



**45 Series  
Transfer Case  
Service Manual**



**BorgWarner  
Automotive**

# Contents

SECTION		PAGE
1	INTRODUCTION AND DESCRIPTION .....	1-1
	1-1. Introduction.....	1-1
	1-8. Description.....	1-1
2	ON-VEHICLE SERVICE AND TROUBLESHOOTING.....	2-1
	2-1. Maintenance .....	2-1
	2-7. Troubleshooting .....	2-1
	2-10. Removal and Installation.....	2-3
3	DISASSEMBLY .....	3-1
	3-1. General Information .....	3-1
	3-4. Removal and Installation of Transfer Case .....	3-1
	3-6. Transfer Case Disassembly .....	3-1
4	CLEANING, INSPECTION, REPAIR OR REPLACEMENT.....	4-1
	4-1. Cleaning.....	4-1
	4-6. Inspection.....	4-1
	4-10. Repair or Replacement .....	4-7
5	ASSEMBLY .....	5-1
	5-1. General Information .....	5-1
	5-4. Assembly of Transfer Case.....	5-1
P	PARTS.....	P-1
T	SPECIAL TOOLS.....	T-1

# Section 1

## Introduction and Description

### 1-1. INTRODUCTION

1-2. **PURPOSE.** This manual contains maintenance, service and parts information for the 13-45 Four-Wheel Drive Transfer Case manufactured by Borg-Warner Automotive, Inc., Transmission Systems, 100 Box 2088, Munroe, 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 location of the exploded view illustration is described in the introduction to Section P. Each detail part shown in the exploded view is assigned an index number. This same index number is used to identify the part throughout this manual. For example, index number 25 (in parentheses in the text) refers to the drive chain regardless of the manual section.

1-5. The exploded view illustration 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 equivalents 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	As Required
Assembly	Assembly
NP	Not Procurable
PN	Part Number
PR	Per
Qty or QY	Quantity
Ref	Reference

### 1-8. DESCRIPTION

1-9. **TRANSFER CASE DESCRIPTION.** The Borg-Warner Automotive 13-45 is a two-speed, part-time transfer case with a single shaft lever. 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 provided 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 2.75 to 1.00 speed reduction ratio.

1-10. **APPLICATION.** The 13-45 transfer case is used for light truck applications.

1-11. **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.

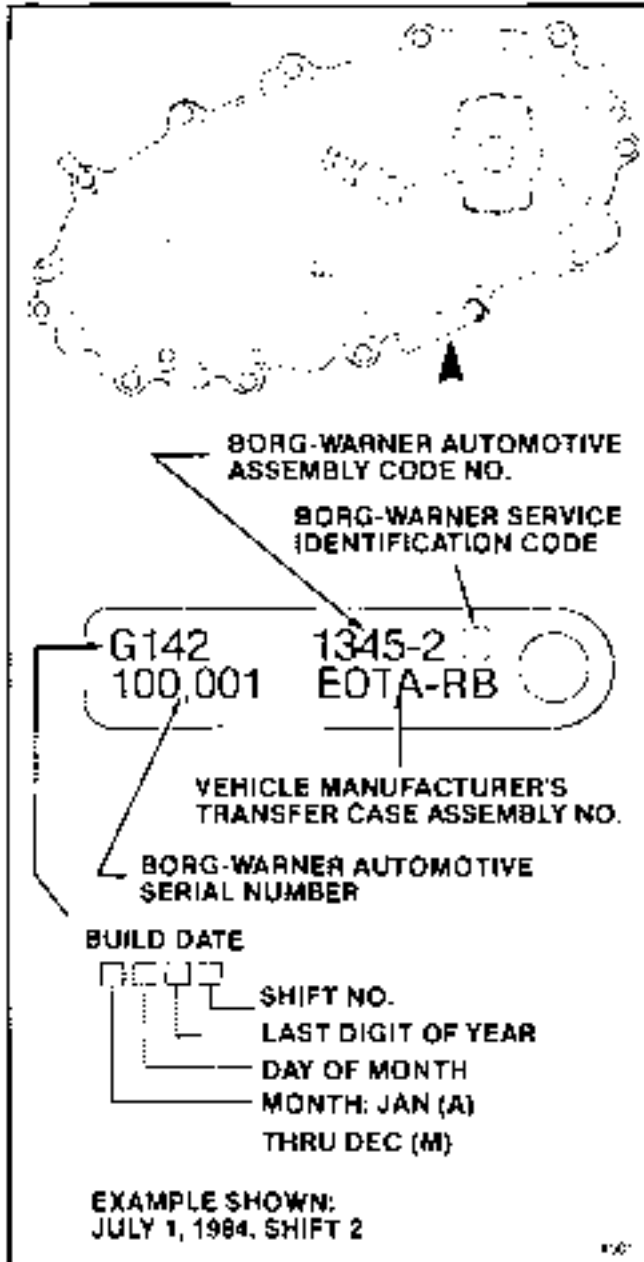


Figure 1-1. Identification Tag

## Section 2 On-Vehicle Service and Troubleshooting

### 2-1. MAINTENANCE

**2-2. GENERAL.** The only periodic maintenance required for the Borg-Warner Automotive 11-45 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<sup>®</sup> 2, XT<sup>®</sup>-QDX (Ford ESP), XGL68-C1 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 lbf-ft (19-30 Nm).

Table 2-1. Lubrication Schedule

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

### 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 6.0 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 lbf-ft (19-30 Nm).
- g. Add approved lubricant 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 lbf-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.

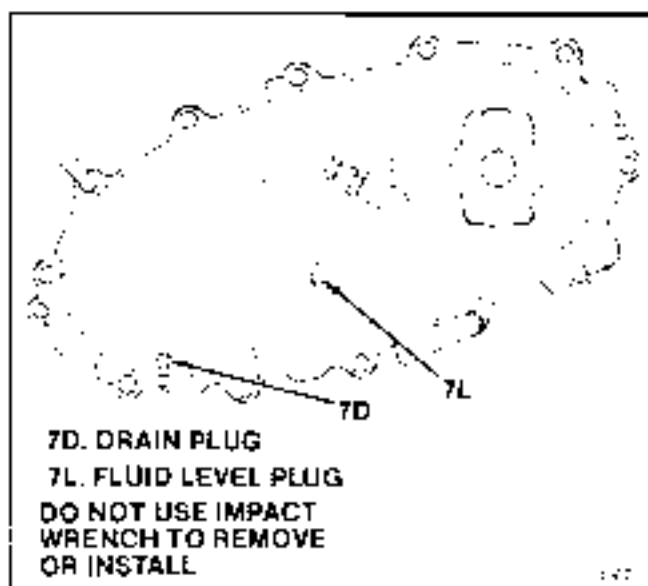


Figure 2-1. Drain and Fluid Level Plugs

**Table 2-2. Troubleshooting Chart**

TROUBLE	POSSIBLE CAUSE	REMEDY
Will not shift; control lever moves	Control lever or shaft linkage broken or damaged  Damaged shift cam; broken shift fork	Repair damaged parts  Remove transfer case cover and check for damaged parts Replace damaged parts
Hard shift or control lever will not move into position	Improper operation  Improper or low transfer case lubricant  Shift fork landing  Binding of sliding shift hub, collar or gears	Refer to vehicle operator's manual for specific operating sequence, if any  Add or drain and replace with proper lubricant; refer to paragraph 2-1  Remove transfer case cover and check for damaged parts. Replace damaged parts  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
Transfer case jumps out of engagement	Damaged shift linkage  Internal shift parts damaged or excessively worn  Sliding fork loose on rail or damaged	Repair shift linkage  Disassemble and check for worn or damaged parts. Replace damaged parts  Disassemble and check for wear or damage. Replace worn or damaged parts
Transfer case locked in one position	Damaged shift linkage Fork loose on rail  Worn or damaged fork  Worn or damaged shift cam, hub or collar  Worn or damaged gears	Repair shift linkage  Remove transfer case cover and check for loose fork on rail. Replace parts as required.  Remove transfer case cover and check for wear or damage Replace damaged parts  Disassemble and check for worn or damaged parts. Replace worn or damaged parts  Disassemble and check for worn or damaged gears. Replace worn or damaged gears
No front wheel drive with control in front wheel drive	Broken drive chain	Disassemble, check all internal parts for damage, replace drive chain

**Table 2-2. Troubleshooting Chart**

TROUBLE	POSSIBLE CAUSE	REMEDY
<p>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.</p>	<p>Improper or low transfer case lubricant</p> <p>Loose bolts or other retaining parts</p> <p>Noisy transfer case bearings</p> <p>Noisy gears</p>	<p>Seal or drain and replace with proper lubricant, refer to paragraph 2-4</p> <p>Make sure all retaining parts are torqued to specifications</p> <p>Disassemble and check bearings and parts in and on which they operate for wear or damage. Replace worn or damaged parts</p> <p>Disassemble and check for worn or damaged parts including speedometer gear. Replace worn or damaged parts</p>
<p>Transfer case noise in 4WD or 4WL</p>	<p>Worn or damaged sprockets or drive chain</p> <p>Incorrect tire pressure</p>	<p>Disassemble and check for worn or damaged parts and replace as required</p> <p>Inflate all tires to correct specifications</p>
<p>Transfer case leakage</p>	<p>Cracked case</p> <p>Leakage from other components</p> <p>Breather clogged</p> <p>Too much or improper lubricant</p> <p>Loose bolts at sealing faces</p> <p>Improperly applied sealant</p> <p>Worn or damaged oil seal</p>	<p>Replace case</p> <p>Verify transfer case leakage. Thoroughly clean, operate and check for leaks</p> <p>Remove breather hose and breather and clean or replace</p> <p>Remove fluid level plug to check for excess, or drain and replace</p> <p>Torque bolts to specifications</p> <p>Replace and torque bolts to specifications</p> <p>Replace oil seal</p>

## 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, 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. Disconnect negative battery terminal.
- c. Shift transmission into park or neutral. Move 4WD control lever into 4H detent.
- d. Latch 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 wiring from 4WD switch on transfer case cover (16).
- g. Disconnect shift linkage from transfer case shift lever (47).
- h. Disconnect speedometer cable from transfer case cover (16).

- i. Disconnect breather hose from breather barb (85) on transfer case.
- j. Disconnect front driveshaft from transfer case front output yoke (83).
- k. Disconnect rear driveshaft from transfer case rear output yoke (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 (101) attaching transfer case to transmission. Do not allow transfer case to "hang" from transmission through splined shafts or damage may result.**

- m. Remove bolts six (101) attaching transfer case to transmission adapter.
- n. Move transfer case straight back to completely disengage spline of transfer case input shaft (63) from transmission.
- o. Carefully lower transfer case on jack or stand.
- p. Remove gasket (103) used between transmission and transfer case.

**2-12. INSTALLATION OF TRANSFER CASE.**

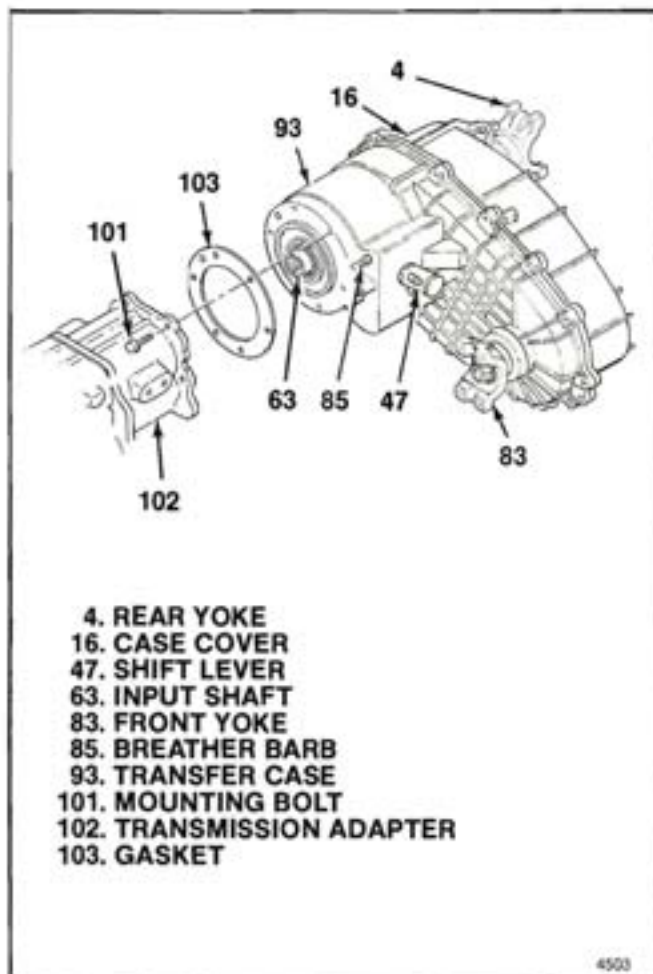
Refer to the vehicle service manual for specific instructions regarding supports, skid plates, shift linkage, speedometer cable and other components which were removed to provide access to transfer case. With vehicle on hoist and transfer case on a suitable jack or stand, proceed as follows (see figure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

- a. Apply thin coat of high temperature grease to spline of transmission output shaft.
- b. Install new gasket (103) 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 output shaft of transfer case to align input shaft (63) spline with that on transmission.**

- d. Carefully move transfer case forward, engaging spline on transmission and dowel pin, until mounting face of transfer case (93), gasket (103) and transmission adapter (102) are in contact.
- e. Make sure mounting holes in transfer case (93), gasket (103) and transmission adapter (102) are aligned and install six mounting bolts (101). Torque mounting bolts to 25-43 lb-ft (34-58 Nm).
- f. Connect rear driveshaft to transfer case rear output yoke (4).
- g. Connect front driveshaft to transfer case front output yoke (83).
- h. Connect breather hose to breather barb (85) on transfer case.
- i. Connect speedometer cable at transfer case rear cover (16).



**Figure 2-2. Transfer Case Installation**

- j. Connect shift linkage to transfer case shift lever (47).
- k. Connect wiring to 4WD switch in transfer case rear cover (16).
- 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.

## Section 3 Disassembly

### 3-1 GENERAL INFORMATION

3-2. During disassembly, refer to the illustrations provided with the test. In addition, an exploded view of the complete assembly can be seen at Section 4, 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 REAR YOKE GROUP.** Position transfer case on work bench with cover and rear or upper yoke side up. Use wooden blocks under front or lower yoke to keep assembly level. Proceed as follows (see Figure 3-1):

- a. Remove nut (1) and washer (2).
- b. Pull yoke (4) and remove oil seal (3).
- c. Pull oil seal (5).

3-8. **REMOVAL OF COVER.** Proceed as follows (see Figure 3-2):

- a. Remove 4WD switch (6) and two plugs (7).

- b. If difficulty is encountered in removing specific part (8), wait until after cover assembly (12) is removed.

- c. Remove two bolts (9). This will free wiring clips (10) and identification tag (11). Use care not to lose identification tag. It contains information required for ordering replacement parts.

- d. Pry at the bosses provided on the cover (16) and transfer case (93) to break the contact ball joint. Then lift the cover assembly (12) straight up to remove.

- e. Pull needle bearing (13) from cover (16).

