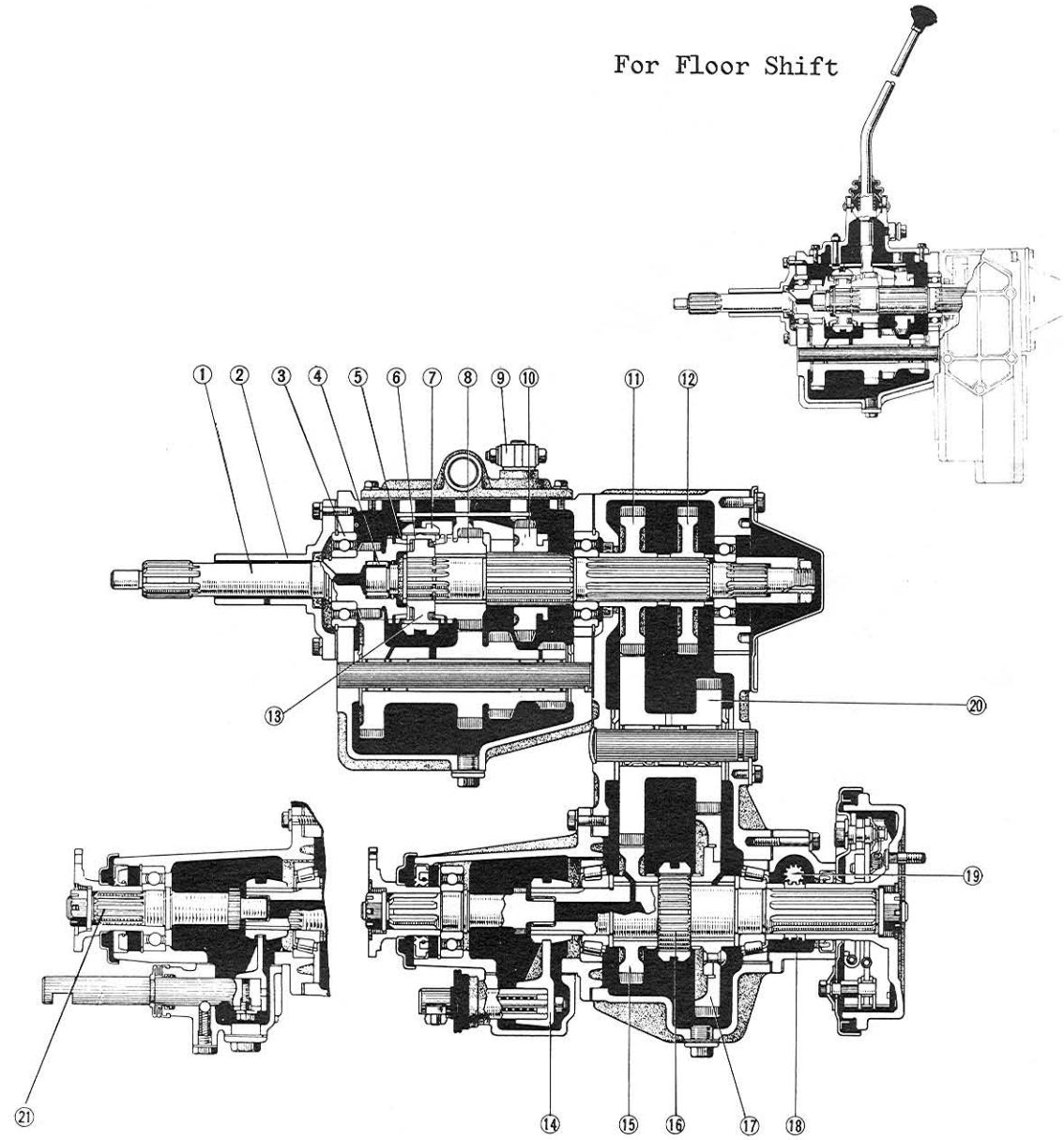
TRANSMISSION & TRANSFER

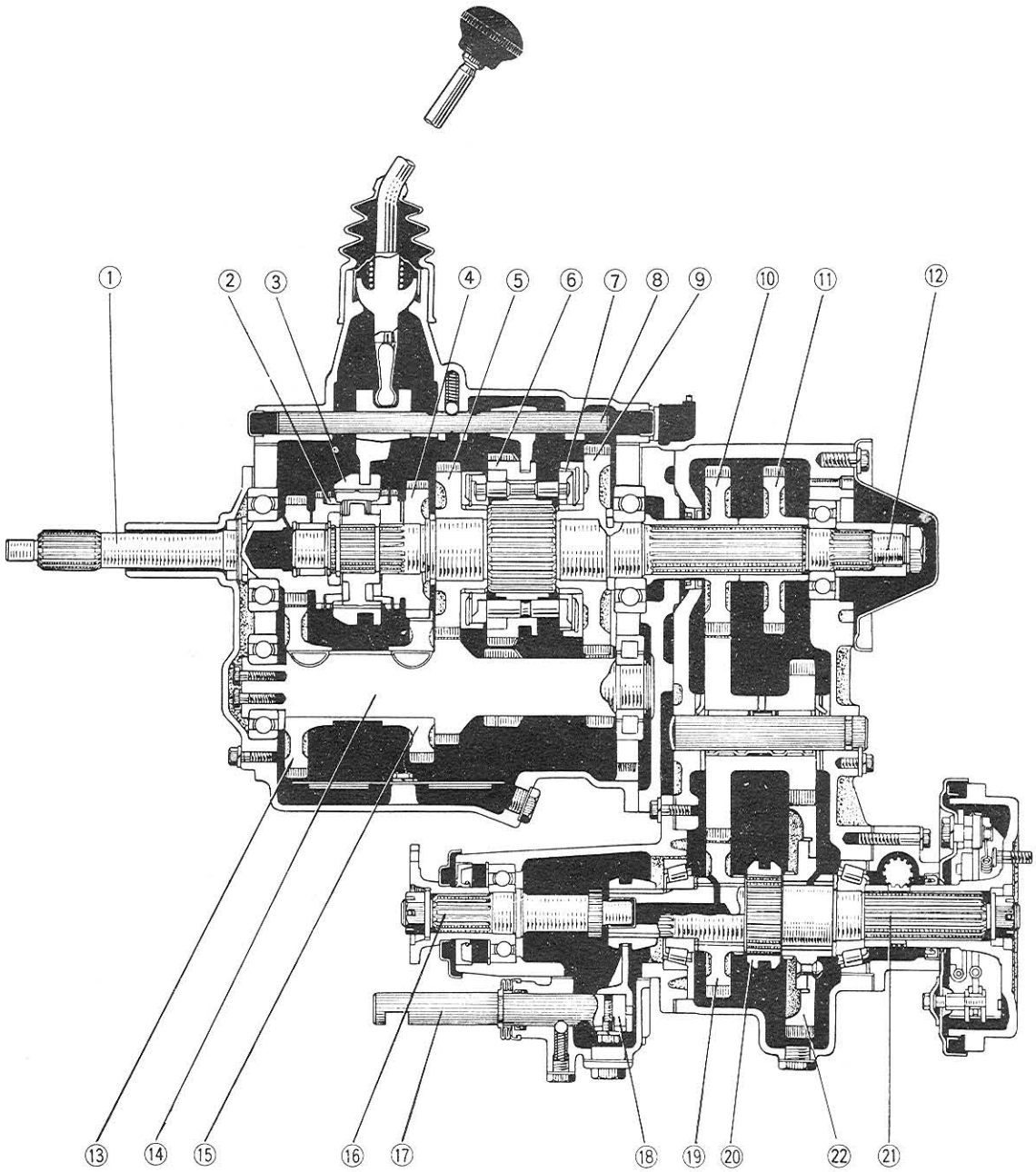
2

DESCRIPTION



1. Input shaft
2. Front bearing retainer
3. Front bearing
4. Bearing roller
5. Synchronizer ring No.2
. Synchronizer ring shifting key No.2
7. Clutch hub sleeve
8. Second gear
9. Gear select outer lever
10. First & reverse gear
11. Transfer input gear
12. Power take-off drive gear
13. Transmission clutch hub No.2
14. Transfer front drive shift fork
15. Transfer high speed output gear
16. Transfer output shaft
17. Transfer low speed output gear
18. Speedometer drive gear
19. Speedometer driven gear
20. Transfer idler gear
21. Transfer output front shaft

Fig.2-1 Transmission & Transfer Cross Section View (3-speed) Y5725



1. Input shaft
2. Synchronizer ring
3. Hub sleeve
4. Third gear
5. Second gear
6. Synchronizer ring (reverse gear)
7. Synchronizer outer ring
8. Shift fork shaft
9. First gear
10. Transfer input gear
11. Power take-off drive gear
12. Transmission output shaft
13. Counter shaft drive gear
14. Counter shaft
15. Counter shaft third speed gear
16. Transfer output front shaft
17. Transfer front drive shift shaft
18. Transfer front drive shift fork
19. Transfer output gear (High speed)
20. Transfer clutch sleeve
21. Transfer output shaft
22. Transfer output gear (Low speed)

Fig. 2-2 Transmission & Transfer Cross Section View (4-speed) Y5357

Two types of transissions are available on the Toyota Land Cruisers; the three speeds forward and one reverse, and the other four speeds forward and one reverse.

The three-speed transmission provides smooth synchromesh operation in second and top speeds, while the first and reverse gears are of a sliding mesh type. The forward gears on the four-speed transmission are all of constant mesh, synchromesh type, while the reverse gear is of a sliding mesh type.

The three-speed transmission is available with two types of gear shift controls. One is with the remote control gear shift mechanism, and the other is a direct gear shift control type, but the four-speed transmission is available only with the direct gear shift control mechanism.

The transfer case is installed behind the transmission, and the transfer gear can be shift into high and low speeds an auxiliary unit of the transmission.
The front drive mechanism is mounted at the front of the transfer case, and the transfer case front drive control mechanism is available with a vacuum control shifiting mechanism and a mechanical shifting mechanism.

Specification

	Three-speed transmission	Four-speed transmission
Shifting device:		
Direct control type		Direct control type
Remote control type		N/A
Front drive shifting device:		
Mechanical shifting type (direct control type only)		Mechanical shifting type
Vacuum control type		N/A
Gear ratio:		
First	2.75	5.30
Second	1.69	2.84
Third	1.00	1.63
Fourth	----	1.00
Reverse	3.67	5.30
Transfer gear ratio:		
High	1.00	1.00
Low	2.30	2.30
Lubricant capacity:		
Transmission	1.7 liters (1.8 US qts., 1.5 Imp qts)	3.1 liters (3.3 US qts., 2.7 Imp qts)
Transfer	1.7 liters (1.8 US qts., 1.5 Imp qts)	1.7 liters (1.8 US qts., 1.5 Imp qts)

TROUBLE SHOOTING

1. Transmission noise.

The noise seemingly produced by the transmission is often caused by other assemblies such as the axle, propeller shaft, or the clutch. Therefore, prior the replacing the transmission and the transfer due to the noise, make sure that the trouble does not exist elsewhere.
If a noise that may be a growl or hum can be stopped by depressing the clutch pedal, and the noise is from the transmission.
In case of gear or bearing failure, and the noise is of a growl or hum, the gear or the bearing may often be in a stage of worn condition, but if a bump or thud noise is present, it indicates a broken or bearing.
Before removing the transmission and the transfer for correction of gear noise, determine by road test which gear is noisy under load, and also the transmission gear noise can be checked without shifting the transfer into high or low by positioning the shift lever in the neutral position so that these parts can be thoroughly inspected when removed.
When the noise develops in the transmission or transfer, first check the lubricant level.

2. Gear jumping out.

a. Jumps out in all gears.
   (1) Engine mounting loose or broken.
   (2) Control shaft linkage out of adjustment, worn or loose.
   (3) Misalignment or loose transmission case and/or clutch housing.
   (4) Loose, weak or worn of gear shift mechanism within the transmission case cover.
   (5) Worn or damaged countershaft or output shaft bearing/s.
   (6) Loose transmission case cover attaching bolts.
   (7) Transfer shift linkage out of adjustment, worn or loose.
   (8) Transfer shift mechanism worn.
   (9) Propeller shaft bent or out of balance.

b. Jumps out in first gear.
   (1) Insufficient spring tension of lock ball spring.
   (2) Worn shift fork shaft or shift fork.
   (3) Worn synchronizer gear on synchronizer ring No.1 or first gear (four-speed transmission)

c. Jumps out in second gear.
   (1) Insufficient spring tension of lock ball spring.
   (2) Worn shift fork shaft or shift fork.
   (3) Worn synchronizer unit splines or synchronizer gear on second gear (three-speed transmission)
   (4) Worn second gear bushing (three-speed transmission)
   (5) Worn synchronizer gear on second gear.
   (6) Worn second gear thrust washer (four-speed transmission)

d. Jumps out in third gear.
   (1) Insufficient spring tension of lock ball spring.
   (2) Worn shift fork shaft or shift fork.
   (3) Worn synchronizer unit splines or synchronizer gear on input shaft. (three-speed transmission)

(4) Input shaft bearing or pilot bearing in the crankshaft worn or damaged.
(5) Roller bearing in input shaft worn or damaged.
(6) Worn synchronizer unit splines or synchronizer gear on third gear. (four-speed transmission)

e. Jumps out in fourth gear.
(1) Insufficient spring tension of lock ball spring.
(2) Worn shift fork shaft or shift fork.
(3) Worn synchronizer unit splines or synchronizer gear on input shaft.
(4) Input shaft bearing or pilot bearing in crankshaft worn or damaged.
(5) Roller bearing in input shaft worn or damaged.

f. Jumps out in reverse gear.
(1) Insufficient spring tension of lock ball spring.
(2) Worn shift fork shaft or shift fork.
(3) Reverse shift arm out of adjustment. (four-speed transmission)

g. Jumps out in high and low gears of transfer.
(1) Shift linkage out of adjustment.
(2) Transfer output shaft bearing/s worn or damaged.
(3) Insufficient spring tension of lock ball spring.
(4) Worn shift fork shaft or shift fork.
(5) Worn clutch sleeve splines.

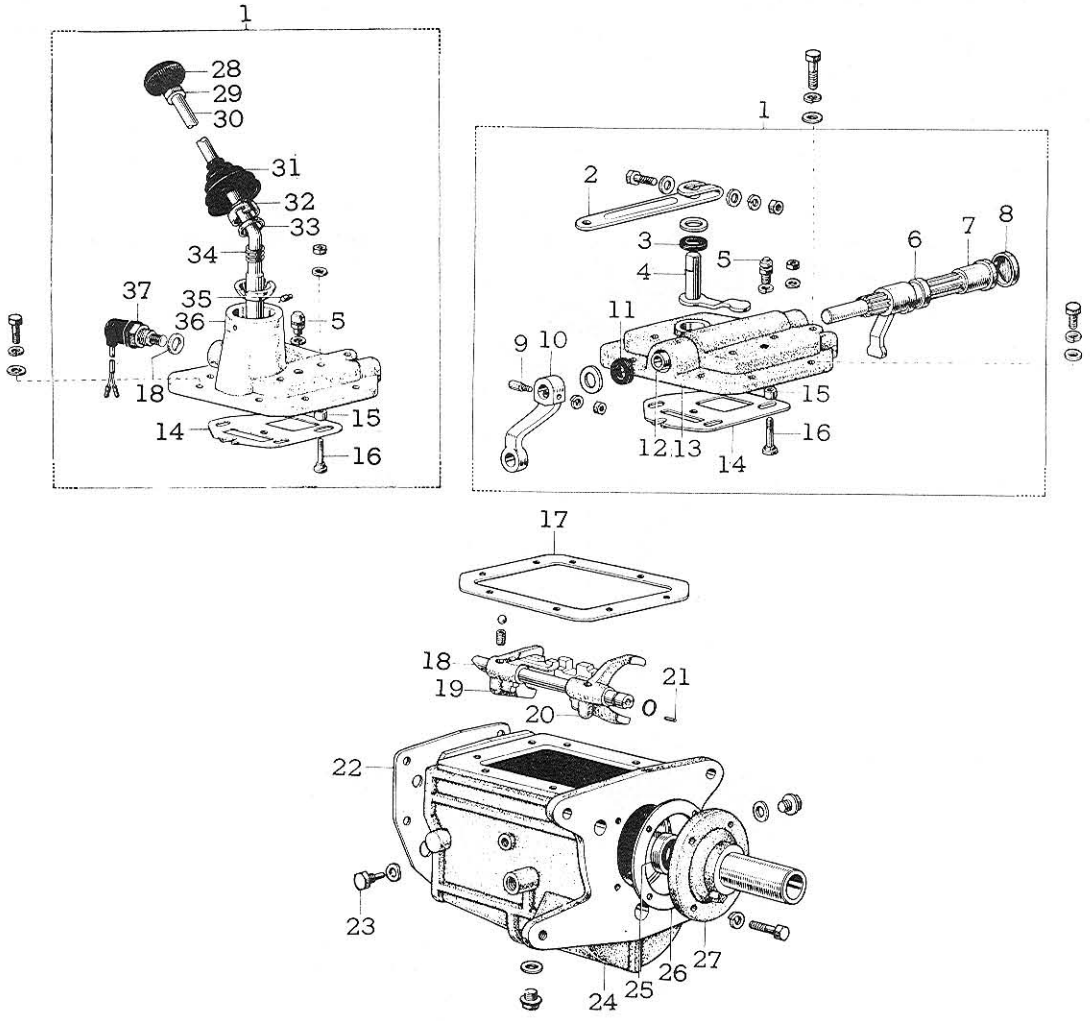
3. Hard shifting.

a. Transmission
If a clashing unpleasant sound is produced, and the gears are exceedingly difficult to shift.
Hard shifting is caused from shift linkage or transmission trouble, but often are results from improper clutch releasing.
(1) Control shaft linkage out of adjustment.
(2) Control shaft linkage bent, damaged or loose.
(3) Worn or damaged shift or inter-lock mechanism in the transmission case cover.
(4) Synchronizer mechanism worn or broken.
(5) Incorrect gear lubricant viscosity.
(6) Loose transmission case cover.

b. Transfer.
(1) Shift linkage bent, damaged or loose.
(2) High and low clutch sleeve splines damaged.
(3) Shift linkage out of alignment.
(4) Loose transfer case cover.

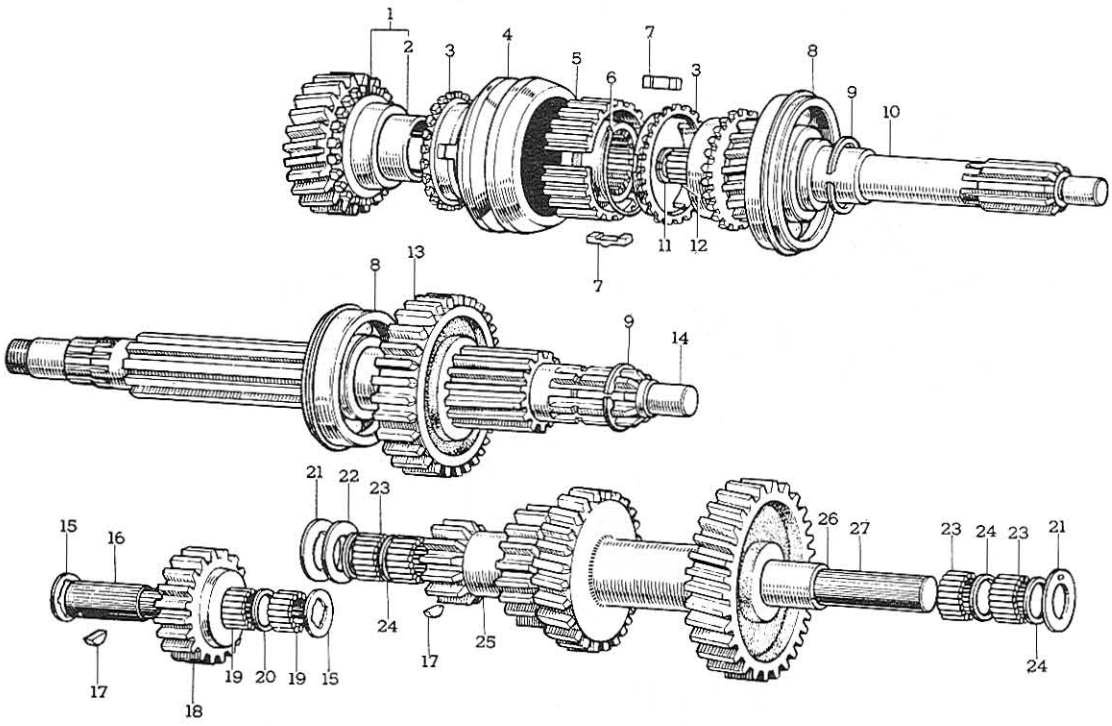
c. Front drive.
(1) Loose front drive shift shaft guide or diaphragm cylinder.
(2) Shift linkage out of alignment.
(3) Vacuum shift valve or diaphragm damaged.
(4) Loose vacuum line connection/s.
(5) Front drive clutch inner gear damaged.
(6) Worn bearing in transfer output shaft front end.

3-SPEED TRANSMISSION & TRANSFER



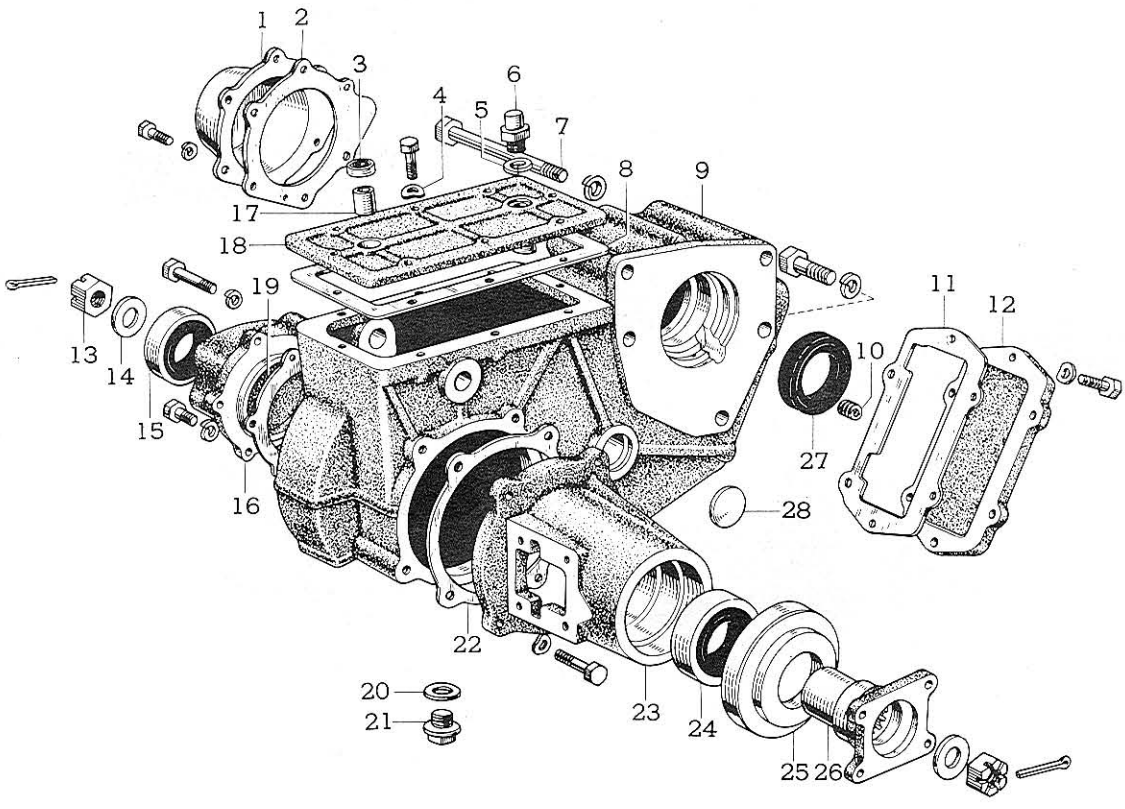
1. Transmission case cover assembly
2. Gear select outer lever
3. Oil seal
4. Select lever shaft
5. Breather plug
6. Sliding shift lever
7. Shift lever shaft
8. Tight plug
9. Lever lock pin
10. Outer shift lever
11. Oil seal
12. Bushing
13. Transmission case cover
14. Shift inter-lock plate
15. Spacer
16. Inter-lock plate set bolt
17. Case cover gasket
18. Shift fork shaft
19. Reverse and first shift fork
20. Second and third shift fork
21. Straight pin
22. Gasket
23. Shift fork stopper
24. Transmission case
25. Oil seal
26. Gasket
27. Front bearing retainer
28. Shift lever knob
29. Nut
30. Shift lever
31. Shift lever cap boot
32. Shift lever cap
33. Shift lever spring seat
34. Spring
35. Dowel pin
36. Transmission case cover
37. Back-up light switch

