).

(3) Align washer 2 (B, foldout 12), which was installed during rebuild of the sump adapter, with the center of the bore of sleeve 4.

(4) Carefully lower the sump adapter and sump assembly, guiding the main shaft through washer 2 and spacer 4.

(5) Install 18 bolts and lock washers which fasten the sump adapter and transmission housing together. Pressing down on the adapter to compress the clutch piston return springs will assist in starting the first few bolts.

(6) Before tightening these bolts, install pin 5 (B, foldout 12). Then tighten the 18 bolts evenly. After tightening the bolts, check to make sure pin 5 is flush with, or below, the rear surface of sleeve 4.

i. Forward and Reverse Components—Installation. Follow the instructions in para 2g, above.

j. Torque Converter Housing Assembly—Installation. Follow the instructions in para 2h, above.

k. Torque Converter Components (3-element converter)—Installation. Follow the instructions in para 2i, above.

l. Torque Converter Components (4-element converter) - Installation. Follow instructions in para 2j, above.

m. Input Drive Components (direct-mount models) - Installation. Follow instructions in para 2k, above.

n. Input Drive Components (remote-mount models) - Installation. Follow instructions in para 2l, above.

o. Input Pressure Pump Assembly - Installation. Follow instructions in para 2m, above.

p. Parking Brake - Installation. Follow instructions in para 2r, above.

q. Rear Output Flange - Installation. Follow instructions in para 2s, above.

r. External Subassemblies - Installation.

(1) Replace any part required in the scavenge pump return tube (fig. 1-4).

(2) Install return tube flange gasket 49 (B, foldout 12) onto the input pressure pump (scavenge section) assembly.

(3) Install rear hose clamp 45 loosely on the oil return nipple on the oil sump.

(4) Install oil return tube assembly (items 46, 47 and 48) and four bolts 53 and lock washers 52 which retain it to the pump assembly.

(5) Spread rear hose clamp 45 and install it on the rear of return tube hose 46.

(6) For the remainder of installation procedures, follow instructions (6) through (14) in para 2t, above.

4. INSTALLING ONE-PIECE OUTPUT SHAFT

a. Install the transfer driven gear with the longer hub toward the rear of the transfer housing (fig. VII-33). Place the rear bearing in the rear bore to be used as a support when the shaft is installed.

b. Install the front bearing onto the output shaft. Install the assembled shaft and bearing into the front of the transfer housing, and guide the shaft through the gear hub and rear bearing.

c. Seat the rear bearing against the gear hub. Seat the front bearing against the shoulder in the housing bore.

d. Continue assembly with paragraph 2a(7) through (15). Omit subparagraphs (16) through (22). Install the front bearing retainer as described in subparagraphs (23) through (26). Omit subparagraph (27). Complete the assembly using the applicable information in subparagraphs (28) through (34).

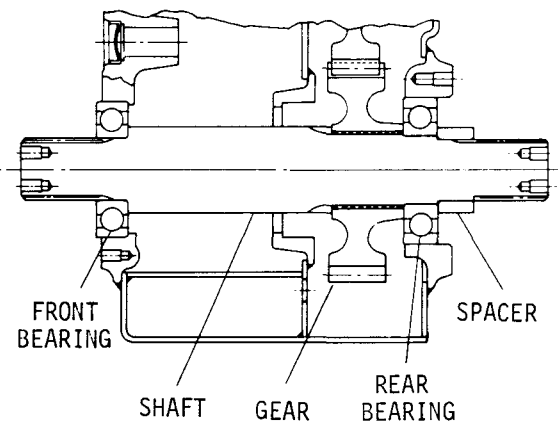


Fig. VII-33. One-piece output shaft and related components

Service Information Notes

Section VIII WEAR LIMITS AND SPRING DATA

1. KEYED TO EXPLODED VIEWS

The wear limits and spring data, below, are keyed to the exploded views (foldouts 7 through 14) in the back of this manual.

2. WEAR LIMITS DATA

a. Maximum Variations. The following wear limits information shows the maximum variations at which the components are expected to function satisfactorily. The tolerances do not include a life factor for further periods of operation without replacing or reworking worn parts.

b. See Cleaning, Inspection. All wear limits information must be used in conjunction with the cleaning and inspection instructions given in sect. IV, para 5.

c. Bearings, Bearing Journal and Bores. The application of bearings to any product is based on the recommendation of the bearing manufacturer and, therefore, no diametral dimensional deviation should be permitted on the bearing or mating pieces. Bearings should be carefully checked for signs of distress before reinstalling in the product.

d. Gears. Gears should be inspected for load pattern and signs of distress. Any distress indicates a possible future failure and the re-using of such gears should be the decision of the individual customer, based on previous experience. Backlash cannot be used to establish critical wear of a gear since production backlash tolerances are of such nature that a gear usually pits, scuffs, scores or

galls long before the gear wears sufficiently that such wear could be determined by backlash measurements.

e. Splines. Unless severe, spline wear is not considered detrimental except where it affects tightness of an assembly such as drive line flanges. Here again, backlash cannot be used to establish critical wear of splines since both parts (male and female) must be centrally located in respect to each other in order to obtain a correct measurement.

f. Oil Seals. Seals should be replaced if there are signs of excessive hardening, scoring, or other indications of deterioration.

g. Springs. Springs should be replaced if they show signs of overheating, permanent set (see individual part wear limits for load versus height dimensions), or wear due to rubbing adjacent parts.

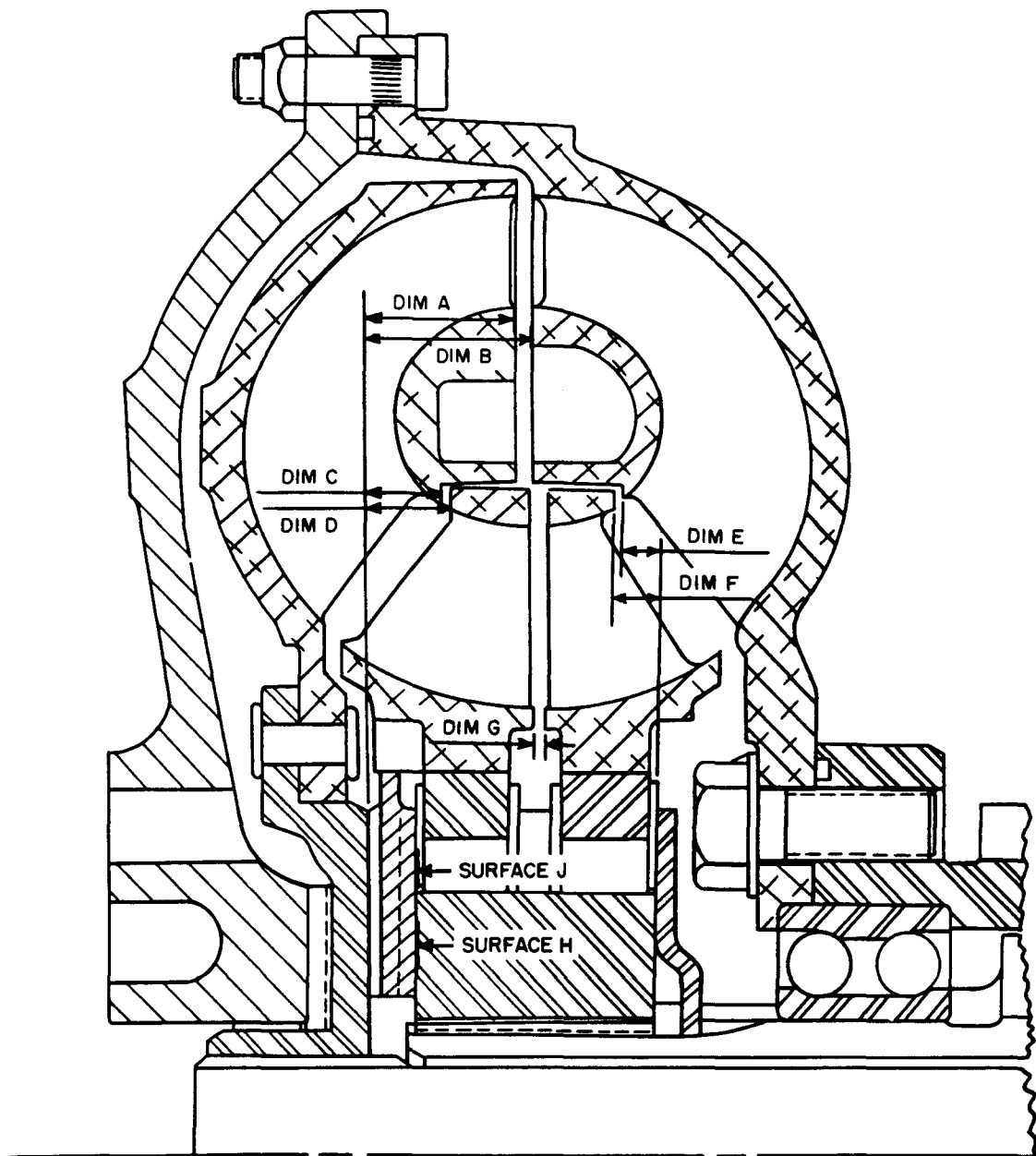
h. Piston-type Seal Rings. The sides of the seal ring should be smooth; maximum wear 0.005 inch (0.127 mm). The sides of the shaft groove in which the seal ring runs should be smooth (50 microinch (1.25 μ m) equivalent), and square with the axis of rotation within 0.002 (0.05 mm). A new seal ring should be installed if shaft grooves are reworked, or seal ring outside diameter wear causes the possibility of closing the gap between seal ring hooks when the ring is installed.

3. WEAR LIMITS CHART

The following chart covers the tabulated wear limits data and is referenced to the exploded views (foldouts) in back of the manual.

Wear Limits Chart begins on page VIII-3

(See page VIII-8 for Spring Chart information)



With stator pack installed, end of roller race (surface H) shall be 0.007 inch (0.178 mm) or more beyond stator side plate (surface J).
 Dimension B, minus dimension A, shall not be less than 0.005 inch (0.127 mm).
 Dimension D, minus dimension C, shall not be less than 0.010 inch (0.254 mm).
 Dimension G shall not be less than 0.005 inch (0.127 mm). Dimension F, minus dimension E, shall not be less than 0.005 inch (0.127 mm).

Fig. VIII-1. Wear limits for 4-element torque converter

WEAR LIMITS CHART

<u>Illustration</u>	<u>Description</u>	<u>Dimension</u>		<u>Wear Limit</u>	
		<u>Inches</u>	<u>Millimetres</u>	<u>Inches</u>	<u>Millimetres</u>
B, foldout 7	TORQUE CONVERTER				
3	Thickness of stator thrust washer in stator assembly (measure across thrust washer face and Torrington needle bearing with bearing installed in stator)	0.4561 to 0.4439	11.585 to 11.275	0.435	11.049
5	Diameter of roller	0.3748 to 0.3750	9.520 to 9.525	0.3743 min	9.507
7	OD of race	2.8430 to 2.8435	72.212 to 72.225	2.841	72.162
*26	Thickness of thrust washer	0.100 to 0.124	2.54 to 3.15	0.080 min	2.032
*28	OD of race	3.499 to 3.500	88.875 to 88.900	3.497	88.824
*29, 33	Diameter of roller	0.3750 to 0.3748	9.525 to 9.520	0.3743 min	9.507
*32	Thickness of thrust washer	0.201 to 0.211	5.105 to 5.359	0.191 min	4.851
*35	Thickness of stator thrust washer	0.316 to 0.320	8.026 to 8.128	0.296 min	7.518
A, foldout 8	INPUT DRIVEN PUMPS				
16	Gear end clearance, pump assembled			0.010 max	0.25
16	Shaft OD at bearings	1.000	25.4	0.9975	25.336
17	Gear end clearance, pump assembled			0.010 max	0.25
17	Shaft OD at bearings	1.000	25.4	0.9975	25.336
20	Pump body bore at gears	2.758	70.053	2.768	70.307
37	Gear end clearance, pump assembled			0.010	0.25
37	Shaft OD at bearings	1.000	25.4	0.9975	25.336

* Refer to fig. VIII-1 for further wear limits information on four-element torque converter

(Continued on next page)

WEAR LIMITS CHART (Continued)

Illustration	Description	Dimension		Wear Limit	
		Inches	Millimetres	Inches	Millimetres
A, foldout 8	INPUT DRIVEN PUMPS (cont'd)				
38	Gear end clearance, pump assembled			0.010	0.25
38	Shaft OD at bearings	1.000	25.4	0.9975	25.336
41	Pump body bore at gear	2.758	70.053	2.768	70.307
A, foldout 9	FORWARD, REVERSE CLUTCHES AND PLANETARIES				
7, 33, 47	Clutch plate—thickness	0.107 to 0.123	2.72 to 3.12	0.097 min	2.46
	—cone max			0.030	0.76
8, 34, 48	Clutch plate—thickness	0.150 to 0.156	3.81 to 3.96	0.130 min	3.3
	—cone max			0.012	0.3
13	Pinion end clearance, assembled in carrier			0.055 max	1.397
22	Anchor clutch face wear (each side)			0.020 max	0.508
40	Pinion end clearance assembled in carrier			0.055 max	1.397
44	Bushing clearance on shafts 15, 16, 18, 20 or 26 (A, foldout 10)			0.010 max	0.25
46	Thrust washer thickness	0.090	2.286	0.075 min	1.9
	Reverse clutch pack thickness (10 plates)				
	Minimum pack thickness			1.135	28.829
	Maximum pack thickness			1.395	35.433
	Forward clutch pack thickness (6 plates)				
	Minimum pack thickness			0.681	17.297
	Maximum pack thickness			0.837	21.26
A, foldout 10	RANGE CLUTCHES, GEARING, SHAFTS				
10	Piston face wear			0.010 max	0.25
15, 16, 18, 20, 26	Shaft clearance in bushing 44 (A, foldout 9)			0.010 max	0.25

(Continued on next page)

WEAR LIMITS CHART (Continued)

Illustration	Description	Dimension		Wear Limit	
A, foldout 10 RANGE CLUTCHES, GEARING, SHAFTS (cont'd)					
		Inches	Millimetres	Inches	Millimetres
31, 50, 53, 58, 64	Clutch plate thickness —cone	0.150 to 0.156	3.81 to 3.96	0.130 min	3.3
				0.012 max	0.305
32	Clutch plate thickness —cone	0.107 to 0.123	2.72 to 3.12	0.097 min	2.46
				0.030 max	0.76
34	Carrier clutch face wear			0.010 max	0.25
36	Pinion end clearance, assembled in carrier			0.055 max	1.4
49, 52, 59, 63	Clutch plate thickness —cone	0.107 to 0.123	2.72 to 3.12	0.097 max	2.46
				0.030 max	0.76
55	Anchor clutch face wear (each side)			0.020 max	0.5
62	Thrust washer thickness	0.121 to 0.126	3.07 to 3.20	0.121 min	3.07
73	Pinion end clearance			0.025 max	0.63
	Range clutch pack thickness				
	CRT 3321 low range (7 plates)				
	Minimum pack thickness			0.993	25.222
	Maximum pack thickness			0.811	20.599
	CRT 3321 high range (6 plates)				
	Minimum pack thickness			0.681	17.297
	Maximum pack thickness			0.837	21.26
	CRT 3331 low range (10 plates)				
	Minimum pack thickness			1.135	28.829
	Maximum pack thickness			1.395	35.433
	CRT 3331 intermediate range (7 plates)				
	Minimum pack thickness			0.993	25.222
	Maximum pack thickness			0.811	20.599
	CRT 3331 high range (6 plates)				
	Minimum pack thickness			0.681	17.297
	Maximum pack thickness			0.837	21.26
A, foldout 11 FRONT OUTPUT SHAFT					
13, 16	Shaft clearance in bushing 42 or 45 (B, foldout 11)			0.010 max	0.25

(Continued on next page)

WEAR LIMITS CHART (Continued)

