AUTOMATIC TRANSAXLE

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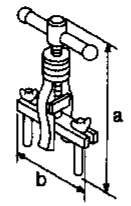
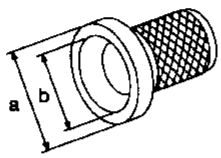
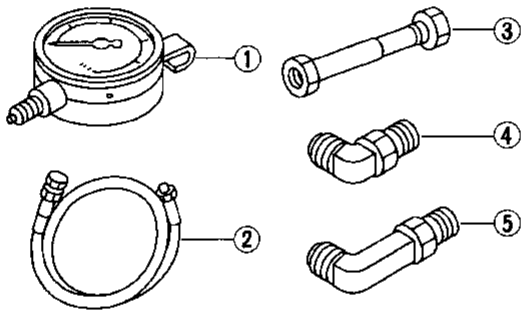
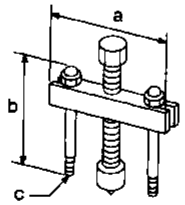
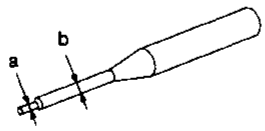
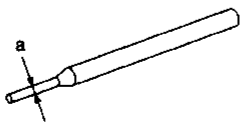
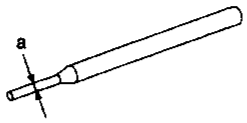
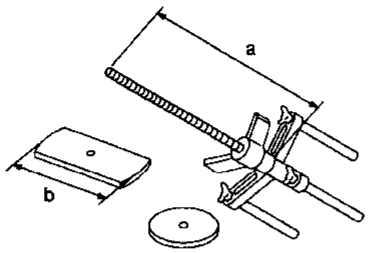
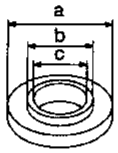
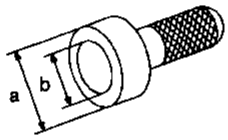
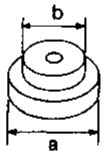
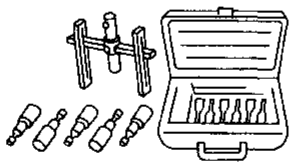
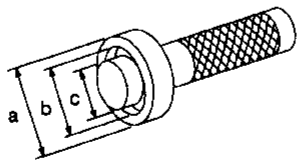
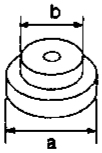
When you read wiring diagrams:
- **Read GI section, "HOW TO READ WIRING DIAGRAMS".**
- **See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.**

When you perform trouble diagnoses, read GI section, "HOW TO FOLLOW FLOW CHART IN TROUBLE DIAGNOSES" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

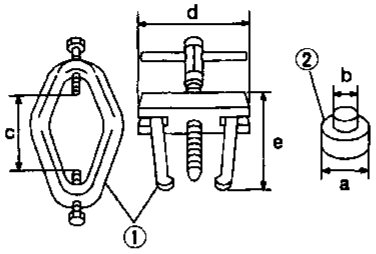
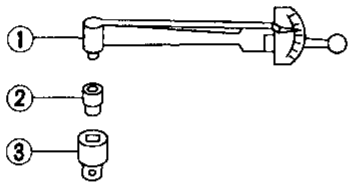
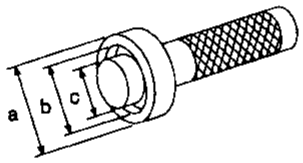
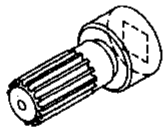
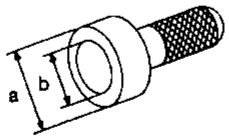
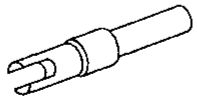
Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
KV38105480 (J34286) Puller	 NT414	• Removing differential side oil seals • Removing differential side bearing outer race • Removing idler gear bearing outer race **a: 250 mm (9.84 in)** **b: 160 mm (6.30 in)**
ST33400001 (J26082) Drift	 NT086	Installing differential side oil seal (RH side) Installing oil seal on oil pump housing **a: 60 mm (2.36 in) dia.** **b: 47 mm (1.85 in) dia.**
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	 NT097	Measuring line pressure.
ST27180001 (—) Puller	 NT424	Removing idler gear **a: 100 mm (3.94 in)** **b: 110 mm (4.33 in)** **c: M8 x 1.25P**
ST23540000 (—) Pin punch	 NT442	Removing and installing parking rod plate and manual plate pins. **a: 2.3 mm (0.091 in) dia.** **b: 4 mm (0.16 in) dia.**
ST25710000 (—) Pin punch	 NT410	Aligning groove of manual shaft and hole of transmission case. **a: 2 mm (0.08 in) dia.**

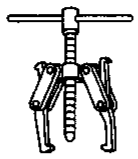
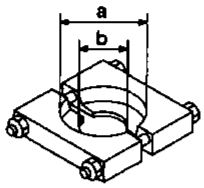
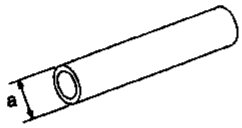
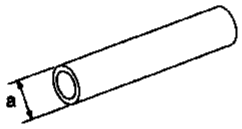
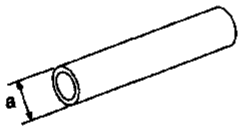
Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
KV32101000 (J25689-A) Pin punch	 NT410	Installing manual shaft retaining pin **a: 4 mm (0.16 in) dia.**
KV31102400 (J34285 and J34285-87) Clutch spring compressor	 NT423	• Removing and installing clutch return springs • Installing low and reverse brake piston **a: 320 mm (12.60 in)** **b: 174 mm (6.85 in)**
KV40100630 (—) Drift	 NT107	• Installing reduction gear bearing inner race • Installing idler gear bearing inner race **a: 67.5 mm (2.657 in) dia.** **b: 44 mm (1.73 in) dia.** **c: 38.5 mm (1.516 in) dia.**
ST30720000 (J34331)	 NT115	• Installing idler gear bearing outer race **a: 77 mm (3.03 in) dia.** **b: 55.5 mm (2.185 in) dia.**
ST35321000 (—) Drift	 NT073	• Installing output shaft bearing **a: 49 mm (1.93 in) dia.** **b: 41 mm (1.61 in) dia.**
(J34291) Shim setting gauge set	 NT101	• Selecting oil pump cover bearing race and oil pump thrust washer • Selecting side gear thrust washer
KV38100300 (—)	 NT085	Installing differential side bearing inner race (RH side) **a: 54 mm (2.13 in) dia.** **b: 46 mm (1.81 in) dia.** **c: 32 mm (1.26 in) dia.**
ST30613000 (—)	 NT073	Installing differential side bearing inner race (LH side) **a: 72 mm (2.83 in) dia.** **b: 48 mm (1.89 in) dia.**

Special Service Tools (Cont'd)

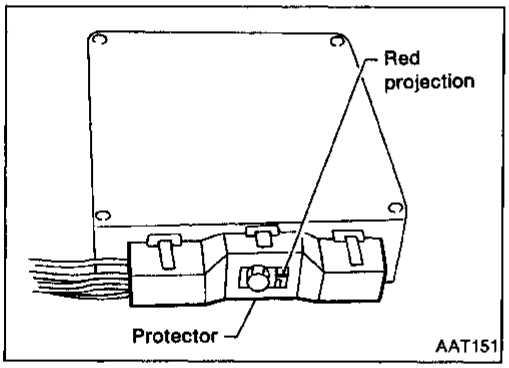
Tool number (Kent-Moore No.) Tool name	Description	
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Puller ② ST33061000 (J8107-2) Adapter	 NT413	Removing differential side bearing inner race **a: 38 mm (1.50 in) dia.** **b: 28.5 mm (1.122 in) dia.** **c: 130 mm (5.12 in)** **d: 135 mm (5.31 in)** **e: 100 mm (3.94 in)**
ST3127S000 (See J25765-A) Preload gauge ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter	 NT124	Checking differential side bearing preload
ST33220000 (—) Drift	 NT085	Selecting differential side bearing adjusting shim (F04V) **a: 37 mm (1.46 in) dia.** **b: 31 mm (1.22 in) dia.** **c: 22 mm (0.87 in) dia.**
KV38105210 (—) Preload adapter	 NT075	• Selecting differential side bearing adjusting shim (F04V) • Checking differential side bearing preload (F04V)
ST35271000 (—) Drift	 NT115	Installing idler gear **a: 72 mm (2.83 in) dia.** **b: 63 mm (2.48 in) dia.**
(J39713) Preload adapter	 NT087	• Selecting differential side bearing adjusting shim (F04A) • Checking differential side bearing preload (F04A)

Commercial Service Tools

Tool name	Description	
Puller	 NT077	• Removing idler gear bearing inner race • Removing and installing band servo piston snap ring
Puller	 NT411	Removing reduction gear bearing inner race **a: 60 mm (2.36 in) dia.** **b: 35 mm (1.38 in) dia.**
Drift	 NT083	Installing differential side oil seal (Left side) **a: 90 mm (3.54 in) dia.**
Drift	 NT083	Installing needle bearing on bearing retainer **a: 36 mm (1.42 in) dia.**
Drift	 NT083	Removing needle bearing from bearing retainer **a: 33.5 mm (1.319 in) dia.**

Service Notice

- 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.
- Place disassembled parts in a parts rack in order to replace them 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.
- When connecting A/T control unit harness connector, tighten bolt until red projection is in line with connector.



- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in a parts rack in order to replace them in correct 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 bores in valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Apply petroleum jelly to protect O-rings and seals, and to hold bearings and washers in place during assembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Flash or replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to TROUBLE DIAGNOSES Remarks, AT-20.
- After overhaul, refill the transaxle with new ATF.
- After removing drain plug, A/T fluid still remains in torque converter and A/T fluid cooling system.
  Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.

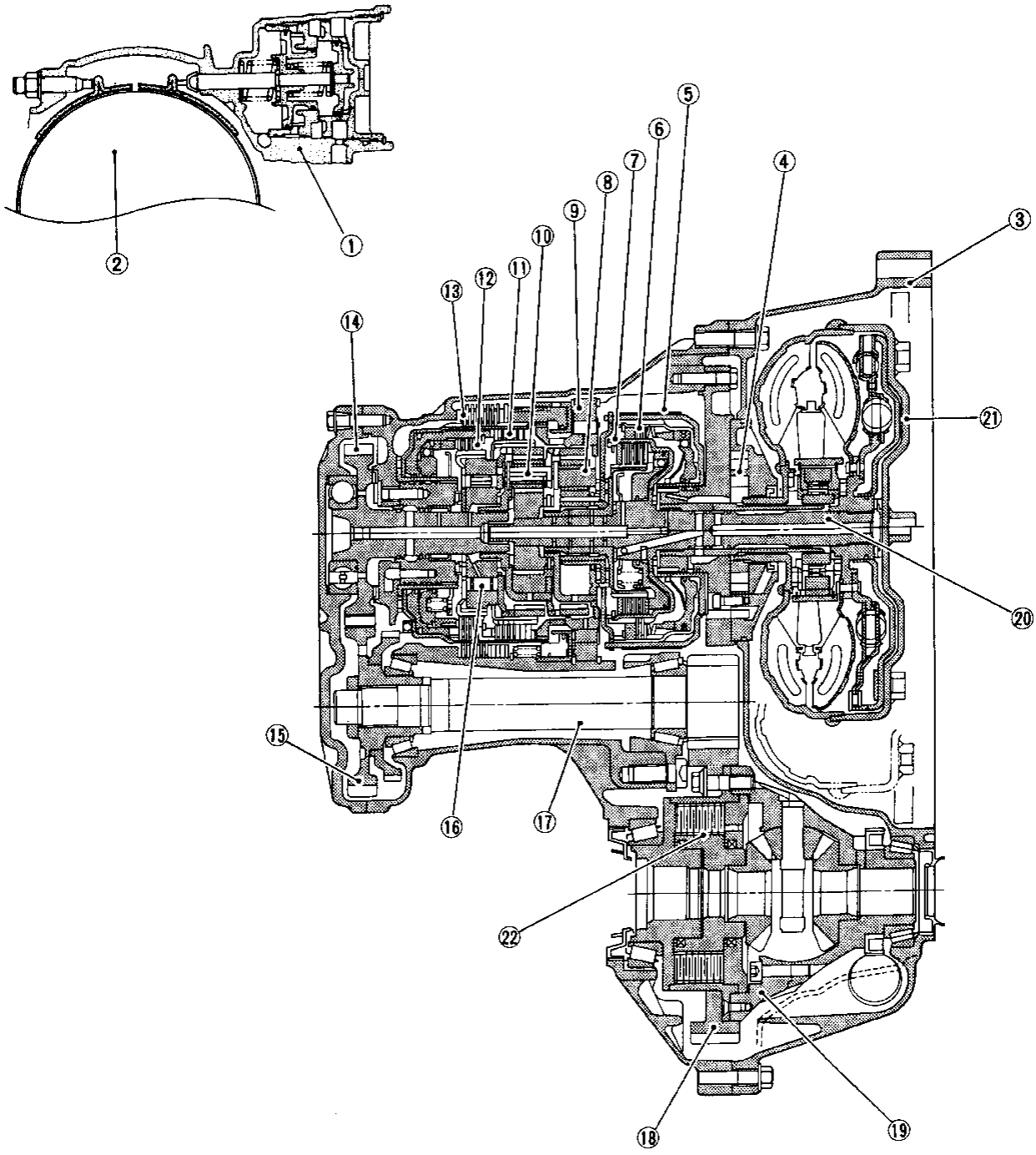
Supplemental Restraint System "AIR BAG"

The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument panel on the passenger side), a diagnosis sensor 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:

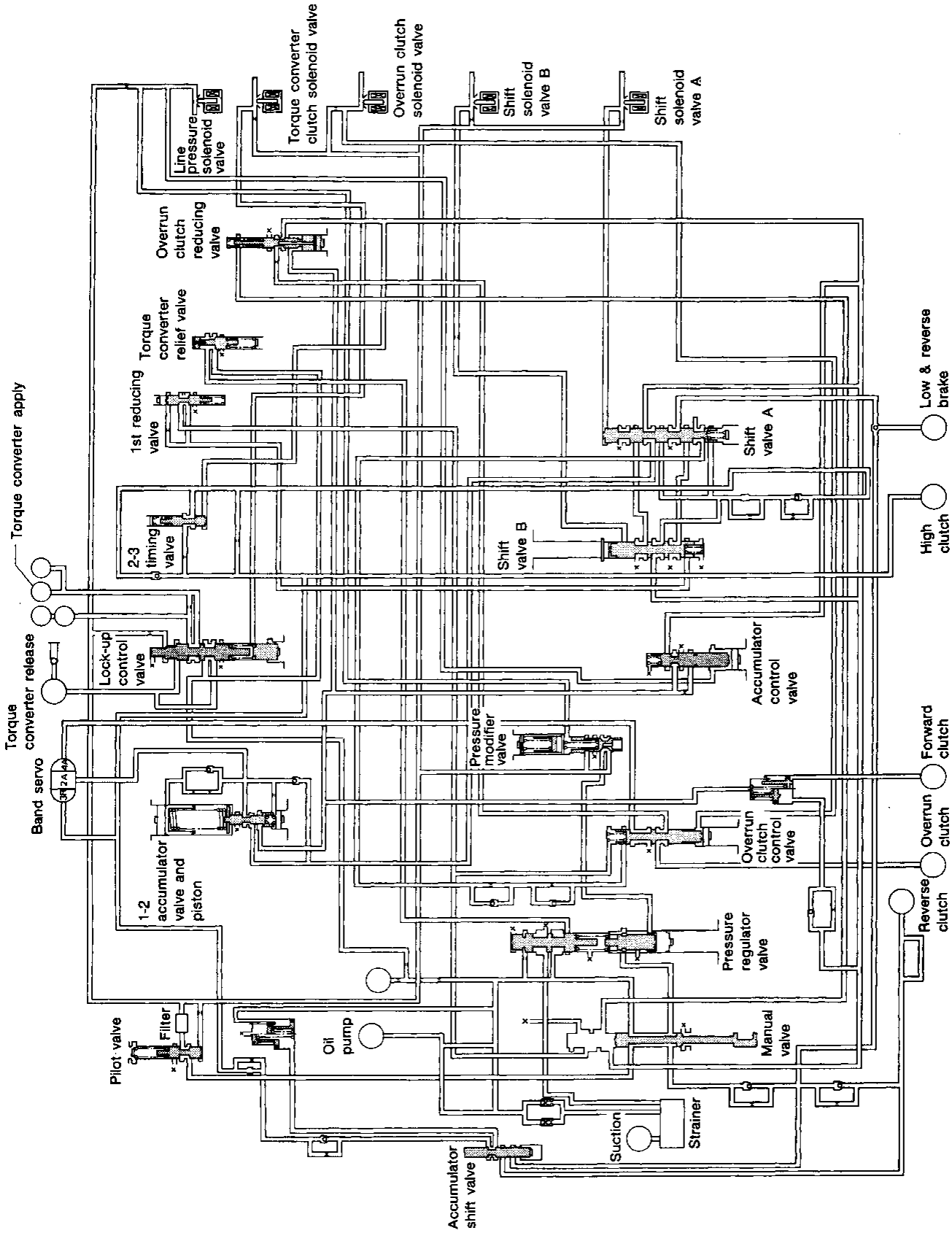
- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.**
- **All SRS air bag electrical wiring harnesses and connectors are covered with yellow outer insulation. Do not use electrical test equipment on any circuit related to the SRS "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
㉒ Viscous coupling

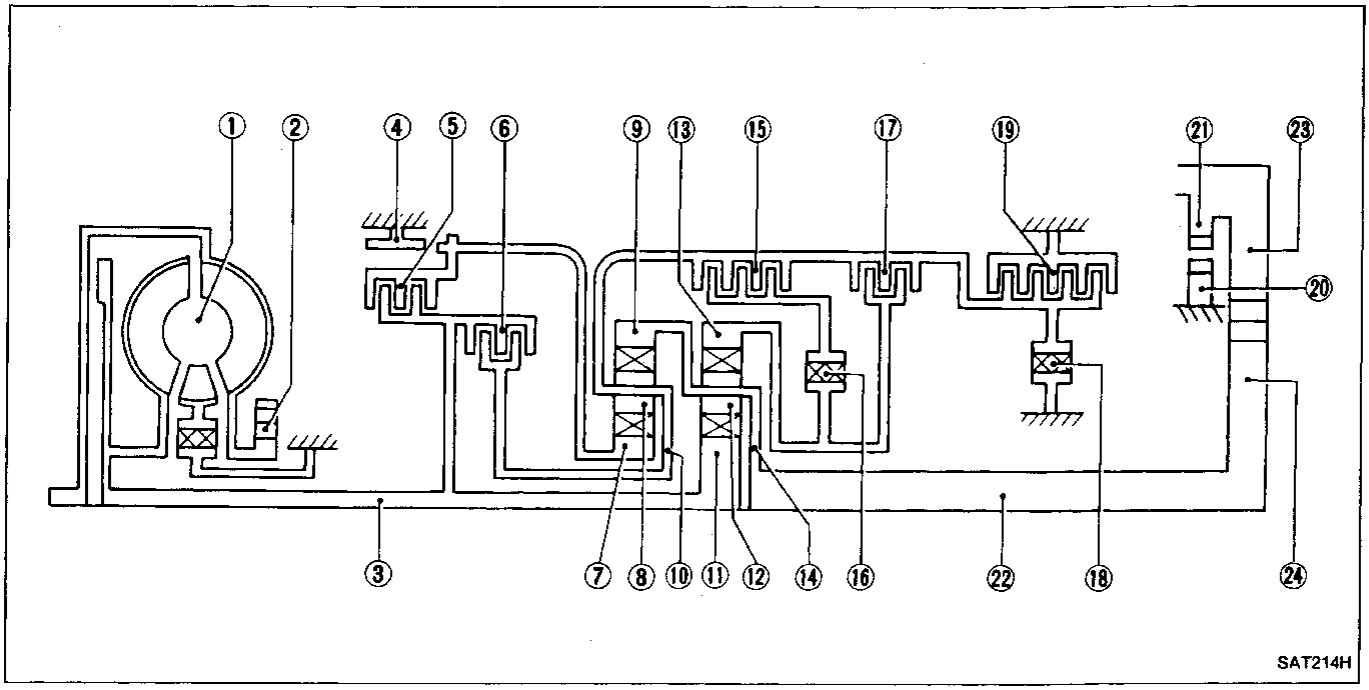
Hydraulic Control Circuit



SAT407H

Shift Mechanism

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 Front 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 Idle gear
㉔ Output gear

FUNCTION OF CLUTCH AND BRAKE

Clutch and brake components	Abbr.	Function
Reverse clutch	R/C	To transmit input power to front sun gear.
High clutch	H/C	To transmit input power to front planetary carrier.
Forward clutch	F/C	To connect front planetary carrier with forward one-way clutch.
Overrun clutch	O/C	To connect front planetary carrier with rear internal gear.
Brake band	B/B	To lock front sun gear.
Forward one-way clutch	F/O.C	When forward clutch is engaged, to stop rear internal gear from rotating in opposite direction against engine revolution.
Low one-way clutch	L/O.C	To stop front planetary carrier from rotating in opposite direction against engine revolution.
Low & reverse brake	L & R/B	To lock front planetary carrier.

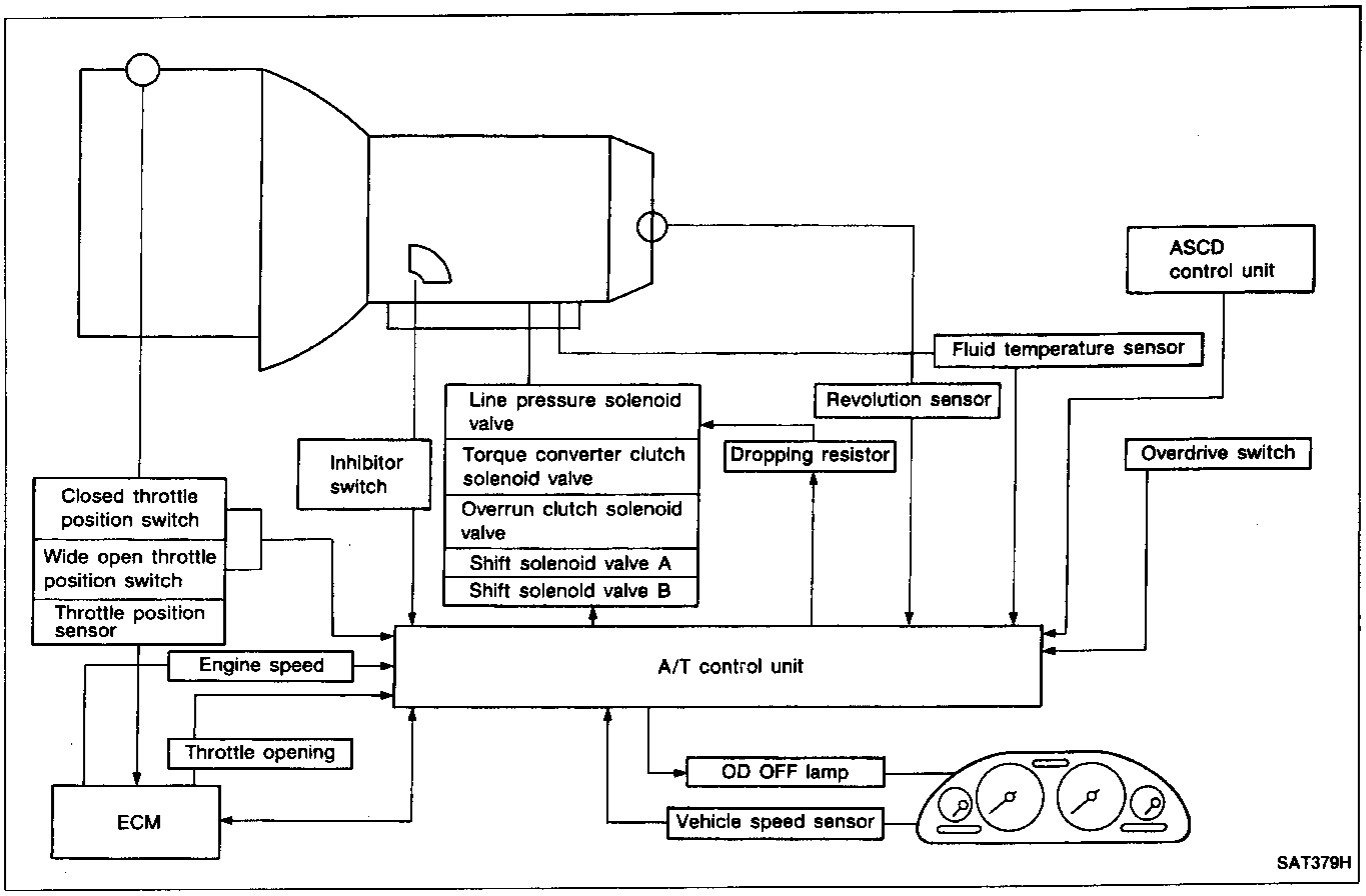
Shift Mechanism (Cont'd)

OPERATION OF CLUTCH AND BRAKE

Shift position		Reverse clutch	High clutch	Forward clutch	Overrun clutch	Band servo 2nd apply	Band servo 3rd release	Band servo 4th apply	Forward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
P													PARK POSITION
R		○									○		REVERSE POSITION
N													NEUTRAL POSITION
D*4	1st			○	*1 ◎				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd			○	*1 ◎	○			●				
	3rd		○	○	*1 ◎	*2 Ⓧ	Ⓧ		●			○	
	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 overdrive switch is being set 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 overdrive switch is set in "OFF" position.
○ : Operates.
◎ : Operates when throttle opening is less than 1/16.
● : Operates during "progressive" acceleration.
Ⓧ : Operates but does not affect power transmission.

Control System



Control System (Cont'd)

A/T CONTROL UNIT FUNCTION

The A/T control unit receives signals sent from various switches and sensors. The control unit then determines required line pressure, shifting point, lock-up operation, engine brake operation. The unit 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 and sends a signal to A/T control unit.
	Engine speed signal	From ECM (ECCS control module).
	Fluid temperature sensor	Detects transmission fluid temperature and sends a signal to A/T control unit.
	Revolution sensor	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 transmission) malfunctions.
	OD switch	Sends a signal, which prohibits a shift to D_4 (OD) range, to the 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 invelation to a signal sent from A/T control unit.

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When shifting A/T from "D" to "2" (with accelerator pedal released), vehicle does not decelerate by engine brake.
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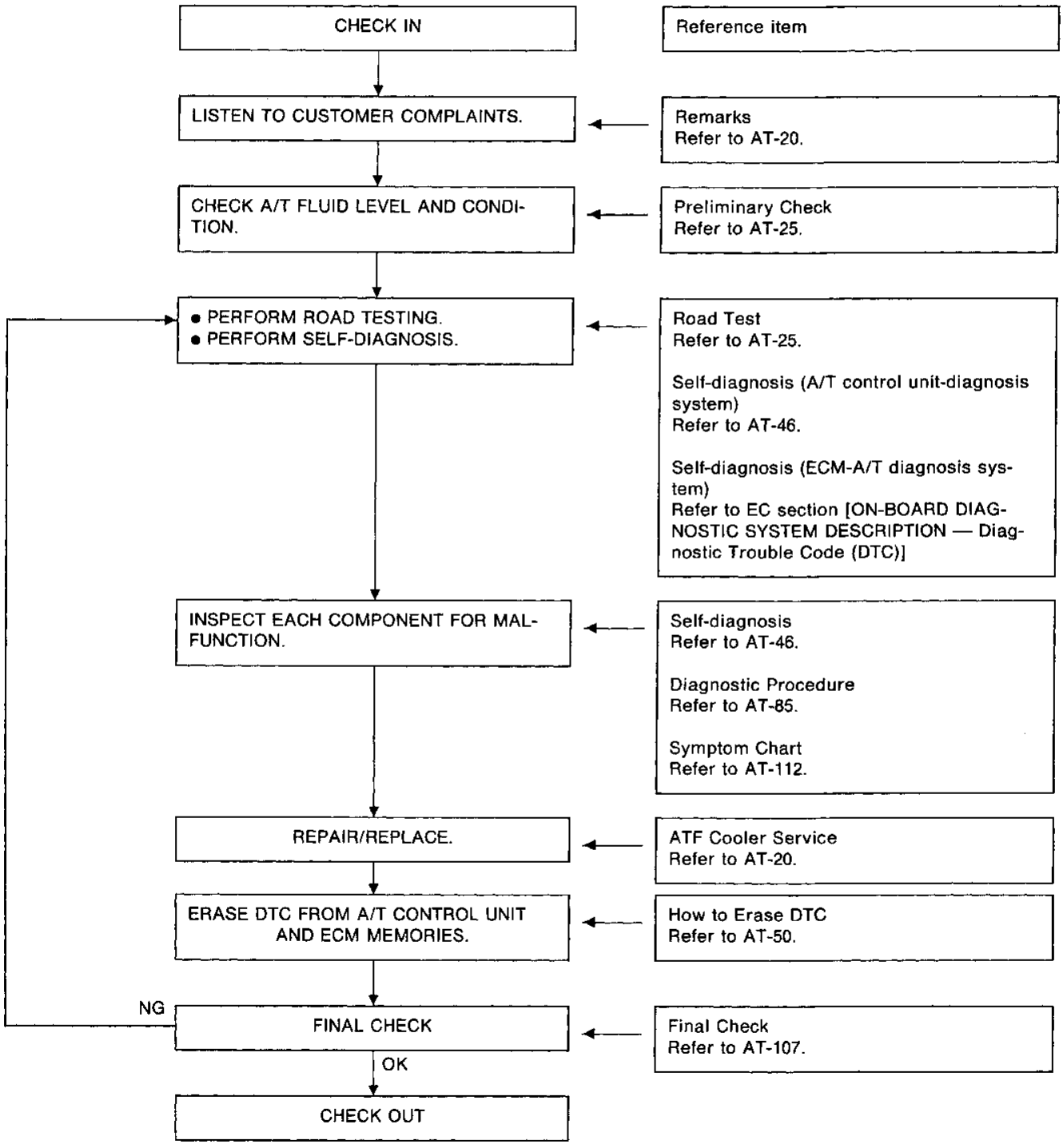
How to Perform Trouble Diagnoses for Quick and Accurate Repair

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 MR/MS	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	Flickers for about 8 seconds.	
	☐ Come on	☐ Come off

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

DIAGNOSTIC WORKSHEET

1.	☐ Read the Fail-safe Remarks and listen to customer complaints.	AT-20
2.	☐ CHECK A/T FLUID ☐ Leakage (Follow specified procedure) ☐ Fluid condition ☐ Fluid level	AT-25
3.	☐ Perform all ROAD TESTING and mark required procedures.	AT-25
	3-1 Check before engine is started. ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. A/T control unit-diagnosis system ☐ 1. Revolution sensor ☐ 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. Battery ☐ 12. Others ECM-A/T diagnosis system ☐ 111. Inhibitor switch circuit ☐ 113. Improper shifting to 1st gear position ☐ 114. Improper shifting to 2nd gear position ☐ 115. Improper shifting to 3rd gear position ☐ 116. Improper shifting to 4th gear position or TCC	AT-26
	3-2. Check at idle ☐ Diagnostic Procedure 1 (OD OFF indicator lamp came on for 2 seconds.) ☐ Diagnostic Procedure 2 (Engine starts only in P and N position) ☐ Diagnostic Procedure 3 (In P position, vehicle does not move when pushed) ☐ Diagnostic Procedure 4 (In N position, vehicle moves) ☐ Diagnostic Procedure 5 (Select shock. N → R position) ☐ Diagnostic Procedure 6 (Vehicle creeps backward in R position) ☐ Diagnostic Procedure 7 (Vehicle creeps forward in D, 2 or 1 position)	AT-27
	3-3. Cruise test Part-1 ☐ Diagnostic Procedure 8 (Vehicle starts from D_1) ☐ Diagnostic Procedure 9 ☐ Diagnostic Procedure 10 ☐ Diagnostic Procedure 11 } (A/T shift schedule: $D_1 \rightarrow D_2/D_2 \rightarrow D_3/D_3 \rightarrow D_4/D_4 \rightarrow D_2$) ☐ Diagnostic Procedure 12 (Shift schedule: Lock-up) ☐ Diagnostic Procedure 13 (Lock-up condition more than 30 seconds) ☐ Diagnostic Procedure 14 (Lock up released) ☐ Diagnostic Procedure 15 (Engine speed return to idle. Light braking $D_4 \rightarrow D_3$)	AT-29

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

3.	Part-2 ☐ Diagnostic Procedure 8 (Vehicle starts from D_1) ☐ Diagnostic Procedure 9 (Kickdown: $D_4 \rightarrow D_2$) ☐ Diagnostic Procedure 10 (Shift schedule: $D_2 \rightarrow D_3$) ☐ Diagnostic Procedure 11 (Shift schedule: $D_3 \rightarrow D_4$ and engine brake)	AT-34
	Part-3 ☐ Diagnostic Procedure 17 ($D_4 \rightarrow D_3$ when OD OFF switch ON → OFF) ☐ Diagnostic Procedure 15 (Engine brake in D_3) ☐ Diagnostic Procedure 18 ($D_3 \rightarrow 2_2$ when selector lever D → 2 position) ☐ Diagnostic Procedure 16 (Engine brake in 2_2) ☐ Diagnostic Procedure 19 ($2_2 \rightarrow 1_1$, when selector lever 2 → 1 position) ☐ Diagnostic Procedure 20 (Engine brake in 1_1) ☐ SELF-DIAGNOSTIC PROCEDURE — Mark detected items. A/T control unit-diagnosis system ☐ 1. Revolution sensor ☐ 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. Battery ☐ 12. Others ECM-A/T diagnosis system ☐ 111. Inhibitor switch circuit ☐ 113. Improper shifting to 1st gear position ☐ 114. Improper shifting to 2nd gear position ☐ 115. Improper shifting to 3rd gear position ☐ 116. Improper shifting to 4th gear position or TCC	AT-35
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-112
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-107

Remarks

FAIL-SAFE

The A/T control unit has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.
Under Fail-Safe, the vehicle always runs in third gear with shift lever position of 1, 2 or D. 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 indicator lamp will blink for about 8 seconds. (For diagnosis, refer to AT-26.)
Fail-Safe may activate without electrical circuit damages if the vehicle is driven under extreme conditions (such as excessive wheel spins and emergency braking immediately afterwards). In this case, turn key OFF for 3 seconds and then ON to recover normal shift pattern.
The blinking of the OD OFF indicator 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-16).
The SELF-DIAGNOSIS results will be as follows:

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

ATF COOLER SERVICE

Flash or replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.
SR20 engine (RE4F03A/RE4F03V) ... 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.

OBD-II

In accordance with the OBD-II requirements, A/T self-diagnoses have been improved as follows:

- On the former models, the A/T control unit performed the self-diagnoses for A/T self-diagnostic items, and illuminated the OD OFF indicator lamp to indicate the self-diagnostic results. On this model (A32), the engine control module also receives the A/T self-diagnostic results and illuminates the malfunction indicator lamp (MIL) to indicate the results.
  The number of self-diagnostic items has increased. Increased items can not be indicated by the OD OFF indicator lamp. For details, refer to the table on the next page.
- The self-diagnostic results indicated by the MIL are automatically stored in the ECM and A/T control unit memories.
  The results stored in the memories (of both ECM and A/T control unit) must be erased each time after repairing the malfunctioning part.
- The following can be used to display the self-diagnostic results indicated by the MIL and to erase the results stored in the ECM and A/T control unit memories. For details, refer to "Self-diagnosis HOW TO ERASE DTC", AT-50.

ECM memory	A/T control unit memory
CONSULT (Select ENGINE)	CONSULT (Select A/T)
Generic Scan Tool (GST)	On-board self-diagnosis
Mode selector on ECM	

- As for the malfunctions indicated by the MIL, the relevant data (sensor signals, ECM signals, etc.) obtained at the moment of detection can be verified by Freeze Frame Data. For details, refer to the EC section.
- All information on the A/T trouble diagnoses, including the self-diagnostic items indicated only by the MIL, is described in the AT section.

Diagnosis by CONSULT

NOTICE

1. The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
   Check for time difference between actual shift timing and the CONSULT display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may 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,
   - Shift schedule indicated in Service Manual refers to the point where shifts start, 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. Gear position is displayed upon completion of shifting (which is computed by A/T control unit).
4. Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.

SELF-DIAGNOSTIC RESULT TEST MODE

Detected items (Screen terms for CONSULT, "SELF DIAG RESULTS" mode)	Malfunction is detected when ...	Indicator for Diagnostic Results	
		OD OFF Indicator Lamp	Malfunction Indicator Lamp
Inhibitor switch circuit (INHIBITOR SWITCH)	• A/T control unit does not receive the correct voltage signal (based on the gear position) from the switch.	—	X
Revolution sensor (VHCL SPEED SEN·A/T)	• A/T control unit does not receive the proper voltage signal from the sensor.	X	X
Vehicle speed sensor (Meter) (VHCL SPEED SEN·MTR)	• A/T control unit does not receive the proper voltage signal from the sensor.	X	—
Improper shifting to 1st gear position (A/T 1ST SIGNAL)	• A/T can not be shifted to the 1st gear position even when electrical circuit is good.	—	X*1
Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	• A/T can not be shifted to the 2nd gear position even when electrical circuit is good.	—	X*1
Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	• A/T can not be shifted to the 3rd gear position even when electrical circuit is good.	—	X*1
Improper shifting to 4th gear position or TCC (A/T 4TH SIG OR TCC)	• A/T can not be shifted to the 4th gear position or can not perform lock-up, even when electrical circuit is good.	—	X*1
Shift solenoid valve A (SHIFT SOLENOID/V A)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	X	X
Shift solenoid valve B (SHIFT SOLENOID/V B)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	X	X
Overrun clutch solenoid valve (OVERRUN CLUTCH S/V)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	X	X
T/C clutch solenoid valve (TOR CONV CLUTCH SV)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	X	X
Line pressure solenoid valve (LINE PRESSURE S/V)	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	X	X
Throttle position sensor (THRTL POSI SEN·A/T)	• A/T control unit receives an excessively low or high voltage from the sensor.	X	X
Engine speed signal (ENGINE SPEED SIG)	• A/T control unit does not receive the proper voltage signal from the ECM.	X	X

Diagnosis by CONSULT (Cont'd)

Detected items (Screen terms for CONSULT, "SELF DIAG RESULTS" mode)	Malfunction is detected when ...	Indicator for Diagnostic Results	
		OD OFF Indicator Lamp	Malfunction Indicator Lamp
Fluid temperature sensor (FLUID TEMP SENSOR)	• A/T control unit receives an excessively low or high voltage from the sensor.	X	X
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)	• No failure has been detected.	X	X

X : Applicable

– : Not applicable

*1 : Malfunctions will not be detected unless self-diagnostic results indicated by OD OFF indicator lamp are in No Failure condition.

DATA MONITOR DIAGNOSTIC TEST MODE

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	• Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in N or P position with vehicle stationary, CONSULT data may not indicate 0 km/h (0 MPH).
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.	Vehicle speed display may not be accurate under approx. 10 km/h (6 MPH). It may not indicate 0 km/h (0 MPH) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	• Throttle position sensor signal voltage is displayed.	
Fluid temperature sensor	FLUID TEMP SEN [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	ENGINE SPEED [rpm]	X	X	• Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Overdrive switch	OVERDRIVE SW [ON/OFF]	X	—	• ON/OFF state computed from signal of overdrive SW is displayed.	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	• ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	• ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	• ON/OFF state 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.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of 1 position SW, is displayed.	

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item: ECU input signals	Monitor item: Main signals	Description	Remarks
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.
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.	
Hold switch	HOLD SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of hold 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 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 S/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 S/V B [ON/OFF]	—	X	• Control value of shift solenoid valve B, computed by control unit from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/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 indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	• Control status of OD OFF indicator lamp is displayed.	

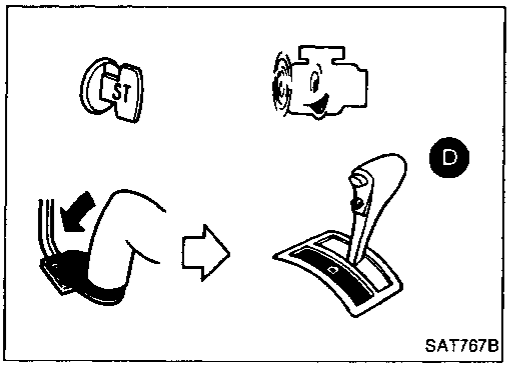
X: Applicable
—: Not applicable

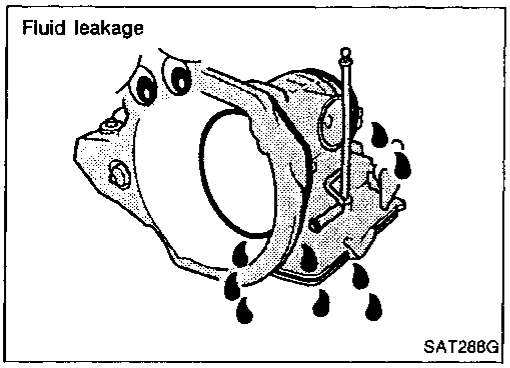
Diagnosis by CONSULT (Cont'd)

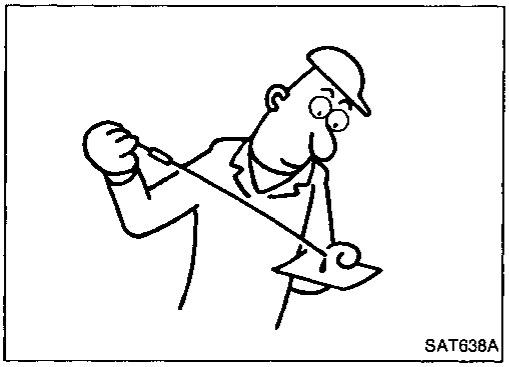
DATA ANALYSIS

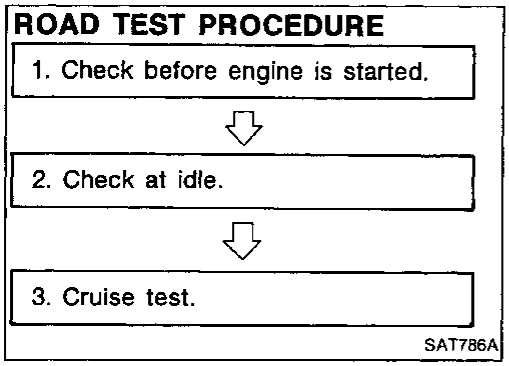
Item	Display form	Meaning
Torque converter clutch solenoid valve duty	Approximately 4% ↓ Approximately 94%	Lock-up "OFF" ↓ Lock-up "ON"
Line pressure solenoid valve duty	Approximately 29% ↓ Approximately 94%	Low line-pressure (Small throttle opening) ↓ High line-pressure (Large throttle opening)
Throttle 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)]

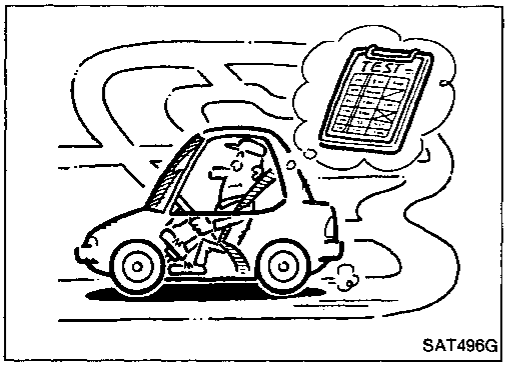
Gear position	1	2	3	4
Shift solenoid valve A	ON	OFF	OFF	ON
Shift solenoid valve B	ON	ON	OFF	OFF











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" position 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

Fluid level check — Refer to MA section (CHASSIS AND BODY MAINTENANCE).

ROAD TESTING

Description

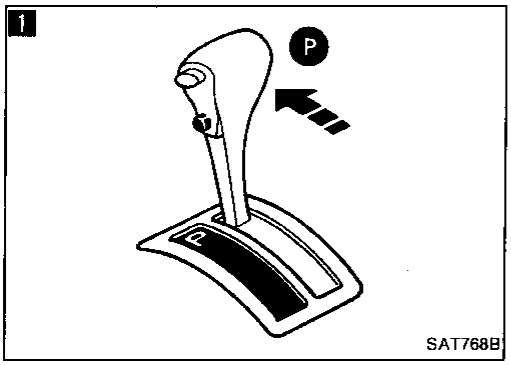
- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:

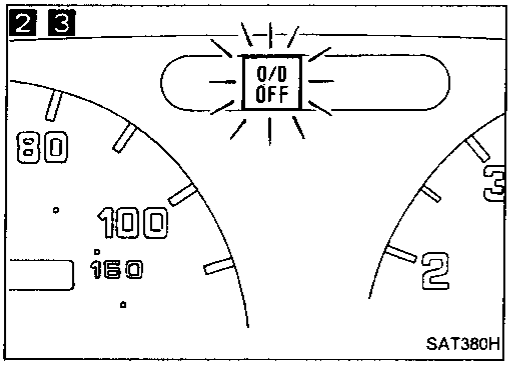
1. Check before engine is started
2. Check at idle
3. Cruise test

- 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" and "Diagnostic Procedure", AT-46, 85.

Preliminary Check (Cont'd)

1. Check before engine is started





1 2

1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move selector lever to "P" position.
4. Set overdrive switch to "ON" position.
5. Turn ignition switch to "ON" position. (Do not start engine.)
6. Does OD OFF indicator lamp come on for about 2 seconds?

No → Go to Diagnostic Procedure 1, AT-85.

Yes ↓

3

Does OD OFF indicator lamp flicker for about 8 seconds?

Yes → Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE, AT-46.

No ↓

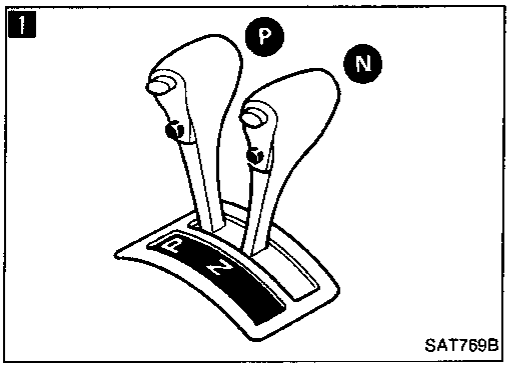
Turn ignition switch to "OFF" position. ↓

Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE and note NG items. ↓

Go to "ROAD TESTING — Check at idle", AT-27.

Preliminary Check (Cont'd)

2. Check at idle



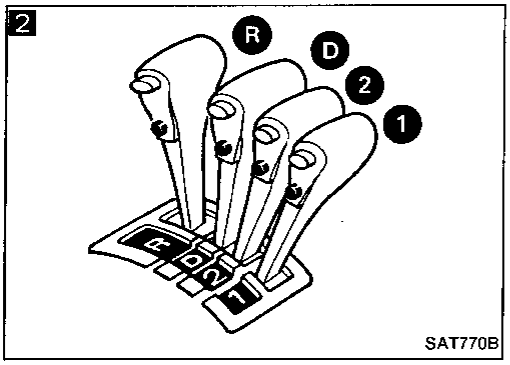
1

1. Park vehicle on flat surface.
2. Move selector lever to "P" position.
3. Turn ignition switch to "OFF" position.
4. Turn ignition switch to "START" position.
5. Is engine started?

No → Go to Diagnostic Procedure 2, AT-86.

Yes ↓

Turn ignition switch to "ACC" position.



2

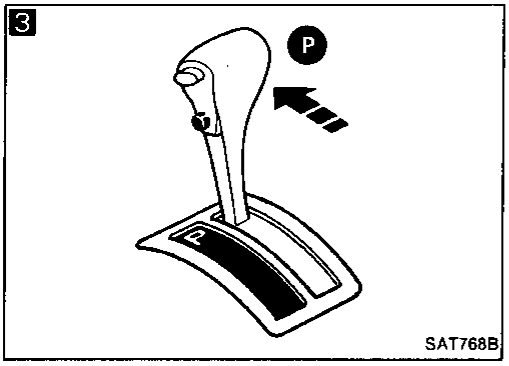
1. Move selector lever to "D", "1", "2" or "R" position.
2. Turn ignition switch to "START" position.
3. Is engine started?

Yes → Go to Diagnostic Procedure 2, AT-86.

No ↓

3

1. Move selector lever to "P" position.
2. Turn ignition switch to "OFF" position.
3. Release parking brake.



4

1. Push vehicle forward or backward.
2. Does vehicle move when it is pushed forward or backward?
3. Apply parking brake.

Yes → Go to Diagnostic Procedure 3, AT-86.

