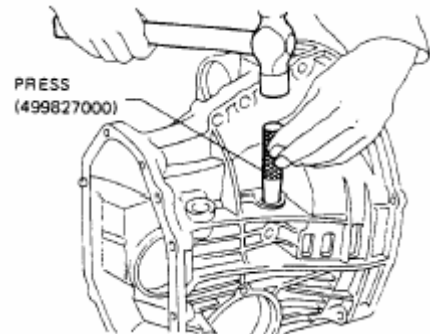
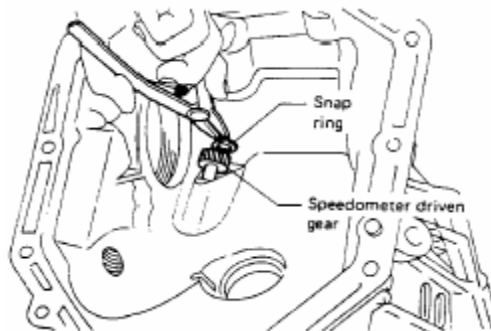


Part 3

Transaxle Assembly

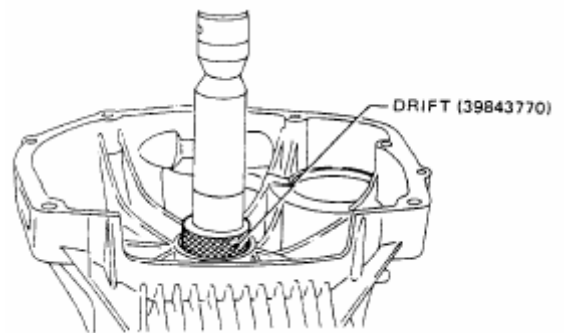
Converter Case Section

- 1) Check the appearance of each component and clean. Make sure each part is free of harmful cuts, damage, and other faults.
- 2) Install the washer and snap ring to the speedometer shaft, and set the oil seal. Then force-fit the shaft to the converter case.

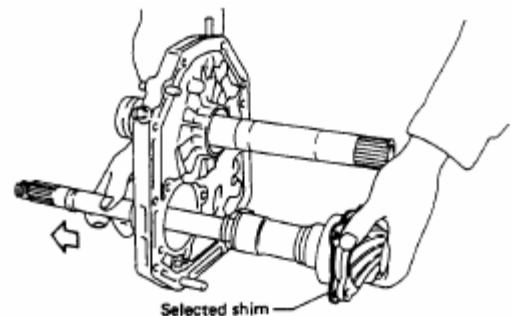


- 3) Install the speedometer driven gear to the speedometer shaft, and secure with a snap ring.

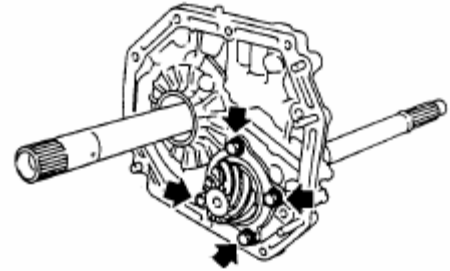
- 4) Force-fit the oil seal to the converter case.



- 5) Install the differential assembly to the case, paying special attention not to damage the speedometer gears (drive and driven) and the inside of the case (particularly, the differential side retainer contact surface).
- 6) Install the snap ring to the axle shaft, insert the shaft into the differential assembly, and tap it into position with a plastic hammer.
Thrust play: Approx. 0.012 - 0.020 in (0.3 mm - 0.5 mm)
 - a. If no play is felt, check whether the shaft is fully inserted. If shaft insertion is correct, replace the axle shaft.
 - b. Be sure to use a new snap ring.
- 7) Wrap vinyl tape around the splined portion of the axle shaft.
- 8) Install the oil seal and outer race (taper roller bearing) to the differential side retainer. Then screw in the retainer after coating the threads with oil.
 - a. Pay attention not to damage the oil seal lips.
 - b. Do not confuse the RH and LH oil seals.
 - c. Keep the O-ring removed from the retainer.
- 9) Using the HANDLE (499787000), screw in the retainer until light contact is felt. Screw in the RH side slightly deeper than the LH side.
- 10) Hypoid gear backlash adjustment and tooth contact check
 - a-1. Be careful not to bend the *shims*.
 - a-2. Be careful not to force the pinion against the housing bore.



- b. Tighten four bolts to secure the roller bearing.
 Tightening torque: 28.9±2.2 ft-lb
 39±3N-m (4.0±0.3 kg-m)

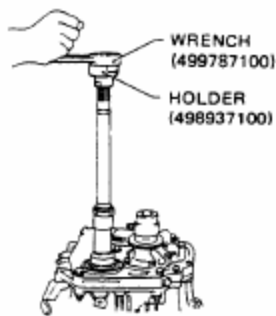


- c. Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

Tightening torque: 24.6 ± 2.2 ft-lb, 33 ± 3 N-m (3.4 ± 0.3 kg-m)

c-1. Thoroughly remove the liquid gasket from the case mating surface beforehand.

c-2. Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.



- d. Turn the drive pinion several times. Then screw in the LH side retainer until light contact is felt.

- e. Repeat this operation several times to confirm the position where light contact is felt: This is called the backlash "zero" state.

- f. Screw in the RH side retainer until light contact is felt.

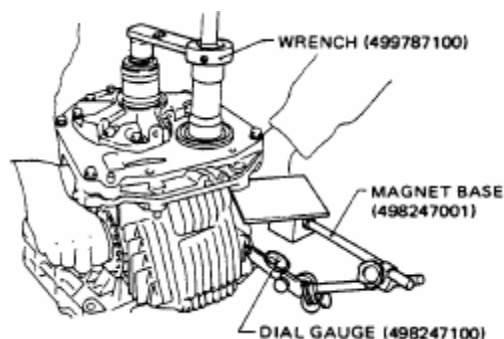
- g. Apply the lock plate. Then screw out the LH side retainer by "three teeth" of the plate. Screw in the RH side retainer by the same amount. Turning the retainer by one tooth changes the backlash about 0.0020 in, (0.05 mm).

- h. Temporarily tighten the LH side lock plate.



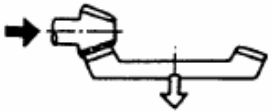





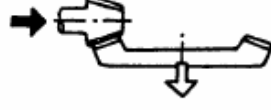
- i. Screw in the RH side retainer another "1.75 teeth". Then tighten the lock plate temporarily.

- j. Turn the drive pinion several rotations and check to see if the backlash is within the standard value. After confirming that the backlash is correct, check the tooth contact.

Backlash: 0.0051 - 0.0071 in (0.13 - 0.18 mm)



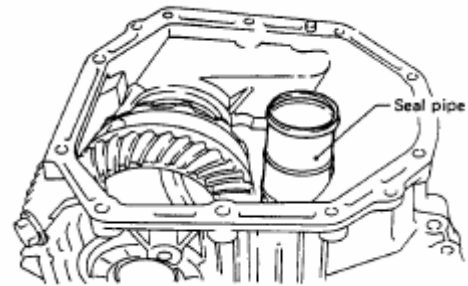
k. Apply red lead evenly to the surfaces of three or four teeth of the crown gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern. If tooth contact is improper, readjust the backlash or shim thickness.

| Checking item | Contact pattern | Corrective action |
|---|---|--|
| <p>Correct tooth contact Tooth contact pattern slightly shifted toward toe under no-load rotation. (When loaded, contact pattern moves toward heel.)</p> |  | |
| <p>Face contact Backlash is too large.</p> |  <p>This may cause noise and chipping at tooth ends.</p> |  <p>Increase thickness of drive pinion hight adjusting shim in order to bring drive pinion close to crown gear.</p> |
| <p>Flank contact Backlash is too small.</p> |  <p>This may cause noise and stepped wear on surfaces.</p> |  <p>Reduce thickness of drive pinion hight adjusting shim in order to move drive pinion away from crown gear.</p> |
| <p>Toe contact (Inside end contact)</p> |  <p>Contact area is small. This may cause chipping at toe ends.</p> | <p>Adjust as for flank contact.</p>  |
| <p>Heel contact (Outside end contact)</p> |  <p>Contact area is small. This may cause chipping at heel ends.</p> | <p>Adjust as for face contact.</p>  |

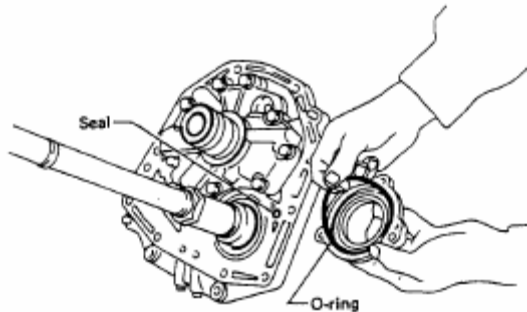
l. If tooth contact is correct, mark the retainer position and loosen it. After fitting the O-ring, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

Tightening torque: 17 - 20 ft-lb, 23 - 26 N-m (2.3 - 2.7 kg-m)

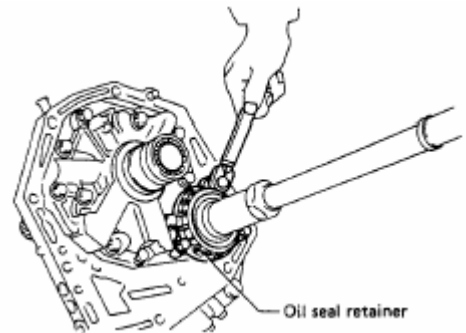
11) Install the seal pipe to the converter case. Be sure to use a new seal pipe.



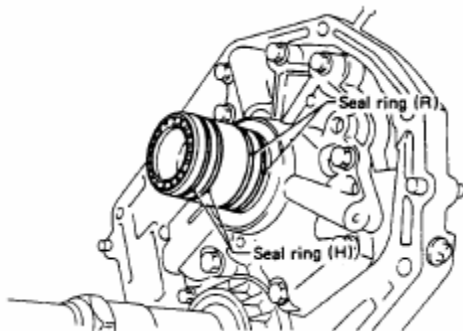
12) Install two oil seals to the oil seal retainer with INSTALLER (499247300).
a. Pay attention to the orientation of the oil seals.
b. Be careful not to damage the seal lips. If any damage is found, replace with a new one.



13) Attach the O-ring to the oil seal retainer with petroleum jelly. Install the seal to the oil pump housing bore.



14) Install the oil seal retainer taking care not to damage the oil seal lips. Then secure with three bolts. Make sure the O-ring is fitted correctly in position.
Tightening torque: 5.1 ± 0.7 ft-lb, 7 ± 1 N-m (0.7 ± 0.1 kg-m)

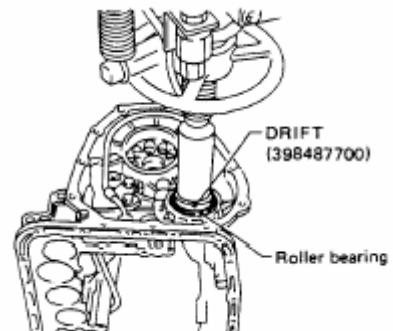


15) Apply petroleum jelly to the groove on the oil pump cover, and install two (R) seal rings and two (H) seal rings.
a. Fit the seal ring after compressing, and rub petroleum jelly into the seal ring to avoid expansion.
b. The "R" seal ring has a large diameter, while "H" has small diameter.

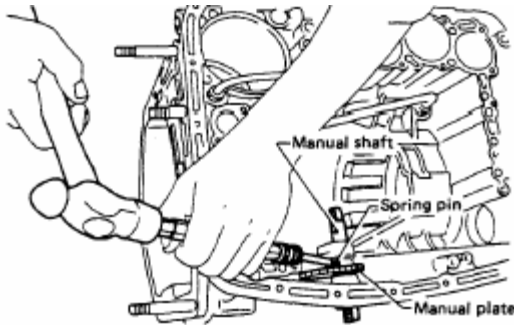
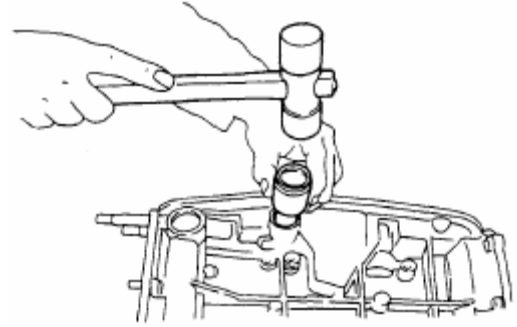
16) Install the rubber seal to the converter case. Be careful not to lose the rubber seal.

Transmission Case

1) Press-fit the roller bearing to the transmission case.



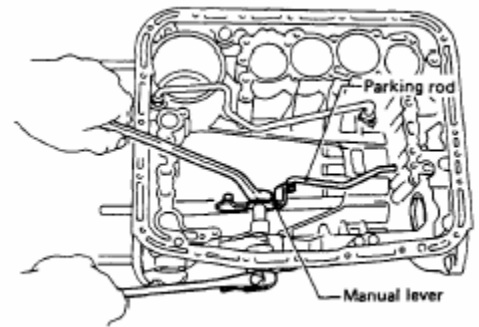
2) Using a plastic hammer, force-fit the oil seal.