Illustration	Description	Dimension		Wear Limit	
		Inches	Millimetres	Inches	Millimetres
B, foldout 11	TRANSFER GEARS, REAR OUTPUT SHAFT				
42, 45	Bushing clearance on shaft 13 or 16 (A, foldout 11)			0.010 max	0.25
B, foldout 12	OIL SUMP ADAPTER				
2	Thrust washer thickness	0.298	7.56	0.290 min	7.37
A, foldout 13	MAIN PRESSURE REGULATOR VALVE				
8	Valve clearance in valve body 11			0.004 max	0.102
11	Body bore clearance for valve 8			0.004 max	0.102
A, foldout 13	MAIN PRESSURE REGULATOR VALVE				
21	Valve clearance in valve body 24			0.004 max	0.102
24	Body bore clearance for valve 21			0.004 max	0.102
B, foldout 13	EARLY INCHING CONTROL VALVE BODIES				
4	Valve clearance in valve sleeve 28			0.004 max	0.102
9	Valve clearance in valve body 11			0.004 max	0.102
11	Body bore clearance for valve 9 and sleeve 28			0.004 max	0.102
28	Sleeve clearance in valve body 11			0.004 max	0.102
37	Valve clearance in valve body 39			0.004 max	0.102
39	Body bore clearance for valves 37, 56 and sleeve 66			0.004 max	0.102

(Continued on next page)

WEAR LIMITS CHART (Continued)

<u>Illustration</u>	<u>Description</u>	<u>Dimension</u>		<u>Wear Limit</u>		
B, foldout 13	EARLY INCHING CONTROL VALVE BODIES (cont'd)					
		<u>Inches</u>	<u>Millimetres</u>	<u>Inches</u>	<u>Millimetres</u>	
56	Valve clearance in valve body 39			0.004 max	0.102	
66	Sleeve clearance in valve body 39			0.004 max	0.102	
A, foldout 14	EARLY SENSE-FEEL CONTROL VALVE BODIES					
3	Sleeve clearance in valve body 16			0.004 max	0.102	
5	Piston clearance in valve body 16			0.009 max	0.226	
8	Valve clearance in sleeves 3 and 10			0.004 max	0.102	
A, foldout 14	EARLY SENSE-FEEL CONTROL VALVE BODIES					
10	Sleeve clearance in valve body 16			0.004 max	0.102	
14	Valve clearance in valve body 16			0.004 max	0.102	
16	Body bore clearance for sleeves 3 and 10			0.004 max	0.102	
38	Sleeve clearance in valve body 69			0.004 max	0.102	
40	Piston clearance in valve body 69			0.009 max	0.226	
43	Valve clearance in sleeves 38 and 45			0.004 max	0.102	
45	Sleeve clearance in valve body 69			0.004 max	0.102	
54	Valve clearance in valve body 69			0.004 max	0.102	
69	Body bore clearance for sleeves 38, 45 and valves 54, 72			0.004 max	0.102	

(Continued on next page)

WEAR LIMITS CHART (Continued)

<u>Illustration</u>	<u>Description</u>	<u>Dimension</u>		<u>Wear Limit</u>	
		<u>Inches</u>	<u>Millimetres</u>	<u>Inches</u>	<u>Millimetres</u>
A, foldout 14 EARLY SENSE-FEEL CONTROL VALVE BODIES (cont'd)					
69	Body bore clearance for piston 40			0.009 max	0.226
72	Valve clearance in valve body 69			0.004 max	0.102
B, foldout 14 LATER CONTROL VALVE BODIES					
10	Body bore clearance for valves 16, 20, 23, 26			0.004 max	0.102
16	Valve clearance in valve body 10			0.004 max	0.102
20	Valve clearance in valve body 10			0.004 max	0.102
23	Valve clearance in valve body 10			0.004 max	0.102
26	Valve clearance in valve body 10			0.004 max	0.102
40	Body bore clearance for valves 50, 54, 57			0.004 max	0.102
50	Valve clearance in valve body 40			0.004 max	0.102
54	Valve clearance in valve body 40			0.004 max	0.102
57	Valve clearance in valve body 40			0.004 max	0.102

4. SPRING CHART

The following chart includes detail which will aid in identifying springs. To perform

satisfactorily, springs must meet the length and load data which appear in the last three columns at the right side of the chart.

(Spring Chart follows on next page)

SPRING CHART

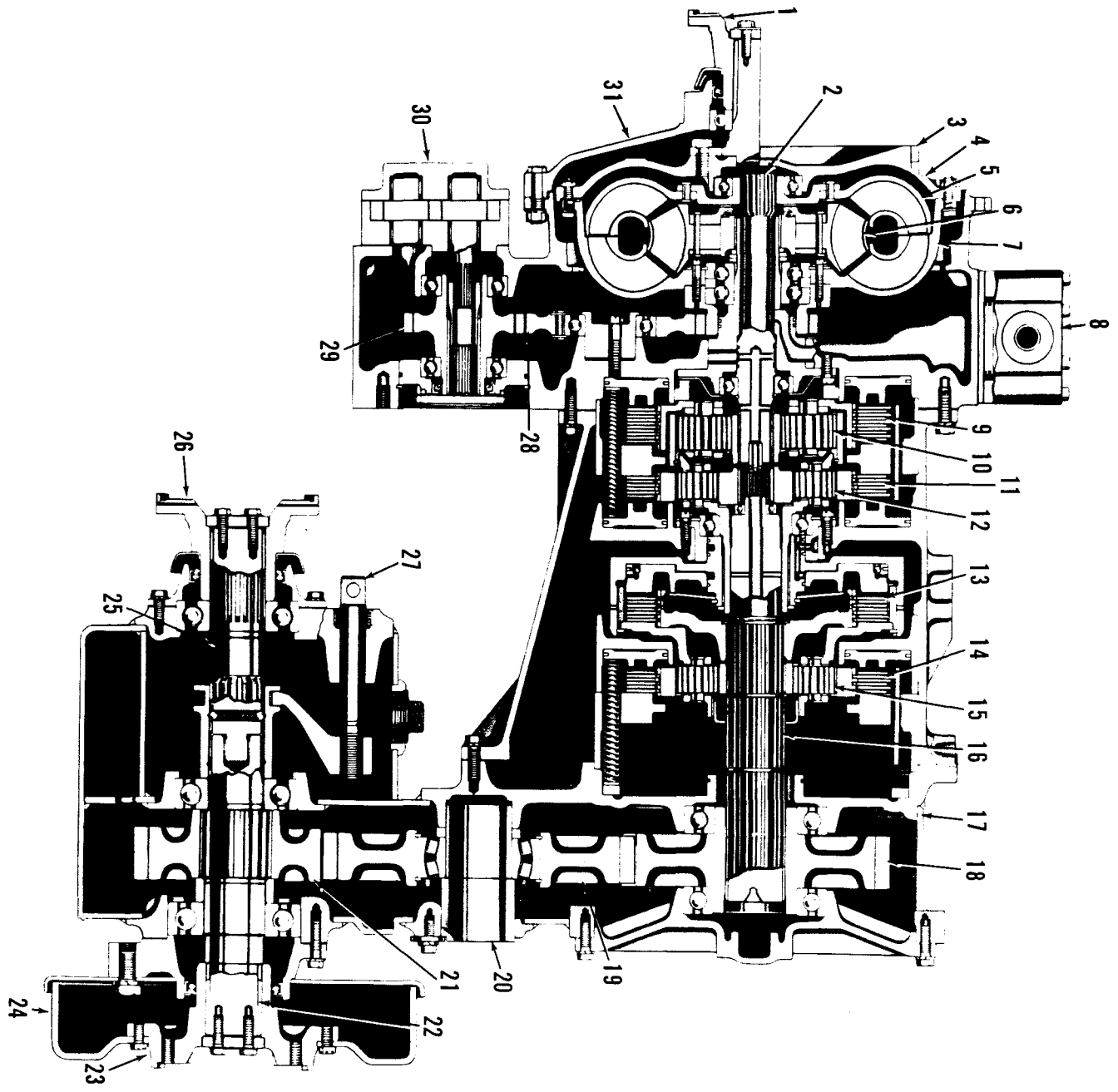
PARA 4

WEAR LIMITS, SPRING DATA

SECT VIII PAGE 9

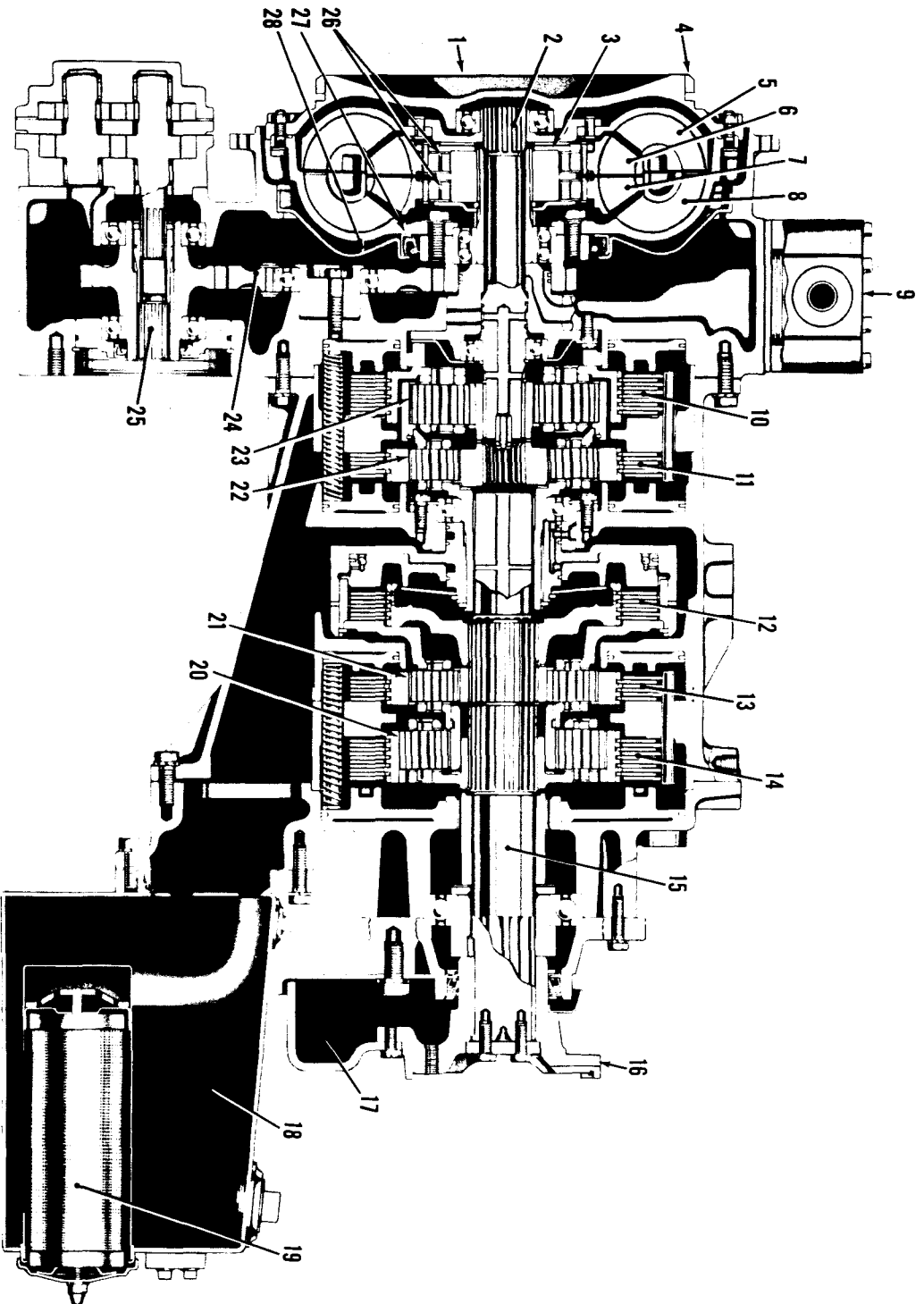
Fold-out	Ref	Spring	Part No.	No. coils*	Diameter of wire		Outside diameter		Free length		Length		Pounds	Force (Newtons)
					Inches	(mm)	Inches	(mm)	Inches	(mm)	Inches	(mm)		
B, 8	15	Lubrication pressure regulator	6772661	21.5	0.0842-0.0872	(2.139-2.215)	0.661	(16.789)	3.379	(85.827)	2.339	(59.411)	@ 22 ±1.1	(97.86 ±4.893)
A, 9	18	Clutch piston return	6775437	37.5	0.103-0.107	(2.616-2.718)	0.625	(15.875)	6.127	(155.626)	4.450	(113.030)	@ 60 ±3	(266.89 ±13.345)
A, 10	11	Clutch piston return	6759491		(disk-type spring)		6.700	(170.180)	0.259-0.279	(6.578 to 7.087)				
A, 10	57	Clutch piston return	6775437	37.5	0.103-0.107	(2.616-2.718)	0.625	(15.875)	6.127	(155.626)	4.450	(113.030)	@ 60 ±3	(266.89 ±13.345)
A, 11	21	Detent	6757249	16	0.062-0.064	(1.5748-1.6256)	0.350	(8.890)	1.620	(41.148)	1.200	(30.480)	@ 28.6 ±2.8	(127.22 ±12.455)
A, 13	10	Main-pressure reg. (110-135 psi)	6771288	22	0.160-0.164	(4.064-4.166)	0.875	(22.225)	5.010	(127.254)	4.200	(106.680)	@ 111 ±2.5	(493.65 ±11.121)
A, 13	10	Main-pressure reg. (135-155 psi)	6771307	22	0.1605-0.1635	(4.077-4.153)	0.875	(22.225)	5.175	(131.445)	4.200	(106.680)	@ 133 ±2.5	(591.61 ±11.121)
A, 13	23	Main-pressure reg. (110-135 psi)	6771288	22	0.160-0.164	(4.064-4.166)	0.875	(22.225)	5.010	(127.254)	4.200	(106.680)	@ 111 ±2.5	(493.65 ±11.121)
A, 13	23	Main-pressure reg. (135-155 psi)	6771307	22	0.1605-0.1635	(4.077-4.153)	0.875	(22.225)	5.175	(131.445)	4.200	(106.680)	@ 133 ±2.5	(591.61 ±11.121)
A, 13	27	Bypass valve	6772453	12	0.100-0.104	(2.54-2.64)	0.708	(17.983)	2.232	(56.693)	1.485	(37.719)	@ 53.3 ±1.6	(237.09 ±7.117)
B, 13	12, 17, 25, 27, 40, 45, 63, 65	Detent	6703162	9	0.062-0.064	(1.5748-1.6256)	0.563	(14.300)	1.391	(35.331)	0.812	(20.625)	@ 15 ±1.5	(66.72 ±6.672)
A, 14	17, 19, 27, 29, 46, 50, 66, 68	Detent	6703162	9	0.062-0.064	(1.5748-1.6256)	0.563	(14.300)	1.391	(35.331)	0.812	(20.625)	@ 15 ±1.5	(66.72 ±6.672)
A, 14	52	Clutch cutoff valve	6757251	17	0.071-0.073	(1.803-1.854)	0.550	(13.970)	2.294	(58.268)	1.531	(38.887)	@ 18 ±1.8	(80.07 ±8.007)
B, 14	5, 7, 9	Detent	6772047	6	0.0615-0.0635	(1.5621-1.6129)	0.593	(15.062)	1.100	(27.940)	0.690	(17.526)	@ 15 ±1	(66.72 ±4.448)
B, 14	22	Inching regulator valve	6770298	14.6	0.040-0.042	(1.016-1.067)	0.384	(9.754)	1.280	(32.512)	0.780	(19.812)	@ 4 ±0.07	(17.793 ±0.311)
B, 14	25	Inching control valve	6772046	15.5	0.084-0.086	(2.134-2.184)	0.806	(20.472)	3.750	(95.250)	1.950	(49.530)	@ 26.5 ±1.3	(117.878 ±5.782)
B, 14	43, 44	Detent	6772047	6	0.0615-0.0635	(1.5621-1.6129)	0.593	(15.062)	1.100	(27.940)	0.690	(17.526)	@ 15 ±1	(66.72 ±4.448)

