

## SPECIAL AND IMPROVISED TOOLS—CHART

(refer to para 4-4)

Name	Number	References		Use
		Figure	Paragraph	
Turbine puller	None	4-1	5-3c(2)	Removing turbine from turbine output shaft
Lifting sling	None	4-1	5-3e(1)	Lifting larger parts of transmission to facilitate disassembly and assembly
Spanner wrench	J 6534-02	4-1	5-3c(6)	Removing spanner nut retaining stator roller race
Flywheel hook	None	4-1	5-3b(9)	Lifting flywheel during removal or installation
Support legs	J 23556	4-1	7-3c(8)	Transmission support legs for disassembly or assembly
Belleville clutch spring compressor	J 7441	4-3	6-22a(2)	Compressing Belleville spring during disassembly and assembly of high-range and low-splitter clutches
Flange puller	None	4-4	4-8a	Removing interference-fit drive flanges
Compressing sleeve	None	4-5	4-8b	Positioning output shaft components prior to installing output flange
Wiring harness adapter	J 24712	NI	3-19b(3)	Hold automatic-electric model in 5th gear during stall test

**4-11. RECOMMENDED PARTS REPLACEMENT AT REBUILD**

Under normal operating conditions it is recommended that the parts shown on the following chart, be replaced at the suggested number of hours listed. Chart accuracy is determined by the number of operating hours versus the type of transmission operation. Consider a part change at 8000 hours.

The part has more than 5000 but considerably less than 8000 hours. Type of transmission operation was severe. Therefore the part in the transmission operating under severe conditions would be replaced immediately. If light operating conditions had existed, replacement of the part would not be necessary until 8000 hours, and then only after inspection.

**RECOMMENDED PARTS REPLACEMENT CHART**

Part Name	Average Operating Hours					
	3000	5000	8000	12,000	16,000	20,000
*Clutch Plates		X	X	X	X	X
Planet & Sun Gears						
- Splitter				X	X	X
- Intermediate (3-4 Range)			X	X	X	X
- Low (1-2 Range)		X	X	X	X	X
- Reverse					X	X
PTO Gears					X	X
Planet Bearings & Spindles						
- Splitter		X	X	X	X	X
- Intermediate (3-4 Range)			X	X	X	X
- Low (1-2 Range)		X	X	X	X	X
- Reverse				X	X	X
Bearings (Ball & Roller Assy.)		X	X	X	X	X
Oil Pumps			X	X	X	X
Springs (Clutch Return)		X	X	X	X	X
Shafts						
- Turbine				X	X	X
- Splitter				X	X	X
- Output		X	X	X	X	X
Turbine		X	X	X	X	X
Brake Rotor				X	X	X

\* Careful consideration and interpretation must be given to the wear of friction plates. The life of these plates is not a straight line function with wear, but the life decreases more rapidly in the second half of the allowable wear. Therefore, good judgement must be used for optimum clutch life, performance and economy.

## Section 5. DISASSEMBLY OF TRANSMISSION INTO SUBASSEMBLIES

### 5-1. SCOPE OF SECTION 5

**a. Models Covered.** This section outlines the disassembly of all 5600 and 5800 model transmissions into subassemblies. To disassemble any transmission, regardless of model variations, follow the notes and instructions pertinent to the model being disassembled. If an option or feature is not applicable, it may be passed over and disassembly continued with the next applicable procedure.

#### b. Disassembly Sequence

(1) The disassembly procedures are divided into two major paragraphs. Paragraph 5-3 covers the straight-through configuration, and includes all model variations except the transfer drive output (dropbox). Paragraph 5-4 covers the two types of transfer drive outputs.

(2) Paragraph 5-4 covers the transfer drive output, (dropbox), plus the various options and features within the dropbox models. The specified combination of paragraphs 5-3 and 5-4 constitute the assembly of the transfer drive type output.

#### c. Illustrations

(1) Disassembly is referenced primarily to photographs in this section. When necessary, procedures are referenced to parts exploded views (foldouts 5 through 20) and the supplement at the back of this manual.

(2) In addition to the photographs and exploded views, two cross-section views (foldouts 1 and 2) show the assembled relation of components.

### 5-2. PREPARATION FOR DISASSEMBLY

**a. Draining Transmission.** Drain the transmission if it was not drained before removal from the driveline.

**b. Overhaul Information.** Refer to Section 4 for information necessary before beginning disassembly.

### 5-3. TRANSMISSION DISASSEMBLY (ALL STRAIGHT THROUGH MODELS)

#### a. Removal of Exterior Components

(1) On remote-mount models, flatten the ends of input flange lockstrip 2 (A, foldout 5) and remove two bolts 1, lockstrip 2, and flange retainer washer 3. Remove shims 4 and flange 5.

#### NOTE

If flange is a tight fit, refer to paragraph 4-8a.

(2) Remove the integral oil filter drain plug from the drain hole (fig. 5-1) and let the oil drain out of the filters into a suitable container. Remove five (four if filter is reversed) long bolts, two (three if filter is reversed) short bolts and seven lockwashers from the oil filter adapter body. Remove the oil filter assembly. Refer to paragraph

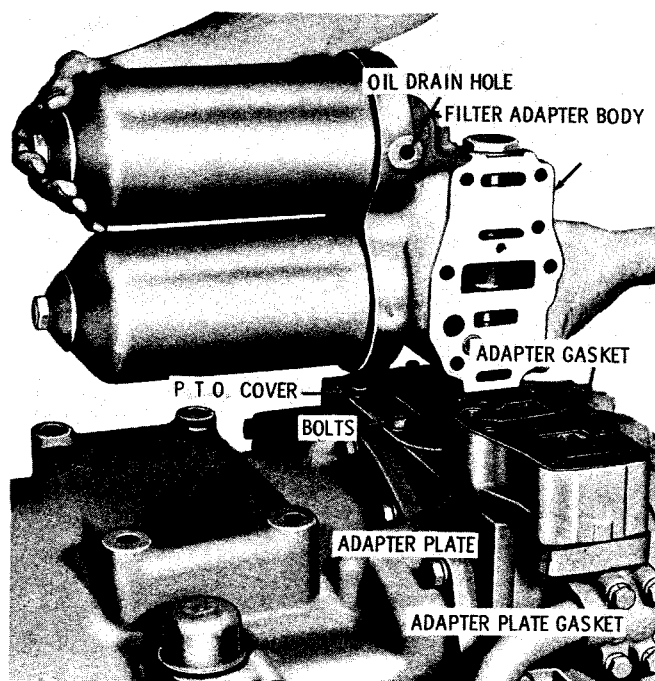


Fig. 5-1. Removing integral oil filter assembly

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## Para 5-3

6-3 for rebuild of the filter assembly including a pressure switch. Refer to paragraph 6-4 for rebuild of other filters.

(3) Remove the adapter gasket, adapter plate and adapter plate gasket. On models with reversed filter, remove six bolts 50, 51, and 52 (A, foldout 9) and four lockwashers 53. Remove adapter 55 and adapter gasket 45. Remove eight bolts (fig. 5-1) and lockwashers. Remove PTO pad cover and gasket.

(4) On transmissions having a remote filter, remove six long bolts (fig. 5-2), one short bolt, and seven lockwashers from the main-pressure regulator valve body assembly. Remove the valve body and gasket. Refer to paragraph 6-5 for rebuild of the main-pressure regulator valve body assembly.

**NOTE**

Models which have a remote-mounted filter and tapped openings in the top of the regulator valve body have seven long bolts only.

(5) For the removal of the variable-capacity control valve, remove five 3/8-16x2-1/4-inch bolts and lockwashers that retain the stator control valve body assembly. Remove the stator control valve body assembly and gasket. Refer to paragraph 6-6 for rebuild of the stator control valve body assembly. Remove the ball and spring. Remove two 7/16-14 x 4-1/2-inch bolts and lockwashers. Remove main-pressure regulator valve body assembly and gasket. Refer to paragraph 6-5 for rebuild of the main-pressure regulator valve

body assembly. Remove adapter plate and gasket. (Refer to figure 7-109 for pictorial view.)

(6) On transmissions having a lockup clutch, remove seven (fig. 5-3) long and two short bolts and nine lockwashers from the lockup shift valve body assembly. Remove the valve body and gasket. Refer to paragraph 6-7 for rebuild of the lockup shift valve body assembly.

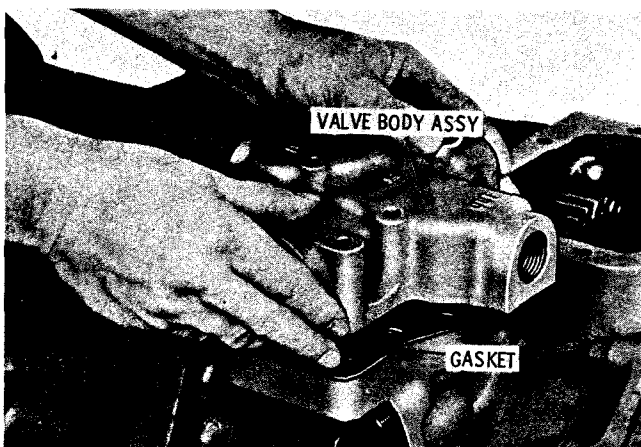
**NOTE**

CT and CBT models use cover 21 (B, fold-out 10), nine bolts 23 and nine lockwashers 22.

(7) Remove 24 bolts and lockwashers retaining the 6-speed control valve body assembly (fig. 5-4). Do not remove four bolts marked A and B. Support the weight of the assembly while removing the final two bolts. Remove the control valve body assembly and gasket. Refer to paragraph 6-8 for rebuild of the control valve body assembly. Refer to the supplement at the back of the manual if the valve body is electrically actuated.

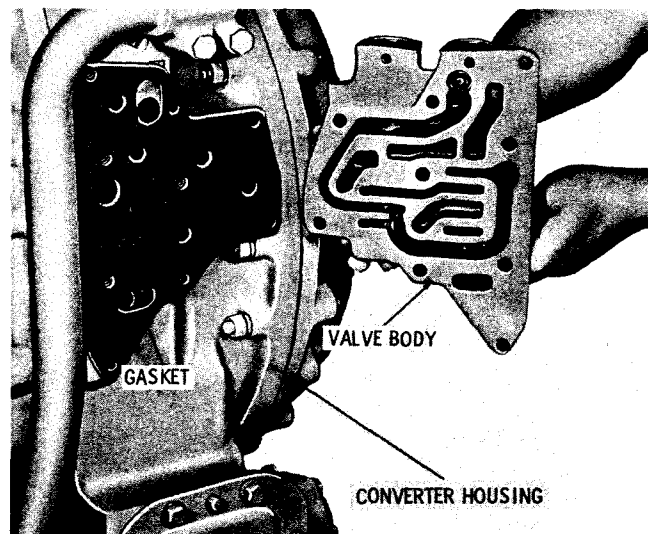
(8) Remove eight short and five long bolts and 13 lockwashers from the 4-speed control valve body assembly. Remove the valve body and gasket (fig. 5-5). Refer to paragraph 6-9 for rebuild of the control valve body assembly.

(9) On 4-speed models, remove ten bolts 4 (C, foldout 13) and ten lockwashers 3 from the oil transfer plate. Remove oil transfer plate 2 and gasket 1.



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Fig. 5-2. Removing main-pressure regulator valve body assembly (remote filter)



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Fig. 5-3. Removing lockup valve assembly



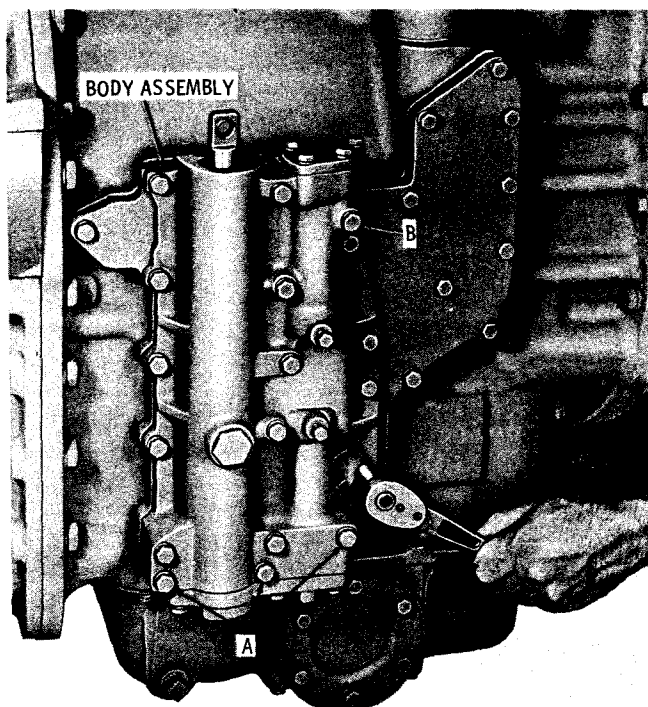


Fig. 5-4. Removing 6-speed control valve body assembly bolts

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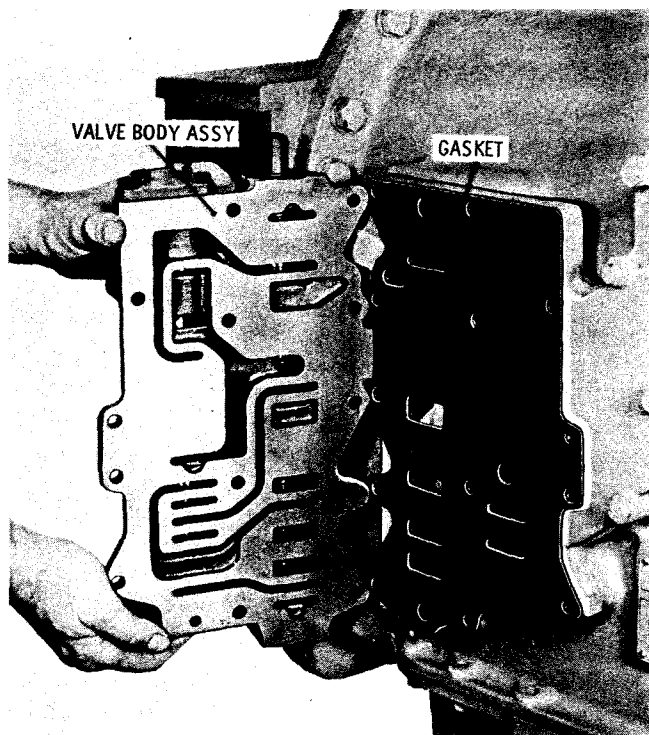
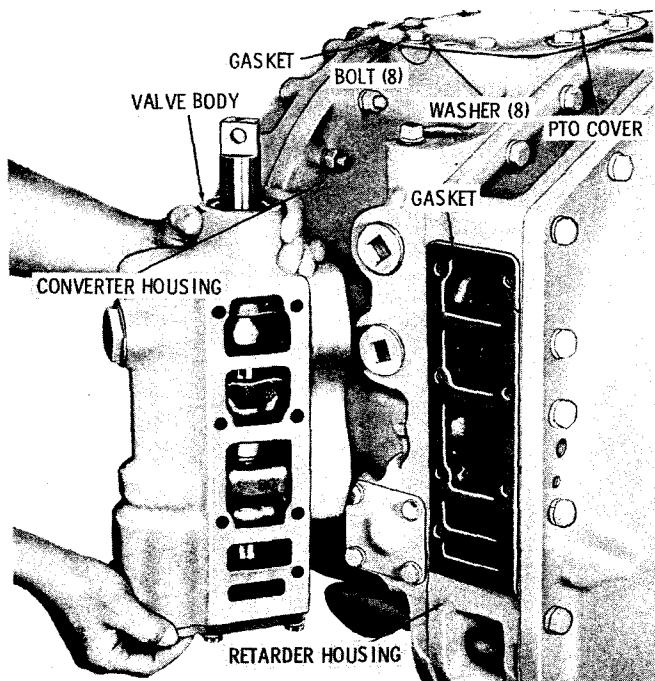


Fig. 5-5. Removing 4-speed control valve body assembly

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Fig. 5-6. Removing hydraulic retarder valve body assembly

(10) Remove seven bolts and lockwashers from the hydraulic retarder valve body assembly. Remove the valve body (gasket and restrictor plate in later models) and gasket (fig. 5-6). Refer to paragraph 6-10 for rebuild of the hydraulic retarder control valve body assembly.

(11) Attach a 2-strand lifting sling to the top of the transmission and raise it slightly (fig. 5-7). Remove six bolts and lockwashers from the oil strainer. Remove the strainer and gasket.

#### NOTE

Some models have strainer on left side of transmission.

(12) Remove 24 short and four long bolts and 28 lockwashers from the transmission oil pan. Remove the pan and gasket (fig. 5-8). Remove the two bolts and lockwashers that secure the converter housing and hydraulic retarder housing to the transmission housing. Refer to (B, foldout 14) for exploded view.

#### NOTE

CT, CLT and VCLT models do not include retarder housing or the hydraulic retarder valve body.

(13) Lower transmission (fig. 5-9) to rest on wood blocks, and remove eight bolts and lockwashers from input oil pump pressure tube. Re-

## Para 5-3

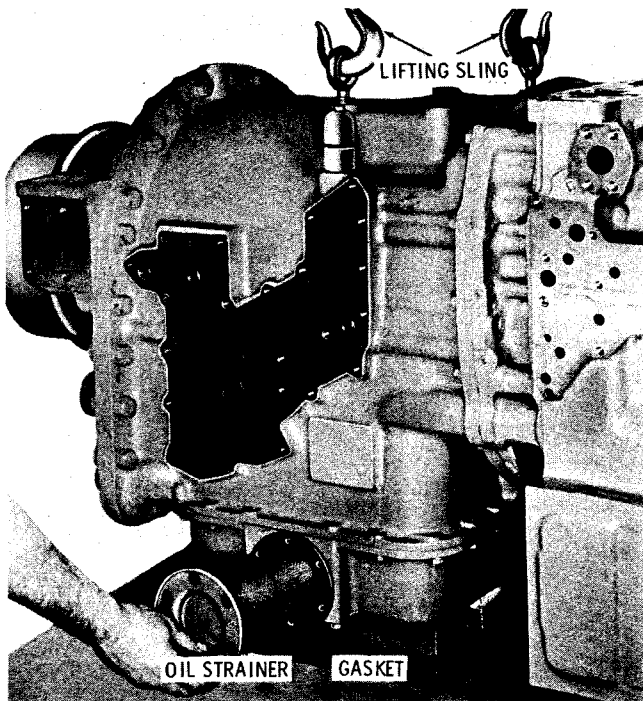


Fig. 5-7. Removing oil strainer

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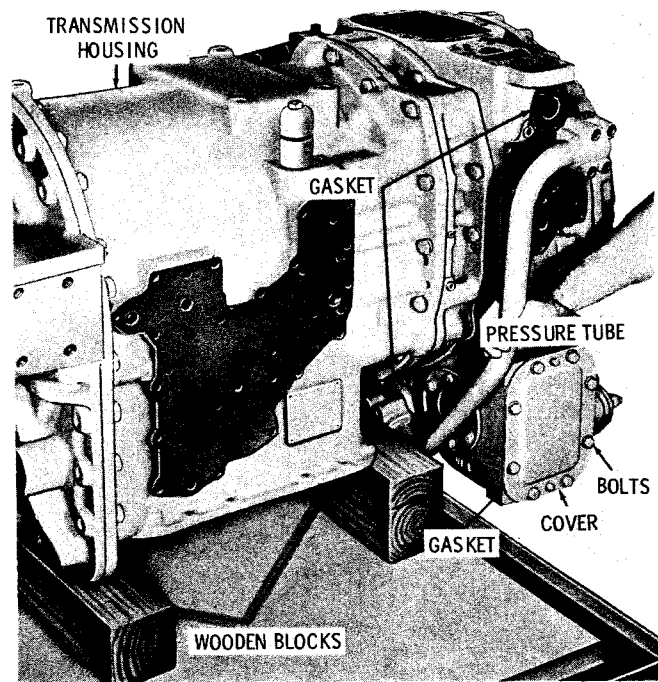


Fig. 5-9. Removing input oil pump pressure tube

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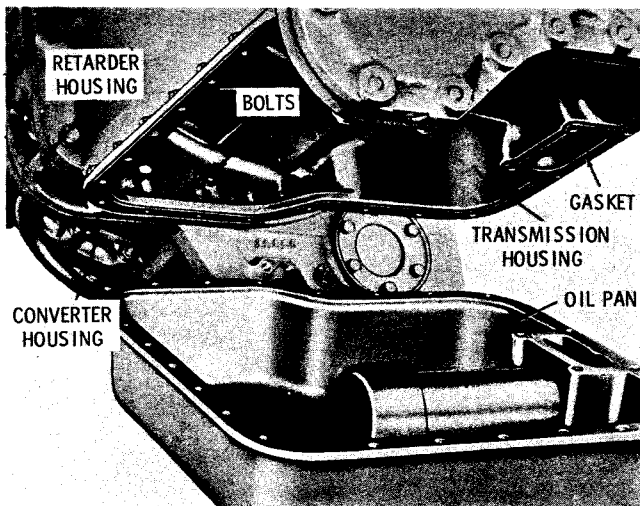


Fig. 5-8. Removing transmission oil pan

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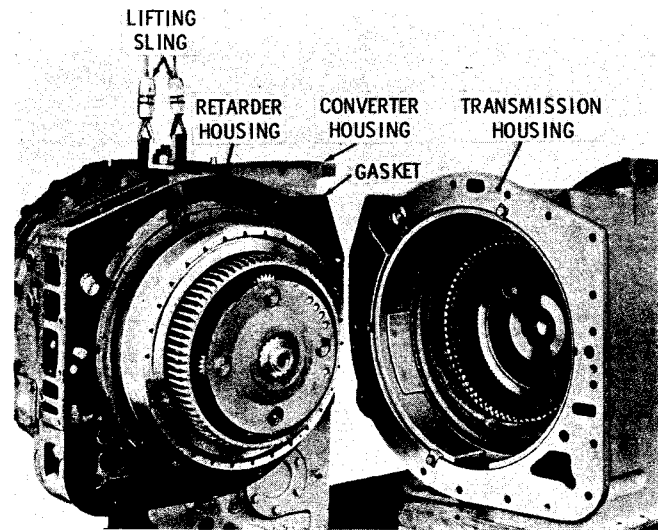


Fig. 5-10. Removing torque converter, converter housing and retarder housing (CBT, CLBT, VCLBT)

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move the tube and gasket. On models which have side power takeoff, remove eight bolts and lockwashers, cover, and gasket.

**NOTE**

Later models have a flexible pressure tube. Refer to items 56 through 64 of A, foldout 8.

**b. Removal of Converter Housing, Retarder Housing and Related Components from Transmission Housing.**

(1) On CBT, CLBT and VCLBT models, lower the transmission to rest on wood blocks (fig. 5-10). Attach a 2-strand lifting sling to the top of the torque converter housing. Remove the 17 remaining bolts and 17 lockwashers which fasten the transmission housing (fig. 5-10) to the retarder

housing. Remove, as a unit, the torque converter, the retarder housing, and attached parts from the transmission housing. Remove the gasket.

(2) On CT, CLT and VCLT models, lower the transmission to rest on wooden blocks (fig. 5-11). Attach the 2-strand lifting sling to the top of the converter housing, adjusting the sling to support the housing. Remove the 17 remaining bolts and 17 lockwashers from the transmission housing. Remove, as a unit, the converter housing and attached parts. Remove the gasket from the transmission housing.

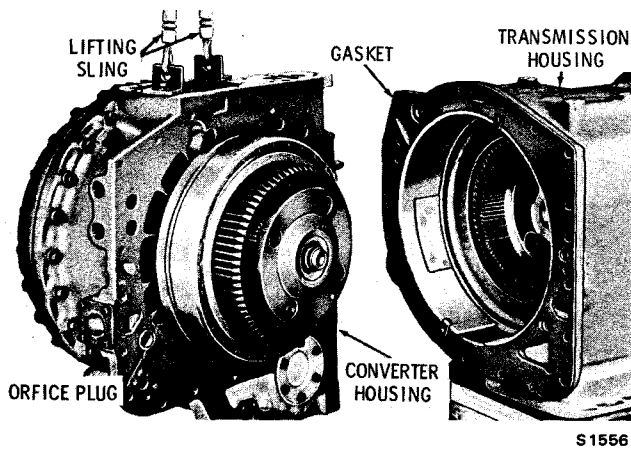


Fig. 5-11. Removing torque converter and housing (CT, CLT, VCLT)

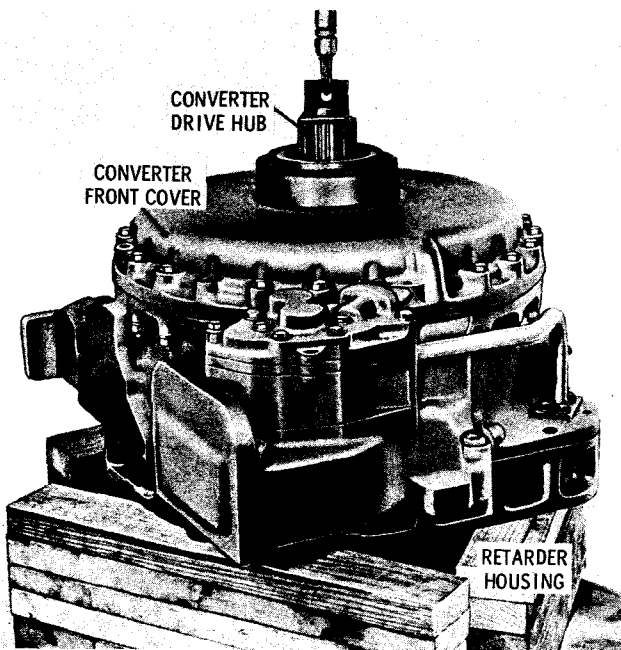


Fig. 5-12. Positioning torque converter and housing for disassembly

(3) Attach one strand of the lifting sling to the converter drive hub on remote-mount models (fig. 5-12). Lower the assembly onto wood blocks.

#### CAUTION

Block sufficiently high to clear the turbine output shaft.

#### NOTE

CT, CLT and VCLT models do not include retarder housing.

(4) Remove 21 bolts, nuts and lockwashers which retain converter housing front cover. Attach a 2-strand lifting sling to the cover and remove the cover from the converter housing (fig. 5-13). Remove the gasket. Do not remove the oil seal from the cover unless replacement is necessary. Refer to paragraph 6-11 for rebuild of the converter housing front cover.

(5) From the power takeoff opening in the top of the converter housing, remove the 36 self-locking bolts and washers that secure the converter drive housing (fig. 5-14).

(6) Attach one strand of the lifting sling (fig. 5-15) to the torque converter drive hub, and remove the torque converter drive housing assembly. Refer to paragraph 6-12d and e for rebuild of the drive housing for transmissions having the arrangement shown in B, foldout 5.

(7) On CLT and CLBT models, remove the spring (used only on some models—fig. 5-15). Remove the lockup clutch plate and lockup clutch back plate. Remove the hook-type sealing from the turbine shaft.

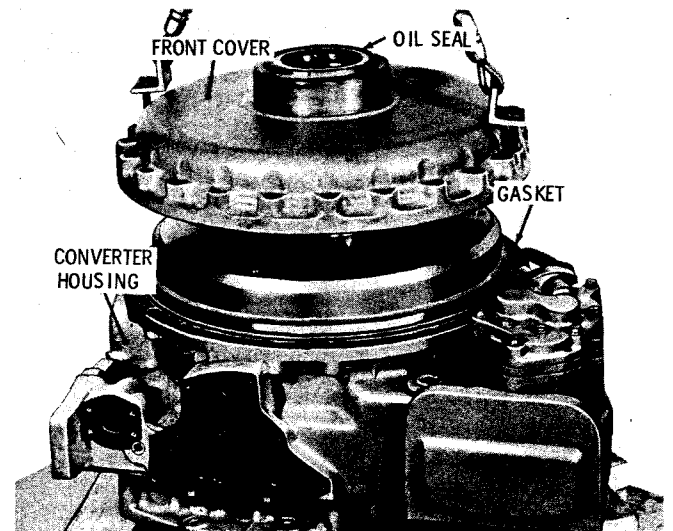


Fig. 5-13. Removing converter housing front cover (remote mount)

## Para 5-3

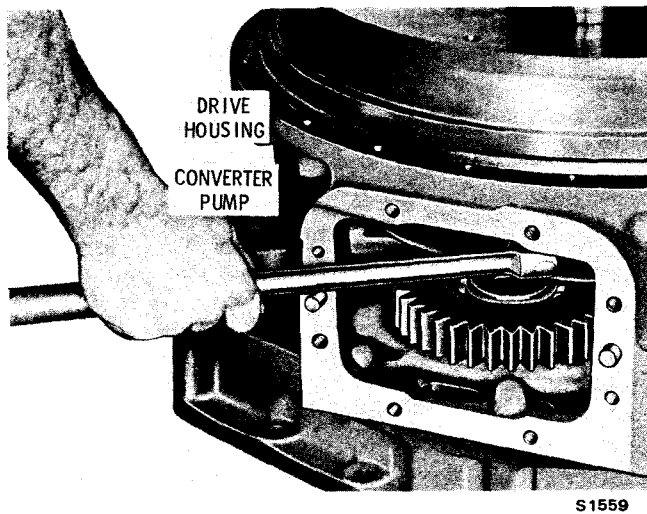


Fig. 5-14. Removing converter drive housing bolts (remote mount)

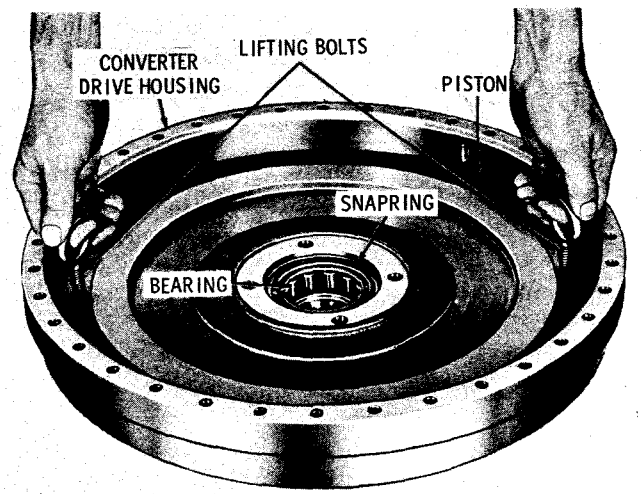


Fig. 5-16. Removing lockup clutch piston

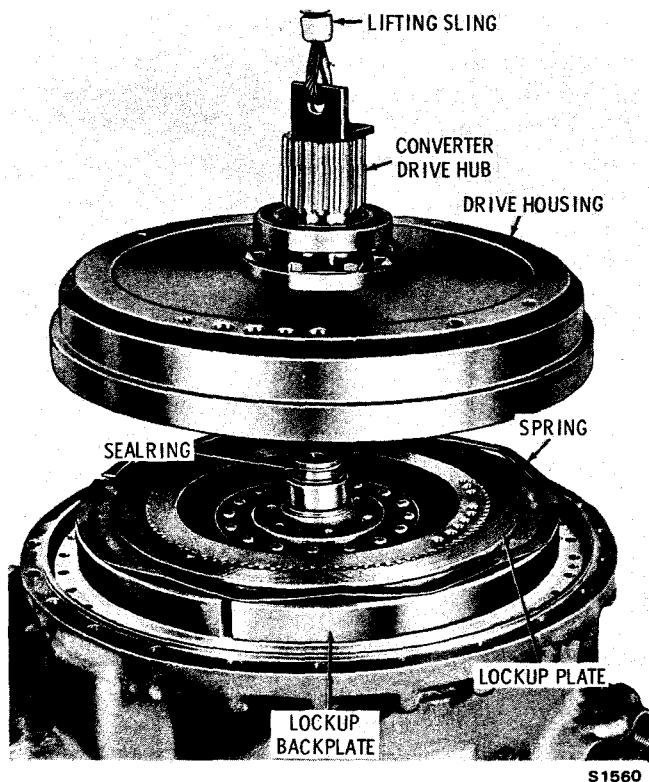


Fig. 5-15. Removing converter drive housing (remote mount)

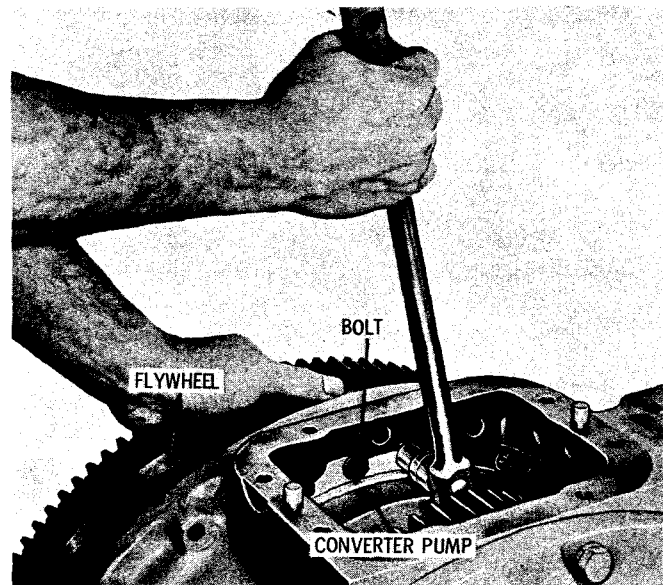


Fig. 5-17. Removing flywheel bolts (direct mount)

bearing from the housing. Remove the sealrings from the drive housing hub and the piston. Refer to paragraph 5-12a, b and c for rebuild of the drive housing for transmissions having the arrangement shown in A, foldout 5.

(9) On direct-mount transmissions, remove 36 bolts (accessible through top PTO opening) and flat washers which secure the flywheel to the converter pump (fig. 5-17).

(10) Using the flywheel lifting hook (fig. 5-18), remove the flywheel assembly. Remove the hook-type sealring.

(8) Place the converter drive housing assembly for CLT and CLBT models on a work bench, converter drive hub down. Using lifting bolts, remove the lockup clutch piston from the converter drive housing (fig. 5-16). Remove the snapring and

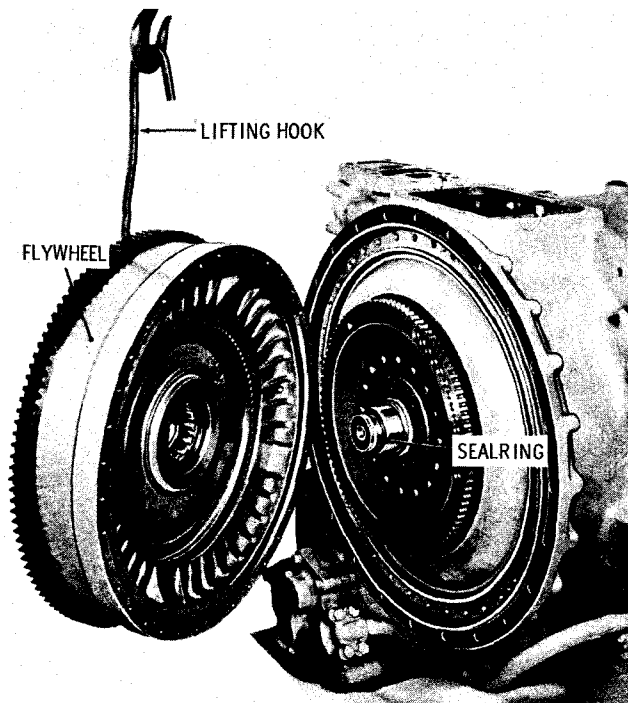


Fig. 5-18. Removing flywheel assembly

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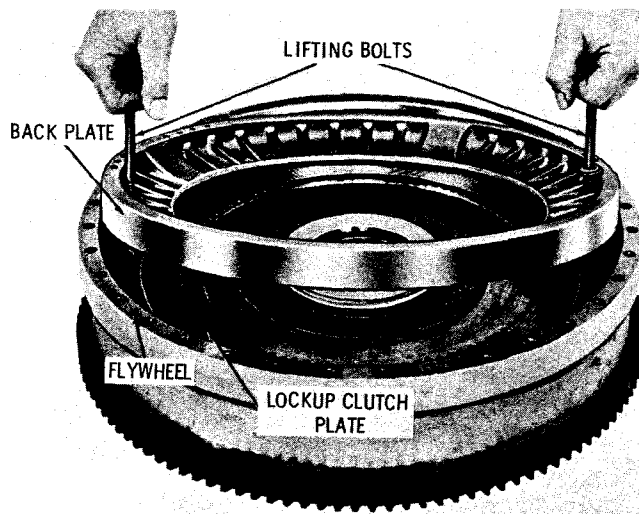


Fig. 5-19. Removing lockup clutch back plate (CLT, CLBT, VCLT, VCLBT)

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#### NOTE

CT, CBT models do not include sealring.

(11) Install two lifting bolts (fig. 5-19) into lockup clutch back plate and remove the plate from the flywheel. Remove the lockup clutch plate.

(12) Remove the lockup clutch piston return spring and lockup clutch piston, using the two

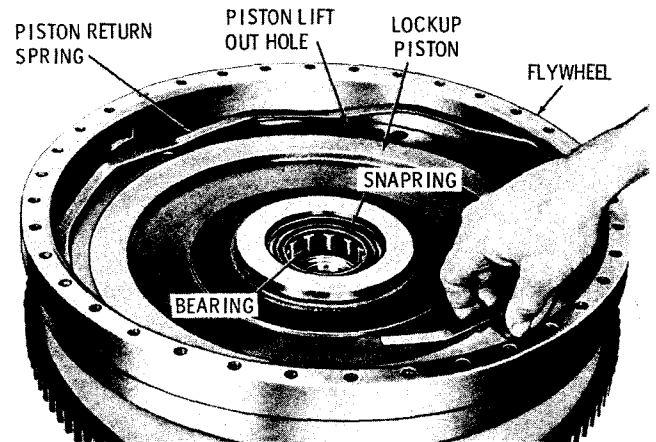


Fig. 5-20. Removing lockup clutch piston return spring (CLT, CLBT, VCLT, VCLBT)

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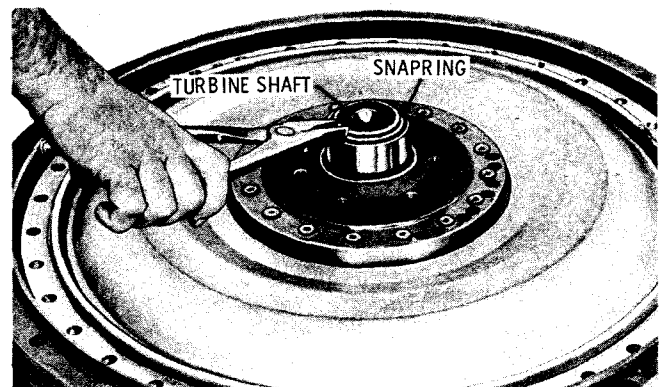


Fig. 5-21. Removing snapring from turbine shaft

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liftout holes provided (fig. 5-20). Remove the snapring and bearing from the flywheel. Remove the sealrings from the outside diameter of the piston and from the flywheel hub. Refer to paragraph 6-13 for rebuild of the flexdisk, and to paragraph 6-4 for rebuild of the flywheel.

#### NOTE

Current models do not have a spring.

#### c. Removing Torqmatic Converter Elements

(1) Using snapring pliers, remove the snapring from the turbine shaft (fig. 5-21).

(2) Using the turbine puller, remove the inner race of the front cover bearing, and the converter turbine (fig. 5-22).

#### NOTE

Some models include a spacer between the race and turbine.



## Para 5-3

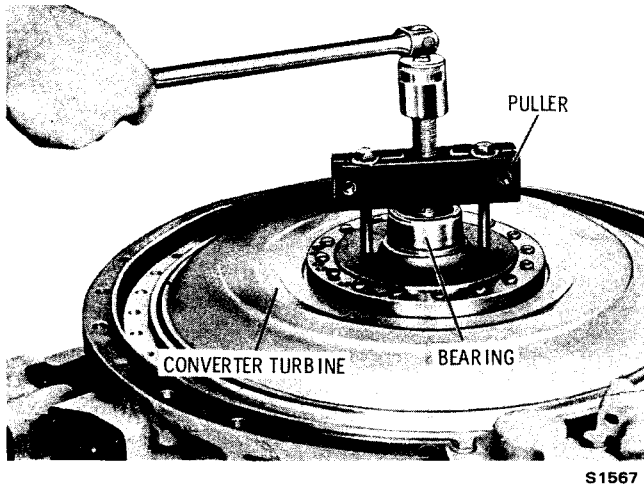


Fig. 5-22. Removing torque converter turbine

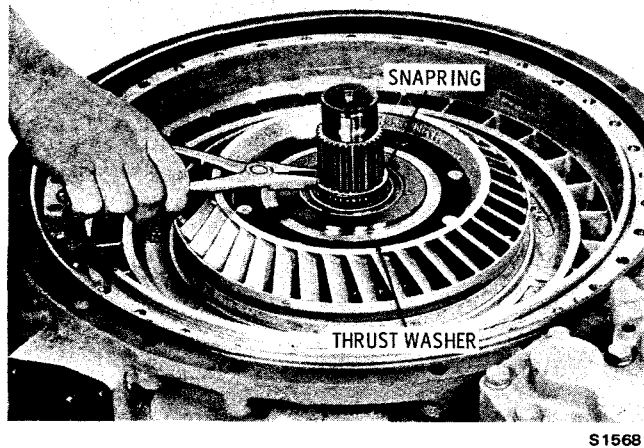


Fig. 5-23. Removing turbine shaft snapping

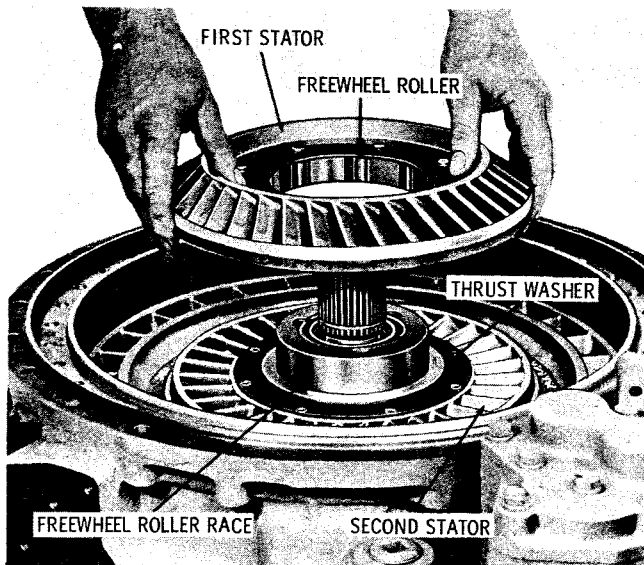


Fig. 5-24. Removing first stator from 4-element converter

(3) Using snapping pliers, remove the snapping which positions the converter turbine on the turbine shaft (fig. 5-23). Remove the bronze thrust washer.

**NOTE**

Some transmissions do not include the snapping on the turbine shaft. Those assemblies will include, instead, an internal snapping in the splined bore of the torque converter turbine.

(4) On earlier models, the 4-element converter was used. This includes converter pump 34, turbine 6 or 8 and two stators 12 and 17 (A, foldout 6). Remove the first stator from the freewheel roller race (fig. 5-24).

**CAUTION**

Do not allow stator freewheel rollers to drop out and become lost.

Remove the bronze thrust washer, and second stator. Refer to paragraph 6-15a and b for rebuild of the stator assemblies.

(5) Later models include two types of 3-element converters (fixed capacity and variable capacity). Each of these types include only one stator. To remove the stator in a fixed capacity 3-element converter, first remove the thrust washer from the stator (fig. 5-25). Remove the single-stator assembly, with its springs, rollers, cups and pins (needle rollers) (fig. 5-25). Refer to paragraph 6-15c and d for rebuild of the stator assembly.

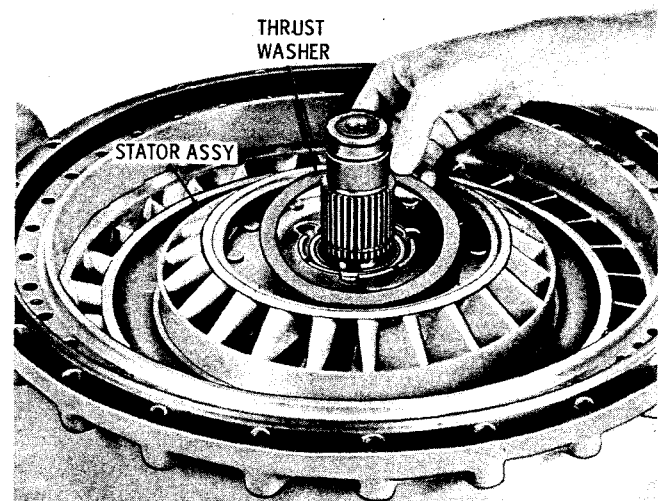


Fig. 5-25. Removing thrust washer from single-stator assembly (fixed-capacity converter)

(6) Straighten the staked section of the freewheel roller race retaining nut. Using a spanner wrench (fig. 5-26) remove the spanner nut which secures the freewheel roller race to the converter ground sleeve. Remove the roller race and stator back plate.

(7) On assemblies having a variable-capacity converter, remove the front thrust washer from the variable-capacity stator assembly (fig. 5-27).

(8) Remove the variable-capacity stator assembly with rollers and springs (fig. 5-28). Rotate

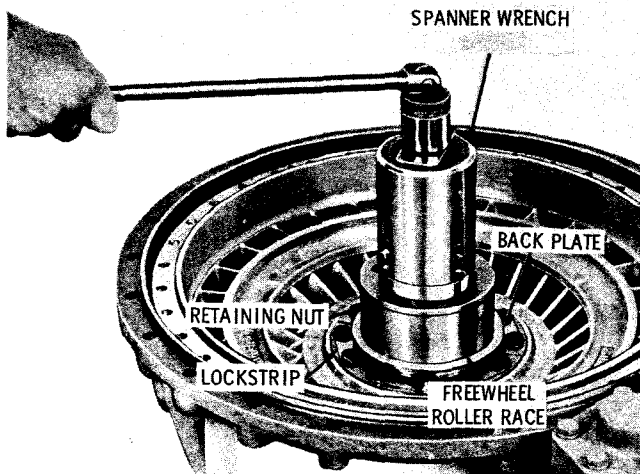
the stator clockwise slightly to free the rollers from the ground sleeve.

(9) Remove the rear thrust washer (fig. 5-29) from the retainer.

(10) Straighten the staked portion of the spanner nut. Using a spanner wrench, remove the spanner nut. Remove the stator freewheel race (fig. 5-30) and retainer.