3) Install the manual plate and shaft, and secure with a spring pin.
a. Be careful not to damage the oil seal lip.
b. After installation, make sure of smooth movement.

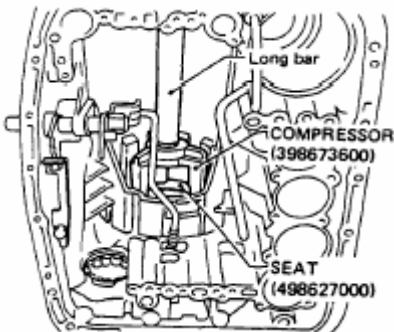
4) Assemble the manual lever and parking rod to the inside shaft, and secure with a nut.

Tightening torque: 28.9 ± 2.2 ft-lb, 39 ± 3 N-m (4.0 ± 0.3 kg-m)



5) Install the detent manual spring. Position the spring so that its center is aligned with the center of the manual plate.

Tightening torque: 4.3 ± 0.7 ft-lb, 6 ± 1 N m (0.6 ± 0.1 kg-m)



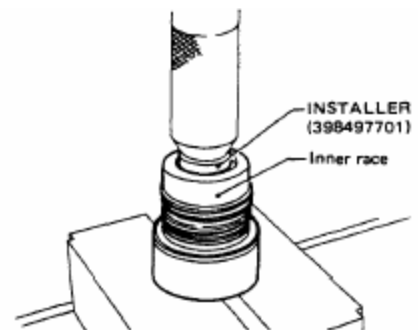
6) Install the lathe cut seal ring and lip seal to the I.D./O.D. of the low & reverse piston. Then install the piston into the case with a press.

a. Be careful not to tilt the piston when installing.
b. Be careful not to damage the lip seal.

7) Install the one-way clutch inner race.

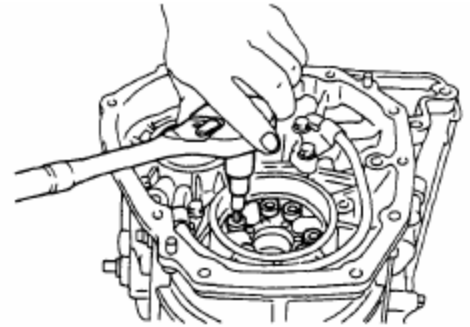
a. Using a press, install the thrust needle bearing to the inner race. Use the PULLEY ASSEMBLY (398527700) for removal.

b. Install four seal rings. Apply petroleum jelly to the groove of the inner race and to the seal ring after installation, so that the seal ring will not expand.

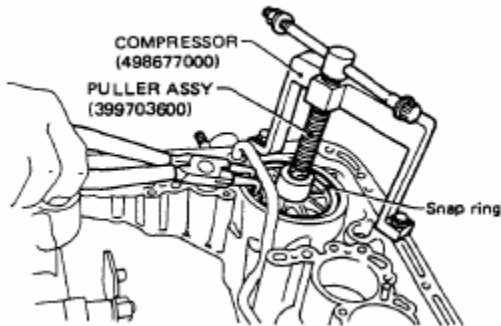


c. Place the spring retainer CP on the inner race. Install the spring to the recessed portion of the piston. Then tighten eight socket head bolts from the rear side of the transmission case. Be sure to tighten evenly.

Tightening torque: 18.1 ± 1.4 ft-lb
 25 ± 2 N-m (2.5 ± 0.2 kg-m)



8) Install the band servo sub assembly.



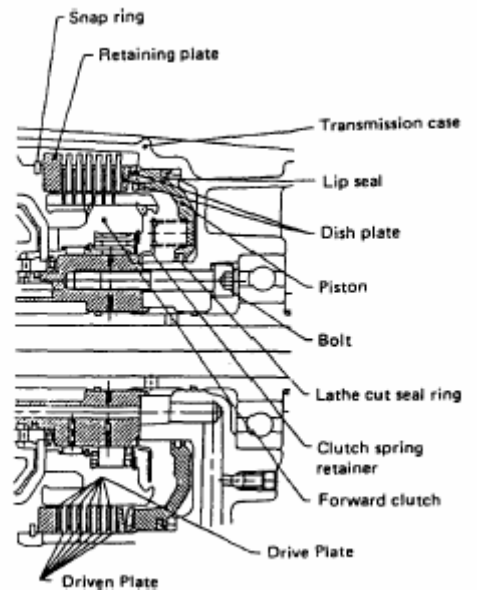
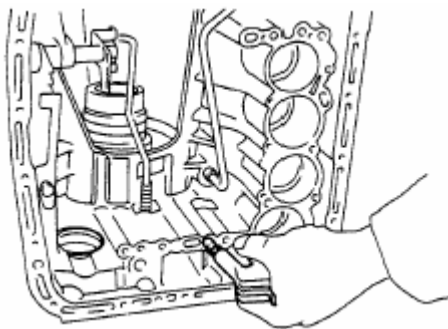
9) Press the O.D. servo retainer into position, and secure with a snap ring.

Perform the following operations with the transmission case set vertically on wooden blocks.

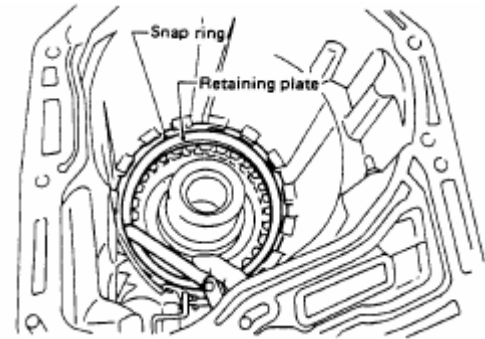
10) Installation of the low & reverse brake:

a. Install two dish plates, driven plates, drive plates, and a retaining plate, and secure with a snap ring. Pay attention to the orientation of the dish plate.

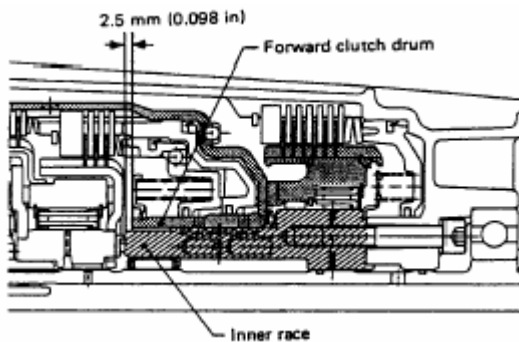
b. Apply compressed air intermittently to check for operation.



- c. Check the clearance (Selection of retaining plate)
 - Standard value: 0.043 - 0.067 in (1.1 -1.7 mm)
 - Allowable limit: 0.106 in (2.7 mm)

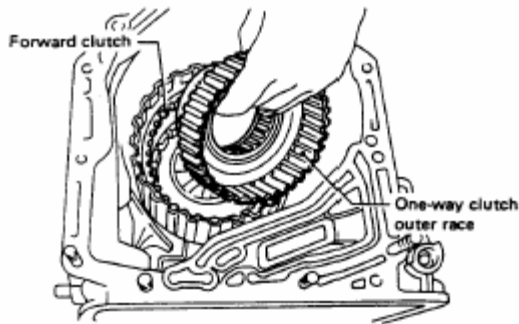
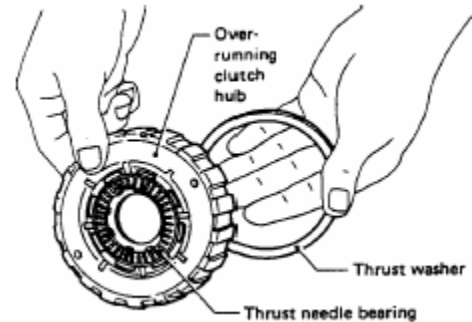


11) Install the thrust needle bearing to the inner race. Refer to "Location and installing direction of thrust needle bearing and washer" for the orientation of the bearing. Carefully check the orientation of all parts indicated by an asterisk * in the following pages.



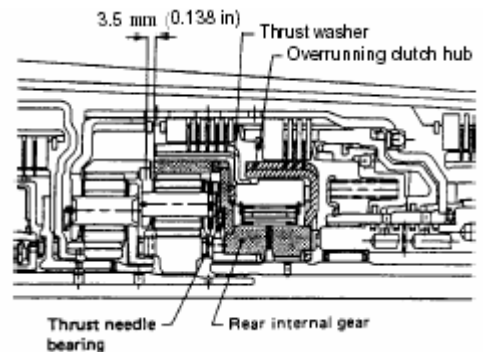
- 12) Install the forward clutch drum assembly.
 - a. Install carefully while rotating the drum slowly paying special attention not to damage the seal ring.
 - b. Installation is complete when the drum recedes 0.098 in (2.5mm) from the inner race surface.

- 13) Assemble the overrunning clutch hub.
 - a. Join the thrust needle bearing* and thrust washer with petroleum jelly, and then install them together.
 - b. Make sure that the splines are engaged correctly.

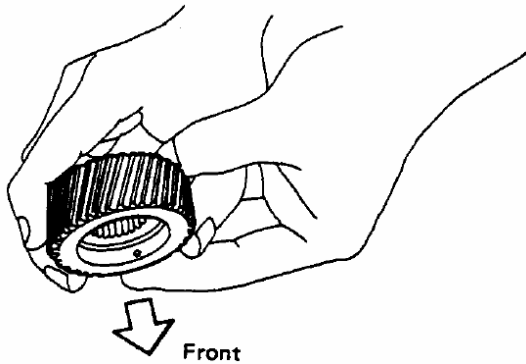
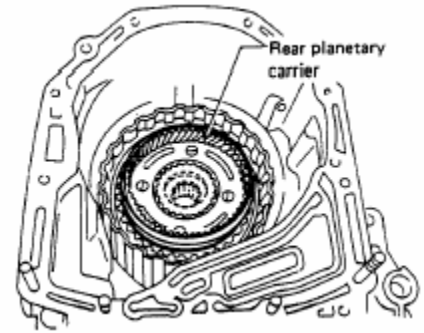


- 14) Install the one-way clutch outer race assembly. Make sure the forward clutch splines are engaged correctly.

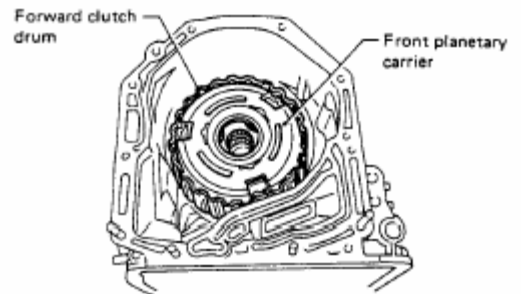
- 15) Assemble the rear internal gear.
 - a. Join the thrust needle bearing* and thrust washer to the gear with petroleum jelly, and install the gear while rotating it.
 - b. Securely engage the bearing with the dog of the overrunning clutch hub. Installation is complete when the snap ring top surface of the forward clutch drum recedes approximately 0.138 in (3.5 mm).



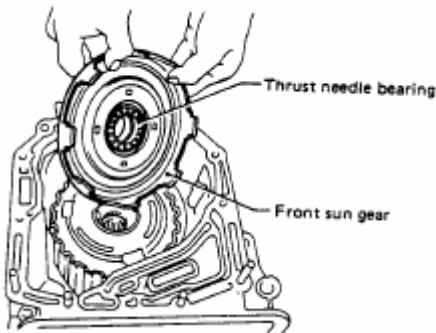
16) Install the rear planetary carrier. Attach the thrust needle bearing* to the inside of the carrier with petroleum jelly. Then install the carrier while rotating slowly.



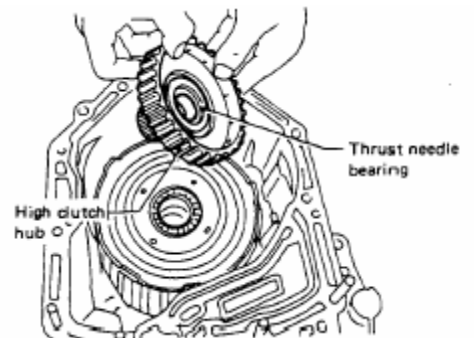
17) Install the rear sun gear. Install the gear with the oil hole facing up.



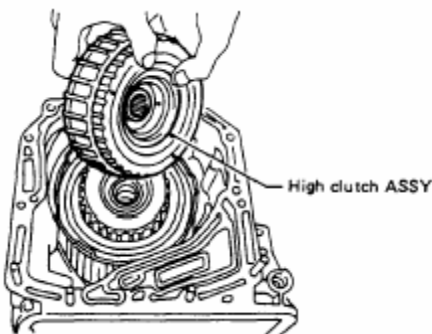
18) Install the front planetary carrier. Attach the thrust needle bearings * to both sides of the carrier with petroleum jelly. Install the carrier carefully, while aligning with the splines of the forward clutch drum, and while rotating the pinion.



