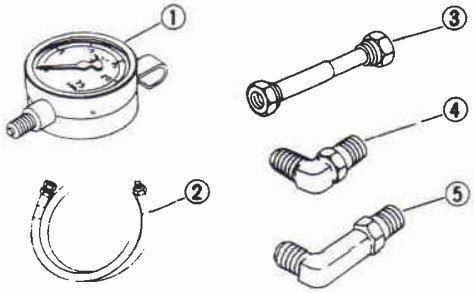
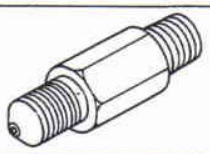
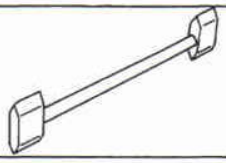
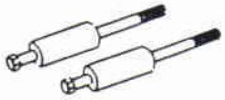
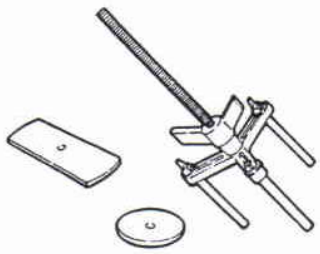
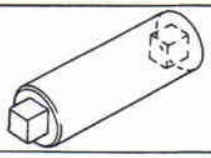
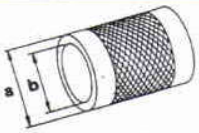
AUTOMATIC TRANSMISSION

SECTION AT

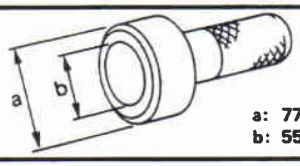
CONTENTS

SPECIAL SERVICE TOOLS

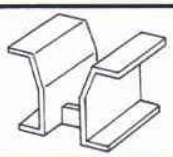
*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST2505S001 Oil pressure gauge set ① ST25051001 Oil pressure gauge ② ST25052000 Hose ③ ST25053000 Joint pipe ④ ST25054000 Adapter ⑤ ST25055000 Adapter		Measuring line pressure
KV31101201 Oil pressure gauge adapter		Measuring line pressure
KV31102100 Torque converter one-way clutch check tool		Checking one-way clutch in torque converter
ST25850000 Sliding hammer		Removing oil pump assembly
KV31102400 Clutch spring compressor		Removing and installing clutch return springs
ST25490000 Socket extension		Removing and installing line pressure plug
ST33200000* Drift	 a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.	Installing oil pump housing oil seal

*: Special tool or commercial equivalent

Tool number Tool name	Description	
ST30720000* Drift	 a: 77 mm (3.03 in) dia. b: 55.5 mm (2.185 in) dia.	Installing rear oil seal

COMMERCIAL SERVICE TOOL

Tool name	Description	
Transmission case stand	 (Make this by bending ST07870000.)	Disassembling and assembling A/T

Service Notice

- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- When disassembling parts, place them in order in a parts rack so that they can be put back into 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 any time the transmission is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in order 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.
- Properly installed valves, sleeves, plugs, etc. will slide along their bores in the valve body under their own weight.
- Before assembly, apply a coat of recommended A.T.F. to all parts. Petroleum jelly may be applied to O-rings and seals and used to hold small bearings and washers in place during reassembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- After overhaul, refill the transmission with new A.T.F.

Abbreviations and Symbols

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

: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.

Ⓟ : Apply petroleum jelly.

ATF : Apply A.T.F.

★ : Select with proper thickness.

☆ : Adjustment is required.

: Check after disconnecting the connector to be measured.

: Check after connecting the connector to be measured.

: Turn ignition switch to "ON" position.

: Turn ignition switch to "OFF" position.

: Turn ignition switch to "START" position.


: Do not start engine.

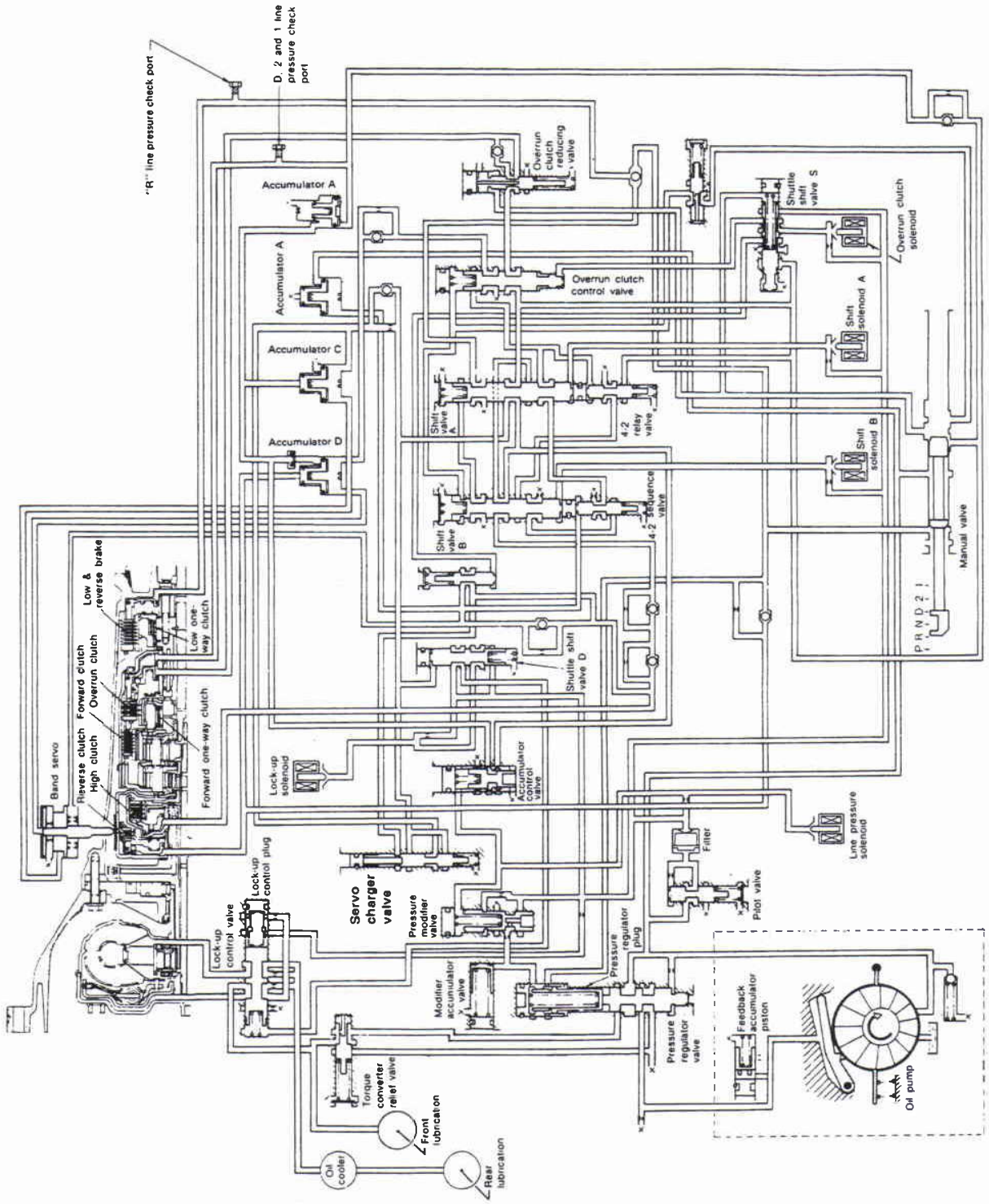

: Start engine.


: Apply parking brake.


: Release parking brake.


: Drive vehicle.

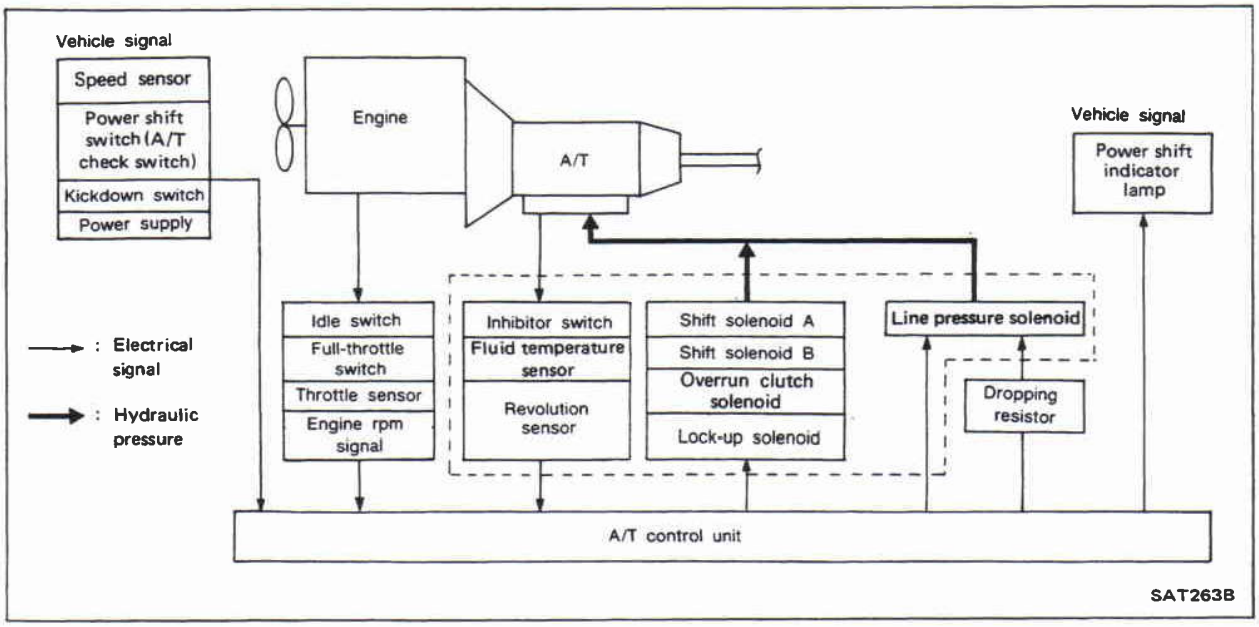
Hydraulic Control Circuits



SAT235B

A/T CONTROL DIAGRAM

Electrical Control Chart

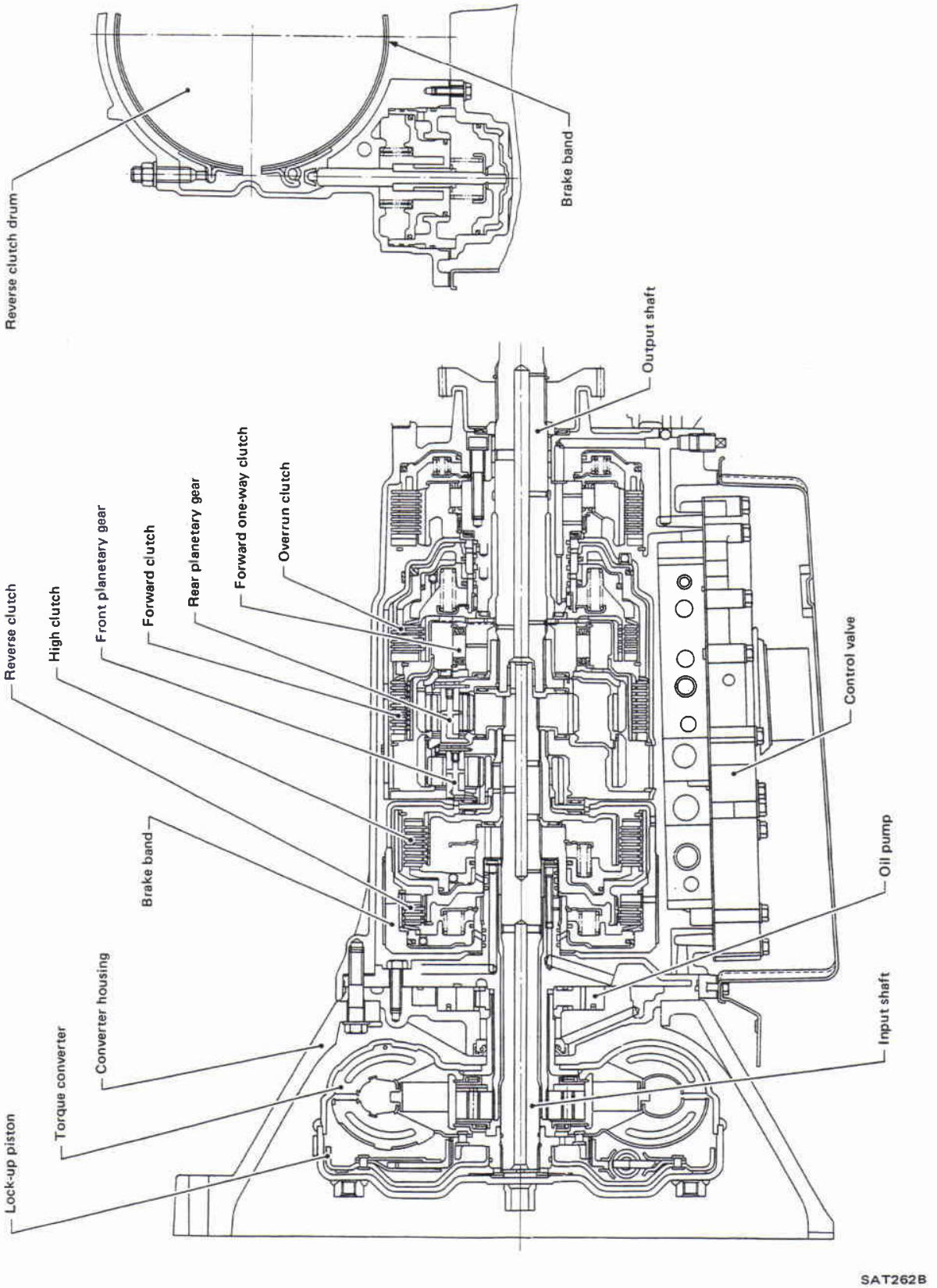


Mechnical Operation

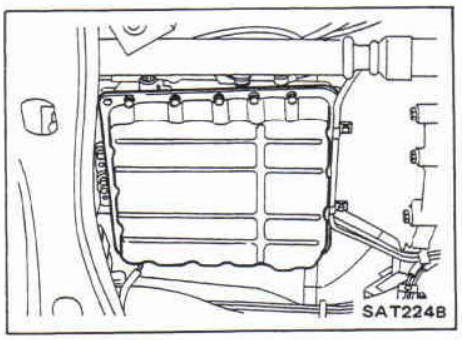
Shift position		Reverse clutch	High clutch	Forward clutch	Overrun clutch	Band servo 2nd apply	Band servo 3rd release	Band servo 4th apply	Forward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
P													PARK
R		○									○		REVERSE
N													NEUTRAL
D *4	1st			○	⊗				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd			○	*1 O	○			●				
	3rd		○	○	O	*2 ⊗	⊗		●				
	4th		○	⊗		*3 ⊗	⊗	○				○	
2	1st			○	⊗				●	●			Automatic shift 1 ↔ 2
	2nd			○	O	○			●				
1	1st			○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2
	2nd			○	○	○			●				

*1. Operates when power shift switch is set in "POWER" position.
*2. Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, because oil pressure area on the "release" side is greater than that on the "apply" side, brake band does not contract.
*3. Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.
*4. A/T will not shift to 4th when power shift switch is set in "POWER" position. [Except Gulf standard (Middle East) models]
○ : Operates.
O : Operates when throttle opening is less than 5.5/16. Engine brake activates.
● : Operates during "progressive" acceleration.
⊗ : Operates but does not affect power transmission.
⊗ : Operates when throttle opening is less than 5.5/16 but does not affect engine brake.

Cross-sectional View

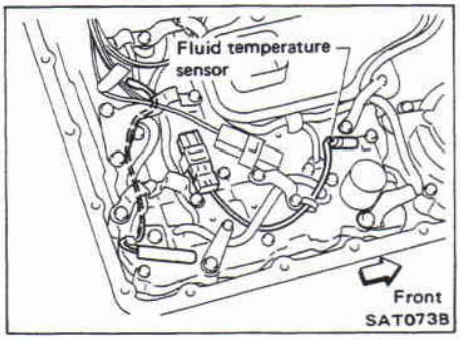


SAT262B

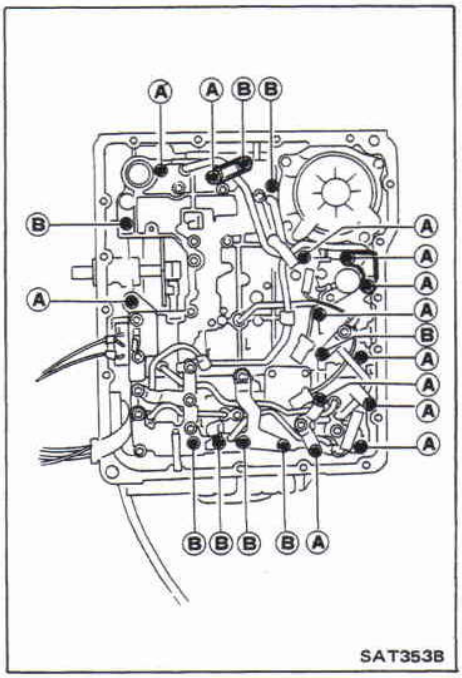


Control Valve Assembly and Accumulators Inspection

1. Remove oil pan and gasket and drain A.T.F.



2. Remove fluid temperature sensor if necessary.
3. Remove oil strainer.

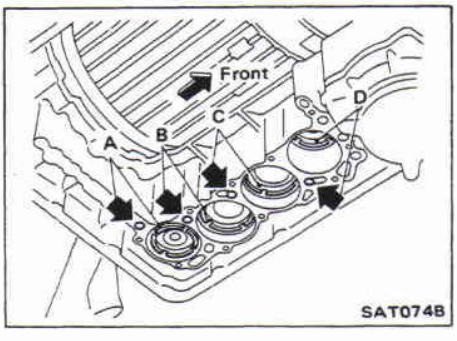


4. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

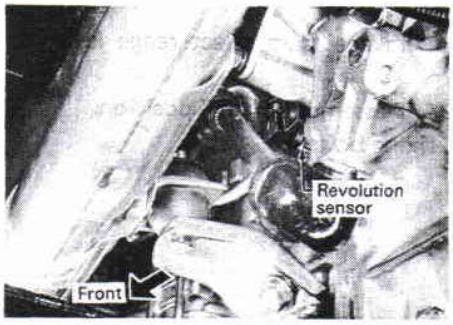
Bolt length and location

Bolt symbol	ℓ mm (in) ℓ
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

5. Remove solenoids and valves from valve body if necessary.
6. Remove terminal cord assembly if necessary.

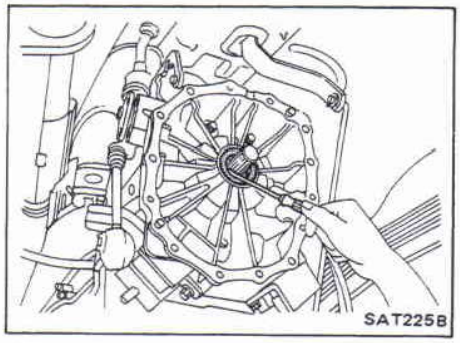


7. Remove accumulator A, B, C and D by applying compressed air if necessary.
- **Hold each piston with rag.**
8. Reinstall any part removed.
- **Always use new sealing parts.**



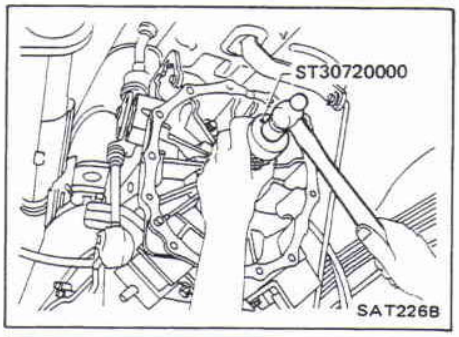
Revolution Sensor Replacement

- Remove revolution sensor from A/T.
- **Always use new sealing parts.**

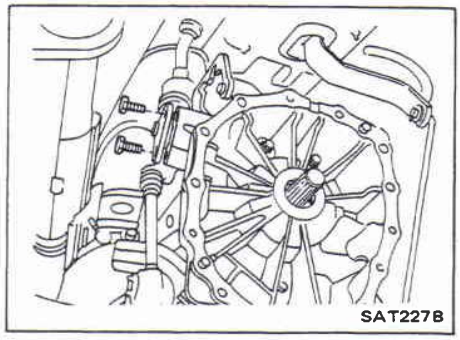


Rear Oil Seal Replacement

1. Remove transfer case from vehicle. – Refer to section TF.
2. Remove rear oil seal.

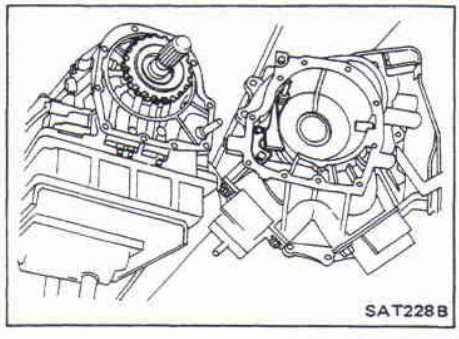


3. Install rear oil seal.
- **Apply A.T.F. before installing.**
4. Reinstall any part removed.

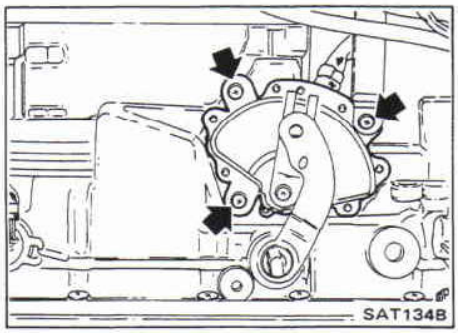


Parking Components Inspection

1. Remove transfer case from vehicle. – Refer to section TF.
2. Remove transfer control linkage from adapter case.

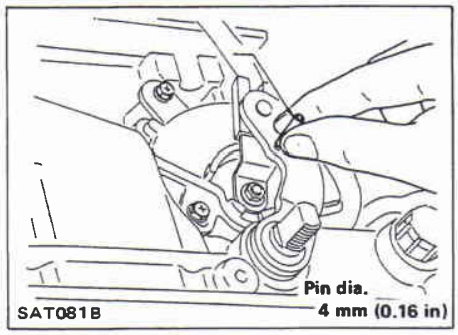


3. Remove adapter case from transmission case.
4. Replace parking components if necessary.
5. Reinstall any part removed.
- **Always use new sealing parts.**

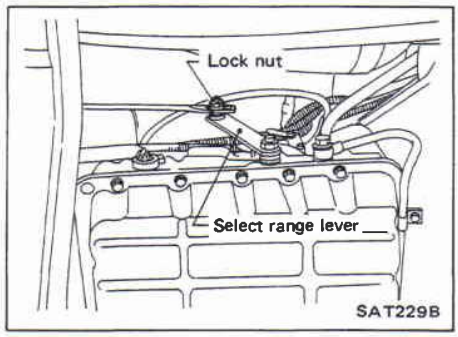


Inhibitor Switch Adjustment

1. Remove manual control linkage from select range lever of A/T assembly.
2. Set select range lever of A/T assembly in "N" position.
3. Loosen inhibitor switch fixing bolts.



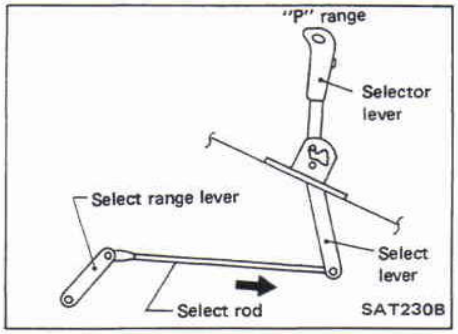
4. Insert pin into adjustment holes in both inhibitor switch and select range lever of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. – Refer to "Electrical System".



Manual Control Linkage Adjustment

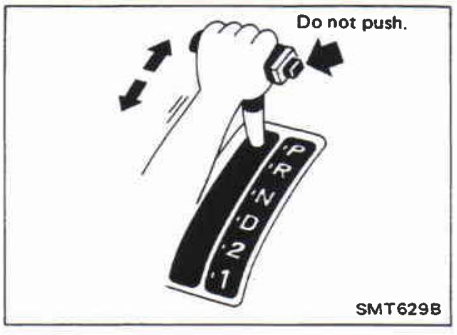
Move selector lever from "P" range to "1" range. You should be able to feel the detents in each range.
If the detents cannot be felt or the pointer indicating the range is improperly aligned, the linkage needs adjustment.

1. Place selector lever in "P" range.
2. Loosen lock nut.
3. Confirm that select range lever of A/T assembly is in "P" range.

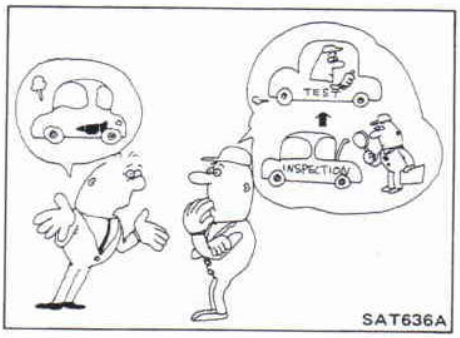


4. Pull select rod backward.
5. Release select rod and confirm that select lever moves forward a little under dead load.
6. Tighten lock nut to the specified torque.

Lock nut
22 - 27 N·m
(2.2 - 2.8 kg-m, 16 - 20 ft-lb)



7. Confirm that selector lever can move both forward and backward a little without pushing button.
8. Move selector lever from "P" range to "1" range. Make sure that selector lever can move smoothly and that pointer indicating the range is properly aligned.

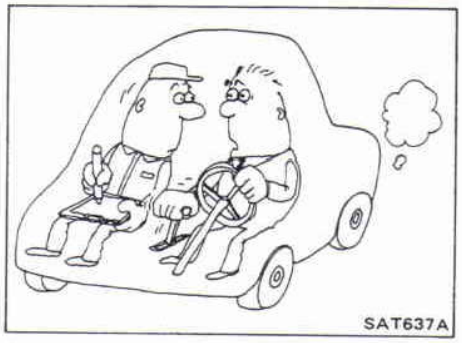


SAT636A

Diagnostic Procedure

1. Listen to customer's complaint attentively.

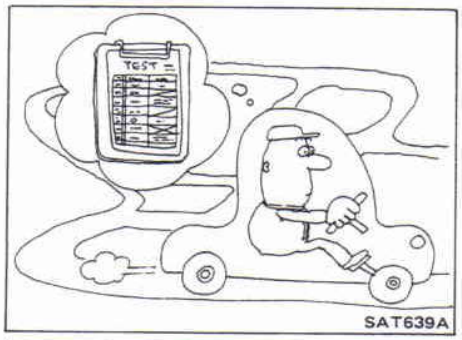
- **In most cases, problems related to A/T can be corrected with simple adjustments or repairs. Therefore, be careful not to remove or disassemble A/T prematurely.**


SAT637A

- **You should drive customer's vehicle with customer as a passenger in order to personally experience the problem.**

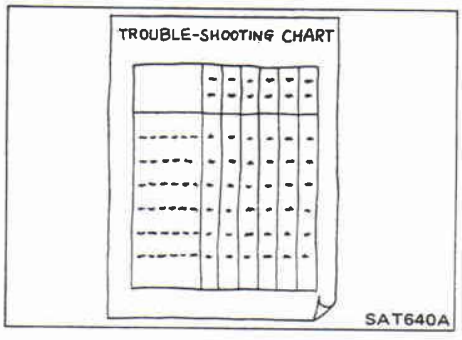

SAT638A

2. Check A/T fluid level and condition. – Refer to A/T FLUID LEVEL CHECK in section MA and following A/T FLUID CHECK section.



SAT639A

3. Perform road test including A/T self-diagnosis and diagnose causes of A/T problem. – Refer to following ROAD TESTING section.



SAT640A

4. If problem is not found during road test, perform general inspection by following TROUBLE-SHOOTING CHART in response to driveability trouble items.

Diagnostic Procedure (Cont'd)


SAT641A

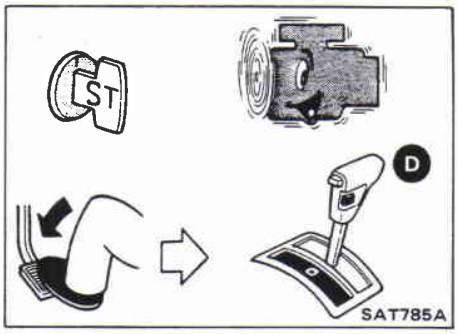
5. Repair or replace the necessary parts.


SAT642A

6. Perform stall test as a final check. — Refer to following STALL TESTING section.
7. Perform line pressure test as a final check. — Refer to following PRESSURE TESTING section.
8. Perform road test as a final check. — Refer to following ROAD TESTING section.

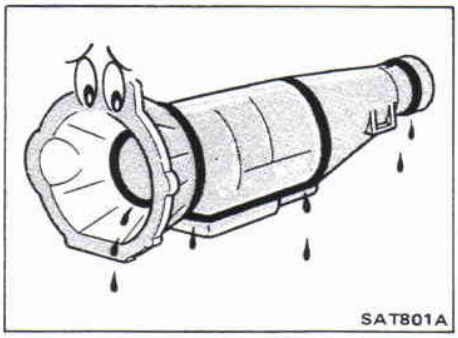
A/T Fluid Check

FLUID LEAKAGE CHECK



SAT785A

1. Clean area suspected of leaking, — for example, mating surface of converter housing and transmission case.
2. Start engine, apply foot brake, place selector lever in "D" range and wait a few minutes.
3. Stop engine.


SAT801A

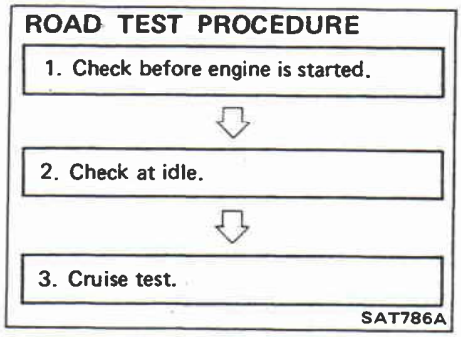
4. Check for fresh leakage.

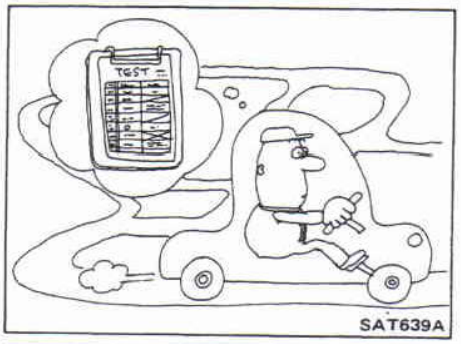
FLUID CONDITION CHECK

Fluid color	Suspected problem
Dark or black with burned odor	Wear of frictional material
Milky pink	Water contamination — Road water entering through filler tube or breather
Varnished fluid, light to dark brown and tacky	Oxidation — Over or under filling — Overheating


SAT638A

FLUID LEVEL CHECK — Refer to section MA.





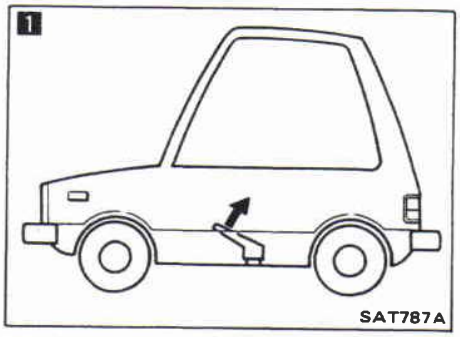
Road Testing

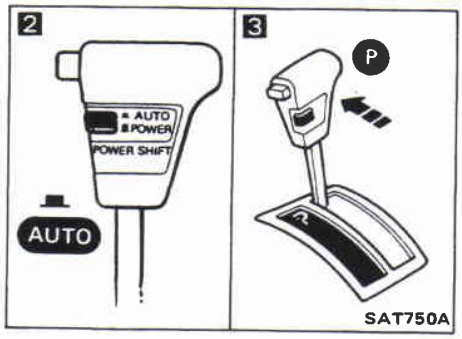
DESCRIPTION

- The purpose of this road test is to determine overall performance of automatic transmission and analyze causes of problems.
- The road test consists of the following three parts:

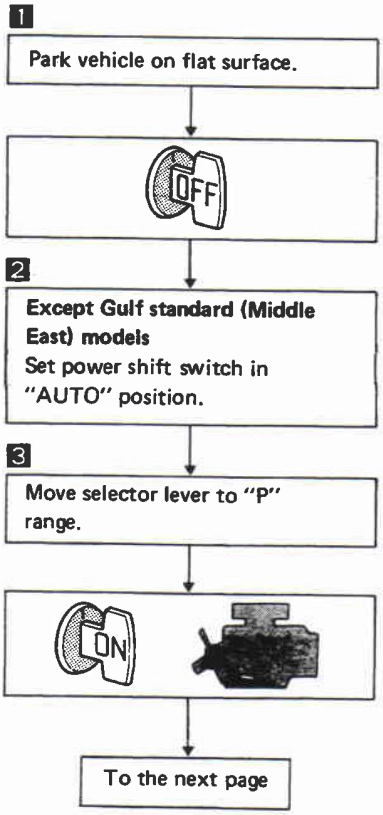
1. Check before engine is started
2. Check at idle
3. Cruise test

- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to the "Trouble-shooting".

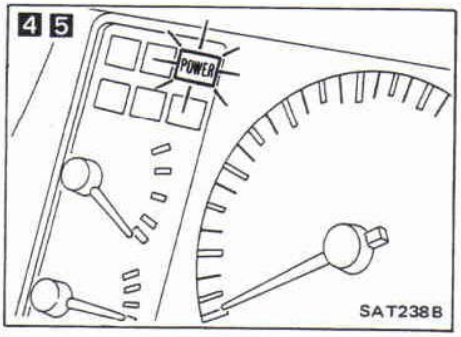


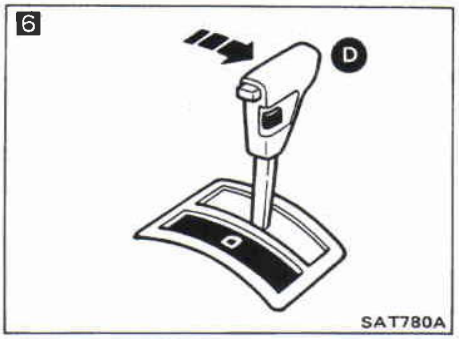


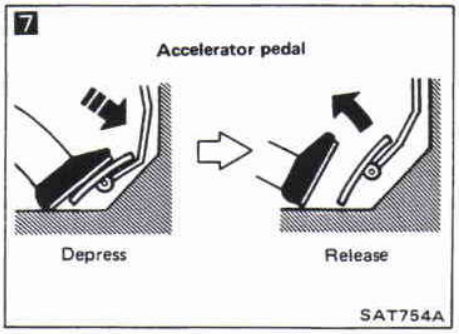
1. CHECK BEFORE ENGINE IS STARTED

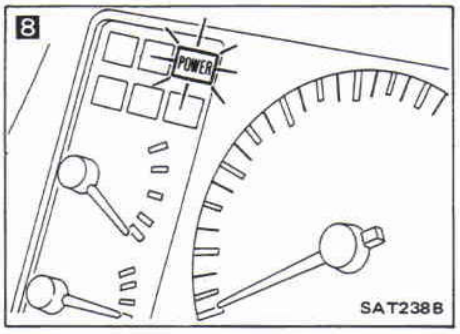


Road Testing (Cont'd)









From the previous page

4 Does power shift indicator lamp come on for about 2 seconds?
- No → Go to check ①.
- Yes ↓

5 Does power shift indicator lamp flicker for about 8 seconds?
- Yes → Perform self-diagnosis. – Refer to SELF-DIAGNOSIS PROCEDURE.
- No ↓

6 Move selector lever to "D" range.

7 Depress and release accelerator pedal quickly.

8 Does power shift indicator lamp come on for about 3 seconds after accelerator pedal is depressed?
- No → Go to check ②.
- Yes ↓

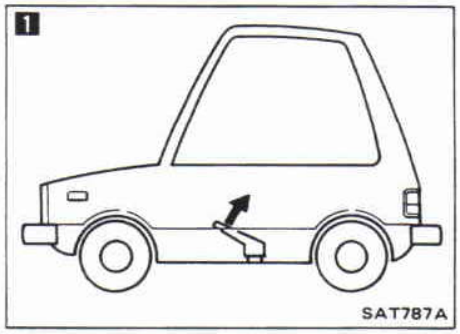
Perform self-diagnosis. – Refer to SELF-DIAGNOSIS PROCEDURE and note No Good items.

Go to "Road Testing – AT IDLE".

Road Testing (Cont'd)

2. CHECK AT IDLE

1


SAT787A

Park vehicle on flat surface.

2

Move selector lever to "P" or "N" range.

3

Except Gulf standard (Middle East) models
Set power shift switch to "AUTO" position.

Is engine started? — No → Go to check ③.

Yes

4

Move selector lever to "D", "1", "2" or "R" range.

Is engine started? — Yes → Go to check ③.

No

5

Move selector lever to "P" range.

6

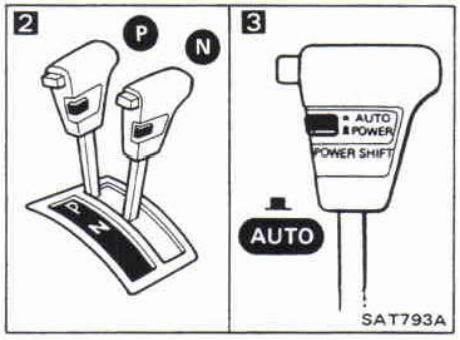
Push vehicle forward or backward.

Does vehicle move when it is pushed forward or backward? — Yes → Go to check ④.

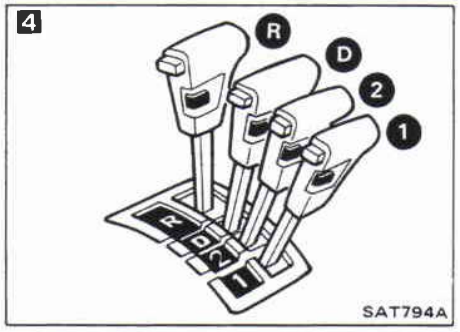
No

To the next page

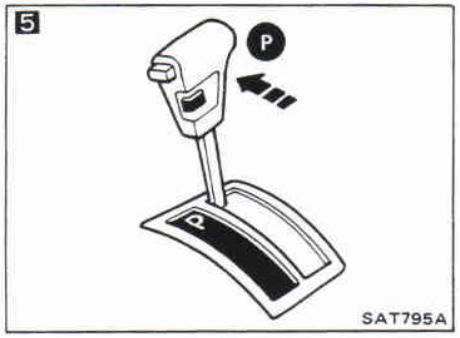
SAT787A



SAT793A



SAT794A



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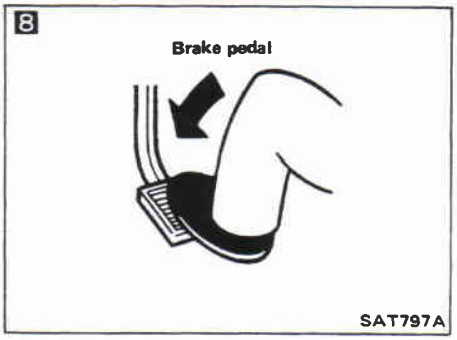
SAT796A

Road Testing (Cont'd)

7

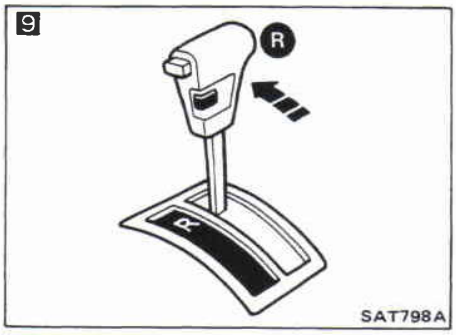
SAT781A

8



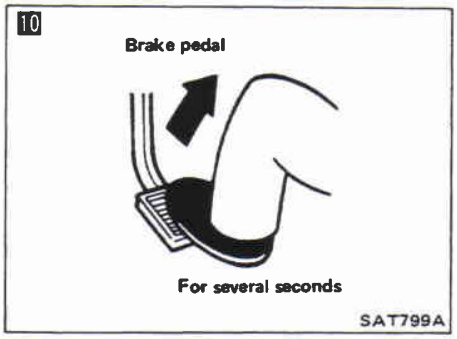
SAT797A

9



SAT798A

10



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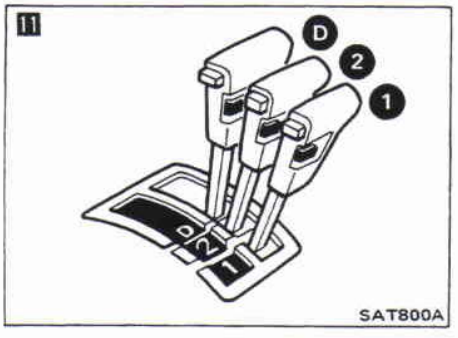
11



SAT800A

From the previous page

7 Move selector lever to "N" range.

Does vehicle move forward or backward?

Yes → Go to check ⑤.

No

8 Apply foot brake.

9 Move selector lever to "R" range.

Is there large shock when changing from "N" to "R" range?

No → Go to check ⑥.

Yes

10 Release foot brake for several seconds.

Does vehicle creep backward when foot brake is released?

No → Go to check ⑦.

Yes

11 Move selector lever to "D", "1" and "2" range and check if vehicle creeps forward.

Does vehicle creep forward in all three ranges?

Yes → Go to CRUISE TEST.

No

Does vehicle creep only in "1" range?

Yes → Go to check ⑧.

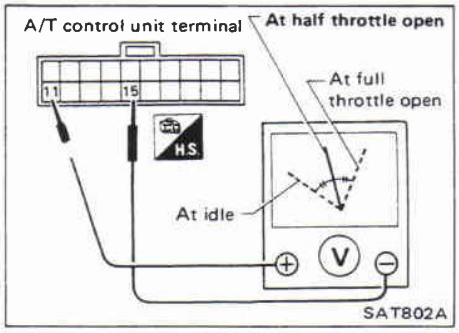
No

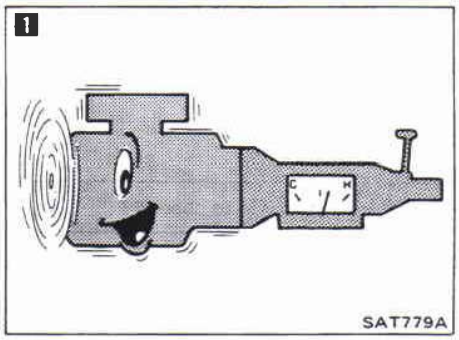
Go to check ⑨.

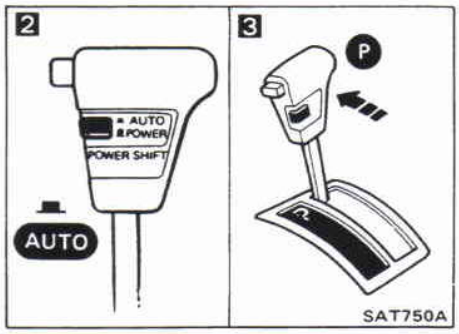
Road Testing (Cont'd)

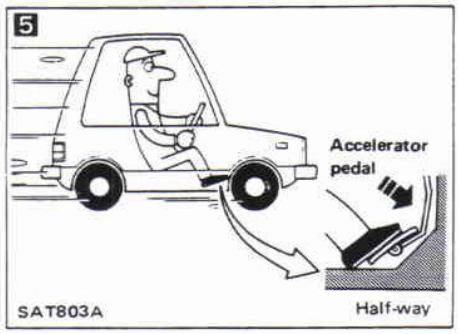
3. CRUISE TEST

- Check all items listed in Parts 1 through 3.
- Throttle position can be controlled by voltage across terminals ⑪ and ⑮ of A/T control unit.



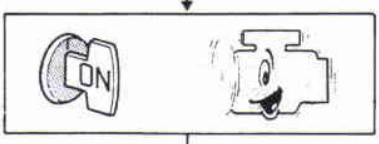






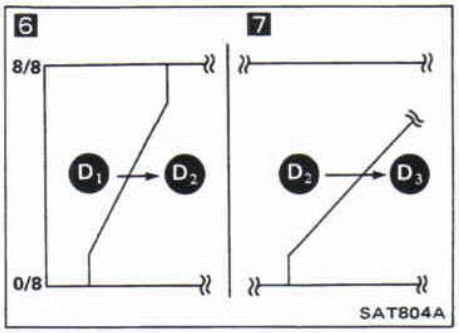
CRUISE TEST – Part 1

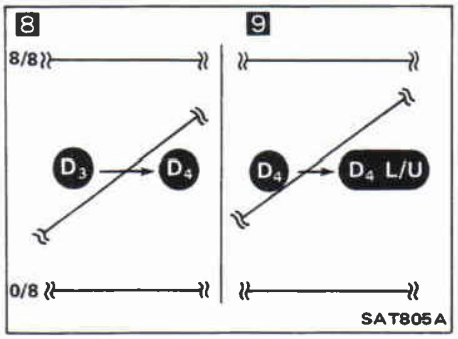
1. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.
   A.T.F. operating temperature: 50 - 80°C (122 - 176°F)
2. Park vehicle on flat surface.
3. **Except Gulf standard (Middle East) models**
   Set power shift switch to "AUTO" position.
4. Move selector lever to "P" range.

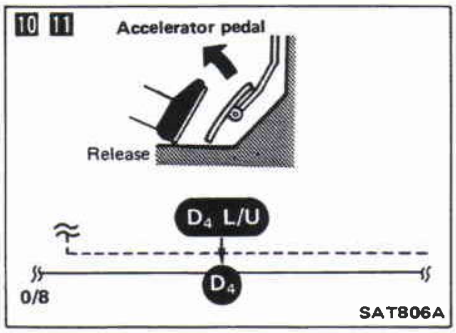


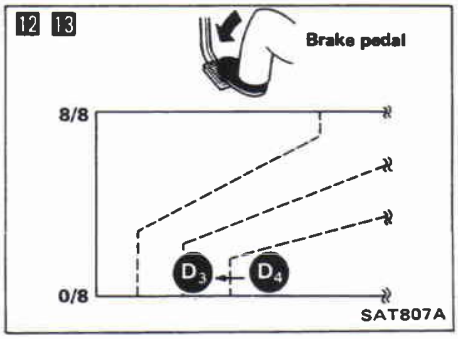
5. Move selector lever to "D" range.
6. Accelerate vehicle by constantly depressing accelerator pedal halfway.
7. Does vehicle start from D_1?
   - No → Go to check ⑩.
   - Yes → To the next page

Road Testing (Cont'd)









From the previous page

6 Does A/T shift from D_1 to D_2 at the specified speed?
Specified speed when shifting from D_1 to D_2:
Refer to shift schedule.
- No → Go to check ⑪.
- Yes ↓

7 Does A/T shift from D_2 to D_3 at the specified speed?
Specified speed when shifting from D_2 to D_3:
Refer to shift schedule.
- No → Go to check ⑫.
- Yes ↓

8 Does A/T shift from D_3 to D_4 at the specified speed?
Specified speed when shifting from D_3 to D_4:
Refer to shift schedule.
- No → Go to check ⑬.
- Yes ↓

9 Does A/T perform lock-up at the specified speed?
Specified speed when lock-up occurs:
Refer to shift schedule.
- No → Go to check ⑭.
- Yes ↓

Does A/T hold lock-up condition for more than 30 seconds?
- No → Go to check ⑮.
- Yes ↓

10 Release accelerator pedal.

11 Is lock-up released when accelerator pedal is released?
- No → Go to check ⑯.
- Yes ↓

12 Decelerate vehicle by applying foot brake lightly.

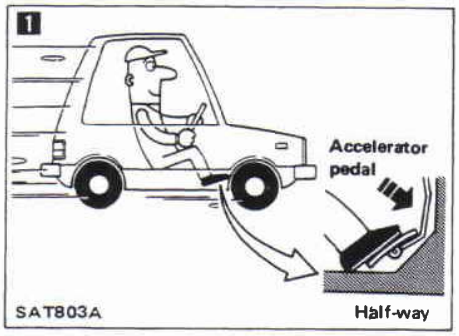
13 Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3?
- No → Go to check ⑰.
- Yes ↓

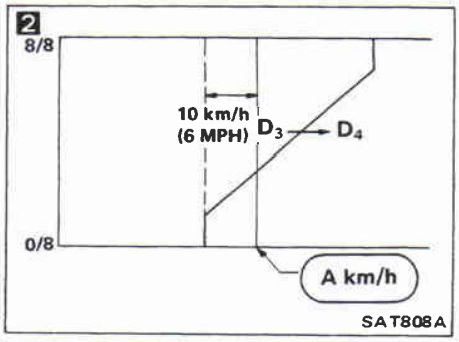
Stop vehicle.

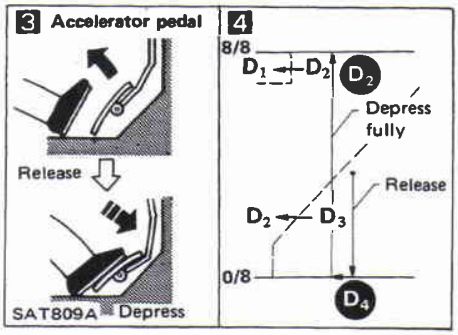
Go to "CRUISE TEST – Part 2".

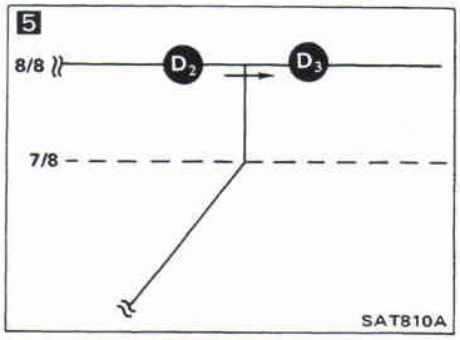
Road Testing (Cont'd)

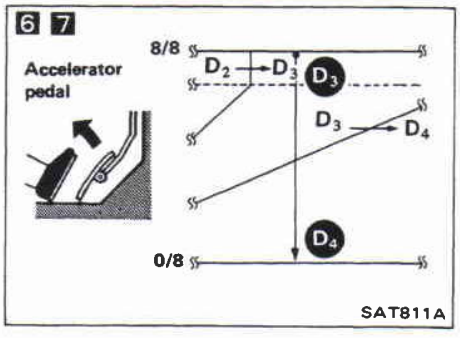
CRUISE TEST – Part 2











Except Gulf standard (Middle East) models
Confirm power shift switch is in "AUTO" position.

↓

Confirm selector lever is in "D" range.

↓

1 Accelerate vehicle by half throttle again.

↓

Does vehicle start from D_1? — No → Go to check ⑱.

↓ Yes

2 Accelerate vehicle to A km/h as shown in illustration.

↓

3 Release accelerator pedal and then quickly depress it fully.

↓

4 Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully? — No → Go to check ⑪.

↓ Yes

5 Does A/T shift from D_2 to D_3 at the specified speed?
Specified speed when shifting from D_2 to D_3: Refer to shift schedule. — No → Go to check ⑫.

↓ Yes

6 Release accelerator pedal after shifting from D_2 to D_3.

↓

7 Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake? — No → Go to check ⑬.

↓ Yes

Stop vehicle.

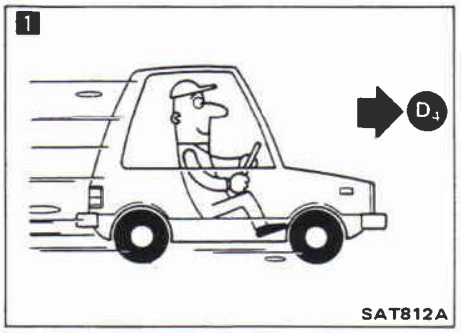
↓

Go to "CRUISE TEST – Part 3".

Road Testing (Cont'd)

CRUISE TEST — Part 3

1



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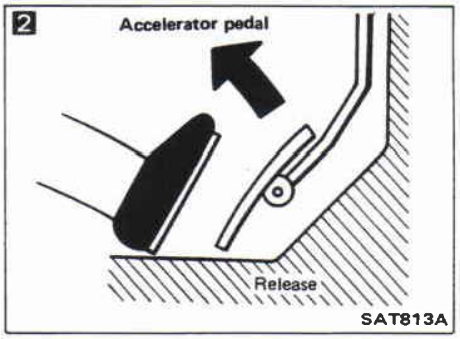
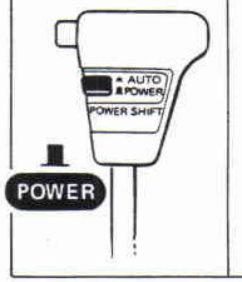
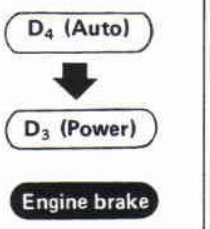


SAT813A

3



4 5



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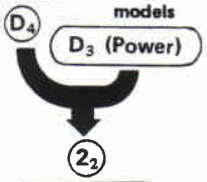
Gulf standard (Middle East) models



Except Gulf standard (Middle East) models

Engine brake

9

SAT816A

10 11

Engine brake

Except Gulf standard (Middle East) models
Confirm power shift switch is in "AUTO" position.

↓

Confirm selector lever is in "D" range.

↓

1 Accelerate vehicle using half-throttle to D_4.

↓

2 Release accelerator pedal.

↓

3 Except Gulf standard (Middle East) models
Set power shift switch in "POWER" position while driving in D_4 range.

↓

4 Does A/T shift from D_4 to D_3? — No → Go to check ⑲.

↓ Yes

5 Does vehicle decelerate by engine brake? — No → Go to check ⑰.

↓ Yes

6 Move selector lever from "D" to "2" range while driving in D_3 or D_4.

↓ Yes

7 Does A/T shift from D_3 to 2_2? — No → Go to check ⑳.

↓ Yes

8 Does vehicle decelerate by engine brake? — No → Go to check ⑰.

↓ Yes

9 Move selector lever from "2" to "1" range while driving in 2_2.

↓

10 Does A/T shift from 2_2 to 1_1 range? — No → Go to check ㉑.

↓ Yes

11 Does vehicle decelerate by engine brake? — No → Go to check ㉒.

↓ Yes

Stop vehicle.

↓

Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE.

Road Testing (Cont'd)

VEHICLE SPEED WHEN SHIFTING GEARS

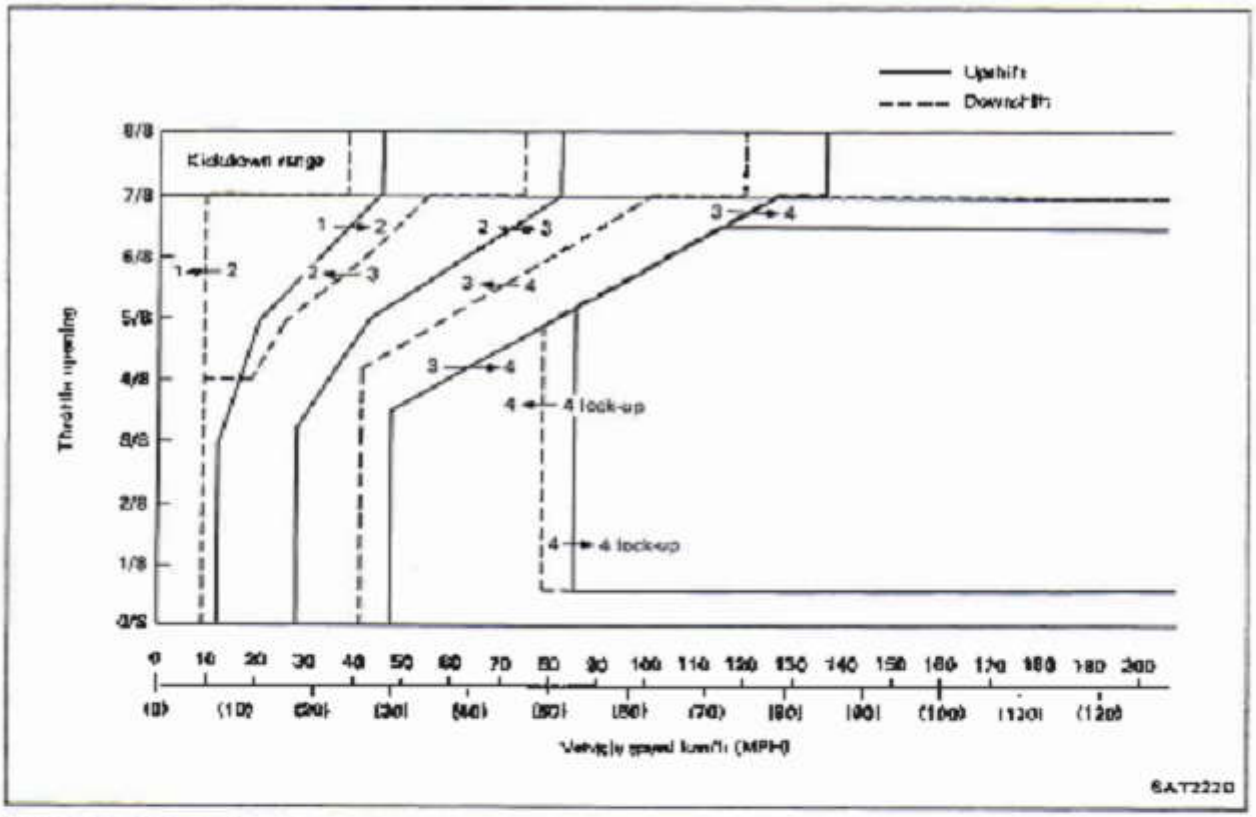
Model	Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
			$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
TB42	Full throttle	Standard	43 - 47 (27 - 29)	77 - 85 (48 - 53)	119 - 129 (74 - 80)	113 - 123 (70 - 76)	70 - 78 (43 - 48)	36 - 40 (22 - 25)	40 - 44 (25 - 27)
		Power	48 - 52 (30 - 32)	87 - 95 (54 - 59)	138 - 148 (86 - 92)	125 - 135 (78 - 84)	78 - 86 (48 - 53)	41 - 45 (25 - 28)	40 - 44 (25 - 27)
	Half throttle	Standard	14 - 18 (9 - 11)	30 - 38 (19 - 24)	52 - 62 (32 - 39)	36 - 46 (22 - 29)	14 - 22 (9 - 14)	7 - 11 (4 - 7)	40 - 44 (25 - 27)
		Power	25 - 29 (16 - 18)	45 - 53 (28 - 33)	80 - 90 (50 - 56)	45 - 55 (28 - 34)	16 - 24 (10 - 15)	7 - 11 (4 - 7)	40 - 44 (25 - 27)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

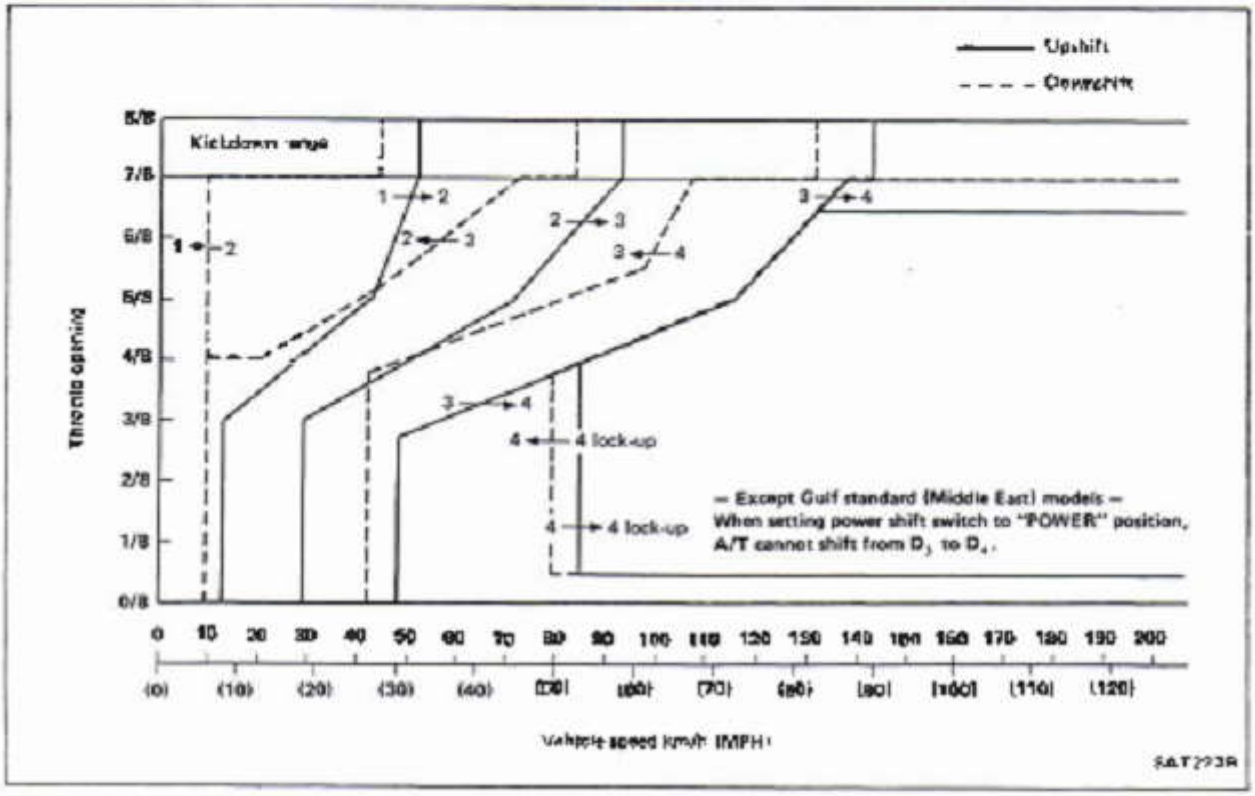
Model	Throttle position	Shift pattern	D_4	
			Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
TB42	Full throttle	Standard	–	–
		Power	–	–
	Half throttle	Standard	78 - 88 (48 - 55)	73 - 83 (45 - 52)
		Power	78 - 88 (48 - 55)	73 - 83 (45 - 52)

Road Testing (Cont'd)

SHIFT SCHEDULE — Standard Pattern



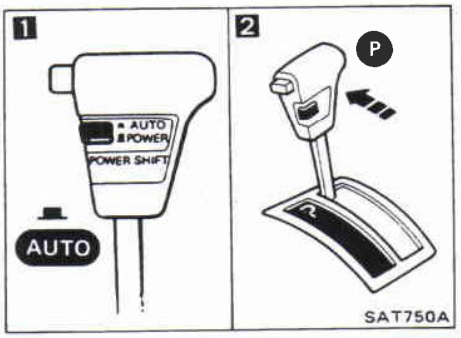
SHIFT SCHEDULE — Power Pattern

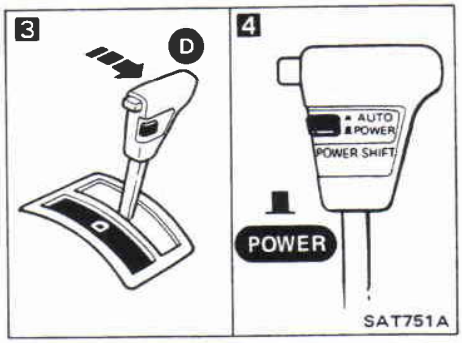


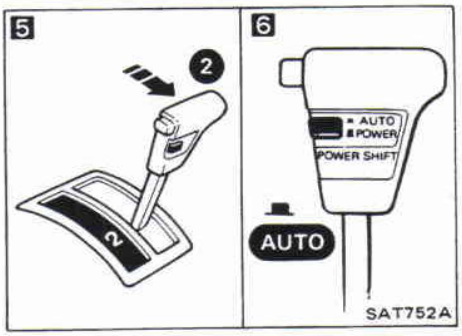
Trouble-shooting, Electrical System, Stall Testing and Line Pressure Testing

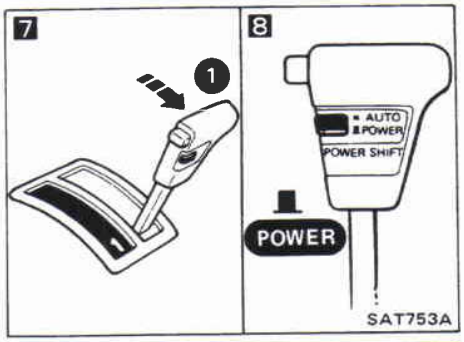
CONTENTS

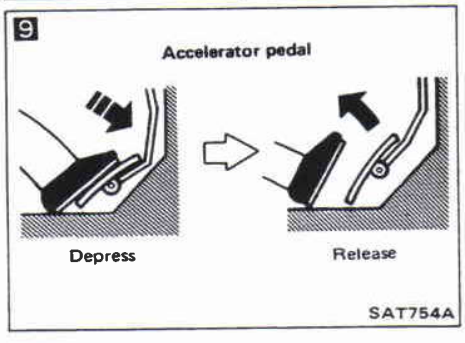
Trouble-shooting, Electrical System, Stall Testing and Line Pressure Testing (Cont'd)











Trouble-shooting — Self-diagnosis

SELF-DIAGNOSIS PROCEDURE

Except Gulf standard (Middle East) models

DIAGNOSIS START

Start engine and warm it up to normal engine operating temperature.

