INDEX

AUTOMATIC TRANSMISSION SERVICE GROUP

INTRODUCTION
NISSAN - L4N71B

The L4N71B transmission is a 4 speed reardrive automatic transmission. Some of these units have a computer controlled converter clutch.

The removal-installation, teardown-assembly and trouble shooting of this unit is covered in detail.

We thank the Nissan Corporation for the illustrations and information that made this booklet possible

The information and part numbers contained in this booklet have been carefully compiled from industry sources known for their reliability, but ATSG does not guarantee its accuracy.

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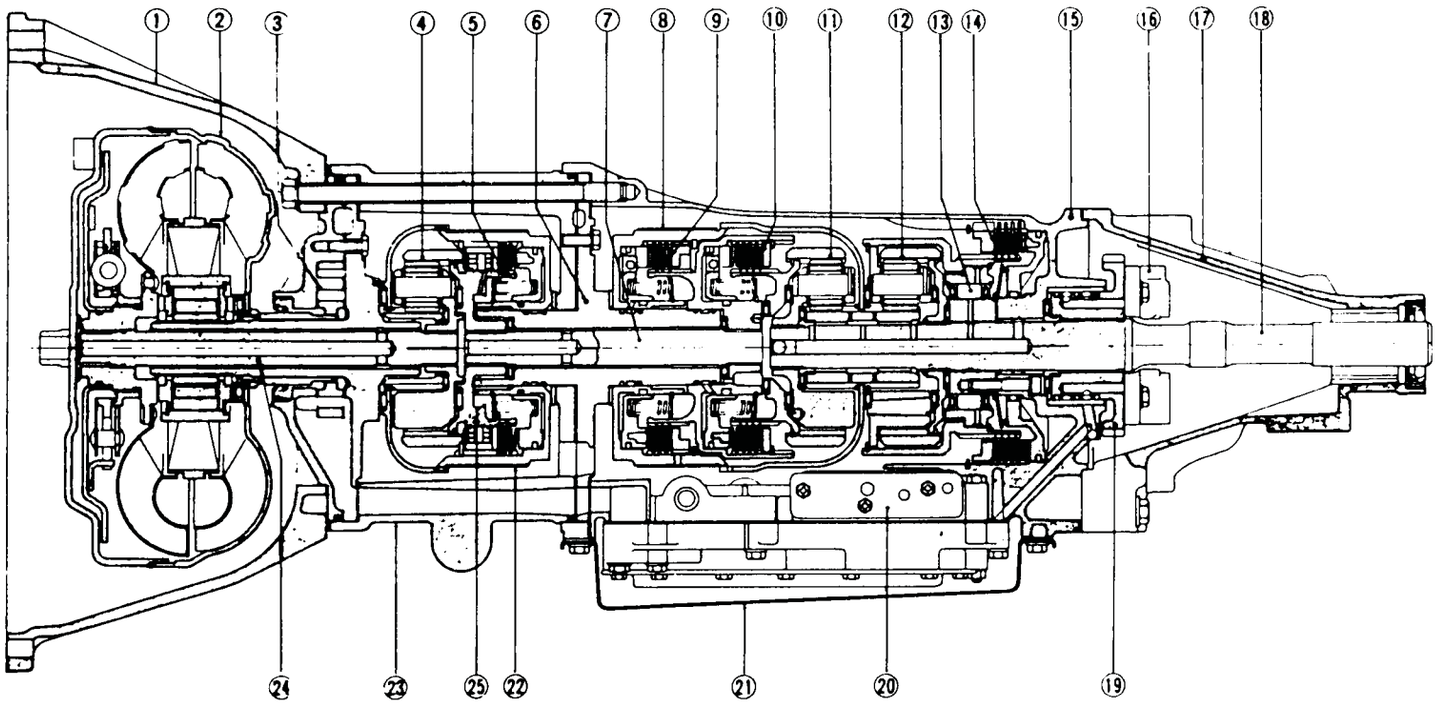
DESCRIPTION OF E4N71B



1 Converter housing
2 Torque converter
3 Oil pump assembly
4 O.D. planetary gear
5 Direct clutch
6 Drum support
7 Intermediate shaft
8 2nd band brake
9 Front clutch
10 Rear clutch
11 Front planetary gear
12 Rear planetary gear
13 One-way clutch
14 Low & reverse clutch
15 Transmission case
16 Governor valve assembly
17 Rear extension
18 Output shaft
19 Oil distributor
20 Control valve assembly
21 Oil pan
22 O.D. band brake
23 O.D. case
24 Input shaft
25 O.D. one-way clutch

GENERAL SERVICE NOTICE

Repair Notes

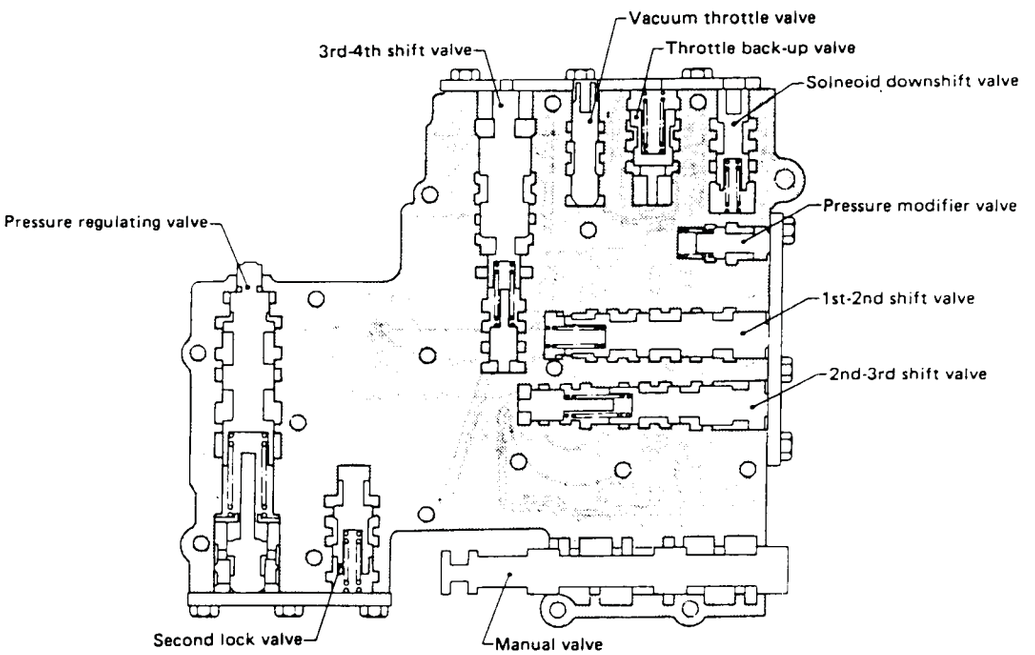
- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts of the transmission from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use a nylon cloth or paper towel for wiping parts clean. Common shop rags can leave lint that might interfere with the transmission's operation.
- When disassembling parts, be sure to place them in order in parts rack so they can be put back in the unit in their proper positions.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals, and O-rings should be replaced. It is also very important to perform functional tests whenever it is designated.
- The valve body contains many precision parts and requires extreme care when parts are removed and serviced. Place removed parts on a parts rack so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
- Before assembly, apply a coat of recommended A.T.F. to all parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
- Care should be taken to avoid damaging O-rings, seals and gaskets when assembling.

Abbreviations used throughout this section stand for the following:

- A.T.F. ..... Automatic transmission fluid
- D_1 ..... Drive range 1st gear
- D_2 ..... Drive range 2nd gear
- D_3 ..... Drive range 3rd gear
- D_4 ..... Drive range 4th gear
- O.D. ..... Overdrive
- 1_2 ..... 1 range 2nd gear
- 1_1 ..... 1 range 1st gear

Control Valve

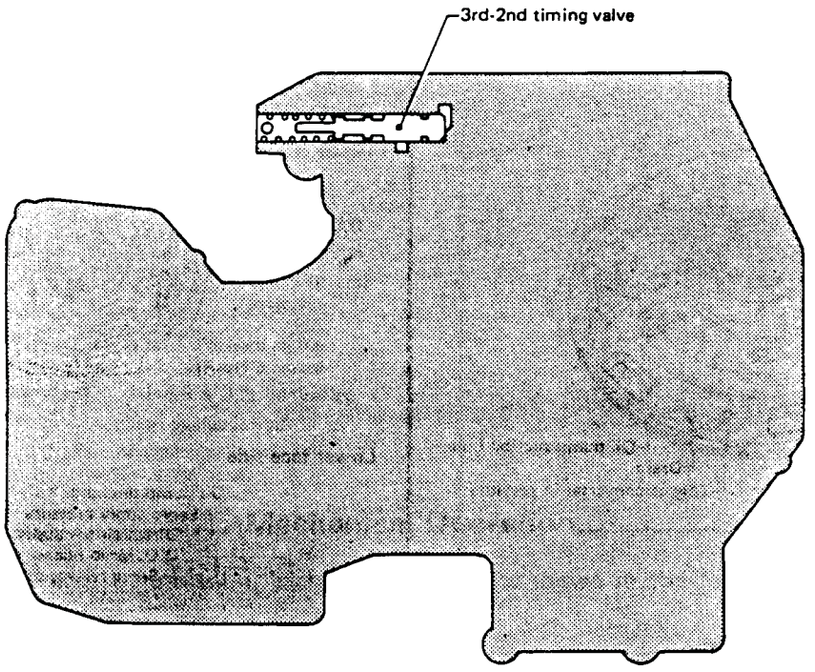
CONTROL VALVE UPPER BODY



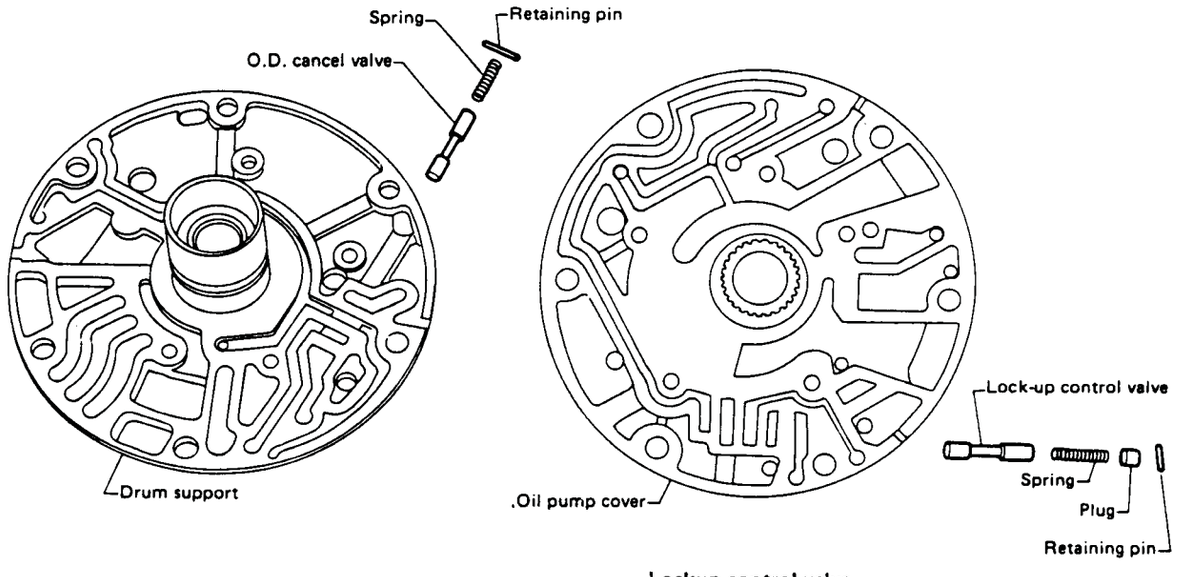
GENERAL SERVICE NOTICE

Control Valve (Cont'd)

CONTROL VALVE LOWER BODY



Lock-up Control Valve and O.D. Cancel Valve



O.D. cancel valve

Lockup control valve

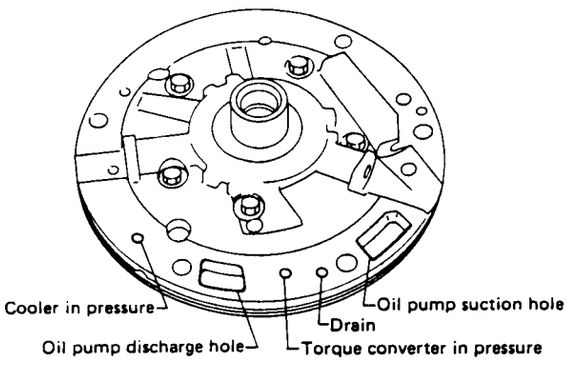
GENERAL SERVICE NOTICE

Oil Channel

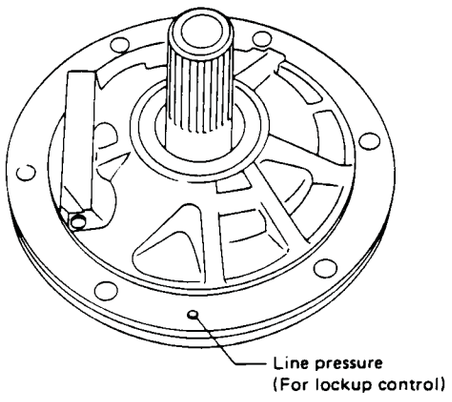
Oil channels which connect components are located in the areas shown below.

OIL CHANNELS IN OIL PUMP

Oil pump cover side

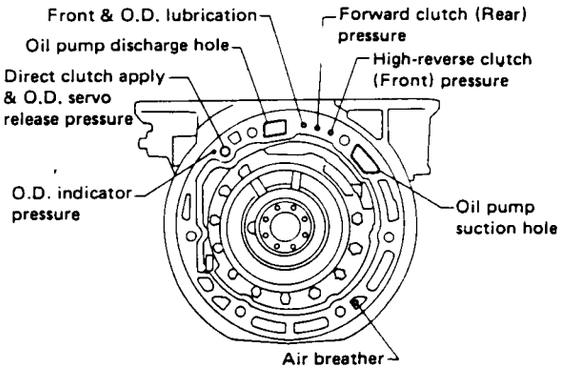


Oil pump housing side

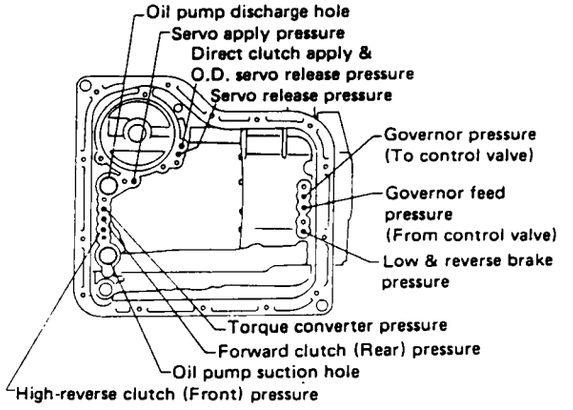


OIL CHANNELS IN TRANSMISSION CASE

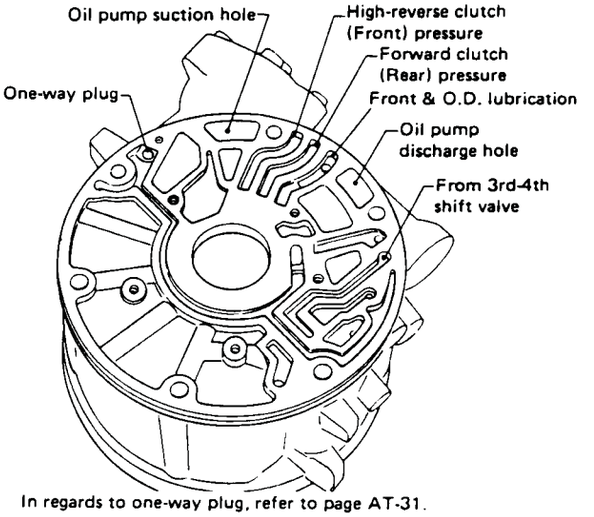
Front face side



Lower face side



OIL CHANNELS IN O.D. CASE

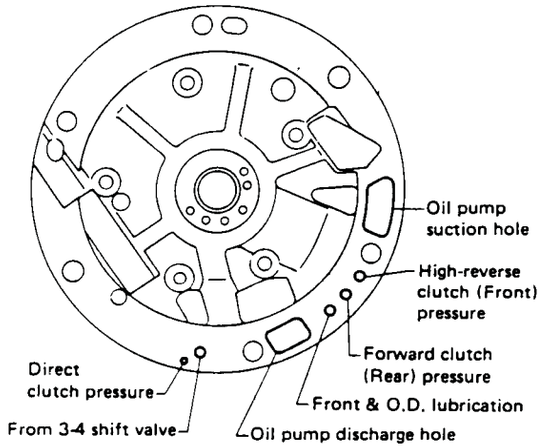


In regards to one-way plug, refer to page AT-31.

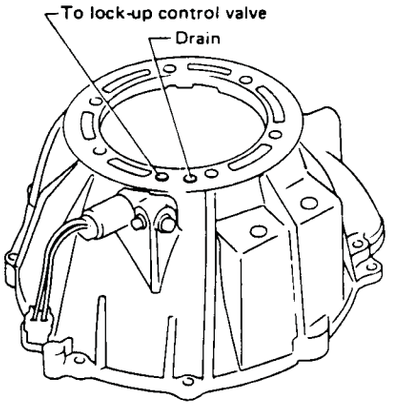
GENERAL SERVICE NOTICE

Oil Channel (Cont'd)

OIL CHANNELS IN DRUM SUPPORT



OIL CHANNELS IN CONVERTER HOUSING (For lockup control)



Mechanical Operation

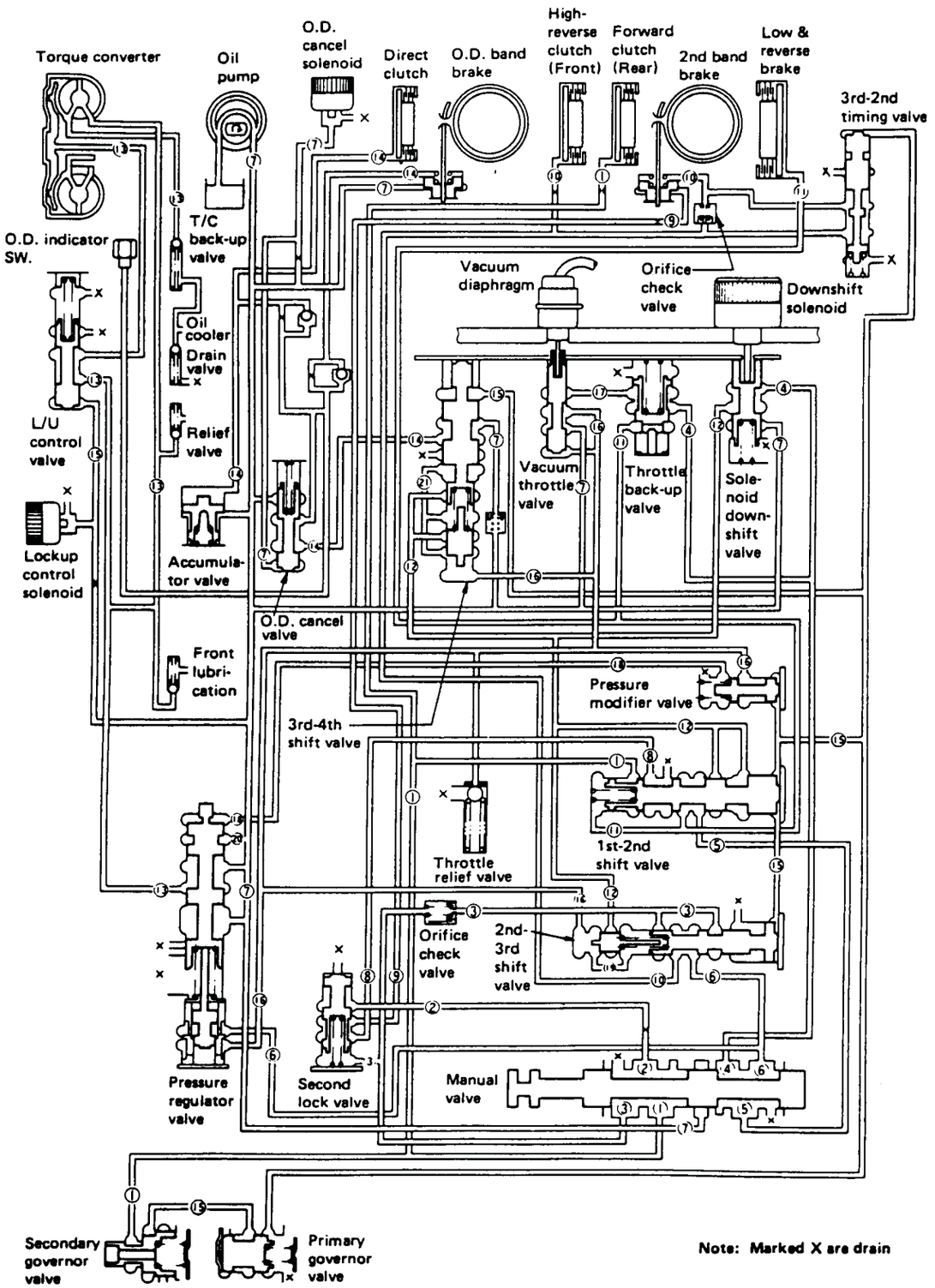
In the E4N71B automatic transmission, each part operates as shown in the following table at each gear select position.

Range		Direct clutch	O.D. band servo		High-reverse clutch (Front)	Forward clutch (Rear)	Low & reverse brake	2nd band servo		One-way clutch	Parking pawl
			Apply	Release				Apply	Release		
Park		ON	(ON)	ON			ON				ON
Reverse		ON	(ON)	ON	ON		ON		ON		
Neutral		ON	(ON)	ON							
D	D_1 (Low)	ON	(ON)	ON		ON				ON	
	D_2 (Second)	ON	(ON)	ON		ON		ON			
	D_3 (Top)	ON	(ON)	ON	ON	ON		(ON)	ON		
	D_4 (O.D.)		ON		ON	ON		(ON)	ON		
2	Second	ON	(ON)	ON		ON		ON			
1	1_2 (Second)	ON	(ON)	ON		ON		ON			
	1_1 (Low)	ON	(ON)	ON		ON	ON			ON	

The low & reverse brake is applied in "1_1" range to prevent free wheeling when coasting and allows engine braking.

GENERAL SERVICE NOTICE

Hydraulic Control Circuits

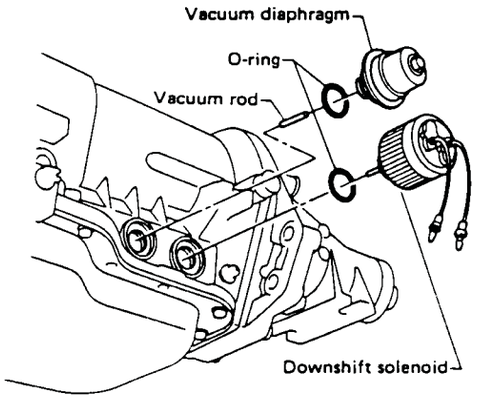


ON-VEHICLE SERVICE

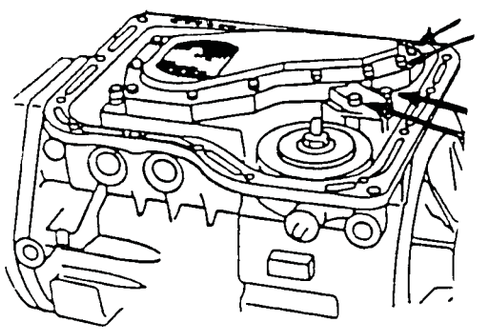
Control Valve

1. Drain fluid by removing oil pan.
2. Remove kickdown solenoid and vacuum diaphragm & rod.

Be careful not to lose vacuum rod.



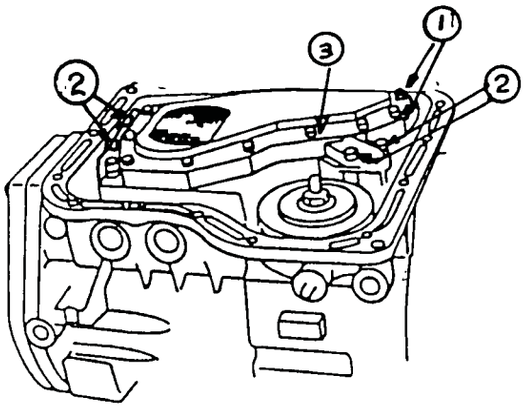
3. Remove control valve assembly.



Be careful not to drop manual valve out of valve body.

4. Disassemble, inspect and assemble control valve assembly. Refer to Control Valve Body.
5. Install control valve assembly.

- **Set manual shaft at Neutral, then align manual plate with groove in manual valve of control valve assembly.**
- **Securing bolts come in 3 different lengths.**



1 40 mm (1.57 in)
2 35 mm (1.38 in)
3 25 mm (0.98 in)

- **After installing control valve to transmission case, make sure that control lever can be moved to all positions.**

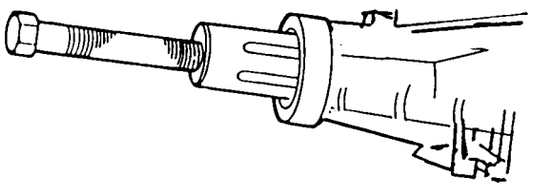
6. Install kickdown solenoid and vacuum diaphragm & rod.

Make sure that vacuum diaphragm rod does not interfere with side plate of control valve.

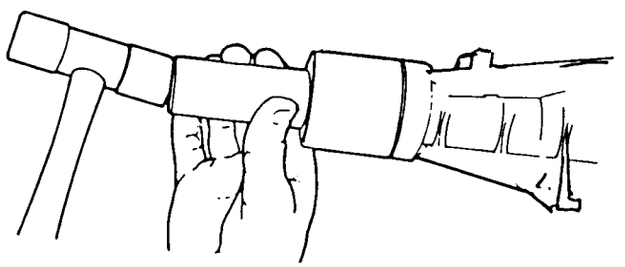
ON-VEHICLE SERVICE

Extension Oil Seal Replacement

1. Remove oil seal.



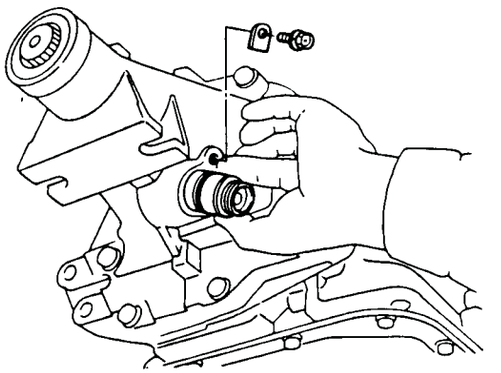
2. Apply coat of A.T.F. to oil seal surface, then drive new oil seal into place.



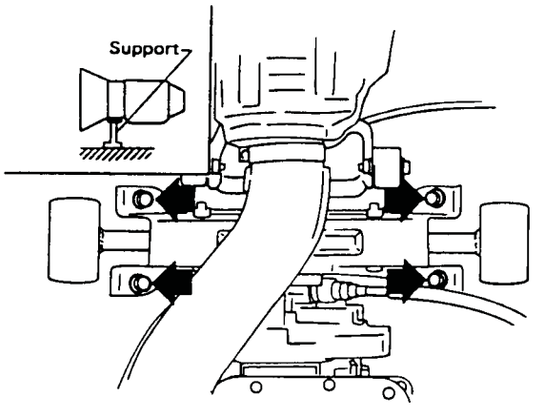
3. Coat sealing lips with vaseline, then install propeller shaft.

Parking Component

1. Remove oil pan.
2. Remove propeller shaft.
3. Remove speedometer pinion.



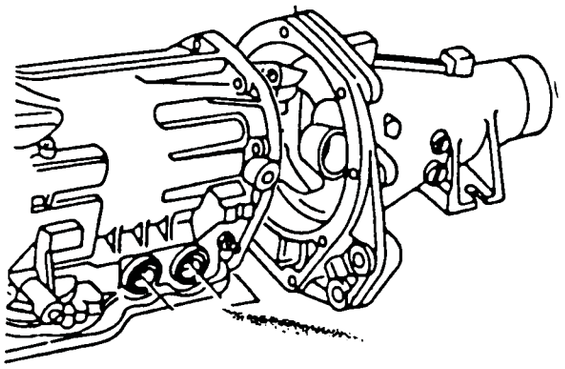
4. Support transmission with a jack, then remove rear mounting bolts.



ON-VEHICLE SERVICE

Parking Component (Cont'd)

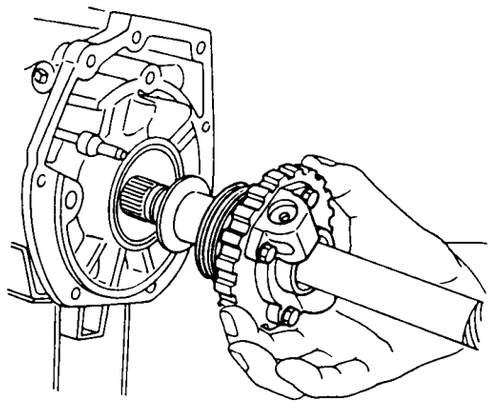
5. Remove rear extension bolts, then draw out rear extension with rear mounting.



6. Remove control valve assembly.
7. Inspect and repair parking components. Check component parts for wear or damage.

Governor Valve Assembly

1. Drain oil by removing oil pan.
2. Remove rear extension with rear mounting.
3. Remove governor valve assembly.

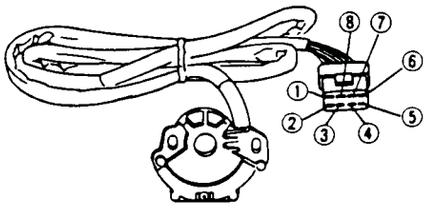


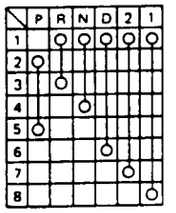
4. Inspect and repair governor valve assembly. Refer to Governor for inspection.

Inhibitor Switch Adjustment

Disconnect harness at connector, then remove inhibitor switch.

- Check continuity at "N", "P" and "R" ranges.

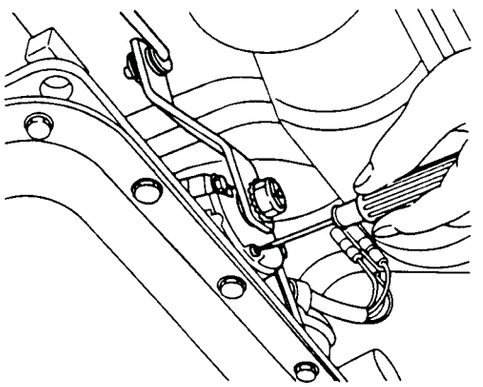




- With control lever held in "Neutral", turn manual lever an equal amount in both directions to see if current flow ranges are nearly the same. (Current normally begins to flow before manual lever reaches a angle of 1.5° in either direction.)
  If current flows outside normal range, or if normal flow range is out of specifications, properly adjust inhibitor switch.

Adjust inhibitor switch as follows:

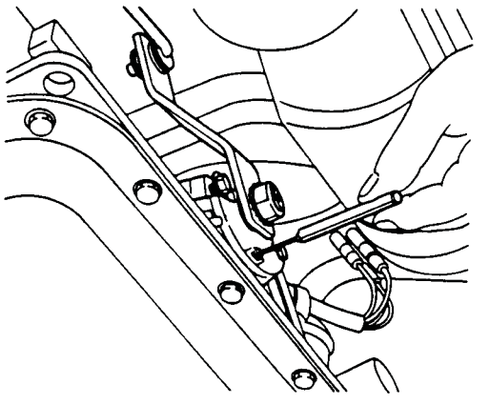
1. Place the manual valve in Neutral (vertical position).
2. Remove the screw.



ON-VEHICLE SERVICE

Inhibitor Switch Adjustment (Cont'd)

3. Loosen the attaching bolts.
4. Using an aligning pin, [2.0 mm (0.079 in) dia.] move the switch until the pin falls into the hole in the rotor.



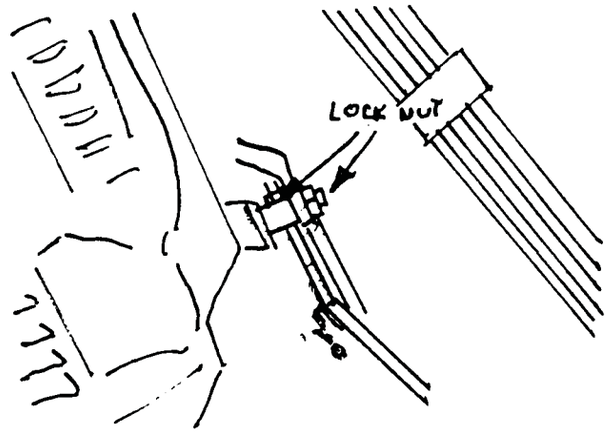
5. Tighten the attaching bolts equally.
6. Recheck for continuity. If faulty, replace the switch.

Manual Linkage Adjustment

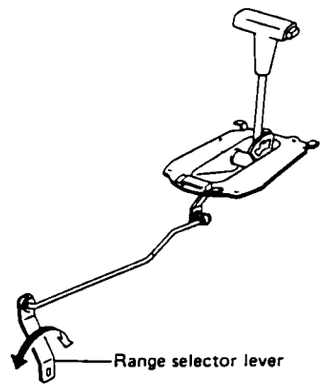
Move the shift lever from the "P" range to "1" range. You should be able to feel the detents in each range.

If the detents cannot be felt or the pointer indicating the range is improperly aligned, the linkage needs adjustment.

1. Place shift lever in "N" range.
2. Loosen locknuts.



3. Move range selector lever to the "N" range.

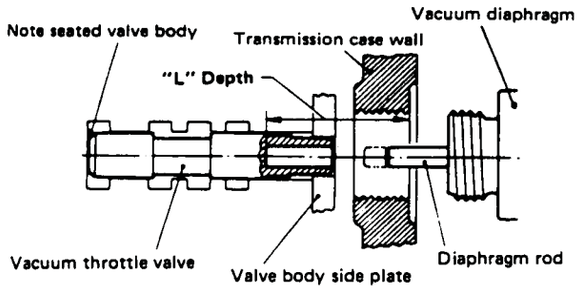


4. Tighten lock nuts when floor control lever is in "N" range and pushed against the "P" range side.
5. Move control lever from "P" range to "1" range. Make sure that control lever can move smoothly and without any sliding noise.

ON-VEHICLE SERVICE

Vacuum Diaphragm Rod Adjustment

1. Remove diaphragm from transmission case.
2. Using a depth gauge, measure depth "L". Be sure vacuum throttle valve is pushed into valve body as far as possible.
3. Check "L" depth with chart below and select proper length rod.



