

# AUTOMATIC TRANSMISSION

## SECTION **AT**

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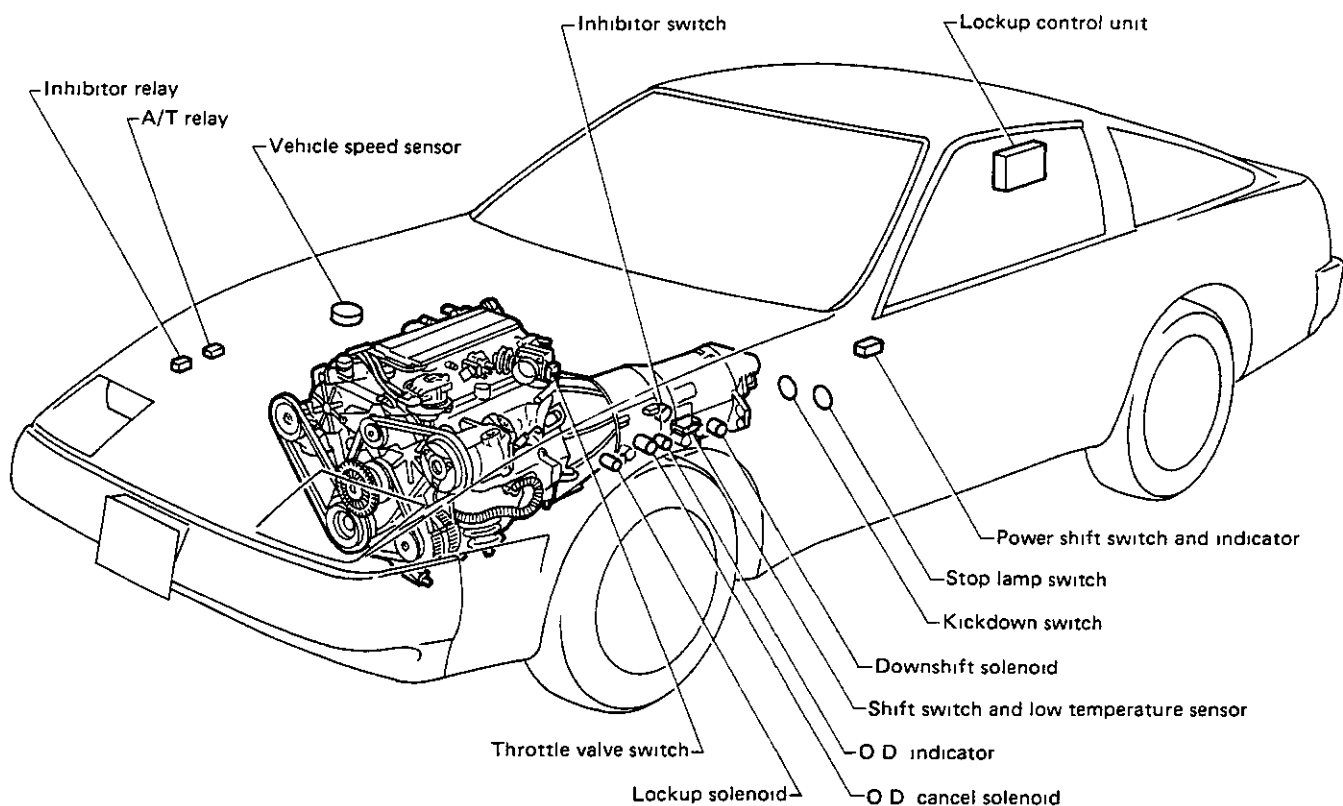
# DESCRIPTION OF E4N71B

The Model E4N71B automatic transmission is the latest addition to Nissan's line-up of transmissions. This transmission is based on the model L4N71B (mounted on the 1983 model 810), and can provide lockup of all forward speeds (1st to 4th speed) by electronic control.

By use of a microcomputer, the electronic-controlled lockup system permits lockup of all forward

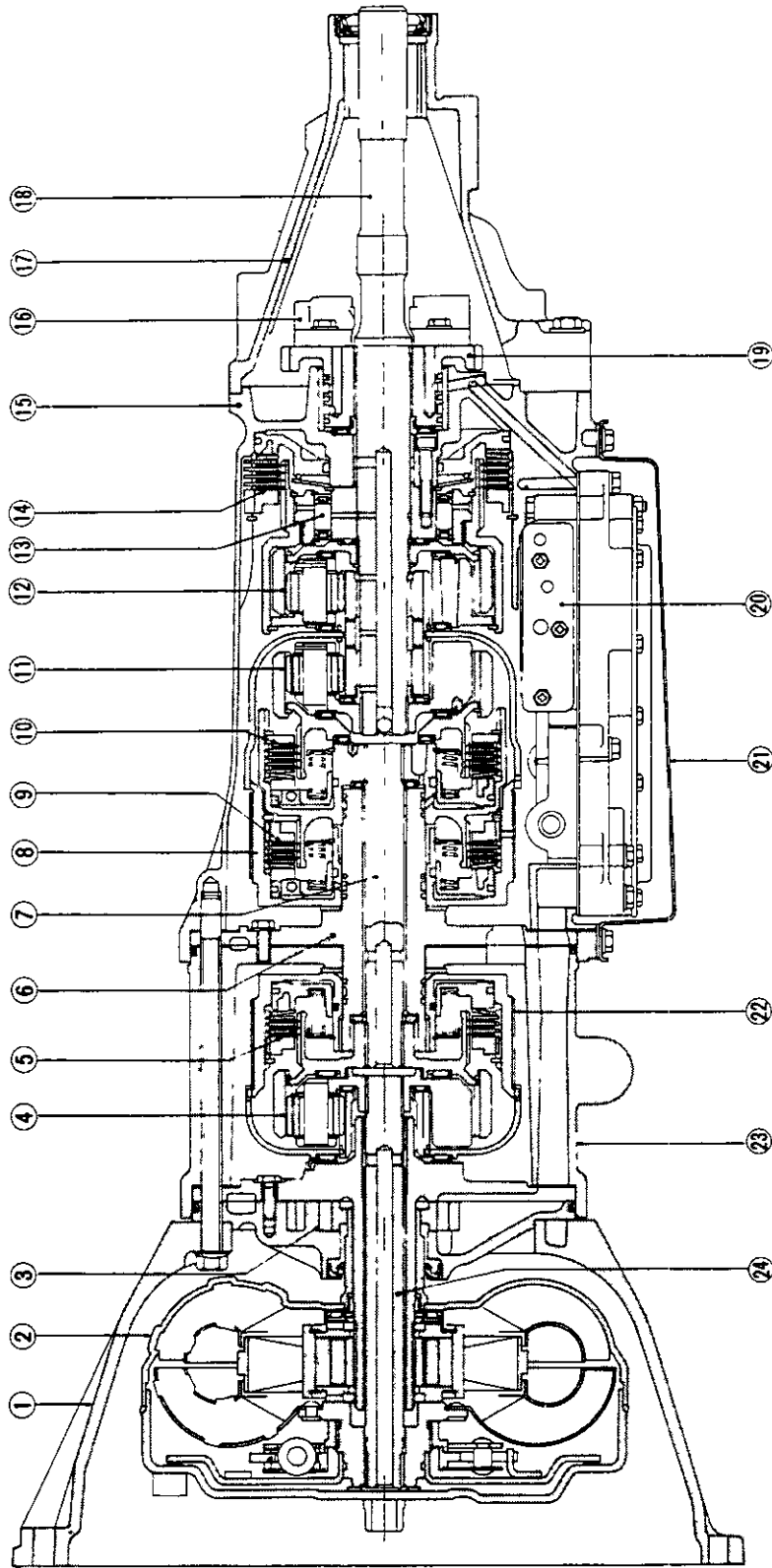
speeds (1st to 4th speed)

Either shifting pattern ("standard" or "power") is automatically selected by programs set in the lockup control unit depending on the speed at which the accelerator pedal is depressed. These programs are set in response to the vehicle speed and throttle position.



SAT704

# DESCRIPTION OF E4N71B



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

# 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.

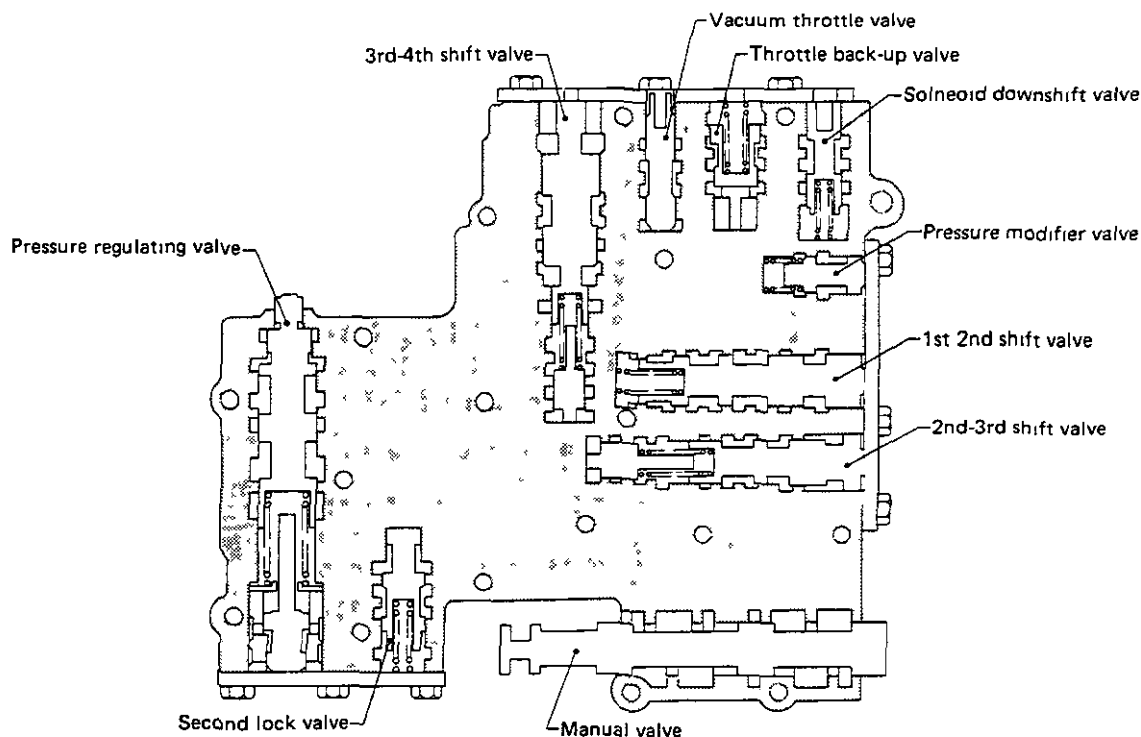
- Before assembly, apply a coat of recommended A.T.F. to all parts. Vaseline may be applied to O-rings and seals. Do not use any grease.
- Care should be taken to avoid damaging O-rings, seals and gaskets when assembling.

Abbreviations used throughout this section stand for the following.

- A.T.F. ... Automatic transmission fluid
- D<sub>1</sub> ..... Drive range 1st gear
- D<sub>2</sub> .... .. Drive range 2nd gear
- D<sub>3</sub> .. ... Drive range 3rd gear
- D<sub>4</sub> ..... Drive range 4th gear
- O.D. .... Overdrive
- 1<sub>2</sub> ..... 1 range 2nd gear
- 1<sub>1</sub> . . .... 1 range 1st gear

## Control Valve

### CONTROL VALVE UPPER BODY



SAT742

# GENERAL SERVICE NOTICE

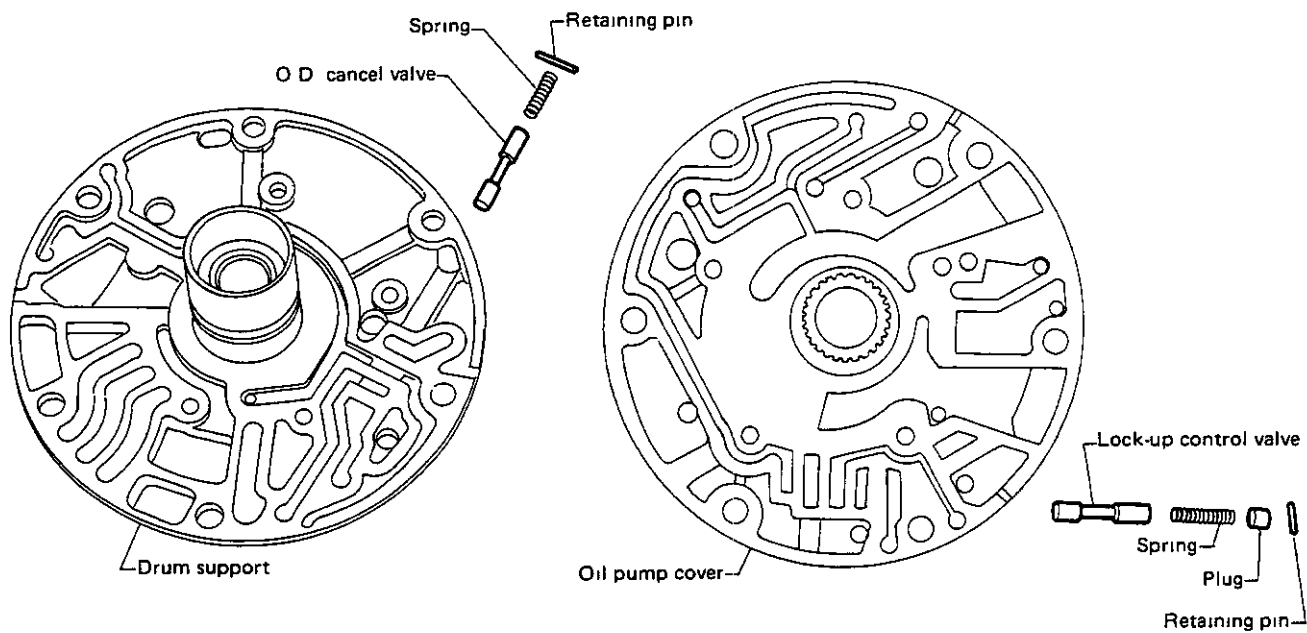
## Control Valve (Cont'd)

### CONTROL VALVE LOWER BODY



SAT705

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



SAT498

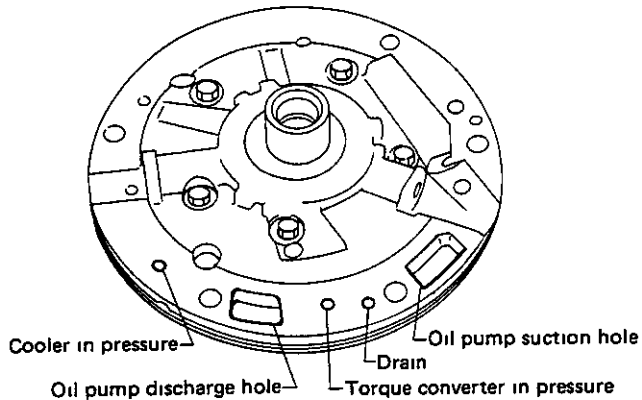
# GENERAL SERVICE NOTICE

## Oil Channel

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

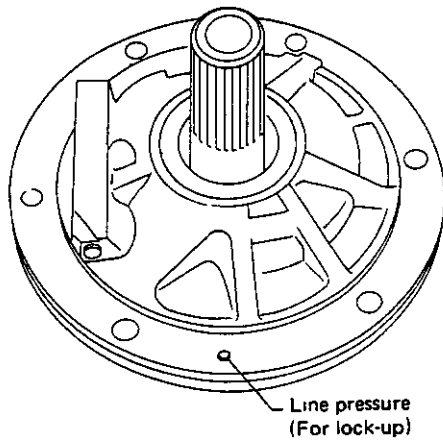
### OIL CHANNELS IN OIL PUMP

Oil pump cover side



SAT499

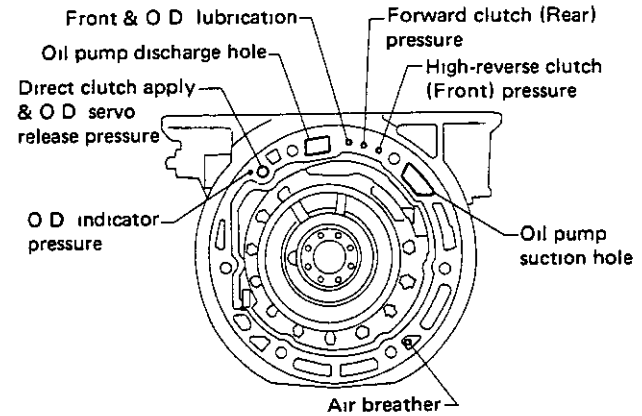
Oil pump housing side



SAT500

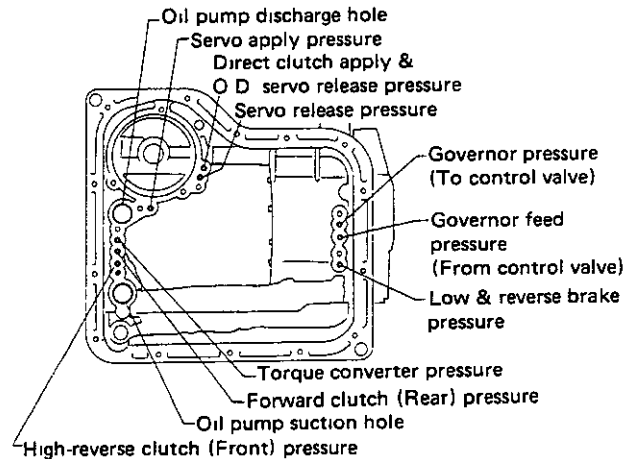
### OIL CHANNELS IN TRANSMISSION CASE

Front face side



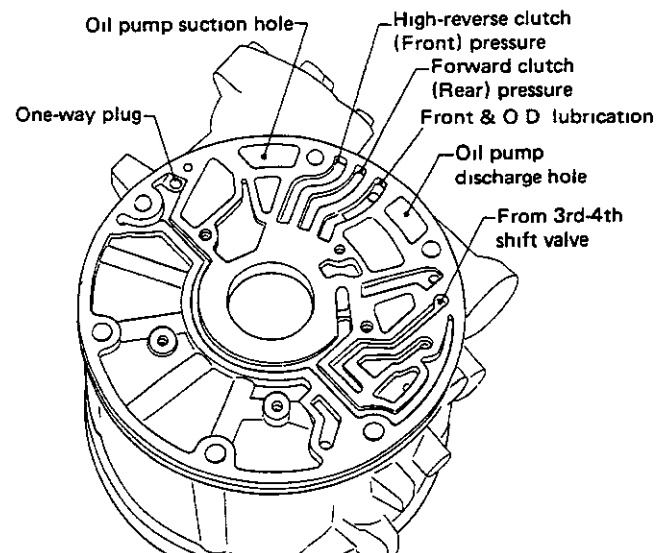
SAT501

Lower face side



SAT502

### OIL CHANNELS IN O.D. CASE



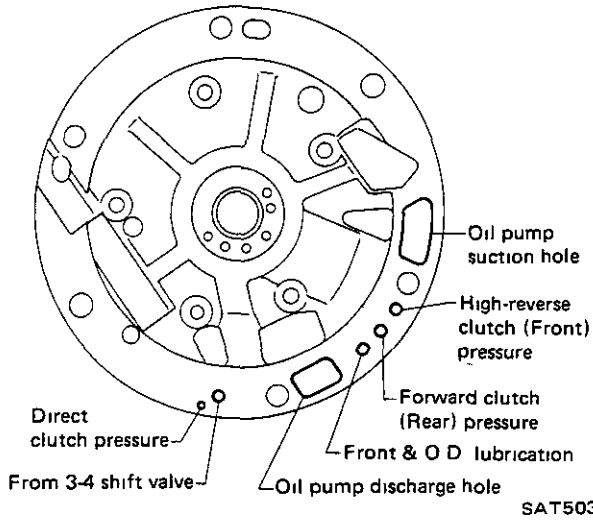
In regards to one-way plug, refer to page AT-32.

SAT645

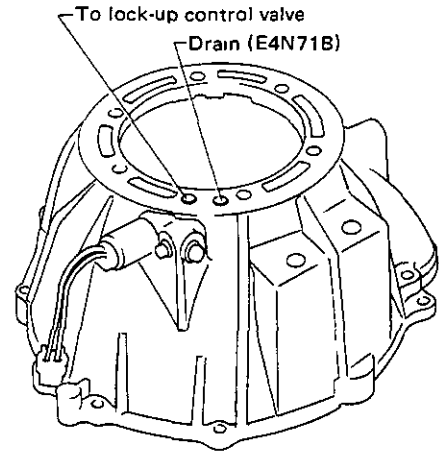
# GENERAL SERVICE NOTICE

## Oil Channel (Cont'd)

### OIL CHANNELS IN DRUM SUPPORT



### OIL CHANNELS IN CONVERTER HOUSING



SAT706

## Mechanical Operation

In the E4N71B and 4N71B automatic transmission, each part operates as shown in the following table at each gear select position

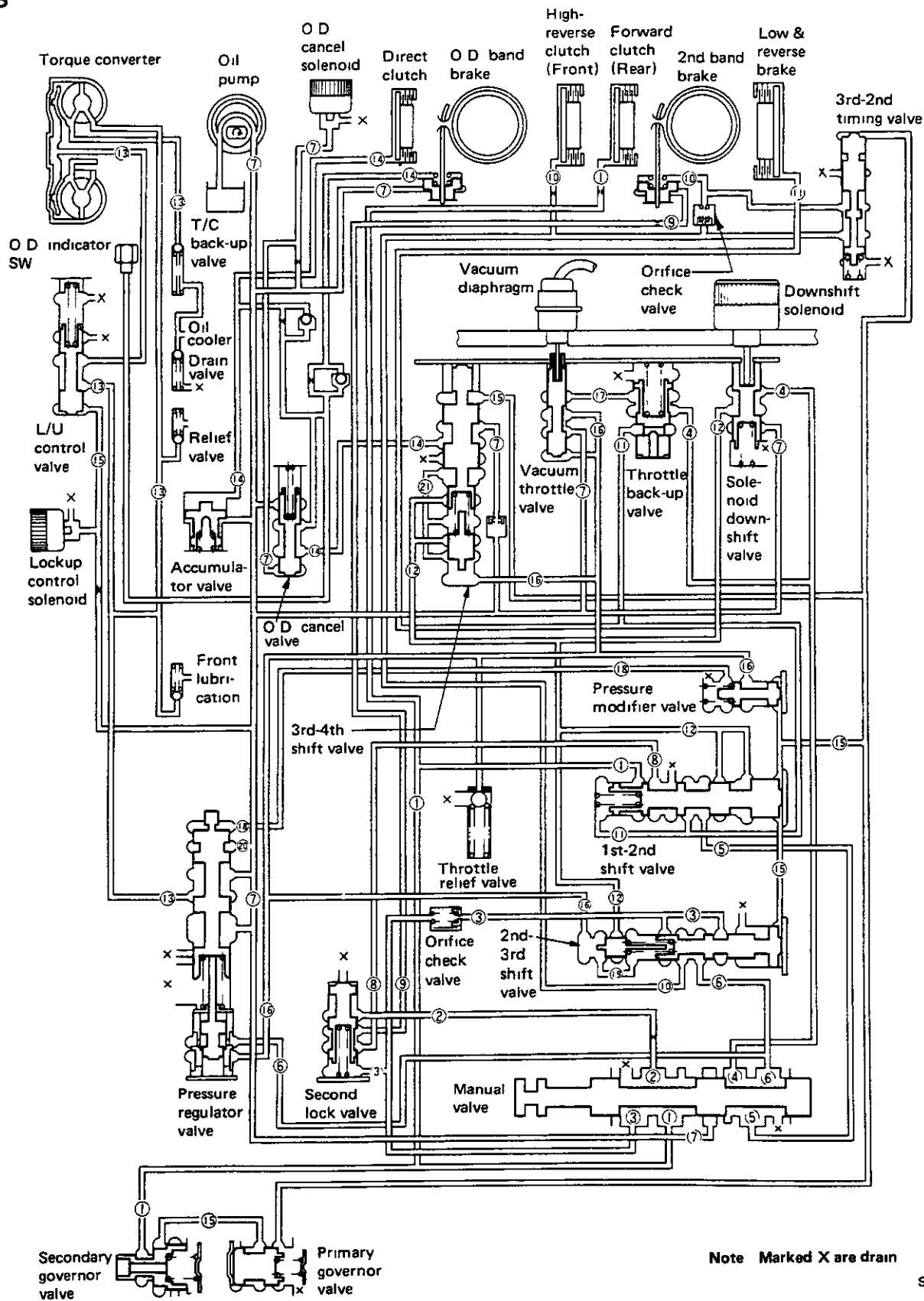
Range	Direct clutch	O D band servo		High-reverse clutch (Front)	Forward clutch (Rear)	Low & reverse brake	2nd band servo		One-way clutch	Parking pawl
		Apply	Release				Apply	Release		
Park	ON	(ON)	ON			ON				ON
Reverse	ON	(ON)	ON	ON		ON		ON		
Neutral	ON	(ON)	ON							
D	D <sub>1</sub> (Low)	ON	(ON)	ON	ON				ON	
	D <sub>2</sub> (Second)	ON	(ON)	ON	ON		ON			
	D <sub>3</sub> (Top)	ON	(ON)	ON	ON		(ON)	ON		
	D <sub>4</sub> (O D)		ON		ON		(ON)	ON		
2	Second	ON	(ON)	ON	ON		ON			
1	1 <sub>2</sub> (Second)	ON	(ON)	ON	ON		ON			
	1 <sub>1</sub> (Low)	ON	(ON)	ON	ON	ON			ON	

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

# GENERAL SERVICE NOTICE

## Hydraulic Control Circuits

E4N71B



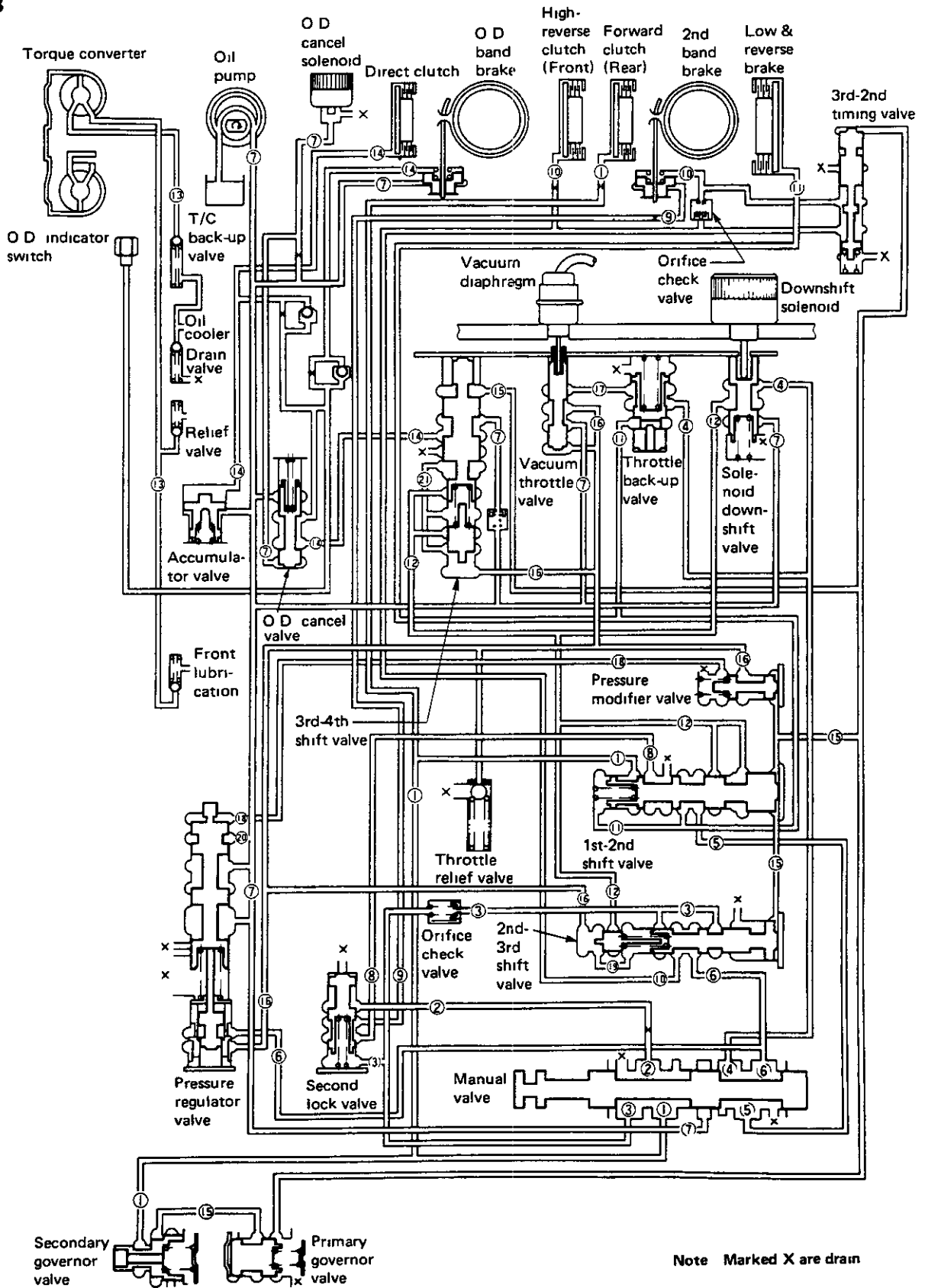
SAT707



# GENERAL SERVICE NOTICE

## Hydraulic Control Circuits (Cont'd)

4N71B



Note Marked X are drain

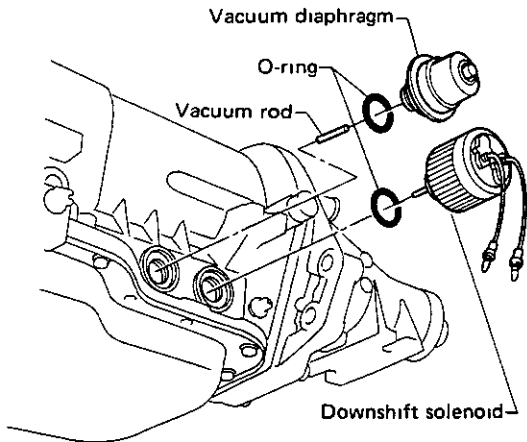
SAT708

# ON-VEHICLE SERVICE

## Control Valve

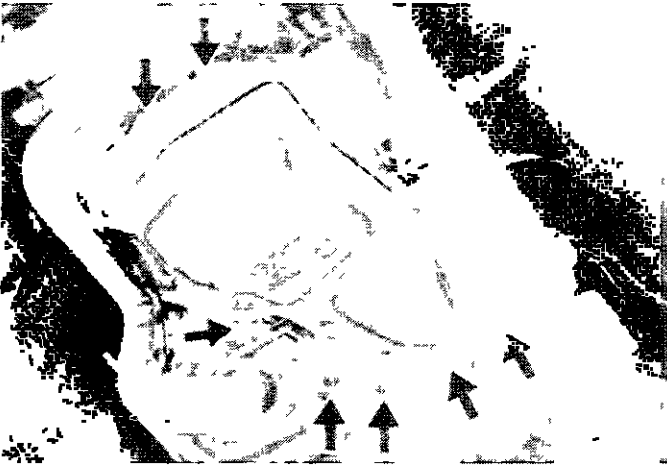
1. Drain fluid by removing oil pan.
2. Remove kickdown solenoid and vacuum diaphragm & rod

Be careful not to lose vacuum rod.



SAT506

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



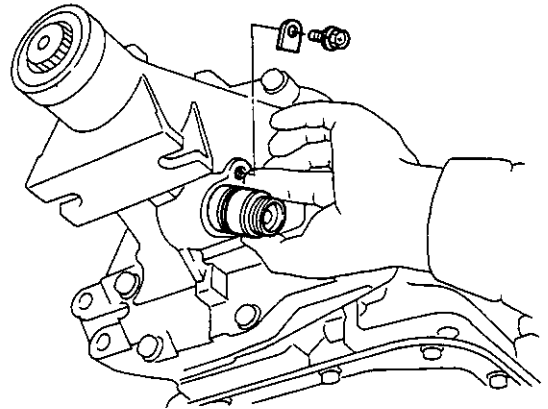
2. Apply coat of A.T.F. to oil seal surface, then drive new seal into place.



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

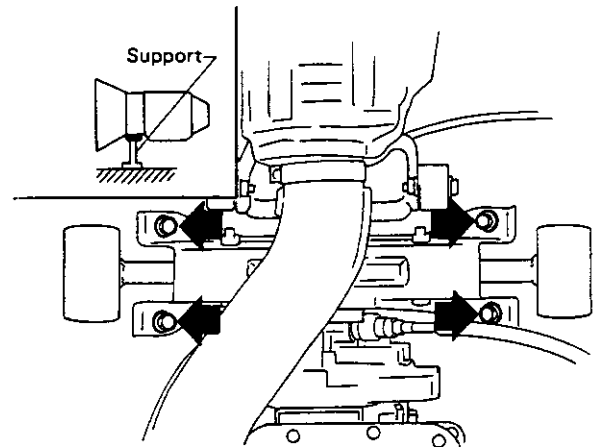
## Parking Component

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



SAT511

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



SAT709

# ON-VEHICLE SERVICE

## Parking Component (Cont'd)

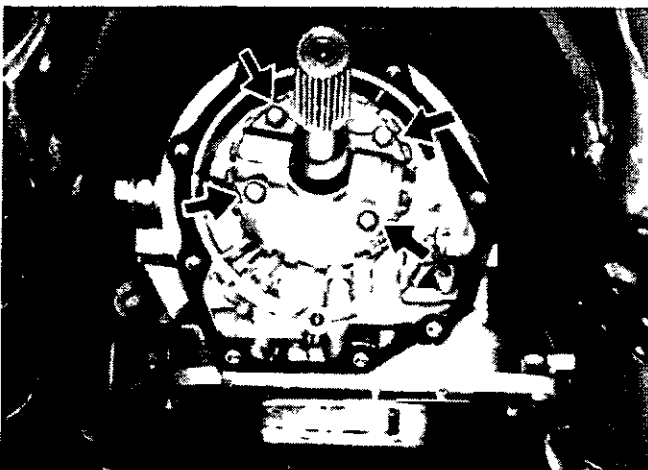
- Remove rear extension bolts, then draw out rear extension with rear mounting.



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

## Governor Valve Assembly

- Drain oil by removing oil pan.
- Remove rear extension with rear mounting
- Remove governor valve assembly.