- f. Remove snap ring (14) and pull ball bearing (15) from cover (16).

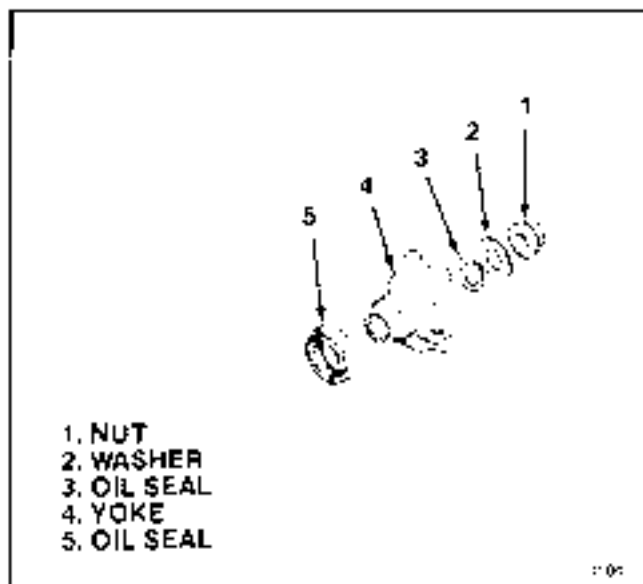


Figure 3-1. Rear Yoke Group

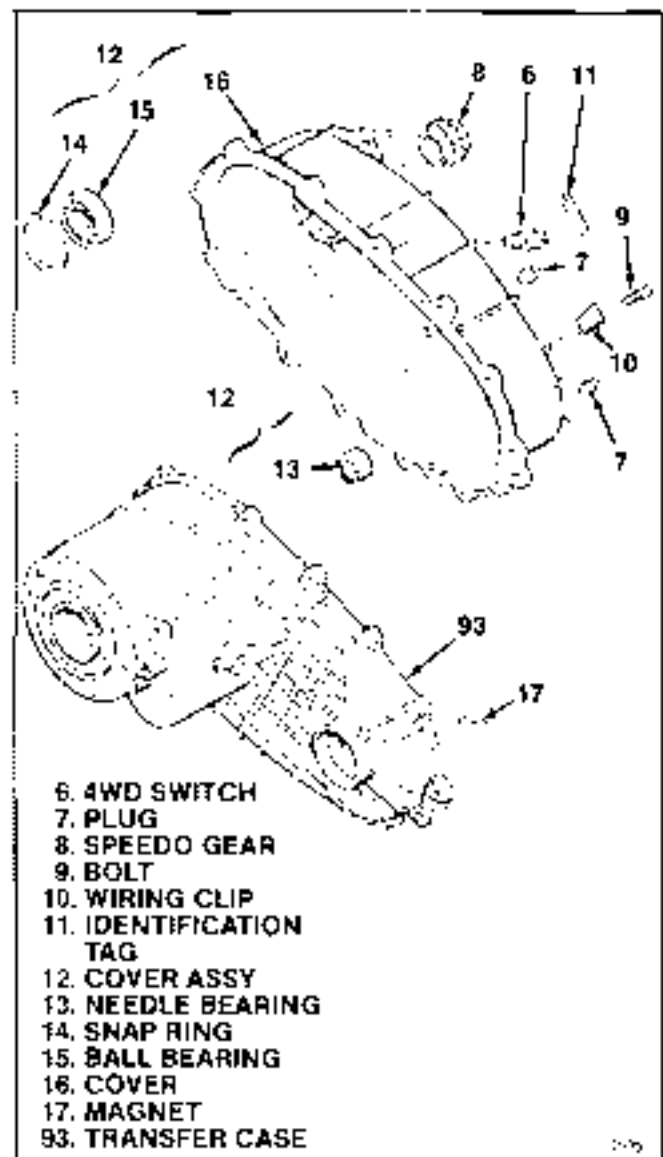
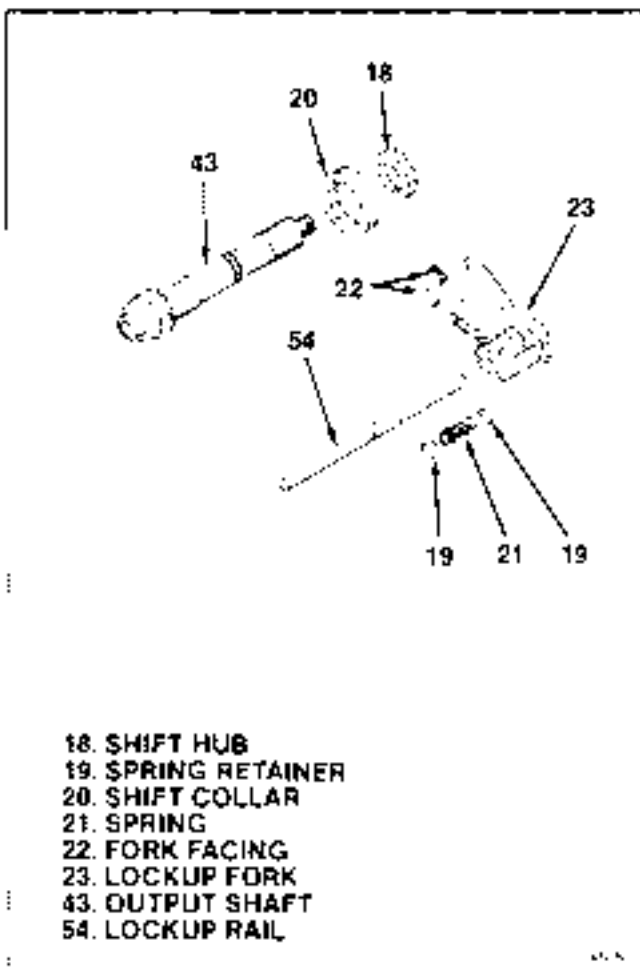


Figure 3-2. Cover Assembly

- j. Remove magnet (17) from slot in case (93).
- k. Scrape and clean sealant from mating faces of (16) and transfer case (93). Use care not to damage metal faces.

**3-9. REMOVAL OF LOCKUP SHIFT PARTS.** From remaining transfer case assembly (16 through 44) remove the following (see figure 3-4):

- a. Remove shift hub (18) from output shaft (43).
- b. Pry up on spring (21) and remove lower spring retainer (19). Pry down on spring (21) and remove upper spring retainer (19).
- c. Together, slide shift collar (20) and lockup fork (23) from output shaft (43) and lockup rail (54). Remove spring (21) and two fork facings (22) from lockup fork (23).

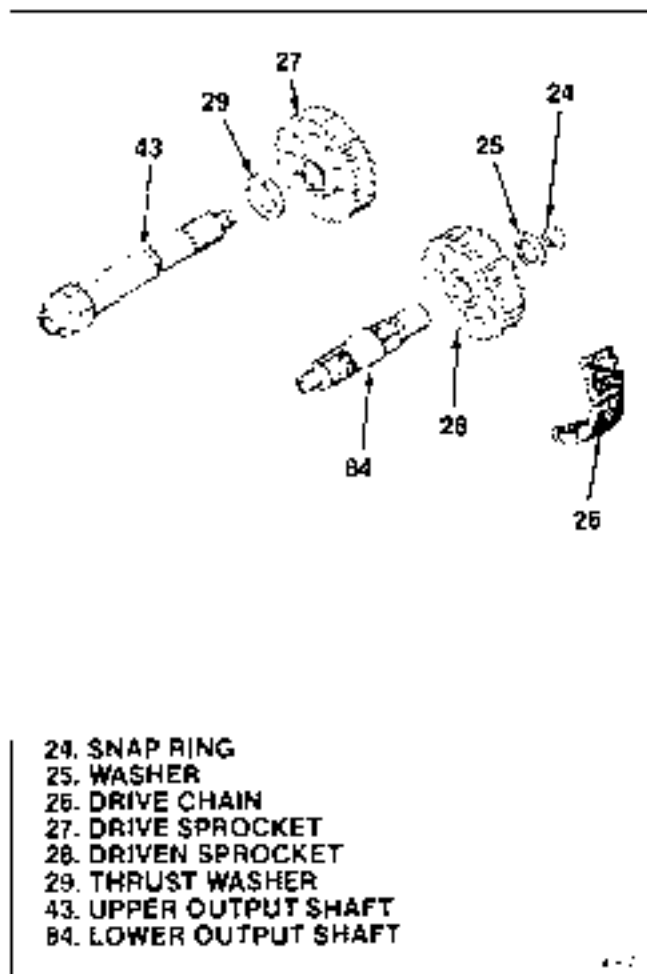


- 18. SHIFT HUB
- 19. SPRING RETAINER
- 20. SHIFT COLLAR
- 21. SPRING
- 22. FORK FACING
- 23. LOCKUP FORK
- 43. OUTPUT SHAFT
- 54. LOCKUP RAIL

Figure 3-3. Lockup Shift Parts

**3-10. REMOVAL OF CHAIN DRIVE.** From remaining transfer case assembly (21 through 43) remove the following (see figure 3-4):

- a. Remove snap ring (24) and washer (25) from lower output shaft (84).
- b. Together, slide chain (26), drive sprocket (27) and driven sprocket (28) from upper and lower output shafts (43 and 84). Separate sprockets and chain when out of assembly.
- c. Remove thrust washer (29) from upper output shaft (43).



- 24. SNAP RING
- 25. WASHER
- 26. DRIVE CHAIN
- 27. DRIVE SPROCKET
- 28. DRIVEN SPROCKET
- 29. THRUST WASHER
- 43. UPPER OUTPUT SHAFT
- 84. LOWER OUTPUT SHAFT

Figure 3-4. Chain Drive

**3-11. REMOVAL OF OIL PUMP PARTS.** From remaining transfer case assembly (30 through 85) remove the following (see figure 3-5):

- a. Remove four capscrews (30) and slide front pump cover (31) off upper output shaft (43).
- b. Loosen hose clamp (32) and separate hose coupling (33) from pump housing (34). Slide pump housing off upper output shaft (43).
- c. Remove hose clamp (32), hose coupling (34) and filter (35).
- d. Remove two pump pins (36) and spring (37) from upper output shaft (43).
- e. Slide front pump cover (38) off upper output shaft (43).

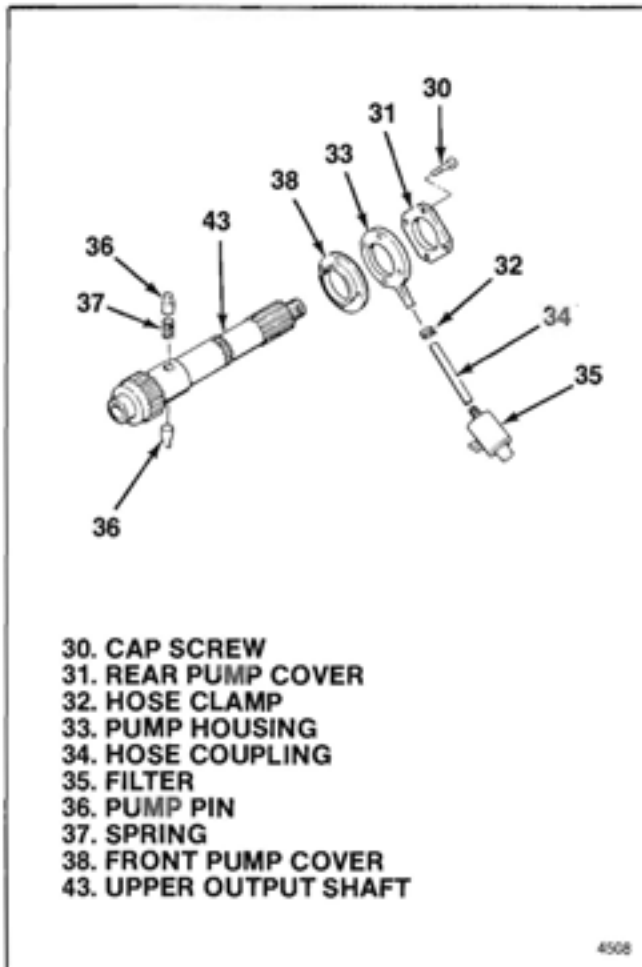


Figure 3-5. Pump Parts

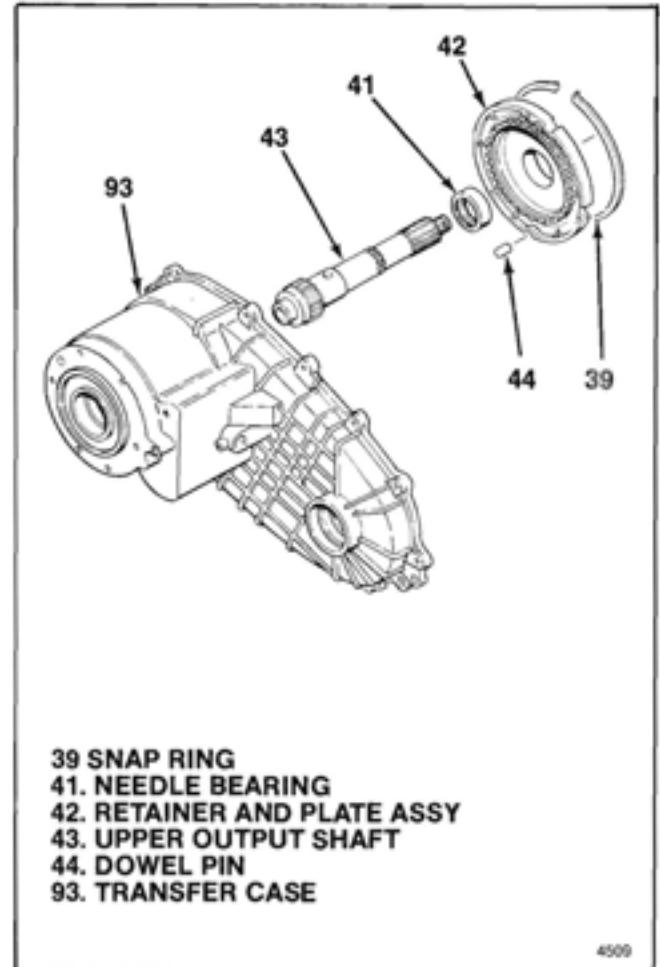


Figure 3-6. Retainer and Upper Output Shaft

**3-12. REMOVAL OF RETAINER AND UPPER OUTPUT SHAFT.** From remaining transfer case assembly (39 through 93), remove the following (see figure 3-6):

- a. Remove snap ring (39) from groove in transfer case (93) just above retainer and plate assembly (42).
- b. Grasp upper output shaft (43) and pull up while tapping transfer case (93) with plastic mallet to free retainer and plate assembly (42). Separate upper output shaft from retainer and plate assembly.
- c. Pull needle bearing (41) from retainer and plate assembly (42).
- d. Remove two dowel pins (44) used to locate retainer and plate assembly (42) to transfer case (93).