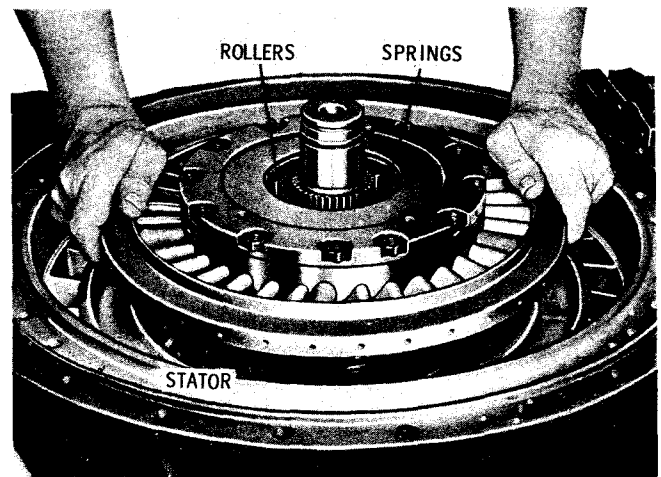
(11) Attach a lifting sling to the converter pump and remove the pump from the converter ground sleeve (fig. 5-31). Refer to paragraph 6-16 for rebuild of the pump assembly.

(12) Remove the two hook-type sealings (one step-joint Teflon sealing on later models) from the ground sleeve (fig. 5-31).



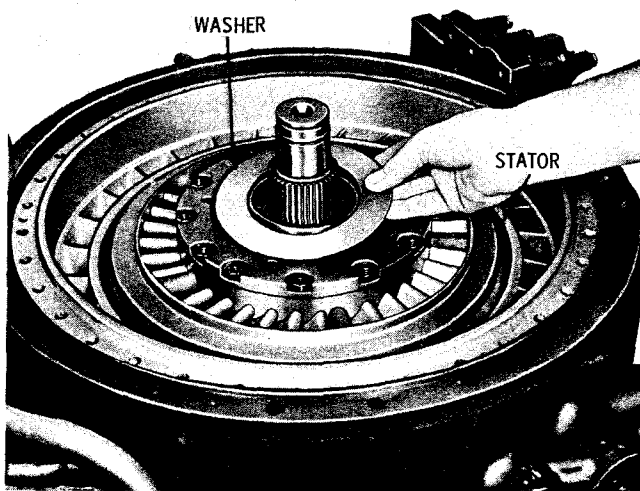
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Fig. 5-26. Removing freewheel roller race retaining nut (fixed-capacity converter)



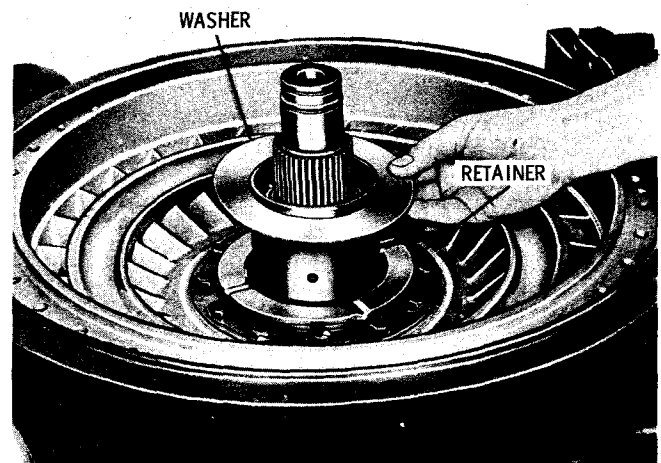
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Fig. 5-28. Removing stator assembly (variable-capacity converter)



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Fig. 5-27. Removing stator front thrust washer (variable-capacity converter)



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Fig. 5-29. Removing stator rear thrust washer (variable-capacity converter)

## Para 5-3

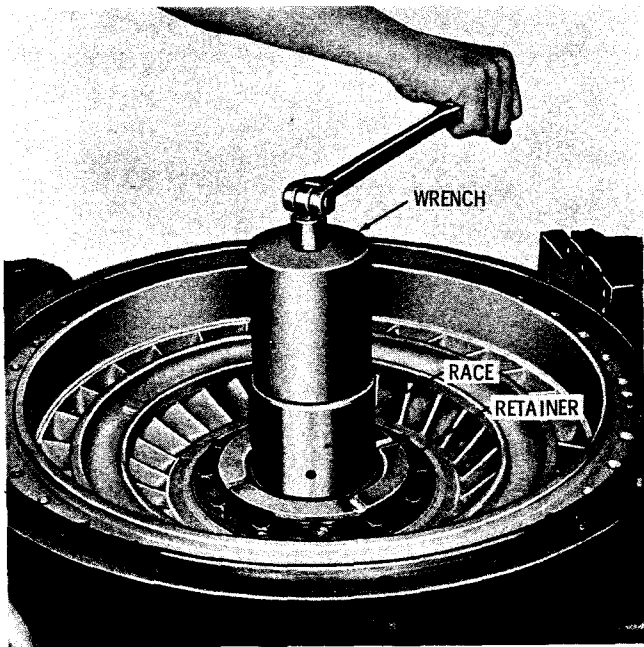


Fig. 5-30. Removing freewheel roller race spanner nut (variable-capacity converter)

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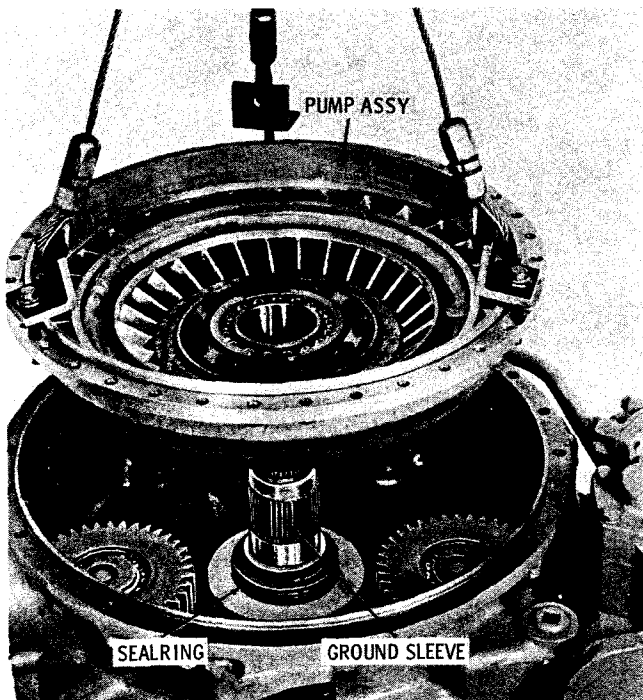


Fig. 5-31. Removing converter pump assembly

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#### d. Removing Oil Pump, PTO and Oil Pump Idler Gears, Lubrication Regulator Valve

(1) Remove six outer bolts and lockwashers from the oil pump assembly. Remove the pump assembly and gasket (fig. 5-32). Remove the

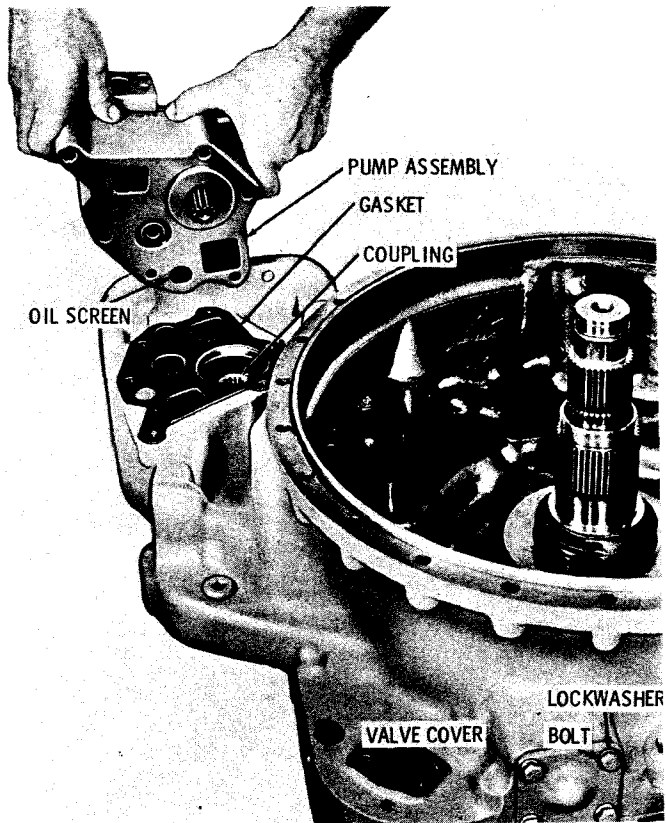


Fig. 5-32. Removing oil pump assembly

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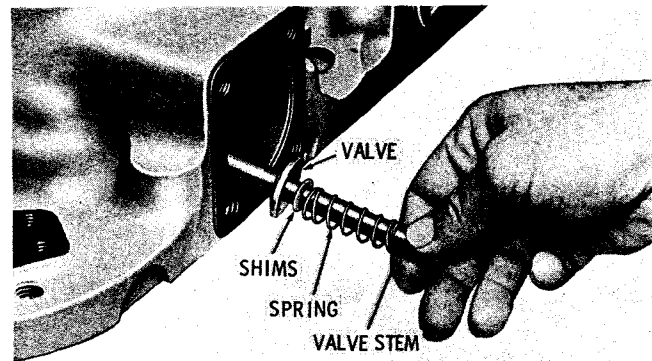


Fig. 5-33. Removing lubrication regulator valve components

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pump drive coupling. Remove the oil screen from the pump on transmission assemblies after S/N 34818 (fig. 5-32). Refer to paragraph 6-17 for rebuild of the oil pump assembly.

(2) Remove four bolts and lockwashers and the lubrication valve cover (fig. 5-32). Remove the valve stem, spring, shims and valve (CLT models only) (fig. 5-33).



(3) On models so equipped, remove the bolt and lockwasher from the power takeoff idler gear spindle (fig. 5-34). Using a slide hammer remover, remove the spindle from the converter housing (fig. 5-34). Remove the gear and bearing. Remove the snapping from the gear. Remove the oil pump idler gear and bearing in the same manner.

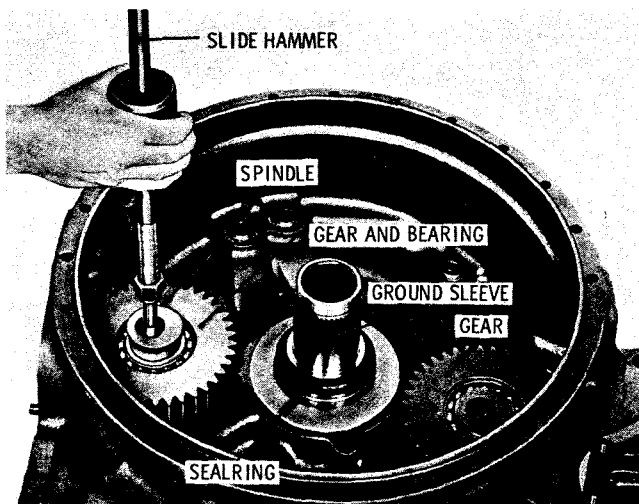
**e. Separating Converter Housing and Retarder Housing (CBT, CLBT, VCLBT models) and Removing Related Parts**

(1) Remove seven bolts and lockwashers which secure the converter housing to the re-

tarder housing. Attach a 3-strand lifting sling to the converter housing and remove it. Remove the gasket (fig. 5-35).

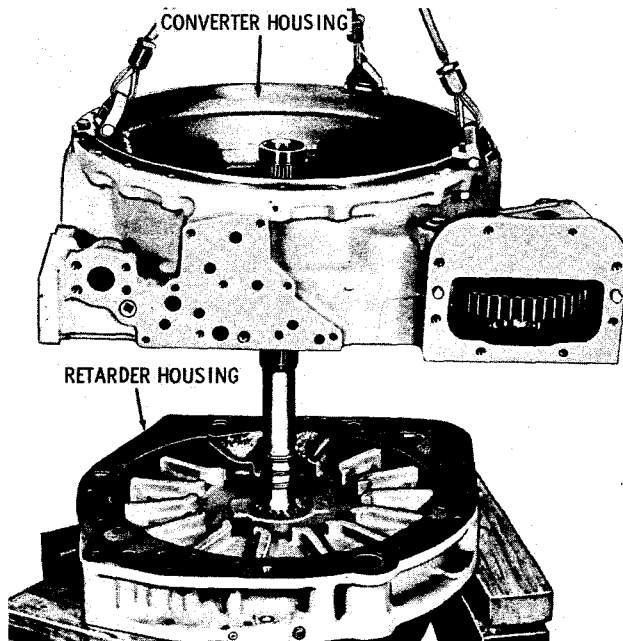
(2) Remove six bolts and lockwashers from the oil pump drive gear hub cover. Remove the cover and gasket. Remove the snapping from the converter housing (fig. 5-36).

(3) Using a hammer and a soft drift, tap on the oil pump drive gear hub and remove the hub and bearing (fig. 5-37). Press the hub from the bearing.



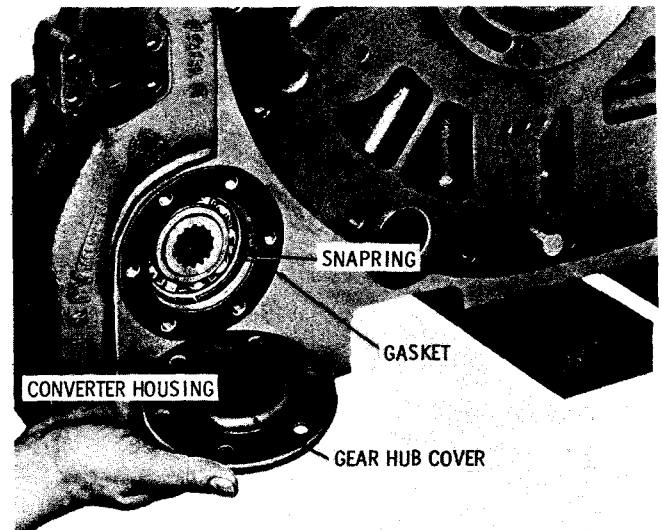
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Fig. 5-34. Removing PTO drive gear spindle



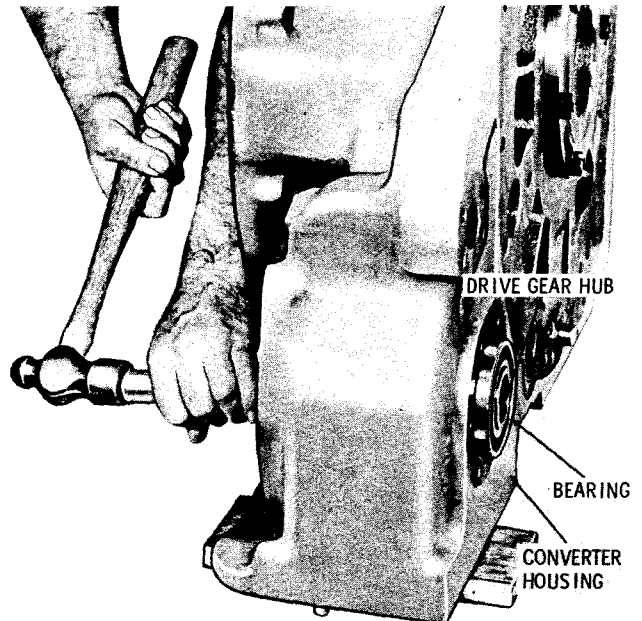
S1580

Fig. 5-35. Removing converter housing from retarder housing (CBT, CLBT, VCLBT)



S1581

Fig. 5-36. Removing pump drive gear hub cover



S1582

Fig. 5-37. Removing oil pump drive gear hub and bearing

## Para 5-3

(4) Remove the oil pump drive gear from the converter housing (fig. 5-38).

(5) Remove the oil pump drive gear spacer and bearing from the converter housing (fig. 5-39). Refer to paragraph 6-18 for rebuild of the housing.

**f. Disassembly of Retarder Housing, Turbine Shaft and Related Parts (CBT, CLBT, VCLBT).**

(1) Remove two (CBT) or three (CLBT, VCLBT) hook-type sealrings from the turbine output shaft (fig. 5-40). Using snapping pliers, remove the snapping from the turbine shaft. Remove the hydraulic retarder rotor from the turbine output shaft.

**NOTE**

On later models (effective with S/N 35993), do not remove snapping and rotor at this time. Refer to note following (7), below.

(2) On earlier models, remove the splined thrust washer from the turbine output shaft (fig. 5-41).

(3) Flatten the end of the lockstrip and remove two bolts which secure the pitot tube (fig. 5-42). The pitot tube will drop into the pitot collector ring.

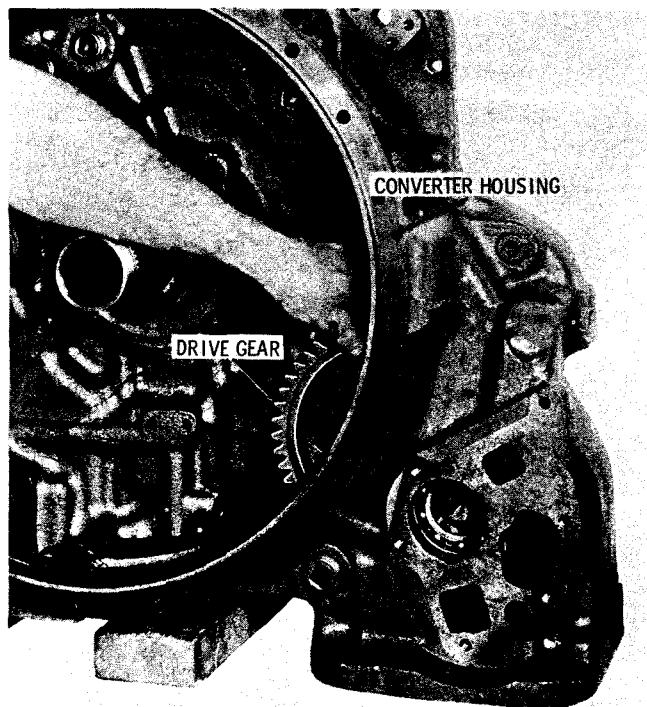


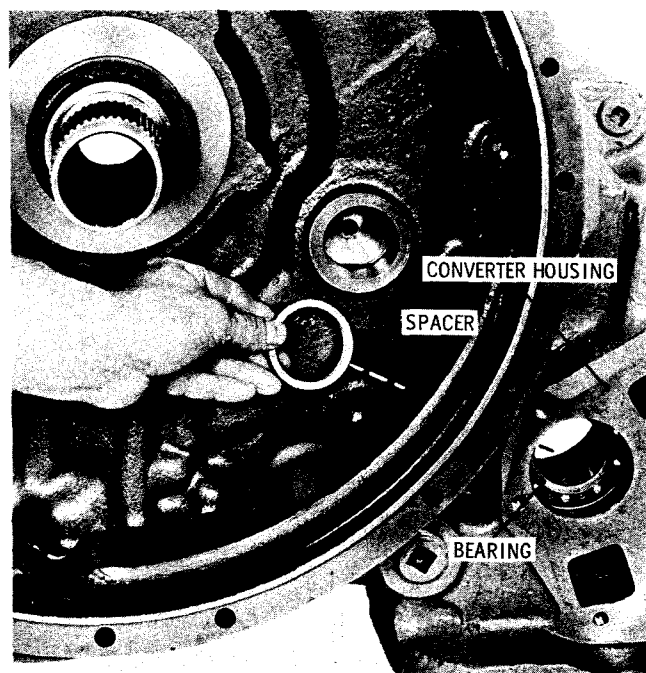
Fig. 5-38. Removing oil pump drive gear

S1583

**NOTE**

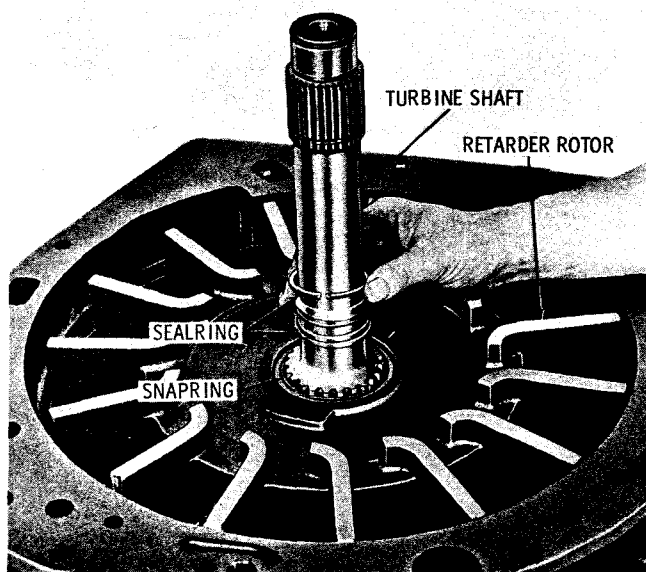
On later models, this procedure is the same except the bolts are removed through an access hole in the retarder rotor.

(4) Turn the retarder housing so that the assembly rests on the front of the turbine output



S1584

Fig. 5-39. Removing oil pump drive gear spacer



S1585

Fig. 5-40. Removing turbine shaft sealring (CBT, CLBT, VCLBT)

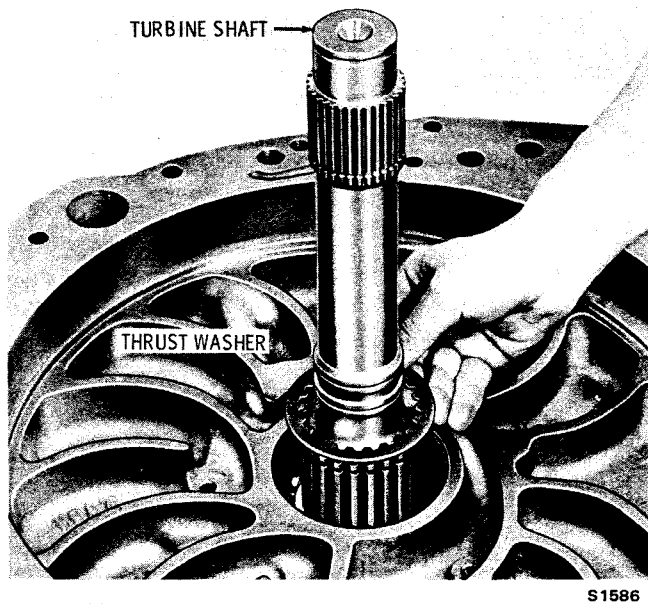


Fig. 5-41. Removing splined thrust washer (CBT, CLBT, VCLBT)

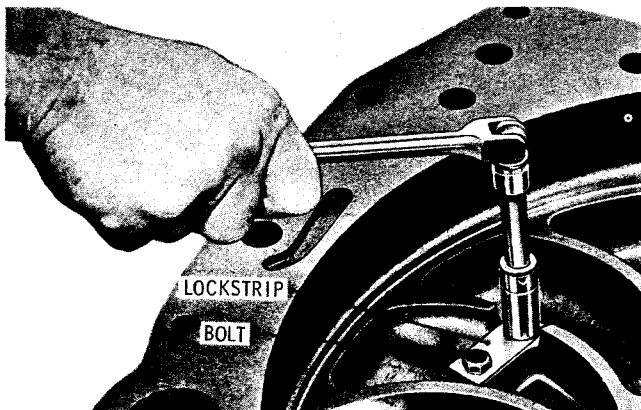


Fig. 5-42. Removing pitot tube bolts (CBT, CLBT, VCLBT)

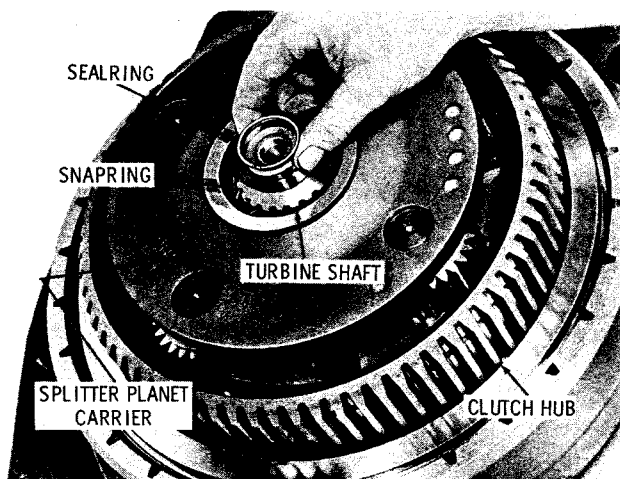


Fig. 5-43. Removing hook-type sealring from rear of turbine shaft (CBT, CLBT, VCLBT)

shaft (fig. 5-43). Remove the hook-type seal ring from the turbine output shaft. Using snapping pliers, remove the snapping. Remove, as a unit, the splitter planetary carrier assembly and low-splitter clutch hub.

(5) Support the splitter planetary carrier assembly and the high-splitter clutch hub assembly under the clutch hub. Place the pressing tool against the hub of the carrier assembly. Press the carrier out of the splitter sun gear bearing (fig. 5-44). Refer to paragraph 6-19 for rebuild of the splitter clutch hub, and to paragraph 6-20 for rebuild of the splitter planetary carrier assembly.

(6) Attach one strand of the lifting sling to the retarder housing (fig. 5-45). Support the housing in a vertical position and remove the low-splitter clutch drum assembly from the turbine output shaft. Refer to paragraph 6-22 for rebuild of the low-splitter clutch drum. Remove five bolts and lockwashers from the oil transfer hub. Remove the hub from the retarder housing.

#### NOTE

On later models (effective with S/N 35993), do not remove oil transfer hub at this time.

(7) Remove the turbine shaft, with the bearing from the housing (fig. 5-46). Slide the rotor washer off the shaft. Press the bearing toward the rear end of the shaft.

#### NOTE

On assemblies beginning with S/N 35993, turbine shaft is a press fit in the retarder rotor. Support the front of housing and

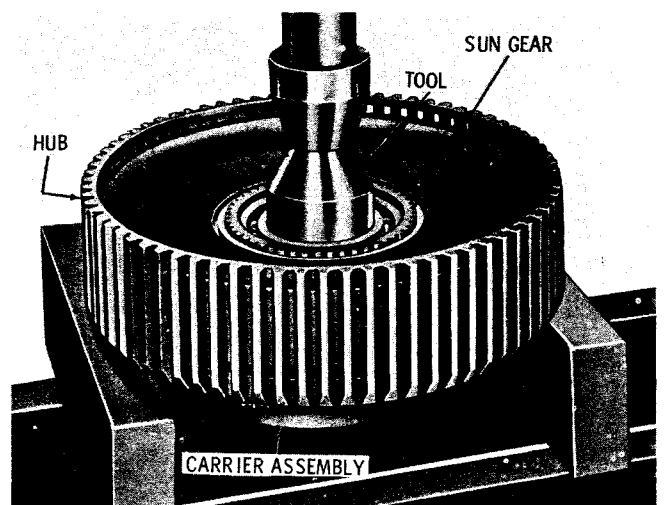


Fig. 5-44. Pressing splitter carrier assembly from splitter sun gear bearings

## Para 5-3

press the shaft and retarder rotor out of bearing. This will free the rotor and a splined washer which may be lifted out. Next, turn housing over and remove the bolts and washers, and sleeve (fig. 5-45). Remove the turbine output shaft bearing. If the retarder rotor, or shaft requires replacement, remove the snapping, support the rear of the rotor hub and press shaft out. Refer to paragraph 6-21 for rebuild of the retarder housing.

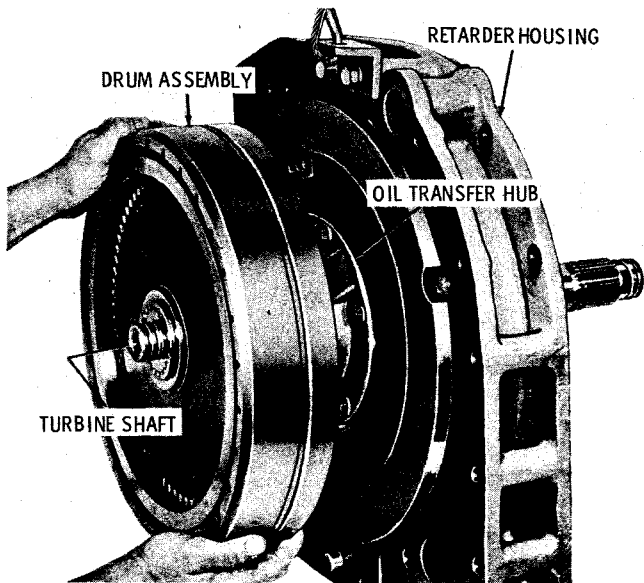


Fig. 5-45. Removing low-splitter clutch drum assembly (CBT, CLBT, VCLBT) S1590

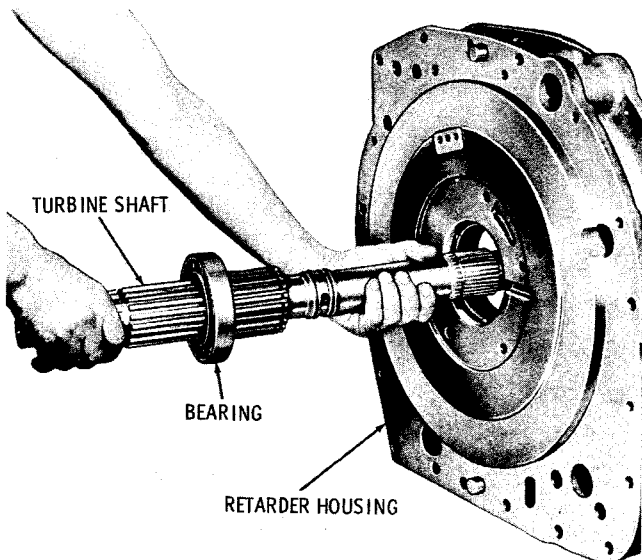


Fig. 5-46. Removing turbine shaft and bearing (CBT, CLBT, VCLBT) S1591

g. Disassembly of Converter Housing, Turbine Shaft and Related Parts (CT, CLT, VCLT)

(1) Flatten the corners of the lockstrip, and remove two bolts that retain the pitot tube assembly (at opposite side of converter housing (fig. 5-47). The pitot tube will drop into the pitot collector ring.

(2) At the rear of the converter housing, remove the hook-type sealing from the rear of the turbine shaft (fig. 5-48). Remove the snapping that retains the splitter planetary carrier assembly.

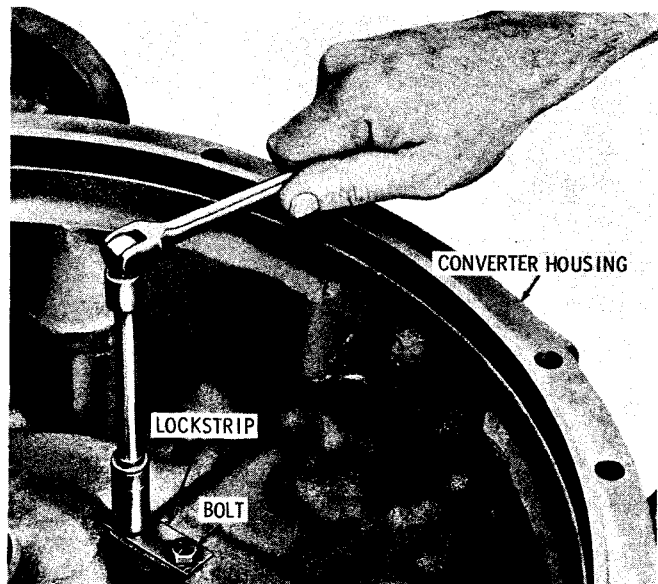


Fig. 5-47. Removing pitot tube bolts (CT, CLT, VCLT) S1592

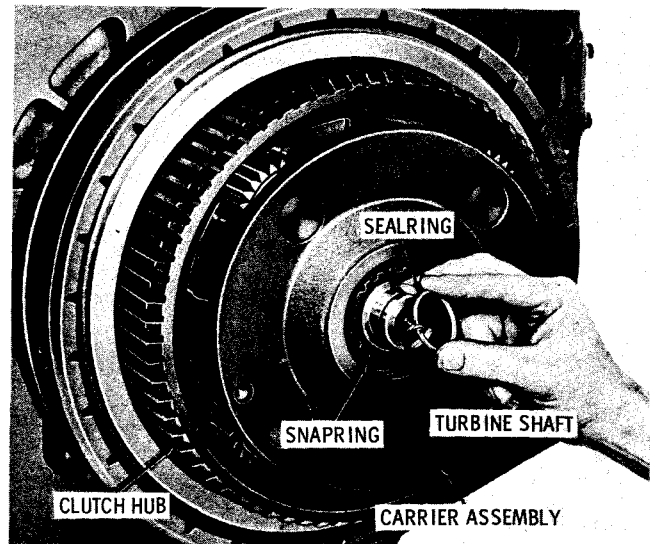


Fig. 5-48. Removing hook-type sealing from rear end of turbine shaft (CT, CLT, VCLT) S1593

(3) Remove, as a unit, the splitter planetary carrier and low-splitter clutch hub. Refer to f(5), above for separation of the carrier from the clutch hub. Refer to paragraph 6-19 for rebuild of the low-splitter clutch hub, and to paragraph 6-20 for rebuild of the splitter planetary.

(4) Remove the low-splitter clutch drum from the turbine shaft (fig. 5-49). Remove the pitot tube assembly lying loose in the collector ring. Refer to paragraph 6-22 for rebuild of the low-splitter clutch drum. Remove five bolts and lockwashers that retain the oil transfer hub. Remove the hub.

(5) Remove the turbine shaft (fig. 5-50). Remove the hook-type sealrings and bearing from

the shaft. The bearing must be pressed toward the rear of the shaft to remove it. Refer to paragraph 6-18 for rebuild of the converter housing.

#### h. Removal of Transmission Output Components.

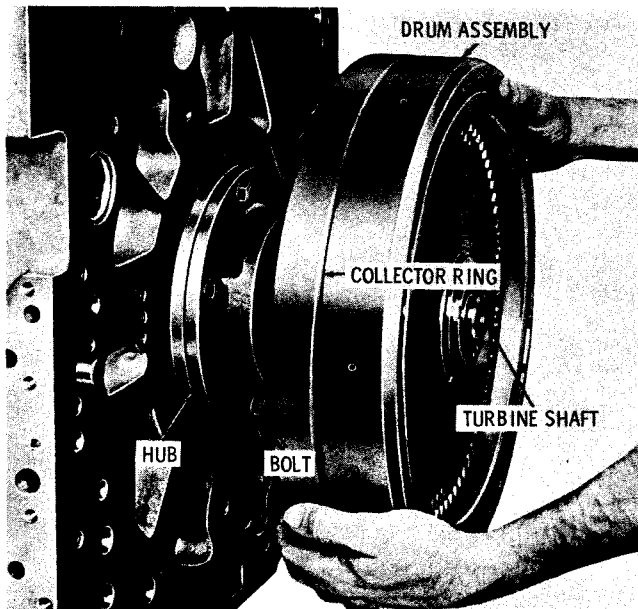
(1) Using snapping pliers, remove the snapping which retains the splitter ring gear hub to the splitter output shaft (fig. 5-51).

#### NOTE

For transmissions with a horizontal transfer gear case at the rear, refer to paragraph 5-4b(1), below. For transmissions with a vertical transfer gear case, refer to paragraph 5-4b(2), below.

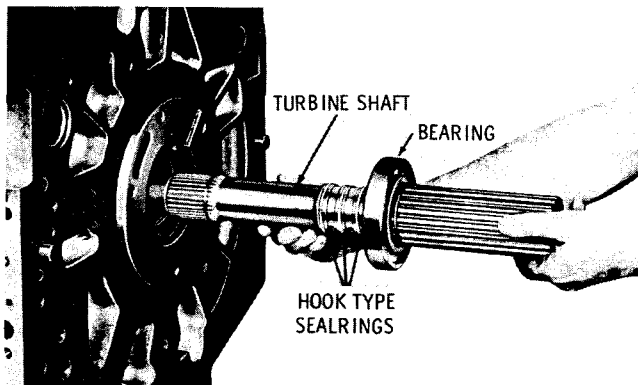
(2) Remove the parking brake drum from the output flange studs (fig. 5-52). Some transmissions have the brake drum bolted to the output flange. Remove eight bolts and lockwashers; then the drum.

(3) Using a 3 1/8-inch socket wrench, remove the nut that retains the output flange (fig. 5-53). The output flange is retained by two bolts 71 (A, foldout 17), lockstrip 70, retainer washer 69 on some models. Remove shims 74, if used. On models using coupling 12 (B, foldout 17), remove bolts 15, lockstrip 14, washer 13 and shims 16.



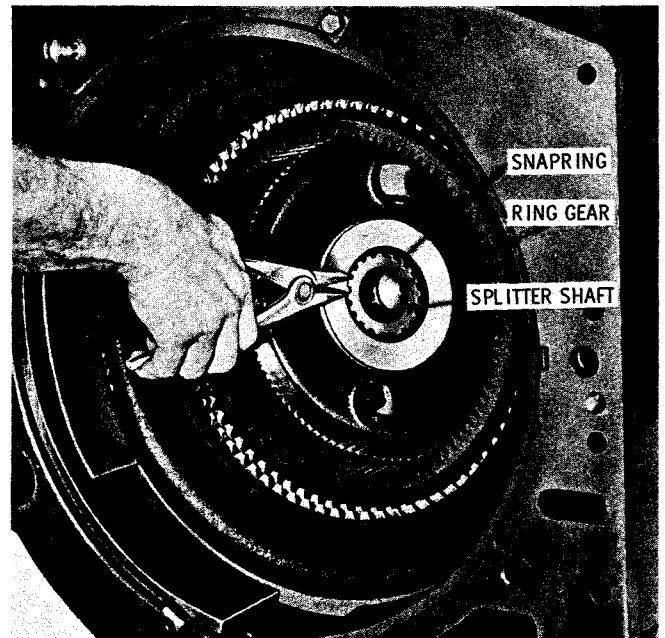
S1594

Fig. 5-49. Removing high-splitter clutch drum assembly (CT, CLT, VCLT)



S1595

Fig. 5-50. Removing turbine shaft and bearing (CT, CLT, VCLT)



S1596

Fig. 5-51. Removing splitter ring gear hub snapping

## Para 5-3

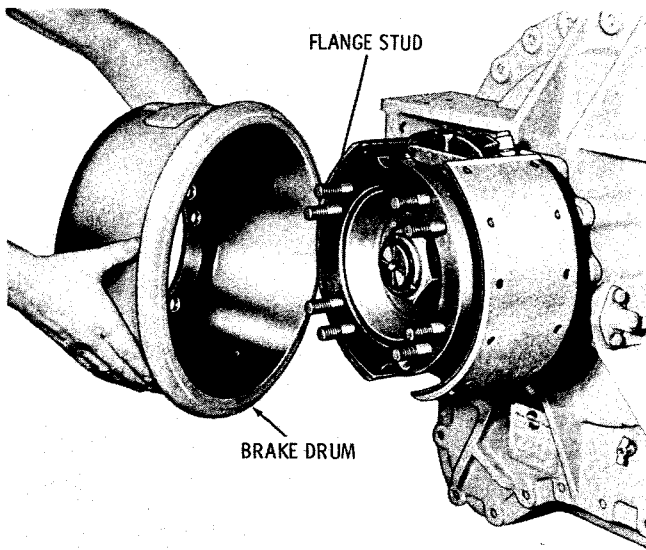


Fig. 5-52. Removing parking brake drum

S1597

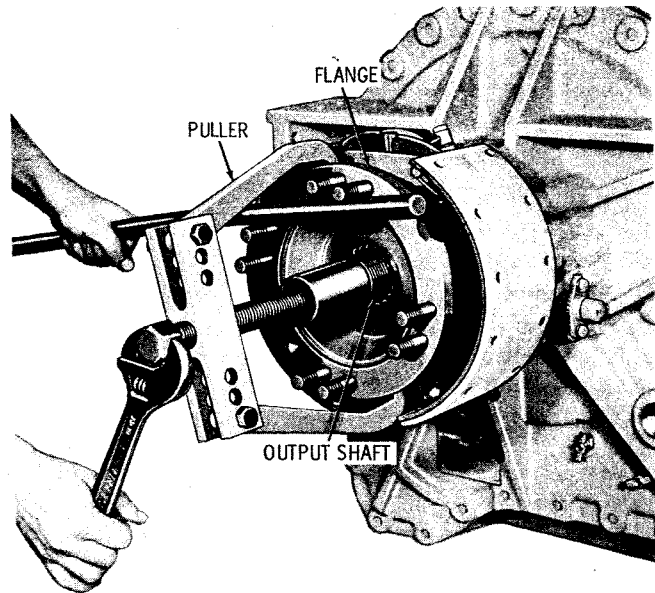


Fig. 5-54. Removing output flange

S1599

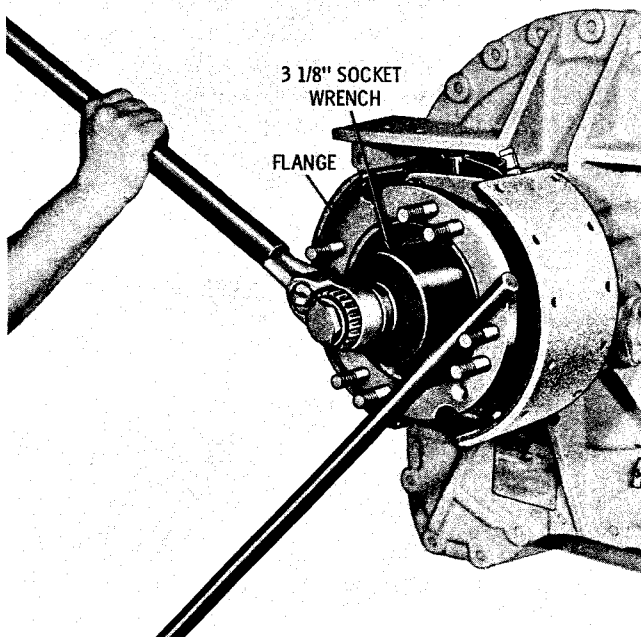


Fig. 5-53. Removing output flange nut

S1598

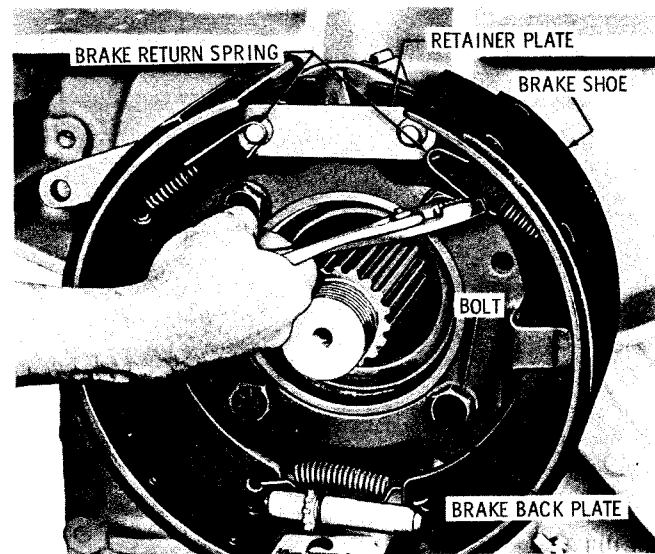


Fig. 5-55. Removing parking brake shoe return spring

S1600

(4) Using a puller, remove the output flange or coupling 12 (B, foldout 17) from the transmission output shaft (fig. 5-54). If the flange is a tight fit, refer to paragraph 4-8.

(5) Using pliers, remove two brake shoe return springs (fig. 5-55). Remove the brake re-

tainer plate and shoes. Remove four bolts, four nuts, and eight flat washers. Remove the brake back plate assembly.

(6) Attach the 2-strand lifting sling to the output drive housing and lower the transmission onto wood blocks (fig. 5-56).

(7) Remove two bolts and lockwashers from the speedometer drive sleeve. Remove the sleeve and speedometer drive shaft assembly (fig. 5-57). Remove the gasket. If the transmission is equipped with an automatic-electric shift control



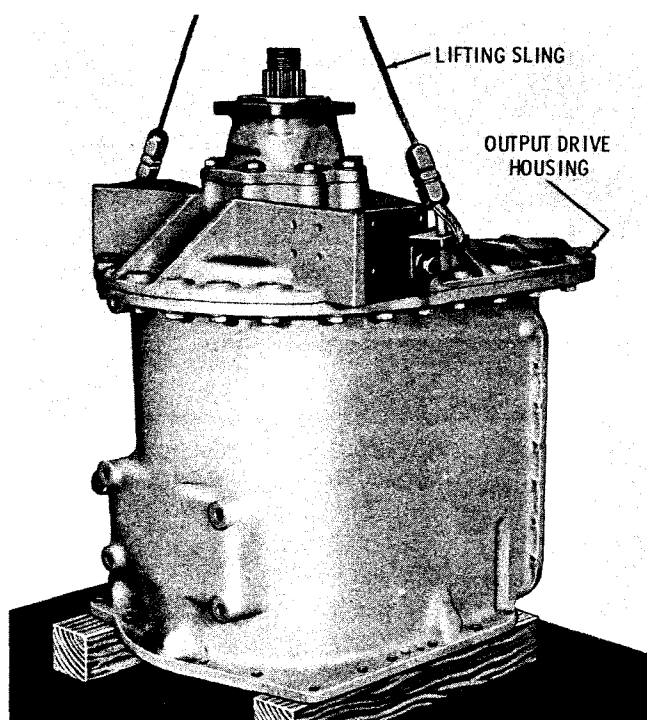


Fig. 5-56. Positioning transmission for removal of rear components

S1601

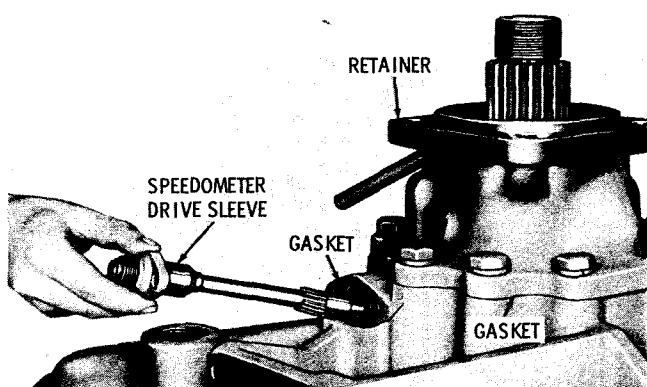


Fig. 5-57. Removing speedometer drive sleeve and shaft

S1602

system, remove magnetic pickup assembly 79 (B, foldout 17) from the rear bearing retainer. Remove eight bolts and lockwashers from the rear bearing retainer. Remove the retainer and gasket. Refer to paragraph 6-23 for rebuild of the retainer assembly.