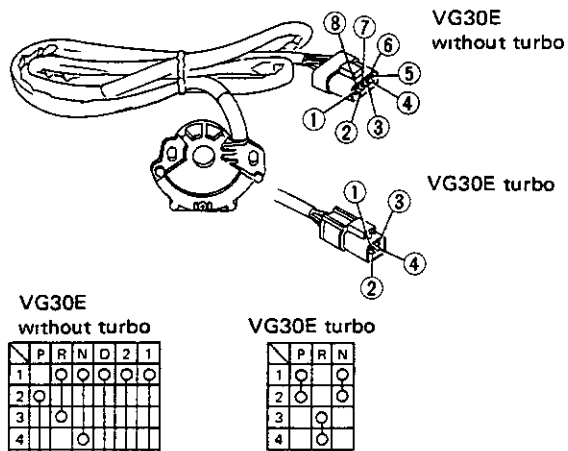


- Inspect and repair governor valve assembly. Refer to Governor for inspection

## Inhibitor Switch Adjustment

Disconnect harness at connector, then remove inhibitor switch

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



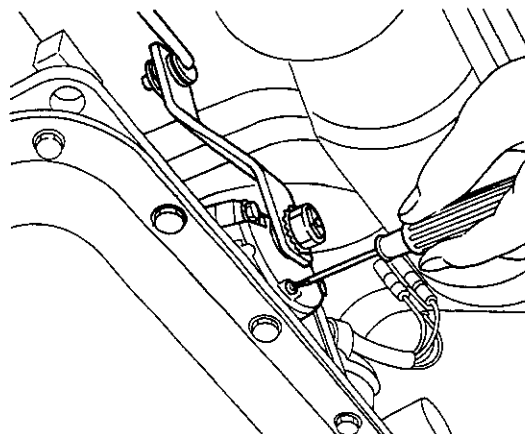
SAT710

- 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

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

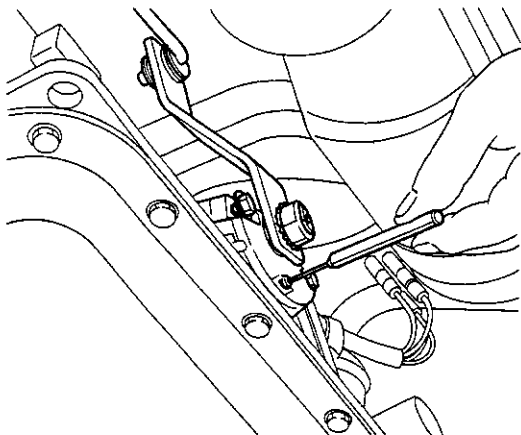


SAT097

# ON-VEHICLE SERVICE

## Inhibitor Switch Adjustment (Cont'd)

3. Loosen the attaching bolts.
4. Using an aligning pin, [20 mm (0.079 in) dia ] move the switch until the pin falls into the hole in the rotor



SAT098

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

## Manual Linkage Adjustment

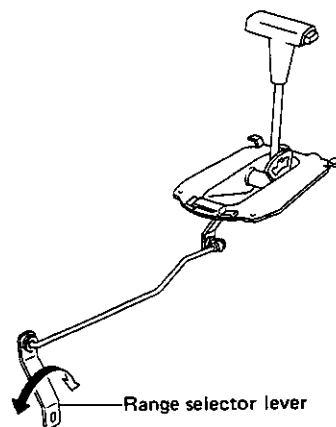
Move the shift lever from the "P" range to "Range 1". You should be able to feel the detents in each range

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.



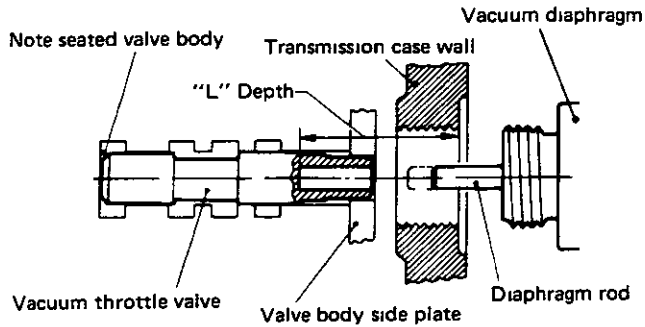
SAT741

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.



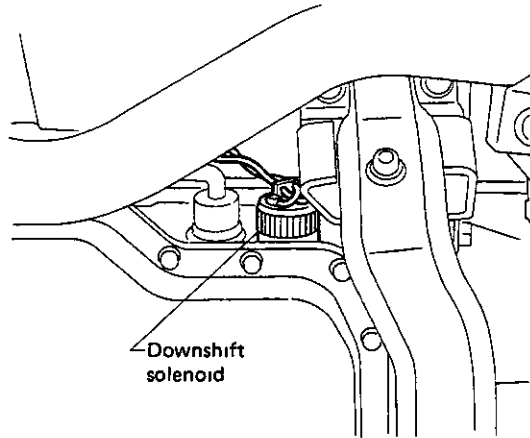
SAT078

### 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

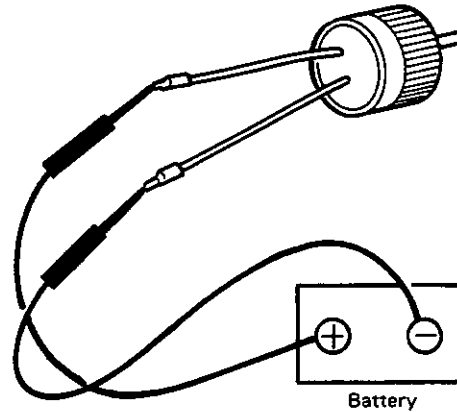
## Downshift Solenoid

1. Remove downshift solenoid and O-ring. Catch oil dropping out of the hole.



SAT516

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

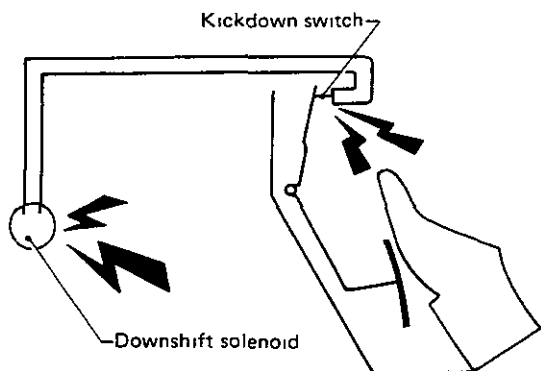


SAT517

# 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.



SAT719

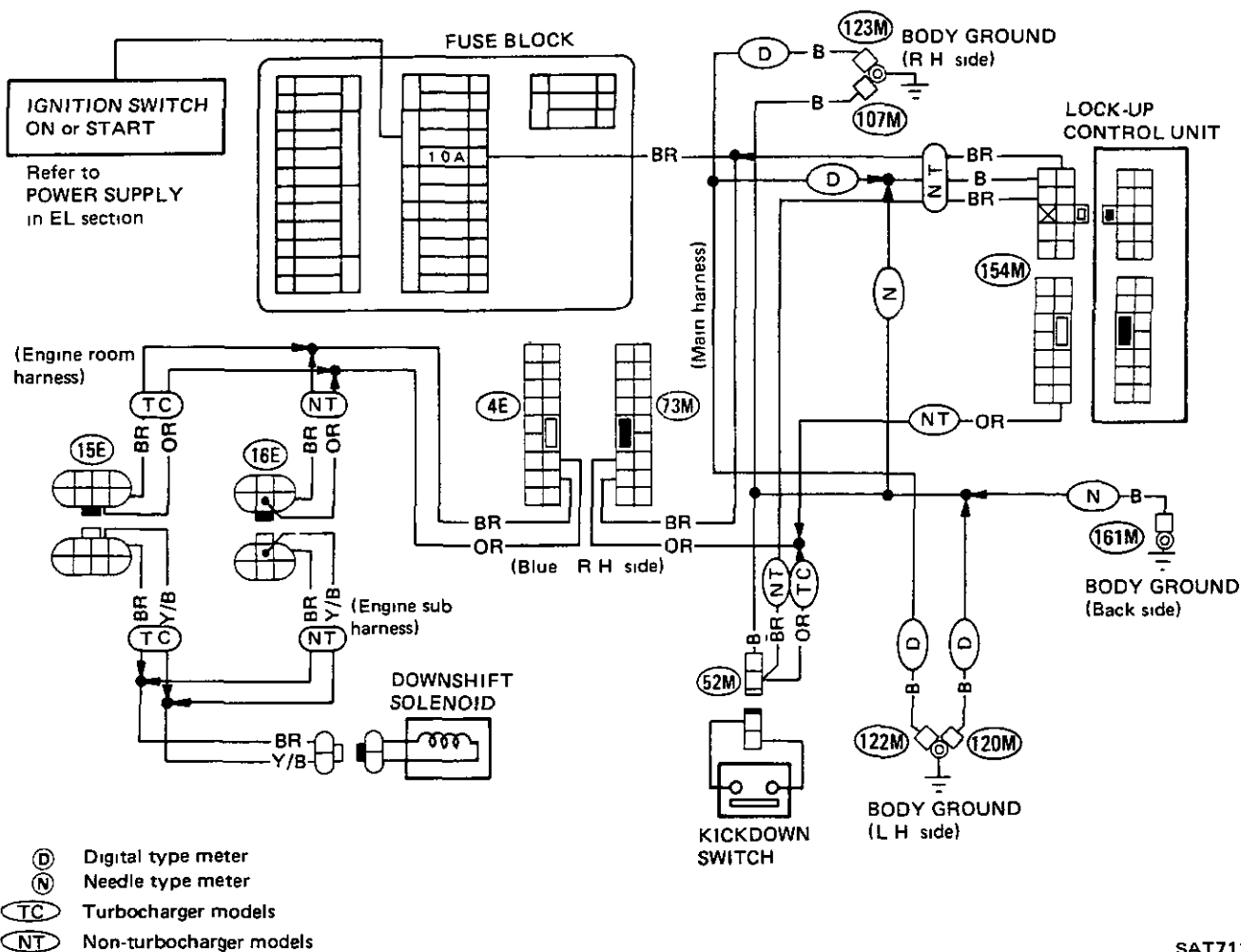
Do not allow the switch to make contact too soon. This would cause the transmission to downshift on part throttle.

### 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).



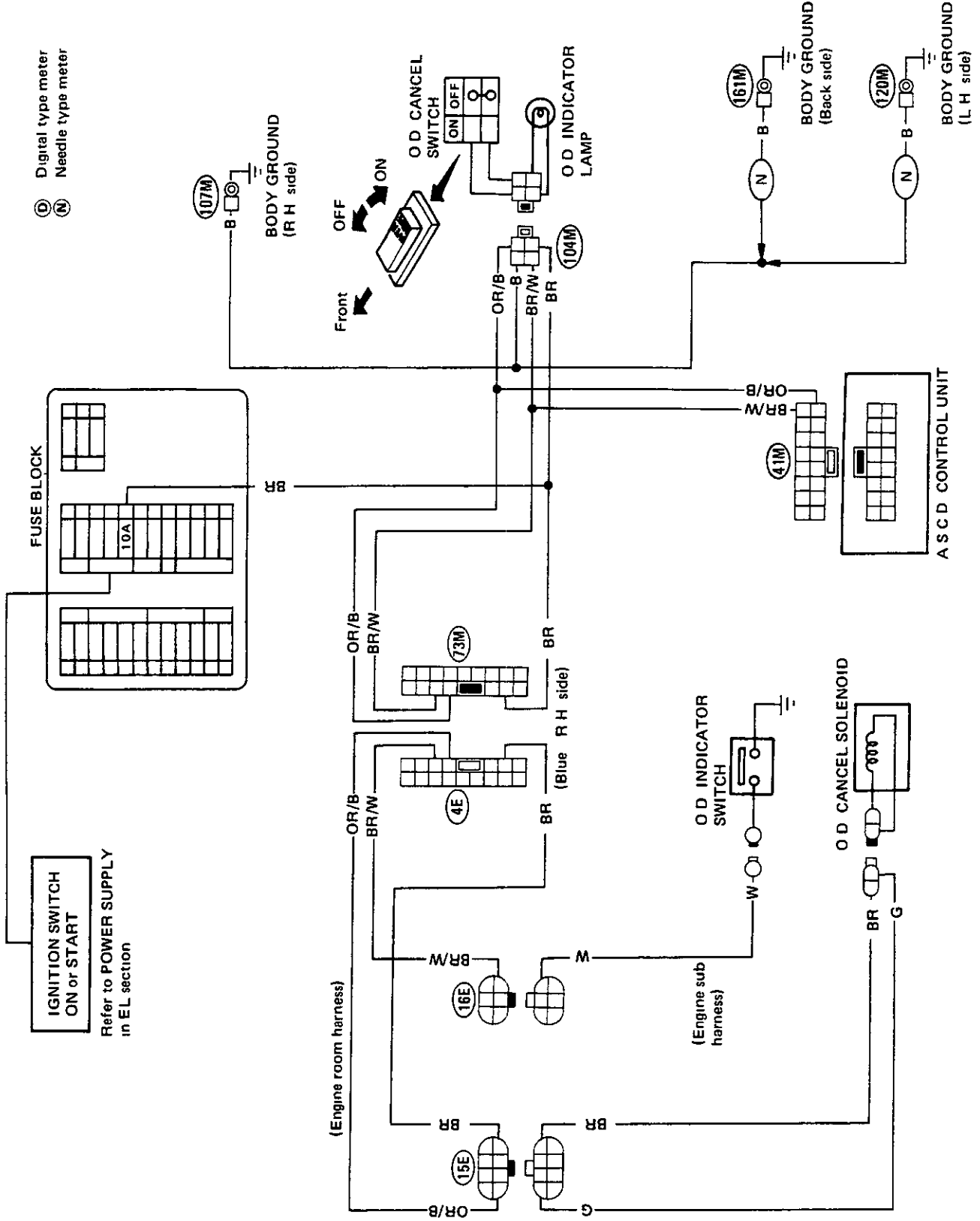
SAT711

# ON-VEHICLE SERVICE

## Overdrive Control System (4N71B)

O D indicator lamp glows when ignition switch is ON (and engine not running) as well as when it is running in O D position

- Ⓚ Digital type meter
- Ⓝ Needle type meter



SAT712

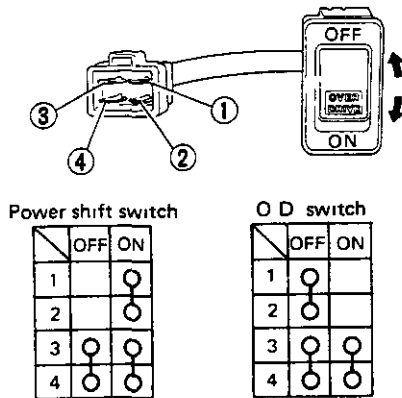


# ON-VEHICLE SERVICE

## Overdrive Control System (4N71B) (Cont'd)

### O.D. CANCEL SWITCH & O.D. INDICATOR LAMP

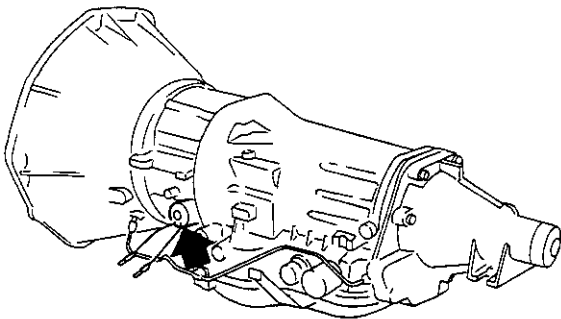
#### Inspection



SAT716

### O.D. CANCEL SOLENOID

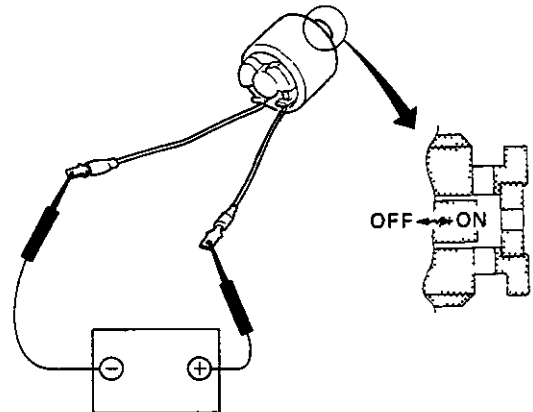
#### Location



SAT619

#### Inspection

Confirm that clicking sound is heard when power is applied.

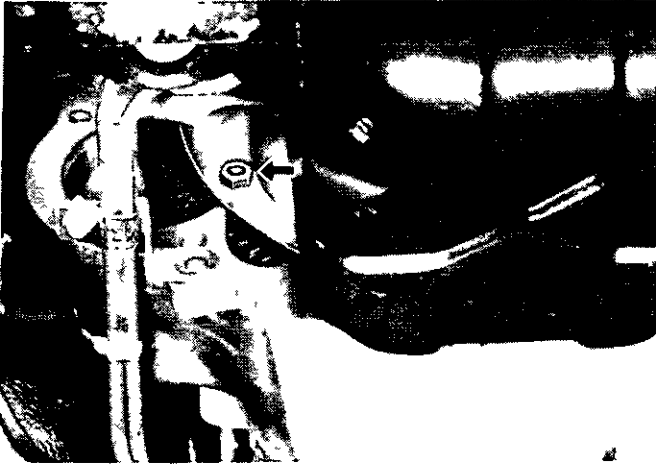


SAT620

# REMOVAL AND INSTALLATION

## Removal

- Remove bolts securing torque converter to drive plate.



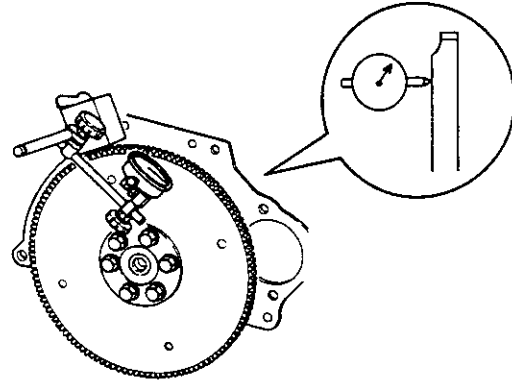
- Remove those bolts turning crank shaft.
  - Before removing torque converter, inscribe matching marks on two parts so that they may be replaced in their original positions during assembly.
- Plug up openings such as oil charging pipe, etc.

### 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)



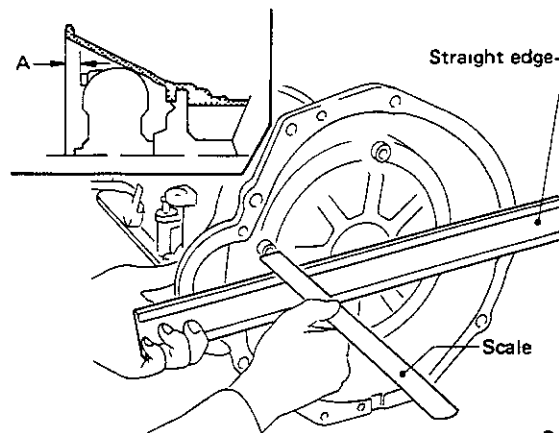
SAT718

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)



SAT615

- Install converter to drive plate
  - Align matching marks painted across both parts during disassembly.
  - 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

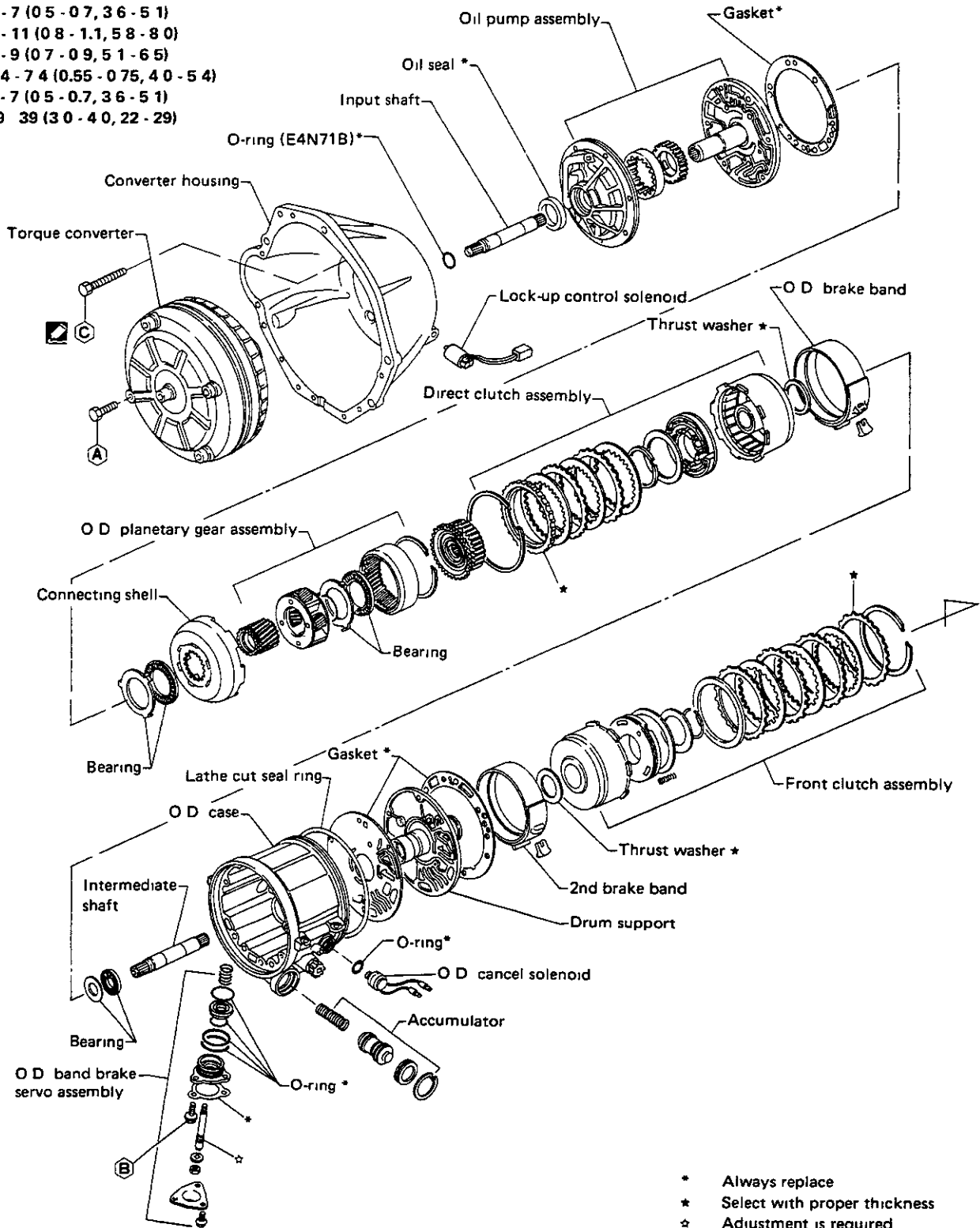
# REMOVAL AND INSTALLATION

## 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.

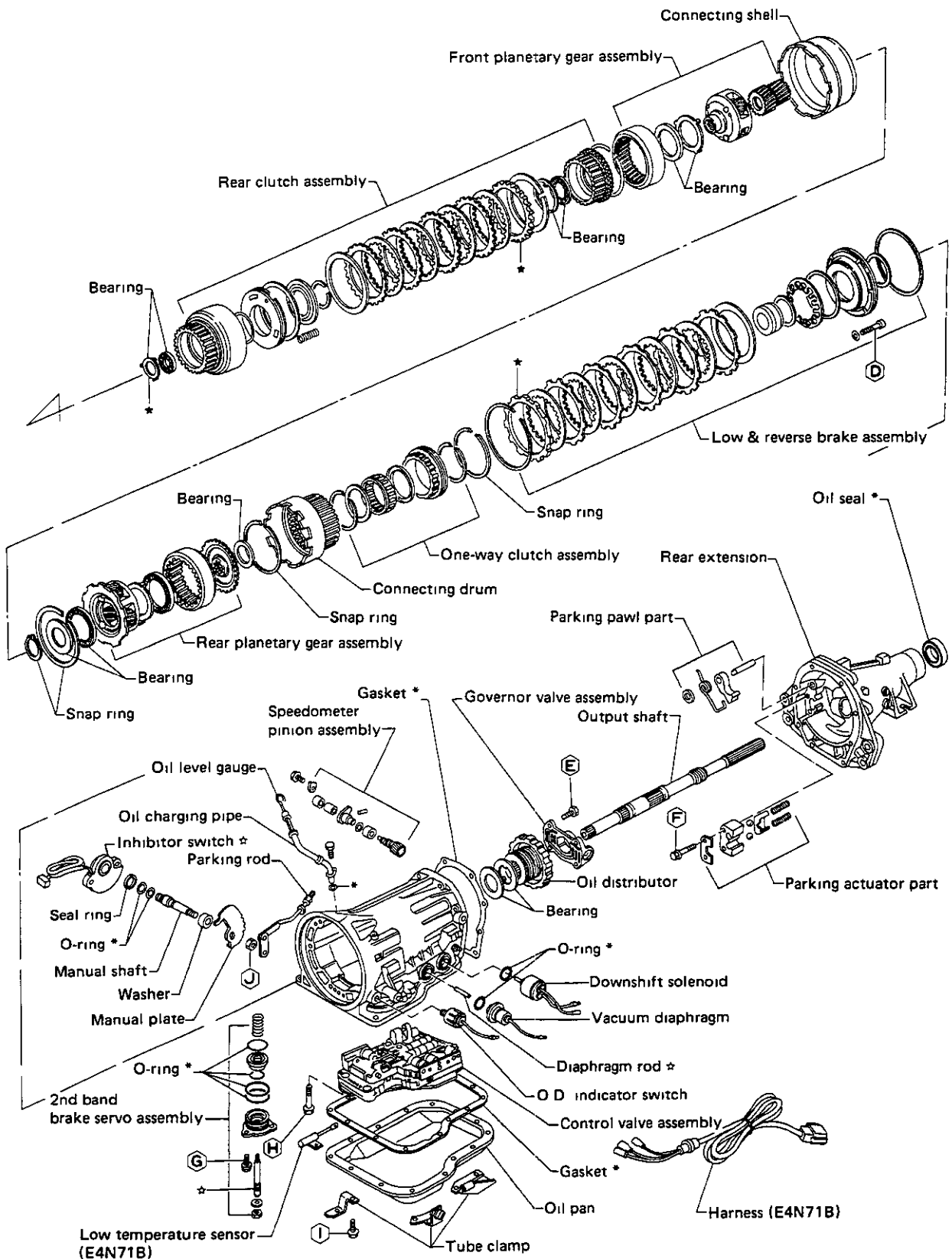
# MAJOR OVERHAUL

- A N m (kg-m, ft-lb)  
A 39 49 (40 - 50, 29 - 36)  
B 10 - 15 (10 - 15, 7 - 11)  
C 44 - 54 (45 - 55, 33 - 40)  
D 13 18 (13 - 18, 9 - 13)  
E 5 - 7 (05 - 07, 36 - 51)  
F 8 - 11 (08 - 11, 58 - 80)  
G 7 - 9 (07 - 09, 51 - 65)  
H 54 - 74 (055 - 075, 40 - 54)  
I 5 - 7 (05 - 07, 36 - 51)  
J 29 39 (30 - 40, 22 - 29)



- \* Always replace
- \* Select with proper thickness
- ☆ Adjustment is required

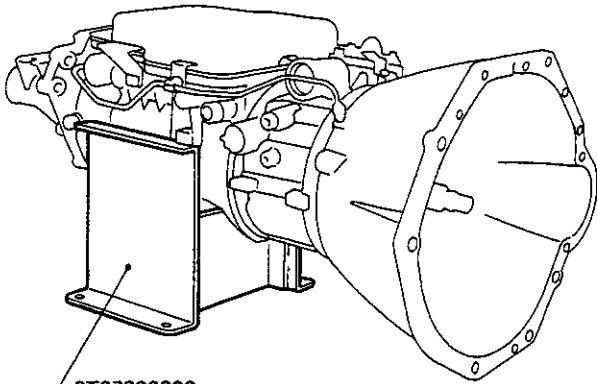
# MAJOR OVERHAUL



SAT713

# DISASSEMBLY

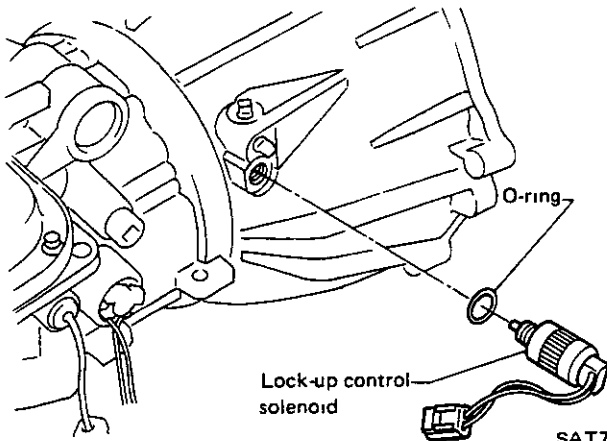
1. Remove torque converter, drain A.T.F through end of rear extension, and place transmission on Tool.



ST07860000  
(ST07870000)

SAT520

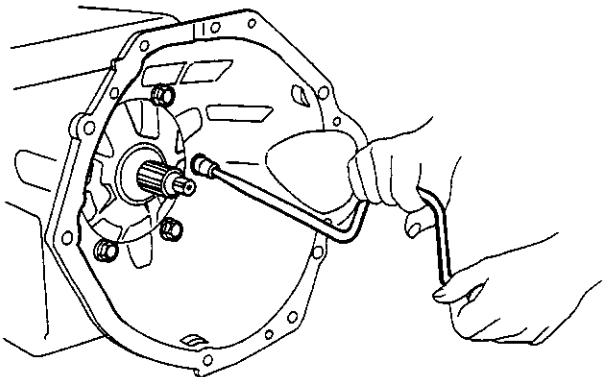
2. Remove lock-up solenoid (E4N71B).



Lock-up control  
solenoid

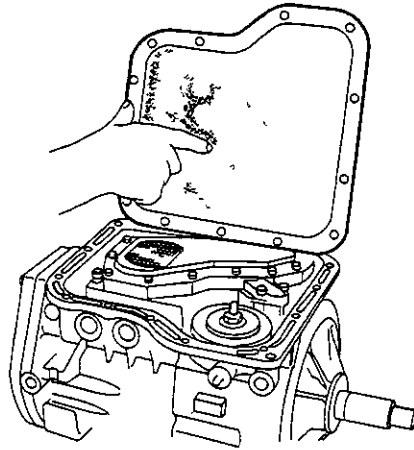
SAT714

3. Remove converter housing.



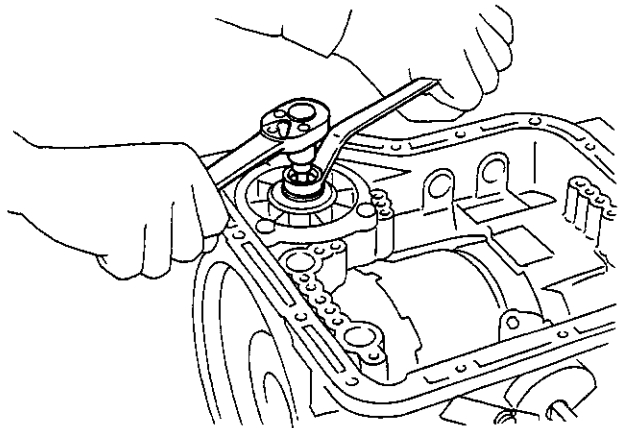
SAT003

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 burned, 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.



SAT006

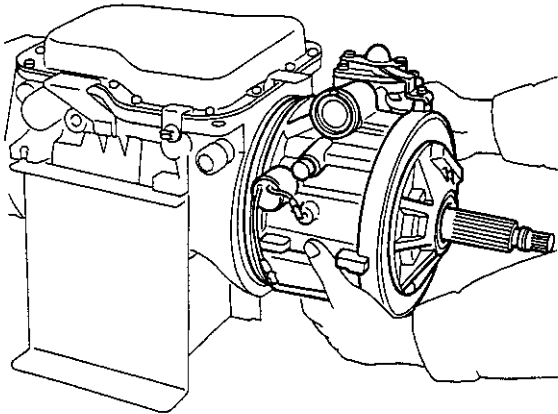
5. Loosen 2nd band servo piston stem lock nut and tighten piston stem. If it turns more than two turns, the band is worn out.



SAT715

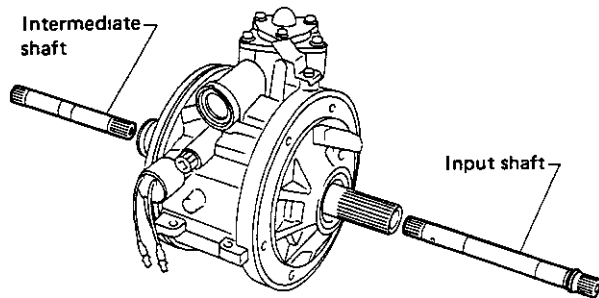
# DISASSEMBLY

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



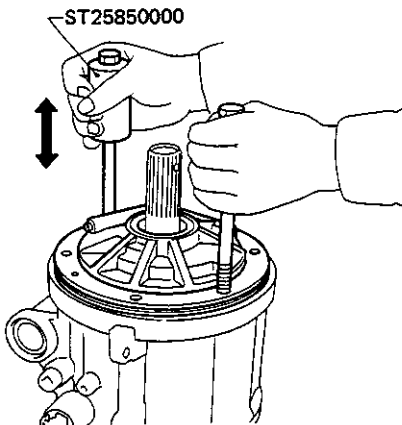
SAT522

7. Draw out input shaft and intermediate shaft



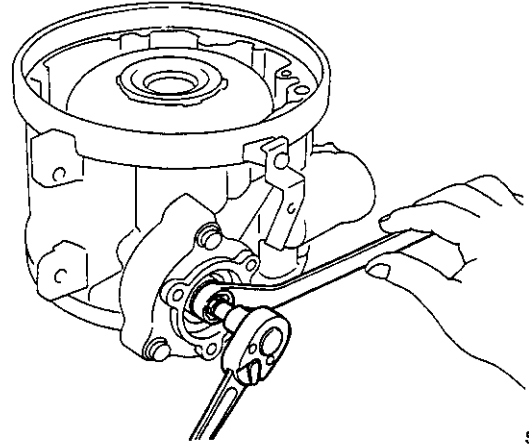
SAT523

8. Attach Tool to pump and remove pump.



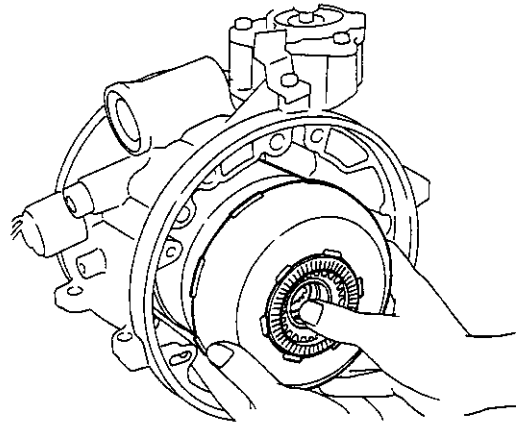
SAT524

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



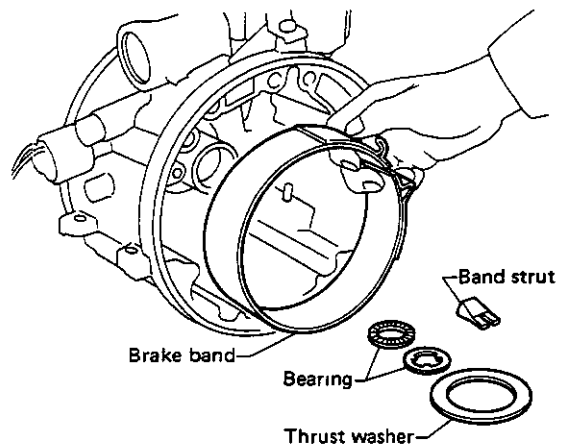
SAT525

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



SAT526

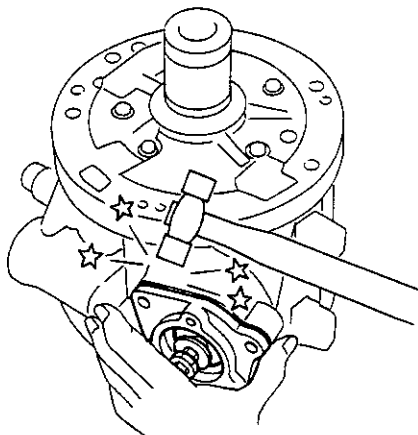
11. Remove needle bearing & race and direct clutch thrust washer, then remove O D. brake band & strut.