1. Set power shift switch in "AUTO" position.
2. Move selector lever to "P" range.

Does power shift indicator lamp come on for about 2 seconds?

Yes

No → Go to check ①.

3. Move selector lever to "D" range.
4. Set power shift switch in "POWER" position.

5. Move selector lever to "2" range.
6. Set power shift switch in "AUTO" position.
7. Move selector lever to "1" range.
8. Set power shift switch in "POWER" position.
9. Depress accelerator pedal fully and release it.

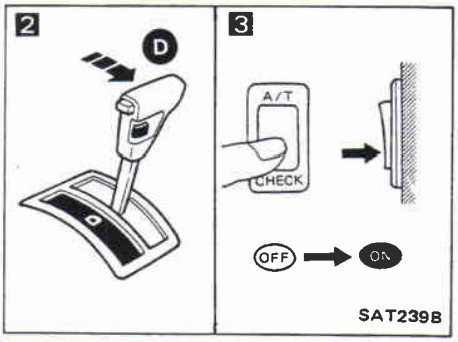
Check power shift indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE.

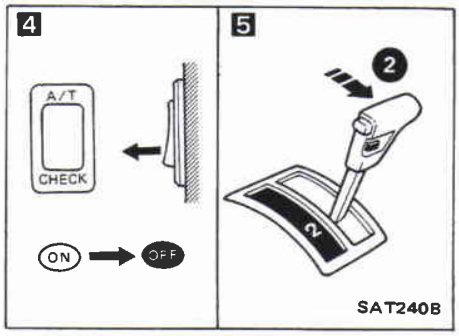
DIAGNOSIS END

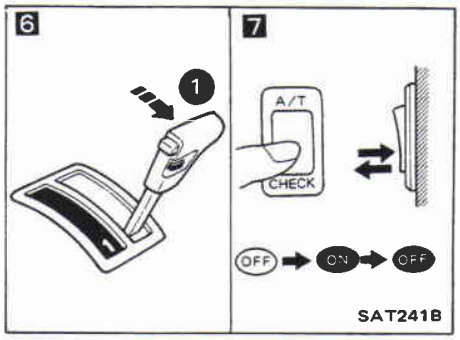
Trouble-shooting — Self-diagnosis (Cont'd)

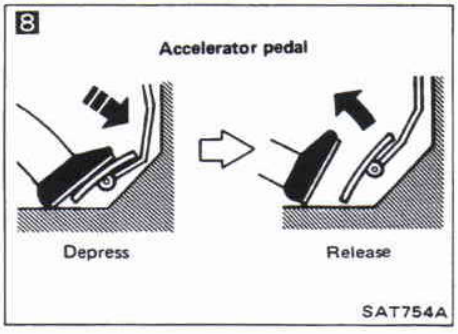
SELF-DIAGNOSIS PROCEDURE

Gulf standard (Middle East) models









DIAGNOSIS START

Start engine and warm it up to normal engine operating temperature.

1 Move selector lever to "P" range.

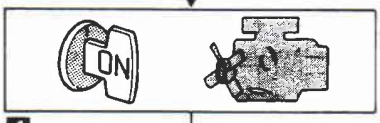
Does power shift indicator lamp come on for about 2 seconds?

Yes

No → Go to check ①.

2 Move selector lever to "D" range.

3 Turn A/T check switch to "ON" position and hold it at "ON".



4 Release A/T check switch. (turn to "OFF" position.)

5 Move selector lever to "2" range.

6 Move selector lever to "1" range.

7 Turn A/T check switch to "ON" position and release it.

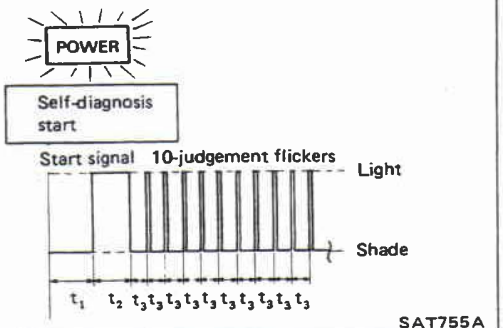
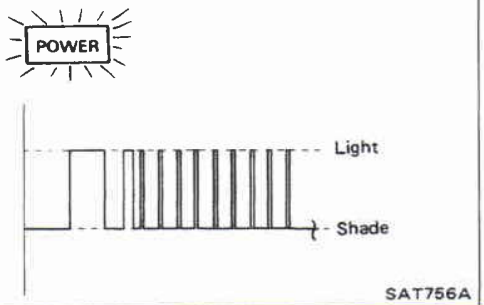
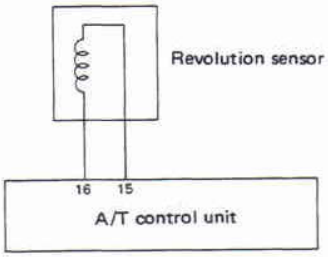
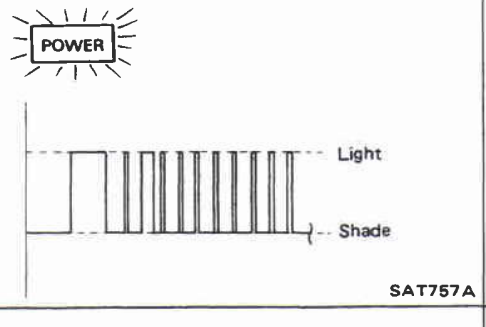
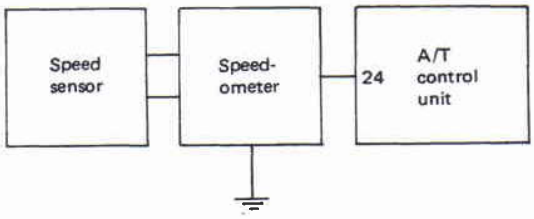
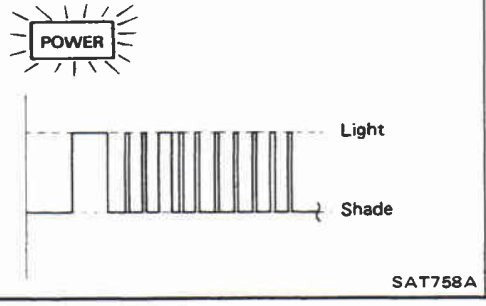
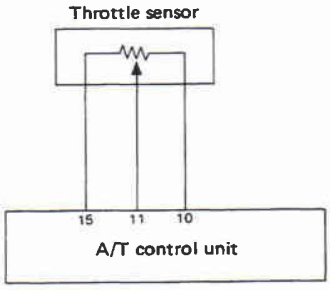
8 Depress accelerator pedal fully and release it.

Check power shift indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE.

DIAGNOSIS END

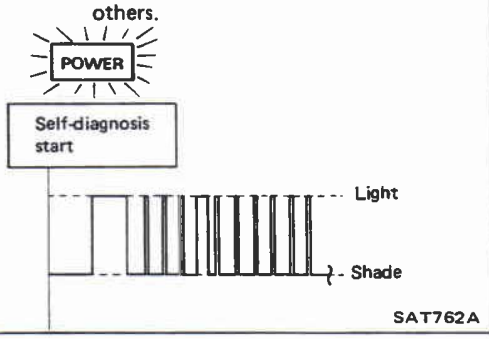
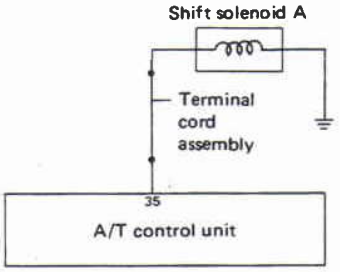
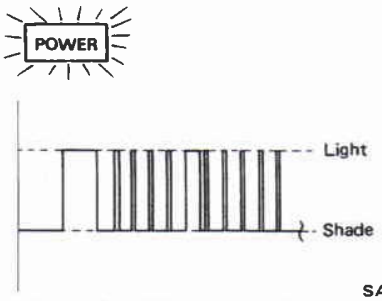
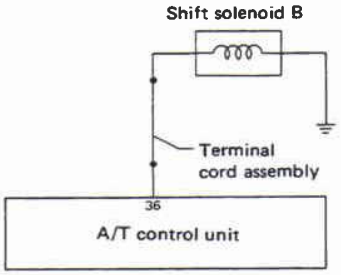
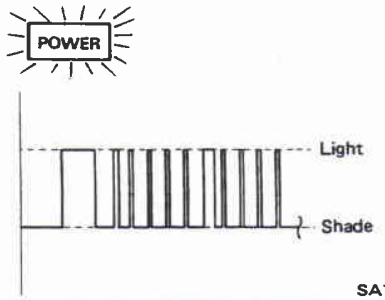
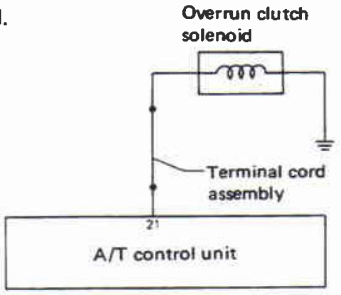
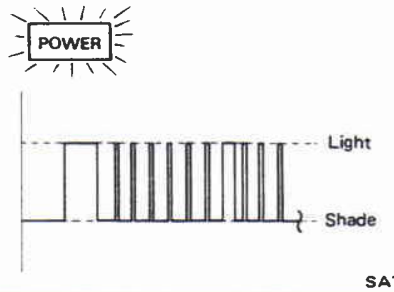
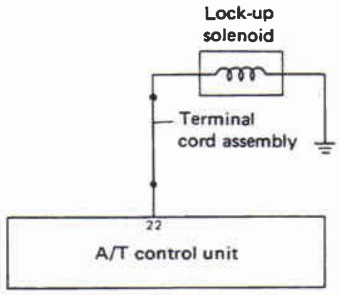
Trouble-shooting — Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

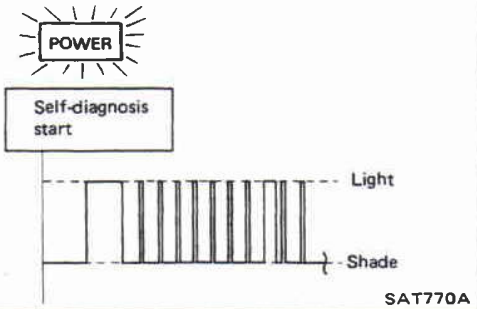
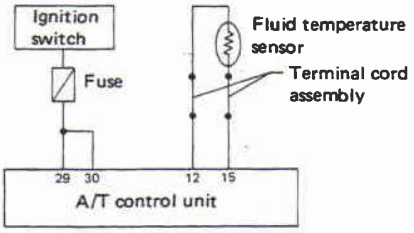
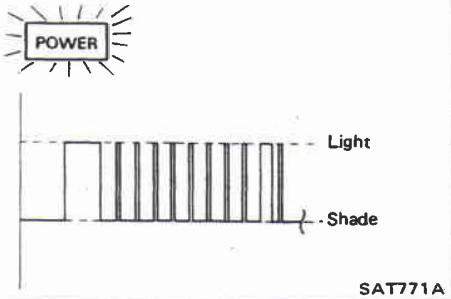
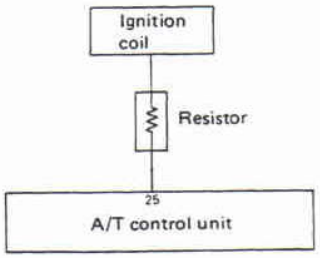
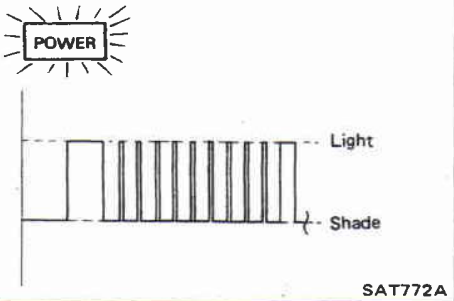
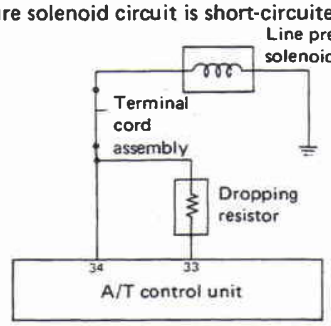
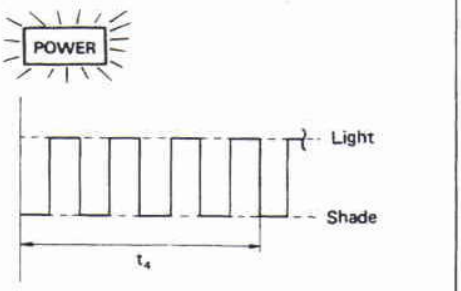
Power shift indicator lamp:	Damaged circuit
All judgement flickers are same. 	All circuits that can be confirmed by self-diagnosis are O.K.
1st judgement flicker is longer than others. 	Revolution sensor circuit is short-circuited or disconnected.  ➡ **Go to revolution sensor circuit check.** SAT140B
2nd judgement flicker is longer than others. 	Speed sensor circuit is short-circuited or disconnected.  ➡ **Go to speed sensor circuit check.** SAT625B
3rd judgement flicker is longer than others. 	Throttle sensor circuit is short-circuited or disconnected.  ➡ **Go to throttle sensor circuit check.** SAT142B

t_1 = 2.5 seconds t_2 = 2.0 seconds t_3 = 1.0 second

Trouble-shooting — Self-diagnosis (Cont'd)

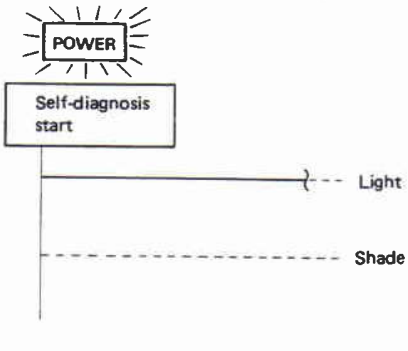
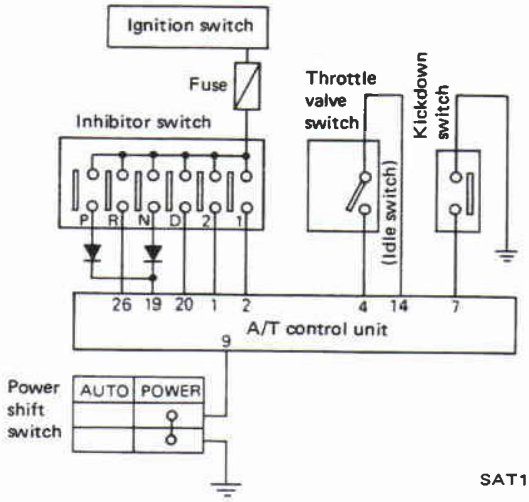
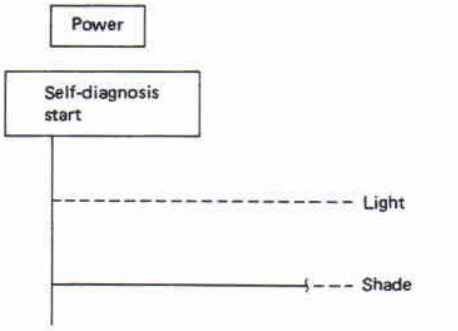
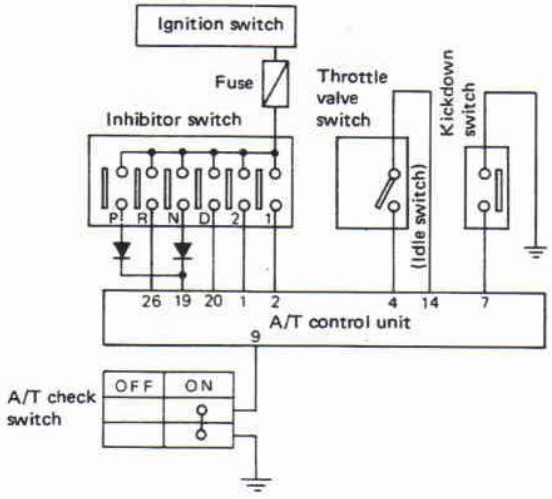
Power shift indicator lamp:	Damaged circuit
4th judgement flicker is longer than others.  SAT762A	Shift solenoid A circuit is short-circuited or disconnected.  ➡ **Go to shift solenoid A circuit check.** SAT766A
5th judgement flicker is longer than others.  SAT763A	Shift solenoid B circuit is short-circuited or disconnected.  ➡ **Go to shift solenoid B circuit check.** SAT767A
6th judgement flicker is longer than others.  SAT764A	Overrun clutch solenoid circuit is short-circuited or disconnected.  ➡ **Go to overrun clutch solenoid circuit check.** SAT768A
7th judgement flicker is longer than others.  SAT765A	Lock-up solenoid circuit is short-circuited or disconnected.  ➡ **Go to lock-up solenoid circuit check.** SAT769A

Trouble-shooting — Self-diagnosis (Cont'd)

Power shift indicator lamp:	Damaged circuit
8th judgement flicker is longer than others. 	Fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged.  ➡ **Go to fluid temperature sensor and A/T control unit power source circuit check.** SAT143B
9th judgement flicker is longer than others. 	Engine revolution signal circuit is short-circuited or disconnected.  ➡ **Go to engine revolution signal circuit check.** SAT624B
10th judgement flicker is longer than others. 	Line pressure solenoid circuit is short-circuited or disconnected.  ➡ **Go to line pressure solenoid circuit check.** SAT776A
Flickers as shown below. 	Battery power is low. Battery has been disconnected for a long time. Battery is connected conversely. (When reconnecting A/T control unit connectors. — This is not a problem.)

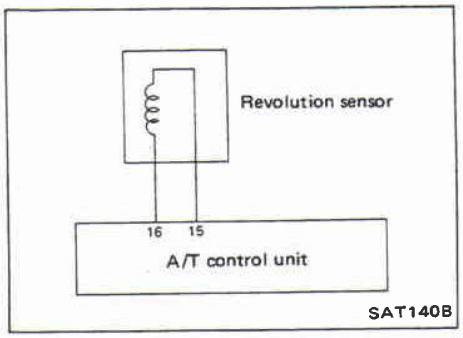
t_4 = 1.0 second

Trouble-shooting — Self-diagnosis (Cont'd)

	Power shift indicator lamp:	Damaged circuit
Except Gulf standard (Middle East) models	Comes on continuously.  SAT777A	Inhibitor switch, power shift switch, kickdown switch or idle switch circuit is disconnected or A/T control unit is damaged.  SAT144B ➡ **Go to inhibitor, power shift, kickdown and idle switch circuit checks.**
Gulf standard (Middle East) models	Does not come on.  SAT146B	Inhibitor switch, A/T check switch, kickdown switch or idle switch circuit is disconnected or A/T control unit is damaged.  ➡ **Go to inhibitor, A/T check, kickdown and idle switch circuit checks.** SAT145B

Trouble-shooting — Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK

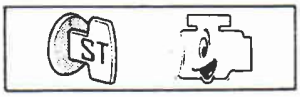


CHECK REVOLUTION SENSOR — Refer to "Electrical System". N.G. → Repair or replace revolution sensor.

O.K. ↓

A

CHECK INPUT SIGNAL N.G. → Check the following items.
- Harness continuity between A/T control unit and revolution sensor (Main harness)

1. 

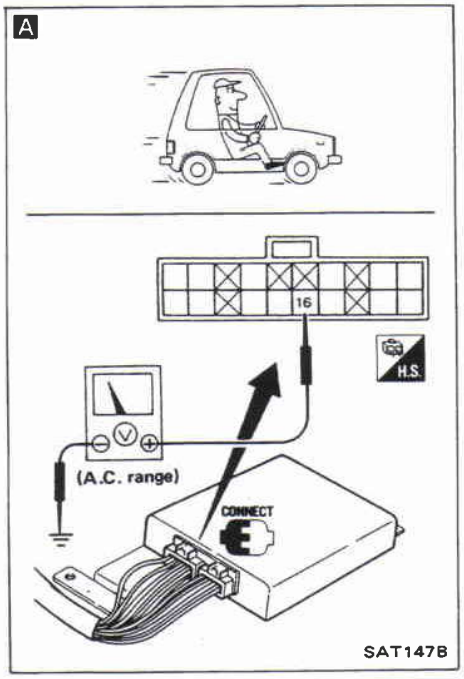
2. Check voltage between A/T control unit terminal ⑯ and ground while driving. (Measure with A.C. range.)
   Voltage:
   at 0 km/h (0 MPH): 0V
   at 30 km/h (19 MPH): 1V or more
   (Voltage rises gradually in response to vehicle speed)

O.K. ↓

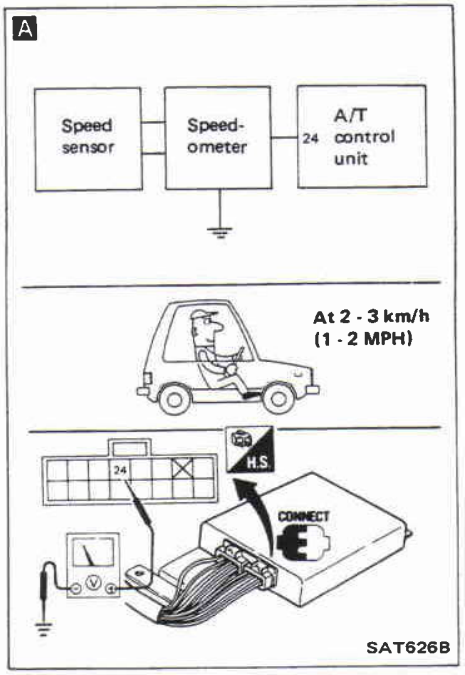
Perform self-diagnosis again after driving for a while. N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END



SPEED SENSOR CIRCUIT CHECK



A

CHECK INPUT SIGNAL N.G. → Check the following items.
- Speed sensor and ground circuit for speed sensor — Refer to section EL.
- Harness continuity between A/T control unit and speed sensor (Main harness)

1. 

2. Check voltage between A/T control unit terminal ㉔ and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.
   Voltage: Varies from 0V to 5V

O.K. ↓

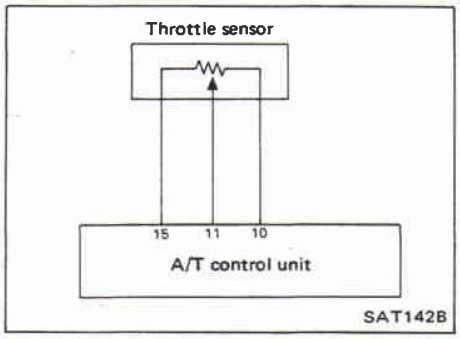
Perform self-diagnosis again after driving for a while. N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

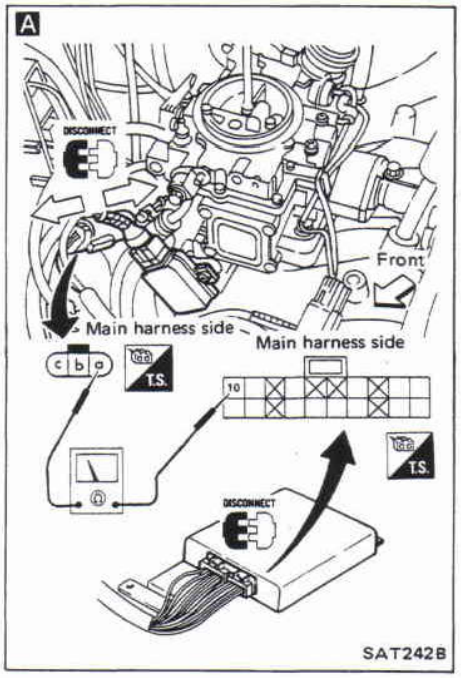
O.K. ↓

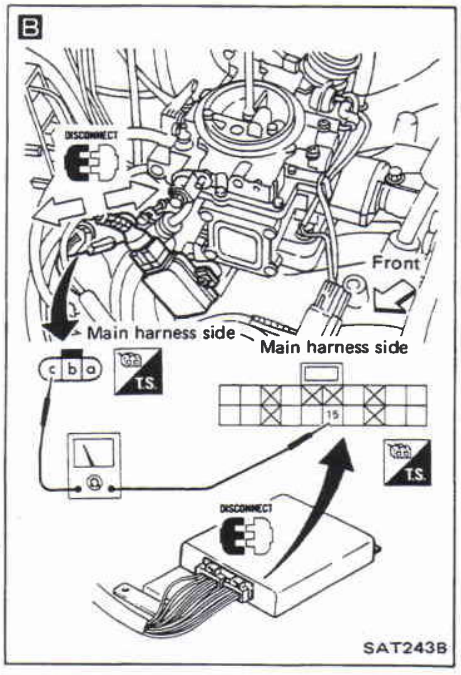
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

THROTTLE SENSOR CIRCUIT CHECK







A

CHECK POWER SOURCE CIRCUIT

1. 

2. Disconnect throttle sensor harness connector.
3. Disconnect A/T control unit 20-pin connector.
4. Check resistance between terminal ⓐ and A/T control unit terminal ⑩.

   Resistance:

   Approximately 0Ω

N.G. → Repair or replace harness between A/T control unit ⑩ and throttle sensor (Main harness).

O.K. ↓

B

CHECK GROUND CIRCUIT

1. 

2. Check resistance between terminal ⓒ and A/T control unit terminal ⑮.

   Resistance:

   Approximately 0Ω
3. Reinstall any part removed.

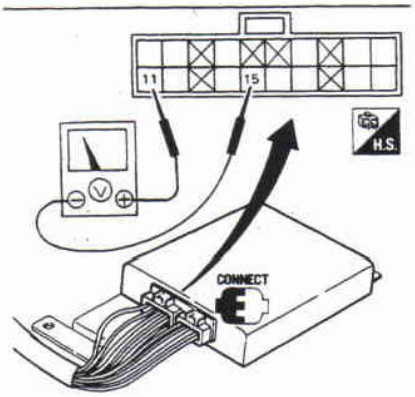
N.G. → Repair or replace harness between A/T control unit ⑮ and throttle sensor (Main harness).

O.K. ↓

To the next page.

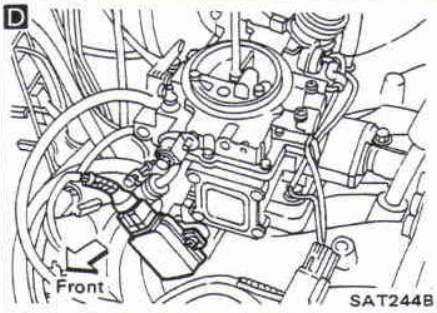
Trouble-shooting — Self-diagnosis (Cont'd)

C



SAT151B

D



SAT244B

C

CHECK INPUT SIGNAL

1. 

2. Check voltage between A/T control unit terminals ⑪ and ⑮ while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle:
0.2 - 0.6V

Fully-open throttle:
3.4 - 4.4V

(Voltage rises gradually in response to throttle valve opening.)

N.G. →

Check the following items.
- Harness continuity between A/T control unit ⑪ and throttle sensor.

D
- Throttle sensor — Refer to section EF & EC.

O.K. ↓

Perform self-diagnosis again after driving for a while.

N.G. →

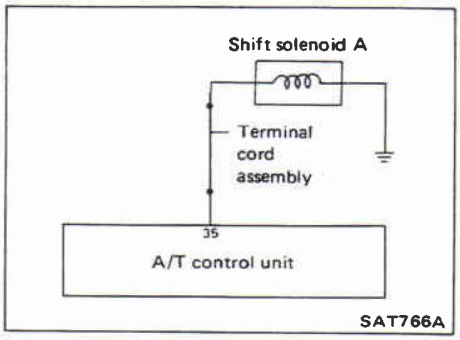
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

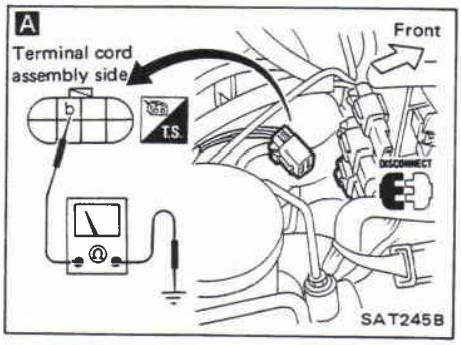
O.K. ↓

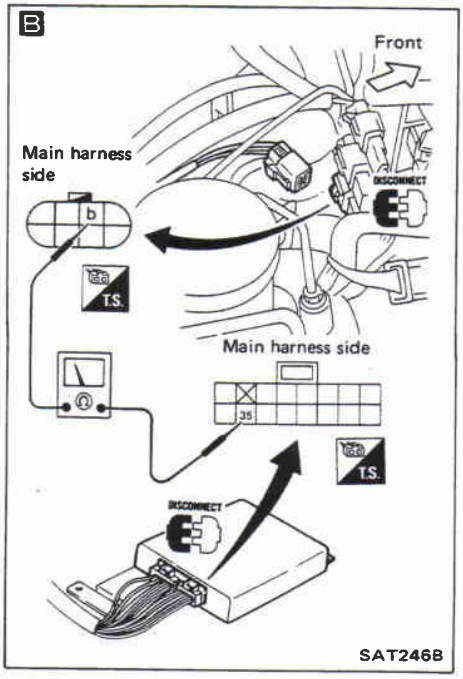
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

SHIFT SOLENOID A CIRCUIT CHECK







A

CHECK GROUND CIRCUIT

1. 

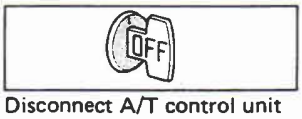
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⓑ and ground.
   Resistance: 20 - 30Ω

N.G. →
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Shift solenoid A — Refer to "Electrical System".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between terminal ⓑ and A/T control unit terminal ㉟.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis after driving for a while.

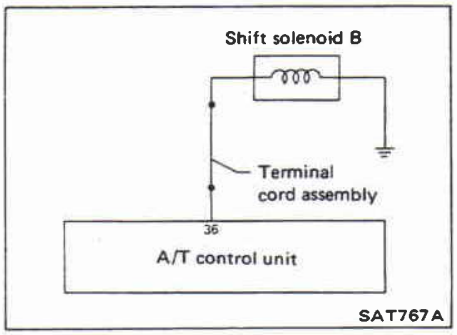
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

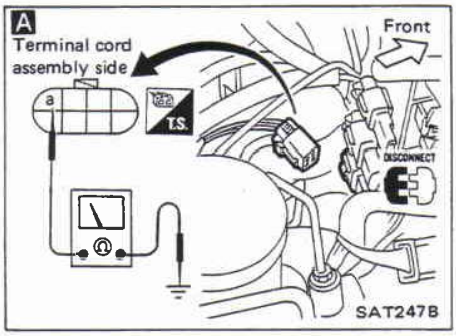
O.K. ↓

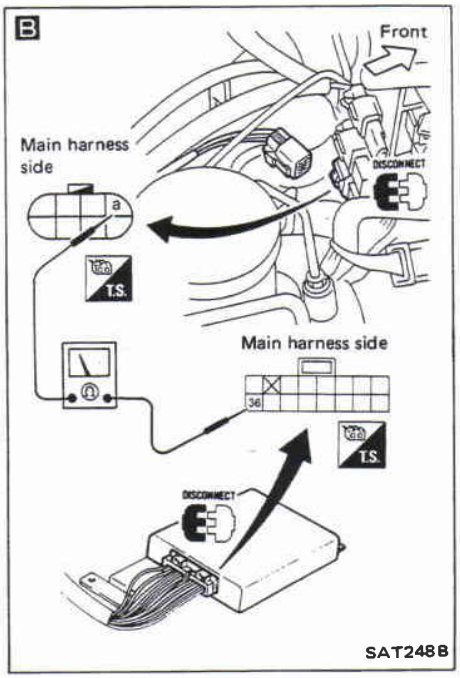
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

SHIFT SOLENOID B CIRCUIT CHECK







A

CHECK GROUND CIRCUIT

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⓐ and ground.
   Resistance: 20 - 30Ω

N.G. →
1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Shift solenoid B – Refer to "Electrical System".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between terminal ⓐ and A/T control unit terminal ㊱.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis after driving for a while.

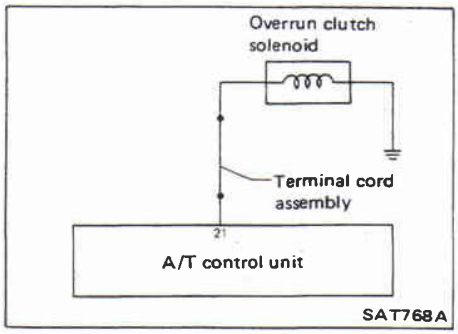
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

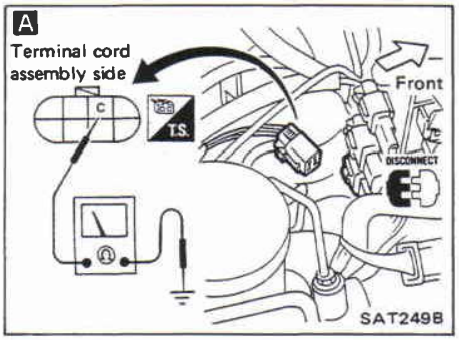
O.K. ↓

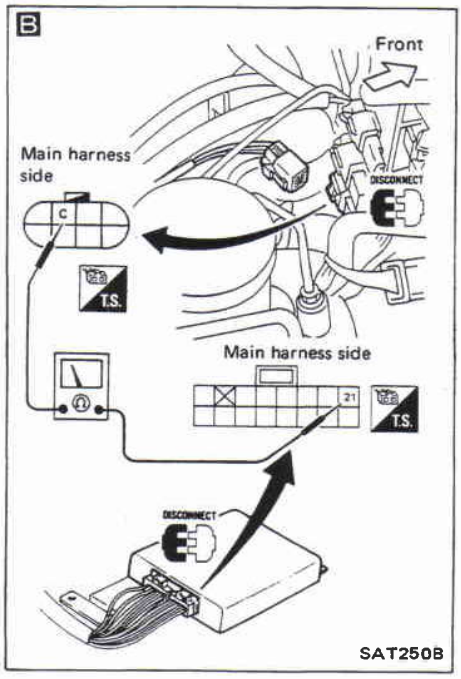
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID CIRCUIT CHECK







A

CHECK GROUND CIRCUIT

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal Ⓒ and ground.
   Resistance: 20 - 30Ω

N.G. →
1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Overrun clutch solenoid. – Refer to "Electrical System".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between terminal Ⓒ and A/T control unit terminal ㉑.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis after driving for a while.

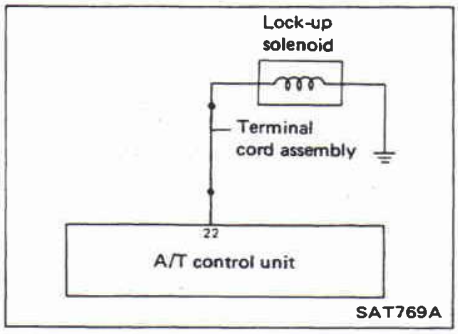
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

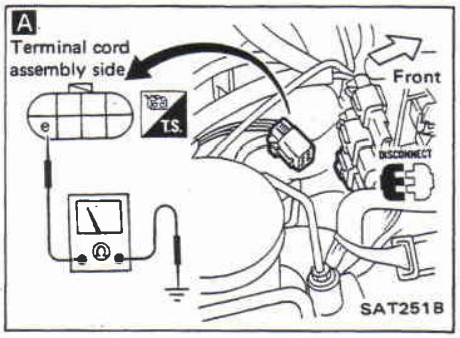
O.K. ↓

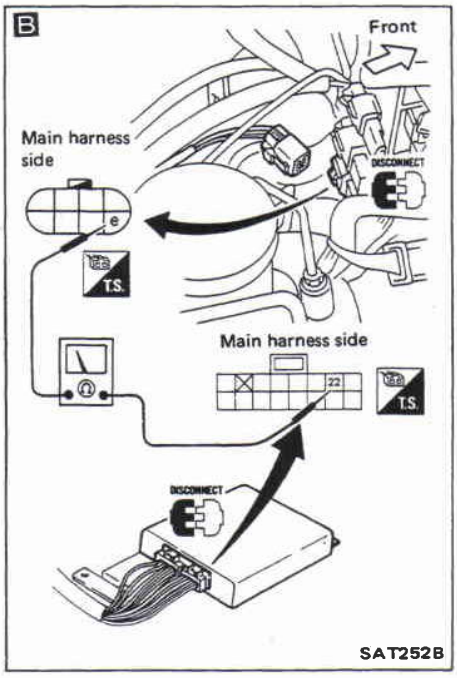
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

LOCK-UP SOLENOID CIRCUIT CHECK







A

CHECK GROUND CIRCUIT

1. 

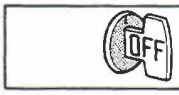
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⓔ and ground.
   Resistance: 10 - 16Ω

N.G. →
1. Remove oil pan. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Lock-up solenoid — Refer to "Electrical System".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between terminal ⓔ and A/T control unit terminal ㉒.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

N.G. → Repair or replace harness between A/T control unit and terminal cord assembly. (Main harness)

O.K. ↓

Perform self-diagnosis after driving for a while.

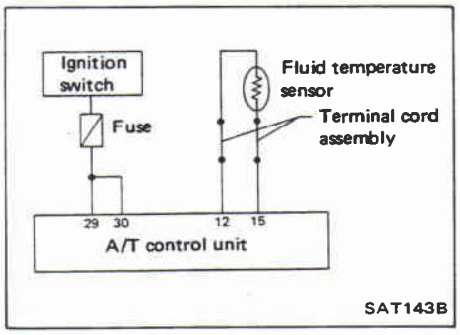
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

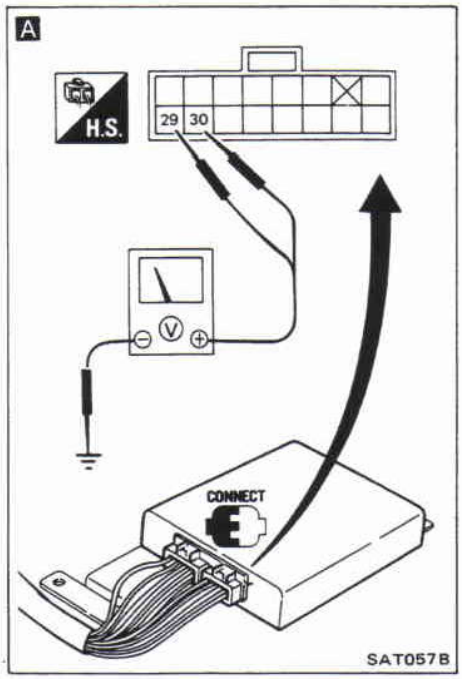
O.K. ↓

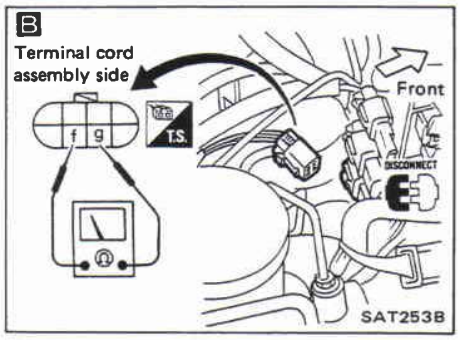
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

FLUID TEMPERATURE SENSOR CIRCUIT AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS

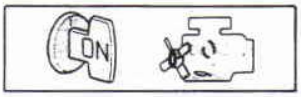






A

CHECK A/T CONTROL UNIT POWER SOURCE

1. 

2. Check voltage between A/T control unit terminals ㉙, ㉚ and ground.
   Battery voltage should exist.

N.G. → Check the following items.
- Harness continuity between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse — Refer to section EL.

O.K. ↓

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY

1. 

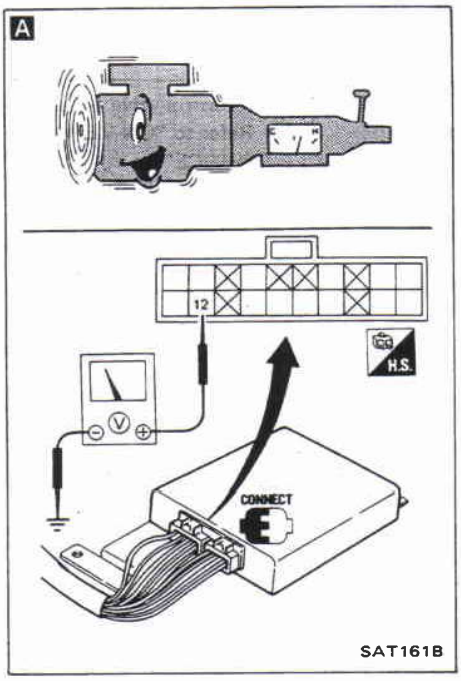
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⓕ and ⓖ when A/T is cold.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

N.G. → 1. Remove oil pan.
2. Check the following items.
- Fluid temperature sensor — Refer to "Electrical System".
- Harness continuity of terminal cord assembly

O.K. ↓

To the next page

Trouble-shooting — Self-diagnosis (Cont'd)



From the previous page

A

CHECK INPUT SIGNAL OF FLUID TEMPERATURE SENSOR

1. 

2. Check voltage between A/T control unit terminal ⑫ and ground while warming up A/T.
   Voltage:
   Cold [20°C (68°F)] → Hot [80°C (176°F)]:
   1.56V → 0.45V

N.G. → Check the following items.
- Harness continuity between A/T control unit and terminal cord assembly (Main harness)

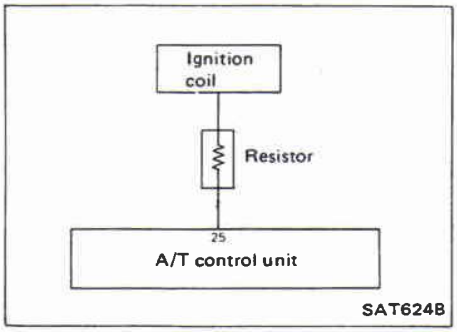
O.K. ↓

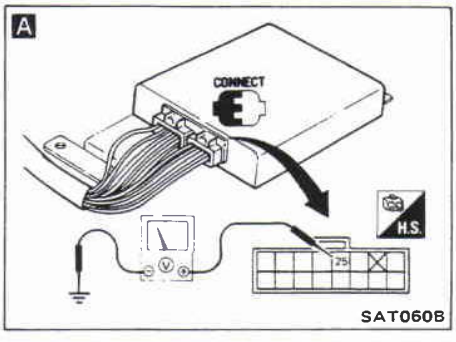
Perform self-diagnosis after driving for a while.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

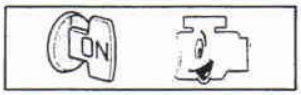




ENGINE REVOLUTION SIGNAL CIRCUIT CHECK

A

CHECK INPUT SIGNAL

1. 

2. Check voltage between A/T control unit terminal ㉕ and ground, when engine runs at idle speed.
   Voltage: Approximately 6V

N.G. → Check the following items.
- Harness continuity between A/T control unit and ignition coil (Main harness)
- Resistor
- Ignition coil — Refer to section EF & EC.

O.K. ↓

Perform self-diagnosis again after driving for a while.

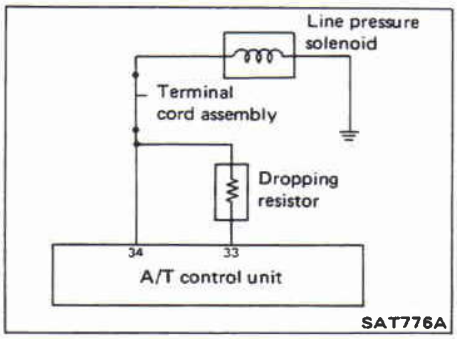
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

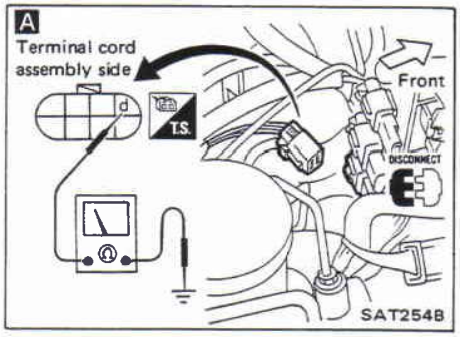
O.K. ↓

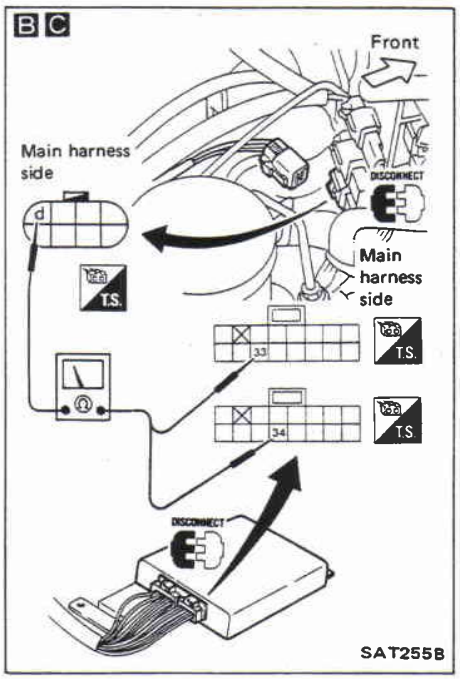
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID CIRCUIT CHECK







A

CHECK GROUND CIRCUIT

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⓓ and ground.
   Resistance: 2.5 - 5Ω

N.G. →
1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Line pressure solenoid – Refer to "Electrical System".
- Harness continuity of terminal cord assembly

O.K. ↓

B

CHECK POWER SOURCE CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between terminal ⓓ and A/T control unit terminal ㉝.
   Resistance: 11.2 - 12.8Ω

N.G. →
Check the following items.
- Dropping resistor – Refer to "Electrical System".
- Harness continuity between A/T control unit ㉝ and terminal cord assembly (Main harness)

O.K. ↓

C

CHECK POWER SOURCE CIRCUIT

1. 

2. Check resistance between terminal ⓓ and A/T control unit terminal ㉞.
   Resistance:
   Approximately 0Ω
3. Reinstall any part removed.

N.G. →
Repair or replace harness between A/T control unit ㉞ and terminal cord assembly.

O.K. ↓

Perform self-diagnosis after driving for a while.

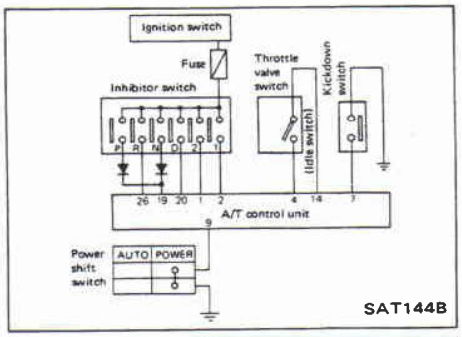
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

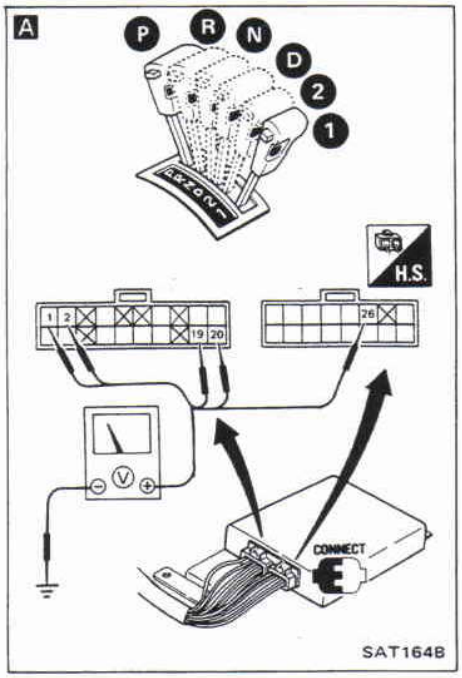
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd) —Except Gulf Standard (Middle East) Models—

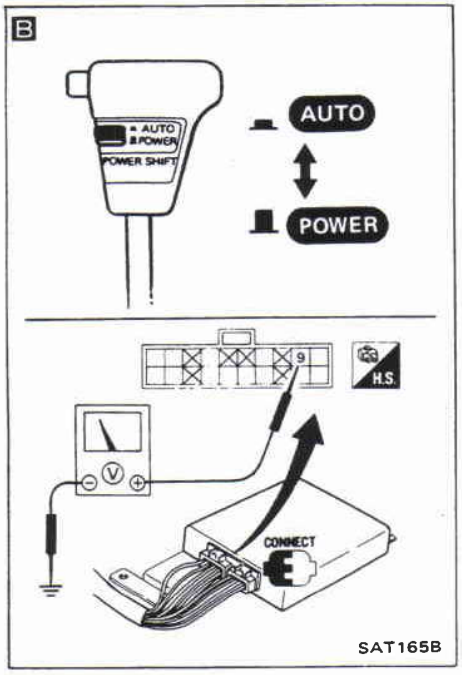
INHIBITOR, POWER SHIFT, KICKDOWN AND IDLE SWITCH CIRCUIT CHECKS



A

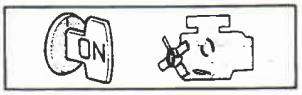


B



A

CHECK INHIBITOR SWITCH CIRCUIT

1. 

2. Check voltage between A/T control unit terminals ①, ②, ⑲, ⑳, ㉖ and ground while moving selector lever through each range.

Voltage:

B: Battery voltage

0: 0V

Lever position \ Terminal No.	⑲	㉖	⑳	①	②
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

N.G. → Check the following items.
- Inhibitor switch — Refer to "Electrical System".
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

O.K. ↓

B

CHECK POWER SHIFT SWITCH CIRCUIT

1. 

2. Check voltage between A/T control unit terminal ⑨ and ground when power shift switch is in "AUTO" position and in "POWER" position.

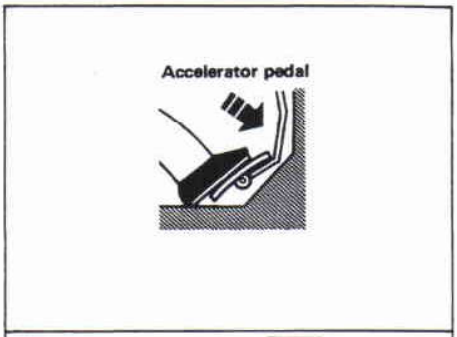
Switch position	Voltage
AUTO	3 - 8V
POWER	1V or less

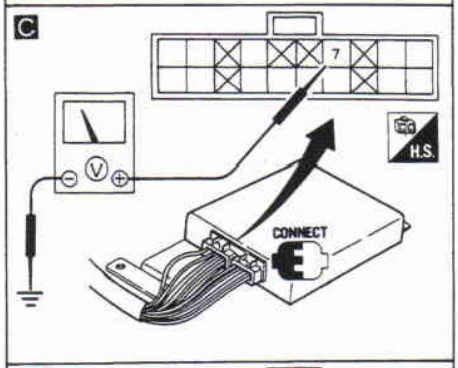
N.G. → Check the following items.
- Power shift switch — Refer to "Electrical System".
- Harness continuity between A/T control unit and power shift switch (Main harness)
- Harness continuity of ground circuit for power shift switch (Main harness)

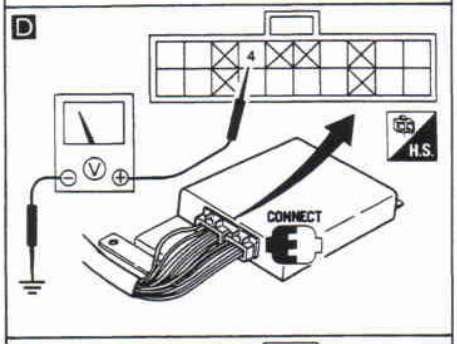
O.K. ↓

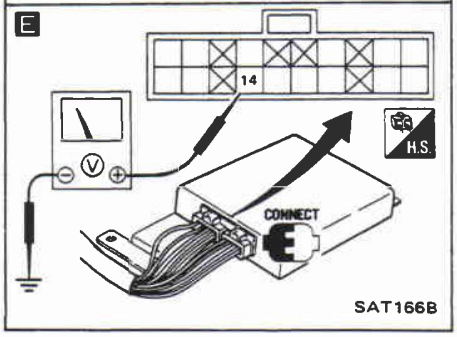
To the next page

Trouble-shooting — Self-diagnosis (Cont'd)









From the previous page

C

CHECK KICKDOWN SWITCH CIRCUIT

1.

2. Check voltage between A/T control unit terminal ⑦ and ground while depressing accelerator pedal slowly. (after warming up engine)
   Voltage:
   When releasing accelerator pedal: 3 - 8V
   When depressing accelerator pedal fully: 1V or less

N.G. → Check the following items.
- Kickdown switch
- Harness continuity between A/T control unit and kickdown switch (Main harness)
- Harness continuity of ground circuit for kickdown switch

O.K. ↓

D

CHECK IDLE SWITCH CIRCUIT

- Check voltage between A/T control unit terminal ④ and ground in the same way as kickdown switch circuit.
  Voltage:
  When releasing accelerator pedal: 8 - 15V
  When depressing accelerator pedal fully: 1V or less

N.G. → E

1.

2. Check voltage between A/T control unit terminal ⑭ and ground.
   Voltage: 8 - 15V

O.K. → Check the following items.
- Harness continuity between A/T control unit ④ and idle switch
- Idle switch — Refer to section EF & EC.

N.G. → Check harness continuity between A/T control unit ⑭ and idle switch.

O.K. ↓

Perform self-diagnosis again after driving for a while.

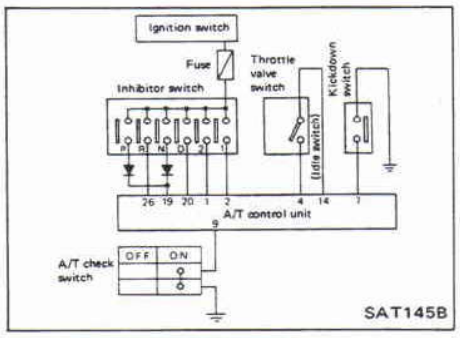
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

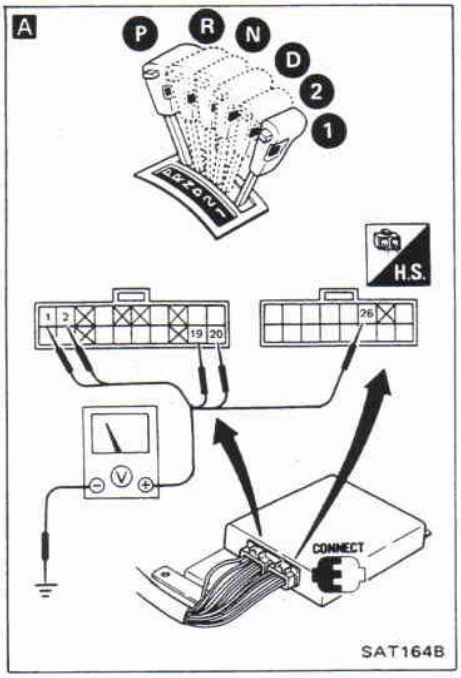
O.K. ↓

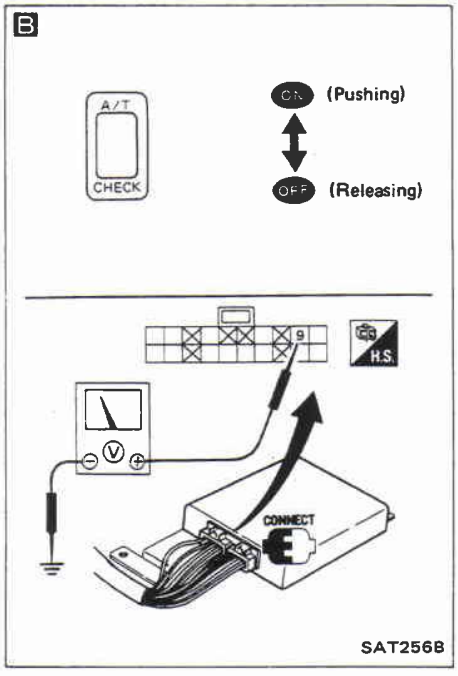
INSPECTION END

Trouble-shooting — Self-diagnosis (Cont'd) —Gulf Standard (Middle East) Models—

INHIBITOR, A/T CHECK, KICKDOWN AND IDLE SWITCH CIRCUIT CHECKS

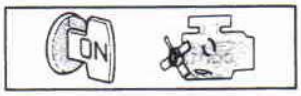






A

CHECK INHIBITOR SWITCH CIRCUIT

1. 

2. Check voltage between A/T control unit terminals ①, ②, ⑲, ⑳, ㉖ and ground while moving selector lever through each range.

Voltage:

B: Battery voltage

0: 0V

Lever position \ Terminal No.	⑲	㉖	⑳	①	②
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

N.G. → Check the following items.
- Inhibitor switch — Refer to "Electrical System".
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

O.K. ↓

B

CHECK A/T CHECK SWITCH CIRCUIT

1. 

2. Check voltage between A/T control unit terminal ⑨ and ground when A/T check switch is in "ON" position and in "OFF" position.