No ↓

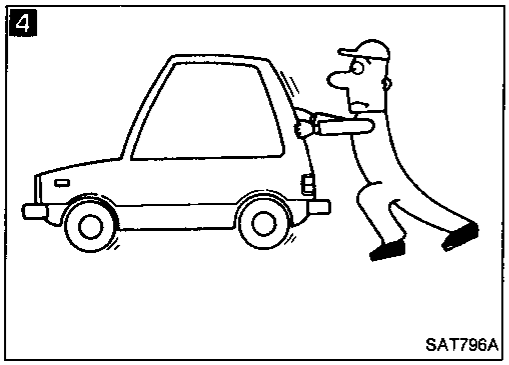
5

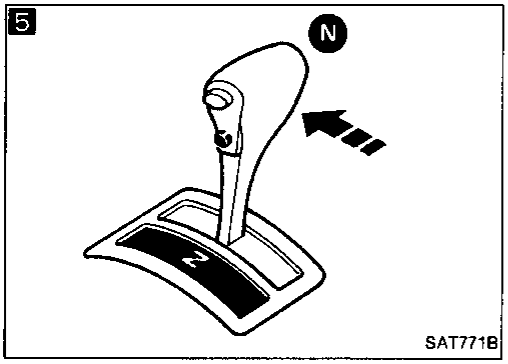
1. Start engine.
2. Move selector lever to "N" position.
3. Release parking brake.
4. Does vehicle move forward or backward?

Yes → Go to Diagnostic Procedure 4, AT-87.

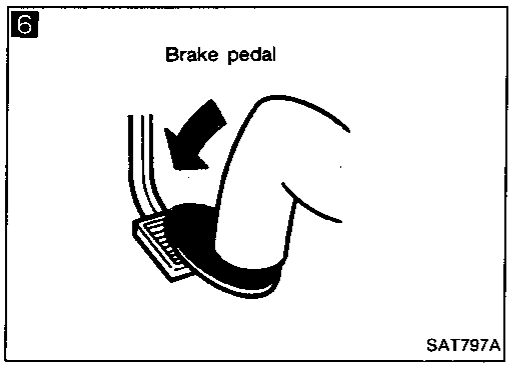
No ↓

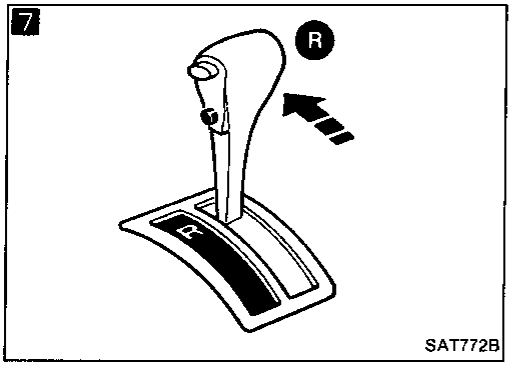
Ⓐ

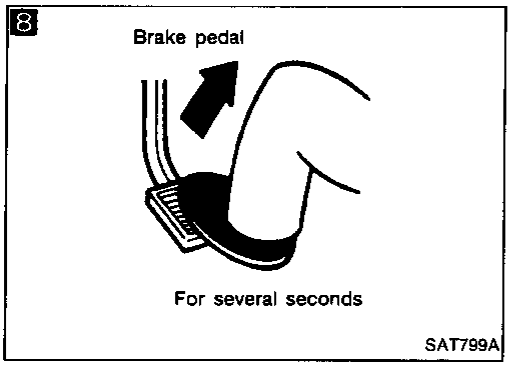


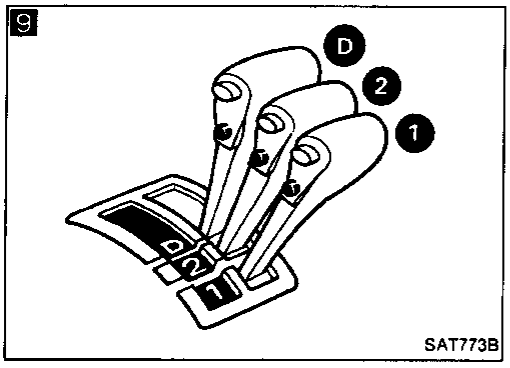


Preliminary Check (Cont'd)









Ⓐ

6 Apply foot brake.

7 1. Move selector lever to "R" position.
2. Is there large shock when changing from "N" to "R" position?

Yes → Go to Diagnostic Procedure 5, AT-88.

No

8 1. Release foot brake for several seconds.
2. Does vehicle creep backward when foot brake is released?

No → Go to Diagnostic Procedure 6, AT-89.

Yes

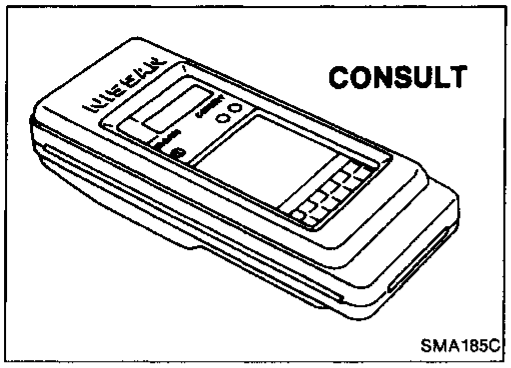
9 1. Move selector lever to "D", "2" and "1" positions and check if vehicle creeps forward.
2. Does vehicle creep forward in all three ranges?

No → Go to Diagnostic Procedure 7, AT-90.

Yes

Go to Cruise test, AT-29.

Preliminary Check (Cont'd)

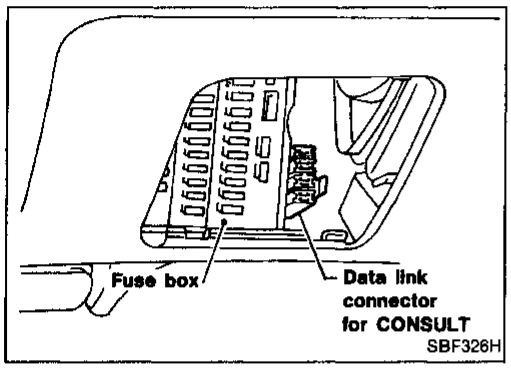


3. Cruise test

- Check all items listed in Parts 1 through 3.

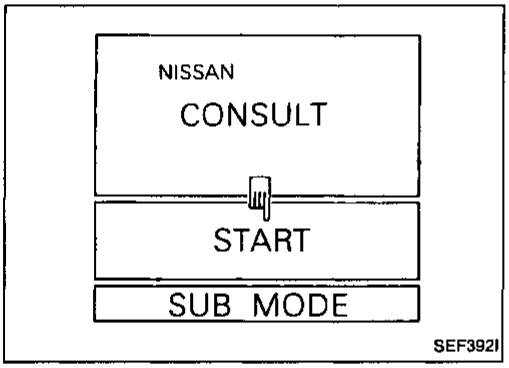
With CONSULT

- 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".

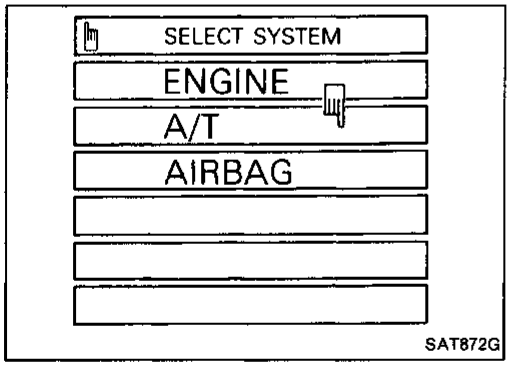


CONSULT setting procedure

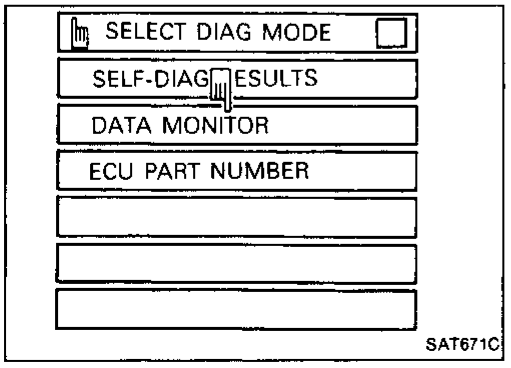
1. Turn off ignition switch.
2. Connect "CONSULT" to Data link connector for CONSULT.



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

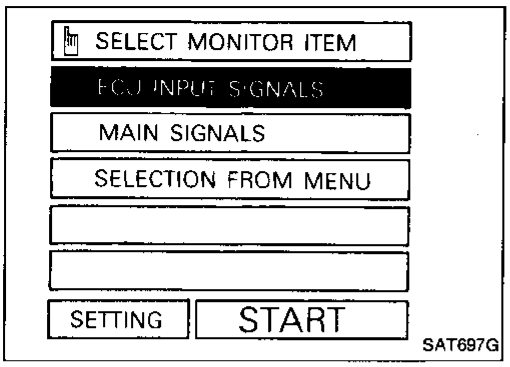


5. Touch "A/T".

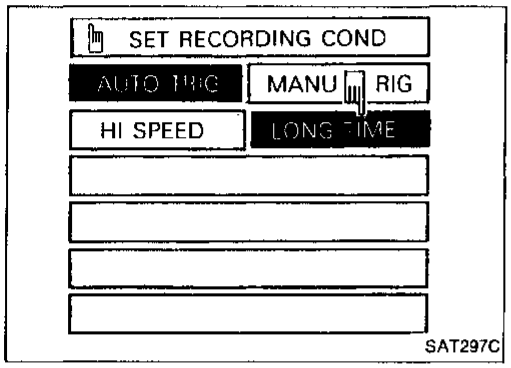


6. Touch "DATA MONITOR".

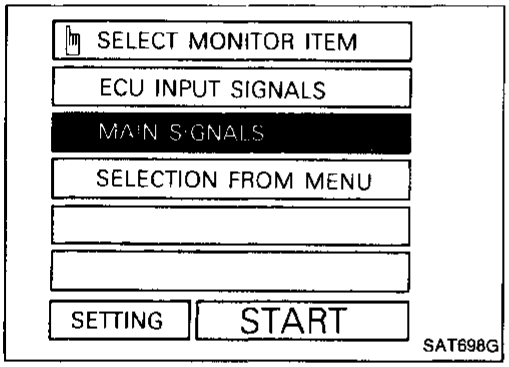
Preliminary Check (Cont'd)



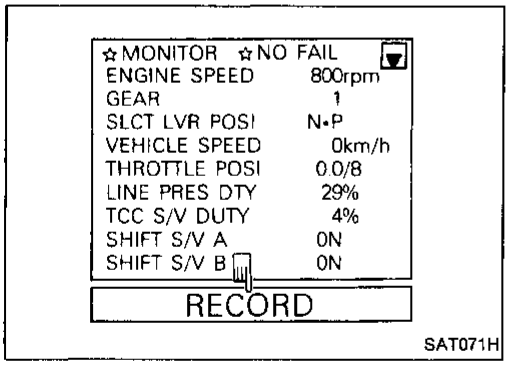
7. Touch "SETTING" to set recording condition.



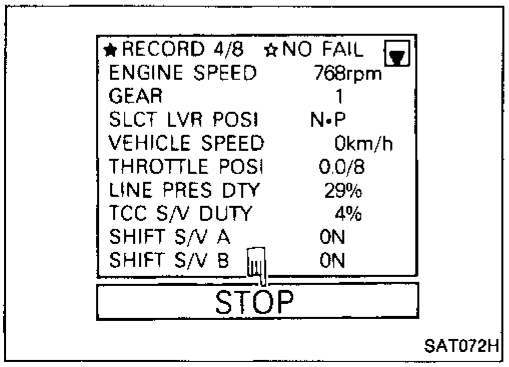
8. Touch "LONG TIME" and "ENTER" key.



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

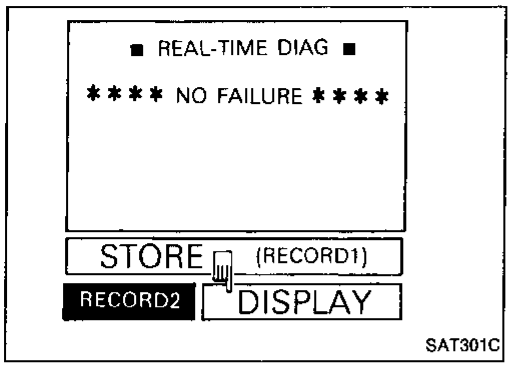


11. When performing cruise test, touch "RECORD".

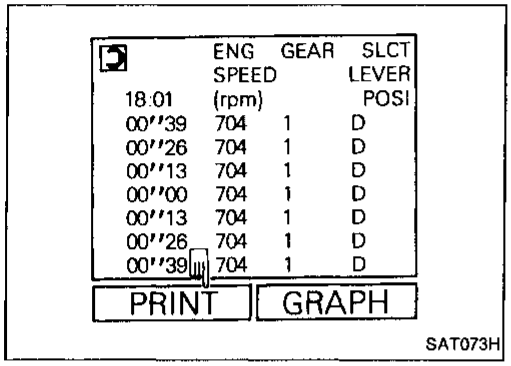


12. After finishing cruise test part 1, touch "STOP".

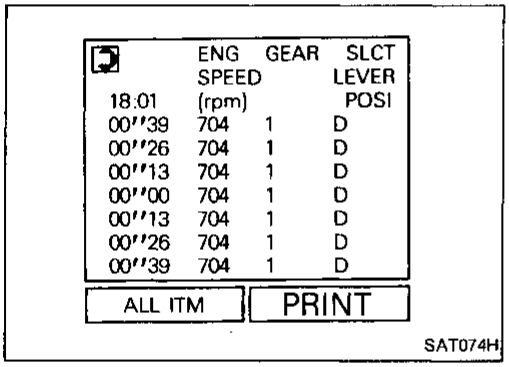
Preliminary Check (Cont'd)



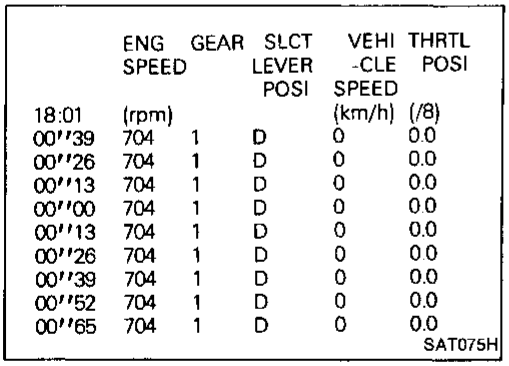
13. Touch "DISPLAY".



14. Touch "PRINT".

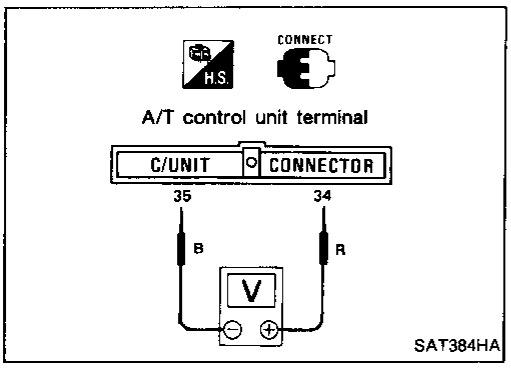


15. Touch "PRINT" again.



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

Preliminary Check (Cont'd)

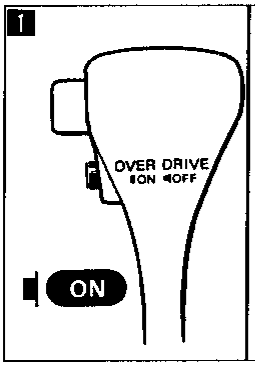


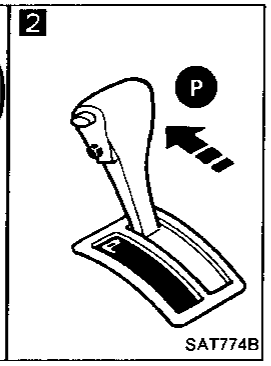
Without CONSULT

- Throttle position can be checked by voltage across terminals ㉞ and ㉟ of A/T control unit.

Cruise test — Part 1

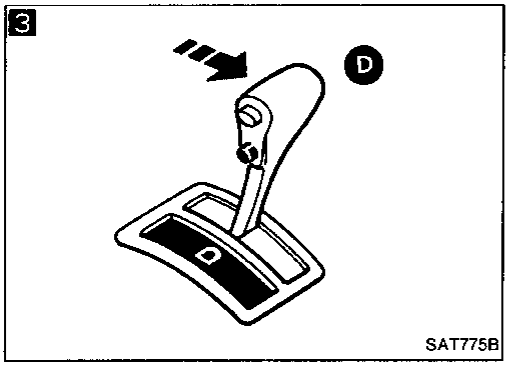
1. Drive vehicle for about 10 minutes to warm engine oil and ATF up to operating temperature.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)





1 2

1. Park vehicle on flat surface.
2. Set overdrive switch to "ON" position.
3. Move selector lever to "P" position.
4. Start engine.



3

Move selector lever to "D" position.

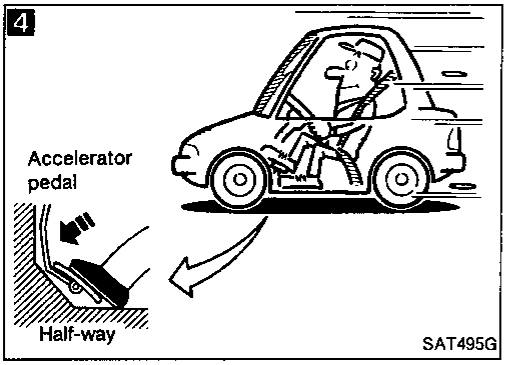
4

Accelerate vehicle by slowly and constantly depressing accelerator pedal halfway.

Does vehicle start from D_1?
Read gear position.

No → Go to Diagnostic Procedure 8, AT-91.

Yes

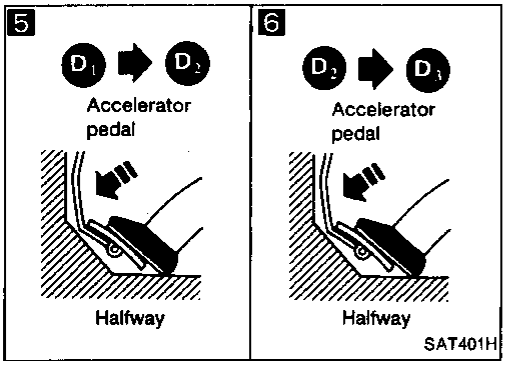


5

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:
Refer to Shift schedule, AT-36.

No → Go to Diagnostic Procedure 9, AT-92.

Yes



6

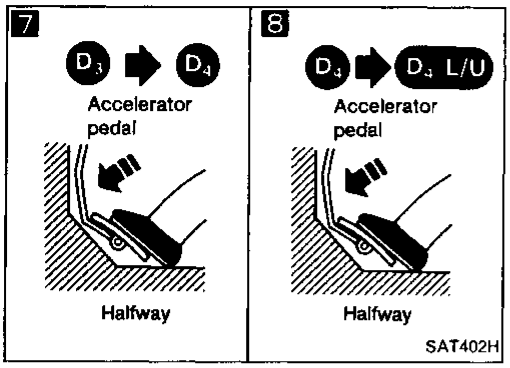
Does A/T shift from D_2 to D_3 at the specified speed?
Read gear position, throttle position and vehicle speed.
Specified speed when shifting from D_2 to D_3:
Refer to Shift schedule, AT-36.

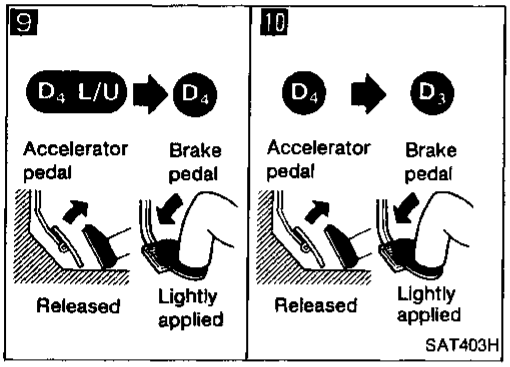
No → Go to Diagnostic Procedure 10, AT-93.

Yes

Ⓐ

Preliminary Check (Cont'd)





Ⓐ

7 Does A/T shift from D_3 to D_4 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_3 to D_4:
Refer to Shift schedule, AT-36.

No → Go to Diagnostic Procedure 11, AT-94.

Yes ↓

8 Does A/T perform lock-up at the specified speed?

Read vehicle speed, throttle position when torque converter clutch solenoid valve duty becomes 94%.

Specified speed when lock-up occurs:
Refer to Shift schedule, AT-36.

No → Go to Diagnostic Procedure 12, AT-95.

Yes ↓

Does A/T hold lock-up condition for more than 30 seconds?

No → Go to Diagnostic Procedure 13, AT-96.

Yes ↓

9
1. Release accelerator pedal and lightly apply foot brake.
2. Is lock-up released when accelerator pedal is released and foot brake is applied?

Read torque converter clutch solenoid valve duty 94% → 4%.

No → Go to Diagnostic Procedure 14, AT-96.

Yes ↓

10
1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D_4 to D_3?

Read gear position and engine speed.

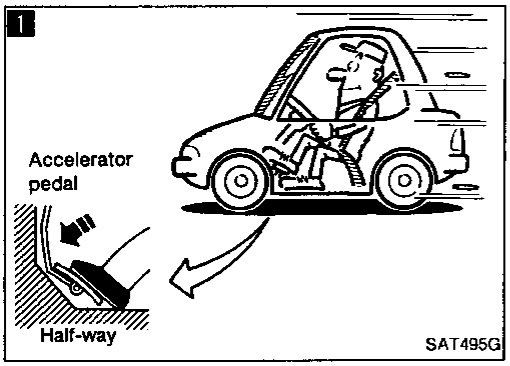
No → Go to Diagnostic Procedure 15, AT-97.

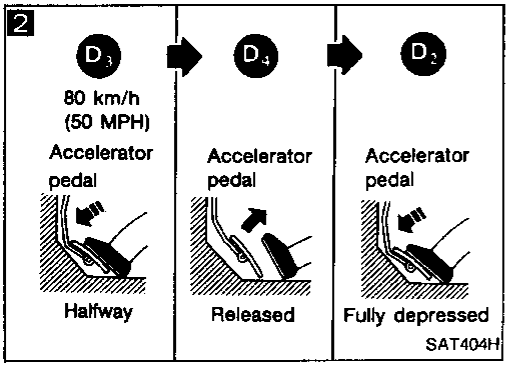
Yes ↓

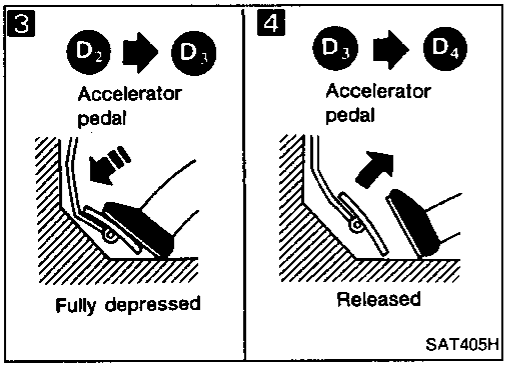
1. Stop vehicle.
2. Go to "Cruise test — Part 2", AT-34.

Preliminary Check (Cont'd)

Cruise test — Part 2







1. Confirm overdrive switch is in "ON" position.
2. Confirm selector lever is in "D" position.

1

1. Accelerate vehicle by half throttle again.
2. Does vehicle start from D_1?

Read gear position.

No → Go to Diagnostic Procedure 16, AT-98.

Yes

2

1. Accelerate vehicle to 80 km/h (50 MPH).
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D_4 to D_2 as soon as accelerator pedal is depressed fully?

Read gear position and throttle position.

No → Go to Diagnostic Procedure 9, AT-92.

Yes

3

Does A/T shift from D_2 to D_3 at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D_2 to D_3:

Refer to Shift schedule, AT-36.

No → Go to Diagnostic Procedure 10, AT-93.

Yes

4

1. Release accelerator pedal after shifting from D_2 to D_3.
2. Does A/T shift from D_3 to D_4 and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.

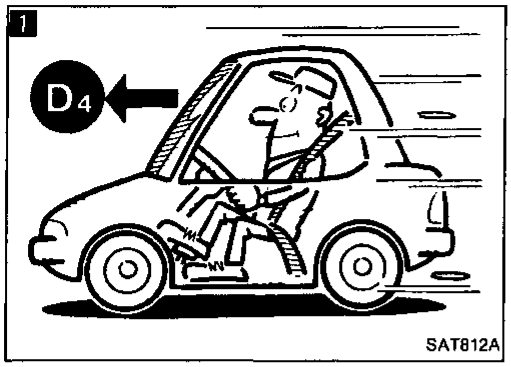
No → Go to Diagnostic Procedure 11, AT-94.

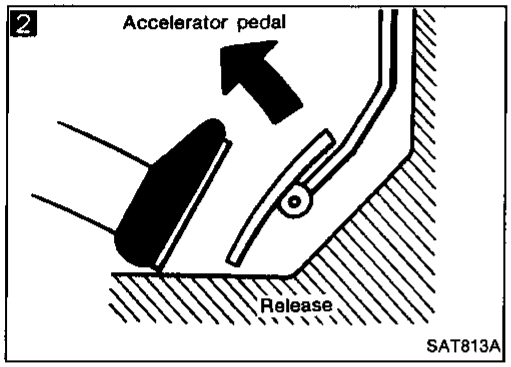
Yes

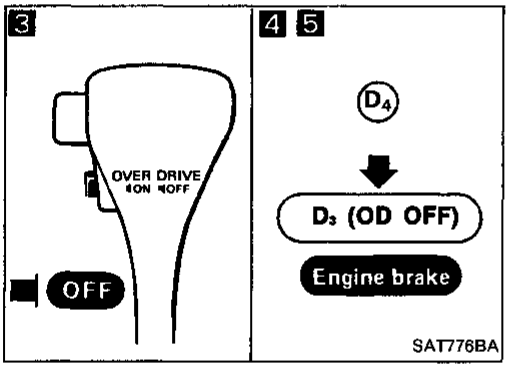
1. Stop vehicle.
2. Go to "Cruise test — Part 3", AT-35.

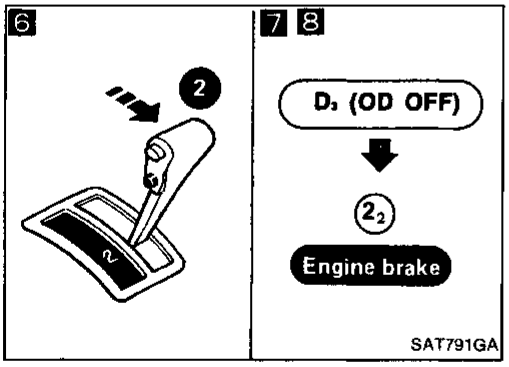
Preliminary Check (Cont'd)

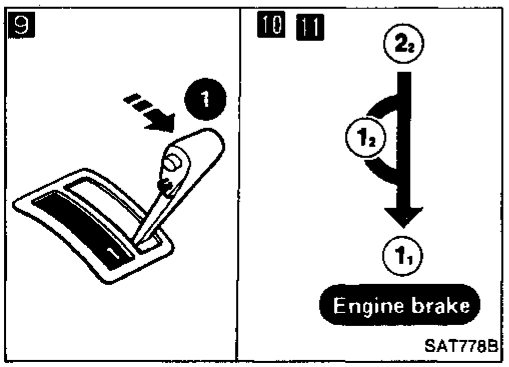
Cruise test — Part 3











1. Confirm overdrive switch is in "ON" position.
2. Confirm selector lever is in "D" position.

↓

1 Accelerate vehicle using half-throttle to D_4.

↓

2 Release accelerator pedal.

↓

3 Set overdrive switch to "OFF" position while driving in D_4 range.

↓

4 Does A/T shift from D_4 to D_3? **Read gear position and vehicle speed.**
- No → Go to Diagnostic Procedure 17, AT-98.
- Yes ↓

5 Does vehicle decelerate by engine brake?
- No → Go to Diagnostic Procedure 15, AT-97.
- Yes ↓

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

↓

7 Does A/T shift from D_3 to 2_2? **Read gear position.**
- No → Go to Diagnostic Procedure 18, AT-99.
- Yes ↓

8 Does vehicle decelerate by engine brake?
- No → Go to Diagnostic Procedure 15, AT-97.
- Yes ↓

9 **10**
1. Move selector lever from "2" to "1" position while driving in 2_2.
2. Does A/T shift from 2_2 to 1_1 position? **Read gear position.**
- No → Go to Diagnostic Procedure 19, AT-99.
- Yes ↓

11 Does vehicle decelerate by engine brake?
- No → Go to Diagnostic Procedure 20, AT-99.
- Yes ↓

1. Stop vehicle.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSTIC PROCEDURE, AT-46.

Preliminary Check (Cont'd)

SHIFT SCHEDULE

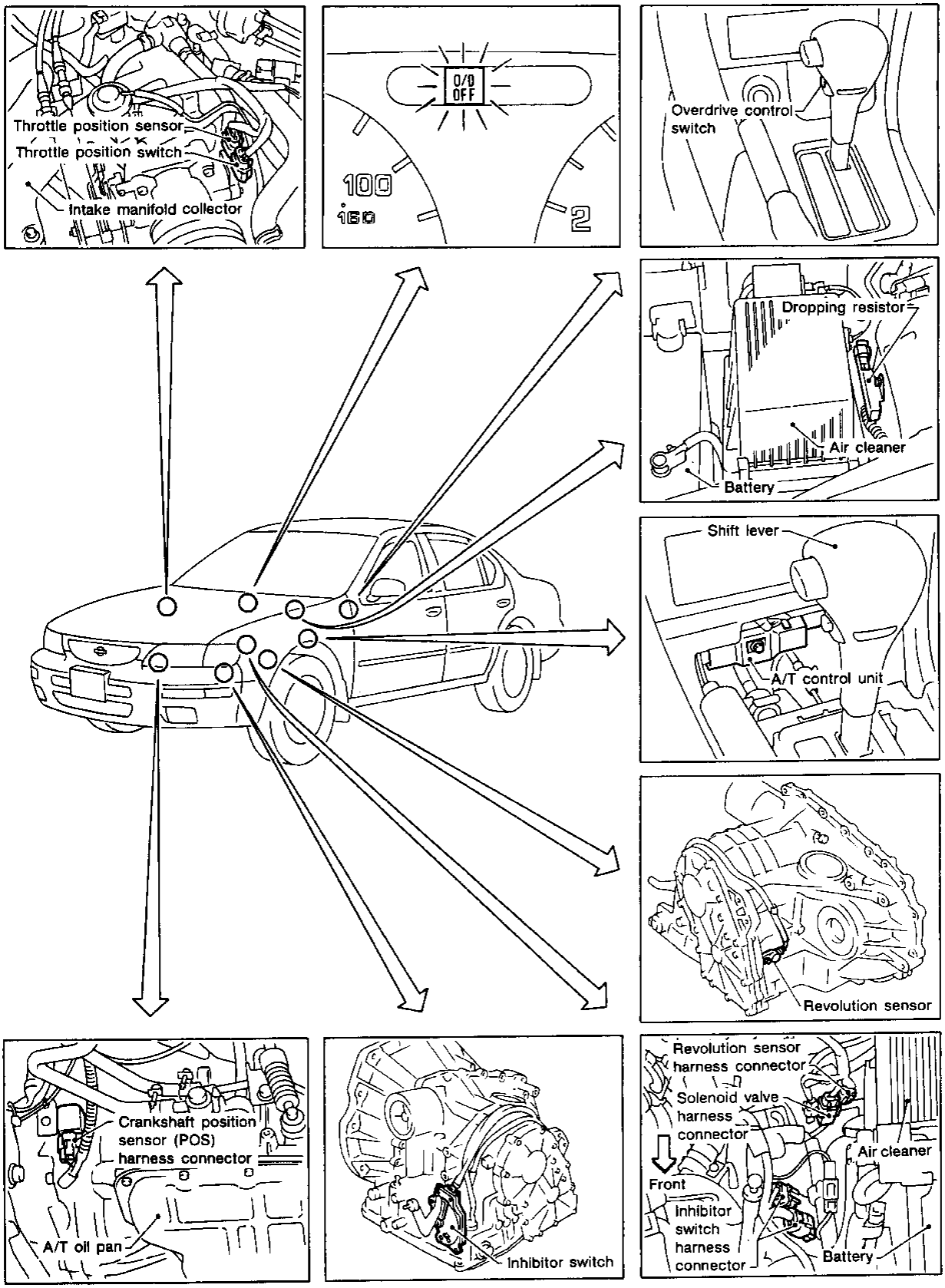
Vehicle speed when shifting gears

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	61 - 69 (38 - 43)	113 - 121 (70 - 75)	177 - 185 (110 - 115)	173 - 181 (108 - 112)	103 - 111 (64 - 69)	54 - 62 (34 - 39)	61 - 69 (38 - 43)
	Auto power	61 - 69 (38 - 43)	113 - 121 (70 - 75)	177 - 185 (110 - 115)	173 - 181 (108 - 112)	103 - 111 (64 - 69)	54 - 62 (34 - 39)	61 - 69 (38 - 43)
Half throttle	Comfort	39 - 47 (24 - 29)	73 - 81 (45 - 50)	113 - 121 (70 - 75)	79 - 87 (49 - 54)	36 - 44 (22 - 27)	5 - 13 (3 - 8)	61 - 69 (38 - 43)
	Auto power	46 - 54 (29 - 34)	85 - 93 (53 - 58)	134 - 142 (83 - 88)	85 - 93 (53 - 58)	51 - 59 (32 - 37)	5 - 13 (3 - 8)	61 - 69 (38 - 43)

Vehicle speed when performing lock-up

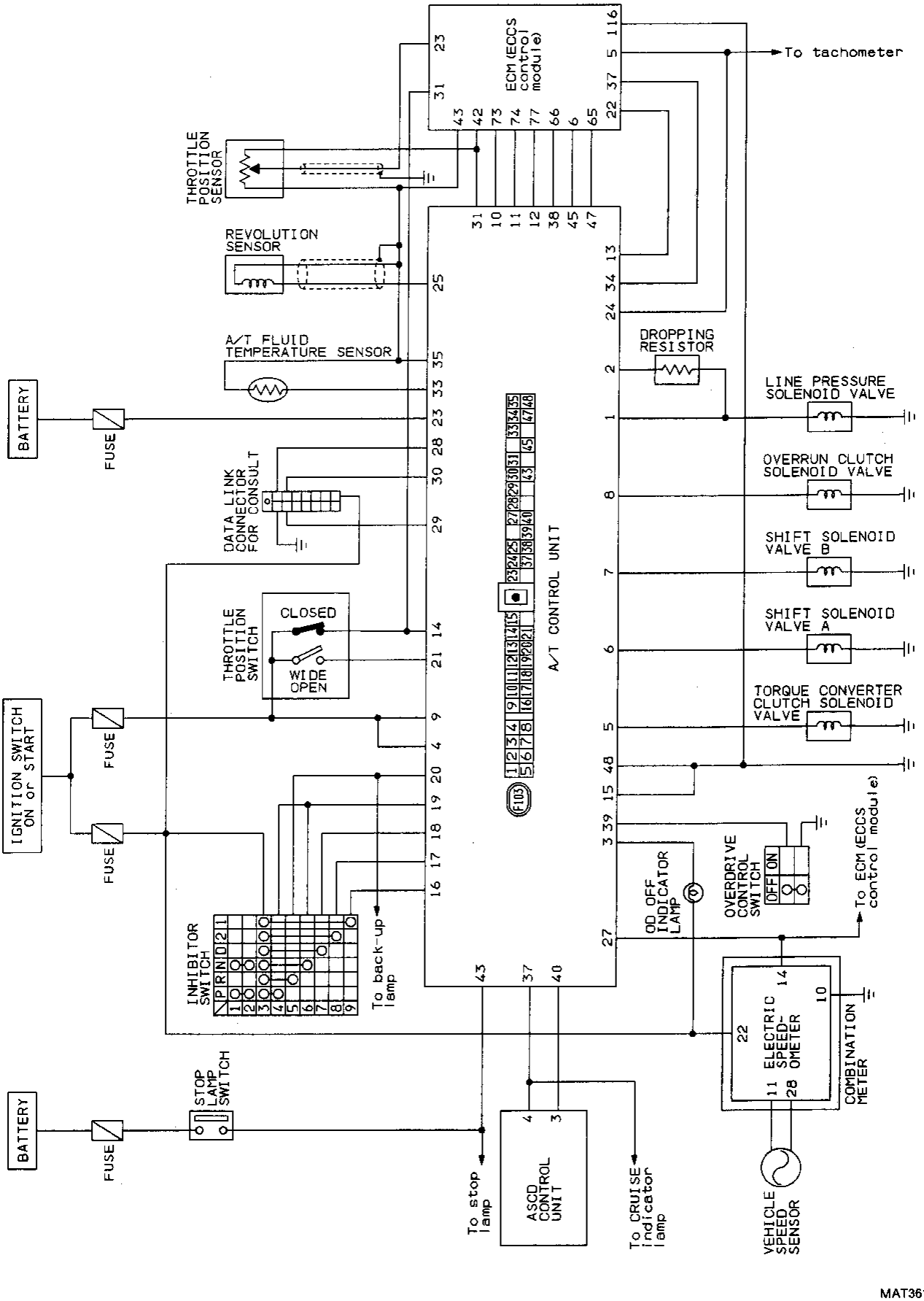
Throttle position	Shift pattern	OD switch	Shift range	Vehicle speed km/h (MPH)	
				Lock-up "ON"	Lock-up "OFF"
2/8	Comfort	ON	D_4	102 - 110 (63 - 68)	90 - 98 (56 - 61)
			D_3	—	38 - 46 (24 - 29)
		OFF	D_3	86 - 94 (53 - 58)	83 - 91 (52 - 57)
	Auto power	ON	D_4	102 - 110 (63 - 68)	90 - 98 (56 - 61)
			D_3	—	38 - 46 (24 - 29)
		OFF	D_3	86 - 94 (53 - 58)	83 - 91 (52 - 57)

A/T Electrical Parts Location



SAT356H

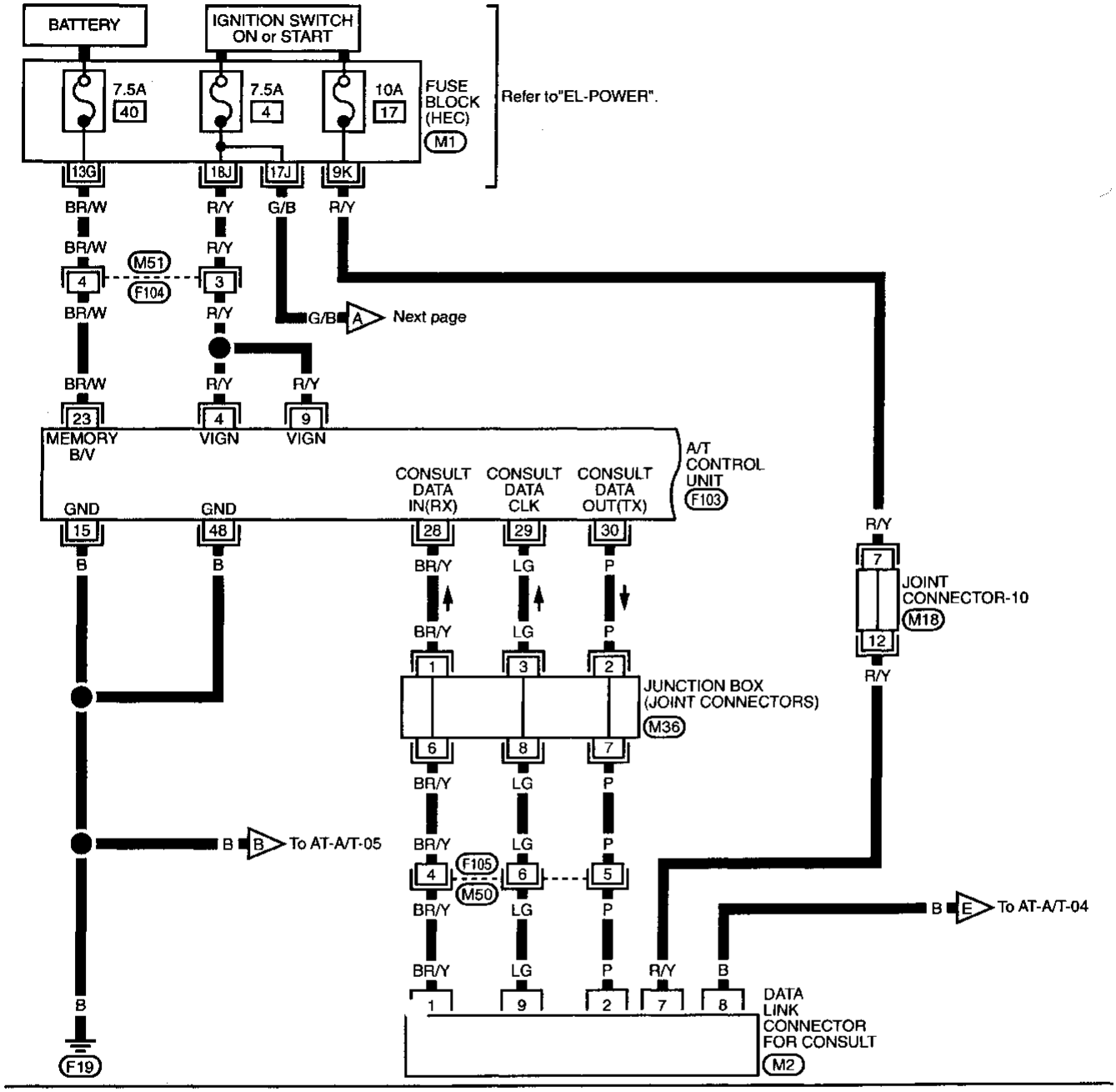
Circuit Diagram for Quick Pinpoint Check



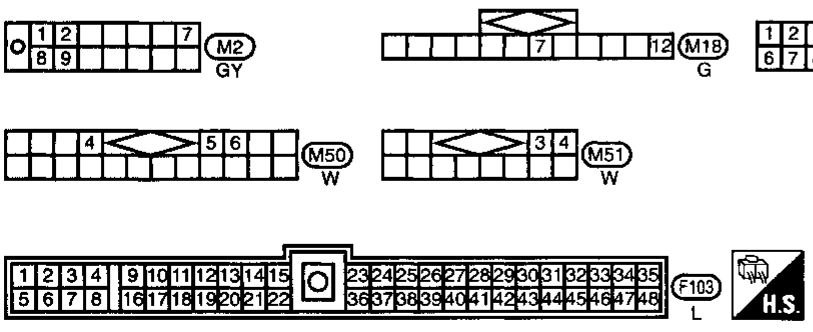
MAT361A

Wiring Diagram — AT —

AT-A/T-01



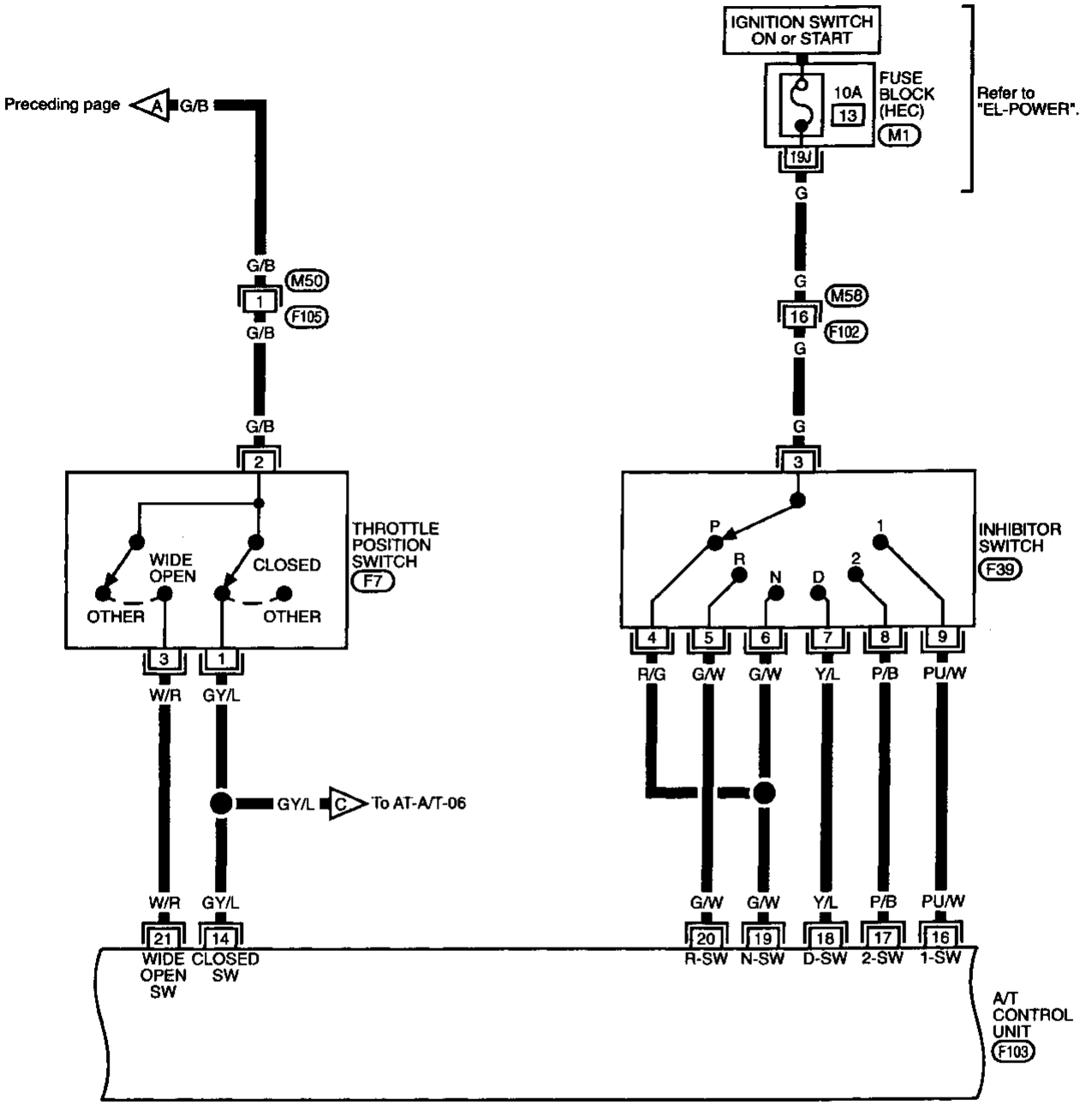
Refer to last page (Foldout page). M1



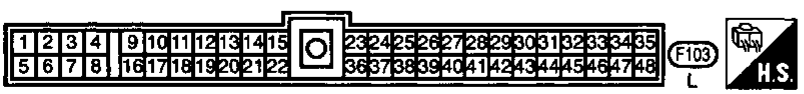
MAT362A

Wiring Diagram — AT — (Cont'd)

AT-A/T-02



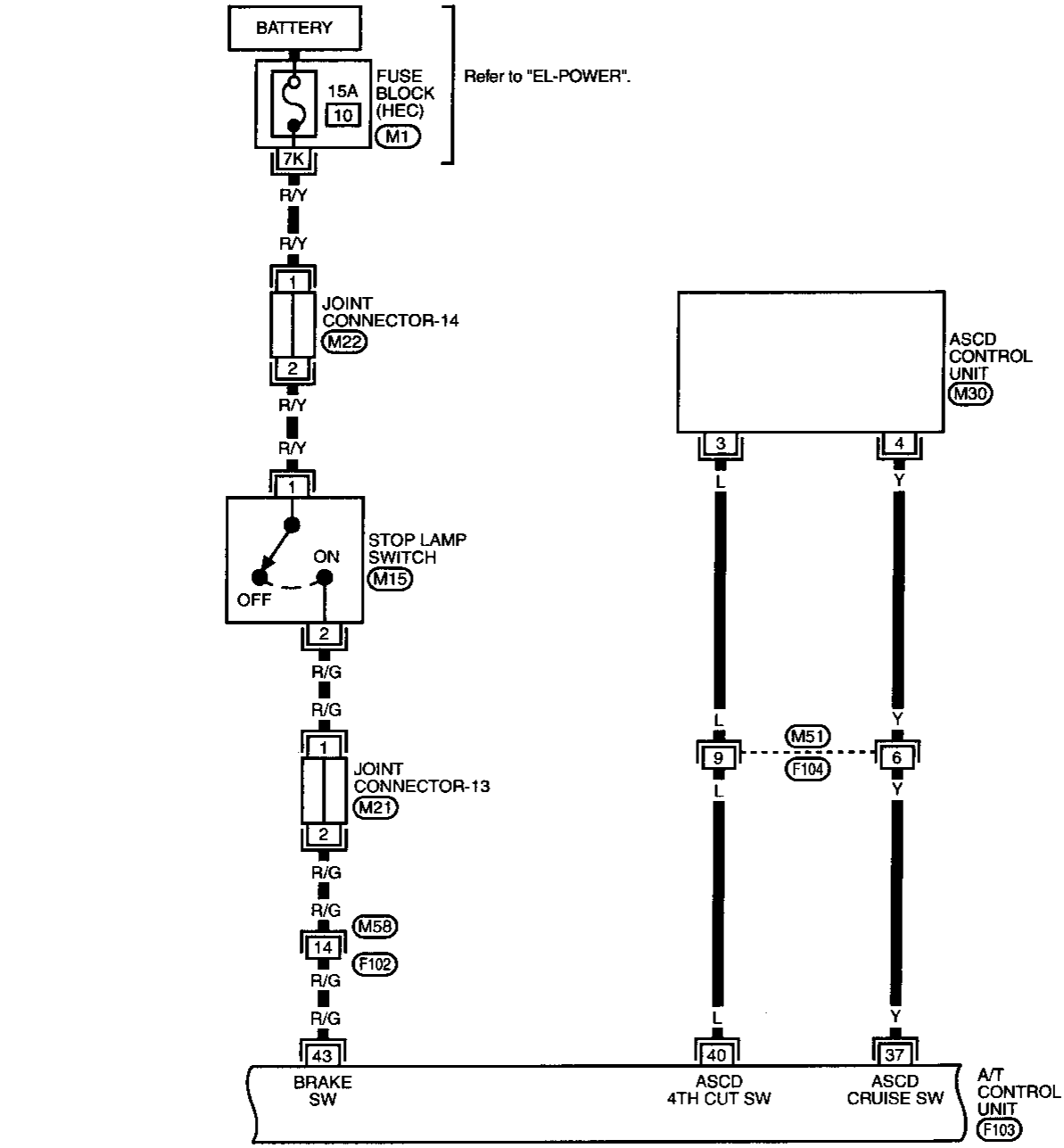
Refer to last page (Foldout page). M1

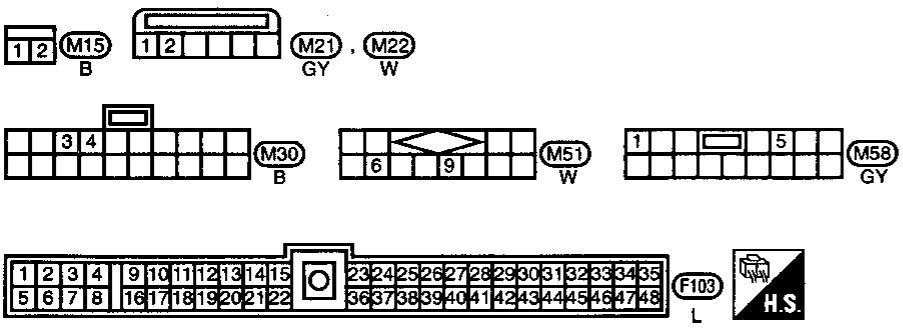


MAT363A

Wiring Diagram — AT — (Cont'd)

