SECTION AT

CONTENTS

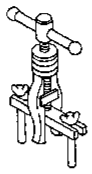
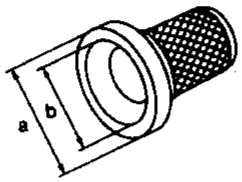
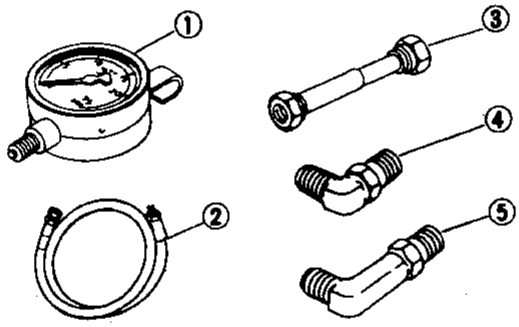
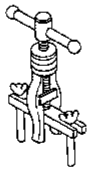
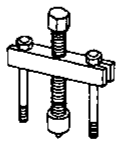
CONTENTS (Cont'd.)

CONTENTS (Cont'd.)

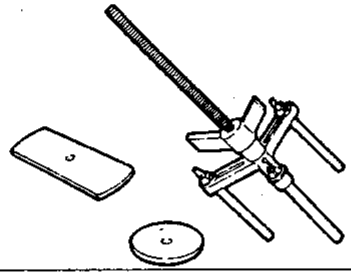
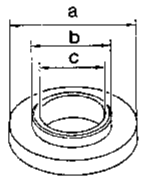
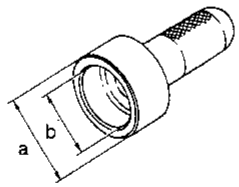
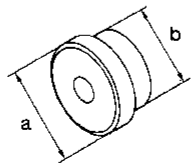
When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES".

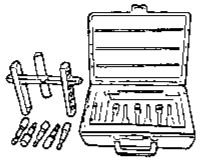
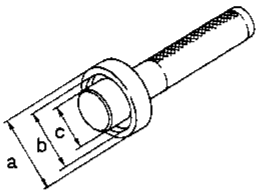
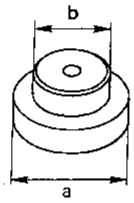
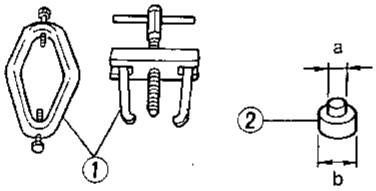
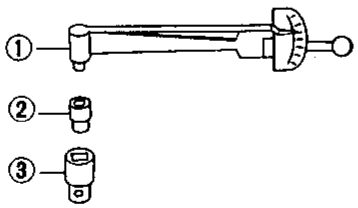
Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description
ST33290001 (J34286) Puller	 Removing differential side oil seals
ST33400001 (J26082) Drift	 **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.** Installing differential side oil seal (RH side) Installing oil seal on oil pump housing
ST2505S001 (J25695-A) Oil pressure gauge set ① ST25051001 (J25695-1) Oil pressure gauge ② ST25052000 (J25695-2) Hose ③ ST25053000 (J25695-3) Joint pipe ④ ST25054000 (J25695-4) Adapter ⑤ ST25055000 (J25695-5) Adapter	 Measuring line pressure and governor pressure
KV381054S0 (—) Puller	 • Removing differential side bearing outer race • Removing idler gear bearing outer race
ST27180001 (—) Puller	 Removing idler gear
ST23540000 (—) Pin punch	 Removing and installing parking rod plate and manual plate pins.

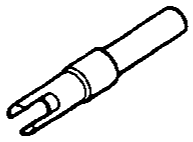
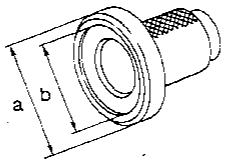
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST25710000 (—) Pin punch		Aligning groove of manual shaft and hole of transmission case.
KV32101000 (J25689-A) Pin punch		Installing manual shaft retaining pin
KV31102400 (J34285 and J34285-87) Clutch spring compressor		• Removing and installing clutch return springs • Installing low and reverse brake piston
KV40100630 (—) Drift	 **a: 67.5 mm (2.657 in) dia.** **b: 44 mm (1.73 in) dia.** **c: 38.5 mm (1.516 in) dia.**	• Installing reduction gear bearing inner race • Installing idler gear bearing inner race
ST30720000 (J34331)	 **a: 55.5 mm (2.185 in) dia.** **b: 77 mm (3.03 in) dia.**	Installing idler gear bearing outer race
ST35321000 (—) Drift	 **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**	Installing output shaft bearing

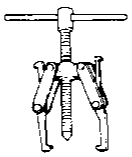
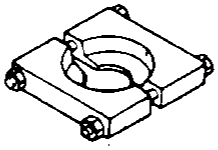
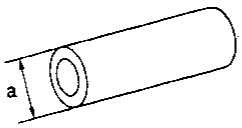
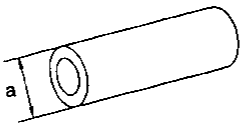
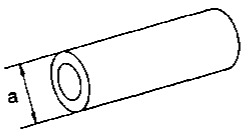
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
(J34291) Shim setting gauge set		• Selecting oil pump cover bearing race and oil pump thrust washer • Selecting side gear thrust washer
KV38100300 (—)	 **a: 54 mm (2.13 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 32 mm (1.26 in) dia.**	Installing differential side bearing inner race (RH side)
ST30613000 (—)	 **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**	Installing differential side bearing inner race (LH side)
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Puller ② ST33061000 (J8107-2) Adapter	 **a: 28.5 mm (1.122 in) dia.** **b: 38 mm (1.50 in) dia.**	Removing differential side bearing inner race
ST3127S000 (See J25765-A) Preload gauge ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter		Checking differential side bearing preload

Special Service Tools (Cont'd)

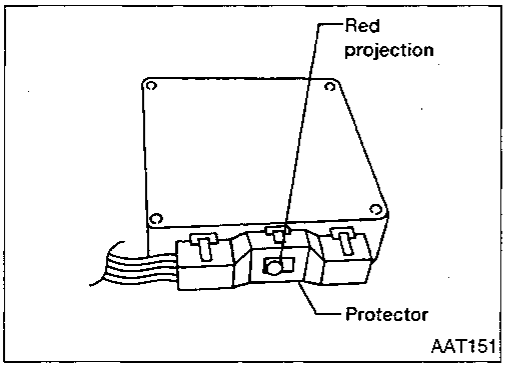
Tool number (Kent-Moore No.) Tool name	Description
(J39713) Preload adapter	 • Selecting differential side bearing adjusting shim • Checking differential side bearing preload
ST35271000 (—) Drift	 Installing idler gear **a: 76 mm (2.99 in) dia.** **b: 67 mm (2.64 in) dia.**

Commercial Service Tools

Tool name	Description
Puller	 • Removing idler gear bearing inner race • Removing and installing band servo piston snap ring
Puller	 Removing reduction gear bearing inner race
Drift	 Installing differential side oil seal (Left side) **a: 90 mm (3.54 in) dia.**
Drift	 Installing needle bearing on bearing retainer **a: 36 mm (1.42 in) dia.**
Drift	 Removing needle bearing from bearing retainer **a: 33.5 mm (1.319 in) dia.**

Precautions

- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. 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 transaxle.
- When disassembling parts, place them in order in a parts rack so that they can be assembled 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 transaxle is disassembled.
- It is very important to perform functional tests whenever they are indicated.
- Valve bodies contain precision parts and require 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 bodies under their own weight.
- Before assembly, apply a coat of recommended ATF 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.
- If foreign matter is found to have accumulated in the oil pan in large quantities during overhaul or the oil strainer is excessively clogged, flush or replace ATF cooler as required. For servicing, refer to AT-18.
- After overhaul, refill the transaxle with new ATF.
- Even when the drain plug is removed, the old A/T fluid will remain in the torque converter and the A/T fluid cooling system.
  Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.



- When connecting A/T control unit harness connector, tighten securing bolt until red projection is in line with connector face.

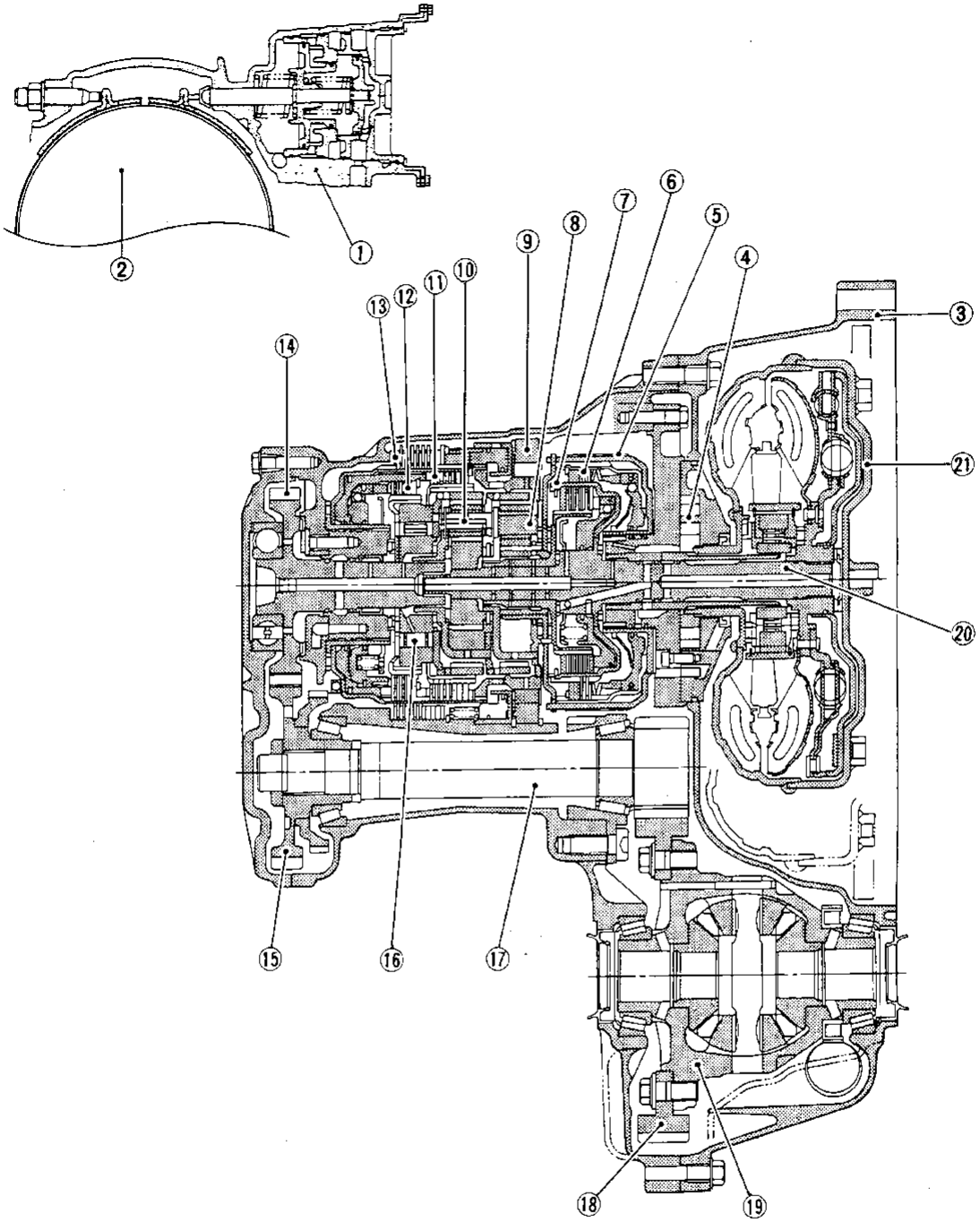
Precautions for Supplemental Restraint System Supplemental "AIR BAG"

The Supplemental Restraint System Supplemental "Air Bag", used along with seat belts, helps to reduce the risk or severity of injury to the driver in a frontal collision. The Supplemental Restraint System consists of a supplemental air bag module (located in the center of the steering wheel), sensors, a diagnosis (control) unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **BF section** of this Service Manual.

WARNING:

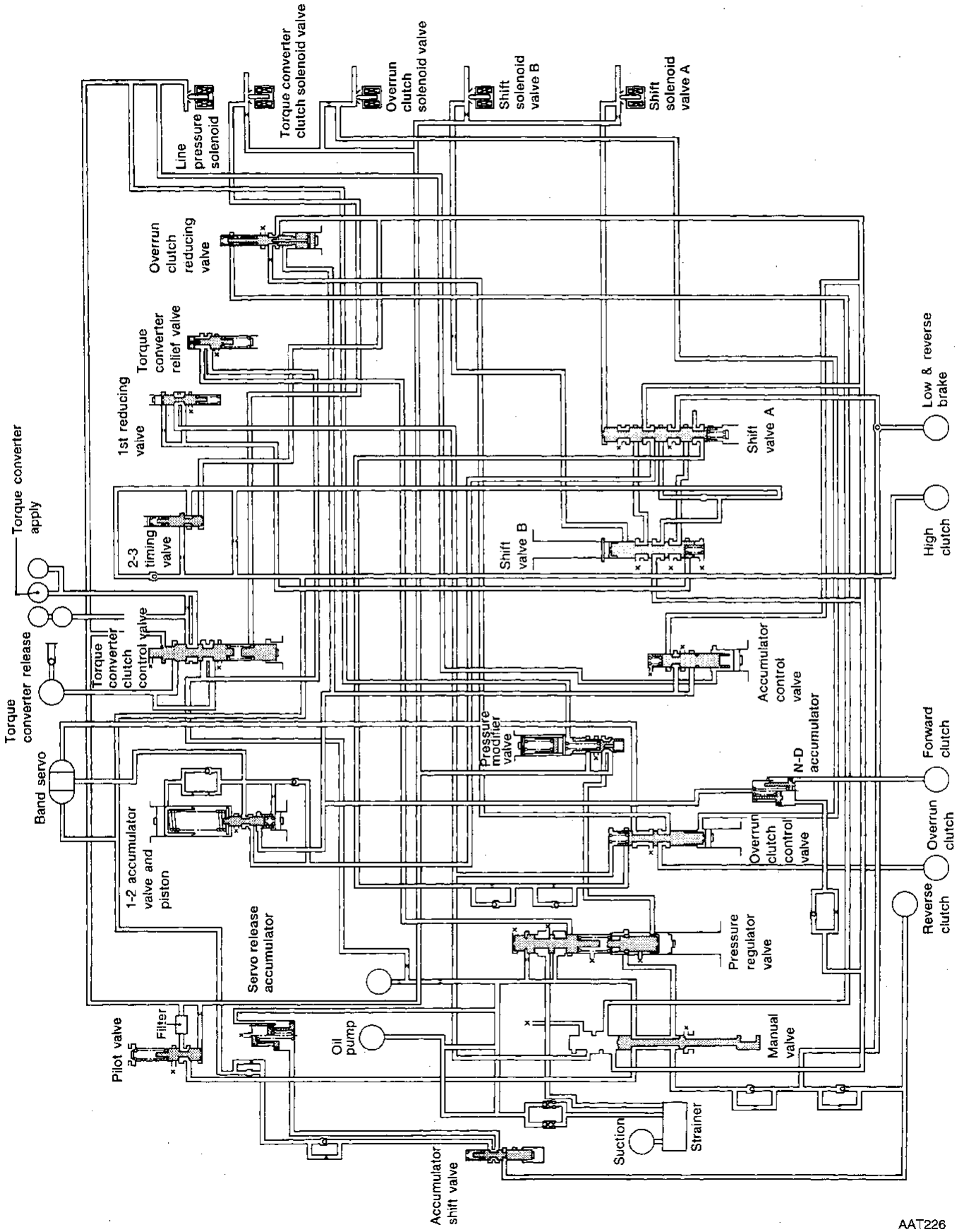
- **To avoid rendering the SRS inoperative, which could lead to personal injury or death in the event of a severe frontal collision, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS Supplemental "Air Bag".**

Cross-Sectional View



① Band servo piston
② Reverse clutch drum
③ Converter housing
④ Oil pump
⑤ Brake band
⑥ Reverse clutch
⑦ High clutch
⑧ Front planetary gear
⑨ Low one-way clutch
⑩ Rear planetary gear
⑪ Forward clutch
⑫ Overrun clutch
⑬ Low & reverse brake
⑭ Output gear
⑮ Idler gear
⑯ Forward one-way clutch
⑰ Pinion reduction gear
⑱ Final gear
⑲ Differential case
⑳ Input shaft
㉑ Torque converter

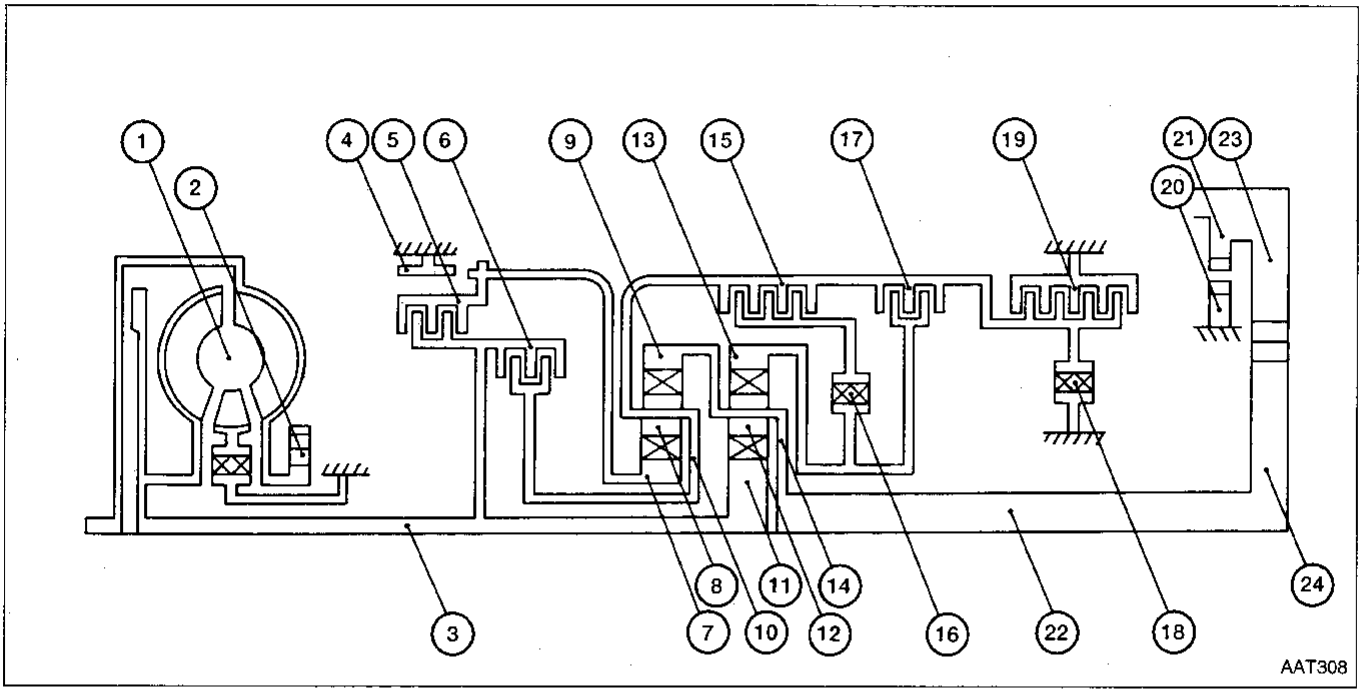
Hydraulic Control Circuits



Shift Mechanism

The RE4F04A automatic transaxle uses compact, dual planetary gear systems to improve power transmission efficiency, simplify construction and reduce weight. Two one-way clutches are also employed. These one-way clutches, combined with two accumulators, reduce shifting shock to a minimum.

CONSTRUCTION



① Torque converter
② Oil pump
③ Input shaft
④ Brake band
⑤ Reverse clutch
⑥ High clutch
⑦ Front sun gear
⑧ Front pinion gear
⑨ Front internal gear
⑩ Rear planetary carrier
⑪ Rear sun gear
⑫ Rear pinion gear
⑬ Rear internal gear
⑭ Rear planetary carrier
⑮ Forward clutch
⑯ Forward one-way clutch
⑰ Overrun clutch
⑱ Low one-way clutch
⑲ Low & reverse brake
⑳ Parking pawl
㉑ Parking gear
㉒ Output shaft
㉓ Idler gear
㉔ Output gear

Shift Mechanism (Cont'd)

FUNCTION OF CLUTCH AND BRAKE

Control members	Function
Reverse clutch	To transmit input power to front sun gear.
High clutch	To transmit input power to front planetary carrier.
Forward clutch	To connect front planetary carrier with forward one-way clutch.
Overrun clutch	To connect front planetary carrier with rear internal gear.
Brake band	To lock front sun gear.
Forward one-way clutch	When forward clutch is engaged, to stop rear internal gear from rotating in opposite direction against engine revolution.
Low one-way clutch	To stop front planetary carrier from rotating in opposite direction against engine revolution.
Low & reverse brake	To lock front planetary carrier.

OPERATION OF CLUTCH AND BRAKE

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

*1: Operates when transaxle gear selection switch-OD is in "OFF" position.
*2: Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, brake band does not contract because oil pressure area on the "release" side is greater than that on the "apply" side.
*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 transaxle gear selection switch-OD is in "OFF" position.
○: Operates
◎: Operates when throttle position is less than 3/16.
●: Operates during "progressive" acceleration.
Ⓧ: Operates but does not affect power transmission.

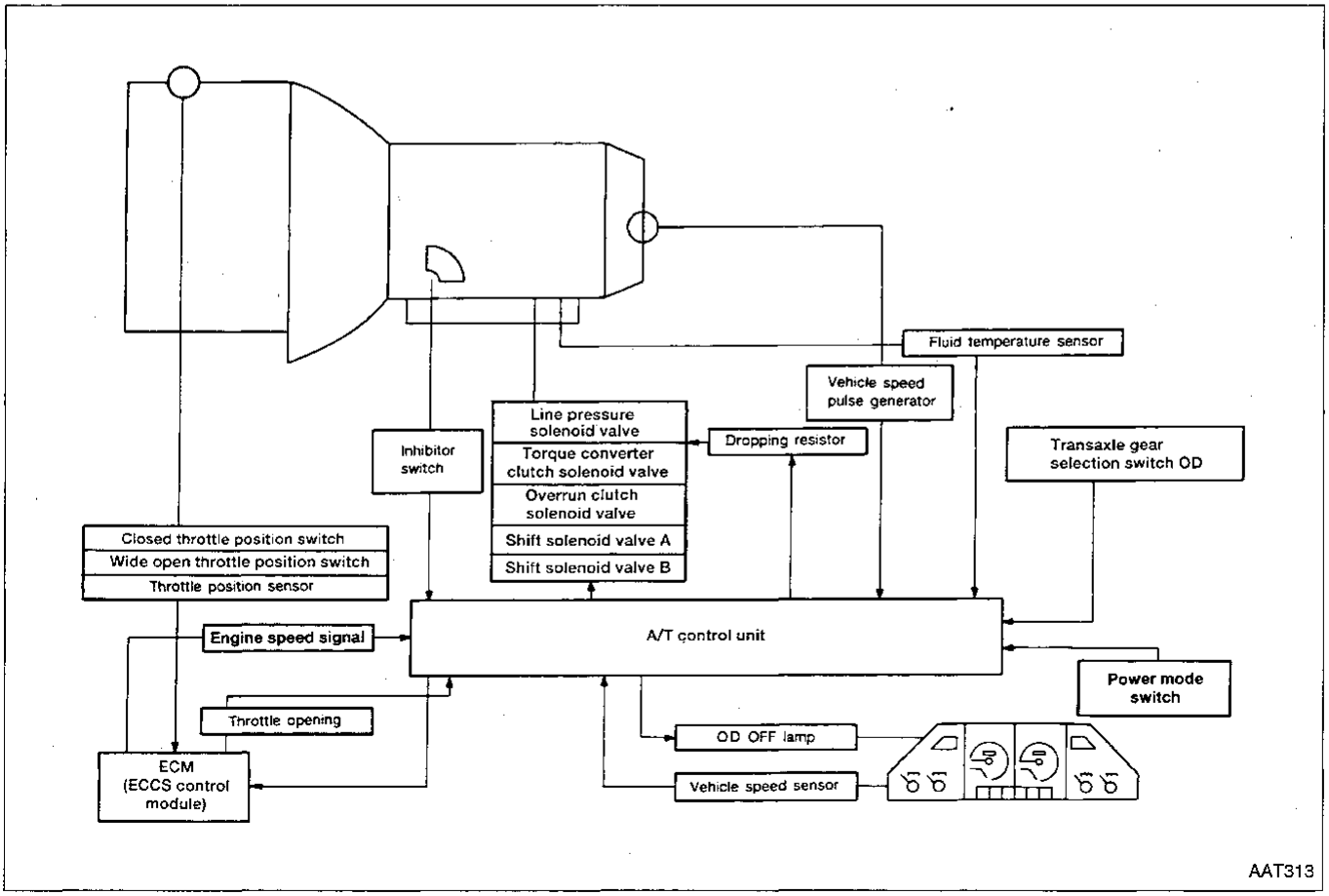
Control System

OUTLINE

The RE4F04A automatic transaxle senses vehicle operating conditions through various sensors. It always controls the optimum shift position and reduces shifting and lock-up shocks.

SENSORS	CONTROL UNIT	ACTUATORS
Inhibitor switch Throttle position sensor Closed throttle position switch Wide open throttle position switch Engine speed signal Fluid temperature sensor Vehicle speed pulse generator Vehicle speed sensor Transaxle gear selection switch OD Power mode switch	Shift control Line pressure control Lock-up control Overrun clutch control Timing control Fail-safe control Self-diagnosis	Shift solenoid valve A Shift solenoid valve B Overrun clutch solenoid valve Torque converter clutch solenoid valve Line pressure solenoid valve OD OFF lamp

CONTROL SYSTEM



Control System (Cont'd)

A/T CONTROL UNIT FUNCTION

The A/T control unit receives signals sent from various switches and sensors, determines required line pressure, shifting point, lock-up operation, engine brake operation, and sends required signals to the respective solenoids.

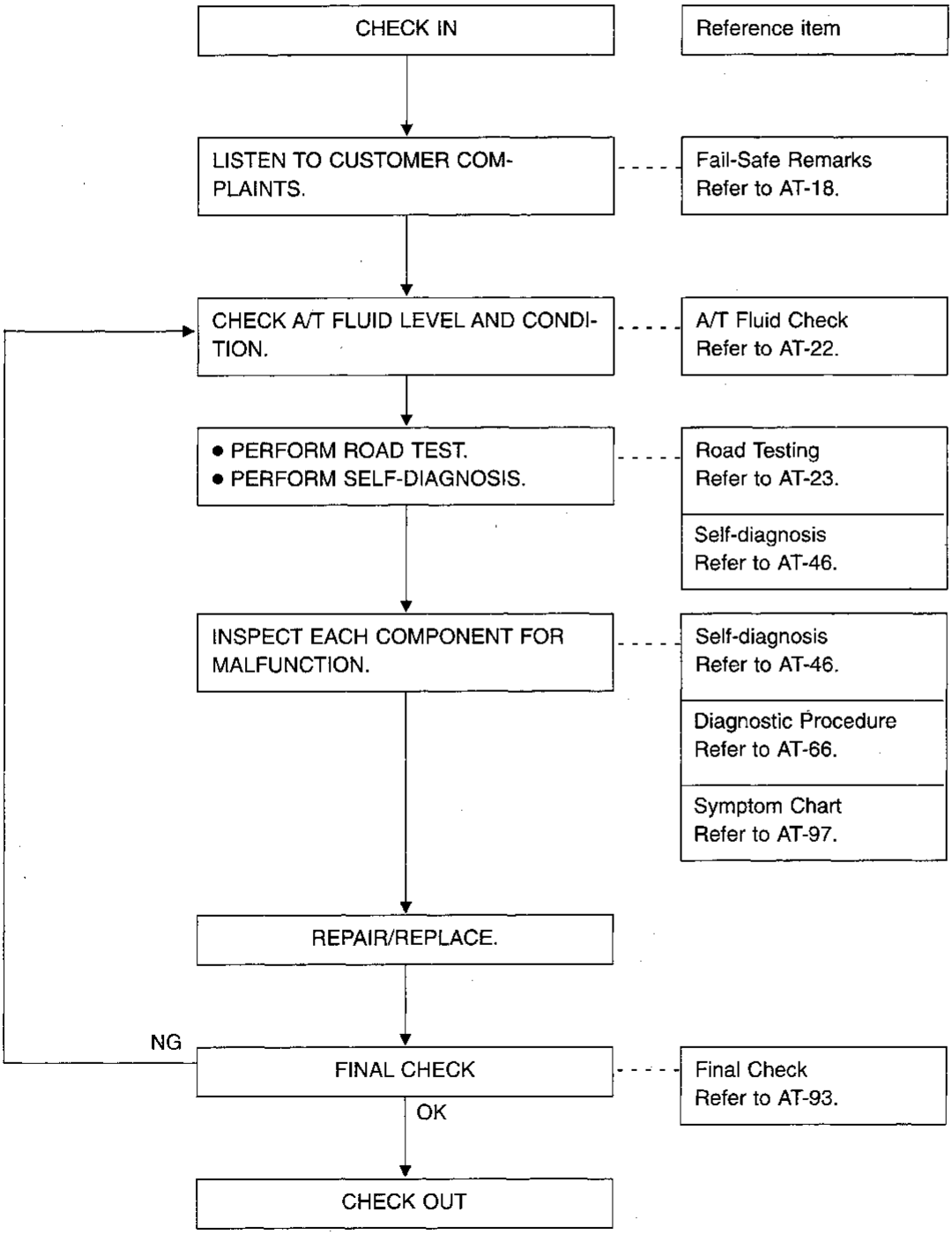
INPUT/OUTPUT SIGNAL OF A/T CONTROL UNIT

	Sensors and solenoid valves	Function
Input	Inhibitor switch	Detects select lever position and sends a signal to A/T control unit.
	Throttle position sensor	Detects throttle valve position and sends a signal to A/T control unit.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to A/T control unit.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle should throttle sensor malfunction and sends a signal to A/T control unit.
	Engine speed signal	From ECM (ECCS control module).
	Fluid temperature sensor	Detects transaxle fluid temperature and sends a signal to A/T control unit.
	Vehicle speed pulse generator	Detects output shaft rpm and sends a signal to A/T control unit.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transaxle) malfunctions.
	Transaxle gear selection switch-OD	Sends a signal, which prohibits a shift to D_4 (OD) range, to the A/T control unit.
	Power mode switch	Detects power or comfort position selected and sends a signal to A/T control unit.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from A/T control unit.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from A/T control unit.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from A/T control unit.
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from A/T control unit.
	OD OFF lamp	Shows when transaxle gear selection switch-OD has been depressed. Shows A/T control unit faults, when A/T control components malfunction.

How to Perform Trouble Diagnoses for Quick and Accurate Repair

A good understanding of the malfunctioning conditions can make troubleshooting faster and more accurate.
In general, the feeling about a problem depends on each customer. It is important to fully understand the symptoms or under what conditions a customer complains.
Make good use of the two sheets provided, "Information from customer" and "Diagnostic worksheet", in order to perform the best troubleshooting possible.

WORK FLOW



How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

INFORMATION FROM CUSTOMER

KEY POINTS
WHAT ..... Vehicle & A/T model
WHEN ..... Date, Frequencies
WHERE .....Road conditions
HOW ..... Operating conditions, Symptoms

Customer name	Model & Year	VIN
Trans. model	Engine	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	☐ Continuous ☐ Intermittent (times a day)	
Symptoms	☐ Vehicle does not move. (☐ Any position ☐ Particular position)	
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → O/D)	
	☐ No down-shift (☐ O/D → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)	
	☐ Lockup malfunction	
	☐ Shift point too high or too low.	
	☐ Shift shock or slip (☐ N → D ☐ Lockup ☐ Any drive position)	
	☐ Noise or vibration	
	☐ No kickdown	
	☐ No pattern select	
	☐ Others ( )	
OD OFF indicator lamp	"TRANSAXLE MALFUNCTION"	
	☐ All judgement flickers are same. _____ judgement flicker is longer than others.	

How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

DIAGNOSTIC WORKSHEET

1.	☐ Read Fail-safe remarks and listen to customer complaints.	AT-18
2.	☐ CHECK A/T FLUID ☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level	AT-22
3.	☐ Perform all ROAD TESTING and mark required procedures.	AT-23
	3.1. Check before engine is started. ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. ☐ 1. Vehicle speed pulse generator ☐ 2. Vehicle speed sensor ☐ 3. Throttle position sensor ☐ 4. Shift-solenoid valve A ☐ 5. Shift-solenoid valve B ☐ 6. Overrun clutch solenoid valve ☐ 7. Torque converter clutch solenoid valve ☐ 8. Fluid temperature sensor and A/T control unit power source ☐ 9. Engine speed signal ☐ 10. Line pressure solenoid valve ☐ 11. Engine control circuit ☐ 12. Battery ☐ 13. Others ☐ Diagnostic Procedure 1 (Ignition switch in ON position, OD OFF lamp working properly) ☐ Diagnostic Procedure 2 (Power mode switch in ON position, power indicator lamp working properly) ☐ Diagnostic Procedure 3 (Transaxle gear selection switch-OD in OFF position, OD OFF lamp working properly)	AT-24
	3.2. Check at idle ☐ Diagnostic Procedure 4 (Selector lever in P or N position, engine starts) ☐ Diagnostic Procedure 5 (In P position, vehicle does not move when pushed) ☐ Diagnostic Procedure 6 (In N position, vehicle moves) ☐ Diagnostic Procedure 7 (Select shock. N → R position) ☐ Diagnostic Procedure 8 (Vehicle creeps backward in R position) ☐ Diagnostic Procedure 9 (Vehicle creeps forward in D, 2 or 1 position)	AT-26
	3.3. Cruise test Part-1 ☐ Diagnostic Procedure 10 (Vehicle starts from D_1) ☐ Diagnostic Procedure 11 ☐ Diagnostic Procedure 12 } (A/T shift schedule: $D_1 \rightarrow D_2$ / $D_2 \rightarrow D_3$ / $D_3 \rightarrow D_4$) ☐ Diagnostic Procedure 13 ☐ Diagnostic Procedure 14 (Shift schedule: Lock-up) ☐ Diagnostic Procedure 15 (Lock-up condition more than 30 seconds) ☐ Diagnostic Procedure 16 (Lock-up released) ☐ Diagnostic Procedure 17 (Engine speed return to idle. Light braking $D_4 \rightarrow D_3$)	AT-31

How to Perform Trouble Diagnoses for Quick and Accurate Repair (Cont'd)

	Part-2 ☐ Diagnostic Procedure 18 (Vehicle starts from D_1) ☐ Diagnostic Procedure 11 (Kickdown: $D_4 \rightarrow D_2$) ☐ Diagnostic Procedure 12 (Shift schedule: $D_2 \rightarrow D_3$) ☐ Diagnostic Procedure 13 (Shift schedule: $D_3 \rightarrow D_4$)	AT-34
	Part-3 ☐ Diagnostic Procedure 19 ($D_4 \rightarrow D_3$ when transaxle gear selection switch-OD ON → OFF position) ☐ Diagnostic Procedure 17 (Engine brake in D_3) ☐ Diagnostic Procedure 20 ($D_3 \rightarrow D_2$ when selector lever D → 2 position) ☐ Diagnostic Procedure 17 (Engine brake in 2_2) ☐ Diagnostic Procedure 21 (2_2 (1_2)→ 1_1, when selector lever 2 → 1 position) ☐ Diagnostic Procedure 22 (Engine brake in 1_1) ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. ☐ 1. Vehicle speed pulse generator ☐ 2. Vehicle speed sensor ☐ 3. Throttle position sensor ☐ 4. Shift-solenoid valve A ☐ 5. Shift-solenoid valve B ☐ 6. Overrun clutch solenoid valve ☐ 7. Torque converter clutch solenoid valve ☐ 8. Fluid temperature sensor and A/T control unit power source ☐ 9. Engine speed signal ☐ 10. Line pressure solenoid valve ☐ 11. Engine control circuit ☐ 12. Battery ☐ 13. Others	AT-36
4.	☐ Perform the Diagnostic Procedures marked in ROAD TESTING. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the components inspection orders.)	AT-97
5.	Perform FINAL CHECK. If NG, go back to "CHECK A/T FLUID". ☐ Stall test — Mark possible damaged components/others. ☐ Torque converter one-way clutch ☐ Reverse clutch ☐ Forward clutch ☐ Overrun clutch ☐ Forward one-way clutch ☐ Low & reverse brake ☐ Low one-way clutch ☐ Engine ☐ Line pressure is low ☐ Clutches and brakes except high clutch and brake band are OK ☐ Pressure test — Suspected parts:	AT-93

Remarks

FAIL-SAFE

The A/T control unit has an electronic Fail-Safe (limp home mode) to allow the vehicle to be driven even in the event of damage to a major electrical input or output device circuit.
In this condition, the vehicle runs in third gear in positions 1, 2 or D and will not upshift. Customer may say "Sluggish, poor acceleration."
When Fail-Safe operation occurs, the next time the key is turned to the "ON" position the OD OFF lamp will blink for about 8 seconds. For diagnosis, refer to AT-14.
If the vehicle is driven under extreme conditions such as excessive wheel spinning and emergency braking suddenly after, Fail-Safe may be activated even if all electrical circuits are undamaged.
In this case, normal shift pattern can be returned by turning the ignition key OFF for 3 seconds and then back ON.
The blinking of the OD OFF lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions by chance.
Always follow the "WORK FLOW" (Refer to AT-14).
The SELF DIAGNOSIS results will be as follows:

The first SELF DIAGNOSIS will indicate the damage of the vehicle speed sensor or the vehicle speed pulse generator.
During the next SELF DIAGNOSIS performed after checking the sensors, no damages will be indicated.

ATF COOLER SERVICE

If foreign matter is found to accumulate in the oil pan in large quantities during overhaul or the strainer is excessively clogged, the ATF cooler must be serviced as follows:
VG30E engine (RE4F04A) ... fin type cooler

Replace radiator lower tank (which includes ATF cooler) with a new one and flush cooler line using cleaning solvent and compressed air.

Diagnosis by CONSULT

NOTICE

1. The CONSULT displays shift timing and lock-up timing (that is, operation timing of each solenoid). When a noticeable time difference occurs between shift timing (indicated by shift shock) and the CONSULT display, then mechanical parts (except solenoid valves, sensors, etc.) are considered to be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:
   - Actual shift schedule has more or less tolerance or allowance than design specification.
   - Shift schedule indicated in Service Manual refers to the point where shifts starts, and gear position displayed on CONSULT indicates the point where shifts are completed.
3. Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting, while gear position is displayed upon completion of shifting (which is computed by the A/T control unit).
4. Additional CONSULT information can be found in Operation Manual supplied with CONSULT unit.

APPLICATION

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Vehicle speed sensor 1(A/T) (Vehicle speed pulse generator)	VHCL/S SE-A/T [km/h] or [mph]	X	—	• Vehicle speed computed from signal of vehicle speed pulse generator is displayed.	When racing engine in N or P position, meter will not indicate 0 km/h (0 mph) even if vehicle is stationary.
Vehicle speed sensor 2 (Meter)	VHCL/S SE-MTR [km/h] or [mph]	X	—	• Vehicle speed computed from signal of vehicle speed sensor is displayed.	Error may occur under approx. 10 km/h (approx. 6 mph) and meter will not indicate 0 km/h (0 mph) even if vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	• Throttle position sensor signal voltage is displayed.	
Fluid temperature sensor	FLUID TEMP SE [V]	X	—	• Fluid temperature sensor signal voltage is displayed. • Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	• Source voltage of control unit is displayed.	
Engine speed (rpm)	ENGINE SPEED [rpm]	X	X	• Engine speed, computed from engine speed signal, is displayed.	Error may occur under approx. 800 rpm and meter will not indicate 0 rpm even if engine is not running.
Transaxle gear selection switch-OD	OVERDRIVE SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of transaxle gear selection SW-OD, is displayed.	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of P/N position SW, is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of R position SW, is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of D position SW, is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 2 position SW, is displayed.	

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
1 position switch	1 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD-cruise signal	ASCD-CRUISE [ON/OFF]	X	—	• Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	• This is displayed even when no ASCD is mounted.
ASCD-OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	• Status of ASCD-OD release signal is displayed. ON ... OD released OFF ... OD not released	• This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of kickdown SW, is displayed.	• This is displayed even when no kickdown SW is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Gear position	GEAR	—	X	• Gear position data used for computation by control unit, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	• Selector lever position data, used for computation by control unit, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	• Vehicle speed data, used for computation by control unit, is displayed.	
Throttle position	THROTTLE POSI [/8]	—	X	• Throttle position data, used for computation by control unit, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Line-pressure solenoid valve duty	LINE PRES DTY [%]	—	X	• Control value of line pressure solenoid valve, computed by control unit from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	• Control value of torque converter clutch solenoid valve, computed by control unit from each input signal, is displayed.	
Shift solenoid valve A	SHIFT SL/V A [ON/OFF]	—	X	• Control value of shift solenoid valve A, computed by control unit from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT SL/V B [ON/OFF]	—	X	• Control value of shift solenoid valve B, computed by control unit from each input signal, is displayed.	

Diagnosis by CONSULT (Cont'd)

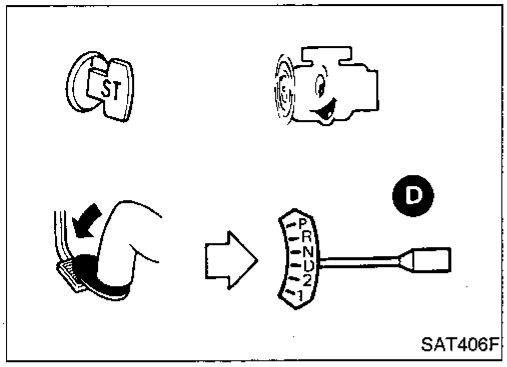
Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Overrun clutch solenoid valve	OVRRUN/C S/V [ON/OFF]	—	X	• Control value of overrun clutch solenoid valve computed by control unit from each input signal, is displayed.	
Self-diagnosis display lamp (OD OFF lamp)	SELF-D DP LAMP [ON/OFF]	—	X	• Control status of transaxle gear selection switch OD.	
Power mode switch	POWERSHIFT SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of power mode SW, is displayed.	
Hold mode switch	HOLD SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of hold SW, is displayed.	• This is displayed even when no hold mode SW is equipped.

X: Applicable
—: Not applicable
Note:
1. When select ECU input signals on CONSULT, electronic control unit input signal are set.
2. When select main signals on CONSULT, monitored items for understanding the overall operation of the system are set, and this setting is indicated by a reversed display.

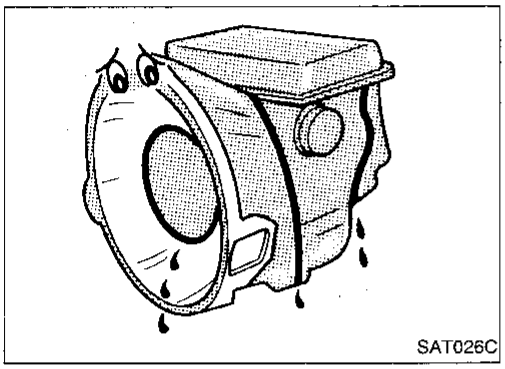
DATA ANALYSIS

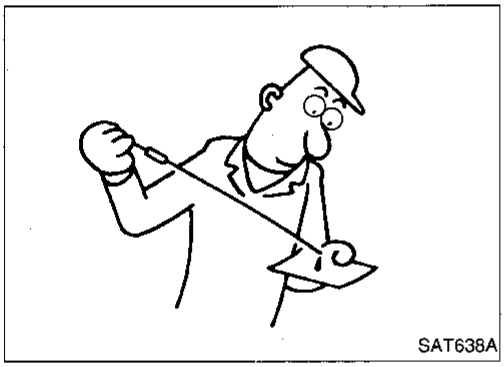
Item	Display	Condition
Torque converter clutch solenoid valve duty	Approximately 4% ↓ Approximately 94%	Lock-up "OFF" ↓ Lock-up "ON"
Line pressure solenoid valve duty	Approximately 29% ↓ Approximately 94%	Low line-pressure (Small throttle opening) ↓ High line-pressure (Large throttle opening)
Throttle position sensor	Approximately 0.5V	Fully-closed throttle
	Approximately 4V	Fully-open throttle
Fluid temperature sensor	Approximately 1.5V ↓ Approximately 0.5V	Cold [20°C (68°F)] ↓ Hot [80°C (176°F)]

Gear position	1	2	3	4
Shift solenoid valve A	ON	OFF	OFF	ON
Shift solenoid valve B	ON	ON	OFF	OFF



SAT406F


SAT026C


SAT638A

Preliminary Check

A/T FLUID CHECK

Fluid leakage check

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.
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

If A/T fluid is very dark or smells burned, flush cooling system after repair of A/T. Refer to MA section ("Changing Engine Coolant", "ENGINE MAINTENANCE").
If A/T fluid contains frictional material (clutches, band, etc.) replace radiator after repair of A/T. Refer to LC section ("Radiator", "ENGINE COOLING SYSTEM").

Fluid level check

Refer to MA section ("Checking A/T Fluid Level", "CHASSIS AND BODY MAINTENANCE").

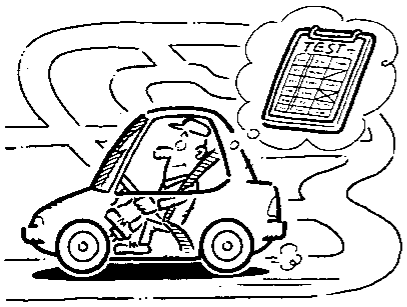
Preliminary Check (Cont'd)

ROAD TESTING

ROAD TEST PROCEDURE

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

SAT786A



SAT639A

Description

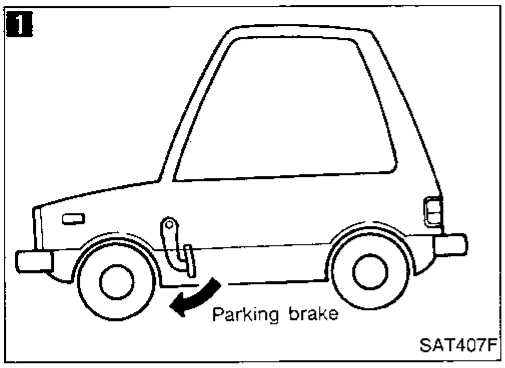
- The purpose of this road test is to determine overall performance of automatic transmission and analyze causes of problems.
- The road test consists of the following three parts:

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 "Self-diagnosis" or "Diagnostic Procedure" as indicated in "Road Test" (See AT-46 or AT-66).

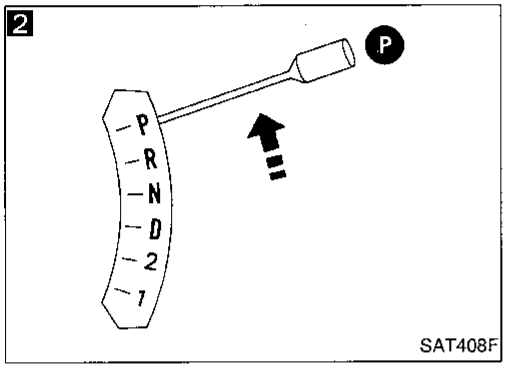
Preliminary Check (Cont'd)

1. Check before engine is started



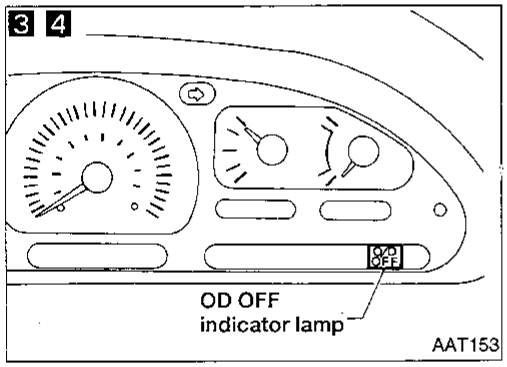
1

Park vehicle on flat surface.



2

Move selector lever to "P" position.



3

Does OD OFF indicator lamp come on for about 2 seconds?

No → Perform Diagnostic Procedure 1. Refer to AT-66.

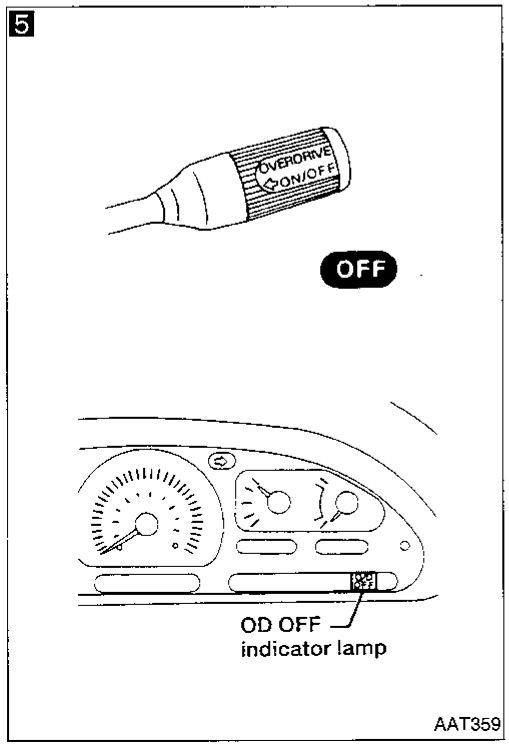
Yes

4

Does OD OFF indicator lamp flicker for about 8 seconds?

Yes → Perform self-diagnosis. — See SELF-DIAGNOSIS PROCEDURE. Refer to AT-46 with CONSULT. Refer to AT-47 without CONSULT.

No



5

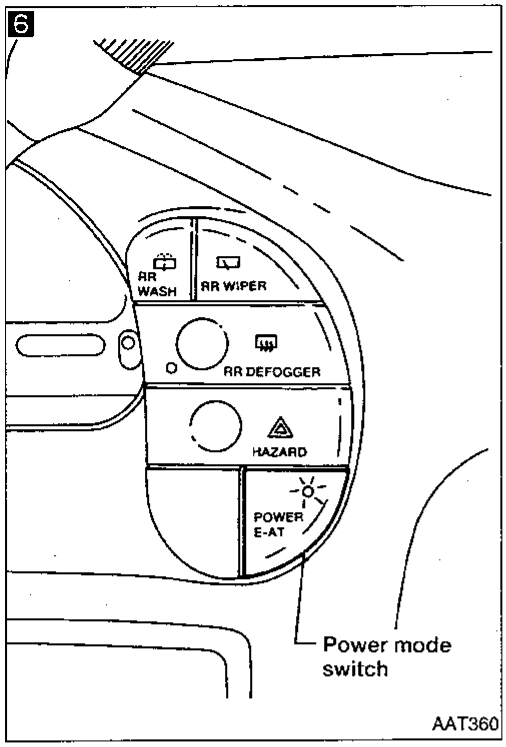
1. Set transaxle gear selection switch-OD to "OFF" position.
2. Does OD OFF indicator lamp come on?

No → Perform Diagnostic Procedure 3. Refer to AT-67.

Yes

Ⓐ

Preliminary Check (Cont'd)



Ⓐ

6

1. Set the power mode switch to "ON" position.
2. Does power indicator lamp come on?

No → Perform Diagnosis Procedure 2. Refer to AT-67.

Yes

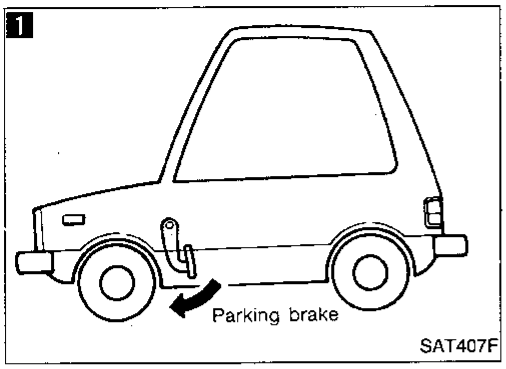
Perform self-diagnosis.
— See SELF-DIAGNOSIS PROCEDURE and note NG items. Refer to AT-46 with CONSULT. Refer to AT-47 without CONSULT.

Perform "2. Check at idle". Refer to AT-26.

Preliminary Check (Cont'd)

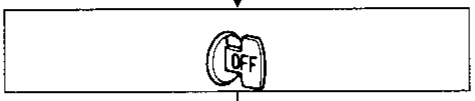
2. Check at idle

1



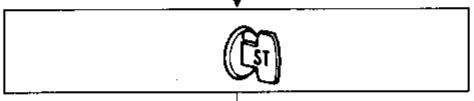
SAT407F

Park vehicle on flat surface.

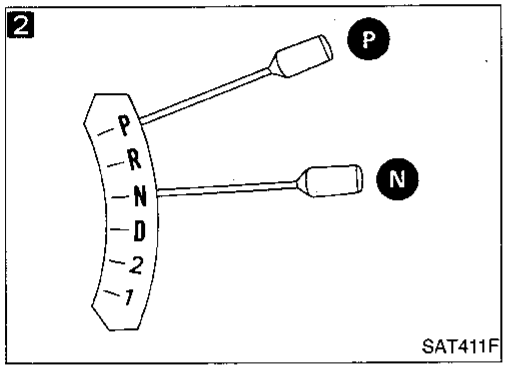


2

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



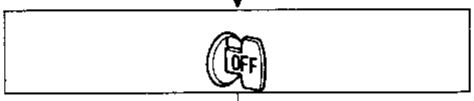
2



SAT411F

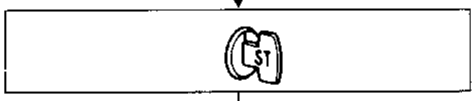
Does engine start? — No → Perform Diagnostic Procedure 4. Refer to AT-68.

Yes



3

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



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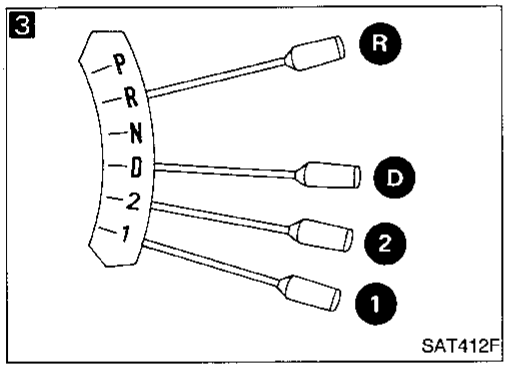
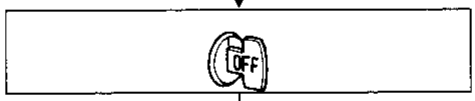


SAT412F

Does engine start? — Yes → Perform Diagnostic Procedure 4. Refer to AT-68.

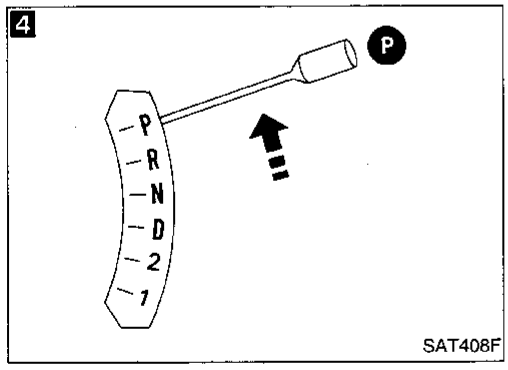
No



4

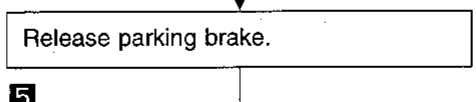
Move selector lever to "P" position.

4



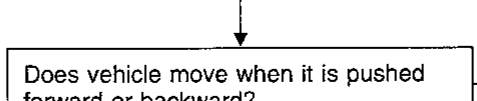
SAT408F

Release parking brake.



5

Push vehicle forward or backward.



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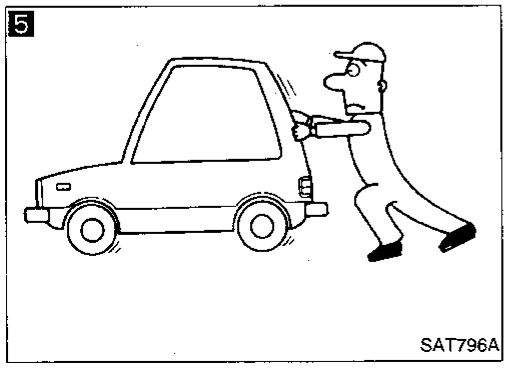
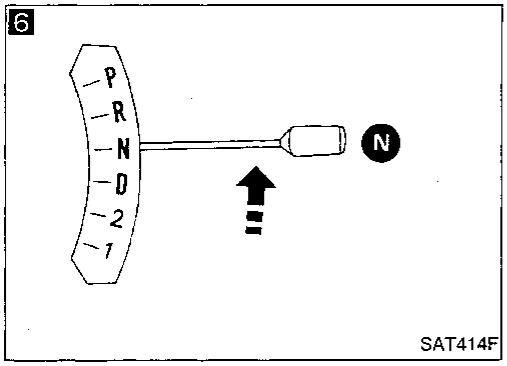

SAT796A

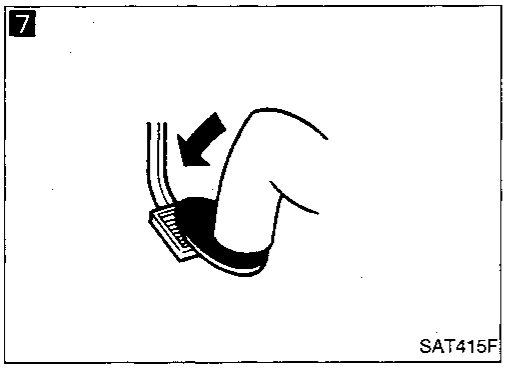
Does vehicle move when it is pushed forward or backward? — Yes → Perform Diagnostic Procedure 5. Refer to AT-68.

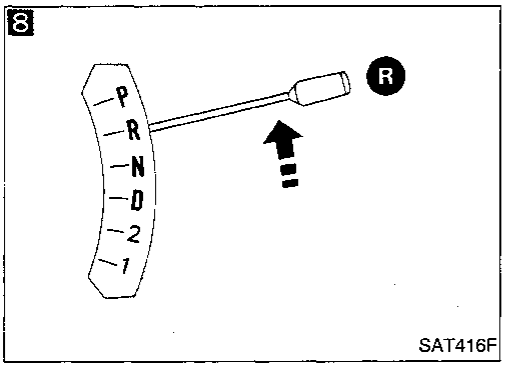
No

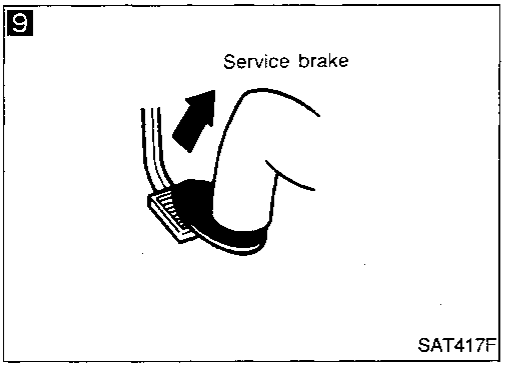
Ⓐ

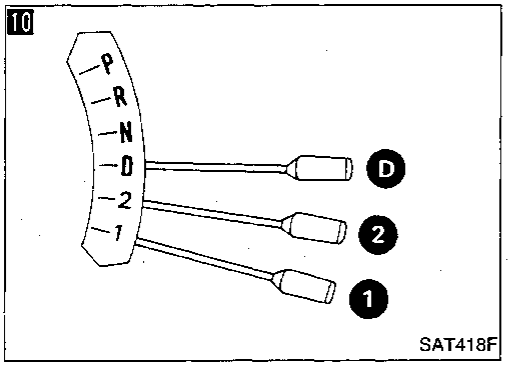
Preliminary Check (Cont'd)







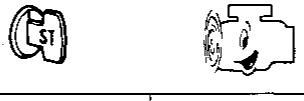




Ⓐ

Apply parking brake.

6 Move selector lever to "N" position.



Release parking brake.

Does vehicle move forward or backward? — Yes → Perform Diagnostic Procedure 6. Refer to AT-69.

No

7 Apply service brake.

8 Move selector lever to "R" position.

Is there large shock when changing from "N" to "R" position? — No → Perform Diagnostic Procedure 7. Refer to AT-70.

Yes

9 Release service brake for several seconds.

Does vehicle creep backward when foot brake is released? — No → Perform Diagnostic Procedure 8. Refer to AT-71.

Yes

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

Does vehicle creep forward in all three ranges? — No → Perform Diagnostic Procedure 9. Refer to AT-73.

Yes

Perform "3. Cruise test". Refer to AT-28.

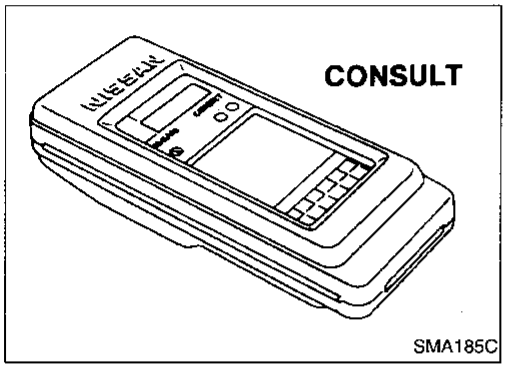
Preliminary Check (Cont'd)

3. Cruise test

- Check all items listed in Parts 1 through 3.

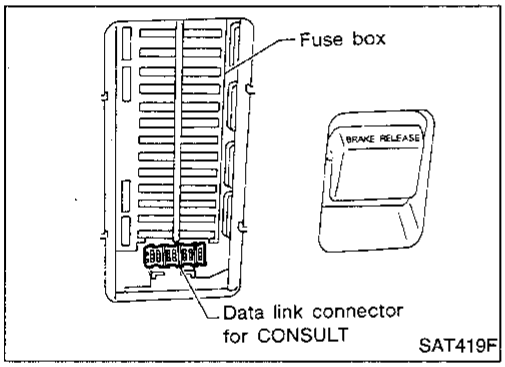
With CONSULT

- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule."

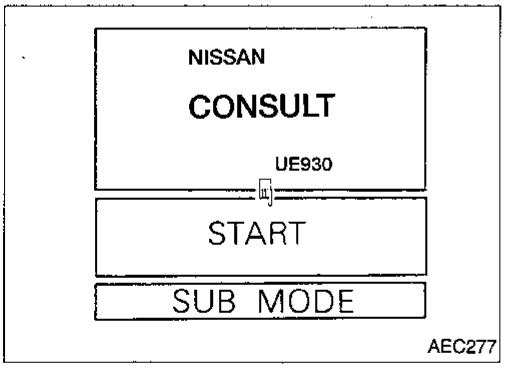


CONSULT setting procedure

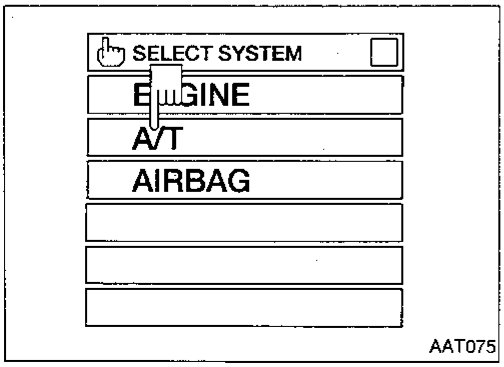
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)



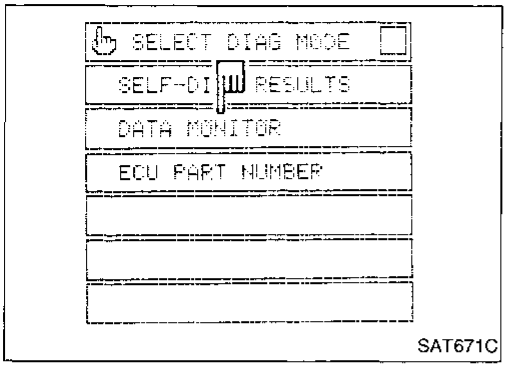
3. Turn on ignition switch.
4. Touch "START".



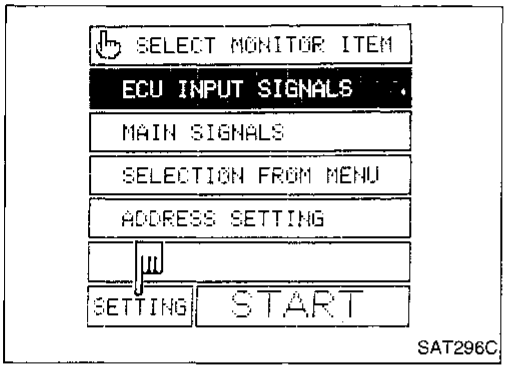
5. Touch "A/T".



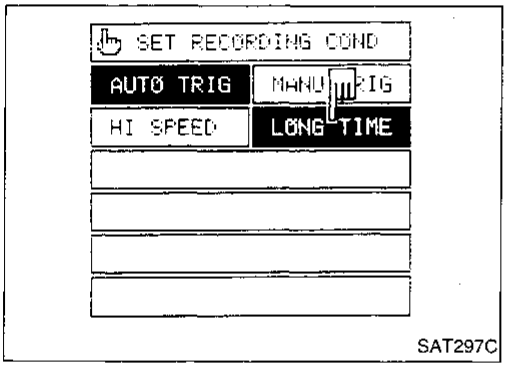
Preliminary Check (Cont'd)



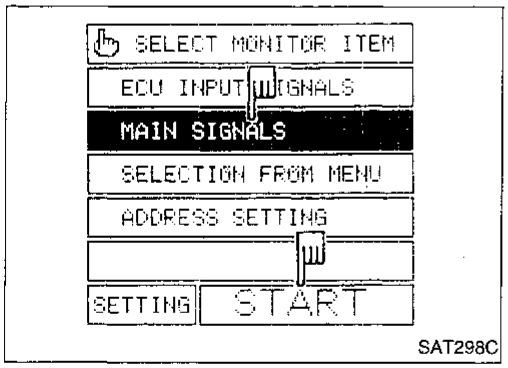
6. Touch "DATA MONITOR".



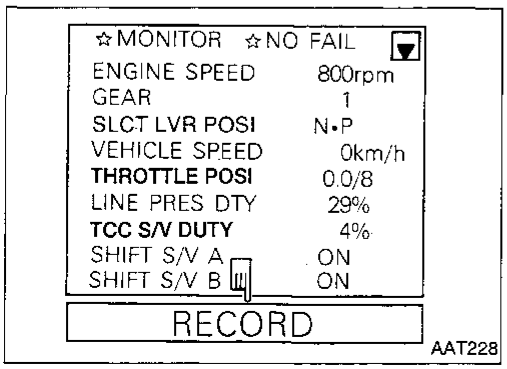
7. Touch "SETTING" to set recording condition.



8. Touch "LONG TIME" and "ENTER" key.

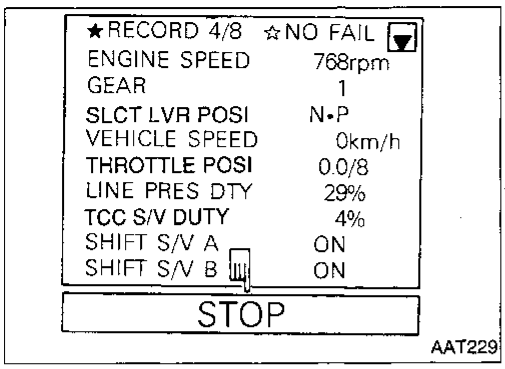


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".
10. Touch "START".

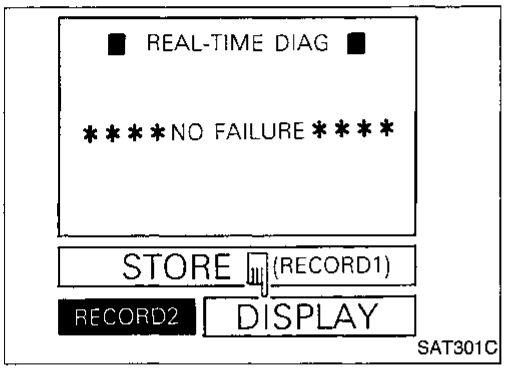


11. When performing cruise test, touch "RECORD".

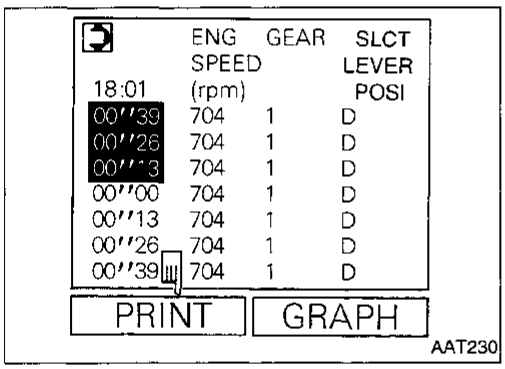
Preliminary Check (Cont'd)



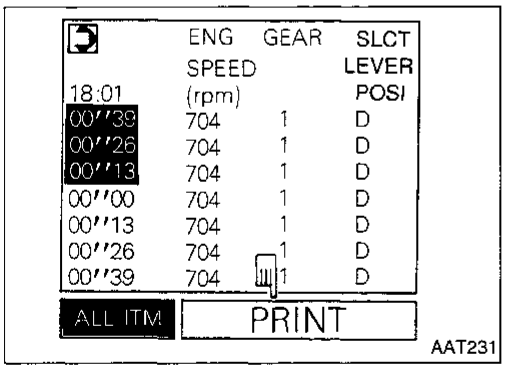
12. After finishing cruise test part 1, touch "STOP".



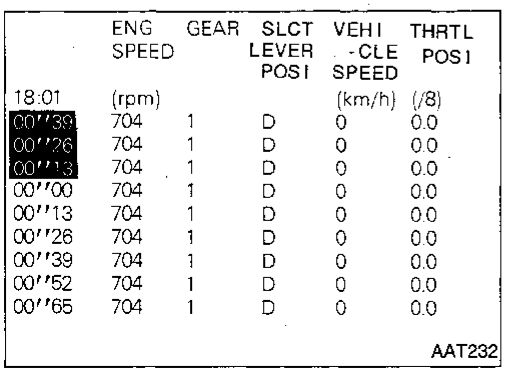
13. Touch "DISPLAY".



14. Touch "PRINT".

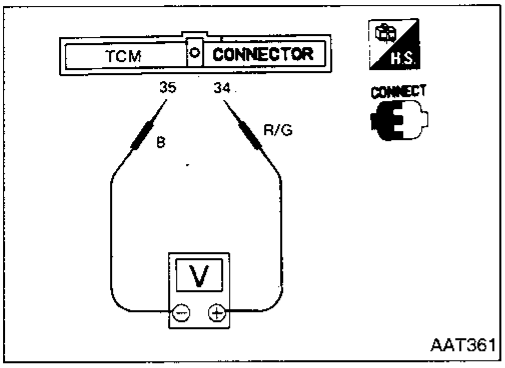


15. Touch "PRINT" again.



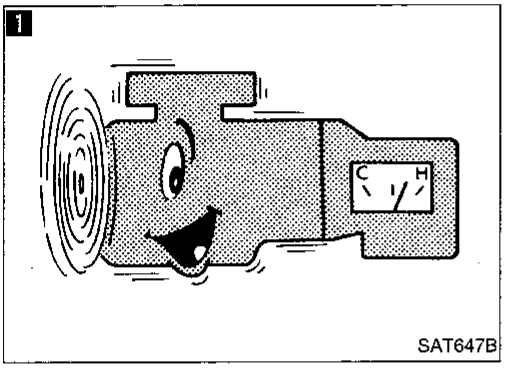
16. Check the monitor data printed out.
17. Continue cruise test part 2 and 3.

Preliminary Check (Cont'd)



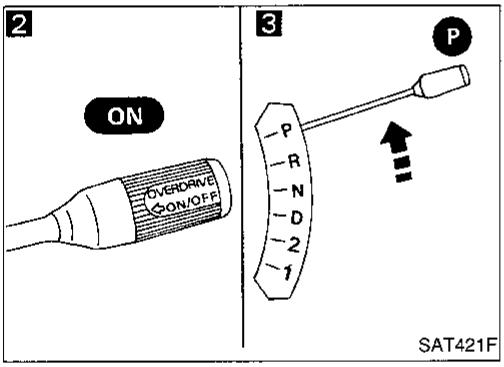
Without CONSULT

- Throttle position sensor output voltage can be measured across terminals ㉞ and ㉟ of A/T control unit. Refer to AT-86.



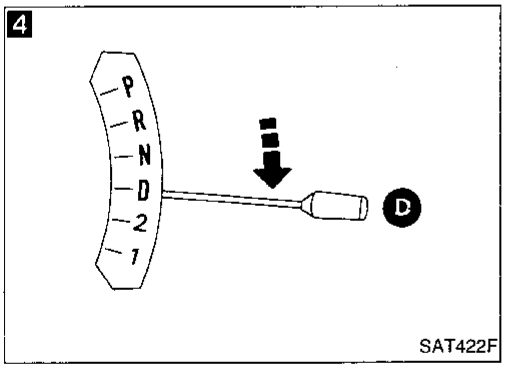
Cruise test — Part 1

1. Warm up engine until engine oil and ATF reach operating temperature after vehicle has been driven approx. 10 minutes.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)



2. Park vehicle on flat surface.

3. Set transaxle gear selection switch-OD to "ON" position.

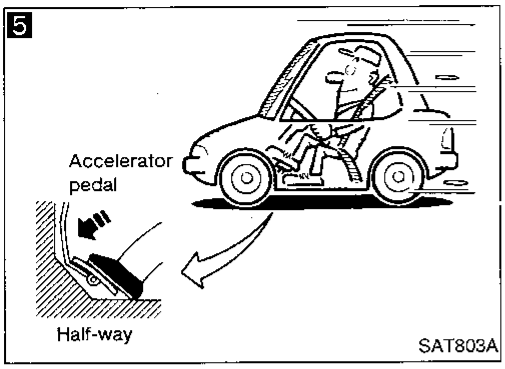


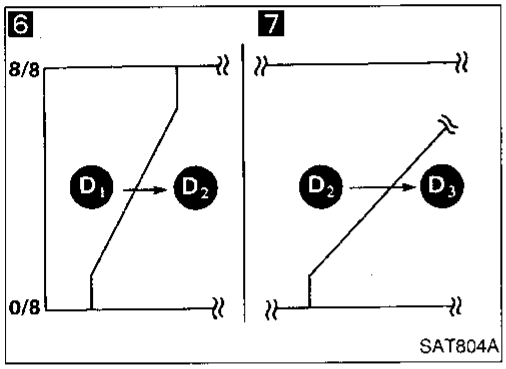
4. Move selector lever to "P" position.

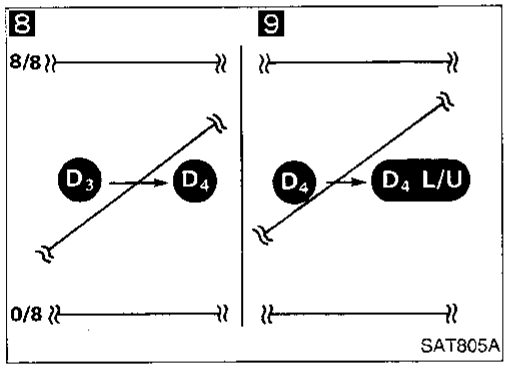
5. Move selector lever to "D" position.

Ⓐ

Preliminary Check (Cont'd)







Ⓐ

5

Accelerate vehicle keeping accelerator pedal depressed halfway.

Does vehicle start from D_1?
Read gear position.
No → Perform Diagnostic Procedure 10. Refer to AT-74.

Yes

6

Does A/T shift from D_1 to D_2 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_1 to D_2:
See "Shift Schedule". Refer to AT-38.
No → Perform Diagnostic Procedure 11. Refer to AT-75.

Yes

7

Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_2 to D_3:
See "Shift Schedule". Refer to AT-38.
No → Perform Diagnostic Procedure 12. Refer to AT-77.

Yes

8

Does A/T shift from D_3 to D_4 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_3 to D_4:
See "Shift Schedule". Refer to AT-38.
No → Perform Diagnostic Procedure 13. Refer to AT-78.

Yes

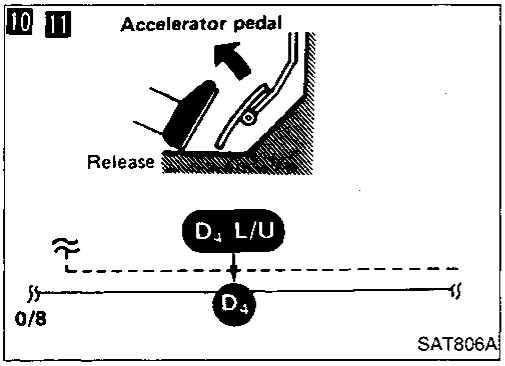
9

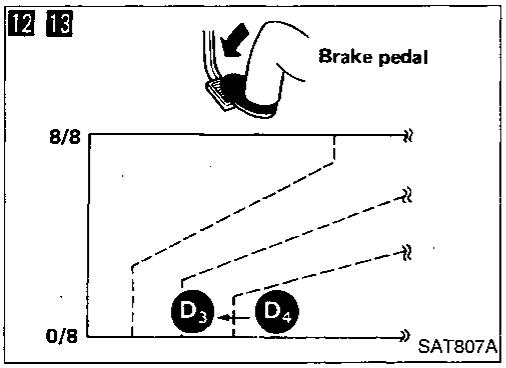
Does A/T perform lock-up at the specified speed?
Read vehicle speed, throttle opening when lock-up duty becomes 94%.
Specified speed when lock-up occurs:
See "Shift Schedule". Refer to AT-38.
No → Perform Diagnostic Procedure 14. Refer to AT-79.

Yes

Ⓑ

Preliminary Check (Cont'd)





Ⓑ

Does A/T hold lock-up for more than 30 seconds? — No → Perform Diagnostic Procedure 15. Refer to AT-80.

Yes

10

Release accelerator pedal.

11

Is lock-up released when accelerator pedal is released? — No → Perform Diagnostic Procedure 16. Refer to AT-81.

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 → Perform Diagnostic Procedure 17. Refer to AT-82.

Read gear position and engine speed.

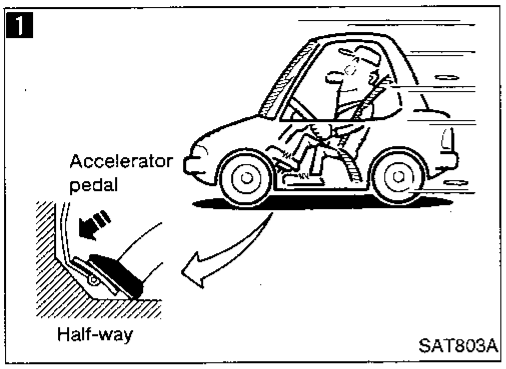
Yes

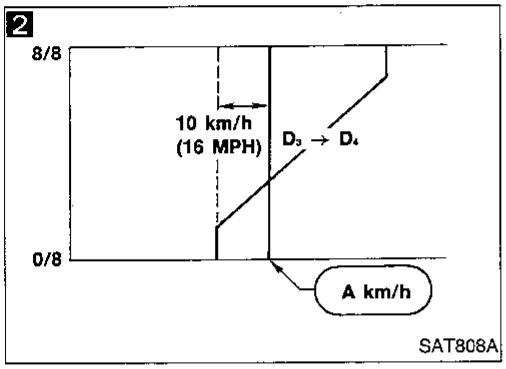
Stop vehicle.

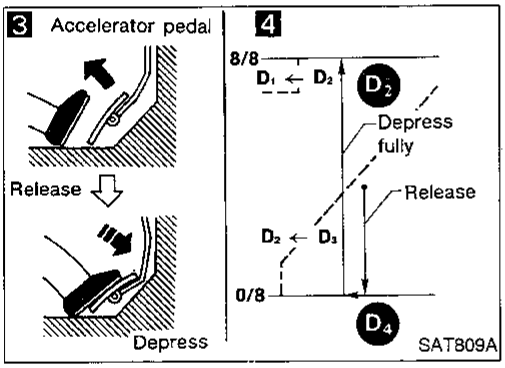
Perform "Cruise test — Part 2". Refer to AT-34.

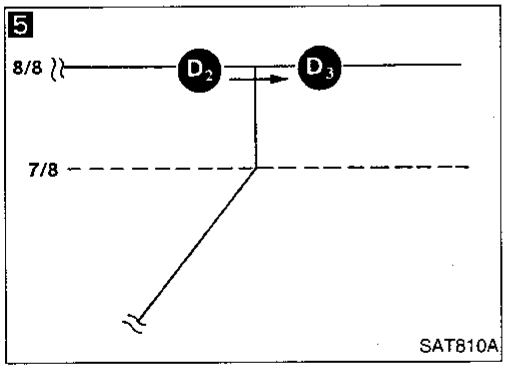
Preliminary Check (Cont'd)

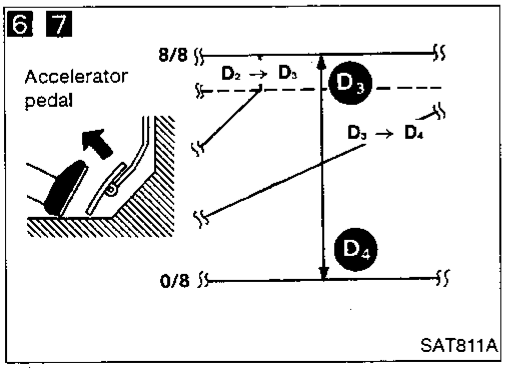
Cruise test — Part 2











Confirm power mode switch is in "OFF" position and transaxle gear selection switch-OD is in "ON" position.

↓

Confirm selector lever is in "D" position.

↓

1

Accelerate vehicle by half throttle again.

↓

Does vehicle start from D_1?
Read gear position.

No → Perform Diagnostic Procedure 18. Refer to AT-83.

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?
Read gear position and throttle opening.

No → Perform Diagnostic Procedure 11. Refer to AT-75.

Yes

↓

5

Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle opening and vehicle speed.
Specified speed when shifting from D_2 to D_3:
See "Shift Schedule". Refer to AT-38.

No → Perform Diagnostic Procedure 12. Refer to AT-77.

Yes

↓

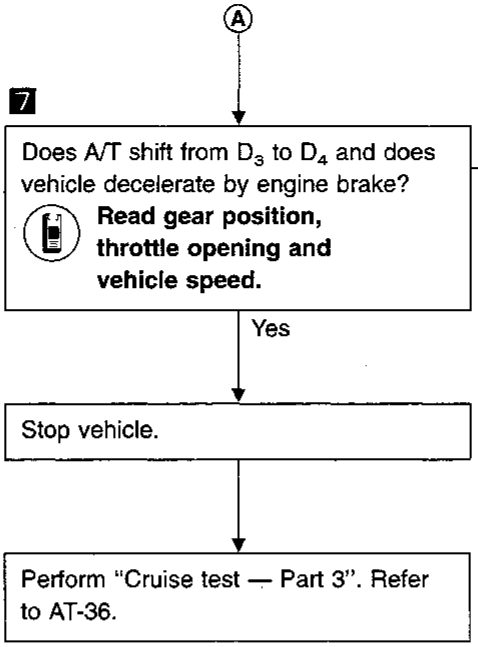
6

Release accelerator pedal after shifting from D_2 to D_3.