**3-13. REMOVAL OF REDUCTION SHIFT, CARRIER AND INPUT SHAFT PARTS.** From remaining transfer case assembly (45 through 93), remove the following (see figure 3-7):

- a. Reach into transfer case (93) and remove clip-ring (45) that attaches shift cam (51) to shaft of shift lever assembly (47).
- b. Remove setscrew (46) and shift lever assembly (47). Remove o-ring (48) from shaft of shift lever assembly.

**NOTE**

When parts are removed as described in following step, thrust washer (74), ball (75) and spring (76) will come free in case. Make sure these parts do not become lost.

c. As an assembly, withdraw reduction shift carrier and input shaft (60) through 73) from transfer case (93). Separate shift rail and fork group (49) through 67) from carrier and shaft group (60) through 73).

d. Slide shift fork (59) from lockup rail (54) and remove two crescent rings (49), cam roller (50), shift cam (51), cam roller (52) and pin (53).

e. Remove two lock facings (55), retaining clip (56), pin (57) and cam roller (58) from shift reduction Fork (59).

f. Separate input shaft assembly (60) from reduction carrier assembly (64). Pull bushing (61) from input shaft (63). Do not remove cup plug (62) unless it is loose or damaged.

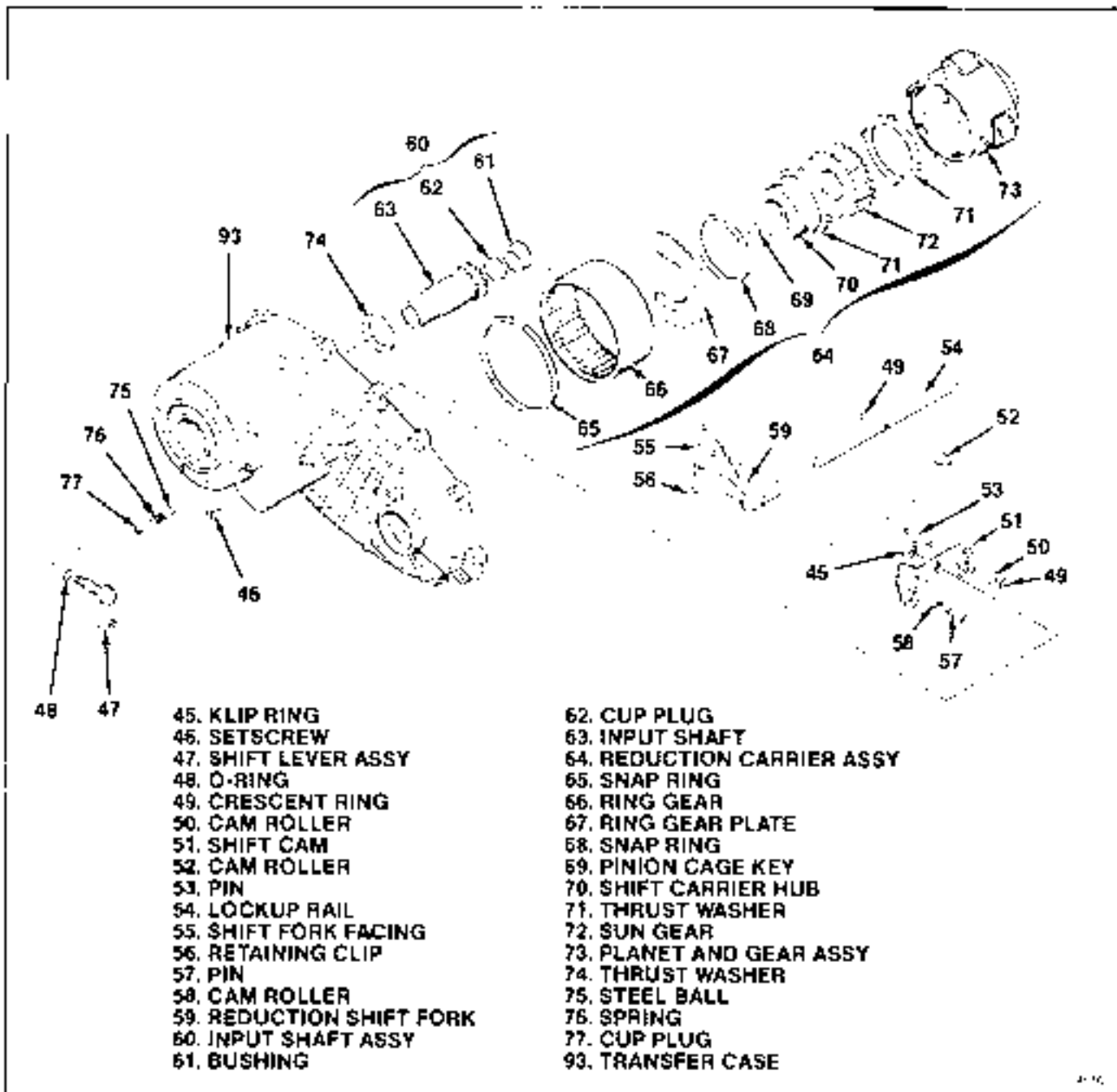


Figure 3-7. Reduction Shift, Carrier and Input Shaft Parts

g. Remove snap ring (65) and ring gear (66) from planet and gear assembly (73).

h. Remove snap ring (68), pinion cage key (69), shaft hub (70) and one thrust washer (71). Before removing sun gear (72), mark its outside face so that it can be installed in same position. Then, remove sun gear and remaining thrust washer (71) from planet and gear assembly (73).

i. Remove thrust washer (74), hub (75) and spring (76) from transfer case (93). Using suitable drift, drive cap plug (77) from transfer case (93).

### 3-14. REMOVAL OF LOWER OUTPUT SHAFT AND YOKE. From remaining transfer case assembly (78 through 93), remove the following (see figure 3-8):

- a. Remove nut (78) and washer (79).

- b. Pull yoke assembly (81) and remove oil seal (80).

- c. Remove lower output shaft (84).

- d. Press dust deflector (82) from yoke (83) only if it is loose or damaged.

### 3-15. DISASSEMBLY OF TRANSFER CASE ASSEMBLY. Disassemble as follows (see figure 3-9):

- a. Remove breather hose barb (85) from transfer case assembly (86).

- b. Pull oil seal (87).

- c. Remove snap ring (88) and pull ball bearing (89).

- d. Pull oil seal (90).

- e. Pull input shaft bushing (91).

- f. Remove two dowel pins (92) from transfer case (93) only if they are loose or damaged.

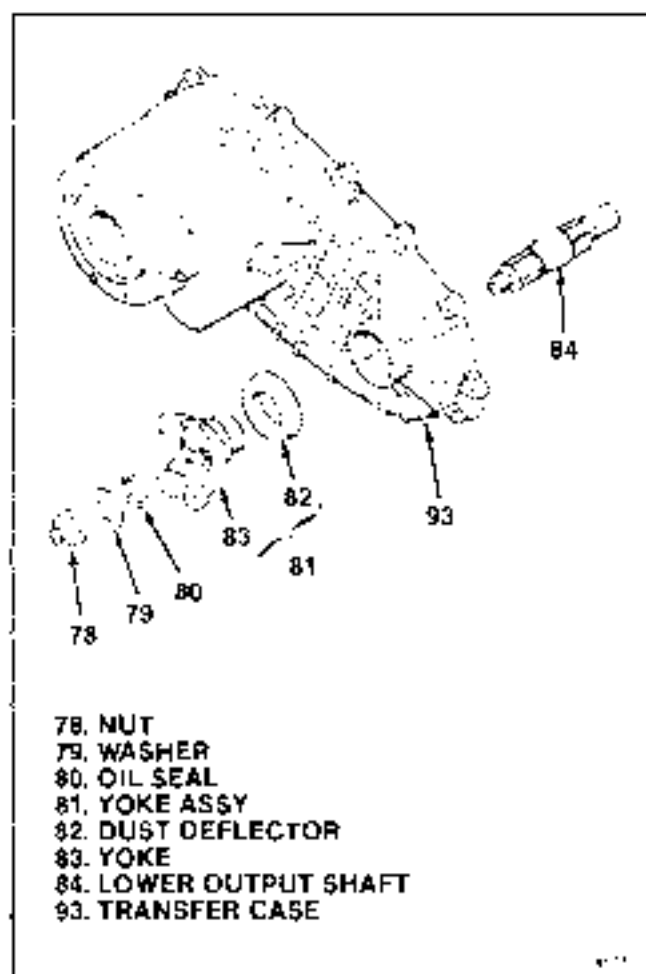


Figure 3-8. Lower Output Shaft and Yoke

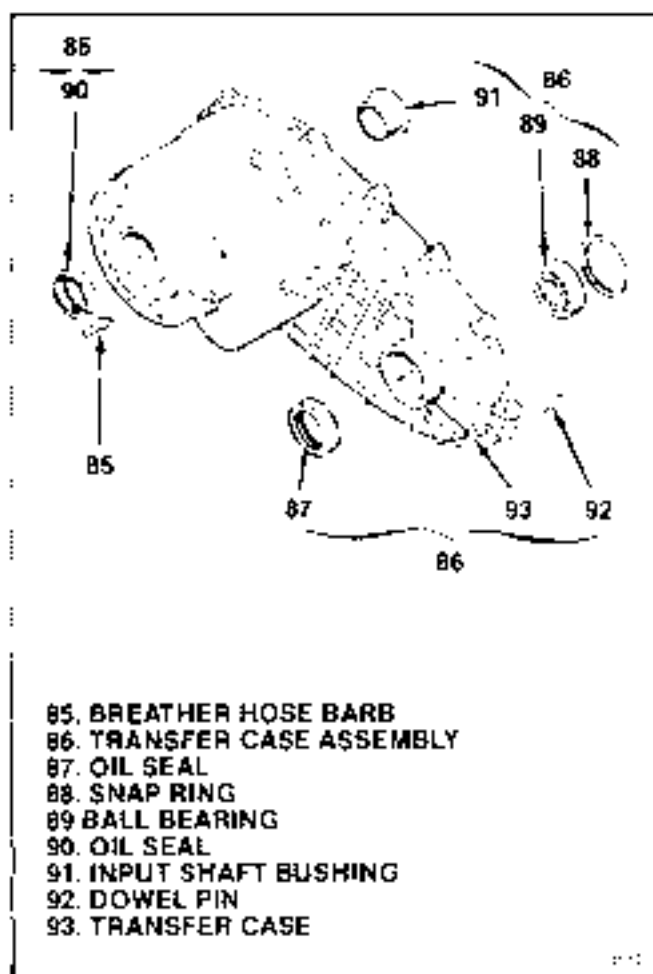


Figure 3-9. Transfer Case Assembly

# Section 4

## Cleaning, Inspection, Repair or Replacement

### 4-1. CLEANING

**NOTE:** Prior to cleaning, check magnet (17) for presence of metal particles. Larger, granular or irregular shaped particles indicate chipping or similar damage. Smaller, powder-like particles indicate uneven or excessive wear. If metal particles are detected, be on the lookout for damage or wear when inspecting rotating parts and those with which they mate.

### 4-2. GENERAL CLEANING PROCEDURE

Wash parts in cleaning solvent to remove old lubricant and dirt deposits. Use a bristle brush to remove caked on deposits. Parts that cannot be cleaned by brushing may be scraped but never, be not to damage metal surfaces.

**4-3. DRYING CLEANED PARTS.** Dry parts with low pressure, 20 psi max, compressed air. Wiping parts dry could wipe out deposits. Fluid bearings to prevent them from spinning when drying.

**4-4. LUBRICATING BEARINGS.** Immediately after cleaning lubricate ball bearings (15 and 80) and needle bearings (13 and 41) with transfer case lubricant (refer to paragraph 2-4). Rotating or spinning dry, unlubricated bearings could result in damage. Cover lubricated bearings to protect from dust.

### 4-5. INSPECTION

**4-5. GENERAL INSPECTION PROCEDURES.** Visually inspect all parts except hose coupling, ring and oil seals, which should be replaced with new parts for damage or excessive or uneven wear. Reject parts with damage or wear that would affect operability of the part. Inspection terms used in this section are as follows:

**Burr:** Local rise of material forming protruding sharp edge.

**Chip:** An area from which a small fragment has been broken off or cut.

**Crack:** Surface break of line nature indicating partial or complete separation of material.

**Excessive wear:** Heavy or obvious wear beyond expectations considering conditions of operation.

**Indentation:** Displacement of material caused by localized heavy contact.

**Galling:** Breakdown or build-up of metal surface due to excessive friction between parts. Particles of the softer material are torn loose and welded to the harder material.

**Nick:** Local break or notch. Usually displacement of material rather than loss.

**Scoring:** Tear or break in metal surface from contact under pressure. May show discoloration from heat produced by friction.

**Step wear:** Heavy wear that produces a step that can be seen or felt between adjacent contact and non-contact surfaces.

**Uneven wear:** Condition of localized, or evenly distributed wear. Includes hollows, shiny spots, grooves, gouges and other visual indications.

### 4-7. SPECIFIC INSPECTION PROCEDURES

Inspect parts in accordance with Table 4-1 and as specified in the following paragraphs. Index numbers used in Table 4-1 are those assigned to the exploded view in Section 2. Parts:

**4-8. GEAR OR SPROCKET TEETH INSPECTION.** When specified in Table 4-1, inspect gear or sprocket teeth as follows:

**NOTE:** Do not confuse contact patterns with normal tool marks that are a result of manufacture. Typical tool marks are shown in figure 4-1.

a. Check gear or sprocket tooth contact patterns. Contact patterns likely to be encountered are shown in figure 4-2. Parts with contact patterns shown in the ACCEPT column are OK for further service provided they meet all other inspection requirements. Parts with contact patterns shown in REJECT column are unacceptable and must be rejected—no repairs are authorized.

b. Check gear or sprocket teeth for chips. Compare tooth chips or nicks with those shown in figure 4-3. Parts with small chips as shown in REPAIR column may be filed repaired (refer to paragraph 4-12) and re-used. Chip or broken teeth as shown in REJECT column are not repairable and the part must be rejected.

