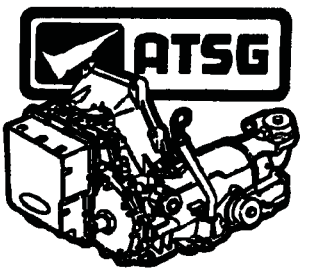


INDEX

1350 - 1354

Technical Service Information

INTRODUCTION
WARNER GEAR
1350 - 1354

With more 4 wheel drive vehicles coming into our shops, the need for information on transfer cases has increased. Mike Weinberg of Rockland Standard Gear has gathered information on various types and model transfer cases that are most common. This series of booklets cover the general information, operation, tear down, and assembly of these units. And in most cases a parts breakdown is shown which helps in ordering replacement parts.

We thank Warner Gear for the information and illustrations that made this booklet possible

ROBERT D. CHERRNAY
TECHNICAL DIRECTOR

DALE ENGLAND
FIELD SERVICE CONSULTANT

FRANK MIETUS
TECHNICAL CONSULTANT

WAYNE COLONNA
TECHNICAL CONSULTANT

WELDON BARNETT
TECHNICAL CONSULTANT

ED KRUSE
LAYOUT

AUTOMATIC TRANSMISSION SERVICE GROUP
9200 SOUTH DADELAND BLVD.
SUITE 720
MIAMI, FLORIDA 33156
(305) 661-4161

1350
Introduction and Description

1–1. INTRODUCTION

1–2. PURPOSE. This manual contains maintenance, service and parts information for the 13-50 and 17-50 Four-Wheel Drive Transfer Cases manufactured by Borg-Warner Automotive, Inc., Transmission Systems, P.O. Box 2688, Muncie, IN 47307. The 13-50 designation is used for OEM transfer cases. Identical aftermarket units are designated 17-50.

1–3. SCOPE. As you will see in the Table of Contents, this manual provides information for maintenance, troubleshooting, installation, removal, disassembly, cleaning, inspection, repair or replacement, and assembly of the transfer case.

1–4. Section P of the manual contains an illustrated parts list. The arrangement of the exploded view illustrations is described in the introduction to Section P. Each detail part shown in the exploded views is assigned an index number. This same index number is used to identify the part throughout this manual. For example, index number 51 (in parentheses in the text) refers to the drive chain regardless of the manual section or the specific model transfer case being serviced.

1–5. The exploded view illustrations in Section P make it possible to view the complete assembly in addition to the illustrations in the service sections relating to a specific service procedure.

1–6. Section T lists special tools. These tools, or equivalent are required for proper disassembly and assembly of the transfer case.

1–7. ABBREVIATIONS. Abbreviations, other than those in common use, found in this manual are identified in Table 1–1.

Table 1–1. Abbreviations

AR	As Required
Assy	Assembly
ID	Inside Diameter
NP	Not Procurable
OD	Outside Diameter
PN	Part Number
PR	Per
Qty or QY	Quantity
Ref	Reference
TIR	Total Indicator Reading

1–8. DESCRIPTION

1–9. TRANSFER CASE DESCRIPTION. The Borg-Warner Automotive 13-50 is a two-speed, part time transfer case. A planetary gear set is used to provide gear reduction. Power is transferred to the front wheel drive through a Morse Hy-Vo chain drive. The unit operates in an oil bath plus an oil pump is used to provide positive lubrication to the planetary gear set and other upper shaft components. Four selector positions are provided:

2H—In two high position, only the two rear wheels are driven and the transfer case operates at a 1.00 to 1.00 speed ratio.

4H—In four high, all four wheels are driven at a 1.00 to 1.00 speed ratio.

N—In the neutral position, the output shaft is disconnected from the input shaft and no power is transmitted to the wheels.

4L—In four low, all four wheels are driven and the transfer case operates at a 2.48 to 1.00 speed reduction ratio.

1–10. SHIFTING. The mechanical shift transfer case is controlled by a single shift lever that operates a shift cam within the transfer case. Additional components are installed on the electric shift transfer case: an electric clutch, a speed sensor and an electric motor to drive the shift cam within the case. A separate electronic shift control system is also necessary (refer to vehicle manual). The clutch is used to spin up the front drive system and permit shifting from 2H to 4H at any speed. The speed sensor provides information to the electronic control system to regulate shifting from 4H to 4L.

1–11. APPLICATION. The 13-50 transfer case is used for light truck applications.

1–12. IDENTIFICATION. The identification tag is installed on the transfer case at the location shown in figure 1–1, looking at the rear of the case. Figure 1–1 also illustrates the information to be found on the tag, some of which may be necessary for specifying correct replacement parts.

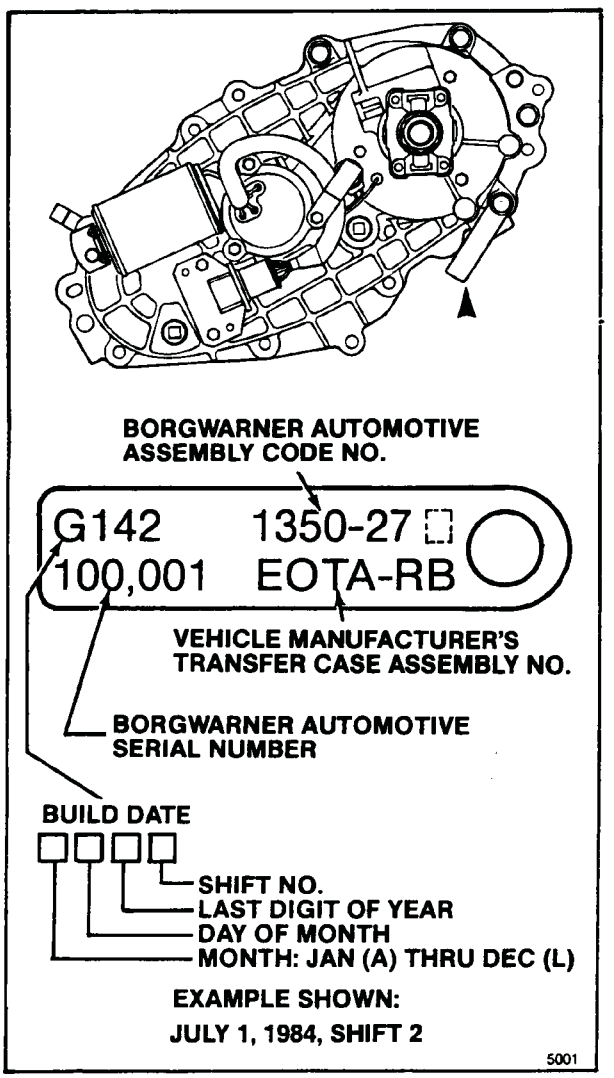


Figure 1–1. Identification Tag

On-Vehicle Service and Troubleshooting

2–1. MAINTENANCE

2–2. GENERAL. The only periodic maintenance required for the Borg-Warner Automotive 13-50 or 13-70 transfer case is to maintain proper lubrication.

2–3. LUBRICATION SCHEDULE. Refer to Table 2–1.

2–4. APPROVED LUBRICANT. Use only automatic transmission fluid, Dexron® II, XT-2–QDX (Ford ESP-M2C138-CJ) or equivalent in the transfer case.

NOTE: To check or drain the lubricant, the transfer case should be warm. This is best done shortly after shutdown.

2–5. CHECKING LUBRICANT LEVEL.

CAUTION

Do not use an impact wrench to remove or install fill or drain plugs since this will damage female threads in transfer case cover.

a. Wipe fluid level plug (see figure 2–1) and surrounding area clean.
b. Remove fluid level plug.
c. When transfer case is full, lubricant will just drip out fluid level plug opening.
d. Add approved lubricant (refer to paragraph 2–4) if required.
e. Install fluid level plug and torque to 14-22 lb-ft (19- 30 Nm).

Table 2–1. Lubrication Schedule

FREQUENCY	PROCEDURE
With each engine oil change,	Check transfer case lubricant level
Yearly or after every 30,000 miles, whichever comes first	Change transfer case lubricant

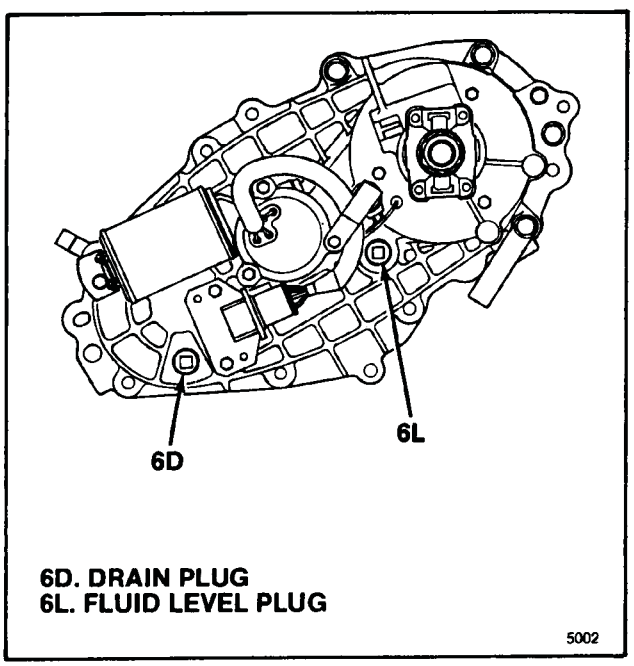


Figure 2–1. Drain and Fluid Level Plugs

2–6. CHANGING LUBRICANT.

a. Wipe fluid level and drain plugs (see figure 2–1) and surrounding areas clean.
b. Place suitable container under transfer case. Transfer case holds approximately 3.0 US pints when full.
c. Remove drain plug.
d. Remove fluid level plug.
e. Allow all lubricant to drain.
f. Install drain plug and torque to 14-22 lb-ft (19-30 Nm).
g. Add approved lubricant (approximately 3 US pints) through fluid level plug opening until lubricant just begins to drip back out of opening.
h. Install fluid level plug and torque to 14-22 lb-ft (19- 30 Nm).

2–7. TROUBLESHOOTING

2–8. GENERAL. In the event of operating difficulty, it is recommended that the transfer case (engine) be shut down. In most cases, to accurately pinpoint the source of trouble, it may be necessary to remove and disassemble, or partially disassemble, the transfer case. Specific inspection procedures for detail parts of the transfer case are provided in Section 4.

2–9. TROUBLESHOOTING CHART. Table 2–2 lists troubles which may be encountered along with possible causes and remedies.

Table 2–2. Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	REMEDY
Electric shift problems	Damaged or defective control console component, electronic control module, speed sensor, electric shift motor, electric clutch or interconnecting wiring	Refer to vehicle manual for diagnosis and test procedure to isolate faulty component or components. Replace as required
	Damaged or worn shift cam, hub, collar, fork or rail shaft	Disassemble and check for worn or damaged parts. Replace as required
	Shift fork, hub collar or gears binding	Disassemble and check that sliding parts move freely. Replace as required.
No mechanical shift (control lever moves)	Control lever or shift linkage broken or damaged	Replace damaged parts
	Damaged shift cam; broken shift fork assy	Remove transfer case cover and check for damaged parts. Replace damaged parts
Hard mechanical shift or control lever will not move into position	Improper operation	Refer to vehicle operator's manual for specific operating sequence, if any
	Improper or low transfer case lubricant	Add or drain and replace with proper lubricant (refer to paragraph 2–4)
	Shift fork binding	Remove transfer case cover and check for damaged parts. Replace damaged parts
	Binding of sliding shift hub, collar or gears	Remove transfer case cover, reach down into transfer case and check that sliding parts (parts with shifting grooves) slide freely on shaft. Remove and replace damaged parts
Mechanical shift jumps out of engagement	Damaged or improperly adjusted shift linkage	Adjust or repair shift linkage
	Internal shift parts damaged or excessively worn	Disassemble and check for worn or damaged parts. Replace damaged parts
	Shifting fork assy loose on rail or damaged	Disassemble and check for wear or damage. Replace worn or damaged parts

Table 2–2. Troubleshooting Chart (Cont)

TROUBLE	POSSIBLE CAUSE	REMEDY
Mechanical shift locked in one position	Damaged or improperly adjusted shift linkage	Adjust or repair shift linkage
	Fork loose on rail	Remove transfer case cover and check for loose fork on rail. Replace parts as required.
	Worn or damaged fork assy, including pin, roller and retainer assy	Remove transfer case cover and check for wear or damage. Replace damaged parts
	Worn or damaged shift cam, hub or collar	Disassemble and check for worn or damaged parts. Replace worn or damaged parts
	Worn or damaged gears	Disassemble and check for worn or damaged gears. Replace worn or damaged gears
No front wheel drive with control in four wheel drive	Broken drive chain	Disassemble, check all internal parts for damage, replace drive chain
Transfer case noise in all modes of operation. NOTE: Make sure noise is coming from transfer case and not clutch, transmission, drive shaft or other components	Improper or low transfer case lubricant	Add or drain and replace with proper lubricant (refer to paragraph 2–4
	Loose bolts or other attaching parts	Make sure all attaching parts are torqued to specifications
	Noisy transfer case bearings	Disassemble and check bearings and parts in and on which they operate for wear or damage. Replace worn or damaged parts
	Noisy gears	Disassemble and check for worn or damaged parts (including speedometer gear). Replace worn or damaged parts
Transfer case noise in 4WH or 4WL	Worn or damaged sprockets or drive chain	Disassemble and check for worn or damaged parts and replace as required
	Incorrect tire pressure	Inflate all tires to manual specifications

Table 2–2. Troubleshooting Chart (Cont)

TROUBLE	POSSIBLE CAUSE	REMEDY
Transfer case leakage	Cracked case	Replace case
	Leakage from other components	Verify transfer case leakage. Thoroughly clean, operate and check for leaks
	Breather clogged	Remove breather hose and breather and clean or replace
	Too much or improper lubricant	Remove fluid level plug to check for excess, or drain and replace
	Loose bolts at sealing faces	Torque bolts to specifications
	Improperly applied sealant	Replace and torque bolts to specifications
	Worn or damaged oil seal	Replace oil seal

2–10. REMOVAL AND INSTALLATION

2–11. REMOVAL OF TRANSFER CASE. Refer to the vehicle service manual for specific instructions regarding supports, skid plates, shift linkage, wiring harness, speedometer cable and other components related to the transfer case installation. These may need to be removed to provide access to the transfer case. A suitable hoist for the vehicle and a jack or stand for the transfer case will be required. The jack or stand must be capable of completely and independently supporting the transfer case. It also must be able to lower, raise and move the transfer case laterally. Proceed as follows (see figure 2–2):

a. Position vehicle over suitable hoist.

b. Shift transmission into park or neutral. Shift transfer case into 2H and shut off engine.

c. Disconnect negative battery terminal.

d. Lift vehicle.

e. Place drain pan under transfer case and remove transfer case drain and fluid level plugs (see figure 2–1). Drain all fluid from transfer case and re-install plugs.

f. Disconnect all electrical wiring and/or wiring harnesses from transfer case.

g. On mechanical shift units, disconnect shift linkage from transfer case shift shaft (103).

h. Disconnect speedometer cable from transfer case cover (26).

i. Disconnect breather hose from transfer case breather barb (82).

j. Disconnect front driveshaft from transfer case front slip yoke assembly (81) or yoke (5C).

k. Disconnect rear driveshaft from transfer case rear output companion flange (4) or yoke (5).

l. Support transfer case with suitable jack or stand.

CAUTION

Make sure transfer case is completely supported by jack or stand before removing bolts (201) attaching transfer case to transmission. Do not allow transfer case to hang" from transmission through splined shafts or damage may result.

m. Remove bolts (201) attaching transfer case to transmission adapter (202).

n. Move transfer case straight back to completely disengage spline of transfer case input shaft (94) from transmission.

o. Carefully lower transfer case on jack or stand.

p. Remove gasket (203) used between transmission and transfer case.

2–12. INSTALLATION OF TRANSFER CASE. Refer to the vehicle service manual for specific instructions regarding supports, skid plates, shift linkage, wiring harness, speedometer cable and other components which were removed to provide access to transfer case. With vehicle on hoist and transfer case on a suitable jack or stand, proceed as follows (see figure 2–2):

a. Apply thin coat of high temperature grease to spline of transmission output shaft.

b. Install new gasket (203) on mounting face of transfer case.

c. Raise transfer case on jack or stand and align with transmission.

CAUTION

Make sure transfer case is in exact alignment with transmission before engaging splines. Do not force transfer case onto transmission. Otherwise, damage may result. If necessary, turn rear output shaft of transfer case to align input shaft (94) spline with that on transmission.

d. Carefully move transfer case forward, engaging spline on transmission and dowel pin, until mounting face of transfer case adapter (88), gasket (203) and transmission adapter (202) are in contact.

NOTE

If transfer case adapter (88) or the complete transfer case assembly was replaced while the unit was off the vehicle, a bolt kit may be required to properly install the transfer case (refer to paragraph 4–16).

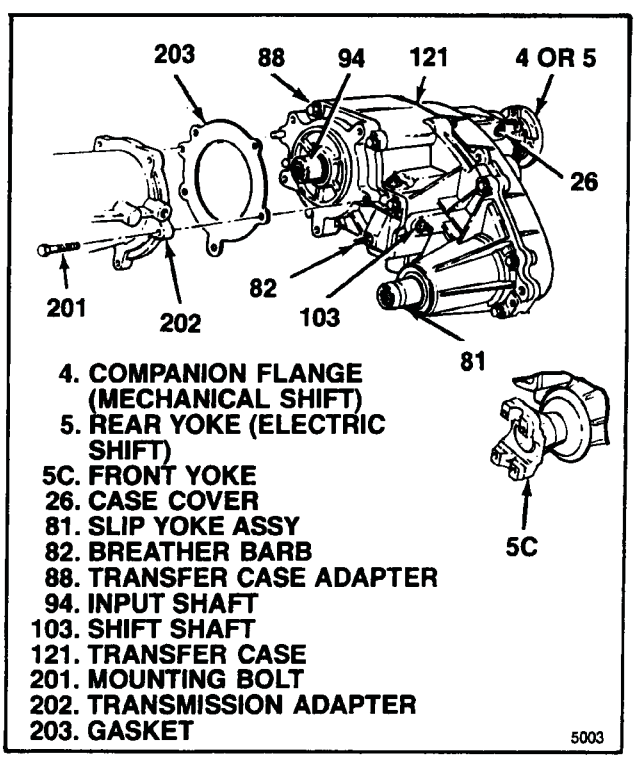


Figure 2–2. Transfer Case Installation

e. Make sure mounting holes in transfer case adapter (88), gasket (203) and transmission adapter (202) are aligned and install mounting bolts (201). Torque mounting bolts to 25-43 lb-ft (34-58 Nm).

f. Connect rear driveshaft to transfer case rear output companion flange (4) or yoke (5).

g. Connect front driveshaft to transfer case front output slip yoke assembly (81) or yoke (5C).

h. Connect breather hose to transfer case breather barb (82).

i. Connect speedometer cable at transfer case rear cover (26).

j. On mechanical shift units, connect shift linkage to transfer case shift shaft (103).

k. Connect all wiring and/or wiring harnesses to transfer case.

l. Fill transfer case with approved lubricant as described in paragraph 2–1.

CAUTION

Failure to fill transfer case to proper level with approved lubricant will result in damage when engine is started.

NOTE

Use of pump type filler may be necessary when filling transfer case installed on vehicle.

NOTE

If transfer case has been removed for repair or overhaul, there will be no lubricant in upper cavities served by transfer case pump. Lubricant level at fluid level plug opening will not be accurate until pump is operated and these cavities are filled. This can be done on hoist if wheels are free or by driving. Recheck lubricant level after operating pump.

m. After final check of lubricant level, lower vehicle and connect negative battery terminal.

Disassembly

3–1. GENERAL INFORMATION

3–2. During disassembly, refer to the illustrations provided with the text. In addition, an exploded view of the complete assembly can be seen in Section P, Parts.

3–3. This section provides instructions for complete disassembly of the transfer case as would be required for overhaul. If the transfer case is not due for overhaul, and repair affecting specific parts is required, disassemble only to the extent necessary to gain access to these parts. Parts removed from the transfer case as subassemblies or groups need not be disassembled for repair unless they contain the affected parts.

3–4. REMOVAL AND INSTALLATION OF TRANSFER CASE

3–5. Refer to paragraph 2-10.

3–6. TRANSFER CASE DISASSEMBLY

3–7. REMOVAL OF COMPANION FLANGE OR YOKE GROUP. Position transfer case on work bench with rear or cover side up. Use wooden blocks under front to keep assembly level. Proceed as follows (see figure 3–1):

a. Hold companion flange (4) or yoke (5) with torque bar T-13-50-002 and remove nut (1) and washer (2). Pull companion flange (4) or yoke (5) and remove oil seal (3).

b. If front yoke is used, remove nut (1A), washer (2A), oil seal (3A) and yoke assembly (5A) in the same manner as step a. Press deflector (5B) from yoke (5C) only if replacement is required.

c. If installed, remove two plugs (6).

3–8. REMOVAL OF EXTERNAL ELECTRIC SHIFT COMPONENTS (ELECTRIC SHIFT TRANSFER CASE ONLY) (see figure 3–2). On electric shift units, remove components as follows:

a. Remove bolt (7), washer (8), three bolts (9), bracket (10) and two bolts (11).

b. Remove wiring harness bracket (12) and speed sensor (13). Remove o-ring (14) from speed sensor.

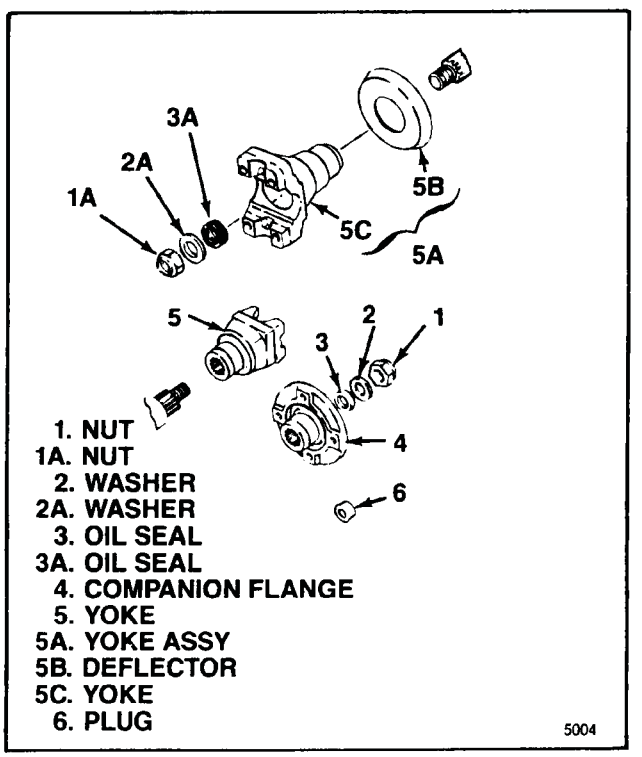


Figure 3–1. Companion Flange or Yoke Group

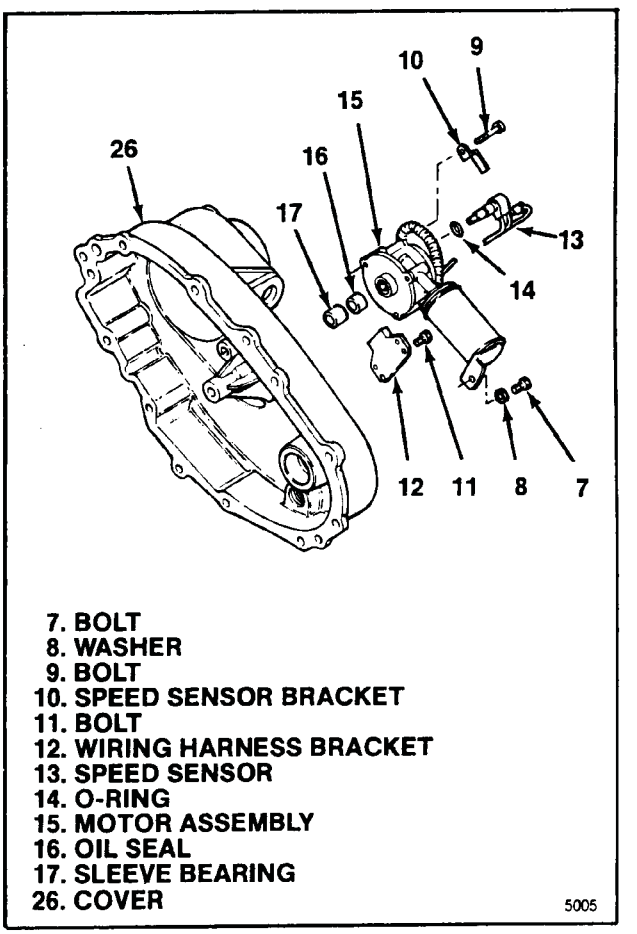


Figure 3–2. External Electric Shift Components

c. Remove motor assembly (15), oil seal (16) and sleeve bearing (17).

3–9. REMOVAL OF COVER. Proceed as follows (see figure 3–3):

a. Remove nine bolts (19). This will free wiring harness clip (20) and identification tag (21). Use care not to lose identification tag. It contains information required for ordering replacement parts.

b. Pry at the bosses provided on the cover (26) and transfer case (121) to break the sealant bond loose. Then, lift the cover assembly (22) straight up to remove.

c. Remove snap ring (23) and pull ball bearing (24) from cover (26). This will free speedo gear (28).

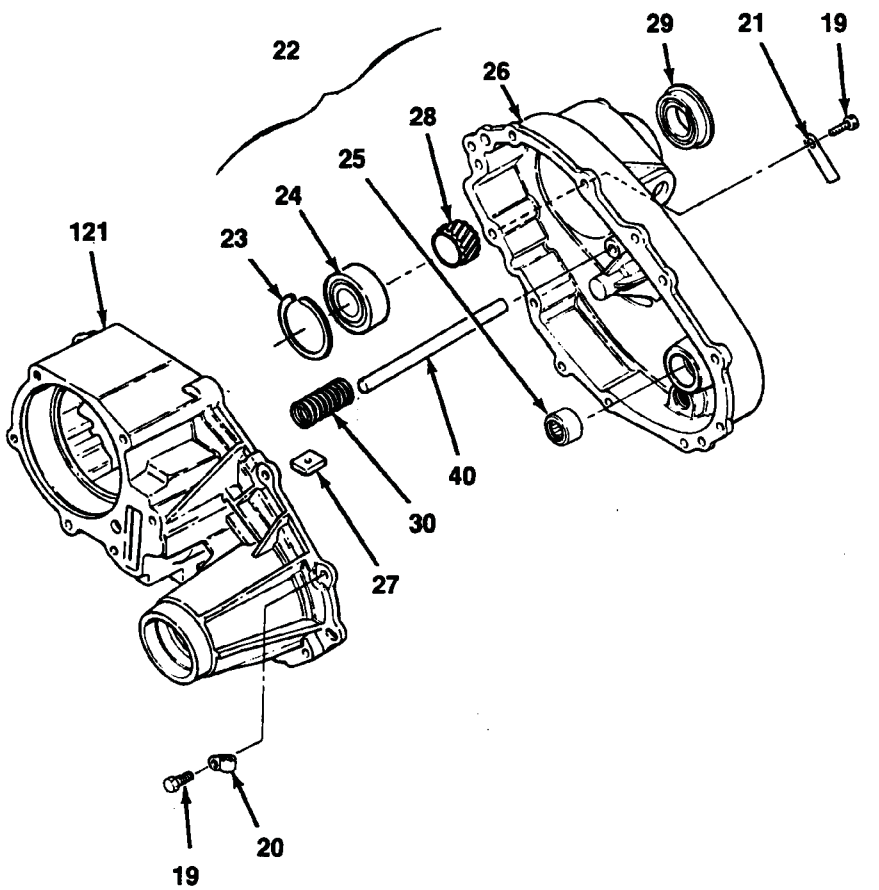
d. Pull needle bearing (25) from cover (26).

e. Pull oil seal (29) from cover (26).

g. Remove magnet (27) from slot in case (121).

h. Remove return spring (30) from rail shaft (40)

i. Scrape and clean sealant from mating faces of cover (26) and transfer case (121). Use care not to damage metal faces or allow scrapings to fall into transfer case



19. BOLT
20. WIRING CLIP
21. IDENTIFICATION TAG
22. COVER ASSY
23. SNAP RING
24. BALL BEARING
25. NEEDLE BEARING
26. COVER
27. MAGNET
28. SPEEDO GEAR
29. OIL SEAL
30. RETURN SPRING
40. RAIL SHAFT
121. TRANSFER CASE

5006

Figure 3–3. Cover Assembly

3–10. REMOVAL OF ELECTRIC CLUTCH COMPONENTS (ELECTRIC SHIFT TRANSFER CASE ONLY) (see figure 3–4). On electric shift units, remove components as follows:

a. Remove three nuts (18) attaching clutch coil assembly inside cover (26).

b. Remove clutch coil assembly (31).

c. Remove retaining ring (32) and slide clutch housing from shift collar hub (34).

3–11. REMOVAL OF LOCKUP SHIFT PARTS. From remaining transfer case assembly (34 through 121), remove the following (see figure 3–5) for mechanical shift; figure 3–6 for electric shift);

a. Remove shift collar hub (34) from output shaft (62).

b. Together, slide 2W-4W lockup assembly (35) and 2W-4W shift fork assembly (42) or lockup fork 90A from output shaft (62) and rail shaft (40). Separate assemblies, remove rail shaft (40) and remove two fork facings (41) from fork assembly (42).

c. To disassemble 2W-4W lockup assembly, remove snap ring (36), lockup hub (37) and return spring (38) from lockup collar (39).

d. One-piece, plastic lockup fork (40A) cannot be disassembled. Disassemble earlier fork assembly with metal fork only if parts replacement is required:

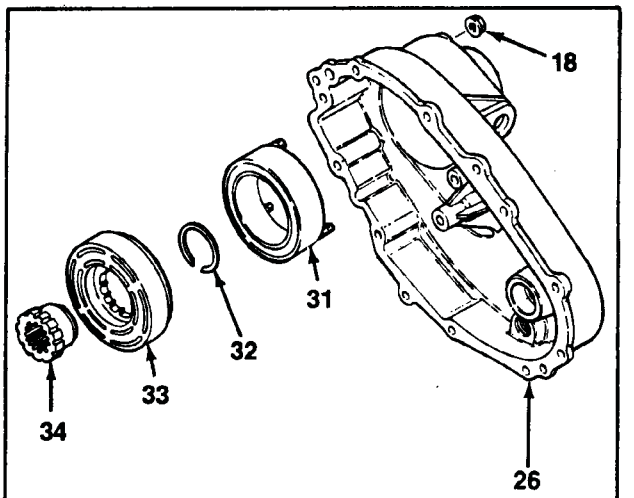


Figure 3–4. Electric Clutch Components

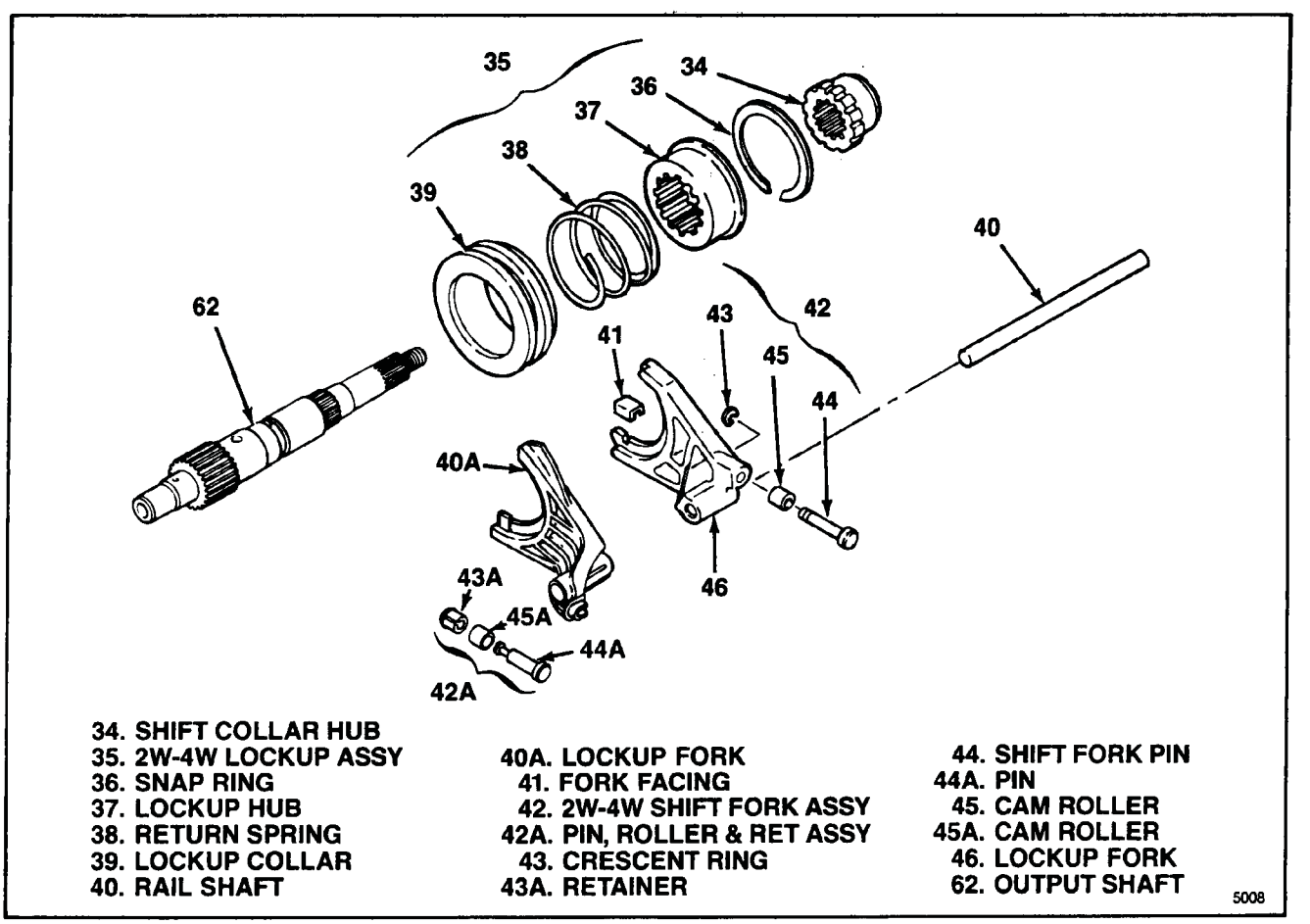


Figure 3–5. Lockup Shift Parts (Mechanical Shift)

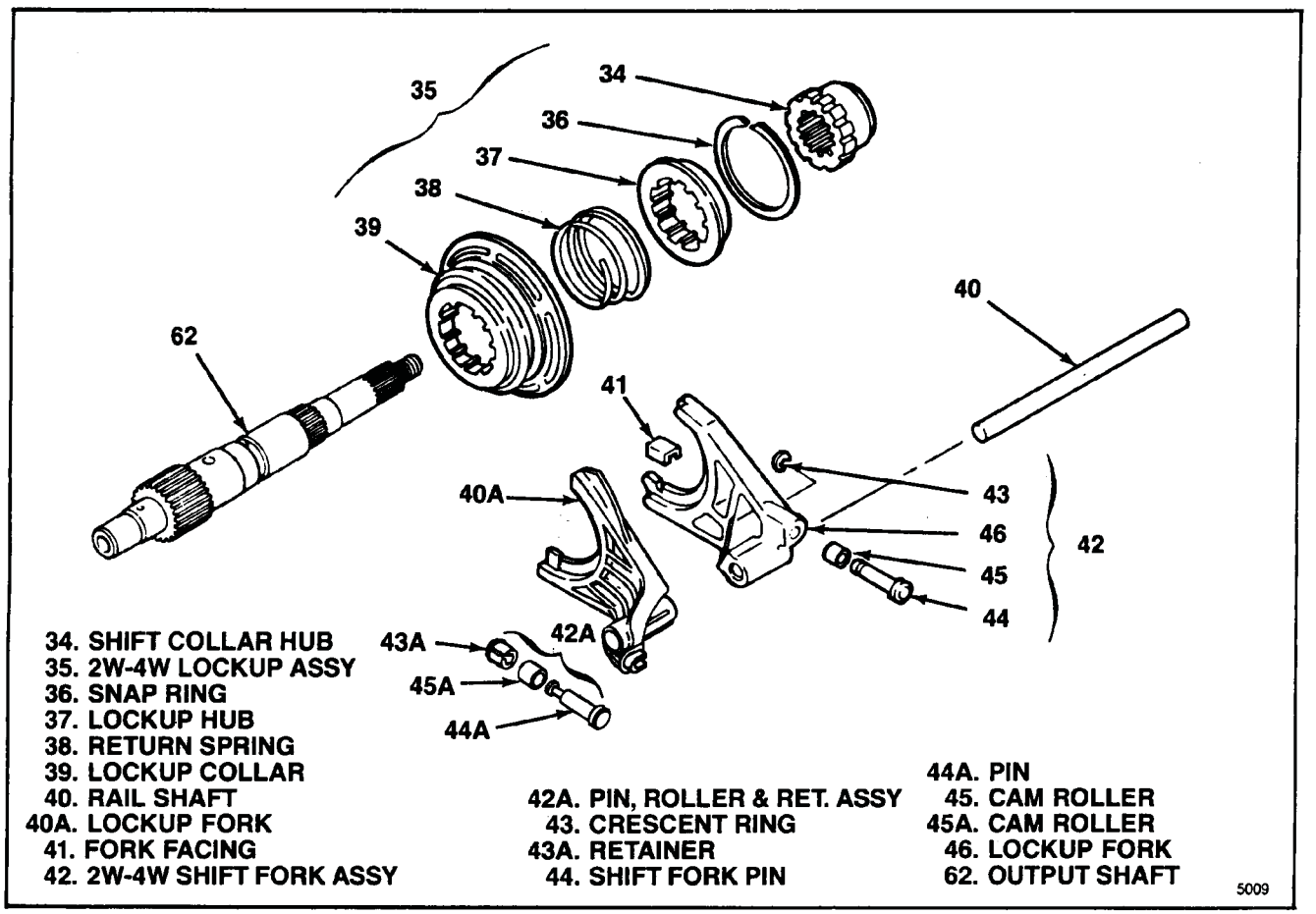


Figure 3–6. Lockup Shift Parts (Electric Shift)

1. If fork assembly (42) has metal crescent ring (43), remove this freeing shift fork pin (44) and cam roller (45).

2. If fork assembly (42) has plastic retainer (43A), cut retainer to remove, freeing pin (44A) and cam roller (45A).

3–12. REMOVAL OF CHAIN DRIVE. From remaining transfer case assembly (47 through 121), remove the following (see figure 3–7):

a. Remove snap ring (47) and spacer (48) from output shaft (80).

b. Together, slide drive sprocket (49), driven sprocket (50) and drive chain (51) from output shafts (62 and 80). Separate sprockets and chain when out of assembly.