AT-A/T-03



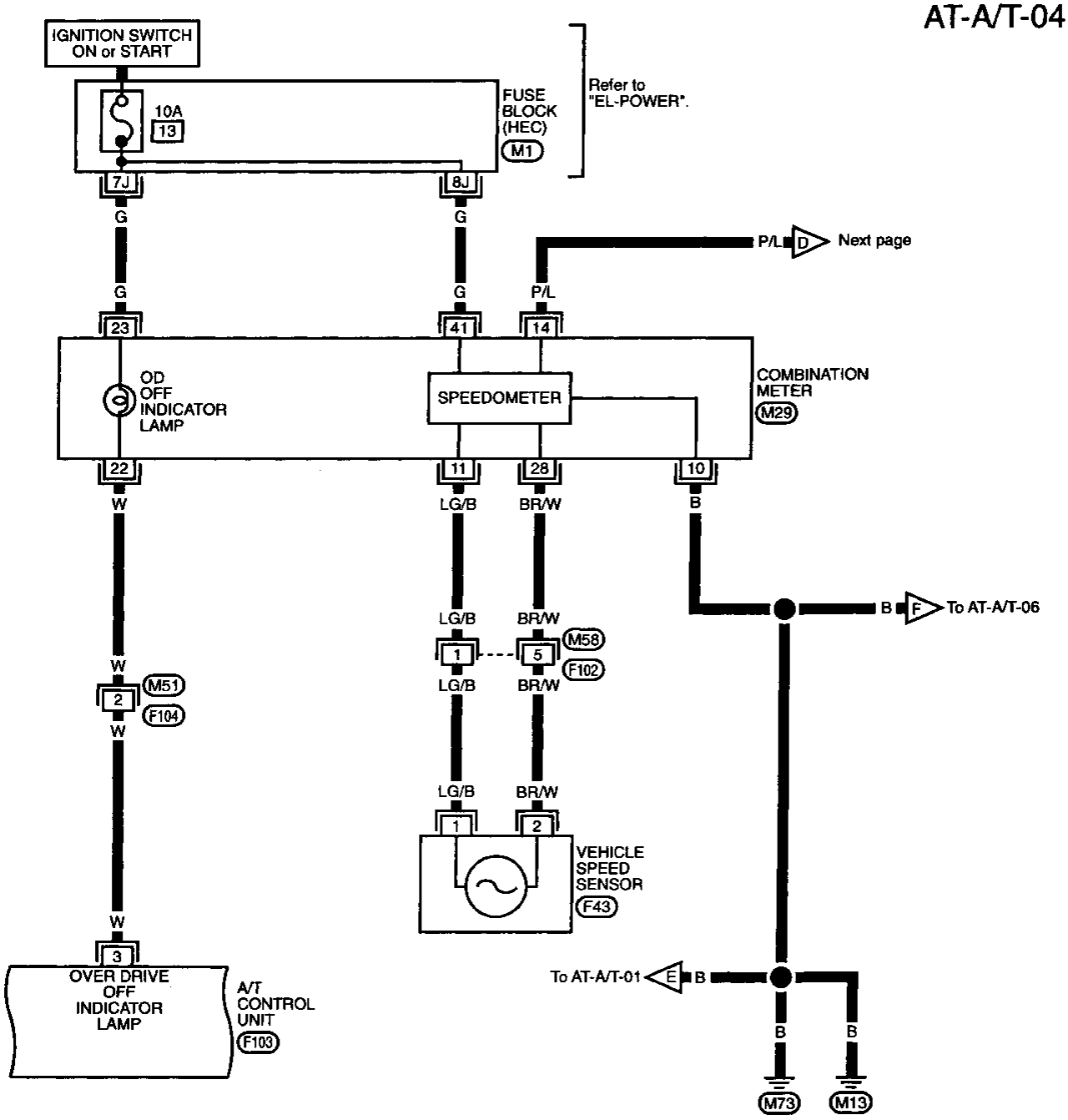


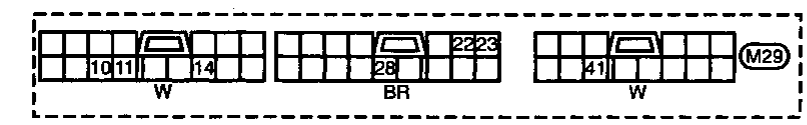
Refer to last page (Foldout page).
M1

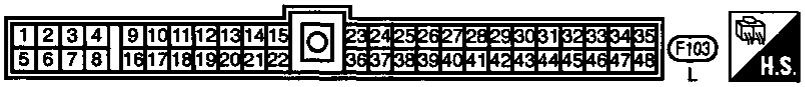
MAT364A

Wiring Diagram — AT — (Cont'd)

AT-A/T-04





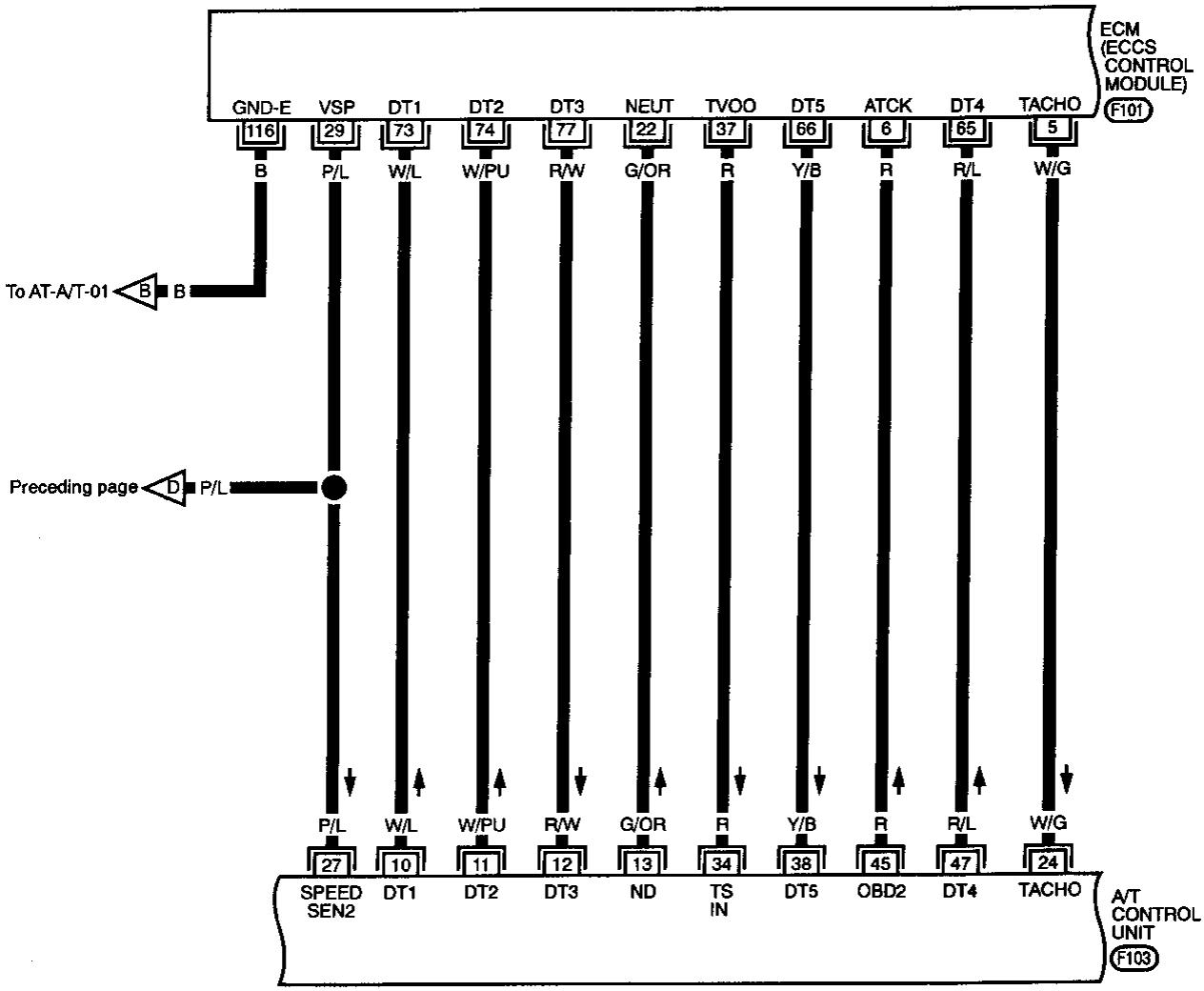


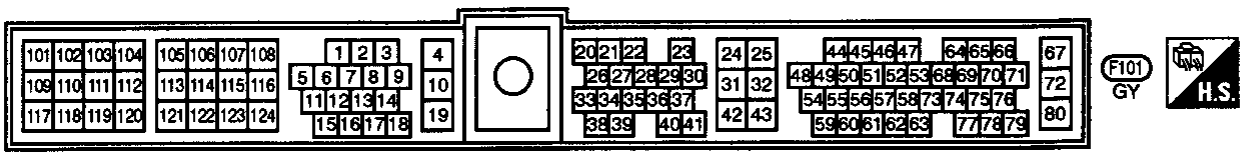
Refer to last page (Foldout page).
M1

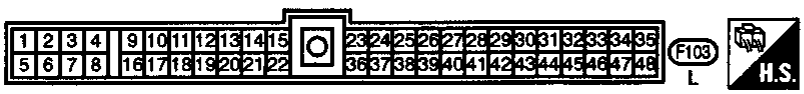
MAT365A

Wiring Diagram — AT — (Cont'd)

AT-A/T-05



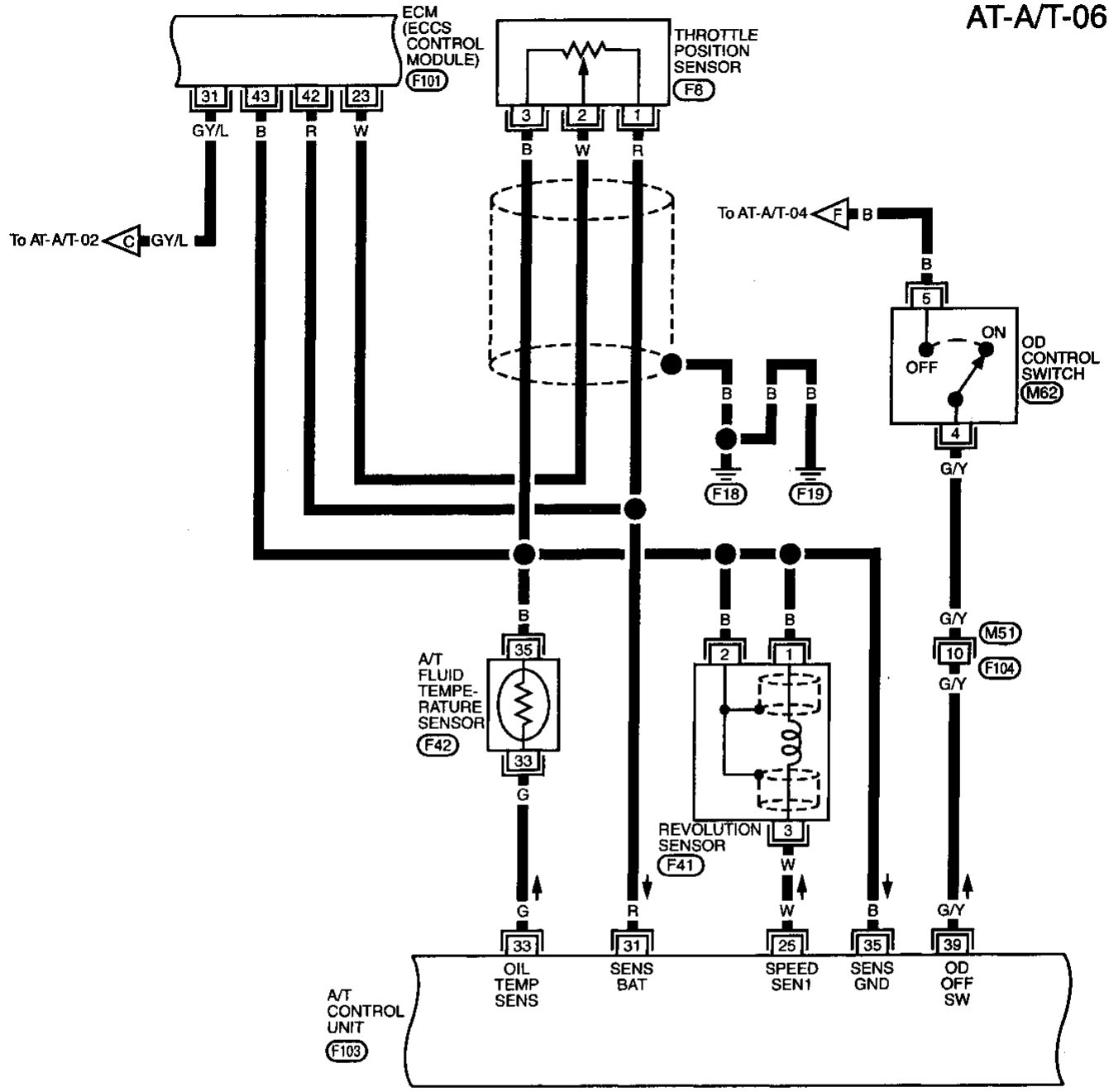


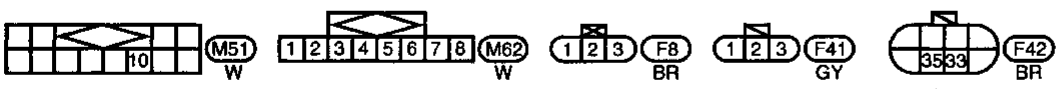


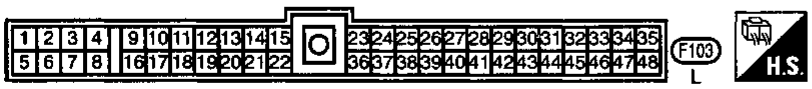
MAT366A

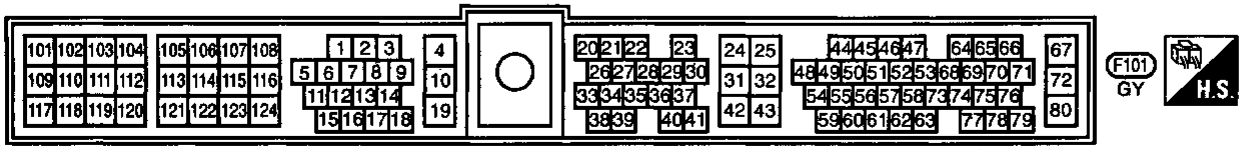
Wiring Diagram — AT — (Cont'd)

AT-A/T-06



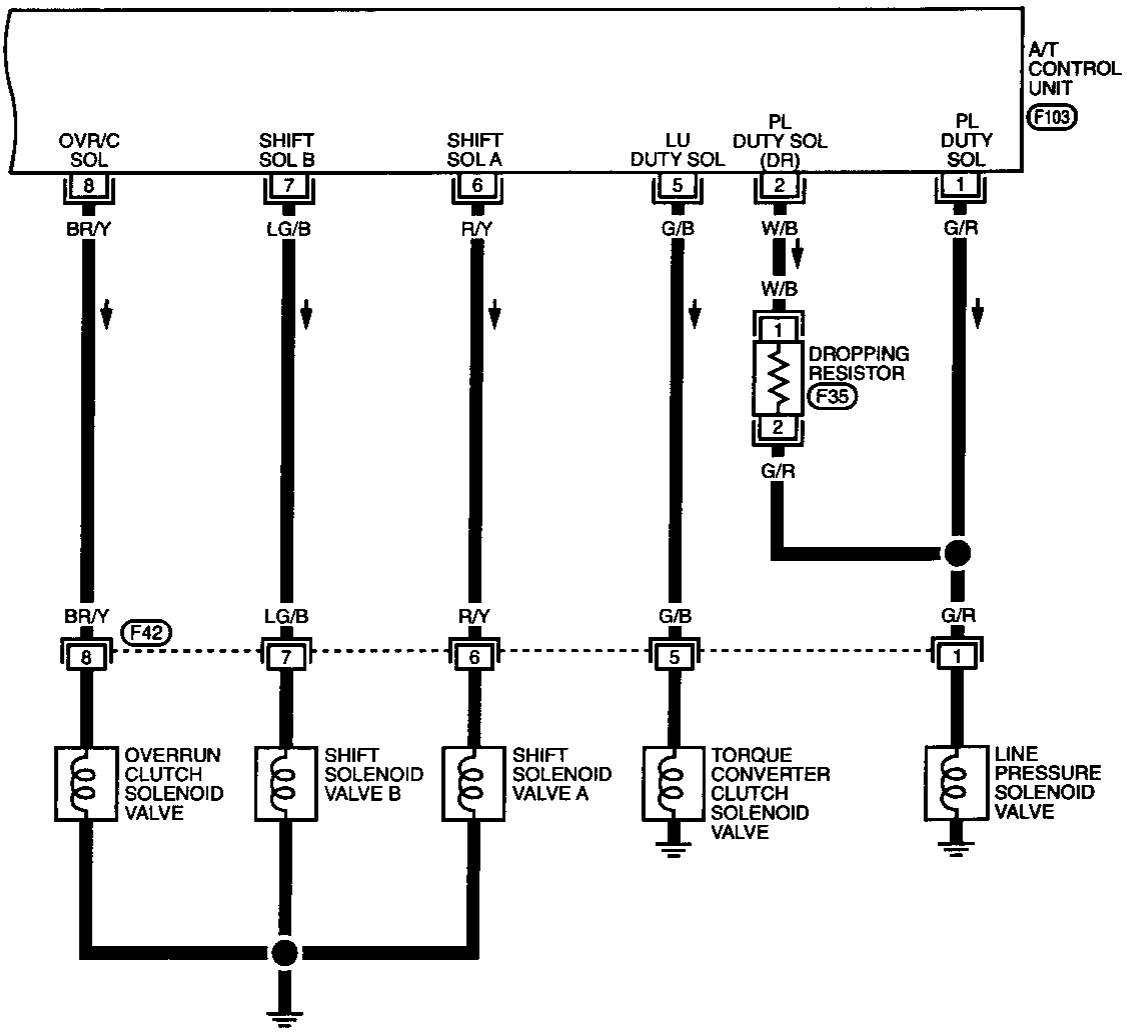


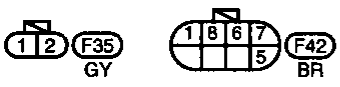


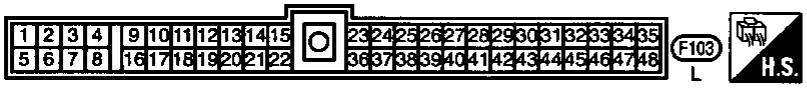


MAT367A

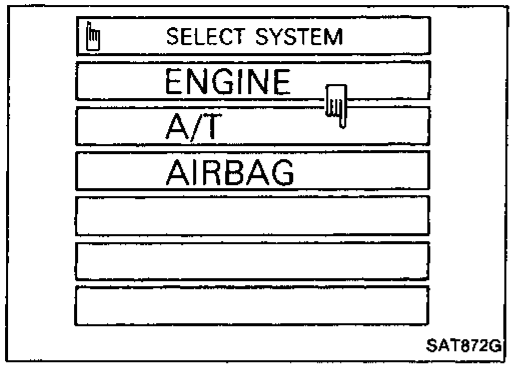
AT-A/T-07







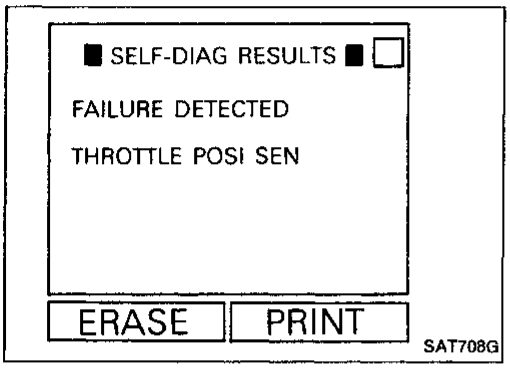
MAT368A



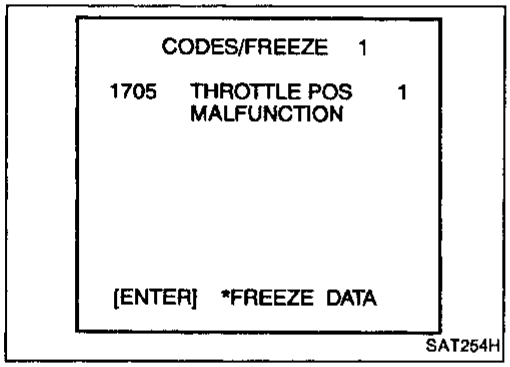
Self-diagnosis

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

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



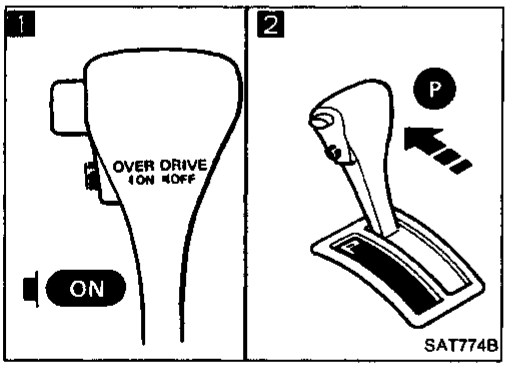
3. Touch "SELF-DIAG RESULTS".
   CONSULT performs REAL-TIME SELF-DIAGNOSIS.

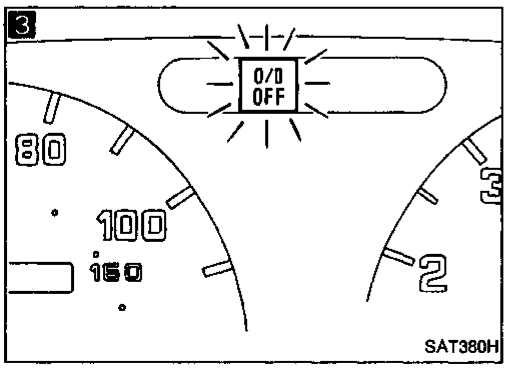


SELF-DIAGNOSTIC PROCEDURE [With Generic Scan Tool (GST, OBD-II Scan Tool)]

Refer to EC section.

SELF-DIAGNOSTIC PROCEDURE (Without CONSULT or GST)





DIAGNOSIS START

1 2 3

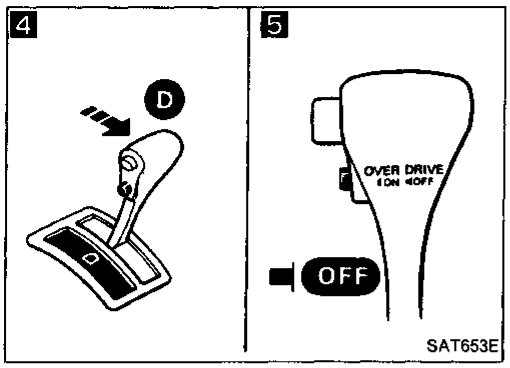
1. Start engine and warm it up to normal engine operating temperature.
2. Turn ignition switch to "OFF" position.
3. Turn ignition switch to "ACC" position.
4. Set overdrive switch in "ON" position.
5. Move selector lever to "P" position.
6. Turn ignition switch to "ON" position. (Do not start engine.)
7. Does OD OFF indicator lamp come on for about 2 seconds?

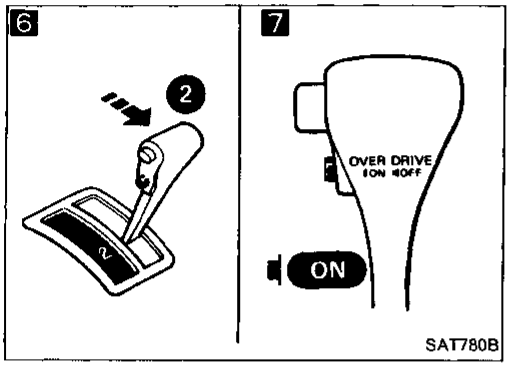
No → Go to Diagnostic Procedure 1, AT-85.

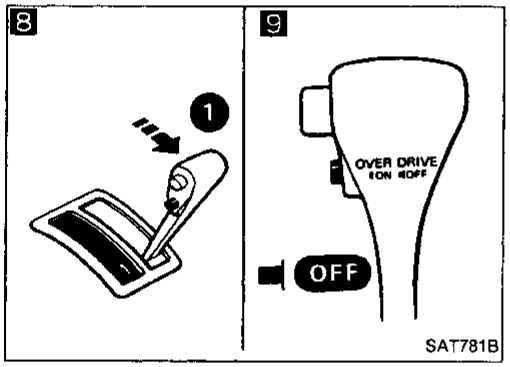
Yes

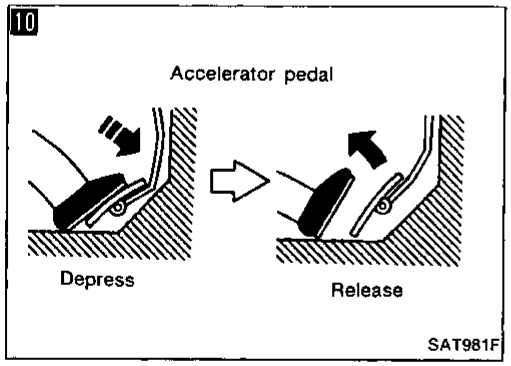
Ⓐ

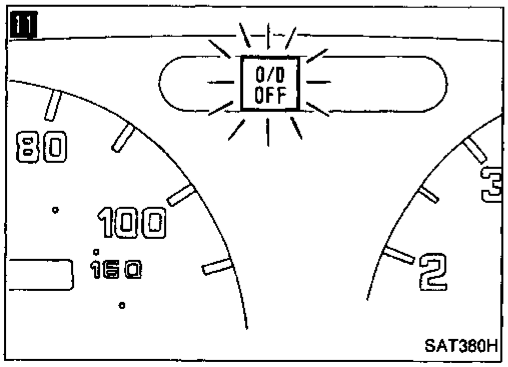
Self-diagnosis (Cont'd)











Ⓐ

4 5

1. Turn ignition switch to "OFF" position.
2. Move selector lever to "D" position.
3. Set overdrive switch to "OFF" position.
4. Turn ignition switch to "ON" position (Do not start engine.)

● Wait for more than 2 seconds after ignition switch "ON".

6 7

1. Move selector lever to "2" position.
2. Set overdrive switch in "ON" position.

8 9

Move selector lever to "1" position.
Set overdrive switch in "OFF" position.

10

Depress accelerator pedal fully and release it.

11

Check OD OFF indicator lamp.
Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE on next page.

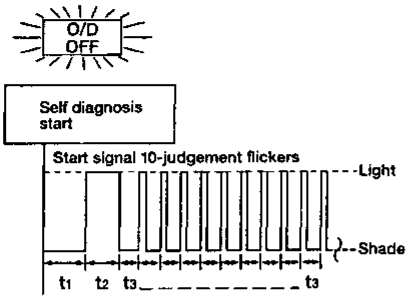
DIAGNOSIS END

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

Power indicator lamp:

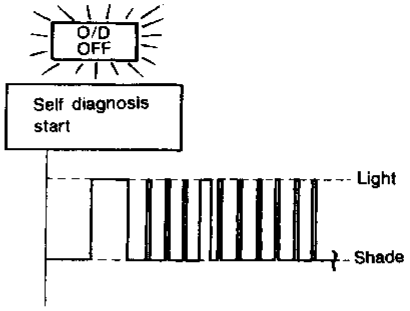
All judgement flickers are same.



AAT131

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

4th judgement flicker is longer than others.

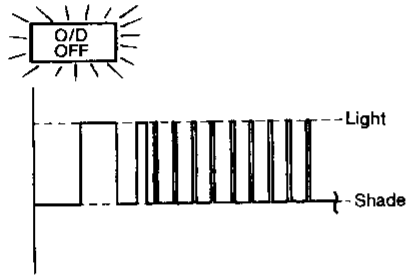


SAT443F

Shift solenoid valve A circuit is short-circuited or disconnected.

➡**Go to SHIFT SOLENOID VALVE A CIRCUIT CHECK, AT-57.**

1st judgement flicker is longer than others.

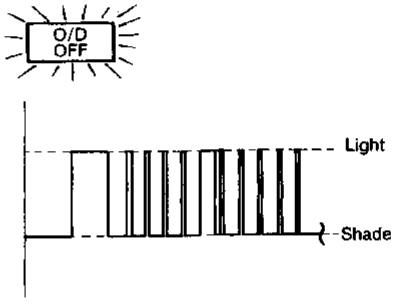


SAT437F

Revolution sensor circuit is short-circuited or disconnected.

➡**Go to REVOLUTION SENSOR CIRCUIT CHECK, AT-51.**

5th judgement flicker is longer than others.

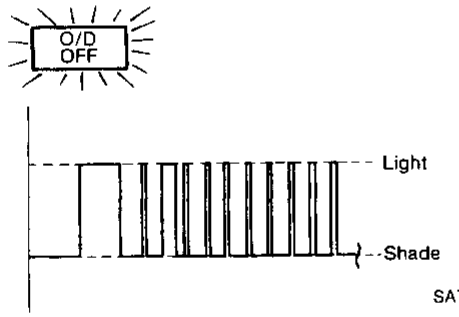


SAT445F

Shift solenoid valve B circuit is short-circuited or disconnected.

➡**Go to SHIFT SOLENOID VALVE B CIRCUIT CHECK, AT-59.**

2nd judgement flicker is longer than others.

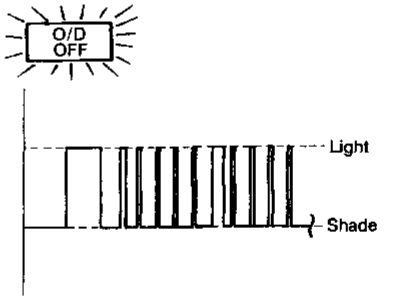


SAT439F

Vehicle speed sensor circuit is short-circuited or disconnected.

➡**Go to VEHICLE SPEED SENSOR CIRCUIT CHECK, AT-53.**

6th judgement flicker is longer than others.

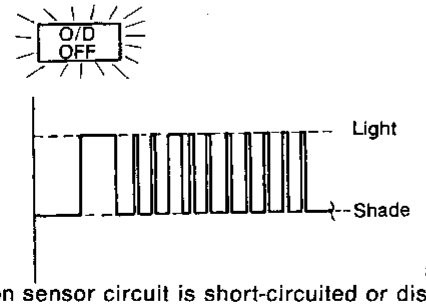


SAT447F

Overrun clutch solenoid valve circuit is short-circuited or disconnected.

➡**Go to OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-61.**

3rd judgement flicker is longer than others.

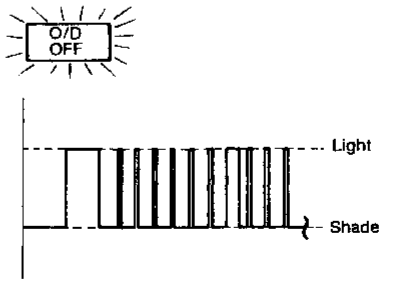


SAT441F

Throttle position sensor circuit is short-circuited or disconnected.

➡**Go to THROTTLE POSITION SENSOR CIRCUIT CHECK, AT-55.**

7th judgement flicker is longer than others.



SAT449F

Torque converter clutch solenoid valve circuit is short-circuited or disconnected.

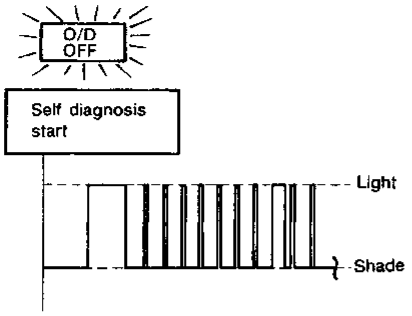
➡**Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-63.**

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

Self-diagnosis (Cont'd)

Power indicator lamp:

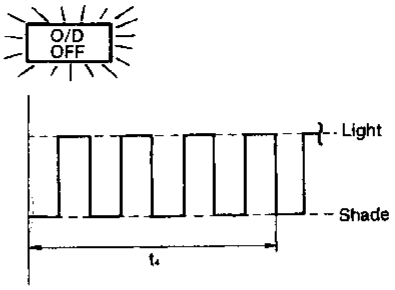
8th judgement flicker is longer than others.



SAT451F

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-65.**

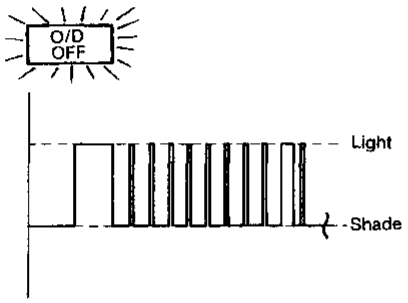
Flickers as shown below.



SAT457F

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

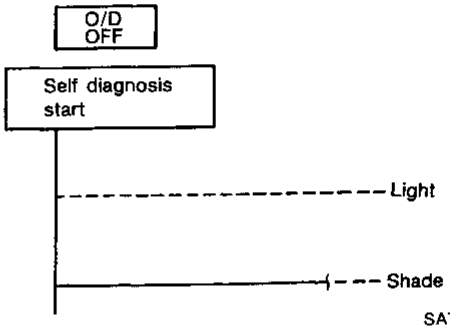
9th judgement flicker is longer than others.



SAT453F

Engine speed signal circuit is short-circuited or disconnected.
➡**Go to ENGINE SPEED SIGNAL CIRCUIT CHECK, AT-68.**

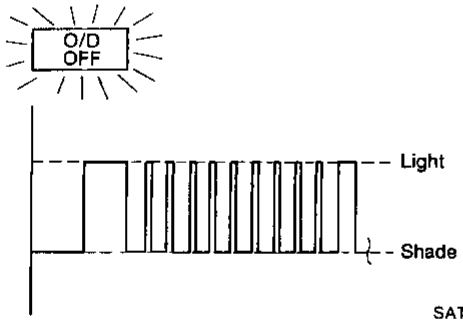
Does not come on.



SAT458F

Inhibitor switch, overdrive switch or throttle position switch circuit is disconnected or A/T control unit is damaged.
➡**Go to INHIBITOR, OVERDRIVE AND THROTTLE POSITION SWITCH CIRCUIT CHECKS, AT-72.**

10th judgement flicker is longer than others.



SAT455F

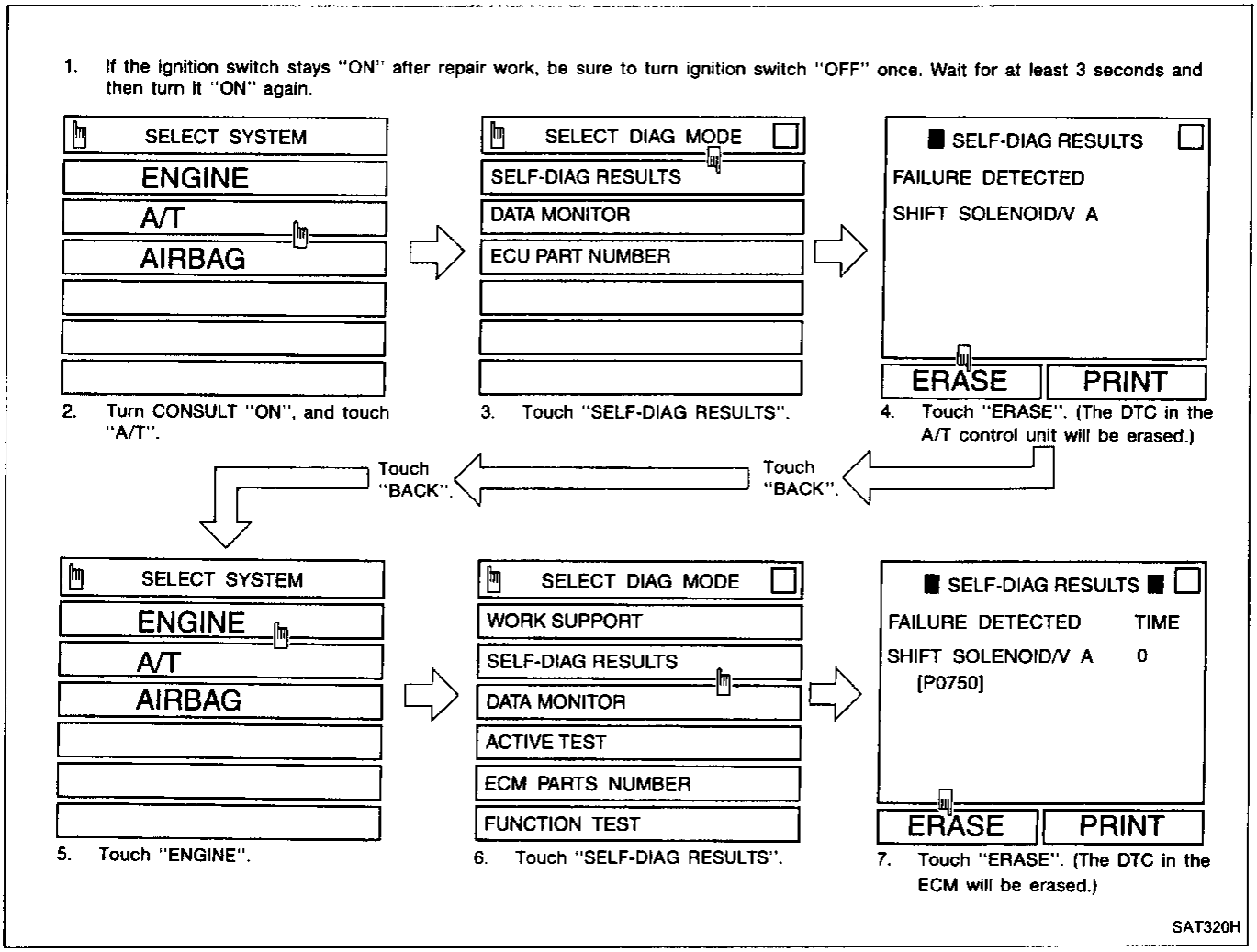
Line pressure solenoid valve circuit is short-circuited or disconnected.
➡**Go to LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK, AT-70.**

t_4 = 1.0 second

Self-diagnosis (Cont'd)

HOW TO ERASE DTC (With CONSULT)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 3 seconds and then turn it "ON" again.
2. Turn CONSULT "ON", and touch "A/T".
3. Touch "SELF-DIAG RESULTS".
4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)
5. Touch "ENGINE".
6. Touch "SELF-DIAG RESULTS".
7. Touch "ERASE". (The DTC in the ECM will be erased.)

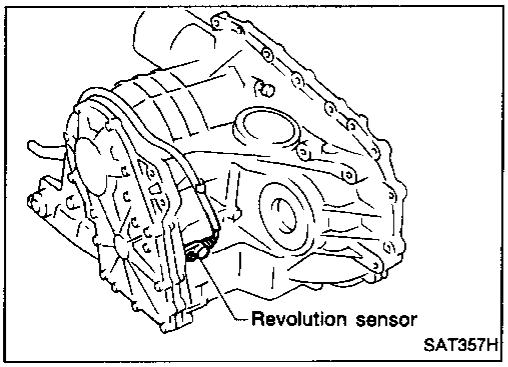


HOW TO ERASE DTC (Without CONSULT)

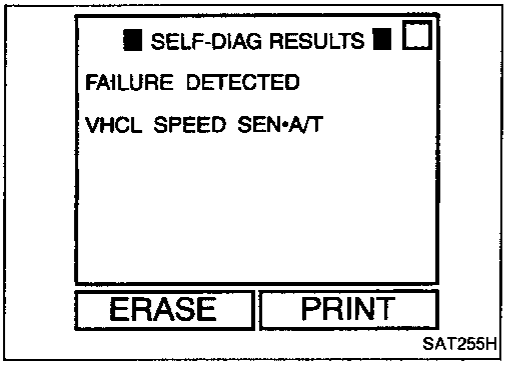
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 3 seconds and then turn it "ON" again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)" in AT section titled "TROUBLE DIAGNOSES", "Self-diagnosis". (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.) Refer to AT-46.
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. [Refer to "ON-BOARD DIAGNOSTIC SYSTEM DESCRIPTION", "Malfunction Indicator Lamp (MIL)", "HOW TO SWITCH DIAGNOSTIC TEST MODES" in EC section.]

Self-diagnosis (Cont'd)

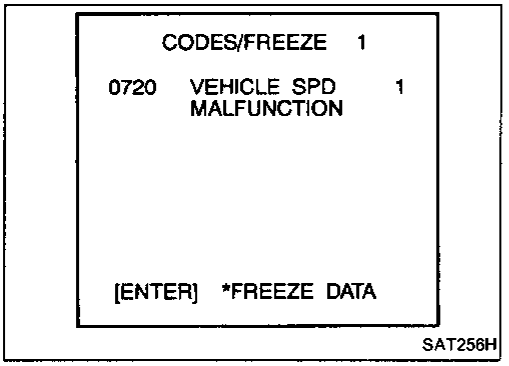
VEHICLE SPEED SENSOR·A/T (REVOLUTION SENSOR) CIRCUIT CHECK



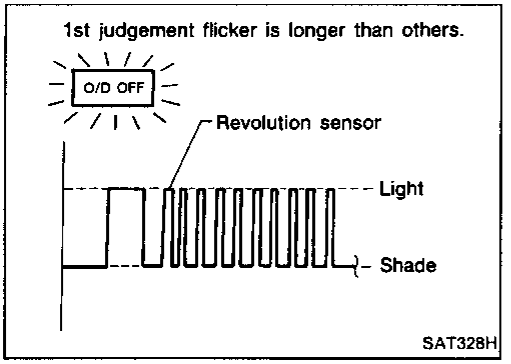
SAT357H



SAT255H



SAT256H



SAT328H

Parts description

The revolution sensor detects the revolution of the idler gear parking pawl lock gear and emits a pulse signal. The pulse signal is sent to the A/T control unit which converts it into vehicle speed.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
VHCL SPEED SEN·A/T P0720 1st judgement flicker	• A/T control unit does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or short.) • Revolution sensor

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

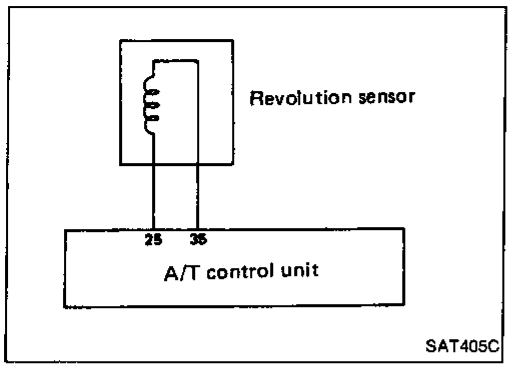
OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)



CHECK REVOLUTION SENSOR. —
Refer to "Electrical Components Inspection", AT-106.

NG → Repair or replace revolution sensor.

OK ↓

A

CHECK INPUT SIGNAL.

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "VHCL/S SE·A/T" while driving.
   Check the value changes according to driving speed.

OR

1. Start engine.
2. Check voltage between A/T control unit terminal ㉕ and ground while driving.
   (Measure with AC 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 revolution sensor (Main harness)
- Harness continuity between revolution sensor and ECM (Main harness)
- Ground circuit for ECM — Refer to section EC.

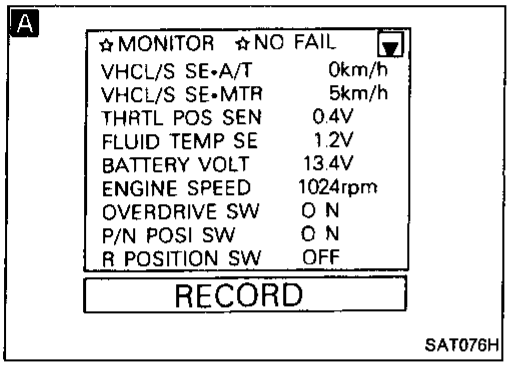
OK ↓

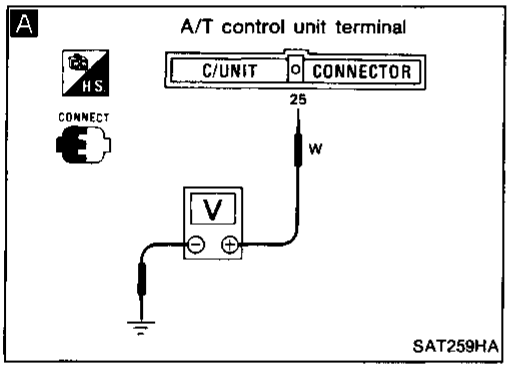
Perform self-diagnosis again after driving for a while.

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

OK ↓

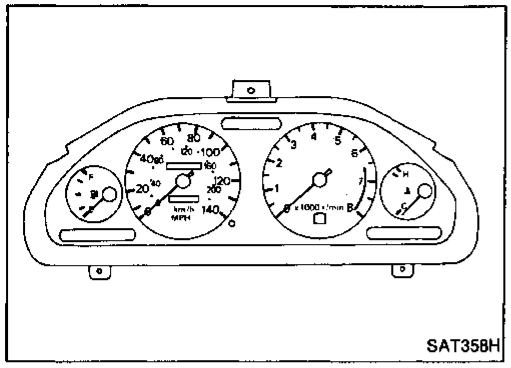
INSPECTION END

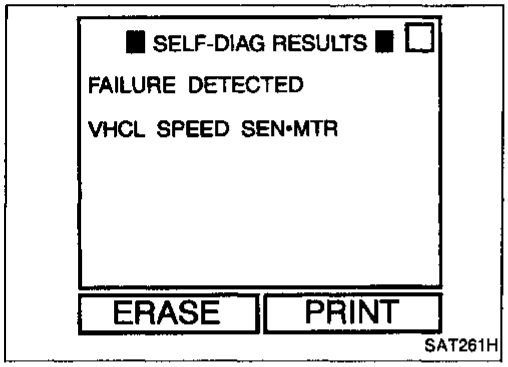




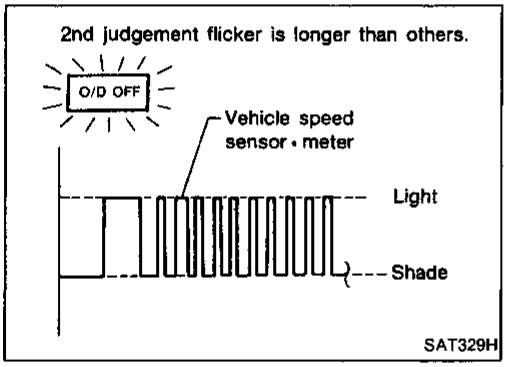
Self-diagnosis (Cont'd)

VEHICLE SPEED SENSOR·MTR CIRCUIT CHECK


SAT358H



SAT261H



SAT329H

Parts description

The vehicle speed sensor·MTR is built into the speedometer assembly. The sensor functions as an auxiliary device to the revolution sensor when it is malfunctioning. The A/T control unit will then use a signal sent from the vehicle speed sensor·MTR.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
VHCL SPEED SEN·MTR 2nd judgement flicker	• A/T control unit does not receive the proper voltage signal from the sensor.	• Harness or connectors (The sensor circuit is open or short.) • Vehicle speed sensor

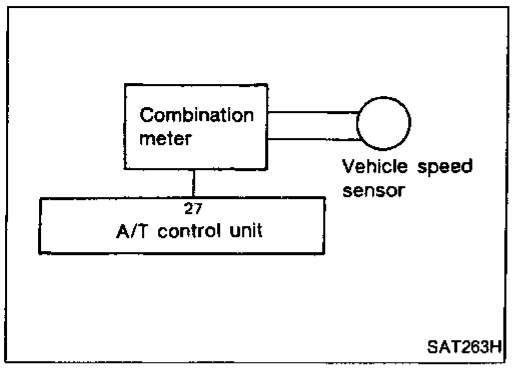
Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Shift lever in D and vehicle speed higher than 20 km/h (12 MPH).