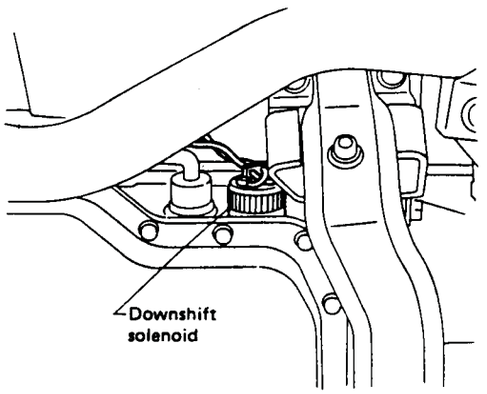
Vacuum diaphragm rod selection

Measured depth "L" mm (in)	Rod length mm (in)	Part number
Under 25.55 (1.0059)	29.0 (1.142)	31932 - X0103
25.65 - 26.05 (1.0098 - 1.0256)	29.5 (1.161)	31932 - X0104
26.15 - 26.55 (1.0295 - 1.0453)	30.0 (1.181)	31932 - X0100
26.65 - 27.05 (1.0492 - 1.0650)	30.5 (1.201)	31932 - X0102
Over 27.15 (1.0689)	31.0 (1.220)	31932 - X0101

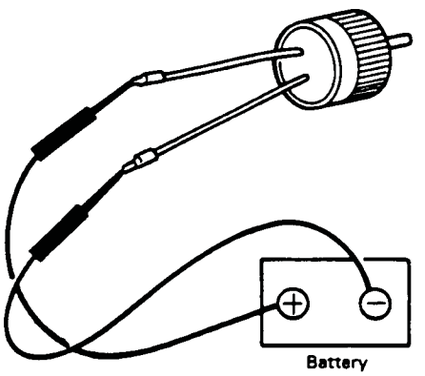
Downshift Solenoid

1. Remove downshift solenoid and O-ring.

Catch oil dropping out of the hole.



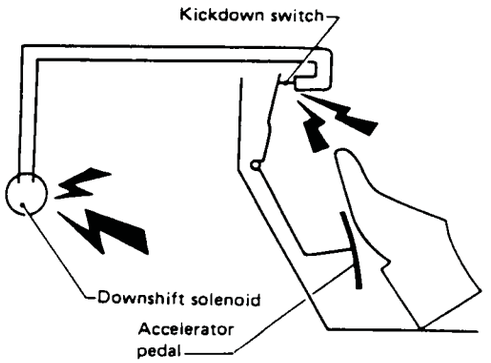
2. Check to verify that downshift solenoid is operating properly. If faulty, replace it with a new one.



ON-VEHICLE SERVICE

Kickdown Switch Adjustment

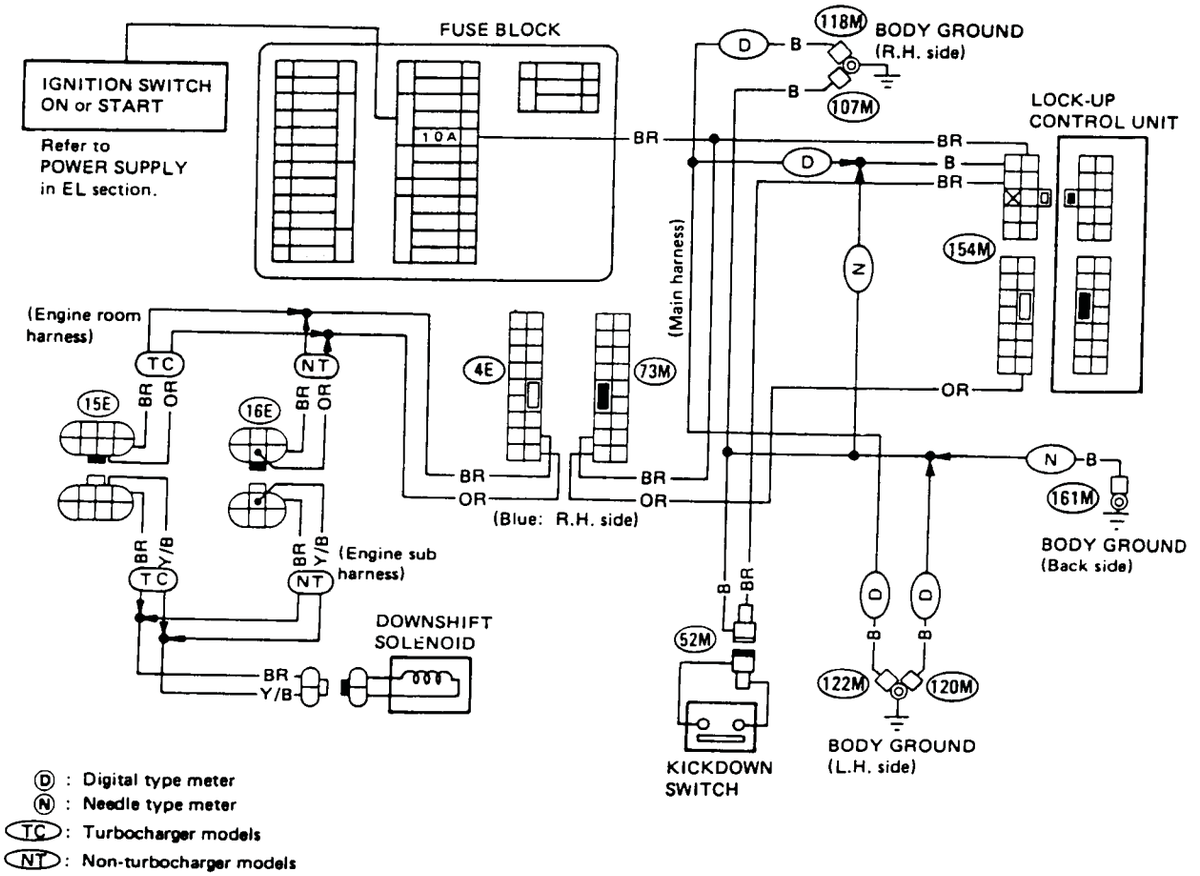
When the pedal is fully depressed, a click can be heard just before the pedal bottoms out. If the click is not heard, loosen the locknut and extend the switch until the pedal lever makes contact with the switch and the switch clicks.



Do not allow the switch to make contact too soon. This would cause the transmission to downshift on part throttle.

DIAGNOSIS:

Switch can be heard clicking, and the transmission still does not kickdown:
Check the continuity of the switch. Also check for available current.
The vehicle upshifts at approximately 55 (1st to 2nd) and 90 km/h (2nd to 3rd) (34 and 56 MPH) only: The kickdown switch may be internally shorted. (When the switch is shorted, there is continuity through the switch in any position).

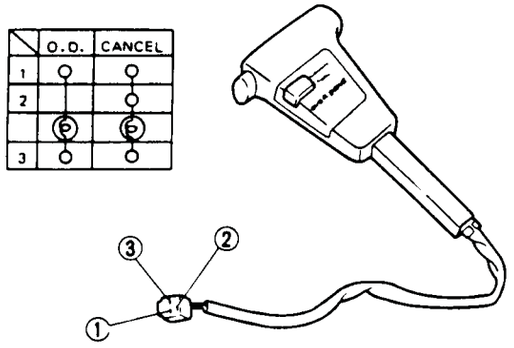


ON-VEHICLE SERVICE

Overdrive and Lockup Control

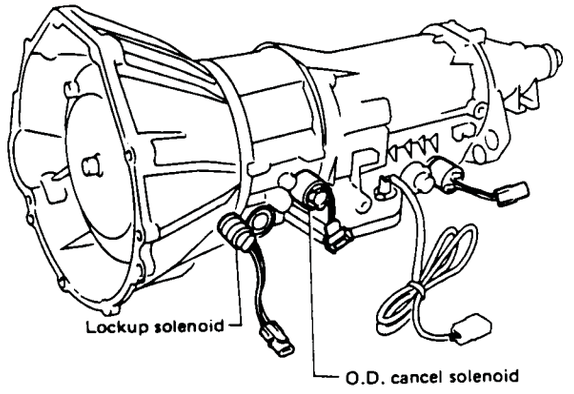
O.D. CONTROL SWITCH & O.D. INDICATOR LAMP

Inspection



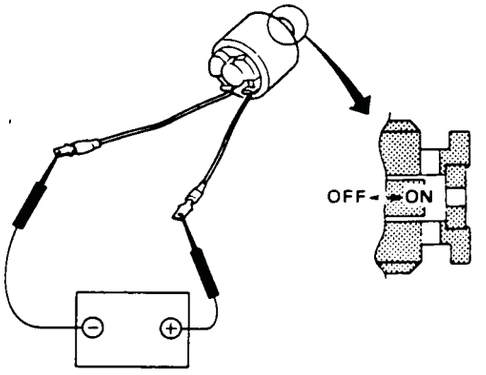
O.D. CANCEL SOLENOID AND LOCKUP SOLENOID

Location



Inspection

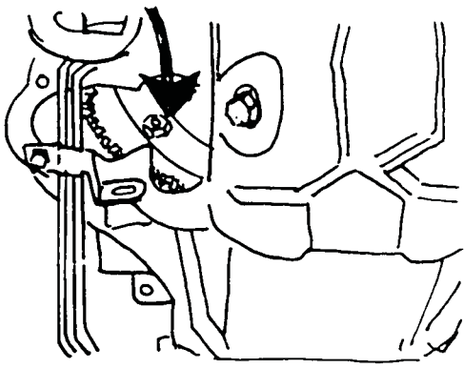
Confirm that clicking sound is heard when power is applied.



REMOVAL AND INSTALLATION

Removal

- Remove bolts securing torque converter to drive plate.



a. Remove those bolts turning crank shaft.
b. Before removing torque converter, inscribe matching marks on two parts so that they may be replaced in their original positions during assembly.

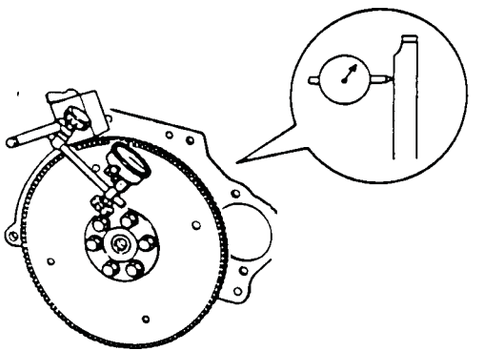
- Plug up openings such as oil charging pipe, etc.

CAUTION:
Take care when dismounting transmission not to strike any adjacent parts.

Installation

- Drive plate runout

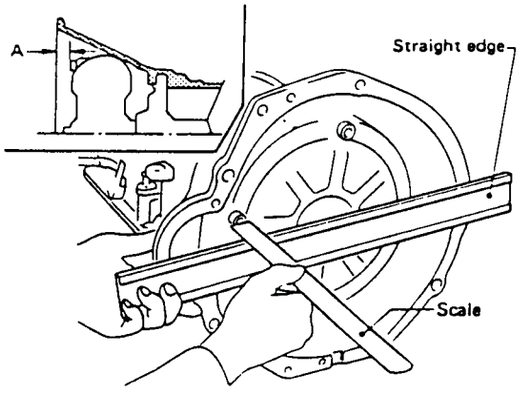
Maximum allowable runout:
0.5 mm (0.020 in)



If this runout is out of allowance, replace drive plate and ring gear.

- When connecting torque converter to transmission, measure distance "A" to be certain that they are correctly assembled.

Distance "A":
More than 35 mm (1.38 in)



- Install converter to drive plate.

a. Align matching marks painted across both parts during disassembly.
b. Before installing torque converter securing bolts, apply locking sealer to threads of bolts.

- After converter is installed, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.

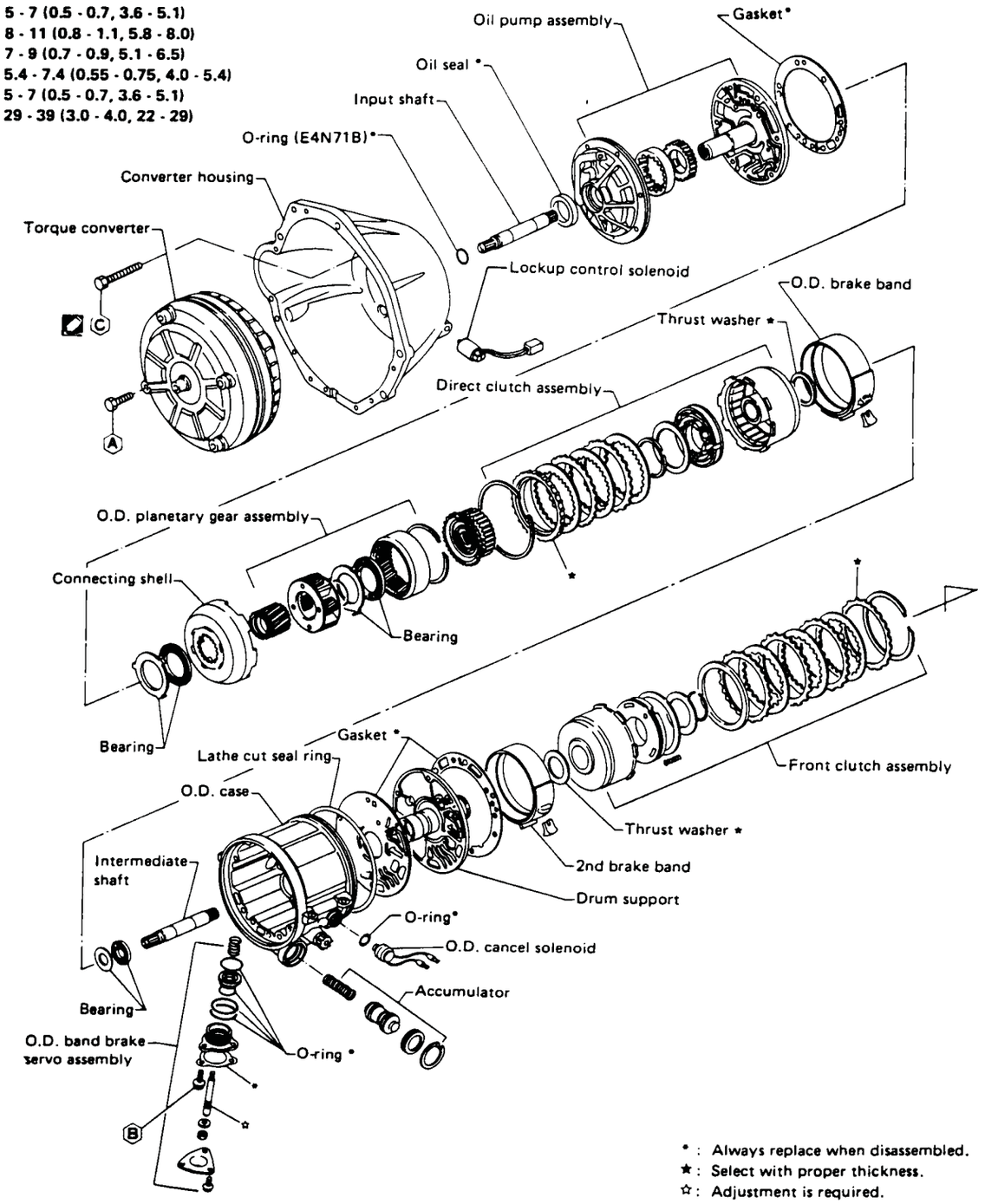
REMOVAL AND INSTALLATION

Installation (Cont'd)

- Check inhibitor switch for operation.
- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Check to be sure that line pressure is correct. To do this, refer to Line Pressure Test.
- Perform stall test.

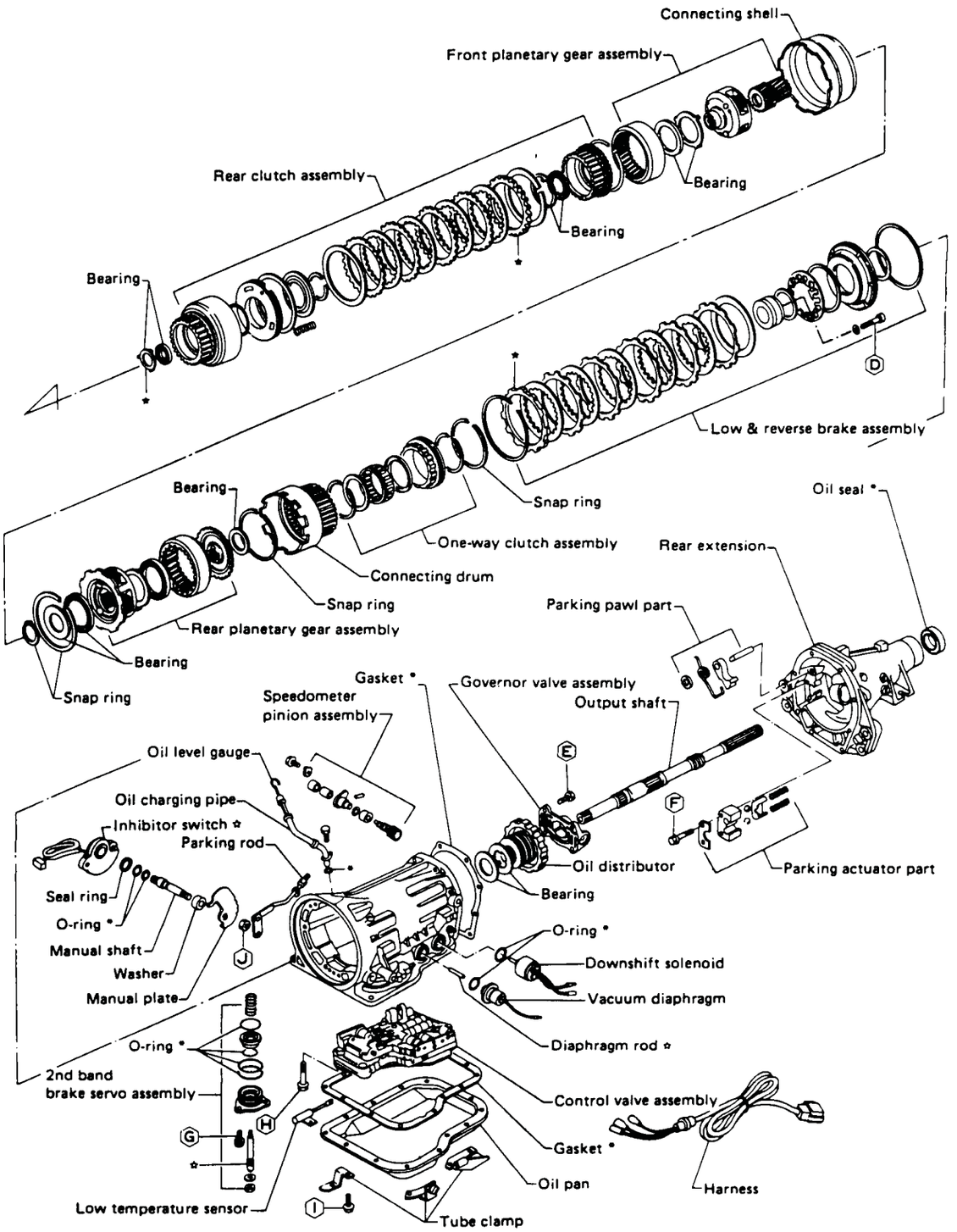
MAJOR OVERHAUL

: N·m (kg-m, ft-lb)
Ⓐ 39 - 49 (4.0 - 5.0, 29 - 36)
Ⓑ 10 - 15 (1.0 - 1.5, 7 - 11)
Ⓒ 44 - 54 (4.5 - 5.5, 33 - 40)
Ⓓ 13 - 18 (1.3 - 1.8, 9 - 13)
Ⓔ 5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Ⓕ 8 - 11 (0.8 - 1.1, 5.8 - 8.0)
Ⓖ 7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Ⓗ 5.4 - 7.4 (0.55 - 0.75, 4.0 - 5.4)
Ⓘ 5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Ⓙ 29 - 39 (3.0 - 4.0, 22 - 29)



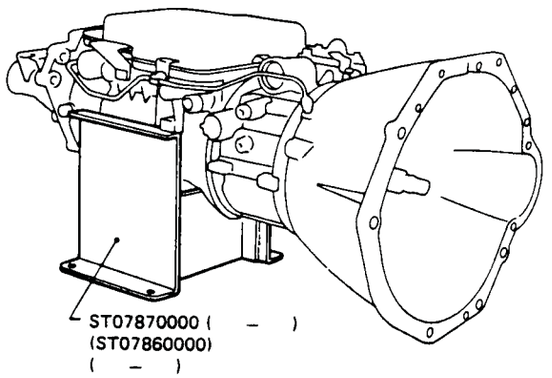
* : Always replace when disassembled.
★ : Select with proper thickness.
☆ : Adjustment is required.

MAJOR OVERHAUL

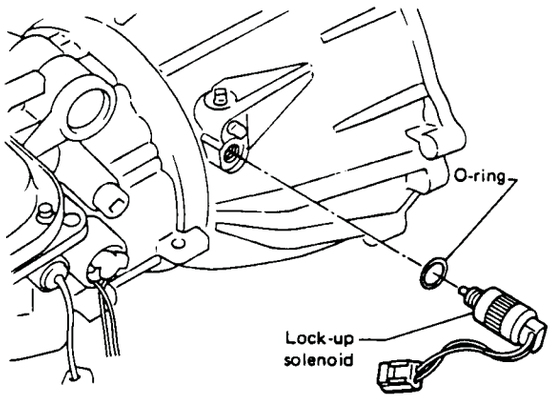


DISASSEMBLY

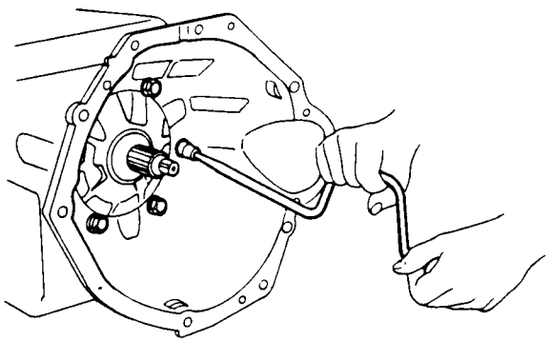
1. Remove torque converter, drain A.T.F. through end of rear extension, and place transmission on Tool.



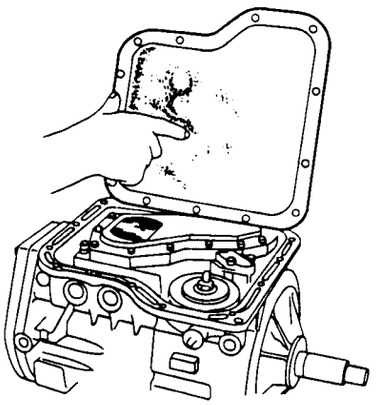
2. Remove lock-up solenoid.



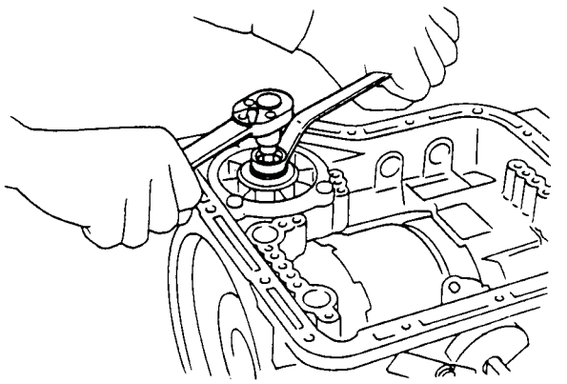
3. Remove converter housing.



4. Remove oil pan and inspect its contents. An analysis of any foreign matter can indicate the types of problems to look for. If the fluid is very dark, smells burnt, or contains foreign particles, the frictional material (clutches, band.) may need replacement. A tacky film that will not wipe clean indicates varnish build up which can cause valves, servo, and clutches to stick and may inhibit pump pressure.

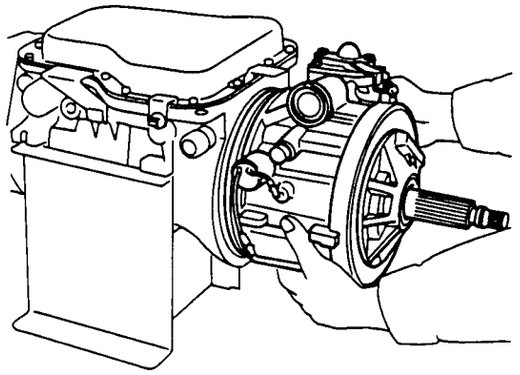


5. Loosen 2nd band servo piston stem lock nut and tighten piston stem.

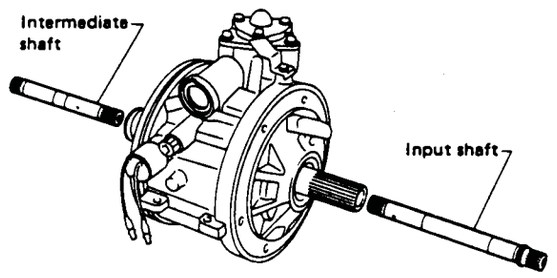


DISASSEMBLY

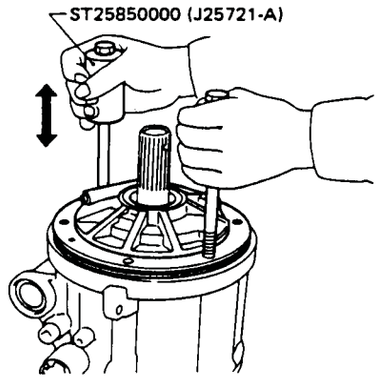
6. Remove O.D. component assembly, then remove high-reverse clutch (Front) thrust washer and needle bearing & race.



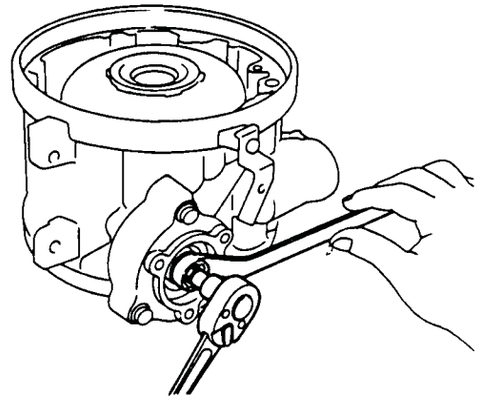
7. Draw out input shaft and intermediate shaft.



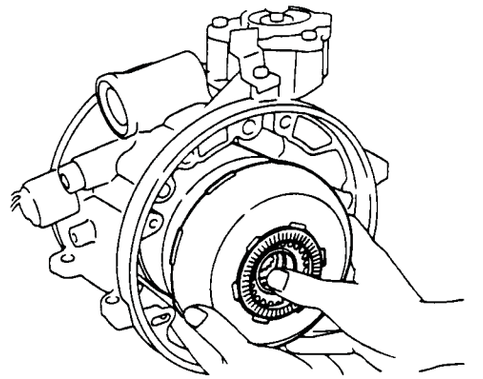
8. Attach Tool to pump and remove pump.



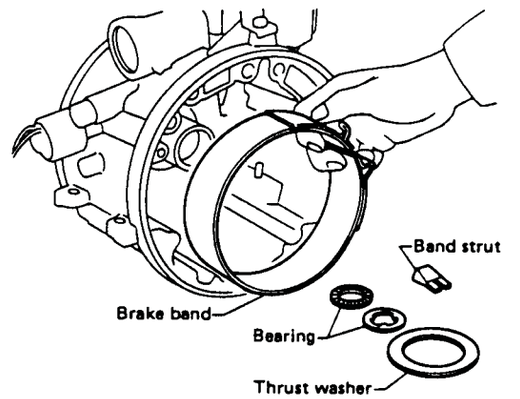
9. Remove O.D. servo cover, then loosen O.D. band servo piston stem.



10. Remove O.D. pack (O.D. planetary gear & direct clutch assembly).

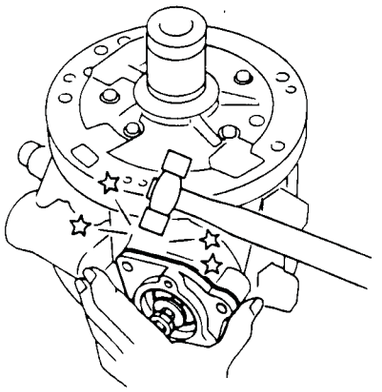


11. Remove needle bearing & race and direct clutch thrust washer, then remove O.D. brake band & strut.

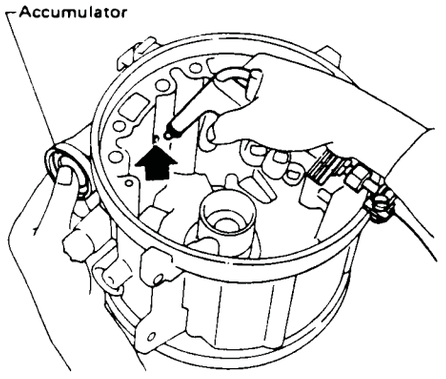


DISASSEMBLY

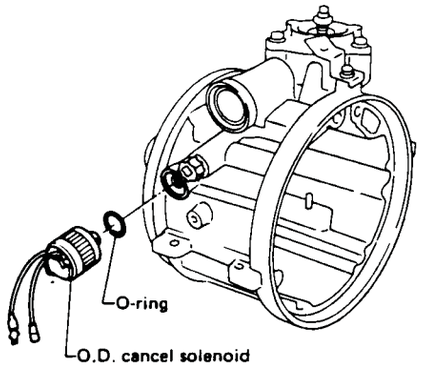
12. Remove O.D. servo assembly by lightly tapping retainer.



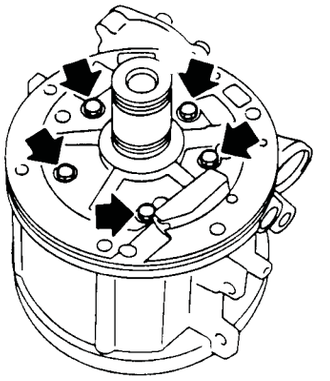
13. Remove accumulator snap ring, then apply pressure to remove accumulator plug, piston and spring.



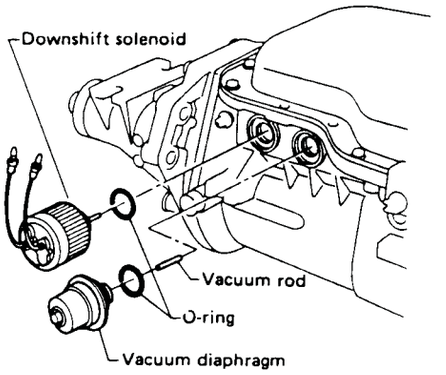
14. Remove O.D. cancel solenoid and O-ring.



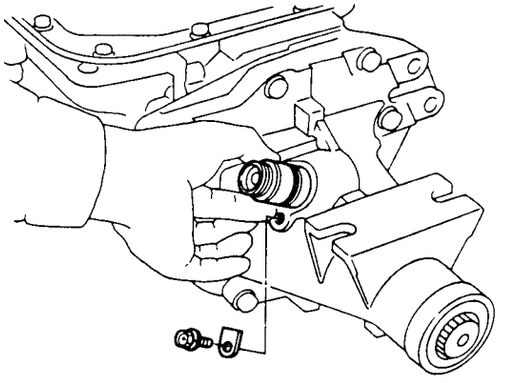
15. Remove drum support.



16. Remove downshift solenoid, vacuum diaphragm & rod and O-rings.

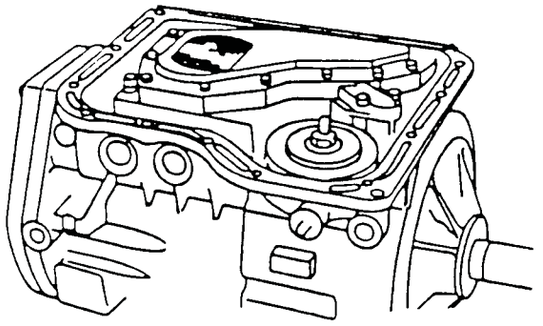


17. Remove speedometer pinion.

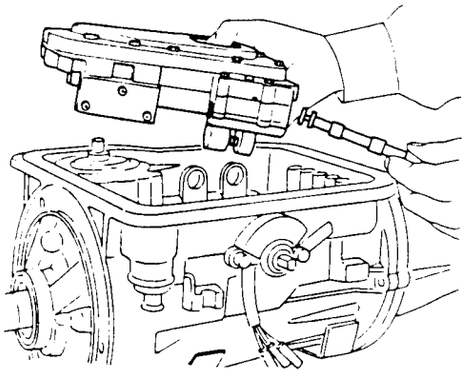


DISASSEMBLY

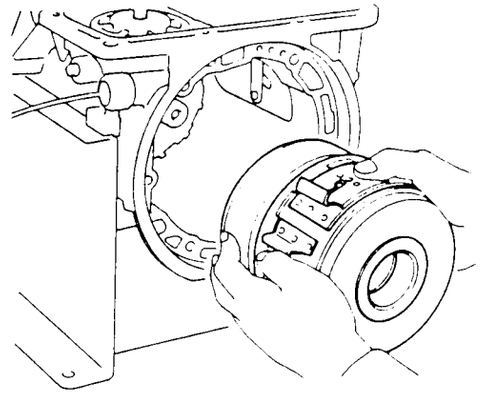
18. Remove control valve body.



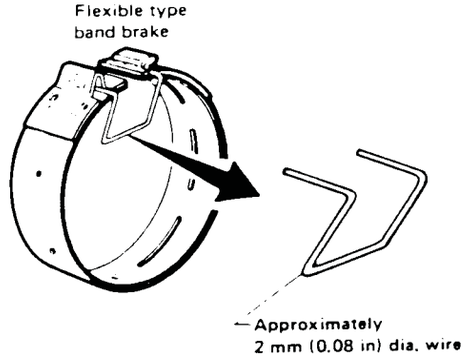
Remove manual valve from valve body as a precaution, to prevent valve from dropping out accidentally.



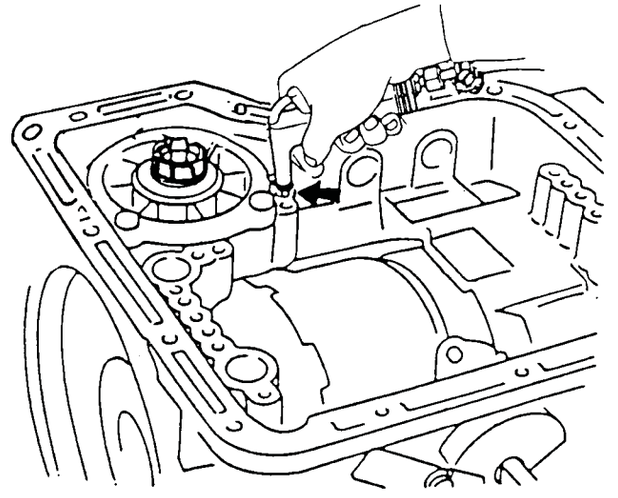
19. Remove 2nd brake band strut. Brake band and clutch & planetary gear pack [including high-reverse clutch (Front), forward clutch (Rear) and front planetary gear] may be removed together.



To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. Before removing the brake band, always secure it with a clip as shown in the figure below.
Leave the clip in position after removing the brake band.