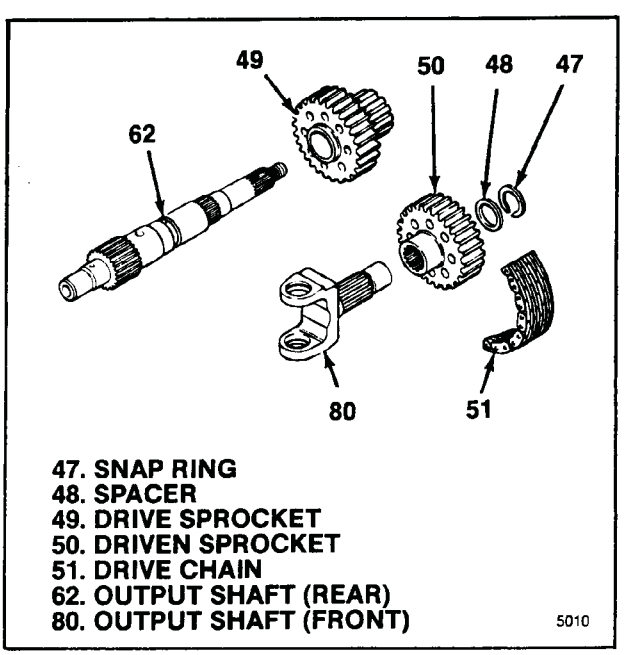


Figure 3–7. Chain Drive

3–13. REMOVAL OF OIL PUMP PARTS. From remaining transfer case assembly (52 through 121) remove the following (see figure 3–8):

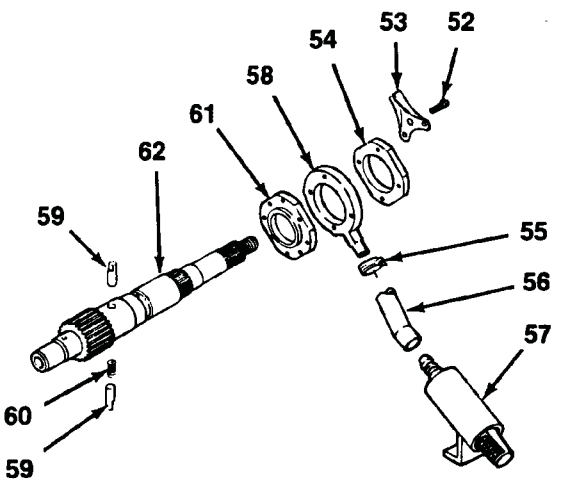
a. Remove four bolts (52) and retainer (53). Slide rear pump cover (54) off output shaft (62).

b. Loosen hose clamp (55) and separate hose coupling (56) from pump housing (58). Slide pump housing off output shaft (62).

c. Remove hose clamp (55), hose coupling (56) and strainer (57).

d. Remove two pump pins (59) and spring (60) from output shaft (62).

e. Slide front pump cover (61) off output shaft (62).



52. BOLT
53. PUMP RETAINER
54. REAR PUMP COVER
55. HOSE CLAMP
56. HOSE COUPLING
57. STRAINER
58. PUMP HOUSING
59. PUMP PIN
60. SPRING
61. FRONT PUMP COVER
62. OUTPUT SHAFT

5011

Figure 3–8. Pump Parts

3–14. REMOVAL OF REDUCTION SHIFT PARTS. From remaining transfer case assembly (62 through 121), remove the following (see figure 3–9):

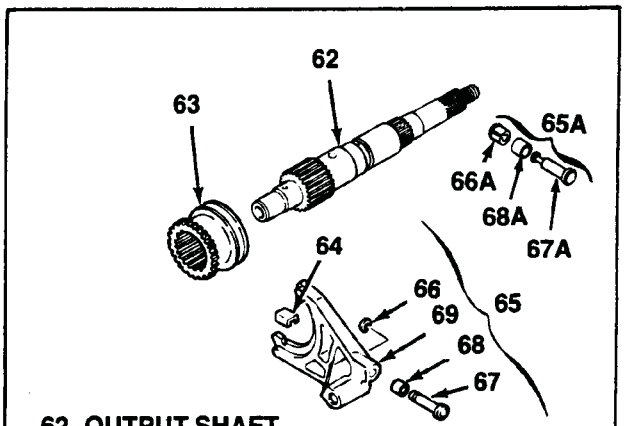
a. Remove output shaft (62), reduction hub (63) and reduction shift fork assembly (65) from transfer case.

b. Remove two facings (64) from shift fork assembly (65).

c. Disassemble fork assembly (65) only if parts replacement is required:

1. If fork assembly (65) has metal crescent ring (66), remove this freeing pin (67) and cam roller (68).

2. If fork assembly (65) has plastic retainer (66A), cut retainer to remove, freeing pin (67A) and cam roller (68A).



62. OUTPUT SHAFT
63. REDUCTION HUB
64. SHIFT FORK FACING
65. REDUCTION SHIFT FORK ASSY
65A. PIN, ROLLER & RETAINER ASSY
66. CRESCENT RING
66A. RETAINER
67. SHIFT FOR PIN
67A. PIN
68. CAM ROLLER
68A. CAM ROLLER
69. REDUCTION SHIFT FORK

5012

Figure 3–9. Reduction Shift Parts

3–15. REMOVAL OF FRONT OUTPUT SHAFT GROUP. From remaining transfer case assembly (70 through 121), remove the following (see figure 3–10):

a. Remove snap ring (70) and retaining clip (71).

b. Remove bearing retainer assembly (72) and joint assembly (76 or 76A) from transfer case (121).

c. Remove snap ring (73) and pull bearing (74) from bearing retainer (75).

e. Remove four retaining rings (77) and pull four bearings (78).

f. Separate spider (79), front driven shaft (80) and slip yoke assembly (81) or front output shaft (81A).

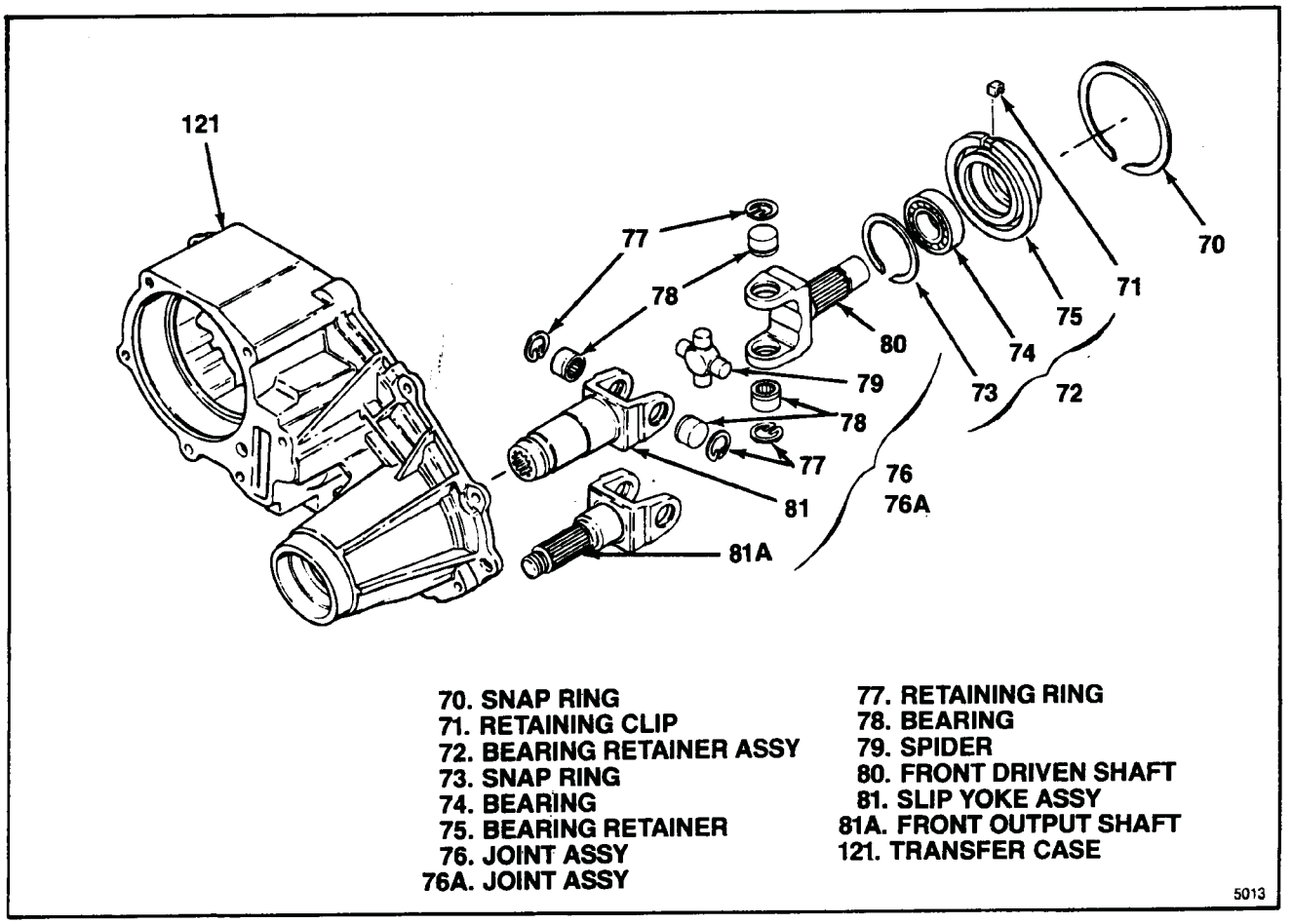


Figure 3–10. Front Output Shaft Group

3–16. REMOVAL OF ADAPTER, INPUT SHAFT AND GEAR CARRIER GROUP. From remaining transfer case assembly (82 through 121), remove the following (see figure 3–11):

a. Remove breather barb (82).

b. Remove six bolts (83). Carefully pry front adapter (84) up to break sealant bond with transfer case (121). Use care not to damage adapter or case.

c. Remove adapter assembly (84), input shaft assembly (91) and gear carrier assembly (96) as an assembled group.

d. Holding end of input shaft (94) on workbench, press down on adapter while expanding long ends of snap ring (85). This will free adapter assembly (84) from remainder of group (89 through 100).

e. Remove snap ring (85) and pull oil seal (86) from front adapter (88). Remove pin (87) only if replacement is required.

f. Remove snap ring (89). Pull bearing (90) and thrust washer (95) from end of input shaft assembly (91). Remove input shaft assembly from gear carrier assembly (96).

g. To disassemble input shaft assembly, pull sleeve bearing (92) and needle bearing (93) from input shaft (94).

h. Remove retaining ring (97), thrust plate (98) and sun gear (99) from planet carrier assembly (100).

i. Do not attempt to disassemble planet carrier assembly (100).

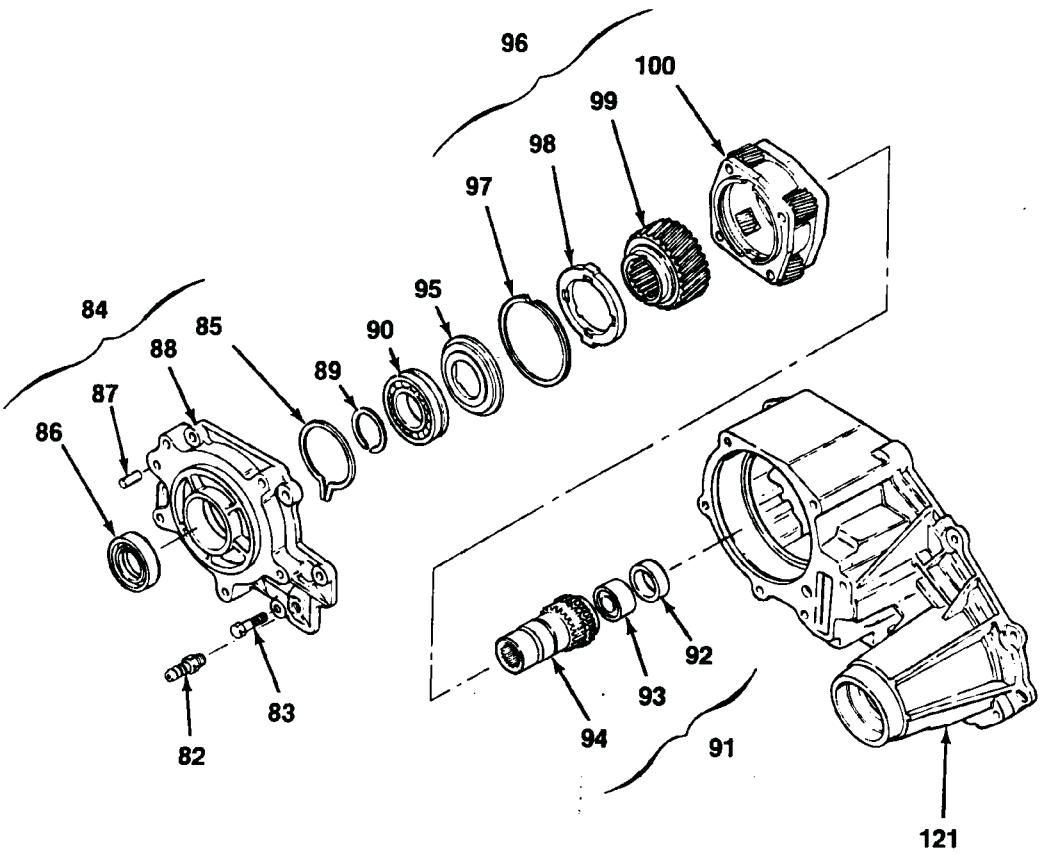


Figure 3–11. Adapter, Input Shaft and Gear Carrier Group

3–17. REMOVAL OF SHIFT CAM PARTS (MECHANICAL SHIFT TRANSFER CASE ONLY). On mechanical shift units, remove the following (see figure 3–12):

a. Remove two screws (101), one from transfer case (121) and one from shift cam (107).

b. Remove klip ring (102) and shift shaft (103). Poppet (108) and spring (109) may pop out as shift shaft is removed. Use care not to loose these parts. Remove o-ring (104) from shift shaft.

c. Remove 4L assist spring (105) and roller (106).

d. Remove shift cam (107), poppet (108) and spring (109) from transfer case (121).

e. Remove 4WD indicator switch (114) from transfer case (121).

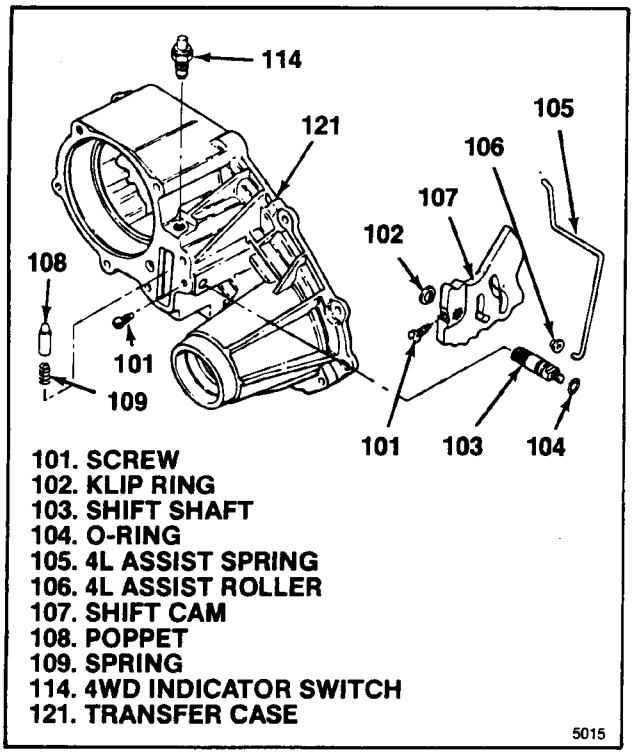


Figure 3–12. Mechanical Shift Cam Parts

3–18. REMOVAL OF SHIFT CAM PARTS (ELECTRIC SHIFT TRANSFER CASE ONLY). On electric shift units, remove the following (see figure 3–13):

a. Remove electric shift cam group (110 through 113) from transfer case as an assembly.

b. Slide electric shift cam (110) off shift shaft (113).

c. Clamp retainer end of shift shaft (113) in soft-jawed vise. Keeping fingers away from spring ends, pry torsion spring (111) out of engagement with shaft drive tang using a screwdriver. Remove torsion spring and spacer from shift shaft.

3–19. DISASSEMBLY OF TRANSFER CASE ASSEMBLY. Disassemble as follows (see figure 3–14):

a. Pull oil seal (116).

b. Remove retaining ring (117) and pull ball bearing (118).

c. Remove dowel pins (119) from transfer case (121) only if they are loose or damaged.

d. Press ring gear (120) out of transfer case (121) only if ring gear must be replaced.

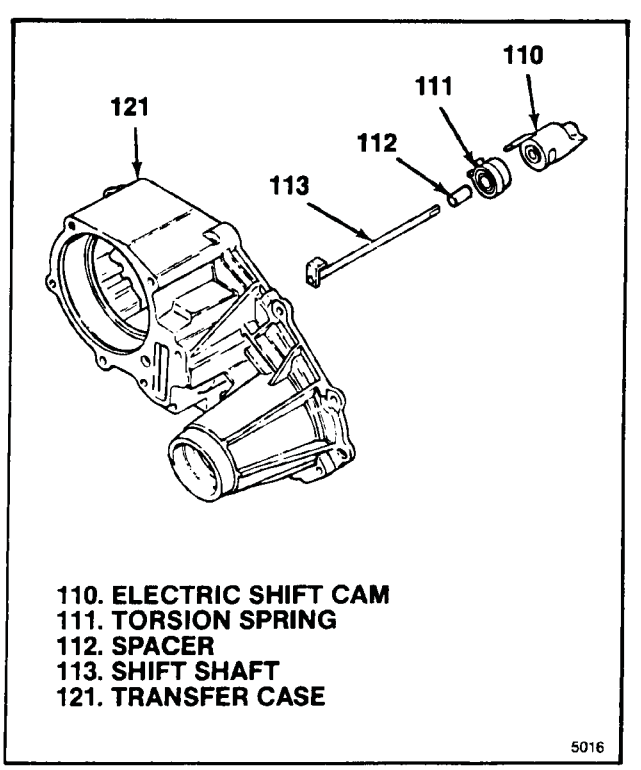


Figure 3–13. Electric Shift Cam Parts

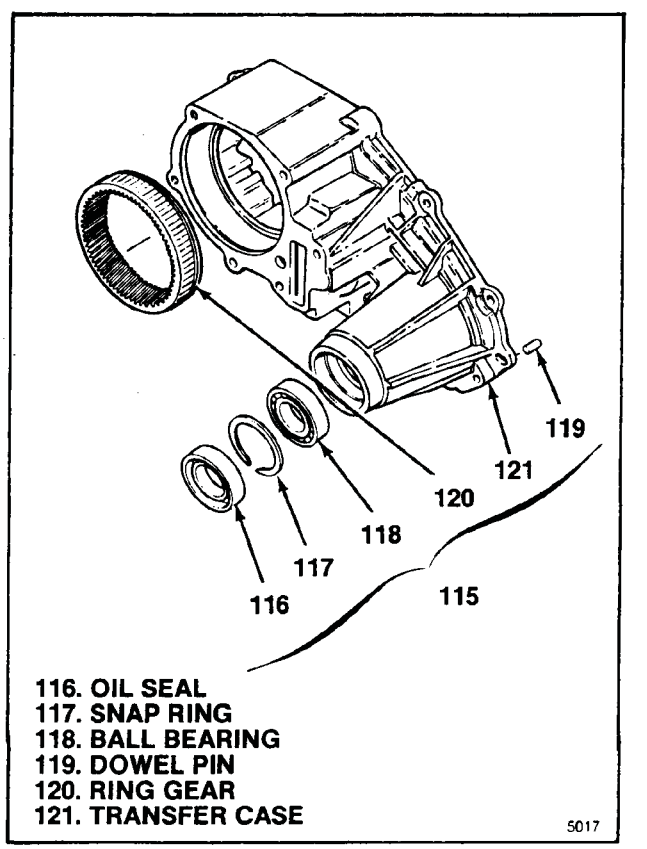


Figure 3–14. Transfer Case Assembly

Assembly

5–1. GENERAL INFORMATION

5–2. During assembly, refer to the illustrations specified in the text. In addition, an exploded view of the complete assembly can be viewed on the applicable illustration in Section P, Parts. The exploded view illustrations are listed at the beginning of Section P. Note the following during assembly:

a. When a torque value is specified, use a torque wrench to tighten the threaded part. Torque values are specified in the text and also in Table 5–1 at the end of this section.

b. Liberally coat small parts with petrolatum to help hold them in place during assembly.

c. Press in oil seals and bearings using universal drift T- 13-50-001. Do not use a hammer to drive in oil seals and bearings.

5–3. LUBRICATION DURING ASSEMBLY. Lubricate all internal parts, not coated with petrolatum, with approved transfer case lubricant (refer to paragraph 2–4) just prior to assembly. This will ease assembly and provide initial lubrication.

a. O-rings or shaft seals may be damaged if not lubricated prior to assembly.

b. Make sure bearings and bushings are thoroughly lubricated before assembly. Running bearings or bushings dry, even for a brief period, will cause damage.

c. Lubricate sealing lips of oil seals and mating metal parts prior to assembly together.

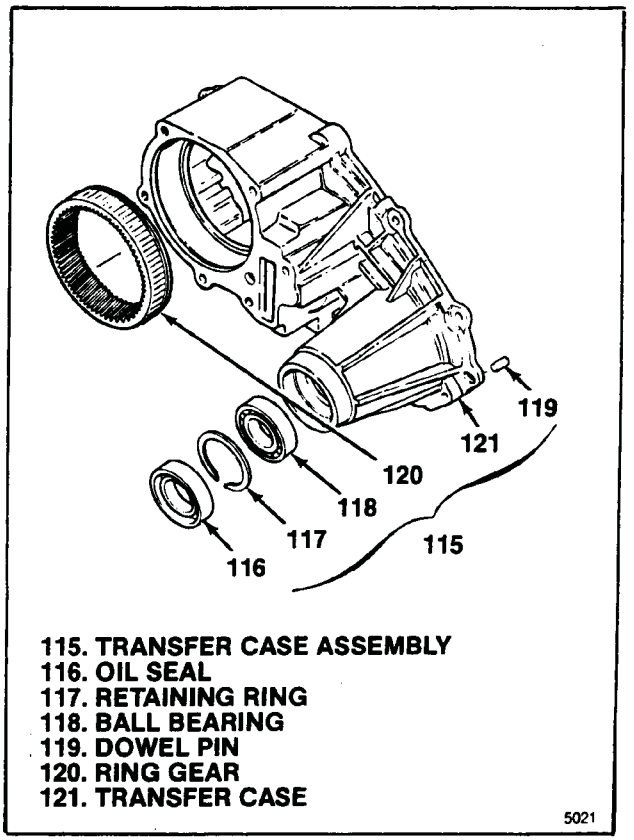


Figure 5–1. Transfer Case Assembly

5–4. ASSEMBLY OF TRANSFER CASE

5–5. ASSEMBLY OF CASE ASSEMBLY. Assemble parts which were removed from transfer case as follows (see figure 5–1):

a. If ring gear (120) was removed for replacement, align serrations on OD of new ring gear with those in transfer case (121). Press in ring gear, chamfered end first, to dimension shown in figure 5–2. Make sure gear is not cocked and is firmly seated in case.

b. If removed, press two new dowel pins (119) into case to dimension shown in figure 5–2.

c. Press in ball bearing (118) to bottom in transfer case (121) and install retaining ring (117).

d. Position new oil seal (116) as shown in figure 5–2 and press in to seat seal flange against transfer case (121).

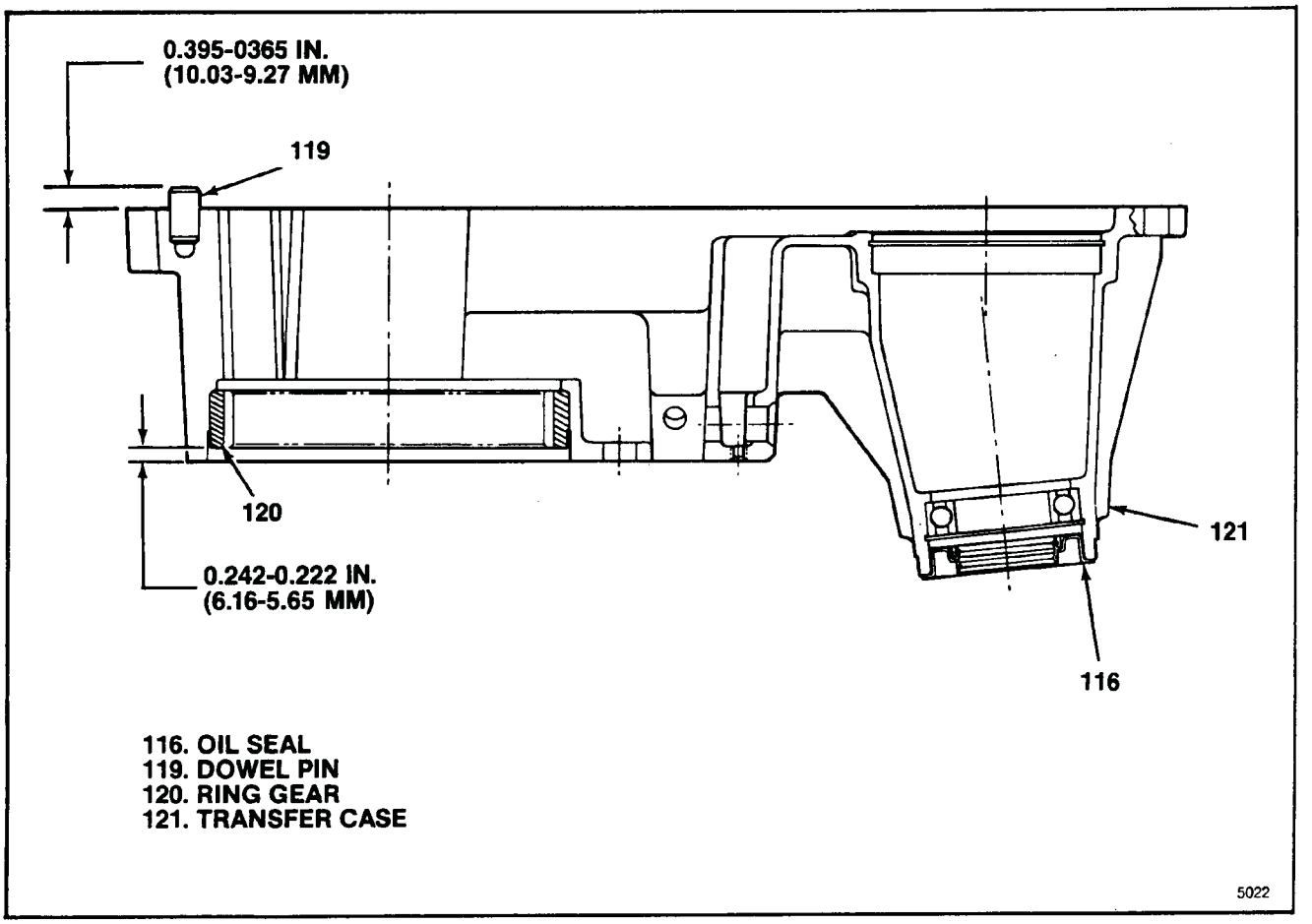


Figure 5–2. Installing Parts in Transfer Case

5–6. ASSEMBLY OF SHIFT CAM PARTS (ELECTRIC SHIFT TRANSFER CASE ONLY). On electric shift units, assemble the following (see figure 5–3):

a. Insert spacer (112) in torsion spring (111) ID and install over free end of shift shaft (113).

b. Slide torsion spring (111) and spacer (112) on shift shaft (113) up to drive tang and position first spring end to left (viewed from free end of shaft) of drive tang (see figure 5–4).

c. Twist second spring (111) end to right of drive tang on shift shaft (113) (see figure 5–5).

d. Push torsion spring (111) and spacer (112) together back as far as they will go (see figure 5–6).

e. Slide electric shift cam (110) onto shift shaft (113), drive tang on cam first. Position drive tang on cam so that it will go under drive tang on shift shaft and between spring ends and slide cam as far as it will go.

f. Defer installation of completed electric shift cam assembly (110 through 113) in transfer case assembly until after shift forks are installed (paragraph 5–13).