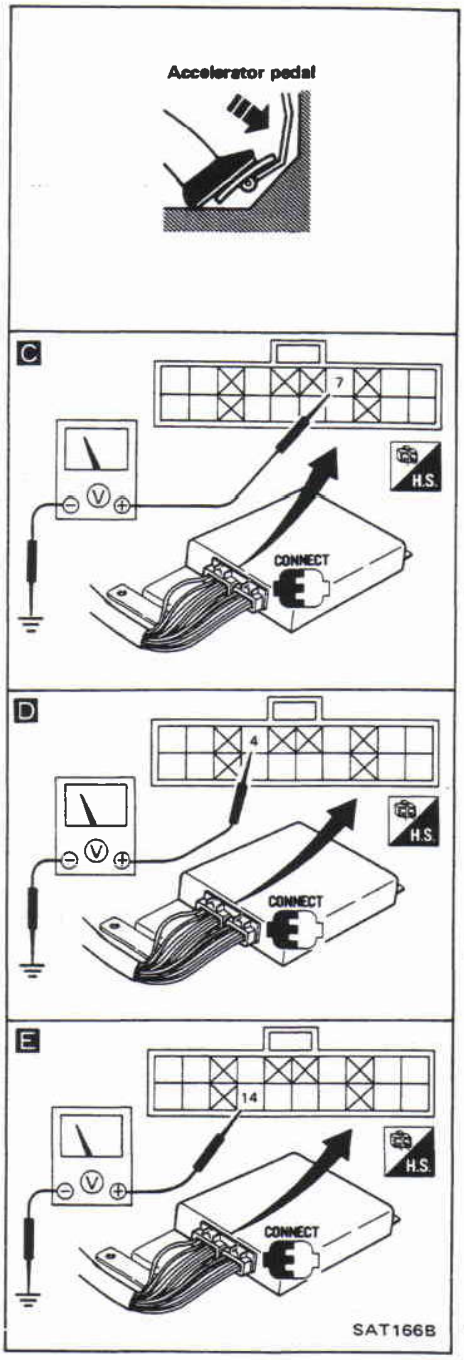
Switch position	Voltage
OFF	3 - 8V
ON	1V or less

N.G. → Check the following items.
- A/T check switch — Refer to "Electrical System".
- Harness continuity between A/T control unit and A/T check switch (Main harness)
- Harness continuity of ground circuit for A/T check switch (Main harness)

O.K. ↓

To the next page

Trouble-shooting — Self-diagnosis (Cont'd)



From the previous page

C

CHECK KICKDOWN SWITCH CIRCUIT

1. 

2. Check voltage between A/T control unit terminal ⑦ and ground while depressing accelerator pedal slowly. (after warming up engine)
   Voltage:
   When releasing accelerator pedal: 3 - 8V
   When depressing accelerator pedal fully: 1V or less

N.G. → Check the following items.
- Kickdown switch
- Harness continuity between A/T control unit and kick-down switch (Main harness)
- Harness continuity of ground circuit for kickdown switch

O.K. ↓

D

CHECK IDLE SWITCH CIRCUIT

- Check voltage between A/T control unit terminal ④ and ground in the same way as kickdown switch circuit.
  Voltage:
  When releasing accelerator pedal: 8 - 15V
  When depressing accelerator pedal fully: 1V or less

N.G. → **E**

1. 

2. Check voltage between A/T control unit terminal ⑭ and ground.
   Voltage: 8 - 15V

O.K. → Check the following items.
- Harness continuity between A/T control unit ④ and idle switch
- Idle switch — Refer to section EF & EC.

N.G. → Check harness continuity between A/T control unit ⑭ and idle switch.

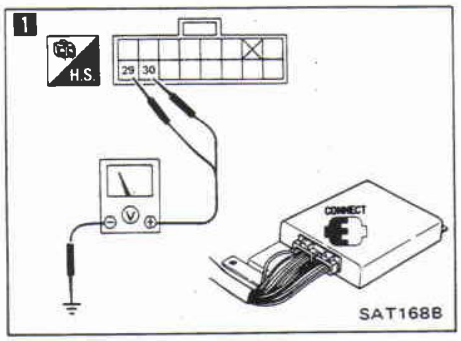
O.K. ↓

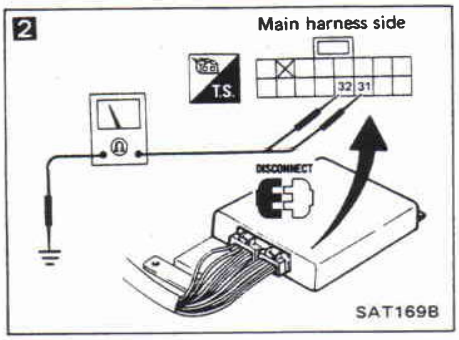
Perform self-diagnosis again after driving for a while.

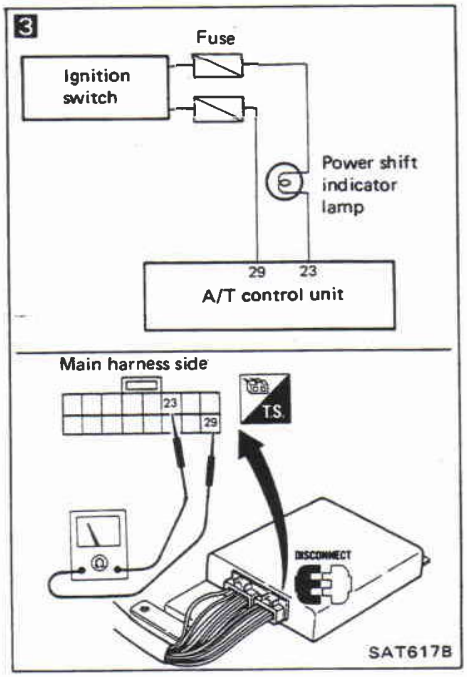
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END







Trouble-shooting

CHECK ①: Power shift indicator lamp does not come on for about 2 seconds when turning ignition switch to "ON".

1 CHECK A/T CONTROL UNIT POWER SOURCE

1. 

2. Check voltage between A/T control unit terminals ㉙, ㉚ and ground.
   Battery voltage should exist.

N.G. → Check the following items.
- Harness continuity between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse
  – Refer to section EL.

O.K. ↓

2 CHECK A/T CONTROL UNIT GROUND CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between A/T control unit terminals ㉛, ㉜ and ground.
   Resistance:
   Approximately 0Ω

N.G. → Check harness continuity between A/T control unit and ground.

O.K. ↓

3 CHECK LAMP CIRCUIT

1. 

2. Disconnect A/T control unit 16-pin connector.
3. Check resistance between A/T control unit terminals ㉓ and ㉙.
   Resistance: Approximately 50Ω
4. Reinstall any part removed.

N.G. → Check the following items.
- Power shift indicator lamp
  – Refer to section EL.
- Harness continuity between ignition switch and power shift indicator lamp (Main harness)
- Harness continuity between power shift indicator lamp and A/T control unit

O.K. ↓

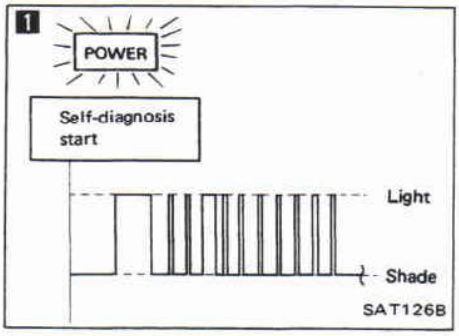
Check again.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

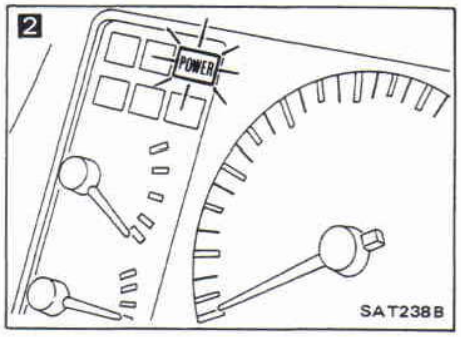
INSPECTION END

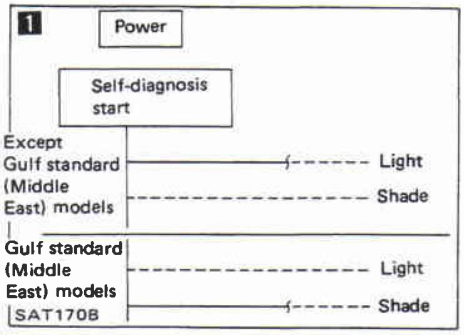
Trouble-shooting (Cont'd)



CHECK ②: Power shift indicator lamp does not come on for about 3 seconds when depressing and releasing accelerator pedal fully.

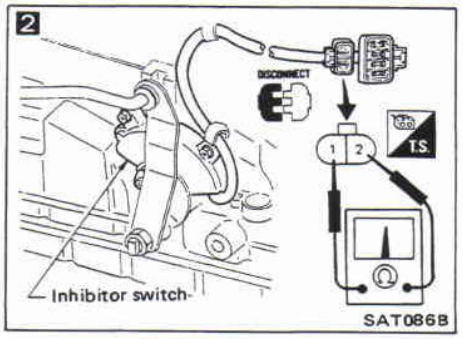
1
Does self-diagnosis show damage to throttle sensor circuit? — No → Check throttle sensor circuit. — Refer to "Self-diagnosis".
↓ Yes
Check throttle sensor. — Refer to section EF & EC. — N.G. → Repair or replace throttle sensor.
↓ O.K.
2
Check condition of power shift indicator lamp again. — N.G. → 1. Perform A/T control unit input/output signal inspection. 2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
↓ O.K.
INSPECTION END





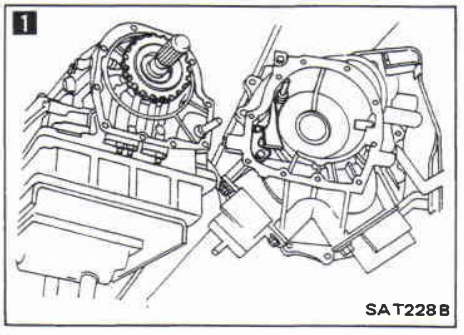
CHECK ③: Engine cannot be started with selector lever in "P" or "N" range or engine can be started with selector lever in "D", "2", "1" or "R" range.

1
Does self-diagnosis show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".
↓ No
2
Check continuity of inhibitor switch 2-pin connector. — Refer to "Electrical System". — N.G. → Repair or replace inhibitor switch.
↓ O.K.
Check starting system. — Refer to section EL. — N.G. → Repair or replace damaged parts.
↓ O.K.
INSPECTION END



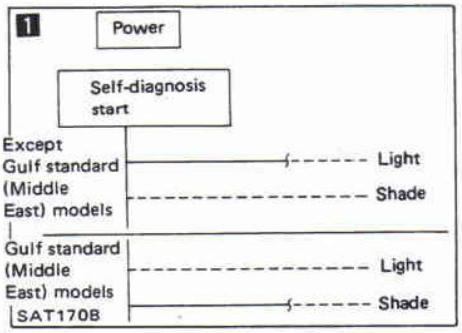
CHECK ④: Vehicle moves when it is pushed forward or backward with selector lever in "P" range.

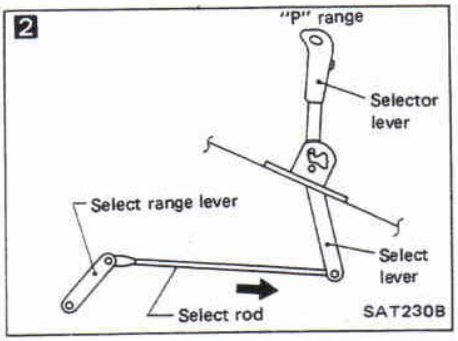
1
Check parking components. — Refer to "ON-VEHICLE SERVICE". — N.G. → Repair or replace damaged parts.
↓ O.K.
INSPECTION END

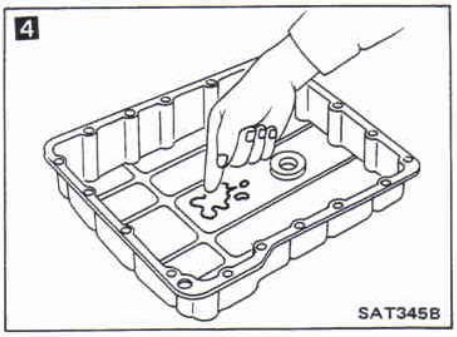


Trouble-shooting (Cont'd)

CHECK ⑤ : Vehicle moves forward or backward when selecting "N" range.







1

Does self-diagnosis show damage to inhibitor switch after cruise test?

Yes → Check inhibitor switch circuit. – Refer to "Self-diagnosis".

No ↓

2

Check manual control linkage. – Refer to ON-VEHICLE SERVICE.

N.G. → Adjust manual control linkage. – Refer to ON-VEHICLE SERVICE.

O.K. ↓

3

Check A/T fluid level again.

N.G. → Refill A.T.F.

O.K. ↓

4

1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Disassemble A/T.
2. Check the following items.
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly
- Accumulator piston D

O.K. ↓

Check again.

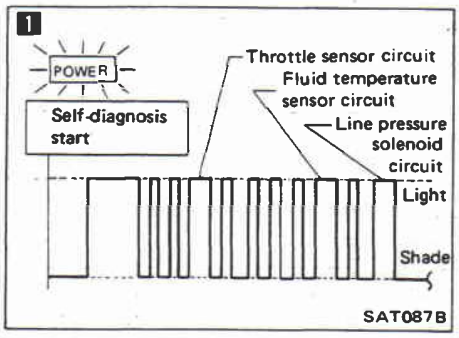
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

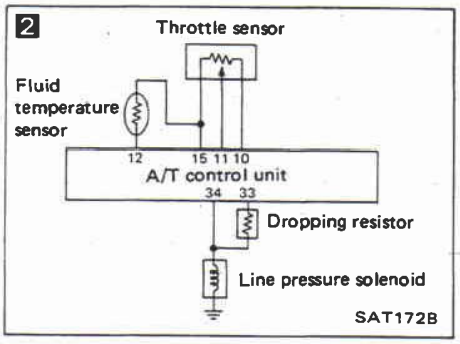
O.K. ↓

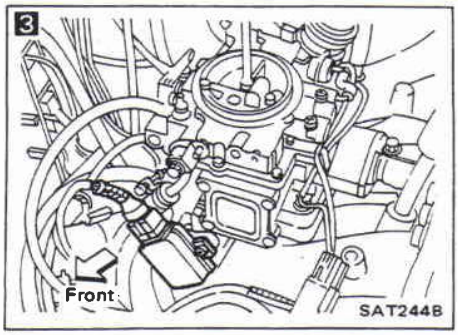
INSPECTION END

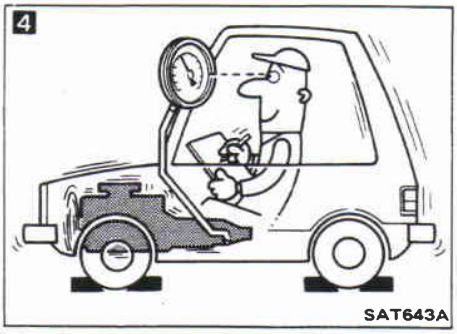
Trouble-shooting (Cont'd)

CHECK ⑥ : There is large shock when changing from "N" to "R" range.









1 Does self-diagnosis show damage to throttle sensor, line pressure solenoid or fluid temperature sensor circuit?

Yes → **2** Check damaged circuit. – Refer to "Self-diagnosis".

No ↓

3 Check throttle sensor. – Refer to section EF & EC.

N.G. → Repair or replace throttle sensor.

O.K. ↓

4 Check line pressure at idle with selector lever in "D" range. – Refer to "Pressure Testing".

N.G. →
1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, modifier valve, pilot valve and pilot filter)
- Line pressure solenoid

O.K. ↓

Check again.

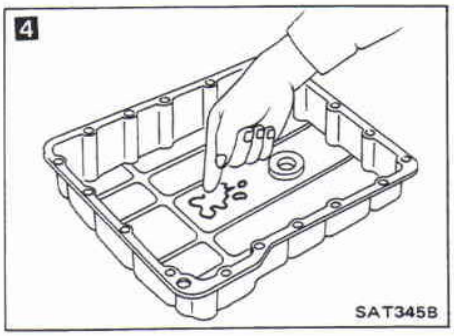
N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Trouble-shooting (Cont'd)

CHECK ⑦ : Vehicle does not creep backward when selecting "R" range.



1 Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

2 Check stall revolution with selector lever in "1" and "R" range.

N.G. in both "1" and "R" range

O.K.

O.K. in "1" range
N.G. in "R" range

3 Check line pressure at idle with selector lever in "R" range. — Refer to "Pressure Test". — N.G. →

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pilot valve and pilot filter)
- Line pressure solenoid
3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly
- Low & reverse brake assembly
- Low one-way clutch

O.K.

4 1. Remove oil pan.
2. Check fluid condition. — N.G. →

O.K.

Check again. — N.G. →

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END

Trouble-shooting (Cont'd)

CHECK ⑧ : Vehicle does not creep forward when selecting "D" and "2" ranges.

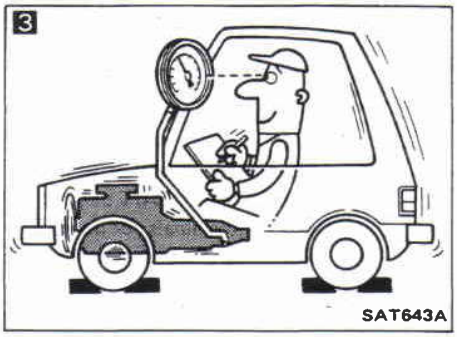
1

SAT638A

2

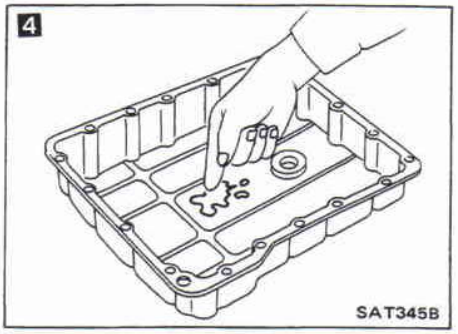
SAT642A

3



SAT643A

4



SAT345B

1 Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

2 Check stall revolution with selector lever in "D" range. — Refer to "Stall Testing". — N.G. →

3 Check line pressure at idle with selector lever in "D" range. — Refer to "Pressure Testing". — N.G. →

4 1. Remove oil pan. 2. Check A/T fluid condition. — N.G. →

1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, modifier valve, pilot valve and pilot filter)
- Line pressure solenoid
3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Torque converter

O.K.

Check again. — N.G. →

1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END

Trouble-shooting (Cont'd)

CHECK ⑨ : Vehicle does not creep forward when selecting "D", "2" and "1" ranges.

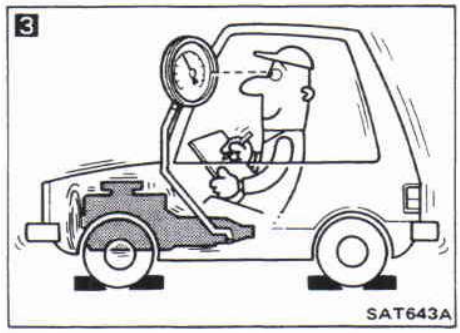
1

SAT638A

2

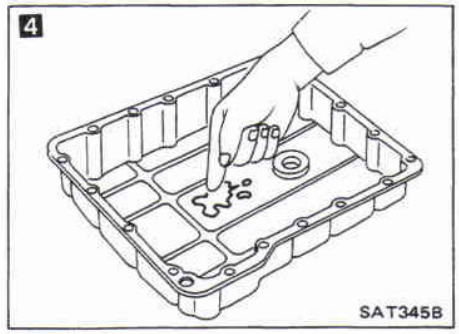
SAT642A

3



SAT643A

4



SAT345B

1 Check A/T fluid level again. — N.G. → Refill A.T.F.

O.K.

2 Check stall revolution with selector lever in "D" range. — Refer to "Stall Testing". — N.G. →

O.K.

3 Check line pressure at idle with selector lever in "D" range. — Refer to "Pressure Testing". — N.G. →

O.K.

4 1. Remove oil pan. 2. Check A/T fluid condition. — N.G. →

O.K.

N.G. →

1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
   - Valves to control line pressure (Pressure regulator valve, modifier valve, pilot valve and pilot filter)
   - Line pressure solenoid
3. Disassemble A/T.
4. Check the following items.
   - Oil pump assembly
   - Forward clutch assembly
   - Forward one-way clutch
   - Overrun clutch assembly
   - Torque converter

Check again. — N.G. →

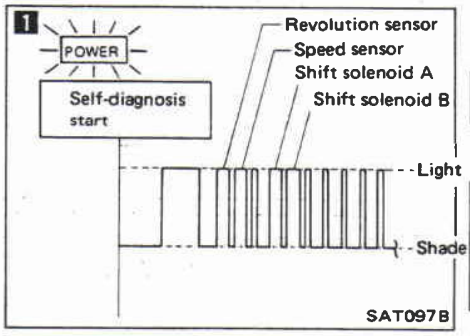
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

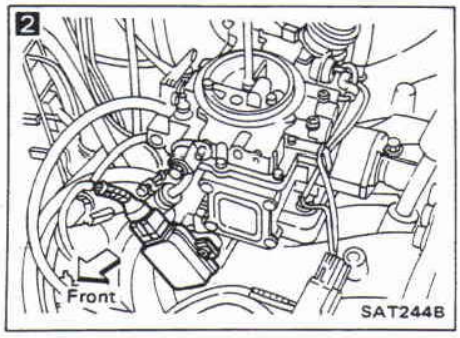
O.K.

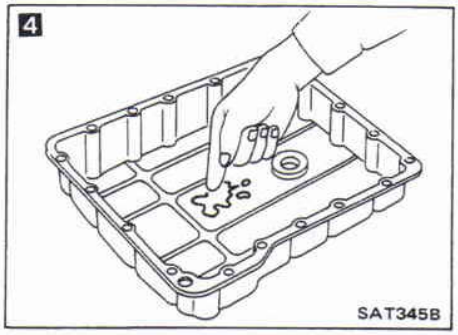
INSPECTION END

Trouble-shooting (Cont'd)

CHECK ⑩ : Vehicle cannot be started from D_1 on CRUISE TEST – Part 1.







Are checks ⑧ and ⑨ O.K.? — No → Go to check ⑧ or ⑨.

Yes ↓

1 Does self-diagnosis show damage to revolution sensor, speed sensor, shift solenoid A or B after cruise test? — Yes → Check damaged circuit. – Refer to "Self-diagnosis".

No ↓

2 Check throttle sensor. – Refer to section EF & EC. — N.G. → Repair or replace throttle sensor.

O.K. ↓

3 Check line pressure at stall point with selector lever in "D" range. – Refer to "Pressure Testing". — N.G. →

1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Shift valve A
- Shift valve B
- Shift solenoid A
- Shift solenoid B
- Pilot valve
- Pilot filter

O.K. ↓

4 1. Remove oil pan.
2. Check A/T fluid condition. — O.K. →

N.G. →

O.K. →

O.K. →

3. Disassemble A/T.
4. Check the following items.
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- High clutch assembly
- Torque converter
- Oil pump assembly

Check again. — N.G. →

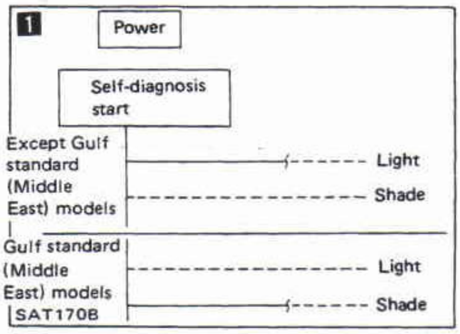
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

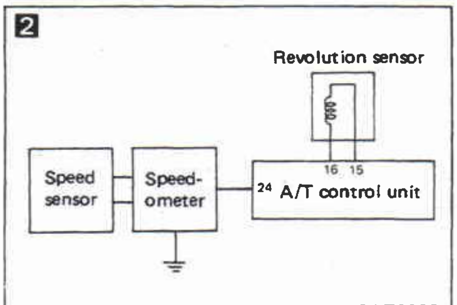
INSPECTION END

Trouble-shooting (Cont'd)

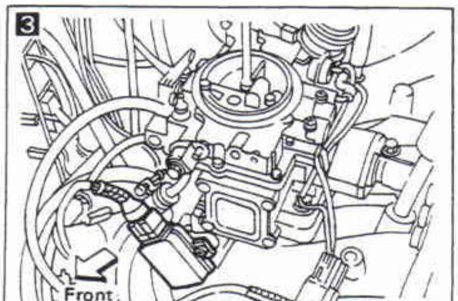
CHECK ⑪: A/T does not shift from D_1 to D_2 at the specified speed.
A/T does not shift from D_4 to D_2 when depressing accelerator pedal fully at the specified speed.



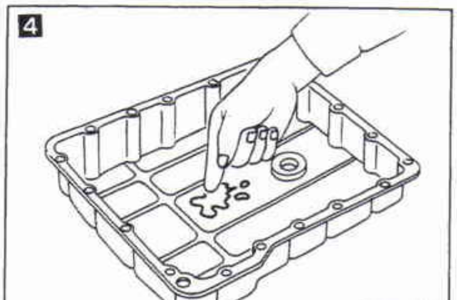
SAT170B



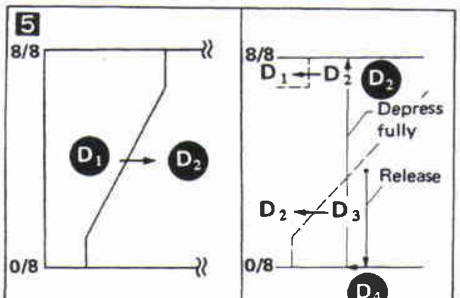
SAT629B



SAT244B



SAT345B



SAT118B

Are checks ⑧, ⑨ and ⑩ O.K.?
- No → Go to check ⑧, ⑨ or ⑩.
- Yes ↓

1 Does self-diagnosis show damage to inhibitor switch after cruise test?
- Yes → Check inhibitor switch circuit. – Refer to "Self-diagnosis".
- No ↓

2 Check revolution sensor and speed sensor circuit. – Refer to "Self-diagnosis".
- N.G. → Repair or replace revolution sensor and speed sensor circuits.
- O.K. ↓

3 Check throttle sensor. – Refer to section EF & EC.
- N.G. → Repair or replace throttle sensor.
- O.K. ↓

4 1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. / O.K. →
  1. Remove control valve. – Refer to "ON-VEHICLE SERVICE".
  2. Check the following items.
     - Shift valve A
     - Shift solenoid A
     - Pilot valve
     - Pilot filter

  (O.K. → to 5)

  3. Disassemble A/T.
  4. Check the following items.
     - Servo piston assembly
     - Brake band
     - Oil pump assembly

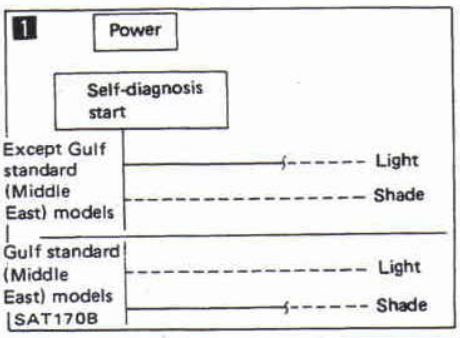
  (O.K. → to 5)

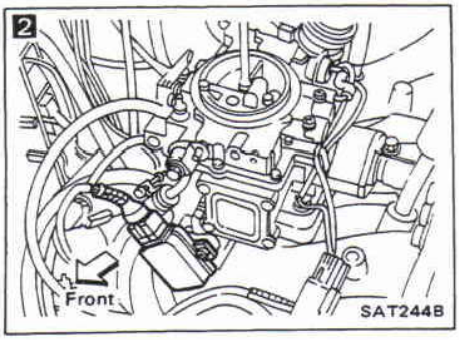
5 Check again.
- N.G. →
  1. Perform A/T control unit input/output signal inspection.
  2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

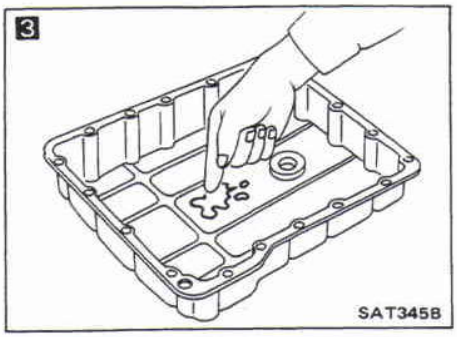
INSPECTION END

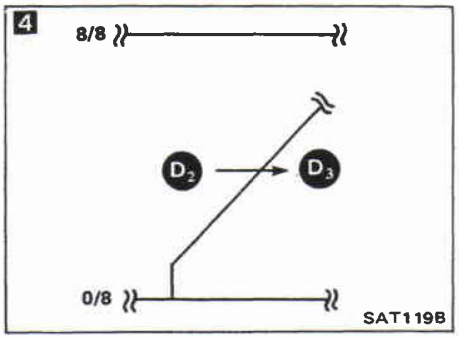
Trouble-shooting (Cont'd)

CHECK ⑫: A/T does not shift from D_2 to D_3 at the specified speed.









Are checks ⑧, ⑨ and ⑩ O.K.? — No → Go to check ⑧, ⑨ or ⑩.

Yes ↓

1 Does self-diagnosis show damage to inhibitor switch after cruise test? — Yes → Check inhibitor switch circuit. – Refer to "Self-diagnosis".

No ↓

2 Check throttle sensor. – Refer to section EF & EC. — N.G. → Repair or replace throttle sensor.

O.K. ↓

3 1. Remove oil pan.
2. Check A/T fluid condition. — N.G. →
1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Shift valve B
- Shift solenoid B
- Pilot valve
- Pilot filter

O.K. ↓ / O.K. ←

3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- High clutch assembly
- Oil pump assembly

4 Check again. — N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Trouble-shooting (Cont'd)

CHECK ⑬ : A/T does not shift from D_3 to D_4 at the specified speed.

Are checks ⑧, ⑨ and ⑩ O.K.?
- No → Go to check ⑧, ⑨ or ⑩.
- Yes ↓

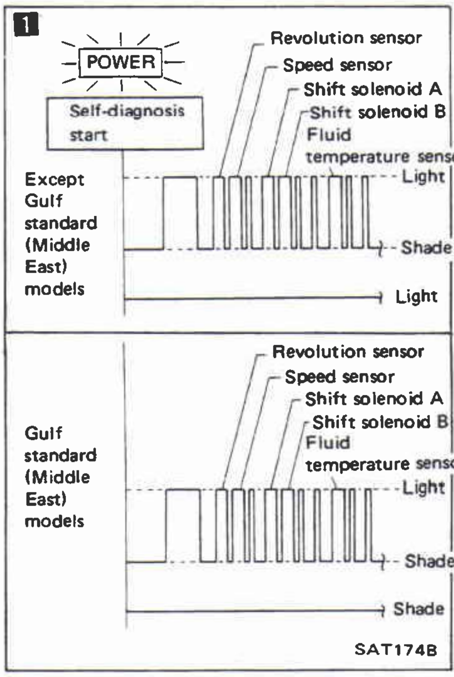
1 Does self-diagnosis show damage to inhibitor switch, power shift switch. [Except Gulf standard (Middle East) models], A/T check switch [Gulf standard (Middle East) models], shift solenoid A, B, revolution sensor, speed sensor or fluid temperature sensor circuit after cruise test?
- Yes → Check damaged circuit. — Refer to "Self-diagnosis".
- No ↓

2 Check throttle sensor. — Refer to section EF & EC.
- N.G. → Repair or replace throttle sensor.
- O.K. ↓

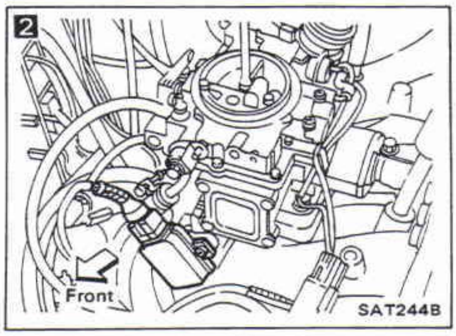
3
1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. / O.K. →
  1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE".
  2. Check the following items.
     - Shift valve B
     - Overrun clutch control valve
     - Shift solenoid B
     - Pilot valve
     - Pilot filter
  3. Disassemble A/T.
  4. Check the following items.
     - Servo piston assembly
     - Brake band
     - Torque converter
     - Oil pump assembly
- O.K. ↓ (to 4)

4 Check again.
- N.G. →
  1. Perform A/T control unit input/output signal inspection.
  2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

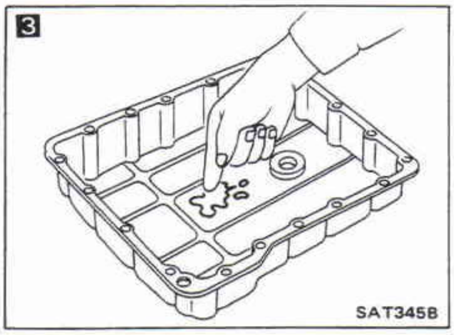
INSPECTION END



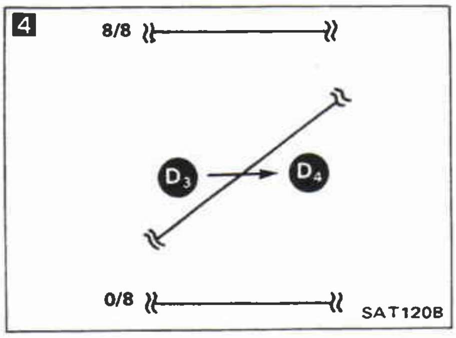
SAT174B



SAT244B



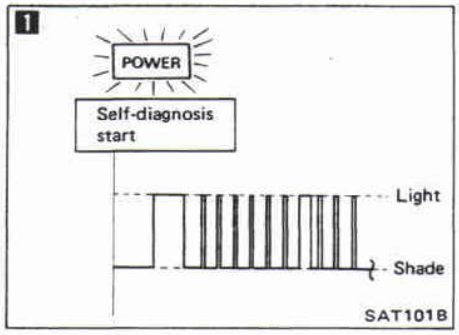
SAT345B

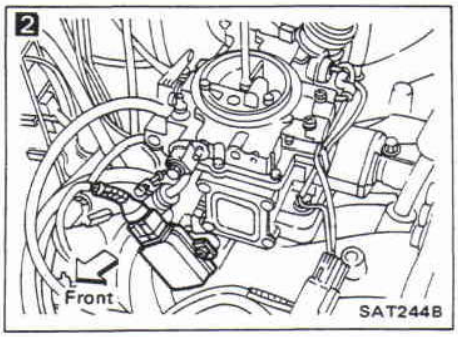


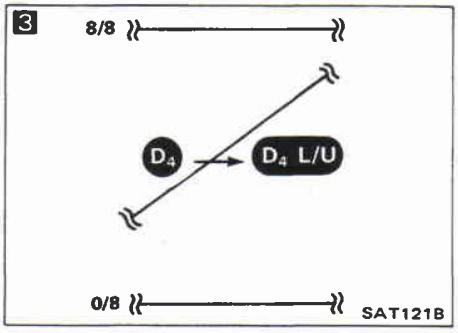
SAT120B

Trouble-shooting (Cont'd)

CHECK ⑭ : A/T does not perform lock-up at the specified speed.







1

Does self-diagnosis show damage to lock-up solenoid circuit after cruise test?

Yes → Check lock-up solenoid circuit. — Refer to "Self-diagnosis".

No ↓

2

Check throttle sensor. — Refer to section EF & EC.

N.G. → Repair or replace throttle sensor.

O.K. ↓

1. Remove control valve. — Refer to "ON-VEHICLE SERVICE".
2. Check following items.
- Lock-up control valve
- Shuttle shift valve D
- Torque converter relief valve
- Lock-up solenoid
- Pilot valve
- Pilot filter

N.G. → Repair or replace damaged parts.

O.K. ↓

3

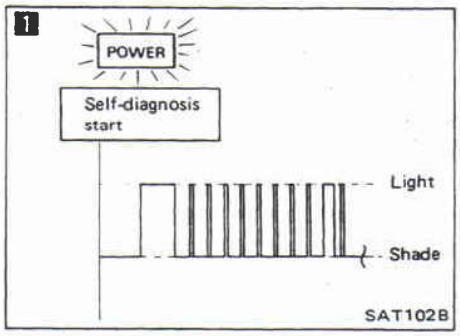
Check again.

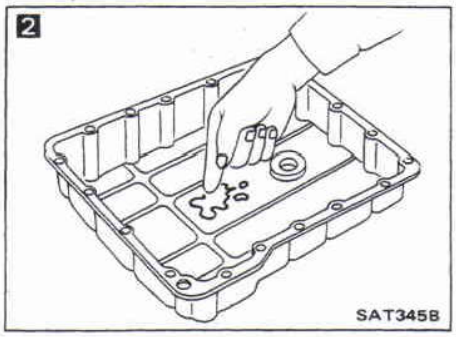
N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

INSPECTION END

Trouble-shooting (Cont'd)





CHECK ⑮ : A/T does not hold lock-up condition for more than 30 seconds.

1

Does self-diagnosis show damage to engine revolution signal circuit after cruise test?

Yes → Check revolution sensor circuit. – Refer to "Self-diagnosis".

No

2

1. Remove oil pan.
2. Check A/T fluid condition.

N.G. →
1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Lock-up control valve
- Pilot valve
- Pilot filter

3. Disassemble A/T.
4. Check torque converter and oil pump assembly.

O.K.

O.K.

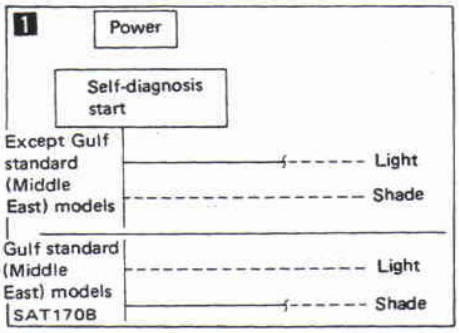
O.K.

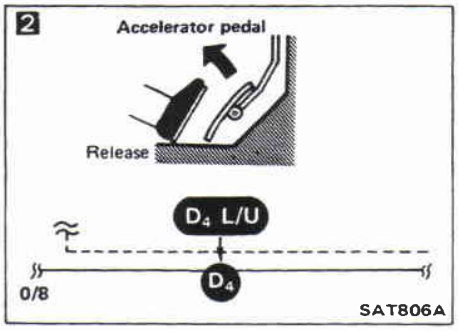
Check again.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K.

INSPECTION END





CHECK ⑯ : Lock-up is not released when accelerator pedal is released.

1

Does self-diagnosis show damage to idle switch circuit after cruise test?

Yes → Check idle switch circuit. – Refer to "Self-diagnosis".

No

2

Check again.

N.G. →
1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

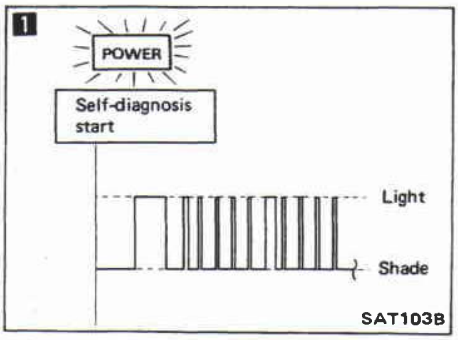
O.K.

INSPECTION END

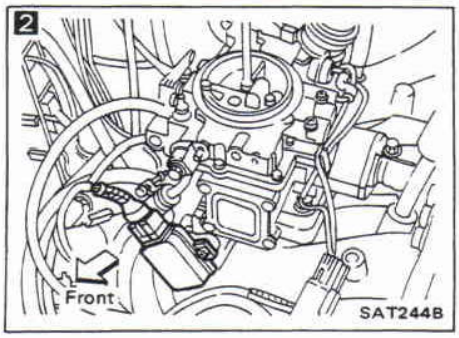
Trouble-shooting (Cont'd)

CHECK ⑰ : Engine speed does not return to idle smoothly when A/T is shifted from D_4 to D_3 with accelerator pedal released.
Vehicle does not decelerate by engine brake when setting "POWER" position with accelerator pedal released.
Vehicle does not decelerate by engine brake when moving selector lever from "D" to "2" range with accelerator pedal released.

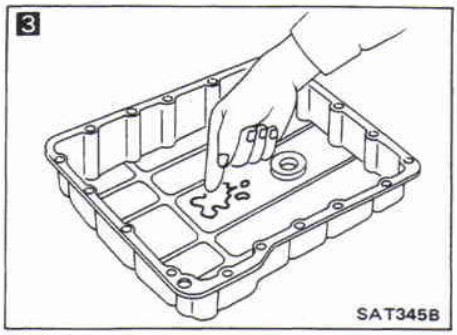
1



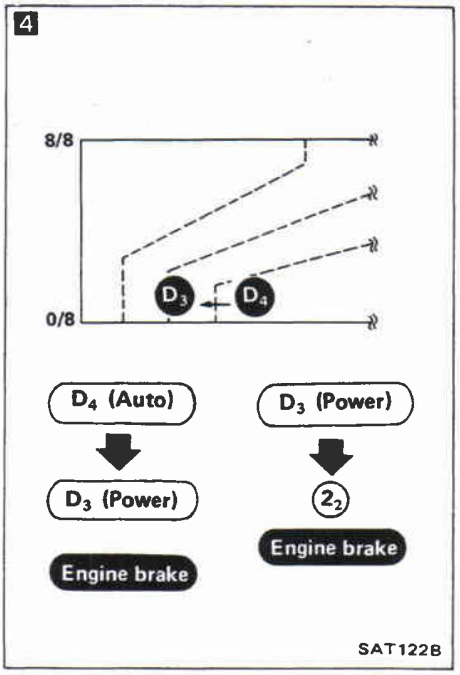
2



3



4



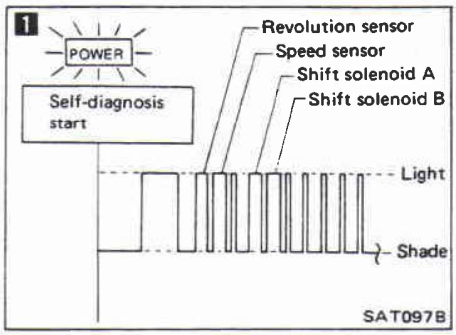
1 Does self-diagnosis show damage to overrun clutch solenoid circuit after cruise test?
- Yes → Check overrun clutch solenoid circuit. – Refer to "Self-diagnosis".
- No → **2**

2 Check throttle sensor. – Refer to section EF & EC.
- N.G. → Repair or replace throttle sensor.
- O.K. → **3**

3 1. Remove oil pan.
2. Check A/T fluid condition.
- N.G. → 1. Remove control valve assembly. – Refer to "ON-VEHICLE SERVICE".
2. Check the following items.
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid
- O.K. → 3. Disassemble A/T.
4. Check the following items.
- Overrun clutch assembly
- Oil pump assembly
- O.K. → **4**

4 Check again.
- N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. → INSPECTION END

Trouble-shooting (Cont'd)



CHECK ⑱ : Vehicle does not start from D_1 on CRUISE TEST — Part 2.

1

Does self-diagnosis show damage to revolution sensor, speed sensor, shift solenoid A or B after cruise test?

Yes → Check damaged circuit. — Refer to "Self-diagnosis".

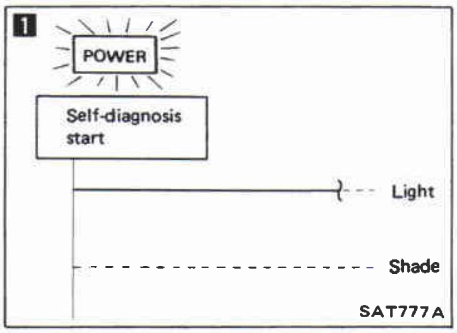
No ↓

Check again.

N.G. → 1. Perform A/T control unit input/output signal inspection.
2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

O.K. ↓

Go to CHECK ⑩.



CHECK ⑲ : A/T does not shift from D_4 to D_3 when changing power shift switch to "POWER" position.
— Except Gulf standard (Middle East) models —

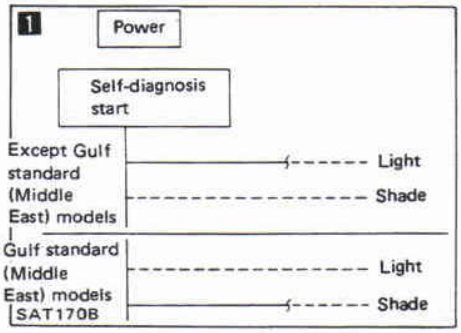
1

Does self-diagnosis show damage to power shift switch circuit after cruise test?

Yes → Check power shift switch circuit. — Refer to "Self-diagnosis".

No ↓

Go to CHECK ⑫.



CHECK ⑳ : A/T does not shift from D_3 to 2_2 when changing selector lever position from "D" to "2" range.

1

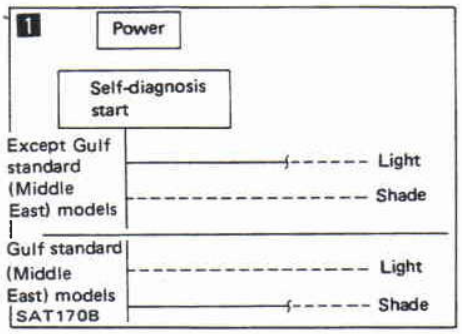
Does self-diagnosis show damage to inhibitor switch circuit after cruise test?

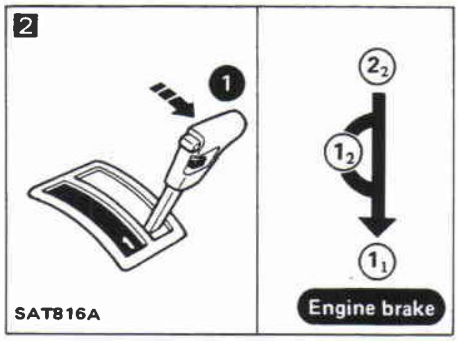
Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis".

No ↓

Go to CHECK ⑪.

Trouble-shooting (Cont'd)





CHECK ㉑ : A/T does not shift from 2_2 to 1_1 when changing selector lever position from "2" to "1" range.

1 Does self-diagnosis show damage to inhibitor switch after cruise test?
- Yes → Check inhibitor switch circuit. – Refer to "Self-diagnosis".
- No ↓

2 Check again.
- N.G. → 1. Perform A/T control unit input/output signal inspection. 2. If N.G., recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.
- O.K. ↓

INSPECTION END

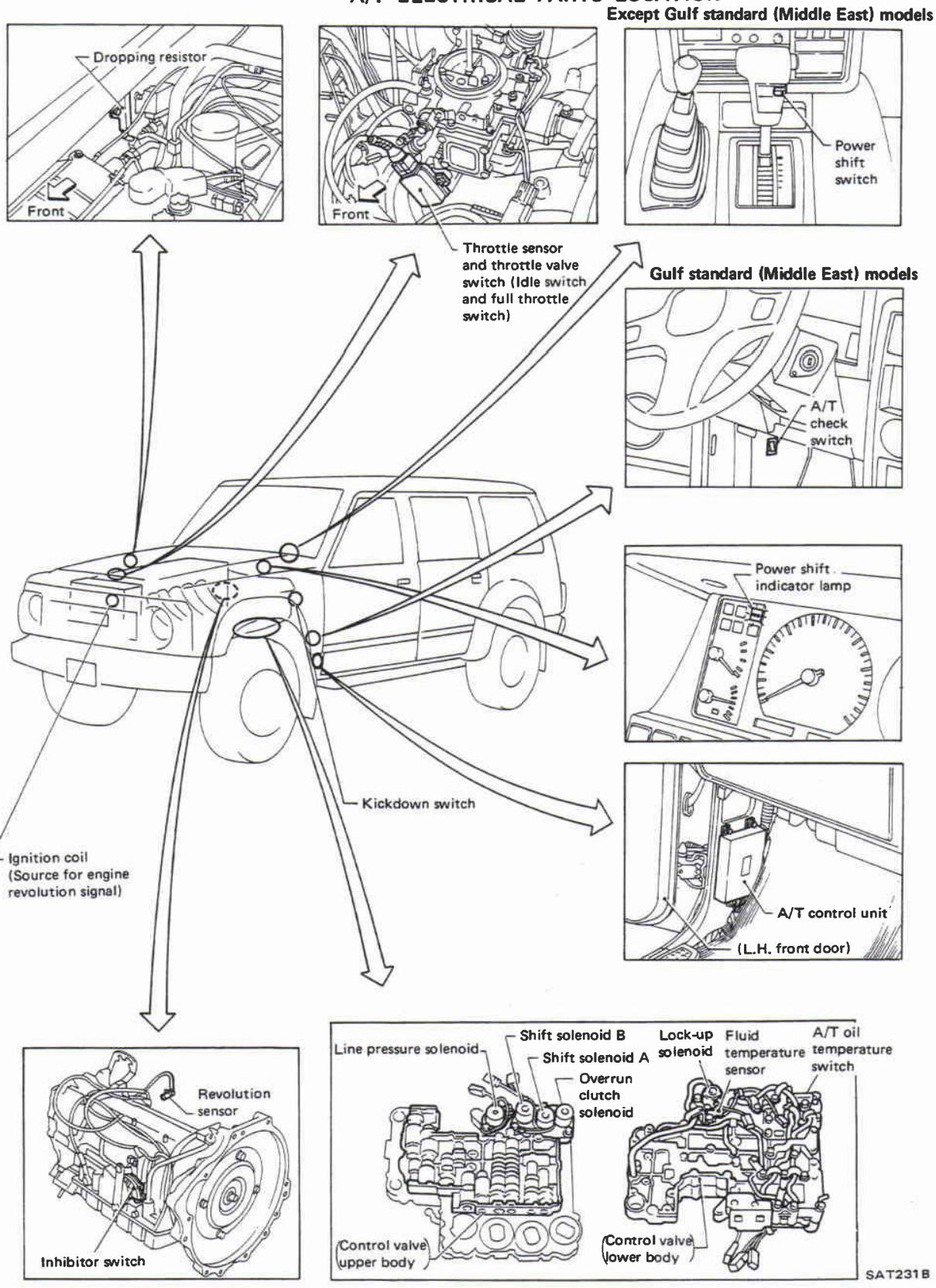
CHECK ㉒ : Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1.

Is CHECK ⑦ O.K.?
- No → Go to CHECK ⑦.
- Yes ↓

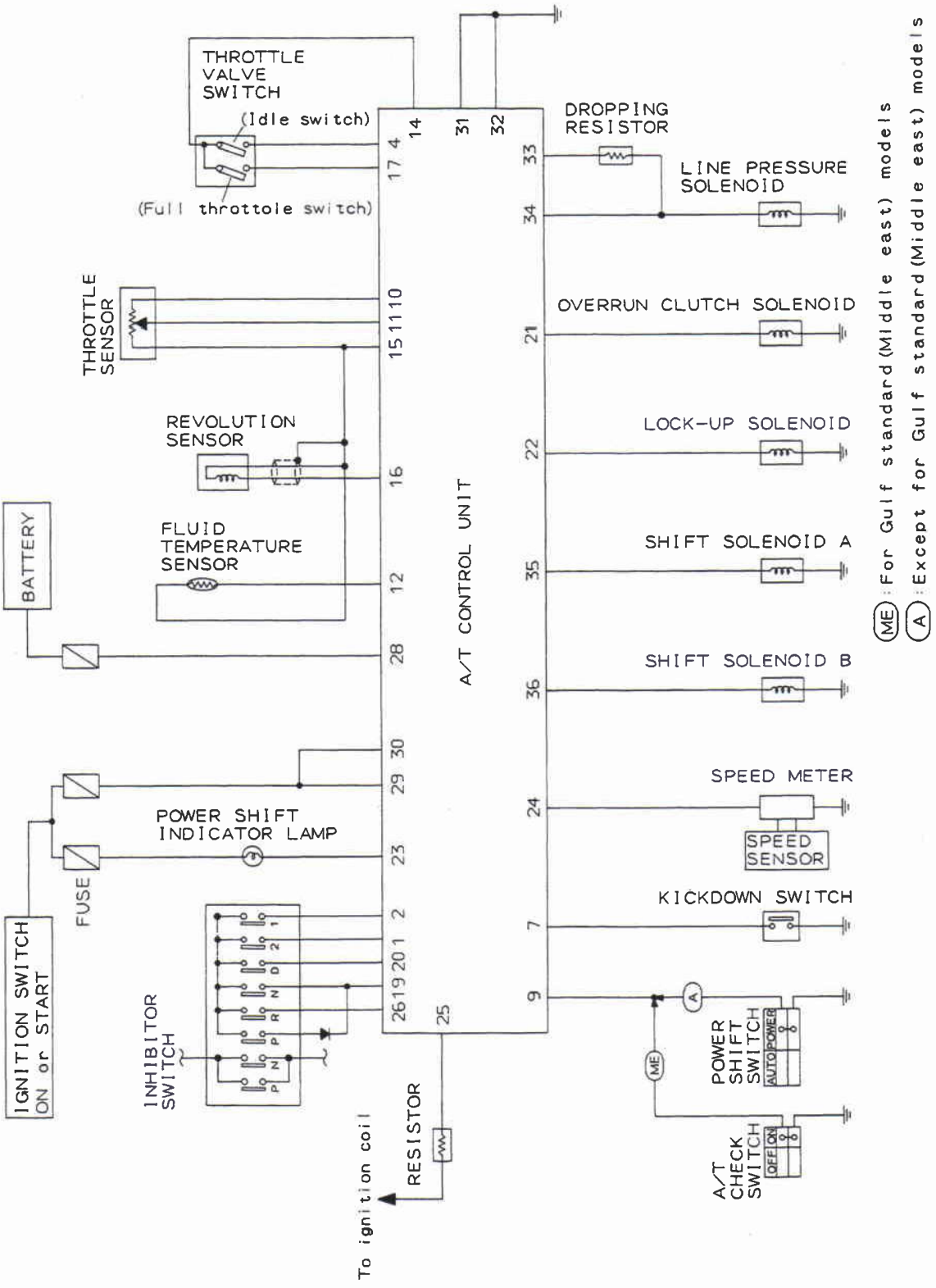
Go to CHECK ⑰.

Electrical System

A/T ELECTRICAL PARTS LOCATION



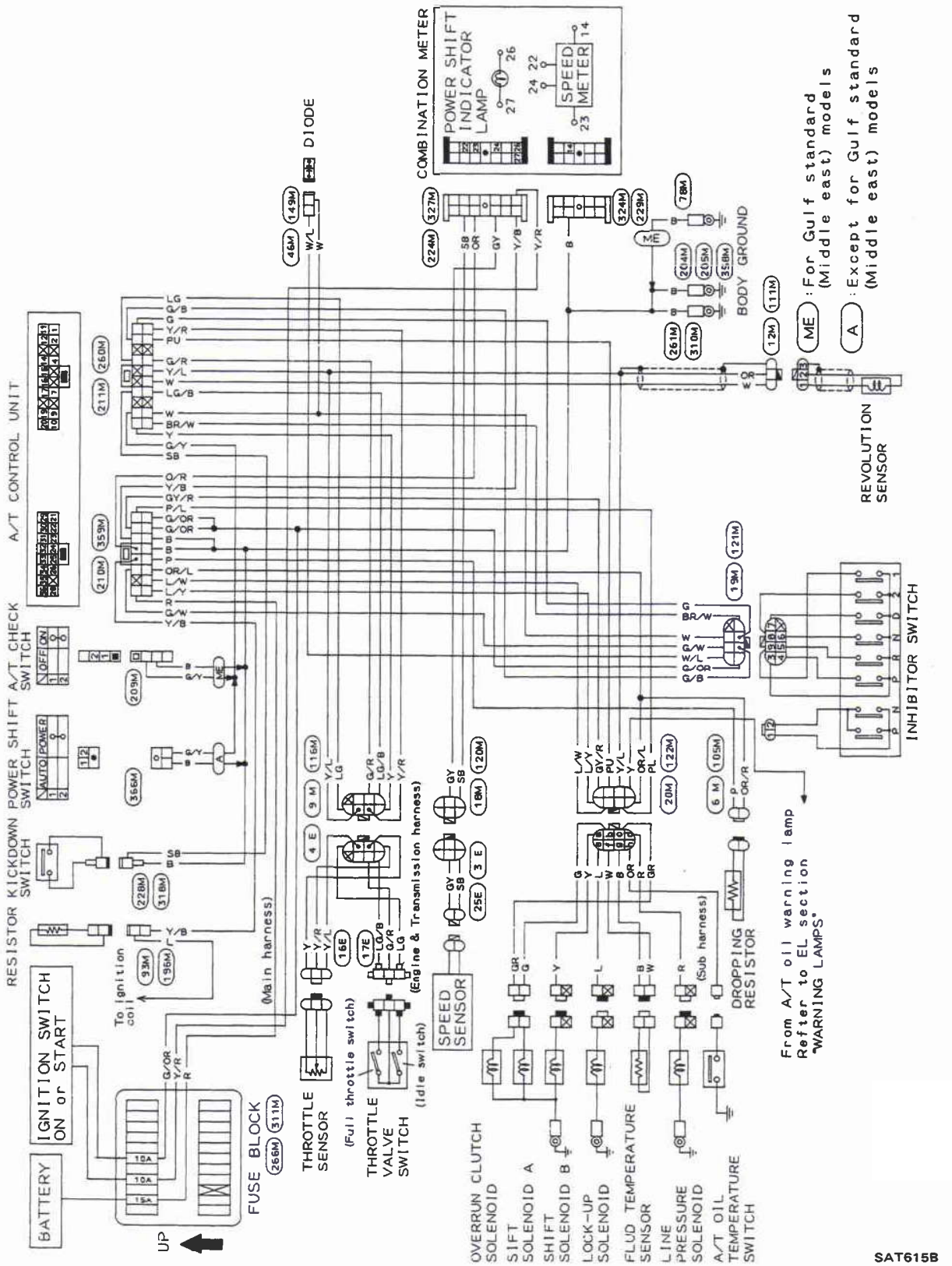
Electrical System (Cont'd)
SCHEMATIC



SAT616B

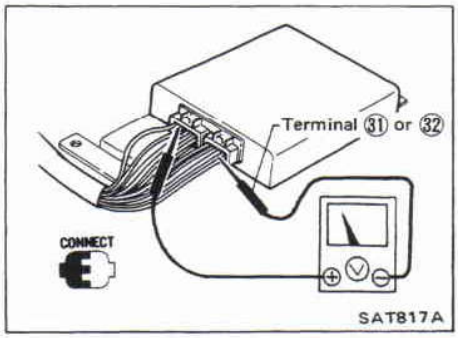
Electrical System (Cont'd)

WIRING DIAGRAM

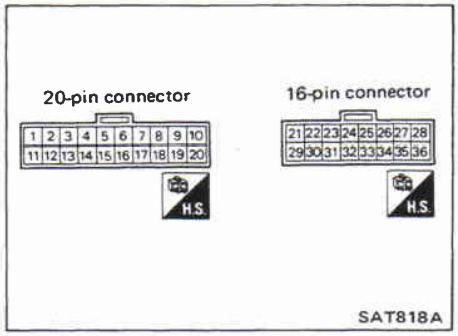


Electrical System (Cont'd)

INSPECTION OF A/T CONTROL UNIT



- Measure voltage between each terminal and terminal ㉛ or ㉜ by following "A/T control unit inspection table".



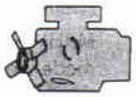
- Pin connector terminal layout.

A/T CONTROL UNIT INSPECTION TABLE

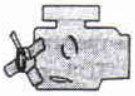
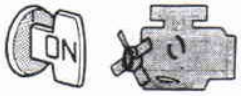
(Data are reference values.)