*To the nearest 1/2 coil



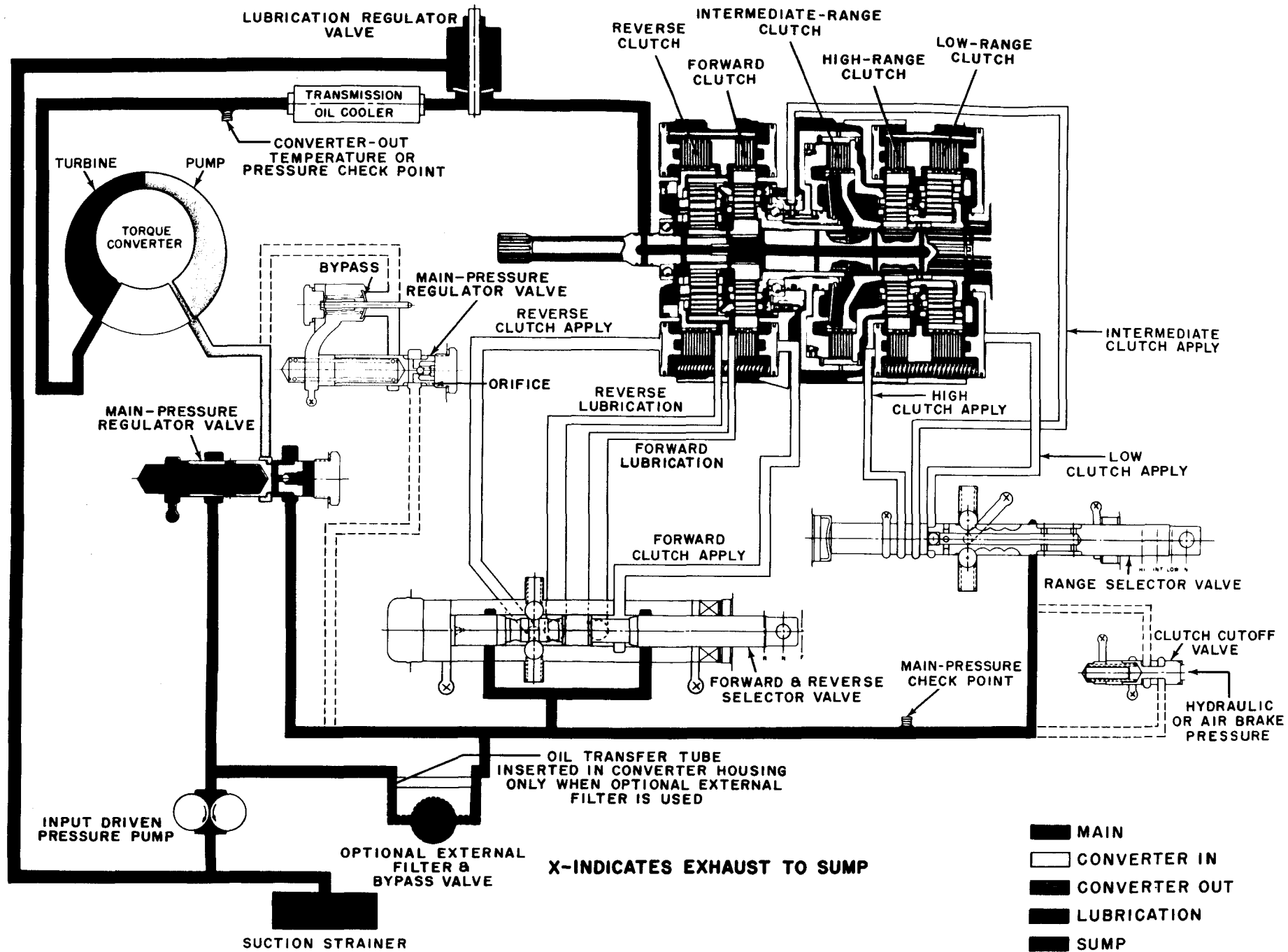
Foldout 1 CRT 3321-1 transmission - cross-section view

- 1 - Input drive flange (remote-mount)
- 2 - Converter shaft
- 3 - Input drive teeth
- 4 - Converter pump cover
- 5 - Converter turbine
- 6 - Converter stator
- 7 - Converter pump
- 8 - Oil cooler
- 9 - Reverse-range clutch
- 10 - Reverse-range planetary
- 11 - Forward-range clutch
- 12 - Forward-range planetary
- 13 - Low-range clutch
- 14 - High-range clutch
- 15 - High-range planetary
- 16 - Transmission main shaft
- 17 - Output transfer housing
- 18 - Output transfer drive gear
- 19 - Transfer idler gear
- 20 - Transfer idler gear spindle
- 21 - Transfer driven gear
- 22 - Rear output shaft
- 23 - Rear output drive flange
- 24 - Parking brake
- 25 - Front output shaft
- 26 - Front output drive flange
- 27 - Front output disconnect
- 28 - Accessory drive idler gear
- 29 - Oil and implement pump drive gear
- 30 - Input-driven oil pump
- 31 - Transmission front cover

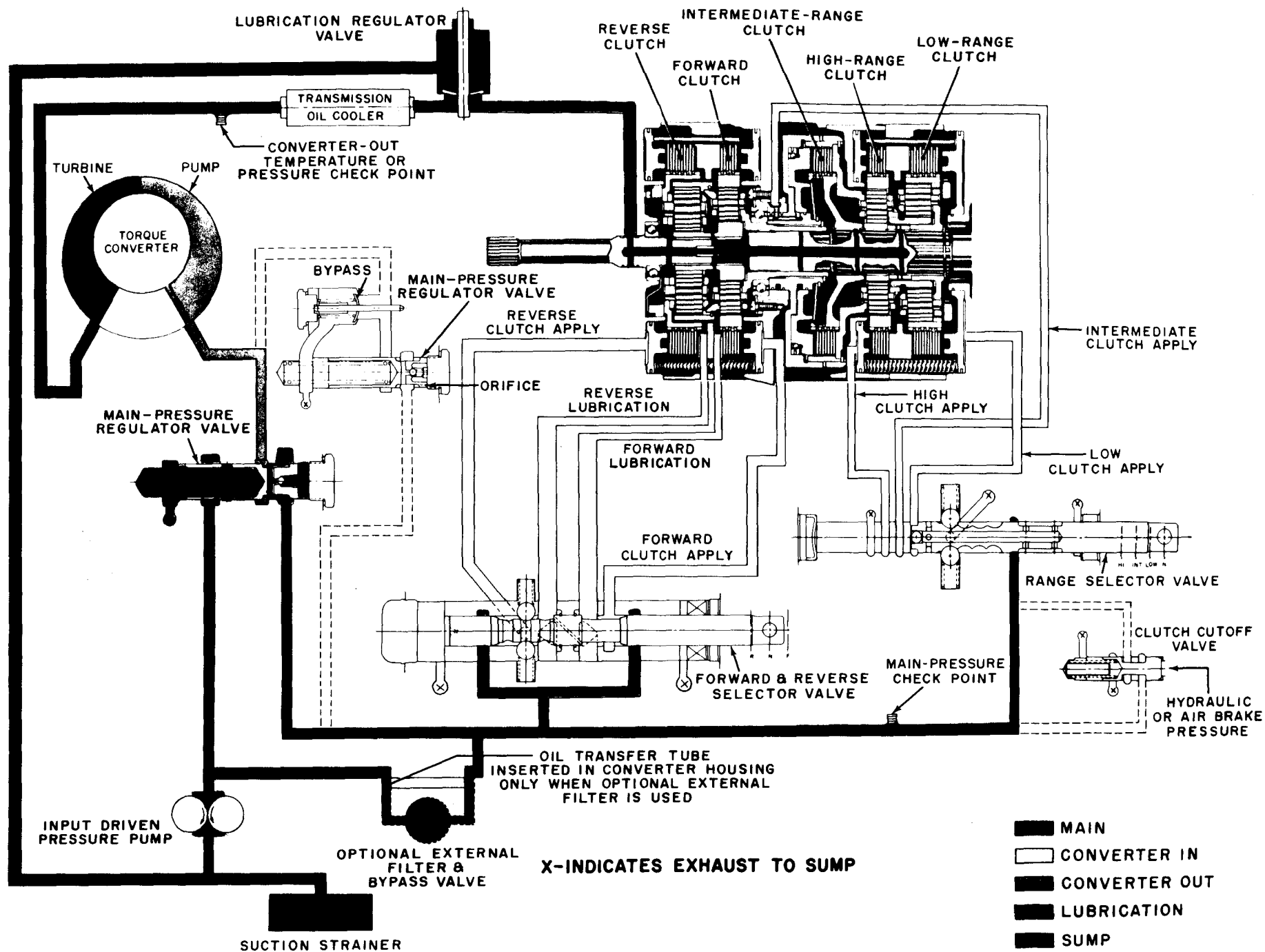


Foldout 2 CRT 3331-3 transmission—cross-section view

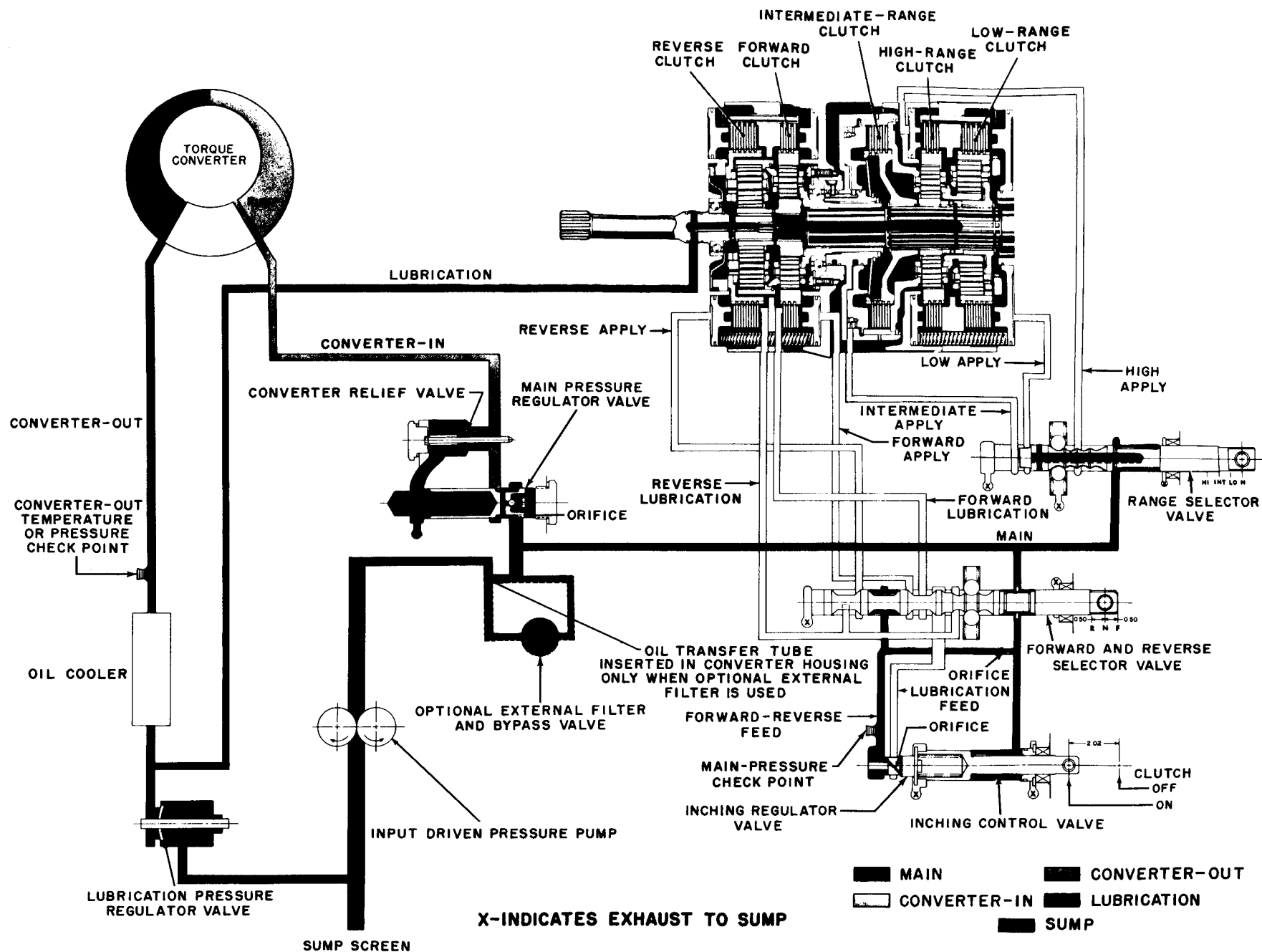
- 1 - Converter pump cover
- 2 - Converter shaft
- 3 - Freewheel roller race
- 4 - Input drive teeth
- 5 - Converter turbine
- 6 - Converter first stator
- 7 - Converter second stator
- 8 - Converter pump
- 9 - Oil cooler
- 10 - Reverse clutch
- 11 - Forward clutch
- 12 - Intermediate-range clutch
- 13 - High-range clutch
- 14 - Low-range clutch
- 15 - Transmission main shaft
- 16 - Rear output drive flange
- 17 - Parking brake
- 18 - Oil sump
- 19 - Oil strainer
- 20 - Low-range planetary
- 21 - High-range planetary
- 22 - Forward planetary
- 23 - Reverse planetary
- 24 - Accessory drive idler gear
- 25 - Oil and implement pump drive gear
- 26 - Freewheel roller
- 27 - Seal
- 28 - Diaphragm



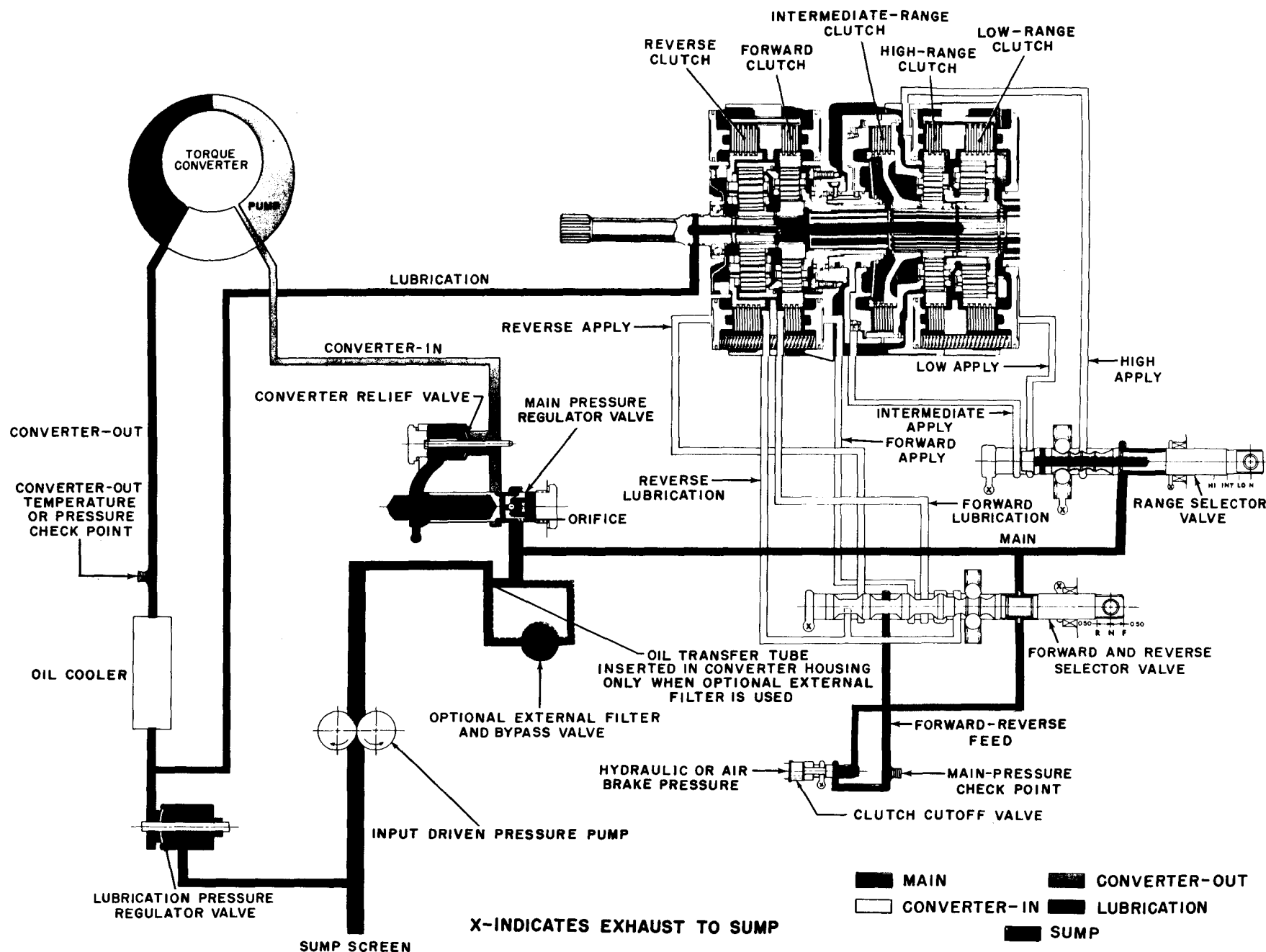
Foldout 3 Transmission hydraulic system, including earlier style inching control valve and clutch cutoff valve—schematic view