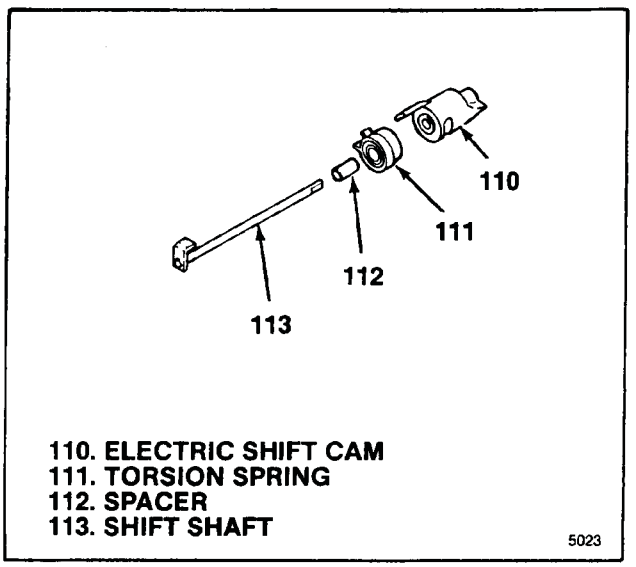


Figure 5–3. Electric Shift Cam Parts

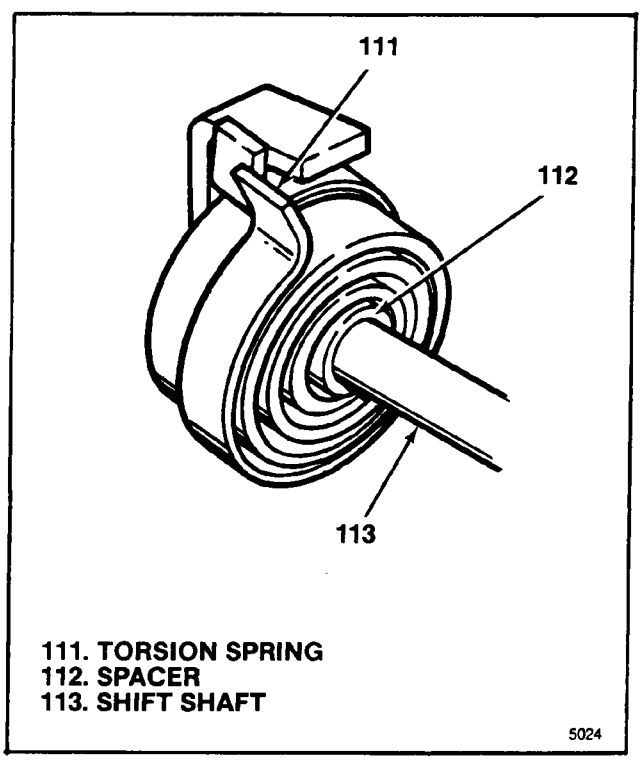


Figure 5–4. Installing First Spring End

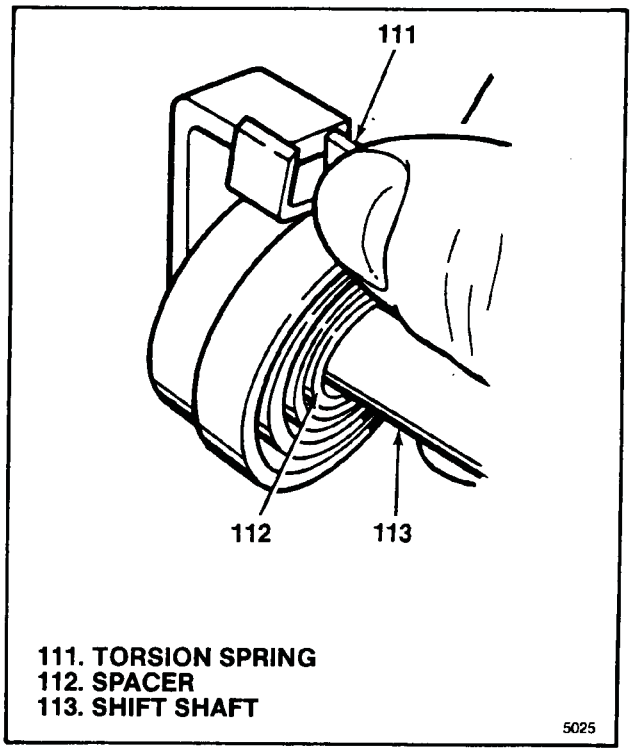


Figure 5–5. Installing Second Spring End

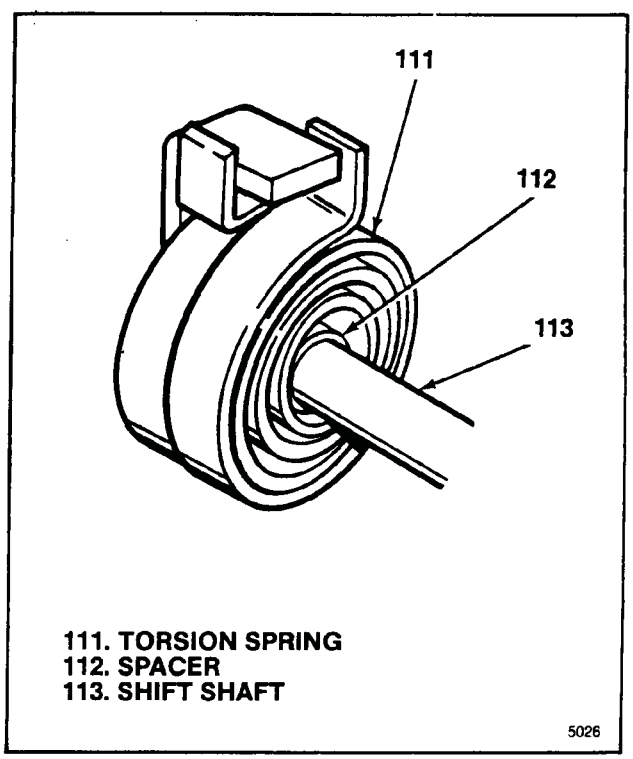


Figure 5–6. Completing Spring Assembly

5–7. ASSEMBLY OF SHIFT CAM PARTS (MECHANICAL SHIFT TRANSFER CASE ONLY). On mechanical shift units, install parts as follows (see figure 5–7):

a. Lubricate o-ring (104) and install on shift shaft (103). Start splined end of shift shaft into transfer case (121) until end is flush with inside of case. Position flats on outside end of shaft as shown in figure 5–7.

b. Apply petrolatum to spring (109) and poppet (108) and position these parts in hole in transfer case (121). Using care not to unseat poppet, insert shift cam (107) into transfer case in position shown in figure 5–7, with flat end of cam approximately parallel with front face of case. Pressing cam against poppet and compressing spring, align splines in cam and on shaft (103) and press shaft fully into cam.

c. Install klip ring (102) in groove near inside end of shift shaft (103).

d. Install two screws (101), one in end of shift cam (107) and one in transfer case. Torque screws to 4-7 lb-ft (6.8-9.5 Nm). Make sure that shift shaft (103) is fully engaged so that second screw end enters groove in shaft.

g. Install assist roller (106) on end of assist spring (105) and install in groove in shift cam (107) closest to shift shaft (103). Install other end of spring in hole in transfer case (121).

h. Install 4WD indicator switch (114) and torque to 25-35 lb-ft (34-47 Nm)

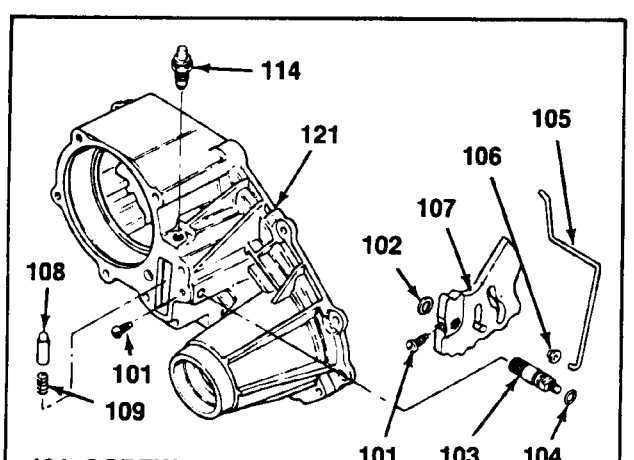


Figure 5–7. Mechanical Shift Cam Parts

5–8. ASSEMBLY OF ADAPTER, INPUT SHAFT AND CARRIER GROUP. On work bench, assemble parts as follows (see figure 5–8):

a. Lay planet carrier assembly (100) on work bench with end having groove for snap ring (97) up.

b. Install sun gear (99) with hub end up. Rotate gears of planet carrier assembly (100) as required until sun gear is fully meshed.

c. Align tabs and install thrust plate (98) into planet carrier assembly (100)

d. Install retaining ring (97) to complete gear carrier assembly (96).

e. If removed, position needle bearing (93) as shown in figure 5–9 and press into input shaft (94) to dimension shown. Press in new sleeve bearing (92) to dimension shown in figure 5–9 to complete input shaft assembly (91).

f. Lift up gear carrier assembly (96) and install input shaft assembly (91) up through gear carrier assembly. Install thrust washer (95) and press bearing (90) over end of input shaft assembly. Retain bearing on input shaft with retaining ring (89) in shaft groove.

g. If removed, press new pin (87) into front adapter (88) to dimension shown in figure 5–10.

h. Apply Loctite 609 to bore area in front adapter (88) where oil seal (86) is to be installed (see figure 5–10). Position oil seal as shown in figure 5–10 and press into front adapter to dimension shown.

i. Install snap ring (85) in groove in front adapter (88) with long ends of snap ring in adapter groove to complete front adapter assembly (84).

j. Position front adapter assembly (84) with face that mates with transfer case (121) up. Support on wood blocks to provide clearance for input shaft assembly (91). Position assembled input shaft and carrier group (89 through 100) over front adapter with input shaft (94) down. Lower shaft and carrier group while expanding long ends of snap ring (85) until snap ring engages groove in OD of bearing (90).

k. Apply continuous 1/16 in. (1.6 mm) bead of sealant (Neutral Cure RTV, Loctite 598) all around transfer case (121) mounting face for front adapter (88). Center sealant bead between edges of face. Circle bolt holes.

l. Install assembled adapter, input shaft and carrier group (85 through 100) on transfer case (121) and attach with six bolts (83). Torque bolts to 20-34 lb-ft (27-46 Nm).

m. Install breather barb (82) and torque to 6-14 lb-ft (8-19 Nm).

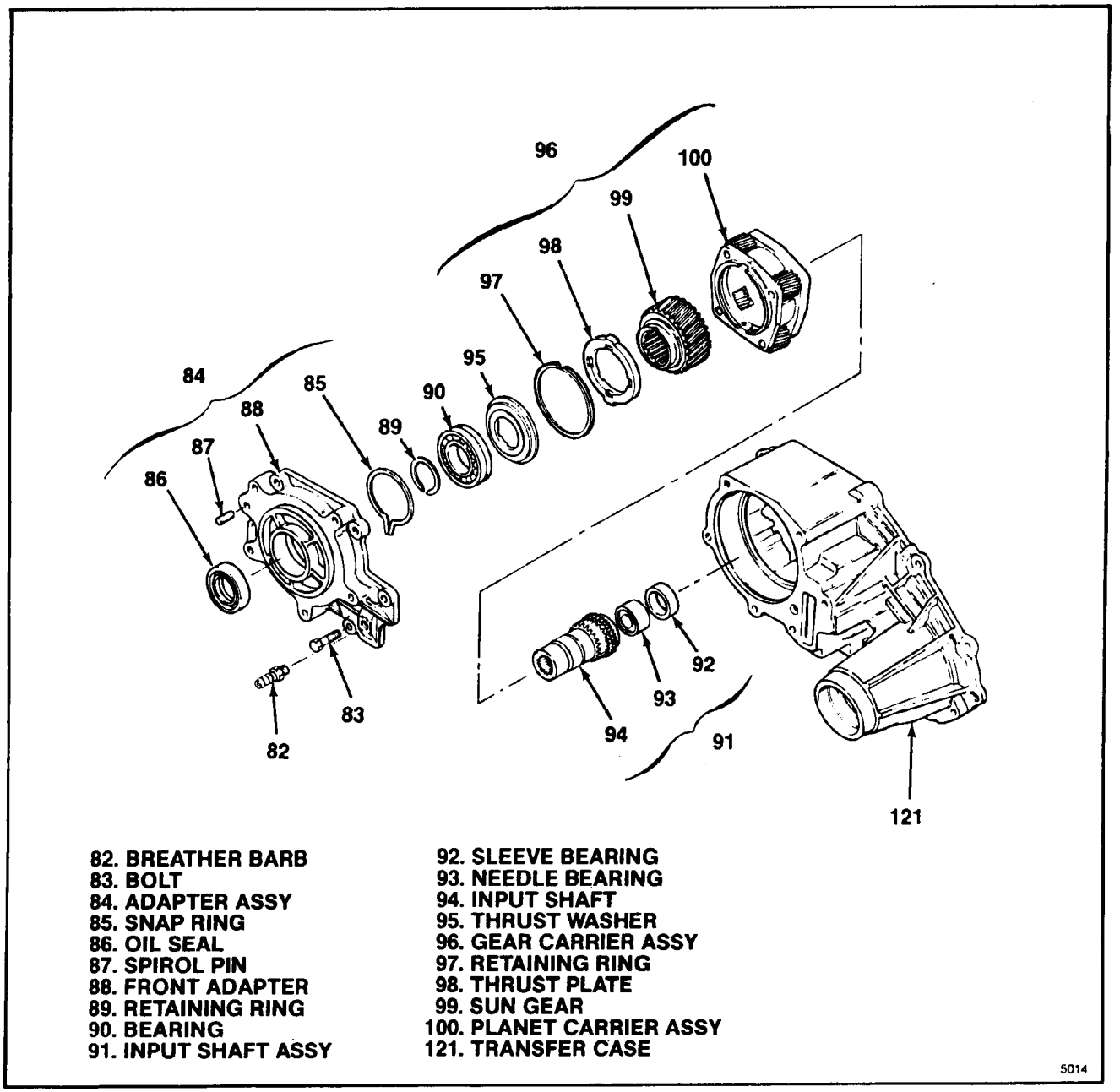


Figure 5–8. Adapter, Input Shaft and Gear Carrier Group

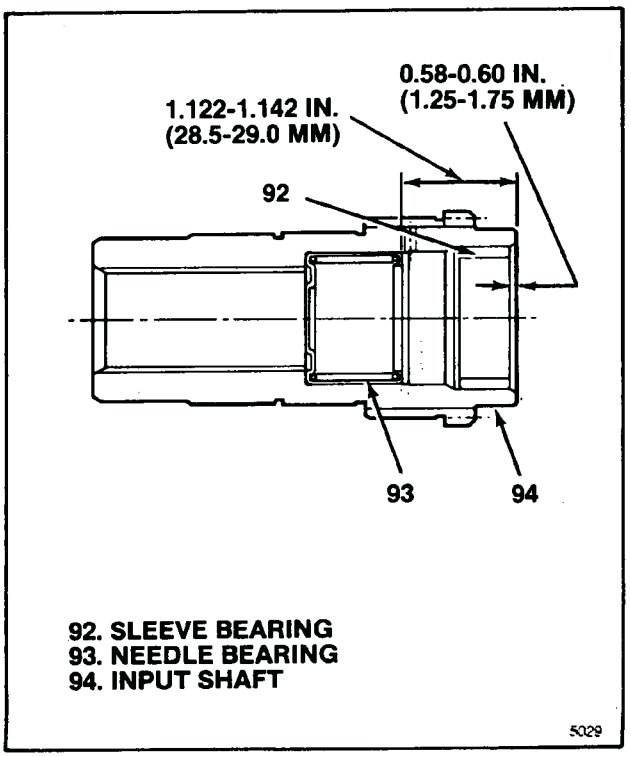


Figure 5–9. Input Shaft Assembly

5–9. INSTALLING FRONT OUTPUT SHAFT GROUP. To assembly as completed thus far (82 through 121), install parts as follows (see figure 5–11):

a. Engage two opposite journals of spider (79) with bearing holes in slip yoke assembly (81) or output shaft (81A). One at a time, press in two bearings (78) until closed ends are just beyond retaining ring grooves in slip yoke assembly. Install two retaining rings (77).

b. Engage remaining journals on spider (79) with bearing holes in front driven shaft (80). Install two bearings (78) and retaining rings (77) as described in step a above to complete joint assembly (76 or 76A)

c. Press in bearing (74) to bottom in bearing retainer (75). Install snap ring (73) to complete bearing retainer assembly (72).

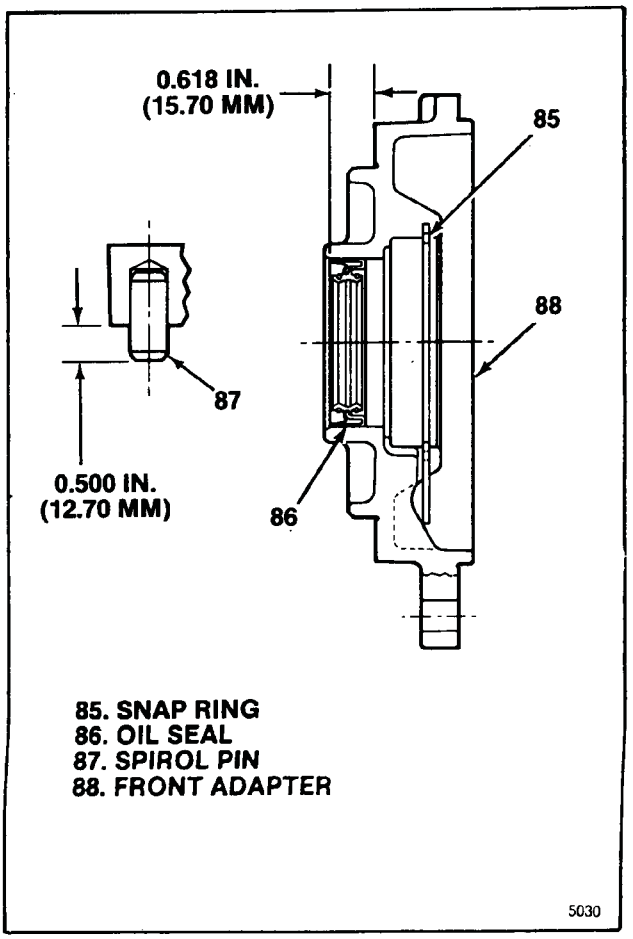


Figure 5–10. Front Adapter Assembly

d. Lubricate OD of slip yoke assembly (81) or front output shaft (81A) and install joint assembly (76 or 76A) through bearing and oil seal in transfer case (121).

e. Install retaining clip (71) on bearing retainer assembly (72), engaging clip in slots provided in retainer. Install bearing retainer assembly over front output shaft (80) in transfer case (121), engaging clip (71) in case slot. Tap bearing retainer with plastic mallet to seat if necessary.

f. Install snap ring (70).

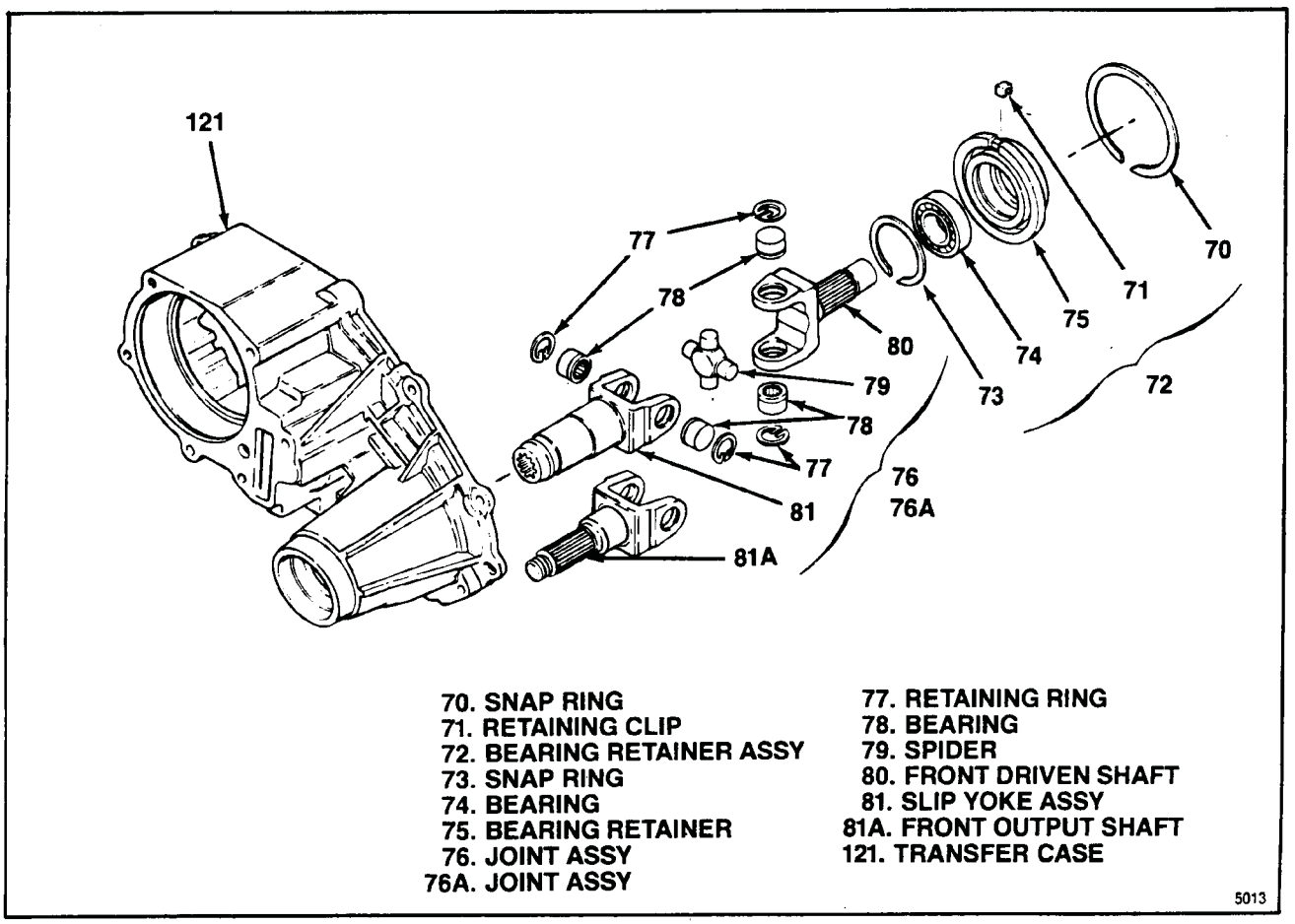


Figure 5–11. Front Output Shaft Group

5–10. ASSEMBLY OF REDUCTION SHIFT PARTS. Assemble and install parts as follows (see figure 5–12):

a. If disassembled for parts replacement, assemble reduction shift fork assembly (65) using new pin, roller and retainer assembly (65A). Press pin, roller and retainer assembly into bore in reduction shift fork (69) until retainer (66A) passes completely through and snaps in place. Make sure that cam roller (68A) turns freely.

b. Install two fork facings (64) on reduction shift fork assembly (65).

c. Engage reduction shift fork assembly (65) with reduction hub (63) and position in transfer case, reduction hub in gear carrier assembly previously installed. On mechanical shift units only, engage cam roller (68 or 68A) in cam slot in shift cam previously installed.

d. Install output shaft (62), engaging output shaft end with input shaft bearings and output shaft spline with reduction hub.

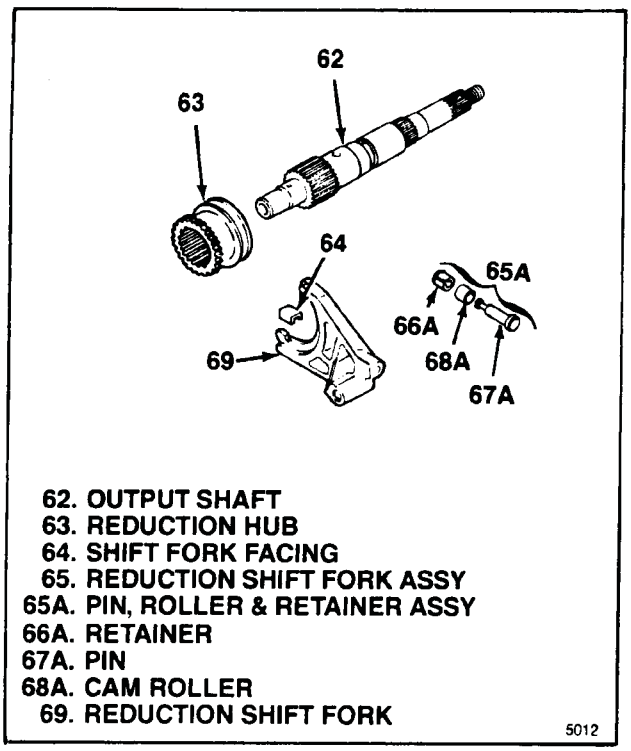


Figure 5–12. Reduction Shift Parts

NOTE

Installation of output shaft (62) way be deferred and oil pump assembled to output shaft (paragraph 5–11) on work bench. Bench assembled, pump can be tested by immersing filter in transmission oil (Table 2-2) and rotating shaft in counterclockwise direction when viewed from output end. Assembled parts then can be installed in transfer case as a unit.

5–11. INSTALLING OIL PUMP. Be sure to thoroughly lubricate pump parts as they are assembled but keep oil out of tapped holes in pump front cover. To assembly as completed thus far (62 through 121) assemble parts as follows (see figure 5–13):

a. Locate pump front cover (61). Front pump cover has tapped holes. Position front cover so that word TOP faces down and turned so that it will be at top of transfer case when installed in vehicle. Install front pump cover (61) over output shaft (62) in this position.

b. Install two pump pins (59) with spring (60) between them in output shaft (62). Flat surface on both pins must point out and face up. Center pins and spring in output shaft.

c. Push hose coupling (56) onto barb on strainer (57) and install L shaped foot on filter in slot in transfer case. Hose coupling must point in direction of pump assembly.

d. Install pump housing (58) so that word REAR marked on it is up and hose barb points toward hose coupling (56) and strainer (57). Lower pump housing over upper output shaft, moving pump pins (59) inward and compressing spring (60) so that both pins are contained inside pump housing.

e. Slip hose clamp (55) over free end of hose coupling (56) and push onto hose barb on pump housing (58). Secure hose clamp over hose coupling on hose barb.

f. Position pump rear cover (54) over assembly with words TOP REAR facing up and located to be at top of transfer case when installed. Position pump retainer (53) on cover so that tab on retainer is in notch in transfer case. Clean threads on four bolts (52) and apply Loctite 222. Align pump holes and install bolts. Torque bolts to 2.9-6.3 lb-ft (4.0-8.5 Nm) while turning upper output shaft (43) by hand to insure that pump pins (59) move freely.

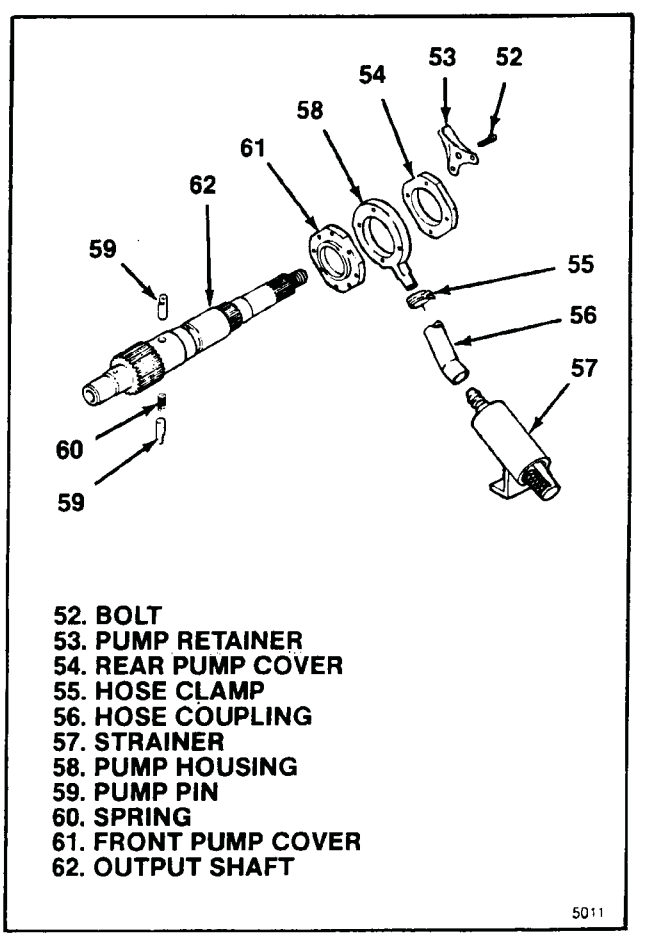


Figure 5–13. Pump Parts

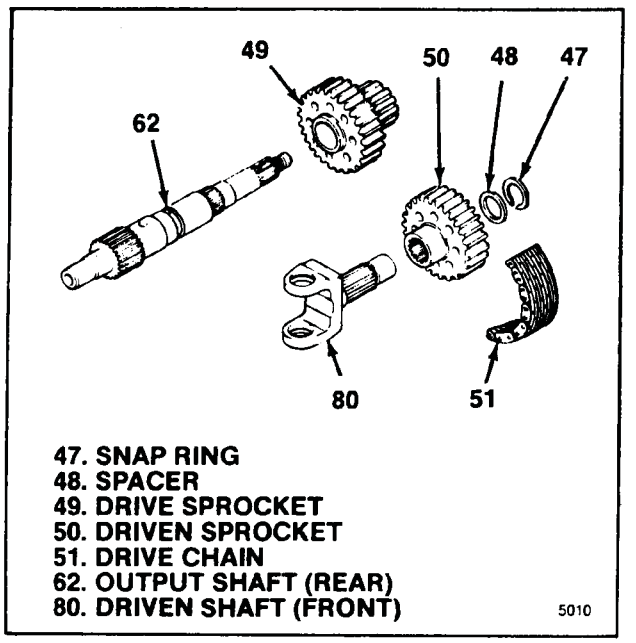


Figure 5–14. Chain Drive

5–12. INSTALLATION OF CHAIN DRIVE. To assembly as completed thus far (52 through 121) assemble parts as follows (see figure 5–14):

a. On work bench, next to transfer case assembly, position driven sprocket (50) (with internal spline) at front driven shaft (80) end of case and drive sprocket (49) (with smooth bore) at output shaft (62) end.

b. Assemble drive chain (51) around sprockets (49 and 50).

c. Grasp each sprocket (49 and 50), hold drive chain (51) tight and parallel with transfer case, and install chain drive assembly (49 through 51) over shafts (80 and 62). It may be necessary to rotate driven sprocket (50) slightly to engage splines on front driven shaft (80).

d. Install spacer (48) on front driven shaft (80). Install snap ring (47) in shaft groove over spacer.

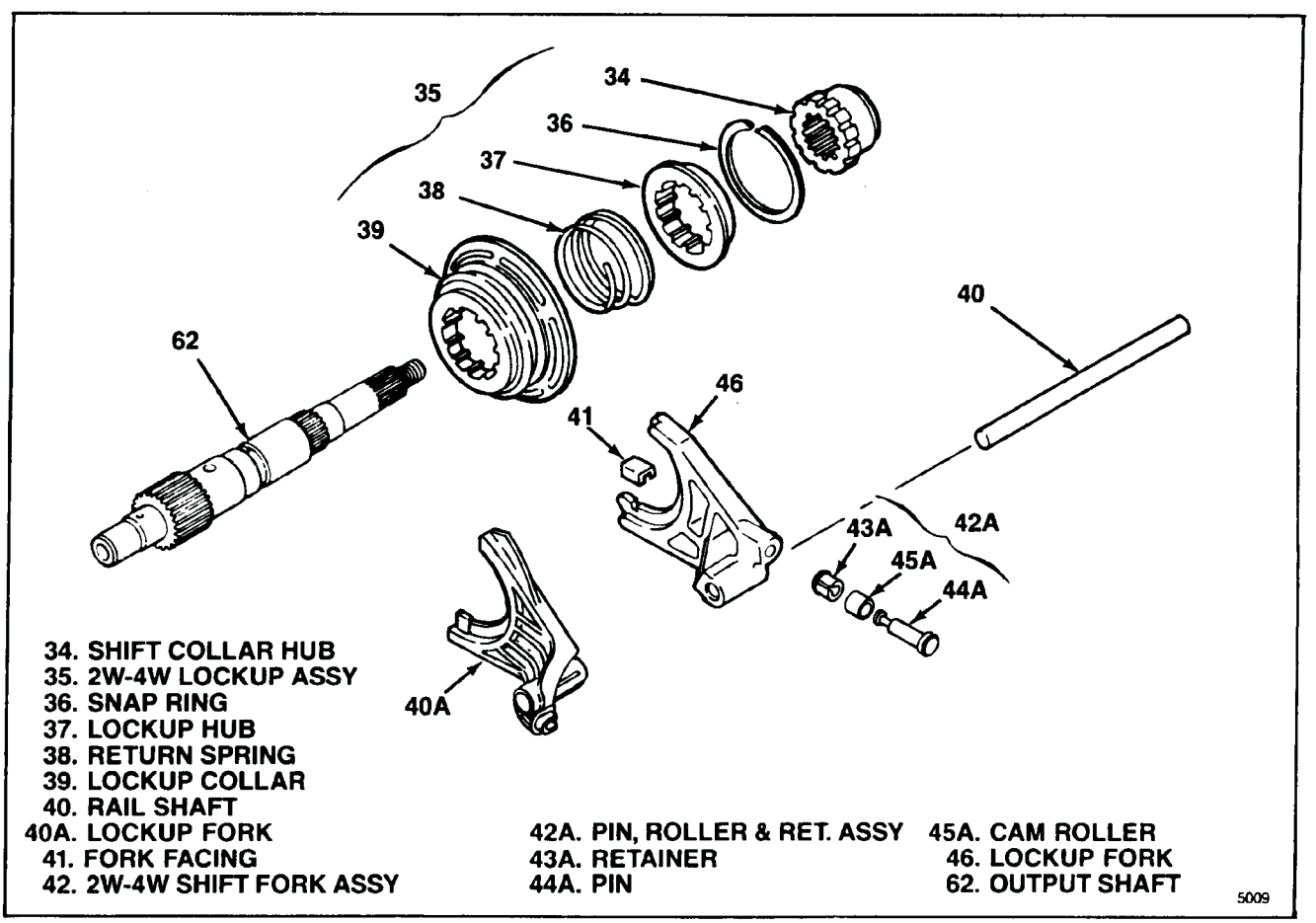


Figure 5–15. Lockup Shift Parts (Electric Shift)

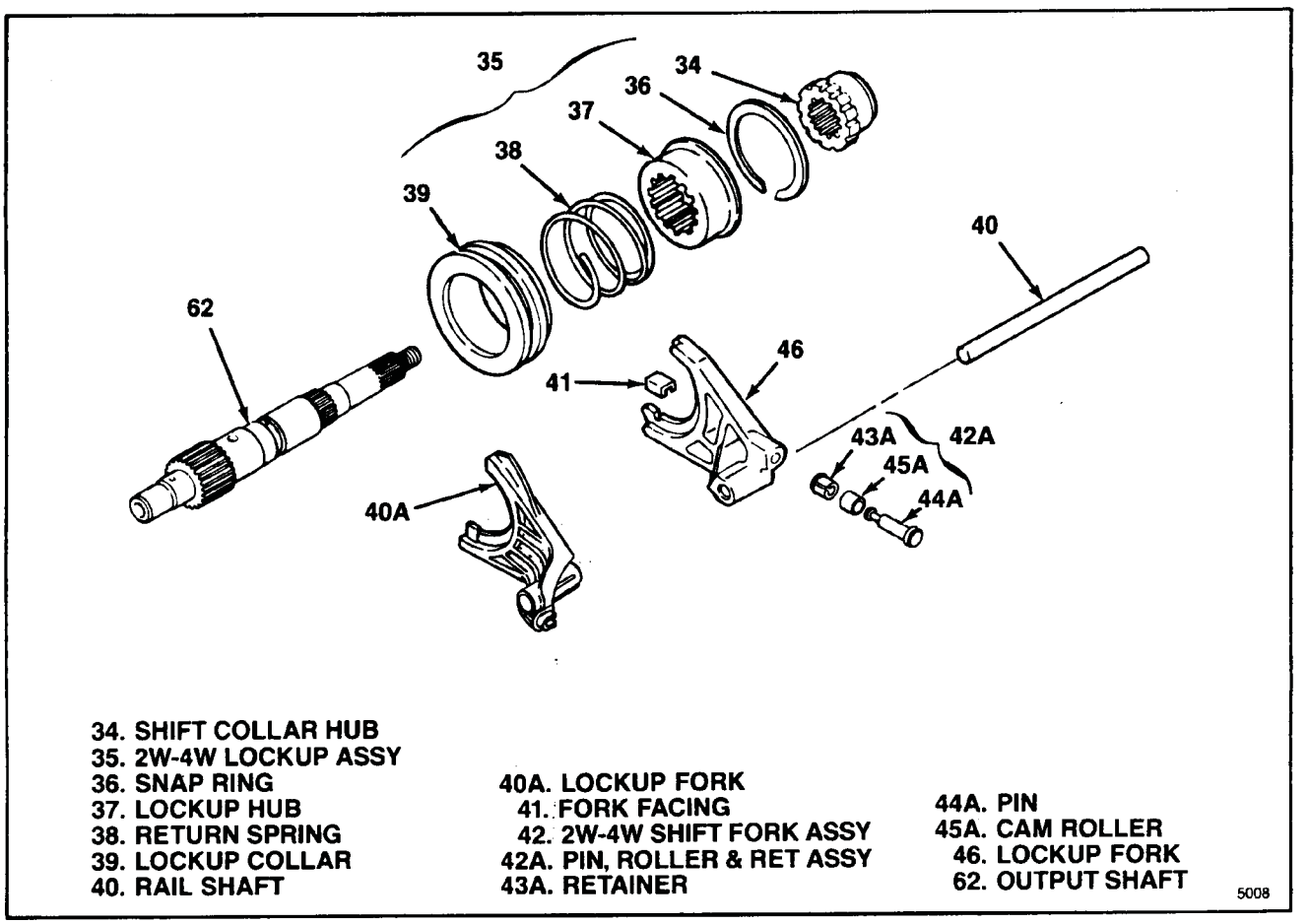


Figure 5–16. Lockup Shift Parts (Mechanical Shift)

5–13. INSTALLING LOCKUP SHIFT PARTS. To assembly as completed thus far (47 through 121) install parts as follows (see figure 5–15 for electric shift; 5–16 for mechanical shift):

NOTE

When installing one-piece plastic lockup fork (40A), disregard following steps a and b.

a. If disassembled for parts replacement, assemble 2W-4W shift fork assembly (42) using new pin, roller and retainer assembly (42A). Press pin, roller and retainer assembly into bore in lockup fork (46) until retainer (43A) passes completely through and snaps in place. Make sure that cam roller (45A) turns freely.

b. Install two fork facings (41) on 2W-4W shift fork assembly (42).

c. Assemble return spring (38) and lockup hub (37) in lockup collar (39) and retain with snap ring (36), completing 2W-4W lockup assembly (35).

d. Install rail shaft (40) in transfer case, through reduction shift fork assembly previously installed and into blind hole in case.

e. Engage 2W-4W shift fork assembly (42) or lockup fork (40A) in groove in 2W-4W lockup assembly and slide this group down over output shaft (62) and rail shaft (40).

f. Install shift collar hub (34), engaging splines on output shaft (62) and in 2W-4W lockup assembly (35).

g. On electric shift units only, install electric shift cam group (110 through 113) previously assembled (paragraph 5–6) as follows (see figure 5–17):

1. Position electric shift cam group as shown in figure 5–17, rotated so that end of torsion spring (111) will contact side of reduction shift fork assembly (65) that faces up, toward top of case.

