

## MAINTENANCE AND REPAIR OF TRANSFER BOX

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## Maintenance and Troubleshooting of Transfer Box

### Maintenance

13-54 transfer box oil is replaced according to the following timetable:

**Oil Change Timetable**

Change Time	Procedure
During replacement of engine oil or after running of 8000km	Check the transfer box oil level and add oil as required.
Every year or after every 48000km of running	Replace the designated oil.

Type of transfer box oil allowed to be used: Dexron III , XT-2-QDX (Fort ESP-M2C138-CJ) or equivalent.

### Check oil.

**Caution:** Before inspection or replacement of the oil, run the vehicle for some time to make the transfer box oil temperature higher. Do not use hammer or other impact tool to open or tighten the drain plug and the filling plug to prevent the threaded holes from being damaged.

1. Clean the filling plug and its surrounding area (see Fig. 2-1).
2. Remove the filling plug, and check that the oil flows out.
3. If the oil can not flow out, it means that the actual oil amount is lower than the stipulated value. Add the designated oil into the transfer box until the oil flows out from the filling hole.
4. Tighten the filling plug to the tightening tongue of 19~30N.m.

### Replace oil.

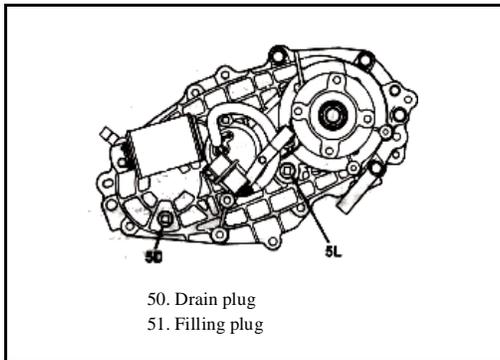
1. Clean the filling plug and the drain plug and their surrounding areas.
2. Place a container for holding oil under the transfer box.
3. Screw off the drain plug.
4. Screw off the filling plug.
5. Exhaust all the oil.
6. Install the drain plug and tighten it to the tightening tongue of 19~30N.m.
7. Fill oil from the filling hole until the oil flows out.
8. Install the filling plug and tighten it to the tightening tongue of 19~30N.m.

### Inspect for trouble.

In case that operation is hard, it is the best to stop the transfer box. In most cases, it is necessary to remove, disassemble and partially disassemble the transfer box in order to locate the trouble. The procedure for designated inspection of the transfer box parts is described in Chapter IV. The common troubleshooting is shown in the following table.

**Troubleshooting Table**

Failure	Cause	Remedy
Electric gear shift defective	Electric control element, electrical control module, speed sensor, electric motor, electric clutch or internal connecting wire damaged or defective. Gear shaft cam, engagement sleeve, lock sleeve, shifting yoke or gear shift guide shaft damaged or worn. Gear shifting yoke, lock sleeve or gear gummed.	Refer to the Vehicle Operation Manual, locate the defective element, and replace it according to the requirement. Remove and check the worn or damaged part. Replace it according to the requirement. Remove the slide part and check for free movement. Replace it according to the requirement.
No mechanical gear shifting (shafting liver is moved)	Gear shift rocker arm or gear shaft connecting rod broken or damaged. Gear shift cam guide plate damaged. Gear shifting yoke broken.	Replace the damaged part. Open the transfer box rear cover, and check and replace the damaged part.



**Fig. 2-1**

<p>Mechanical gear shifting hard or gear shifting mispositioned.</p>	<p>Operation incorrect. Oil unqualified or oil quantity insufficient. Gear shifting yoke gummed. Sliding connecting sleeve, lock sleeve or gear gummed.</p>	<p>Refer to the Vehicle Operation Manual for correct operation. Fill oil of stipulated quality and quantity. Open the transfer box rear cover, and check and replace the damaged part. Open the transfer box rear cover, check the sliding parts for free slide on the shaft, and remove and replace the damaged part.</p>
<p>Gear slide of transfer box during mechanical gear shifting</p>	<p>Gear shifting linkage damaged or improperly adjusted. Internal gear shifting part damaged or seriously worn. Gear shifting yoke assembly loose on guide shaft or damaged.</p>	<p>Adjust or repair the gear shifting linkage. Replace the severely damaged part. Replace the loose or severely damaged part.</p>
<p>Mechanical gear shifting seized at a position.</p>	<p>Gear shifting linkage improperly adjusted. Gear shifting yoke assembly too loose on guide shaft. Gear shifting yoke assembly worn, including pin and roller. Gear shifting cam hub and bush worn. Meshing tooth damaged.</p>	<p>Adjust or repair the gear shifting connecting rod. Open the transfer box, and check the shifting yoke and replace the part according to the requirement. Open the transfer box, check the part for wear and replace the part if worn. Open the transfer box, check the part for wear and replace the part if worn. Open the transfer box, check the part for wear and replace the part if worn.</p>
<p>No front wheel drive in 4WD gear.</p>	<p>Drive chain broken.</p>	<p>Remove and check the internal parts for damage, and replace the chain.</p>
<p>Noise at all gears. Make sure that the noise comes from the transfer box but not from the clutch, engine, drive shaft or other units.</p>	<p>Incorrect oil or oil quantity insufficient.</p>	<p>Replace or replenish oil according to the requirement.</p>
	<p>Connection bolt or other connecting part loose.</p>	<p>Make sure that all the connecting parts are tightened to their stipulated torque.</p>
	<p>Noise in transfer box bearing.</p>	<p>Open the transfer box, check the bearing and other parts for wear or damage, and replace the part if worn or damaged.</p>
	<p>Gear noise.</p>	<p>Open and check the parts (including the odometer gear) for wear or damage, and replace the part if worn or damaged.</p>
<p>Noise in 4WD drives high gear and low gear.</p>	<p>Sprocket or chain damaged or worn.</p>	<p>Open and check the parts for wear or damage, and replace the part if worn or damaged.</p>
	<p>Tyre air pressure incorrect.</p>	<p>Regulate the tyre air pressure to the correct value.</p>
<p>Transfer box oil leaking.</p>	<p>Transfer box casing broken.</p>	<p>Replace the casing.</p>
	<p>Leakage from other unit.</p>	<p>Make sure that the transfer box leaks oil. Wipe it try and check for leakage.</p>
	<p>Vent plug blocked.</p>	<p>Open and clean, replace when necessary.</p>
	<p>Oil excessive or oil brand incorrect.</p>	<p>Use the designated oil and adjust to oil to correct quantity.</p>
	<p>Seal face bolt loose.</p>	<p>Tighten the bolt according to the requirement.</p>
	<p>Sealants in different brands or unusable.</p>	<p>Use the designated sealant and tighten the bolt according to the requirement.</p>
	<p>Seal worn or damaged.</p>	<p>Replace the seal.</p>

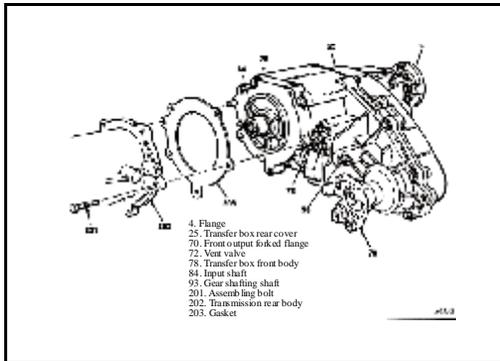


Fig. 2-2

## Removal and Installation

### Removal of Transfer Box

During removal, a suitable vehicle lift and transfer box bracket or jack is required. The transfer box bracket or jack must support the transfer box fully and independently and move it upward, downward and laterally. The removal procedure is as follows: (see Fig. 2-2)

1. Drive the vehicle onto a suitable lift.
2. The Transmission gear shifting is moved to Parking or Neutral position, and the transfer box is changed to 2H gear and stops the engine.
3. Disconnect the negative electrode of the battery.
4. Lift the vehicle.
5. Place the drain pan under the transfer box, and remove the drain plug and the filling plug from the transfer box (see Fig. 2-1). Drain all the oil from the transfer box, and then reinstall the two plugs.
6. Disconnect all the wires and bundle of wires related to the transfer box.
7. As for the transfer box with mechanical gear shift, disconnect the gear shifting mechanism from the transfer box gear shifting shaft (93).
8. Disconnect the connecting wires of odometer.
9. Disconnect the hose from the vent valve of transfer box.
10. Disconnect the front drive shaft from the front flange of transfer box.
11. Disconnect the rear drive shaft from the rear flange of transfer box.
12. Jack up the transfer box..

**Warning: Make sure that the transfer box is supported by the lift fully before removal of the bolts (201) or the nuts for connecting the transfer box and the transmission is not allowed to directly engage the transfer box to the transmission through the spline shaft in order to prevent the parts of transfer box form damage.**

13. Remove the nuts connecting the transfer box and the transmission, and take off the transfer box.
14. Move the transfer box directly backward until the input shaft of transfer box is fully disconnected from the spline of transmission.
15. Carefully lower the transfer box lift.
16. Remove the gasket (230) between the transfer box and the transmission. Remove the material or adhesive fro the gasket

between the bonding faces of the front body (78) of transfer box and rear body (22) of transmission. Take care not to damage the bonding faces.

### Installation of Transfer Box

Refer to the support, gear shifting mechanism, bundle of wires odometer wires and the units related to transfer box installation in the Vehicle Service Manual. During installation, use vehicle lift and transfer box bracket or jack. The installation procedure is as follows: (see Fig. 2-2)

1. Use a thin sleeve with grease to apply grease to the output shaft spline of transmission.
2. Install a new gasket (203) on the transfer box installation face.
3. Heighten the transfer box lift bracket and align it to the transmission in an axis.

**Warning: Before connection of the spline, make sure that the transfer box and the transmission are aligned. Do not force the transfer box spline into the transmission. To prevent a possible damage, turn the rear output shaft of transfer box to align the spline.**

4. Slowly move the transfer box forward, and joint the Input shaft spline of transmission with the pin until the front body (78) of transfer box, Gasket (203) and the rear body (202) of transmission are fit to each other.