Fig.2-3 Transmission Case & Cover Components Y7184



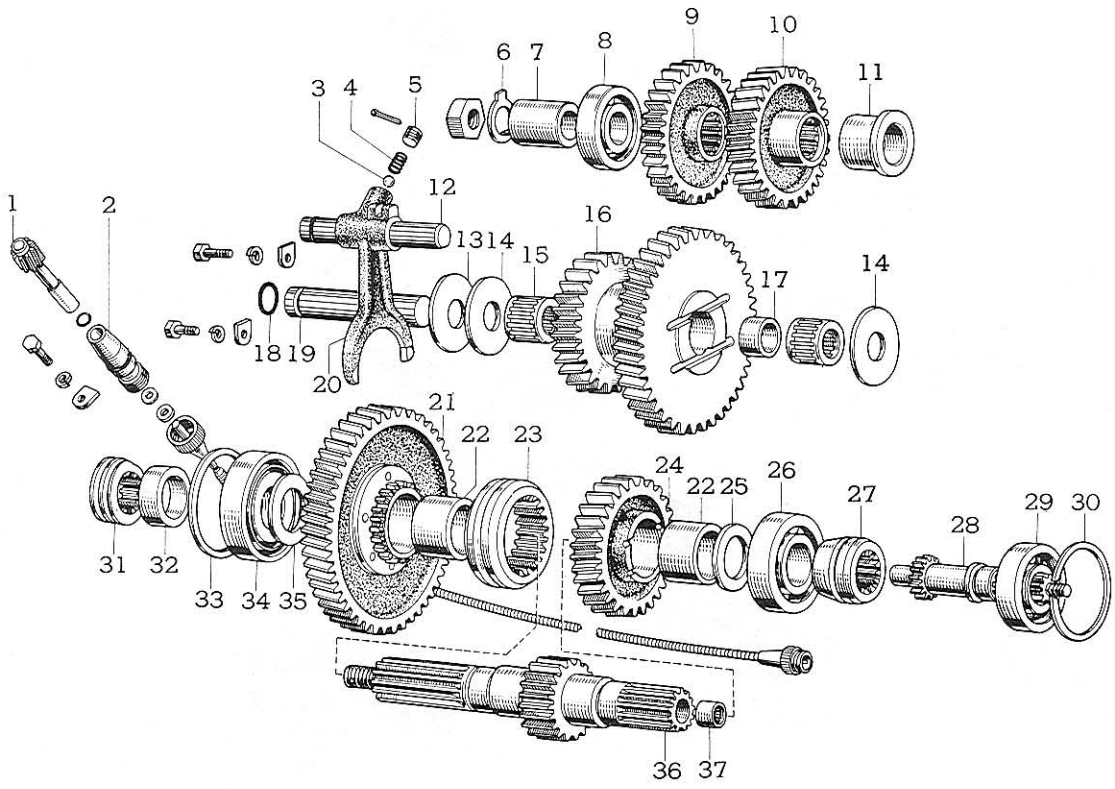
1. Second gear
2. Second gear bushing
3. Synchronizer ring No.2
4. Clutch hub sleeve
5. Clutch hub No.2
6. Shifting key spring
7. Shifting key No.2
8. Bearing
9. Shaft snap ring
10. Input shaft
11. Hole snap ring
12. Bearing roller
13. First & reverse gear
14. Output shaft
15. Reverse idler thrust washer
16. Reverse idler gear shaft
17. Woodruff key
18. Reverse idler gear
19. Bearing roller
20. Washer
21. Counter gear case side thrust washer
22. Counter gear side thrust washer
23. Bearing roller
24. Washer
25. Counter shaft drive gear
26. Counter shaft tube
27. Counter shaft

Fig.2-4 Transmission Gear Components G2370



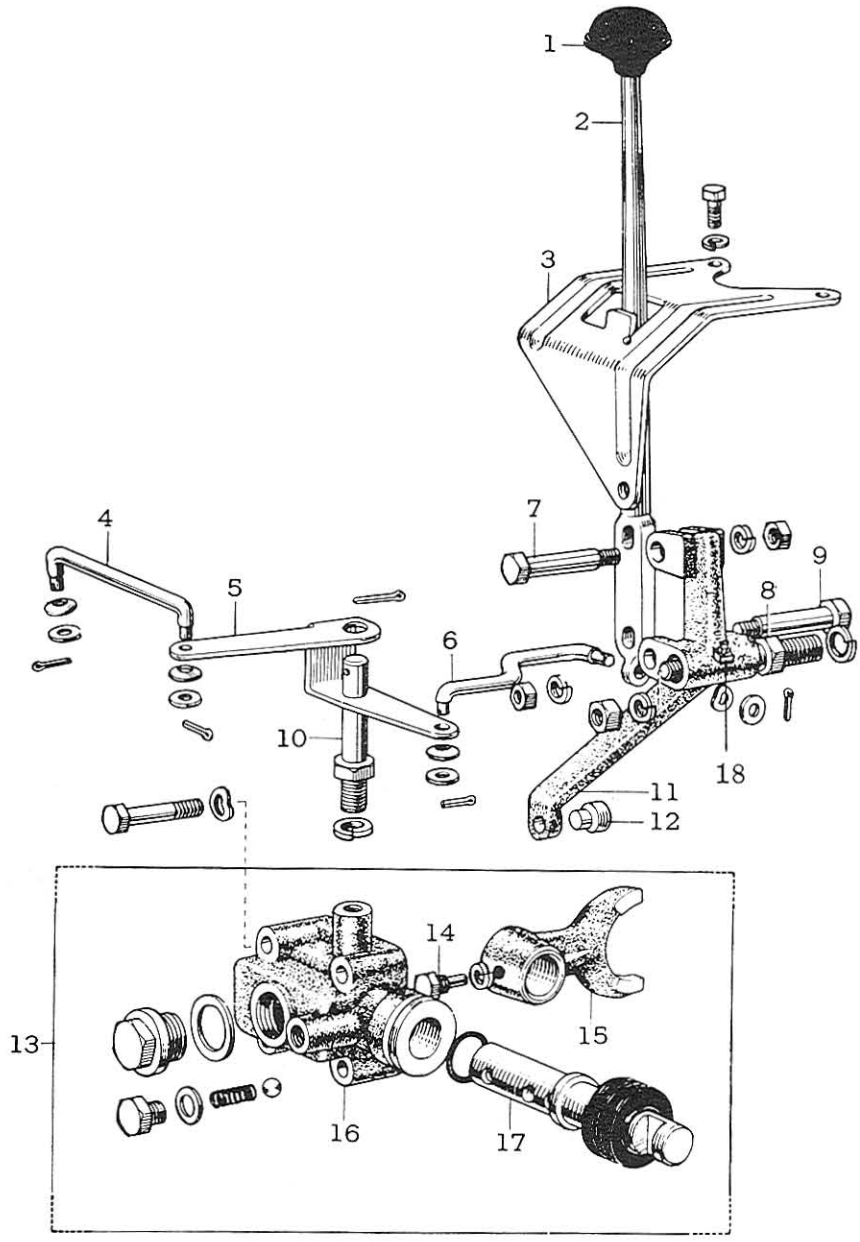
1. Transfer case cover No.2
2. Gasket
3. Oil seal
4. Wave washer
5. Lock washer
6. Breather plug
7. Bolt
8. Gasket
9. Transfer case
10. Compression spring
11. Gasket
12. Transfer power take-off cover
13. Retaining nut
14. Washer
15. Oil seal
16. Output shaft bearing rear retainer
17. Bushing
18. Transfer case cover
19. Gasket
20. Plug gasket
21. Plug
22. Gasket
23. Transfer extension housing
24. Oil seal
25. Dust deflector
26. Universal joint flange
27. Oil seal
28. Expansion plug

Fig.2-5 Transfer Case & Cover Components G2371



1. Speedometer driven gear
2. Speedometer shaft sleeve
3. Shift fork lock ball
4. Compression spring
5. Straight screw plug
6. Lock washer
7. Transfer input shaft spacer
8. Bearing
9. Power take-off drive gear
10. Transfer input gear
11. Transfer input gear stopper (4-speed T/M)
12. Transfer high & low shift fork shaft
13. Transfer idler gear spacer
14. Washer
15. Needle roller bearing
16. Transfer idler gear
17. Spacer
18. "O" ring
19. Transfer idler gear shaft
20. Transfer high & low shift fork
21. Transfer low speed output gear
22. Bushing
23. Transfer high & low clutch sleeve
24. Transfer high speed output gear
25. Washer
26. Bearing
27. Front drive clutch sleeve
28. Transfer output front shaft
29. Bearing
30. Hole snap ring
31. Speedometer drive gear
32. Spacer
33. Adjusting shim
34. Bearing
35. Washer
36. Transfer output shaft
37. Needle roller bearing

Fig. 2-6 Transfer Gear & Shift Fork Components G2372



1. Shift lever knob
2. Front drive shift lever
3. Shift lever guide
4. High and low shift rod No.3
5. High and low shift link lever
6. High and low shift rod No.1
7. Shift lever pin No.1
8. Shift link support shaft
9. Shift lever pin No.2
10. Link support shaft
11. Front drive shift link lever
12. Link lever shoe
13. Transfer front drive shift shaft guide assembly
14. Fork shaft pin
15. Front drive shift fork
16. Shift shaft guide
17. Front drive shift shaft
18. Grease nipple

Fig.2-7 Transfer Shift Lever & Link Components G2384

Removal

1. Remove the transmission under cover, and disconnect the front and rear propeller shafts from the transfer output shaft.

2. Drain the gear lubricant from the transmission and the transfer.

3. Remove the transmission cover.

4. Disconnect the parking brake cable from the parking brake link lever.

5. Pull up the shift lever cap boot, and then remove the shift lever from the transmission case cover with the Transmission Gear Shift Lever Remover 09305-60010.
   To remove the shift lever, hold down the gear shift lever cap, then turn the Transmission Gear Shift Lever Remover clockwise.
   Cover the shift lever retainer hole with a clean shop towel to prevent dropping any foreign matter into the transmission case cover.
   Loosen and remove the knob on the transfer front drive shift lever.

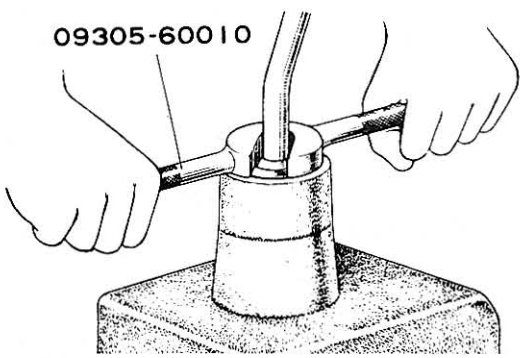


Fig.2-8 Shift Lever Removal G2400 2-10

6. Loosen and remove the speedometer drive cable from the speedometer shaft sleeve.
   Disconnect the wires from the front drive indicator switch.

7. Remove the hole pin, and disconnect the high and low shift rod from the transfer high and low shift inner lever on the transfer case cover.

8. Disconnect the gear shifting rod No.3 and the gear selecting rod from the gear select outer lever and the gear shift outer lever on the transmission case cover. (for R.C.)

9. Loosen the clamp screws, and desconnect the vacuum hoses from the connections on the diaphragm cylinder body cover and the diaphragm cylinder body. (for R.C.)

10. Remove the flywheel housing under cover, and then remove the bolts retaining the transmission onto the clutch housing.

11. Slide the transmission assembly rearward until the transmission input shaft completely clears the clutch housing, and carefully withdraw it downward from the vehicle.

Disassembly

1. Remove the transfer shift lever quide (1), cotter pin (2), and the lock bolt (3), then remove the shift lever and the lever linkage.
   Do not lose the link lever shoe (4), connecting the front drive shift link lever to the transfer front drive shift shaft.

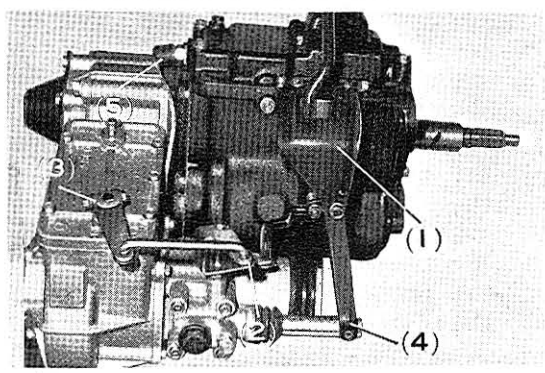


Fig.2-9 Shift Lever & Linkage Removal V5062

2. Loosen and remove the back-up light switch (5), and the gasket from the transmission case cover.

3. Remove the transfer case cover No.2 and the gasket.

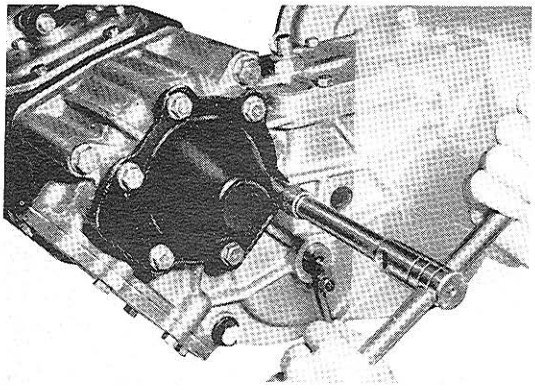


Fig.2-10 Removing Case Cover Attaching Bolts V0433

4. Remove the transfer power take-off cover and the gasket.

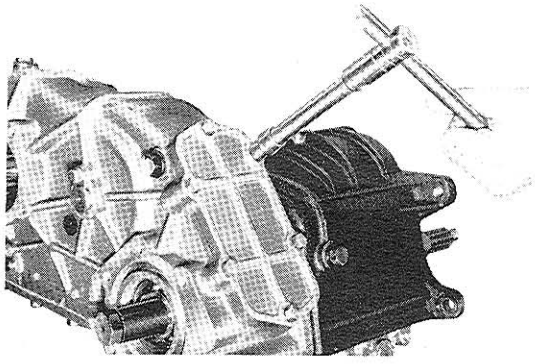


Fig.2-11 Removing Power Take-off Cover Attaching Bolts V0434

5. Straighten the input shaft nut lock washer, and remove the nut at the end of the shaft, then slide out the spacer.
   To loosen the nut, use a brass rod or a wooden block and lock the power take-off drive gear or the transfer input gear to prevent the rotation of the shaft.

6. Loosen and remove the five bolts retaining the transfer case onto the transmission case.
   Two bolts are short, which should be removed from the inside of the transfer case.

7. Install an universal puller onto the transfer case, and separate the transfer assembly from the transmission case.
   At this time, retain the power take-off drive gear, spacers and the transfer input gear with the hand, and being careful not to drop the gears and spacers.
   Take out the spring in the transfer case.

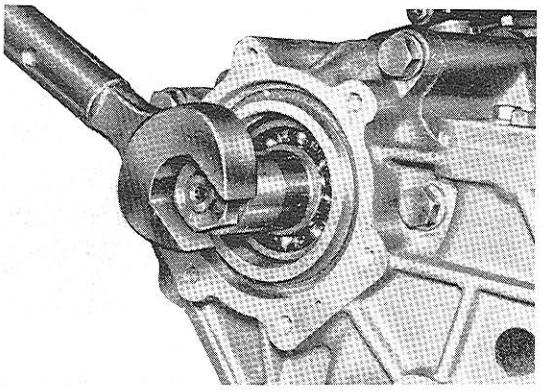


Fig.2-12 Removing Nut V0435

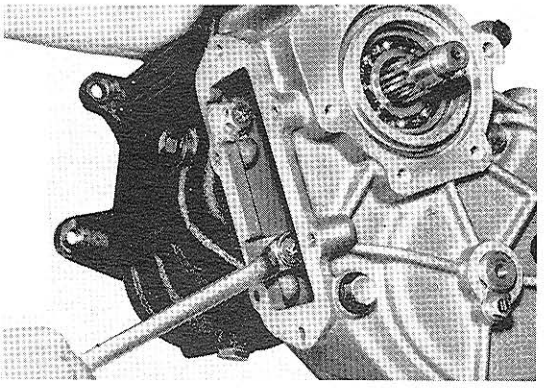


Fig.2-13 Removing Transfer Case Retaining Bolts V0436

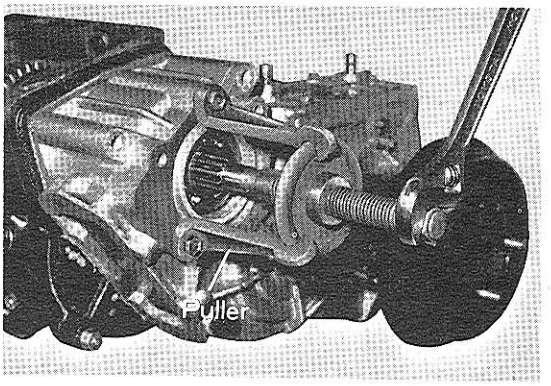


Fig.2-14 Removing Transfer Assembly V0437

8. Transmission disassembly.

a. Remove the bolt, and take out the gear select outer lever.

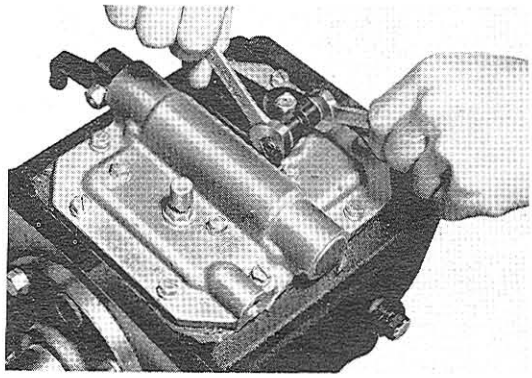


Fig.2-15 Removing Gear Select Outer Lever V0438

b. Remove the transmission case cover and the gasket.

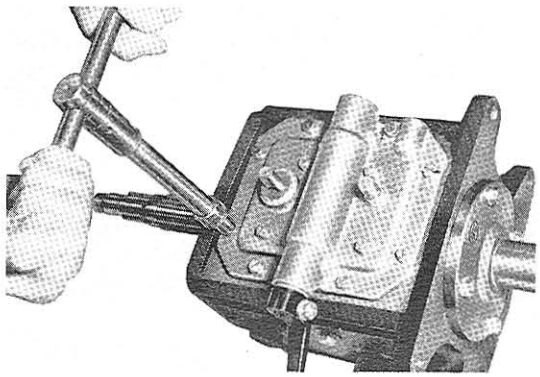


Fig.2-16 Removing Transmission Case Cover V0439

c. Remove the transmission front bearing retainer and the gasket.

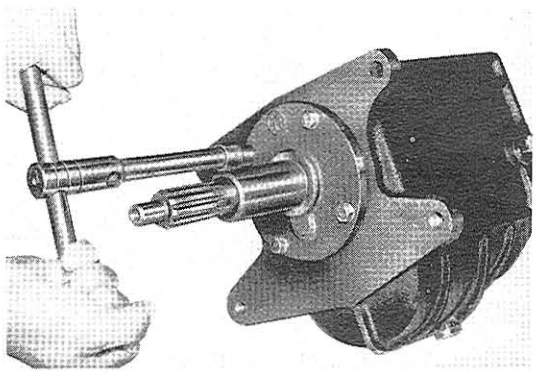


Fig.2-17 Removing Front Bearing Retainer V0440

d. Carefully drive out the shift fork shaft towards the front of the transmission case with a brass rod and a hammer.
At this time, be careful not to lose the gear shift fork lock balls, springs and the straight pin.

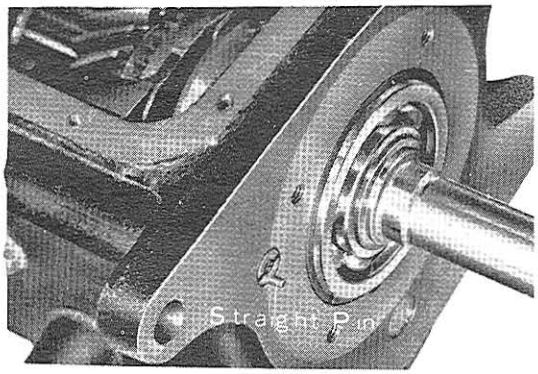


Fig.2-18 Gear Shift Fork Shaft Straight Pin V0441

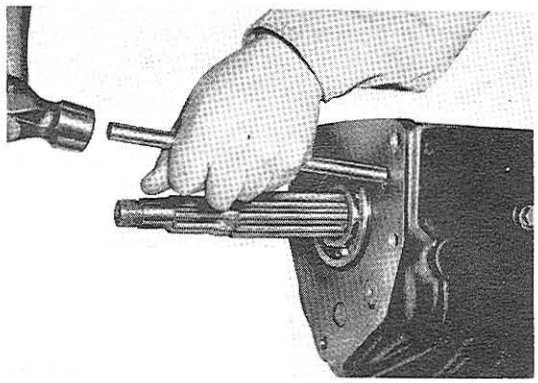


Fig.2-19 Removing Gear Shift Fork Shaft V0442

e. Take out the reverse and first shift fork, and the second and third shift fork from the transmission case.
Remove the two gear shift fork lock balls and springs.

f. Using a brass rod, drive out the counter shaft towards the rear of the transmission case.
Remove the woodruff key from the rear end of the counter shaft.
After removing the counter shaft, the counter shaft drive gear should remain in the transmission case.

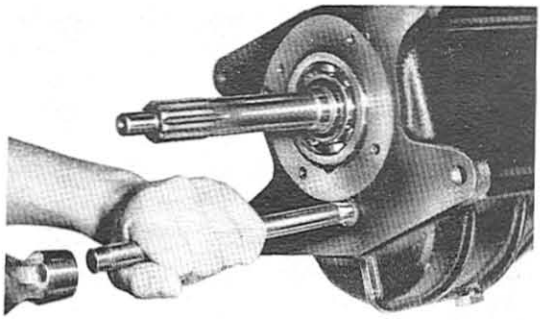


Fig.2-20 Removing Counter Shaft V0443

g. Install the Puller Set 09910-00013 onto the input shaft front end, and drive out the input shaft together with the bearing from the transmission case.

h. Using a brass rod, gently tap the output shaft towards the rear until the output shaft rear bearing is driven out of the transmission case.

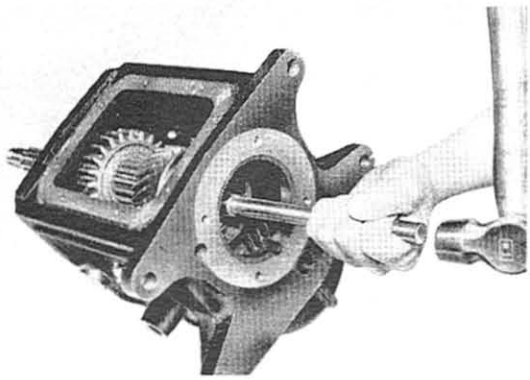


Fig.2-21 Output Shaft Removal No.1 V0444

i. Using the Universal Puller 09950-20010, remove the rear bearing from the output shaft.
Next, take out the output shaft together with the gears, clutch hub and clutch hub sleeve, and the synchronizer ring from the transmission case.

j. Remove the shaft snap ring from the output shaft front end with a snap ring expander, and slide the clutch hub No.2 and clutch hub sleeve, synchronizer ring second gear, and the first and reverse gear out of the output shaft.

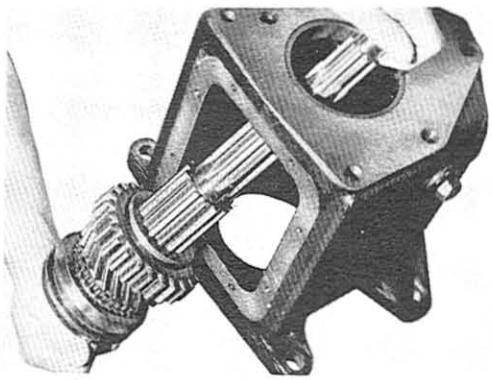


Fig.2-22 Output Shaft Removal No.2 V0445

k. Remove the counter shaft drive gear with the tube, bearing rollers and washers, and the side thrust washers.
At this time, note the position of the gear side thrust washers.
When removing the counter shaft drive gear, be careful not to lose the bearing rollers in the gear.

l. Remove the washers, bearing rollers and the tube from the counter shaft drive gear.

m. Using a brass rod, drive out the reverse idler gear shaft towards the rear, and remove the

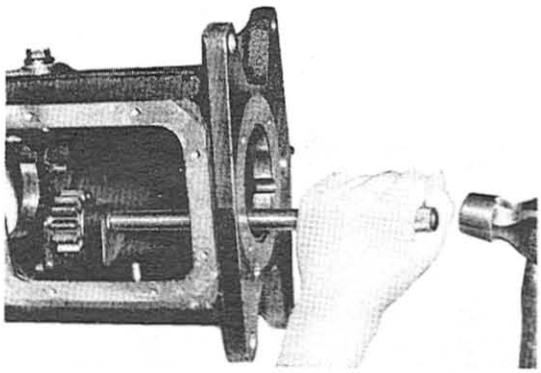


Fig.2-23 Removing Reverse Idler Gear Shaft V0446

woodruff key from the shaft.

n. Next, take out the reverse idler gear with the bearing rollers and the thrust washers from the transmission case.