#### NOTE

On some assemblies, the speedometer drive components are in the bearing retainer. Also, some other models include neither a bearing retainer nor speedometer drive.

(8) Using a bearing puller (fig. 5-88), remove the bearing from the output shaft. Remove the spacer. If the transmission is equipped with an

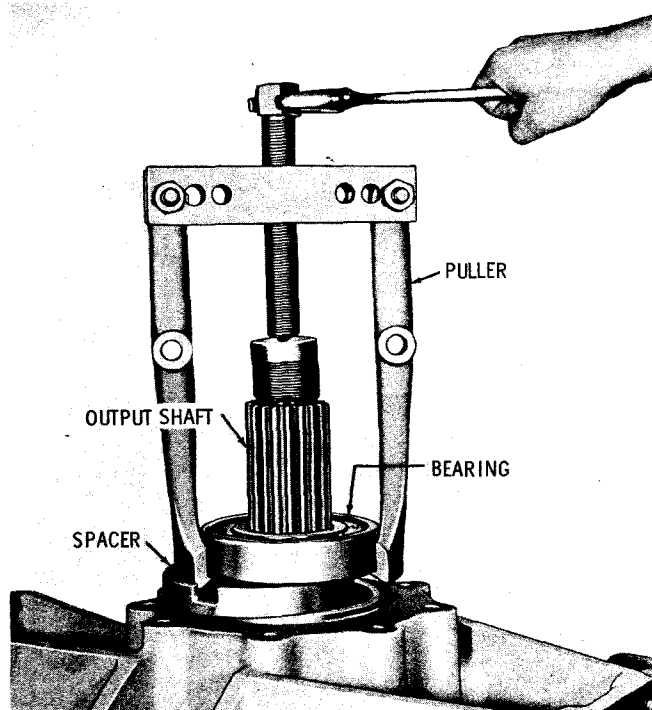


Fig. 5-58. Removing bearing from output shaft

S1603

automatic-electric shift control system, remove drive gear assembly 75 (A, foldout 17).

#### NOTE

On some models, remove only speedometer drive gear 44 (A, foldout 17). Bearing 43 will remain on the output shaft.

(9) Remove the speedometer drive gear (fig. 5-59) and roll pin from the transmission output shaft. The pin is no longer required and may be discarded. (Later models are equipped with drive gear assembly 75 (A, foldout 17).

(10) Remove both upper oil jumper tubes (fig. 5-60) by installing a bolt into the tube and catching the threads on the end of the tube. Be sure that the hoses are removed with the tubes.

(11) Remove 27 bolts and lockwashers which secure the output drive housing assembly to the transmission housing (fig. 5-61). Using a lifting sling, remove the drive housing assembly (with the output pump, if used) from the transmission. Remove the gasket. If necessary, tap the end of the output shaft, as the housing is raised, to free the rear bearing from the shaft. If the reverse-range planetary carrier starts to raise with the cover, pry the ring gear away from the housing. Remove the reverse-range clutch piston return springs from the transmission. Refer to paragraph 6-24 for rebuild of the output drive housing.

## Para 5-3

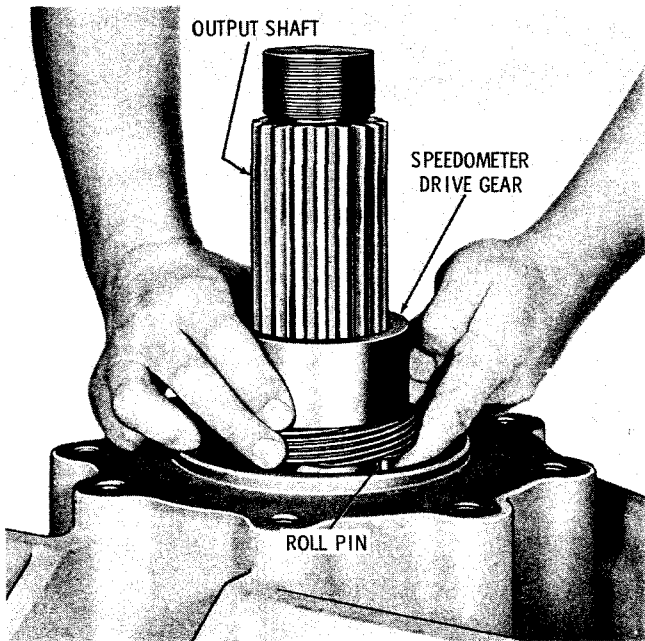


Fig. 5-59. Removing speedometer drive gear

S1604

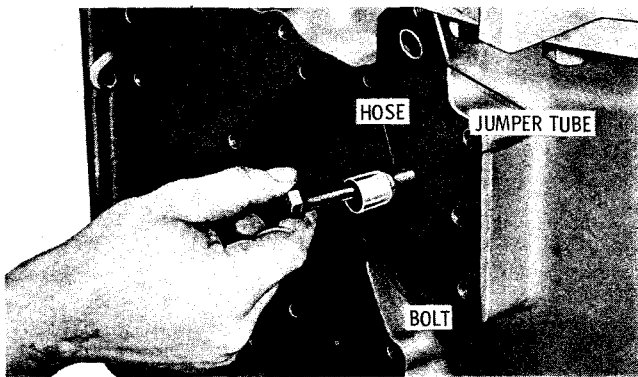


Fig. 5-60. Removing jumper tubes

S1605

**NOTE**

On models which did not have the rear bearing removed in figure 5-58, remove the bearing and a spacer beneath it. Also, on models which include an output oil pump, the oil pump assembly should be removed after removing the snapping which retains it. Refer to paragraph 6-17 c and d for rebuild of the output pump.

**i. Removal of Range Planetaries, Clutches and Related Parts from Transmission Housing Output End.**

(1) Grasp the reverse-range planetary carrier bearing and remove the bearing and the

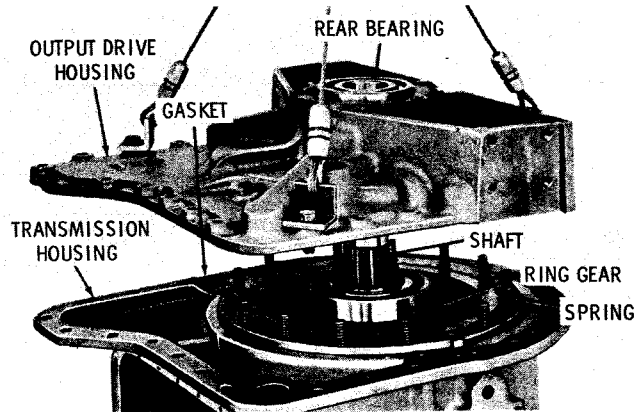


Fig. 5-61. Removing output drive housing from transmission housing

S1606

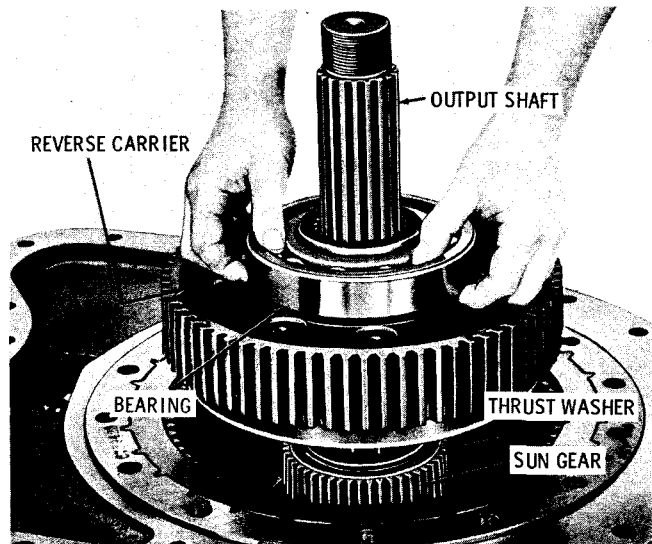


Fig. 5-62. Removing reverse-range planetary carrier and bearing

S1607

reverse-range planetary carrier, as a unit, from the output shaft (fig. 5-62). Remove the bronze thrust washer from the reverse-range sun gear. Refer to paragraph 6-26 for rebuild of the reverse-range planetary carrier assembly. The washer may come out with carrier. Remove it.

(2) Remove five external- and five internal-splined, reverse-range clutch plates from the reverse-range clutch anchor (fig. 5-63). Remove the reverse-range clutch anchor. Remove two keys from the transmission housing and place them in a marked container.

(3) Remove the reverse-range sun gear from the hub of the low-range planetary carrier (fig. 5-64). Remove the bronze thrust washer.



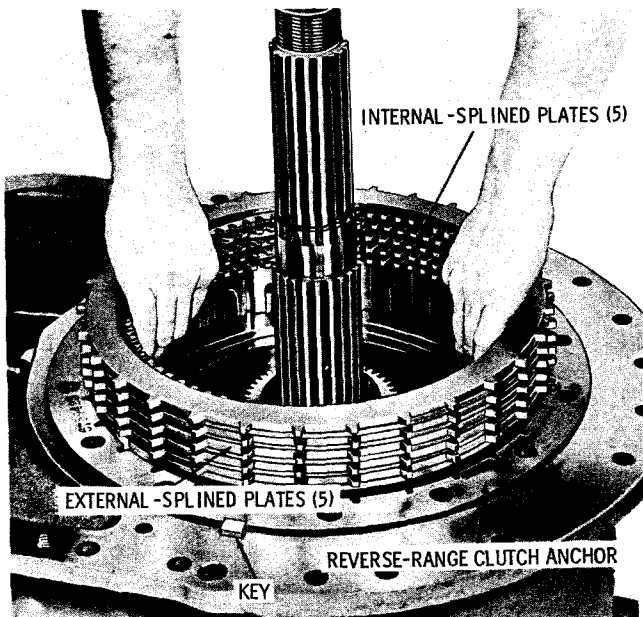


Fig. 5-63. Removing reverse-range clutch plates

S1608

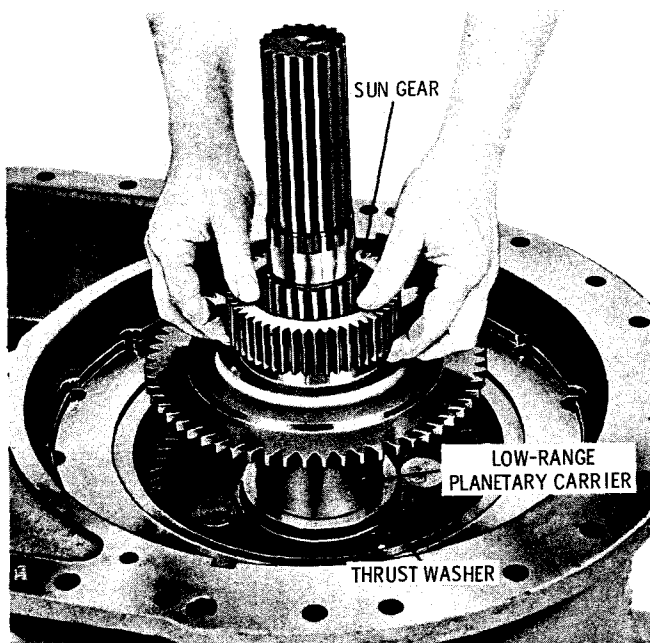


Fig. 5-64. Removing reverse-range sun gear

S1609

(4) Remove the low-range planetary carrier assembly and transmission output shaft, as a unit, from the transmission (fig. 5-65). Remove the output shaft from the carrier assembly. Refer to paragraph 6-27 for rebuild of the carrier assembly.

(5) Flatten the ends of each of the four lockstrips (fig. 5-66). Remove eight self-locking

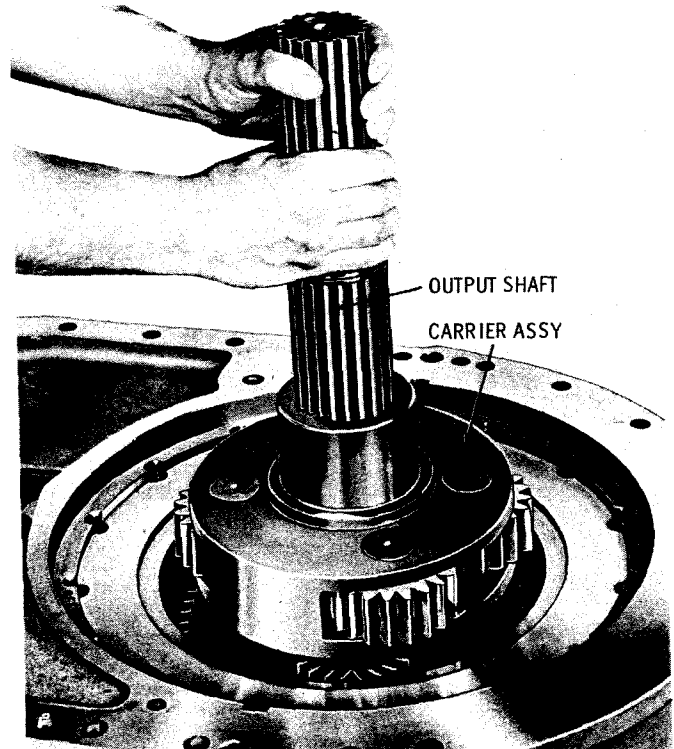


Fig. 5-65. Removing output shaft and low-range planetary carrier assembly

S1610

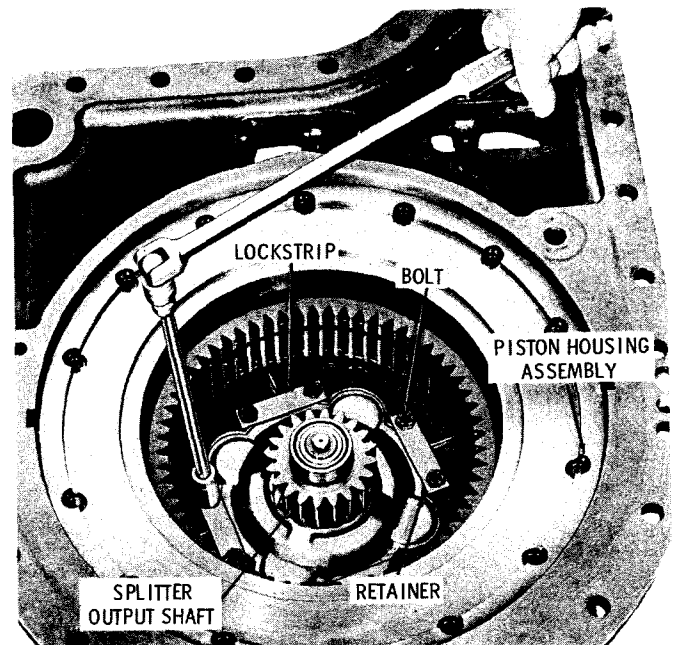


Fig. 5-66. Removing splitter output shaft retainer bolts

S1611

bolts, four lockstrips and four retainers. Remove the low-range clutch piston and piston housing assembly. Refer to paragraph 6-25 for rebuild of the piston assembly.

## Para 5-3

(6) Remove 14 low-range clutch piston return springs (approximately 3.2 inches long) (fig. 5-67). Remove the low-range ring gear. Remove the eight low-range clutch plates. Remove the low-range clutch anchor.

(7) Remove the intermediate-range clutch piston and piston housing assembly (fig. 5-68) and two anchor keys. Refer to paragraph 6-25 for rebuild of the piston. Remove 14 intermediate-range piston return springs. Remove the intermediate-range clutch anchor.

(8) Remove six intermediate-range clutch plates (fig. 5-69).

(9) Remove the intermediate-range ring gear (fig. 5-70).

(10) Remove as a unit, two splitter shaft bearings, oil collector ring and splitter shaft (fig. 5-71). Remove the sealing from the carrier. Remove intermediate-range carrier assembly. Remove the bearings and oil collector ring from the shaft. If the splitter shaft does not readily lift out of the carrier assembly, remove the carrier assembly with the shaft. Then remove the shaft as shown in figure 5-72, below. Refer to paragraph 6-28 for rebuild of the splitter output shaft, and to paragraph 6-29 for rebuild of the intermediate-range carrier assembly.

(11) Remove the intermediate-range sun gear (fig. 5-73). Remove the intermediate-range clutch back plate.

(12) Remove the large internal snapping from the high-range clutch drum. Remove the high-range clutch back plate (fig. 5-74) and five clutch plates from the clutch drum.

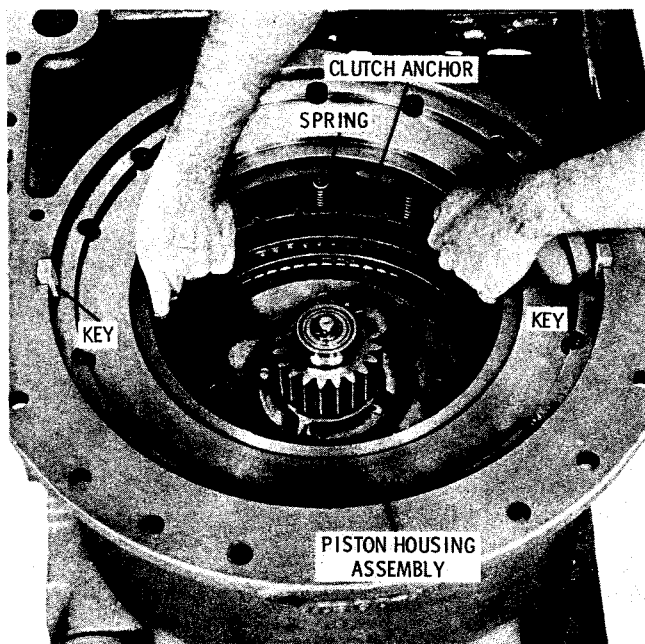


Fig. 5-68. Removing intermediate-range clutch piston housing and piston S1613

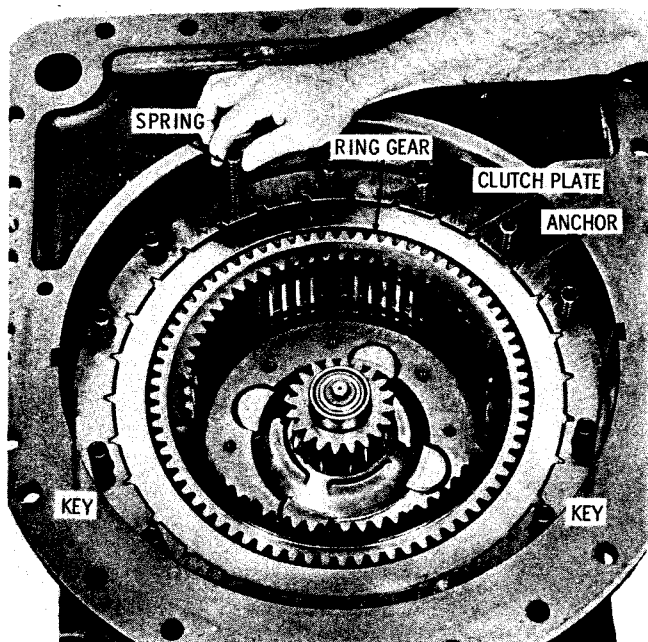


Fig. 5-67. Removing low-range clutch piston return springs S1612

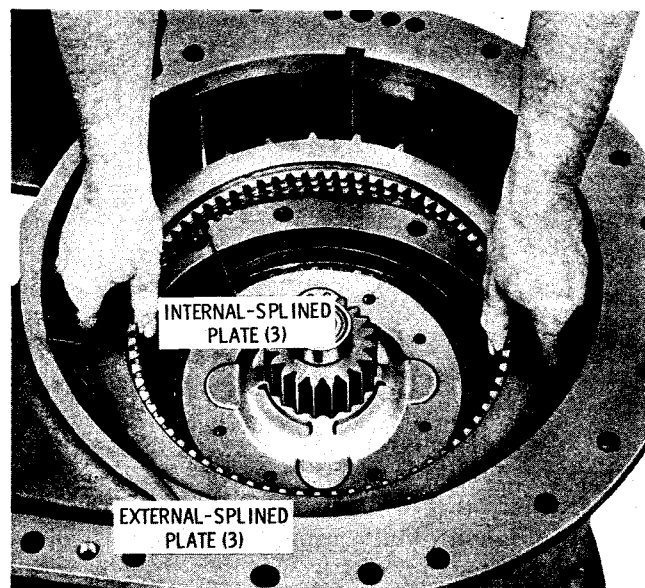


Fig. 5-69. Removing intermediate-range clutch plates S1614

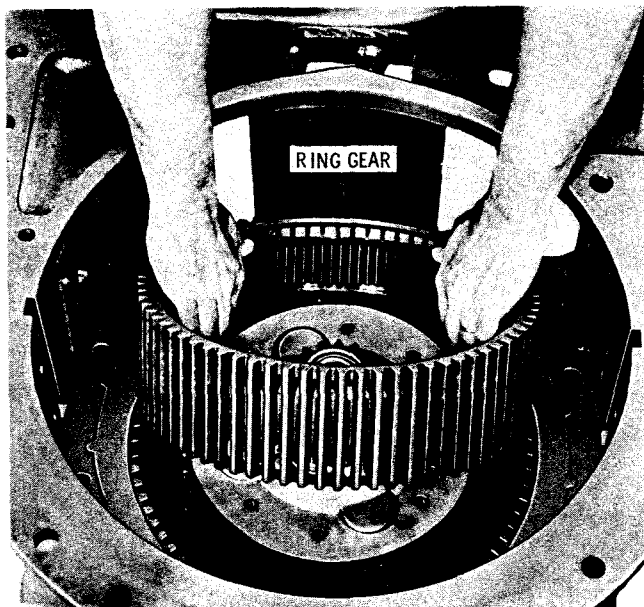


Fig. 5-70. Removing intermediate-range ring gear

S1615

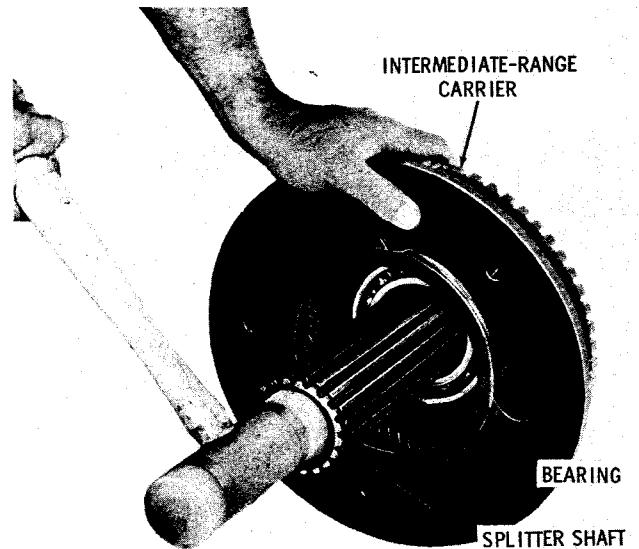


Fig. 5-72. Removing splitter output shaft assembly from intermediate-range carrier

S1617

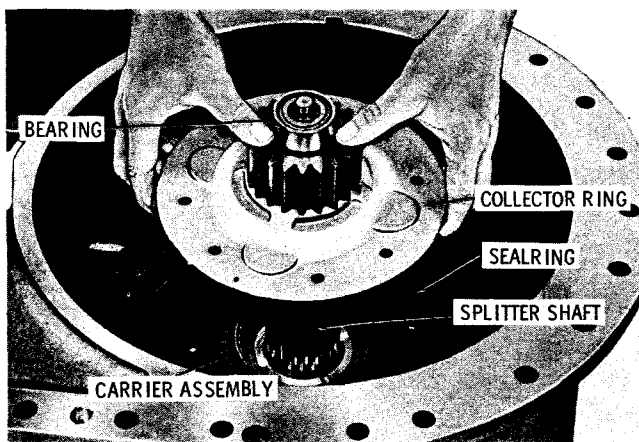


Fig. 5-71. Removing splitter output shaft assembly

S1616



Fig. 5-73. Removing intermediate-range sun gear

S1618

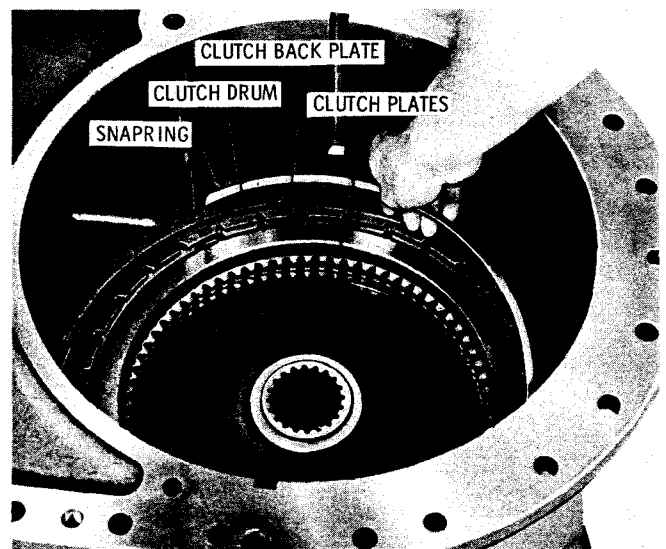


Fig. 5-74. Removing high-range clutch back plate snapping

S1619

(13) Re-install the high-range clutch back plate (fig. 5-75) and snapping into the high-range clutch drum. Lift out the drum and related parts by shouldering the back plate against the snapping. Remove the snapping and back plate. Refer to paragraph 6-30 for rebuild of the high-range clutch drum assembly.

(14) Remove two clutch anchor keys from the transmission housing key guides (fig. 5-76). Remove the compression ring from the transmission housing.

## Para 5-3

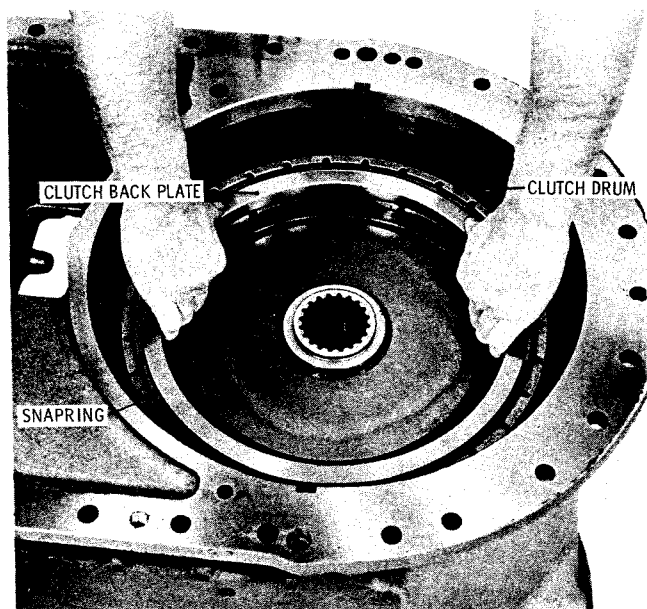


Fig. 5-75. Removing high-range clutch drum assembly

S1620

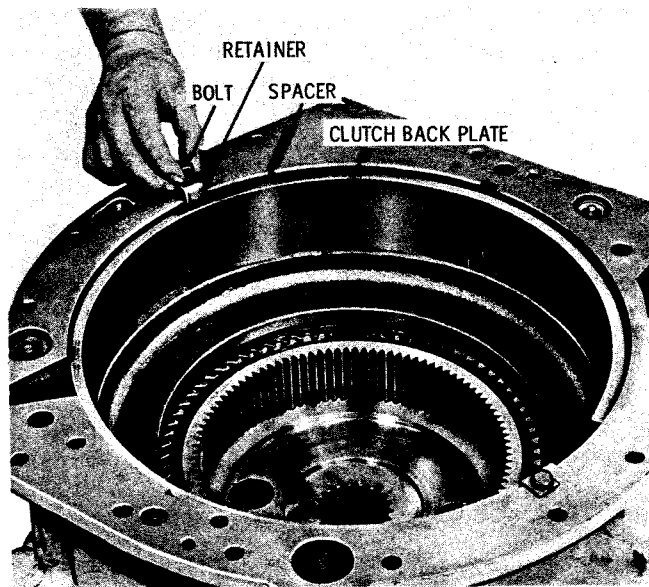


Fig. 5-77. Removing high-splitter clutch back plate spacer retainers

S1622

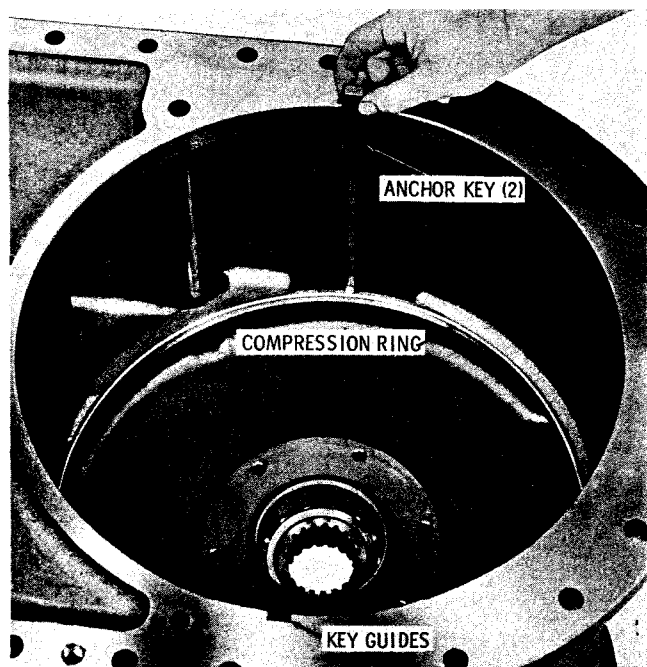


Fig. 5-76. Removing clutch anchor keys

S1621

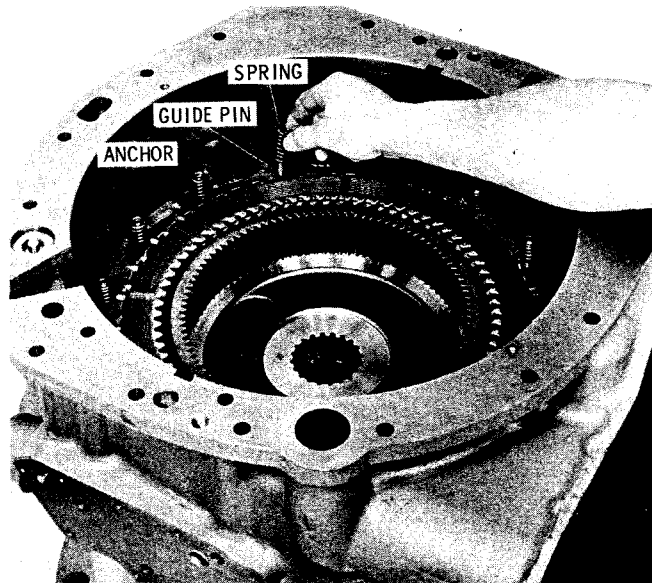


Fig. 5-78. Removing high-splitter clutch piston return springs

S1623

#### j. Removal of Splitter Clutch and Related Parts

(1) Turn the transmission housing assembly over, front end up, and rest it on wood blocks. Remove two bolts and retainers that secure the high-splitter clutch back plate spacer (fig. 5-77). Remove the spacer and high-splitter clutch back plate.

(2) Remove 14 high-splitter clutch piston return springs (fig. 5-78) from the high-splitter clutch anchor.

(3) Remove the high-splitter clutch anchor (fig. 5-79) from the housing.

(4) Remove four high-splitter clutch plates (fig. 5-79).

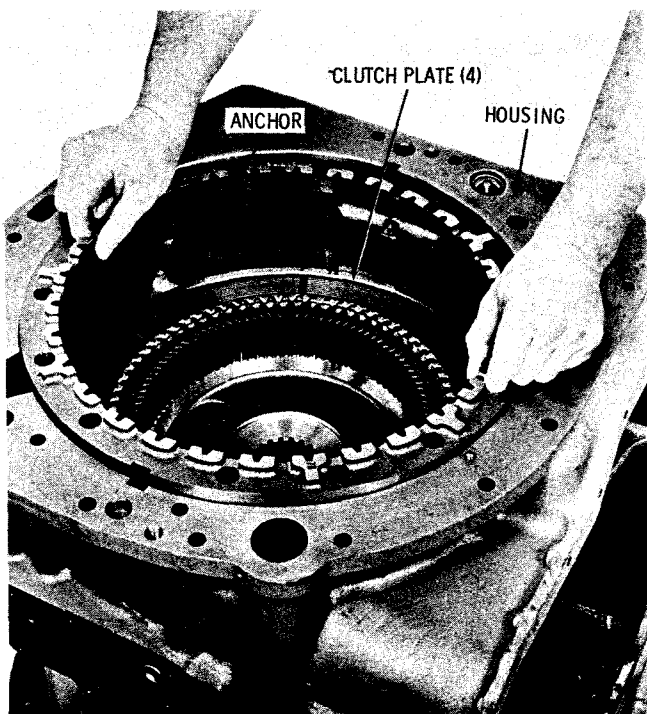


Fig. 5-79. Removing high-splitter clutch anchor

(5) Through access holes provided in the splitter ring gear hub, remove six bolts and lockwashers that secure the ring gear hub bearing retainer to the transmission housing (fig. 5-80).

(6) Remove, as a unit, the splitter ring gear, hub, bearing, and bearing retainer (fig. 5-81). Refer to paragraph 6-31 for rebuild of the splitter ring gear and hub assembly.

(7) Using a bolt, remove the splitter overdrive oil jumper tube and hose (fig. 5-82). Remove two clutch anchor keys. Remove, as a unit, the high-splitter clutch piston and housing. Refer to paragraph 6-32 for rebuild of the piston and housing assembly, and to paragraph 6-33 for rebuild of the transmission housing assembly.

#### 5-4. TRANSMISSION DISASSEMBLY (ALL MODELS WITH TRANSFER GEARS)

a. **Dropbox Model Differences.** This transmission is the same as the basic transmission (para 5-3, above) except that it has a transfer gear output (dropbox) instead of a straight-through type output. Follow the procedures as outlined in b, below, for the disassembly of this model transmission. Various options and features within the dropbox models are indicated by notes in the following disassembly.

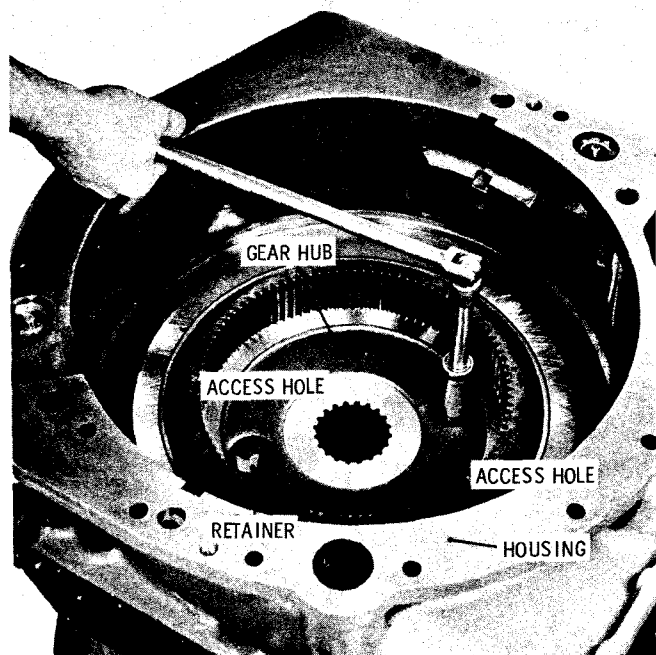


Fig. 5-80. Removing splitter ring gear hub bearing retainer bolts

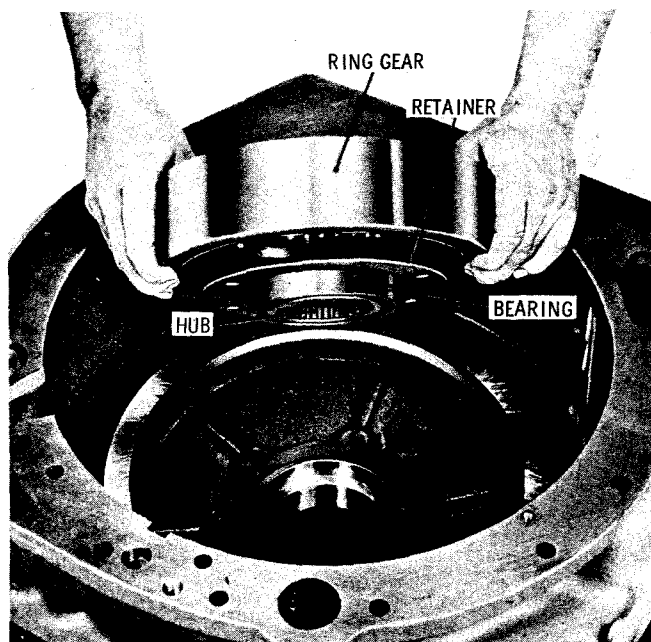


Fig. 5-81. Removing splitter ring gear and attached parts

#### b. Disassembly Procedures

(1) For transmissions with the horizontal transfer gear housing, follow the procedures outlined in paragraph 5-2, and in paragraph 5-3a(1) through 5-3h (1), above. Then continue with (4), through (16), below.



## Para 5-4

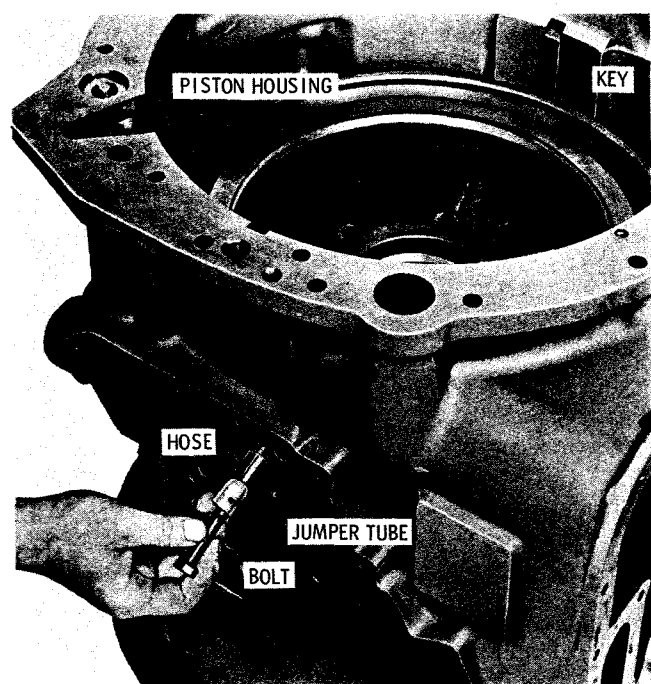


Fig. 5-82. Removing high-splitter clutch jumper tube and hose

S1627

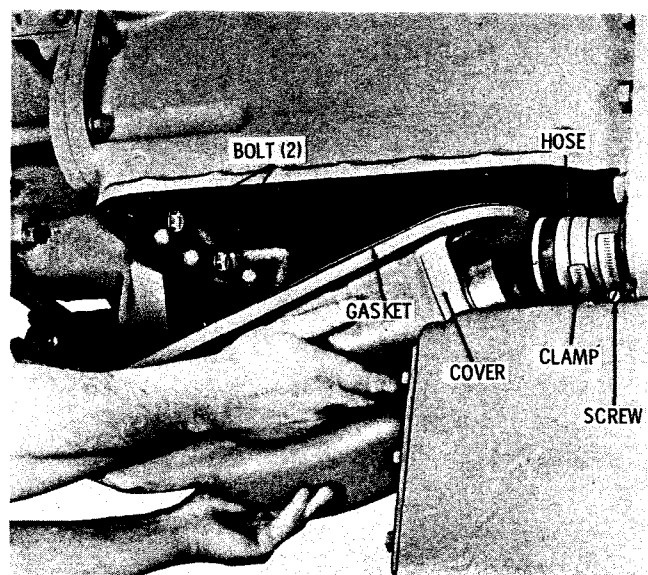
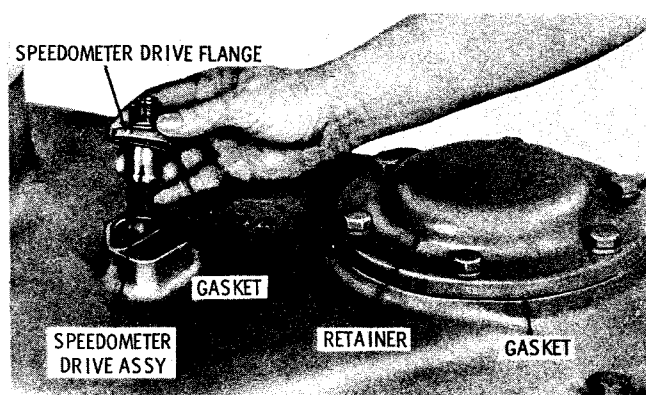


Fig. 5-83. Removing transmission oil drain cover

S1628

(2) For transmissions with the vertical transfer gear housing, follow the procedures in paragraph 5-2, and in paragraph 5-3a(1) through 5-3h(1), omitting 5-3a(11) and (12). Then continue with (3) through (16), below.

(3) Loosen the screw that retains one oil drain hose clamp (fig. 5-83). Remove 28 bolts and lockwashers that secure the oil drain cover to



S1629

Fig. 5-84. Removing speedometer drive assembly

the transmission housing. Remove the cover and gasket. Remove two hidden bolts from the forward splitline of the transmission housing. Loosen the remaining hose clamp screw and remove the hose.

(4) Position the transmission to rest on its front end. Remove two bolts and lockwashers from the speedometer drive flange (fig. 5-84). Remove the speedometer drive assembly and gasket. Remove six bolts and lockwashers from the driven gear bearing retainer. Remove the retainer and gasket. If the transmission is equipped with an automatic-electric control system, remove magnetic pickup shield 55 (B, foldout 18), and magnetic pickup 63 (A, foldout 18).

**NOTE**

Some assemblies do not include a speedometer drive. Some do not include the driven gear bearing retainer.

(5) Remove the parking brake drum (fig. 5-52) from the transmission output flange. Flatten the ends of the lockstrip.

(6) Remove two bolts (fig. 5-85), lockstrip, retainer washer and shims.

(7) Using a suitable puller (fig. 5-86), remove the transmission output flange. If the flange is a tight fit, refer to paragraph 4-8a.

(8) Remove the parking brake assembly (fig. 5-55). Remove the rear bearing retainer. Refer to paragraph 6-34 for rebuild of the bearing retainers.

(9) Remove gasket and spacer (fig. 5-87).

(10) Remove 26 (or 24 if automatic-electric) bolts and lockwashers from the transfer gear housing cover (fig. 5-88). Using a lifting sling, remove the cover and gasket. Tap the cover as it is

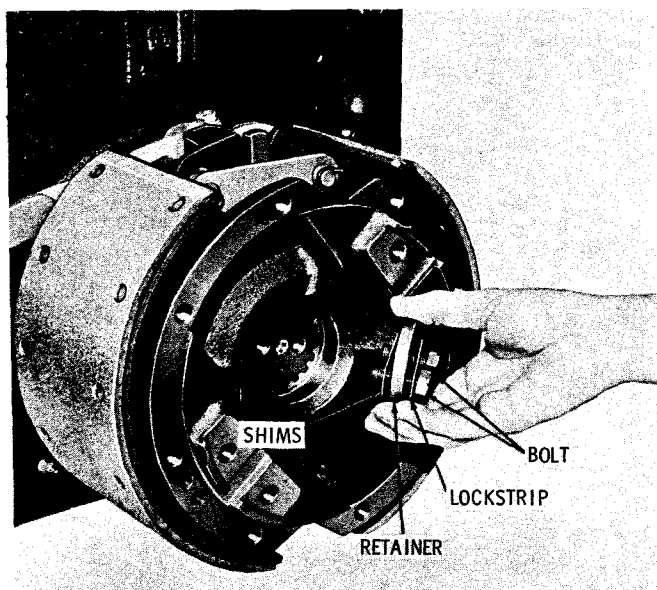


Fig. 5-85. Removing output flange retainer components

S1630

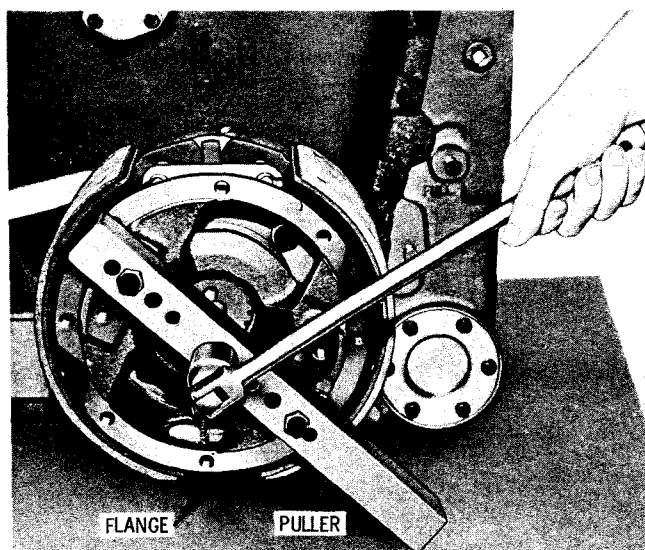


Fig. 5-86. Removing output flange

S1631

raised to free it from the transmission gear bearings. If necessary, use a soft drift through the speedometer drive bore to loosen idler gear and bearing. When a rear oil pump assembly is included, remove snapping 1 (B, foldout 16) and pump assembly 2 from the housing cover. Refer to paragraph 6-17c and d for rebuild of the outpump pump.

(11) Remove output drive gear and bearings from the transmission output shaft (fig. 5-89). Refer to paragraph 6-35 for rebuild of the drive gear. Remove the output idler gear with its two bearings from the transfer gear housing. Refer to paragraph 6-36 for rebuild of the idler gear.