Terminal No.	Item	Condition		Judgement standard
1	Inhibitor "2" range switch		When setting selector lever to "2" range.	Battery voltage
			When setting selector lever to other ranges.	1V or less
2	Inhibitor "1" range switch		When setting selector lever to "1" range.	Battery voltage
			When setting selector lever to other ranges.	1V or less
3	–		–	–
4	Idle switch (in throttle valve switch)		When releasing accelerator pedal after warming up engine.	8 - 15V
			When depressing accelerator pedal after warming up engine.	1V or less
5	–		–	–
6	–		–	–

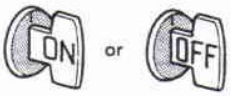
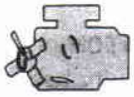
Electrical System (Cont'd)

Terminal No.	Item	Condition		Judgement standard
7	Kickdown switch		When releasing accelerator pedal after warming up engine.	3 - 8V
			When depressing accelerator pedal fully after warming up engine.	1V or less
8	–		–	–
9	**Gulf standard (Middle East) models** Power shift switch		When setting power shift switch in "AUTO" position.	3 - 8V
			When setting power shift switch in "POWER" position.	1V or less
	Except Gulf standard (Middle East) models A/T check switch		When turning A/T check switch to "OFF" position.	3 - 8V
			When turning A/T check switch to "ON" position.	1V or less
10	Throttle sensor (Power source)		–	4.5 - 5.5V
11	Throttle sensor		When depressing accelerator pedal slowly after warming up engine. Voltage rises gradually in response to throttle opening angle.	Fully-closed throttle: 0.2 - 0.6V Fully-open throttle: 3.4 - 4.4V
12	Fluid temperature sensor		When A.T.F. temperature is 20°C (68°F).	1.56V
			When A.T.F. temperature is 80°C (176°F).	0.45V
13	–		–	–
14	Throttle valve switch (Power source)	 	When turning ignition switch to "ON" position.	8 - 15V
			When turning ignition switch to "OFF" position.	1V or less
15	Throttle sensor (Ground)		–	–
16	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
			When vehicle parks.	0V

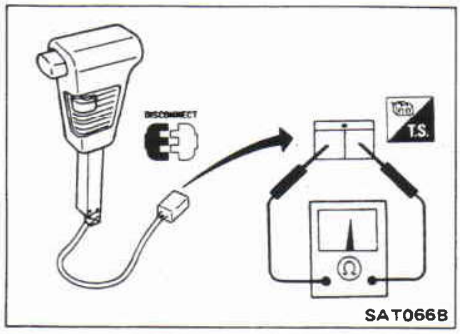
Electrical System (Cont'd)

Terminal No.	Item	Condition		Judgement standard
17	Full throttle switch		When depressing accelerator pedal more than half-way after warming up engine.	8 - 15V
			When releasing accelerator pedal after warming up engine.	1V or less
18	–		–	–
19	Inhibitor "N" and "P" range switch		When setting selector lever to "N" or "P" range.	Battery voltage
			When setting selector lever to other ranges.	1V or less
20	Inhibitor "D" range switch		When setting selector lever to "D" range.	Battery voltage
			When setting selector lever to other ranges.	1V or less
21	Overrun clutch solenoid		When overrun clutch solenoid operates. [Ex: When driving at 50 km/h (31 MPH) in "D" range and AUTO mode with depressing accelerator pedal half-way.]	Battery voltage
			When overrun clutch solenoid does not operate. [Ex: When driving in "D" range and POWER mode with releasing accelerator pedal.]	1V or less
22	Lock-up solenoid		When A/T performs lock-up.	8 - 15V
			When A/T does not perform lock-up.	1V or less
23	Power shift indicator lamp		**Except Gulf standard (Middle East) models** When setting power shift switch to "AUTO" position.	Battery voltage
			When setting power shift switch to "POWER" position.	1V or less
			Gulf standard (Middle East) models When turning A/T check switch to "OFF" position.	Battery voltage
			When turning A/T check switch to "ON" position.	1V or less
24	Speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V

Electrical System (Cont'd)

Terminal No.	Item	Condition		Judgement standard
25	Engine revolution signal		When engine runs at idle speed.	Approximately 6V
			When engine runs at 2,500 rpm.	Approximately 7.5V
26	Inhibitor "R" range switch		When setting selector lever to "R" range.	Battery voltage
			When setting selector lever to other ranges.	1V or less
27	–		–	–
28	Power source (Back-up)		When turning ignition switch to "OFF".	Battery voltage
			When turning ignition switch to "ON".	Battery voltage
29 30	Power source		When turning ignition switch to "ON".	Battery voltage
			When turning ignition switch to "OFF".	1V or less
31 32	Ground		–	–
33	Line pressure solenoid (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
34	Line pressure solenoid		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
35	Shift solenoid A		When shift solenoid A operates. (When driving in "D_1" or "D_4".)	Battery voltage
			When shift solenoid A does not operate. (When driving in "D_2" or "D_3".)	1V or less
36	Shift solenoid B		When shift solenoid B operates. (When driving in "D_1" or "D_2".)	Battery voltage
			When shift solenoid B does not operate. (When driving in "D_3" or "D_4".)	1V or less

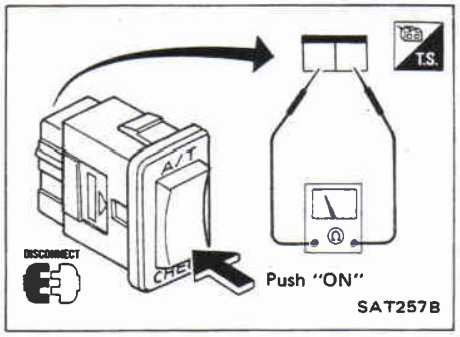
Electrical System (Cont'd)



POWER SHIFT SWITCH – Except Gulf standard (Middle East) models

- Check continuity between two terminals.

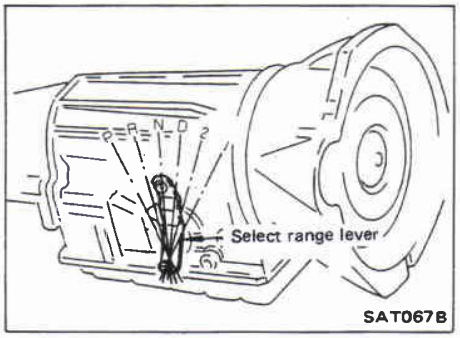
Switch position	Continuity
AUTO	No
POWER	Yes



A/T CHECK SWITCH – Gulf standard (Middle East) models

- Check continuity between two terminals.

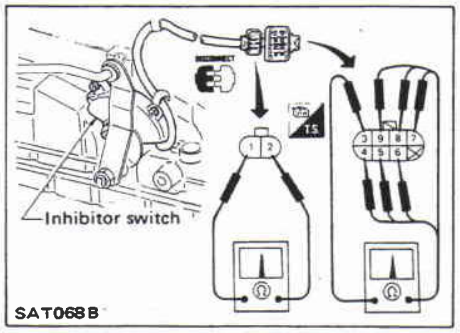
Switch position	Continuity
ON	Yes
OFF	No



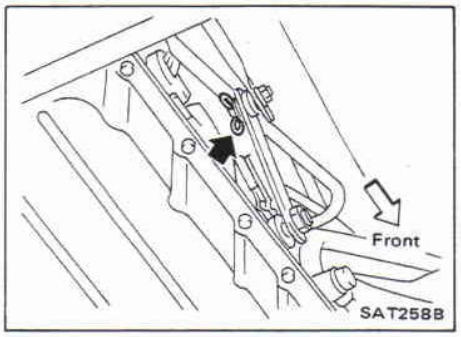
INHIBITOR SWITCH

1. Check continuity between terminals ① and ② and between terminals ③ and ④, ⑤, ⑥, ⑦, ⑧, ⑨ while moving select range lever through each range.

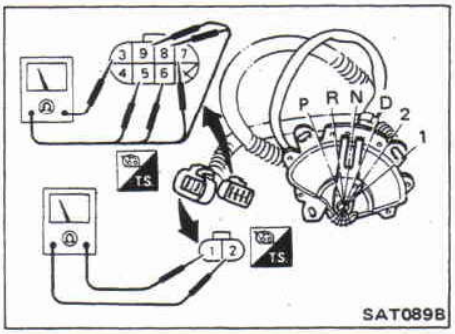
Lever position \ Terminal No.	①	②	③	④	⑤	⑥	⑦	⑧	⑨
P	○	○	○	○					
R			○		○				
N	○	○	○			○			
D			○				○		
2			○					○	
1			○						○



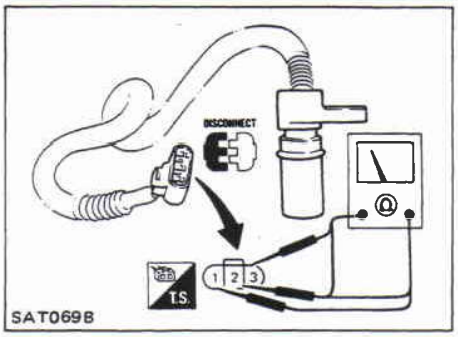
2. If N.G., check again with manual control linkage disconnected from select range lever of A/T assembly. – Refer to step 1.
3. If O.K. on step 2, adjust manual control linkage. – Refer to "ON-VEHICLE SERVICE".



Electrical System (Cont'd)



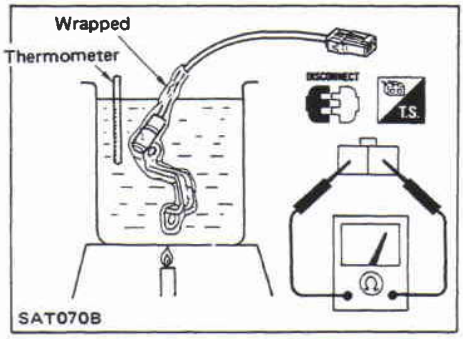
4. If N.G. on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminal. – Refer to step 1.
5. If O.K. on step 4, adjust inhibitor switch. – Refer to "ON-VEHICLE SERVICE".
6. If N.G. on step 4, replace inhibitor switch.



REVOLUTION SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between terminals ①, ② and ③.

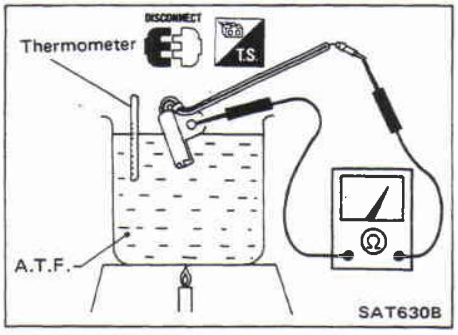
Terminal No.		Resistance
①	②	500 - 650Ω
②	③	No continuity
①	③	No continuity



FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals while changing temperature as shown at left.

Temperature °C (°F)	Resistance
20 (68)	Approximately 2.5 kΩ
80 (176)	Approximately 0.3 kΩ

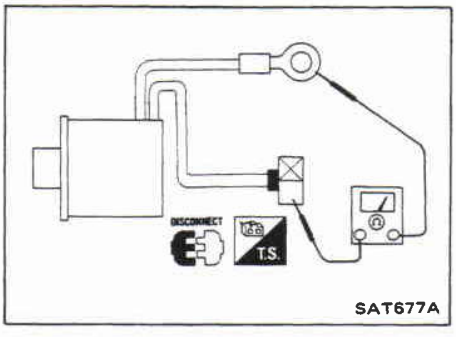


A/T OIL TEMPERATURE SWITCH

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check continuity.

Temperature °C (°F)	Continuity
150 (302) or more	Yes
145 (293) or less	No

- **Do not reuse boiled A.T.F.**



LOCK-UP SOLENOID AND LINE PRESSURE SOLENOID

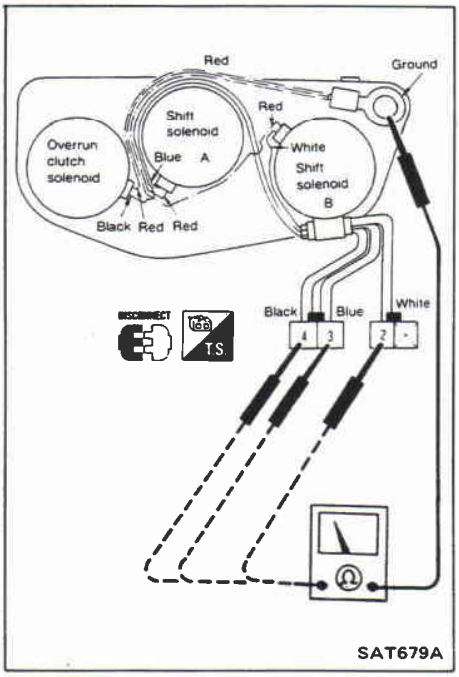
- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between two terminals.

Resistance:

Lock-up solenoid: 10 - 16Ω

Line pressure solenoid: 2.5 - 5Ω

Electrical System (Cont'd)



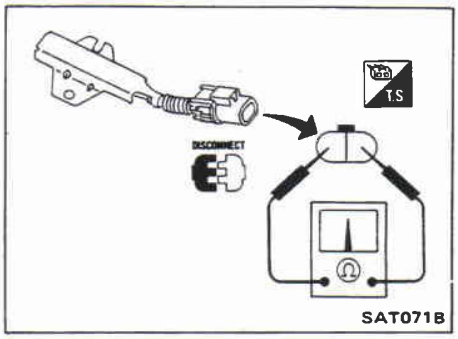
SAT679A

3-UNIT SOLENOID ASSEMBLY

(Shift solenoid A, B and overrun clutch solenoid)

- For removal and installation, refer to "ON-VEHICLE SERVICE".
- Check resistance between terminals of each solenoid.

Solenoid	Terminal No.		Resistance
Shift solenoid A	③	Ground terminal	20 - 30Ω
Shift solenoid B	②		
Overrun clutch solenoid	④		



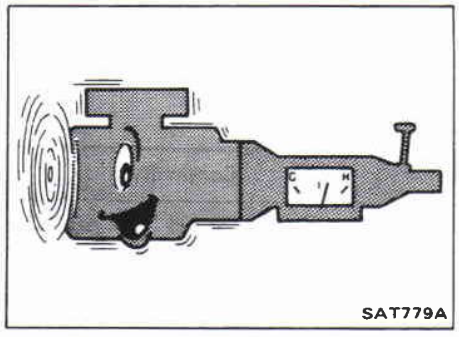
SAT071B

DROPPING RESISTOR

- Check resistance between two terminals.

Resistance: 11.2 - 12.8Ω

Stall Testing


SAT779A

STALL TEST PROCEDURE

1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

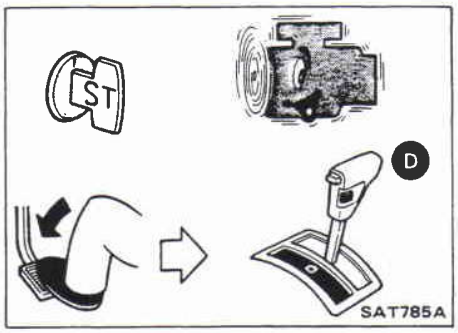
A.T.F. operating temperature:
50 - 80°C (122 - 176°F)


SAT597

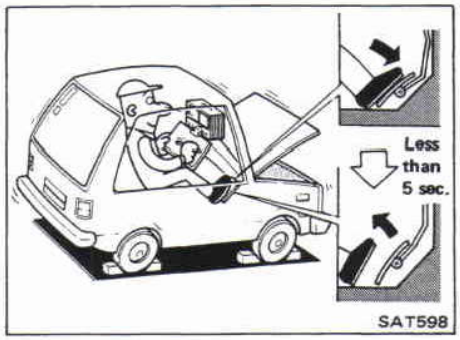
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.

- **It is good practice to put a mark on point of specified engine rpm on indicator.**

Stall Testing (Cont'd)



5. Start engine, apply foot brake, and place selector lever in "D" range.



6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**

Stall revolution:
2,090 - 2,390 rpm

8. Shift selector lever to "N".
9. Cool off A.T.F.

- **Run engine at idle for at least one minute.**

10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R", respectively.

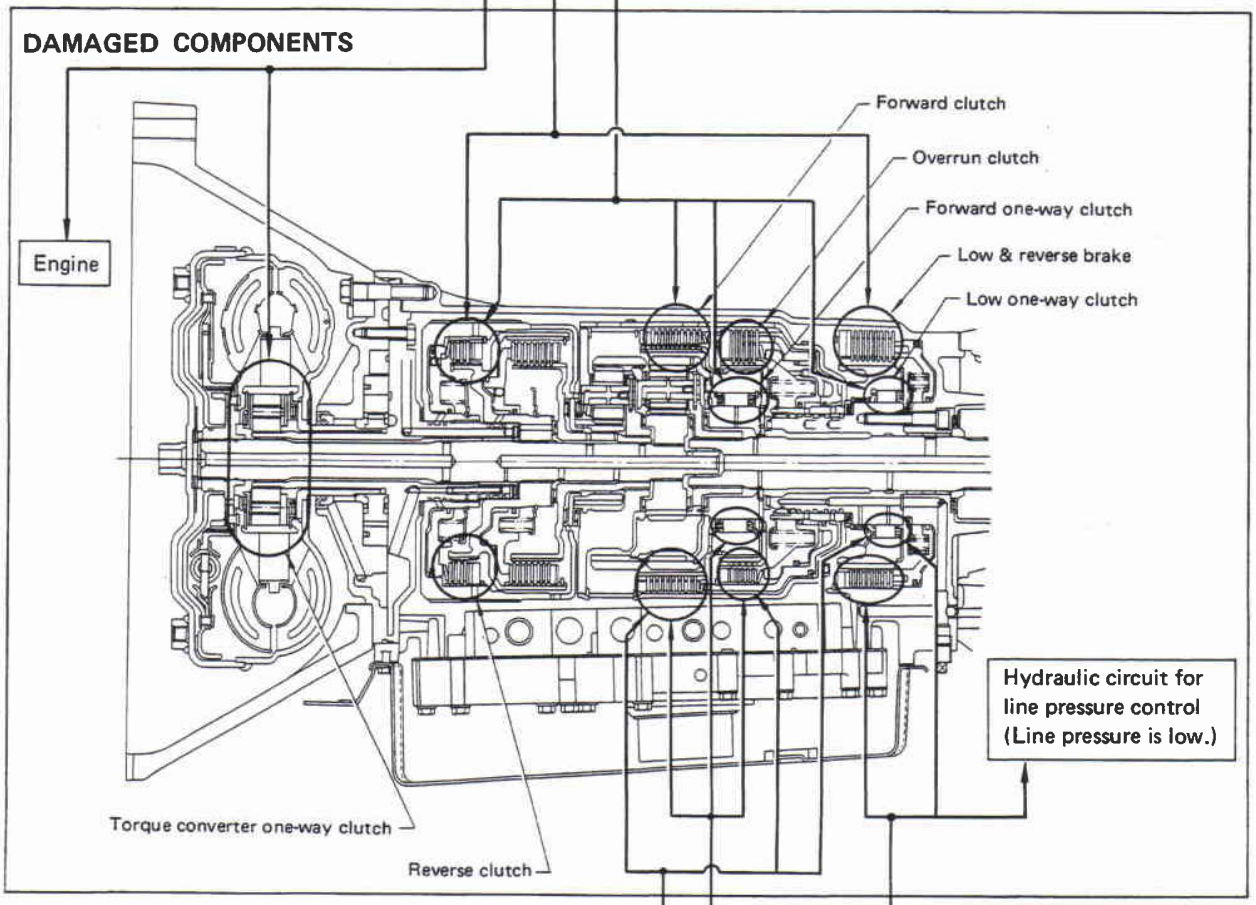
Stall Testing (Cont'd)

JUDGEMENT OF STALL TEST

Selector lever position	Judgement		
D	L	O	H
2	L	O	H
1	L	O	O
R	L	H	H

O : Stall revolution is normal.
H : Stall revolution is higher than specified.
L : Stall revolution is lower than specified.

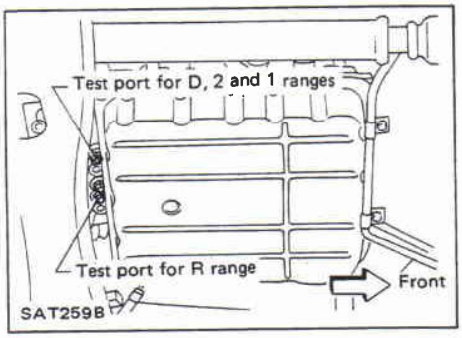
DAMAGED COMPONENTS



Clutches and brakes except high clutch and brake band are O.K. (Condition of high clutch and brake band cannot be confirmed by stall test.)

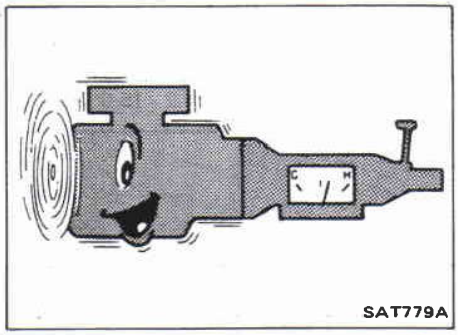
D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgement			

SAT236B



Pressure Testing

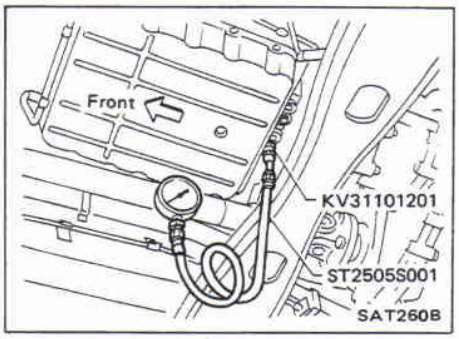
- Location of line pressure test port
- Use Tool (ST25490000) when removing and installing line pressure plug.
- **Always replace line pressure plugs as they are self-sealing bolts.**



LINE PRESSURE TEST PROCEDURE

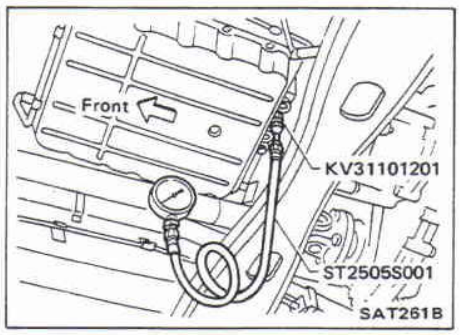
1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and A.T.F. reach operating temperature after vehicle has been driven approx. 10 minutes.

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



3. Install pressure gauge to line pressure port.

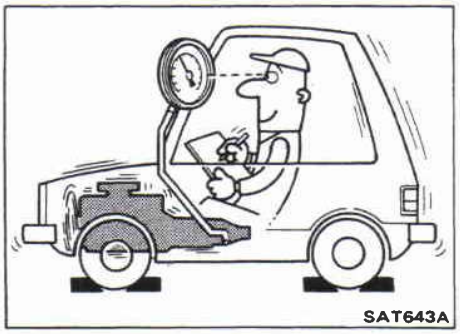
– D, 2 and 1 ranges –



– R range –

4. Set parking brake and block wheels.

- **Continue to depress brake pedal fully while line pressure test at stall speed is performed.**


SAT643A

Pressure Testing (Cont'd)

5. Start engine and measure line pressure at idle and stall speed.

- **When measuring line pressure at stall speed, follow the stall test procedure.**

Line pressure

Model	Engine speed rpm	Line pressure kPa (bar, kg/cm^2, psi)	
		D, 2 and 1 ranges	R range
TB42	Idle	392 - 471 (3.92 - 4.71, 4.0 - 4.8, 57 - 68)	667 - 706 (6.67 - 7.06, 6.8 - 7.2, 97 - 102)
	Stall	883 - 961 (8.83 - 9.61, 9.0 - 9.8, 128 - 139)	1,393 - 1,471 (13.93 - 14.71, 14.2 - 15.0, 202 - 213)

JUDGEMENT OF LINE PRESSURE TEST

	Judgement	Suspected parts
At idle	Line pressure is low in all ranges.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve
	Line pressure is low in particular range.	• Fluid pressure leakage between manual valve and particular clutch. • For example; If line pressure is low in "R" and "1" ranges but is normal in "D" and "2" range, fluid leakage exists at or around low & reverse brake circuit.
	Line pressure is high.	• Mal-adjustment of throttle sensor • Fluid temperature sensor damaged • Line pressure solenoid sticking • Short circuit of line pressure solenoid circuit • Pressure modifier valve sticking • Pressure regulator valve or plug sticking
At stall speed	Line pressure is low.	• Mal-adjustment of throttle sensor • Control piston damaged • Line pressure solenoid sticking • Short-circuit of line pressure solenoid circuit • Pressure regulator valve or plug sticking • Pressure modifier valve sticking • Pilot valve sticking

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.

	ON vehicle														OFF vehicle						
	Fluid level Control linkage	Inhibitor switch Throttle sensor (Adjustment)	Revolution sensor and speed sensor Engine revolution signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid A	Shift solenoid B Line pressure solenoid	Lock-up solenoid Overrun clutch solenoid	Fluid temperature sensor Accumulator N-D	Accumulator 1-2 Accumulator 2-3	Accumulator 3-4 (N-R) Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Parking components
Engine does not start in "N", "P" ranges.	2	3								1						
Engine starts in range other than "N" and "P".	1	2														
Transmission noise in "P" and "N" ranges.	1	3	4 5	2							⑦⑥					
Vehicle moves when changing into "P" range or parking gear does not disengage when shifted out of "P" range.	1															②
Vehicle runs in "N" range.	1									4		③	②	⑤		
Vehicle will not run in "R" range (but runs in "D", "2" and "1" ranges). Clutch slips. Very poor acceleration.	1			2	4	3						⑤⑥	⑦	⑧	⑨	
Vehicle braked when shifting into "R" range.	1 2			3	5	4						⑥	⑧	⑨	⑦	
Sharp shock in shifting from "N" to "D" range.	2	2	5	1 3	7	6		4 8					⑨			
Vehicle will not run in "D" and "2" ranges (but runs in "1" and "R" range).	1													②		
Vehicle will not run in "D", "1", "2" ranges (but runs in "R" range). Clutch slips. Very poor acceleration.	1			2	4	3		5				⑥ ⑦	⑧ ⑨	⑩		
Clutches or brakes slip somewhat in starting.	1 2	3		4	6	5		7		8	⑬ ⑫	⑩	⑨		⑪	
Excessive creep.				1												
No creep at all.	1			2	3						⑥⑤		④			
Failure to change gear from "D_1" to "D_2".	2	1	5		4 3										⑥	
Failure to change gear from "D_2" to "D_3".	2	1	5		4	3						⑥			⑦	
Failure to change gear from "D_3" to "D_4".	2	1	4		3			5							⑥	
Too high a gear change point from "D_1" to "D_2", from "D_2" to "D_3", from "D_3" to "D_4".		1	2	3		4										
Gear change directly from "D_1" to "D_3" occurs.	1								2						③	
Engine stops when shifting lever into "R", "D", "2" and "1".				1	3		2				④					
Too sharp a shock in change from "D_1" to "D_2".		1		2	4			5	3						⑥	
Too sharp a shock in change from "D_2" to "D_3".		1		2	4				3			⑤			⑥	

Trouble-shooting Chart (Cont'd)

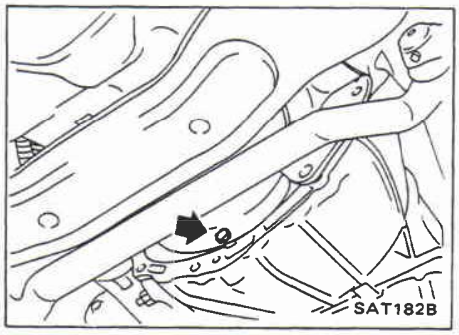
Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transmission must be removed from the vehicle.

	ON vehicle													OFF vehicle						
	Fluid level Control linkage	Inhibitor switch Throttle sensor (Adjustment)	Revolution sensor and speed sensor Engine revolution signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid A	Shift solenoid B Line pressure solenoid	Lock-up solenoid Overrun clutch solenoid	Fluid temperature sensor Accumulator N-D	Accumulator 1-2 Accumulator 2-3	Accumulator 3-4 (N-R) Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Parking components
Too sharp a shock in change from "D_3" to "D_4".	. .	. 1	. .	. 2	4 .	. .	. .	. .	. .	3 .	. .	. .	. .	⑥ .	. ⑤	.
Almost no shock or clutches slipping in change from "D_1" to "D_2".	1 .	. 2	. .	. 3	5 .	. .	. .	. .	4 .	. .	. .	. .	. .	. .	. ⑥	.
Almost no shock or slipping in change from "D_2" to "D_3".	1 .	. 2	. .	. 3	5 .	. .	. .	. .	. 4	. .	. .	. ⑥	. .	. .	. ⑦	.
Almost no shock or slipping in change from "D_3" to "D_4".	1 .	. 2	. .	. 3	5 .	. .	. .	. .	. .	4 .	. .	. ⑥	. .	. .	. ⑦	.
Vehicle braked by gear change from "D_1" to "D_2".	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	② ④	. .	. ⑤	③ .	.
Vehicle braked by gear change from "D_2" to "D_3".	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. ②	.
Vehicle braked by gear change from "D_3" to "D_4".	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	④ .	. ③	② .	. .	.
Maximum speed not attained. Acceleration poor.	1 .	2 .	. .	. .	5 3	4 .	. .	. .	. .	. .	⑪ ⑩	⑥ ⑦	. .	. .	⑨ ⑧	.
Failure to change gear from "D_4" to "D_3".	1 .	. 2	. .	. .	6 4	. 5	. 3	. .	. .	. .	. .	. .	. .	⑧ .	⑦ .	.
Failure to change gear from "D_3" to "D_2" or from "D_4" to "D_2".	1 .	. 2	. .	. .	5 3	4 .	. .	. .	. .	. .	. .	. ⑥	. .	. .	. ⑦	.
Failure to change gear from "D_2" to "D_1" or from "D_3" to "D_1".	1 .	. 2	. .	. .	5 3	4 .	. .	. .	. .	. .	. .	. ⑦	. .	. ⑥	. ⑧	.
Gear change shock felt during deceleration by releasing accelerator pedal.	. .	. 1	. .	. 2	4 .	. .	. 3	. .	. .	. .	. .	. .	. .	. .	. .	.
Too high a change point from "D_4" to "D_3", from "D_3" to "D_2", from "D_2" to "D_1".	. .	. 1	2 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
Kickdown does not operate when depressing pedal in "D_4" within kickdown vehicle speed.	. .	. 1	2 .	. .	. 3	4 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
Kickdown operates or engine overruns when depressing pedal in "D_4" beyond kickdown vehicle speed limit.	. .	. 2	1 .	. .	. 3	4 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	.
Races extremely fast or slips in changing from "D_4" to "D_3" when depressing pedal.	1 .	. 2	. .	. 3	5 .	. 4	. .	. .	. .	. .	. .	. ⑥	⑦ .	. .	. .	.
Races extremely fast or slips in changing from "D_4" to "D_2" when depressing pedal.	1 .	. 2	. .	. 3	6 5	. 4	. .	. .	. .	. .	. .	. .	⑧ .	. .	. ⑦	.
Races extremely fast or slips in changing from "D_3" to "D_2" when depressing pedal.	1 .	. 2	. .	. 3	5 .	. 4	. .	8 .	. 0	. .	. .	. ⑨	⑦ .	. .	. ⑥	.
Races extremely fast or slips in changing from "D_4" or "D_3" to "D_1" when depressing pedal.	1 .	. 2	. .	. 3	5 .	. 4	. .	. .	. .	. .	. .	. .	⑥ ⑦	. ⑧	. .	.
Vehicle will not run in any range.	1 2	. .	. .	. 3	. .	. 4	. .	. .	. .	. .	⑨ ⑤	. ⑥	. .	. .	⑧ ⑦	⑩
Transmission noise in "D", "2", "1" and "R" ranges.	1 .	. .	. .	. .	. .	. .	. .	. .	. .	. .	② .	. .	. .	. .	. .	.

Trouble-shooting Chart (Cont'd)

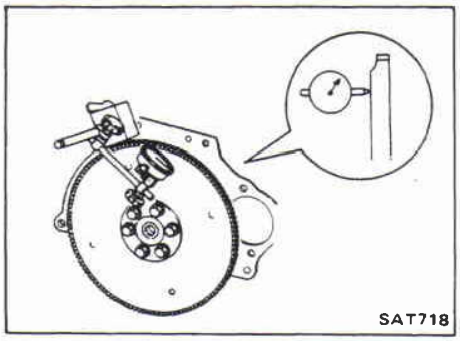
Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transmission must be removed from the vehicle.

	ON vehicle												OFF vehicle					
	Fluid level Control linkage	Inhibitor switch Throttle sensor (Adjustment)	Revolution sensor and speed sensor Engine revolution signal	Engine idling rpm Line pressure	Control valve assembly Shift solenoid A	Shift solenoid B Line pressure solenoid	Lock-up solenoid Overrun clutch solenoid	Fluid temperature sensor Accumulator N-D	Accumulator 1-2 Accumulator 2-3	Accumulator 3-4 (N-R) Ignition switch and starter	Torque converter Oil pump	Reverse clutch High clutch	Forward clutch Forward one-way clutch	Overrun clutch Low one-way clutch	Low & reverse brake Brake band	Parking components
Failure to change from "D_3" to "2_2" when changing lever into "2" range.	7	1 2			6 5	4	3							⑨	⑧	
Gear change from "2_2" to "2_3" in "2" range.		1														
Engine brake does not operate in "1" range.	2	1 3	4		6 5		7							⑧	⑨	
Gear change from "1_1" to "1_2" in "1" range.	2	1														
Does not change from "1_2" to "1_1" in "1" range.		1	2		4 3		5							⑥	⑦	
Large shock changing from "1_2" to "1_1" in "1" range.					1										②	
Transmission overheats.	1	3		2 4	6	5					⑭ ⑦	⑧ ⑨	⑪	⑫	⑬ ⑩	
A.T.F. shoots out during operation. White smoke emitted from exhaust pipe during operation.	1											② ③	⑤	⑥	⑦ ④	
Offensive smell at fluid charging pipe.	1										② ③	④ ⑤	⑦	⑧	⑨ ⑥	
Torque converter is not locked up.		3 1	2 4	6	8		7	5			⑨					
Lock-up piston slip	1	2		3	6	5	4				⑦					
Lock-up point is extremely high or low.		1	2		4		3									
A/T does not shift to "D_4" when driving in "AUTO" mode.		2 1	3	8	6 4		5	7						⑩	⑨	
Engine is stopped at "R", "D", "2" and "1" ranges.	1				5 4	3	2									



Removal

- Remove bolts securing torque converter to drive plate.
- **Remove those bolts by turning crankshaft.**
- Plug up opening such as oil charging pipe hole, etc.



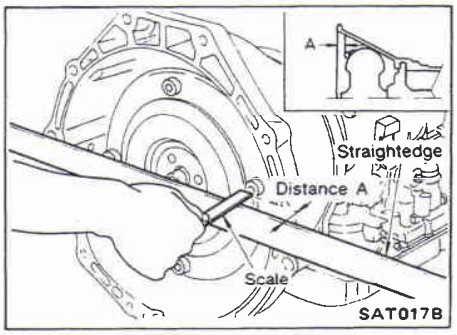
Installation

- Drive plate runout

  Maximum allowable runout:

  0.5 mm (0.020 in)

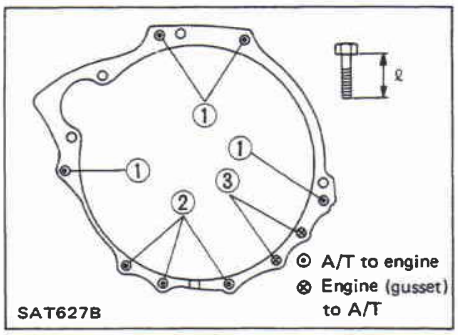
  If this runout is out of allowance, replace drive plate with ring gear.



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

  Distance "A":

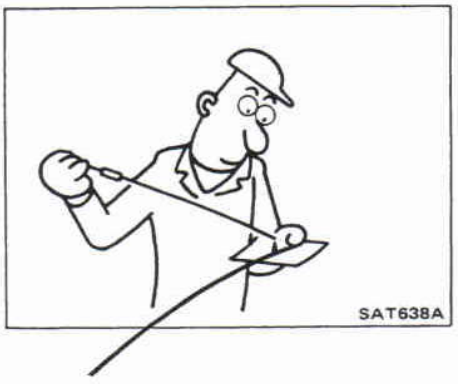
  26 mm (1.02 in) or more
- Install converter to drive plate.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**



- Tighten bolts securing transmission.
- **TB42 engine models**

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	83 - 113 (8.5 - 11.5, 61 - 83)	65 (2.56)
2	29 - 39 (3.0 - 4.0, 22 - 29)	65 (2.56)
3	29 - 39 (3.0 - 4.0, 22 - 29)	35 (1.38)
Gusset to engine	29 - 39 (3.0 - 4.0, 22 - 29)	50 (1.97) 35 (1.38)

- Reinstall any part removed.

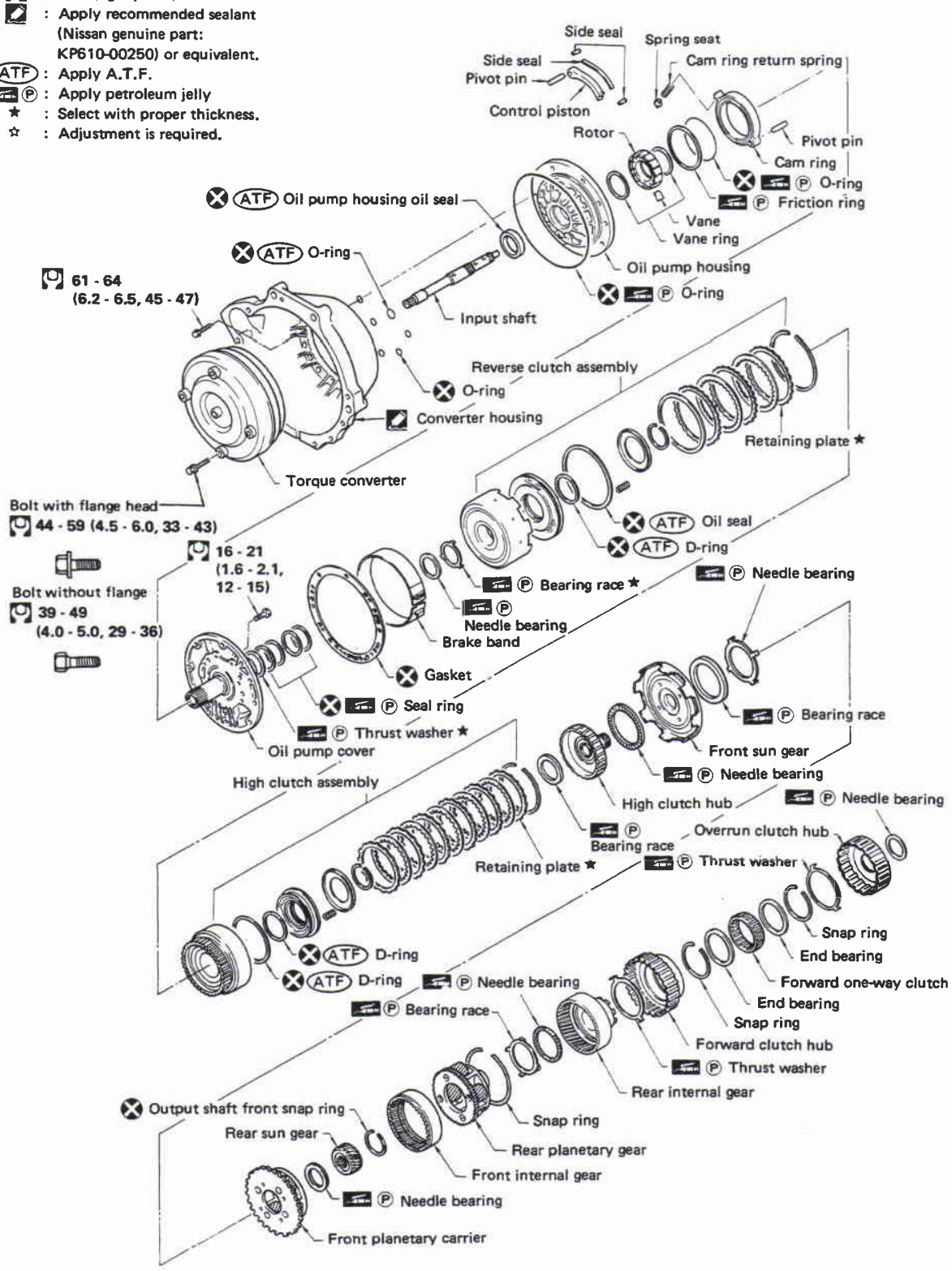


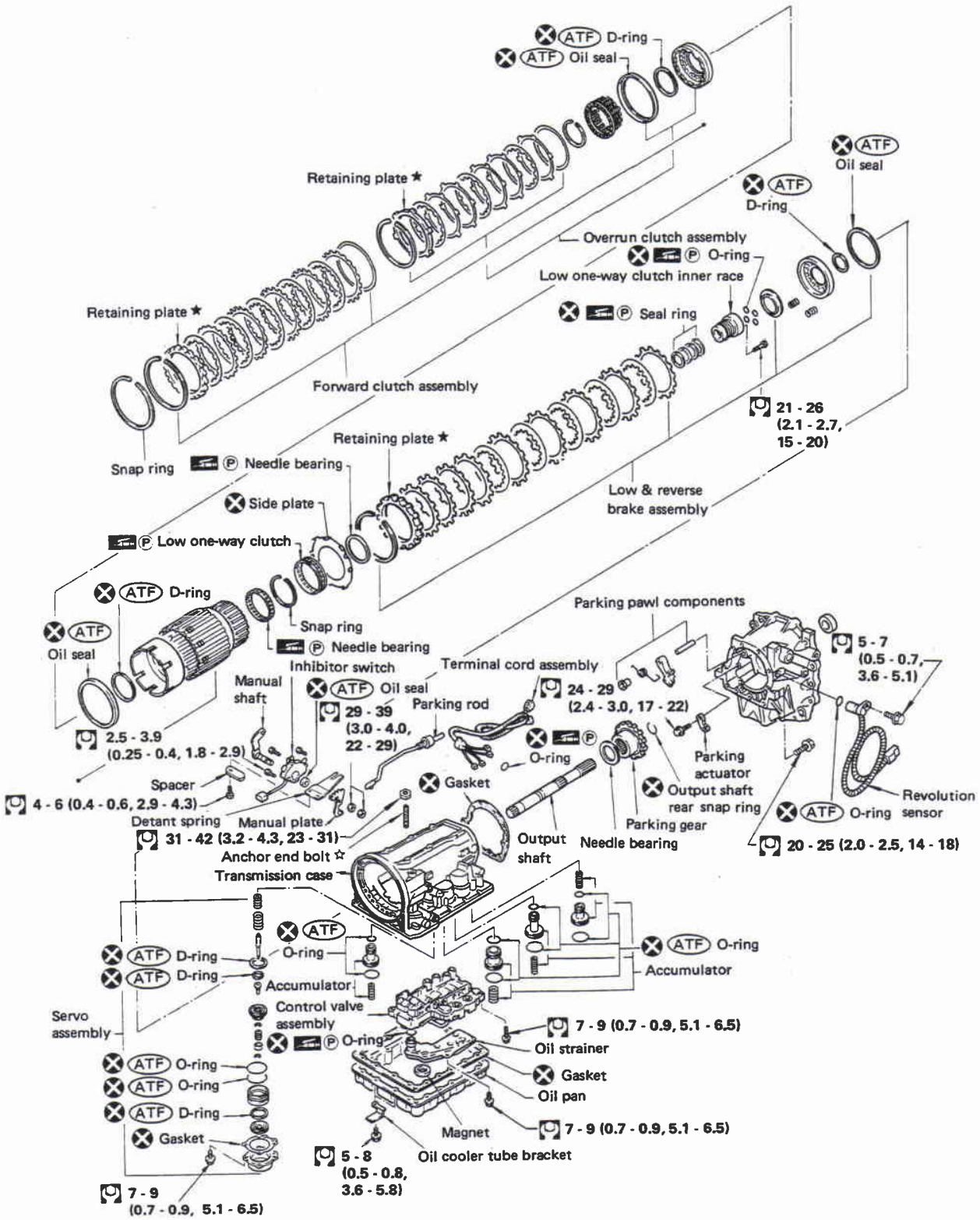
- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.

  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.
- Perform road test. — Refer to "Road Testing".

Note:

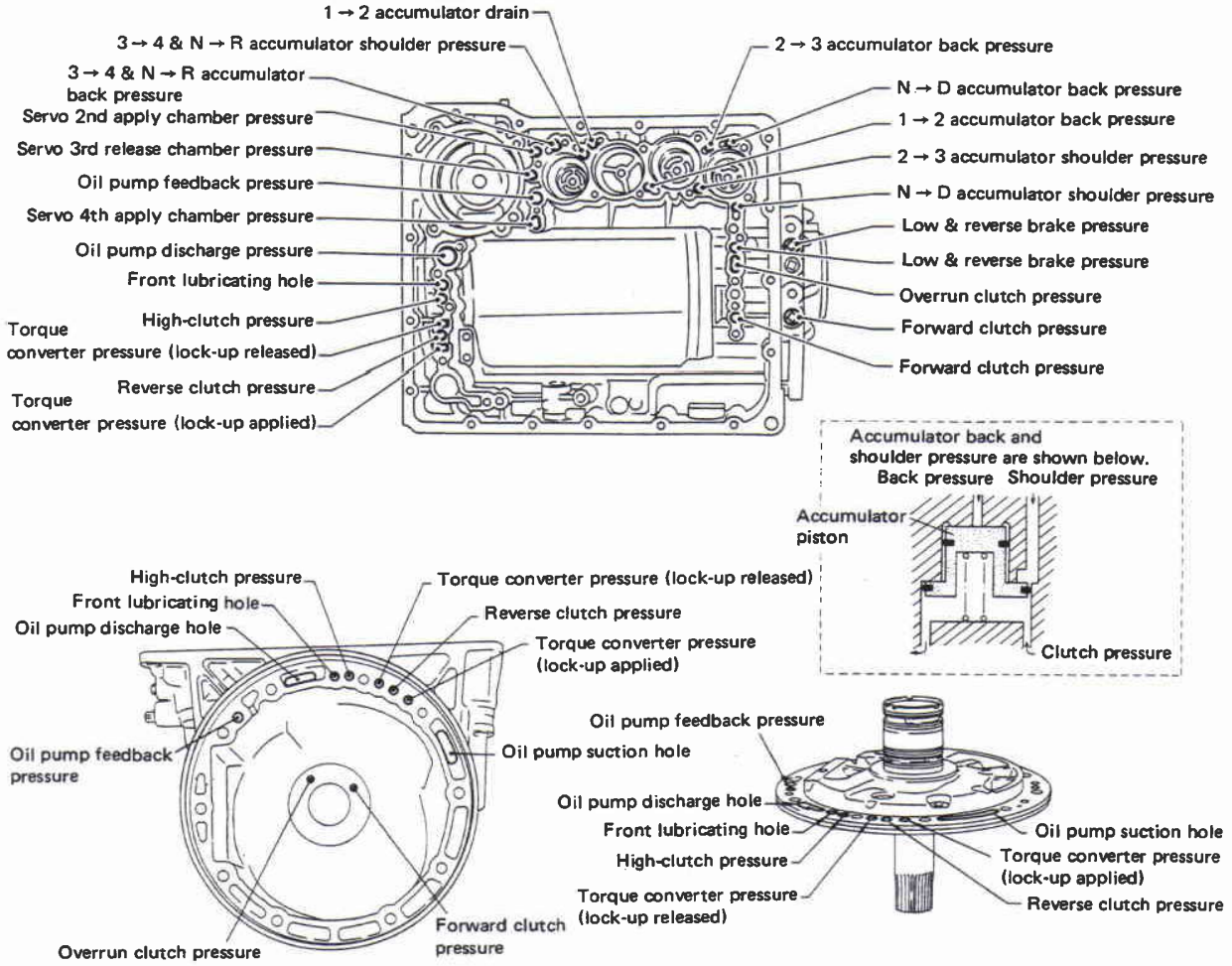
: N·m (kg-m, ft-lb)
: Apply recommended sealant (Nissan genuine part: KP610-00250) or equivalent.
ATF : Apply A.T.F.
P : Apply petroleum jelly
★ : Select with proper thickness.
☆ : Adjustment is required.

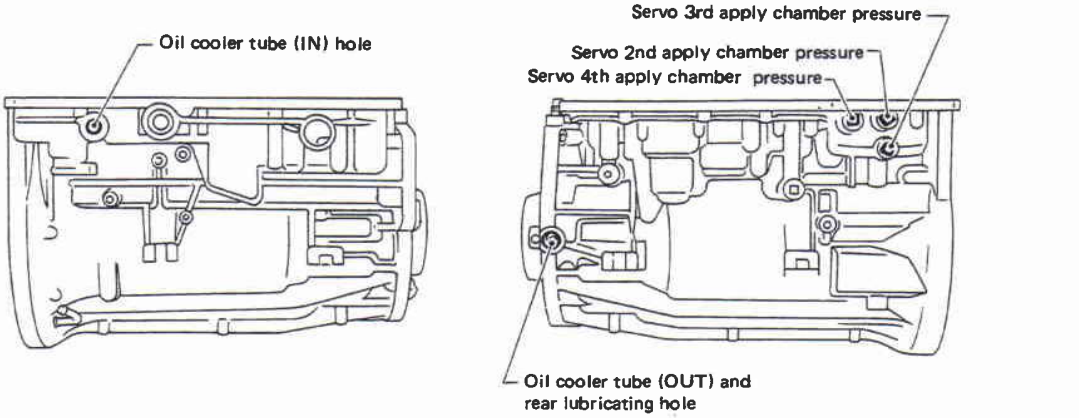



ATF D-ring
ATF Oil seal
Retaining plate ★
ATF Oil seal
ATF D-ring
Overrun clutch assembly
O-ring
Low one-way clutch inner race
Retaining plate ★
Seal ring
Forward clutch assembly
21 - 26 (2.1 - 2.7, 15 - 20)
Snap ring
Needle bearing
Retaining plate ★
Side plate
Low & reverse brake assembly
Low one-way clutch
ATF D-ring
ATF Oil seal
Snap ring
Needle bearing
Inhibitor switch
Parking pawl components
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Terminal cord assembly
Manual shaft
ATF Oil seal
24 - 29 (2.4 - 3.0, 17 - 22)
29 - 39 (3.0 - 4.0, 22 - 29)
Parking rod
2.5 - 3.9 (0.25 - 0.4, 1.8 - 2.9)
O-ring
Parking actuator
Spacer
4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Gasket
Output shaft rear snap ring
Revolution sensor
Detant spring
Manual plate
31 - 42 (3.2 - 4.3, 23 - 31)
Parking gear
Needle bearing
ATF O-ring
20 - 25 (2.0 - 2.5, 14 - 18)
Anchor end bolt ☆
Transmission case
Output shaft
ATF
ATF D-ring
ATF D-ring
O-ring
ATF O-ring
Accumulator
Accumulator
Control valve assembly
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
Servo assembly
O-ring
Oil strainer
ATF O-ring
ATF O-ring
ATF D-ring
Gasket
Oil pan
Magnet
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
5 - 8 (0.5 - 0.8, 3.6 - 5.8)
Oil cooler tube bracket
Gasket
7 - 9 (0.7 - 0.9, 5.1 - 6.5)

SAT200E

Oil Channel





SAT611B

Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings

Item number	Outer diameter mm (in)
②, ⑤	164.0 (6.46)
③	176.0 (6.93)
⑥	172.0 (6.77)

Thrust washers

Item number	Color
①	Black
④	White

Outer diameter of bearing races

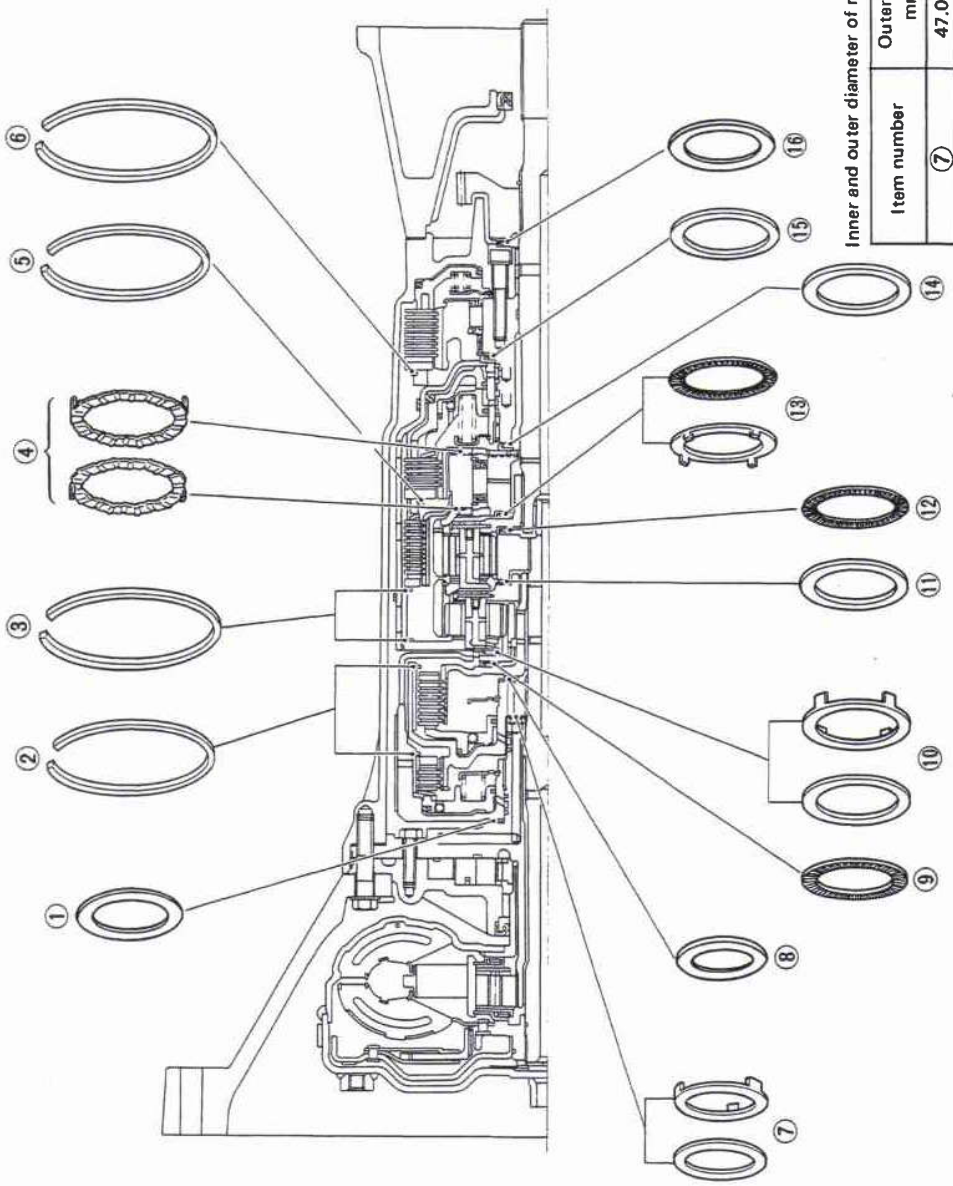
Item number	Outer diameter mm (in)
⑦	43.5 (1.713)
⑩	82.0 (3.228)
⑬	63.2 (2.488)

Installation of one-place bearings

Item number	Bearing race (black) location
⑮	Rear side
⑯	Rear side

Inner and outer diameter of needle bearings

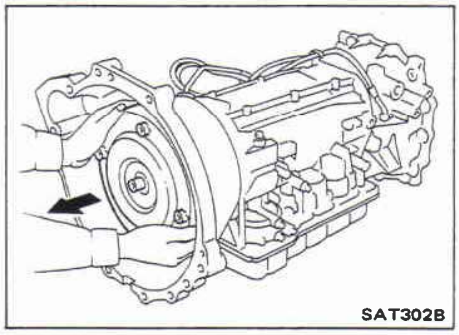
Item number	Outer diameter mm (in)	Inner diameter mm (in)	Number of needles
⑦	47.0 (1.850)	30.0 (1.181)	–
⑧	53.0 (2.087)	35.1 (1.382)	–
⑨, ⑩	85.0 (3.346)	62.7 (2.468)	–
⑪, ⑫	64.0 (2.520)	45.0 (1.772)	52
⑬	64.0 (2.520)	45.0 (1.772)	50
⑭	64.0 (2.520)	44.0 (1.732)	34
⑮	78.1 (3.075)	–	–
⑯	64.0 (2.520)	–	–



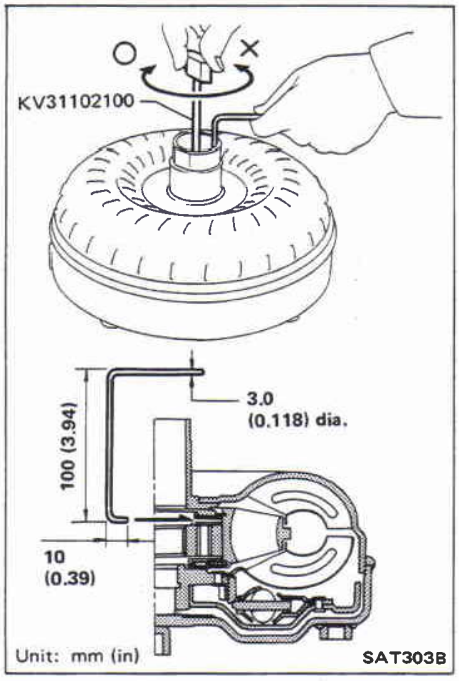
SAT612B

Disassembly

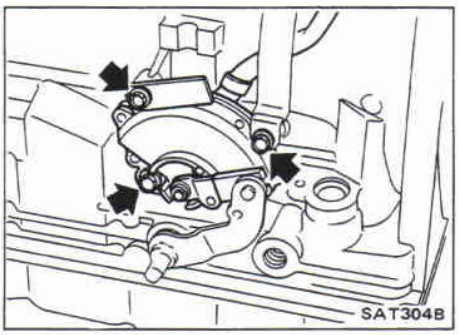
1. Remove torque converter by holding it firmly and turning while pulling straight out.



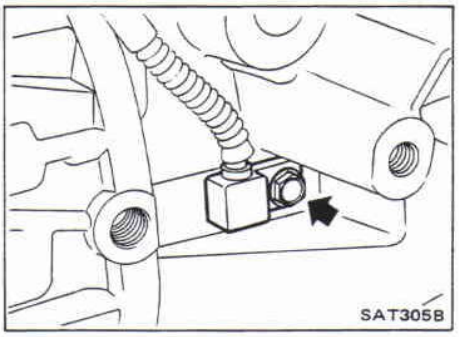
2. Check torque converter one-way clutch.
a. Insert Tool into spline of one-way clutch inner race.
b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



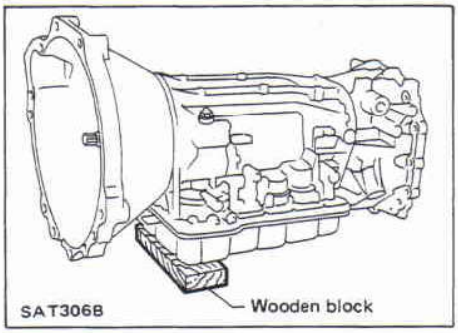
3. Remove inhibitor switch and revolution sensor.
a. Remove inhibitor switch from transmission case.



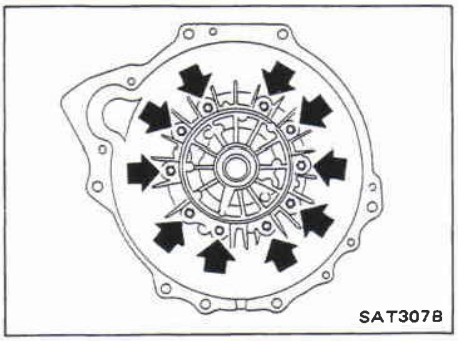
b. Remove revolution sensor from adapter case.
c. Remove O-ring from revolution sensor.



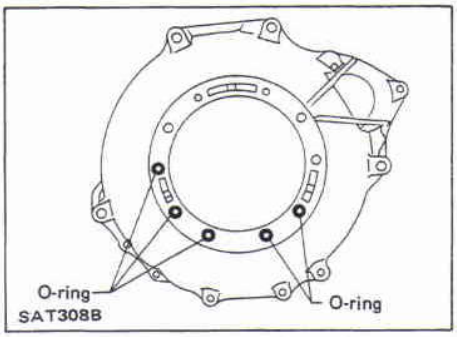
Disassembly (Cont'd)



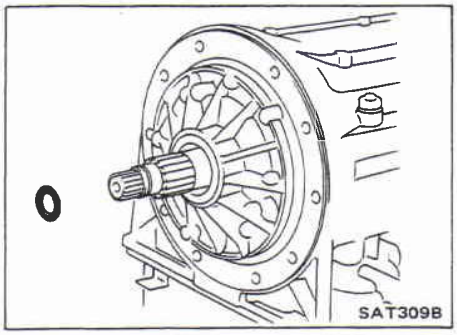
4. Remove converter housing.
a. Place wooden block under front end of oil pan to remove converter housing.



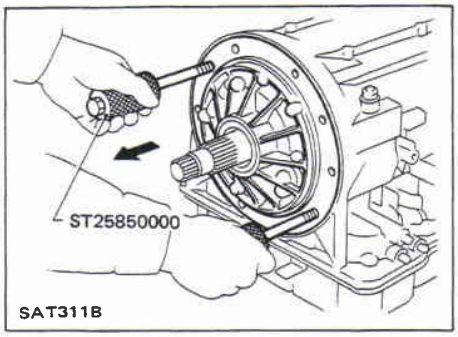
b. Remove converter housing from transmission case.



c. Remove O-rings from converter housing.
d. Remove traces of sealant.
- **Be careful not to scratch converter housing.**

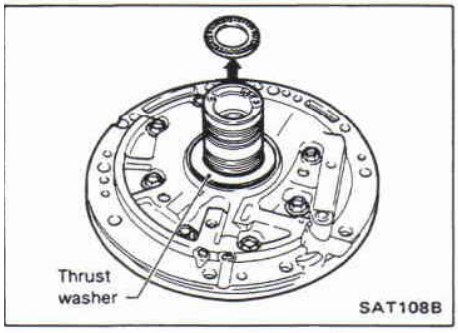


5. Remove oil pump assembly.
a. Remove O-ring from input shaft.

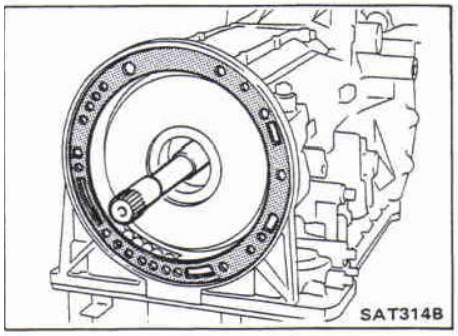


b. Attach Tool to oil pump assembly and extract it evenly from transmission case.
c. Remove traces of sealant from oil pump housing.
- **Be careful not to scratch pump housing.**

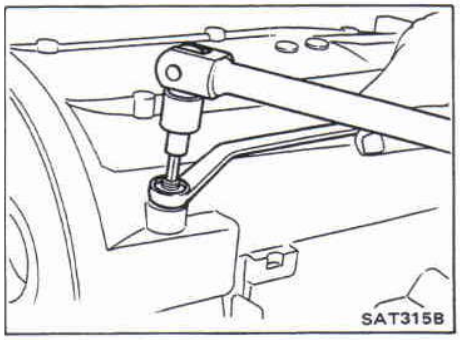
Disassembly (Cont'd)



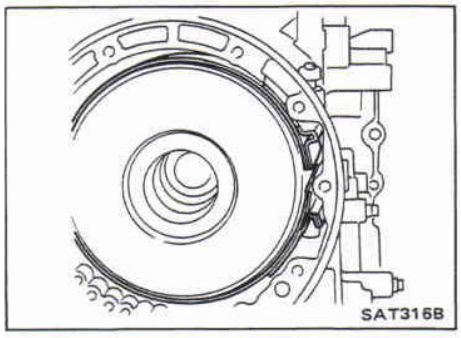
d. Remove needle bearing and thrust washer from oil pump assembly.