9. Transfer disassembly.

a. Remove the cotter pin, and loosen the parking brake drum retaining nut.

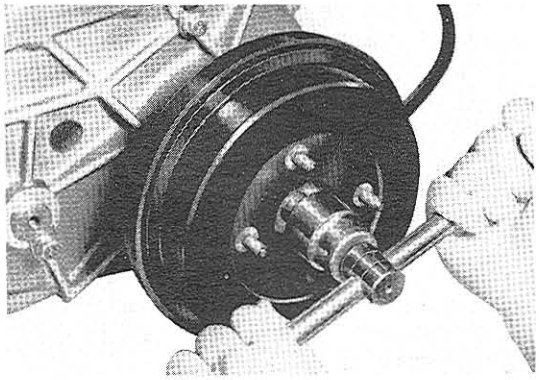


Fig.2-24 Removing Parking Brake Retaining Nut V0447

b. Slide the parking brake drum out of the transfer output shaft, then remove the parking brake plate assembly from the output shaft rear bearing retainer No.1.

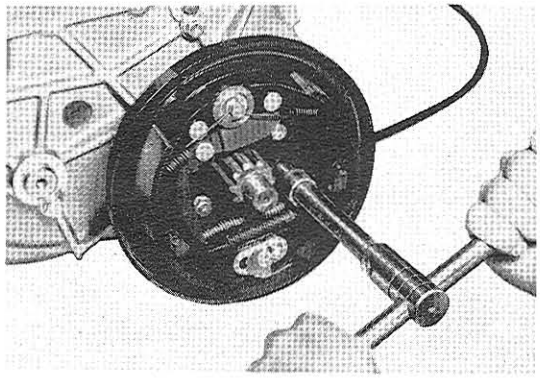


Fig.2-25 Removing Parking Brake Plate Assembly V0448

c. Remove the speedometer sleeve lock plate, then remove the speedometer shaft sleeve assembly from the output shaft rear bearing retainer No.1.

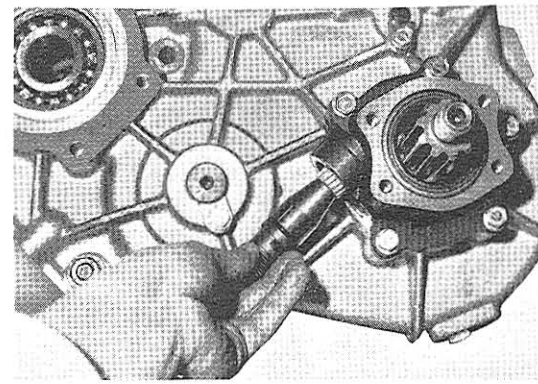


Fig.2-26 Removing Speedometer Shaft Sleeve Assembly V0449

d. Remove the output shaft rear bearing retainer No.1 and the gasket.

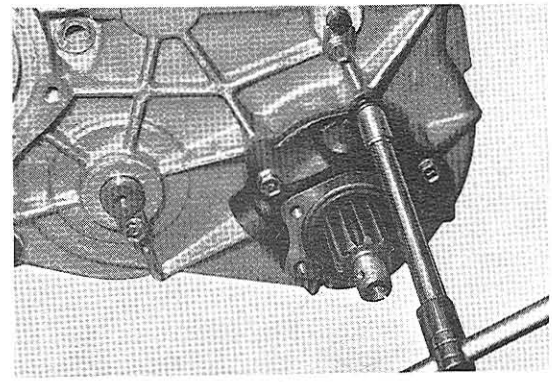


Fig.2-27 Removing Rear Bearing Retainer V0450

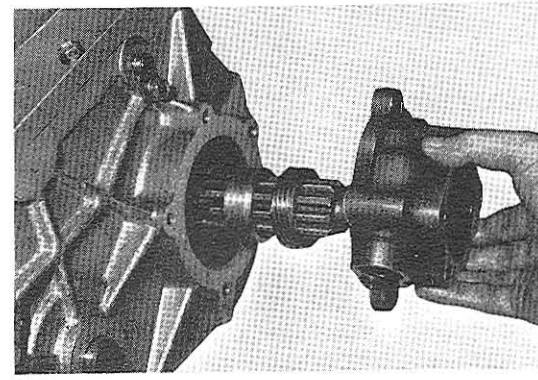


Fig.2-28 Removing Speedometer Drive Gear and Spacer V0451

e. Slide the speedometer drive gear and the spacer out of the transfer output shaft.

f. Remove the diaphragm cylinder or shift shaft guide and transfer front drive fork assemble and the gasket from the transfer extension housing.

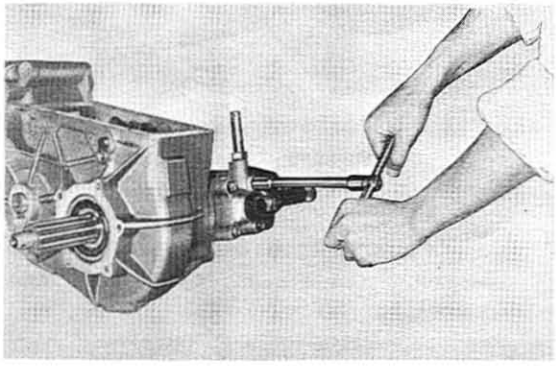


Fig.2-29 Removing Shift Shaft Guide

g. Remove the cotter pin, and retain the transfer output front shaft flange with the Universal Joint Flange Holding Tool 09330-00010, and remove the flange retaining nut.

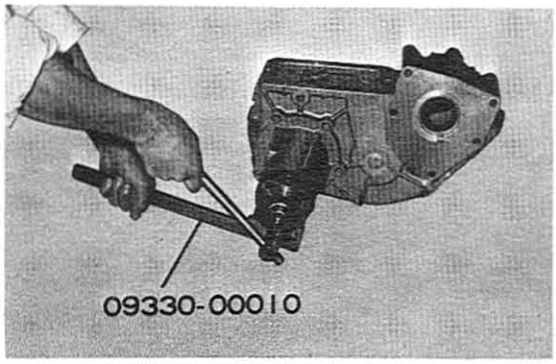


Fig.2-30 Removing Flange

h. Remove the transfer extension housing and the gasket together with the internal parts from the transfer case.

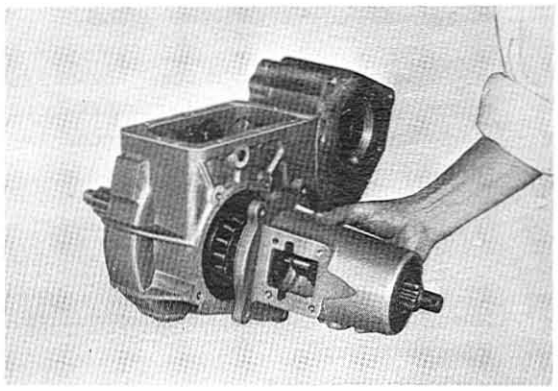


Fig.2-31 Removing Transfer Extension Housing V0453

Remove the flange from the transfer output front shaft, then drive out the front shaft with the front drive clutch sleeve towards the rear.

i. Pry out the oil seal from the transfer extension housing. Next, remove the hole snap ring within the housing.
Remove the transfer extension housing front bearing with the Transmission & Transfer Bearing Replacer 09316-60010 and a press.

j. Remove the transfer case cover assembly and the gasket.

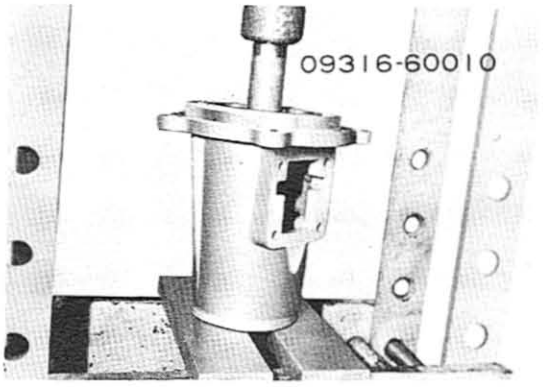


Fig.2-32 Removing Front Bearing V5081

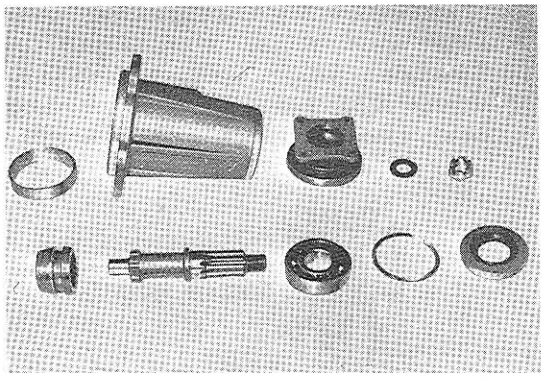


Fig.2-33 Disassembled Parts

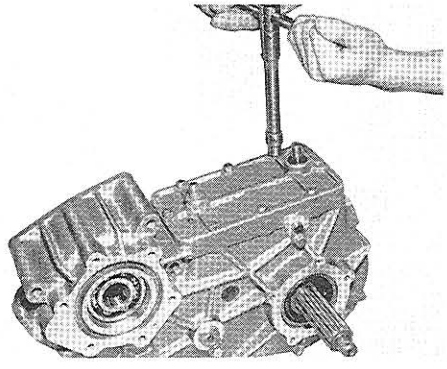


Fig.2-34 Removing Case Cover V0456

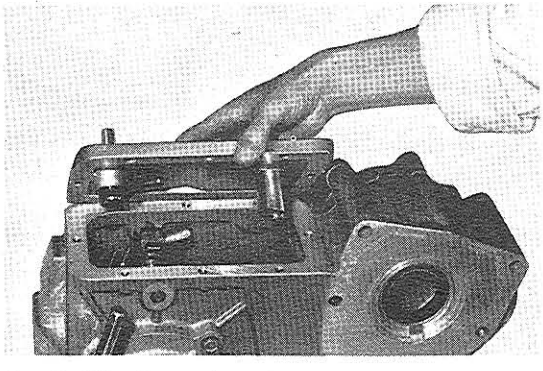


Fig.2-35 Removing Case Cover

k. Remove the cotter pin, and screw out the straight screw plug, then invert the transfer case, and remove the gear shift fork lock ball and the spring from the transfer high and low shift fork.

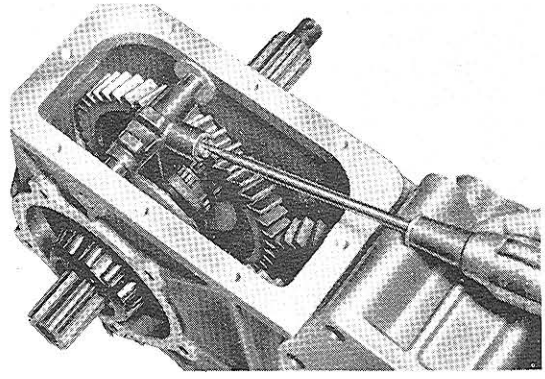


Fig.2-36 Removing Straight Screw Plug V0457

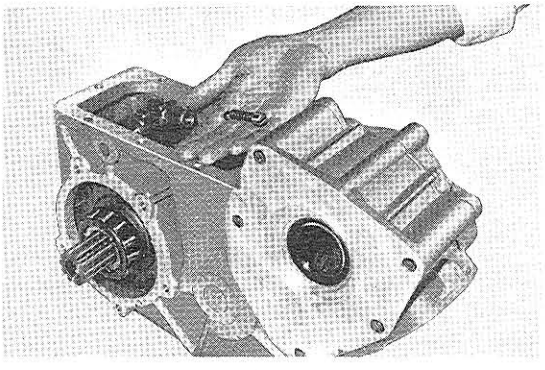


Fig.2-37 Removing Spring & Ball

l. Remove the lock plate, and drive out the transfer high and low shift fork shaft with a brass rod towards the rear from the transfer case, and then take out the transfer high and low shift fork.

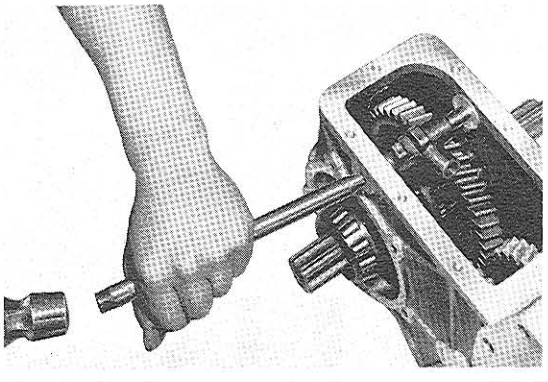


Fig.2-38 Removing Shift Fork Shaft V0458

m. Install the Transfer Low Speed Gear Holding Tool 09318-60010 between the low speed gear and the

front inside of the case to prevent the gear from moving forward, then remove the shaft together with the transfer high speed output gear and the transfer high and low clutch sleeve by press from the transfer case. Next, remove the transfer low speed output gear from the case.

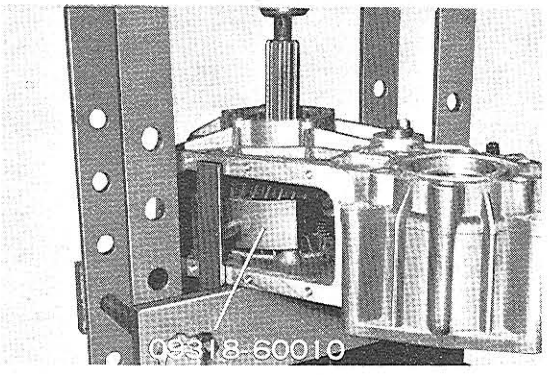


Fig. 2-39 Removing Transfer Output Shaft V0495

n. Place the transfer high speed output gear on the anvils, and press out the transfer output shaft.

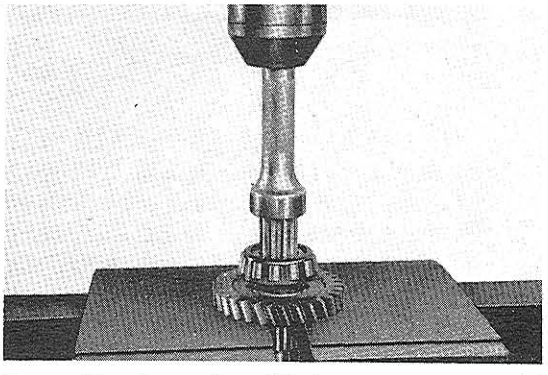


Fig. 2-40 Removing High Speed Output Gear and Bearing V0460

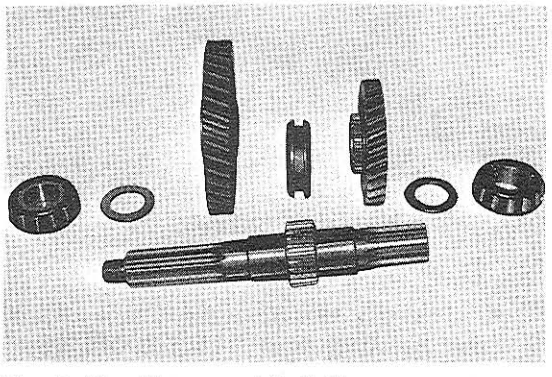
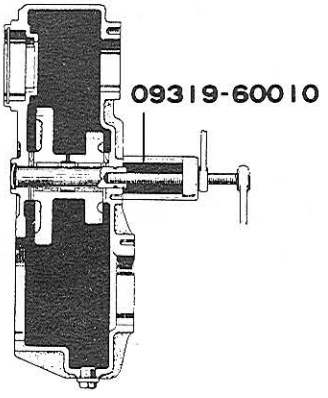


Fig. 2-41 Disassembled Parts

o. Remove the transfer idler gear shaft lock plate, then install the Transfer Idler Gear Shaft Remover 09319-60010 into the idler gear shaft, and remove the idler gear shaft from the transfer case.



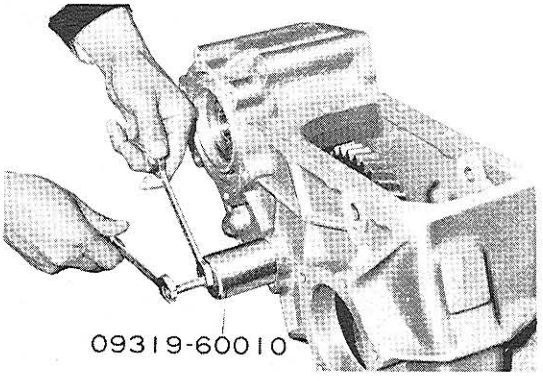


Fig. 2-42 Removing Transfer Idler Gear Shaft V5080 G2373

p. Take out the transfer idler gear with the bearings, spacer and the thrust washers.
Prior to removal, note the position of installation of the thrust washers.

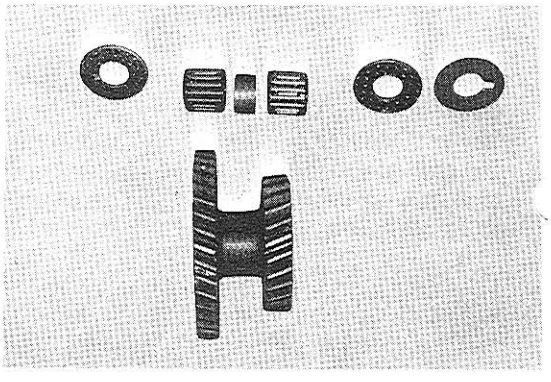


Fig. 2-43 Disassembled Parts

Inspection

After disassembling, wash all parts thoroughly, and inspect for the following.

Transmission Case & Transfer Case

Check the transmission and transfer cases for cracks, and the gasket or other contacting surfaces for burrs and nicks.
Replace the case/s if cracked or burred excessively.

Gears

1. Check the gears for tooth wear or damage. Also check the tooth contact condition which may result in noisy operation.
   If defective, replace the necessary gear/s.

2. Check the synchronizer ring contacting surface of the gear cone for uneven wear or roughness.

3. Check the bushings or bearings in the gears for wear or damage, and the gear to shaft fitting conditions.

   Specified gear backlash:
   Between input shaft gear to counter shaft drive gear:
   0.11 mm (0.00433")
   Between second gear to counter shaft gear:
   0.11 mm (0.00433")
   Between first & reverse gear to counter shaft gear:
   0.20 mm (0.00787")
   Between first & reverse gear to reverse idler gear:
   0.20 mm (0.00787")
   Between counter shaft gear to reverse idler gear:
   0.20 mm (0.00787")
   Between transfer input gear to transfer idler gear:
   0.15 mm (0.00591")
   Between transfer idler gear to transfer high speed output gear:
   0.15 mm (0.00591")
   Between transfer idler gear to transfer low speed output gear:
   0.15 mm (0.00591")

4. Check the bearing roller contact surface for scores or damage. If necessary, replace the gear/s.

Synchronizer Rings

1. Check the synchronizer rings for external tooth wear or damage. Also check the internal surface for wear or damage.

2. Check the contacting surface of the synchronizer ring for uneven wear or damage.
   Place the synchronizer ring onto the respective gear cone and check the clearance between the gear and the synchronizer ring.
   If the clearance is less than the limit, replace the synchronizer ring or the gear.

   Specified clearance:
   1.5 ~ 1.85 mm
   (0.059 ~ 0.073")
   Clearance limit:
   1.0 mm (0.039")

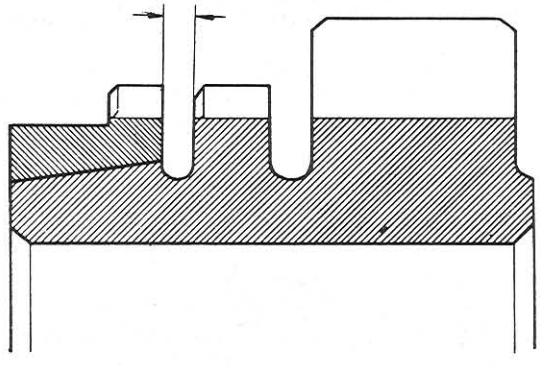


Fig. 2-44 Synchronizer Ring G2374 Inspection

Shifting Keys & Springs

1. Check the shifting keys for improper wear or warpage.
   Replace the key as a set if defective.

2. Check the shifting key springs for weakness or bent condition.
   Replace if necessary.

Bearings & Bushings

1. Check the bearings for roughness and wear.
   Check for noise or damage by rotating the bearing after applying few drops of oil.
   Replace the bearing/s if necessary.
   To remove the bearing cup/s from the transfer case, use the Transmission & Transfer Bearing Replacer 09316-60010.

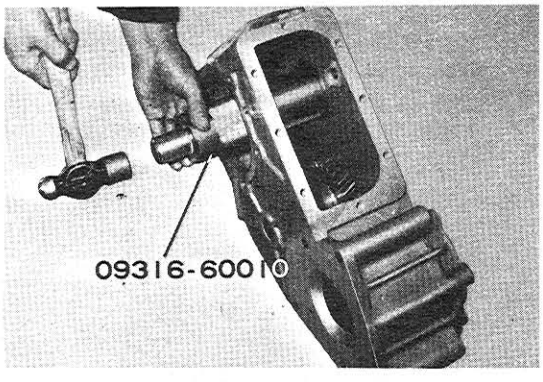


Fig. 2-45 Removing Bearing Cup

   If the transmission input shaft bearing is to be removed, remove the shaft snap ring with a snap ring expander. Next, remove the bearing from the input shaft with the Universal Puller 09950-20010.

2. Check the bushing and the bearing rollers for abnormal wear.
   If the wear is excessive, replace the bushing/s or the bearing rollers.
   The bearing rollers should be replaced as a set.

Oil Seal

It is recommended that all oil seals and dust seals be replaced at the time of the assembly.
If no oil seal is available for replacement, check the lip of the seal for wear or damage.
If the seals are serviceable, re-install them, but recheck after installing the transmission onto the vehicle for oil leak.

Gear Shift Mechanism

1. Inspect each shift fork and the lever thrust surfaces for wear and distortion. Replace if defective.
   Check the clearance between each shift fork and the sleeve, and if it exceeds the service limit, replace the fork/s or sleeve/s.
   Second & third shift fork to clutch hub sleeve clearance:
   0.15 ~ 0.30 mm
   (0.0059 ~ 0.0118")
   Reverse & first shift fork to first & reverse gear clearance:
   0.10 ~ 0.30 mm
   (0.0039 ~ 0.0118")
   Transfer high & low shift fork to transfer high & low clutch sleeve clearance:
   0.10 ~ 0.30 mm
   (0.0039 ~ 0.0118")
   Transfer front drive shift fork to front drive clutch sleeve clearance:
   0.10 ~ 0.30 mm
   (0.0039 ~ 0.0118")

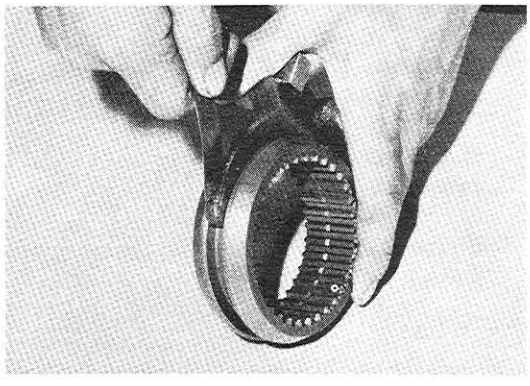


Fig. 2-46 Checking Clearance V5171

2. Inspect the splines of the clutch hubs and hub sleeves for wear or damage, and for smooth operation. The hub sleeve and the hub must be replaced as a set if required.

3. Inspect the contacting surfaces of the shift forks and the shift lever heads for wear. Replace if necessary.

4. Check each shift fork or shift fork shaft for smooth movement and for damage or distortion.

Shaft

Check the shaft splines, snap ring grooves, bearing contact surfaces, bearing fitting portions and the oil seal lip contact surfaces for wear, scores or damage.
If necessary, replace the shaft.

Speedometer Drive & Driven Gears

Check the speedometer drive and driven gears for scores and wear. Replace if necessary.

Assembly

Always install new gaskets, and apply liquid sealer or gasket cement upon assembly.
To provide initial lubrication, apply a thin coating of transmission lubricant on all parts before installation.

1. Transmission assembly.

a. Apply grease in the bore of the reverse idler gear, and install the bearing rollers and the washer into the reverse idler gear.
Place the reverse idler gear and the two thrust washers, and gently drive the reverse idler gear shaft into the transmission case from the rear.