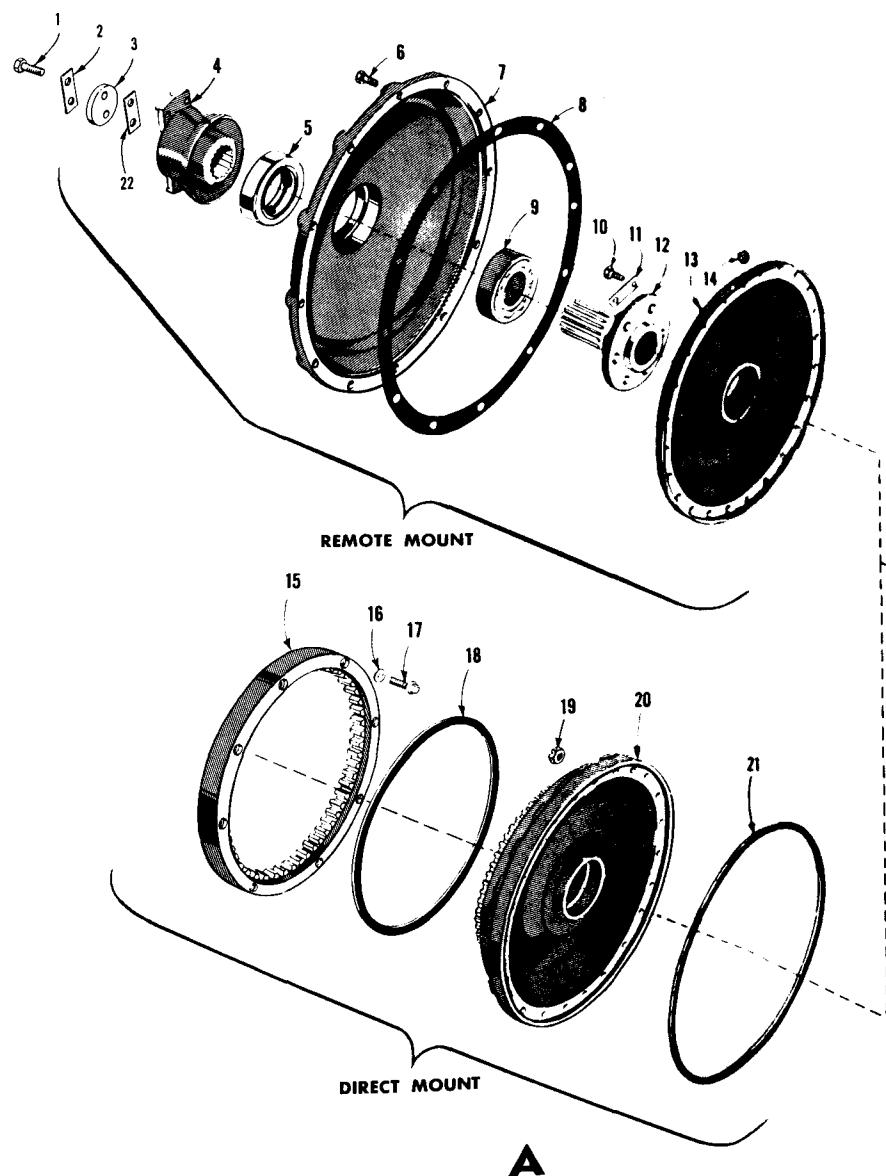
Foldout 4 Transmission hydraulic system, including sense-feel control valve and clutch cutoff valve— schematic view



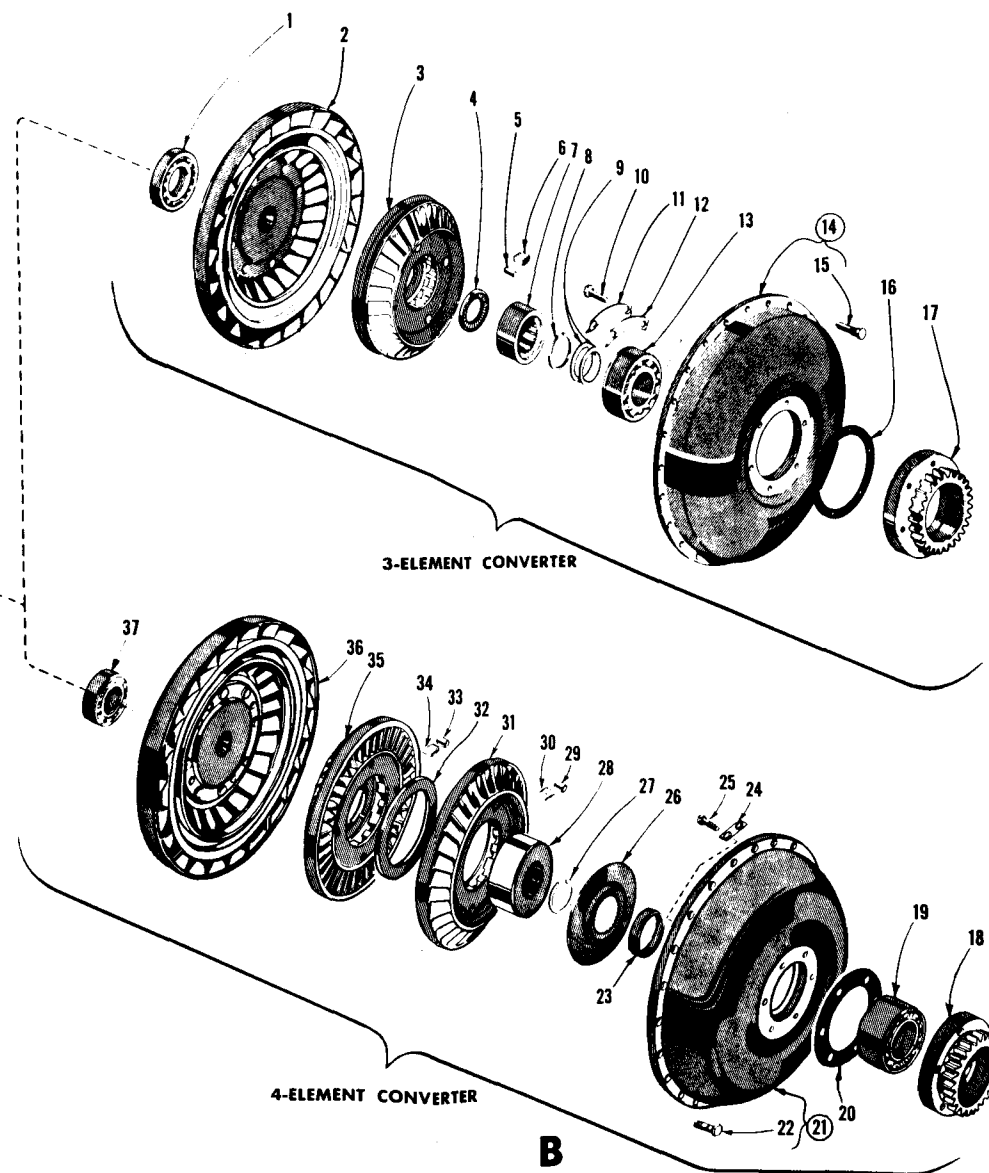
Foldout 5 Transmission hydraulic system, including later inching control valve—schematic view



Foldout 6 Transmission hydraulic system, including clutch cutoff valve--schematic view



A, foldout 7 Input drive—exploded view

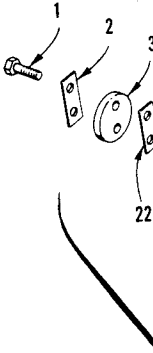


B, foldout 7 Torque converter—exploded view

A

- 1 - Self-locking bolt, 3/8-24 x 1 1/8 (2)
- 2 - Lock strip
- 3 - Flange retaining washer
- 4 - Input flange
- 5 - Oil seal
- 6 - Hexagon-head bolt, 3/8-24 x 2 (12)
- 7 - Transmission front cover
- 8 - Cover gasket
- 9 - Single-row ball bearing assembly
- 10 - Hexagon-head bolt, 1/2-13 x 1 1/8 (6)
- 11 - Lock strip (3)

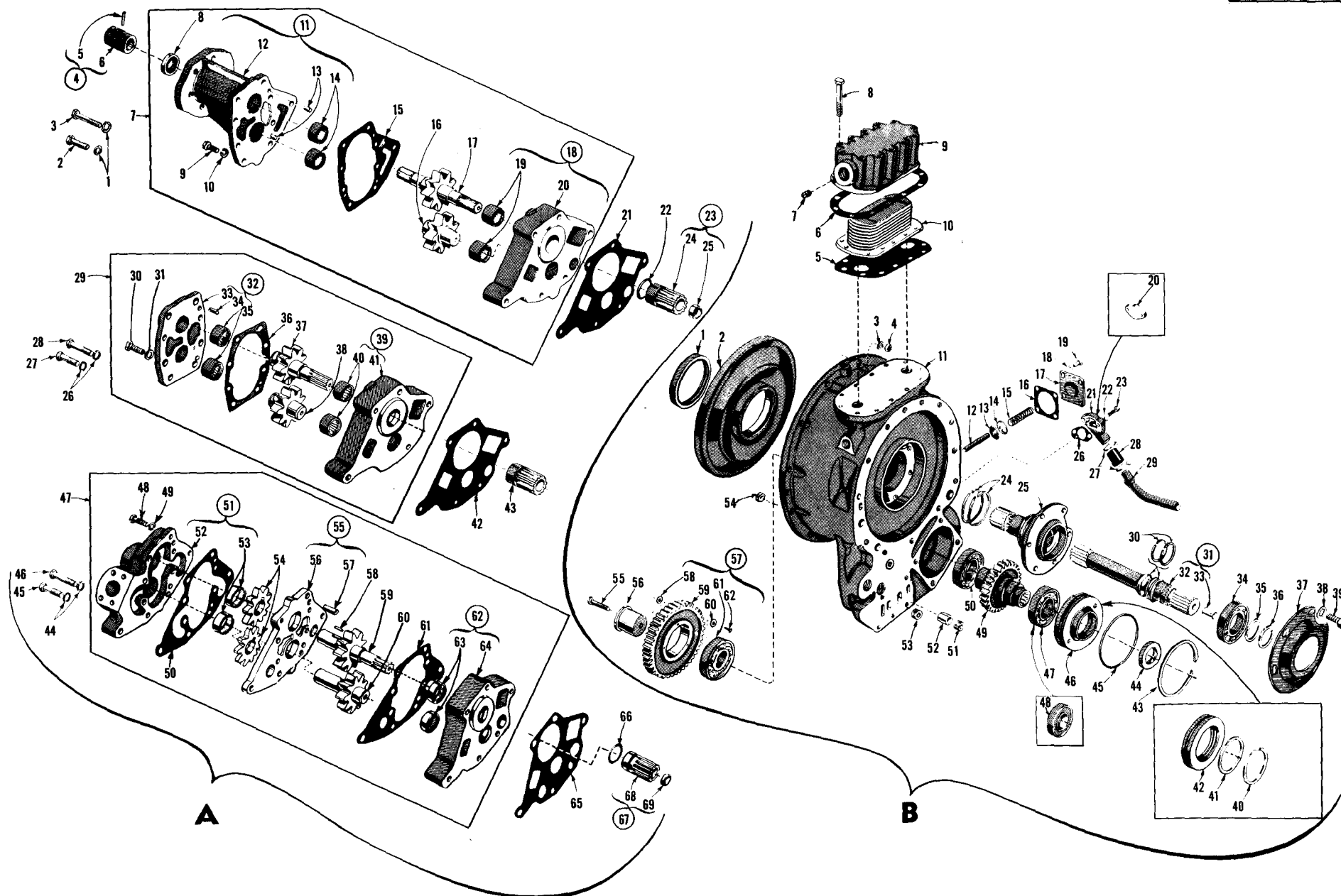
- 12 - Input shaft
- 13 - Converter pump cover
- 14 - Self-locking nut, 5/16-24 (24)
- 15 - Converter drive ring
- 16 - Flat washer (8)
- 17 - Special bolt, 3/8-16 x 1 1/4 (8)
- 18 - Input drive seal ring
- 19 - Self-locking nut, 5/16-24 (24)
- 20 - Converter pump cover
- 21 - Converter seal ring
- 22 - Shim (AR)



B

- 1 - Single-row ball bearing
- 2 - Torque converter turbine
- 3 - Torque converter stator assembly
- 4 - Stator needle roller thrust bearing assembly
- 5 - Freewheel roller (10)
- 6 - Freewheel roller spring (10)
- 7 - Freewheel roller race
- 8 - External-snap ring
- 9 - Internal-splined spacer (2)
- 10 - Self-locking bolt, 3/8-24 x 1 1/8 (6)
- 11 - Lock strip (3)
- 12 - Retainer (3)
- 13 - Double-row ball bearing assembly
- 14 - Torque converter pump assembly
- 15 - Torque converter pump bolt, 5/16-24 x 1.30 (24)
- 16 - Converter pump gasket
- 17 - Accessory drive gear
- 18 - Accessory drive gear

- 19 - Double-row ball bearing assembly
- 20 - Converter pump gasket
- 21 - Torque converter pump assembly
- 22 - Torque converter pump bolt, 5/16-24 x 1.30 (24)
- 23 - Spacer
- 24 - Lock strip (3)
- 25 - Hexagon-head bolt, 1/2-20 x 1 1/4 (6)
- 26 - Stator rear thrust washer
- 27 - External-snap ring
- 28 - Freewheel roller race
- 29 - Freewheel roller (8)
- 30 - Freewheel roller spring (8)
- 31 - Second-stator assembly
- 32 - Stator spacing washer
- 33 - Freewheel roller (8)
- 34 - Freewheel roller spring (8)
- 35 - First-stator assembly
- 36 - Torque converter turbine assembly
- 37 - Single-row ball bearing assembly



A, foldout 8 Input-driven oil pumps—exploded view

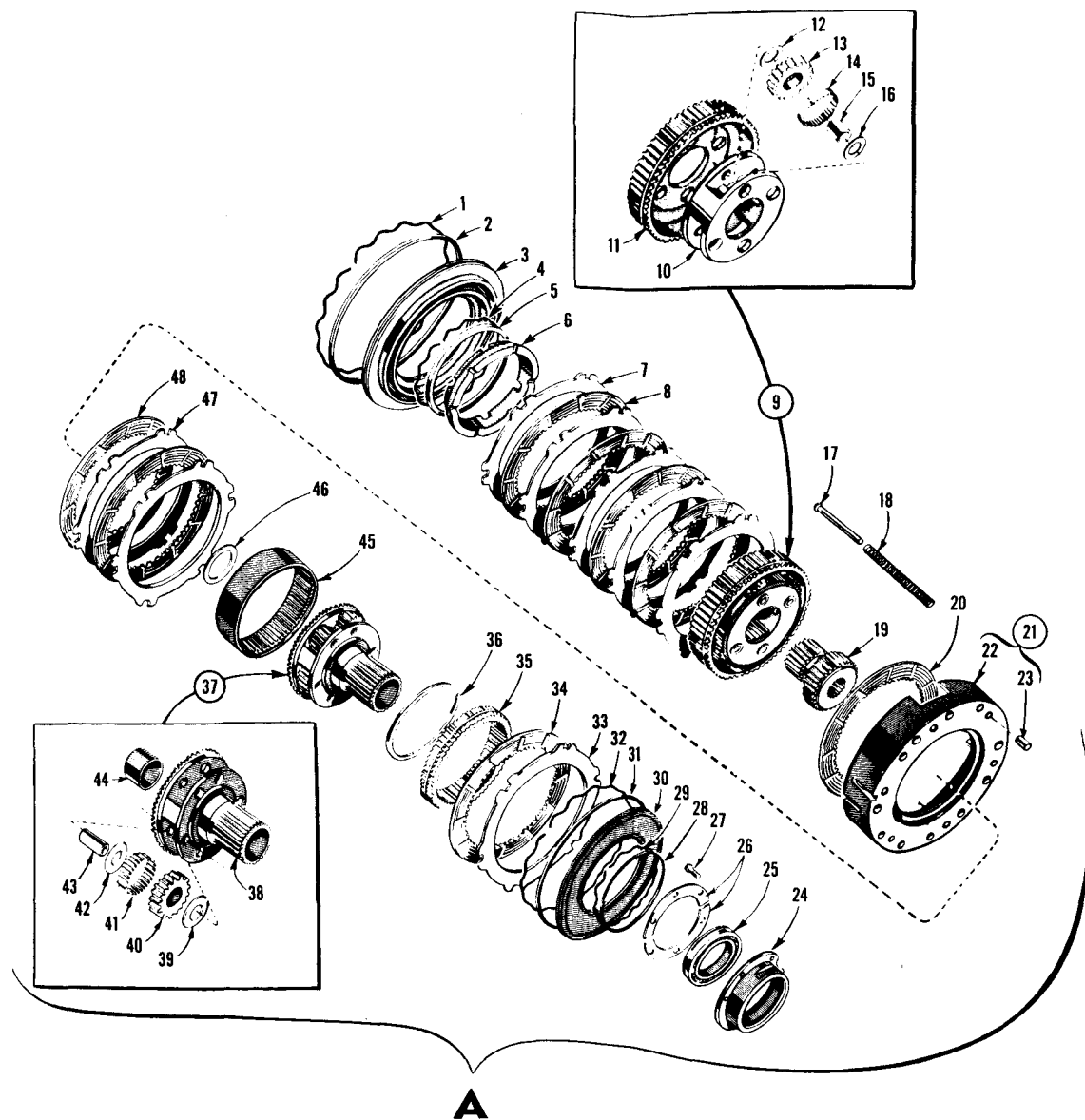
B, foldout 8 Oil cooler, torque converter housing, accessory drive components, and converter shaft—exploded view