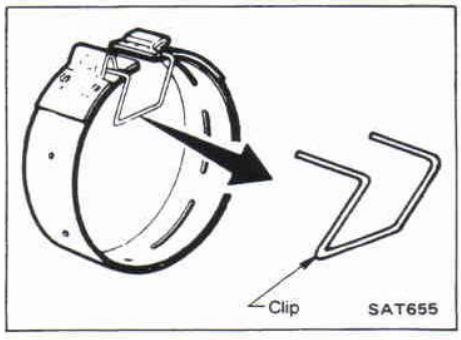
6. Remove input shaft and oil pump gasket.



7. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.

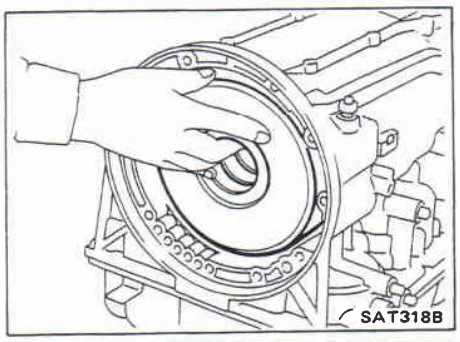


b. Remove brake band and band strut from transmission case.

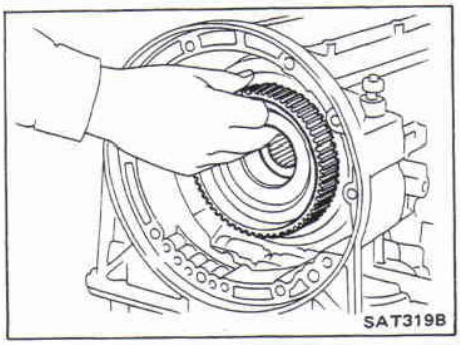


c. Hold brake band in a circular shape with clip.

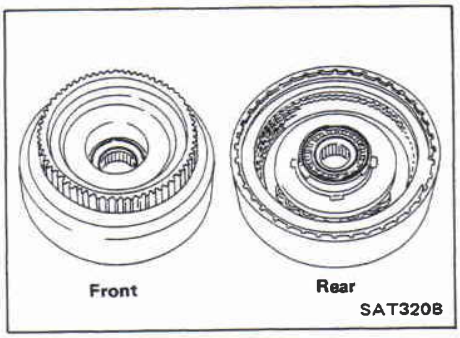
Disassembly (Cont'd)



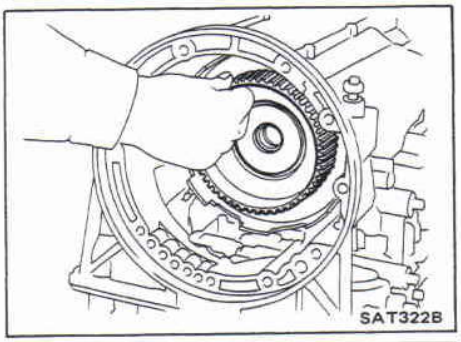
8. Remove front side clutch and gear components.
a. Remove reverse clutch assembly from transmission case.



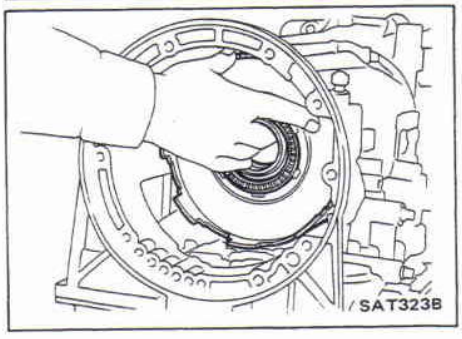
b. Remove high clutch assembly from transmission case.



c. Remove front bearing race from high clutch assembly.
d. Remove rear needle bearing from high clutch assembly.

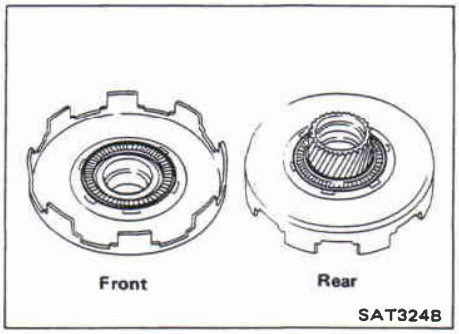


e. Remove high clutch hub from transmission case.

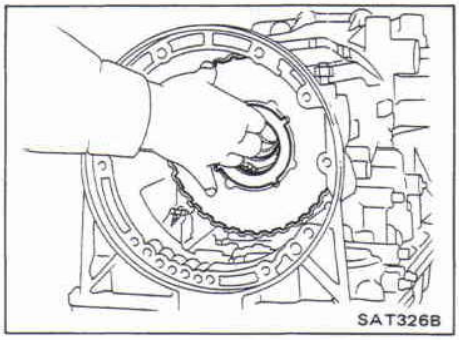


f. Remove front sun gear from transmission case.

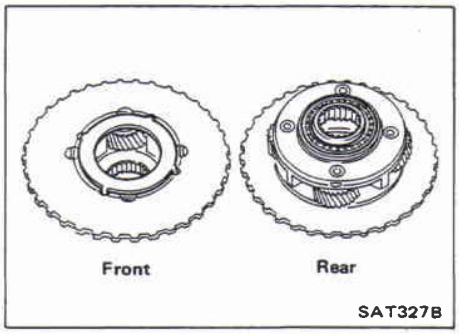
Disassembly (Cont'd)



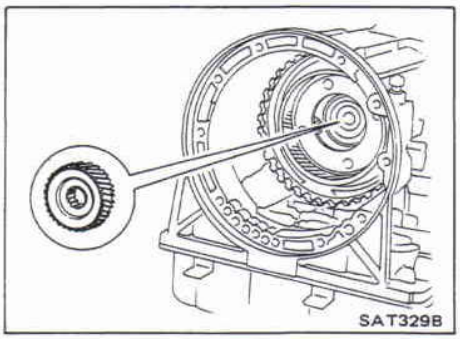
g. Remove front needle bearing from front sun gear.
h. Remove rear needle bearing from front sun gear.



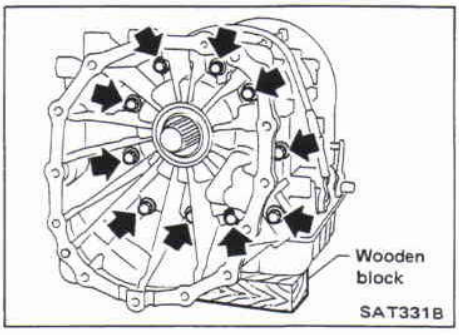
i. Remove front planetary carrier from transmission case.



j. Remove front bearing race from front planetary carrier.
k. Remove rear needle bearing from front planetary carrier.

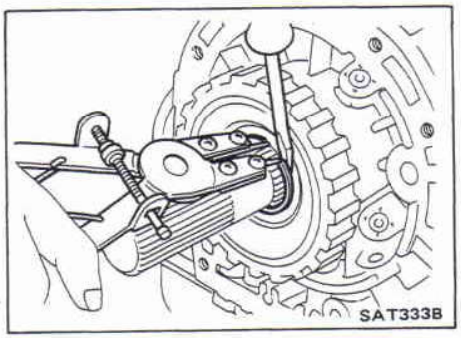


l. Remove rear sun gear from transmission case.

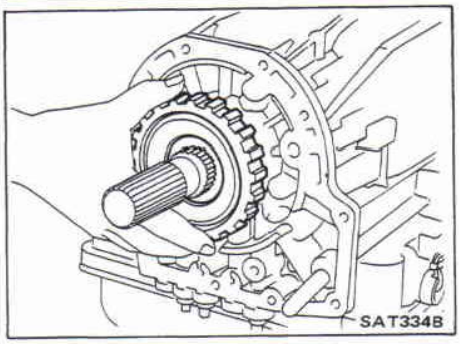


9. Remove adapter case.
a. Remove adapter case from transmission case.
b. Remove adapter case gasket from transmission case.

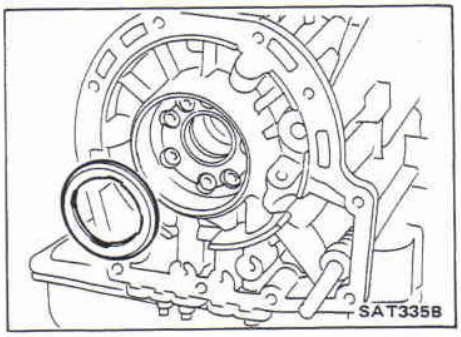
Disassembly (Cont'd)



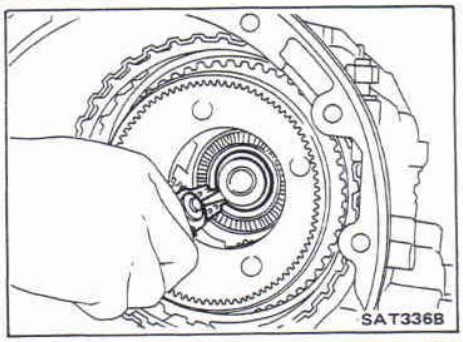
10. Remove output shaft and parking gear.
a. Remove rear snap ring from output shaft.



b. Remove parking gear from transmission case.

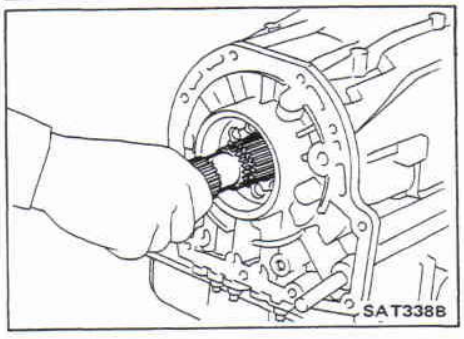


c. Remove needle bearing from transmission case.



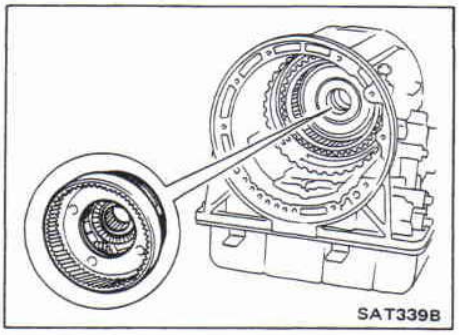
d. Slowly push output shaft all the way forward.
- **Do not use excessive force.**

e. Remove snap ring from output shaft.

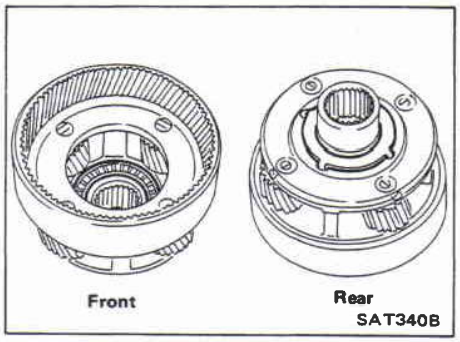


f. Remove output shaft from transmission case.

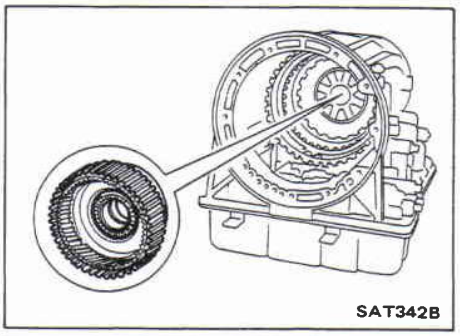
Disassembly (Cont'd)



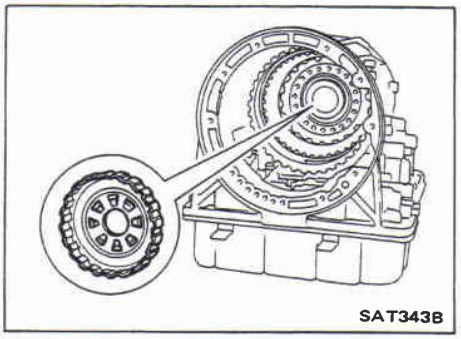
11. Remove rear side clutch and gear components.
a. Remove front internal gear.



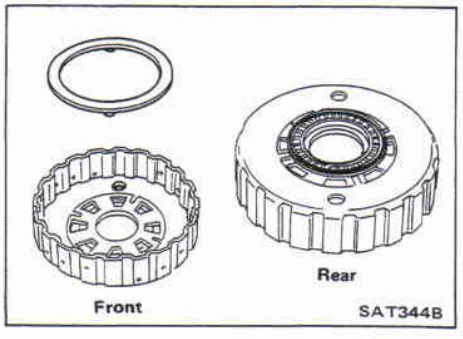
b. Remove front needle bearing from front internal gear.
c. Remove rear bearing race from front internal gear.



d. Remove rear internal gear and forward clutch hub as a set from transmission case.

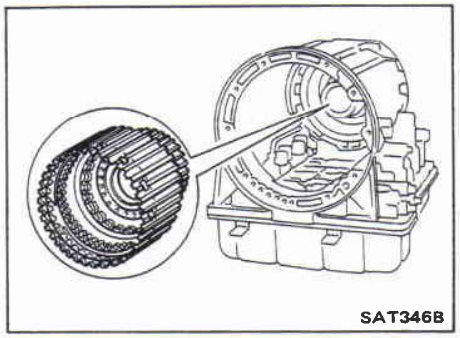


e. Remove overrun clutch hub from transmission case.

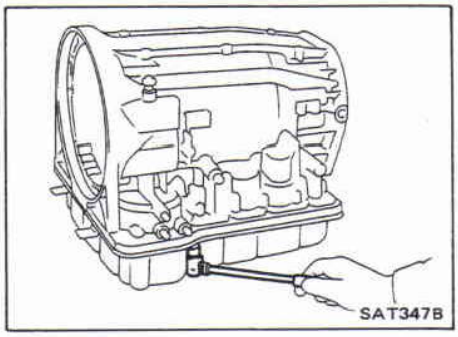


f. Remove thrust washer from overrun clutch hub.
g. Remove needle bearing from overrun clutch hub.

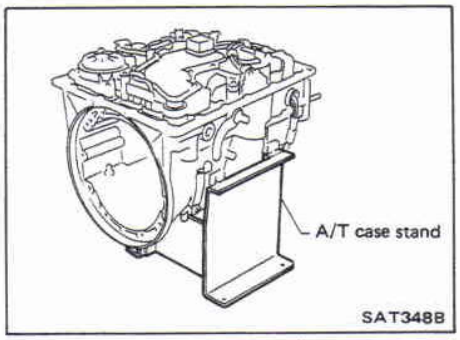
Disassembly (Cont'd)



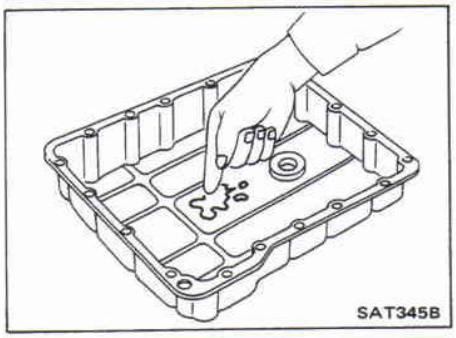
h. Remove forward clutch assembly from transmission case.



12. Remove oil pan.
- Separate the oil pan and transmission case.
- **Always place oil pan straight down so that foreign particles inside will not move.**

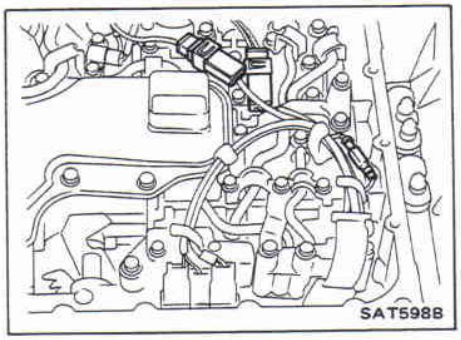


13. Place transmission case on transmission case stand with the control valve facing up.



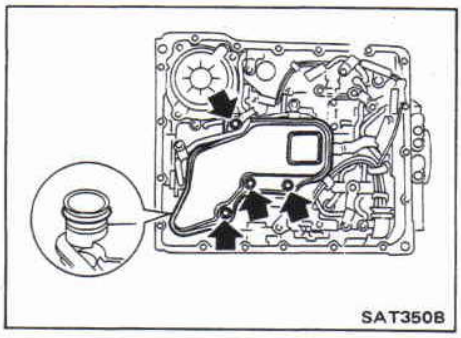
14. Check oil pan and oil strainer for accumulation of foreign particles.
- If materials of clutch facing are found, clutch plates may be worn.
- If metal filings are found, clutch plates, brake bands, etc. may be worn.
- If aluminum filings are found, bushings or aluminum cast parts may be worn.

In above cases, replace torque converter and check unit for cause of particle accumulation.

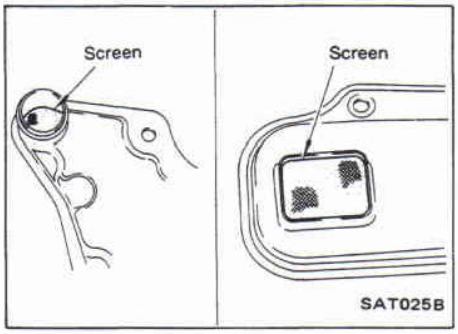


15. Remove lock-up solenoid, fluid temperature sensor and A/T oil temperature switch connectors.
- **Be careful not to damage connector.**

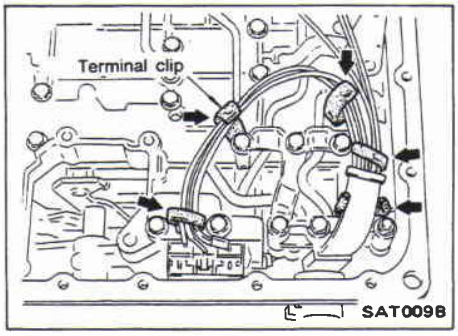
Disassembly (Cont'd)



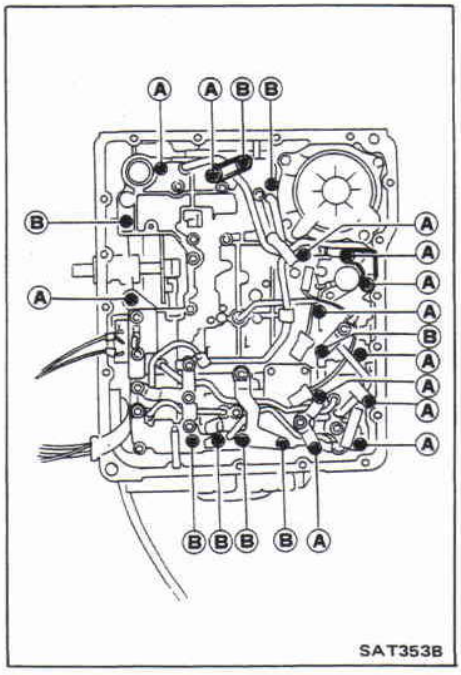
16. Remove oil strainer.
a. Remove oil strainer from control valve assembly. Then remove O-ring from oil strainer.



b. Check oil strainer screen for damage.



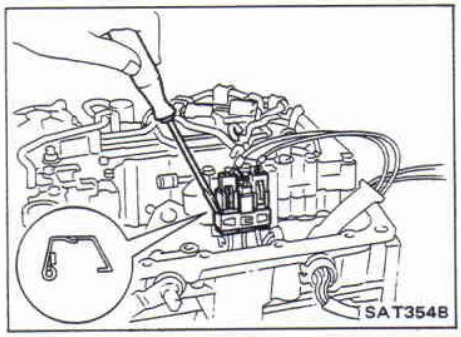
17. Remove control valve assembly.
a. Straighten terminal clips to free terminal cords then remove terminal clips.



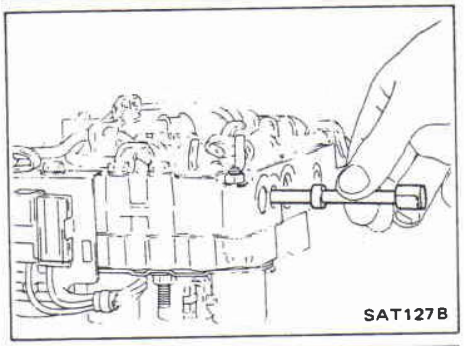
b. Remove bolts Ⓐ and Ⓑ, and remove control valve assembly from transmission.

Bolt symbol	ℓ mm (in) ℓ
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

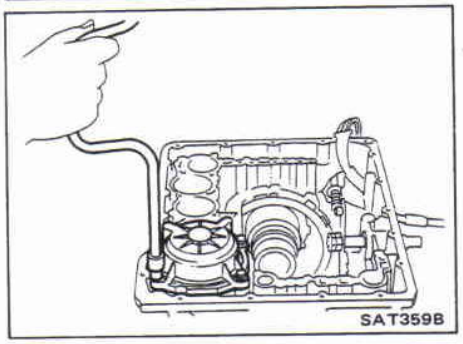
Disassembly (Cont'd)



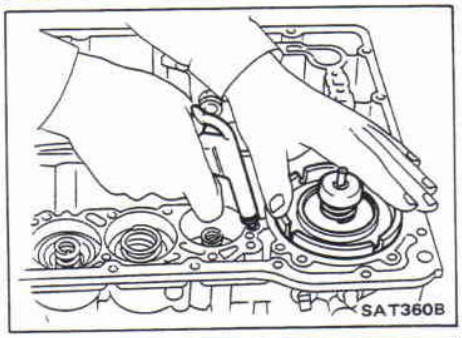
c. Remove solenoid connector.
- **Be careful not to damage connector.**



d. Remove manual valve from control valve assembly.

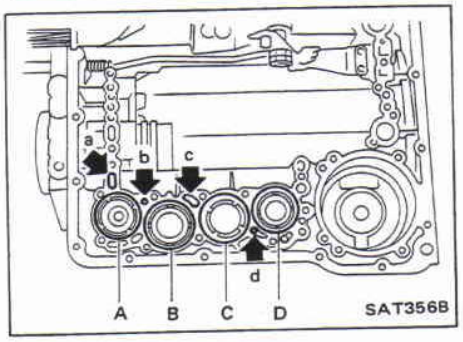


18. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.



b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**

c. Remove return springs.

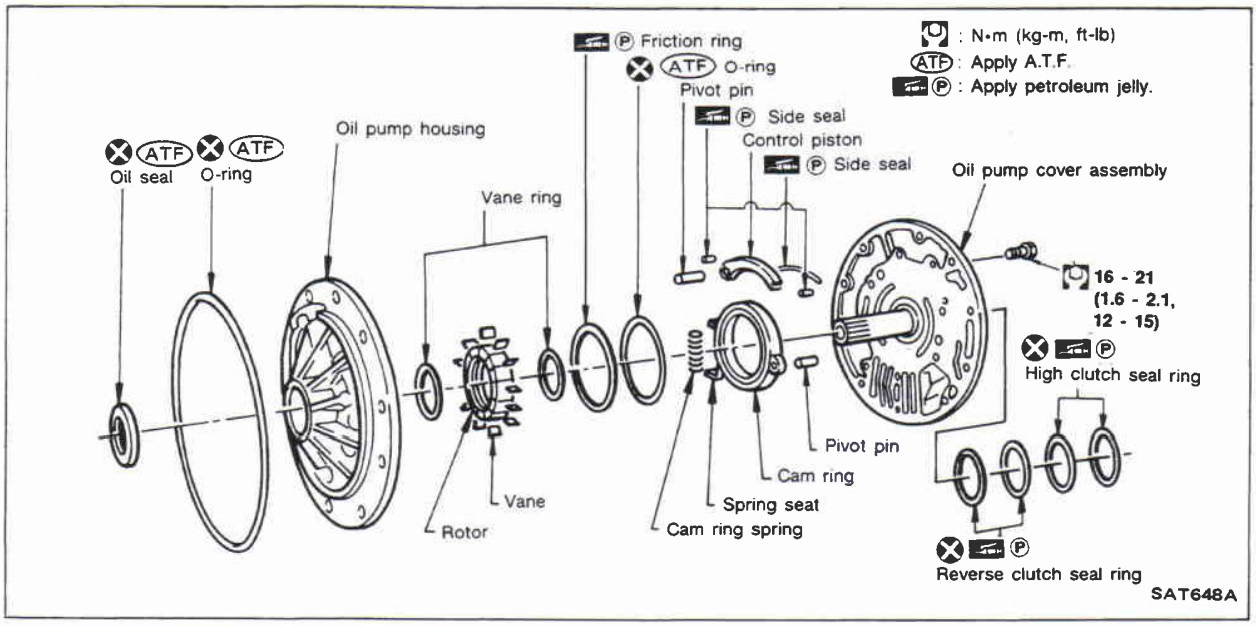


d. Remove springs from accumulator pistons B, C and D.
e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

Identification of accumulator pistons	A	B	C	D
Identification of oil holes	a	b	c	d

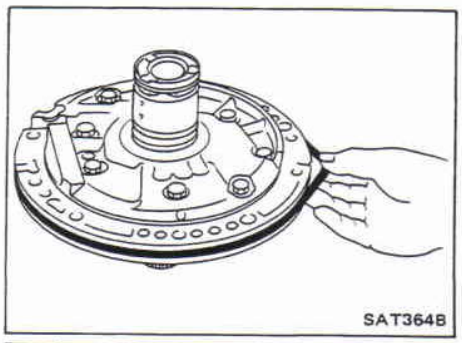
f. Remove O-ring from each piston.

Oil Pump

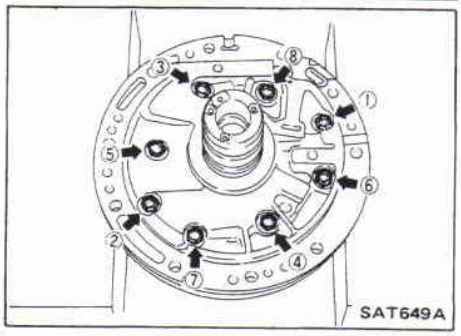


DISASSEMBLY

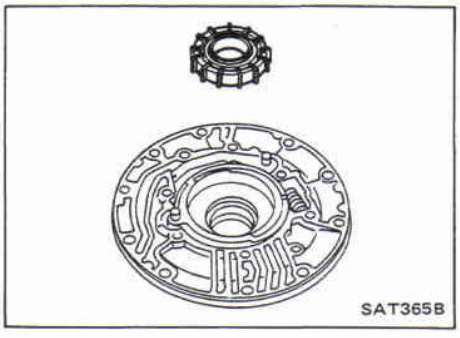
1. Remove O-ring from oil pump assembly.



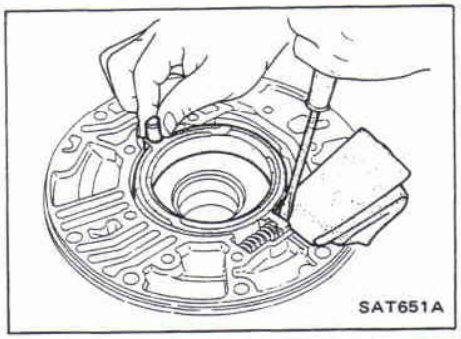
2. Loosen bolts in numerical order and remove oil pump cover.



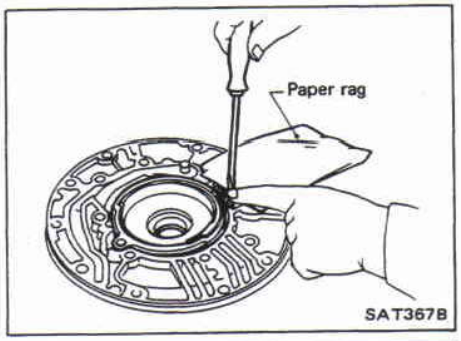
3. Remove rotor, vane rings and vanes.



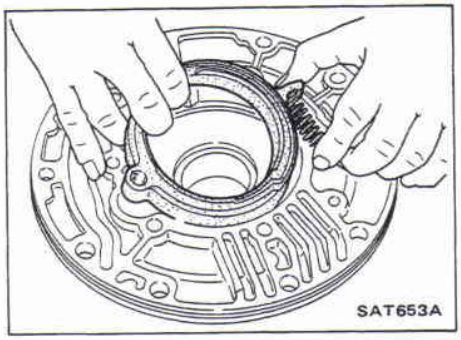
Oil Pump (Cont'd)



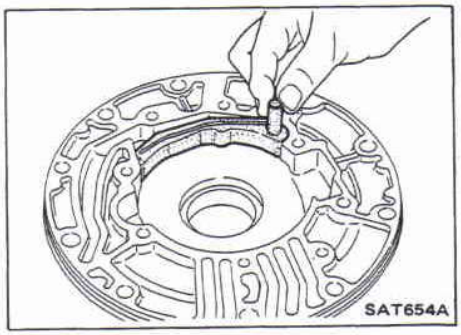
4. While pushing on cam ring remove pivot pin.
- **Be careful not to scratch oil pump housing.**



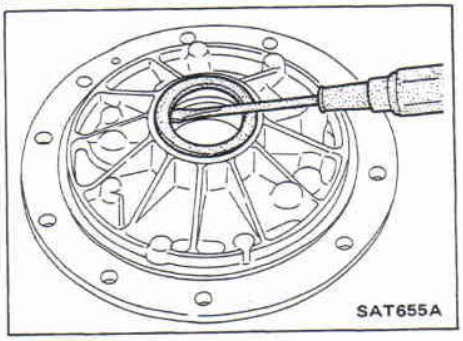
5. While holding cam ring and spring lift out cam ring spring.
- **Be careful not to damage oil pump housing.**
- **Hold cam ring spring to prevent it from jumping.**



6. Remove cam ring from oil pump housing.

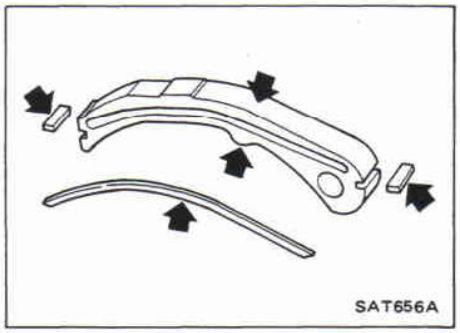


7. Remove pivot pin from control piston and remove control piston assembly.



8. Remove oil seal from oil pump housing.
- **Be careful not to scratch oil pump housing.**

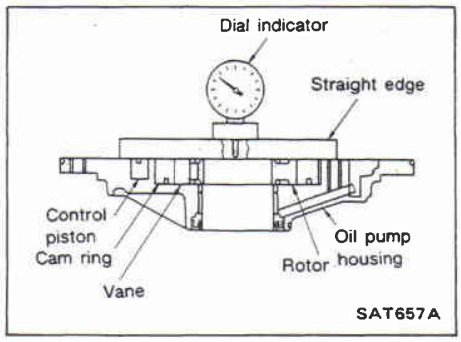
Oil Pump (Cont'd)


SAT656A

INSPECTION

Oil pump cover, rotor, vanes, control piston, side seals, cam ring and friction ring

- Check for wear or damage.



SAT657A

Side clearances

- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences. Maximum measured values should be within specified ranges.
- **Before measuring side clearance, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**

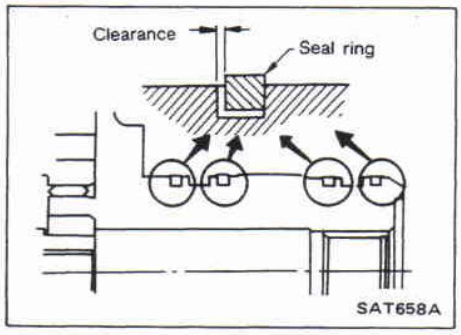
  Standard clearance:

  Cam ring

  0.01 - 0.024 mm (0.0004 - 0.0009 in)

  Rotor, vanes, control piston

  0.03 - 0.044 mm (0.0012 - 0.0017 in)
- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.



SAT658A

Seal ring clearance

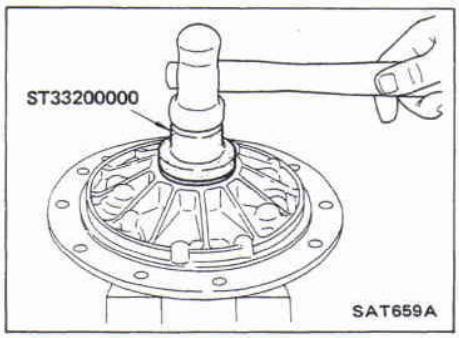
- Measure clearance between seal ring and ring groove.

  Standard clearance:

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

  Wear limit:

  0.25 mm (0.0098 in)
- If not within wear limit, replace oil pump cover assembly.

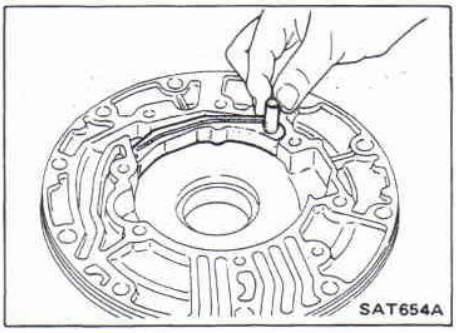


SAT659A

ASSEMBLY

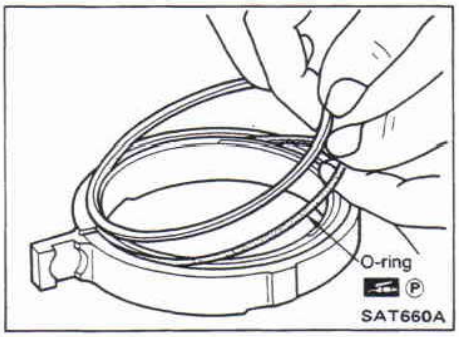
1. Drive oil seal into oil pump housing.
- **Apply A.T.F. to outer periphery and lip surface.**

Oil Pump (Cont'd)

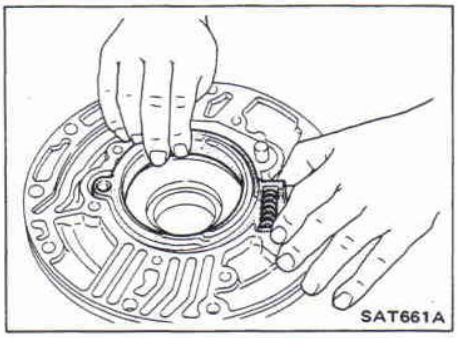


2. Install cam ring in oil pump housing by the following steps.
a. Install side seal on control piston.
- **Pay attention to its direction. — Black surface goes toward control piston.**
- **Apply petroleum jelly to side seal.**

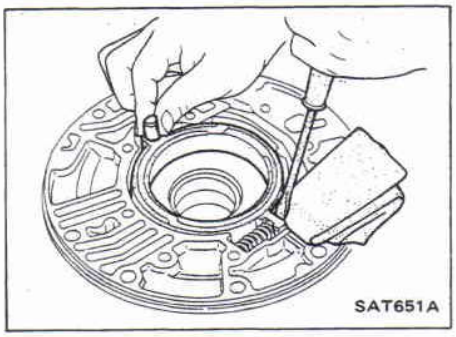
b. Install control piston on oil pump.



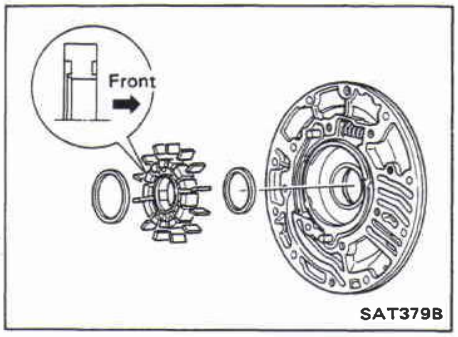
c. Install O-ring and friction ring on cam ring.
- **Apply petroleum jelly to O-ring.**



d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.

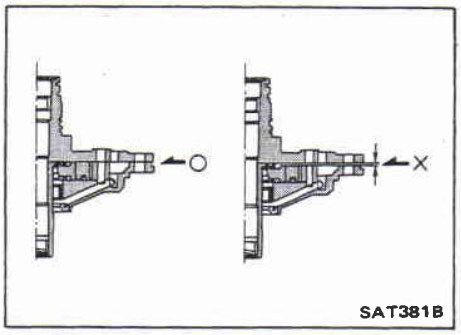


e. While pushing on cam ring install pivot pin.

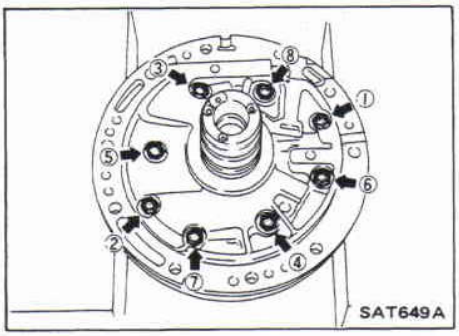


3. Install rotor, vanes and vane rings.
- **Pay attention to direction of rotor.**

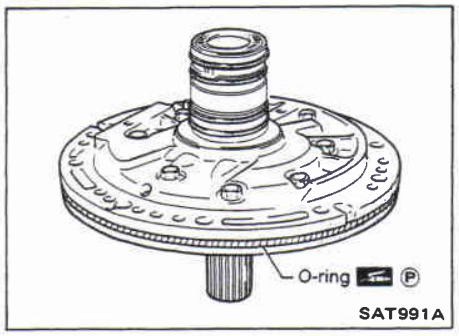
Oil Pump (Cont'd)



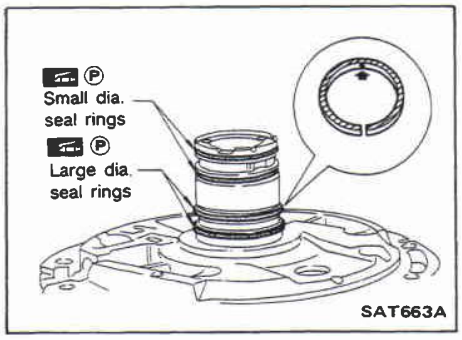
4. Install oil pump housing and oil pump cover.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
- **Make sure that oil pump cover assembly is assembled on oil pump housing assembly correctly.**



b. Tighten bolts in a criss-cross pattern.

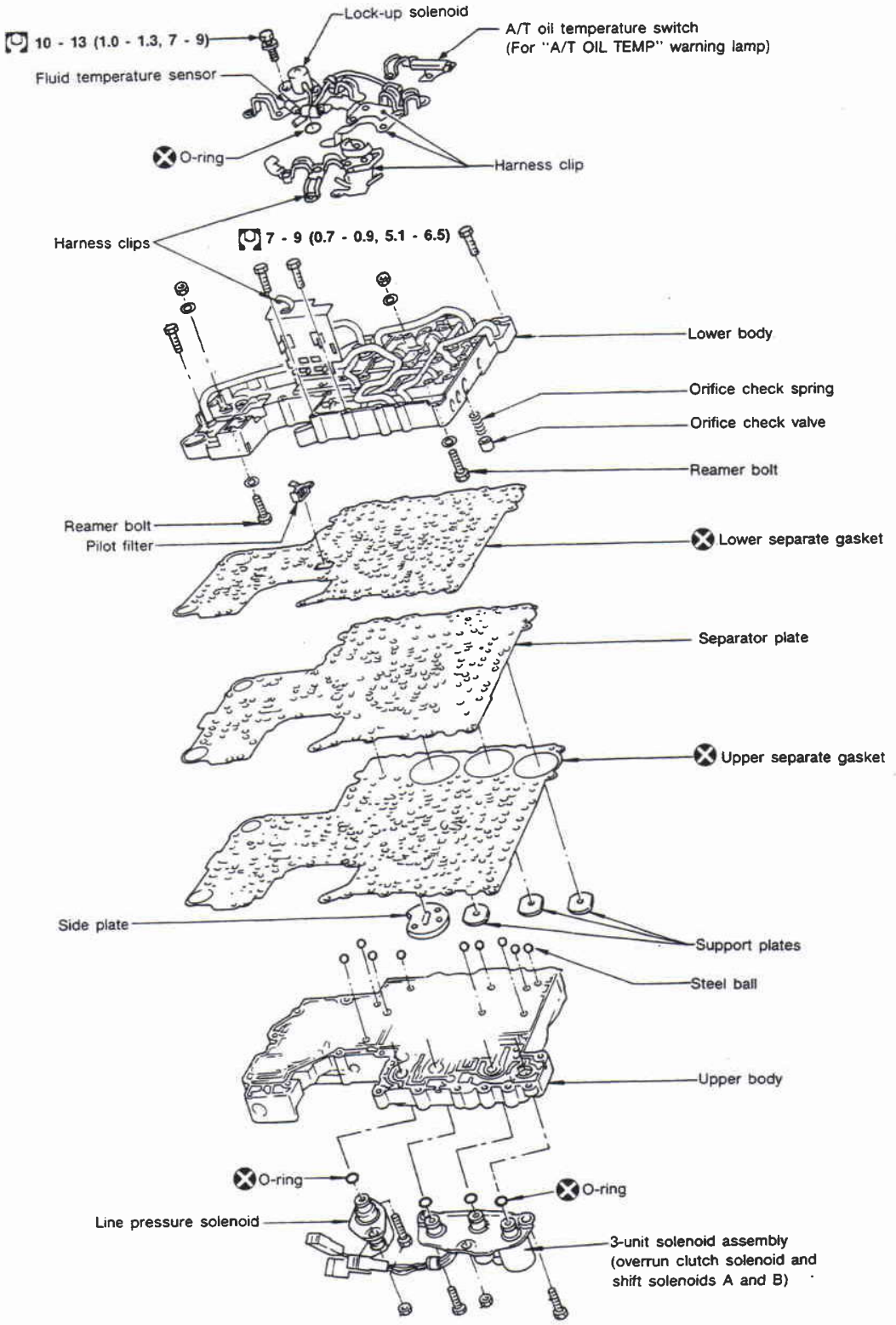


5. Install O-ring on oil pump assembly.
- **Apply petroleum jelly to O-ring.**



6. Install seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.
- **Seal rings come in two different diameters. Check fit carefully in each groove.**
  Small dia. seal ring:
  No mark
  Large dia. seal ring:
  Yellow mark in area shown by arrow
- **Do not spread gap of seal ring excessively while installing. It may deform ring.**

Control Valve Assembly



: N•m (kg-m, ft-lb)

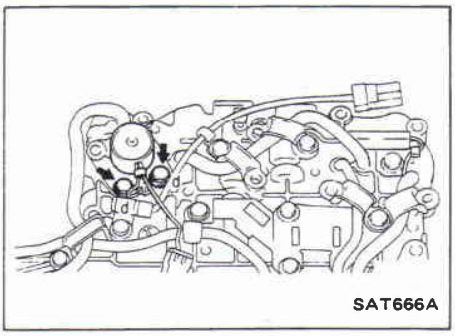
SAT665A

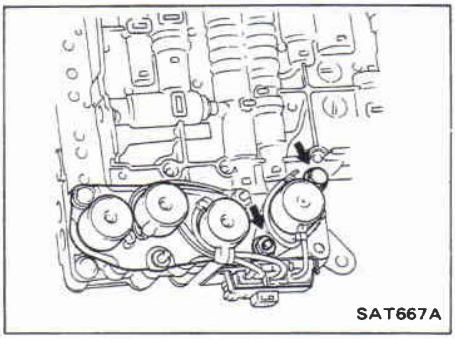
Control Valve Assembly (Cont'd)

DISASSEMBLY

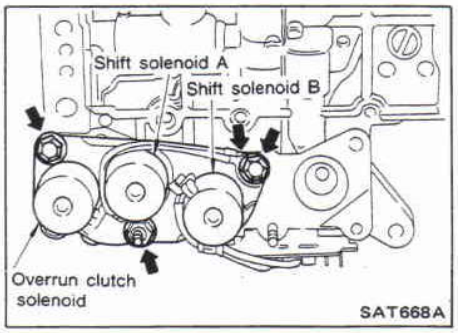
1. Remove solenoids.

a. Remove lock-up solenoid and side plate from lower body.
b. Remove O-ring from solenoid.


SAT666A

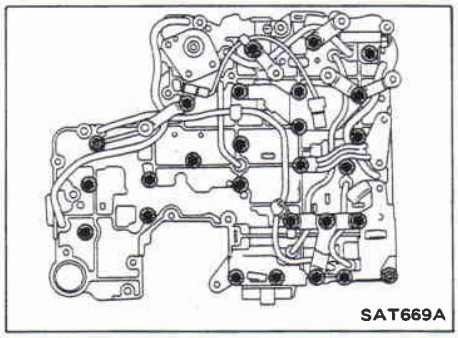

SAT667A

c. Remove line pressure solenoid from upper body.
d. Remove O-ring from solenoid.



SAT668A

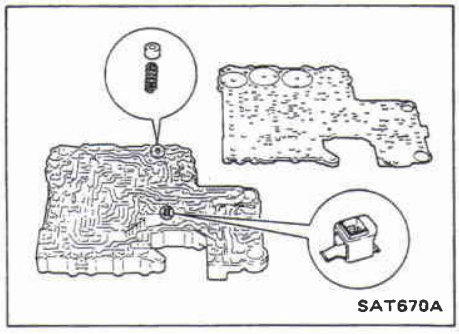
e. Remove 3-unit solenoid assembly from upper body.
f. Remove O-rings from solenoids.


SAT669A

2. Disassemble upper and lower bodies.

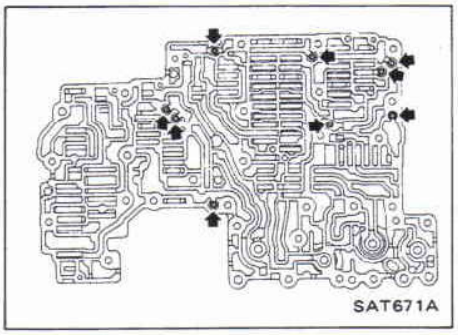
a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
b. Remove lower body, separator plate and separate gasket as a unit from upper body.

- **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**


SAT670A

c. Place lower body facedown, and remove separate gasket and separator plate.
d. Remove pilot filter, orifice check valve and orifice check spring.

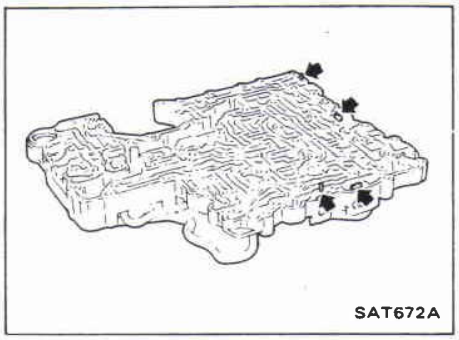
Control Valve Assembly (Cont'd)


SAT671A

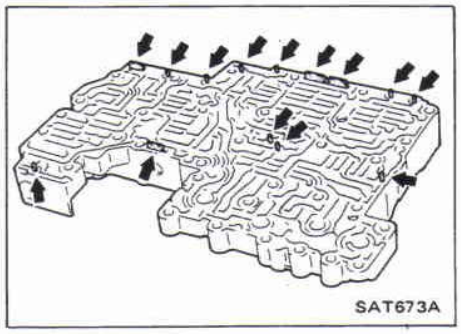
e. Check to see that steel balls are properly positioned in upper body and then remove them from upper body.

INSPECTION

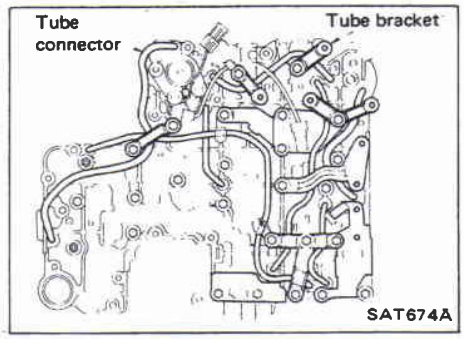
Lower and upper bodies


SAT672A

- Check to see that there are pins and retainer plates in lower body.


SAT673A

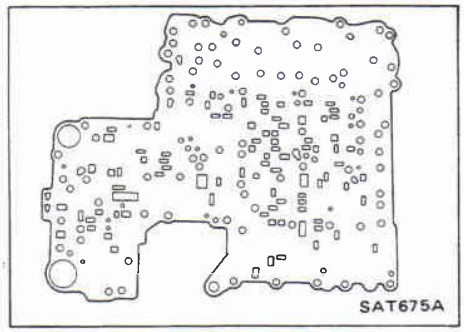
- Check to see that there are pins and retainer plates in upper body.
- **Be careful not to lose these parts.**



SAT674A

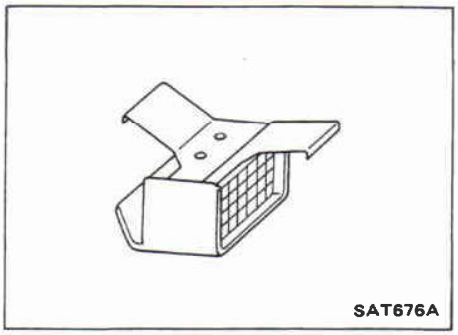
- Check to make sure that oil circuits are clean and free from damage.
- Check tube brackets and tube connectors for damage.

Separator plates


SAT675A

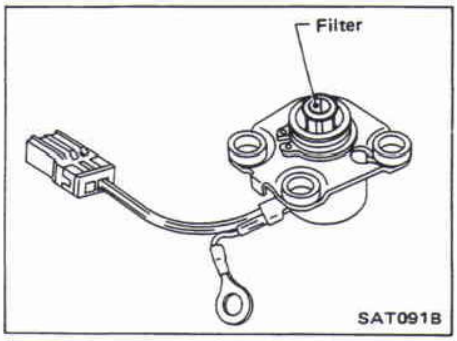
- Check to make sure that separator plate is free of damage and not deformed and oil holes are clean.

Control Valve Assembly (Cont'd)



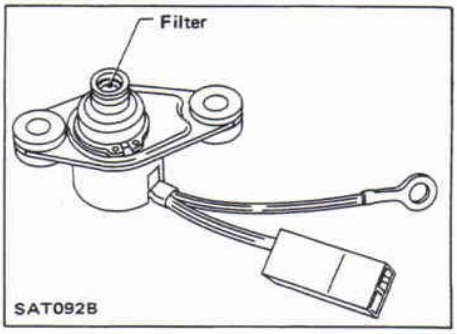
Pilot filter

- Check to make sure that filter is not clogged or damaged.



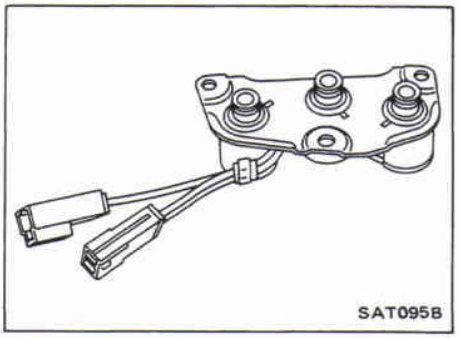
Lock-up solenoid

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical System".



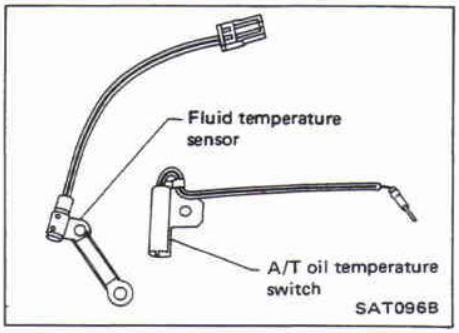
Line pressure solenoid

- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical System".



3-unit solenoid assembly (Overrun clutch solenoid and shift solenoids A and B)

- Measure resistance of each solenoid. — Refer to "Electrical System".



Fluid temperature sensor and A/T oil temperature switch

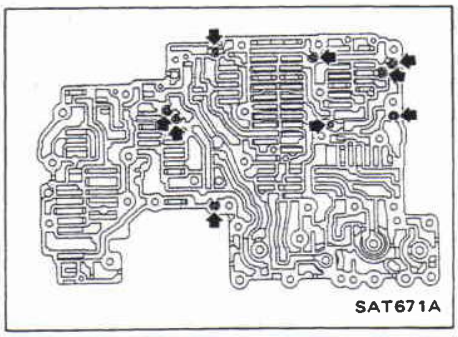
- Measure resistance. — Refer to "Electrical System".

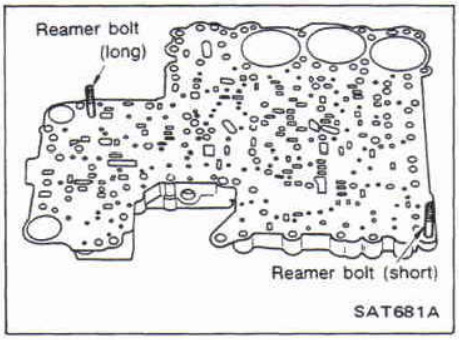
Control Valve Assembly (Cont'd)

ASSEMBLY

1. Install upper and lower bodies.

a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

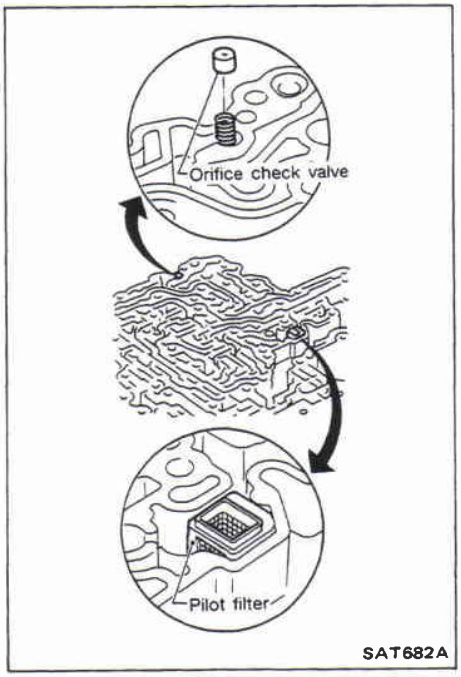

SAT671A



SAT681A

b. Install reamer bolts from bottom of upper body and install separate gaskets.

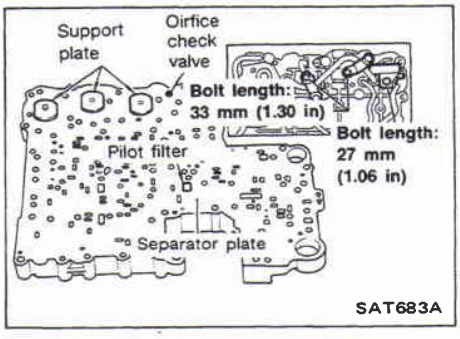
c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.



SAT682A

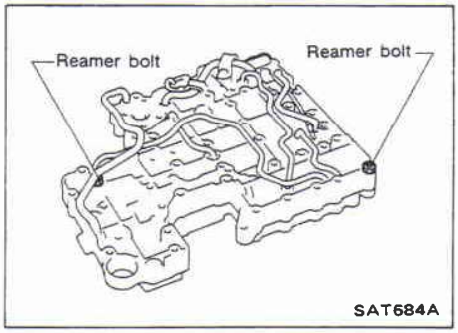
d. Install lower separate gaskets and separator plates on lower body.

e. Install and temporarily tighten support plates, A/T oil temperature switch and tube brackets.



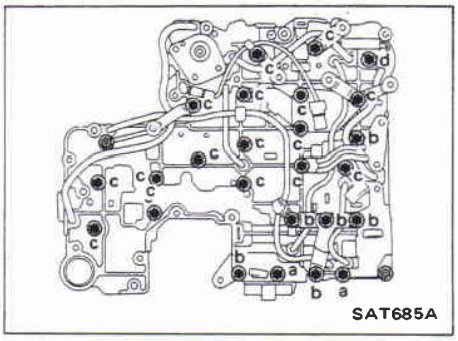
SAT683A

Control Valve Assembly (Cont'd)



f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

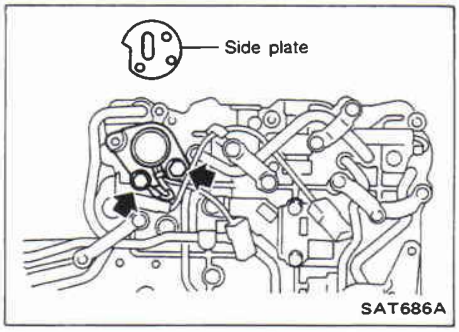
- **Be careful not to dislocate or drop steel balls, orience check spring, orifice check valve and pilot filter.**



g. Install and temporarily tighten bolts and tube brackets in their proper locations.

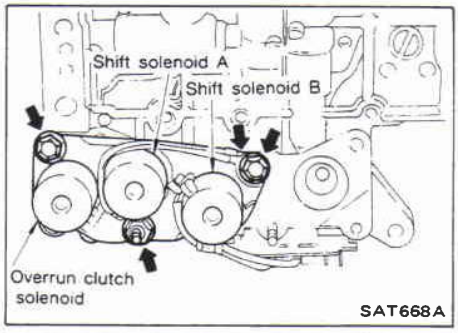
Bolt length and location

Item \ Bolt symbol		a	b	c	d
Bolt length	mm (in)	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)

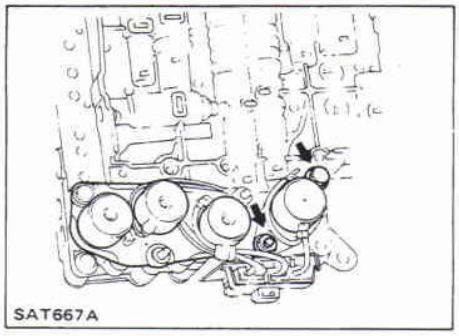


2. Install solenoids.

a. Attach O-ring and install lock-up solenoid and side plates onto lower body.



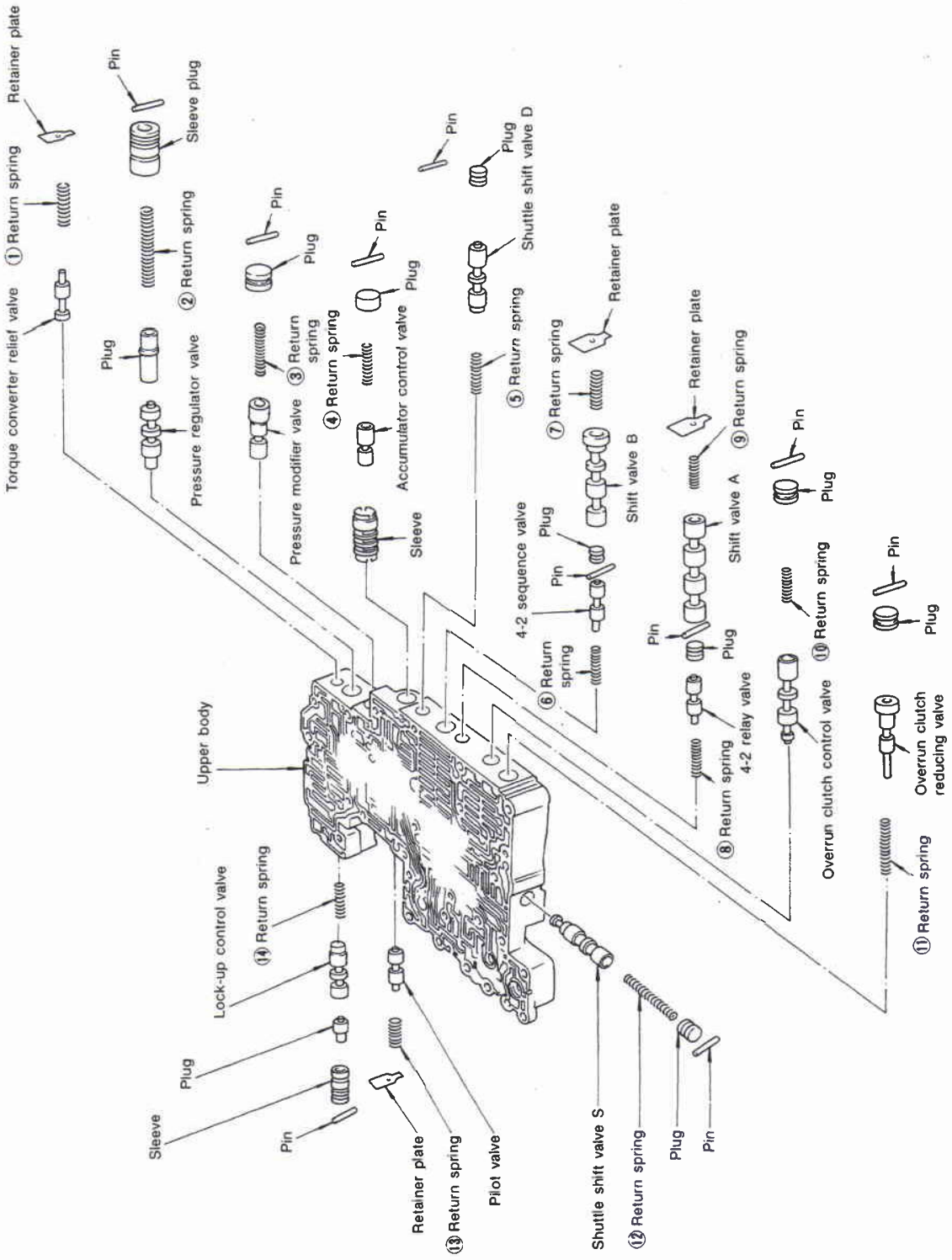
b. Attach O-rings and install 3-unit solenoids assembly onto upper body.



c. Attach O-ring and install line pressure solenoid onto upper body.