↓

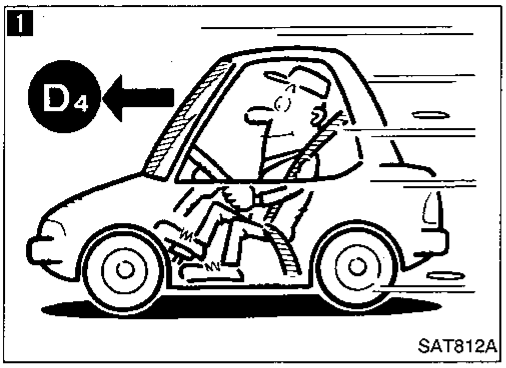
Ⓐ

Preliminary Check (Cont'd)



Preliminary Check (Cont'd)

Cruise test — Part 3

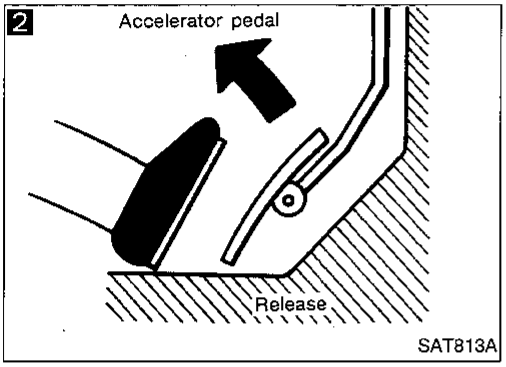


Confirm power mode switch is in "OFF" position and transaxle gear selection switch-OD is in "ON" position.

↓

Confirm selector lever is in "D" position.

↓



1

Accelerate vehicle using half-throttle to D_4.

↓

2

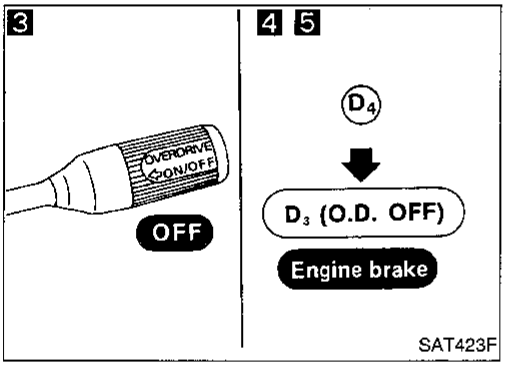
Release accelerator pedal.

↓

3

Set transaxle gear selection switch-OD in "OFF" position while driving in D_4.

↓



4

Does A/T shift from D_4 to D_3?
Read gear position and vehicle speed.

No → Perform Diagnostic Procedure 19. Refer to AT-83.

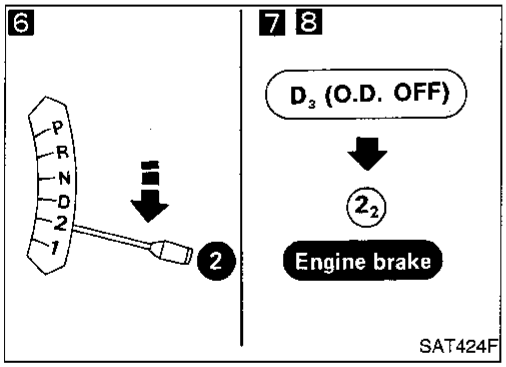
Yes ↓

5

Does vehicle decelerate by engine brake?

No → Perform Diagnostic Procedure 17. Refer to AT-82.

Yes ↓



6

Move selector lever from "D" to "2" position while driving in D_3.

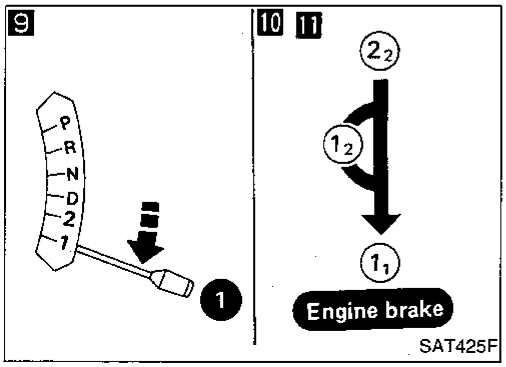
↓

7

Does A/T shift from D_3 to 2_2?
Read gear position.

No → Perform Diagnostic Procedure 20. Refer to AT-84.

Yes ↓



8

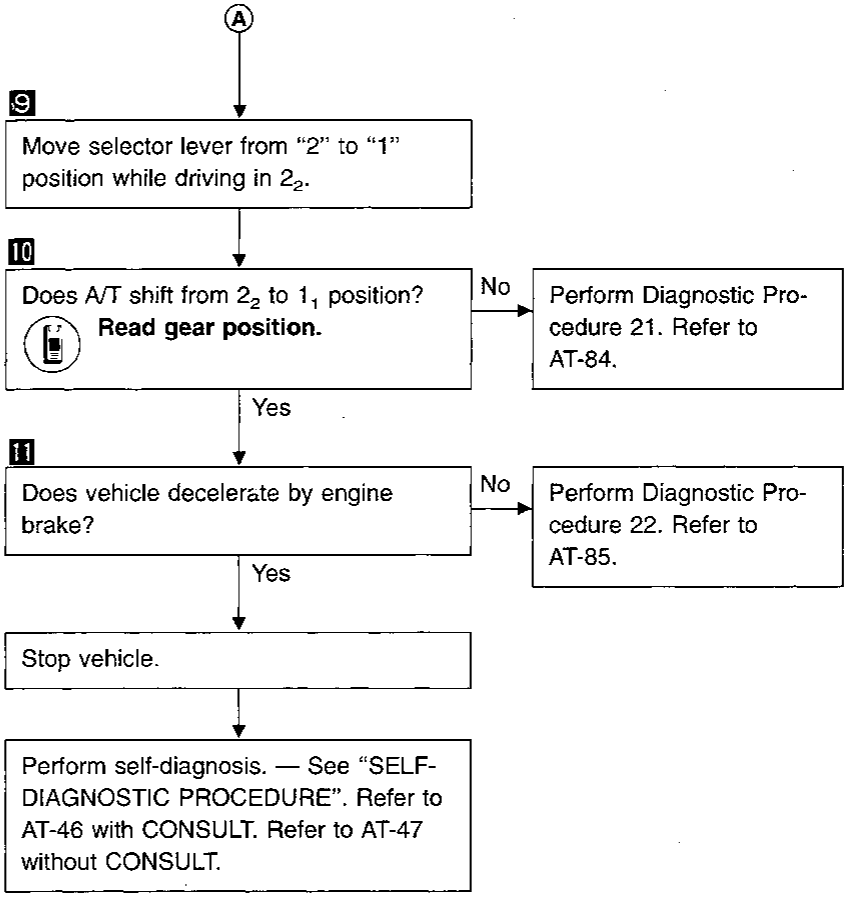
Does vehicle decelerate by engine brake?

No → Perform Diagnostic Procedure 17. Refer to AT-82.

Yes ↓

Ⓐ

Preliminary Check (Cont'd)



Vehicle speed when shifting gears

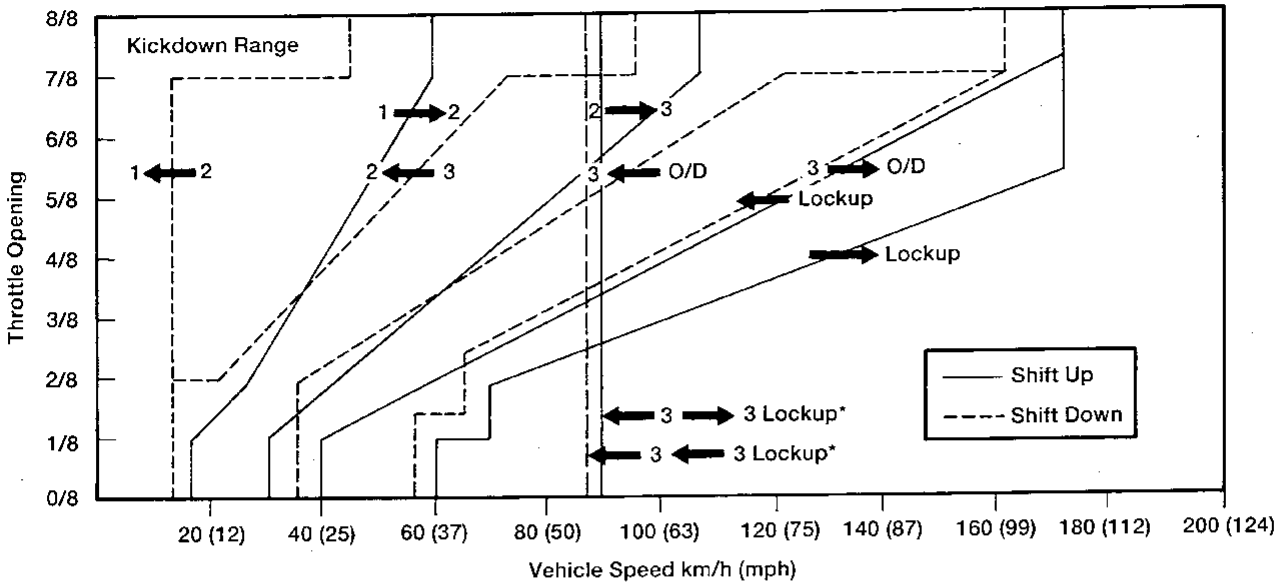
Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	56 - 64 (35 - 40)	100 - 108 (62 - 67)	164 - 174 (102 - 108)	158 - 166 (98 - 103)	90 - 98 (56 - 61)	42 - 50 (26 - 31)	42 - 50 (26 - 31)
	Power	52 - 60 (32 - 37)	100 - 108 (62 - 67)	164 - 174 (102 - 108)	158 - 166 (98 - 103)	90 - 98 (56 - 61)	42 - 50 (26 - 31)	42 - 50 (26 - 31)
Half throttle	Comfort	36 - 44 (22 - 27)	63 - 71 (39 - 44)	101 - 109 (63 - 68)	65 - 73 (40 - 45)	36 - 44 (22 - 27)	8 - 16 (5 - 10)	42 - 50 (26 - 31)
	Power	37 - 45 (23 - 28)	72 - 80 (45 - 50)	117 - 125 (73 - 78)	79 - 87 (49 - 54)	41 - 49 (25 - 30)	8 - 16 (5 - 10)	42 - 50 (26 - 31)

Vehicle speed when performing lock-up

Throttle opening	Gear position	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
2/8	D_4	Comfort	66 - 74 (41 - 46)	63 - 71 (39 - 44)
		Power	66 - 74 (41 - 46)	63 - 71 (39 - 44)
	OD OFF	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)
		Power	86 - 94 (53 - 58)	83 - 91 (52 - 57)

Preliminary Check (Cont'd)

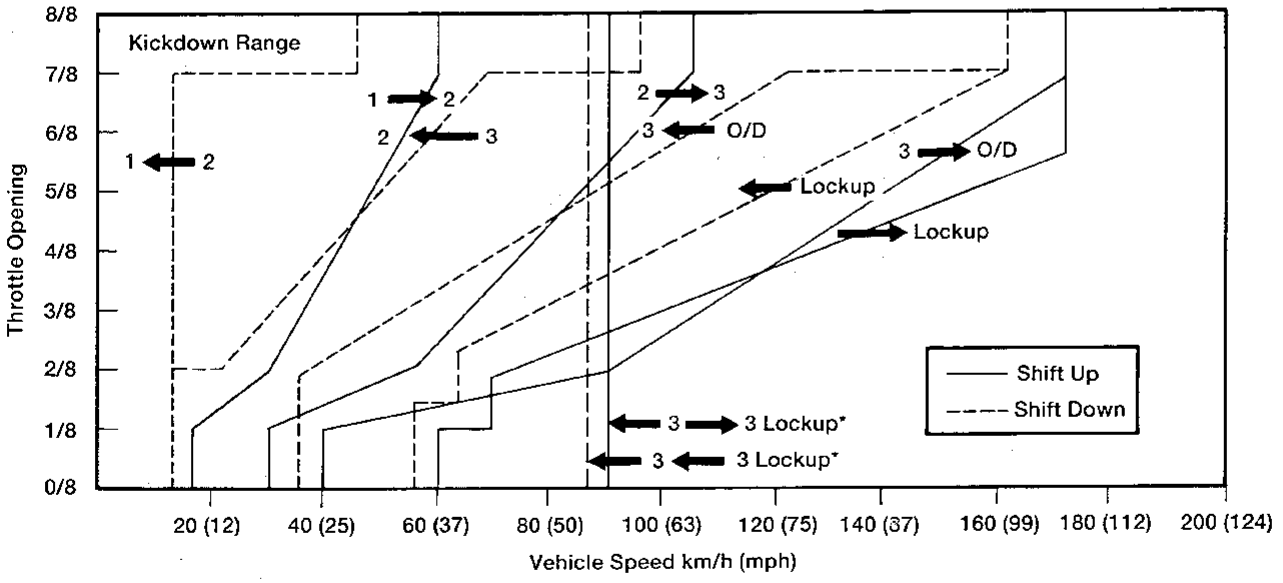
Shift schedule (Comfort pattern)



*Transaxle gear selection switch – OD is in OFF position

AAT315

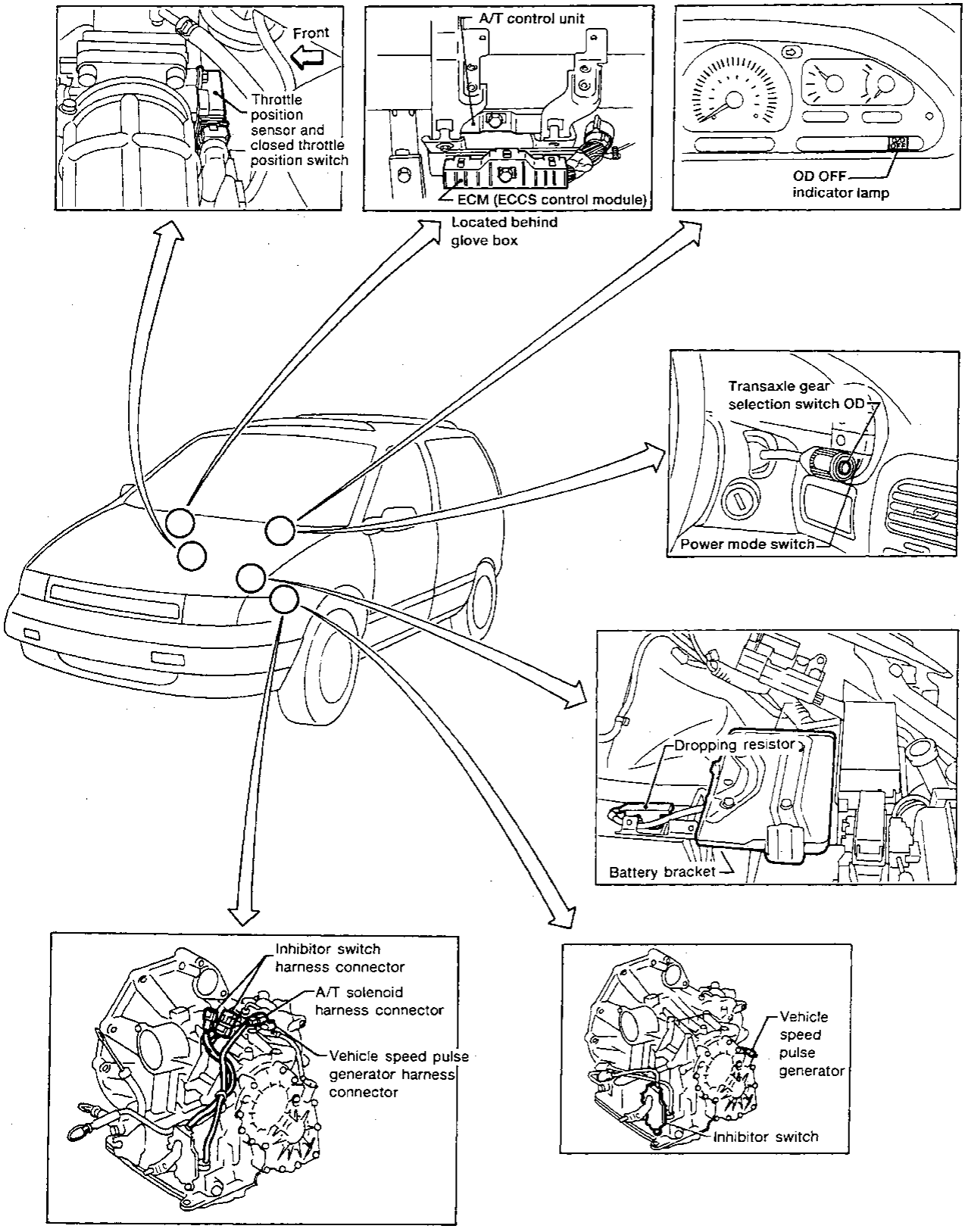
Shift schedule (Auto power pattern)



*Transaxle gear selection switch – OD is in OFF position

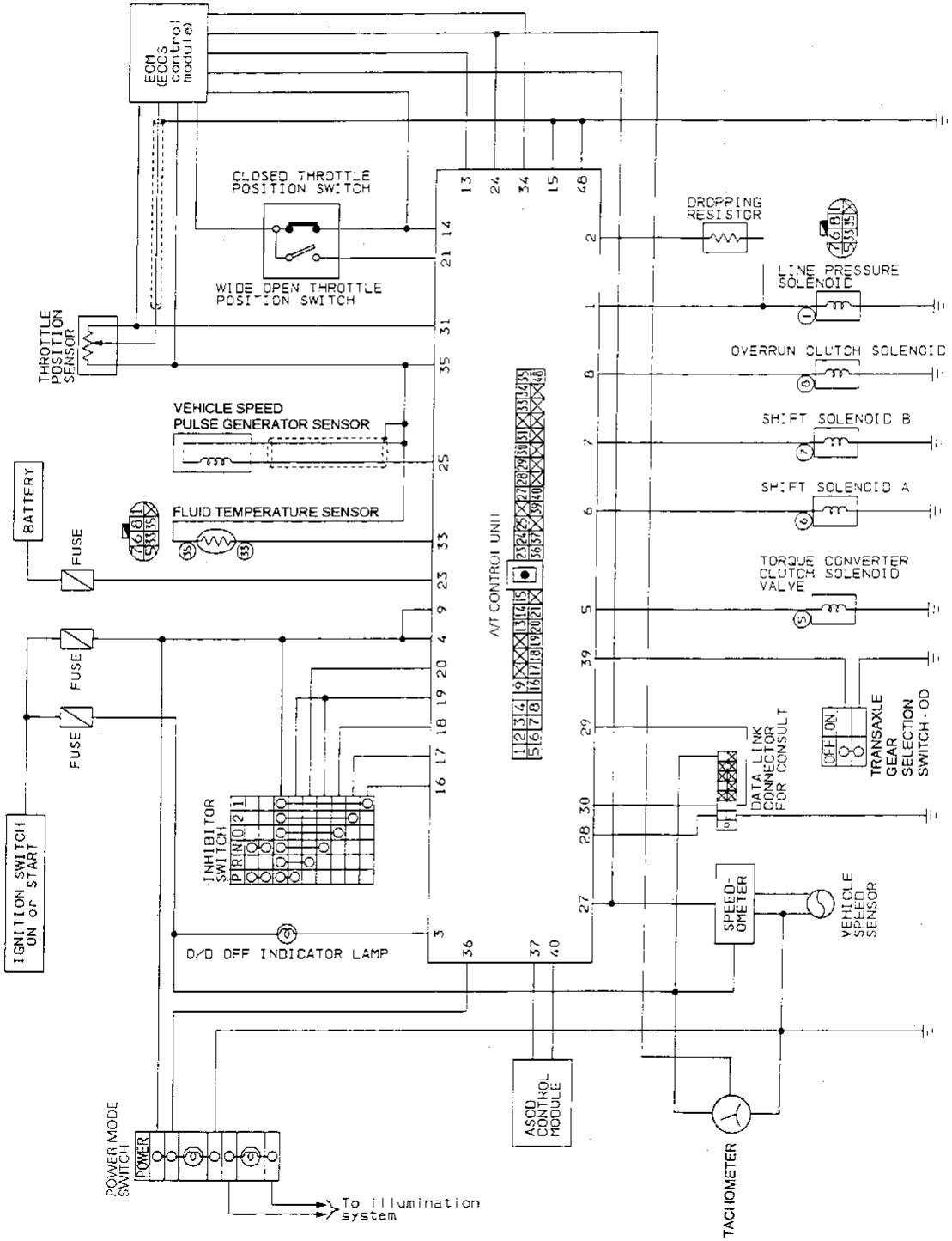
AAT316

A/T Electrical Parts Location



AAT314

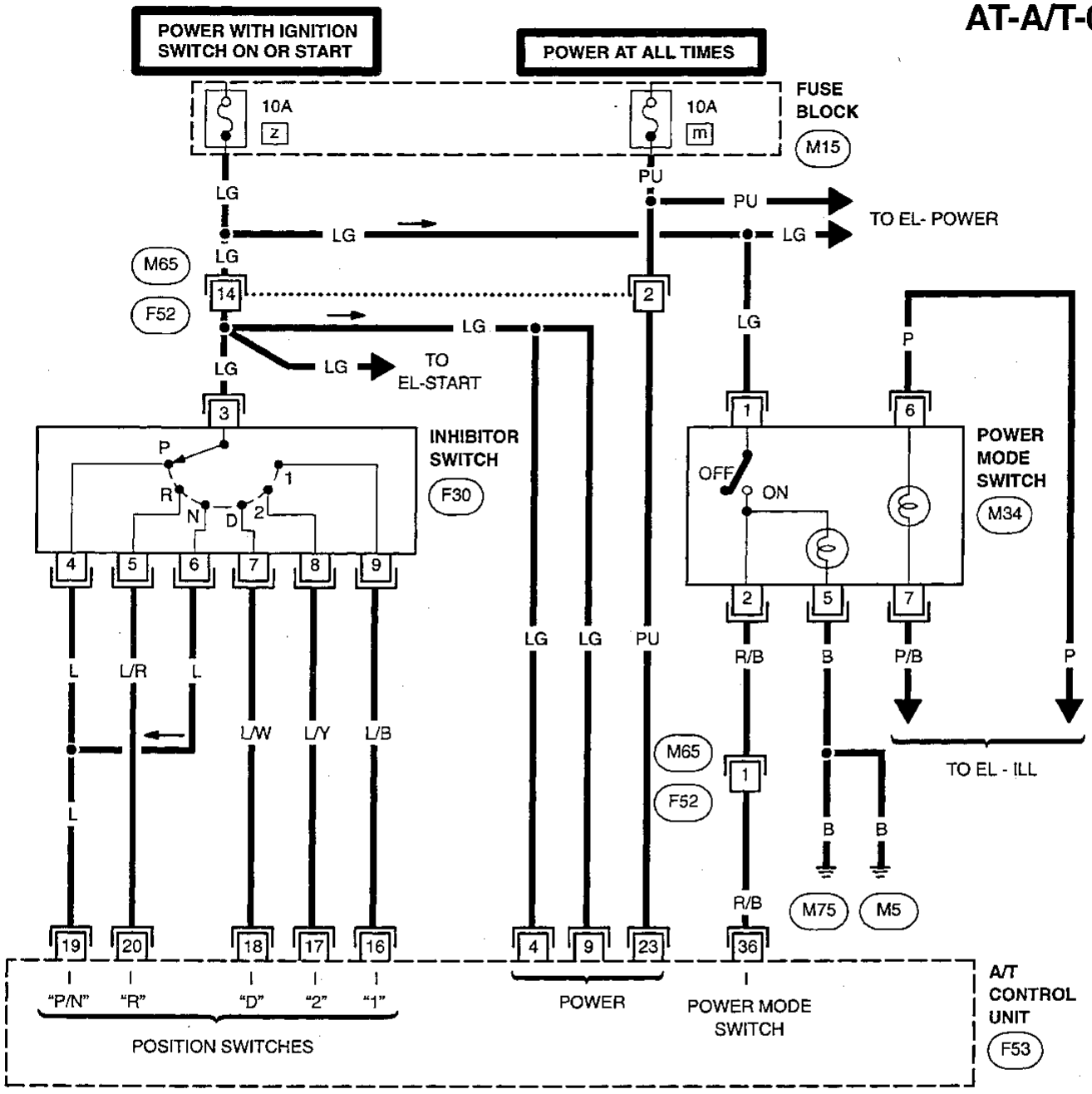
Circuit Diagram for Quick Pinpoint Check



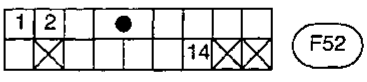
AAT312

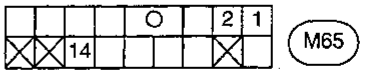
Wiring Diagram –A/T–

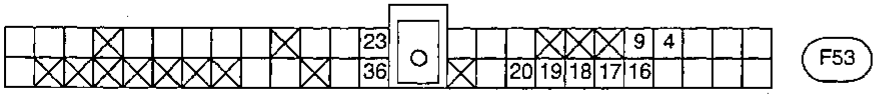
AT-A/T-01

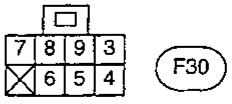


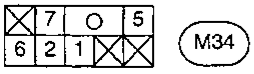
Refer to POWER SUPPLY ROUTING in EL Section. M15







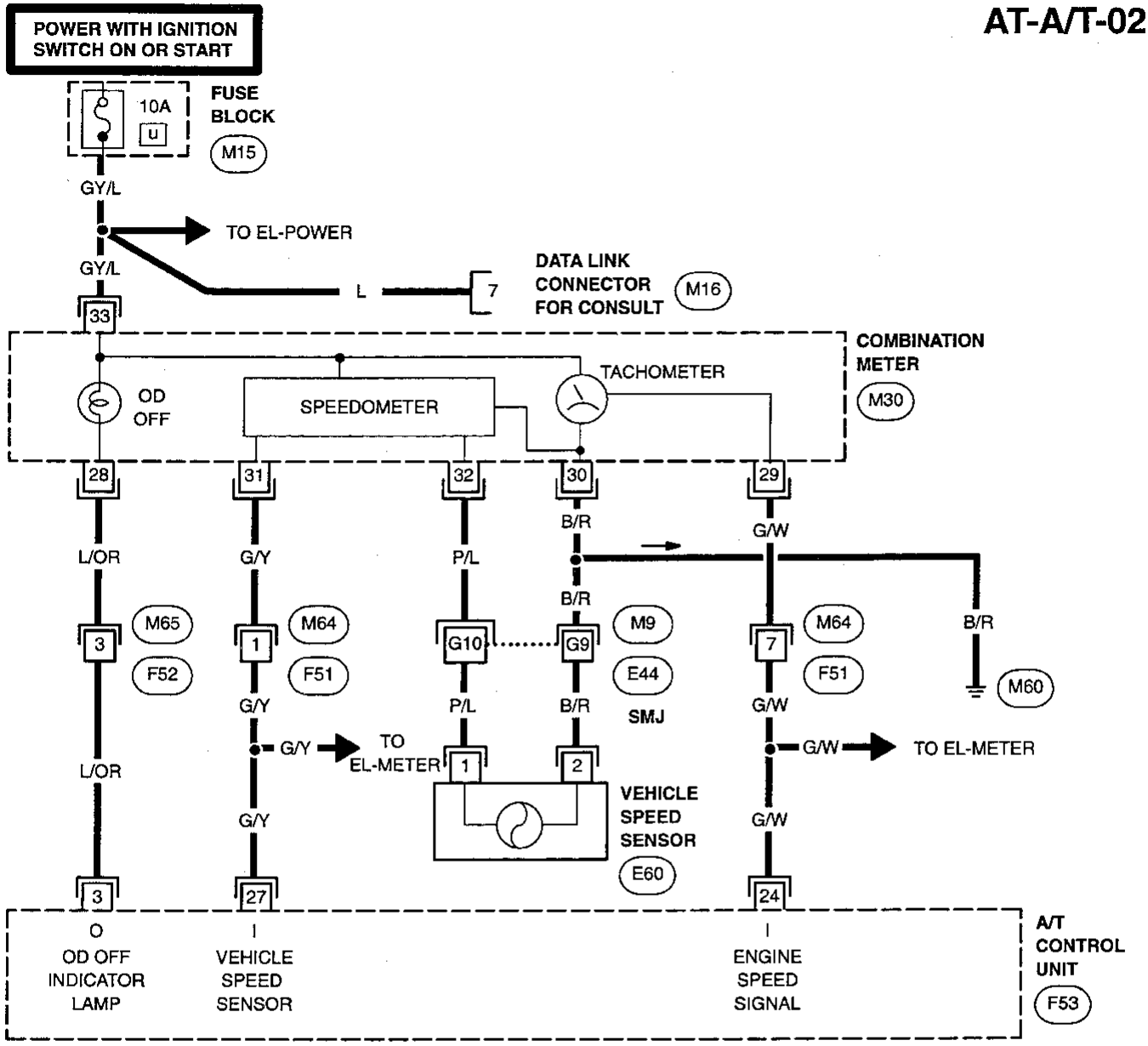


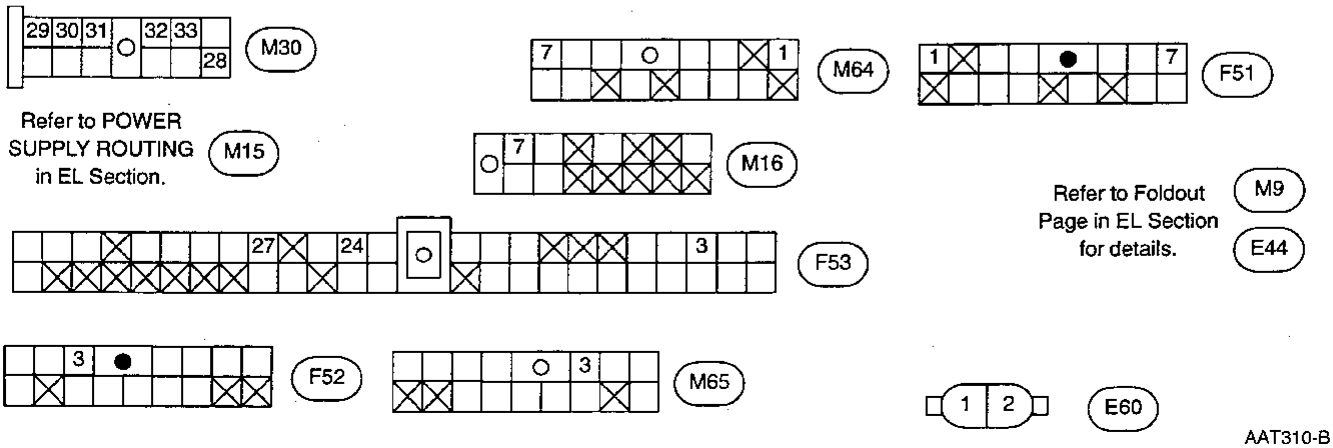


AAT310-A

Wiring Diagram –A/T– (Cont'd)

AT-A/T-02

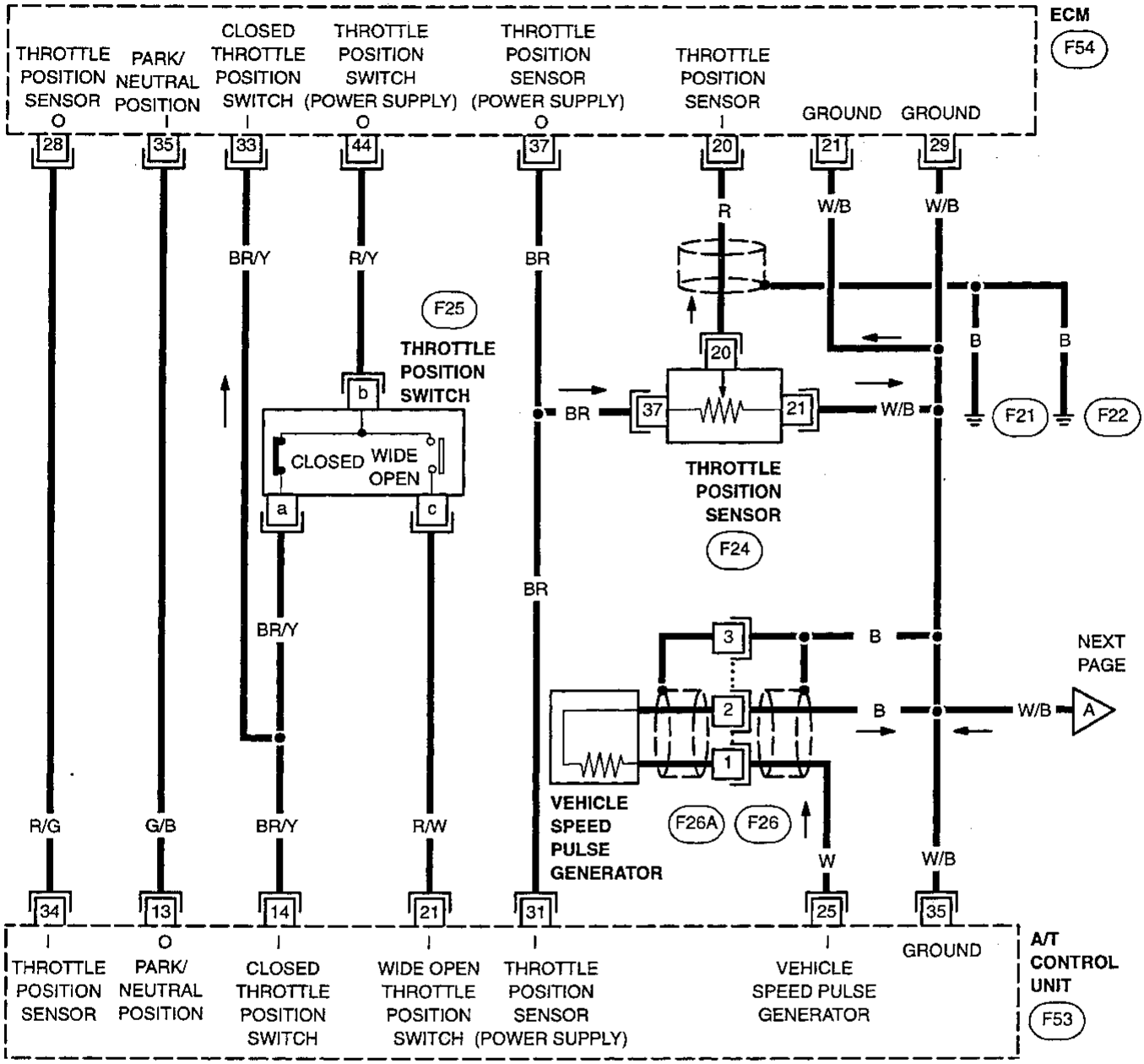


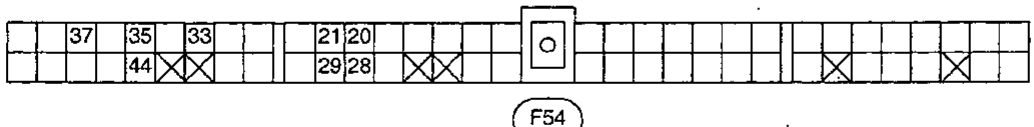


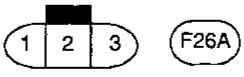
AAT310-B

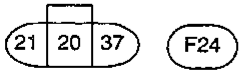
Wiring Diagram –A/T– (Cont'd)

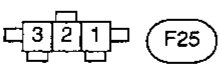
AT-A/T-03

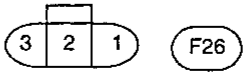


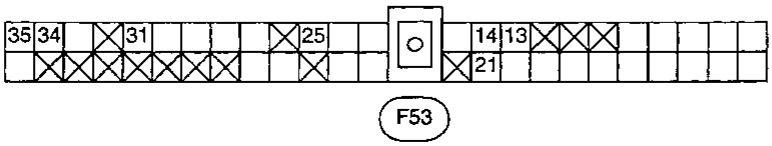








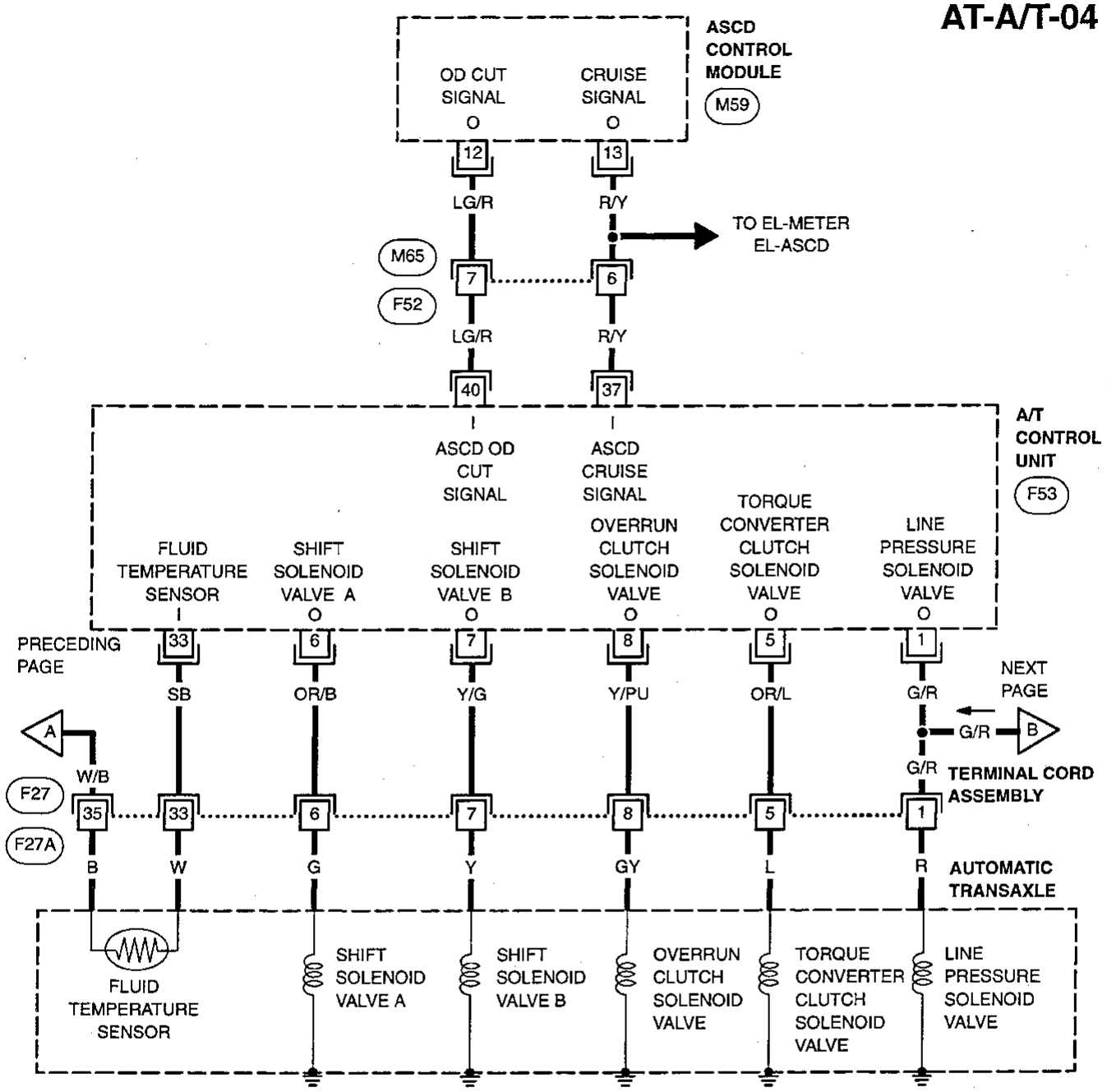


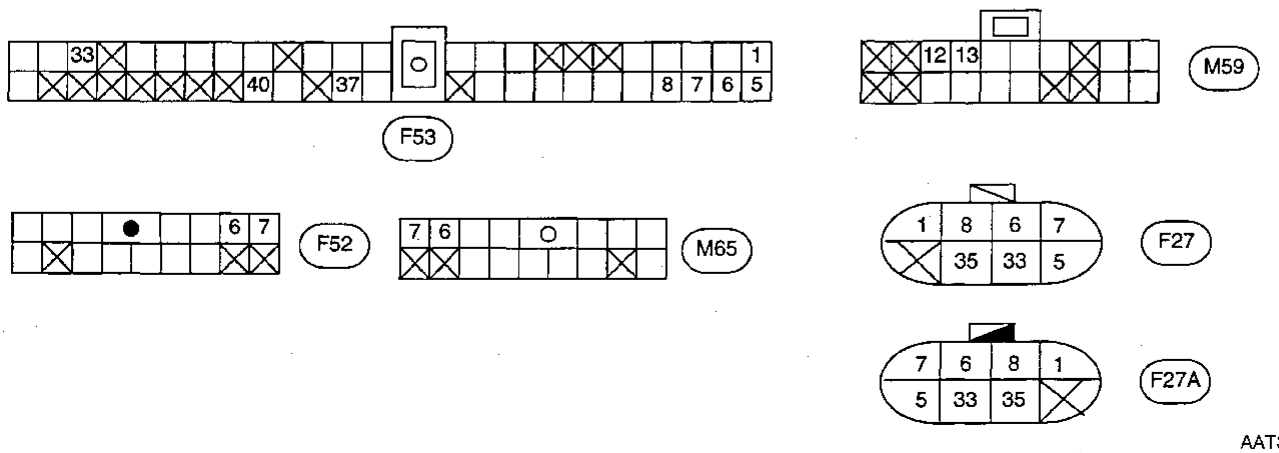


AAT310-C

Wiring Diagram –A/T– (Cont'd)

AT-A/T-04

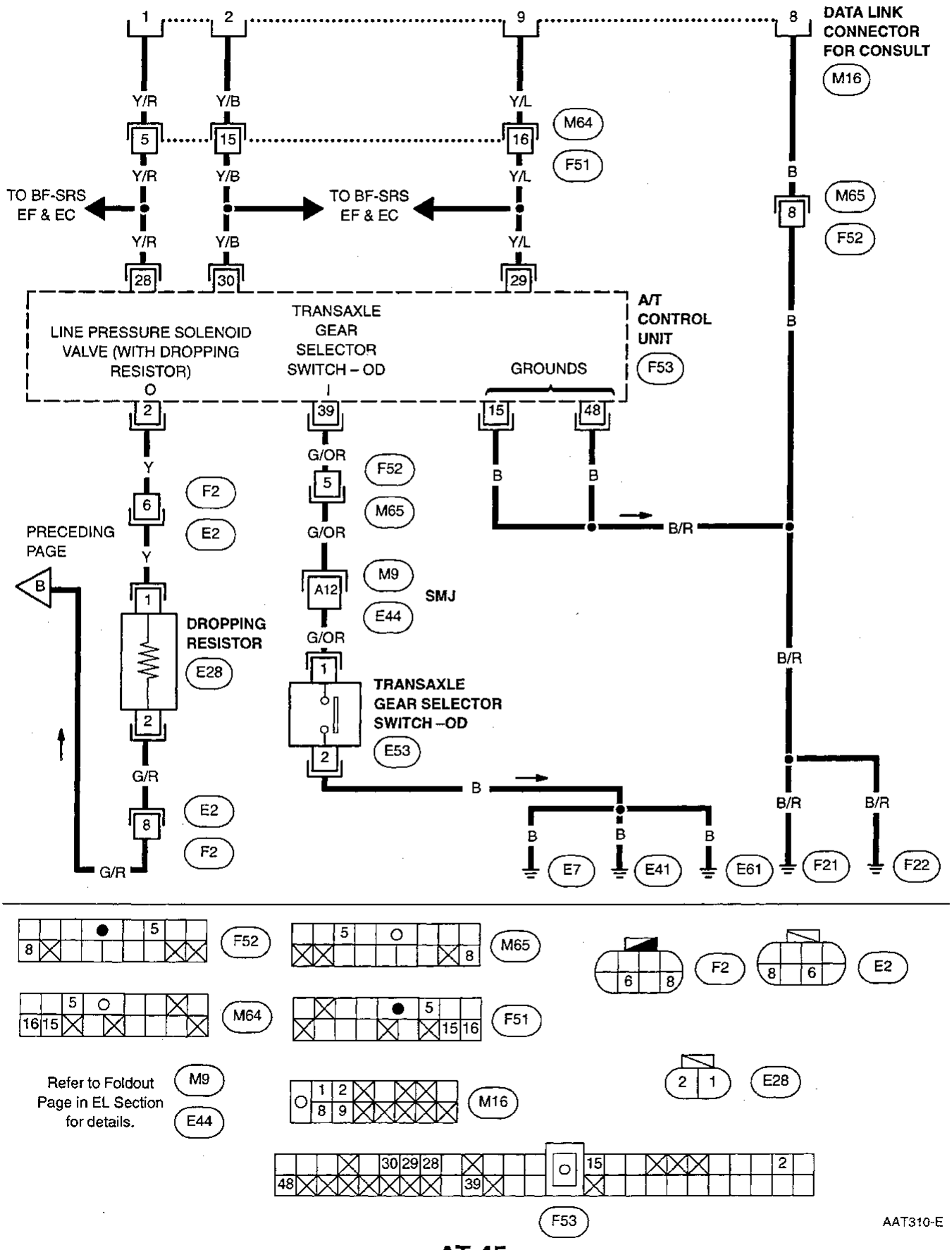




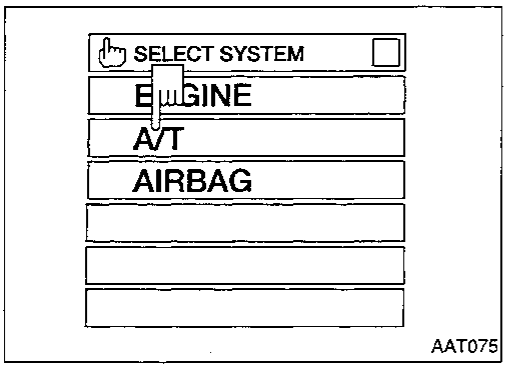
AAT310-D

Wiring Diagram –A/T– (Cont'd)

AT-A/T-05



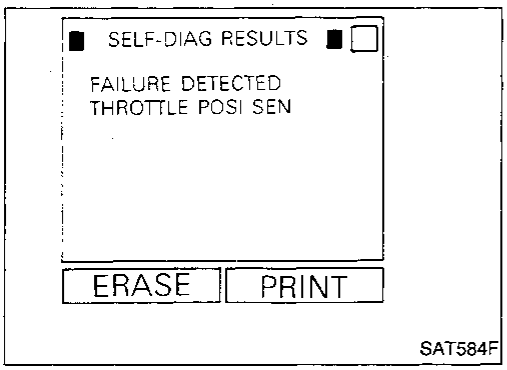
AAT310-E



Self-diagnosis

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

1. Turn on CONSULT.
2. Touch "A/T".

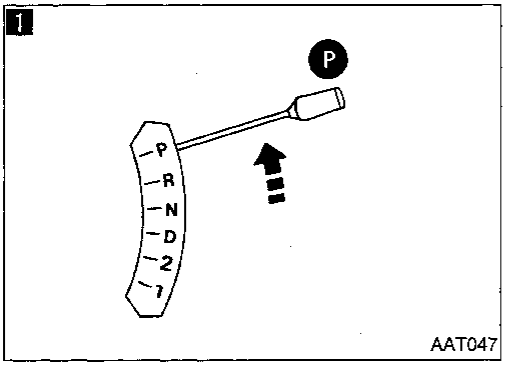


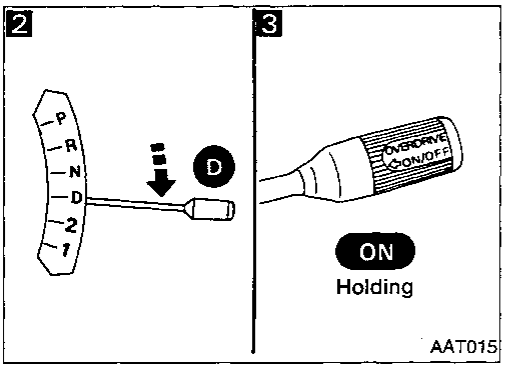
3. Touch "SELF-DIAG RESULTS".
   CONSULT performs self-diagnosis.

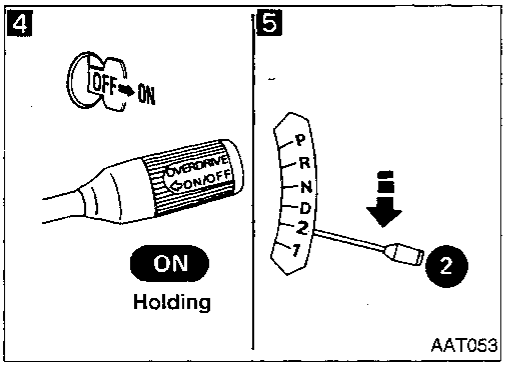
- If condition is intermittent and self-diagnosis results are "NO FAILURE DETECTED", drive vehicle while in self-diagnosis mode. If a failure occurs, it will be immediately displayed.

Self-diagnosis (Cont'd)

SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)







DIAGNOSIS START

1. Move selector lever to "P" position.

Does OD OFF indicator lamp come on for about 2 seconds or blink?

No → Perform Diagnostic Procedure 1. Refer to AT-66.

Yes

(Not LOCK)

2. Move selector lever to "D" position.

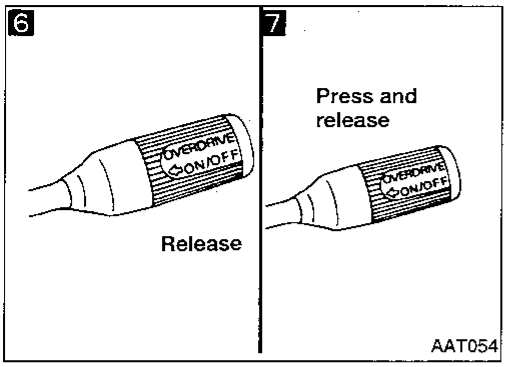
3. Press and hold transaxle gear selection switch-OD in.
Continue to hold.

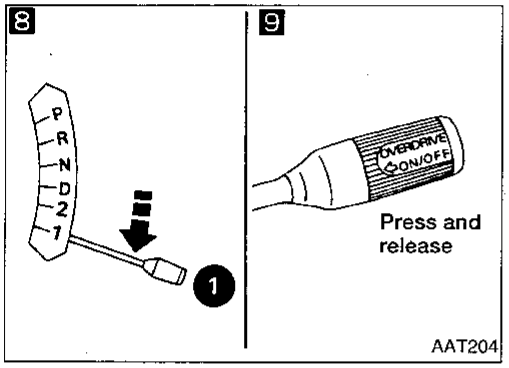
4. Wait for more than 2 seconds after ignition switch "ON" (keep holding transaxle gear selection switch-OD button in).

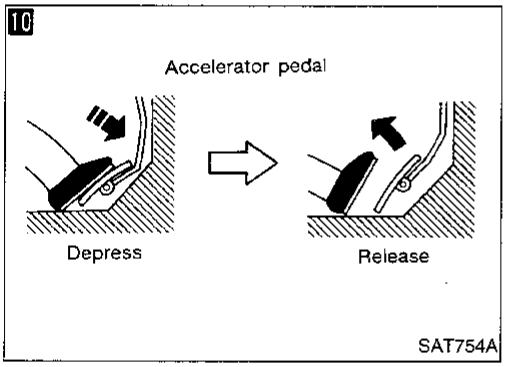
5. Move selector lever to "2" position (keep holding transaxle gear selection switch-OD button in).

Ⓐ

Self-diagnosis (Cont'd)







Ⓐ

6 Release transaxle gear selection switch-OD button.

7 Press and release transaxle gear selection switch-OD button.

8 Move selector lever to "1" position.

9 Press and release transaxle gear selection switch-OD button.

10 Depress accelerator pedal fully and release it.

Check OD OFF indicator lamp.
See "JUDGEMENT OF SELF-DIAGNOSIS CODE". Refer to AT-49.

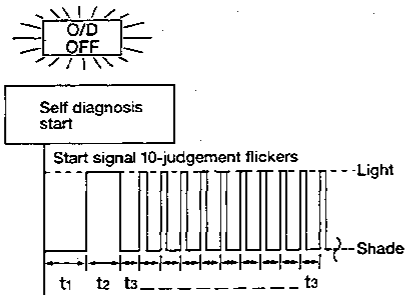
DIAGNOSIS END

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

Flickers of OD OFF indicator lamp: Damaged circuit

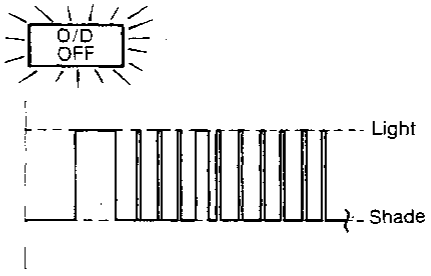
All judgement flickers are same.



AAT131

All circuits that can be confirmed by self-diagnosis are OK

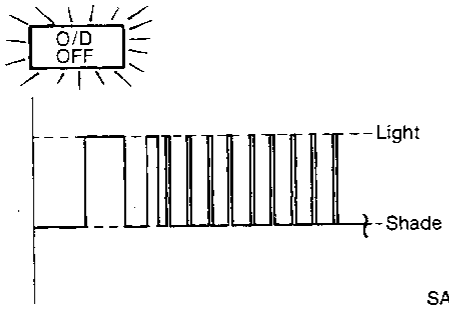
4th judgement flicker is longer than others.



AAT336

Shift solenoid valve A circuit is short-circuited or disconnected.
Go to SHIFT SOLENOID VALVE A CIRCUIT CHECK (AT-54).

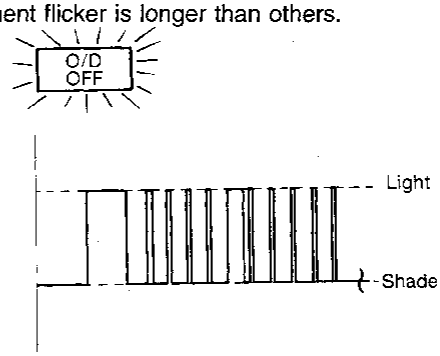
1st judgement flicker is longer than others.



SAT437F

Vehicle speed pulse generator circuit is short-circuited or disconnected.
Go to VEHICLE SPEED PULSE GENERATOR CIRCUIT CHECK (AT-51).

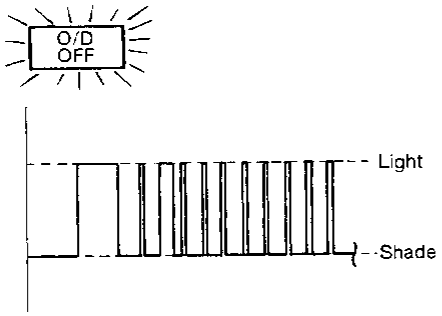
5th judgement flicker is longer than others.



SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.
Go to SHIFT SOLENOID VALVE B CIRCUIT CHECK (AT-55).

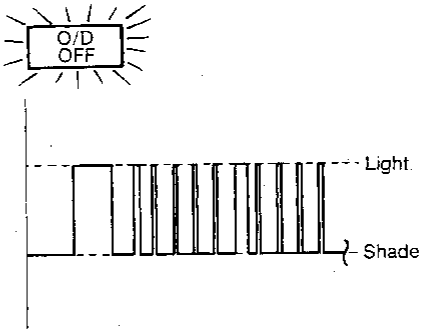
2nd judgement flicker is longer than others.



SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.
Go to VEHICLE SPEED SENSOR CIRCUIT CHECK (AT-52).

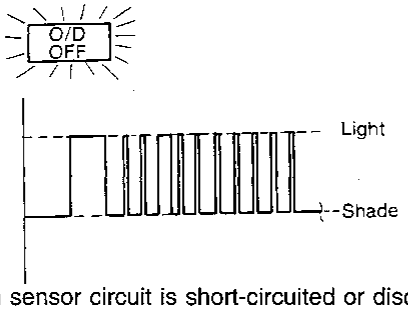
6th judgement flicker is longer than others.



SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.
Go to OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK (AT-56).

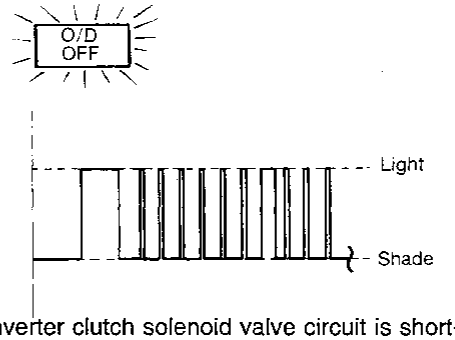
3rd judgement flicker is longer than others.



SAT441F

Throttle position sensor circuit is short-circuited or disconnected.
Go to THROTTLE POSITION SENSOR CIRCUIT CHECK (AT-53).

7th judgement flicker is longer than others.



SAT449F

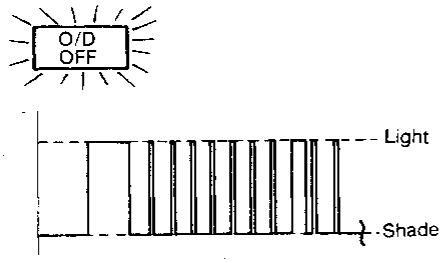
Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK (AT-57).

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

Self-diagnosis (Cont'd)

Flickers of OD OFF indicator lamp: Damaged circuit

8th judgement flicker is longer than others.

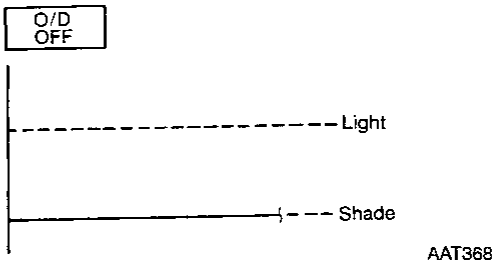


AAT367

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 CHECKS (AT-58).

Does not come on.

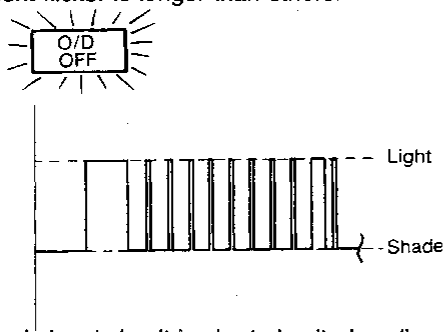


AAT368

Inhibitor switch, transaxle gear selection switch-OD or throttle position switch circuit is disconnected or A/T control unit is damaged.

Go to INHIBITOR SWITCH, TRANSAXLE GEAR SELECTION SWITCH-OD AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS (AT-62).

9th judgement flicker is longer than others.

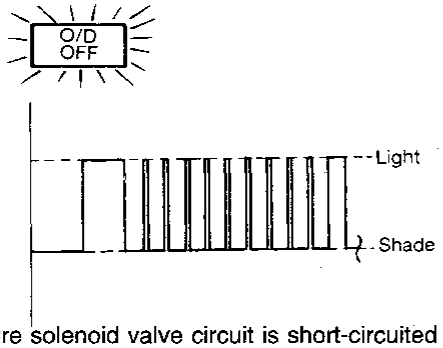


SAT453F

Engine speed signal circuit is short-circuited or disconnected.

Go to ENGINE SPEED SIGNAL CIRCUIT CHECK (AT-60).

10th judgement flicker is longer than others.

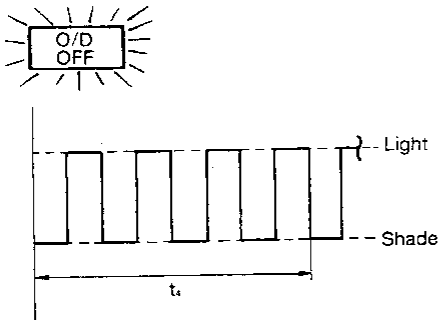


SAT455F

Line pressure solenoid valve circuit is short-circuited or disconnected.

Go to LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK (AT-61).

Flickers as shown below.



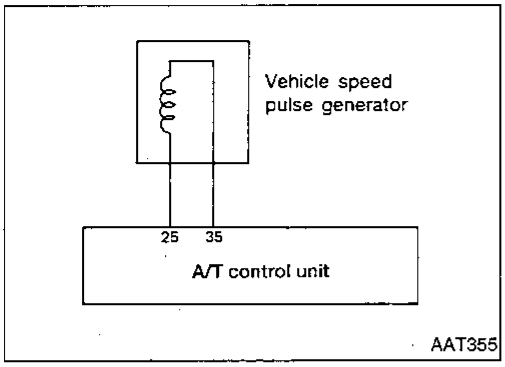
SAT457F

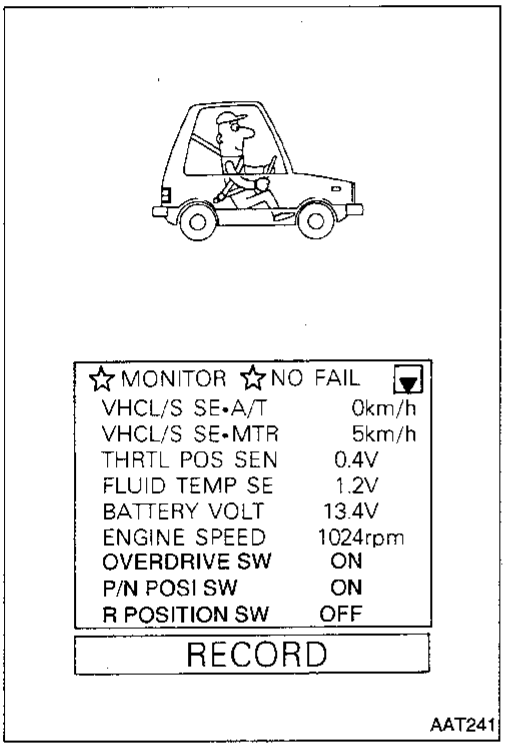
Battery power is low.
Battery has been disconnected for a long time.
Battery is conversely connected.
(When reconnecting A/T control unit connectors. — This is not a problem.)

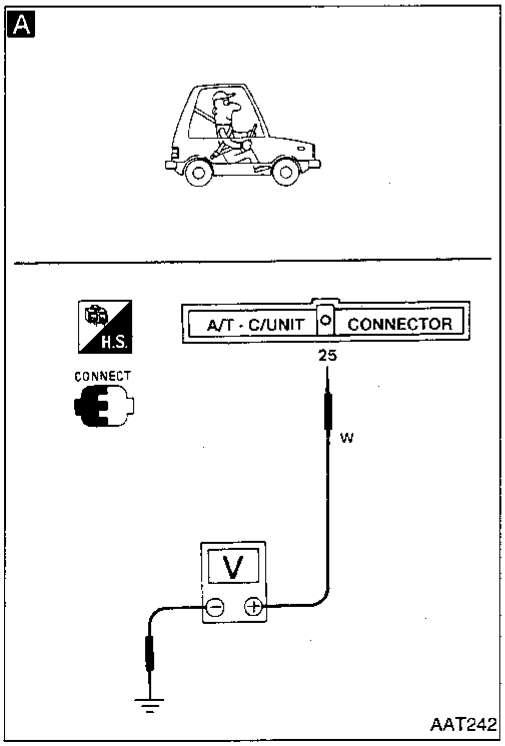
t_4 = 1.0 second

Self-diagnosis (Cont'd)

VEHICLE SPEED PULSE GENERATOR CIRCUIT CHECK







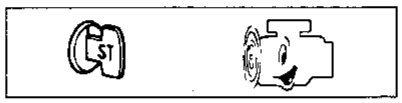
CHECK VEHICLE SPEED PULSE GENERATOR. — See "Electrical Components Inspection". Refer to AT-92.

NG → Repair or replace vehicle speed pulse generator.

OK ↓

A

CHECK POWERTRAIN INPUT SIGNAL.

1. 

2.
- Select "ECU INPUT SIGNALS".
- Read out the value of "VEHICLE SPEED SENSOR A/T" while driving.
- Check the value changes according to driving speed.

OR

Check voltage between A/T control unit terminal (25) 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.)

NG → Check the following items.
- Harness continuity between A/T control unit and vehicle speed pulse generator (Main harness)
- Harness continuity between vehicle speed pulse generator and ECM (Main harness)
- Ground circuit for ECM — Refer to EF & EC section ("Diagnostic Prodecure 22", "TROUBLE DIAGNOSES").

OK ↓

Perform self-diagnosis again after driving for a while.

NG → 1. Perform powertrain input and control signal inspection for A/T control unit. Refer to AT-86.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK ↓

INSPECTION END

Self-diagnosis (Cont'd)

VEHICLE SPEED SENSOR CIRCUIT CHECK

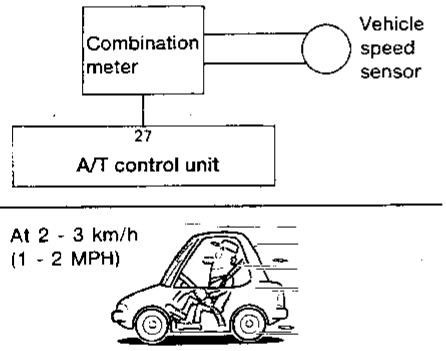
A

☆MONITOR ☆NO FAIL	
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
OVERDRIVE SW	ON
P/N POSI SW	ON
R POSITION SW	OFF

RECORD

AAT243

A



AAT317

A

CHECK POWERTRAIN INPUT SIGNAL.

1. 

2. ● Select "ECU INPUT SIGNALS".
   ● Read out the value of "VEHICLE SPEED SENSOR 2-MTR" while driving.
   ● Check the value changes according to driving speed.

NG → Check the following items.
- Vehicle speed sensor and ground circuit for vehicle speed sensor — Refer to EL section ("VEHICLE SPEED SENSOR SIGNAL CHECK", "METERS AND GAUGES").
- Harness continuity between A/T control unit and vehicle speed sensor (Main harness)

OR

Check voltage between A/T control unit terminal (27) 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

OK ↓

Perform self-diagnosis again after driving for a while.

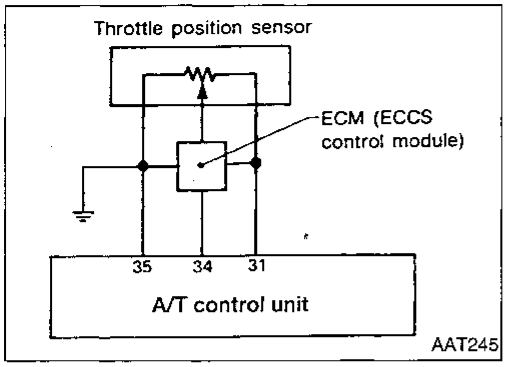
NG → 1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK ↓

INSPECTION END

Self-diagnosis (Cont'd)

THROTTLE POSITION SENSOR CIRCUIT CHECK

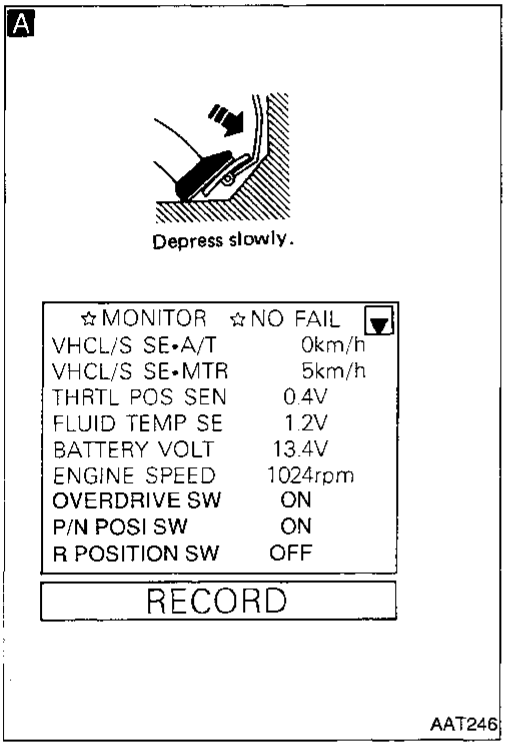


Perform self-diagnosis (Mode II) for engine control.

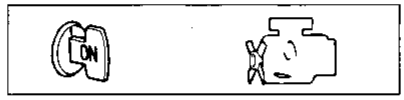
NG → Check throttle position sensor circuit for engine control. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

OK

A



CHECK POWERTRAIN INPUT SIGNAL.

1. 

2. 

- Select "ECU INPUT SIGNALS".
- Read out the value of "THROTTLE POSITION SENSOR".

Voltage:
Fully-closed throttle:
0.2 - 0.6V
Fully-open throttle:
2.9 - 3.9V

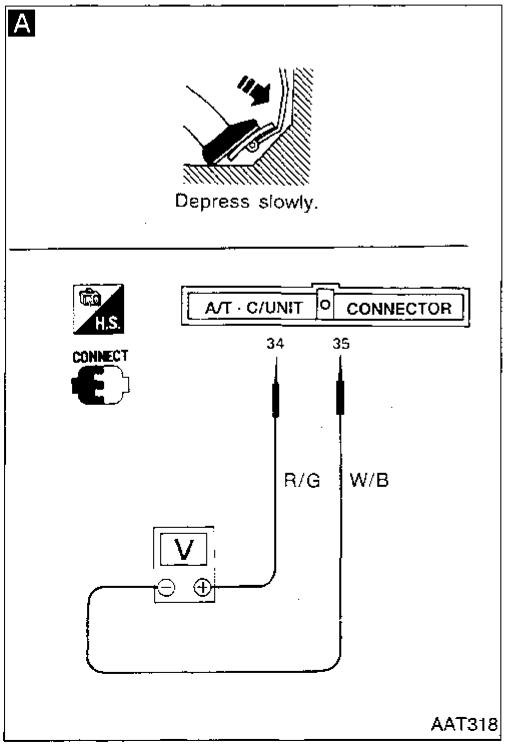
OR

- Check voltage between A/T control unit terminal ㉞ and ㉟ while accelerator pedal is depressed slowly.

Voltage:
Fully-closed throttle:
0.2 - 0.6V
Fully-open throttle:
2.9 - 3.9V
(Voltage rises gradually in response to throttle valve opening.)

NG → Check harness continuity between ECM and A/T control unit regarding throttle position sensor circuit. (Main harness)

OK



Perform self-diagnosis again after driving for a while.

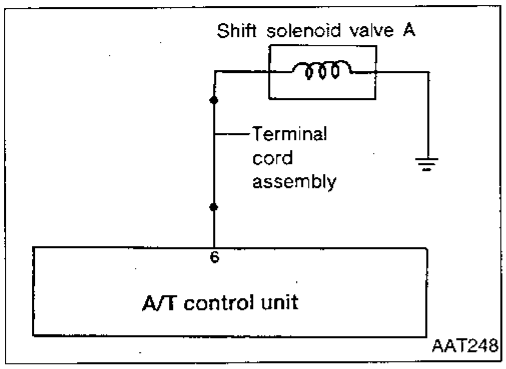
NG → 1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

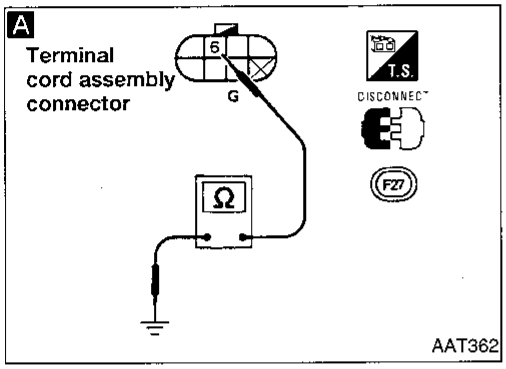
OK

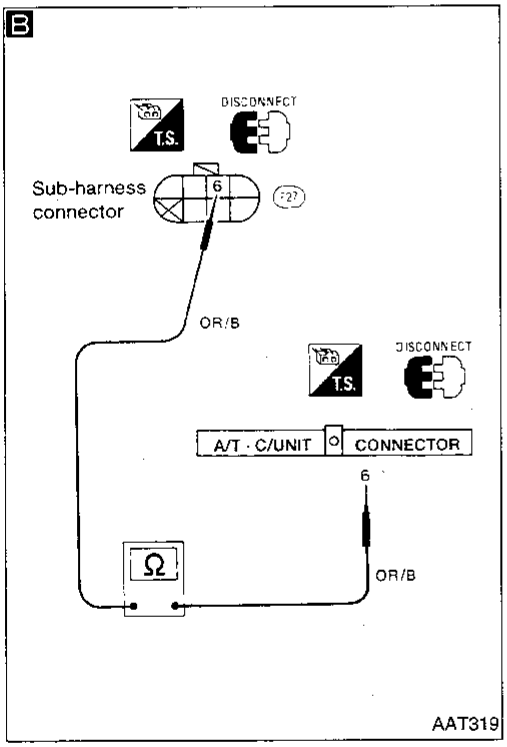
INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK

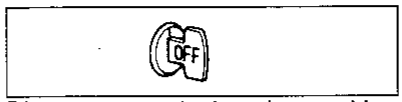






A

CHECK GROUND CIRCUIT.

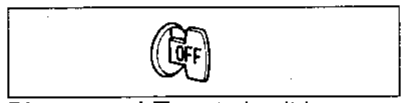
1. 
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑥ and ground.
   Resistance: 20 - 30Ω

NG →
1. Remove control valve assembly. — See "ON-VEHICLE SERVICE". Refer to AT-104.
2. Check the following items.
- Shift solenoid valve A — See "Electrical Components Inspection". Refer to AT-87.
- Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑥ and A/T control unit terminal ⑥.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

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

OK ↓

Perform self-diagnosis again after driving for a while.

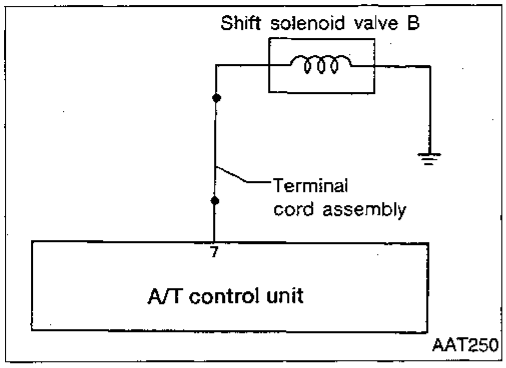
NG →
1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

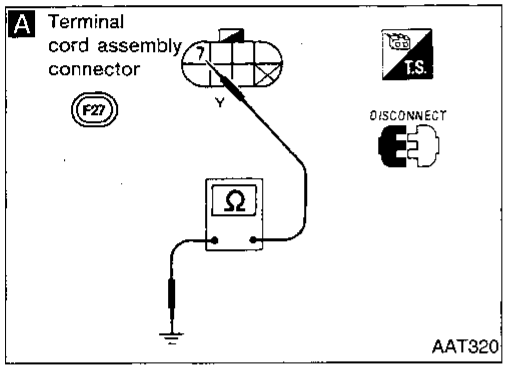
OK ↓

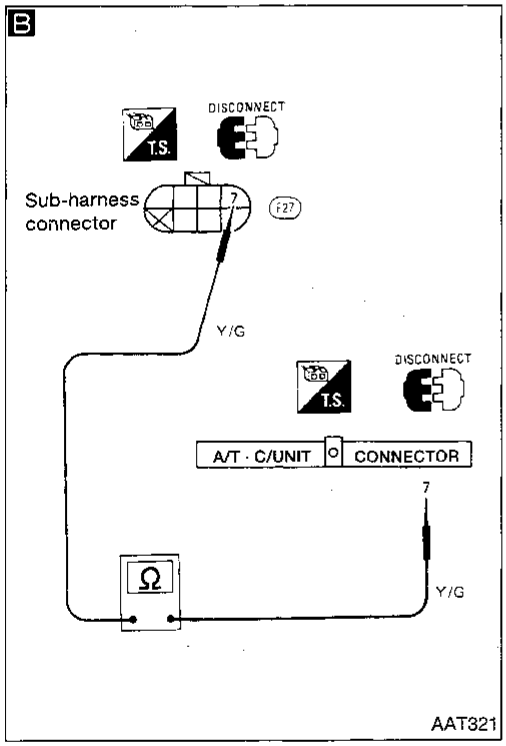
INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK

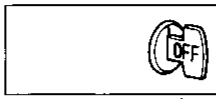






A

CHECK GROUND CIRCUIT.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.
   Resistance: 20 - 30Ω

NG →
1. Remove control valve assembly. — See "ON-VEHICLE SERVICE". Refer to AT-104.
2. Check the following items.
- Shift solenoid valve B — Refer to AT-87.
- Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑦ and A/T control unit terminal ⑦.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

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

OK ↓

Perform self-diagnosis again after driving for a while.

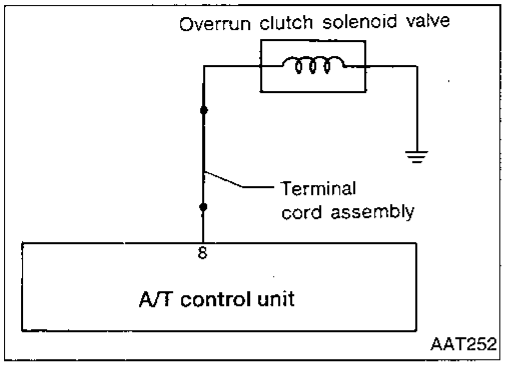
NG →
1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

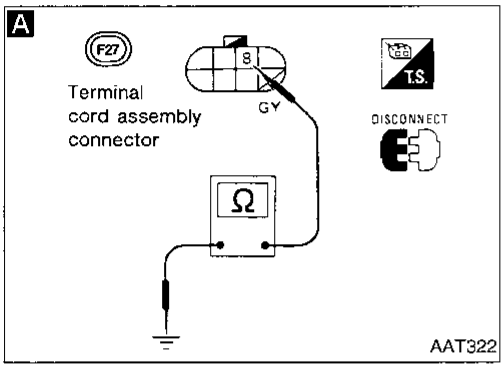
OK ↓

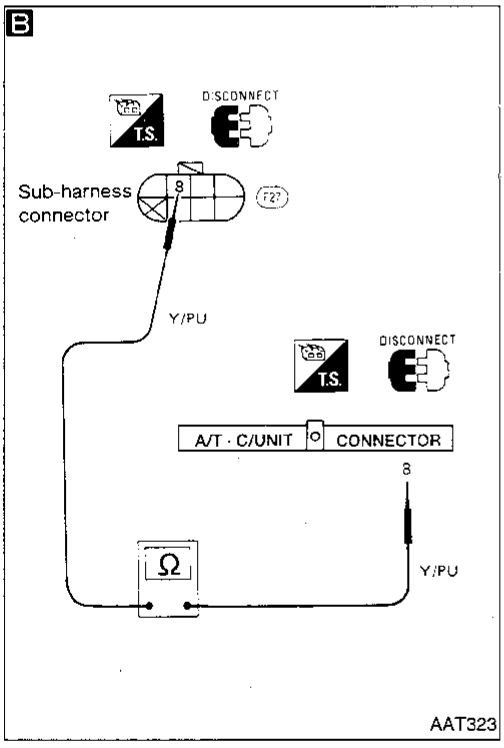
INSPECTION END

Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK

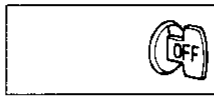






A

CHECK GROUND CIRCUIT.

1. 

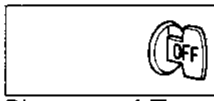
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑧ and ground.
   Resistance: 20 - 30Ω

NG →
1. Remove control valve assembly. — See "ON-VEHICLE SERVICE". Refer to AT-104.
2. Check the following items.
- Overrun clutch solenoid valve — See "Electrical Components Inspection". Refer to AT-87.
- Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑧ and A/T control unit terminal ⑧.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

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

OK ↓

Perform self-diagnosis again after driving for a while.

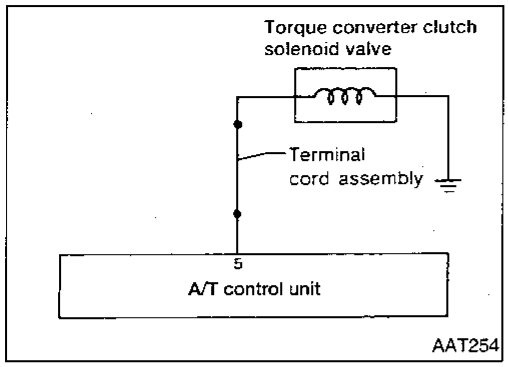
NG →
1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

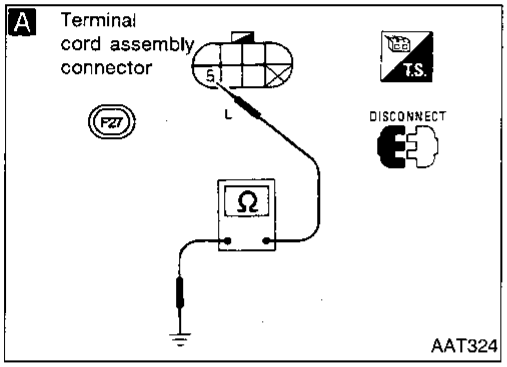
OK ↓

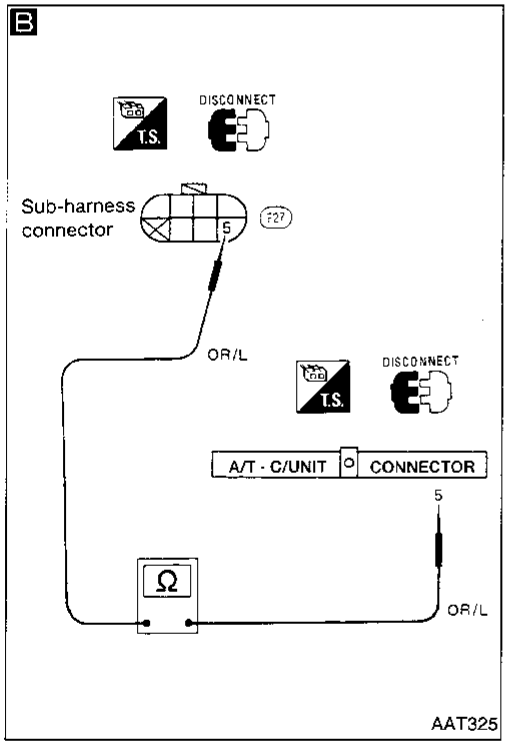
INSPECTION END

Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK

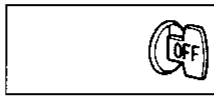






A

CHECK GROUND CIRCUIT.

1. 

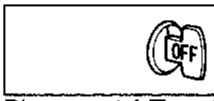
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
   Resistance: 2.5 - 5Ω

NG →
1. Remove oil pan. See "ON-VEHICLE SERVICE". — Refer to AT-104.
2. Check the following items.
- Torque converter clutch solenoid valve — See "Electrical Components Inspection". Refer to AT-87.
- Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑤ and A/T control unit terminal ⑤.
   Resistance:
   Approximately 0Ω
4. Reinstall any part removed.

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

OK ↓

Perform self-diagnosis again after driving for a while.