A

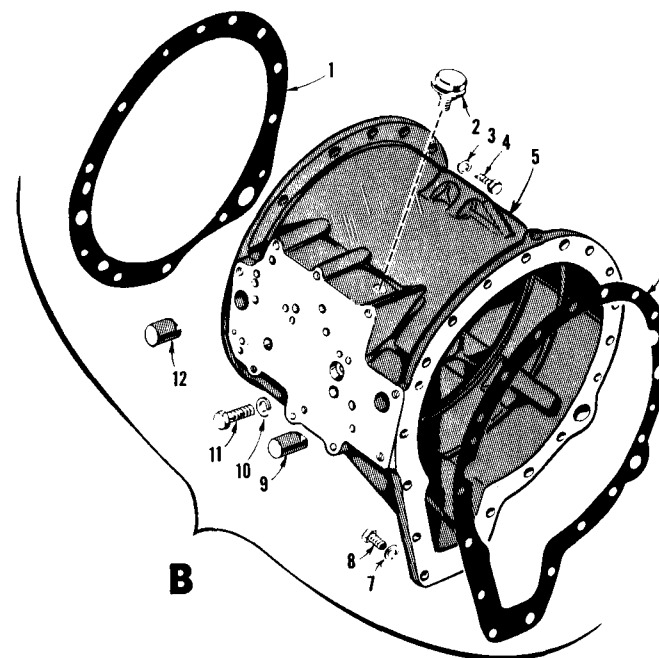
- 1 - Lock washer, 3/8 (6)
- 2 - Hexagon-head bolt, 3/8-16 x 2 1/4
- 3 - Hexagon-head bolt, 3/8-16 x 2 3/4 (5)
- 4 - Coupling assembly
- 5 - Pin
- 6 - Coupling
- 7 - Input pressure pump assembly
- 8 - Oil seal
- 9 - Hexagon-head bolt, 3/8-16 x 1 (4)
- 10 - Lock washer, 3/8 (4)
- 11 - Oil pump cover assembly
- 12 - Cover
- 13 - Dowel pin (2)
- 14 - Needle bearing (2)
- 15 - Gasket
- 16 - Pump driven gear
- 17 - Pump drive gear
- 18 - Oil pump body assembly
- 19 - Needle bearing (2)
- 20 - Pump body
- 21 - Pump mounting gasket
- 22 - Seal ring
- 23 - Coupling assembly
- 24 - Coupling
- 25 - Plug
- 26 - Lock washer, 3/8 (6)
- 27 - Hexagon-head bolt, 3/8-16 x 2 1/4 (2)
- 28 - Hexagon-head bolt, 3/8-16 x 2 3/4 (4)
- 29 - Input pressure pump assembly
- 30 - Hexagon-head bolt, 3/8-16 x 1 (4)
- 31 - Lock washer, 3/8 (4)
- 32 - Pump cover assembly
- 33 - Cover
- 34 - Dowel pin (2)
- 35 - Needle bearing (2)
- 36 - Gasket
- 37 - Pump drive gear
- 38 - Pump driven gear
- 39 - Pump body assembly
- 40 - Needle bearing (2)
- 41 - Pump body
- 42 - Pump mounting gasket
- 43 - Pump coupling
- 44 - Lock washer, 3/8 (6)
- 45 - Hexagon-head bolt, 3/8-16 x 3 3/4 (2)
- 46 - Hexagon-head bolt, 3/8-16 x 3 3/4 (4)
- 47 - Input pressure and scavenge pump assembly
- 48 - Hexagon-head bolt, 3/8-16 x 2 1/4 (4)
- 49 - Lock washer, 3/8 (4)
- 50 - Gasket
- 51 - Scavenge pump body assembly
- 52 - Scavenge pump body
- 53 - Needle bearing (2)
- 54 - Scavenge pump gear (2)
- 55 - Pump separator plate assembly
- 56 - Pump separator plate
- 57 - Dowel pin (2)
- 58 - Roller
- 59 - Pump drive gear
- 60 - Pump driven gear
- 61 - Gasket
- 62 - Pressure pump body assembly
- 63 - Needle bearing (2)
- 64 - Pressure pump body
- 65 - Pump mounting gasket
- 66 - Seal ring
- 67 - Pump coupling assembly
- 68 - Pump coupling
- 69 - Plug

B

- 1 - Oil seal
- 2 - Diaphragm
- 3 - Lock washer, 3/8 (12)
- 4 - Hexagon nut, 3/8-24 (12)
- 5 - Oil cooler core gasket
- 6 - Oil cooler cover gasket
- 7 - Pipe plug, 1/4 NPTF
- 8 - Hexagon-head bolt, 5/16-18 x 3 3/4 (12)
- 9 - Oil cooler cover
- 10 - Oil cooler core
- 11 - Torque converter housing
- 12 - Valve guide pin
- 13 - Valve washer
- 14 - Lubrication pressure regulator valve
- 15 - Valve spring
- 16 - Gasket
- 17 - Cover
- 18 - Lock washer, 3/8 (4)
- 19 - Hexagon-head bolt, 3/8-16 x 3/4 (4)
- 20 - Cover
- 21 - Oil drain tube adapter
- 22 - Lock washer, 3/8 (2)
- 23 - Hexagon-head bolt, 3/8-16 x 1 1/2
(3/8-16 x 7/8 used with item 20) (2)
- 24 - Hook-type seal ring (2)
- 25 - Converter stator ground sleeve
- 26 - Gasket
- 27 - Hose clamp (2)
- 28 - Oil drain hose
- 29 - Oil drain tube
- 30 - Hook-type seal ring (2), some models (1)
- 31 - Converter shaft assembly
- 32 - Converter shaft
- 33 - Orifice plug
- 34 - Single-row ball bearing assembly
- 35 - External-snap ring
- 36 - External-snap ring-(not used, some models)
- 37 - Bearing retainer
- 38 - Special flat washer (6)
- 39 - Self-locking bolt, 3/8-16 x 7/8 (6)
- 40 - Internal-snap ring
- 41 - Seal ring
- 42 - Bearing retainer
- 43 - Internal-snap ring
- 44 - Oil seal
- 45 - Seal ring
- 46 - Bearing retainer
- 47 - Single-row ball bearing assembly
- 48 - Sealed ball bearing assembly
- 49 - Pump drive gear
- 50 - Single-row ball bearing assembly
- 51 - Pipe plug, 3/4 or 1 NPTF
- 52 - Oil director tube
- 53 - Pipe plug, 3/4 NPTF (4)
- 54 - Plug
- 55 - Self-locking bolt, 7/16-14 x 1 3/4
- 56 - Idler spindle
- 57 - Idler gear assembly
- 58 - Flat washer (3)
- 59 - Idler gear
- 60 - Flat washer (3)
- 61 - Single-row ball bearing assembly
- 62 - Rivet (3)



A, foldout 9 Forward and reverse clutches, and planetary gearing—exploded view



B, foldout 9 Transmission housing and related components—exploded view

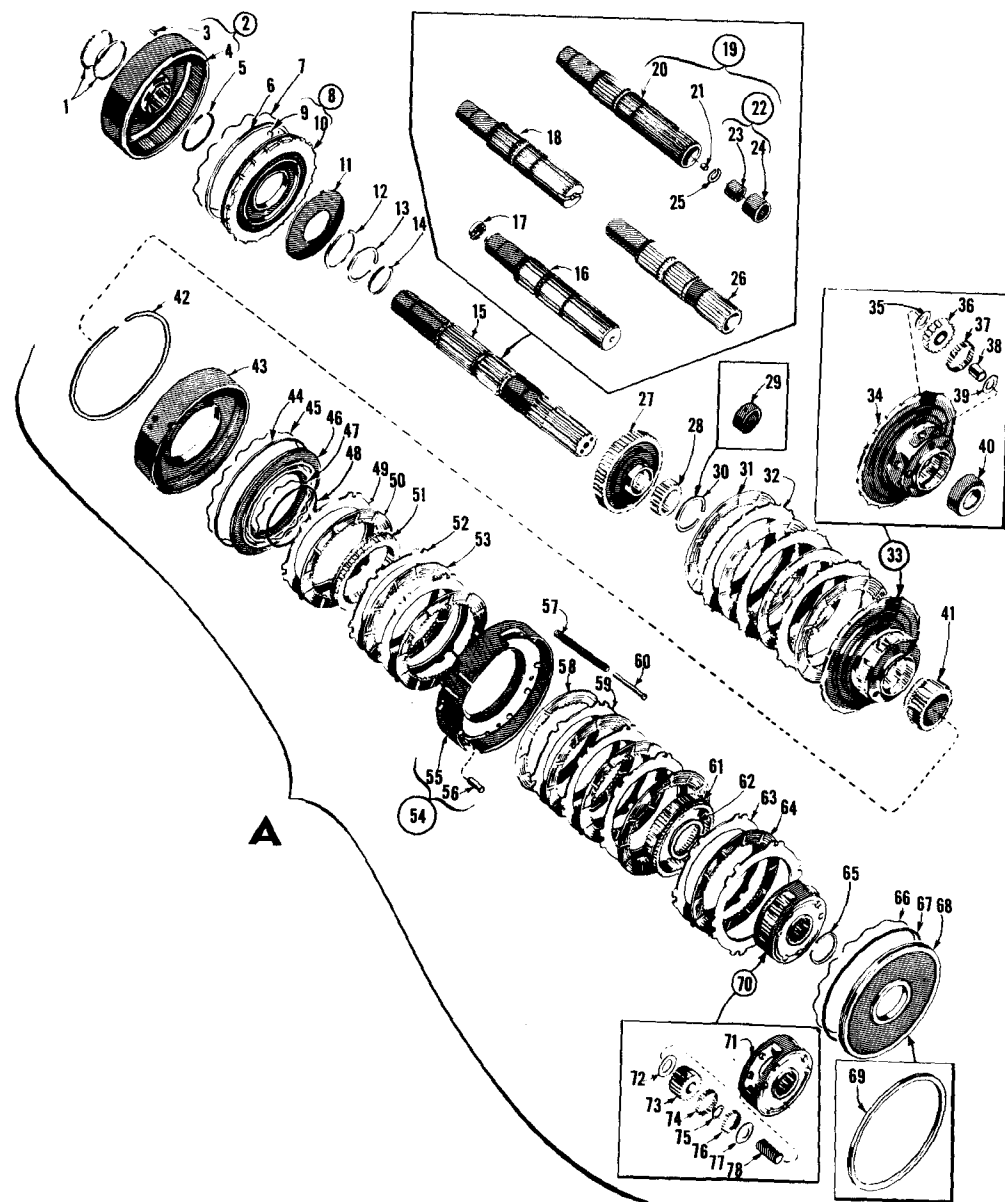
A

- 1 - Seal ring expander
- 2 - Seal ring
- 3 - Reverse-range clutch piston
- 4 - Seal ring expander
- 5 - Seal ring
- 6 - Thrust washer
- 7 - External-tanged clutch plate (5)
- 8 - Internal-splined clutch plate (4)
- 9 - Reverse-range planetary carrier assembly
- 10 - Planetary carrier
- 11 - Reverse-range clutch hub
- 12 - Thrust washer (4)
- 13 - Planetary pinion, matched set of 4
- 14 - Pinion bearing roller (88)
- 15 - Pinion spindle (4)
- 16 - Thrust washer
- 17 - Spring guide pin (12)
- 18 - Clutch piston return spring (12)
- 19 - Reverse- and forward-range sun gear
- 20 - Internal-splined clutch plate
- 21 - Reverse- and forward-range clutch anchor assembly
- 22 - Clutch anchor
- 23 - Clutch anchor pin (6)
- 24 - Oil transfer hub
- 25 - Single-row ball bearing assembly
- 26 - Bearing retainer (2)
- 27 - Self-locking bolt, 3/8-16 x 7/8 (4)
- 28 - Seal ring
- 29 - Seal ring expander
- 30 - Forward-range clutch piston
- 31 - Seal ring
- 32 - Seal ring expander
- 33 - External-tanged clutch plate
- 34 - Internal-splined clutch plate
- 35 - Forward planetary ring gear
- 36 - Internal-snap ring
- 37 - Forward-range planetary carrier assembly
- 38 - Planetary carrier
- 39 - Thrust washer (6)
- 40 - Planetary pinion, matched set of 6
- 41 - Pinion bearing roller (120)
- 42 - Thrust washer (6)
- 43 - Pinion spindle (6)
- 44 - Bushing
- 45 - Reverse-range planetary ring gear
- 46 - Thrust washer
- 47 - External-tanged clutch plate (2)
- 48 - Internal-splined clutch plate (2)

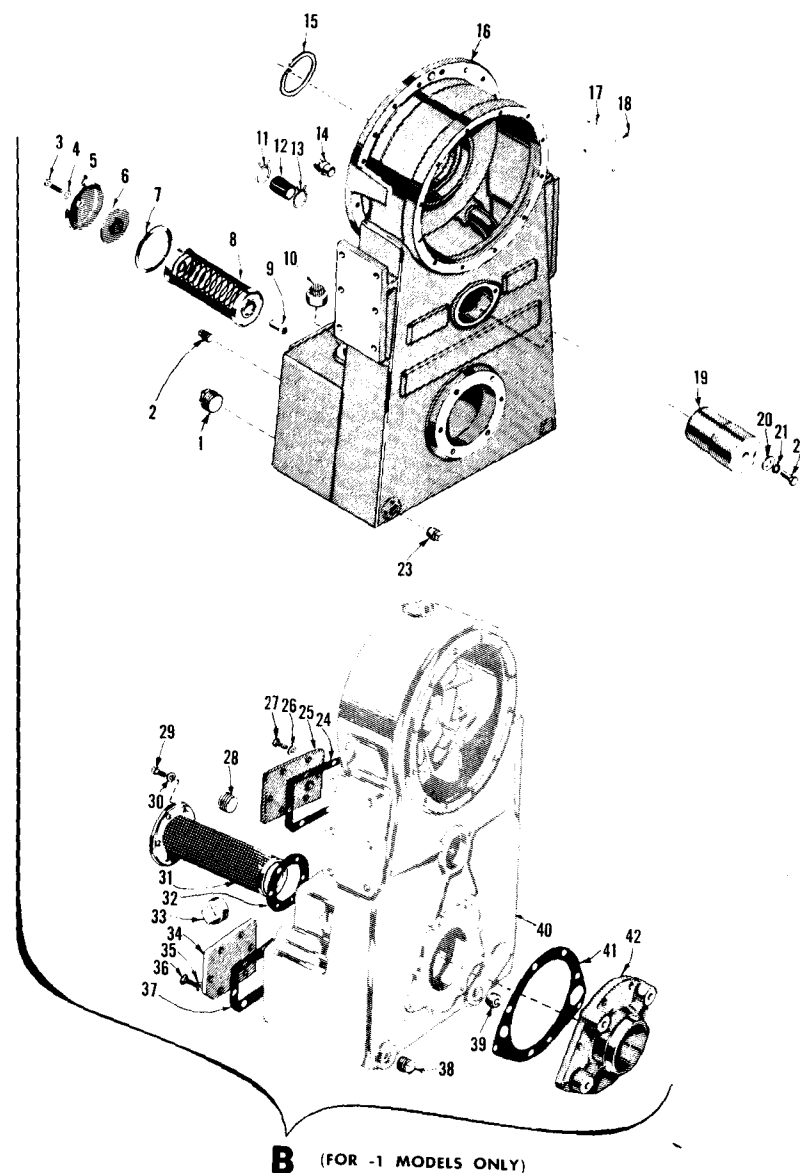
B

- 1 - Transmission housing front gasket
- 2 - Breather assembly
- 3 - Lock washer, 7/16 (13)
- 4 - Hexagon-head bolt, 7/16-14 x 1 3/8 (13)
- 5 - Transmission housing
- 6 - Transmission housing rear gasket
- 7 - Lock washer, 7/16 (18)
- 8 - Hexagon-head bolt, 7/16-14 x 1 3/8 (18)
- 9 - Low- and high-range clutch anchor pin
- 10 - Lock washer, 3/8
- 11 - Hexagon-head bolt, 3/8-16 x 1 1/2
- 12 - Reverse- and forward-range clutch anchor pin