3. Tighten all bolts.

Control Valve Upper Body



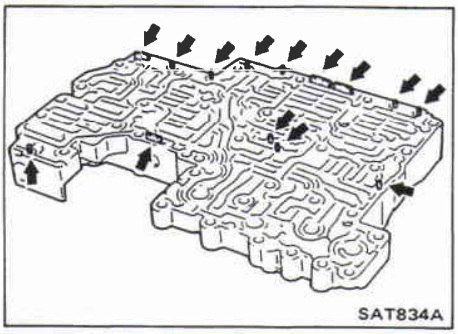
Numbers preceding valve springs correspond with those shown in Spring Chart on page AT-108.

Apply A.T.F. to all components before their installation.

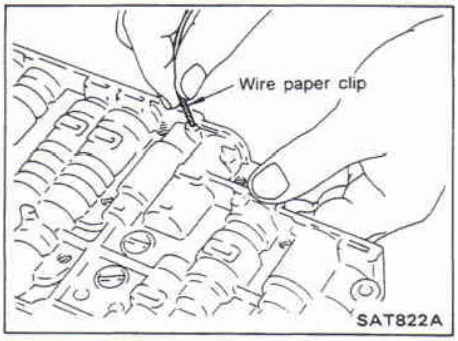
SAT820A

Control Valve Upper Body (Cont'd)

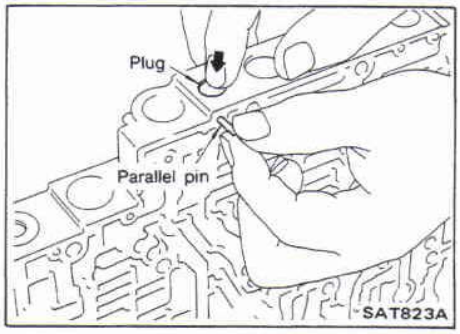
DISASSEMBLY



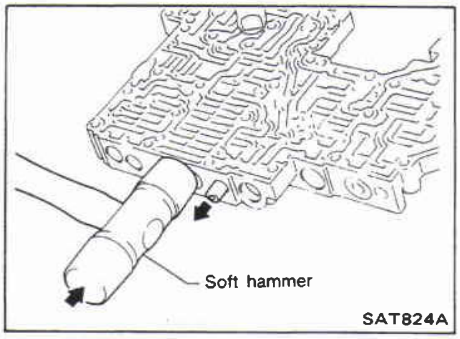
1. Remove valves at parallel pins.
- **Do not use a magnetic hand.**



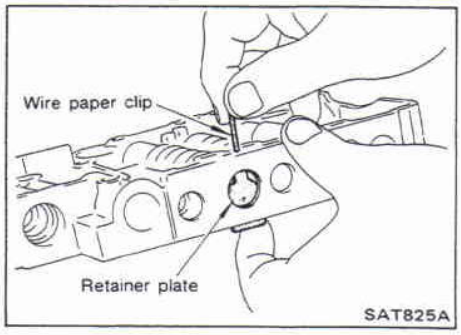
a. Use a wire paper clip to push out parallel pins.



b. Remove parallel pins while pressing their corresponding plugs and sleeves.
- **Remove plug slowly to prevent internal parts from jumping out.**



c. Place mating surface of valve facedown, and remove internal parts.
- **If a valve is hard to remove, place valve body facedown and lightly tap it with a soft hammer.**
- **Be careful not to drop or damage valves and sleeves.**

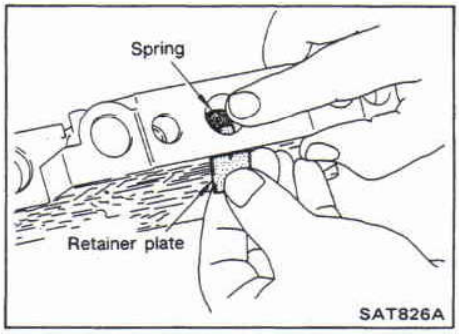


2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.

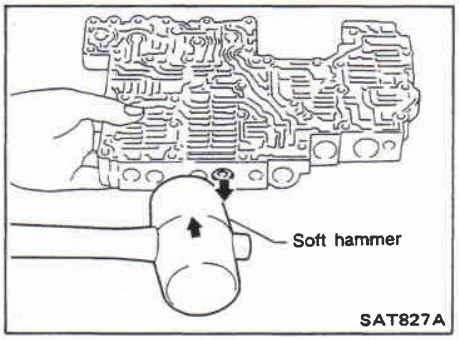
Control Valve Upper Body (Cont'd)

b. Remove retainer plates while holding spring.

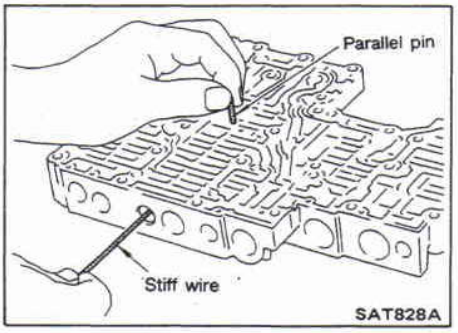


c. Place mating surface of valve facedown, and remove internal parts.

- **If a valve is hard to remove, lightly tap valve body with a soft hammer.**
- **Be careful not to drop or damage valves, sleeves, etc.**

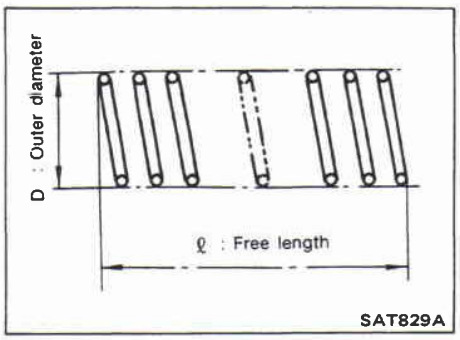


- 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.
- **Be careful not to scratch sliding surface of valve with wire.**



Control Valve Upper Body (Cont'd)

INSPECTION



Valve springs

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
- Numbers of each valve spring listed in table below are the same as those in the figure on AT-105.

Inspection standard

Unit: mm (in)

Parts / Item		Part No.	ℓ	D
①	Torque converter relief valve spring	31742-41X18	32.3 (1.272)	9.0 (0.354)
②	Pressure regulator valve spring	31742-41X16	61.5 (2.421)	8.9 (0.350)
③	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
④	Accumulator control plug spring	31742-41X17	27.5 (1.083)	6.6 (0.260)
⑤	Shuttle shift valve D spring	31762-41X00	26.5 (1.043)	6.0 (0.236)
⑥	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
⑦	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
⑧	4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
⑨	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
⑩	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
⑪	Overrun clutch reducing valve spring	31742-41X14	38.9 (1.531)	7.0 (0.276)
⑫	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
⑬	Pilot valve spring	31742-41X13	25.7 (1.012)	9.1 (0.358)
⑭	Lock-up control valve spring	31742-41X21	33.0 (1.299)	6.5 (0.256)

- Replace valve springs if deformed or fatigued.

Control valves

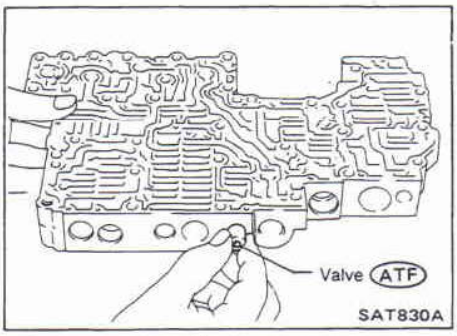
- Check sliding surfaces of valves, sleeves and plugs.

Control Valve Upper Body (Cont'd)

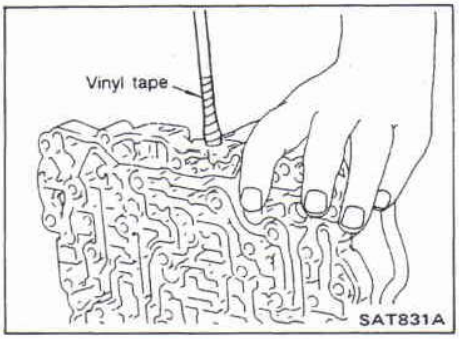
ASSEMBLY

1. Lubricate the control valve body and all valves with A.T.F. Install control valves by sliding them carefully into their bores.

- **Be careful not to scratch or damage valve body.**

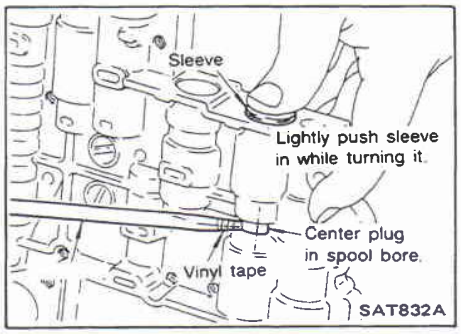


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



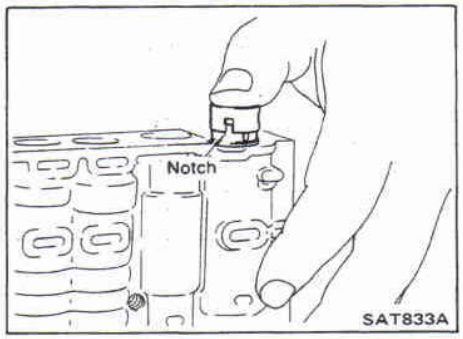
Pressure regulator valve

- If pressure regulator plug is not centered properly, sleeve cannot be inserted into bore in upper body.
  If this happens, use vinyl tape wrapped screwdriver to center sleeve until it can be inserted.
- Turn sleeve slightly while installing.

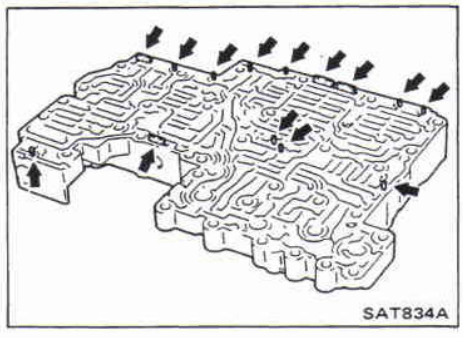


Accumulator control plug

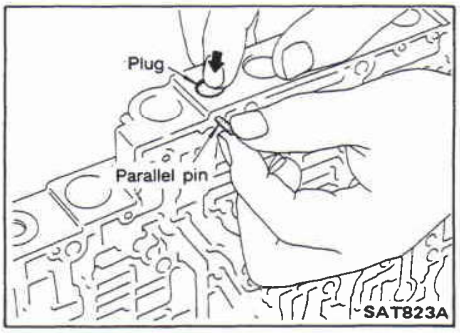
- Align protrusion of accumulator control sleeve with notch in plug.
- Align parallel pin groove in plug with parallel pin, and install accumulator control valve.



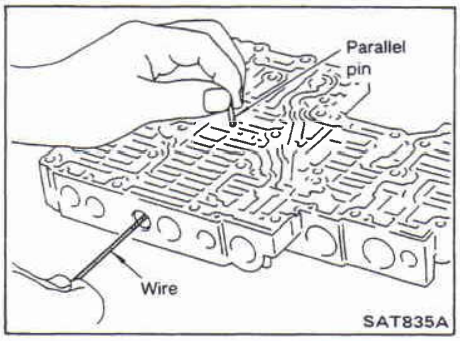
2. Install parallel pins and retainer plates.



Control Valve Upper Body (Cont'd)

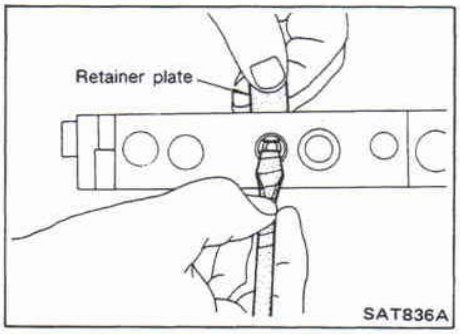


- **While pushing plug, install parallel pin.**

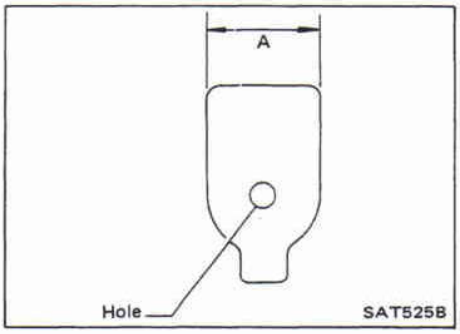


4-2 sequence valve and relay valve

- Push 4-2 sequence valve and relay valve with wire wrapped in vinyl tape to prevent scratching valve body. Install parallel pins.



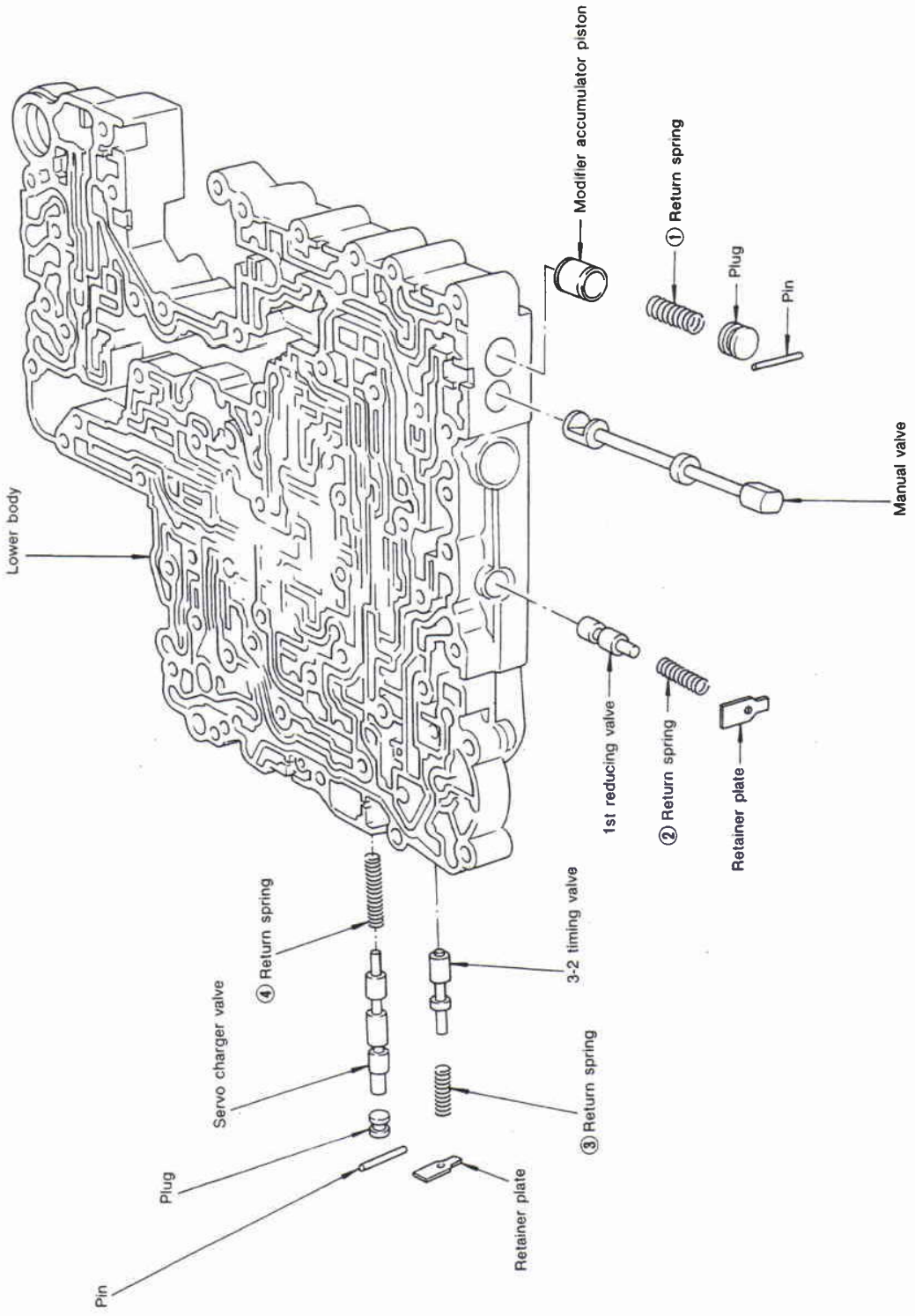
- Insert retainer plate while pushing spring.



Retainer plate

Parts	A mm (in)
Shift valve A	15 (0.59)
Shift valve B	17 (0.67)
Pilot valve	13 (0.51)
Torque converter relief valve	13 (0.51)

Control Valve Lower Body

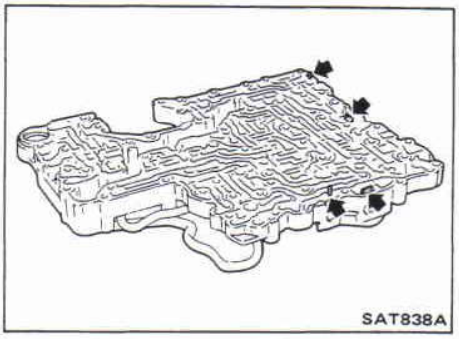


Numbers preceding valve springs correspond with those shown in Spring Chart on page AT-112.

Apply A.T.F. to all components before their installation.

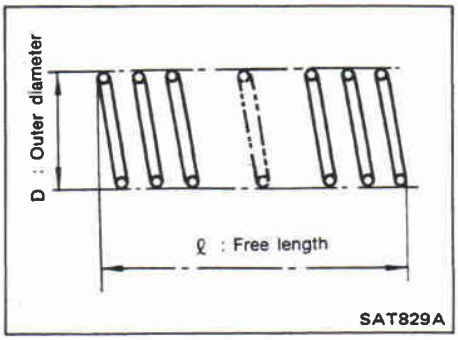
SAT837A

Control Valve Lower Body (Cont'd)


SAT838A

DISASSEMBLY

1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
   For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body.



SAT829A

INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers of each valve spring listed in table below are the same as those in the figure on AT-111.

Inspection standard

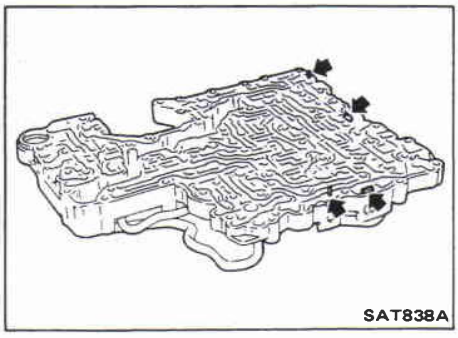
Unit: mm (in)

Parts / Item		Part No.	ℓ	D
①	Modifier accumulator piston spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
②	1st reducing valve spring	31756-41X05	25.4 (1.000)	6.75 (0.2657)
③	3-2 timing valve spring	31742-41X08	20.55 (0.8091)	6.75 (0.2657)
④	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)

- Replace valve springs if deformed or fatigued.

Control valves

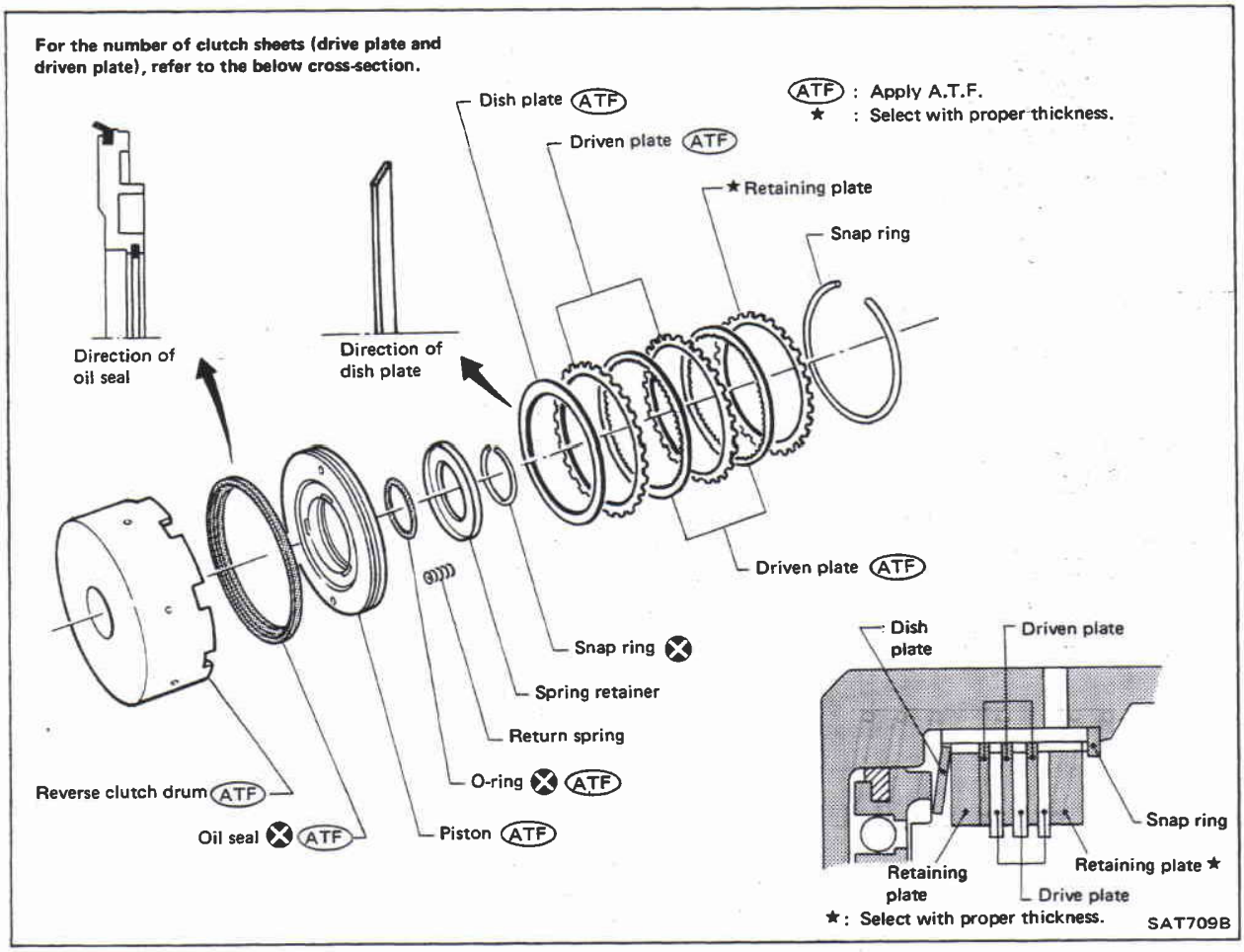
- Check sliding surfaces of control valves, sleeves and plugs for damage.

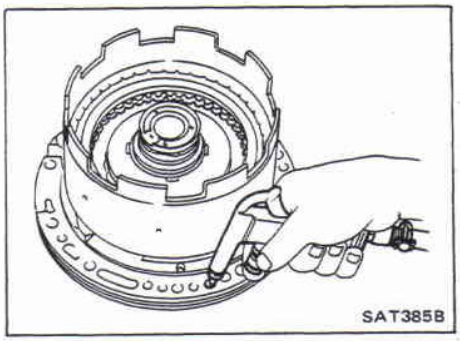

SAT838A

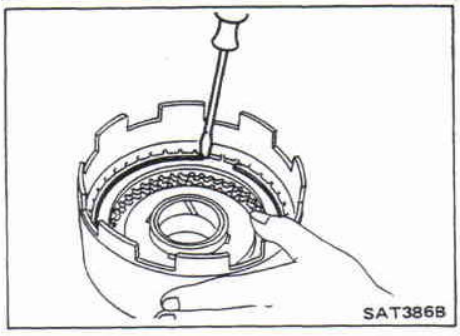
ASSEMBLY

- Install control valves.
  For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body.

Reverse Clutch



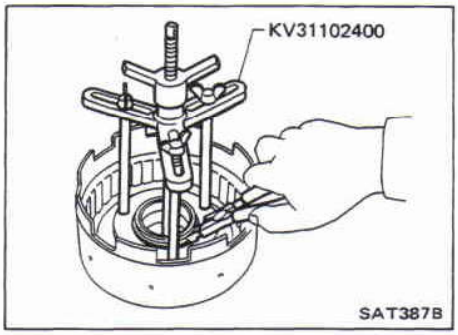




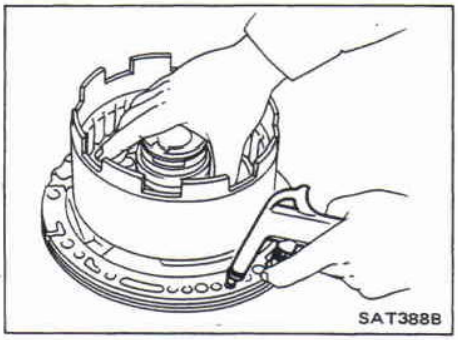
DISASSEMBLY

1. Check operation of reverse clutch.
   a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
   b. Check to see that retaining plate moves to snap ring.
   c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.
2. Remove drive plates, driven plates, retaining plate, dish plate and snap ring.

Reverse Clutch (Cont'd)



3. Remove snap ring from clutch drum while compressing clutch springs.
- **Do not expand snap ring excessively.**
4. Remove spring retainer and return spring.

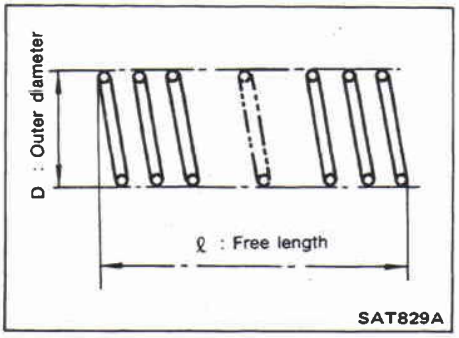


5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
- **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

- Check for deformation, fatigue or damage.



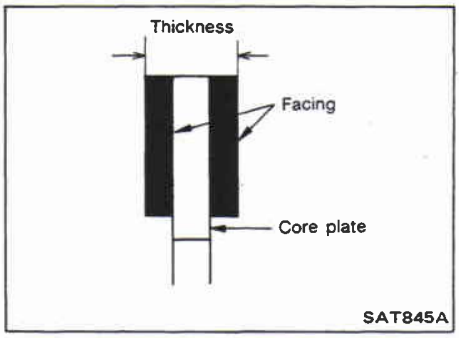
Reverse clutch return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard

Unit: mm (in)

Part No.	ℓ	D
31505-51X00	37.18 (1.4638)	14.8 (0.583)



Reverse clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value

2.0 mm (0.079 in)

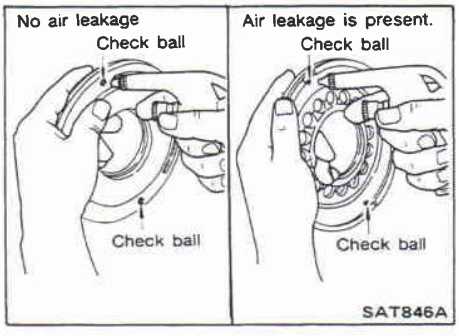
Wear limit

1.8 mm (0.071 in)

- If not within wear limit, replace.

Reverse clutch dish plate

- Check for deformation or damage.

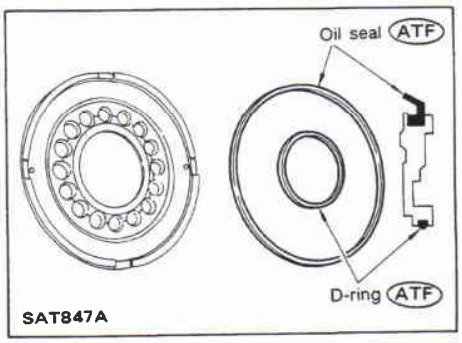


Reverse clutch piston

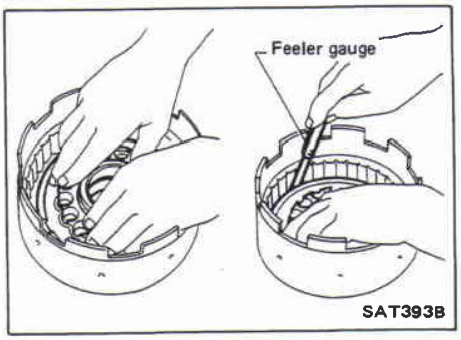
- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring to assure that there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.

Reverse Clutch (Cont'd)

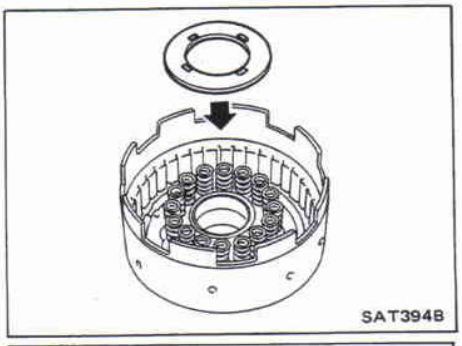
ASSEMBLY



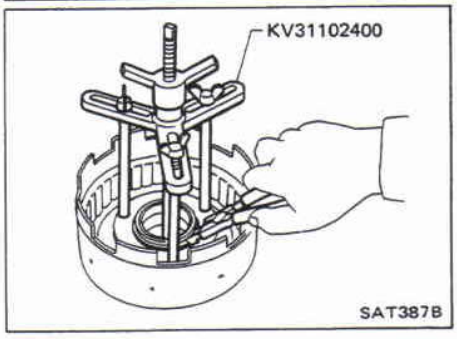
1. Install D-ring and oil seal on piston.
   - **Apply A.T.F. to both parts.**



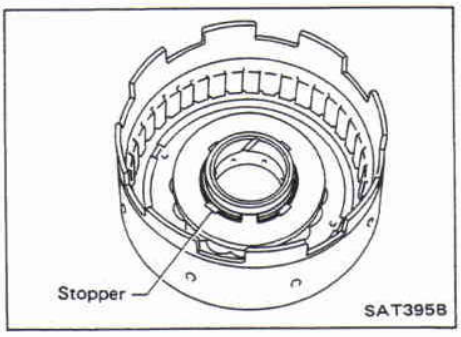
2. Install piston assembly by turning it slowly and evenly.
   - **Apply A.T.F. to inner surface of drum.**
   - **Use feeler gauge, that will not damage lip seal, to make sure lip seal goes into place.**



3. Install return springs and spring retainer.

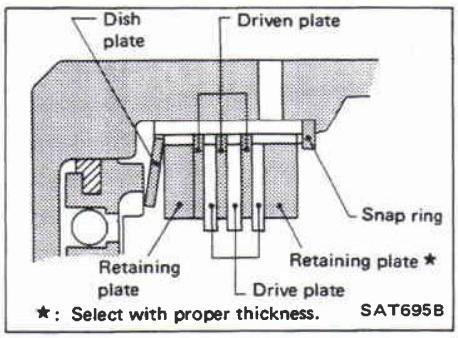


4. Install snap ring while compressing clutch springs.

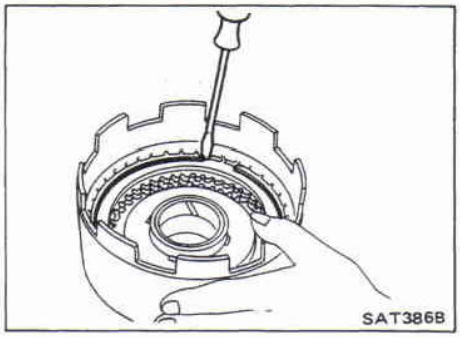


- **Do not align snap ring gap with spring retainer stopper.**

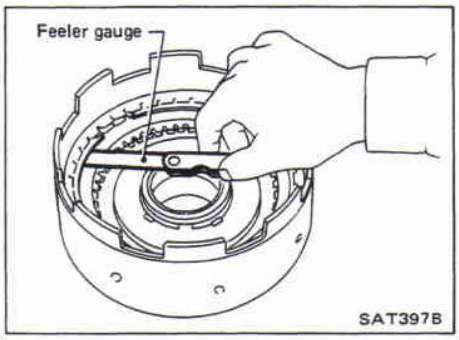
Reverse Clutch (Cont'd)



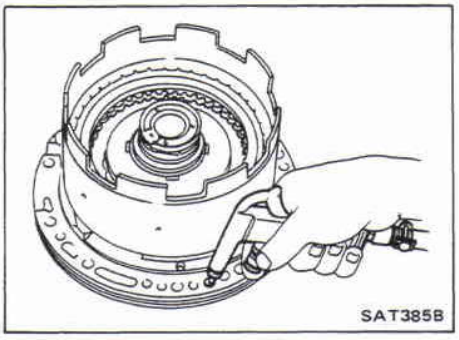
5. Install drive plates, driven plates, retaining plate and dish plate.



6. Install snap ring.

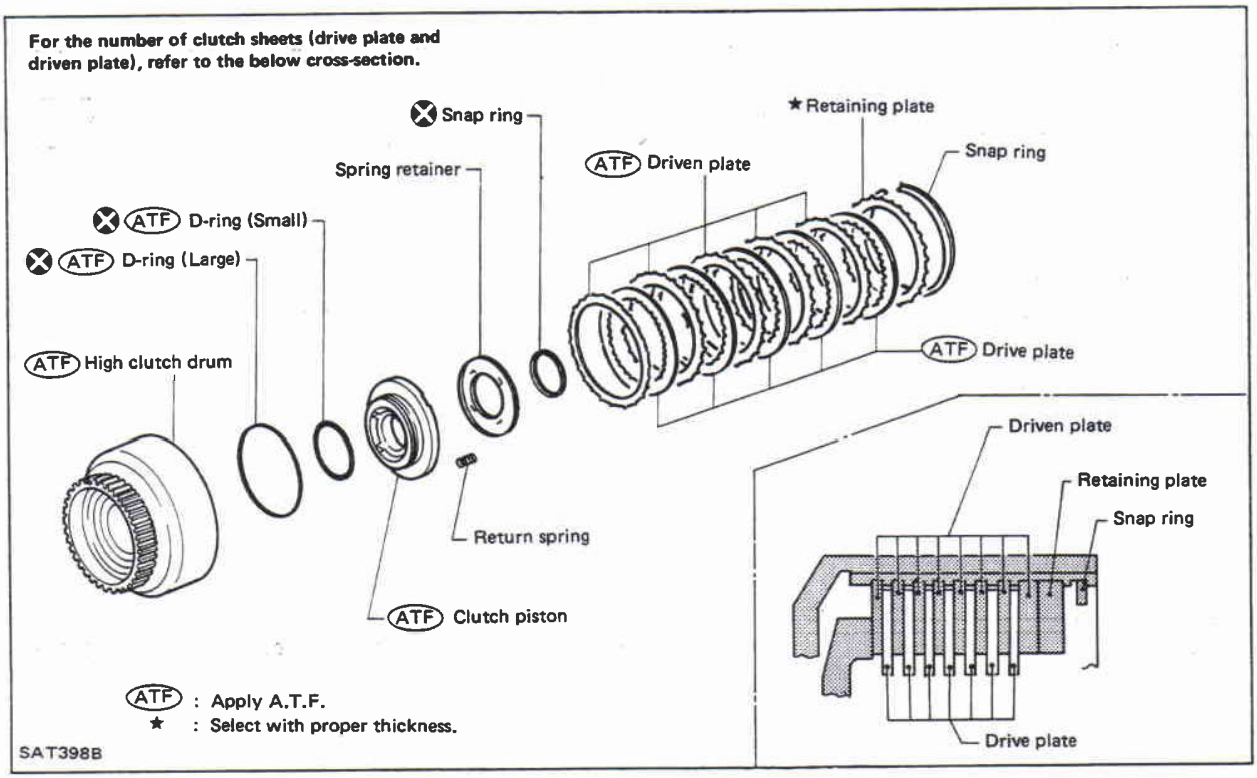


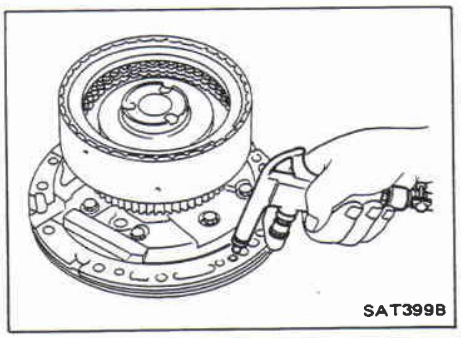
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard
   0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit
   1.4 mm (0.055 in)
   Retaining plate:
   Refer to S.D.S.



8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY" of Reverse Clutch.

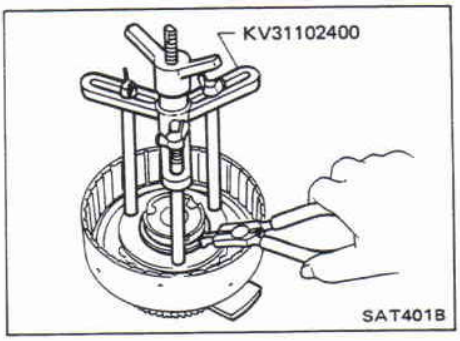
High Clutch





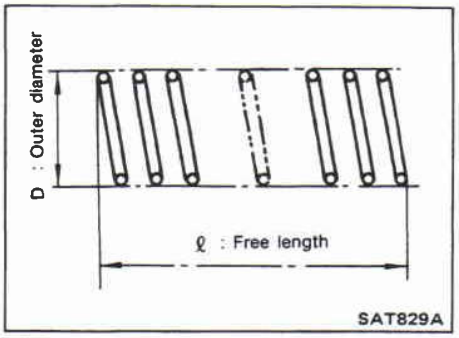
Service procedures for high clutch are essentially the same as those for reverse clutch, with the following exception:

- Check of high clutch operation



- Removal and installation of return spring

High Clutch (Cont'd)

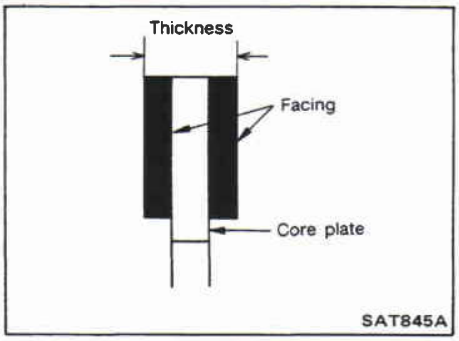


- Inspection of high clutch return springs

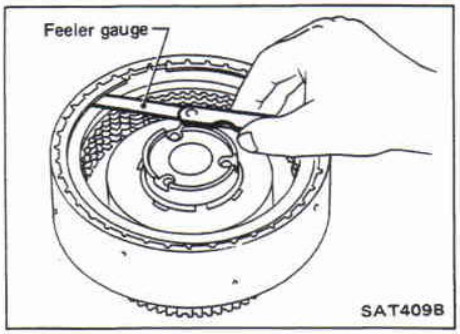
Inspection standard

Unit: mm (in)

Part No.	ℓ	D
31505-21X03	22.06 (0.8685)	11.6 (0.457)



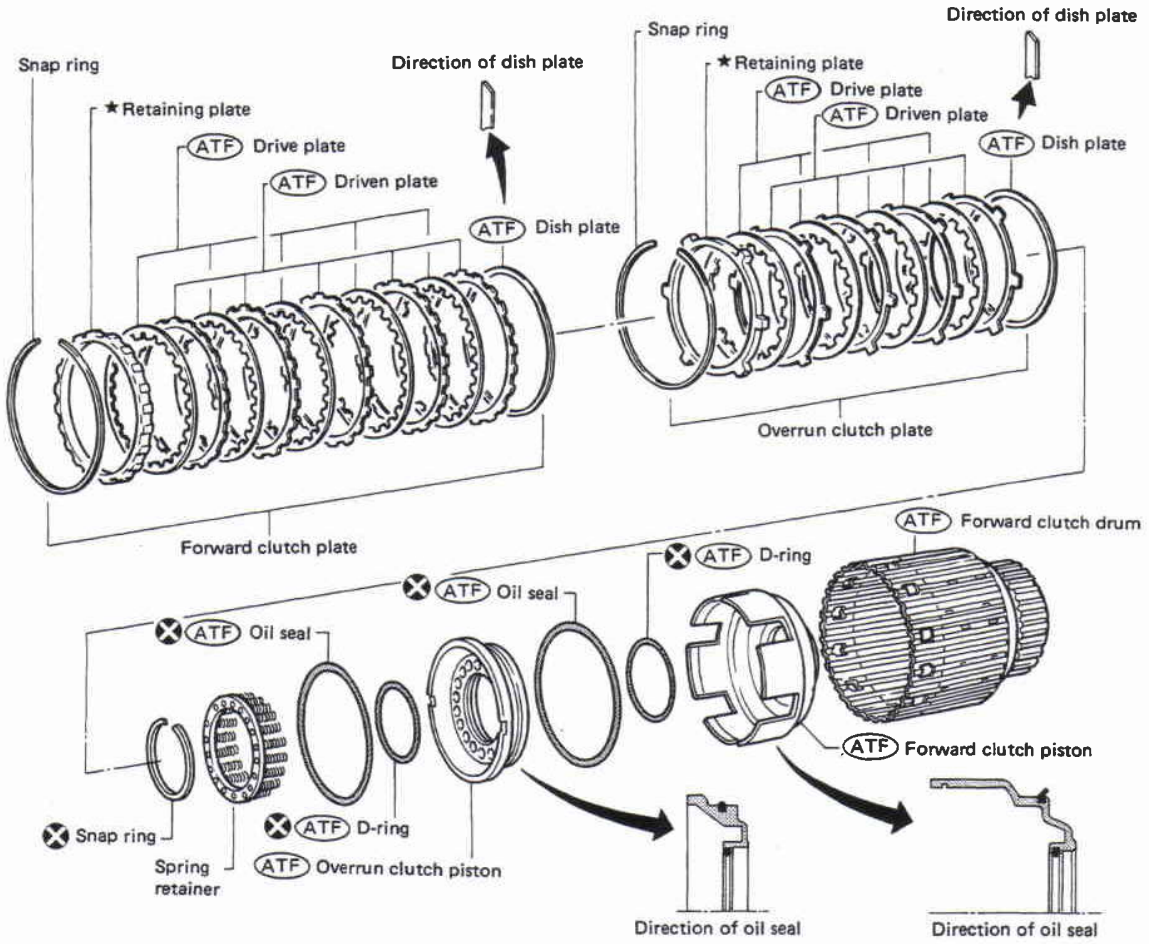
- Inspection of high clutch drive plate
  - **Thickness of drive plate:**
    - **Standard**
      - **1.6 mm (0.063 in)**
    - **Wear limit**
      - **1.4 mm (0.055 in)**

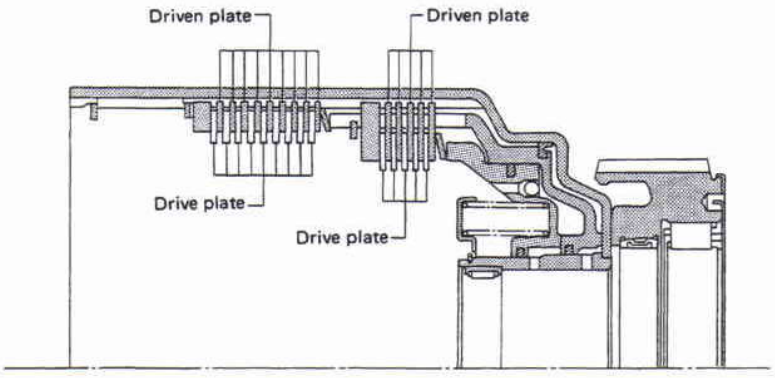


- Measurement of clearance between retaining plate and snap ring
  - **Specified clearance:**
    - **Standard**
      - **1.8 - 2.2 mm (0.071 - 0.087 in)**
    - **Allowable limit**
      - **3.6 mm (0.142 in)**
  - **Retaining plate:**
    - **Refer to S.D.S.**

Forward and Overrun Clutches

For the number of clutch sheets (drive plate and driven plate), refer to the below cross-section.





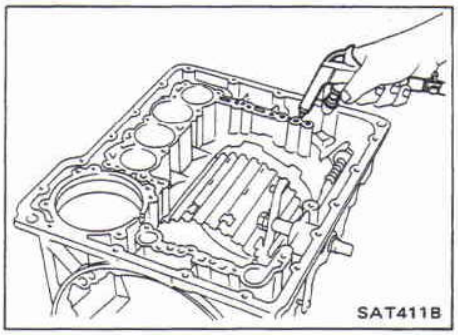
ATF : Apply A.T.F.
★ : Select with proper thickness.

SAT410B

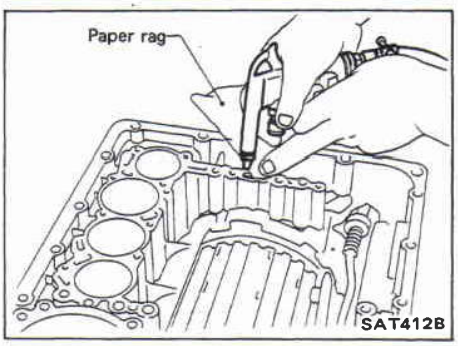
Forward and Overrun Clutches (Cont'd)

Service procedures for forward and overrun clutches are essentially the same as those for reverse clutch, with the following exception:

- Check of forward clutch operation

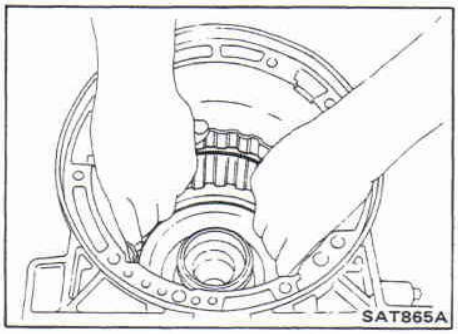


- Check of overrun clutch operation



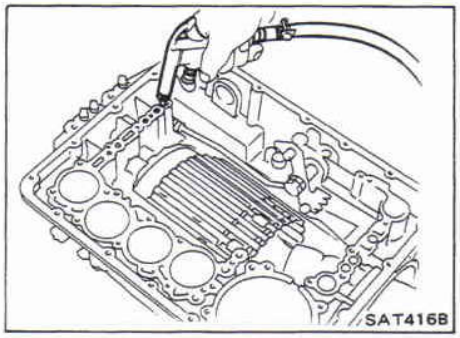
- Removal of forward clutch drum

  Remove forward clutch drum from transmission case by holding snap ring.

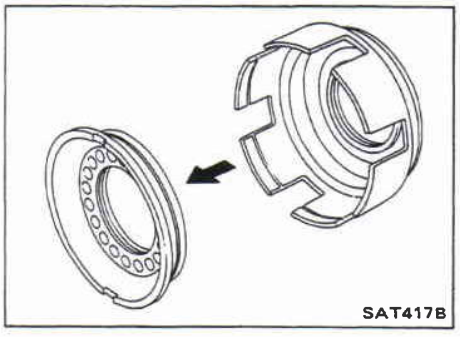


- Removal of forward clutch and overrun clutch pistons

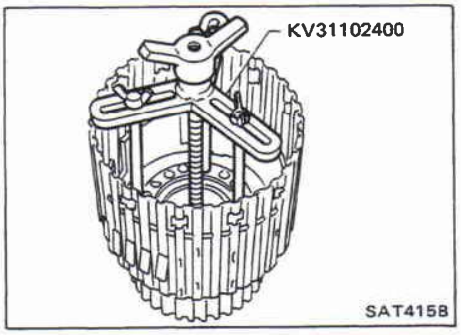
1. While holding overrun clutch piston, gradually apply compressed air to oil hole.



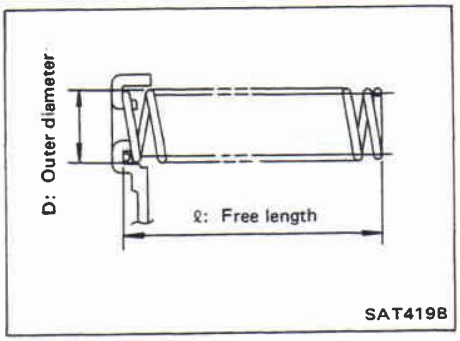
2. Remove overrun clutch from forward clutch.



Forward and Overrun Clutches (Cont'd)



- Removal and installation of return springs

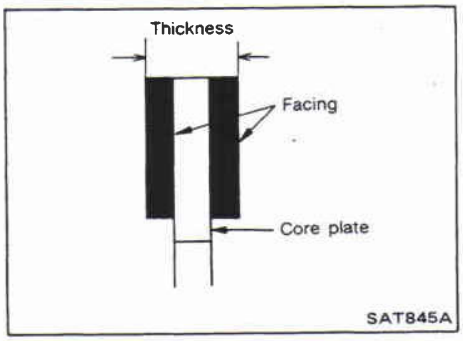


- Inspection of forward clutch and overrun clutch return springs

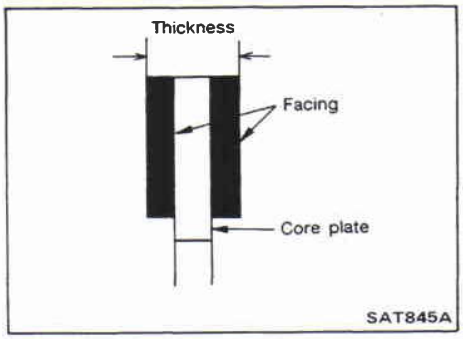
Inspection standard

Unit: mm (in)

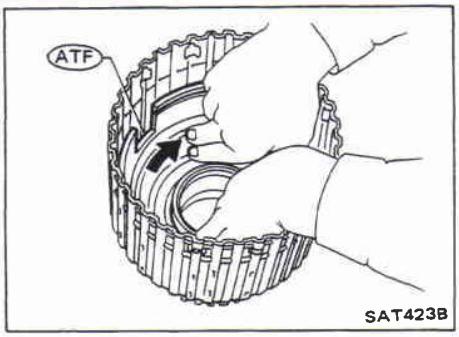
Part No.	ℓ	D
31505-51X04	36.83 (1.4500)	9.8 (0.386)



- Inspection of forward clutch drive plates
  Thickness of drive plate:
  Standard
  2.0 mm (0.079 in)
  Wear limit
  1.8 mm (0.071 in)



- Inspection of high clutch drive plate
  Thickness of drive plate:
  Standard
  2.0 mm (0.079 in)
  Wear limit
  1.8 mm (0.071 in)

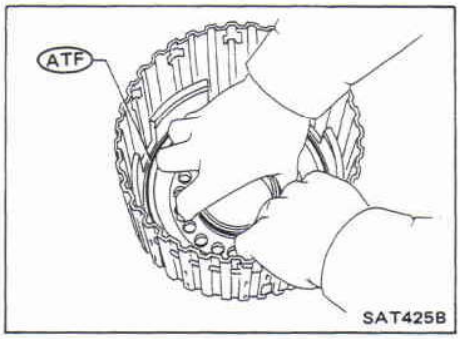


- Installation of forward clutch piston and overrun clutch piston

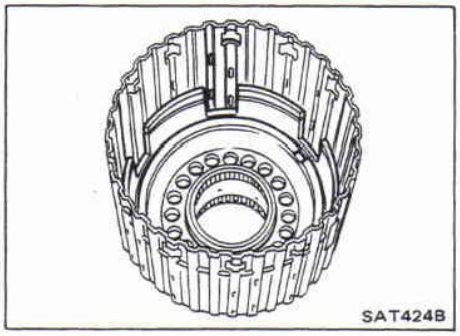
1. Install forward clutch piston by turning it slowly and evenly.

- **Apply A.T.F. to inner surface of clutch drum.**

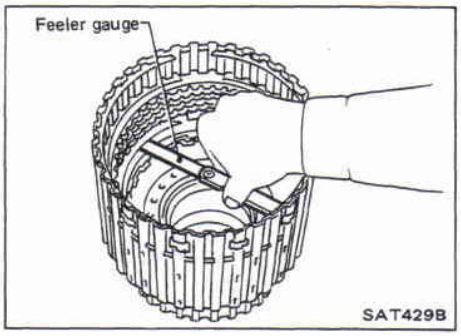
Forward and Overrun Clutches (Cont'd)



2. Install overrun clutch by turning it slowly and evenly.
- **Apply A.T.F. to inner surface of forward clutch piston.**



- **Align notch in forward clutch piston with groove in forward clutch drum.**



- Measurement of clearance between retaining plate and snap ring of overrun clutch

Specified clearance:

Standard

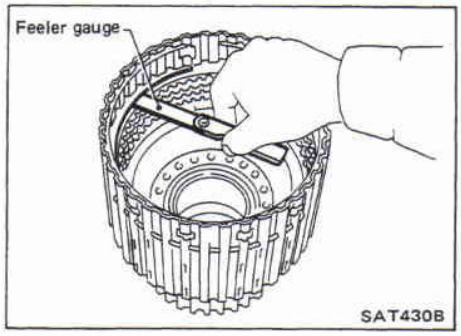
1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.4 mm (0.094 in)

Retaining plate:

Refer to S.D.S.



- Measurement of clearance between retaining plate and snap ring of forward clutch

Specified clearance:

Standard

0.45 - 0.85 mm (0.0177 - 0.0335 in)

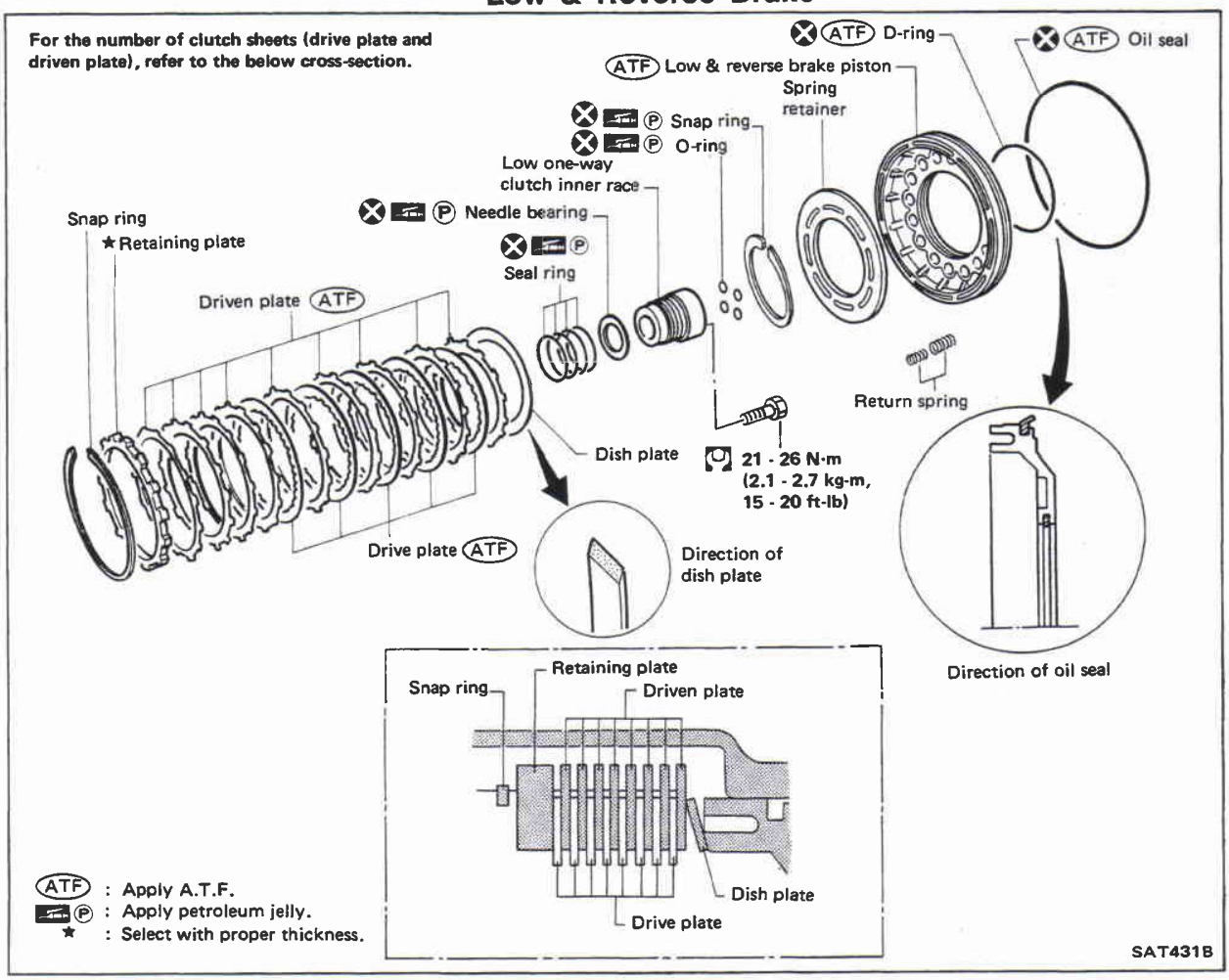
Allowable limit

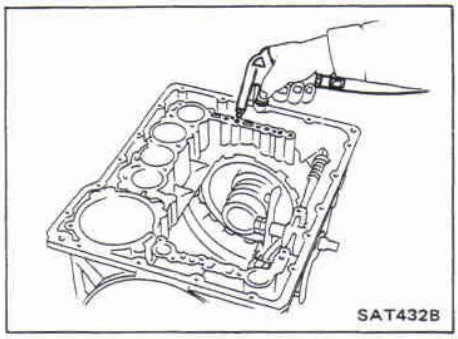
2.65 mm (0.1043 in)

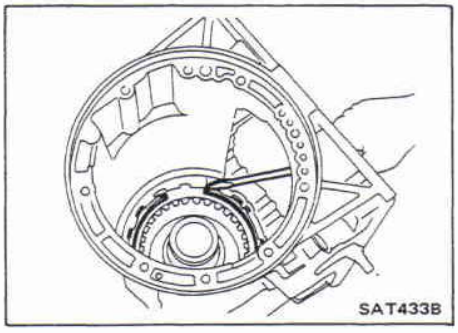
Retaining plate:

Refer to S.D.S.

Low & Reverse Brake





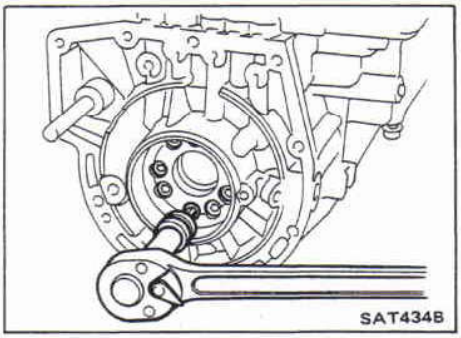


DISASSEMBLY

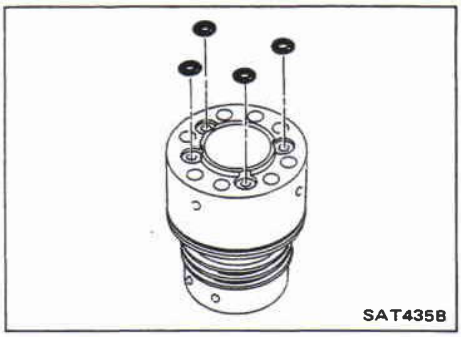
1. Check operation of low & reverse brake.
a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
b. Check to see that retaining plate moves to snap ring.
c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged or fluid may be leaking at piston check ball.

2. Remove snap ring, low & reverse brake drive plates, driven plates and dish plate.

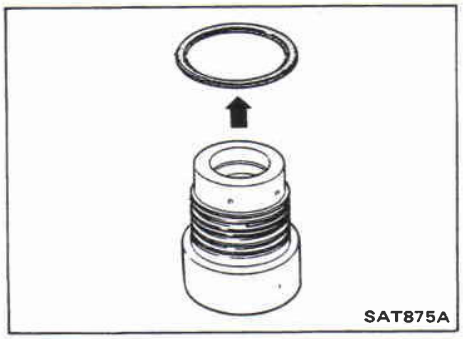
Low & Reverse Brake (Cont'd)



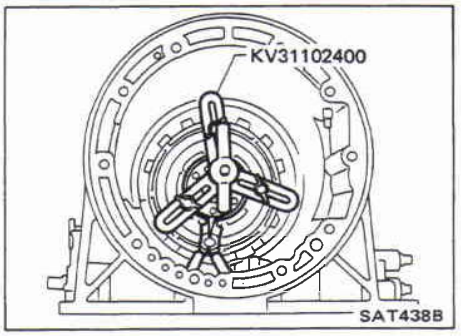
3. Remove low one-way clutch inner race from transmission case.