2. Holding rail shaft (40) down, raise up fork assemblies (65 and 42 or 40A) slightly. Rotate electric shift cam group into position so that roller on reduction shift fork assembly (65) is in groove in shift cam (110) and roller on 2W-4W shift fork assembly (42) or button on lockup fork (40A) is on cam end. Then lower this group of parts into the transfer case engaging shift shaft (113) on pin in transfer case.

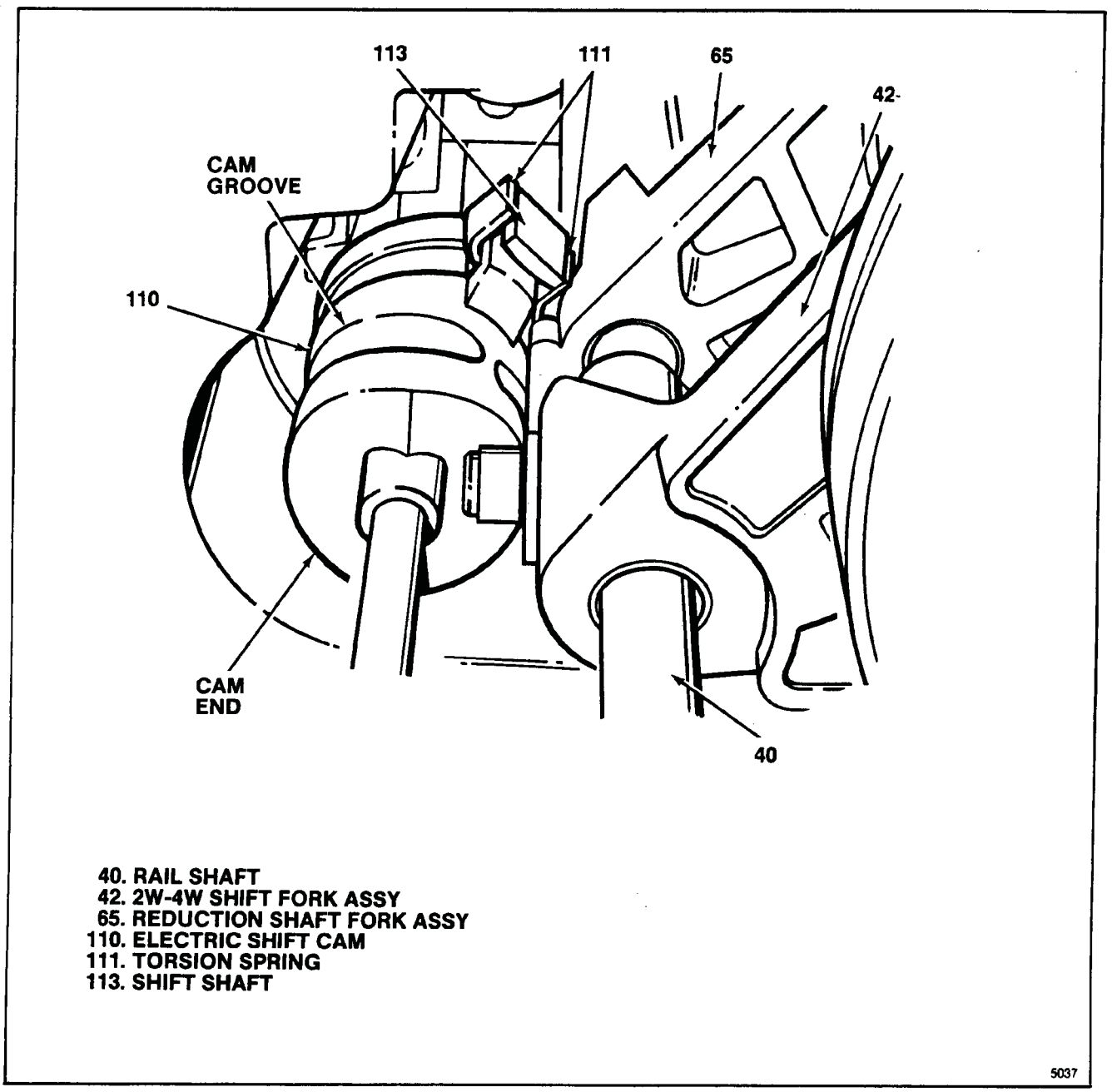
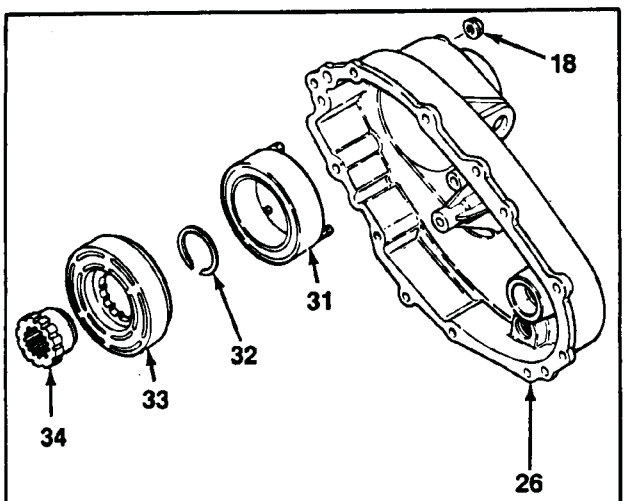


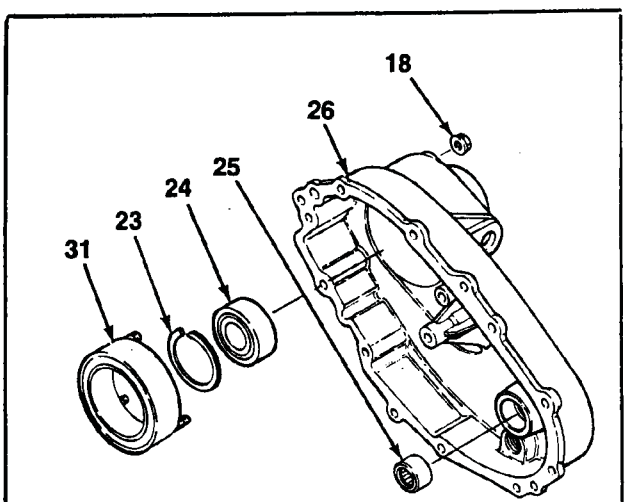
Figure 5–17. Electric Shift Cam Installation



18. NUT
26. COVER
31. CLUTCH COIL ASSY
32. RETAINING RING
33. CLUTCH HOUSING
34. SHIFT COLLAR HUB

5007

Figure 5–18. Electric Clutch Components



18. NUT
23. SNAP RING
24. BALL BEARING
25. NEEDLE BEARING
26. CASE COVER
31. CLUTCH COIL ASSY

5039

Figure 5–19. Cover Assembly

5–14. INSTALLING ELECTRIC CLUTCH COMPONENTS (ELECTRIC SHIFT TRANSFER CASE ONLY). On electric shift units, install parts as follows (See figure 5–18):

a. Position clutch housing (33) in transfer case over shift collar hub (34). Attach with retaining ring (32) in clutch collar hub groove.

b. Clutch coil assembly (31) will be attached to case cover as described in paragraph 5–15 before it is installed in transfer case.

5–15. COVER ASSEMBLY. Assemble parts into cover as follows (see figure 5–19):

a. Position cover (26) on bed of suitable press so that open face of cover is up and parallel with press bed.

b. Position end of needle bearing (25) with identification marking up and press into cover (26) until upper end of bearing is 1.593-1.603 in. (40.47-40.97 mm) below face of cover that mates with transfer case.

c. Press in ball bearing (24) to bottom in cover (26) and install snap ring (23).

d. On electric shift units only, verify that four o-rings (one on wire and one each on three studs) are in place on clutch coil assembly (31). Install clutch coil assembly in inside of case cover, with electrical wire and studs extending through cover. Use care not to kink or trap electrical wire under clutch coil assembly. Attach with three nuts (18) and torque to 6-8 lb- ft (8-11 Nm).

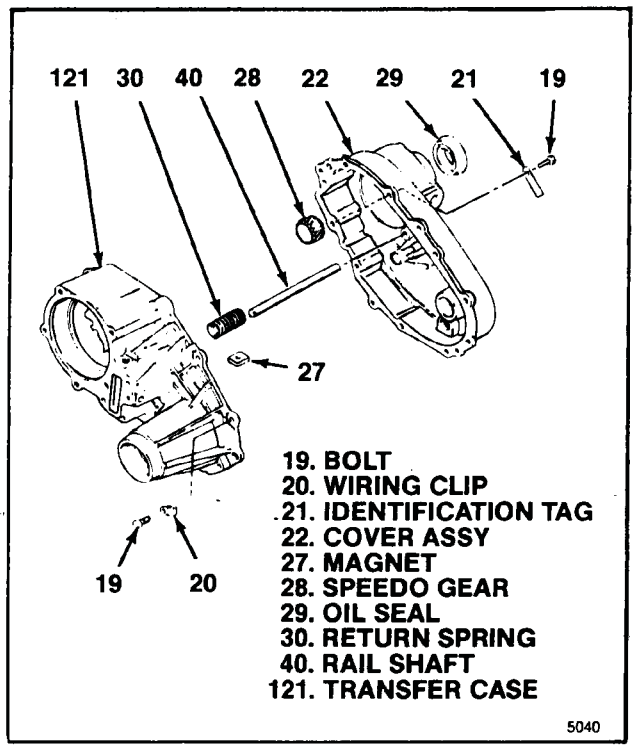


Figure 5–20. Cover Installation

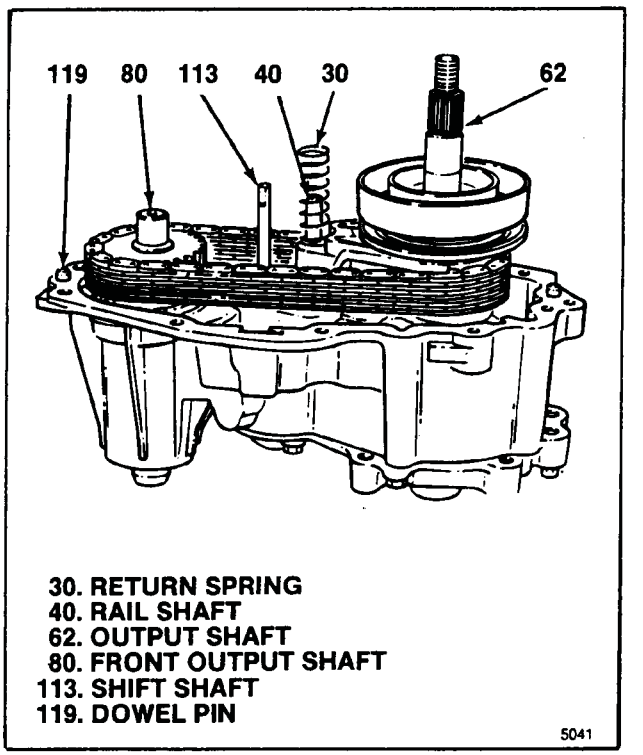


Figure 5–21. Parts To Be Aligned With Cover

5–16. INSTALLING COVER ASSEMBLY. Install cover assembly as completed in paragraph 5–15 on transfer case as follows (see figure 5–20):

a. Install return spring (30) over rail shaft (40) in transfer case to rest on shift fork.

b. Install magnet (27) in slot in transfer case (121).

c. Apply continuous 1/16 in. (1.6 mm) bead of sealant (Neutral Cure RTV, Loctite 598) all around transfer case (121) mounting face for cover assembly (22). Center sealant bead between edges of face. Circle bolt holes. Remove excess is sealant bead is larger than 1/16 in. (1.6 mm).

CAUTION

In the following step do not use excessive force in an attempt to seat cover on transfer case. When all of the alignment conditions specified are met, the cover will seat without using undue force. If not, remove cover assembly and check alignment conditions.

d. Install cover assembly (22) on transfer case (121). All of the following alignment conditions must be met for the cover assembly to seat on transfer case properly (see figure 5–21):

1. Cover holes with transfer case dowel pins (119).

2. Cover bearings with output shafts (62 and 80).

3. Blind hole in cover with rail shaft (40). Make sure spring (30) is not cocked. On electric shift, check with pen light through cover hole for speed sensor (13).

4. On electric shift units, cover bore with shift shaft (113).

e. Install nine bolts (19) positioning identification tag (21) and wiring clip (20) under bolt heads at locations shown in figure 5–22. Torque bolts to 20-34 lb-ft (27-46 Nm).

f. Install speedo gear (28) over spline of output shaft (62) into cover assembly (22).

g. Press new oil seal (29) into cover assembly (22).

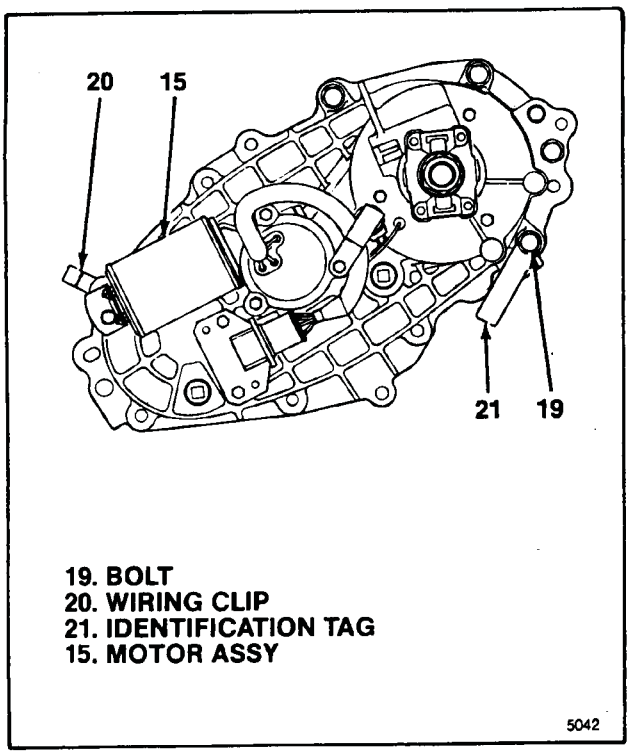


Figure 5–22. Wiring Clip, Identification Tag and Motor Locations

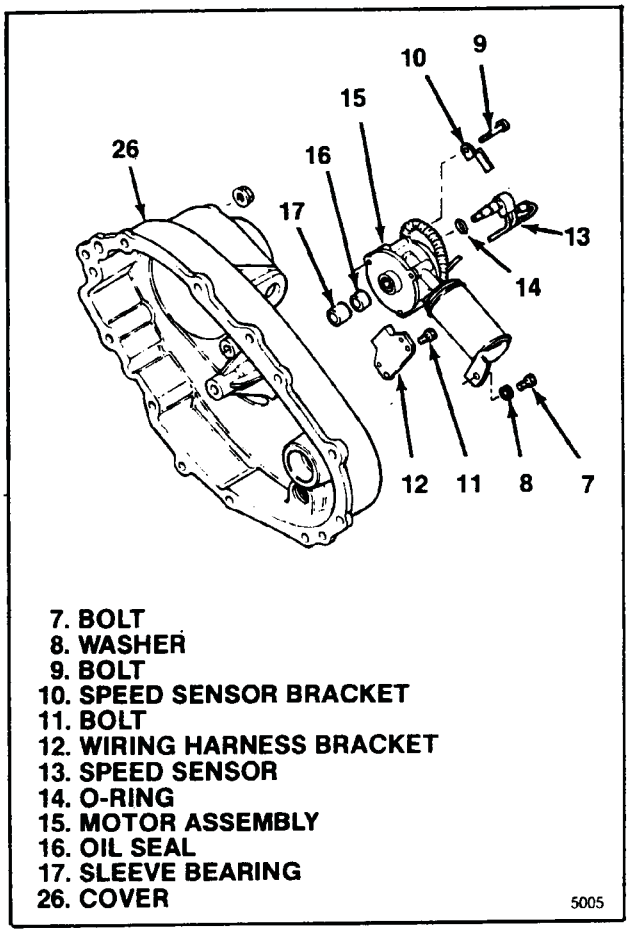


Figure 5–23. External Electric Shift Components

5–17. INSTALLING EXTERNAL ELECTRIC SHIFT COMPONENTS (ELECTRIC SHIFT TRANSFER CASE ONLY) (see figure 5–23). On electric shift units, install components as follows:

a. Install sleeve bearing (17) and oil seal (16) in cover (26) around shift shaft (113) (see figure 5–24).

b. Position motor assembly (15) so that triangular slot in motor will align with shift shaft (113) (see figure 5–24). Move motor in to engage shift shaft and contact cover (26). Then rotate motor in clockwise direction until motor is in correct position (see figure 5–22) and mounting holes are aligned. Install three bolts (9) hand tight with bracket (10) under head of bolt closest to opening for speed sensor (13).

c. Fit o-ring (14) on speed sensor (13) and install in cover. Rotate bracket (10) so that it is over speed sensor and torque all bolts (9) to 6-8 lb-ft (8-11 Nm).

d. Install bolt (7) and washer (8) at bracket end of motor assembly (15) and torque to 6-8 lb-ft (8-11 Nm).

e. Attach bracket (12) with two bolts (11) and torque to 5-7 lb-ft (6.8-9.5 Nm).

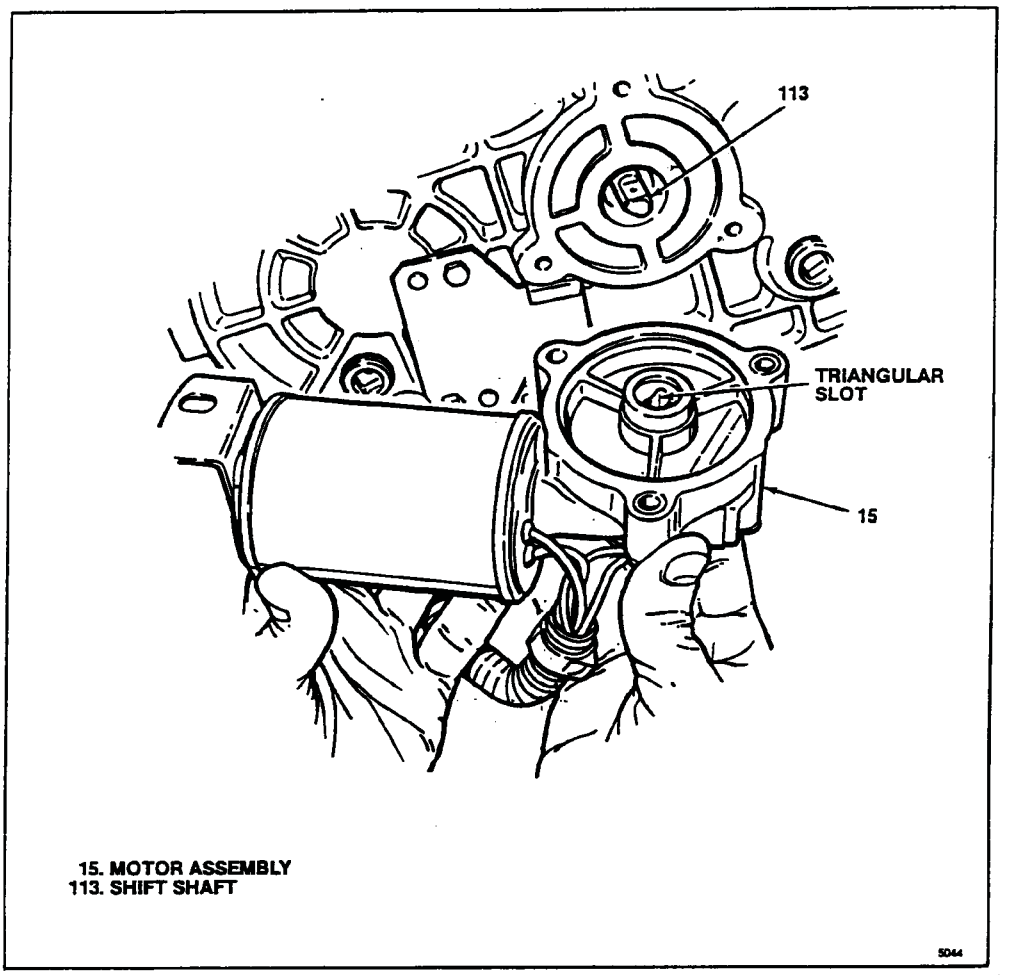


Figure 5–24. Motor Assembly Alignment

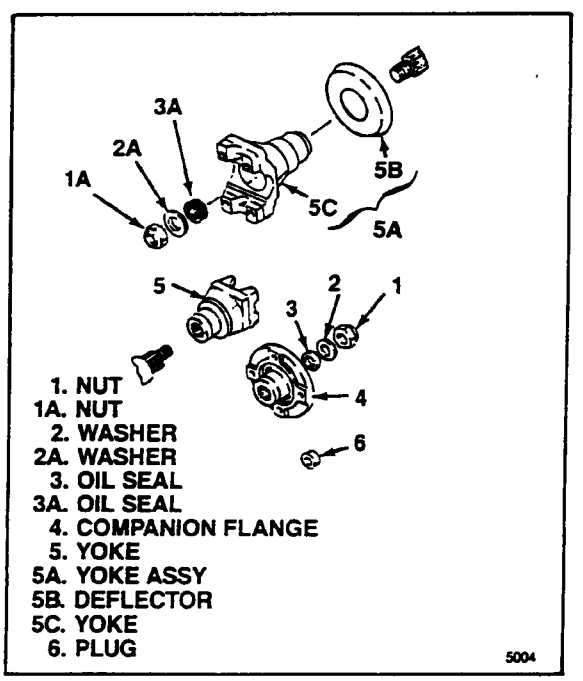


Figure 5–25. Companion Flange or Yoke Group

5–18. INSTALLING COMPANION FLANGE OR YOKE GROUP. To assembly as completed thus far (7 through 121), install parts as follows (see figure 5–25):

a. Install two plugs (6).

b. Install rear yoke (5) or companion flange (4), oil seal (3), washer (2) and nut (1). Hold yoke with torque bar T-13-50-002 and torque nut (1) to 150-180 lb-ft (203-244 Nm).

c. If front yoke is used, press deflector (5B) onto yoke (5C) if removed. Install front yoke assembly (5A), oil seal (3A), washer (2A) and nut (1A) in same manner as described in step b.

TORQUES FOR SPECIFIC PARTS

PART (INDEX NO.)	TORQUE IN LB-FT	TORQUE IN Nm
Nut (1 and 1A)	150-180	203-244
Plug (6)	14-22	19-30
Bolt (7)	6-8	8-11
Bolt (9)	6-8	8-11
Bolt (11)	5-7	6.8-9.5
Nut (18)	6-8	8-11
Bolt (19)	20-34	27-46
Bolt (52)	2.9-6.3	4.0-8.5
Breather Barb (82)	6-14	8-19
Bolt (83)	20-34	27-46
Screw (101)	5–7	6.8-9.5
4WD Switch (114)	25-35	34-47

Table 5–1. Torque Values

GENERAL TORQUES

THREAD SIZE	TORQUE IN LB-FT	TORQUE IN Nm
5/16-18 UNC	15.0-25.0	20.3-33.9
3/8-16 UNC	25.0-40.0	33.9-54.5
3/8-24 UNF	25.0-40.0	33.9-54.5
7/16-14 UNC	35.0-55.0	47.5-74.6
1/2-13 UNC	45.0-70.0	61.0-94.9
1/2-30 UNF	45.0-70.0	61.0-94.9
9/16-12 UNC	60.0-90.0	81.3-122.0
1/8-27 NPTF	7.0-15.0	9.5-20.3
1/4-18 NPTF	10.0-20.0	13.6-27.1
3/8-18 NPTF	15.0-25.0	20.3-33.9
1/2-14 NPTF	20.0-30.0	27.1-40.7
3/4-14 NPTF	25.0-40.0	33.9-54.5

FIGURE NO.	DESCRIPTION	APPLICATION
P–1	Transfer Case Assembly	Mechanical Shift
P–2	Transfer Case Assembly	Electric Shift

P–1. INTRODUCTION.

P–2. This section lists, describes and illustrates replacement parts for the Borg-Warner Automotive 13-50 or 13-70 Transfer Case. Each exploded view illustration, listed in the Contents, has a corresponding parts list. Index numbers are used to key each part in the exploded views to the parts list and service instructions in preceding sections of this manual.

P–3. The PART NUMBER column in the parts list gives the part number which can be used to order replacement parts. Since this section covers more than one model, and not all detail parts are used on a particular model, the words "not used" may appear in this column. Complete information on the identification tag (11, figure P–1) should be included with all parts orders (see figure 1–1).

P–4. The DESCRIPTION column gives the part nomenclature used, not only in the list but also in the service instructions.

P–5. The QTY column designates the number of parts used at the location defined by the index number. Letter symbols may be used in this column to designate specific information. The symbols are as follows:

a. **AR**—As Required. This is used for selective fit parts, determined as necessary at assembly.

b. **NP**—Not Procurable. Detail parts so designated are not procurable separately. When replacement is required, order the next higher assembly.

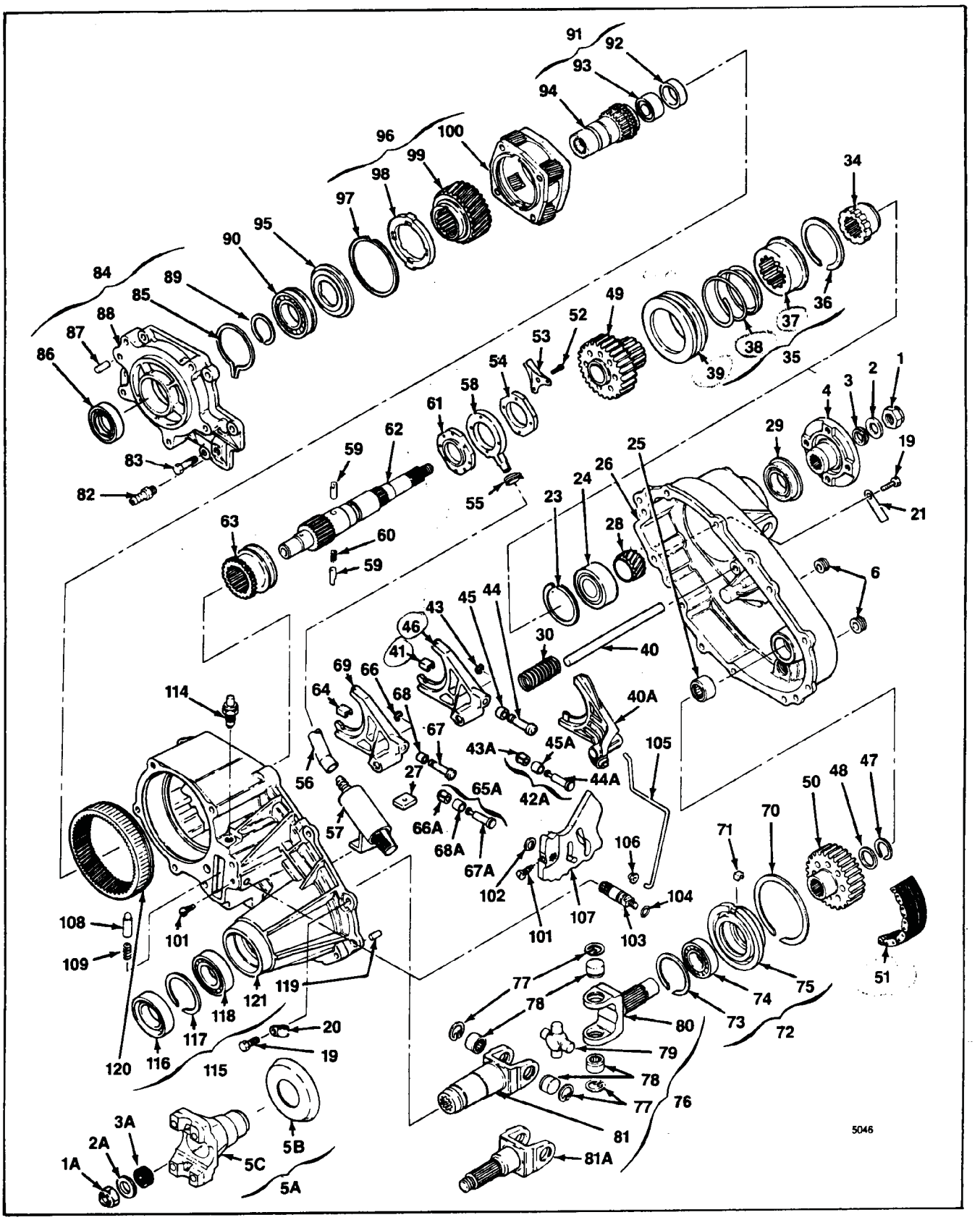


Figure P–1. Transfer Case Assembly, Mechanical Shift

PARTS LIST FOR FIGURE P–1

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
1	19-00-149-001	Nut	1
1A	19-00-149-001	Nut (front, when used)	1
2	10-00-047-016	Washer	1
2A	10-00-047-016	Washer (front, when used)	1
3	10-00-044-012	Seal, Oil	1
3A	10-00-044-012	Seal, Oil (front, when used)	1
4	13-00-031-001	Flange, Companion	1
5	Not used		
5A	10-00-531-011	Yoke Assy (front, when used)	1
5B	13-50-035-002	• Deflector, Dust (front, when used)	1
5C	13-00-031-004	• Yoke (front, when used)	1
6	0000445751	Plug, Pipe	2
7	Not used		
8	Not used		
9	Not used		
10	Not used		
11	Not used		
12	Not used		
13	Not used		
14	Not used		
15	Not used		
16	Not used		
17	Not used		
18	Not used		
19	13-00-183-018	Bolt, Hex Head	9
20	10-00-056-007	Clip, Wiring Harness	1
21	13-50-199-XXX	Tag, Identification	1
22	13-50-539-003	Cover Assy, Transfer Case	1
23	R6A-7-1/2	Ring, Snap	1
24	10-00-130-008	Bearing, Annular	1
25	10-00-132-039	Bearing, Needle	1
26	13-50-039-003	Cover, Transfer Case	1
27	10-00-012-002	Magnet	1
28	13-50-110-003	Gear, Speedo	1
29	10-00-044-052	Seal, Oil	1
30	13-50-156-002	Spring, Return	1
31	Not used		
32	Not used		
33	Not used		
34	13-50-090-001	Hub, Shift Collar	1
35	13-50-589-002	Lockup Assy, 2W-4W	1
36	10-00-139-041	• Ring, Snap	1
37	13-50-089-003	• Hub, Lockup	1
38	13-50-156-001	• Spring, Sleeve Return	1
39	13-50-055-002	• Collar, Lockup	1
40	13-50-100-001	Shaft, Rail	1
40A	13-54-096-001	Fork, Lockup (replaces items 41 through 46)	1
41	13-45-235-001	Facing, Shift Fork	2
42	13-50-596-003	Fork Assy, Shift, 2W-4W	1
42A	13-50-543-001	• Pin, Roller & Retainer Assy (includes items 43A, 44A and 45A, replaces items 43, 44 and 45)	1
43	13-45-056-003	• Ring, Crescent	1
43A	13-50-040-002	• • Retainer	1
44	13-00-043-006	• Pin, Shift Fork	1
44A	13-50-043-001	• • Pin	1
45	13-52-127-001	• Roller, Cam	1

PARTS LIST FOR FIGURE P–1 (Cont)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
45A	13-52-127-001	• • Roller, Cam	1
46	13-50-096-003	• Fork, Lockup	1
47	10-00-139-038	Ring, Snap	1
48	13-50-193-003	Spacer	1
49	13-50-144-001	Sprocket, Drive	1
	13-50-144-003	Sprocket, Drive (optional)	1
50	13-50-144-002	Sprocket, Driven	1
	13-50-144-004	Sprocket, Driven (optional)	1
51	13-50-143-001	Chain, Drive	1
52	13-45-183-003	Bolt, Hex Head	4
53	13-50-056-004	Retainer, Pump	1
54	13-45-039-005	Cover, Pump, Rear	1
55	13-45-056-005	Clamp, Hose	1
56	13-50-034-002	Coupling, Hose	1
57	13-45-238-001	Strainer, Oil	1
58	13-45-097-004	Housing, Pump	1
59	13-45-043-007	Pin, Pump	2
60	13-45-156-004	Spring, Pump Pin	1
61	13-45-039-007	Cover, Pump, Front	1
62	13-50-171-001	Shaft, Output	1
63	13-50-089-001	Hub, Reduction	1
64	13-45-235-001	Facing, Shift Fork	2
65	13-50-596-005	Fork Assy, Reduction Shift	1
65A	13-50-543-001	• Pin, Roller & Retainer Assy (includes items 66A, 67A and 68A, replaces items 66, 67 and 68)	1
66	13-45-056-003	• Ring, Crescent	1
66A	13-50-040-002	• • Retainer	1
67	10-00-043-006	• Pin, Shift Fork	1
67A	13-50-043-001	• • Pin	1
68	13-52-127-001	• Roller, Cam	1
68A	13-52-127-001	• • Roller, Cam	1
69	13-50-096-004	• Fork, Reduction Shift	1
70	10-00-139-043	Ring, Snap	1
71	10-00-056-008	Clip, Retaining	1
72	13-50-607-001	Retainer Assy, Bearing	1
73	R6A-7-1/2	• Ring, Snap	1
74	10-00-130-008	• Bearing, Annular	1
75	13-50-107-001	• Retainer, Bearing	1
76	13-50-671-003	Joint Assy	1
76A	13-50-671-004	Joint Assy (with front yoke)	1
77	10-00-139-042	• Ring, Retaining	4
78	10-00-132-040	• Bearing	4
79	13-50-079-001	• Spider	1
80	13-50-171-002	• Shaft, Front Driven	1
81	13-50-671-002	• Yoke Assy, Slip	1
81A	13-50-171-004	• Shaft, Front Output (with yoke)	1
82	13-45-072-001	Barb, Breather	1
83	13-00-183-018	Bolt, Hex Head	6
84	13-50-672-001	Adapter Assy, Front	1
85	10-00-139-039	• Ring, Snap	1
86	10-00-044-054	• Seal, Oil	1
87	10-00-043-017	• Pin, Spirol	1
88	13-50-172-001	• Adapter, Front	1
89	10-00-139-040	Ring, Retaining	1
90	10-00-130-011	Bearing, Annular	1
91	13-50-689-100 =OO\	Shaft Assy, Input	1