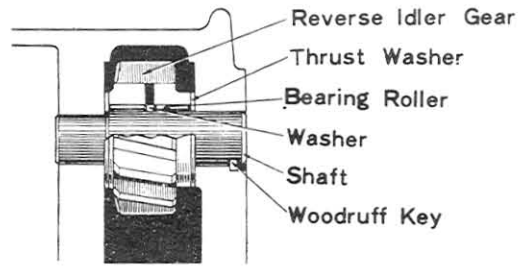


Fig. 2-47 Reverse Idler Gear Assembly G2375

Next, lock the shaft with the woodruff key at the rear end.

b. Apply grease in the bore of the counter shaft drive gear, and install the tube and the Counter Gear Needle Roller Guide Shaft 09311-60010 into the bore of the counter shaft drive gear.
Next, install the bearing rollers and the washers into the bore of the counter shaft drive gear.
Place the counter shaft drive gear, gear thrust washer and the counter gear case side thrust washers in position in the transmission case.

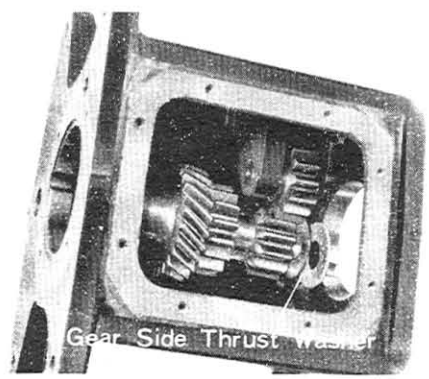


Fig. 2-48 Counter Shaft Drive Gear & Thrust Washer Installation V0461

c. If the input shaft bearing was removed, install the bearing onto the input shaft with the Transmission & Transfer Bearing Replacer 09316-60010 and a press.

d. Next, select and install the proper shaft snap ring to obtain minimum thrust play on the input shaft.

Shaft snap ring thickness:
Part No. 90520-33010
Thickness: 2.43 ~ 2.60 mm
(0.0957 ~ 0.1024")
Part No. 90520-33011
Thickness: 2.30 ~ 2.42 mm
(0.0905 ~ 0.0953")

e. Apply grease in the bore of the input shaft, and install the bearing rollers into the input shaft, then install the hole snap ring.

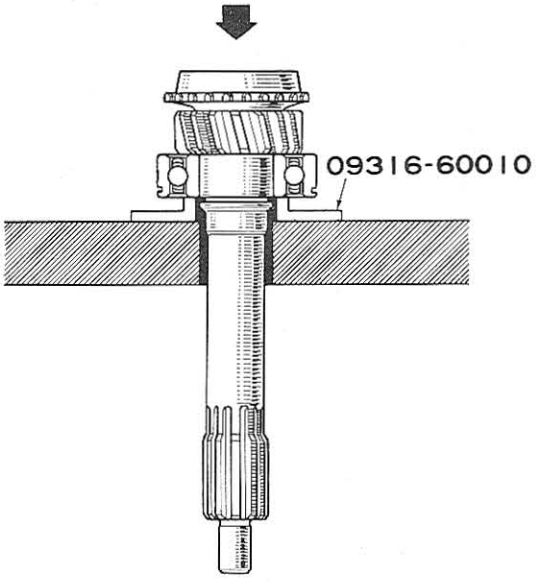


Fig. 2-49 Input Shaft Bearing Installation G2376

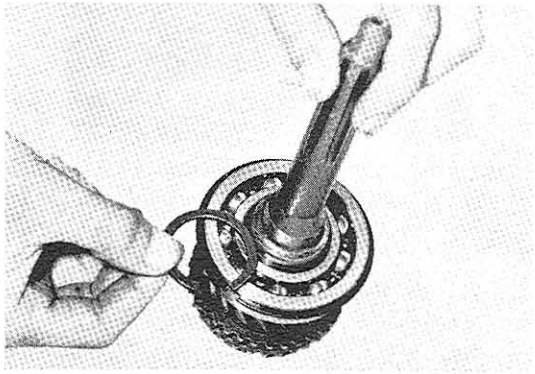


Fig. 2-50 Selecting Shaft Snap Ring V5172

f. Using the Transmission and Transfer Bearing Replacer 09316-60010, install the input shaft assembly into the transmission case.

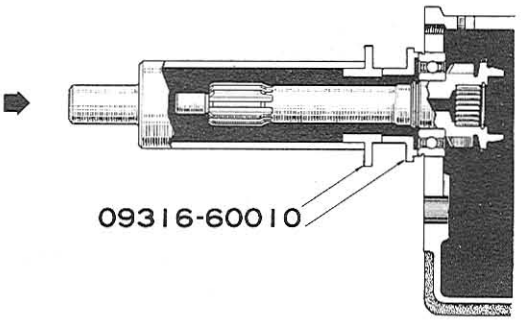


Fig. 2-51 Input Shaft Installation G2377

g. Lifting the counter shaft drive gear within the transmission case, install the counter shaft into the gear from the rear of the transmission case.
Secure the counter shaft in the transmission case with the woodruff key to prevent turning of the shaft.

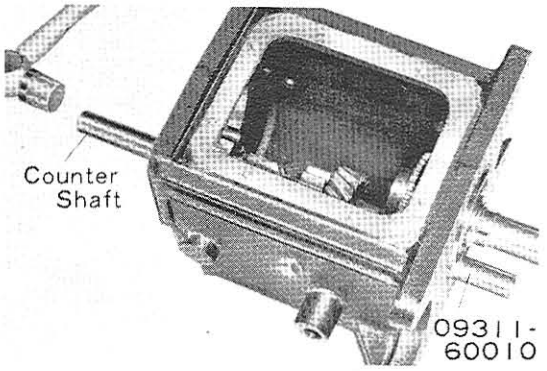


Fig. 2-52 Installing Counter Shaft V0462

h. Measure the counter shaft drive gear thrust clearance with a feeler gauge.
The specified clearance is 0.05 to 0.20 (0.002 ~ 0.008"), and if necessary, select and install the counter gear side thrust washer

at the rear end of the counter shaft drive gear to obtain the specified clearance.

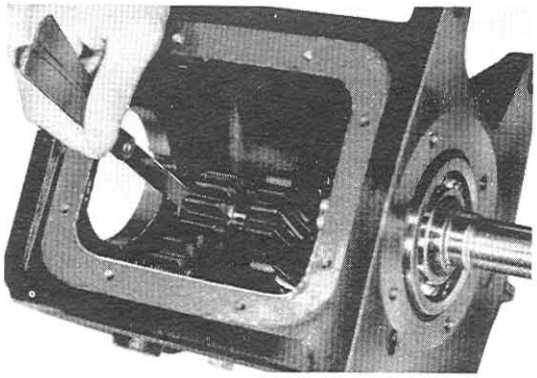


Fig.2-53 Measuring Counter Drive Gear Thrust Clearance V0463

Counter gear side thrust washer thickness:

Part No. 33441-61010
Thickness: 1.45 ~ 1.50 mm (0.0578 ~ 0.0590")
Part No. 33442-61010
Thickness: 1.50 ~ 1.55 mm (0.0590 ~ 0.0610")
Part No. 33443-61010
Thickness: 1.55 ~ 1.60 mm (0.0610 ~ 0.0630")

i. Assemble the synchronizer units by installing the two synchromesh shifting key springs onto the clutch hub, and placing the three shifting keys into the clutch hub key slots.
In installing the key springs, the open ends of the springs should be kept at 120° spart as shown in figure 2-43, so that the spring tension on each key will be uniform.

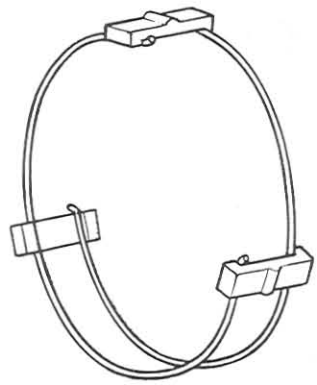


Fig.2-54 Key Spring Installation G2389

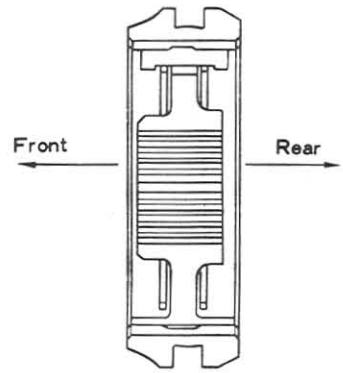


Fig.2-55 Synchronizer Unit Assembly G1164

Next, slide the clutch hub sleeve onto the clutch hub.
The clutch hub and the clutch sleeve are of a selected assembly, therefore, should be kept together for smooth operation.

j. Assemble the second gear, synchronizer ring No.2, and the assembled synchronizer unit onto the transmission output shaft, and then measure the second gear thrust clearance with a feeler gauge.
The clearance should be 0.08 to 0.23 mm (0.0031 ~ 0.0090").
If necessary, select and install the shaft snap ring at the front end of the transmission output shaft to obtain the specified clearance.

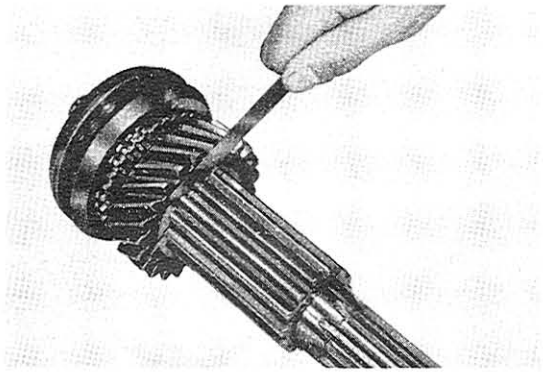


Fig. 2-56 Measuring Second Gear Thrust Clearance V0465

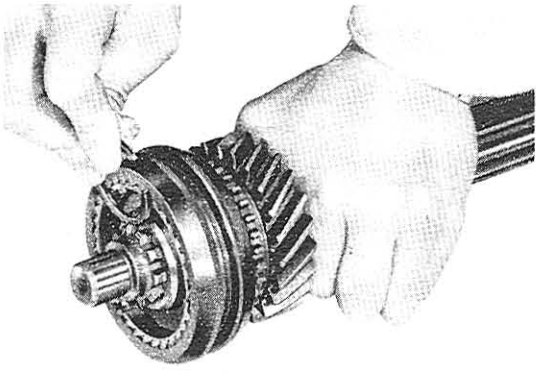


Fig. 2-57 Selecting Shaft Snap Ring V0466

Shaft snap ring thickness:
Part No. 90520-33010
Thickness: 2.43 ~ 2.60 mm
(0.0957 ~ 0.1024")
Part No. 90520-33011
Thickness: 2.30 ~ 2.42 mm
(0.0905 ~ 0.0953")

k. Slide the first and reverse gear onto the transmission output shaft from the rear.
Place the transmission output shaft assembly and the synchronizer ring No.2 into the transmission case.

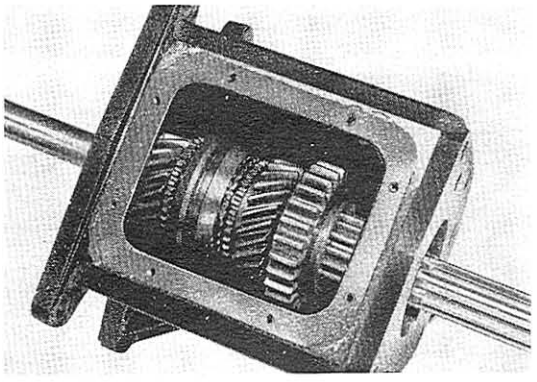


Fig. 2-58 Transmission Output Shaft Assembly V0464

l. Using the Transmission and Transfer Bearing Replacer 09316-60010, install the output shaft rear bearing onto the shaft within the case.

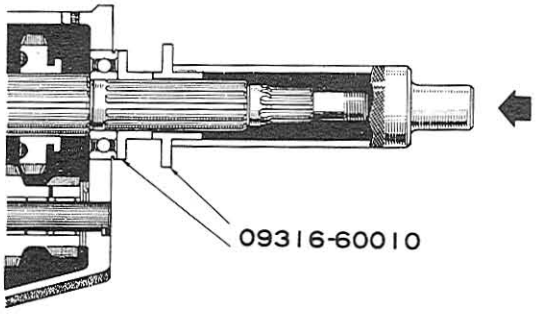


Fig. 2-59 Output Shaft Rear Bearing Installation G2390

m. Place the reverse and first shift fork and the second and third shift fork.
Install the gear shift fork lock springs and the balls into each hole of the shift fork.

Pushing down on the gear shift fork lock balls with a screwdriver, drive in the shift fork shaft gently into the transmission case and the shift forks.
The "O" ring on the shift fork shaft should be replaced with a new ring, and lock the shaft with the straight pin.

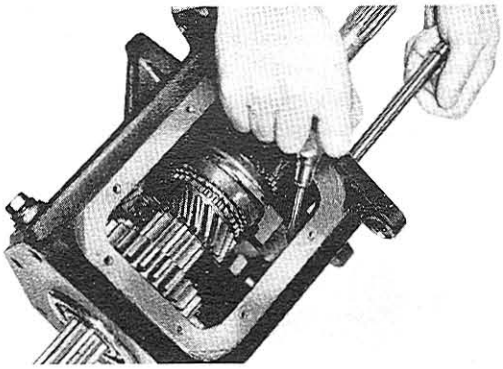


Fig. 2-60 Installing Shift Fork Shaft V0467

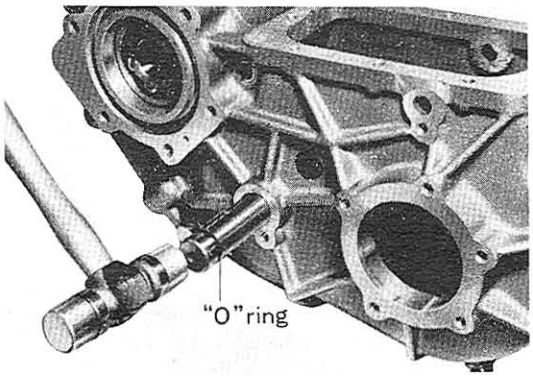


Fig. 2-61 Installing Idler Gear Shaft V0468

n. Coat the liquid sealer on the gasket, and install the front bearing retainer onto the transmission case.
Tighten the bearing retainer attaching bolts to 1.5 ~ 2.0 m-kg (11 ~ 14 ft-lb) torque.

o. Check the input shaft and the output shaft for free movement, and the synchronizer unit for smooth operation.

2. Transfer assembly.

a. Install the bearing spacer and the two needle roller bearings into the transfer idler gear.
Place the transfer idler gear and the two transfer idler gear washers and the spacer in position in the transfer case.
Install the new "O" ring onto the transfer idler gear shaft, and then drive in the shaft into the transfer case from the rear.

b. After installing the shaft, measure the transfer idler gear thrust clearance with a feeler gauge. The thrust clearance should be 0.15 ~ 0.40 mm or 0.0059" to 0.0157", and if it exceeds this specified clearance, select and install the other spacer to obtain the specified clearance.
The spacer should be installed at the rear end of the idler gear.
Transfer idler gear spacer thickness:

Part No. 36261-60010
Thickness: 1.20 ~ 1.30 mm (0.047 ~ 0.051")
Part No. 36262-60010
Thickness: 1.30 ~ 1.40 mm (0.051 ~ 0.055")

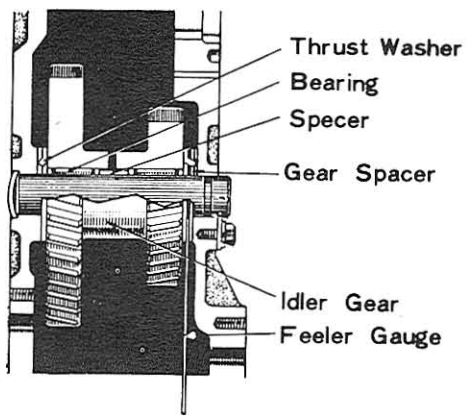


Fig. 2-62 Transfer Idler Gear Thrust Clearance G2391

Part No. 36263-60010
Thickness: 1.40 ~ 1.50 mm (0.055 ~ 0.059")
Part No. 36264-60010
Thickness: 1.50 ~ 1.60 mm (0 059 ~ 0.063")
Part No. 36265-60010
Thickness: 1.60 ~ 1.70 mm (0.063 ~ 0.067")
Part No. 36266-60010
Thickness: 1.70 ~ 1.80 mm (0.067 ~ 0.071")

Secure the transfer idler gear shaft with the lock plate.

c. Slide the transfer high speed output gear onto the transfer output shaft.
Position the washer, and install the output shaft front bearing onto the shaft with the Transmission & Transfer Bearing Replacer 09316-60010 and a press.

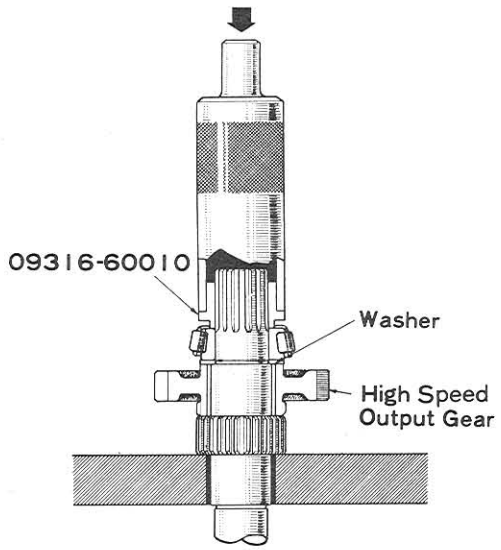


Fig. 2-63 Transfer Output Shaft Front Bearing Installation G2392

d. Place the transfer low speed output gear and the transfer high and low clutch sleeve in position within the transfer case.
Next, install the transfer output shaft together with the transfer high speed output gear and the bearing into the transfer case. Install the washer and the transfer output shaft rear bearing onto the transfer output shaft with the Transmission & Transfer Bearing Replacer 09316-60010.

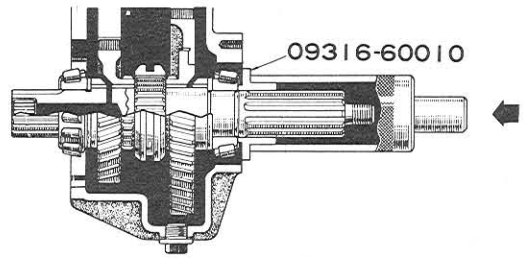


Fig. 2-64 Transfer Output Shaft Rear Bearing Installation G2393

e. Using the Transmission and Transfer Bearing Replacer 09316-60010, install the transfer output shaft front and rear bearing cups into the transfer case.

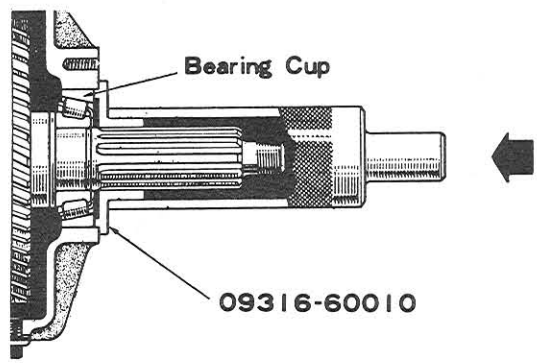


Fig. 2-65 Transfer Output Shaft Bearing Cup Installation G2394

f. Transfer extension housing assembly.
(1) Install the transfer output front shaft bearing into the transfer extension housing with the Transmission & Transfer Bearing Replacer 09316-60010, and then install the hole snap ring.
(2) Install the oil seal into the transfer extension housing.

(3) Install the transfer output front shaft into the transfer extension housing, then install the transfer joint flange.
Position the washer, and tighten the flange retaining nut to 14 ~ 17 m-kg (101 ~ 123 ft-lb) torque.
Install the cotter pin.

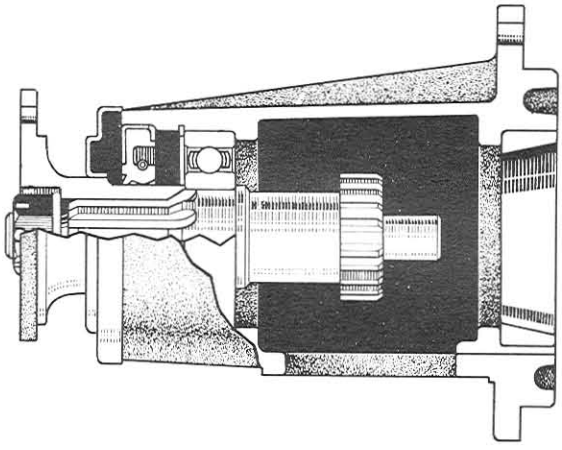


Fig. 2-66 Transfer Extension G2395 Housing Assembly

g. Coat the gasket with the liquid sealer, and install the transfer extension housing assembly and the front drive clutch sleeve onto the transfer case.
Tighten the extension housing retaining bolts to 1.0 ~ 1.6 m-kg (7 ~ 11 ft-lb) torque.
When assembling the front drive clutch sleeve, the tapered side of the clutch sleeve should be towards the rear.

h. Slide the spacer and the speedometer drive gear onto the transfer output shaft.

i. Place the bearing adjusting shim in position on the transfer output shaft rear bearing cup, and then install the output shaft rear bearing retainer with the gasket. Tighten the bearing retainer securing bolts to 1.0 ~ 1.6 m-kg (7 ~ 11 ft-lb) torque.
Next, install the parking brake drum, and tighten the retaining nut to 14 ~ 17 m-kg (101 ~ 123 ft-lb) torque.
Check the transfer output shaft bearing pre-load by hooking the pull-scale at the parking brake drum bolt with the transfer high and low clutch sleeve in neutral position, and the front drive disengaged.
The pull-scale reading should be 4.7 ~ 5.9 kg (10 ~ 13 lb). If necessary, adjust the bearing pre-load by selecting the adjusting shim.

Adjusting shim thickness:
Part No. 90564-64017
Thickness: 0.10 mm (0.0039")
Part No. 90564-64023
Thickness: 0.15 mm (0.0059")
Part No. 90564-64024
Thickness: 0.20 mm (0.0079")
Part No. 90564-64025
Thickness: 0.25 mm (0.0098")

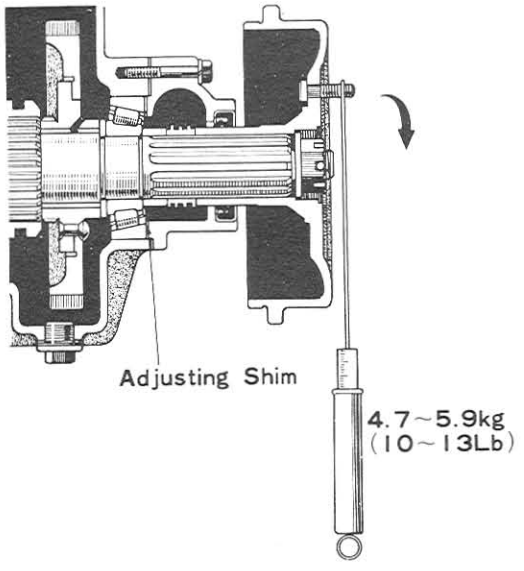


Fig. 2-67 Bearing Pre-load G2396 Adjustment

j. After adjusting the transfer output shaft bearing pre-load, remove the parking brake drum.
Place the transfer high and low shift fork into the transfer case, and then drive the shift fork shaft

with the "O" ring into the transfer case.
Secure the shift fork shaft with the lock plate.

k. Insert the gear shift fork lock ball and the spring into the transfer high and low shift fork, and screw in the straight screw plug. Lock the straight screw plug with the cotter pin.

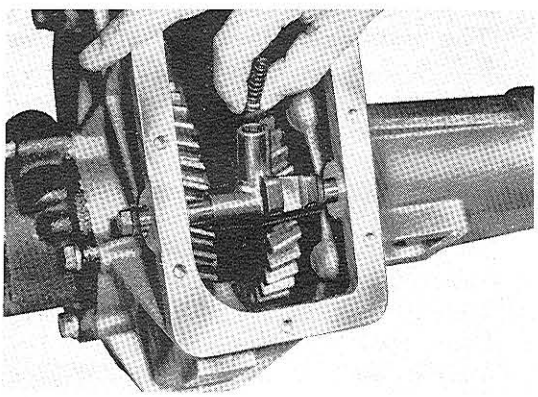


Fig. 2-68 Installing Lock Ball & Spring V0469

1. Assemble the high and low inner lever, and the outer lever onto the transfer case cover.
Install the transfer case cover with the gasket.

3. Install the Transfer Guide Shaft 09323-60010 onto the transmission output shaft.
Place the transfer input gear, power take-off drive gear and the two spacers onto the Transfer Guide Shaft in position inside the case through the transfer power take-off cover hole.
Be careful and install the transfer assembly onto the transmission case.

Caution:
At this time, do not forget to install the transfer case front gasket between the transmission case and the transfer case.
Coat the gasket with the liquid sealer to prevent oil leak.