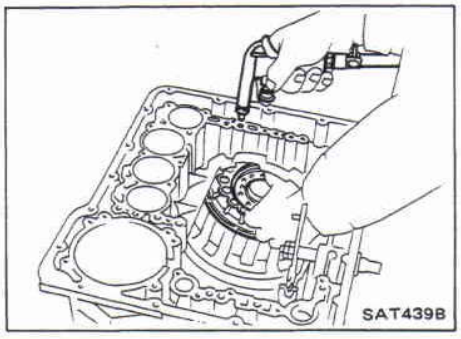
4. Remove O-rings from low one-way clutch inner race.



5. Remove seal rings from low one-way clutch inner race.
6. Remove needle bearing from low one-way clutch inner race.



7. Remove snap ring from transmission case while compressing clutch springs.
- **Do not expand snap ring excessively.**



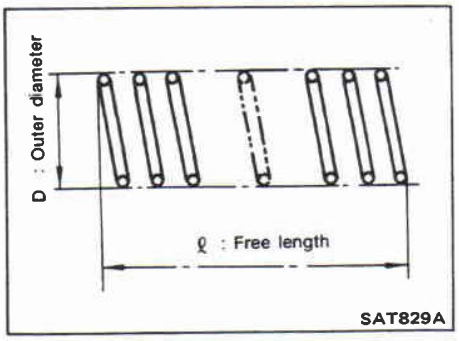
8. Remove low & reverse brake piston using compressed air.
9. Remove oil seal and D-ring from piston.

INSPECTION

Low & reverse brake snap ring and spring retainer

- Check for deformation, or damage.

Low & Reverse Brake (Cont'd)



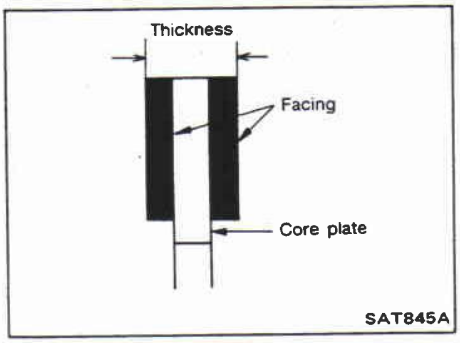
Low & reverse brake return springs

- Check for deformation or damage. Also measure free length and outside diameter.

Inspection standard

Unit: mm (in)

Parts	Part No.	ℓ	D
Inner spring	31505-51X03	15.71 (0.6185)	8.9 (0.350)
Outer spring	31505-51X02	18.75 (0.7382)	11.6 (0.457)



Low & reverse brake drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.

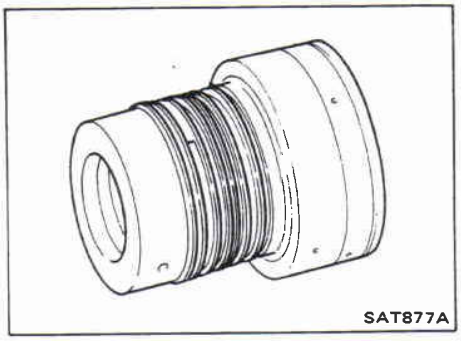
  Thickness of drive plate:

  Standard value

  1.6 mm (0.063 in)

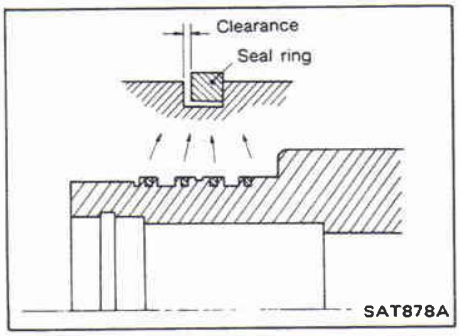
  Wear limit

  1.4 mm (0.055 in)
- If not within wear limit, replace.



Low one-way clutch inner race

- Check frictional surface of inner race for wear or damage.



- Install new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

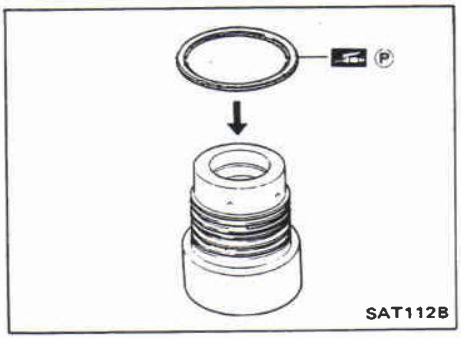
  Inspection standard:

  Standard value

  0.10 - 0.25 mm (0.0039 - 0.0098 in)

  Allowable limit

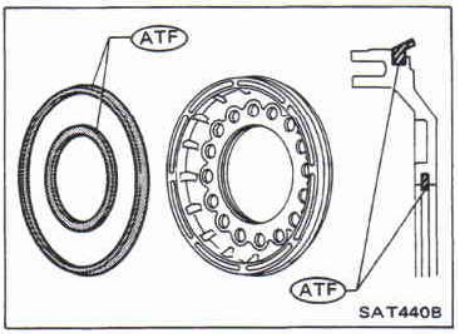
  0.25 mm (0.0098 in)
- If not within allowable limit, replace low one-way clutch inner race.



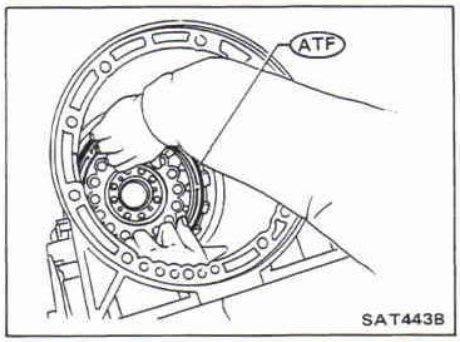
ASSEMBLY

1. Install bearing onto one-way clutch inner race.
- **Pay attention to its direction. — Black surface goes to rear side.**
- **Apply petroleum jelly to needle bearing.**

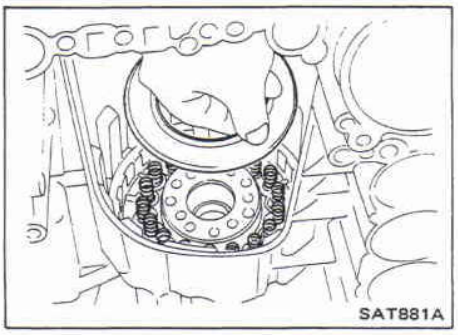
Low & Reverse Brake (Cont'd)



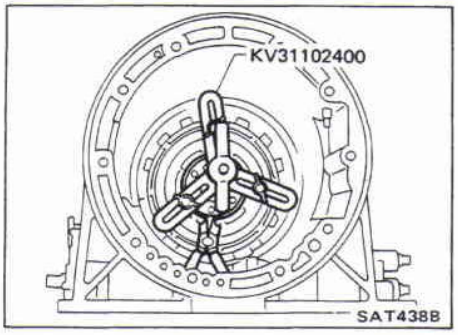
2. Install oil seal and D-ring onto piston.
● **Apply A.T.F. to oil seal and D-ring.**



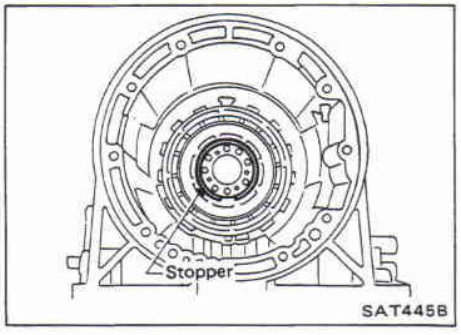
3. Install piston by rotating it slowly and evenly.
● **Apply A.T.F. to inner surface of transmission case.**



4. Install return springs and spring retainer onto transmission case.

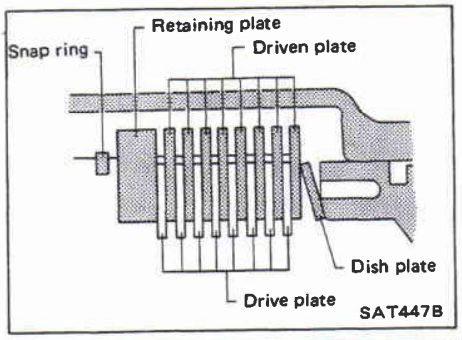


5. Install snap ring while compressing clutch springs.

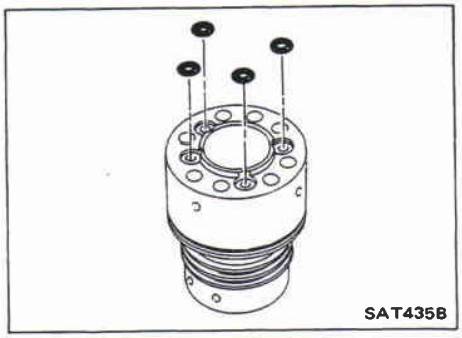


● **Do not align snap ring gap with spring retainer stopper.**

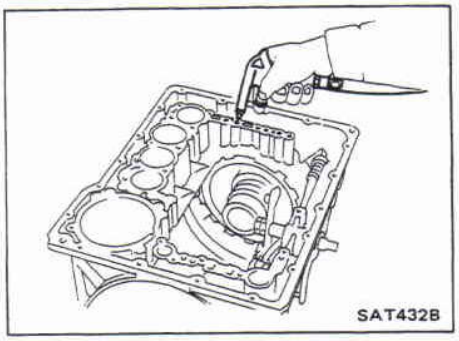
Low & Reverse Brake (Cont'd)



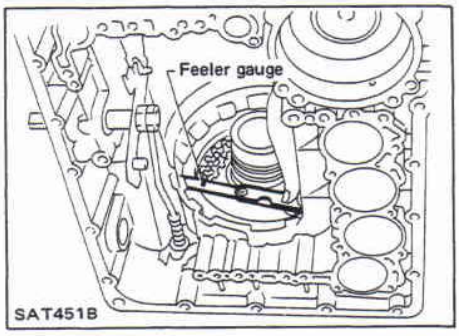
6. Install dish plate low & reverse brake drive plates, driven plates and retaining plate.
7. Install snap ring on transmission case.



8. Install O-rings on low one-way clutch inner race.
- **Apply petroleum jelly to O-rings.**
9. Install low one-way clutch inner race on transmission case.



10. Check operation of low & reverse brake clutch piston. Refer to "DISASSEMBLY".



11. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard

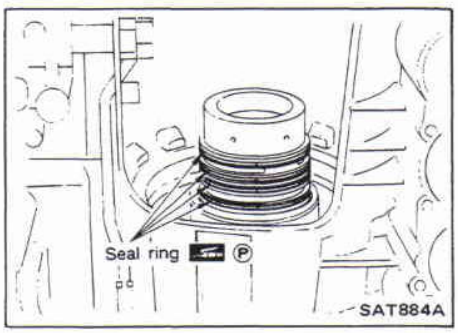
0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

2.4 mm (0.094 in)

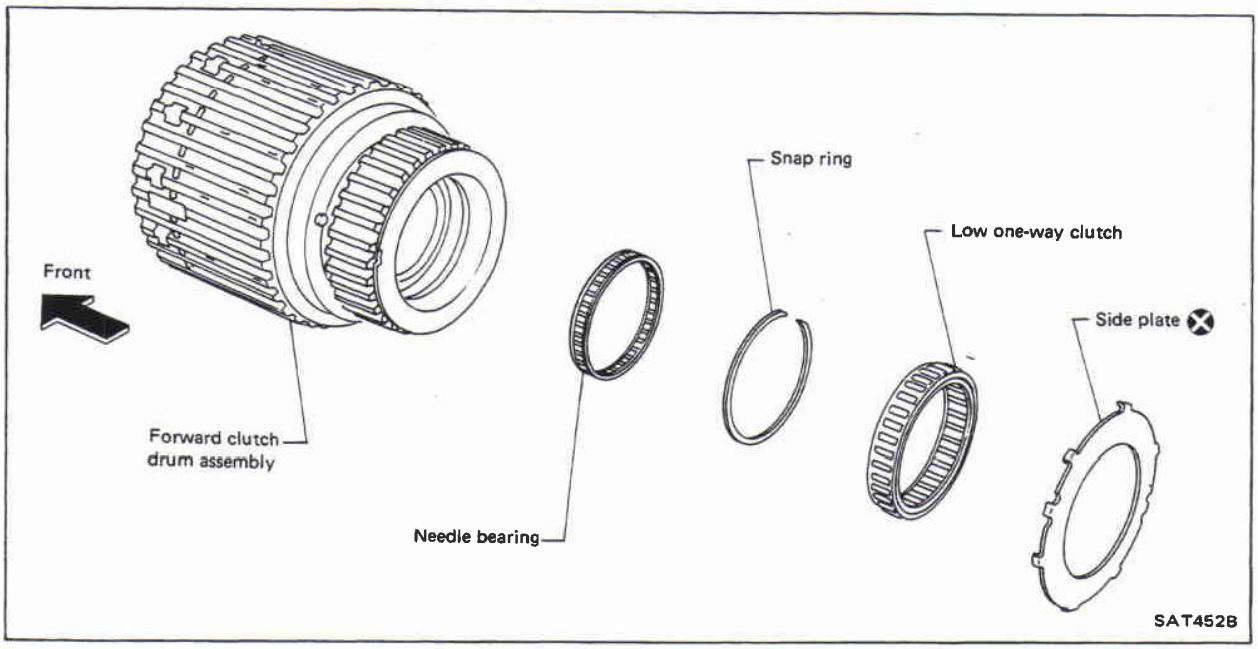
Retaining plate:

Refer to S.D.S.



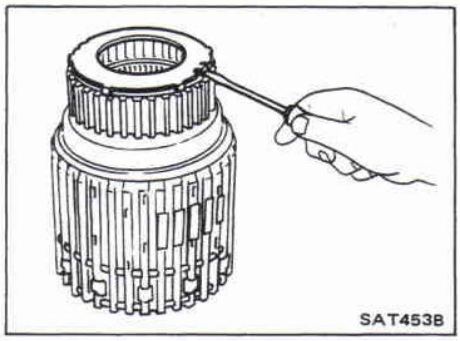
12. Install low one-way clutch inner race seal ring.
- **Apply petroleum jelly to seal ring.**
- **Make sure seal rings are pressed firmly into place and held by petroleum jelly.**

Forward Clutch Drum Assembly

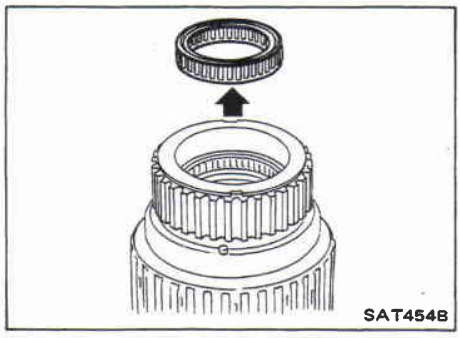


DISASSEMBLY

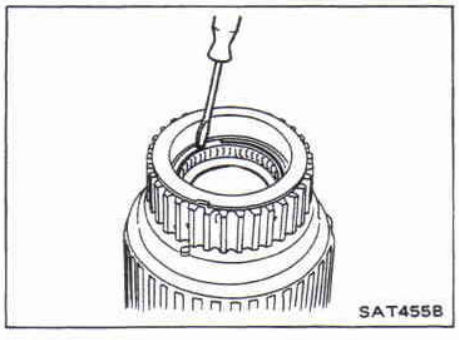
1. Remove side plate from forward clutch drum.



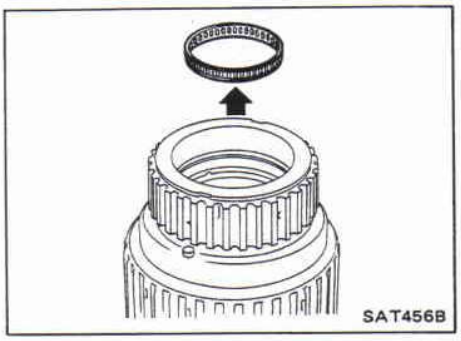
2. Remove low one-way clutch from forward clutch drum.



3. Remove snap ring from forward clutch drum.



Forward Clutch Drum Assembly (Cont'd)

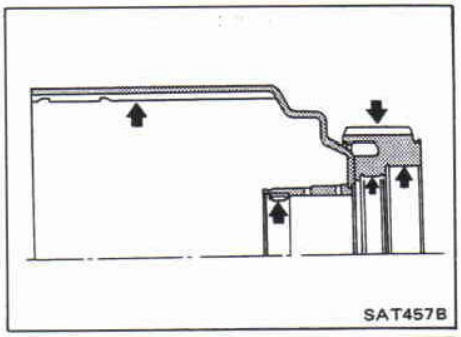

SAT456B

4. Remove needle bearing from forward clutch drum.

INSPECTION

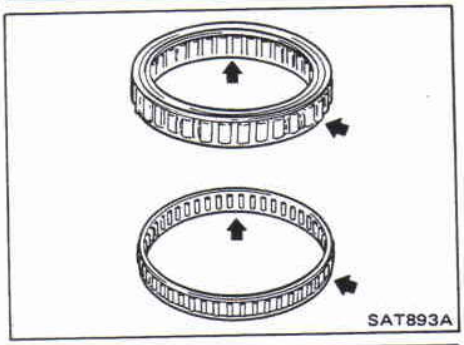
Forward clutch drum

- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.


SAT457B

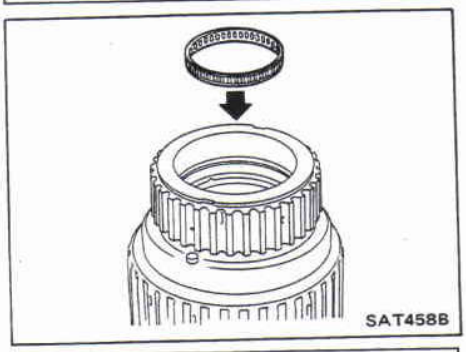
Needle bearing and low one-way clutch

- Check frictional surface for wear or damage.

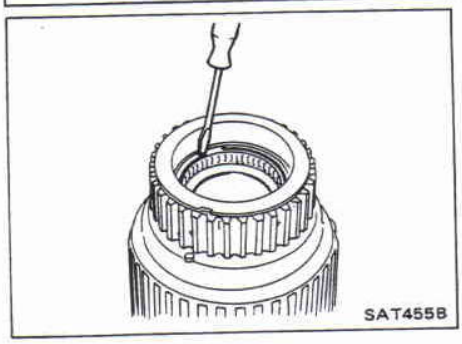

SAT893A

ASSEMBLY

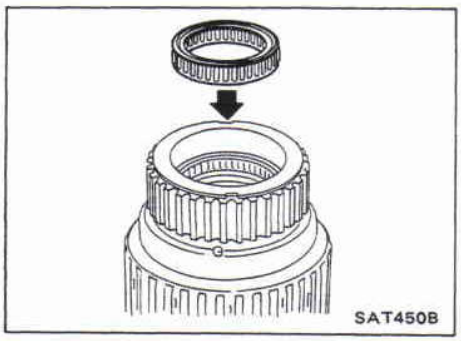
1. Install needle bearing in forward clutch drum.


SAT458B

2. Install snap ring onto forward clutch drum.

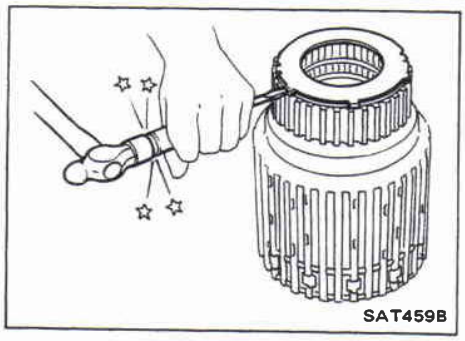

SAT455B

Forward Clutch Drum Assembly (Cont'd)



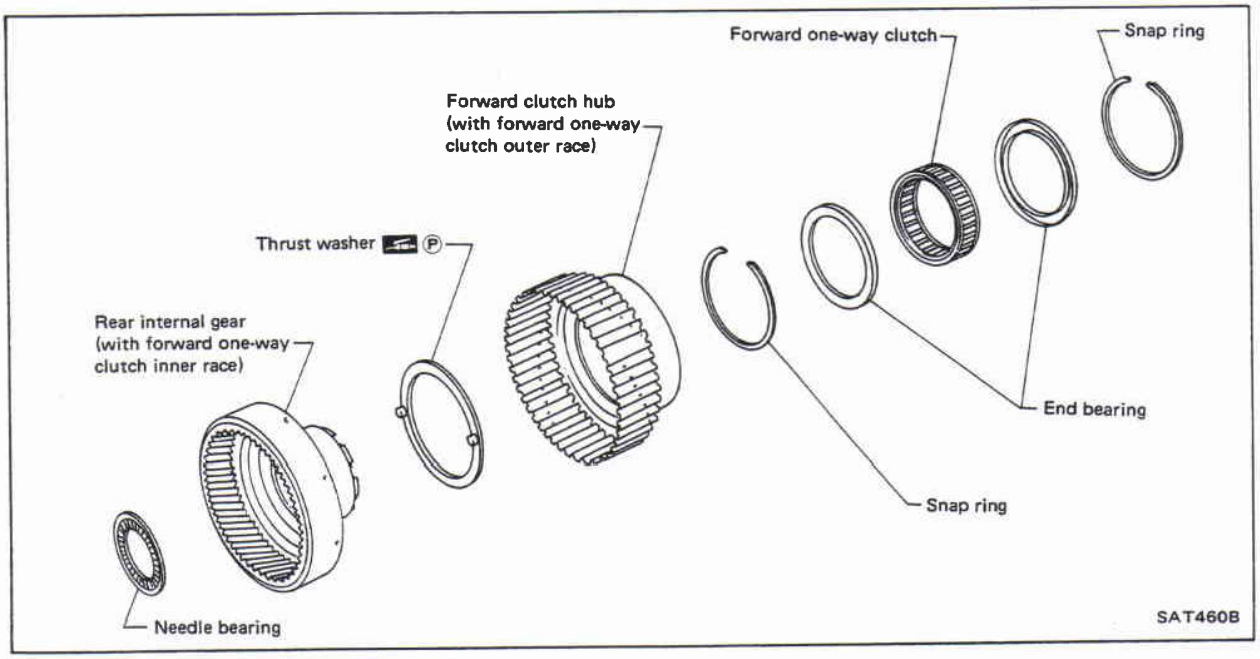
3. Install low one-way clutch onto forward clutch drum by pushing the roller in evenly.

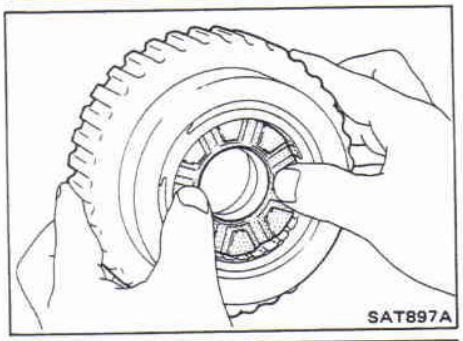
- **Install low one-way clutch with flange facing rearward.**



4. Install side plate onto forward clutch drum.

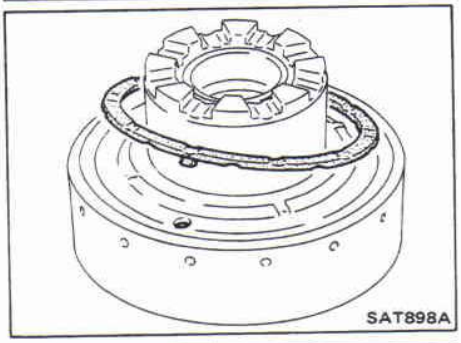
Rear Internal Gear and Forward Clutch Hub



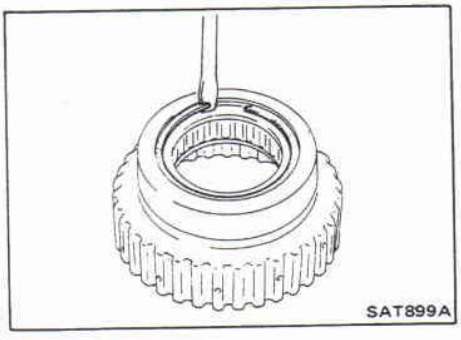


DISASSEMBLY

1. Remove needle bearing from rear internal gear.
2. Remove rear internal gear by pushing forward clutch hub forward.

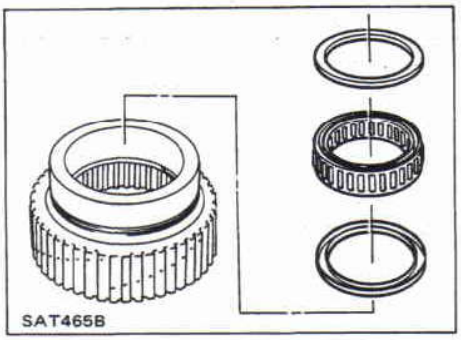


3. Remove thrust washer from rear internal gear.

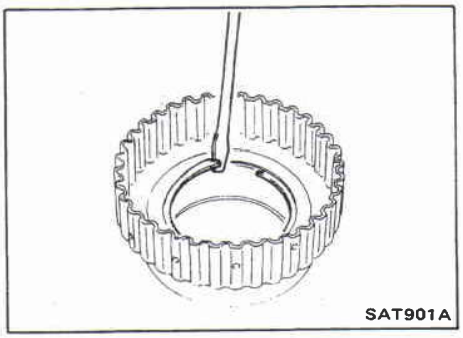


4. Remove snap ring from forward clutch hub.

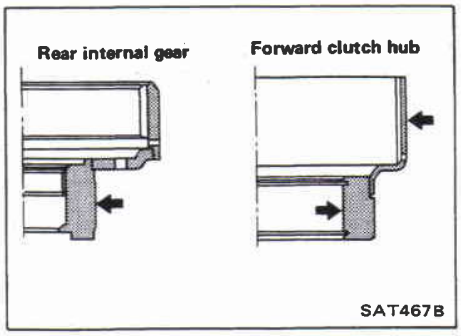
Rear Internal Gear and Forward Clutch Hub (Cont'd)



5. Remove end bearings and forward one-way clutch.



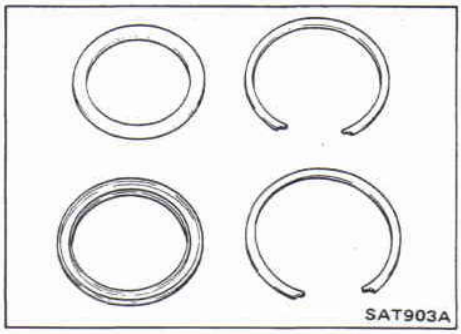
6. Remove snap ring from forward clutch hub.



INSPECTION

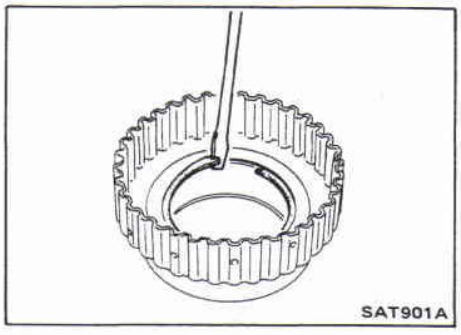
Rear internal gear and forward clutch hub

- Check gear for excessive wear, chips or cracks.
- Check frictional surfaces of forward one-way clutch and thrust washer for wear or damage.
- Check spline for wear or damage.



Snap ring and end bearing

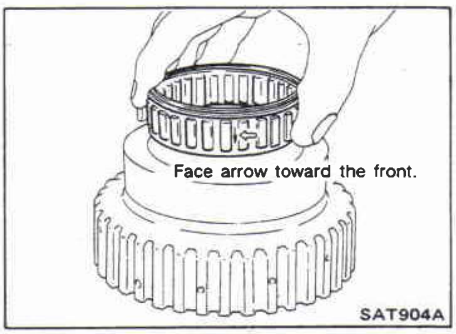
- Check for deformation or damage.



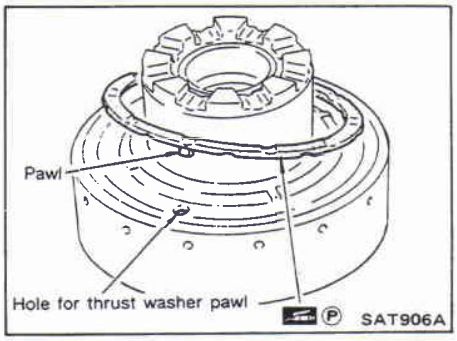
ASSEMBLY

1. Install snap ring onto forward clutch hub.
2. Install end bearing

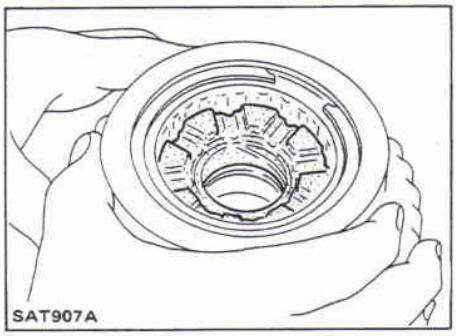
Rear Internal Gear and Forward Clutch Hub (Cont'd)



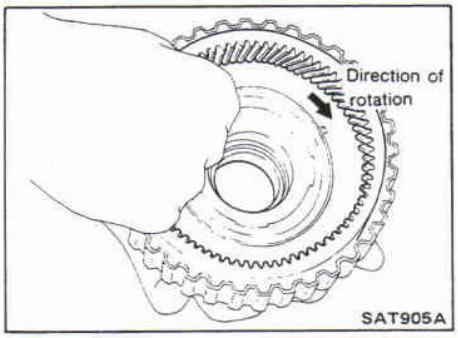
3. Install forward one-way clutch onto clutch hub.
- **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.



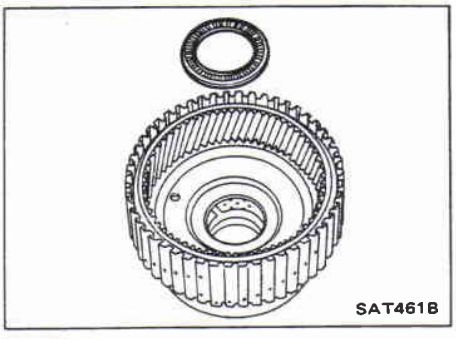
6. Install thrust washer onto rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Securely insert pawls of thrust washer into holes in rear internal gear.**



7. Position forward clutch hub in rear internal gear.

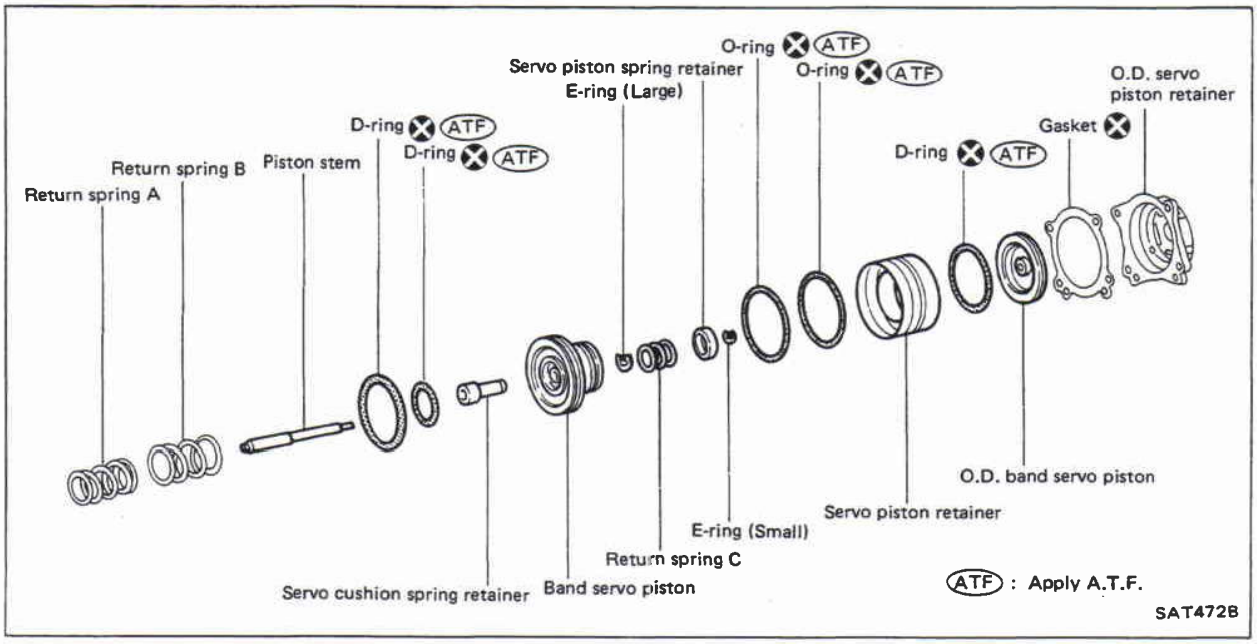


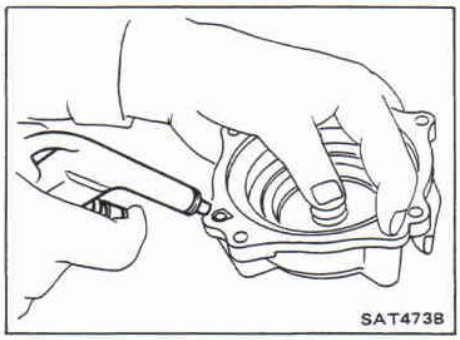
8. After installing, check to assure that rear internal gear rotates clockwise.



9. Install needle bearing on rear internal gear.
- **Apply petroleum jelly to needle bearing.**

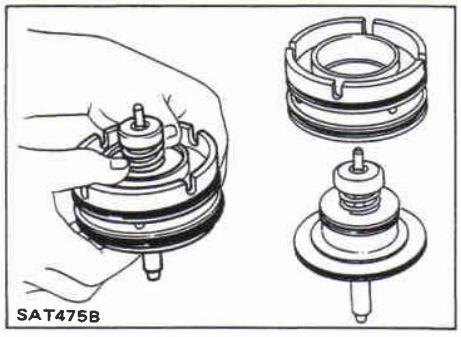
Band Servo Piston Assembly



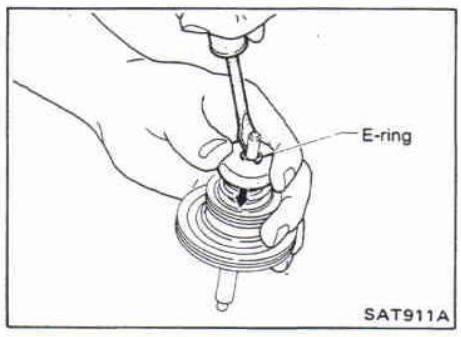


DISASSEMBLY

1. Block one oil hole in O.D. servo piston retainer and the center hole in O.D. band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove O.D. band servo piston from retainer.
3. Remove D-ring from O.D. band servo piston.

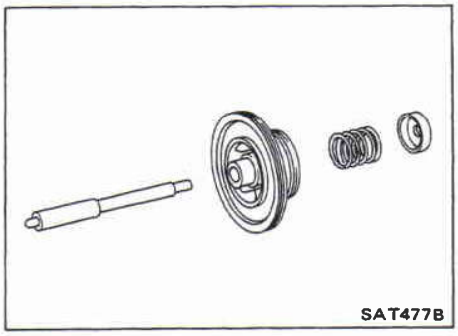


4. Remove band servo piston assembly from servo piston retainer by pushing it forward.

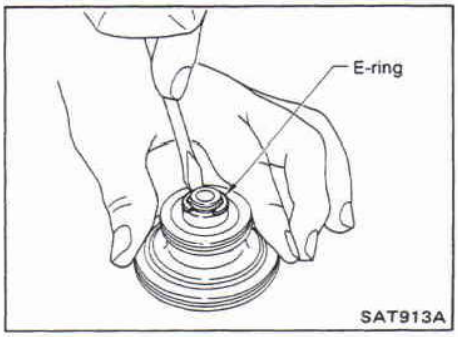


5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

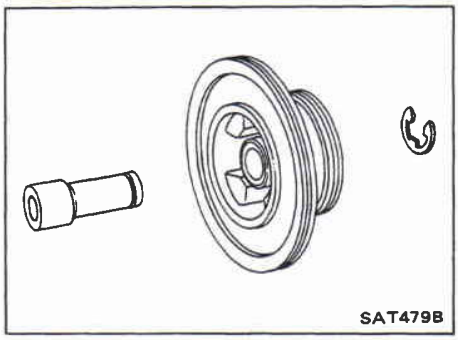
Band Servo Piston Assembly (Cont'd)



6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.



7. Remove E-ring from band servo piston.

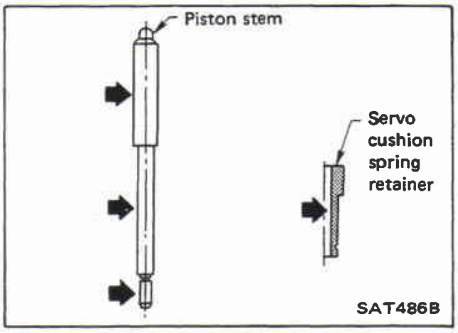


8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.

INSPECTION

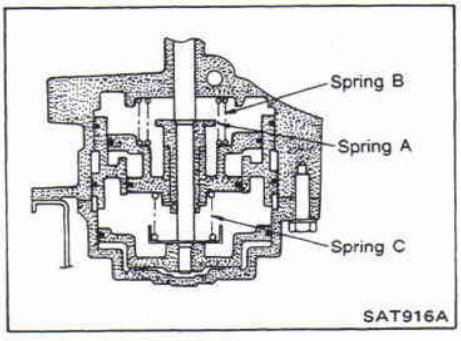
Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.



Return springs

- Check for deformation or damage. Measure free length and outer diameter.

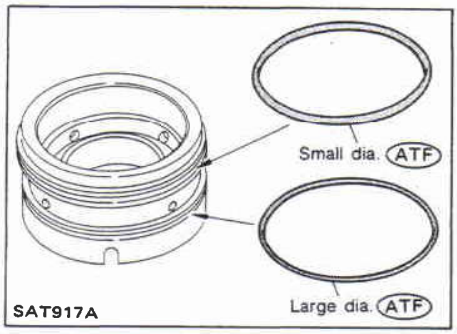


Inspection standard Unit: mm (in)

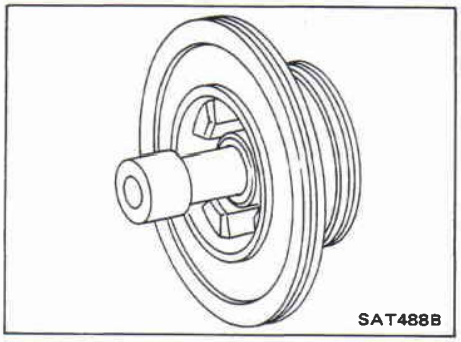
Parts	Free length	Outer diameter
Spring A	45.6 (1.795)	34.3 (1.350)
Spring B	53.8 (2.118)	40.3 (1.587)
Spring C	29.7 (1.169)	27.8 (1.094)

Band Servo Piston Assembly (Cont'd)

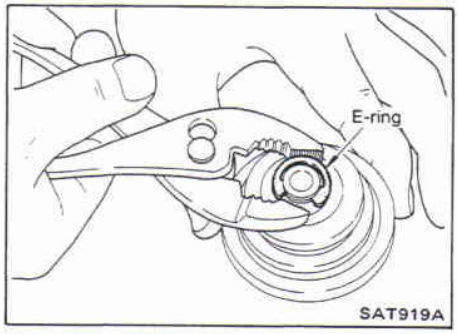
ASSEMBLY



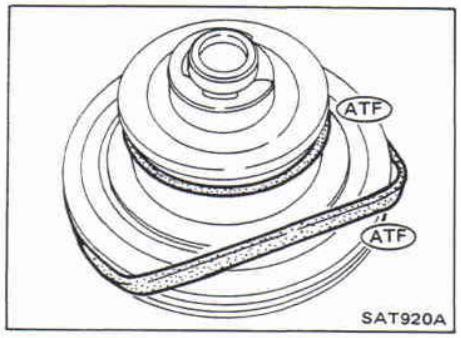
1. Install O-rings onto servo piston retainer.
   - **Apply A.T.F. to O-rings.**
   - **Pay attention to position of each O-ring.**



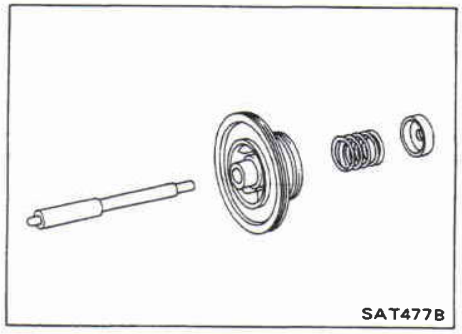
2. Install servo cushion spring retainer onto band servo piston.



3. Install E-ring onto servo cushion spring retainer.

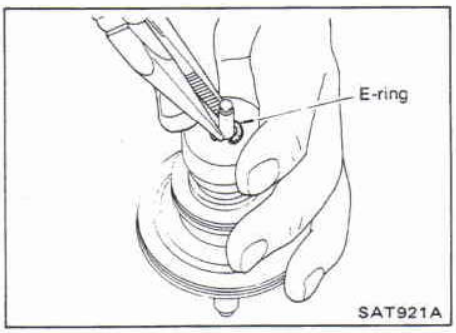


4. Install D-rings onto band servo piston.
   - **Apply A.T.F. to D-rings.**

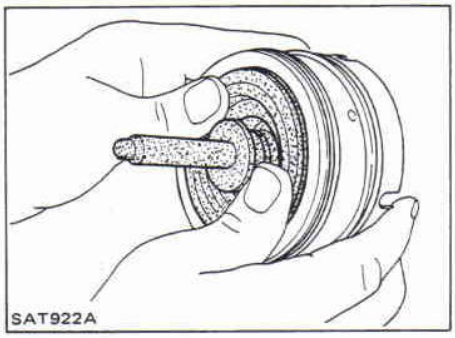


5. Install servo piston spring retainer, return spring C and piston stem onto band servo piston.

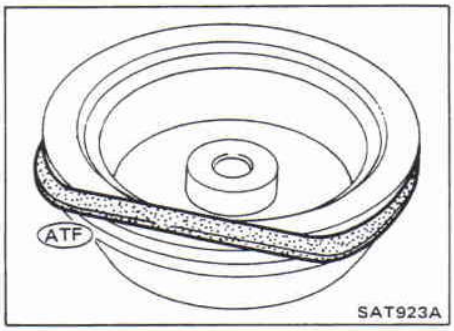
Band Servo Piston Assembly (Cont'd)



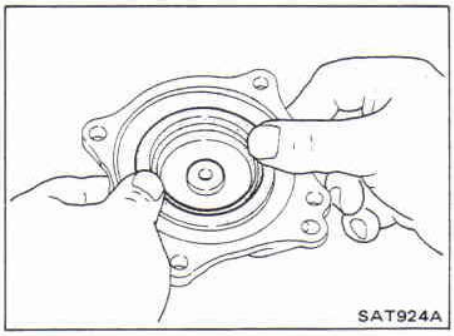
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

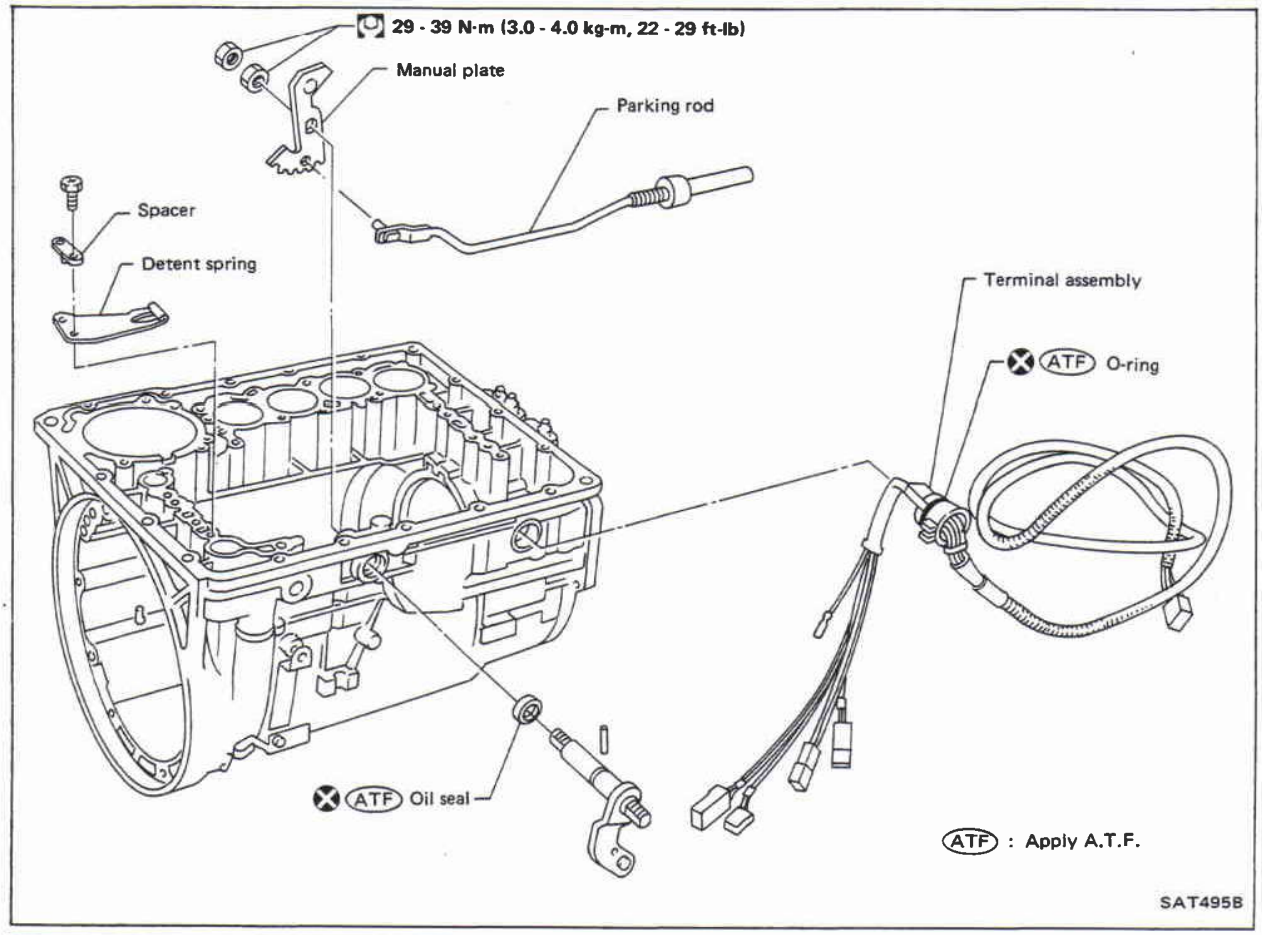


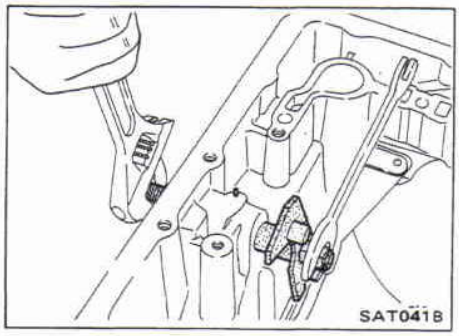
8. Install D-ring on O.D. band servo piston.
   - **Apply A.T.F. to D-ring.**

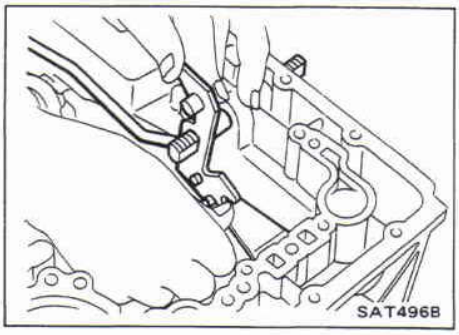


9. Install O.D. band servo piston onto servo piston retainer by pushing it inward.

Manual Shaft Components and Terminal Assembly







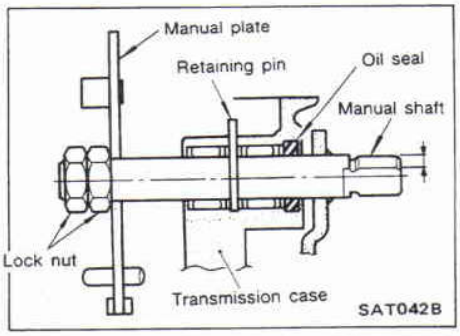
DISASSEMBLY

1. Remove manual plate.

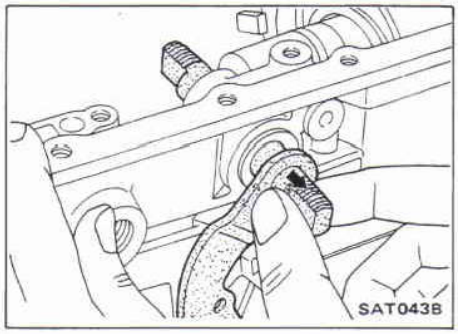
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.

b. While pushing detent spring down, remove manual plate and parking rod from transmission case.

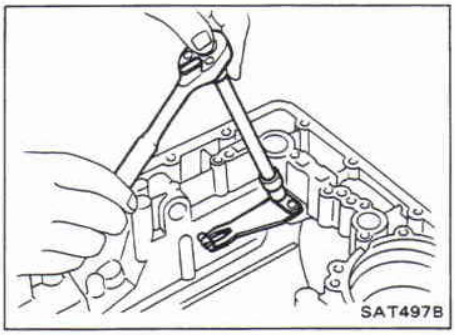
Manual Shaft Components and Terminal Assembly (Cont'd)



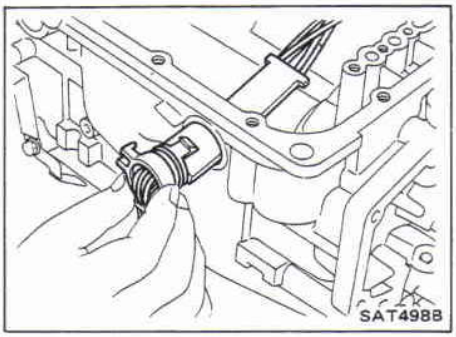
2. Remove manual shaft.
a. Remove retaining pin from transmission case.



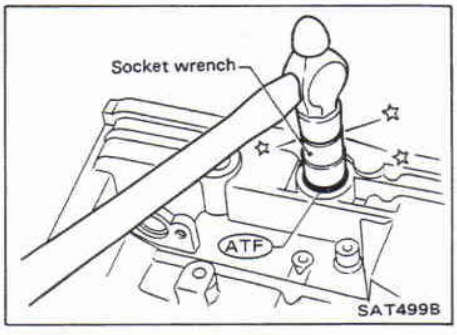
b. Remove manual shaft from transmission case.



c. Remove spacer and detent spring from transmission case.
d. Remove oil seal from transmission case.



3. Remove terminal cord assembly from transmission case while pushing on stopper.
- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**

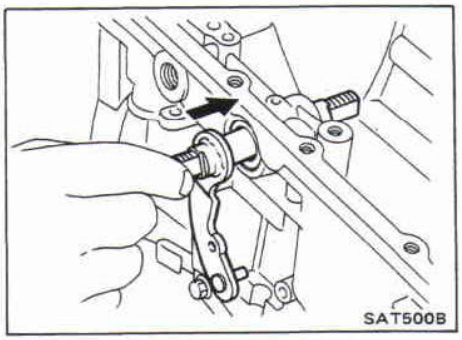


ASSEMBLY

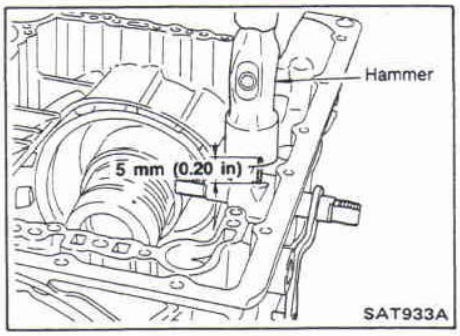
1. Install manual shaft.
a. Install oil seal on transmission case.
- **Apply A.T.F. to oil seal.**

b. Install detent spring and spacer.

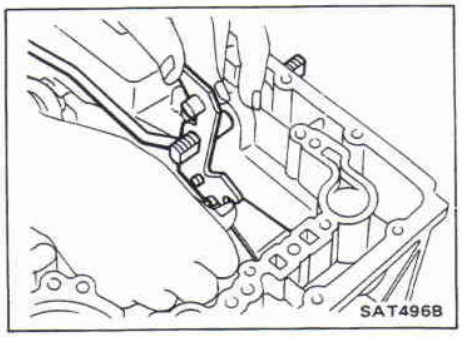
Manual Shaft Components and Terminal Assembly (Cont'd)



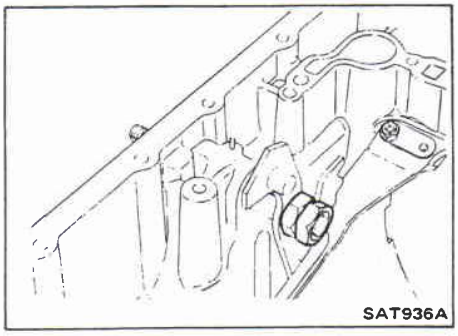
c. Install manual shaft into oil seal.



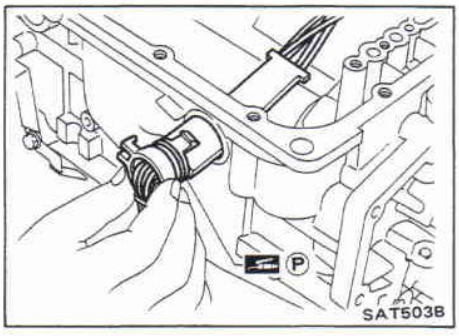
d. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.



2. Install manual plate.
a. While pushing detent spring down, install manual plate onto manual shaft.



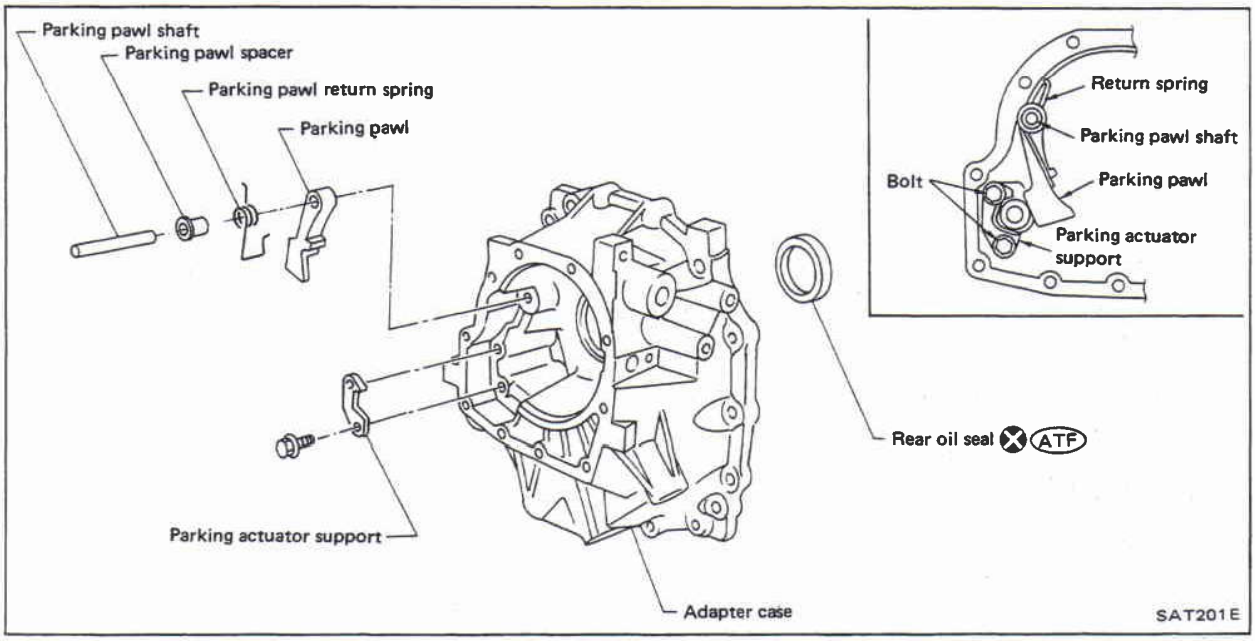
b. Install lock nuts onto manual shaft.

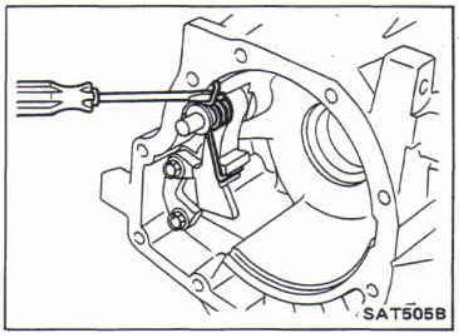


3. Install terminal cord assembly.
a. Install O-ring on terminal cord assembly.
- **Apply petroleum jelly to O-ring.**

b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.

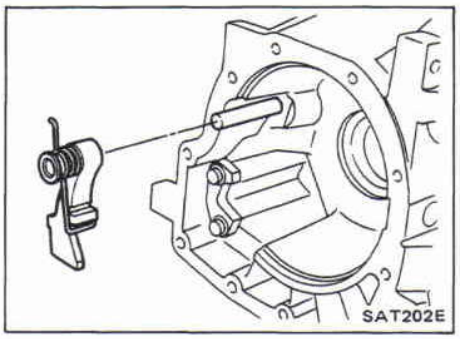
Parking Pawl Components



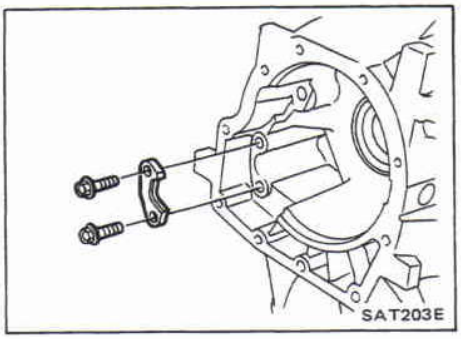


DISASSEMBLY

1. Slide return spring to the front of adapter case flange.



2. Remove return spring, pawl spacer and parking pawl from adapter case.
3. Remove parking pawl shaft from adapter case.



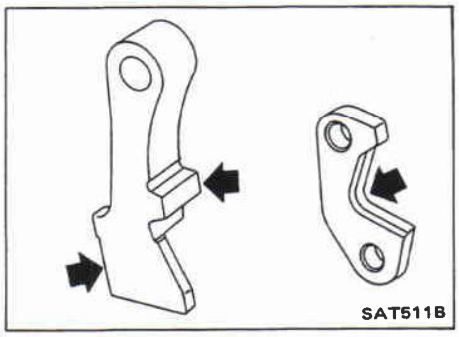
4. Remove parking actuator support from adapter case.
5. Remove rear oil seal.

Parking Pawl Components (Cont'd)

INSPECTION

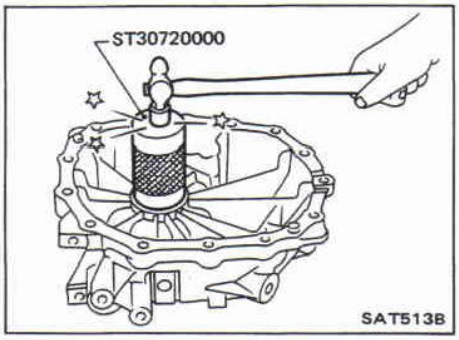
Parking pawl and parking actuator support

- Check contact surface of parking rod for wear.

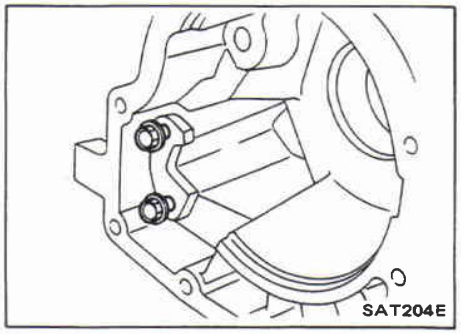


ASSEMBLY

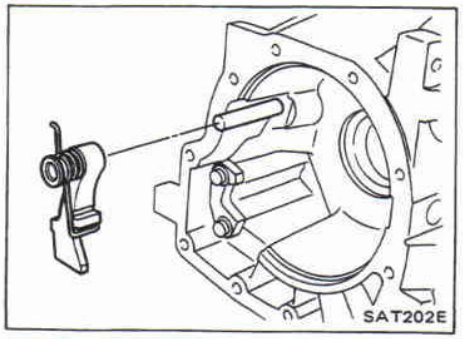
1. Install rear oil seal.



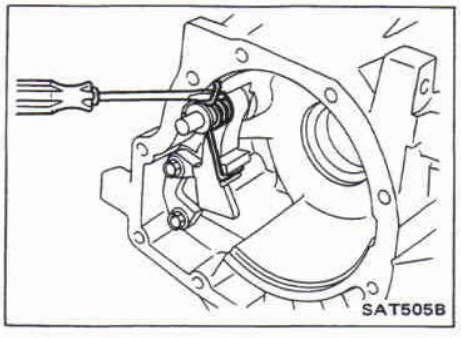
2. Install parking actuator support onto adapter case.
3. Insert parking pawl shaft into adapter case.