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D and vehicle speed higher than 20 km/h (12 MPH).
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)



A

CHECK INPUT SIGNAL.

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "VHCL/S SE·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 section EL.
- Harness continuity between A/T control unit and vehicle speed sensor (Main harness)

OR

1. Start engine.
2. 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

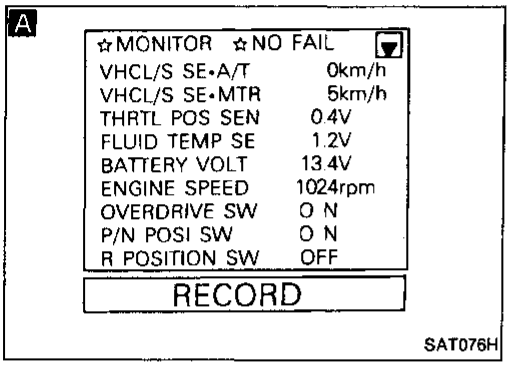
Perform self-diagnosis again after driving for a while.

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

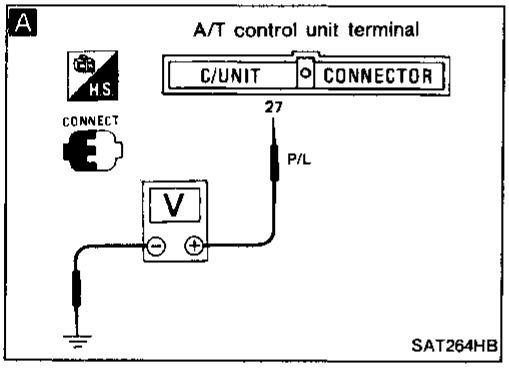
OK

INSPECTION END

A

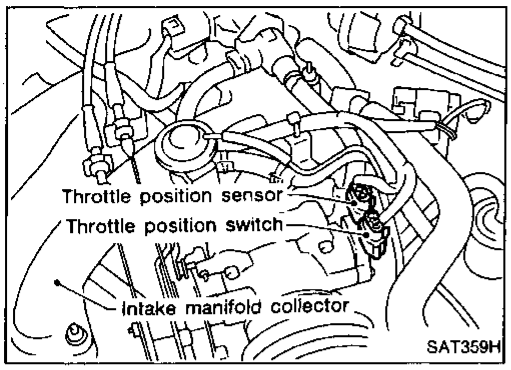


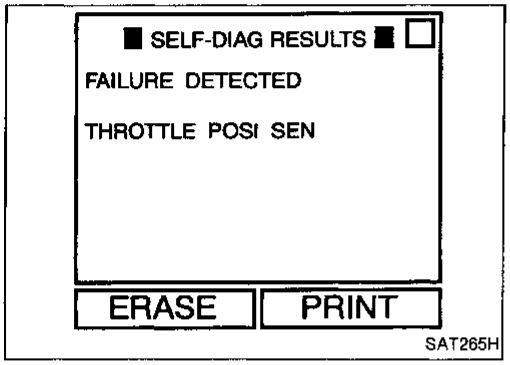
A

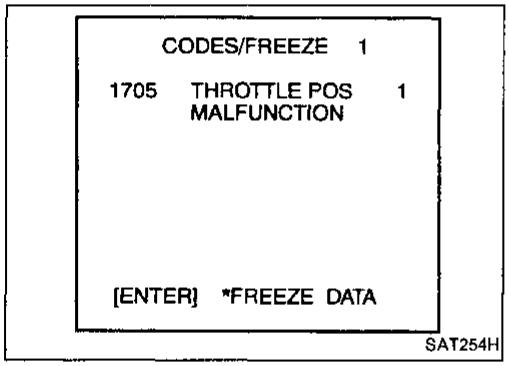


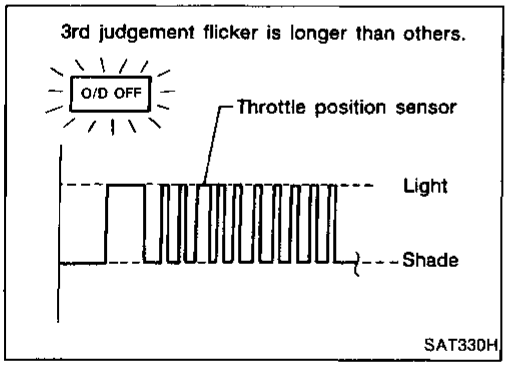
Self-diagnosis (Cont'd)

THROTTLE POSITION SENSOR CIRCUIT CHECK









Parts description

The throttle position sensor detects the throttle valve position and sends a signal to the A/T control unit.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
THROTTLE POSI SEN P1705 3rd judgement flicker	• A/T control unit receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or short.) • Throttle position sensor

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.

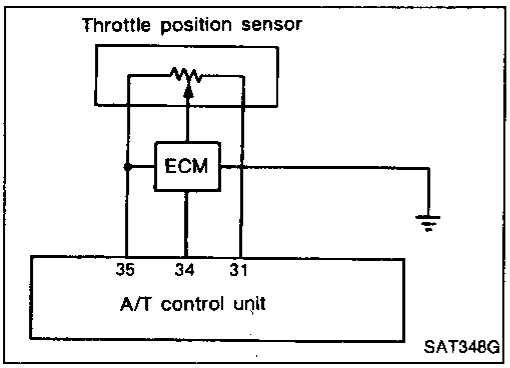
OR

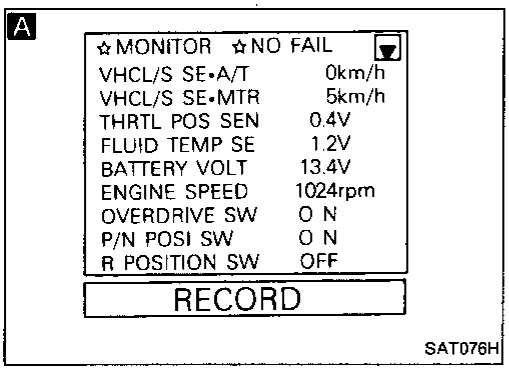
1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
3) Select "MODE 3" with GST.

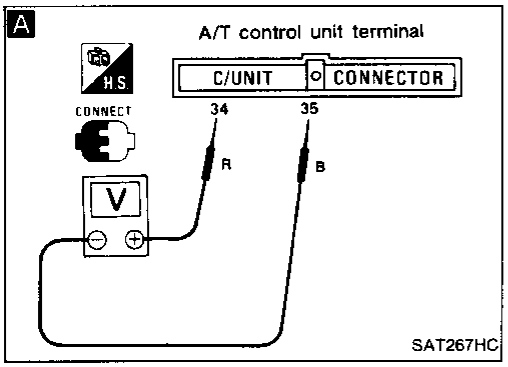
OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)







Perform diagnostic test mode II (self-diagnostic results) for engine control.

NG → Check throttle position sensor circuit for engine control. — Refer to section EC.

OK

A

CHECK INPUT SIGNAL.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "THRTL POS SEN".

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

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

OR

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ㉞ and ㉟ while accelerator pedal is depressed slowly.

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

OK

Perform self-diagnosis again after driving for a while.

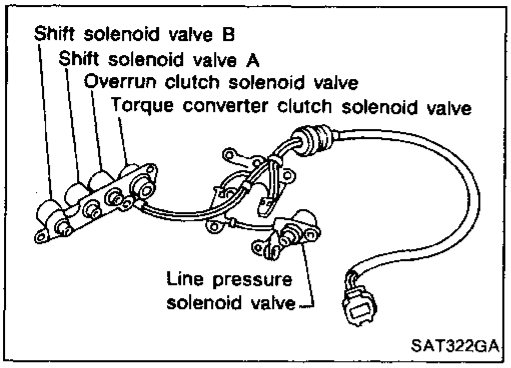
NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

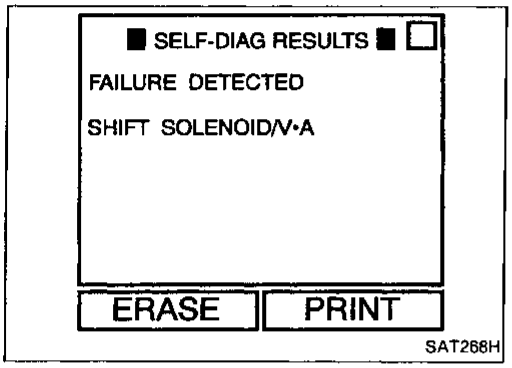
OK

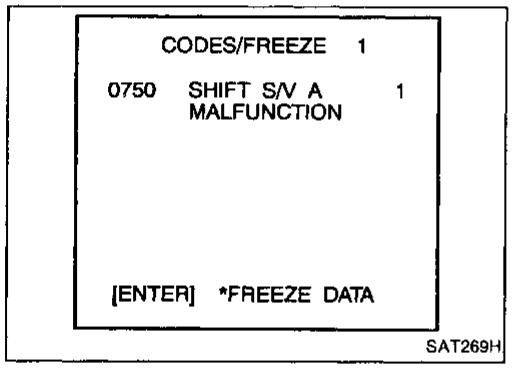
INSPECTION END

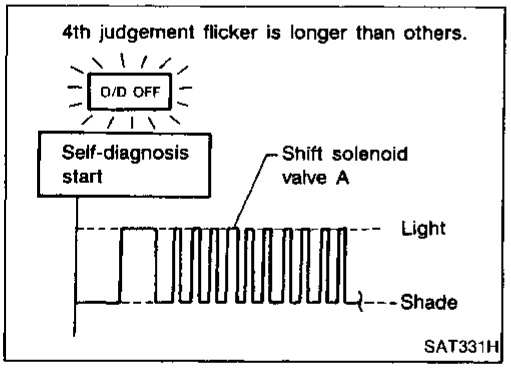
Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK









Parts description

Shift solenoid valves A and B are turned ON or OFF by the A/T control unit in response to signals sent from the inhibitor switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

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

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
SHIFT SOLENOID/V·A (P0750) 4th judgement flicker	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or short.) • Shift solenoid valve A

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle in $D_1 \rightarrow D_2$ position.

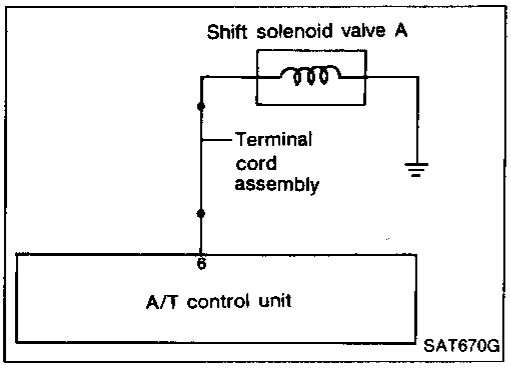
OR

1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2$ position.
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2$ position.
3) Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)

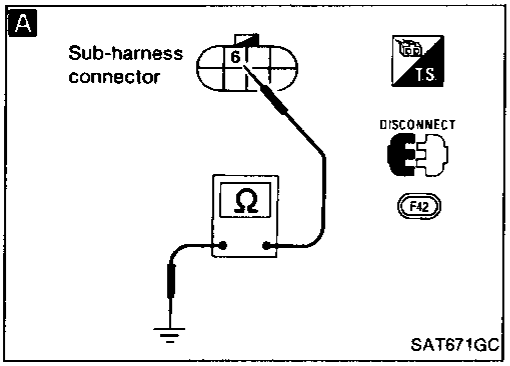


A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
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. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Shift solenoid valve A — Refer to "Electrical Components Inspection", AT-104.
- Harness continuity of terminal cord assembly

OK ↓

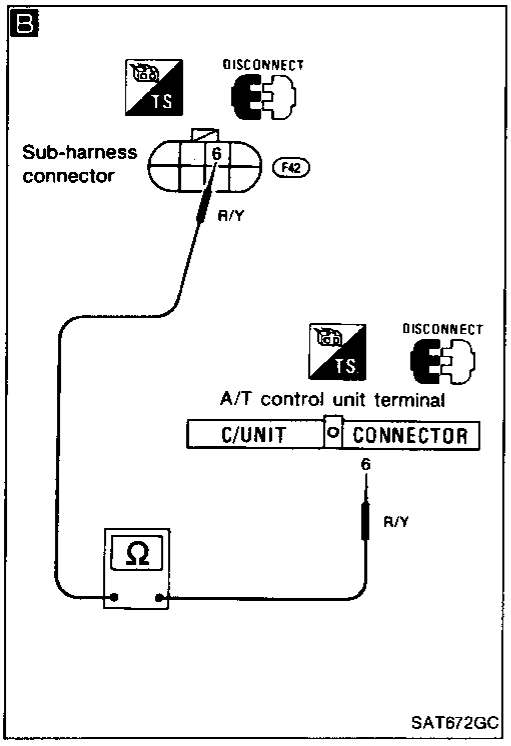


B

CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
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 after driving for a while.

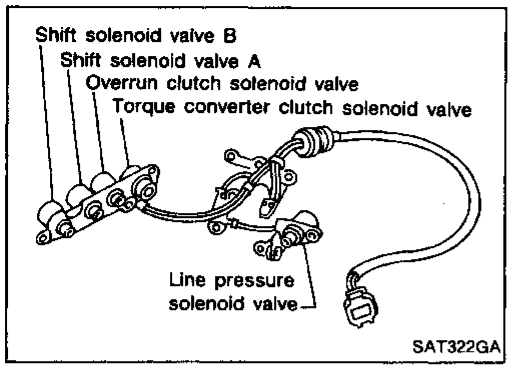
NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

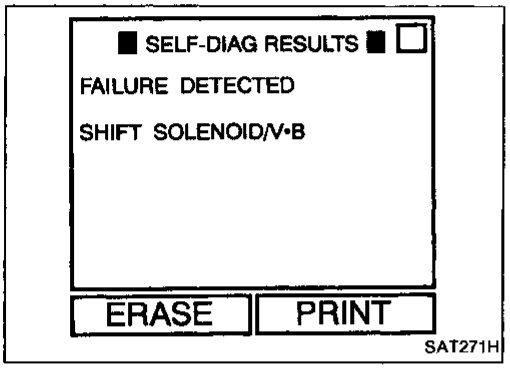
OK ↓

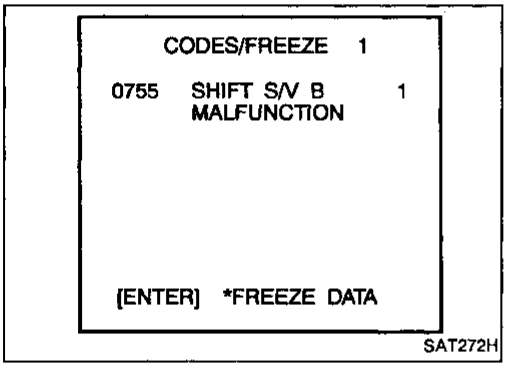
INSPECTION END

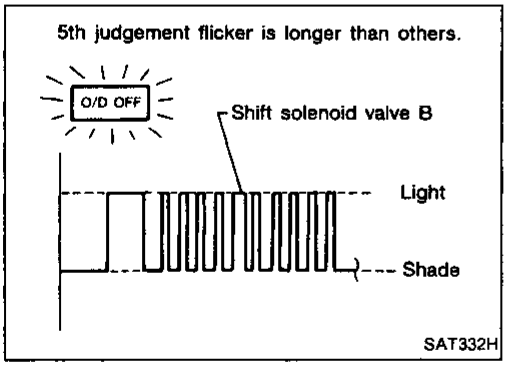
Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK









Parts description

Shift solenoid valves A and B are turned ON or OFF by the A/T control unit in response to signals sent from the inhibitor switch, vehicle speed and throttle position sensors. Gears will then be shifted to the optimum position.

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

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
SHIFT SOLENOID/V·B (P0755) 5th judgement flicker	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or short.) • Shift solenoid valve B

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3$ position.

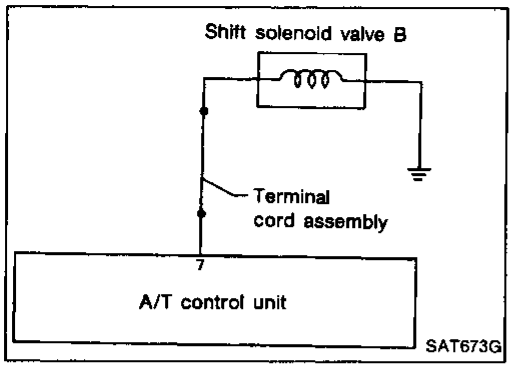
OR

1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3$ position.
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3$ position.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)

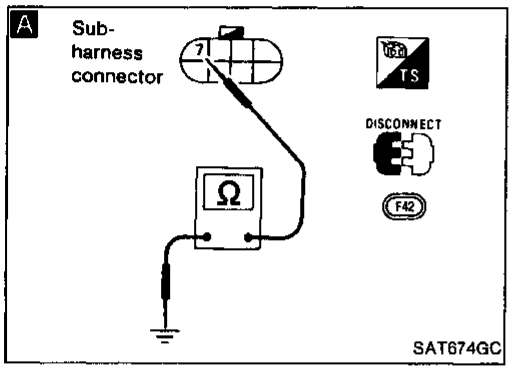


A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
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. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Shift solenoid valve B — Refer to "Electrical Components Inspection", AT-104.
- Harness continuity of terminal cord assembly

OK ↓

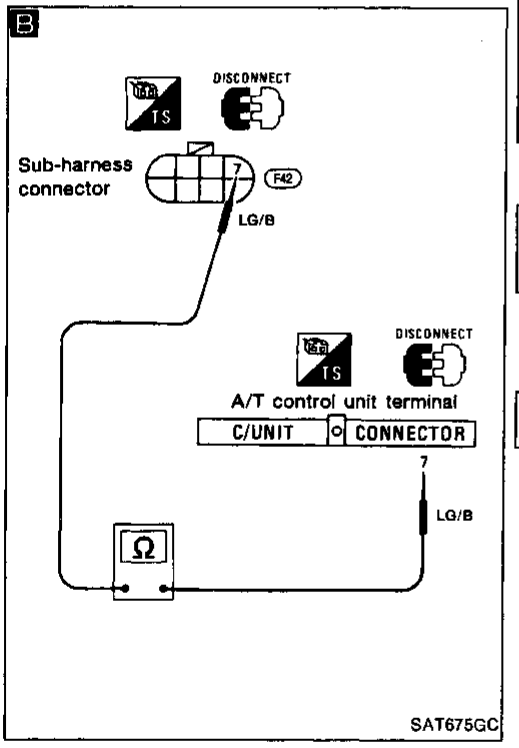


B

CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
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 after driving for a while.

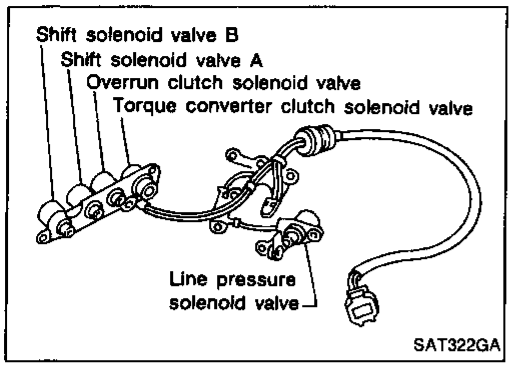
NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

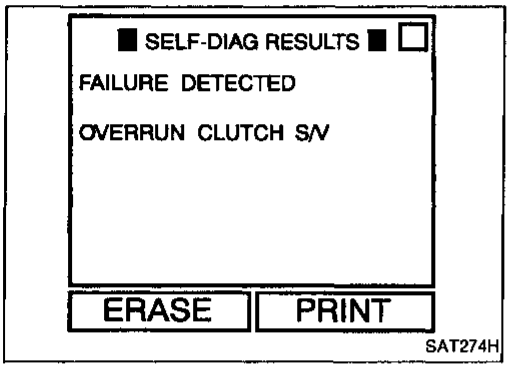
OK ↓

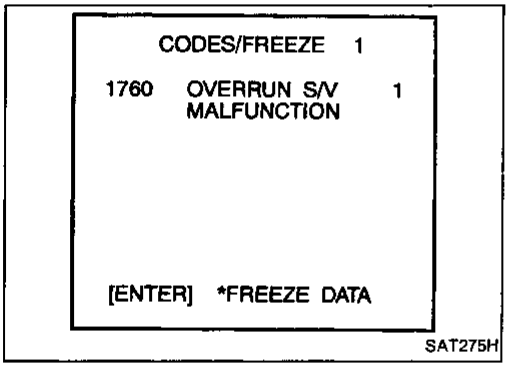
INSPECTION END

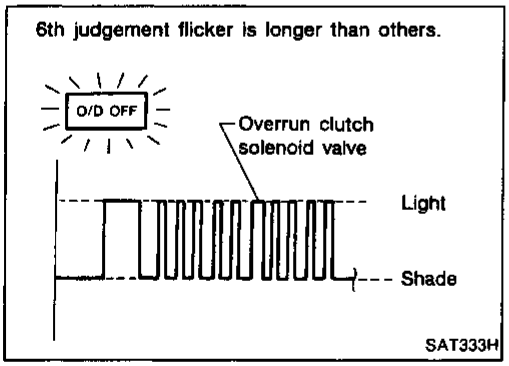
Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK









Parts description

The overrun clutch solenoid valve is activated by the A/T control unit in response to signals sent from the inhibitor switch, OD switch, vehicle speed and throttle position sensors. The overrun clutch operation will then be controlled.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
OVERRUN CLUTCH S/V P1760 6th judgement flicker	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or short.) • Overrun clutch solenoid valve

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).

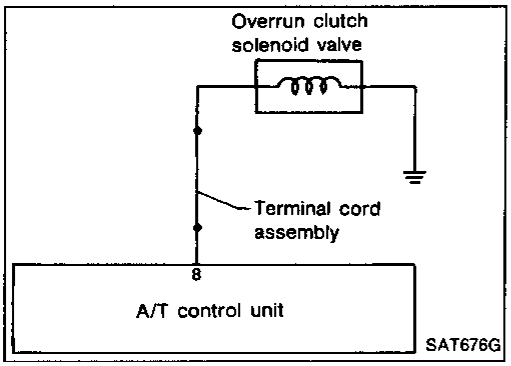
OR

1) Start engine.
2) Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
3) Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)

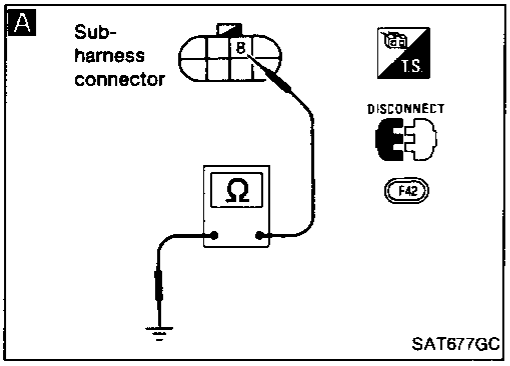


A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
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. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Overrun clutch solenoid valve. — Refer to "Electrical Components Inspection", AT-104.
- Harness continuity of terminal cord assembly

OK ↓



B

CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
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)

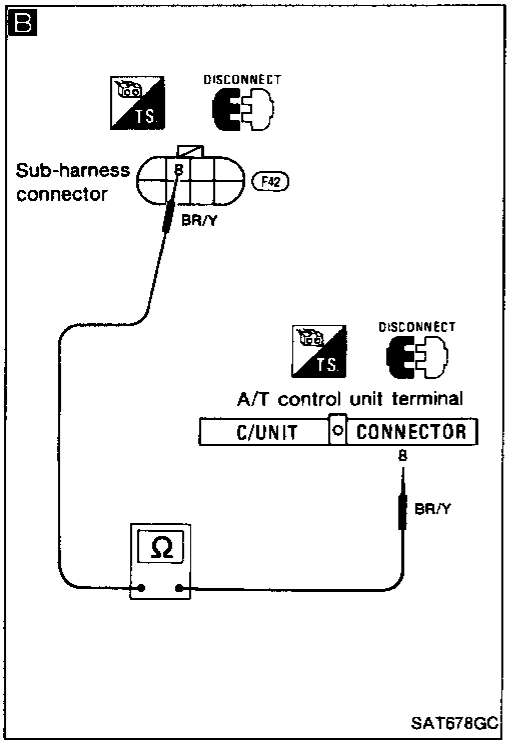
OK ↓

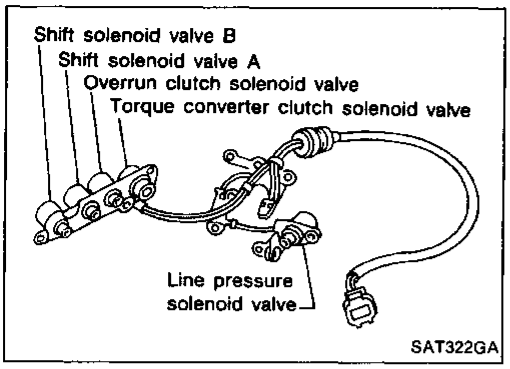
Perform self-diagnosis after driving for a while.

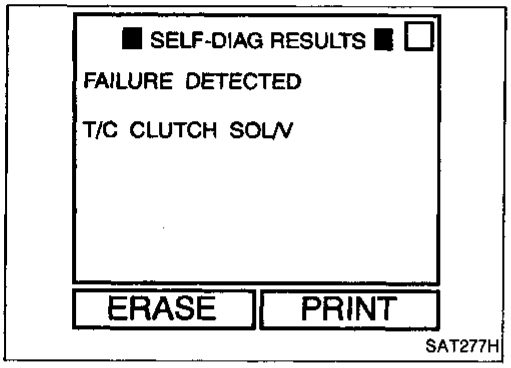
NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

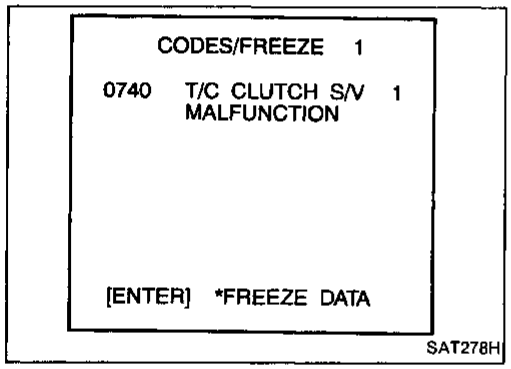
OK ↓

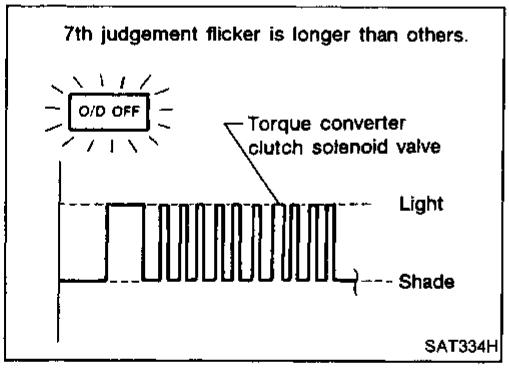
INSPECTION END











Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK

Parts description

The torque converter clutch solenoid valve is activated, with the gear in D_4, by the A/T control unit in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled.
Lock-up operation, however, is prohibited when ATF temperature is too low.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
T/C CLUTCH SOL/V P0740 7th judgement flicker	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or short.) • T/C clutch solenoid valve

Diagnostic trouble code detecting condition

1) Turn ignition switch "ON".
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up position.

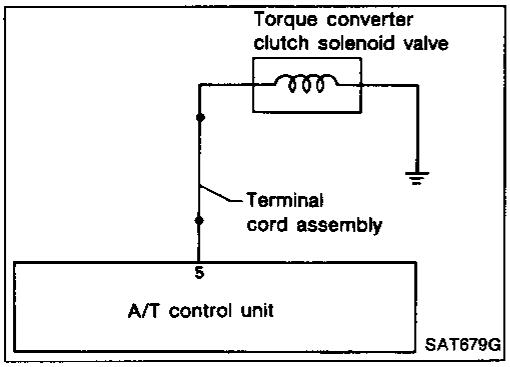
OR

1) Turn ignition switch "ON".
2) Select "MODE 3" with GST.
3) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up position.

OR

1) Turn ignition switch "ON".
2) Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.
3) Drive vehicle in $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up position.

Self-diagnosis (Cont'd)



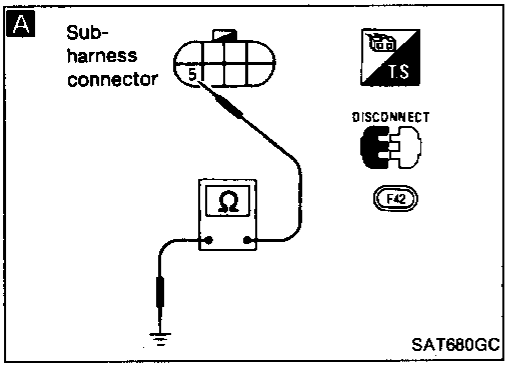
A

CHECK GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑤ and ground.
   Resistance: 10 - 16Ω

NG →
1. Remove oil pan. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Torque converter clutch solenoid valve — Refer to "Electrical Components Inspection", AT-104.
- Harness continuity of terminal cord assembly

OK ↓



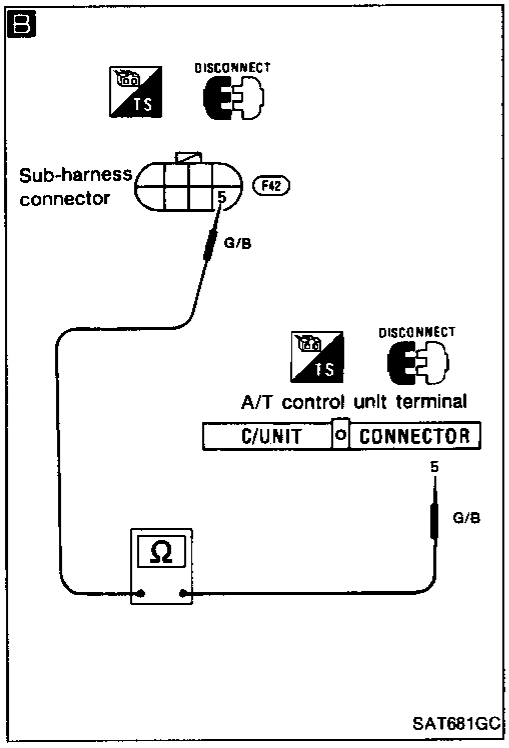
B

CHECK POWER SOURCE CIRCUIT.

1. Turn ignition switch to "OFF" position.
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 after driving for a while.

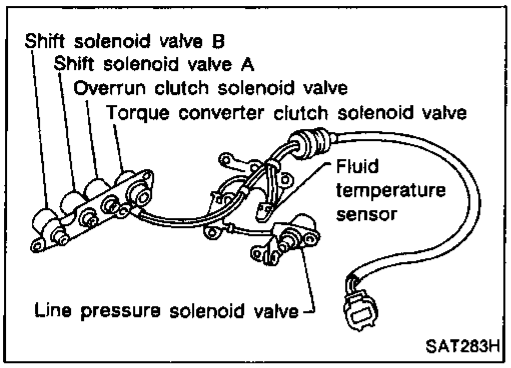
NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

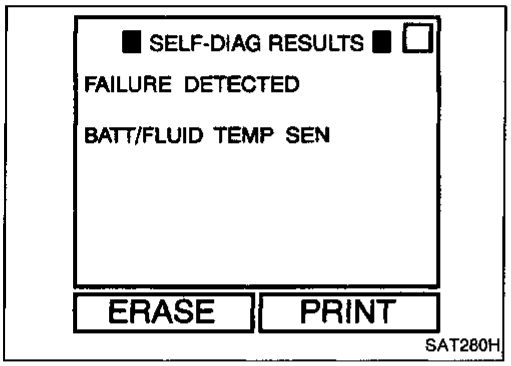
OK ↓

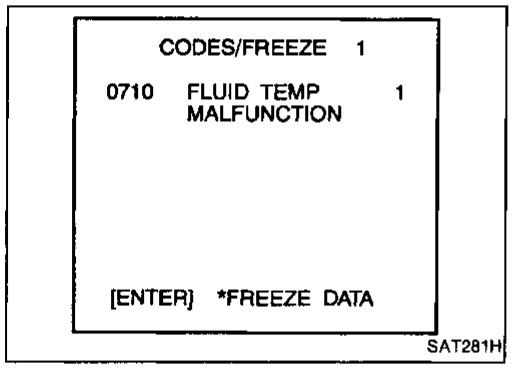
INSPECTION END

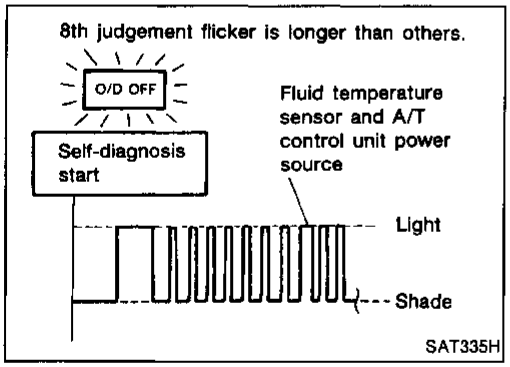
Self-diagnosis (Cont'd)

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









Parts description

The fluid temperature sensor detects the ATF temperature and sends a signal to the A/T control unit.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
BATT/FLUID TEMP P0710 8th judgement flicker	• A/T control unit receives an excessively low or high voltage from the sensor.	• Harness or connectors (The sensor circuit is open or short.) • Fluid temperature sensor

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.

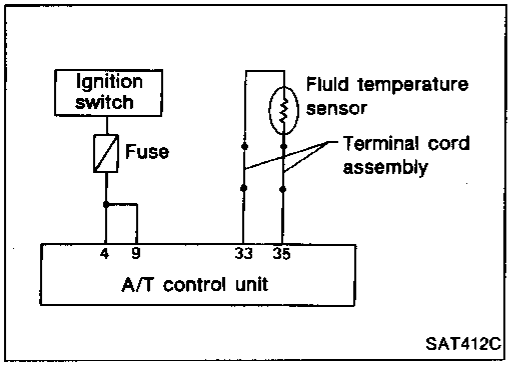
OR

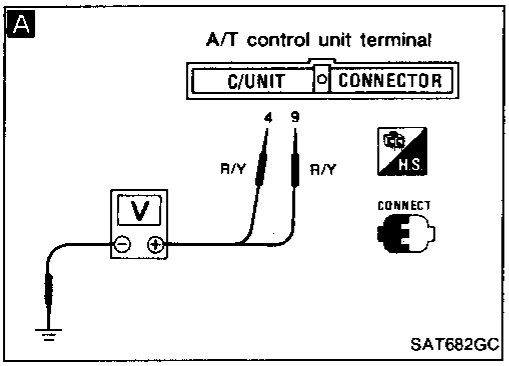
1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
3) Select "MODE 3" with GST.

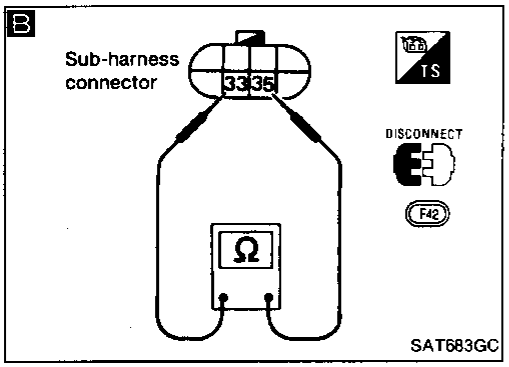
OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)







A

CHECK A/T CONTROL UNIT POWER SOURCE.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.
   Battery 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 section EL.

OK ↓

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

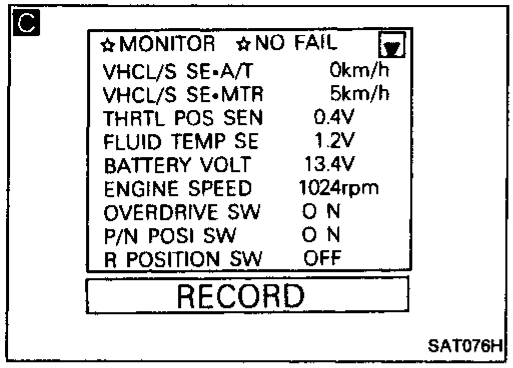
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ㉝ and ㉟ when A/T is cold.
   Resistance:
   Cold [20°C (68°F)]
   Approximately 2.5 kΩ
4. Reinstall any part removed.

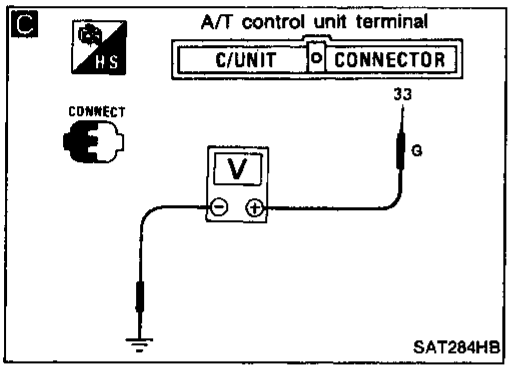
NG → 1. Remove oil pan.
2. Check the following items.
- Fluid temperature sensor — Refer to "Electrical Components Inspection", AT-104.
- Harness continuity of terminal cord assembly

OK ↓

Ⓐ

Self-diagnosis (Cont'd)





Ⓐ

CHECK INPUT SIGNAL OF FLUID TEMPERATURE SENSOR.

1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "FLUID TEMP SE".

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)

OR

1. Start engine.
2. 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

OK

Perform self-diagnosis after driving for a while.

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

OK

INSPECTION END

Self-diagnosis (Cont'd)

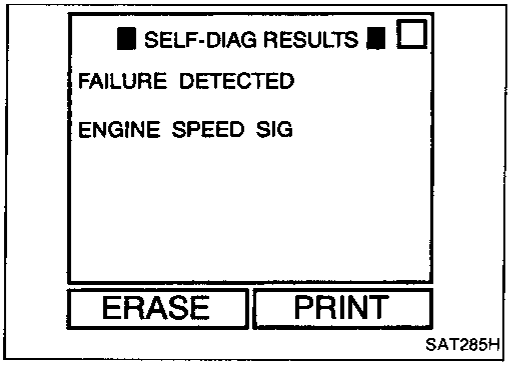
ENGINE SPEED SIGNAL CIRCUIT CHECK

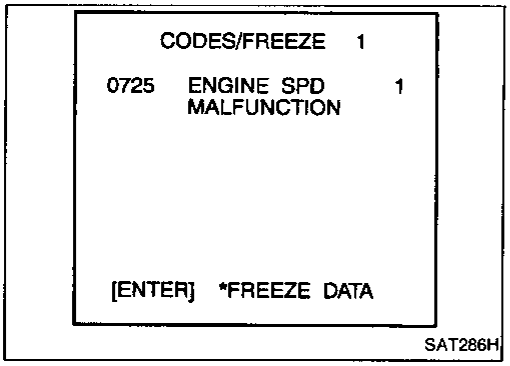
Parts description

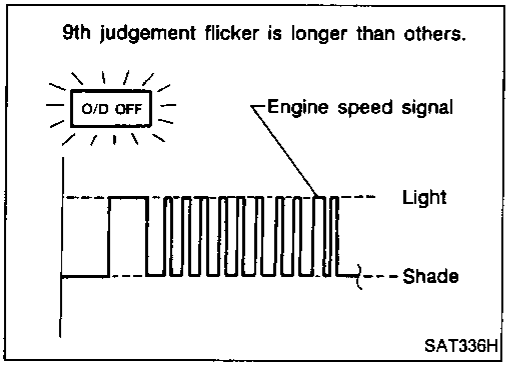
The engine speed signal is sent from the ECM to the A/T control unit.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
ENGINE SPEED SIG P0725 9th judgement flicker	• A/T control unit does not receive the proper voltage signal from ECM.	• Harness or connectors (The sensor circuit is open or short.)







Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.

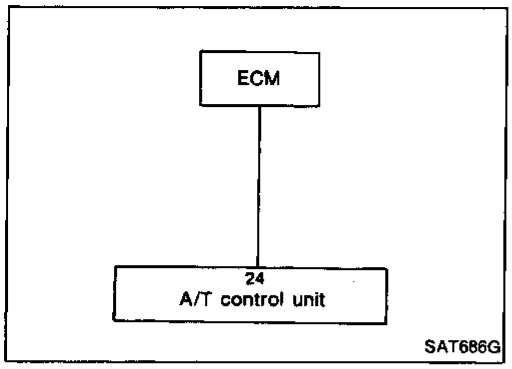
OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)



Perform diagnostic test mode II (self-diagnostic results) for engine control. Check ignition signal circuit condition.

NG → Check ignition signal circuit for engine control. — Refer to section EC.

OK

A

CHECK INPUT SIGNAL.

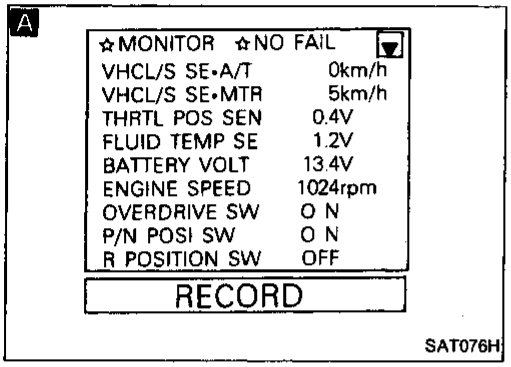
1. Start engine.
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out the value of "ENGINE SPEED". Check engine speed changes according to throttle position.

NG → Check the following items.
- Harness continuity between A/T control unit and ignition coil.
- Resistor
- Ignition coil — Refer to section EC.

OR

1. Start engine.
2. Check voltage between A/T control unit terminal ㉔ and ground.

Voltage: 0.9 - 4.5V



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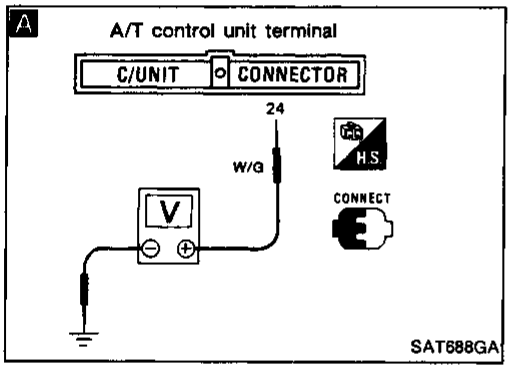


Perform self-diagnosis again after driving for a while.

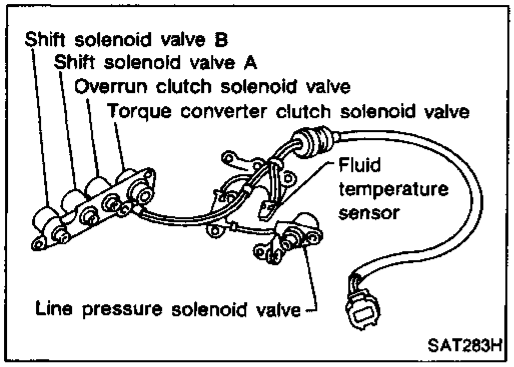
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

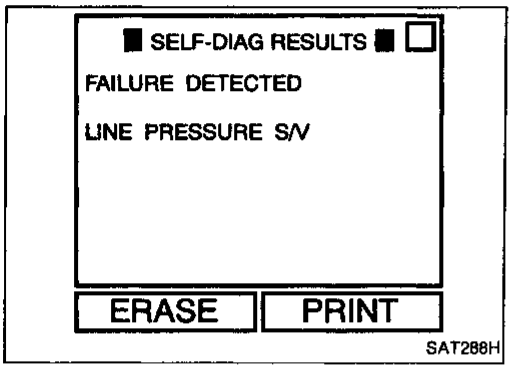
OK

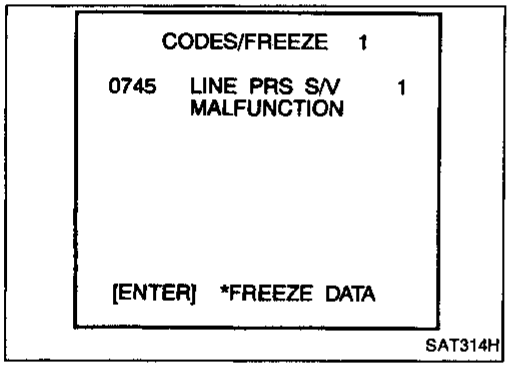
INSPECTION END

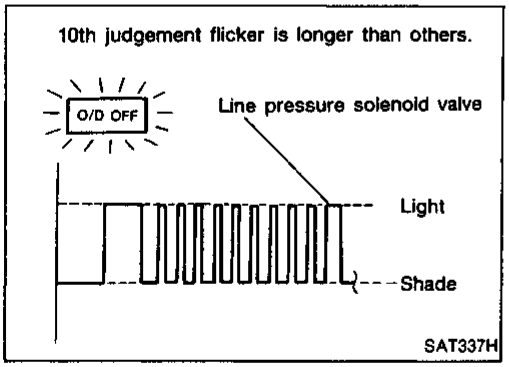
Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK









Parts description

The line pressure solenoid valve regulates the oil pump discharge pressure to suit the driving condition in response to a signal sent from the A/T control unit.

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
LINE PRESSURE S/V P0745 10th judgement flicker	• A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	• Harness or connectors (The solenoid circuit is open or short.) • Line pressure solenoid valve

Diagnostic trouble code detecting condition

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) With brake pedal depressed, shift the lever from P → N → D → N → P.

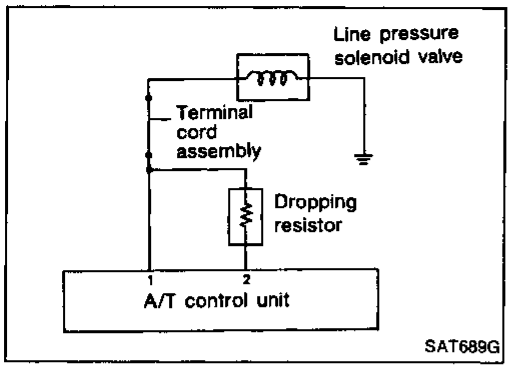
OR

1) Start engine.
2) With brake pedal depressed, shift the lever from P → N → D → N → P.
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) With brake pedal depressed, shift the lever from P → N → D → N → P.
3) Perform self-diagnosis.
   Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-46.

Self-diagnosis (Cont'd)

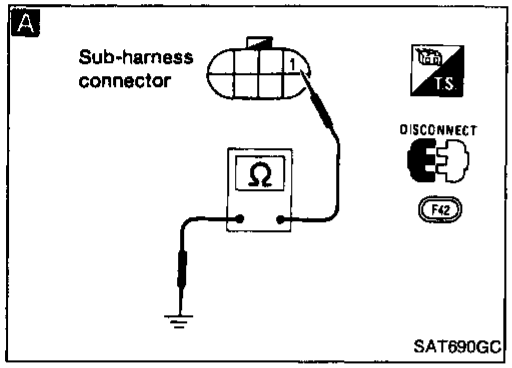


A

CHECK GROUND CIRCUIT.
1. Turn ignition switch to "OFF" position.
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. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Line pressure solenoid valve — Refer to "Electrical Components Inspection".
- Harness continuity of terminal cord assembly

OK ↓

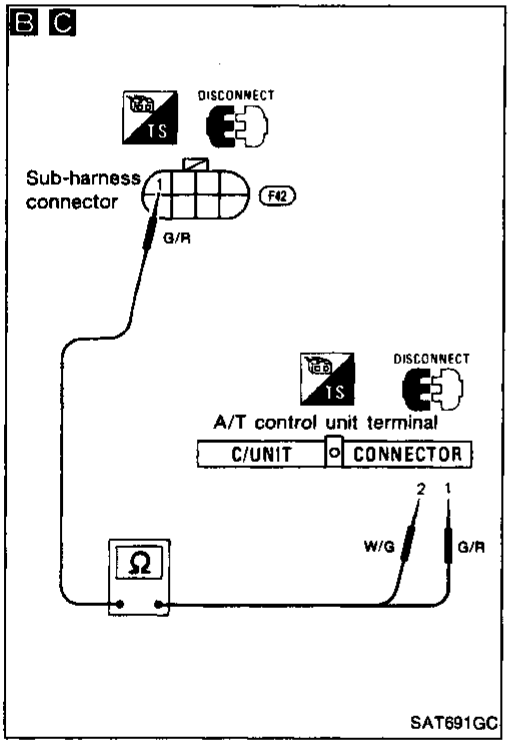


B

CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
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 — Refer to "Electrical Components Inspection", AT-106.
- Harness continuity between A/T control unit ② and terminal cord assembly (Main harness)

OK ↓



C

CHECK POWER SOURCE CIRCUIT.
1. Turn ignition switch to "OFF" position.
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 after driving for a while.