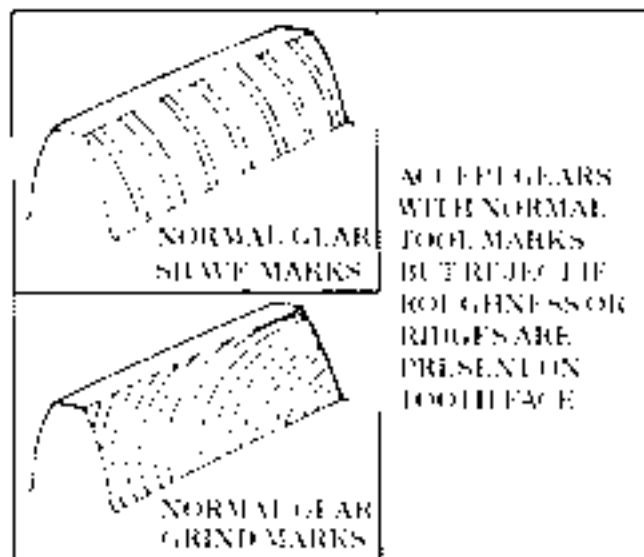


Figure 4-1. Normal Gear Tooth Tool Marks


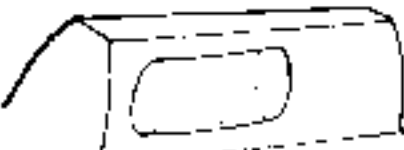
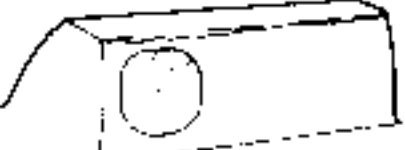
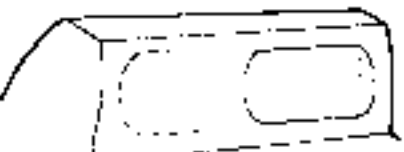
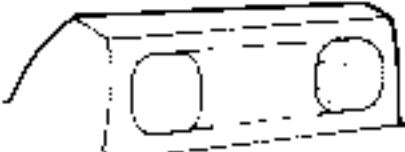
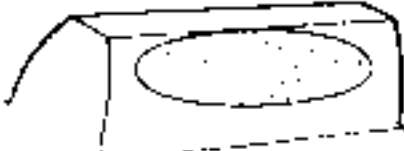
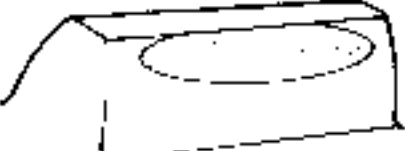
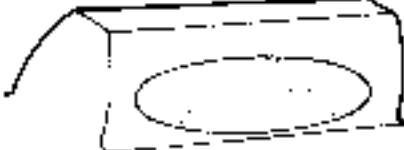
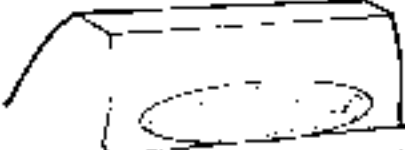
DESCRIPTION	ACCEPT	REJECT
DESIRED CONTACT PATTERN		
END CONTACT PATTERN		
TRAVELING CONTACT PATTERN MOVES FROM SIDE TO SIDE		
HIGH CONTACT PATTERN		
LOW CONTACT PATTERN		

Figure 4-2. Gear Tooth Contact Patterns

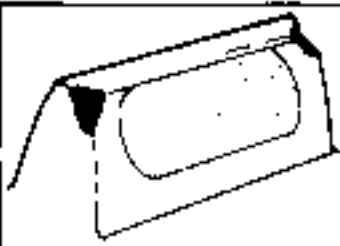
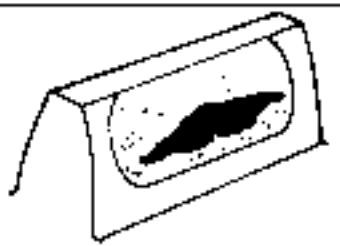
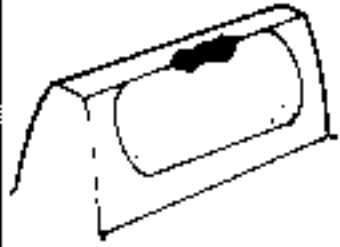

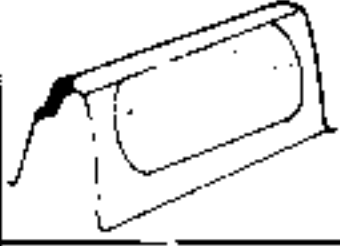
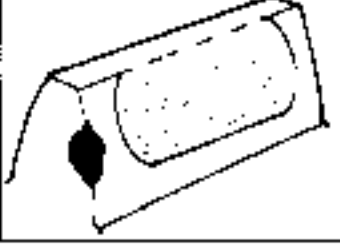
REPAIR		REJECT	
CORNER CHIP AT DRIVE FACE		CHIP WITHIN CONTACT PATTERN	
OLD EDGE CHIP AT DRIVE FACE MAY EXTEND SLIGHTLY INTO CONTACT PATTERN		CHIP COMPLETELY THROUGH TOOTH (CONSIDERED TO BE BROKEN)	
CORNER CHIP AT COAST FACE			
SIDE EDGE CHIP AT DRIVE FACE			

Figure 4-3. Gear Tooth Chips

**4-9. SPLINE TEETH INSPECTION.** Check for broken or chipped spline teeth. Small chips may be blind-repaired in same manner as gear teeth (see Figure 4-2 and refer to paragraph 4-32). If any spline tooth is broken, the part must be rejected. Spline teeth will not show contact patterns as gear teeth do. However, they may show evidence of step wear which is cause for rejection.

Table 4-1. Inspection

PART (INDEX NO.)	INSPECTION	ACCEPT/REJECT
All parts (including all springs)	Check for cracks Check for distortion Check for corrosion	Reject parts with cracks Reject parts that are bent, distorted or out of round Reject parts that are pitted or badly corroded
All threaded parts	Check for stripped, crossed or otherwise damaged threads	Reject parts with threads that cannot be cleaned up using a suitable tap or die
Yoke (4 and 5.3)	Check splines per paragraph 4-9	Paragraph 4-9
Speedometer gear (8)	Check gear teeth per paragraph 4-8	Paragraph 4-8
Needle bearings (13 and 41)	Visually check rollers and race for chipping, galling, scoring or other damage	Reject damaged bearings
Ball bearings (14 and 50)	Visually check balls and races for chipping, galling, scoring or other damage	Reject damaged bearings
	Make sure bearing is clean and lubricated. Slowly rotate outer race while holding inner race. Feel for binding, roughness or flat spots. Bearing must rotate smoothly without side-to-side play.	Reject damaged or loose bearings, or if end play exceeds 0.001 inch (0.25 mm).
Case cover (16 and transfer case 198)	Check mating faces for burrs or other damage that would prevent proper seating of mating faces	Remove small burrs per paragraph 4-13. Otherwise replace damaged parts
Case Cover (16)	Check bore for bearing (15)	Reject if seized
Shaft (9)	Check splines per paragraph 4-9	Paragraph 4-9
Shaft collar (20)	Check for groove for wear or damage	Reject if step wear or damage found
	Check spline per paragraph 4-9	Paragraph 4-9

Table 4-1. Inspection

PART (INDEX NO.)	INSPECTION	ACCEPT/REJECT
Shift forks (23 and 49)	Check fits (32 and 55) that engage shift hubs for wear or damage.	Reject if damaged or if step wear found.
Drive chain (26)	Check for step wear, loose or damaged pins or links.	Reject worn or damaged drive chain.
Drive and driven sprockets (27 and 28)	Check sprocket teeth per paragraph 4-8.	Paragraph 4-8.
Driven sprocket (28)	Check spline per paragraph 4-9.	Paragraph 4-9.
Drive sprocket (37)	Check ID for output shaft (43) for wear or damage.	Reject if worn, scored or damaged.
Pump housing (33)	Check ID for scoring or step wear.	Reject worn or damaged pump housing.
Filter (35)	Check that filter screen is clean and free from punctures or damage.	Replace if necessary; reject if damaged.
Pump pin (36)	Check for wear, scoring or damage.	Reject if worn, scored or damaged.
Retainer and plate assembly (42)	Check gear teeth per paragraph 4-8.	Paragraph 4-8.
	Check bore for needle bearing (41).	Reject if scored.
Upper input, input and lower output shafts (43, 63 and 84)	Check splines per paragraph 4-9. Check OD bearing surfaces. Check for distortion.	Paragraph 4-9. Reject if scored or damaged. Reject if bent or out of round.
Shift lever (47) and ram (51)	Check splines per paragraph 4-9.	Paragraph 4-9.
Cone rollers (50, 52 and 58)	Check for distortion. Check for scoring. Check for wear.	Reject if distorted. Reject if scored. Reject if step wear found.

Table 4-1. Inspection (cont.)

PART (INDEX NO.)	INSPECTION	ACCEPT-REJECT
Rail (54)	<p>Check for distortion</p> <p>Check OD for burrs or other damage</p> <p>Check OD for wear</p>	<p>Reject rail if bent</p> <p>Remove small burrs per paragraph 4-13. Otherwise reject damaged rail</p> <p>Reject if stop wear found</p>
Bushing (61)	<p>Check ID bearing surface</p>	<p>Reject if scored or damaged</p>
Ring gear (66)	<p>Check gear teeth per paragraph 4-8</p>	<p>Paragraph 4-8</p>
Shaft hub (70)	<p>Check fork groove for wear or damage</p>	<p>Reject if stop wear or damage found</p>
Sun gear (73)	<p>Check gear teeth per paragraph 4-8</p> <p>Check spline per paragraph 4-9</p>	<p>Paragraph 4-8</p> <p>Paragraph 4-9</p>
Planet and gear assembly (73)	<p>Check gear teeth per paragraph 4-8</p> <p>Check for loose or worn pins or worn thrust washers</p>	<p>Paragraph 4-8</p> <p>Reject if any pin loose or any gear has excessive slide or end play</p>
Thrust washers (74, 71, 29 and 25)	<p>Check for scoring</p>	<p>Reject if scored or damaged</p>
Steel ball (75)	<p>Check for nicks, burrs or fat spots</p>	<p>Reject worn or damaged balls</p>
Bushing (91)	<p>Check ID and thrust face for scoring</p>	<p>Reject if scored or damaged</p>
Transfer case (93)	<p>Check bars for bearing (89) and bushing (91)</p>	<p>Reject if scored</p>

#### 4-10. REPAIR OR REPLACEMENT

**4-11. Parts which are rejected at inspection shall be replaced unless repair procedures specified in the following paragraphs or other obvious major repair will restore the part to complete serviceability.**

**4-12. GEAR AND SPROCKET TOOTH REPAIR.** Repair shall be limited to blend-repair to chips within the limits shown in figure 4-3.

a. Blend-repair chips using a suitable hand held, high speed grinding tool.

b. Blend chip into surrounding base metal, but do not remove any more metal than necessary.

c. Blend all sharp edges into smooth contour. Sharp edges may chip again or develop cracks.

**4-13. REMOVING SMALL BURRS.** Use a suitable abrasive stone to remove burrs. Be careful to remove only raised material, not base metal.

**4-14. PARTS REPLACEMENT.** Replace rejected parts that are not repairable. If there is any doubt about the serviceability of a part, replace it. Follow-

ing are some specific parts replacement conditions.

a. Drive Chain and Sprockets. If drive chain 26, or either sprocket 027 or 028, requires replacement, measure thickness either 1-14 in. or 1-12 in. to determine correct replacement part number (refer to Section F).

b. Input Shaft Assembly. If input shaft 63, requires replacement, replace with input shaft assembly, part number 13-45-689-010, regardless of part number of shaft originally installed.

c. Transfer Case. If transfer case 053, was manufactured prior to January, 1987, it will have 3/8 in. tapped mounting holes. Replacement transfer case will have 10 mm tapped mounting holes. If earlier case must be replaced, order bolt service kit, part number 17-50-410-001 to get required 10 mm mounting bolts.

**4-15. SERVICE KIT.** Service kit part number 13-15-410-004 is recommended when servicing the transfer case. This kit contains bearings, snap rings and other small parts that normally require replacement.

Table 4-2. Service Kit Part Number 13-45-410-004

QTY	PART NUMBER	DESCRIPTION
2	10-00-149-019	Nut, yoke
2	10-00-047-015	Washer, yoke
1	13-45-193-005	Washer, lower output shaft
2	10-00-044-045	Seal, Oil, yoke
2	10-00-044-053	Seal, Oil, output shafts
1	13-45-044-054	Seal, Oil, input shaft
1	4840J	Bearing, Needle, lower output shaft
1	10-00-132-015	Bearing, Needle, retainer and plate assy
2	T86-7-1/2	Ring, Snap, output shaft bearings
1	13-45-139-004	Ring, Snap, lower output shaft
1	13-45-139-006	Ring, Snap, plate and bearing assy
1	13-45-139-002	Ring, Snap, ring gear
1	13-45-139-001	Ring, Snap, carrier hub
2	13-45-130-001	Bearing, Ball, output shaft
1	13-45-193-004	Washer, Thrust, driven sprocket
2	13-45-193-003	Washer, Thrust, carrier assy
1	13-45-193-001	Washer, Thrust, input shaft
1	13-45-056-005	Clamp, Hose, oil pump
1	13-45-034-006	Coupling, Hose, oil pump
1	13-45-056-002	Klip, Ring, shift cam
1	T89B-108	O-Ring, shift lever
2	13-45-056-001	Ring, Crescent, cam roller
1	13-45-056-003	Clip, Retaining, cam roller
1	13-45-104-001	Key, Pinion Cage, carrier assy
1	0000453593	Ball, Steel, speedo gear

## Section 5 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 illustration in Section 3, Parts. 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 petroleum to help hold them in place during assembly.

c. Press in oil seals and bearings using a suitable drift. Do not use a hammer to drive in oil seals and bearings.

### 5-3. LUBRICATION DURING ASSEMBLY

Lubricate all internal parts not coated with petroleum with approved transfer case lubricant (refer to paragraph 3-4) 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.

### 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 removed, press two new dowel pins (92) into case so that they project 0.365-0.395 in. (9.27-10.03 mm) above face of case.

b. Note that bushing (91) has a key on its OD in line with flat on the bushing flange. Note also that bushing bore in transfer case (93) has a groove. Align bushing key with flange groove. Using suitable drift, press in bushing until its flange seats against inside face of case.

c. Make sure bore in transfer case (93) for oil seal (90) is free from oil or grease. Apply a thin film of Loctite 009 to case bore. Position new oil seal (90) as shown in figure 5-2 and press in to dimension shown using suitable drift.

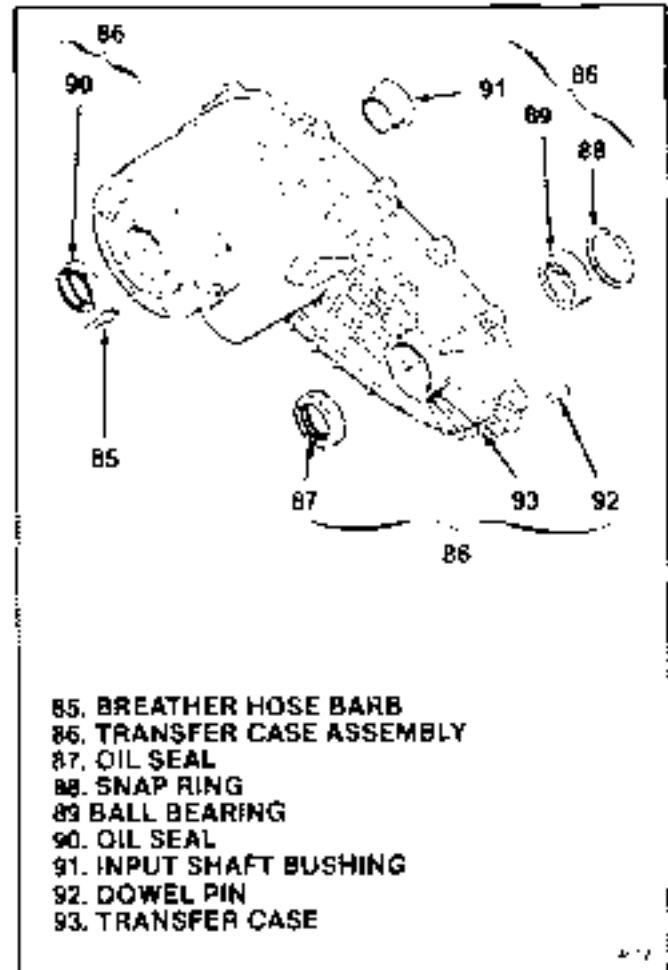


Figure 5-1. Transfer Case Assembly

d. Using suitable drift, press in ball bearing (89) to bottom in transfer case (93) and install snap ring (88).

e. Position new oil seal (87) as shown in figure 5-3 and press in transfer case (93) to dimension shown using suitable drift.

f. Install breather hose barb (85) in transfer case (93) and torque to 6-12 lbf-ft (8-19 Nm).