Make sure that the installation holes of the front body (78) of transfer box; gasket (203) and rear body (202) of transmission are aligned to each other, and install bolt (201) or nut. Tighten the bolt to the torque of 25-43lbs/ft (35-48N.m).

5. Connect the rear drive shaft to the rear output flange (4) of transfer box.
6. Connect the front drive shaft to the front output forked flange (70) of transfer box.
7. Connect vent valve (72) and the vent hose.

8. Connect the odometer wires at transfer box rear cover (25) .
9. Connect all the bundles of wires related to the transfer box.
10. Fill oil of correct brand.

**Warning: If correct oil in a suitable amount is not filled according to the requirement, damage may be caused to the transfer box.**

**Caution: It is necessary to use oil pump to fill oil to the transfer box installed on the vehicle.**

**Caution: If the transfer box was removed for repair or inspection, there is no oil in the oil duct which is located on the upper part of transfer box. Control of the oil quantity by opening the filling plug is not accurate until the oil pump operates to fill the oil duct full. If the wheel is rotary, this may be done on the vehicle lift. After operation of the oil pump, recheck the oil level.**

After check of the oil, lower the vehicle and connect the negative terminal of battery.

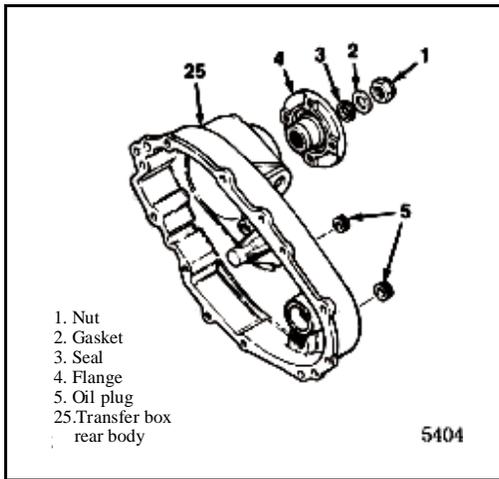


Fig. 3-1

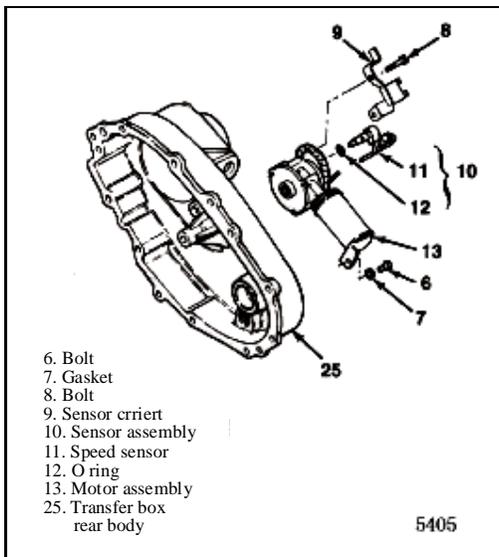


Fig. 3-2

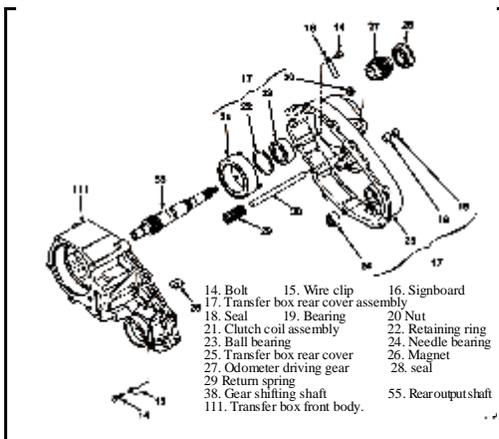


Fig. 3-3

## Disassembly of Transfer Box

### General

During disassembly, refer to legend and description of the diagram in this chapter. Additionally refer to the Exploded Diagram of Transfer Box Assembly in Chapter VI.

This describes the full disassembly of transfer box when all-round inspection is necessary. If a specific part of transfer box is to be repaired, the disassembly of transfer box is conducted to such extent that the damaged part may be removed. The parts removed from transfer box may be subassembly or units. It is not necessary to disassemble them unless the damaged part is included.

### Disassembly of Transfer Box

Place the transfer box on a working bench with rear part or rear cover upward. Level the transfer box by placing wooden block under its front part. The disassembly procedure is as follows: (see Fig. 3-1)

1. Hold flange (4) with torque rod T-13-54-002, screw off nut (1), take off gasket (2), and then remove the flange and seal.
2. Take off two plugs (5) from casing (25).

As for the transfer box with electric gear shift, remove the electric gear shift unit (see Fig. 3-2). Removal steps are as follows:

1. Remove bolt (6), gasket (7), three bolts (8) and sensor and clips for bundle of wires.
2. Remove sensor assembly (10), and take off O ring (12) from speed sensor (11).
2. Remove motor assembly (13).

The removal procedure of the rear cover is as follows: (see Fig. 3-3)

1. Remove 9 screws (14), and remove the clip of bundle of wires (15) and signboard (16). Take care to keep the signboard which includes the information for replacement.
2. Gently crowd the casing, separate the surface sealant, and then directly move the rear cover assembly (17) of transfer box upward to take it off.
3. As for the transfer box with electric gear shift, remove seal (18), bearing (19) and 3 nuts (20) and clutch coil assembly (21).
4. Remove retaining ring (22), pull out bearing (23) from rear cover (25) and remove the odometer gear.
5. Pull out needle bearing (24) from rear cover (25) of transfer box.
6. Pull out seal (28) from rear cover (25) of transfer box.
7. Remove magnet (26) from transfer box front casing (111).
8. Remove return spring (29) from gear shifting shaft (38).
9. Remove the sealant on the bonding faces of transfer box front casing (111) and rear cover (25). Take care not to damage the bonding faces of the casings or not to drop the removed objects into the transfer box.

Fig. 3-6

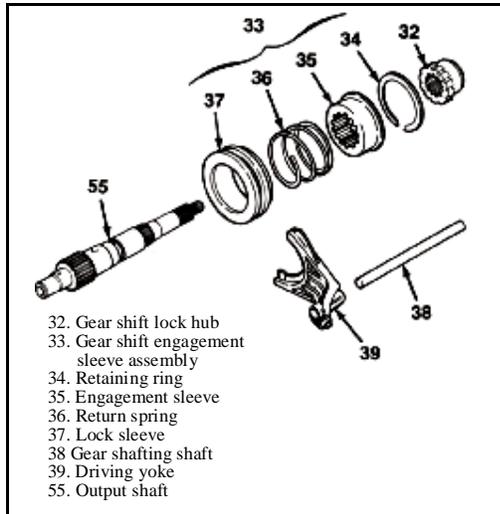


Fig. 3-4

### Removal of Gear Shifting Parts for Engagement of Front Axle

From the remaining transfer box casing assembly (Parts 30 to 111), remove the following parts (For mechanical gear shift, see Fig. 3-4; and for electric gear shift, see Fig. 3-5).

1. For electric gear shift assembly, remove retaining ring (30) and the slide clutch sleeve from gear shifting lock hub (32).
2. Remove gear shifting lock hub (32) from rear output shaft (55).
3. Remove shifter collar assembly (33) and gear shifting yoke (39) from rear output shaft (55) and gear shifting shaft (38). Separate all the assemblies and remove gear shifting shaft (38).
4. To disassemble shifter collar assembly (33), remove retaining ring (34), shifter collar (35), return spring (36) and lock sleeve (37).
5. Replace the early used metal shifting yoke assembly and independent roller with a plastic shifting yoke (39).

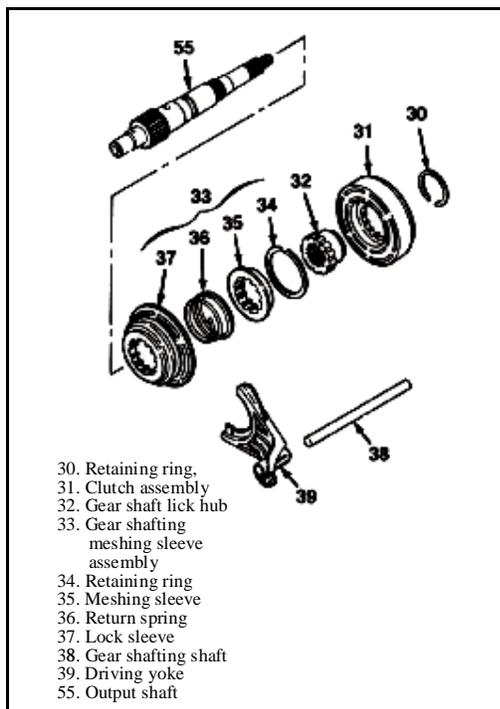
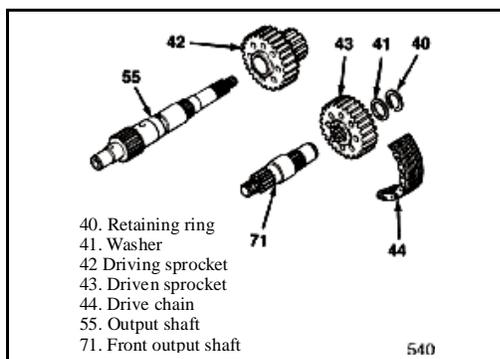


Fig. 3-5

### Removal of Chain Drive System

From the remaining transfer box casing assembly (Parts 40 to 111), remove the following parts (see Fig. 3-6).

- 1.1. Remove retaining ring (40) and washer (41) from front output shaft (71)
- 2.2. Remove driving sprocket (42), sprocket 43 and drive chain (44) from the two output shafts (55 and 71).
3. Separate the sprocket and the chain.