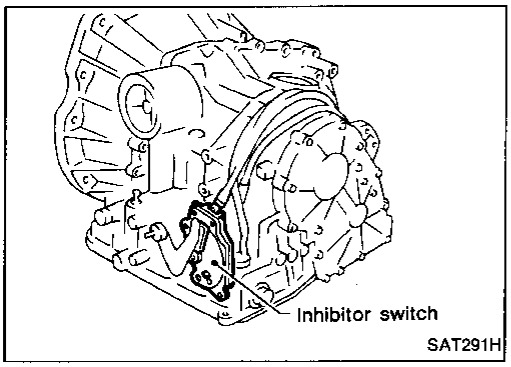
NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

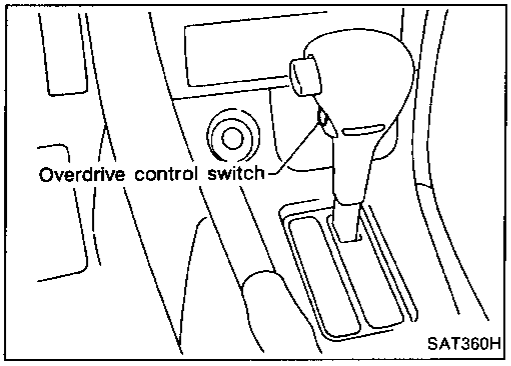
INSPECTION END

Self-diagnosis (Cont'd)

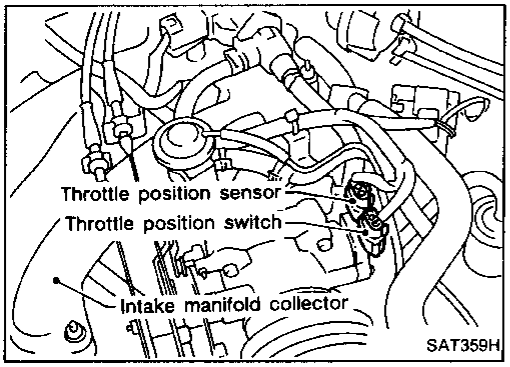
INHIBITOR, OVERDRIVE AND THROTTLE POSITION SWITCH CIRCUIT CHECKS



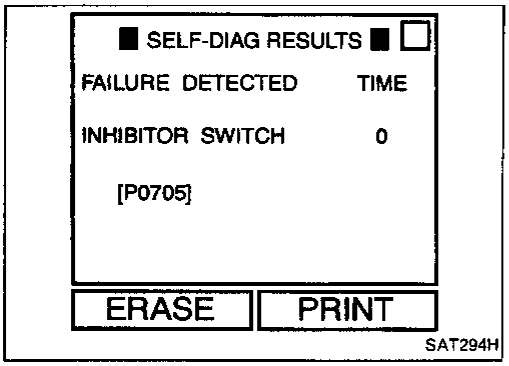
SAT291H



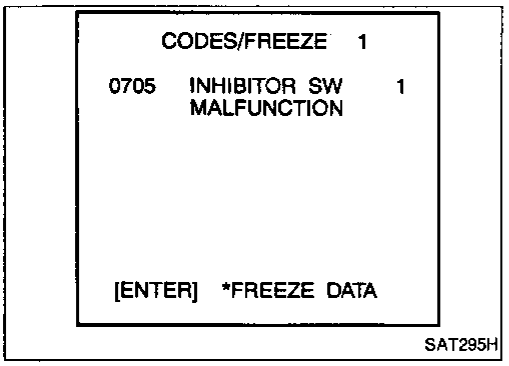
SAT360H



SAT359H



SAT294H



SAT295H

Parts description

Inhibitor switch
Detects the selector lever position and sends a signal to the A/T control unit.
Overdrive switch
Detects the overdrive switch position (ON or OFF) and sends a signal to the A/T control unit.
Throttle position switch
Consists of a wide-open throttle position switch and a closed throttle position switch.
The wide-open position switch sends a signal to the A/T control unit when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the A/T control unit when the throttle valve is fully closed.

Overall function check

1) Start engine.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Drive vehicle under the following conditions:
   Shift lever in D, OD control switch in "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.

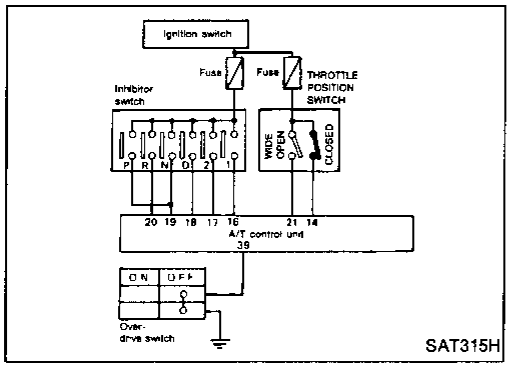
OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, OD control switch in "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
3) Select "MODE 3" with GST.

OR

1) Start engine.
2) Drive vehicle under the following conditions:
   Shift lever in D, OD control switch in "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
3) Perform self-diagnosis for ECM.
   Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode-II (Self-diagnostic results).

Self-diagnosis (Cont'd)



SAT315H

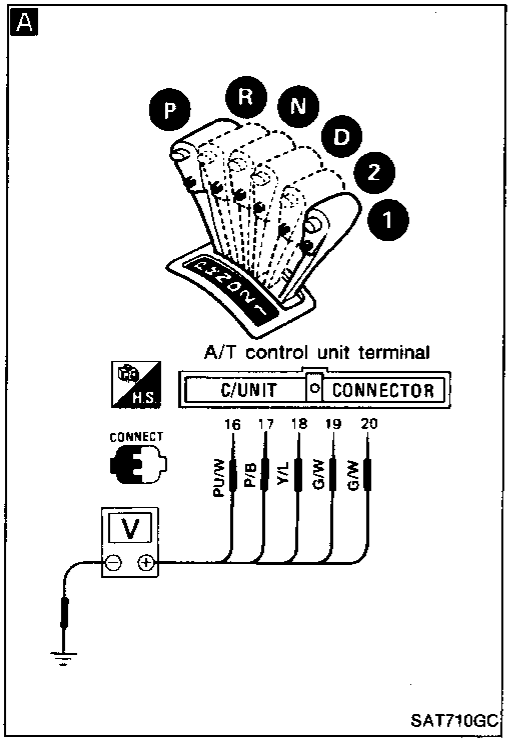
A

☆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	O N
P/N POSI SW	O N
R POSITION SW	OFF

RECORD

SAT076H

A



SAT710GC

A

CHECK INHIBITOR SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out "R, N, D, 1 and 2 position switches" moving selector lever to each position.
   Check the signal of the selector lever position is indicated properly.

NG → Check the following items.
- Inhibitor switch — Refer to "Electrical Components Inspection", AT-105.
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

OR

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. 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 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**

OK → Ⓐ

Self-diagnosis (Cont'd)

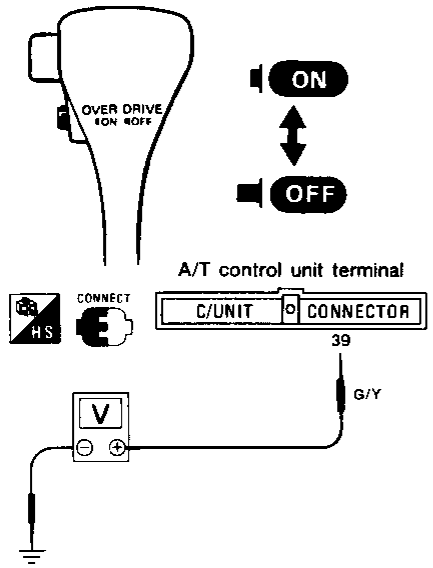
B

☆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	O N
P/N POSI SW	O N
R POSITION SW	OFF

RECORD

SAT076H

B



SAT340HB

Ⓐ

B

CHECK OVERDRIVE SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out "OVERDRIVE SWITCH".
   Check the signal of the overdrive switch is indicated properly.
   (Overdrive switch "ON" displayed on CONSULT means overdrive "OFF".)

OR

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Check voltage between A/T control unit terminal ㊴ and ground when overdrive switch is "ON" and "OFF".

Switch position	Voltage
ON	Battery voltage
OFF	1V or less

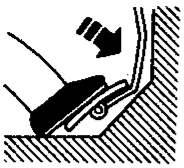
NG → Check the following items.
- Overdrive switch — Refer to "Electrical Components Inspection", AT-105.
- Harness continuity between A/T control unit and overdrive switch (Main harness)
- Harness continuity of ground circuit for overdrive switch (Main harness)

OK

Ⓑ

Self-diagnosis (Cont'd)

C D



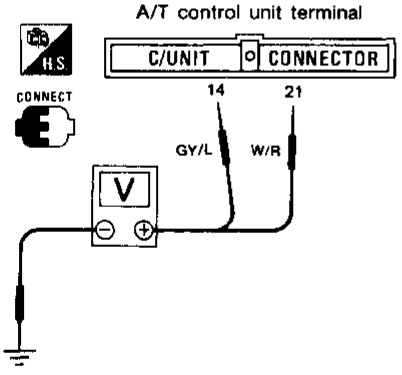
☆MONITOR	☆NO FAIL
D POSITION SW	OFF
2 POSITION SW	OFF
1 POSITION SW	OFF
ASCD•CRUISE	OFF
ASCD•OD CUT	OFF
KICKDOWN SW	OFF
POWERSHIFT SW	OFF
CLOSED THL/SW	O N
W/O THRL/P-SW	OFF

RECORD

SAT714G

C D

A/T control unit terminal



SAT715GC

Ⓑ

C

CHECK WIDE OPEN THROTTLE POSITION SWITCH CIRCUIT.

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out "W/O THRL/P-SW" depressing accelerator pedal fully.
   Check the signal of wide open throttle position switch is indicated properly.

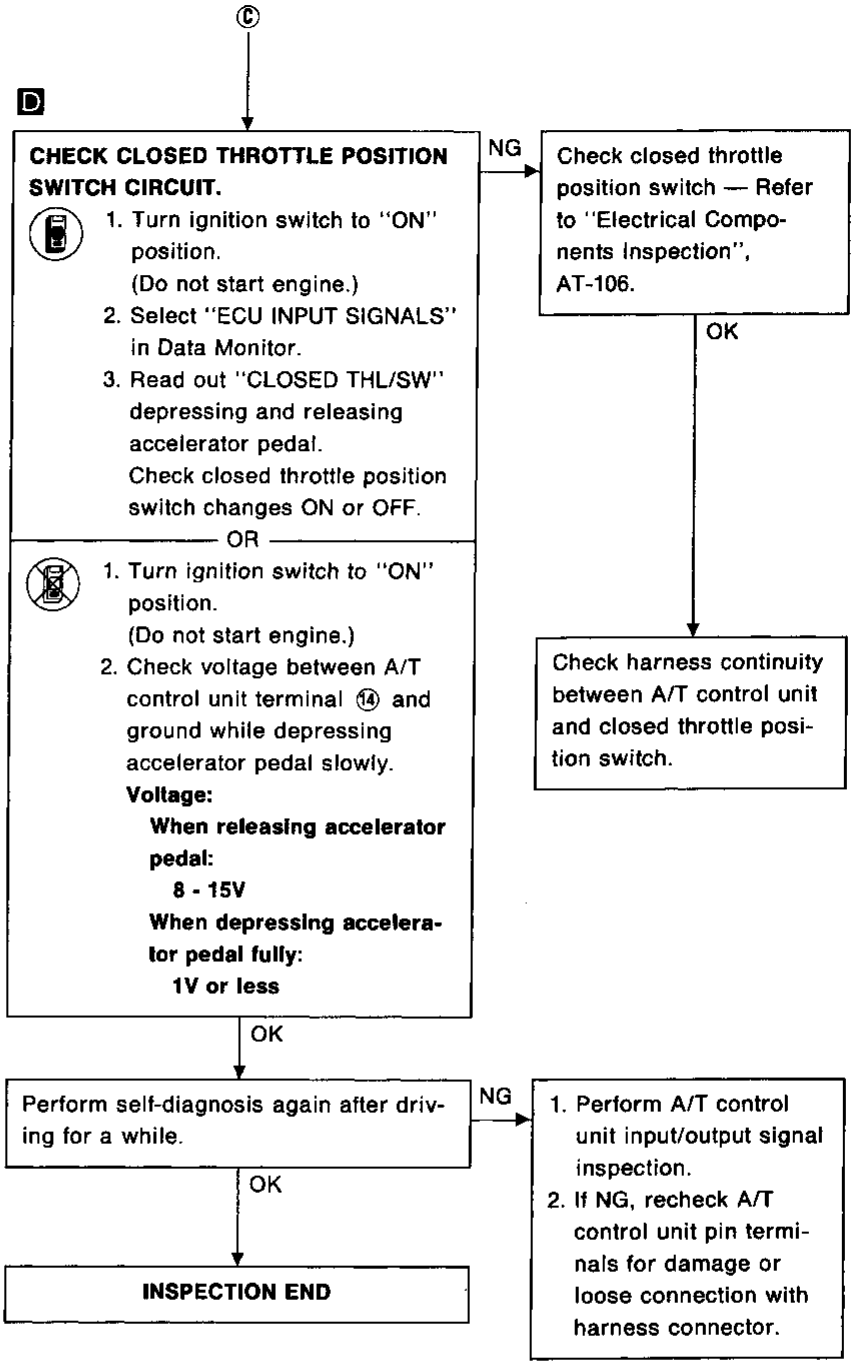
NG → Check harness continuity between A/T control unit and wide open throttle position switch — Refer to "Electrical Components Inspection", AT-106.

OR

1. Turn ignition switch to "ON" position.
   (Do not start engine.)
2. 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

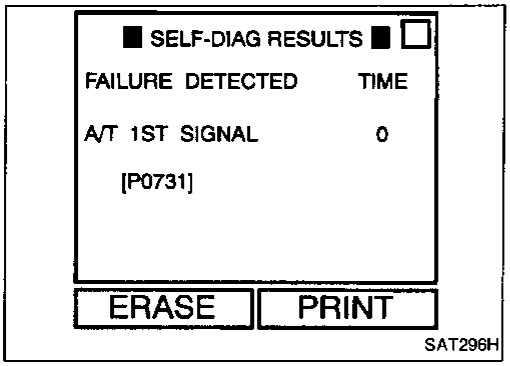
OK → Ⓒ

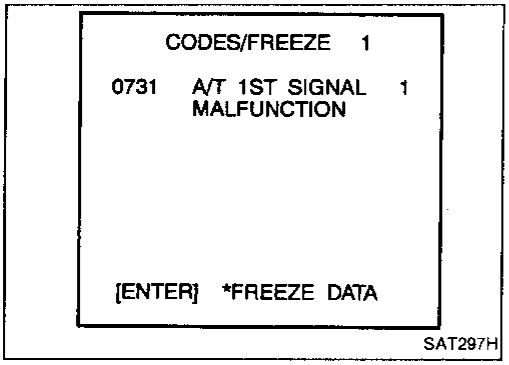
Self-diagnosis (Cont'd)

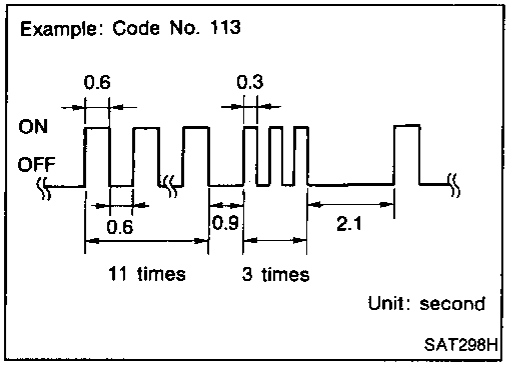


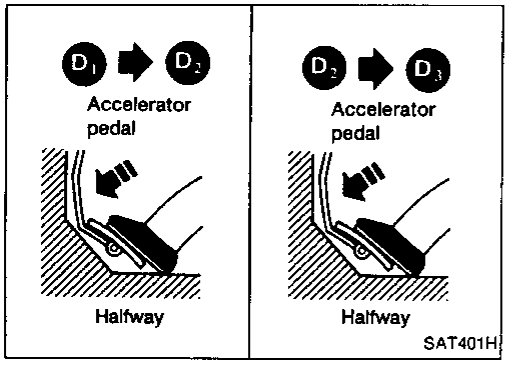
Self-diagnosis (Cont'd)

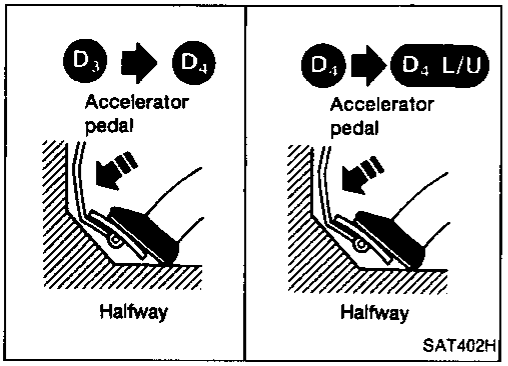
IMPROPER SHIFTING TO 1ST GEAR POSITION











Description

- This is a "failure" item indicated by the MIL.
- This is indicated when the vehicle is being driven at any gear position other than 1st while the A/T control unit is instructing the A/T to shift the gear in the 1st position.
- The detected item, "A/T 1ST SIGNAL", is not determined as a fault unless the A/T control unit self-diagnosis system is in the "No Failure" condition. When "A/T 1ST SIGNAL" is displayed, it indicates that the gears are not properly shifted. The problem is not caused by electrical failure of the A/T (circuits open or shorted) but by mechanical failure (control valve sticking, improper solenoid valve operation, etc.).

Overall function check

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.

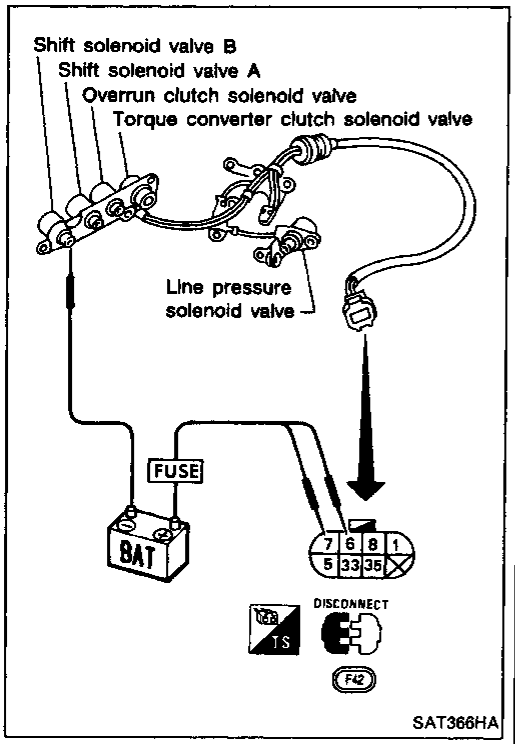
OR

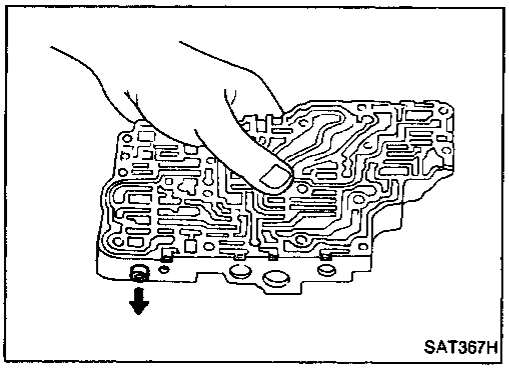
1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Select "MODE 3" with GST.

OR

1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Perform self-diagnosis for ECM.
Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).

Self-diagnosis (Cont'd)





CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check shift solenoid valve operation.
   - Shift solenoid valve A
   - Shift solenoid valve B

   Refer to "Electrical Components Inspection", AT-104.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS — Control Valve Assembly —", AT-153.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK ↓

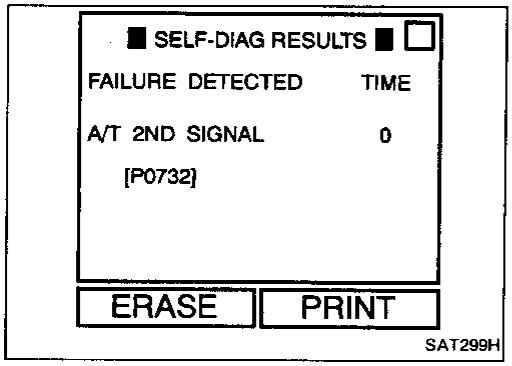
Check again.

OK ↓

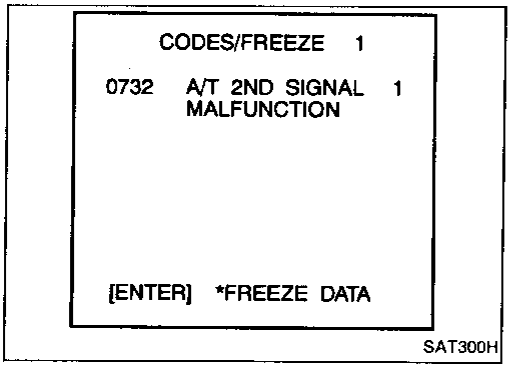
INSPECTION END

Self-diagnosis (Cont'd)

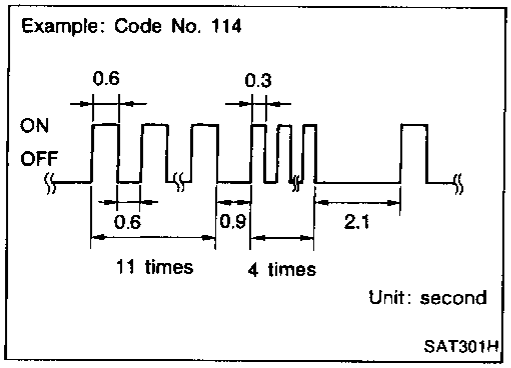
IMPROPER SHIFTING TO 2ND GEAR POSITION



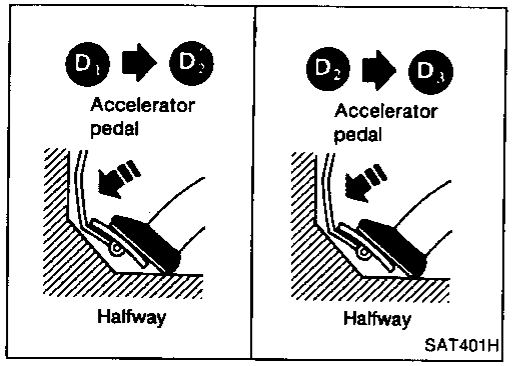
SAT299H



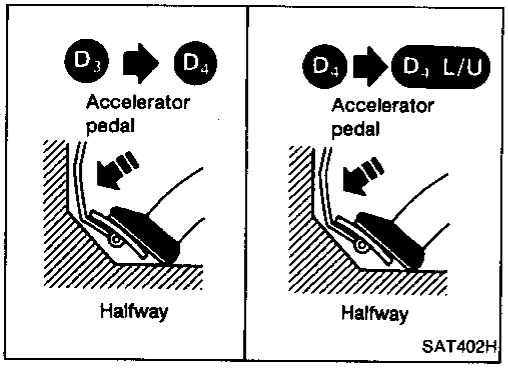
SAT300H



SAT301H



SAT401H



SAT402H

Description

- This is a "failure" item indicated by the MIL.
- This is indicated when the vehicle is being driven at any gear position other than 2nd while the A/T control unit is instructing the A/T to shift the gear in the 2nd position.
- The detected item, "A/T 2ND SIGNAL", is not determined as a fault unless the A/T control unit self-diagnosis is in the "No Failure" condition. When "A/T 2ND SIGNAL" is displayed, it indicates that the gears are not properly shifted. The problem is not caused by electrical failure of the A/T (circuits open or shorted) but by mechanical failure (control valve sticking, improper solenoid valve operation, etc.).

Overall function check

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.

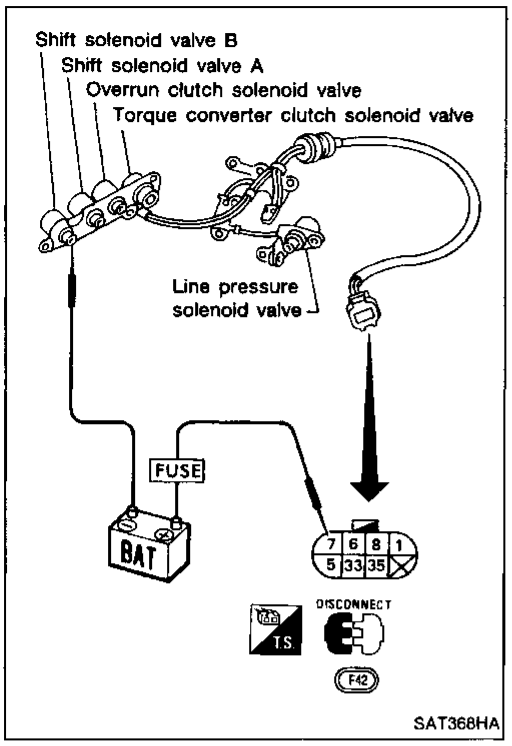
OR

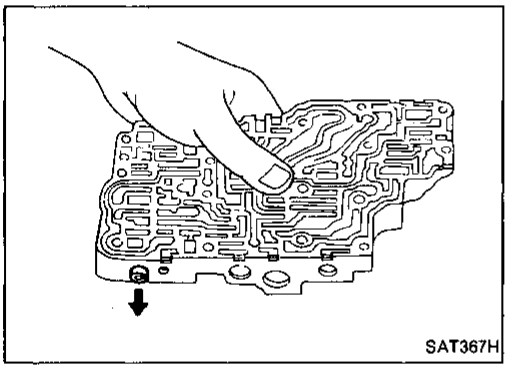
1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Select "MODE 3" with GST.

OR

1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Perform self-diagnosis for ECM.
Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).

Self-diagnosis (Cont'd)





CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check shift solenoid valve operation.
   - Shift solenoid valve B

   Refer to "Electrical Components Inspection", AT-104.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS — Control Valve Assembly —", AT-153.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK ↓

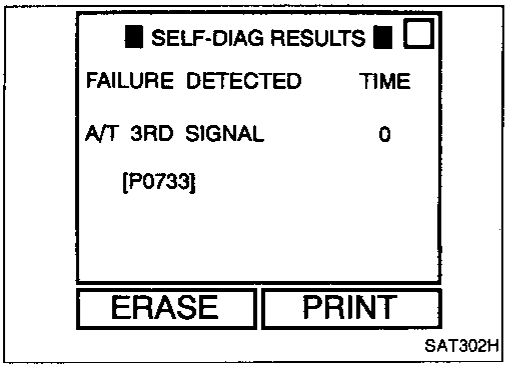
Check again.

OK ↓

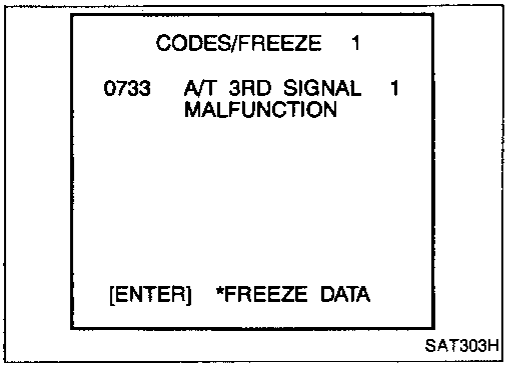
INSPECTION END

Self-diagnosis (Cont'd)

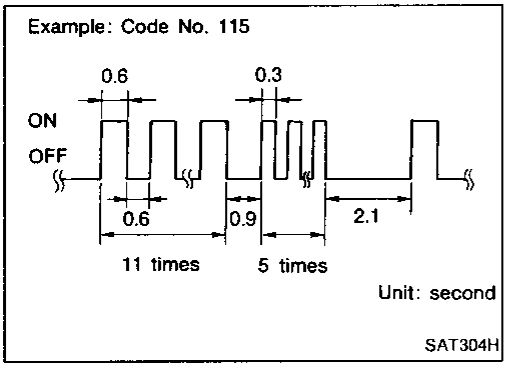
IMPROPER SHIFTING TO 3RD GEAR POSITION



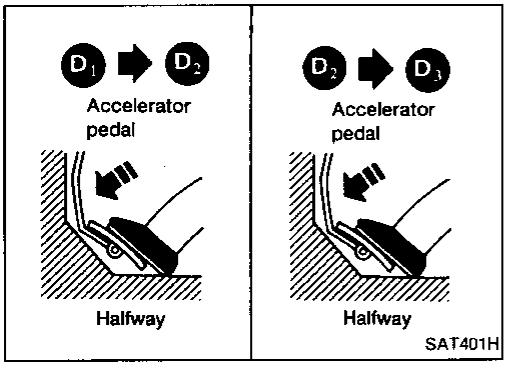
SAT302H



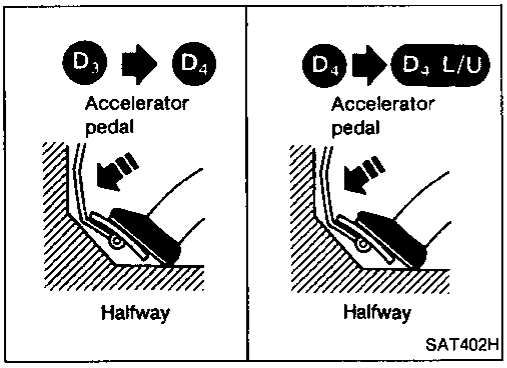
SAT303H



SAT304H



SAT401H



SAT402H

Description

- This is a "failure" item indicated by the MIL.
- This is indicated when the vehicle is being driven at any gear position other than 3rd while the A/T control unit is instructing the A/T to shift the gear in the 3rd position.
- The detected item, "A/T 3RD SIGNAL", is not determined as a fault unless the A/T control unit self-diagnosis system is in the "No Failure" condition. When "A/T 3RD SIGNAL" is displayed, it indicates that the gears are not properly shifted. The problem is not caused by electrical failure of the A/T (circuits open or shorted) but by mechanical failure (control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.).

Overall function check

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.

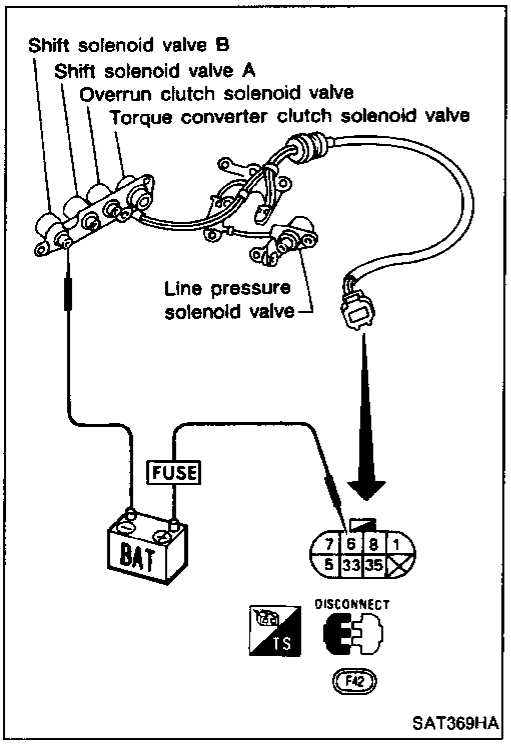
OR

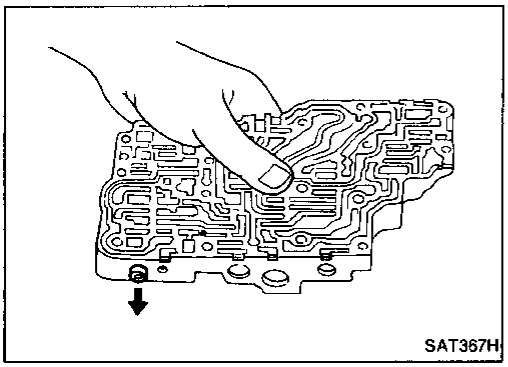
1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Select "MODE 3" with GST.

OR

1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Perform self-diagnosis for ECM.
Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).

Self-diagnosis (Cont'd)





CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check shift solenoid valve operation.
   - Shift solenoid valve A

   Refer to "Electrical Components Inspection", AT-104.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS — Control Valve Assembly —", AT-153.
2. Check to ensure that:
   - Valve, sleeve and plug slide along valve bore under their own weight.
   - Valve, sleeve and plug are free from burrs, dents and scratches.
   - Control valve springs are free from damage, deformation and fatigue.
   - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

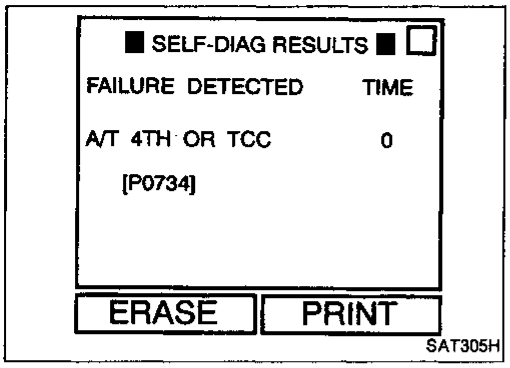
OK ↓

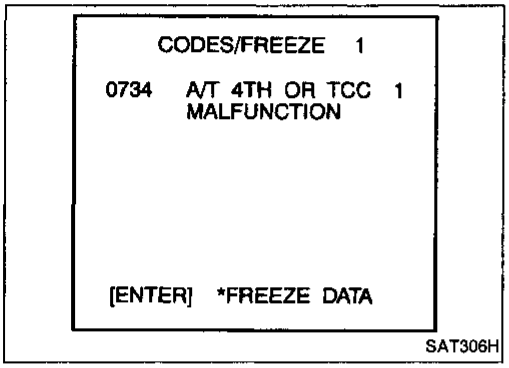
Check again.

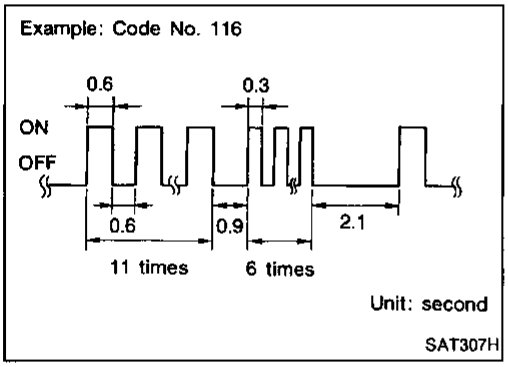
OK ↓

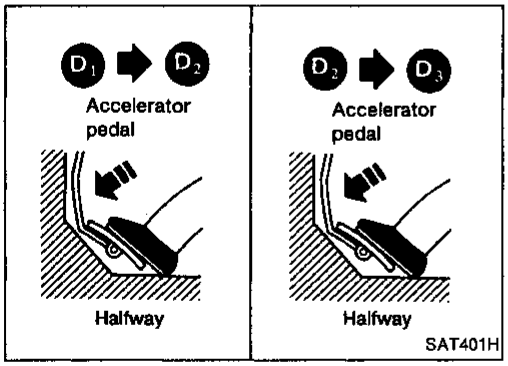
INSPECTION END

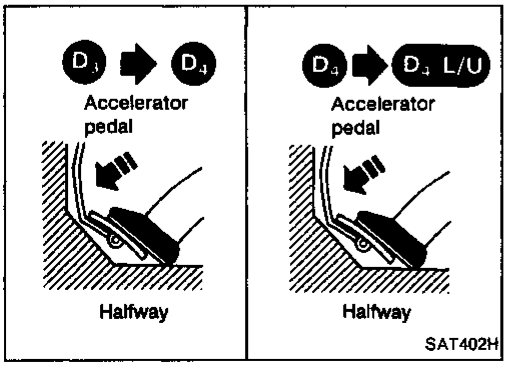
Self-diagnosis (Cont'd)











IMPROPER SHIFTING TO 4TH GEAR POSITION OR IMPROPER TORQUE CONVERTER CLUTCH OPERATION

Description

- This is a "failure" item indicated by the MIL.
- This is indicated when the vehicle is being driven at any gear position other than 4th while the A/T control unit is instructing the A/T to shift the gear in the 4th position. Also, this is indicated when the vehicle is being driven without the torque converter clutch locked up while the A/T control unit is instructing the A/T to lock up the torque converter clutch.
- The detected item, "A/T 4TH OR TCC", is not determined as a fault unless the A/T control unit self-diagnosis system is in the "No Failure" condition. When "A/T 4TH OR TCC" is displayed, it indicates that the gears are not properly shifted. The problem is not caused by electrical failure of the A/T (circuits open or shorted) but by mechanical failure (control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.).

Overall function check

1) Start engine and warm up ATF.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
3) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-36.

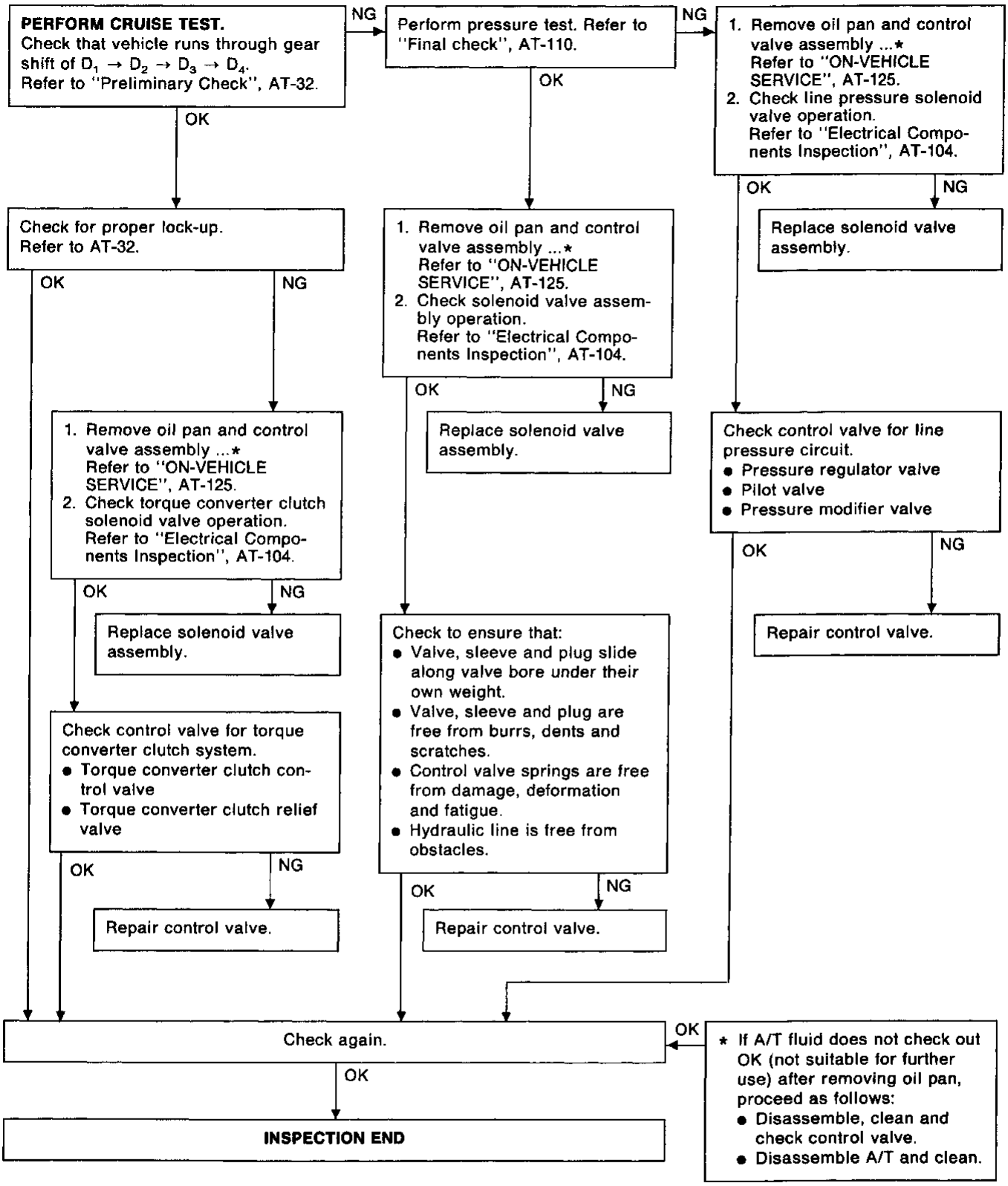
OR

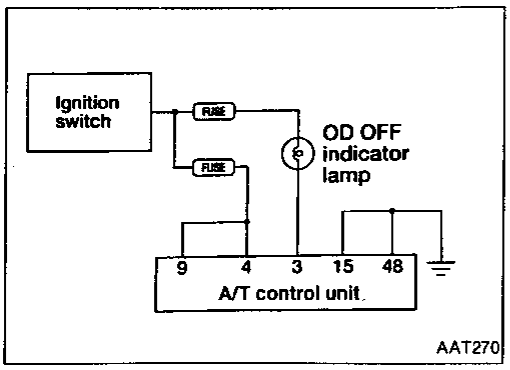
1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Select "MODE 3" with GST.

OR

1) Start engine and warm up ATF.
2) Start vehicle with shift lever in D and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-36.
3) Perform self-diagnosis for ECM.
Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).

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

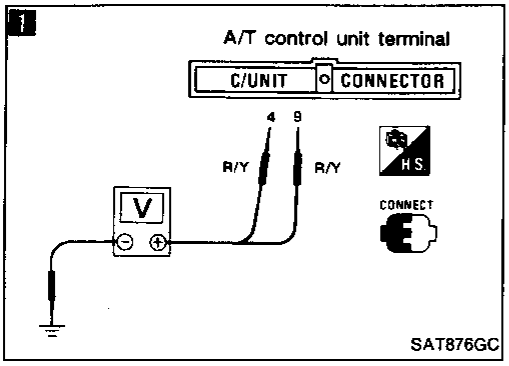
CHECK A/T CONTROL UNIT POWER SOURCE.

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ④, ⑨ and ground.

Battery 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 section EL.

OK ↓



2

CHECK A/T CONTROL UNIT GROUND CIRCUIT.

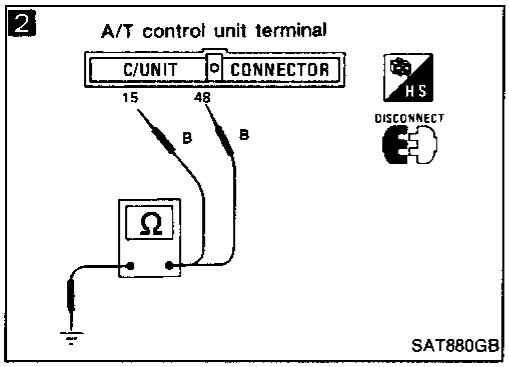
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between A/T control unit terminals ⑮, ㊽ and ground.

Resistance:

Approximately 0Ω

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

OK ↓



3

CHECK LAMP CIRCUIT.

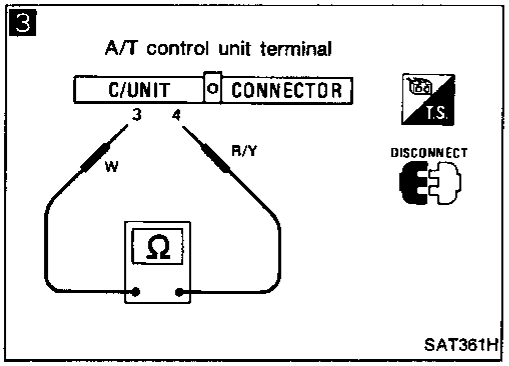
1. Turn ignition switch to "OFF" position.
2. Check resistance between A/T control unit terminals ③ and ④.

Resistance: 50 - 100Ω

3. Reinstall any part removed.

NG → Check the following items.
- OD OFF indicator lamp — Refer to section EL.
- 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 ↓

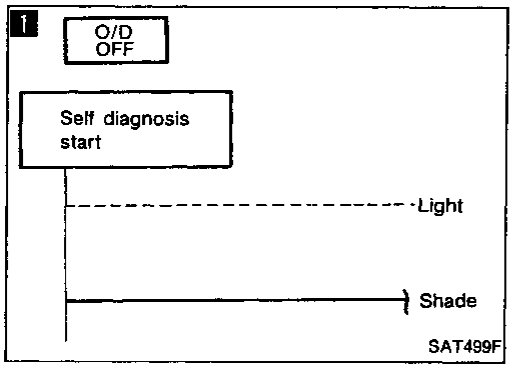


Check again.

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

OK ↓

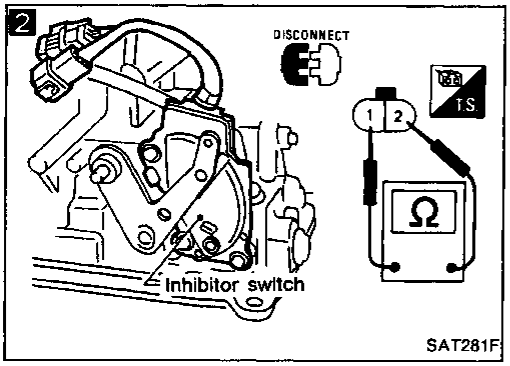
INSPECTION END



Diagnostic Procedure 2

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.



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

Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No

2

Check continuity of inhibitor switch 2-pin connector. — Refer to "Electrical Components Inspection", AT-105.

NG → Repair or replace inhibitor switch.

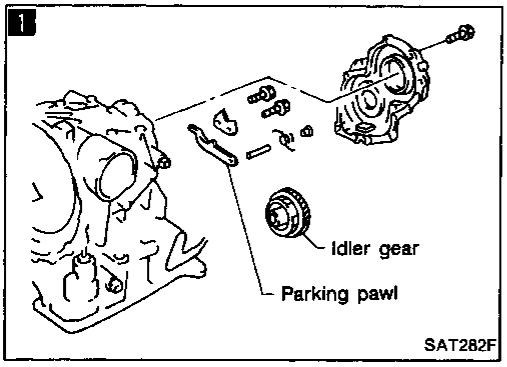
OK

Check starting system. — Refer to section EL.

NG → Repair or replace damaged parts.

OK

INSPECTION END



Diagnostic Procedure 3

SYMPTOM:

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

1

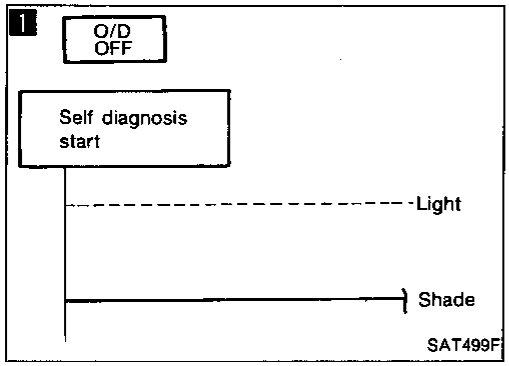
Check parking components. — Refer to "DISASSEMBLY" and "ASSEMBLY", AT-133.

NG → Repair or replace damaged parts.

OK

INSPECTION END

1



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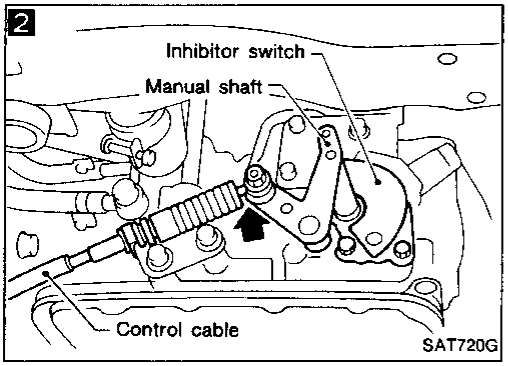

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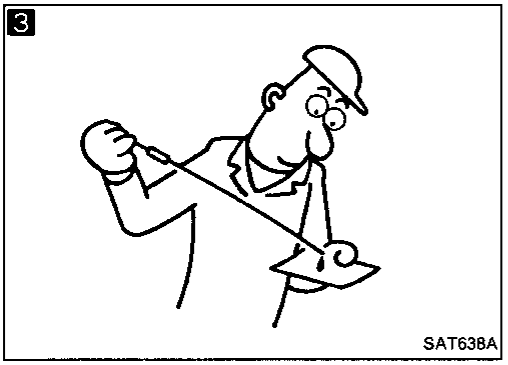

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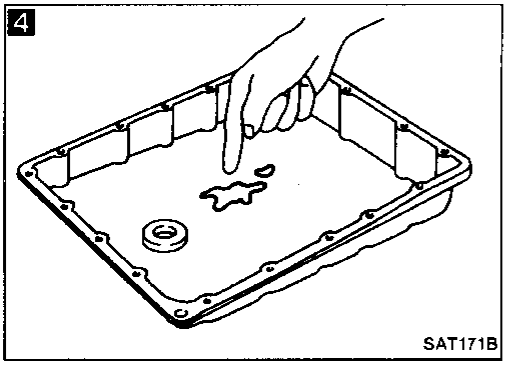


Diagnostic Procedure 4

SYMPTOM:

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

1

Does self-diagnosis show damage to inhibitor switch circuit?