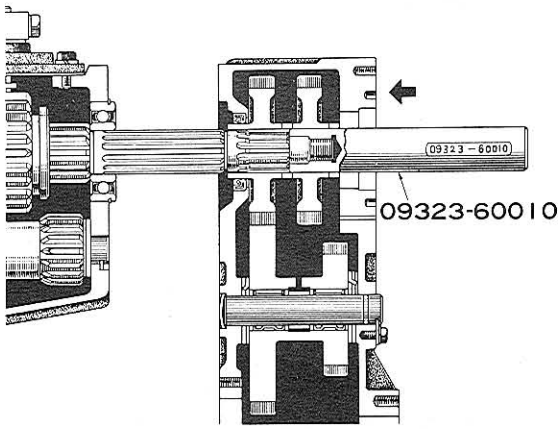


Fig. 2-69 Transfer Assembly Installation G2397

4. Tighten the bolts retaining the transfer case onto the transmission case to 3.5 ~ 4.1 m-kg (25 ~ 30 ft-lb) torque.
Two of the bolts are short, and these should be secured from the inside of the transfer case.

5. Remove the Transfer Guide Shaft 09323-60010 from the transmission output shaft.
Install the bearing onto the end of the transmission output shaft in the transfer case with the Transmission & Transfer Bearing Replacer 09316-60010.

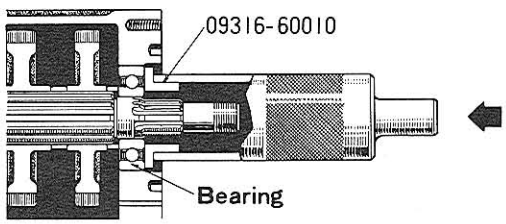


Fig. 2-70 Bearing Installation G2398

6. Install the transfer input shaft spacer, and tighten the bearing retaining nut to 14 ~ 15 m-kg or 101 ~ 108 ft-lb torque.
   Secure the retaining nut with the lock washer.
   Install the transfer case cover No.2 with the gasket.

7. Apply the liquid sealer onto the gasket, and install the transfer power take-off cover.

8. Install the diaphragm cylinder and the transfer front drive fork assembly with the gasket onto the transfer extension housing.

9. Install the speedometer shaft sleeve together with the speedometer driven gear into the transfer output shaft rear bearing retainer.
   Secure the speedometer shaft sleeve with the lock plate.

10. Install the parking brake plate assembly.

11. Install the parking brake drum, and tighten the retaining nut to 14 to 17 m-kg (101 ~ 123 ft-lb) torque.

Installation

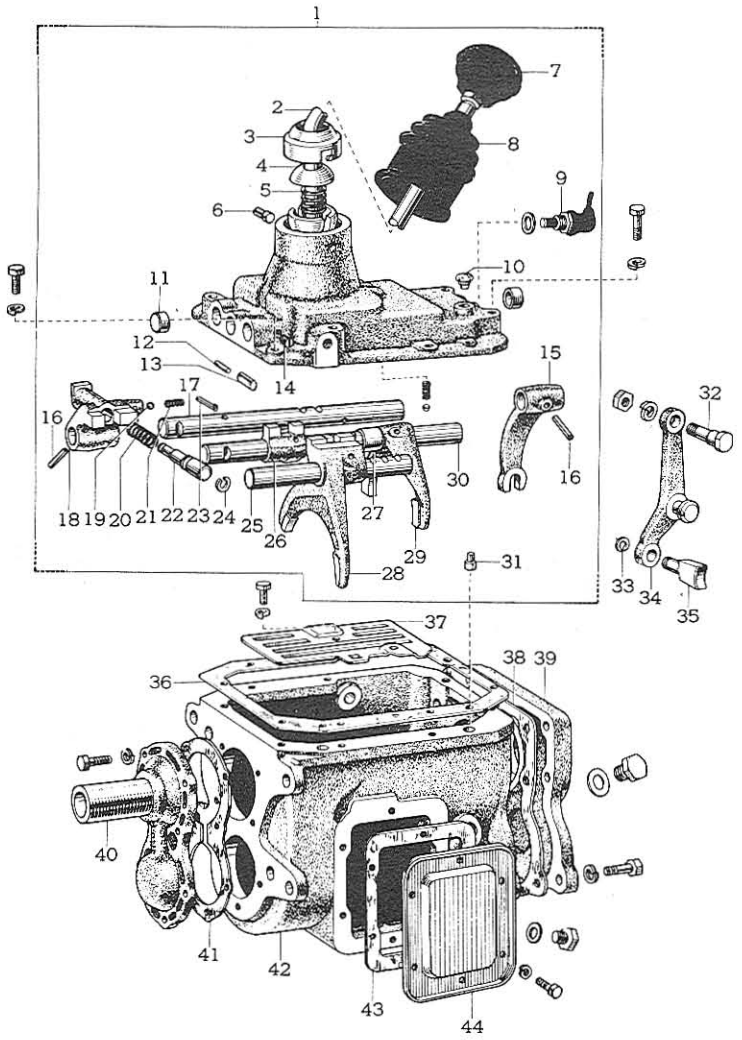
Follow the removal procedures in the reverse order.

1. Fill the transmission and transfer with the lubricant SAE 90.
   Capacities:
   Transmission case:
   1.7 liters (1.8 US qts., 1.5 Imp qts.)
   Transfer case:
   1.7 liters (1.8 US qts., 1.5 Imp qts.)

2. Check the remote control linkage and clutch for correct movement, and adjust if required.

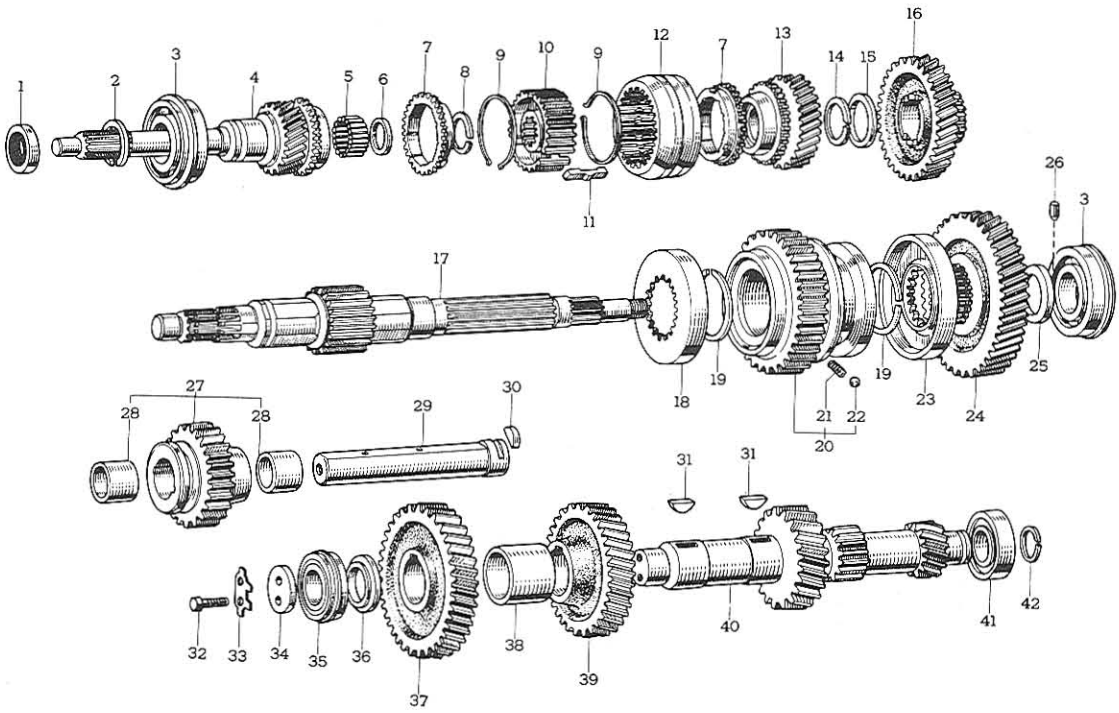
* *

4-SPEED TRANSMISSION



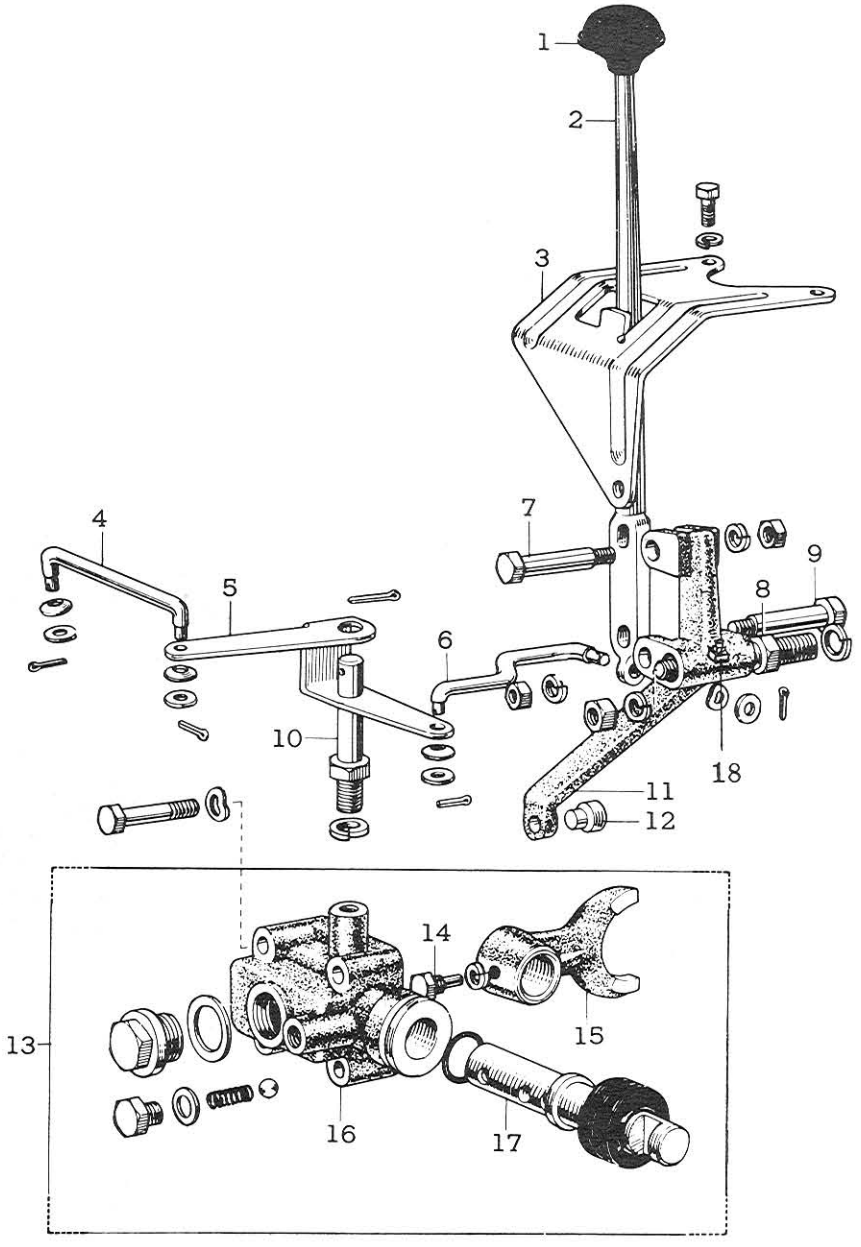
1. Transmission case cover assembly
2. Shift lever
3. Shift lever cap
4. Shift lever spring seat
5. Spring
6. Dowel pin
7. Shift lever knob
8. Shift lever cap boot
9. Back up lamp switch
10. Breather plug
11. Tight plug
12. Straight pin
13. Roller
14. Screw plug
15. Reverse shift fork
16. Slotted spring pin
17. Reverse shift fork shaft
18. Reverse shift head
19. Lock ball
20. Spring
21. Spring
22. Reverse shift return plunger
23. Cotter pin
24. "C" washer
25. Third and fourth shift fork shaft
26. First and second shift head
27. Spacer
28. Third and fourth shift fork
29. First and second shift fork
30. First and second shift fork shaft
31. Dowel pin
32. Shift arm pivot
33. Shaft snap ring
34. Reverse shift arm
35. Shift arm shoe
36. Case cover gasket
37. Transmission oil filter plate
38. Gasket
39. Rear bearing retainer
40. Front bearing retainer
41. Gasket
42. Transmission case
43. Gasket
44. Power take-off cover

Fig. 2-71 Transmission Case & Cover Components Y7185



1. Oil seal
2. Shaft snap ring
3. Bearing
4. Input shaft
5. Bearing roller
6. Bearing spacer
7. Synchronizer ring No.2
8. Shaft snap ring
9. Shifting key spring
10. Clutch hub No.2
11. Shifting key No.2
12. Hub sleeve
13. Third gear
14. Shaft snap ring
15. Second gear thrust washer
16. Second gear
17. Output shaft
18. Second synchronizer outer ring
19. Shaft snap ring
20. Synchronizer ring No.1
21. Compression spring
22. Lock ball
23. First synchronizer outer ring
24. First gear
25. First gear thrust washer
26. Straight pin
27. Reverse idler gear
28. Bushing
29. Reverse idler gear shaft
30. Woodruff key
31. Woodruff key
32. Bolt
33. Lock bolt washer
34. Lock bolt plate
35. Bearing
36. Front bearing spacer
37. Counter shaft drive gear
38. Spacer
39. Counter shaft third speed gear
40. Counter shaft
41. Bearing
42. Shaft snap ring

Fig.2-72 Transmission Gear Components G2383



1. Shift lever knob
2. Front drive shift lever
3. Shift lever guide
4. High and low shift rod No.3
5. High and low shift link lever
6. High and low shift rod No.1
7. Shift lever pin No.1
8. Shift link support shaft
9. Shift lever pin No.2
10. Link support shaft
11. Front drive shift link lever
12. Link lever shoe
13. Transfer front drive shift shaft guide assembly
14. Fork shaft pin
15. Front drive shift fork
16. Shift shaft guide
17. Front drive shift shaft
18. Grease nipple

Fig.2-73 Transfer Shift Lever & Link Components G2384

4-SPEED TRANSMISSION & TRANSFER

Removal

1. Remove the transmission under cover, and disconnect the front and rear propeller shafts from the transfer output shafts.

2. Drain the gear lubricant from the transmission and the transfer.

3. Pull up the shift lever cap boot, and then remove the shift lever from the transmission case cover with the Transmission Gear Shift Lever Remover 09305-60010.
   To remove the shift lever, hold down the gear shift lever cap, then turn the Transmission Gear Shift Lever Remover clockwise.
   Cover the shift lever retainer hole with a clean shop towel to prevent dropping any foreign matter into the transmission case cover.
   Loosen and remove the knob on the transfer front drive shift lever.

Fig. 2-74 Shift Lever Removal G2400

4. Remove the transmission cover.
   Disconnect the back-up light switch wires on the transmission case cover.
   Loosen and disconnect the speedometer drive cable from the speedometer shaft sleeve.

5. Remove the hole pin, and disconnect the parking brake cable from the parking brake link lever.

6. Remove the flywheel housing under cover, and then remove the bolts retaining the transmission onto the clutch housing.

7. Slide the transmission assembly rearward until the transmission input shaft clears the clutch housing and carefully withdraw it downward from the vehicle.

Disassembly

1. Remove the transfer shift lever guide (1), cotter pin (2), and the lock bolt (3), then remove the shift lever and the lever linkage.
   Do not lose the link lever shoe (4), connecting the front drive shift link lever to the transfer front drive shift shaft.

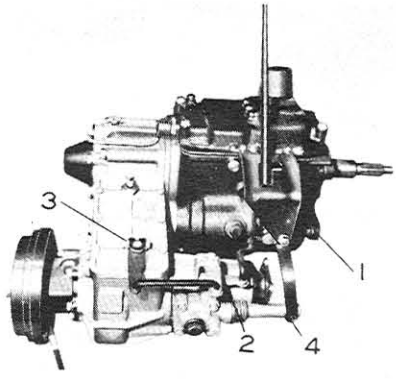


Fig. 2-75 Shift Lever & Linkage Removal V5062

2. Loosen and remove the back-up light switch and the gasket from the transmission case cover.

3. Remove the transmission case cover assembly.

4. Remove the transfer case cover No. 2 and the gasket.
   Straighten the lock washer, and remove the transfer rear bearing retaining nut and the transfer input shaft spacer.

5. Remove the transfer power take-

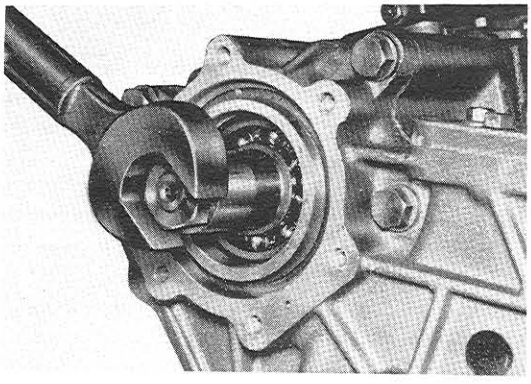


Fig. 2-76 Removing Rear Bearing Retaing Nut V0435

off cover and the gasket. Remove the five bolts retaining the transfer case onto the transmission case. Two of the bolts are shorter and these two should be removed from the inside of the transfer case.

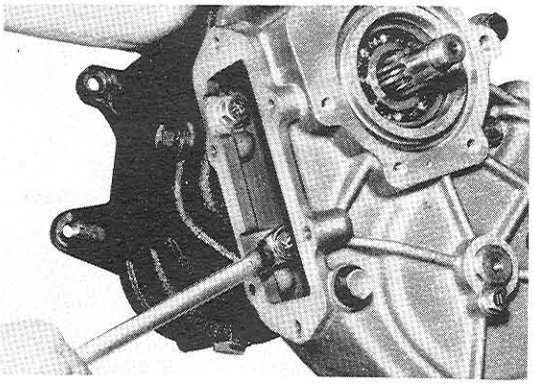


Fig. 2-77 Removing Transfer Case Retaining Bolts V0436

6. Install the universal puller onto the transfer case. and remove the transfer assembly from the transmission case. At this time, take out the power take-off drive gear and the transfer input gear from the transfer case.
Remove the transfer input gear stopper in the transmission rear bearing retainer.

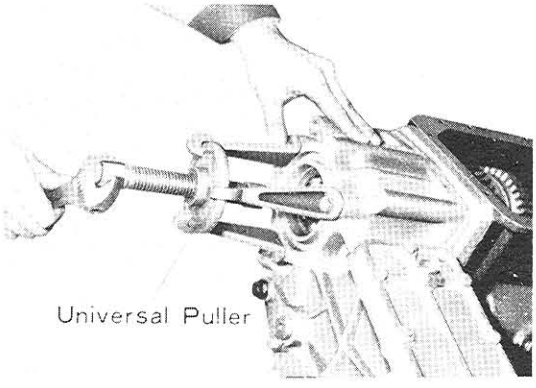


Fig. 2-78 Removing Transfer Assembly V5063

7. Transmission disassembly.

a. Remove the transmission rear bearing retainer and the gasket.

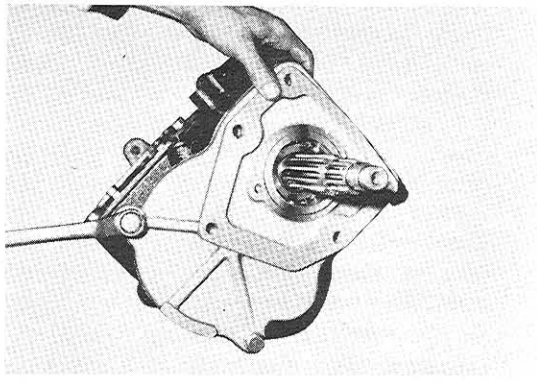


Fig. 2-79 Removing Rear Bearing Retainer V5064

b. Remove the front bearing retainer and the gasket.

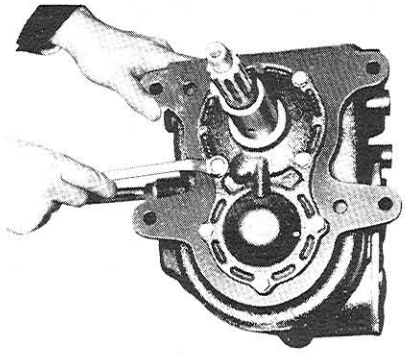


Fig. 2-80 Removing Front Bearing Retainer V5065

c. Using the Puller Set 09910-00013, remove the input shaft together with the bearing from the transmission case.
Before removing the input shaft, be sure to locate the synchronizer gear cut portion of the input shaft

with the counter drive gear. Also the needle bearings and the bearing spacer in the input shaft will drop into the transmission case if these are not carefully watched. At this time, remove the synchronizer ring.

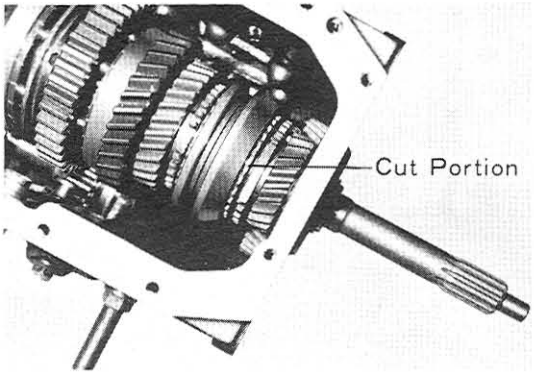


Fig. 2-81 Synchronizer Gear V5066 Cut Portion

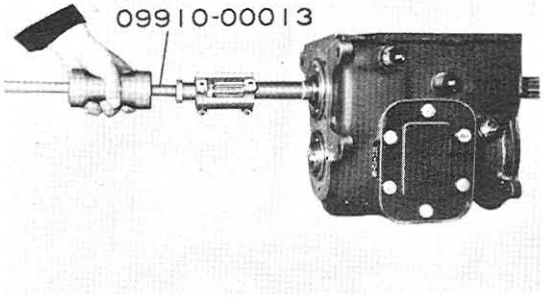


Fig. 2-82 Removing Input Shaft V5067

d. Remove the snap ring on the output shaft rear bearing. Next using the rear bearing Puller (09334-36010), remove the output shaft rear bearing in the same manner as the counter shaft bearing removal.

e. Take out the output shaft and gears assembly from the transmission case.

f. Straighten the lock washer on the counter shaft front bearing retaining plate, and remove the bolts. Remove the counter shaft front bearing retaining plate and the lock washer.

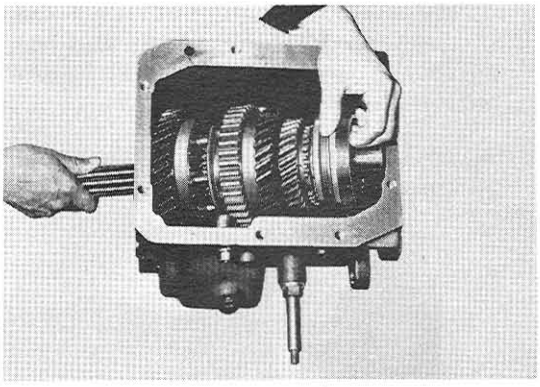


Fig. 2-83 Removing Output Shaft & Gear Assembly V5068

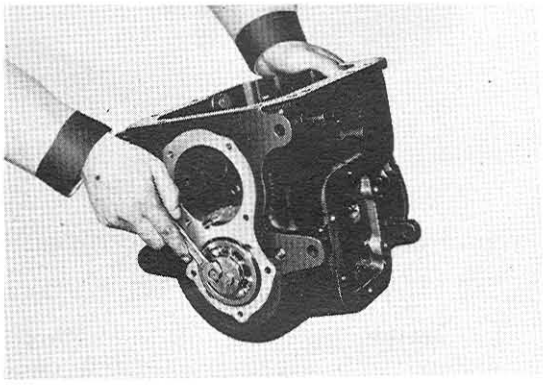


Fig. 2-84 Removing Bearing Retaining Bolts V5069

g. Remove the counter shaft front bearing with the Universal Puller 09950-20010.
Remove the front bearing spacer at this time.

h. Insert the Universal Puller

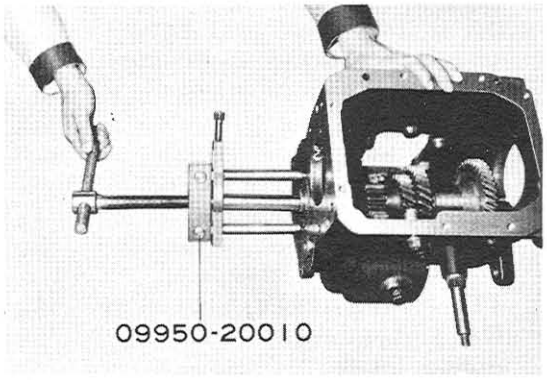


Fig. 2-85 Removing Counter Shaft Rear Bearing V5070

09950-20010 into the service holes of the transmission case, and remove the counter shaft rear bearing.

i. Take out the counter shaft assembly from the transmission case.