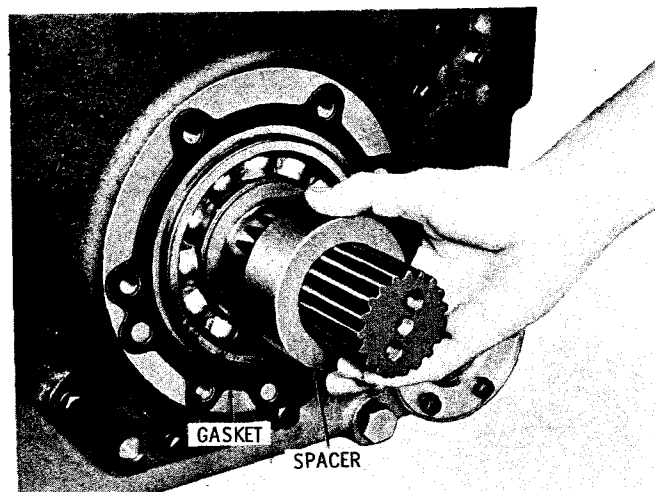


Fig. 5-87. Removing spacer from output shaft (models with rear output)

S1632

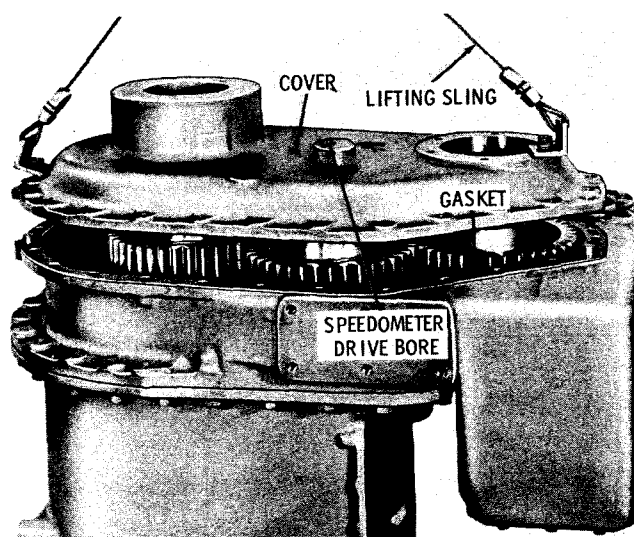


Fig. 5-88. Removing transfer gear housing cover

S1633

(12) Remove six bolts and lockwashers from the oil strainer. Remove the strainer and gasket (fig. 5-7).

(13) Using a bearing puller (fig. 5-90), remove the output driven gear bearing from the output shaft.

(14) Remove the output driven gear spacer from the output shaft (fig. 5-91). Remove the output driven gear from the shaft.

#### NOTE

Models having a side output (foldout 20) have a press-fit gear which cannot be removed at this time (para 6-37b).

## Para 5-4

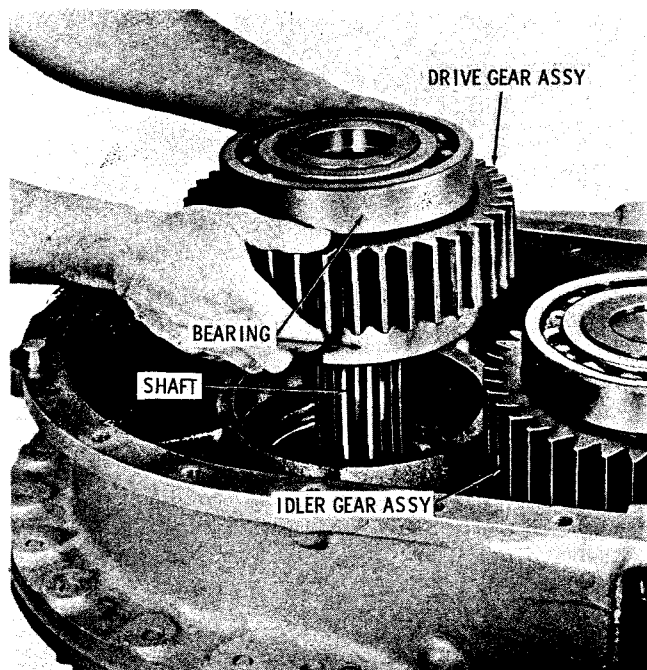


Fig. 5-89. Removing transfer drive gear assembly

S1634

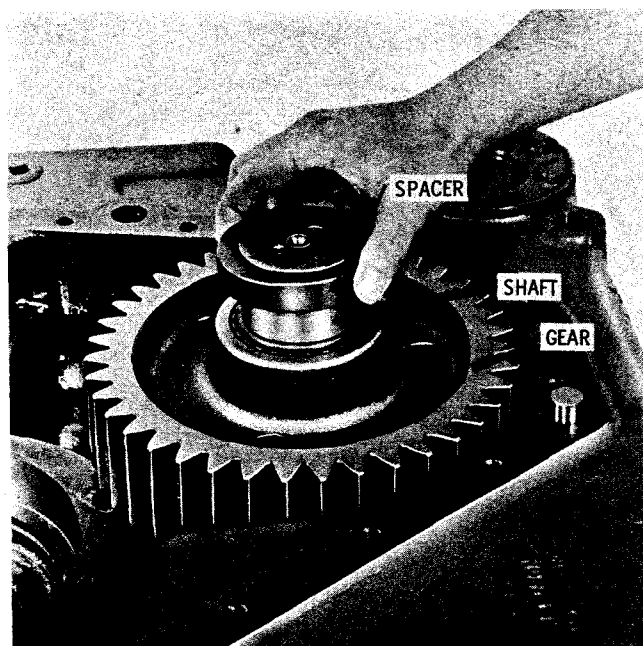


Fig. 5-91. Removing spacer from rear of output shaft (models with no rear output)

S1636

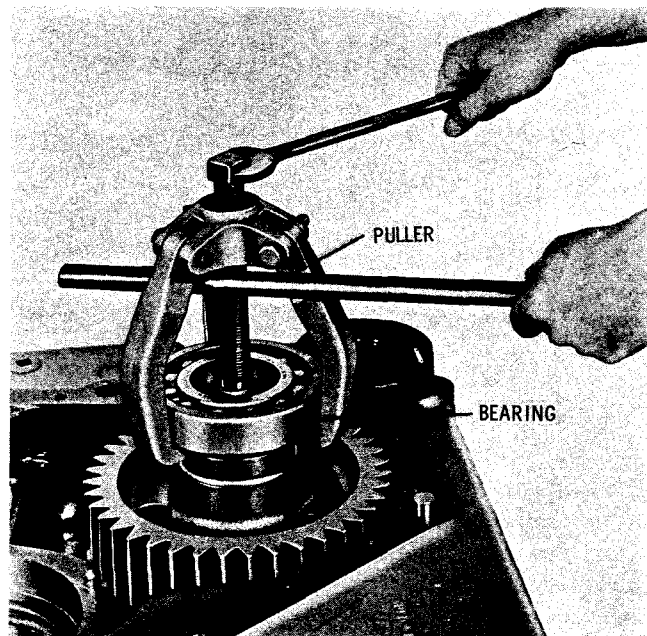


Fig. 5-90. Removing output shaft rear bearing

S1635

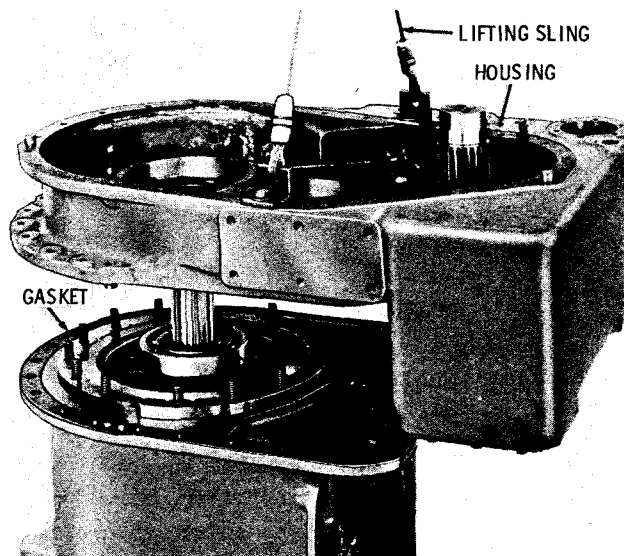


Fig. 5-92. Removing transfer gear housing from transmission housing

S1637

(15) Remove 27 transfer gear housing bolts and lockwashers. Using a lifting sling, remove the transfer gear housing (fig. 5-92). Remove the gasket. Refer to paragraph 6-38 for rebuild of the transfer housing.

(16) Complete the disassembly of the transmission, by following the procedures outlined in paragraph 5-3h(10) through 5-3j(7), omitting 5-3h(11).



## Section 6. REBUILD OF SUBASSEMBLIES

### 6-1. SCOPE OF SECTION 6

**a. Arrangement.** This section outlines the disassembly, rework and assembly of subassemblies removed from the transmission as prescribed in Section 5, above. References to parts exploded-view foldouts (at the back of the book) serve, mainly, to illustrate the relation of components. In addition, photographs and drawings are included where they are helpful.

**b. Same Sequence.** Subassembly rebuild procedures in this section are covered in the same sequence used in disassembly (Sect. 5, above).

**c. Related References.** Related procedures, pertinent to rebuild operations, are referenced in paragraph 6-2, below, and paragraph 6-2 is referenced in each rebuild paragraph.

### 6-2. GENERAL INFORMATION FOR SUB-ASSEMBLY REBUILD

**a. Tools, Parts, Methods.** Refer to paragraph 4-4 and 4-5.

**b. Cleaning, Inspection.** Refer to paragraph 4-6.

**c. Torque Specifications.** Refer to paragraph 4-10.

**d. Wear Limits.** Refer to Section 8.

**e. Spring Information.** Refer to Section 8 for spring identification and specifications.

### 6-3. OIL FILTER ASSEMBLY (WITH PRESSURE SWITCH)

#### a. Disassembly (A, foldout 9)

(1) Remove two shell and center stud assemblies 22 by unscrewing center studs 30. Discard filter elements 20 and sealrings 21.

(2) Disassemble shell and center stud assemblies by removing snaprings 23.

(3) Later models are equipped with plug 57 in place of oil pressure switch 19. Remove plug 57 or switch 19, gasket 56 or 18 and sealring 37.

(4) Remove plug 9, gasket 10, spring 11 and bypass valve 12.

(5) Remove plugs 14, 16 and 31 if necessary for cleaning.

(6) Do not remove base plates 15 unless replacement is necessary.

#### NOTE

Refer to paragraph 6-2, above.

#### b. Assembly (A, foldout 9)

(1) If base plates 15 were removed, install them and retain each with three screws.

(2) If plugs 14, 16 and 31 were removed, install them.

(3) Install bypass valve 12, large end first, into base 13.

(4) Install spring 11, and retain it with plug 9 and gasket 10.

(5) Install sealring 17.

(6) Install pressure switch 19 or plug 57 with gasket 18 or 56.

(7) Install gaskets 29 onto center studs 30. Install center studs 30 into filter shells 28.

(8) Install springs 27, washers 26, seals 25, and retainers 24, cupped side first, onto center studs 30. Install snaprings 23.

(9) Install new elements 20 onto center studs 30.

(10) Install new sealrings 21 into base 13. Install shell and center stud assemblies 22, with elements 20, onto base 13. Tighten the center studs to 25 to 35 pound feet torque.

### 6-4. OIL FILTER ASSEMBLY (WITH MAIN-PRESSURE REGULATOR)

#### a. Disassembly (B, foldout 9)

(1) Remove two shell and center stud assemblies 25 by unscrewing center studs 33. Discard filter elements 23 and sealrings 24.

## Para 6-4/6-5

(2) Disassemble shell and center stud assemblies 25 by removing snaprings 26.

(3) Remove plug 19, gasket 18, plug 17, shims 16 (if used), spring 15, setscrew 21, stop 14 and valve 13.

(4) Remove plug 6, gasket 7, spring 8, valve 9, and pin 10.

(5) Some assemblies will include check valve 22. Inspect this valve for leakage by pouring solvent or paint thinner into the valve bore, on the valve. If there is evidence of leakage, remove the valve and discard it.

(6) Remove plugs 12 and 20.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (B, foldout 9)**

(1) Install two plugs 12 and 20 into adapter 11.

(2) If check valve 22 was removed, install a new valve, spring side first, into adapter 11.

(3) Install pin 10, bypass valve 9 with its convex side first, spring 8, gasket 7 and plug 6.

(4) Install pressure regulator valve 13, with small diameter first.

(5) Install stop 14, drilled hole in stop toward outer end of adapter bore.

(6) Aline the hole in the stop with the tapped hole in the adapter and install setscrew 21. Tighten the setscrew to 3 to 5 pound feet torque. The head of setscrew 21 must not project above the mounting surface of adapter 11.

(7) Install spring 15 and shims 16 (in the amount originally used) into the recess in plug 17.

(8) Install the assembled spring, shims and plug, spring first, into adapter 11. Install gasket 18 and plug 19.

**NOTE**

Further shimming for pressure adjustment may be required when the transmission is put into operation. Refer to paragraph 3-14, above.

(9) Install gaskets 32 (B, foldout 9) onto studs 33. Install studs 33 into filter shells 31.

(10) Install springs 30, washers 29, seals 28 and retainers 27, cupped side first, onto studs 33. Install snaprings 26.

(11) Install new sealrings 24 into adapter assembly 5.

(12) Install new filter elements 23 into filter shells 31. Install the filter shell and center stud assemblies 25, with elements 23, into adapter assembly 5. Tighten studs 33 to 25 to 35 pound feet torque.

**6-5. MAIN-PRESSURE REGULATOR VALVE BODY ASSEMBLY**

There are two types of assemblies which differ mainly as to the location of the oil ports. The earlier type (B, foldout 8) has its oil ports at the front and rear. It can be used only with a remote-mounted filter. The later type 33 (A, foldout 9) has its ports at the top, and can be used with either a direct-mounted or remote-mounted filter. The procedures outlined below apply to either, although they are keyed only to A, foldout 9.

**a. Disassembly (A, foldout 9)**

(1) Remove plug 34, gasket 35, plug 36, shims 37 (if used) and spring 38.

(2) Remove setscrew 42. Then remove stop 39 and valve 40.

(3) Remove plug 44. This plug is at the top of the earlier type assemblies.

(4) Inspect check valve 43 (not used in some assemblies) for leakage by pouring solvent or paint thinner into the valve bore in body 41, on the valve. If there is evidence of leakage after 15 seconds, remove the valve and discard it.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 9)**

(1) If check valve 43 was removed, install a new valve, spring side first, into body 41.

(2) Install plug 44. This plug is at the top of the body on earlier assemblies.

(3) Install pressure regulator valve 40, smaller diameter first, into body 41. Install stop 39, the drilled hole in the stop toward the outer end of the valve bore.

(4) Aline the hole in stop 39 with the tapped hole in body 41, and install setscrew 42.

Tighten the setscrew to 3 to 5 pound feet torque. The head of setscrew 42 must not project above the mounting surface of body 41.

(5) Install shims 37 (in the amount originally used) and spring 38 into the recess in plug 36. Install the assembled spring, shims and plug, spring first, into body 41. Install gasket 35 and plug 34.

**NOTE**

Further shimming for pressure adjustment may be required when the transmission is put into operation. Refer to paragraph 3-14, above.

**6-6. STATOR CONTROL VALVE BODY, ADAPTER (VCLT, VCLBT MODELS)**

**a. Disassembly (A, foldout 10)**

(1) Remove valve stop plug 26 and gasket 27 from stator control valve body 30. Remove spring 28. Remove stator control valve 29. Valve 29 will fall out the open end if valve bore is held downward.

(2) Remove adapter 34 and gasket 33. Remove valve plug 32 from adapter 34. Remove seal ring 31 from plug 32.

(3) Do not remove plugs 35, except for cleaning or replacement.

(4) Do not remove any of the five dowel pins 5, or tube 4 from the valve adapter unless defective.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 10)**

(1) Install seal ring 31 onto plug 32. Use oil-soluble grease to grease the bore of adapter 34, and insert plug 32 and seal ring into the small end of adapter 34. The small tip end of plug 32 must project at the external-threaded end of adapter 34.

(2) Install adapter 34, with gasket 33, into valve body 30 and tighten it.

(3) Install the stator control valve 29, smaller diameter first, into the control valve body. Install valve spring 28 on the valve end and push the valve and spring into the body.

**NOTE**

The spring will protrude approximately 1/2 inch from the valve body opening when valve and spring are properly installed.

(4) Install gasket 27 on stop plug assembly 26.

(5) Insert the stop plug pin into the center of the spring and push the plug and spring in until the threads of the plug and body are engaged. Tighten the plug.

(6) If removed, install plug 35 (A, foldout 10) into valve body 30.

**6-7. LOCKUP VALVE ASSEMBLY**

**a. Disassembly (B, foldout 10)**

(1) Remove four (three if manual-electric) plugs 15 from valve body 2.

(2) Drive two spring pins 14 out of body 2.

(3) Remove plug 8. Remove sealring 9 from plug 8.

(4) Remove springs 6 and 7, or only one spring.

**NOTE**

Some assemblies use both springs; some use only one, which may be either small diameter spring 7, or large diameter spring 6.

(5) Remove spring washer 5 if used.

**NOTE**

Washer 5 is not used when only small diameter spring 7 is used.

(6) Remove shim(s) 4 from the stem of valve 3.

(7) Remove valve 3 from body 2. It may be easier to shake valve 3 out of body 2 before removing springs, washers and shims (refer to (4), (5) and (6), above).

(8) Remove plug 11. Remove sealring 10 from plug 11. Plug 11 may be loosened by tapping the top of valve body 2 against a wood surface.

(9) Remove lockup cutoff (flow) valve 12.

(10) Do not remove check valve 13 unless replacement is necessary. Removal destroys the valve.

(11) If transmission is equipped with manual-electric control system, refer to paragraph 4-4 in the supplement at the back of this manual.

**NOTE**

Refer to paragraph 6-2, above.

## Para 6-7/6-8

**b. Assembly (B, foldout 10)**

(1) If check valve 13 was removed, install a new valve, flat side first, into valve body 2. Tap or press the valve into the body, using a tubular sleeve which seats only on the outer diameter shoulder of the valve. Seat the valve lightly in its bore.

(2) Install lockup cutoff (flow) valve 12, long land first, into valve body 2.

(3) Install sealring 10 onto plug 11. Install the plug, flat side outward, into valve body 2. Push the plug inward until its outer side clears the holes into which spring pin 14 fits.

(4) Install spring pin 14, locating the end 0.030 to 0.060 inch below the mounting surface of valve body 2.

(5) Install shim(s) 4 (in the quantity used originally) onto the stem of lockup valve 3.

(6) Install lockup spring washer 5 (if used), flat side first, onto the stem of valve 3.

**NOTE**

Washer 5 is not used if only small diameter spring 7 is used.

(7) Install spring 7 (and spring 6, if used).

(8) Install the assembled valve, shim(s), washer and spring(s), valve first, into valve body 2.

(9) Install sealring 9 onto plug 8. Install plug 8 into valve body 2, pushing it inward until its outward side clears the holes into which spring pin 14 fits.

(10) Install spring pin 14, locating it 0.030 to 0.060 inch below the mounting surface of valve body 2.

(11) Install four (three if manual-electric) plugs 15 into valve body 2. Before installing plugs 15, apply sealant onto plugs.

(12) If valve assembly 1 requires a pressure switch (ref subpara (11), above), install the switch and tighten it sufficiently to prevent leakage.

**6-8. CONTROL VALVE BODY ASSEMBLY (6-SPEED)****NOTE**

If the control valve assembly is electrically actuated, refer to the supplement at the back of this manual.

**a. Disassembly (A, foldout 14)**

(1) Remove four bolts 25 and lockwashers 24. Separate valve body 31 from oil transfer plate 9. Remove spring 30, one ball 29 and gasket 10.

(2) Remove four bolts 11 and lockwashers 12. Remove cover 13 and gasket 14. Cover 13 is spring loaded and must be held while removing bolts.

(3) Remove spring 16 and stop 15.

(4) Remove valve plug 17, springs 18 and 19, and valve 20.

(5) Mark the location and arrangement of parts removed in (3) and (4), above.

(6) Remove six bolts 46 (A, foldout 14) and lockwashers 45. Cover 44 is spring loaded and must be held while removing bolts.

(7) Remove cover 44 and gasket 43.

(8) Remove valve stop 42, spring 41, plug valve 40, springs 38 and 39, and valve 37.

(9) Remove plug 26, gasket 27, spring 28, and remaining ball 29.

(10) Mark the location and arrangement of parts removed in (8) and (9), above.

(11) Clean the stem of valve 36 (A, foldout 14) to remove dirt, paint and burrs. Push valve assembly 32 downward, and out of valve body 31.

(12) Remove valve stop 21 from the slot in valve body 31.

(13) If oil seal assembly 22 must be replaced, drive it out by hammering a wood dowel, inserted through the manual selector valve bore, against the lower side of the seal assembly.

(14) Remove two plugs 23.

(15) Do not disassemble valve assembly 32, except to remove bushing 33 if replacement is required.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 14)**

(1) If bushing 33 was removed from valve assembly 32, press a new bushing in. Center the bushing between the flat sides of the valve stem.

(2) Install two plugs 23 into control valve body 31. Before installing plugs 23, apply sealant onto plugs.

(3) If oil seal assembly 22 was removed, install a new seal assembly. Lubricate the seal assembly and the bore in the valve body before installing the seal assembly. The assembly consists of two parts. The seal should be installed first, spring-loaded lip first, and the scraper last, flat steel side first (refer to (4), below).

(4) Press both parts of the seal assembly inward until the scraper clears the inner edge of

the bore chamfer. The seal must not project into the slot in valve body 31, into which valve stop 21 is to be installed.

(5) Install valve stop 21 and align it with the selector valve bore.

(6) Install selector valve assembly 32, working its stem carefully through oil seal assembly 22.

(7) Install one detent ball 29, into the outer side of valve body 31. Into the same bore, install spring 28, gasket 27 and plug 26.

(8) Install neutral trimmer valve 37, closed end first. Install springs 38 and 39, neutral trimmer plug valve 40, spring 41, and valve stop 42.

(9) Compress springs 38, 39 and 41, and install gasket 43 and cover 44. Retain the cover with six bolts 46 and lockwashers 45. Tighten the bolts to 26 to 32 pound feet torque.

(10) Install intermediate trimmer valve 20, closed end first. Install springs 18 and 19, intermediate trimmer valve plug 17, spring 16, and valve stop 15.

(11) Compress springs 16, 18, and 19, and install gasket 14 and cover 13. Retain the cover with four bolts 11, with lockwashers 12. Tighten the bolts to 13 to 16 pound feet torque.

(12) Install remaining ball 29, and spring 30. Install gasket 10 and oil transfer plate 9. Retain plate 9 with four bolts 25 and lockwashers 24. Tighten the bolts to 26 to 32 pound feet torque.

#### 6-9. CONTROL VALVE BODY ASSEMBLY (4-SPEED)

##### a. Disassembly (C, foldout 13)

(1) Remove cap 21, gasket 22, spring 23, pin 24, and one ball 25 from valve body 20. Clean the stem of valve 31.

(2) Using a soft hammer, drive selector valve assembly 29 downward, pushing cap 33 out of valve body 20.

(3) Remove selector valve assembly 29. Remove remaining ball 25 and spring 26.

(4) Remove four bolts 11 and lockwashers 12. Remove cover 13 and gasket 14.

(5) Remove accumulator valve 15, spring 16 and valve plug 19.

(6) Remove spring pin 28. Remove plug 34. Remove sealing 35 from plug 34.

(7) Remove relay valve 36.

(8) In assemblies prior to S/N 23851, remove stop pin 37, and a spring (not illustrated). In later assemblies, there is no spring.

(9) If oil seal 17 requires replacement, remove it.

(10) If check valve 18 requires replacement, remove it.

(11) Remove plug 27 from valve body 20.

(12) Do not disassemble selector valve assembly 29 except to remove bushing 30 if replacement is necessary.

#### NOTE

Refer to paragraph 6-2, above.

##### b. Assembly (C, foldout 13)

(1) If bushing 30 was removed from valve assembly 29, install a new bushing. Locate it centrally between the flat sides of the stem of valve 31.

(2) Install plug 27 into valve body 20. Before installing plug 27, apply sealant onto plug.

(3) If check valve 18 was removed, install a new valve. Press it, spring side first, into valve body 20 until it bottoms lightly on the shoulder in its bore.

(4) If oil seal 17 was removed, install a new oil seal. Press it, spring-loaded lip first, to the bottom of its bore.

(5) In assemblies prior to transmission S/N 23851, install stop pin 37 and a spring (not illustrated) into valve body 20. In later assemblies, install only stop pin 37 (no spring is used).

(6) Install reverse relay valve 36. Install sealing 35 onto plug 34. Install the plug and retain it with spring pin 28. The end of pin 28 must be located 0.060 to 0.100 inch below the mounting surface of valve body 20.

(7) Install valve plug 19, large diameter first, into valve body 20. Install spring 16 into the same bore.

(8) Install accumulator valve 15, cupped end first, onto spring 16.

(9) Install gasket 14 and cover 13. Retain the cover with four bolts 11 and lockwashers 12. Tighten the bolts to 13 to 16 pound feet torque.

Para 6-9/6-10

(10) Install spring 26 and one detent ball 25 into the bore in valve body 20.

(11) Depress the ball and spring while installing valve assembly 29, stem first, into the lower end of the selector valve bore.

(12) Work the stem of valve 31 carefully through oil seal 17 and push the valve to any one of its detent positions.

(13) Install the remaining detent ball 25, spring 23, pin 24, gasket 22 and cap 21.

(14) Coat the outer circumference of cap 33 with a nonhardening sealer. Install cap 33, closed end first, and press it firmly to a seat against the shoulder in the bore of valve body 20.

## 6-10 HYDRAULIC RETARDER CONTROL VALVE BODY ASSEMBLY

### a. Disassembly (type with front oil ports)(B, foldout 11)

(1) Remove six bolts 22, washers 21, cover 20 and gasket 19 from valve body 7. Remove spring 23.

(2) Remove control valve 14.

(3) Remove snapping 18, oil transfer tube 17, spring 16 and valve 15.

#### NOTE

Some models use a separate retainer and tube instead of tube 17.

(4) Remove plug assembly 11, gasket 10, spring 9 and valve 8.

(5) Remove oil seal and scraper assembly 5, and snapping 6 only if parts replacement is necessary.

#### NOTE

Refer to paragraph 6-2, above.

### b. Disassembly (type with rear oil ports) (B, foldout 11)

(1) Remove plug 27 from valve body 38.

(2) Remove plug assembly 42, gasket 41, spring 40 and valve 39.

(3) Remove plug assembly 28, gasket 31, spring 32 and valve 33.

(4) Remove snapping 34, seal and scraper assembly 35, and valve stop 36 only if parts replacement is necessary.

(5) Remove scraper and seal assembly by holding valve 37 on a bolt or pin clamped in a vise, and driving valve body 38 off with a soft hammer.

#### NOTE

Refer to paragraph 6-2, above.

### c. Assembly (type with front oil ports) (B, foldout 11)

(1) If removed, install snapping 6.

(2) If oil seal and scraper assembly 5 was removed, install a new assembly. The assembly consists of two parts—oil seal and scraper. The oil seal is installed first, followed by the scraper.

(3) Install the oil seal part of assembly 5, spring-loaded lip first. When it is seated, install the scraper, flat side first, and press it against the oil seal.

(4) Install torque limiter valve 8, convex side first. Install spring 9, gasket 10, and plug assembly 11. Items 8 through 11 are not required in later models.

(5) Install secondary-pressure regulator valve 15, convex side first, spring 16 and oil transfer tube 17. Retain tube 17 with snapping 18.

#### NOTE

In some models oil transfer tube 17 will consist of a separate tube and retainer.

(6) Install control valve 14, stem first, into the bottom of valve body 7. Work the stem of the valve carefully through the oil seal and scraper assembly 5. Install spring 23.

(7) Install gasket 19, cover 20, six bolts 22, and lockwashers 21. Tighten the bolts to 26 to 32 pound feet torque.

### d. Assembly (type with rear oil ports) (B, foldout 11)

(1) If valve 37 and valve stop 36 were removed, install them.

(2) If oil seal and scraper assembly 35 was removed, install a new one. The assembly consists of two parts—scraper and oil seal. The oil seal is installed first, followed by the scraper.

(3) Install the oil seal, spring-loaded lip first into valve body 38. Follow it with the scraper, flat side first. Press them together into their bore until the scraper clears the groove for snapping 34.

(4) Install snapping 34.

(5) Install torque limiter valve 33, convex side first, spring 32, gasket 31, and plug assembly 28. Items 28 through 33 are not required in later models.

(6) Install secondary-pressure regulator valve 39, convex side first, spring 40, gasket 41, and plug assembly 42.

(7) Install plug 27 into valve body 38.

#### 6-11. CONVERTER HOUSING FRONT COVER

Front covers differ between models which have a lockup clutch (CLT and CLBT models) and those which do not (CT and CBT). However, rebuild procedures are the same.

##### a. Disassembly (A or B, foldout 5)

(1) Remove oil seal 6, driving it out the front of cover 8.

(2) Clean the bore in cover 8.

##### NOTE

Refer to paragraph 6-2, above.

##### b. Assembly (A or B, foldout 5)

(1) Coat the outer circumference of oil seal 6 with a nonhardening sealer.

(2) Press the seal, spring-loaded lip first, into the front of the bore in cover 8. Press the seal in until its front edge is even with the inner end of the chamfer in the bore.

#### 6-12. CONVERTER DRIVE HOUSING ASSEMBLY

##### a. Disassembly (CLT, CLBT)(A, foldout 5)

(1) Remove ball bearing assembly 12, from hub 16.

(2) Inspect bolts 14, lockstrips 15, and hub 16 for looseness.

(3) Do not remove dowel pins 18 unless replacement is necessary. (Refer to para 6-14a(4), below.)

(4) Do not remove anchor key 23 (used prior to S/N 19246) unless replacement is necessary.

##### NOTE

Refer to paragraph 6-2, above.

##### b. Rework of Sealing Bore in Hub (A, foldout 5)

(1) Bore the inner diameter of hub 16 to the dimensions shown in figure 6-1.

(2) Cool sleeve 22 (A, foldout 5) in dry ice for at least 30 minutes. Then press the sleeve into the bored-out hub until it seats. The chamfer in the sleeve should be toward the rear.

##### c. Assembly (CLT, CLBT) (A, foldout 5)

(1) If dowel pins 18 were removed, install new dowel pins. Press them, from the inside (rear) of housing 17, into the housing until they project 0.30 inch from the inside face of the housing.

(2) If bolts 14 were loose, tighten them to 122 to 146 pound feet torque. Bend the lock strips against a flat on the bolt heads.

(3) Install ball bearing assembly 12 onto hub 16, pressing the inner race of the bearing against the shoulder on the hub. (Refer to para 6-14c(2), below.)

(4) If anchor key 23 (prior to S/N 19246) was removed, install it. Align the tongue of the key parallel to the bore of the housing and in line with the housing axis. Press in to no more than 0.190 inch above the adjacent bore.

##### d. Disassembly (CT, CBT) (B, foldout 5)

(1) Remove ball bearing assembly 11 from hub 14.

(2) Flatten the ends of lockstrips 13, remove eight bolts 12.

(3) Remove hub 14. Remove the outer race and rollers of roller bearing assembly 2 (A, foldout 6) from housing 15 (B, foldout 5).

##### e. Assembly (CT, CBT) (B, foldout 5)

(1) Install the outer race and rollers of roller bearing assembly 2 (A, foldout 6) into housing 15 (B, foldout 5).

(2) Install hub 14 onto housing 15, and align the bolt holes.

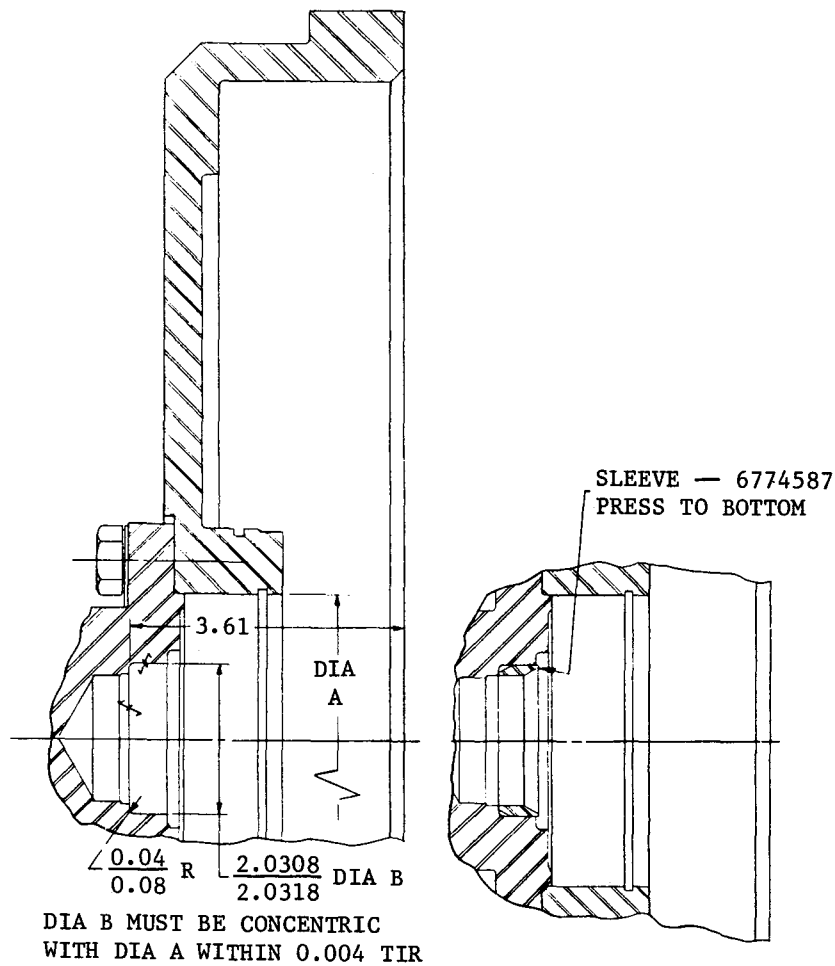


Fig. 6-1. Rework of converter drive housing—cross-section view

8492

(3) Install four lockstrips 13, and eight bolts 12. Tighten the bolts to 83 to 100 pound feet torque.

(4) Bend each end of each lockstrip 13 against a flat of each bolt head.

(5) Install ball bearing assembly 11 onto hub 14. Press the inner race of the bearing assembly against the shoulder on hub 14.

### 6-13. FLEX DISK ASSEMBLY

#### a. Disassembly (C, foldout 5)

(1) If not previously removed, remove the flex disk assembly from the engine crankshaft.

(2) Remove twelve bolts 11, and separate plate 10, disks 9, and disk and washer assembly 6 from hub assembly 3.



(3) Do not remove dowel pin 5 unless replacement is necessary.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (C, foldout 5)**

(1) If dowel pin 5 was removed, press a new pin into the rear of hub 4 until it projects 0.13 inch.

(2) Install disk and washer assembly 6 onto hub assembly 3, engaging the smaller hole in the inner bolt circle with dowel pin 5. Washer 7 must face toward hub assembly 3.

(3) Install four flex disks 9, engaging them with dowel pin 5 and aligning all other holes.

(4) Install plate 10, aligning it with the dowel pin and bolt holes.

(5) Install twelve bolts 11, and tighten them to 96 to 115 pound feet torque.

(6) Install the assembly, large diameter of hub first, onto the engine crankshaft. Retain it with six bolts.

**6-14. FLYWHEEL ASSEMBLY**

The flywheels for CT and CBT models are not fitted with a lockup clutch; CLT and CLBT models include a lockup clutch. Thus, certain operations below do not apply to CT and CBT models.

**a. Disassembly (C, foldout 5)**

(1) The flywheel assembly should be disassembled only if parts replacement is necessary.

(2) Remove dowel pin 14 from the front of flywheel 15.

(3) Remove four dowel pins 16 from the rear of flywheel 15.

(4) Remove anchor key 27 (prior to S/N 19246).

(5) Remove starter ring gear 13, after noting whether the chamfered teeth face forward or rearward.

**NOTE**

Refer to paragraph 6-2, above.

**b. Rework of Flywheel Center Bore (CLT, CLBT)**

(1) If the sealing surface of the flywheel bore is worn enough to impair sealing, bore it to the dimensions shown in figure 6-2.

(2) Cool sleeve 18 (C, foldout 5) in dry ice for at least 30 minutes. Then install the sleeve, being careful that it is aligned with the bore and is not damaged during installation. The inside chamfer must be toward the rear.

**c. Assembly (C, foldout 5)**

(1) Install starter ring gear 13 after heating it to 400 F maximum temperature. Be sure the chamfer of the teeth is facing the proper direction for starter pinion engagement. Gear 13 must fit firmly against the shoulder on flywheel 15.

(2) Install anchor key 27 (prior to S/N 19246), aligning the tongue of the key parallel with the inner bore of flywheel 15 and in line with the axis of the flywheel. Press it into its bore until it is no more than 0.190 inch above the inner bore of the flywheel.

(3) Install four dowel pins 16, pressing them in until they project 0.31 inch at the inside of flywheel 15.

(4) Install dowel pin 14, pressing it in until it projects 0.13 inch at the front of flywheel 15.

**6-15. TORQUE CONVERTER STATOR ASSEMBLIES**

**a. Disassembly (four element) (A, foldout 6)**

(1) Remove the rollers, cups, springs, and pins from stator assemblies 12 and 17. Do not disassemble the stators further.

(2) Each stator in 5640 and 5660 models includes eight rollers 15 or 20, eight pins 13 or 18, and eight springs 14 or 19.

(3) Each stator in 5840 and 5860 models includes twelve rollers 15 or 20, twenty-four cups 22, 25, 26 or 29, twelve pins 24 or 28 (not used prior to S/N 24578), and twelve springs 23 or 27.

**b. Assembly (four element) (A, foldout 6)**

(1) Each stator, during assembly, should be positioned front side upward on the assembly table. Each cam pocket (roller cavity) should be at least half filled with oil-soluble grease to help retain the parts.

(2) On 5640 and 5660 models, install eight springs 14 into first stator assembly 12. Install eight pins 13. Install eight rollers 15, pressing them into the deeper ends of the cam pockets. Refer to figure 6-3 for arrangement of the parts.

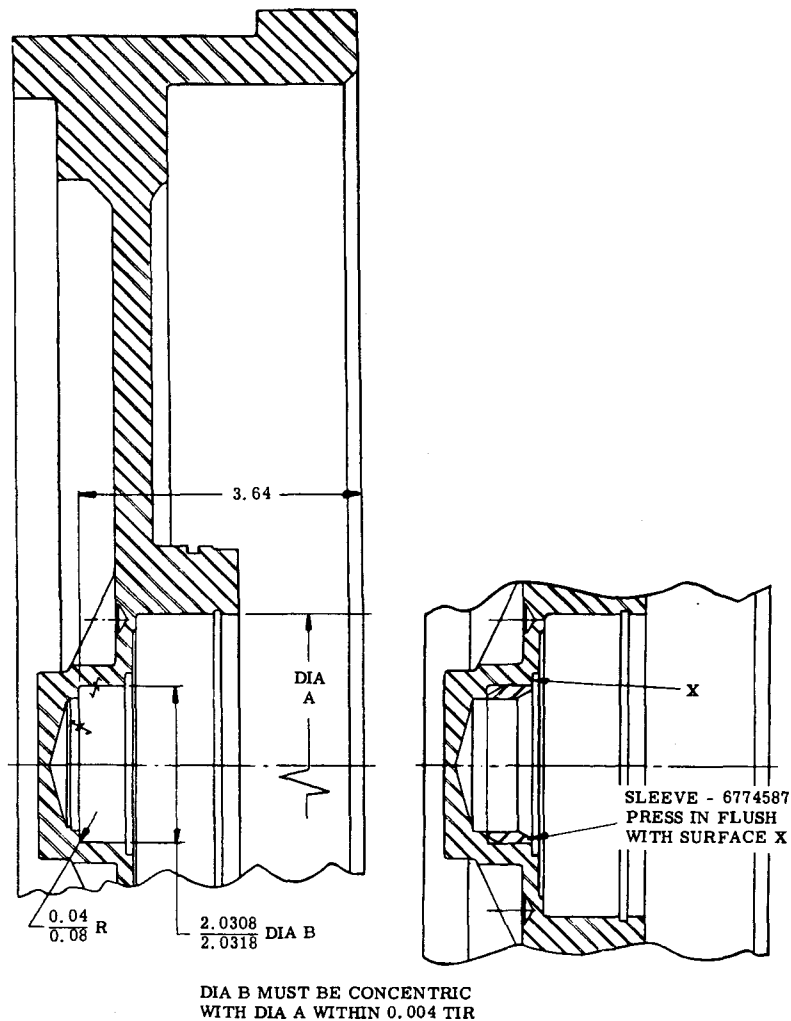


Fig. 6-2. Rework of flywheel—cross-section view

8495

(3) On 5640 and 5660 models, install eight springs 19 (A, foldout 6), eight pins 18, and eight rollers 20 into second-stator assembly 17.

(4) On 5840 and 5860 models, install twelve springs 23 into cups 25, install needle rollers 24 (not used prior to S/N 24578) into springs 23, install cups 22 onto springs 23. Install the twelve assembled groups into first-stator assembly 12.

(5) Install twelve rollers 15 into first-stator assembly 12, pushing the rollers into the deeper ends of the cam pockets.

(6) On 5840 and 5860 models, assemble the parts and install them into second-stator assembly 17 in the manner described in (4) and (5), above. Use cups 26, springs 27, needle roller 28, cups 29, and rollers 20. Refer to figure 6-3.

c. **Disassembly (single stator) (B, foldout 6).** Place stator assembly front side up on the work table, and remove twelve rollers 8, twenty-four cups 5, twelve springs 7, and twelve needle rollers 6.

#### NOTE

Refer to paragraph 6-2, above.

d. **Assembly (single stator) (B, foldout 6)**

(1) Place stator assembly, front side up on the work table. Place oil-soluble grease in each cavity (cam pocket)

(2) Install twelve roller springs 7, into cups 5; install twelve needle rollers 6 into springs 7. Install cups 5 onto springs 7. Install the twelve assembled groups into stator 4.

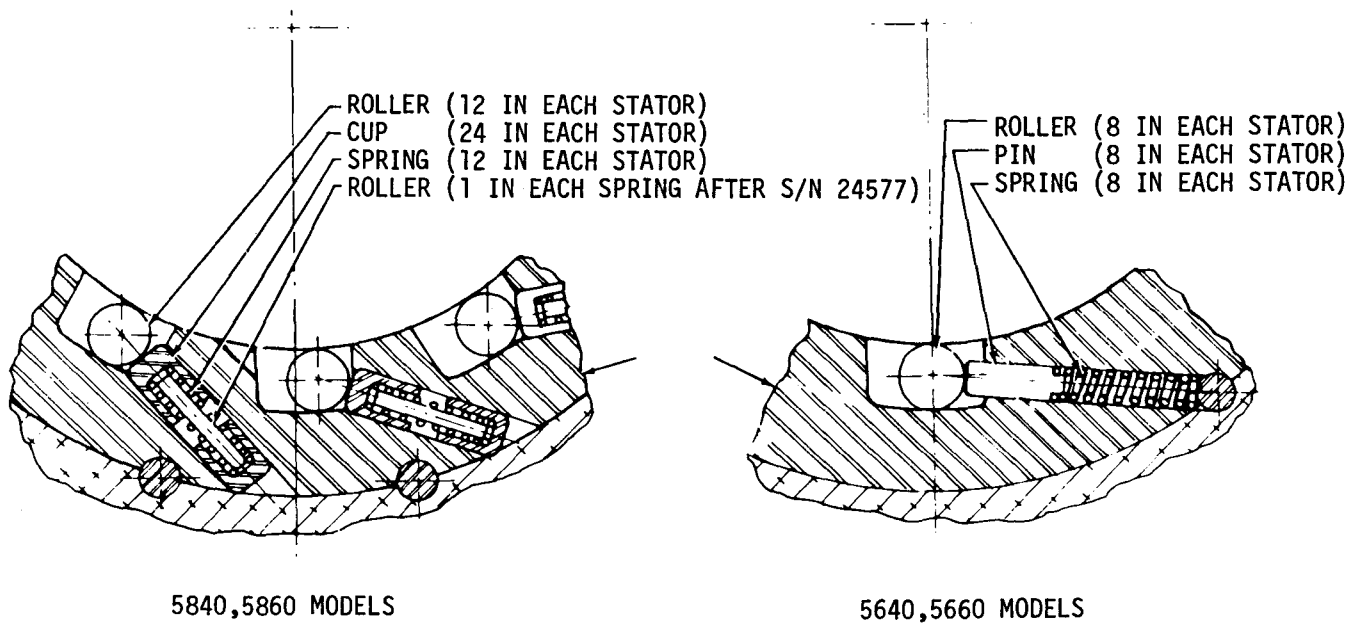


Fig. 6-3 Arrangement of stator freewheel components—cross-section, front view

8478

(3) Install twelve rollers 8 into stator 4, pushing the rollers into the deeper ends of the cam pockets. Refer to figure 6-3.

**e. Disassembly (variable capacity) (A, foldout 7)**

(1) Lay stator assembly 6 on the rear side and remove twelve nuts 17.

(2) Hold the assembly together and turn it over. Remove twelve bolts 7. Again, hold the assembly together and turn it over.

(3) Remove front side plate assembly 18. Remove spring retainer 16, and springs 8 will fall out.

(4) Lift shroud assembly 9, vane assemblies 12, piston housing 22 and piston 14 as a unit, and remove it from stator cam 24.

(5) Remove piston housing 22 from piston 14. Do not remove the Teflon sealrings and expanders from the piston unless they are defective.

(6) By gently shaking and/or tapping on piston 14, the piston and vane assemblies 12 will fall free of shroud assembly 9.

(7) Remove stator cam 24 from rear side plate assembly 25. Do not remove spring pins 23. The pins are not replaceable.

(8) Do not remove bushings 20 and 27 from side plates 19 and 26. The bushings are not replaceable.

**NOTE**

Refer to paragraph 6-2, above.

**f. Assembly (variable capacity)(A, foldout 7)**

(1) Lay the stator cam on a table with the flat (rear) side downward (fig. 6-4). Place the shroud on the housing, thickest section of the vanes upward, and seat the vane pins in place in the stator cam grooves.

(2) Install piston outer seal ring and expander assembly 15 (A, foldout 7) and piston inner seal ring and expander assembly 13 into their respective grooves in the piston, using the following installation procedures.

(a) Make sure the sealring grooves in piston 14 are clean and free from burrs and sharp edges.

(b) Coil the expanders (as shown in fig. 6-5) to make sure that the sharp ends of the expanders are turned away from the seal, and install the inner and outer expanders into the sealring grooves.