FOLDOUT 10



A, foldout 10 Range clutches, gearing, and main shafts—exploded view



B (FOR -1 MODELS ONLY)

B, foldout 10 Output transfer case and related components—exploded view

A

- | | |
|---|---|
| 1 - Hook-type seal ring (2) | 38 - Pinion spindle (6) |
| 2 - Intermediate-range clutch drum assembly | 39 - Thrust washer (6) |
| 3 - Dowel pin | 40 - Oil collector (3321 models) |
| 4 - Clutch drum | 41 - Low-range planetary sun gear |
| 5 - Hook-type seal ring | 42 - External-snap ring |
| 6 - Seal ring | 43 - High-range clutch piston housing |
| 7 - Seal ring expander | 44 - Seal ring |
| 8 - Intermediate-range clutch piston assembly | 45 - Seal ring expander |
| 9 - Ball (2) | 46 - High-range clutch piston |
| 10 - Clutch piston | 47 - Seal ring expander |
| 11 - Piston return spring | 48 - Seal ring |
| 12 - External-snap ring | 49 - External-tanged clutch plate |
| 13 - External-snap ring | 50 - Internal-splined clutch plate |
| 14 - External-snap ring | 51 - High-range planetary ring gear |
| 15 - Transmission main shaft (-3 models) | 52 - External-tanged clutch plate (2) |
| 16 - Transmission main shaft (3321-1 models) | 53 - Internal-splined clutch plate (2) |
| 17 - Single-row ball bearing assembly | 54 - High- and low-range clutch anchor assembly |
| 18 - Transmission main shaft (-1 models with speedometer drive) | 55 - Clutch anchor |
| 19 - Transmission main shaft assembly (-1 models with upper-rear output disconnect) | 56 - Clutch anchor pin (6) |
| 20 - Transmission main shaft | 57 - Clutch piston return spring (12) |
| 21 - Orifice plug | 58 - Internal-splined clutch plate (4) |
| 22 - Needle roller bearing assembly | 59 - External-tanged clutch plate (3) |
| 23 - Bearing inner race | 60 - Spring guide pin (12) |
| 24 - Bearing assembly | 61 - Low-range planetary ring gear |
| 25 - External-snap ring | 62 - Thrust washer |
| 26 - Transmission main shaft (-1 models with accessory drive) | 63 - External-tanged clutch plate (2) |
| 27 - Intermediate-range clutch hub | 64 - Internal-splined clutch plate |
| 28 - High-range planetary sun gear | 65 - External-snap ring |
| 29 - Spacer | 66 - Seal ring expander |
| 30 - External-snap ring | 67 - Seal ring |
| 31 - Internal-splined clutch plate (4) | 68 - Low-range clutch piston |
| 32 - External-tanged clutch plate (3) | 69 - Spacer (3321 models) |
| 33 - High-range planetary carrier assembly | 70 - Low-range planetary carrier assembly |
| 34 - High-range planetary carrier | 71 - Low-range planetary carrier |
| 35 - Thrust washer (6) | 72 - Thrust washer (6) |
| 36 - Planetary pinion (matched set of 6) | 73 - Planetary pinion (matched set of 6) |
| 37 - Pinion bearing roller (120) | * 74 - Pinion bearing roller (120) |
| | ** 75 - Bearing roller spacer (6) |
| | * 76 - Pinion bearing roller (120) |
| | 77 - Thrust washer (6) |
| | 78 - Pinion spindle (6) |

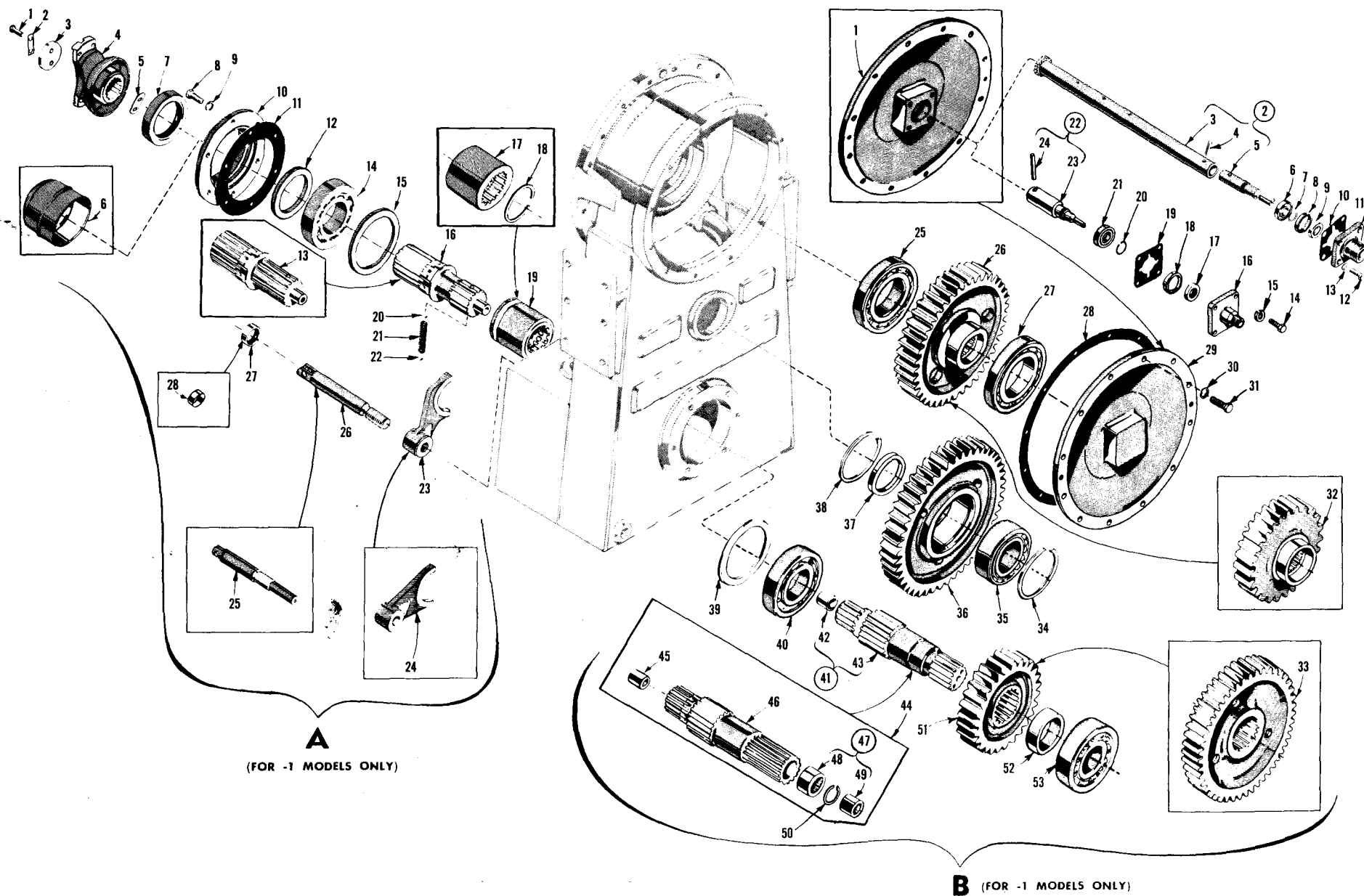
*Total quantity (96), some models

**Not used in (96) roller arrangements

B

- | | |
|--|--|
| 1 - Oil filler plug, 1 NPT | 22 - Hexagon-head bolt, 7/16-14 x 7/8 |
| 2 - Oil level check plug, 1/4 NPTF | 23 - Transmission drain plug, 3/4 NPT |
| 3 - Hexagon-head bolt, 5/16-24 x 1 1/2 | 24 - Inspection drain cover gasket |
| 4 - Plain washer | 25 - Inspection drain cover |
| 5 - Oil strainer cover | 26 - Lock washer, 3/8 (6) |
| 6 - Oil strainer retainer | 27 - Hexagon-head bolt, 3/8-16 x 1 (6) |
| 7 - Cover gasket | 28 - Pipe plug, 1 1/4 NPT |
| 8 - Oil strainer | 29 - Hexagon-head bolt, 3/8-16 x 7/8 (6) |
| 9 - Strainer bolt coupling | 30 - Lock washer, 3/8 (6) |
| 10 - Oil filler plug, 1 1/2 NPT | 31 - Oil strainer |
| 11 - Hose clamp | 32 - Strainer gasket |
| 12 - Oil drain hose | 33 - Access pipe plug, 1 1/2 NPT |
| 13 - Hose clamp | 34 - Inspection cover |
| 14 - Oil drain nipple | 35 - Lock washer, 3/8 (6) |
| 15 - Hook-type seal ring | 36 - Hexagon-head bolt, 3/8-16 x 1 (6) |
| 16 - Output transfer housing (welded) | 37 - Inspection cover gasket |
| 17 - Name plate | 38 - Transmission drain plug, 3/4 NPT |
| 18 - Drive screw (4) | 39 - Pipe plug, 1 NPT |
| 19 - Transfer idler gear spindle | 40 - Output transfer housing (cast) |
| 20 - Flat washer | 41 - Bearing retainer gasket |
| 21 - Lock washer, 7/16 | 42 - Rear bearing retainer |

FOLDOUT 11



A, foldout 11 Front-output shaft, and disconnect components—exploded view

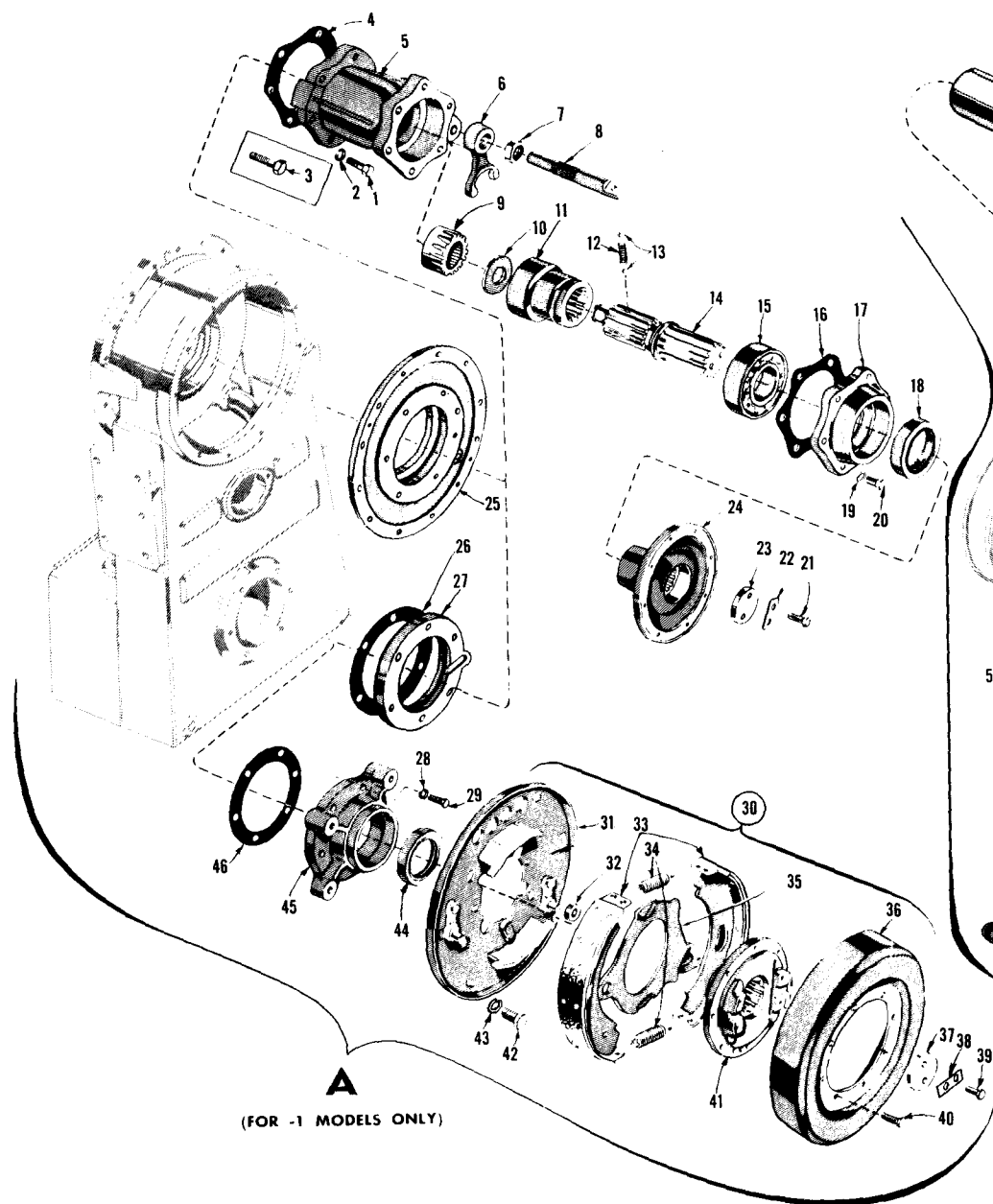
B, foldout 11 Accessory drives, output transfer gears, and rear-output shafts—exploded view