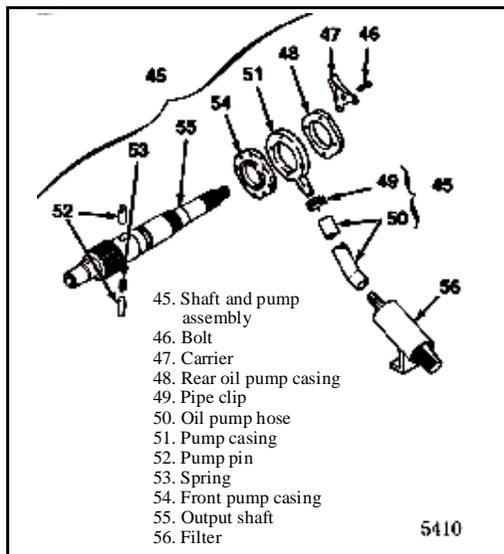


Fig. 3-7

### Oil Pump Assembly

From the remaining transfer box casing assembly (Parts 45 to 111), remove shaft and pump assembly (45) (see Fig. 3-7).

1. Remove 4 bolts (46) and retainer (47). Remove rear oil pump casing (48) from rear output shaft (55).
2. Loosen clamp (49), remove oil pump hose (50) from pump casing (51), and take off the oil pump casing from output shaft (55).
3. Remove clamp (49), oil pipe (50) and filter (56)
4. Remove 2 pump pins (52) and spring (53) from rear output shaft (55).
5. Slide front oil pump carrier off rear output shaft (55) and remove rear output shaft (55).

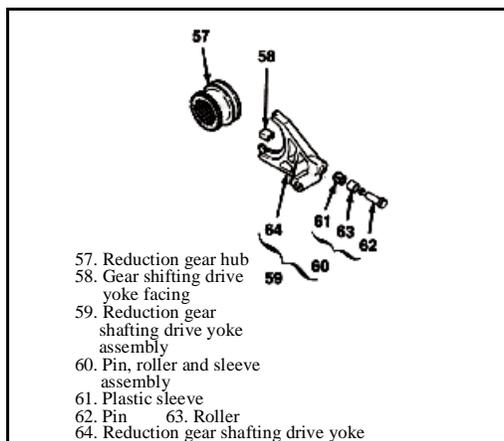


Fig. 3-8

### Removal of Reduction Gear Shifting Parts

From the remaining transfer box casing assembly (Parts 57 to 111), remove the following parts (see Fig. 3-8).

1. Remove reduction gear hub (57) and reduction shift fork assembly (59) from the casing.
2. From reduction shift fork assembly (59), remove 2 plastic facings (58).
3. Only when the damaged part in reduction shift fork assembly (59) is required to be replaced, can reduction shift fork assembly (59) be disassembled. Cut off plastic sleeve (61) and remove pin (62) and roller (63).

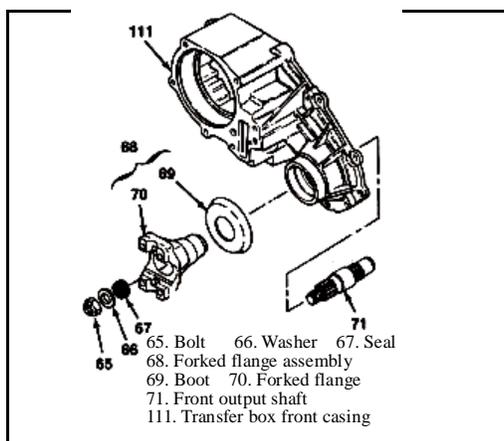


Fig. 3-9

### Front Output Assembly

From the remaining transfer box casing assembly (Parts 65 to 111), remove the following parts (see Fig. 3-9).

1. Hold front forked flange (70) with torque rod T-13-54-002, screw off nut (65), take off gasket (67), and then pull out the front forked flange assembly (68) and seal (67).
2. If replacement is necessary, press down boot (69) from front forked flange (70).

Remove front output shaft.

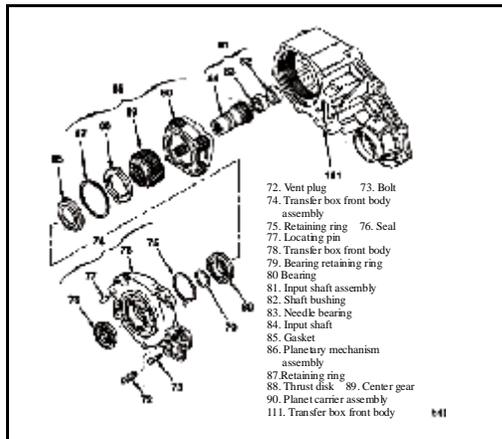


Fig. 3-10

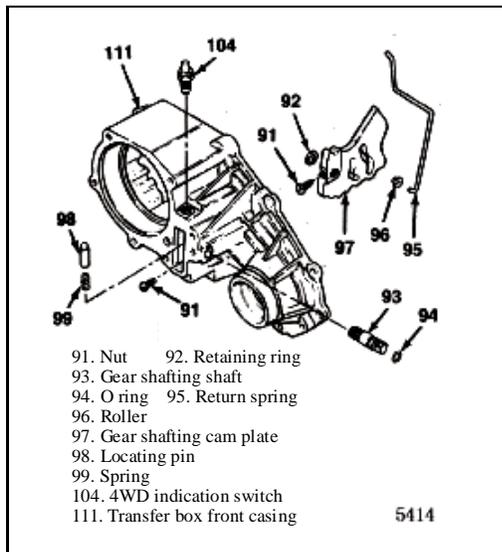


Fig. 3-11

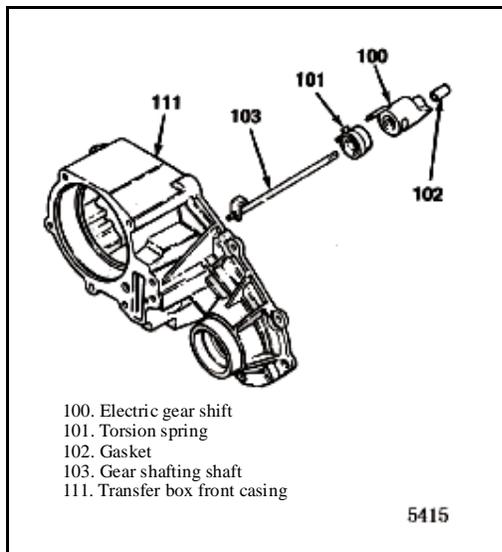


Fig. 3-12

### Removal of Front Body, Input Shaft Assembly and Planetary Mechanism Assembly

From the remaining transfer box casing assembly (Parts 72 to 111), remove the following parts (see Fig. 3-10).

1. Remove vent valve (72).
2. Remove 6 bolts (73). Separate front body (78) from transfer box casing (111), and take off the front body. (Take care not to damage the front end cover and transfer box casing.)
3. Remove front body assembly (74), input shaft assembly (81) and planetary mechanism assembly (86) as a whole. (Loosen the retaining ring, remove the input shaft from the front end cover.)
4. On the working bench, hold one end of input shaft (84) with hand, expand the long end of retaining ring (75) and lightly press the front body so as to remove the front body assembly from the (Part 79 to 90).
5. Remove retaining ring (75) and seal (76) from front body (78). Remove pin (77) only when replacement is necessary.
6. After removal of bearing retaining ring (79), remove bearing (80) and gasket (85) from the end of input shaft assembly. Remove input shaft assembly from planetary mechanism assembly (86).
7. Remove needle bearing (83) and bushing (82) from the input shaft assembly.
8. Remove retaining ring (87), thrust disk (88) and center gear (89) from planet carrier assembly (90).
9. Do not try to disassemble planet carrier (90).

### Disassembly of Mechanical Shifting Cam Plate Parts (only for transfer box with mechanical gear shift)

As for the transfer box with mechanical gear shift, remove the following parts (see Fig. 3-11).

1. Remove the hexagon nut and remove the gear shifting rocker arm from the gear shifting shaft.
2. Remove 2 nuts (91) from transfer box casing (111) and gear shafting cam plate (97).
3. Remove retaining ring (92) and gear shifting shaft (93). When gear shifting shaft is removed, the locating pin (98) and spring (99) may spring out. Do not loosen these parts. Remove O ring from selector shaft.
4. Remove return spring (95) and roller (96).
5. From transfer box front casing (111), remove gear shafting cam plate (97), locating pin (98) and spring (99).
6. Remove 4WD indicator switch (111) from transfer box front casing.

### Disassembly of Shifting Cam Plate Parts (only for transfer box with electric gear shift)

As for the transfer box with electric gear shift, remove the following parts (see Fig. 3-12).

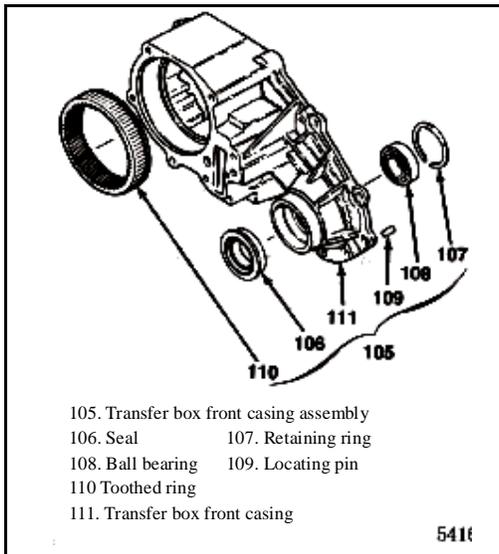
1. From transfer box casing, remove electric gear shift cam assembly (Parts 100 to 103).
2. From gear shifting shaft (103), remove electric gear shift cam (100).
3. Clamp the end of gear shifting shaft (103) on soft-mounted vice, use a screwdriver to crowd to disengage and remove torsion spring (101).