## Para 6-15

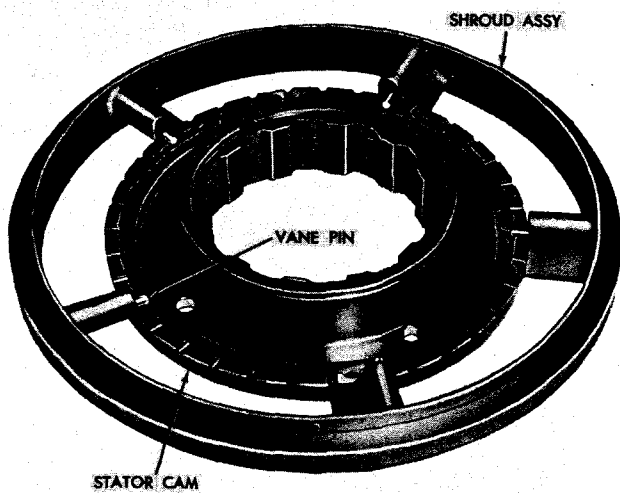


Fig. 6-4. Installing shroud assembly onto stator cam

S1641

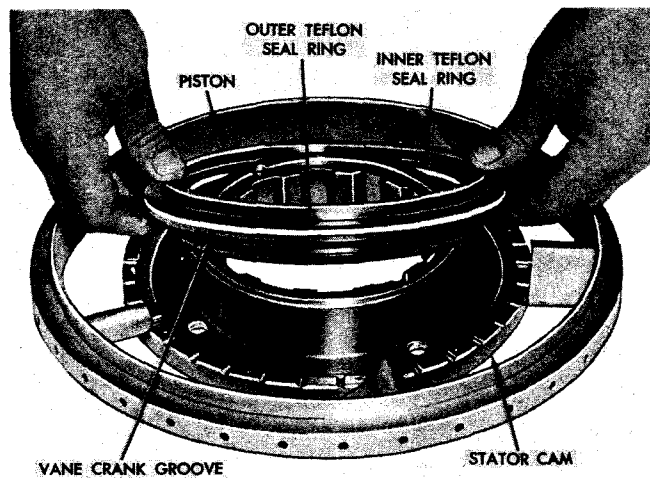


Fig. 6-6. Installing piston and sealrings onto stator cam

S1642

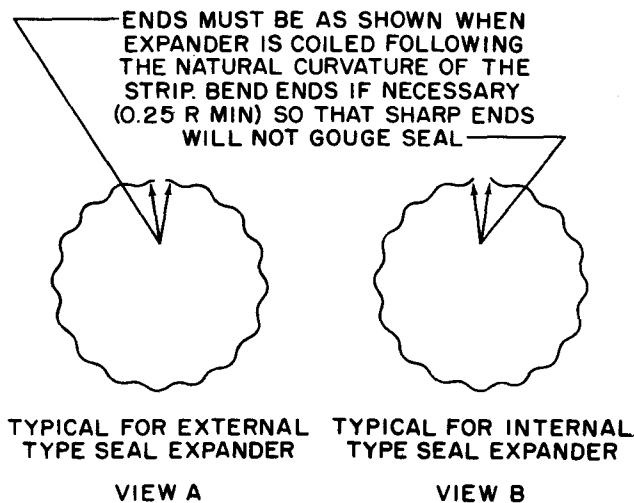


Fig. 6-5. Typical expanders for Teflon sealrings

S6228

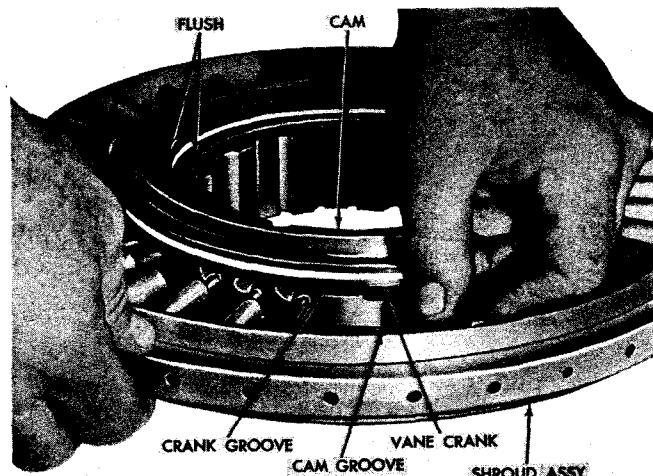


Fig. 6-7. Installing stator vanes into piston groove and shroud

S1542

(c) Starting at a point opposite the open ends of the expanders, install the sealrings into their grooves. The outer sealring will have to be stretched slightly to get it into the groove but do not stretch it more than necessary. The use of tools is not desirable.

(3) Install the piston with sealrings and expanders, vane crank groove downward, onto the stator cam (fig. 6-6). Install the piston so that the surface adjacent to the bore of the piston is flush with the front surface of the cam hub (fig. 6-7).

(4) Lift the shroud assembly up slightly to allow for easier installation of vane assemblies into the piston groove and pin holes in the shroud (fig. 6-7). Install 30 vane assemblies by first placing the outer end of the vane crank into the shroud and carefully twisting the vane to insert the crank in the piston groove. When the vane assemblies are all in place, push the piston down until it bottoms on the cam. The shroud assembly and vane cranks will fall into place in the cam grooves.

(5) Install piston housing 22 (A, foldout 7) and match its bolt holes with those in cam 24.

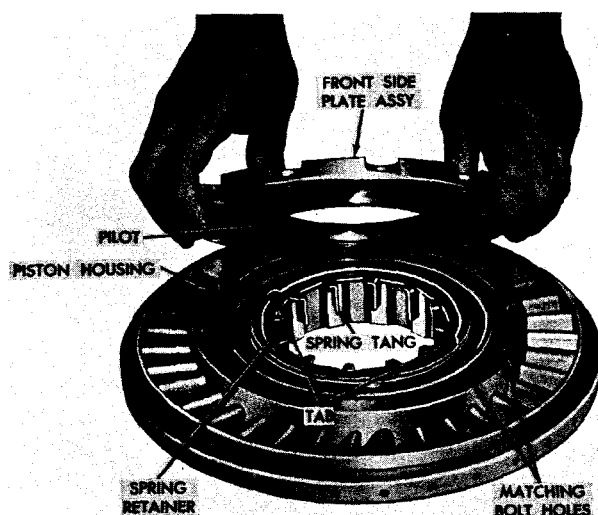


Fig. 6-8. Installing front-side plate assembly onto piston housing

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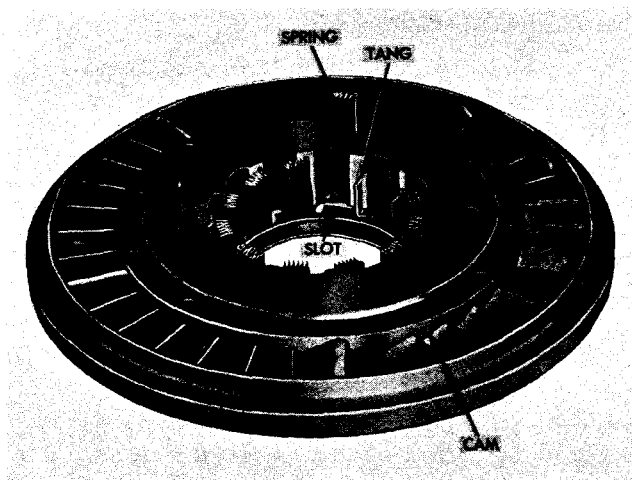


Fig. 6-9. Installing freewheel roller springs

S1544

(6) Install the spring retainer into the stator cam, with the spring tangs down (fig. 6-8). Make certain the retainer tabs are properly located in the hub of the cam. Install the front side plate assembly, making certain the pilot seats properly against the spring retainer. Aline the bolt holes.

(7) Hold the assembly securely together and turn it over. Install 12 freewheel roller springs on the spring retainer, positioning the springs by sliding the "hook" end of the spring over the tang, between the tang and the inner diameter of the cam (fig. 6-9). Each spring should be installed so that it is hanging from the tang over the slot in the spring retainer.

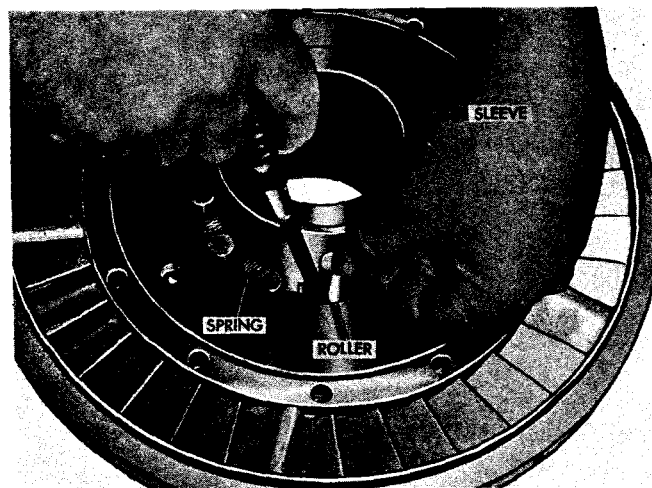


Fig. 6-10. Installing freewheel rollers

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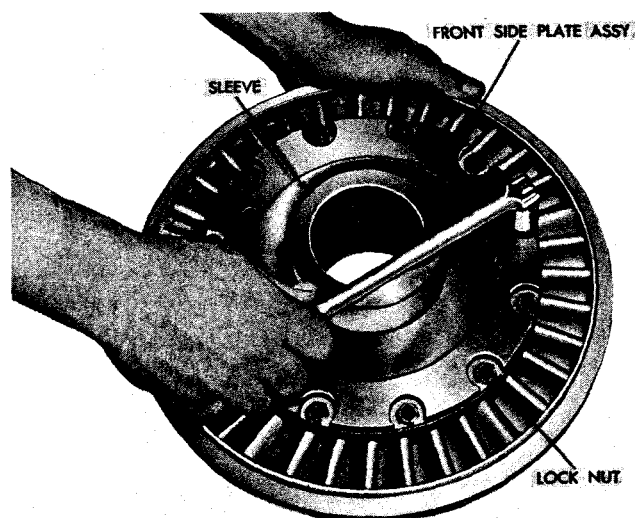


Fig. 6-11. Installing stator lock nuts

S1570

(8) Place the variable-stator assembly installation sleeve, inner chamfer upward, in the center of the cam (fig. 6-10). Using a screwdriver to compress the spring, install a freewheel roller in the cam pocket. Install twelve rollers in this manner.

(9) Install rear side plate assembly 25 (A, foldout 7) onto the sleeve, and aline the bolt holes. Hold the assembly together securely and turn it to stand on the outer rim of the shroud assembly.

(10) Install twelve bolts 7 from the rear of the stator assembly. While holding the assembly securely, start twelve lock nuts (fig. 6-11) on the bolts. Tighten the lock nuts to 14 to 18 pound feet. Leave the sleeve in the stator until stator is installed into the transmission.

## Para 6-16/6-17

**6-16. TORQUE CONVERTER PUMP ASSEMBLY****a. Disassembly (A, foldout 6)**

(1) Flatten the ends of lockstrips 31. Remove twelve bolts 30, six lockstrips 31 and two retainers 32.

(2) Tap ball bearing assembly 33 toward the front of pump 34, removing it from the pump and drive gear 37.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 6)**

(1) Position drive gear 37, tapped holes upward, on the assembly table. Position converter pump 34 on the gear, and align their bolt holes.

(2) Install bearing assembly 33, grooved end of outer race upward, into the pump bore. Tap the bearing assembly outer race until the bearing groove meets the hub surface of pump 34.

(3) Install two retainers 32, six lockstrips 31, and twelve bolts 30. Tighten the bolts to 33 to 40 pound feet torque. Lock each bolt head by bending a corner of the lockstrip against it.

**6-17. INPUT-DRIVEN PRESSURE AND SCAVENGE PUMP, AND OUTPUT PUMP****a. Disassembly of Input Pump (B, foldout 7)**

(1) Remove four bolts 28 and lockwashers 29.

(2) Remove scavenge pump body assembly 30 and gasket 35.

(3) Remove scavenge pump gears 34 and needle roller 33 (roller 33 serves as a key for the scavenge pump drive gear).

(4) Remove separating plate assembly 36 and gasket 42.

(5) Remove driven gear 40 and drive gear 41.

(6) If parts replacement is necessary, remove bearing assemblies 32 from body 31. Removal destroys bearing assemblies 32.

(7) If parts replacement is necessary, remove dowel pins 37 and 39 from plate 38.

(8) If parts replacement is necessary, press bearing assemblies 44 from body 46. Also, remove tolerance rings 45 if necessary.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly of Input Pump (B, foldout 7)**

(1) If bearing assemblies 44 were removed, press new bearings into body 46. Start the bearings into the inner side of the body. Press on the

part-numbered end of the bearing shells, and locate them 0.090 inch below the inner surface of body 46. If tolerance rings 45 were removed, replace them. Press the rings into the pump body until they are flush with or below the surface.

(2) If dowel pins 37 and 39 were removed, press new pins into plate 38. Leave the pins projecting 0.19 inch from the front of the plate.

(3) If bearing assemblies 32 were removed, press new bearings into body 31. Start the bearings into the inner side of the body. Press on the part-numbered end of the bearing shells, and locate them 0.090 inch below the inner surface of body 31.

(4) Install drive gear 41, splined end first, into body assembly 43, through the thicker section of the body.

(5) Install driven gear 40, shorter shaft first, into body assembly 43.

(6) Install gasket 42 and plate assembly 36 onto body assembly 43.

(7) Install needle roller 33 into the groove in the shaft on drive gear 41. Install one gear 34 onto the same shaft.

(8) Install the remaining gear 34 onto the shaft of driven gear 40.

(9) Install gasket 35 and body assembly 30 onto plate assembly 36.

(10) Install four bolts 28, with lockwashers 29, to hold the pump components together. Tighten the bolts to 26 to 32 pound feet torque.

**c. Disassembly of Output Pump (B, foldout 16)****NOTE**

On earlier models the removal of the output pump incurred the use of a spacer which was used as a hydraulic plug for the pump exhaust port. Later models discontinued use of the spacer and the output pump.

(1) Remove nine flat-head screws 7.

(2) Remove cover 6, and gears 4 and 5 from body 3.

(3) Remove snapping 1 and oil pump spacer 8.

**NOTE**

Refer to paragraph 6-2, above.

**d. Assembly of Output Pump (B), foldout 16)**

(1) Install gears 4 and 5 into body 3.

(2) Lubricate the gears with transmission oil, and install cover 6.

(3) Retain cover 6 with nine flat-head screws 7.

(4) Install oil pump spacer 8 and retain with snapping.

## 6-18 TORQUE CONVERTER HOUSING

### NOTE

Some items referred to below do not apply to all models.

#### a. Disassembly (A, foldout 8)

(1) Remove five bolts 48 which retain ground sleeve 47 (bolts previously removed in CBT, CLBT, VCLBT models).

(2) Press ground sleeve 47 out the rear of housing assembly 12.

(3) Remove oil pump suction tube 44. Remove sealrings 43 and 45 from the tube.

(4) Remove plugs 15, 16, 19, 21, 22, 23, 24, 25, as necessary for cleaning.

(5) Remove dowel pins 17, 18 and 26 only if replacement is necessary.

(6) Do not remove orifice plug 14 (prior to S/N 30084), but be sure orifice is not restricted.

(7) Do not remove bolt 1 (B, foldout 7), but check it for tightness (bolt 1 not used on some models).

(8) On models equipped with an output-driven oil pump, spring 35 (A, foldout 8), valve 36 and guide 37 are included. If parts replacement is necessary, remove these parts by twisting guide 37 out of housing 13. On models without the pump, orifice plug 65 replaces the valve components. Remove the plug only if necessary.

(9) Remove sealring 38.

(10) Do not remove any other parts from housing 13.

### NOTE

Refer to paragraph 6-2, above.

#### b. Assembly (A, foldout 8)

(1) On models equipped with an output driven oil pump, install valve 36, convex side first, onto guide 37. Install spring 35 onto guide 37. Press guide 37 into its bore until it bottoms. If plug 65 was removed, install new plug, flat side first, into the housing. Press the plug flush with the housing splitline.

(2) Place sealring 38 in the housing bore, retaining it with oil-soluble grease. Install two

dowel pins 17, letting them project 0.50 inch from the rear of housing 13.

(3) Install two dowel pins 18 (if used), letting them project 0.44 inch from the side of housing 13.

(4) Install two dowel pins 26, letting them project 0.44 from the top of housing 13.

(5) Install plugs 15, 16, 19, 21, 22, 23, 24 and 25. Plugs 15, 16 and 19 must be flush with, or below, the surface when installed. Before installing apply sealant onto plugs.

(6) Install two sealrings 43 and 45 onto tube 44. Install Tube 44 into housing 13.

(7) Cool ground sleeve 47 in dry ice for at least 1 hour. Install two 1/2-13 headless guide bolts into housing 13. Install ground sleeve 47, making sure that its bolt holes aline with those in housing 13. Seat sleeve 47 solidly against housing 13. Remove the guide bolts.

(8) On CT and CLT models, install five bolts 48 to retain the ground sleeve. Tighten the bolts to 81 to 97 pound feet torque.

## 6-19. LOW-SPLITTER CLUTCH HUB

#### a. Disassembly (A, foldout 12)

(1) Remove snapping 21 after breaking the weld on it.

(2) Remove sun gear 23 from clutch hub 22.

(3) Remove snapping 18 and ball bearing assembly 19.

### NOTE

Refer to paragraph 6-2, above.

#### b. Assembly (A, foldout 12)

(1) Install ball bearing assembly 19 into sun gear 23. Retain it with snapping 18.

(2) Install sun gear 23, grooved end first, into the hubbed side of hub 22.

(3) Install snapping 21 and wedge it into its groove. Braze it as shown in figure 6-12.

## 6-20 SPLITTER PLANETARY CARRIER ASSEMBLY

#### a. Disassembly (B, foldout 12)

(1) Remove snapping 8 from carrier 6.

(2) Pressing on the smaller ends of spindles 10, remove four spindles and four steel balls 9.

(3) Remove four pinions 3, four thrust washers 2, four bearing assemblies 4, and four thrust washers 5.



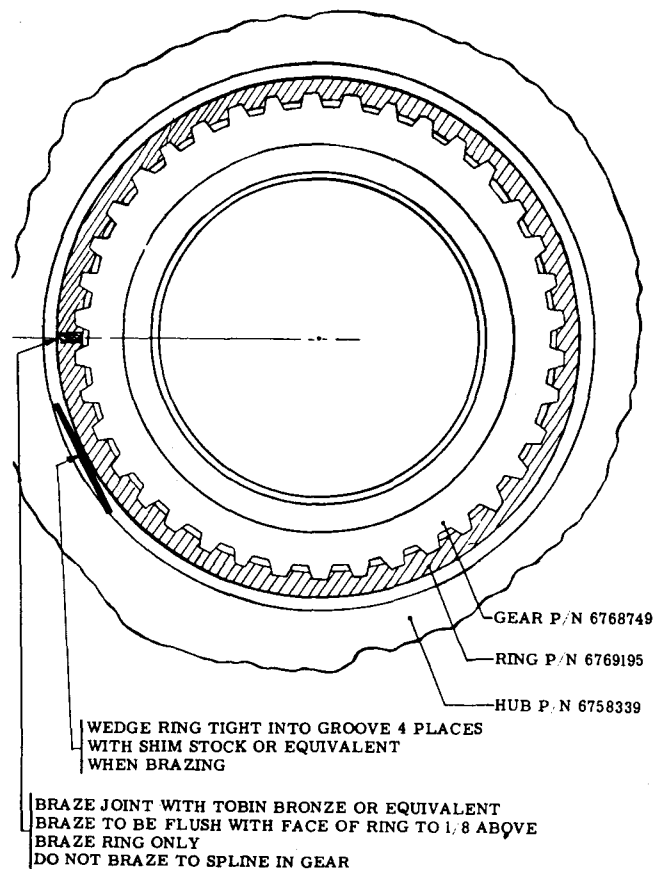


Fig. 6-12. Braze instructions for splitter sun gear snapping

8493

(4) Do not remove oil shield 7 unless replacement is necessary.

#### NOTE

Refer to paragraph 6-2, above.

#### b. Assembly (B, foldout 6-2, above.)

#### NOTE

Chill spindles 10 in dry ice for 1 hour prior to assembly, or heat carrier 6 in an oil bath or oven to 400°F.

(1) If oil shield 7 was removed, install a new one. Press it, convex side first, into the rear of carrier 6 until it seats.

(2) Install a bearing assembly 4 into each pinion 3. Pinions must be replaced in matched sets — never individually.

(3) Install a washer 2 and a washer 5 onto each pinion, retaining them with oil-soluble grease.

(4) Install the four assembled pinion groups into carrier 6 (carrier positioned rear downward).

#### NOTE

Improper alinement of pinion pin 10 during installation may distort the cage of needle

bearing 4, causing early bearing failure and extensive damage to mating parts.

(5) To insure proper alinement make a pinion pin alining tool 2 1/2 inches long by 1 1/4 inches outside diameter (fig. 6-13).

(6) Install the alining tool into the carrier. Be sure the tool alines the pinion group (items (2), (3), (4), above) with the upper and lower holes in carrier 6. Leave the alining tool in place, and allow the spindle to displace the tool during installation.

(7) Install a steel ball 9 into each spindle 10, retaining them with oil-soluble grease.

(8) Start spindle 10 into carrier 6. Aline steel balls 9 with the ball recesses in the carrier. Press the spindles until the larger ends are flush with the area adjacent to the bore into which the spindles fit. If chilled spindles were installed, apply a coating of oil onto each spindle to inhibit rust.

(9) Install snapping 8.

### 6-21. HYDRAULIC RETARDER HOUSING ASSEMBLY

#### a. Disassembly (A, foldout 11)

(1) Remove snapping 27, guide assembly 28, spring 31 and valve 32.

(2) Remove plugs 18 and 19.

(3) Remove dowel pins 20 only if replacement is necessary. Remove sealring 33.

#### NOTE

Refer to paragraph 6-2, above.

#### b. Assembly (A, foldout 11)

(1) If dowel pins 20 were removed, install two new pins, letting them project 0.50 inch from the rear of housing 17.

(2) Install plugs 18 and 19.

(3) Install spring 31 onto guide assembly 28. Install primary converter pressure regulator valve 32, concave side against spring 31. Install the assembled parts into housing 17. Retain them with snapping 27.

(4) Install sealring 33. Retain sealring with oil-soluble grease.

### 6-22. LOW-SPLITTER CLUTCH DRUM ASSEMBLY

#### a. Disassembly (A, foldout 12)

(1) Remove snapping 17, back plate 16, two clutch plates 14, and clutch plate 15.

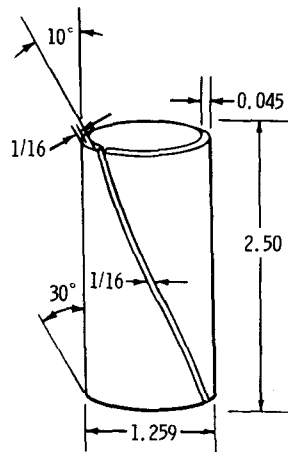


Fig. 6-13. Guide for installing pinion pin

(2) Install the improvised tool, shown in figure 4-3. Tighten the nut on the tool to compress the Belleville spring (fig. 6-14). Remove snapping 13 (A, foldout 12). Remove the tool, and remove spring 12.

(3) Remove sealring and expander assembly 24 (used prior to S/N 49007) or lip-type sealring 8 (used after S/N 49006), from drum 6. Remove piston inner seal ring 7 from drum 6 (refer to para 6-25).

(4) Remove two Teflon step-joint sealrings 1 from the hub of drum 6. Earlier models use hook-type sealrings in this location.

(5) Do not remove dowel pins 5. Do not remove collector ring 3 unless parts replacement is necessary.

#### NOTE

Refer to paragraph 6-2, above.

#### b. Assembly (A, foldout 12)

(1) If collector ring 3 was removed, install a new ring as illustrated in figure 6-14.

#### NOTE

Prior to S/N 24276, there is a second external groove in the clutch drum, with a sealring in it. The sealring should be discarded and not replaced.

(2) To secure collector ring 3 (A, foldout 12) to drum 6, the ring must be depressed into the groove in the drum. Use a 1/8-inch round steel rod, tangent to and against the ring, aligned with the groove (0.415 inch from shoulder on the drum) as a forming tool. Hammer on the rod and force the ring into the groove at four points around the circumference. Then complete the forming opera-

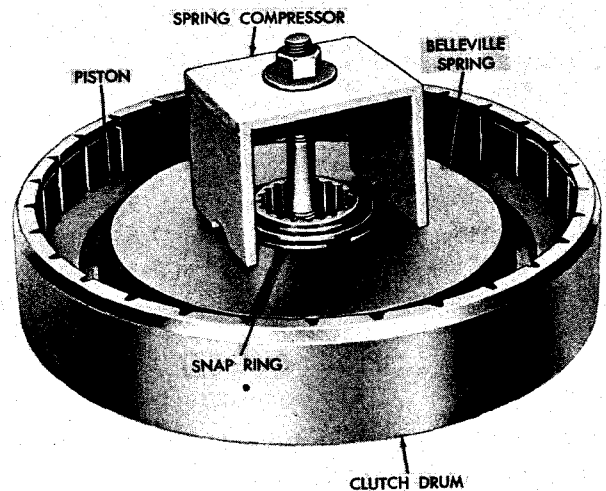


Fig. 6-14. Compressing low-splitter, or high-range clutch spring

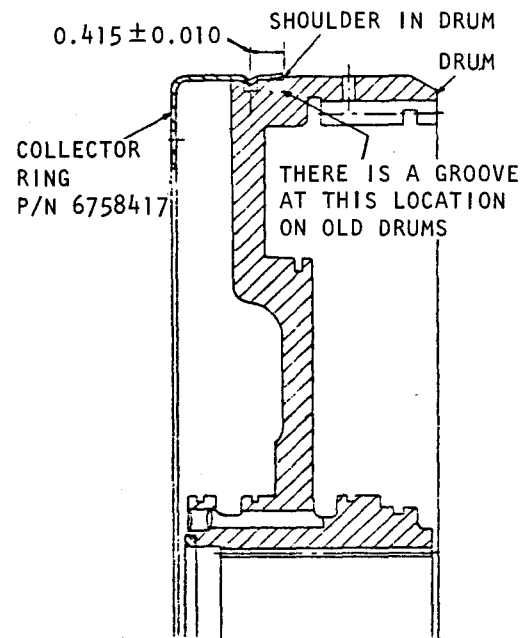


Fig. 6-15. Assembly of collector ring to clutch drum

tion by forcing the ring metal into the groove around the entire circumference. The depression must be uniform, and should not exceed 0.070 depth.

(3) Install two step-joint sealrings 1 (A, foldout 12) into grooves in the front hub of drum 6. New sealrings may require forming by wrapping them, for a few seconds, around an object about 2/3 the diameter of the groove. Use oil-soluble grease in the grooves to retain the sealrings.

**NOTE**

Older models use metal, hook-type sealrings. These should be replaced with the Teflon, step-joint type.

(4) Install piston inner seal ring 7 into the groove in drum 6. Into the outer groove of piston housing 6, install sealring and expander assembly 24 (used prior to S/N 49007). Install lip-type sealring 8 (after S/N 49006). Make sure the lip of the sealring is facing the piston (away from housing cavity). Refer to paragraph 6-25, below, for methods of installing Teflon sealrings and expanders.

(5) Install piston assembly 9 (A, foldout 12) into drum assembly 2.

(6) Install return spring 12, cupped side first, onto the piston.

(7) Using the tool shown in figures 4-3 and 6-13, install snapping 13 (A, foldout 12). Remove the tool.

### 6-23. REAR BEARING RETAINER ASSEMBLY (STRAIGHT-THROUGH MODELS)

#### a. Disassembly (A, foldout 17)

These procedures cover two types of assemblies. One type 17 (A, foldout 17) has no provision for speedometer drive. The other type 47 includes bushing 51. Remove only items requiring replacement.

(1) Remove baffle 18 or 48 from retainer 20 or 50.

(2) Remove oil seal 19 or 49 from retainer 20 or 50.

(3) Remove bushing 51 from retainer 50.

(4) Remove pipe nipple 21 or 52 from retainer 20 or 50.

**NOTE**

Refer to paragraph 6-2, above.

#### b. Assembly (A, foldout 17)

(1) Install bushing 51 into retainer 50. Seat the shoulder on the bushing in the counterbore in the retainer.

(2) Press seal 19 or 49, spring-loaded lip first, into the rear of retainer 20 or 50. In retainer 20, the rear side of the seal is located 1.28 inches from the extreme rear surface of the retainer. For seal 49 in retainer 50, this dimension is 1.50 inches.

(3) Install baffle 18, smaller inner diameter first, into the rear of retainer 20. The rear of the baffle is located 0.070 inch below the extreme rear surface of retainer 20.

(4) Install baffle 48 into retainer 50 in the same manner (see (3), above), except that its rear side is located flush with the counterbore at the rear of the retainer bore.

(5) Install pipe nipple 21 or 52 into retainer 20 or 50.

### 6-24. OUTPUT DRIVE HOUSING ASSEMBLY

The procedures below apply to three assemblies which differ only slightly. Housing assembly 2 (A, foldout 17) is used on transmissions beginning with S/N 20549, and earlier transmissions with -V suffix after the assembly number on the nameplate. Housing assembly 37 is used on assemblies prior to S/N 20549 except those marked -V and those using a splined output coupling. Housing assembly 5 (B, foldout 17) is used only on assemblies using coupling 12.

#### a. Disassembly (A and B, foldout 17)

(1) Remove piston 21 (A, foldout 16) with lip-type sealring 22 (seal and expander assemblies 24 were used in earlier models), from housing 6 or 40 (A, foldout 17) or from housing 7 (B, foldout 17).

(2) Remove the lip-type seal 22 (A, foldout 16) or seal and expander 24 from piston 21, as outlined in paragraph 6-25, below. Remove lip-type sealring 23 (A, foldout 16) or sealring and expander 25 from housing 6 or 40 (A, foldout 17) or from housing 7 (B, foldout 17).

(3) Remove dowel pins 4 or 38 (A, foldout 17) and pins 5 or 39, if replacement is necessary.

(4) Remove bushing 7 from housing 6, if replacement is necessary.

(5) Remove plugs 22 or 53 as necessary for cleaning.

(6) Remove snapping 2 (B, foldout 17) from housing 7. Remove bearing assembly 3.

(7) Remove oil seal assemblies 4 from housing 7.

(8) Remove dowel pins 6 from housing 7, if replacement is necessary.

(9) Remove plugs 8 and 9 from housing 7, as necessary for cleaning.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A and B, foldout 17)**

(1) Install plugs 8 and 9 (B, foldout 17) into housing 7.

(2) Install two dowel pins 6 into housing 7, letting them project 0.50 inch at the front of the housing.

(3) Install ball bearing assembly 3 into housing 7, and retain it with snapping 2.

(4) Install two oil seal assemblies 4 into the rear of housing 7. The spring-loaded lip on the first seal assembly installed must be toward the front. The spring-loaded lip on the second seal assembly installed must be toward the rear. Install the seals back-to-back (lips away from each other), and press them in until the second (rear) seal is just slightly past the chamfer in the housing bore.

(5) On models equipped with an output-driven oil pump, install dowel pin 4 or 38 (A, foldout 17) into housing 6 or 40. Press it to the bottom.

(6) Install two dowel pins 5 or 39 into housing 6 or 40. Leave them extending 0.50 inch from the front of the housing.

(7) Install plugs 3 and 22, or plugs 53 into housing 6 or 40.

(8) Install lip-type sealring 23 (A, foldout 16), (seal and expander 25 on earlier models) into the groove at the front of housing 6 or 40 (A, foldout 17) or housing 7 (B, foldout 17). Make sure the lip of the seal is facing the rear cover (rearward).

(9) Place lip-type sealring 22 (A, foldout 16) on outside diameter groove of reverse piston 21. (Use seal and expander 24 on earlier models). Install piston 21 into the front of housing 6 or 40 (A, foldout 17), or housing 7 (B, foldout 17).

**NOTE**

Sealring and expander assemblies and lip-type rings are not interchangeable. Refer to paragraph 6-25 for installation of seals and expanders.

**6-25. TEFLON SEALRINGS AND EXPANDERS****a. Applies to All Clutches**

(1) These instructions apply to the installation of Teflon sealrings and their expanders regardless of the clutch in which they are used.

(2) All rebuild paragraphs in this section which involve sealrings and expanders are referenced to this paragraph for removal and installation.

**b. Removal**

(1) If the sealring is to be reused, be careful to avoid stretching, scratching or deforming it during removal. Insert a thin, bladed tool into the sealring groove, and work one edge of the sealring out, where it can be grasped with the fingers.

**WARNING**

Do not dispose of Teflon sealrings by burning. Toxic gases are produced.

(2) Remove the sealring expander. Clean the groove thoroughly, and make sure there are no burs or rough spots in the groove sides or bottom.

**NOTE**

Earlier type (polyacrylate) seals may be replaced with Teflon seals and expanders. Teflon seals and expanders must be replaced with identical items.

**c. Installation**

(1) Coil the expanders as shown in figure 6-15. Inspect the ends for curvature toward the bottom of the groove (inward for external grooves; outward for internal grooves).

(2) Install the expander into the groove.

(3) Starting at a point opposite the open ends of the expander, install the Teflon sealring.

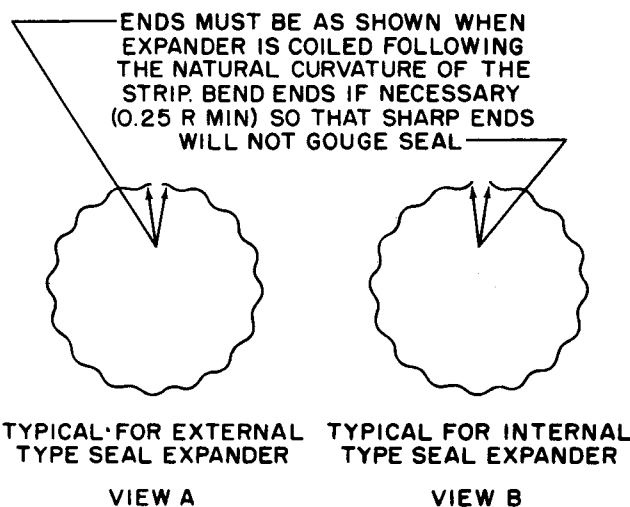


Fig. 6-16. Typical expander for Teflon sealring

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Do not stretch or deform the sealring more than absolutely necessary for installation. Work both directions from the starting point until the sealring is completely installed. Do not use tools to force the sealring—use fingers only.

(4) Lubricate the sealring, and center it radially in respect to the piston or part on which it is installed. This will aid installation of the piston into its bore.

## 6-26. REVERSE-RANGE PLANETARY CARRIER ASSEMBLY.

### a. Disassembly (A, foldout 16)

(1) Remove six self-locking bolts 2 and washer 3. Remove retainer 4. (Earlier models used tab washers with standard bolts.)

(2) Remove ring gear 6.

(3) Position carrier assembly 7, hub upward, in a press, and remove six spindles 13 and steel balls 14.

(4) Remove six pinion groups, each consisting of pinion 11, twenty-four rollers 12, two spacers 10, and two thrust washers 9. Place each group in a separate container.

(5) Remove ball bearing assembly 15 only if replacement is necessary.

### NOTE

Refer to paragraph 6-2, above.

### b. Assembly (A, foldout 16)

### NOTE

Chill spindles 13 in dry ice for 1 hour prior to assembly, or heat carrier 8 in an oil bath or oven to 400°F.

(1) Make a pinion alining tool by grinding a used spindle 13 to 0.005-inch undersize, or by polishing a 4-inch length of 1-1/4-inch cold rolled steel shafting. The alining tools should have a slight chamfer at one end.

(2) Install one washer 9, and one spacer 10 onto the pinion alining tool.

### NOTE

(Pinions must be replaced in matched sets—never individually.)

(3) Coat the bore of a pinion 11 with oil-soluble grease, and install the pinion on the alining tool.

(4) Install 24 rollers 12 into the space between the alining tool and the pinion bore.

(5) Install another spacer 10, and washer 9 onto the alining tool.

(6) Grasp the assembled pinion group to hold its parts in place, and remove the alining tool. Install the pinion group into carrier 8, positioned hub downward.

(7) Repeat procedures (2) through (6), above, for the remaining five pinion groups. Aline each pinion group with its spindle bore in the carrier by inserting the pinion alining tool. Leave the alining tool in place, and allow the spindle to displace the tool during installation.

(8) Position carrier 8, hub downward, in a press. Start a spindle 13 into one of the spindle bores. The recess in the spindle, into which ball 14 fits, must aline with the matching recess in the carrier.

(9) Before pressing the spindle into the carrier, install ball 14 into its recess in spindle 13. Use oil-soluble grease to retain it.

(10) Repeat procedures (8) and (9), above, for the remaining five spindles. Press each spindle to a firm seat in carrier 8.

(11) Install ring gear 6, counterbored end first, onto carrier assembly 7.

(12) Install retainer 4 onto carrier 8, alining the retainer's internal tangs with spindles 13, and the bolt holes with the tapped holes in the carrier.

(13) Install six 3/8-24 × 5/8 self-locking bolts 2. Tighten the bolts 41 to 49 pound feet torque. If plain bolts (with tab washers) are used, tighten to 33 to 40 pound feet torque. Bend the tab washers to retain the bolts. If chilled spindles were installed, apply a coating of oil onto the spindles to inhibit rust.

(14) If bearing assembly 15 was removed, install the bearing assembly. Press on the inner race until the bearing assembly is seated against the shoulder on the hub of carrier 8.

## 6-27. LOW-RANGE PLANETARY CARRIER ASSEMBLY

### a. Disassembly (A, foldout 15)

(1) Remove internal snapping 7 from carrier 8.

(2) Position carrier assembly 6, hub upward, in a press. Press spindles 13 out of carrier 8. Remove steel balls 14, which are free when spindles 13 are removed.

### NOTE

CBLT 5865 models have five spindles 13. All other models have four spindles.

(3) Remove pinion 11, bearing 10, and thrust washers 9 and 12 from each pinion location (earlier models included two spacers and 28 rollers instead of bearing 10 in each pinion.)

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 15)****NOTE**

Chill spindles 13 in dry ice for 1 hour prior to assembly, or heat carrier 8 in an oil bath or oven to 400°F.

(1) The pinions, bearings, spacers and thrust washers are different in earlier models of both 4-pinion and 5-pinion carrier assemblies. The earlier models use 28 individual rollers, 2 spacers and 2 bronze thrust washers at each pinion location. Current models use a caged bearing assembly and 2 fiber thrust washers at each pinion location.

(2) When servicing the early carriers, only the rollers, spacers and bronze thrust washers are available as repair parts. If other parts are required, the newer pinions, caged bearings and fiber thrust washers must be installed—completely replacing all older parts, at all pinion locations. If one or more pinions require replacement, replace as a complete set—never individually. Do not mix earlier and current parts of pinion groups. Do not mix new and used pinion bearings.

(3) In earlier models (with separate rollers) coat the bore of a pinion 11 with oil-soluble grease. Install 28 rollers into the bore. Install a steel spacer at each end of the pinion bore. Install a bronze thrust washer, retained by oil-soluble grease, onto each end of the pinion. Prepare the remaining pinion groups in the same manner.

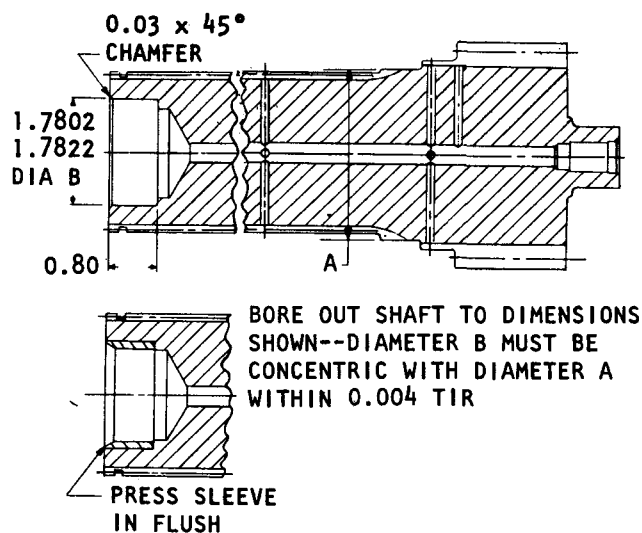


Fig. 6-17. Rework of splitter output shaft bore

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**NOTE**

Check to ensure that bearing 10 has a machined-type cage. Refer to SPI 10-TR-75 in current Parts Catalog SA 1077.

(4) In current models (with caged bearings), lubricate bearing 10 and fiber thrust washers 9 and 12 with oil-soluble grease. Install bearing 10 into the bore of pinion 11. Install a fiber thrust washer 9 or 12 onto each end of the pinion. Prepare the remaining pinion groups in the same manner.

(5) Position planetary carrier 8, hub downward, in a press. Support the area adjacent to each spindle bore.

(6) Place a pinion group, as assembled in (3) and (4), above, into the carrier. Aline the pinion group with the spindle bore in the carrier. Leave the alining tool in place, and allow the spindle to displace the tool during installation.

(7) Start a spindle 13 into a carrier spindle bore, alining the ball recess in the spindle with its matching recess in the carrier.

(8) Install a ball 14 into the recess in the spindle, retaining the ball with oil-soluble grease. Press the spindle until it seats firmly in the carrier.

(9) Repeat steps (6), (7) and (8) for the remaining pinion groups and spindles. If chilled spindles were installed, apply a coating of oil onto the spindles to inhibit rust.

(10) Install internal snapping 7 into carrier 8.

## 6-28. SPLITTER OUTPUT SHAFT ASSEMBLY

**a. Disassembly (A, foldout 15)**

(1) Remove orifice 3 only if replacement is necessary.

(2) Inspect the bore at the front end of shaft 2 for wear and scoring. The bore of a new shaft is 1.500 to 1.502 inches, to a depth of 0.800 inch. If the bore is excessively worn or scored, it may be reworked by installing sleeve 33 (refer to b(1) and (2), below).

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 15)**

(1) If the front bore of shaft 2 is worn or scored (refer to a(2), above), rework the bore to dimensions shown in figure 6-16.

(2) Chill sleeve 33 (A, foldout 15) in dry ice. Install it, internal chamfer out, and press it to flush with the front of shaft 2.

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(3) If orifice 3 was removed, install a new orifice. Press it, open-end first, into the rear bore of shaft 2 until it projects 0.22 to 0.28 inch from the end of the shaft.

(4) Install oil collector ring 12 (B, foldout 15), convex side first, onto the front of shaft assembly 1 (A, foldout 15).

(5) Install bearing assembly 10 (B, foldout 15), with snapring installed, snapring first, onto the front of shaft assembly 1 (A, foldout 15). Press the inner race of the bearing assembly to a seat against the shoulder on the shaft.

(6) Press bearing 4 onto the rear of shaft 2.

## 6-29. INTERMEDIATE-RANGE PLANETARY CARRIER ASSEMBLY

### a. Disassembly (B, foldout 15)

(1) Position carrier assembly 2, splined end downward, in a press. Press out six spindles 4, removing balls 5 which are free when the spindles are removed.

(2) Remove the six pinion groups, each consisting of two washers 6, two spacers 7, twenty-four rollers 8, and one pinion 9. Place each pinion group in a separate container.

#### NOTE

Refer to paragraph 6-2, above.

### b. Assembly (B, foldout 15)

#### NOTE

Chill spindles 4 in dry ice for 1 hour prior to assembly.

(1) Make a pinion alining tool as outlined in paragraph 6-26b(1), above.

(2) Install a washer 6 onto the alining tool. Install a spacer 7 onto the alining tool.

#### NOTE

Pinions 9 must be replaced only in matched sets—never individually.

(3) Coat the bore of a pinion 9 with oil-soluble grease, and install it onto the pinion alining tool.

(4) Install twenty-four rollers 8 into the space between the alining tool and the bore of pinion 9.

(5) Install another spacer 7, and another washer 6 onto the alining tool and pinion 9.

(6) Grasp the pinion group to hold it together, and remove the alining tool. Install the pinion group into carrier 3, positioned with its splined end upward.

(7) Repeat procedures (2) through (6), above, for the remaining three pinion groups.

(8) Position carrier 3, splined end upward, in a press. Aline the pinion groups in the carrier by inserting the pinion alining tool in each spindle bore.

(9) Start a chilled spindle 4 into carrier 3, alining its recess into which ball 5 fits, with the ball recess in carrier 3. Install ball 5 into the ball recess in spindle 4, retaining it with oil-soluble grease.

(10) Press spindle 4 into carrier 3 until it seats firmly in the carrier.

(11) Repeat procedures (9) and (10), above, for installation of the three remaining spindles 4 and balls 5.

## 6-30. HIGH-RANGE CLUTCH DRUM ASSEMBLY

### a. Disassembly (B, foldout 13)

(1) Remove two step-joint Teflon sealrings 1 from the hub of drum 4.

#### NOTE

Metallic hook-type sealrings are used on older models.

(2) Using the tool shown in figure 4-3, compress the Belleville spring in the high-range clutch drum assembly (fig. 6-13).

(3) Remove the snapring retaining the Belleville spring, and remove the spring (fig. 6-13).

(4) Remove the high-range clutch piston (fig. 6-13).

(5) Remove lip-type sealring 6 (B, foldout 13). If the piston housing is equipped with sealring and expander assembly 16, remove from piston housing as outlined in paragraph 6-25, above.

(6) Remove piston inner sealring 5 from the rear hub of drum 4.

(7) Do not remove dowel pins 3 from drum 4.

#### NOTE

Refer to paragraph 6-2, above.

### b. Assembly (B, foldout 13)

(1) Install piston inner sealring 5 onto the rear hub of drum 4.

(2) Install lip-type sealring 6 onto drum 4. Make sure the lip of the seal is facing the piston (rearward). (Earlier models used seal and expander assemblies—refer to paragraph 6-25, above.)



**NOTE**

Lip sealring and sealring and expander assemblies are not interchangeable.

(3) Install the piston assembly into clutch drum assembly 2. The flatter side of the piston must be toward the drum.

(4) Install piston return spring 10, concave side first, onto piston 9.

(5) Using the tool shown in figure 4-3, compress the spring (fig. 6-13). Install the snapping which retains the spring. Remove the tool.

(6) Install two step-joint Teflon sealrings 1 (B, foldout 13) into grooves in the front hub of drum 4. (earlier models used metallic hook-type sealrings). Retain them with oil-soluble grease.

**NOTE**

New Teflon sealrings may require pre-forming by wrapping them, for a few seconds, around a circular object two-thirds the diameter of the sealring groove.

**6-31. SPLITTER RING GEAR AND HUB**

**a. Disassembly** (B, foldout 12 and A, foldout 13)

(1) Remove bearing assembly 20 (A, foldout 13) from hub 14 (B, foldout 12). Remove retainer 21 (A, foldout 13).

(2) Remove snapping 15 (B, foldout 12) from ring gear 12. Remove hub 14 from gear 12.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly** (B, foldout 12 and A, foldout 13)

(1) Install hub 14 (B, foldout 12) into the rear of ring gear 12. Retain it with snapping 15.

(2) Install retainer 21 (A, foldout 13), convex side first, onto hub 14 (B, foldout 12).