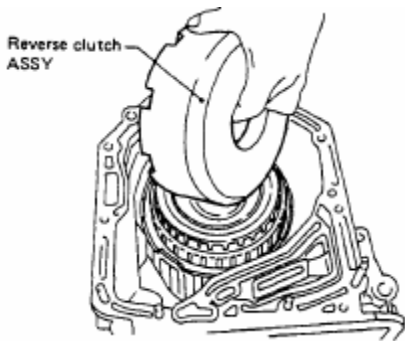
19) Install the front sun gear. Attach the thrust needle bearing* to the gear, and install the gear while turning slowly.



20) Install the high clutch hub. Attach the thrust needle bearing* to the hub with petroleum jelly and install the hub by correctly engaging the splines of the front planetary carrier.

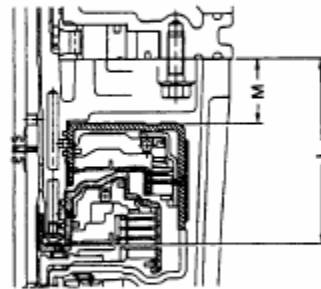
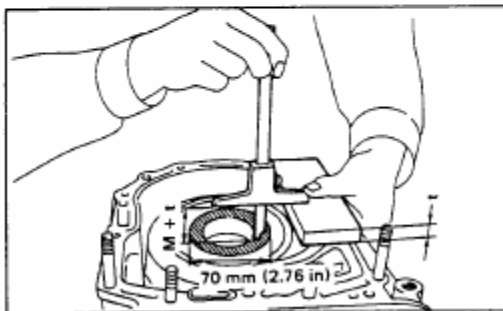
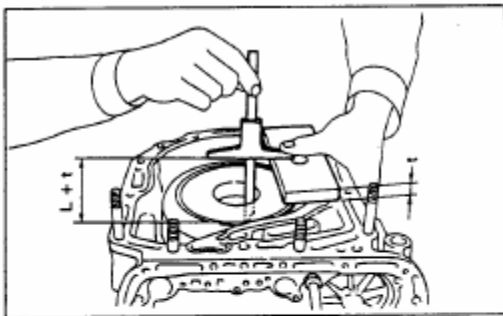
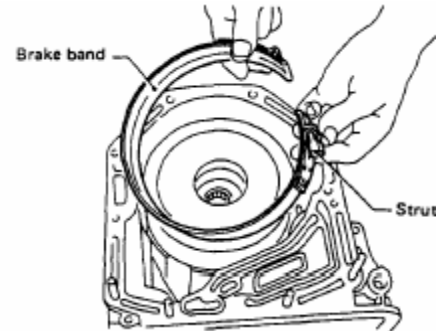


21) Install the high clutch assembly. Correctly engage the high clutch hub and clutch splines.



22) Install the reverse clutch assembly. Engage the high clutch outer spline with the reverse clutch spline and the front sun gear with the cut-out portion of the reverse clutch drum correctly when installing.

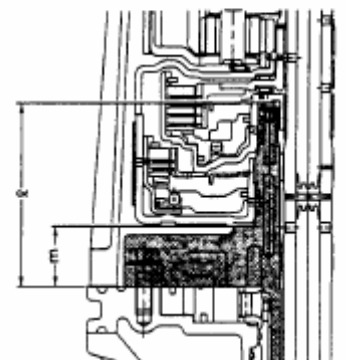
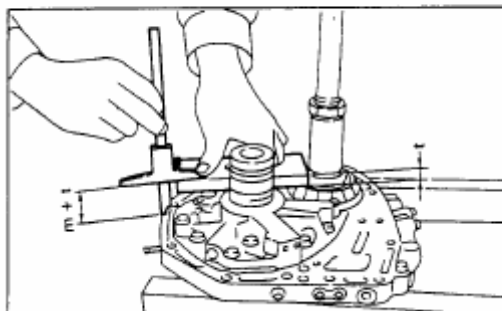
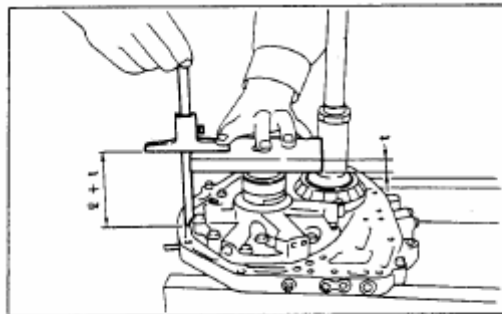
- 23) Install the brake band assembly.
- Be careful not to damage the brake band when installing.
 - Install the strut to the band servo piston stem. Then tighten it temporarily to avoid tilting the band.



24) Adjustment of total endplay

- Measure the distance from the transmission case mating surface to the recessed portion of the high clutch drum, and the distance to the top surface of the reverse clutch drum.

- Measure the distance from the oil pump housing mating surface to the top surface of the oil pump cover with needle bearing, and to the thrust surface of the reverse clutch.



c. Equation for calculation (Unit: mm)

$$T = (L + 0.4) - Q - (0.25 \text{ to } 0.55)$$

T: Thickness of bearing race

L: Depth of the recess of high clutch drum from case mating surface

Q: Height of top surface of the oil pump cover with needle bearing from the mating surface of the housing

0.4: Thickness of gasket

0.25 to 0.55: Total end play standard value

$$t = (M + 0.4) - m - (0.55 \text{ to } 0.9)$$

t: Thickness of thrust washer

M: Depth of top surface of reverse clutch drum from case mating surface

m: Height of reverse clutch thrust surface from housing mating surface.

0.4: Thickness of gasket

0.55 to 0.9: Total end play standard value

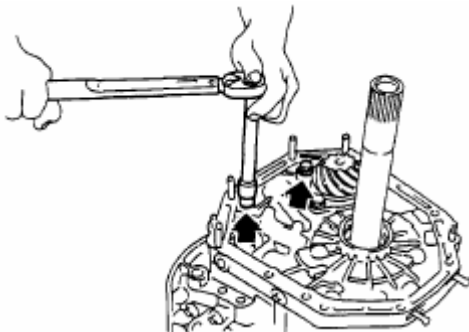
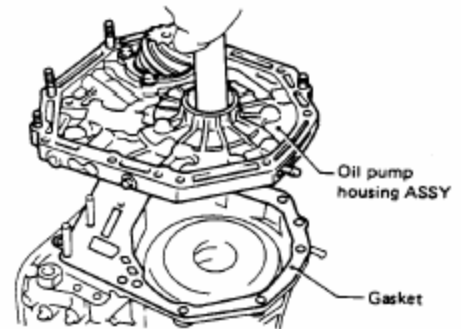
25) Install the oil pump housing assembly.

a. After completing endplay adjustment, insert the bearing race* in the recess of the high clutch. Attach the thrust washer to the oil pump cover with petroleum jelly.

b. After correctly installing the gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.

b-1. Be careful not to damage the seal ring.

b-2. Be sure to use a new gasket.



c. Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface. Any clearance suggests a damaged seal ring.

d. Secure the housing with two nuts.

Tightening torque: 24.6 ± 2.2 ft-lb

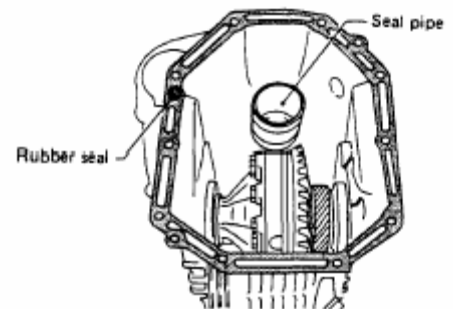
33 ± 3 N-m (3.4 ± 0.3 kg-m)

Mating Converter Case to Transmission Case

1) Apply proper amount of liquid gasket (Three-bond 1215 suggested) to the entire converter case mating surface. Make sure that the rubber seal and seal pipe are fitted in position.

2) Install the converter case assembly to the transmission case assembly, and secure with six bolts and four nuts. When installing, be careful not to damage the converter case bushing and oil seal.

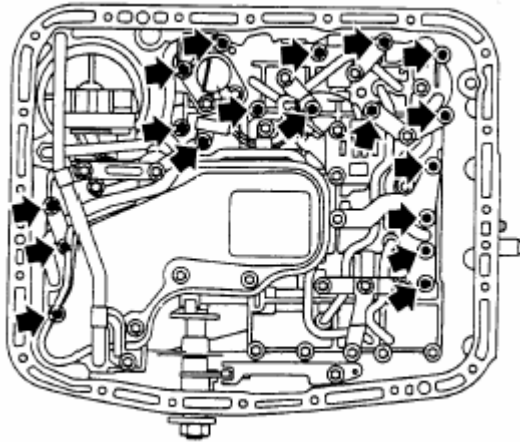
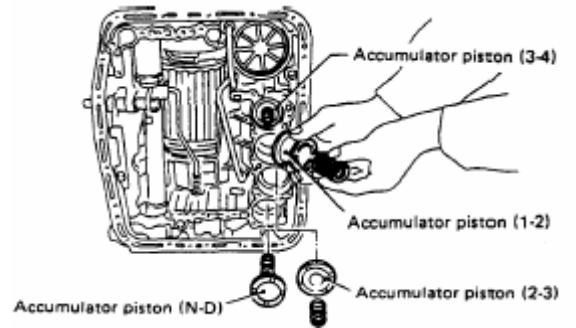
Tightening torque: 24.6 ± 2.2 ft-lb, 33 ± 3 N-m (3.4 ± 0.3 kg-m)



Installing the Control Valve and Oil Pan

1) Install four accumulators. Be careful not to confuse the springs and installation positions.

2) Install and route the transmission harness. Be careful not to damage the harness.



3) Install the control valve assembly.

a. Set the select lever in range "2".

b. Install the control valve by engaging the manual valve and manual lever, then tighten the 18 bolts.

Tightening torque: 5.8 ± 0.7 ft-lb, 8 ± 1 N-m (0.8 ± 0.1 kg-m)

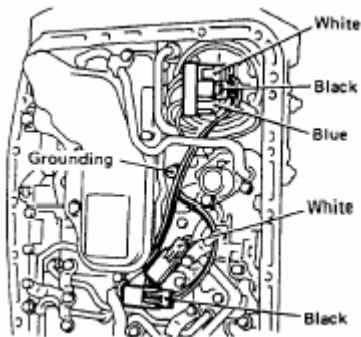
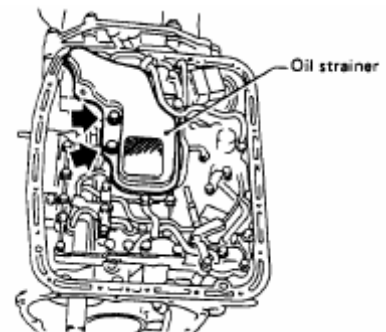
b-1. Be careful not to pinch the harness roll the gasket.

b-2. Tighten the control valve mounting bolts evenly.

The oil strainer (filter) and pipe will not be in place at this point, this is just the only illustration for all the bolts (18).

4) Install the oil strainer to the control valve. Be careful not to cut or break the O-ring. Then tighten bolts.

Tightening torque: 5.8 ± 0.7 ft-lb, 8 ± 1 N-m (0.8 ± 0.1 kg-m)



5) Secure five connectors.

6) Install the oil cooler outlet pipe, and secure with two bolts. Fit the pipe into position. Be careful to avoid twisting.

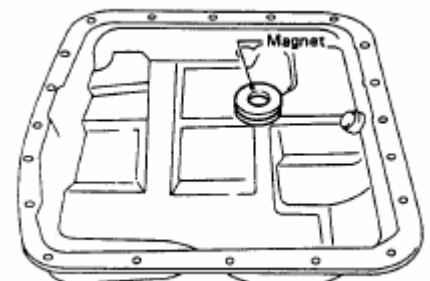
Tightening torque: 5.8 ± 0.7 ft-lb, 8 ± 1 N-m (0.8 ± 0.1 kg-m)

7) Install the oil pan.

a. Attach the magnet at the specified position.

b. With gasket inserted, secure the oil pan by tightening 20 bolts. Tighten the bolts evenly.