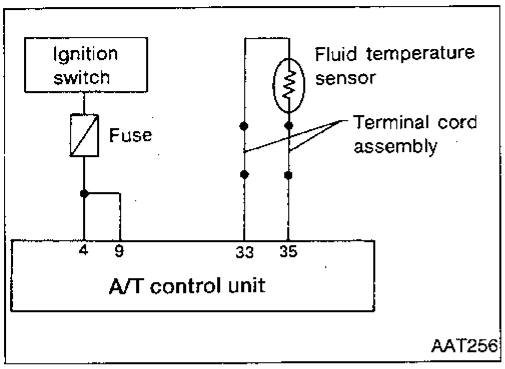
NG →
1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

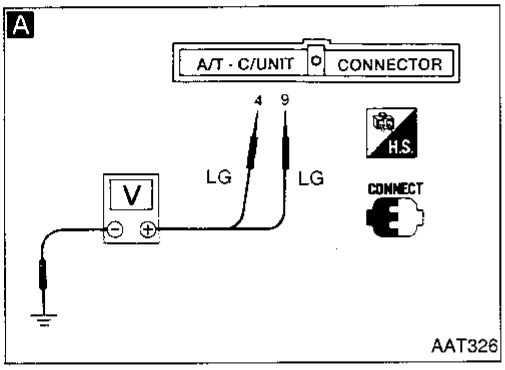
OK ↓

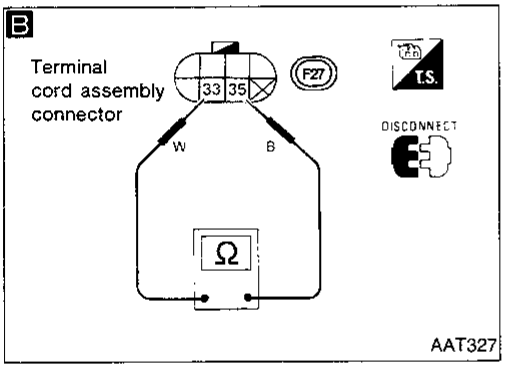
INSPECTION END

Self-diagnosis (Cont'd)

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

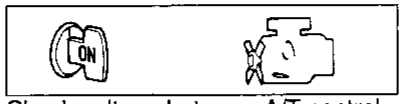






A

CHECK A/T CONTROL UNIT POWER SOURCE.

1. 

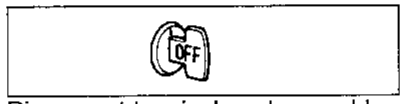
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   Battery positive voltage should exist.

NG → Check the following items.
- Harness continuity between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse — Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

OK ↓

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

1. 

2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ㉝ and ㉟ when A/T is cold.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

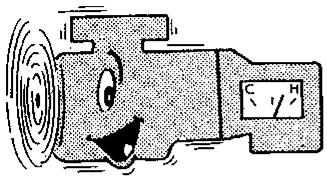
NG →
1. Remove oil pan.
2. Check the following items.
- Fluid temperature sensor — See "Electrical Components Inspection". Refer to AT-88.
- Harness continuity of terminal cord assembly

OK ↓

Ⓐ

Self-diagnosis (Cont'd)

C

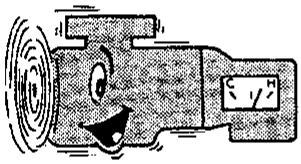


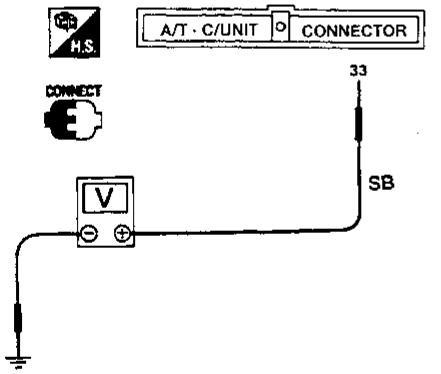
☆MONITOR	☆NO FAIL
VHCL/S SE•A/T	0km/h
VHCL/S SE•MTR	5km/h
THRTL POS SEN	0.4V
FLUID TEMP SE	1.2V
BATTERY VOLT	13.4V
ENGINE SPEED	1024rpm
OVERDRIVE SW	ON
P/N POSI SW	ON
R POSITION SW	OFF

RECORD

AAT258

C





AAT328

Ⓐ

C

CHECK POWERTRAIN INPUT SIGNAL OF FLUID TEMPERATURE SENSOR.

1. 

2. ● Select "ECU INPUT SIGNALS".
● Read out the value of "FLUID TEMPERATURE SENSOR".
Voltage:
Cold [20°C (68°F)] →
Hot [80°C (176°F)]:
Approximately
1.5V → 0.5V

OR

● Check voltage between A/T control unit terminal ㉝ and ground while warming up A/T.
Voltage:
Cold [20°C (68°F)] →
Hot [80°C (176°F)]:
Approximately
1.5V → 0.5V

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

OK

Perform self-diagnosis again after driving for a while.

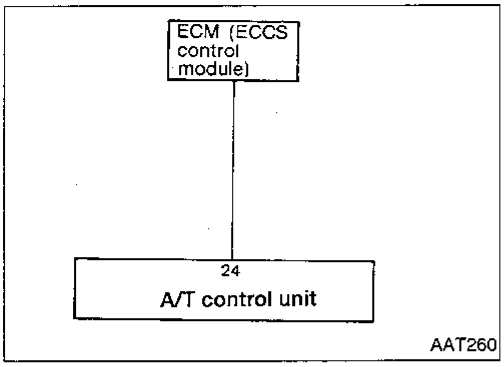
NG → 1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

Self-diagnosis (Cont'd)

ENGINE SPEED SIGNAL CIRCUIT CHECK

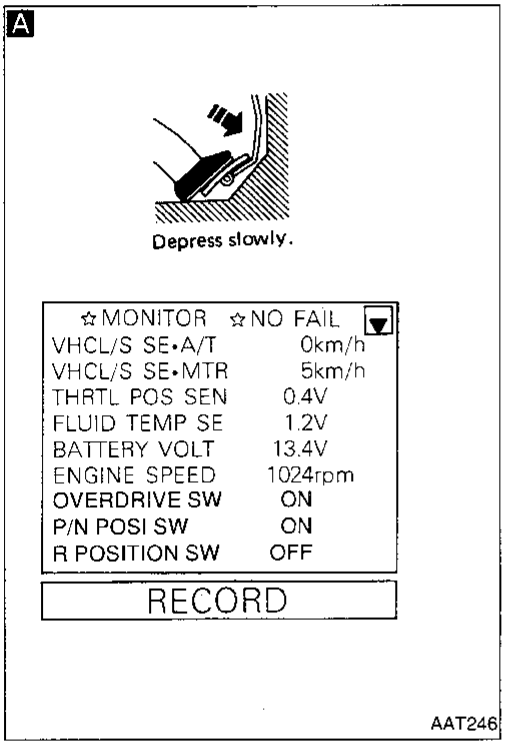


Perform self-diagnosis (Mode II) for engine control. Check ignition signal circuit.

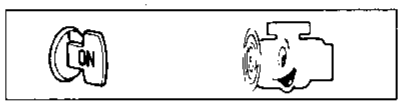
NG → Check ignition signal circuit for engine control. — Refer to EF & EC section ("Diagnostic Procedure 27", "TROUBLE DIAGNOSES").

OK ↓

A



CHECK POWERTRAIN INPUT SIGNAL.

1. 

2.
- Select "ECU INPUT SIGNALS".
- Read out the value of "ENGINE SPEED".
- Check engine speed changes according to throttle opening.

OR

- Check voltage between A/T control unit terminal (24) and ground.
  Voltage: 0.9 - 4.5V

NG → Check the following items.
- Harness continuity between A/T control unit and ignition coil.
- Resistor
- Ignition coil — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 21", "TROUBLE DIAGNOSES").

OK ↓

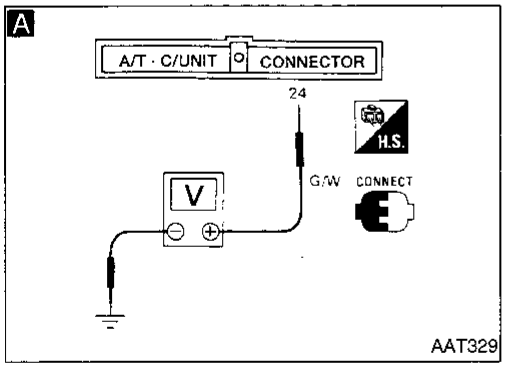
Perform self-diagnosis again after driving for a while.

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

OK ↓

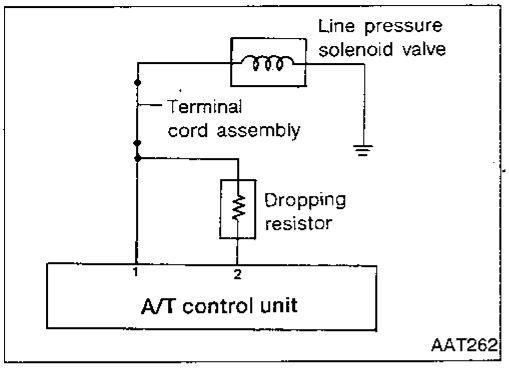
INSPECTION END

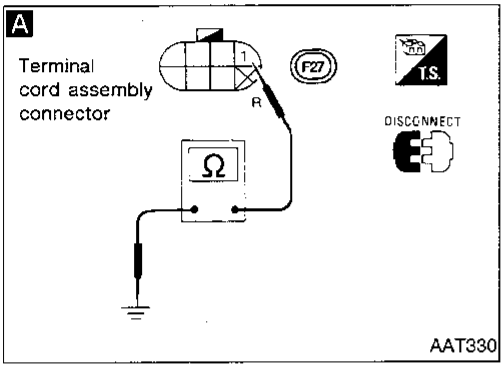
A

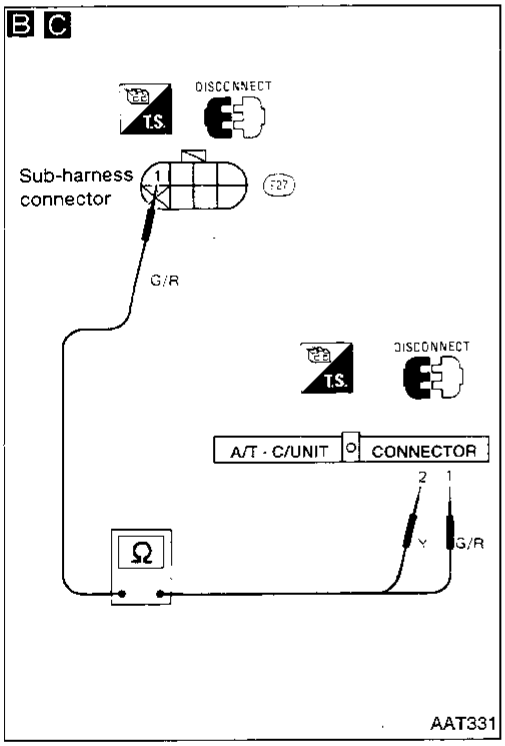


Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK

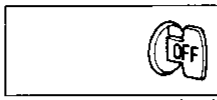






A

CHECK GROUND CIRCUIT.

1. 

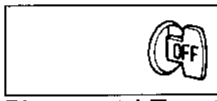
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ① and ground.
   Resistance: 2.5 - 5Ω

NG →
1. Remove control valve assembly — See "ON- VEHICLE SERVICE". Refer to AT-104.
2. Check the following items.
- Line pressure solenoid valve — See "Electrical Components Inspection". Refer to AT-86.
- Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

1. 

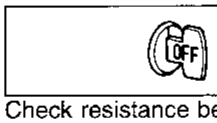
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ① and A/T control unit terminal ②.
   Resistance: 11.2 - 12.8Ω

NG →
Check the following items:
- Dropping resistor — See "Electrical Components Inspection". Refer to AT-86.
- Harness continuity between A/T control unit ② and terminal cord assembly (Main harness)

OK ↓

C

CHECK POWER SOURCE CIRCUIT.

1. 

2. Check resistance between terminal ① and A/T control unit terminal ①
   Resistance:
   Approximately 0Ω
3. Reinstall any part removed.

NG →
Repair or replace harness between A/T control unit ① and terminal cord assembly.

OK ↓

Perform self-diagnosis again after driving for a while.

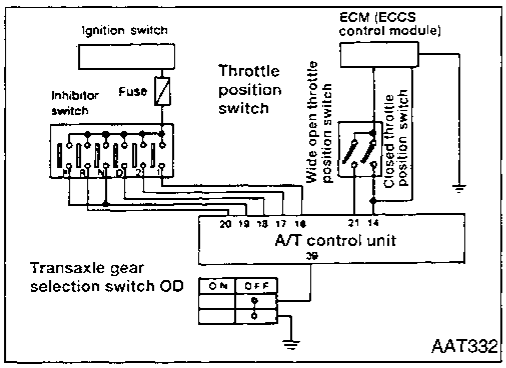
NG →
1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK ↓

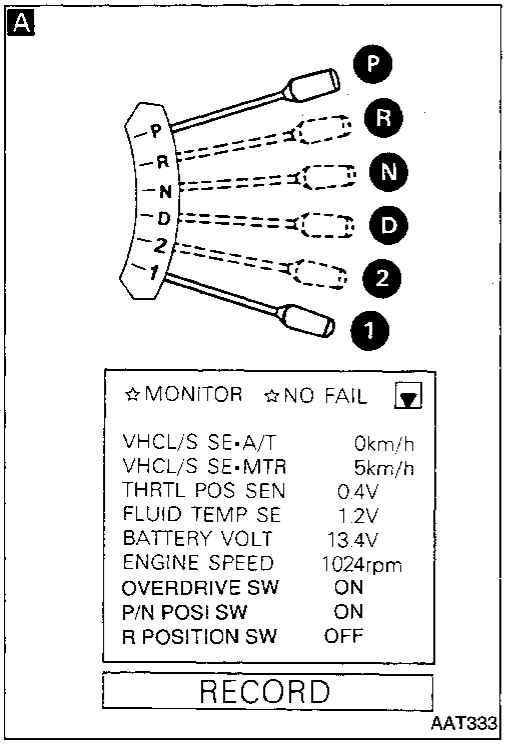
INSPECTION END

Self-diagnosis (Cont'd)

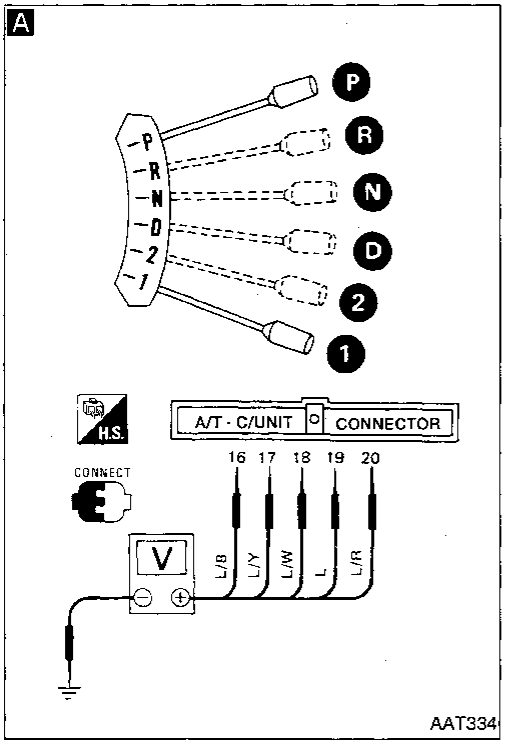
INHIBITOR SWITCH, TRANSAXLE GEAR SELECTION SWITCH-OD AND CLOSED THROTTLE POSITION SWITCH CIRCUIT CHECKS



A



A



A

CHECK INHIBITOR SWITCH CIRCUIT.

1. 

2. 

- Select "ECU INPUT SIGNALS".
- Read out "R", "D", "1" and "2" POSITION SWITCH moving selector lever to each position.
- Check the selector lever position is indicated properly.

OR

Check voltage between A/T control unit terminals ⑯, ⑰, ⑱, ⑲, ⑳ and ground while moving selector lever through each position.

Voltage:

B: Battery positive voltage

0: 0V

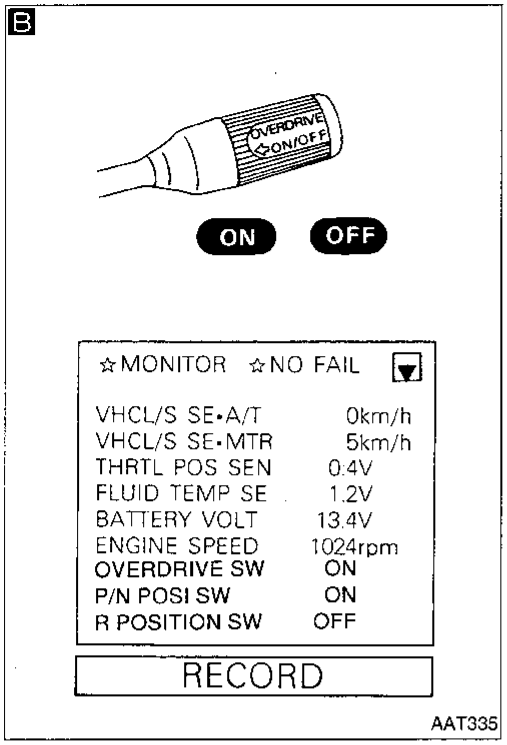
Lever position	Terminal No.				
	⑲	⑳	⑱	⑰	⑯
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

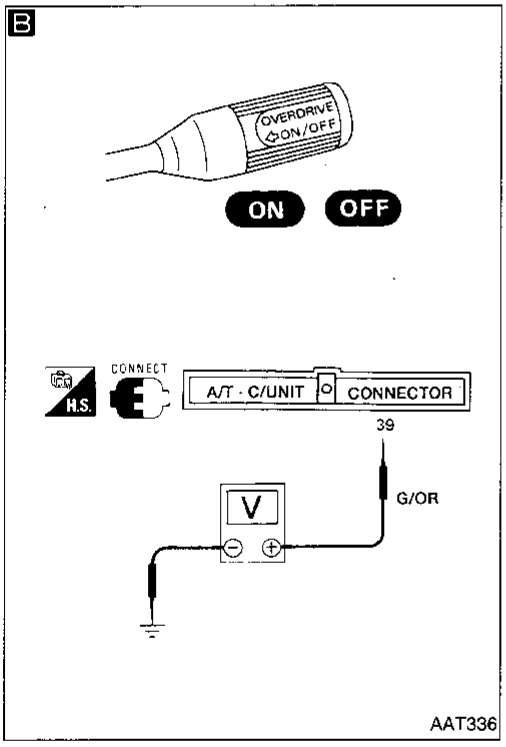
NG → Check the following items.

- Inhibitor switch — See "Electrical Components Inspection". Refer to AT-90.
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

OK → Ⓐ

Self-diagnosis (Cont'd)

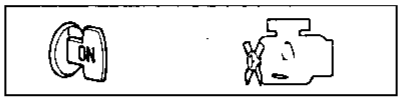




Ⓐ

B

CHECK TRANSAXLE GEAR SELECTION SWITCH-OD CIRCUIT.

1. 

2. ● Select "ECU INPUT SIGNALS".
● Read out "OVERDRIVE SW (Transaxle gear selection switch-OD)".
● Check the position is indicated properly. (OVERDRIVE SW "ON" displayed on CONSULT means transaxle gear selection switch-OD is "OFF".)

OR

● Check voltage between A/T control unit terminal ㊴ and ground when transaxle gear selection switch-OD is in "ON" position and in "OFF" position.

Switch position	Voltage
ON	Battery positive voltage
OFF	1V or less

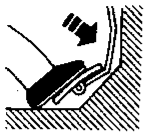
NG → Check the following items.
- Transaxle gear selection switch-OD — See "Electrical Components Inspection". Refer to AT-89.
- Harness continuity between A/T control unit and transaxle gear selection switch-OD (Main harness)
- Harness continuity of ground circuit for transaxle gear selection switch-OD (Main harness)

OK

Ⓑ

Self-diagnosis (Cont'd)

C D

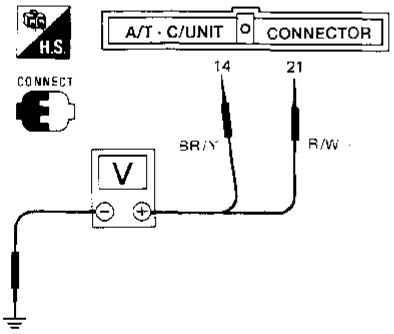


☆MONITOR	☆NO FAIL
D POSITION SW	OFF
2 POSITION SW	OFF
1 POSITION SW	OFF
ASCD•CRUISE	OFF
ASCD•OD OUT	OFF
KICKDOWN SW	OFF
POWERSHIFT SW	OFF
CLOSED THL/SW	ON
W/O THRL/P-SW	OFF

RECORD

AAT268

C D



AAT337

Ⓑ

C

CHECK WIDE OPEN THROTTLE POSITION SWITCH CIRCUIT.

1. 

2.

- Select "ECU INPUT SIGNALS".
- Read out "WIDE OPEN THROTTLE POSITION SWITCH" depressing accelerator pedal fully.
- Check wide open throttle position switch position changes ON or OFF.

NG → Check harness continuity between A/T control unit and wide open throttle position switch.

OR

- Check voltage between A/T control unit terminal (21) and ground while depressing accelerator pedal slowly. (after warming up engine)

Voltage:

When releasing accelerator pedal:

1V or less

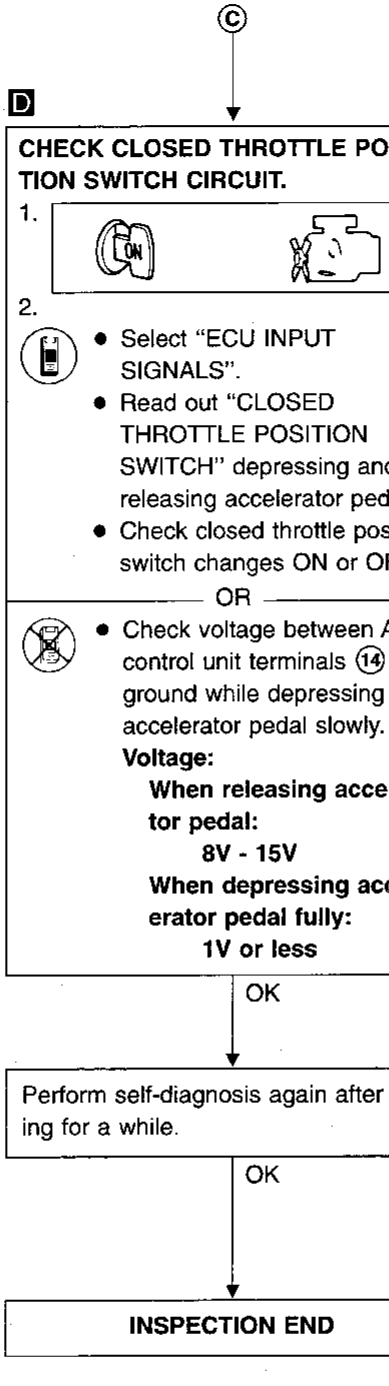
When depressing accelerator pedal fully:

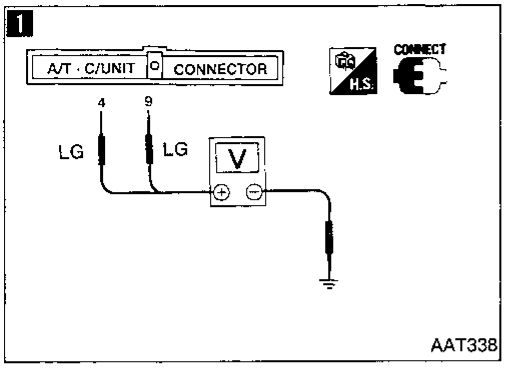
8 - 15V

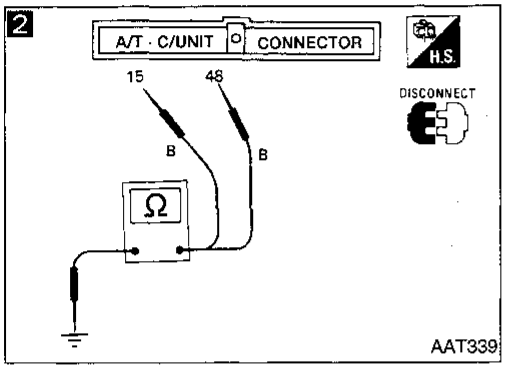
OK

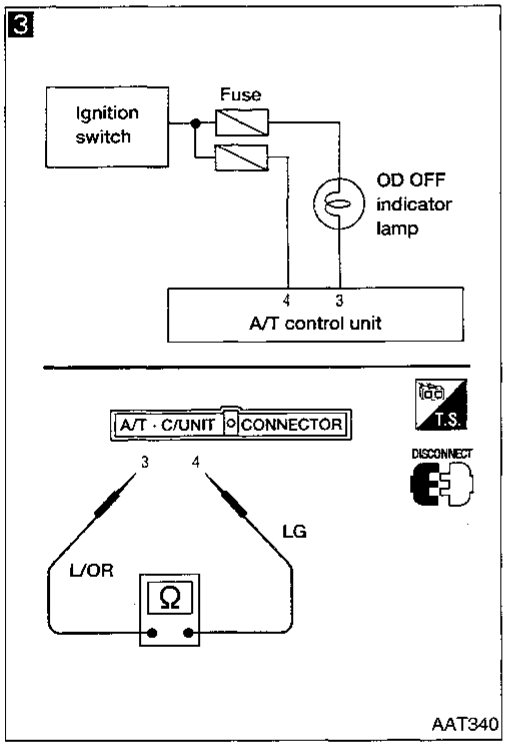
Ⓒ

Self-diagnosis (Cont'd)









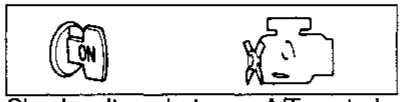
Diagnostic Procedure 1

SYMPTOM:

OD OFF 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. 

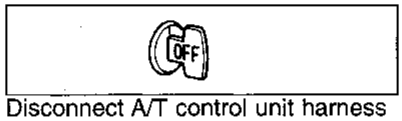
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   Battery positive voltage should exist.

NG → Check the following items.
- Harness continuity between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse — Refer to EL section ("Wiring Diagram", "POWER SUPPLY ROUTING").

OK ↓

2

CHECK A/T CONTROL UNIT GROUND CIRCUIT.

1. 

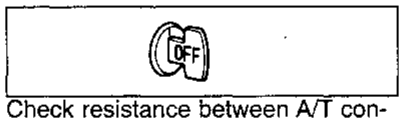
2. Disconnect A/T control unit harness connector.
3. Check resistance between A/T control unit terminals ⑮, ㊽ and ground.
   Resistance:
   Approximately 0Ω

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

OK ↓

3

CHECK LAMP CIRCUIT.

1. 

2. Check resistance between A/T control unit terminals ③ and ④.
   Resistance: 50 - 100Ω
3. Reinstall any part removed.

NG → Check the following items:
- OD OFF indicator lamp — Refer to EL section ("Combination Meter", METER AND GAUGES").
- Harness continuity between ignition switch and OD OFF indicator lamp (Main harness)
- Harness continuity between OD OFF indicator lamp and A/T control unit.

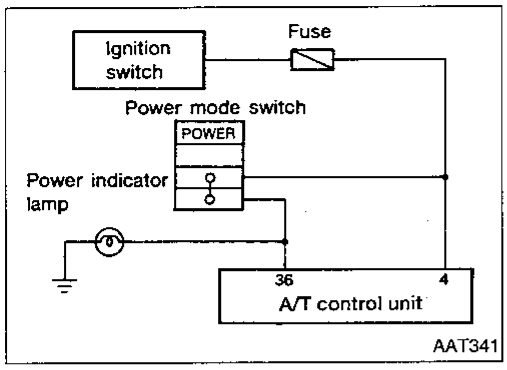
OK ↓

Check again.

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

OK ↓

INSPECTION END



Diagnostic Procedure 2

SYMPTOM:

Power indicator lamp does not come on when turning power mode switch to "ON".

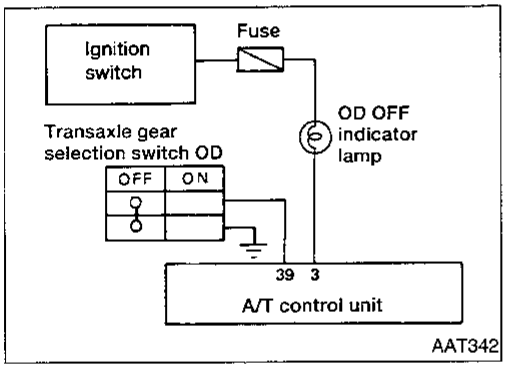
Is Diagnostic Procedure 1 OK?

No → Perform Diagnostic Procedure 1. Refer to AT-66.

Yes ↓

Check the following items:
- Power mode switch
- Harness continuity between ignition switch and power mode switch
- Harness continuity between power mode switch and A/T control unit

NG → Repair or replace damaged parts.



Diagnostic Procedure 3

SYMPTOM:

OD OFF indicator lamp does not come on when setting transaxle gear selection switch-OD to "OFF" position.

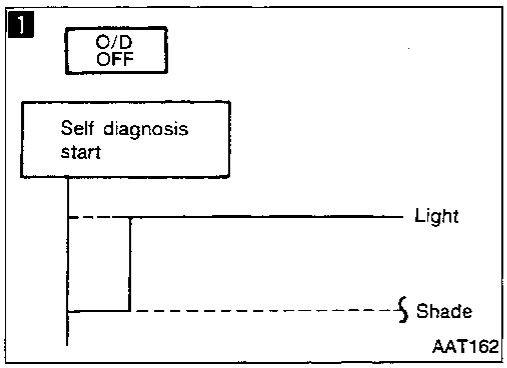
Is Diagnostic Procedure 1 OK?

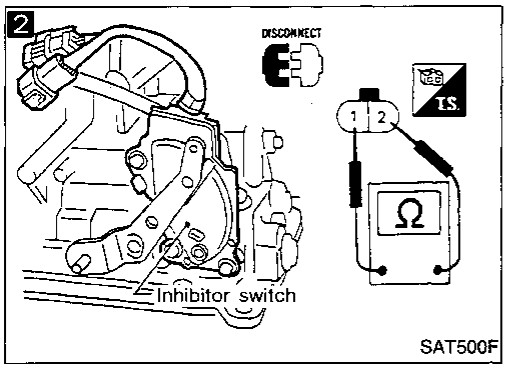
No → Perform Diagnostic Procedure 1. Refer to AT-66.

Yes ↓

Check the following items:
- Transaxle gear selection switch-OD
- Harness continuity between transaxle gear selection switch-OD and A/T control unit

NG → Repair or replace damaged parts.





Diagnostic Procedure 4

SYMPTOM:

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

Do "ECM INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — See "Self-diagnosis". Refer to AT-62.

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No

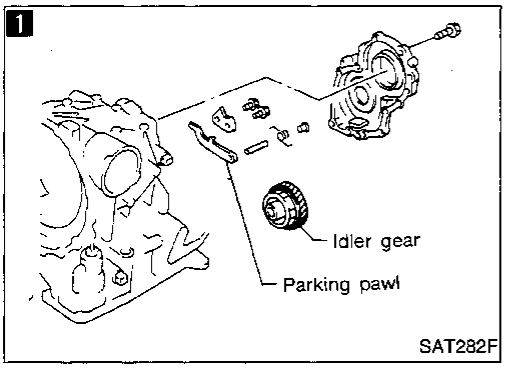
2 Check continuity of inhibitor switch 2-pin connector. — See "Electrical Components Inspection". Refer to AT-90. — NG → Repair or replace inhibitor switch.

OK

Check starting system. — Refer to EL section ("STARTING SYSTEM"). — NG → Repair or replace damaged parts.

OK

INSPECTION END



Diagnostic Procedure 5

SYMPTOM:

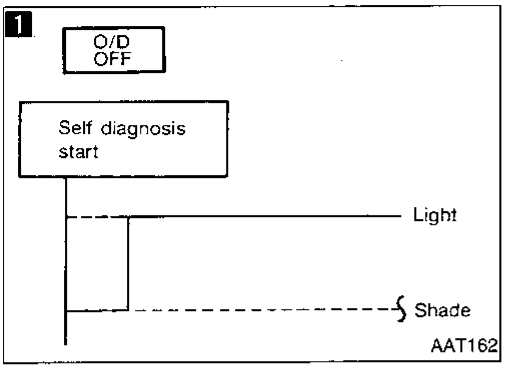
Vehicle moves when it is pushed forward or backward with selector lever in "P" position.

1 Check parking components. — See "DISASSEMBLY" and "ASSEMBLY". Refer to AT-112, AT-187. — NG → Repair or replace damaged parts.

OK

INSPECTION END

1



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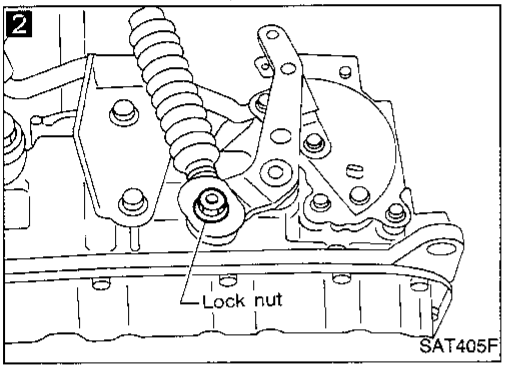

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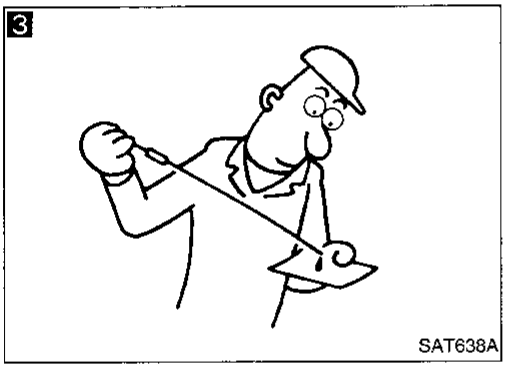

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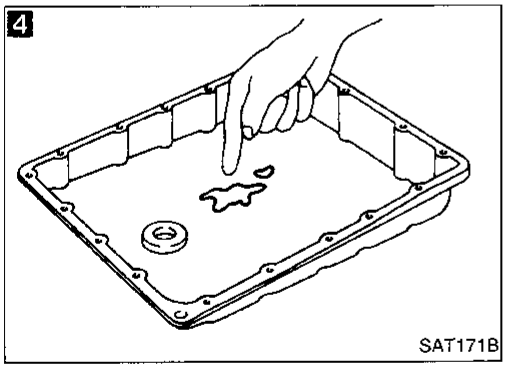


Diagnostic Procedure 6

SYMPTOM:
Vehicle moves forward or backward when selecting "N" position.

Do "ECM INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — See "Self-diagnosis". Refer to AT-62.

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No

Check control cable. — See "ON-VEHICLE SERVICE". Refer to AT-106. — NG → 2 Adjust control cable. — See "ON-VEHICLE SERVICE". Refer to AT-106.

OK

3

Check A/T fluid level again. — NG → Refill ATF.

OK

4

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

NG →
1. Disassemble A/T.
2. Check the following items.
- Forward clutch assembly
- Overrun clutch assembly
- Reverse clutch assembly

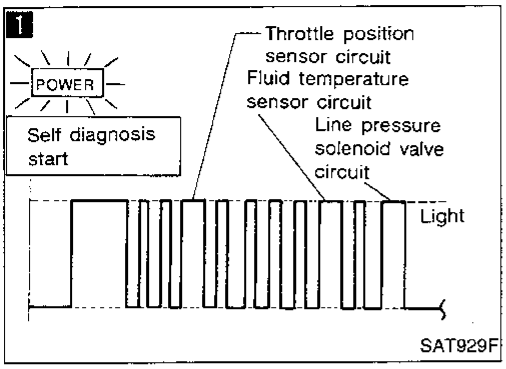
OK

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

OK

INSPECTION END

1



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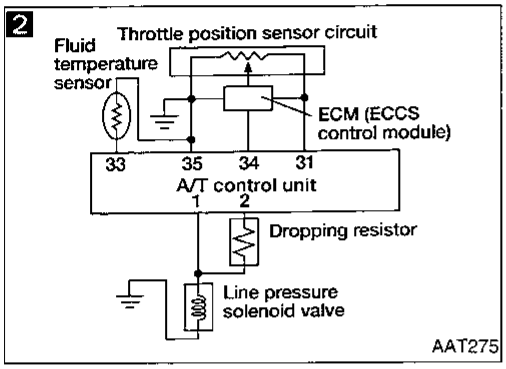

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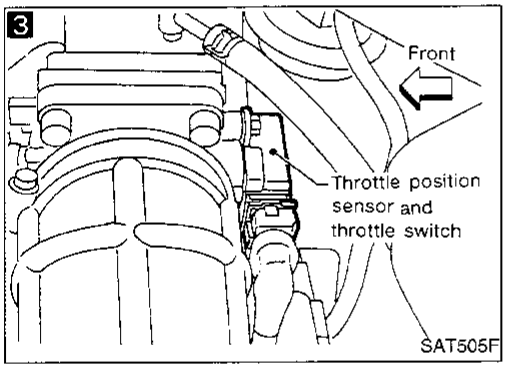

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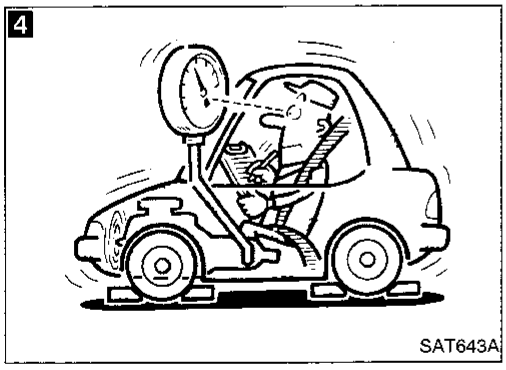


Diagnostic Procedure 7

SYMPTOM:

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

1

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

Yes → **2**

Check damaged circuit. — See "Self-diagnosis". Refer to AT-46 with CONSULT. Refer to AT-47 without CONSULT.

No ↓

3

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

NG → Repair or replace throttle position sensor.

OK ↓

4

Check line pressure at idle with selector lever in "D" position. — See "PRESSURE TESTING". Refer to AT-95.

NG →

1. Remove control valve assembly. — See "ON-VEHICLE SERVICE". Refer to AT-104.
2. Check the following items.

- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

OK ↓

Check again.

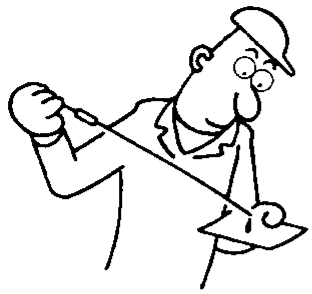
NG →

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

OK ↓

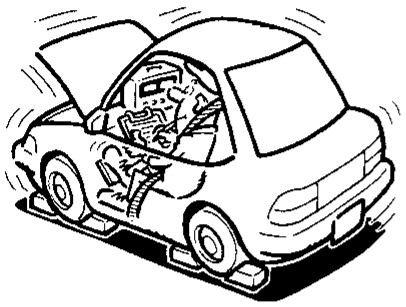
INSPECTION END

1



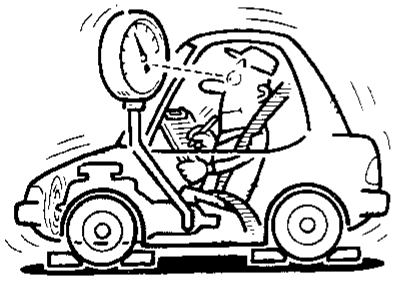
SAT638A

2



SAT642A

3



SAT643A

Diagnostic Procedure 8

SYMPTOM:

Vehicle does not creep backward when selecting "R" position.

1

Check A/T fluid level again.

NG → Refill ATF.

OK ↓

NG in both "1" and "R" positions

2

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

NG → 1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

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

OK ↓

OK in "1" position
NG in "R" position →

1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly
- Torque converter
- Reverse clutch assembly
- High clutch assembly

3

Check line pressure at idle with selector lever in "R" position. — Refer to AT-95.

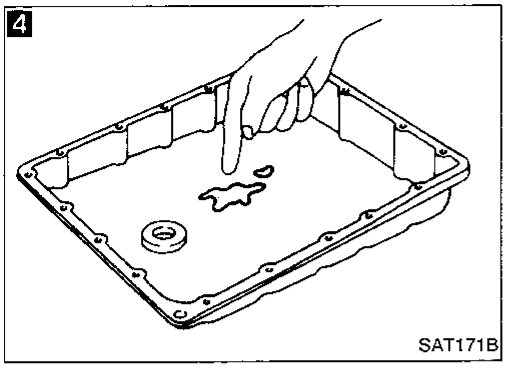
NG → 1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Valve to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

3. Disassemble A/T.
4. Check the following item.
- Oil pump assembly

OK ↓

Ⓐ

Diagnostic Procedure 8 (Cont'd)



Ⓐ

4

1. Remove oil pan.
2. Check fluid condition.

NG →
1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve

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

OK ↓

Check again.

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

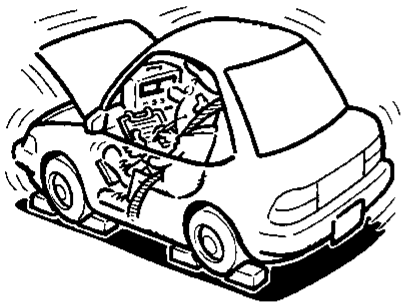
OK ↓

INSPECTION END

1

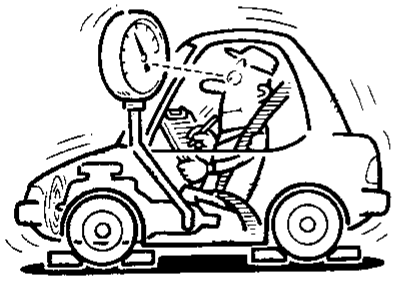
SAT638A

2



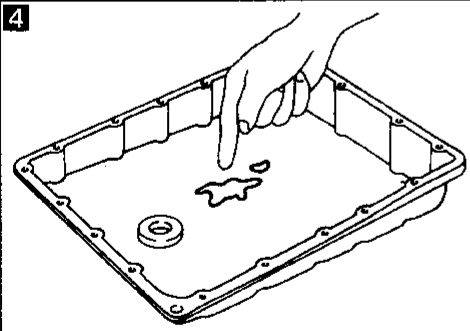
SAT642A

3



SAT643A

4



SAT171B

Diagnostic Procedure 9

SYMPTOM:
Vehicle does not creep forward when selecting "D", "2" or "1" position.

1

Check A/T fluid level again.

NG → Refill ATF.

OK ↓

2

Check stall revolution with selector lever in "D" position. — Refer to AT-93.

NG →
1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following items.
- Oil pump assembly
- Forward clutch assembly
- Forward one-way clutch
- Low one-way clutch
- Low & reverse brake assembly
- Torque converter

OK ↓

3

Check line pressure at idle with selector lever in "D" position. — Refer to AT-95.

OK ↓

NG →
1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)
- Line pressure solenoid valve
3. Disassemble A/T.
4. Check the following item.
- Oil pump assembly

4

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

NG → Go to Ⓐ above.

OK ↓

Check again.

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

OK ↓

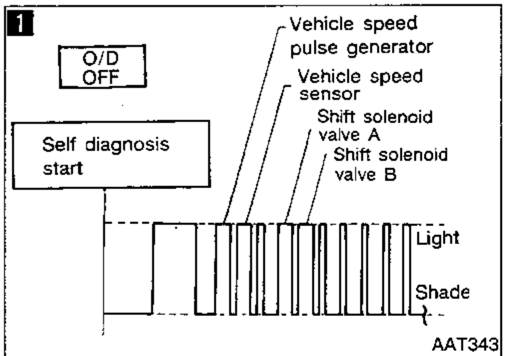
INSPECTION END

Ⓐ

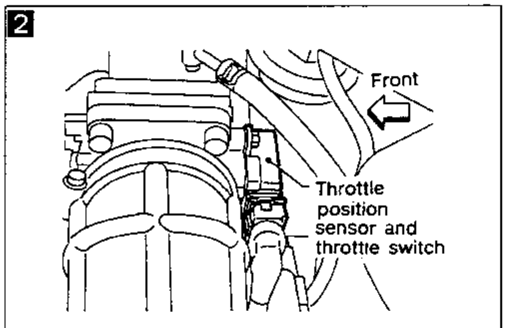
Diagnostic Procedure 10

SYMPTOM:

Vehicle cannot be started from D_1 on Cruise test — Part 1.



AAT343



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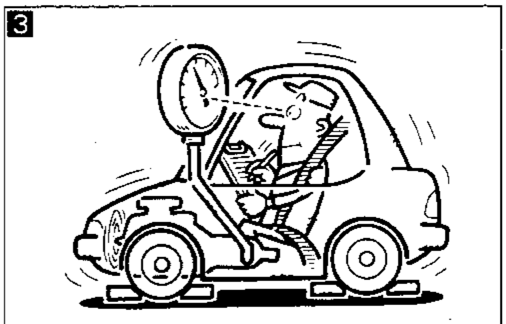
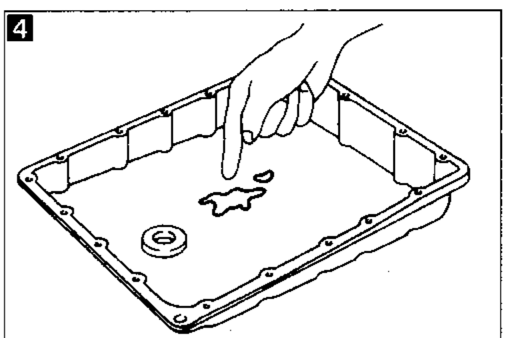


SAT643A



SAT171B

Is Diagnostic Procedure 8 OK?
- No → Go to Diagnostic Procedure 8.
- Yes ↓

1 Does self-diagnosis show damage to vehicle speed pulse generator, vehicle speed sensor, shift solenoid valve A or B after cruise test?
- Yes → Check damaged circuit. — See "Self-diagnosis". Refer to AT-46 with CONSULT. Refer to AT-47 without CONSULT.
- No ↓

2 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSIS").
- NG → Repair or replace throttle position sensor.
- OK ↓

3 Check line pressure at stall point with selector lever in "D" position. — Refer to AT-95.
- NG → (see box A below)
- OK ↓

4
1. Remove oil pan.
2. Check A/T fluid condition.
- NG → (see box A below)
- OK ↓

1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓

Box A:
1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter
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

OK ↓

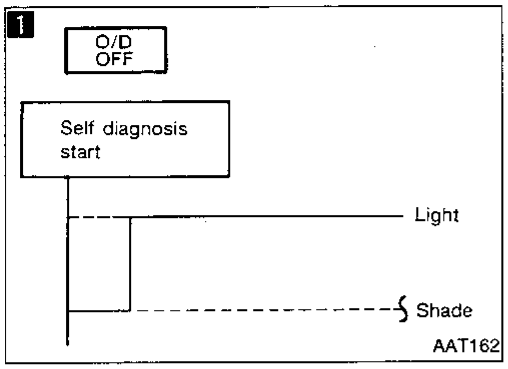
Check again.
- NG →
  1. Perform powertrain input and control signal inspection for A/T control unit.
  2. If NG, recheck A/T control unit pin terminals for damage or connection of control unit harness connector.
- OK ↓

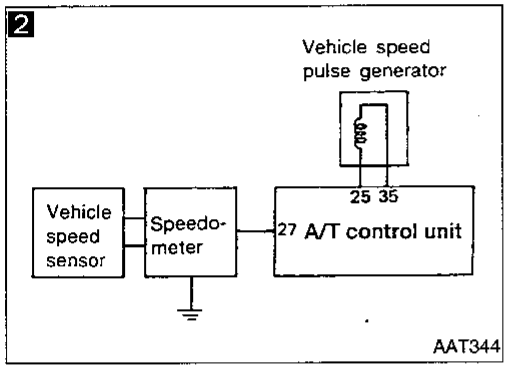
INSPECTION END

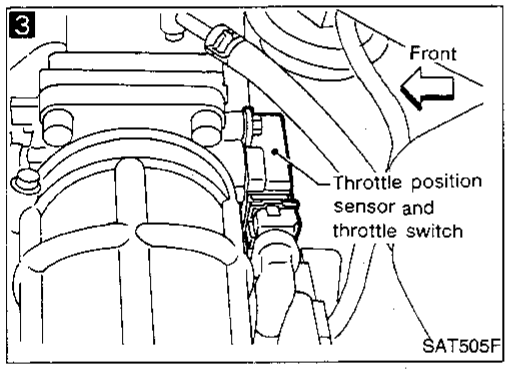
Diagnostic Procedure 11

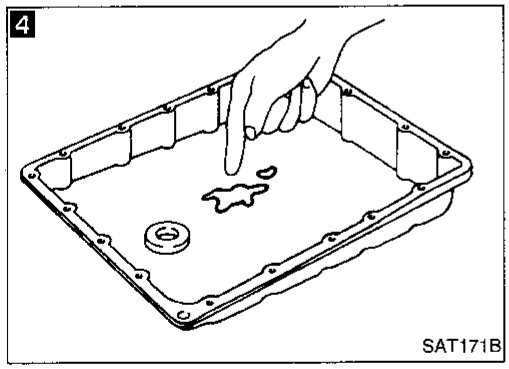
SYMPTOM:

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.









Are Diagnostic Procedures 9 and 10 OK?
- No → Go to Diagnostic Procedure 9 or 10.
- Yes ↓

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?
- Yes → Check inhibitor switch circuit. — Refer to AT-62.

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

2 Check vehicle speed pulse generator and vehicle speed sensor circuits. — Refer to AT-51 and AT-52.
- NG → Repair or replace vehicle speed pulse generator and vehicle speed sensor circuits.

OK ↓

3 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").
- NG → Repair or replace throttle position sensor.

OK ↓

4
1. Remove oil pan.
2. Check A/T fluid condition.
- NG →
  1. Remove control valve. — Refer to AT-104.
  2. Check the following items.
  - Shift valve A
  - Shift solenoid valve A
  - Pilot valve
  - Pilot filter
  3. Disassemble A/T.
  4. Check the following items.
  - Servo piston assembly
  - Brake band
  - Oil pump assembly

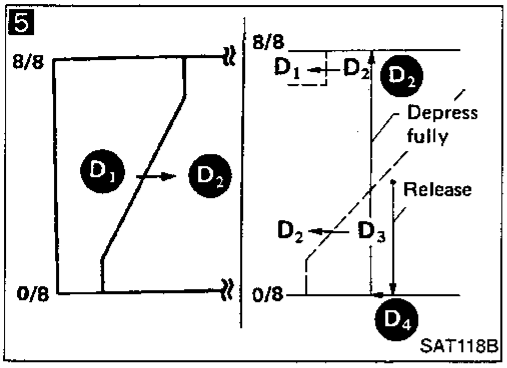
  OK ↓ Ⓐ

OK ↓

1. Remove control valve. — Refer to AT-104.
2. Check the following items.
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK ↓ Ⓐ

Diagnostic Procedure 11 (Cont'd)



Ⓐ

5

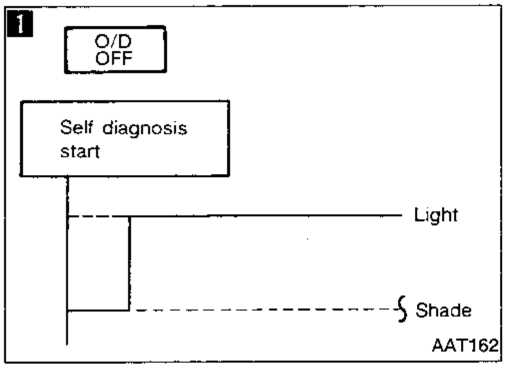
Check again.

NG

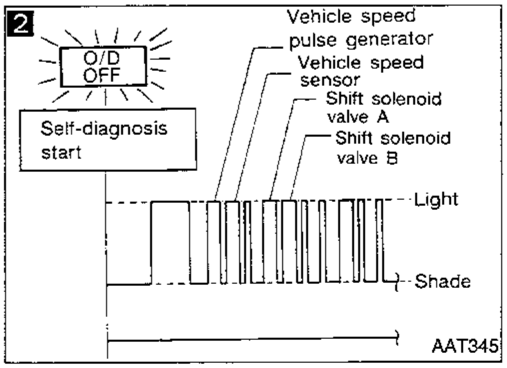
OK

INSPECTION END

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



AAT162



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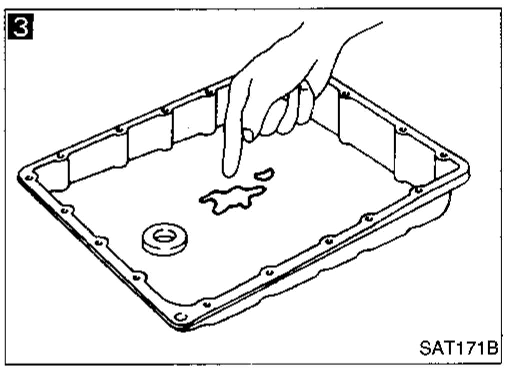
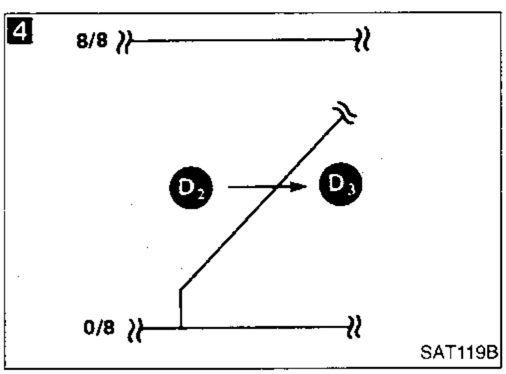


SAT171B



SAT119B

Diagnostic Procedure 12

SYMPTOM:

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

Are Diagnostic Procedures 9 and 10 OK?
- No → Perform Diagnostic Procedure 9 or 10. Refer to AT-73 or AT-74.
- Yes ↓

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?

OR

1 Does self-diagnosis show damage to inhibitor switch circuit?
- Yes → Check inhibitor switch circuit. — Refer to AT-62.
- No ↓

2 Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").
- NG → Repair or replace throttle position sensor.
- OK ↓

3
1. Remove oil pan.
2. Check A/T fluid condition.

- NG →
  1. Remove control valve assembly. — Refer to AT-104.
  2. Check the following items.
     - Shift valve B
     - Shift solenoid valve B
     - Pilot valve
     - Pilot filter
  3. Disassemble A/T.
  4. Check the following items.
     - Servo piston assembly
     - High clutch assembly
     - Oil pump assembly

  OK → (to step 4)
- OK ↓

1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
   - Shift valve B
   - Shift solenoid valve B
   - Pilot valve
   - Pilot filter

- OK ↓

4 Check again.
- NG →
  1. Perform powertrain input and control signal inspection for A/T control unit.
  2. If NG, recheck A/T control unit pin terminals for damage or connection of control unit harness connector.
- OK ↓

INSPECTION END

GI
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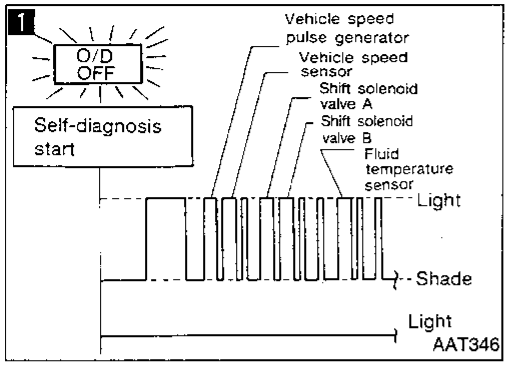
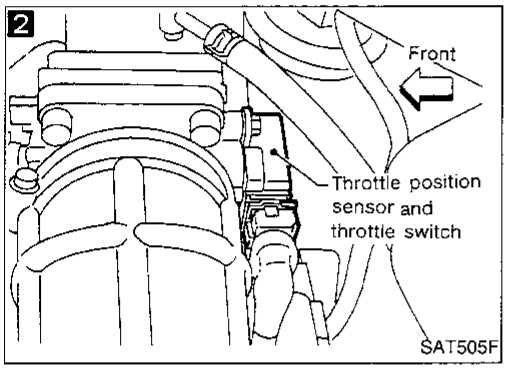
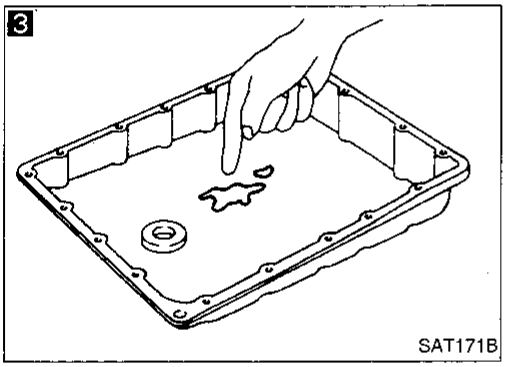
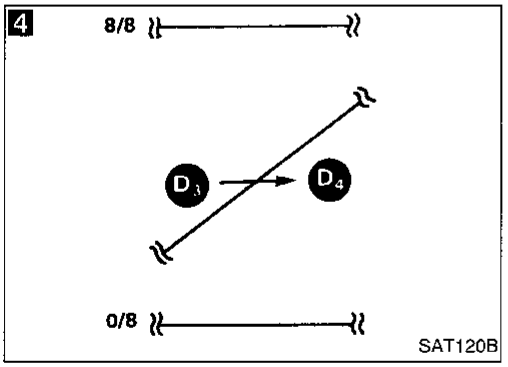








Diagnostic Procedure 13

SYMPTOM:

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

- **A/T MUST be warm before D_3 to D_4 shift will occur.**

Are Diagnostic Procedures 9 and 10 OK?

No → Perform Diagnostic Procedure 9 or 10. Refer to AT-73 or AT-74.

Yes ↓

1

Does self-diagnosis show damage to inhibitor switch, transaxle gear selection switch-OD, shift solenoid valve A, B, vehicle speed pulse generator, vehicle speed sensor or fluid temperature sensor circuit after cruise test?

Yes → Check damaged circuit. — See to Self-diagnosis". Refer to AT-46.

No ↓

2

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

NG → Repair or replace throttle position sensor.

OK ↓

3

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

NG → 1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter
3. Disassemble A/T.
4. Check the following items.
- Servo piston assembly
- Brake band
- Torque converter
- Oil pump assembly

OK ↓

1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓

OK ←

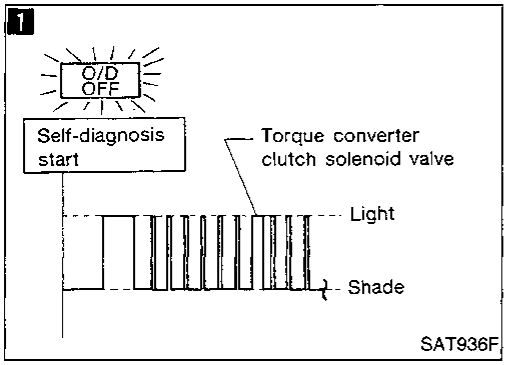
4

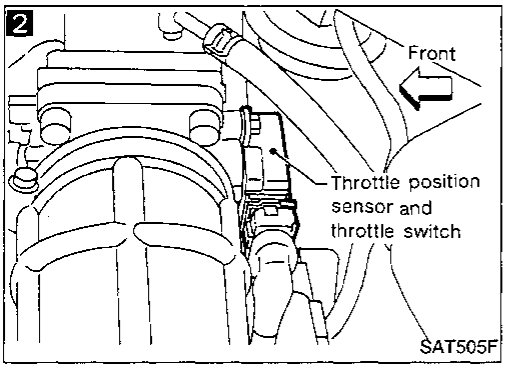
Check again.

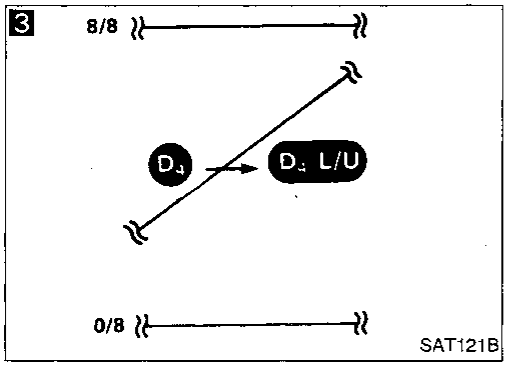
NG → 1. Perform powertrain input and control signal inspection for A/T control unit.
2. If NG, recheck A/T control unit pin terminals for damage or connection of control unit harness connector.

OK ↓

INSPECTION END







Diagnostic Procedure 14

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

1

Does self-diagnosis show damage to torque converter clutch solenoid valve circuit after cruise test?

Yes → Check torque converter clutch solenoid valve circuit. — See "Self-diagnosis". Refer to AT-57.

No ↓

2

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

NG → Repair or replace throttle position sensor.

OK ↓

1. Remove control valve. — See "ON-VEHICLE SERVICE". Refer to AT-104.
2. Check the following items.
- Lock-up control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

NG → Repair or replace damaged parts.

OK ↓

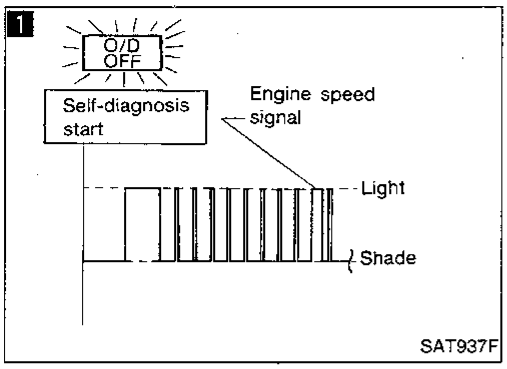
3

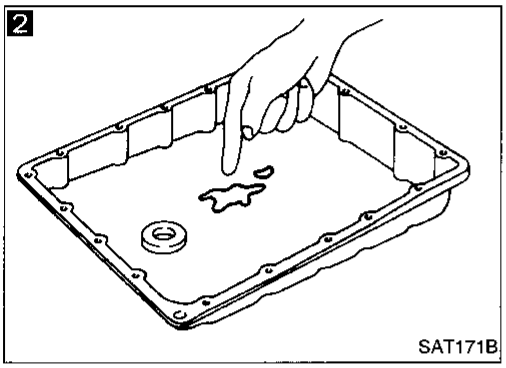
Check again.

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

OK ↓

INSPECTION END





Diagnostic Procedure 15

SYMPTOM:

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

1

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

Yes → Check engine speed signal circuit. — Refer to AT-60.

No

2

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

NG → 1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

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

OK

1. Remove control valve assembly. — Refer to AT-104.
2. Check the following item.
- Torque converter clutch control valve

OK

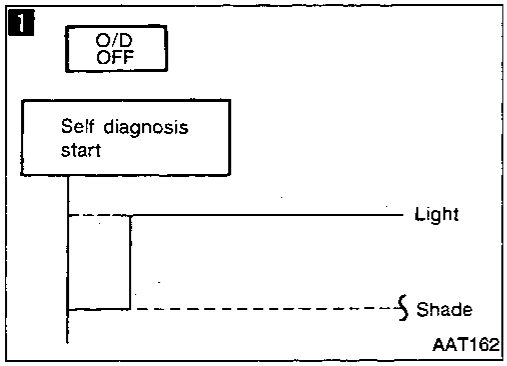
OK

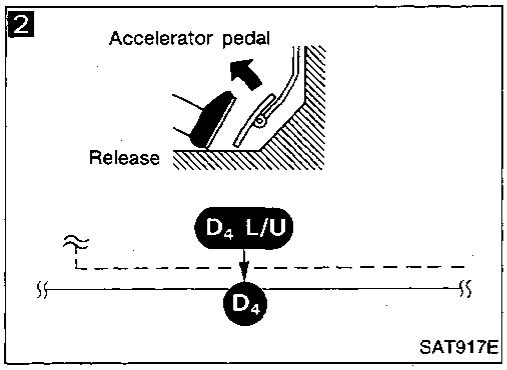
Check again.

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

OK

INSPECTION END





Diagnostic Procedure 16

SYMPTOM:

Lock-up is not released when accelerator pedal is released.

Do "ECU INPUT SIGNALS" show damage to closed throttle position switch circuit?

Yes → Check closed throttle position switch circuit. — See "Self-diagnosis". Refer to AT-62.

OR

1

Does self-diagnosis show damage to closed throttle position switch circuit?

No

2

Check again.

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

OK

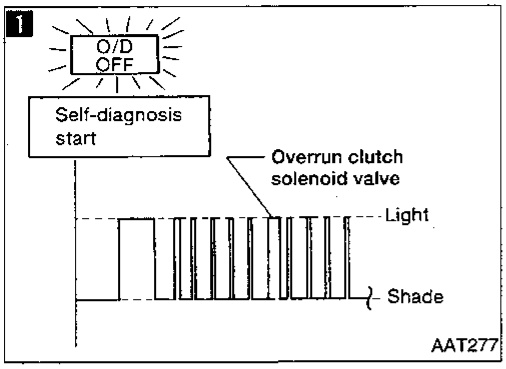
INSPECTION END

Diagnostic Procedure 17

SYMPTOM:

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 changing transaxle gear selection switch-OD to "OFF" position with accelerator pedal released.
Vehicle does not decelerate by engine brake when changing selector lever from "D" to "2" position with accelerator pedal released.

1



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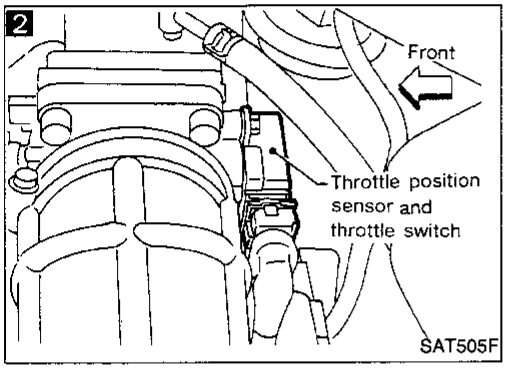

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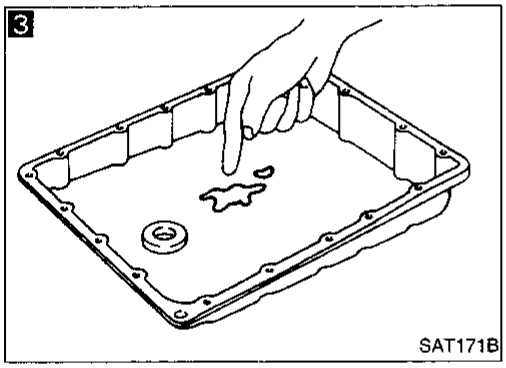

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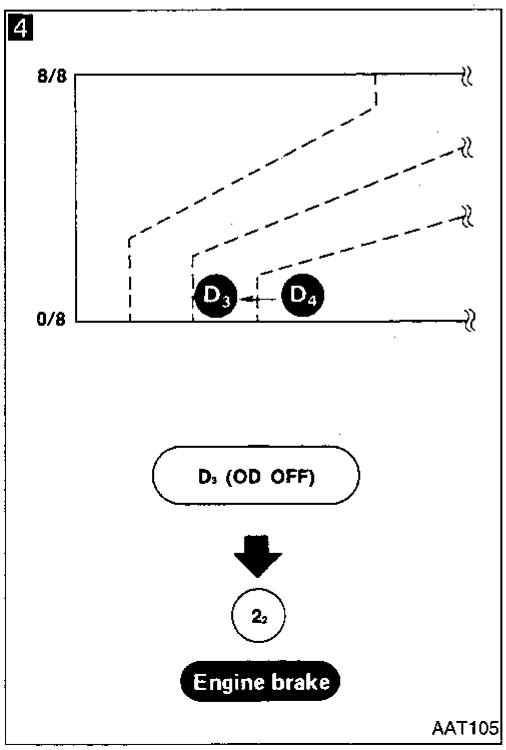


1

Does self-diagnosis show damage to overrun clutch solenoid valve circuit after cruise test?

Yes → Check overrun clutch solenoid valve circuit. — Refer to AT-56.

No

2

Check throttle position sensor. — Refer to EF & EC section ("Diagnostic Procedure for Trouble Code 43", "TROUBLE DIAGNOSES").

NG → Repair or replace throttle position sensor.

OK

3

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

NG →
1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve
3. Disassemble A/T.
4. Check the following items.
- Overrun clutch assembly
- Oil pump assembly

OK

1. Remove control valve assembly. — Refer to AT-104.
2. Check the following items.
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

OK

OK ←

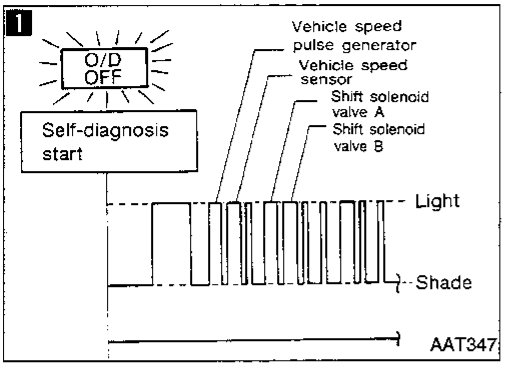
4

Check again.

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

OK

INSPECTION END



Diagnostic Procedure 18

SYMPTOM:

Vehicle does not start from D_1 on Cruise test — Part 2.

1

Does self-diagnosis show damage to vehicle speed pulse generator, speed sensor, shift solenoid valve A or B after cruise test?

Yes → Check damaged circuit. — Perform "Self-diagnosis". Refer to AT-46.

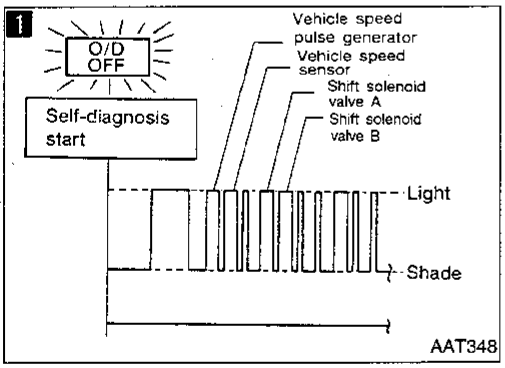
No ↓

Check again.

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

OK ↓

Perform Diagnostic Procedure 10. Refer to AT-74.



Diagnostic Procedure 19

SYMPTOM:

A/T does not shift from D_4 to D_3 when changing transaxle gear selection switch-OD to "OFF" position.

Do "ECU INPUT SIGNALS" show damage to transaxle gear selection switch-OD circuit?

Yes → Check transaxle gear selection switch-OD circuit. — Perform "Self-diagnosis". Refer to AT-62.

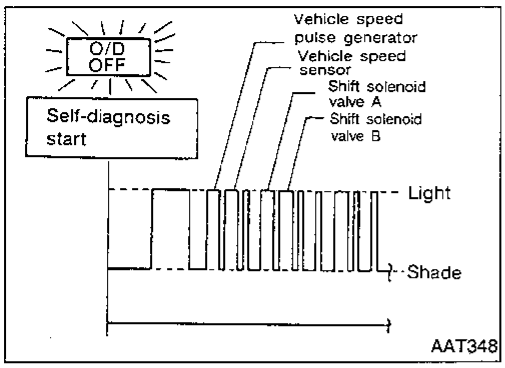
OR

1

Does self-diagnosis show damage to transaxle gear selection switch-OD circuit?

No ↓

Go to Diagnostic Procedure 12. Refer to AT-77.



Diagnostic Procedure 20

SYMPTOM:

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

Do "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Perform "Self-diagnosis". Refer to AT-62.

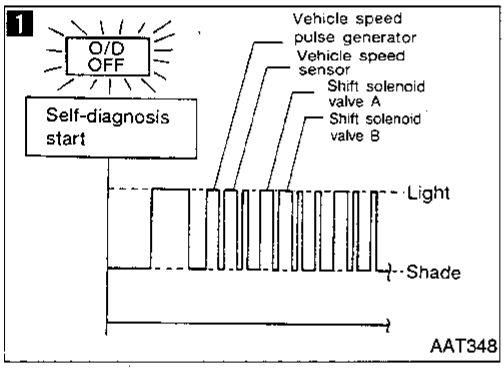
OR

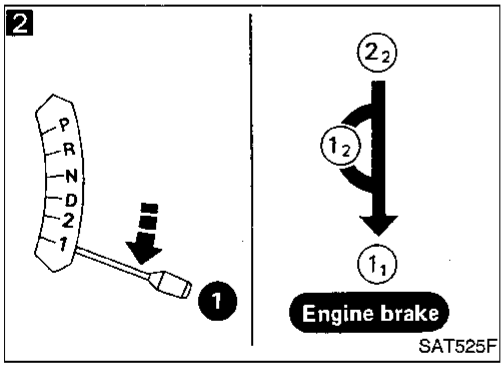
1

Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

Perform Diagnostic Procedure 11. Refer to AT-75.





Diagnostic Procedure 21

SYMPTOM:

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

Do "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Perform "Self-diagnosis". Refer to AT-62.

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No ↓

2

Check again. — NG →

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

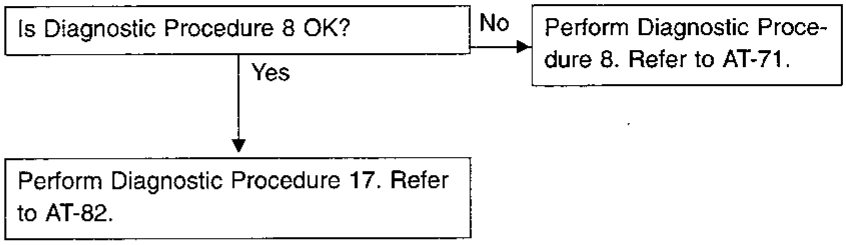
OK ↓

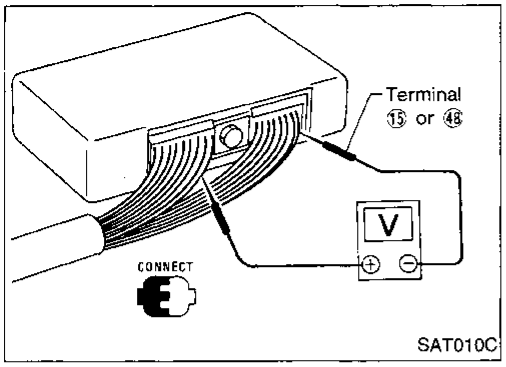
INSPECTION END

Diagnostic Procedure 22

SYMPTOM:

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

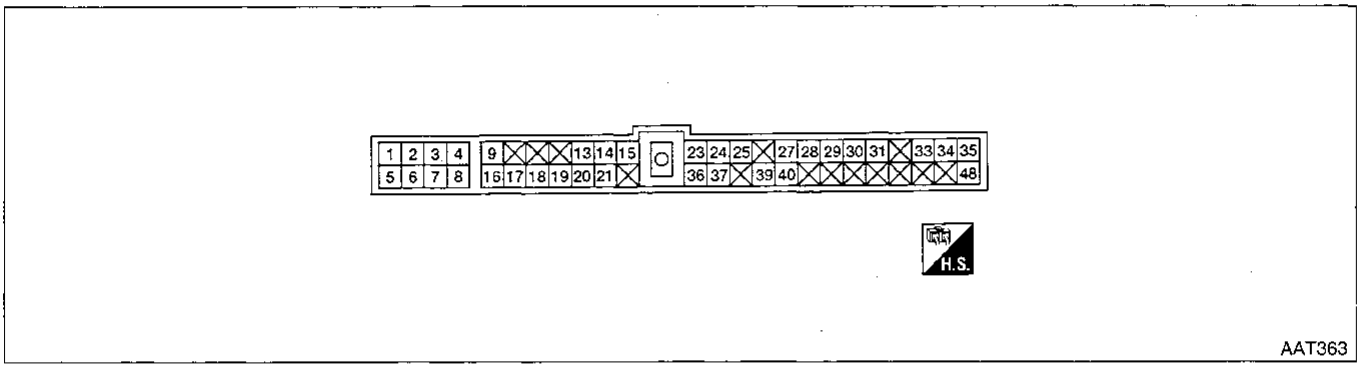




Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

- Measure voltage between each terminal and terminal ⑮ or ㊽ by following "A/T CONTROL UNIT INSPECTION TABLE".
- The A/T control unit is located behind the glove box, above the ECM (ECCS control module).
- Pin connector terminal layout.



A/T CONTROL UNIT INSPECTION TABLE

(Data are reference values.)

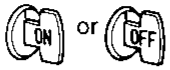
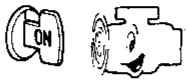
Terminal No.	Item	Condition		Judgement standard
1	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
		ON	When depressing accelerator pedal fully after warming up engine.	0.5V or less
3	OD OFF indicator lamp		When setting transaxle gear selection switch-OD in "OFF" position.	1V or less
			When setting transaxle gear selection switch-OD in "ON" position.	Battery positive voltage
4	Power source		When turning ignition switch to "ON".	Battery positive voltage
			When turning ignition switch to "OFF".	1V or less

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
5	Torque converter clutch solenoid valve		When A/T performs lock-up.	10 - 16V
			When A/T does not perform lock-up.	1V or less
6	Shift solenoid valve A		When shift solenoid valve A operates. (When driving in "D_1" or "D_4".)	Battery positive voltage
			When shift solenoid valve A does not operate. (When driving in "D_2" or "D_3".)	1V or less
7	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D_1" or "D_2".)	Battery positive voltage
			When shift solenoid valve B does not operate. (When driving in "D_3" or "D_4".)	1V or less
8	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery positive voltage
			When overrun clutch solenoid valve does not operate.	1V or less
9	Power source		Same as No. 4	
10	—		—	—
11	—		—	—
12	—		—	—
13*	—		—	—
14	Closed throttle position switch		When releasing accelerator pedal after warming up engine.	8 - 15V
			When depressing accelerator pedal after warming up engine.	1V or less
15	Ground		—	—
16	Inhibitor switch-1 position		When setting selector lever to "1" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
17	Inhibitor switch-2 position		When setting selector lever to "2" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
18	Inhibitor switch-D position		When setting selector lever to "D" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
19	Inhibitor switch		When setting selector lever to "N" and "P" positions.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
20	Inhibitor switch-Reverse		When setting selector lever to "R" position.	Battery positive voltage
			When setting selector lever to other positions.	1V or less
21	Wide open throttle position switch		When depressing accelerator pedal more than half-way.	8 - 15V
			When releasing accelerator pedal.	1V or less
22	—		—	—

*: This terminal is connected to the ECM (ECCS control module).

Electrical Components Inspection (Cont'd)

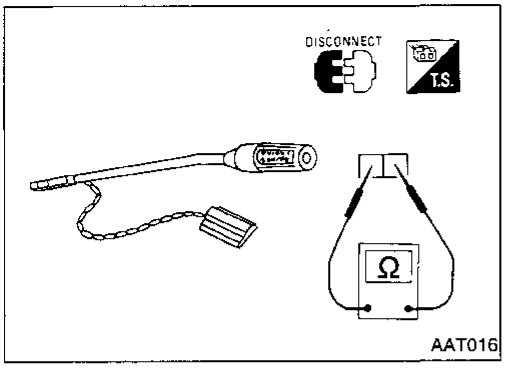
Terminal No.	Item	Condition		Judgement standard
23	Power source (Back-up)		When turning ignition switch to "OFF".	Battery positive voltage
			When turning ignition switch to "ON".	Battery positive voltage
24	Engine speed signal		When engine runs at idle speed.	1.13 - 1.15V
			When engine runs at 4,000 rpm.	Approximately 5.85V
25	Vehicle speed pulse generator (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
26	—		—	—
27	Vehicle 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
28**	—		—	—
29**	—		—	—
30**	—		—	—
31	Throttle position sensor (Power source)		—	4.5 - 5.5V
32	—		—	—
33	Fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.56V
			When ATF temperature is 80°C (176°F).	0.45V
34	Throttle position 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: 2.9 - 3.9V
35	Throttle position sensor (Ground)		—	—
36	Power mode switch		When setting power mode switch "ON".	Battery positive voltage
			When setting power mode switch "OFF".	1V or less
37	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery positive voltage
			When ASCD cruise is not being performed. ("CRUISE" light does not come on.)	1V or less

**: These terminals are connected to the data link connector for CONSULT.

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
38	—		—	—
39	Transaxle gear selection switch-OD	 	When setting transaxle gear selection switch-OD in "ON" position.	4.5 - 5.5V
			When holding transaxle gear selection switch-OD in.	1V or less
40	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	4.5 - 5.5V
			When "ACCEL" set switch on ASCD cruise is applied.	1V or less
41	—		—	—
42	—		—	—
43	—		—	—
44	—		—	—
45	—		—	—
46	—		—	—
47	—		—	—
48	Ground		—	—

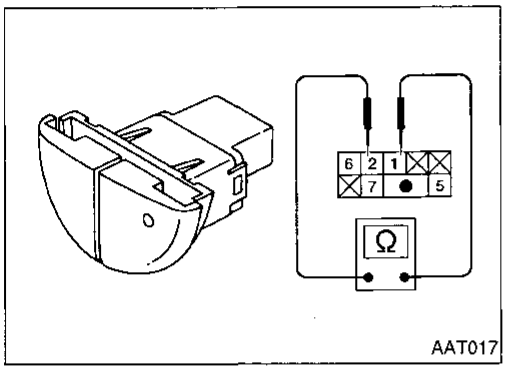
Electrical Components Inspection (Cont'd)



TRANSAXLE GEAR SELECTION SWITCH-OD

- Check continuity between two terminals.

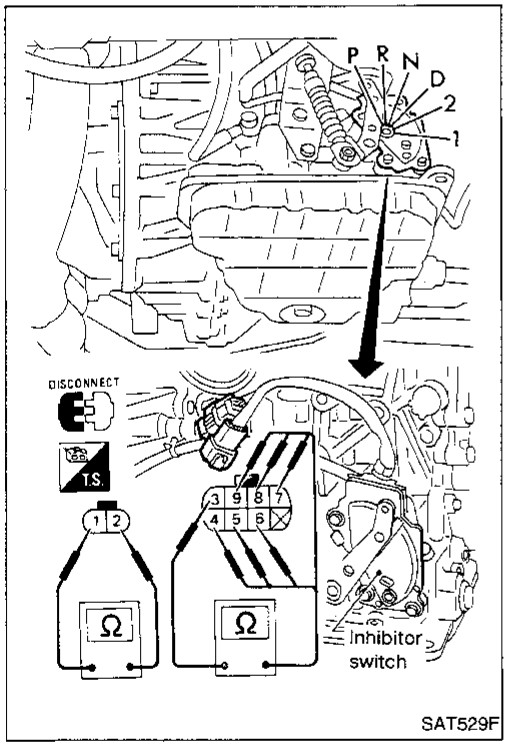
Transaxle gear selection switch-OD position	Continuity
ON	No
OFF	Yes



POWER MODE SWITCH

- Check continuity between power mode switch terminal.

Power mode switch position	Continuity
ON	① - ②
OFF	No

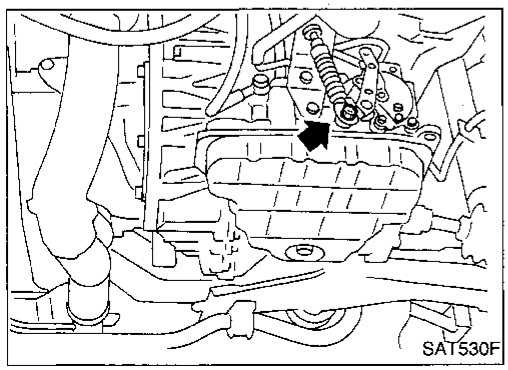


INHIBITOR SWITCH

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

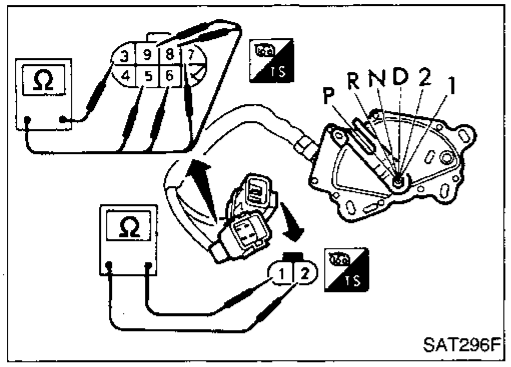
Lever position	Terminal No.								
	①	②	③	④	⑤	⑥	⑦	⑧	⑨
P	○	○	○	○					
R			○		○				
N	○	○	○			○			
D			○				○		
2			○					○	
1			○						○

- Terminals ① and ② are utilized in the starter circuit.