A

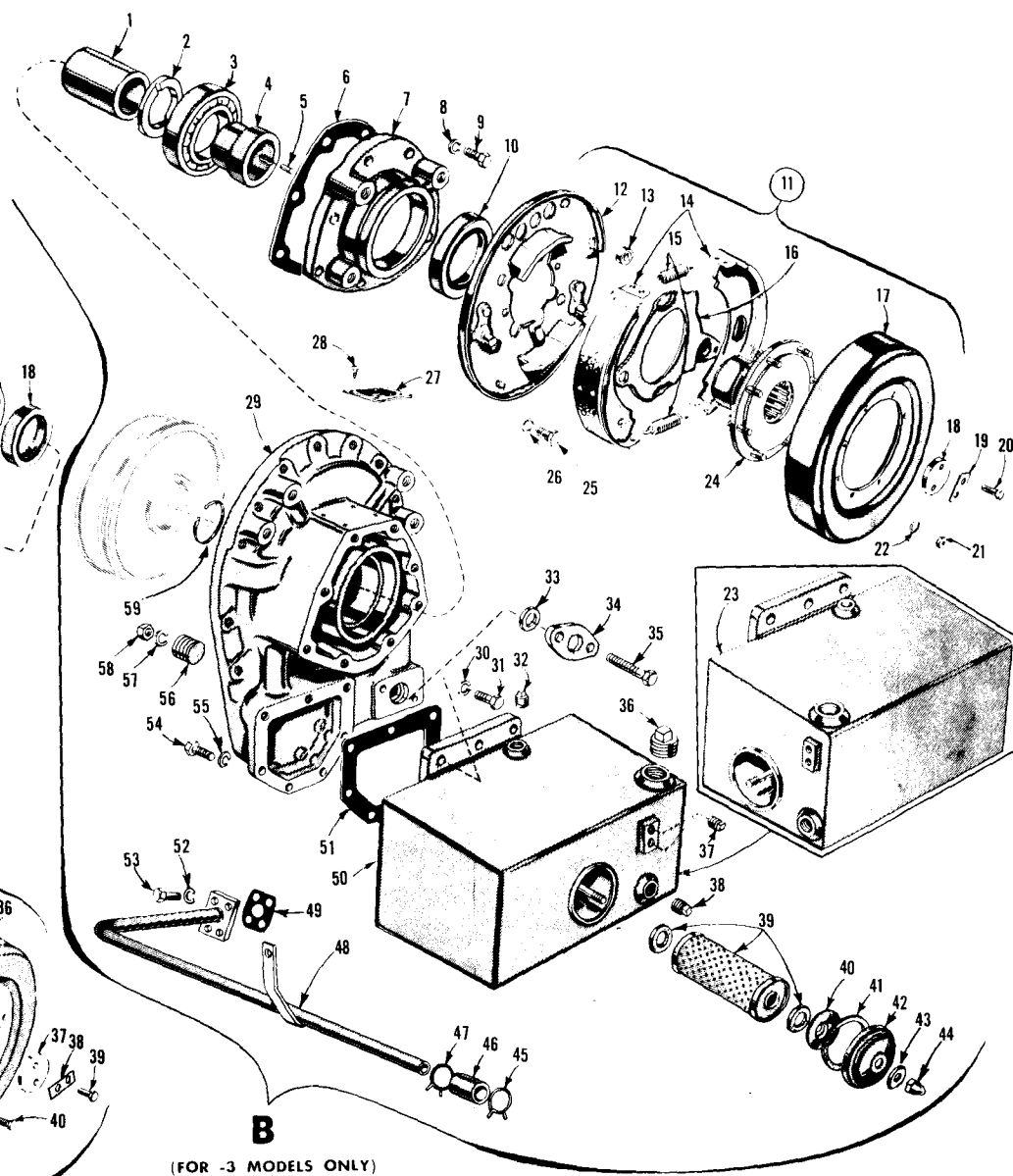
- | | |
|---------------------------------------|---------------------------------------|
| 1 - Self-locking bolt (2) | 15 - Bearing spacer |
| 2 - Lock strip | 16 - Standard front output shaft |
| 3 - Flange retainer washer | 17 - Front-output shaft coupling |
| 4 - Front-output flange | 18 - Internal-snap ring |
| 5 - Shim (AR) | 19 - Front-output disconnect coupling |
| 6 - Front-bearing retainer cap | 20 - Detent ball |
| 7 - Oil seal | 21 - Detent spring |
| 8 - Hexagon-head bolt, 3/8-16 x 1 (6) | 22 - Detent ball |
| 9 - Lock washer, 3/8 (6) | 23 - Output disconnect shifter fork |
| 10 - Front bearing retainer | 24 - Output disconnect shifter fork |
| 11 - Retainer gasket | 25 - Output disconnect shifter shaft |
| 12 - Spacer | 26 - Output disconnect shifter shaft |
| 13 - Heavy-duty front output shaft | 27 - Oil seal |
| 14 - Single-row ball bearing assembly | 28 - Plug |

B

- | | |
|---|--|
| 1 - Transfer drive gear cover (for -1 models with speedometer or accessory drive) | 29 - Transmission rear cover |
| 2 - Accessory drive shaft assembly | 30 - Lock washer, 3/8 (12) |
| 3 - Front shaft | 31 - Hexagon-head bolt, 3/8-16 x 1 1/8 (12) |
| 4 - Dowel pin | 32 - Output transfer drive gear (1.62:1 ratio) |
| 5 - Rear shaft | 33 - Output transfer driven gear (1.62:1 ratio) |
| 6 - Single-row ball bearing assembly | 34 - Internal-snap ring |
| 7 - External-snap ring | 35 - Self-aligning roller bearing assembly |
| 8 - Spacer | 36 - Output transfer idler gear |
| 9 - Oil seal | 37 - Bearing spacer |
| 10 - Gasket | 38 - Internal-snap ring |
| 11 - Adapter | 39 - Bearing spacer |
| 12 - Hexagon-head bolt, 5/16-18 x 1 1/8 (4) | 40 - Single-row ball bearing assembly |
| 13 - Lock washer, 5/16 (4) | 41 - Rear-output shaft assembly |
| 14 - Hexagon-head bolt, 5/16-18 x 1 1/8 (4) | 42 - Bushing |
| 15 - Lock washer, 5/16 (4) | 43 - Shaft |
| 16 - Adapter | 44 - Rear-output shaft assembly (-1 models with lower-rear output disconnect assembly) |
| 17 - Oil seal | 45 - Bushing |
| 18 - Spacer | 46 - Shaft |
| 19 - Gasket | 47 - Needle roller bearing assembly |
| 20 - External-snap ring | 48 - Bearing assembly |
| 21 - Single-row ball bearing | 49 - Bearing inner race |
| 22 - Speedometer drive shaft assembly | 50 - External-snap ring |
| 23 - Drive shaft | 51 - Output transfer driven gear (0.659:1 ratio) |
| 24 - Drive pin | 52 - Bearing spacer |
| 25 - Single-row ball bearing assembly | 53 - Single-row ball bearing assembly |
| 26 - Output transfer drive gear (0.659:1 ratio) | |
| 27 - Single-row ball bearing assembly | |
| 28 - Transmission rear cover gasket | |



A, foldout 12 Rear-output disconnect assembly, and parking brake—exploded view



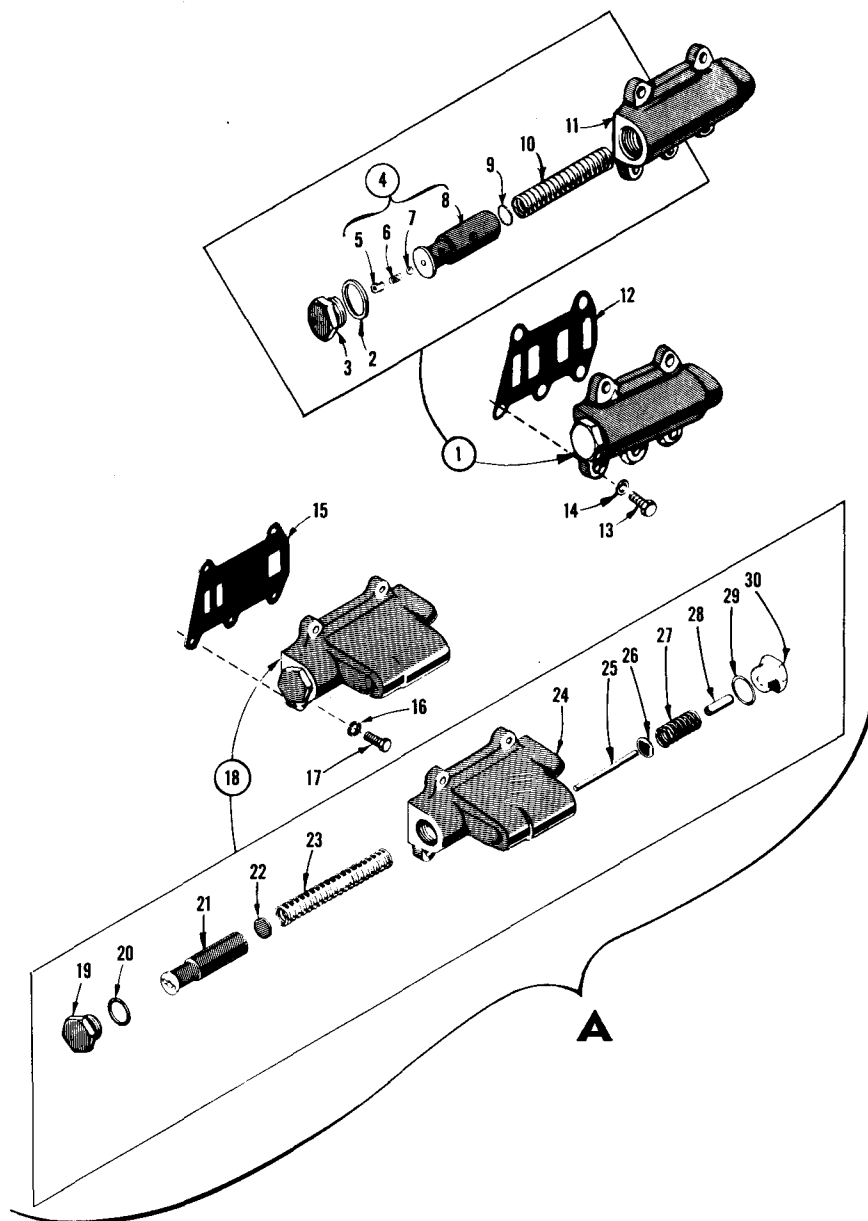
B, foldout 12 Oil sump adapter, sump, and parking brake—exploded view

A

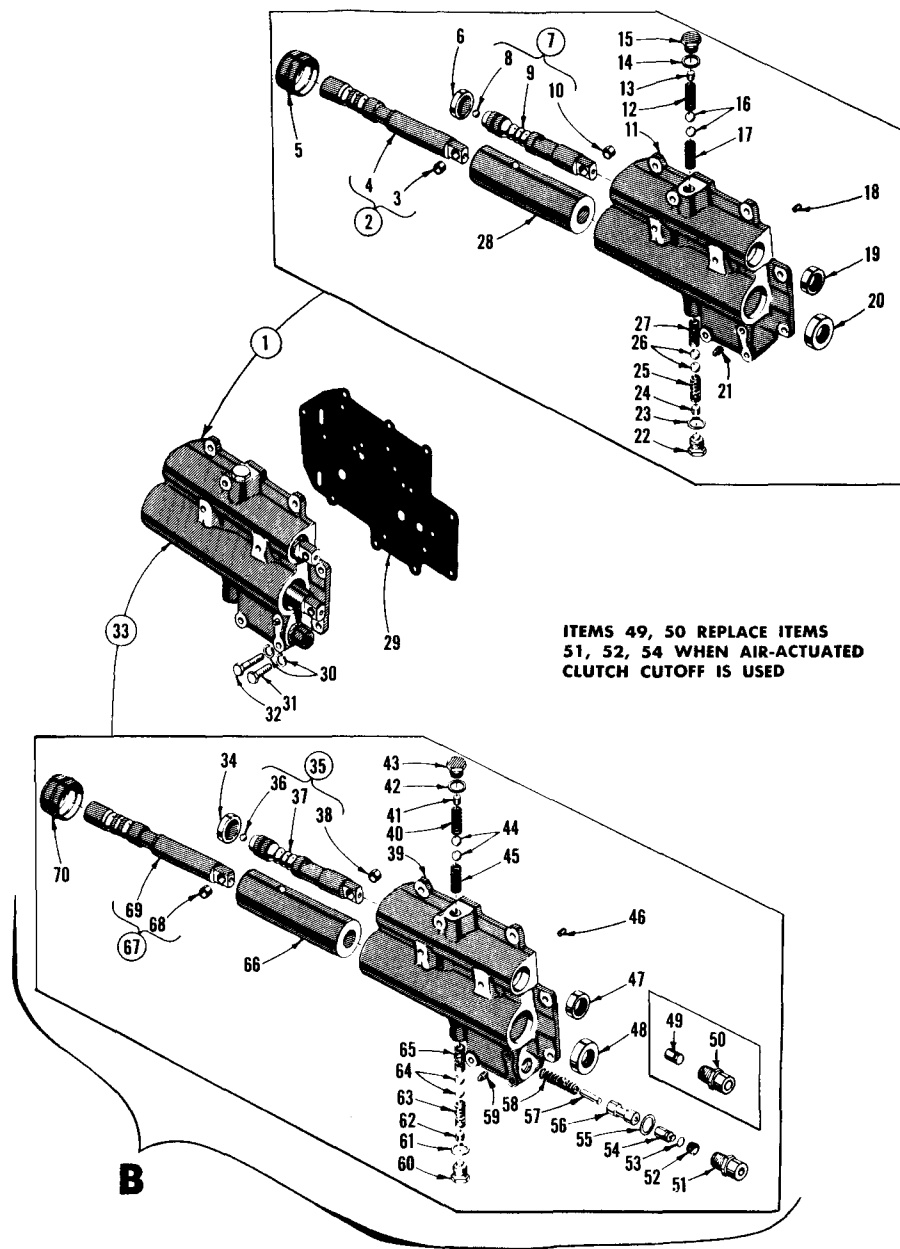
- 1 - Hexagon-head bolt, 1/2-13 x 1/2 (6)
- 2 - Lock washer, 1/2 (6)
- 3 - Hexagon-head bolt, 1/2-13 x 2 3/4 (6)
- 4 - Gasket
- 5 - Rear-disconnect housing
- 6 - Shifter fork
- 7 - Oil seal
- 8 - Shifter shaft
- 9 - Coupling
- 10 - Thrust washer
- 11 - Disconnect coupling
- 12 - Detent spring
- 13 - Detent ball (2)
- 14 - Rear-disconnect output shaft
- 15 - Single-row ball bearing assembly
- 16 - Gasket
- 17 - Bearing retainer
- 18 - Oil seal
- 19 - Lock washer, 1/2 (6)
- 20 - Hexagon-head bolt, 1/2-13 x 1 1/2 (6)
- 21 - Self-locking bolt, 3/8-24 x 1 1/8 (2)
- 22 - Lock strip
- 23 - Flange retaining washer
- 24 - Rear output flange
- 25 - Transfer drive gear cover (for -1 models with upper-rear output disconnect)
- 26 - Gasket
- 27 - Lower-rear output disconnect adapter
- 28 - Lock washer, 1/2 (6)
- 29 - Hexagon-head bolt, 1/2-13 x 1 3/8 (6)
- 30 - Parking brake assembly
- 31 - Brake back plate assembly
- 32 - Roller
- 33 - Brake shoe assembly (2)
- 34 - Brake return spring (2)
- 35 - Operating cam lever
- 36 - Brake drum
- 37 - Flange retaining washer
- 38 - Lock strip
- 39 - Self-locking bolt, 3/8-24 x 1 1/8 (2)
- 40 - Self-locking bolt, 3/8-24 x 3/4 (8)
- 41 - Rear-output flange
- 42 - Hexagon-head bolt, 5/8-11 x 1 1/4 (3)
- 43 - Lock washer, 5/8 (3)
- 44 - Oil seal
- 45 - Rear-output bearing retainer
- 46 - Retainer gasket

B

- 1 - Spacer
- 2 - Washer
- 3 - Single-row ball bearing assembly
- 4 - Sleeve
- 5 - Pin
- 6 - Retainer gasket
- 7 - Bearing retainer
- 8 - Lock washer, 3/8 (8)
- 9 - Hexagon-head bolt, 3/8-16 x 1 3/8 (8)
- 10 - Oil seal
- 11 - Parking brake assembly
- 12 - Brake back plate assembly
- 13 - Roller
- 14 - Brake shoe assembly (2)
- 15 - Brake return spring (2)
- 16 - Operating cam lever
- 17 - Brake drum
- 18 - Flange retaining washer
- 19 - Lock strip
- 20 - Self-locking bolt, 3/8-24 x 1 1/8 (2)
- 21 - Hexagon nut, 3/8-24 (8)
- 22 - Lock washer, 3/8 (8)
- 23 - Oil sump (strainer at left side)
- 24 - Rear-output flange
- 25 - Hexagon-head bolt, 5/8-11 x 1 1/4 (3)
- 26 - Lock washer, 5/8 (3)
- 27 - Name plate
- 28 - Drive screw (4)
- 29 - Transmission sump adapter
- 30 - Lock washer, 7/16 (3)
- 31 - Hexagon-head bolt, 7/16-14 x 1 1/2 (3)
- 32 - Pipe plug, 3/8 NPTF
- 33 - Oil seal
- 34 - Oil seal plate
- 35 - Hexagon-head bolt, 7/16-20 x 3 1/2 (2)
- 36 - Oil filler plug, 1 1/4 NPT
- 37 - Oil check plug, 1/4 NPTF (2)
- 38 - Transmission drain plug, 3/4 NPT
- 39 - Oil strainer
- 40 - Oil strainer retainer
- 41 - Strainer cover gasket
- 42 - Oil strainer cover
- 43 - Plain washer
- 44 - Hexagon crown nut, 5/16-24
- 45 - Hose clamp
- 46 - Oil drain hose
- 47 - Hose clamp
- 48 - Oil return tube
- 49 - Gasket
- 50 - Oil sump (strainer at rear)
- 51 - Oil sump gasket
- 52 - Lock washer, 3/8 (4)
- 53 - Hexagon-head bolt, 3/8-16 x 1 (4)
- 54 - Hexagon-head bolt, 7/16-20 x 1 1/4 (4)
- 55 - Lock washer, 7/16 (4)
- 56 - Pipe plug, 1 1/4 NPT
- 57 - Lock washer, 7/16 (2)
- 58 - Hexagon nut, 7/16-20 (2)
- 59 - Hook-type seal ring