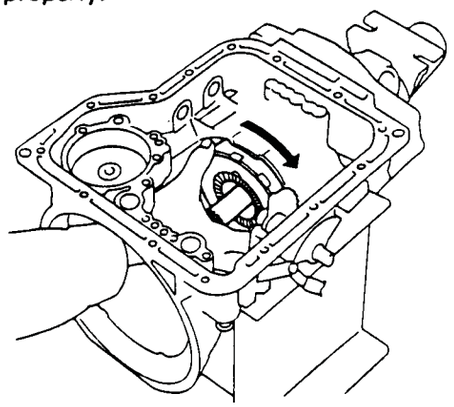


20. Remove 2nd band servo retaining bolts. Apply pressure to remove 2nd band servo.

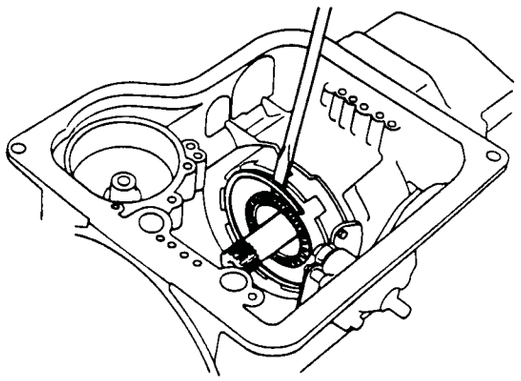


DISASSEMBLY

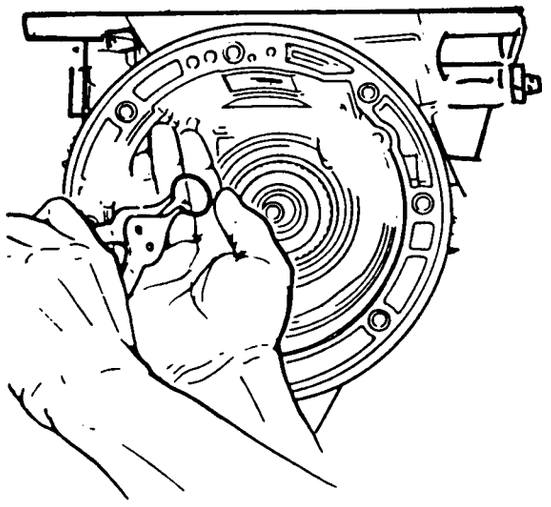
21. Check one-way clutch to see if it operates properly.



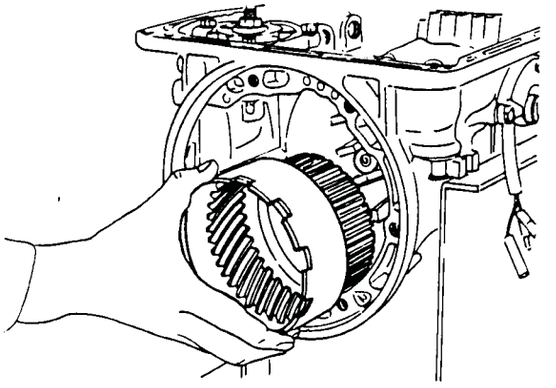
22. Remove rear planetary carrier snap ring and rear planetary carrier.



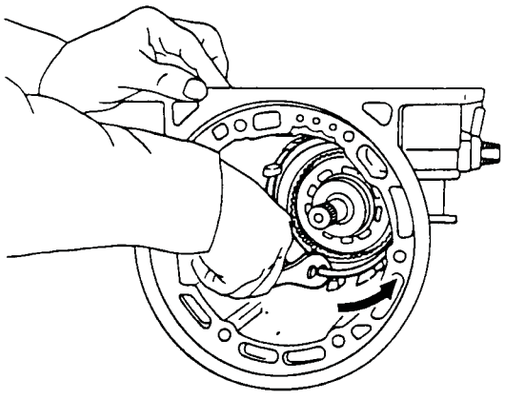
23. Remove output shaft snap ring.



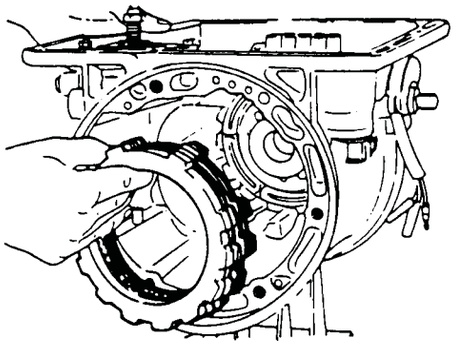
24. Remove connecting drum with internal gear.



25. Pry off one end of snap ring with a screwdriver. Remove snap ring from low and reverse brake assembly while applying plier force in direction of arrow.



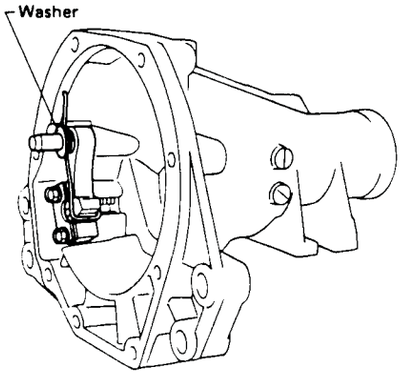
26. Remove low and reverse brake clutch assembly.



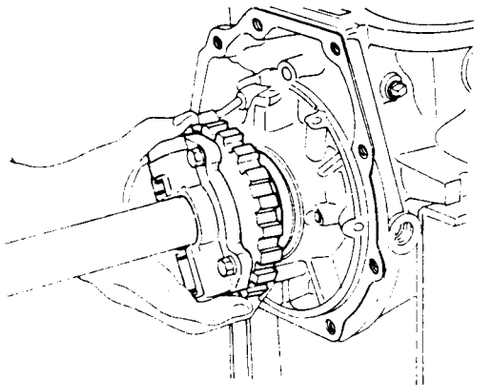
DISASSEMBLY

27. Remove rear extension.

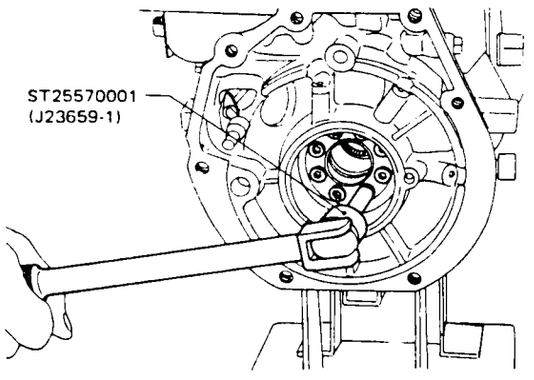
Be careful not to lose retainer washer.



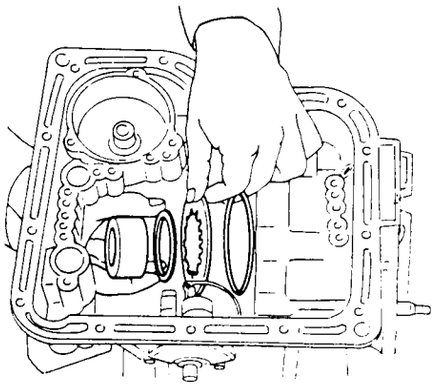
28. Remove output shaft with governor.



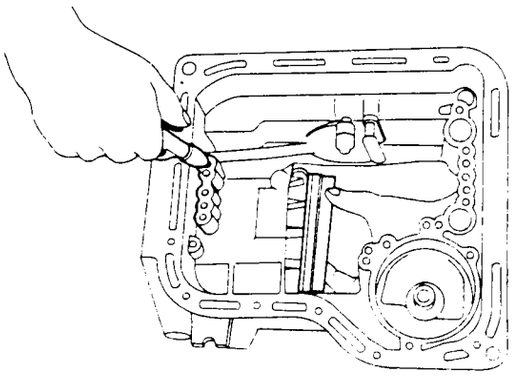
29. Remove governor thrust washer and needle bearing.
    Remove one-way clutch inner race attaching hex-head slotted bolts using Tool.



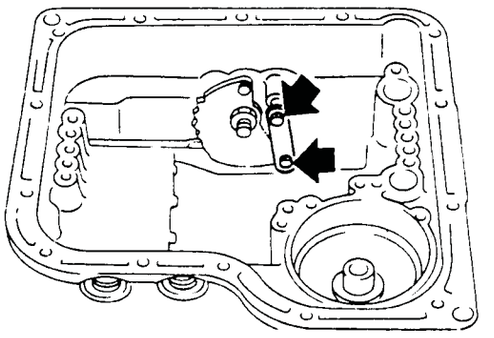
30. Remove one-way clutch inner race, return thrust washer, low and reverse return spring, and spring thrust ring.



31. Apply air pressure to remove low and reverse brake piston.



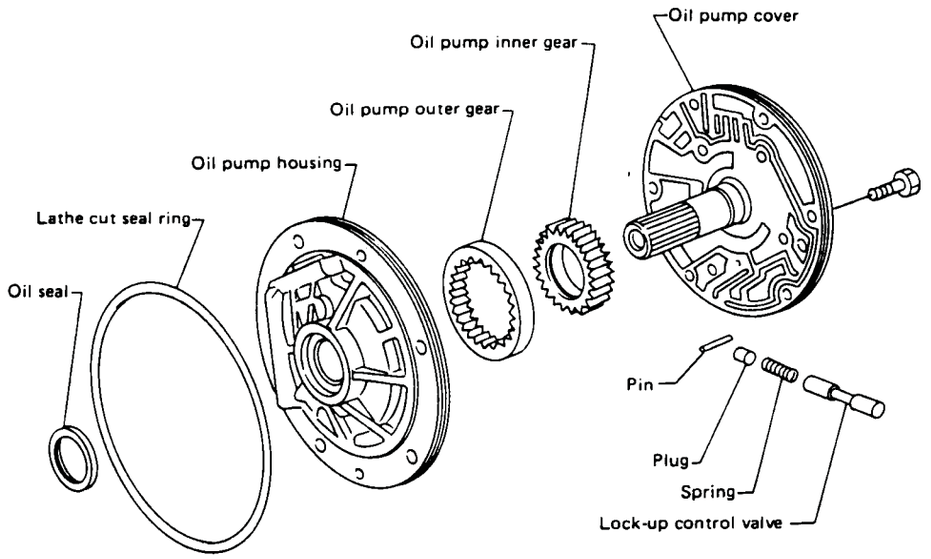
32. Remove snap ring, then remove lock nut, manual plate and parking rod.



33. Remove inhibitor switch and manual shaft.
34. Remove O.D. indicator switch and O-ring.

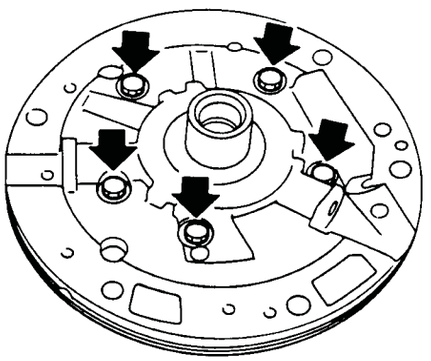
REPAIR FOR COMPONENT PARTS

Oil Pump

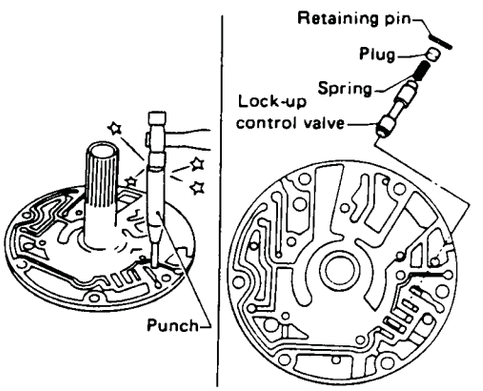


DISASSEMBLY

1. Remove pump cover from pump housing.



2. Stake off retaining pin with a punch [outer dia. 1.5 to 1.8 mm (0.059 to 0.071 in)], then remove lock-up control valve and spring.



INSPECTION

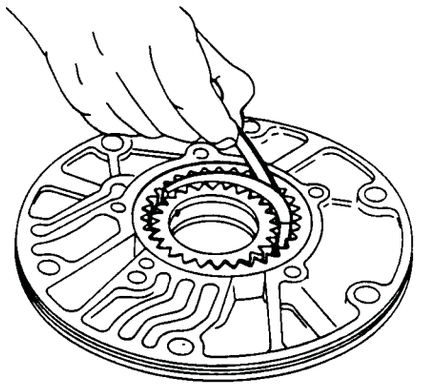
1. Inspect pump body, bushing and pump shaft, for wear.
2. Inspect gears, lock-up control valve, spring and all internal surfaces for damage and visible wear.

REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

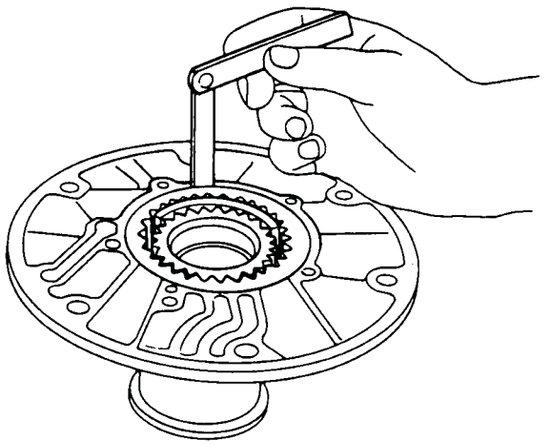
3. Measure clearance between outer gear and crescent.

   Standard clearance:
   0.14 - 0.21 mm (0.0055 - 0.0083 in)
   Wear limit:
   0.25 mm (0.0098 in)



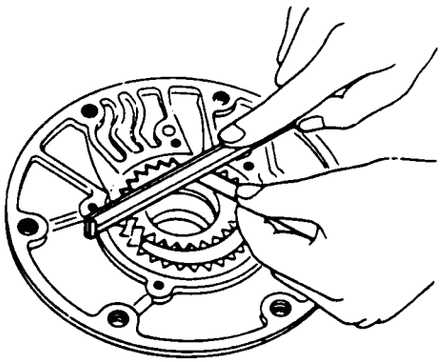
4. Measure clearance between outer gear and pump housing.

   Standard clearance:
   0.05 - 0.20 mm (0.0020 - 0.0079 in)
   Wear limit:
   0.25 mm (0.0098 in)



5. Measure clearance between gears and pump cover with a feeler gauge and straight edge.

   Standard clearance:
   0.02 - 0.04 mm (0.0008 - 0.0016 in)
   Wear limit:
   0.08 mm (0.0031 in)

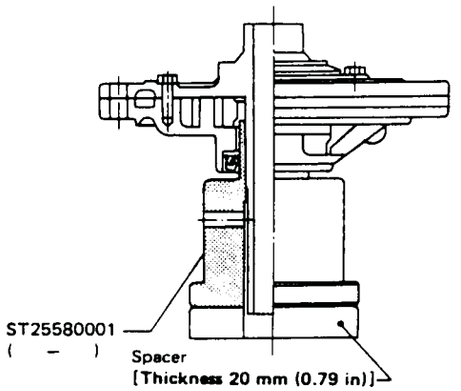


REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

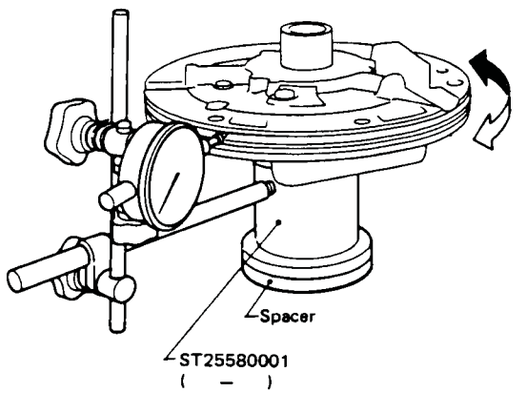
ASSEMBLY

1. Install lock-up control valve and spring into oil pump cover, then tap new retaining pin.
2. Mount pump housing in Tool and suitable spacer. Set up pump housing with inner and outer pump gears on it and install pump cover to pump housing. Temporarily assemble oil pump.



3. Set the cover to within the run-out of the specified total indicator reading.

   Total indicator reading:
   Less than 0.07 mm (0.0028 in)

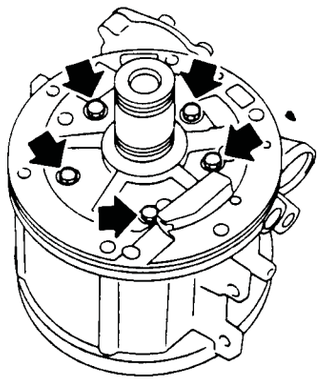


4. Tighten pump securing bolts to the specified torque.
   Recheck run-out.

Drum Support

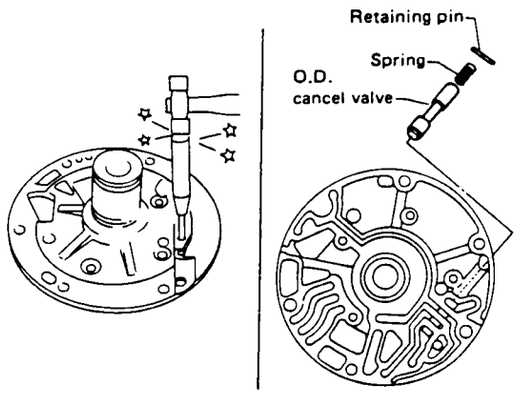
DISASSEMBLY

1. Remove drum support and gasket from O.D. case.



2. Stake off retaining pin with a punch [outer dia. 1.5 to 1.8 mm (0.059 to 0.071 in)], then remove O.D. cancel valve and spring.

Don't stake it off from contacting face side.

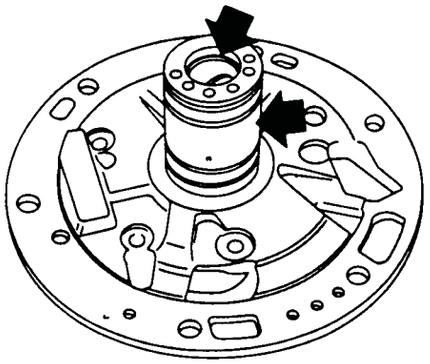


REPAIR FOR COMPONENT PARTS

Drum Support (Cont'd)

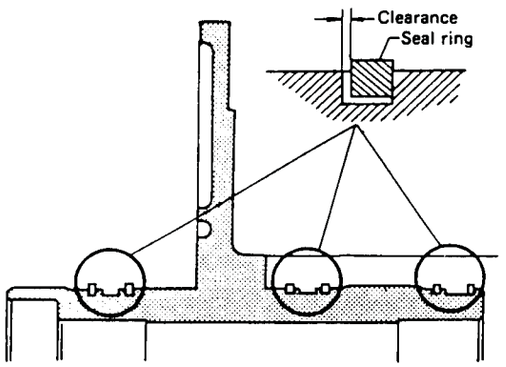
INSPECTION

- Inspect drum support bushing and ring groove areas for wear.



- Measure clearance between seal ring and ring groove.

  Standard clearance:
  0.05 - 0.20 mm (0.0020 - 0.0079 in)
  Wear limit:
  0.20 mm (0.0079 in)



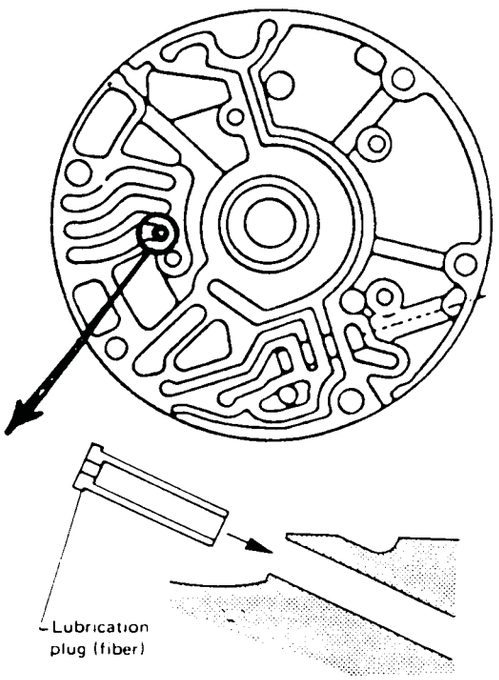
- Inspect O.D. cancel valve & spring and all internal surfaces for damage visible wear.

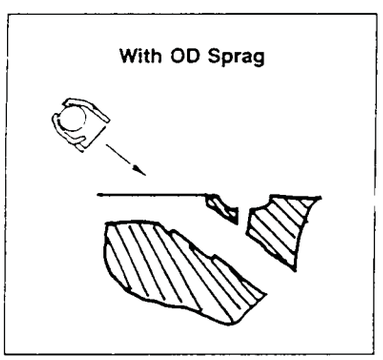
REPAIR FOR COMPONENT PARTS

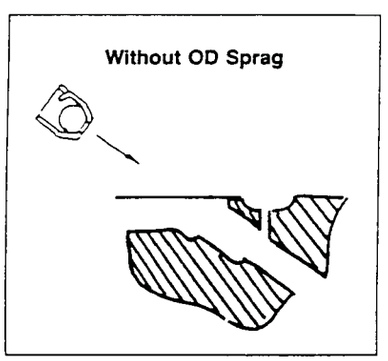
Drum Support (Cont'd)

ASSEMBLY

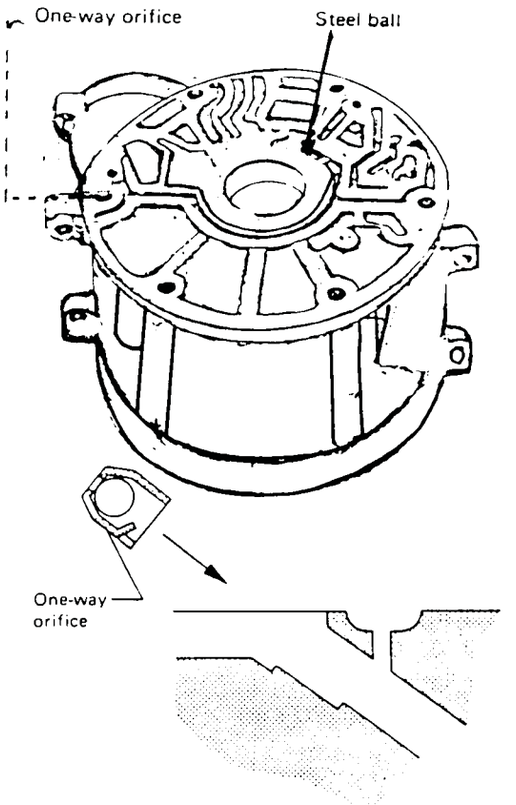
1. Install O.D. cancel valve and spring into drum support, then tap new retaining pins.
2. Install lubrication plug in drum support.



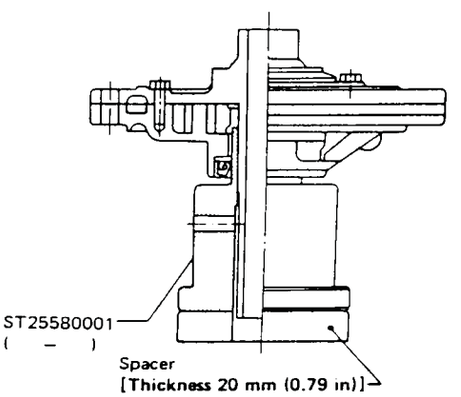




3. Install one-way orifice in O.D. case.



4. Mount oil pump assembly in Tool and suitable spacer.

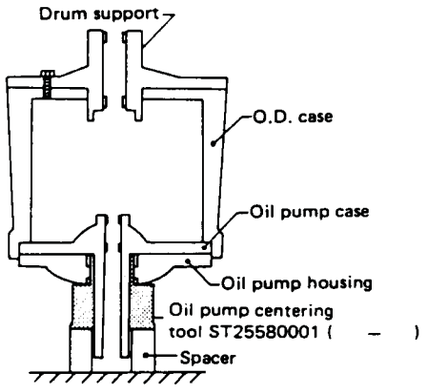


REPAIR FOR COMPONENT PARTS

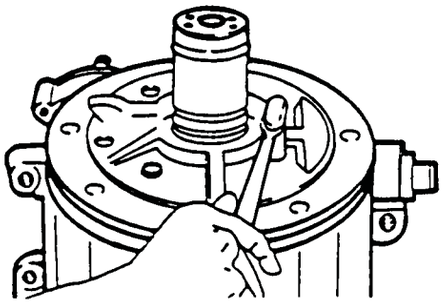
Drum Support (Cont'd)

5. Mount O.D. case, drum support and gasket in oil pump assembly.

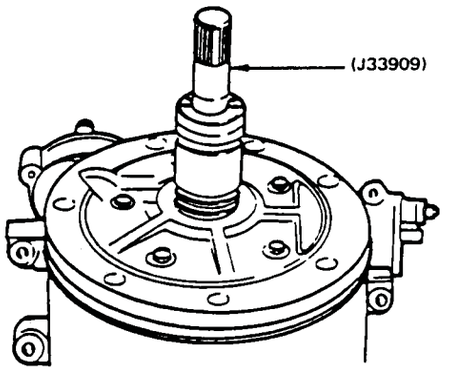
Ensure O.D. case is inserted properly into oil pump assembly.



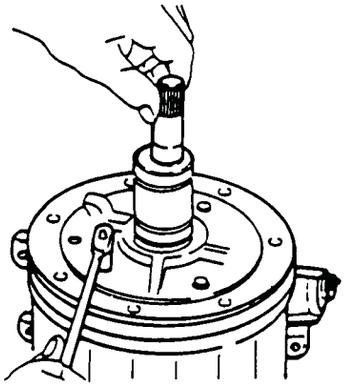
6. Loosen drum support bolts before inserting Tool (J33909).



7. Insert the tapered edge of Tool and install Tool until it completely passes through O.D. case.

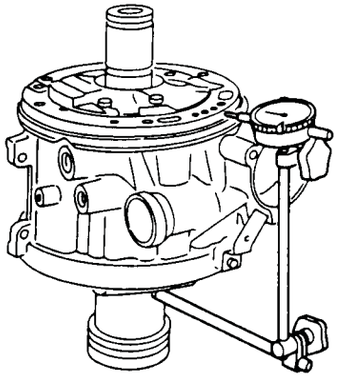


8. Rotate Tool to ensure proper alignment.
9. Tighten drum support bolts while Tool is inside O.D. case.



10. Remove Tool (J33909)
11. Check te drum support is within the run-out of the specified total indicator reading.

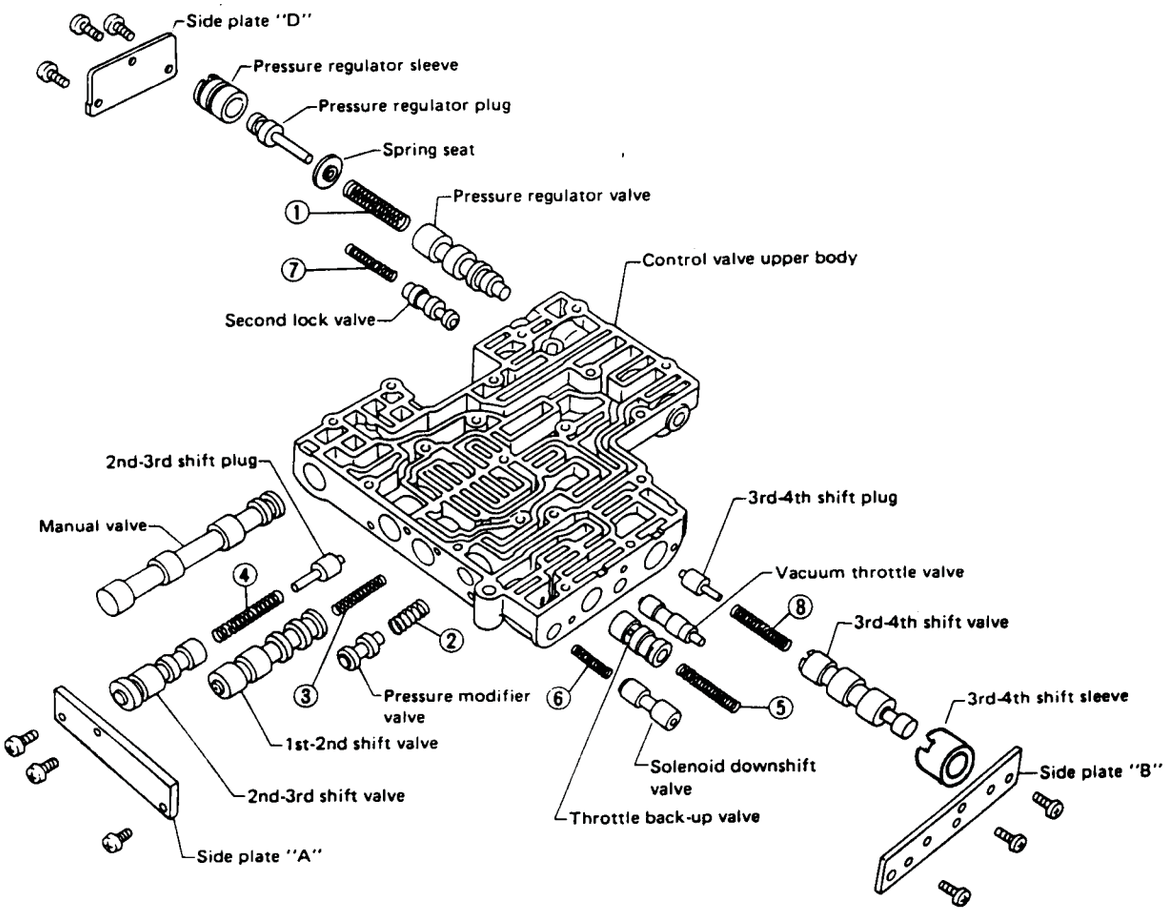
Total indicator reading:
Less than 0.05 mm (0.0020 in)



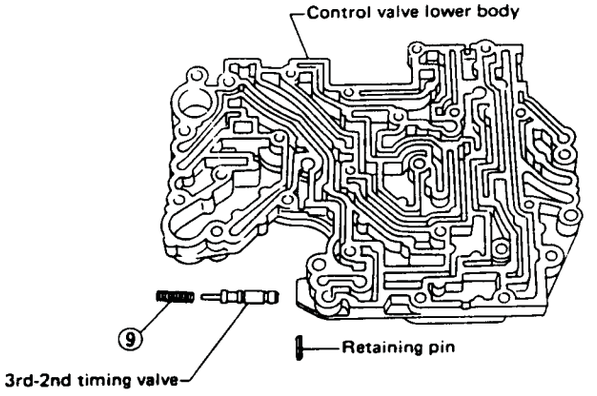
REPAIR FOR COMPONENT PARTS

Control Valve Body

Upper body side



Lower body side

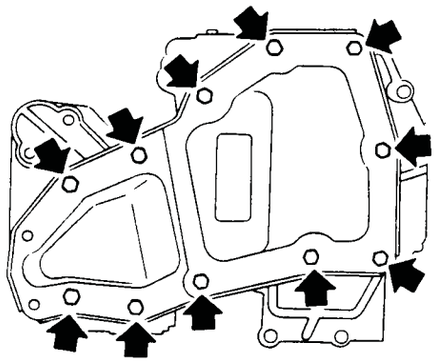


REPAIR FOR COMPONENT PARTS

Control Valve Body (Cont'd)

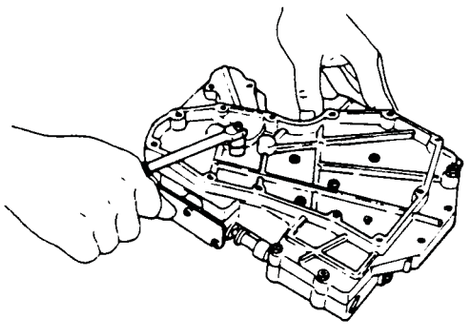
DISASSEMBLY

1. Remove oil strainer.



2. Separate lower body, separator plate and upper body.

Be careful not to scatter or lose orifice check valve, servo orifice check valve, or throttle relief check valve (ball) and related springs.



INSPECTION

A newly manufactured valve body represents precision manufactured valves assembled with close tolerances into precision bores of the valve body. If inspection reveals excessive clearances, 0.03 mm (0.0012 in) or more, between the valves and the valve body bores, replace the entire valve body rather than attempt rework.

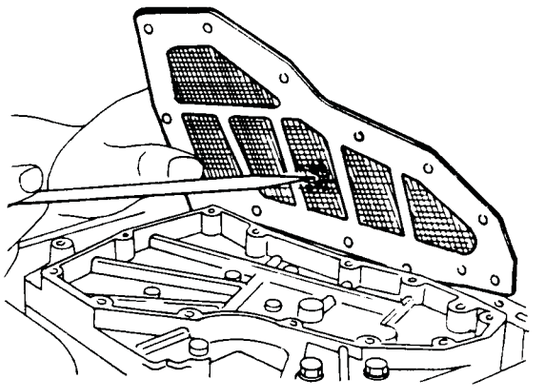
If one or more valves are sticking from varnish deposits or burns resulting from deteriorated oil or overheating, you may be able to clean the valves and valve bodies. Always use crocus cloth, which is a very fine type of cutting material. Never use emery cloth, as it is too coarse and can scratch the valves or valve bores. Scratches can lead to future deposits of varnish or foreign matter.

During cleaning, do not remove the sharp edges of the valve. When edges are rounded or scratched, entry is provided for dirt or foreign matter to work into the sides of the valves and hinder valve movement.

The valves may be cleaned using alcohol or lacquer thinner. The valve bodies can be dip cleaned with a good carburetor cleaner or lacquer thinner. Do not leave valve bodies submerged in carburetor cleaner longer than five minutes. Rinse parts thoroughly and dry.

Lubricate all parts in clean A.T.F. before reassembly.

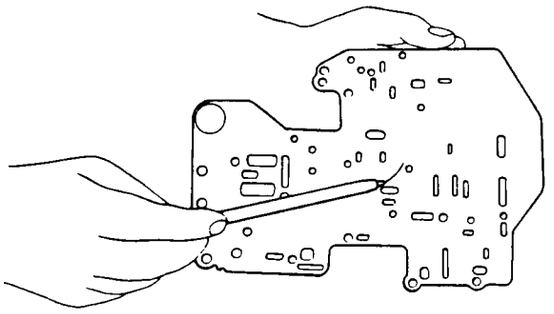
1. Check valves for signs of burning. Replace if beyond clean-up.
2. Check oil strainer for general condition. Replace if necessary.



3. Check separator plate for scratches or damage. Replace if necessary. Scratches or score marks can cause oil to by-pass correct oil passages and result in system malfunction.

REPAIR FOR COMPONENT PARTS

Control Valve Body (Cont'd)



4. Check oil passages in upper and lower valve bodies for varnish deposits, scratches or other damage that would impair valve movement. Check threaded holes and related bolts and screws for stripped threads; replace as needed.
5. Check valve springs for damage. Measure free length of valve springs. If the free length is out of specification, replace it.

Numbers stamped on valve springs listed in table below are the same as those in the figure on page AT-32.