2. If NG, check again with control cable disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If OK on step 2, adjust control cable. — See "ON-VEHICLE SERVICE". Refer to AT-106.

Electrical Components Inspection (Cont'd)



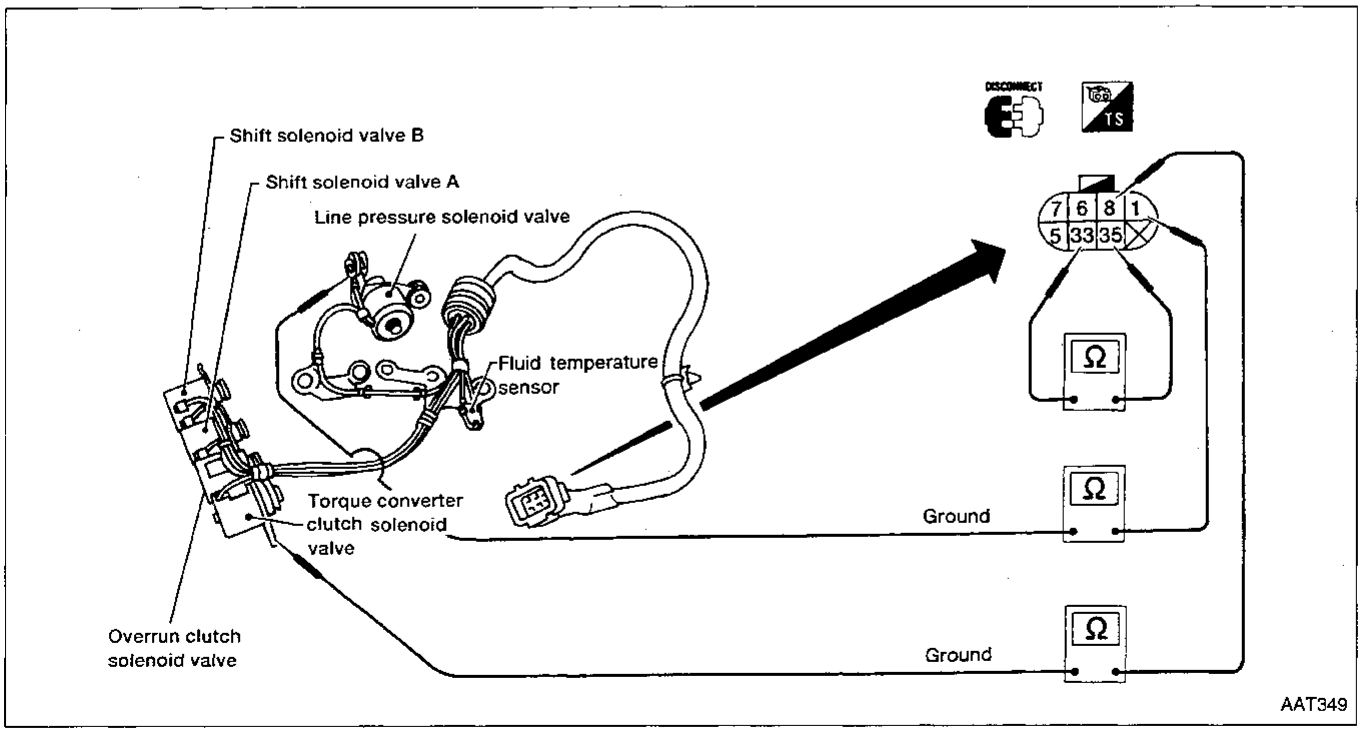
4. If NG on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminal. — Refer to step 1.
5. If OK on step 4, adjust inhibitor switch. — See "ON-VEHICLE SERVICE". Refer to AT-105.
6. If NG on step 4, replace inhibitor switch.

SOLENOID VALVES AND FLUID TEMPERATURE SENSOR

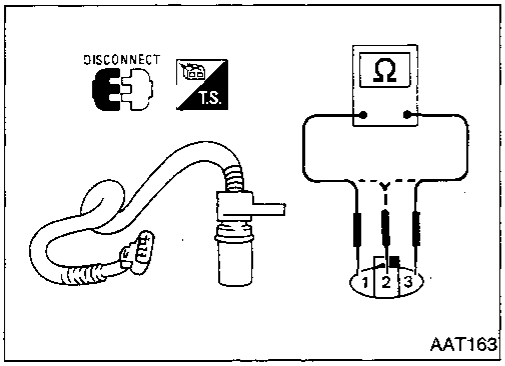
- For removal and installation, see "ON-VEHICLE SERVICE". Refer to AT-104.
- Check resistance between two terminals.

Solenoids

Solenoid	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	⑥	Ground (Bracket)	25Ω
Shift solenoid valve B	⑦		
Overrun clutch solenoid valve	⑧		
Line pressure solenoid valve	①		3.2Ω
Torque converter clutch solenoid valve	⑤		13.4Ω



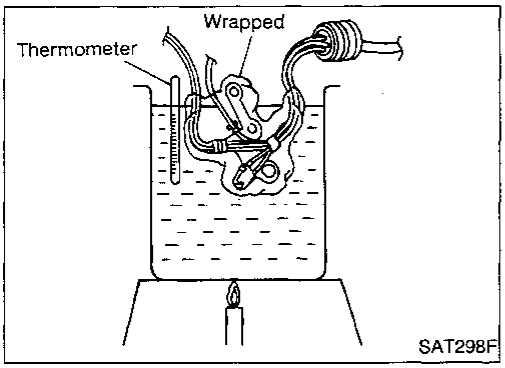
Electrical Components Inspection (Cont'd)



VEHICLE SPEED PULSE GENERATOR

- For removal and installation, see "ON-VEHICLE SERVICE". Refer to AT-104.
- Check resistance between terminals ①, ② and ③.

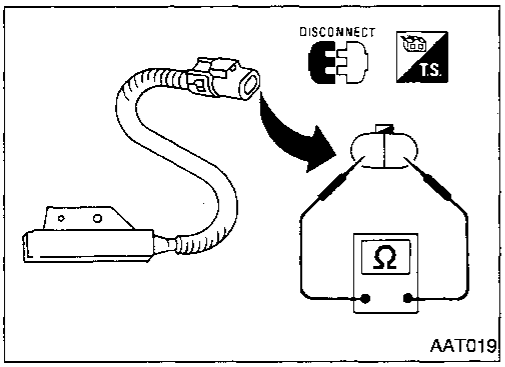
Terminal No.		Resistance
①	②	500 - 650Ω
②	③	No continuity
①	③	No continuity



FLUID TEMPERATURE SENSOR

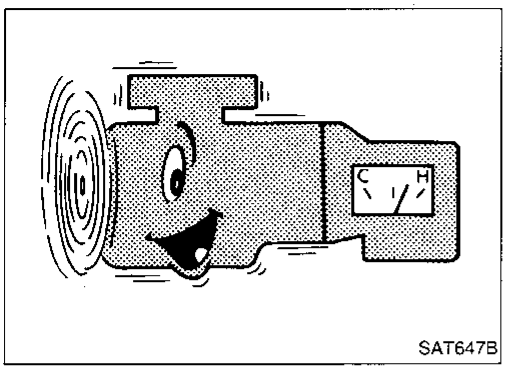
Check resistance between terminals ㉝ and ㉟ while changing temperature as shown at left.

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



DROPPING RESISTOR

- Check resistance between two terminals.
  Resistance: 11.2 - 12.8Ω



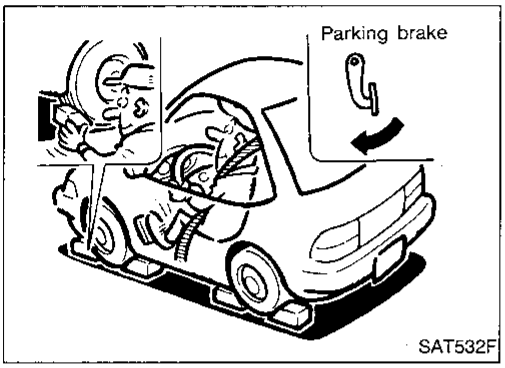
SAT647B

Final Check

STALL TESTING

Stall test procedure

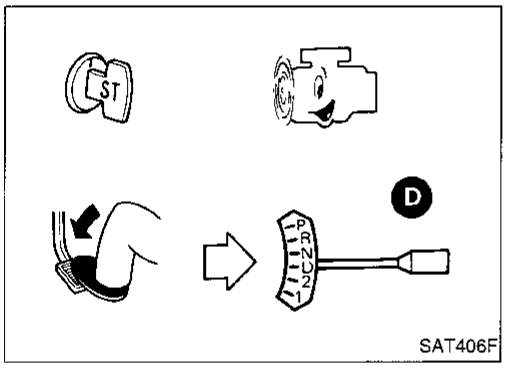
1. Check A/T and engine fluid levels. If necessary, add.
2. Warm up engine until engine oil and ATF reach operating temperature after vehicle has been driven approx. 10 minutes.
   ATF operating temperature:
   66 - 77°C (151 - 171°F)



SAT532F

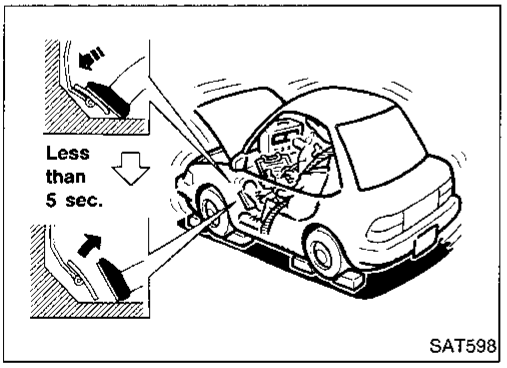
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.

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



SAT406F

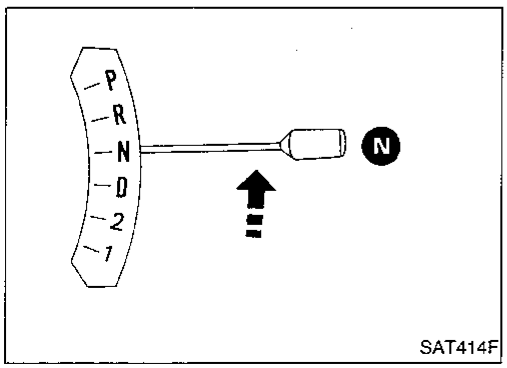
5. Start engine, apply foot brake, and place selector lever in "D" position.



SAT598

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 speed:
  1,800 - 2,100 rpm



SAT414F

8. Shift selector lever to "N" position.
9. Cool off ATF.

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

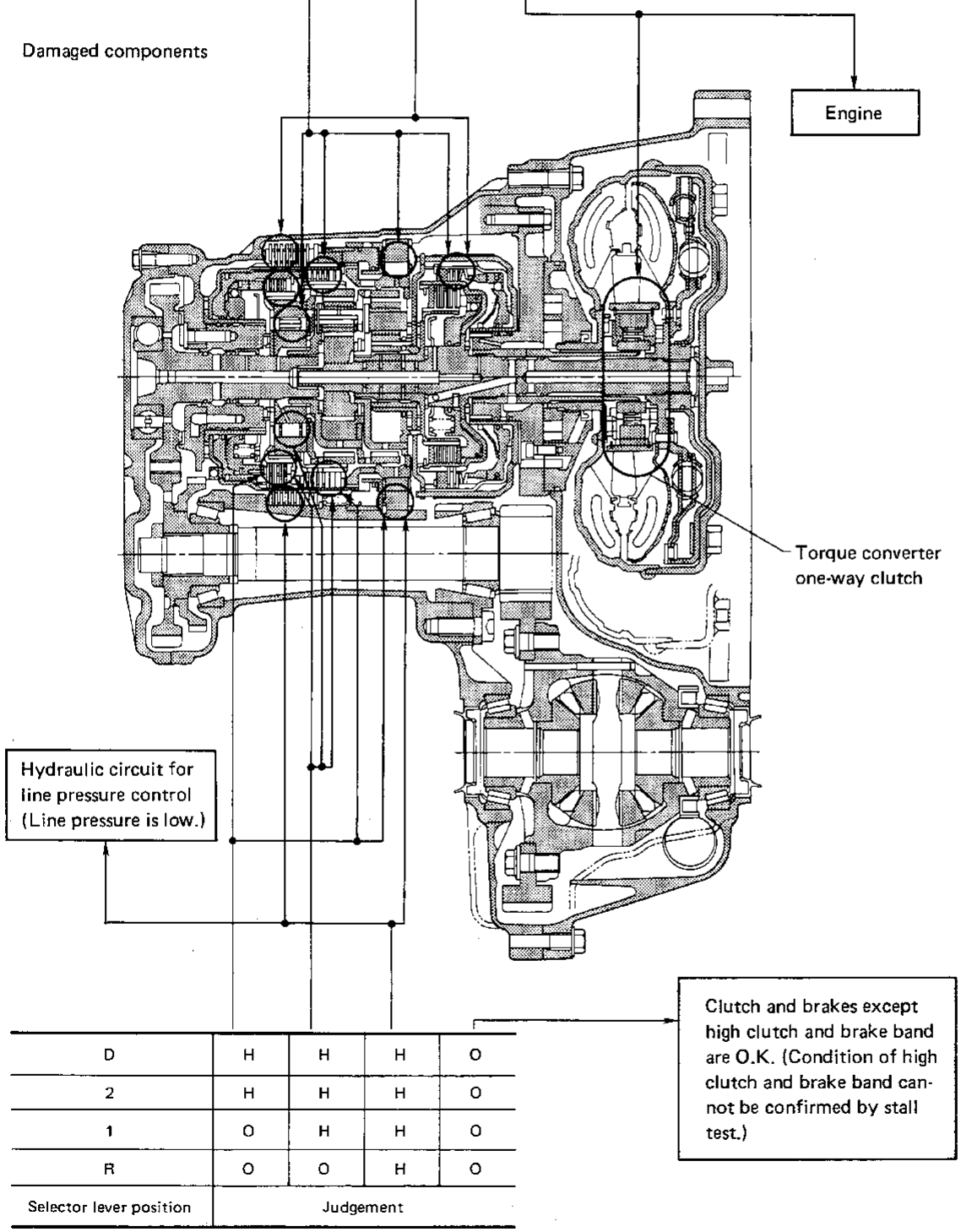
10. Perform stall tests in the same manner as in steps 5 through 9 with selector lever in "2", "1" and "R" positions, respectively.

Final Check (Cont'd)

Judgement of stall test

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

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

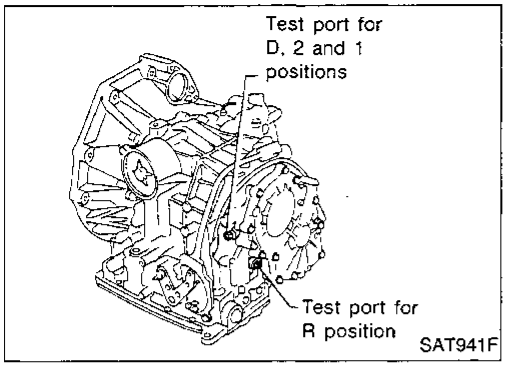


D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgement			

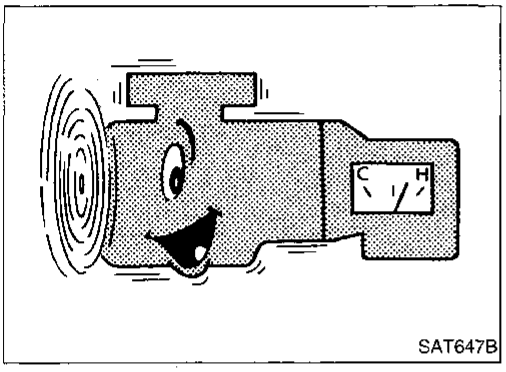
SAT535F

Final Check (Cont'd)

PRESSURE TESTING



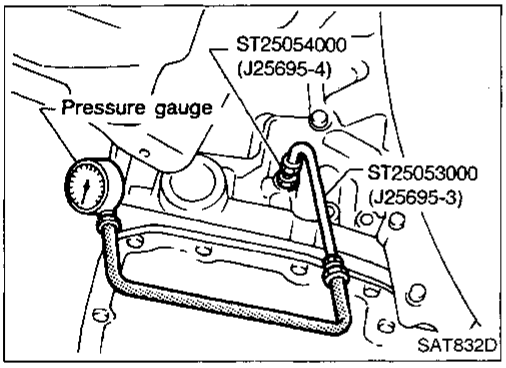
- Location of line pressure test port
- **Always replace pressure plugs as they are self-sealing bolts.**



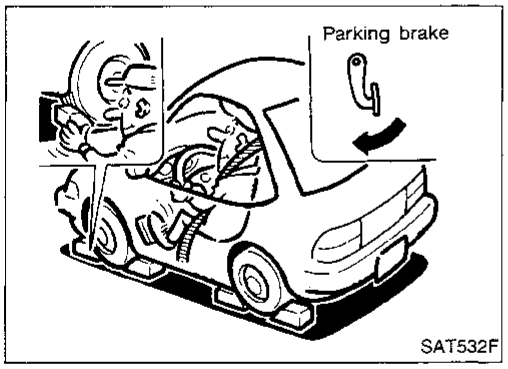
Line pressure test procedure

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

   ATF operating temperature:
   66 - 77°C (151 - 171°F)

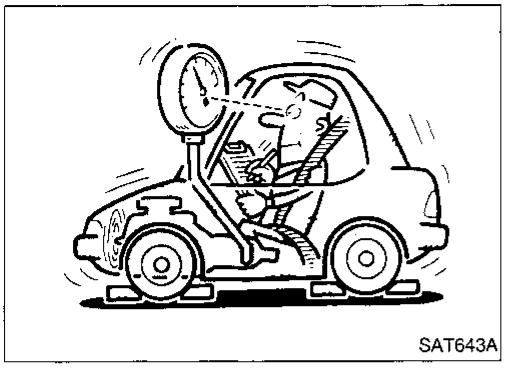


3. Install pressure gauge to corresponding line pressure port.



4. Set parking brake and block wheels.
- **Continue to depress brake pedal fully while line pressure test is being performed at stall speed.**

Final Check (Cont'd)


SAT643A

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:

Engine speed rpm	Line pressure (Approx.) kPa (kg/cm^2, psi)	
	"D", "2" and "1" positions	"R" position
Idle	500 (5.1, 73)	775 (7.9, 112)
Stall	1,089 (11.1, 158)	1,687 (17.2, 245)

JUDGEMENT OF LINE PRESSURE TEST

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

Symptom Chart

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

Reference page (AT-)		ON vehicle																		OFF vehicle										
	Reference page (AT-)	22, 106		90		92		95		91, 134		91		91		92, 104		104		112, 130		150, 154		159, 168		159, 112		165, 177		112
		Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Vehicle speed pulse generator and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	Fluid temperature sensor	Accumulator N-D	Accumulator servo release	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
68	Engine does not start in "N", "P" positions.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
68	Engine starts in position other than "N" and "P".	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Transaxle noise in "P" and "N" positions.	1	.	.	3	4	5	.	2	.	.	.	.	.	.	.	.	.	.	⑦	⑥	.	.	.	.	.	.	.	.	.
68	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	②
69	Vehicle runs in "N" position.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	③	.	②	.	④	.	.	.	.
71	Vehicle will not run in "R" position (but runs in "D", "2" and "1" positions). Clutch slips. Very poor acceleration.	.	1	.	.	.	.	.	2	4	.	.	3	.	.	.	.	.	.	.	.	⑤	⑥	⑦	.	⑧	.	⑨	.	.
—	Vehicle braked when shifting into "R" position.	1	2	.	.	.	.	.	3	5	.	.	4	.	.	.	.	.	.	.	.	.	⑥	⑧	.	⑨	.	.	⑦	.
—	Sharp shock in shifting from "N" to "D" position.	.	.	.	2	.	5	1	3	7	.	.	6	.	.	4	8	.	.	.	.	.	.	⑨	.	.	.	.	.	.
—	Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" position).	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	②	.	.	.
73	Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). 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	.	.	⑫	⑪	⑨	.	⑧	.	.	.	⑩	.	.
—	Excessive creep.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
71, 73	No creep at all.	1	.	.	.	.	.	.	2	3	.	.	.	.	.	.	.	.	.	⑥	⑤	.	.	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	.
75, 77, 78	Too high 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	3	.	.	.	.	.	.	.	.	.	.	.	.	④	.	.	.	.	.	⑤	.

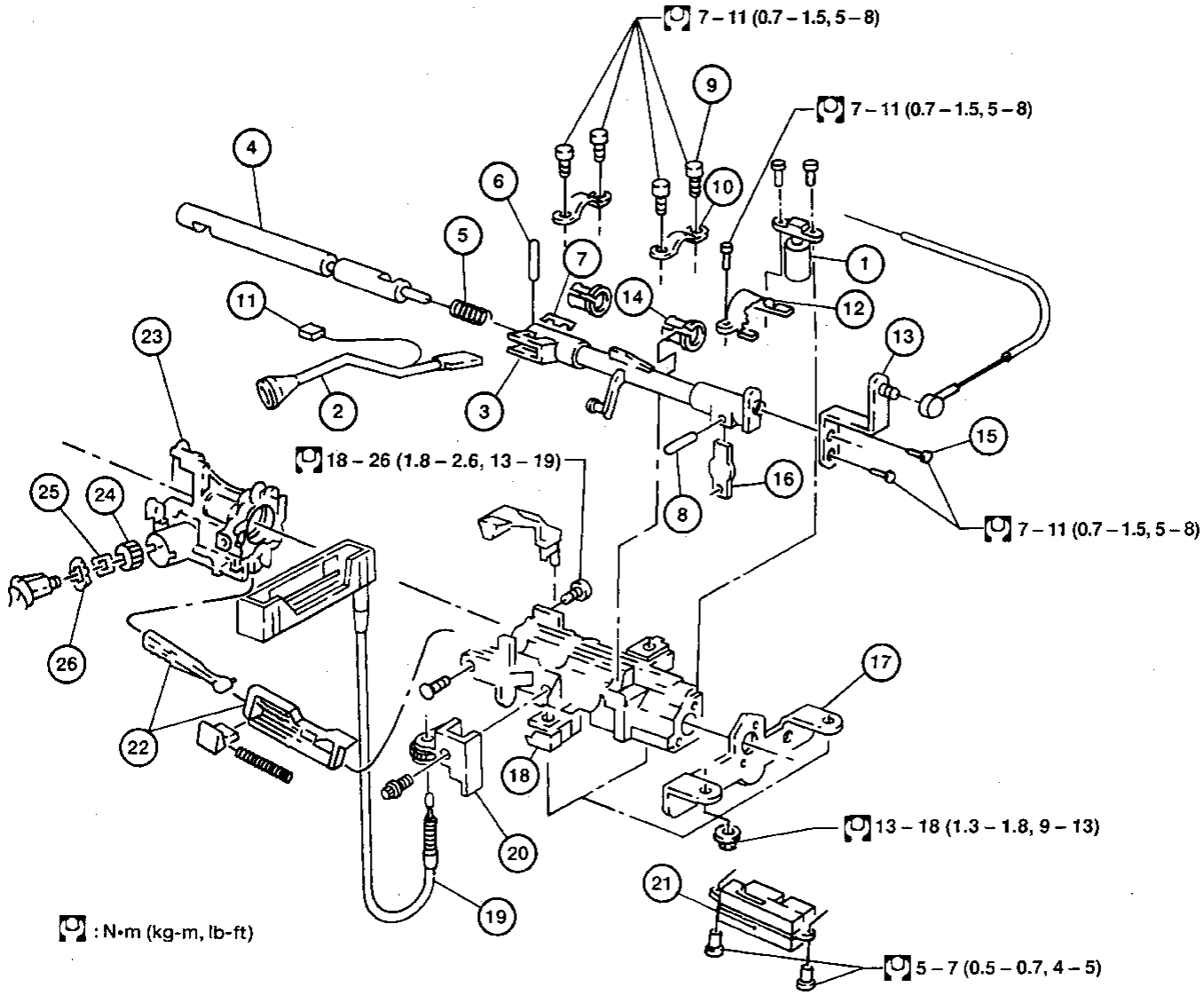
Symptom Chart (Cont'd)

		ON vehicle									OFF vehicle					
	Reference page (AT-)	22, 106	90	92	95	91, 134	91	91	92, 104	104	112, 130	150, 154	159, 168	159, 112	165, 177	112
Reference page (AT-)	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.	Fluid level Control linkage	Inhibitor switch Throttle position sensor (Adjustment)	Vehicle speed pulse generator and vehicle speed sensor Engine speed signal	Engine idling speed Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Overrun clutch solenoid valve	Fluid temperature sensor Accumulator N-D	Accumulator servo release 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	3								⑤	④	
—	Almost no shock or clutches slipping in change from "D_1" to "D_3".	1	2		3	5				4					⑥	
—	Almost no shock or slipping in change from "D_2" to "D_3".	1	2		3	4						⑤			⑥	
—	Almost no shock or slipping in change from "D_3" to "D_4".	1	2		3	4						⑤			⑥	
—	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_3".	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			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 position.	1 2			3		4				⑨ ⑤	⑥			⑧ ⑦	⑩
—	Transaxle noise in "D", "2", "1" and "R" positions.	1									②					

Symptom Chart (Cont'd)

Reference page (AT-)		ON vehicle									OFF vehicle					
	Reference page (AT-)	22, 106	90	92	95	91, 134	91	91	92 104	104	112, 130	150, 154	159, 168	159, 112	165, 177	112
	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.	Fluid level Control linkage	Inhibitor switch Throttle position sensor (Adjustment)	Vehicle speed pulse generator and vehicle speed sensor Engine speed signal	Engine idling speed Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Overrun clutch solenoid valve	Fluid temperature sensor Accumulator N-D	Accumulator servo release 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
84	Failure to change from "D_3" to "2_2" when changing lever into "2" position.	7	1 2			6 5	4	3						⑨	⑧	
—	Gear change from "2_2" to "2_3" in "2" position.		1													
85	Engine brake does not operate in "1" position.	2	1 3	4		6 5		7						⑧	⑨	
—	Gear change from "1_1" to "1_2" in "1" position.	2	1													
—	Does not change from "1_2" to "1_1" in "1" position.		1	2		4 3		5						⑥	⑦	
—	Large shock changing from "1_2" to "1_1" in "1" position.					1									②	
—	Transaxle overheats.	1	3		2 4	6	5				⑭ ⑦	⑧ ⑨	⑪	⑫	⑬ ⑩	
—	ATF 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					
79	Lock-up point is extremely high or low.		1	2		4		3								
—	A/T does not shift to "D_4" when driving with transaxle gear selection switch-OD.		2 1	3	8	6 4		5	7					⑩	⑨	
—	Engine is stopped at "R", "D", "2" and "1" positions.	1				5 4	3	2								

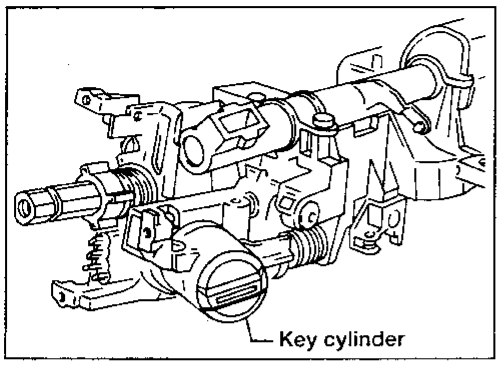
Shift Control and Shift Lock Components — Column Shift

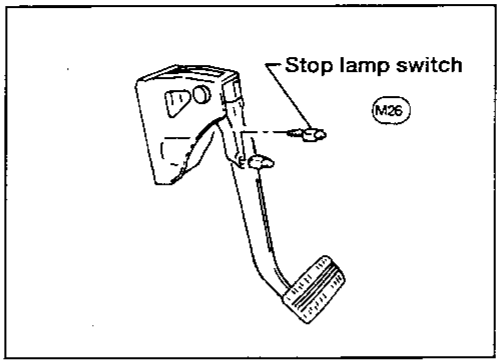


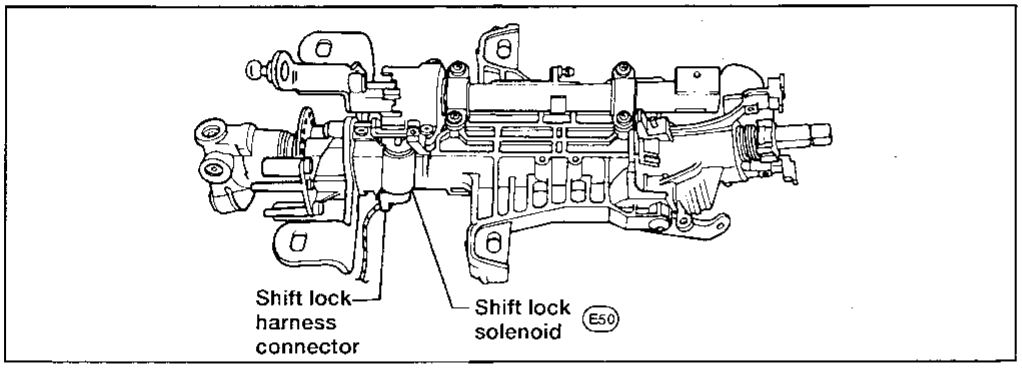
AAT358

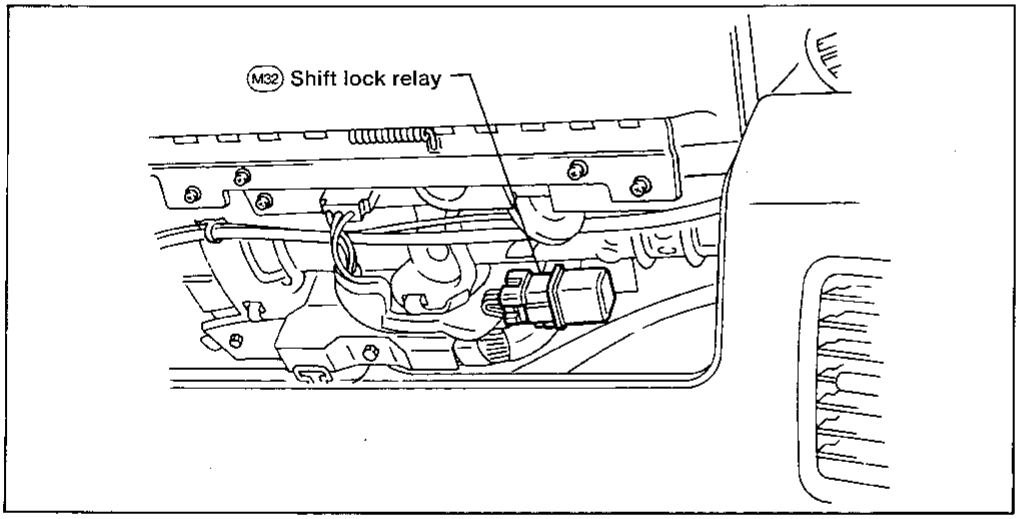
① Shift lock solenoid
② Shift control selector lever
③ Shift control shaft
④ Shift control shaft
⑤ Shift control shaft return spring
⑥ Selector lever pin
⑦ Clip
⑧ Position pin
⑨ Screws
⑩ Clamps
⑪ Transaxle gear selection switch-OD harness connector
⑫ Shift control selector bracket
⑬ Transaxle control selector lower lever
⑭ Bushing
⑮ Screws
⑯ Position plate
⑰ Lower column bracket
⑱ Actuator housing
⑲ Position indicator
⑳ Position indicator adjusting wheel bracket
㉑ Ignition switch
㉒ Column lock actuator
㉓ Lock cylinder housing
㉔ Ignition lock gear
㉕ Metal bearing
㉖ Plastic bearing retainer

Shift Lock Electrical Parts Location





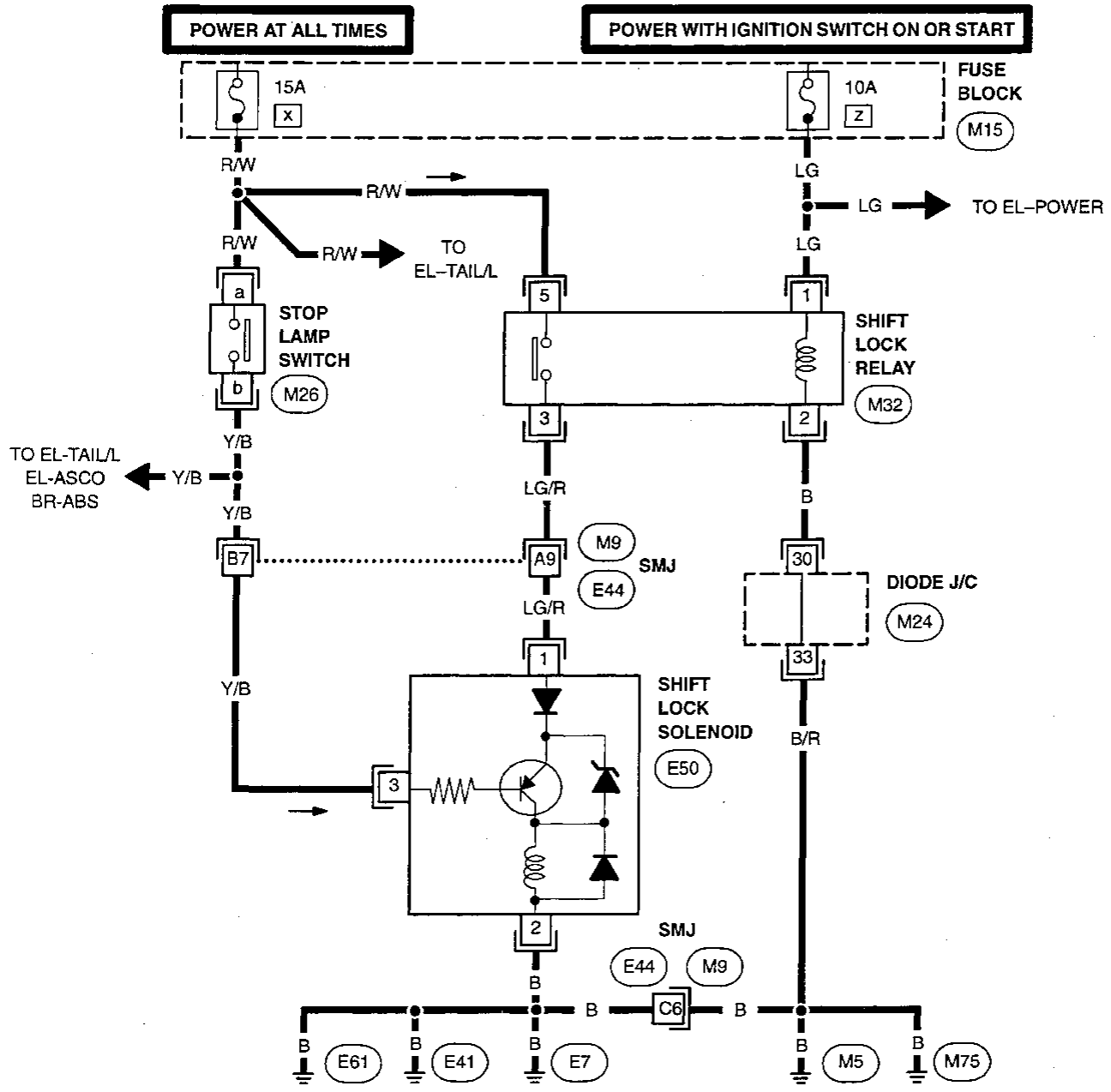




AAT364

Wiring Diagram –SHIFT–

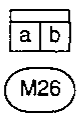
AT-SHIFT-01

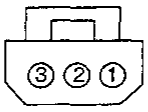


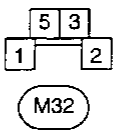
Refer to POWER SUPPLY ROUTING in EL Section. M15

Refer to Foldout Page in EL Section for details. M9 E44

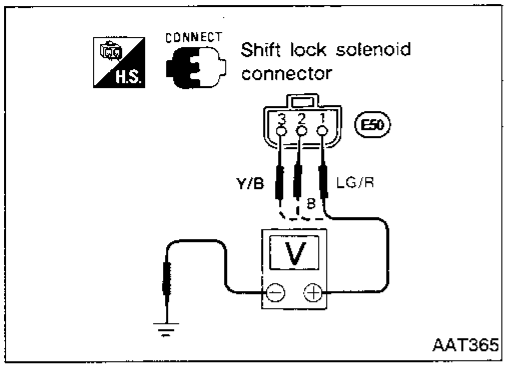
Refer to Foldout Page in EL Section for details. M24







AAT311



Trouble Diagnosis

- Check voltage between each terminal of shift lock solenoid connector and ground when ignition switch and brake pedal include the following conditions.

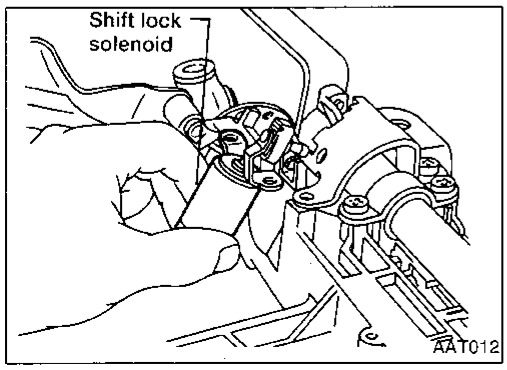
Battery positive voltage should exist as follows:

Ignition Switch	Brake Pedal	Terminal No.		
		3	2	1
ON	Depressed	Approx. 12V	0V	Approx. 12V
	Released	0V	0V	Approx. 12V
OFF (Not Locked)	Depressed	Approx. 12V	0V	0V
	Released	0V	0V	0V
Check/Repair when it does not work correctly.		Check/Repair stop lamp switch, harness, connector	Check/Repair harness, connector	Check/Repair relay, harness, connector.

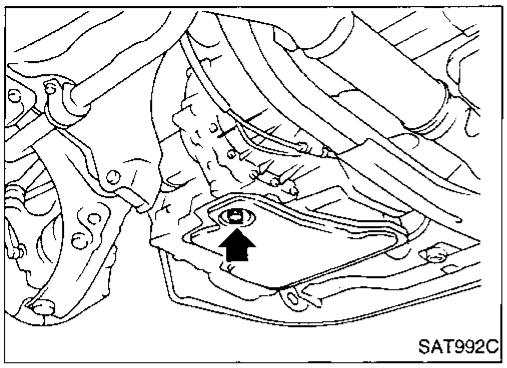
REMARKS:
When selector lever cannot be moved from "P" position — even if ignition switch is in "ON" position and brake pedal is depressed — turn ignition switch to "OFF" (not "LOCK") position and the lever can be moved.

Removal — Shift Lock Solenoid

1. Remove lower instrument cover LH
2. Remove heater duct.
3. Remove four nuts attaching steering column.
4. Disconnect ignition switch connector.
5. Disconnect combination switch connector.
6. Remove two screws attaching solenoid bracket.
7. Disconnect solenoid connector.



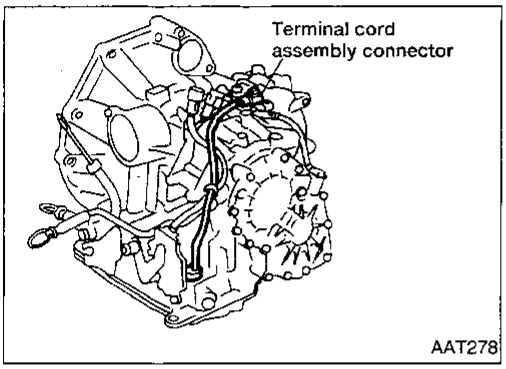
8. Remove shift lock solenoid screws and solenoid.
9. Reinstall any parts removed.


SAT992C

Control Valve Assembly and Accumulator

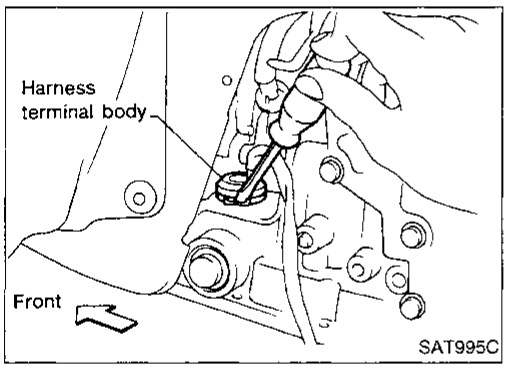
REMOVAL

1. Drain ATF from transaxle.
2. Remove oil pan and gasket.



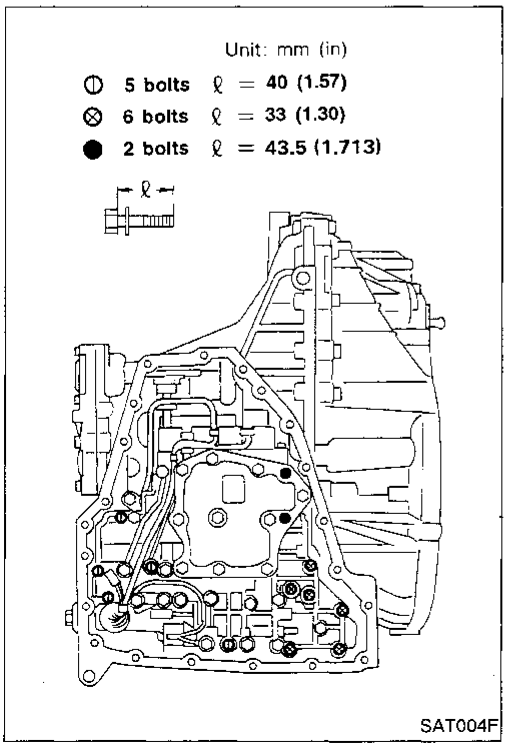
AAT278

3. Disconnect terminal cord assembly connector.



SAT995C

4. Remove stopper ring from terminal cord assembly harness terminal body.
5. Remove terminal cord assembly harness from transmission case by pushing on terminal body.



SAT004F

6. Remove control valve assembly by removing fixing bolts ①, ⓧ and ●.

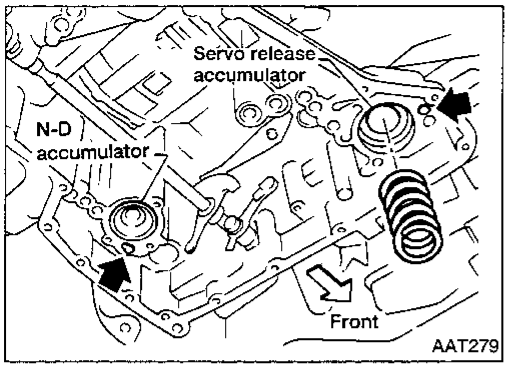
Bolt length, number and location:

Bolt symbol	①	ⓧ	●
Bolt length "ℓ" mm (in)	40.0 (1.575)	33.0 (1.299)	43.5 (1.713)
Number of bolts	5	6	2

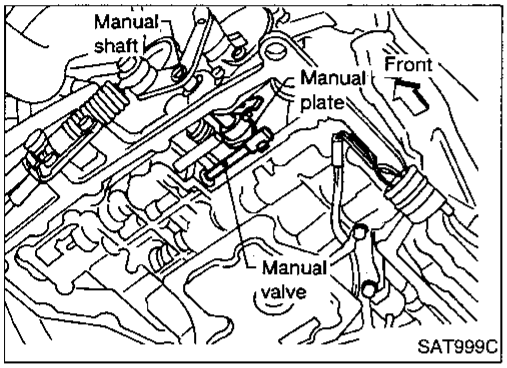
- Be careful not to drop manual valve, tube connector, tubes and servo release accumulator return spring.

7. Disassemble and inspect control valve assembly if necessary — See "REPAIR FOR COMPONENT PARTS". Refer to AT-127.

Control Valve Assembly and Accumulator (Cont'd)



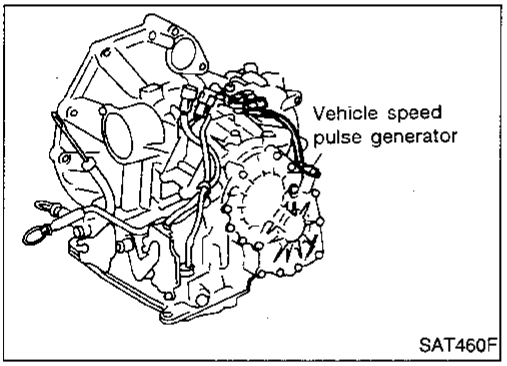
8. Remove servo release and N-D accumulators by applying compressed air if necessary.
- **Hold each piston with a rag.**



INSTALLATION

- **Set manual shaft in Neutral, then align manual plate with groove in manual valve.**
- **After installing control valve on to transmission case, make sure that selector lever can be moved to all positions.**

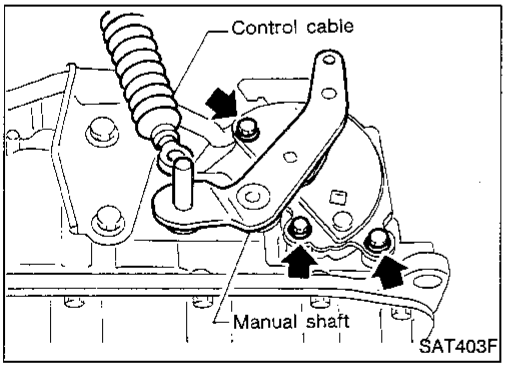
Vehicle Speed Pulse Generator Replacement



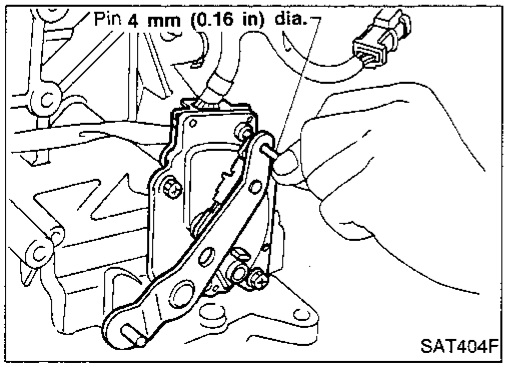
1. Remove under cover.
2. Remove vehicle speed pulse generator from A/T.
3. Reinstall any part removed.

Always use new sealing parts.

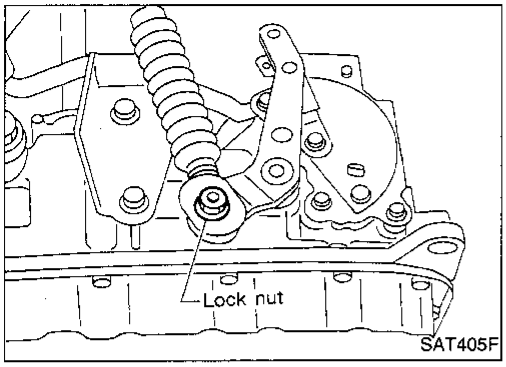
Inhibitor Switch Adjustment



1. Remove control cable from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen inhibitor switch fixing bolts.



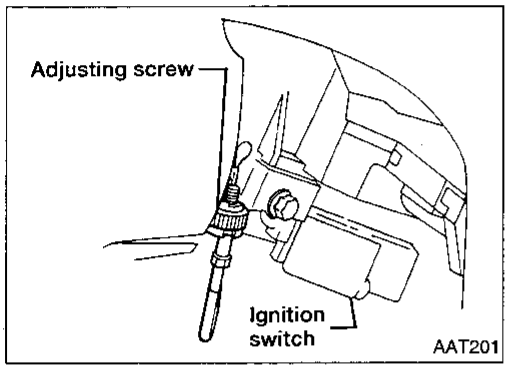
4. Insert pin into adjustment holes in both inhibitor switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — See "Electrical Components Inspection". Refer to AT-90.



Control Cable Adjustment

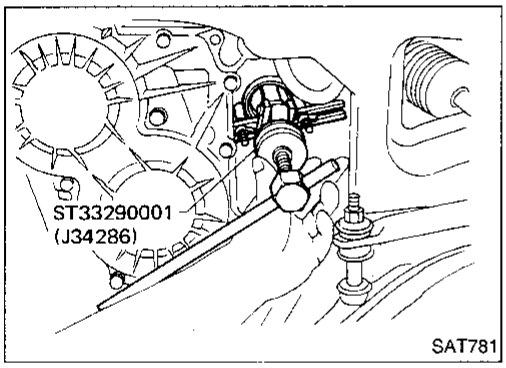
Move selector lever from "P" position to "1" position. You should be able to feel the detents in each position.
If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.

1. Place selector lever in "P" position.
2. Loosen lock nuts.
3. Tighten lock nut, pulling selector lever toward "R" position side.
4. Move selector lever from "P" position to "1" position again. Make sure selector lever moves smoothly.



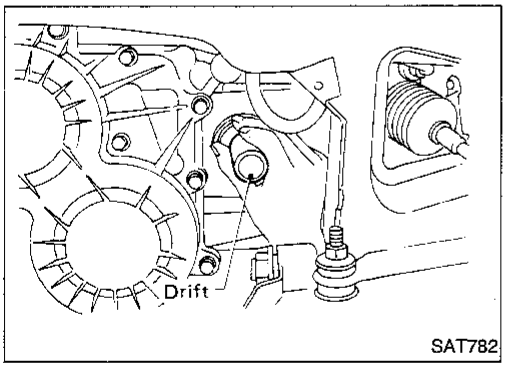
Position Indicator Adjustment

1. Remove column cover.
2. Turn position indicator adjusting wheel beside actuator housing.



Differential Side Oil Seal Replacement

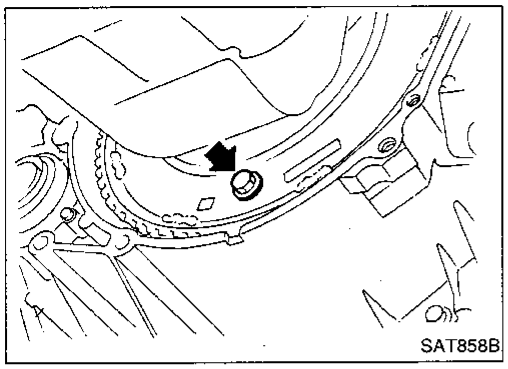
1. Remove drive shaft assembly. — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
2. Remove oil seal.



3. Install oil seal.

Apply ATF before installing.

4. Reinstall any part removed.


SAT858B

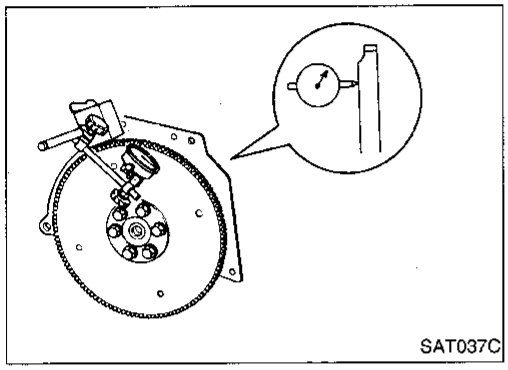
Removal

- Disconnect drive shafts. Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
- Remove bolts securing torque converter to drive plate.

a. Remove those bolts by turning crankshaft.

b. Immediately after transaxle is disconnected, inscribe matching marks on torque converter and drive plate so that they may be reinstalled in their original positions.

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


SAT037C

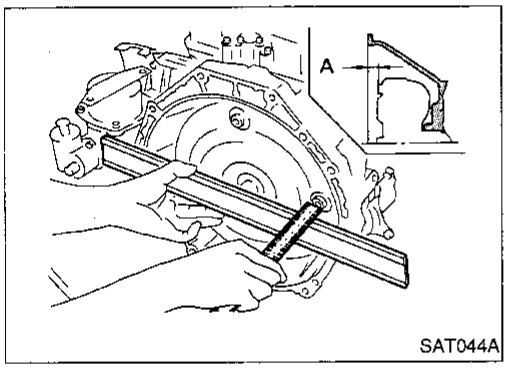
Installation

- Drive plate runout

  Maximum allowable runout:

  Refer to EM section ("Inspection", "CYLINDER BLOCK").

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



SAT044A

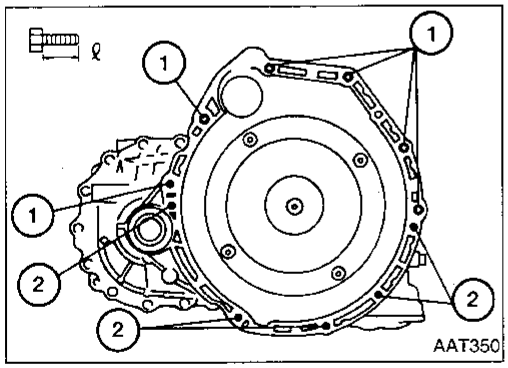
- When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.

  Distance "A":

  14 mm (0.55 in) or more

- Install converter to drive plate.

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

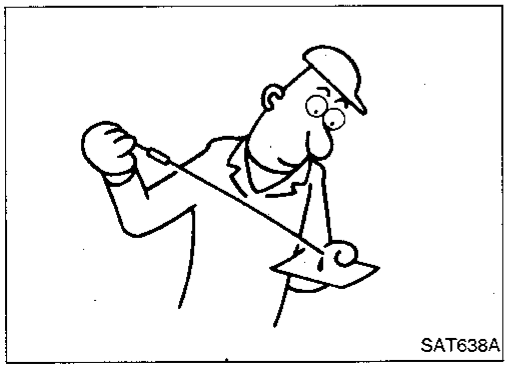


AAT350

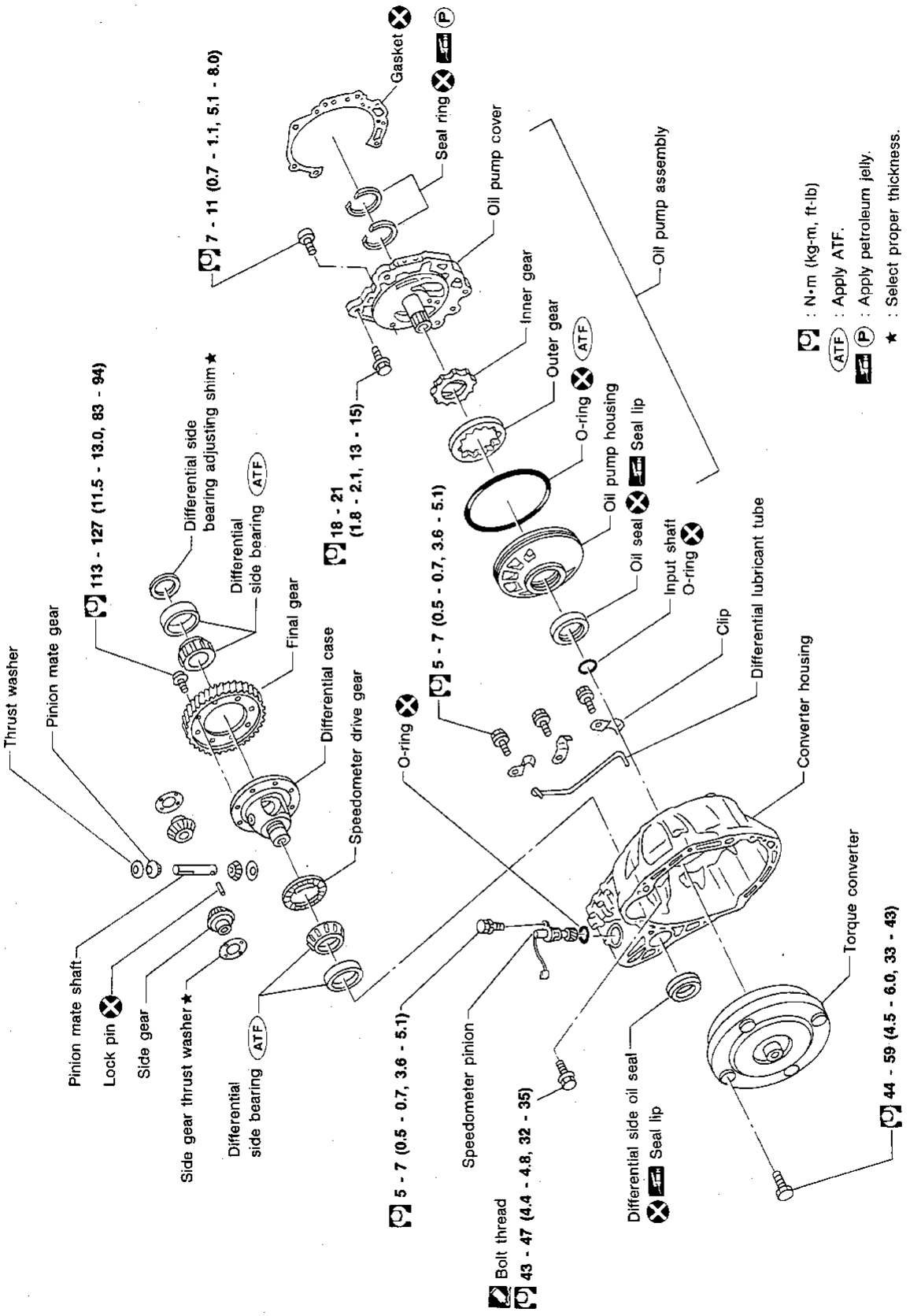
- Tighten bolt securing transaxle.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
2	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)

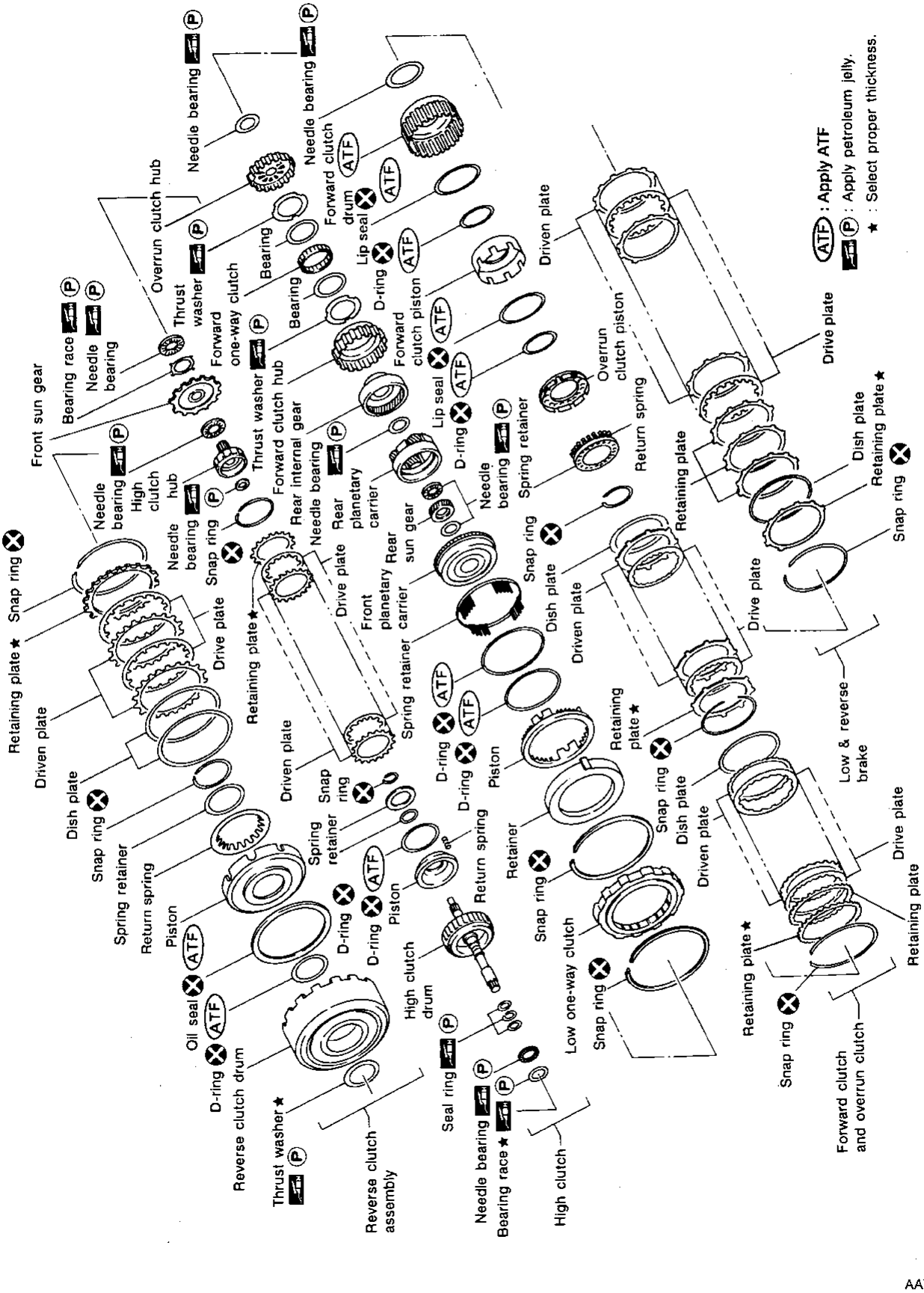
- Reinstall any part removed.


SAT638A

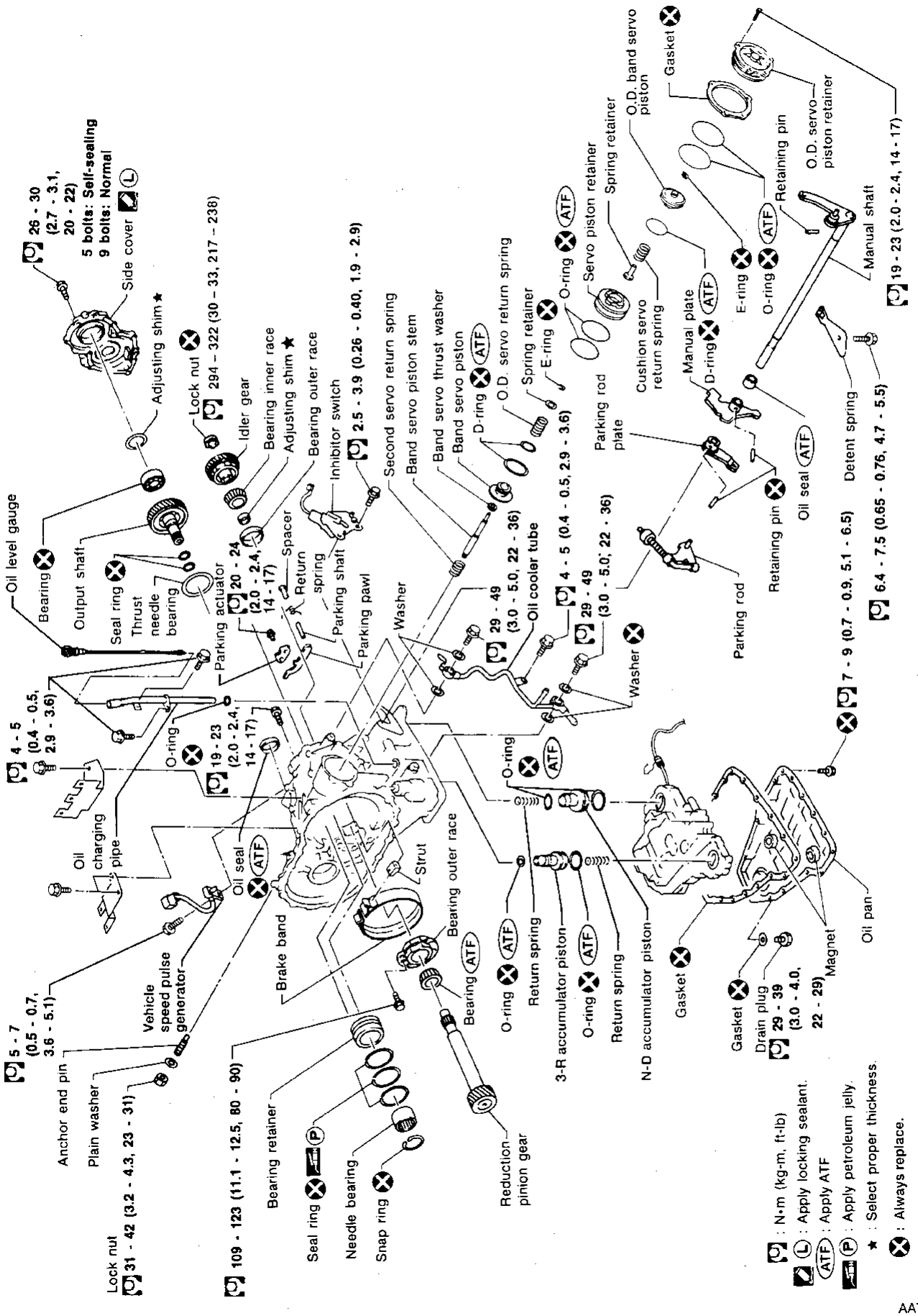
- Check fluid level in transaxle.
- Move selector lever through all positions to be sure that transaxle operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" positions. A slight shock should be felt by hand gripping selector each time transaxle is shifted.
- Perform road test — See "Road Test". Refer to AT-23.


Thrust washer
Pinion mate gear
113 - 127 (11.5 - 13.0, 83 - 94)
Differential side bearing adjusting shim★
Differential side bearing (ATF)
Final gear
Differential case
Speedometer drive gear
Pinion mate shaft
Lock pin
Side gear
Side gear thrust washer★
Differential side bearing (ATF)
7 - 11 (0.7 - 1.1, 5.1 - 8.0)
18 - 21 (1.8 - 2.1, 13 - 15)
Gasket
Seal ring (P)
Oil pump cover
Inner gear
Outer gear
O-ring (ATF)
Oil pump housing
Seal lip
Oil seal
Input shaft O-ring
Clip
Differential lubricant tube
Oil pump assembly
Converter housing
O-ring
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Speedometer pinion
Bolt thread
43 - 47 (4.4 - 4.8, 32 - 35)
Differential side oil seal
Seal lip
Torque converter
44 - 59 (4.5 - 6.0, 33 - 43)
: N•m (kg-m, ft-lb)
(ATF) : Apply ATF.
(P) : Apply petroleum jelly.
★ : Select proper thickness.

AAT356

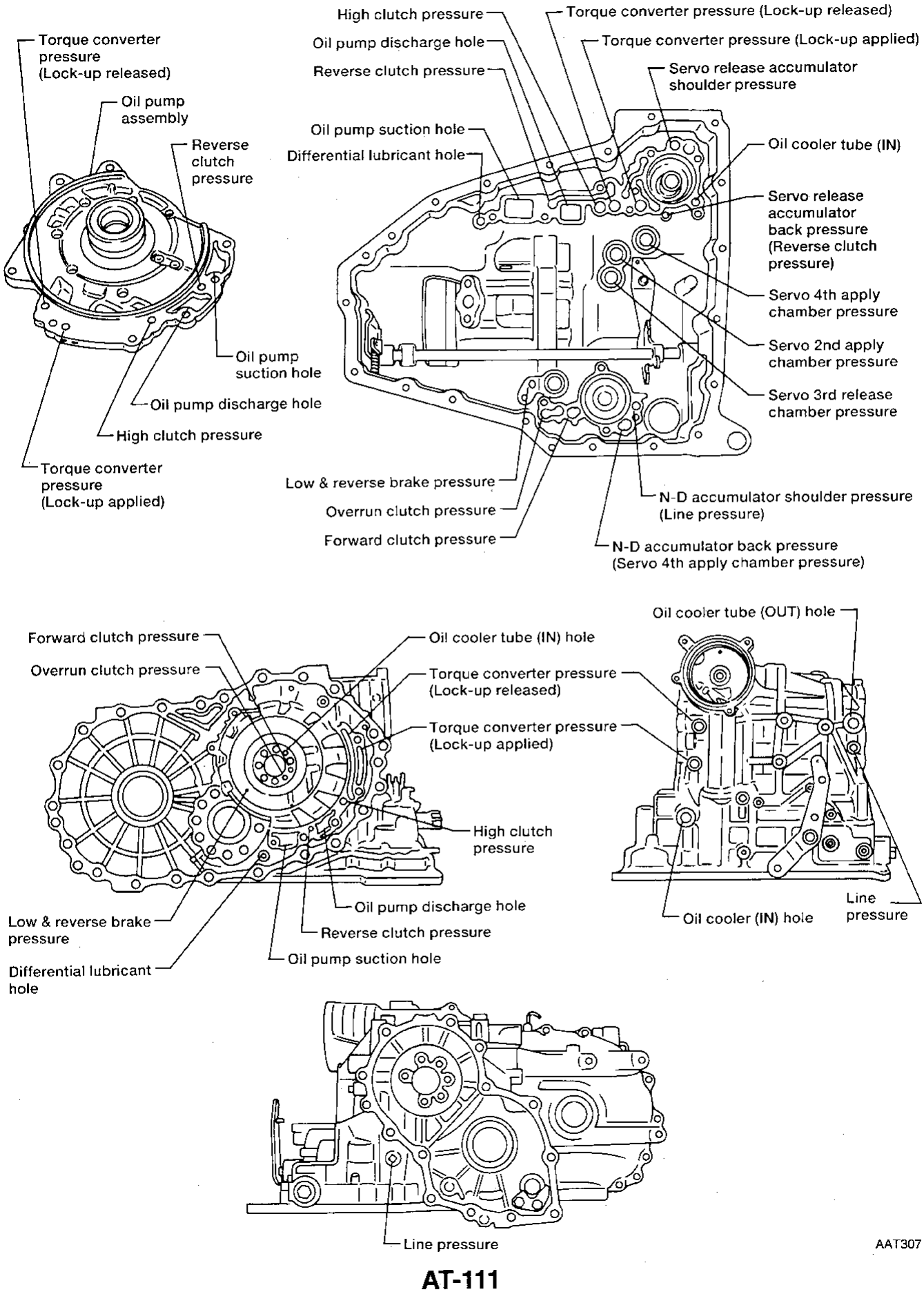

Front sun gear
Bearing race
Needle bearing
Overrun clutch hub
Needle bearing
Thrust washer
Forward one-way clutch
Bearing
Bearing
Forward clutch drum
Needle bearing
Lip seal
D-ring
Forward clutch piston
Driven plate
Overrun clutch piston
Return spring
Spring retainer
Needle bearing
Lip seal
D-ring
Thrust washer
Forward clutch hub
Rear internal gear
Needle bearing
Rear planetary carrier
Needle bearing
High clutch hub
Needle bearing
Snap ring
Retaining plate
Drive plate
Drive plate
Dish plate
Retaining plate
Snap ring
Snap ring
Retaining plate
Driven plate
Drive plate
Front planetary carrier
Rear sun gear
Needle bearing
Spring retainer
Snap ring
Dish plate
Driven plate
Driven plate
Snap ring
Spring retainer
Return spring
Piston
Spring retainer
Snap ring
D-ring
D-ring
Piston
Retainer
Return spring
Snap ring
Low one-way clutch
Snap ring
Dish plate
Driven plate
Retaining plate
Low & reverse brake
Drive plate
Oil seal
D-ring
Reverse clutch drum
Thrust washer
Reverse clutch assembly
D-ring
D-ring
Piston
High clutch drum
Seal ring
Needle bearing
Bearing race
High clutch
Snap ring
Retaining plate
Forward clutch and overrun clutch
Drive plate
Retaining plate
ATF : Apply ATF
P : Apply petroleum jelly.
★ : Select proper thickness.

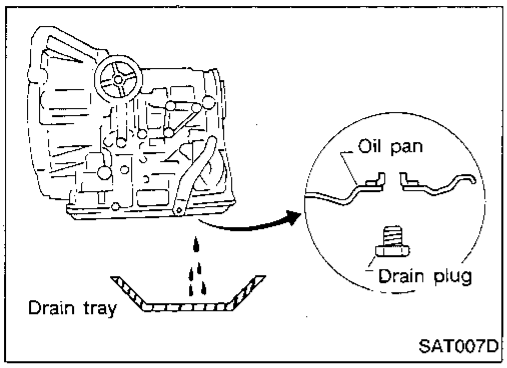
AAT282


Oil level gauge
Bearing
Output shaft
Seal ring
Thrust needle bearing
Parking actuator
20 - 24 (2.0 - 2.4, 14 - 17)
Spacer
Return spring
Parking shaft
Parking pawl
Bearing outer race
Adjusting shim ★
Idler gear
Lock nut
294 - 322 (30 - 33, 217 - 238)
Adjusting shim ★
Side cover Ⓛ
26 - 30 (2.7 - 3.1, 20 - 22)
5 bolts: Self-sealing
9 bolts: Normal
Inhibitor switch
2.5 - 3.9 (0.26 - 0.40, 1.9 - 2.9)
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring ATF
O.D. servo return spring
Spring retainer
E-ring
O-ring ATF
Servo piston retainer
Spring retainer
O.D. band servo piston
Gasket
Parking rod plate
Cushion servo return spring
Manual plate
D-ring ATF
E-ring
O-ring ATF
Retaining pin
O.D. servo piston retainer
Manual shaft
19 - 23 (2.0 - 2.4, 14 - 17)
Detent spring
6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
Oil seal ATF
Retaining pin
Parking rod
Washer
4 - 5 (0.4 - 0.5, 2.9 - 3.6)
29 - 49 (3.0 - 5.0, 22 - 36)
Oil cooler tube
4 - 5 (0.4 - 0.5, 2.9 - 3.6)
29 - 49 (3.0 - 5.0, 22 - 36)
Washer
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
O-ring
Oil charging pipe
Oil seal ATF
Strut
Bearing outer race
Brake band
Bearing retainer
Seal ring P
Needle bearing
Snap ring
Reduction pinion gear
Bearing ATF
O-ring ATF
Return spring
3-R accumulator piston
O-ring ATF
Return spring
N-D accumulator piston
Gasket
Gasket
Drain plug
29 - 39 (3.0 - 4.0, 22 - 29)
Magnet
Oil pan
Anchor end pin
Plain washer
Lock nut
31 - 42 (3.2 - 4.3, 23 - 31)
5 - 7 (0.5 - 0.7, 3.6 - 5.1)
Vehicle speed pulse generator
109 - 123 (11.1 - 12.5, 80 - 90)
: N·m (kg-m, ft-lb)
Ⓛ : Apply locking sealant.
ATF : Apply ATF
P : Apply petroleum jelly.
★ : Select proper thickness.
: Always replace.

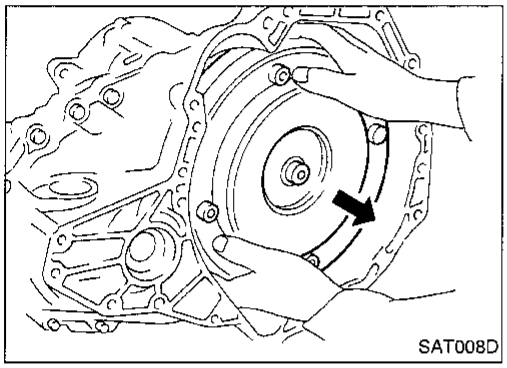
AAT357

Oil Channel

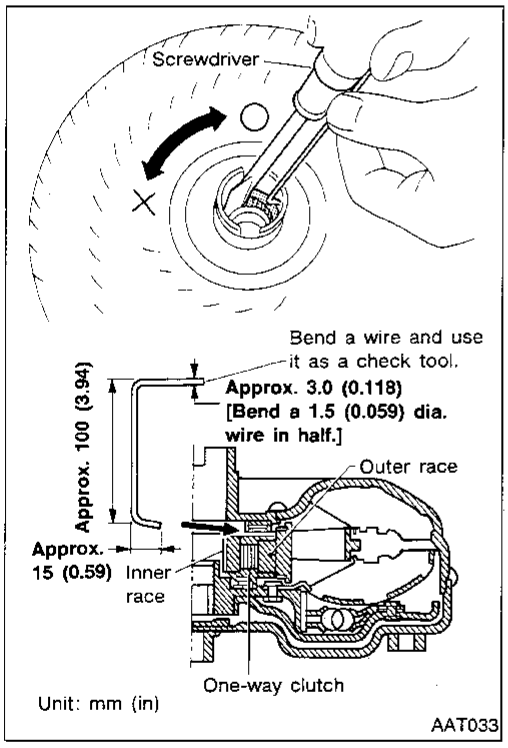

Torque converter pressure (Lock-up released)
Oil pump assembly
Reverse clutch pressure
Oil pump suction hole
Oil pump discharge hole
High clutch pressure
Torque converter pressure (Lock-up applied)
High clutch pressure
Oil pump discharge hole
Oil pump suction hole
Differential lubricant hole
Low & reverse brake pressure
Overrun clutch pressure
Forward clutch pressure
Torque converter pressure (Lock-up released)
Torque converter pressure (Lock-up applied)
Servo release accumulator shoulder pressure
Oil cooler tube (IN)
Servo release accumulator back pressure (Reverse clutch pressure)
Servo 4th apply chamber pressure
Servo 2nd apply chamber pressure
Servo 3rd release chamber pressure
N-D accumulator shoulder pressure (Line pressure)
N-D accumulator back pressure (Servo 4th apply chamber pressure)
Forward clutch pressure
Overrun clutch pressure
Low & reverse brake pressure
Differential lubricant hole
Oil cooler tube (IN) hole
Torque converter pressure (Lock-up released)
Torque converter pressure (Lock-up applied)
High clutch pressure
Oil pump discharge hole
Reverse clutch pressure
Oil pump suction hole
Oil cooler tube (OUT) hole
Oil cooler (IN) hole
Line pressure
Line pressure
AAT307



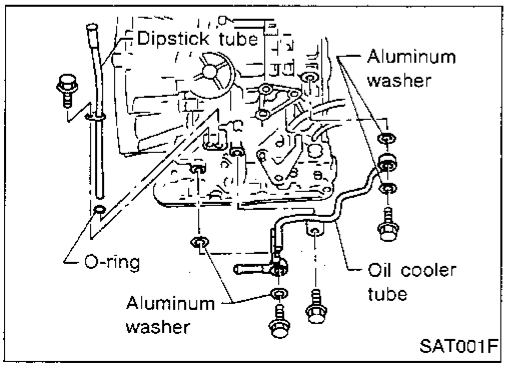
1. Drain ATF through drain plug.



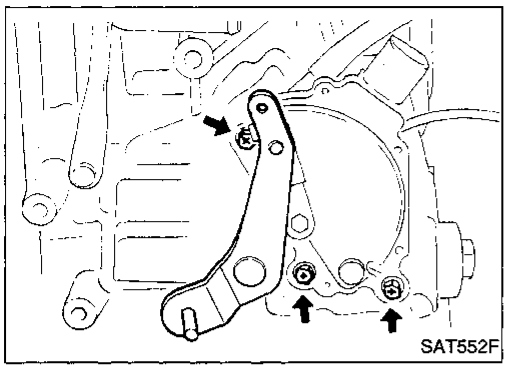
2. Remove torque converter.



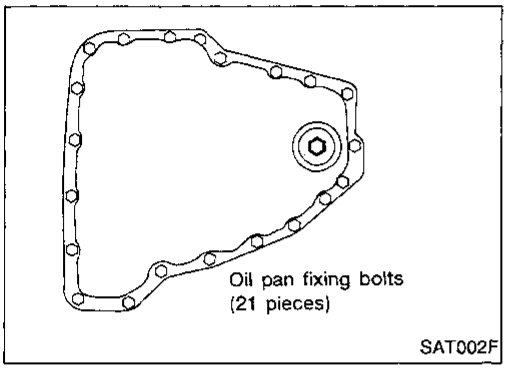
3. Check torque converter one-way clutch using check tool as shown at left.
   a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
   b. When fixing bearing support with check tool, rotate one-way clutch spline using screwdriver.
   c. Check that inner race rotates clockwise only. If not, replace torque converter assembly.



4. Remove oil charging pipe and oil cooler tube.

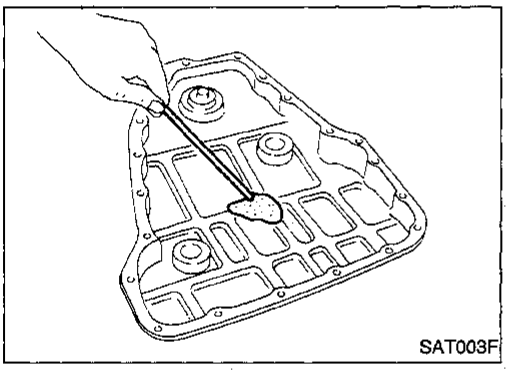

SAT552F

5. Set manual lever to "P" position.
6. Remove inhibitor switch.

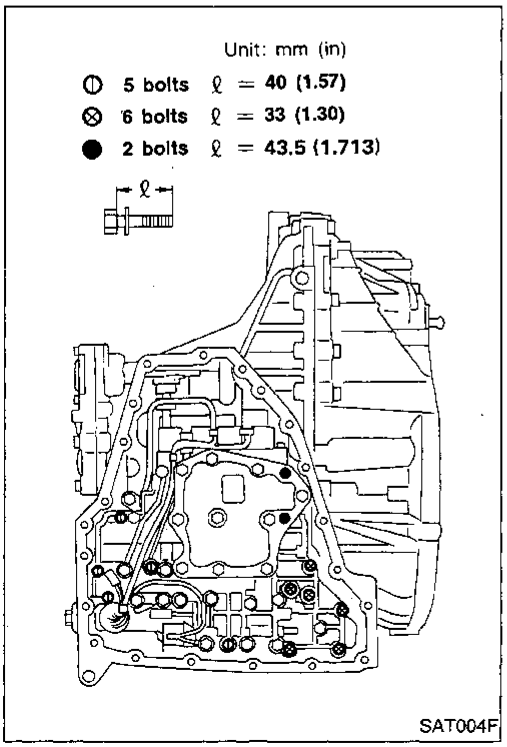


SAT002F

7. Remove oil pan and oil pan gasket.
- **Do not reuse oil pan bolts.**


SAT003F

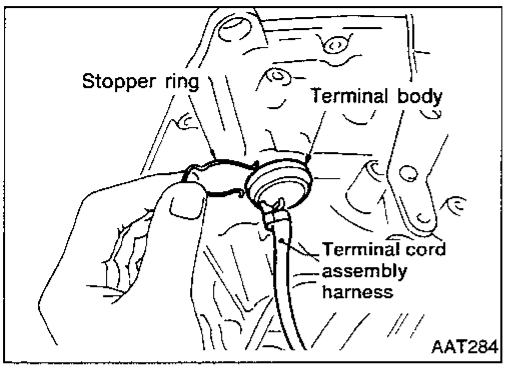
8. Analyze foreign materials in oil pan to trace possible causes of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up which can cause valves, servo, and clutches to stick and may inhibit pump pressure.
- **If frictional material is detected, replace radiator after repair of A/T. Refer to LC section ("Radiator", "ENGINE COOLING SYSTEM").**



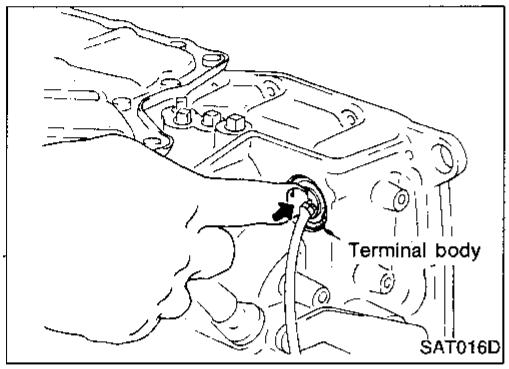
SAT004F

9. Remove control valve assembly according to the following procedures.

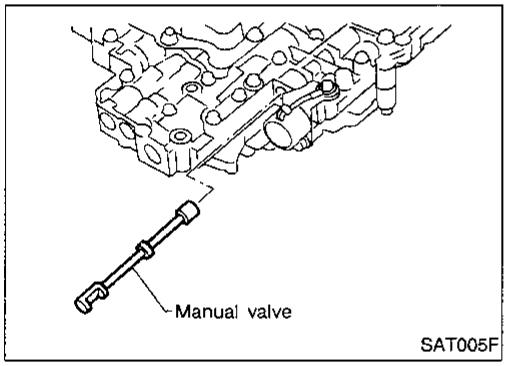
a. Remove control valve assembly mounting bolts ①, ⑥ and ●.