Tightening torque: 2.9 ± 0.4 ft-lb, 3.9 ± 0.5 N-m (0.4 ± 0.05 kg-m)

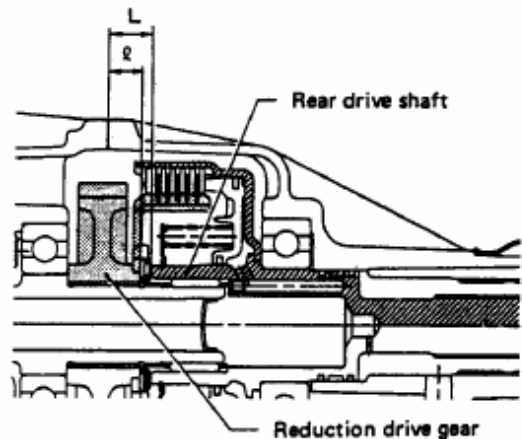
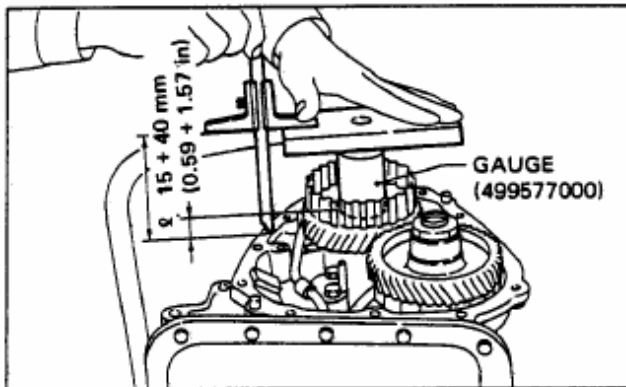
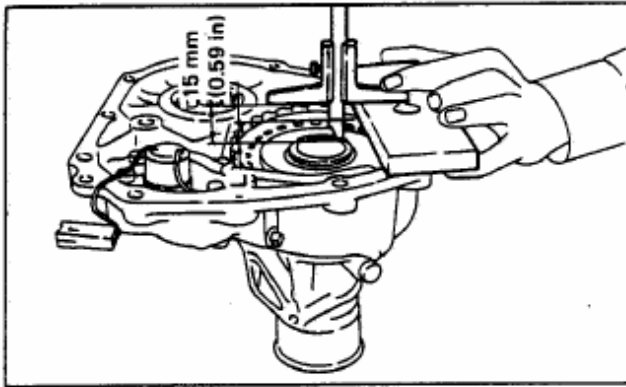


Extension Case

- 1) Install the filter in the extension case. Pay attention to the orientation of the filter.
- 2) Install the transfer clutch valve assembly, and secure with four bolts.
Tightening torque: 5.8 ± 0.7 ft-lb, 8 ± 1 N-m (0.8 ± 0.1 kg-m)
 - a. Be sure to use a new gasket
- 3) Install the pipe, and clamp securely.
- 4) Install the transfer clutch assembly to the case.
 - a. Be careful not to damage the seal rings.
 - b. Insert the clutch assembly fully into position until the bearing shoulder bottoms.

Connection between Extension Case & Transmission Case

- 1) Install the revolution sensor to the transmission case with one bolt. (AWD model only)
Tightening torque: 5.1 ± 0.7 ft-lb, 7 ± 1 N-m (0.7 ± 0.1 kg-m)
- 2) Install the reduction driven gear.
- 3) Install the parking pawl and shaft, set the select lever in the "P" range and tighten the drive pinion lock nut. After tightening, stake the lock nut securely.
Tightening torque: 72.3 ± 3.6 ft-lb, 98 ± 5 N•m (10 ± 0.5 kg-m)
- 4) Install the reduction drive gear assembly. Insert the assembly fully into position until the bearing shoulder bottoms.
- 5) Adjustment of extension end play:
 - a. Measure the distance from the transmission case mating surface to the reduction drive gear end surface.
AWD model: Measure the distance from the transmission case mating surface to the bearing end face.
 - b. Measure the distance from the extension case mating surface to the rear drive shaft end face. AWD model: Measure the distance from the cover case mating surface to the bearing mounting surface.



c. Calculation equation: Unit (mm)

$$T = (L + 0.4) - Q - (0.05 \text{ to } 0.25)$$

T: Thickness of thrust bearing (AWD model: Thickness of Al washer)

L: Distance of rear drive shaft end face from extension case mating surface (AWD model: Depth of bearing mounting face from cover case mating surface)

Q: Height of reduction drive gear end surface from transmission case mating surface (AWD model: Height of bearing end face from transmission case mating surface)

0.4: Thickness of gasket

0.05 to 0.25: Standard value of end play

6) Installation of extension case AWD, cover case FWD and transmission case

AWD model:

a. Attach the selected thrust needle bearing* to the end-surface of reduction drive gear with petroleum jelly.

b. Set the parking return spring.

c. Remove the transfer clutch from the extension case. Set the needle bearing on the reduction drive shaft and then install transfer clutch to the transfer clutch hub. Be sure to engage the spline teeth correctly.

d. With gasket inserted between them, install the extension case to the transmission case. (Be sure to use a new gasket.)

d-1. After inserting the extension case halfway, connect the connector for duty sol. C. Be careful not to jam the cord in the case.

d-2. Be careful not to damage the rear drive shaft seal ring.

e. Tighten bolts to secure the case. Tightening torque: 18.1 ± 1.4 ft-lb, 25 ± 2 N-m (2.5 ± 0.2 kg-m)

FWD model:

a. Attach the selected aluminum washer to the cover case with petroleum jelly.

b. Set the parking return spring.

c. With gasket inserted between them, install the cover case to the transmission case.

c-1. Be sure to use a new gasket.

c-2. Install the case while ensuring proper alignment of the bearing, parking shaft, and reduction driven gear.

d. Tighten bolts to secure the case. Tightening torque: 18.1 ± 1.4 ft-lb, 25 ± 2 N-m (2.5 ± 0.2 kg-m)

Installation of Exterior Parts

1) Install the revolution sensor. (AWD only)

Tightening torque: 5.1 ± 0.7 ft-lb, 7 ± 1 N-m (0.7 ± 0.1 kg-m)

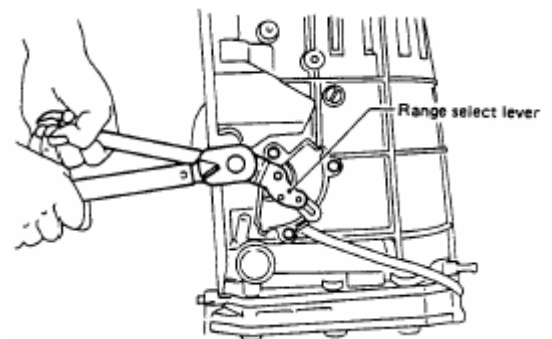
2) Installation and adjustment of inhibitor switch:

a. Install the inhibitor switch to the transmission case. Fit the projecting portion of the switch in the recessed portion of the case, and tighten three bolts temporarily.

b. Insert the range selector lever into the shaft, and tighten the nut.

Tightening torque: 28.9 ± 2.2 ft-lb

39 ± 3 N-m (4.0 ± 0.3 kg-m)



c. With the selector lever set to "N" adjust the inhibitor switch so that the hole of range selector lever is aligned with the inhibitor switch hole.

d. With hole aligned, tighten three bolts to secure the inhibitor switch.

Tightening torque: 2.5 ± 0.4 ft-lb
 3.4 ± 0.5 N-m (0.35 ± 0.05 kg-m)

3) Clip the following cords and harness:

- a. Transmission harness
- b. Inhibitor switch cord
- c. Revolution sensor cord (AWD only)

4) Install the oil cooler outlet pipe.

Tightening torque: 22.8 ± 2.5 ft-lb, 30.9 ± 3.4 N-m (3.15 ± 0.35 kg-m)

5) Install the oil cooler inlet pipe. Be sure to use a new aluminum washer.

Tightening torque: 18.1 ± 1.4 ft-lb, 25 ± 2 N-m (2.5 ± 0.2 kg-m)

6) Install the oil charge pipe. Be careful not to damage the O-ring.

Tightening torque: 22.8 ± 2.5 ft-lb, 30.9 ± 3.4 N-m (3.15 ± 0.35 kg-m)

7) Adjustment of brake band: After tightening the brake band adjusting screw to 6.5 ft-lb, 9 N.m (0.9 kg-m) torque, back it off three full turns. Then secure with a lock nut. When tightening the lock nut, be careful not to turn the adjusting screw.

Lock nut tightening torque: 18 - 21 ft-lb, 25 - 28 N-m (2.5 - 2.9 kg-m)

8) Install the pitching stopper.

Tightening torque: 28.9 ± 2.2 ft-lb, 39 ± 3 N-m (4.0 ± 0.3 kg-m)

9) Tighten the drain plugs. Tightening torque:

Differential: 32.5 ± 2.2 ft-lb, 44 ± 3 N-m (4.5 ± 0.3 kg-m)

ATF: 18.1 ± 1.4 ft-lb, 25 ± 2 N-m (2.5 ± 0.2 kg-m)

10) Install the air breather hose.

11) Insert the input shaft while turning lightly by hand. Be careful not to damage the bushing.

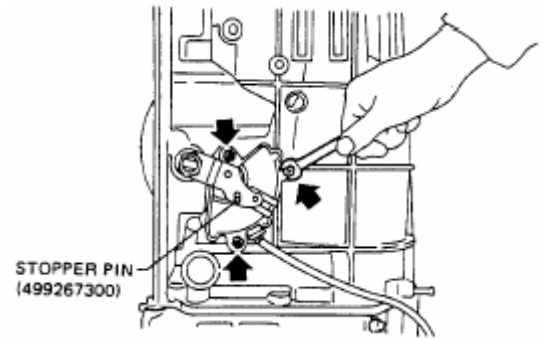
12) Install the torque converter assembly.

a. Clean out any rust from the center of the flex-plate on the engine side. Clean any excess paint (especially for a rebuilt torque converter) at the mating point. Neglecting this may cause failure of the front oil pump bushing. It would be a good idea to dry fit the torque converter to the drive/flex-plate to ensure there is no binding.

b. Fill the torque converter with ATF. Install the oil pump shaft to the torque converter. Make sure the clip fits securely in its groove.

c. Holding the torque converter assembly by hand, carefully install it to the converter case. Be careful not to damage the bushing. In addition, to avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.

d. Rotate the shaft lightly by hand to engage the splines securely. Do this several times to ensure the torque converter is fully seated. The usual process has the torque converter going in what feels like all the way, then after rotating the converter (while lightly pressing inward), you feel it go in about another half-inch.



Transaxle Installation Procedure

Note: Always use NEW roll pins when reinstalling axle shafts. Tighten bolts to specification (see table below).

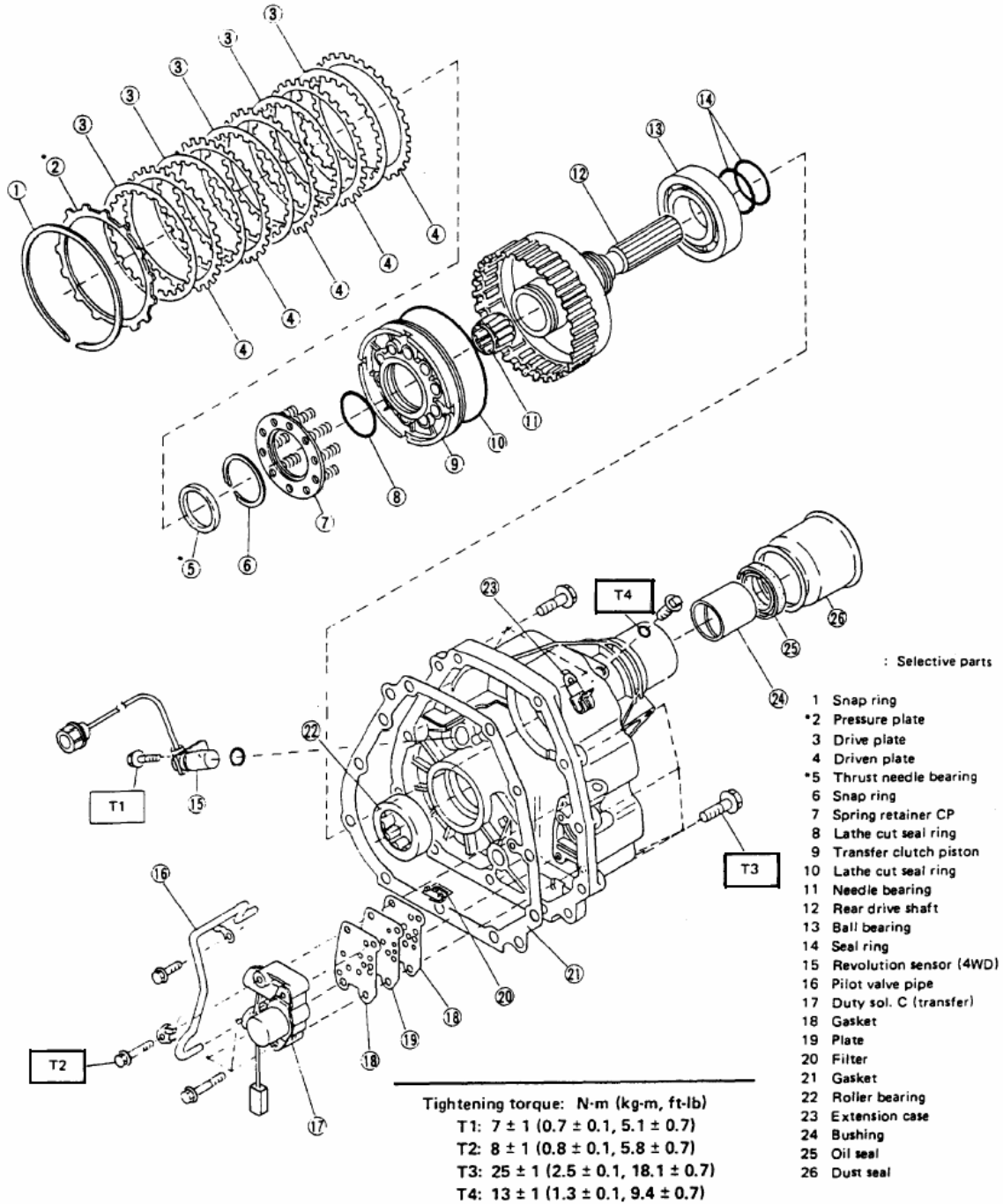
Did you **fill the torque converter with ATF before putting it in the case?** Did you **put the torque converter back in the transmission, then turn it a bit and get it to seat in about a half-inch more?** If your answer to either of these is **no, then STOP** and make sure it is taken care of before proceeding further. I cannot stress this enough, if the torque converter is not fully seated you will ruin the pump when the transmission is mated to the engine. If it starts up with a dry torque converter, there is a good chance to blow out some internal oil seals.