PARTS LIST FOR FIGURE P–1 (Cont)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
92	13-45-127-002	• Bearing, Sleeve	1
93	4840G	• Bearing, Needle	1
94	13-50-189-001	• Shaft, Input	1
95	13-50-193-001	Washer, Thrust	1
96	13-50-659-007	Carrier Assy, Gear	1
97	10-00-139-043	• Ring, Retaining	1
98	13-50-014-001	• Plate, Thrust	1
99	13-50-165-001	• Gear, Sun	1
100	No number	• Carrier Assy, Planet 1350-659-003	NP
101	13-50-183-002	Screw, Pan Head	2
102	13-45-056-002	Ring, Klip	1
103	13-50-122-001	Shaft, Shift	1
104	T89B-108	O-Ring	1
105	13-50-156-005	Spring, 4L Assist	1
106	13-00-127-001	Roller, 4L Assist	1
107	13-50-099-006	Cam, Shift	1
108	13-50-108-001	Poppet	1
109	13-50-156-003	Spring	1
110	Not used		
111	Not used		
112	Not used		
113	Not used		
114	13-00-140-003	Switch, 4WD Indicator	1
115	13-50-565-003	Case Assy, Transfer	1
116	10-00-044-051	• Seal, Oil	1
117	4766B	• Ring, Retaining	1
118	B108A	• Bearing, Annular	1
119	0000141281	• Pin Dowel	2
120	13-50-162-001	• Gear, Ring	1
121	13-50-065-003	• Case, Transfer	1

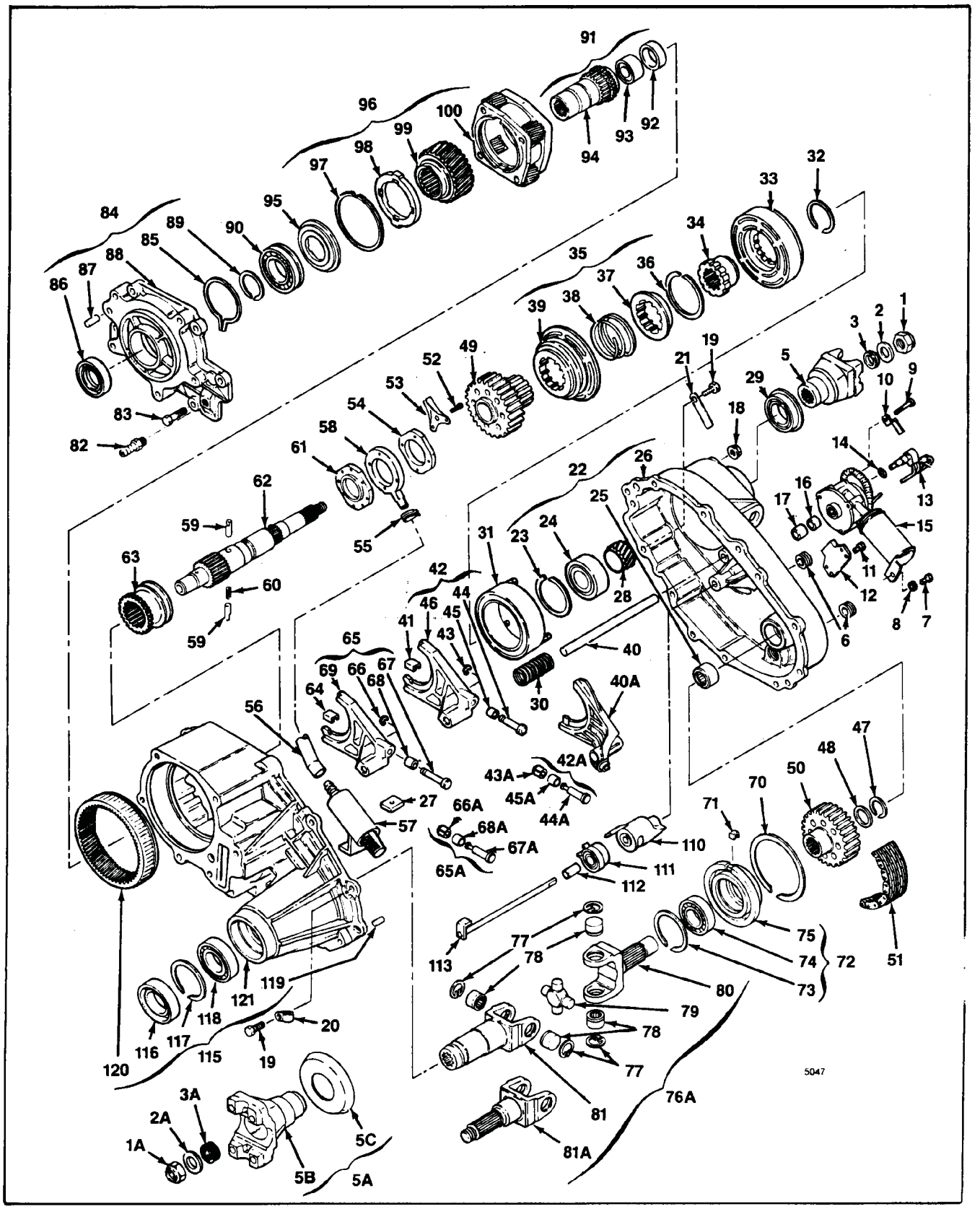


Figure P–2. Transfer Case Assembly, Electric Shift

PARTS LIST FOR FIGURE P–2

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
1	19-00-149-001	Nut	1
1A	19-00-149-001	Nut (front, when used)	1
2	10-00-047-016	Washer	1
2A	10-00-047-016	Washer (front, when used)	1
3	10-00-044-012	Seal, Oil	1
3A	10-00-044-012	Seal, Oil (front, when used)	1
4	Not used		
5	10-00-031-022	Yoke	1
5A	10-00-531-011	Yoke Assy (front, when used)	1
5B	13-50-035-002	• Deflector, Dust (front, when used)	1
5C	13-00-031-004	• Yoke (front, when used)	1
6	0000445751	Plug, Pipe	2
7	0011500420	Bolt, Hex Head	1
8	011503961	Washer, Flat	1
9	0011503949	Bolt, Hex Head	3
10	13-50-056-002	Bracket, Speed Sensor	1
11	009411592	Bolt, Hex Head	2
12	13-50-056-003	Bracket, Wiring Harness	1
13	13-50-140-002	Sensor, Speed	1
14	10-00-141-014	O-Ring	1
15	13-50-640-005	Motor Assy	1
16	13-00-044-001	Seal, Oil	1
	13-00-044-005	Seal, Oil (optional)	1
17	13-00-127-002	Bearing	1
18	13-00-149-002	Nut, Hex	3
19	13-00-183-018	Bolt, Hex Head	9
20	10-00-056-007	Clip, Wiring Harness	1
21	13-50-199-XXX	Tag, Identification	1
22	13-50-539-005	Cover Assy, Transfer Case	1
23	R6A-7-1/2	Ring, Snap	1
24	10-00-130-008	Bearing, Annular	1
25	10-00-132-039	Bearing, Needle	1
26	13-50-039-005	Cover, Transfer Case	1
27	10-00-012-002	Magnet	1
28	13-50-110-003	Gear, Speedo	1
29	10-00-044-052	Seal, Oil	1
30	13-50-156-002	Spring, Return	1
31	13-50-640-004	Coil Assy, Clutch	1
32	10-00-139-029	Ring, Retaining	1
33	13-50-212-001	Housing, Clutch	1
34	13-50-090-002	Hub, Shift Collar	1
35	13-50-589-003	Lockup Assy, 2W-4W	1
36	10-00-139-041	• Ring, Snap	1
37	13-56-089-002	• Hub, Lockup	1
38	13-50-156-007	• Spring, Sleeve Return	1
39	13-50-055-003	• Collar, Lockup	1
40	13-50-100-001	Shaft, Rail	1
40A	13-54-096-001	Fork, Lockup (replaces items 41 through 46)	1
41	13-45-235-001	Facing, Shift Fork	2
42	13-50-596-003	Fork Assy, Shift, 2W-4W	1
42A	13-50-543-001	• Pin, Roller & Retainer Assy (includes items 43A, 44A and 45A, replaces items 43, 44 and 45)	1
43	13-45-056-003	• Ring, Crescent	1
43A	13-50-040-002	• • Retainer	1
44	13-00-043-006	• Pin, Shift Fork	1
44A	13-50-043-001	• • Pin	1

PARTS LIST FOR FIGURE P–2 (Cont)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
45	13-52-127-001	• Roller, Cam	1
45A	13-52-127-001	• • Roller, Cam	1
46	13-50-096-003	• Fork, Lockup	1
47	10-00-139-038	Ring, Snap	1
48	13-50-193-003	Spacer	1
49	13-50-144-001	Sprocket, Drive	1
	13-50-144-003	Sprocket, Drive (optional)	1
50	13-50-144-002	Sprocket, Driven	1
	13-50-144-004	Sprocket, Driven (optional)	1
51	13-50-143-001	Chain, Drive	1
52	13-45-183-003	Bolt, Hex Head	4
53	13-50-056-004	Retainer, Pump	1
54	13-45-039-005	Cover, Pump, Rear	1
55	13-45-056-005	Clamp, Hose	1
56	13-50-034-002	Coupling, Hose	1
57	13-45-238-001	Strainer, Oil	1
58	13-45-097-004	Housing, Pump	1
59	13-45-043-007	Pin, Pump	2
60	13-45-156-004	Spring, Pump Pin	1
61	13-45-039-007	Cover, Pump, Front	1
62	13-50-171-001	Shaft, Output	1
63	13-50-089-001	Hub, Reduction	1
64	13-45-235-001	Facing, Shift Fork	2
65	13-50-596-005	Fork Assy, Reduction Shift	1
65A	13-50-543-001	• Pin, Roller & Retainer Assy (includes items 66A, 67A and 68A, replaces items 66, 67 and 68)	11
66	13-45-056-003	• Ring, Crescent	1
66A	13-50-040-002	• • Retainer	1
67	10-00-043-006	• Pin, Shift Fork	1
67A	13-50-043-001	• • Pin	1
68	13-52-127-001	• Roller, Cam	1
68A	13-52-127-001	• • Roller, Cam	1
69	13-50-096-004	• Fork, Reduction Shift	1
70	10-00-139-043	Ring, Snap	1
71	10-00-056-008	Clip, Retaining	1
72	13-50-607-001	Retainer Assy, Bearing	1
73	R6A-7-1/2	• Ring, Snap	1
74	10-00-130-008	• Bearing, Annular	1
75	13-50-107-001	• Retainer, Bearing	1
76	13-50-671-003	Joint Assy	1
76A	13-50-571-004	Joint Assy (with front yoke)	1
77	10-00-139-042	• Ring, Retaining	4
78	10-00-132-040	• Bearing	4
79	13-50-079-001	• Spider	1
80	13-50-171-002	• Shaft, Front Driven	1
81	13-50-671-002	• Yoke Assy, Slip	1
81A	13-50-171-004	• Shaft, Front Output (with yoke)	1
82	13-45-072-001	Barb, Breather	1
83	13-00-183-018	Bolt, Hex Head	6
84	13-50-672-001	Adapter Assy, Front	1
85	10-00-139-039	• Ring, Snap	1
86	10-00-044-054	• Seal, Oil	1
87	10-00-043-017	• Pin, Spirol	1
88	13-50-172-001	• Adapter, Front	1
89	10-00-139-040	Ring, Retaining	1
90	10-00-130-011	Bearing, Annular	1

PARTS LIST FOR FIGURE P–2 (Cont)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
91	13-50-689-100	Shaft Assy, Input	1
92	13-45-127-002	• Bearing, Sleeve	1
93	4840G	• Bearing, Needle	1
94	13-50-189-001	• Shaft, Input	1
95	13-50-193-001	Washer, Thrust	1
96	13-50-659-007	Carrier Assy, Gear	1
97	10-00-139-043	• Ring, Retaining	1
98	13-50-014-001	• Plate, Thrust	1
99	13-50-165-001	• Gear, Sun	1
100	No number•	Carrier Assy, Planet 13-50-659-008	NP
101	Not used		
102	Not used		
103	Not used		
104	Not used		
105	Not used		
106	Not used		
107	Not used		
108	Not used		
109	Not used		
110	13-50-099-007	Cam, Electric Shift	1
111	13-50-156-006	Spring, Torsion	1
112	13-50-053-002	Spacer	1
113	13-50-122-004	Shaft, Shift	1
114	Not used		
115	13-50-565-004	Case Assy, Transfer	1
116	10-00-044-051	• Seal, Oil	1
117	4766B	• Ring, Retaining	1
118	B108A	• Bearing, Annular	1
119	0000141281	• Pin, Dowel	2
120	13-50-162-001	• Gear, Ring	1
121	13-50-065-004	• Case, Transfer	1

1354

Introduction and Description

1-1. INTRODUCTION

1-2. PURPOSE. This manual contains maintenance, service and parts information for the 13-54 Four-Wheel Drive Transfer Cases manufactured by Borg-Warner Automotive, Inc., Transmission Systems, P.O. Box 2688, Muncie, IN 47307.

1-3. SCOPE. As you will see in the Table of Contents, this manual provides information for maintenance, troubleshooting, installation, removal, disassembly, cleaning, inspection, repair or replacement, and assembly of the transfer case.

1-4. Section P of the manual contains an illustrated parts list. The arrangement of the exploded view illustrations is described in the introduction to Section P. Each detail part shown in the exploded views is assigned an index number. This same index number is used to identify the part throughout this manual. For example, index number 44 (in parentheses in the text) refers to the drive chain regardless of the manual section or the specific model transfer case being serviced.

1-5. The exploded view illustrations in Section P make it possible to view the complete assembly in addition to the illustrations in the service sections relating to a specific service procedure.

1-6. Section T lists special tools. These tools, or equivalent are required for proper disassembly and assembly of the transfer case.

1-7. ABBREVIATIONS. Abbreviations, other than those in common use, found in this manual are identified in Table 1-1.

1-8. DESCRIPTION

1-9. TRANSFER CASE DESCRIPTION. The Borg-Warner Automotive 13-54 is a two-speed, part time transfer case. A planetary gear set is used to provide gear reduction. Power is transferred to the front wheel drive through a Morse Hy-Vo® chain drive. The unit operates in an oil bath plus an oil pump is used to provide positive lubrication to the planetary gear set and other upper shaft components. Four selector positions are provided:

2H — In two high position, only the two rear wheels are driven and the transfer case operates at a 1.00 to 1.00 speed ratio.

4H — In four high, all four wheels are driven at a 1.00 to 1.00 speed ratio.

N — In the neutral position (available only with manual shift), the output shaft is disconnected from the input shaft and no power is transmitted to the wheels.

4L — In four low, all four wheels are driven and the transfer case operates at a 2.48 to 1.00 speed reduction ratio.

Table 1-1. Abbreviations

AR	As Required
Assy	Assembly
ID	Inside Diameter
NP	Not Procurable
OD	Outside Diameter
PN	Part Number
PR	Per
Qty or QY	Quantity
Ref	Reference
TIR	Total Indicator Reading

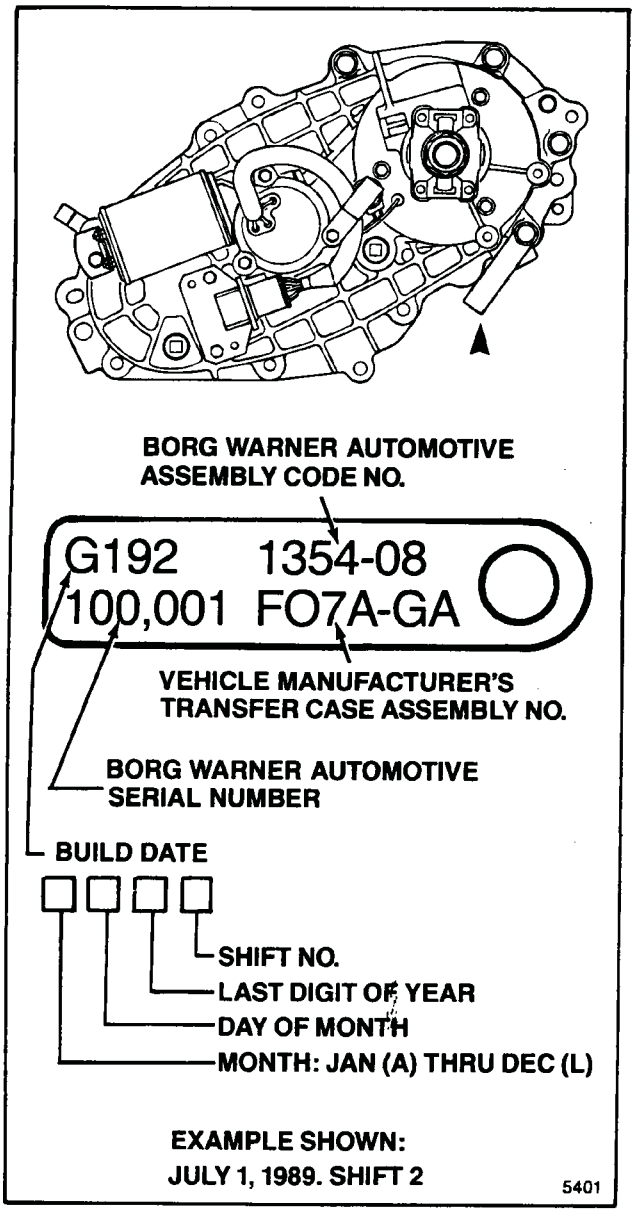


Figure 1-1. Identification Tag

1-10. SHIFTING. The mechanical shift transfer case is controlled by a single shift lever that operates a shift cam within the transfer case. Additional components are installed on the electric shift transfer case: an electric clutch, a speed sensor and an electric motor to drive the shift cam within the case. A separate electronic shift control system is also necessary (refer to vehicle manual). The clutch is used to spin up the front drive system and permit shifting from 2H to 4H at any speed. The speed sensor provides information to the electronic control system to regulate shifting from 4H to 4L.

1-11. APPLICATION. The 13-54 transfer case is used for light truck applications.

1-12. IDENTIFICATION. The identification tag is installed on the transfer case at the location shown in figure 1-1, looking at the rear of the case. Figure 1-1 also illustrates the information to be found on the tag, some of which may be necessary for specifying correct replacement parts.

On-Vehicle Service and Troubleshooting

2-1. MAINTENANCE

2-2. GENERAL. The only periodic maintenance required for the Borg-Warner Automotive 13-54 transfer case is to maintain proper lubrication.

2-3. LUBRICATION SCHEDULE. Refer to Table 2-1.

2-4. APPROVED LUBRICANT. Use only automatic transmission fluid, Dexron® II, XT-2-QDX (Ford ESP-M2C138-CJ) or equivalent in the transfer case.

NOTE:

To check or drain the lubricant, the transfer case should be warm. This is best done shortly after shutdown.

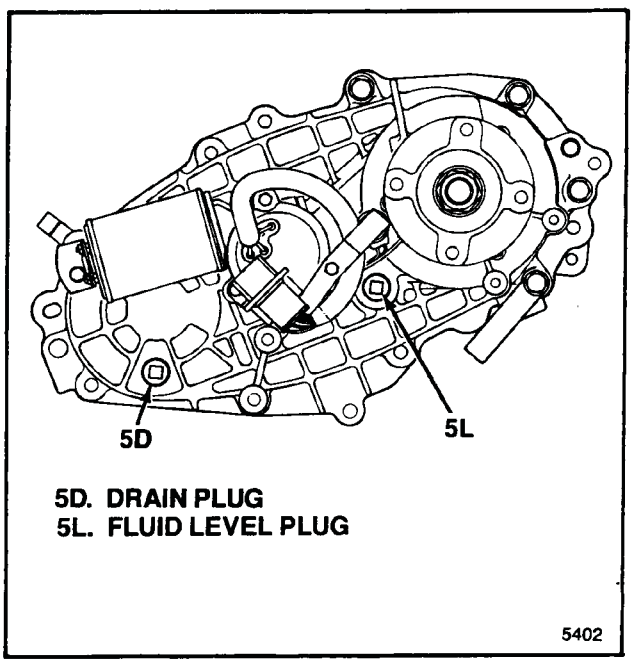


Figure 2-1. Drain and Fluid Level Plugs

2-5. CHECKING LUBRICANT LEVEL.

CAUTION

Do not use an impact wrench to remove or install fill or drain plugs since this will damage female threads in transfer case cover.

a. Wipe fluid level plug (see figure 2-1) and surrounding area clean.
b. Remove fluid level plug.
c. When transfer case is full, lubricant will just drip out fluid level plug opening.
d. Add approved lubricant (refer to paragraph 2-4) if required.
e. Install fluid level plug and torque to 14-22 lb-ft (19-30 Nm).

2-6. CHANGING LUBRICANT.

a. Wipe fluid level and drain plugs (see figure 2-1) and surrounding areas clean.
b. Place suitable container under transfer case. Transfer case holds approximately 3.0 US pints when full.
c. Remove drain plug.
d. Remove fluid level plug.
e. Allow all lubricant to drain.
f. Install drain plug and torque to 14-22 lb-ft (19-30 Nm).
g. Add approved lubricant (approximately 3 US pints) through fluid level plug opening until lubricant just begins to drip back out of opening.
h. Install fluid level plug and torque to 14-22 lb-ft (19-30 Nm).

2-7. TROUBLESHOOTING

2-8. GENERAL. In the event of operating difficulty, it is recommended that the transfer case (engine) be shut down. In most cases, to accurately pinpoint the source of trouble, it may be necessary to remove and disassemble, or partially disassemble, the transfer case. Specific inspection procedures for detail parts of the transfer case are provided in Section 4.

2-9. TROUBLESHOOTING CHART. Table 2-2 lists troubles which may be encountered along with possible causes and remedies.

Table 2-1. Lubrication Schedule

FREQUENCY	PROCEDURE
With each engine oil change	Check transfer case lubricant level
Yearly or after every 30,000 miles, whichever comes first	Change transfer case lubricant

Table 2-2. Troubleshooting Chart

TROUBLE	POSSIBLE CAUSE	REMEDY
Electric shift problems	Damaged or defective control console component, electronic control module, speed sensor, electric shift motor electric clutch or interconnecting wiring	Refer to vehicle manual for diagnosis and test procedure to isolate faulty component or components. Replace as required
	Damaged or worn shift cam, hub, collar, fork or rail shaft	Disassemble and check for worn or damaged parts. Replace as required
	Shift fork, hub collar or gears binding	Disassemble and check that sliding parts move freely. Replace as required
No mechanical shift (control lever moves)	Control lever or shift linkage broken or damaged	Replace damaged parts
	Damaged shift cam; broken shift fork assy	Remove transfer case cover and check for damaged parts. Replace damaged parts
Hard mechanical shift or control lever will not move into position	Improper operation	Refer to vehicle operator's manual for specific operating sequence, if any
	Improper or low transfer case lubricant	Add or drain and replace with proper lubricant (refer to paragraph 2-4)
	Shift fork binding	Remove transfer case cover and check for damaged parts. Replace damaged parts
	Binding of sliding shift hub, collar or gears	Remove transfer case cover, reach down into transfer case and check that sliding parts (parts with shifting grooves) slide freely on shaft. Remove and replace damaged parts
Mechanical shift jumps out of engagement	Damaged or improperly adjusted shift linkage	Adjust or repair shift linkage
	Internal shift parts damaged or excessively worn	Disassemble and check for worn or damaged parts. Replace damaged parts
	Shifting fork assy loose on rail or damaged	Disassemble and check for wear or damage. Replace worn or damaged parts

Table 2-2. Troubleshooting Chart (Cont.)

TROUBLE	POSSIBLE CAUSE	REMEDY
Mechanical shift locked in one position	Damaged or improperly adjusted shift linkage	Adjust or repair shift linkage
	Fork loose on rail	Remove transfer case cover and check for loose fork on rail. Replace parts as required.
	Worn or damaged fork assy, including pin, roller and retainer assy	Remove transfer case cover and check for wear or damage. Replace damaged parts
	Worn or damaged shift cam, hub or collar	Disassemble and check for worn or damaged parts. Replace worn or damaged parts
	Worn or damaged gears	Disassemble and check for worn or damaged gears. Replace worn or damaged gears
No front wheel drive with control in four wheel drive	Broken drive chain	Disassemble, check all internal parts for damage, replace drive chain
Transfer case noise in all modes of operation. NOTE: Make sure noise is coming from transfer case and not clutch, transmission, drive shaft or other components	Improper or low transfer case lubricant	Add or drain and replace with proper lubricant (refer to paragraph 2-4
	Loose bolts or other attaching parts	Make sure all attaching parts are torqued to specifications
	Noisy transfer case bearings	Disassemble and check bearings and parts in and on which they operate for wear or damage. Replace worn or damaged parts
	Noisy gears	Disassemble and check for worn or damaged parts (including speedometer gear). Replace worn or damaged parts
Transfer case noise in 4WH or 4WL	Worn or damaged sprockets or drive chain	Disassemble and check for worn or damaged parts and replace as required
	Incorrect tire pressure	Inflate all tires to manual specifications
Transfer case leakage	Cracked case	Replace case
	Leakage from other components	Verify transfer case leakage. Thoroughly clean, operate and check for leaks
	Breather clogged	Remove breather hose and breather and clean or replace
	Too much or improper lubricant	Remove fluid level plug to check for excess, or drain and replace
	Loose bolts at sealing faces	Torque bolts to specifications
	Improperly applied sealant	Replace and torque bolts to specifications
	Worn or damaged oil seal	Replace oil seal

2-10. REMOVAL AND INSTALLATION

2-11. REMOVAL OF TRANSFER CASE. Refer to the vehicle service manual for specific instructions regarding supports, skid plates, shift linkage, wiring harness, speedometer cable and other components related to the transfer case installation. These may need to be removed to provide access to the transfer case. A suitable hoist for the vehicle and a jack or stand for the transfer case will be required. The jack or stand must be capable of completely and independently supporting the transfer case. It also must be able to lower, raise and move the transfer case laterally. Proceed as follows (see figure 2-2):

a. Position vehicle over suitable hoist.

b. Shift transmission into park or neutral. Shift transfer case into 2H and shut off engine.

c. Disconnect negative battery terminal.

d. Lift vehicle.

e. Place drain pan under transfer case and remove transfer case drain and fluid level plugs (see figure 2-1). Drain all fluid from transfer case and re-install plugs.

f. Disconnect all electrical wiring and/or wiring harnesses from transfer case.

g. On mechanical shift units, disconnect shift linkage from transfer case shift shaft (93).

h. Disconnect speedometer cable from transfer case cover (25).

i. Disconnect breather hose from transfer case breather barb (72).

j. Disconnect front driveshaft from transfer case front yoke (70).

k. Disconnect rear driveshaft from transfer case rear output companion flange (4).

l. Support transfer case with suitable jack or stand.

CAUTION

Make sure transfer case is completely supported by jack or stand before removing bolts (201) attaching transfer case to transmission. Do not allow transfer case to "hang" from transmission through splined shafts or damage may result.

m. Remove bolts (201) attaching transfer case to transmission adapter (202).

n. Move transfer case straight back to completely disengage spline of transfer case input shaft (84) from transmission.

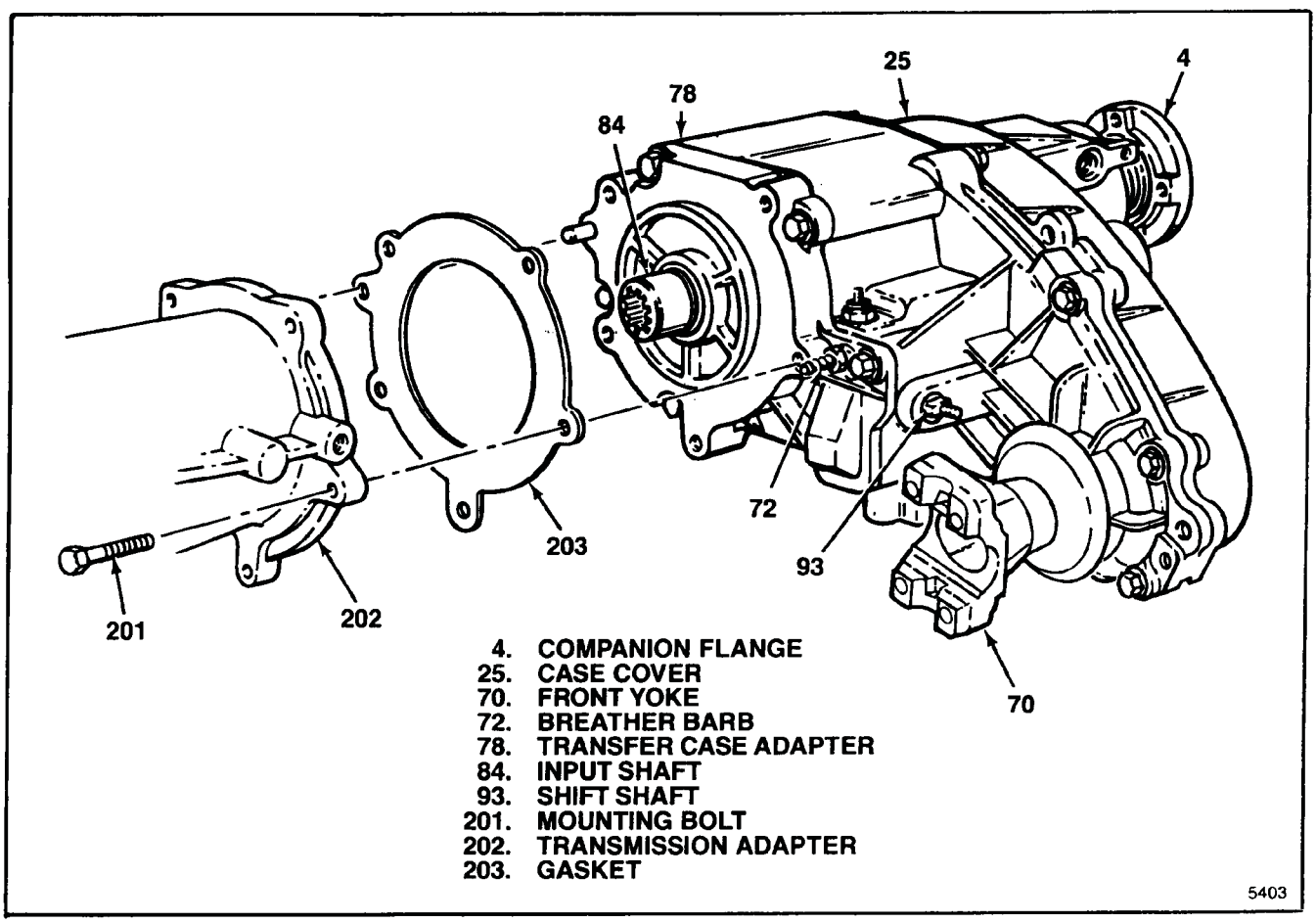


Figure 2-2. Transfer Case Installation

o. Carefully lower transfer case on jack or stand.

p. Remove gasket (203) used between transmission and transfer case. Scrape and clean all old gasket material from mating surfaces of transmission adapter (202) and transfer case adapter (78). Use care not to damage metal surfaces.

2-12. INSTALLATION OF TRANSFER CASE. Refer to the vehicle service manual for specific instructions regarding supports, skid plates, shift linkage, wiring harness, speedometer cable and other components which were removed to provide access to transfer case. With vehicle on hoist and transfer case on a suitable jack or stand, proceed as follows (see figure 2-2):

a. Apply thin coat of high temperature grease to spline of transmission output shaft.

b. Install new gasket (203) on mounting face of transfer case. After removing all of old gasket (scrap & clean) from mating surfaces, transmission adapter 202 and transfer case adapter.

c. Raise transfer case on jack or stand and align with transmission.

CAUTION

Make sure transfer case is in exact alignment with transmission before engaging splines. Do not force transfer case onto transmission. Otherwise, damage may result. If necessary, turn rear output shaft of transfer case to align input shaft (84) spline with that on transmission.

d. Carefully move transfer case forward, engaging spline on transmission and dowel pin, until mounting face of transfer case adapter (78), gasket (203) and transmission adapter (202) are in contact.

e. Make sure mounting holes in transfer case adapter (78), gasket (203) and transmission adapter (202) are aligned and install mounting bolts (201). Torque mounting bolts to 25-43 lb-ft (34-58 Nm).

f. Connect rear driveshaft to transfer case rear output companion flange (4).

g. Connect front driveshaft to transfer case front output yoke (70).

h. Connect breather hose to transfer case breather barb (72).

i. Connect speedometer cable at transfer case rear cover (25).

j. On mechanical shift units, connect shift linkage to transfer case shift shaft (93).

k. Connect all wiring and/or wiring harnesses to transfer case.

l. Fill transfer case with approved lubricant as described in paragraph 2-1.

CAUTION

Failure to fill transfer case to proper level with approved lubricant will result in damage when engine is started.

NOTE

Use of pump type filler may be necessary when filling transfer case installed on vehicle.

NOTE

If transfer case has been removed for repair or overhaul, there will be no lubricant in upper cavities served by transfer case pump. Lubricant level at fluid level plug opening will not be accurate until pump is operated and these cavities are filled. This can be done on hoist if wheels are free or by driving. Recheck lubricant level after operating pump.

m. After final check of lubricant level, lower vehicle and connect negative battery terminal.

Disassembly

3-1. GENERAL INFORMATION

3–2. During disassembly, refer to the illustrations provided with the text. In addition, an exploded view of the complete assembly can be seen in Section P, Parts.

3-3. This section provides instructions for complete disassembly of the transfer case as would be required for overhaul. If the transfer case is not due for overhaul, and repair affecting specific parts is required, disassemble only to the extent necessary to gain access to these parts. Parts removed from the transfer case as subassemblies or groups need not be disassembled for repair unless they contain the affected parts.

3-4. REMOVAL AND INSTALLATION OF TRANSFER CASE

3-5. Refer to paragraph 2-10.

3-6. TRANSFER CASE DISASSEMBLY

3-7. REMOVAL OF COMPANION FLANGE OR YOKE GROUP. Position transfer case on work bench with rear or cover side up. Use wooden blocks under front to keep assembly level. Proceed as follows (see figure 3-1):

a. Hold companion flange (4) with torque bar T-13-54-002 and remove nut (1) and washer (2). Pull companion flange (4) and remove oil seal (3).

b. If installed, remove two plugs (5) from cover (25).