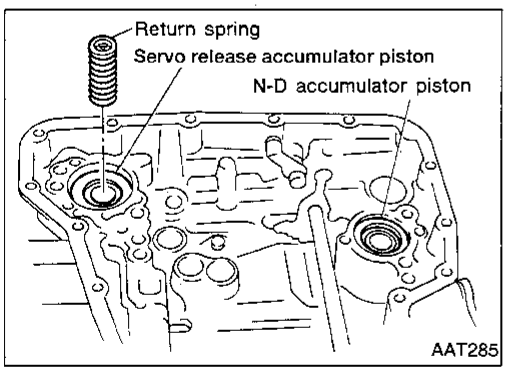
b. Remove stopper ring from terminal body.



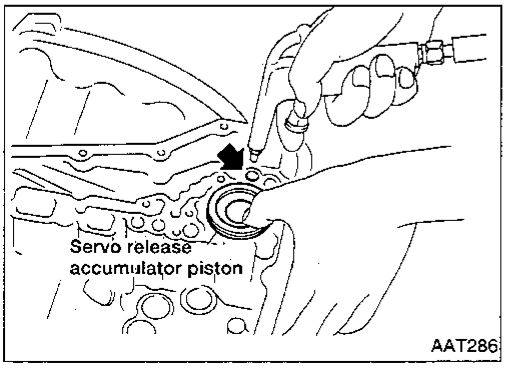
c. Push terminal body into transmission case and draw out terminal cord assembly harness.



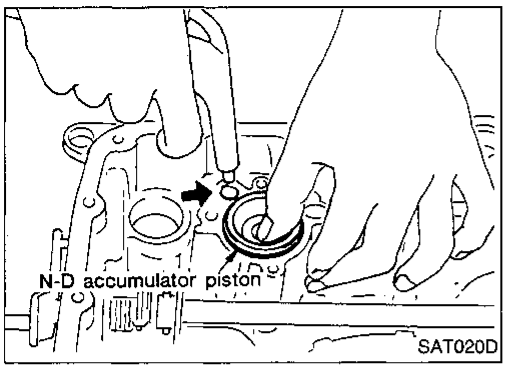
10. Remove manual valve from control valve assembly.



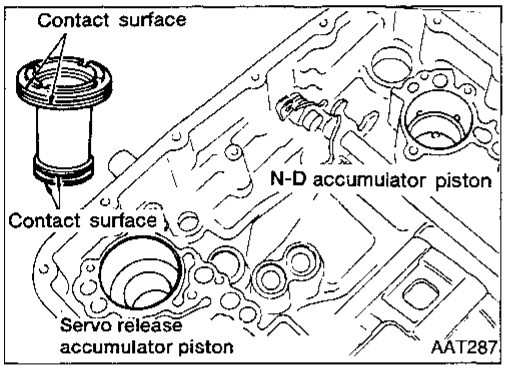
11. Remove return spring from servo release accumulator piston.



12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.



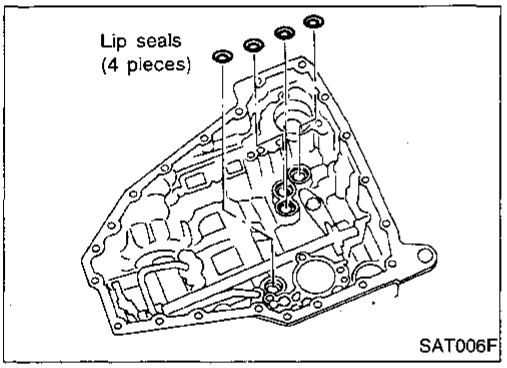
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



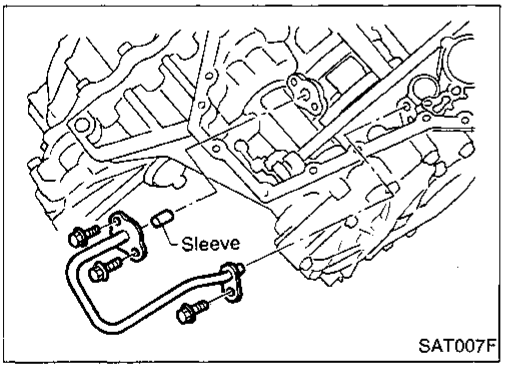
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Unit: mm (in)

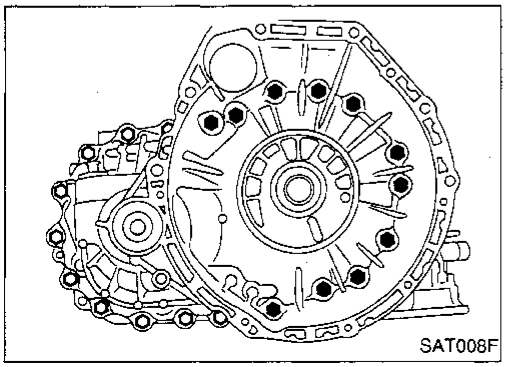
Spring	Free length	Outer diameter
Servo release accumulator spring	52.5 (2.067)	20.4 (0.803)
N-D accumulator spring	43.5 (1.713)	27.0 (1.063)



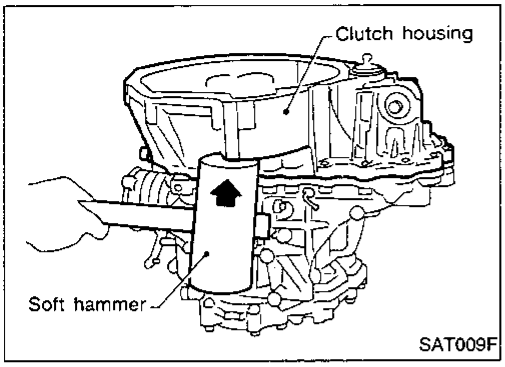
18. Remove lip seals.



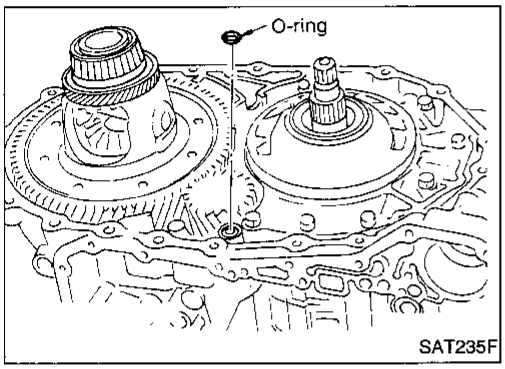
19. Remove tube and sleeve.



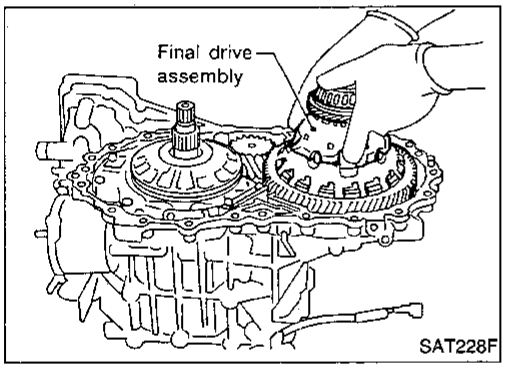
20. Remove converter housing according to the following procedures.
a. Remove converter housing mounting bolts.



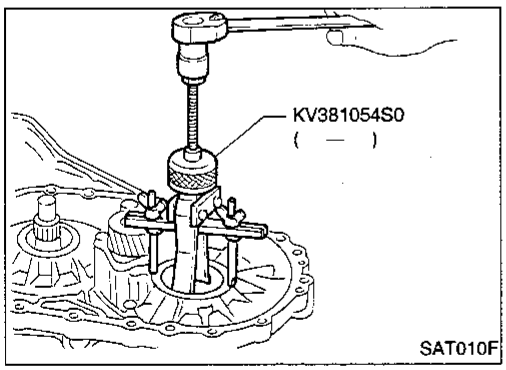
b. Remove converter housing by tapping it lightly.



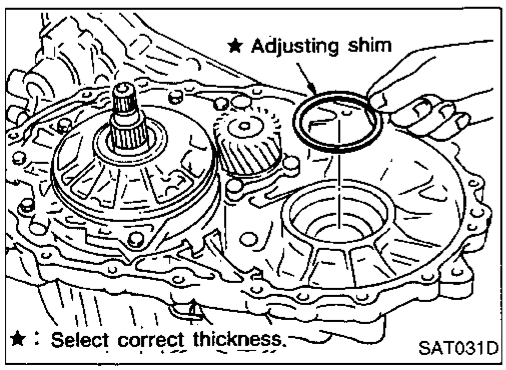
c. Remove O-ring from differential oil port.



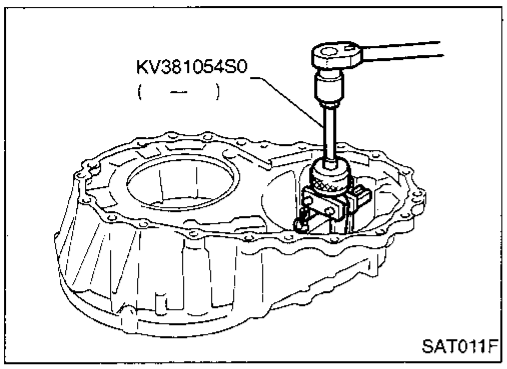
21. Remove final drive assembly from transmission case.



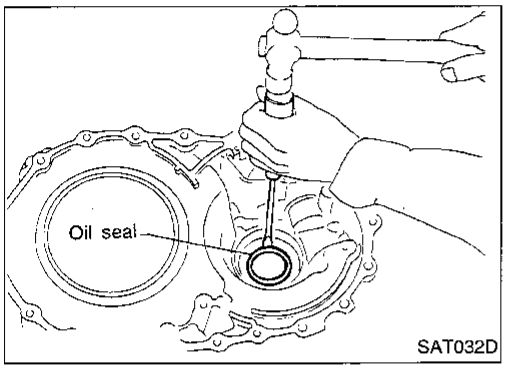
22. Remove differential side bearing outer race from transmission case.



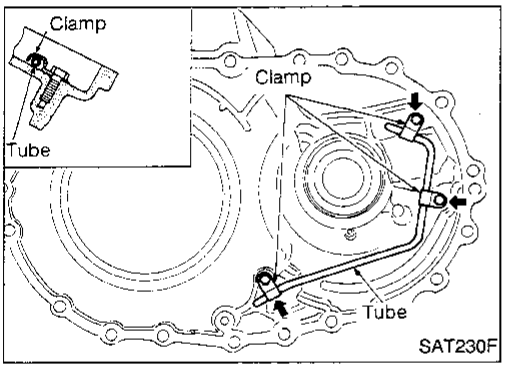
23. Remove differential side bearing adjusting shim from transmission case.



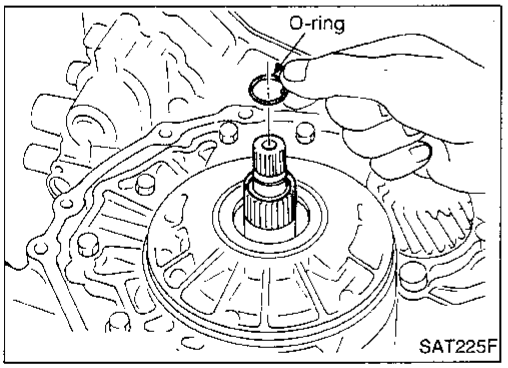
24. Remove differential side bearing outer race from converter housing.



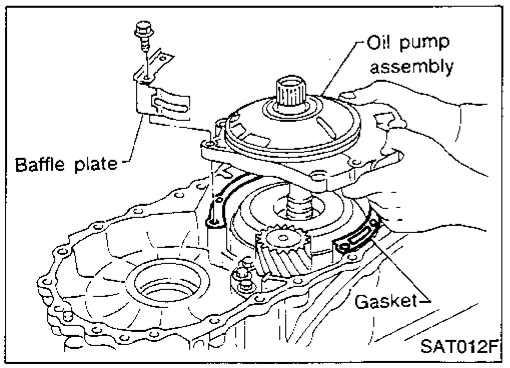
25. Remove oil seal with screwdriver from converter housing.
- **Be careful not to damage case.**



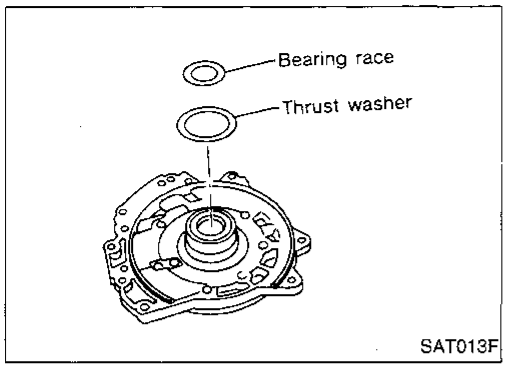
26. Remove oil tube from converter housing.



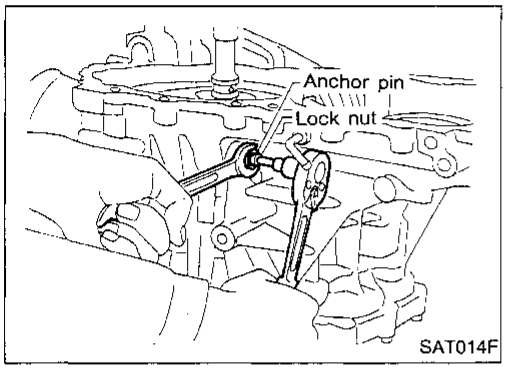
27. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.



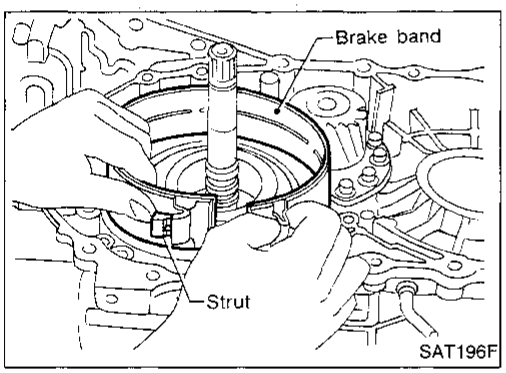
b. Remove oil pump assembly, baffle plate and gasket from transmission case.



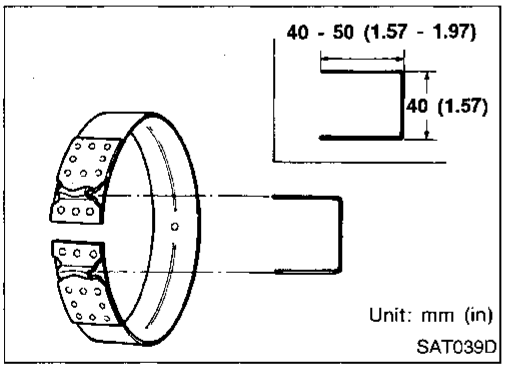
c. Remove thrust washer and bearing race from oil pump assembly.



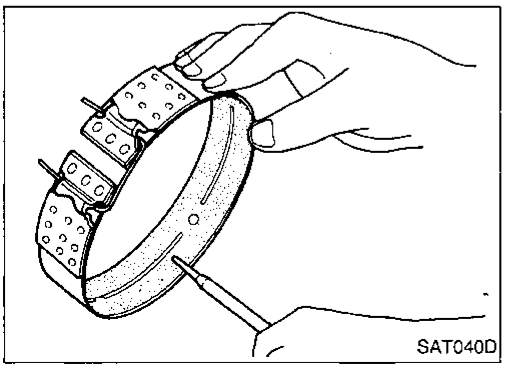
28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off band servo anchor end pin.



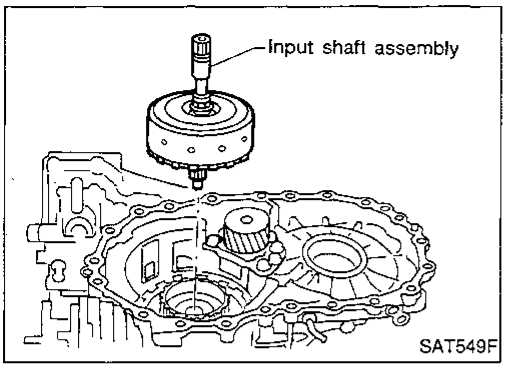
b. Remove brake band and strut from transmission case.



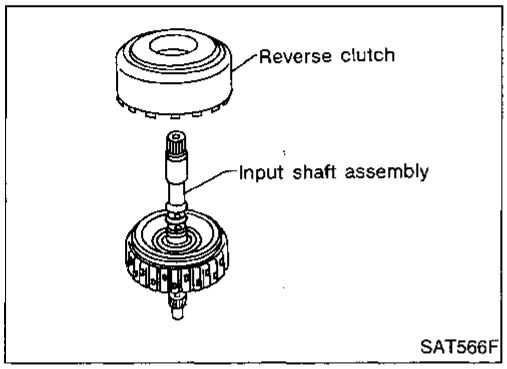
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
  Leave the clip in position after removing the brake band.



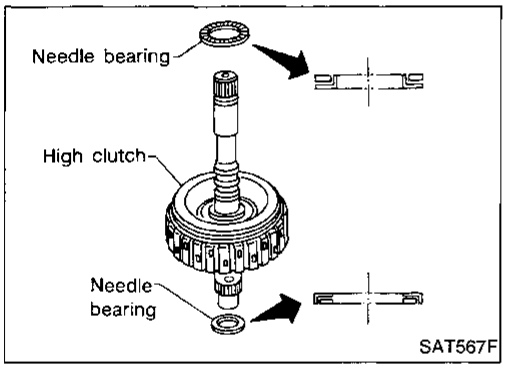
c. Check brake band facing for damage, cracks, wear or burns.



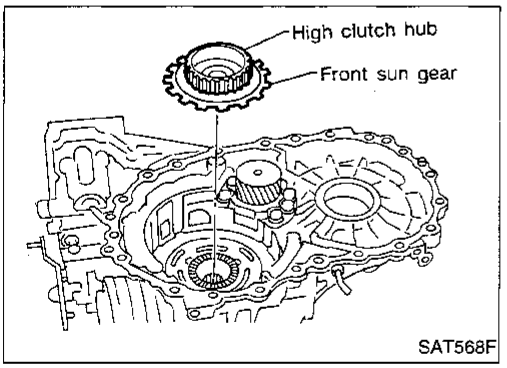
29. Remove input shaft assembly (high clutch), reverse clutch and front sun gear according to the following procedures.
a. Remove input shaft assembly (high clutch) with reverse clutch.



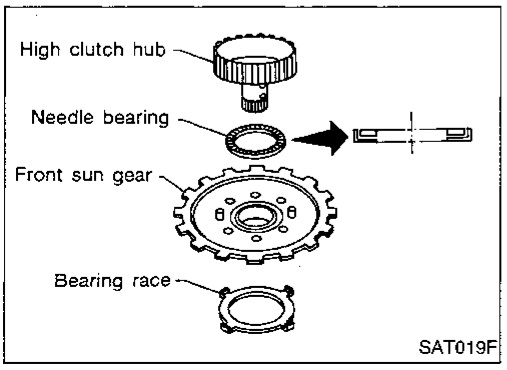
b. Remove input shaft assembly (high clutch) from reverse clutch.



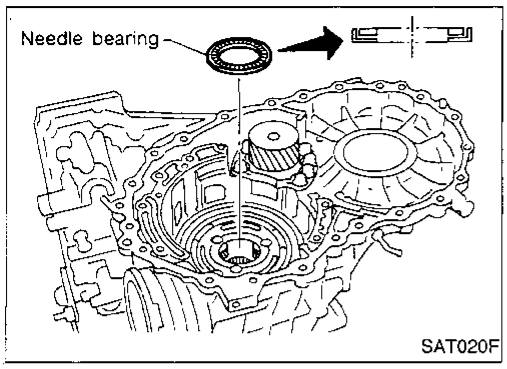
c. Remove needle bearings from high clutch drum and check for damage or wear.



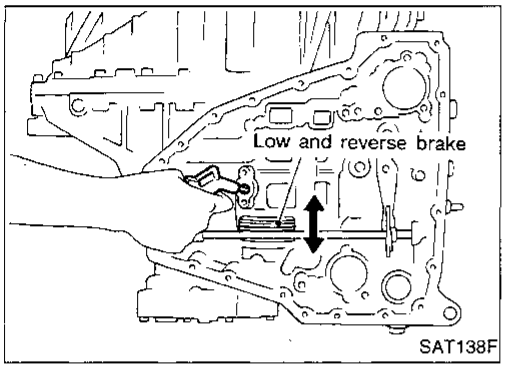
d. Remove high clutch hub and front sun gear from transmission case.



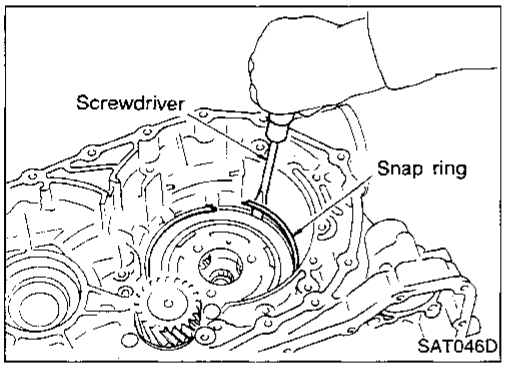
e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.
f. Remove bearing race from front sun gear and check for damage or wear.



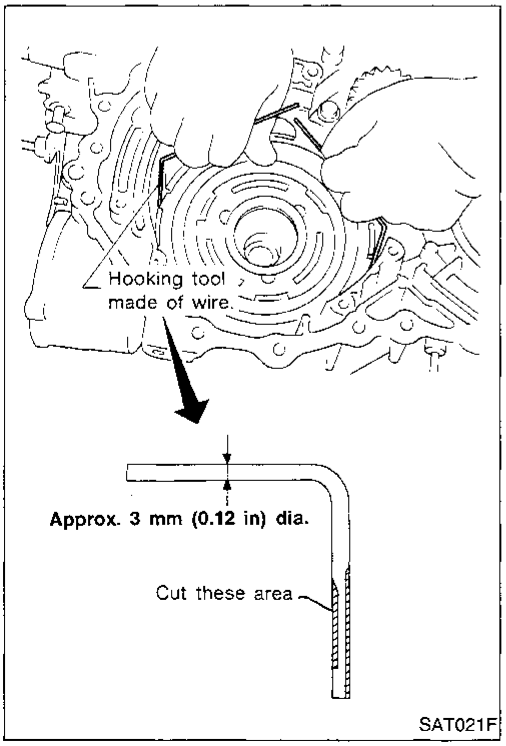
30. Remove needle bearing from transmission case and check for damage or wear.



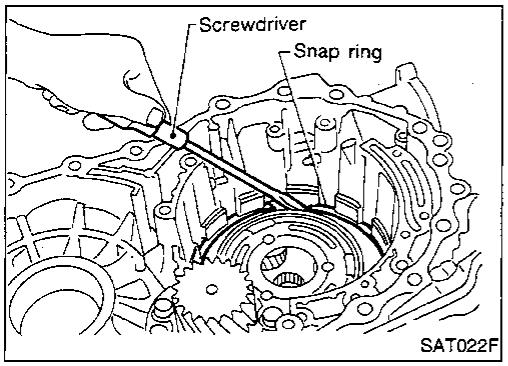
31. Apply compressed air and check to see that low and reverse brake operates.



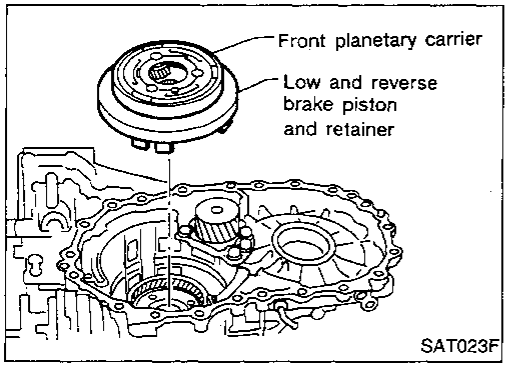
32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.
a. Remove snap ring with flat-bladed screwdriver.



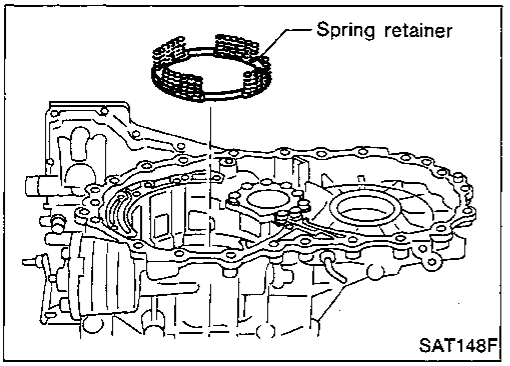
b. Remove low one way clutch with a hook made of wire.



c. Remove snap ring with flat-bladed screwdriver.

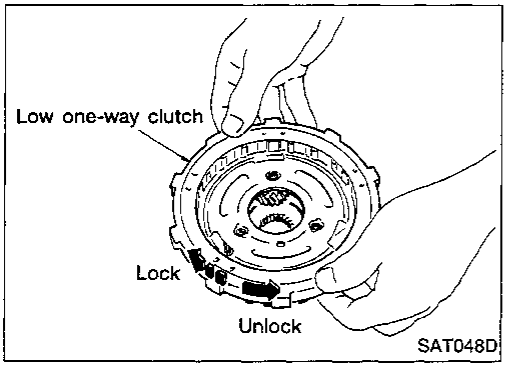


d. Remove front planetary carrier with low and reverse brake piston and retainer.

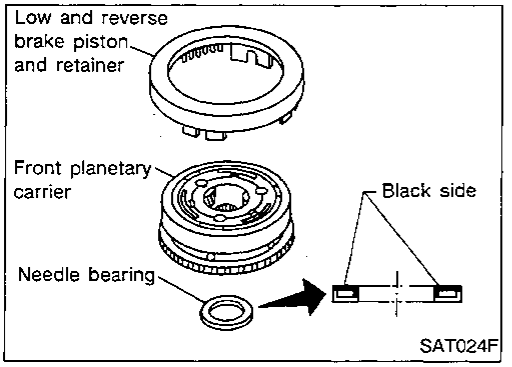


e. Remove low and reverse brake spring retainer.

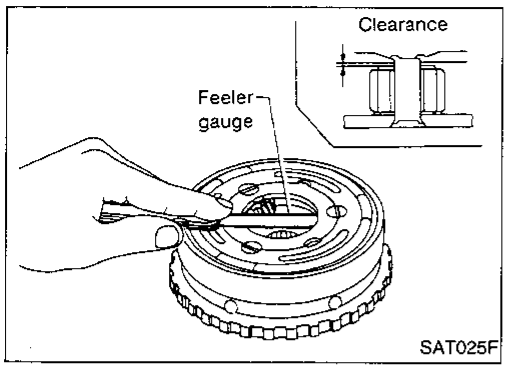
- **Do not remove return springs from spring retainer.**



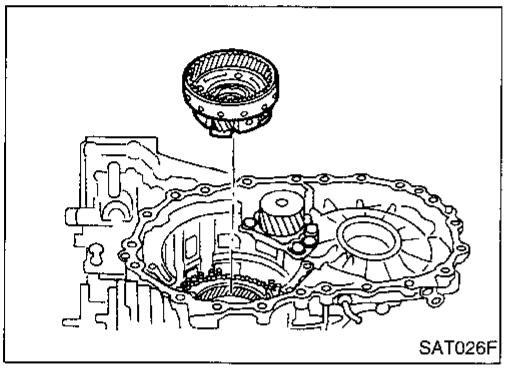
f. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



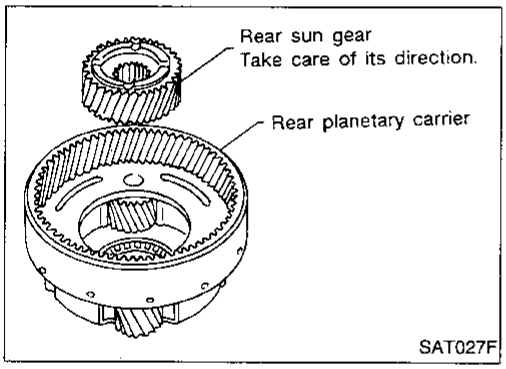
g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.



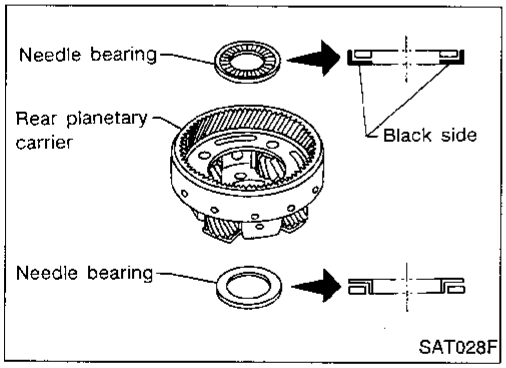
h. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.
i. Check clearance between planetary gears and planetary carrier with feeler gauge.
Standard clearance:
0.20 - 0.70 mm (0.0079 - 0.0276 in)
Allowable limit:
0.80 mm (0.0315 in)
Replace front planetary carrier if the clearance exceeds allowable limit.



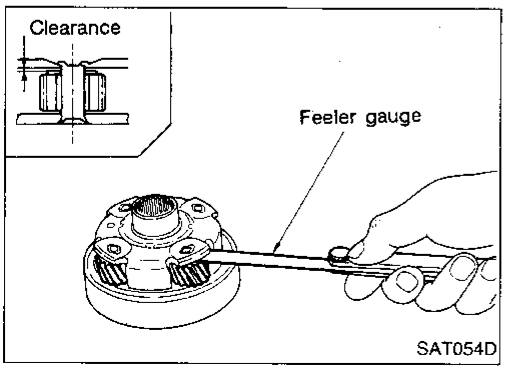
33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.
a. Remove rear planetary carrier assembly from transmission case.



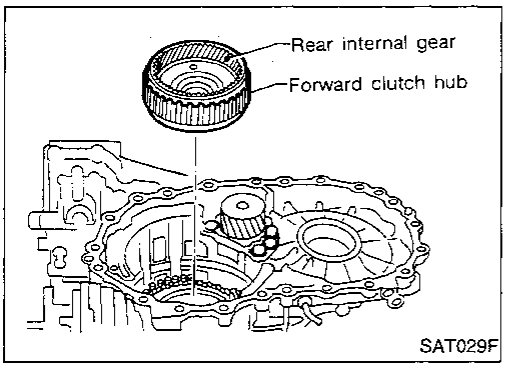
b. Remove rear sun gear from rear planetary carrier.



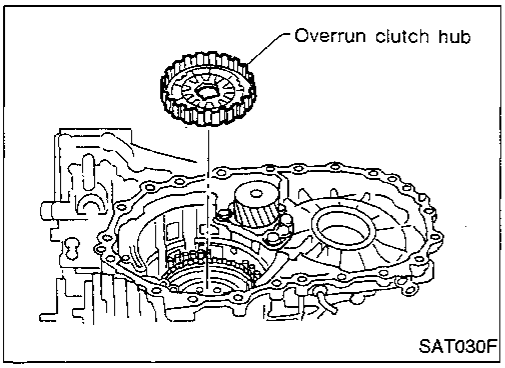
c. Remove needle bearings from rear planetary carrier assembly.



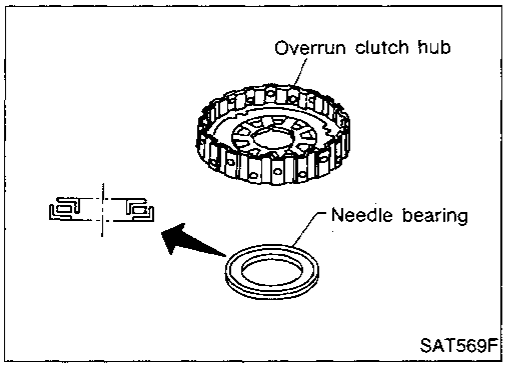
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.
Standard clearance:
0.20 - 0.70 mm (0.0079 - 0.0276 in)
Allowable limit:
0.80 mm (0.0315 in)
Replace rear planetary carrier if the clearance exceeds allowable limit.



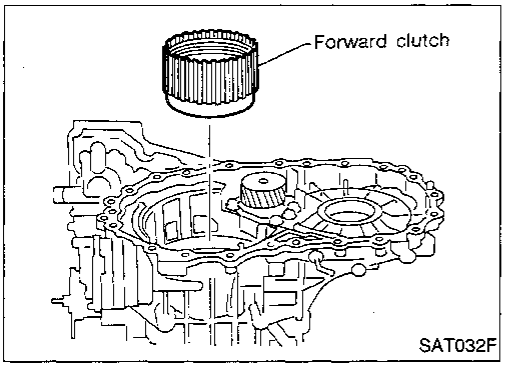
34. Remove rear internal gear and forward clutch hub from transmission case.



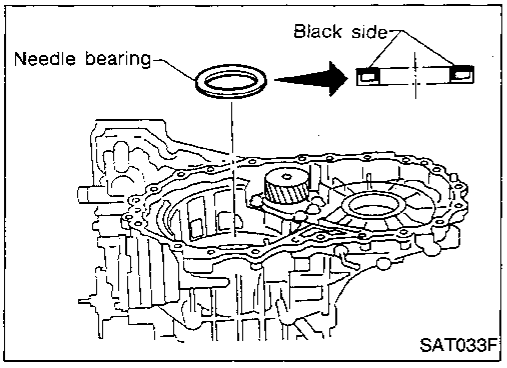
35. Remove overrun clutch hub from transmission case.



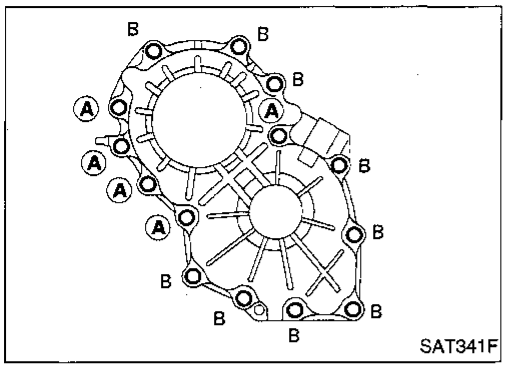
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



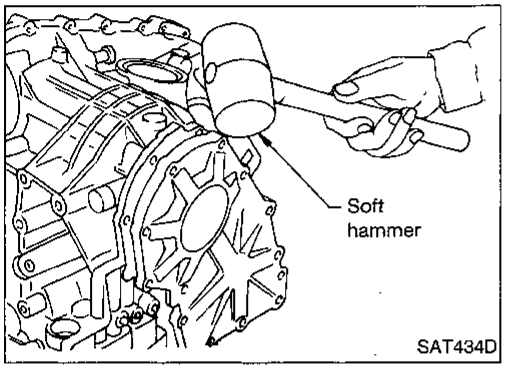
37. Remove forward clutch assembly from transmission case.



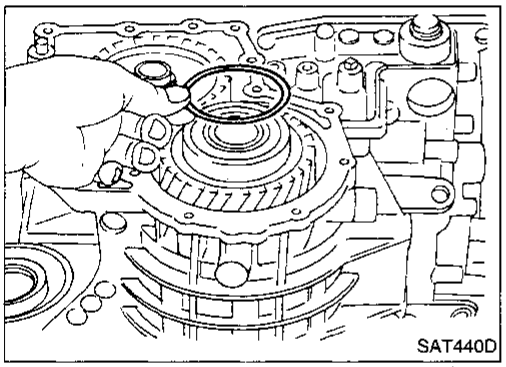
38. Remove needle bearing from transmission case.



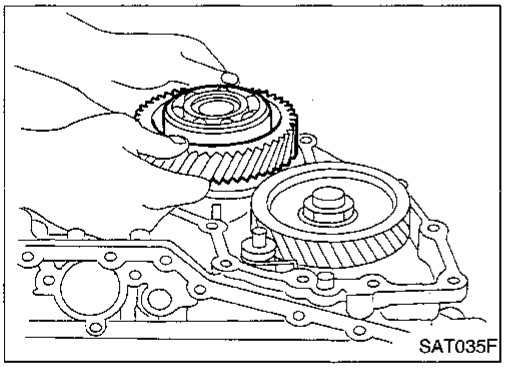
39. Remove output shaft assembly according to the following procedures.
a. Remove side cover bolts.
- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**



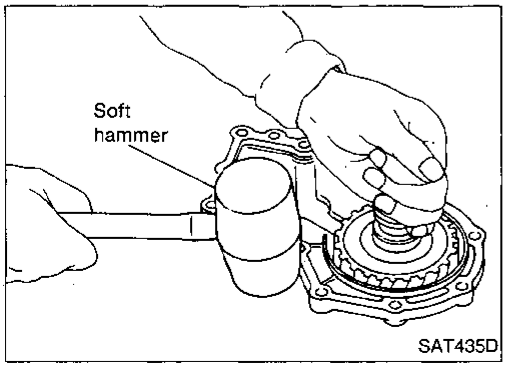
b. Remove side cover by lightly tapping it with a soft hammer.
- **Be careful not to drop output shaft assembly as output shaft assembly may be removed together with side cover.**



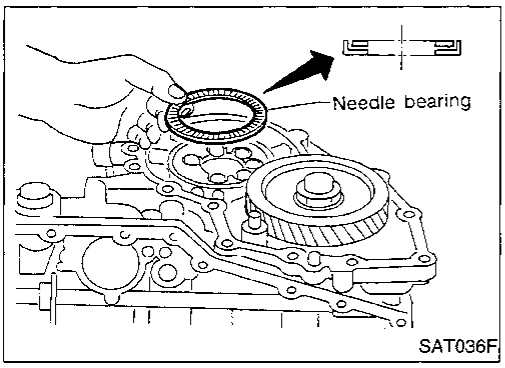
c. Remove adjusting shim.



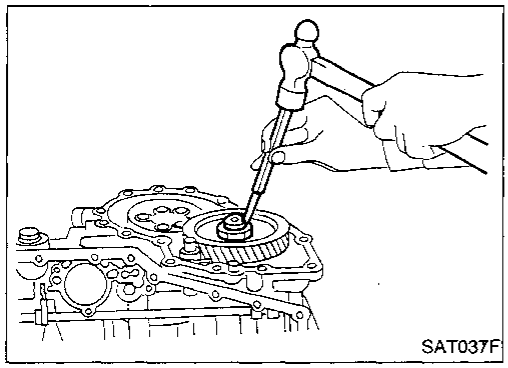
d. Remove output shaft assembly.



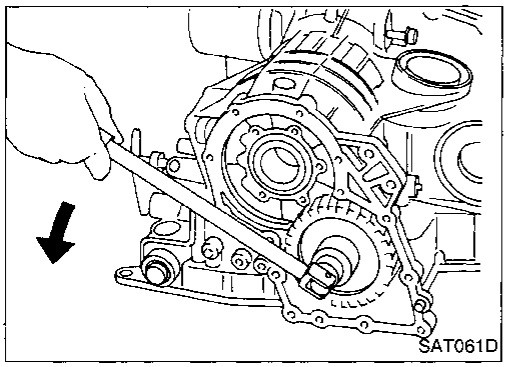
- If output shaft assembly was removed together with side cover, remove side cover by tapping it lightly with a soft hammer.



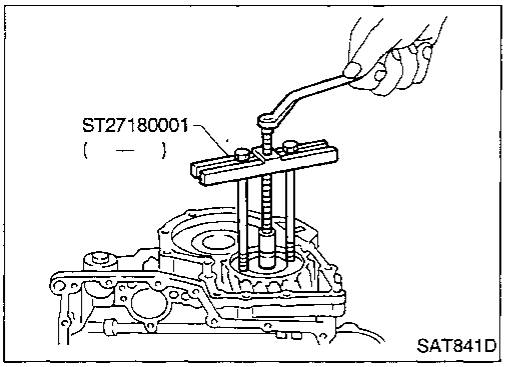
e. Remove needle bearing.



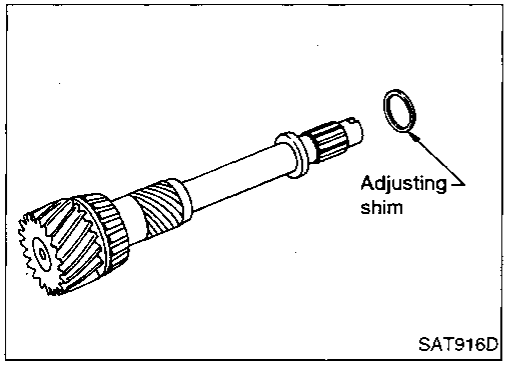
40. Disassemble reduction gear according to the following procedures.
a. Set manual lever to position "P" to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.



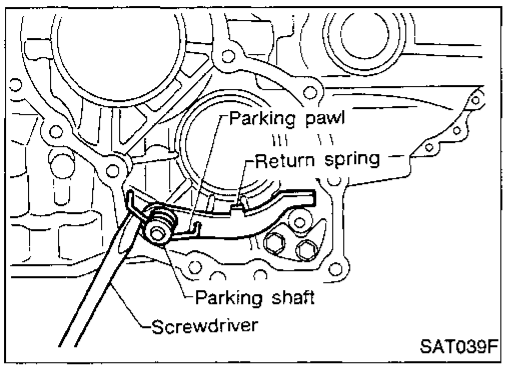
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



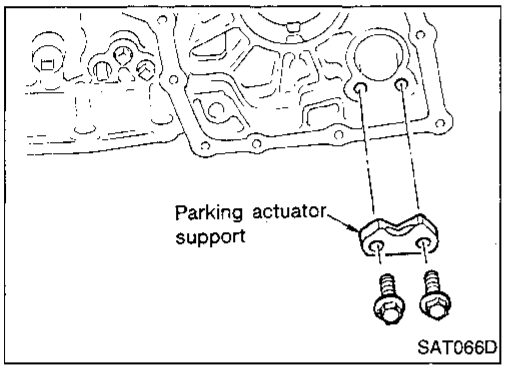
d. Remove idler gear with puller.



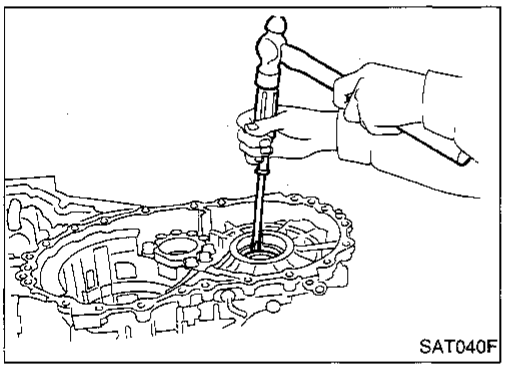
e. Remove reduction gear.
f. Remove adjusting shim from reduction gear.



41. Remove return spring from parking shaft with screwdriver.
42. Draw out parking shaft and remove parking pawl from transmission case.
43. Check parking pawl and shaft for damage or wear.

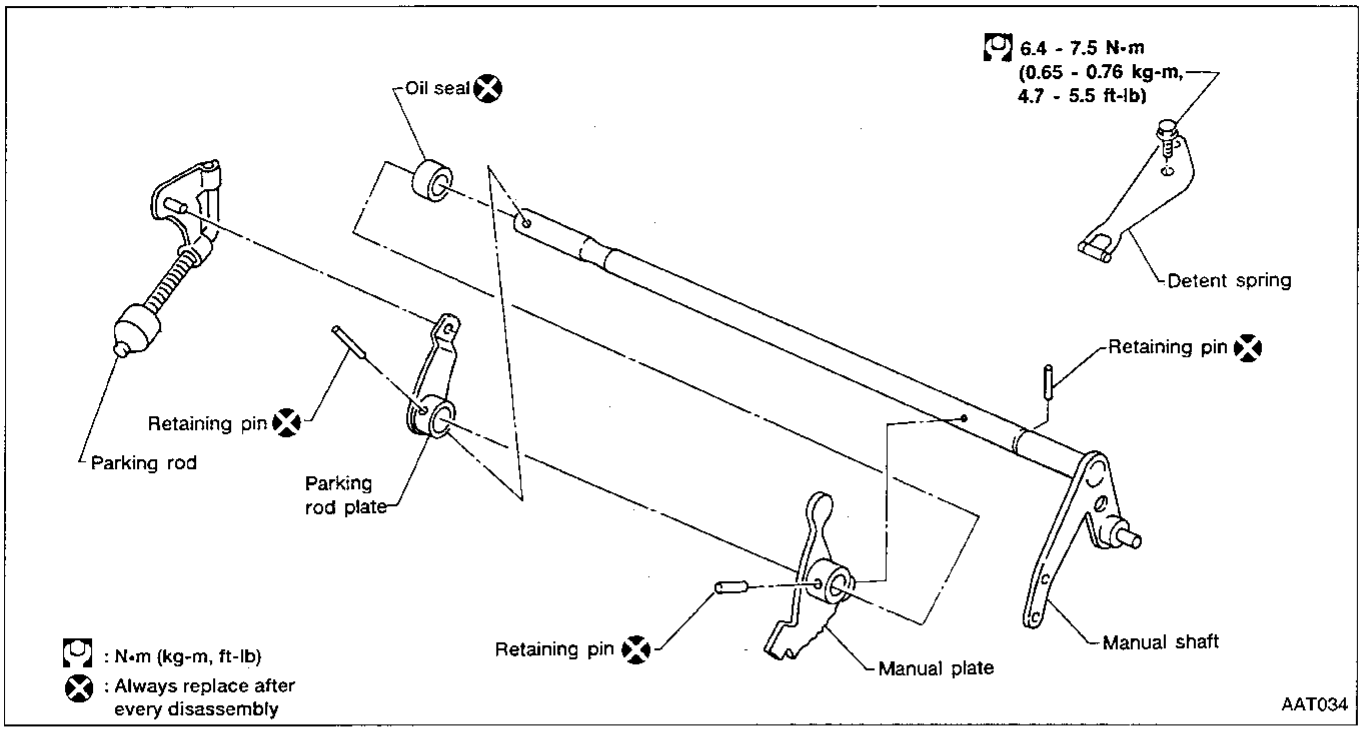


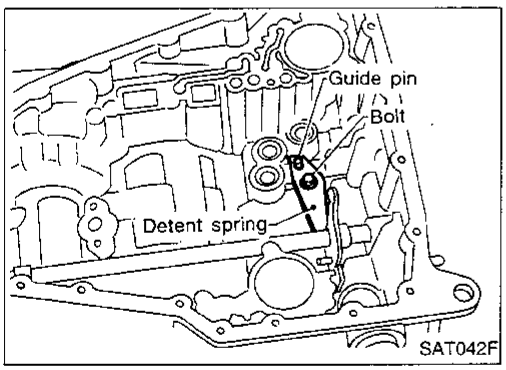
44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.



46. Remove side oil seal from transmission case with screwdriver.

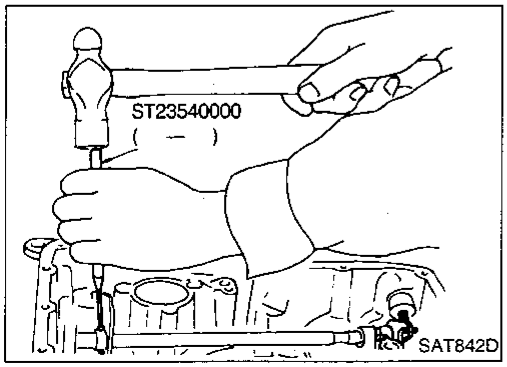
Manual Shaft





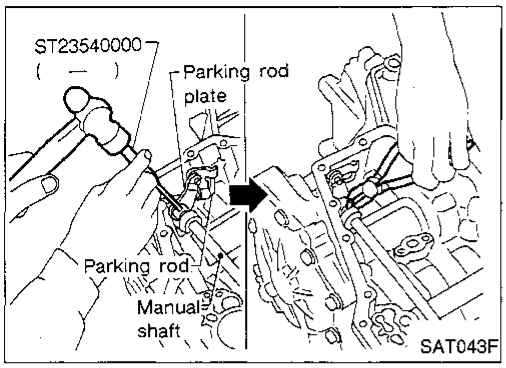
REMOVAL

1. Remove detent spring from transmission case.

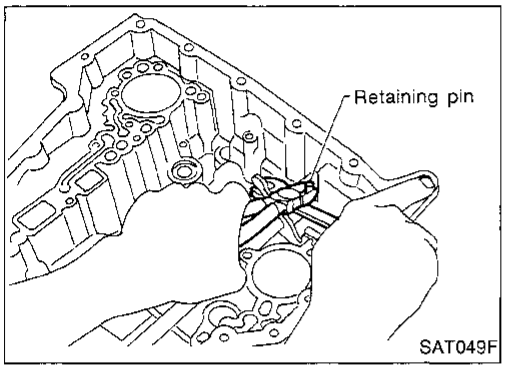


2. Drive out manual plate retaining pin.

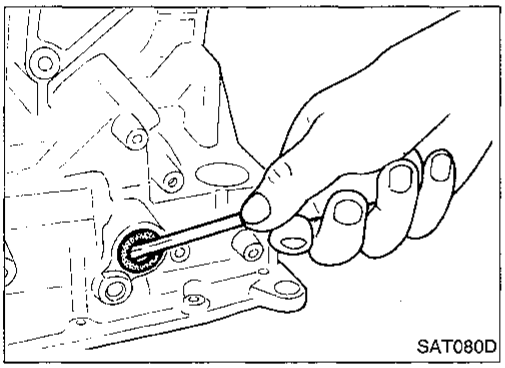
Manual Shaft (Cont'd)



3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.



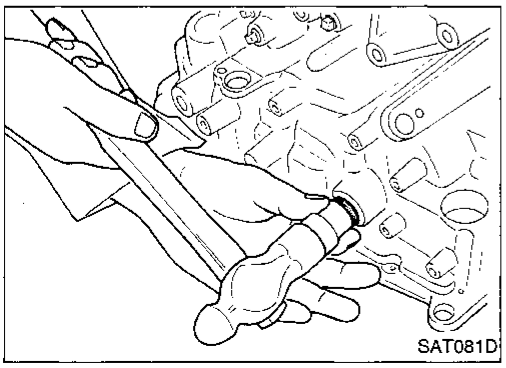
6. Pull out manual shaft retaining pin.
7. Remove manual shaft and manual plate from transmission case.



8. Remove manual shaft oil seal.

INSPECTION

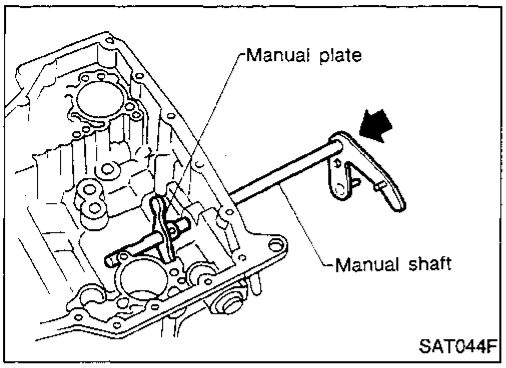
- Check component parts for wear or damage. Replace if necessary.



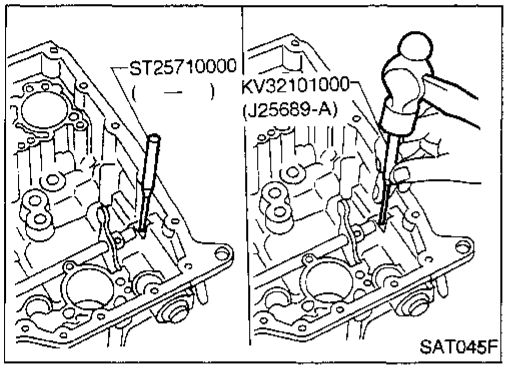
INSTALLATION

1. Install manual shaft oil seal.
- **Apply ATF to outer surface of oil seal.**

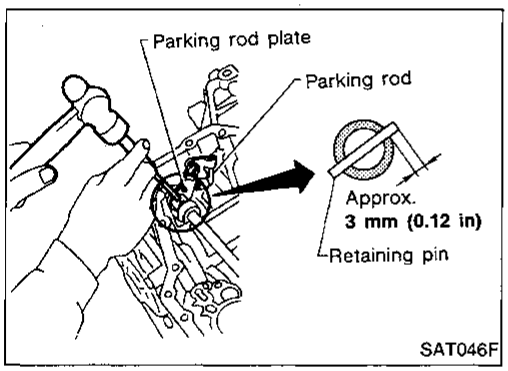
Manual Shaft (Cont'd)



2. Install manual shaft and manual plate.

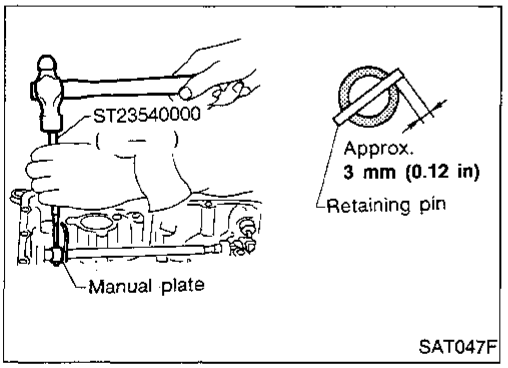


3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.



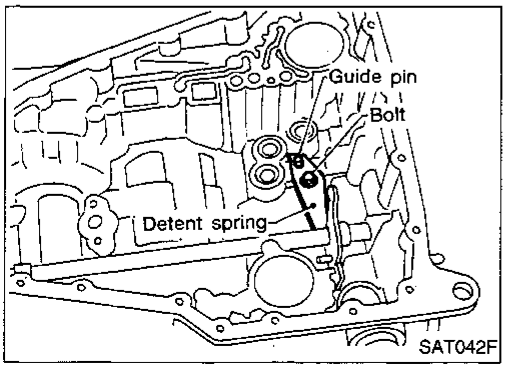
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.

Both ends of pin should protrude.



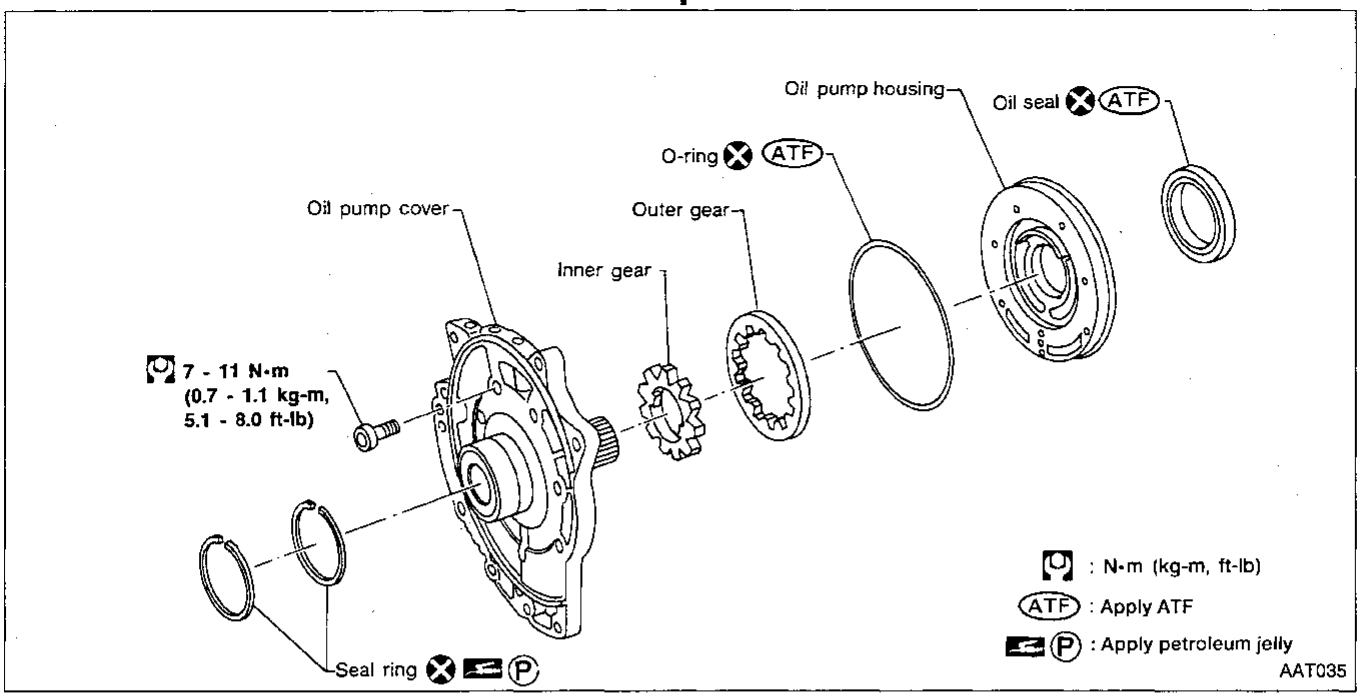
7. Drive manual plate retaining pin.

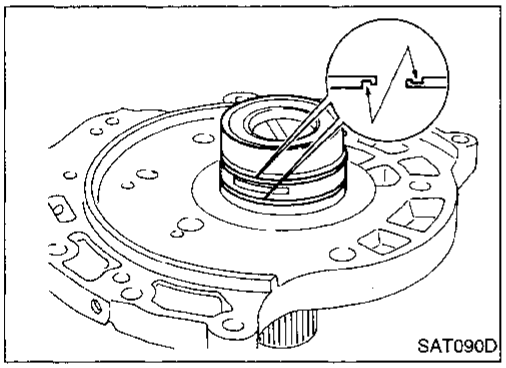
Both ends of pin should protrude.



8. Install detent spring.

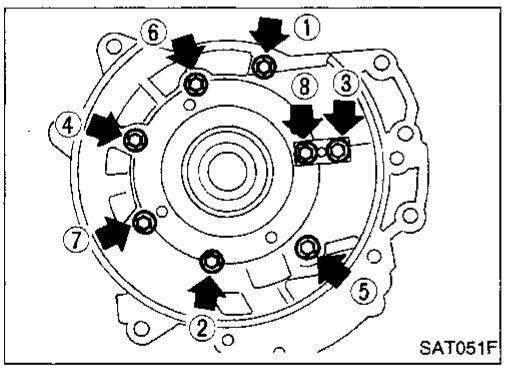
Oil Pump



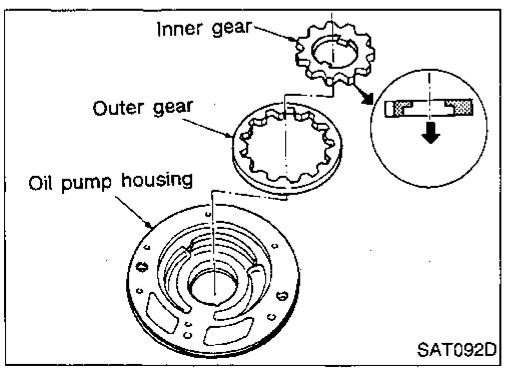


DISASSEMBLY

1. Remove seal rings by undoing hooks.

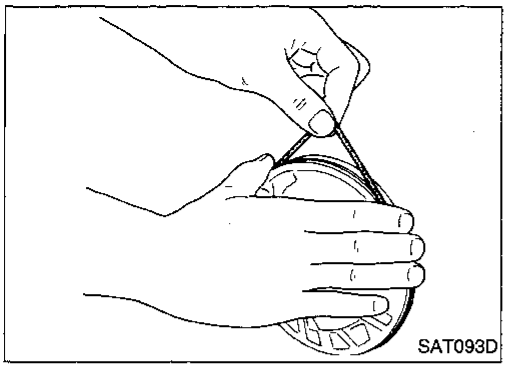


2. Loosen bolts in a crisscross pattern and remove oil pump cover.

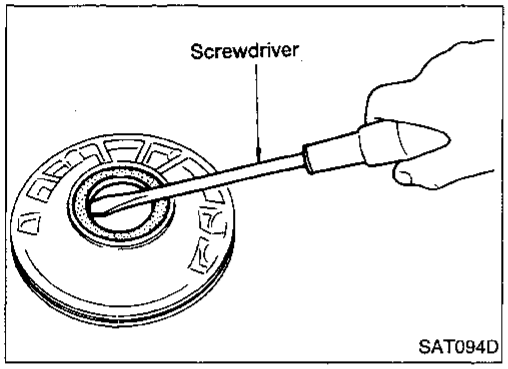


3. Remove inner and outer gear from oil pump housing.

Oil Pump (Cont'd)



4. Remove O-ring from oil pump housing.



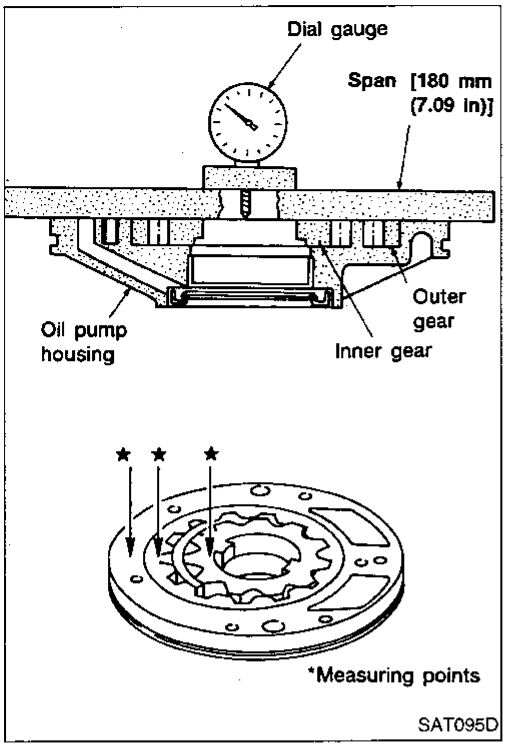
5. Remove oil pump housing oil seal.

INSPECTION

Oil pump housing, oil pump cover, inner gear and outer gear

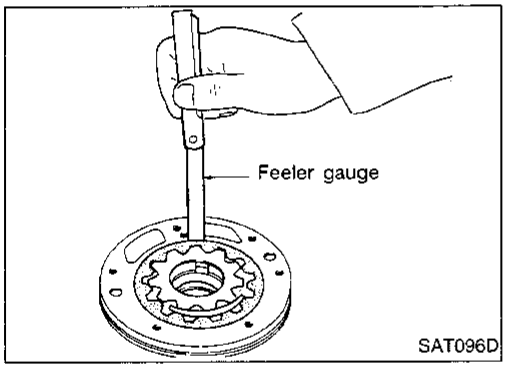
- Check for wear or damage.

Oil Pump (Cont'd)

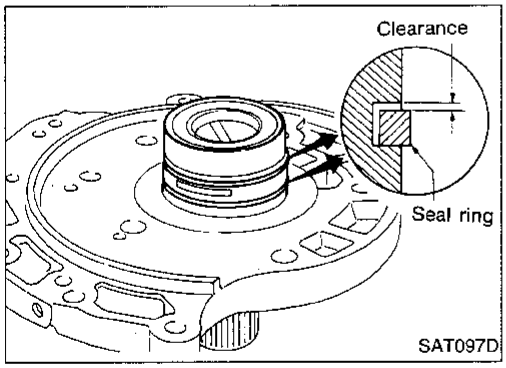


Side clearance

- Measure side clearance between end of oil pump housing and inner and outer gears in at least four places along their circumferences. Maximum measured values should be within specified ranges.
  Standard clearance:
  0.030 - 0.050 mm (0.0012 - 0.0020 in)
- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.
  Inner and outer gear:
  Refer to AT-212.
- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.

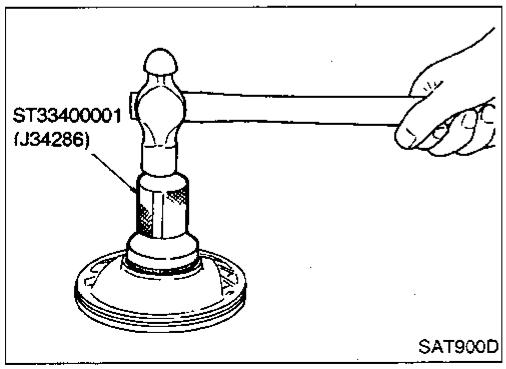


- Measure clearance between outer gear and oil pump housing.
  Standard clearance:
  0.111 - 0.181 mm (0.0044 - 0.0071 in)
  Allowable limit:
  0.181 mm (0.0071 in)
- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



Seal ring clearance

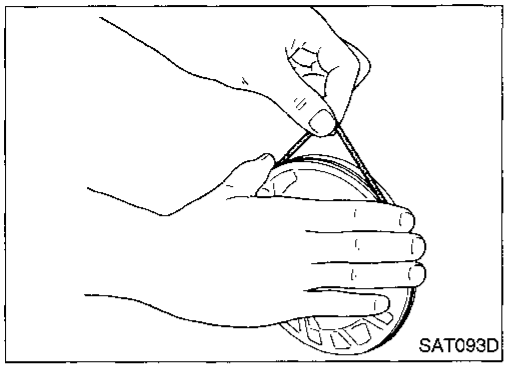
- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.036 - 0.176 mm (0.0014 - 0.0069 in)
  Allowable limit:
  0.176 mm (0.0069 in)
- If not within allowable limit, replace oil pump cover assembly.



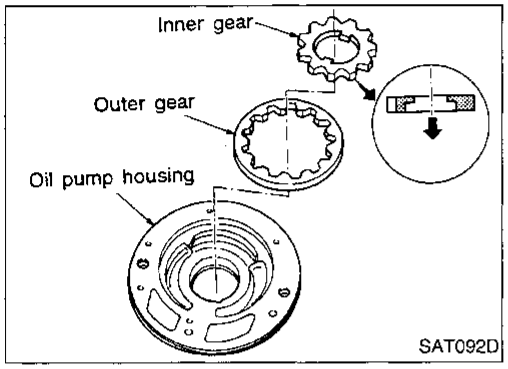
ASSEMBLY

1. Install oil seal on oil pump housing.

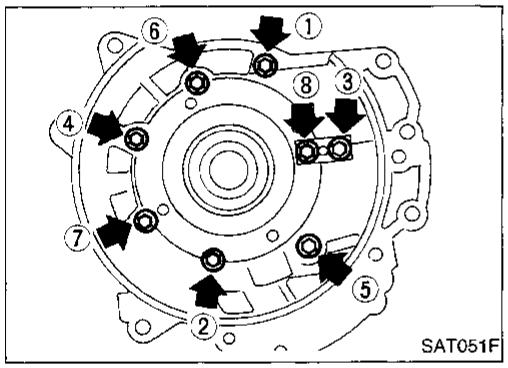
Oil Pump (Cont'd)



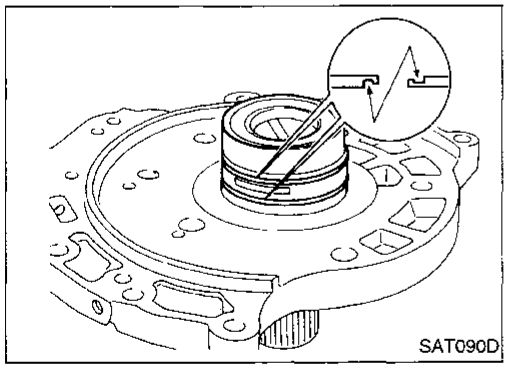
2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**



3. Install inner and outer gears on oil pump housing.
- **Be careful of direction of inner gear.**

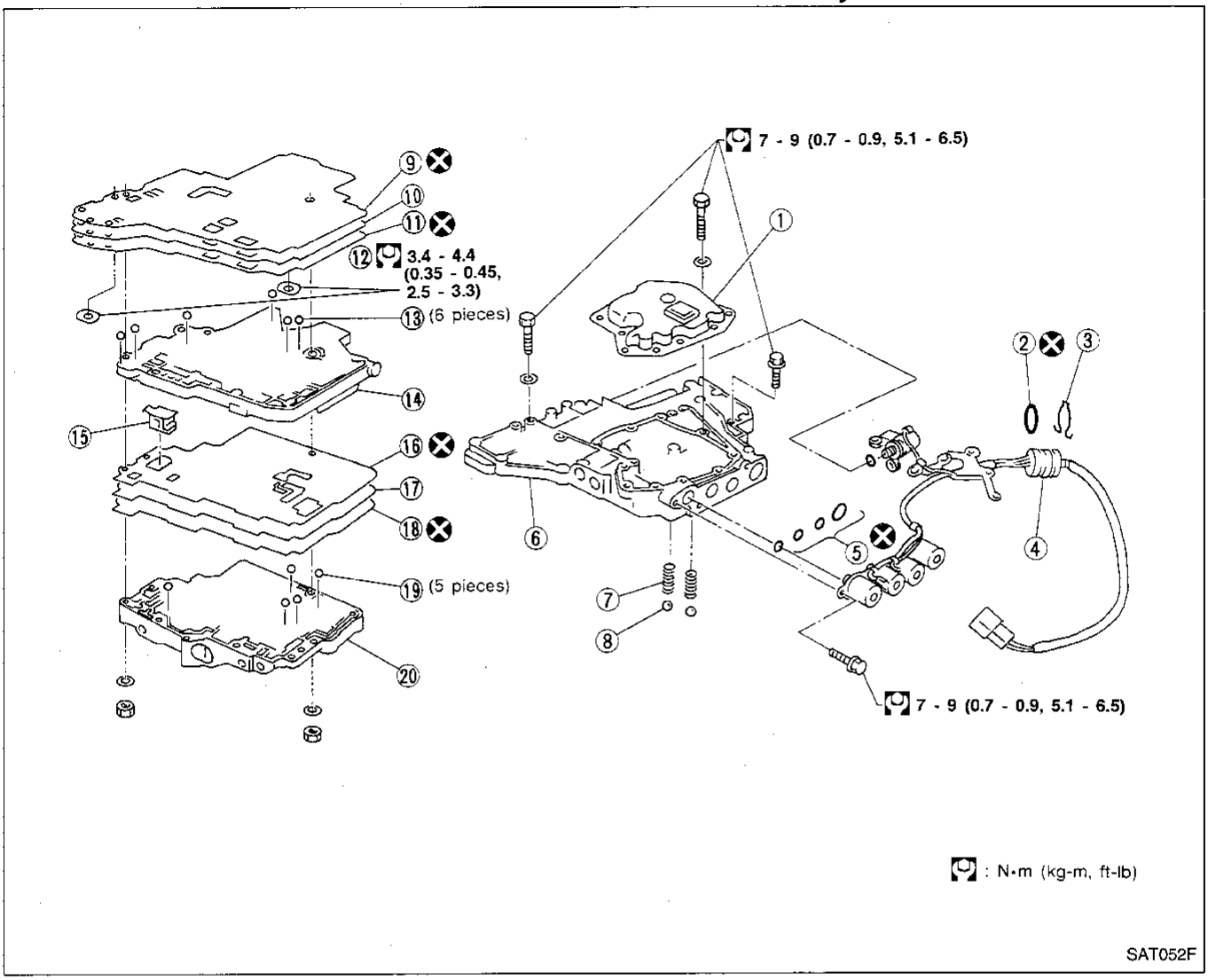


4. Install oil pump cover on oil pump housing.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
b. Tighten bolts in a crisscross pattern.



5. Install new seal rings carefully after packing ring groove with petroleum jelly and attach hooks.
- **Do not spread gap of seal ring excessively while installing. The ring may be deformed.**

Control Valve Assembly



① Oil strainer
② O-ring
③ Clamp
④ Terminal body
⑤ O-rings
⑥ Control valve lower body
⑦ Oil cooler relief valve spring
⑧ Check ball
⑨ Lower separating gasket
⑩ Separating plate
⑪ Lower inter separating gasket
⑫ Support plate
⑬ Steel ball
⑭ Control valve inter body
⑮ Pilot filter
⑯ Upper inter separating gasket
⑰ Separating plate
⑱ Upper separating gasket
⑲ Steel ball
⑳ Control valve upper body

DISASSEMBLY

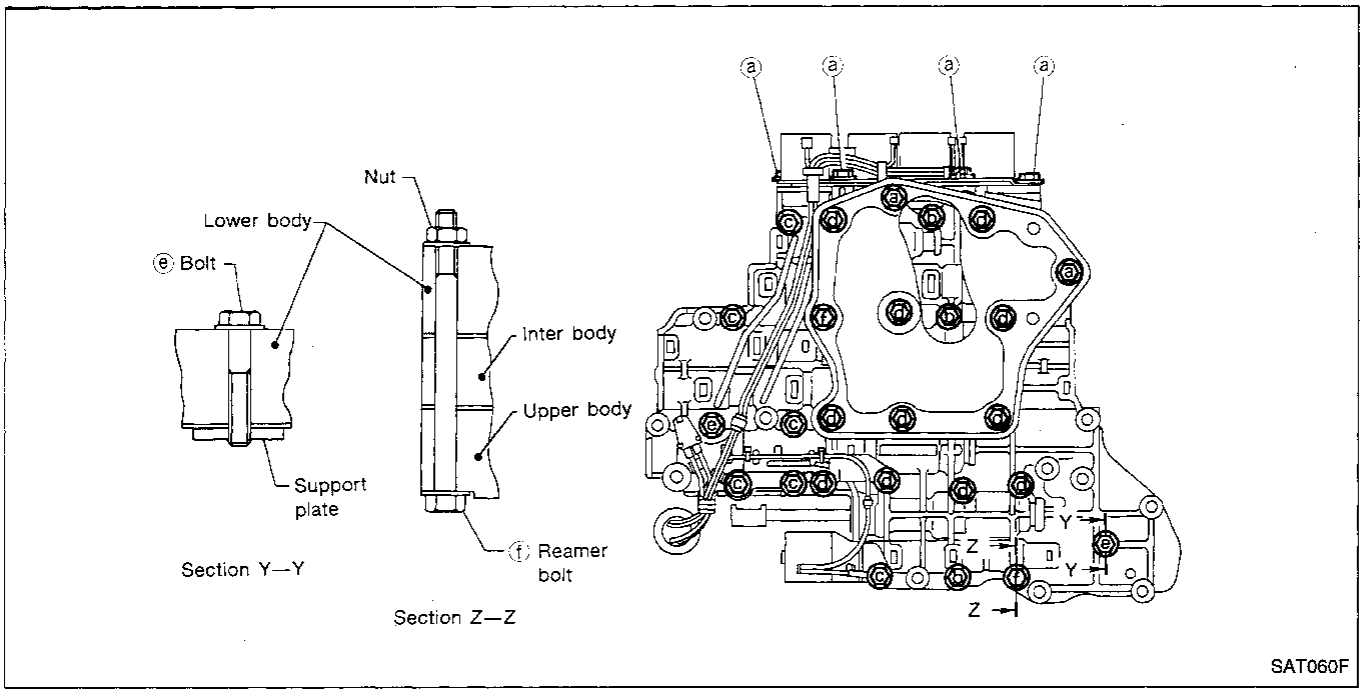
Disassemble upper, inter and lower bodies.

Bolt length, number and location:

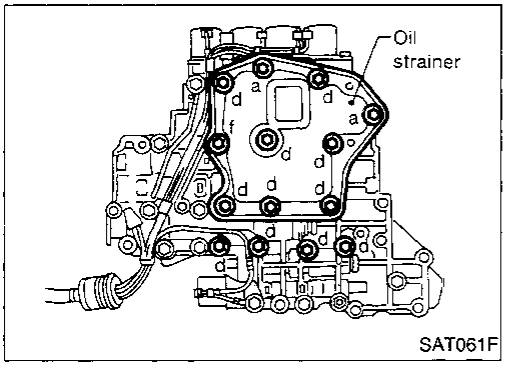
Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in) ℓ	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

f: Reamer bolt and nut.

Control Valve Assembly (Cont'd)

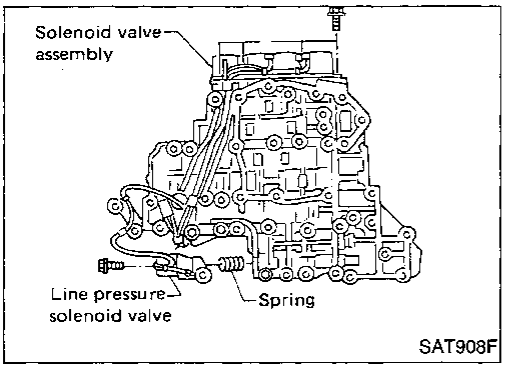


SAT060F



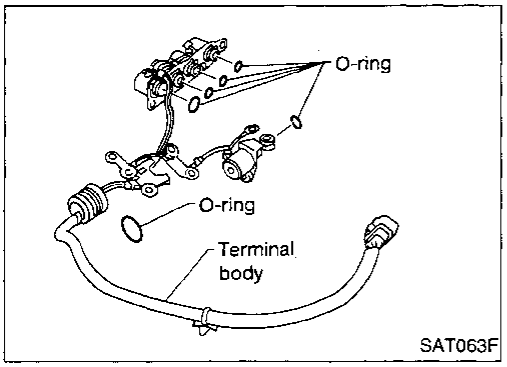
SAT061F

a. Remove bolts ⓐ, ⓓ and nut ⓕ and remove oil strainer from control valve assembly.



SAT908F

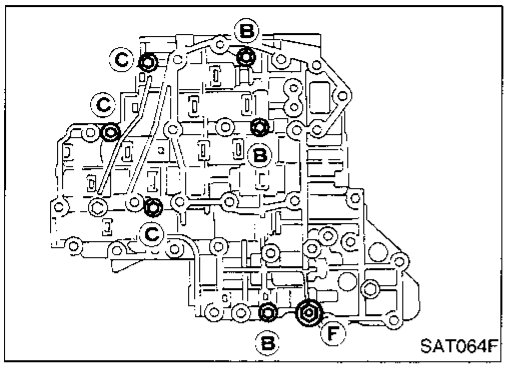
b. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.



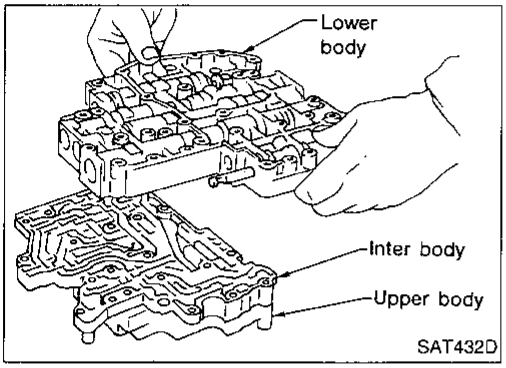
SAT063F

c. Remove O-rings from solenoid valves and terminal body.

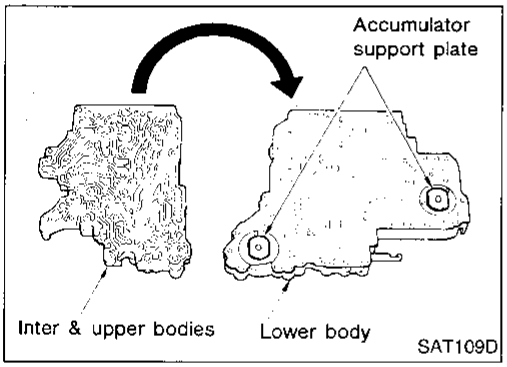
Control Valve Assembly (Cont'd)



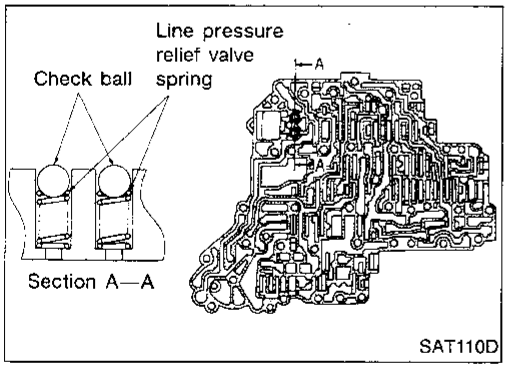
d. Place upper body facedown, and remove bolts ⓑ, ⓒ and nut ⓕ.



e. Remove inter body from lower body.

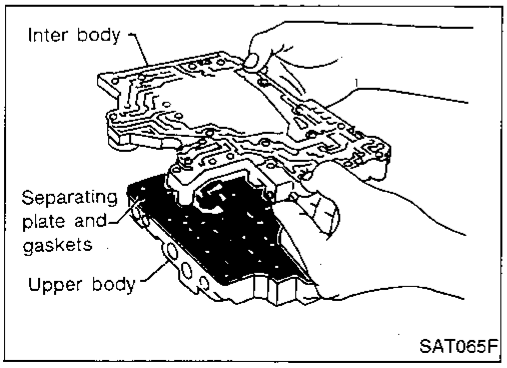


f. Turn over lower body, and remove accumulator support plate.



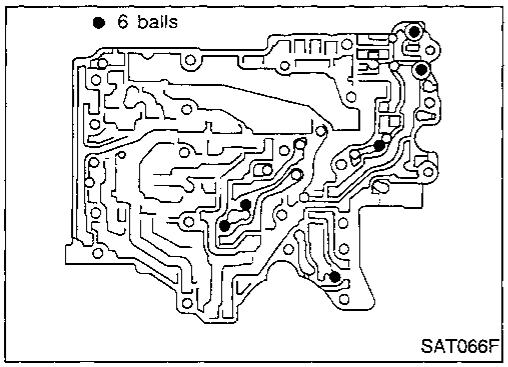
g. Remove bolts ⓔ, separating plate and separating gasket from lower body.
h. Remove steel balls and relief valve springs from lower body.

- **Be careful not to lose steel balls and relief valve springs.**



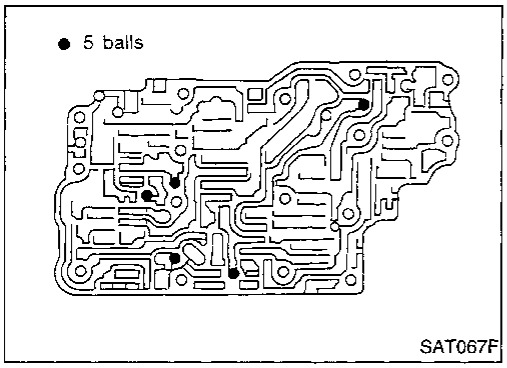
i. Remove inter body from upper body.

Control Valve Assembly (Cont'd)



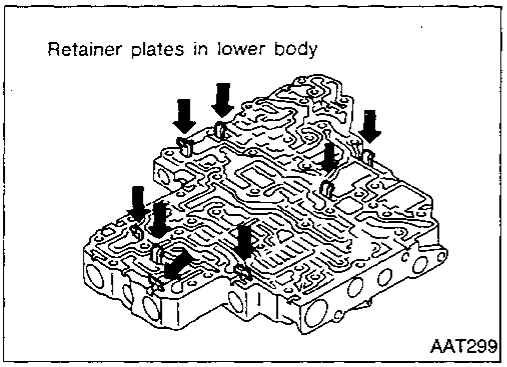
j. Check to see that steel balls are properly positioned in inter body and then remove them from inter body.

- **Be careful not to lose steel balls.**



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

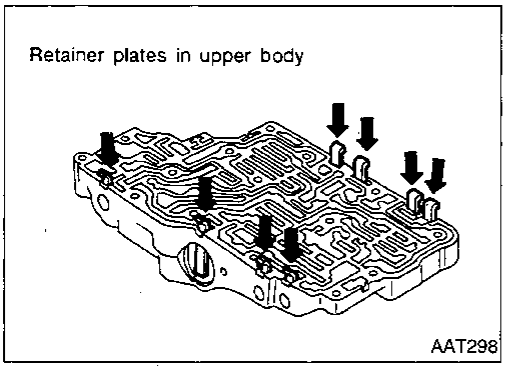
- **Be careful not to lose steel balls.**



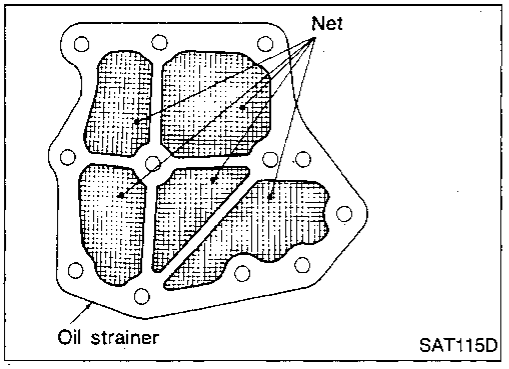
INSPECTION

Lower and upper bodies

- Check to see that retainer plates are properly positioned in lower body.