SAT527

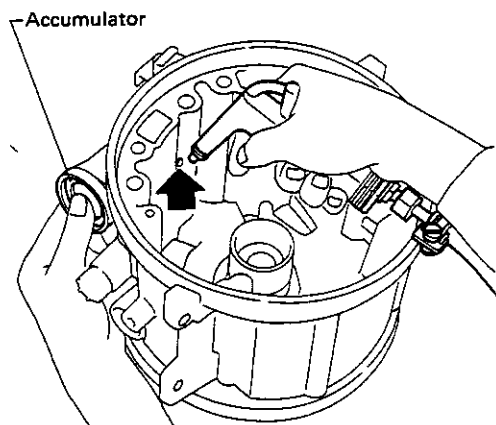
# DISASSEMBLY

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



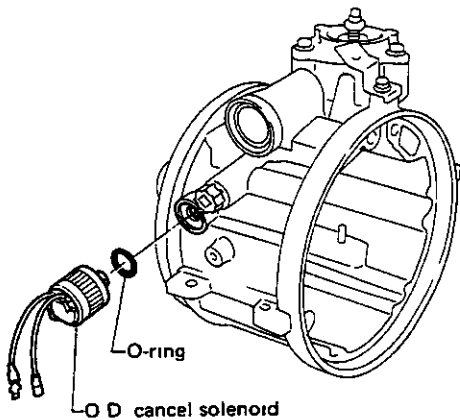
SAT528

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



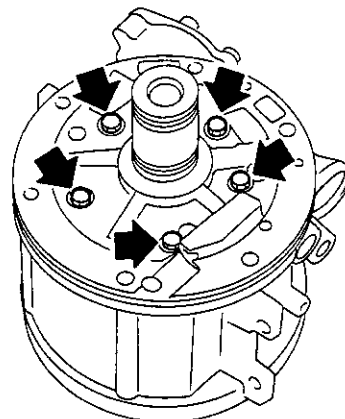
SAT529

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



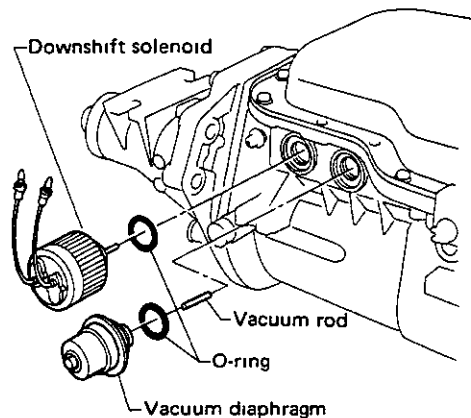
SAT530

15. Remove drum support.



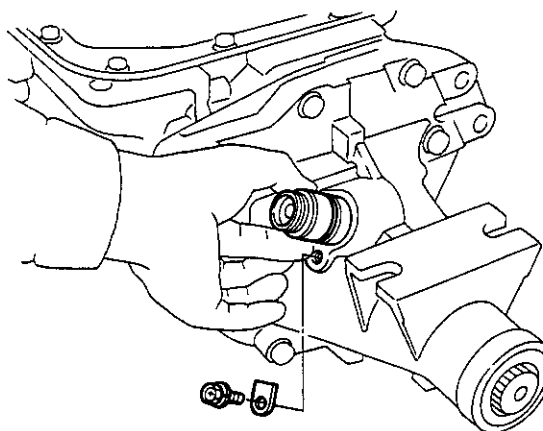
SAT531

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



SAT532

17. Remove speedometer pinion.



SAT533

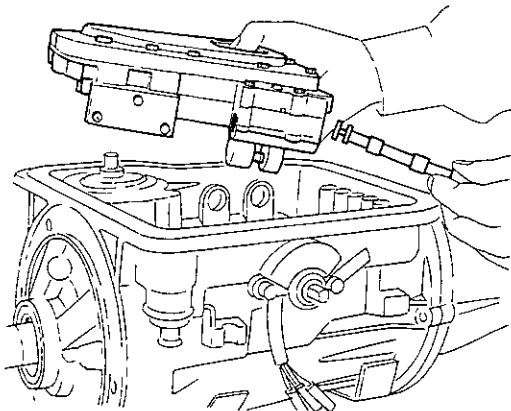


# DISASSEMBLY

18. Remove control valve body.

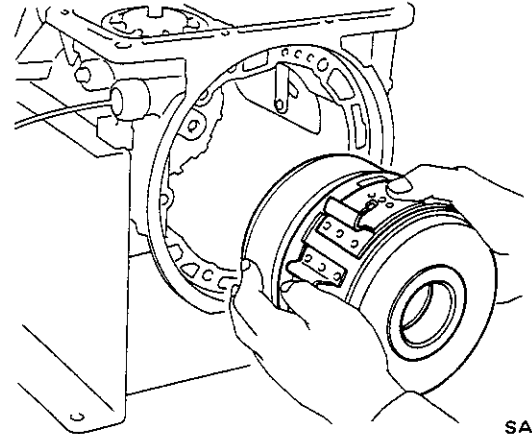


Remove manual valve from valve body as a precaution, to prevent valve from dropping out accidentally.



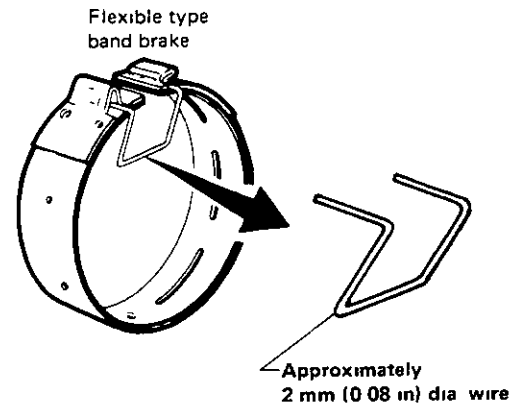
SAT007

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



SAT534

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.



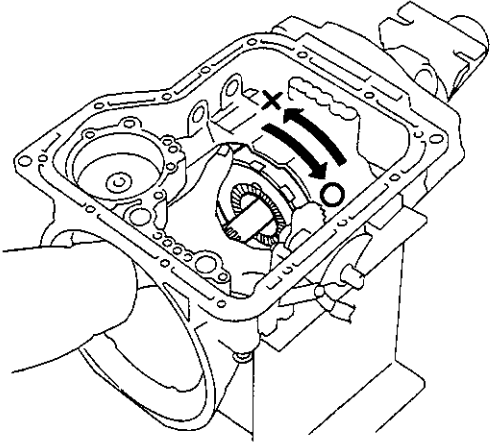
SAT656

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



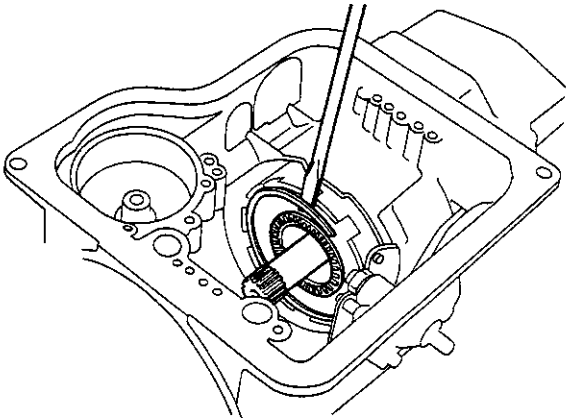
# DISASSEMBLY

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



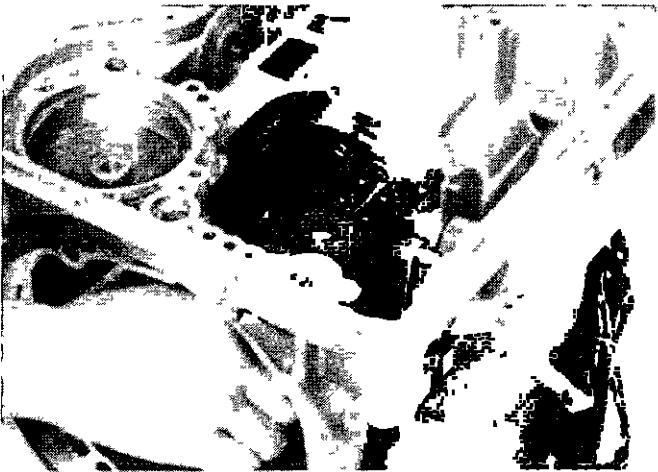
SAT536

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

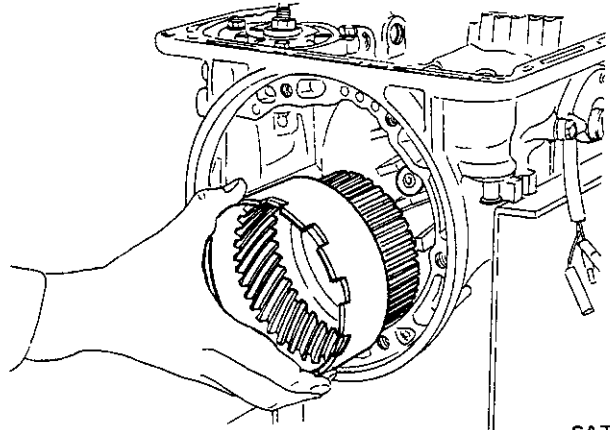


SAT015

23. Remove output shaft snap ring

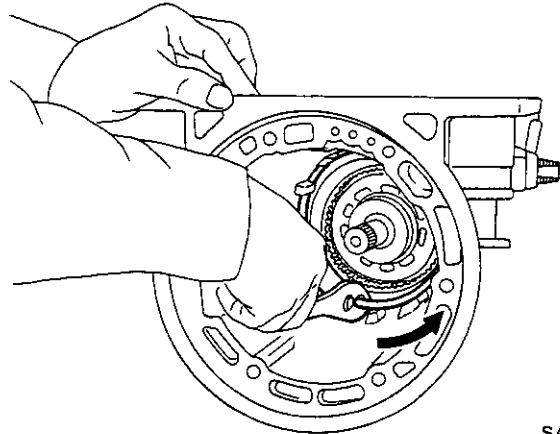


24 Remove connecting drum with internal gear



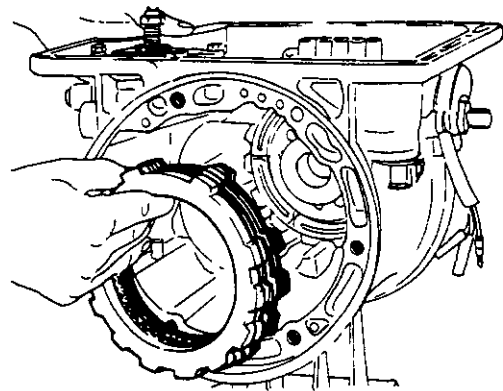
SAT017

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



SAT087

26. Remove low and reverse brake clutch assembly.

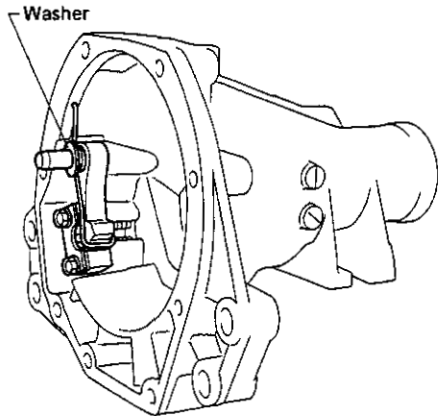


AT129

# DISASSEMBLY

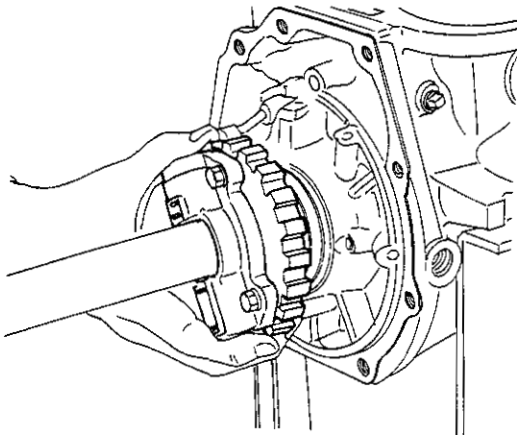
27 Remove rear extension.

Be careful not to lose retainer washer.



SAT537

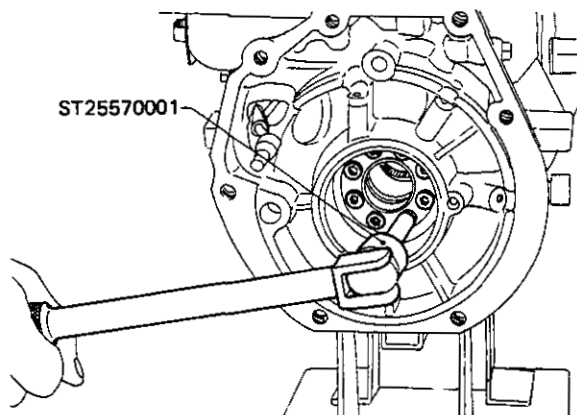
28 Remove output shaft with governor.



SAT019

29. Remove governor thrust washer and needle bearing.

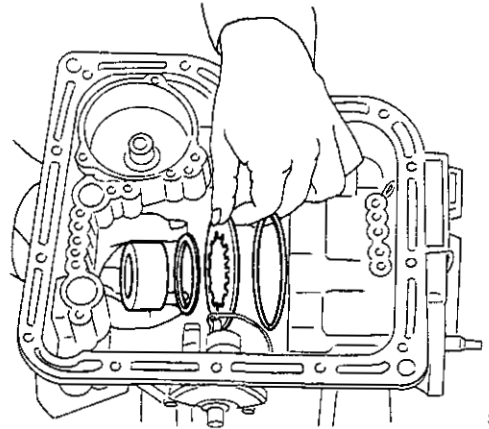
Remove one-way clutch inner race attaching hex-head slotted bolts using Tool



ST25570001

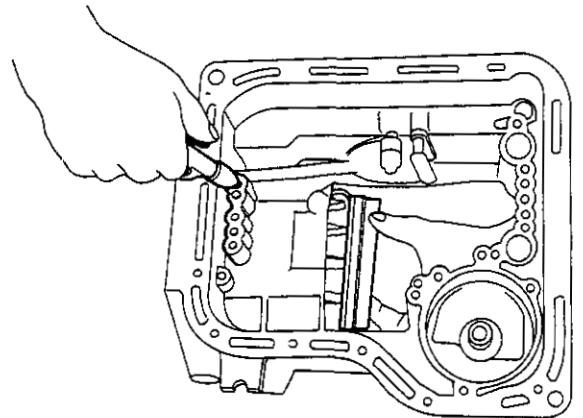
SAT020

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



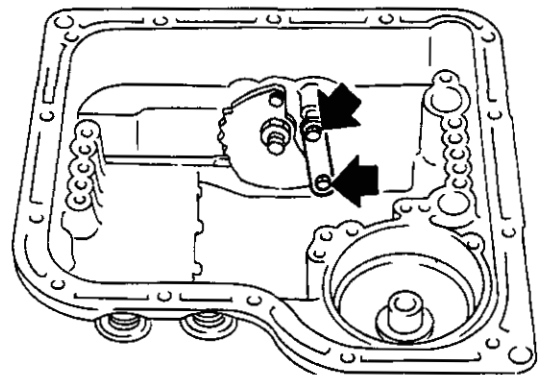
SAT021

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



SAT022

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

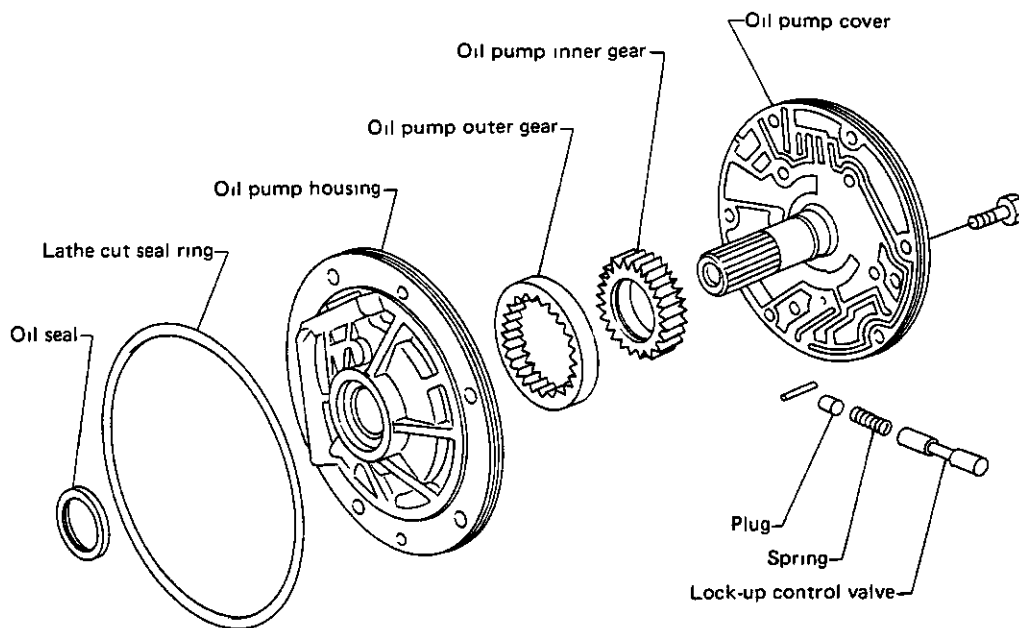


SAT720

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

# REPAIR FOR COMPONENT PARTS

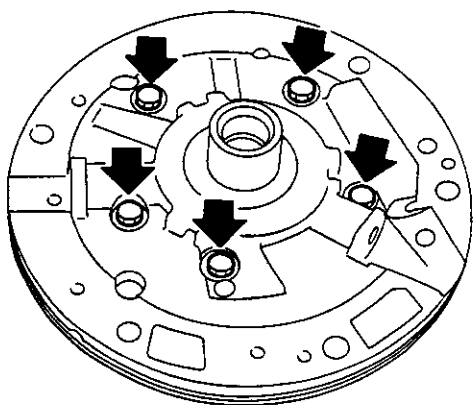
## Oil Pump



SAT721

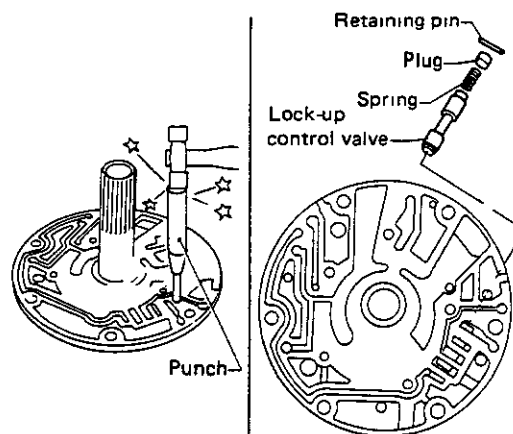
### DISASSEMBLY

- 1 Remove pump cover from pump housing



SAT538

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



SAT722

### 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)

### Valve spring chart

Valve spring	Wire dia mm (in)	Outer coil dia mm (in)	No of active coil	Free length mm (in)	Installed	
					Length mm (in)	Load N (kg, lb)
Lock-up control valve	0.65 (0.0256)	5.45 (0.2146)	14.5	25.7 (1.012)	16.0 (0.630)	10.89 (1.11, 2.45)

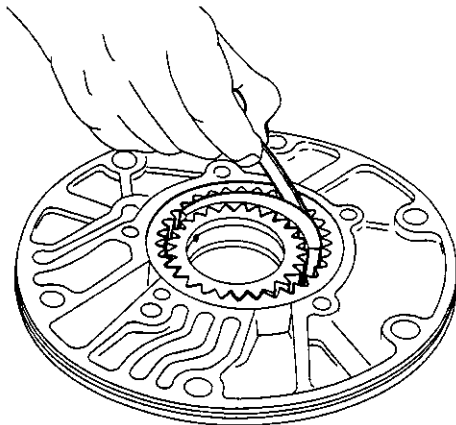
- 3 Measure clearance between outer gear and crescent.

**Standard clearance:**

**0.14 - 0.21 mm (0.0055 - 0.0083 in)**

**Wear limit:**

**0.25 mm (0.0098 in)**



SAT025

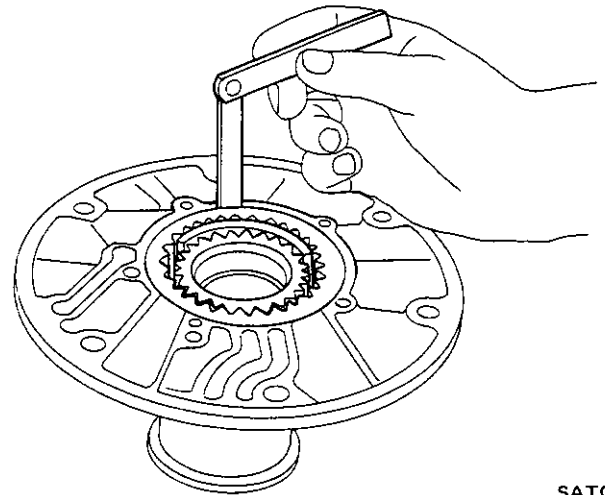
- 4 Measure clearance between outer gear and pump housing.

**Standard clearance:**

**0.05 - 0.20 mm (0.0020 - 0.0079 in)**

**Wear limit:**

**0.25 mm (0.0098 in)**



SAT026

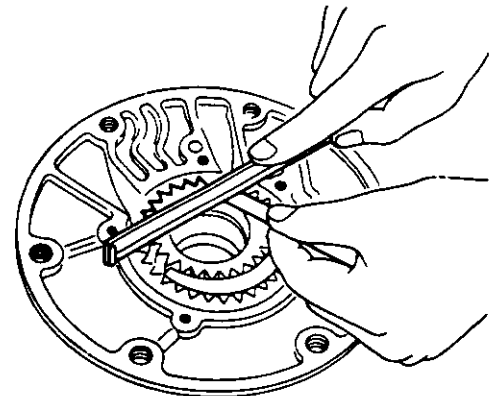
- 5 Using a feeler gauge and straight edge, measure clearance between gears and pump cover

**Standard clearance:**

**0.02 - 0.04 mm (0.0008 - 0.0016 in)**

**Wear limit:**

**0.08 mm (0.0031 in)**



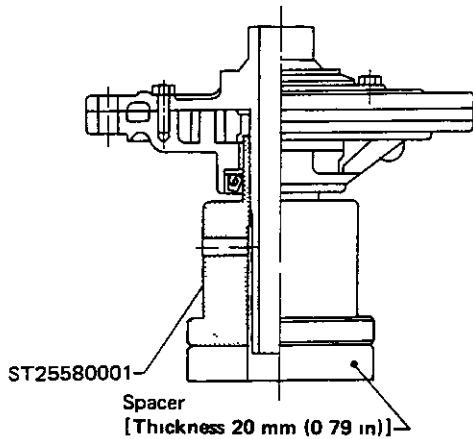
AT162

# 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.

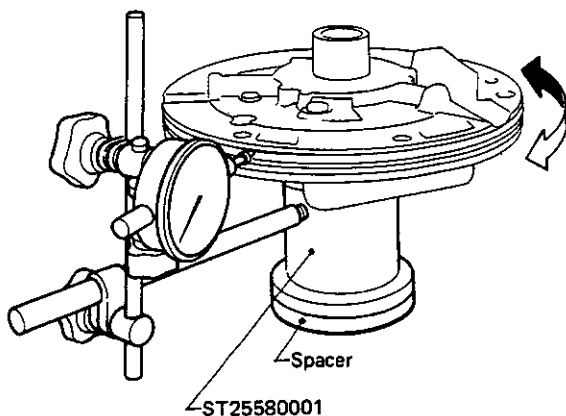


SAT540

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)



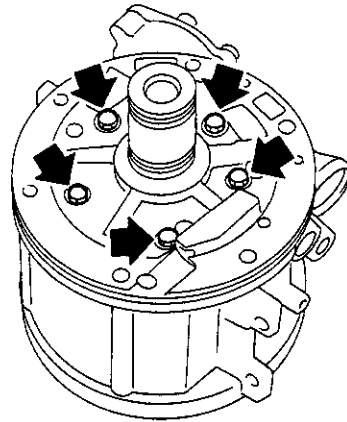
SAT541

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

## Drum Support

### DISASSEMBLY

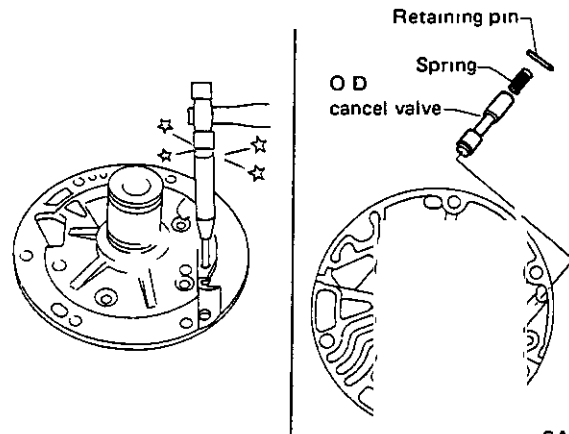
1. Remove drum support and gasket from O.D. case.



SAT531

2. Stake off retaining pin using 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



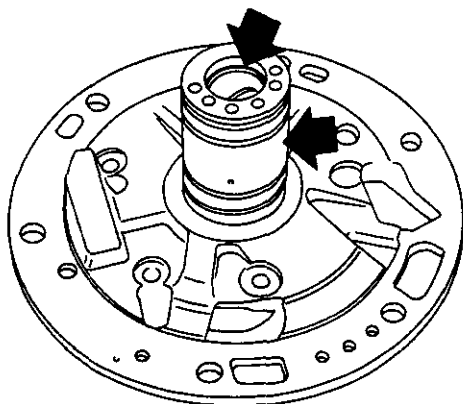
SAT723

# REPAIR FOR COMPONENT PARTS

## Drum Support (Cont'd)

### INSPECTION

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



SAT542

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

### Valve spring chart

Valve spring	Wire dia mm (in)	Outer coil dia mm (in)	No of active coil	Free length mm (in)	Installed	
					Length mm (in)	Load N (kg, lb)
O D. cancel valve	0 65 (0 0256)	4 95 (0 1949)	12 8	23 0 (0 906)	16 0 (0 630)	12 26 (1 25, 2 76)

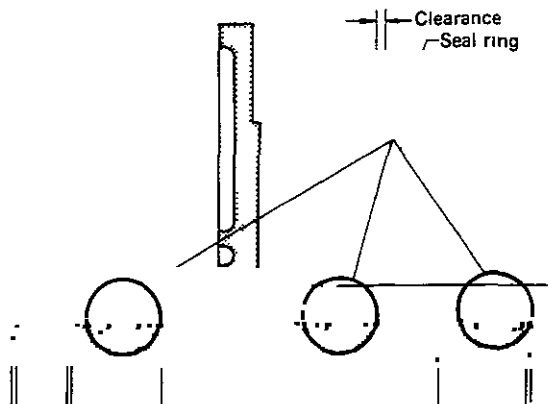
- Measure clearance between seal ring and ring groove

Standard clearance:

0.05 - 0.20 mm (0.0020 - 0.0079 in)

Wear limit:

0.20 mm (0.0079 in)



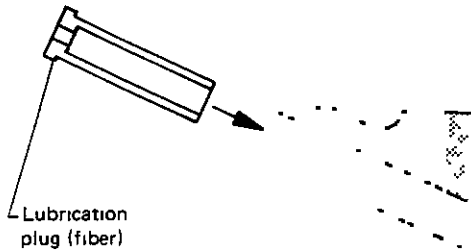
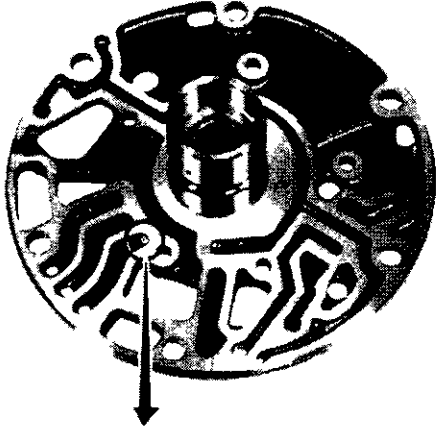
SAT545

# REPAIR FOR COMPONENT PARTS

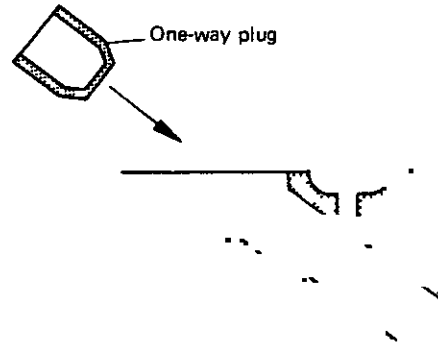
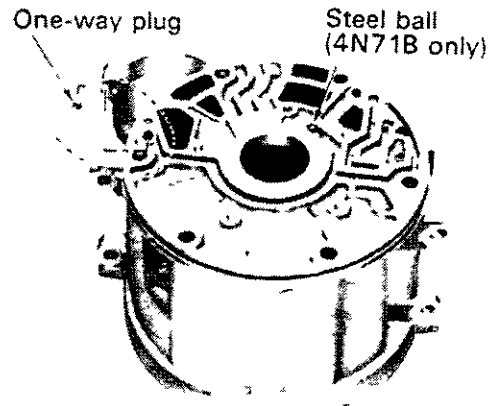
## Drum Support (Cont'd)

### ASSEMBLY

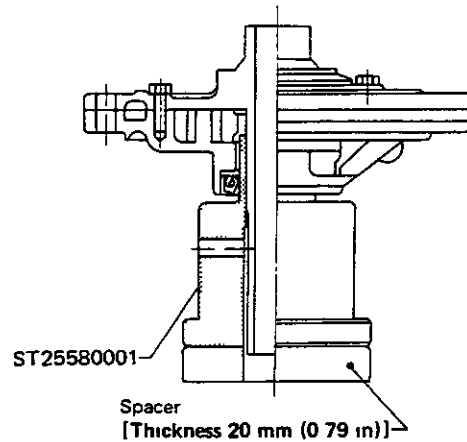
- 1 Install O D cancel valve and spring into drum support, then tap new retaining pins
- 2 Install lubrication plug in drum support



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



- 4 Mount oil pump assembly in Tool and suitable spacer



SAT540

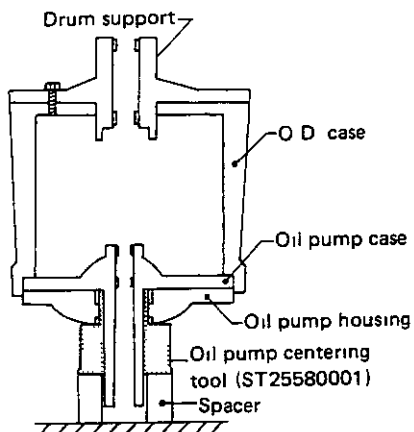


# REPAIR FOR COMPONENT PARTS

## Drum Support (Cont'd)

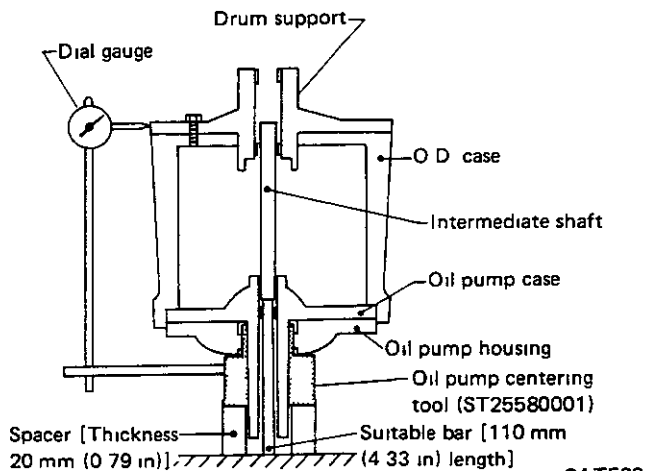
- 5 Mount O.D. case, drum support and gasket in oil pump assembly. Temporarily assemble drum support.

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



SAT547

6. Insert an approx. 110 mm (4.33 in) bar into bore in oil pump at shaft location and install intermediate shaft onto it.



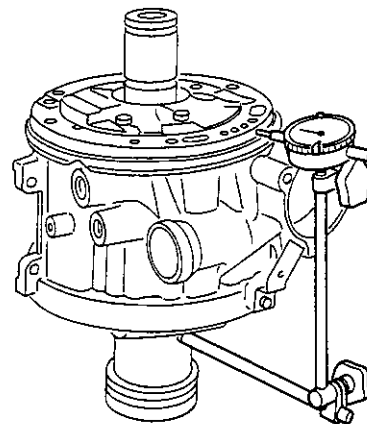
SAT599

This operation can also be performed by using Tool (J33909)

- 7 Set the drum support within the run-out of the specified total indicator reading

Total indicator reading:

Less than 0.05 mm (0.0020 in)



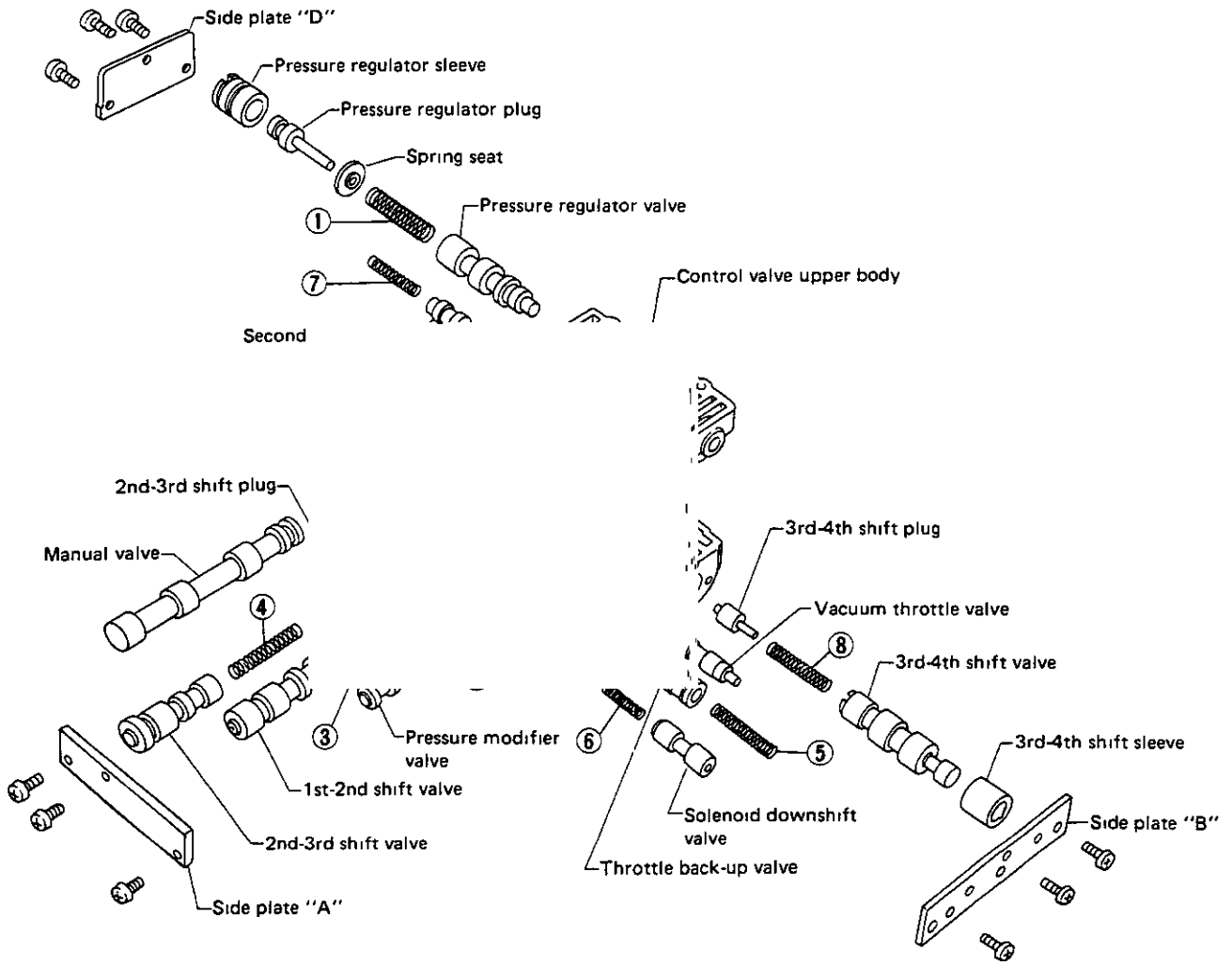
SAT600

- 8 Tighten drum support securing bolts to the specified torque. Recheck run-out.