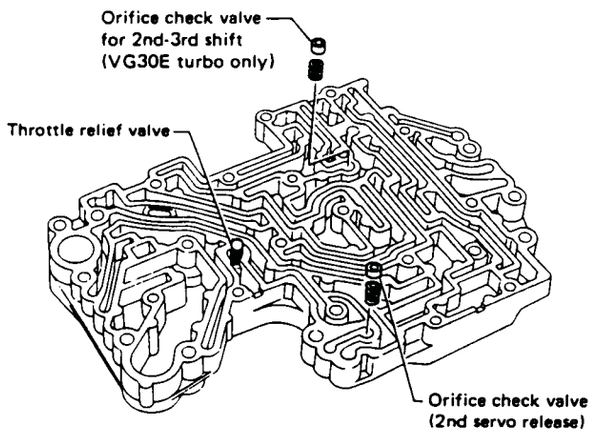
Valve spring		Free length mm (in)
① Pressure regulator valve	VG30E	43.0 (1.693)
	VG30E turbo	38.9 (1.531)
② Pressure modifier valve		18.5 (0.728)
③ 1st- 2nd shift valve	VG30E	32.0 (1.260)
	VG30E turbo	28.3 (1.114)
④ 2nd - 3rd shift valve		41.0 (1.614)
⑤ Throttle back-up valve	VG30E	31.8 (1.252)
	VG30E turbo	36.0 (1.417)
⑥ Solenoid downshift valve		22.0 (0.866)
⑦ Second lock valve		33.5 (1.319)
Throttle relief check valve	VG30E	26.8 (1.055)
	VG30E turbo	24.9 (0.980)
Orifice check valve		15.5 (0.610)
⑧ 3rd - 4th shift valve		30.3 (1.193)
⑨ 3rd - 2nd timing valve	VG30E	22.2 (0.874)
	VG30E turbo	20.7 (0.815)

REPAIR FOR COMPONENT PARTS

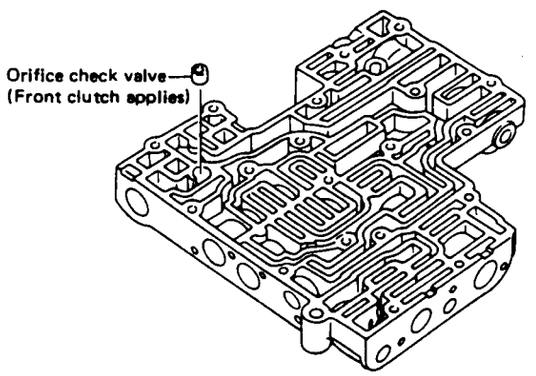
Control Valve Body (Cont'd)

ASSEMBLY

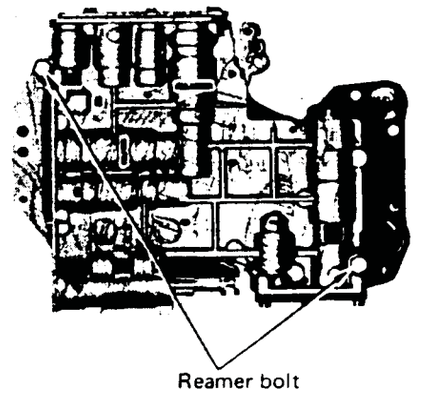
1. Install orifice check valves, valve springs, throttle relief valve spring and steel ball in valve body.



Upper valve body



2. Assemble separator plate and upper valve body on lower valve body, then tighten bolts.



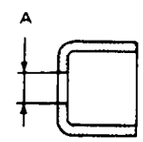
When installing these bolts, first be sure to install the two reamer bolts to their original positions.

3. Install oil strainer.

Orifice check valve

Unit: mm (in)

Orifice check valve		Diameter "A"	Identification
2nd servo release	VG30E	1.5 (0.059)	Gray
	VG30E turbo	1.4 (0.055)	Gray
2nd - 3rd shift (VG30E turbo only)		1.5 (0.059)	Black
Front clutch applies		2.2 (0.087)	Black

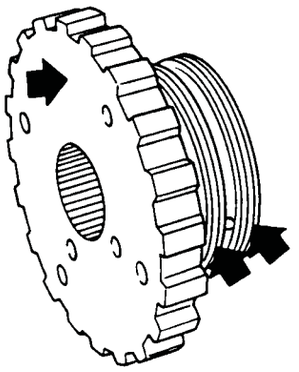


REPAIR FOR COMPONENT PARTS

Oil Distributor

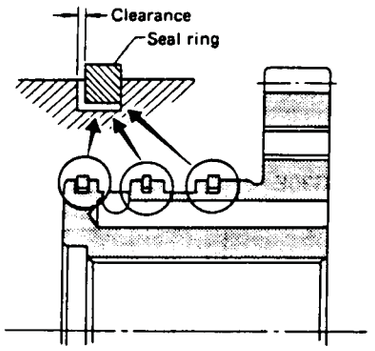
INSPECTION

- Inspect contacting surface of oil distributor and ring groove areas for wear.



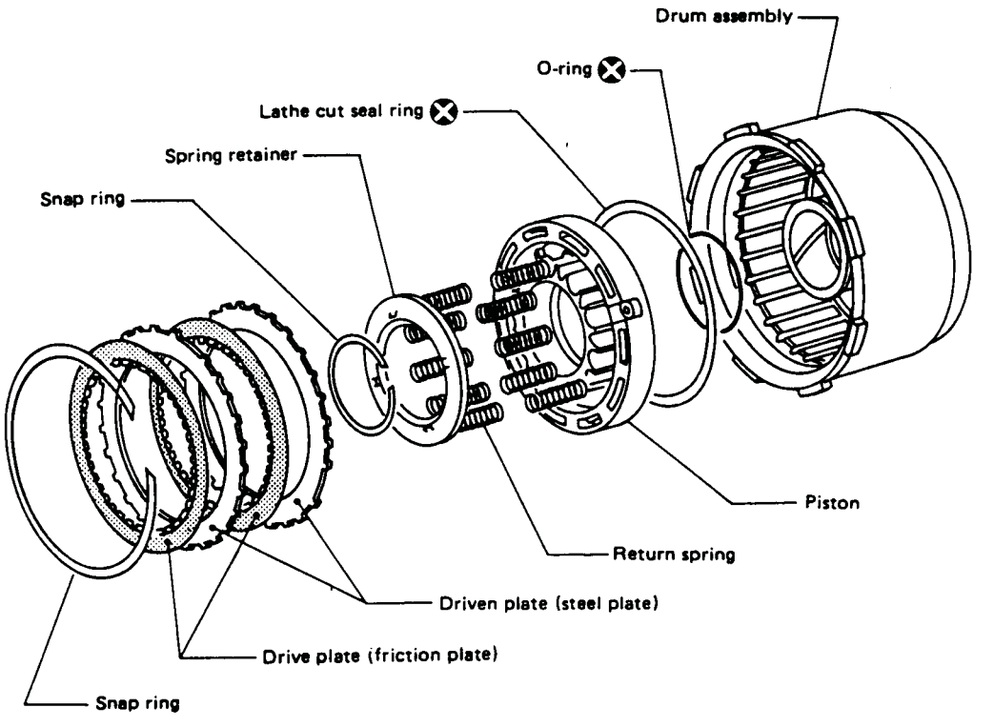
- Measure clearance between seal ring and ring groove.

  Standard clearance:
  0.04 - 0.16 mm (0.0016 - 0.0063 in)
  Wear limit:
  0.16 mm (0.0063 in)



REPAIR FOR COMPONENT PARTS

Direct Clutch

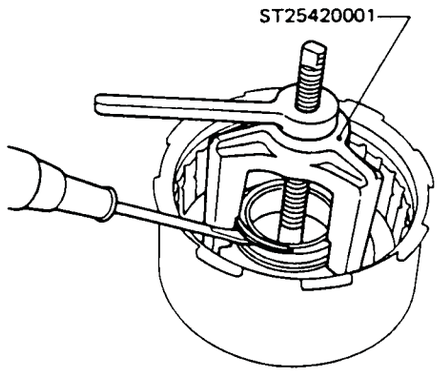


REPAIR FOR COMPONENT PARTS.

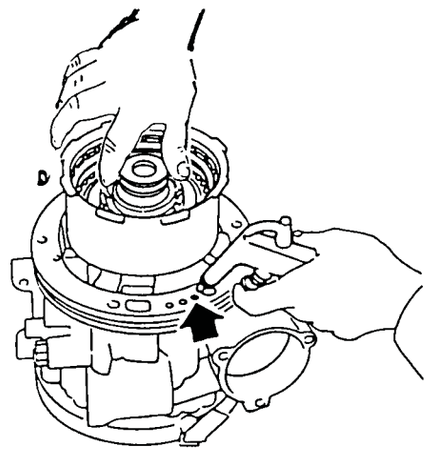
Direct Clutch (Cont'd)

DISASSEMBLY

- Compress clutch springs and remove snap ring from spring retainer with Tool.



- For easy removal of piston from drum, mount clutch on drum support. Use an air gun with a tapered rubber up to carefully apply air pressure to loosen piston from drum.

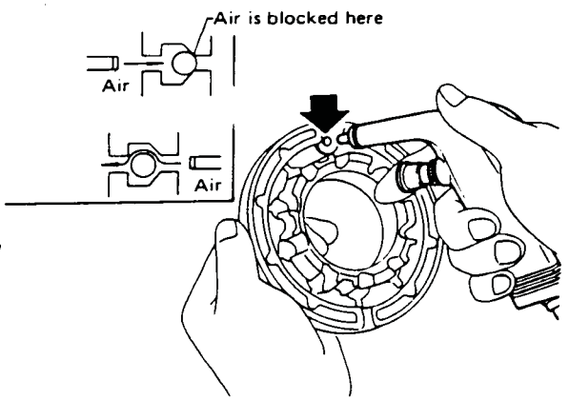


INSPECTION AND ASSEMBLY

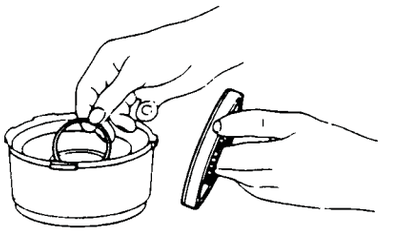
1. Check clutch drive plate facing for wear or damage.

   Standard thickness:
   1.50 - 1.65 mm (0.0591 - 0.0650 in)
   Wear limit:
   1.4 mm (0.055 in)

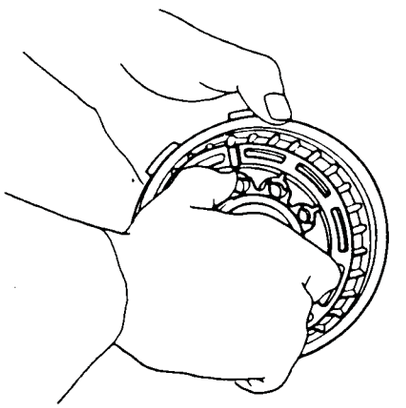
2. Check for wear on snap ring, weak or broken coil springs, and warped spring retainer.
3. Check the operation of check ball in piston using compressed air.



4. Lubricate clutch drum hub and seals, and install inner seal and piston seal as illustrated. Be careful not to stretch seals during installation.



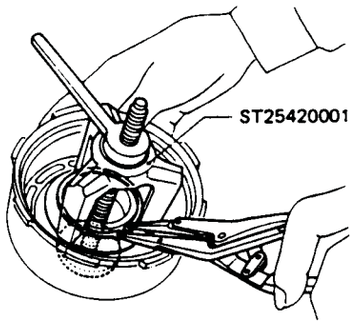
5. Assemble piston, being careful not to allow seal to kink or become damaged during installation. After installing, turn piston by hand to ensure that there is no binding.



REPAIR FOR COMPONENT PARTS

Direct Clutch (Cont'd)

6. Reassemble spring and retainer. Reinstall snap ring. Be sure snap ring is properly seated.

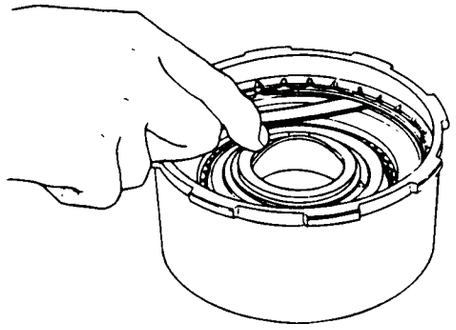


7. Install driven plates, drive plates, and secure with snap ring.
8. Install retainer plate, O.D. one-way clutch assembly, race side, and secure with snap ring.
9. Measure clearance between race side and snap ring.

   Specified clearance:

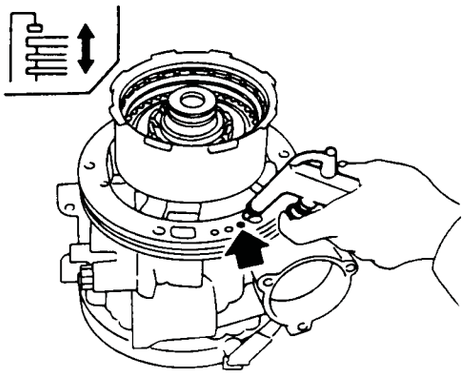
   0 - 0.2 mm (0 - 0.008 in)

   If necessary, try other race side having different thicknesses until correct clearance is obtained.



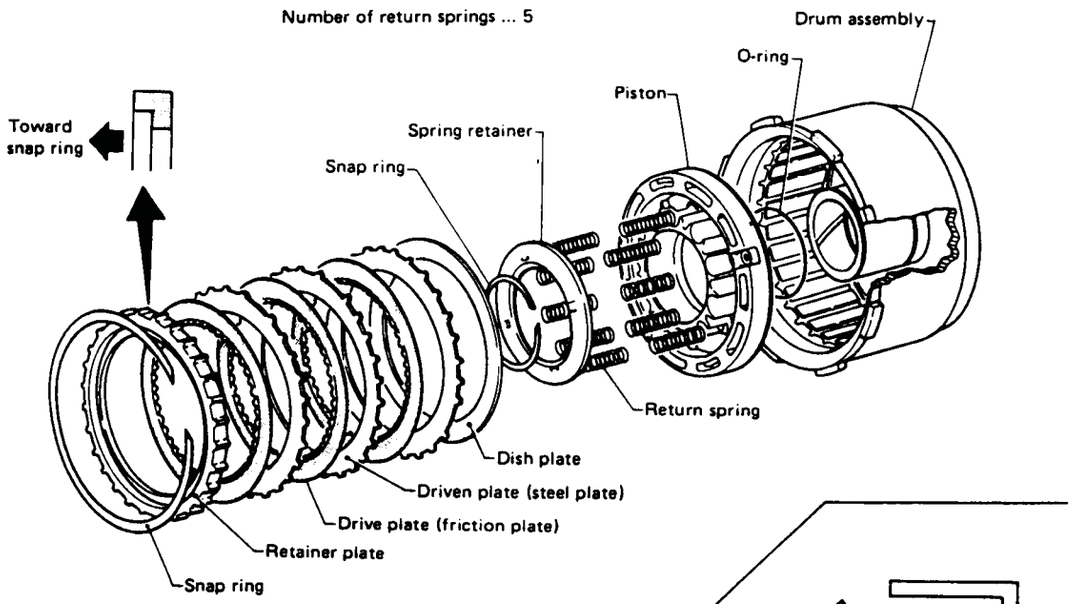
Thickness mm (in)	Part number
0.4 (0.016)	31606-X8501
0.6 (0.024)	31606-X8502
0.8 (0.031)	31606-X8500
1.0 (0.039)	31606-X8503
1.2 (0.047)	31606-X8504

10. Testing direct clutch.
    With direct clutch assembled on drum support, direct a jet of air into hole in clutch drum for definite clutch operation.

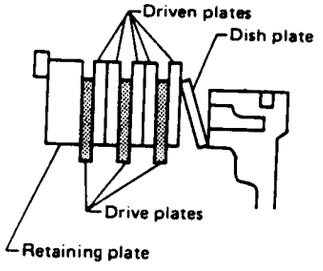


REPAIR FOR COMPONENT PARTS

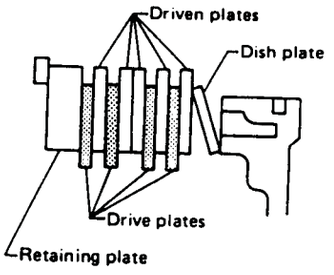
Front Clutch



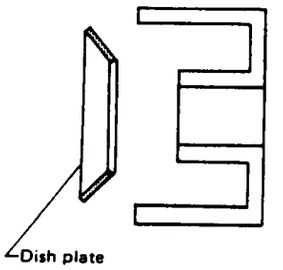
Layout of front clutch plates



VG30E



VG30E turbo

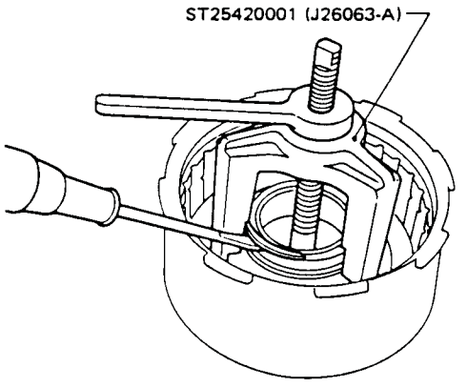


REPAIR FOR COMPONENT PARTS

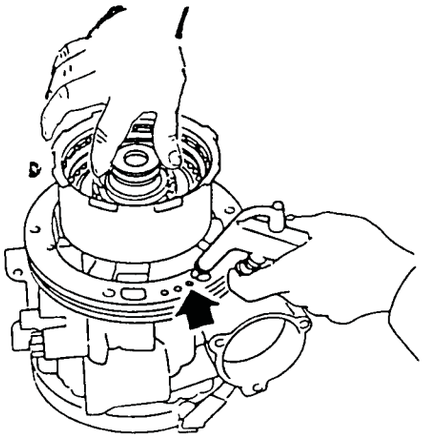
Front Clutch (Cont'd)

DISASSEMBLY

- Compress clutch springs and remove snap ring from spring retainer with Tool.



- For easy removal of piston from drum, mount clutch on drum support. Use an air gun with a tapered rubber up to carefully apply air pressure to loosen piston from drum.

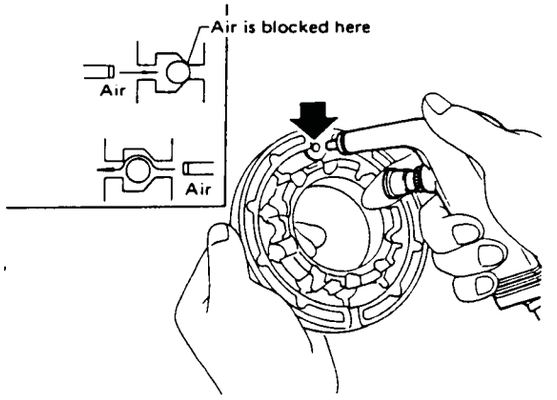


INSPECTION AND ASSEMBLY

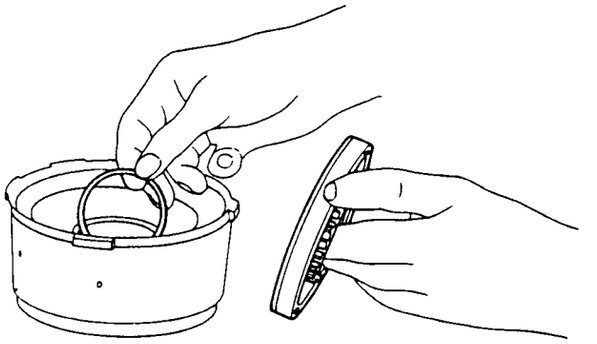
1. Check clutch drive plate facing for wear or damage.

   Standard thickness:
   1.50 - 1.65 mm (0.0591 - 0.0650 in)
   Wear limit:
   1.4 mm (0.055 in)

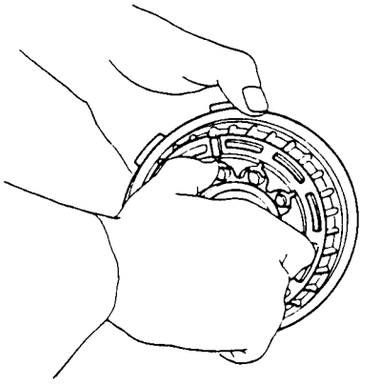
2. Check for wear on snapring, weak or broken coil springs, and warped spring retainer.
3. Check the operation of check ball in piston using compressed air.



4. Lubricate clutch drum hub and seals, and install inner seal and piston seal as illustrated. Be careful not to stretch seals during installation.



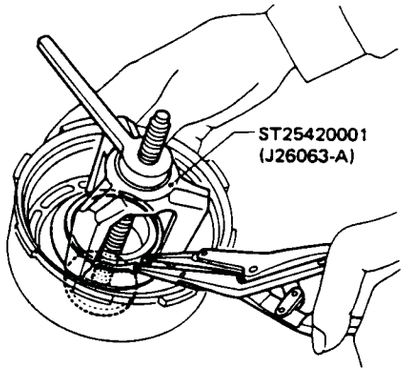
5. Assemble piston, being careful not to allow seal to kink or become damaged during installation. After installing, turn piston by hand to ensure that there is no binding.



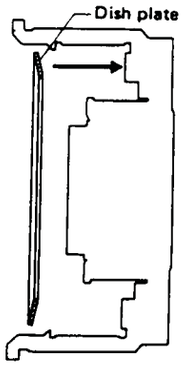
REPAIR FOR COMPONENT PARTS

Front Clutch (Cont'd)

6. Reassemble spring and retainer. Reinstall snap ring. Be sure snap ring is properly seated.



7. Install dish plate.

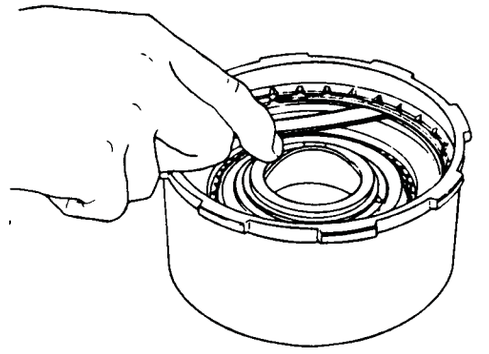


8. Install driven plates, drive plates, and secure with snap ring.
9. Measure clearance between retainer plate and snap ring.

   Specified clearance:

   1.6 - 1.8 mm (0.063 - 0.071 in)

   If necessary, try other retaining plates having different thicknesses until correct clearance is obtained.

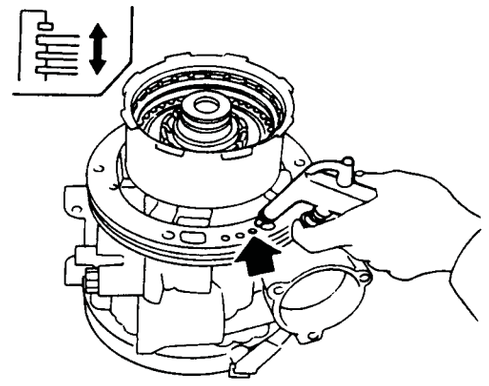


Available retaining plate

Thickness mm (in)	Part number
5.0 (0.197)	31567-X2900
5.2 (0.205)	31567-X2901
5.4 (0.213)	31567-X2902
5.6 (0.220)	31567-X2903
5.8 (0.228)	31567-X2904
6.0 (0.236)	31567-X2905
6.2 (0.244)	31567-X2906

10. Testing front clutch (High-reverse)

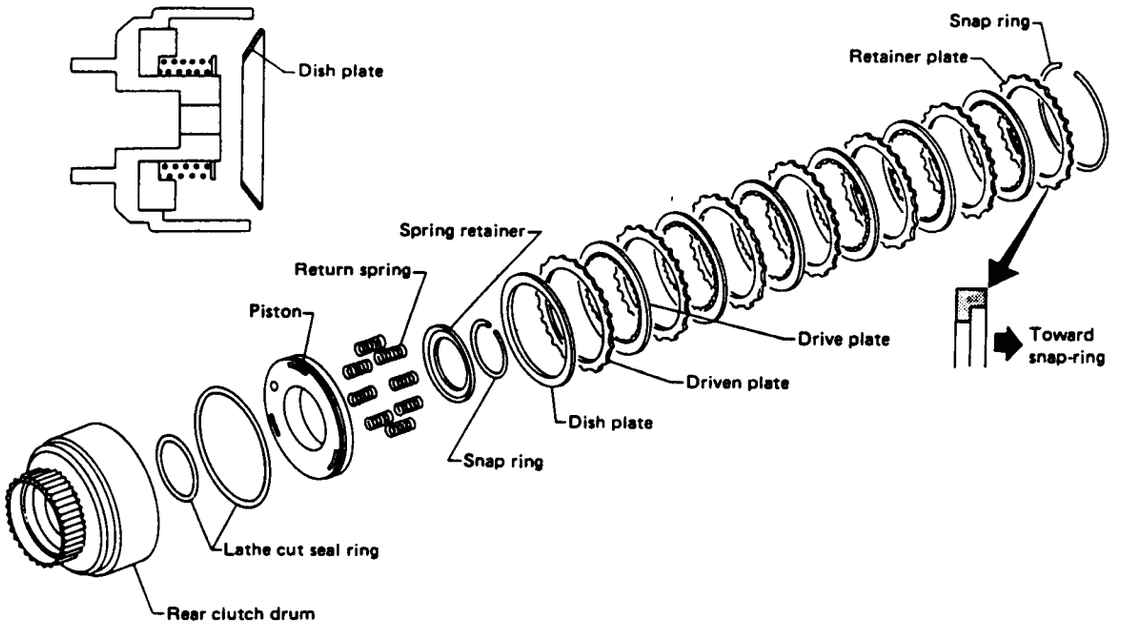
    With front clutch (High-reverse) assembled on drum support, direct a jet of air into hole in clutch drum for definite clutch operation.



REPAIR FOR COMPONENT PARTS

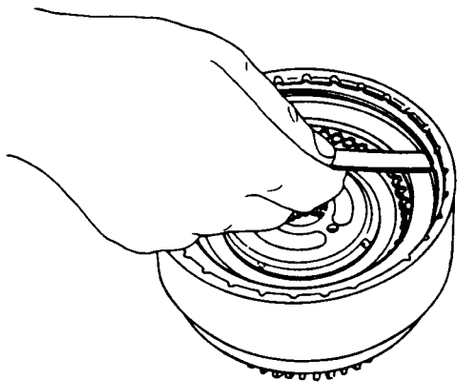
Rear Clutch (Forward)

In regard to the number of clutch sheets (drive plate and driven plate), refer to S.D.S.

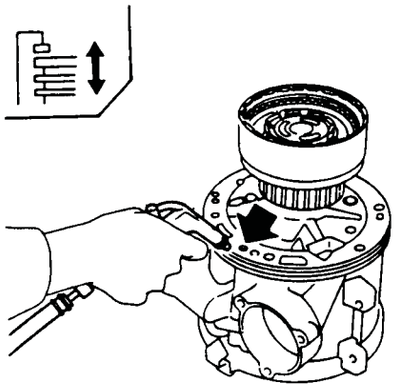


Service procedures for rear clutch (Forward) are essentially the same as those for front clutch (High-reverse), with the following exception:

Specified clearance between retainer plate and snap ring:
0.8 - 1.0 mm (0.031 - 0.039 in)



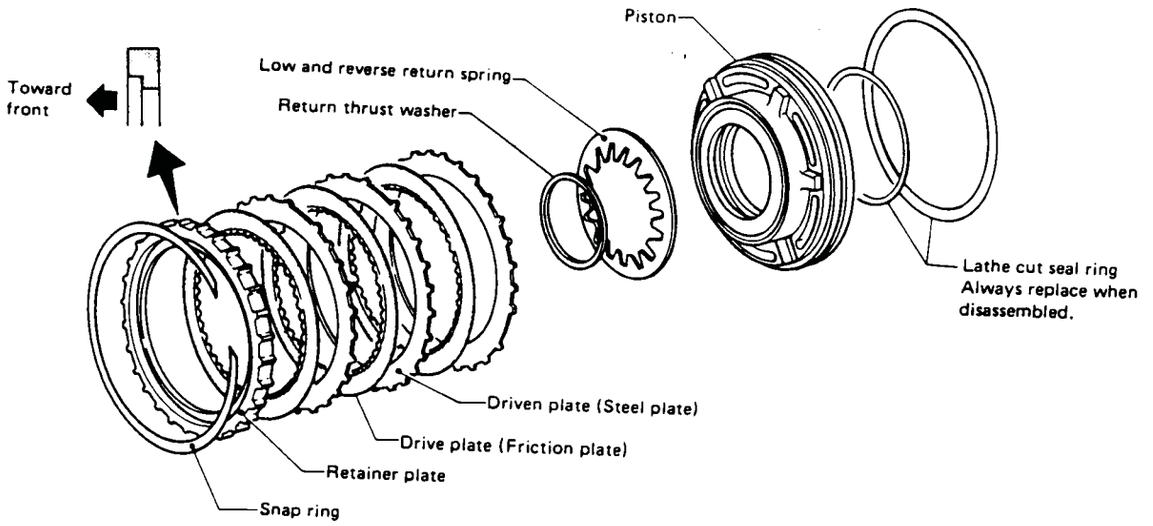
Test rear clutch



REPAIR FOR COMPONENT PARTS

Low & Reverse Brake

In regard to the number of clutch sheets (drive plate and driven plate), refer to S.D.S.



INSPECTION

- Examine for damaged drive plate facing and worn snap ring.
- Check drive plate facing for wear; if necessary, replace.

Drive plate thickness:

Standard

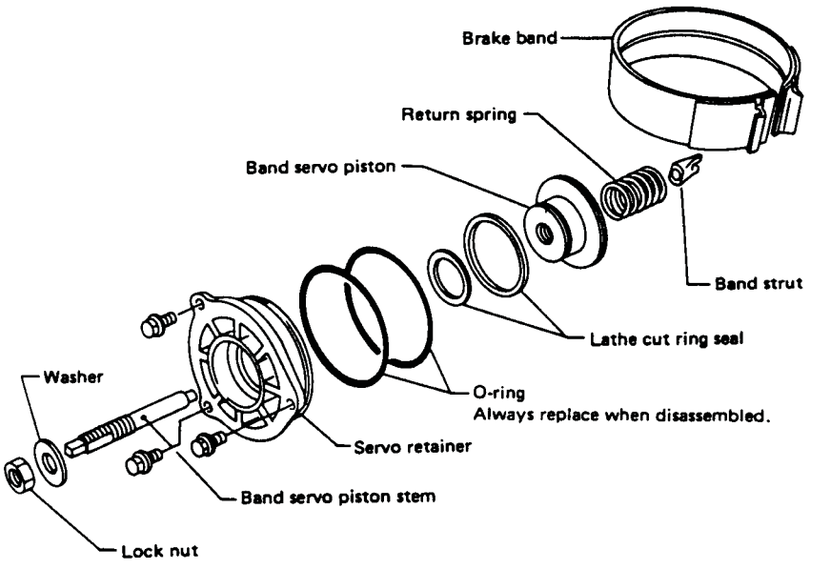
1.90 - 2.05 mm (0.0748 - 0.0807 in)

Allowable limit

1.8 mm (0.071 in)

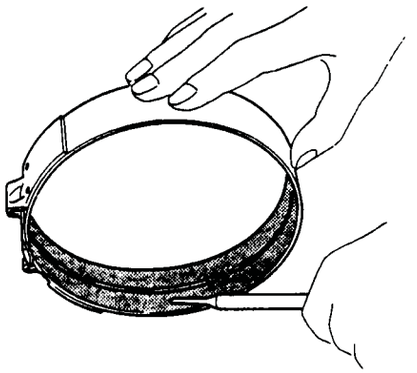
REPAIR FOR COMPONENT PARTS

Brake Band and Band Servo



INSPECTION

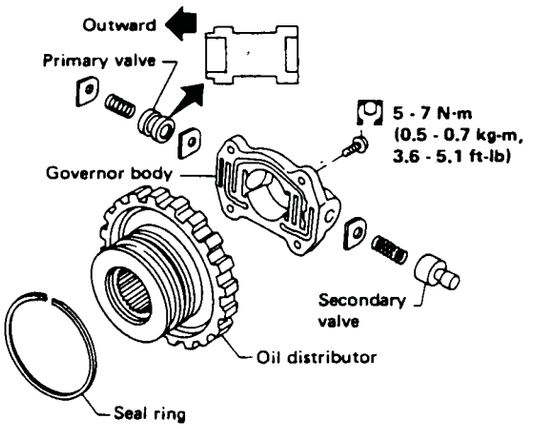
- Inspect band friction material for wear. If cracked, chipped or burnt spots are apparent, replace the band.



- Check band servo components for wear and scoring.

REPAIR FOR COMPONENT PARTS

Governor



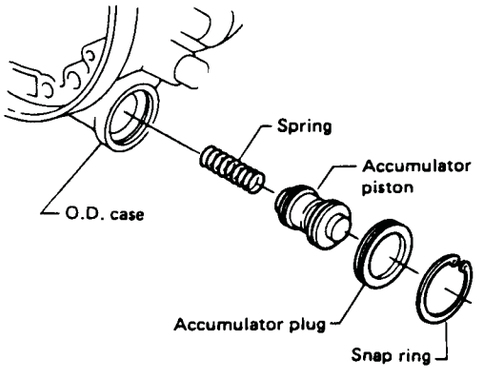
INSPECTION

- Check governor valves and valve body for indication of burning or scratches.
- Check valve springs for damage.
  Measure free length of valve springs.

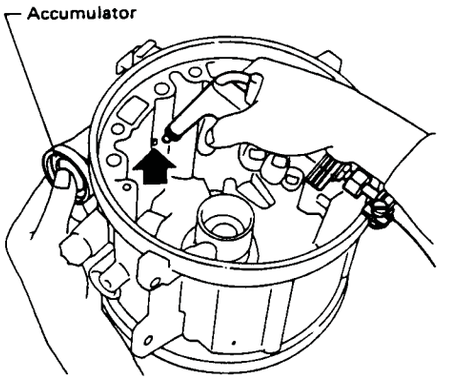
Valve spring		Free length mm (in)
Primary governor	VG30E	10.5 (0.413)
	VG30E turbo	21.8 (0.858)
Secondary governor	VG30E	19.8 (0.780)
	VG30E turbo	19.8 (0.780)

If any abnormalities are found, replace governor body, valves and springs as an assembly.

Accumulator



- Remove snap ring, then apply pressure to remove accumulator plug, piston and spring.



- Check accumulator components for wear and scoring.

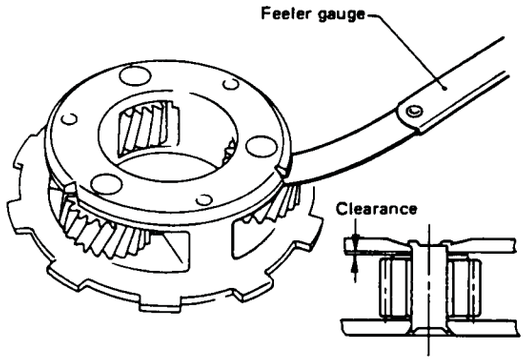
REPAIR FOR COMPONENT PARTS

Planetary Carrier

INSPECTION

- Check clearance between pinion washer and planetary carrier with a feeler.

  Standard clearance:
  0.20 - 0.70 mm (0.0079 - 0.0276 in)
  Wear limit:
  0.80 mm (0.0315 in)

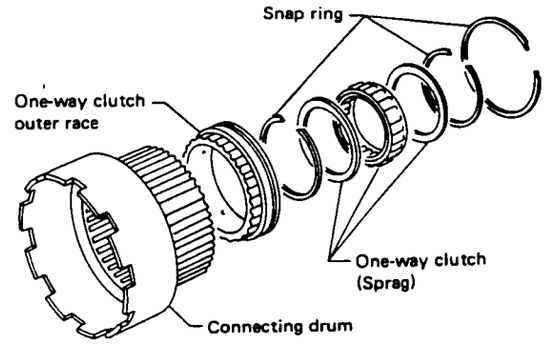


- Check planetary gear sets and bearings for damaged or worn gears.