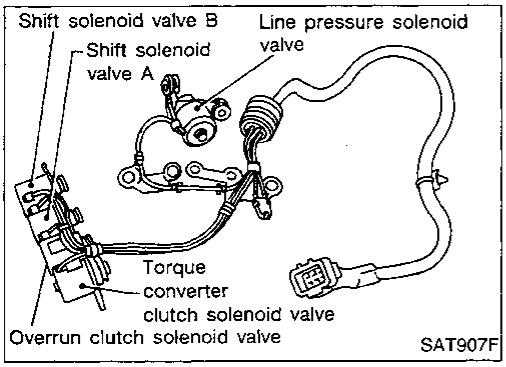
- Check to see that retainer plates are properly positioned in upper body.
- **Be careful not to lose these parts.**



Oil strainer

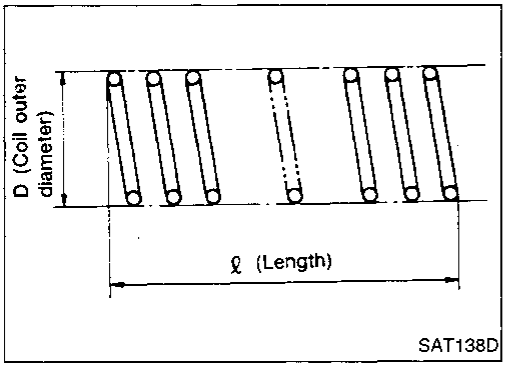
- Check wire netting of oil strainer for damage.

Control Valve Assembly (Cont'd)



Shift solenoid valves A and B, line pressure solenoid valve, torque converter clutch solenoid valve and overrun clutch solenoid valve.

- Measure resistance — See "Solenoid Valves and Fluid Temperature Sensor". Refer to AT-91.



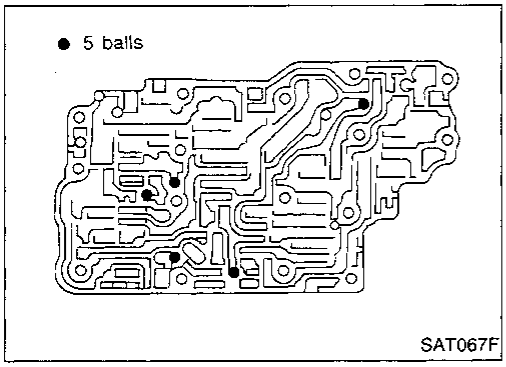
Oil cooler relief valve spring.

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

Inspection standard:

Unit: mm (in)

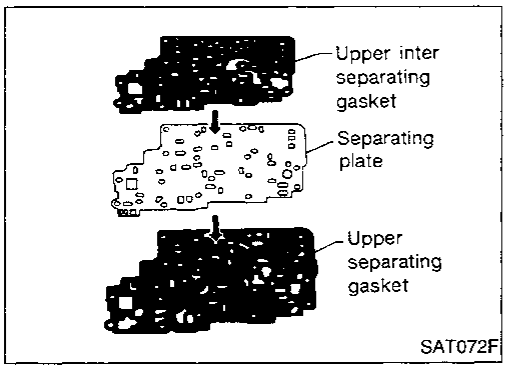
Part No.	ℓ	D
31872-31X00	17.02 (0.6701)	8.0 (0.315)



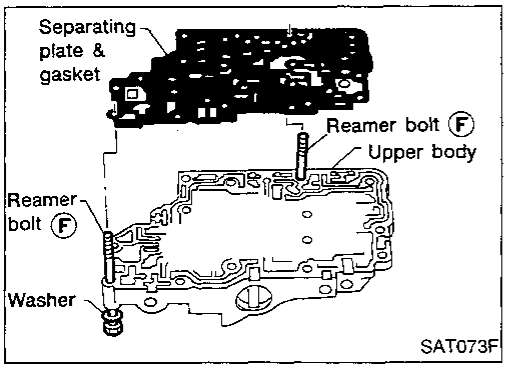
ASSEMBLY

1. Install upper, inter and lower body.

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

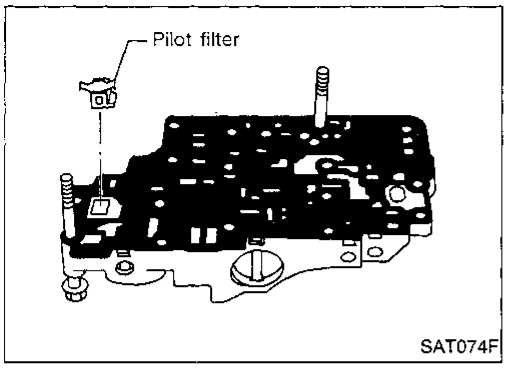


b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

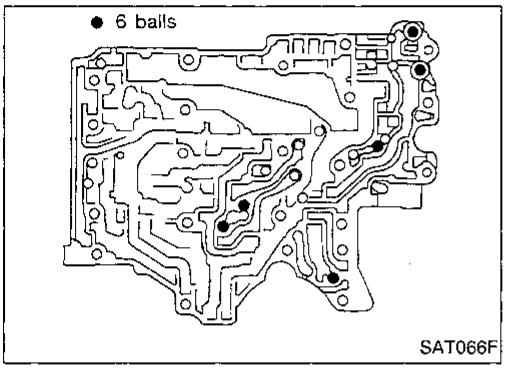


c. Install reamer bolts ⓕ from bottom of upper body and install separating gaskets and separating plate as a set on upper body using reamer bolts as guides.

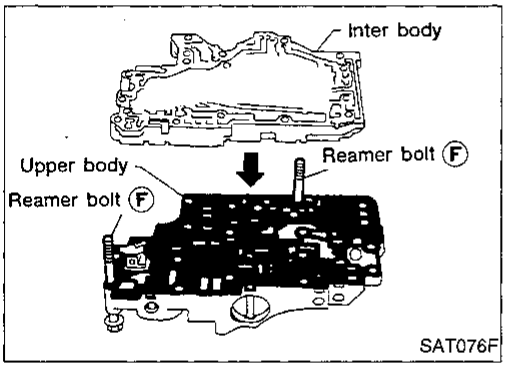
Control Valve Assembly (Cont'd)



d. Install pilot filter.

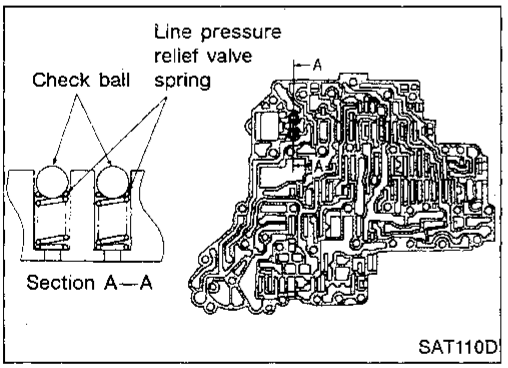


e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

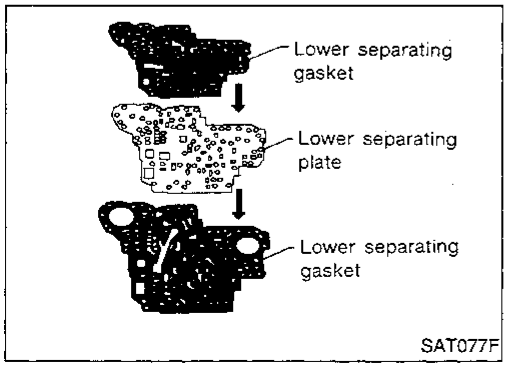


f. Install inter body on upper body using reamer bolts Ⓕ as guides.

- **Be careful not to dislocate or drop steel balls.**

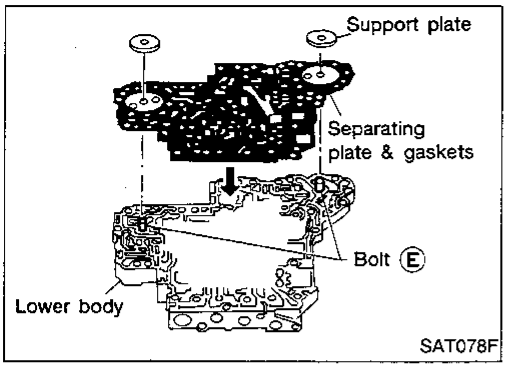


g. Install steel balls and relief valve springs in their proper positions in lower body.

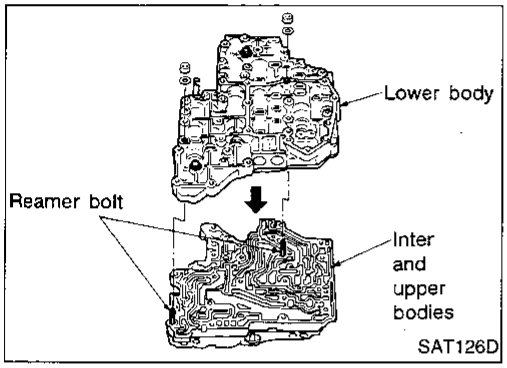


h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in illustration.

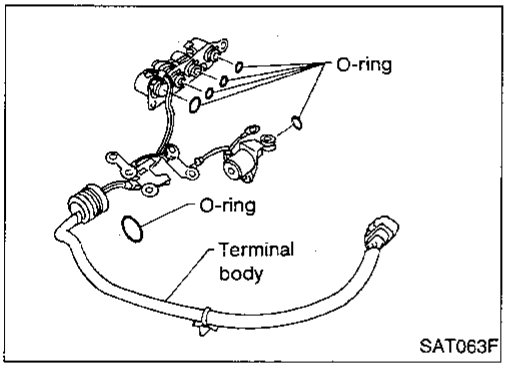
Control Valve Assembly (Cont'd)



i. Install bolts (e) from bottom of lower body and install separating gaskets and separating plate as a set on lower body using bolts (e) as guides.
j. Temporarily install support plates on lower body.



k. Install lower body on inter body using reamer bolts (f) as guides and tighten reamer bolts (f) slightly.



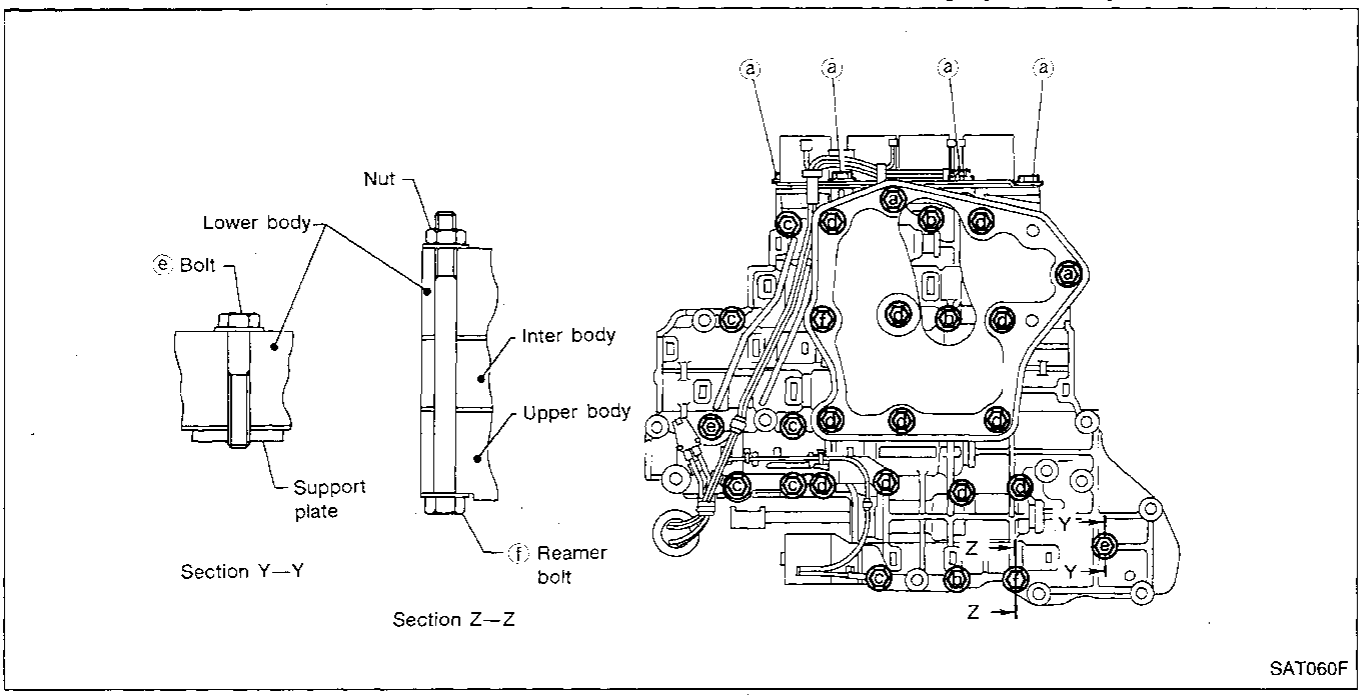
2. Install O-rings to solenoid valves and terminal body.
- **Apply ATF to O-rings.**

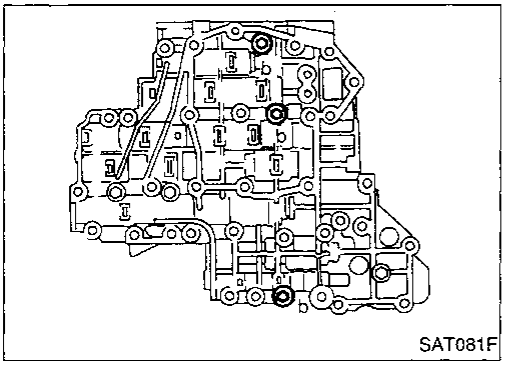
3. Install and tighten bolts.

Bolt length, number and location:

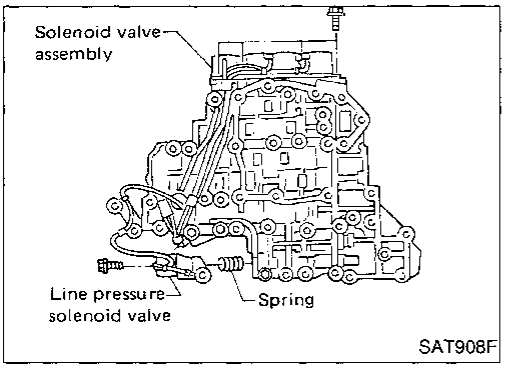
Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in) ℓ	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

Control Valve Assembly (Cont'd)

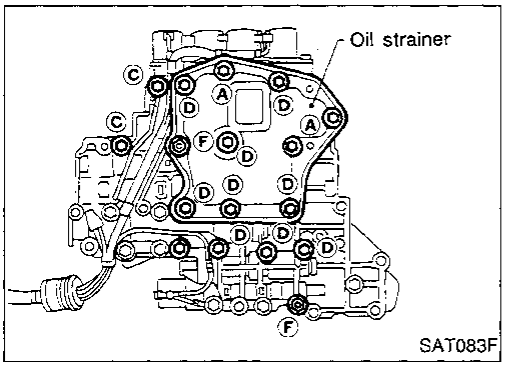




a. Install and tighten bolts ⓑ to specified torque.

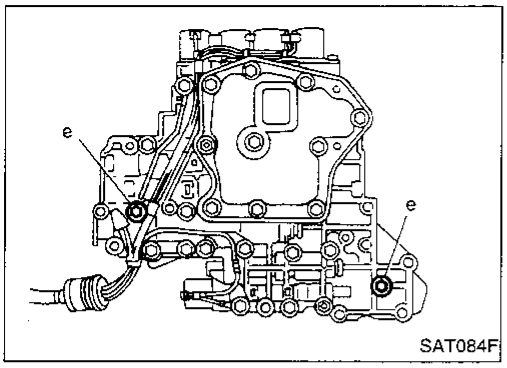


b. Install solenoid valve assembly and line pressure solenoid valve to lower body.



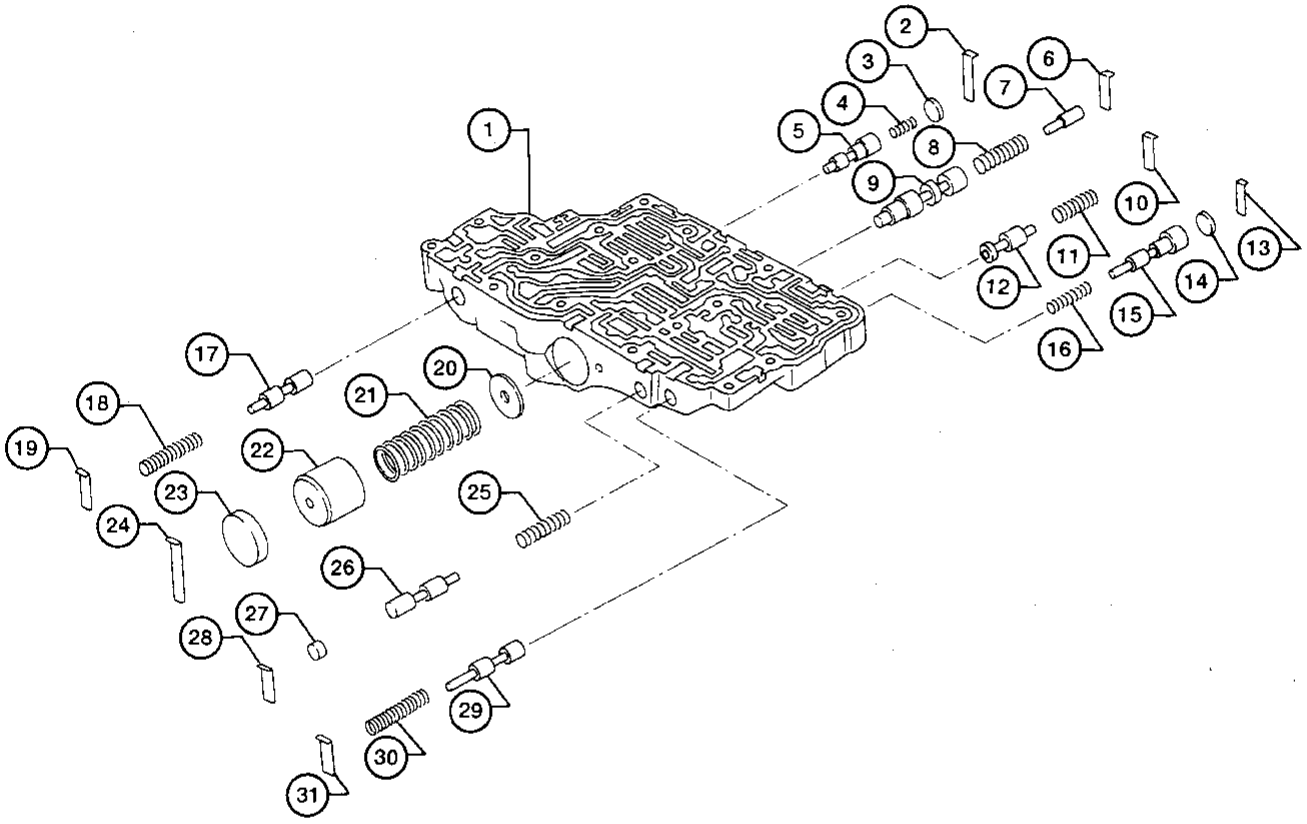
c. Set oil strainer, then tighten bolts ⓐ, ⓒ, ⓓ and nuts ⓕ to specified torque.

Control Valve Assembly (Cont'd)



d. Tighten bolts ⓔ (2 pieces) to specified torque.

Control Valve Upper Body

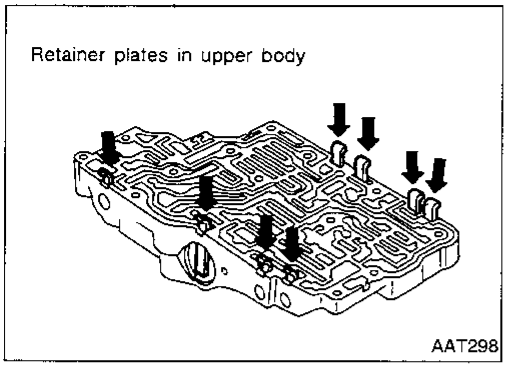


AAT300

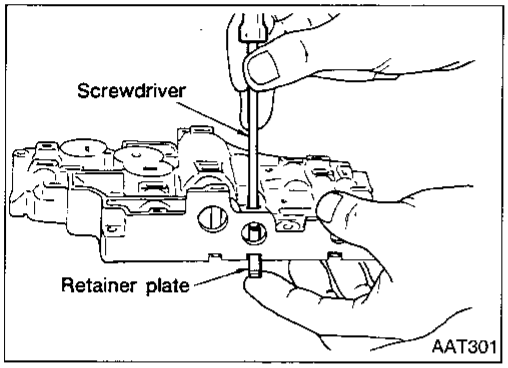
① Upper body
② Retainer plate
③ Plug
④ Return spring
⑤ 1-2 accumulator valve
⑥ Retainer plate
⑦ Plug
⑧ Return spring
⑨ Torque converter clutch control valve
⑩ Retainer plate
⑪ Return spring
⑫ Torque converter relief valve
⑬ Retainer plate
⑭ Plug
⑮ Overrun clutch reducing valve
⑯ Return spring
⑰ Pilot valve
⑱ Return spring
⑲ Retainer plate
⑳ 1-2 accumulator retainer plate
㉑ Return spring
㉒ 1-2 accumulator piston
㉓ Plug
㉔ Retainer plate
㉕ Return spring
㉖ 1st reducing valve
㉗ Plug
㉘ Retainer plate
㉙ 2-3 timing valve
㉚ Return spring
㉛ Retainer plate

Control Valve Upper Body (Cont'd)

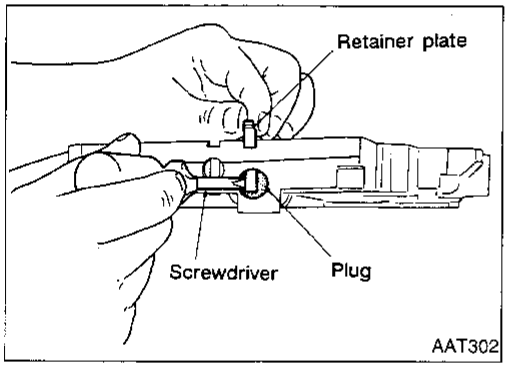
DISASSEMBLY



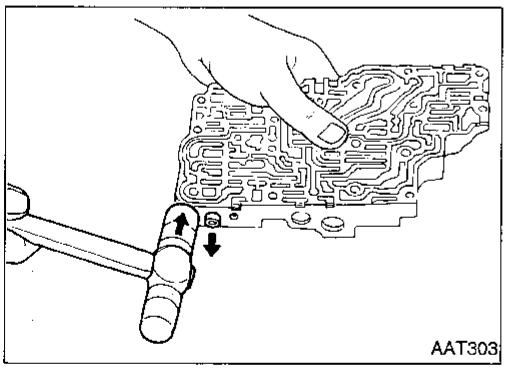
1. Remove valves at retainer plates.
- **Do not use a magnetic "hand".**



a. Use a screwdriver to pry out retainer plates.

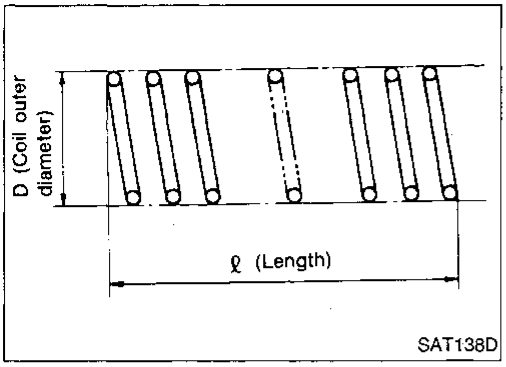


b. Remove retainer plates while holding spring, plugs or sleeves.
- **Remove plugs slowly to prevent internal parts from jumping out.**



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

Control Valve Upper Body (Cont'd)



INSPECTION

Valve spring

- 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 page AT-143.

Inspection standard

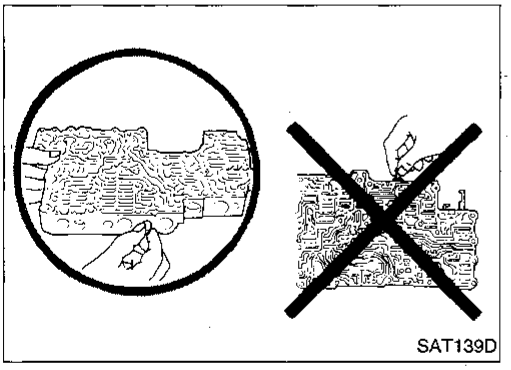
Unit: mm (in)

	Parts	Part No.	ℓ	D
⑱	Pilot valve spring	31742 80x14	36.0 (1.417)	8.1 (0.319)
④	1-2 accumulator valve spring	31742 80x10	20.5 (0.807)	7.0 (0.276)
㉑	1-2 accumulator piston spring	31742 80x12	52.0 (2.047)	19.6 (0.772)
㉕	1st reducing valve spring	31742 80x05	27.0 (1.063)	7.0 (0.276)
㉚	2-3 timing valve	31742 80x18	30.5 (1.201)	6.6 (0.260)
⑯	Overrun clutch reducing valve spring	31742 80x15	37.5 (1.476)	6.9 (0.272)
⑪	Torque converter relief valve spring	31742 80x07	31.0 (1.220)	9.0 (0.354)
⑧	Torque converter clutch control valve spring	31742 80x17	39.5 (1.555)	11.0 (0.433)

- Replace valve springs if deformed or fatigued.

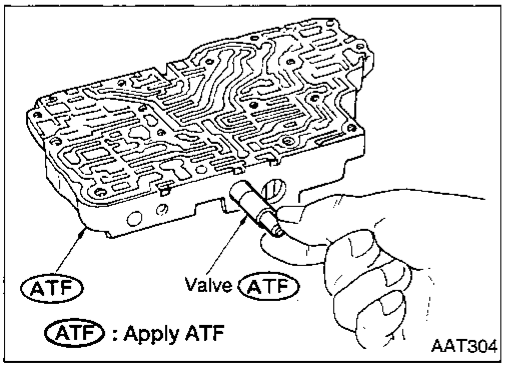
Control valves

- Check sliding surfaces of valves, sleeves and plugs.



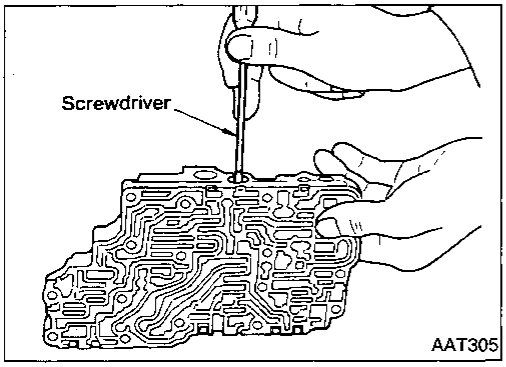
ASSEMBLY

- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



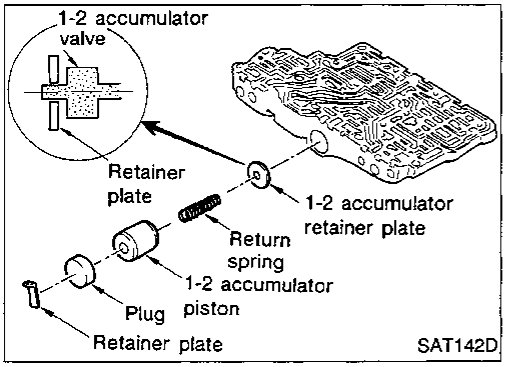
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.
- **Be careful not to scratch or damage valve body.**

Control Valve Upper Body (Cont'd)

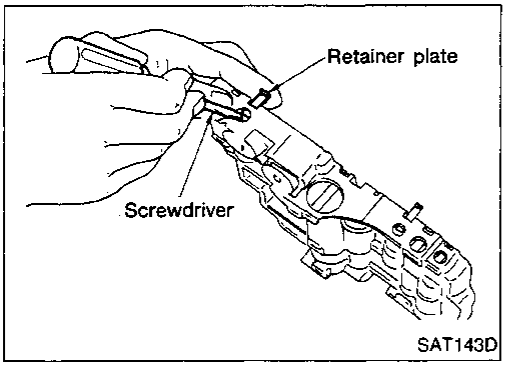


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.

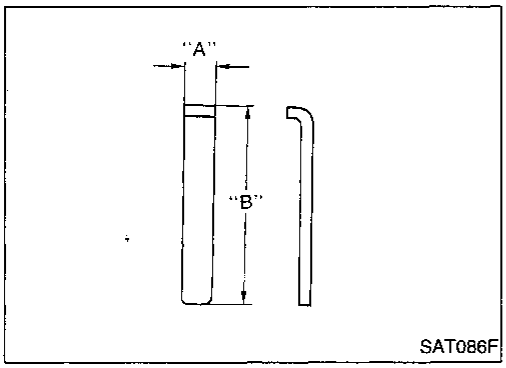
1-2 accumulator valve



- Install 1-2 accumulator valve and then align 1-2 accumulator retainer plate with 1-2 accumulator valve from opposite side of control valve body.
- Install return spring, 1-2 accumulator piston and plug.



2. Install retainer plates
- Install retainer plate while pushing plug or return spring.



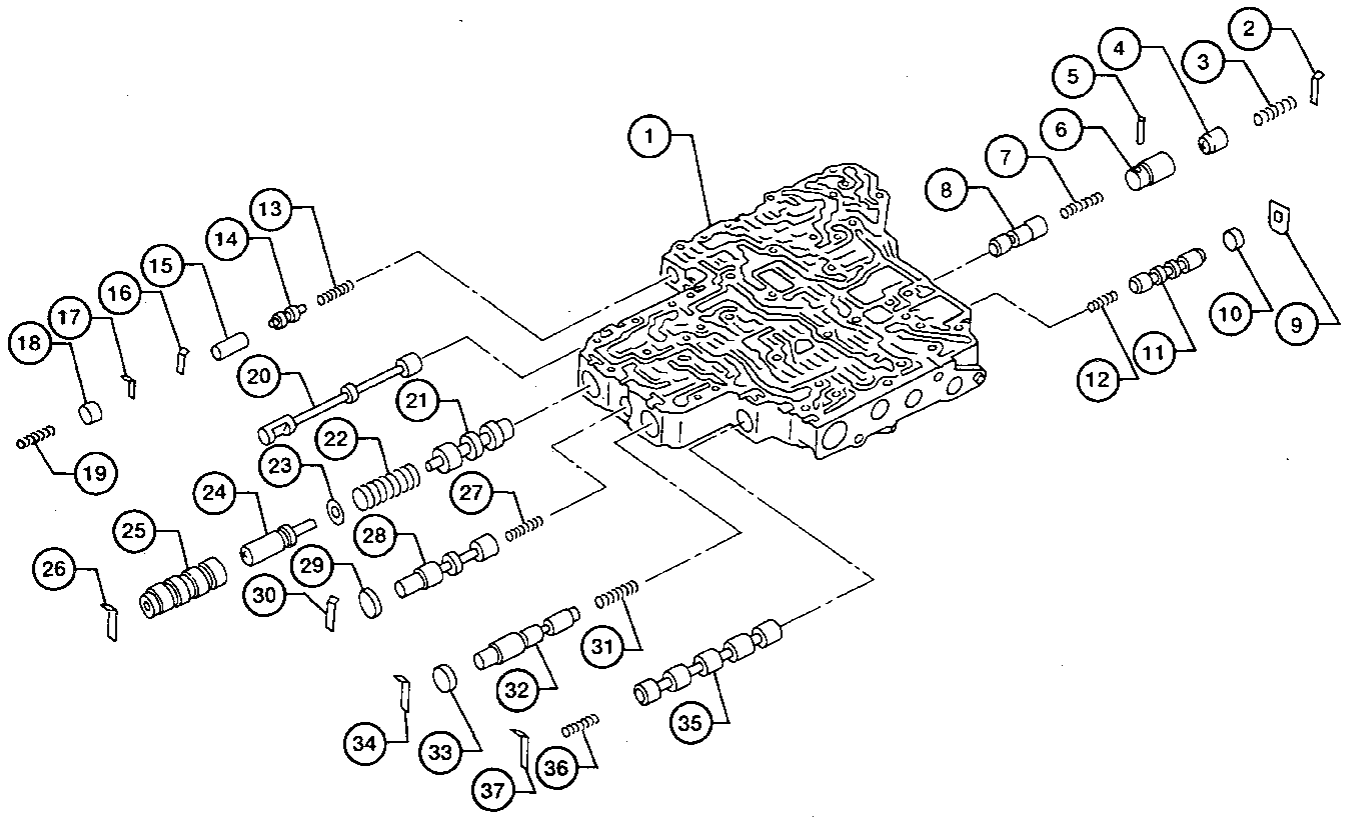
Retainer plate

Unit: mm (in)

Name of control valve	Length A	Length B
Pilot valve	6.0 (0.236)	21.5 (0.846)
1-2 accumulator valve		38.5 (1.516)
1-2 accumulator piston valve		
1st reducing valve		21.5 (0.846)
2-3 timing valve		
Overrun clutch reducing valve		24.0 (0.945)
Torque converter relief valve		21.5 (0.846)
Torque converter clutch control valve		28.0 (1.102)

- Install proper retainer plates.

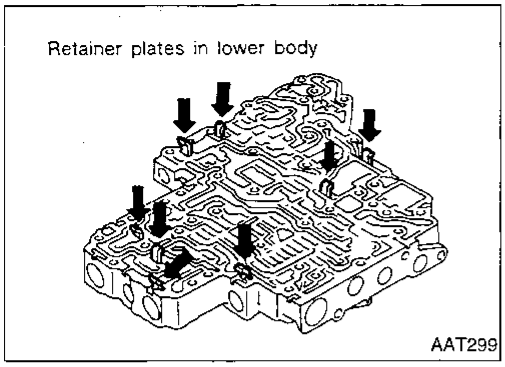
Control Valve Lower Body



AAT306

① Lower body
② Retainer plate
③ Return spring
④ Piston
⑤ Parallel pin
⑥ Sleeve
⑦ Return spring
⑧ Pressure modifier valve
⑨ Retainer plate
⑩ Plug
⑪ Shift valve B
⑫ Return spring
⑬ Return spring
⑭ Accumulator shift valve
⑮ Plug
⑯ Retainer plate
⑰ Retainer plate
⑱ Plug
⑲ Return spring
⑳ Manual valve
㉑ Pressure regulator valve
㉒ Return spring
㉓ Spring seat
㉔ Plug
㉕ Sleeve
㉖ Retainer plate
㉗ Return spring
㉘ Overrun clutch control valve
㉙ Plug
㉚ Retainer plate
㉛ Return spring
㉜ Accumulator control valve
㉝ Plug
㉞ Retainer plate
㉟ Shift valve A
㊱ Return spring
㊲ Retainer plate

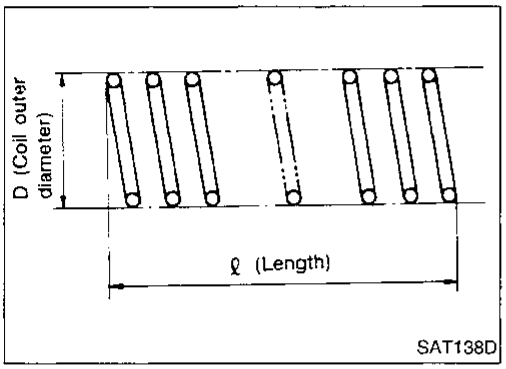
Control Valve Lower Body (Cont'd)



DISASSEMBLY

Remove valves at retainer plates.

For removal procedures, see "DISASSEMBLY" of Control Valve Upper Body. Refer to AT-144.



INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
- Numbers for each valve spring listed in the table below are the same as those in the figure on page AT-147.

Inspection standard

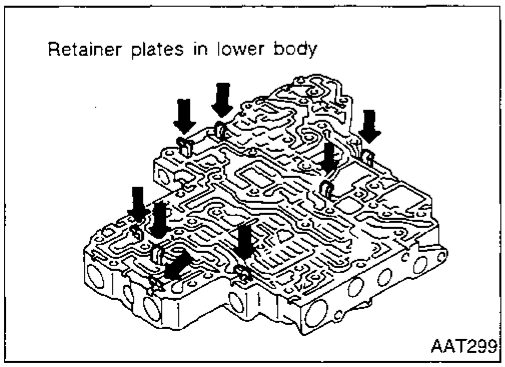
Unit: mm (in)

	Parts	Part No.		D
⑬	Accumulator shift valve spring	31736 01X00	23.0 (0.906)	6.65 (0.2618)
⑲	Line pressure solenoid valve spring	31742 80X11	17.0 (0.669)	10.7 (0.421)
㉒	Pressure regulator valve spring	31742 80X13	45.0 (1.772)	15.0 (0.591)
㉗	Overrun clutch control valve spring	31762 80X00	21.7 (0.854)	7.0 (0.276)
㉛	Accumulator control valve spring	31742 80X02	22.0 (0.866)	6.5 (0.256)
㊱	Shift valve A spring	31762 80X00	21.7 (0.854)	7.0 (0.276)
⑫	Shift valve B spring	31762 80X00	21.7 (0.854)	7.0 (0.276)
③	Pressure modifier valve spring	31742 41X15	30.5 (1.201)	9.8 (0.386)
⑦		31742 80X16	32.0 (1.260)	6.9 (0.272)

- Replace valve springs if deformed or fatigued.

Control valves

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

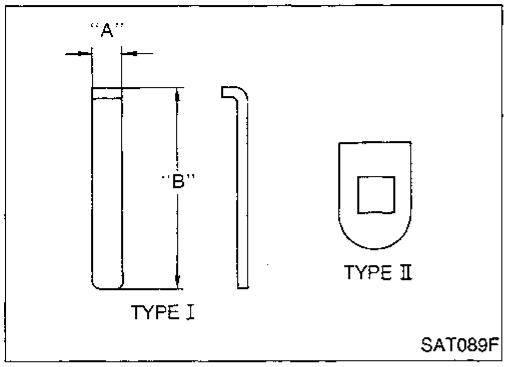


ASSEMBLY

- Install control valves.
  For installation procedures, see "ASSEMBLY" of Control Valve Upper Body. Refer to AT-145.

Control Valve Lower Body (Cont'd)

Retainer plate

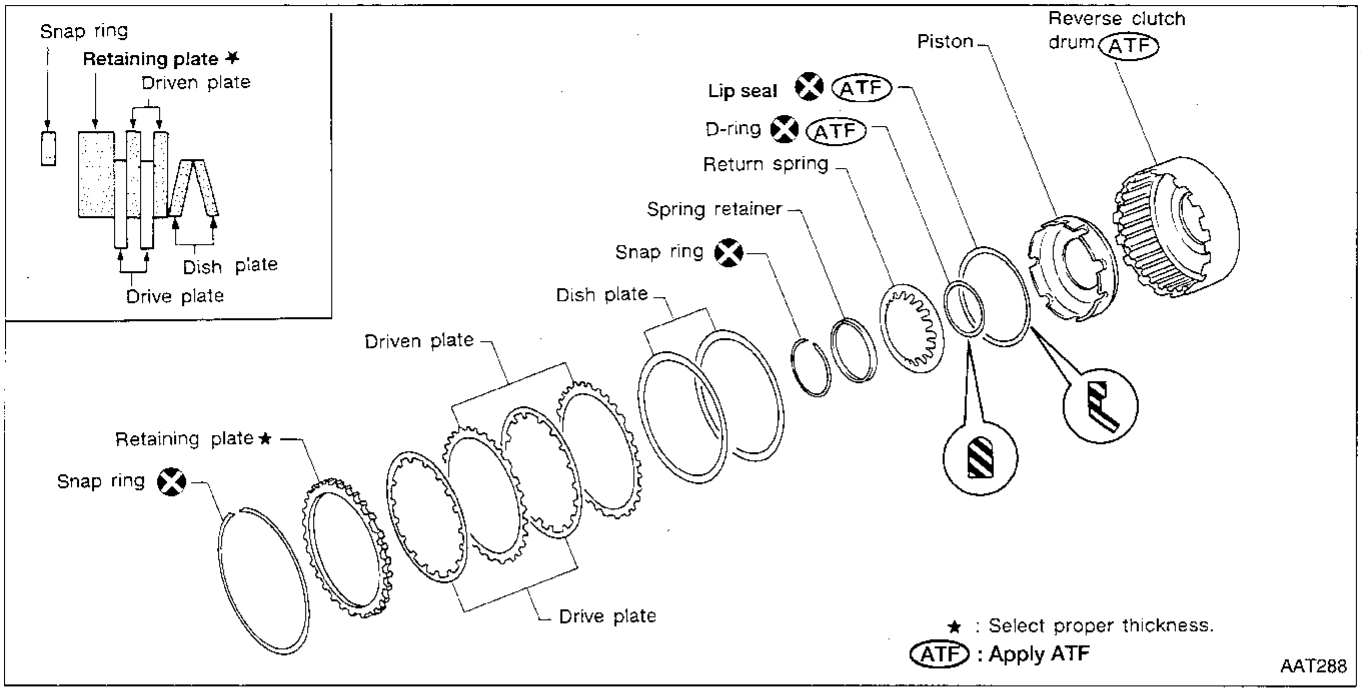


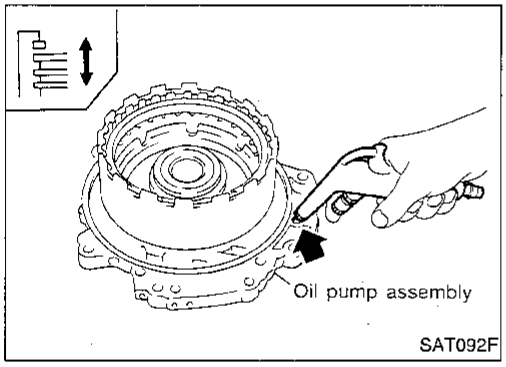
Unit: mm (in)

Name of control valve	Length A	Length B	Type
Accumulator shift valve	6.0 (0.236)	19.5 (0.768)	I
Pressure regulator valve		28.0 (1.102)	
Pressure clutch control			
Accumulator control valve			
Shift valve A			
Overrun clutch control valve			
Pressure modifier valve			
Shift valve B	—	—	II

- Install proper retainer plates

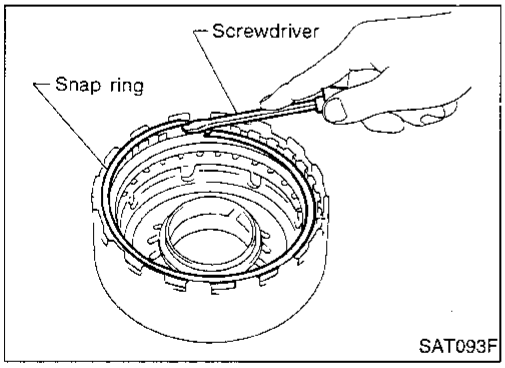
Reverse Clutch



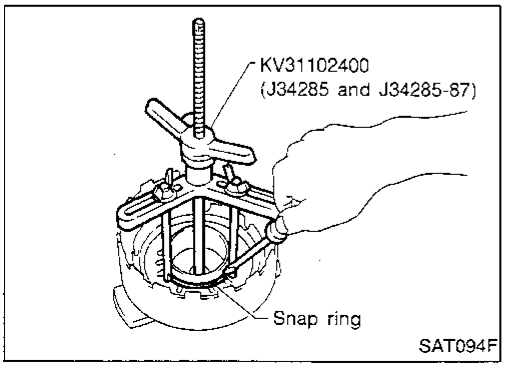


DISASSEMBLY

1. Check operation of reverse clutch
a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. 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 lip seal may be damaged or fluid may be leaking at piston check ball.



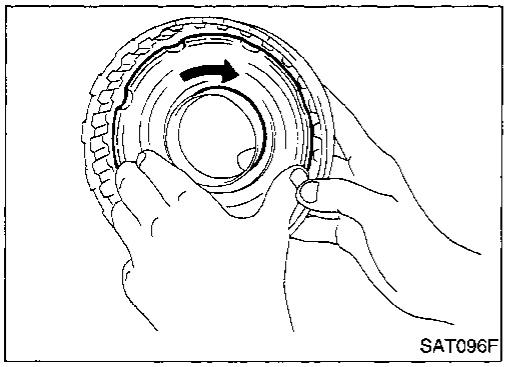
2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.



4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

5. Remove spring retainer and return springs.

Reverse Clutch (Cont'd)

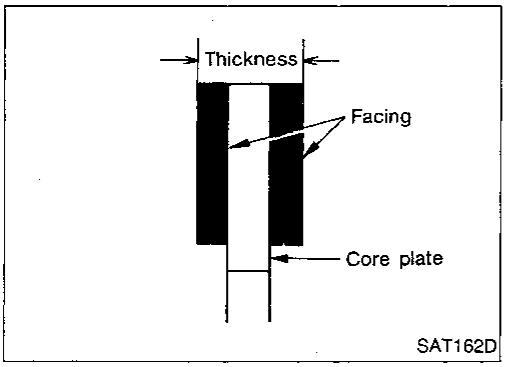

SAT096F

6. Remove piston from reverse clutch drum by turning it.
7. Remove D-ring and lip seal from piston.

INSPECTION

Reverse clutch snap ring, spring retainer and return springs

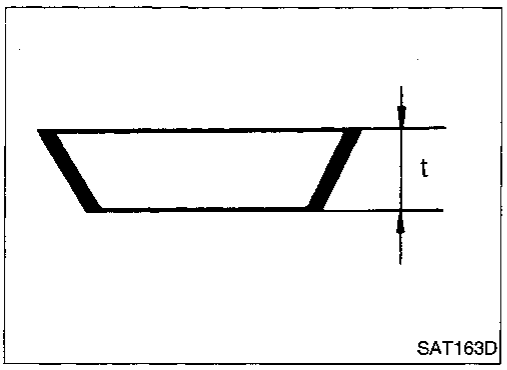
- Check for deformation, fatigue or damage.
  If necessary, replace.



SAT162D

Reverse clutch 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.



SAT163D

Reverse clutch dish plates

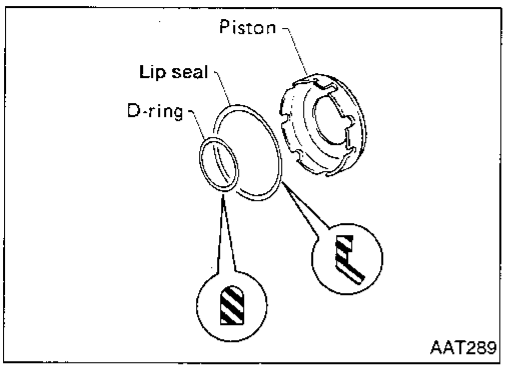
- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate: 3.08 mm (0.1213 in)
- If deformed or fatigued, replace.

Reverse clutch piston

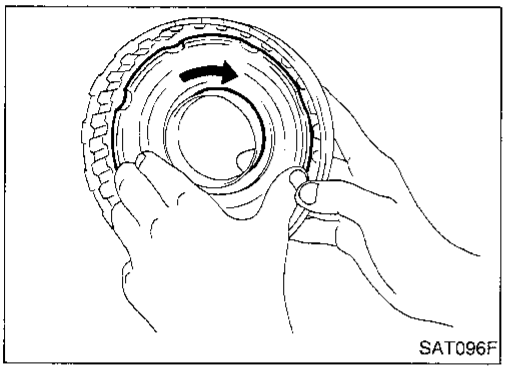
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

Reverse Clutch (Cont'd)

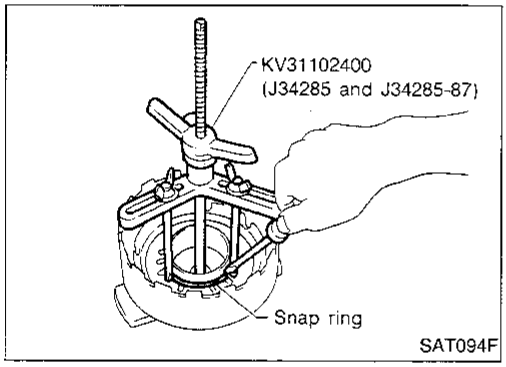
ASSEMBLY



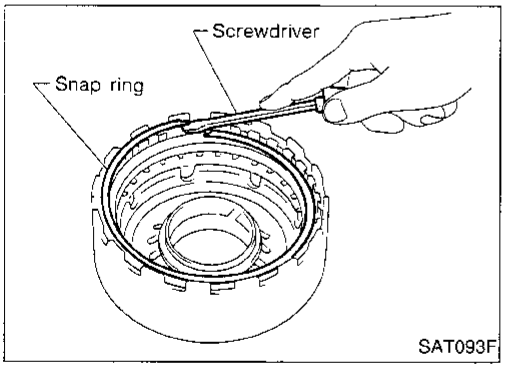
1. Install D-ring and lip seal on piston.
- **Take care with the direction of lip seal.**
- **Apply ATF to both parts.**



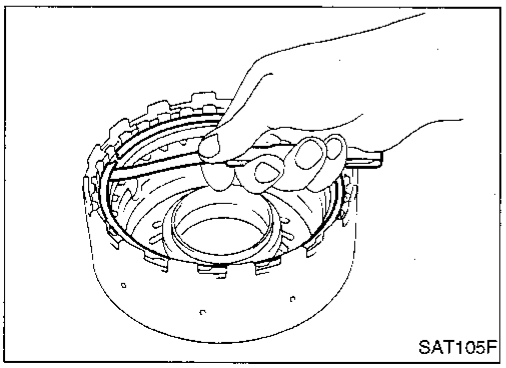
2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**



3. Install return springs and spring retainer on piston.
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**

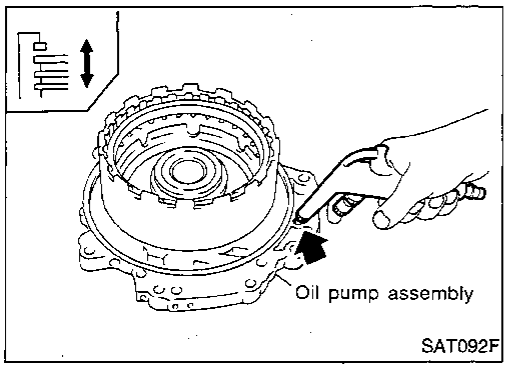


5. Install drive plates, driven plates, retaining plate and dish plates.
- **Take care with order of plates.**
6. Install snap ring.



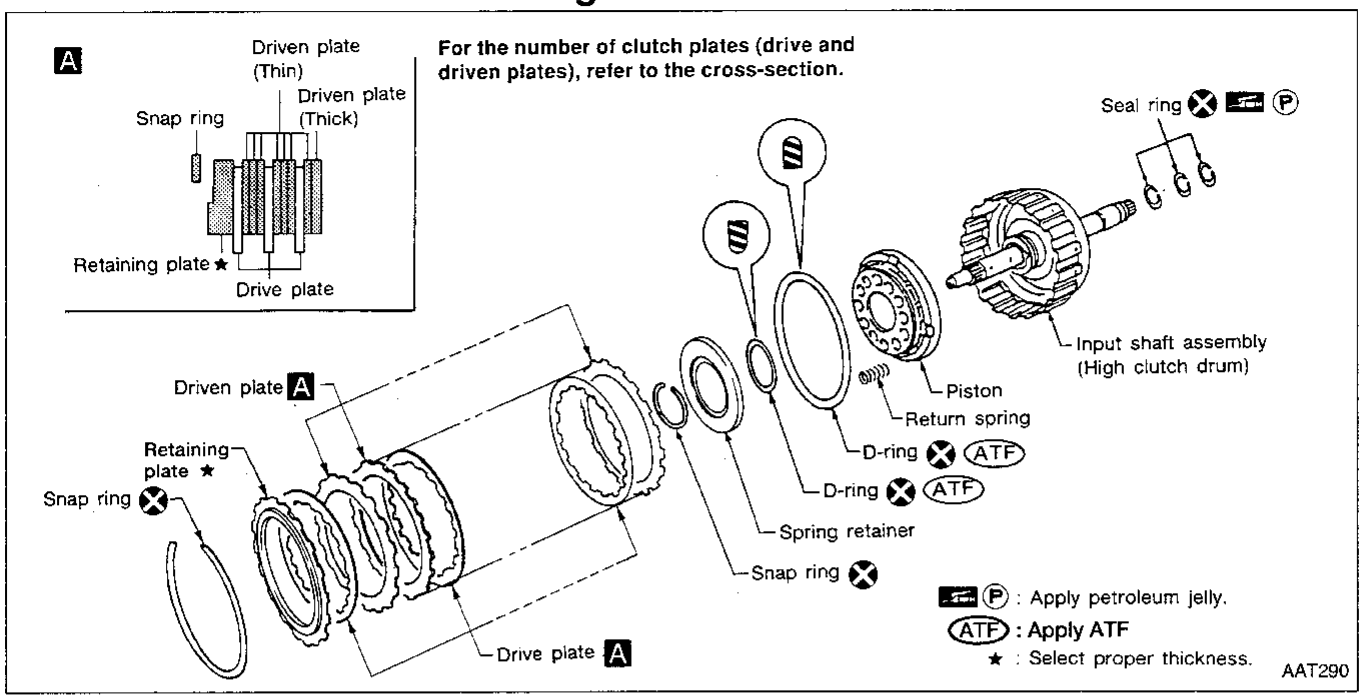
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit 1.2 mm (0.047 in)
   Retaining plate: Refer to AT-209.

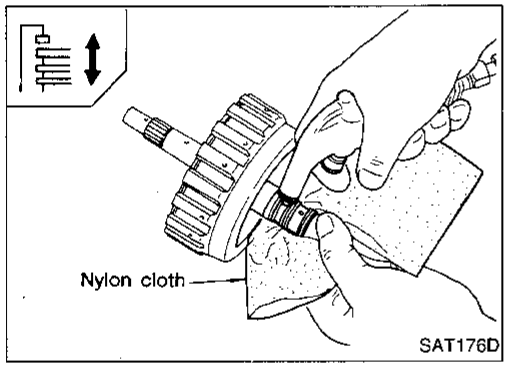
Reverse Clutch (Cont'd)



8. Check operation of reverse clutch. Refer to AT-150.

High Clutch





DISASSEMBLY

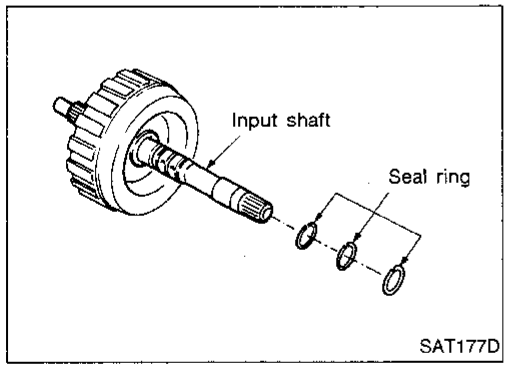
1. Check operation of high clutch.

a. Apply compressed air to oil hole of input shaft with nylon cloth.

- **Stop up hole on opposite side of input shaft with nylon cloth.**

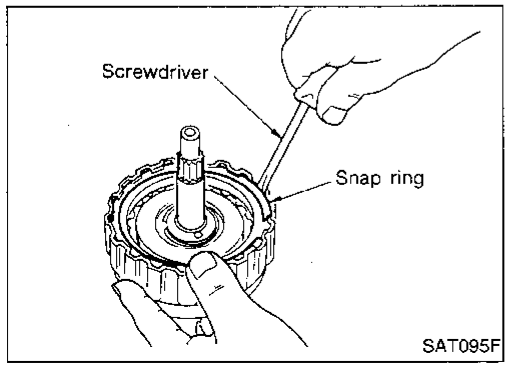
b. Check to see that retaining plate moves to snap ring.

c. If retaining plate does not move to snap ring, D-rings may be damaged or fluid may be leaking at piston check ball.



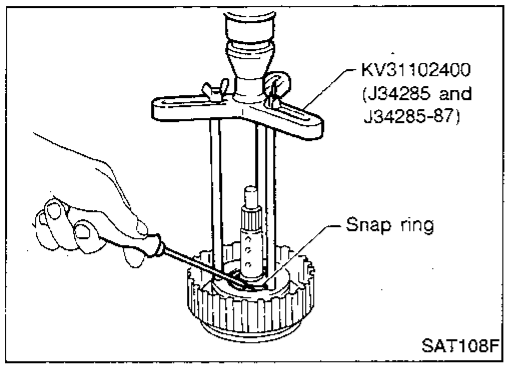
2. Remove seal rings from input shaft.

- **Always replace when removed.**



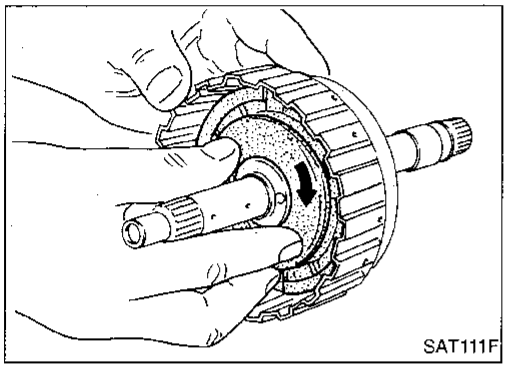
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.

High Clutch (Cont'd)

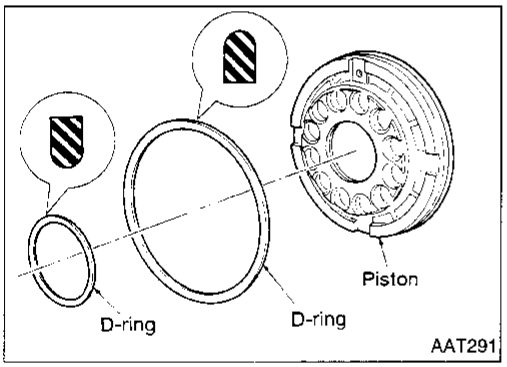


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

6. Remove spring retainer and return springs.



7. Remove piston from high clutch drum by turning it.

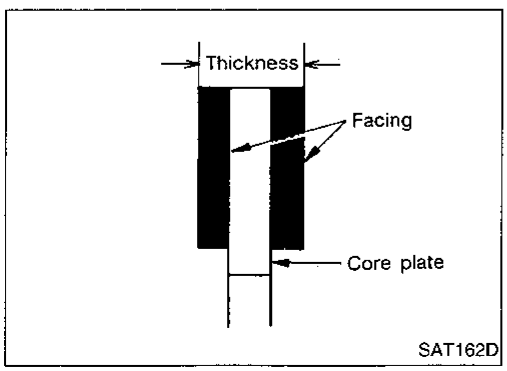


8. Remove D-rings from piston.

INSPECTION

High clutch snap ring, spring retainer and return springs.

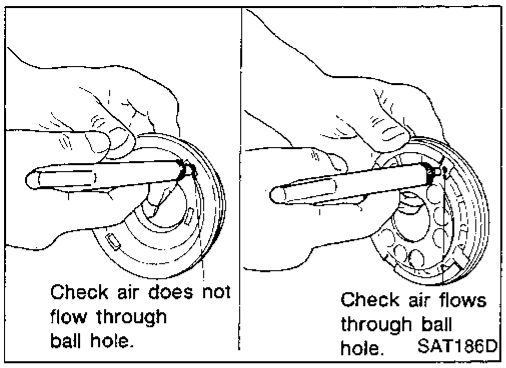
- Check for deformation, fatigue or damage. If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**



High clutch drive plates

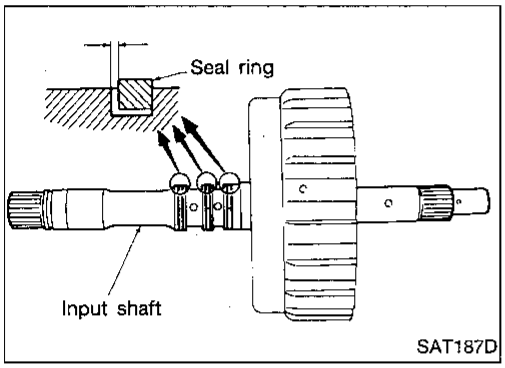
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.6 mm (0.063 in)
  Wear limit 1.4 mm (0.055 in)
- If not within wear limit, replace.

High Clutch (Cont'd)



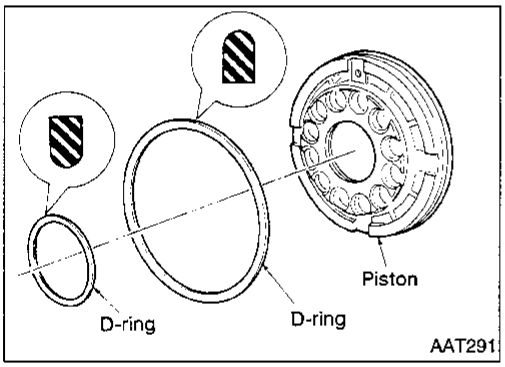
High clutch piston

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.



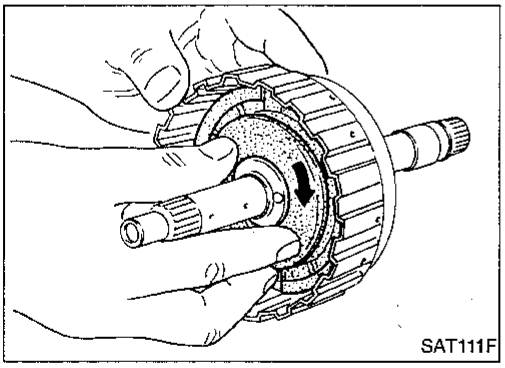
Seal ring clearance

- Measure clearance between seal ring and ring groove.
  Standard clearance: 0.08 - 0.23 mm (0.0031 - 0.0091 in)
  Allowable limit: 0.23 mm (0.0091 in)
- If not within allowable limit, replace input shaft assembly.

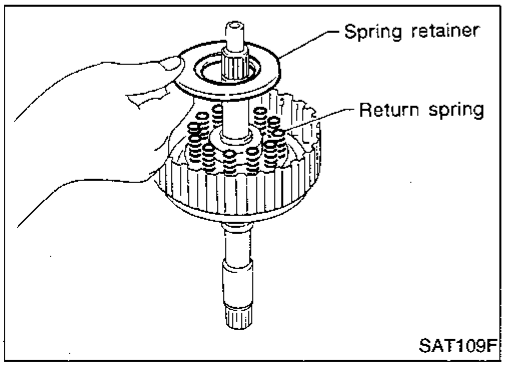


ASSEMBLY

1. Install D-rings on piston.
- **Apply ATF to both parts.**

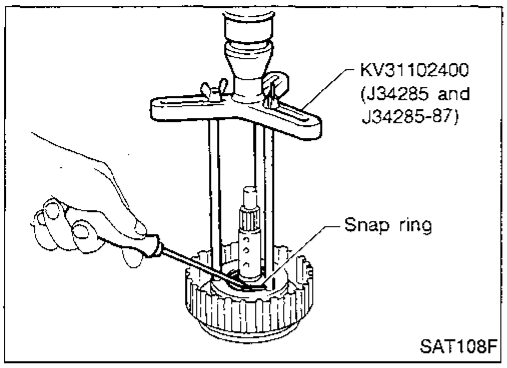


2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**

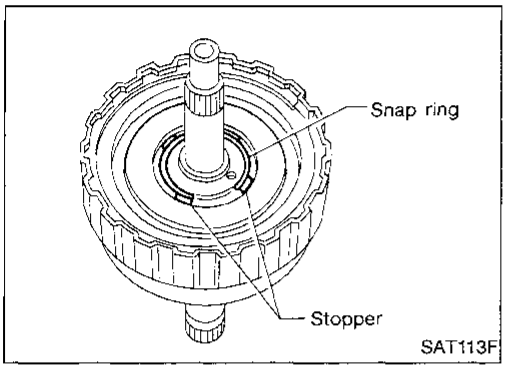


3. Install return springs and spring retainer on piston.

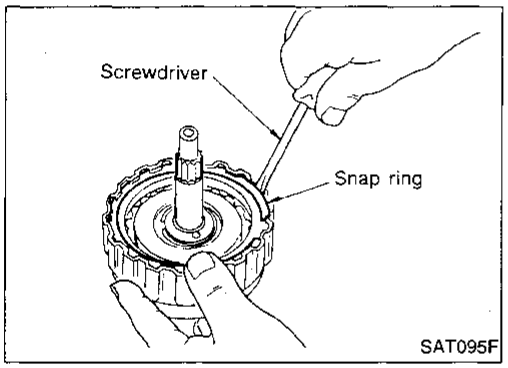
High Clutch (Cont'd)



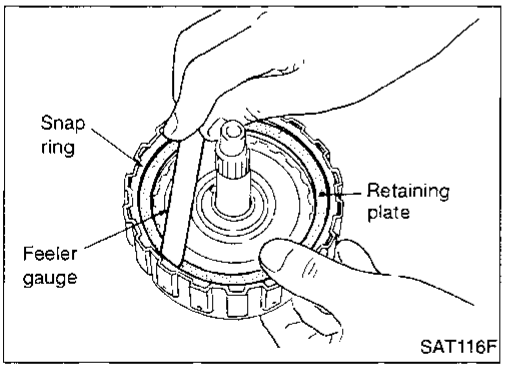
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



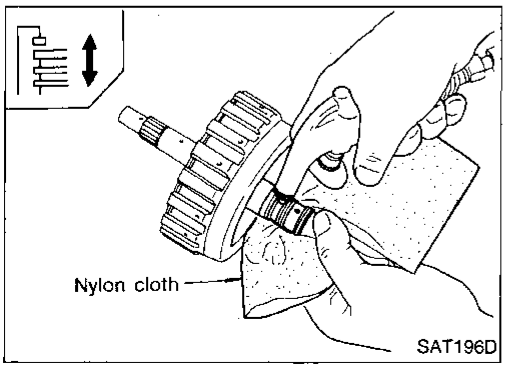
- **Do not align snap ring gap with spring retainer stopper.**



5. Install drive plates, driven plates and retaining plate.
- **Take care with direction of retaining plate and order of plates.**
6. Install snap ring.

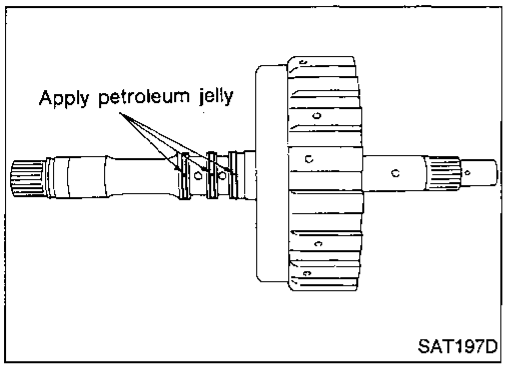


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 1.8 - 2.2 mm (0.071 - 0.087 in)
   Allowable limit 3.0 mm (0.118 in)
   Retaining plate: Refer to AT-209.

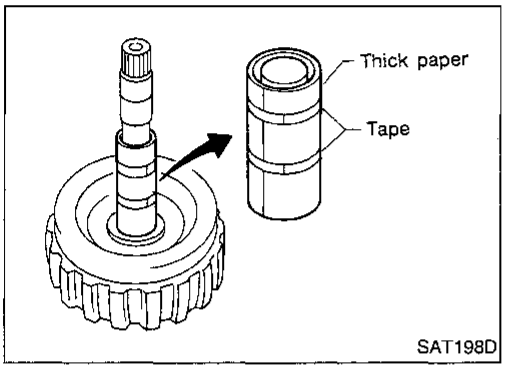


8. Check operation of high clutch. Refer to AT-154.

High Clutch (Cont'd)

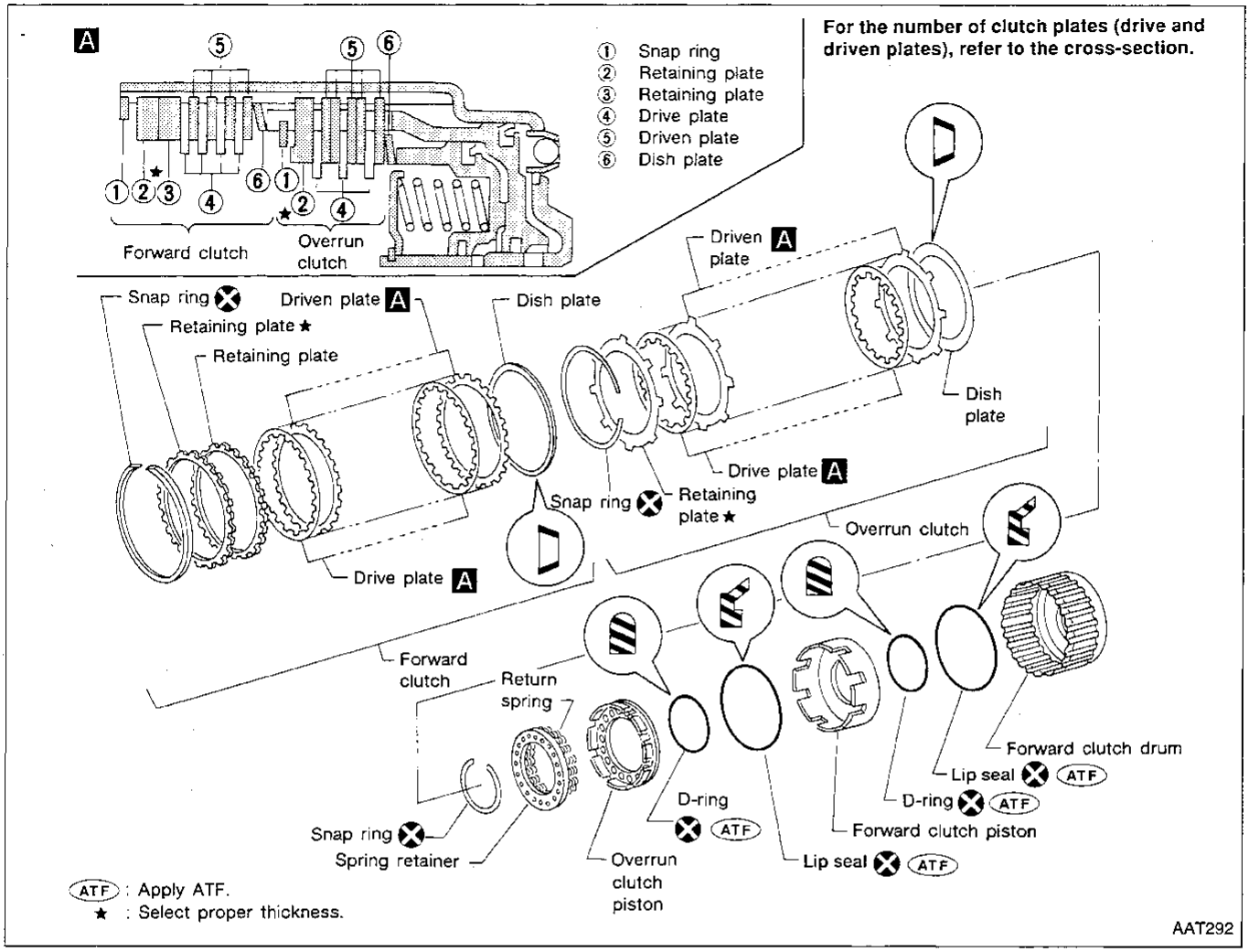


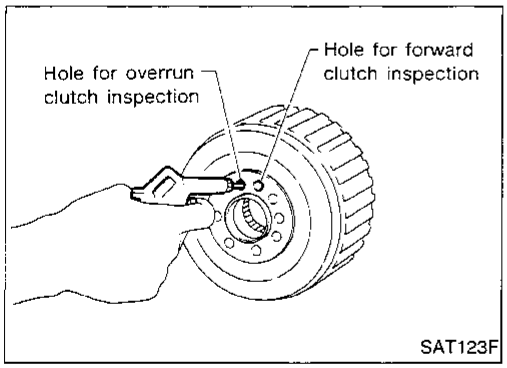
9. Install seal rings to input shaft.
- **Apply petroleum jelly to seal rings.**
- **Always replace when removed.**



- **Roll paper around seal rings to prevent seal rings from spreading.**

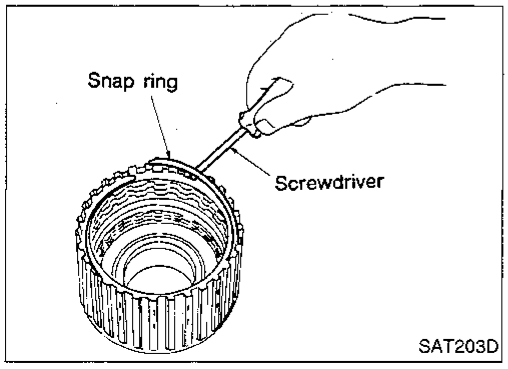
Forward Clutch and Overrun Clutch





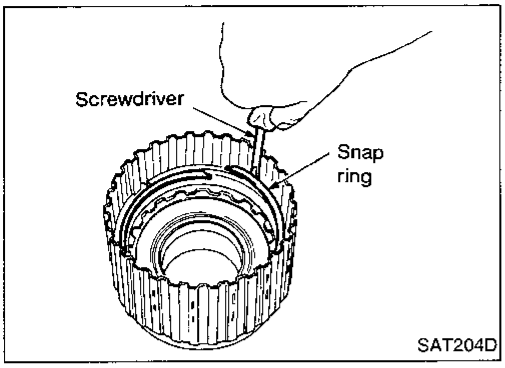
DISASSEMBLY

1. Check operation of forward clutch and overrun clutch.
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not move to snap ring, D-ring or lip seal may be damaged or fluid may be leaking at piston check ball.

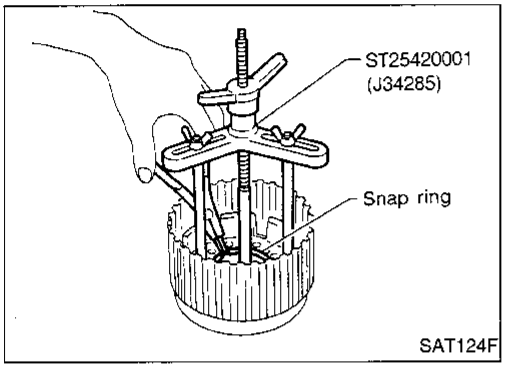


2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.

Forward Clutch and Overrun Clutch (Cont'd)

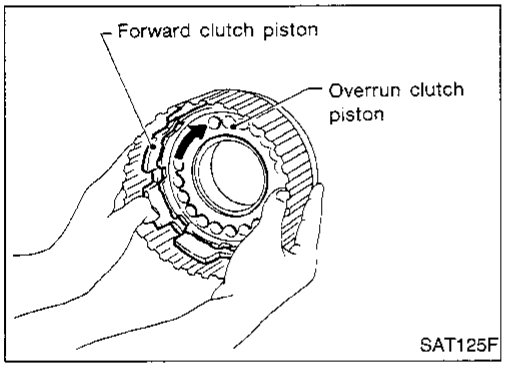


4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.

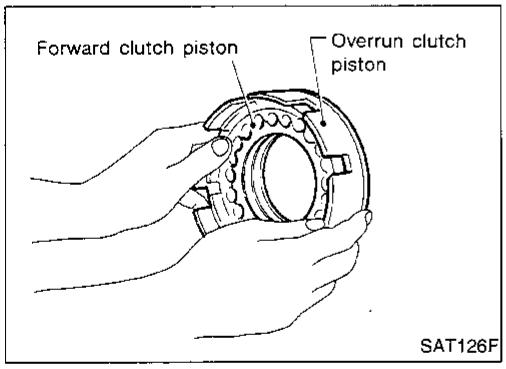


6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
- **Set Tool directly over return springs.**
- **Do not expand snap ring excessively.**

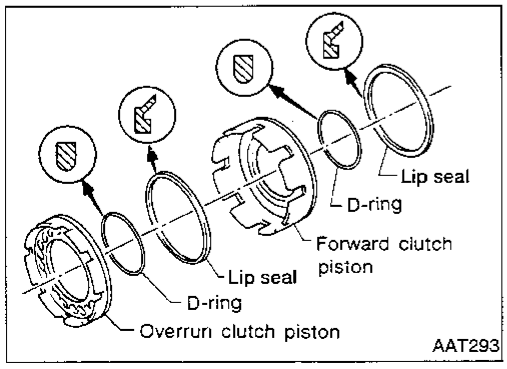
7. Remove spring retainer.
- **Do not remove return springs from spring retainer.**



8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.



9. Remove overrun clutch piston from forward clutch piston by turning it.



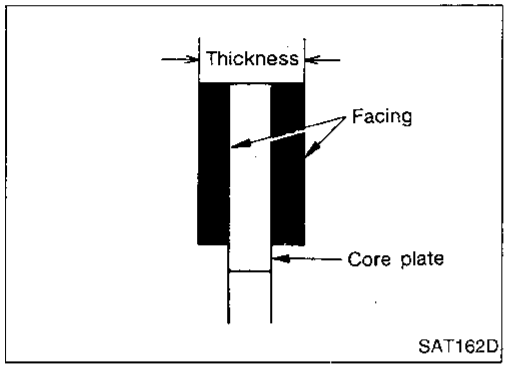
10. Remove D-rings and lip seals from forward clutch piston and overrun clutch piston.

Forward Clutch and Overrun Clutch (Cont'd)

INSPECTION

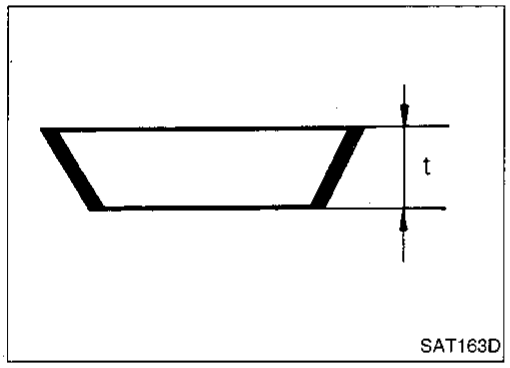
Snap rings, spring retainer and return springs

- Check for deformation, fatigue or damage.
- Replace if necessary.
- When replacing spring retainer and return springs, replace them as a set.



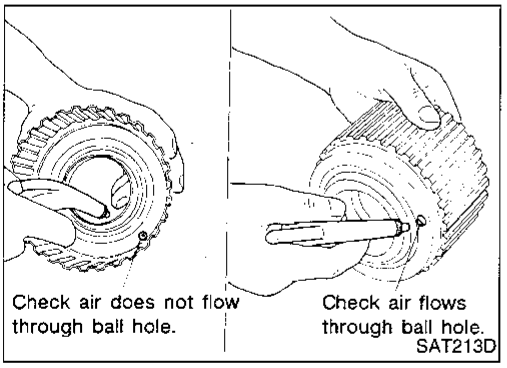
Forward clutch and overrun clutch drive plates

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Forward clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
  Overrun clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit, replace.



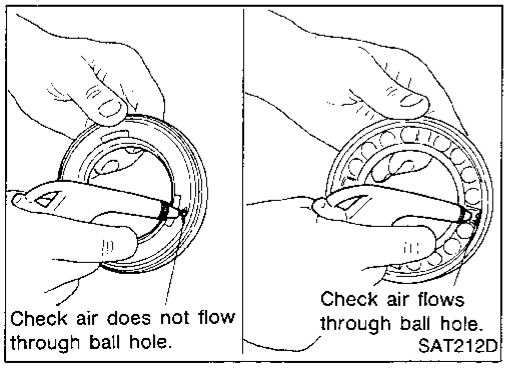
Forward clutch and overrun clutch dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate:
  Forward clutch 2.7 mm (0.106 in)
  Overrun clutch 2.7 mm (0.106 in)
- If deformed or fatigued, replace.



Forward clutch drum

- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum to make sure that air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum to make sure that there is no air leakage.

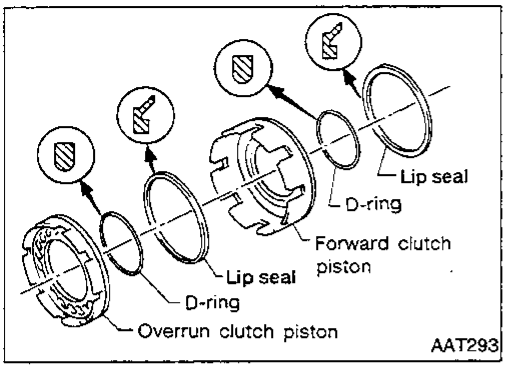


Overrun clutch piston

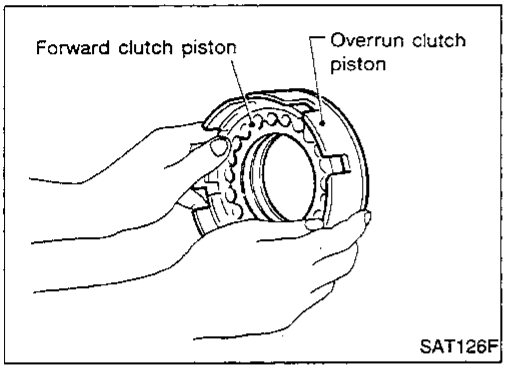
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

Forward Clutch and Overrun Clutch (Cont'd)

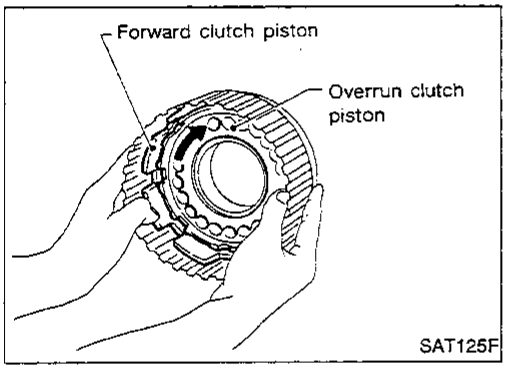
ASSEMBLY



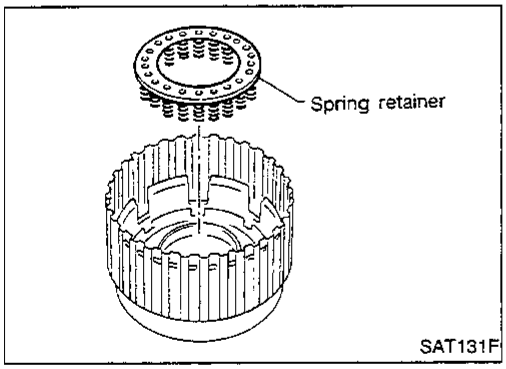
1. Install D-rings and lip seals on forward clutch piston and overrun clutch piston.
- **Take care with direction of lip seal.**
- **Apply ATF to both parts.**



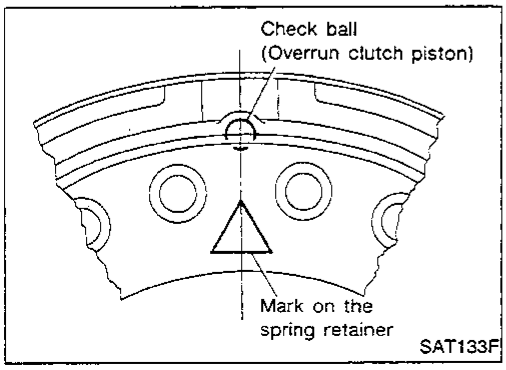
2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
- **Apply ATF to inner surface of forward clutch piston.**



3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
- **Apply ATF to inner surface of drum.**

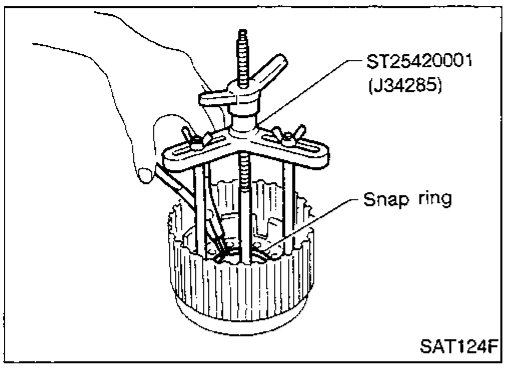


4. Install spring retainer on overrun clutch piston.

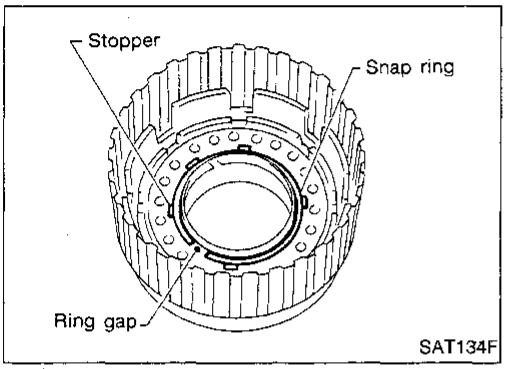


5. Align the mark on spring retainer with check ball in overrun clutch piston.

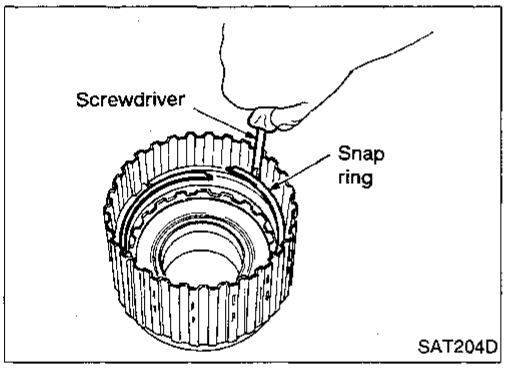
Forward Clutch and Overrun Clutch (Cont'd)



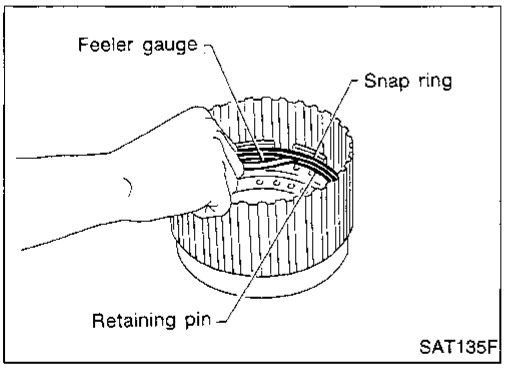
6. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



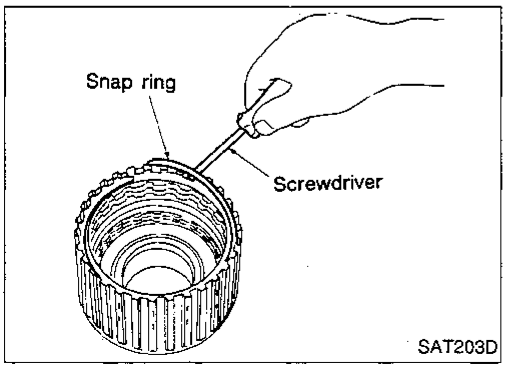
- **Do not align snap ring gap with spring retainer stopper.**



7. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- **Take care with order of plates.**
8. Install snap ring for overrun clutch.