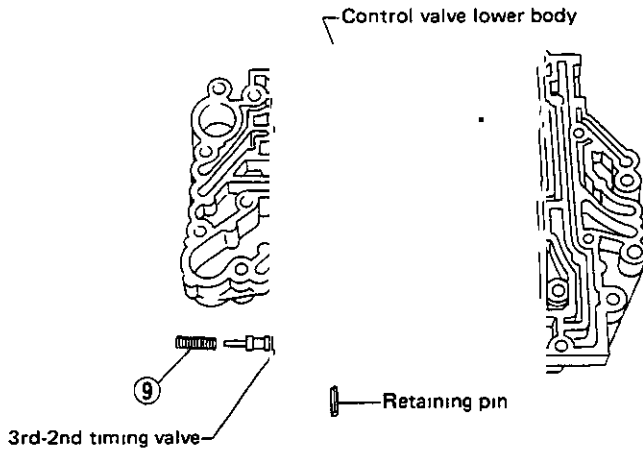
# REPAIR FOR COMPONENT PARTS

## Control Valve Body

### Upper body side



### Lower body side

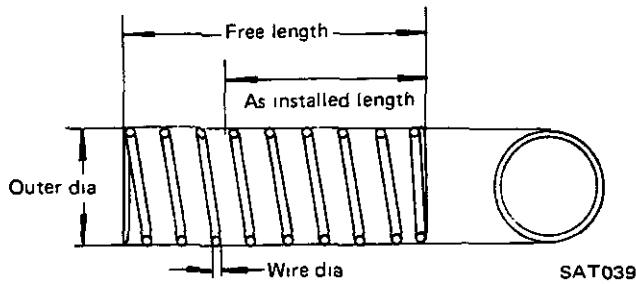


SAT724

# REPAIR FOR COMPONENT PARTS

## Control Valve Body (Cont'd)

### VALVE BODY SPRING CHART



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

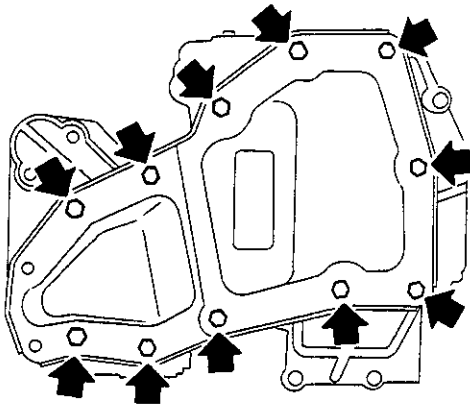
Valve spring	Wire dia mm (in)	Outer coil dia mm (in)	No of active coil	Free length mm (in)	Installed	
					Length mm (in)	Load N (kg, lb)
① Pressure regulator valve	1.2 (0.047)	11.7 (0.461)	13	43.0 (1.693)	23.5 (0.925)	27.5 (2.8, 6.2)
② Pressure modifier valve	VG30E	0.4 (0.016)	5	18.5 (0.728)	9.0 (0.354)	1.0 (0.1, 0.2)
	VG30E turbo	0.6 (0.024)	5.5	18.5 (0.728)	9.0 (0.354)	4.9 (0.5, 1.1)
③ 1st - 2nd shift valve	VG30E	0.6 (0.024)	16	32.0 (1.260)	16.0 (0.630)	6.129 (0.625, 1.378)
	VG30E turbo	0.7 (0.028)	11.8	28.3 (1.114)	16.0 (0.630)	10.00 (1.02, 2.25)
④ 2nd - 3rd shift valve	0.7 (0.028)	6.9 (0.272)	18	41.0 (1.614)	17.0 (0.669)	13.73 (1.40, 3.09)
⑤ Throttle back-up valve	VG30E	0.8 (0.031)	13.5	31.8 (1.252)	18.8 (0.740)	14.32 (1.46, 3.22)
	VG30E turbo	0.8 (0.031)	14	36.0 (1.417)	18.8 (0.740)	18.83 (1.92, 4.23)
⑥ Solenoid downshift valve	0.55 (0.0217)	5.55 (0.2185)	12	22.0 (0.866)	12.5 (0.492)	5.88 (0.60, 1.32)
⑦ Second lock valve	0.55 (0.0217)	5.55 (0.2185)	16	33.5 (1.319)	21.0 (0.827)	5.88 (0.60, 1.32)
Throttle relief check valve	VG30E	0.9 (0.035)	14	26.8 (1.055)	19.0 (0.748)	21.48 (2.19, 4.83)
	VG30E turbo	1.0 (0.039)	13	24.9 (0.980)	19.0 (0.748)	27.95 (2.85, 6.28)
Orifice check valve	0.23 (0.0091)	5.0 (0.197)	12	15.5 (0.610)	11.5 (0.453)	0.10 (0.01, 0.02)
Servo orifice check valve						
⑧ 3rd - 4th shift valve	VG30E	0.8 (0.031)	12.6	30.3 (1.193)	13.1 (0.516)	24.586 (2.507, 5.528)
	VG30E turbo	0.75 (0.0295)	13.6	26.8 (1.055)	13.1 (0.516)	21.38 (2.18, 4.81)
⑨ 3rd - 2nd timing valve	VG30E	0.7 (0.028)	12.5	22.7 (0.894)	14.5 (0.571)	11.08 (1.13, 2.49)
	VG30E turbo	0.9 (0.035)	9	20.7 (0.815)	14.5 (0.571)	16.48 (1.68, 3.70)

# REPAIR FOR COMPONENT PARTS

## Control Valve Body (Cont'd)

### DISASSEMBLY

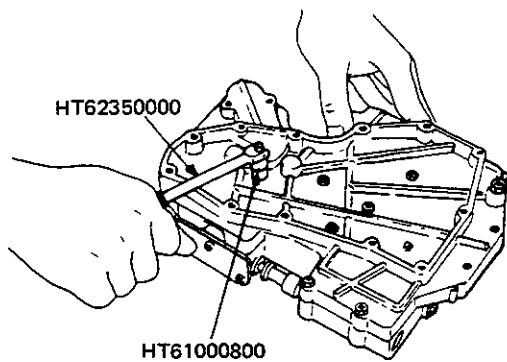
1. Remove oil strainer.



SAT564

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.



AT168

### 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

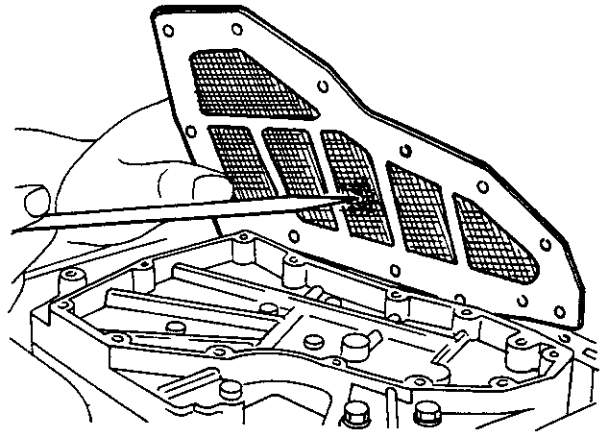
and valve bodies. Always use crocus cloth, which is a very fine type of cutting material. Never use emery cloth, as it is too coarse and can scratch the valves or valve bores. Scratches can lead to future deposits of varnish or foreign matter.

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 ATF before reassembly.

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

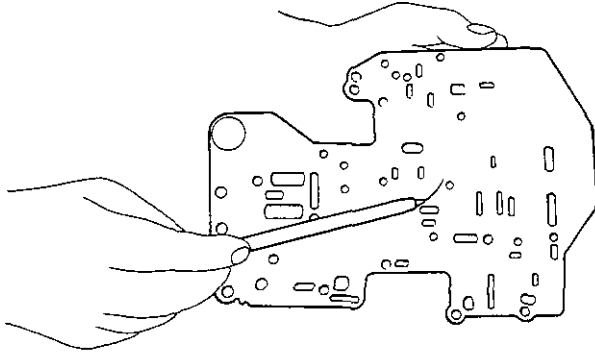


SAT045

# REPAIR FOR COMPONENT PARTS

## Control Valve Body (Cont'd)

- 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.



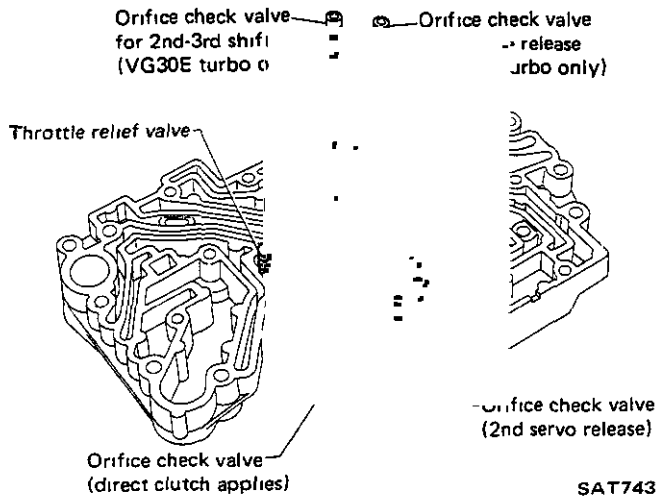
SAT046

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 Test valve springs for weakened load condition. Refer to Valve Body Spring Chart for spring specifications.

### ASSEMBLY

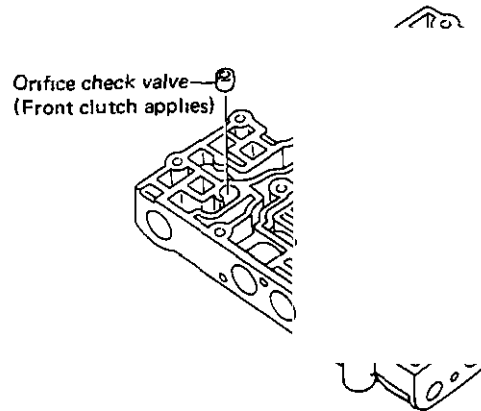
- 1 Install orifice check valves, valve springs, throttle relief valve spring and steel ball in valve body.

### Lower valve body



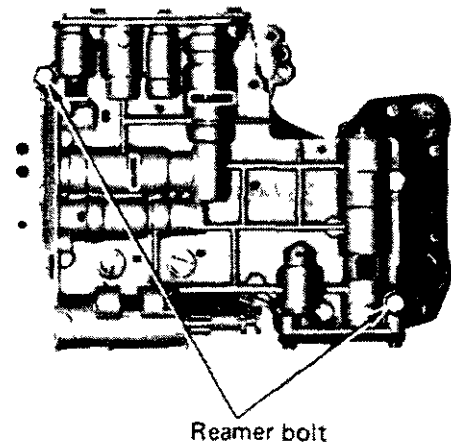
SAT743

### Upper valve body



SAT766

- 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.

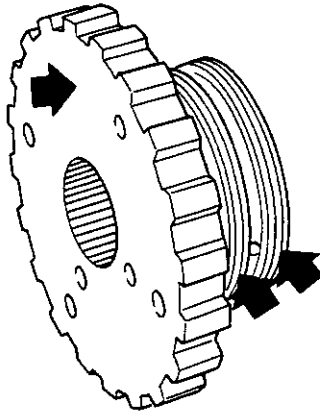
3. Install oil strainer.

# REPAIR FOR COMPONENT PARTS

## Oil Distributor

### INSPECTION

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



SAT725

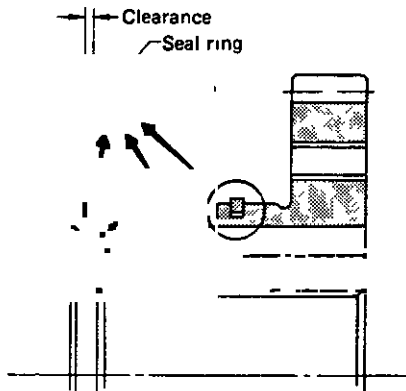
- Measure clearance between seal ring and ring groove.

Standard clearance:

0.04 - 0.16 mm (0.0016 - 0.0063 in)

Wear limit:

0.16 mm (0.0063 in)

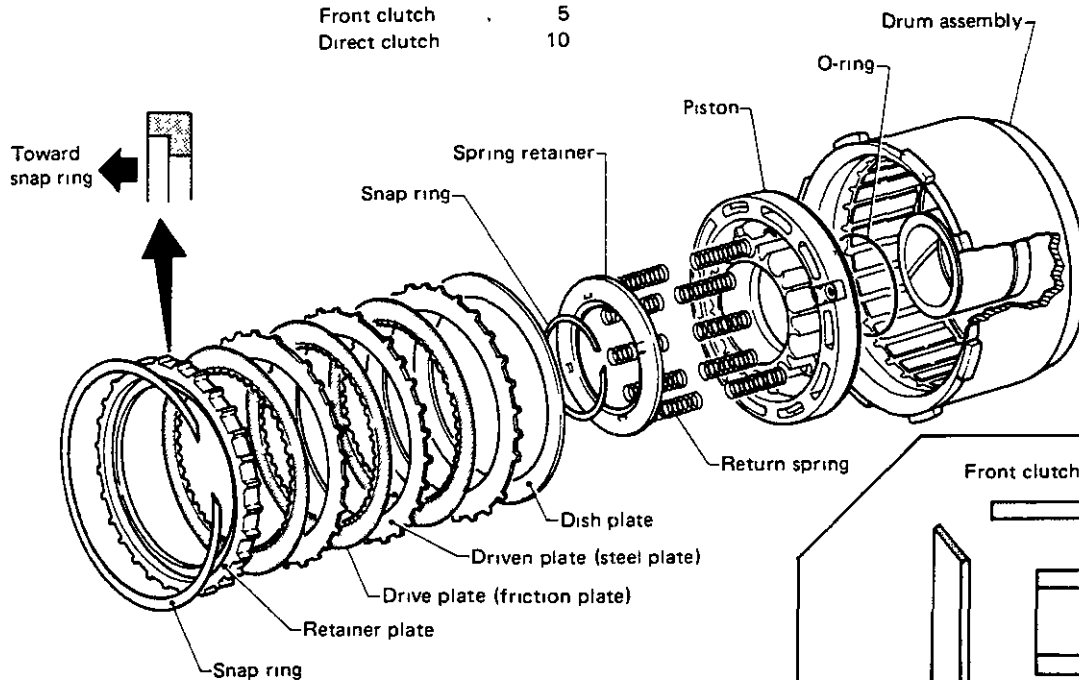


SAT726

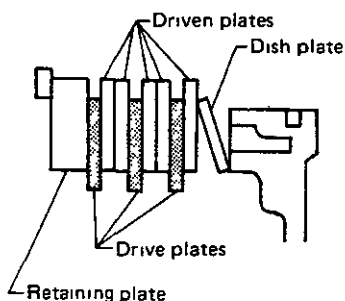
# REPAIR FOR COMPONENT PARTS

## Direct Clutch & Front Clutch

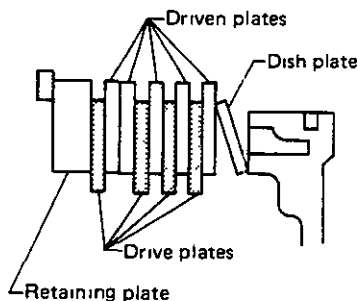
Number of return springs	
Front clutch	5
Direct clutch	10



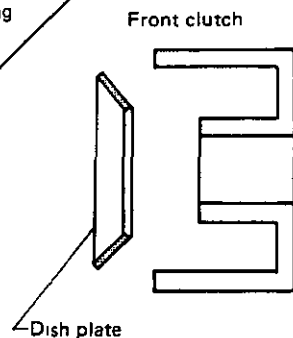
Layout of front clutch plates



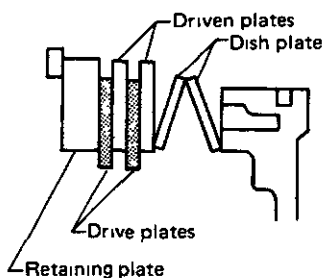
VG30E without turbo



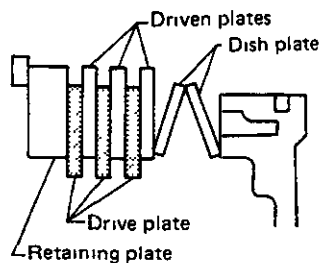
VG30E turbo



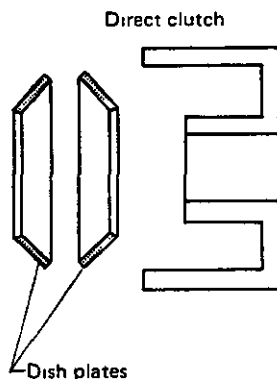
Layout of direct clutch plates



VG30E without turbo



VG30E turbo



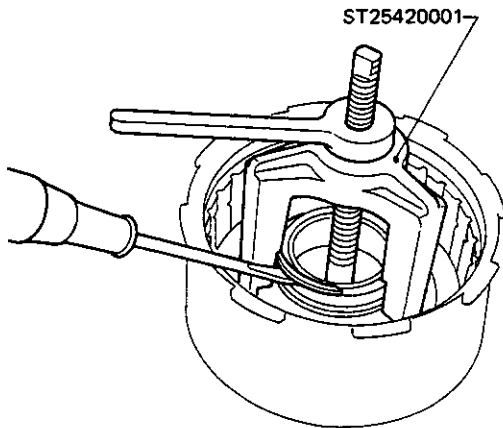
SAT727

# REPAIR FOR COMPONENT PARTS

## Direct Clutch & Front Clutch (Cont'd)

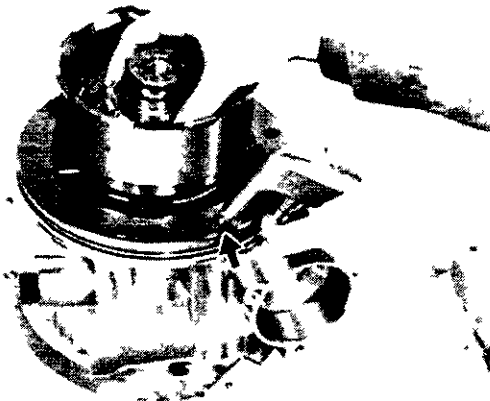
### DISASSEMBLY

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



SAT551

- 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.

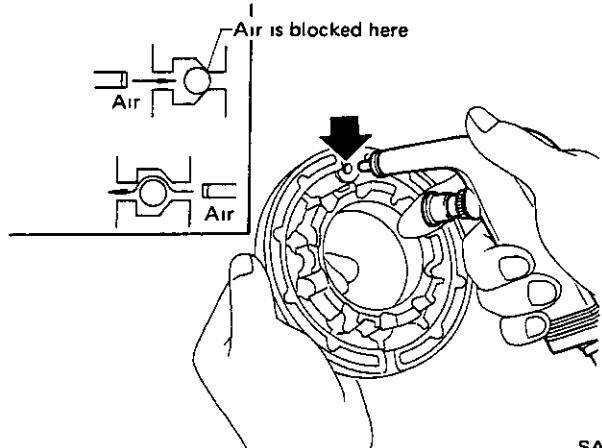
**Standard thickness:**

1.50 - 1.65 mm (0.0591 - 0.0650 in)

**Wear limit:**

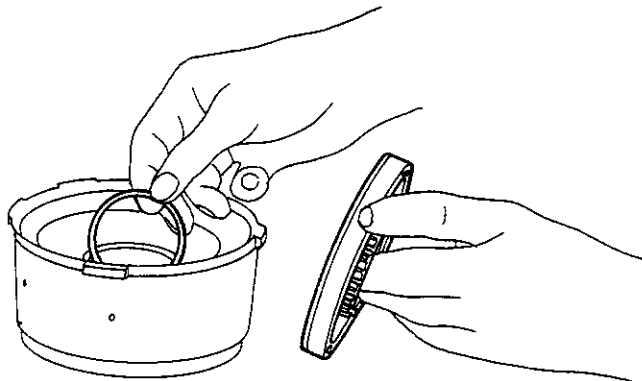
1.4 mm (0.055 in)

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



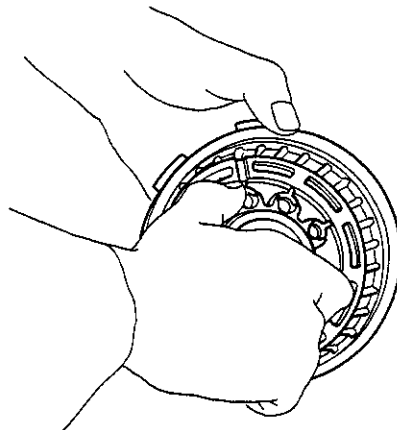
SAT553

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



SAT031

- 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.



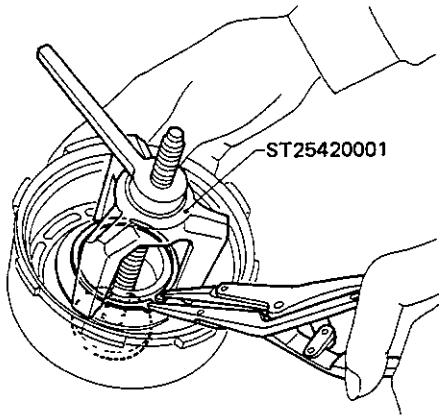
SAT032



# REPAIR FOR COMPONENT PARTS

## Direct Clutch & Front Clutch (Cont'd)

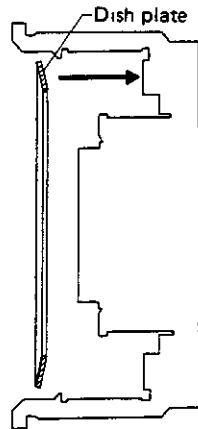
- 6 Reassemble spring and retainer. Reinstall snap ring. Be sure snap ring is properly seated.



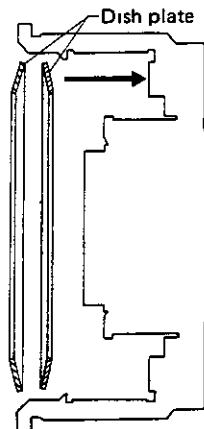
SAT028

7. Install dish plate

### High-reverse clutch (Front)



### Direct clutch



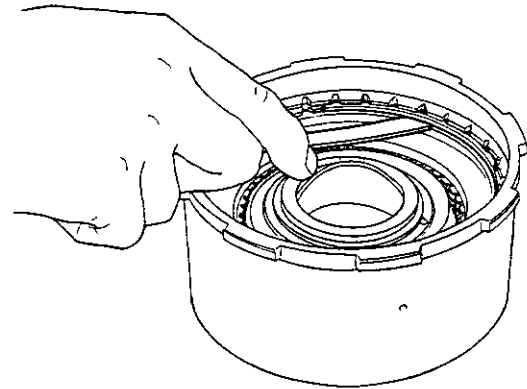
SAT554

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



SAT034

### Available retaining plate High-reverse clutch (Front)

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

### Direct clutch

Thickness mm (in)	Part number
5.8 (0.228)	31567-X2904
6.0 (0.236)	31567-X2905
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

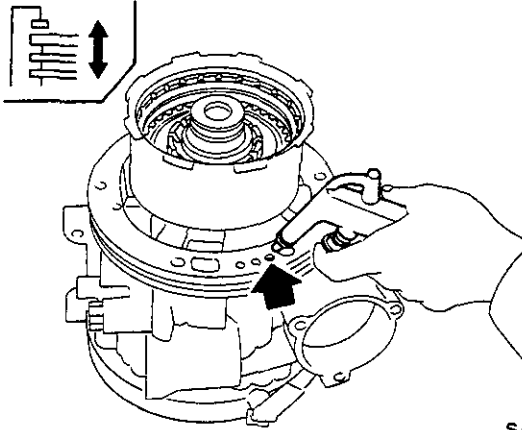
VG30E  
turbo  
only

# REPAIR FOR COMPONENT PARTS

## Direct Clutch & Front Clutch (Cont'd)

### 10. Testing high-reverse clutch (Front)

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

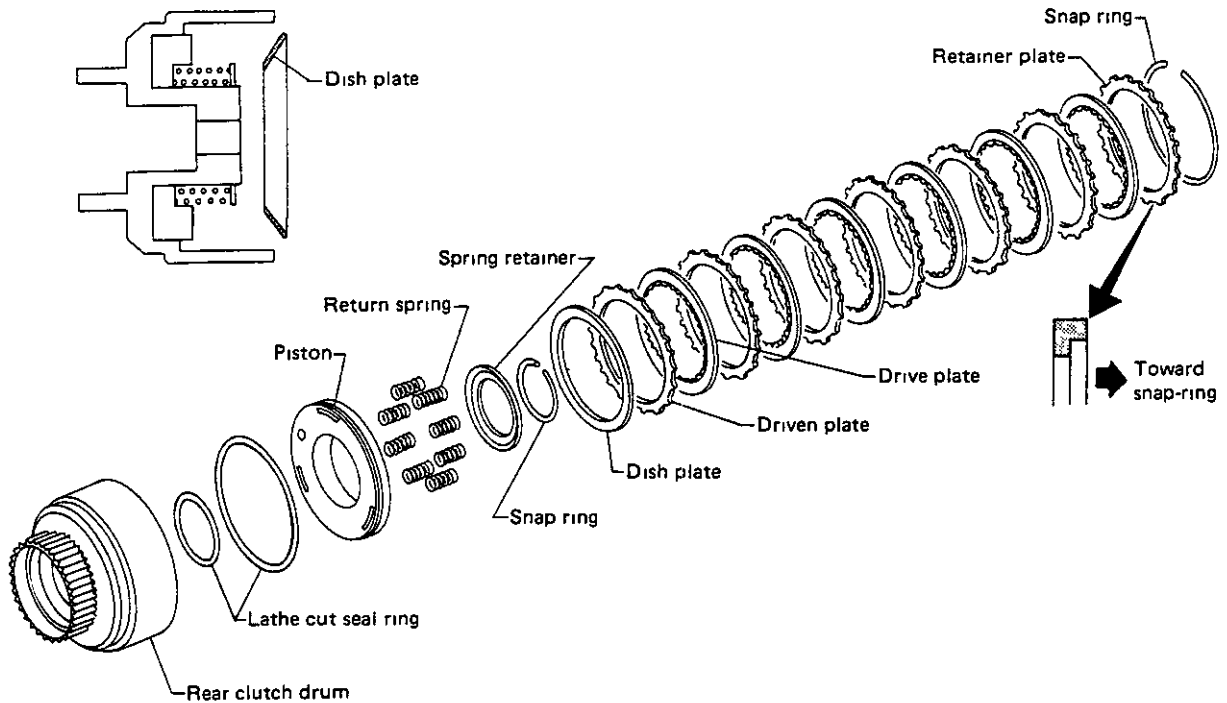


SAT621

# REPAIR FOR COMPONENT PARTS

## Forward Clutch (Rear)

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

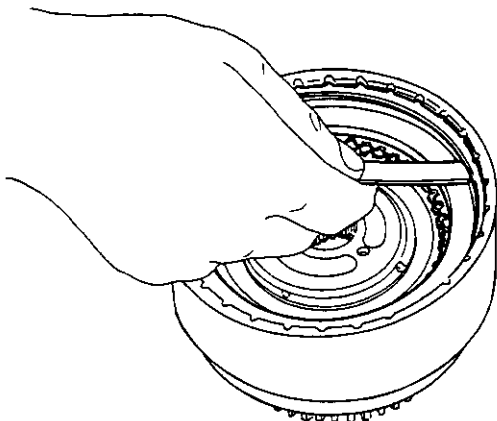


SAT728

Service procedures for forward clutch (Rear) are essentially the same as those for high-reverse clutch (Front), with the following exception:

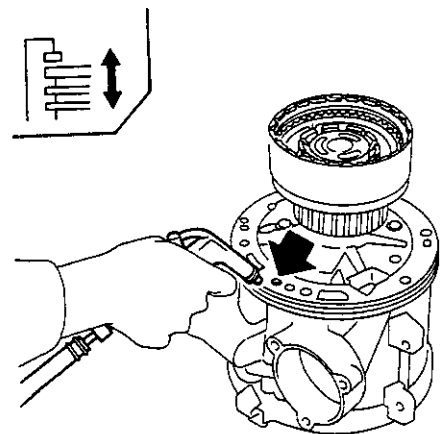
**Specified clearance between retainer plate and snap ring:**

**0.8 - 1.5 mm (0.031 - 0.059 in)**



SAT035

### Test rear clutch

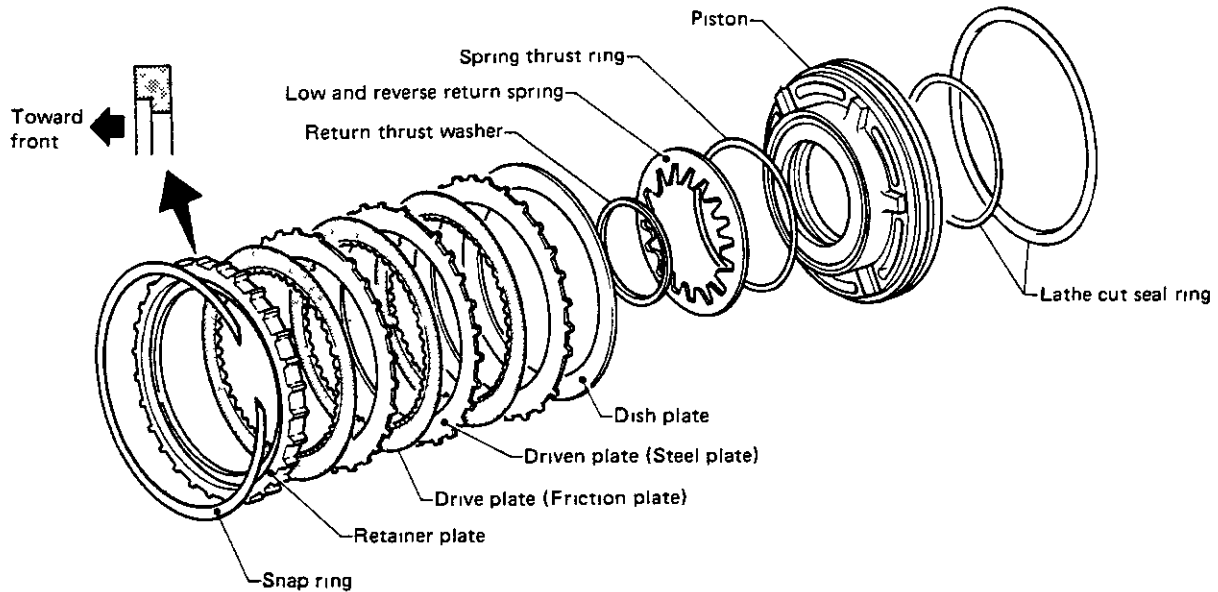


SAT622

# 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



SAT729

### INSPECTION

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

#### Drive plate thickness:

##### Standard

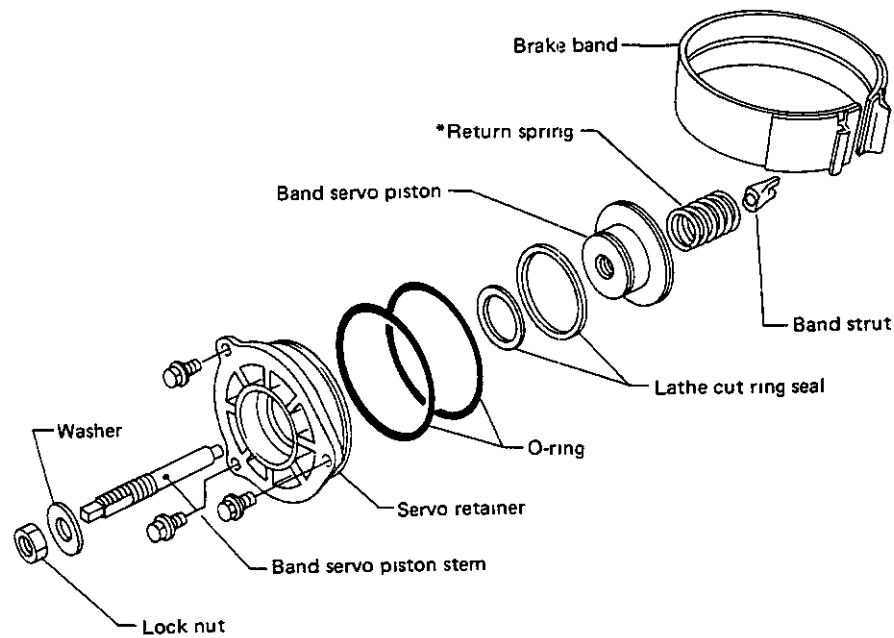
1.90 - 2.05 mm (0.0748 - 0.0807 in)

##### Allowable limit

1.8 mm (0.071 in)

# REPAIR FOR COMPONENT PARTS

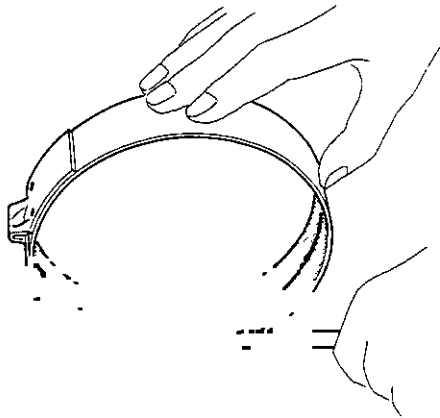
## Brake Band and Band Servo



SAT559

### INSPECTION

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

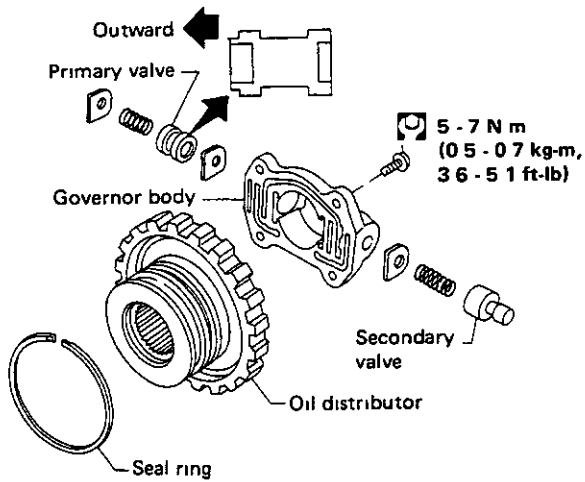


SAT327

- Check band servo components for wear and scoring

# REPAIR FOR COMPONENT PARTS

## Governor

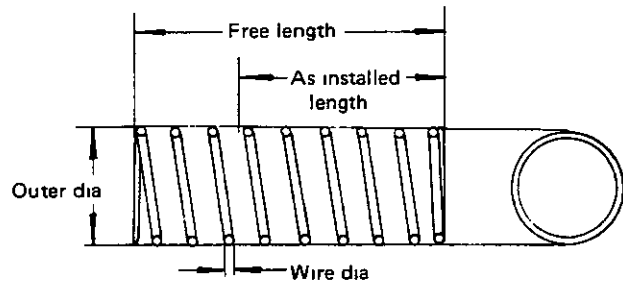


SAT560

- Check valves for burning or scratches. Inspect springs for weakness or burning. Replace parts as necessary.

Do not interchange components of primary and secondary governor valves.

### GOVERNOR VALVE SPRING CHART

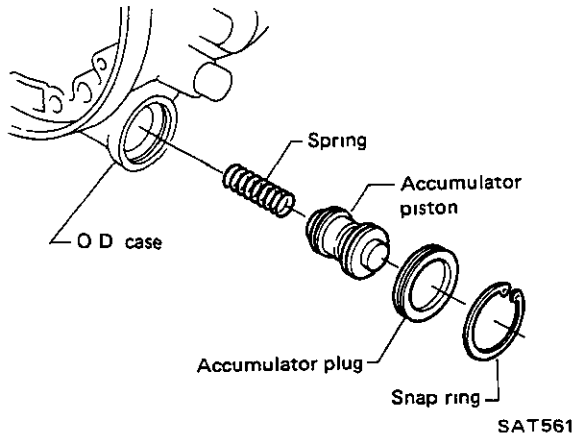


SAT039

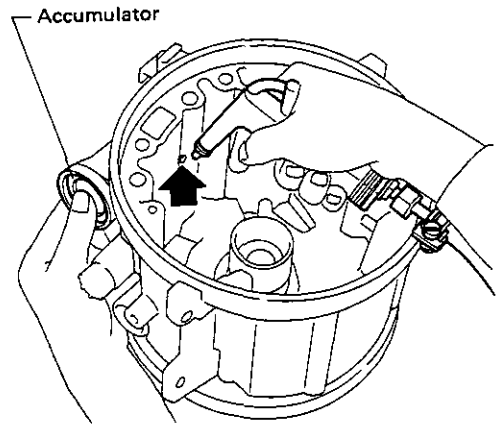
Valve spring		Wire dia mm (in)	Outer coil dia mm (in)	No of active coil	Free length mm (in)	Installed	
						Length mm (in)	Load N (kg, lb)
Primary governor	VG30E	0.65 (0.0256)	8.95 (0.3524)	4.4	10.5 (0.413)	7.5 (0.295)	2.109 (0.215, 0.474)
	VG30E turbo	0.45 (0.0177)	8.75 (0.3445)	5.0	21.8 (0.858)	7.5 (0.295)	2.109 (0.215, 0.474)
Secondary governor	VG30E	0.70 (0.0276)	9.20 (0.3622)	5.5	19.8 (0.780)	10.5 (0.413)	6.9 (0.7, 1.5)
	VG30E turbo	0.70 (0.0276)	9.20 (0.3622)	5.5	19.8 (0.780)	10.5 (0.413)	6.9 (0.7, 1.5)

# REPAIR FOR COMPONENT PARTS

## Accumulator



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



- Check accumulator components for wear and scoring.