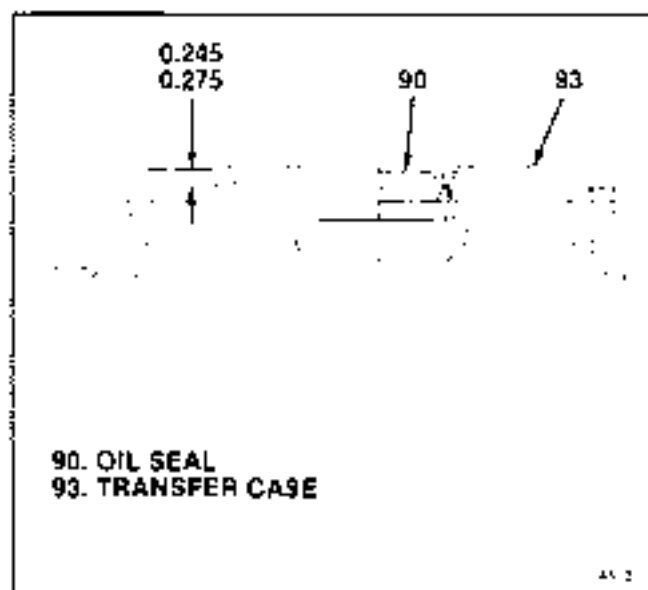
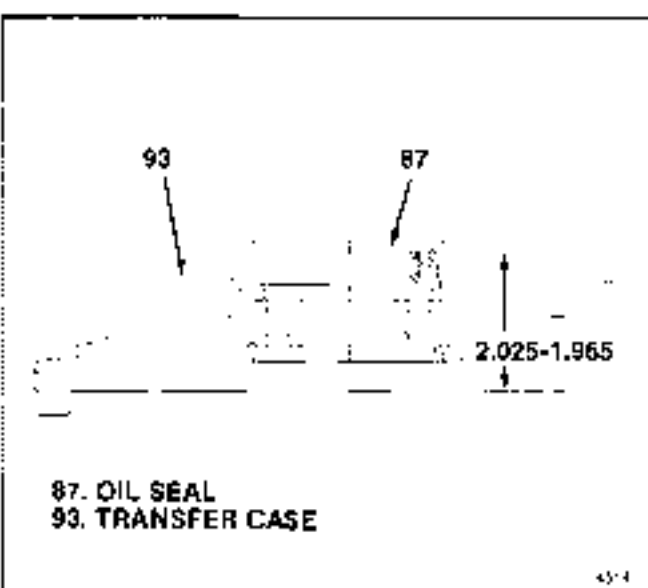


Figure 5-2. Installing Input Shaft Oil Seal Figure



5-3. Installing Output Shaft Oil Seal

**5-6. INSTALLING LOWER OUTPUT SHAFT AND YOKE.** To assembly as completed thus far (85 through 93), install parts as follows (see figure 5-4).

- If removed, press dust deflector (82) onto yoke (83) to seat against yoke shoulder.
- Lubricate oil seal (80) and install over threads of lower output shaft (84) with sealing head on oil seal facing out. Seat oil seal on shaft shoulder.
- Insert lower output shaft (84) through ball bearing in transfer case (93), hold in position and install yoke assembly (81). Attach with washer (79) and nut (78). Tighten nut just enough to hold shaft securely but do not torque at this time.

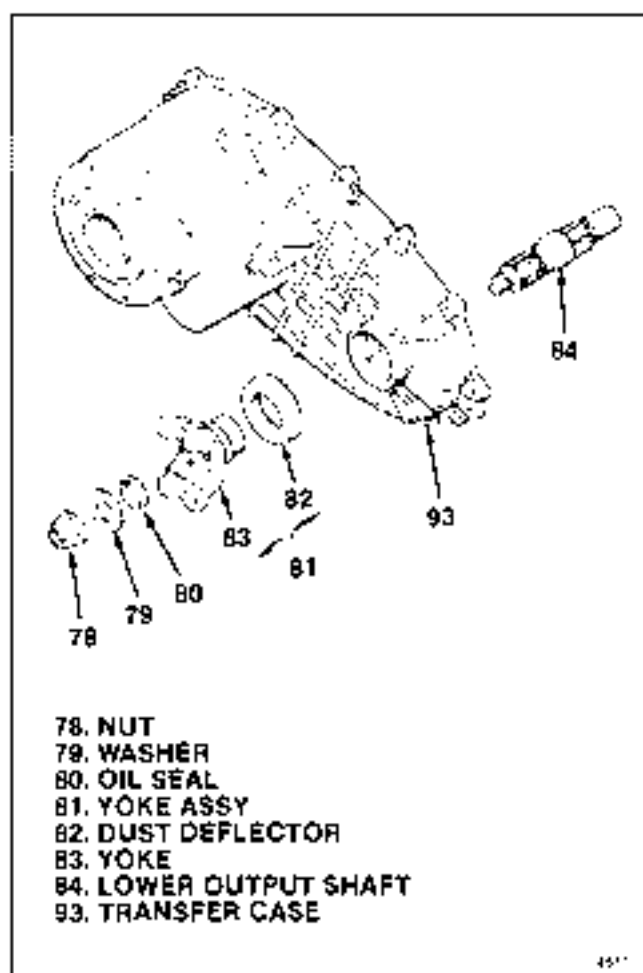


Figure 5-4. Lower Output Shaft and Yoke

**5-7. ASSEMBLY OF CARRIER AND INPUT SHAFT GROUP.** On work bench, assemble parts as follows (see figure 5-5).

- Lay planet and gear assembly (73) on work bench with open side up (splined end down).
- Insert one thrust washer (71) into planet and gear assembly (73) with washer tabs between gears. Then rotate thrust washer until its tabs line up with notches in planet and gear assembly and drop into place.
- Install sun gear (72) with side marked at disassembly up. Rotate gears of planet and gear assembly (73) as required until sun gear is fully meshed and resting against thrust washer (71) previously installed.
- Apply petroleum to face of remaining thrust washer (71) to hold it in place and install in shift hub (70) with washer tabs in hub notches. Install shift hub in planet and gear assembly so that notch on hub flange aligns with that of planet and gear assembly. The two notches will form a T-shaped recess. Install pinion cage key (69) in this recess.
- Rotate shift hub (70) in planet and gear assembly (73) with snap ring (68).

f. Slide ring gear plate (66) into groove in OD of shaft hub (70). Make sure plate goes into narrow groove, not the wider groove for shift fork.

g. Place ring gear (66) on two 3/8 in. (9.5 mm) spacers on work bench with snap ring groove up. Lower planet and pinion assembly and assembled parts (67 through 73) into ring gear. Rotate planet and gear assembly (67) to align gear teeth, and snap gear plate (67) to align its teeth with those in ring gear.

h. If removed, press in cup plug (62) to bottom in input shaft (63). Press in new bushing (61) until its outside end is flush with bottom of chamfer in input shaft (63).

i. Install input shaft assembly (60) into reduction carrier assembly (64). Install assembly tool T13-15-001 as shown in figure 5-6 and tighten hand knobs securely to hold assembly in neutral and together for installation later.

**5-8. ASSEMBLY OF REDUCTION SHIFT FORK, RAIL AND CAM.** On work bench, assemble parts as follows (see figure 5-7):

a. Insert pin (57) through cam roller (58) and into reduction shift fork (59). Attach with retaining clip (56). Make sure that cam roller turns freely.

b. Install two fork springs (55) on reduction shift fork (59).

c. Install one crescent ring (48) in groove at one end of pin (57). Insert pin through hole in lost-clip rail (54). Install stepped cam roller (52) over free end of pin (57) and position assembly on work bench with roller pointing up.

d. Hold shift cam (51) over the roller-pinion assembly (52) through (54) in the position shown in figure 5-7. Make sure that the side of the cam with the raised hub reinforcement is up. Lower cam into position with the larger cam track going over roller (52). Install roller (50) and remaining crescent ring (49).

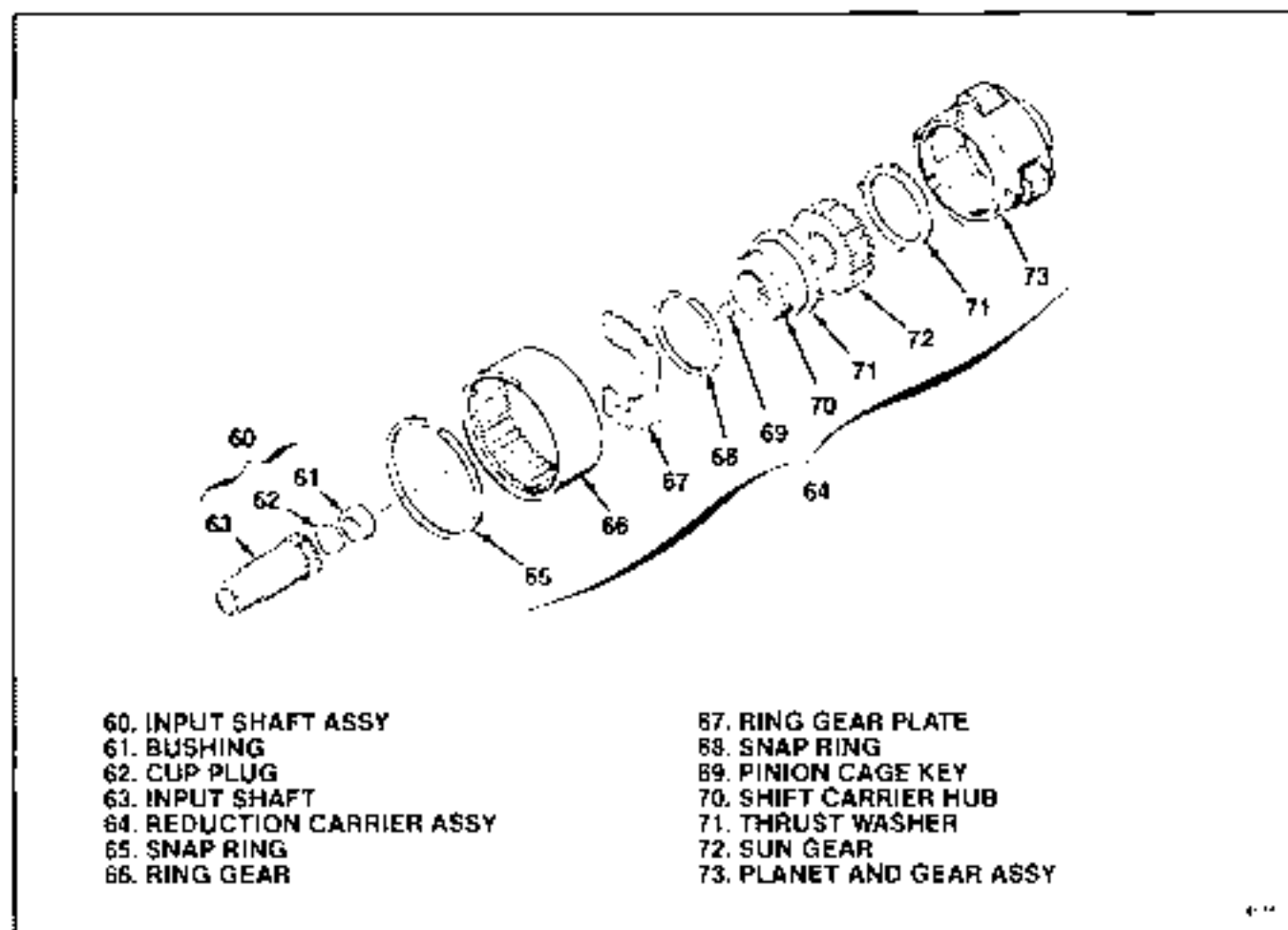


Figure 5-5. Carrier and Input Shaft Group

c. Slide reduction shift fork (59) onto lockup rail (54), long hub end first. Engage cam roller (58) in open track in rail (54).

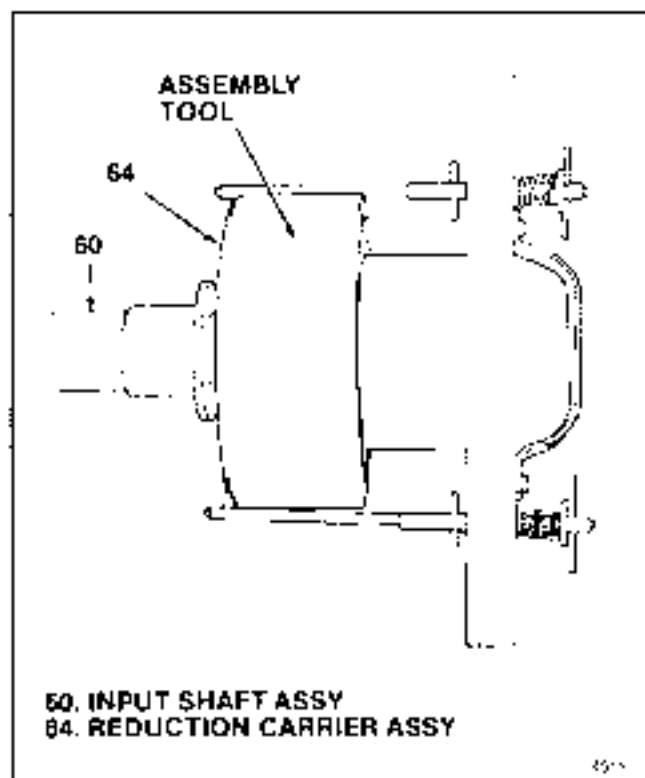


Figure 5-6. Holding Parts Together With Assembly Tool

**5-9. INSTALLATION OF REDUCTION SHIFT CARRIER AND INPUT SHAFT GROUP IN TRANSFER CASE.** Position transfer case and lower output shaft assembly (78 through 95) on work bench, input face of case up. Use wooden blocks under lower output yoke to keep line of rail aligned. Proceed as follows (see figure 5-8):

a. Apply petroleum jelly to thrust washer (74) to help hold in place and center on bushing in transfer case assembly (86).

b. Bring the previously assembled paragraphs 5-7 and 5-8 carrier and input shaft group retained with assembly tool (T-13 45-061) and reduction shift fork, rail and cam group together by engaging reduction shift fork (59) with groove in shift hub (70). Holding these two groups together, lower into transfer case assembly (86) (see figure 5-9), meeting following conditions:

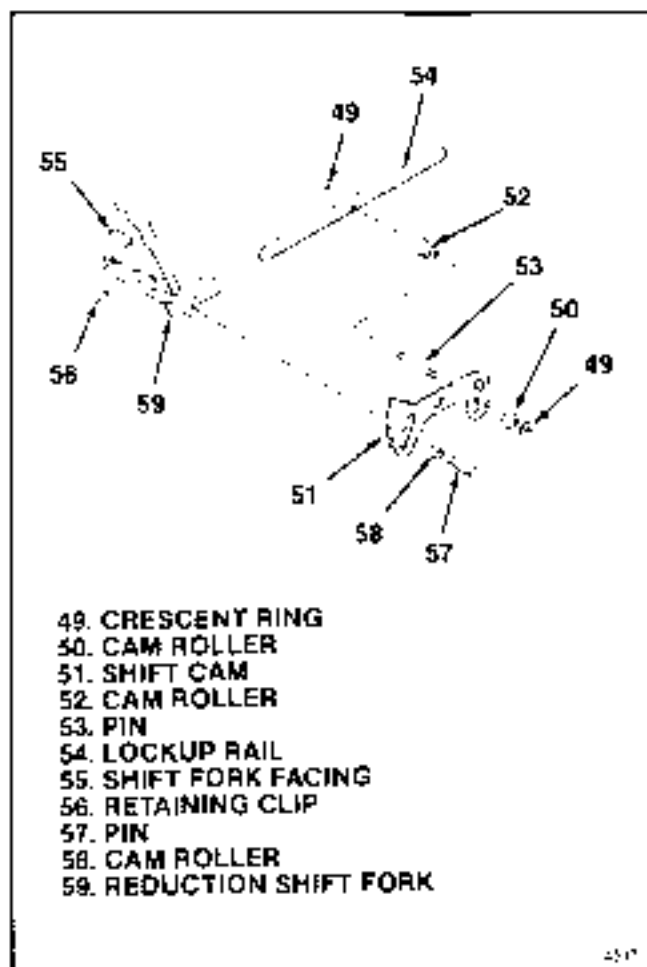


Figure 5-7. Reduction Shift Fork, Rail and Cam Parts

1. Input shaft (63) must go through thrust washer (74) and bushing in transfer case assembly (86).

2. End of lockup rail (54) must enter hole in transfer case assembly (86).

3. Cam roller (50) must rest in cradle provided in transfer case assembly (86).

c. Install bearing (48) in groove in shaft of shift lever assembly (47).

d. Holding shift lever assembly (47) in neutral position (see figure 5-10) insert through transfer case assembly (86) and splines of shift cam (51). Install clip ring (45) in groove in shift lever assembly to retain it on shift cam.

e. Apply Loctite 242 to threads of set screw (46) and install in transfer case assembly (86). Torque set screw to 5.0-7.0 lb ft (6.8-9.5 Nm).

f. Remove assembly tool (T-13 45-061).

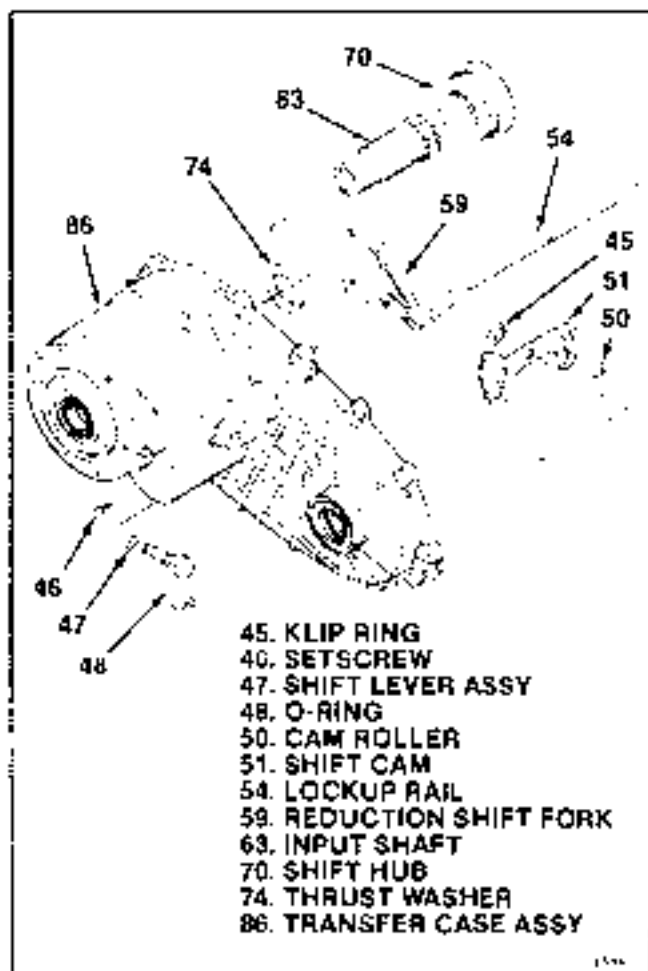


Figure 5-8 Installation of Reduction Shift, Carrier and Input Shaft Group

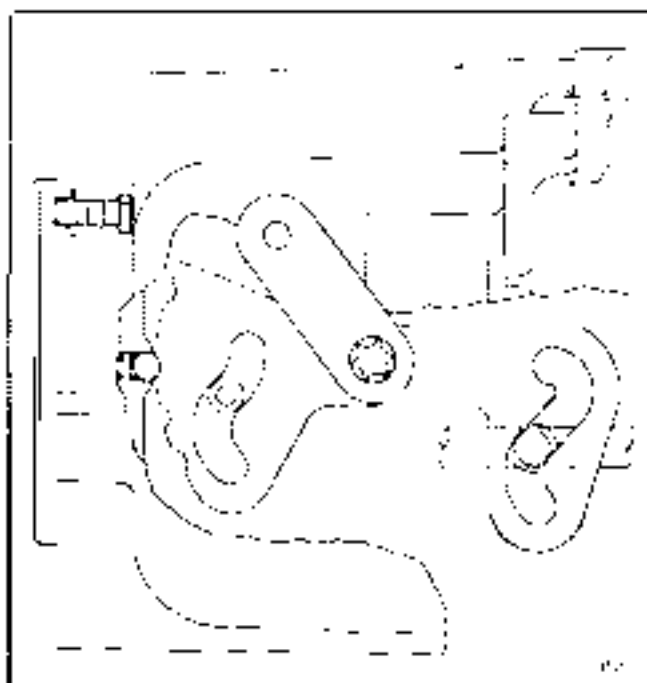


Figure 5-10. Shift Lever Assembly in Neutral Position

**NOTE**

Installation of retainer and upper output shaft (paragraph 5-10) may be deferred and oil pump assembled to upper output shaft and retainer (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.

**5-10. INSTALLATION OF RETAINER AND UPPER OUTPUT SHAFT.** To assembly as completed thus far (45 through 86), install parts as follows (see figure 5-11):

- a. Install spline of upper output shaft (43) in mating spline of planet and gear assembly in transfer case assembly (86).
- b. Position retainer and plate assembly (42) on bed of suitable press with open face down. Position needle bearing (41) over retainer and plate assembly with end of bearing having identification markings up. Using suitable drift, press bearing into retainer and plate assembly until end of bearing with identification markings is 1.405-1.375 in. (35.09-34.93 mm) above surface of press bed.
- c. Install retainer plate and bearing assembly (40) over upper output shaft (43) in transfer case assembly (86). Align semi-circular notches in plate (D) with those in case (E) before seating retainer plate. Install two dowel pins (44) in aligned notches.
- d. Install snap ring (39) in groove in transfer case assembly (86) to retain retainer plate and bearing assembly.

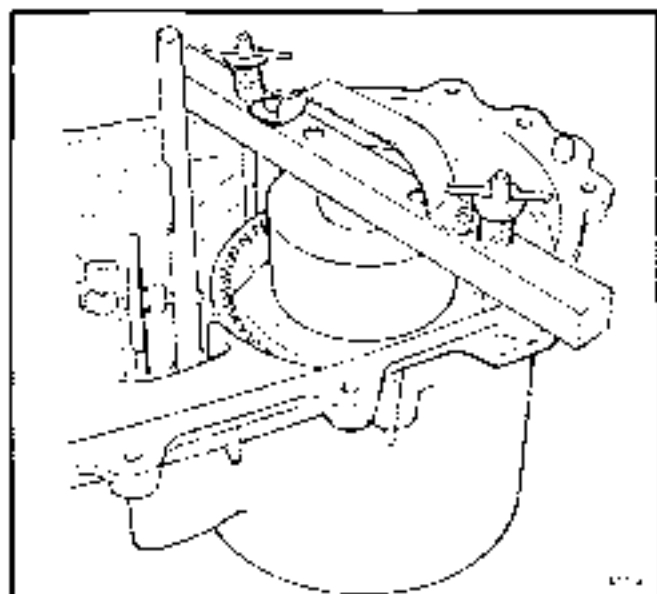
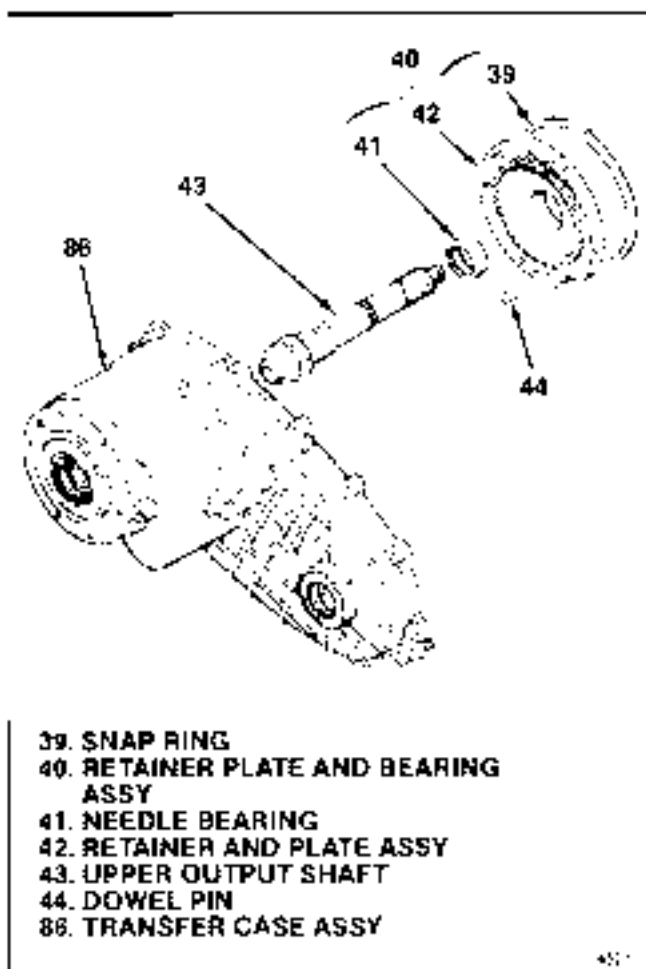


Figure 5-9. Reduction Shift, Carrier and Input Shaft Group in Transfer Case



- 39. SNAP RING
- 40. RETAINER PLATE AND BEARING ASSY
- 41. NEEDLE BEARING
- 42. RETAINER AND PLATE ASSY
- 43. UPPER OUTPUT SHAFT
- 44. DOWEL PIN
- 86. TRANSFER CASE ASSY

Figure 5-11. Retainer and Upper Output Shaft

**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 assemble as complete, thus kit (30 through 93) assemble parts as follows, see figure 5-12:

a. Locate pump front cover (38). Front pump cover has tapped holes. Post on 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 (38) over upper output shaft (43) in this position.

b. Install two pump pins (36) with spring (37) between them in upper output shaft (43). Flat surface on both pins must point out and face up. Center pins and spring in output shaft.

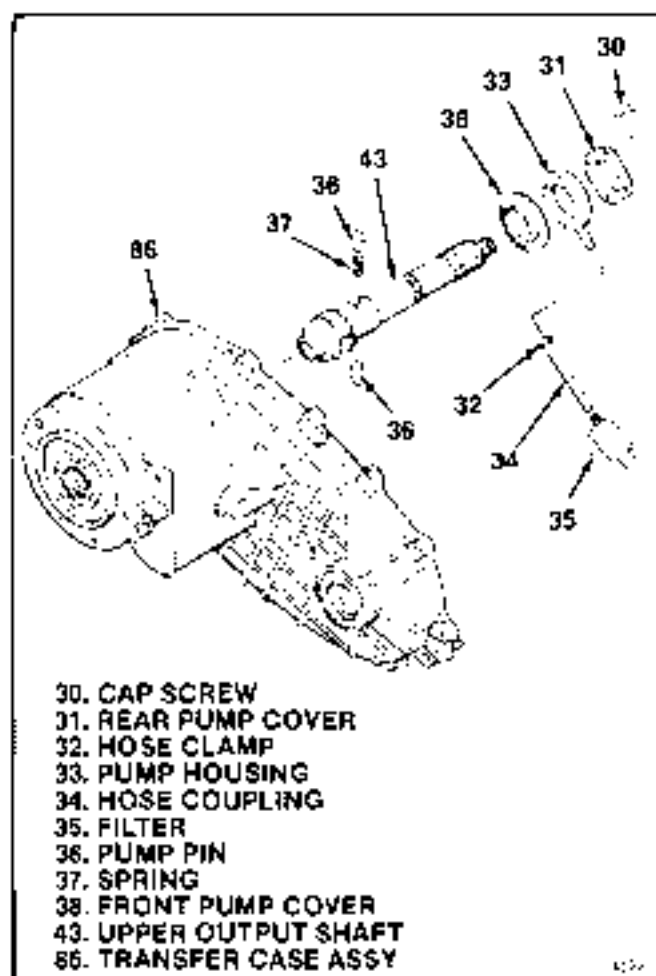
c. Push hose coupling (34) onto barb on filter (35) and install L-shaped part on filter in slot in transfer case assembly (86). Hose coupling must point in direction of pump assembly.

d. Install pump housing (33) so that word REAR marked on it is up and hose barb points toward hose coupling (34) and filter (35). Lower pump housing over upper output shaft moving pump pins (36) inward and compressing spring (37) so that both pins are contained inside pump housing.

e. Slip hose clamp (32) over free end of hose coupling (34) and push onto hose barb on pump housing (33). Secure hose clamp over hose coupling on hose barb.

f. Position pump rear cover (31) over assembly with word TOP REAR facing up and located to be at top of transfer case when installed. Clean threads on four cap screws (30) and apply Loctite 222. Align pump holes and install cap screws. Torque cap screws to 36-49 lbs in (4-1.5-5 Nm) while turning upper output shaft (43) by hand to insure that pump pins (36) move freely.

g. Make sure that upper output shaft (43) turns freely in oil pump assembly. If not, disassemble, check and remedy cause.