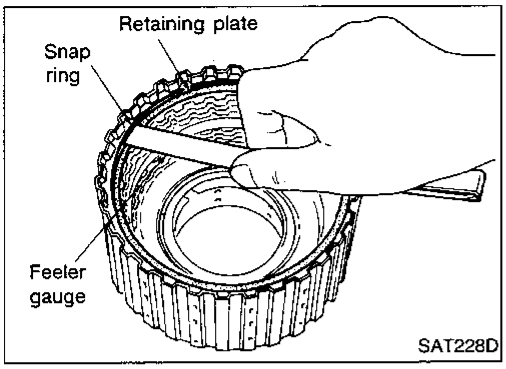


9. Measure clearance between overrun clutch retaining plate and snap ring.
   If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.7 - 1.1 mm (0.028 - 0.043 in)
   Allowable limit 1.7 mm (0.067 in)
   Overrun clutch retaining plate: Refer to AT-210.

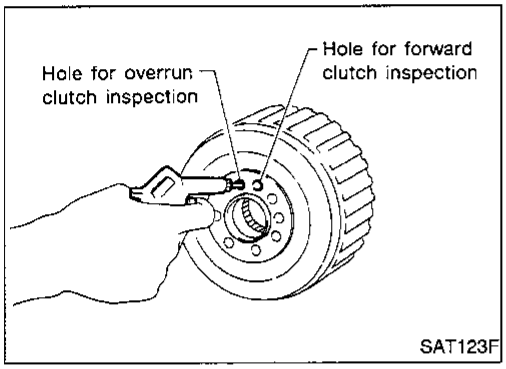


10. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
- **Take care with order of plates.**
11. Install snap ring for forward clutch.

Forward Clutch and Overrun Clutch (Cont'd)

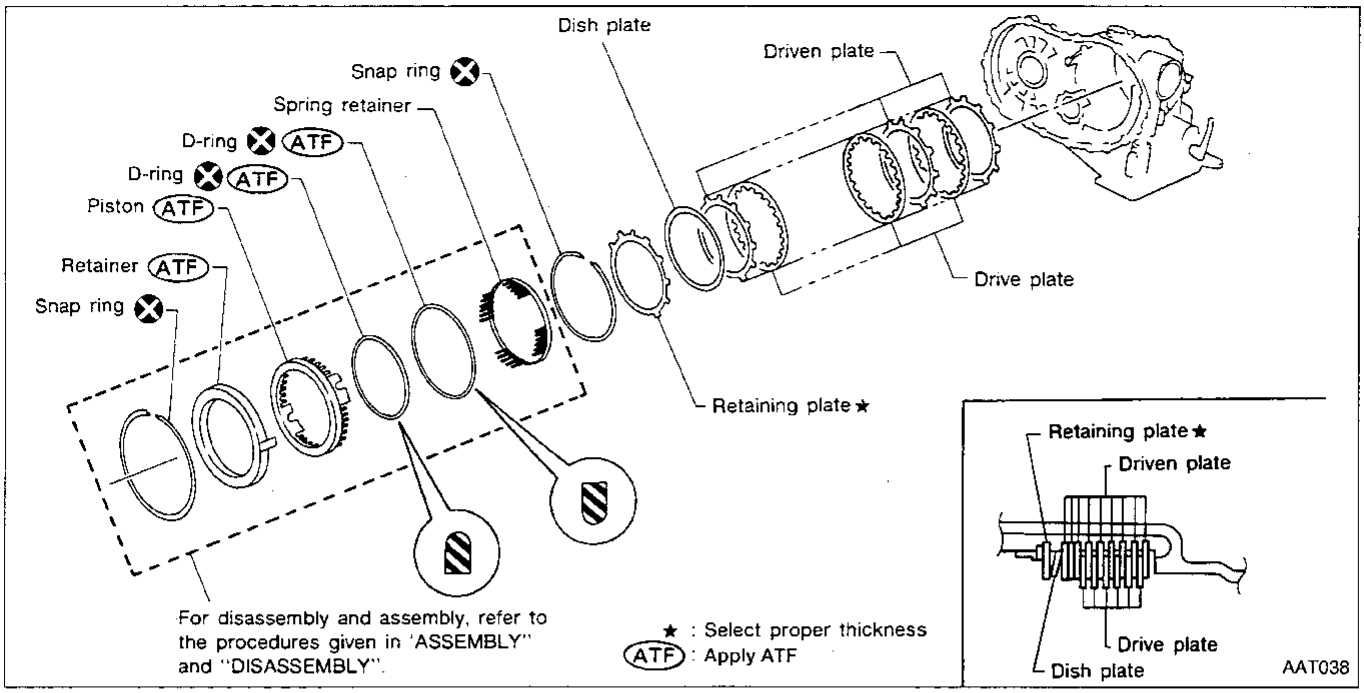


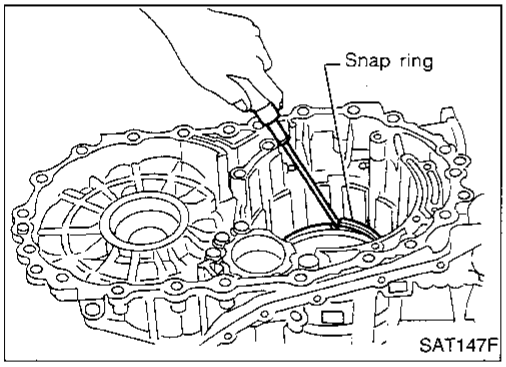
12. Measure clearance between forward clutch retaining plate and snap ring.
    If not within allowable limit, select proper retaining plate.
    Specified clearance:
    Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)
    Allowable limit 1.85 mm (0.0728 in)
    Forward clutch retaining plate: Refer to AT-210.



13. Check operation of forward clutch. Refer to AT-159.
14. Check operation of overrun clutch. Refer to AT-159.

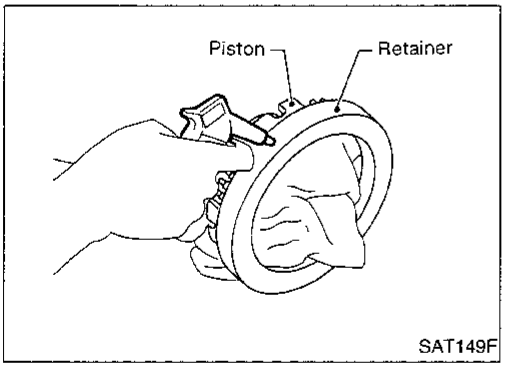
Low & Reverse Brake



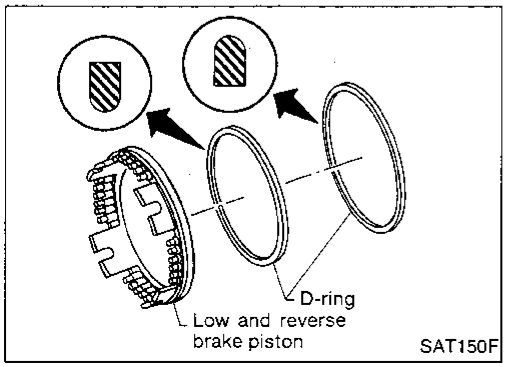


DISASSEMBLY

1. Stand transmission case.
2. Remove snap ring.
3. Remove dish plate, retaining plate, drive plates and driven plates from transmission case.



4. In order to remove piston, apply compressed air to oil hole of retainer while holding piston.
- **Apply air gradually and allow piston to come out evenly.**



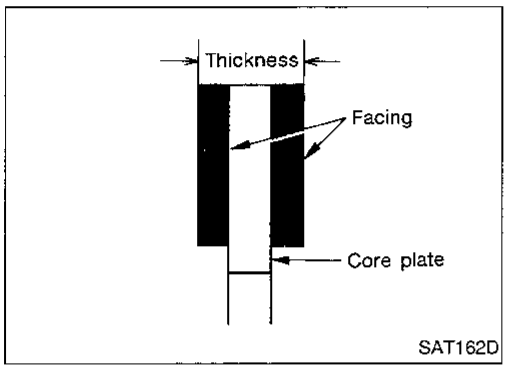
5. Remove D-rings from piston.

Low & Reverse Brake (Cont'd)

INSPECTION

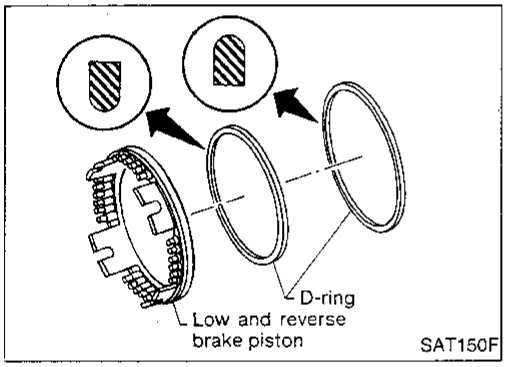
Low & reverse clutch snap ring, spring retainer and return springs

- Check for deformation, fatigue or damage. If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**



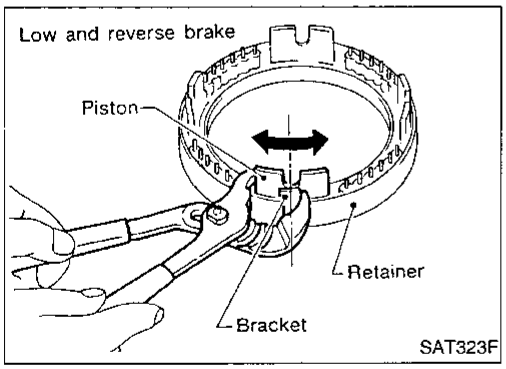
Low & reverse brake drive plate

- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.8 mm (0.071 in)
  Wear limit 1.6 mm (0.063 in)
- If not within wear limit, replace.

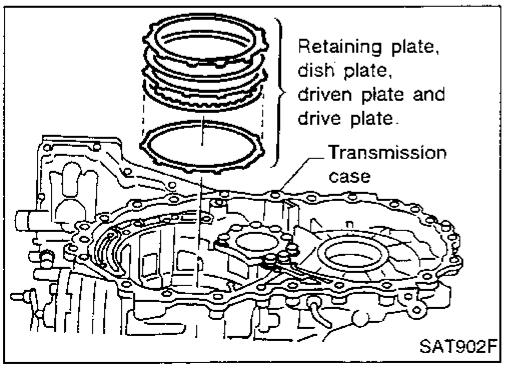


ASSEMBLY

1. Install D-rings on piston.
- **Apply ATF to both parts.**



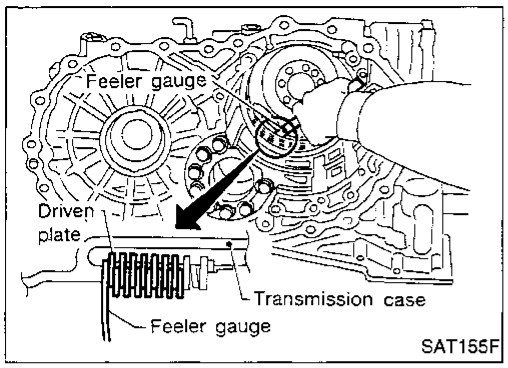
2. Set and align piston with retainer.
- **This operation is required in order to engage the protrusions of piston to return springs correctly. Further procedures are given in "ASSEMBLY". Refer to AT-192.**



3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
- **Refer to the illustration on the previous page for order of plates and direction of dish plate.**

4. Install snap ring.

Low & Reverse Brake (Cont'd)



5. Measure clearance between driven plate and transmission case. If not within allowable limit, select proper retaining plate. (front side)

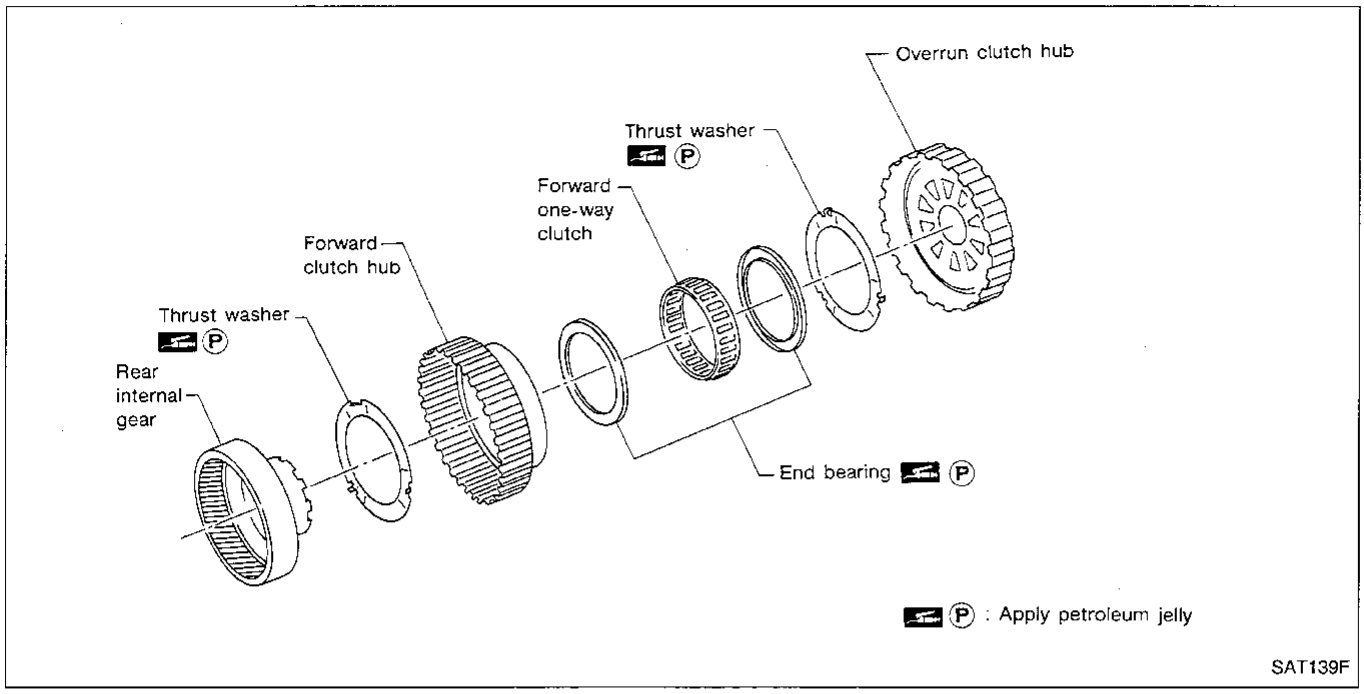
Specified clearance:

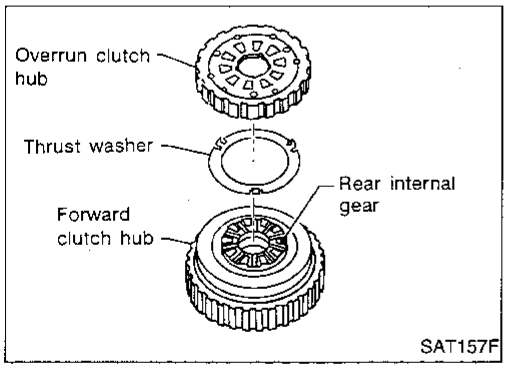
Standard 1.7 - 2.1 mm (0.067 - 0.083 in)

Allowable limit 3.3 mm (0.130 in)

Retaining plate: Refer to AT-211.

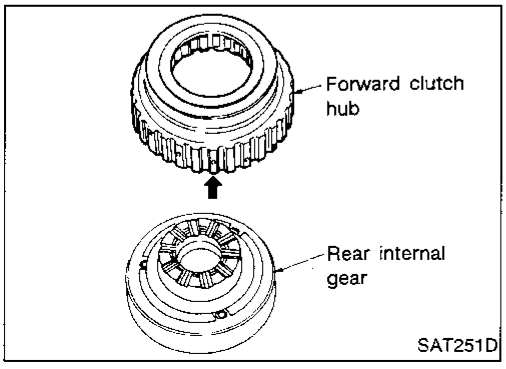
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub





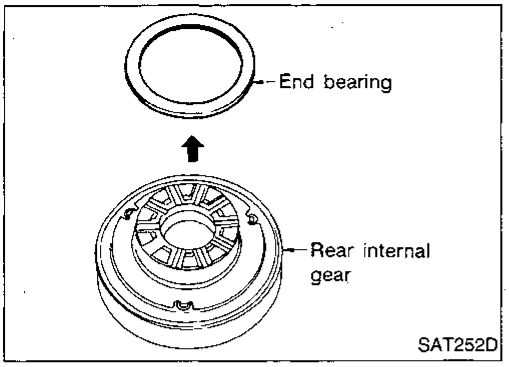
DISASSEMBLY

1. Remove overrun clutch hub and thrust washer from forward clutch hub.

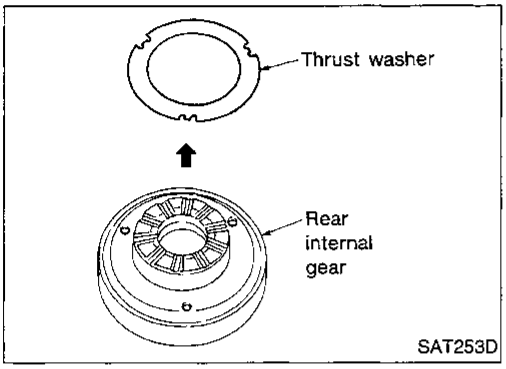


2. Remove forward clutch hub from rear internal gear.

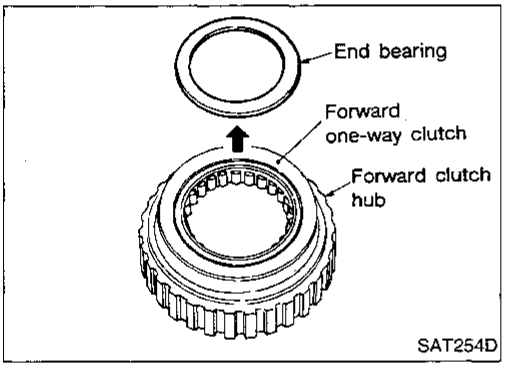
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



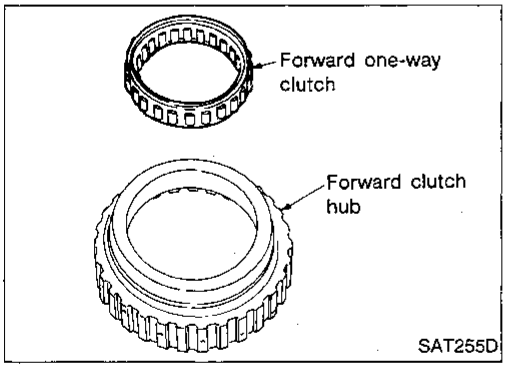
3. Remove end bearing from rear internal gear.



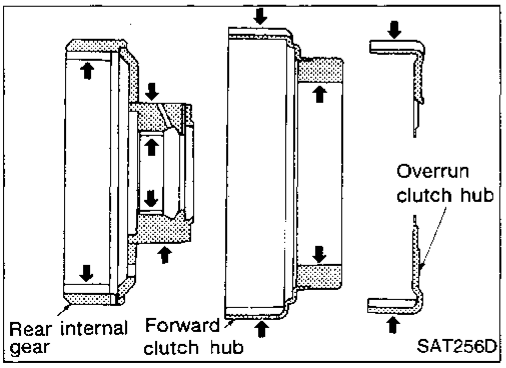
4. Remove thrust washer from rear internal gear.



5. Remove end bearing from forward one-way clutch.



6. Remove forward one-way clutch from forward clutch hub.



INSPECTION

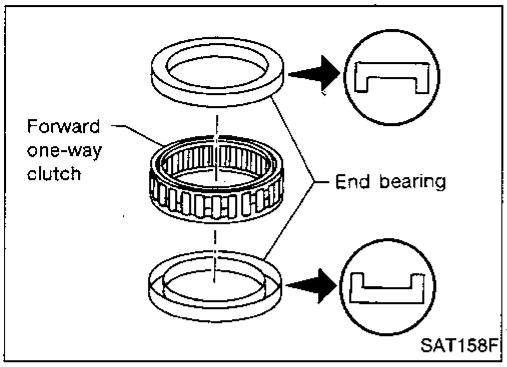
Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surfaces for wear or damage.

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

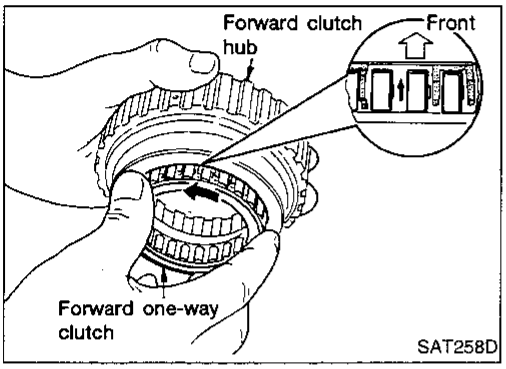
End bearings and forward one-way clutch

- Check end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.

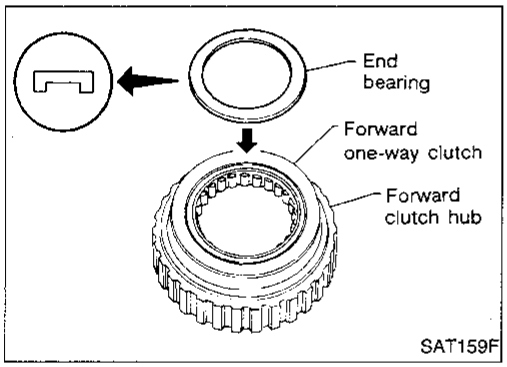


ASSEMBLY

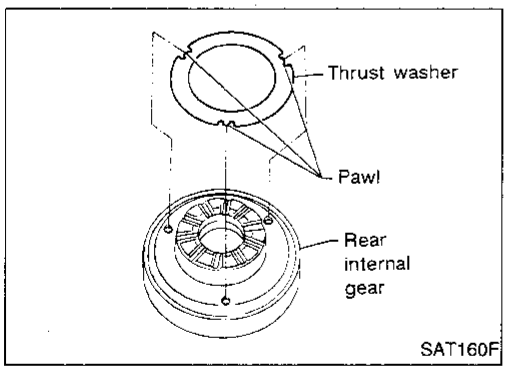
1. Install forward one-way clutch on forward clutch.
- **Take care with the direction of forward one-way clutch.**



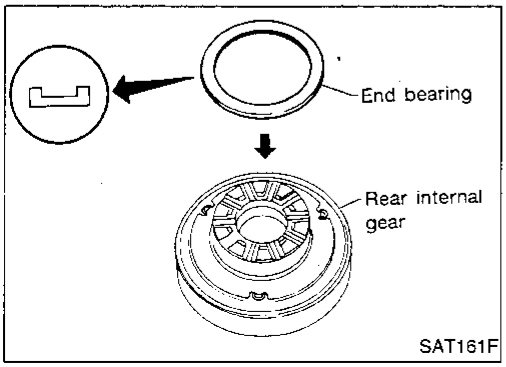
2. Install end bearing on forward one-way clutch.
- **Apply petroleum jelly to end bearing.**



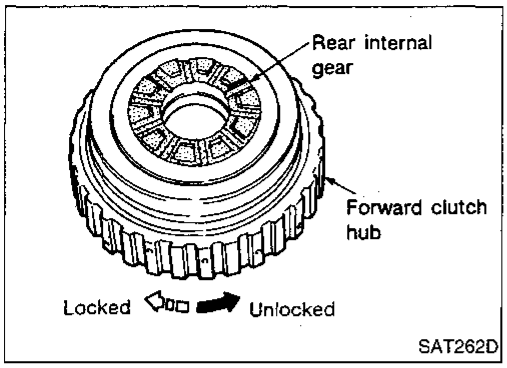
3. Install thrust washer on rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of rear internal gear.**



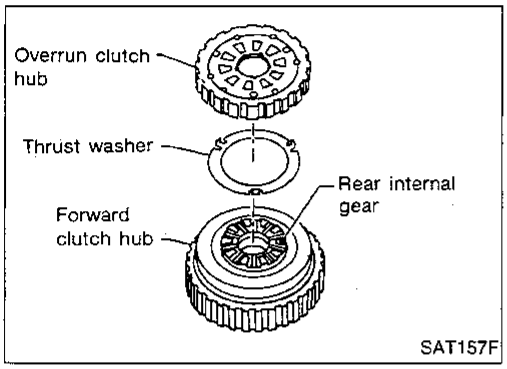
4. Install end bearing on rear internal gear.
- **Apply petroleum jelly to end bearing.**



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

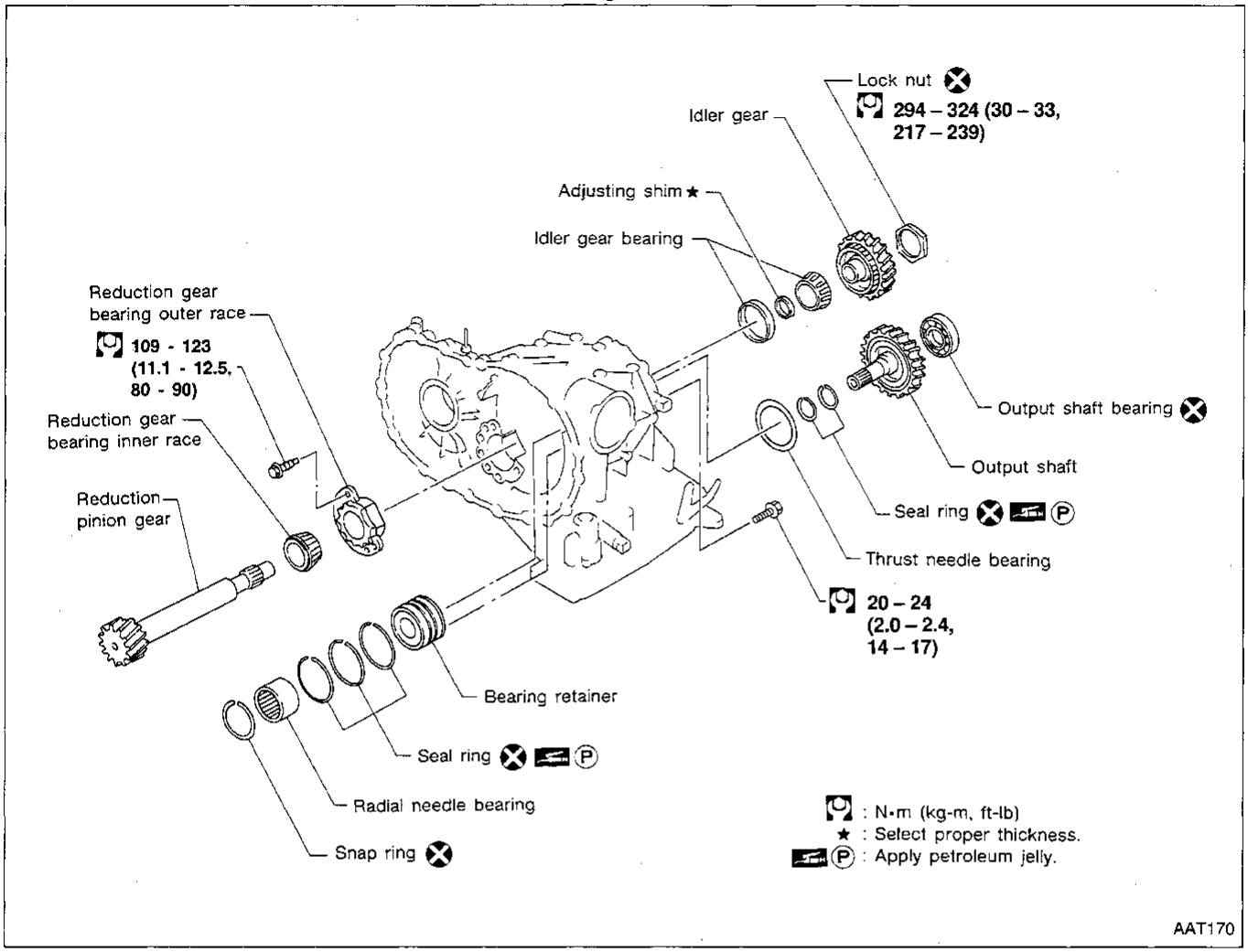


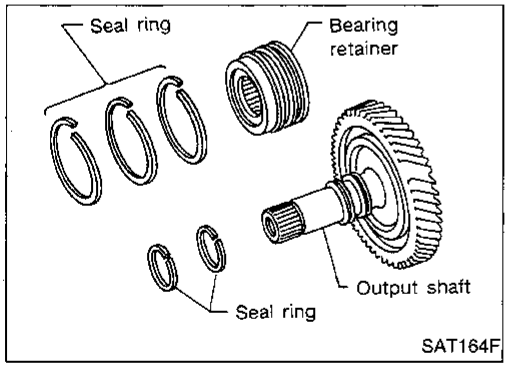
5. Install forward clutch hub on rear internal gear.
- **Check operation of forward one-way clutch.**



6. Install thrust washer and overrun clutch hub.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of overrun clutch hub.**
- **Align projections of rear internal gear with holes of overrun clutch hub.**

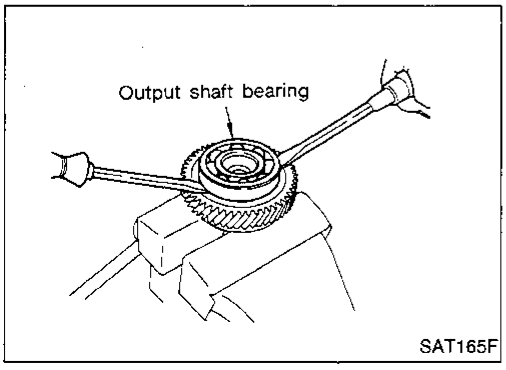
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer





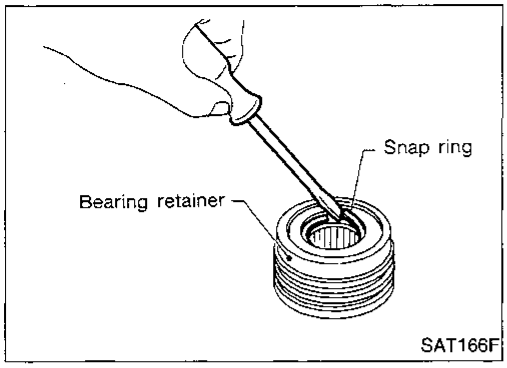
DISASSEMBLY

1. Remove seal rings from output shaft and bearing retainer.

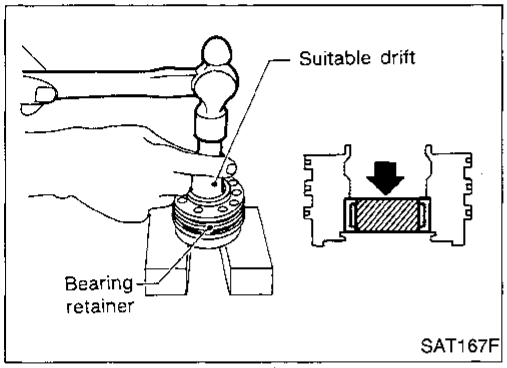


2. Remove output shaft bearing with screwdrivers.
- **Always replace bearing with a new one when removed.**
- **Do not damage output shaft.**

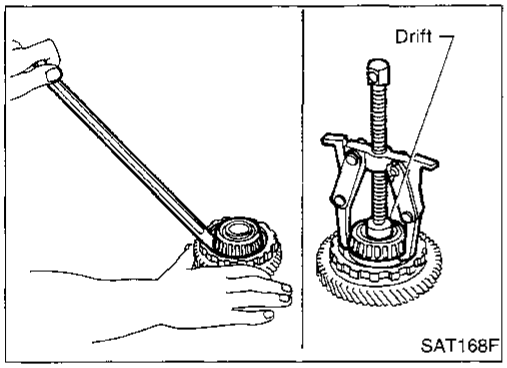
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



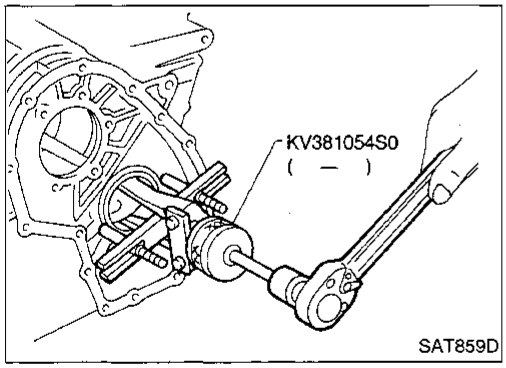
3. Remove snap ring from bearing retainer.



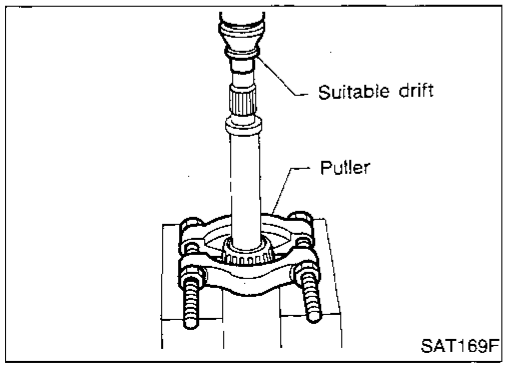
4. Remove needle bearing from bearing retainer.



5. Remove idler gear bearing inner race from idler gear.

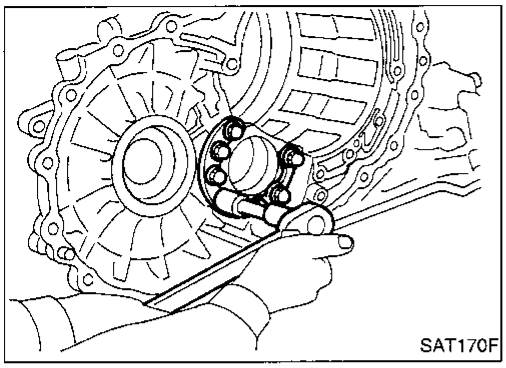


6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction gear bearing inner race from reduction gear.

Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)

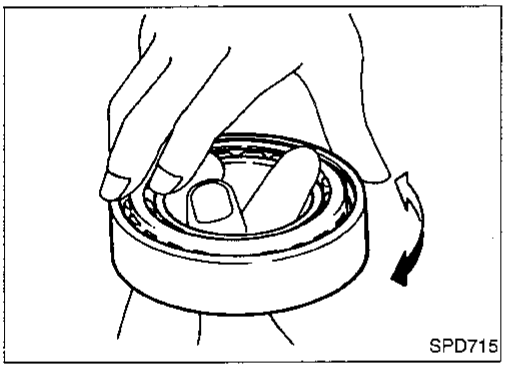

SAT170F

8. Remove reduction gear bearing outer race from transmission case.

INSPECTION

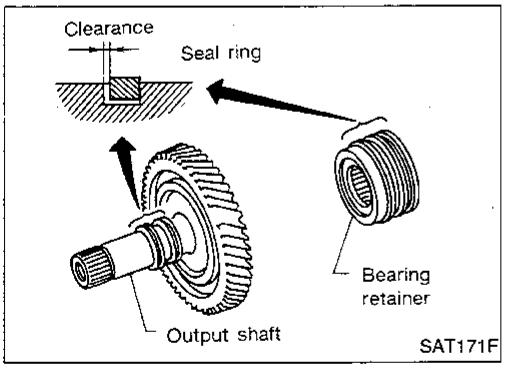
Output shaft, idler gear and reduction gear

- Check shafts for cracks, wear or bending.
- Check gears for wear, chips and cracks.


SPD715

Bearing

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**



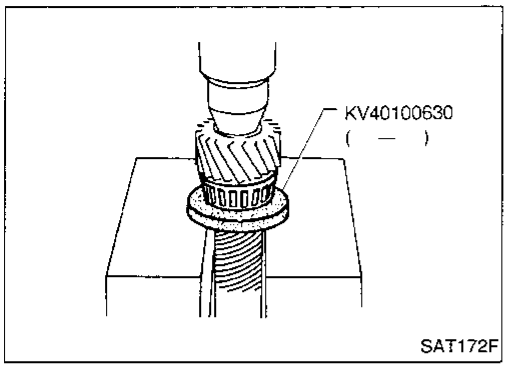
SAT171F

Seal ring clearance

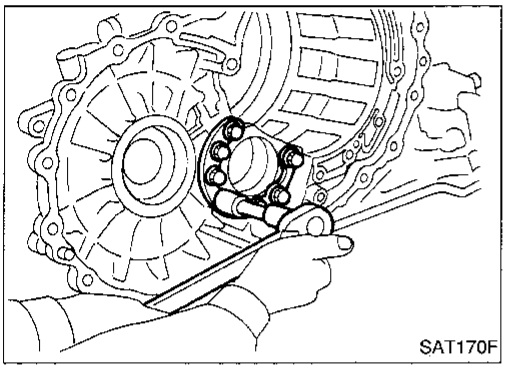
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.
  Standard clearance:
  0.10 - 0.25 mm (0.0039 - 0.0098 in)
  Allowable limit:
  0.25 mm (0.0098 in)
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.
  Standard clearance:
  0.10 - 0.30 mm (0.0039 - 0.0118 in)
  Allowable limit:
  0.30 mm (0.0118 in)
- If not within allowable limit, replace bearing retainer.

Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)

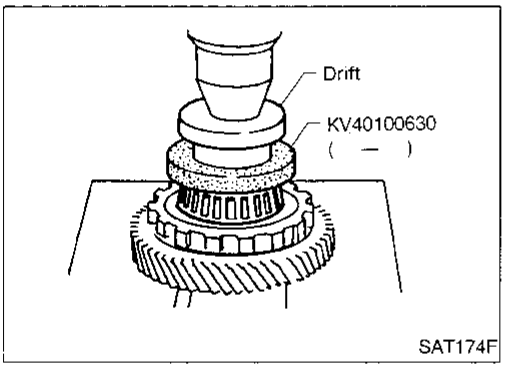
ASSEMBLY



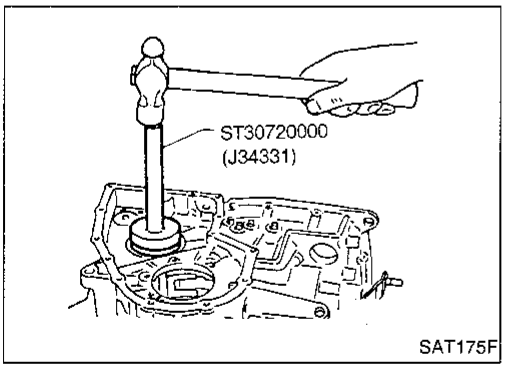
1. Press reduction gear bearing inner race on reduction gear.



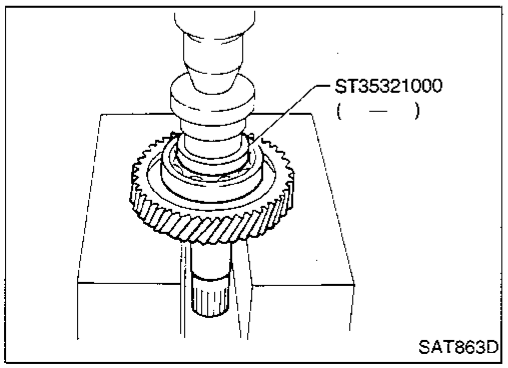
2. Install reduction gear bearing outer race on transmission case.



3. Press idler gear bearing inner race on idler gear.

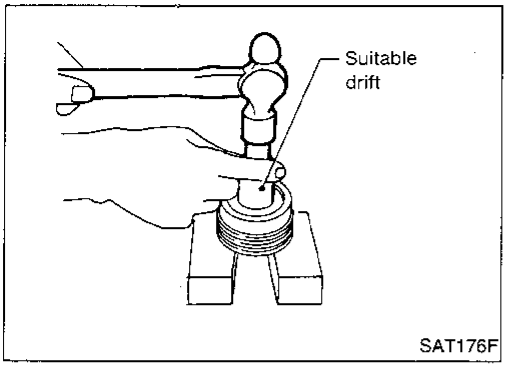


4. Install idler gear bearing outer race on transmission case.

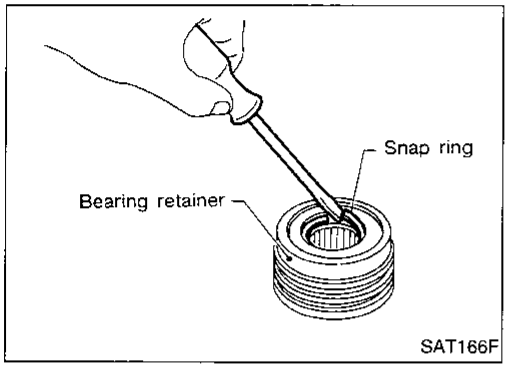


5. Press output shaft bearing on output shaft.

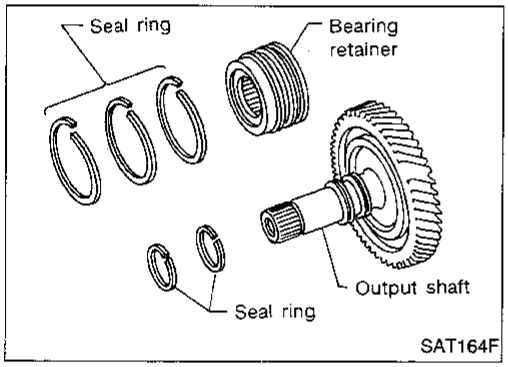
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



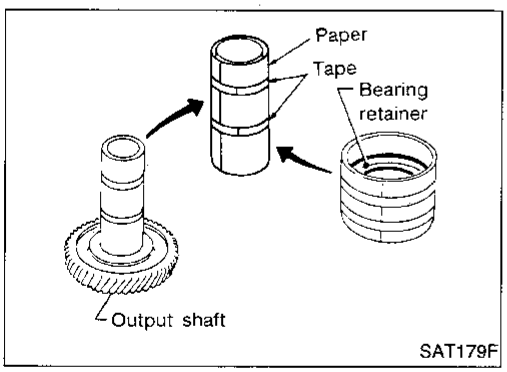
6. Press needle bearing on bearing retainer.



7. Install snap ring on to bearing retainer.

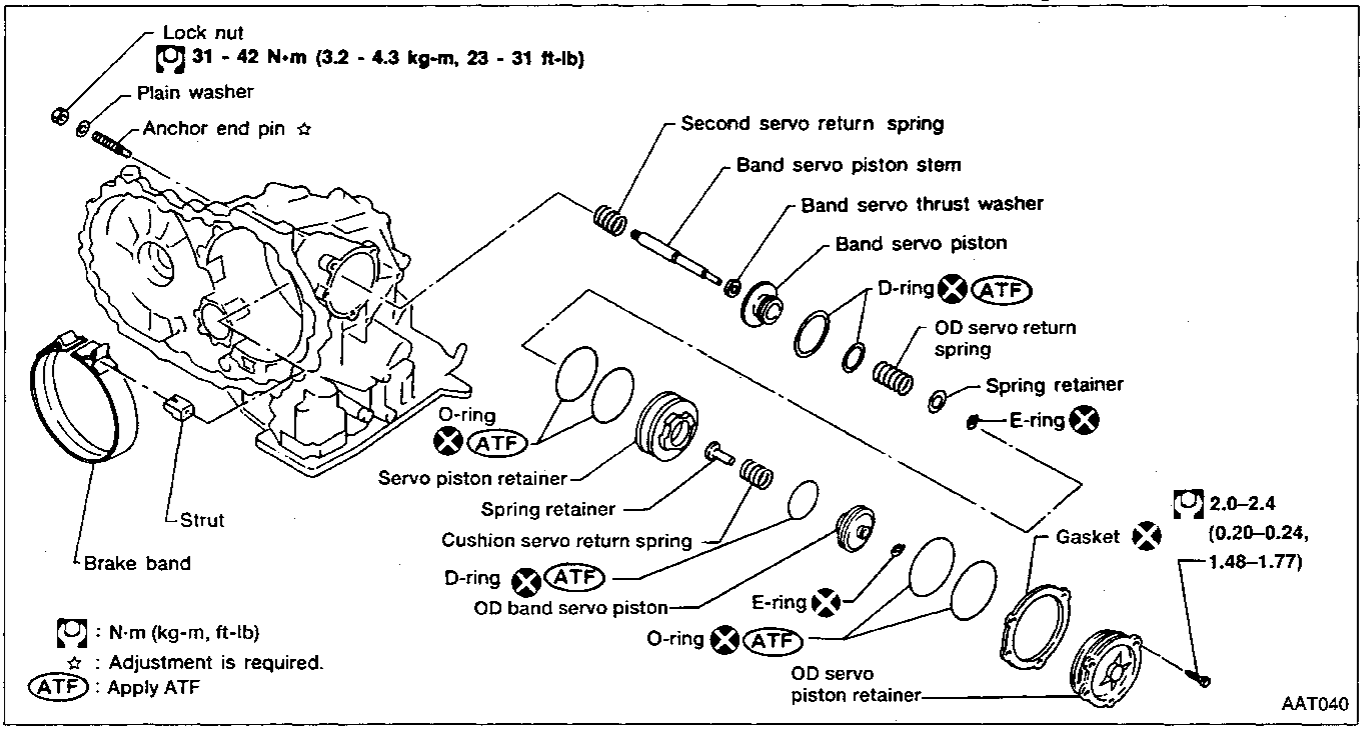


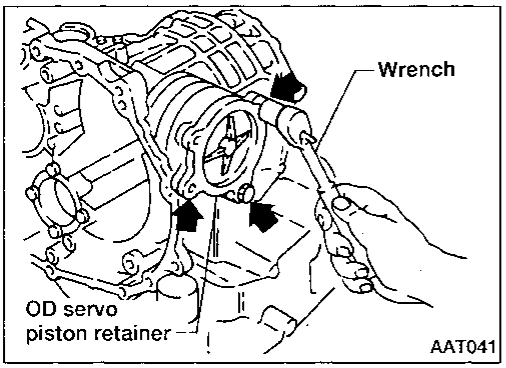
8. Install new seal rings to output shaft and bearing retainer carefully after packing ring grooves with petroleum jelly.



- **Roll paper around seal rings to prevent seal rings from spreading.**

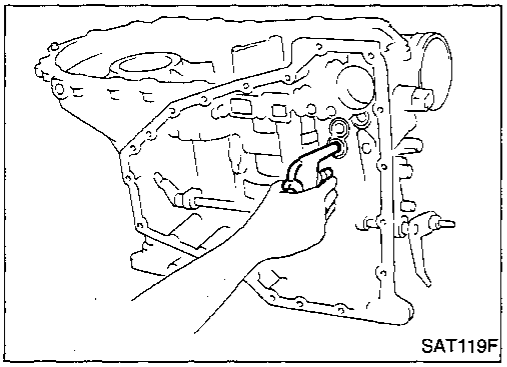
Band Servo Piston Assembly





DISASSEMBLY

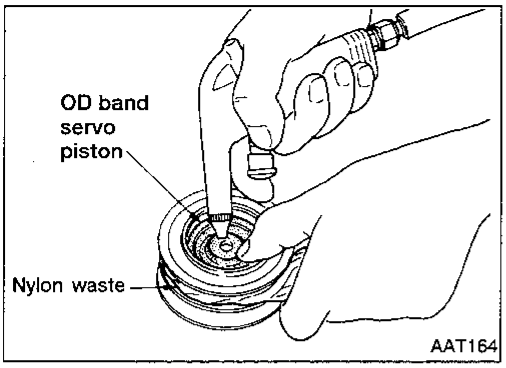
1. Remove band servo piston fixing bolts.



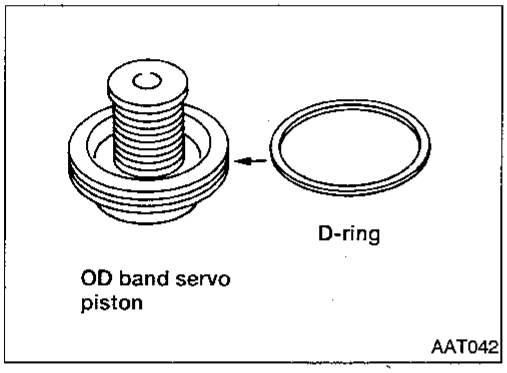
2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.

- **Hold band servo piston assembly with a rag.**

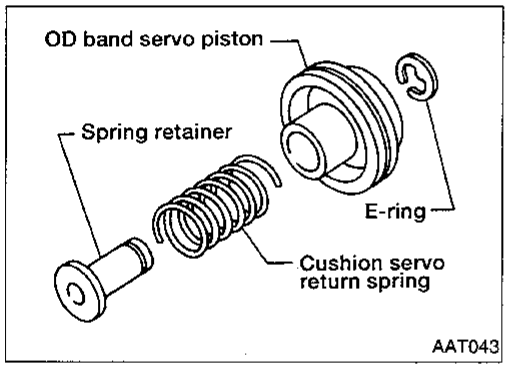
Band Servo Piston Assembly (Cont'd)



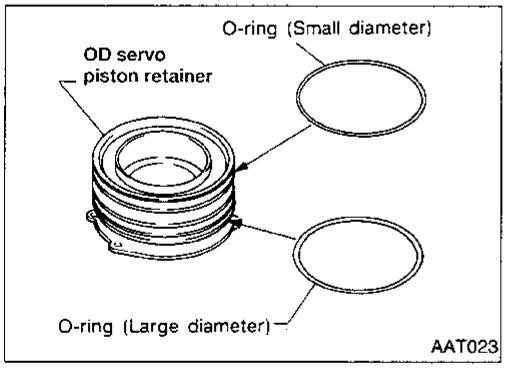
3. Apply compressed air to oil hole in OD servo piston retainer to remove OD band servo piston from retainer.
- **Hold OD band servo piston while applying compressed air.**



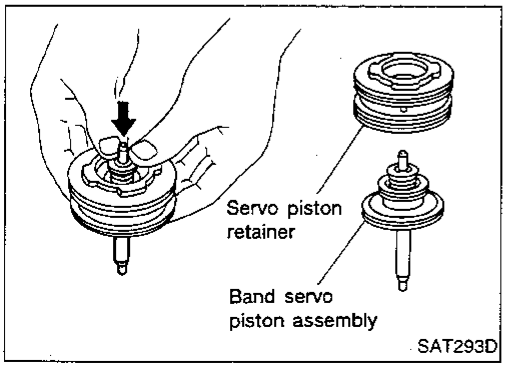
4. Remove D-ring from OD band servo piston.



5. Remove E-ring, cushion servo return spring and spring retainer from OD band servo piston.

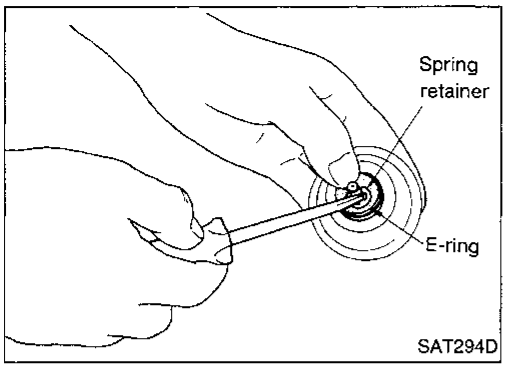


6. Remove O-rings from OD servo piston retainer.

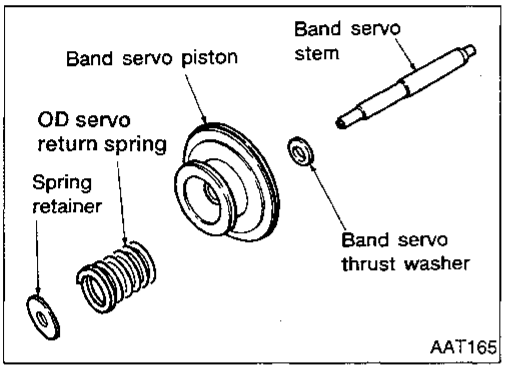


7. Remove band servo piston assembly from servo piston retainer by pushing it forward.

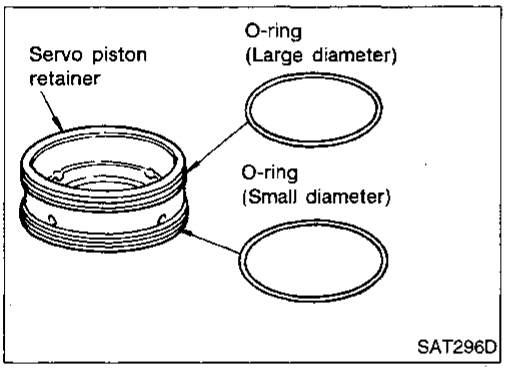
Band Servo Piston Assembly (Cont'd)



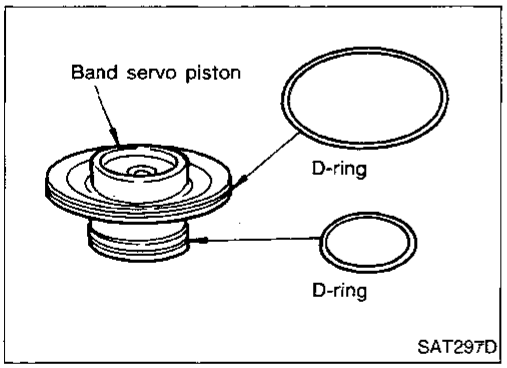
8. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.



9. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.



10. Remove O-rings from servo piston retainer.



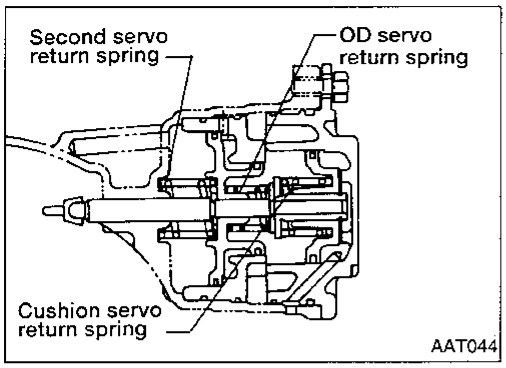
11. Remove D-rings from band servo piston.

INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

Band Servo Piston Assembly (Cont'd)



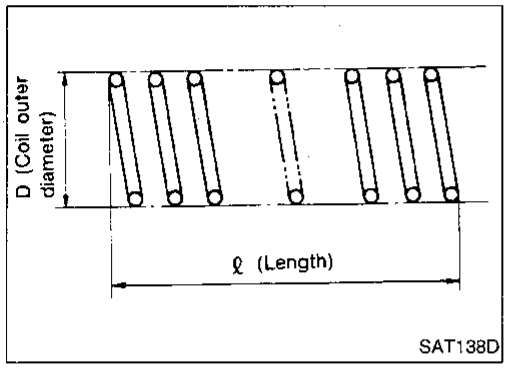
Return springs

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

Inspection standard

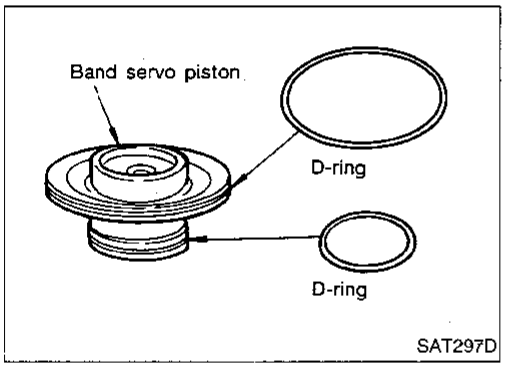
Unit: mm (in)

Parts	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	23.5 (0.925)	20.1 (0.791)
Cushion servo return spring	23.4 (0.921)	25.5 (1.004)

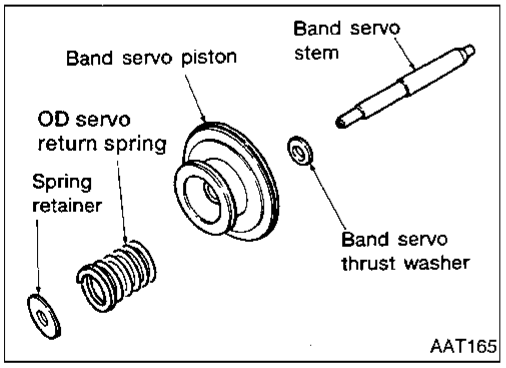


ASSEMBLY

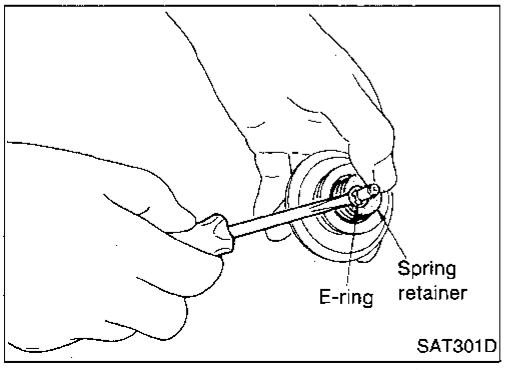
1. Install D-rings to servo piston retainer.
   - **Apply ATF to D-rings.**
   - **Pay attention to position of each O-ring.**



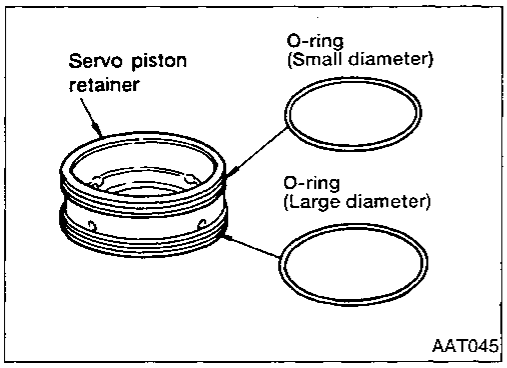
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



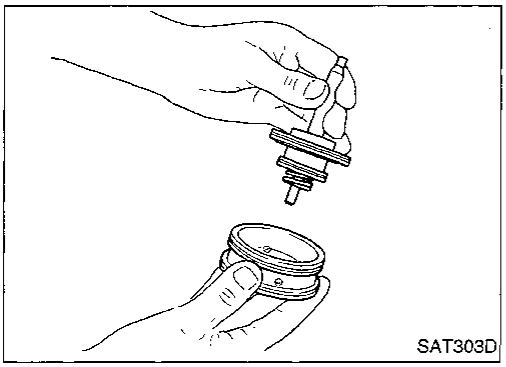
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



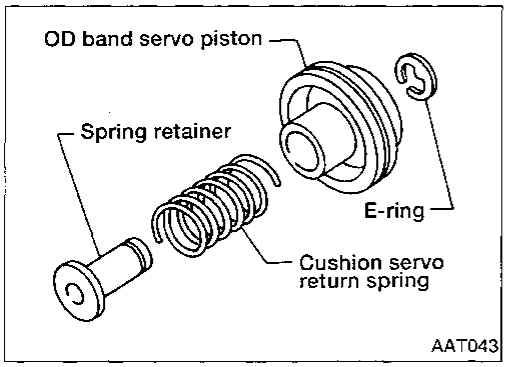
Band Servo Piston Assembly (Cont'd)



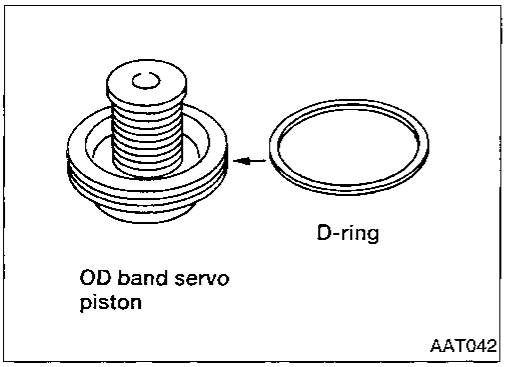
4. Install O-rings onto servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



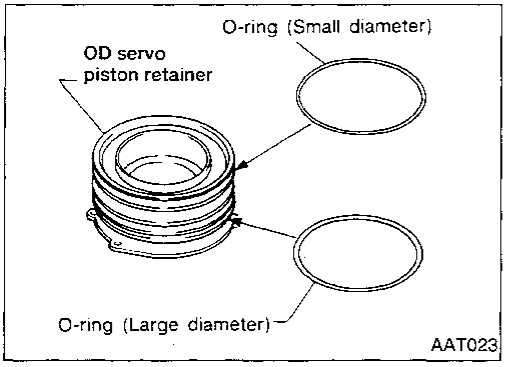
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



6. Install cushion servo return spring, spring retainer and E-ring into OD band servo piston.

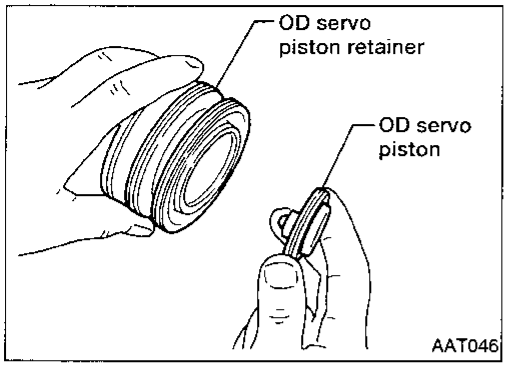


7. Install D-ring to OD band servo piston.
- **Apply ATF to D-ring.**

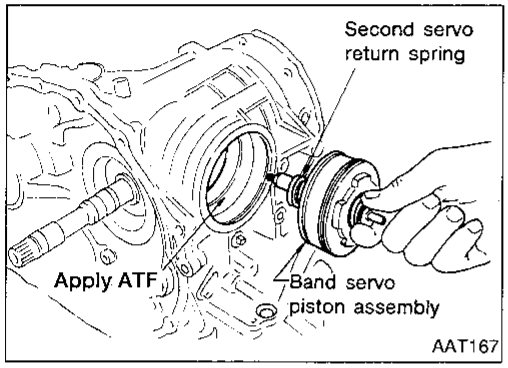


8. Install O-rings to OD servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**

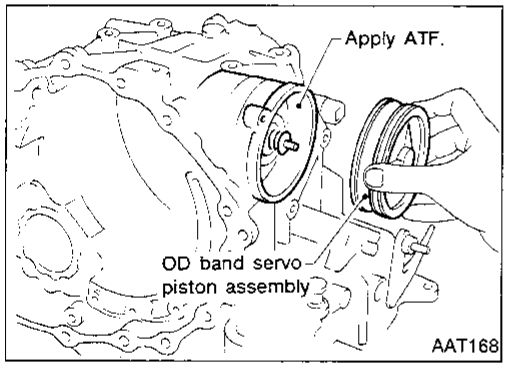
Band Servo Piston Assembly (Cont'd)



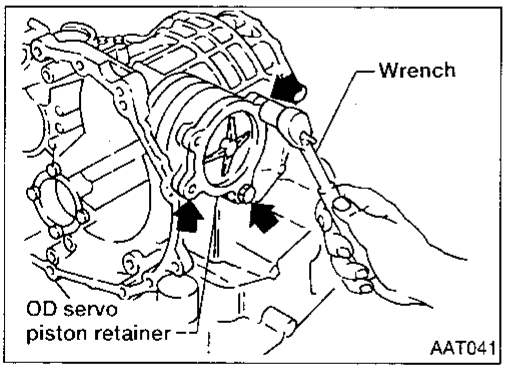
9. Install OD band servo piston to OD servo piston retainer.



10. Install band servo piston assembly and 2nd servo return spring to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**

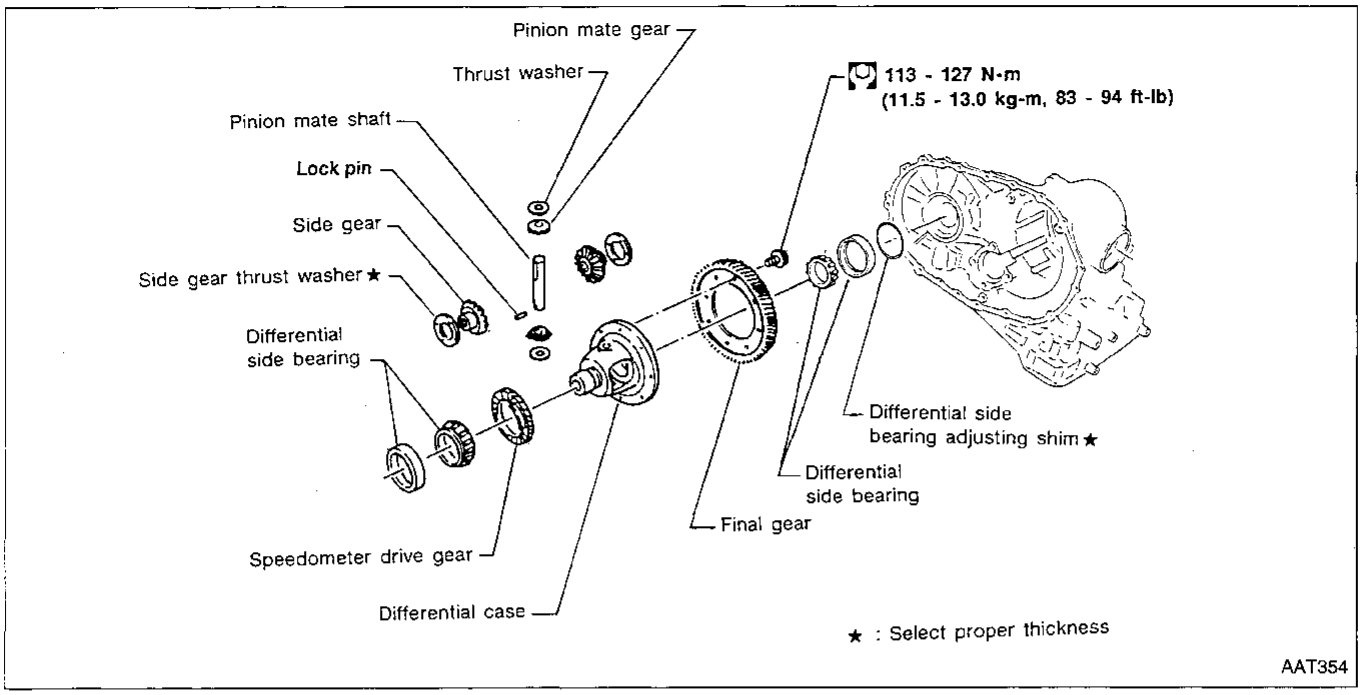


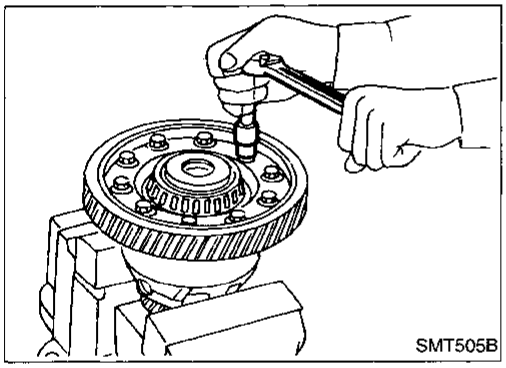
11. Install OD band servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**



12. Tighten band servo piston fixing bolts to transmission case.

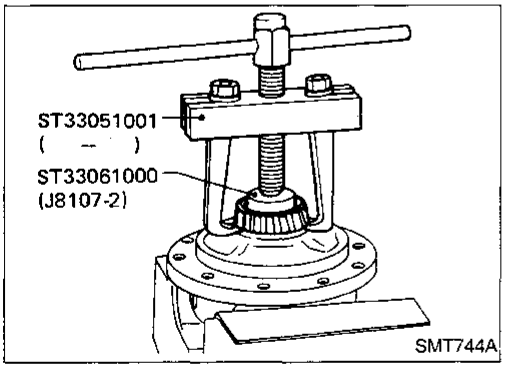
Final Drive



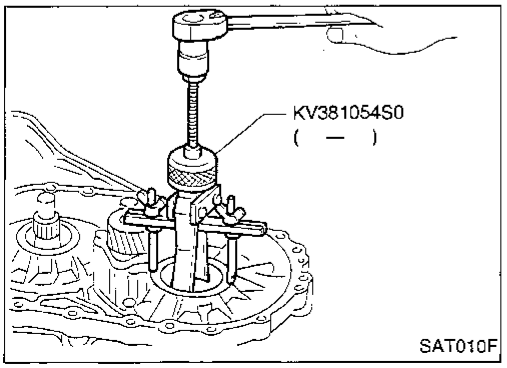


DISASSEMBLY

1. Remove final gear.

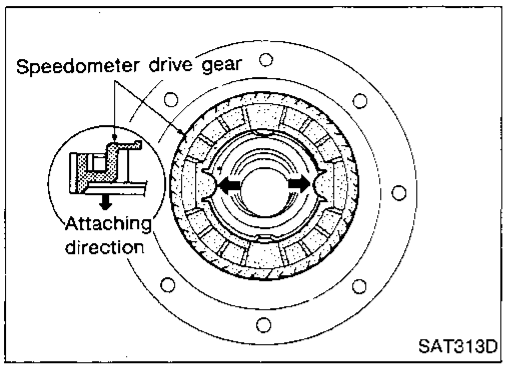


2. Press out differential side bearings.
- **Be careful not to mix up the right and left bearings.**

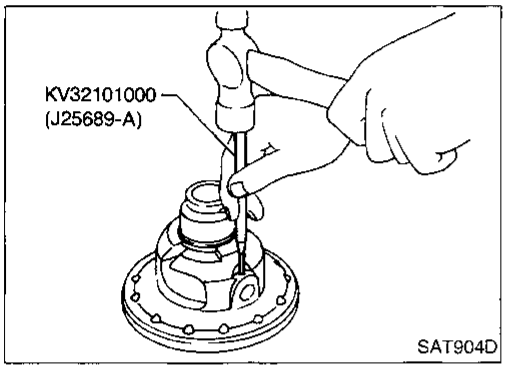


3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

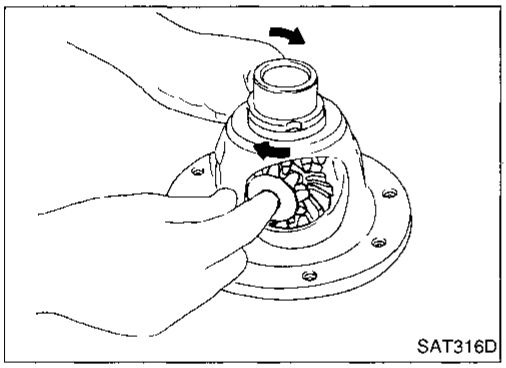
Final Drive (Cont'd)



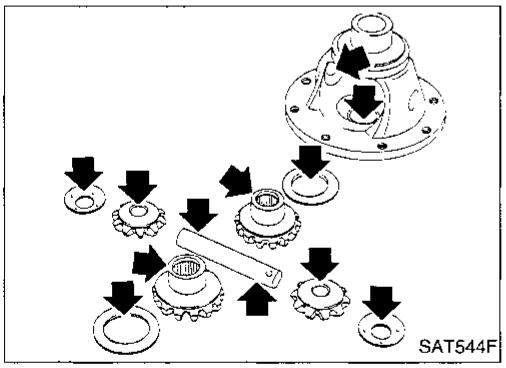
4. Remove speedometer drive gear.



5. Drive out pinion mate shaft lock pin.



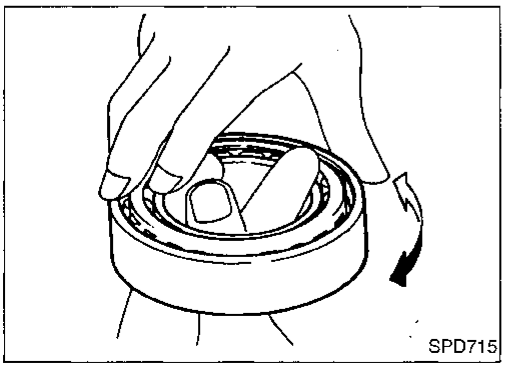
6. Draw out pinion mate shaft lock pin.
7. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

- Check mating surfaces of differential case, side gears and pinion mate gears.
- Check washers for wear.

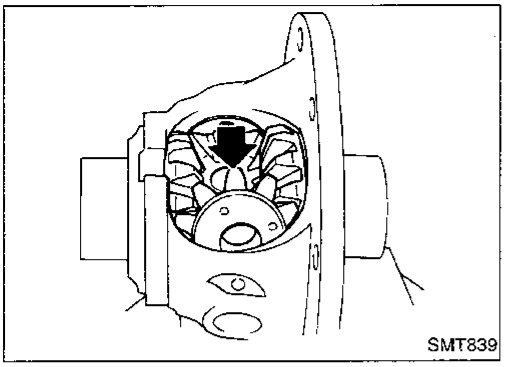


Bearings

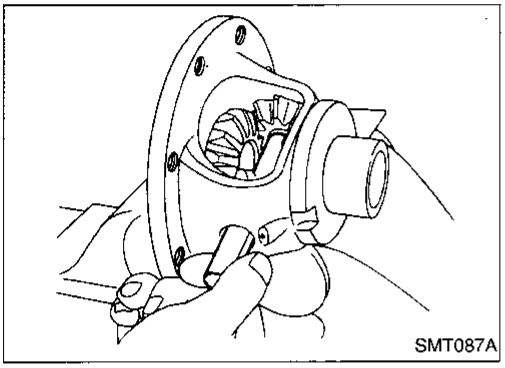
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

Final Drive (Cont'd)

ASSEMBLY

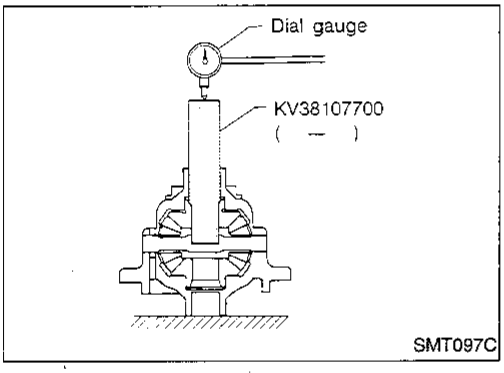


1. Attach side gear thrust washers to side gears, then install pinion mate washers and pinion mate gears in place.



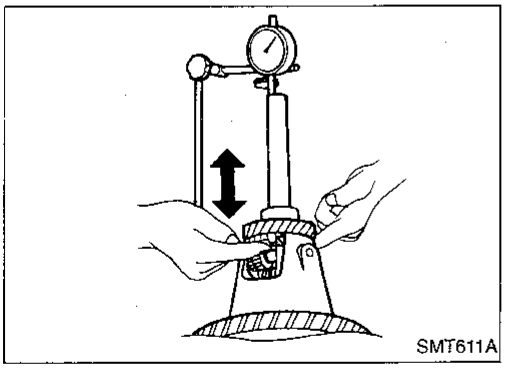
2. Insert pinion mate shaft.

- **When inserting, be careful not to damage pinion mate thrust washers.**



3. Measure clearance between side gear and differential case with washers following the procedure below:

a. Set Tool and dial indicator on side gear.



b. Move side gear up and down to measure dial indicator deflection. Always measure indicator deflection on both side gears.

Clearance between side gear and differential case with washers:

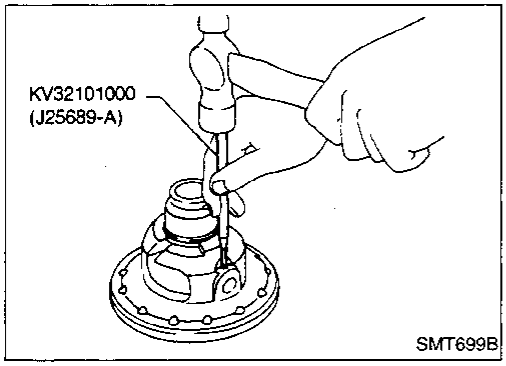
0.1 - 0.2 mm (0.004 - 0.008 in)

c. If not within specification, adjust clearance by changing thickness of side gear thrust washers.

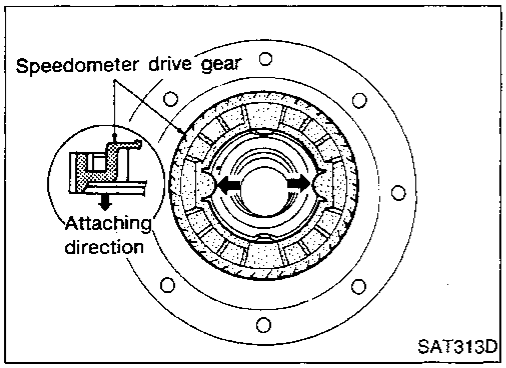
Side gear thrust washer:

Refer to AT-211.

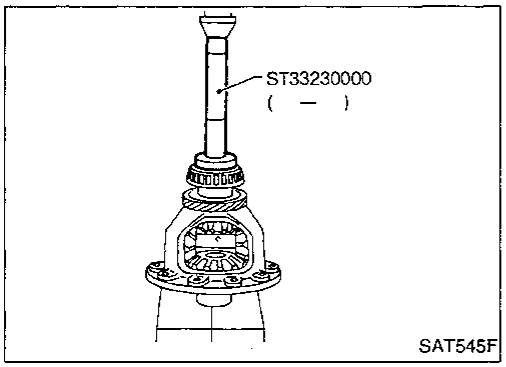
Final Drive (Cont'd)



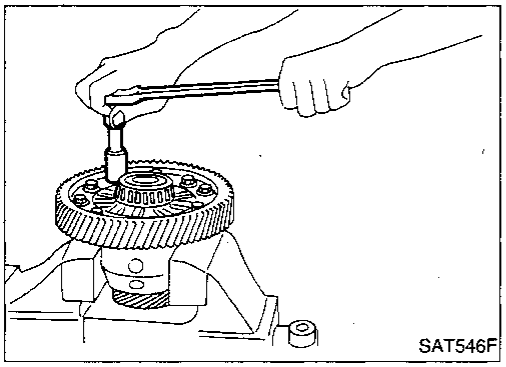
4. Install lock pin.
- **Make sure that lock pin is flush with case.**



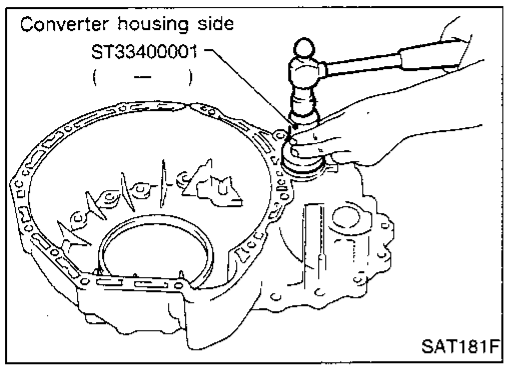
5. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**



6. Press on differential side bearings.

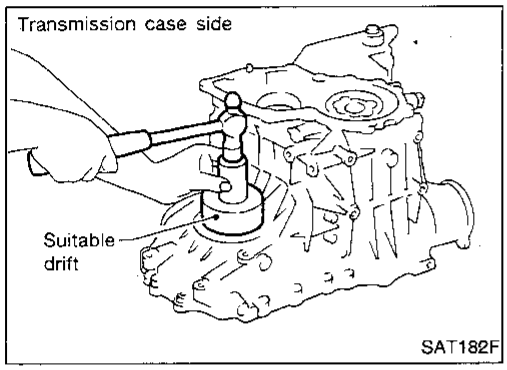


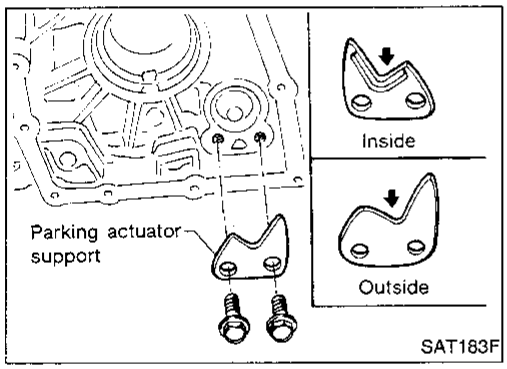
7. Install final gear and tighten fixing bolts in a crisscross pattern.