**Disassembly of Transfer Box Casing Assembly**

Disassemble transfer box casing assembly (105) in the following steps:

( See Fig. 3-13 )

1. Remove seal (106).
2. Remove retaining ring (107, and pull out bearing (108).
3. Only when the pin is loose or damaged, can locating pine (109) be removed fro from transfer box front casing (111) .
4. From transfer box casing (111, press out toothed ring (110) when necessary to be replaced.



**Fig. 3-13**

## Cleaning, Inspection, Repair or Replacement

### Cleaning

Caution: Before cleaning, check the magnet for metal chips. Big, intergranular or irregularly intergranular chips mean break or similar damage. Small and powder-shaped chips means uneven or excessive wear. If metal chips are found, take care to check the rotary parts and their mating parts for damage and wear.

#### General Cleaning

Clean the parts in cleaning agent to remove the old oil and sediment. Remove the sediment from the oil holes with a brush. Take care to clean the parts which can not be cleaned with brush and do not scratch their metal bonding faces bonding faces.

#### Blowing of Washed Parts

Blow the parts dry with low pressure (20psi) compressed air. Do not leave any cloth thread if cloth is used for wiping. When drying the bearing with compressed air, hold it without rotation.

#### Lubrication of Bearing

Immediately after cleaning, lubricate ball bearings (23, 80 and 108) and needle bearings (24 and 83) with transfer box oil. During drying, the unduplicated bearing may result in damage. Cover the lubricated bearing to prevent dust from entry.

### Inspection

#### General Inspection

Visually check all the parts (except oil pump pipe, O ring and seal which are replaced with new ones) for damage or excessive and uneven wear. Discard the damaged or worn parts which impact the performance. The following items should be inspected:

**Burr:** the partially protruding sharp edge on material

**Chip:** broken or fractional block or particle.

**Crack:** seam to partially or completely separate the surface of material.

**Excessive wear:** serious or visible wear exceeding the application range.

**Shrinkage:** slippery of material caused by partial compression.

**Gluing:** biding of the torn particles of soft metal material onto the hard metal surface.

**Furrow:** partial crack or groove, usually the displacement but not lose of material.

**Point corrosion:** drawing fracture of metal surface under contact pressure. The heat generated during metal friction causes color change which may be displayed.

**Stepping wear:** A visible or sensible step generated due to excessive wear between the contact surface and its neighboring contact surface.

**Uneven wear:** partial and unevenly distributed wear, including whole, bright point, uneven polishing and other visible signs.

#### Special Inspection

Check the parts according to the Inspection Table designated in Table 4-1. The part serial numbers used in Table 4-1 is the same as that designated in the Exploded Diagram in Chapter VI.

#### Inspection of Gear or Sprocket Teeth

Check the gear or sprocket teeth in the following steps as designated in Table 4-1.

**Caution: Do not confuse the tool sign caused during matching and that squeezed. The typical machining signs are shown in Fig. 4-1.**

Check the meshing and contact form of gear or sprocket teeth. The common meshing and contact forms are as shown in Fig. 4-2. The part may be further used if it is acceptable in the contact form shown in Column "Acceptance" and meets the requirements in other inspections. The part must be rejected and is not allowed to be used further if it is not acceptable in the contact form shown in

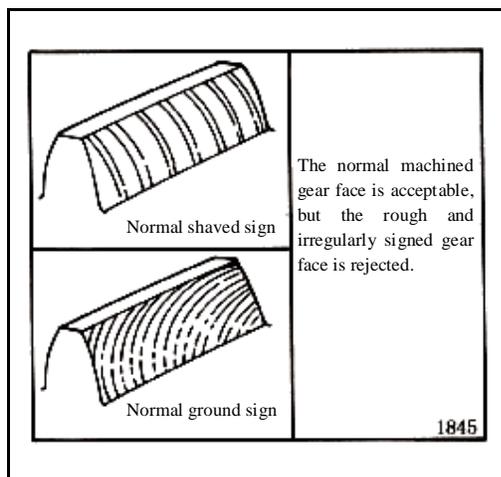


Fig. 4-1

Column "Reject".

Description	Accept	Reject
Ideal meshing contact area		
Contact area deviation to one side		
Contact area deviation to other side		
Contact area deviation to crest		
Contact area deviation to root		

Fig. 4-2

	Repair	Reject
Contact face crest flake-off on two sides		
Contact face crest flake-off at center		
Non-contact crest flake-off on one side		
Non-contact tooth flake-off at center		

Fig. 4-3

1. Check gear or sprocket teeth for flake-off. For the form of teeth flake-off or furrow, refer to Fig. 4-3. As shown in Column "Repair" in diagram, the part with small partial flake-off may be repaired and used (refer to Section 4-3). As shown Column "Reject" in the diagram, the part with serious flake-off or broken tooth can not be repaired and must be discarded.

**Inspection of Spline Teeth**

Check the spline teeth for break or flake-off. The part with small partial flake-off, as gear flake-off, may be repaired and reused (refer to Fig. 4-2 and Section 4-3). The part with broken spline tooth must be discarded. The contact form of spline teeth is not the same as that of gear. However, the spline with step and slippery must be discarded.

**Repair or Replacement**

The part rejected in inspection should be replaced, unless the part that is repaired according to the procedure designated in the flowing diagram or lightly repaired may be used further.

**Inspection of Gear or Sprocket Teeth**

The repair is limited to the part with small partial flake-off as shown in Fig. 4-3.

1. Repair the part with small partial flake-off by using suitable hand-operated, high-speed grinding and cutting tools.
2. When grinding and cutting metal on the basic body, do not remove more metal as possible.

All the sharp angles or edges must be repaired to smooth contour line. Sharp angle or edge may be flaked off again or develop to crack. Deburr with a suitable lapping stone. Carefully remove the protruding material and do not damage the basic body. Replace the unrepairable part (e.g., bearing). Replace the part that raises any doubts for further use.

Part (Item)	Inspection	Accept/Reject
All parts (including all springs)	Check for crack. Check for torsion. Check for corrosion.	Reject all cracked parts. Reject the bent, torsion and unround parts. Reject all pointed corroded or etched parts.
All threaded parts	Check the thread for turn-over or other damage.	Reject the unthreaded or overturned parts.
Flange (4) and forked flange (70)	Check spline as per Section 4-2.	Check spline in Section 4-2.
Parts of speed sensor (11), motor assembly (13) and electric clutch	Refer to On-board Functional Inspection in the Vehicle Service Manual.	Replace parts and assemblies according to the requirements.
Sliding bearings (19 and 82)	Check the inner surface of sliding bearing for condition.	Reject the point corroded and damaged parts.
Ball bearings (23, 80 and 108)	Visually check the bearing balls and races for flake-off, gluing, point corrosion or other damage. Make sure that the bearing is lubricated. Hold bearing inner race, and slowly turn the bearing outer race. Check for unfree rotation or corrosion. Check that the bearing rotates smoothly without any jumping and wandering.	Reject the damaged bearing.  Reject the damaged or loose bearing. Or check that the axial gap exceeds 0.23mm.

Needle bearing (24 and 83)	Visually check the bearing balls and races for flake-off, gluing, point corrosion or other damage.	Reject the damaged bearing.
Rear cover (25, front body (78) and transfer box front casing (111))	Check the bonding faces for burr or other damage affecting match and seal.	Debar as per Section 4-3. Or replace damaged part.
Rear cover (25) of transfer box	Check bearing (23 and 24) holes.	Reject the point corroded parts.
Odometer gear (27)	Check gear teeth as per Section 4-2.	Check gear or sprocket teeth in Section 4-2.
Clutch casing (31), outer engagement gear sleeve (32) and engagement sleeve (35)	Check spline as per Section 4-2.	Check spline in Section 4-2.
Lock sleeve (37)	Check the shifting yoke groove for wear or damage. Check spline as per Section 4-2.	Reject the stepped, slipped or damaged parts. Check spline in Section 4-2.
Gear shifting shaft (38)	Check for deformation. Check the outer circle for burr or other damage. Check the outer circle for wear.	Reject the bent parts. Deburr as per Section 4-3. Or reject the damaged shaft. Reject the stepped, slipped or damaged parts.
Gear shifting yoke (39)	Check the mating portion between shifting yoke and gear shifting cam and gear sleeve for wear or damage.	Reject the stepped, slipped or damaged parts.
Gear shifting yoke assembly	Check the shifting yoke facing matched with gear sleeve for wear or damage. Remove the roller for free rotation or damage.	Reject the facing if stepped, slipped or damaged. If the roller turns hard or is damaged, replace with new pin, roller and retainer assembly (60).
Driving and driven sprockets (42 and 43)	Check sprocket teeth as per Section 4-2. Check sprocket spline as per Section 4-2.	Check sprocket teeth in Section 4-2. Check spline in Section 4-2.
Driving sprocket (42)	Check the inner diameter matched with output shaft.	Reject the point corroded and damaged parts.
Drive chain (44)	Check for stepping, slippery and looseness or check the pin or connecting parts for damage.	Reject worn or damaged drive sprocket.
Filtering screen (56)	Check the filtering screen for cleaning, small holes or damage.	Clean it when necessary, and discard it if damaged.
Pump casing (51)	Check the inner diameter pump for point corrosion or stepping and slippery.	Discard the pump casing if damaged or worn.
Oil pump pin (52)	Check for point corrosion.	Reject the worn, point corroded and damaged parts.
Output shaft (55)	Check spline as per Section 4-2. Check the surface matching with bearing for condition. Check for torsion.	Check spline in Section 4-2. Reject the point corroded or damaged parts. Reject the bent or unround parts.
Reduction hub (57)	Check sprocket spline as per Section 4-2. Check the portion matching with shifting yoke for wear or damage.	Check spline in Section 4-2. Reject the stepped, slipped or damaged parts.
Front output shaft (71)	Check the surface matching with bearing for condition. Check spline as per Section 4-2.	Reject the point corroded or damaged parts. Check spline in Section 4-2.
Input shaft (84)	Check spline as per Section 4-2. Check for torsion.	Check spline in Section 4-2. Reject the bent or unround parts.
Thrust gasket (85) and thrust disk (88)	Check for point corrosion.	Reject the point corroded and damaged parts.
Center gear (89)	Check gear teeth as per Section 4-2. Check spline as per Section 4-2.	Check gear teeth in Section 4-2. Check spline in Section 4-2.
Planetary mechanism assembly	Check gear teeth as per Section 4-2. Check the planet shaft pin for wear or looseness and the thrust gasket for wear.	Check gear teeth in Section 4-2. Reject the stepped, slipped or damaged parts.
Electric gear shift cam (97)	Check for point corrosion or stepping and slippery.	Reject the stepped, slipped or damaged parts.