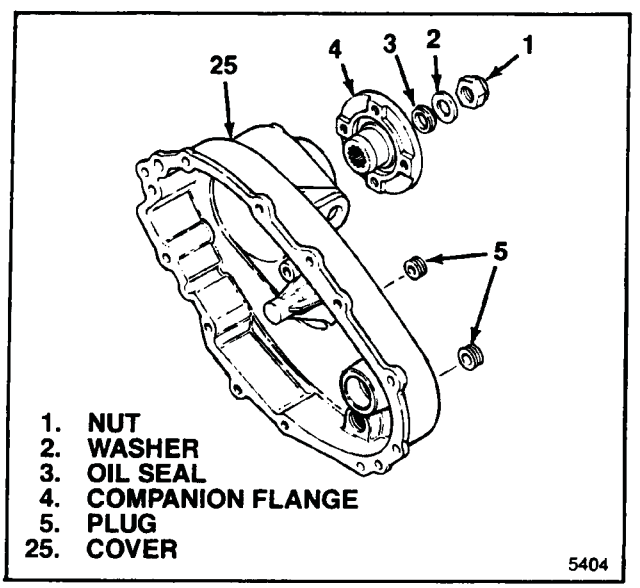


Figure 3-1. Companion Flange Group

3-8. REMOVAL OF EXTERNAL ELECTRIC SHIFT COMPONENTS (ELECTRIC SHIFT TRANSFER CASE ONLY) (See figure 3-2). On electric shift units, remove components as follows:

a. Remove bolt (6), washer (7), three bolts (8) and sensor and harness bracket (9).

b. Remove sensor assembly (10). Remove o-ring (12) from speed sensor (11).

c. Remove motor assembly (13).

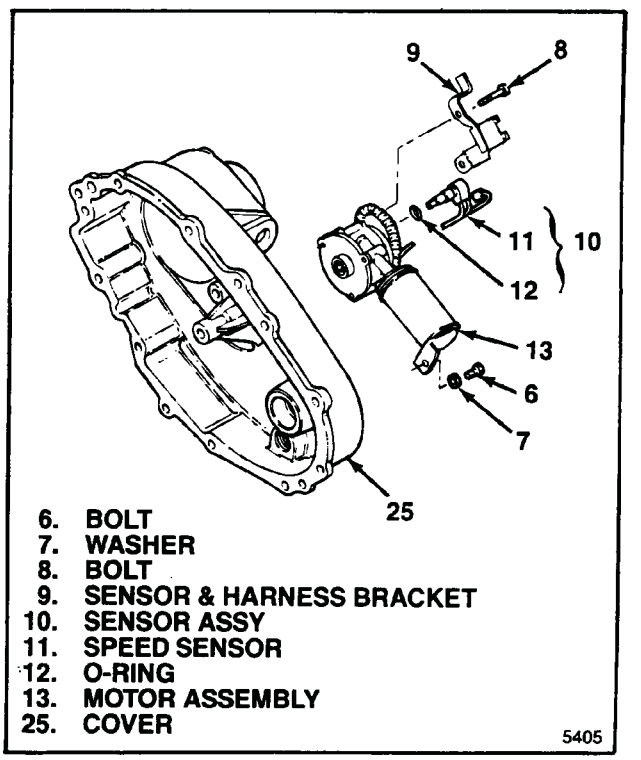


Figure 3-2. External Electric Shift Components

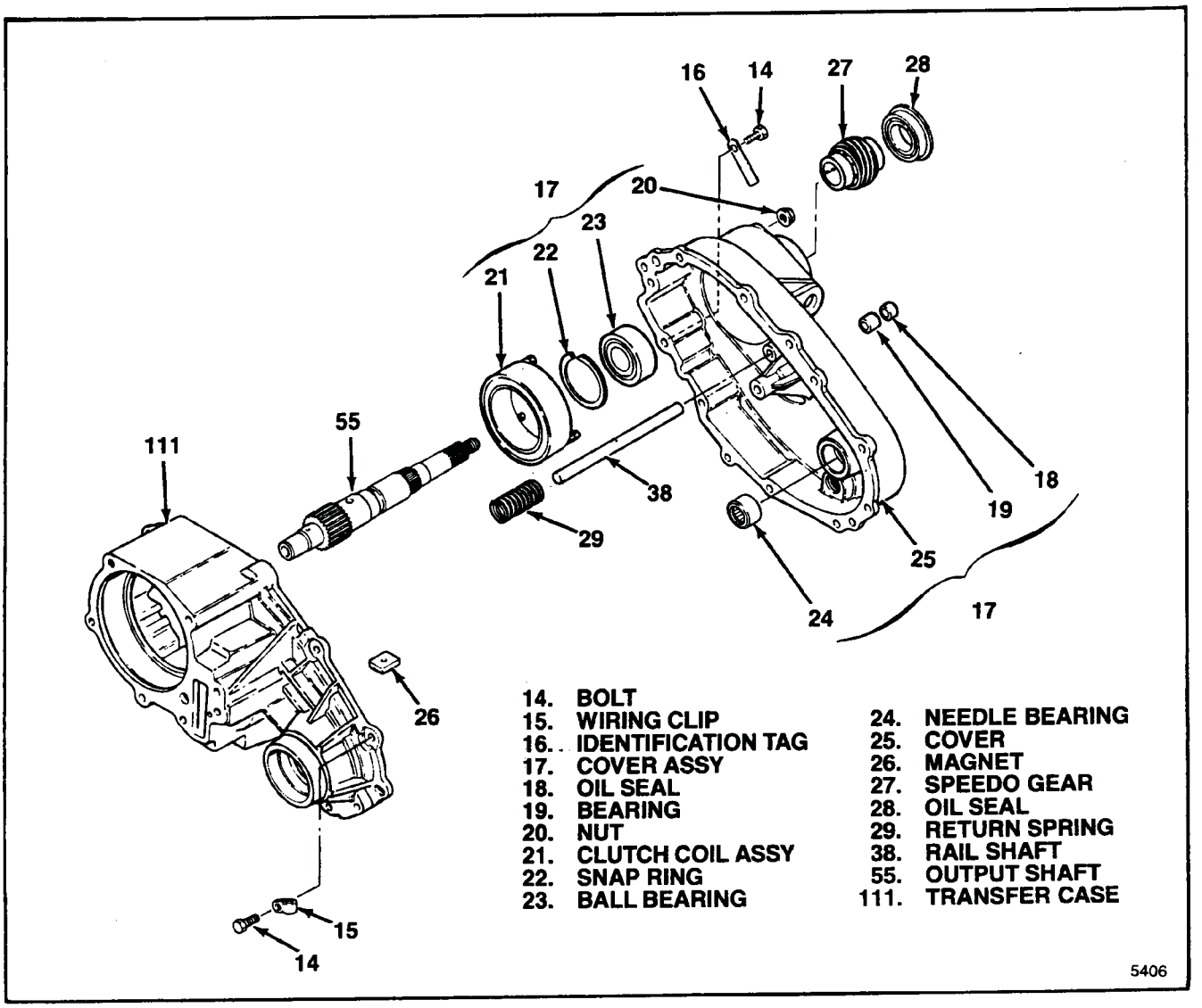


Figure 3-3. Cover Assembly

3-9. REMOVAL OF COVER. Proceed as follows (see figure 3-3):

a. Remove nine bolts (14). This will free wiring harness clip (15) and identification tag (16). Use care not to lose identification tag. It contains information required for ordering replacement parts.

b. Pry at the bosses provided on the cover (25) and transfer case (111) to break the sealant bond loose. Then, lift cover assembly (17) straight up to remove.

c. On electric shift units, remove oil seal (18), bearing (19), three nuts (20) and clutch coil assembly (21).

d. Remove snap ring (22) and pull ball bearing (23) from cover (25). This will free speedo gear (27).

e. Pull needle bearing (24) from cover (25).

f. Pull oil seal (28) from cover (25).

g. Remove magnet (26) from slot in case (111).

h. Remove return spring (29) from rail shaft (38).

i. Scrape and clean sealant from mating faces of cover (25) and transfer case (111). Use care not to damage metal faces or allow scrapings to fall into transfer case

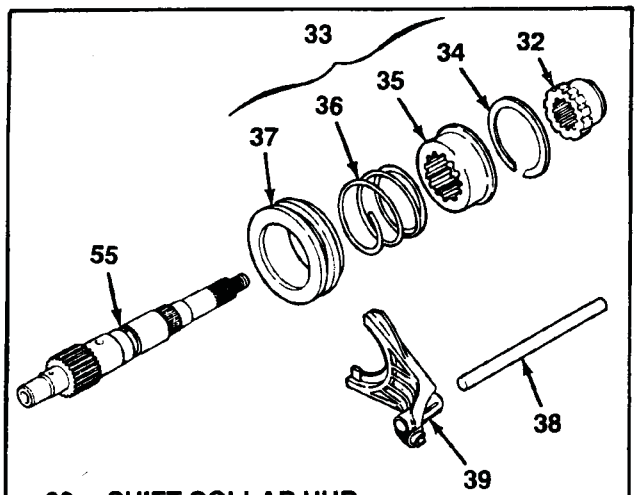


Figure 3-4. Lockup Shift Parts (Mechanical Shift)

3-10. REMOVAL OF LOCKUP SHIFT PARTS. From remaining transfer case assembly (30 through 111), remove the following (see figure 3-4) for mechanical shift; figure 3-5 for electric shift);

c. From electric shift only, remove retaining ring (30) and slide clutch housing (31) from shift collar hub (32).

b. Remove shift collar hub (32) from output shaft (55).

c. Together, slide 2W-4W lockup assembly (33) and lockup fork (39) from output shaft (55) and rail shaft (38). Separate assemblies and remove rail shaft (38).

d. To disassemble 2W-4W lockup assembly, remove snap ring (34), lockup hub (35) and return spring (36) from lockup collar (37).

e. One-piece, plastic lockup fork (39) replaces earlier fork assembly with metal fork and separate roller parts.

3-11. REMOVAL OF CHAIN DRIVE. From remaining transfer case assembly (40 through 111), remove the following (see figure 3-6):

a. Remove snap ring (40) and spacer (41) from output shaft (71).

b. Together, slide drive sprocket (42), driven sprocket (43) and drive chain (44) from output shafts (55 and 71). Separate sprockets and chain when out of assembly.

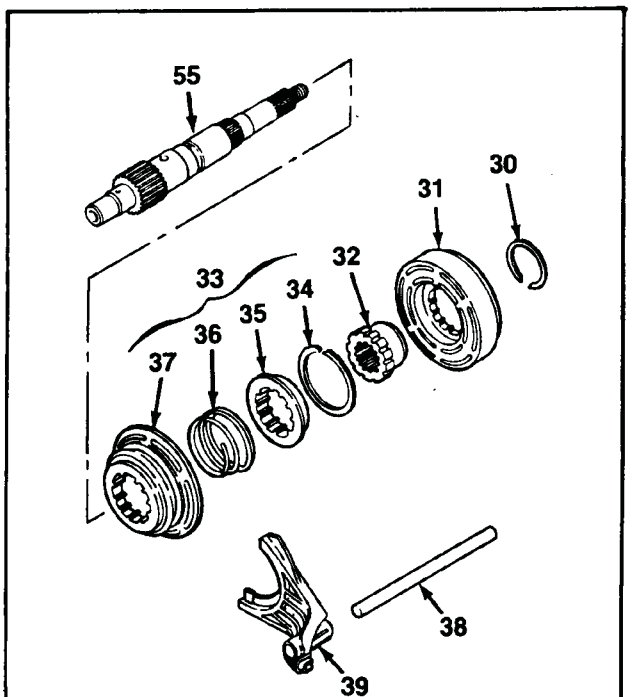


Figure 3-5. Lockup Shift Parts (Electric Shift)

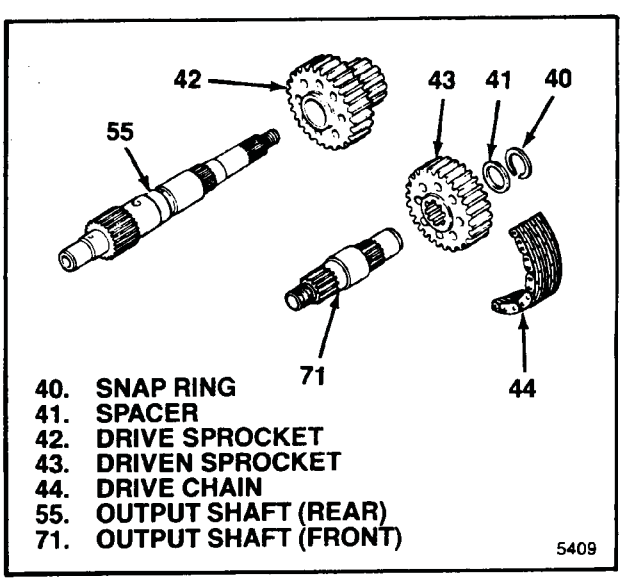


Figure 3-6. Chain Drive

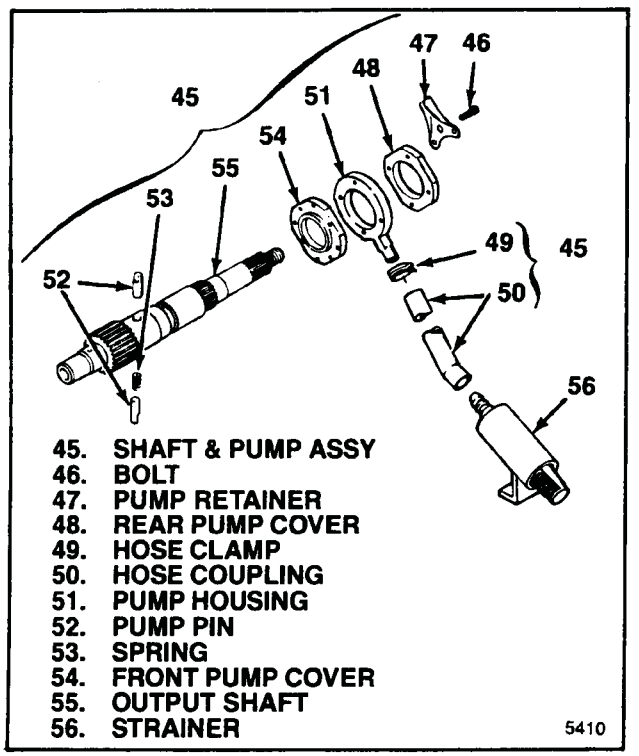


Figure 3-7. Pump Parts

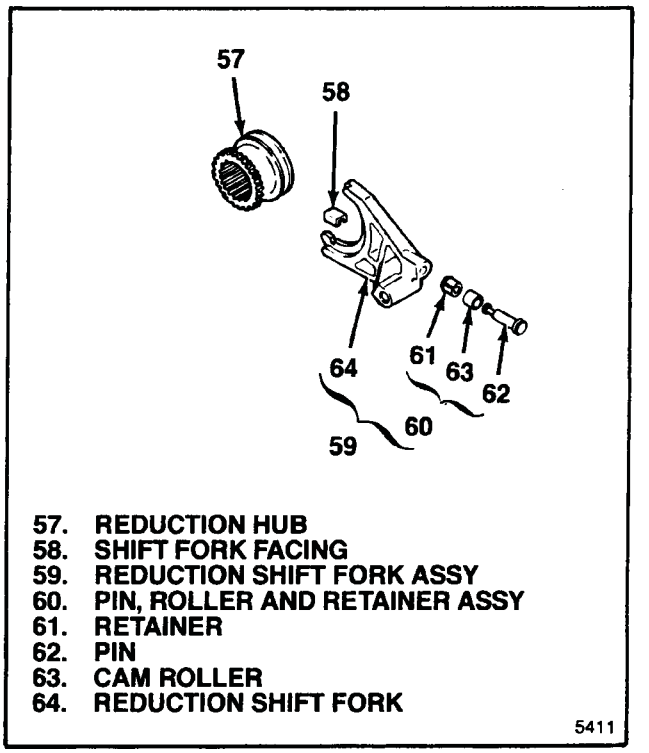


Figure 3-8. Reduction Shift Parts

3-12. REMOVAL OF OIL PUMP PARTS. From remaining transfer case assembly (45 through 111) disassemble shaft and pump assembly (45) (see figure 3-7):

a. Remove four bolts (46) and retainer (47). Slide rear pump cover (48) off output shaft (55).

b. Loosen hose clamp (49) and separate hose coupling (50) from pump housing (51). Slide pump housing off output shaft (55).

c. Remove hose clamp (49), hose coupling (50) and strainer (56).

d. Remove two pump pins (52) and spring (53) from output shaft (55).

e. Slide front pump cover (54) off output shaft (55) and remove output shaft.

3-13. REMOVAL OF REDUCTION SHIFT PARTS. From remaining transfer case assembly (57 through 111), remove the following (see figure 3-8):

a. Remove reduction hub (57) and reduction shift fork assembly (59) from transfer case.

b. Remove two facings (58) from shift fork assembly (59).

c. Disassemble fork assembly (59) only if parts replacement is required. Cut plastic retainer (61) to remove, freeing pin (62) and cam roller (63).

3-14. REMOVAL OF FRONT OUTPUT SHAFT GROUP. From remaining transfer case assembly (65 through 111), remove the following (see figure 3-9):

a. Hold yoke (70) with torque bar T-13-54-002 and remove nut (65) and washer (66). Pull yoke assembly (68) and oil seal (67).

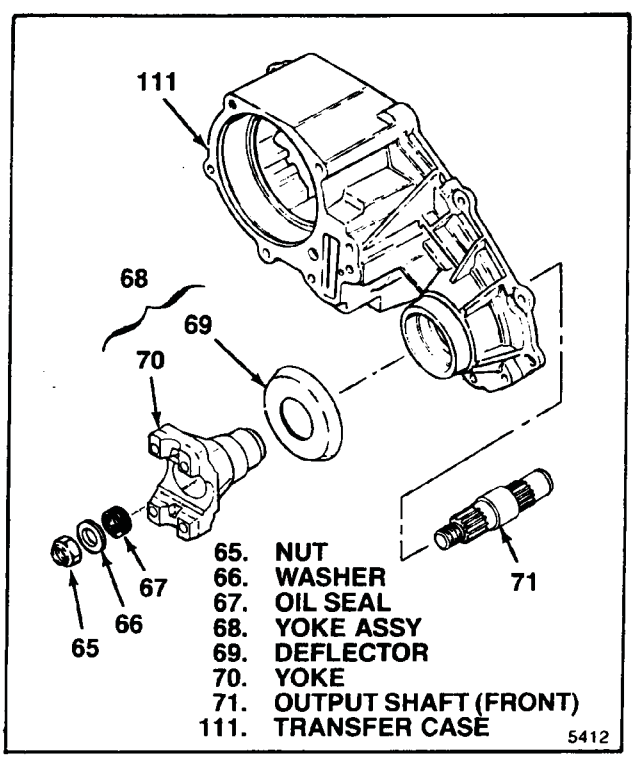


Figure 3-9. Front Output Shaft Group

b. Press deflector (69) from yoke (70) only if replacement is required.

c. Remove output shaft (71).

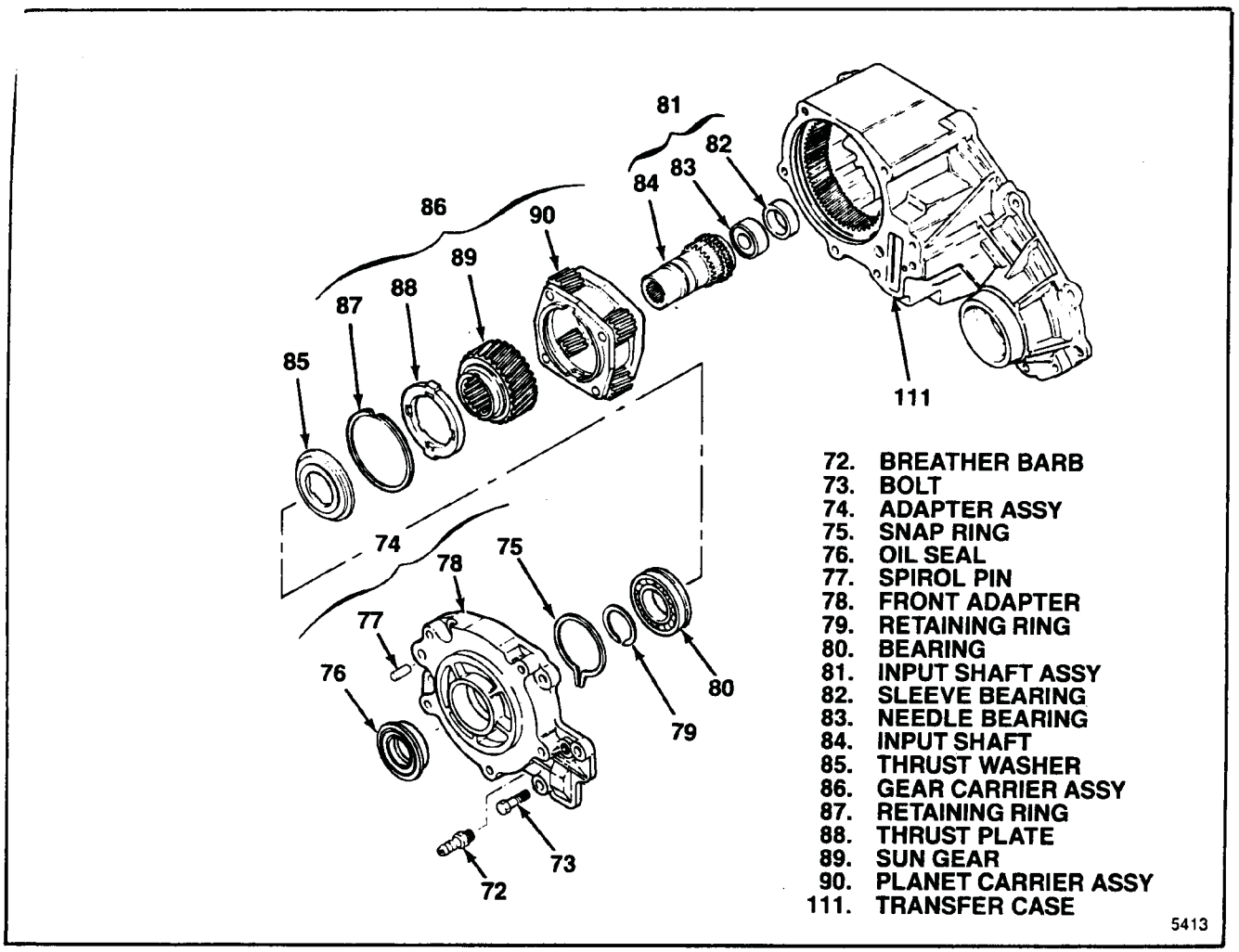


Figure 3-10. Adapter, Input Shaft and Gear Carrier Group

3-15. REMOVAL OF ADAPTER, INPUT SHAFT AND GEAR CARRIER GROUP. From remaining transfer case assembly (72 through 111), remove the following (see figure 3-10):

a. Remove breather barb (72).

b. Remove six bolts (73). Carefully pry front adapter (78) up to break sealant bond with transfer case (111). Use care not to damage adapter or case.

c. Remove adapter assembly (74), input shaft assembly (81) and gear carrier assembly (86) as an assembled group.

d. Holding end of input shaft (84) on workbench, press down on adapter while expanding long ends of snap ring (75). This will free adapter assembly (74) from remainder of group (79 through 90).

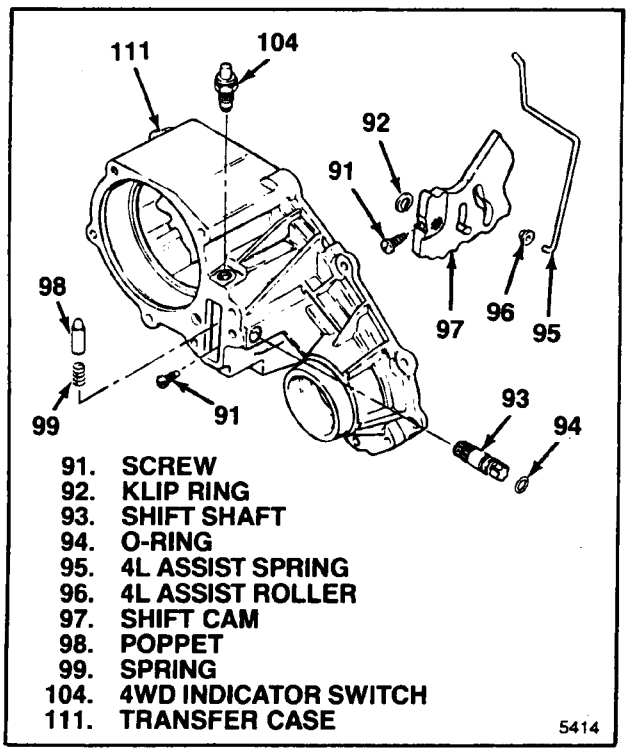
e. Remove snap ring (75) and pull oil seal (76) from front adapter (78). Remove pin (77) only if replacement is required.

f. Remove snap ring (79). Pull bearing (80) and thrust washer (85) from end of input shaft assembly (81). Remove input shaft assembly from gear carrier assembly (86).

g. To disassemble input shaft assembly, pull sleeve bearing (82) and needle bearing (83) from input shaft (84).

h. Remove retaining ring (87), thrust plate (88) and sun gear (89) from planet carrier assembly (90).

i. Do not attempt to disassemble planet carrier assembly (90).



91. SCREW
92. KLIP RING
93. SHIFT SHAFT
94. O-RING
95. 4L ASSIST SPRING
96. 4L ASSIST ROLLER
97. SHIFT CAM
98. POPPET
99. SPRING
104. 4WD INDICATOR SWITCH
111. TRANSFER CASE

5414

Figure 3-11. Mechanical Shift Cam Parts

3-16. REMOVAL OF SHIFT CAM PARTS (MECHANICAL SHIFT TRANSFER CASE ONLY). On mechanical shift units, remove the following (see figure 3-11):

a. Remove two screws (91), one from transfer case (111) and one from shift cam (97).

b. Remove klip ring (92) and shift shaft (93). Poppet (98) and spring (99) may pop out as shift shaft is removed. Use care not to loose these parts. Remove o-ring (94) from shift shaft.

c. Remove 4L assist spring (95) and roller (96).

d. Remove shift cam (97), poppet (98) and spring (99) from transfer case (111).

e. Remove 4WD indicator switch (104) from transfer case (121).

3-17. REMOVAL OF SHIFT CAM PARTS (ELECTRIC SHIFT TRANSFER CASE ONLY). On electric shift units, remove the following (see figure 3-12):

a. Remove electric shift cam group (100 through 103) from transfer case as an assembly.

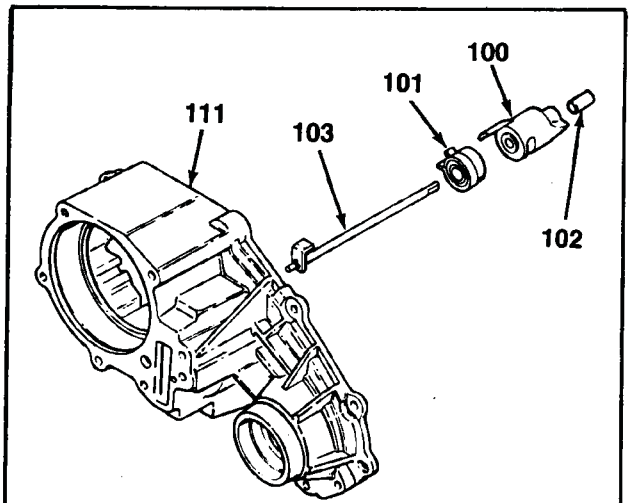
b. Slide electric shift cam (100) off shift shaft (103).

c. Clamp retainer end of shift shaft (103) in soft-jawed vise. Keeping fingers away from spring ends, pry torsion spring (101) out of engagement with shaft drive tang using a screwdriver. Remove torsion spring and spacer (102) from shift shaft.

3-18. DISASSEMBLY OF TRANSFER CASE ASSEMBLY. Disassemble transfer case assembly (105) as follows (see figure 3-13):

a. Pull oil seal (106).

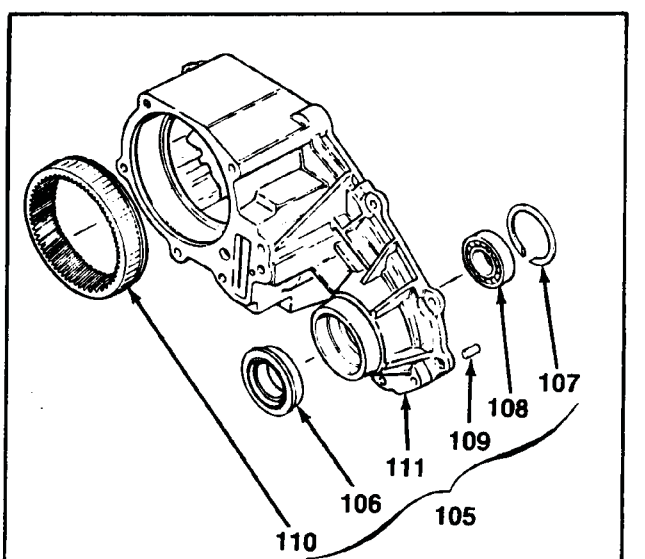
b. Remove retaining ring (107) and pull ball bearing (108).



100. ELECTRIC SHIFT CAM
101. TORSION SPRING
102. SPACER
103. SHIFT SHAFT
111. TRANSFER CASE

5415

Figure 3-12. Electric Shift Cam Parts



105. TRANSFER CASE ASSEMBLY
106. OIL SEAL
107. RETAINING RING
108. BALL BEARING
109. DOWEL PIN
110. RING GEAR
111. TRANSFER CASE

5416

Figure 3-13. Transfer Case Assembly

c. Remove dowel pins (109) from transfer case (111) only if they are loose or damaged.

d. Press ring gear (110) out of transfer case (111) only if ring gear must be replaced.

Assembly

5-1. GENERAL INFORMATION

5-2. During assembly, refer to the illustrations specified in the text. In addition, an exploded view of the complete assembly can be viewed on the applicable illustration in Section P, Parts. The exploded view illustrations are listed at the beginning of Section P. Note the following during assembly:

a. When a torque value is specified, use a torque wrench to tighten the threaded part. Torque values are specified in the text and also in Table 5-1 at the end of this section.

b. Liberally coat small parts with petrolatum to help hold them in place during assembly.

c. Press in oil seals and bearings using universal drift T-13-54-001. Do not use a hammer to drive in oil seals and bearings.

5-3. LUBRICATION DURING ASSEMBLY. Lubricate all internal parts, not coated with petrolatum, with approved transfer case lubricant (refer to paragraph 2-4) just prior to assembly. This will ease assembly and provide initial lubrication.

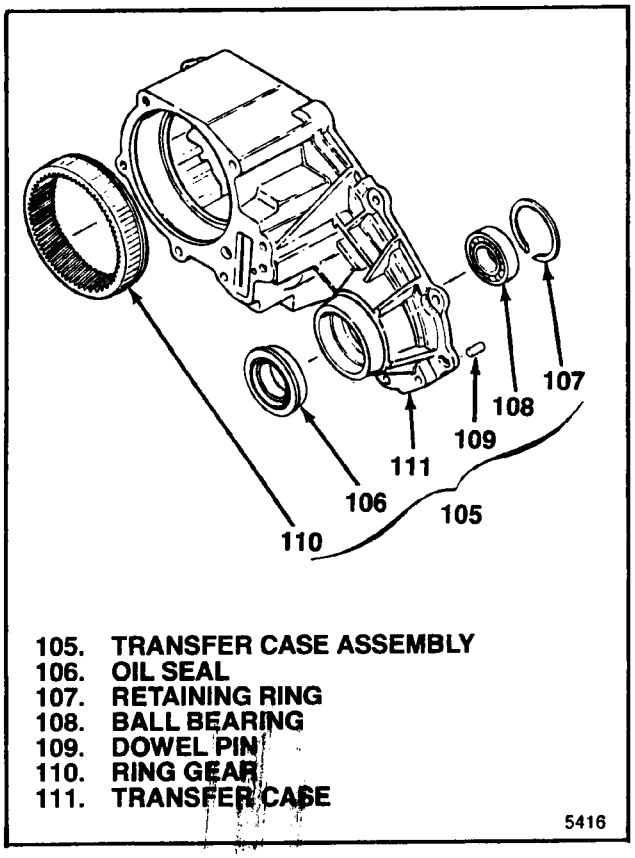


Figure 5-1. Transfer Case Assembly

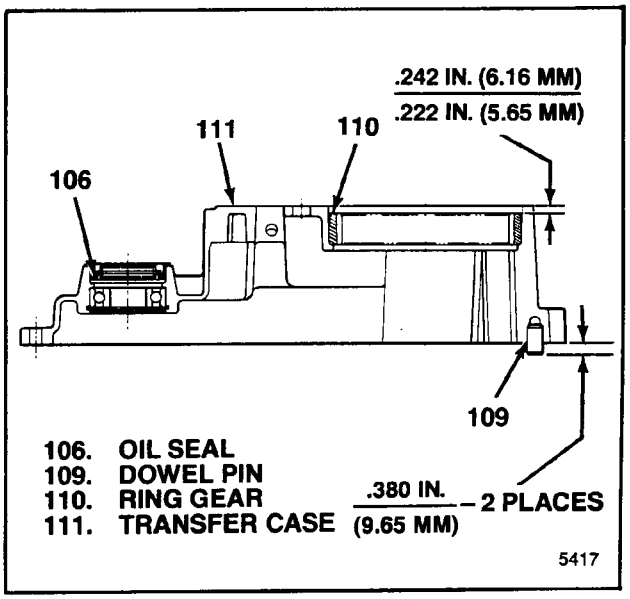


Figure 5-2. Installing Parts in Transfer Case

a. O-rings or shaft seals may be damaged if not lubricated prior to assembly.

b. Make sure bearings and bushings are thoroughly lubricated before assembly. Running bearings or bushings dry, even for a brief period, will cause damage.

c. Lubricate sealing lips of oil seals and mating metal parts prior to assembly together.

5-4. ASSEMBLY OF TRANSFER CASE

5-5. ASSEMBLY OF CASE ASSEMBLY. Assemble parts which were removed from transfer case as follows (see figure 5-1):

a. If ring gear (110) was removed for replacement, align serrations on OD of new ring gear with those in transfer case (111). Press in ring gear, chamfered end first, to dimension shown in figure 5-2. Make sure gear is not cocked and is firmly seated in case.

b. If removed, press two new dowel pins (109) into case to dimension shown in figure 5-2.

c. Press in ball bearing (108) to bottom in transfer case (111) and install retaining ring (107).

d. Position new oil seal (106) as shown in figure 5-2 and press in to seat seal flange against transfer case (111).