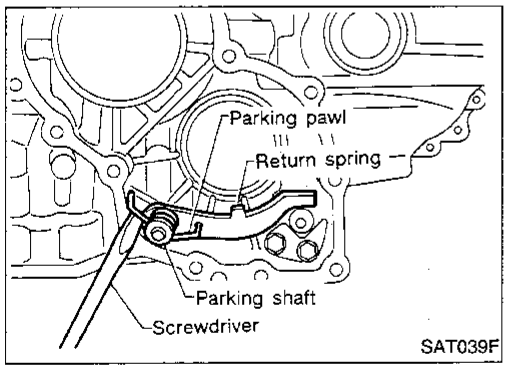
Assembly

1. Install differential side oil seals on transmission case and converter housing.

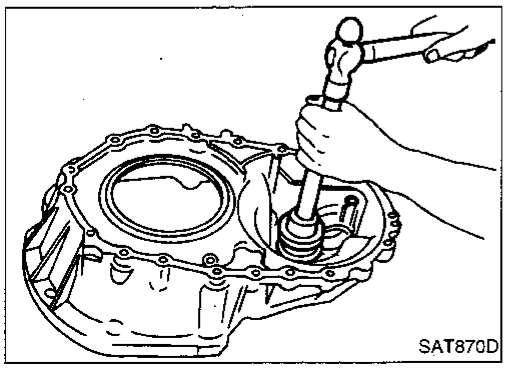




2. Install parking actuator support to transmission case.
- **Pay attention to direction of parking actuator support.**



3. Install parking pawl on transmission case and fix it with parking shaft.
4. Install return spring.

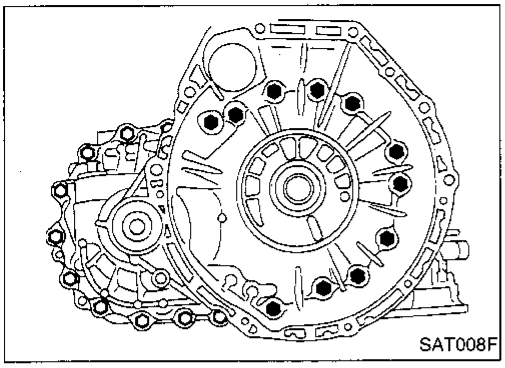


Adjustment

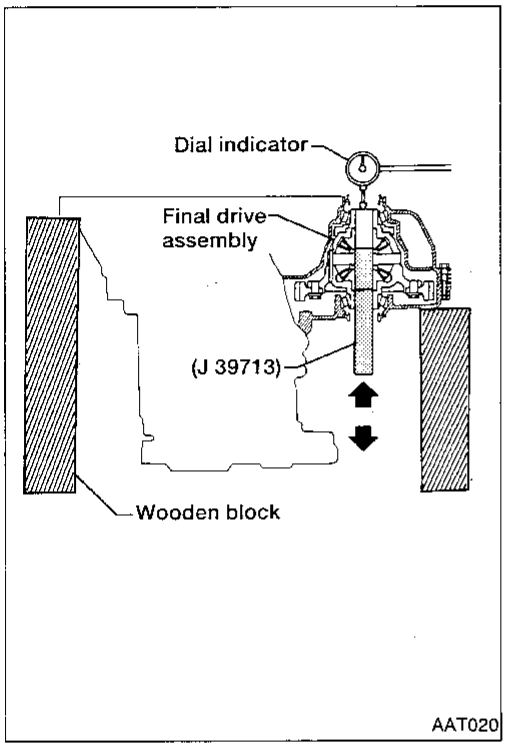
DIFFERENTIAL SIDE BEARING PRELOAD

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

Adjustment (Cont'd)


SAT008F

3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing and tighten transmission case fixing bolts to the specified torque.



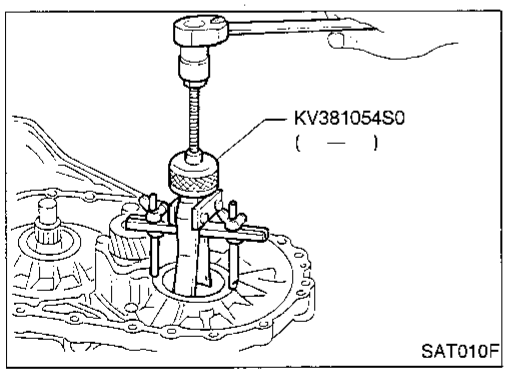
AAT020

5. Attach dial indicator on differential case at converter housing side.
6. Insert Tool into differential side gear from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s).

Suitable shim thickness = Dial indicator deflection + Specified bearing preload

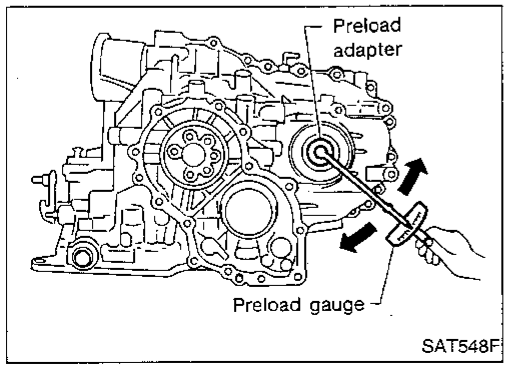
Differential side bearing adjusting shim:
Refer to AT-211.

Bearing preload:
0.05 - 0.09 mm (0.0020 - 0.0035 in)



SAT010F

9. Remove converter housing from transmission case.
10. Remove final drive assembly from transmission case.
11. Remove differential side bearing outer race from transmission case.
12. Reinstall differential side bearing outer race and shim(s) selected from SDS table on transmission case.
13. Reinstall converter housing on transmission case and tighten transmission case fixing bolts to the specified torque.



SAT548F

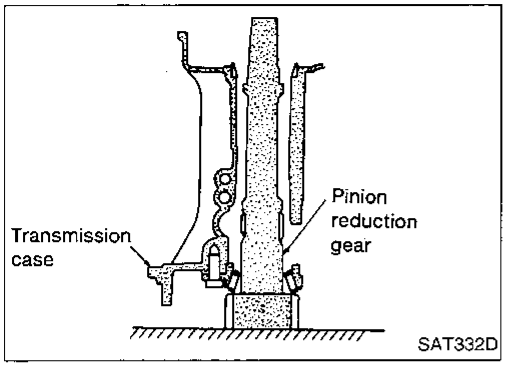
14. Insert Tool into differential side gear and measure turning torque of final drive assembly.

- **When measuring turning torque, turn final drive assembly in both directions several times to seat bearing rollers correctly.**

  Turning torque of final drive assembly (New bearing):
  0.78 - 1.37 N·m (8.0 - 14.0 kg-cm, 6.9 - 12.2 in-lb)
- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

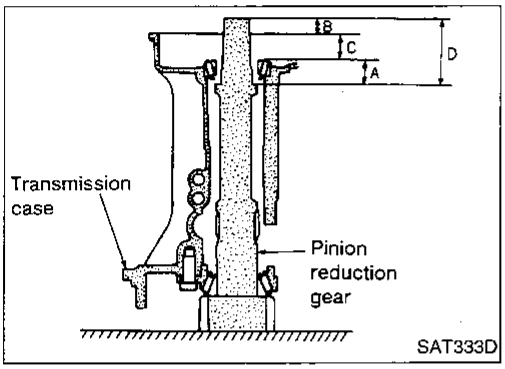
Adjustment (Cont'd)

REDUCTION GEAR BEARING PRELOAD



1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction gear bearing adjusting shim using the following procedures.

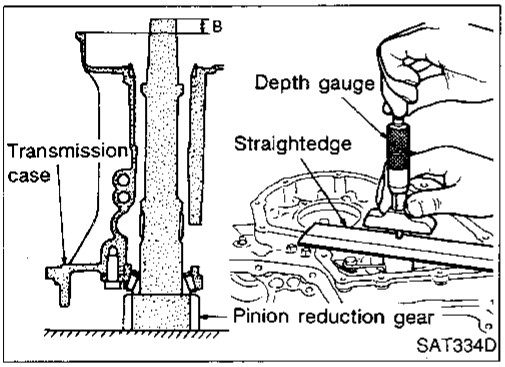
a. Place reduction gear on transmission case as shown.



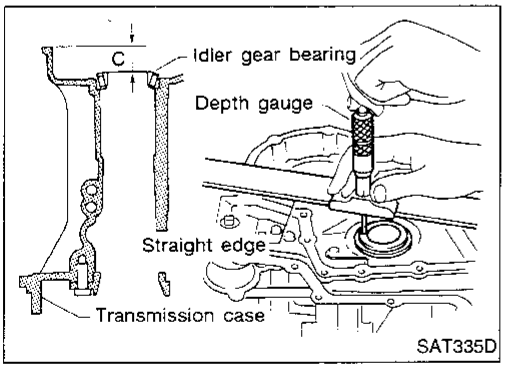
b. Place idler gear bearing on transmission case.
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

A = D – (B + C)

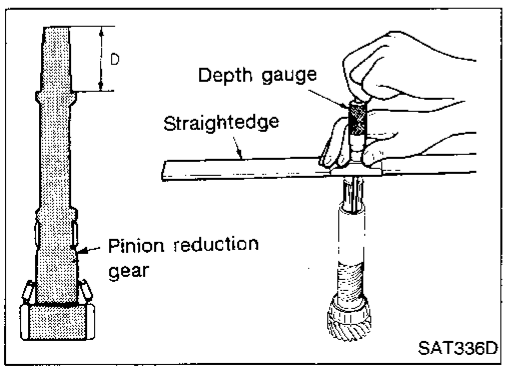
"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction gear.



- Measure dimension "B" between the end of reduction gear and the surface of transmission case.
- **Measure dimension "B" in at least two places.**



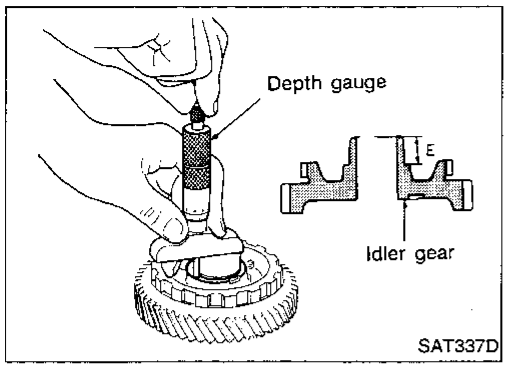
- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**



- Measure dimension "D" between the end of reduction gear and the adjusting shim mating surface of reduction gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A"

A = D – (B + C)

Adjustment (Cont'd)



d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.

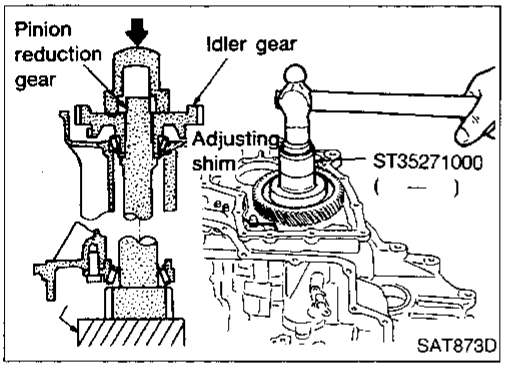
- **Measure dimension "E" in at least two places.**

e. Select proper thickness of reduction gear bearing adjusting shim.

Proper shim thickness = A – E – 0.5 mm (0.0020 in)*

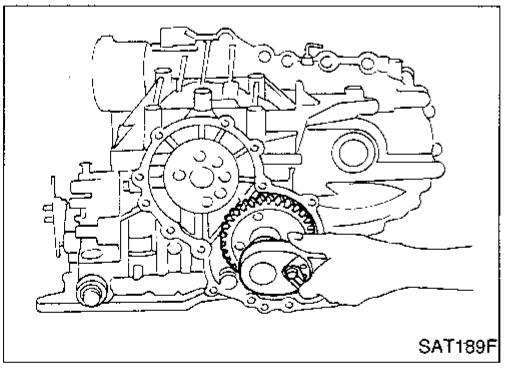
(* ... Bearing preload)

Reduction gear bearing adjusting shim: Refer to AT-213.



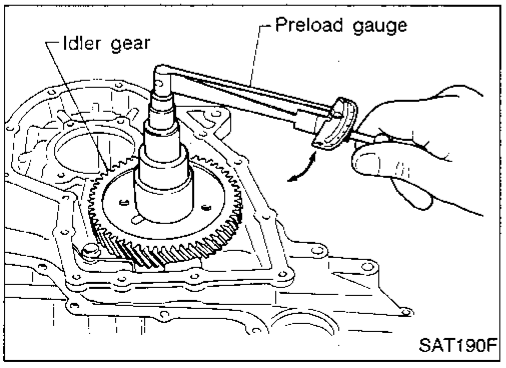
3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.

- **Press idler gear so that idler gear can be locked by parking pawl.**



6. Tighten idler gear lock nut to the specified torque.

- **Lock idler gear with parking pawl when tightening lock nut.**



7. Measure turning torque of reduction gear.

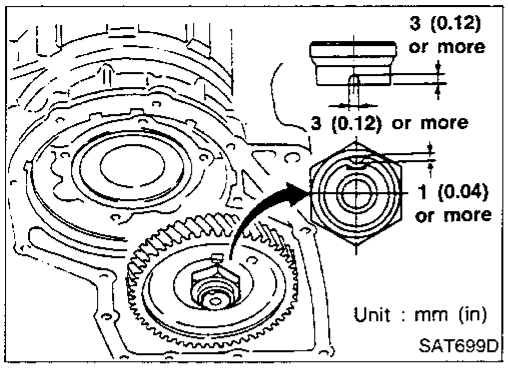
- **When measuring turning torque, turn reduction gear in both directions several times to seat bearing rollers correctly.**

  Turning torque of reduction gear:

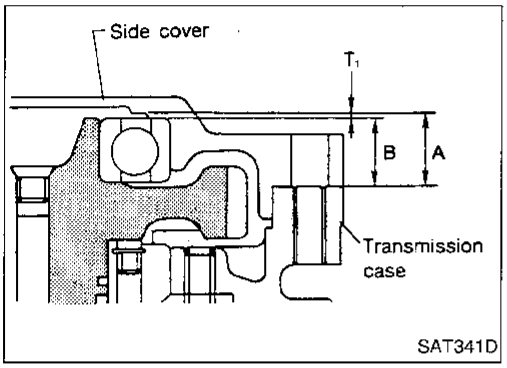
  0.05 - 0.39 N·m (0.5 - 4.0 kg-cm, 0.43 - 3.5 in-lb)

- **If turning torque is out of specification, decrease or increase thickness of reduction gear bearing adjusting shim.**

Adjustment (Cont'd)

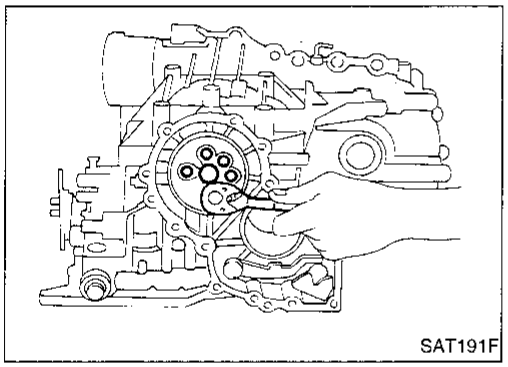


8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

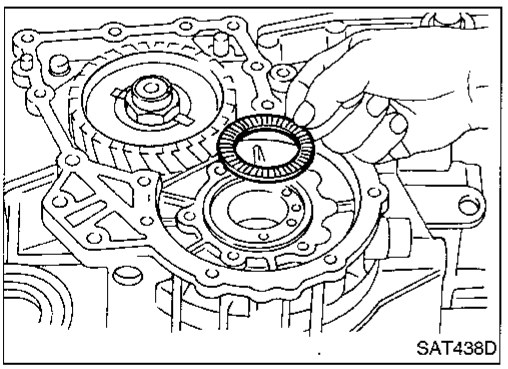


OUTPUT SHAFT END PLAY

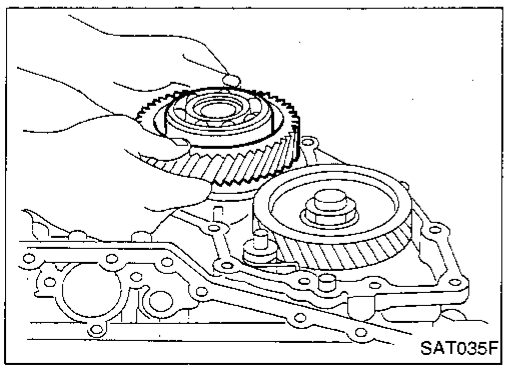
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



1. Install bearing retainer for output shaft.

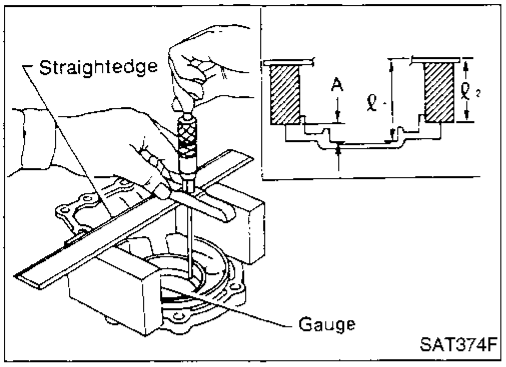


2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

Adjustment (Cont'd)

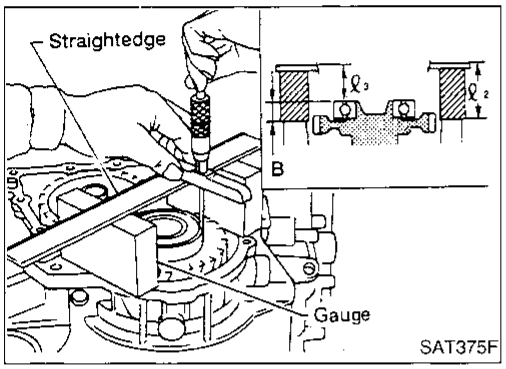


4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".

- **Measure dimension "ℓ_1" and "ℓ_2" in at least two places.**

"A": Distance between transmission case fitting surface and adjusting shim mating surface.

$A = \ell_1 - \ell_2$ ℓ_2: Height of gauge

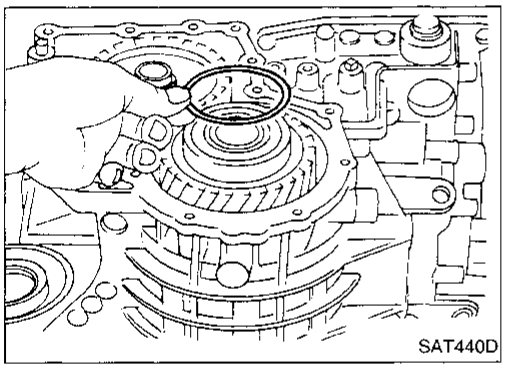


5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

Measure "ℓ_2" and "ℓ_3" in at least two places.

"B": Distance between the end of output shaft bearing outer race and the side cover fitting surface of transmission case.

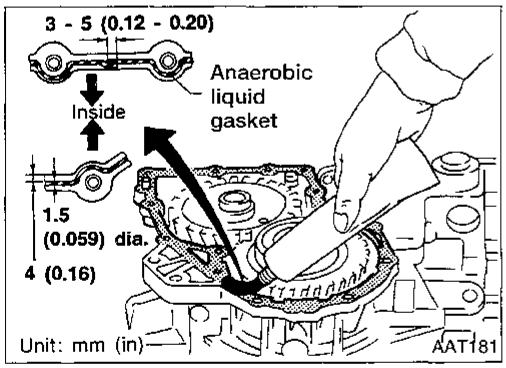
$B = \ell_2 - \ell_3$ ℓ_2: Height of gauge



6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

Output shaft end play (A – B):
0 - 0.15 mm (0 - 0.0059 in)
Output shaft end play adjusting shim:
Refer to AT-214.

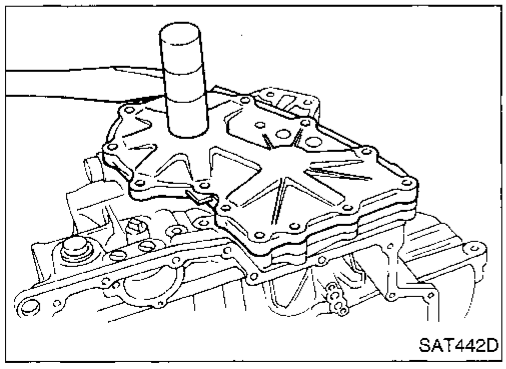
7. Install adjusting shim on output shaft bearing.



Assembly

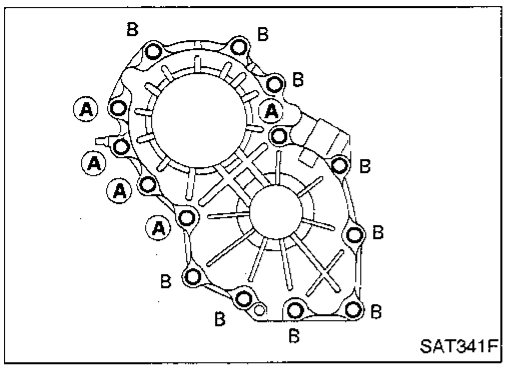
1. Apply locking sealant to transmission case as shown in illustration.

- **Wash mating surfaces with a brake cleaner type solvent, allow to dry.**
- **The mating surfaces must be smooth (no nicks or gouges) and free of oil.**
- **Apply anaerobic liquid gasket Loctite P/N 51813 or equivalent to mating surface of transmission case.**

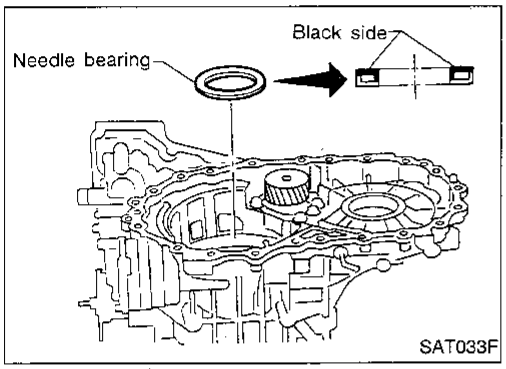


2. Set side cover on transmission case.

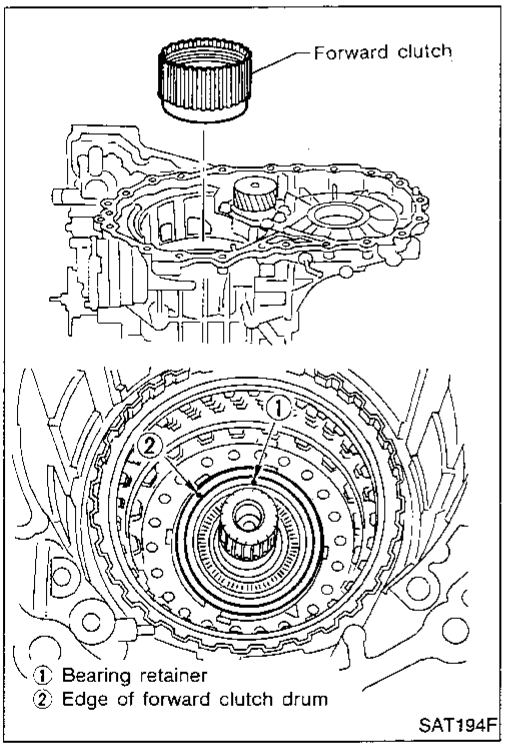
Assembly (Cont'd)



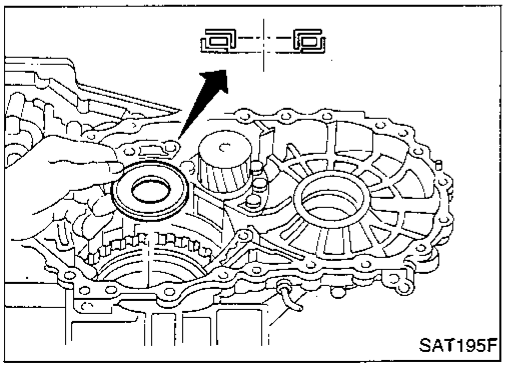
3. Tighten side cover fixing bolts to specified torque.
- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**



4. Remove paper rolled around bearing retainer.
5. Install thrust washer on bearing retainer.
- **Apply petroleum jelly to thrust washer.**

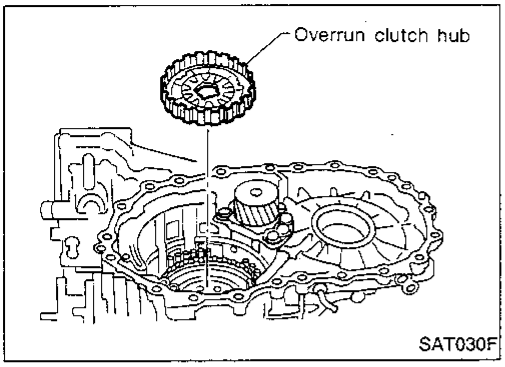


6. Install forward clutch assembly.
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**
- **If forward clutch assembly is correctly seated, points ① and ② are at almost same level.**

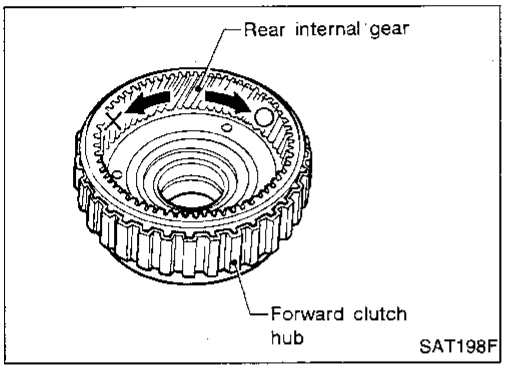


7. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**

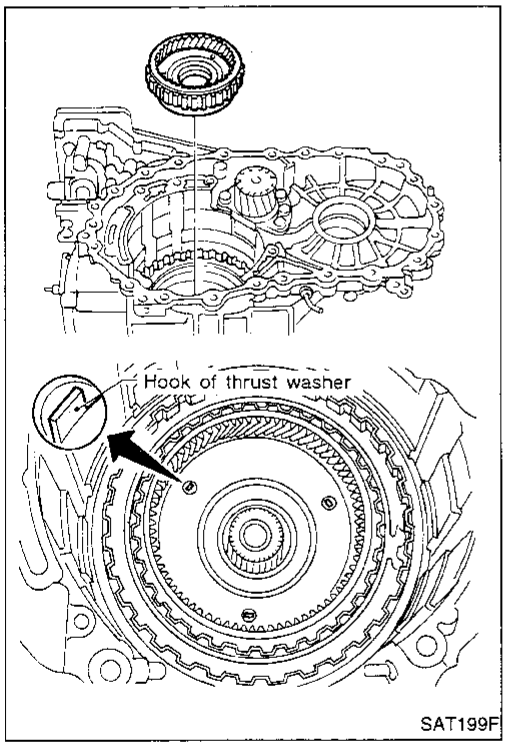
Assembly (Cont'd)



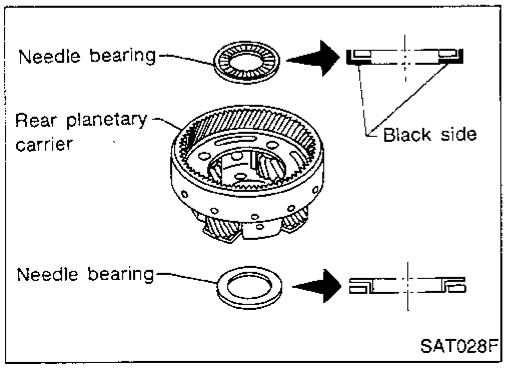
8. Install overrun clutch hub.
- **Apply petroleum jelly to thrust washers.**
- **Align teeth of overrun clutch drive plates before installing.**



9. Hold forward clutch hub and turn rear internal gear. Check overrun clutch hub for correct directions of lock and unlock.
- **If not shown as illustration, check installed direction of forward one-way clutch.**



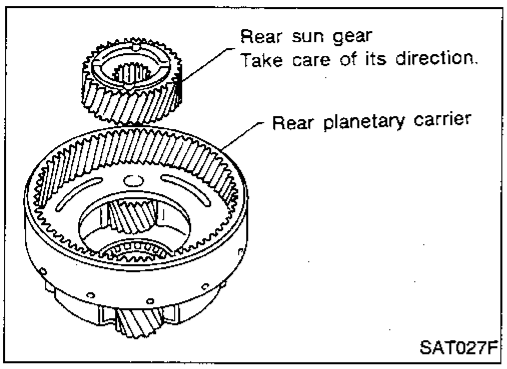
10. Install forward clutch hub and rear internal gear assembly.
- **Align teeth of forward clutch drive plates before installing.**
- **Check three hooks of thrust washer are correctly aligned after installing.**



11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.

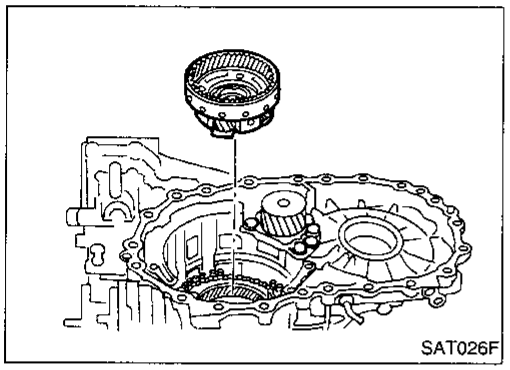
a. Install needle bearings on rear planetary carrier.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

Assembly (Cont'd)

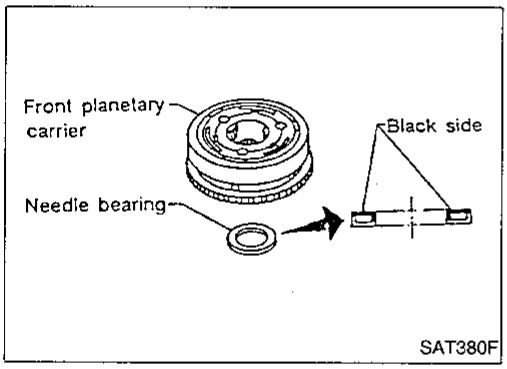


b. Install rear sun gear on rear planetary carrier.

- **Pay attention to direction of rear sun gear.**

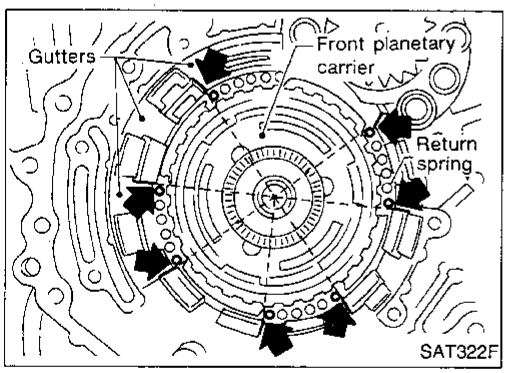


c. Install rear planetary carrier on transmission case.



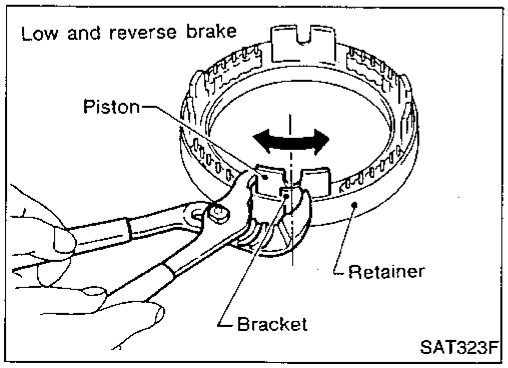
12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.

- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**



13. Install low and reverse brake piston according to the following procedures.

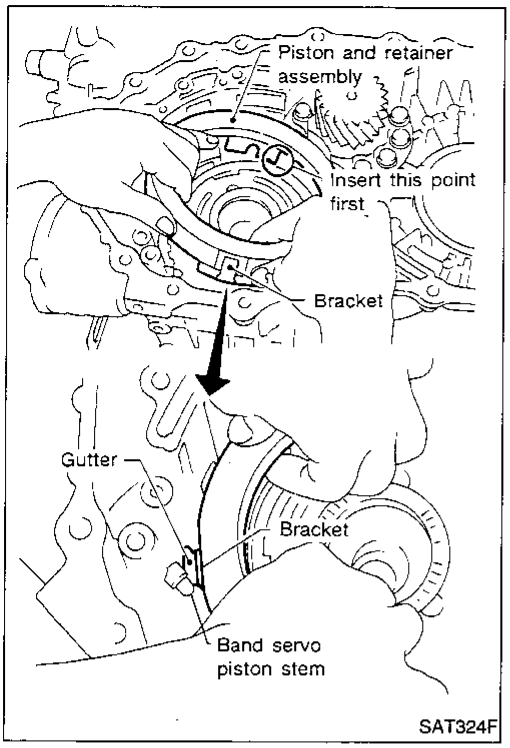
a. Set and align return springs to transmission case gutters as shown in illustration.



b. Set and align piston with retainer.

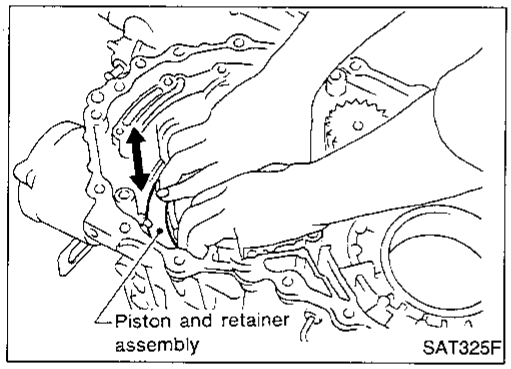
- **Secure the springs to the piston with thin wire. Do not use petroleum jelly.**

Assembly (Cont'd)



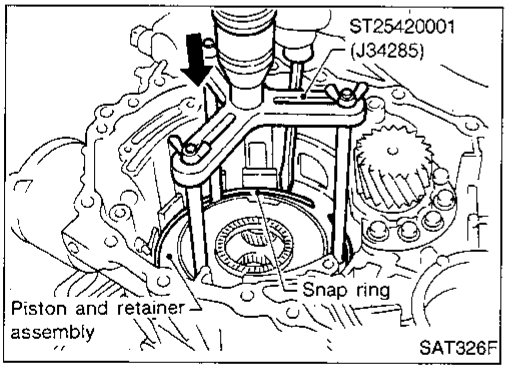
c. Install piston and retainer assembly on the transmission case.

- **Remove band servo.**
- **Align bracket to specified gutter as indicated in illustration.**

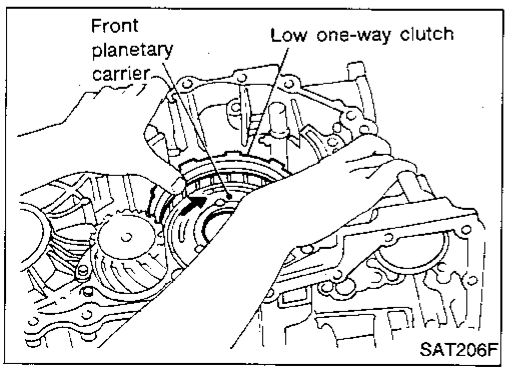


d. Check that each protrusions of piston is correctly set to corresponding return spring as follows.

Push piston and retainer assembly evenly and confirm they move smoothly.
If they can not move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a" (Refer to AT-195).

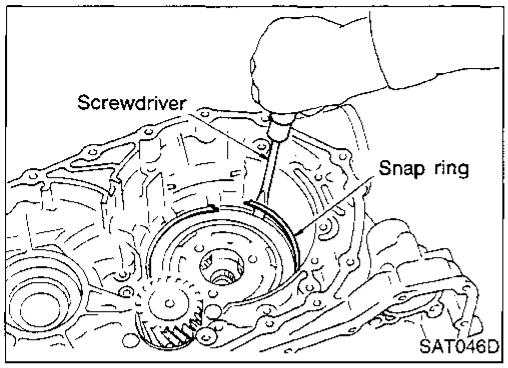


e. Push down piston and retainer assembly and install snap ring.
f. Install band servo.

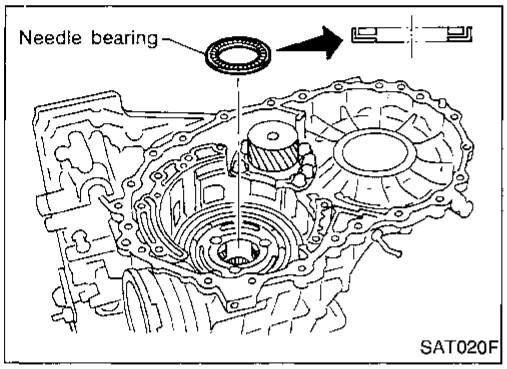


14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.

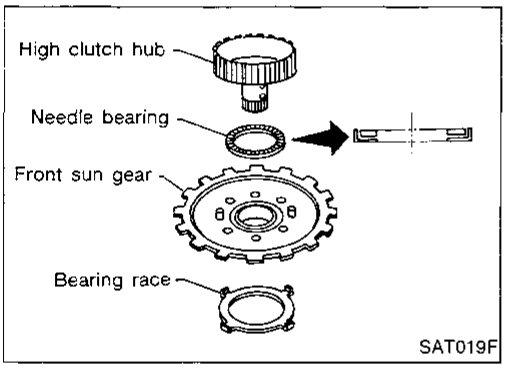
Assembly (Cont'd)



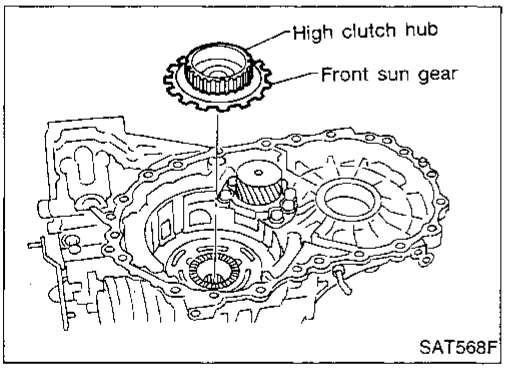
15. Install snap ring with screwdriver.



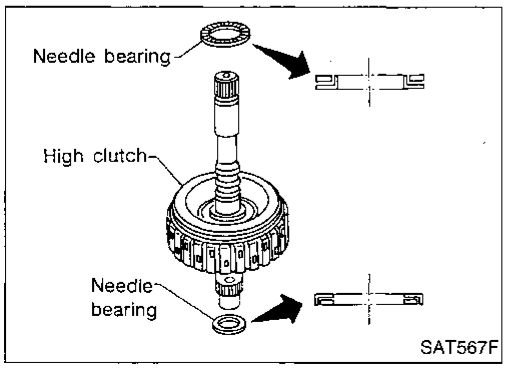
16. Install needle bearing on transmission case.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



17. Install bearing race, needle bearing and high clutch hub on front sun gear.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**

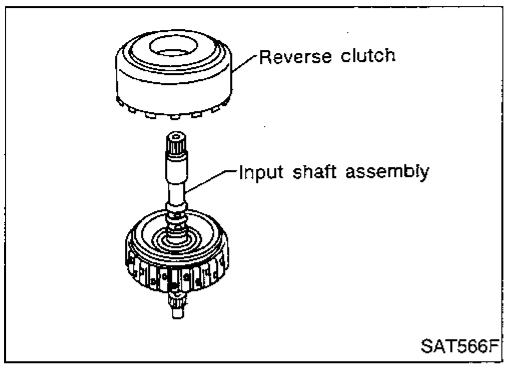


18. Install high clutch hub and front sun gear on transmission case.

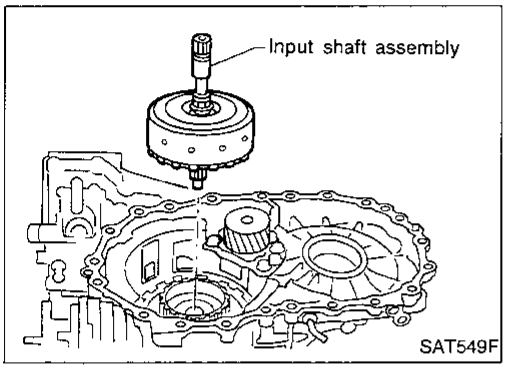


19. Install needle bearings on high clutch drum.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

Assembly (Cont'd)



20. Remove paper rolled around input shaft.
21. Install input shaft assembly in reverse clutch.
- **Align teeth of reverse clutch drive plates before installing.**

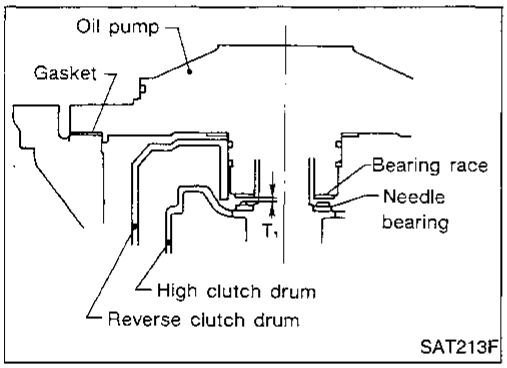


22. Install reverse clutch assembly on transmission case.
- **Align teeth of high clutch drive plates before installing.**

Adjustment

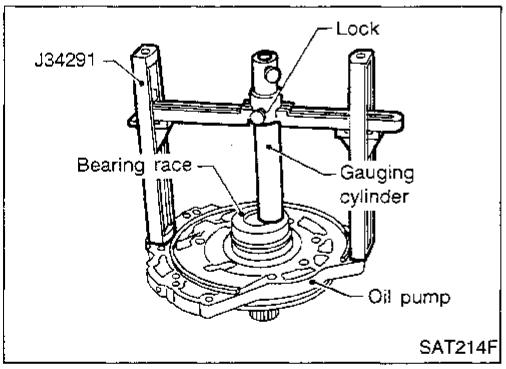
When any of the following parts are replaced, total end play or reverse clutch end play must be adjusted.

- Transmission case
- 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

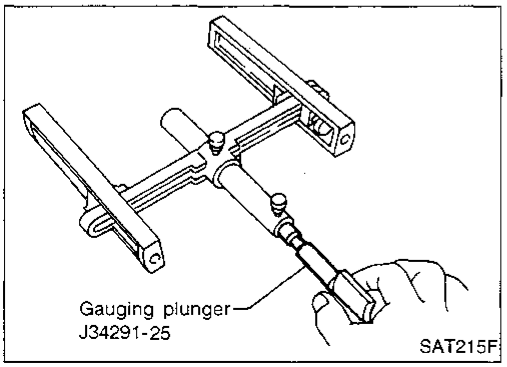


TOTAL END PLAY

1. Adjust total end play "T_1".

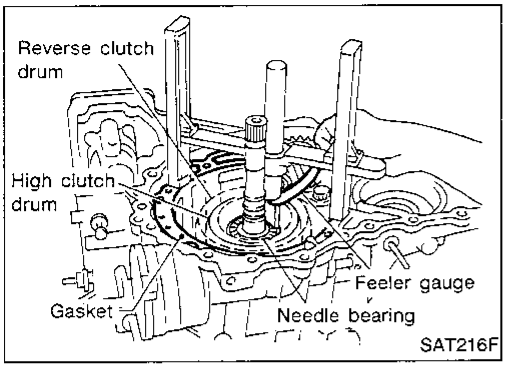


a. With original bearing race installed, place Tool onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.

Adjustment (Cont'd)

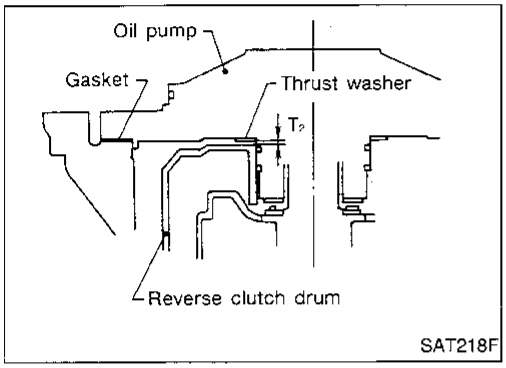


c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket) and allow plunger to rest on needle bearing.
d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

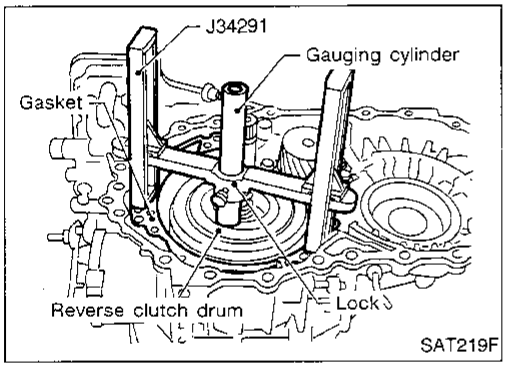
Total end play "T_1":
0.25 - 0.55 mm (0.0098 - 0.0217 in)

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

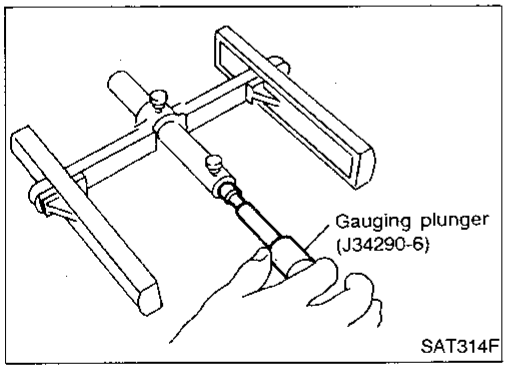
Available bearing race:
Refer to AT-214.



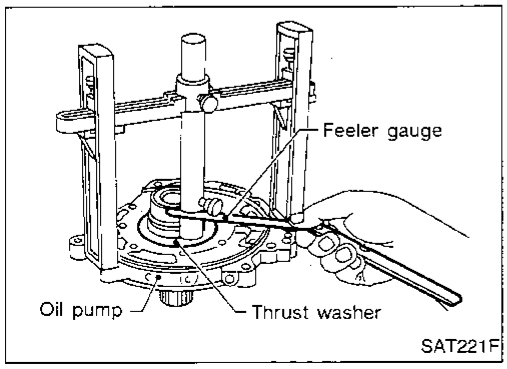
2. Adjust reverse clutch drum end play "T_2".



a. Place Tool on machined surface of transmission case (with gasket) and allow gauging cylinder to rest on reverse clutch drum. Lock cylinder in place with set screw.



b. Install gauging plunger into cylinder.



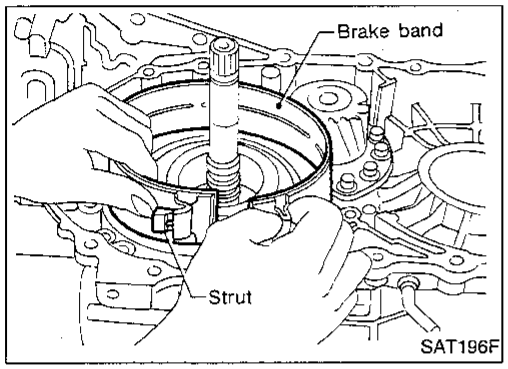
c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly and allow plunger to rest on thrust washer.
d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse clutch drum end play.

Reverse clutch drum end play "T_2":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

Adjustment (Cont'd)

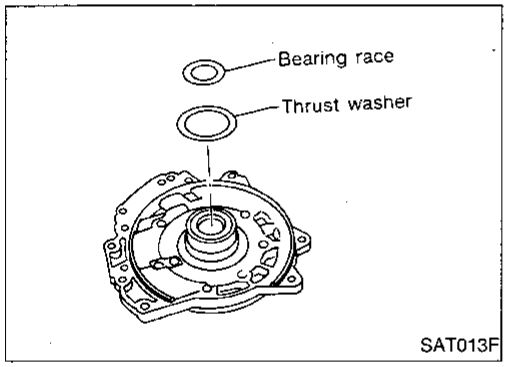
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

Available thrust washer:
Refer to AT-213.

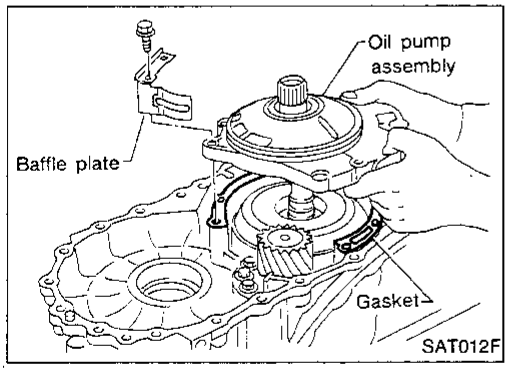


Assembly

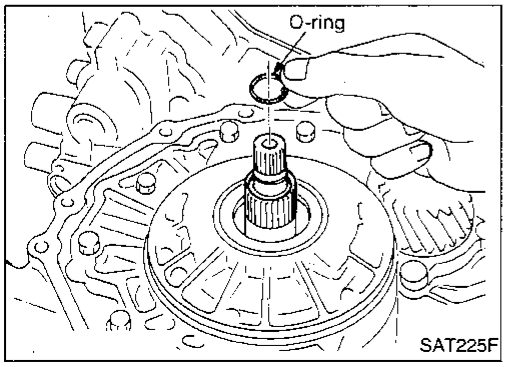
1. Install anchor end pin, washer and lock nut on transmission case.
2. Place brake band and strut on periphery of reverse clutch drum. Then, tighten anchor end pin just enough so that brake band is fitted on periphery of reverse clutch drum uniformly.



3. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**

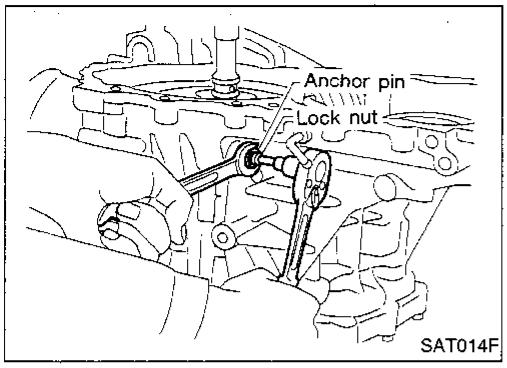


5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.

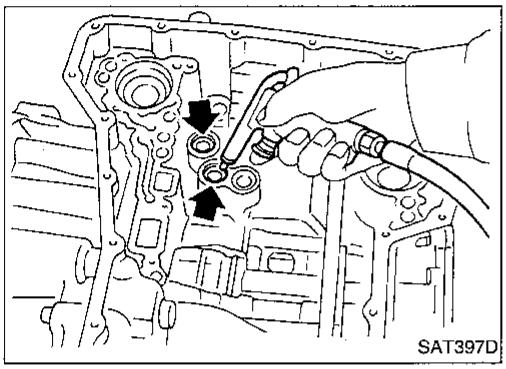


7. Install O-ring to input shaft.
- **Apply ATF to O-ring.**

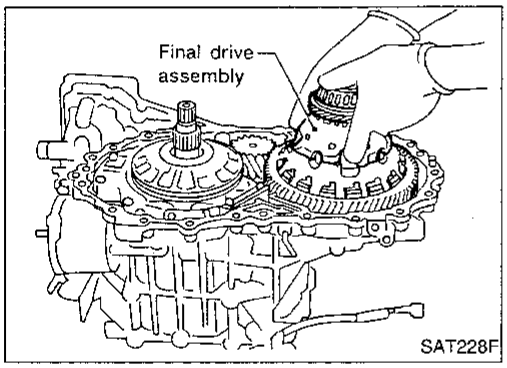
Assembly (Cont'd)



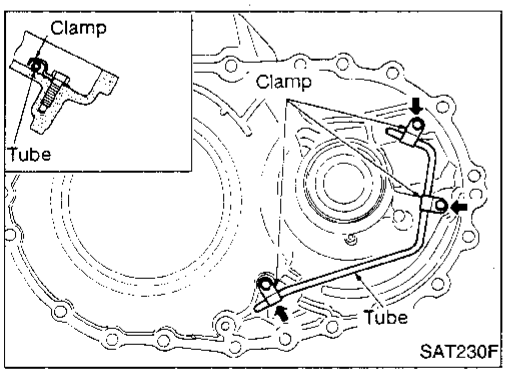
8. Adjust brake band.
a. Tighten anchor end pin to the specified torque.
Anchor end pin:
: 4 - 6 N·m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)
b. Back off anchor end pin two and a half turns.
c. While holding anchor end pin, tighten lock nut to the specified torque.
Lock nut:
: 31- 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)



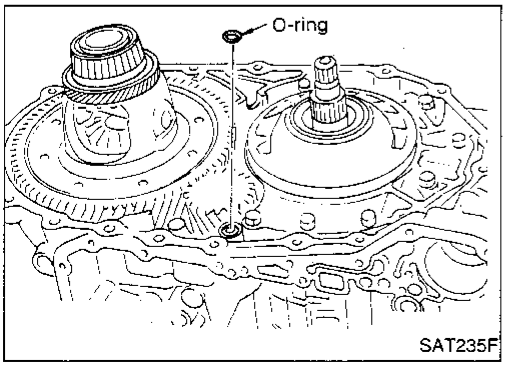
9. Apply compressed air to oil holes of transmission case and check operation of brake band.



10. Install final drive assembly on transmission case.

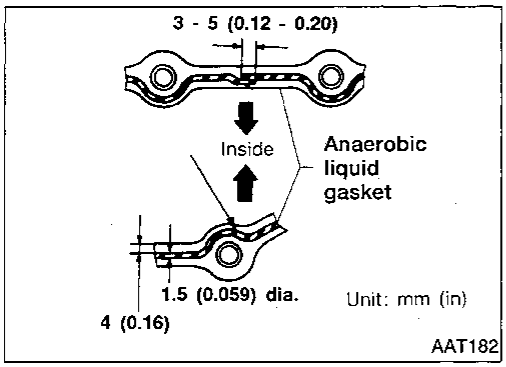


11. Install oil tube on converter housing.

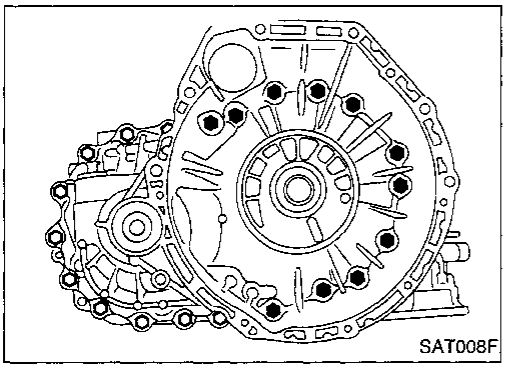


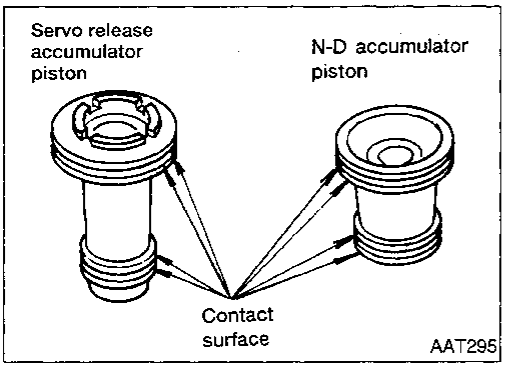
12. Install O-ring on differential oil port of transmission case.

Assembly (Cont'd)

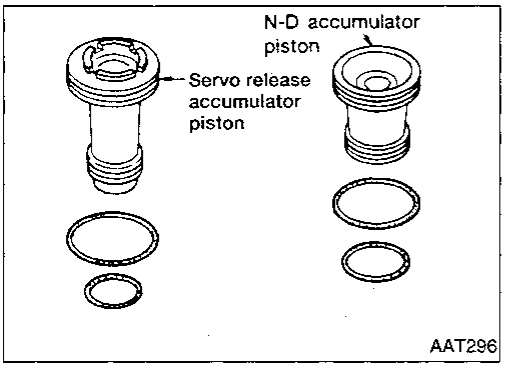


13. Install converter housing on transmission case.
- **Wash mating surfaces with a brake cleaner type solvent, allow to dry.**
- **The mating surfaces must be smooth (no nicks or gouges) and free of oil.**
- **Apply anaerobic liquid gasket Loctite P/N 51813 or equivalent to mating surface of converter housing.**





14. Install accumulator piston.
a. Check contact surface of accumulator piston for damage.

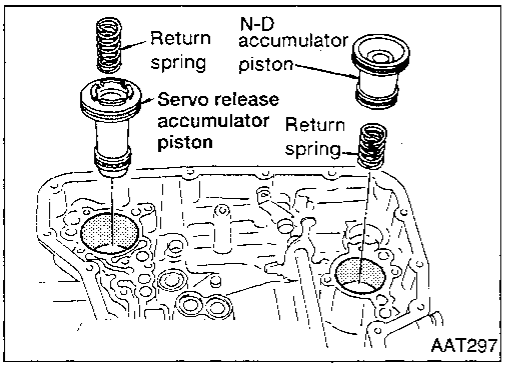


b. Install O-rings on accumulator piston.
- Apply ATF to O-rings.

Accumulator piston O-rings:

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
Servo release accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)



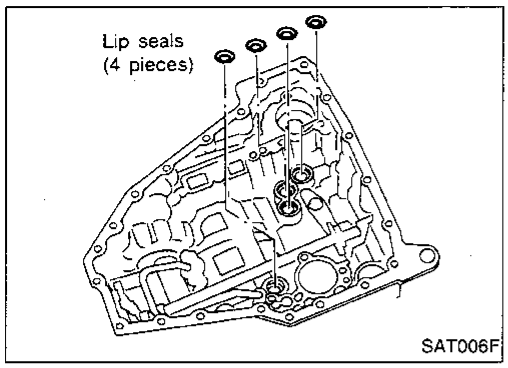
c. Install accumulator pistons and return springs on transmission case.
- **Apply ATF to inner surface of transmission case.**

Return springs:

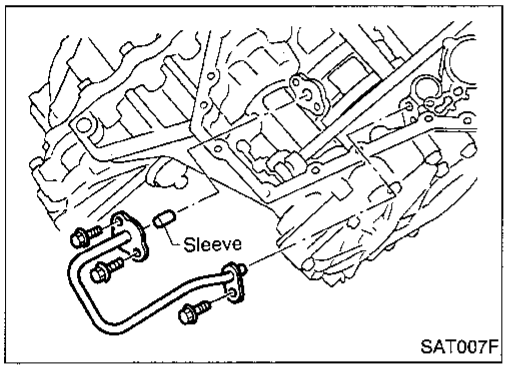
Unit: mm (in)

Spring	Free length	Outer diameter
Servo release accumulator spring	52.5 (2.067)	20.4 (0.803)
N-D accumulator spring	43.5 (1.713)	27.0 (1.063)

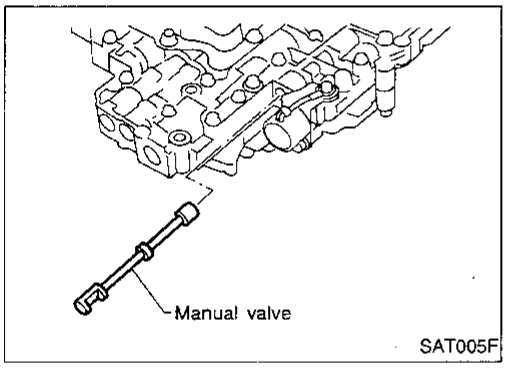
Assembly (Cont'd)



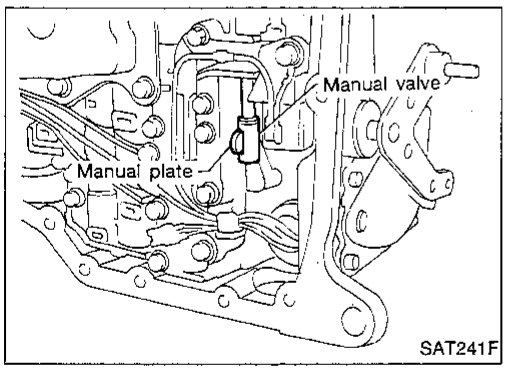
15. Install lip seals for band servo oil holes on transmission case.
- **Apply petroleum jelly to lip seals.**



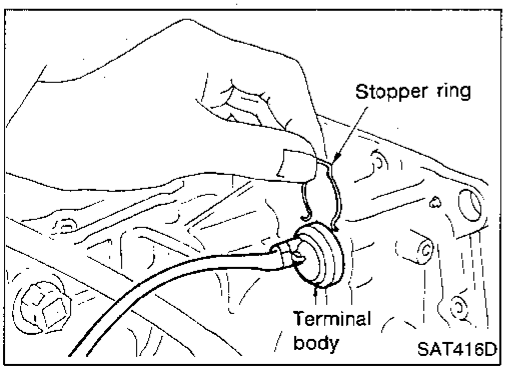
16. Install tube and sleeve.



17. Install control valve assembly.
a. Insert manual valve into control valve assembly.
- **Apply ATF to manual valve.**

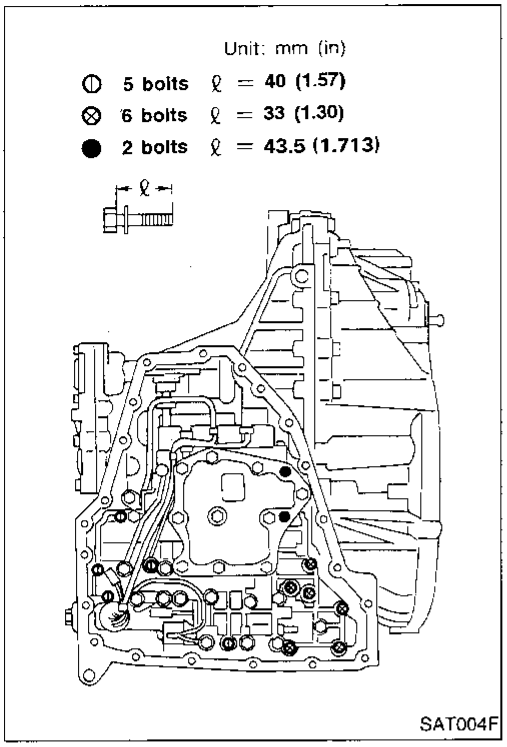


b. Set manual shaft in Park/neutral position.
c. Install control valve assembly on transmission case while aligning manual valve with manual plate.



d. Pass terminal cord assembly harness through transmission case and install terminal body on transmission case by pushing it.
e. Install stopper ring to terminal body.

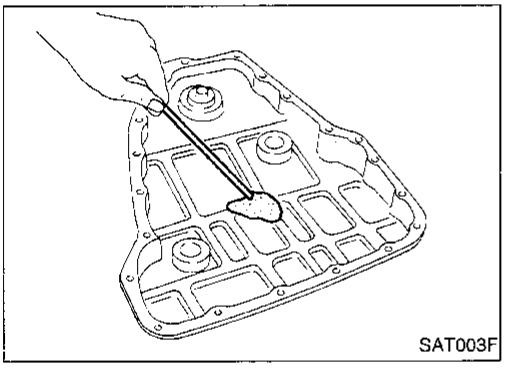
Assembly (Cont'd)



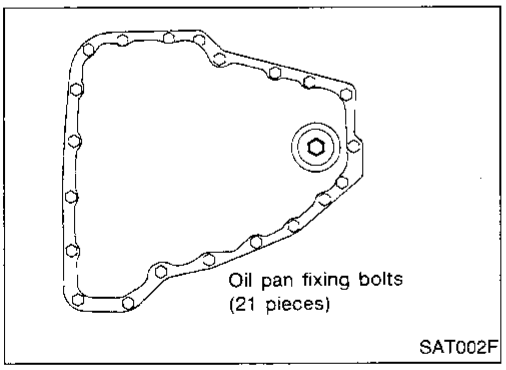
f. Tighten bolts ⓘ,ⓧ and ●.

Bolt length, number and location:

Bolt	ⓘ	ⓧ	●
Bolt length "ℓ" mm (in)	40.0 (1.575)	33.0 (1.299)	43.5 (1.713)
Number of bolts	5	6	2



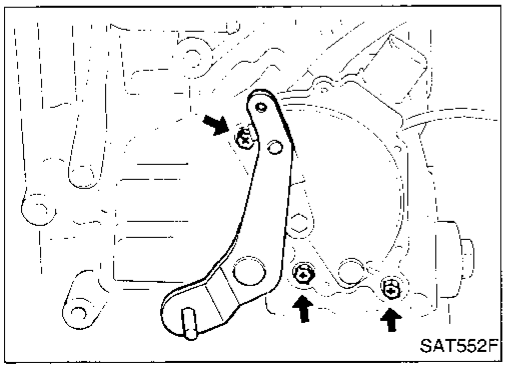
18. Install oil pan.
a. Attach a magnet to oil pan.



b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.

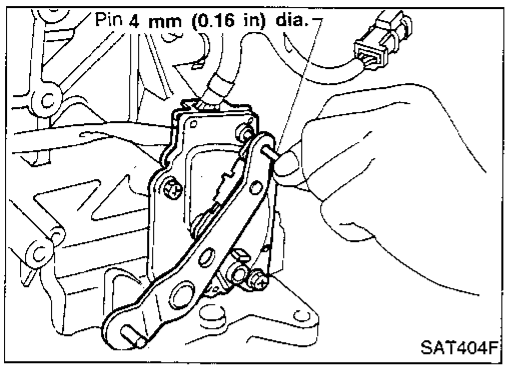
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to the specified torque.
Drain plug:
: 29 - 39 N·m (3.0 - 4.0 kg-m, 22 - 29 ft-lb)

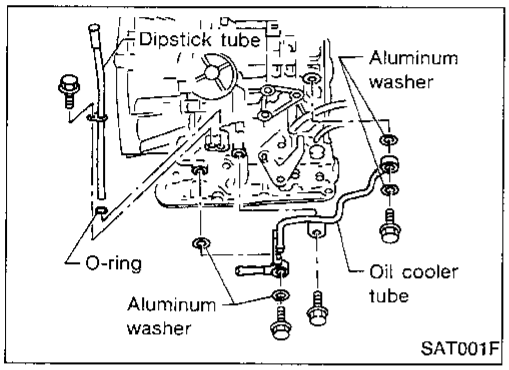


19. Install inhibitor switch.
a. Set manual lever in "P" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move selector lever to "N" position.

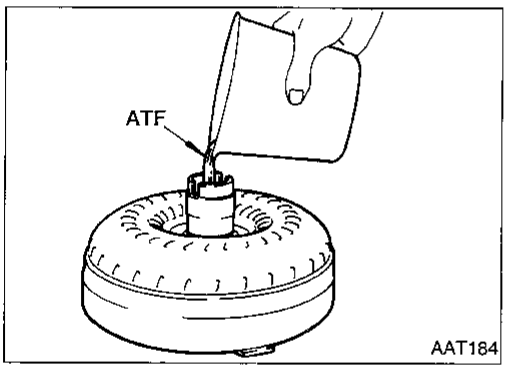
Assembly (Cont'd)



d. Insert 4.0 mm (0.157 in) dia. pin into adjustment hole in both inhibitor switch and manual shaft as near vertically as possible.
e. Tighten inhibitor switch fixing bolts.
f. Remove pin from adjustment hole after adjusting inhibitor switch.

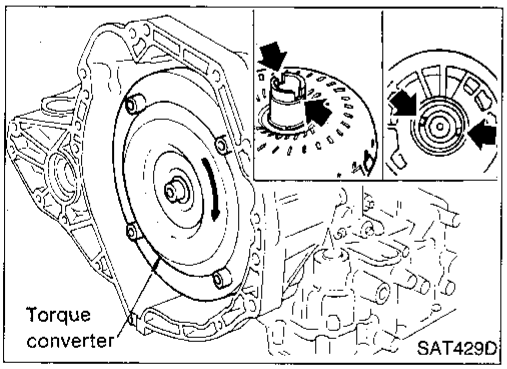


20. Install oil charging pipe and oil cooler tube to transmission case.

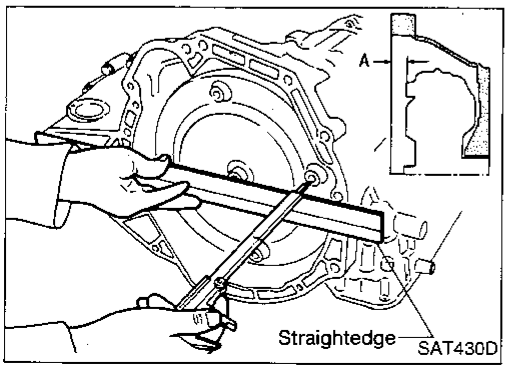


21. Install torque converter.
a. Pour ATF into torque converter.

- **Approximately 1 liters (1-1/8 US qt, 7/8 Imp qt) of fluid is required for a new torque converter.**
- **When reusing old torque converter, add the same amount of fluid as was drained.**



b. Install torque converter while aligning notches of torque converter with notches of oil pump.



c. Measure distance "A" to check that torque converter is in proper position.
Distance "A": 14 mm (0.55 in) or more

General Specifications

Engine	VG30E
Automatic transaxle model	RE4F04A
Automatic transaxle assembly	
Model code number	80X02
Transaxle gear ratio	
1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Reverse	2.272
Final drive	3.861
Recommended oil	Genuine NISSAN ATF or Dexron™ II E or equivalent
Oil capacity ℓ (US qt, Imp qt)	9.4 (10, 8-1/4)

Specifications and Adjustments

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Shift pattern	Vehicle speed km/h (MPH)						
		$D_1 \rightarrow D_2$	$D_2 \rightarrow D_3$	$D_3 \rightarrow D_4$	$D_4 \rightarrow D_3$	$D_3 \rightarrow D_2$	$D_2 \rightarrow D_1$	$1_2 \rightarrow 1_1$
Full throttle	Comfort	56 - 64 (35 - 40)	100 - 108 (62 - 67)	164 - 174 (102 - 108)	158 - 166 (98 - 103)	90 - 98 (56 - 61)	42 - 50 (26 - 31)	42 - 50 (26 - 31)
	Power	56 - 64 (35 - 40)	100 - 108 (62 - 67)	164 - 174 (102 - 108)	158 - 166 (98 - 103)	90 - 98 (56 - 61)	42 - 50 (26 - 31)	42 - 50 (26 - 31)
Half throttle	Comfort	36 - 44 (22 - 27)	63 - 71 (39 - 44)	101 - 109 (63 - 68)	65 - 73 (40 - 45)	37 - 45 (23 - 28)	8 - 16 (5 - 10)	42 - 50 (26 - 31)
	Power	37 - 45 (23 - 28)	72 - 80 (45 - 50)	117 - 125 (73 - 78)	79 - 87 (49 - 54)	41 - 49 (25 - 30)	8 - 16 (5 - 10)	42 - 50 (26 - 31)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

Throttle opening	Gear position	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
2/8	D_4	Comfort	66 - 74 (41 - 46)	63 - 71 (39 - 44)
		Power	66 - 74 (41 - 46)	63 - 71 (39 - 44)
	OD OFF	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)
		Power	86 - 94 (53 - 58)	83 - 91 (52 - 57)

STALL REVOLUTION

Stall revolution (rpm)	1,800 - 2,100

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 ranges	R range
Idle	500 (5.1, 73)	775 (7.9, 112)
Stall	1,089 (11.1, 158)	1,687 (17.2, 245)

Specifications and Adjustments (Cont'd)

CONTROL VALVES

Control valve return springs

- Numbers of each valve spring listed in table below are the same as those listed in figures in "REPAIR FOR COMPONENT PARTS".

Unit: mm (in)

Parts			Part No.	Free length	Outer diameter
Lower body	⑬	Accumulator shift valve spring	31736-01X00	23.0 (0.906)	6.65 (0.2618)
	⑲	Line pressure solenoid valve spring	31742-80X11	17.0 (0.669)	10.7 (0.421)
	㉒	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	㉗	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	㉛	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	㊱	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	⑫	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	③	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
		31742-80X16	32.0 (1.260)	6.9 (0.272)	
Upper body	⑱	Pilot valve spring	31742-80X14	36.0 (1.417)	8.1 (0.319)
	④	1-2 accumulator valve spring	31742-80X10	20.5 (0.807)	7.0 (0.276)
	㉑	1-2 accumulator piston spring	31742-80X12	52.0 (2.047)	19.6 (0.772)
	㉕	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	㉚	2-3 timing valve spring	31742-80X18	30.5 (1.201)	6.6 (0.260)
	⑯	Overrun clutch reducing valve spring	31742-80X15	37.5 (1.476)	6.9 (0.272)
	⑪	Torque converter relief valve spring	31742-80X07	31.0 (1.220)	9.0 (0.354)
	⑧	Torque converter clutch control valve spring	31742-80X17	39.5 (1.555)	11.0 (0.433)

Specifications and Adjustments (Cont'd)

CLUTCHES AND BRAKES

Reverse clutch

Number of drive plates		2
Number of driven plates		2
Drive plate thickness	mm (in)	
Standard		1.6 (0.063)
Allowable limit		1.4 (0.055)
Clearance	mm (in)	
Standard		0.5 - 0.8 (0.020 - 0.031)
Allowable limit		1.2 (0.047)

Thickness of retaining plates

Thickness mm (in)	Part number
6.6 (0.260)	31537-80X05
6.8 (0.268)	31537-80X06
7.0 (0.276)	31537-80X07
7.2 (0.283)	31537-80X08
7.4 (0.291)	31537-80X09
7.6 (0.299)	31537-80X20
7.8 (0.307)	31537-80X21

High clutch

Number of drive plates		4
Number of driven plates		7
Drive plate thickness	mm (in)	
Standard		1.6 (0.063)
Allowable limit		1.4 (0.055)
Clearance	mm (in)	
Standard		1.8 - 2.2 (0.071 - 0.087)
Allowable limit		3.0 (0.118)

Thickness of retaining plates

Thickness mm (in)	Part number
3.0 (0.118)	31537-80X15
3.2 (0.126)	31537-80X16
3.4 (0.134)	31537-80X17
3.6 (0.142)	31537-80X18
3.8 (0.150)	31537-80X19

Specifications and Adjustments (Cont'd)

Forward clutch			
Number of drive plates		5	
Number of driven plates		5	
Drive plate thickness	mm (in)		
Standard		1.6 (0.063)	
Allowable limit		1.4 (0.055)	
Clearance	mm (in)		
Standard		0.45 - 0.85 (0.0177 - 0.0335)	
Allowable limit		1.85 (0.0728)	
Thickness of retaining plates		Thickness mm (in)	Part number
		3.6 (0.142)	31537-80X70
		3.8 (0.150)	31537-80X71
		4.0 (0.157)	31537-80X72
		4.2 (0.165)	31537-80X73
		4.4 (0.173)	31537-80X74
		3.4 (0.134)	31537-80X75
		3.2 (0.126)	31537-80X76
Overrun clutch			
Number of drive plates		3	
Number of driven plates		5	
Drive plate thickness	mm (in)		
Standard		1.6 (0.063)	
Allowable limit		1.4 (0.055)	
Clearance	mm (in)		
Standard		0.7 - 1.1 (0.028 - 0.043)	
Allowable limit		1.7 (0.067)	
Thickness of retaining plates		Thickness mm (in)	Part number
		3.0 (0.118)	31537-80X60
		3.2 (0.126)	31537-80X61
		3.4 (0.134)	31537-80X62
		3.6 (0.142)	31537-80X63
		3.8 (0.150)	31537-80X64

Specifications and Adjustments (Cont'd)

Low & reverse brake		
Number of drive plates		6
Number of driven plates		9
Drive plate thickness	mm (in)	
Standard		1.8 (0.071)
Allowable limit		1.6 (0.063)
Clearance	mm (in)	
Standard		1.7 - 2.1 (0.067 - 0.083)
Allowable limit		3.3 (0.130)

Thickness of retaining plates	Thickness mm (in)	Part number
	2.0 (0.079)	31667-80X00
	2.2 (0.087)	31667-80X01
	2.4 (0.094)	31667-80X02
	2.6 (0.102)	31667-80X03
	2.8 (0.110)	31667-80X04
	3.0 (0.118)	31667-80X05
	3.2 (0.126)	31667-80X06
	3.4 (0.134)	31667-80X07

Brake band		
Anchor end pin 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
Lock nut tightening torque	N·m (kg-m, ft-lb)	31 - 42 (3.2 - 4.3, 23 - 31)

FINAL DRIVE

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)

Differential side gear thrust washers

Thickness mm (in)	Part number
0.75 (0.0295)	38424-81X00
0.80 (0.0315)	38424-81X01
0.85 (0.0335)	38424-81X02
0.90 (0.0354)	38424-81X03
0.95 (0.0374)	38424-81X04

Differential side bearing preload adjusting shims

Thickness mm (in)	Part number
0.48 (0.0189)	31438-80X00
0.52 (0.0205)	31438-80X01
0.56 (0.0220)	31438-80X02
0.60 (0.0236)	31438-80X03
0.64 (0.0252)	31438-80X04
0.68 (0.0268)	31438-80X05
0.72 (0.0283)	31438-80X06
0.76 (0.0299)	31438-80X07
0.80 (0.0315)	31438-80X08
0.84 (0.0331)	31438-80X09
0.88 (0.0346)	31438-80X10
0.92 (0.0362)	31438-80X11

Bearing preload

Differential side bearing preload mm (in)	0.05 - 0.09 (0.0020 - 0.0035)

Turning torque

Turning torque of final drive assembly N·m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)

Clutch and brake return springs

Unit: mm (in)

Parts	Free length	Outer diameter
Forward clutch (Overrun clutch) (22 pcs)	21.4 (0.843)	10.3 (0.406)
High clutch (12 pcs)	22.5 (0.886)	10.8 (0.425)

PLANETARY CARRIER AND OIL PUMP

Planetary carrier		
Clearance between planetary carrier and pinion washer mm (in)		
	Standard	0.20 - 0.70 (0.0079 - 0.0276)
	Allowable limit	0.80 (0.0315)
Oil pump		
Oil pump side clearance mm (in)		0.030 - 0.050 (0.0012 - 0.0020)
Thickness of inner gears and outer gears		Inner gear
	Thickness mm (in)	Part number
	11.99 - 12.0 (0.4720 - 0.4724)	31346-80X00
	11.98 - 11.99 (0.4717 - 0.4720)	31346-80X01
	11.97 - 11.98 (0.4713 - 0.4717)	31346-80X02
		Outer gear
	Thickness mm (in)	Part number
	11.99 - 12.0 (0.4720 - 0.4724)	31347-80X00
	11.98 - 11.99 (0.4717 - 0.4720)	31347-80X01
	11.97 - 11.98 (0.4713 - 0.4717)	31347-80X02
Clearance between oil pump housing and outer gear mm (in)		
	Standard	0.111 - 0.181 (0.0044 - 0.0071)
	Allowable limit	0.181 (0.0071)
Oil pump cover seal ring clearance mm (in)		
	Standard	0.036 - 0.176 (0.0014 - 0.0069)
	Allowable limit	0.176 (0.0069)

INPUT SHAFT

Input shaft seal ring clearance mm (in)	
Standard	0.08 - 0.23 (0.0031 - 0.0091)
Allowable limit	0.23 (0.0091)

REDUCTION GEAR

Turning torque

Turning torque of reduction gear N·m (kg-cm, in-lb)	0.05 - 0.39 (0.5 - 4.0, 0.43 - 3.5)

Reduction gear bearing adjusting shims

Thickness mm (in)	Part number
5.20 (0.2047)	31439-81X10
5.22 (0.2055)	31439-81X11
5.24 (0.2063)	31439-81X12
5.26 (0.2071)	31439-81X13
5.28 (0.2079)	31439-81X14
5.30 (0.2087)	31439-81X15
5.32 (0.2094)	31439-81X16
5.34 (0.2102)	31439-81X17
5.36 (0.2110)	31439-81X18
5.38 (0.2118)	31439-81X19
5.40 (0.2126)	31439-81X20
5.42 (0.2134)	31439-81X21
5.44 (0.2142)	31439-81X22
5.46 (0.2150)	31439-81X23
5.48 (0.2157)	31439-81X24
5.50 (0.2165)	31439-81X46
5.52 (0.2173)	31439-81X47
5.54 (0.2181)	31439-81X48
5.56 (0.2189)	31439-81X49
5.58 (0.2197)	31439-81X60
5.60 (0.2205)	31439-81X61
5.62 (0.2213)	31439-81X62
5.64 (0.2220)	31439-81X63
5.66 (0.2228)	31439-81X64
5.68 (0.2236)	31439-81X65
5.70 (0.2244)	31439-81X66
5.72 (0.2252)	31439-81X67
5.74 (0.2260)	31439-81X68
5.76 (0.2268)	31439-81X69
5.78 (0.2276)	31439-81X70
5.80 (0.2283)	31439-81X71
5.82 (0.2291)	31439-81X72
5.84 (0.2299)	31439-81X73
5.86 (0.2307)	31439-81X74
5.88 (0.2315)	31439-81X75
5.90 (0.2323)	31439-81X76
5.92 (0.2331)	31439-81X77
5.94 (0.2339)	31439-81X78
5.96 (0.2346)	31439-81X79
5.98 (0.2354)	31439-81X80
6.00 (0.2362)	31439-81X81
6.02 (0.2370)	31439-81X82
6.04 (0.2378)	31439-81X83
6.06 (0.2386)	31439-81X84
6.08 (0.2394)	31439-82X00
6.10 (0.2402)	31439-82X01
6.12 (0.2409)	31439-82X02
6.14 (0.2417)	31439-82X03
6.16 (0.2425)	31439-82X04
6.18 (0.2433)	31439-82X05
6.20 (0.2441)	31439-82X06
6.22 (0.2449)	31439-82X07
6.24 (0.2457)	31439-82X08
6.26 (0.2465)	31439-82X09
6.28 (0.2472)	31439-82X10
6.30 (0.2480)	31439-82X11
6.32 (0.2488)	31439-82X12
6.34 (0.2496)	31439-82X13
6.36 (0.2504)	31439-82X14
6.38 (0.2512)	31439-82X15
6.40 (0.2520)	31439-82X16
6.42 (0.2528)	31439-82X17
6.44 (0.2535)	31439-82X18
6.46 (0.2543)	31439-82X19
6.48 (0.2551)	31439-82X20
6.50 (0.2559)	31439-82X21

REVERSE CLUTCH END PLAY

Reverse clutch end play mm (in)	0.55 - 0.90 (0.0217 - 0.0354)

Thrust washers for adjusting reverse clutch drum end play

Thickness mm (in)	Part number
0.80 (0.0315)	31508-80X00
1.40 (0.0551)	31508-80X03
0.95 (0.0374)	31508-80X07
1.10 (0.0433)	31508-80X08
1.25 (0.0492)	31508-80X09
1.55 (0.0610)	31508-80X10
1.70 (0.0669)	31508-80X11
1.85 (0.0728)	31508-80X12

ACCUMULATOR

O-ring

Unit: mm (in)

Accumulator	Inner diameter (Small)	Inner diameter (Large)
Servo release accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

Specifications and Adjustments (Cont'd)

Return spring

Unit: mm (in)

Accumulator	Free length	Outer diameter
Servo release accumulator	52.5 (2.067)	20.4 (0.803)
N-D accumulator	43.5 (1.713)	27.0 (1.063)

BAND SERVO

Return spring

Unit: mm (in)

Return spring	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	23.5 (0.925)	20.1 (0.791)
Cushion servo return spring	23.4 (0.921)	25.5 (1.004)

REMOVAL AND INSTALLATION

Unit: mm (in)

Distance between end of converter housing and torque converter	14 (0.55)

OUTPUT SHAFT

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

End play

Output shaft end play	mm (in)	0 - 0.15 (0 - 0.0059)

Output shaft adjusting shims

Thickness mm (in)	Part number
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

BEARING RETAINER

Seal ring clearance

Bearing retainer seal ring clearance	mm (in)
Standard	0.10 - 0.30 (0.0039 - 0.0118)
Allowable limit	0.30 (0.0118)

TOTAL END PLAY

Total end play	mm (in)	0.25 - 0.55 (0.0098 - 0.0217)

Bearing race for adjusting total end play

Thickness mm (in)	Part number
0.8 (0.031)	31435-80X00
1.0 (0.039)	31435-80X01
1.2 (0.047)	31435-80X02
1.4 (0.055)	31435-80X03
1.6 (0.063)	31435-80X04
1.8 (0.071)	31435-80X05
2.0 (0.079)	31435-80X06
0.9 (0.035)	31435-80X09
1.1 (0.043)	31435-80X10
1.3 (0.051)	31435-80X11
1.5 (0.059)	31435-80X12
1.7 (0.067)	31435-80X13
1.9 (0.075)	31435-80X14