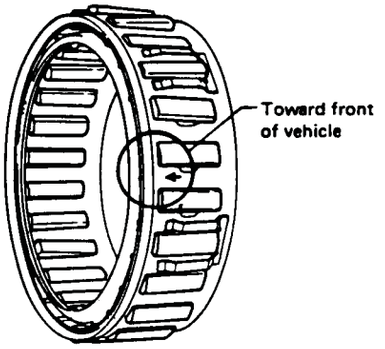
Connecting Drum Assembly

If one-way clutch is out of order as determined during disassembly, repair it as follows:

1. Remove each snap ring, then draw out one-way clutch inner & outer race.



2. Inspect one-way sprag and contacting surface for wear or burns.
   Replace parts as necessary.
3. Assemble those parts.

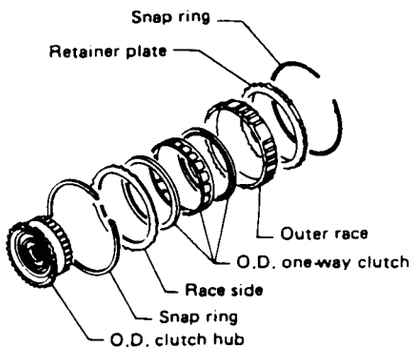


REPAIR FOR COMPONENT PARTS

O.D. One-Way Clutch

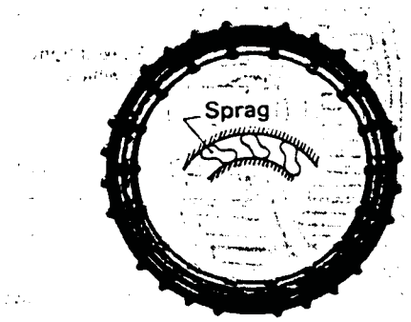
If one-way clutch is out of order as determined during disassembly, repair it as follows:

1. Remove each snap ring, then draw out O.D. one-way clutch.
2. Inspect one-way sprag and contacting surface for wear or burns.
   Replace parts as necessary.

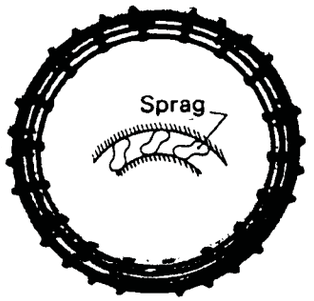


3. Assemble those parts.

Pay attention to direction of O.D. one-way clutch.

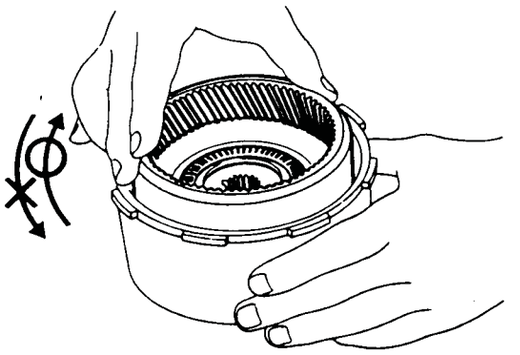


Front side



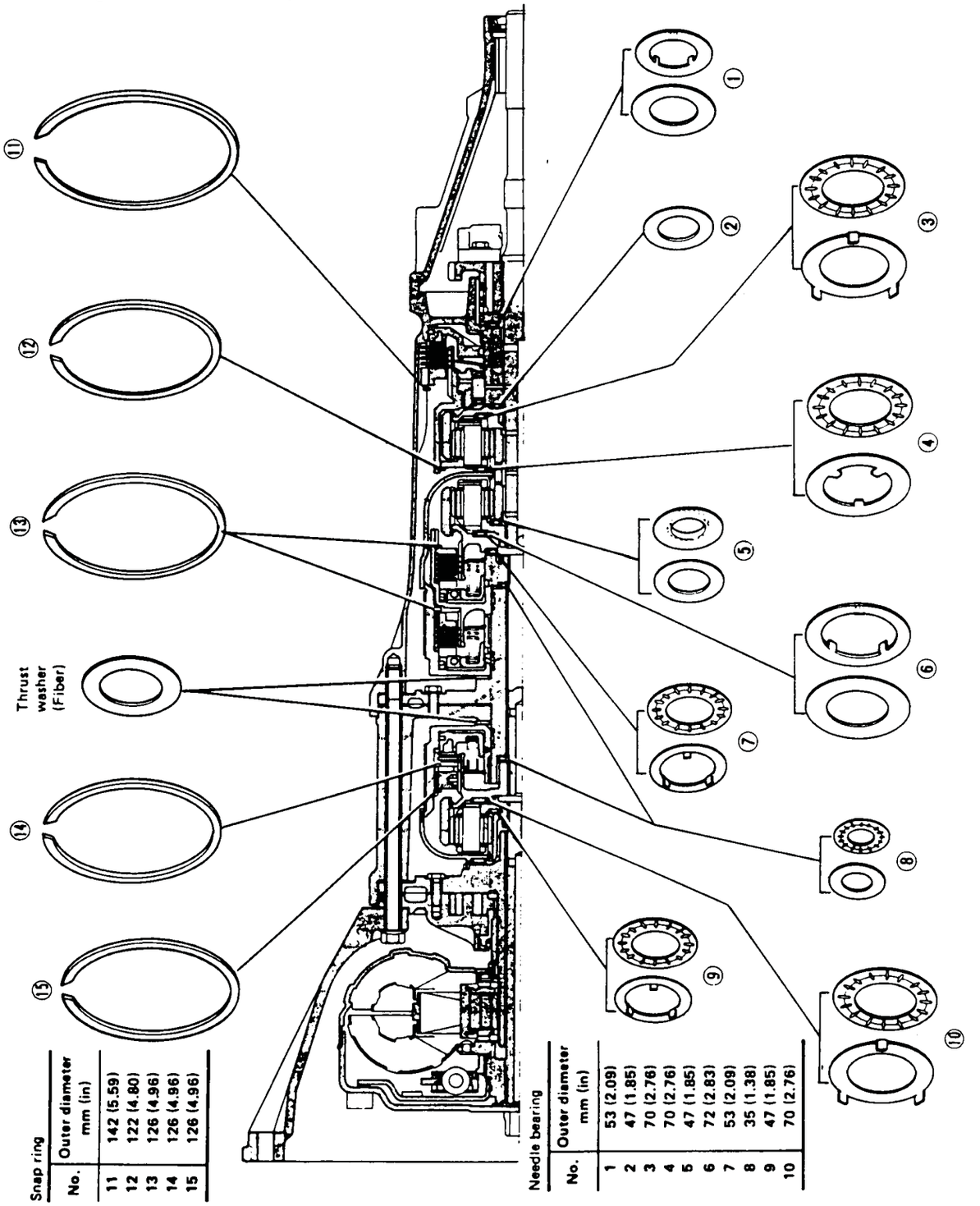
Rear side

4. After assembly, check O.D. one-way clutch to see if it operates properly.



ASSEMBLY

When installing/assembling needle bearing, bearing race, snap ring and thrust washer, use the following illustration as a guide to installation procedures and locations.



Snap ring

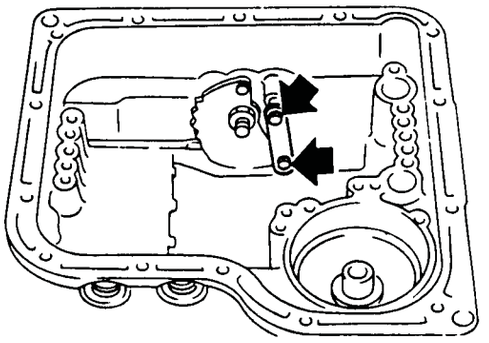
No.	Outer diameter mm (in)
11	142 (5.59)
12	122 (4.80)
13	126 (4.96)
14	126 (4.96)
15	126 (4.96)

Needle bearing

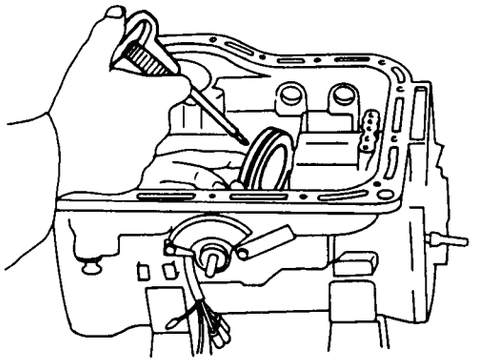
No.	Outer diameter mm (in)
1	53 (2.09)
2	47 (1.85)
3	70 (2.76)
4	70 (2.76)
5	47 (1.85)
6	72 (2.83)
7	53 (2.09)
8	35 (1.38)
9	47 (1.85)
10	70 (2.76)

ASSEMBLY

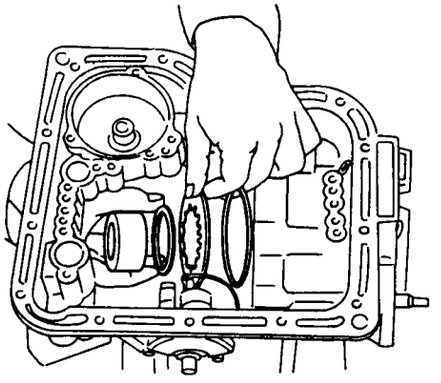
1. Install parking rod, manual plate, manual plate lock nut, parking brake lever and snap rings.



2. Lubricate and install low and reverse piston into the case.

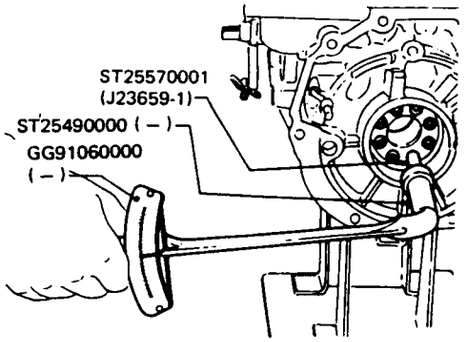


3. Install thrust ring, piston return spring, thrust washer and one-way clutch inner race.

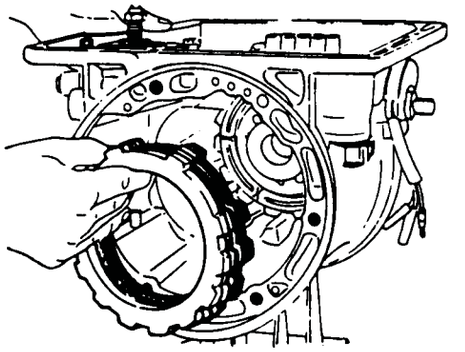


4. Install hex-head slotted bolts.

Check that return spring is centered on race before tightening.



5. Install steel dished plate first, then steel and friction plates, and, finally, retaining plate and snap-ring.

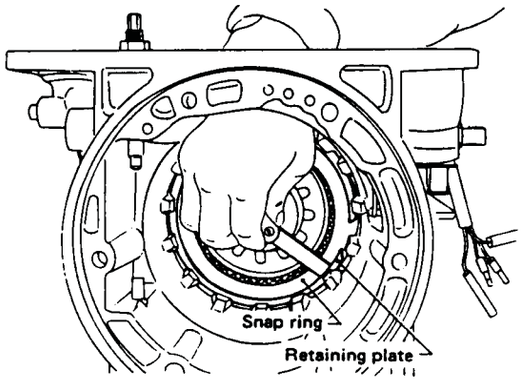


ASSEMBLY

6. After low and reverse brake has been completely assembled, measure clearance between snap ring and retainer plate. If measurement exceeds specifications adjust by replacing retainer plate with one of a different thickness.

   Low and reverse brake clearance:

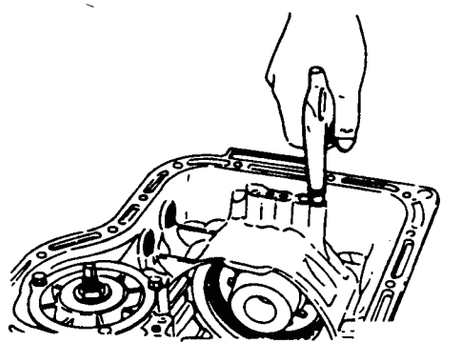
   0.80 - 1.05 mm (0.0315 - 0.0413 in)



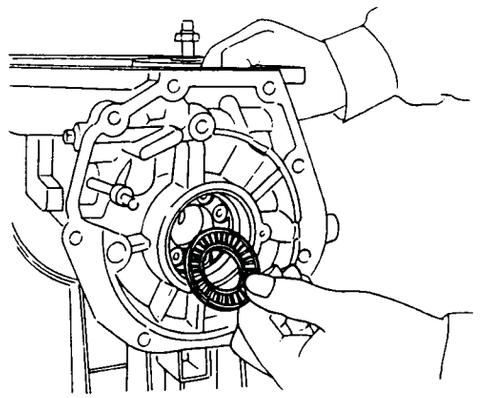
Available retainer plates

	Thickness mm (in)	Part number
VG30E turbo	9.8 (0.386)	31667-X2900
	10.0 (0.394)	31667-X2901
	10.2 (0.402)	31667-X2902
	10.4 (0.409)	31667-X2903
	10.6 (0.417)	31667-X2904
	10.8 (0.425)	31667-X2905
VG30E	11.8 (0.465)	31667-X0300
	12.0 (0.472)	31667-X0301
	12.2 (0.480)	31667-X0302
	12.4 (0.488)	31667-X0303
	12.6 (0.496)	31667-X0304
	12.8 (0.504)	31667-X0305

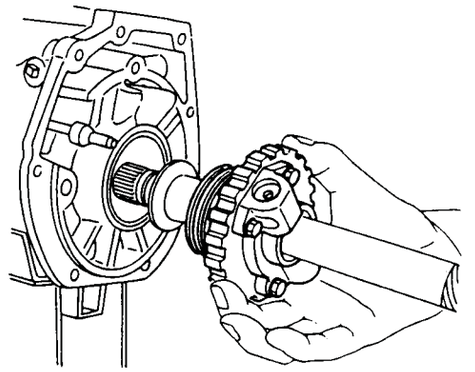
7. Check low and reverse brake operation with compressed air.



8. Install governor thrust washer and needle bearing.

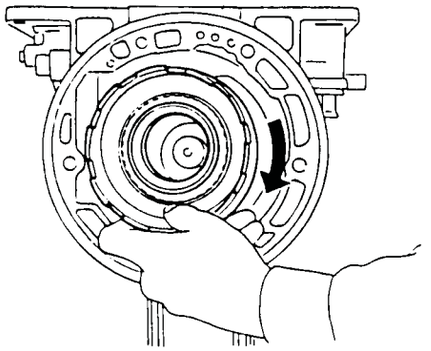


9. Install output shaft and governor distributor into case.

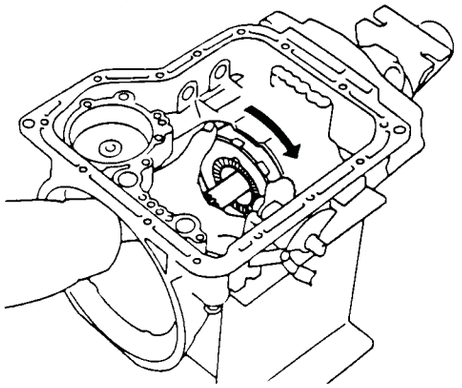


ASSEMBLY

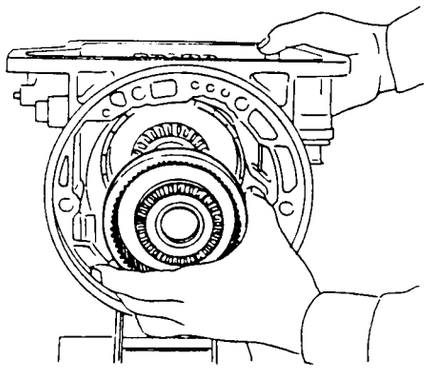
10. Install connecting drum with sprag by rotating drum clockwise.



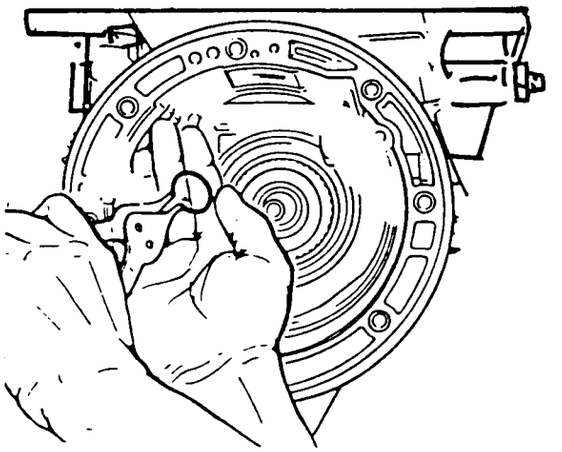
11. Check one-way clutch to see if it operates properly.



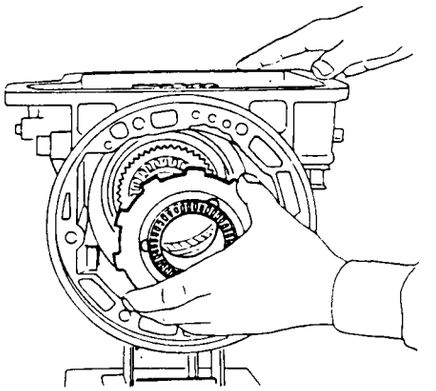
12. Install rear internal gear.



13. Install snap-ring on shaft.

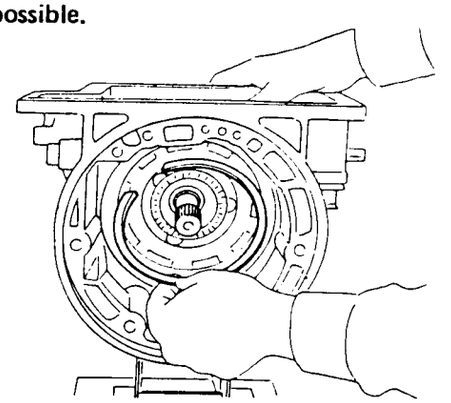


14. Secure thrust bearing and thrust washer with vaseline and install rear planetary carrier.



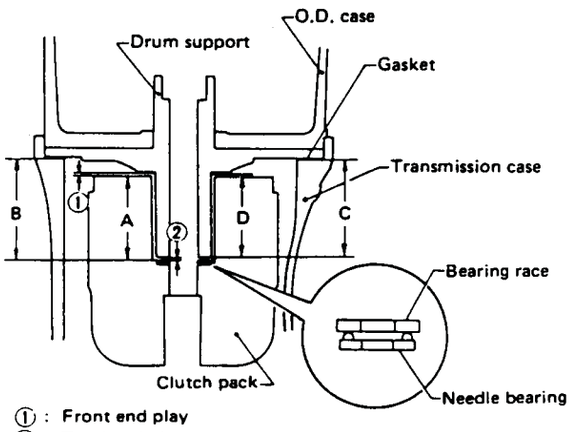
15. Install rear planetary carrier snap ring.

If you have insufficient space to install snap ring into drum groove, pull connecting drum forward as far as possible.



ASSEMBLY

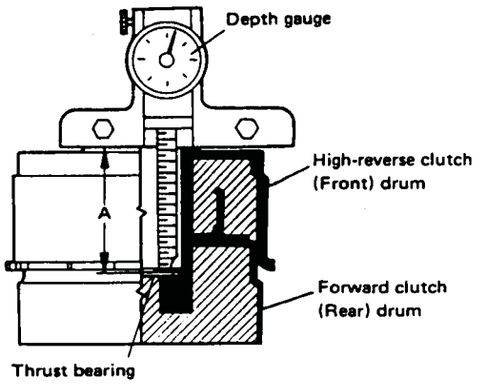
16. Adjust end play as follows:

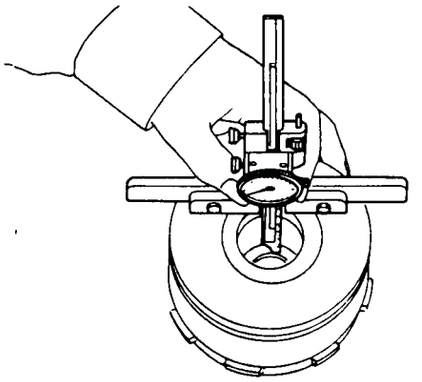


① : Front end play
② : Total end play

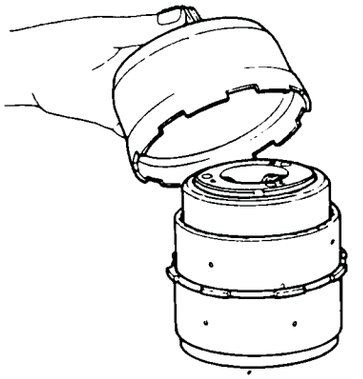
Front end play

1) Assemble front clutch (High-reverse) and rear clutch (Forward) drum assemblies together and lay them flat on bench. Be sure rear hub thrust bearing is properly seated. Measure from face of clutch drum to top of thrust bearing race (dimension A).

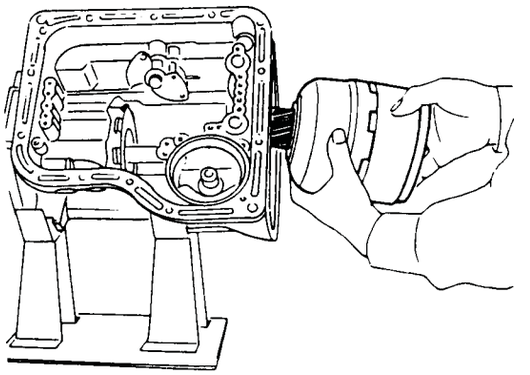




2) Assemble front internal gear, front planetary carrier and connecting shell. Secure thrust bearings with vaseline.

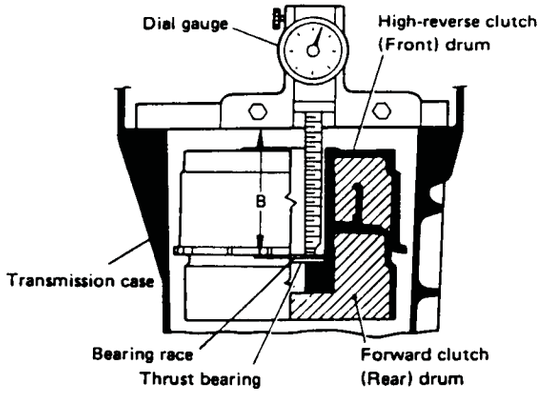


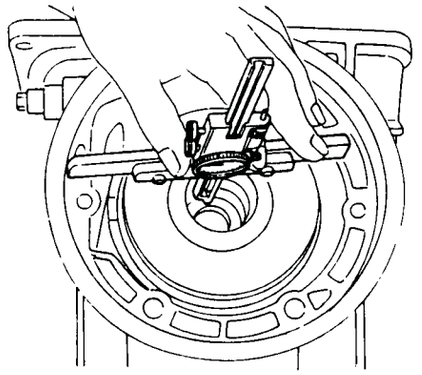
3) Install assembly into transmission case. Check that parts are properly seated before proceeding with measurements.



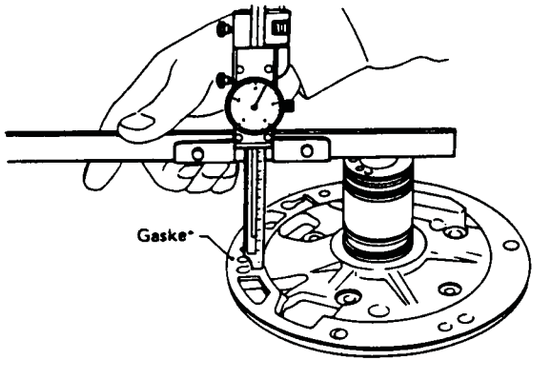
ASSEMBLY

4) Using a dial gauge or caliper with a seven inch base, measure from rear hub thrust bearing race to case (dimension B).

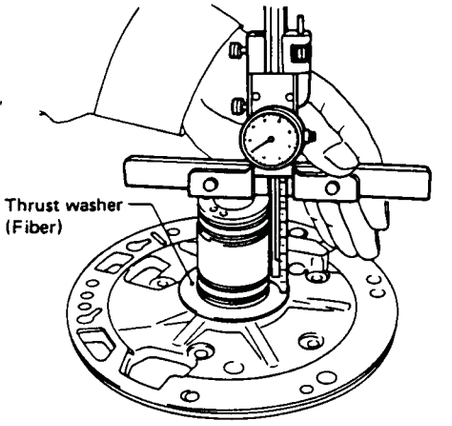




5) Measure from top of drum support shaft (front clutch and rear clutch side) to installed gasket (dimension C).



6) Install thrust washer. Measure from top of drum support shaft (front clutch and rear clutch side) to thrust washer (dimension D).



Front end play = [B – A – 0.1 mm (0.004 in)] – (C – D)

Specified front end play:
0.5 - 0.8 mm (0.020 - 0.031 in)

Front end play can be adjusted with front clutch (High-reverse) thrust washers.

Available high-reverse clutch (Front) thrust washer

Thickness mm (in)	Part number
1.3 (0.051)	31528-X0107
1.5 (0.059)	31528-X0105
1.7 (0.067)	31528-X0106
1.9 (0.075)	31528-X0100
2.1 (0.083)	31528-X0101
2.3 (0.091)	31528-X0102
2.5 (0.098)	31528-X0103
2.7 (0.106)	31528-X0104

ASSEMBLY

Total end play

Total end play = [B – 0.1 mm (0.004 in)] – C

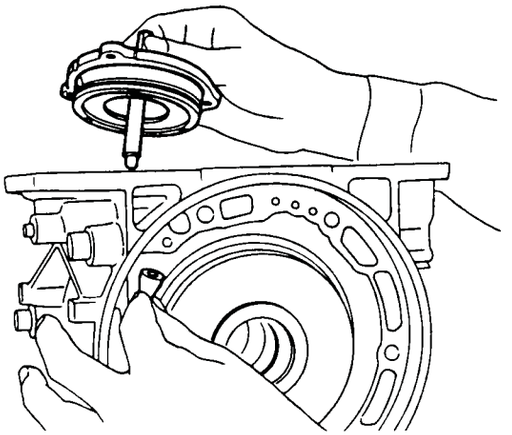
Specified total end play:
0.25 - 0.50 mm
(0.0098 - 0.0197 in)

Total end play can be adjusted with bearing race.

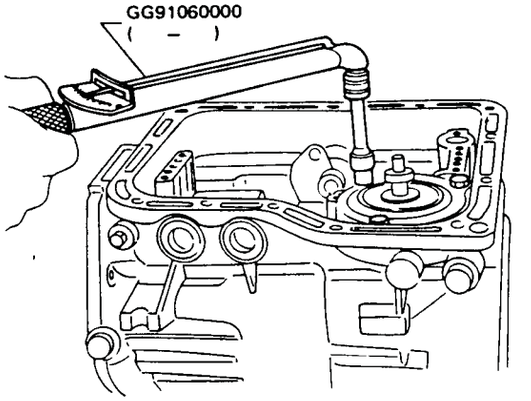
Available oil pump cover bearing race

Thickness mm (in)	Part number
1.2 (0.047)	31556-X0100
1.4 (0.055)	31556-X0101
1.6 (0.063)	31556-X0102
1.8 (0.071)	31556-X0103
2.0 (0.079)	31556-X0104
2.2 (0.087)	31556-X0105

17. Install brake band, band strut, and band servo. Lubricate servo O-rings before installing.

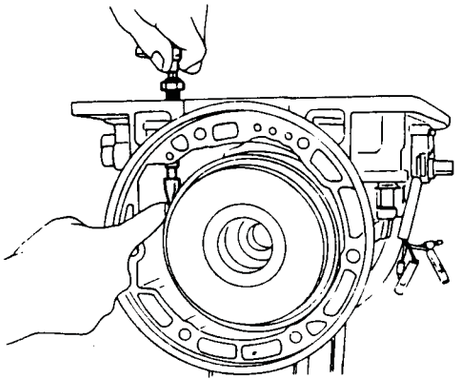


18. Install and torque the retainer bolts. Loosen piston stem.

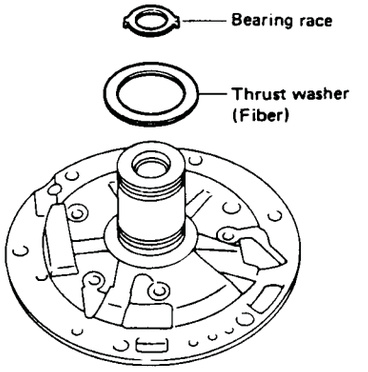


19. Finger tighten brake band servo piston stem enough to prevent brake band and strut from falling out.

Do not adjust brake band at this time.

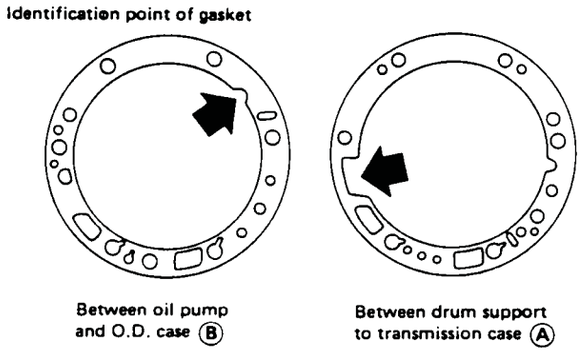


20. Apply vaseline to bearing race and thrust washer, then mount them on drum support.



ASSEMBLY

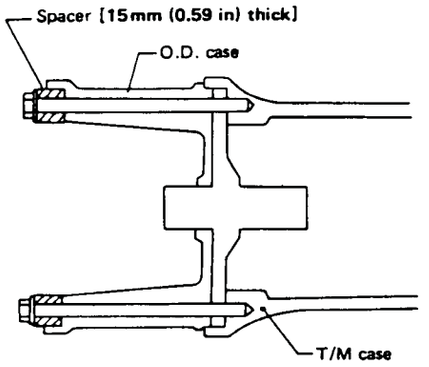
21. Mount drum support gasket Ⓐ on drum support after coating with vaseline. Apply A.T.F. to O-ring of drum support. Align drum support with O.D. case to transmission case and install.



22. Apply A.T.F. to O-ring of drum support, then install drum support and O.D. case.

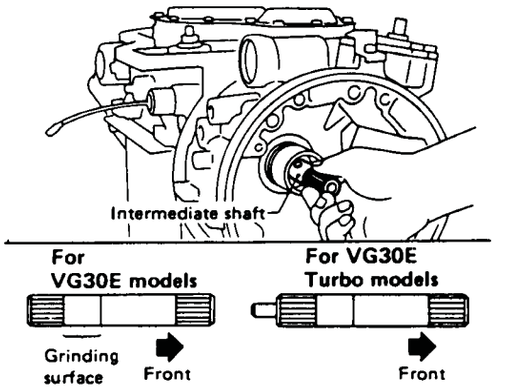
Before installing drum support and O.D. case on transmission case, ensure that they have been centered properly. Refer to Component Parts for Drum Support.

23. Temporarily tighten O.D. case with two converter housing securing bolts.

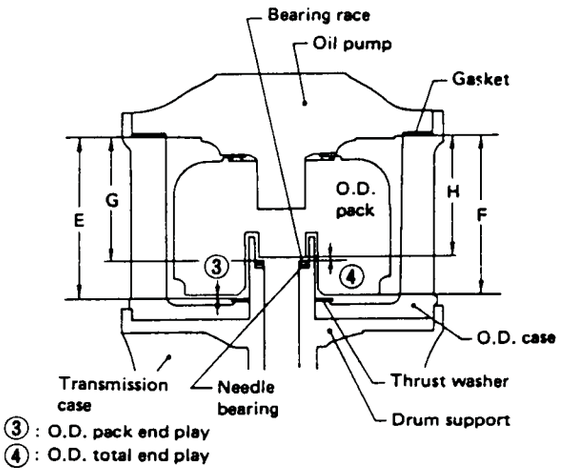


24. Insert intermediate shaft.

Be careful of shaft direction.

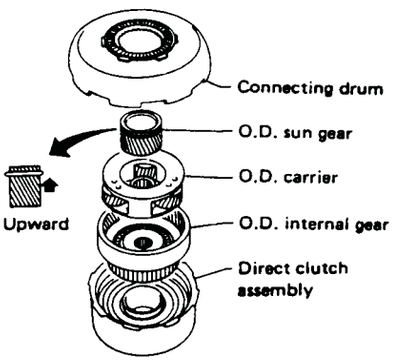


25. Adjust O.D. end play.



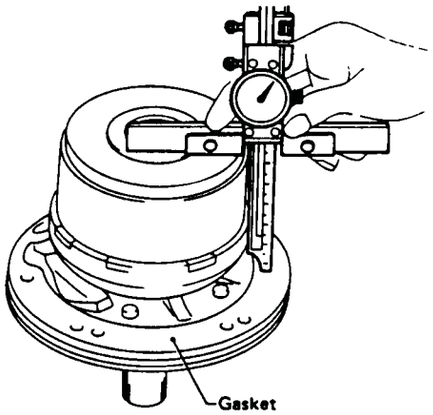
O.D. pack end play

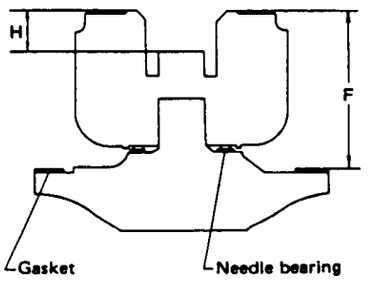
1) Assemble direct clutch assembly, O.D. planetary gear set and connecting drum, and install them on O.D. pack.



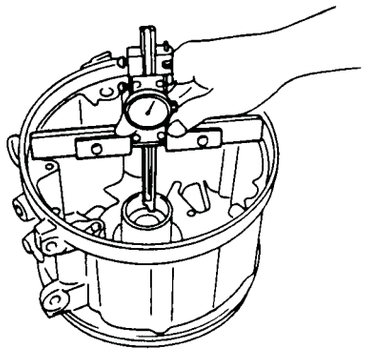
ASSEMBLY

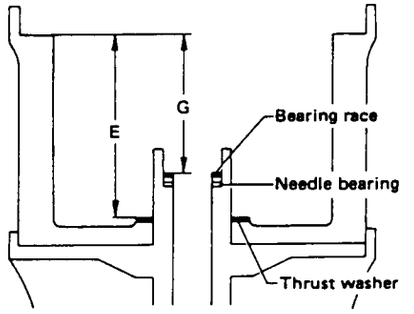
2) Install oil pump bearing, gasket and O.D. pack on oil pump, and measure dimensions F and H.





3) Attach thrust washer and needle bearing to drum support and O.D. case, and measure dimensions E and G.





O.D. pack end play = [E – 0.1 mm (0.004 in)] – F

Specified O.D. pack end play:
0.5 - 0.8 mm (0.020 - 0.031 in)

O.D. pack end play can be adjusted with O.D. thrust washers (these parts are the same as the front clutch thrust washers).