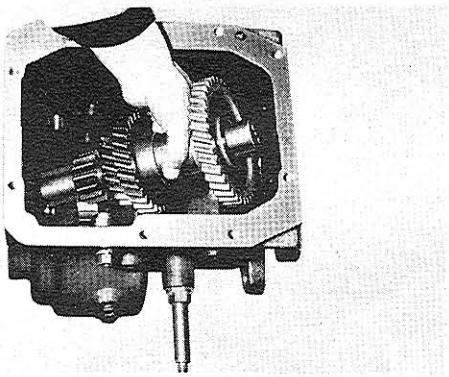


Fig. 2-86 Removing Counter Shaft Assembly V5071

j. Remove the shift arm pivot and the reverse shift arm.

k. Install the Idler Gear Shaft Puller 09312-55010 into the reverse idler gear shaft end, and pull out the reverse idler gear shaft and the key from the transmission case.

l. Take out the reverse idler gear from the transmission case.

m. Output shaft and gears disassembly.
(1) Slide the first gear thrust washer and the first gear out of the output shaft rearward.
(2) Remove the shaft snap ring at the front end of the output shaft, and remove the clutch hub with the hub sleeve, synchronizer ring and the third gear from the output shaft.
(3) Remove the shaft snap ring, and then slide out the second gear and the thrust washer.
(4) Remove the synchronizer ring No.1 (reverse gear) from the output shaft.

n. Counter shaft disassembly.
(1) Using a press, remove the counter shaft drive gear, and then remove the woodruff key and spacer from the counter shaft.

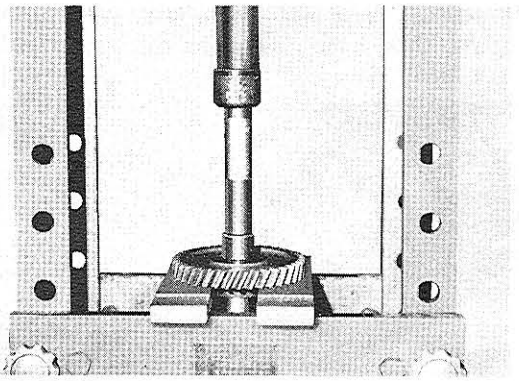


Fig. 2-87 Counter Shaft Drive Gear Removal V5072

(2) Using a press, remove the counter shaft third speed gear from the counter shaft.
Remove the woodruff key.

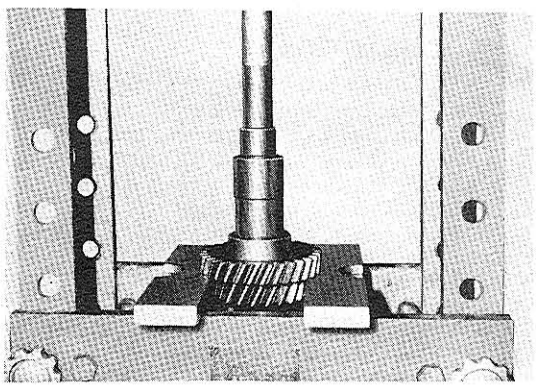


Fig. 2-88 Third Speed Gear Removal V5073

o. Transmission case cover disassembly.
To remove the shift fork shafts, be sure to shift the shift fork into neutral position, and do not apply excessive force against the shaft.
(1) Drive out the slotted spring pin from the third and fourth shift fork with a long drift punch.
Next, drive out the third and fourth shift fork shaft together with the tight plug forward with a brass rod.

Remove the shift fork, lock ball and the spring.

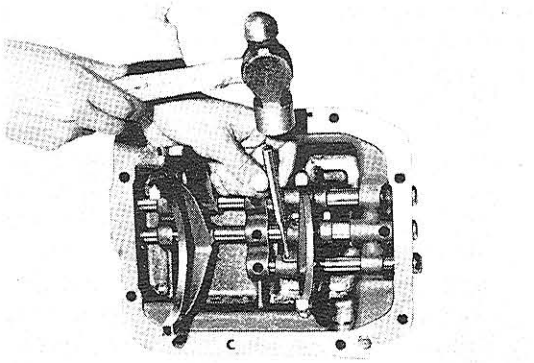


Fig. 2-89 Removing Slotted V5074 Spring Pin

(2) Using a long drift punch, drive out the slotted spring pins from the first and second shift fork and the first and second shift head.
Remove the tight plug at the rear end of the transmission case cover, and then drive out the first and second shift fork shaft together with the tight plug forward with a brass rod.
Remove the shift fork, shift head, lock ball and the spring.
Remove the straight pin in the first and second shift fork shaft front end.
(3) Using a long drift punch, remove the slotted spring pins from the reverse shift fork and the reverse shift head.
Take out the reverse shift fork, shift head, lock ball and the spring.
(4) Remove the two inter-lock rollers in the transmission case cover.
If difficult to remove the inter-lock rollers, loosen and remove the taper screw plug on the transmission case cover, and push them out with a long drift punch.
(5) Remove the cotter pin, and take out the spring and lock ball from the reverse shift head.
Next, remove the "C" washer, and pull out the reverse shift return plunger and the spring from the reverse shift head.

8. Transfer disassembly.
To disassemble the transfer, refer to 3-speed transmission & transfer procedures.

Inspection

After disassembling, wash all parts thoroughly, and inspect for the following.

Transmission case.

Check the transmission and transfer cases for cracks, gasket or other contacting surfaces for burrs and nicks.

Gears

1. Check the gears for tooth wear or damage.
Also check the tooth contact condition which may result for noisy operation.
If defective, replace the necessary gear/s.

2. Check the synchronizer ring contacting surface of the gear cone for uneven wear or roughness.

3. Check the bushings or bearings in the gears for wear or damage. and fitting conditions of the gear with the shaft.
The specified oil clearance of the output shaft to first, second and third gears is 0.08 ~ 0.121 mm (0.003 ~ 0.005"), and the reverse idler gear to shaft is 0.115 to 0.153 mm (0.0045 ~ 0.0060").

Specified gear backlash:
Between input shaft gear to counter shaft drive gear:
0.090 mm (0.00354")
Between third gear to counter shaft gear:
0.090 mm (0.00354")
Between second gear to counter shaft gear:
0.108 mm (0.00425")

Between first gear to counter shaft gear:
0.109 mm (0.00429")
Between reverse gear to reverse idler gear:
0.120 mm (0.00472")

4. Check the bearing rollers contacting surface for scores or damage. If necessary, replace the gear/s.

Synchronizer Rings

1. Check the synchronizer rings for external tooth wear or damage. Also check the internal surface for wear or damage.

2. Check the contacting surface of the synchronizer ring for uneven wear or damage.
Place the synchronizer ring onto the respective gear cone, and check the clearance between the gear and the synchronizer ring.
If necessary, replace the gear/s or the synchronizer ring/s.

Specified clearance:
Input shaft to synchronizer ring No.2
0.97 ~ 1.59 mm (0.038 ~ 0.063")
Third gear to synchronizer ring No.2
0.87 ~ 1.69 mm (0.034 ~ 0.067")

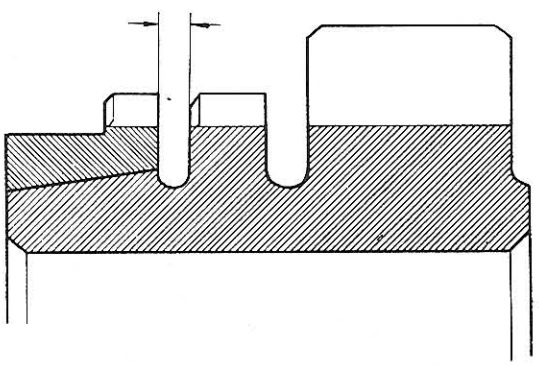


Fig.2-90 Synchronizer Ring Inspection G2374

3. Apply a thin coat of red-lead onto the synchronizer outer rings, and place the synchronizer ring No.1 into the outer rings.
Apply light pressure onto the synchronizer ring and turn it to check the synchronizer ring contacting condition.

If necessary, lap the synchronizer outer ring and the synchronizer ring No.1 lightly with a lapping compound to match.
Remove all compound thoroughly from the outer ring and the synchronizer ring No.1 after lapping.
Place the synchronizer ring No.1 into the synchronizer outer ring, and check the distance between the end of the synchronizer ring No.1 and the end of the synchronizer outer ring.
If necessary, replace the synchronizer outer ring or the synchronizer ring No.1 assembly.

Specified distance:
Synchronizer ring No.1 to second synchronizer outer ring:
0.1 ~ 0.5 mm (0.004 ~ 0.020")
Synchronizer ring No.1 to first synchronizer outer ring:
0.1 ~ 0.5 mm (0.004 ~ 0.020")

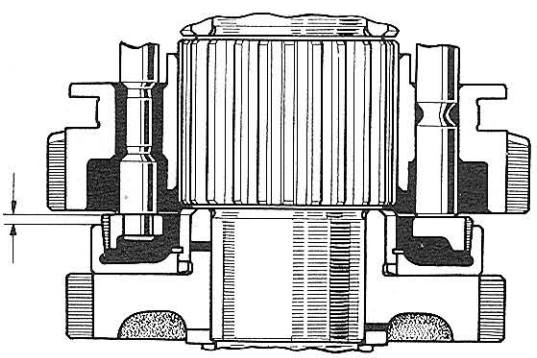


Fig.2-91 Synchronizer Ring Inspection G2385

Shifting Keys & Springs

1. Check the shifting keys for improper wear or warpage.
Replace the key as a set if defective.

2. Check the shifting key springs for weakness or bent condition.
   Replace if necessary.

Bearing & Bushings

1. Check the bearings for roughness and wear.
   Check for noise or damage by rotating the bearing after applying few drops of oil.
   Replace the bearing/s if defective.
   If the transmission input shaft bearing is to be removed, remove the shaft snap ring with a snap ring expander, then remove the bearing from the input shaft with the Universal Puller 09950-20010.

2. Check the bushings and the bearing rollers for abnormal wear.
   If the wear is excessive, replace the bushing/s or the bearing rollers.
   The bearing rollers should be replaced as a set.

Oil Seals

It is recommended that all oil seals and dust seals should be replaced at the time of assembly.
If no oil seal is available for replacement, check the lip of the seal for wear or damage.

Gear Shift Mechanism

1. Inspect each shift fork and the shift head thrust surfaces for excessive wear and distortion.
   Replace if defective.

2. Check the clearance between each shift fork and the sleeve, and if it exceeds the specified clearance, replace the shift fork/s, sleeve or the gear/s.

   Specified clearance:
   0.10 ~ 0.30 mm (0.0039 ~ 0.0118")

3. Inspect the splines of the clutch hub and the hub sleeve for wear or damage, and for smooth operation.
   The hub and the hub sleeve should be replaced as a set.

4. Check each shift fork or shift fork shaft for smooth movement and for damage or distortion.

Shaft

Check the shaft splines, snap ring grooves, bearing contacting surfaces, bearing fitting portions, gear fitting portions and the oil seal lip contacting portions for wear, scores or damage.
If necessary, replace the shaft.

Speedometer Drive & Driven Gears

Check the speedometer drive and driven gears for scores and wear.
Replace if necessary.

Assembly

All gaskets and oil seals should be replaced when assembling the transmission and the transfer.
Always install new gaskets, and apply the liquid sealer upon assembly.
To provide initial lubrication, lubricate all parts before installation.

1. Transmission assembly.

   a. Install the reverse idler gear with the fork groove towards the front, and gently drive the reverse idler gear shaft with the woodruff key through the holes in the transmission case, through the reverse idler gear, aligning the key groove in the shaft with the slot in the case.

Note:
If the bushings in the reverse idler gear have been removed, install the two bushings into the gear.
In installing the bushings, the open end of the bushing should be kept at 90° apart.
The installation of the bushings must

be as illustrated in figure 2-91..

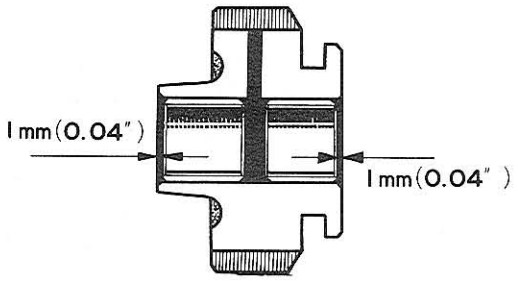


Fig.2-92 Bushing Installation G2386

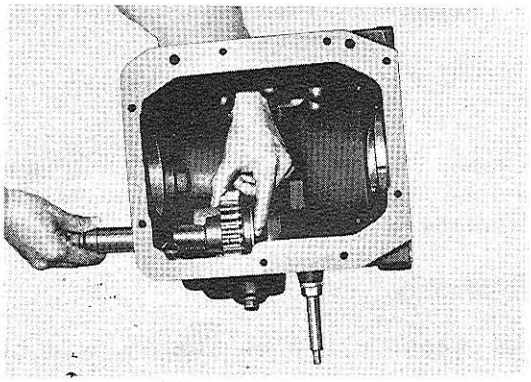


Fig.2-93 Assembling Reverse Idler Gear V5149

b. Reverse shift arm assembly.
(1) Install the reverse shift arm and the shift arm pivot and tighten finger tight.
(2) Make three gauges with a cardboard as illustrated in figure 2-109.
(3) Install the gauge "B" into the shift groove of the reverse idler gear, and adjust the gear position (reversely shifted position) by turning the shift arm pivot to obtain the distance of 114 mm or 4.49" between the outer rear end of the transmission case to the gear front end as figure 2-94. Tighten the shift arm pivot lock nut securely.
(4) Next, install the gauge "A" onto the reverse shift arm pin, and the gauge "C" into the shift groove of the gear, and check the gear neutral position.
The distance between the gear front end to outer rear end of the transmission case should be 69 mm (2.71").
If necessary, re-adjust the gear position by rotating the shift arm pivot.

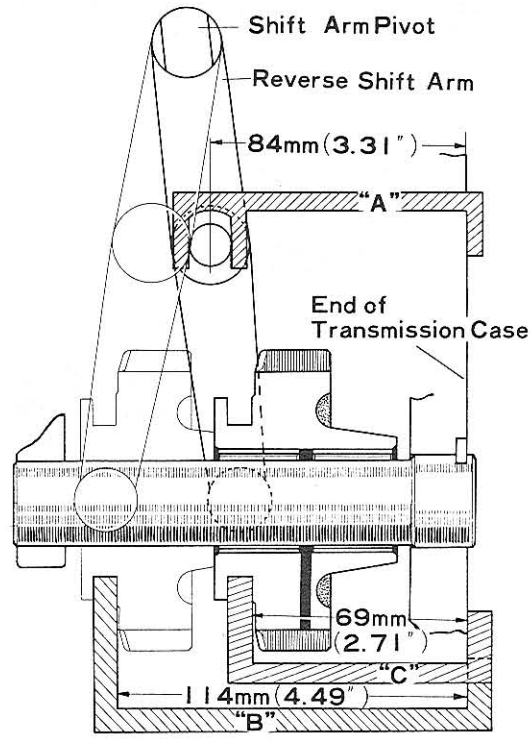


Fig.2-94 Reverse Shift Arm Adjustment G2387

c. Counter shaft assembly.
(1) Position the woodruff key into the groove of the counter shaft aligning the key way with the counter shaft third speed gear, and press on the gear with the long hub towards the front.
(2) Slide the spacer onto the counter shaft, and install the woodruff key into the key groove of the counter shaft.
Aligning the key way with the counter shaft drive gear, press the gear firmly onto the counter shaft with the long hub towards the rear.

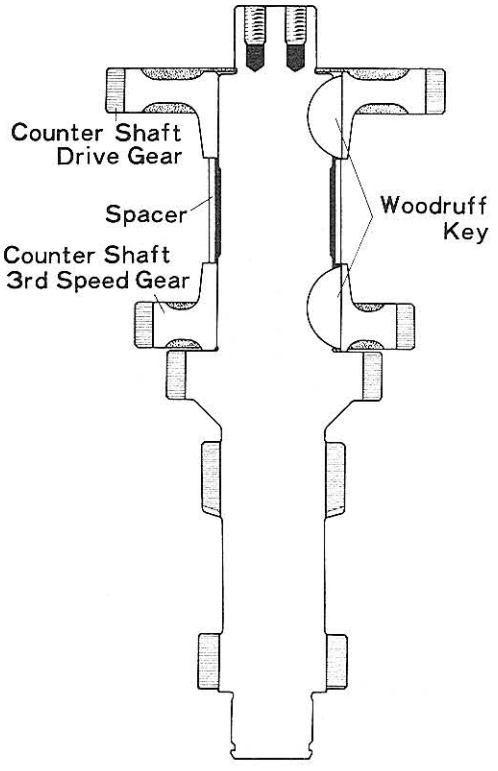


Fig. 2-95 Counter Shaft G2388

d. Position the assembled counter shaft into the transmission case, then install the counter shaft rear bearing with the Transmission & Transfer Bearing Replacer 09316-60010 and a press.
Install the shaft snap ring onto the rear end of the counter shaft.

e. Install the front bearing spacer onto the counter shaft with the protruded surface towards the front.
Next, press in the counter shaft front bearing until the snap ring on the front bearing contacts firmly against the transmission case using the Transmission & Transfer Bearing Replacer 09316-60010.
To prevent damage to the bearing, apply the pressure onto the outer race of the bearing only.
Place the bearing retaining plate and the lock washer onto the counter shaft front end, and tighten the bolts to 1.5 ~ 2.2 m-kg (11 ~ 16 ft-lb) torque.
After installation, check the counter shaft for smooth rotation.
Secure the bolts by bending the lock washers.

f. Output shaft assembly.
(1) Slide the second gear onto the output shaft with the synchronizer outer ring to the rear, then install the second gear thrust washer.
Next, select and install the shaft snap ring to obtain the proper second gear thrust clearance.
The specified thrust clearance is 0.1 ~ 0.3 mm (0.004 ~ 0.012").

Shaft snap ring thickness:
Part No. 90520-41103
Thickness: 2.5 mm (0.0984")
Part No. 90520-41104
Thickness: 2.6 mm (0.1024")

(2) Slide the third gear onto the output shaft with the synchronizer ring cone towards the front of the shaft.
(3) Assemble the synchronizer unit by installing the two shifting key springs onto the clutch hub, and place the three shifting keys into the hub key slots.
When installing the shifting key springs, these should be kept at 120° apart so that the spring tension on each key will be uniform.

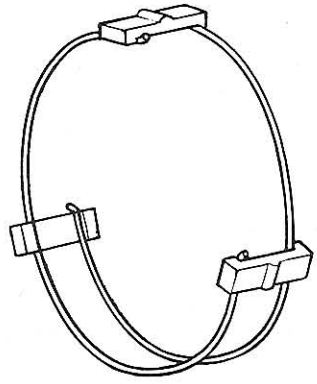


Fig. 2-96 Shifting Key Spring Installation G2389

Next, install the hub sleeve onto

the clutch hub. After assembling the synchronizer unit, check the hub sleeve for smooth movement.

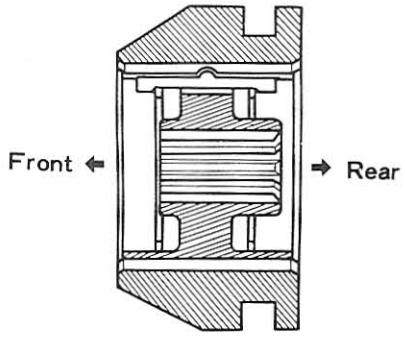


Fig. 2-97 Clutch Hub & Hub Sleeve Direction G2432

(4) Install the synchronizer ring No.2, then slide the assembled synchronizer unit onto the output shaft.
The direction of the synchronizer unit should be as shown in figure 2-112 when the synchronizer unit is assembled onto the output shaft.
(5) Select and install a proper shaft snap ring to obtain the thrust clearance of the clutch hub which should be 0 ~ 0.2 mm (0.008").

Snap ring thickness:
Part No. 90520-32101
Thickness: 2.4 mm (0.0945")
Part No. 90520-32102
Thickness: 2.5 mm (0.0984")

(6) Slide the synchronizer ring No.1 assembly (reverse gear) onto the output shaft.
The direction of the synchronizer ring No.1 should be as shown in figure 2-113 when the synchronizer ring No.1 is assembled onto the output shaft.
After installation, check the synchronizer ring No.1 for smooth movement.
(7) Install the first gear onto the output shaft.

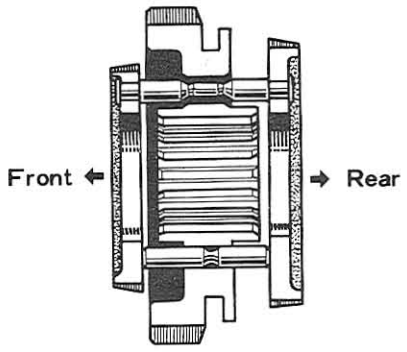


Fig. 2-98 Synchronizer Ring No.1 Direction G2433

g. Position the output shaft and the gear assembly into the transmission case.

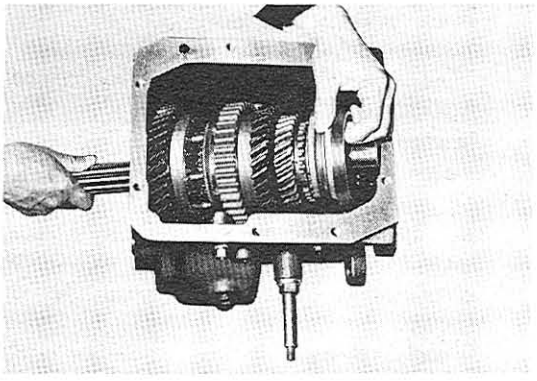


Fig. 2-99 Installing Output Shaft & Gear Assembly V5068

h. Place the first gear thrust washer onto the output shaft aligning the thrust washer slot with the straight pin on the output shaft.

i. After aligning the output shaft with the gears assembly, then in-

stall the output shaft rear bearing. To prevent damage to the bearing, apply the pressure onto the outer race of the bearing only.
For installation of the output shaft rear bearing, use SST 09309-36010 Transmiaaion Rear Bearing Replacer and 09317-36010 Transmission Rear Bearing Puller Attachment together with a press.

j. Next, install the rear bearing retainer with the gasket.

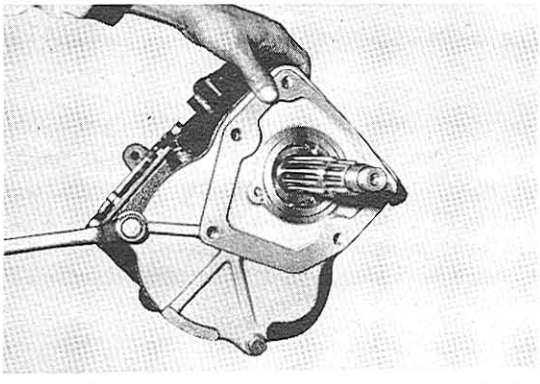


Fig. 2-100 Installing Rear Bearing Retainer V5064

k. Input shaft assembly.
(1) Using the Transmission and Transfer Bearing Replacer 09316-60010, press the bearing onto the input shaft.

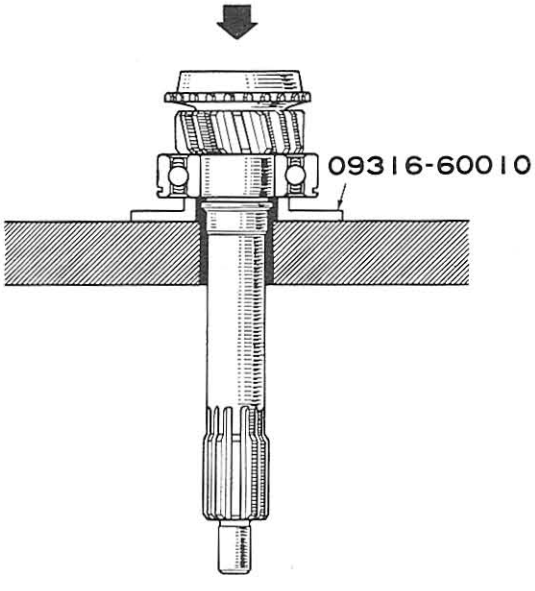


Fig. 2-101 Installing Input Shaft Bearing G2376

(2) Apply grease onto the bearing rollers, and install the eighteen bearing rollers into the bearing hole of the input shaft.