- 1) If the engine rotated forward when the transmission was removed, you will have to find a way to correct the alignment. Depending on the engine tilt, in one direction, you may not clear the power steering gear, the other and you will not have the necessary clearance to mate the engine to the transaxle. Support transmission with a transmission jack. Mate transmission to engine ensuring the transmission slides fully on to the studs on the back of the engine block. Be cautious to avoid damage to the steering rack and associated hoses, fittings, etc. Install nuts holding lower side of transmission to engine. Install bolts securing rear cross-member to body. Connect ATF cooler hoses from pipes on the transmission (left side near firewall).
- 2) Pull out on knuckle to give you some free space and install axle shaft onto transmission. Reverse the three bolt trick (³) or ball joint work done when removing transmission (for the three bolt trick, install the single inner bolt first, and then the two outer bolts, it is much easier this way). Install new spring pin holding axle shaft to front differential drive shaft.
- 3) Install performance rod. Install selector cable bracket on body. Install selector cable to selector lever assembly. Install drive shaft in transmission. Install bolts holding drive shaft center support bearing to body. Install drive shaft to companion flange bolts of rear differential.
- 4) Install front exhaust pipes and rear catalyst converter. Install front exhaust cover. Install engine undercover. Lower vehicle.
- 5) Install transmission and differential dipsticks. Install bolts holding right upper side of transmission to engine.
- 6) Remove engine support. Rotate the torque converter to match torque converter to drive-plate, rotating engine as necessary. Remember my caution about fully seating the torque converter in the case? **The torque converter must be able to freely spin**, using only finger pressure at the service hole. If it does not, then the torque converter was not fully seated. Proceeding beyond this point WILL ruin the ATF oil pump and require dismantling and overhaul again. Install torque converter-to-drive/flex-plate bolts. Install starter. Connect starter wiring. Install torque converter service hole plug.
- 7) Connect left and right O2 sensors. Connect transmission harness connectors. Connect transmission ground terminal connector. Connect vehicle speed sensor.
- 8) Install torque strut bracket along with bracket on transmission case. Connect transmission air vent hoses. Install strut (dog-bone). Install air intake boot and throttle body cover. Connect negative battery terminal.
- 9) Fill with ATF and differential fluid, remembering how much ATF was used for the torque converter (subtract that from the ten quarts total). I would suggest you leave the ATF about one quart low until you are able to start the unit and execute a few simple tests, then check again. Remember this checking is done on the cold side of the stick. See the drain & refill instructions for final fluid amounts.

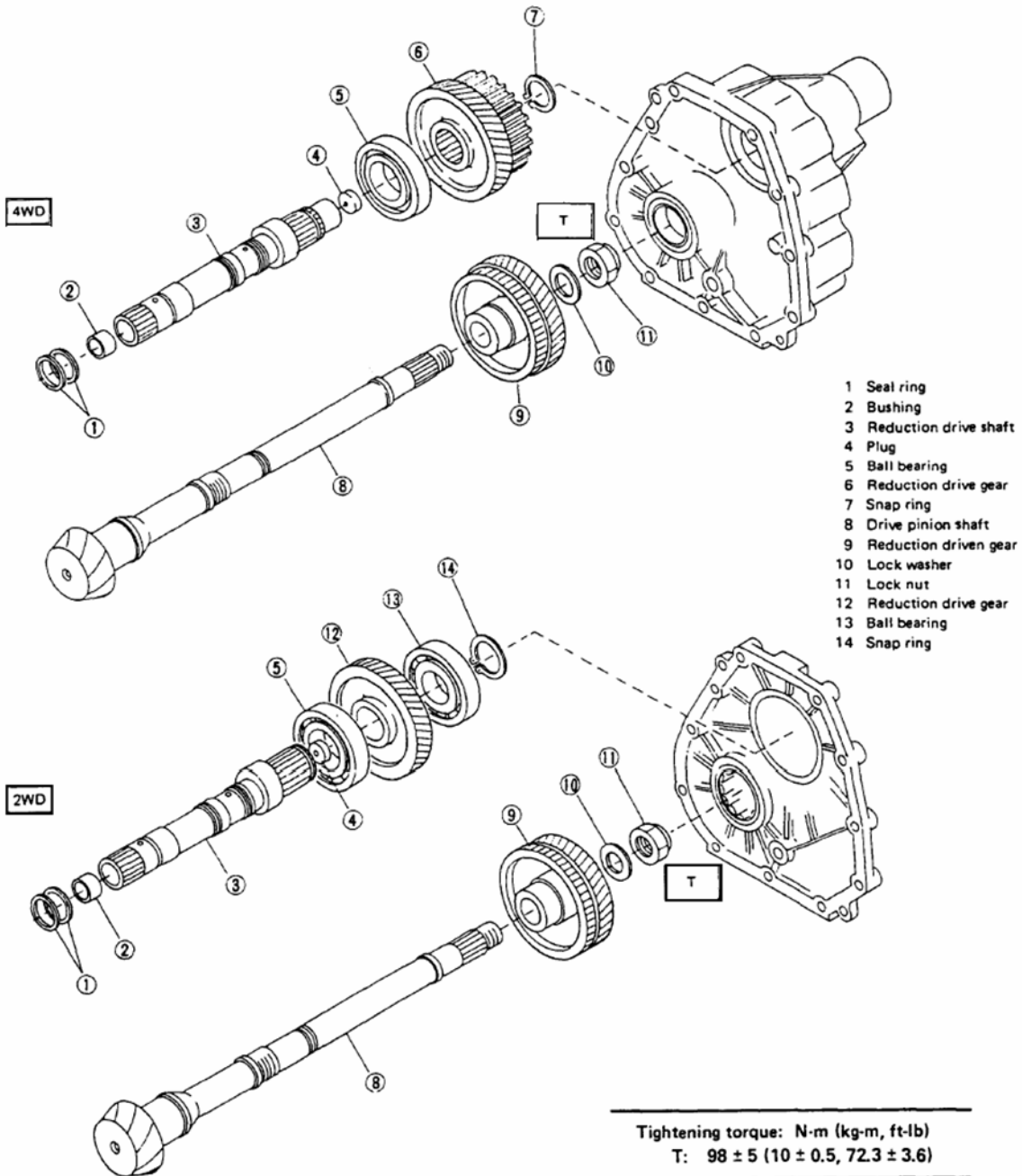
| TORQUE SPECIFICATIONS TABLE | |
|---------------------------------------|----------------|
| Application | Ft. Lbs. (N.m) |
| Cross-member Bolts | 27-49 (37-66) |
| Engine Mount Bracket Bolts | 27-49 (37-66) |
| Engine Mount to Body Bolts | 27-49 (37-66) |
| Torque Converter to Drive Plate Bolts | 17-20 (23-27) |
| Torque Strut Bolt | 31-46 (42-62) |
| Transaxle to Engine Bolts | 34-40 (46-54) |
| Transaxle Mount to Body Bolts | 27-49 (37-66) |
| Transverse Link to Cross-member | 54-69 (73-94) |