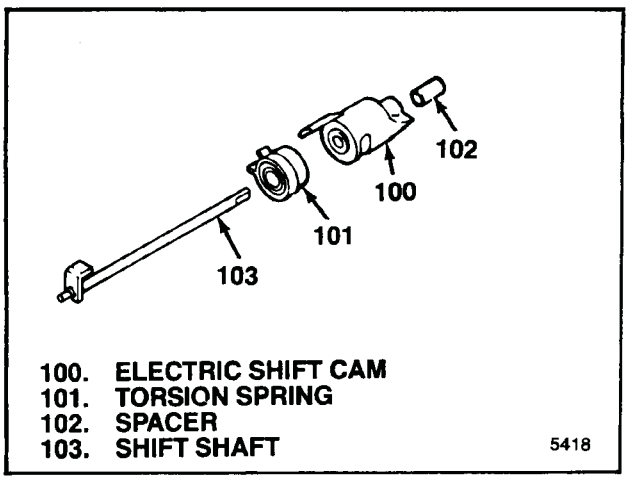


Figure 5-3. Electric Shift Cam Parts

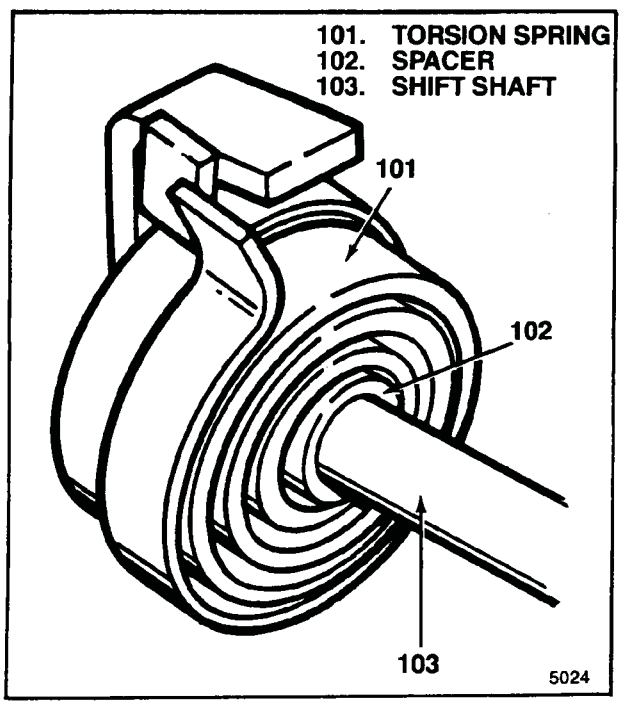


Figure 5-4. Installing First Spring End

5-6. ASSEMBLY OF SHIFT CAM PARTS (ELECTRIC SHIFT TRANSFER CASE ONLY). On electric shift units, assemble the following (see figure 5-3):

a. Insert spacer (102) in torsion spring (101) ID and install over free end of shift shaft (103).

b. Slide torsion spring (101) and spacer (102) on shift shaft (103) up to drive tang and position first spring end to left (viewed from free end of shaft) of drive tang (see figure 5-4).

c. Twist second spring (101) end to right of drive tang on shift shaft (103) (see figure 5-5).

d. Push torsion spring (101) and spacer (102) together back as far as they will go (see figure 5-6).

e. Slide electric shift cam (100) onto shift shaft (103), drive tang on cam first. Position drive tang on cam so that it will go under drive tang on shift shaft and between spring ends and slide cam as far as it will go.

f. Defer installation of completed electric shift cam assembly (100 through 103) in transfer case assembly until after shift forks are installed (paragraph 5-13).

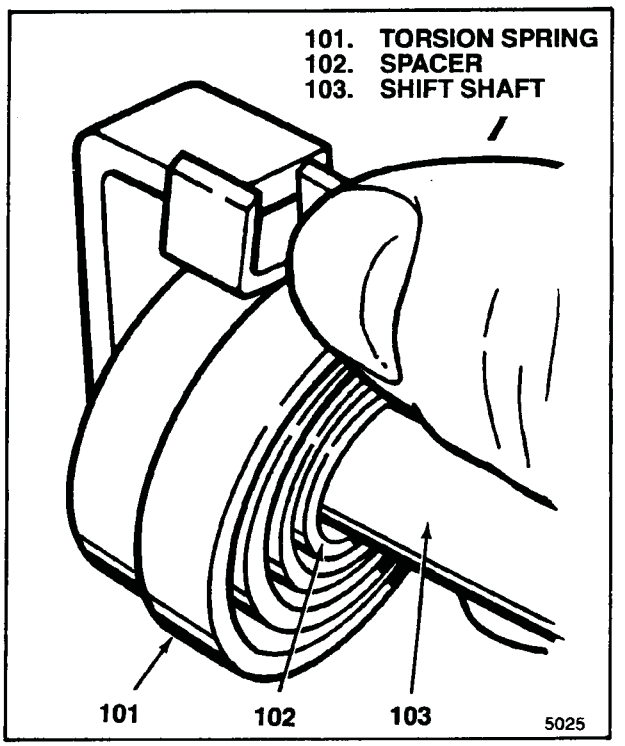


Figure 5-5. Installing Second Spring End

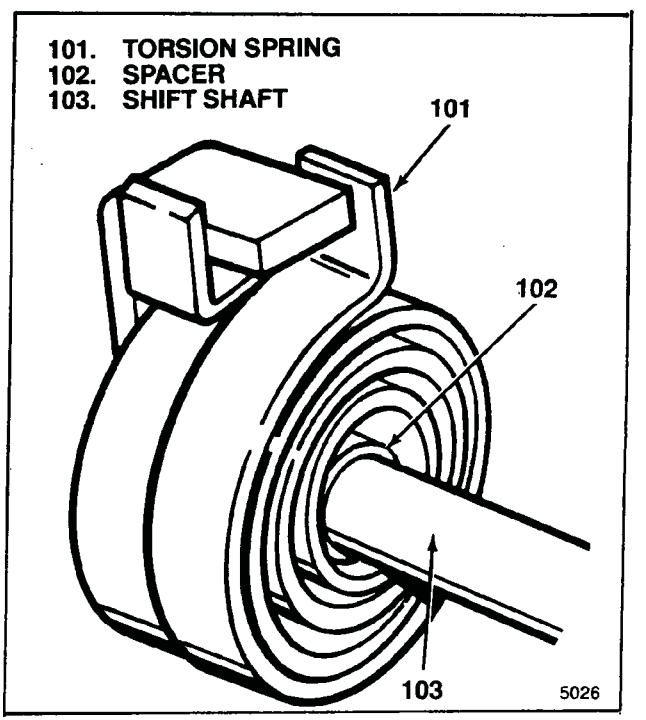


Figure 5-6. Completing Spring Assembly

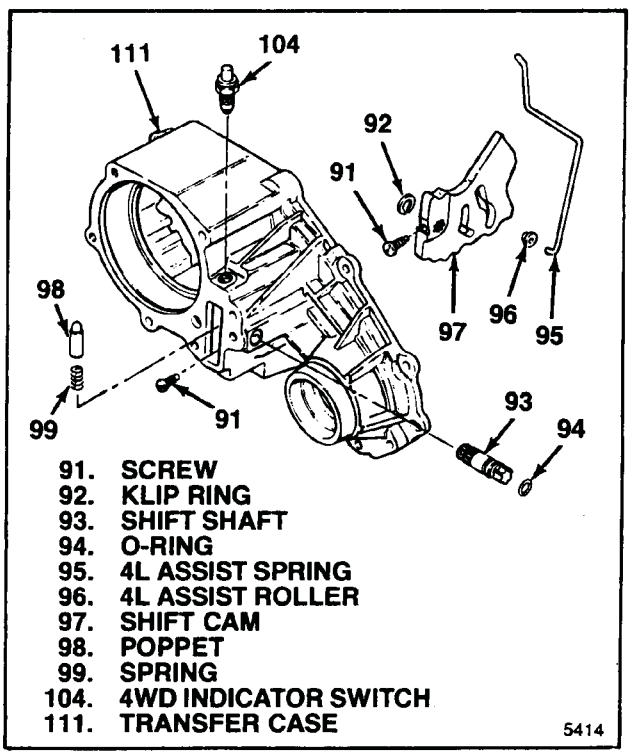


Figure 5-7. Mechanical Shift Cam Parts

5-7. ASSEMBLY OF SHIFT CAM PARTS (MECHANICAL SHIFT TRANSFER CASE ONLY). On mechanical shift units, install parts as follows (see figure 5-7):

a. Lubricate o-ring (94) and install on shift shaft (93). Start splined end of shift shaft into transfer case (111) until end is flush with inside of case. Position flats on outside end of shaft as shown in figure 5-7.

b. Apply petrolatum to spring (99) and poppet (98) and position these parts in hole in transfer case (111). Using care not to unseat poppet, insert shift cam (97) into transfer case in position shown in figure 5-7, with flat end of cam approximately parallel with front face of case. Pressing cam against poppet and compressing spring, align splines in cam and on shaft (93) and press shaft fully into cam.

c. Install klip ring (92) in groove near inside end of shift shaft (93).

d. Install two screws (91), one in end of shift cam (97) and one in transfer case. Torque screws to 4-7 lb-ft (6.8-9.5 Nm). Make sure that shift shaft (93) is fully engaged so that second screw end enters groove in shaft.

g. Install assist roller (96) on end of assist spring (95) and install in groove in shift cam (97) closest to shift shaft (93). Install other end of spring in hole in transfer case (111).

h. Install 4WD indicator switch (104) and torque to 25-35 lb-ft (34-47 Nm)

5-8. ASSEMBLY OF ADAPTER, INPUT SHAFT AND CARRIER GROUP. On work bench, assemble parts as follows (see figure 5-8):

a. Lay planet carrier assembly (90) on work bench with end having groove for retaining ring (87) up.

b. Install sun gear (89) with hub end up. Rotate gears of planet carrier assembly (90) as required until sun gear is fully meshed.

c. Align tabs and install thrust plate (88) into planet carrier assembly (90)

d. Install retaining ring (87) to complete gear carrier assembly (86).

e. If removed, position needle bearing (83) as shown in figure 5-9 and press into input shaft (84) to dimension shown. Press in new sleeve bearing (82) to dimension shown in figure 5-9) to complete input shaft assembly (81).

f. Lift up gear carrier assembly (86) and install input shaft assembly (81) up through gear carrier assembly. Install thrust washer (85) and press bearing (80) over end of input shaft assembly. Retain bearing on input shaft with retaining ring (79) in shaft groove.

g. If removed, press new pin (77) into front adapter (78) to dimension shown in figure 5-10.

h. Position oil seal as shown in figure 5-10 and press into front adapter to dimension shown.

i. Install snap ring (75) in groove in front adapter (78) with long ends of snap ring in adapter groove to complete front adapter assembly (74).

j. Position front adapter assembly (84) with face that mates with transfer case (111) up. Support on wood blocks to provide clearance for input shaft assembly (81). Position assembled input shaft and carrier group (79 through 90) over front adapter with input shaft (84) down. Lower shaft and carrier group while expanding long ends of snap ring (75) until snap ring engages groove in OD of bearing (80).

k. Apply continuous 1/16 in. (1.6 mm) bead of sealant (Neutral Cure RTV, Loctite 598) all around transfer case (111) mounting face for front adapter (78). Center sealant bead between edges of face. Circle bolt holes.

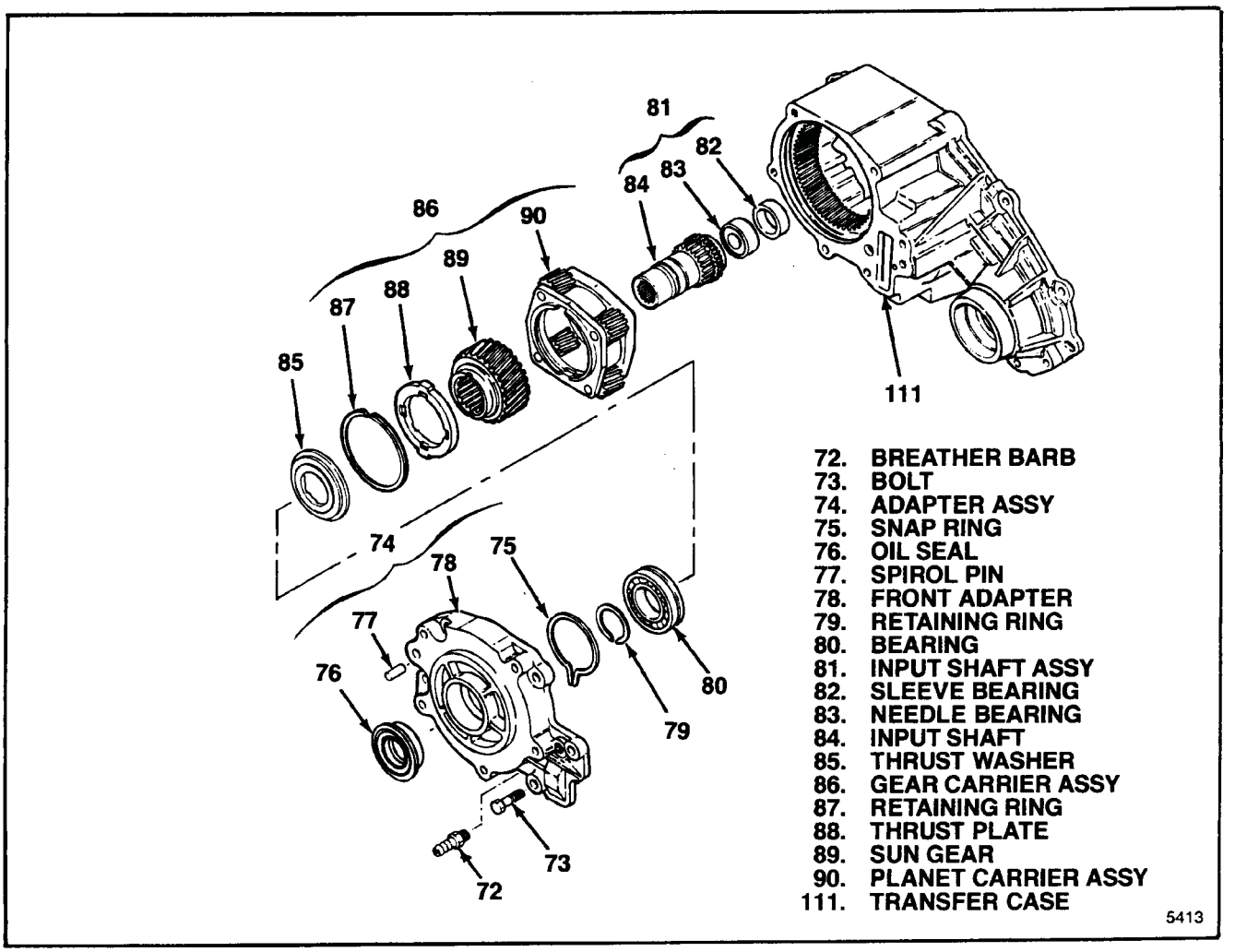


Figure 5-8. Adapter, Input Shaft and Gear Carrier Group

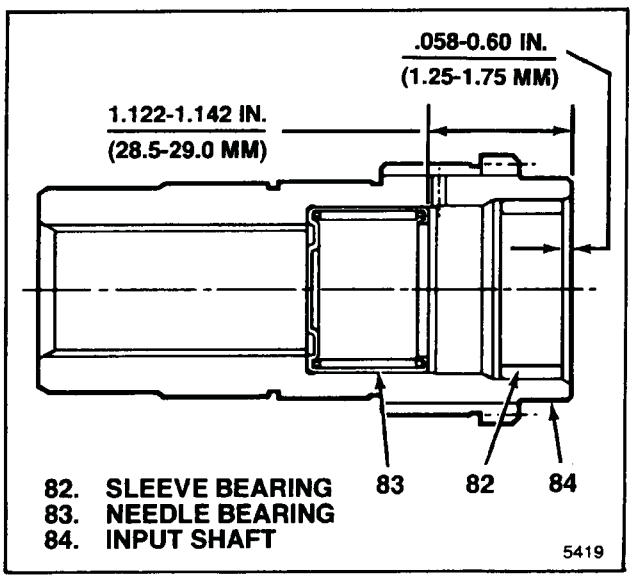


Figure 5-9. Input Shaft Assembly

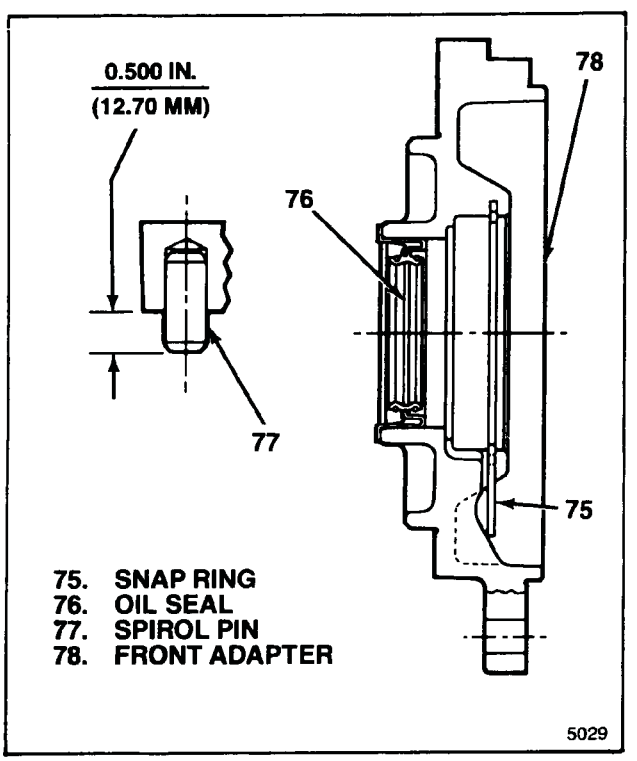


Figure 5-10. Front Adapter Assembly

l. Install assembled adapter, input shaft and carrier group (75 through 90) on transfer case (111) and attach with six bolts (73). Torque bolts to 20-34 lb-ft (27-46 Nm).

m. Install breather barb (72) and torque to 6-14 lb-ft (8-19 Nm).

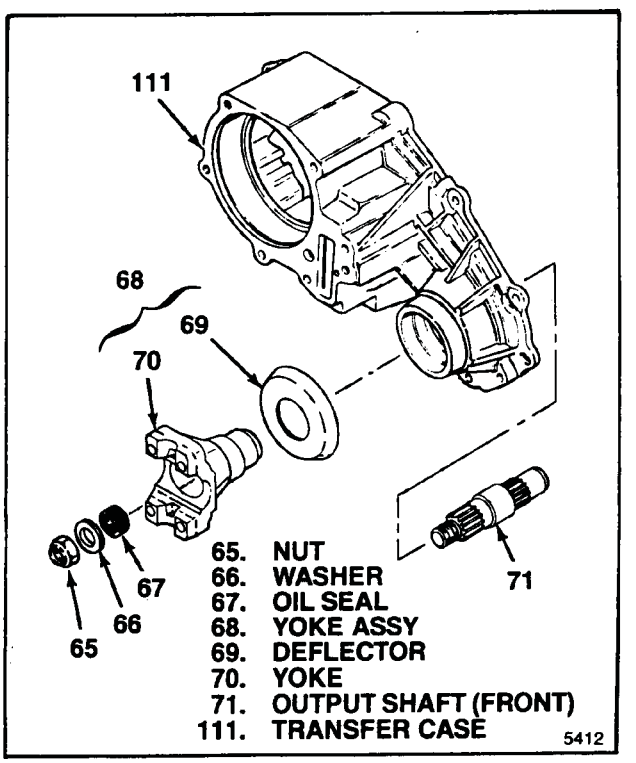


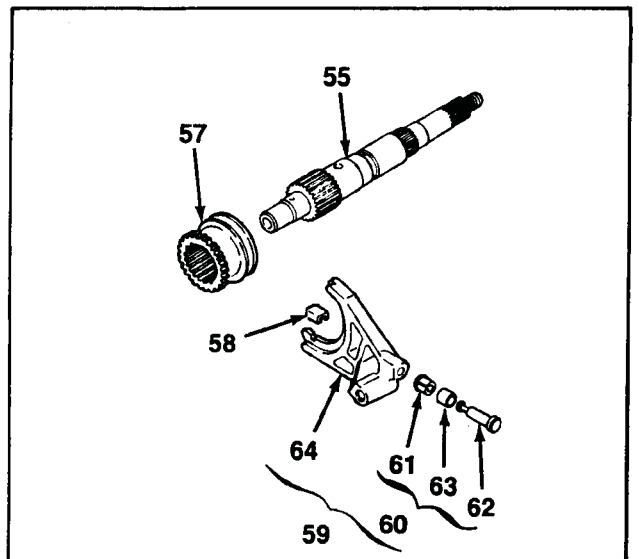
Figure 5-11. Front Output Shaft Group

5-9. INSTALLING FRONT OUTPUT SHAFT GROUP. To assembly as completed thus far (72 through 111), install parts as follows (see figure 5-11):

a. If removed, press deflector (69) onto yoke (70).

b. Position output shaft (71) in transfer case (111) and install yoke assembly (68), oil seal (67), washer (66) and nut (65).

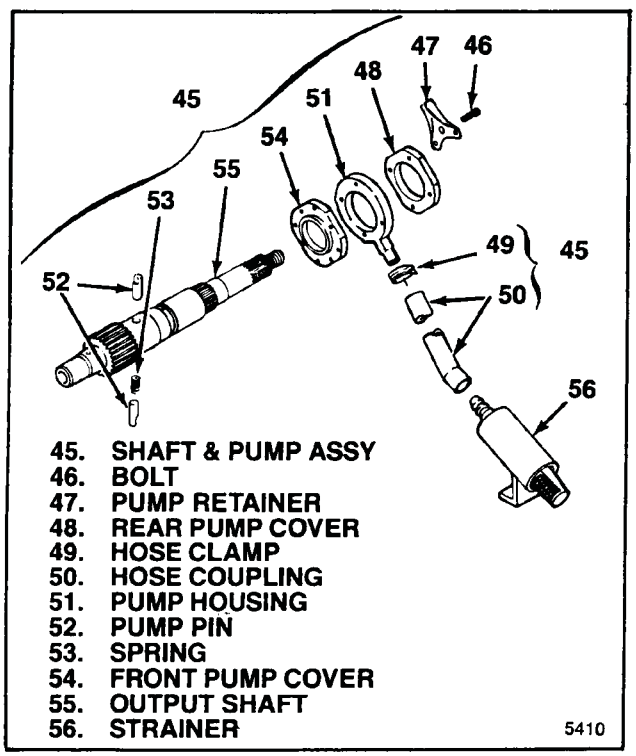
c. Hole yoke (70) with torque bar T-13-54-002 and torque nut (65) to 150-180 lb-ft (203-244 Nm).



55. OUTPUT SHAFT
57. REDUCTION HUB
58. SHIFT FORK FACING
59. REDUCTION SHIFT FORK ASSY
60. PIN, ROLLER AND RETAINER ASSY
61. RETAINER
62. PIN
63. CAM ROLLER
64. REDUCTION SHIFT FORK

5420

Figure 5-12. Reduction Shift Parts



45. SHAFT & PUMP ASSY
46. BOLT
47. PUMP RETAINER
48. REAR PUMP COVER
49. HOSE CLAMP
50. HOSE COUPLING
51. PUMP HOUSING
52. PUMP PIN
53. SPRING
54. FRONT PUMP COVER
55. OUTPUT SHAFT
56. STRAINER

5410

Figure 5-13. Pump Parts

5-10. ASSEMBLY OF REDUCTION SHIFT PARTS. Assemble and install parts as follows (see figure 5-12):

a. If disassembled for parts replacement, assemble reduction shift fork assembly (59) using new pin, roller and retainer assembly (60). Press pin, roller and retainer assembly into bore in reduction shift fork (64) until retainer (61) passes completely through and snaps in place. Make sure that cam roller (63) turns freely.

b. Install two fork facings (58) on reduction shift fork assembly (59).

c. Engage reduction shift fork assembly (59) with reduction hub (57) and position in transfer case, reduction hub in gear carrier assembly previously installed. On mechanical shift units only, engage cam roller (63) in cam slot in shift cam previously installed.

d. Install output shaft (55), engaging output shaft end with input shaft bearings and output shaft spline with reduction hub.

NOTE

Installation of output shaft (55) may be deferred and oil pump assembled to output shaft (paragraph 5-11) on work bench. Bench assembled, pump can be tested by immersing filter in transmission oil (Table 2-2) and rotating shaft in counterclockwise direction when viewed from output end. Assembled parts then can be installed in transfer case as a unit.

5-11. ASSEMBLY OF OIL PUMP. Be sure to thoroughly lubricate pump parts as they are assembled but keep oil out of tapped holes in pump front cover. Assemble parts as follows (see figure 5-13):

a. Locate pump front cover (54). Front pump cover has tapped holes. Position front cover so that word TOP faces down and turned so that it will be at top of transfer case when installed in vehicle. Install front pump cover (54) over output shaft (55) in this position.

b. Install two pump pins (52) with spring (53) between them in output shaft (55). Flat surface on both pins must point out and face up. Center pins and spring in output shaft.

c. Push hose coupling (50) onto barb on strainer (56) and install L shaped foot on filter in slot in transfer case. Hose coupling must point in direction of pump assembly.

d. Install pump housing (51) so that word REAR marked on it is up and hose barb points toward hose coupling (50) and strainer (56). Lower pump housing over upper output shaft, moving pump pins (52) inward and compressing spring (53) so that both pins are contained inside pump housing.

e. Slip hose clamp (49) over free end of hose coupling (50) and push onto hose barb on pump housing (51). Secure hose clamp over hose coupling on hose barb.

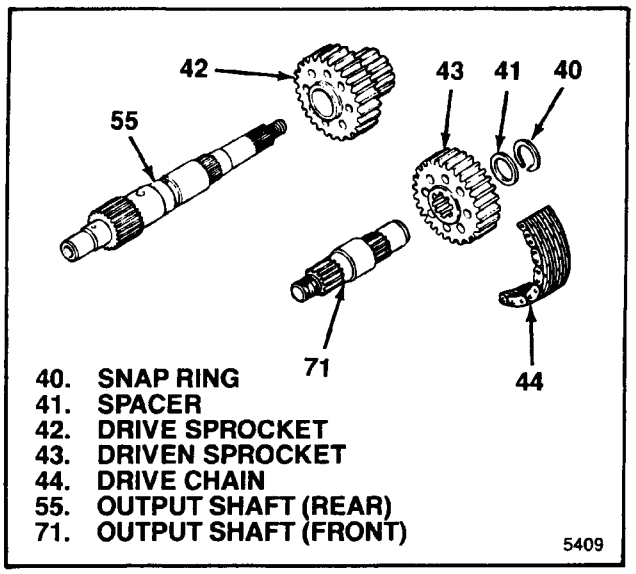


Figure 5-14. Chain Drive

f. Position pump rear cover (48) over assembly with words TOP REAR facing up and located to be at top of transfer case when installed. Position pump retainer (47) on cover so that tab on retainer is in notch in transfer case. Clean threads on four bolts (46) and apply Loctite 222. Align pump holes and install bolts. Torque bolts to 2.9-6.3 lb-ft (4.0-8.5 Nm) while turning output shaft (55) by hand to insure that pump pins (52) move freely.

5-12. INSTALLATION OF CHAIN DRIVE. To assembly as completed thus far (45 through 111) assemble parts as follows (see figure 5-14):

a. On work bench, next to transfer case assembly, position driven sprocket (43) (with internal spline) at front output shaft (71) end of case and drive sprocket (42) (with smooth bore) at output shaft (55) end.

b. Assemble drive chain (44) around sprockets (42 and 43).

c. Grasp each sprocket (42 and 43), hold drive chain (44) tight and parallel with transfer case, and install chain drive assembly (42 through 44) over output shafts (71 and 55). It may be necessary to rotate driven sprocket (43) slightly to engage splines on front output shaft (71).

d. Install spacer (41) on front output shaft (71). Install snap ring (40) in shaft groove over spacer.

5-13. INSTALLING LOCKUP SHIFT PARTS. To assembly as completed thus far (40 through 111) install parts as follows (see figure 5-15 for electric shift; 5-16 for mechanical shift):

a. Assemble return spring (36) and lockup hub (35) in lockup collar (37) and retain with snap ring (34), completing 2W-4W lockup assembly (33).

b. Install rail shaft (38) in transfer case, through reduction shift fork assembly previously installed and into blind hole in case.

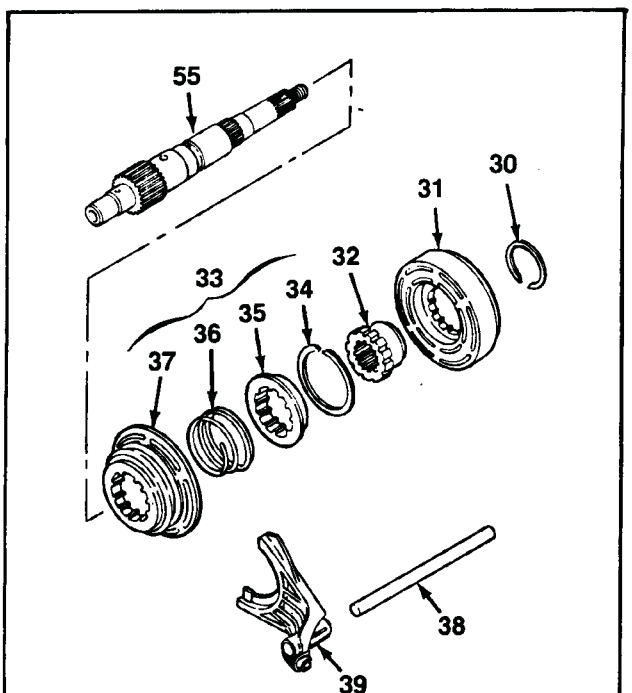


Figure 5-15. Lockup Shift Parts (Electric Shift)

c. Engage lockup fork (39) in groove in 2W-4W lockup assembly and slide this group down over output shaft (55) and rail shaft (38).

d. Install shift collar hub (32), engaging splines on output shaft (55) and in 2W-4W lockup assembly (33).

e. On electric shift units only, install electric shift cam group (100 through 103) previously assembled (paragraph 5-6) and clutch housing (31) as follows:

1. Position electric shift cam group as shown in figure 5-17, rotated so that end of torsion spring (101) will contact side of reduction shift fork assembly (59) that faces up, toward top of case.

2. Holding rail shaft (38) down, raise up fork assemblies (59 and 39) slightly. Rotate electric shift cam group into position so that roller on reduction shift fork assembly (59) is in groove in shift cam (100) and button on lockup fork (39) is on cam end. Then lower this group of parts into the transfer case engaging shift shaft (103) on pin in transfer case.

3. Position clutch housing (31) in transfer case over shift collar hub (32). Attach with retaining ring (30) in clutch collar hub groove.

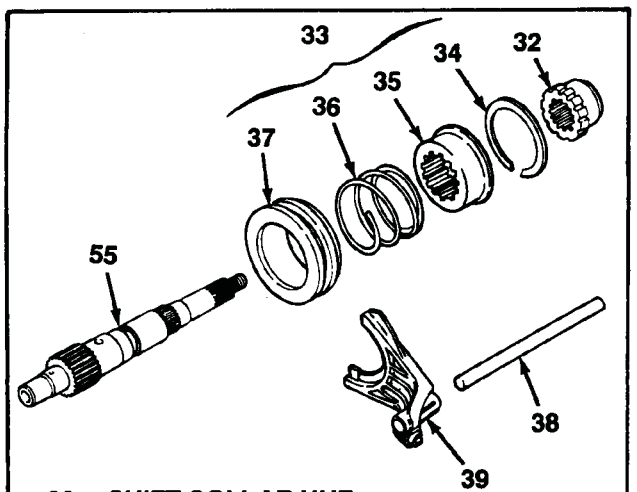


Figure 5-16. Lockup Shift Parts (Mechanical Shift)

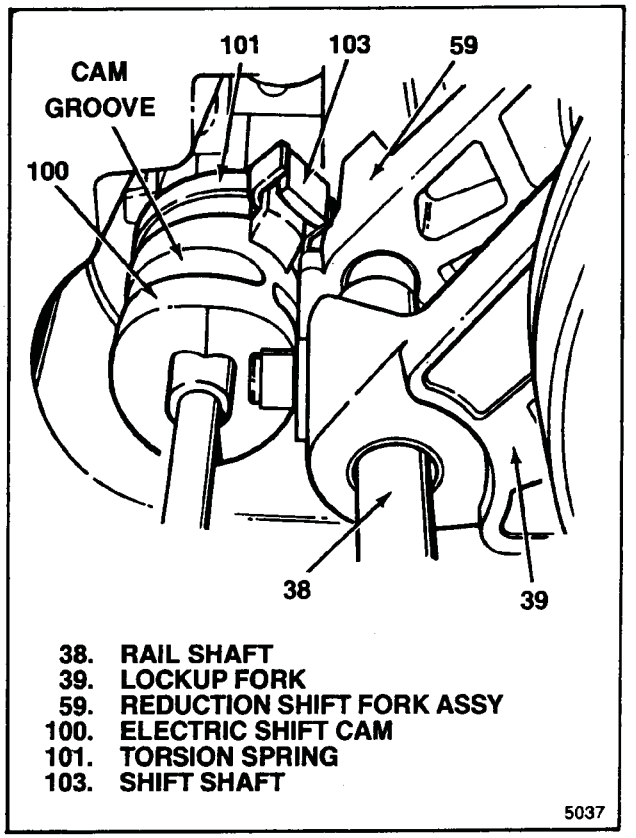


Figure 5-17. Electric Shift Cam Installation

5-14. COVER ASSEMBLY. Assemble parts into cover as follows (see figure 5-18):

a. Position cover (25) on bed of suitable press so that open face of cover is up and parallel with press bed.

b. Position end of needle bearing (24) with identification marking up and press into cover (25) until upper end of bearing is 1.593-1.603 in. (40.47-40-97 mm) below face of cover that mates with transfer case.

c. Press in ball bearing (23) to bottom in cover (25) and install snap ring (22).

d. On electric shift units only, install parts as follows:

1. Verify that four o-rings (one on wire and one each on three studs) are in place on clutch coil assembly (21). Install clutch coil assembly in inside of cover (25), with electrical wire and studs extending through cover. Use care not to kink or trap electrical wire under clutch coil assembly. Attach with three nuts (20) and torque to 6-8 lb-ft (8-11 Nm).

2. Install motor bearing (19) and oil seal (18) in cover (25).

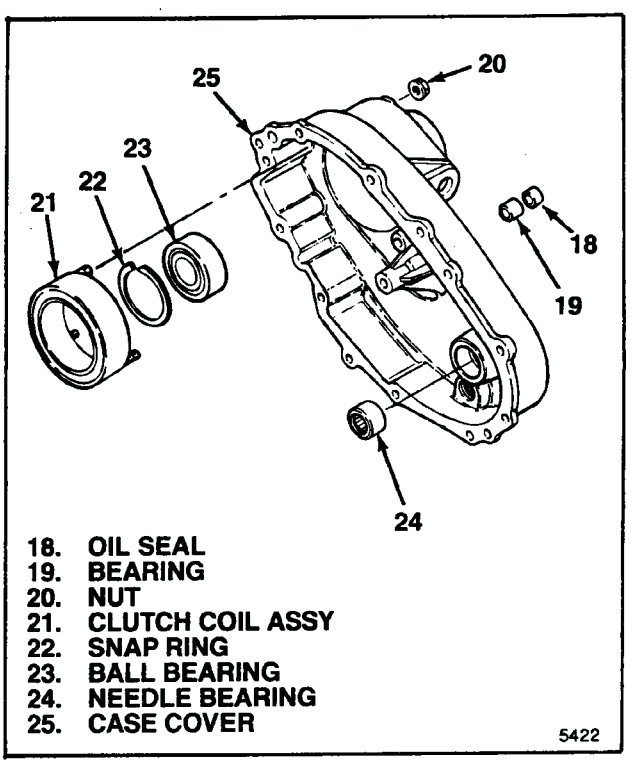


Figure 5-18. Cover Assembly

5-15. INSTALLING COVER ASSEMBLY. Install cover assembly as completed in paragraph 5-14 on transfer case as follows (see figure 5-19):

a. Install return spring (29) over rail shaft (38) in transfer case to rest on shift fork.

b. Install magnet (26) in slot in transfer case (111).

c. Apply continuous 1/16 in. (1.6 mm) bead of sealant (Neutral Cure RTV, Loctite 598) all around transfer case (111) mounting face for cover assembly (17). Center sealant bead between edges of face. Circle bolt holes. Remove excess if sealant bead is larger than 1/16 in. (1.6 mm).