No

Check control cable. — Refer to "ON-VEHICLE SERVICE", AT-127. — NG → 2 Adjust control cable. — Refer to "ON-VEHICLE SERVICE", AT-127.

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

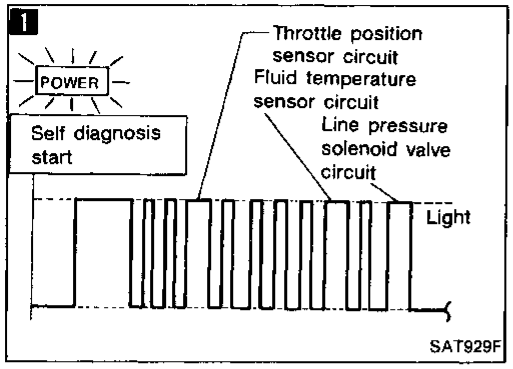
OK

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

OK

INSPECTION END

1



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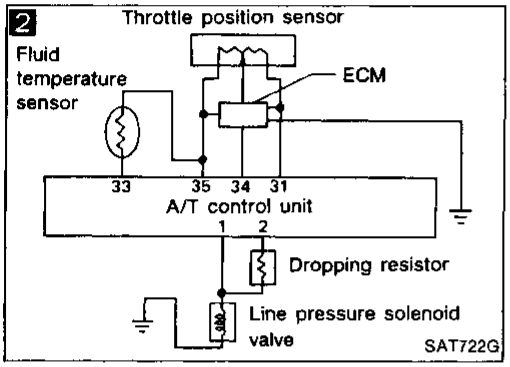
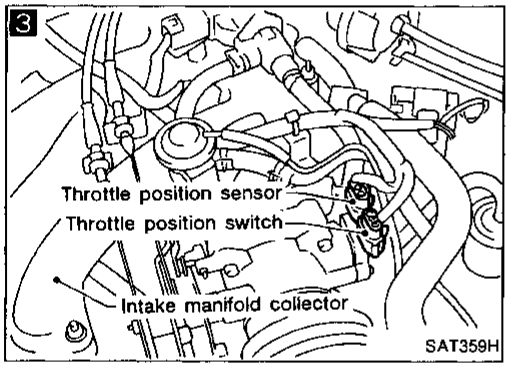
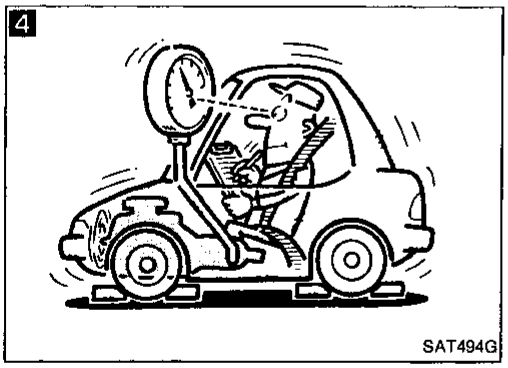


3



4



Diagnostic Procedure 5

SYMPTOM:

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

1

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

Yes → **2**

2

Check damaged circuit. — Refer to "Self-diagnosis", AT-55.

No ↓

3

Check throttle position sensor. — Refer to section EC.

NG → Repair or replace throttle position sensor.

OK ↓

4

Check line pressure at idle with selector lever in "D" position. — Refer to "PRESSURE TESTING", AT-110.

NG →

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
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 →

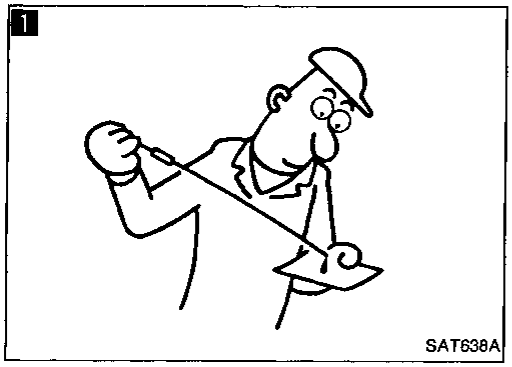
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

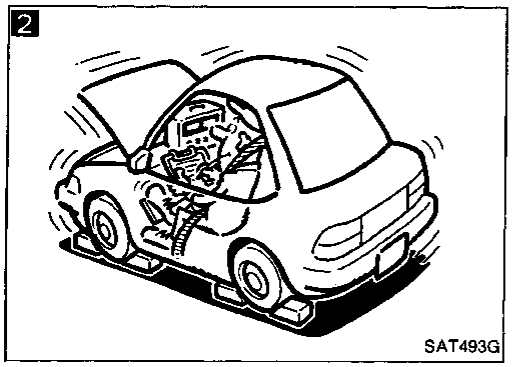
OK ↓

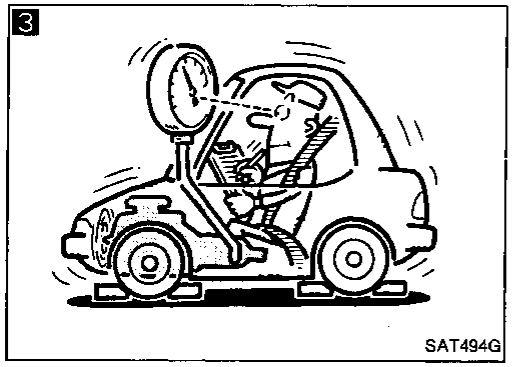
INSPECTION END

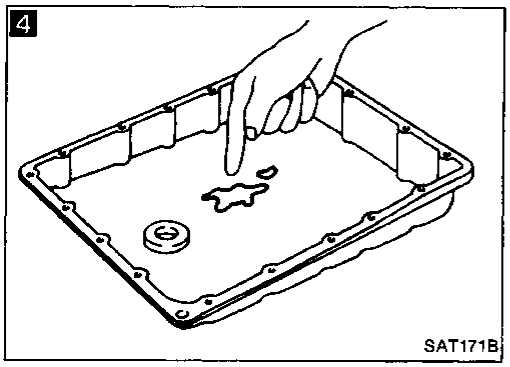
Diagnostic Procedure 6

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









1 Check A/T fluid level again.
- NG → Refill ATF. → Ⓐ
- OK → **2**

2 Check stall revolution with selector lever in "1" and "R" positions.
- NG in both "1" and "R" positions → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125. 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 → **3**
- OK in "1" position NG in "R" position → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125. 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

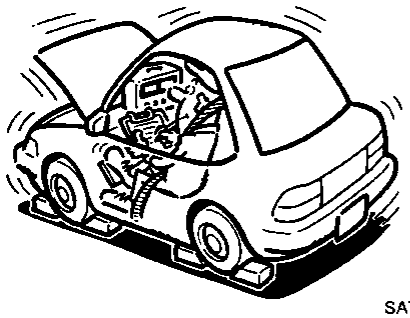
3 Check line pressure at idle with selector lever in "R" position. — Refer to "PRESSURE TESTING", AT-110.
- NG → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125. 2. Check the following items. • Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter) • Line pressure solenoid valve 3. Disassemble A/T. 4. Check the following items. • Oil pump assembly
- OK → **4**

4 1. Remove oil pan. 2. Check fluid condition.
- NG → Ⓐ
- OK → Check again.
  - NG → 1. Perform A/T control unit input/output signal inspection. 2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.
  - OK → **INSPECTION END**

1

SAT638A

2



SAT493G

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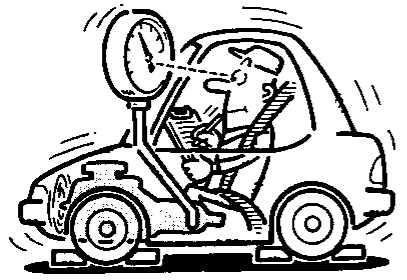

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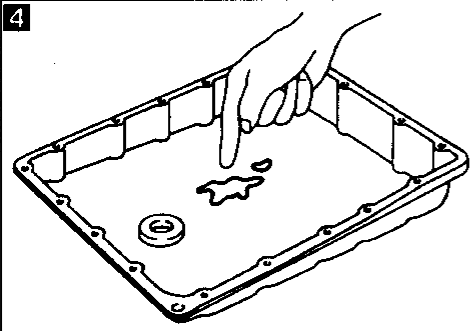


SAT171B

Diagnostic Procedure 7

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 "STALL TESTING", AT-107.

NG →

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
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 "PRESSURE TESTING", AT-110.

OK

NG →

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
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

4

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

NG → Ⓐ

OK

Check again.

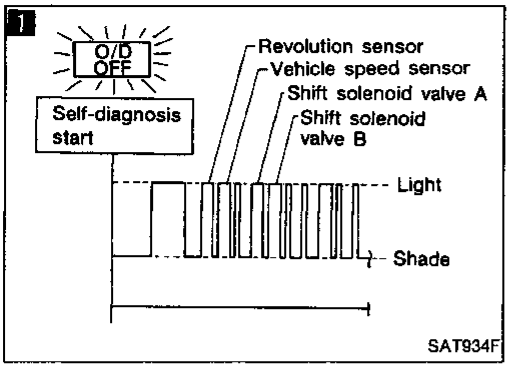
NG →

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

OK

INSPECTION END

1



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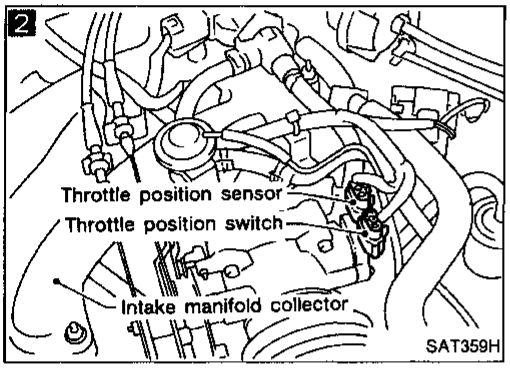

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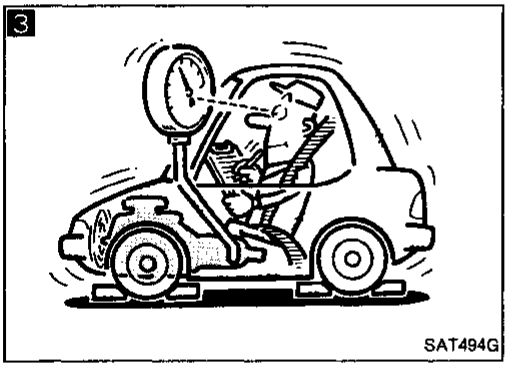

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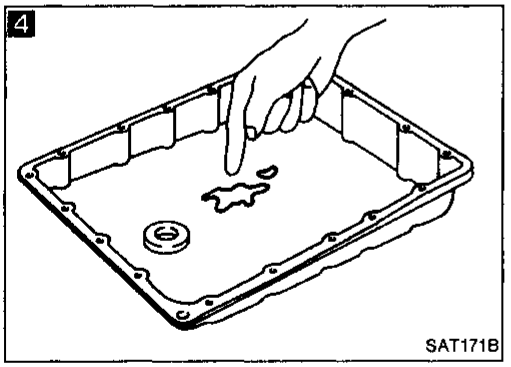

Diagnostic Procedure 8

SYMPTOM:

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

Is Diagnostic Procedure 6 OK?
- No → Go to Diagnostic Procedure 6, AT-89.
- Yes ↓

1

Does self-diagnosis show damage to revolution sensor, vehicle speed sensor, shift solenoid valve A or B after cruise test?
- Yes → Check damaged circuit. — Refer to "Self-diagnosis", AT-51.
- No ↓

2

Check throttle position sensor. — Refer to section EC.
- NG → Repair or replace throttle position sensor.
- OK ↓

3

Check line pressure at stall point with selector lever in "D" position. — Refer to "PRESSURE TESTING", AT-110.
- NG →
  1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
  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 ↓

4

1. Remove oil pan.
2. Check A/T fluid condition.
- NG → (same as above)
- OK ↓

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Shift valve A
- Shift valve B
- Shift solenoid valve A
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓ / OK ←

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

INSPECTION END

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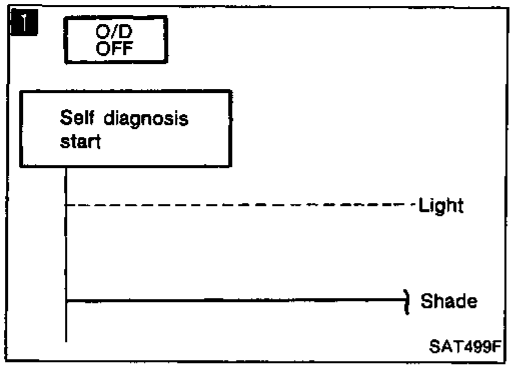
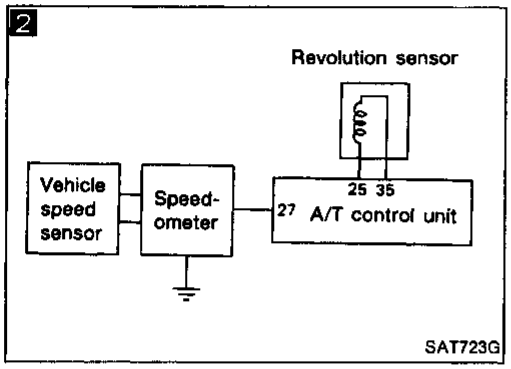
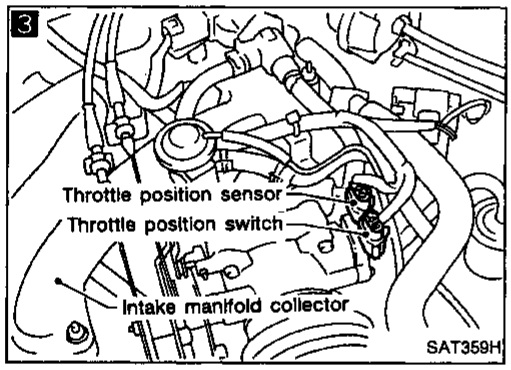
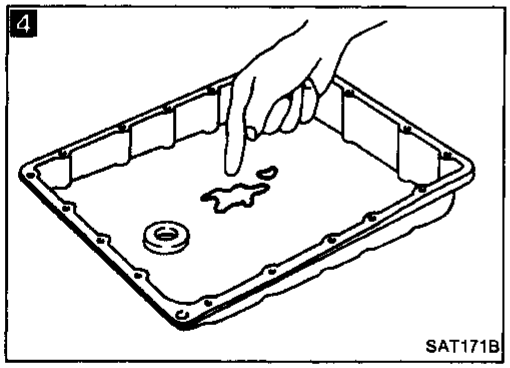








Diagnostic Procedure 9

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 7 and 8 OK? — No → Go to Diagnostic Procedure 7 or 8, AT-90.

Yes ↓

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

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

No ↓

2 Check revolution sensor and vehicle speed sensor circuit. — Refer to "Self-diagnosis", AT-51. — NG → Repair or replace revolution sensor and vehicle speed sensor circuits.

OK ↓

3 Check throttle position sensor. — Refer to section EC. — 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 "ON-VEHICLE SERVICE", AT-125.
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 ↓

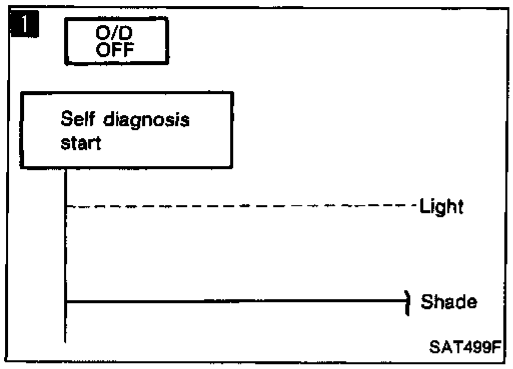
1. Remove control valve. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

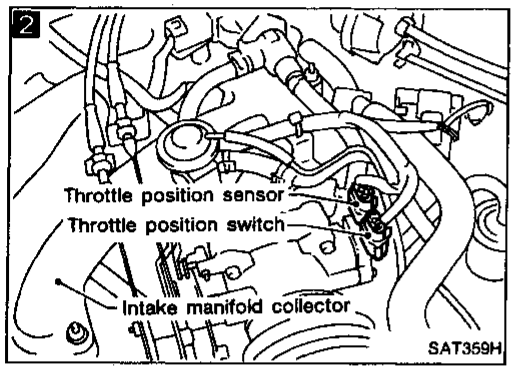
OK ↓

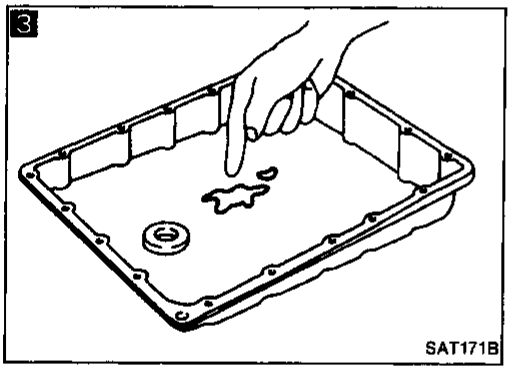
Check again. — NG →
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END







Diagnostic Procedure 10

SYMPTOM:

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

Are Diagnostic Procedures 7 and 8 OK? — No → Go to Diagnostic Procedure 7 or 8, AT-90.

Yes ↓

Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit? — Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

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

No ↓

2 Check throttle position sensor. — Refer to section EC. — 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 "ON-VEHICLE SERVICE", AT-125.
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 ↓

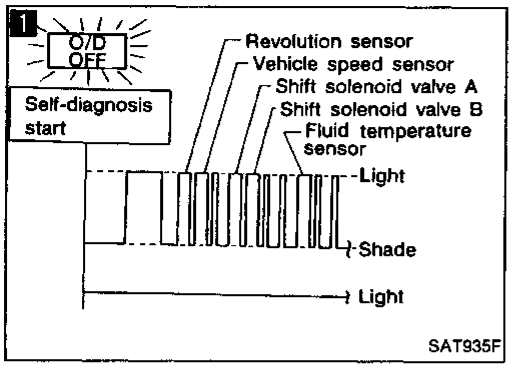
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Shift valve B
- Shift solenoid valve B
- Pilot valve
- Pilot filter

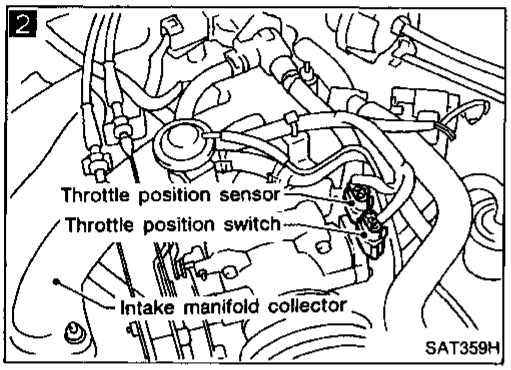
OK ↓

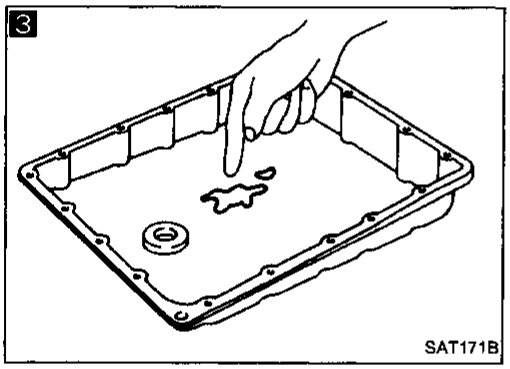
Check again. — NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK ↓

INSPECTION END







Diagnostic Procedure 11

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 Procedure 7 and 8 OK?
- No → Go to Diagnostic Procedure 7 or 8, AT-90.
- Yes ↓

1

Does self-diagnosis show damage to any of the following after cruise test: inhibitor switch, overdrive switch, shift solenoid valve A, B, revolution sensor, vehicle speed sensor or fluid temperature sensor circuit?
- Yes → Check damaged circuit. — Refer to "Self-diagnosis", AT-51.
- No ↓

2

Check throttle position sensor. — Refer to section EC.
- NG → Repair or replace throttle position sensor.
- OK ↓

3

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

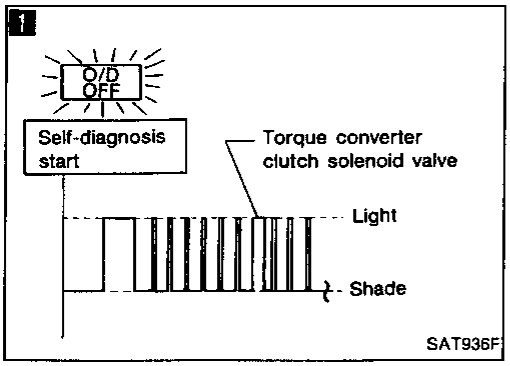
- NG → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
  2. Check the following items.
  - Shift valve B
  - Overrun clutch control valve
  - Shift solenoid valve B
  - Pilot valve
  - Pilot filter
  3. Disassemble A/T.
  4. Check the following items.
  - Servo piston assembly
  - Brake band
  - Torque converter
  - Oil pump assembly
- OK ↓

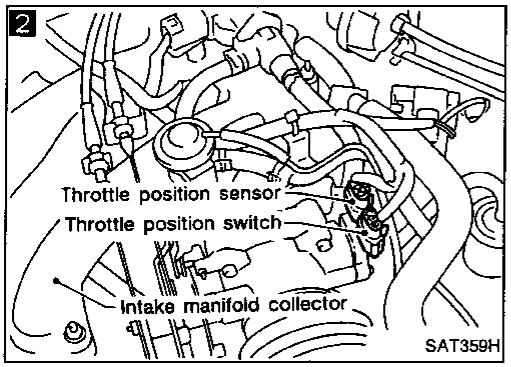
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Shift valve B
- Overrun clutch control valve
- Shift solenoid valve B
- Pilot valve
- Pilot filter

OK ↓

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

INSPECTION END





Diagnostic Procedure 12

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. — Refer to "Self-diagnosis", AT-63.

No

2

Check throttle position sensor. — Refer to section EC.

NG → Repair or replace throttle position sensor.

OK

1. Remove control valve. — Refer to "ON-VEHICLE SERVICE", AT-125.
2. Check following items.
- Torque converter clutch control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

NG → Repair or replace damaged parts.

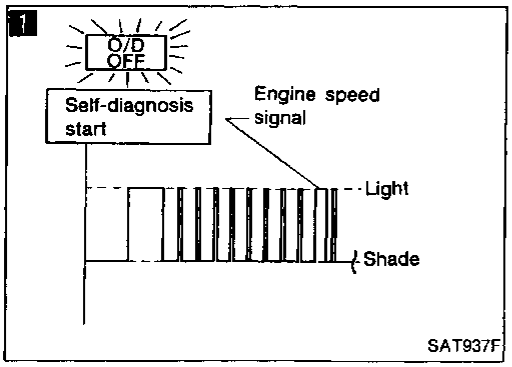
OK

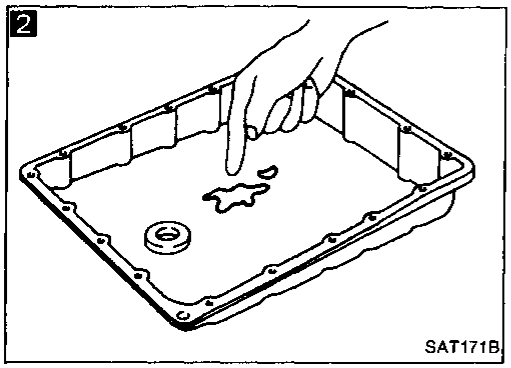
Check again.

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

OK

INSPECTION END





Diagnostic Procedure 13

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 "Self-diagnosis", AT-68.

No

2

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

NG → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-125.
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 "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Torque converter clutch control valve
- Pilot valve
- Pilot filter

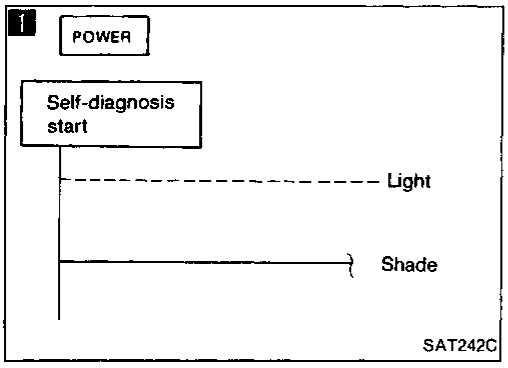
OK ← OK

Check again.

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

OK

INSPECTION END



Diagnostic Procedure 14

SYMPTOM:

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

Does "ECU INPUT SIGNALS" in Data Monitor show damage to closed throttle position switch circuit?

Yes → Check closed throttle position switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

1

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

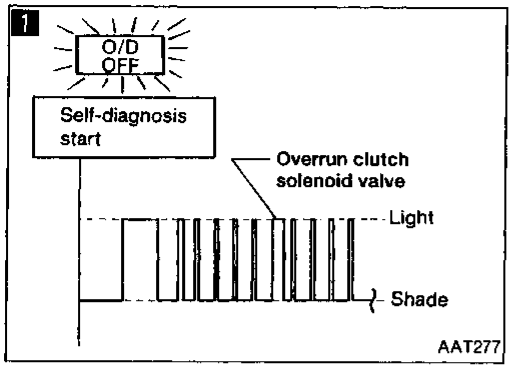
No

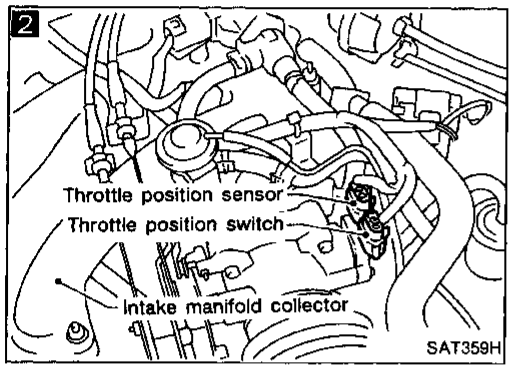
Check again.

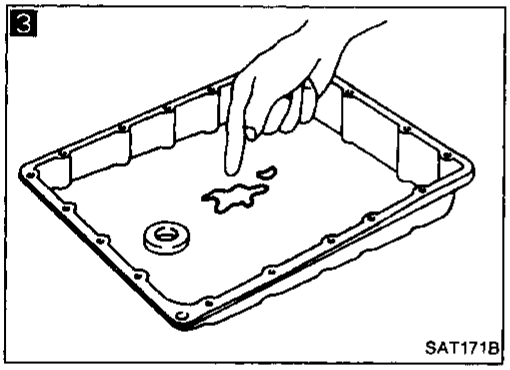
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK

INSPECTION END







Diagnostic Procedure 15

SYMPTOM:

Engine speed does not return to idle smoothly when A/T is shifted from D_4 to D_3 (with accelerator pedal released).
When turning overdrive switch OFF (with accelerator pedal released), vehicle does not decelerate by engine brake.
When shifting A/T from "D" to "2" (with accelerator pedal released), vehicle does not decelerate by engine brake.

1

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

Yes → Check overrun clutch solenoid valve circuit. — Refer to "Self-diagnosis", AT-61.

No

2

Check throttle position sensor. — Refer to section EC.

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 "ON-VEHICLE SERVICE", AT-125.
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 "ON-VEHICLE SERVICE", AT-125.
2. Check the following items.
- Overrun clutch control valve
- Overrun clutch reducing valve
- Overrun clutch solenoid valve

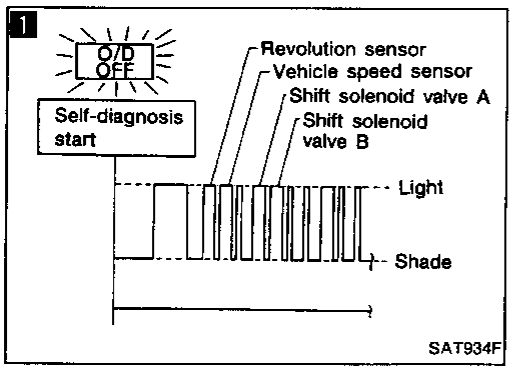
OK

Check again.

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

OK

INSPECTION END



Diagnostic Procedure 16

SYMPTOM:

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

1

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

Yes → Check damaged circuit. — Refer to "Self-diagnosis", AT-51.

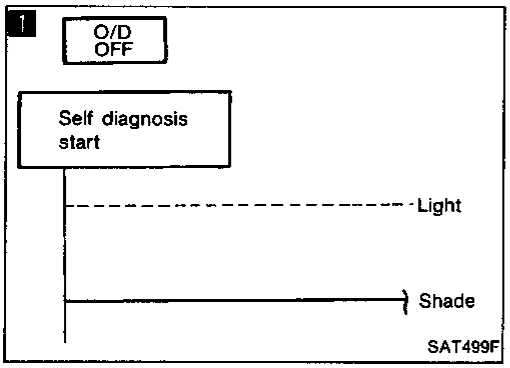
No

Check again.

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

OK

Go to Diagnostic Procedure 8, AT-91.



Diagnostic Procedure 17

SYMPTOM:

A/T does not shift from D_4 to D_3 when changing overdrive switch to "OFF" position.

Does "ECU INPUT SIGNALS" in Data Monitor show damage to overdrive switch circuit?

Yes → Check overdrive switch circuit. — Refer to "Self-diagnosis", AT-72.

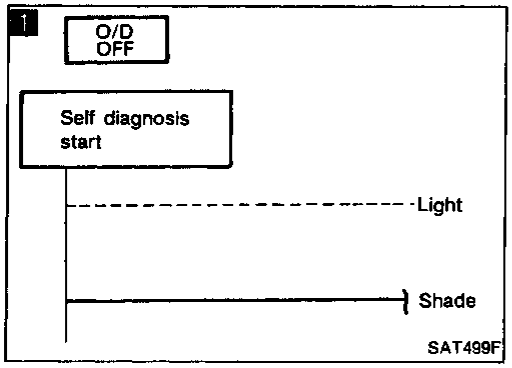
OR

1

Does self-diagnosis show damage to overdrive switch circuit?

No

Go to Diagnostic Procedure 10, AT-93.



Diagnostic Procedure 18

SYMPTOM:

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

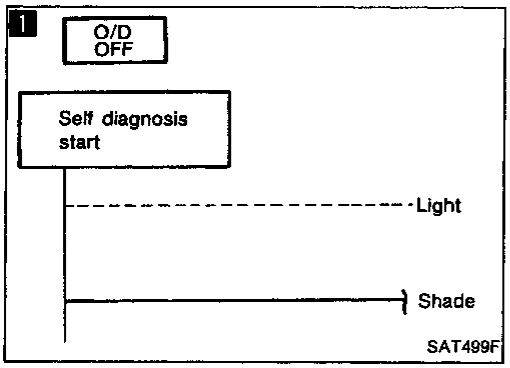
Does "ECU INPUT SIGNALS" in Data Monitor show damage to inhibitor switch circuit?

Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

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

No → Go to Diagnostic Procedure 9, AT-92.



Diagnostic Procedure 19

SYMPTOM:

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

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

Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-72.

OR

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

No → Check again.

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

OK → **INSPECTION END**

Diagnostic Procedure 20

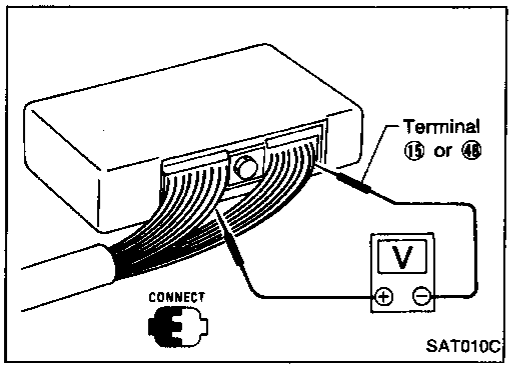
SYMPTOM:

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

Is Diagnostic Procedure 6 OK?

No → Go to Diagnostic Procedure 6, AT-89.

Yes → Go to Diagnostic Procedure 15, AT-97.

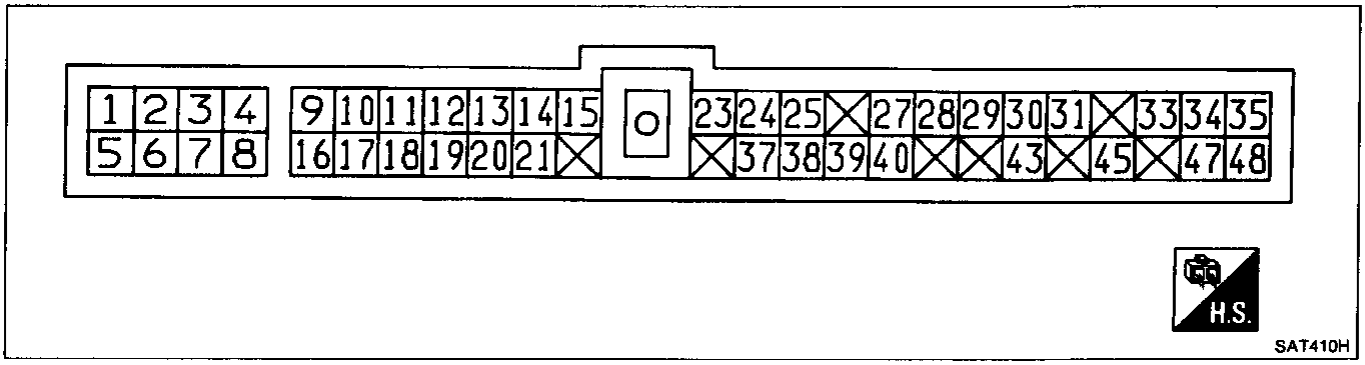


Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

- Measure voltage between each terminal and terminal ⑮ or ㊽ by following "A/T CONTROL UNIT INSPECTION TABLE".

- Pin connector terminal layout



A/T CONTROL UNIT INSPECTION TABLE

(Data are reference values.)

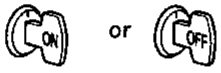
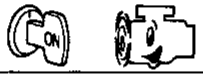
Terminal No.	Item	Condition		Judgement standard
1	Line pressure solenoid valve		When releasing accelerator pedal after warming up engine.	1.5 - 2.5V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
2	Line pressure solenoid valve (with dropping resistor)		When releasing accelerator pedal after warming up engine.	5 - 14V
			When depressing accelerator pedal fully after warming up engine.	0.5V or less
3	OD OFF indicator lamp		When setting overdrive switch in "ON" position.	Battery voltage
			When setting overdrive switch in "OFF" position.	1V or less
4	Power source		When turning ignition switch to "ON".	Battery 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.	8 - 15V
			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 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 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 voltage
			When overrun clutch solenoid valve does not operate.	1V or less
9	Power source		Same as No. 4	
10*	DT1		—	—
11*	DT2		—	—
12*	DT3		—	—
13*	N position signal		—	—
14	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	Battery voltage
			When depressing accelerator pedal after warming up engine.	1V or less
15	Ground		—	—
16	Inhibitor "1" position switch		When setting selector lever to "1" position.	Battery voltage
			When setting selector lever to other positions.	1V or less
17	Inhibitor "2" position switch		When setting selector lever to "2" position.	Battery voltage
			When setting selector lever to other positions.	1V or less
18	Inhibitor "D" position switch		When setting selector lever to "D" position.	Battery voltage
			When setting selector lever to other positions.	1V or less

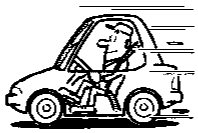
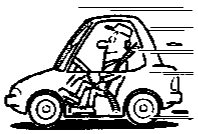
*: These terminals are connected to the ECM (ECCS control module).

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
19	Inhibitor "N" or "P" position switch		When setting selector lever to "N" or "P" position.	Battery voltage
			When setting selector lever to other positions.	1V or less
20	Inhibitor "R" position switch		When setting selector lever to "R" position.	Battery voltage
			When setting selector lever to other positions.	1V or less
21	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
			When releasing accelerator pedal after warming up engine.	1V or less
22	—		—	—
23	Power source (Back-up)		When turning ignition switch to "OFF".	Battery voltage
			When turning ignition switch to "ON".	Battery voltage
24	Engine speed signal		When engine runs at idle speed.	0.9V
			When engine runs at 4,000 rpm.	Approximately 3.7V
25	Revolution sensor (Measure in AC position)		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	—		—	—

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

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
33	Fluid temperature sensor		When ATF temperature is 20°C (68°F).	Approximately 1.5V
			When ATF temperature is 80°C (176°F).	Approximately 0.5V
34	Throttle position sensor		When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: Approximately 0.5V Fully-open throttle: Approximately 4V
35	Throttle position sensor (Ground)		—	—
36	—		—	—
37	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage
			When ASCD cruise is not being performed. ("CRUISE" light does not comes on.)	1V or less
38	DT5*		—	—
39	Overdrive OFF indicator lamp		When setting overdrive switch in "ON" position	Battery voltage
			When setting overdrive switch in "OFF" position	1V or less
40	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	5 - 8V
			When "ACCEL" set switch on ASCD cruise is applied.	1V or less
41	—		—	—
42	—		—	—
43	Stop lamp switch		When depressing brake pedal	Battery voltage
			When releasing brake pedal	1V or less
44	—		—	—
45	OBD-II*		—	—
46	—		—	—
47	DT4*		—	—
48	Ground		—	—

* These terminals are connected to the ECM (ECCS control module).

Electrical Components Inspection (Cont'd)

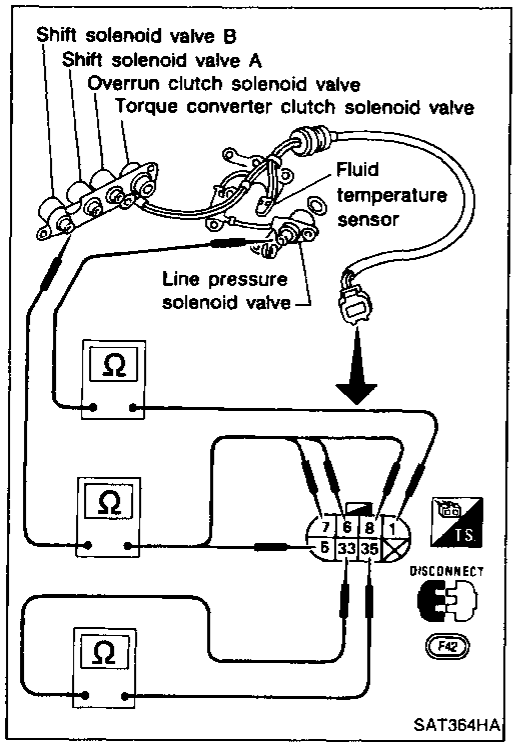
SOLENOID VALVES AND FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE", AT-125.

Solenoid valves

Resistance check

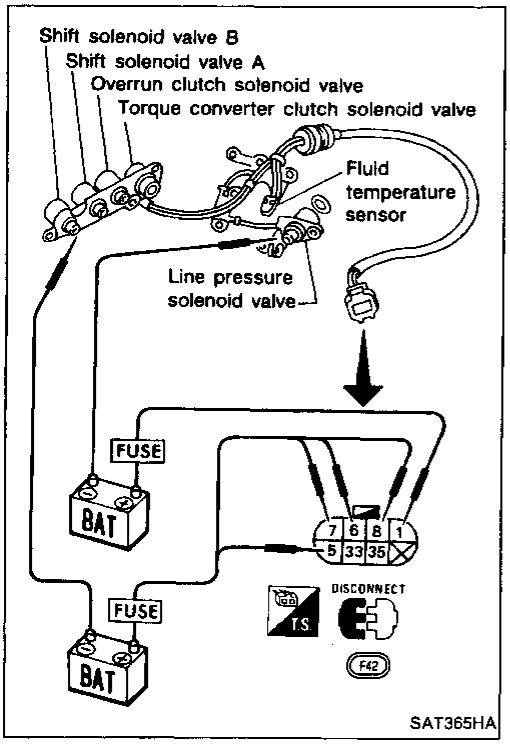
- Check resistance between two terminals.



Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	⑥	Ground (Bracket)	20 - 30Ω
Shift solenoid valve B	⑦		
Overrun clutch solenoid valve	⑧		
Line pressure solenoid valve	①		2.5 - 5Ω
Torque converter clutch solenoid valve	⑤		10 - 16Ω

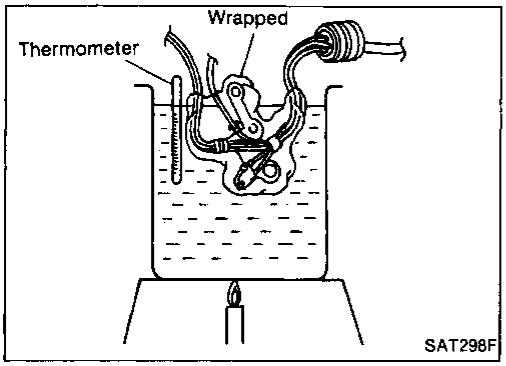
Operation check

- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).



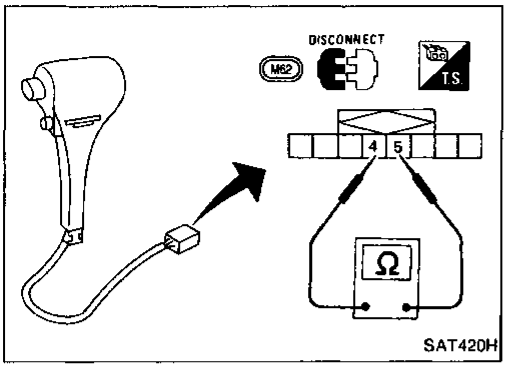
Fluid temperature sensor

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

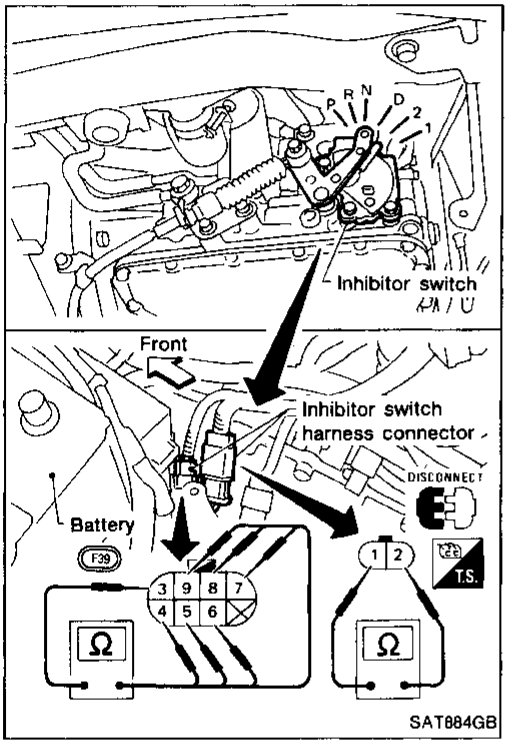
Electrical Components Inspection (Cont'd)



OVERDRIVE SWITCH

- Check continuity between two terminals.

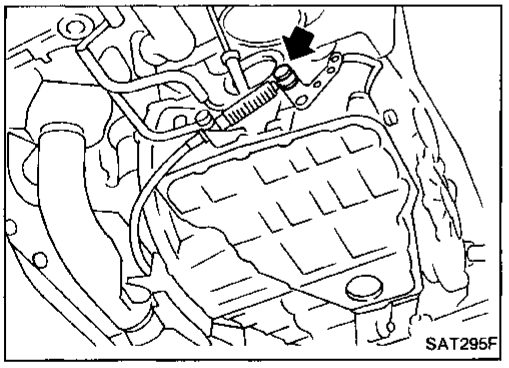
OD switch position	Continuity
ON	No
OFF	Yes



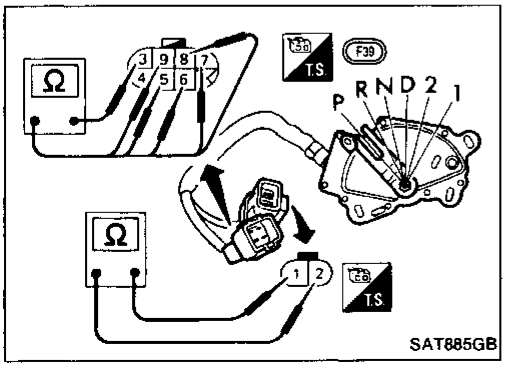
INHIBITOR SWITCH

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.	
P	① — ②	③ — ④
R	③ — ⑤	
N	① — ②	③ — ⑥
D	③ — ⑦	
2	③ — ⑧	
1	③ — ⑨	

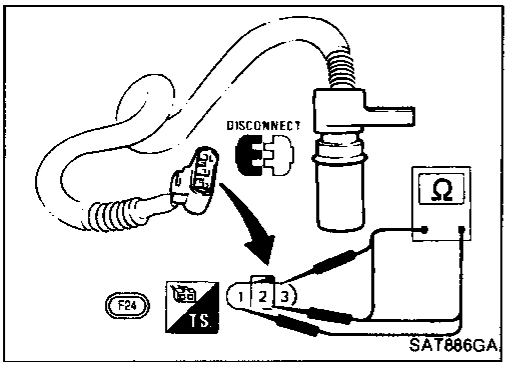


2. If NG, check again with control cable disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If OK on step 2, adjust control cable. — Refer to "ON-VEHICLE SERVICE", AT-127.



4. If NG on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminals. — Refer to step 1.
5. If OK on step 4, adjust inhibitor switch. — Refer to "ON-VEHICLE SERVICE", AT-126.
6. If NG on step 4, replace inhibitor switch.

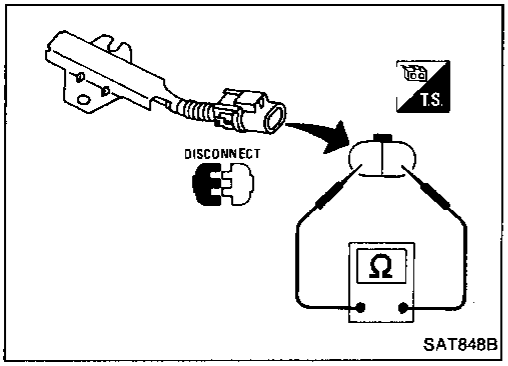
Electrical Components Inspection (Cont'd)



REVOLUTION SENSOR

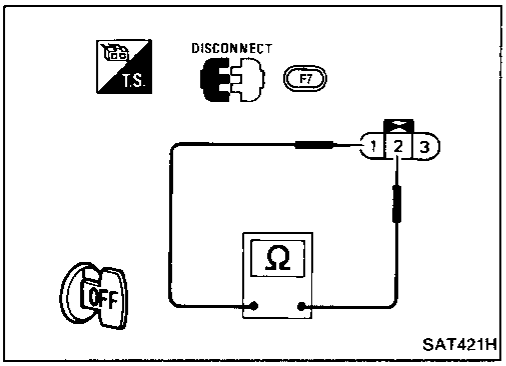
- For removal and installation, refer to "ON-VEHICLE SERVICE", AT-126.
- Check resistance between terminals ①, ② and ③.

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



DROPPING RESISTOR

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

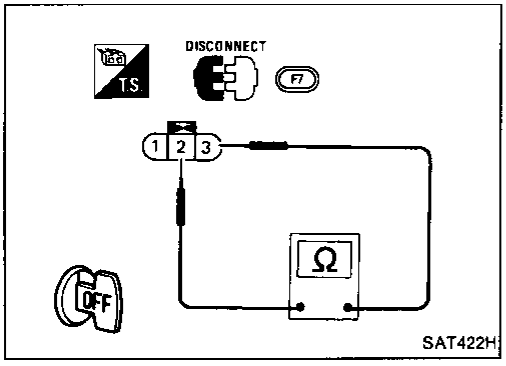


THROTTLE POSITION SWITCH

Closed throttle position switch (idle position)

- Check continuity between terminals ① and ②.