Component Diagrams

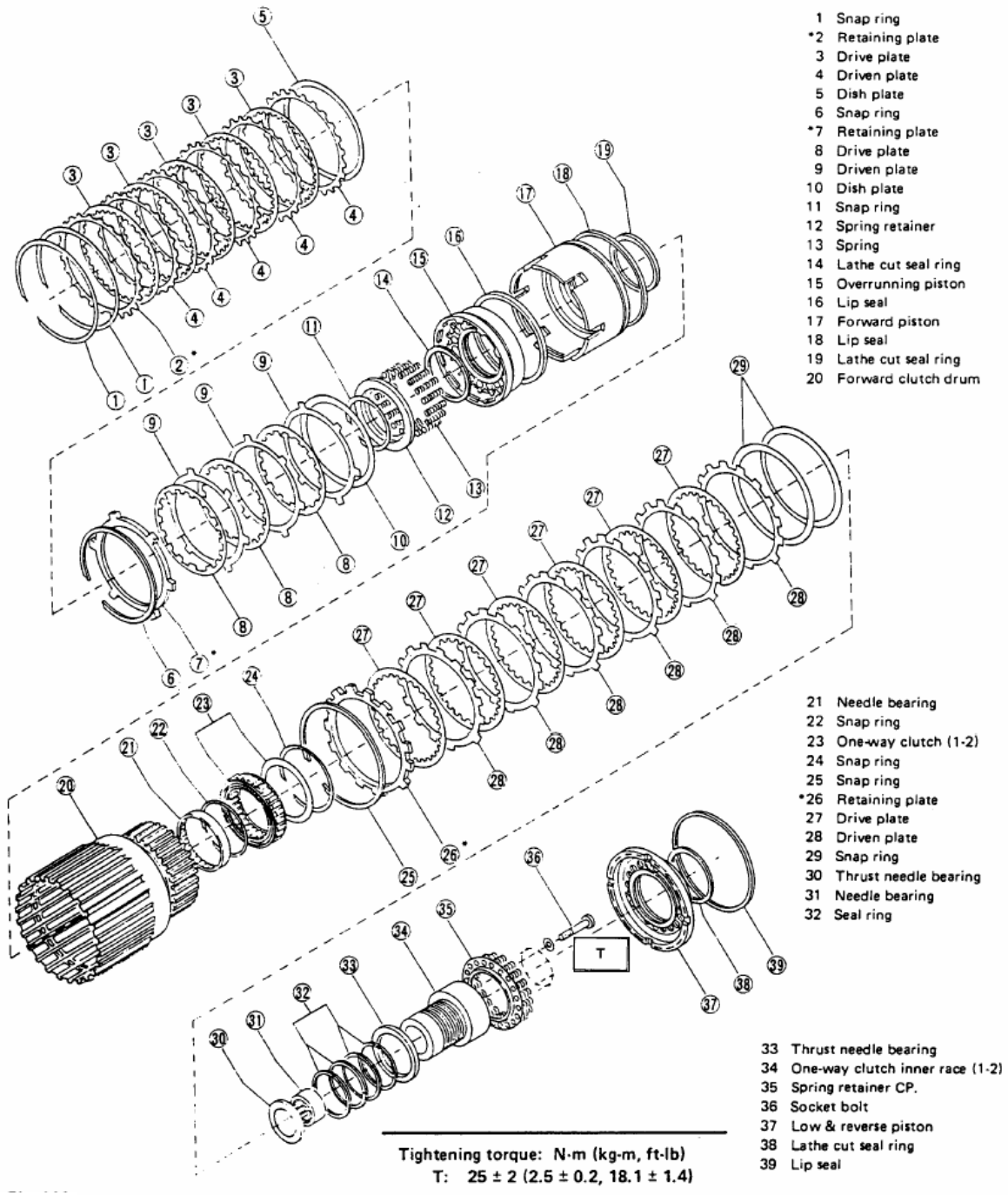
Transfer and Extension



Reduction gear



Forward Clutch and Low & Reverse Brake



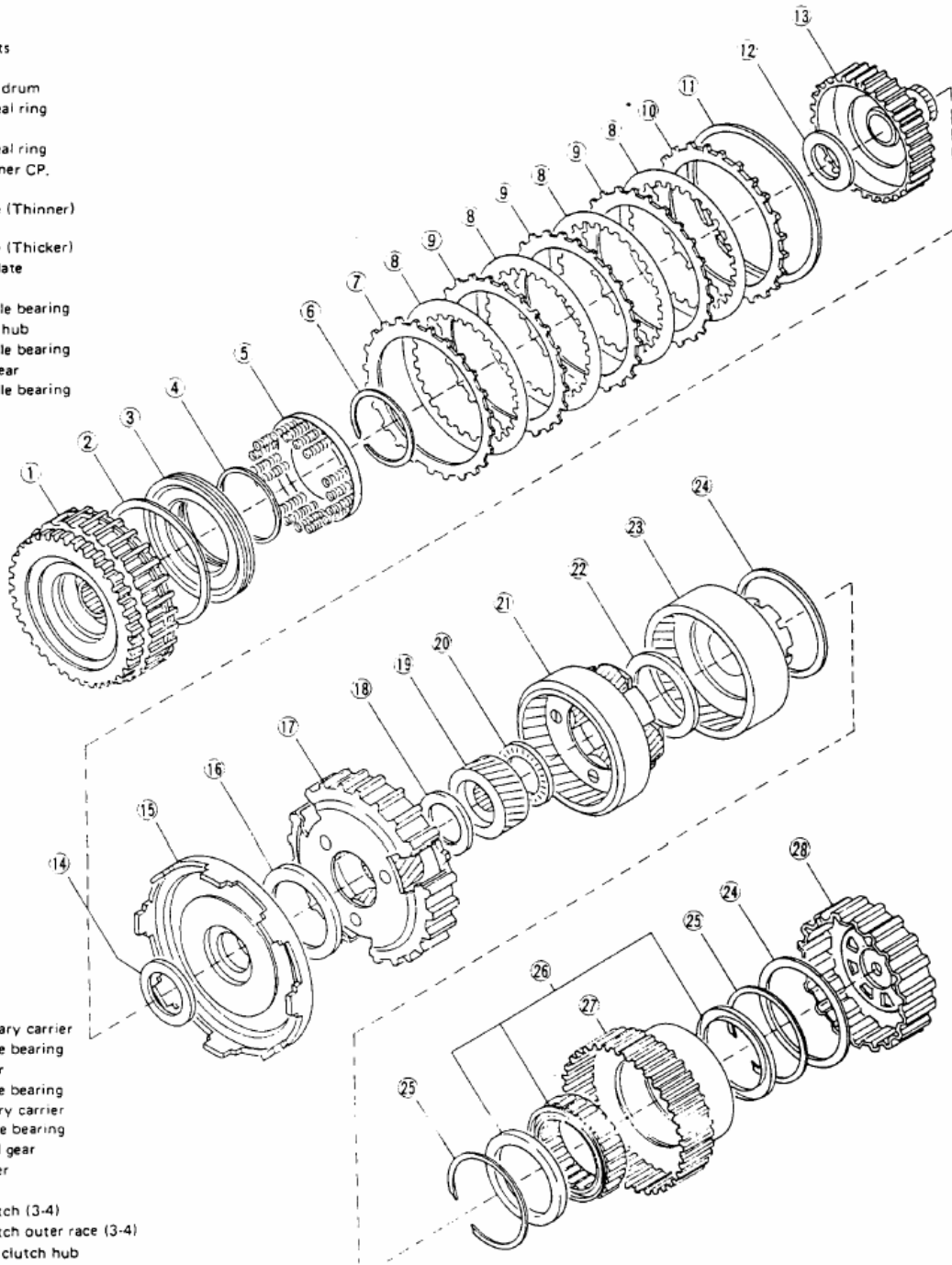
- 1 Snap ring
- *2 Retaining plate
- 3 Drive plate
- 4 Driven plate
- 5 Dish plate
- 6 Snap ring
- *7 Retaining plate
- 8 Drive plate
- 9 Driven plate
- 10 Dish plate
- 11 Snap ring
- 12 Spring retainer
- 13 Spring
- 14 Lathe cut seal ring
- 15 Overrunning piston
- 16 Lip seal
- 17 Forward piston
- 18 Lip seal
- 19 Lathe cut seal ring
- 20 Forward clutch drum
- 21 Needle bearing
- 22 Snap ring
- 23 One-way clutch (1-2)
- 24 Snap ring
- 25 Snap ring
- *26 Retaining plate
- 27 Drive plate
- 28 Driven plate
- 29 Snap ring
- 30 Thrust needle bearing
- 31 Needle bearing
- 32 Seal ring
- 33 Thrust needle bearing
- 34 One-way clutch inner race (1-2)
- 35 Spring retainer CP.
- 36 Socket bolt
- 37 Low & reverse piston
- 38 Lathe cut seal ring
- 39 Lip seal

Tightening torque: N-m (kg-m, ft-lb)
T: 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4)

High Clutch and Planetary Gear

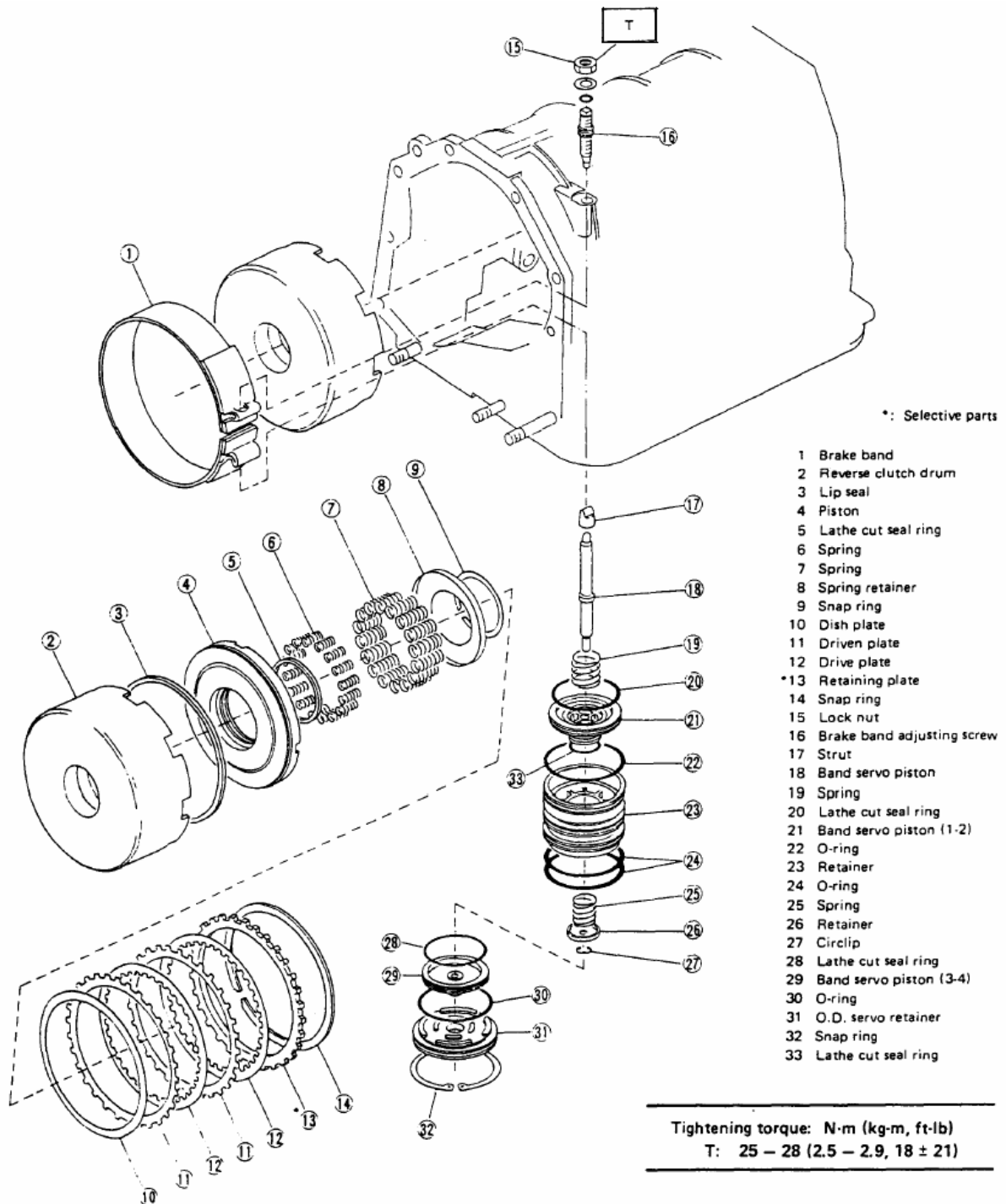
*: Selective parts

- 1 High clutch drum
- 2 Lathe cut seal ring
- 3 Piston
- 4 Lathe cut seal ring
- 5 Spring retainer CP.
- 6 Snap ring
- 7 Driven plate (Thinner)
- 8 Drive plate
- 9 Driven plate (Thicker)
- *10 Retaining plate
- 11 Snap ring
- 12 Thrust needle bearing
- 13 High clutch hub
- 14 Thrust needle bearing
- 15 Front sun gear
- 16 Thrust needle bearing

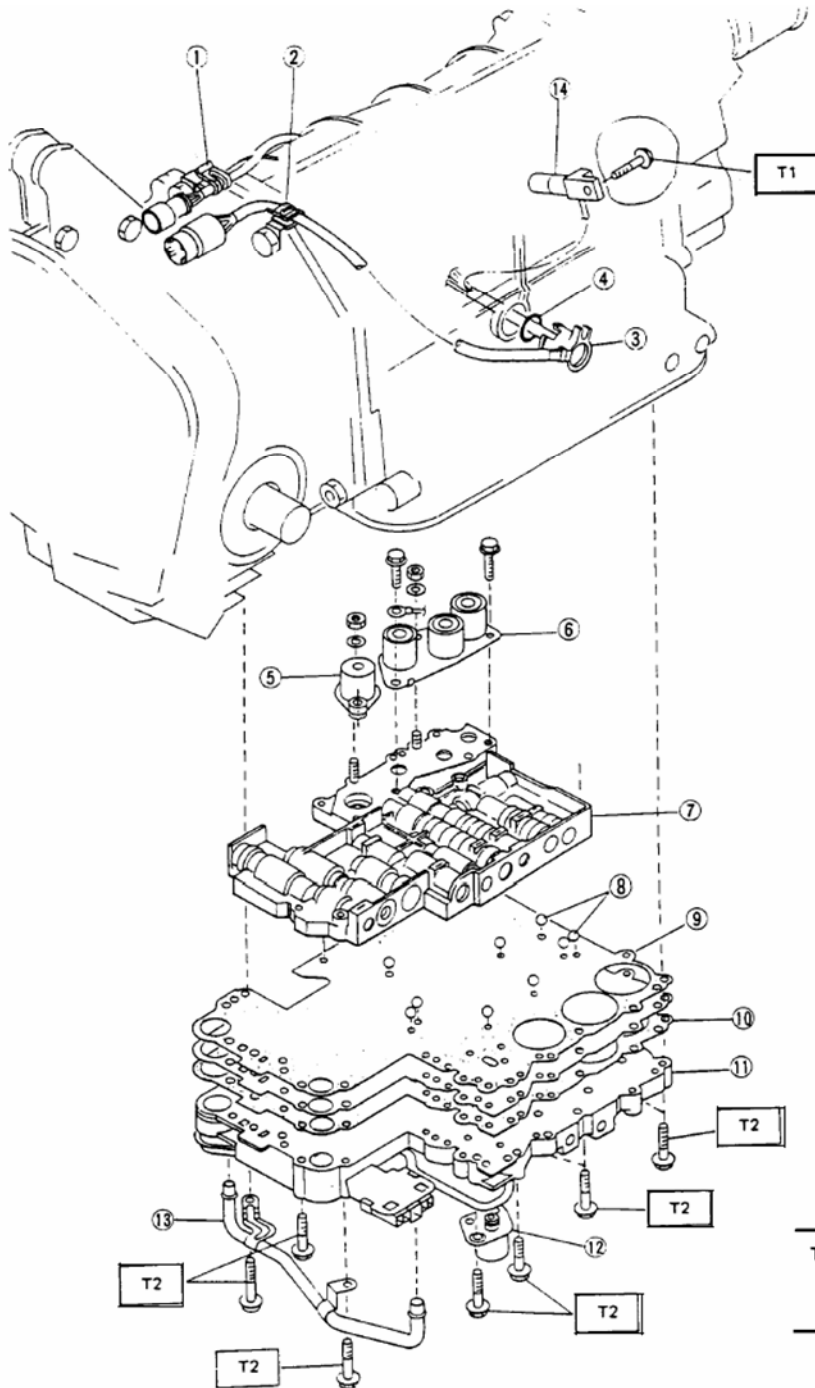


- 17 Front planetary carrier
- 18 Thrust needle bearing
- 19 Rear sun gear
- 20 Thrust needle bearing
- 21 Rear planetary carrier
- 22 Thrust needle bearing
- 23 Rear internal gear
- 24 Thrust washer
- 25 Snap ring
- 26 One-way clutch (3-4)
- 27 One-way clutch outer race (3-4)
- 28 Overrunning clutch hub