CAUTION

In the following step do not use excessive force in an attempt to seat cover on transfer case. When all of the alignment conditions specified are met, the cover will seat without using undue force. If not, remove cover assembly and check alignment conditions.

d. Install cover assembly (17) on transfer case (111). All of the following alignment conditions must be met for the cover assembly to seat on transfer case properly (see figure 5-20):

1. Cover holes with transfer case dowel pins (109).

2. Cover bearings with output shafts (55 and 71).

3. Blind hole in cover with rail shaft (38). Make sure spring (29) is not cocked. On electric shift, check with pen light through cover hole for speed sensor.

4. On electric shift units, cover bearing with shift shaft (103).

e. Install nine bolts (14) positioning identification tag (16) and wiring clip (15) under bolt heads at locations shown in figure 5-21. Torque bolts to 20-34 lb-ft (27-46 Nm).

f. Install speedo gear (27) over spline of output shaft (55) into cover assembly (17).

g. Press new oil seal (28) into cover assembly (17).

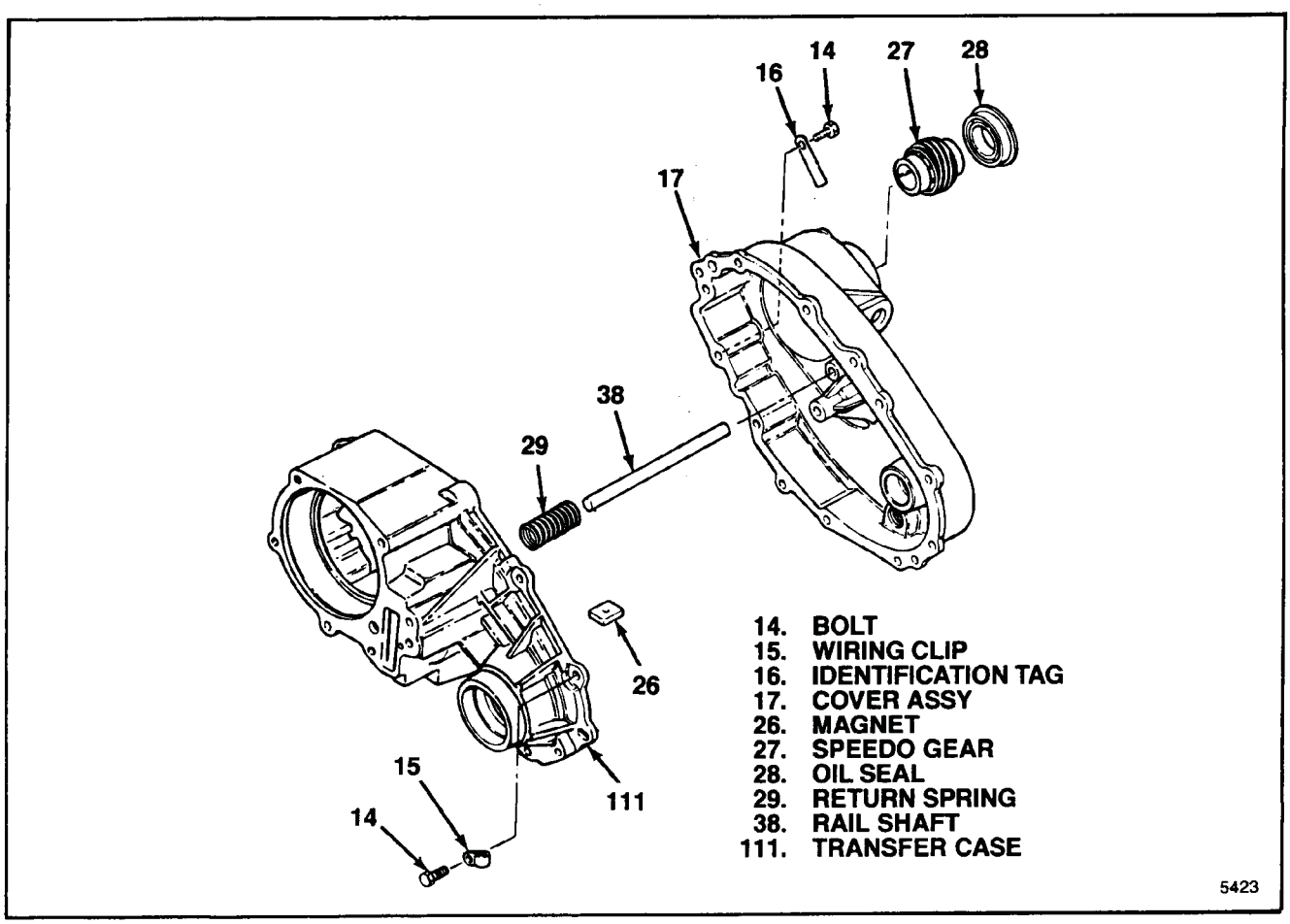


Figure 5-19. Cover Installation

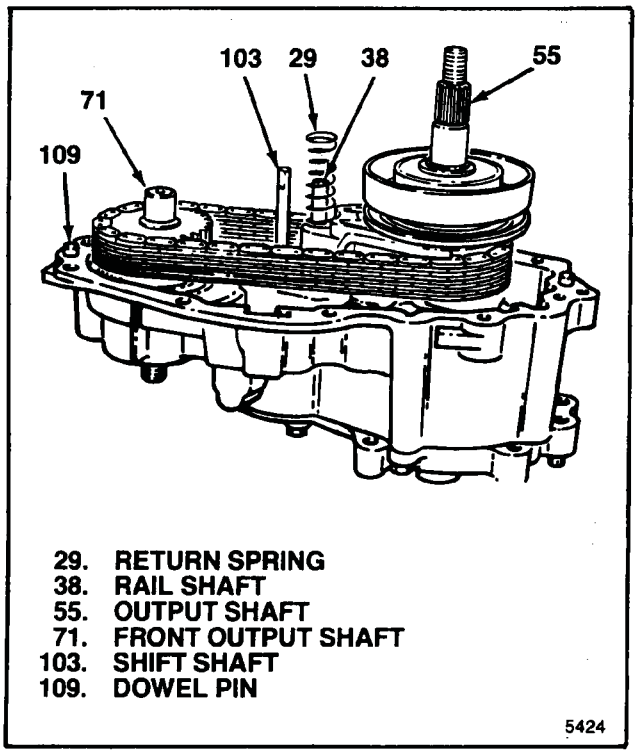


Figure 5-20. Parts To Be Aligned With Cover

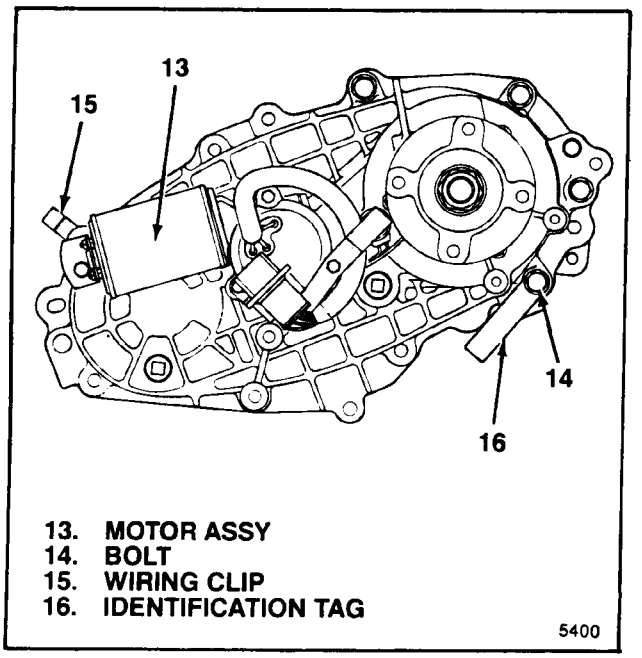


Figure 5-21. Wiring Clip, Identification Tag and Motor Locations

5-16. INSTALLING EXTERNAL ELECTRIC SHIFT COMPONENTS (ELECTRIC SHIFT TRANSFER CASE ONLY) (See figure 5-22). On electric shift units, install components as follows:

b. Position motor assembly (13) so that triangular slot in motor will align with shift shaft (103) (see figure 5-23). Move motor in to engage shift shaft and contact cover (25). Then rotate motor in clockwise direction until motor is in correct position (see figure 5-21) and mounting holes are aligned.

c. Fit o-ring (12) on speed sensor (11) and install speed sensor assembly (10) in cover. Install bracket (9) so that it is over speed sensor and install three bolts (9). Torque bolts to 6-8 lb-ft (8-11 Nm).

d. Install bolt (6) and washer (7) at bracket end of motor assembly (13) and torque to 6-8 lb-ft (8-11 Nm).

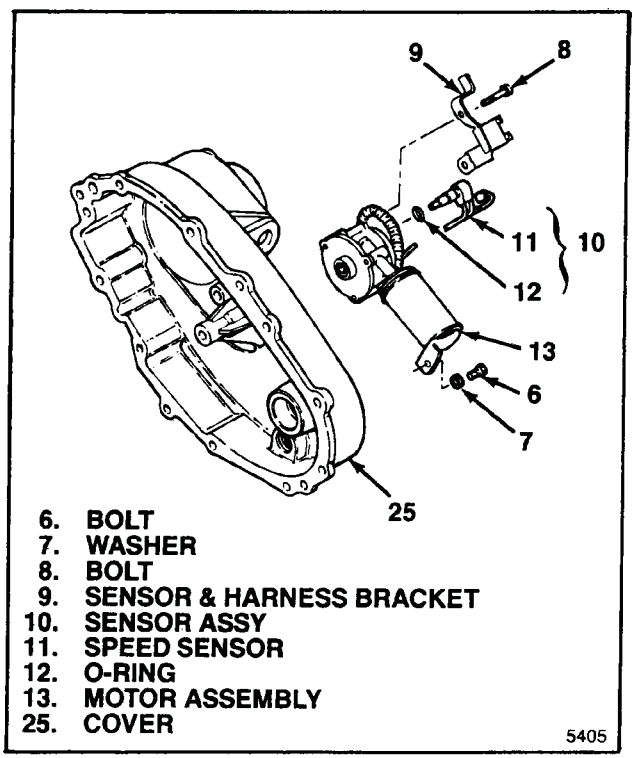
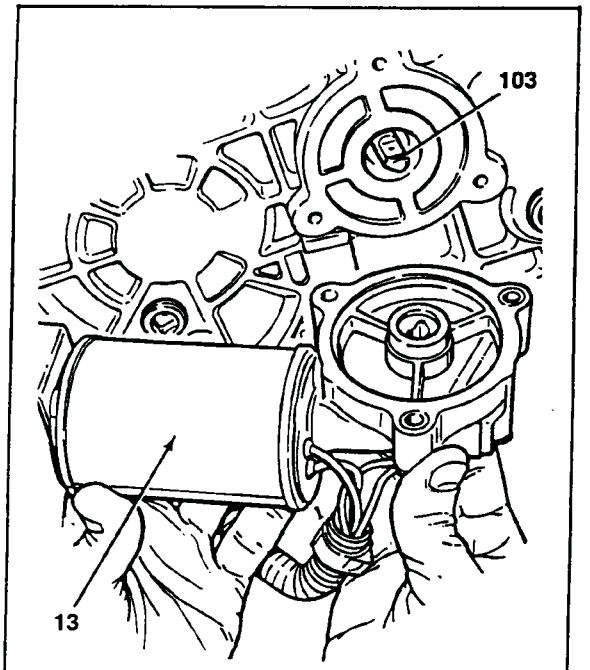


Figure 5-22. External Electric Shift Components



13. MOTOR ASSY
103. SHIFT SHAFT

Figure 5-23. Motor Assembly Alignment

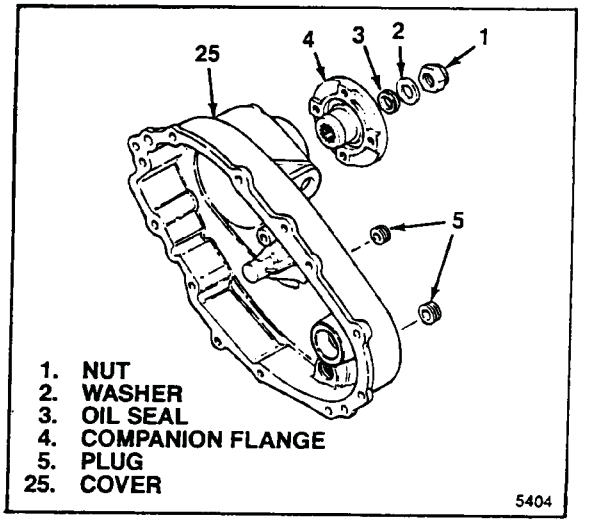


Figure 5-24. Companion Flange or Yoke Group

5-17. INSTALLING COMPANION FLANGE GROUP. To assembly as completed thus far (6 through 111), install parts as follows (see figure 5-24):

a. Install two plugs (5) in cover (25).

b. Install companion flange (4), oil seal (3), washer (2) and nut (1). Hold companion flange with torque bar T-13-54-002 and torque nut (1) to 150-180 lb-ft (203-244 Nm).

Table 5-1. Torque Values

TORQUES FOR SPECIFIC PARTS		
PART (INDEX NO.)	**TORQUE IN LB-FT**	**TORQUE IN Nm**
Yoke & flange nut (1 and 65)	150-180	203-244
Level & drain plug (5)	14-22	19-30
Motor bracket bolt (6)	6-8*	8-11
Motor mount bolt (8)	6-8	8-11
Clutch coil nut (20)	6-8	8-11
Case bolt (14)	20-34	27-46
Pump bolt (46)	2.9-6.3	4.0-8.5
Breather Barb (72)	6-14	8-19
Adapter bolt (73)	20-34	27-46
Shift shaft & cam screw (91)	5-7	6.8-9.5
4WD Switch (104)	25-35	34-47
Bracket to motor nut	1.7-2.5	
GENERAL TORQUES		
THREAD SIZE	**TORQUE IN LB-FT**	**TORQUE IN Nm**
5/16-18 UNC	15.0-25.0	20.3-33.9
3/8-16 UNC	25.0-40.0	33.9-54.5
3/8-24 UNF	25.0-40.0	33.9-54.5
7/16-14 UNC	35.0-55.0	47.5-74.6
1/2-13 UNC	45.0-70.0	61.0-94.9
1/2-30 UNF	45.0-70.0	61.0-94.9
9/16-12 UNC	60.0-90.0	81.3-122.0
1/8-27 NPTF	7.0-15.0	9.5-20.3
1/4-18 NPTF	10.0-20.0	13.6-27.1
3/8-18 NPTF	15.0-25.0	20.3-33.9
1/2-14 NPTF	20.0-30.0	27.1-40.7
3/4-14 NPTF	25.0-40.0	33.9-54.5

Parts

Contents

P-1. INTRODUCTION.

P-2. This section lists, describes and illustrates replacement parts for the Borg-Warner Automotive 13-54 Transfer Case. Each exploded view illustration, listed in the Contents, has a corresponding parts list. Index numbers are used to key each part in the exploded views to the parts list and service instructions in preceding sections of this manual.

P-3. The PART NUMBER column in the parts list gives the part number which can be used to order replacement parts. Since this section covers more than one model, and not all detail parts are used on a particular model, the words "not used" may appear in this column. Complete information on the identification tag (16, figure P-1 or P-2) should be included with all parts orders (see figure 1-1).

P-4. The DESCRIPTION column gives the part nomenclature used, not only in the list but also in the service instructions.

P-5. The QTY column designates the number of parts used at the location defined by the index number. Letter symbols may be used in this column to designate specific information. The symbols are as follows:

a. AR — As Required. This is used for selective fit parts, determined as necessary at assembly.

b. NP — Not Procurable. Detail parts so designated are not procurable separately. When replacement is required, order the next higher assembly.

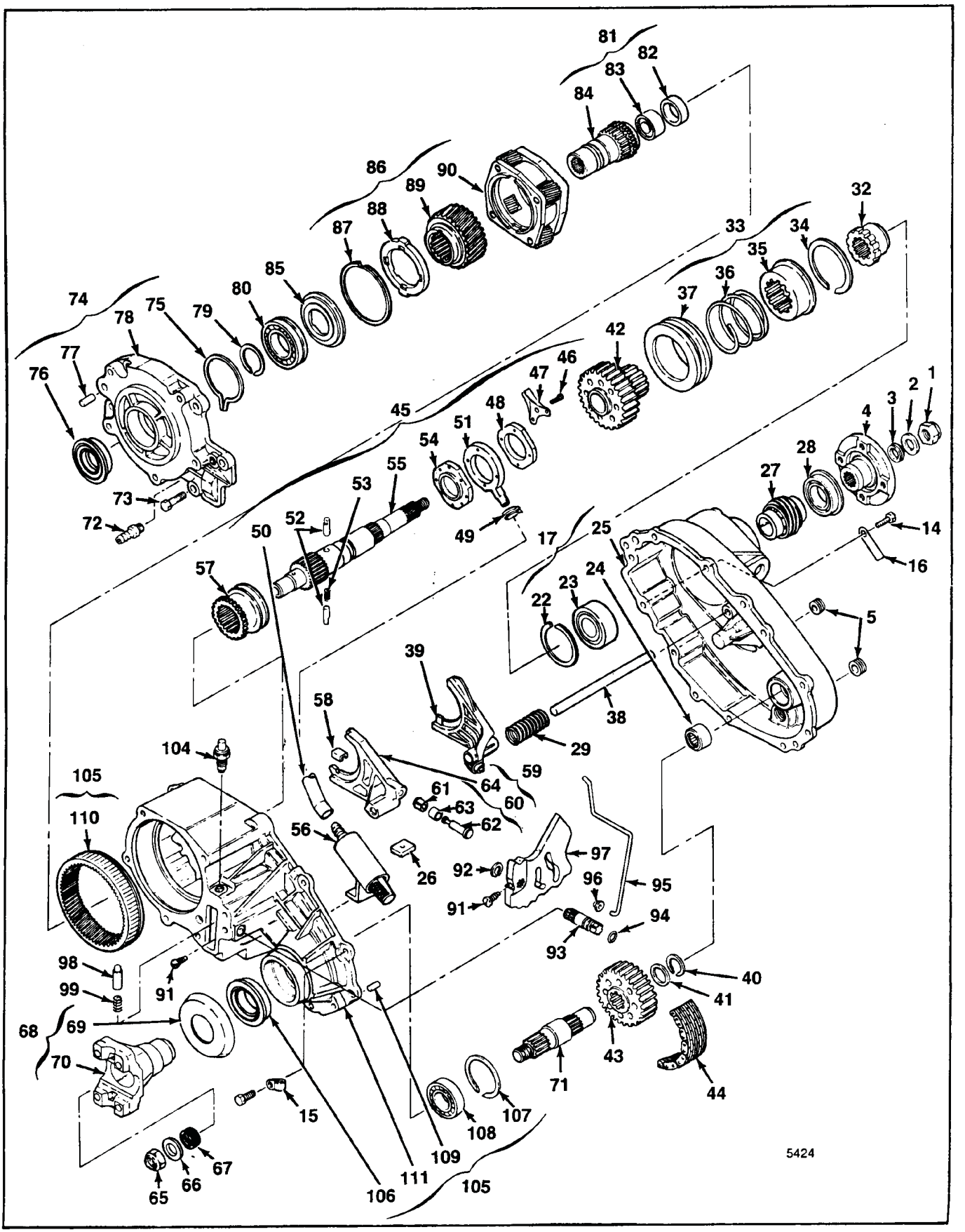


Figure P-1. Transfer Case Assembly, Mechanical Shift

PARTS LIST FOR FIGURE P-1

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
1	19-00-149-001	Nut	1
2	10-00-047-016	Washer	1
3	10-00-044-012	Seal, Oil	1
4	13-00-031-001	Flange, Companion	1
5	0000445751	Plug, Pipe	2
6	Not used		
7	Not used		
8	Not used		
9	Not used		
10	Not used		
11	Not used		
12	Not used		
13	Not used		
14	13-00-183-018	Bolt, Hex Head	9
15	10-00-056-007	Clip, Wiring Harness	1
16	13-54-199-XXX	Tag, Identification	1
17	13-54-539-001	Cover Assy, Transfer Case	1
18	Not used		
19	Not used		
20	Not used		
21	Not used		
22	R6A-7-1/2	•Ring, Snap	1
23	10-00-130-008	•Bearing, Annular	1
24	10-00-132-039	•Bearing, Needle	1
25	13-54-039-001	•Cover, Transfer Case	1
26	10-00-012-002	Magnet	1
27	13-50-110-002	Gear, Speedo	1
28	10-00-044-052	Seal, Oil	1
29	13-50-156-002	Spring, Return	1
30	Not used		
31	Not used		
32	13-50-090-001	Hub, Shift Collar	1

PARTS LIST FOR FIGURE P-1 (CONT)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
33	13-50-589-002	Lockup Assy, 2W-4W	1
34	10-00-139-041	•Ring, Snap	1
35	13-50-089-003	•Hub, Lockup	1
36	13-50-156-001	•Spring, Sleeve Return	1
37	13-50-055-002	•Collar, Lockup	1
38	13-50-100-001	Shaft, Rail	1
39	13-54-096-001	Fork, Lockup	1
40	10-00-139-038	Ring, Snap	1
41	13-50-193-003	Spacer	1
42	13-50-144-003	Sprocket, Drive	1
43	13-54-144-001	Sprocket, Driven	1
44	13-50-143-001	Chain, Drive	1
45	13-50-671-001	Shaft and Pump Assy	1
46	13-45-183-003	•Bolt, Hex Head	4
47	13-50-056-004	•Retainer, Pump	1
48	13-45-039-005	•Cover, Pump, Rear	1
49	13-45-056-005	•Clamp, Hose	1
50	13-50-034-002	•Coupling, Hose	1
51	13-45-097-004	•Housing, Pump	1
52	13-45-043-007	•Pin, Pump	2
53	13-45-156-004	•Spring, Pump Pin	1
54	13-45-039-007	•Cover, Pump, Front	1
55	13-50-171-001	•Shaft, Output	1
56	13-45-238-001	Strainer Assy	1
57	13-50-089-001	Hub, Reduction	1
58	13-45-235-001	Facing, Shift Fork	2
59	13-50-596-005	Fork Assy, Reduction Shift	1
60	13-50-543-001	•Pin, Roller & Retainer Assy	1
61	13-50-040-002	••Retainer	1
62	13-50-043-001	••Pin	1
63	13-52-127-001	••Roller, Cam	1
64	13-50-096-004	•Fork, Reduction Shift	1

PARTS LIST FOR FIGURE P-1 (CONT)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
65	19-00-149-001	Nut	1
66	10-00-047-016	Washer	1
67	10-00-044-012	Seal, Oil	1
68	10-00-531-005	Yoke Assy	1
69	13-50-035-002	•Deflector, Dust	1
70	13-00-031-005	•Yoke	1
71	13-54-171-001	Shaft, Front Output	1
72	13-45-072-001	Barb, Breather	1
73	13-00-183-018	Bolt, Hex Head	6
74	13-54-672-001	Adapter Assy, Front	1
75	10-00-139-039	•Ring, Snap	1
76	10-00-044-052	•Seal, Oil	1
77	10-00-043-017	•Pin, Spirol	1
78	13-54-172-001	•Adapter, Front	1
79	10-00-139-040	Ring, Retainer	1
80	10-00-130-011	Bearing, Annular	1
81	13-54-689-001	Shaft Assy, Input	1
82	13-45-127-002	•Bearing, Sleeve	1
83	4840G	•Bearing, Needle	1
84	13-54-189-001	•Shaft, Input	1
85	13-50-193-001	Washer, Thrust	1
86	13-50-659-007	Carrier Assy, Gear	1
87	10-00-139-043	•Ring, Retainer	1
88	13-50-014-001	•Plate, Thrust	1
89	13-50-165-001	•Gear, Sun	1
90	13-50-659-001	•Carrier Assy, Planet	1
91	13-50-183-002	Screw, Pan Head	2
92	13-45-056-002	Ring, Klip	1
93	13-54-122-003	Shaft, Shift	1
94	T89B-108	O-Ring	1
95	13-50-156-005	Spring, 4L Assist	1
96	13-00-127-001	Roller, 4L Assist	1

PARTS LIST FOR FIGURE P-1 (CONT)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
97	13-50-099-006	Cam, Shift	1
98	13-50-108-001	Poppet	1
99	13-50-156-003	Spring	1
100	Not used		
101	Not used		
102	Not used		
103	Not used		
104	13-00-140-003	Switch, 4WD Indicator	1
105	13-54-565-001	Case Assy, Transfer	1
106	10-00-044-052	•Seal, Oil	1
107	R6A-7-1/2	•Ring, Snap	1
108	10-00-130-008	•Bearing, Annular	1
109	0000141281	•Pin, Dowel	2
110	13-50-162-001	•Gear, Ring	1
111	13-54-065-001	•Case, Transfer	1

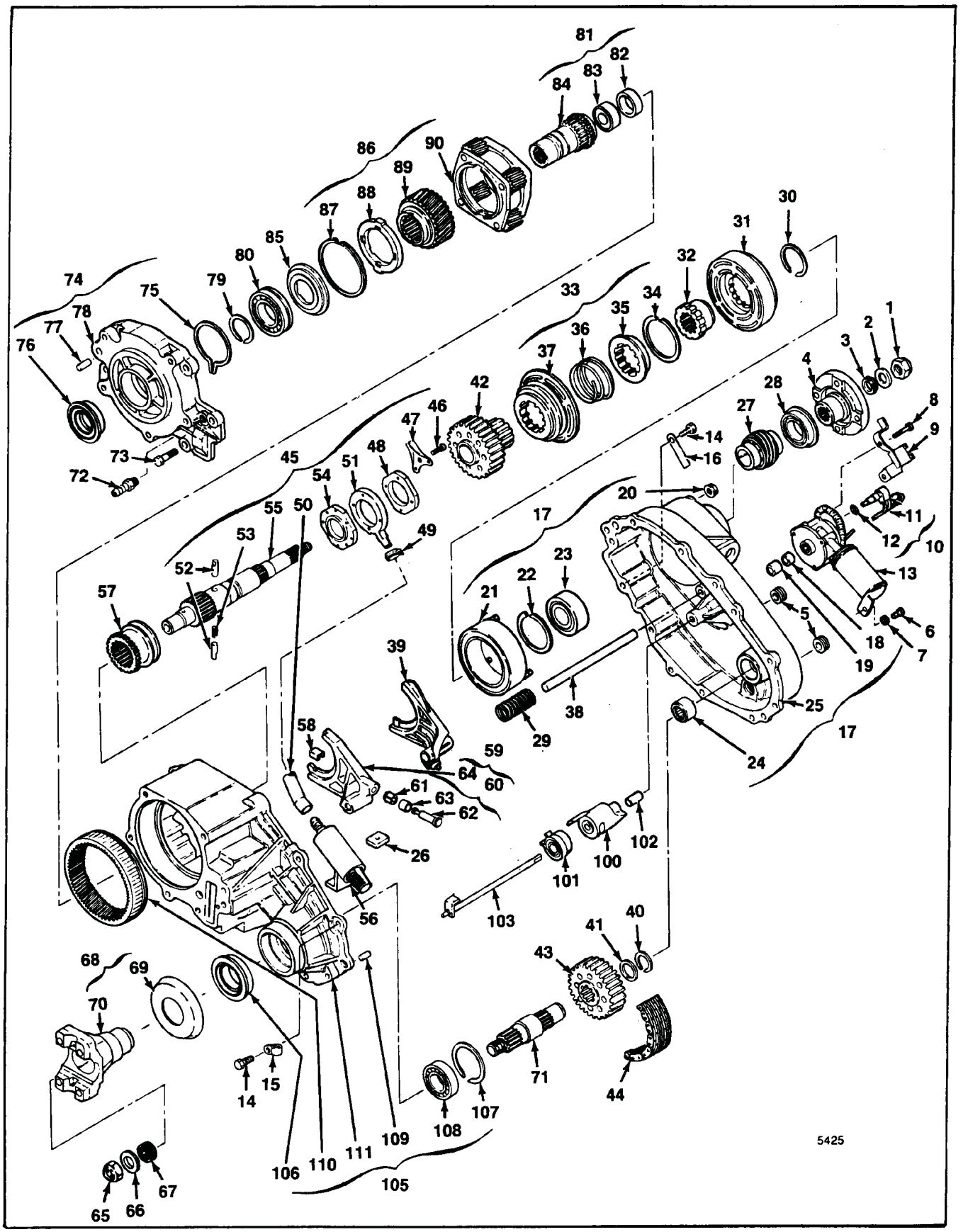


Figure P-2. Transfer Case Assembly, Electric Shift

PARTS LIST FOR FIGURE P-2

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
1	19-00-149-001	Nut	1
2	10-00-047-016	Washer	1
3	10-00-044-012	Seal, Oil	1
4	13-00-031-006	Flange, Companion	1
5	0000445751	Plug, Pipe	2
6	0011500420	Bolt, Hex Head	1
7	011503961	Washer, Flat	1
8	0011503949	Bolt, Hex Head	3
9	13-54-056-001	Bracket, Sensor and Harness	1
10	13-50-640-003	Sensor Assy	1
11	13-50-140-002	•Sensor, Speed	1
12	10-00-141-014	•O-Ring	1
13	13-50-640-005	Motor Assy	1
14	13-00-183-018	Bolt, Hex Head	9
15	10-00-056-007	Clip, Wiring Harness	1
16	13-54-199-XXX	Tag, Identification	1
17	13-54-539-002	Cover Assy, Transfer Case	1
18	13-00-044-001	•Seal, Oil	1
	13-00-044-005	•Seal, Oil (optional)	1
19	13-00-127-002	•Bearing	1
20	Nut, Hex	•Nut, Hex	3
21	13-50-640-004	•Coil Assy, Clutch	1
22	R6A-7-1/2	•Ring, Snap	1
23	10-00-130-008	•Bearing, Annular	1
24	10-00-132-039	•Bearing, Needle	1
25	13-54-039-002	•Cover, Transfer Case	1
26	10-00-012-002	Magnet	1
27	13-50-110-002	Gear, Speedo	1
28	10-00-044-052	Seal, Oil	1
29	13-50-156-002	Spring, Return	1
30	10-00-139-029	Ring, Retainer	1
31	13-50-212-001	Housing, Clutch	1

PARTS LIST FOR FIGURE P-2 (CONT)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
32	13-50-090-002	Hub, Shift Collar	1
33	13-50-589-003	Lockup Assy, 2W-4W	1
34	10-00-139-141	•Ring, Snap	1
35	13-56-089-002	•Hub, Lockup	1
36	13-50-156-007	•Spring, Sleeve Return	1
37	13-50-055-003	•Collar, Lockup	1
38	13-50-100-001	Shaft, Rail	1
39	13-54-096-001	Fork, Lockup	1
40	10-00-139-038	Ring, Snap	1
41	13-50-193-003	Spacer	1
42	13-50-144-003	Sprocket, Drive	1
43	13-54-144-001	Sprocket, Driven	1
44	13-50-143-001	Chain, Drive	1
45	13-50-671-001	Shaft and Pump Assy	1
46	13-45-183-003	•Bolt, Hex Head	4
47	13-50-056-004	•Retainer, Pump	1
48	13-45-039-005	•Cover, Pump, Rear	1
49	13-45-056-005	•Clamp, Hose	1
50	13-50-034-002	•Coupling, Hose	1
51	13-45-097-004	•Housing, Pump	1
52	13-45-043-007	•Pin, Pump	2
53	13-45-156-004	•Spring, Pump Pin	1
54	13-45-039-007	•Cover, Pump, Front	1
55	13-50-171-001	•Shaft, Output	1
56	13-45-238-001	Strainer, Oil	1
57	13-50-089-001	Hub, Reduction	1
58	13-45-235-001	Facing, Shift Fork	2
59	13-50-596-005	Fork Assy, Reduction Shift	1
60	13-50-543-001	•Pin, Roller and Retainer Assy	1
61	13-50-040-002	••Retainer	1
62	13-50-043-001	••Pin	1
63	13-52-127-001	••Roller, Cam	1
64	13-50-096-004	•Fork, Reduction Shift	1

PARTS LIST FOR FIGURE P-2 (CONT)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
65	19-00-149-001	Nut	1
66	10-00-047-016	Washer	1
67	10-00-044-012	Seal, Oil	1
68	10-00-531-011	Yoke Assy	1
69	13-50-035-002	•Deflector, Dust	1
70	13-00-031-005	•Yoke	1
71	13-54-171-001	Shaft, Front Output	1
72	13-45-072-001	Barb, Breather	1
73	13-00-183-018	Bolt, Hex Head	6
74	13-54-672-001	Adapter Assy, Front	1
75	10-00-139-039	•Ring, Snap	1
76	10-00-044-052	•Seal, Oil	1
77	10-00-043-017	•Pin, Spirol	1
78	13-54-172-001	•Adapter, Front	1
79	10-00-139-040	Ring, Retaining	1
80	10-00-130-011	Bearing, Annular	1
81	13-54-689-001	Shaft Assy, Input	1
82	13-45-127-002	•Bearing, Sleeve	1
83	4840G	•Bearing, Needle	1
84	13-54-189-001	•Shaft, Input	1
85	13-50-193-001	Washer, Thrust	1
86	13-50-659-007	Carrier Assy, Gear	1
87	10-00-139-043	•Ring, Retaining	1
88	13-50-014-001	•Plate, Thrust	1
89	13-50-165-001	•Gear, Sun	1
90	13-50-659-001	Carrier Assy, Planet	1
91	Not used		
92	Not used		
93	Not used		
94	Not used		
95	Not used		
96	Not used		
97	Not used		

PARTS LIST FOR FIGURE P-2 (CONT)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY.
98	Not used		
99	Not used		
100	13-50-099-007	Cam, Electric Shift	1
101	13-50-156-008	Spring, Torsion	1
102	13-50-053-002	Spacer	1
103	13-50-122-002	Shaft, Shift	1
104	Not used		
105	13-54-565-002	Case Assy, Transfer	1
106	10-00-044-052	•Seal, Oil	1
107	R6A-7-1/2	•Ring, Snap	1
108	10-00-130-008	•Bearing, Annular	1
109	0000141281	•Pin, Dowel	2
110	13-50-162-001	•Gear, Ring	1
111	13-54-065-002	•Case, Transfer	1