### VALVE SPRING CHART

Valve spring	Wire dia mm (in)	Outer coil dia mm (in)	No of active coil	Free length mm (in)	Installed	
					Length mm (in)	Load N (kg, lb)
Accumulator spring	1.8 (0.071)	14.85 (0.5846)	7.3	39.7 (1.563)	30.5 (1.201)	58.8 (6.0, 13.2)

# REPAIR FOR COMPONENT PARTS

## Planetary Carrier

### INSPECTION

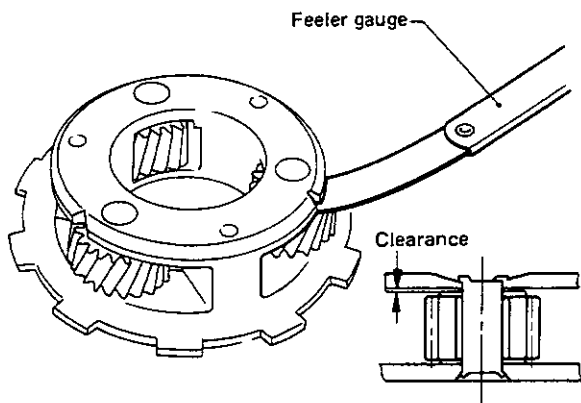
- Check clearance between pinion washer and planetary carrier with a feeler

Standard clearance.

0.20 - 0.70 mm (0.0079 - 0.0276 in)

Wear limit:

0.80 mm (0.0315 in)



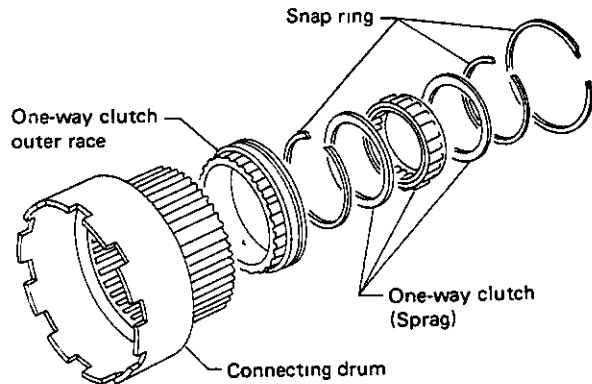
SAT730

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

## Connecting Drum Assembly

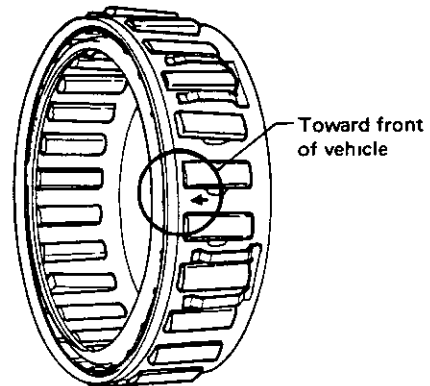
If one-way clutch is out of order as determined during disassembly, repair it as follows

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



SAT562

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

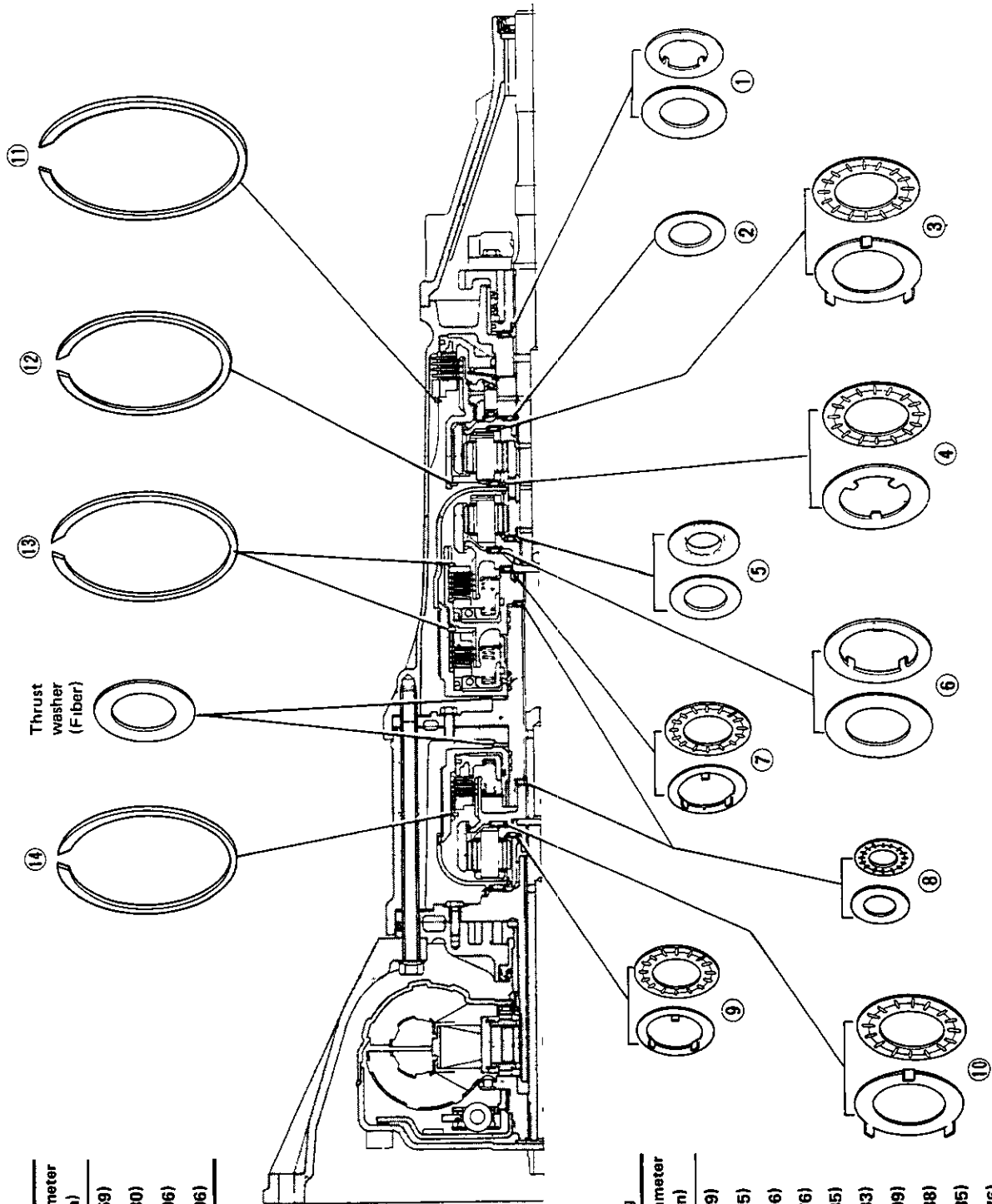


SAT563



# 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.



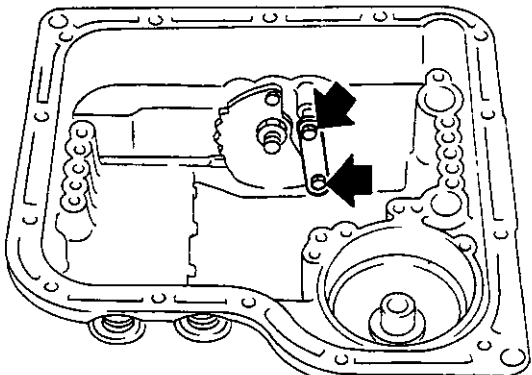
Snap ring	
No	Outer diameter mm (in)
11	142 (5 59)
12	122 (4 80)
13	126 (4 96)
14	126 (4 96)

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)

SAT569

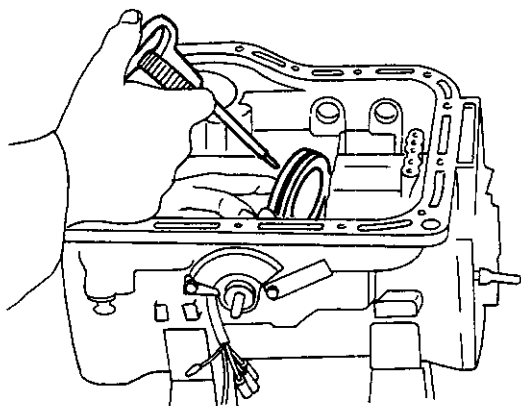
# ASSEMBLY

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



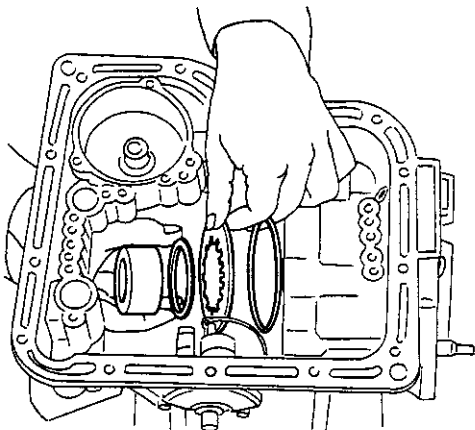
SAT720

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



SAT048

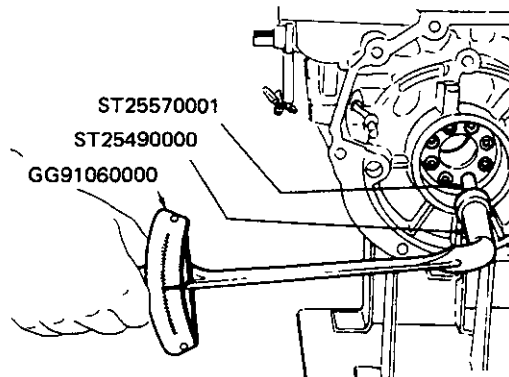
3. Install thrust ring, piston return spring, thrust washer and one-way clutch inner race.



SAT021

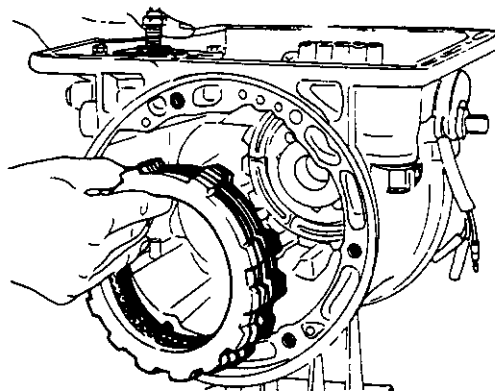
4. Install hex-head slotted bolts.

Check that return spring is centered on race before tightening.



AT135

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

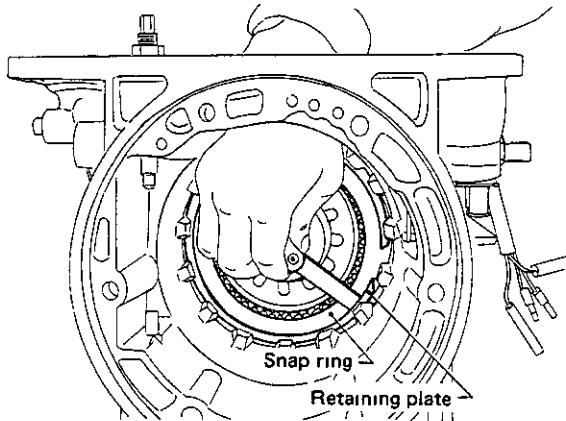


AT129

# 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 - 1.25 mm (0.0315 - 0.0492 in)

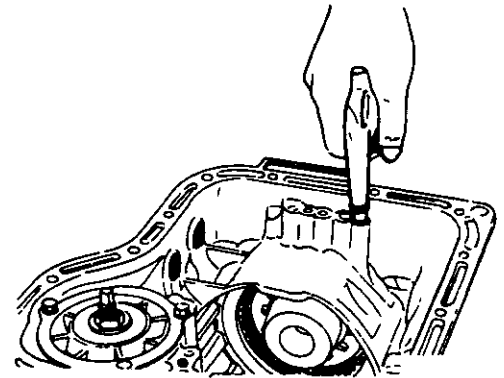


SAT049

## Available retainer plates

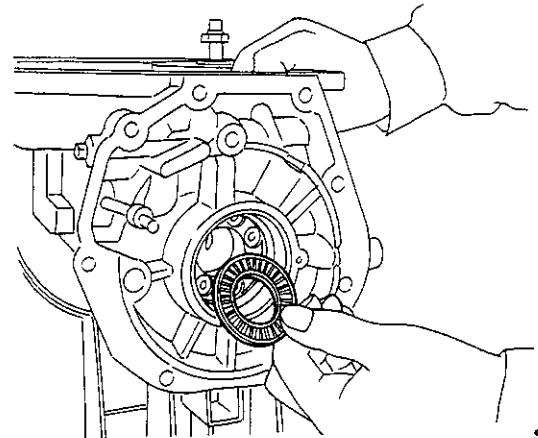
	Thickness mm (in)	Part number
VG30E turbo	7.8 (0.307)	31667-X0500
	8.0 (0.315)	31667-X0501
	8.2 (0.323)	31667-X0502
	8.4 (0.331)	31667-X0503
	8.6 (0.339)	31667-X0504
	8.8 (0.346)	31667-X0505
VG30E	11.8 (0.465)	31667-X0300
	12.0 (0.472)	31667-X0301
	12.2 (0.480)	31667-X0302
	12.4 (0.488)	31667-X0303
	12.6 (0.496)	31667-X0304
	12.8 (0.504)	31667-X0305

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



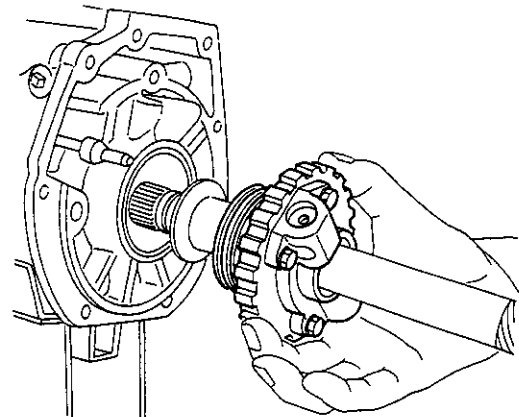
AT158

8. Install governor thrust washer and needle bearing



SAT050

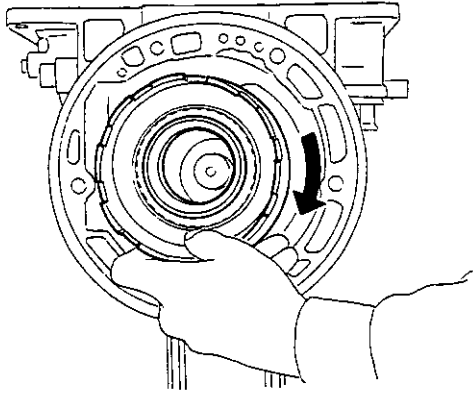
9. Install output shaft and governor distributor into case.



SAT731

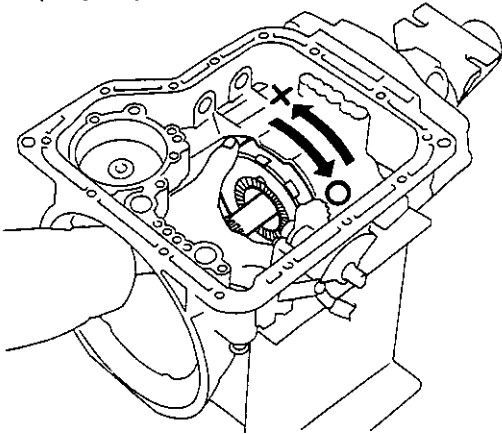
# ASSEMBLY

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



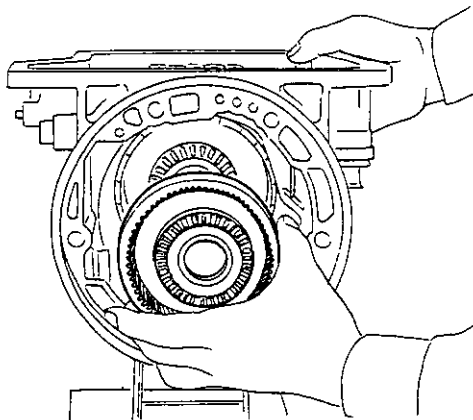
SAT732

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



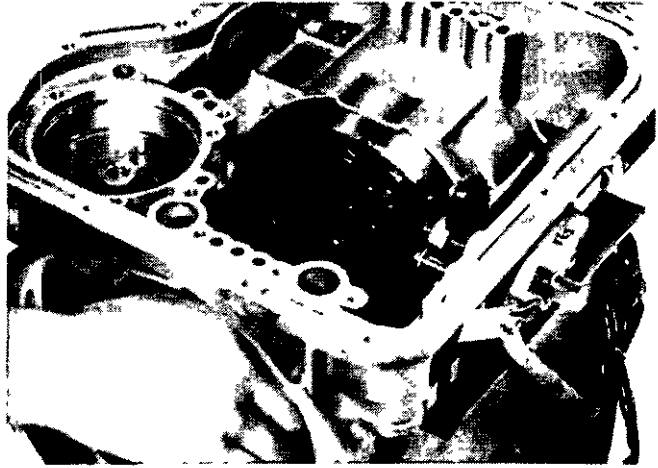
SAT536

12. Install rear internal gear.

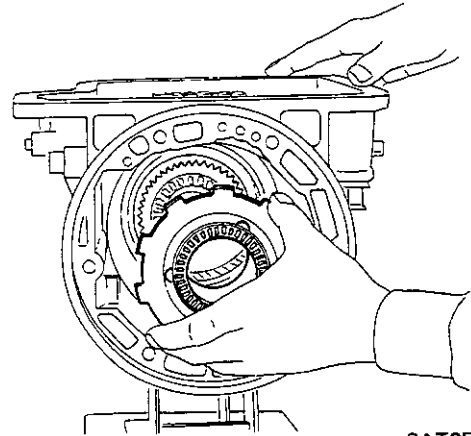


SAT054

13. Install snap-ring on shaft.



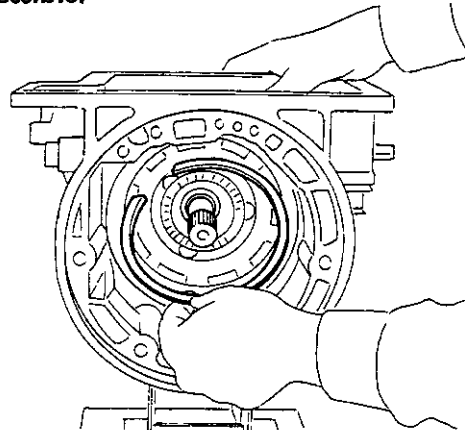
14 Secure thrust bearing and thrust washer with vaseline and install rear planetary carrier



SAT055

15 Install rear planetary carrier snap ring.

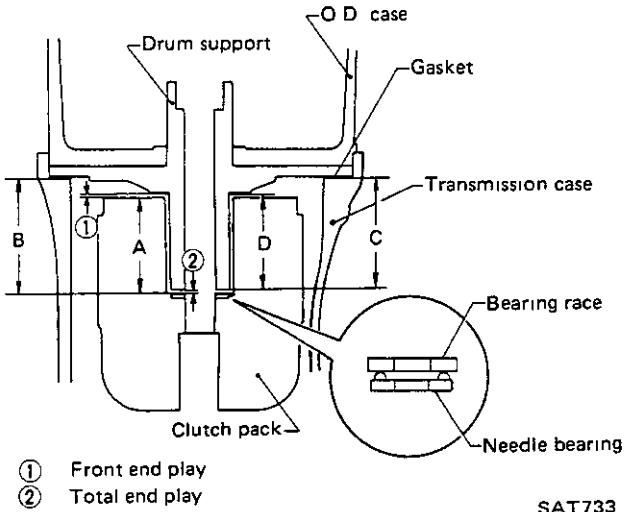
If you have insufficient space to install snap ring into drum groove, pull connecting drum forward as far as possible.



SAT056

# ASSEMBLY

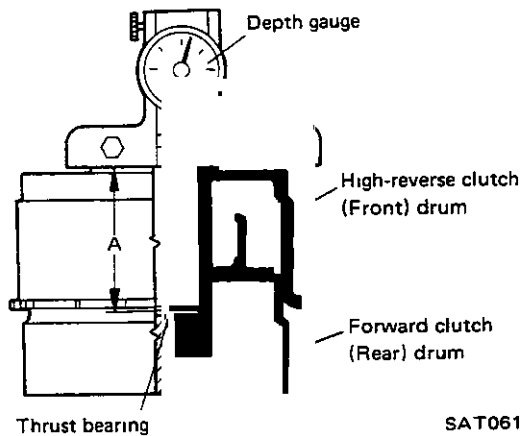
16. Adjust end play as follows:



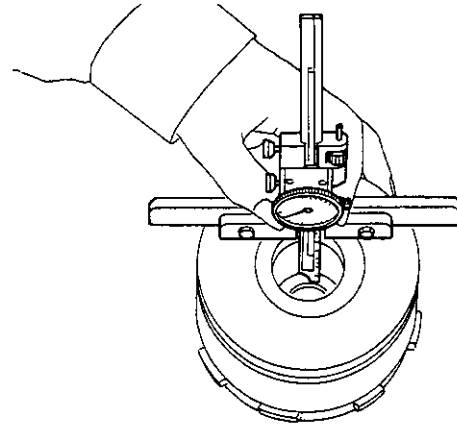
SAT733

## Front end play

- 1) Assemble high-reverse clutch (Front) and forward clutch (Rear) 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)

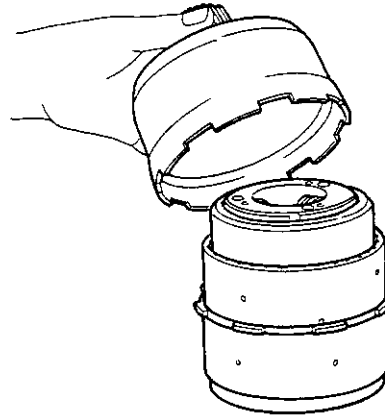


SAT061



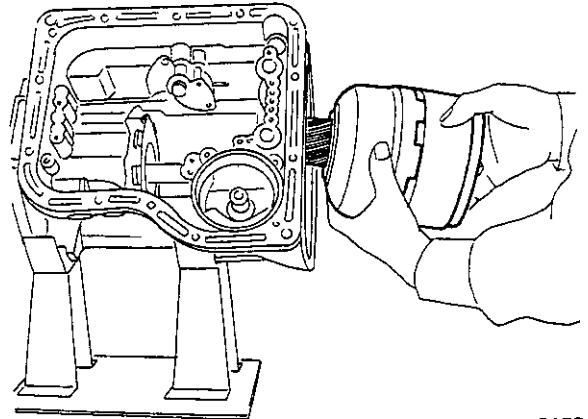
SAT062

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



SAT057

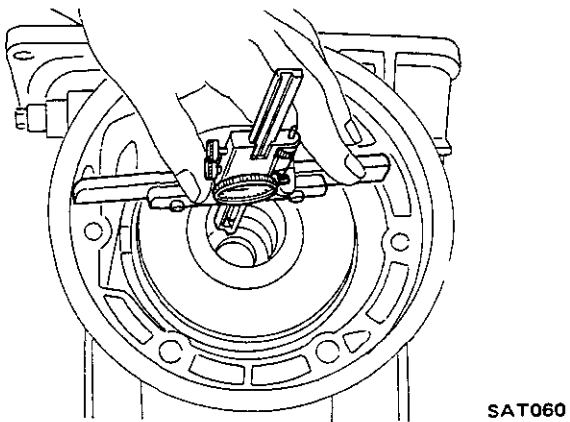
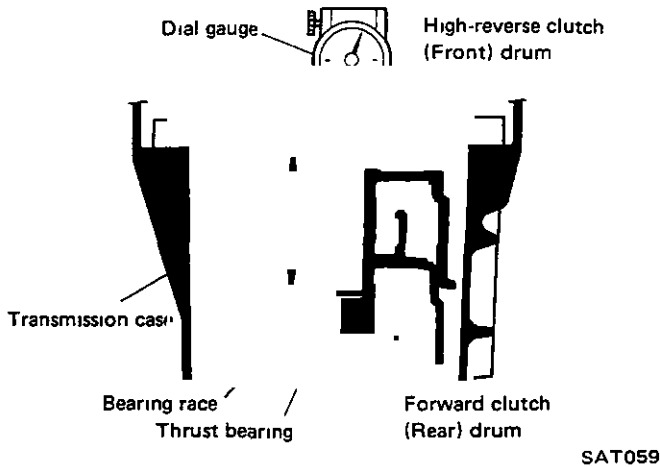
- 3) Install assembly into transmission case. Check that parts are properly seated before proceeding with measurements.



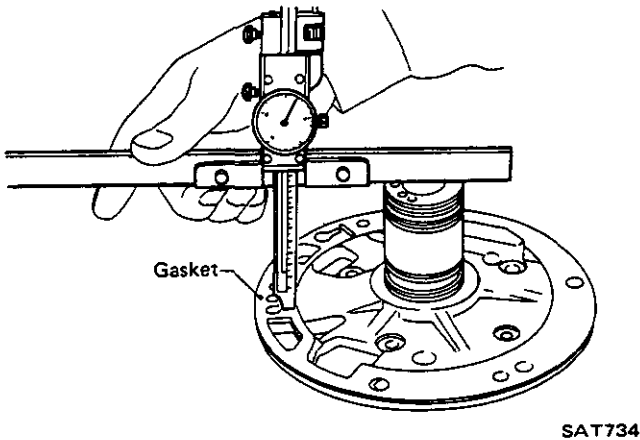
SAT058

# ASSEMBLY

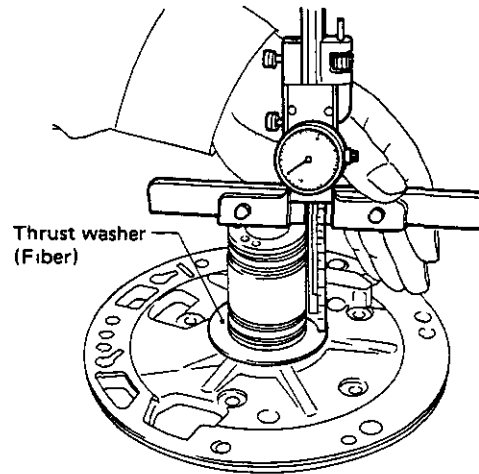
- 4) Using a dial gauge or caliper with a seven inch base, measure from rear hub thrust bearing race to case (dimension B).



- 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)



$$\text{Front end play} = [B - A - 0.1 \text{ mm (0.004 in)}] - (C - D)$$

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

Front end play can be adjusted with high-reverse clutch (Front) 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-X0106
1.7 (0 067)	31528-X0105
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

$$\text{Total end play} = [B - 0.1 \text{ mm (0.004 in)}] - C$$

Specified total end play:

0.25 - 0.50 mm

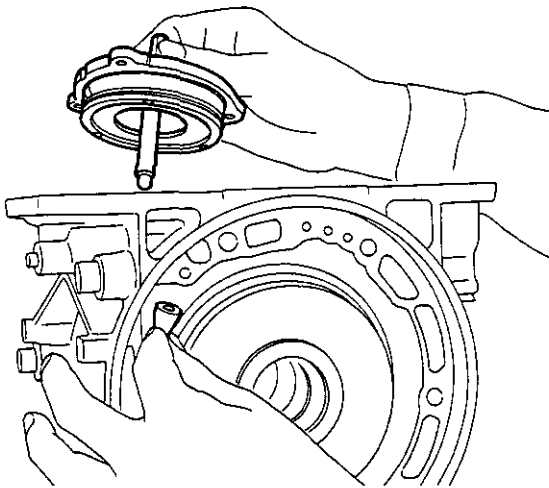
(0.0098 - 0.0197 in)

Total end play can be adjusted with bearing race

Available oil pump cover bearing race

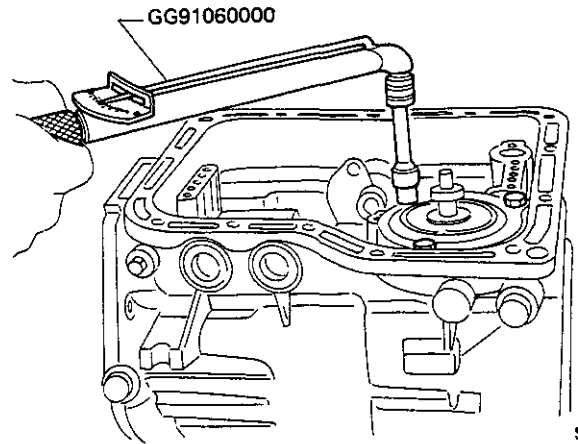
Thickness mm (in)	Part number
1.2 (0.047)	31556-X0100
1.4 (0.055)	31556-X0101
1.6 (0.063)	31556-X0102
1.8 (0.071)	31556-X0103
2.0 (0.079)	31556-X0104
2.2 (0.087)	31556-X0105

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



SAT066

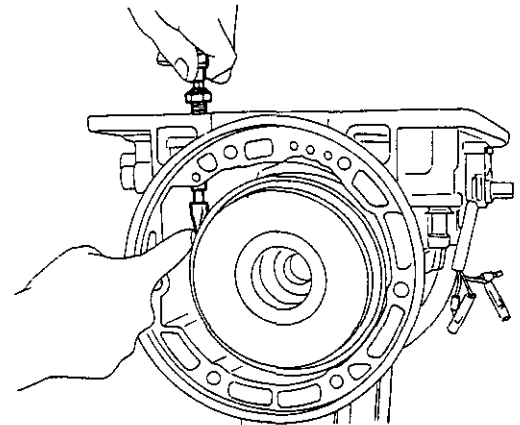
- 18 Install and torque the retainer bolts. Loosen piston stem.



SAT067


- 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.**

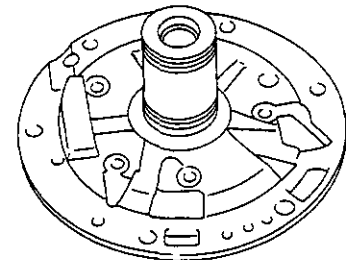


SAT068

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

 Bearing race

 Thrust washer (Fiber)

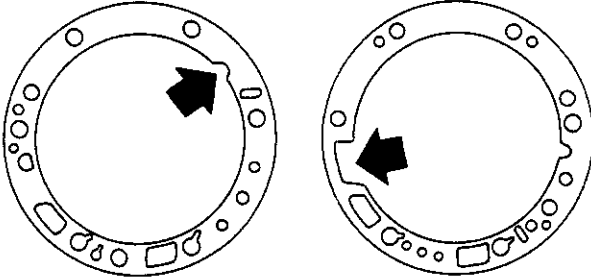


SAT573

# ASSEMBLY

21. Mount drum support gasket (A) 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.

Identification point of gasket



Between oil pump and O.D. case (B)

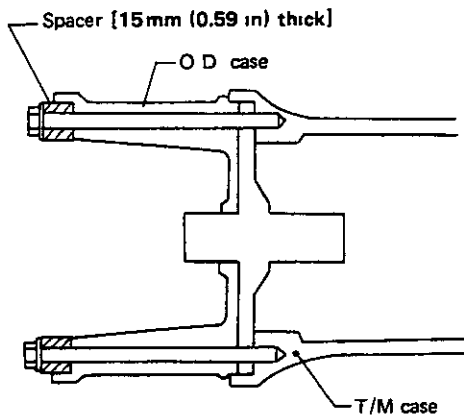
Between drum support to transmission case (A)

SAT524

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 using two converter housing securing bolts.

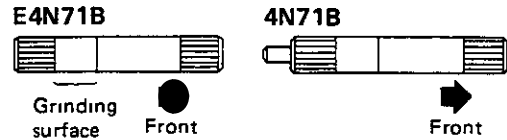
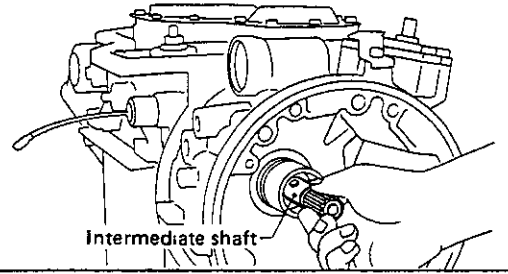


SAT574

24. Insert intermediate shaft.

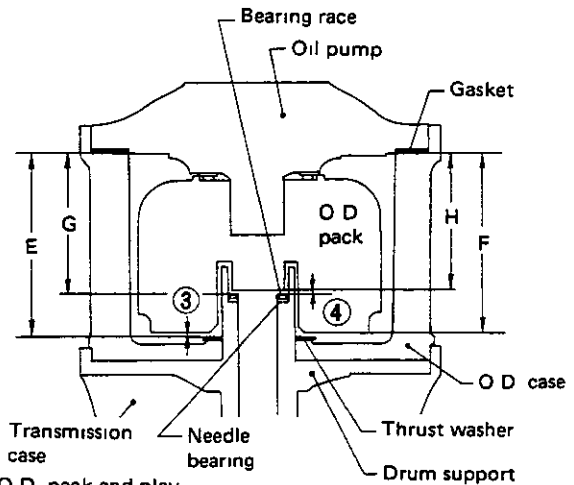
E4N71B:

Be careful of shaft direction.



SAT754

25. Adjust O.D. end play.

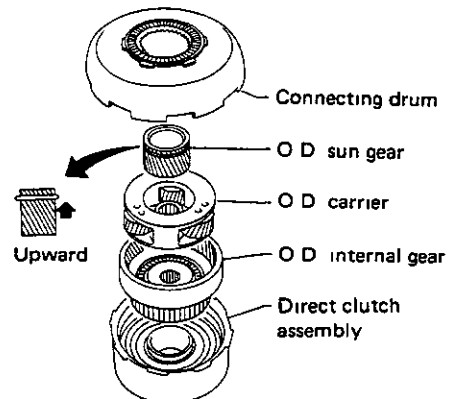


- ③ O.D. pack end play
- ④ O.D. total end play

SAT576

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.