(3) Install bearing assembly 20 (A, foldout 13) onto the hub, pressing it against the shoulder on the hub.

**6-32. HIGH-SPLITTER CLUTCH PISTON AND HOUSING**

**a. Disassembly** (B, foldout 12)

(1) Remove piston 23, with sealring and expander assemblies 27 and 28 (used prior to S/N

49007), or lip-type sealrings 22 and 24 (after S/N 49006) from housing 26.

(2) Refer to paragraph 6-25, above, for removal of sealrings and expanders.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly** (B, foldout 12)

(1) Install sealring and expander assemblies 27 and 28 (used prior to S/N 49007), or lip-type sealrings 22 and 24 (after S/N 49006) onto piston 23 as outlined in paragraph 6-25, above. Make sure the lips of the sealrings face the piston housing (rearward).

(2) Install piston 23, with lip-type sealrings or sealrings and expanders, whichever was removed in **a**, above, into housing 26.

**NOTE**

Lip-type sealrings, and sealrings and expanders are not interchangeable.

**6-33. TRANSMISSION HOUSING ASSEMBLY**

**a. Disassembly** (A, foldout 13)

(1) Remove snap ring 3, valve seat 4, valve 5 and valve spring 6.

(2) Remove valve pin 18 only if replacement is necessary. It is a press fit and must be pulled out (refer to (6), below).

(3) Remove breather 7 and bushing 19.

**NOTE**

Earlier models have a breather which is pressed into housing 15, and do not include bushing 19.

(4) Remove oil transfer hub 26 only if replacement is necessary. Press or drive it toward the rear of housing 15 to remove it.

(5) Do not remove tubes 16 or 17, if used, from housing 15.

(6) Note that some housings include a second pin 18, at the lower-left front. This pin has no function in the models covered in this manual.

(7) If a straight-through transmission is equipped with oil sight gage 27, remove the gage. Remove two washers 28 and plugs 29 if gage 27 is not used.

**NOTE**

Refer to paragraph 6-2, above.

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**b. Assembly (A, foldout 13)**

(1) If oil transfer hub 26 was removed, align its bolt holes with those in housing 15, and press or drive the hub into the rear side of the partition in the housing.

**NOTE**

Chilling hub 26 in dry ice, and the use of two 1/2-20 x 3 headless guide bolts, screwed into opposite holes in the hub, will aid in installation.

(2) Install bushing 19 and breather 7.

**NOTE**

Earlier models have a breather which is pressed into housing 15, and do not use bushing 19.

(3) If valve pin 18 was removed, press a new pin into its bore until it is 0.080 to 0.120 inch below the front surface of housing 15. The location of this pin in all models is at the upper-right front. Disregard the lower-left front location.

(4) Install valve spring 6 onto pin 18 (upper-right front location). Install converter pressure relief valve 5, cupped side first, onto pin 18.

(5) Install valve seat 4 into housing 15, against valve 5. The edge of the bore of seat 4 should be sharp and square. If the same seat is being reused, it may be reversed when installing it to make use of the unworn edge.

(6) Install snapping 3 to retain seat 4.

(7) Install sight gage 27 or washers 28 and plugs 29, if removed. Tighten the threaded fasteners sufficiently to prevent leakage.

**6-34. REAR BEARING RETAINER ASSEMBLY (TRANSFER CASE MODELS)****a. Disassembly (B, foldout 18)**

(1) Remove pipe nipple 47 from retainer assembly 38.

(2) Remove oil baffle 41 and oil seal 40 from retainer 39.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (B, foldout 18)**

(1) Install oil seal 40, spring-loaded lip first, into retainer 39. Locate the rear of the seal 1.50 inches from the rear of retainer 39.

(2) Install oil baffle 41, smaller inside diameter first, into retainer 39. Locate its rear edge

flush with, to 0.030 inch below, the inner end of the counterbore in retainer 39.

(3) Install pipe nipple 47 into retainer assembly 38.

**6-35. TRANSFER DRIVE GEARS****a. Disassembly (B, foldout 18; A, foldout 19)**

(1) On models which have the vertical dropbox, remove bearing assemblies 1 and 3 (B, foldout 18) from gear 2.

(2) On models which have the horizontal dropbox (A, foldout 19) remove bearing assemblies 38 and 40 from gear 39.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (B, foldout 18; A, foldout 19)**

(1) On models which have the vertical dropbox, install bearing assemblies 1 and 3 (B, foldout 18) onto gear 2. Press the inner races of the bearing assemblies against the shoulders on the gear.

(2) On models which have the horizontal dropbox, install bearing assemblies 38 and 40 (A, foldout 19) onto gear 39. Press the inner races of the bearing assemblies against the shoulders on the gear.

**6-36. TRANSFER IDLER GEARS****a. Disassembly (B, foldout 18; A, foldout 19)**

(1) On models which have the vertical dropbox, remove bearing assemblies 25 and 29 (B, foldout 18) from gear assembly 26. Do not remove speedometer drive plug 27 from gear 28.

(2) On models which have the horizontal dropbox, remove bearing assemblies 41 and 43 (A, foldout 19) from gear 42.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (B, foldout 18; A, foldout 19)**

(1) On models which have the vertical dropbox, install bearing assemblies 25 and 29 (B, foldout 18) onto gear assembly 26. Press the inner races of the bearing assemblies against the shoulders of the gear.

(2) On models which have the horizontal dropbox, install bearing assemblies 41 and 43 (A, foldout 19) onto gear 42. Press the inner races of the bearing assemblies against the shoulders of the gear.

## 6-37. OUTPUT SHAFTS

### a. Disassembly (vertical dropbox) (B, foldout 18)

(1) On all vertical dropbox models, support the inner race of bearing assembly 7 (A, foldout 18) and press shaft 49, 50 or 51 (B, foldout 18), out of the bearing assembly. Remove spacer 48 from the shaft.

(2) On models which use shaft 52 or 53 (with front disconnect assembly), remove needle bearing assembly 49 (A, foldout 18) only if replacement is necessary. Removal will destroy the bearing assembly.

### b. Disassembly (horizontal dropbox) (A, foldout 19)

(1) Support the inner race of ball bearing assembly 25 and press output shaft assembly 50 out of it. Remove spacer 26.

(2) Do not remove shaft 51 from gear 52 unless parts replacement is necessary.

#### NOTE

Refer to paragraph 6-2, above.

### c. Assembly (vertical dropbox) (B, foldout 18)

(1) On models which use shaft 52 or 53 (with front disconnect assembly), install needle bearing assembly 49 (A, foldout 18) by pressing on the numbered end of the bearing shell. Locate the bearing assembly flush with, to 0.010 inch below the front end of shaft 52 or 53 (B, foldout 18).

(2) On all models with vertical dropbox, install spacer 48 onto shaft 49, 50 or 51. Install bearing assembly 7 (A, foldout 18). The snapping groove in the outer race must be opposite the side of the bearing which seats on spacer 48 (B, foldout 18).

### d. Assembly (horizontal dropbox) (A, foldout 19)

(1) If shaft 51 was removed from gear 52, install the unsplined end of the shaft into the front of gear 52. Press the shaft in until the larger splines of the shaft are flush with, to 0.020 inch above the front of the hub of gear 52.

(2) Install spacer 26 onto the front of shaft assembly 50. Press ball bearing assembly 25 onto shaft assembly 50, until the inner race seats on spacer 26. The snapping groove in the outer race

of bearing assembly 25 must be opposite the side of the bearing inner race which seats against spacer 26.

## 6-38. TRANSFER GEAR HOUSING ASSEMBLY

#### NOTE

The transfer gear housing when removed, will include all of the front output components, some of which may be rebuilt as outlined in subsequent paragraphs.

### a. Disassembly (vertical type) (A, foldout 18)

(1) Remove reverse-range clutch piston 21 (A, foldout 16), with lip-type seal ring 22, from the front of housing 10 (A, foldout 18). Earlier models used sealring and expander assembly 24 (A, foldout 16). Refer to paragraph 6-25, above, for removal of sealring and expander assembly.

(2) Remove piston inner sealring 23 (A, foldout 16) from the housing (seal and expander 25 used prior to S/N 49007).

(3) On assemblies which include a front output disconnect (items 36 through 59 — A, foldout 18), remove six bolts 56 and lockwashers 55. Remove the disconnect assembly and gasket 53, adapter 52 and gasket 51. Refer to paragraph 6-39, below, for rebuild of the disconnect assembly.

(4) On the same models, remove shaft 52 or 53 (B, foldout 18) and spacer 48, with bearing assembly 7 (A, foldout 18). Refer to paragraph 6-37a and c above, for rebuild of the shaft assembly.

(5) On models which have only a flange at the front, remove nut 30 (A, foldout 18) and flange 29, or remove bolts 31, lockstrip 32, retainer washer 33, shims 34 (if used) and flange 35. If the flange is interference fit, refer to paragraph 4-8.

(6) On the same models, remove six bolts 1 (A, foldout 18), lockwashers 2, retainer 4 and gasket 5. Remove oil seal 3 from retainer 4, if replacement is necessary.

(7) Remove shaft 49, 50 or 51 (B, foldout 18) with spacer 48 and bearing assembly 7 (A, foldout 18). Refer to paragraph 6-37, above, for rebuild.

(8) If not previously removed, remove six bolts 21 (A, foldout 18), washers 20, oil strainer 19 and gasket 18.

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(9) Remove twenty bolts 28, washers 27, two covers 26 and gaskets 25.

(10) Do not remove other parts from the transfer housing unless parts replacement is necessary.

**NOTE**

Refer to paragraph 6-2, above.

**b. Disassembly (horizontal type) (A, foldout 19)**

(1) Remove reverse-range clutch piston 21 (A, foldout 16), with lip-type sealring 22, from the front of housing 30 (A, foldout 19). Earlier models use sealring and expander assembly 24 (A, foldout 16). Refer to paragraph 6-25, above, for removal of sealring and expander assembly.

(2) Remove piston inner sealring 23 (A, foldout 16) from housing 30 (A, foldout 19). Earlier models use seal and expander 25 (A, foldout 16) — refer to paragraph 6-25 for removal.

(3) Remove two bolts 1 (A, foldout 19), lockstrip 2, retainer washer 3, shims 5 (if used) and flange 4. If the flange is interference fit, refer to paragraph 4-8.

(4) Remove two bolts 13 (A, foldout 19), washers 14, sleeve assembly 15, washer 19, gasket 20, and shaft and gear 21 from retainer 9.

(5) Remove eight bolts 11, washers 12, retainer assembly 6, gasket 23, and drive gear 24. Refer to paragraph 6-40, below, for rebuild of the retainer assembly.

(6) Remove shaft assembly 50 (A, foldout 19) by driving shaft 51, with a soft hammer, out of bearing assembly 25. Remove spacer 26 from shaft 51. Remove bearing assembly 25 from housing 30. Refer to paragraph 6-37, above, for rebuild of the shaft assembly.

(7) If bearing assembly 25 (A, foldout 19) fits shaft 51 too tightly to allow the shaft to be easily driven out, remove the snapping from the bearing assembly. This will permit removal of bearing assembly 25, spacer 26, shaft 51 and gear 52 as a unit.

(8) Do not remove the remainder of the components from housing 30 unless parts replacement is necessary.

**NOTE**

Refer to paragraph 6-2, above.

**c. Assembly (vertical type) (A, foldout 18)**

(1) Install minor parts which may have been removed from housing 10. If dowel pins 9 were removed, install new pins, letting them project 0.50 inch from the front of housing 10.

(2) Install two gaskets 25 and two covers 26. Retain each cover with ten bolts 28, and lockwashers 27. Tighten the bolts to 26 to 32 pound feet torque.

(3) Install gasket 18 and oil strainer 19. Retain the strainer with six bolts 21 and lockwashers 20. Tighten the bolts to 26 to 32 pound feet torque.

(4) Install shaft 49, 50 or 51 (B, foldout 18), assembled with spacer 48 and bearing assembly 7(A, foldout 18), less snapping, into housing 10. Install the snapping onto bearing assembly 7.

(5) When shaft 49, 50 or 51 (B, foldout 18) is used, install gasket 5 (A, foldout 18) and retainer 4. If oil seal 3 was removed from retainer 4, install a new seal, spring-loaded lip first, into the front of retainer 4. Press the seal in until its front edge is even with the chamfer in the retainer.

(6) Install six lockwashers 2 and bolts 1, to secure retainer 4. Tighten the bolts to 67 to 80 pound feet torque.

(7) Install flange 29 or 35 and retain it with nut 30 or bolts 31 and related parts 32, 33 and 34. Refer to paragraph 4-8 for installation instructions. Tighten the nut to 700 to 1000 pound feet torque; tighten the bolts to 96 to 115 pound feet torque.

(8) If shaft 52 or 53 (B, foldout 18), with an output disconnect (items 36 through 59 — A, foldout 18), is used, install gasket 51, adapter 52, gasket 53, and the output disconnect as assembled in paragraph 6-39b, below.

(9) Install six lock washers 55 (A, foldout 18) and bolts 56 to retain the disconnect assembly. Tighten the bolts to 67 to 80 pound feet torque.

**d. Assembly (horizontal type) (A, foldout 19)**

(1) Install minor parts which may have been removed from housing 30. If dowel pins 29 and 34 were removed, install new pins, letting them project 0.50 inch from the surfaces of housing 30.

(2) With the snapping removed from bearing assembly 25, install the output shaft assembly (as assembled in para 6-37, above), bearing end first, into housing 30.

(3) Install the snapping on bearing assembly 25.

(4) Position the housing, rear side downward (front of shaft 51 upward.)

(5) Install gear 24, smaller diameter first, onto shaft 51. Install gasket 23.

(6) Install bearing retainer assembly 6, positioning pipe nipple 22 so that it points downward (relative to the installed position of the transmission). Secure the retainer with eight 1/2-13 x 1 1/2-inch bolts 11 and lockwashers 12. Tighten the bolts to 67 to 80 pound feet torque.

(7) Install shaft and gear 21, gasket 20, washer 19 and drive sleeve assembly 15. Retain those parts with two bolts 13 and washers 14. Tighten the bolts to 13 to 16 pound feet torque.

(8) Install flange 4, shims 5, washer 3, lockstrip 2 and bolts 1. Refer to paragraph 4-8 for installation and shimming instructions. Tighten the bolts to 96 to 115 pound feet torque. Bend lockstrip 2 to retain the bolts.

### 6-39. OUTPUT DISCONNECT ASSEMBLY

#### a. Disassembly (A, foldout 18)

(1) Remove two bolts 31, lockstrip 32, retainer washer 33, shims 34 (if used) and output flange 35. If flange 35 is interference fit, refer to paragraph 4-8.

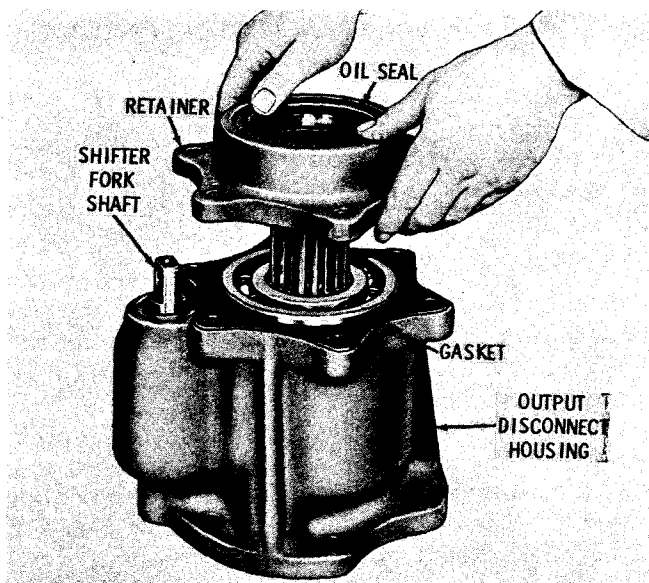


Fig. 6-18. Removing (or installing) bearing retainer

S1638

(2) Remove six bolts and lockwashers which secure the bearing retainer. Remove the retainer and gasket (fig. 6-17).

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

(4) Remove the shifter shaft by unscrewing it (counterclockwise), and lifting it out (fig. 6-18).

(5) Remove snapping 50 (A, foldout 18), bearing inner race 48 and thrust washer 46. If race 48 is too tight to be easily removed, coupling 45 can be pushed forward (toward bearing 41) to provide room to install a puller over thrust washer 46.

(6) Press or drive against the rear (smaller end) of the shaft to dislodge the bearing assembly from the housing. Remove the shaft and bearing assembly, and the detent balls and spring (fig. 6-19).

(7) Support the inner race of the bearing assembly, and press the shaft out (fig. 6-20).

(8) Disengage the disconnect coupling from the shifter fork and remove it (fig. 6-21).

(9) Remove the shifter fork from the housing (fig. 6-22).

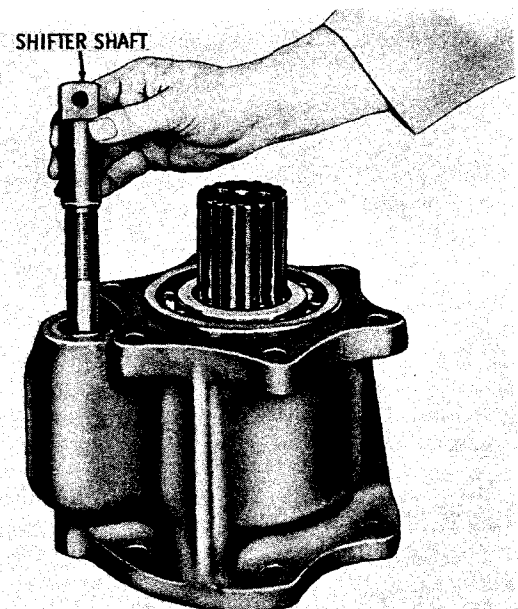
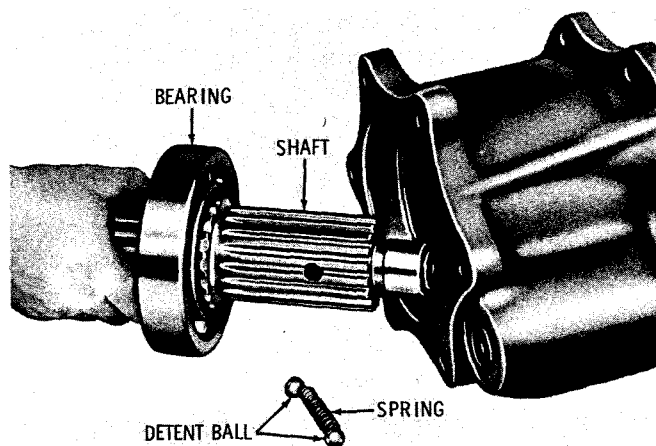


Fig. 6-19. Removing shifter shaft

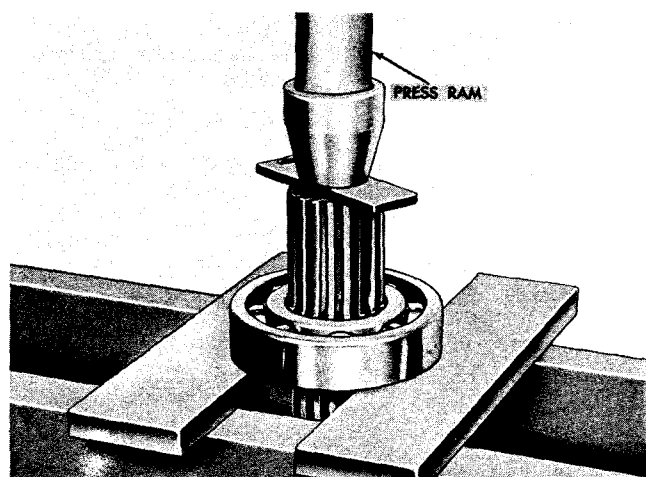
S1639

## Para 6-39



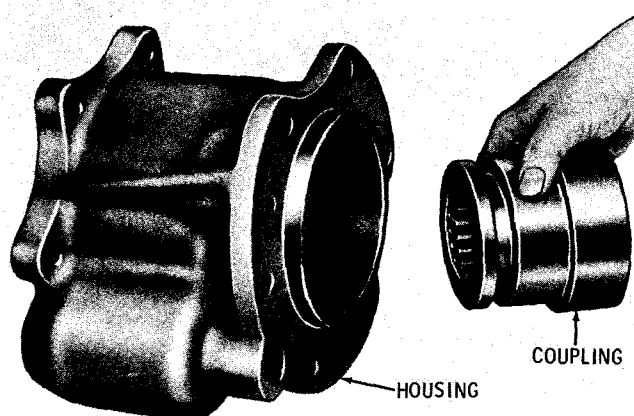
S1640

Fig. 6-20. Removing shaft and bearing assembly from housing



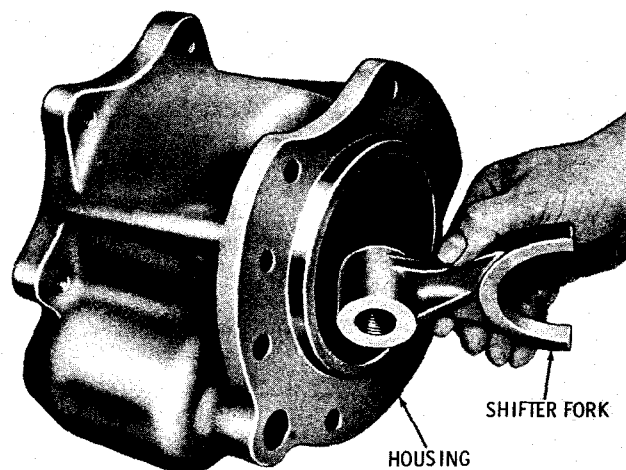
S1643

Fig. 6-21. Removing bearing assembly from output drive shaft



S1644

Fig. 6-22. Removing (or installing) disconnect coupling



S1645

Fig. 6-23. Removing (or installing) shifter fork

(10) Do not remove the oil seal (fig. 6-19) unless replacement is necessary. Removal will destroy the seal.

**NOTE**

Refer to paragraph 6-2, above.

**b. Assembly (A, foldout 18)**

(1) If oil seal 58 was removed, install a new seal, spring-loaded lip first, into housing 54. Press it to a light seat in the housing.

(2) Install the shifter fork in the housing (fig. 6-22). The longer side of the threaded boss must be toward the front (output end) of the housing.

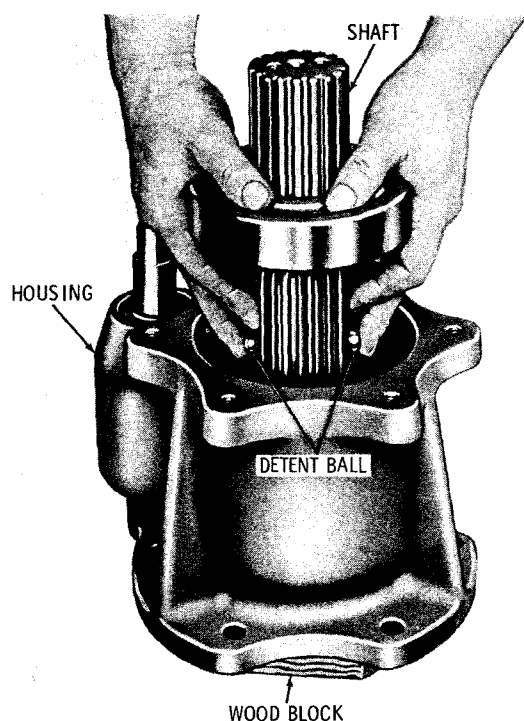
(3) Install disconnect coupling, smaller end first, into the rear of the housing (fig. 6-21).

(4) Engage shifter fork 57 (A, foldout 18) with the groove in disconnect coupling 45. Install shifter shaft 59, threading it (clockwise) into the shifter fork until the fork is centered on the threaded part of the shaft.

(5) If ball bearing assembly 41 was removed from shaft 42, support the inner race of the bearing assembly and press the shaft into it.

(6) Position the housing, rear downward, supporting the disconnect coupling on a sleeve or blocks approximately 1-1/2 inches high (fig. 6-23). The sleeve or blocks must allow room for the shaft to pass through.

(7) Install the detent spring in the hole through the shaft. Hold the detent balls in place



S1646

Fig. 6-24. Installing shaft and bearing assembly

and install the shaft into the disconnect coupling (fig. 6-23). Push the shaft downward until the detent balls engage the first internal groove in the coupling.

(8) Remove the sleeve or blocks under the coupling, and tap the bearing assembly outer race until it seats in the housing.

(9) Install thrust washer 46 (A, foldout 18), bearing inner race 48 and snapping 50, onto the rear of shaft 42.

(10) If oil seal 36 was removed from retainer 39, install a new seal, spring-loaded lip first, into the front of retainer 39. Press it to a light seat in the retainer.

(11) Install the gasket and bearing retainer onto the output drive housing (fig. 6-17).

(12) Install six bolts 37 (A, foldout 18), with lockwashers 38, to secure retainer 39. Tighten the bolts to 67 to 80 pound feet torque.

(13) Install output flange 35, shims 34 (if used), retainer washer 33, lockstrip 32, and two bolts 31. Refer to paragraph 4-8 for installation instructions for the flange and shims. Tighten the bolts to 96 to 115 pound feet torque. Bend lock strip 32 to retain the bolts.

#### 6-40. FRONT BEARING RETAINER ASSEMBLY (HORIZONTAL DROPBOX).

##### a. Disassembly (A, foldout 19)

(1) Remove pipe nipple 22 from retainer assembly 6.

(2) Remove oil baffle 7 and oil seal 8 from retainer 9 only if parts replacement is necessary.

(3) Remove bushing 10 from retainer 9 only if replacement is necessary.

##### NOTE

Refer to paragraph 6-2 above.

##### b. Assembly (A, foldout 19)

(1) If bushing 10 was removed from retainer 9, install a new bushing. Seat the shoulder of the bushing against retainer 9.

(2) If oil seal 8 was removed, install a new seal, spring-loaded lip first, into the front of retainer 9. Locate it 1.500 inches below the extreme front of retainer 9.

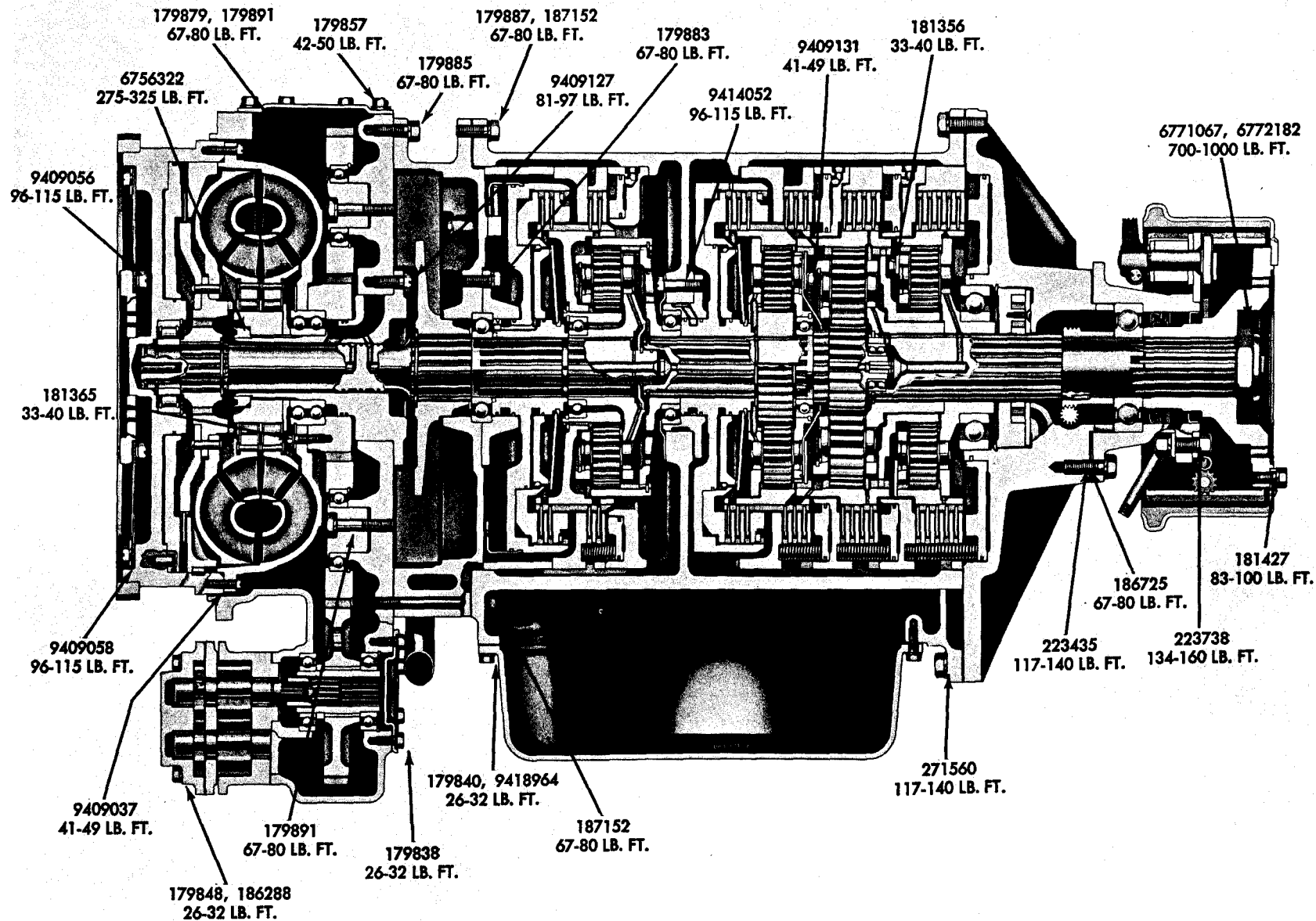
(3) If oil baffle 7 was removed, install it, smaller inside diameter first, into the front of retainer 9. Locate its front edge flush with, to 0.03 below the shoulder at the front of the bore into which it is installed.

(4) Install pipe nipple 22 into retainer assembly 6.

#### 6-41. TORQUE VALUES—ILLUSTRATED

Figure 6-24, which follows, shows the torque values for the threaded fasteners visible in the illustration.





S1647

Fig. 6-25. Model CLBT5660 transmission showing torque valves-cross-section view

## Section 7. ASSEMBLY OF TRANSMISSION FROM SUBASSEMBLIES

### 7-1. SCOPE OF SECTION 7

a. **Models Covered.** This section outlines the assembly of all 5640, 5840, 5660 and 5860 model transmissions. All options and features for these models are included in the assembly procedures except those referenced in paragraph 1-3b, above.

#### b. Assembly Sequence

(1) The assembly procedures are divided into two major paragraphs. Paragraph 7-3 covers the straight-through configuration, and includes all model variations except the transfer drive output (dropbox). Paragraph 7-4 covers the two types of transfer drive outputs.

(2) To assemble any transmission, regardless of model variations, follow the notes and instructions pertinent to the model being assembled. If an option or feature is not applicable, it may be passed over and assembly continued with the next applicable procedure.

(3) Paragraph 7-4 covers only the transfer drive outputs, and must be used in conjunction with instructions in paragraph 7-3.

#### c. Illustrations

(1) Assembly is referenced to photographs in this section. When necessary, procedures are referenced to parts exploded views (foldouts 5 through 20) at the back of this manual.

(2) In addition to the photographs and exploded views, two cross-section views (foldouts 1 and 2) show the assembled relation of components.

### 7-2. PREPARATION FOR ASSEMBLY

a. **Tools.** Refer to paragraph 4-4 for special tools needed for assembly.

b. **Torque Specifications.** The specific torque value for each threaded fastener is stated at each point of assembly. Refer to paragraph 4-10 and figure 6-24 for general torque specifications.

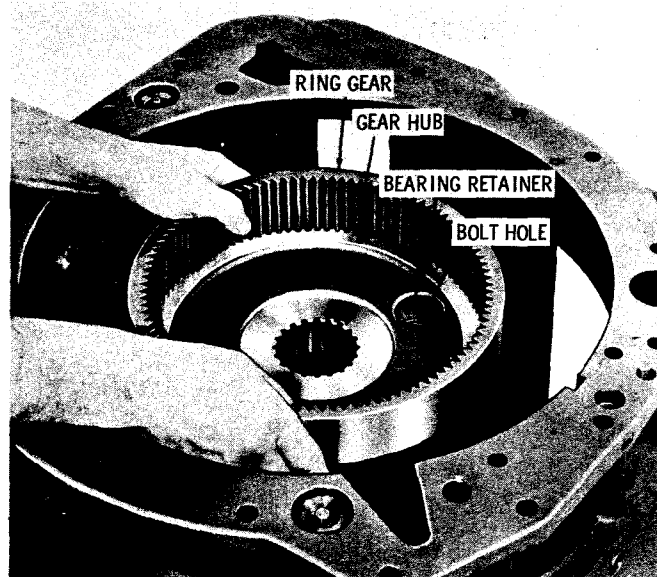
### 7-3. TRANSMISSION ASSEMBLY (ALL STRAIGHT-THROUGH MODELS)

#### a. Installing Splitter Ring Gear, Intermediate-range Carrier Assembly, and Clutch

(1) Install, as a unit, the splitter ring gear, gear hub, bearing and bearing retainer (fig. 7-1). Aline the bolt holes in the retainer with the bolt holes in the transmission housing. Tap the hub to seat the bearing in its bore.

(2) Install six self-locking bolts and toothed lockwashers which secure hub bearing retainer to transmission housing (fig. 7-2). Tighten the bolts to 96 to 115 pound feet torque.

(3) Turn the transmission housing assembly over and position it on wood blocks, front end down. Block the transmission at least six inches above the work table to allow for space to reach under and rotate the splitter ring gear hub. Refer to (7), below. Install two (one at each side) anchor keys (approximately 2.7 in. long). Install the compression ring (fig. 7-3).



S1648

Fig. 7-1. Installing splitter ring gear and hub

## Para 7-3

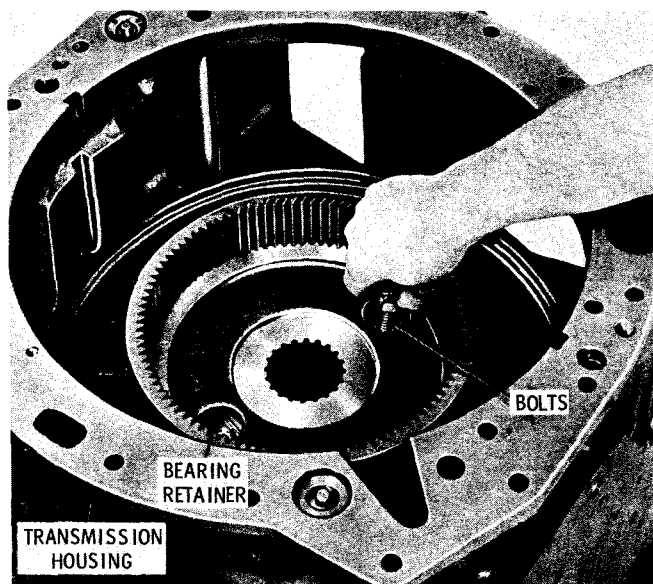


Fig. 7-2. Installing splitter ring gear and bearing retainer bolts

S1649

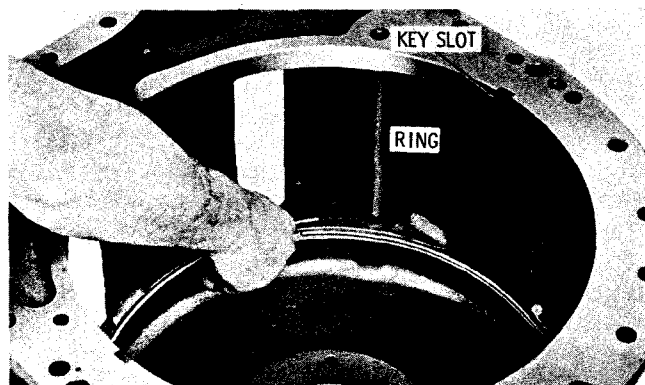


Fig. 7-3. Installing compression ring

S1650

(4) To aid in lifting the assembly, install the back plate and snapping into the high-range clutch drum. Grasp the back plate and lower the clutch drum and related parts into the transmission. Aline the splines of the high-range clutch drum hub with the splines in the splitter ring gear hub (fig. 7-4).

**CAUTION**

Center the assembly with extreme care, during installation, to avoid damaging the sealrings on the high-range clutch drum hub.

(5) Install the intermediate-range sun gear (fig. 7-5). Aline the sun gear splines with high-range clutch drum splines.

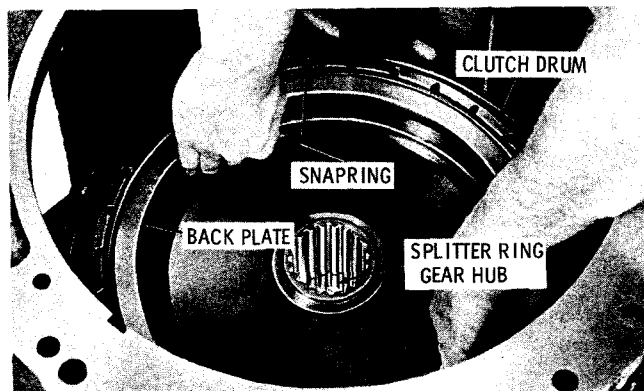


Fig. 7-4. Installing high-range clutch drum

S1651

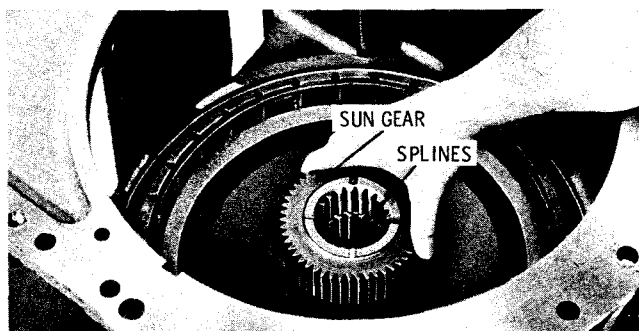


Fig. 7-5. Installing intermediate-range sun gear

S1652

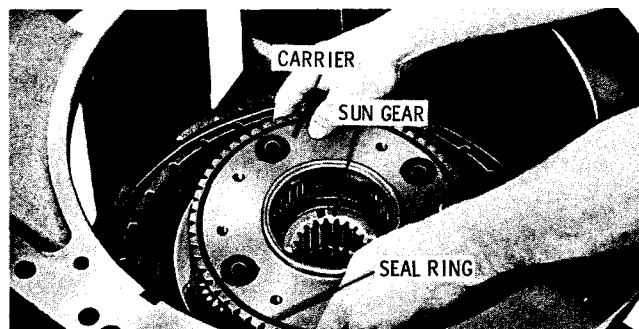


Fig. 7-6. Installing intermediate-range planetary carrier assembly

S1653

(6) Install the intermediate-range planetary carrier assembly onto the sun gear (fig. 7-6). Aline each of four pinion gears with the sun gear. Install the sealring into the carrier.

(7) Install, as a unit, the splitter output shaft, oil collector ring, and splitter shaft bearings (fig. 7-7). If necessary, reach up under the transmission and rotate the splitter ring gear hub in order to aline all splines.

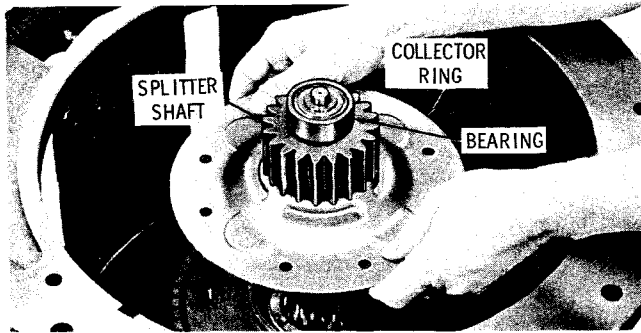


Fig. 7-7. Installing splitter output shaft S1654

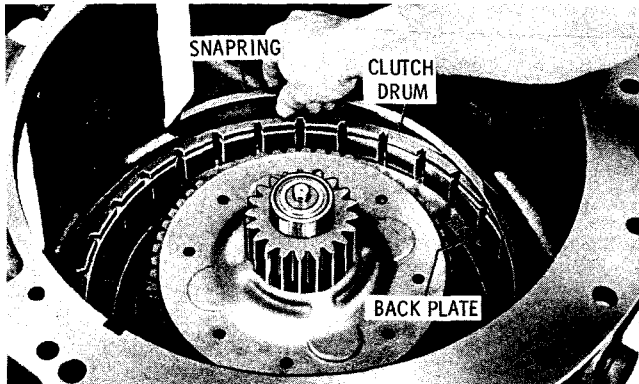


Fig. 7-8. Removing high-range clutch snapping and back plate S1655

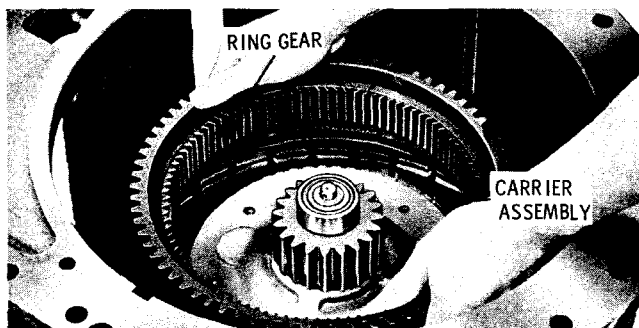


Fig. 7-9. Installing intermediate-range ring gear S1656

(8) Remove the large high-range clutch drum snapping from the clutch drum. Remove the clutch back plate (fig. 7-8).

(9) Install the intermediate-range ring gear, with the shorter counterbore upward (toward the rear of the transmission), onto the intermediate-range planetary carrier assembly (fig. 7-9).

(10) Beginning with an internal-splined plate, alternately install three internal- and two external-splined, high-range clutch plates (fig. 7-10).

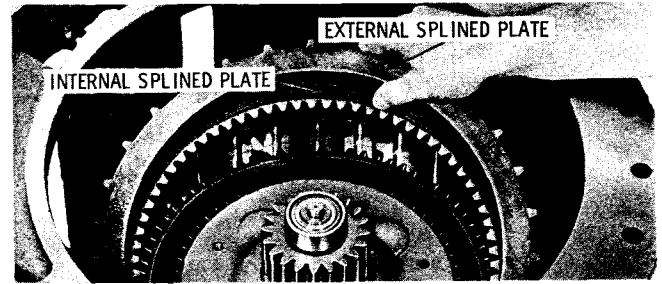


Fig. 7-10. Installing high-range clutch plates S1657

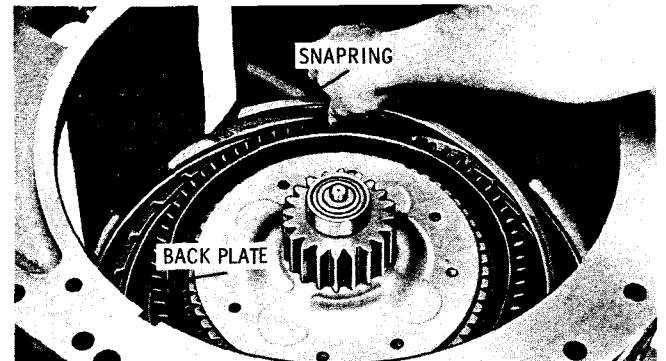


Fig. 7-11. Installing high-range clutch back plate snapping S1658

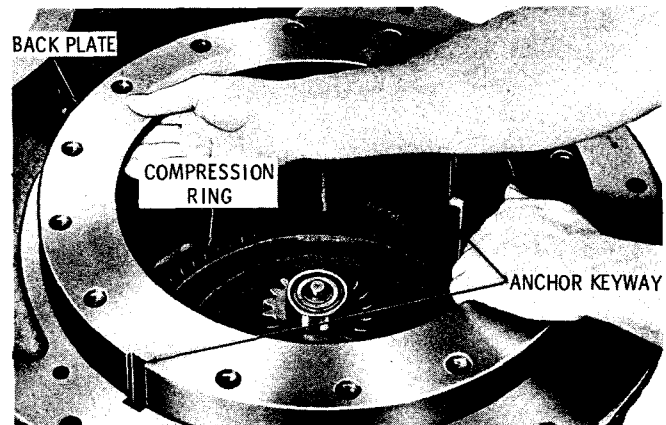


Fig. 7-12. Installing intermediate-range clutch back plate S1659

(11) Reinstall the high-range clutch back plate (see (8), above). Reinstall high-range clutch internal snapping (fig. 7-11).

(12) Install the intermediate-range clutch back plate, aligning the keyways with the anchor keys (fig. 7-12). Be certain that the compression ring is positioned against the surface onto which the back plate seats.

(13) Install the intermediate-range clutch anchor, aligning the keyways with the anchor keys (fig. 7-13).