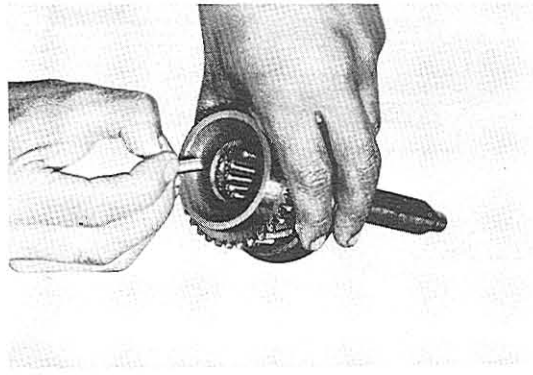


Fig. 2-102 Installing Bearing Rollers V3807

l. Install the input shaft into the transmission case with the synchronizer ring No. 2 aligning the key ways with the shifting keys. At this time, do not forget to install the bearing spacer into the input shaft bearing hole.
Do not permit the bearing rollers and the bearing spacer to drop into the transmission case when installing the input shaft.

m. Install the front bearing retainer with the gasket.
Tighten the bearing retainer attaching bolts to 1 ~ 1.6 m-kg or 7 ~ 11 ft-lb torque.
Check the transmission operation in all gears.

n. Transmission case cover assembly.
Make sure that all shift fork shafts are in neutral positions when assembling.
(1) Install the spring and the reverse shift return plunger into the reverse shift head, and secure with the "C" washer.
Put in the ball and spring, and install the cotter pin.
(2) Place the reverse shift head and the reverse shift fork onto the transmission case cover.

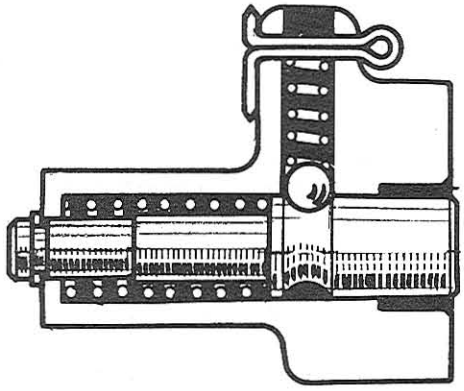


Fig. 2-103 Reverse Shift Head Assembly G2434

Install the fork lock spring and the ball in place in the case cover, then assemble the reverse shift fork shaft from the front of the case cover through the shaft bores, reverse shift fork and the reverse shift head while pushing down the fork lock ball with a screwdriver.

(3) Align the holes and drive in the slotted spring pins into the reverse shift fork and the reverse shift head to connect with the reverse shift fork shaft.

(4) Apply the roller with grease, and install the roller into the interlock hole of the case cover.

(5) Place the first and second shift head, and the first and second shift fork onto the case cover. Place the fork lock spring and the ball into the case cover.

Install the straight pin into the hole of the first and second shift fork shaft, and then assembled the fork shaft with the spacer from the front of the case cover while pushing down the fork lock ball with a screwdriver.

(6) Drive in the slotted spring pins into the shift head and the shift fork to connect with the shift fork shaft.

(7) Install the roller into the interlock hole of the case cover.

(8) Install the fork lock spring and the ball, and then assemble the third and fourth shift fork and the third and fourth shift fork shaft. Drive in the slotted spring pin.

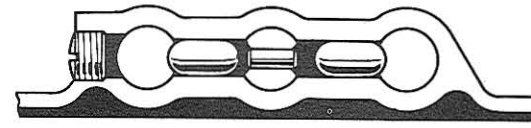


Fig. 2-104 Inter-lock Mechanism G2435

(9) After assembling the shift fork mechanism, check all shift fork mechanism for smooth operation. Apply the liquid sealer onto the tight plugs and the threads on the screw plug, and tighten them securely.

2. Install the transfer input gear stopper onto the transmission output shaft with the flanged side towards the front (output shaft bearing side).

3. Install the Transfer Guide Shaft 09323-60010 onto the transmission output shaft.
   Place the transfer input gear and the power take-off drive gear in position in the transfer case through the transfer power take-off cover hole. Be carefull, and install the transfer assembly onto the transmission.
   At this time, do not forget to install the transfer case front gasket between the transmission rear bearing retainer and the transfer case.

4. Tighten the bolts retaining the transfer case onto the transmission case to 3.5 ~ 4.1 m-kg (25 ~ 30 ft-lb) torque. Two bolts are shorter, therefore, these must be secured from the inside of the transfer case.

5. Remove the Transfer Guide Shaft 09323-60010 from the transmission output shaft.
Install the bearing onto the end of the transmission output shaft in the transfer case with the Transmission & Transfer Bearing Replacer 09316-60010.

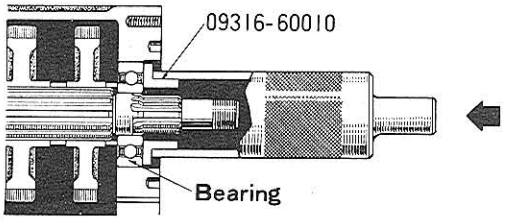


Fig. 2-105 Bearing Installation G2398

6. Slide the transfer input shaft spacer onto the transmission output shaft. Install the lock washer, and tighten the retaining nut to 14 ~ 15 m-kg (101 ~ 108 ft-lb) torque.

7. Install the transfer power take-off cover with the gasket.

8. Install the speedometer shaft sleeve together with the speedometer driven gear into the transfer output shaft rear bearing retainer. Secure the speedometer shaft sleeve with the lock plate.

Install the parking brake plate assembly.
Tighten the plate retaining bolts to 1.5 ~ 2.2 m-kg (11 ~ 16 ft-lb) torque.

10. Install the parking brake drum, and tighten the drum retaining nut to 14 ~ 17 m-kg (101 ~ 123 ft-lb) torque.

11. Position the transmission hub sleeve, synchronizer ring No.1, and the reverse idler gear in neutral position, and also set all shift forks on the transmission case cover in neutral position.
Next, assemble the transmission case cover with the gasket onto the transmission case.

12. Install the transfer shift lever linkage and the shift lever guide.
Lubricate the connecting or sliding portion with grease.
Do not forget the front drive link lever shoe when assembling the linkage.

13. After assembling the transmission and the transfer, check the transmission and transfer in all gears.

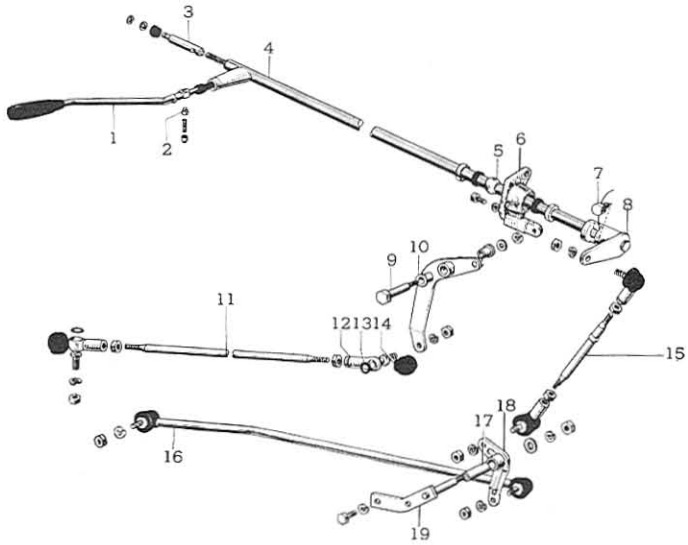
Installation

Follow the removal procedures in the reverse order.

1. Fill the transmission and transfer cases with gear lubricant up-to the filler holes.
Lubricant grade; SAE 90
Capacity:
Transmission case: 3.1 liters (3.3 US qts., 2.7 Imp qts)
Transfer case: 1.7 liters (1.8 US qts., 1.5 Imp qts)

2. Using the Transmission Gear Shift Lever Remover 09305-60010, assemble the shift lever onto the transmission case cover.

CONTROL SHAFT & LINKAGE (FJ55V series - OLD)



1. Shift lever
2. Shift lever pin
3. Control shaft upper shaft
4. Control shaft
5. Control shaft lower bushing
6. Control shaft lower bracket
7. Shift fork lock bolt
8. Control shift lever
9. Control select lever shaft
10. Bushing
11. Gear selecting rod
12. Connecting rod end
13. Hole snap ring
14. Dust seal
15. Gear shifting rod No.1
16. Gear shifting rod No.3
17. Bushing
18. Shifting bell crank
19. Shift link lever support

Fig.2-106 Control Shaft & Linkage Components G2378

Removal

1. Remove the three screws attaching the steering wheel pad onto the steering wheel, and remove the steering wheel pad.

2. Remove the steering wheel retaining nut.
   Using the Steering Wheel Puller 09609-20010, remove the steering wheel.

Fig.2-107 Removing Steering Wheel V5136

3. Disconnect the wirings at the wiring connections.
   Loosen the three screws, and remove the turn signal switch.

4. Remove the "E" ring and the washer at the end of the control shaft upper shaft.
   Next, loosen and remove the two square bolts mounting the contact ring housing onto the steering column tube, then remove the contact ring housing.
   At this time, remove the control shaft upper shaft and the spring from the control shaft.

5. Disconnect the wirings, and remove the back-up light switch together with the bracket.

6. Disconnect the gear selecting rod from the control select lever.
   Loosen and remove the control select lever shaft, and remove the control select lever with the bushings.

7. Disconnect the gear shifting rod No.1 from the control shift lever. Cut the lock wire and loosen the shift fork lock bolt. Slide the control shift lever out of the control shaft.

8. Pull out the control shaft assembly towards the interior.

9. Push in the shift lever pins, and remove the shift lever from the control shaft.
   Do not lose the pins and the spring as they may pop out upon removal.

10. Disconnect the gear selecting rod from the select outer lever on the transmission, and remove it.
    Also disconnect the gear shifting rod No.3 from the shift outer lever on the transmission.

11. Remove the nut on the gear shift link lever support, then remove the shifting bell-crank together with the gear shifting rod No.3 and the gear shifting rod No.1 towards the transmission.

Inspection

Wash the disassembled parts thoroughly, and check for wear and damage. Replace the defective part/s if necessary.

1. Inspect the control select lever and the control shift lever for wear and scores at the portions where the bushings fit in, and the cut portion of the control shift lever.

2. Inspect the shift lever, control shaft upper shaft, shift lever pins, springs and the "E" ring for wear, scores, grooves, and other defects.

3. Check the bushings at the control select lever and the shifting bell-crank for wear.

4. Check the control shaft lower bushing for wear.

5. Check the connecting rod ends for wear.

Installation

Follow the removal procedures in the reverse order.

1. In case the connecting rod end/s of the gear shifting rod No.1 is replaced, adjust the length of the gear shifting rod No.1 so that the shift lever may be horizontal in the neutral position.

2. Apply grease onto the control shaft upper shaft, shift lever fitting portion, control shaft lower bushing, control select lever bushing, shifting bell-crank bushing and the control shift lever cut portion before installation.

3. After installing the shift fork lock bolt, secure the bolt with the lock wire.

4. After installation, check the gear shift for smooth movement.
   Also check the turn signal switch operation.

* *

CONTROL SHAFT & LINKAGE (FJ40, 43,45 series - OLD)

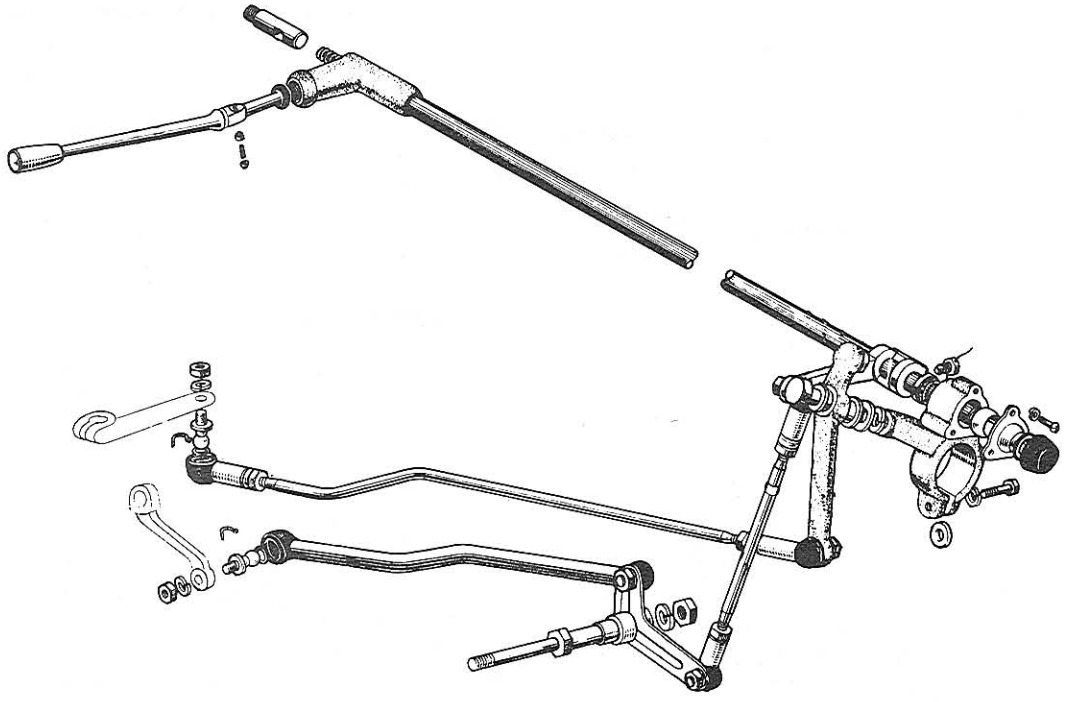


Fig.2-108 Control Shaft and Linkage

Removal & Disassembly

1. Remove the steering wheel using Steering Wheel Puller 09609-20010.
2. Disconnect the gear shifting lever by pressing the lever pins.
3. Remove the turn-signal switch from the mast jacket. Disconnect the horn wiring. The shaft spring can be taken out.
4. Remove the mast jacket lower clamp and also remove the mast jacket hole cover rubber set plate and hole cover rubber.
5. Disconnect the gear shifting rod No.1 and gear selecting rod at the end of the control shift lever and control select lever.
6. Remove the control shaft lower bracket.
7. Unloosen the bolts holding the st eering gear box bracket cap.

Note: On the left hand drive vehicles, it is recommended to remove or raise the oil cleaner to facilitate removal of the control shaft.

8. Pull the control shaft with the control select and shift levers attached out through the engine compartment.

9. Disconnect the control select and shift levers and control select lower bracket from the control shaft.

10. Removal procedure of the shift linkage down from the control select shift levers is self explanatory.

Inspection & Adjustment

Clean all parts thoroughly in cleaning solvent and inspect for wear or other damages. Repair or replace the defective parts.

Assembly & Installation

1. Assemble the shift linkage down from the control select and shift levers.

2. Install the turn signal switch on the mast jacket with the control shaft upper bracket shaft.
Make sure that the hole provided on the shaft be positioned correctly.

3. Assemble the control select and shift levers and the control shaft lower bracket to the control shaft.

4. Place the control shaft with the control levers attached in correct position on the mast jacket.
Connect the control shaft with the control shaft upper bracket shaft on the turn signal switch after installing into the control shaft.

5. Assemble the control lever to lever housing.

6. Tighten the control shaft lower bracket clamp.

7. Tighten the bolts holding the steering gear box bracket clamp.

8. Keeping the levers in the neutral position, connect the gear shifting rod No.1 and gear selecting rod.

9. Install the mast jacket lower clamp and also install the mast jacket hole cover rubber set plate and hole cover rubber.

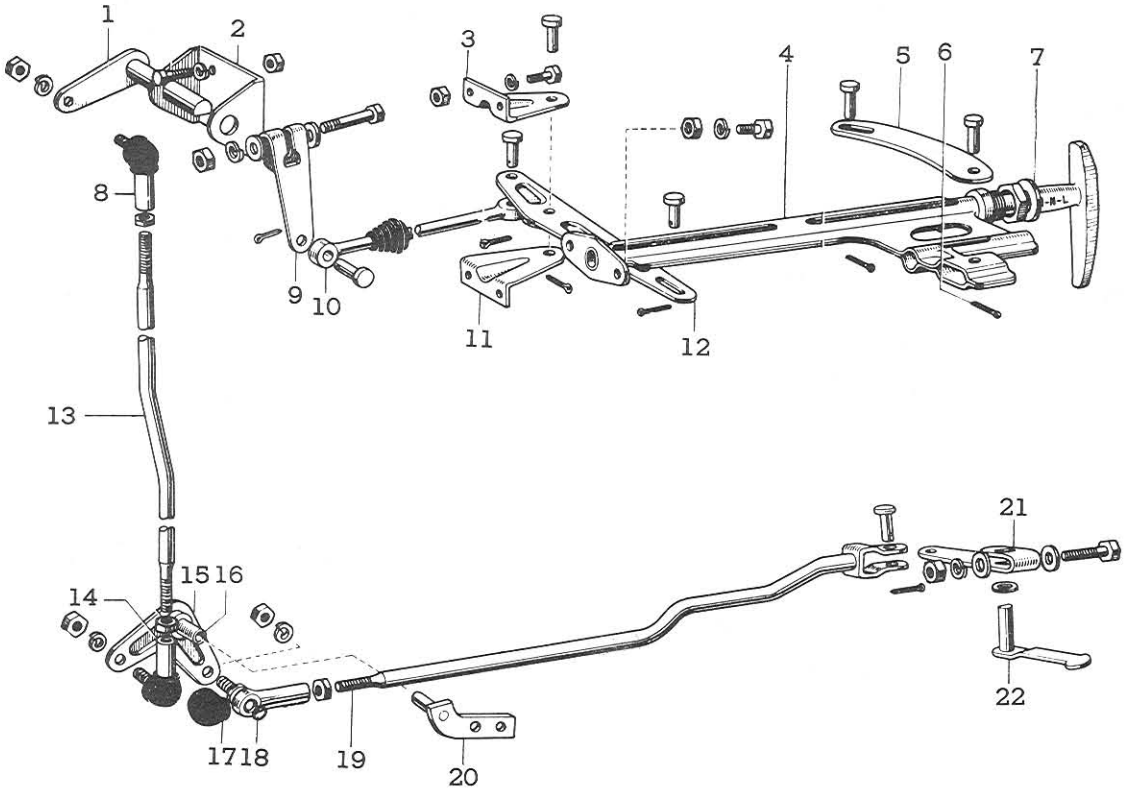
10. Install the steering wheel.

11. Connect the horn wiring connector.

12. Operate the control lever and check if the gear shifting is performed properly.

* *

TRANSFER SHIFT LEVER & LINKAGE (FJ55V series - OLD)



1. High and low shift link lever
2. Shift link bracket
3. Shift link bracket No.1
4. Shift lever guide
5. Front drive guide lever No.1
6. Cotter pin
7. Transfer high and low shift lever
8. Connecting rod end No.1
9. Shift link lever No.1
10. High and low shift rod No.1
11. Shift link bracket No.1
12. Front drive guide lever No.2
13. High and low shift rod No.2
14. Connecting rod end No.2
15. Shifting bell crank
16. Bell crank bushing
17. Dust seal
18. Hole snap ring
19. High and low shift rod No.3
20. Link lever support
21. Transfer high and low shift lever
22. Shift inner lever

Fig.2-109 Transfer Shift Lever & Linkage Components G2379

Removal & Disassembly

1. Remove the air duct No.1 of the heater.

2. Pull out the cotter pins, and remove the pins which connect the transfer high and low shift lever to the front drive guide lever No.1 and the front drive guide lever No.2, then slide the shift lever out of the shift lever guide.

3. Remove the pins (1) and then take out the front drive guide lever No.2 (2).

4. Remove the bolt (1) connecting the high and low shift link lever No.1 to the high and low shift link lever

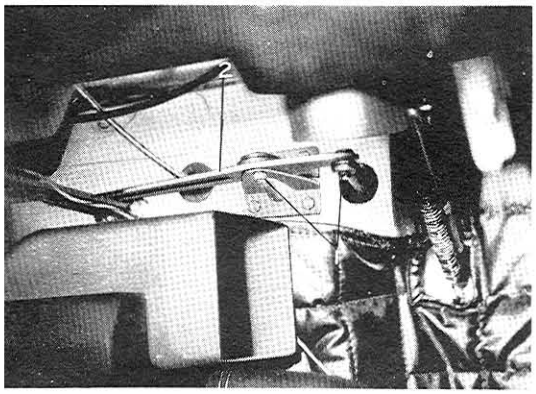


Fig.2-110 Guide Lever No.2 Removal V5137

shaft, and then remove the shift link lever No.1 (2), and the high and low shift rod No.1 (3).

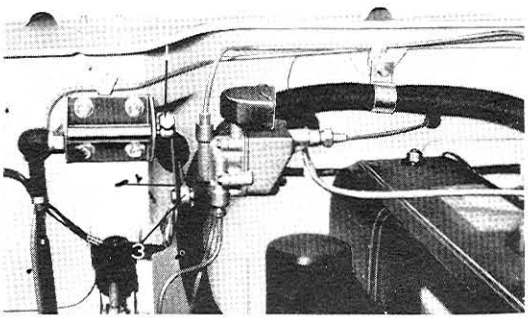


Fig.2-111 Shift Link Lever No.1 & Shift Rod No.1 V5138

5. Disconnect the high and low shift rod No.2 from the high and low shift link lever, and remove the shift link lever.

6. Disconnect the high and low shift rod No.3 from the transfer high and low shift outer lever.

7. Loosen and remove the nut retaining the shifting bell-crank to the gear shift link lever stopper, then withdraw the shift rod No.2 together with the shifting bell-crank and the shift rod No.3.

Inspection

Wash the disassembled parts, and check for wear and damage. Replace the defective part/s if required.

1. Check the connecting rod ends for wear and stickiness.

2. Check the pins for excessive wear.

3. Check the bushing for wear at the shifting bell-crank.

4. Inspect the transfer high and low shift lever for cracks, scores, rust and distortion, and check for smooth movement.

Installation

Follow the removal procedures in the reverse order.

1. Before installing, lubricate all sliding or connecting portions with grease.

2. After installing the transfer shift linkages, check and adjust the length of the shift rod No.2 or the shift rod No.3.
   To adjust, disconnect the shift rod No.2 and No.3 from the shifting bell-crank and the high and low shift link lever.
   Next, shift the transfer high and low shift outer lever on the transfer and the transfer high and low shift lever at the instrument panel to the transfer high speed position. In this condition, adjust the length of the shift rod No.2 and the No.3 by turning the connecting rod ends to obtain correct connection and proper shifting.

3. After installation, check the movement of the transfer high and low shift lever in the L (low), N (neutral) and H (high) positions.