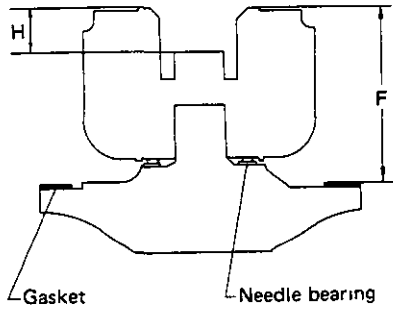
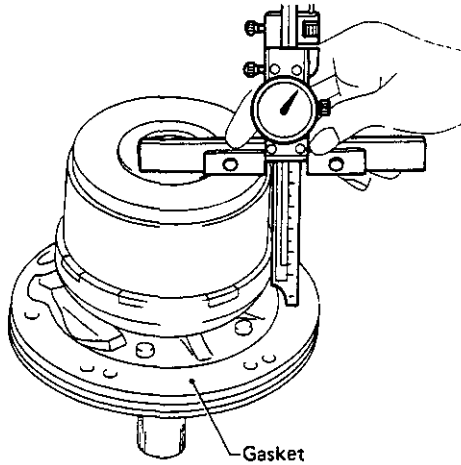


SAT577



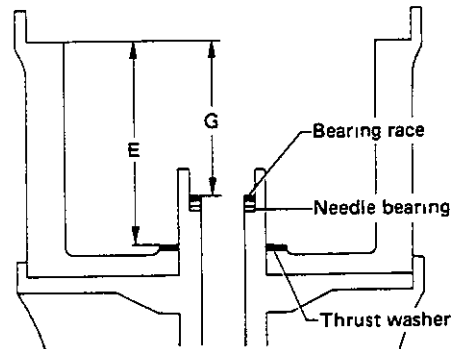
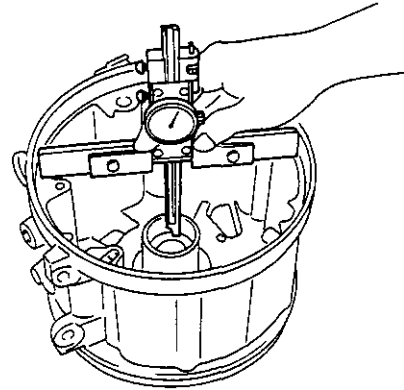
# ASSEMBLY

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



SAT735

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



SAT736

$$\text{O.D. pack end play} = [E - 0.1 \text{ mm (0.004 in)}] - F$$

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
1.5 (0.059)	31528-X0106
1.7 (0.067)	31528-X0105
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

## O.D. total end play

$$\text{O.D. total end play} = [G - 0.1 \text{ mm (0.004 in)}] - (F - H)$$

## Specified O.D. total end play.

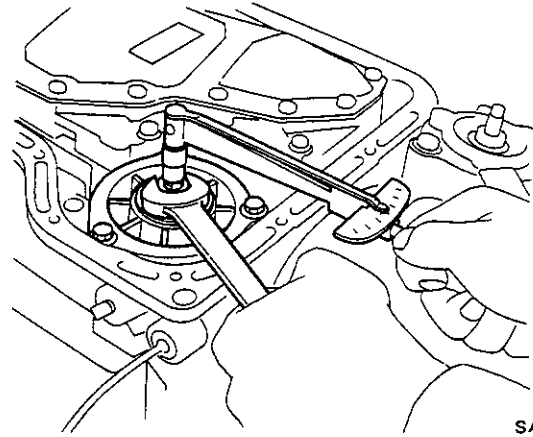
$$0.25 - 0.50 \text{ mm (0.0098 - 0.0197 in)}$$

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

## Available O.D. bearing races

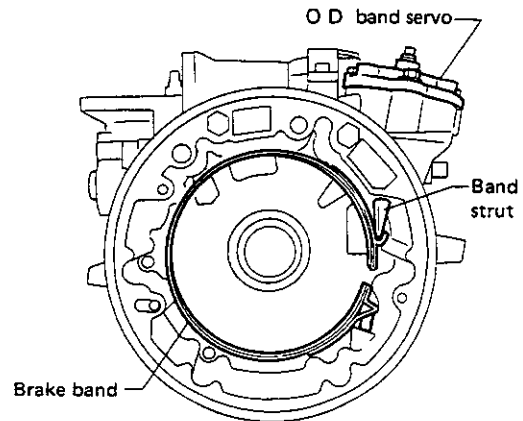
Thickness mm (in)	Part number
1.2 (0.047)	31556-X0100
1.4 (0.055)	31556-X0101
1.6 (0.063)	31556-X0102
1.8 (0.071)	31556-X0103
2.0 (0.079)	31556-X0104
2.2 (0.087)	31556-X0105

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



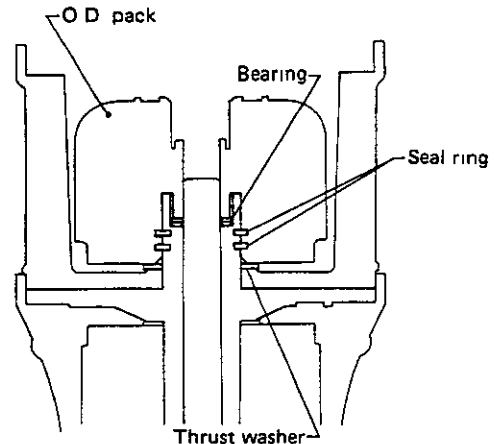
SAT580

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



SAT581

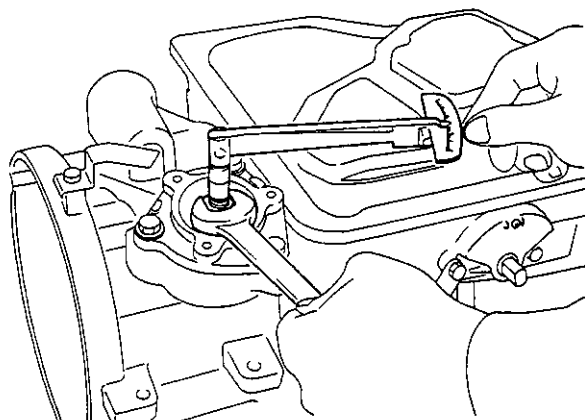
28. Lubricate seal ring of drum support, then install O D. bearing & race, O.D. thrust washer and O.D. pack on drum support. Make sure that brake band strut is correctly installed.



SAT737

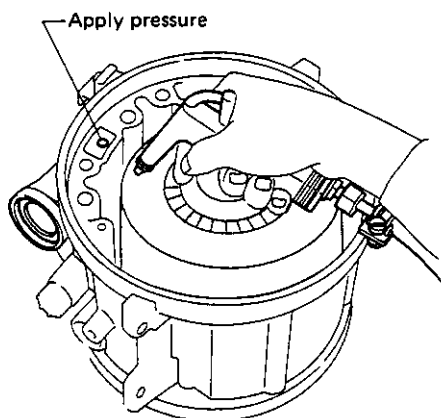
# ASSEMBLY

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



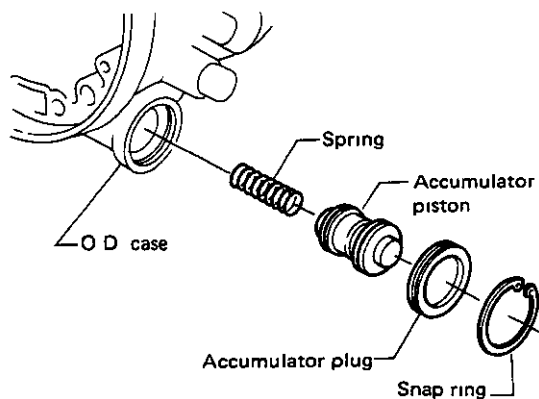
SAT625

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



SAT648

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



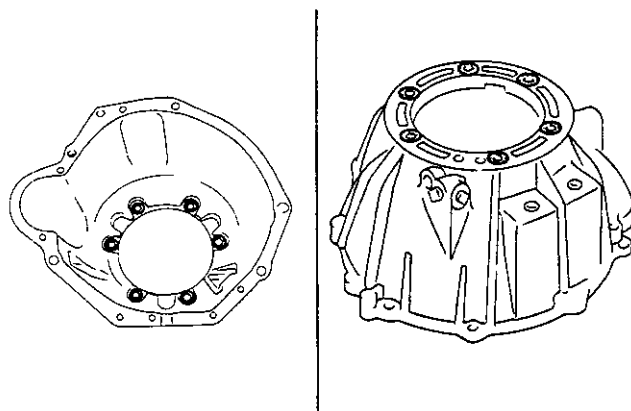
SAT561

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

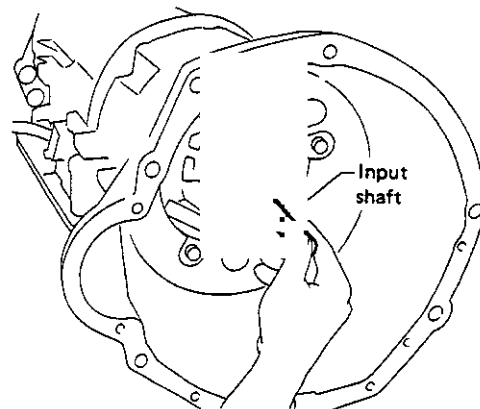


Apply sealant

SAT738

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

35. Install input shaft.

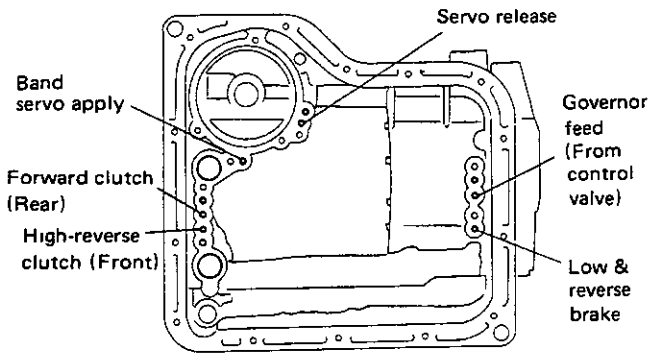


SAT585

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

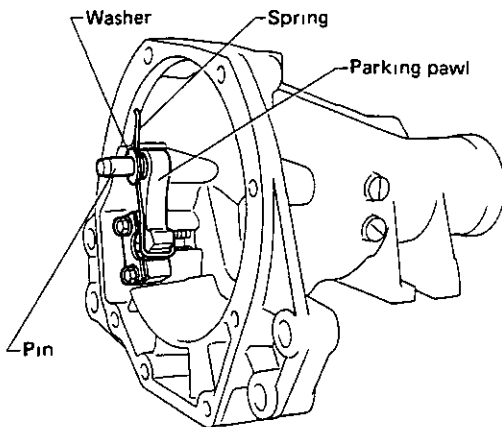
# ASSEMBLY

## Air check point



SAT586

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

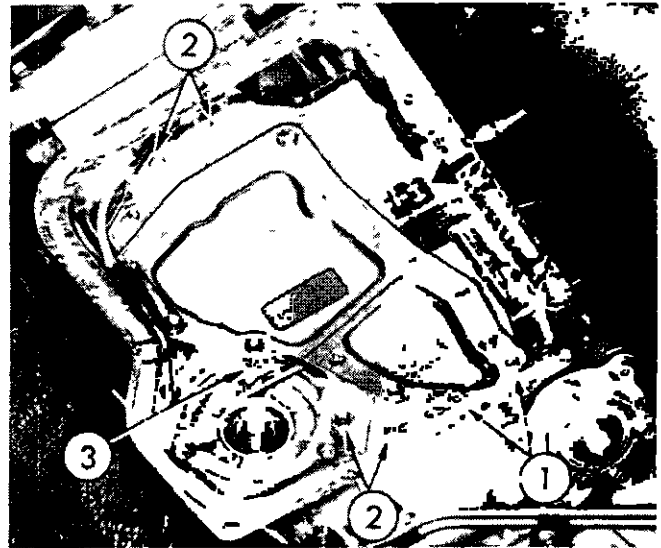


SAT739

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.

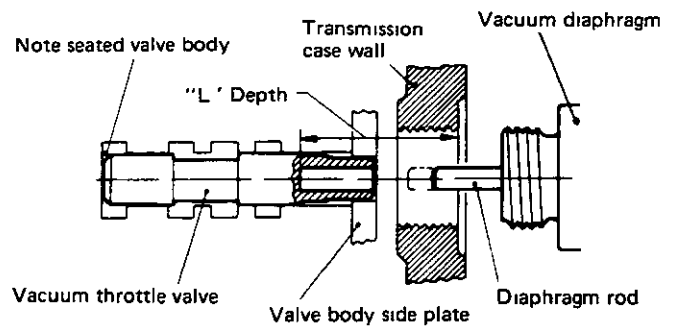
Securing bolt comes in three different lengths.



- 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.



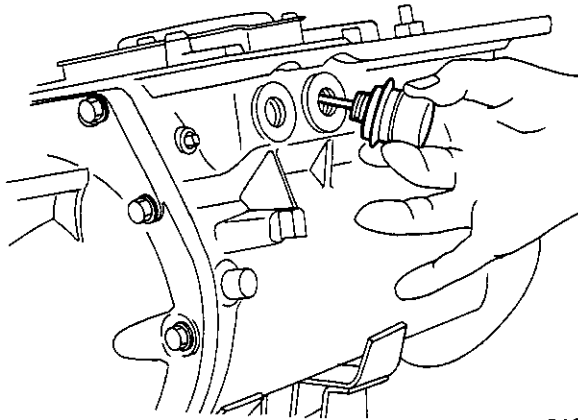
SAT078

# 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

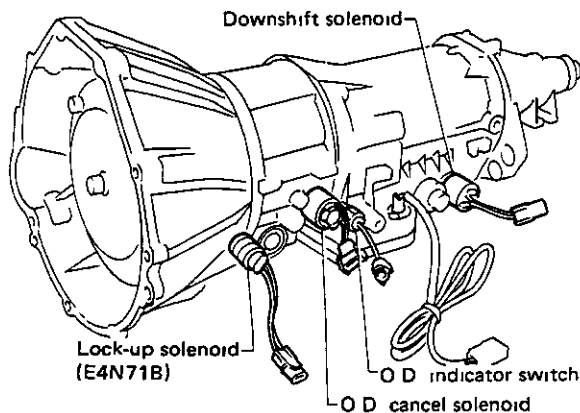
41 Install vacuum diaphragm.



SAT079

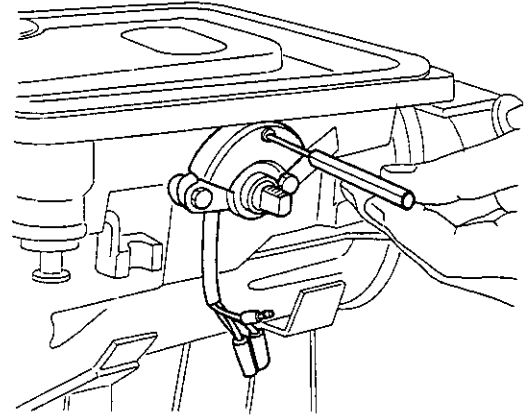
Make sure that vacuum diaphragm rod does not interfere with side plate of control valve.

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



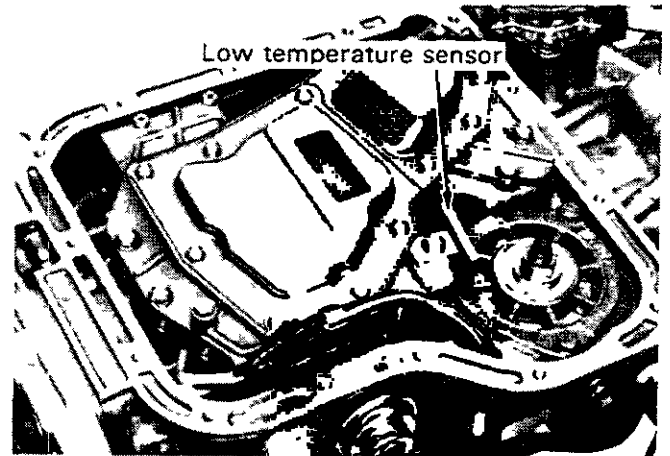
SAT740

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



SAT082

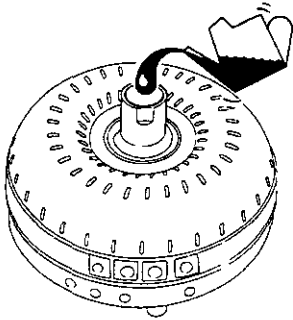
44 Before installing oil pan, check parking pawl engagement. Make wiring connections to shift switches and low temperature sensor (E4N71B automatic transmission models).



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



SAT518

- 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

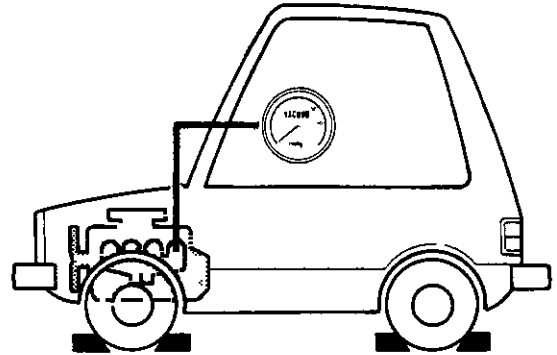
### FLUID CONDITION

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



SAT596

- 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 )

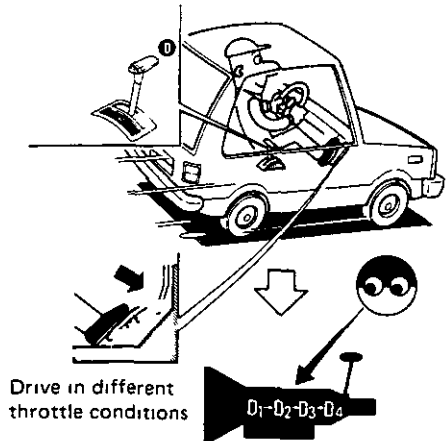
### "D" RANGE

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

# TROUBLE-SHOOTING AND DIAGNOSES

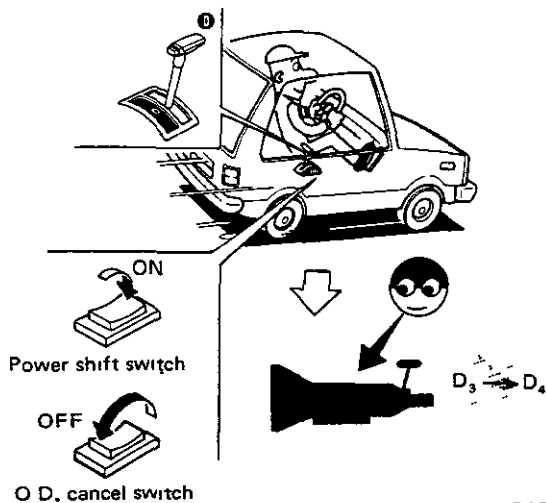
## Road Testing (Cont'd)

- 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 These speeds are to be read at several different intake manifold vacuum levels (see the chart on the next page). Also determine the timing at which shocks are encountered during shifting and which clutches are engaged



SAT590

- Check to determine if shifting speed changes when accelerator pedal is depressed slowly and when it is depressed quickly (E4N71B transmission models)
- Check to determine if shifting to overdrive gear cannot be made while power shift switch (E4N71B transmission) is "ON" or O.D. cancel switch (4N71B transmission) is "OFF".



SAT744

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

### "2" RANGE

- While vehicle is being driven in "2" range, make sure that it does not shift into 1st or 3rd gear, despite speed changes.
- 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

- 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
- While vehicle is being driven in "1" range, release accelerator pedal to make sure that engine compression acts as a brake
- 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 AND LINE PRESSURE WHEN SHIFTING GEARS

**E4N71B**

VG30E engine without turbo

1 Disconnect harness from lock-up 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 lock-up control unit  
Road test the vehicle to see if shifting corresponds to the specified shift schedule pattern

Intake manifold vacuum kPa (mmHg, inHg)	Gearshift	Vehicle speed km/h (MPH)	Propeller shaft revolution rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)
0 (0, 0) (Kickdown)	D <sub>1</sub> → D <sub>2</sub>	59 - 67 (37 - 42)	1,900 - 2,150	785 - 941 (8 0 - 9 6, 114 - 137)
	D <sub>2</sub> → D <sub>3</sub>	101 - 109 (63 - 68)	3,250 - 3,500	
	D <sub>3</sub> → D <sub>4</sub>	—	—	—
	D <sub>4</sub> → D <sub>3</sub>	—	—	—
	D <sub>3</sub> → D <sub>2</sub>	89 - 97 (55 - 60)	2,850 - 3,100	745 - 902 (7 6 - 9 2, 108 - 131)
	D <sub>2</sub> → D <sub>1</sub>	42 - 50 (26 - 31)	1,350 - 1,600	
-13 3 (-100, -3 94)	D <sub>1</sub> → D <sub>2</sub>	12 - 22 (7 - 14)	400 - 700	549 - 706 (5.6 - 7 2, 80 - 102)
	D <sub>2</sub> → D <sub>3</sub>	47 - 59 (29 - 37)	1,500 - 1,900	
	D <sub>3</sub> → D <sub>4</sub>	67 - 83 (42 - 52)	2,150 - 2,650	490 - 647 (5 0 - 6 6, 71 - 94)
	D <sub>4</sub> → D <sub>3</sub>	25 - 41 (16 - 25)	800 - 1,300	
	D <sub>3</sub> → D <sub>2</sub>	14 - 30 (9 - 19)	450 - 950	490 - 902 (5 0 - 9 2, 71 - 131)
	D <sub>2</sub> → D <sub>1</sub>	11 - 19 (7 - 12)	350 - 600	
0 (0, 0) (Full throttle)	1 <sub>2</sub> → 1 <sub>1</sub>	42 - 50 (26 - 31)	1,350 - 1,600	726 - 883 (7 4 - 9 0, 105 - 128)
-40 0 (-300, -11 81)	1 <sub>2</sub> → 1 <sub>1</sub>	39 - 47 (24 - 29)	1,250 - 1,500	637 - 785 (6 5 - 8 0, 92 - 114)

### VG30E turbo engine

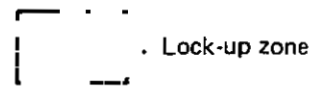
Intake manifold vacuum kPa (mmHg, inHg)	Gearshift	Vehicle speed km/h (MPH)	Propeller shaft revolution rpm	Line pressure kPa (kg/cm <sup>2</sup> , psi)
+46 7 (+350, +13.78) (Kickdown)	D <sub>1</sub> → D <sub>2</sub>	60 - 70 (37 - 43)	1,850 - 2,150	637 - 863 (6.5 - 8 8, 92 - 125)
	D <sub>2</sub> → D <sub>3</sub>	103 - 112 (64 - 70)	3,150 - 3,450	
	D <sub>3</sub> → D <sub>4</sub>	—	—	—
	D <sub>4</sub> → D <sub>3</sub>	—	—	—
	D <sub>3</sub> → D <sub>2</sub>	85 - 94 (53 - 58)	2,600 - 2,900	637 - 863 (6 5 - 8 8, 92 - 125)
	D <sub>2</sub> → D <sub>1</sub>	46 - 55 (29 - 34)	1,400 - 1,700	
-26 7 (-200, -7 87)	D <sub>1</sub> → D <sub>2</sub>	16 - 26 (10 - 16)	500 - 800	314 - 471 (3 2 - 4 8, 46 - 68)
	D <sub>2</sub> → D <sub>3</sub>	21 - 34 (13 - 21)	650 - 1,050	
	D <sub>3</sub> → D <sub>4</sub>	41 - 57 (25 - 35)	1,250 - 1,750	314 - 530 (3.2 - 5 4, 46 - 77)
	D <sub>4</sub> → D <sub>3</sub>	21 - 37 (13 - 23)	650 - 1,150	
	D <sub>3</sub> → D <sub>2</sub>	11 - 28 (7 - 17)	350 - 850	314 - 530 (3.2 - 5 4, 46 - 77)
	D <sub>2</sub> → D <sub>1</sub>	11 - 20 (7 - 12)	350 - 600	
+46 7 (+350, +13 78) (Full throttle)	1 <sub>2</sub> → 1 <sub>1</sub>	46 - 55 (29 - 34)	1,400 - 1,700	588 - 745 (6.0 - 7 6, 85 - 108)
-60 0 (-450, -17 72)	1 <sub>2</sub> → 1 <sub>1</sub>	44 - 54 (27 - 34)	1,350 - 1,650	588 - 745 (6 0 - 7 6, 85 - 108)

# TROUBLE-SHOOTING AND DIAGNOSES

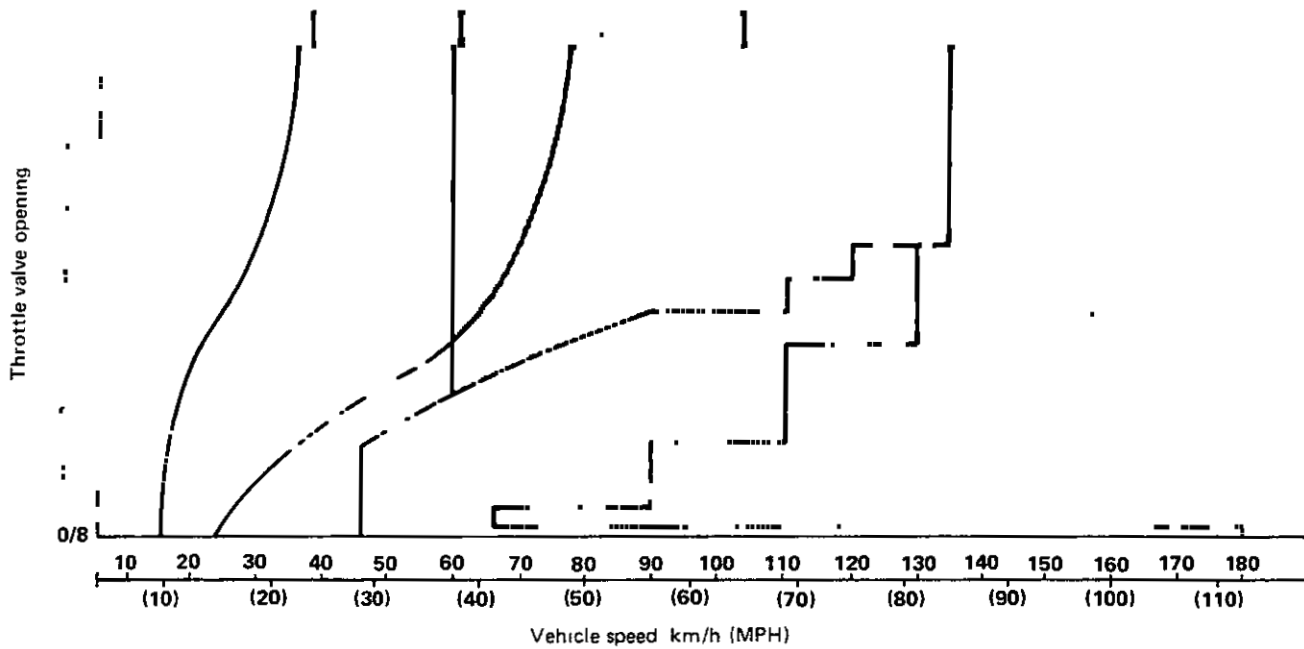
## Road Testing (Cont'd)

### SHIFT SCHEDULE

VG30E engine without turbo  
[Standard pattern]

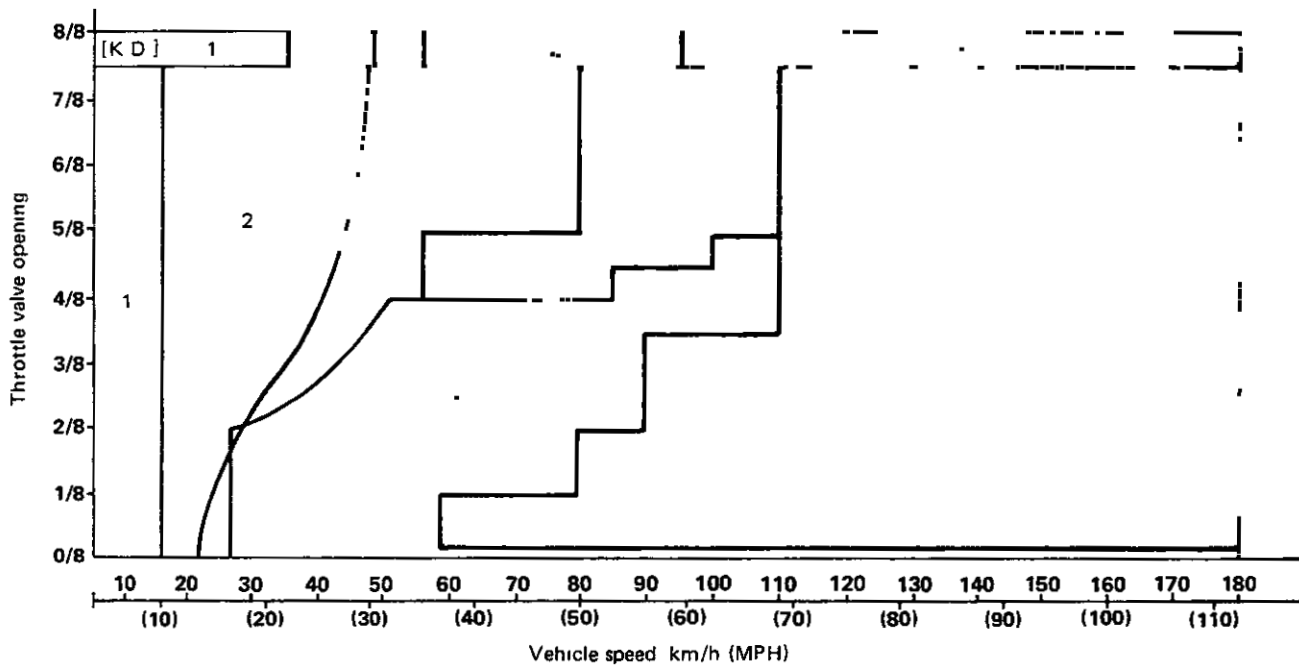


### Upshift



SAT745

### Downshift



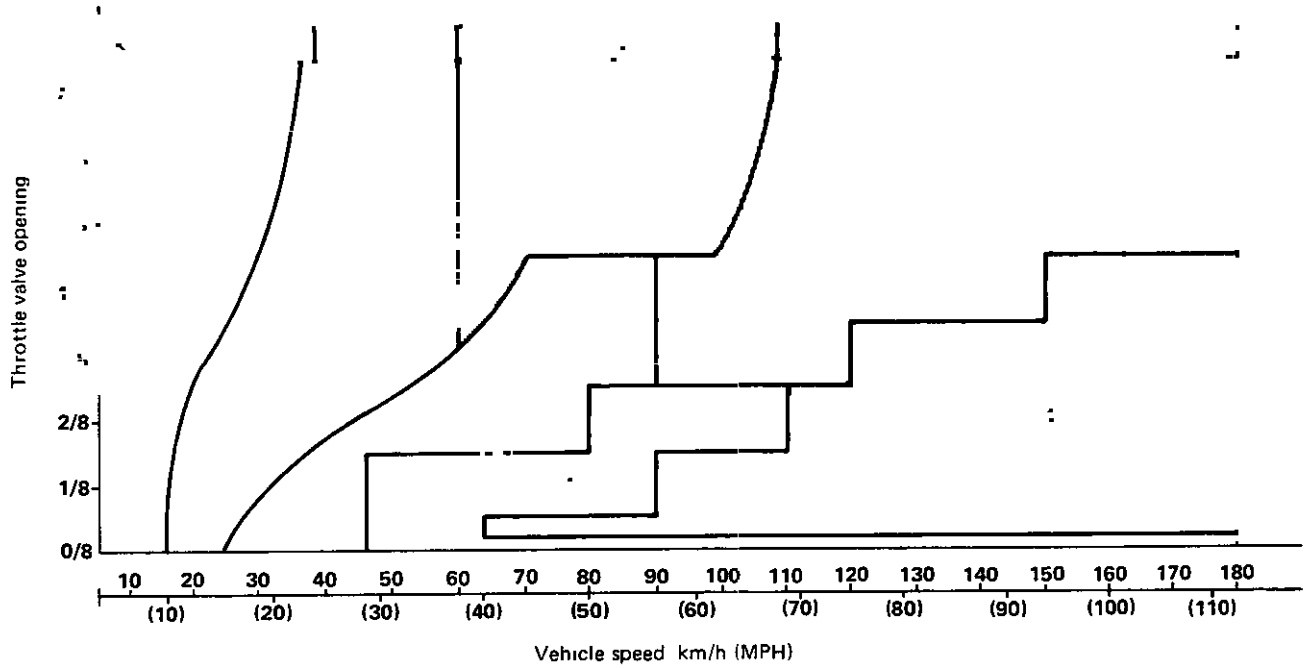
SAT746

# TROUBLE-SHOOTING AND DIAGNOSES

## Road Testing (Cont'd)

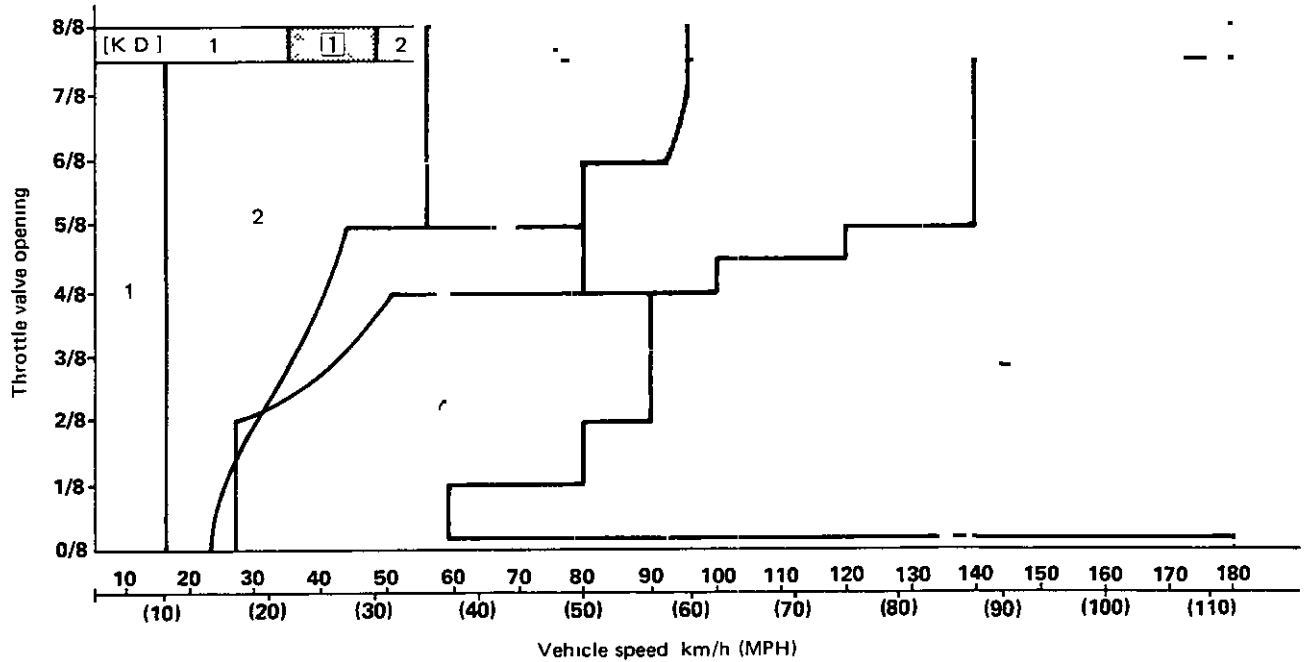
[Power pattern]