Reverse Clutch and Brake Band



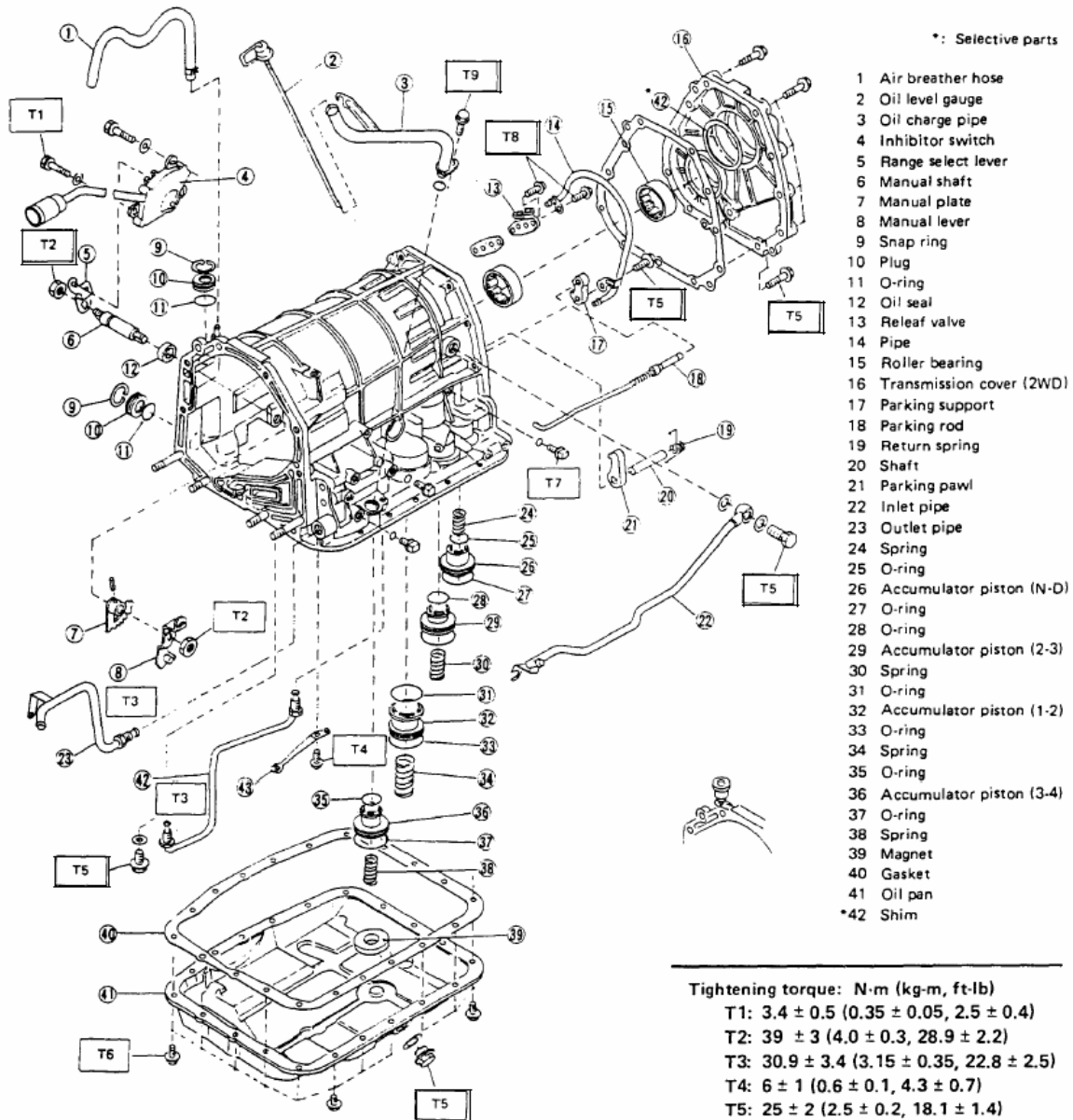
Control Valve & Harness



- 1 Clip
- 2 Clip
- 3 Transmission harness
- 4 O-ring
- 5 Duty sol. A (Line-pressure)
- 6 Sol. Assy
- 7 Upper valve body
- 8 Ball
- 9 Upper separator plate
- 10 Lower separator plate
- 11 Lower valve body
- 12 Duty sol. B (Lock-up)
- 13 Pipe
- 14 Revolution sensor (2WD)

Tightening torque: N-m (kg-m, ft-lb)
T1: 7 ± 1 ($0.7 \pm 0.1, 5.1 \pm 0.7$)
T2: 8 ± 1 ($0.8 \pm 0.1, 5.8 \pm 0.7$)

Transmission Case, Cover, and Control Device



Tightening torque: N-m (kg-m, ft-lb)

| | |
|-----|--------------------------------------|
| T1: | 3.4 ± 0.5 (0.35 ± 0.05, 2.5 ± 0.4) |
| T2: | 39 ± 3 (4.0 ± 0.3, 28.9 ± 2.2) |
| T3: | 30.9 ± 3.4 (3.15 ± 0.35, 22.8 ± 2.5) |
| T4: | 6 ± 1 (0.6 ± 0.1, 4.3 ± 0.7) |
| T5: | 25 ± 2 (2.5 ± 0.2, 18.1 ± 1.4) |
| T6: | 3.9 ± 0.5 (0.4 ± 0.05, 2.9 ± 0.4) |
| T7: | 13 ± 1 (1.3 ± 0.1, 9.4 ± 0.7) |
| T8: | 8 ± 1 (0.8 ± 0.1, 5.8 ± 0.7) |
| T9: | 6.4 ± 0.5 (0.65 ± 0.05, 4.7 ± 0.4) |

Oil Pump

Tightening torque: N·m (kg·m, ft·lb)

T1: 25 ± 2 (2.5 ± 0.2 , 18.1 ± 1.4)

T2: 39 ± 3 (4.0 ± 0.3 , 28.9 ± 2.2)

T3: 33 ± 3 (3.4 ± 0.3 , 24.6 ± 2.2)

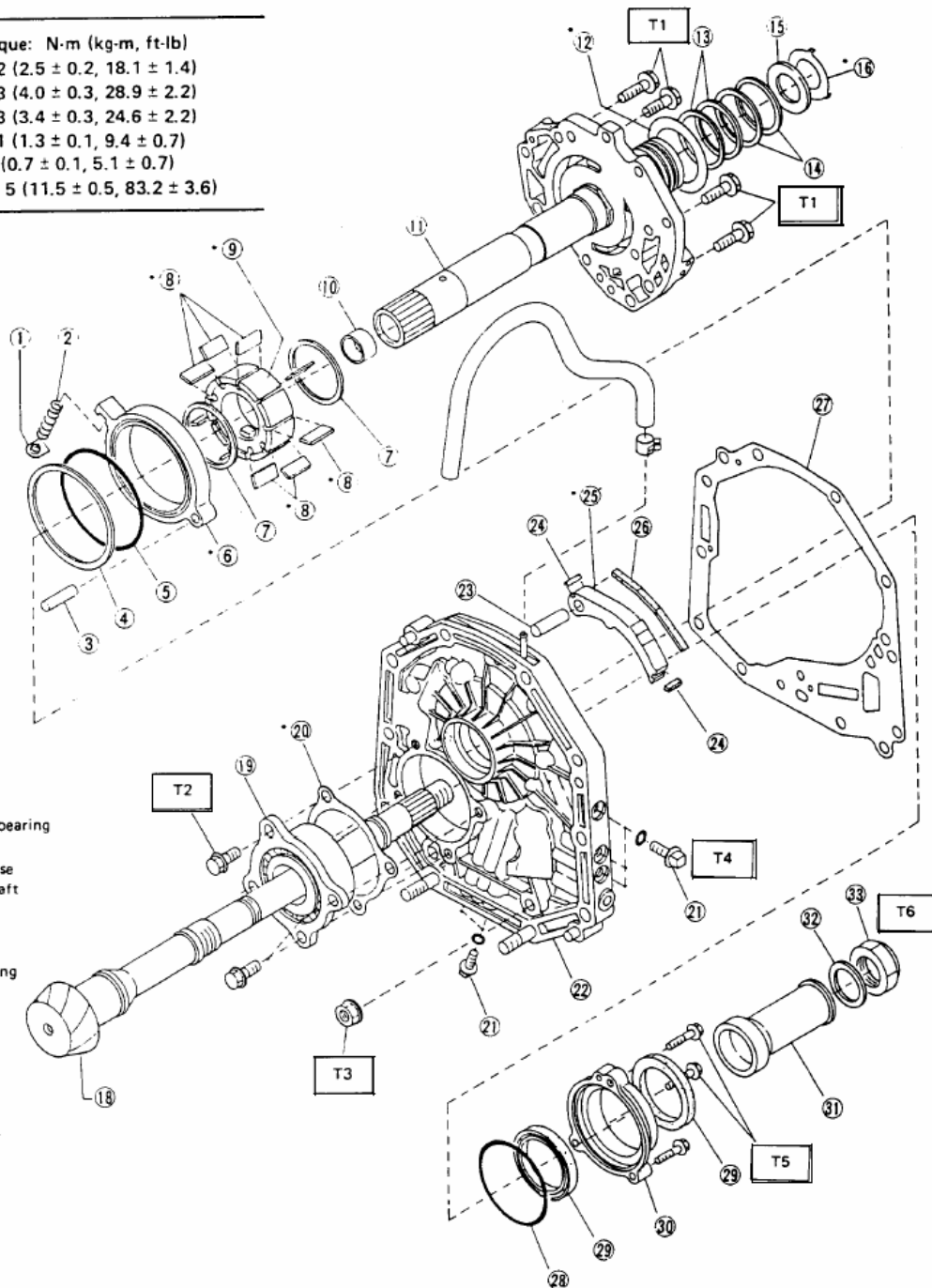
T4: 13 ± 1 (1.3 ± 0.1 , 9.4 ± 0.7)

T5: 7 ± 1 (0.7 ± 0.1 , 5.1 ± 0.7)

T6: 113 ± 5 (11.5 ± 0.5 , 83.2 ± 3.6)

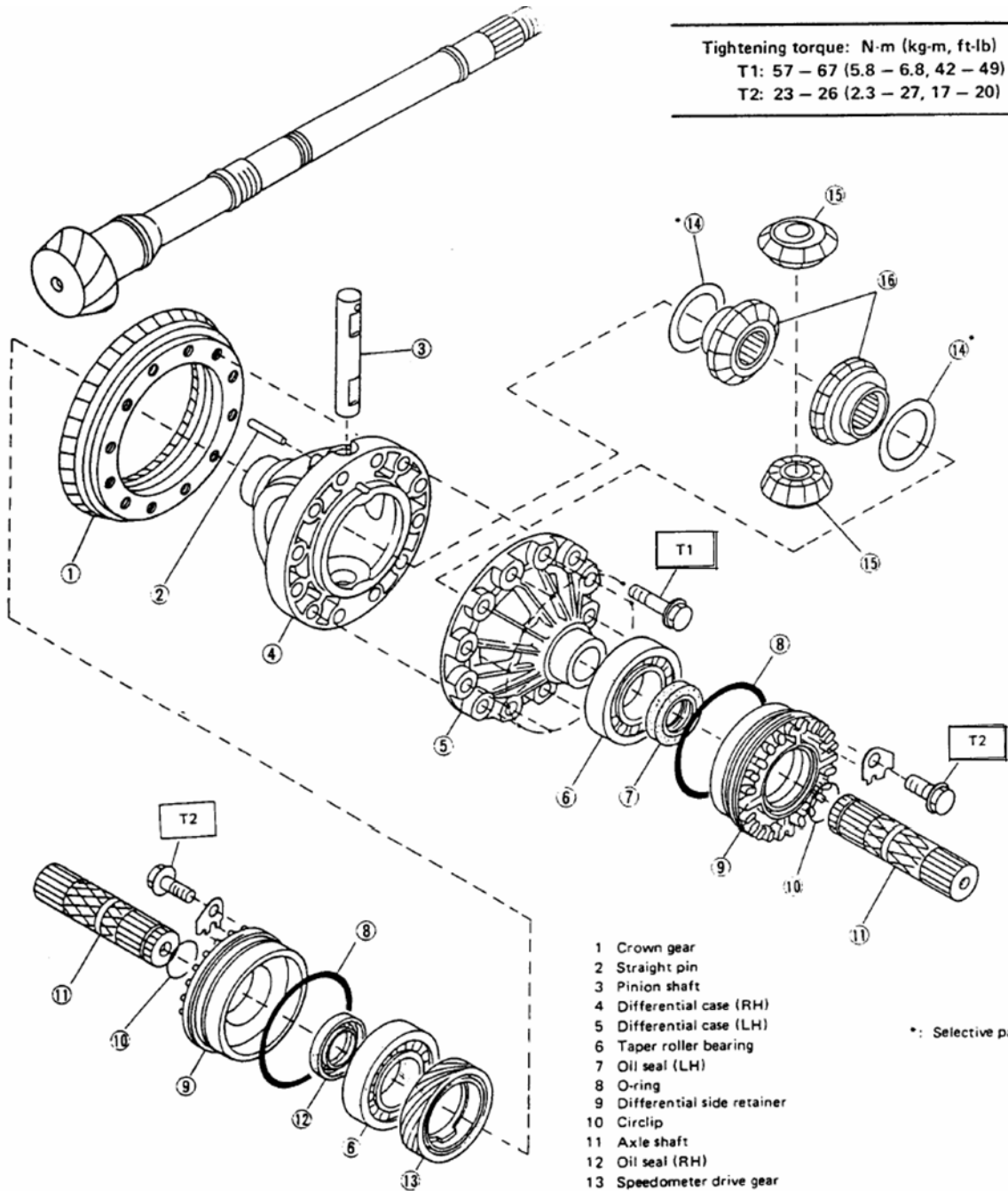
Selective parts

- 1 Retainer
- 2 Return spring
- 3 Pin
- 4 Friction ring
- 5 O-ring
- *6 Cam ring
- 7 Vane ring
- *8 Vane
- *9 Rotor
- 10 Bushing
- 11 Oil pump cover
- *12 Thrust washer
- 13 Seal ring (R)
- 14 Seal ring (H)
- 15 Thrust needle bearing
- *16 Thrust washer
- 17 Air breather hose
- 18 Drive pinion shaft
- 19 Roller bearing
- *20 Shim
- 21 Test plug
- 22 Oil pump housing
- 23 Pin
- 24 Side seal
- *25 Control piston
- 26 Plane seal
- 27 Gasket
- 28 O-ring
- 29 Oil seal
- 30 Oil seal retainer
- 31 Seal
- 32 Lock washer
- 33 Lock nut