A, foldout 13 Main-pressure regulator valve body assemblies—exploded view



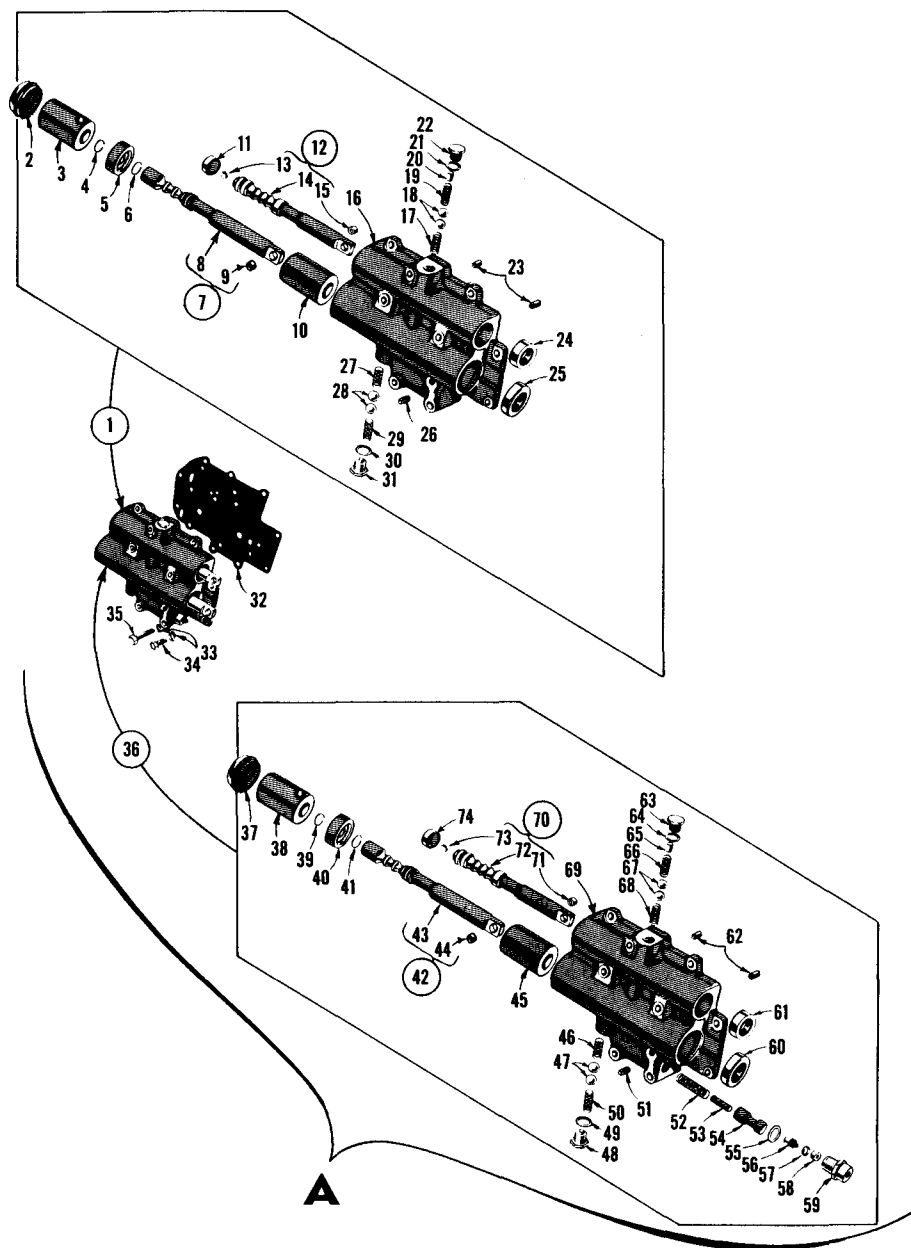
B, foldout 13 Earlier inching control valve body assemblies—exploded view

A

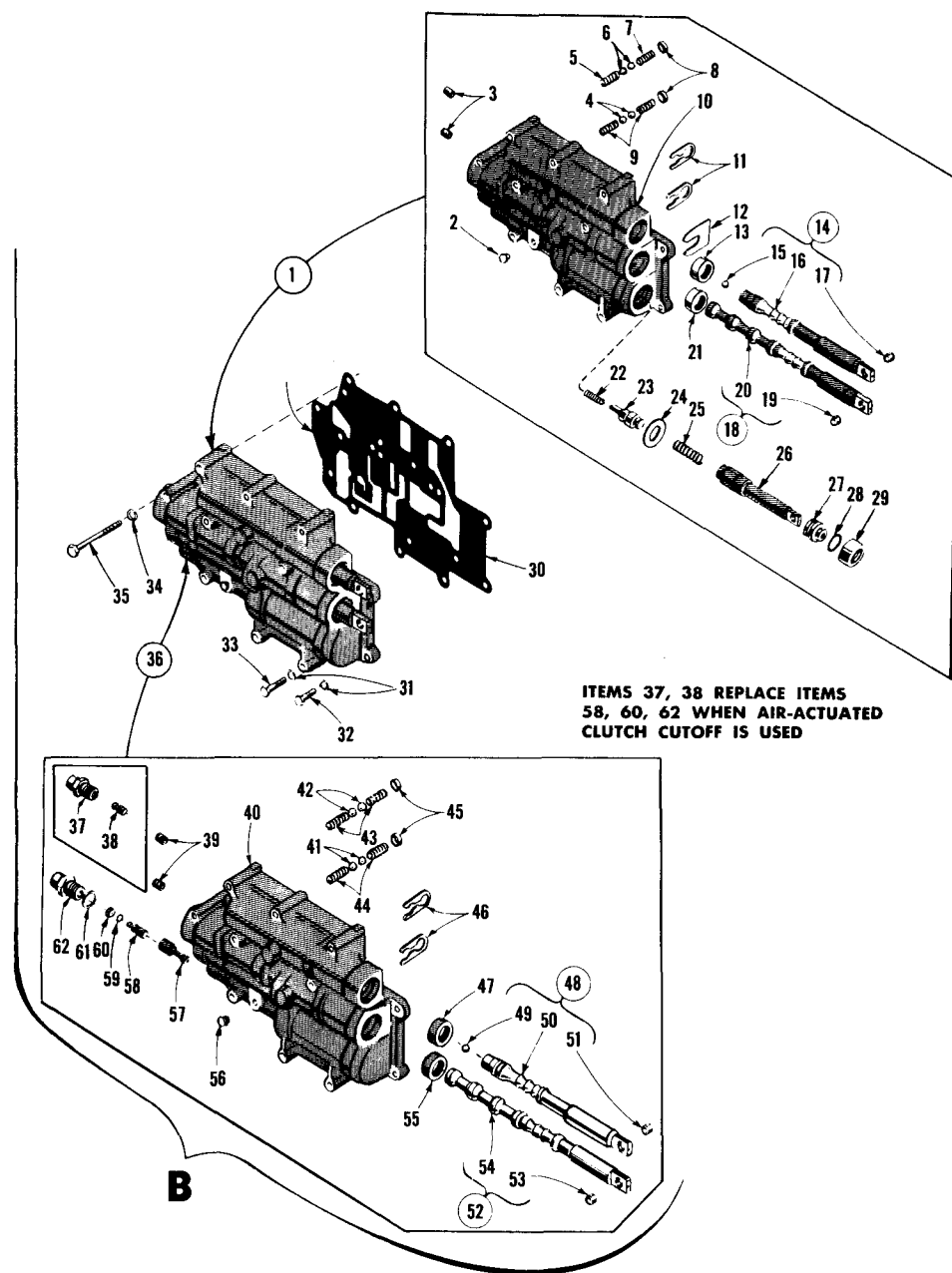
- | | |
|---|--|
| 1 - Main-pressure regulator valve body assembly | 16 - Lock washer, 3/8 (5) |
| 2 - Gasket | 17 - Hexagon-head bolt, 3/8-16 x 1 1/4 (5) |
| 3 - Plug | 18 - Main-pressure regulator valve body assembly |
| 4 - Regulator valve assembly | 19 - Plug |
| 5 - Retainer | 20 - Gasket |
| 6 - Spring | 21 - Regulator valve |
| 7 - Ball | 22 - Shim (AR) |
| 8 - Valve | 23 - Spring |
| 9 - Shim (AR) | 24 - Valve body |
| 10 - Spring | 25 - Valve guide pin |
| 11 - Valve body | 26 - Bypass valve |
| 12 - Gasket | 27 - Valve spring |
| 13 - Hexagon-head bolt, 3/8-16 x 1 1/4 (5) | 28 - Spring guide tube |
| 14 - Lock washer, 3/8 (5) | 29 - Gasket |
| 15 - Gasket | 30 - Plug |

B

- | | |
|--|---|
| 1 - Control valve body assembly | 36 - Ball |
| 2 - Forward-reverse control valve assembly | 37 - Range selector valve |
| 3 - Bushing | 38 - Bushing |
| 4 - Valve | 39 - Valve body |
| 5 - Plug | 40 - Detent spring |
| 6 - Plug | 41 - Stop pin |
| 7 - Range selector valve assembly | 42 - Gasket |
| 8 - Ball | 43 - Plug |
| 9 - Valve | 44 - Detent ball (2) |
| 10 - Bushing | 45 - Detent spring |
| 11 - Valve body | 46 - Spring pin |
| 12 - Detent spring | 47 - Oil seal |
| 13 - Stop pin | 48 - Oil seal |
| 14 - Gasket | 49 - Clutch cutoff valve plug (air) |
| 15 - Plug | 50 - Cutoff valve retainer plug (air) |
| 16 - Detent ball (2) | 51 - Cutoff valve retainer plug (hydraulic) |
| 17 - Detent spring | 52 - Cutoff valve plug cup (hydraulic) |
| 18 - Spring pin | 53 - Seal ring |
| 19 - Oil seal | 54 - Cutoff valve plug (hydraulic) |
| 20 - Oil seal | 55 - Gasket |
| 21 - Plug, 1/8 NPTF | 56 - Clutch cutoff valve |
| 22 - Plug | 57 - Stop pin |
| 23 - Gasket | 58 - Valve spring |
| 24 - Stop pin | 59 - Plug, 1/8 NPTF |
| 25 - Detent spring | 60 - Plug |
| 26 - Detent ball (2) | 61 - Gasket |
| 27 - Detent spring | 62 - Stop pin |
| 28 - Valve sleeve | 63 - Detent spring |
| 29 - Valve body gasket | 64 - Detent ball (2) |
| 30 - Lock washer, 3/8 (11) | 65 - Detent spring |
| 31 - Hexagon-head bolt, 3/8-16 x 1 1/4 (6) | 66 - Valve sleeve |
| 32 - Hexagon-head bolt, 3/8-16 x 3 (5) | 67 - Forward-reverse control valve assembly |
| 33 - Control valve body assembly | 68 - Bushing |
| 34 - Plug | 69 - Valve |
| 35 - Range selector valve assembly | 70 - Plug |



A, foldout 14 Earlier sense-feel control valve body assemblies—exploded view



ITEMS 37, 38 REPLACE ITEMS
58, 60, 62 WHEN AIR-ACTUATED
CLUTCH CUTOFF IS USED

B, foldout 14 Later control valve body assemblies—exploded view

A

- 1 - Control valve body assembly
- 2 - Plug
- 3 - Reverse shift sleeve
- 4 - External-snap ring
- 5 - Piston
- 6 - External-snap ring
- 7 - Forward-reverse control valve assembly
- 8 - Valve
- 9 - Bushing
- 10 - Forward shift sleeve
- 11 - Plug
- 12 - Range selector valve assembly
- 13 - Ball
- 14 - Valve
- 15 - Bushing
- 16 - Valve body
- 17 - Detent spring
- 18 - Detent ball (2)
- 19 - Detent spring
- 20 - Stop pin
- 21 - Gasket
- 22 - Plug
- 23 - Spring pin (2)
- 24 - Oil seal
- 25 - Oil seal
- 26 - Pipe plug, 1/8 NPTF
- 27 - Detent spring
- 28 - Detent ball (2)
- 29 - Detent spring
- 30 - Gasket
- 31 - Plug
- 32 - Valve body gasket
- 33 - Lock washer, 3/8 (11)
- 34 - Hexagon-head bolt, 3/8-16 x 1 1/4 (5)
- 35 - Hexagon-head bolt, 3/8-16 x 3 (6)
- 36 - Control valve body assembly
- 37 - Plug
- 38 - Reverse shift sleeve
- 39 - External-snap ring
- 40 - Piston
- 41 - External-snap ring
- 42 - Forward-reverse control valve assembly
- 43 - Control valve
- 44 - Bushing
- 45 - Forward shift sleeve
- 46 - Detent spring
- 47 - Detent ball (2)
- 48 - Plug
- 49 - Gasket
- 50 - Detent spring
- 51 - Pipe plug, 1/8 NPTF
- 52 - Clutch cutoff valve spring
- 53 - Stop pin
- 54 - Clutch cutoff valve
- 55 - Gasket
- 56 - Clutch cutoff valve plug (hydraulic)
- 57 - Seal ring
- 58 - Cutoff valve plug cup (hydraulic)
- 59 - Cutoff valve retainer plug (hydraulic)
- 60 - Oil seal
- 61 - Oil seal
- 62 - Spring pin (2)
- 63 - Plug
- 64 - Gasket
- 65 - Stop pin
- 66 - Detent spring
- 67 - Detent ball (2)
- 68 - Detent spring
- 69 - Valve body
- 70 - Range selector control valve assembly
- 71 - Bushing
- 72 - Valve
- 73 - Ball
- 74 - Plug

B

- 1 - Control valve body assembly
- 2 - Plug, 1/8 NPTF
- 3 - Plug, 1/8 NPTF (2)
- 4 - Detent ball (2)
- 5 - Detent spring
- 6 - Detent ball (2)
- 7 - Detent spring
- 8 - Spring retainer (2)
- 9 - Detent spring (2)
- 10 - Valve body
- 11 - Valve stop (2)
- 12 - Valve stop
- 13 - Oil seal
- 14 - Range selector control valve assembly
- 15 - Ball
- 16 - Range selector valve
- 17 - Bushing
- 18 - Forward-reverse control valve assembly
- 19 - Bushing
- 20 - Valve
- 21 - Oil seal
- 22 - Inching regulator valve spring
- 23 - Inching regulator valve
- 24 - Washer
- 25 - Inching control valve spring
- 26 - Inching control valve
- 27 - Inching control valve plug
- 28 - Seal ring
- 29 - Oil seal
- 30 - Valve body gasket
- 31 - Lock washer, 3/8 (8)
- 32 - Hexagon-head bolt, 3/8-16 x 1 1/4 (2)
- 33 - Hexagon-head bolt, 3/8-16 x 2 1/2 (6)
- 34 - Lock washer, 3/8 (3)
- 35 - Hexagon-head bolt, 3/8-16 x 3 1/2 (3)
- 36 - Control valve body assembly
- 37 - Clutch cutoff valve retainer plug (air)
- 38 - Clutch cutoff valve plug (air)
- 39 - Pipe plug, 1/8 NPTF (2)
- 40 - Valve body
- 41 - Detent ball (2)
- 42 - Detent ball (2)
- 43 - Detent spring (2)
- 44 - Detent spring (2)
- 45 - Spring retainer (2)
- 46 - Valve stop (2)
- 47 - Oil seal
- 48 - Range selector control valve assembly
- 49 - Ball
- 50 - Valve
- 51 - Bushing
- 52 - Forward-reverse control valve assembly
- 53 - Bushing
- 54 - Valve
- 55 - Oil seal
- 56 - Pipe plug, 1/8 NPTF
- 57 - Clutch cutoff valve
- 58 - Clutch cutoff valve plug (hydraulic)
- 59 - Seal ring
- 60 - Cutoff valve plug cup (hydraulic)
- 61 - Gasket
- 62 - Clutch cutoff valve retainer plug (hydraulic)