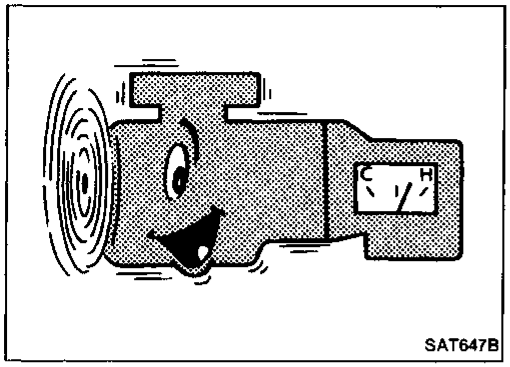
Accelerator pedal condition	Continuity
Released	Yes
Depressed	No



Wide open throttle position switch

- Check continuity between terminals ② and ③.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes



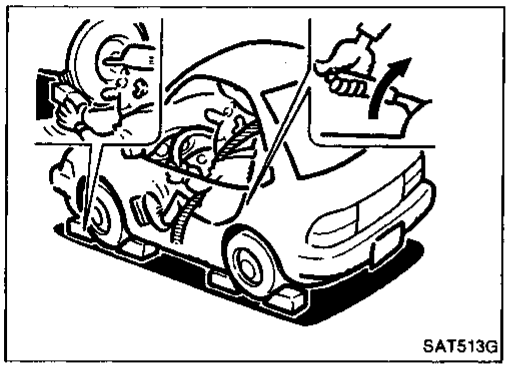
SAT647B

Final Check

STALL TESTING

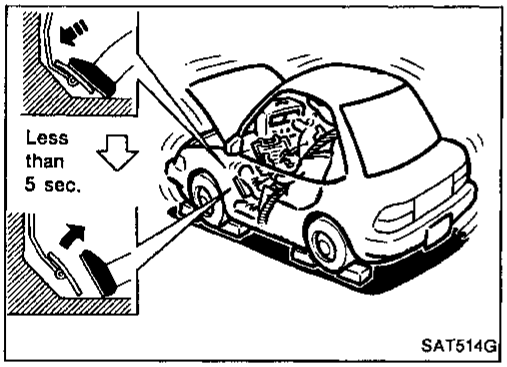
Stall test procedure

1. Check A/T and engine fluid levels. If necessary, add.
2. Drive vehicle for about 10 minutes to warm engine oil and ATF up to operating temperature.
   ATF operating temperature:
   50 - 80°C (122 - 176°F)


SAT513G

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

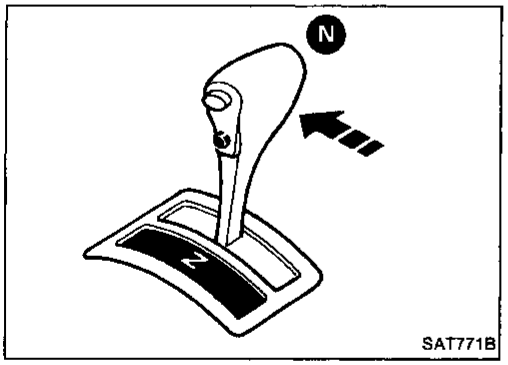
- **It is good practice to put a mark on point of specified engine rpm on indicator.**



SAT514G

5. Start engine, apply foot brake, and place selector lever in "D" position.
6. Accelerate to wide-open throttle gradually while applying foot brake.
7. Quickly note the engine stall revolution and immediately release throttle.

- **During test, never hold throttle wide-open for more than 5 seconds.**
  Stall revolution:
  2,000 - 2,300 rpm



SAT771B

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

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

10. Repeat tests following steps 5 through 9 with selector lever in "2", "1" and "R" positions.

Final Check (Cont'd)

JUDGEMENT OF STALL TEST

The test result and possible damaged components relating to each result are shown in the illustration. In order to pinpoint the possible damaged components, follow the WORK FLOW shown in AT-16.

Note

Stall revolution is too high in "D" or "2" position:

- Slippage occurs in 1st gear but not in 2nd and 3rd gears. ..... Low one-way clutch slippage
- Slippage occurs at the following gears:
  1st through 3rd gears in "D" position and engine brake functions with power shift switch set to "POWER".
  1st and 2nd gears in "2" position and engine brake functions with accelerator pedal released (fully closed throttle). ..... Forward clutch or forward one-way clutch slippage

Stall revolution is too high in "R" position:

- Engine brake does not function in "1" position. ..... Low & reverse brake slippage
- Engine brake functions in "1" position. ..... Reverse clutch slippage

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h. ..... One-way clutch seizure in torque converter housing

CAUTION:

Be careful since automatic fluid temperature increases abnormally.

- Slippage occurs in 3rd and 4th gears in "D" position. ..... High clutch slippage
- Slippage occurs in 2nd and 4th gear in "D" position. ..... Brake band slippage

Stall revolution less than specifications:

- Poor acceleration during starts. ..... One-way clutch seizure in torque converter

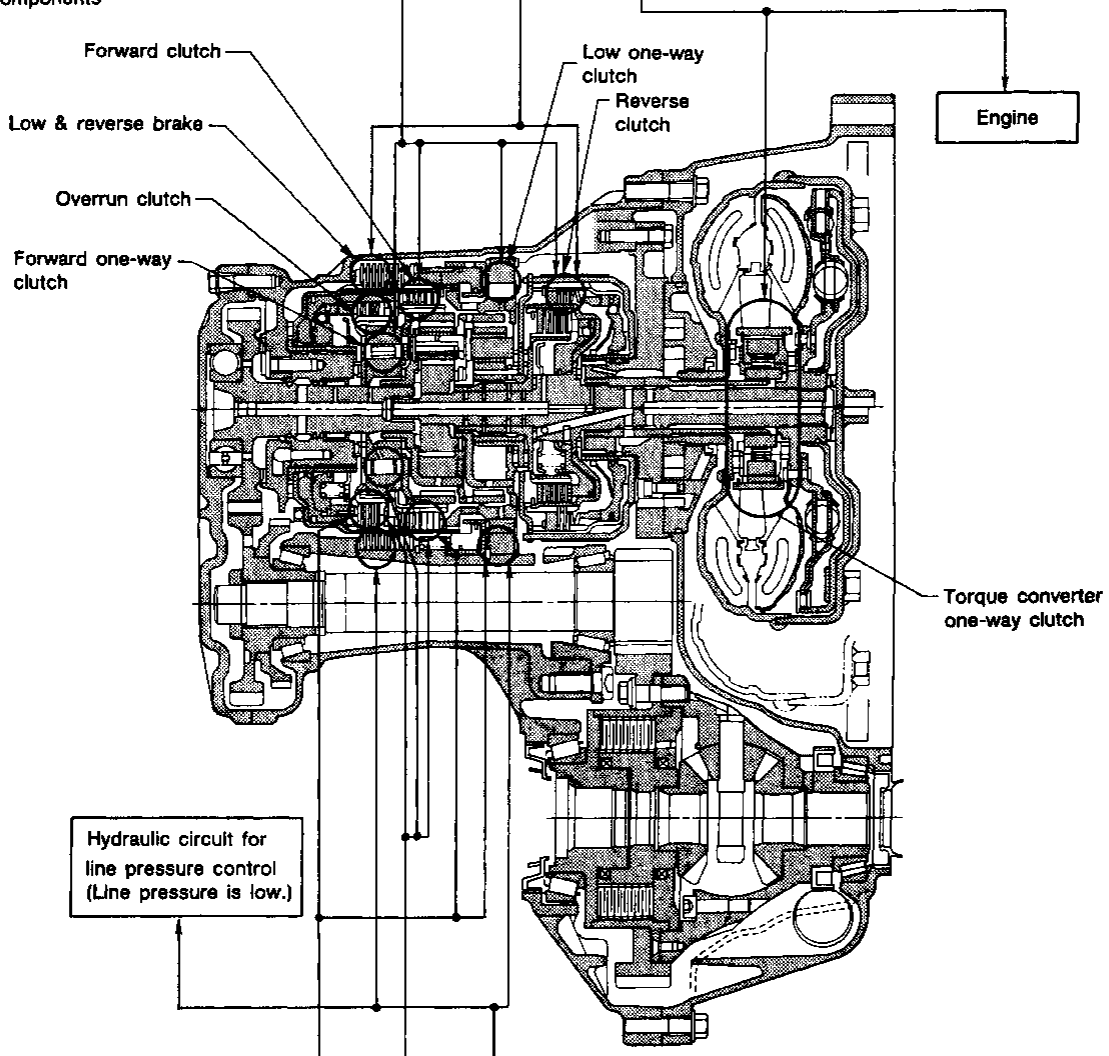
Final Check (Cont'd)

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.

Damaged components



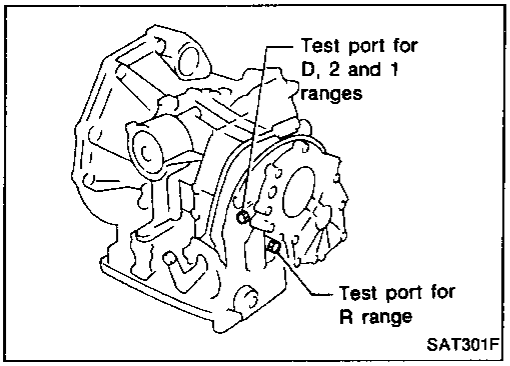
Clutches and brakes except high clutch and brake band are OK. (Condition of high clutch and brake band cannot be confirmed by stall test.)

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

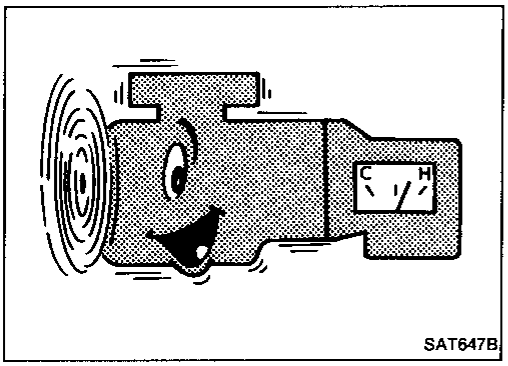
SAT077H

Final Check (Cont'd)

PRESSURE TESTING



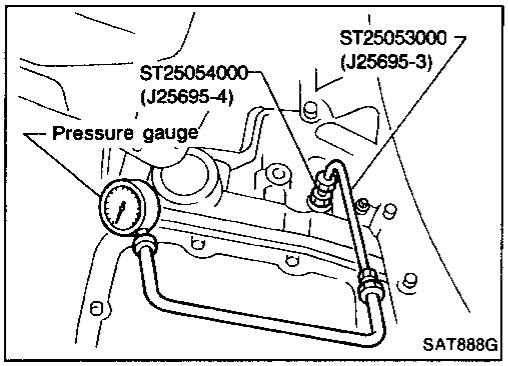
- Location of pressure test ports.
- **Always replace pressure plugs as they are self-sealing bolts.**



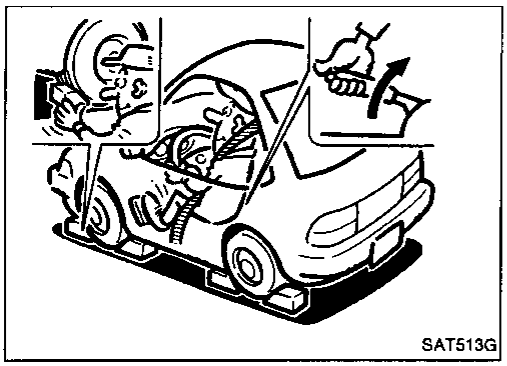
Line pressure test procedure

1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Drive vehicle for about 10 minutes to warm engine oil and ATF up to operating temperature.

   ATF operating temperature:
   50 - 80°C (122 - 176°F)

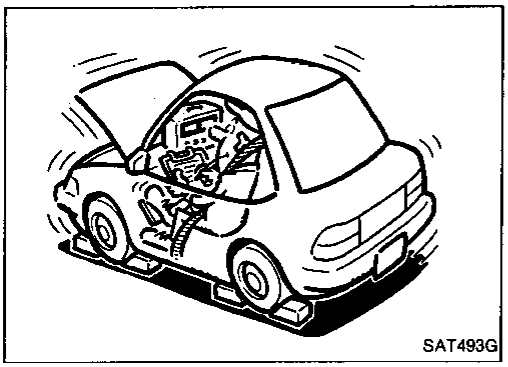


3. Install pressure gauge to corresponding line pressure port.



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)


SAT493G

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: Refer to SDS, AT-224.

JUDGEMENT OF LINE PRESSURE TEST

	Judgement	Suspected parts
At idle	Line pressure is low in all positions.	• Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve
	Line pressure is low in particular 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

Reference page (AT-)		ON vehicle										OFF vehicle					
	Reference page (AT-)	25, 127	126	51, 53, 68	70	125, 57	59, 70	63, 61	65, 125	125	133, 149	167, 170	174, 184	174	180, 191	—
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level / Control cable	Inhibitor switch / Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor / Engine speed signal	Engine idling rpm / 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
86	Engine does not start in "N", "P" positions.	2	3							1						
86	Engine starts in positions other than "N" and "P".	1	2													
—	Transaxle noise in "P" and "N" positions.	1	3	4 5	2						⑦ ⑥					
86	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	1														②
87	Vehicle runs in "N" position.	1										③	②	④		
89	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" positions).	1												②		
90	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		⑱	
—	Excessive creep.				1											
89, 90	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	
92, 93, 94	Too high a gear change point from "D_1" to "D_2", from "D_2" to "D_3", from "D_3" to "D_4".		1	2		3	4									
—	Gear change directly from "D_1" to "D_3" occurs.	1								2					③	
—	Engine stops when shifting lever into "R", "D", "2" and "1".				1	3		2			④					
—	Too sharp a shock in change from "D_1" to "D_2".		1		2	4			5	3					⑥	
—	Too sharp a shock in change from "D_2" to "D_3".		1		2	3						④			⑤	

Symptom Chart (Cont'd)

		ON vehicle									OFF vehicle					
Reference page (AT-)		25, 127	126	51, 53, 68,	70	125, 57	59, 70	63, 61	65, 125	125	133, 149	167, 170	174, 184	174	180, 191	—
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—	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_2".	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_2".	1	2			5 3	4					⑥			⑦	
—	Failure to change gear from "D_2" to "D_1" or from "D_3" to "D_1".	1	2			5 3	4					⑦		⑥	⑧	
—	Gear change shock felt during deceleration by releasing accelerator pedal.		1		2	4		3								
—	Too high a change point from "D_4" to "D_3", from "D_3" to "D_2", from "D_2" to "D_1".		1	2												
—	Kickdown does not operate when depressing pedal in "D_4" within kickdown vehicle speed.		1	2		3	4									
—	Kickdown operates or engine overruns when depressing pedal in "D_4" beyond kickdown vehicle speed limit.		2	1		3	4									
—	Races extremely fast or slips in changing from "D_4" to "D_3" when depressing pedal.	1	2		3	5	4					⑥	⑦			
—	Races extremely fast or slips in changing from "D_4" to "D_2" when depressing pedal.	1	2		3	6 5	4						⑧		⑦	
—	Races extremely fast or slips in changing from "D_3" to "D_2" when depressing pedal.	1	2		3	5	4		6			⑨	⑧		⑦	
—	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)

		ON vehicle										OFF vehicle					
Reference page (AT-)		25, 127	126	51, 53, 68,	70	125, 57	59, 70	63, 61	65, 125	125	133, 149	167, 170	174, 184	174	180, 191	—
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transaxle must be removed from the vehicle.	Fluid level / Control cable	Inhibitor switch / Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor / Engine speed signal	Engine idling rpm / 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
99	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													
99	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					
—	Torque converter clutch piston slip.	1	2		3	6	5	4			⑦					
95	Lock-up point is extremely high or low.		1	2		4		3								
—	A/T does not shift to "D_4" when driving with overdrive switch "ON".		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								

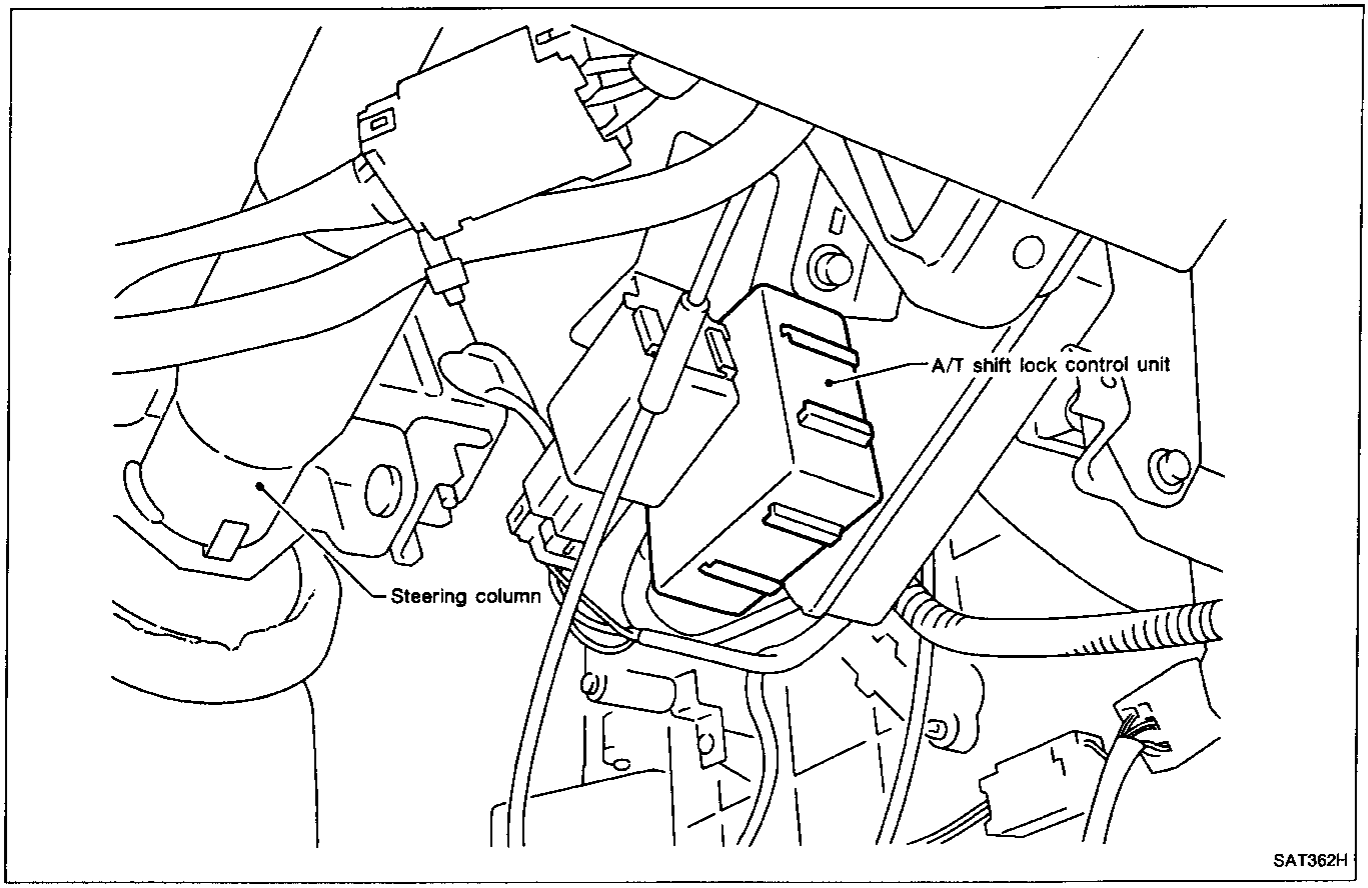
Contents

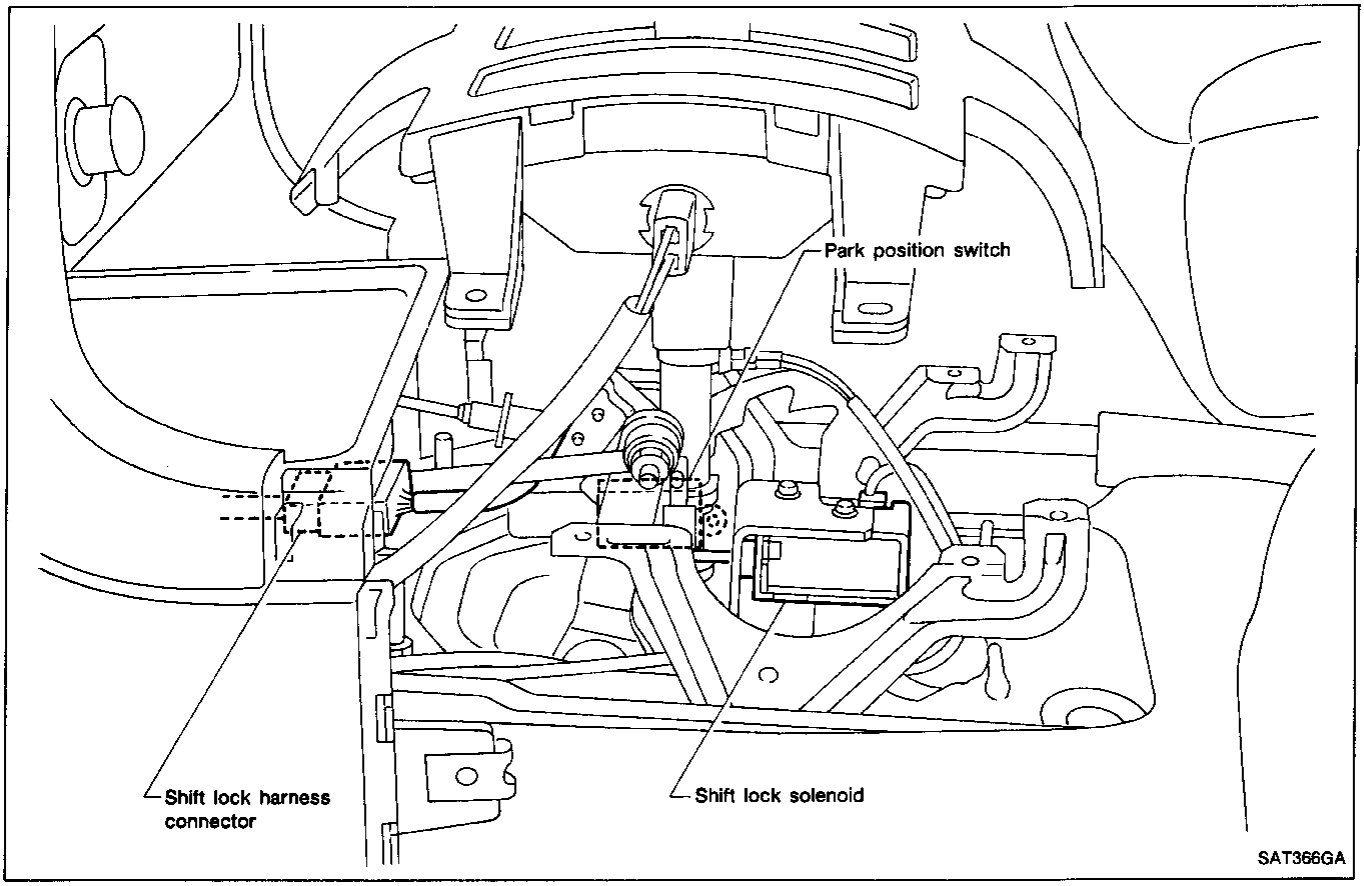
Shift Lock System Electrical Parts Location AT-116
Wiring Diagram — SHIFT — AT-117
Diagnostic Procedure AT-118
SYMPTOM 1:
- Selector lever cannot be moved from "P" position with key in "ON" position and brake pedal applied.
- Selector lever can be moved from "P" position with key in "ON" position and brake pedal released.
- Selector lever can be moved from "P" position when key is removed from key cylinder.

SYMPTOM 2: Ignition key cannot be removed when selector lever is set to "P" position. It can be removed when selector lever is set to any position except "P".

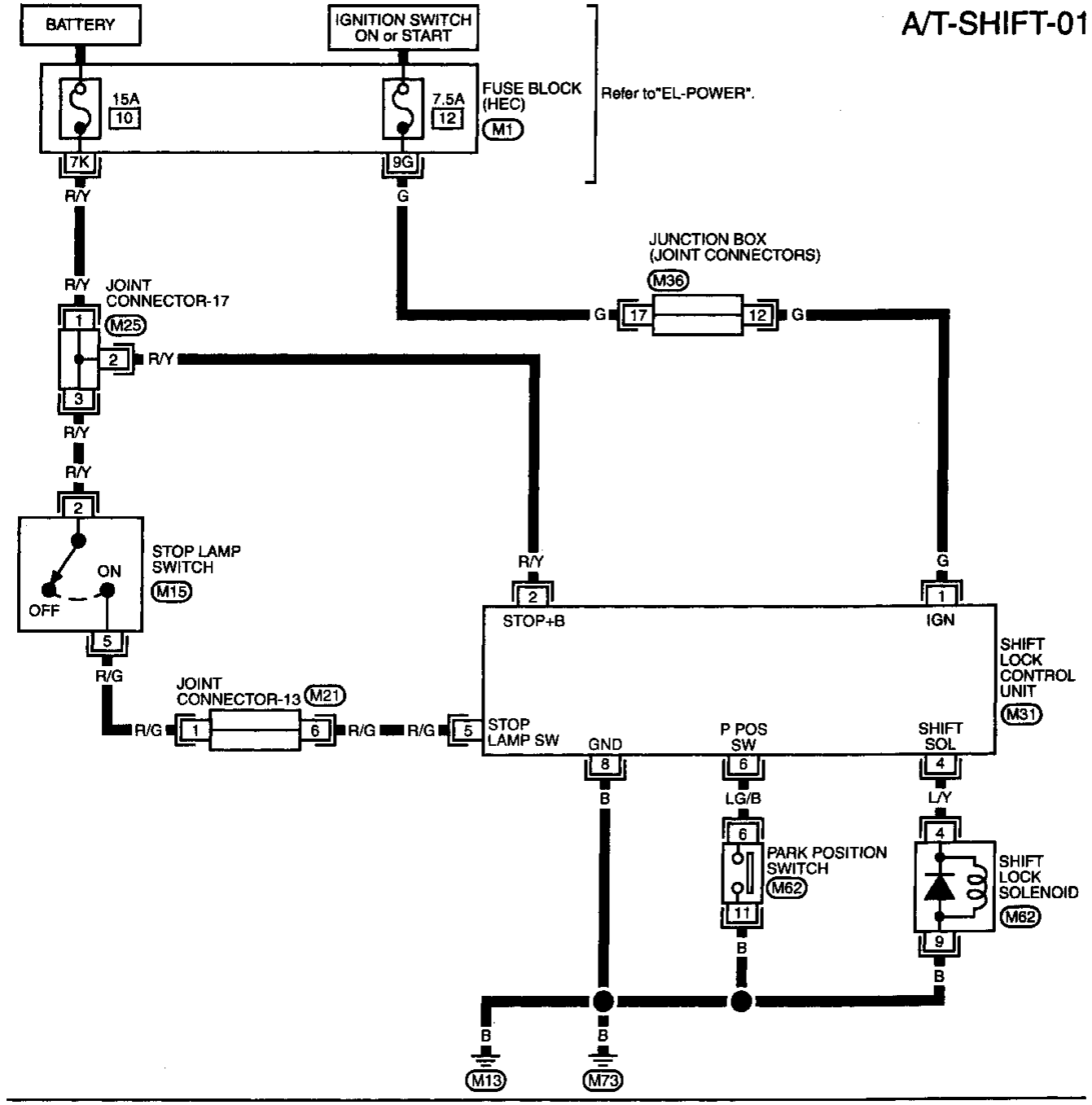
Key Interlock Cable AT-122
Shift Lock Control Unit Inspection AT-123
Shift Lock Control Unit Inspection Table AT-123
Component Check AT-124

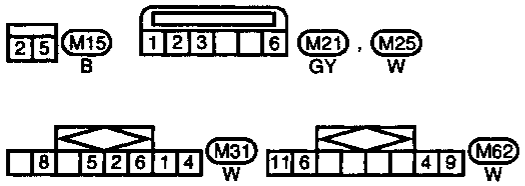
Shift Lock System Electrical Parts Location





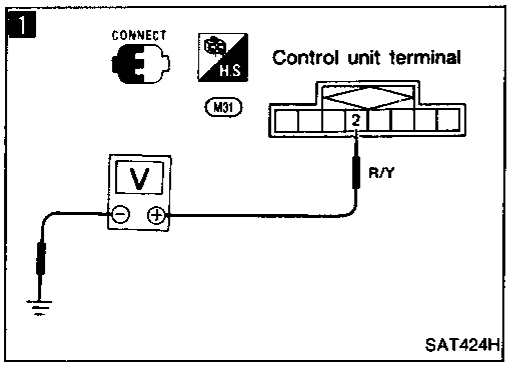
Wiring Diagram — SHIFT —





Refer to last page (Foldout page).
M1
M36

MAT354A



Diagnostic Procedure

SYMPTOM 1:

- **Selector lever cannot be moved from "P" position with key in "ON" position and brake pedal applied.**
- **Selector lever can be moved from "P" position with key in "ON" position and brake pedal released.**
- **Selector lever can be moved from "P" position when key is removed from key cylinder.**

SYMPTOM 2:

Ignition key cannot be removed when selector lever is set to "P" position. It can be removed when selector lever is set to any position except "P".

Check key interlock cable for damage.

NG → Repair key interlock cable. Refer to "Key Interlock Cable", AT-122.

OK ↓

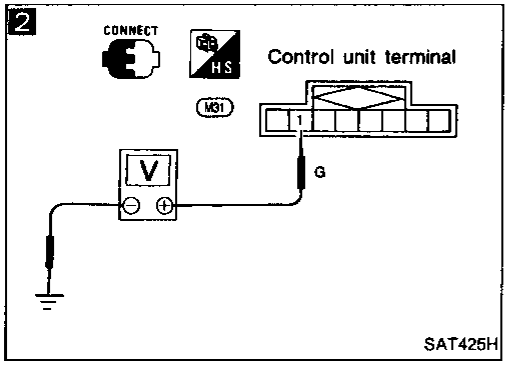
1

CHECK POWER SOURCE.

1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ② and ground.
   Battery voltage should exist.

NG → Check the following items:
1. Harness continuity between battery and control unit harness terminal ②
2. Fuse

OK ↓



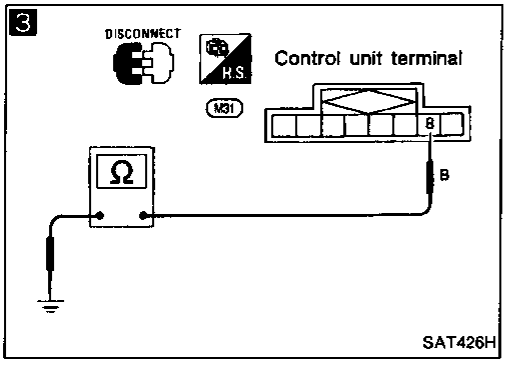
2

CHECK IGNITION SIGNAL.

1. Turn ignition switch to "OFF" position.
2. Check voltage between control unit harness terminal ① and ground.
   0V
3. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
4. Check voltage between control unit harness terminal ① and ground.
   Battery voltage should exist.

NG → Check the following items:
1. Harness continuity between battery and control unit harness terminal ①
2. Fuse
3. Ignition switch

OK ↓



3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

1. Turn ignition switch from "ON" to "OFF" position.
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑧ and ground.
   Continuity should exist.

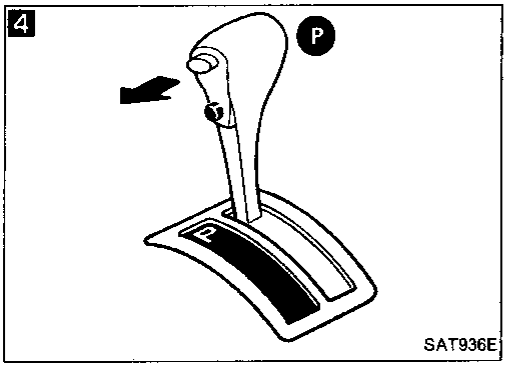
NG → Repair harness or connector.

OK ↓

Ⓐ

Diagnostic Procedure (Cont'd)

4



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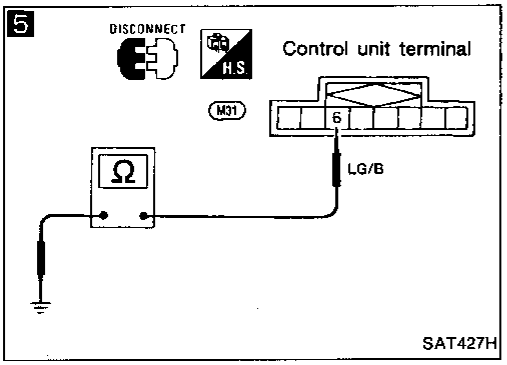
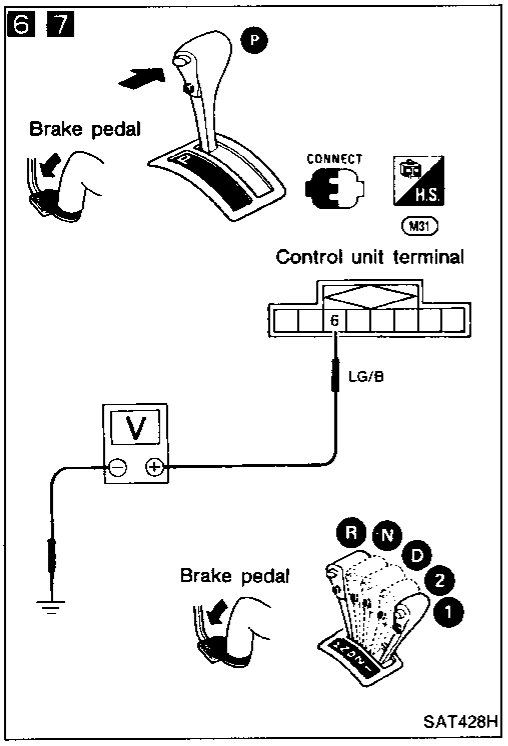


6 7



Ⓐ

CHECK INPUT SIGNAL (PARK POSITION SWITCH).

1. Reconnect control unit harness connector.
2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)

4 3. Set selector lever in "P" position and release selector lever button.

5 4. Disconnect control unit harness connector.

5. Check continuity between control unit harness terminal ⑥ and ground.

Continuity should not exist.

NG → Check park position switch. (Refer to "COMPONENT CHECK", AT-124.)

OK

CHECK INPUT SIGNAL (PARK POSITION SWITCH).

1. Turn ignition switch to "ON" position. (Do not start engine.)

6 2. Check voltage between control unit harness terminal ⑥ and ground. Check while depressing brake pedal with selector lever button pushed.

0V

7 3. Check voltage between control unit harness terminal ⑥ and ground. Check while selector lever is set in any position except "P".

When selector lever cannot be moved from "P" position with brake pedal depressed, set ignition key to "ACC" position and move lever. Then set ignition key to "ON" position.

Battery voltage should exist.

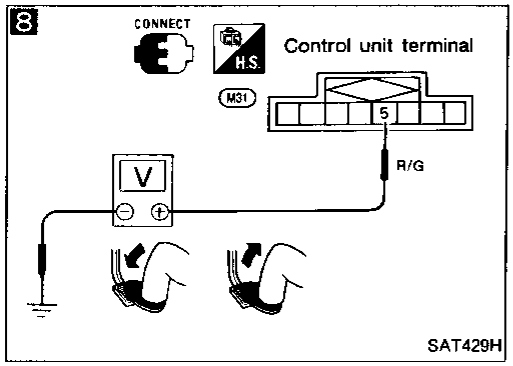
NG → Check the following items:

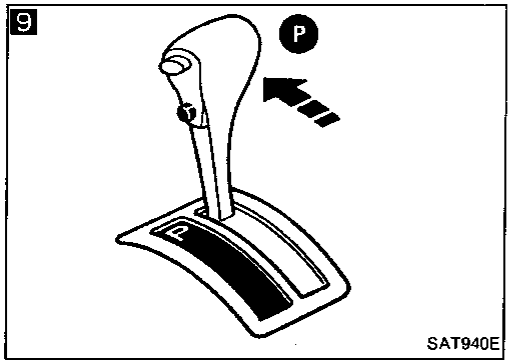
1. Harness continuity between control unit harness terminal ⑥ and park position switch harness terminal ⑥
2. Harness continuity between park position switch harness terminal ⑥ and ground
3. Park position switch (Refer to "COMPONENT CHECK", AT-124.)

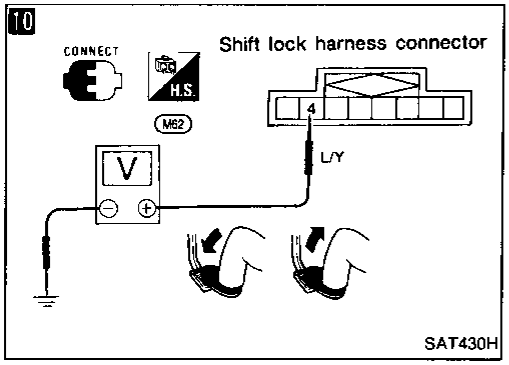
OK

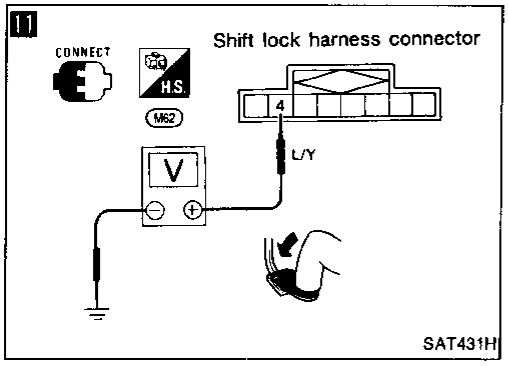
Ⓑ

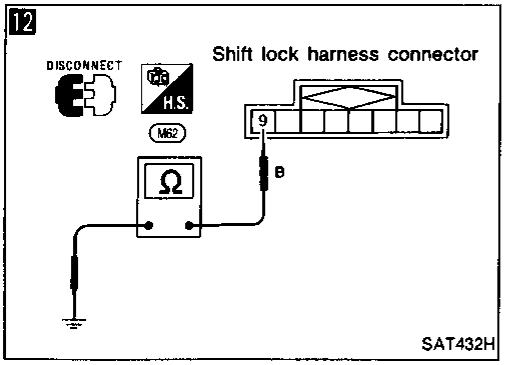
Diagnostic Procedure (Cont'd)











Ⓑ

8

CHECK INPUT SIGNAL (STOP LAMP SWITCH).

Turn ignition switch to "ON" position. (Do not start engine.)

- Check voltage between control unit harness terminal ⑤ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

NG → Check the following items:
1. Harness continuity between control unit harness terminal ⑤ and stop lamp switch harness terminal ②
2. Harness continuity between stop lamp switch harness terminal ① and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK", AT-124.)

OK ↓

9

Set selector lever in "P" position.

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

1. Turn ignition switch to "ON" position. (Do not start engine.)

10 2. Check voltage between shift lock harness connector terminal ④ and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

3. Turn ignition switch from "ON" to "OFF" position.

11 4. Check voltage between shift lock harness connector terminal ④ and ground with brake pedal depressed.
0V

NG → Check harness continuity between control unit harness terminal ④ and shift lock solenoid harness terminal ④.

OK ↓

12

CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.

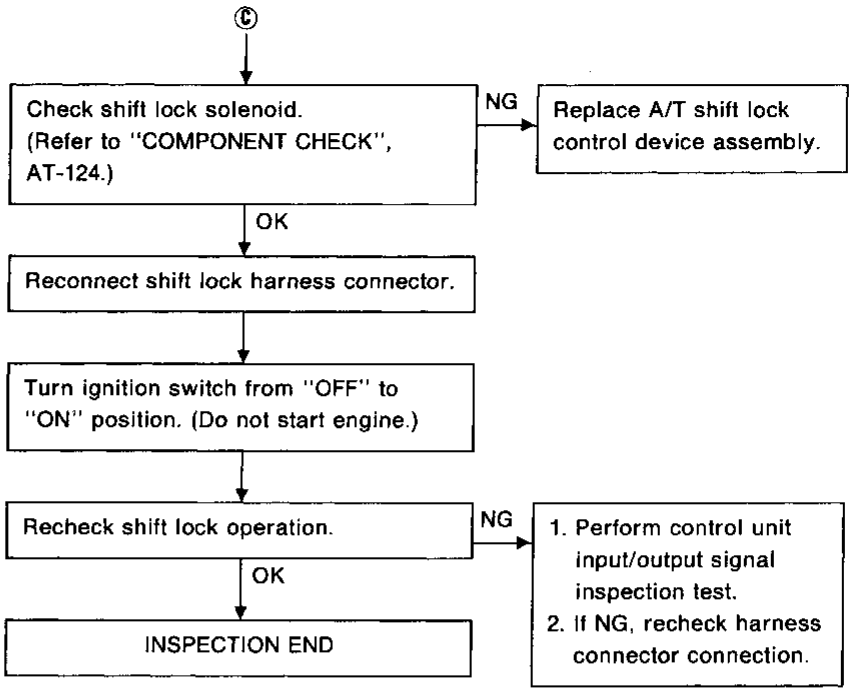
1. Disconnect shift lock harness connector.
2. Check continuity between shift lock harness terminal ⑨ and ground.
Continuity should exist.

NG → Repair harness or connector.

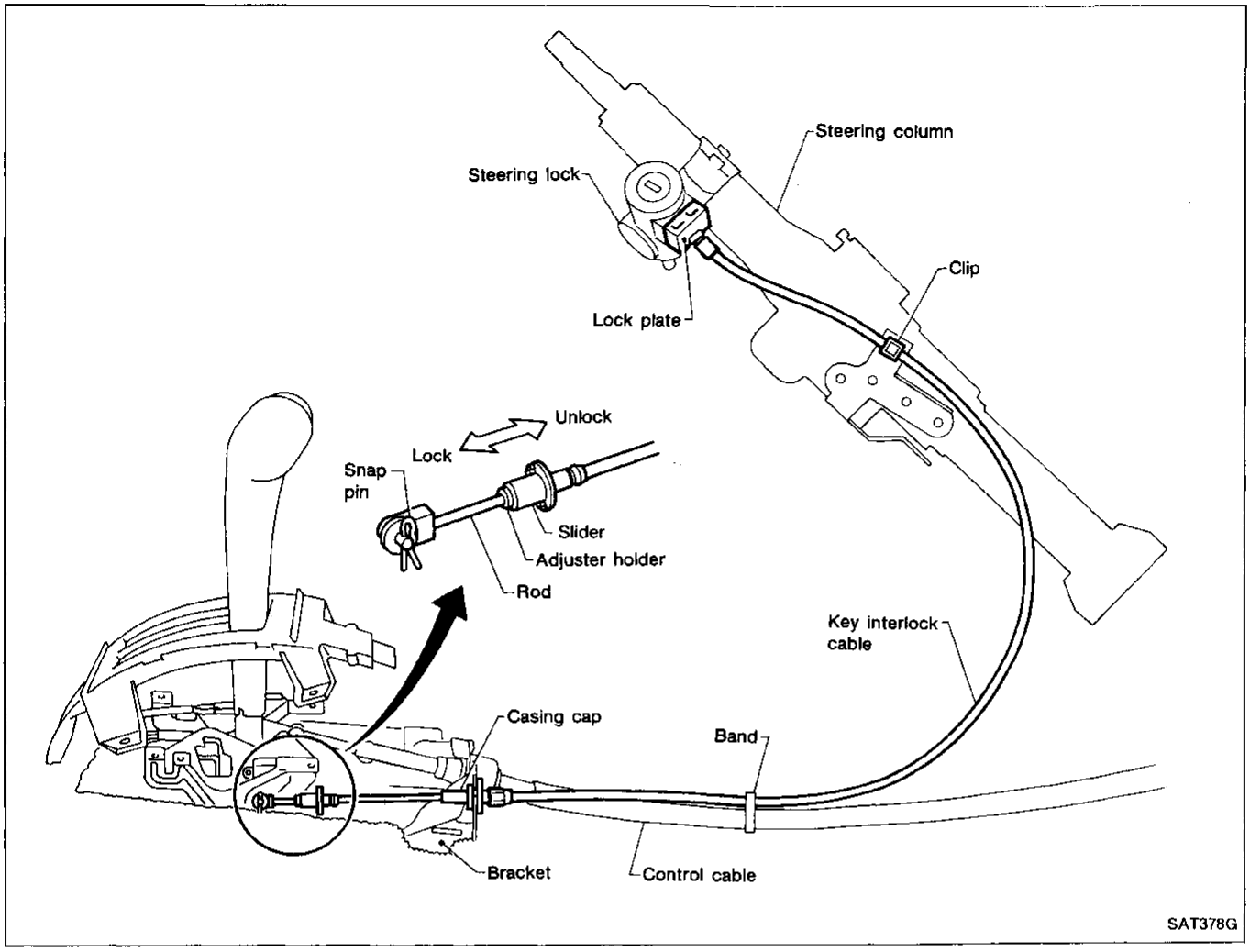
OK ↓

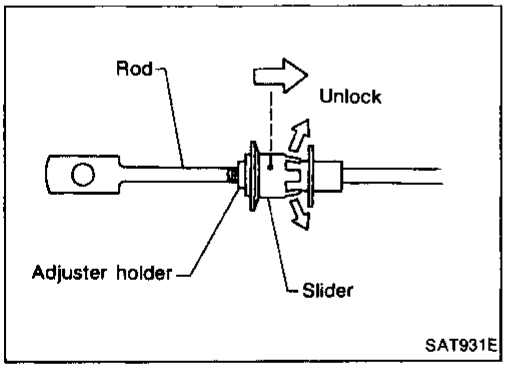
Ⓒ

Diagnostic Procedure (Cont'd)



Key Interlock Cable



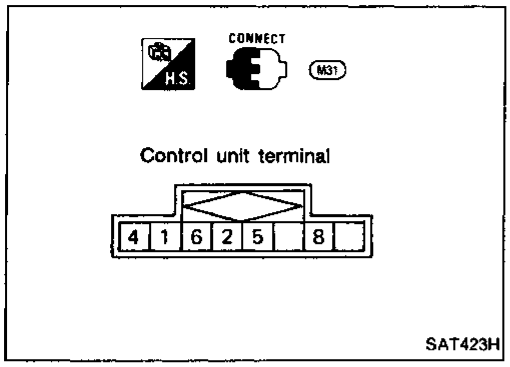


REMOVAL

1. Remove snap pin temporarily and remove key interlock cable from vehicle.
2. Unlock slider from adjuster holder and remove rod from cable.
3. Install rod to control device with snap pin.

INSTALLATION

1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set control lever to "P".
4. Insert rod into adjuster holder.
5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to rod.



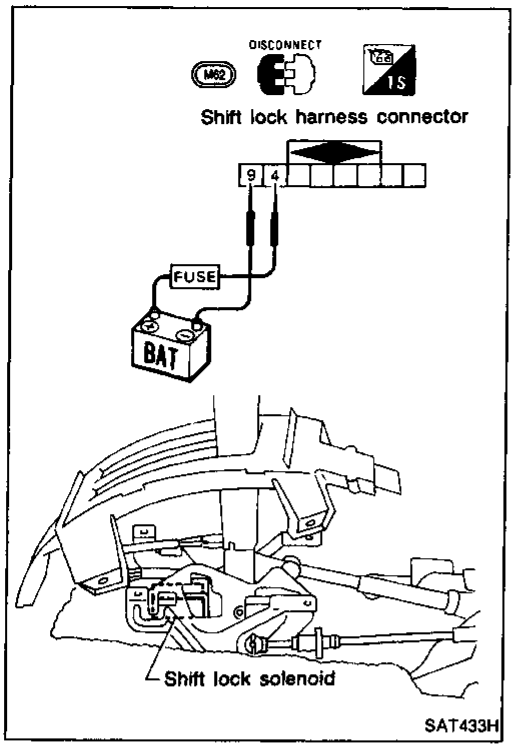
Shift Lock Control Unit Inspection

- Measure voltage between each terminal and terminal ⑧ by following "Shift Lock Control Unit Inspection Table".
- Pin connector terminal layout.

Shift Lock Control Unit Inspection Table

(Data are reference values.)

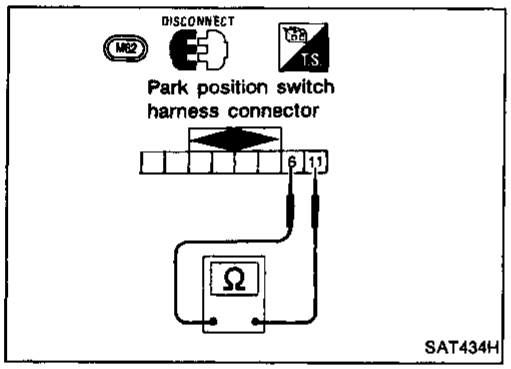
Terminal No. ⊕	Terminal No. ⊖	Item	Condition	Judgment standard
1	8	Ignition signal	Turn ignition switch to "ON" position.	Battery voltage
			Except above	0V
2		Power source	Any condition	Battery voltage
4		Shift lock signal	• Turn ignition switch to "ON" position • When selector lever is set in "P" position and brake pedal is depressed.	Battery voltage
			Except above	0V
5		Stop lamp switch	When brake pedal is depressed.	Battery voltage
			When brake pedal is released.	0V
6		Park position switch	• When key is inserted into key cylinder. Selector lever is set in "P" position. Selector lever button is pushed. • When selector lever is set in any position except "P".	Battery voltage
			Except above	0V



Component Check

SHIFT LOCK SOLENOID

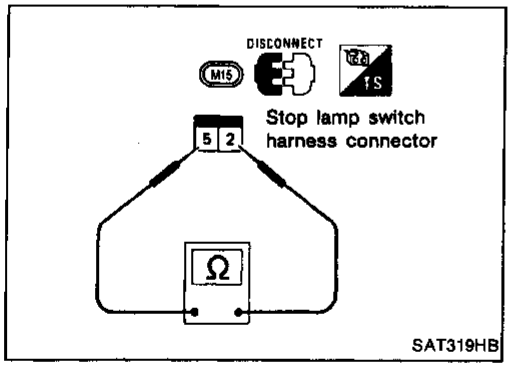
- Check operation by applying battery voltage to shift lock harness connector.