TRANSFER SHIFT LEVER & LINKAGE (FJ40, 43, 45 series)

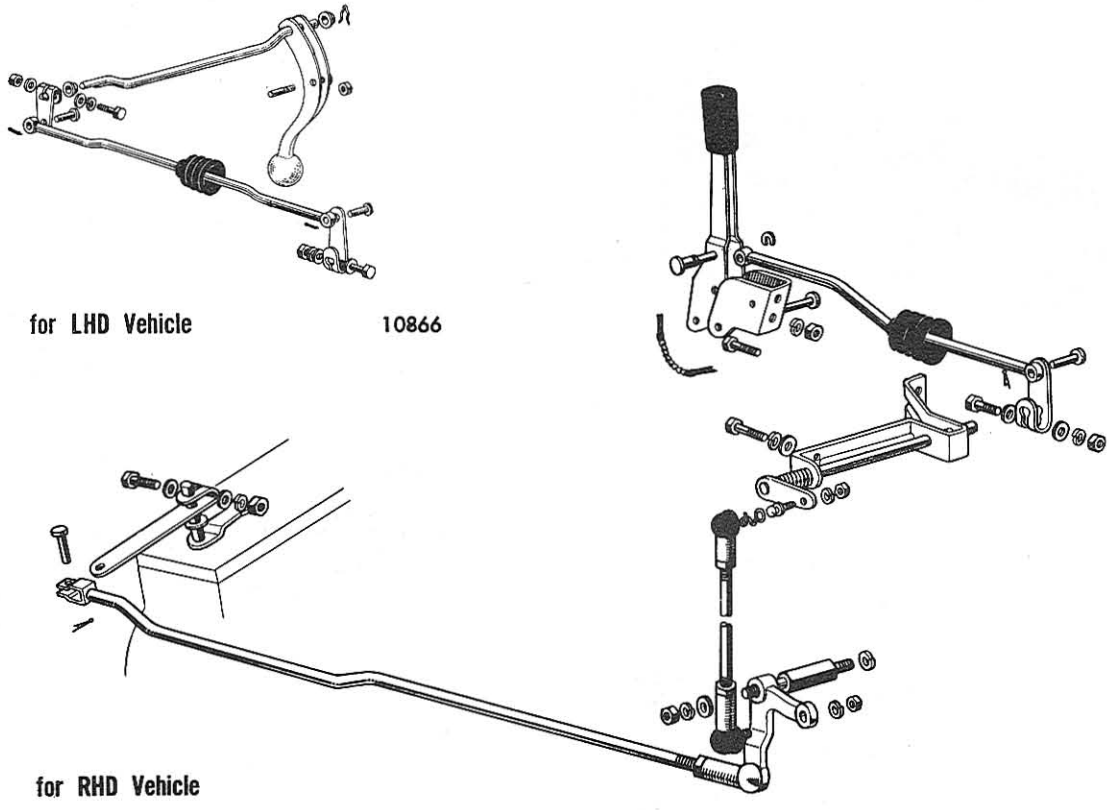
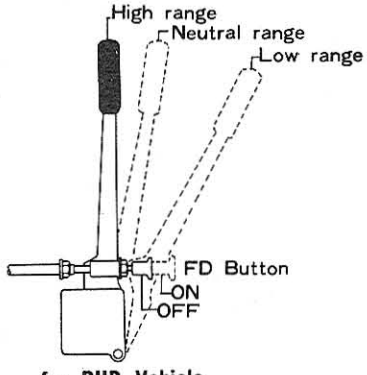


Fig.2-112 Transfer Gase Gear Shift Linkage

Transfer Gear Shift & Front Drive Shift Operation



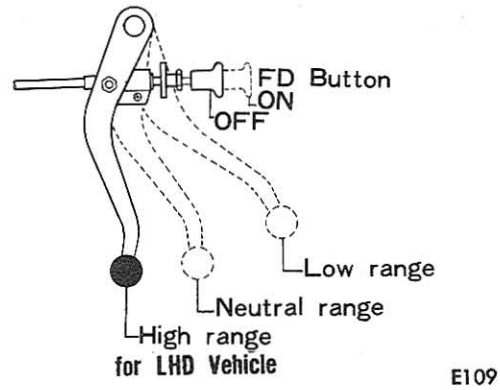


Fig.2-113 Operation

TRANSFER FRONT DRIVE CONTROL

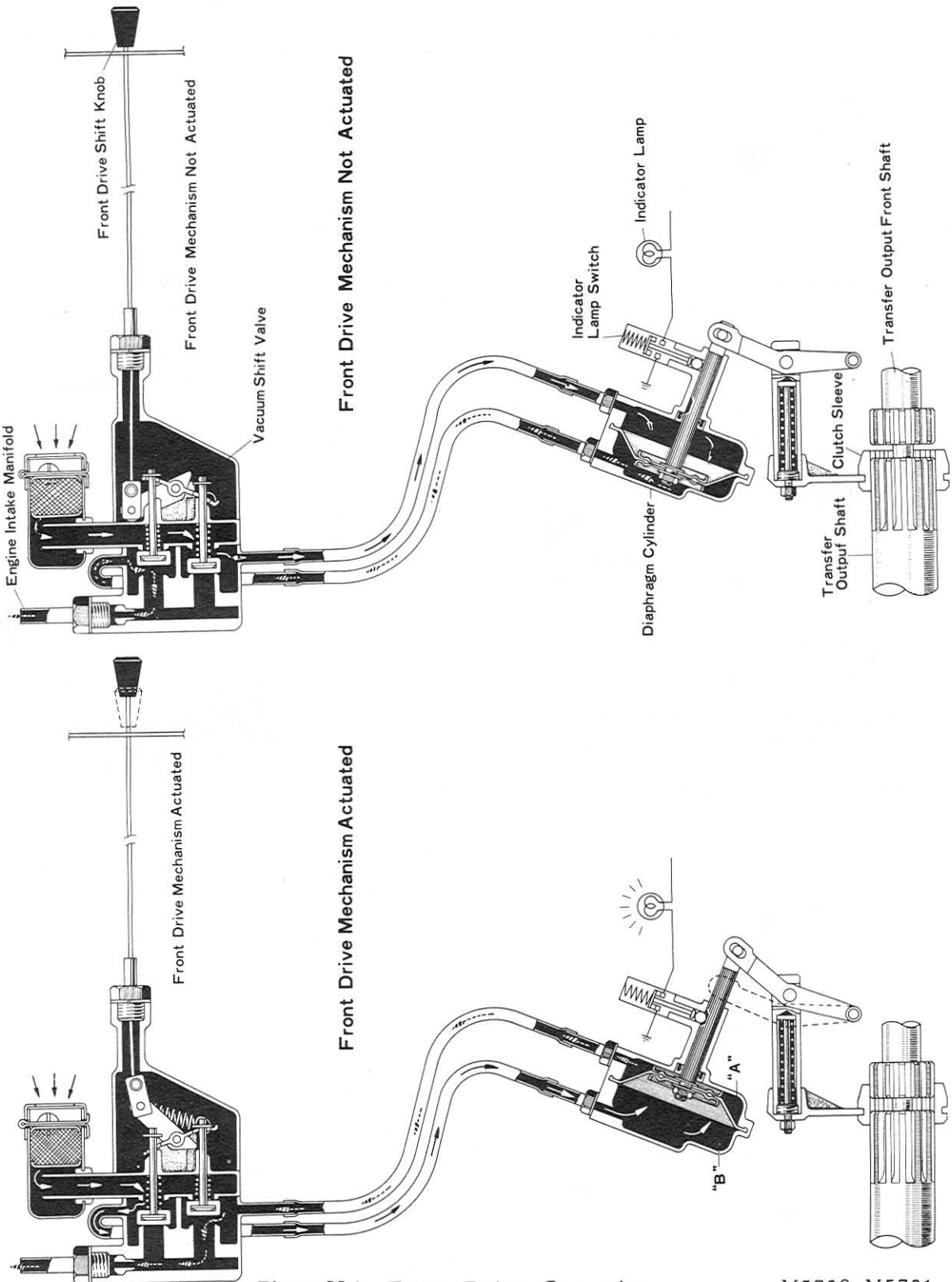
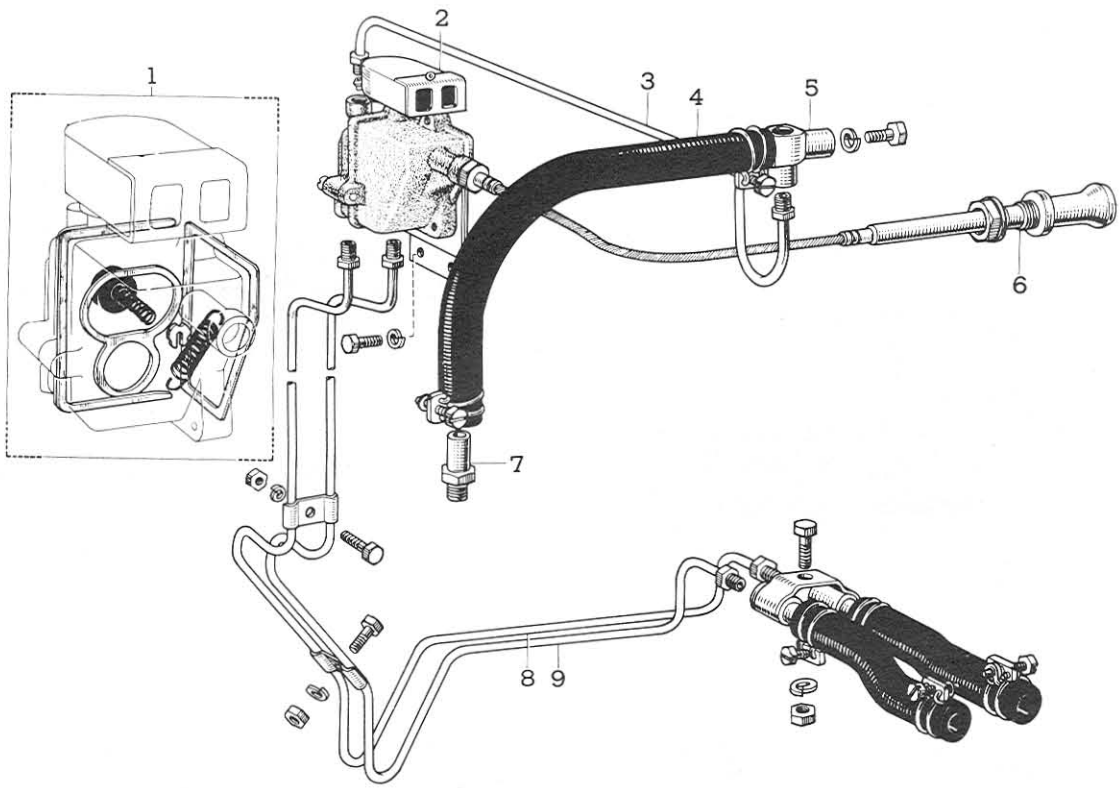


Fig. 2-114 Front Drive Operation Y5730 Y5731

Description

The transfer front drive control mechanism consists of the vacuum shift wire with front drive shift knob, vacuum shift valve, diaphragm cylinder and the vacuum connections.

The front drive is operated utilizing the vacuum in the engine intake manifold, which is indiced to the diaphragm cylinder provided on the transfer extension housing.



1. Vacuum shift valve kit
2. Vacuum shift valve
3. Front drive vacuum tube No.3
4. Vacuum hose
5. Vacuum check valve
6. Vacuum shift valve wire
7. Union
8. Front drive vacuum tube No.1
9. Front drive vacuum tube No.2

Fig.2-115 Transfer Front Drive Control Components G2380

Operation

The vacuum shift valve is operated by the front drive shift knob on the instrument panel.
When the front drive shift knob is pulled out, atmospheric pressure actuates on the diaphragm cylinder "B" and the vacuum in the engine intake manifold actuates on the diaphragm cylinder "A"
As a result, the transfer front drive shift fork slides the front drive clutch sleeve to mesh with the transfer output front shaft to engage the front drive.
At the same time, the front drive indicator lamp switch ball seats on the slot provided on the diaphragm push rod to light the indicator lamp.
In case the front drive shift knob is pushed in, the front drive mechanism functions in reverse manner as the operations described above, and the front drive is disengaged.

Removal

1. Disconnect the front drive vacuum tube No.1, No.2 and the No.3 from the vacuum shift valve.
2. Remove the two bolts retaining the vacuum shift valve onto the dash panel.
3. Remove the cover from the vacuum shift valve, and then loosen the vacuum shift valve wire lock screw in the vacuum shift valve.
   Next, loosen the nut, and disconnect the vacuum shift valve wire from the vacuum shift valve, and remove the vacuum shift valve.
4. Loosen and remove the straight pin on the vacuum shift valve wire rod under the instrument panel.
5. Loosen the nut attaching the vacuum shift valve wire tube onto the instrument panel, and then pull out the vacuum shift valve wire.
6. Disconnect the vacuum hose from the vacuum check valve, and remove the check valve and the vacuum tube No.3.
7. Disconnect the vacuum tubes No.1 and No.2 from the vacuum tube unions.
   Loosen the vacuum tube clamps, and remove the vacuum tubes No.1 and No.2.

Inspection

1. Check the vacuum shift valve wire for proper operation.
   If it sticks and will not move smoothly by pulling the shift knob, replace the vacuum shift valve wire assembly.
2. Check the vacuum tubes for cracks and rusty condition.
3. In case the front drive is hard to shift, check the vacuum shift valve and the vacuum check valve operation.
   Check the operation of the vacuum shift valve for air tightness, worn or damaged condition.
   If the valve is found to be defective, disassemble the vacuum shift valve, and replace the valve/s.
   The vacuum shift valve kit is available as follows.
   Part No. 04411-55011.
   Inspect the vacuum check valve operation, and if necessary, replace the assembly.
4. Check the vacuum hoses for cracks and other defects.
   If defective, replace with a new part.

Installation

Follow the removal procedures in the reverse order.

1. Lubricate the vacuum shift valve wire with grease when installing the wire.
2. Do not forget to install the straight pin onto the shift valve wire rod.
3. After installing, check the operation of the front drive control mechanism during road test.
   Do not test on dry and hard surface road.

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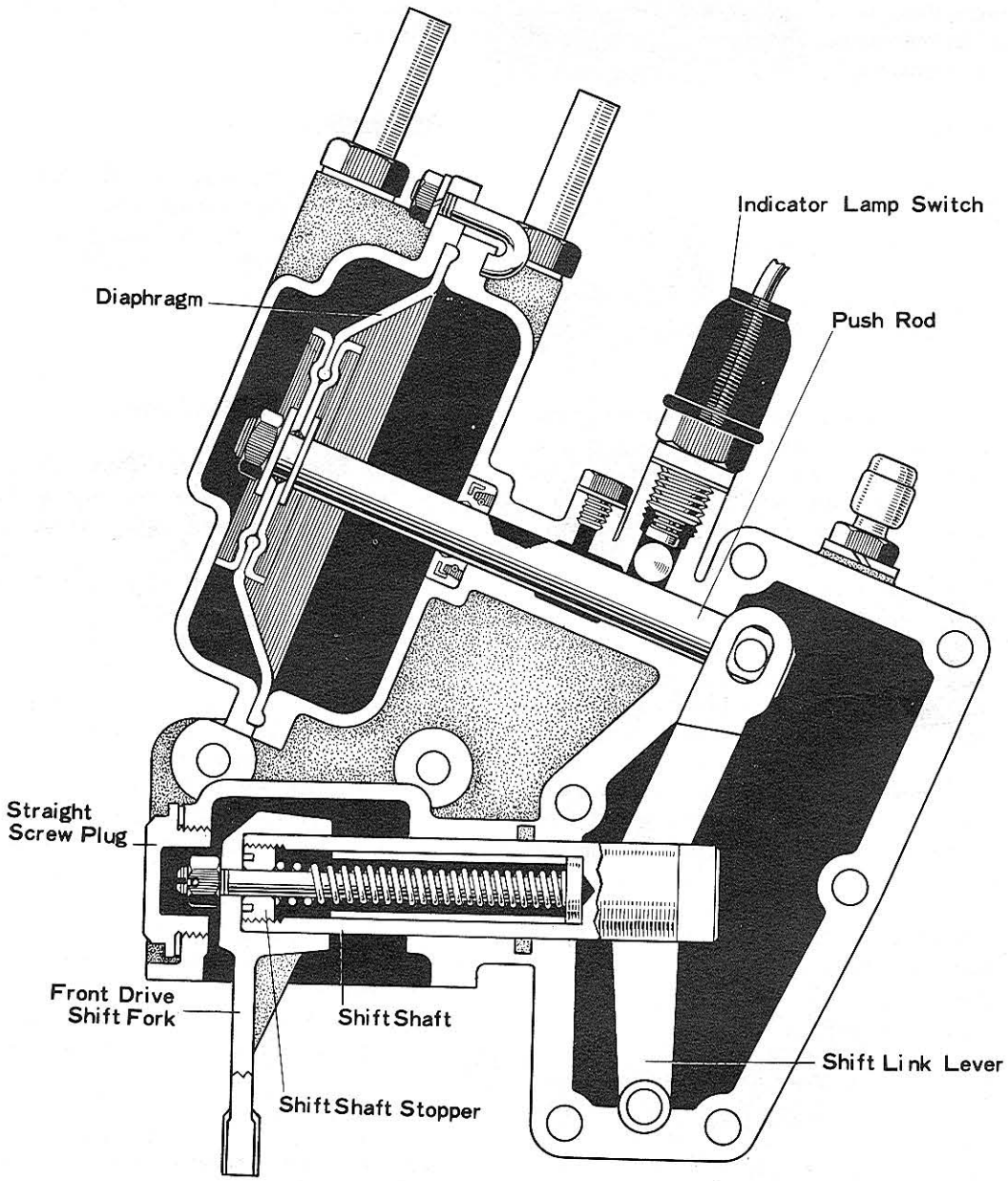
DIAPHRAGM CYLINDER & TRANSFER FRONT DRIVE FORK



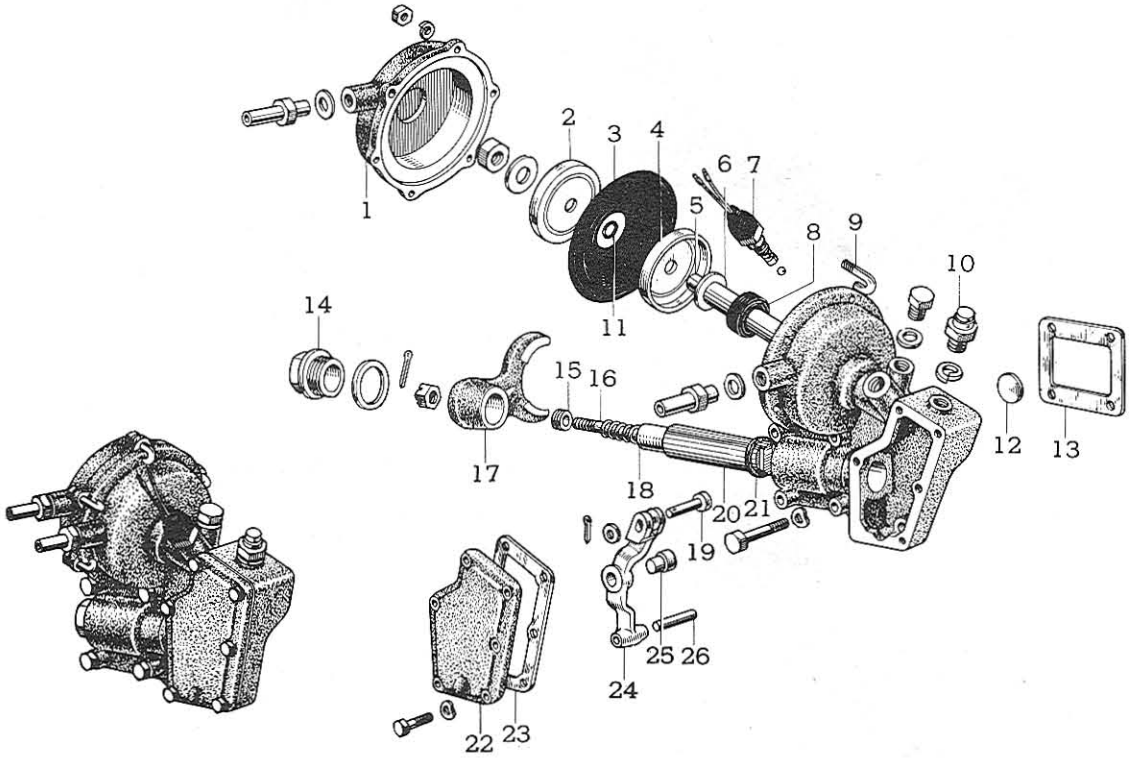
Y7021

Fig.2-116 Cross Section of Diaphragm Cylinder & Transfer Front Drive Fork

Removal

1. Remove the transmission under cover.
2. Remove the plug, and drain the gear lubricant from the transfer case.
3. Remove the cotter pin, and disconnect the high and low shift rod No.3 from the transfer high and low shift outer lever.
4. Loosen the clamps, and disconnect the two vacuum hoses from the unions on the diaphragm cylinder body and the cover.
5. Disconnect the wirings from the front drive indicator lamp switch.
6. Loosen and remove the bolts, and dismantle the diaphragm cylinder and transfer front drive fork assembly from the transfer extension housing.

Disassembly



1. Diaphragm cylinder body cover
2. Diaphragm plate
3. Diaphragm
4. Diaphragm plate
5. Diaphragm push rod
6. Washer
7. Front drive indicator switch
8. Oil seal
9. Diaphragm cylinder set bolt
10. Breather, plug
11. "O" ring
12. Expansion plug
13. Gasket
14. Straight screw plug
15. Shift shaft stopper
16. Push rod bolt
17. Transfer front drive shift fork
18. Spacer
19. Pin
20. Transfer front drive shift shaft
21. Dust seal
22. Diaphragm cylinder cover
23. Cover gasket
24. Front drive shift link lever
25. Link lever shoe
26. Straight pin

G2381

Fig.2-117 Diaphragm Cylinder & Transfer Front Drive Fork Components

1. Loosen and remove the front drive indicator light switch and the steel ball from the diaphragm cylinder body.

2. Remove the diaphragm cylinder body cover.

3. Remove the diaphragm cylinder cover and the gasket.

4. Remove the straight pin from the front drive shift link lever. Remove the cotter pin and the washer at the end of the front drive shift link lever.

5. Remove the pin, and then take out the front drive shift link lever as shown in figure 2-69.

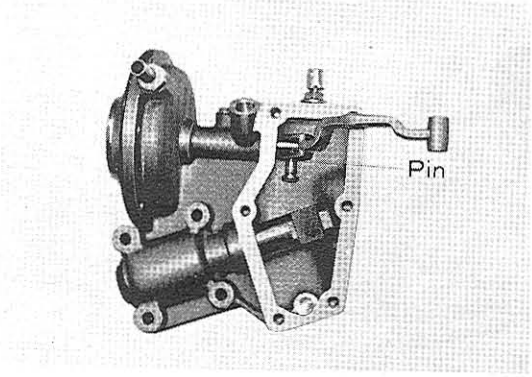


Fig.2-118 Front Drive Shift Link Lever Removal V5059

6. Slide the diaphragm push rod together with the diaphragm out of the diaphragm cylinder body.

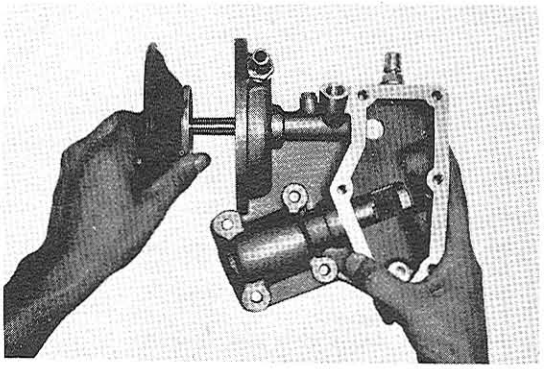


Fig.2-119 Removing Diaphragm Push Rod & Diaphragm V5060

7. Loosen and remove the straight screw plug with the gasket, and then remove the cotter pin and the nut from the push rod bolt. Next, remove the transfer fror drive shift fork from the transfer front drive shift shaft.

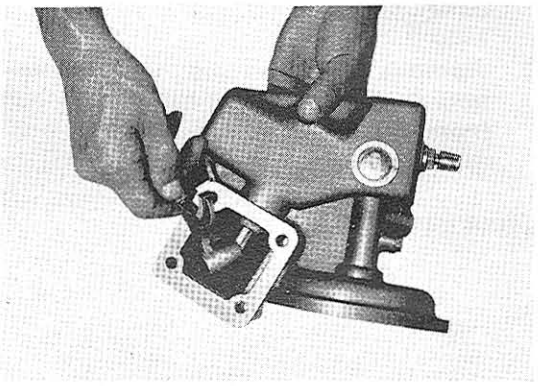


Fig.2-120 Removing Front Drive Shift Fork V5061

8. Slide the transfer front drive shift shaft out of the diaphragm cylinder body.

9. Loosen and remove the shift shaft stopper with a suitable tool, and take out the push rod bolt together with the spring and the spacer from the front drive shift shaft.

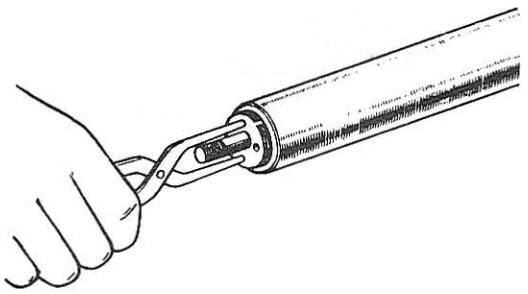


Fig.2-121 Removing Shift Shaft Stopper G2399

10. Loosen and remove the diaphragm attaching nut, then remove the diaphragm plates, diaphragm and the washer from the diaphragm push rod.

Inspection

Wash all disassembled parts thoroughly except the diaphragm in cleaning solvent.

1. Inspect the diaphragm for air tightness, damaged, swollen or torn conditions.
   If any of these conditions exists, replace the diaphragm.

2. Check the oil seal, and replace if excessively worn.

3. Install the diaphragm push rod, and the transfer front drive shift shaft into the diaphragm cylinder body, and check the shafts for smooth movement.

4. Check the groove of the transfer front drive shift shaft, and the front drive link lever shoe for excessive wear.
   Replace if necessary.

Assembly

Follow the disassembly procedures in the reverse order.

1. Take care to keep the push rod position correctly so that the slot on the diaphragm push rod will face the front drive indicator lamp switch side.

2. After assembling the transfer front drive shift shaft, lock the shift shaft stopper in place by punching at two places.

3. When assembling the diaphragm push rod, transfer front drive shift shaft and the front drive shift link lever into the diaphragm cylinder body, apply multipurpose grease onto the sliding surfaces and connecting portion of these items.

Installation

Follow the removal procedures in the reverse order.

1. When installing the diaphragm cylinder and transfer front drive fork assembly, coat the liquid sealer onto the gasket to prevent oil leak.

2. Fill the transfer case with gear lubricant.
   Transfer case lubricant capacity: 1.7 liters (1.8 US qts., 1.5 Imp qts.).

3. After installation, check the operation of the front drive mechanism during road test.
   Do not test on dry and hard surface road.

* *