- 30. CAP SCREW
- 31. REAR PUMP COVER
- 32. HOSE CLAMP
- 33. PUMP HOUSING
- 34. HOSE COUPLING
- 35. FILTER
- 36. PUMP PIN
- 37. SPRING
- 38. FRONT PUMP COVER
- 43. UPPER OUTPUT SHAFT
- 86. TRANSFER CASE ASSY

Figure 5-12. Pump Parts

**5-12. INSTALLATION OF CHAIN DRIVE.** To assembly as completed, thus kit (30 through 93) assemble parts as follows, see figure 5-13:

a. Install thrust washer (29) so that it seats on shoulder of upper output shaft (43).

b. On work bench, next to transfer case assembly, position driven sprocket (28) with internal spline at lower output shaft (54) end of case and drive sprocket (27) with smooth bore at upper output shaft (43) end.

c. Assemble drive chain (26) around sprockets (27 and 28).

d. Grasp each sprocket (27 and 28), hold drive chain (26) tight and parallel with transfer case, and install chain drive assembly (26) through (28) over output shafts (84 and 43). It may be necessary to rotate driven sprocket (28) slightly to engage splines on lower output shaft (84).

e. Install washer (25) on lower output shaft (84). Install snap ring (24) in shaft groove over washer.

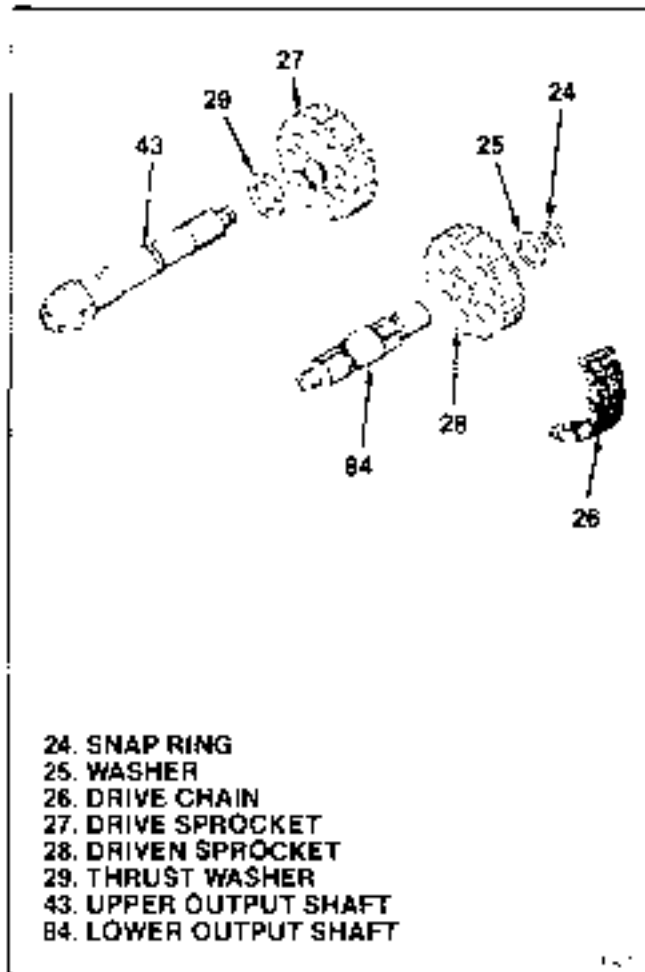


Figure 5-13. Chain Drive

**5-13. INSTALLING LOCKUP SHIFT PARTS.** To assembly as completed thus far (24 through 93) install parts as follows (see figure 5-14):

a. Install two fork facings (22) on lockup fork (23).

b. Position spring (21) on lockup fork (23).

c. In one hand, hold lockup fork (23) with hub extension containing spring down. In other hand, hold shift collar (20) with hub extension up. Bring parts together engaging lockup fork in hub extension groove. Install assembled parts with shift collar onto upper output shaft (43) and lockup fork and spring (21) onto lockup rail (54).

d. Pry down on spring (21) and install upper spring retainer (19) on lockup rail (54). Flat on spring retainer must be aligned with flat on lockup rail. Pry up on spring and install lower spring retainer in same manner.

e. Install shift hub (18) over spline on upper output shaft (43).

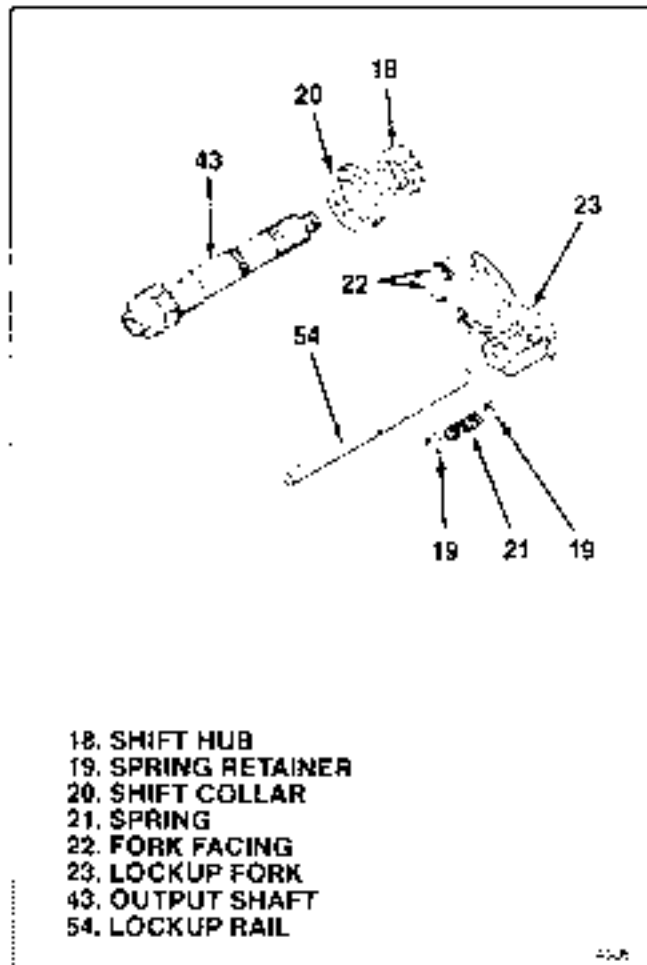


Figure 5-14. Lockup Shift Parts

**5-14. COVER ASSEMBLY.** Assemble parts into cover as follows (see figure 5-15):

a. Position cover (16) on bed of suitable press so that open face of cover is up and parallel with press bed.

b. Using suitable drift, press in ball bearing (15) to bottom in cover (16) and install snap ring (14).

c. Position end of needle bearing (17) with identification marking up. Using suitable drift, press bearing into cover (16) until upper end of bearing is 2.98 to 2.815 in. (75.7-71.5 mm) below face of cover that mates with transfer case.

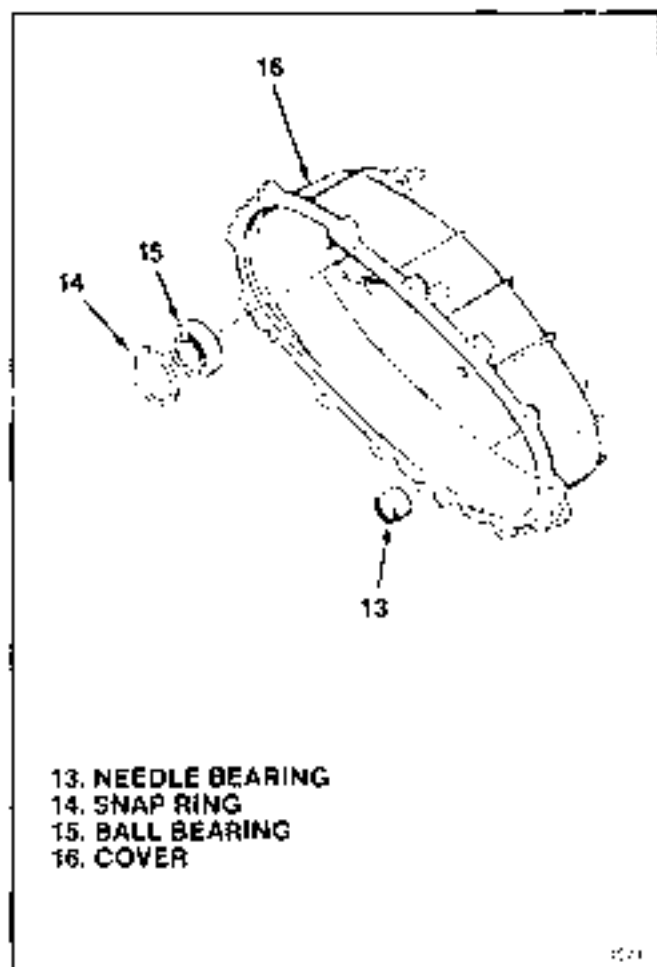


Figure 5-15. Cover Assembly

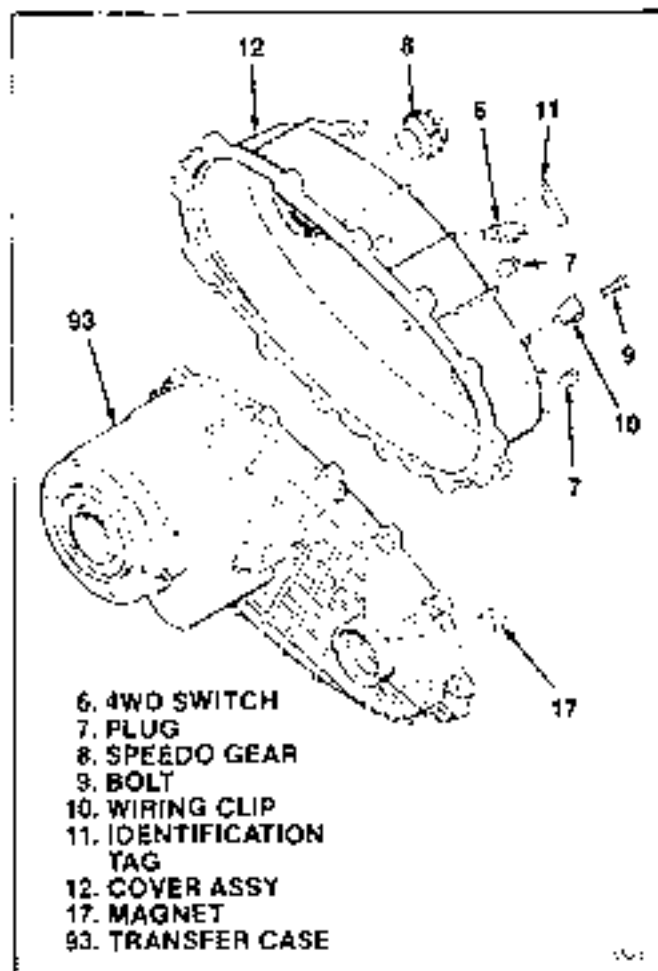


Figure 5-16. Cover Installation

**5-16. INSTALLING COVER ASSEMBLY.** To assemble as completed, transfer (18) through (20) install parts as follows (see Figure 5-16):

- a. Install magnet (17) in slot in transfer case (93).
- b. Apply continuous 1/16 in. (1.6 mm) bead of Aquantastic RTV No. 132 or General Electric Silicone RTV No. 1173, all around transfer case (93) mounting area for cover assembly (12). Center sealant bead between edges of face. Create or lay double thickness sealant bead through bolt holes.
- c. Install cover assembly (12) on transfer case (93), aligning dowel pins (92) and pulling output shaft (43, figure 5-14) through cover. It may be necessary to use screwdriver to position lockup pin (64, figure 5-14) to enter hole in cover.
- d. Install twelve bolts (9) positioning identification tag (11) and wiring clip (10) under bolt heads at locations shown in figure 5-17. Torque bolts to 40-45 lb-ft (54-2.61 k Nm).
- e. Install speedo gear (8) over spline of output shaft (43, figure 5-14) into cover assembly (12).
- f. Install two plugs (7) and torque to 10-20 lb-ft (13.6-27.1 Nm).
- g. Install 4WD switch (6) and torque to 8.0-12.0 lb-ft (10.9-16.3 Nm).

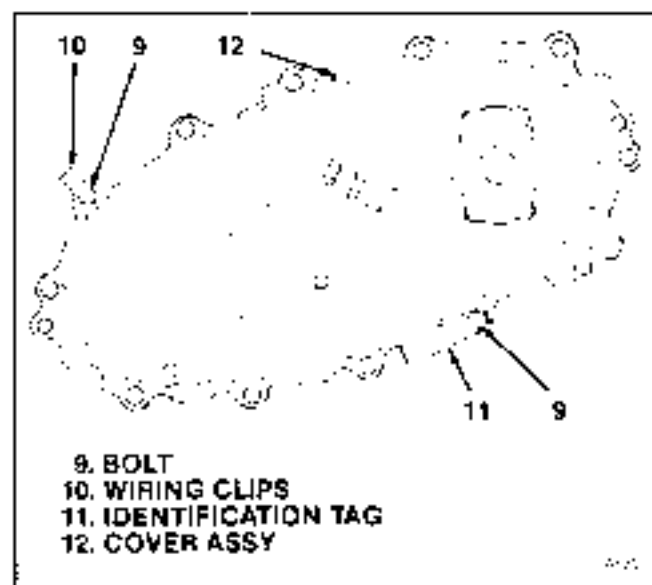


Figure 5-17. Wiring Clip and Identification Tag Locations

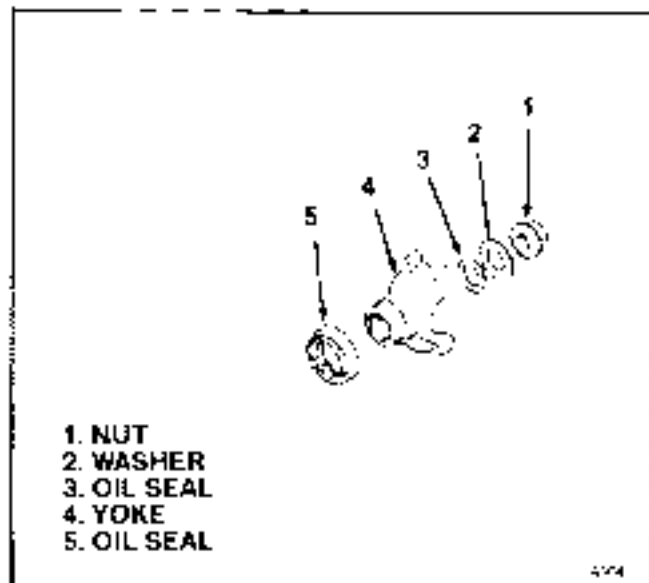


Figure 5-18. Rear Yoke Group

**5-16. INSTALLING REAR YOKE GROUP:** To assemble as completed thus far (9) through (13) install parts as follows (see figure 5-18):

a. Fit oil seal (5) over cover with side marked **OUTSIDE**, up. Using section's drift, press in oil seal until outside end is flush with bottom of chamber in cover.

b. Fit oil seal (3) on output shaft with sealing bead facing out. Install yoke (4), washer (2) and nut (1). Torque nut (1) and nut (78) (figure 5-19) on lower output shaft to 150-180  $\text{lb-ft}$  (203-241 Nm).