ASSEMBLY

Available O.D. thrust washer

Thickness mm (in)	Part number
1.3 (0.051)	31528-X8607
1.5 (0.059)	31528-X8605
1.7 (0.067)	31528-X8606
1.9 (0.075)	31528-X8600
2.1 (0.083)	31528-X8601
2.3 (0.091)	31528-X8602
2.5 (0.098)	31528-X8603
2.7 (0.106)	31528-X8604

O.D. total end play

O.D. total end play = [G – 0.1 mm (0.004 in)] – (F – H)

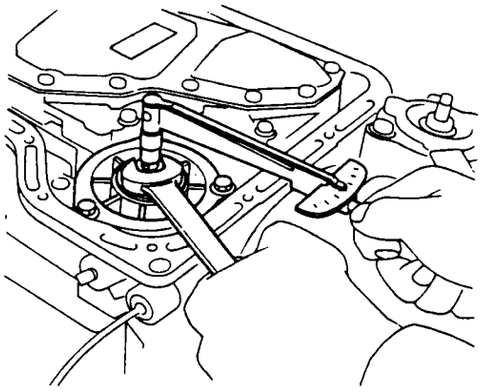
Specified O.D. total end play:
0.25 - 0.50 mm (0.0098 - 0.0197 in)

O.D. total end play can be adjusted with O.D. bearing race.

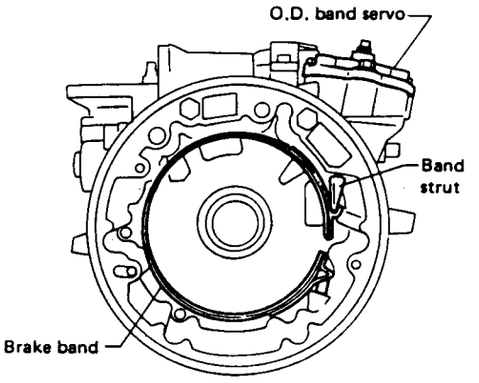
Available O.D. bearing races

Thickness mm (in)	Part number
1.2 (0.047)	31603-X8600
1.4 (0.055)	31603-X8601
1.6 (0.063)	31603-X8602
1.8 (0.071)	31603-X8603
2.0 (0.079)	31603-X8604
2.2 (0.087)	31603-X8605

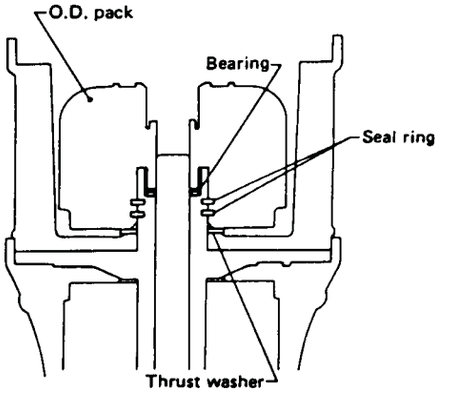
26. Adjust 2nd brake band. Tighten piston stem to the specified value. Back off three full turns and secure with lock nut.



27. Lubricate O.D. servo O-rings, then install O.D. band servo, brake band and band strut.

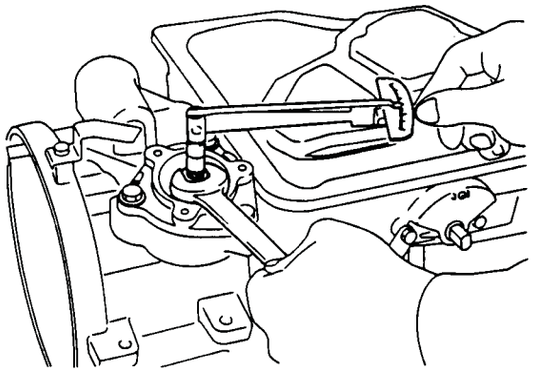


28. Lubricate seal ring of drum support, then install O.D. bearing & race, O.D. thrust washer and O.D. pack on drum support. Make sure that brake band strut is correctly installed.

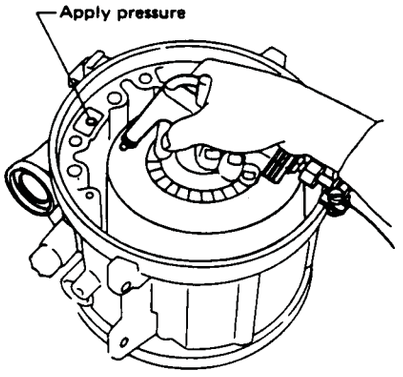


ASSEMBLY

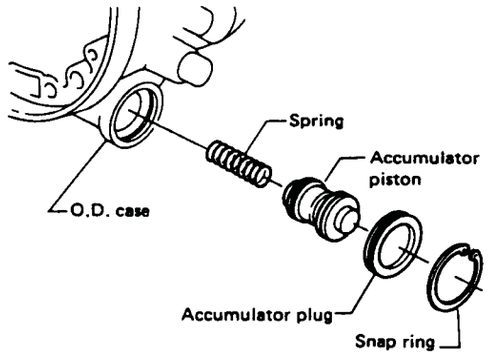
29. Adjust O.D. band. Tighten piston stem to the specified value. Back off two full turns and secure with lock nut.



30. Test O.D. band servo operation with compressed air.



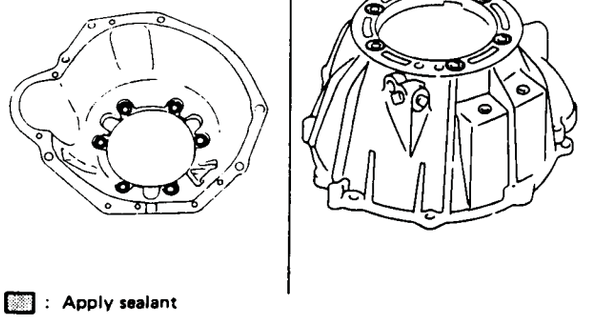
31. Install accumulator parts, then secure with snap ring.



32. Lubricate O-ring of oil pump, then install needle bearing & race and oil pump.

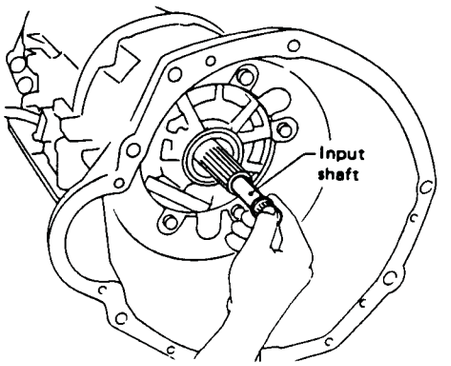
Before installing oil pump housing and oil pump on O.D. case, ensure that they have been centered properly.
Refer to Oil Pump in Repair for Component parts.

33. Remove the two bolts used to temporarily tighten O.D. case. Apply sealant to seating surface of converter housing around the bolt holes.



▨ : Apply sealant

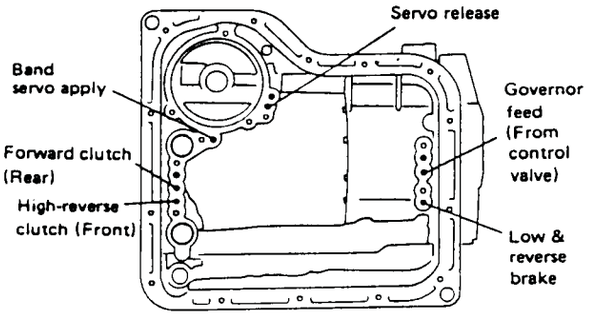
34. Install converter housing on O.D. case and tighten to the specified torque.
35. Install input shaft.



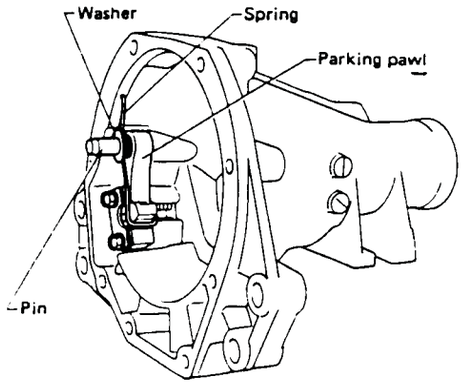
36. Before installing valve body assembly perform a final operation check of all assembled components, with compressed air.

ASSEMBLY

Air check point

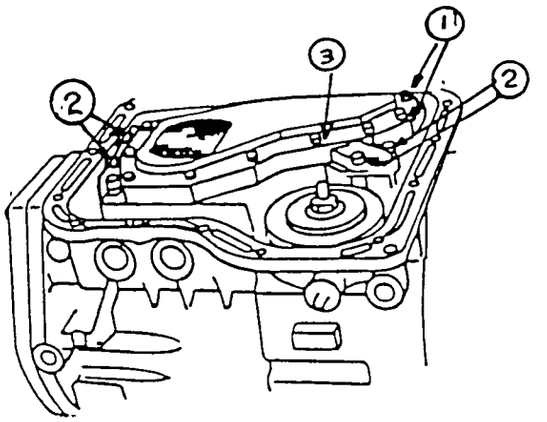


37. Check that parking pawl, pin, spring and washer are assembled correctly.



38. Install rear extension.
39. Install control valve assembly. Be sure manual valve is in alignment with selector pin. Tighten control valve body attaching bolts.

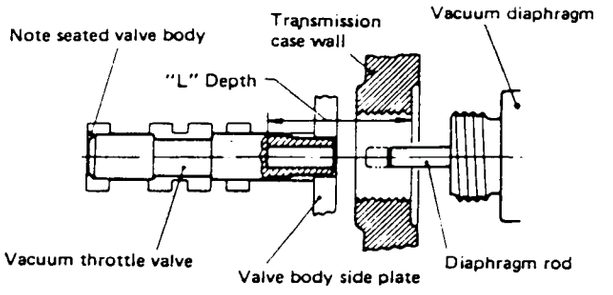
Securing bolt comes in three different lengths.



1 40 mm (1.57 in)
2 35 mm (1.38 in)
3 25 mm (0.98 in)

After installing control valve to transmission case, make sure that control lever can be moved to all positions.

40. Before installing vacuum diaphragm valve, measure depth of hole in which it is inserted. This measurement determines correct rod length to ensure proper performance.

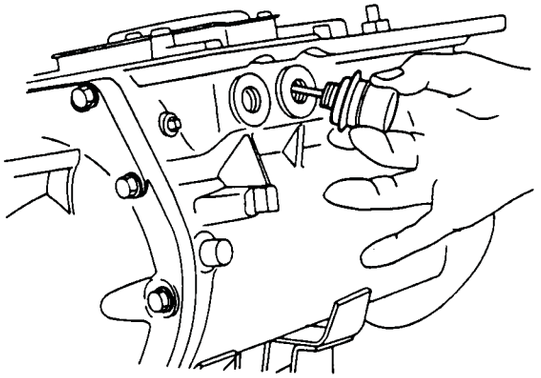


ASSEMBLY

Vacuum diaphragm rod selection

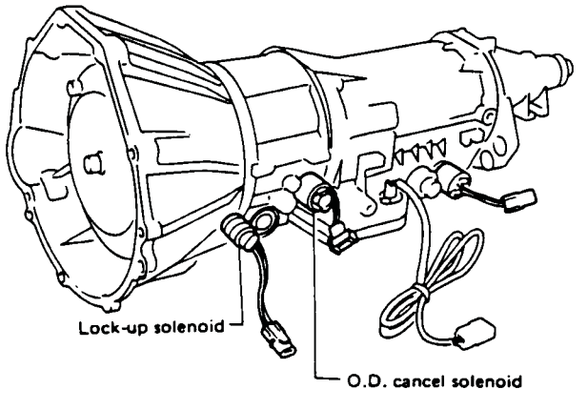
Measured depth "L" mm (in)	Rod length mm (in)	Part number
Under 25.55 (1.0059)	29.0 (1.142)	31932-X0103
25.65 - 26.05 (1.0098 - 1.0256)	29.5 (1.161)	31932-X0104
26.15 - 26.55 (1.0295 - 1.0453)	30.0 (1.181)	31932-X0100
26.65 - 27.05 (1.0492 - 1.0650)	30.5 (1.201)	31932-X0102
Over 27.15 (1.0689)	31.0 (1.220)	31932-X0101

41. Install vacuum diaphragm.

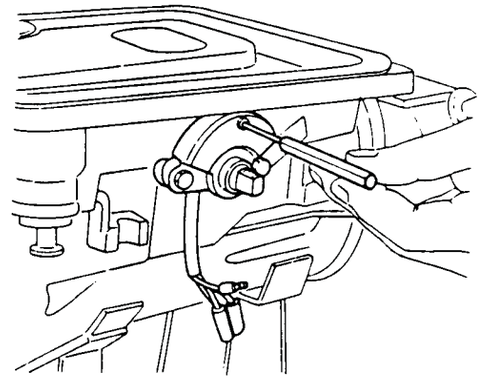


Make sure that vacuum diaphragm rod does not interfere with side plate of control valve.

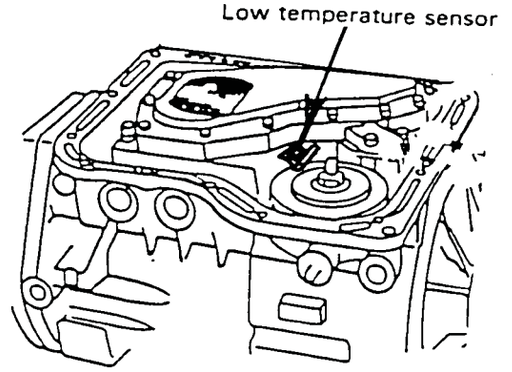
42. Install downshift solenoid, O.D. cancel solenoid, and lock-up solenoid.



43. Install inhibitor switch. Check for proper operation in each range with a circuit tester. Refer to On Vehicle Service.



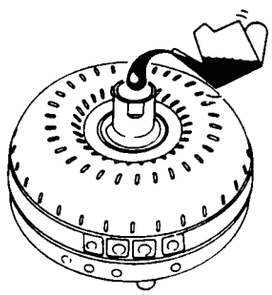
44. Before installing oil pan, check parking pawl engagement. Make wiring connections to shift switches and low temperature sensor (E4N71B automatic transmission models).



45. Install oil pan with new gasket.

ASSEMBLY

46. Pour approx. 2-liters (2-1/8 US qt, 1-3/4 Imp qt) of A.T.F. into converter housing.



47. Install torque converter to converter housing.

Be careful not to scratch front cover oil seal.

TROUBLE-SHOOTING AND DIAGNOSES

Preliminary Checks (Prior to Road Testing)

FLUID LEAKAGE

To detect a fluid leak:

1) Raise vehicle.
2) Clean area suspected of leaking.
3) Start engine, apply foot brake, place control lever in drive, and wait a few minutes.
4) Stop engine.
5) Check for fresh leakage.

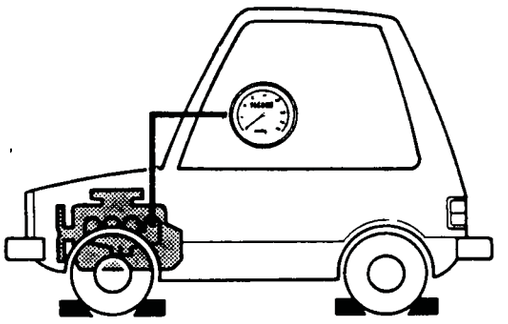
FLUID CONDITION

Examine the A.T.F. and note its color, texture, and odor.

1) Dark of Black Fluid:
   With a burned odor
   - Worn friction material.
2) Milky Pink Fluid: Water Contamination
   - Road water entering through filler tube or breather.
3) Varnished Fluid, light to dark brown and tacky: Oxidation
   - Over or Underfilling.
   - Overheating.

Road Testing

- Before starting road tests, install vacuum gauge.



- Perform road tests, using "Symptom" chart, as follows:

"P" RANGE

1. Place the control lever in "P" range and start the engine. Stop the engine and repeat the procedure in all other ranges and neutral.
2. Stop vehicle on a slight upgrade and place control lever in "P" range. Release parking brake to make sure vehicle remains locked.

"R" RANGE

1. Manually shift the control lever from "P" to "R", and note shift quality.
2. Drive the vehicle in reverse long enough to detect slippage or other abnormalities.

"N" RANGE

1. Manually shift the control lever from "R" and "D" to "N" and note quality.
2. Release parking brake with control lever in "N" range. Lightly depress accelerator pedal to make sure vehicle does not move. (When vehicle is new or soon after clutches have been replaced, vehicle may move slightly. This is not a problem.)

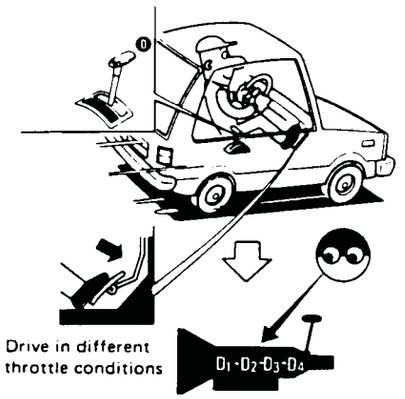
"D" RANGE

1. Manually shift the gear selector from "N" to "D" range, and note shift quality.

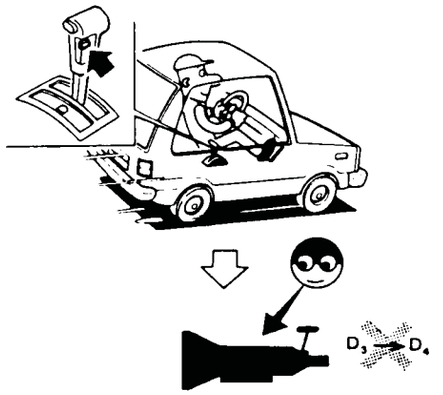
TROUBLE-SHOOTING AND DIAGNOSES

Road Testing (Cont'd)

2. Using the shift schedule as a reference, drive vehicle in "D" range. Record, on symptom chart, respective vehicle speeds at which upshifting and downshifting occur. Check that there is not a considerable jolt when shifting gears. Also determine the timing at which shocks are encountered during shifting and which clutches are engaged.



3. Check to determine if shifting speed changes when accelerator pedal is depressed slowly and when it is depressed quickly.
4. Check to determine if shifting to overdrive gear cannot be made while O.D. control switch is "CANCEL".



5. When vehicle is being driven in the 65 to 85 km/h (40 to 53 MPH) range in "D_3" range at half to light throttle position, fully depress accelerator pedal to make sure it downshifts from 3rd to 2nd gear.
6. When vehicle is being driven in the 25 to 35 km/h (16 to 22 MPH) ("D_2" range) at half to light throttle position, fully depress accelerator pedal to make sure it downshifts from 2nd to 1st gear.

"2" RANGE

1. While vehicle is being driven in "2" range, make sure that it does not shift into 1st or 3rd gear, despite speed changes.
2. Shift control lever to "D" range and allow vehicle to operate at 40 to 50 km/h (25 to 31 MPH). Then, shift to "2" range to make sure it downshifts to 2nd gear.

"1" RANGE

1. Shift control lever to "1" range and allow vehicle to run. Ensure that it does not upshift from 1st to 2nd gear although vehicle speed increases.
2. While vehicle is being driven in "1" range, release accelerator pedal to make sure that engine compression acts as a brake.
3. Shift control lever to "D" or "2" range and allow vehicle to run at 20 to 30 km/h (12 to 19 MPH). Then, shift control lever to "1" range to make sure the downshift to 1st gear is made.

TROUBLE-SHOOTING AND DIAGNOSES

Road Testing (Cont'd)

VEHICLE SPEED WHEN SHIFTING GEARS

1. Disconnect harness from A/T control unit. Road test the vehicle to determine if all items listed in the following chart are within their specified values.
2. Reconnect harness to A/T control unit. Road test the vehicle to see if shifting corresponds to the specified shift schedule pattern.

VG30E engine

Throttle position	Gearshift	Vehicle speed km/h (MPH)
Full throttle	$D_1 \rightarrow D_2$	59 - 67 (37 - 42)
	$D_2 \rightarrow D_3$	101 - 109 (63 - 68)
	$D_3 \rightarrow D_4$	–
	$D_4 \rightarrow D_3$	–
	$D_3 \rightarrow D_2$	89 - 97 (55 - 60)
	$D_2 \rightarrow D_1$	42 - 50 (26 - 31)

VG30E turbo engine

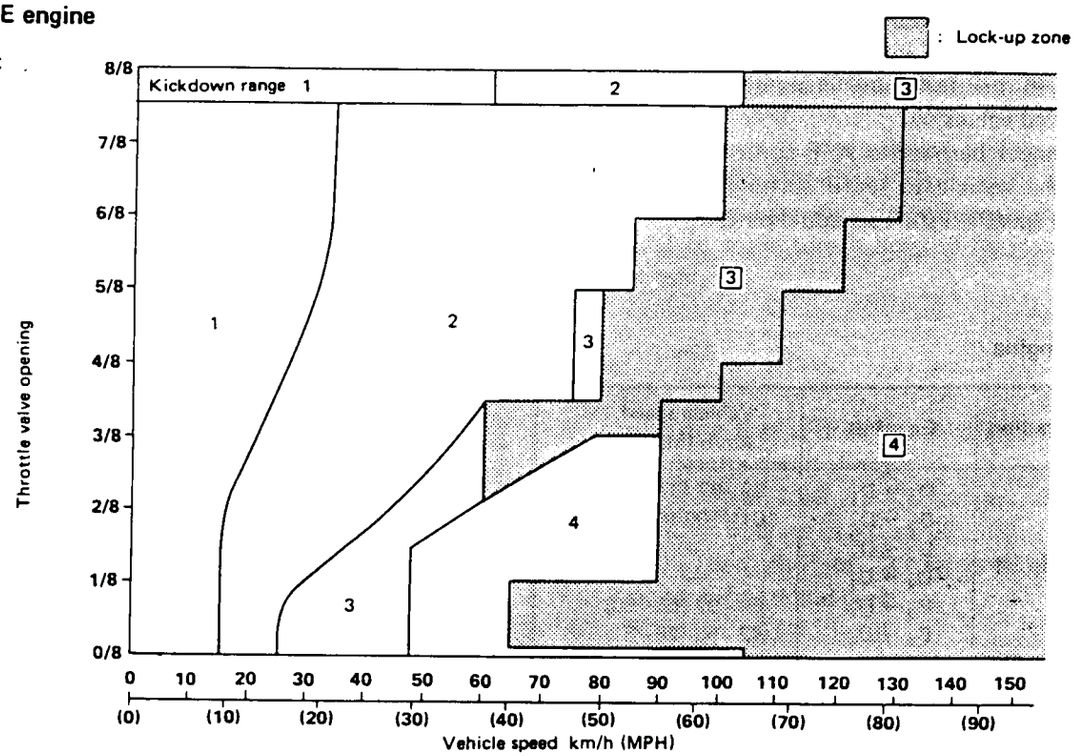
Throttle position	Gearshift	Vehicle speed km/h (MPH)
Full throttle	$D_1 \rightarrow D_2$	56 - 64 (35 - 40)
	$D_2 \rightarrow D_3$	93 - 101 (58 - 63)
	$D_3 \rightarrow D_4$	–
	$D_4 \rightarrow D_3$	–
	$D_3 \rightarrow D_2$	84 - 92 (52 - 57)
	$D_2 \rightarrow D_1$	44 - 52 (27 - 32)

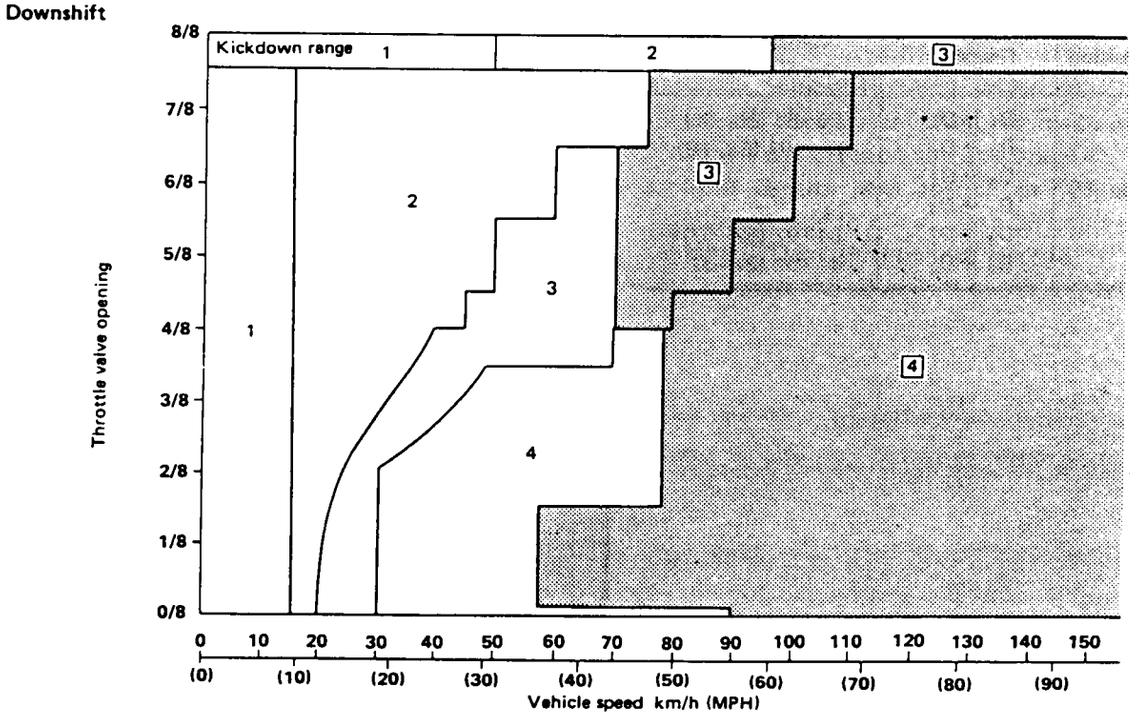
TROUBLE-SHOOTING AND DIAGNOSES

Road Testing (Cont'd)

SHIFT SCHEDULE

VG30E engine



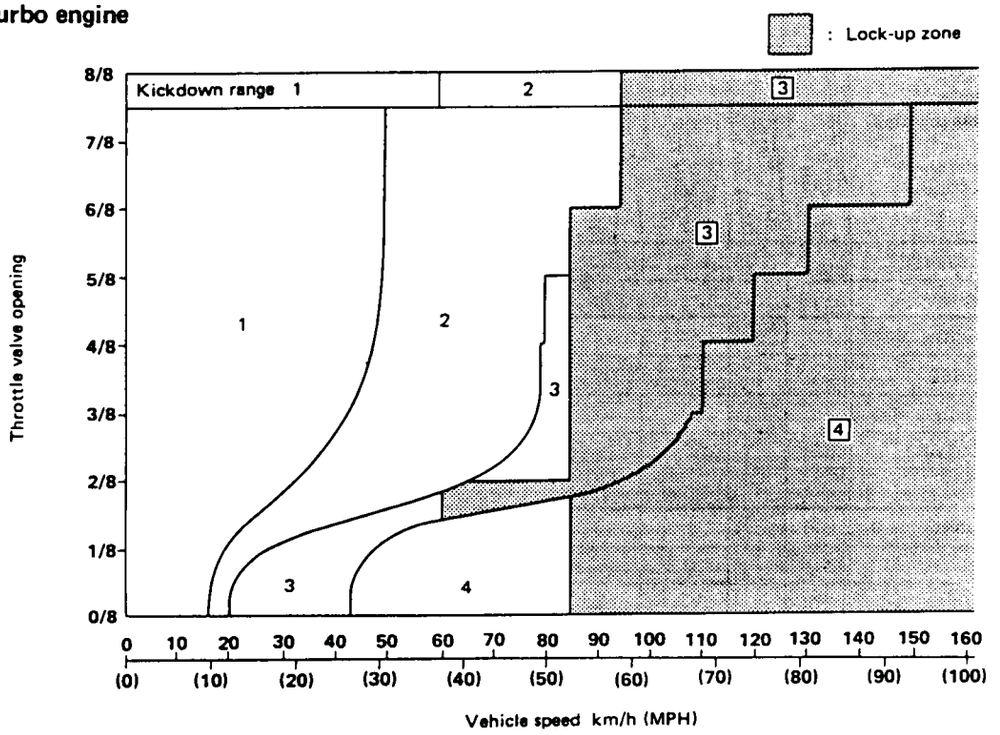


TROUBLE-SHOOTING AND DIAGNOSES

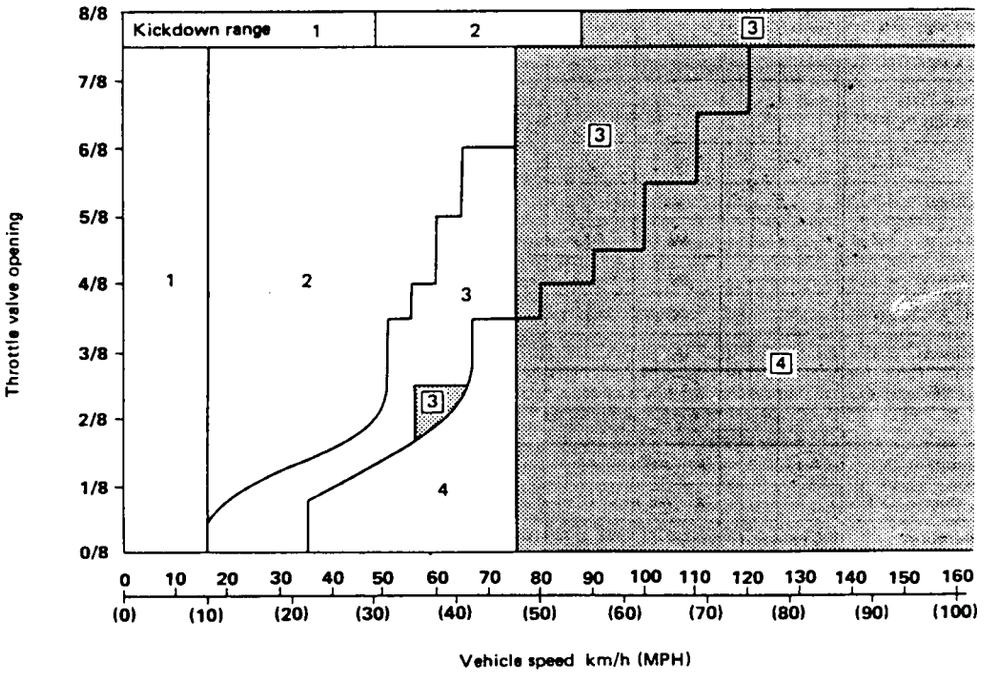
Road Testing (Cont'd)

VG30E Turbo engine

Upshift



Downshift



TROUBLE-SHOOTING AND DIAGNOSES

Road Test Symptom Chart

Numbers in chart below correspond with those indicated in Trouble-shooting chart.
It is not necessary to check shaded items.

		SHIFT QUALITY												
		ROUGH	SHIFT TIMING (Mark km/h (MPH))	NO SHIFT	SHIFT SLIPPAGE	VEHICLE WON'T MOVE	CRUISE SLIPPAGE	POOR POWER/ ACCELERATION	NOISY	ENGINE WON'T START	VEHICLE WON'T STAND STILL	NO ENGINE BRAKING	NO LOCK-UP	COMMENTS
PARK RANGE	ENG. START									Ⓐ				
	HOLDING								Ⓑ		Ⓒ			
"R" RANGE	Man. shift P-R					A3			A4					
	REVERSE					Ⓔ·A3	Ⓔ	Ⓔ	A4					
"N" RANGE	Man. shift R-N								A4					
	ENG. START									Ⓐ				
	N								Ⓑ		Ⓓ			
"D" RANGE	Man. shift N-D	Ⓕ				Ⓖ·A3			A4					
	1st					Ⓖ·A3		Ⓘ	A4					
	Auto shift 1-2	Ⓞ		Ⓙ	Ⓡ				A4					
	2nd							Ⓤ	A4					
	Auto shift 2-3	Ⓟ		Ⓚ	Ⓢ				A4					
	3rd							Ⓤ	A4					
	Auto shift 3-4	Ⓠ		Ⓛ	Ⓣ				A4					
	4th							Ⓤ	A4					
	Lock-up "OFF" → Lock-up "ON"	Ⓝ							A4				Ⓜ	
	In lock-up "ON"								A4				Ⓜ	
	Lock-up "ON" → Lock-up "OFF"								A4					
	Decel. 4-3			Ⓥ	Ⓩ				A4					
	Kickdown 4-3			Ⓥ	Ⓩ·A2				A4					
	Decel. 3-2			Ⓦ	A1				A4					
	Kickdown 3-2			Ⓦ	Ⓨ·A1				A4					
	Decel. 2-1			Ⓧ					A4					
	Kickdown 2-1			Ⓧ					A4					
"2" RANGE	Man. shift D-2			A5		Ⓗ·A3			A4					
	2nd					Ⓗ·A3		Ⓘ	A4					
"1" RANGE	Man. shift 2-1	A9		Ⓧ·A8					A4					
	Man. shift D-1			Ⓧ·A6					A4					
	Acceleration					Ⓗ·A3		Ⓘ	A4					
	"1" Engine Braking								A4			A7		

TROUBLE-SHOOTING AND DIAGNOSES

Trouble-shooting Chart

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transmission must be removed from the vehicle.