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Gear shifting shaft (103)	Check for point corrosion or stepping and slippery. Check for torsion.	Reject the stepped, slipped or point corroded parts. Reject the bent parts.
Planet gear ring (110)	Check the matching with transfer box casing for condition. Check gear teeth as per Section 4-2.	Check transfer box casing assembly (115), and make sure that the toothed ring is loose in the casing. Check gear teeth in Section 4-2.
Transfer box casing (111)	Check the hole matched with bearing (108) .	Reject the point corroded and damaged parts.

## Assembly

### General

During assembly, refer to the description designated in this chapter. At the same time, refer to the Exploded View of Parts in Transfer Box Assembly at the beginning of Chapter Videoing assembly, pay attention to the following:

1. When there is torque requirement for threaded parts, the threaded parts should be tightened with torque spanner. The designated torque values are listed at the end of this chapter (Table 5-1).
2. During installation, apply grease on the small parts so as to fix them their positions.
3. Use special tool, sleeve T-13-54-001, to press the seal and the bearing during assembly. Do not hammer the seal or bearing directly.

### Lubrication during Assembly

Apply correct grease to all ungreased internal parts for easy assembly and initial lubrication before assembly.

1. O ring or shaft seal may be damaged if not lubricated before assembly.
2. Make sure that bearing or bush is fully lubricated before assembly. The unlubricated bearing or bush is damaged even in a short-time running.
3. Lubricate oil seal lip and its matching metal part before assembly.

### Assembly of Transfer Box

#### Assembly of Transfer Box casing

Install the parts removed from the transfer box casing in following steps (see Fig. 5-1):

1. When a new toothed ring (110) is pressed in to replace the old, ensure that the tooth-shaped protrusion on the new toothed ring is aligned with the corresponding groove on transfer box front casing (111), and that the toothed ring is pressed to the dimension as shown in Fig. 5-2 with its chamfer entering first. Make sure that the toothed ring is free from buckling and fixed on the casing firmly.
2. If the 2 locating pins are removed, install 2 new locating pins (109) into the casing as shown in Fig. 5-2.
3. Press bearing (108) into transfer box front casing (111) and install retaining ring (107) .
4. Place and press new seal (106) into the casing as shown in Fig. 5-2.

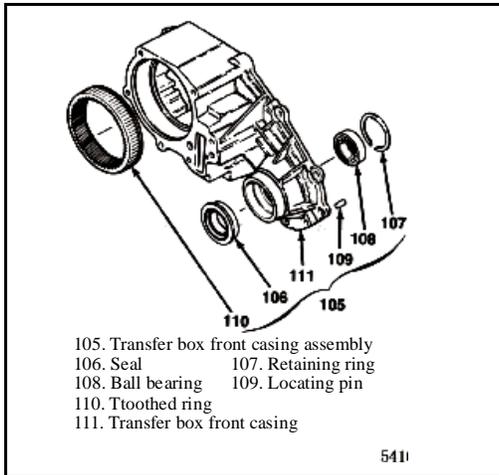


Fig. 5-1

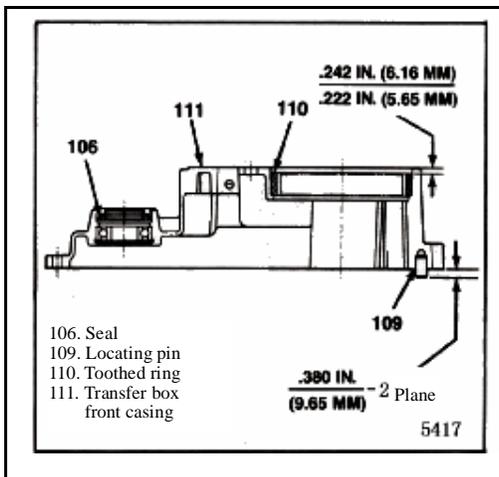


Fig. 5-2

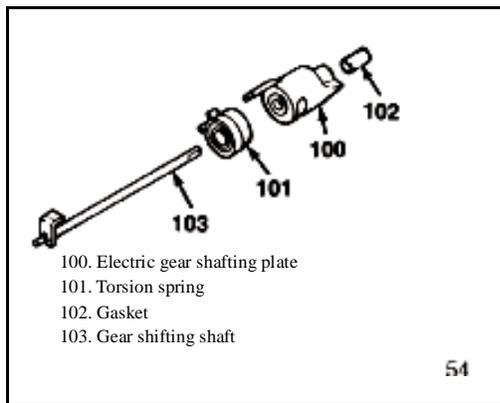


Fig. 5-3

### Assembly of Shifting Cam Plate Parts (only for transfer box with electric gear shift)

Install the electric gear shift assembly in the following steps (see Fig. 5-3):

1. Insert gasket (102) to the inner diameter of torsion spring (101) and beyond the free end of gear shifting shaft (103) .

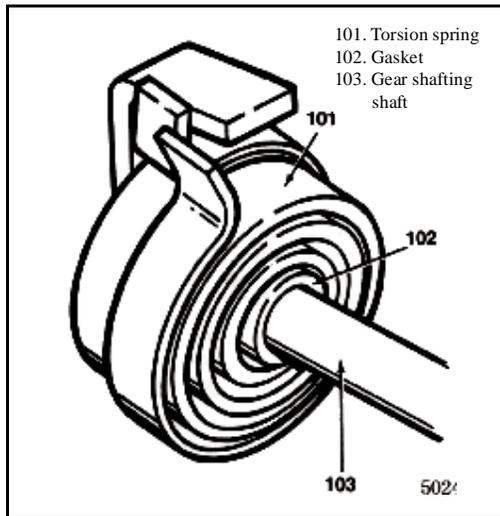


Fig. 5-4

2. Slide torsion spring (101) and gasket (102) on gear shifting shaft (103) to position of drive tongue, and place the first finger tip of torsion spring on left side of the drive tongue (observe from the free end of gear shifting shaft) (see Fig. 5-4).

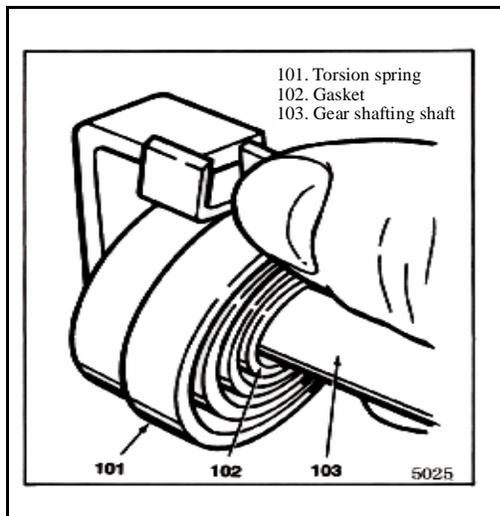


Fig. 5-5

3. Turn the second finger tip of torsion spring on gear shifting (103) to the right end of drive tongue (see Fig. 5-5) .

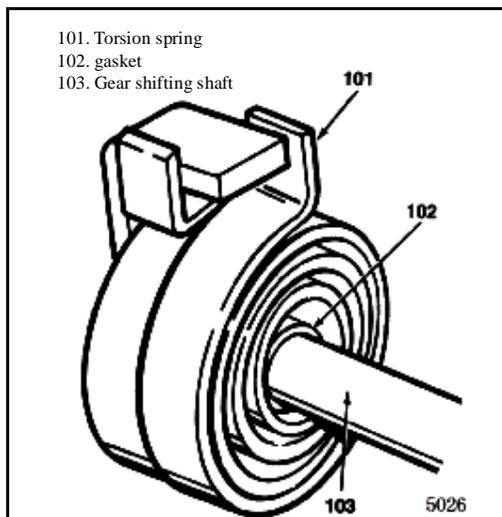


Fig. 5-6

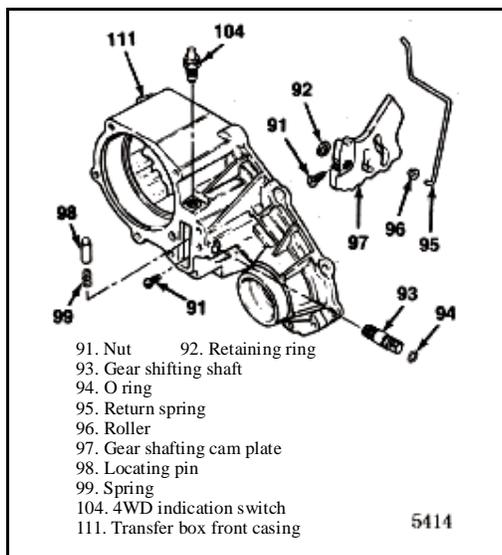


Fig. 5-7

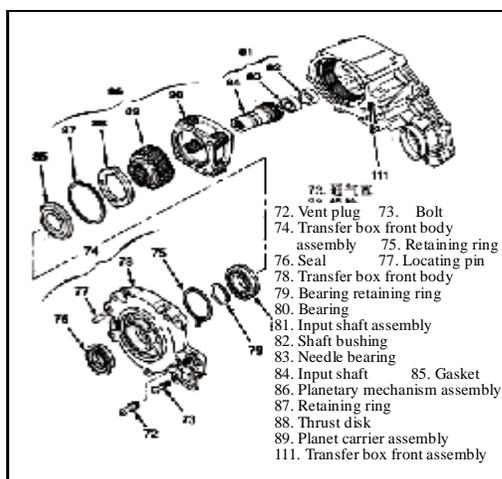


Fig. 5-8

4. Push torsion spring (101) and gasket (102) together backward as possible (see Fig. 5-6) .
5. Install electric gear shift Cam (100) on gear shifting shaft (103) with the end of cam with drive tongue entering first. The cam fixed on the drive tongue is located above gear shifting shaft, under drive tongue and between the torsion spring finger tips, and moves inward as possible.
6. Install the Gear shifting yoke first and then install the electric gear shift cam assembly (Parts 100 to 103) into the transfer box casing assembly. (See Installation of Lock Gear Shifting Unit in Section 5-2)