Upshift



SAT747

Downshift

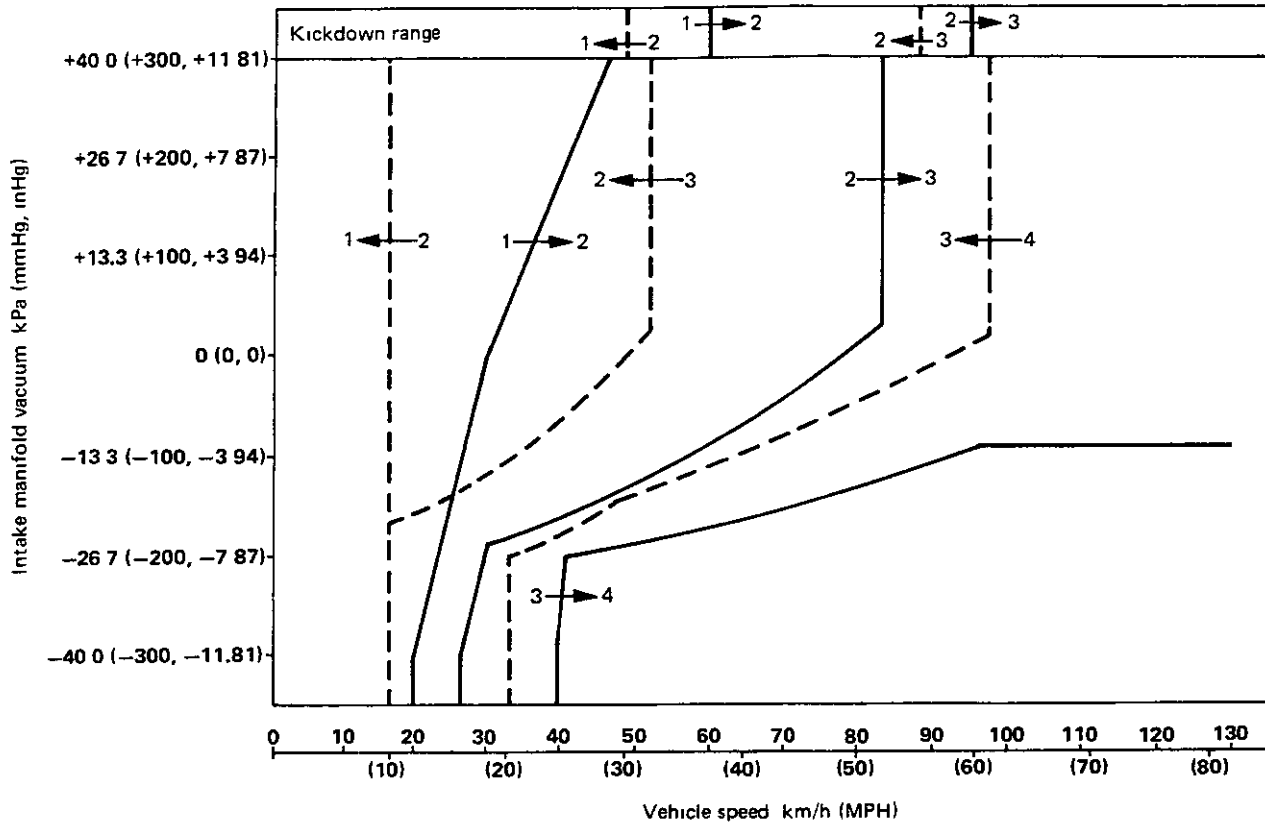


SAT748

# TROUBLE-SHOOTING AND DIAGNOSES

## Road Testing (Cont'd)

VG30E turbo engine



SAT749

# 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				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	
		ROUGH	SHIFT TIMING (Mark km/h (MPH))	NO SHIFT	SHIFT SLIPPAGE										
PARK RANGE	ENG START									A					
	HOLDING								B		C				
"R" RANGE	Man shift P-R					A3			A4						
	REVERSE					E A3	E	E	A4						
"N" RANGE	Man shift R-N								A4						
	ENG START									A					
	N								B		D				
"D" RANGE	Man shift N-D	F				G A3			A4						
	1st					G A3		I	A4						
	Auto shift 1-2	O		J	R				A4						
	2nd							U	A4						
	Auto shift 2-3	P		K	S				A4						
	3rd							U	A4						
	Auto shift 3-4	Q		L	T				A4						
	4th							U	A4						
	Lock-up "OFF" → Lock-up "ON"	N								A4				M	
	In lock-up "ON"									A4				M	
	Lock-up "ON" → Lock-up "OFF"									A4					
	Decel 4-3			V		Z				A4					
	Kickdown 4-3			V		Z A2				A4					
	Decel 3-2			W		A1				A4					
	Kickdown 3-2			W		Y A1				A4					
Decel 2-1			X						A4						
Kickdown 2-1			X						A4						
"2" RANGE	Man shift D-2			A5		H A3			A4						
	2nd					H A3		I	A4						
"1" RANGE	Man shift 2-1	A9		X A8					A4						
	Man shift D-1			X A6					A4						
	Acceleration					H A3		I	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

Refer ence		ON vehicle										OFF 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	Power shift SW (O D cancel SW)	O D cancel solenoid	Lock up solenoid	Lock up control unit and sensors	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	
A	Engine does not start in N P ranges	.	2	3	.	.	.	.	.	.	.	1	.	.	.	.	4	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
	Engine starts in range other than N and P	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
B	Transmission noise in P and N ranges	1	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	.	.	.	.	.	.	
C	Vehicle moves when changing into P range or parking gear does not disengage when shifted out of P range	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.		
D	Vehicle runs in N range	.	1	.	.	.	3	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	.	.	.	
E	Vehicle will not run in 'R' range (but runs in D 2 and 1 ranges) Clutch slips	1	2	.	.	.	3	5	.	6	4	.	.	.	.	.	.	.	.	.	.	.	8	.	.	7	10	.	.	.	.	.	.	.	.		
	Very poor acceleration	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
	Vehicle braked when shifting into R range	.	.	.	.	.	.	.	3	2	1	.	.	.	.	.	.	.	.	.	.	.	4	.	.	5	.	.	.	6	.	.	.	.	.	.	
F	Sharp shock in shifting from N to D range	.	.	2	.	1	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	.	.	.	.	.	.	.	.	.	
G	Vehicle will not run in 'D' range (but runs in 2' 1 and R ranges)	.	1	.	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	
H	Vehicle will not run in D 1 2 ranges (but runs in R range) Clutch ships	1	2	.	.	.	4	5	.	6	3	7	.	.	.	.	.	.	.	.	.	.	8	10	.	.	9	.	.	.	.	.	.	.	.	.	
	Very poor acceleration	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
I	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	.	6	7	.	.	.	.	.	.	.		
J	Failure to change gear from 1st to 2nd	.	1	.	2	3	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	.	.	.	9	.	10	.	.	.	.	.	.	.	.	
K	Failure to change gear from 2nd to 3rd	.	1	.	2	3	.	5	6	8	7	4	.	.	.	.	.	.	.	.	.	.	.	.	.	9	.	10	.	.	.	.	.	.	.	.	
L	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	.	.	.	.	.	.	.	.		
M	Lock up does not occur in any range (E4N71B)	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	.	3	.	.	.	.	4	.	.		
M	Lock up does not occur in 4th gear (L4N71B)	.	.	.	.	.	.	1	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	3	.		
N	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

Refer- ence		ON vehicle										OFF 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	Power shift SW (O.D. cancel SW)	O.D. cancel solenoid	Lock up solenoid	Lock up control unit and sensors	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										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								
⓬	Races extremely fast or slips in changing from 3rd to 2nd when depressing pedal			1			2	4	6	5	3													7	8		9									
⓭	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)

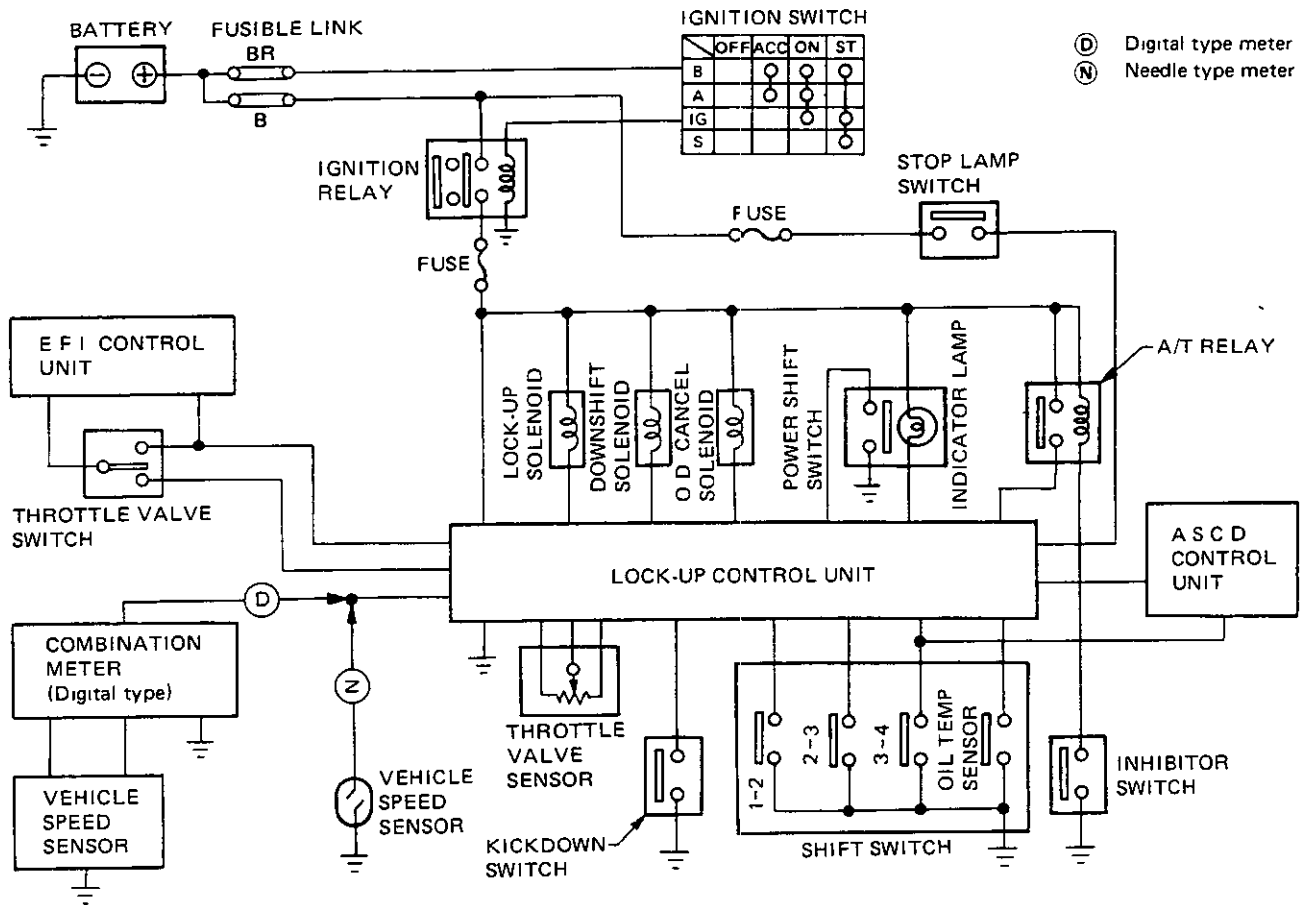
Numbers are arranged in order of probability  
Perform inspections starting with number one  
and working up. Circled numbers indicate that  
the transmission must be removed from the  
vehicle

Refer ence	ON vehicle											OFF 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	Power shift SW (O D cancel SW ) O D cancel solenoid Lock up solenoid	Lock up control unit and sensors	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 16	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 <sup>1</sup> 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				16				.	.	.	.	
(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 cancel switch is turned to ON	.				.	.	.	.	1 2	3								.	.	.	.	4	.	.	.	
	Lamp inside power shift switch (O D cancel 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	.					.	.	.	.	.	.	.	.	.	
	Lamp inside power shift switch does not glow even if shift pattern is turned to power pattern	.	.	.		.	.	.	.	.	1	2						.	.	.	.	.	.	.	.	.	



# TROUBLE-SHOOTING AND DIAGNOSES

## E4N71B Electrical System/Schematic



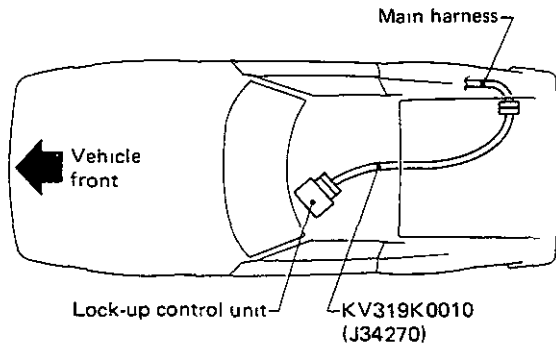
SAT750



# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Lock-up Control Unit

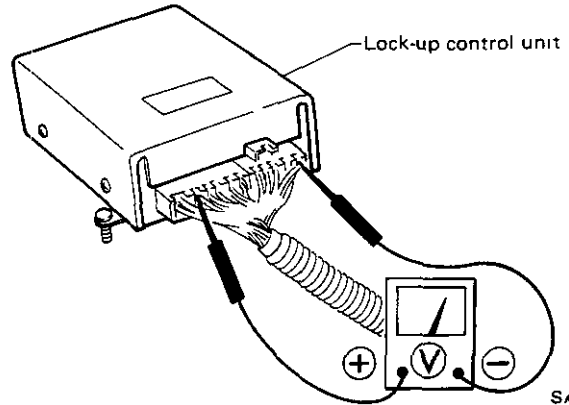
Check voltage between No. 22 terminal (Ground) and each terminal in the following table using tester and Tool (Diagnostic sub-harness)



SAT763

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

(Lock-up control unit harness connector as seen from front)  
Note (20) is not used



SAT752

Terminal No	Checking input/output signal	Checking method	Judgment standard
1	Downshift solenoid	Measure when depressing and releasing accelerator pedal	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 O D cancel switch	0V if turned on 12V if turned off
7	Power shift indicator lamp	Measure while depressing accelerator pedal in "D" range with driving	0V if turned on 12V if turned off
8	Idle contact switch	Measure while operating accelerator pedal	Full-close throttle 12V Part-open throttle 0V
9	Full throttle contact switch		Throttle opening Over 1/2 12V 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 more than 5V

# TROUBLE-SHOOTING AND DIAGNOSES

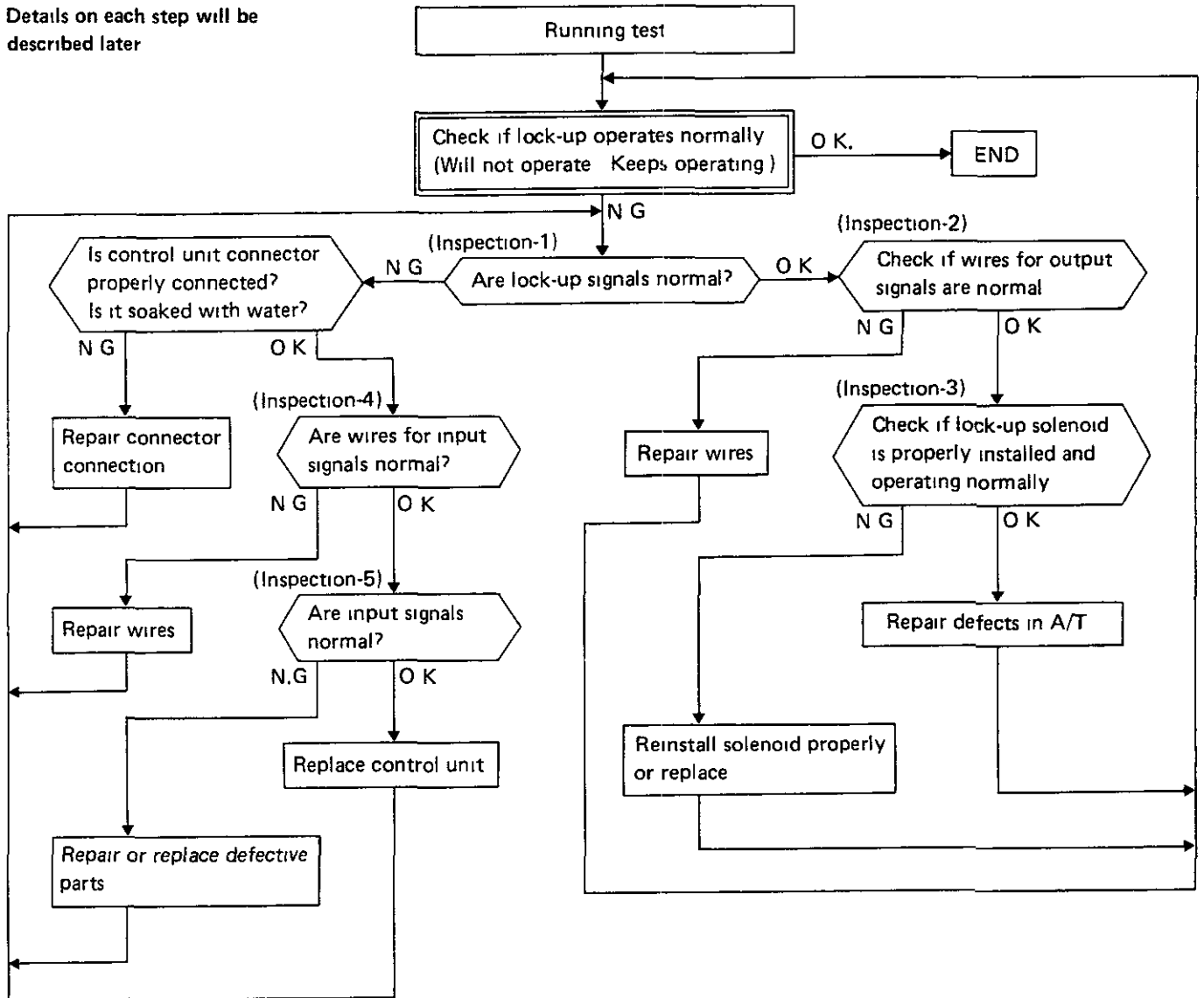
## Inspection of Lock-up Control Unit (Cont'd)

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	Brake switch	Measure while operating brake pedal	Braking condition 12V Non-braking condition 0V
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, 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	Power shift switch	Measure while operating power shift switch	0V if turned on 12V if turned off
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 Lock-up Control

Details on each step will be described later



# TROUBLE-SHOOTING AND DIAGNOSES

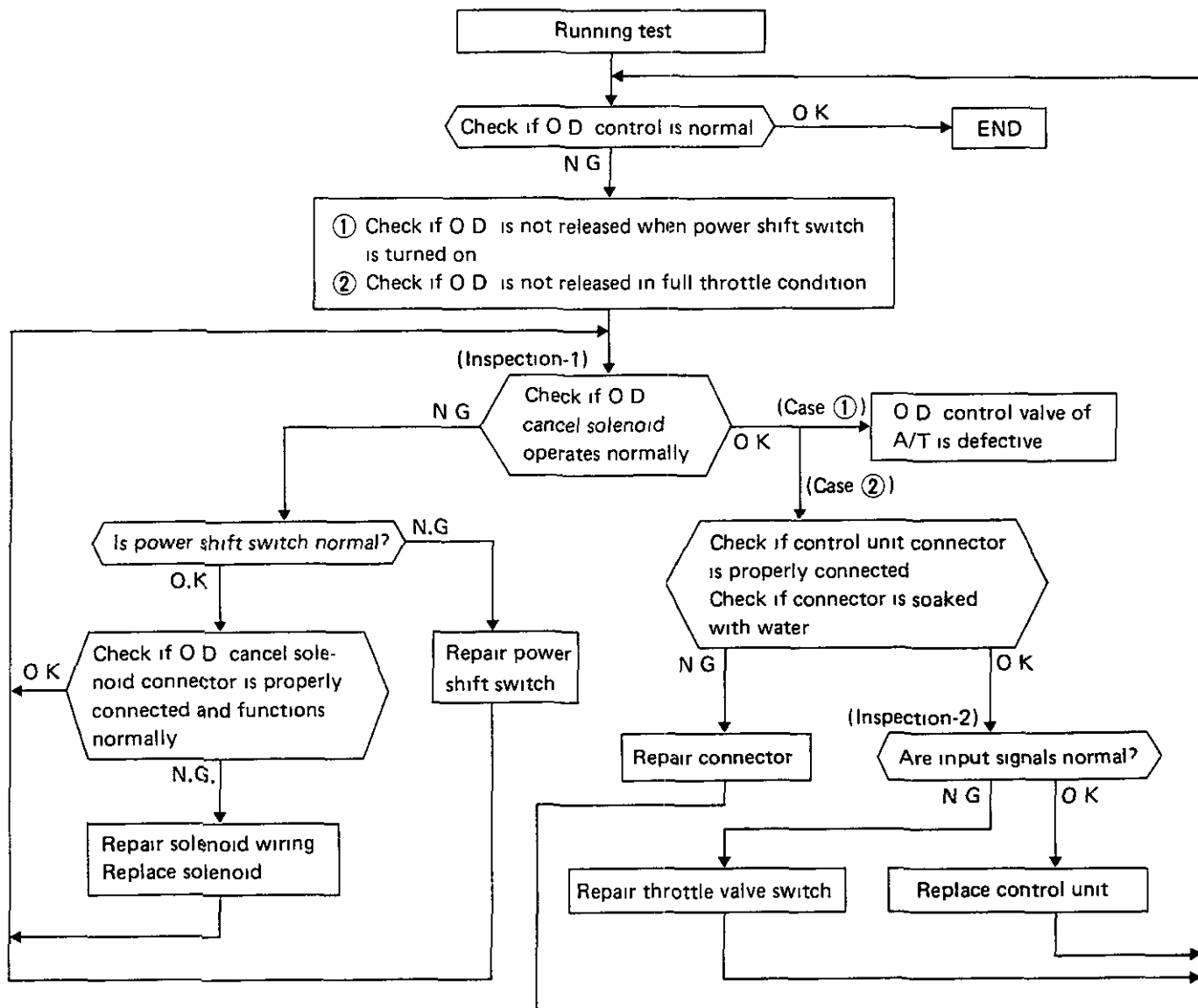
## Inspection of Lock-up Control (Cont'd)

### INSPECTION POINTS

Inspection No	Item to be checked	Checking method
1	Lock-up signals	<ul style="list-style-type: none"><li>● Connect tester to control unit connector terminals, Nos 2 and 22 and check lock-up signals while running vehicle</li></ul> 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	<ul style="list-style-type: none"><li>● Check if O-ring is installed to tip of solenoid</li><li>● Check operation of solenoid by applying 12V voltage</li></ul>
4	Wires for input signals	Check if connections are properly made between control unit and following sensors Also, check connectors for conduction <ul style="list-style-type: none"><li>● Throttle sensor (Idle, high-throttle side)</li><li>● Inhibitor switch (2 range)</li><li>● Shift switches (1-2, 2-3 and 3-4)</li><li>● Low-temperature sensor</li><li>● Kickdown switch</li><li>● Vehicle speed sensor</li><li>● O D switch</li></ul>
5	Input signals	Check item given on inspection-4 in flow chart on pages AT-75 and 76

# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of O.D. Control



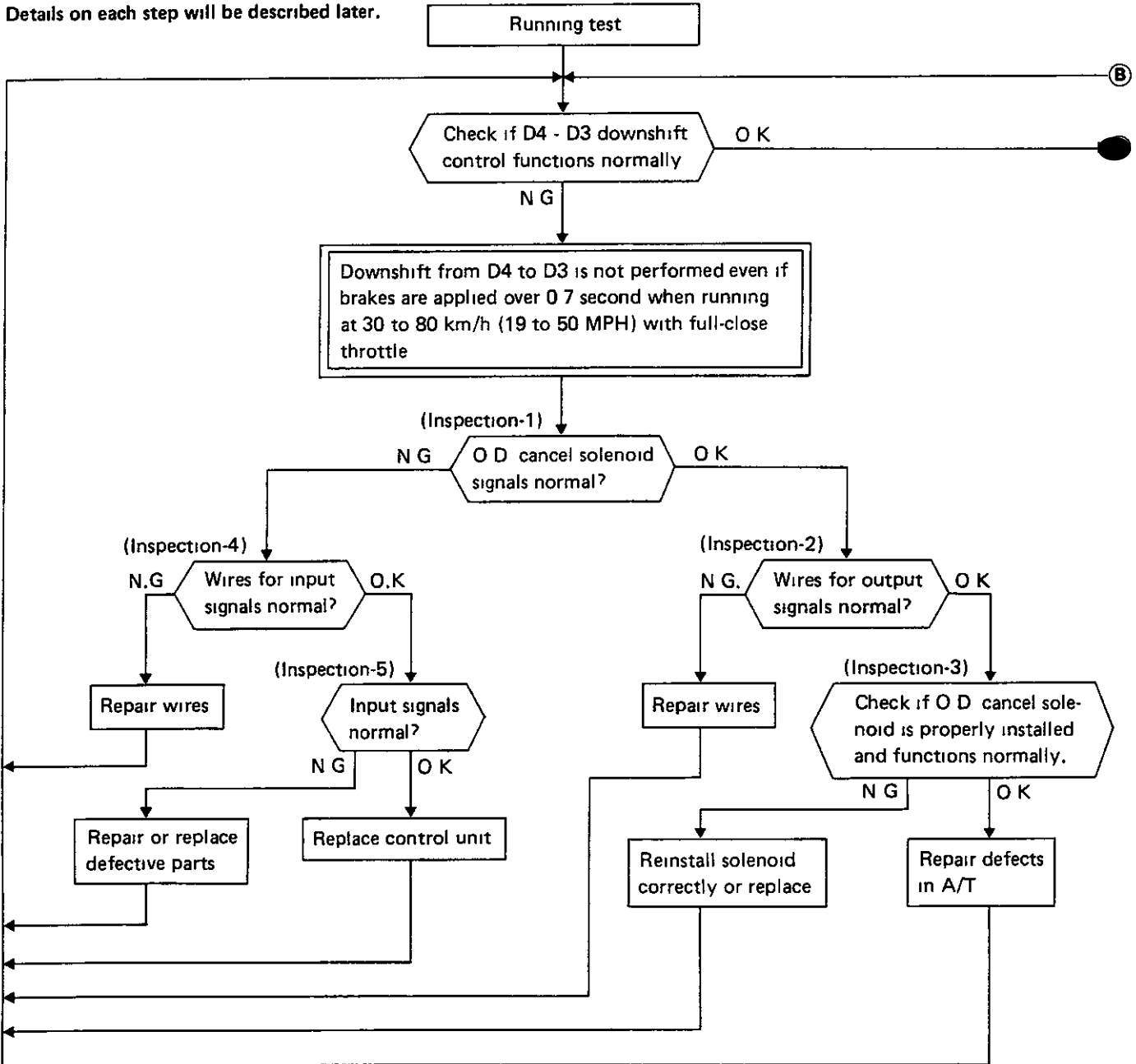
### INSPECTION POINTS

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-75 and 76 <ul style="list-style-type: none"> <li>● Shift switches (1-2, 2-3 and 3-4)</li> <li>● Vehicle speed sensor</li> <li>● Low-temperature sensor</li> <li>● Full throttle contact switch</li> <li>● Kickdown switch</li> </ul>

# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Downshift Control

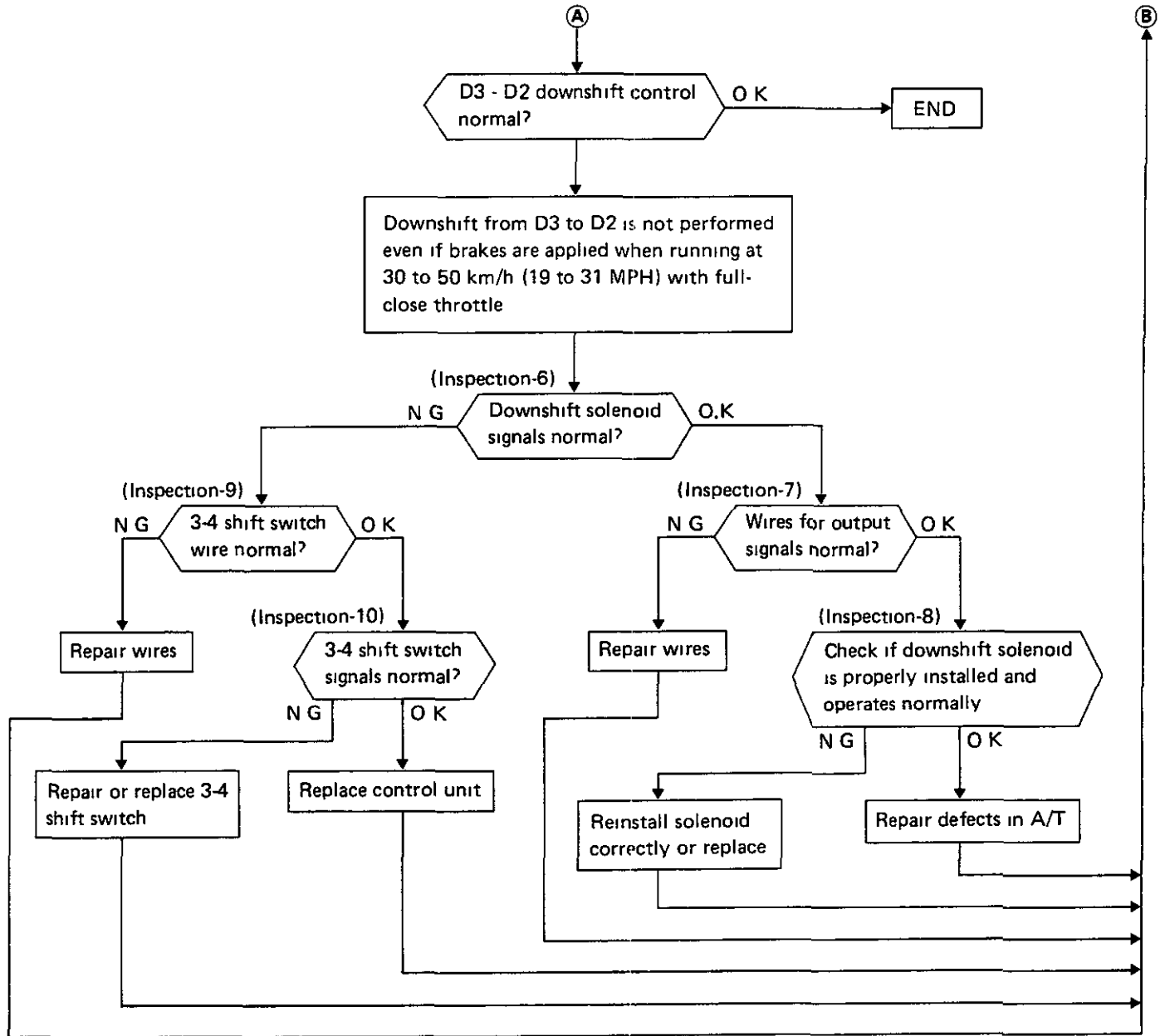
Details on each step will be described later.





# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Downshift Control (Cont'd)



# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Downshift Control (Cont'd)

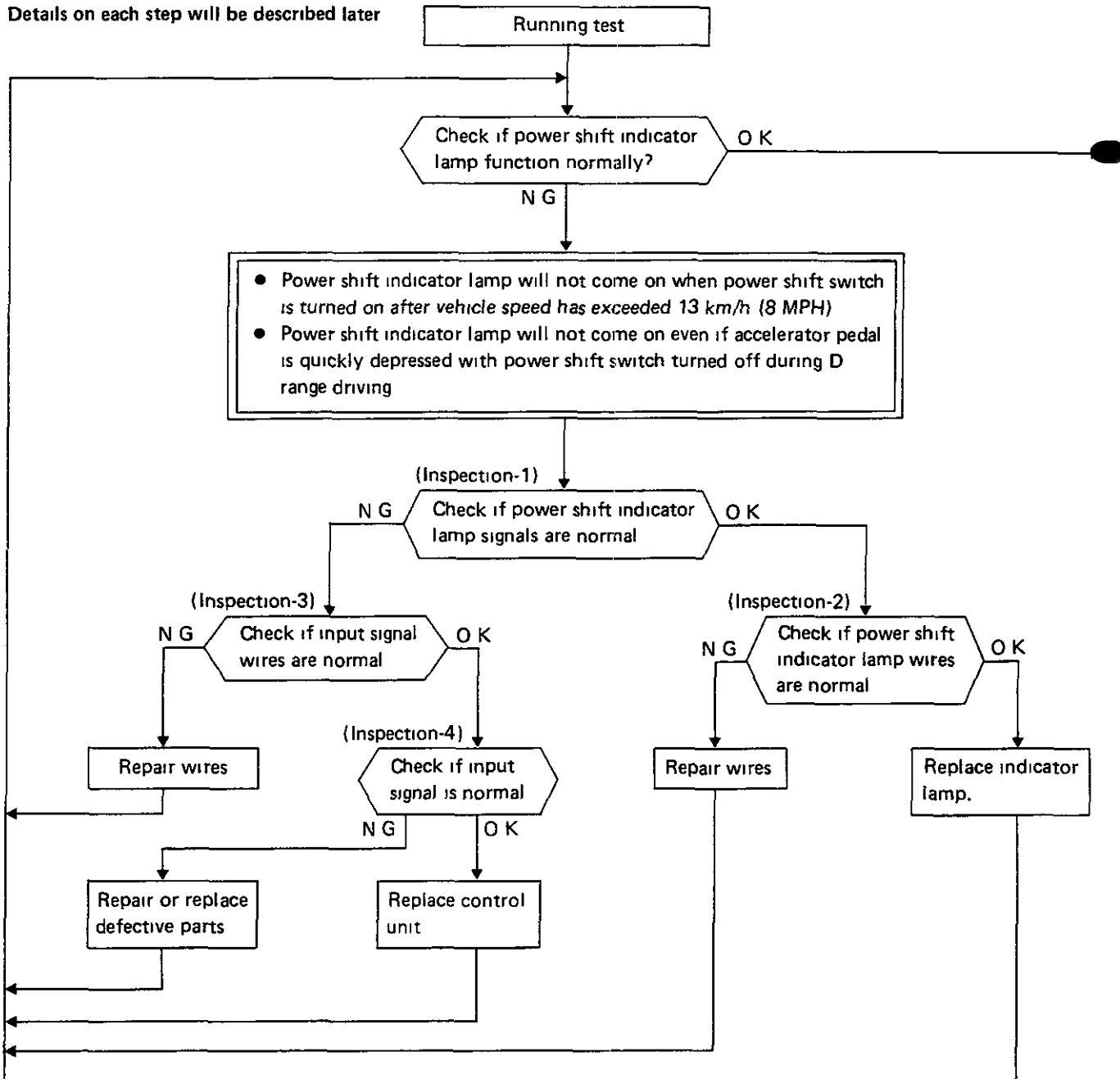
### INSPECTION POINTS

Inspection No	Item to be checked	Checking method
1	O D cancel solenoid signals	<ul style="list-style-type: none"> <li>● Jack up rear wheels, set lever to D range, and accelerate up to D4 speed by slightly opening throttle. Then, when vehicle speed is 30 to 80 km/h (19 to 50 MPH), completely close accelerator and apply brakes over 0.7 second. To check if signals to turn on O D cancel solenoid come out at this time, check item "O D cancel solenoid" in chart on page AT-75.</li> </ul>
2	Wires for output signals	<ul style="list-style-type: none"> <li>● Check connector between control unit and O D cancel solenoid for proper connection and continuity.</li> </ul>
3	O D cancel solenoid	<ul style="list-style-type: none"> <li>● Apply 12V voltage to solenoid proper to see if it operates normally.</li> </ul>
4	Wires for input signals	<p>Check if connectors between control unit and sensors are properly connected and have proper continuity. Refer to circuit diagram on page AT-74.</p> <ul style="list-style-type: none"> <li>● Inhibitor switch ("2" range)</li> <li>● Shift switches (1-2, 2-3 and 3-4)</li> <li>● Brake switch</li> <li>● Idle contact switch</li> <li>● Throttle sensor</li> <li>● Vehicle speed sensor</li> </ul>
5	Input signals	Check same items as inspection-4 in chart on pages AT-75 and 76.
6	Downshift and solenoid signals	<ul style="list-style-type: none"> <li>● Jack up rear wheels, set lever to D range, and accelerate up to D3 speed by slightly opening throttle. Then, when vehicle speed is 30 to 50 km/h (19 to 31 MPH), completely close accelerator and apply brakes. To check if signals to turn on downshift solenoid come out at this time, check items concerning downshift solenoid in chart on page AT-75.</li> </ul>
7	Wires for output signals	<ul style="list-style-type: none"> <li>● Check connector between control unit and downshift solenoid for proper connection and continuity.</li> </ul>
8	Downshift solenoid	<ul style="list-style-type: none"> <li>● Apply 12V voltage to solenoid proper to see if it operates normally.</li> </ul>
9	3-4 shift switch wires	Check in same manner as in inspection-4, above.
10	3-4 shift switch signals	Check in same manner as in inspection-5, above.