Reference		ON vehicle: Oil level	Range select linkage	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kickdown solenoid, switch and wiring	Engine idling rpm	Line pressure	Control valve	Governor	2nd band servo	Transmission air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	O.D. band servo	O.D. control SW.	O.D. cancel solenoid	Lock-up solenoid	Lock-up control unit and sensors	OFF vehicle: Direct clutch	Forward clutch (Rear)	High-reverse clutch (Front)	O.D. band brake	2nd band brake	Low and reverse brake	Oil pump	Oil passage leak	Torque converter	Transmission one-way clutch	Park linkage	Planetary gear	O.D. cancel valve	Lock-up control valve	Accumulator
Ⓐ	Engine does not start in "N", "P" ranges.	.	2	3	.	.	.	.	.	.	.	.	.	1	.	.	.	.	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Engine starts in range other than "N" and "P".	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ⓑ	Transmission noise in "P" and "N" ranges.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.
Ⓒ	Vehicle moves when changing into "P" range or parking gear does not disengage when shifted out of "P" range.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	(2)	.	.	.	.	.
Ⓓ	Vehicle runs in "N" range.	.	1	.	.	.	.	.	3	.	.	.	2	.	.	.	.	.	.	.	.	(4)	.	.	.	.	.	.	.	.	.	.	.	.	.
Ⓔ	Vehicle will not run in "R" range (but runs in "D", "2" and "1" ranges). Clutch slips. Very poor acceleration.	1	2	.	.	.	.	3	5	.	.	6	4	.	.	.	.	.	.	.	.	.	(8)	.	.	(7)	.	(10)	.	.	.	.	.	.	.
	Vehicle braked when shifting into "R" range.	.	.	.	.	.	.	.	.	.	3	2	1	.	.	.	.	.	.	.	.	(4)	.	.	(5)	.	.	.	.	(6)	.	.	.	.	.
Ⓕ	Sharp shock in shifting from "N" to "D" range.	.	.	.	2	.	1	3	4	.	.	.	.	.	.	.	.	.	.	.	.	(5)	.	.	.	.	.	.	.	.	.	.	.	.	.
Ⓖ	Vehicle will not run in "D" range (but runs in "2", "1" and "R" ranges).	.	1	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.
Ⓗ	Vehicle will not run in "D", "1", "2" ranges (but runs in "R" range). Clutch ships. Very poor acceleration.	1	2	.	.	.	.	4	5	.	.	6	3	.	7	.	.	.	.	.	.	(8)	(10)	.	.	.	.	(9)	.	.	.	.	.	.	.
Ⓘ	Clutches or brakes slip somewhat in starting.	1	2	.	6	.	.	3	5	.	.	7	4	.	.	.	.	.	.	.	.	.	.	.	.	.	(8)	(9)	.	.	.	.	.	.	.
	Excessive creep.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	No creep at all.	1	2	.	.	.	3	.	5	.	.	.	4	.	.	.	.	.	.	.	(8)	(9)	(10)	.	(7)	.	(6)	(7)	.	.	.	.	.	.	.	.
Ⓙ	Failure to change gear from "1st" to "2nd".	.	1	.	2	3	.	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	(9)	.	.	.	(10)	.	.	.	.	.	.	.	.
Ⓚ	Failure to change gear from "2nd" to "3rd".	.	1	.	2	3	.	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	(9)	.	.	.	.	(10)	.	.	.	.	.	.	.	.
Ⓛ	Failure to change gear from "3rd" to "4th".	.	1	.	2	3	.	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	9	.	.	.	(10)	.	.	.	.	.	.	.	.
	Too high a gear change point from "1st" to "2nd", from "2nd" to "3rd", from "3rd" to "4th".	.	.	.	1	2	.	3	5	6	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	(7)	.	.	.	.	.	.	.	.
	Gear change directly from "1st" to "3rd" occurs.	.	.	.	.	.	.	.	2	4	.	3	1	.	.	.	.	.	.	.	.	.	.	(5)	.	.	.	(6)	.	.	.	.	.	.	.	.
	Gear change directly from "2nd" to "4th" occurs.	.	.	.	.	.	.	.	2	4	.	3	1	.	.	.	.	.	.	.	.	.	(5)	.	.	.	.	(6)	.	.	.	.	.	.	.	.
Ⓜ	Lock-up does not occur in any range (E4N71B).	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	.	3	.	.	.	.	4	.
Ⓝ	Large jolt changing from lock-up "OFF" to "ON".	.	.	.	.	.	.	2	.	3	.	.	1	.	.	.	.	.	4	.	.	.	(6)	.	.	.	.	.	.	.	.	.	.	5	.

TROUBLE-SHOOTING AND DIAGNOSES

Trouble-shooting Chart (Cont'd)

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transmission must be removed from the vehicle.

Reference		ON vehicle: Oil level	Range select linkage	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kickdown solenoid, switch and wiring	Engine idling rpm	Line pressure	Control valve	Governor	2nd band servo	Transmission air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	O.D. band servo	O.D. control SW.	O.D. cancel solenoid	Lock-up solenoid	Lock-up control unit and sensors	OFF vehicle: Direct clutch	Forward clutch (Rear)	High-reverse clutch (Front)	O.D. band brake	2nd band brake	Low and reverse brake	Oil pump	Oil passage leak	Torque converter	Transmission one-way clutch	Park linkage	Planetary gear	O.D. cancel valve	Lock-up control valve	Accumulator
Ⓞ	Too sharp a shock in change from "1st" to "2nd".	.	.	.	1	.	2	.	4	.	5	.	3	.	.	.	.	.	6	7	.	.	.	⑧	.	.	.	⑩	.	.	.	⑨	.
Ⓟ	Too sharp a shock in change from "2nd" to "3rd".	.	.	.	1	.	.	2	3	.	5	4	.	.	.	.	.	6	7	.	.	⑧	.	.	.	.	.	⑩	.	.	.	⑨	.
Ⓠ	Too sharp a shock in change from "3rd" to "4th".	.	.	.	1	.	.	2	3	.	.	7	.	.	.	4	.	5	6	.	.	⑧	.	.	.	.	.	⑩	.	.	.	⑨	.
Ⓡ	Almost no shock or clutches slipping in change from "1st" to "2nd".	1	2	.	3	.	.	4	6	.	8	7	5	.	.	.	.	.	.	.	.	.	.	⑨	.	.	.	⑩	.	.	.	.	.
Ⓢ	Almost no shock or slipping in change from "2nd" to "3rd". Engine races extremely fast.	1	2	.	3	.	.	4	6	.	8	7	5	.	.	.	.	.	.	.	.	.	⑨	.	.	.	⑩	.	.	.	.	.
Ⓣ	Almost no shock or slipping in change from "3rd" to "4th".	1	2	.	3	.	.	4	6	.	8	7	5	.	.	.	.	.	.	.	.	.	⑨	.	.	.	⑩	.	.	.	.	.	.
	Vehicle braked by gear change from "1st" to "2nd".	.	.	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	.	.	④	.	.	③	.	.	⑤	.	.	.	.	.
	Vehicle braked by gear change from "2nd" to "3rd".	.	.	.	.	.	.	.	3	.	2	.	1	.	.	.	.	.	.	.	.	.	.	④	.	.	.	.	.	.	.	.	.	.
	Vehicle braked by gear change from "3rd" to "4th".	.	.	.	.	.	.	.	2	.	.	.	1	.	.	.	.	.	.	.	③	.	④	.	.	.	.	.	.	.	.	.	.	.
Ⓤ	Maximum speed not attained. Acceleration poor.	1	2	.	.	.	5	4	7	.	6	.	3	.	8	.	.	.	.	.	.	⑪	⑫	.	⑨	⑩	⑬	.	⑭	.	.	.	.	.
Ⓥ	Failure to change gear from "4th" to "3rd".	.	.	.	1	.	.	.	3	4	.	5	2	.	.	.	6	7	8	.	⑨	.	⑩	⑪	.	.	.	⑫	.	.	.	.	⑬	.	.
Ⓦ	Failure to change gear from "3rd" to "2nd" and from "4th" to "2nd".	.	.	.	1	.	.	.	3	4	6	5	2	.	.	.	.	.	.	.	.	.	⑦	⑩	⑧	.	.	⑨	.	.	.	.	.	.
Ⓧ	Failure to change gear from "2nd" to "1st" or from "3rd" to "1st".	.	.	.	1	.	.	.	3	4	6	5	2	.	.	.	.	.	.	.	.	.	⑦	.	.	.	.	⑧	.	.	.	.	.	.
	Gear change shock felt during deceleration by releasing accelerator pedal.	.	1	.	2	3	.	4	5	6	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	⑦	.	.	.	.	.	⑧
	Too high a change point from "4th" to "3rd", from "3rd" to "2nd", from "2nd" to "1st".	.	1	.	2	3	.	4	5	6	.	.	.	.	.	.	.	.	7	.	.	.	.	.	.	.	⑧	.	.	.	.	.	.
Ⓨ	Kickdown does not operate when depressing pedal in "3rd" within kickdown vehicle speed.	.	.	.	2	1	.	.	4	5	.	.	3	.	.	.	.	.	.	.	.	.	.	⑥	.	.	⑦	.	.	.	.	.	.
	Kickdown operates or engine overruns when depressing pedal in "3rd" beyond kickdown vehicle speed limit.	.	1	.	2	.	.	3	5	6	.	7	4	.	.	.	.	.	.	.	.	.	⑧	.	.	.	⑨	.	.	.	.	.	.
Ⓩ	Races extremely fast or slips in changing from "4th" to "3rd" when depressing pedal.	.	.	.	1	.	.	2	4	.	6	5	3	.	.	.	.	.	.	.	⑦	.	⑧	⑨	.	.	.	⑩	.	.	.	.	.	.
(A1)	Races extremely fast or slips in changing from "3rd" to "2nd" when depressing pedal.	.	.	.	1	.	.	2	4	.	6	5	3	.	.	.	.	.	.	.	.	.	⑦	.	⑧	.	.	⑨	.	.	.	.	.	.
(A2)	Kickdown does not operate when depressing pedal in "4th" within kickdown vehicle speed.	.	.	.	2	1	.	.	4	5	.	.	3	.	.	.	.	.	.	.	⑦	.	⑥	.	.	.	.	⑧	.	.	.	.	.	.
	Kickdown operates or engine overruns when depressing pedal in "4th" beyond kickdown vehicle speed limit.	.	1	.	2	.	.	3	5	6	.	7	4	.	.	.	.	.	.	.	.	.	⑧	.	.	.	⑨	.	.	.	.	.	.	.
	Shift pattern does not change.	.	.	.	1	3	.	.	7	.	.	.	.	.	5	.	2	4	.	6	.	.	.	.	.	.	.	.	.	.	.	⑧	.	.

TROUBLE-SHOOTING AND DIAGNOSES

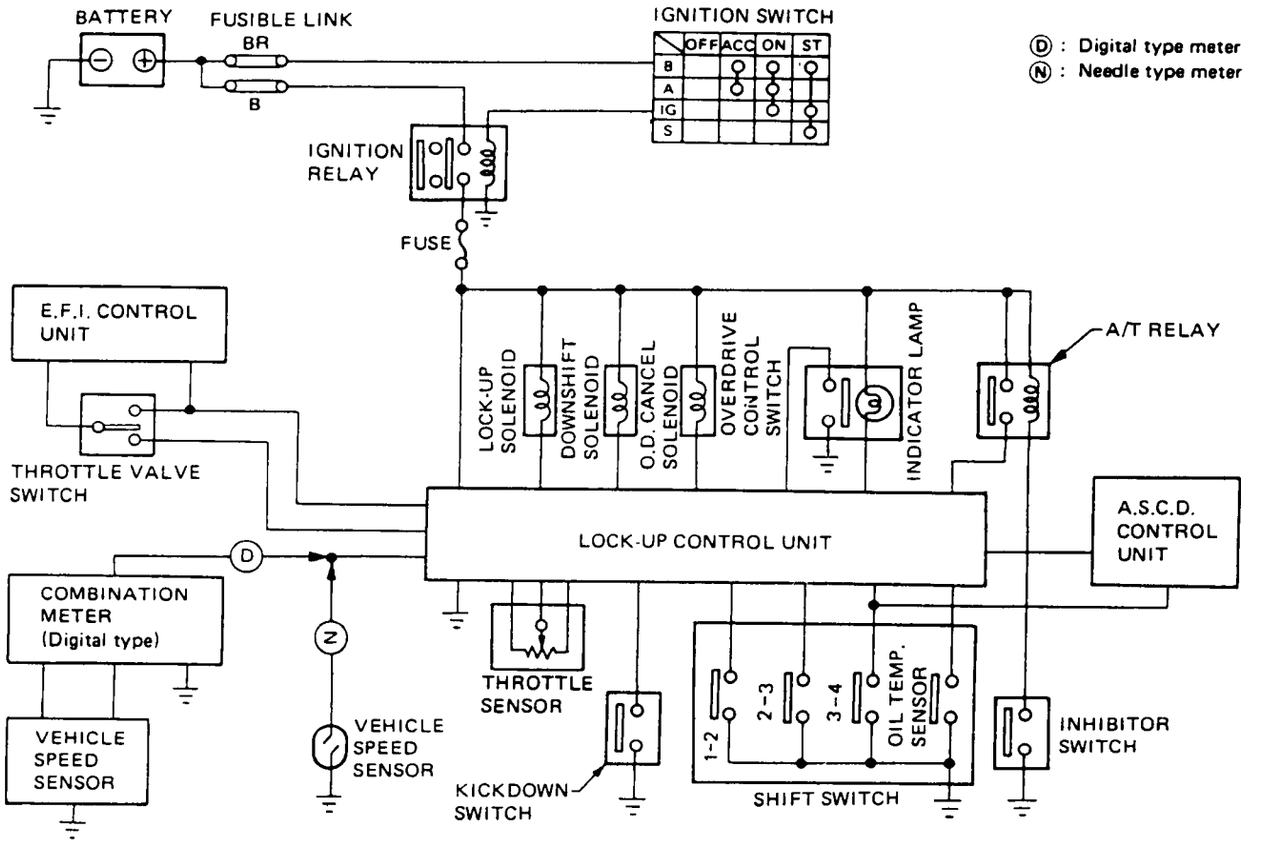
Trouble-shooting Chart (Cont'd)

Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transmission must be removed from the vehicle.

Reference		ON vehicle: Oil level	Range select linkage	Inhibitor switch and wiring	Vacuum diaphragm and piping	Kickdown solenoid, switch and wiring	Engine idling rpm	Line pressure	Control valve	Governor	2nd band servo	Transmission air check	Oil quality	Ignition switch and starter motor	Engine adjustment, brake inspection	O.D. band servo	O.D. control SW.	O.D. cancel solenoid	Lock-up solenoid	Lock-up control unit and sensors	OFF vehicle: Direct clutch	Forward clutch (Rear)	High-reverse clutch (Front)	O.D. band brake	2nd band brake	Low and reverse brake	Oil pump	Oil passage leak	Torque converter	Transmission one-way clutch	Park linkage	Planetary gear	O.D. cancel valve	Lock-up control valve	Accumulator	Rear lubrication
(A3)	Vehicle will not run in any range.	1	2	.	.	.	.	3	5	.	.	6	4	.	.	.	.	.	8	7	.	.	.	.	.	.	(9)	(10)	.	.	(11)	.	.	(12)	.	.
(A4)	Transmission noise in "D", "2", "1" and "R" ranges.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	(3)	.	(6)	(4)	.	(5)	.	.	.	.
(A5)	Failure to change from "3rd" to "2nd" when changing lever into "2" range.	.	1	.	.	.	.	2	4	.	5	.	3	.	.	.	.	.	.	.	.	.	.	(6)	.	.	(7)	.	.	.	.	.	.	.	.	.
	Gear change from "2" to "1st" or from "2nd" to "3rd" in "2" range.	.	1	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	No shock at change from "1" to "2" range or engine races extremely.	1	2	.	3	.	4	.	7	.	.	8	6	.	5	.	.	.	.	.	.	.	.	(9)	.	(10)	.	.	.	.	.	.	.	.	.	.
(A6)	Failure to change from "3rd" to "2nd" when shifting lever into "1" range.	.	1	.	.	.	.	2	4	5	7	6	3	.	.	.	.	.	.	.	.	.	(8)	.	(9)	.	.	(10)	.	.	.	.	.	.	.	.	.
(A7)	Engine brake does not operate in "1" range.	.	1	.	.	.	.	2	4	.	.	5	3	.	.	.	.	.	.	.	.	.	.	.	(6)	.	.	(7)	.	.	.	.	.	.	.	.	.
	Gear change from "1st" to "2nd" or from "2nd" to "3rd" in "1" range.	.	1	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	(3)	.	.	.	.	.	.	.	.	.
(A8)	Does not change from "2nd" to "1st" in "1" range.	1	2	.	.	.	.	.	4	5	6	7	3	.	.	.	.	.	.	.	.	.	.	.	(8)	.	.	(9)	.	.	.	.	.	.	.	.	.
(A9)	Large shock changing from "2nd" to "1st" in "1" range.	.	.	.	1	.	.	.	4	.	.	.	3	.	2	.	.	.	.	.	.	.	.	.	(5)	.	.	.	.	.	.	.	.	.	.	.	.
	Transmission overheats.	1	.	.	.	.	.	2	5	.	7	6	4	.	3	8	.	.	.	.	(10)	(9)	(11)	(13)	(12)	(14)	(15)	(16)	(17)	.	.	(18)	.	.	.	.	(19)
	Oil shoots out during operation. White smoke, emitted from exhaust pipe during operation.	1	.	.	2	.	.	4	6	.	.	7	3	.	5	.	.	.	.	.	(9)	(8)	(10)	(12)	(11)	(13)	(14)	(15)	(16)	.	.	(17)	.	.	.	.	(18)
	Offensive smell at oil charging pipe.	1	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	.	.	(12)	.	.	.	.	.
	Transmission shifts to overdrive even if O.D. control switch is turned to "ON"	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	3	.	.	.	.	.	.	.	.	.	.	.	.	(4)	.	.	.
	Lamp inside O.D. control switch does not glow even if ignition switch is turned to "ON" (engine not started).	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Lamp inside O.D. cancel switch does not glow even if transmission is shifted to O.D.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

TROUBLE-SHOOTING AND DIAGNOSES

E4N71B Electrical System/Schematic



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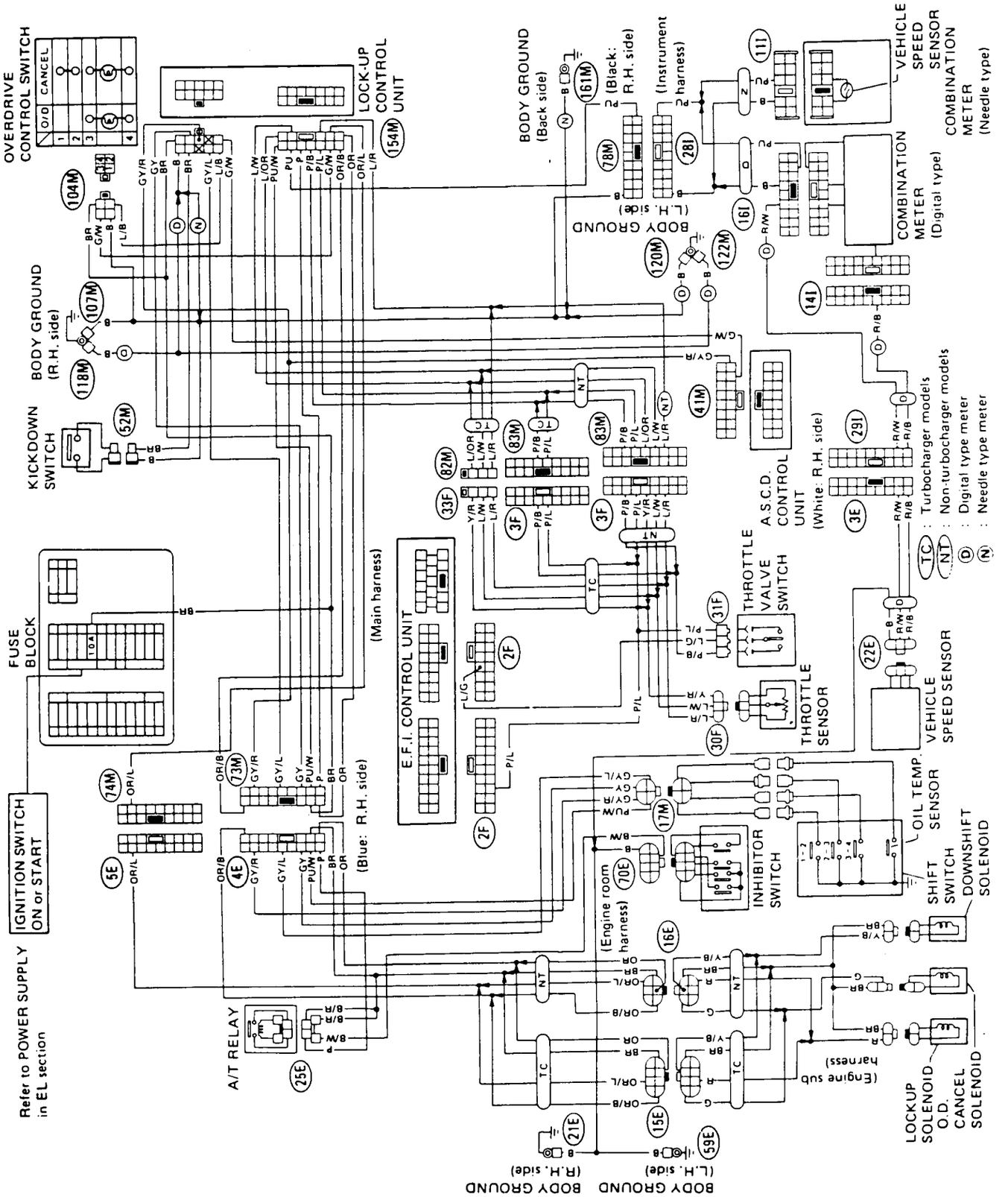
TROUBLE-SHOOTING AND DIAGNOSES

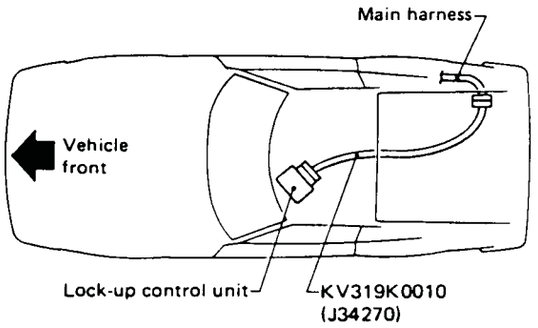
E4N71B Electrical System/Wiring Diagram



TROUBLE-SHOOTING AND DIAGNOSES

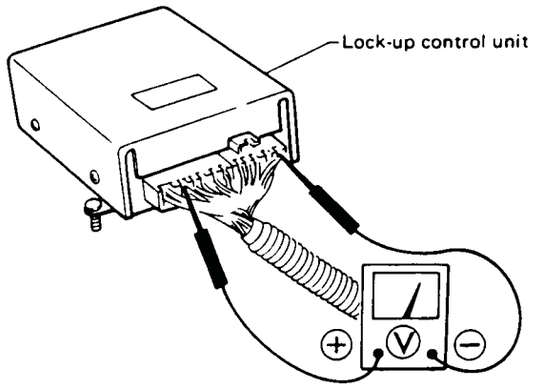
Inspection of A/T Control Unit

Check voltage between No. 22 terminal (Ground) and each terminal in the following table using tester and Tool (Diagnostic sub-harness).



1	2	3		4	5	13	(14)	15	16	17
6	7	8	9	10	11	12	18	19	(20)	21	22

(A/T control unit harness connector as seen from front)
Note: (14) and (20) is not used.



Terminal No.	Checking input/output signal	Checking method	Judgment standard
1	Downshift solenoid	Measure when depressing and releasing accelerator pedal while driving vehicle.	0V if turned on 12V if turned off
2	Lock-up solenoid	Measure while driving vehicle in "D" range.	0V if turned on 12V if turned off
3	Throttle sensor (power source)	Connect tester to terminals 3 and 5.	5V at all times
4	Throttle sensor	Measure while operating accelerator pedal.	Full-close throttle: 0.4V Full-open throttle: 4V
5	Throttle sensor (ground)	–	–
6	O.D. cancel solenoid	Measure while operating power shift switch.	0V if turned on 12V if turned off
7	O.D. indicator lamp	Measure while operating O.D. control switch.	0V if turned to "CANCEL" 12V if turned to "O/D"
8	Idle contact switch	Measure while operating accelerator pedal.	Full-close throttle: More than 4.8V Part-open throttle: 0V
9	Full throttle contact switch		Throttle opening Over 1/2: More than 4.8V Below 1/4: 0V
10	Inhibitor "2" range switch	Measure with control lever set to "2" range or other ranges.	12V if set to "2" range 0V if set to other ranges
11	Vehicle speed sensor	Check voltage variation while running vehicle over 1 m (3 ft) at very low speed.	Voltage must vary from 0V to approx. 5V.

TROUBLE-SHOOTING AND DIAGNOSES

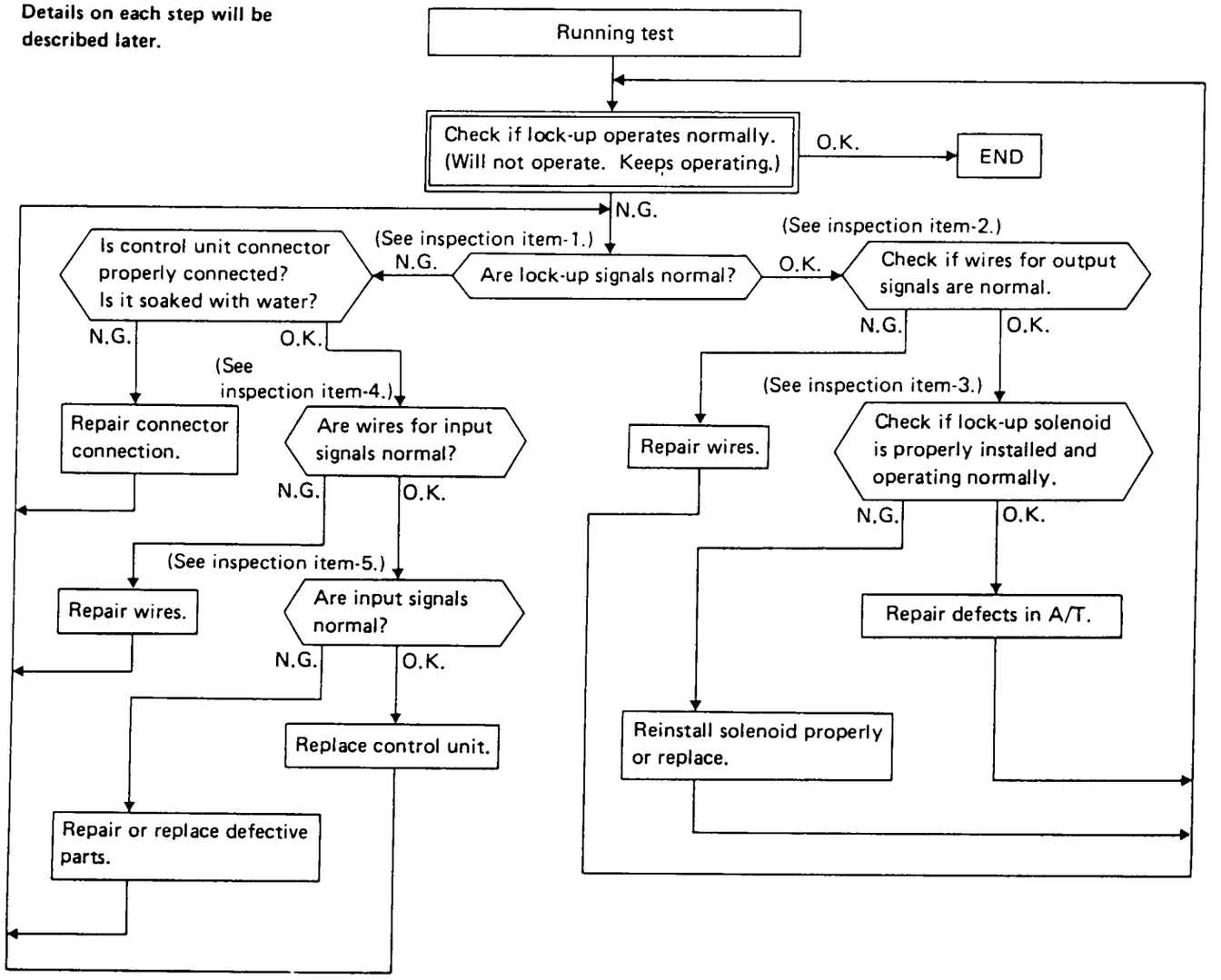
Inspection of A/T Control Unit (Cont'd)

Terminal No.	Checking input/output signal	Checking method	Judgment standard
12	1-2 shift switch	Jack up rear wheels, set lever to D range, and measure while accelerating with a slightly open throttle.	D1 range: 0V D2, D3, and D4 ranges: 5V
13	A.S.C.D. cruise signal	Measure by repeatedly releasing vehicle speed setting during A.S.C.D. driving.	12V if A.S.C.D. is set 0V if A.S.C.D. is released
14	–	–	–
15	A.S.C.D. O.D. cut signal	Measure by turning on and off accelerator switch during A.S.C.D. driving at D4 speed.	0V if accelerator switch is on 5V if accelerator switch is off
	3-4 shift switch	Jack up rear wheels, set lever to D range range, and measure while accelerating with a slightly open throttle.	D1, D2, and D3 ranges: 0V D4 range: 5V
16	2-3 shift switch		D1 and D2 ranges: 0V D3 and D4 ranges: 5V
17	Power source	Make ground connection.	12V at all times
18	O.D. control switch	Measure while operating O.D. control switch.	0V if turned to "CANCEL" 5V if turned to "O/D"
19	Low-temperature sensor	When checking in installed state, refer to the items on the right. Remove sensor from transmission and make continuity test.	Continuity test Zero continuity at 20°C (68°F) or higher Continuity at 10°C (50°F) or lower (Reference) 5V if oil temp. is over 20°C (68°F) 0V if oil temp. is below 10°C (50°F)
20	–	–	–
21	Kickdown switch	Measure while operating accelerator pedal.	Full-open accelerator: 0V Less than full open: 5V
22	Ground	–	–

TROUBLE-SHOOTING AND DIAGNOSES

Inspection of Lockup Control

Details on each step will be described later.



TROUBLE-SHOOTING AND DIAGNOSES

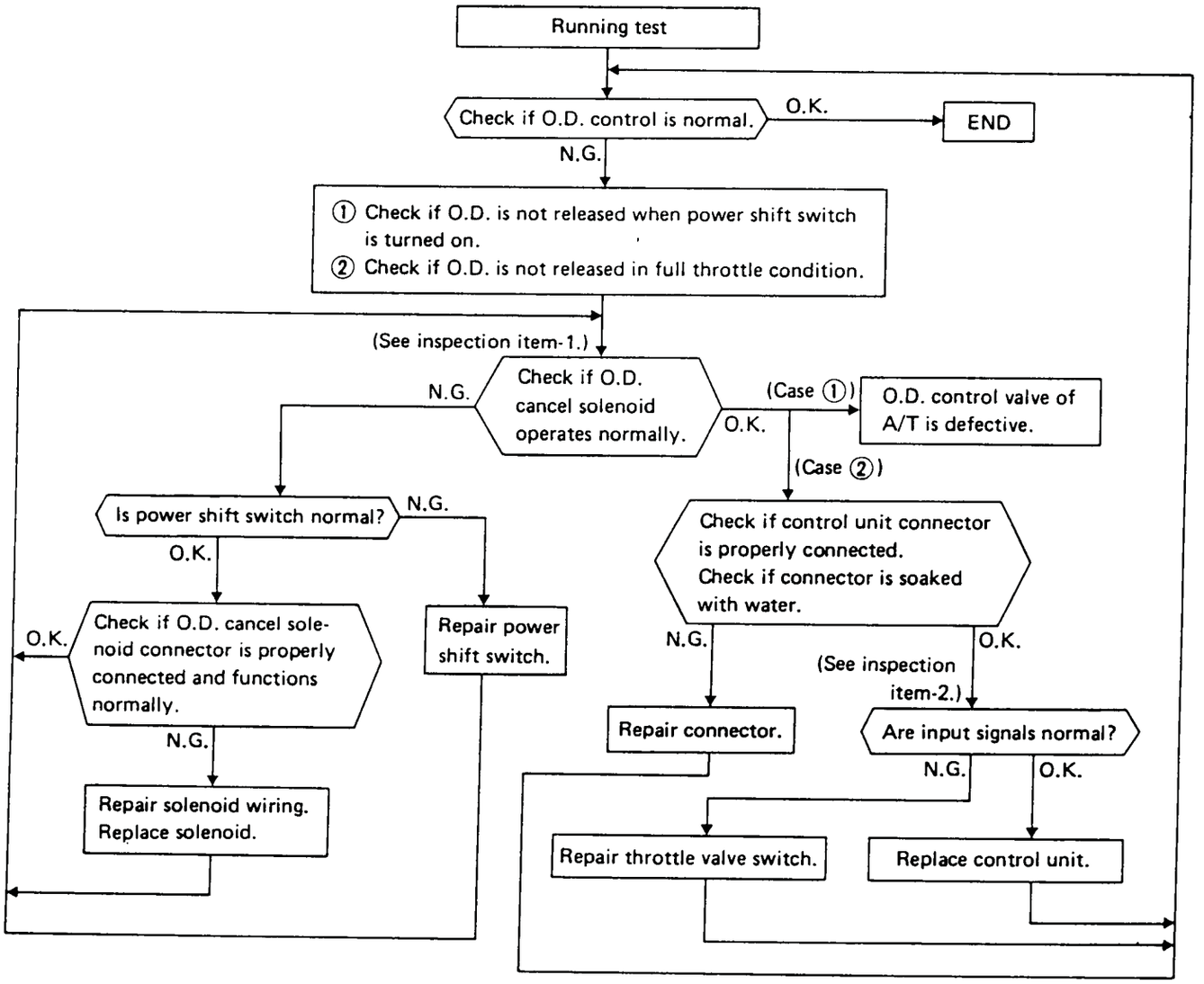
Inspection of Lockup Control (Cont'd)

INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	Lock-up signals	• Connect tester to control unit connector terminals, Nos. 2 and 22 and check lock-up signals while running vehicle. Proper indication: 0V if lock-up solenoid is on. 12V if lock-up solenoid is off.
2	Wires for output signals	Check if connector between control unit and lock-up solenoid is properly connected. Also, check connector for continuity.
3	Lock-up solenoid	• Check if O-ring is installed to tip of solenoid. • Check operation of solenoid by applying 12V voltage.
4	Wires for input signals	Check if connections are properly made between control unit and following sensors. Also, check connectors for conduction. • Throttle sensor (Idle, high-throttle side) • Inhibitor switch (2 range) • Shift switches (1-2, 2-3 and 3-4) • Low-temperature sensor • Kickdown switch • Vehicle speed sensor • O.D. switch
5	Input signals	Check items given on inspection-4 in chart on pages AT-74 and 75.