## Para 7-3

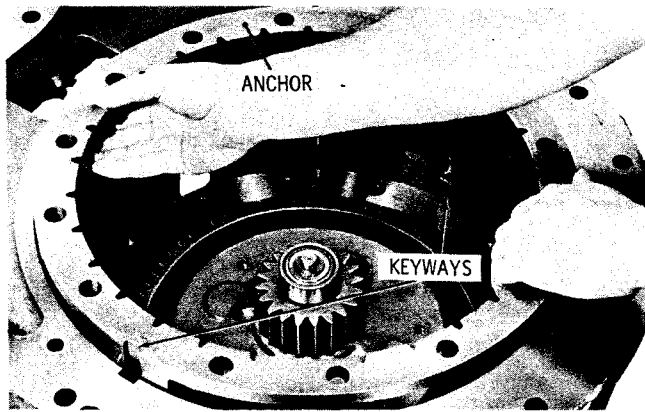


Fig. 7-13. Installing intermediate-range clutch anchor

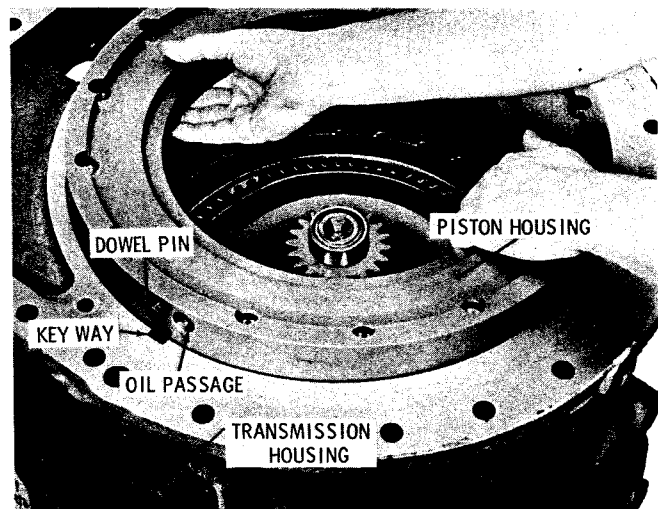


Fig. 7-16. Installing intermediate-range clutch piston housing and piston

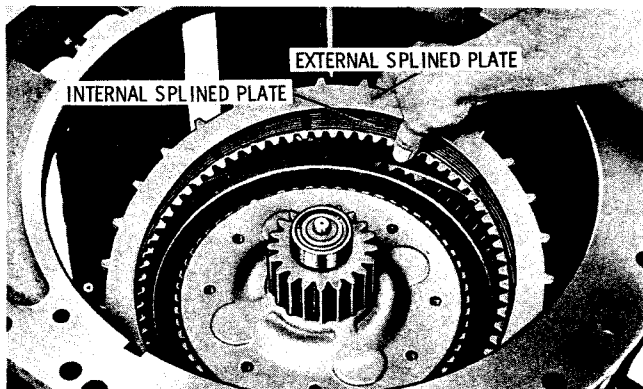


Fig. 7-14. Installing intermediate-range clutch plates

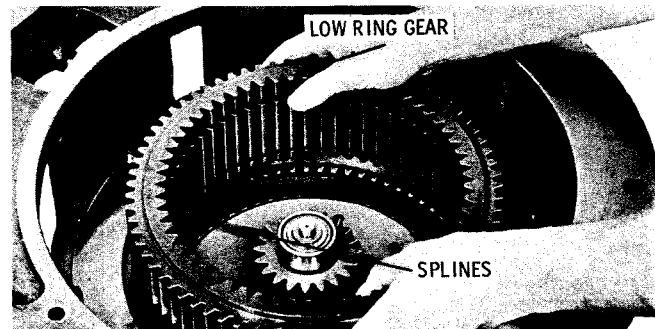


Fig. 7-17. Installing low-range ring gear

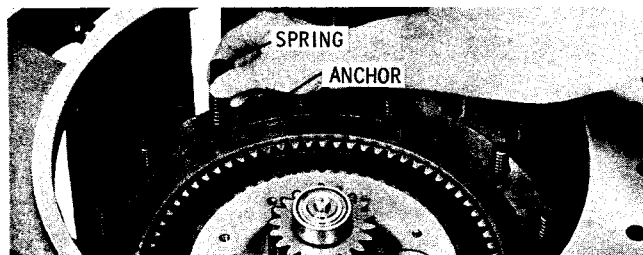


Fig. 7-15. Installing intermediate-range clutch piston return spring

(14) Beginning with an internal-splined plate, alternately install three internal- and three external-splined, intermediate-range clutch plates (fig. 7-14).

(15) Install 14 intermediate-range clutch piston return springs into the clutch anchor (fig. 7-15).

(16) Install, as a unit, the intermediate-range clutch piston and piston housing (fig. 7-16). Aline the dowel pin with the keyway in the trans-

mission housing. Aline the oil passage with the oil passage in the transmission housing.

#### b. Installing Low-range Planetary and Clutch

(1) Install the low-range ring gear with the longer, outer shoulder downward. Engage the internal splines of the ring gear with the intermediate-range carrier splines (fig. 7-17).

(2) Install one anchor key (approximately 1.25 inches long) into each keyway in the transmission housing (fig. 7-18).

(3) Install, flat side upward, the low-range clutch anchor, alining the keyways in the anchor with the anchor keys (fig. 7-19).

(4) Beginning with an internal-splined plate, alternately install four internal- and four external-splined, low-range clutch plates. External-splined plates index with the low-range clutch anchor, and internal-splined plates index with the low-range ring gear (fig. 7-20).

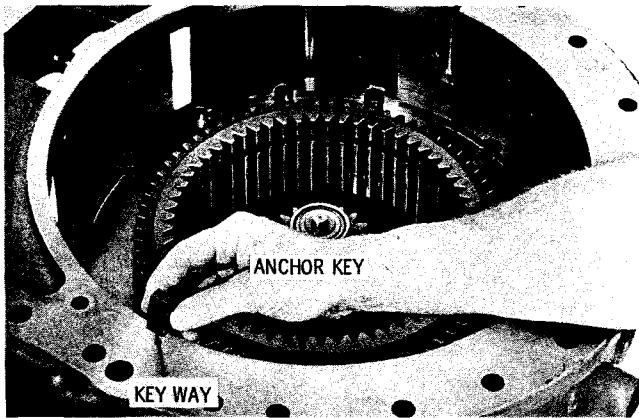


Fig. 7-18. Installing anchor key

S1665

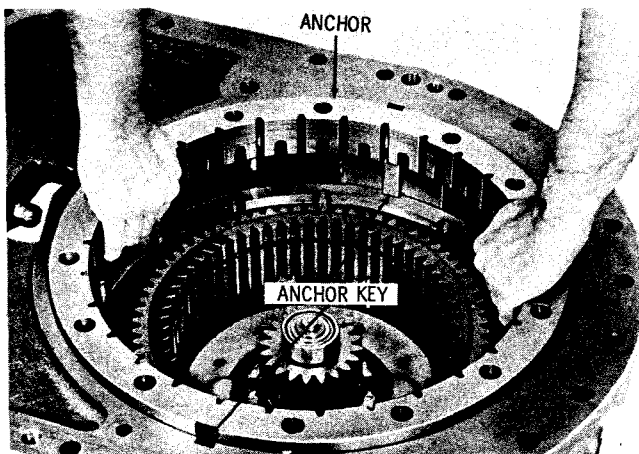


Fig. 7-19. Installing low-range clutch anchor

S1666

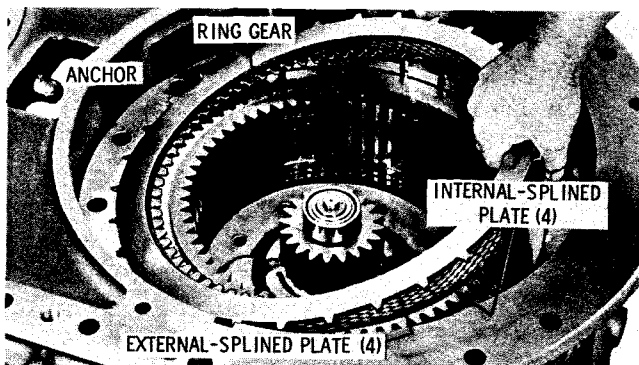


Fig. 7-20. Installing low-range clutch plates

S1667

(5) Install 14 low-range clutch piston return springs into the low-range clutch anchor (fig. 7-21).

(6) Install the low-range clutch piston housing and piston. Aline the dowel pin with the

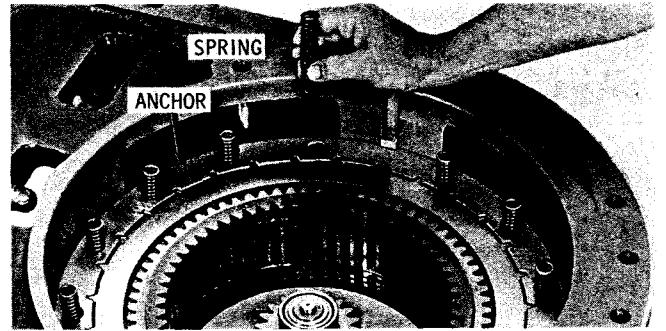


Fig. 7-21. Installing low-range clutch piston return springs

S1668

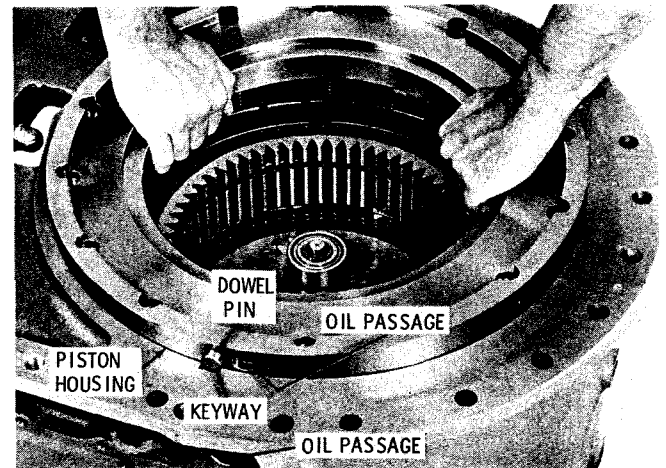


Fig. 7-22. Installing low-range clutch piston housing and piston

S1669

keyway. Aline the oil passage with the oil passage in the transmission housing (fig. 7-22).

(7) Install two anchor keys (approximately 1.7 inches long) into the keyways. Install, flat side upward, the reverse-range clutch anchor, alining the keyways with the anchor keys (fig. 7-23).

(8) Install four retainers into a groove in the low-range ring gear. Secure the retainers with eight 3/8-24 x 3/4-inch, self-locking bolts (fig. 7-24). Tighten the bolts to 41 to 49 pound feet torque. Be sure that the splines of the intermediate-range carrier and the low-range ring gear are alined.

#### NOTE

It may be necessary to compress the clutch piston return springs to aline the groove in the gear with the retainers.



## Para 7-3

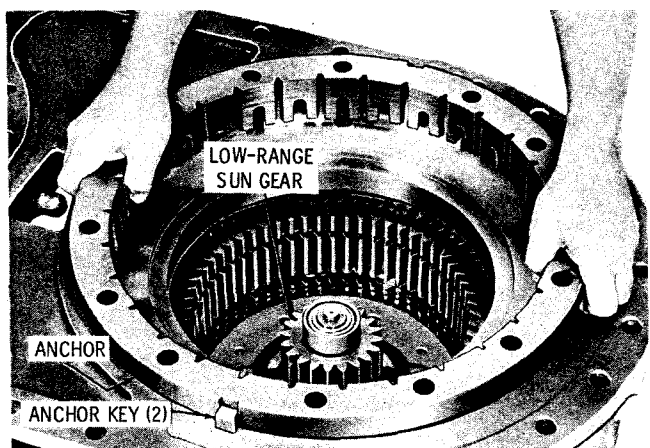


Fig. 7-23. Installing reverse-range clutch anchor

S1670

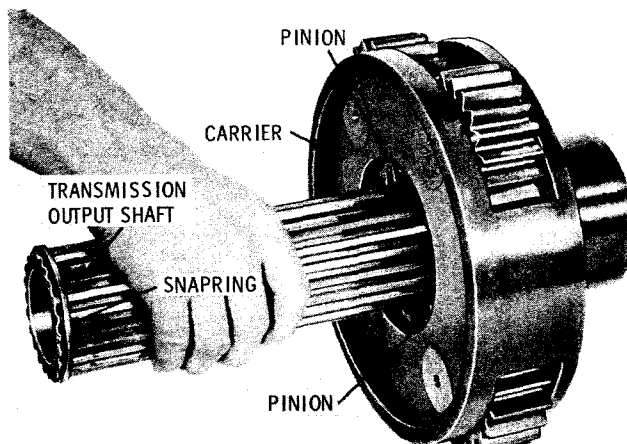


Fig. 7-25. Installing transmission output shaft

S1672

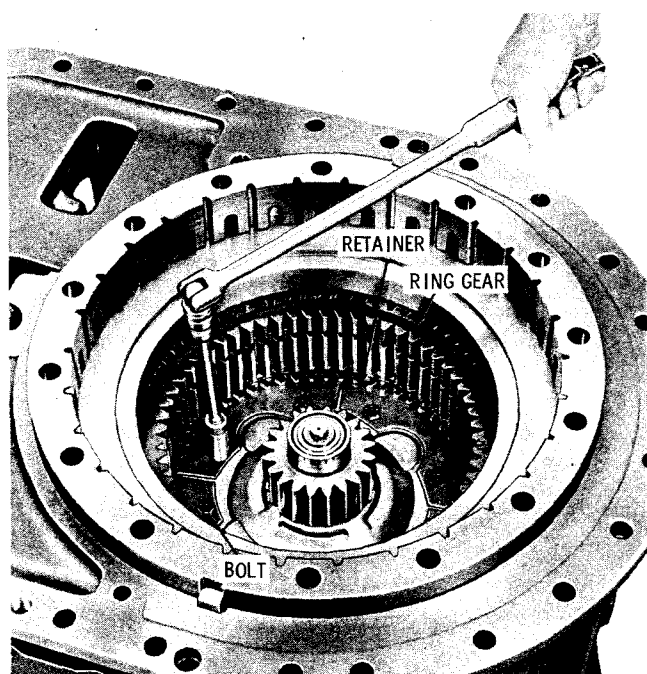


Fig. 7-24. Installing low-range ring gear retainer bolts

S1671

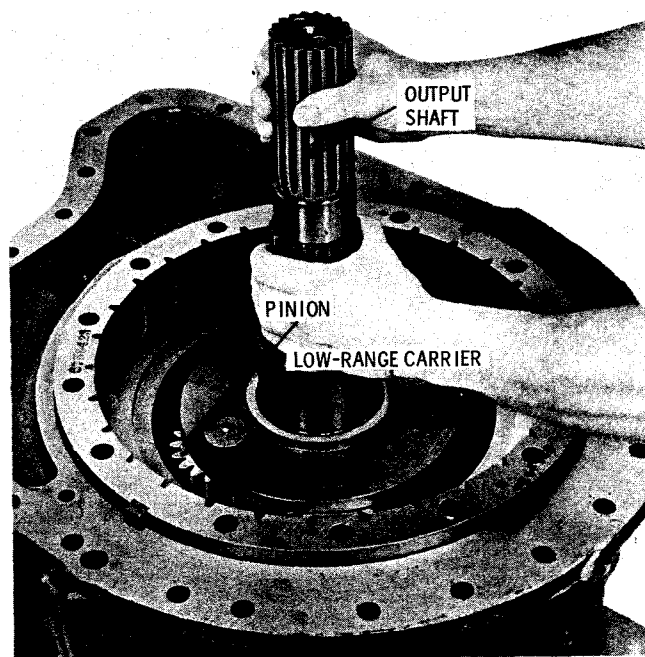


Fig. 7-26. Installing low-range carrier assembly

S1673

(9) Install the transmission output shaft with the snapping into the low-range planetary carrier (fig. 7-25).

#### CAUTION

Rotate each pinion so that the snapping is cleared as the shaft is installed. The snapping must seat against the carrier.

(10) Install the low-range carrier assembly and transmission output shaft (fig. 7-26). Engage the carrier pinions with the splitter output shaft (low-range sun gear) (fig. 7-23), above.

(11) Install the bronze thrust washer onto the low-range carrier hub. Install the reverse-range sun gear over the hub of the carrier. Engage the sun gear splines with the teeth of the low-range ring gear (fig. 7-27).

#### c. Installing Reverse-range Planetary Carrier and Clutch

(1) Install the bronze thrust washer onto the reverse-range sun gear. Install the reverse-range planetary carrier assembly and bearing onto the reverse-range sun gear (fig. 7-28).



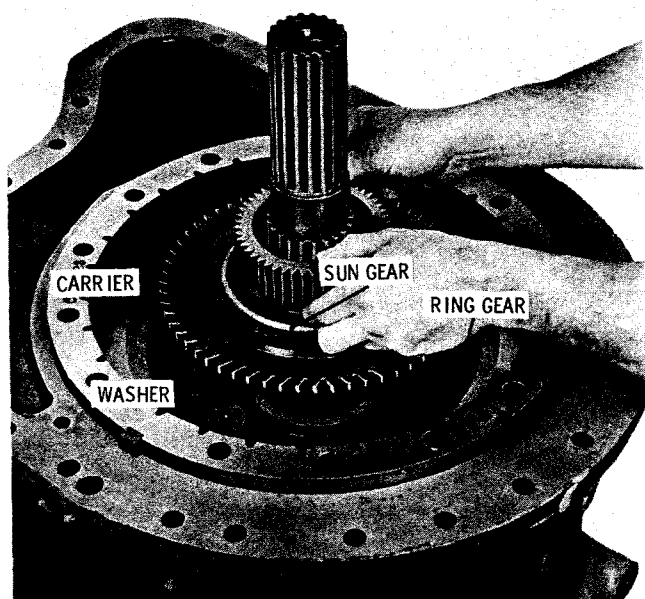


Fig. 7-27. Installing reverse-range sun gear

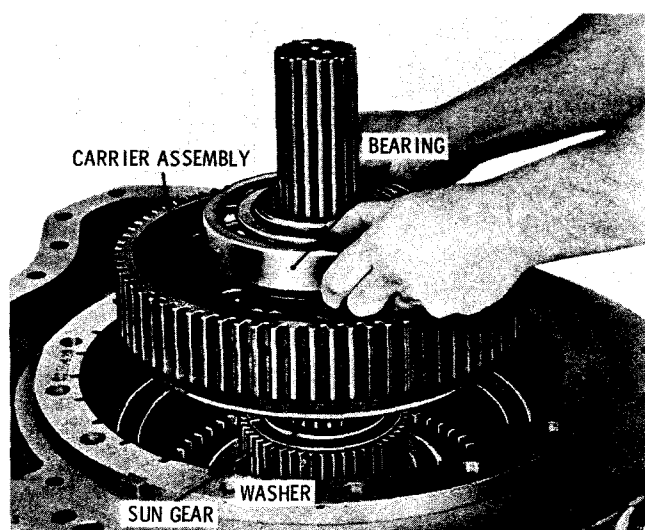


Fig. 7-28. Installing reverse-range planetary carrier assembly

(2) Beginning with an internal-splined plate, alternately install five internal- and five external-splined, reverse-range clutch plates (fig. 7-29). Internal-splined plates engage the reverse-range ring gear, and external-splined plates engage the reverse-range clutch anchor.

(3) Install 14 reverse-range clutch piston return springs into holes in the clutch anchor.

#### NOTE

On transfer gear models, continue assembly with paragraph 7-4b(3).

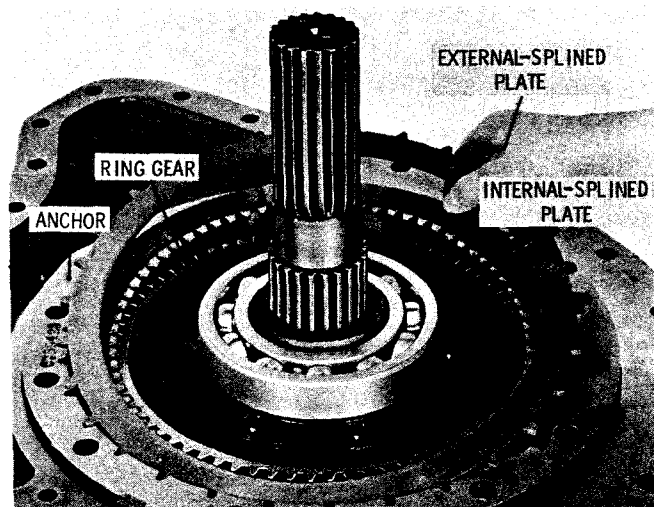


Fig. 7-29. Installing reverse-range clutch plates

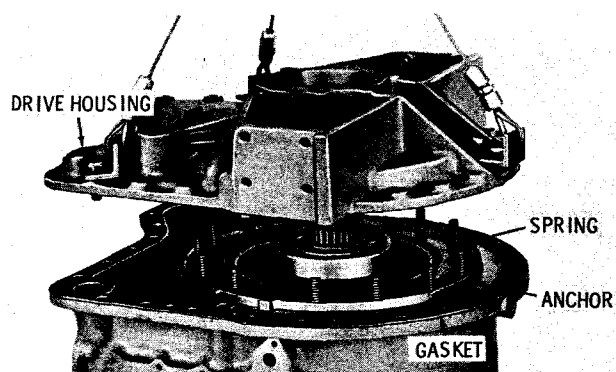


Fig. 7-30. Installing output drive housing

#### d. Installing Output Drive Housing Components

(1) On models which include a rear oil pump assembly 2 (B, foldout 16), install the assembly, indexing the slot in body 3 with the dowel pin in the output drive housing. Retain the pump assembly with snapping 1. Also, on rear pump-equipped models, install gasket 56 (A, foldout 17), inner lip first, into the rear pump oil passage in housing 6 or 40. Retain it with oil-soluble grease.

(2) Install the gasket onto the transmission housing.

(3) Install the output drive housing (fig. 7-30). Retain it with twenty-seven 5/8-11 x 1 3/4 bolts and lockwashers (installed from the front of the housing rear flange), and (in some models) two 5/8-11 x 3 3/4-inch bolts and lockwashers,

## Para 7-3

installed at the rear of the housing (fig. 7-30). Tighten the bolts to 117 to 140 pound feet torque.

**NOTE**

On models using housing assembly 5 (B, foldout 17), disregard (4) through (8), below.

(4) Install the speedometer drive gear, toothed end first, onto the output shaft (fig. 7-31). The key, formerly used, is no longer required. If the transmission is equipped with an automatic-electric shift control system (or is of current production), install gear assembly 75 (A, foldout 17) spur-tooth gear last onto the shaft.

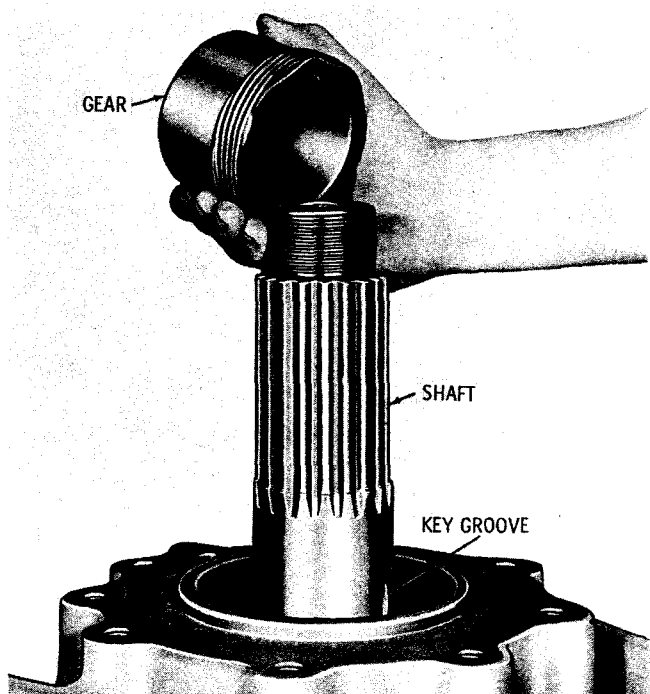


Fig. 7-31. Installing speedometer drive gear S1678

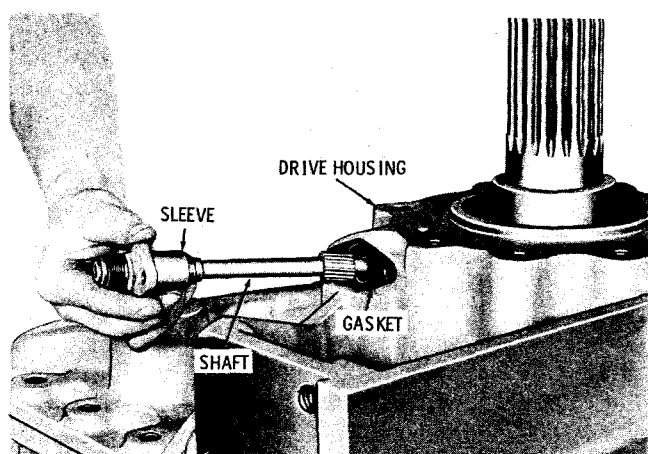


Fig. 7-32. Installing speedometer drive shaft assembly S1679

**NOTE**

Earlier models do not have a speedometer drive at this location. Install spacer 42 (A, foldout 17) instead of the gear. Install, also, bearing 43.

(5) Install the gasket, speedometer drive shaft assembly and sleeve into the output drive housing (fig. 7-32). Secure the assembly with two 5/16-18 x 7/8-inch bolts and lockwashers. Tighten the bolts to 13 to 16 pound feet torque.

**NOTE**

Earlier models have the speedometer drive in the rear bearing retainer.

(6) Install the spacer, slot upward, and the bearing (fig. 7-33). If gear assembly 75 (A, foldout 17) was installed, also install spacer 78. Position the spacer gap (approx 5 o'clock) to accept magnetic pickup 79. Heat the bearing to 250° to 300°F. Be sure that the bearing outer race is against the spacer and the inner race is against the speedometer drive gear.

(7) Install the rear bearing retainer and gasket, and secure the retainer with eight 1/2-13 x 1 1/2-inch bolts and lockwashers. Tighten the bolts to 67 to 80 pound feet torque. If spacer 78 was previously installed, install magnetic pickup 79. Be sure the pickup passes freely through the spacer gap. (Refer to the supplement at the back of this manual for installation and adjustment of the magnetic pickup.)

(8) On earlier models, the rear bearing retainer is held by eight 5/8-11 x 1 3/4-inch bolts

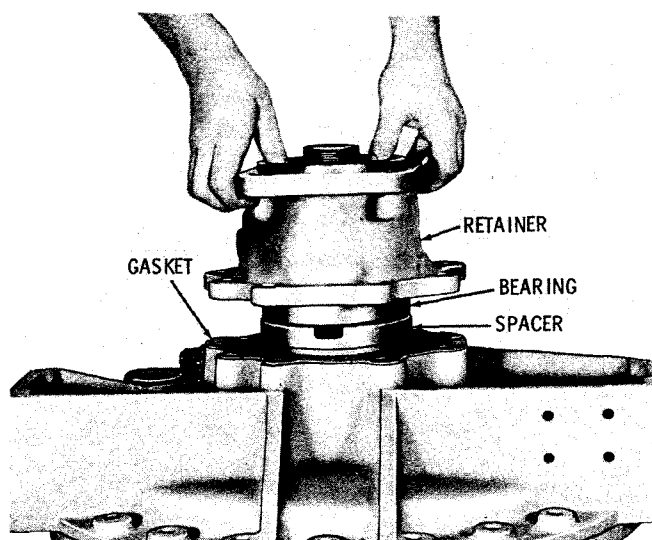


Fig. 7-33. Installing rear bearing retainer S1680

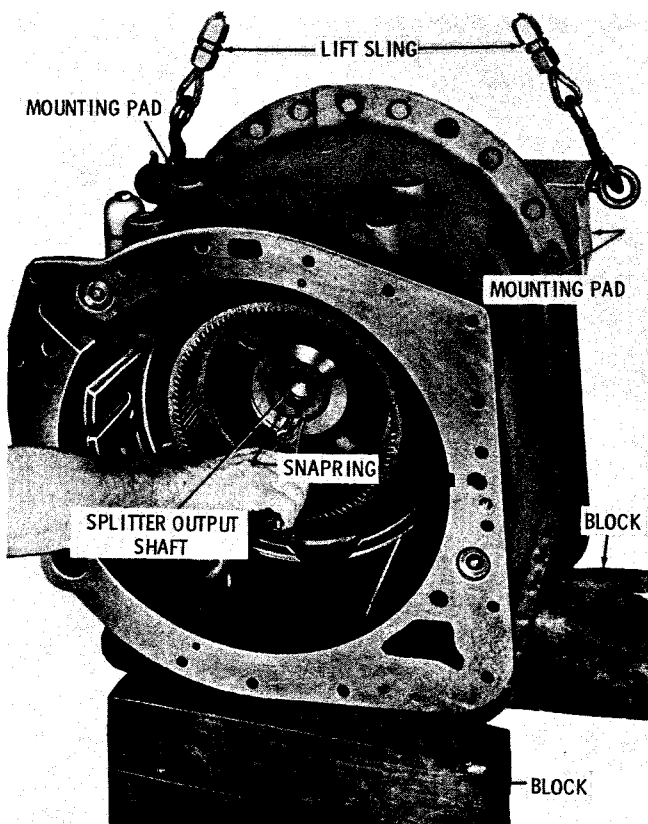
and lockwashers, tightened to 117 to 140 pound feet torque. Also, install speedometer drive gear 44 (A, foldout 17), smaller diameter first, and speedometer shaft components 58 through 66. Tighten bolts 66 to 13 to 16 pound feet torque.

**e. Installing Splitter Ring Gear Snapping, High-Splitter Clutch**

(1) Attach a 2-strand lifting sling to the transmission rear mounting pads and raise the transmission until the front end clears the work table. Rearrange the wood blocks and lower the transmission with the forward edge of the oil pan splitline resting on the block (fig. 7-34).

**CAUTION**

Keep the transmission rear higher than the transmission front. If the transmission should be lowered to a horizontal position, or the transmission rear be lowered below the transmission front, some parts within the housing could shift, preventing the snapping from being installed on the splitter output shaft.



S1681

Fig. 7-34. Installing splitter ring gear hub snapping

(2) Install the snapping (fig. 7-34). Then lower the rear of the transmission onto wood blocks, and remove the sling.

**NOTE**

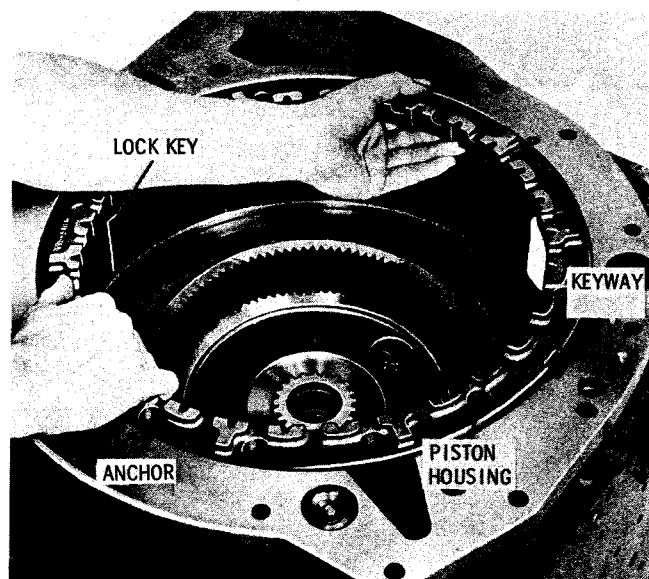
Transmission support legs (fig. 4-1) may be installed at this time. The legs will support the transmission, rear downward, in a vertical attitude.

(3) Install two anchor keys (approx 3.91-inch long), stepped ends first, longer sides inward, into keyways at the front of the transmission housing (fig. 7-35). Install, piston upward, the high-splitter clutch piston and piston housing, being sure to index oil passages. Install, flat side first, the high-splitter clutch anchor. Aline the keyways in the anchor with the anchor keys.

(4) With the hose installed on the tube, install the splitter overdrive oil jumper tube, hose end first, through the transmission housing into the oil passage port of the high-splitter clutch piston housing (fig. 7-36).

(5) Beginning with an external-splined plate, alternately install two external and two internal-splined, high-splitter clutch plates (fig. 7-37).

(6) Install 14 high-splitter clutch piston return springs (fig. 7-38). Install, flat side first, the splitter clutch back plate. Aline the keyways in the back plate with the anchor keys in the transmission housing.



S1682

Fig. 7-35. Installing high-splitter clutch anchor

## Para 7-3

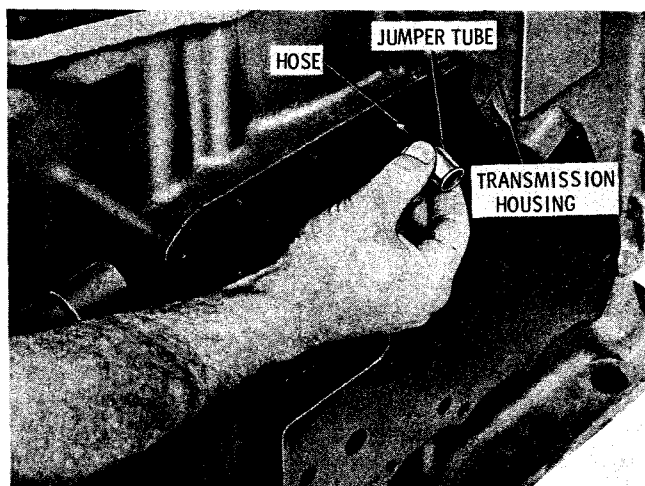


Fig. 7-36. Installing high-splitter clutch oil jumper tube S1683

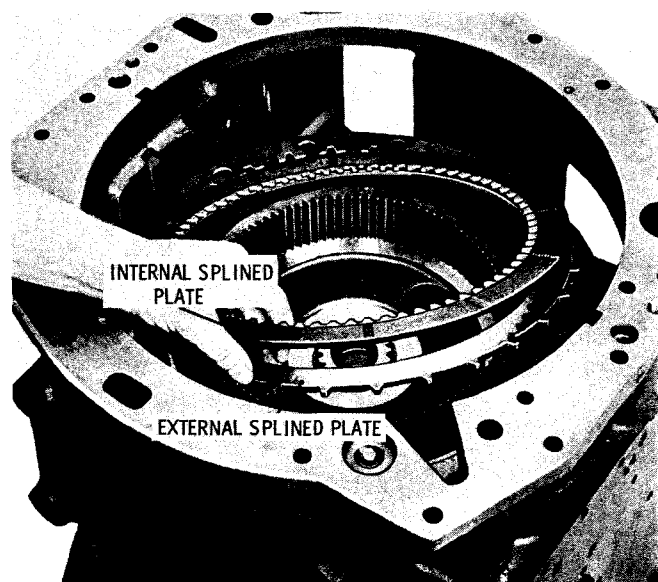


Fig. 7-37. Installing high-splitter clutch plates S1684

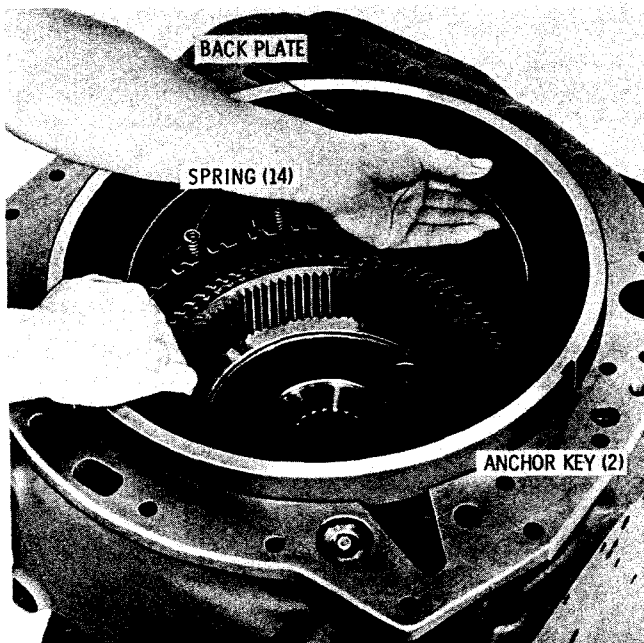


Fig. 7-38. Installing high-splitter clutch back plate S1685

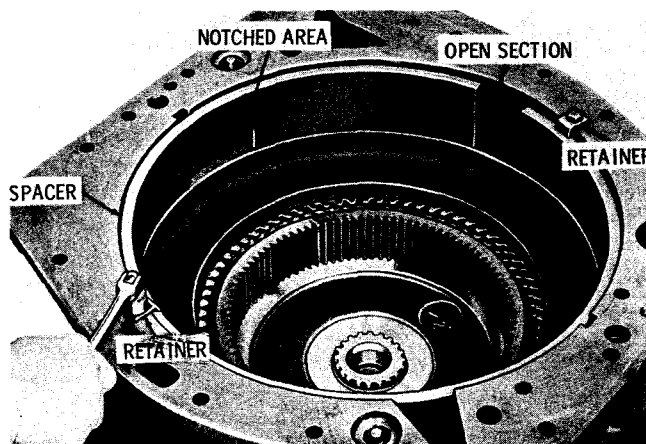


Fig. 7-39. Installing high-splitter clutch back plate spacer retainers S1686

(7) Install the back plate spacer, notched area facing down and open section toward the bottom of the transmission housing. Secure the spacer with two retainers and two 3/8-16 x 3/4-inch bolts (fig. 7-39). Tighten the bolts to 26 to 32 pound feet torque.

(8) Install two oil jumper tubes, each with a hose (fig. 7-40).

**f. Installing Splitter Planetary, Low-Splitter Clutch and Hydraulic Retarder (CBT, CLBT, VCLBT)**

(1) For assemblies prior to S/N 35993, follow the procedures in (2) through (10), below.

For assemblies beginning with S/N 35993, omit the procedures in (2) through (10), and continue with (11) through (18).

(2) Install the ball bearing, sealing (not used in CBT) near the bearing, and three (two for CBT model) hook-type sealrings near the center of the turbine shaft (fig. 7-41).

(3) Install the turbine output shaft into the rear of the retarder housing (fig. 7-41).

(4) Install the oil transfer hub (fig. 7-42). Retain the hub with five 1/2-13 x 1 1/4-inch bolts and lockwashers. Tighten the bolts to 67 to 80 pound feet torque.

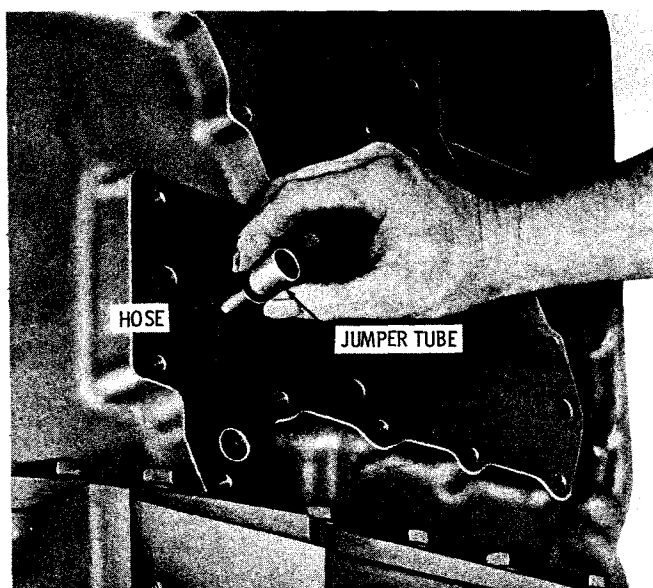


Fig. 7-40. Installing low- and intermediate-range clutch oil jumper tubes S1687

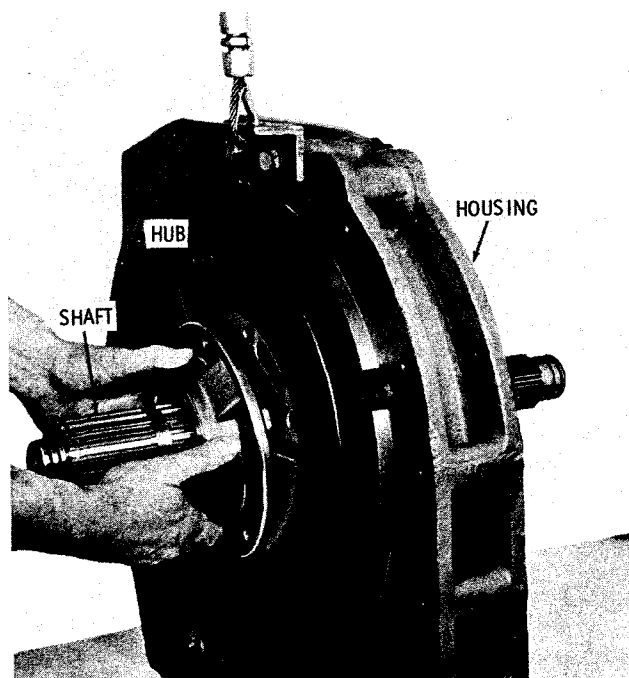


Fig. 7-42. Installing oil transfer hub (CBT, CLBT, prior to S/N 35993) S1689

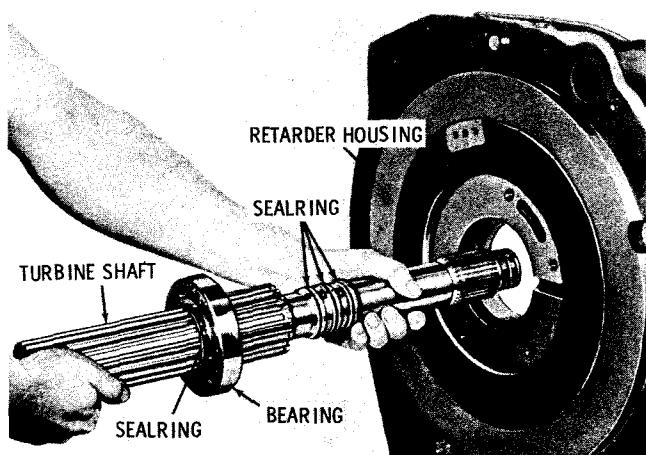


Fig. 7-41. Installing turbine output shaft (CBT, CLBT, prior to S/N 35993) S1688

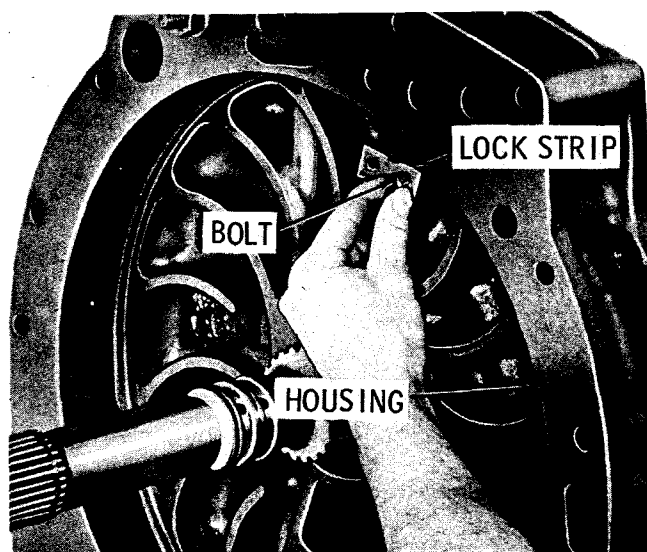


Fig. 7-43. Installing first pitot tube bolt (CBT, CLBT, VCLBT) S1690

(5) Install the lockstrip and one 5/16-24 x 2-inch bolt (fig. 7-43). The bolt must pass through the web of the retarder housing, and be threaded loosely into the pitot tube (fig. 7-44).

(6) Install the low-splitter clutch drum assembly onto the rear of the turbine output shaft (fig. 7-44).

(7) Using a thin metal strip, between the clutch drum assembly and retarder housing, position the pitot tube to receive the remaining pitot tube bolt (fig. 7-45).

(8) Install a 5/16-24 x 2-inch bolt through the lockstrip, through the retarder housing web,

and into the pitot tube (fig. 7-45). Tighten both pitot tube bolts to 14 to 18 pound feet torque. Bend the lock strip to retain both bolts.

(9) Install the splined washer onto the front of the turbine output shaft (fig. 7-46).

(10) Install the hydraulic retarder rotor (fig. 7-49). Install the snapping that retains the rotor.

## Para 7-3

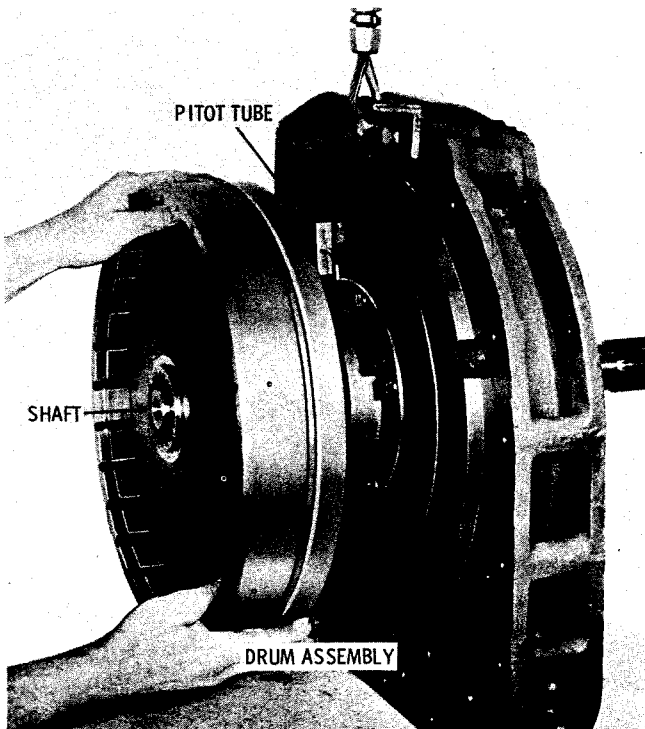


Fig. 7-44. Installing low-splitter clutch drum assembly (CBT, CLBT, VCLBT)

S1691

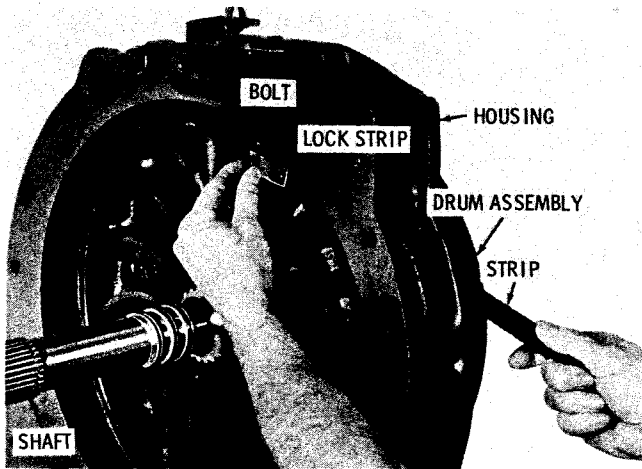


Fig. 7-45. Installing second pitot tube bolt (CBT, CLBT, VCLBT)

S1692

(11) Beginning with S/N 35993, the hydraulic retarder rotor is press-fit to the turbine output shaft. A different method of assembly is required, as follows:

(12) Heat the hydraulic rotor evenly to 300°F (maximum). Do not use direct flame. Install snapping 9 (A, foldout 11) into the groove on the largest splined diameter of the turbine output

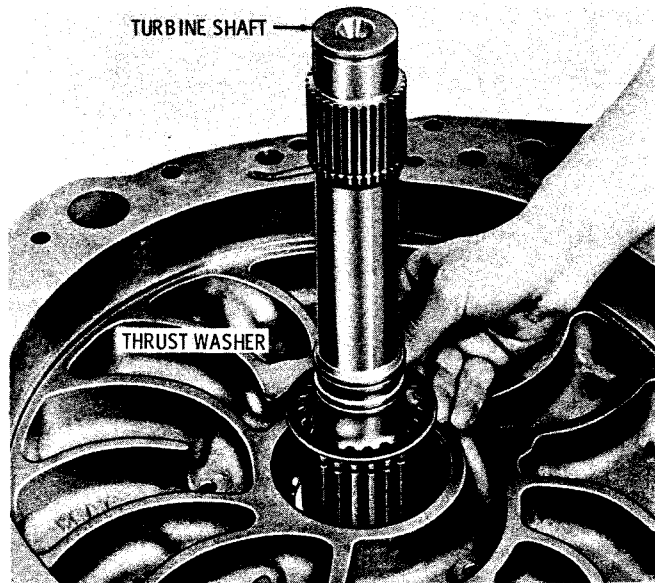


Fig. 7-46. Installing splined washer onto turbine output shaft (CBT, CLBT, prior to S/N 35993)

S1586

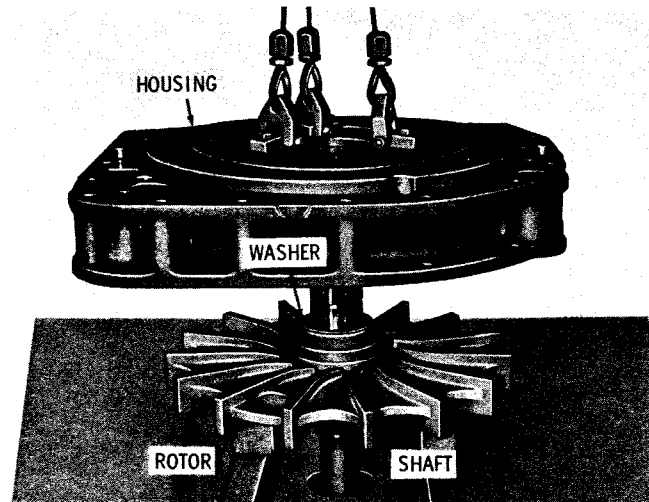


Fig. 7-47. Installing retarder housing onto retarder rotor and turbine shaft (CBT, CLBT, VCLBT, after S/N 35992)

S1693

shaft. Press the shaft, rear end first, into the front of rotor 10. Seat snapping 9 against the hub of the rotor.