#### Assembly of Mechanical Shifting Cam Plate Parts (only for transfer box with mechanical gear shift)

Install the mechanical gear shift assembly in the following steps (see Fig. 5-7):

1. Install lubrication O ring (94) onto gear shifting shaft (93), and punch the end gear shifting shaft spline into the transfer box until it is flushed with the casing end face. The shaft position is as shown in Fig. 5-7.
2. Apply grease on limiting pin (98) and spring (99), and place the two parts into the holes in transfer box (111) . Insert gear shafting cam plate (97) into the casing as shown in Fig. 5-7 with the flat end of the plate flushed with the front surface of the casing roughly. At the same time, take care not to miss the limiting pin during the insertion. By compressing the limiting pin spring with the plate, align the spline on the plate and the spline on the gear shifting pin shaft, and press the gear shifting pin shaft into the plate fully.
3. Install retaining ring (92) in the groove on the back of gear shifting shaft.
4. Tighten 2 screws (91) into the rear end of gear shafting cam plate and the transfer box casing to the torque of 6.8~9.5N.m respectively. Make sure that gear shifting pin shaft is installed completely and even that the second screw can enter the groove in the gear shifting pin shaft.
5. Install roller (96) on return spring (95), and install them into gear shafting cam plate (97) in firm contact to gear shifting pin shaft (93), and install the other end of the return spring into the groove in the transfer box.
6. Install 4WD indication switch (104) to the torque of 34~47 N.m.

#### Assembly of Front Body, Input Shaft Assembly and Planetary Mechanism Assembly

On the working bench, conduct the installation in the following steps (see Fig.5-8):

1. Place planet carrier assembly (90) on the working bench with the end of retaining ring (87) groove upward.
2. Install the center gear with the protrusion end upward. Rotate the gear of the planet carrier assembly until the center gear is fully meshed.
3. Align the protrusion teeth, and install thrust disk (88) into planet carrier assembly (86).
4. Install retaining ring (87) to complete the whole planet carrier assembly (86).

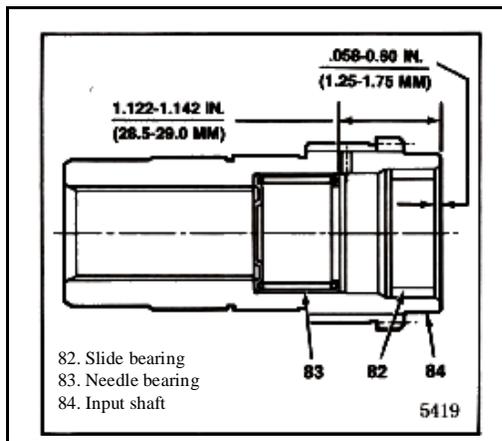


Fig. 5-9

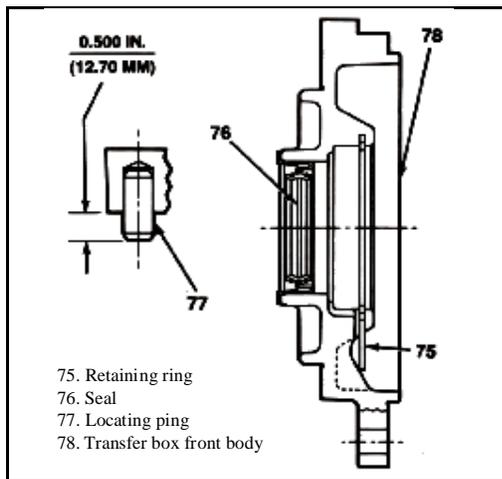


Fig. 5-10

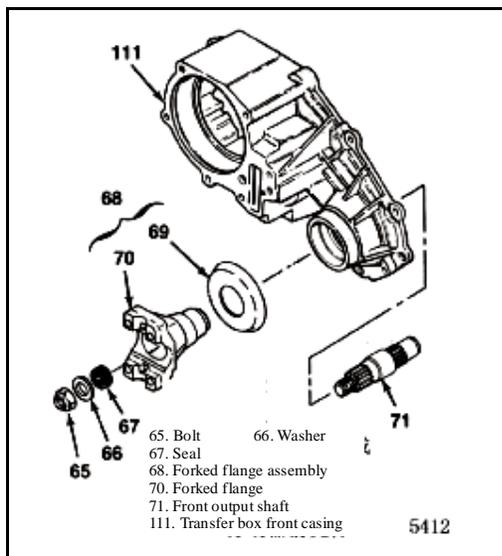


Fig. 5-11

5. Place needle bearing (83), if removed, and press it into the input shaft as shown in Fig. 5-9. At the same time, press in new sliding bearing (82) to complete the whole input shaft assembly (81) as shown in Fig. 5-9.

6. Lift planetary mechanism assembly (86) and install it into input shaft assembly (81), install thrust pad (85), and press in bearing (80) through the end of input shaft. Install retaining ring (79) into the retaining ring groove on the input shaft to retain the bearing.

7. Install a new locating pin (77), if removed, into the front body as shown in Fig. 5-10.

8. Place the seal and press it into the front body as shown in Fig. 5-10.

9. Place front body assembly (84) on two wooden blocks, with the bonding face of casing (111) upward, to gap input shaft assembly (81) and the working bench. Place the well assembled input shaft and planetary mechanism assembly (Parts 79-90) in the front body with input shaft downward. Expand the long end of retaining ring (75), and install input shaft and planetary mechanism assembly until the retaining ring enters into its groove on the outer race of bearing (80).

10. Apply 1.6mm thick sealant (Locklite 598) on the bonding portions of the front end cover and the transfer box assembly uninterruptedly with exception of thread holes.

11. Then tighten 6 bolts (73) to the torque of 27~46 N.m.

12. Install and tighten vent valve (72) to the torque of 27~46 N.m.

### Assembly of Front Output Shaft

Assemble the following parts (see Fig. 5-11):

1. Press boot (69), if removed, on forked flange (70).
2. Place output shaft (71) into transfer box front casing (111), and then install forked flange assembly (68).
3. Install seal ring (67), gasket (66) and nut (65).
4. Insert torque rod T-13-54-002 into the forked flange hole to fix the flange, and tighten nut (65) to the torque of 203~244N.m.

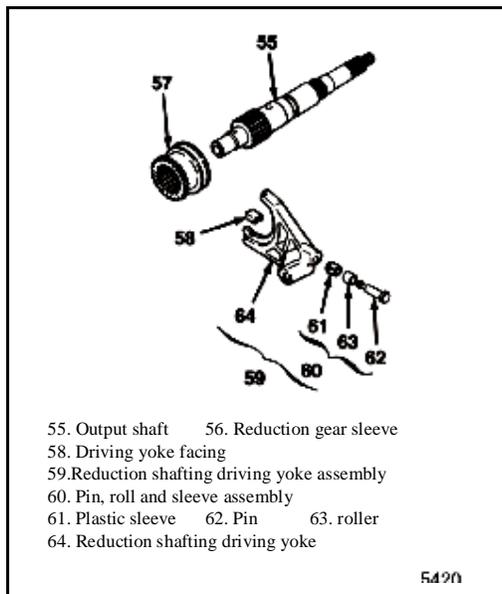


Fig. 5-12

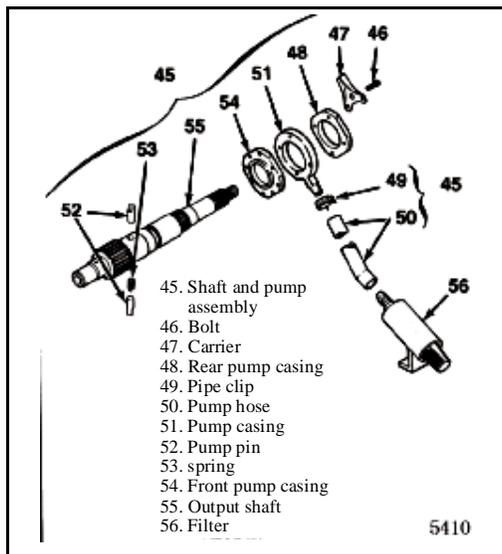


Fig. 5-13

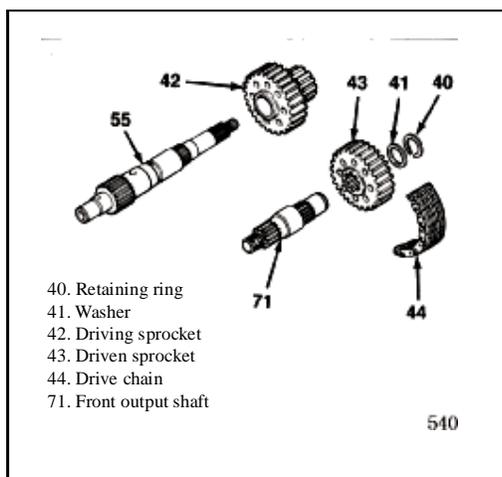


Fig. 5-14

### Assembly of Reduction Gear Shifting Parts

Install the parts in the following steps (see Fig. 5-12):

1. If the removed part is replaced, assemble gear shifting yoke assembly (59) with a new pin and roller (60) .  
Press the pin and roller assembly into the hole of reduction yoke until the pin (61) passes through and is snapped to position. Make sure that roller (63) rotates freely.
2. On reduction shift fork assembly (59), install 2 shifting yoke facings (58).
3. Connect reduction yoke assembly (59) and reduction gear sleeve (57) and place them into the casing, and place the reduction gear sleeve into the well assembled planetary mechanism assembly. As for the transfer box with mechanical gear shifting, place roller (63) into the groove of the well assembled gear shafting cam plate.
4. Install rear output shaft (55), and connect the bearing and the reduction gear sleeve spline at the ends of output shaft and input shaft.