TROUBLE-SHOOTING AND DIAGNOSES

Inspection of O.D. Control

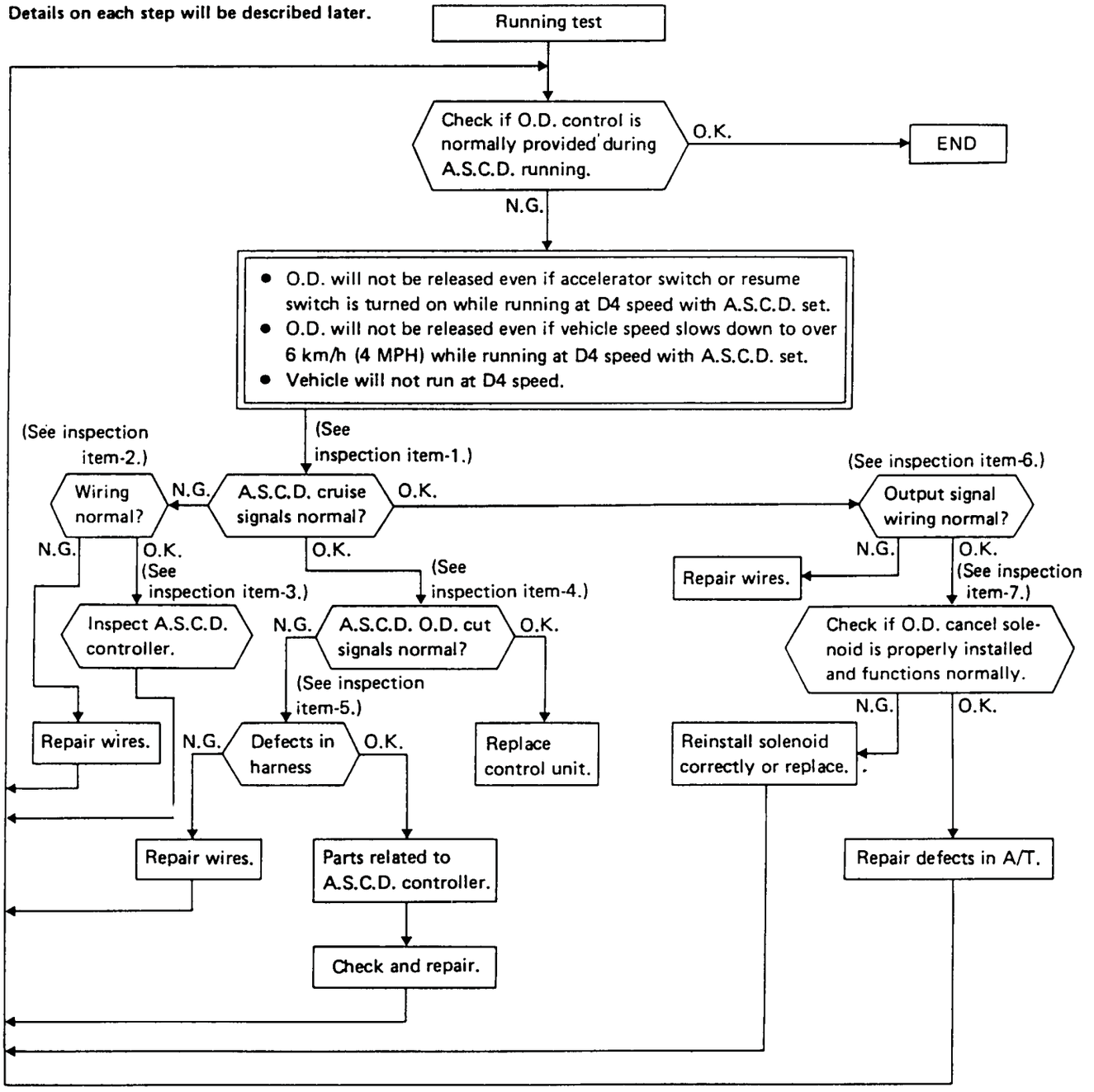


INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	O.D. solenoid	Turn on key and set O.D. switch to "O.D. release" position to see if O.D. solenoid clicks.
2	Input signals	Inspect following items given in flow chart on pages AT-74 and 75. • Shift switches (1-2, 2-3 and 3-4) • Vehicle speed sensor • Full throttle contact switch • Kickdown switch • Low-temperature sensor

TROUBLE-SHOOTING AND DIAGNOSES

Inspection of Parts Related to A.S.C.D.



TROUBLE-SHOOTING AND DIAGNOSES

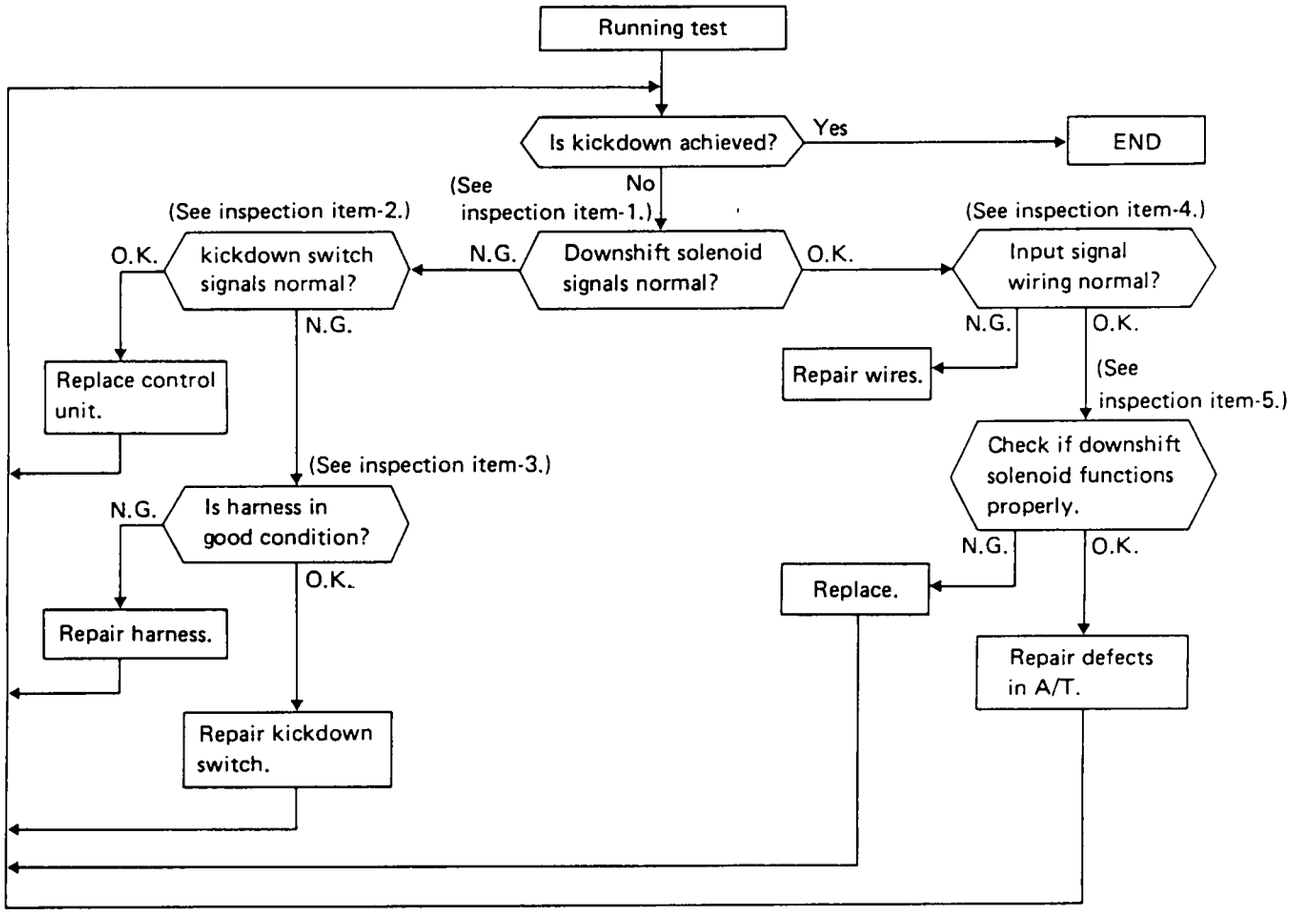
Inspection of Parts Related to A.S.C.D. (Cont'd)

INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	A.S.C.D. cruise signals	1. Connect tester to connector terminals, Nos. 13 and 22, of lock-up control unit. 2. Measure by repeatedly releasing vehicle speed setting during A.S.C.D. driving. Proper indication: A.S.C.D. is set: 12V A.S.C.D. is released: 0V
2	A.S.C.D. wiring harness	Refer to section EL for A.S.C.D.
3	A.S.C.D. controller	Refer to section EL for A.S.C.D.
4	A.S.C.D. O.D. cut signals	1. Connect tester to connector terminals, Nos. 15 and 22, of lock-up control unit. 2. Measure by repeatedly releasing vehicle speed setting during A.S.C.D. driving in D4 speed. Proper indication: Accelerator pedal is depressed: 0V Accelerator pedal is released: 5V
5	A.S.C.D. wiring harness	Refer to section EL for A.S.C.D.
6	Output signal wiring	Check connector between control unit and O.D. cancel solenoid for connections and continuity.
7	O.D. cancel solenoid	Apply 12V voltage to solenoid proper to see if it operates normally.

TROUBLE-SHOOTING AND DIAGNOSES

Inspection of Kickdown Control



INSPECTION POINTS

Inspection No.	Item to be checked	Checking method
1	Downshift solenoid signals	Listen for a "click" to be emitted by downshift solenoid when accelerator pedal is fully depressed and ignition switch is "ON".
2	Kickdown switch signals	Connect tester to connector terminals, Nos. 21 and 22, of lock-up control unit. Measure while operating accelerator pedal. Full-open accelerator: 0V Less than full open: 5V
3	Wires for kickdown switch	Check connector between kickdown switch and control unit for proper connection and continuity.
4	Input signal wiring	Check connector between downshift solenoid and control unit for proper connection and continuity.
5	Downshift solenoid	Apply 12V voltage to solenoid proper to see if it functions normally.

TROUBLE-SHOOTING AND DIAGNOSES

Troubles Detected by Self-diagnosing and Their Indication

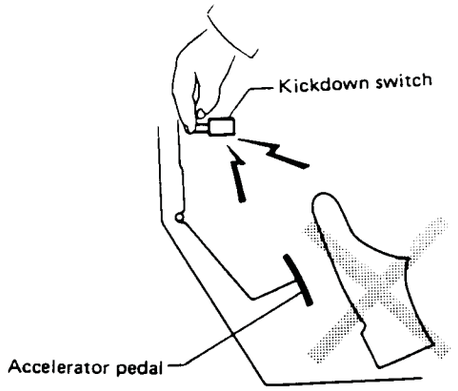
Trouble-shooting procedure

Before trouble-shooting the lock-up control unit, operate the self-diagnosis function as follows:

1. Turn O.D. control switch to "O/D".
2. Turn the ignition switch to "ON".

   Do not start the engine.

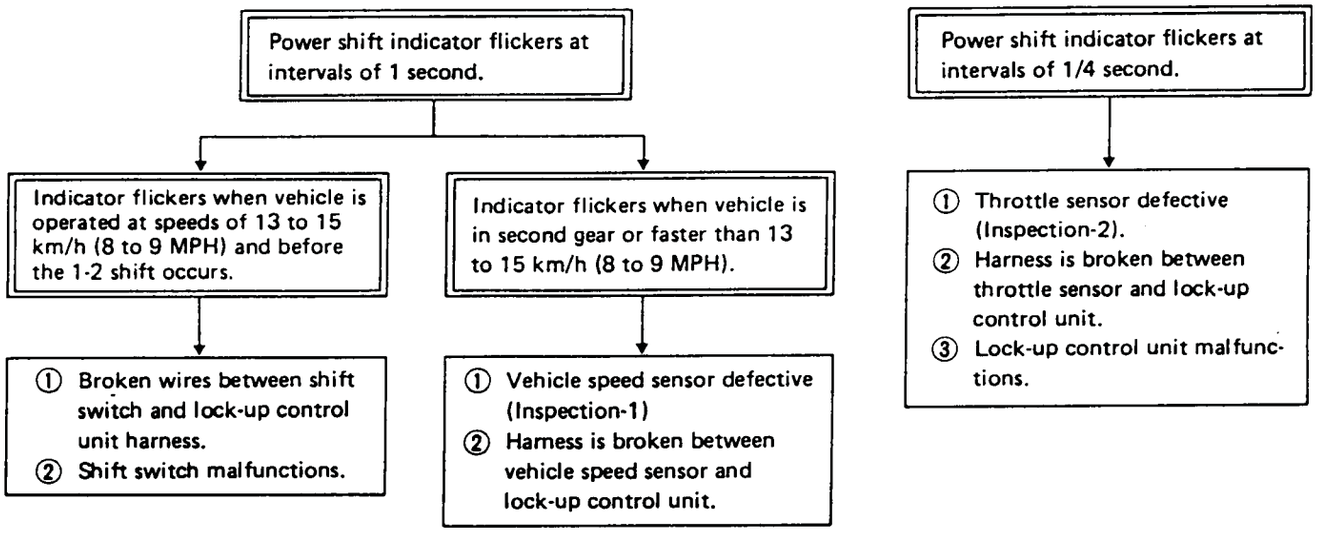
3. Press the kickdown switch to "ON" for at least one second.



4. Start the engine and run the vehicle about 20 km/h (12 MPH), and check to see whether or not an abnormal condition exists.

   Turning the ignition switch to "OFF" or "ACC" cancels the self-diagnosis function. If cancelled, repeat steps over again.

5. If an abnormal condition is indicated, track down the cause of the problem in accordance with the chart as shown below.



TROUBLE-SHOOTING AND DIAGNOSES

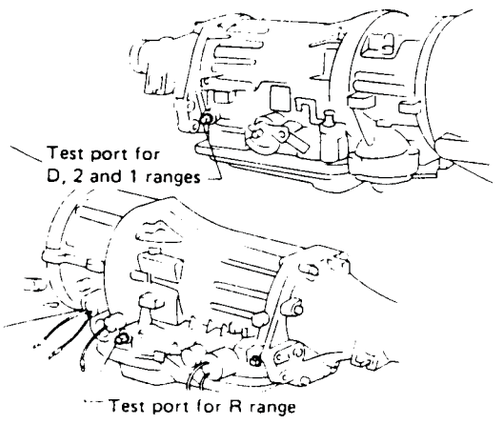
Troubles Detected by Self-diagnosing and Their Indication (Cont'd)

INSPECTION POINTS

No. of inspection	Checking item	Checking method
1	Vehicle speed sensor	1. Connect tester to connector terminals, Nos. 11 and 22, of lock-up control unit. 2. Check voltage variation by running vehicle over 1 m (3 ft) at very slow speed. Proper indication: Voltage must vary from 0V to over 5V.
2	Throttle sensor	1. Connect tester to connector terminals, Nos. 4 and 22, of lock-up control unit. 2. Measure voltage while operating accelerator pedal. Proper indication: Accelerator pedal in full-close throttle position: 0.4 V Accelerator pedal in full-open throttle position: 4V

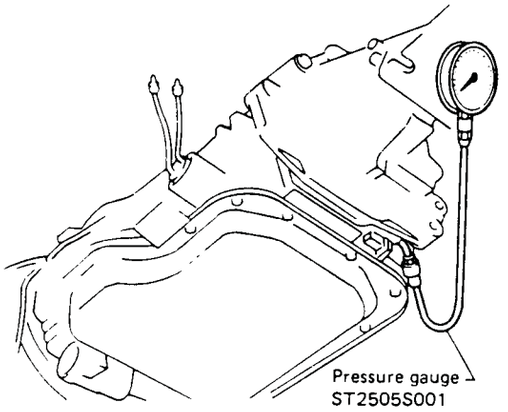
TROUBLE-SHOOTING AND DIAGNOSES

Pressure Testing



LINE PRESSURE

1. Install pressure gauge to line pressure port.



2. Warm up engine until engine oil and A.T.F. reach operating temperatures.

   A.T.F. temperature:
   50 - 80°C (122 - 176°F)

3. Set parking brake and block wheels.
4. Measure line pressure at idle and at stall point while depressing brake pedal fully.

At idling

VG30E engine without turbo

Range	Line pressure kPa (kg/cm^2, psi)
R	549 - 686 (5.6 - 7.0, 80 - 100)
D	314 - 373 (3.2 - 3.8, 46 - 54)
2	569 - 1,128 (5.8 - 11.5, 82 - 164)
1	314 - 373 (3.2 - 3.8, 46 - 54)

VG30E turbo engine

Range	Line pressure kPa (kg/cm^2, psi)
R	333 - 432 (3.4 - 4.4, 48 - 63)
D	255 - 353 (2.6 - 3.6, 37 - 51)
2	588 - 1,177 (6.0 - 12.0, 85 - 171)
1	255 - 355 (2.6 - 3.6, 37 - 51)

At stall test

1. Start engine and place select lever in "D" range.
2. Apply foot brake and accelerate to wide-open throttle.
3. Quickly note the line pressure and immediately release throttle.
4. Shift select lever to "N".
5. Cool off A.T.F.
6. Perform line pressure testing in the same manner as in steps 2 through 6 with select lever in "2", "1" and "R", respectively.

- Do not perform tests for more than five seconds at any shift range.
- Do not proceed to next "range" test immediately after one "range" test is done. Wait until oil temperature decreases.

TROUBLE-SHOOTING AND DIAGNOSES

Pressure Testing (Cont'd)

VG30E engine without turbo

Range	Line pressure kPa (kg/cm^2, psi)
R	2,187 - 2,373 (22.3 - 24.2, 317 - 344)
D	1,157 - 1,275 (11.8 - 13.0, 168 - 185)
2	1,157 - 1,275 (11.8 - 13.0, 168 - 185)
1	1,157 - 1,275 (11.8 - 13.0, 168 - 185)

VG30E turbo engine

Range	Line pressure kPa (kg/cm^2, psi)
R	2,148 - 2,442 (21.9 - 24.9, 311 - 354)
D	1,824 - 1,981 (18.6 - 20.2, 264 - 287)
2	1,824 - 1,981 (18.6 - 20.2, 264 - 287)
1	1,824 - 1,981 (18.6 - 20.2, 264 - 287)

Judgment by measuring line pressure

If line pressure does not rise, first check to make sure that vacuum hose is connected properly.

1) When line pressure is low at all positions, the problem may be due to:
- Wear on interior of oil pump
- Oil leakage at or around oil pump, control valve body, transmission case or governor
- Sticking pressure regulator valve
- Sticking pressure modifier valve

2) When line pressure is low at a particular position, the problem may be due to the following:
- If oil leaks at or around forward clutch (rear) or governor, line pressure is low in "D", "2" or "1" range but is normal in "R" range.
- If oil leaks at or around low and reverse brake circuit, line pressure becomes low in "R" or "P" range but is normal in "D", "2" or "1" range.

3) When line pressure is high, pressure regulator valve may have stuck.

TROUBLE-SHOOTING AND DIAGNOSES

Stall Testing

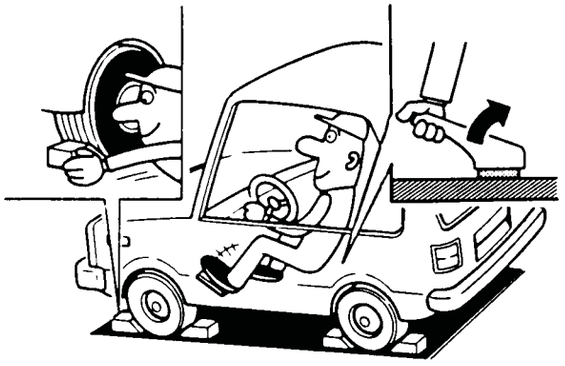
The stall test is an effective method of testing clutch and band holding ability, torque converter one-way clutch operation, and engine performance. A stall test should only be performed as a last resort because of the high fluid temperature it generates and the excessive load it places on the engine and transmission.

CAUTION:

a. **Transmission and engine fluid levels should always be checked and fluid added as needed.**
b. **Run engine to attain proper warm-up.**
c. **During test, never hold throttle wide-open for more than 5 seconds.**
d. **Do not test more than two gear ranges without driving vehicle to cool off engine and transmission.**

STALL TEST PROCEDURE

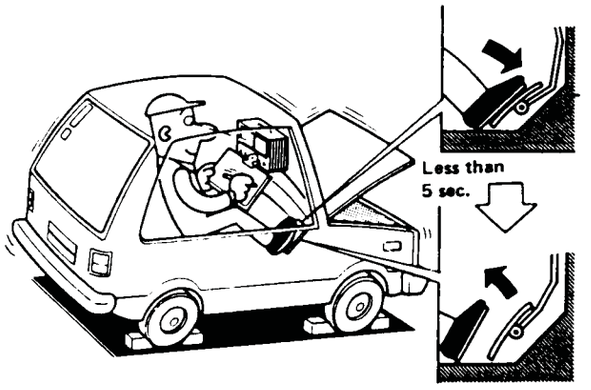
1. Set parking brake and block wheels.



2. Install a tachometer where it can be seen by driver during test.
3. Start engine and place select lever in "D" range.
4. Apply foot brake and accelerate to wide-open throttle.
5. Quickly note the engine stall speed and immediately release throttle.

Stall revolution:

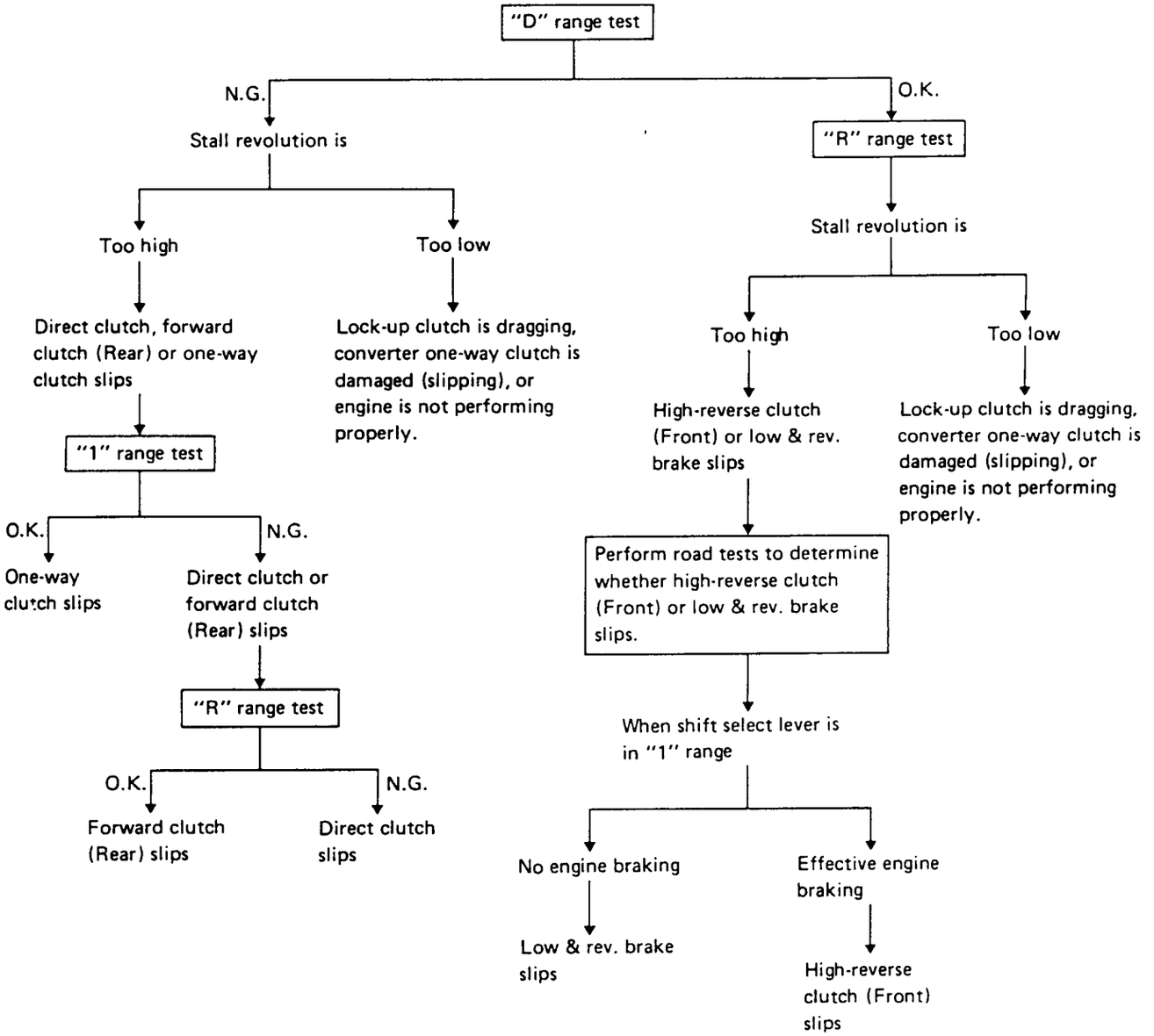
VG30E engine without turbo
2,150 - 2,450 rpm
VG30E turbo engine
2,500 - 2,800 rpm



6. Shift select lever to "N".
7. Cool off A.T.F.
8. Perform stall tests in the same manner as in steps 3 through 7 with select lever in "1" and "R", respectively.

TROUBLE-SHOOTING AND DIAGNOSES

STALL TEST ANALYSIS



If converter one-way clutch is stuck, vehicle will have poor high speed performance and low engine rpm when it is raced in "N" range. If converter one-way clutch is slipping, vehicle will be sluggish up to 50 or 60 km/h (30 or 40 MPH).

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

General Specifications

Engine model	VG30E	VG30E turbo
Automatic transmission model	E4N71B	
Transmission model code number	X8084	X8179
Stall torque ratio	2.0 : 1	
Transmission gear ratio 1st 2nd Top O.D. Reverse	 2.458 1.458 1.000 0.686 2.182	
Recommended oil	Automatic transmission fluid "Dexron" type	
Oil capacity	7.0 liters (7-3/8 US qt, 6-1/8 Imp qt)	

Specifications and Adjustment

Transmission model code number	X8084	X8179
Torque converter assembly Stamped mark on the torque converter	GXA	G
Direct clutch Number of drive plates	2	2
Number of driven plates	2	2
Clearance mm (in) Standard Allowable limit	 0 - 0.2 (0 - 0.008) 0.2 (0.008)	
Drive plate thickness mm (in) Standard Allowable limit	 1.50 - 1.65 (0.0591 - 0.0650) 1.4 (0.055)	

Thickness of race side	Thickness mm (in)	Part number
	0.4 (0.016)	31606-X8501
	0.6 (0.024)	31606-X8502
	0.8 (0.031)	31606-X8500
	1.0 (0.039)	31606-X8503
	1.2 (0.047)	31606-X8504

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

Specifications and Adjustment (Cont'd)

Transmission model code number	X8084	X8179
Front clutch (High-reverse)		
Number of drive plates	3	4
Number of driven plates	5	5
Clearance mm (in)		
Standard	1.6 - 1.8 (0.063 - 0.071)	
Allowable limit	2.2 (0.087)	2.4 (0.094)
Drive plate thickness mm (in)		
Standard	1.50 - 1.65 (0.0591 - 0.0650)	
Allowable limit	1.4 (0.055)	
Thickness of retaining plate	Thickness mm (in) / Part number	
	5.0 (0.197)	31567-X2900
	5.2 (0.205)	31567-X2901
	5.4 (0.213)	31567-X2902
	5.6 (0.220)	31567-X2903
	5.8 (0.228)	31567-X2904
	6.0 (0.236)	31567-X2905
	6.2 (0.244)	31567-X2906
Rear clutch (Forward)		
Number of drive plates	6	6
Number of driven plates	6	6
Clearance mm (in)		
Standard	0.8 - 1.0 (0.031 - 0.039)	0.8 - 1.0 (0.031 - 0.039)
Allowable limit	1.5 (0.059)	1.5 (0.059)
Drive plate thickness mm (in)		
Standard	1.50 - 1.65 (0.0591 - 0.0650)	
Allowable limit	1.4 (0.055)	
Thickness of retaining plate	Thickness mm (in) / Part number	
	6.2 (0.244)	31567-X2906
	6.4 (0.252)	31507-X8600
	6.6 (0.260)	31507-X8601
	6.8 (0.268)	31537-X2800
	7.0 (0.276)	31537-X2801
	7.2 (0.283)	31537-X0900
	7.4 (0.291)	31537-X0901
	7.6 (0.295)	31537-X0902

Transmission model code number	X8084	X8179
Low & reverse brake		
Number of drive plates	6	8
Number of driven plates	6	8
Clearance mm (in)		
Standard	0.80 - 1.05 (0.0315 - 0.0413)	
Allowable limit	2.0 (0.079)	2.4 (0.094)
Drive plate thickness mm (in)		
Standard	1.90 - 2.05 (0.0748 - 0.0807)	
Allowable limit	1.8 (0.071)	
Thickness of retaining plate	Thickness mm (in) / Part number	
	11.8 (0.465)	31667-X0300
	12.0 (0.472)	31667-X0301
	12.2 (0.480)	31667-X0302
	12.4 (0.488)	31667-X0303
	12.6 (0.496)	31667-X0304
	12.8 (0.504)	31667-X0305
Thickness of retaining plate	Thickness mm (in) / Part number	
	9.8 (0.386)	31667-X2900
	10.0 (0.394)	31667-X2901
	10.2 (0.402)	31667-X2902
	10.4 (0.409)	31667-X2903
	10.6 (0.417)	31667-X2904
	10.8 (0.425)	31667-X2905
2nd brake band		
Piston size mm (in)		
Big dia.	72 (2.83)	80 (3.15)
Small dia.	50 (1.97)	44 (1.73)
O.D. brake band		
Piston size mm (in)		
Big dia.	60 (2.36)	60 (2.36)
Small dia.	40 (1.57)	40 (1.57)
Front end play mm (in)	0.5 - 0.8 (0.020 - 0.031)	
Thickness of high-reverse clutch (Front) thrust washer	Thickness mm (in) / Part number	
	1.3 (0.051)	31528-X0107
	1.5 (0.059)	31528-X0105
	1.7 (0.067)	31528-X0106
	1.9 (0.075)	31528-X0100
	2.1 (0.083)	31528-X0101
	2.3 (0.091)	31528-X0102
	2.5 (0.098)	31528-X0103
	2.7 (0.106)	31528-X0104

SERVICE DATA AND SPECIFICATIONS (S.D.S.)

Specifications and Adjustment (Cont'd)

Total end play mm (in)	0.25 - 0.50 (0.0098 - 0.0197)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	1.2 (0.047)	31556-X0100
	1.4 (0.055)	31556-X0101
	1.6 (0.063)	31556-X0102
	1.8 (0.071)	31556-X0103
	2.0 (0.079)	31556-X0104
	2.2 (0.087)	31556-X0105
O.D. pack end play mm (in)	0.5 - 0.8 (0.020 - 0.031)	
Thickness of O.D. thrust washer	Thickness mm (in)	Part number
	1.3 (0.051)	31528-X8607
	1.5 (0.059)	31528-X8605
	1.7 (0.067)	31528-X8606
	1.9 (0.075)	31528-X8600
	2.1 (0.083)	31528-X8601
	2.3 (0.091)	31528-X8602
	2.5 (0.098)	31528-X8603
	2.7 (0.106)	31528-X8604
O.D. total end play mm (in)	0.25 - 0.50 (0.0098 - 0.0197)	
Thickness of O.D. bearing race	Thickness mm (in)	Part number
	1.2 (0.047)	31603-X8600
	1.4 (0.055)	31603-X8601
	1.6 (0.063)	31603-X8602
	1.8 (0.071)	31603-X8603
	2.0 (0.079)	31603-X8604
	2.2 (0.087)	31603-X8605

Oil pump clearance mm (in)	
Outer gear-pump housing	
Standard	0.05 - 0.20 (0.0020 - 0.0079)
Allowable limit	0.25 (0.0098)
Outer gear-crescent	
Standard	0.14 - 0.21 (0.0055 - 0.0083)
Allowable limit	0.25 (0.0098)
Gears-pump cover	
Standard	0.02 - 0.04 (0.0008 - 0.0016)
Allowable limit	0.08 (0.0031)
Drum support	
Seal ring-ring groove	
Standard	0.05 - 0.20 (0.0020 - 0.0079)
Allowable limit	0.20 (0.0079)
Oil distributor	
Seal ring-ring groove	
Standard	0.04 - 0.16 (0.0016 - 0.0063)
Allowable limit	0.16 (0.0063)
Planetary carrier mm (in)	
Clearance between pinion washer and planetary carrier	
Standard	0.20 - 0.70 (0.0079 - 0.0276)
Allowable limit	0.80 (0.0315)
Run-out of oil pump cover to housing mm (in)	Less than 0.07 (0.0028)
Run-out of drum support to O.D. case mm (in)	Less than 0.05 (0.0020)

STALL REVOLUTION

VG30E engine without turbo	2,150 - 2,450 rpm
VG30E turbo engine	2,500 - 2,800 rpm

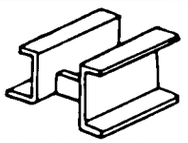
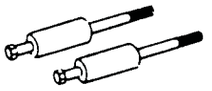
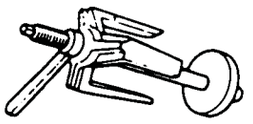
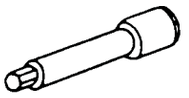
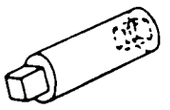
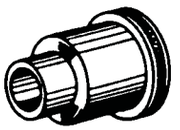
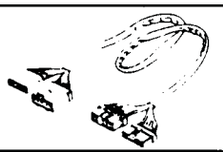
SERVICE DATA AND SPECIFICATIONS (S.D.S.)

Tightening Torque

Unit	N·m	kg-m	ft-lb
Transmission installation			
Drive plate to Crankshaft	137 - 157	14.0 - 16.0	101 - 116
Drive plate to torque converter	39 - 49	4.0 - 5.0	29 - 36
Converter housing to engine	39 - 49	4.0 - 5.0	29 - 36
Rear mounting bracket to transmission	31 - 42	3.2 - 4.3	23 - 31
Rear mounting bracket to rear insulator	31 - 42	3.2 - 4.3	23 - 31
Rear mounting member to body	59 - 78	6.0 - 8.0	43 - 58
Component part			
Transmission case to converter housing	44 - 54	4.5 - 5.5	33 - 40
Transmission case to rear extension	20 - 25	2.0 - 2.5	14 - 18
Oil pan to transmission case	5 - 7	0.5 - 0.7	3.6 - 5.1
2nd servo piston retainer to transmission case	7 - 9	0.7 - 0.9	5.1 - 6.5
2nd piston stem (when adjusting band brake)	12 - 15*1	1.2 - 1.5*1	9 - 11*1
2nd piston stem lock nut	15 - 39	1.5 - 4.0	11 - 29
One-way clutch inner race to transmission case	13 - 18	1.3 - 1.8	9 - 13
Control valve body to transmission case	5.4 - 7.4	0.55 - 0.75	4.0 - 5.4
Lower valve body to upper valve body	2.5 - 3.4	0.25 - 0.35	1.8 - 2.5
O.D. servo piston retainer to O.D. case	10 - 15	1.0 - 1.5	7 - 11
O.D. piston stem (when adjusting band brake)	7 - 10*2	0.7 - 1.0*2	5.1 - 7.2*2
O.D. piston stem lock nut	15 - 39	1.5 - 4.0	11 - 29
Side plate to control valve body	2.5 - 3.4	0.25 - 0.35	1.8 - 2.5
Nut for control valve reamer bolt	5 - 7	0.5 - 0.7	3.6 - 5.1
Oil strainer to lower valve body	3 - 4	0.3 - 0.4	2.2 - 2.9
Governor valve body to oil distributor	5 - 7	0.5 - 0.7	3.6 - 5.1
Oil pump housing to oil pump cover	6 - 8	0.6 - 0.8	4.3 - 5.8
Inhibitor switch to transmission case	5 - 7	0.5 - 0.7	3.6 - 5.1
Manual shaft lock nut	29 - 39	3.0 - 4.0	22 - 29
Oil cooler pipe to transmission case	29 - 49	3.0 - 5.0	22 - 36
Test plug (oil pressure inspection hole)	14 - 21	1.4 - 2.1	10 - 15
Support actuator (parking rod inserting position) to rear extension	8 - 11	0.8 - 1.1	5.8 - 8.0
Drum support to O.D. case	7 - 9	0.7 - 0.9	5.1 - 6.5

*1 Turn back three turns after tightening.
*2 Turn back two turns after tightening.

SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No.) Tool name	Tool
ST07870000 (–) (ST07860000) (–) Transmission case stand	
ST25850000 (J25721-A) Sliding hammer	
GG91060000 (–) (GG93010000) (J25703) Torque wrench	
ST25420001 (J26063) (ST25420000) (J26063-A) Clutch spring compressor	
ST25570001 (J23659-A) (ST25570000) (J23659-1) Hex-head extension	
ST25490000 (–) (ST25512001) (–) Socket extension	
ST25580001 (–) Oil pump assembling gauge	
ST2505S001 (–) Oil pressure gauge set	
KV319K0010 (J34270) Diagnostic sub-harness	
(J33909) Transmission alignment arbor