Differential Case

Tightening torque: N-m (kg-m, ft-lb)
 T1: 57 – 67 (5.8 – 6.8, 42 – 49)
 T2: 23 – 26 (2.3 – 2.7, 17 – 20)



- 1 Crown gear
- 2 Straight pin
- 3 Pinion shaft
- 4 Differential case (RH)
- 5 Differential case (LH)
- 6 Taper roller bearing
- 7 Oil seal (LH)
- 8 O-ring
- 9 Differential side retainer
- 10 Circlip
- 11 Axle shaft
- 12 Oil seal (RH)
- 13 Speedometer drive gear
- *14 Washer
- 15 Differential bevel pinion
- 16 Differential bevel gear

*: Selective parts

Torque Converter and Converter Case

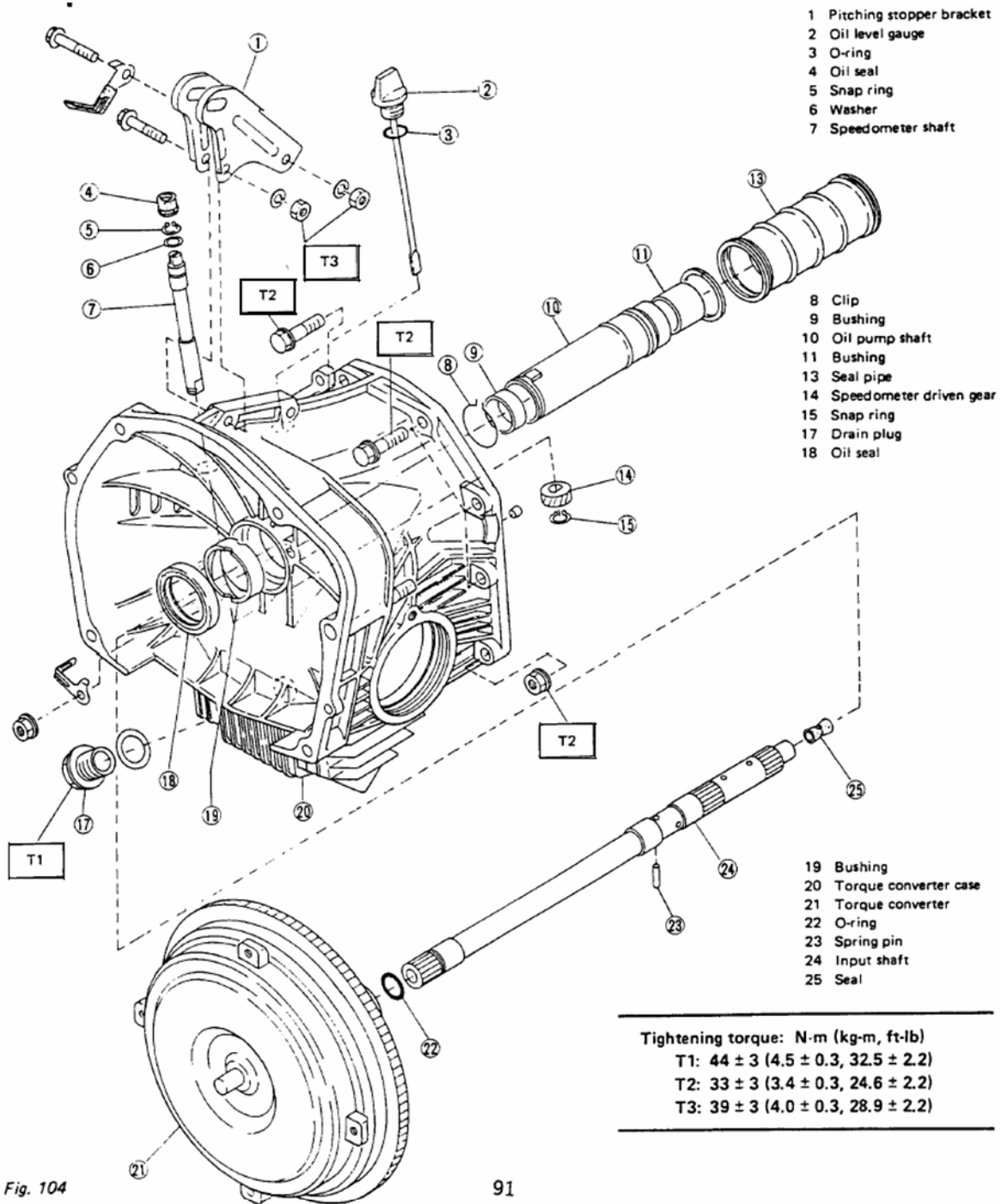


Fig. 104

Appendix: Credits, Tips & Misc. Ramblings

1 – Credit & References

a. The photos of the 4EAT came from the Subaru site www.endwrench.com, as well as being the inspiration of much of the text in the opening portion of the General Information section.

b. A large part of this document is derivative from a publication put out by the Automatic Transmission Service Group (ATSG), no date of place of publishing. ATSG in turn thanks Subaru for illustrations and information. Although no reproduction notice was present, and no copyrights or trademarks are found in the ATSG publication, I would be remiss if credit was not given to these organizations.

c. General notes on the use of a pressure gauge are derivative from a TSB put out by the Automatic Transmission Repair Association (ATRA).

d. I need to make an apology to some SVX owners out there. I could not have gotten this far in working on the SVX without the help and support of the members from the SVX forum: www.subaru-svx.net/forum. I listed some few of its members in these credits, and I am very sorry I could not remember/list all who have helped me (but whom I undoubtedly still plagiarized). As an example, one member who has given me lots of advice, but received no credit in this document is Harvey.

2 - Dropping Resistor

The TCU code for a failed solenoid A is frequently caused by a failure of the dropping resistor. The resistor is found on the inner fender wall, behind the battery. The value of the OEM resistor is specified between 9 and 15 ohms and has a 20-watt rating.

Some SVX owners have deliberately removed the dropping resistor from the circuit to increase the crispness of shifting. However, this act will cause the "blinking power light" condition on start-up with the potential to hide other trouble codes.

Note: Use this recommendation for changing the dropping resistor only after you consider carefully and judge it for yourself. Also, the article referenced below was not tailored to the SVX automatic transmission, but was of a general nature concerning dropping resistors and shift solenoids.

An article in the *Gears* magazine (May 2002 - published by the Automatic Transmission Rebuilder's Association - ATRA), suggested that for both crisp shifting and continued health of the duty solenoid, a minimum current of approximately 0.2 amps should flow. The article also stated that a current flow of more than 1.0 amp could shorten the life of the solenoid. The system employed on the SVX could, when at the limits of allowable specification (9 ohm resistor, 1.5 ohm solenoid), produce a current flow of over 1.0 amps. Using the data found in the article, and for those desiring an increased "sporty" feel to the shifts, the dropping resistor may be changed to a value of approximately 60 ohm. If you want to check the numbers yourself, the dropping resistor "sees" alternator charging voltage while running (~14.2v), and the solenoid may have a resistance as low as 1.5 ohm. Using $V=IR$, $14.2=0.2*(X+1.5)$, so $X=69.5$ ohm. At the other end, the solenoid may have a resistance of 4.5 ohm. Using the same formula implies $X=66.5$ ohm. Therefore, a value of 60 ohm should produce a safe margin in preserving adequate current flow, while facilitating the crisp shifts desired. This resistor should be specified with a minimum 5-watt rating, 10 watts being the preferred value. Finally, the writer for ATRA claimed too little current through the solenoid would not exercise it enough, potentially resulting in a seized solenoid. Therefore, a value much higher than 60 ohms should be avoided.

3 - Noises in the Night & Other Scary Things

Clunk in reverse: A clunk or thud that is heard normally while in reverse and giving the car a bit of gas may mean its time for a new rear transmission mount. Source: aredujaj, SVX forum

Grinding from rear of transmission: Failure of the AWD system should reveal a code in the TCU. If it does not, and you are hearing noises that appear to be coming from the rear of the transmission, remove the speed sensor at the rear of the transmission and check for the presence of metal particles. It may mean the transfer clutch has begun to self-destruct. Source: UberRoo, SVX forum

TPS failure mode: A partial failure of the TPS has been known to manifest itself as a "flare" in engine RPMs during the shift from 2nd to 3rd gear. The likely cause is a partial failure in the resistive element of the TPS producing a "drop-out" in the smooth change of voltage output to the TCU (and ECU). This dropout effectively signals the TCU that throttle pressure has gone to zero, and therefore the TCU signals a reduced line pressure - resulting in a slip during the shifting process.

Front differential failure: There have been a few cases of the front differential housing failing, with subsequent failure of the ring/pinion gears (likely from a part of the failed housing being introduced between the gear teeth). There may or may not be a warning sound(s). After failure, there will be a loud, distinct and rhythmic thud/thunk with each turn of the ring gear. There has been some speculation that the failure might be induced by excessive torque being applied through the front differential if the transfer clutch is not fully functional.

Binding AWD system: For those AWD Subaru owners experiencing binding in the transfer clutch system, the addition of 4 oz. of a limited slip differential additive to the ATF has been found to be an effective cure. Source: Green1995SVX, SVX forum.

Synthetic ATF: Subaru does NOT recommend the use of synthetic fluids in the SVX. The premise seems to be that synthetics have a greater tendency to leak. In practice, no one I know that used a synthetic fluid from "new" condition has experienced a problem. However, many people changing to a synthetic with significant mileage do experience a problem. This is most likely caused by the superior cleaning ability inherent in the synthetic oils used as base stock. A layer of "crud" builds up behind the old seal, assisting the seal with performing its sealing function. After the synthetic ATF cleans away the "crud" the seal begins to leak. As there are internal seals, in addition to external ones, the result could be transmission damage.

A-arm hint: Removal of the three A-arm attachment bolts vice ball-joint separation was first suggested by Beav on the SVX forum. Negates the need to perform a front-end alignment, post transmission removal & reinstallation. Hint: also works when it comes time to replace the axles because the CV joints failed.

4 - Subaru issued SVX transmission TSBs

| | | |
|-----------|--------|--|
| 16-63-99R | AUG 00 | A/T - 4EAT Remanufactured Transaxle Available |
| 16-63-99 | APR 99 | A/T - 4EAT Remanufactured Transaxle Program |
| 11-51-97 | DEC 97 | AWD & Full-Time AWD Diagnostic Testing Precautions |
| 16-62-97 | MAY 97 | Transfer Clutch - Binding And/Or Bucking On Turns |
| 16-61-94 | JUN 94 | 4EAT Modifications - Updated Information |
| 16-90-94 | MAY 94 | Speedometer - Cable Adapter |
| 16-59-94 | APR 94 | Prevention of Planetary Gear Failure |
| 16-58-94 | MAR 94 | A/T - 4EAT Modifications |
| 16-56-93 | MAY 93 | A/T - Auxiliary Filter Kit |
| 16-57-93 | MAY 93 | A/T - Cooler Hose Kit |
| 16-54-92 | NOV 92 | A/T - (4EAT) Gear Reduction Driven Shaft Replacement |
| 18-03-92 | SEP 92 | Service Manual Updates - Throttle Sensor Specifications |
| 16-52-92 | APR 92 | A/T - (4EAT) Reduction Gear & Transfer Gear Installation |
| 16-50-92 | MAR 92 | A/T - (4EAT) One Way Clutch Operation |
| 16-49-91 | DEC 91 | A/T - (4EAT FWD & AWD) Brake Band Adjustment |

My thanks are extended to Subaru for making the SVX, a unique sports coupe. Lee, 2004.

Because the sources providing references, assistance, and/or inspiration have not been contacted for release, this document, in whole or part, may not be sold or used for commercial purposes. This document was created as an educational paper for myself and others.