(13) Install the splined spacer onto the rear of the turbine output shaft (fig. 7-47). Install the hydraulic retarder housing onto the assembled shaft and rotor.

(14) Install the ball bearing, sealing and oil transfer hub onto the rear of the retarder housing (fig. 7-48). Retain the hub with five 1/2-13 x 1 1/4 bolts and lockwashers. Tighten the bolts to 67 to 80 pound feet torque.



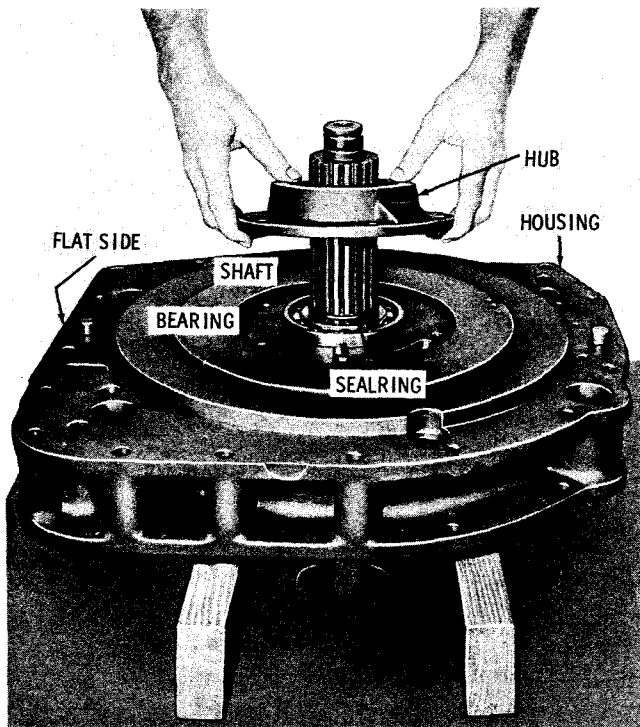


Fig. 7-48. Installing oil transfer hub onto retarder housing  
(CBT, CLBT, VCLBT, after S/N 35992)

S1694

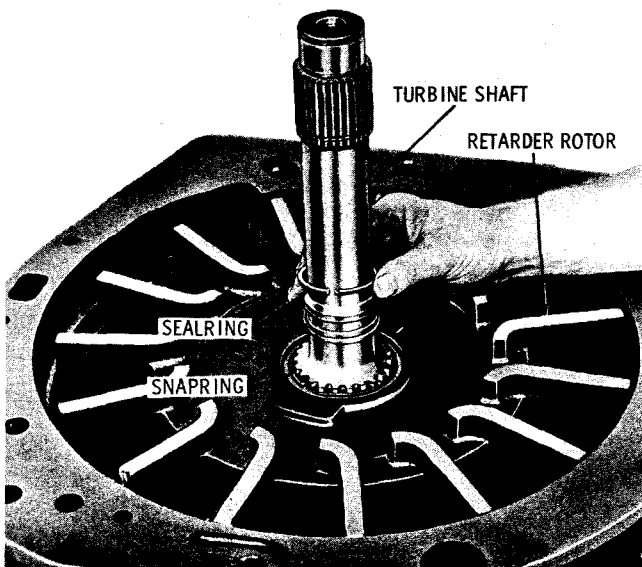


Fig. 7-49. Installing sealrings onto turbine output shaft  
(CBT, CLBT, VCLBT, after S/N 35992)

S1585

(15) Install the bolt, lockstrip and pitot tube as outlined in (5), above. (Openings in the hydraulic retarder rotor permit access to the bolt location.)

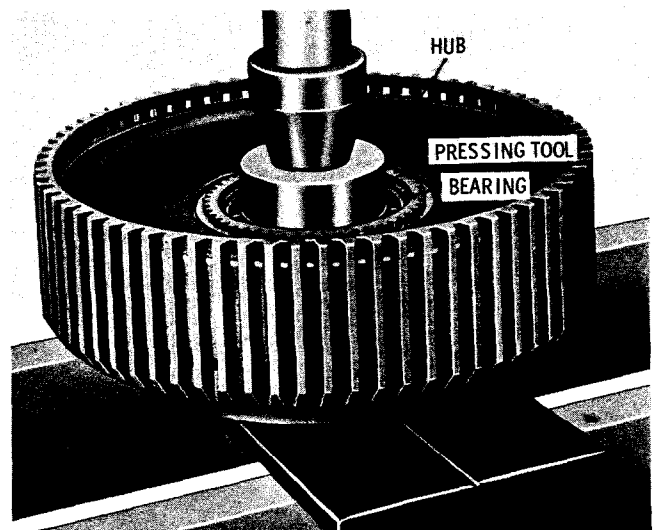


Fig. 7-50. Installing low-splitter clutch hub

S1695

(16) Install the low-splitter clutch drum assembly as outlined in (6), above.

(17) Install the remaining pitot tube bolt, and tighten both bolts as outlined in (7) and (8), above.

(18) Install two (CBT) or three (CLBT, VCLBT) step-joint sealrings onto the turbine output shift (fig. 7-49).

(19) Install the low-splitter clutch hub over the splitter planetary carrier, indexing the splitter sun gear with the splitter carrier pinions (fig. 7-50). Support the carrier on a press and place a pressing tool on the inner race of the bearing. Press the bearing onto the hub of the carrier.

(20) Carefully tip the retarder housing so that the rotor end of the turbine shaft rests on the work table (fig. 7-51). Install the splitter planetary carrier assembly and splitter clutch hub onto the turbine shaft. Install the snapring onto the end of the turbine shaft.

(21) Install the step-joint or hook-type sealring onto the turbine shaft (fig. 7-52). Beginning with an internal-splined plate, alternately install two internal- and one external-splined clutch plates into the low-splitter drum.

(22) Install the splitter clutch back plate into the low-splitter clutch drum (fig. 7-53). Install the internal snapring.

(23) Install the gasket onto the transmission housing (fig. 7-54). Attach a 2-strand lifting sling to the rotor side of the retarder housing



## Para 7-3

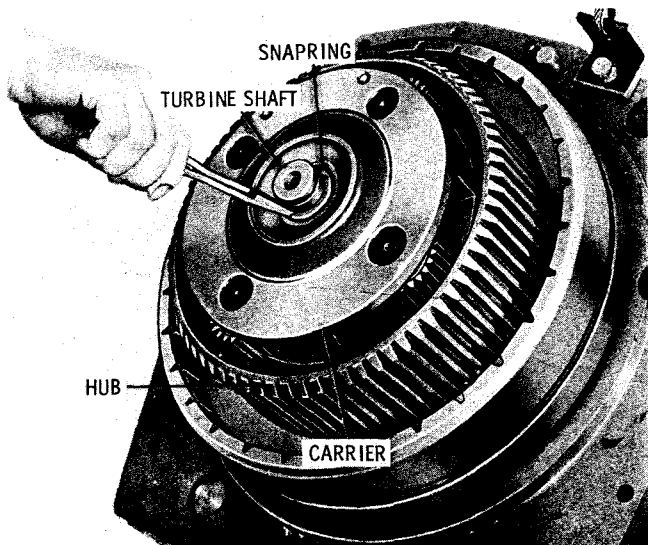


Fig. 7-51. Installing snapring that retains splitter planetary (CBT, CLBT, VCLBT)

S1696

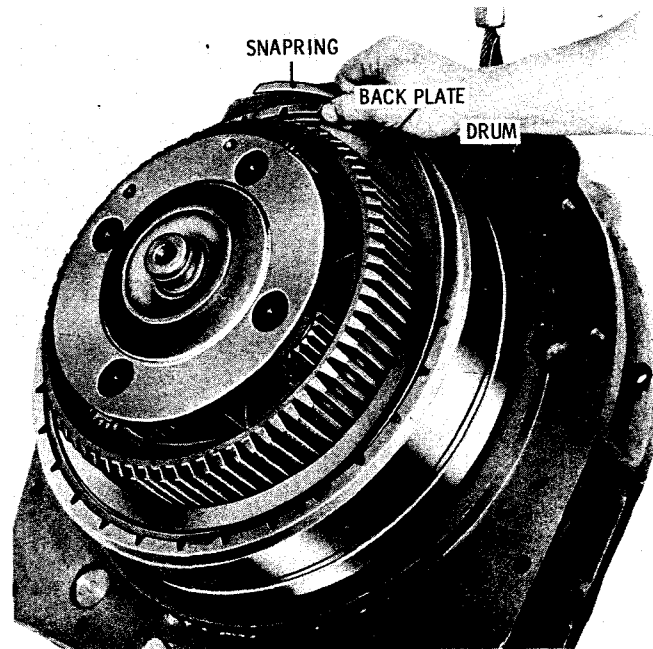


Fig. 7-53. Installing low-splitter clutch back plate snap ring (CBT, CLBT, VCLBT)

S1698

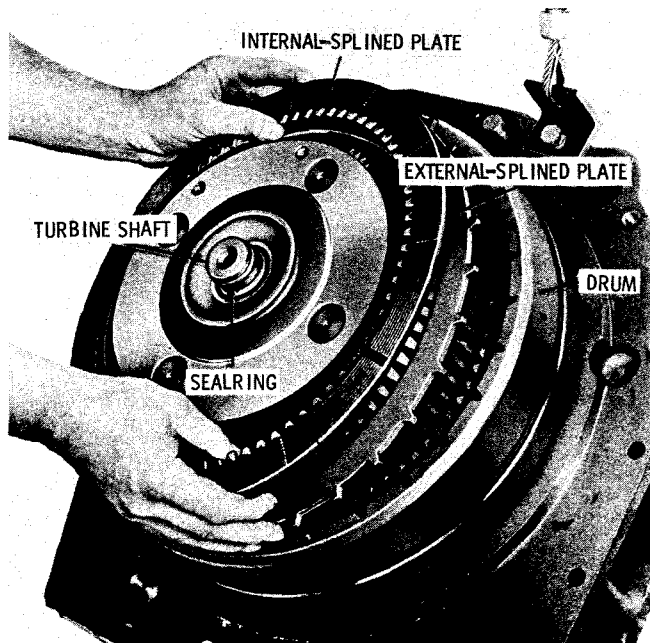


Fig. 7-52. Installing low-splitter clutch plates (CBT, CLBT, VCLBT)

S1697

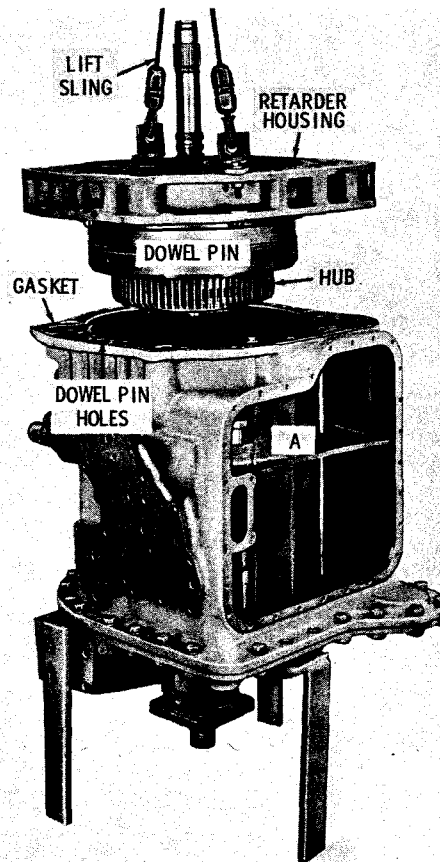


Fig. 7-54. Installing retarder housing onto transmission housing

S1699

and lower the housing and attached parts onto the transmission. Aline the splines of the low-splitter clutch hub with splines of the high-splitter clutch plates inside the transmission. It may help to use a screwdriver at location A to engage the hub with the high-splitter clutch plates. Engage the high-splitter ring gear, inside the transmission, with the high-splitter planetary pinions. Aline dowel

pins in the retarder housing with dowel pin holes on both sides of the transmission housing. Install seven 1/2-13 x 1 1/2-inch bolts and lockwashers through the transmission housing side of the split-line. Tighten the bolts to 67 to 80 pound feet torque.

**g. Installing Converter Housing Components**

(1) Block the converter housing in an upright position (fig. 7-55). Install the input pres-

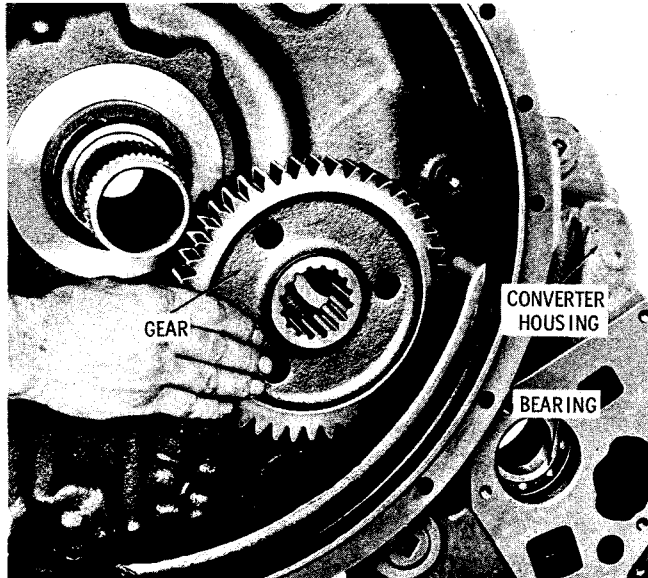


Fig. 7-55. Installing oil pump drive gear

S1700

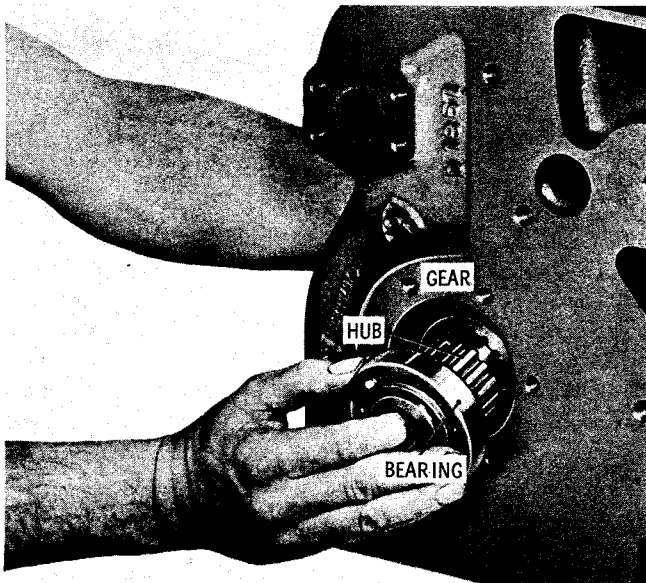


Fig. 7-56. Installing pump drive gear hub

S1701

sure oil pump drive gear bearing into the housing. Install the oil pump drive gear, longer end of the hub toward the rear, into the housing recess behind the bearing.

(2) Support the pump drive gear with one hand and, with the other hand, engage the pump drive gear hub and bearing by pushing it halfway into the pump drive gear (fig. 7-56). Partial installation of the gear hub will allow space for the gear spacer (fig. 7-57).

(3) Support the gear hub and bearing with one hand and, with the other hand, install the pump gear spacer. Push the gear hub through the spacer and all the way into the pump gear (fig. 7-57).

(4) Tap on the gear hub to seat it in the pump drive gear. Secure the bearing with the snapping (fig. 7-58). Install the pump drive gear hub gasket and cover (refer to fig. 5-36) onto the converter housing and install six 3/8-16 x 7/8-inch bolts and lockwashers in holes provided in the housing. Tighten the bolts to 26 to 32 pound feet torque.

(5) Install the bearing into the oil pump idler gear. Secure the bearing with the snapping (fig. 7-59). Assemble, in the same manner, the power takeoff idler gear (if used) which is identical to the oil pump idler gear.

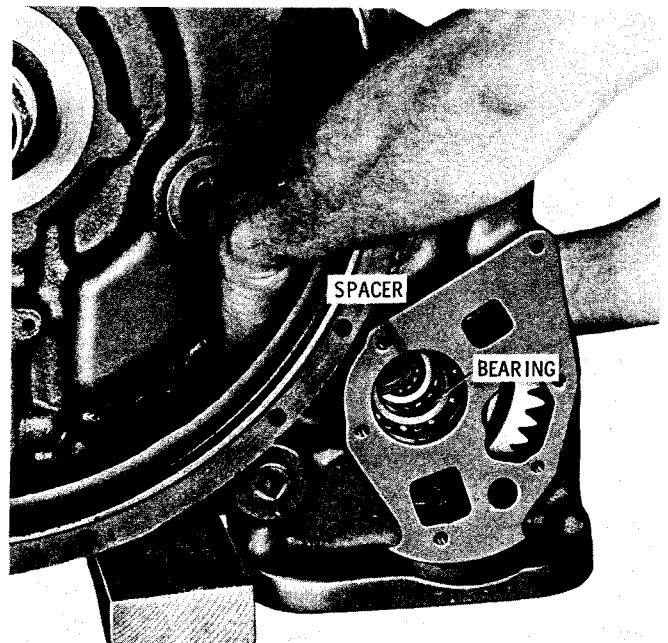


Fig. 7-57. Installing pump drive gear spacer

S1702

## Para 7-3

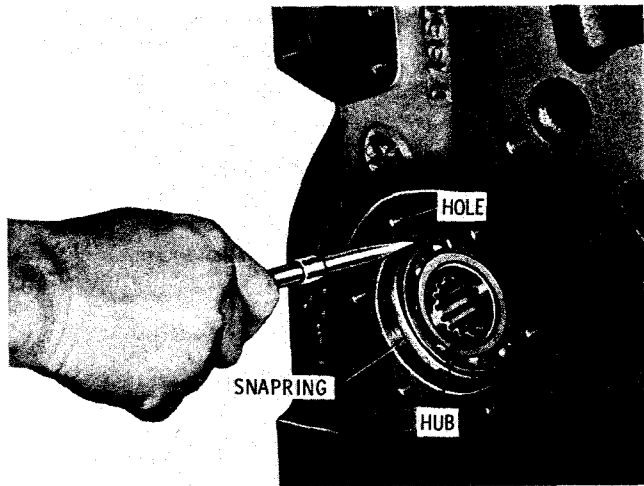


Fig. 7-58. Installing pump drive gear hub bearing snapping S1703

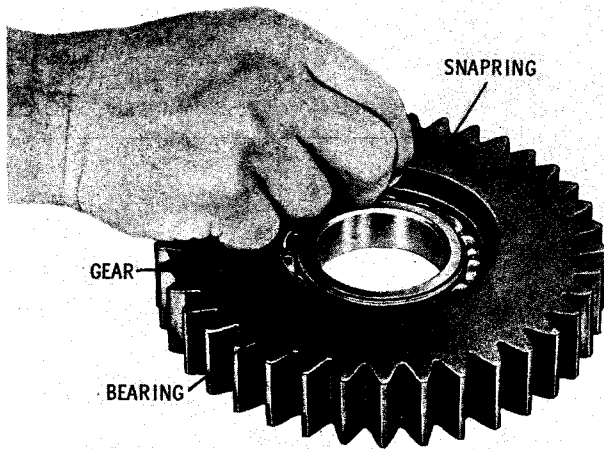


Fig. 7-59. Installing oil pump idler gear (or PTO idler gear) bearing snapping S1704

(6) Install the oil pump idler gear and bearing assembly (snapping down) over the idler gear spindle bore in the converter housing (fig. 7-60). Align the gear with the spindle bore.

(7) Install two hook-type sealrings onto the converter ground sleeve (fig. 7-61). (On later models, one teflon sealring is required.) Install a headless, 1/2-13 guide bolt into the tapped hole at the bottom of the spindle bore. Using gloves, install the spindle, which has been chilled in dry ice. Secure the spindle with a 1/2-13 x 2 1/2-inch bolt and lockwasher. Note power takeoff (PTO) spindle bore and tapped hole. Install the power takeoff idler gear and spindle (if used) in the same manner. Tighten the bolt(s) to 67 to 80 pound feet torque.

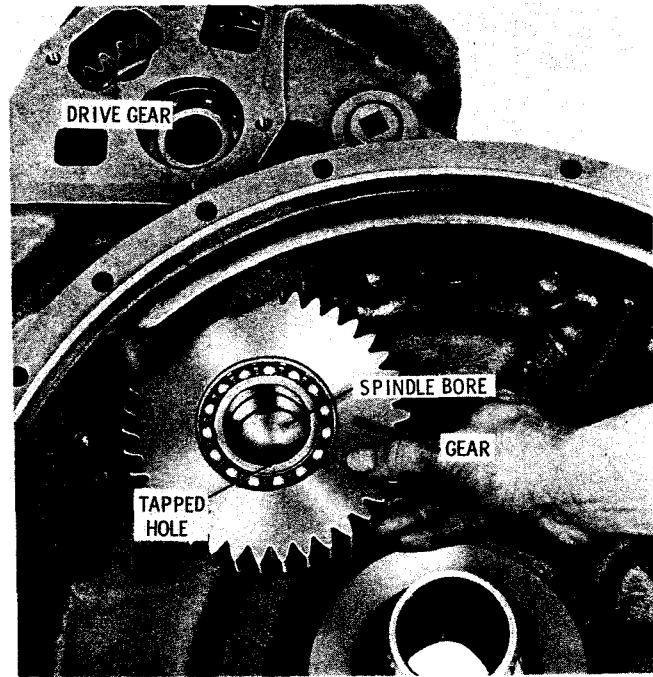


Fig. 7-60. Installing oil pump idler gear assembly S1705

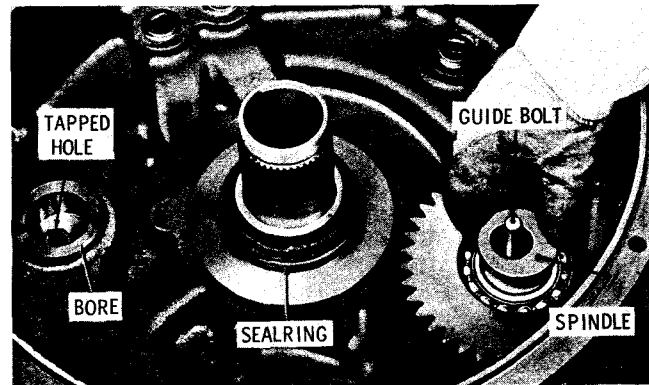


Fig. 7-61. Installing oil pump idler gear spindle S1706

#### h. Installing Converter Housing (CBT, CLB, VCLBT)

(1) Attach a 2-strand lifting sling to converter housing (fig. 7-62). Install a gasket onto the retarder housing and lower the converter housing, aligning dowel pins in the converter housing with dowel pin holes on both sides of the retarder housing.

#### CAUTION

Lower the converter housing slowly and carefully, keeping it centered over the turbine shaft, so that the hook-type sealrings on the shaft will not be damaged during the installation.

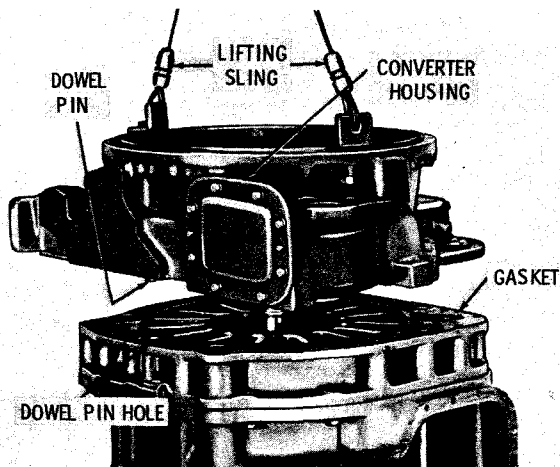


Fig. 7-62. Installing converter housing onto retarder housing (CBT, CLBT, VCLBT)

S1707

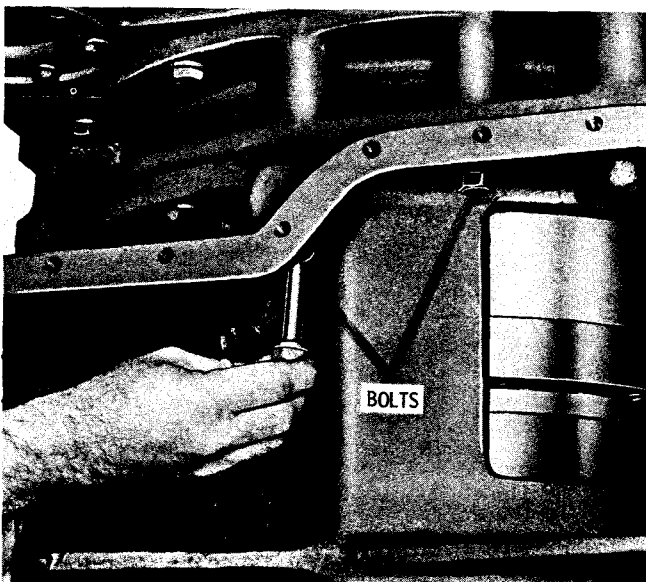


Fig. 7-63. Installing converter housing bolts at bottom of transmission (CBT, CLBT, VCLBT)

S1708

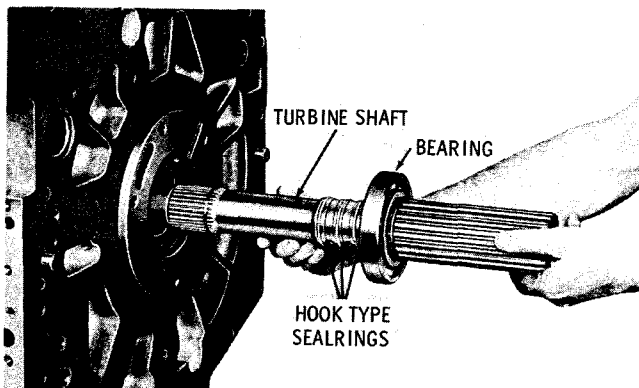


Fig. 7-64. Installing turbine output shaft (CT, CLT, VCLT)

S1595

(2) Install seven 1/2-13 x 1 1/2-inch bolts and lockwashers and twelve 1/2-13 x 5-inch bolts and lockwashers into the converter housing. The short bolts go through the front flange of the retarder housing; the long bolts through the front of the transmission housing and through the retarder housing. (Two of the 5-inch bolts are located in the bottom of the transmission (fig. 7-63).) Tighten the bolts to 67 to 80 pound feet torque.

**i. Installing Splitter Planetary, Low-Splitter Clutch and Converter Housing (CT, CLT, VCLT)**

(1) Install converter housing components as outlined in g(1) through (7), above.

(2) Install the bearing assembly and step-joint or hook-type sealrings onto the shaft (fig. 7-64). CT models use only two in place of three sealrings. If included, install the sealring behind the bearing. Install the shaft into the housing (fig. 7-64).

(3) Install the oil transfer hub and secure it with five 1/2-13 x 1 1/4-inch bolts and lockwashers (fig. 7-65). Tighten the bolts to 67 to 80 pound feet torque.

(4) Install one 5/16-24 x 2 1/2-inch bolt (with lockstrip) into the converter housing from the converter side (refer to fig. 7-67). Thread the bolt

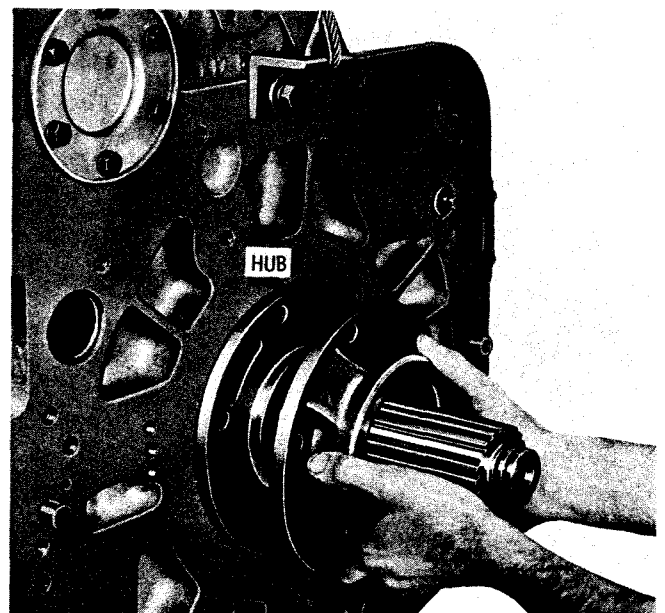


Fig. 7-65. Installing oil transfer hub (CT, CLT, VCLT)

S1709

## Para 7-3

into the pitot tube assembly. Snug the bolt to hold the pitot tube assembly parallel to the work table surface (fig. 7-66).

**CAUTION**

Failure to position the pitot tube assembly correctly will result in no pitot pressure in the transmission.

(5) Install the low-splitter clutch drum assembly onto the turbine shaft (fig. 7-66).

**CAUTION**

Because hook-type sealings tend to drop off center, keep them centered in their grooves on the drum hub with oil-soluble grease. Take care to avoid damaging them during assembly.

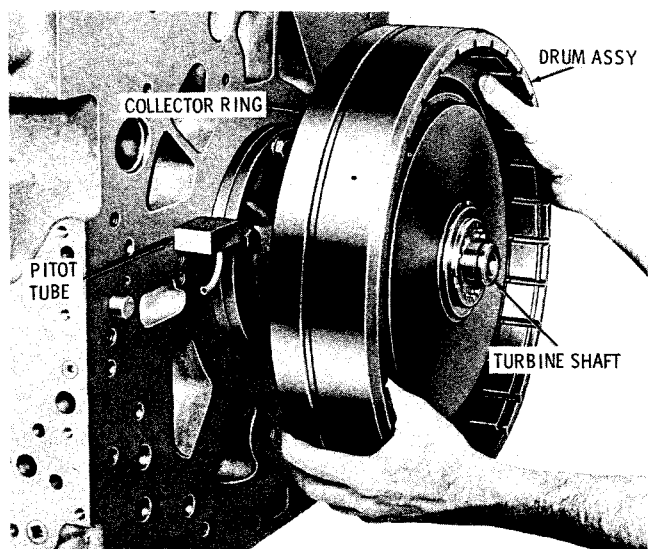


Fig. 7-66. Installing low-splitter clutch drum assembly (CT, CLT, VCLT)

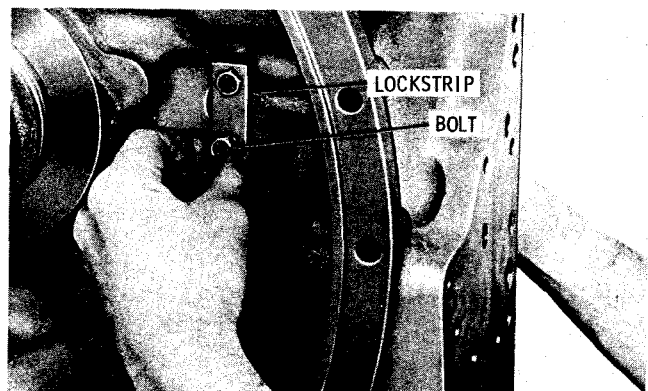


Fig. 7-67. Installing second-pitot tube bolt (CT, CLT, VCLT)

(6) Rotate the pitot tube assembly to its correct position with a length of thin steel stock (refer to fig. 7-45) and install the remaining bolt with the other hand. Tighten both bolts to 14 to 18 pound feet torque and bend the corners of the lockstrip against the two bolt heads (fig. 7-67).

(7) Install the splitter planetary carrier assembly and low-splitter clutch hub (assembled in f(19), above) onto the turbine shaft and secure the assemblies with the snapping (fig. 7-68).

(8) Install the hook-type sealing onto the turbine shaft. Install one internal-splined plate, one external-splined plate and one internal-splined low-splitter clutch plate (fig. 7-69).

(9) Install the low-splitter clutch back plate into the low-splitter drum and secure it with an internal snapping (fig. 7-70).

(10) Install the gasket onto the transmission housing. Attach a 2-strand lifting sling to the converter housing assembly. Lower the assembly onto the transmission. Engage the splines of the splitter clutch hub with the splines of the high-splitter clutch plates inside the transmission housing. Engage the splitter planetary pinions with the ring gear inside the transmission housing. Aline the dowel pins with the dowel pin holes in the transmission housing (fig. 7-71).

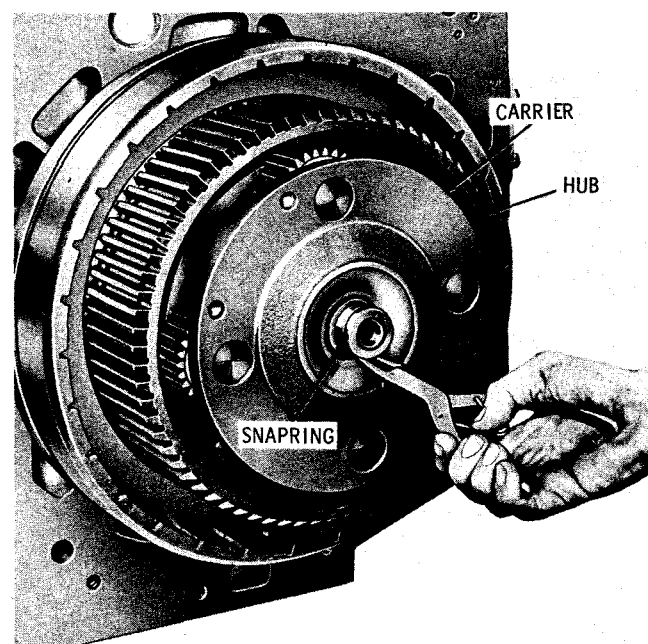


Fig. 7-68. Installing snapping that retains splitter planetary (CT, CLT, VCLT)

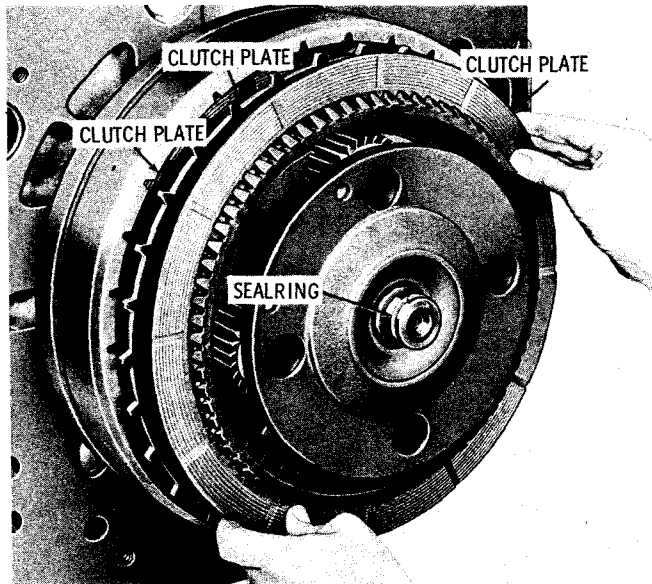


Fig. 7-69. Installing low-splitter clutch plates (CT, CLT, VCLT) S1713

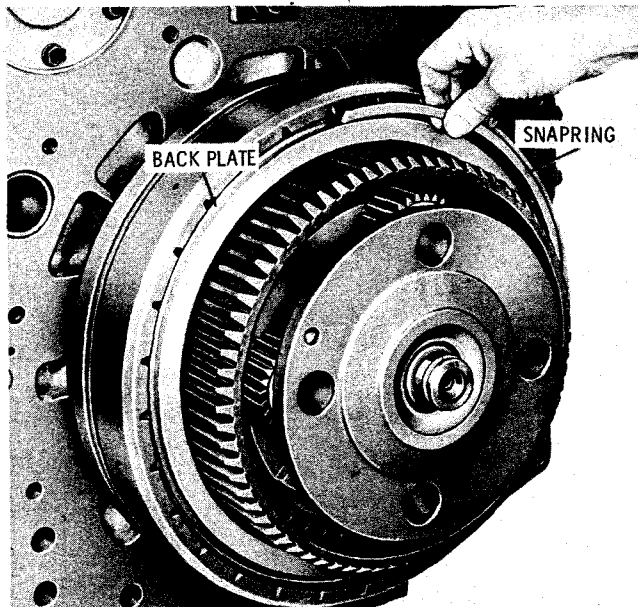


Fig. 7-70. Installing low-splitter clutch back plate snapping (CT, CLT, VCLT) S1714

(11) Install nineteen 1/2-13 x 1 1/2-inch bolts and lockwashers into the torque converter housing. (Two bolts and lockwashers are located in the bottom of the transmission (fig. 7-72).) Tighten the bolts to 67 to 80 pound feet torque.

**j. Installing Torque Converter Pump, Stators**

(1) Install the Teflon step-joint sealring onto the ground sleeve (fig. 7-73). (Two hook-type sealrings are used on earlier models.)

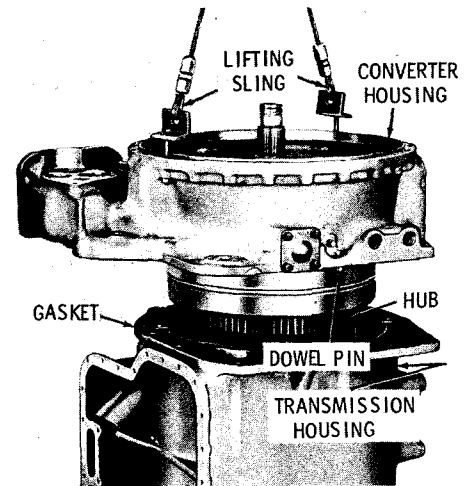


Fig. 7-71. Installing converter housing onto transmission housing (CT, CLT, VCLT) S1715

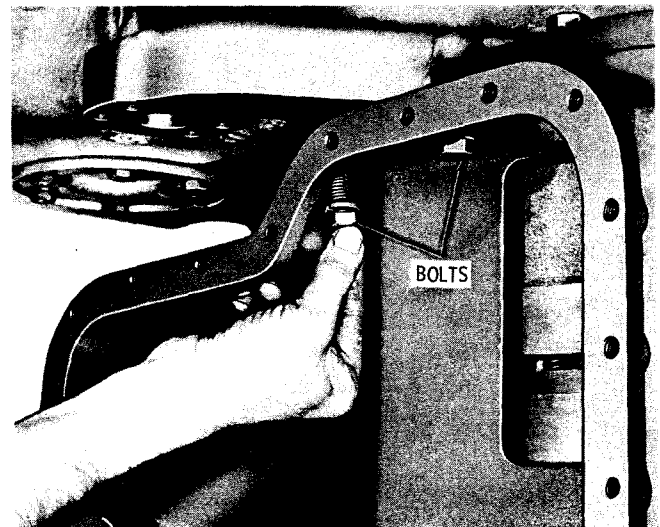


Fig. 7-72. Installing converter housing bolts at bottom of transmission (CT, CLT, VCLT) S1716

(2) Install the torque converter pump with the input accessory drive gear onto the torque converter ground sleeve (fig. 7-73). Index the accessory drive gear with the power takeoff idler gear (if used) and the oil pump idler gear. Tap on the inner race of the converter pump bearing to seat it against the shoulder on the ground sleeve.

(3) On 4-element (fixed-capacity converter) install the stator back plate, flat side up, onto the ground sleeve (fig. 7-74). Install the stator freewheel roller race, notches up, onto the ground sleeve. Install the spanner nut onto the stator ground sleeve. Using the spanner wrench shown in figure 4-1, tighten the spanner nut 275 to 325 pound feet torque. Stake the outer flange of the spanner



## Para 7-3

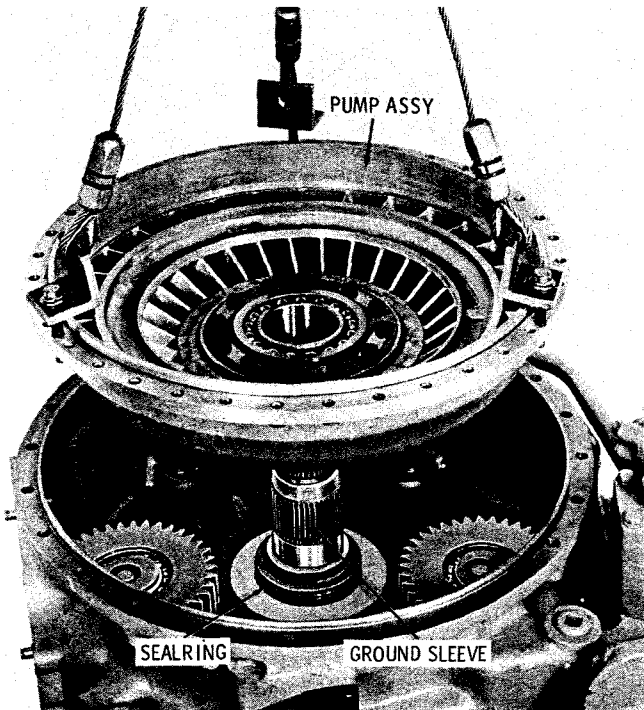


Fig. 7-73. Installing torque converter pump assembly

S1576

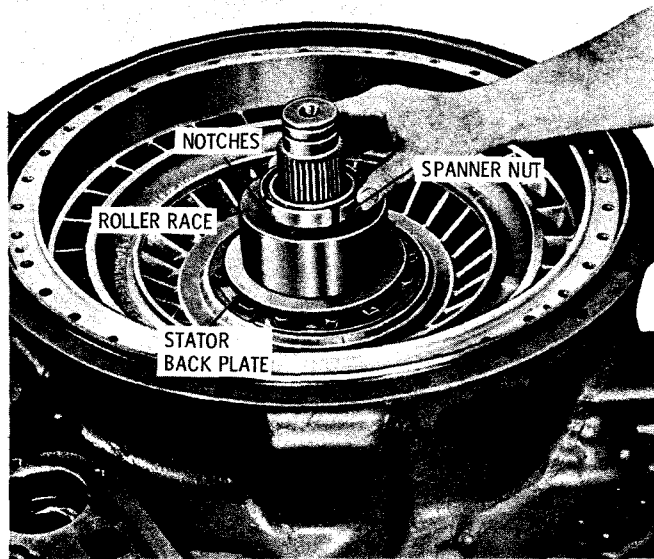
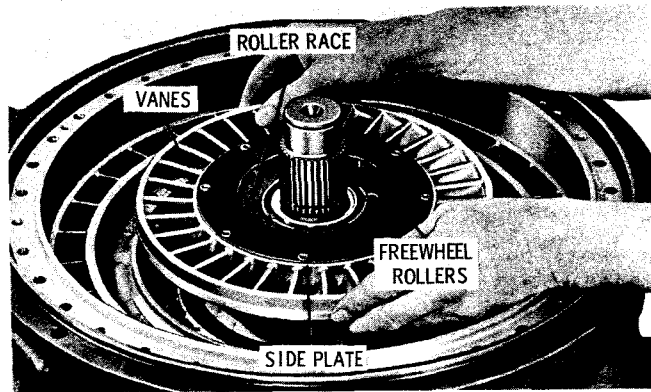


Fig. 7-74. Installing freewheel roller race spanner nut (fixed-capacity converter)

S1717

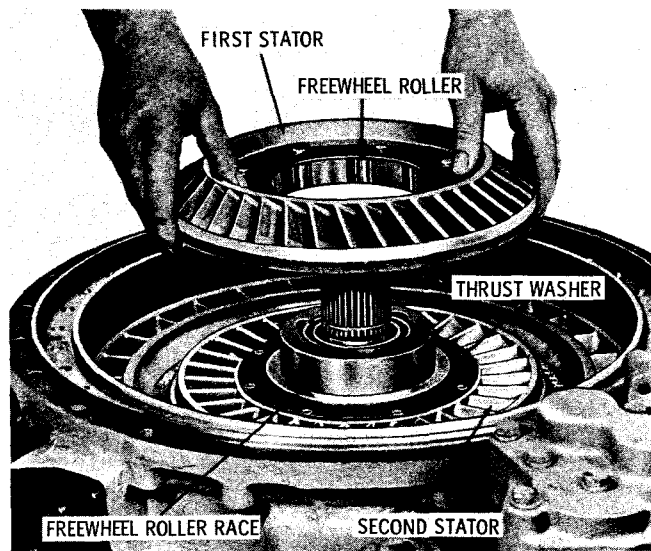
nut into one of three notches in the stator freewheel roller race. Continue assembly of four-element converter through (6), below.

(4) Lay both stator assemblies on the work table with the flat side up. The stator with the thin edge blades is the first stator. The stator



S1718

Fig. 7-75. Installing second-stator assembly (fixed-capacity, 4 element converter)



S1569

Fig. 7-76. Installing first-stator assembly (fixed-capacity, 4-element converter)

with the thick edge blades is the second stator. Install the second stator, flat side upward, onto the freewheel roller race (fig. 7-75). Exerting a steady downward pressure, rotate the stator clockwise. This will move freewheel rollers into their recesses and clear the edge of the freewheel roller race.

(5) Install bronze thrust washer onto the second-stator side plate (fig. 7-76). Install the first stator assembly, flat side downward. Rotate the stator clockwise until it seats.

(6) Install the thrust washer onto the first stator assembly (fig. 7-77). On earlier models, install the snapping onto the ground sleeve. Check both stators for free rotation clockwise; lockup counterclockwise.