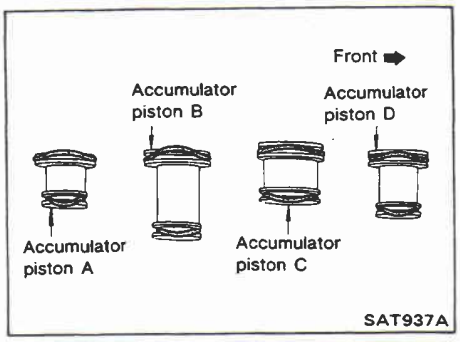


4. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



5. Bend return spring upward and install it onto adapter case.





Assembly

1. Install accumulator piston.
a. Install O-rings onto accumulator piston.
● **Apply A.T.F. to O-rings.**

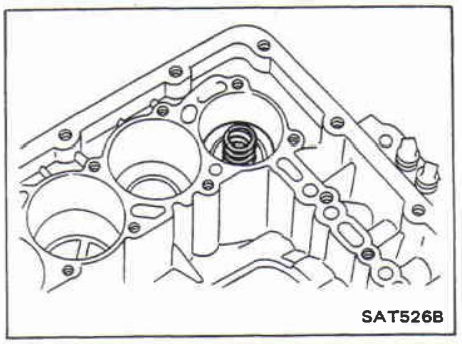
Accumulator piston O-rings Unit: mm (in)

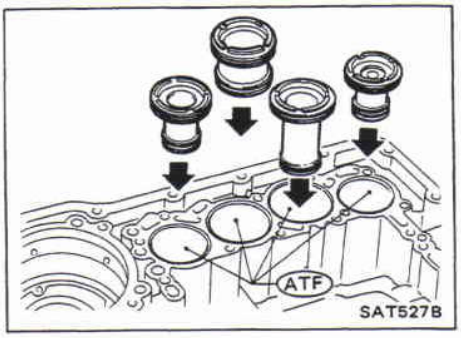
Accumulator	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

b. Install return spring for accumulator A onto transmission case.

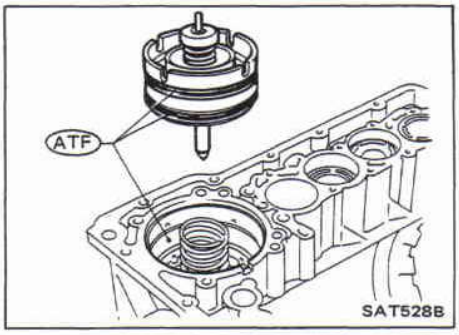
Free length of return spring Unit: mm (in)

Accumulator	A
Free length	43 (1.69)

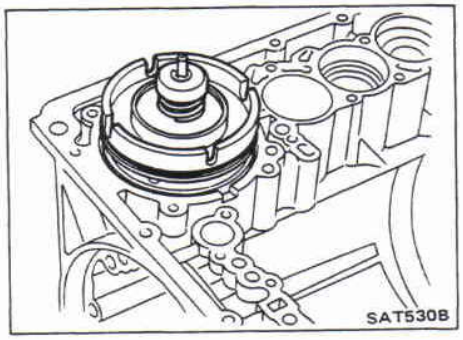




c. Install accumulator pistons A, B, C and D.
● **Apply A.T.F. to transmission case.**

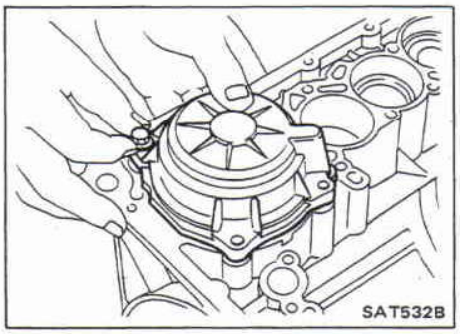


2. Install band servo piston.
a. Install return springs onto transmission case.
● **Apply A.T.F. to O-rings of band servo piston and transmission case.**

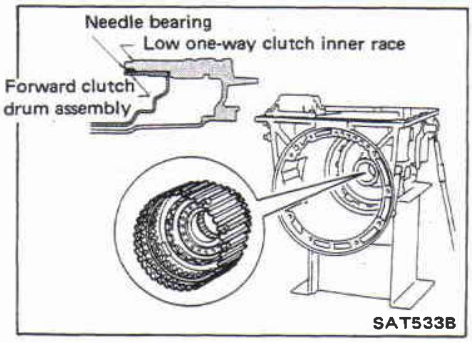


b. Install band servo piston onto transmission case.
c. Install gasket for band servo onto transmission case.

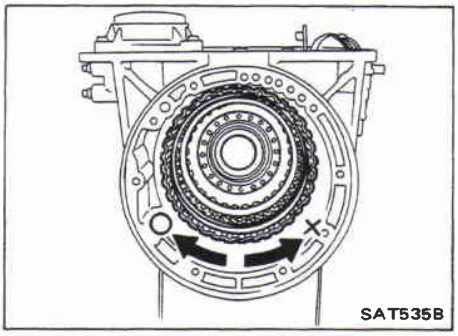
Assembly (Cont'd)



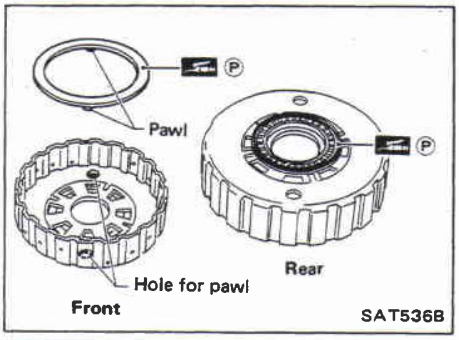
d. Install band servo retainer onto transmission case.



3. Install rear side clutch and gear components.
a. Place transmission case in horizontal position.
b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.

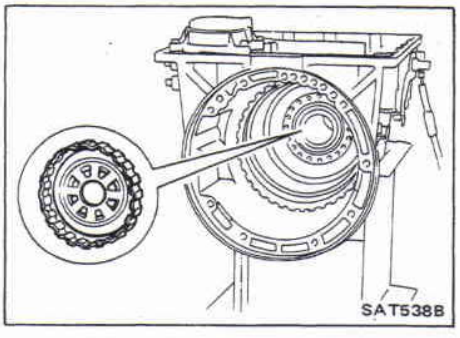


c. Check to be sure that rotation direction of forward clutch assembly is correct.



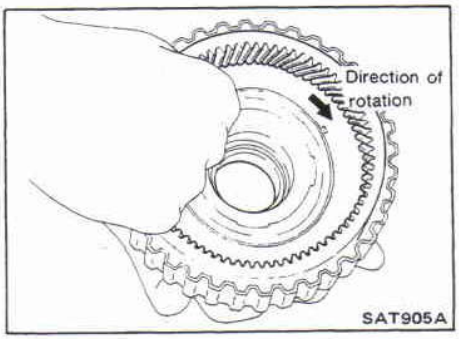
d. Install thrust washer onto front of overrun clutch hub.
- **Apply petroleum jelly to the thrust washer.**
- **Insert pawls of thrust washer securely into holes in overrun clutch hub.**

e. Install needle bearing onto rear of overrun clutch hub.
- **Apply petroleum jelly to needle bearing.**

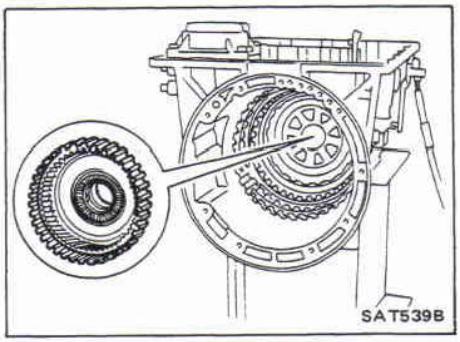


f. Install overrun clutch hub onto transmission case while rotating it slowly.

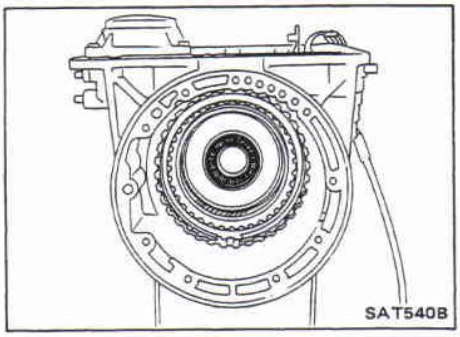
Assembly (Cont'd)



g. Check that rear internal gear rotates as shown while holding forward clutch hub.

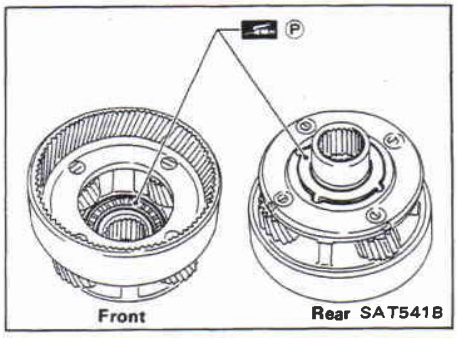


h. Install rear internal gear and forward clutch hub as a unit onto transmission case.



i. Install needle bearing onto rear internal gear.

- **Apply petroleum jelly to needle bearing.**

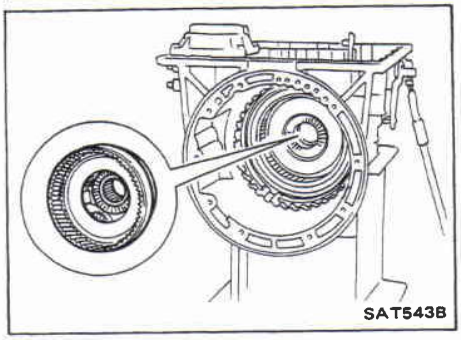


j. Install needle bearing onto front of front internal gear.

- **Apply petroleum jelly to needle bearing.**

k. Install bearing race onto rear of front internal gear.

- **Apply petroleum jelly to bearing race.**
- **Securely engage pawls of bearing race with holes in front internal gear.**

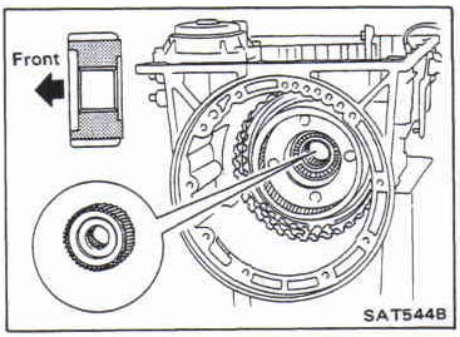


l. Install front internal gear on transmission case.

Adjustment

When any parts listed in the following table are replaced, total end play or reverse clutch end play must be adjusted.

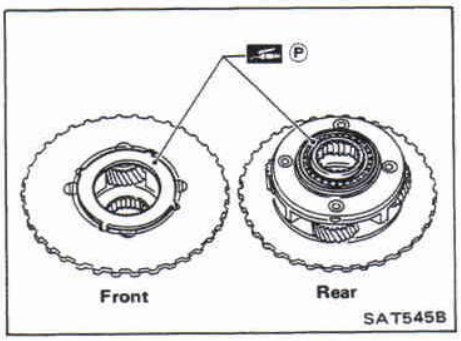
Part name \ Item	Total end play	Reverse clutch end play
Transmission case	●	●
Low one-way clutch inner race	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	–	●



1. Install front side clutch and gear component.

a. Install rear sun gear on transmission case.

- **Pay attention to its direction.**



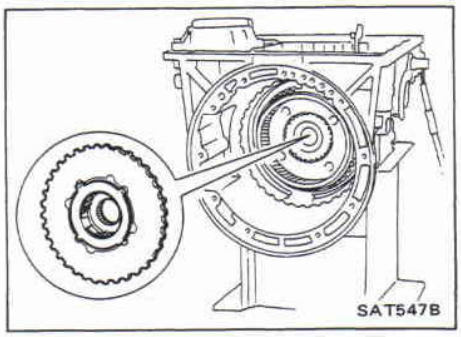
b. Install bearing race on front of front planetary carrier.

- **Apply petroleum jelly to needle bearing.**
- **Securely engage pawls of bearing race with holes in carrier.**

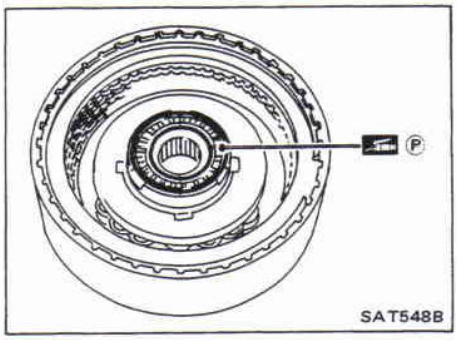
c. Install needle bearing on rear of front planetary carrier.

- **Apply petroleum jelly to bearing.**

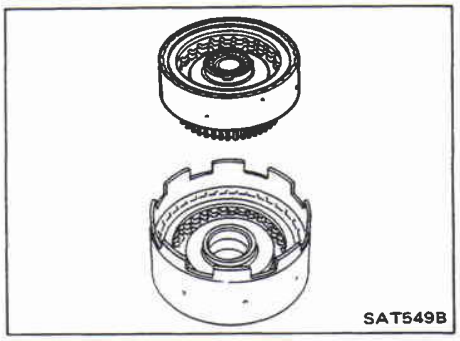
Adjustment (Cont'd)



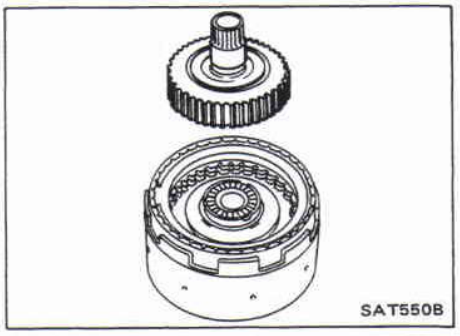
d. Install front planetary carrier on forward clutch drum.



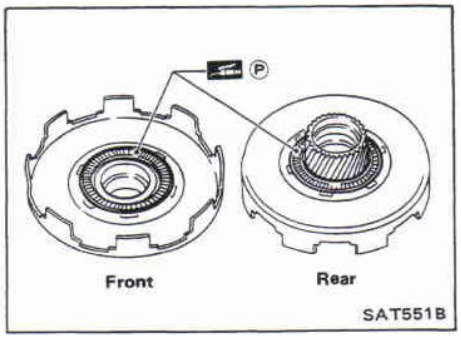
e. Install needle bearing on rear of high clutch.
- **Apply petroleum jelly to bearing.**



f. Install high clutch assembly onto reverse clutch assembly.

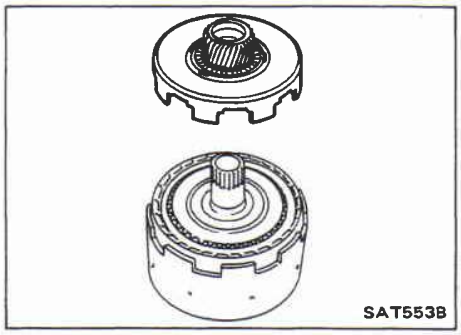


g. Install high clutch hub onto high clutch assembly.

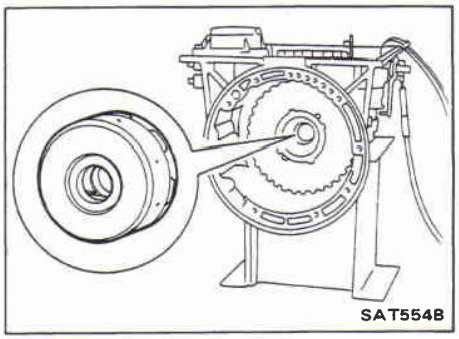


h. Install needle bearings onto front sun gear.
- **Apply petroleum jelly to needle bearings.**

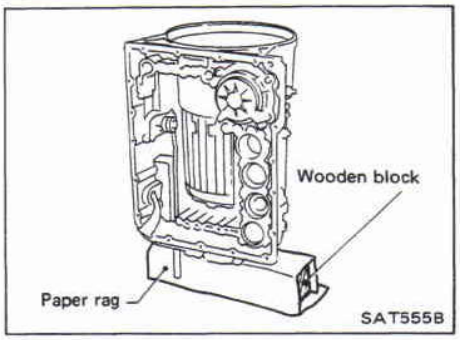
Adjustment (Cont'd)



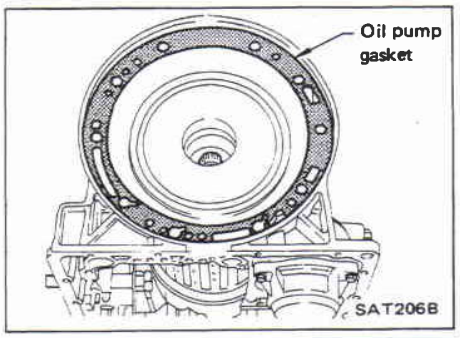
i. Install front sun gear onto reverse clutch assembly.



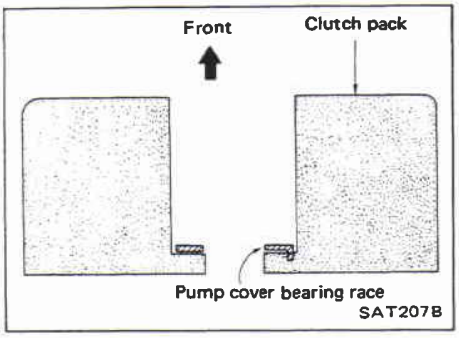
j. Install clutch pack into transmission case.



k. Place transmission case in vertical position.

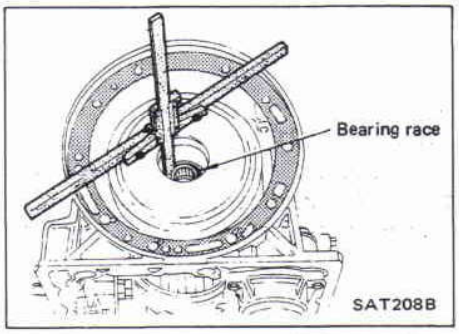


2. Adjust total end play.
a. Install new oil pump gasket on transmission case.

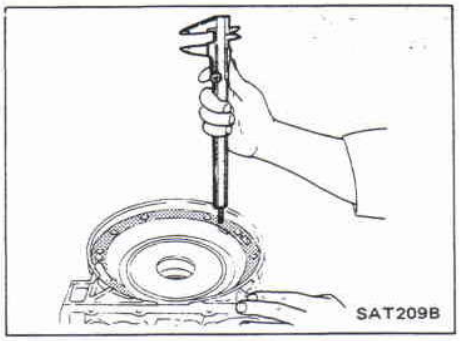


b. Install pump cover bearing race on clutch pack.

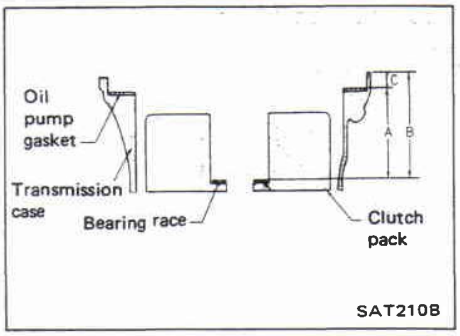
Adjustment (Cont'd)



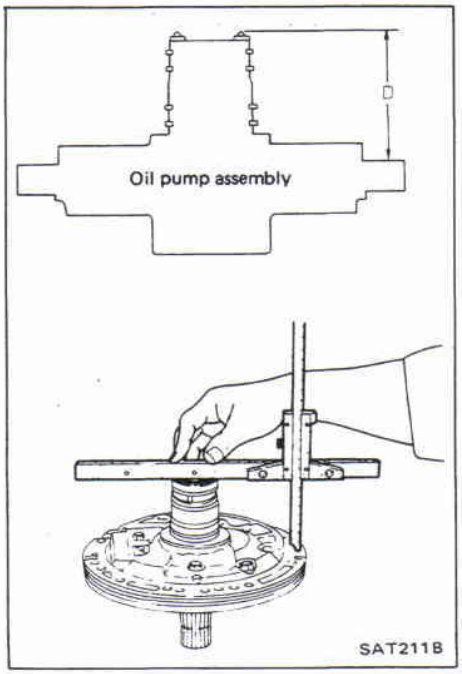
c. Measure distance "B" between front end of transmission case and oil pump cover bearing race.



d. Measure distance "C" between front end of transmission case and oil pump gasket.

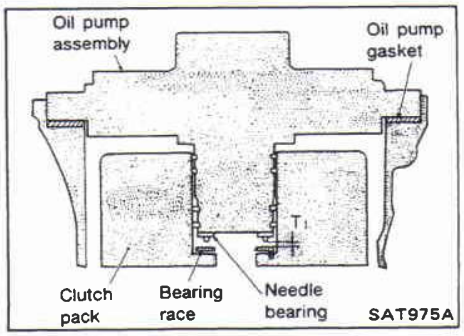


e. Determine dimension "A" by using the following equation.
A = B – C



f. Install needle bearing on oil pump assembly.
g. Measure distance "D" between needle bearing and machined surface of oil pump cover assembly.

Adjustment (Cont'd)



h. Determine total end play "T_1" by using the following equation.

$T_1 = A - D - 0.1$

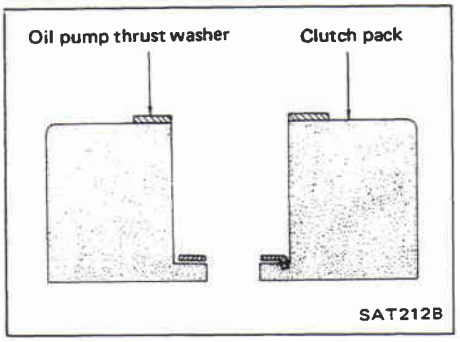
Total end play "T_1":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

- If end play is out of specification, decrease or increase thickness of oil pump cover bearing race as necessary.

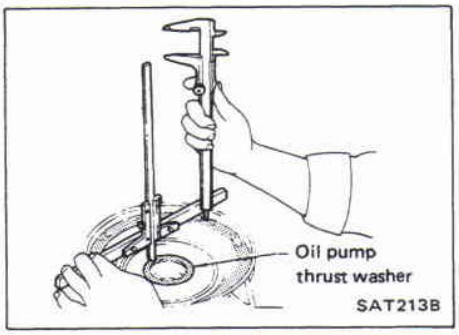
Available oil pump cover bearing race:

Refer to S.D.S.



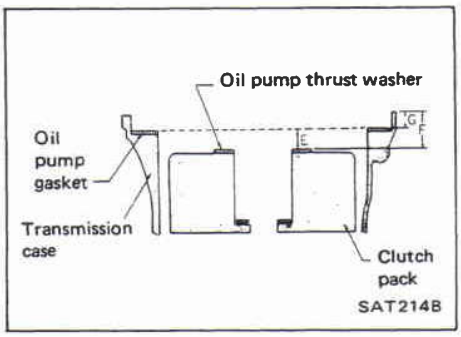
3. Adjust reverse clutch drum end play.

a. Install oil pump thrust washer on clutch pack.



b. Measure distance "F" between front end of transmission case and oil pump thrust washer.

c. Measure distance "G" between front end of transmission case and gasket.

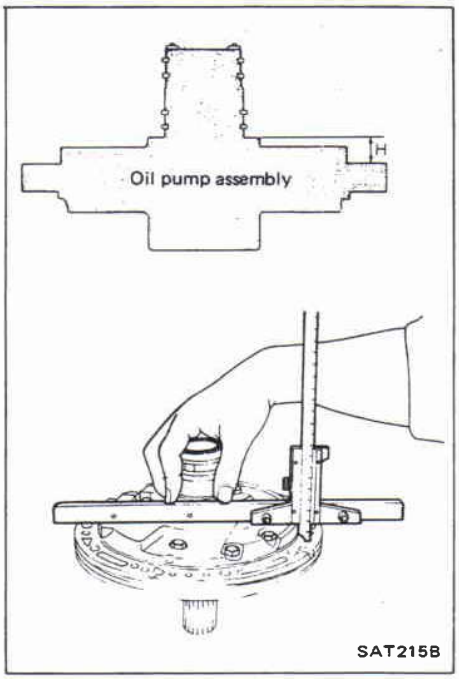


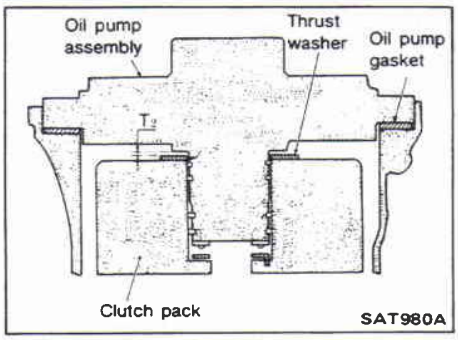
d. Determine dimension "E" by using the following equation.

$E = F - G$

Adjustment (Cont'd)

e. Measure distance "H".





f. Determine reverse clutch drum end play "T_2" by using the following equation.

$T_2 = E - H - 0.1$

Reverse clutch drum end play "T_2":

0.55 - 0.90 mm (0.0217 - 0.0354 in)

- If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.

Available oil pump thrust washer:

Refer to S.D.S.

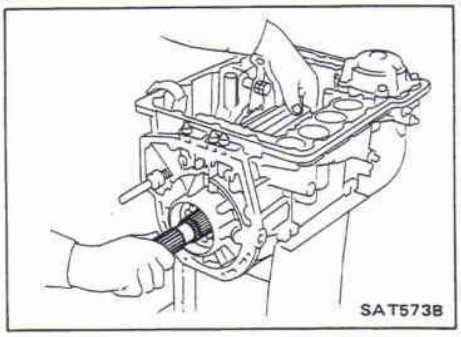
4. Remove any part installed to adjust end plays.

Assembly

1. Install output shaft and parking gear.

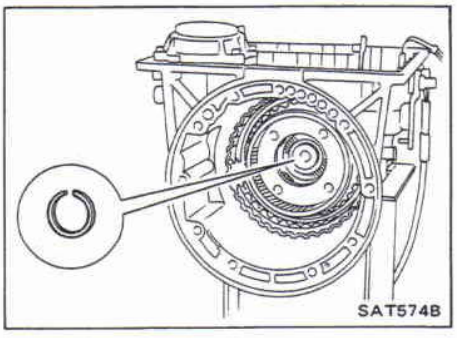
a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.

- **Do not force output shaft against front of transmission case.**

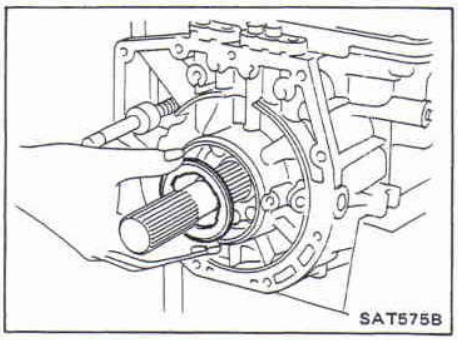


b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.

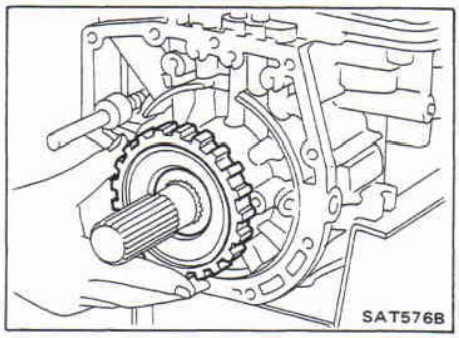
- **Check to be sure output shaft cannot be removed in rear direction.**



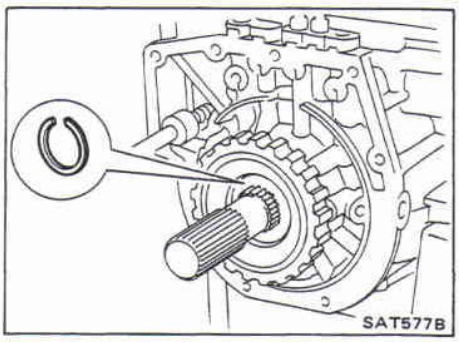
Assembly (Cont'd)



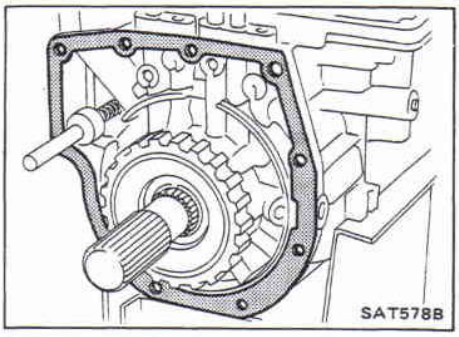
c. Install needle bearing on transmission case.
- **Pay attention to its direction. — Black side goes to rear.**
- **Apply petroleum jelly to needle bearing.**



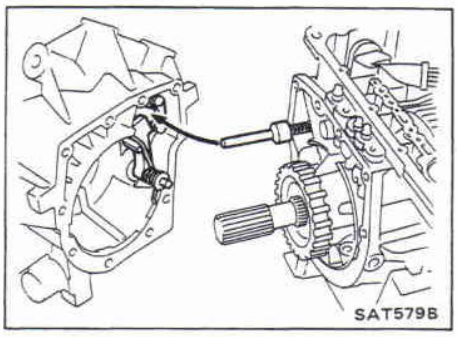
d. Install parking gear on transmission case.



e. Install snap ring on rear of output shaft.
- **Check to be sure output shaft cannot be removed in forward direction.**

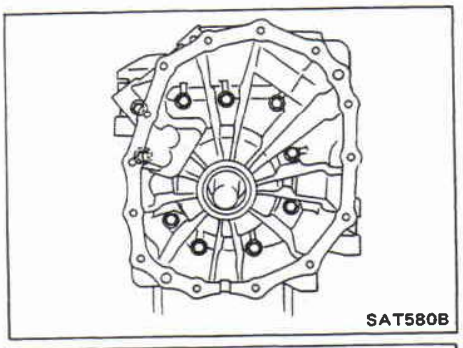


2. Install adapter case.
a. Install adapter case gasket on transmission case.

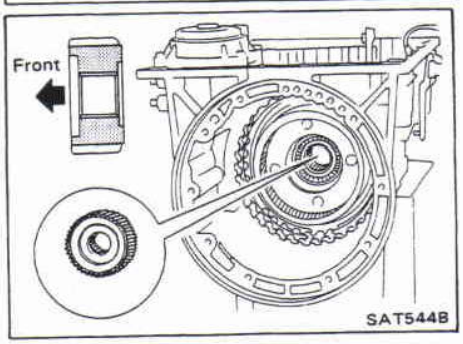


b. Install parking rod on adapter case.

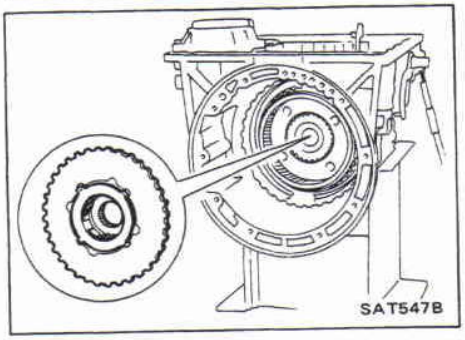
Assembly (Cont'd)



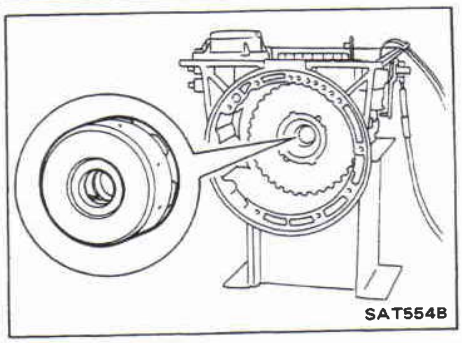
c. Install adapter case on transmission case.



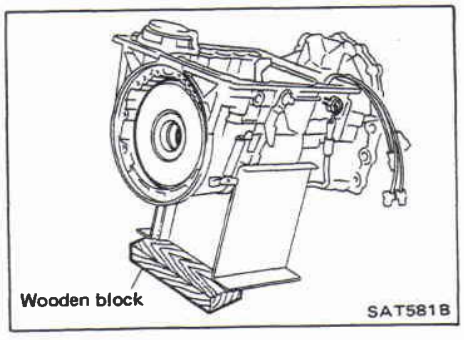
3. Install front side clutch and gear components.
a. Install rear sun gear on transmission case.
- **Pay attention to its direction.**



b. Make sure bearing race and needle bearings are in proper position on front planetary carrier.
c. Install front planetary carrier on forward clutch drum.

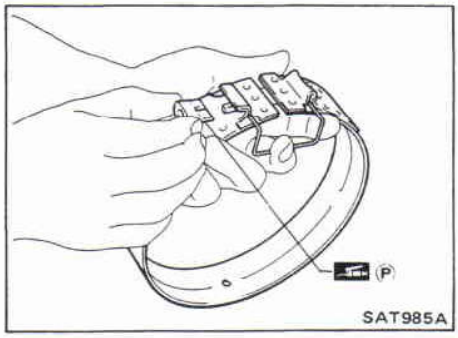


d. Make sure needle bearings and selected bearing race are in proper position on clutch pack.
e. Install clutch pack onto transmission case.

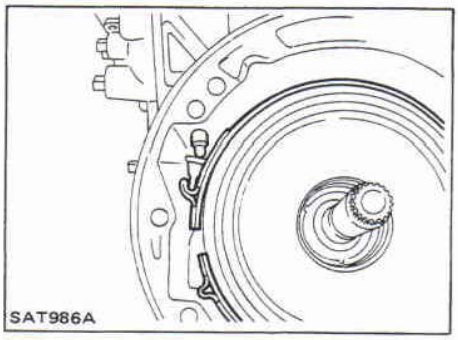


4. Tilt transmission case with wooden block.

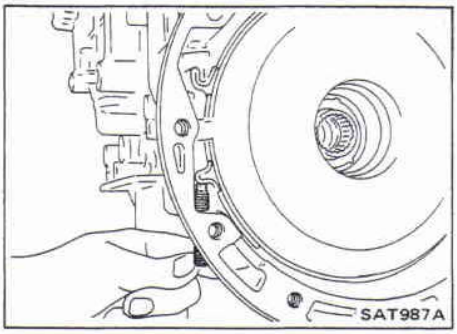
Assembly (Cont'd)



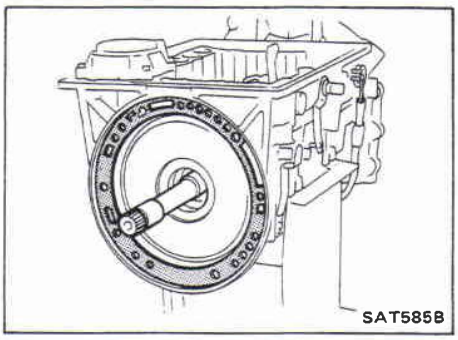
5. Install brake band and band strut.
a. Install band strut on brake band.
- **Apply petroleum jelly to band strut.**



b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

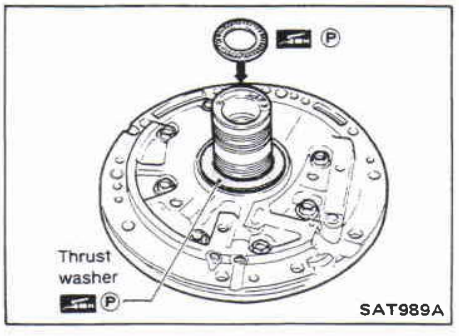


c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.



6. Install input shaft on transmission case.
- **Pay attention to its direction. — O-ring groove side is front.**

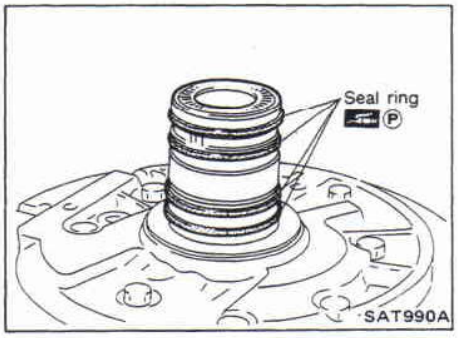
7. Install gasket on transmission case.



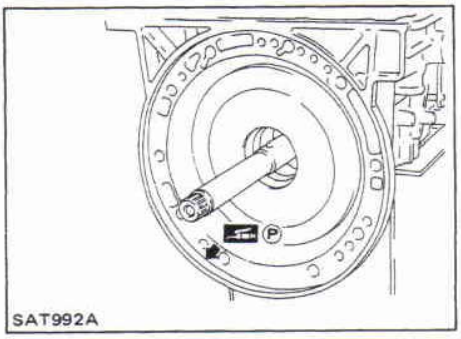
8. Install oil pump assembly.
a. Install needle bearing on oil pump assembly.
- **Apply petroleum jelly to the needle bearing.**

b. Install selected thrust washer on oil pump assembly.
- **Apply petroleum jelly to thrust washer.**

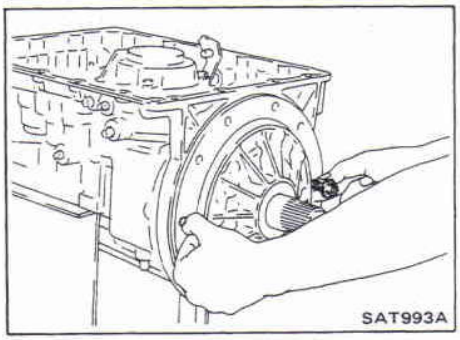
Assembly (Cont'd)



c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.

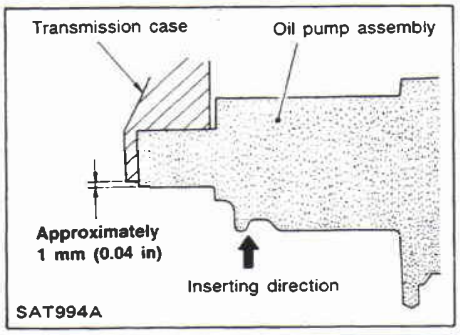


d. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

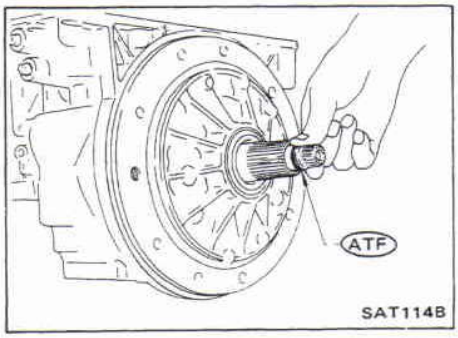


e. Install oil pump assembly.

- **Install two converter housing securing bolts in bolt holes in oil pump assembly as guides.**



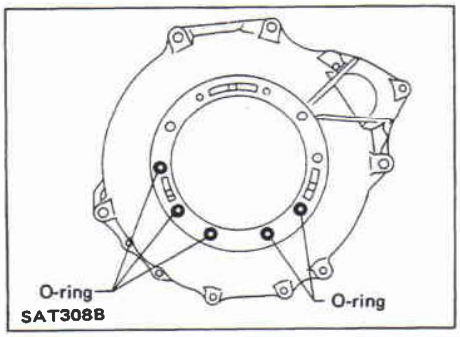
- **Insert oil pump assembly to the specified position in transmission, as shown at left.**



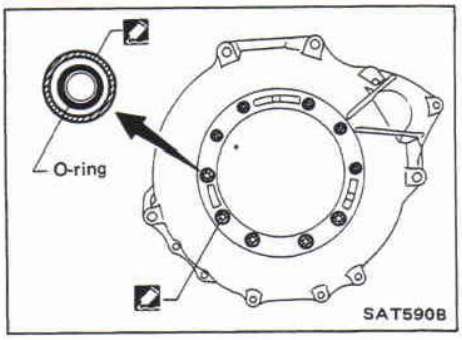
9. Install O-ring on input shaft.

- **Apply A.T.F. to O-rings.**

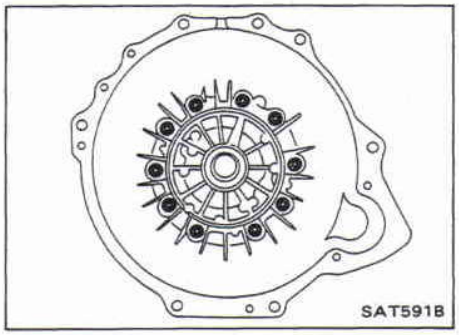
Assembly (Cont'd)



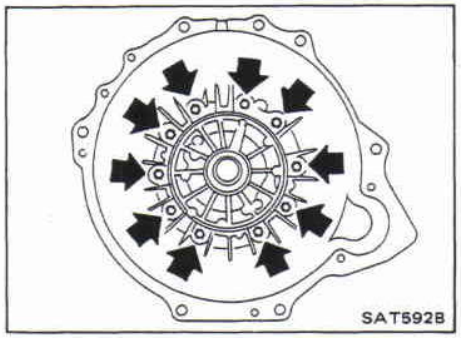
10. Install converter housing.
a. Install O-rings on converter housing.



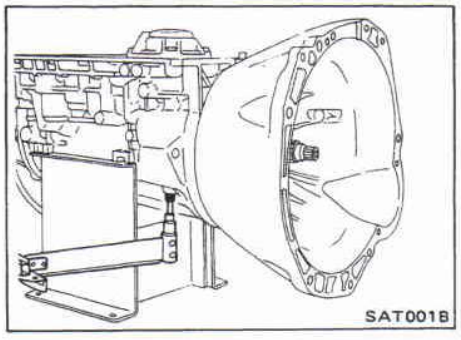
b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to outer periphery of bolt holes in converter housing.
- **Do not apply too much sealant.**



c. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.

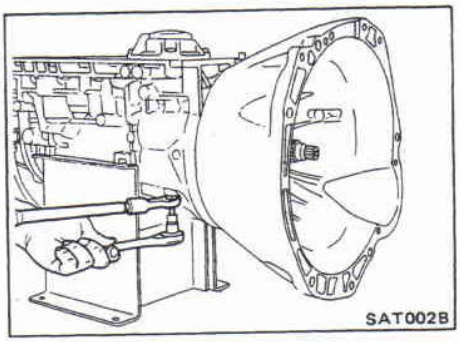


d. Install converter housing on transmission case.

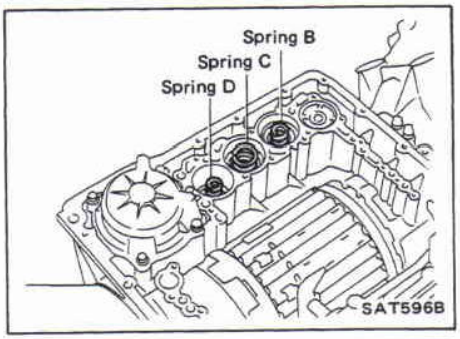


11. Adjust brake band.
a. Tighten anchor end bolt to specified torque.
: Anchor end bolt
4 - 6 N·m
(0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)
b. Back off anchor end bolt two and a half turns.

Assembly (Cont'd)



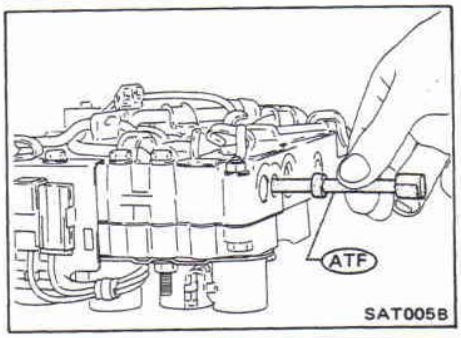
c. While holding anchor end bolt, tighten lock nut.



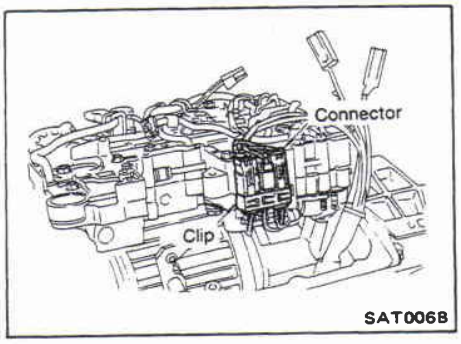
12. Install control valve assembly.
a. Install accumulator piston return springs B, C and D.

Free length of return springs Unit: mm (in)

Item \ Accumulator	B	C	D
Free length	66 (2.60)	45 (1.77)	58.4 (2.299)

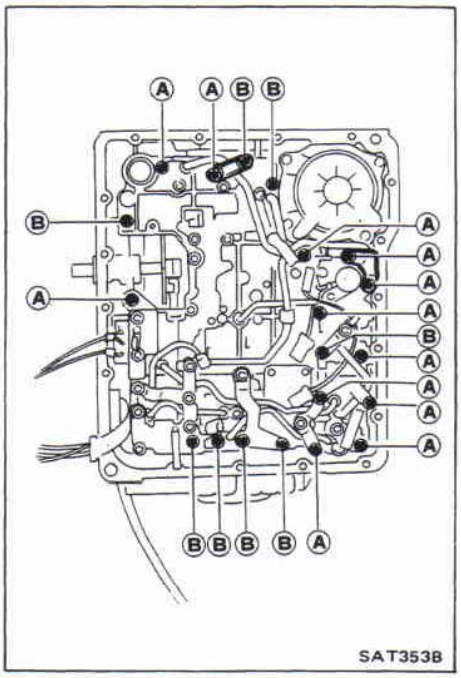


b. Install manual valve on control valve.
● **Apply A.T.F. to manual valve.**



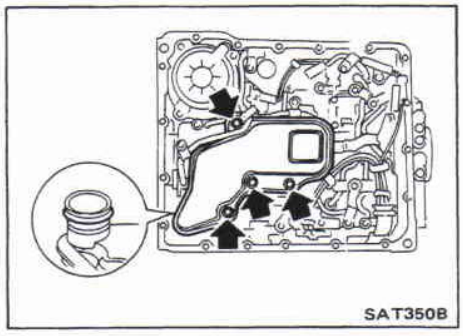
c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
d. Install connector clip.

Assembly (Cont'd)



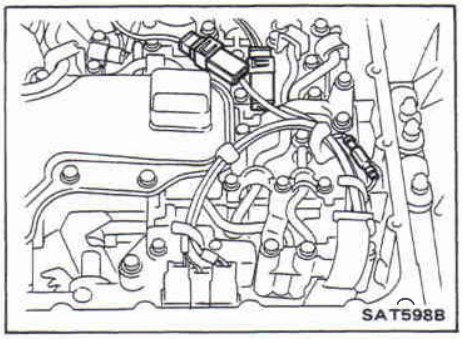
e. Install control valve assembly on transmission case.
f. Install connector tube brackets and tighten bolts Ⓐ and Ⓑ.
- **Check that terminal assembly harness does not catch.**

Bolt symbol	ℓ mm (in) ℓ
Ⓐ	33 (1.30)
Ⓑ	45 (1.77)

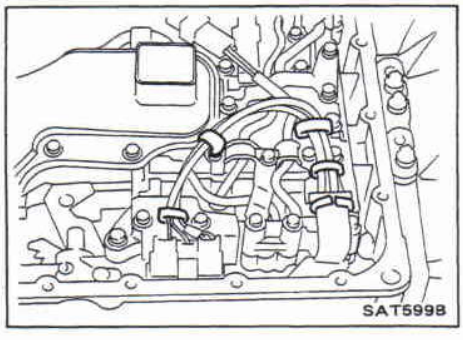


g. Install O-ring on oil strainer.
- **Apply petroleum jelly to O-ring.**

h. Install oil strainer on control valve.

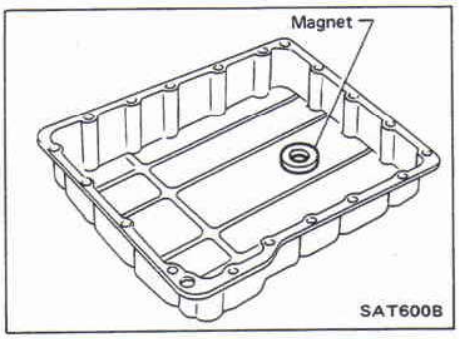


i. Install lock-up solenoid, fluid temperature sensor and A/T oil temperature switch connectors.

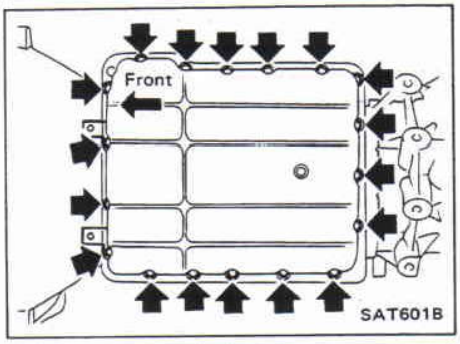


j. Securely fasten terminal harness with clips.

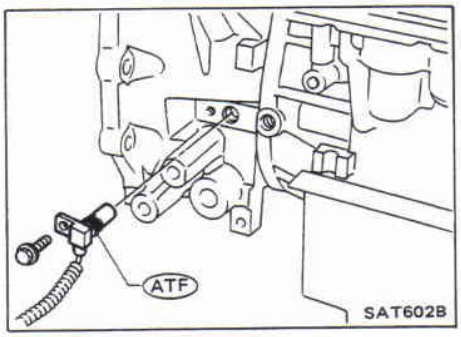
Assembly (Cont'd)



13. Install oil pan.
a. Attach a magnet to oil pan.

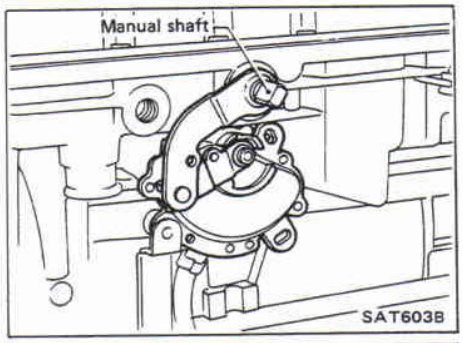


b. Install oil pan gasket on transmission case.
c. Install oil pan and bracket on transmission case.
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

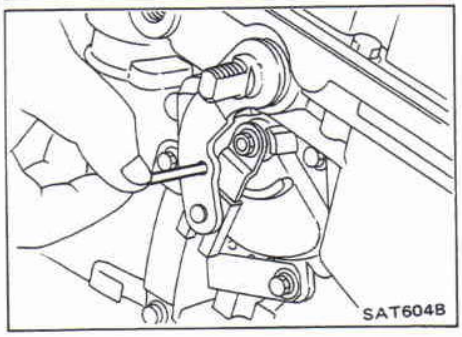


14. Install revolution sensor.
a. Install O-ring on revolution sensor.
- **Apply A.T.F. to O-ring.**

b. Install revolution sensor on adapter case.

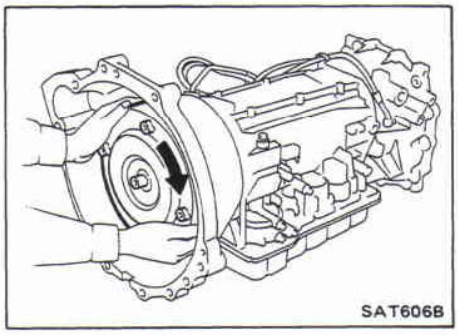


15. Install inhibitor switch.
a. Check that manual shaft is in "1" range.
b. Temporarily install inhibitor switch on manual shaft.
c. Move manual shaft to "N".

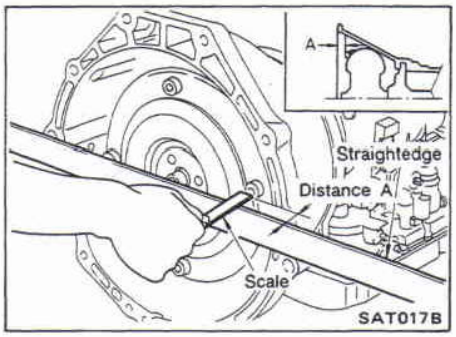


d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in inhibitor switch and manual shaft.

Assembly (Cont'd)



16. Install torque converter.
a. Install torque converter while aligning notches and oil pump.



b. Measure distance A to check that torque converter is in proper position.
Distance "A":
26.0 mm (1.024 in) or more

General Specifications

Applied model	TB42
Automatic transmission model	RE4R03A
Transmission model code number	51X01
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.784
2nd	1.544
Top	1.000
O.D.	0.694
Reverse	2.275
Recommended oil	Automatic transmission fluid Type DEXRON ™
Oil capacity ℓ (Imp qt)	8.5 (7-1/2)

Specifications and Adjustment

VEHICLE SPEED WHEN SHIFTING GEARS

Model	Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
			$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
TB42	Full throttle	Standard	43 - 47 (27 - 29)	77 - 85 (48 - 53)	119 - 129 (74 - 80)	113 - 123 (70 - 76)	70 - 78 (43 - 48)	36 - 40 (22 - 25)	40 - 44 (25 - 27)
		Power	48 - 52 (30 - 32)	87 - 95 (54 - 59)	138 - 148 (86 - 92)	125 - 135 (78 - 84)	78 - 86 (48 - 53)	41 - 45 (25 - 28)	40 - 44 (25 - 27)
	Half throttle	Standard	14 - 18 (9 - 11)	30 - 38 (19 - 24)	52 - 62 (32 - 39)	36 - 46 (22 - 29)	14 - 22 (9 - 14)	7 - 11 (4 - 7)	40 - 44 (25 - 27)
		Power	25 - 29 (16 - 18)	45 - 53 (28 - 33)	80 - 90 (50 - 56)	45 - 55 (28 - 34)	16 - 24 (10 - 15)	7 - 11 (4 - 7)	40 - 44 (25 - 27)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Model	Throttle position	Shift pattern	D_4	
			Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
TB42	Full throttle	Standard	—	—
		Power	—	—
	Half throttle	Standard	78 - 88 (48 - 55)	73 - 83 (45 - 52)
		Power	78 - 88 (48 - 55)	73 - 83 (45 - 52)

STALL REVOLUTION

Model	Stall revolution rpm
TB42	2,090 - 2,390

LINE PRESSURE

Model	Engine speed rpm	Line pressure kPa (bar, kg/cm², psi)	
		D, 2 and 1 ranges	R range
TB42	Idle	392 - 471 (3.92 - 4.71, 4.0 - 4.8, 57 - 68)	667 - 706 (6.67 - 7.06, 6.8 - 7.2, 97 - 102)
	Stall	883 - 961 (8.83 - 9.61, 9.0 - 9.8, 128 - 139)	1,393 - 1,471 (13.93 - 14.71, 14.2 - 15.0, 202 - 213)

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

Parts	Item	Part No.	Free length	Outer diameter
Control valve	Torque converter relief valve spring	31742-41X18	32.3 (1.272)	9.0 (0.354)
	Pressure regulator valve spring	31742-41X16	61.5 (2.421)	8.9 (0.350)
	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
	Accumulator control plug spring	31742-41X17	27.5 (1.083)	6.6 (0.260)
	Shuttle shift valve D spring	31762-41X00	26.5 (1.043)	6.0 (0.236)
	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
	4-2 relay valve spring	31756 -41X00	29.1 (1.146)	6.95 (0.2736)
	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
	Overrun clutch reducing valve spring	31742-41X14	38.9 (1.531)	7.0 (0.276)
	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
	Pilot valve spring	31742-41X13	25.7 (1.012)	9.1 (0.358)
	Lock-up control valve spring	31742-41X21	33.0 (1.299)	6.5 (0.256)
	Modifier accumulator piston spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	1st reducing valve spring	31756-41X05	25.4 (1.000)	6.75 (0.2657)
	3-2 timing valve spring	31742-41X08	20.55 (0.8091)	6.75 (0.2657)
	Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
Reverse clutch	16 pcs	31505-51X00	37.18 (1.4638)	14.8 (0.583)
High clutch	16 pcs	31505-21X03	22.06 (0.8685)	11.6 (0.457)
Forward clutch (Overrun clutch)	20 pcs	31505-51X04	36.83 (1.4500)	9.8 (0.386)
Low & reverse brake	Inner spring 16 pcs	31505-51X03	15.71 (0.6185)	8.9 (0.350)
	Outer spring 16 pcs	31505-51X02	18.75 (0.7382)	11.6 (0.457)
Band servo	Spring A	31605-41X05	45.6 (1.795)	34.3 (1.350)
	Spring B	31605-41X00	53.8 (2.118)	40.3 (1.587)
	Spring C	31605-41X01	29.0 (1.142)	27.6 (1.087)
Accumulator	Accumulator A	31605-41X02	43.0 (1.693)	
	Accumulator B	31605-41X03	66.0 (2.598)	
	Accumulator C	31605-41X09	45.0 (1.772)	
	Accumulator D	31605-41X06	58.4 (2.299)	

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

Accumulator	Diameter mm (in)			
	A	B	C	D
Small diameter end	29 (1.14)	32 (1.26)	45 (1.77)	29 (1.14)
Large diameter end	45 (1.77)	50 (1.97)	50 (1.97)	45 (1.77)

CLUTCHES AND BRAKES

Reverse clutch		
Number of drive plates	3	
Number of driven plates	3	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.5 - 0.8 (0.020 - 0.031)	
Allowable limit	1.4 (0.055)	
	Thickness mm (in)	Part number
Thickness of retaining plate	4.4 (0.173)	31537-51X61
	4.6 (0.181)	31537-51X00
	4.8 (0.189)	31537-51X01
	5.0 (0.197)	31537-51X02
	5.2 (0.205)	31537-51X03
	5.4 (0.213)	31537-51X04
High clutch		
Number of drive plates	7	
Number of driven plates	8	
Thickness of drive plate mm (in)		
Standard	1.6 (0.063)	
Wear limit	1.4 (0.055)	
Clearance mm (in)		
Standard	1.8 - 2.2 (0.071 - 0.087)	
Allowable limit	3.6 (0.142)	
	Thickness mm (in)	Part number
Thickness of retaining plate	4.0 (0.157)	31537-51X19
	4.2 (0.165)	31537-51X60
	4.4 (0.173)	31537-51X61
	4.6 (0.181)	31537-51X00
	4.8 (0.189)	31537-51X01
	5.0 (0.197)	31537-51X02

Forward clutch		
Number of drive plates	9	
Number of driven plates	9	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.45 - 0.85 (0.0177 - 0.0335)	
Allowable limit	2.65 (0.1043)	
	Thickness mm (in)	Part number
Thickness of retaining plate	4.4 (0.173)	31537-51X05
	4.6 (0.181)	31537-51X06
	4.8 (0.189)	31537-51X07
	5.0 (0.197)	31537-51X08
	5.2 (0.205)	31537-51X09
	5.4 (0.213)	31537-51X10
Overrun clutch		
Number of drive plates	5	
Number of driven plates	5	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	2.4 (0.094)	
	Thickness mm (in)	Part number
Thickness of retaining plate	4.0 (0.157)	31537-51X12
	4.2 (0.165)	31537-51X13
	4.4 (0.173)	31537-51X14
	4.6 (0.181)	31537-51X15
	4.8 (0.189)	31537-51X64
	5.0 (0.197)	31537-51X65
	5.2 (0.205)	31537-51X66

Specifications and Adjustment (Cont'd)

Low & reverse brake Number of drive plates	8	
Number of driven plates	8	
Thickness of drive plate mm (in) Standard Wear limit	1.6 (0.063) 1.4 (0.055)	
Clearance mm (in) Standard Allowable limit	0.5 - 0.8 (0.020 - 0.031) 2.4 (0.094)	
Thickness of retaining plate	Thickness mm (in)	Part number
	5.0 (0.197)	31667-51X03
	5.2 (0.205)	31667-51X04
	5.4 (0.213)	31667-51X05
	5.6 (0.220)	31667-51X06
	5.8 (0.228)	31667-51X07
	6.0 (0.236)	31667-51X08
	6.2 (0.244)	31667-51X09
Brake band Anchor end bolt tightening torque N-m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)	
Number of returning revolutions for anchor end bolt	2.5	

OIL PUMP AND LOW ONE-WAY CLUTCH

Oil pump clearance mm (in) Cam ring — oil pump housing Standard	0.01 - 0.024 (0.0004 - 0.0009)
Rotor, vanes and control piston — oil pump housing Standard	0.03 - 0.044 (0.0012 - 0.0017)
Seal ring clearance mm (in) Standard Allowable limit	0.10 - 0.25 (0.0039 - 0.0098) 0.25 (0.0098)

TOTAL END PLAY

Total end play "T_1"	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	0.8 (0.031)	31429-21X00
	1.0 (0.039)	31429-21X01
	1.2 (0.047)	31429-21X02
	1.4 (0.055)	31429-21X03
	1.6 (0.063)	31429-21X04
	1.8 (0.071)	31429-21X05
	2.0 (0.079)	31429-21X06

REVERSE CLUTCH DRUM END PLAY

Reverse clutch drum end play "T_2"	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number
	0.7 (0.028)	31528-21X00
	0.9 (0.035)	31528-21X01
	1.1 (0.043)	31528-21X02
	1.3 (0.051)	31528-21X03
	1.5 (0.059)	31528-21X04
	1.7 (0.067)	31528-21X05
	1.9 (0.075)	31528-21X06

REMOVAL AND INSTALLATION

Manual control linkage Number of returning revolutions for lock nut	1
Lock nut tightening torque	22 - 27 N-m (2.2 - 2.8 kg-m, 16 - 20 ft-lb)
Distance between end of clutch housing and torque converter	26.0 mm (1.024 in) or more
Drive plate runout limit	0.5 mm (0.020 in)