**Caution:** Assembly of output shaft may be postponed to the time when the oil pump is installed on the output shaft. Immerse the filtering screen of oil pump into the oil (see Table 2-2), observe from the rear end of the output shaft that oil is pumped out while the output shaft rotates clockwise, and check that the oil pump for normal operation. Install the well assembled parts as a whole assembly into the transfer box casing.

### Assembly of Oil Pump

Make sure that the parts of the oil pump are fully lubricated during assembly, and that the oil is pumped out from the conical hole in the oil pump front cover. Install the oil pump parts in the following steps (see Fig. 5-13):

1. Place front end cover (54) of oil pump on rear output shaft (55) with the end with word "TOP" downward.
2. Install 2 oil pump pins (52) into the holes in rear output shaft (55), and at the same time place spring (53) in between the 2 pins. Make sure that the flat ends of the two pins extend outward.
3. Connect oil pipe (50) to the connector on filter (56).Snap the filter in the groove on the transfer box casing. Make sure that the oil pipe points to the direction of pump assembly.
4. Place the pump casing (51) with the end of word "REAR" upward and with the connector pointing to the direction of oil pipe (50) and filter (56).By moving pump pin (52), press spring (53) to enable the two pins to enter the pump casing.
5. Place clamp (49) on the end of oil pipe, push the oil pipe onto the pump casing connector, and tighten the clamp.

Place oil pump rear cover (48), clean the threads of four bolts (46) and apply Locklite adhesive 222#.Align the pump hole and install and tighten the bolt to the torque 4~8.5N.m, and at the same time rotate rear output shaft (55) to check that oil pump pin (52) moves freely.

### Assembly of Drive Chain

Assemble the parts in the following steps (see Fig. 5-14):

1. After assembly of transfer box casing assembly on the working bench, place driving sprocket (42) on the rear end of rear output shaft (55), and the driven sprocket (43) on the rear end of front output shaft (71).
2. Install chain (44) on sprocket (Parts 42 and 43).
3. Hold the two sprockets and contact the chain on the sprocket, place them in parallel to the transfer box , install chain and sprocket assembly (Parts 42 to 44) through output shaft (Parts 71 and 55), and lightly turn the driven sprocket (43) to ensure that it is meshed with the spline of front output shaft (71).

- 
4. Install gasket (41) and retaining ring (40) onto front output shaft (71).

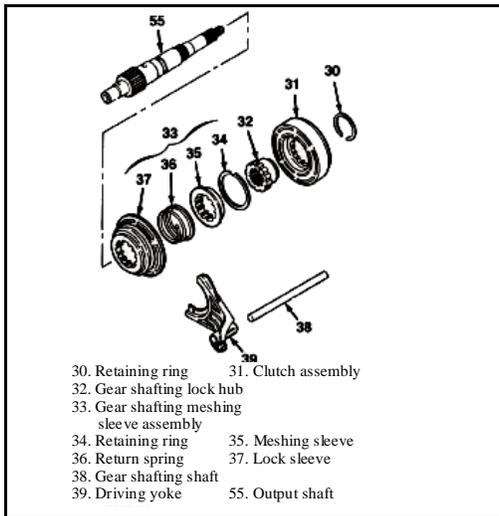


Fig. 5-15

### Assembly of Gear Shifting Lock Parts

Assemble the parts in following steps (see Fig. 5-15 for transfer box with electric gear shift, see Fig. 5-16 for transfer box with mechanical gear shift)

1. Install return spring (36) and lock hub (35) onto lock sleeve (37), and retain with retaining ring (34) to complete 2W-4W lock sleeve (33).
2. Install gear shifting shaft (38) into the blind hole in the casing through the well assembled reduction shifting yoke assembly.
3. Install Gear shifting yoke (39) onto 2W-4W lock sleeve assembly, and slide the whole sleeve assembly through gear shifting shaft (38) and rear output shaft (55).
4. Engage the spline of outer gear sleeve (32) and the spline of rear output shaft (55) and connect with 2W-4W lock sleeve (33).
5. Only for the transfer box assembly with electric gear shift, assemble the well assembled electric gear shift cam group (Parts 100 to 103) and clutch casing (31) in the following steps:

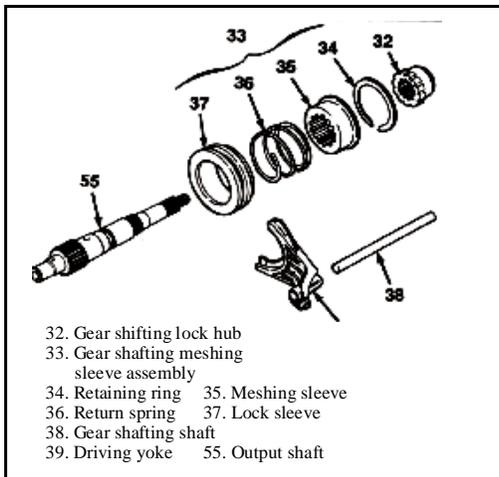


Fig. 5-16

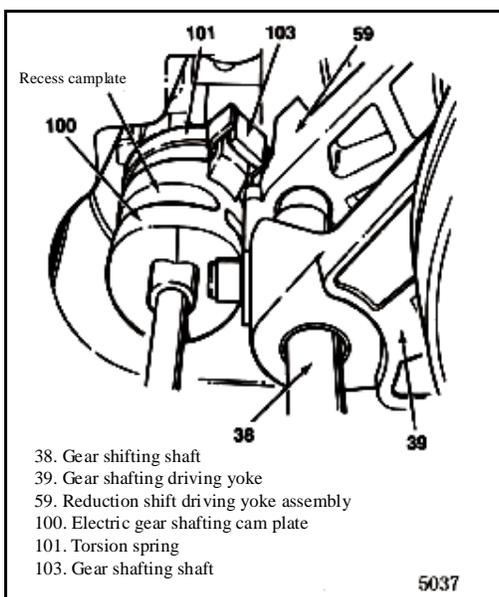


Fig. 5-17

- a. Place the electric gear shift cam group as shown in Fig. 5-17.
- b. Hold gear shifting (38) downward, and gently lift shifting yoke assembly (Parts 59 and 39). Rotate the electric gear shift cam group to position so that the roller on reduction shifting yoke assembly (59) enter the groove on the gear shifting cam and that the protrusion of lock shifting yoke (39) is located on the tail end of gear shifting cam. Then lower this group to enable it to enter the transfer box casing, and at the same time engage gear shifting shaft (103) to the pin in the transfer box casing.
- c. Place gear shifting outer gear sleeve (32) through the clutch casing, and install retaining ring (30).

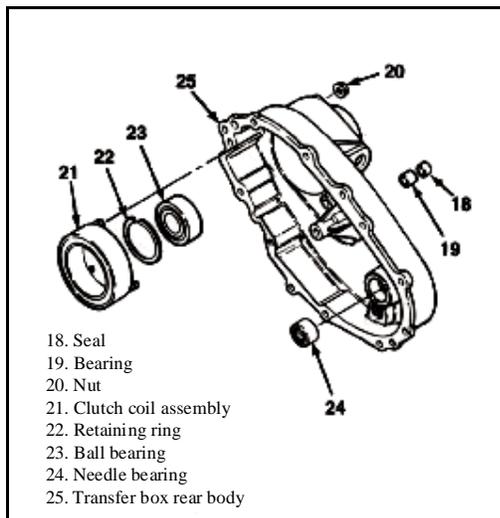


Fig. 5-18

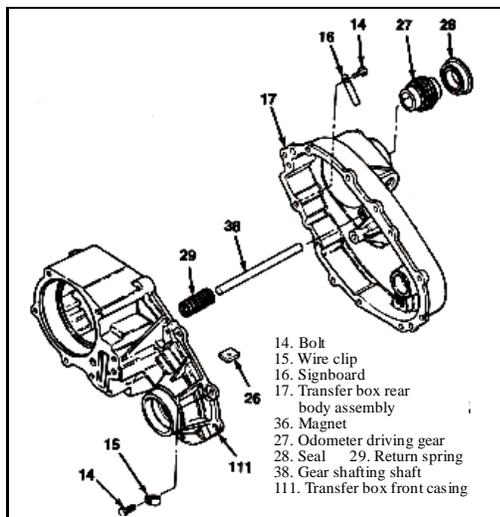


Fig. 5-19

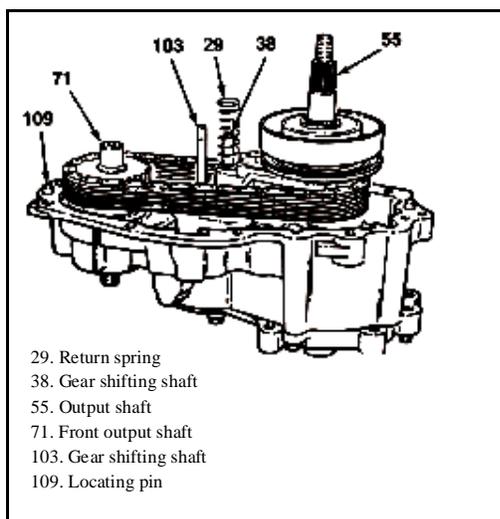


Fig. 5-20

### Assembly of Rear Cover

Install the parts into the rear cover in the following steps (see Fig. 5-18):

1. Place rear cover (25) on a suitable press with the bonding face facing upward and parallel to the press operating face.
2. Place the needle bearing with the marked end upward, press it into rear cover (25) until the top end of the needle bearing is 40.47~40.97mm lower than the rear cover bonding face with the front casing.
3. Press ball bearing (23) into rear cover (25) and install retaining ring (22).
4. As for the transfer box with electric gear shift, install the parts in the following steps:
  - a. Make sure that four O rings are positioned on clutch coil assembly (21) (one on coil and three on bolt stem). Install clutch coil assembly (21) with the wire and bolt stem extending out of rear cover. Take care not to damage the wire. Install and tighten three nuts (20) to the torque of 8~11N.m.
  - b. Install motor bearing (19) and seal (18) into rear cover (25).