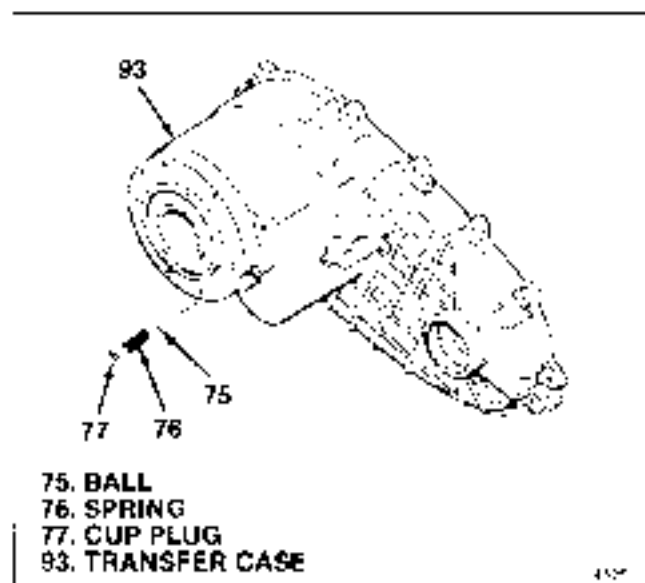


Figure 5-19. Installing Cam Ball and Spring

**5-17. INSTALLING CAM BALL AND SPRING:** See figure 5-19 and proceed as follows:

a. Insert ball (75) and spring (76) into transfer case (93).

b. Apply force to (76) to OD of cup plug (77). Drive in cup plug, closed end first, until top end of cup plug is 1/16 in (2.5 mm) below face of transfer case (93).

Table 5-1. Torque Values  
**TORQUES FOR SPECIFIC PARTS**

PART (INOEX NO.)	TORQUE IN LB-FT	TORQUE IN Nm
Nut (1) and (78)	150-180	203-241
4WD Switch (6)	8.0-12.0	10.9-16.3
Plug (7)	10-20	13.6-27.1
Ball (9)	10-45	54.2-61.0
Cap Screw (30)	3.0-4.1	4.1-5.5
Set screw (16)	5.0-7.0	6.8-9.5
Bushing (Rear shaft)	6-11	8-19

**Table 5-1. Torque Values (cont.)**

**GENERAL TORQUES**

<b>THREAD SIZE</b>	<b>TORQUE IN LB-FT</b>	<b>TORQUE IN Nm</b>
5/16-18 UNF	15.0-28.0	20.3-38.0
3/8-16 UNF	25.0-40.0	33.9-54.5
3/8-24 UNF	25.0-40.0	33.9-54.5
7/16-14 UNF	35.0-55.0	47.5-74.6
1/2-13 UNF	45.0-70.0	61.0-94.9
1/2-20 UNF	45.0-70.0	61.0-94.9
9/16-12 UNF	60.0-90.0	81.3-122.0
1-8-27 NPTF	7.0-15.0	9.6-20.3
1-1/4-18 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

# Section P Parts Contents

FIGURE NO.	DESCRIPTION	APPLICATION
P-1	Transfer Case Assembly	15-45

## P-1. INTRODUCTION.

P-2. This section lists, describes and illustrates replacement parts for the Borg Warner Automotive 11-45 Transfer Case. The 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. 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 Preparable. Detail parts so designated are not preparable separately. When replacement is required, order the next higher assembly.

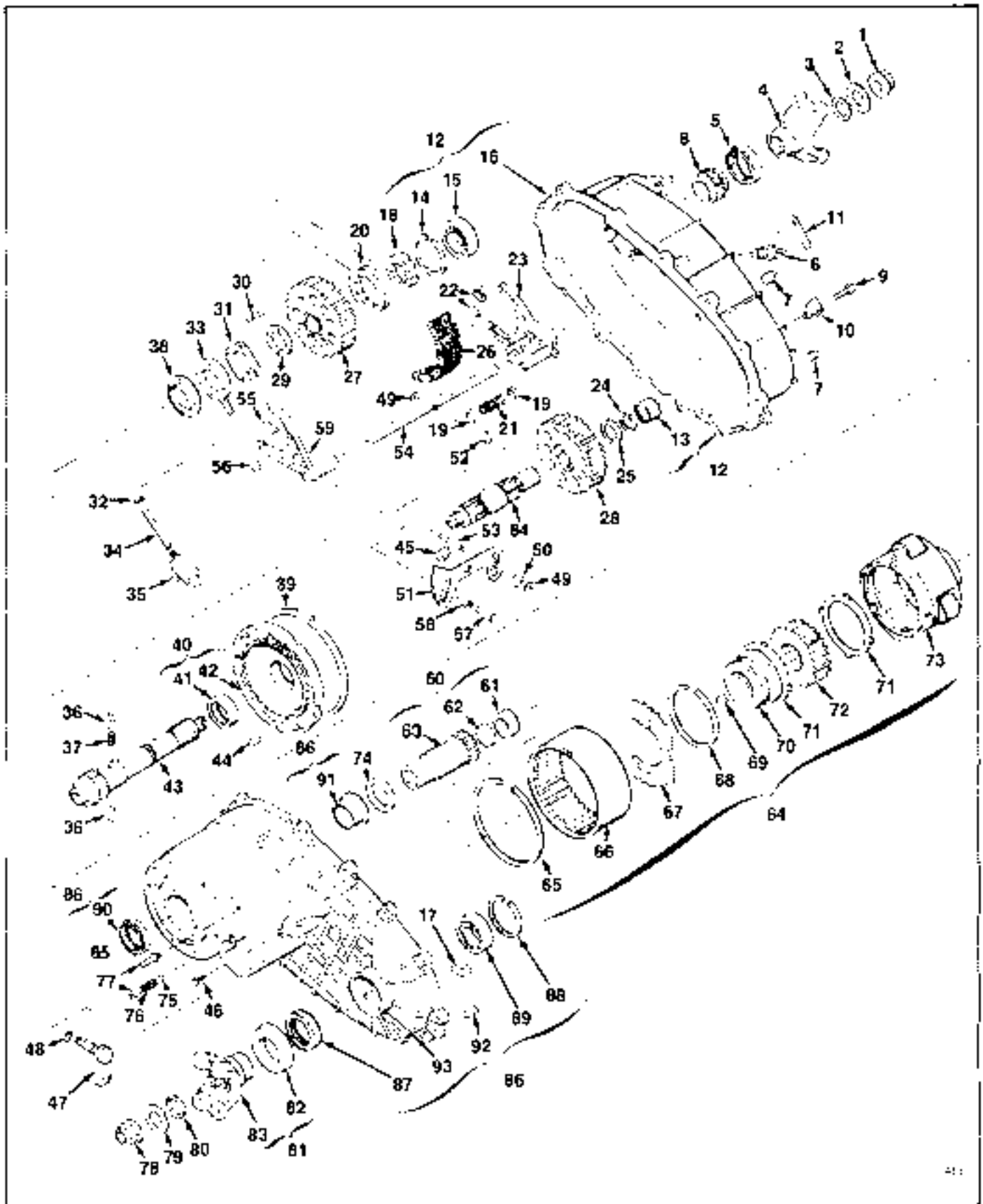


Figure P-1. Transfer Case Assembly PN B-45-013

## PARTS LIST FOR FIGURE P-1

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
1	10-00-149-019	Nut	1
2	10-00-047-015	Washer	1
3	10-00-041-045	Seal, Oil	1
4	13-45-031-003	Yoke, prior to 1187	1
	13-45-031-001	Yoke, after 1187	1
5	10-00-041-013	Seal, Oil	1
6	13-45-140-001	Switch, 4WD (prior to 1187)	1
	13-00-140-003	Switch, 4WD (after 1187)	1
7	0000414576	Plug, Pipe	2
8	13-45-210-006	Gear, Speed	1
9	13-00-185-018	Ball	12
10	10-00-056-007	Clip, Wiring	2
11	13-45-199-033	Tag, Identification	1
12	13-45-500-008	Cover Assy, Case	1
13	48601	• Bearing, Needle	1
14	T86-7-12	• Ring, Snap	1
15	13-45-210-001	• Bearing, Ball	1
16	13-45-610-005	• Cover, Case	1
17	10-00-012-002	Magnet	1
18	13-45-090-001	Hub, Shaft	1
19	13-45-040-001	Retainer, Spring	2
20	13-45-055-001	Collar, Shaft	1
21	13-45-150-006	Spring	1
22	13-45-235-001	Facing, Shaft Fork	2
23	13-45-096-004	Fork, Lockup	1
24	13-45-130-004	Ring, Snap	1
25	13-45-195-005	Washer	1
26	13-45-143-002	Chain, Drive, 1 1/4 in. wide #	1
	13-45-143-001	Chain, Drive, 1 1/4 in. wide #	1
27	13-45-144-005	Sprocket, Drive, 1 1/4 in. wide #	1
	13-45-144-001	Sprocket, Drive, 1 1/4 in. wide #	1
28	13-45-144-004	Sprocket, Driven, 1 1/4 in. wide #	1
	13-45-144-002	Sprocket, Driven, 1 1/4 in. wide #	1
29	13-45-193-001	Washer, Thrust	1
30	13-45-183-003	Screw, Cap	1
31	13-45-030-005	Cover, Pump, Rear	1
32	13-45-058-005	Gump, Hose	1
33	13-45-097-004	Housing, Pump	2
34	13-45-031-006	Coupling, Hose	1
35	13-45-238-001	Filter	1
36	13-45-013-007	Pin, Pump	2
37	13-45-150-004	Spring	2
38	13-45-039-007	Cover, Pump, Front	1
39	13-45-130-006	Ring, Snap	1
40	13-45-007-006	Retainer, Plate and Bearing Assy	2
41	10-00-132-015	• Bearing, Needle	1
42	13-45-007-005	• Retainer and Plate Assy	1
43	13-45-171-003	Shaft, Output, Upper	1
44	00801411275	Pin, Dowel	2
45	13-45-056-002	Clip, Ring	1
46	13-45-283-001	Set screw	1
47	13-45-098-006	Lever Assy, Shift	1
48	T89B-108	O-ring	1
49	13-45-056-001	Ring, Crosscut	2
50	13-45-127-004	Roller, Cam	1
51	13-45-098-004	Cam, Shaft	1
52	13-45-127-003	Roller, Cam	1
53	13-45-043-006	Pin	1

## PARTS LIST FOR FIGURE P-1 (Cont.)

INDEX NO.	PART NUMBER	DESCRIPTION	QTY
54	13-45-100-002	Roll Lockup	1
55	13-45-235-001	Facegr. Split Fork	2
56	13-45-056-003	Cup, Retaining	1
57	13-45-013-001	Pin	1
58	13-45-127-005	Roller, Cam	1
59	13-45-096-005	Fork, Reduction Shift	1
60	13-45-689-004	Shaft Assy, Input (long) -superseded 13-45-689-004	1
	13-45-689-004	Shaft Assy, Input (short) -superseded by 13-45-689-003	1
61	13-45-127-002	• Bushing	1
62	0009421756	• Plug, Cup	1
63	13-45-189-003	• Shaft, Input (long) -super-sedes 13-45-189-001	N <sup>1</sup>
	13-45-189-004	• Shaft, Input (short) -superseded by 13-45-189-003	N <sup>2</sup>
64	13-45-659-003	Carrier Assy, Reduction	1
65	13-45-139-002	• Ring, Snap	1
66	13-45-162-002	• Gear, Ring	1
	13-45-162-003	• Gear, Ring (optional)	AB
	13-45-162-004	• Gear, Ring (optional)	AB
	13-45-162-005	• Gear, Ring (optional)	AB
67	13-45-014-004	• Plate, Ring Gear	1
68	13-45-139-001	• Ring, Snap	1
69	13-45-101-001	• Key, Pinion Cage	1
70	13-45-105-002	• Hub, Shift Carrier	2
71	13-45-193-003	• Washer, Thrust	2
72	13-45-165-002	• Gear, Sun	1
73	13-45-659-004	• Planet and Gear Assy	1
74	13-45-193-001	Washer, Thrust	1
75	0030453503	Ball, Steel	1
76	13-45-156-001	Spring	1
77	10-00-113-011	Plug, Cup	1
78	10-00-149-019	Nut	1
79	10-00-047-015	Washer	1
80	10-00-044-015	Seal, Oil	1
81	13-45-531-002	Yoke Assy (Bronze) -short wheel base	1
	13-45-531-003	Yoke Assy (F Series) -long wheel base	1
82	13-45-035-001	• Deflector, Dust	1
83	13-45-031-003	• Yoke (Bronze) -short wheel base	1
	13-45-031-002	• Yoke (F Series) -long wheel base	1
84	13-45-171-002	Shaft, Output, Lower	1
85	13-45-012-001	Barb, Breather Hose	1
86	13-45-565-002	Case Assy, Transfer	1
87	13-45-041-053	• Seal, Oil	1
88	186-7	• Ring, Snap	1
89	13-45-130-001	• Bearing, Ball	1
90	13-45-041-054	• Seal, Oil	1
91	13-45-127-001	• Bushing, Input Shaft	1
92	0000141281	• Pin, Dowel	2
93	13-45-065-002	• Case, Transfer	1

<sup>1</sup>Date of manufacture - see ID tag (11) and figure 1-1

• Measure with 13 to determine correct replacement part No.

## Section T Special Tools

This section lists, describes, and illustrates the special tool required to assemble the 13-45 transfer case. Use of this tool is specified in Section 5 of the manual. An equivalent tool may be used provided it performs the same function as the tool specified. Failure to use the proper special tool could result in damage to the transfer case.

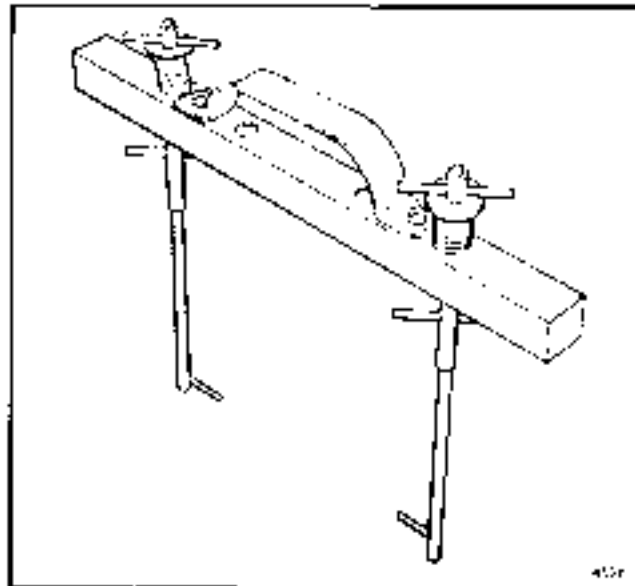


Figure T-1 Special Tools

FIG. T-1 INDEX NO.	TOOL NUMBER	TOOL NAME	APPLICATION
1	T-13-45-001	Assembly Tool	Hold carrier assembly and input shaft during assembly



**BorgWarner  
Automotive**

Borg-Warner  
Automotive,  
Inc.

Electronic  
& Mechanical  
Systems

12000  
Tech Center  
Drive

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Michigan  
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Kilgore  
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