# TROUBLE-SHOOTING AND DIAGNOSES

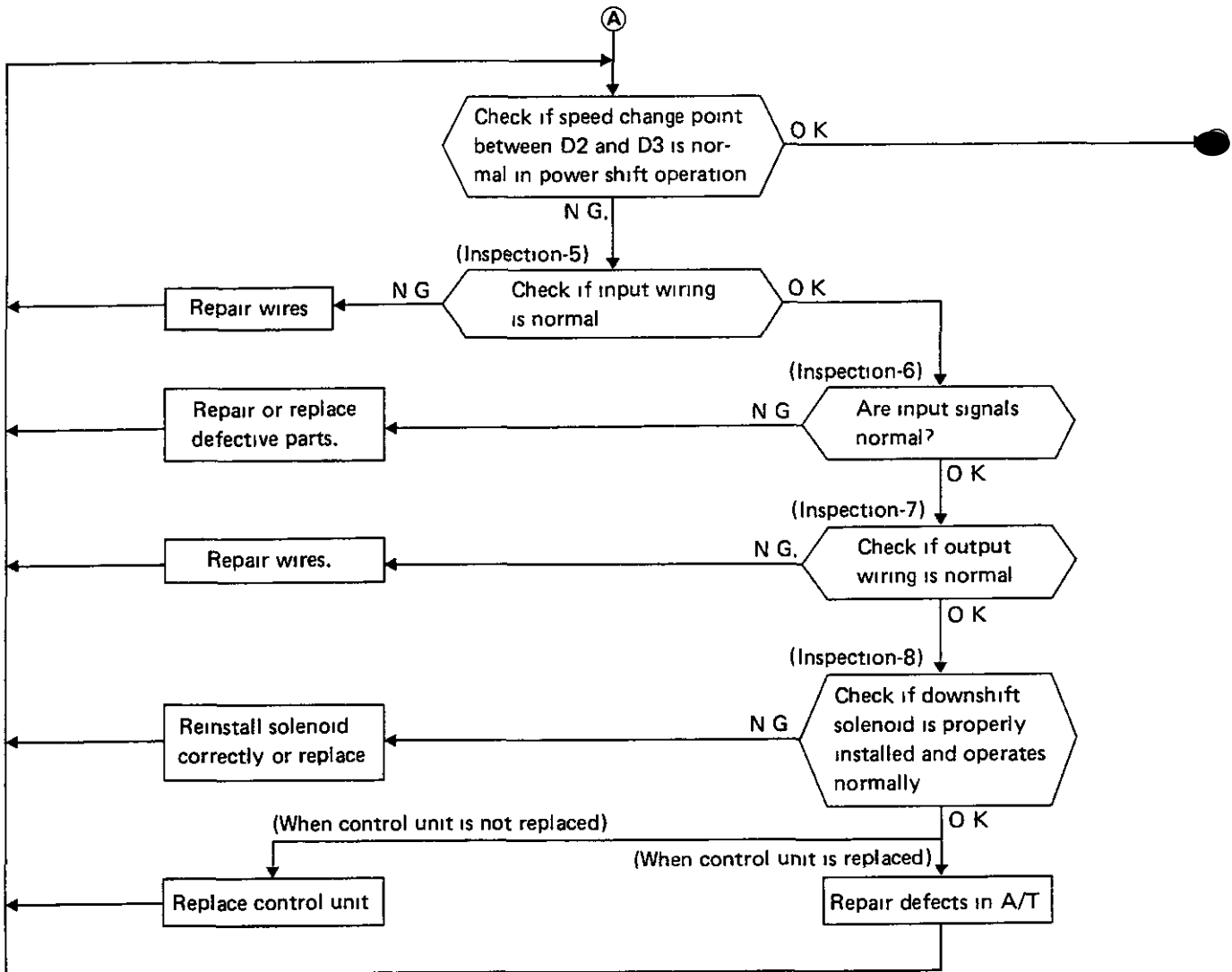
## Inspection of Shift Pattern Change Control

Details on each step will be described later



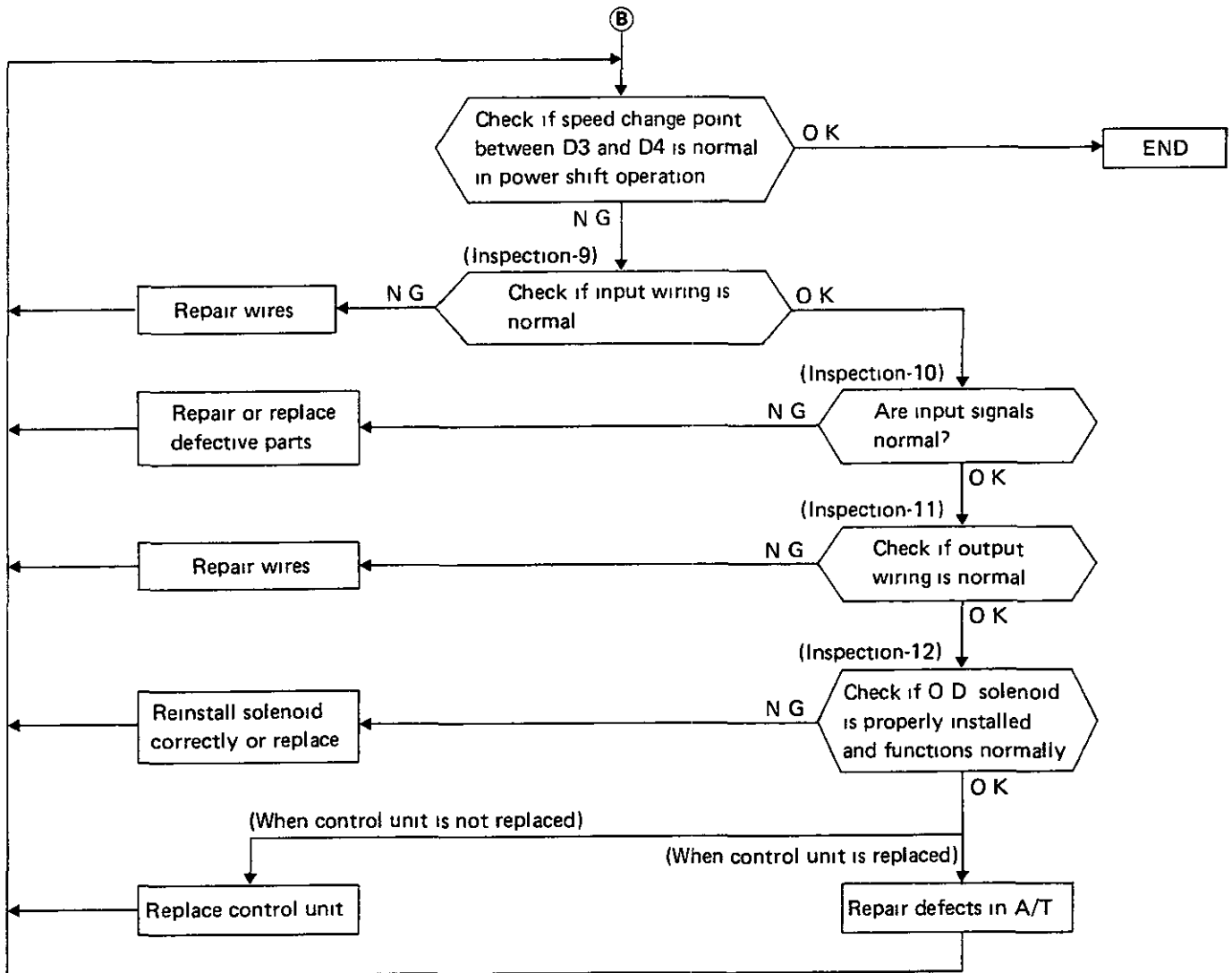
# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Shift Pattern Change Control (Cont'd)



# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Shift Pattern Change Control (Cont'd)



# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Shift Pattern Change Control (Cont'd)

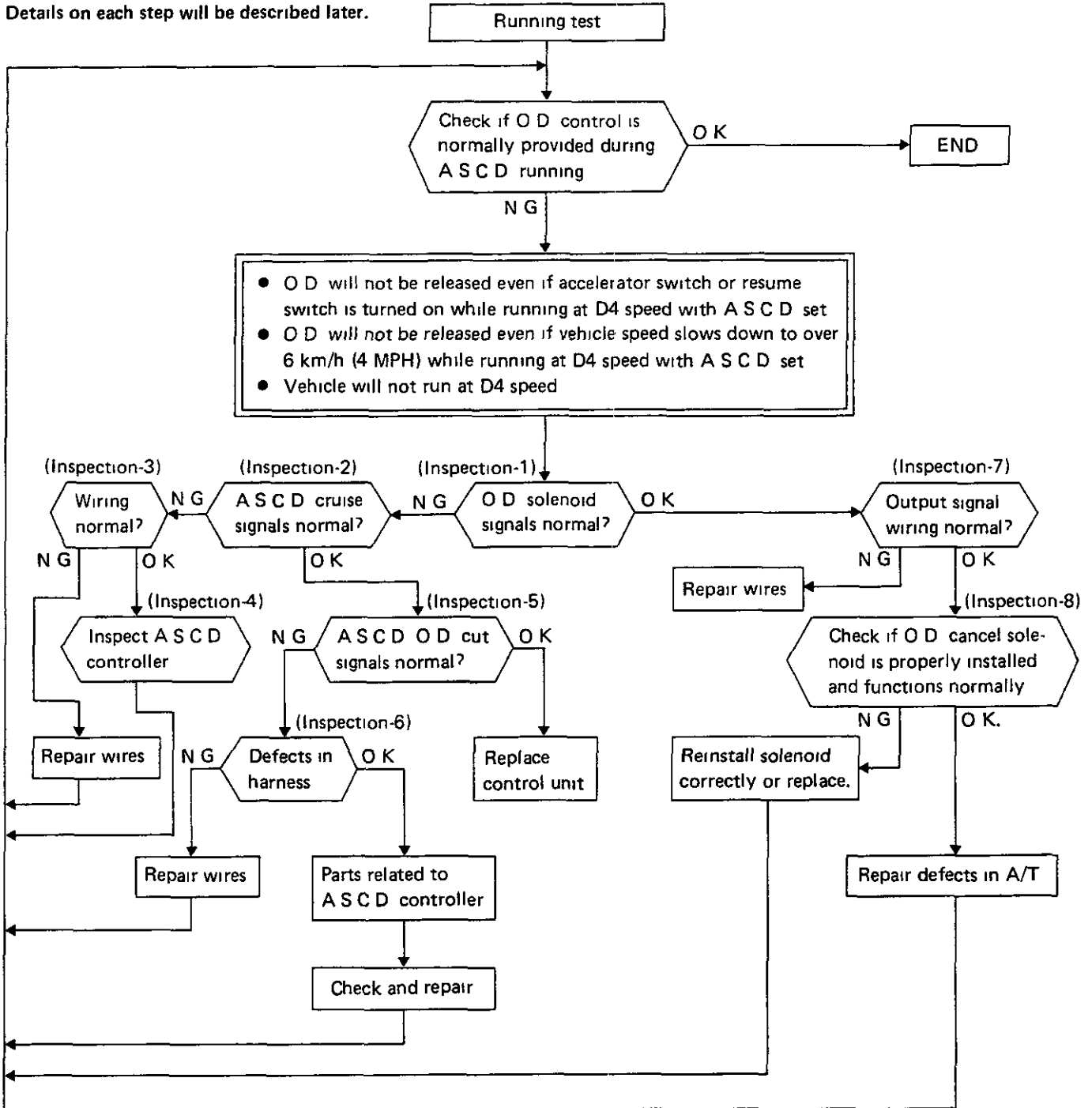
### INSPECTION POINTS

Inspection No	Item to be checked	Checking method
1	Power shift indicator lamp signals	<ul style="list-style-type: none"> <li>● Jack up rear wheels and accelerate in D range. When vehicle speed goes over 13 km/h (8 MPH), turn on power shift switch</li> <li>● Jack up rear wheels and quickly depress accelerator pedal while in D range. To confirm if signals come out to turn on power shift indicator lamp in the above condition, check power shift indicator lamp for items given in chart on page AT-75</li> </ul>
2	Power shift indicator lamp wirings	<ul style="list-style-type: none"> <li>● Check connector between control unit and power shift indicator lamp for proper connection and continuity</li> </ul>
3	Input wiring	<p>Check connectors between control unit and following sensors for proper connections and continuity. Refer to circuit diagram on page AT-74</p> <ul style="list-style-type: none"> <li>● Power shift switch</li> <li>● Throttle sensor</li> <li>● Vehicle speed sensor</li> </ul>
4	Input signals	Check same items as inspection-3 given in chart on pages AT-75 and 76
5	Input wiring	<p>Check connectors between control unit and following sensors for proper connections and continuity. Refer to circuit diagram on page AT-74</p> <ul style="list-style-type: none"> <li>● Inhibitor switch ("2" range)</li> <li>● Shift switches (1-2, 2-3, and 3-4)</li> </ul>
6	Input signals	Check same items as inspection-5 given in chart on pages AT-75 and 76
7	Output wiring	Check connector between control unit and downshift solenoid for proper connections and continuity
8	Downshift solenoid	<ul style="list-style-type: none"> <li>● Apply 12V voltage to solenoid proper to see if it functions normally</li> </ul>
9	Input wiring	<ul style="list-style-type: none"> <li>● Check connector between control unit and 3-4 shift switch for proper connections and continuity</li> </ul>
10	Input signals	Check item "3-4 shift switch" in chart on page AT-76
11	Output wiring	Check connector between control unit and O D cancel solenoid for connections and continuity
12	O D cancel solenoid	Apply 12V voltage to solenoid proper to see if it functions normally.

# TROUBLE-SHOOTING AND DIAGNOSES

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

Details on each step will be described later.



# TROUBLE-SHOOTING AND DIAGNOSES

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

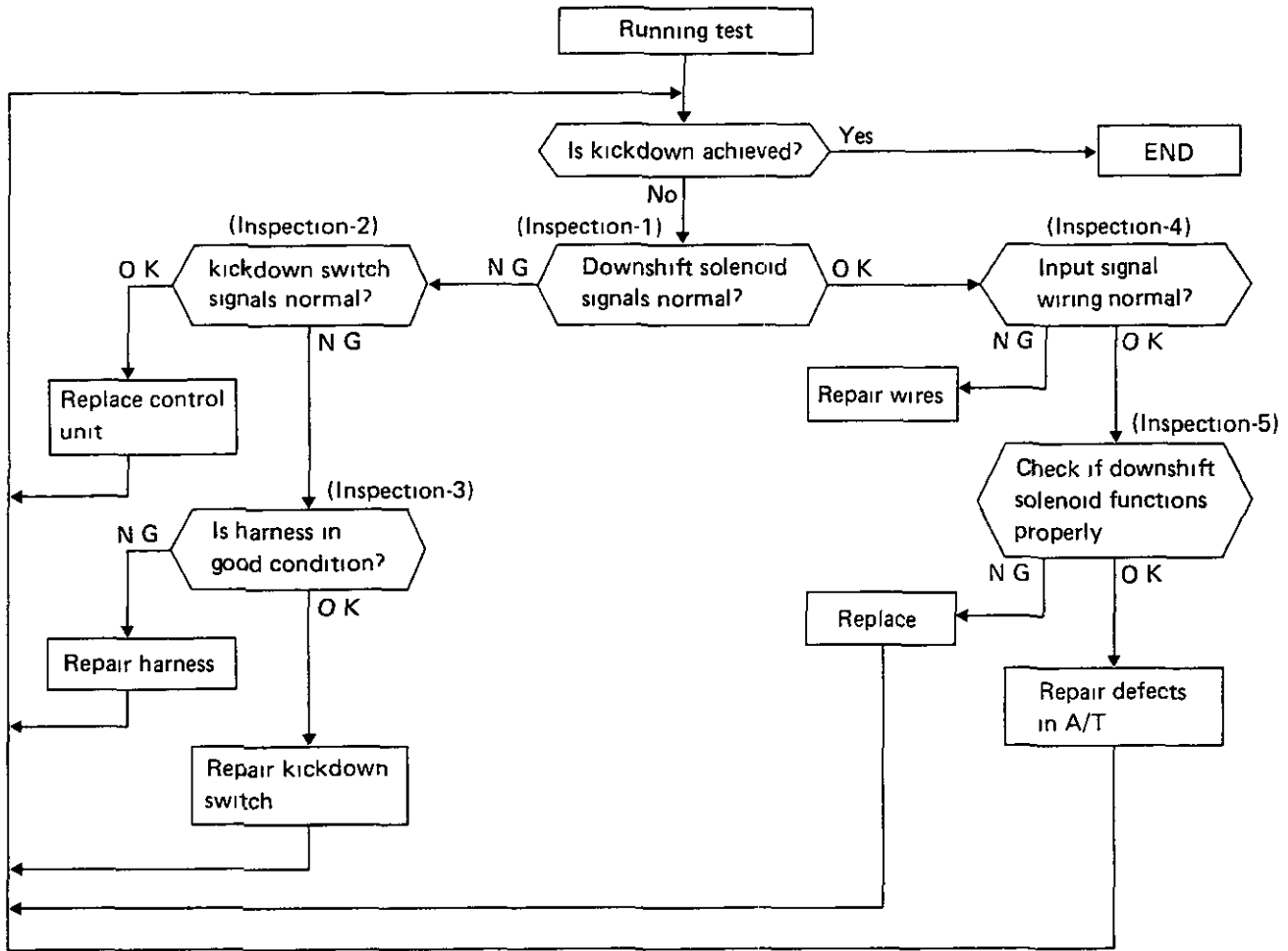
### INSPECTION POINTS

Inspection No	Item to be checked	Checking method
1	O D cancel solenoid signals	Jack up rear wheels, set lever to D range, and accelerate up to D4 speed by slightly opening throttle. Then, when vehicle speed is 30 to 80 km/h (19 to 50 MPH), completely close accelerator and apply brakes over 0.7 second. To check if signals to turn on O D cancel solenoid come out at this time, check item "O D cancel solenoid" in chart on page AT-75.
2	A S C D cruise signals	<ol style="list-style-type: none"><li>1 Connect tester to connector terminals, Nos 13 and 22, of lock-up control unit</li><li>2 Measure by repeatedly releasing vehicle speed setting during A S C D driving</li></ol> Proper indication A S C D is set 12V A S C D is released 0V
3	A S C D wiring harness	Refer to section EL for A S C D
4	A S C D controller	Refer to section EL for A S C D
5	A S C D O D cut signals	<ol style="list-style-type: none"><li>1 Connect tester to connector terminals, Nos 15 and 22, of lock-up control unit</li><li>2 Measure by repeatedly releasing vehicle speed setting during A S C D driving in D4 speed</li></ol> Proper indication Accelerator pedal is depressed 0V Accelerator pedal is released 5V
6	A S C D wiring harness	Refer to section EL for A S C D
7	Output signal wiring	Check connector between control unit and O D cancel solenoid for connections and continuity
8	O.D cancel solenoid	Apply 12V voltage to solenoid proper to see if it operates normally



# TROUBLE-SHOOTING AND DIAGNOSES

## Inspection of Kickdown Control

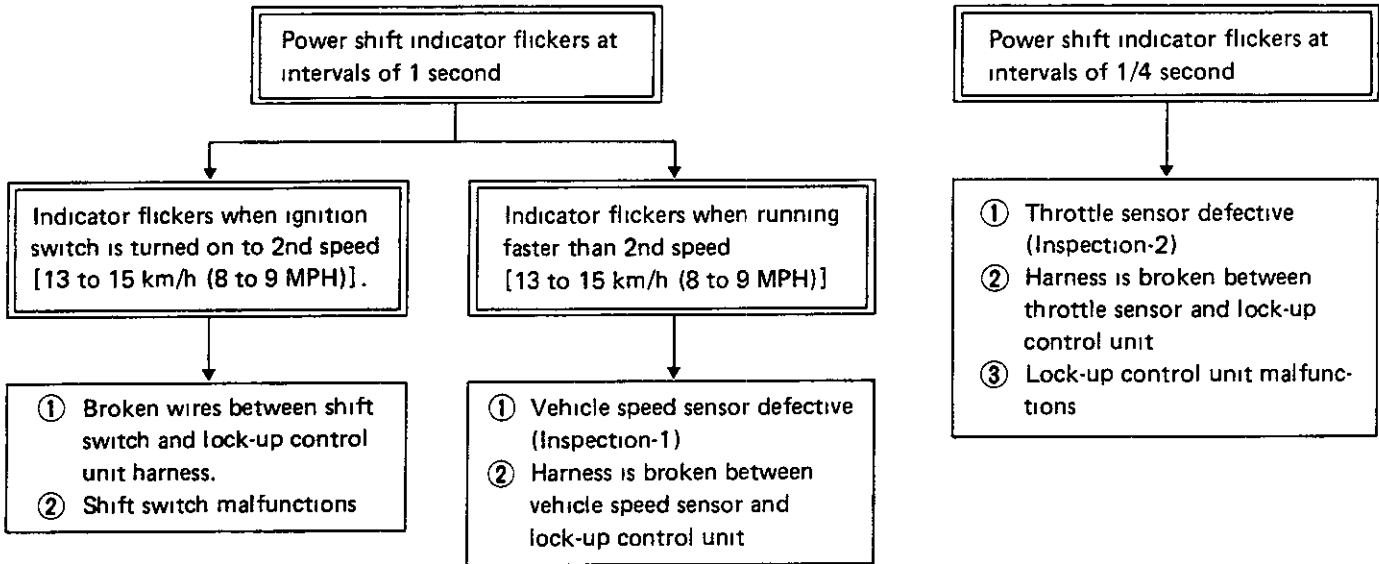


### INSPECTION POINTS

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

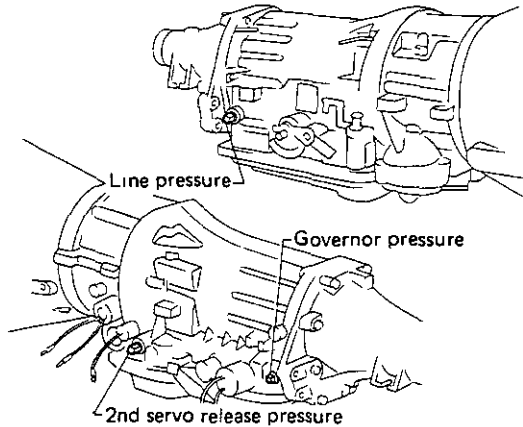


### INSPECTION POINTS

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 0V Accelerator pedal in full-open throttle position 4V

# TROUBLE-SHOOTING AND DIAGNOSES

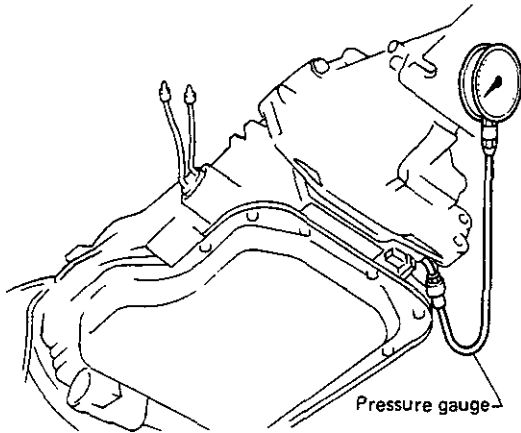
## Pressure Testing



SAT753

### LINE PRESSURE

- 1 Install pressure gauge to line pressure port



SAT765

- 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 <sup>2</sup> , psi)
R	451 - 588 (4.6 - 6.0, 65 - 85)
D	275 - 373 (2.8 - 3.8, 40 - 54)
2	785 - 1,079 (8.0 - 11.0, 114 - 156)
1	275 - 373 (2.8 - 3.8, 40 - 54)

VG30E turbo engine

Range	Line pressure kPa (kg/cm <sup>2</sup> , psi)
R	304 - 441 (3.1 - 4.5, 44 - 64)
D	275 - 373 (2.8 - 3.8, 40 - 54)
2	785 - 1,128 (8.0 - 11.5, 114 - 164)
1	275 - 373 (2.8 - 3.8, 40 - 54)

### 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 <sup>2</sup> , psi)
R	1,961 - 2,393 (20.0 - 24.4, 284 - 347)
D	1,079 - 1,226 (11.0 - 12.5, 156 - 178)
2	1,079 - 1,275 (11.0 - 13.0, 156 - 185)
1	1,079 - 1,226 (11.0 - 12.5, 156 - 178)

### VG30E turbo engine

Range	Line pressure kPa (kg/cm <sup>2</sup> , psi)
R	1,961 - 2,354 (20.0 - 24.0, 284 - 341)
D	1,667 - 1,883 (17.0 - 19.2, 242 - 273)
2	1,667 - 1,883 (17.0 - 19.2, 242 - 273)
1	1,667 - 1,883 (17.0 - 19.2, 242 - 273)

### 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

### Cut-down point

The cut-down point indicates a point where line pressure changes from high to low value.

Before proceeding cut-down testing, make sure that line pressure "At Idle" and "At Stall" is normal

Install vacuum gauge

### VG30E engine without turbo

Intake manifold vacuum kPa (mmHg, inHg)	Vehicle speed km/h (MPH)	Propeller shaft revolutions rpm
0 (0, 0)	28 - 37 (17 - 23)	900 - 1,200
-13.3 (-100, -3.94)	12 - 22 (7 - 14)	400 - 700

### VG30E turbo engine

Intake manifold vacuum kPa (mmHg, inHg)	Vehicle speed km/h (MPH)	Propeller shaft revolutions rpm
+46.7 (+350, +13.78)	29 - 39 (18 - 24)	1,200 - 1,600
-26.7 (-200, -7.87)	13 - 23 (8 - 14)	400 - 800

### Judgment by cut-down testing

- (1) When cut-down point disappears, the problem may be due to
  - Sticking pressure modifier valve
  - Sticking governor valve
  - Oil leaks at oil passage
- (2) When cut-down point is too low or too high, the problem may be due to
  - Incorrect springs (at pressure modifier valve or governor valve)
  - Oil leaks at oil passage

# TROUBLE-SHOOTING AND DIAGNOSES

## Stall Testing

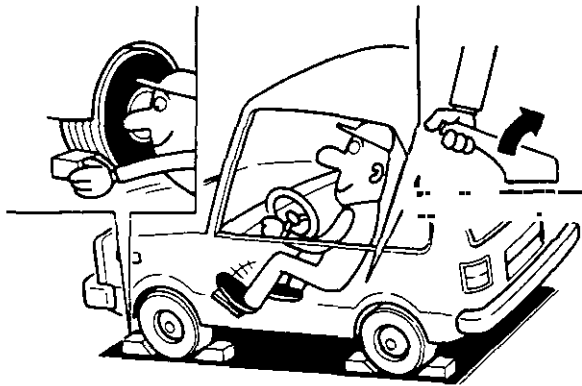
The stall test is an effective method of testing clutch and band holding ability, torque converter one-way clutch operation, and engine performance. A stall test should only be performed as a last resort because of the high fluid temperature it generates and the excessive load it places on the engine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



SAT597

- 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

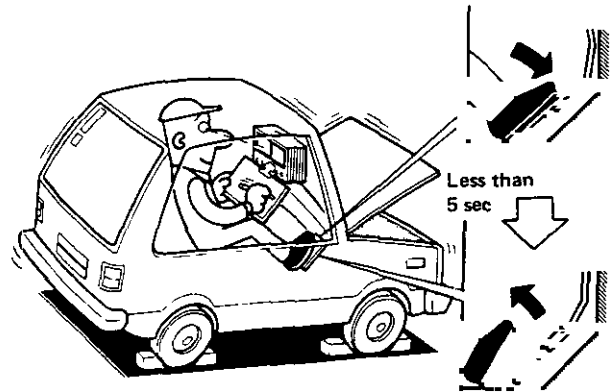
### Stall revolution:

**VG30E engine without turbo**

**2,150 - 2,450 rpm**

**VG30E turbo engine**

**2,500 - 2,800 rpm**

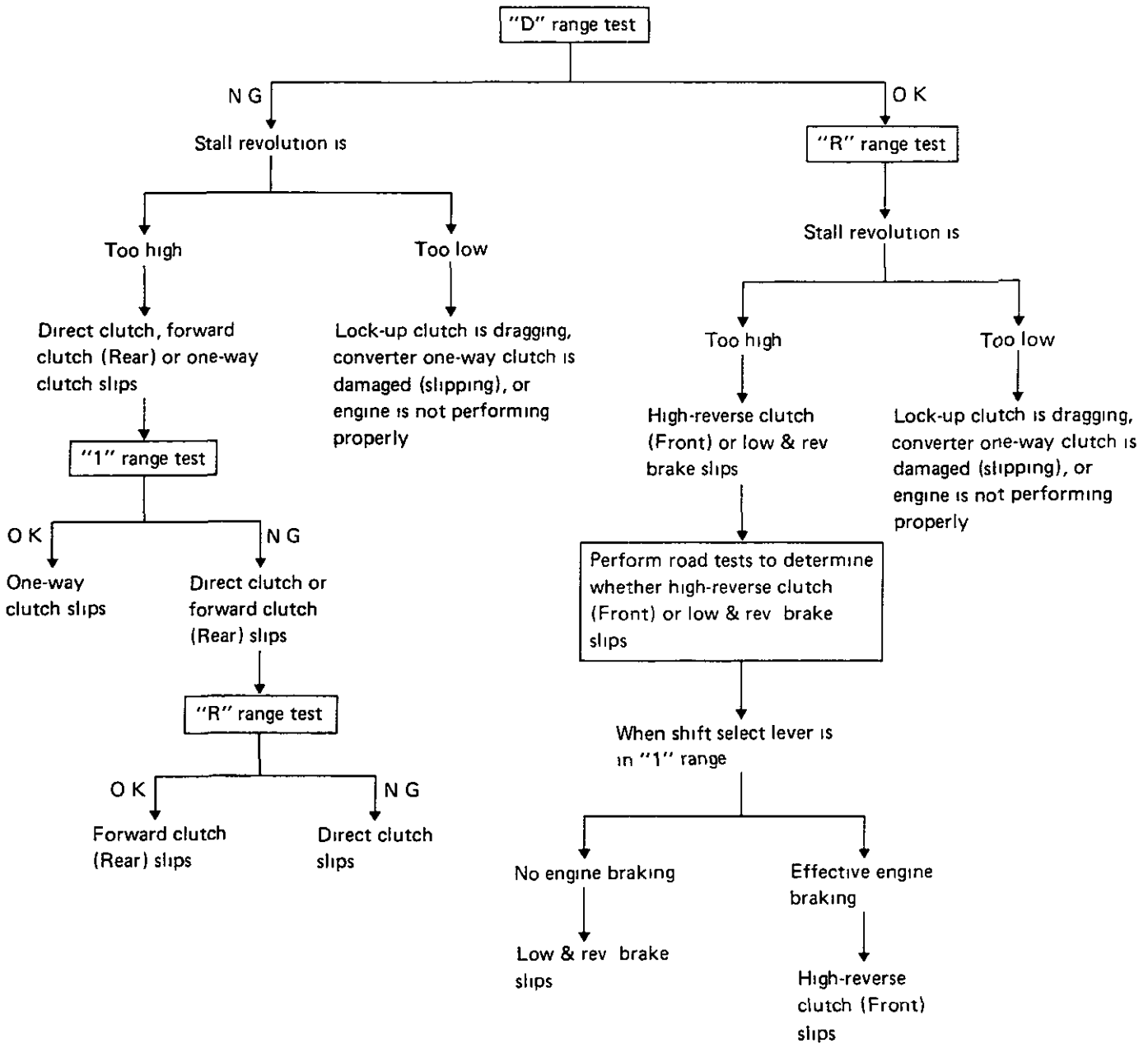


SAT598

- 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 frozen, vehicle will have poor high speed performance. 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	4N71B
Transmission model code number	X8075	X8006
Stall torque ratio	2.0 : 1	
Transmission gear ratio		
1st	2.458	
2nd	1.458	
Top	1.000	
O/D	0.686	
Reverse	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	X8075	X8006
Torque converter assembly Stamped mark on the torque converter	GK	GC
<b>Direct clutch</b>		
Number of drive plates	2	3
Number of driven plates	2	3
<i>Clearance mm (in)</i>		
Standard	1.6 - 1.8 (0.063 - 0.071)	
Allowable limit	2.0 (0.079)	2.2 (0.087)
Drive plate thickness <i>mm (in)</i>		
Standard	1.50 - 1.65 (0.0591 - 0.0650)	
Allowable limit	1.4 (0.055)	
Thickness of retaining plate	Thickness mm (in)	Part number
	5.6 (0.220)	31567-X2903
	5.8 (0.228)	31567-X2904
	6.0 (0.236)	31567-X2905
	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
	Thickness mm (in)	Part number
	5.8 (0.228)	31567-X2904
	6.0 (0.236)	31567-X2905
	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

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

## Specifications and Adjustment (Cont'd)

Transmission model code number	X8075	X8006
<b>High-reverse clutch (Front)</b>		
Number of drive plates	3	4
Number of driven plates	5	5
Clearance mm (in)	1 6 - 1 8 (0 063 - 0 071)	
Standard	2 2 (0 087)	
Allowable limit	2 4 (0 094)	
Drive plate thickness mm (in)	1 50 - 1 65 (0 0591 - 0 0650)	
Standard	1 4 (0 055)	
Allowable limit		
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
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
<b>Forward clutch (Rear)</b>		
Number of drive plates	6	6
Number of driven plates	6	6
Clearance mm (in)	0 8 - 1 5 (0 031 - 0 059)	
Standard	2 0 (0 079)	
Allowable limit		
Drive plate thickness mm (in)	1 50 - 1 65 (0 0591 - 0 0650)	
Standard	1 4 (0 055)	
Allowable limit		
Thickness of retaining plate	Thickness mm (in)	Part number
	4 8 (0 189)	31567-X0300

Transmission model code number	X8075	X8006
<b>Low &amp; reverse brake</b>		
Number of drive plates	6	7
Number of driven plates	6	7
Clearance mm (in)	0 80 - 1 05 (0 0315 - 0 0413)	
Standard	2 0 (0 079)	
Allowable limit	2 2 (0 087)	
Drive plate thickness mm (in)	1 90 - 2 05 (0 0748 - 0 0807)	
Standard	1 8 (0 071)	
Allowable limit		
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
	7 8 (0 307)	31667-X0500
	8 0 (0 315)	31667-X0501
	8 2 (0 323)	31667-X0502
	8 4 (0 331)	31667-X0503
	8 6 (0 339)	31667-X0504
	8 8 (0 346)	31667-X0505
2nd brake band		
Piston size mm (in)		
Big dia	64 (2 52)	80 (3 15)
Small dia	40 (1 57)	50 (1 97)
O D brake band		
Piston size mm (in)		
Big dia	60 (2 36)	64 (2 52)
Small dia	36 (1 42)	36 (1 46)
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-X0106
	1 7 (0 067)	31528-X0105
	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	Part number	
	mm (in)		
	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	Part number	
	mm (in)		
	1.5 (0.059)	31528-X0106	
	1.7 (0.067)	31528-X0105	
	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		
O D total end play	mm (in)	0.25 - 0.50 (0.0098 - 0.0197)	
Thickness of O D bearing race	Thickness	Part number	
	mm (in)		
	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		

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.)

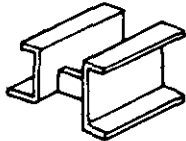

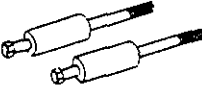
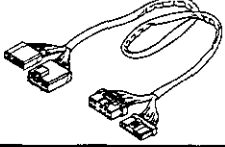

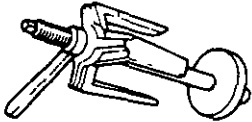

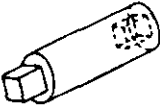
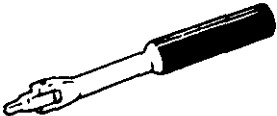

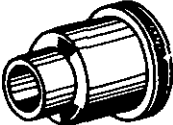
## Tightening Torque

Unit	N m	kg-m	ft-lb
<b>Transmission installation</b>			
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
<b>Component part</b>			
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 2 - 1 5	*9 - 11
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 stem (when adjusting band brake)	7 - 10	0 7 - 1 0	5 1 - 7 2
O.D 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

Unit	N m	kg-m	ft lb
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

\* Turn back two turns after tightening

# SPECIAL SERVICE TOOLS

Tool number (Kent-Moore No ) Tool name	Tool	Tool number (Kent-Moore No ) Tool name	Tool
ST07870000 ( - ) (ST07860000) (J25605) Transmission case stand		ST2505S001 (J25695) Oil pressure gauge set	
ST25850000 (J25721) Sliding hammer		KV319K0010 (J34270) Diagnostic sub-harness	
GG91060000 ( - ) (GG93010000) (J25703) Torque wrench			
ST25420001 (J26063) (ST25420000) (J26063) Clutch spring compressor			
ST25570001 (J23659) (ST25570000) (J23659) Hex-head extension			
ST25490000 ( - ) (ST25512001) (J25713) Socket extension			
HT62350000 ( - ) Spinner handle			
ST25160000 ( - ) Torque driver			
ST25580001 (J25719) Oil pump assembling gauge			
HT61000800 ( - ) Hexagon wrench	