### Assembly of Rear Cover Assembly

Install the well assembled cover assembly onto the transfer box casing in the following steps (see Fig. 5-19):

1. Install return spring (29) onto transfer box gear shifting shaft (38).
2. Install magnet (26) in the groove on casing (111).
3. Apply 1.6mm thick sealant (Locklite 598) on the bonding faces of the casing uninterruptedly with exception of thread holes.

**Warning:** In the following steps, do not use too much force to install the rear cover onto the transfer box front casing. If all the requirements for alignment are met, no much force is used to install the rear cover onto the front casing. If the installation is not successful, take down the rear cover assembly, and check for alignment.

4. Install rear cover assembly (17) onto transfer box front casing (111) under the precondition that all the requirements for alignment are met.
  - a. Align pin (109) on the casing and the pin hole on the rear cover.
  - b. Align rear output shaft (Parts 55 and 71) to the bearing in the rear cover hole.
  - c. Align the blind hole in the rear cover to gear shifting shaft (38), and make sure that return spring (29) is not corrugated. As for the electric gear shift assembly, use a pen to check the speed sensor hole in the rear cover.
  - d. As for the transfer box with electric gear shift, align gear shifting shaft (103) to the bearing in the rear cover.
5. Place the signboard, and tighten 9 bolts (14) to the torque of 27 ~ 46 N.m.
6. Install odometer driving gear (27) to rear cover assembly (17) through rear output shaft (55).
7. Press new seal (28) into cover assembly (17).

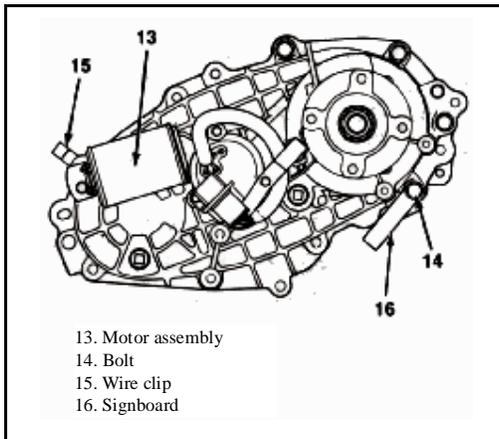


Fig. 5-21

### Installation of External Electric Gear Shift Unit (only for transfer box with electric gear shift)

As for the transfer box with electric gear shift, install the unit in the following steps (see Fig. 5-22):

1. Place motor assembly (13) with the triangular groove and gear shifting shaft (103) aligned to each other (see Fig. 5-23). Move the motor and gear shifting shaft to joint them, and contact them with rear cover (25) firmly. Then clockwise rotate the motor until the motor is at correct position (see Fig. 5-21) and aligned to its installation hole.
2. Install O ring (12) to speed sensor (11), and install speed sensor assembly (10) to the rear cover. Install clip (9) to the speed sensor, and install and tighten three bolts (9) to the torque of 8~11N.m.
3. Install bolt (96) and gasket (7) onto clip end of the motor, and tighten bolt (6) to the torque of 8~11N.m.

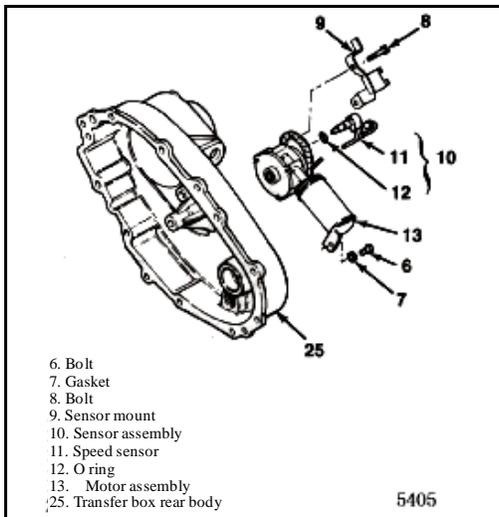


Fig. 5-22

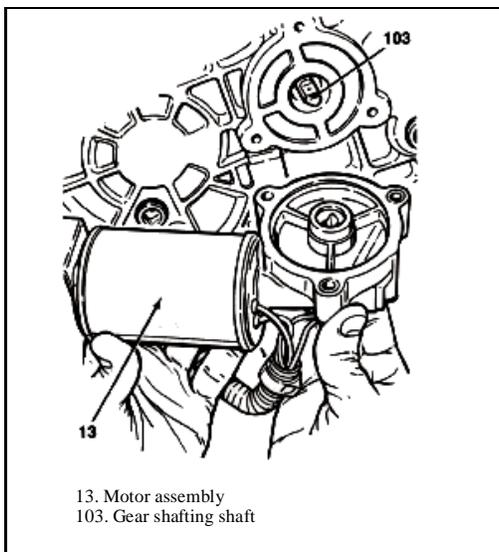


Fig. 5-23

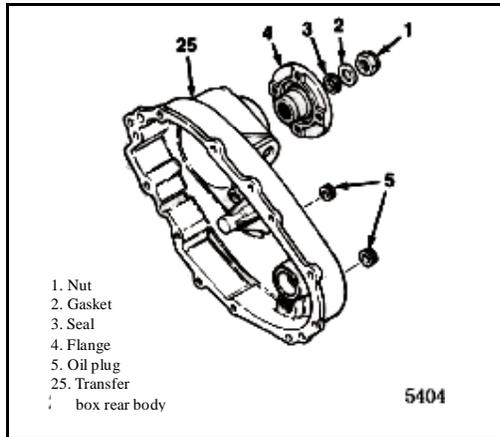


Fig. 5-24

### Flange Unit Assembly

Install the parts in the following steps (see Fig. 5-24):

1. Install two oil plugs (5) onto the rear cover (25).
2. Install flange (4), seal (3) and gasket (2), and tighten nut (1) to the torque of 203~244N.m. Use torque rod T-13-54-002 to fix the flange during assembly.

### Tightening Torque Value Table

Description and Index No.	Torque Value (lbs.)	Torque Value (N.m)
Flange nut (1 and 65)	150~180	203~244
Drain plug (5)	14~22	19~30
Motor clip bolt (6)	6~8	8~11
Motor fixing bolt (8)	6~8	8~11
Clutch coil nut (20)	6~8	8~11
Casing bolt (14)	20~34	27~46
Oil pump bolt (46)	2.9~6.3	4.0~8.5
Vent Valve (72)	6~14	8~19
Front connection bolt (73)	20~34	27~46
Gear shifting pin shaft and cam plate screw (91)	5~7	5.8~9.5
4WD lamp (104)	25~35	34~47

## High-Mortality Parts List

During repair of transfer box, it is recommended to use 13-54-410-001 high-mortality parts kit. This high-mortality parts kit contains bearings, clips and other small parts for normal required replacement.

Description	Quantity
Nut	2
Gasket	2
Gasket (for motor)	1
Seal (for motor)	1
Seal (for flange)	2
Seal (for output shaft and input shaft)	2
O ring (for speed sensor)	3
O ring (for gear shifting shaft)	1
Retaining ring (for output shaft bearing)	2
Retaining ring (for lock assembly) (transfer box with mechanical gear shift)	1
Retaining ring (for driven sprocket)	1
Retaining ring (for planet carrier assembly)	1
Retaining ring (for lock assembly) (transfer box with electric gear shift)	1
Retaining ring (for input shaft bearing)	1
Output shaft bearing	2
Input shaft bearing	1
Front output shaft needle bearing	1
Input shaft needle bearing	1
Driven sprocket gasket	1
Gear shifting yoke facing	4
Oil pump pipe clamp	1
Oil pipe	1
Retaining ring at gear shifting cam plate	1
Thrust pad at input shaft	1

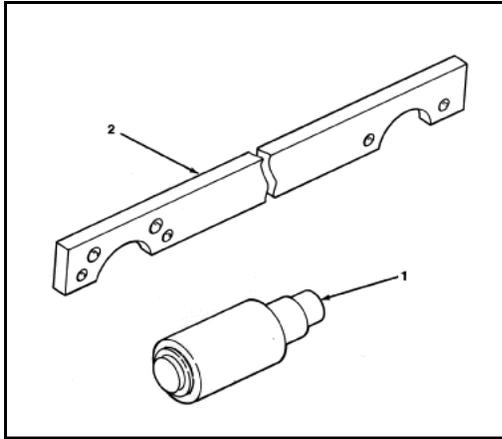


Fig. T-1

## Special Tools

This chapter describes all the special tools used during assembly and removal of 1354 transfer box.

Fig. T-1 shows the special tools.

S/N	Tool Part No.	Tool Description	Purpose
1	T-13-54-001	General punch sleeve	Used to press seal and bearing during assembly.
2	T-13-54-002	Anti-torsion rod	Used to fix forked flange during tightening of flange nut.