PARK POSITION SWITCH

- Check continuity between terminals ⑥ and ⑪ of park position switch harness connector.

Condition	Continuity
When selector lever is set in "P" position and selector lever button is released	No
Except above	Yes

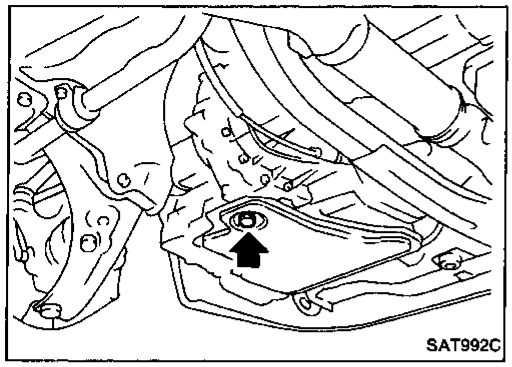


STOP LAMP SWITCH

- Check continuity between terminals ② and ⑤ of stop lamp switch harness connector.

Condition	Continuity
When brake pedal is depressed	Yes
When brake pedal is released	No

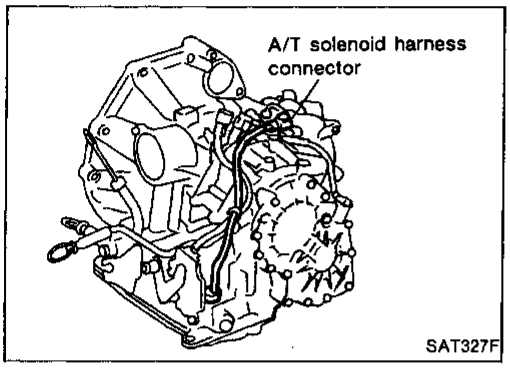
Check stop lamp switch after adjusting brake pedal — refer to section BR.


SAT992C

Control Valve Assembly and Accumulator

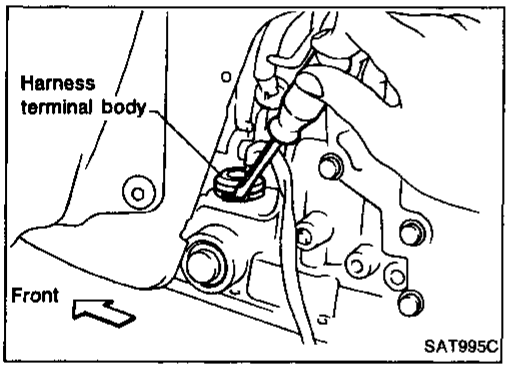
REMOVAL

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



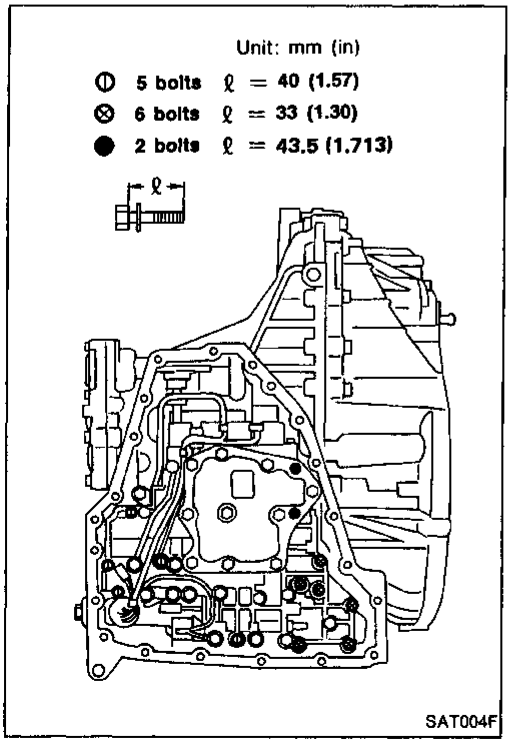
SAT327F

3. Disconnect A/T solenoid harness 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

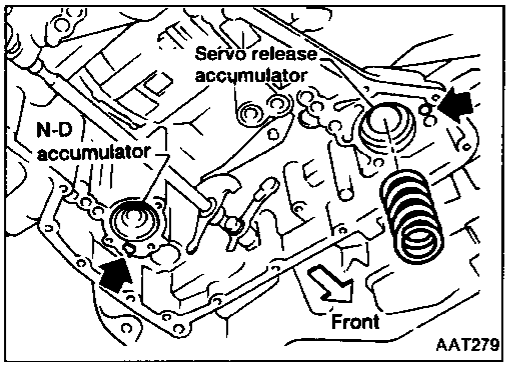
6. Remove control valve assembly by removing fixing bolts ⓘ, ⓧ and ●.

Bolt length, number and location are shown in the illustration.

- **Be careful not to drop manual valve and servo release accumulator return spring.**

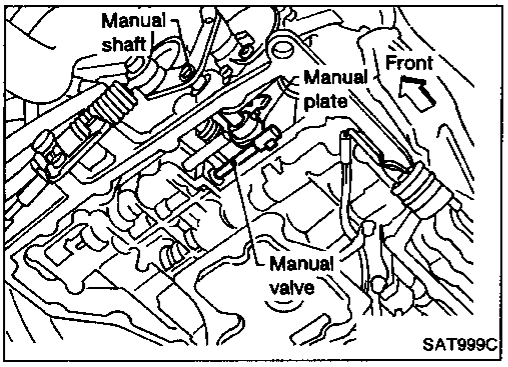
7. Disassemble and inspect control valve assembly if necessary — Refer to AT-153.

Control Valve Assembly and Accumulator (Cont'd)



8. Remove servo release and N-D accumulators by applying compressed air if necessary.

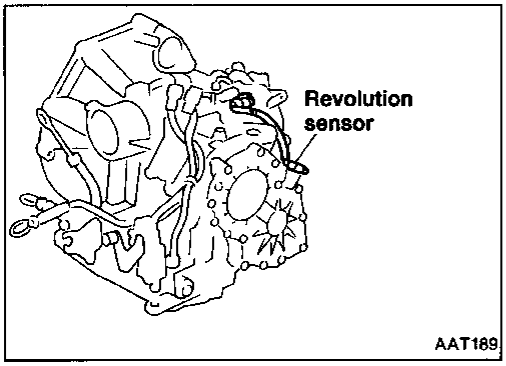
- **Hold each piston with a rag.**



INSTALLATION

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

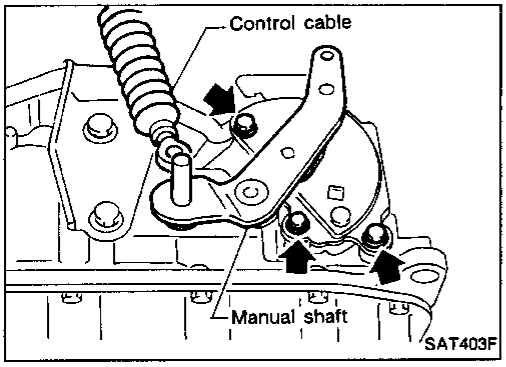
Revolution Sensor Replacement



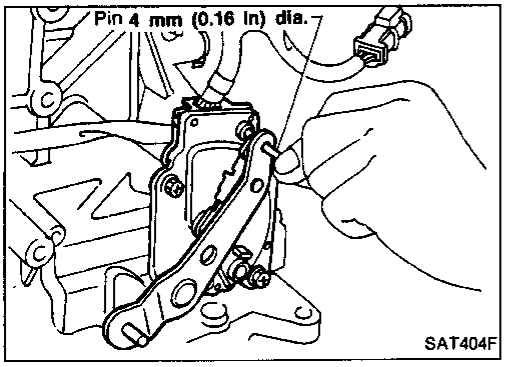
1. Remove under cover.
2. Remove revolution sensor from A/T.
3. Reinstall any part removed.

Always use new sealing parts.

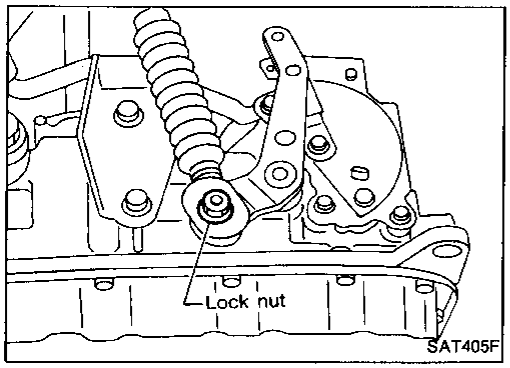
Inhibitor Switch Adjustment



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



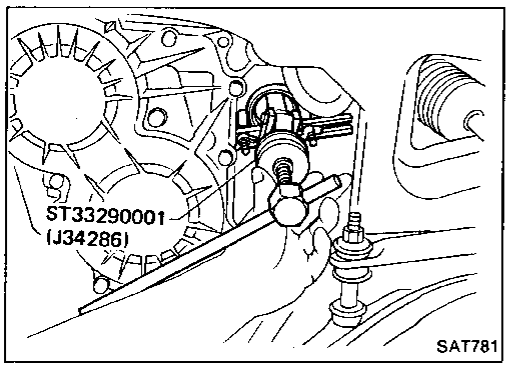
4. Insert pin into adjustment holes in both inhibitor switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — Refer to AT-105.



Control Cable Adjustment

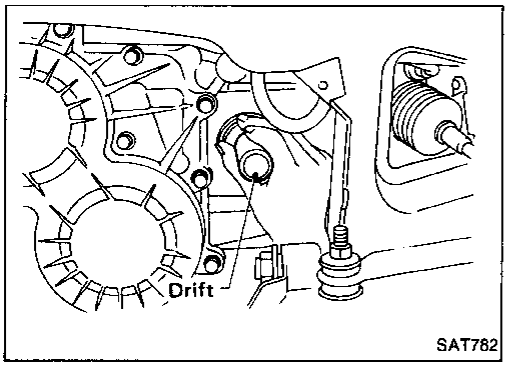
Move selector lever from "P" to "1" position. You should be able to feel the detents in each position.
If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.

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" to "1" position again. Make sure selector lever moves smoothly.



Differential Side Oil Seal Replacement

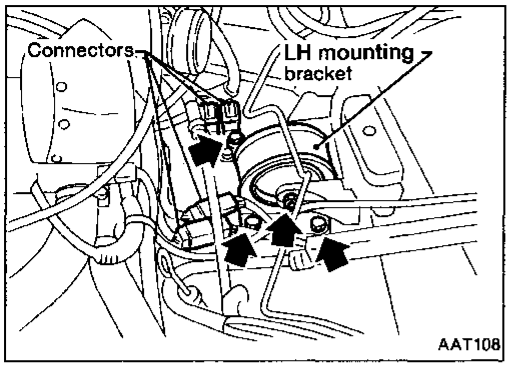
1. Remove drive shaft assembly. — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
2. Remove oil seal.

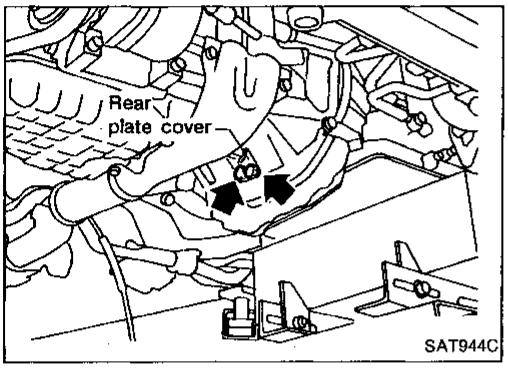


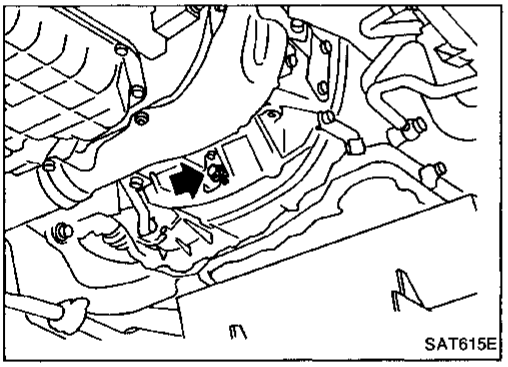
3. Install oil seal.

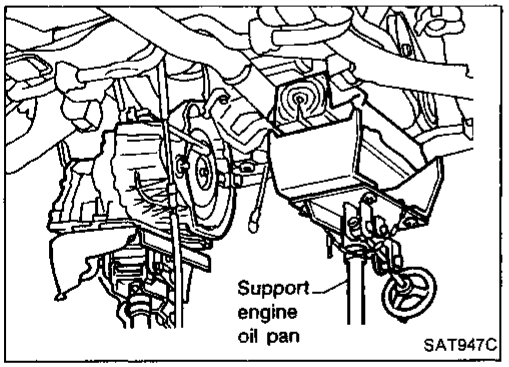
Apply ATF before installing.

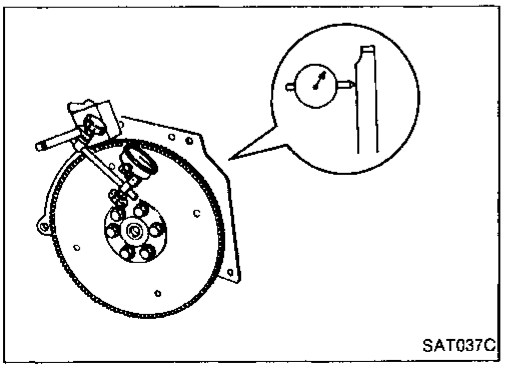
4. Reinstall any part removed.











Removal

CAUTION:

When removing the transaxle assembly from engine, first remove the crankshaft position sensor (POS) from the assembly.

Be careful not to damage sensor edge.

- Remove battery and bracket.
- Remove air cleaner and resonator.
- Disconnect terminal cord assembly harness connector and inhibitor switch harness connectors.
- Disconnect harness connectors of revolution sensor and vehicle speed sensor.
- Remove crankshaft position sensor (POS) from transaxle.
- Remove LH mounting bracket from transaxle and body.
- Disconnect control cable at transaxle side.
- Drain ATF.
- Remove drive shafts — Refer to FA section ("Removal", "FRONT AXLE — Drive Shaft").
- Disconnect oil cooler piping.
- Remove starter motor from transaxle.
- Support engine by placing a jack under oil pan.

Do not place jack under oil pan drain plug.

- Remove center member.
- Remove rear plate cover and bolts securing torque converter to drive plate.

Rotate crankshaft for access to securing bolts.

- Support transaxle with a jack.
- Remove bolts fixing A/T to engine.
- Lower transaxle while supporting it with a jack.

Installation

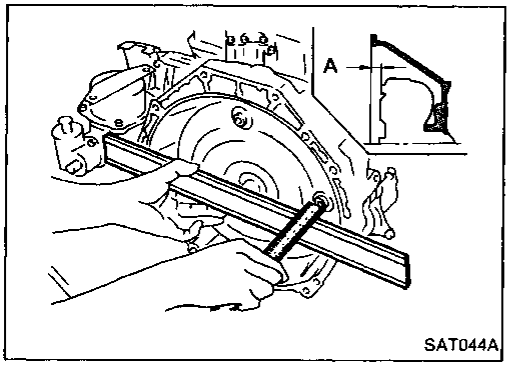
- Drive plate runout

  Maximum allowable runout:

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

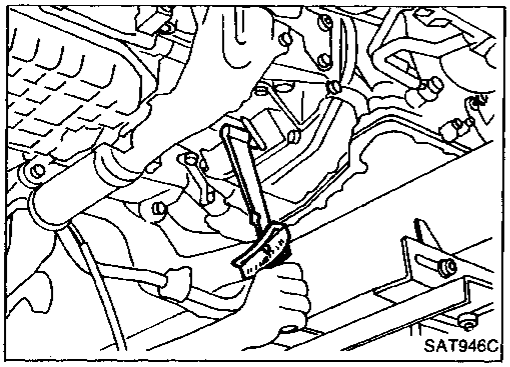
  If this runout is out of allowance, replace drive plate and ring gear.

Installation (Cont'd)

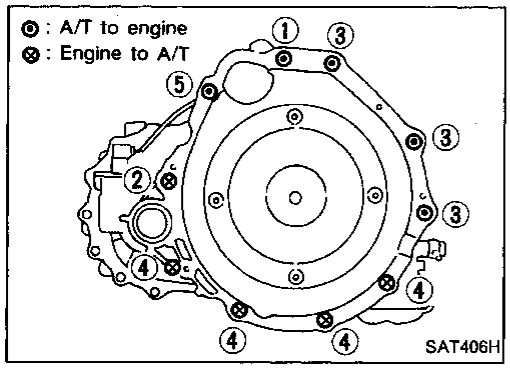


- When connecting torque converter to transaxle, measure distance "A" to be certain that they are correctly assembled.

  Distance "A":
  14 mm (0.55 in) or more



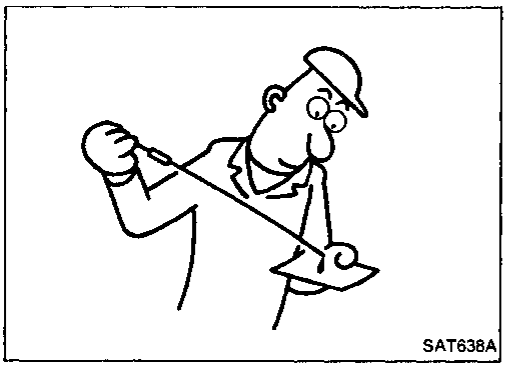
- Install bolts fixing converter to drive plate.
- **With converter installed, rotate crankshaft several turns to check that transaxle rotates freely without binding.**



- Tighten bolt securing transaxle.

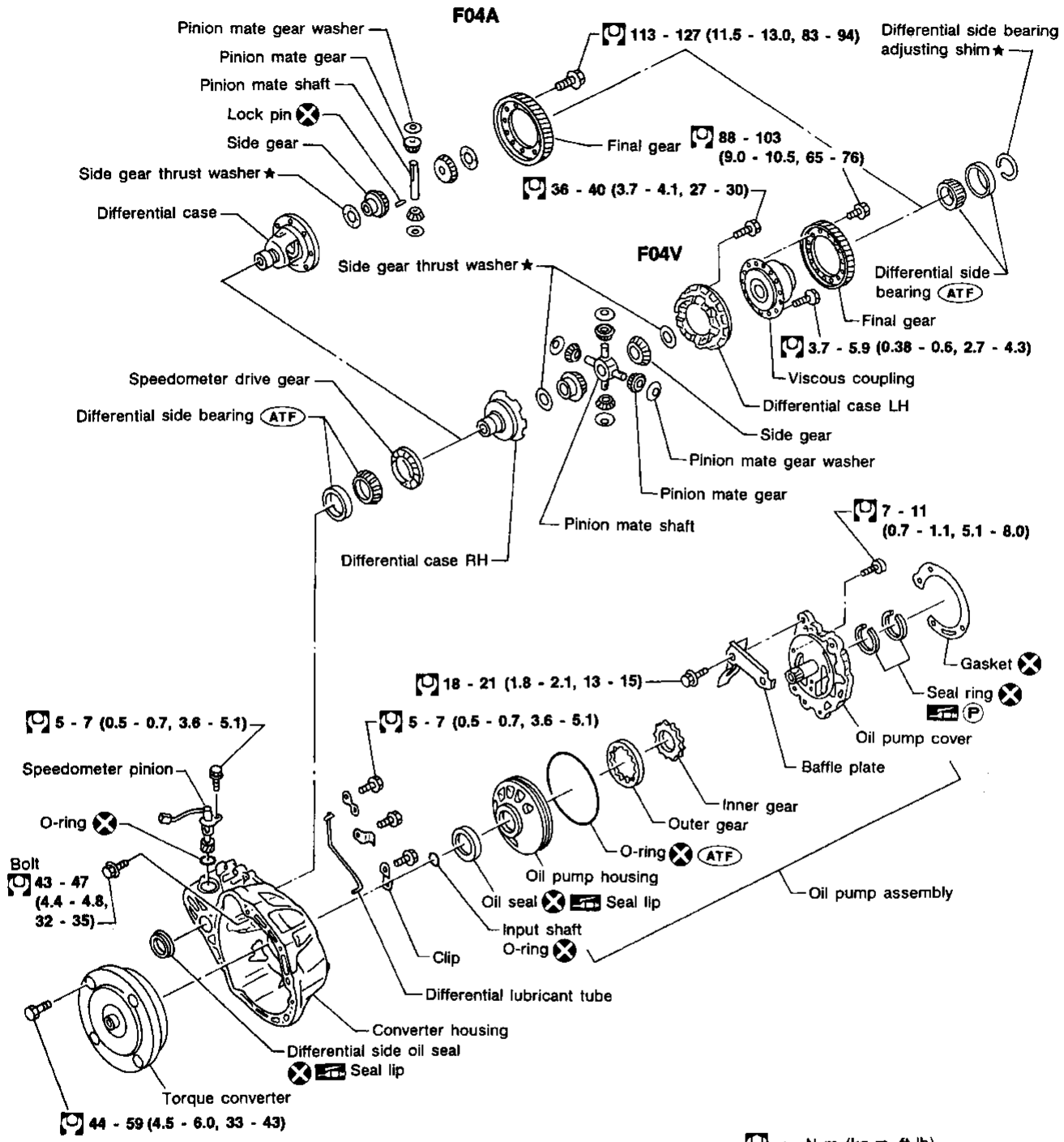
Bolt No.	Tightening torque N·m (kg-m, ft-lb)	mm (in)
1	70 - 79 (7.1 - 8.1, 51 - 59)	65 (2.56)
2	70 - 79 (7.1 - 8.1, 51 - 59)	52 (2.05)
3	70 - 79 (7.1 - 8.1, 51 - 59)	52 (2.05)
4	70 - 79 (7.1 - 8.1, 51 - 59)	40 (1.57)
5	70 - 79 (7.1 - 8.1, 51 - 59)	124 (4.88)

- Reinstall any part removed.

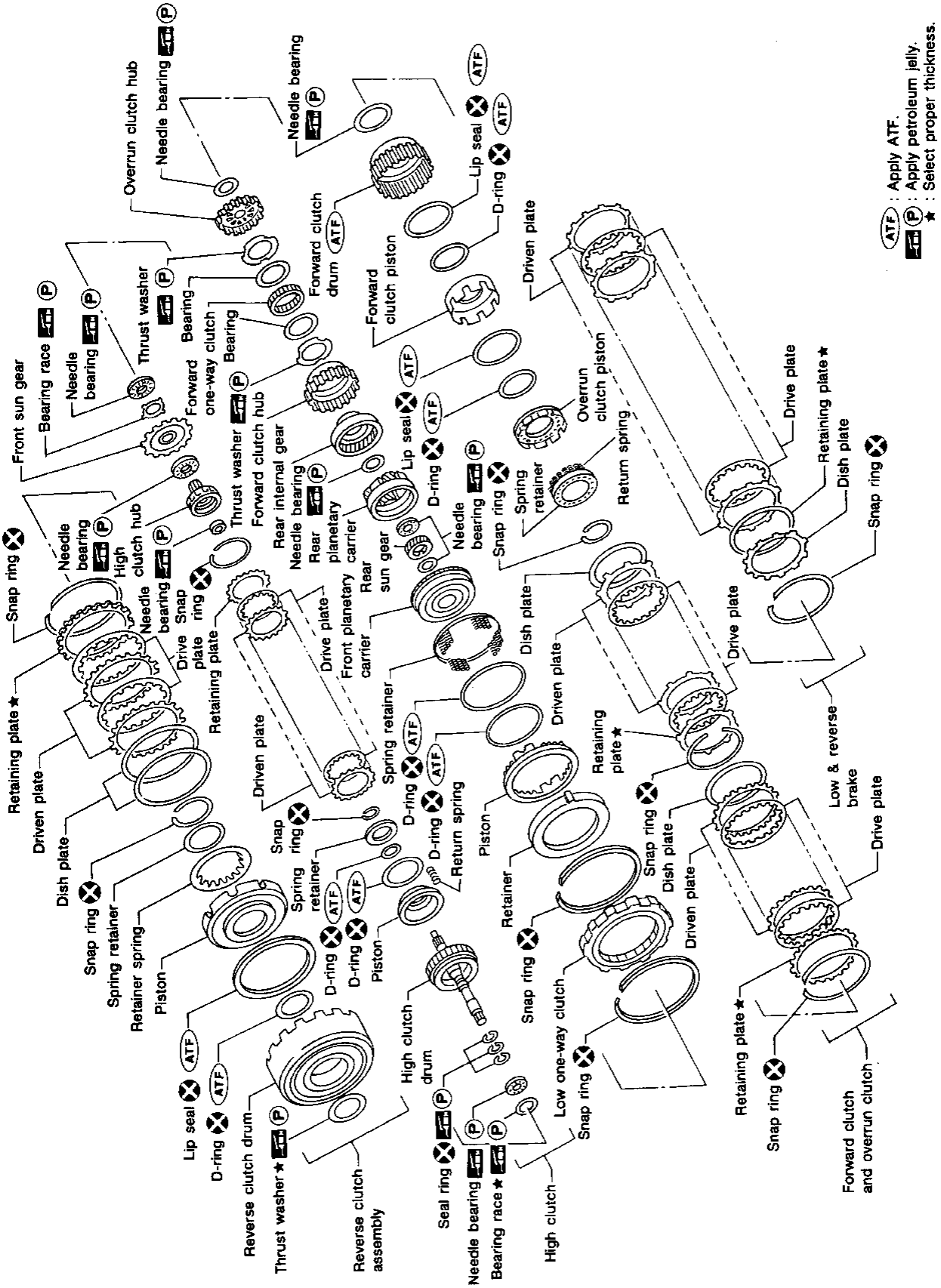


- Check fluid level in transaxle.
- Move selector lever through all positions to be sure that transaxle operates correctly.
  With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" position. A slight shock should be felt by hand gripping selector each time transaxle is shifted.
- Perform road test — Refer to AT-25.

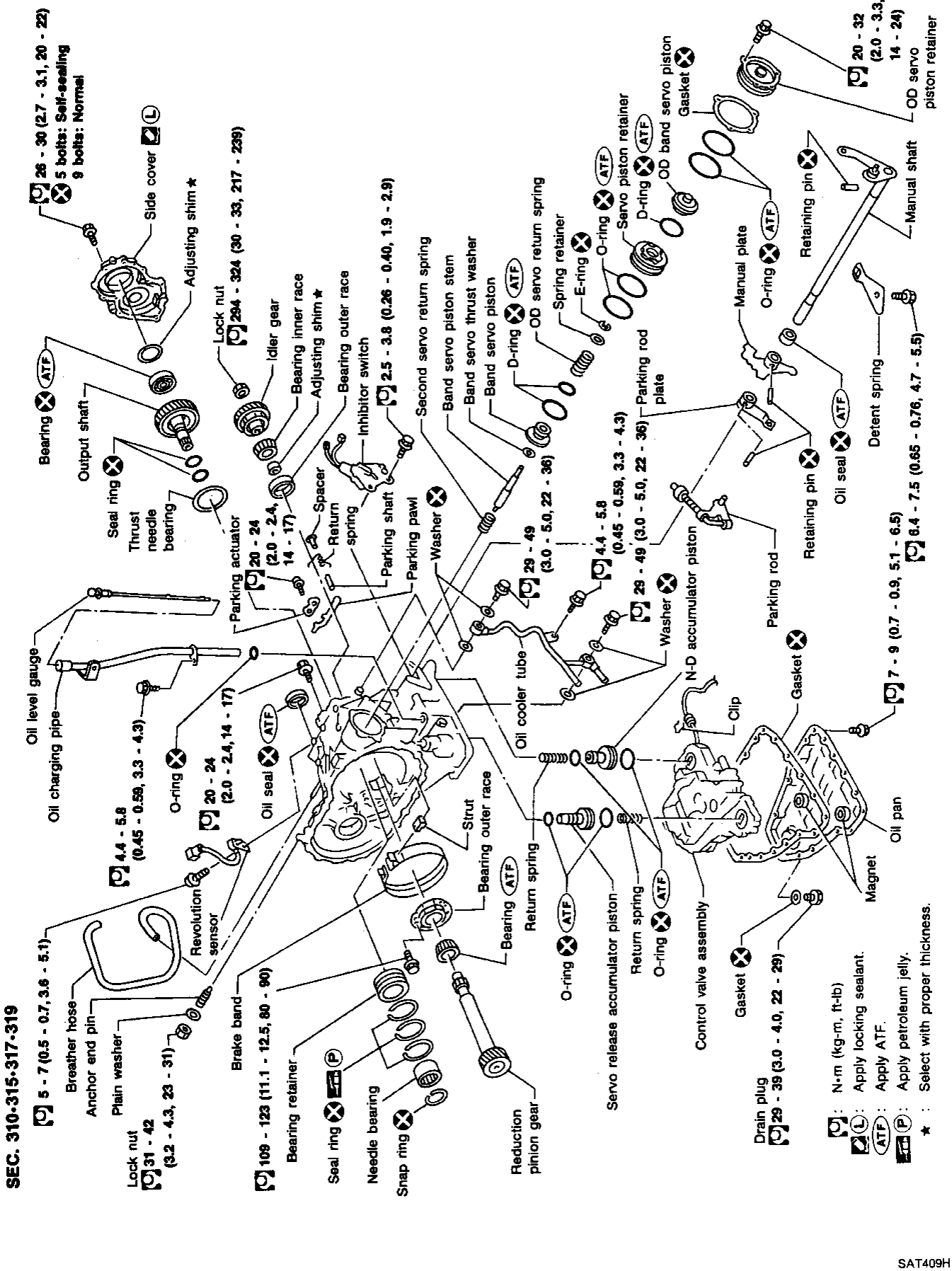
SEC. 311•313•327•381



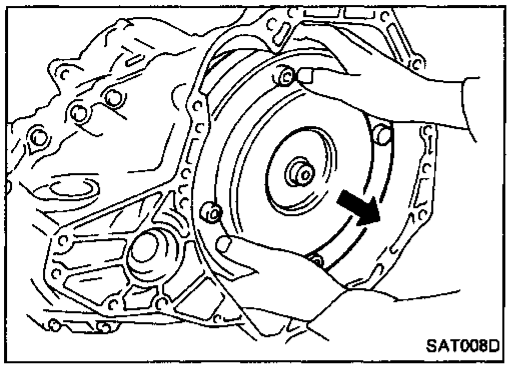
SAT408H


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

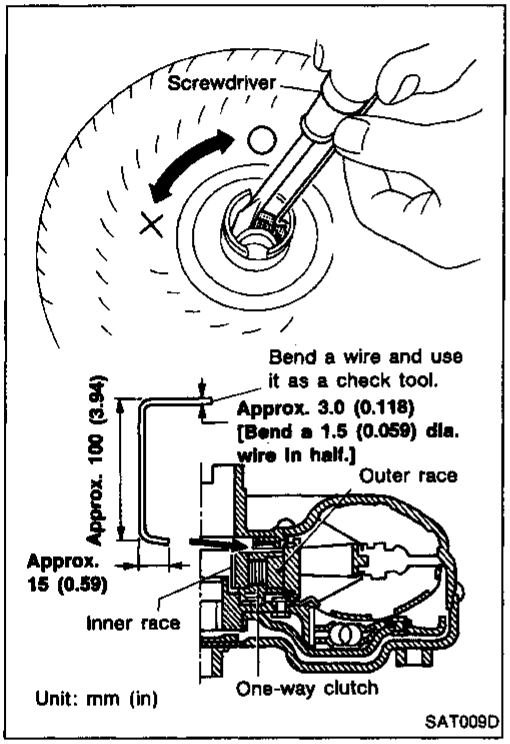
SAT114HB


SEC. 310·315·317·319
26 - 30 (2.7 - 3.1, 20 - 22)
5 bolts: Self-sealing
9 bolts: Normal
Side cover (L)
Adjusting shim ★
Bearing (ATF)
Output shaft
Seal ring
Thrust needle bearing
Lock nut 294 - 324 (30 - 33, 217 - 239)
Idler gear
Bearing inner race
Adjusting shim ★
Bearing outer race
Inhibitor switch
2.5 - 3.8 (0.26 - 0.40, 1.9 - 2.9)
Spacer
Return spring
Parking shaft
Parking pawl
Parking actuator
20 - 24 (2.0 - 2.4, 14 - 17)
Second servo return spring
Band servo piston stem
Band servo thrust washer
Band servo piston
D-ring (ATF)
OD servo return spring
Spring retainer
E-ring
O-ring (ATF)
Servo piston retainer
D-ring (ATF)
OD band servo piston
Gasket
20 - 32 (2.0 - 3.3, 14 - 24)
OD servo piston retainer
Manual plate
O-ring (ATF)
Retaining pin
Manual shaft
Detent spring
Oil seal (ATF)
Retaining pin
Parking rod
Parking rod plate
29 - 49 (3.0 - 5.0, 22 - 36)
4.4 - 5.8 (0.45 - 0.59, 3.3 - 4.3)
Washer
N-D accumulator piston
Oil cooler tube
Oil level gauge
Oil charging pipe
Breather hose
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)
4.4 - 5.8 (0.45 - 0.59, 3.3 - 4.3)
O-ring
20 - 24 (2.0 - 2.4, 14 - 17)
Oil seal (ATF)
Revolution sensor
Brake band
109 - 123 (11.1 - 12.5, 80 - 90)
Bearing retainer
Seal ring (P)
Needle bearing
Snap ring
Reduction pinion gear
Strut
Bearing outer race
Bearing (ATF)
Return spring
O-ring (ATF)
Servo release accumulator piston
Return spring
O-ring (ATF)
Control valve assembly
Clip
Gasket
Gasket
Drain plug 29 - 39 (3.0 - 4.0, 22 - 29)
Magnet
Oil pan
7 - 9 (0.7 - 0.9, 5.1 - 6.5)
6.4 - 7.5 (0.65 - 0.76, 4.7 - 5.5)
: N·m (kg-m, ft-lb)
(L): Apply locking sealant.
(ATF): Apply ATF.
(P): Apply petroleum jelly.
★ : Select with proper thickness.

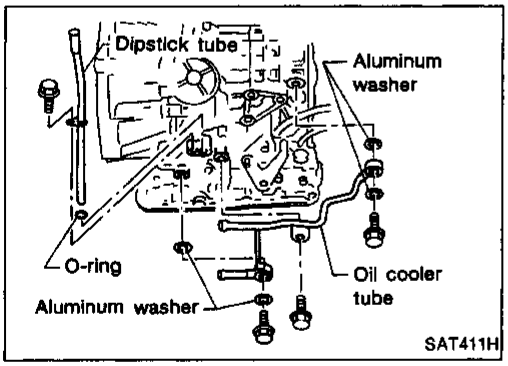
SAT409H



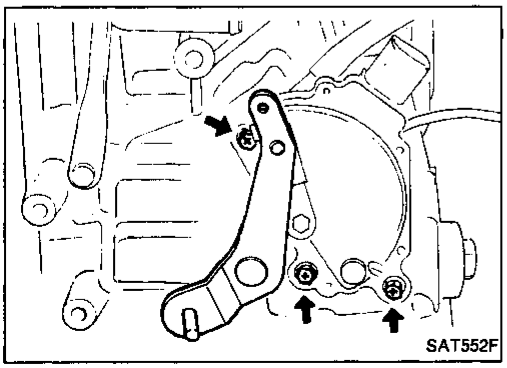
1. Drain ATF through drain plug.
2. Remove torque converter.



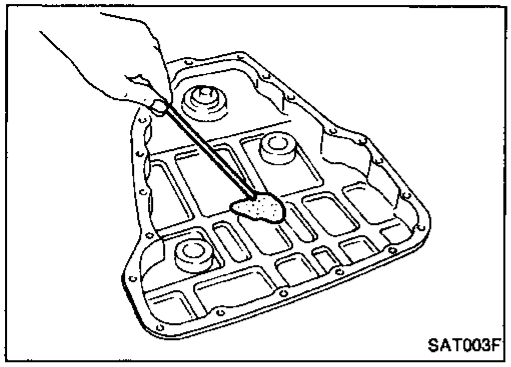
3. Check torque converter one-way clutch using check tool as shown at left.
   a. Insert check tool into the groove of bearing support built into one-way clutch outer race.
   b. When fixing bearing support with check tool, rotate one-way clutch spline using screwdriver.
   c. Check that inner race rotates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



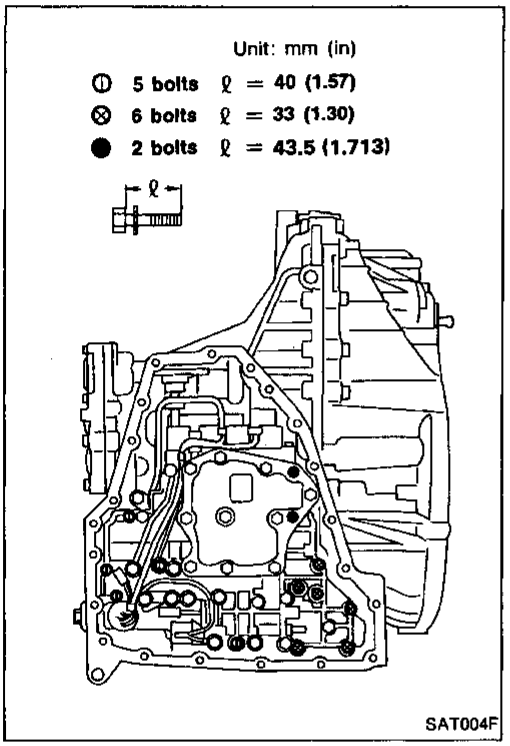
4. Remove oil charging pipe and oil cooler tube.



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


SAT003F

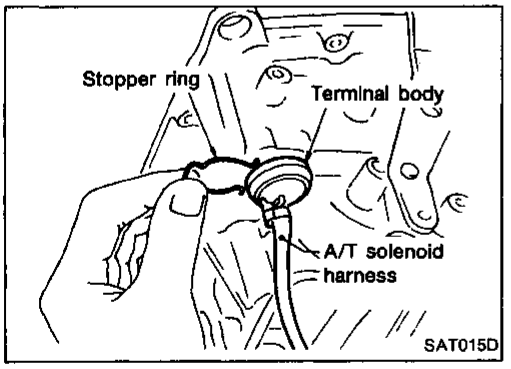
7. Remove oil pan and oil pan gasket.
- **Do not reuse oil pan bolts.**
8. Check foreign materials in oil pan to help determine causes of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. It can cause valves, servo, and clutches to stick and may inhibit pump pressure.



SAT004F

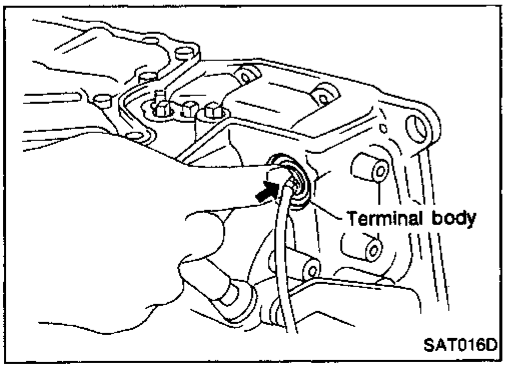
9. Remove control valve assembly according to the following procedures.

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



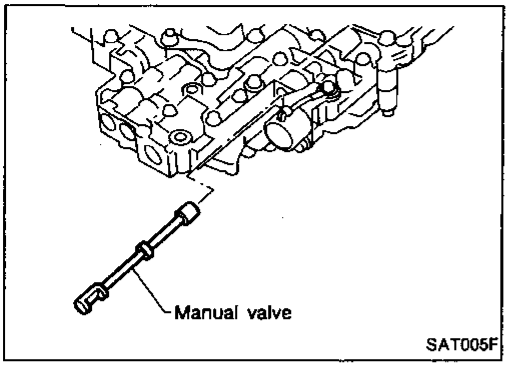
SAT015D

b. Remove stopper ring from terminal body.

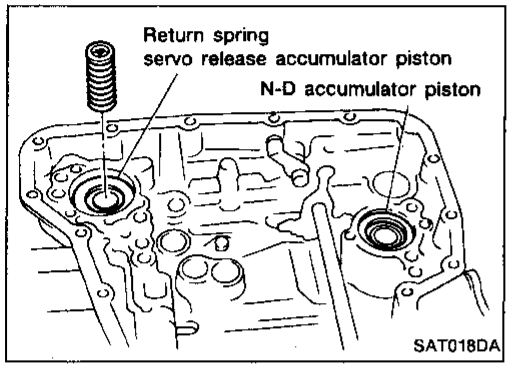


SAT016D

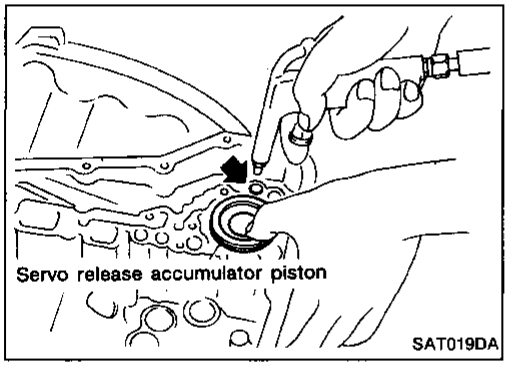
c. Push terminal body into transmission case and draw out solenoid harness.



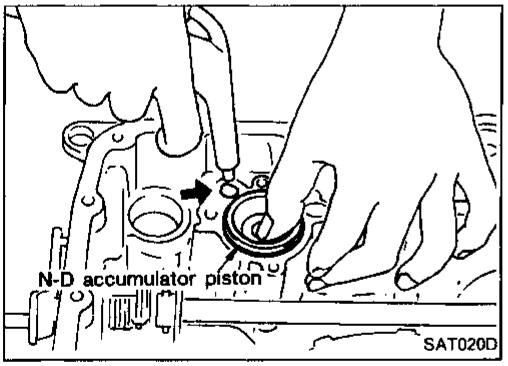
10. Remove manual valve from control valve assembly.



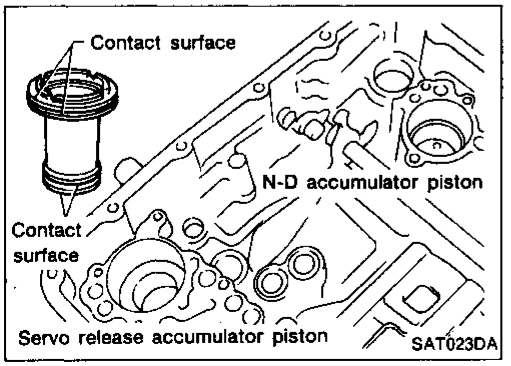
11. Remove return spring from servo release accumulator piston.



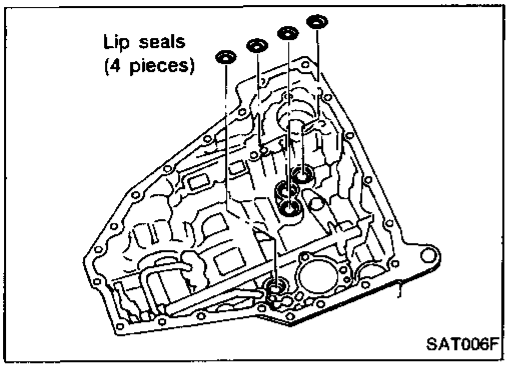
12. Remove servo release accumulator piston with compressed air.
13. Remove O-rings from servo release accumulator piston.



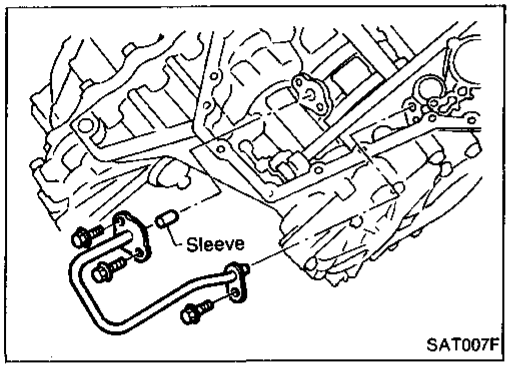
14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.



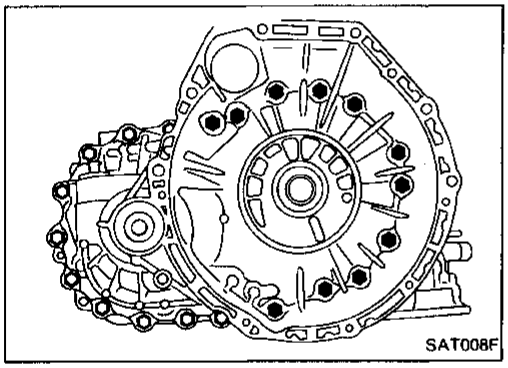
16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.



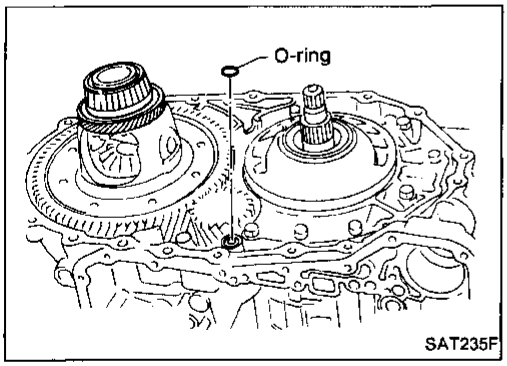
18. Remove lip seals.



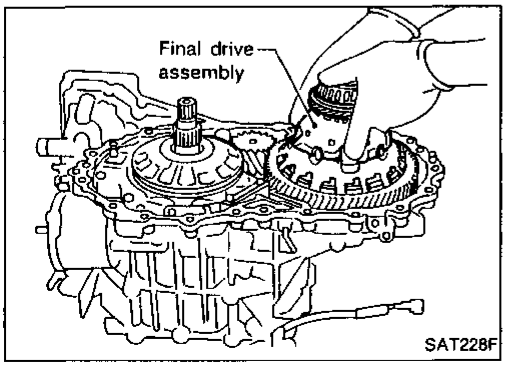
19. Remove tube and sleeve.



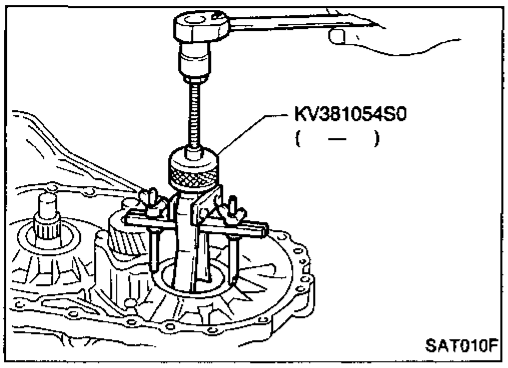
20. Remove converter housing according to the following procedures.
a. Remove converter housing mounting bolts.
b. Remove converter housing by tapping it lightly.



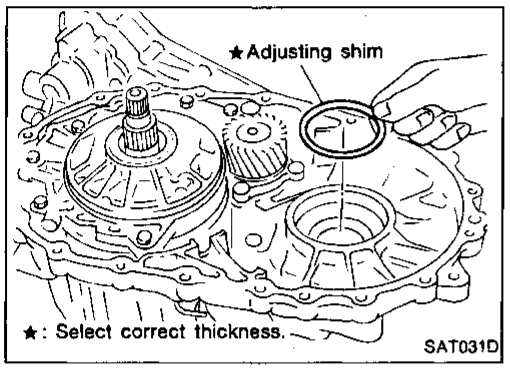
c. Remove O-ring from differential oil port.



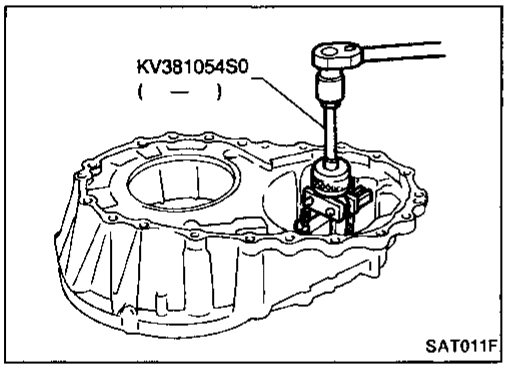
21. Remove final drive assembly from transmission case.



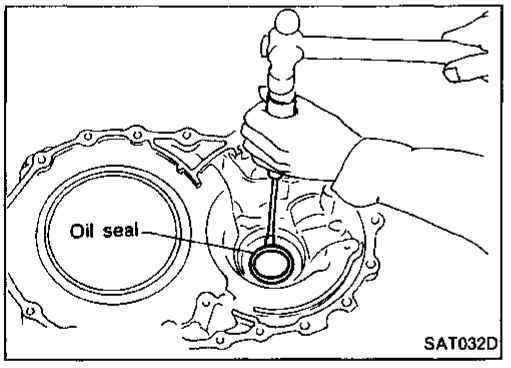
22. Remove differential side bearing outer race from transmission case.



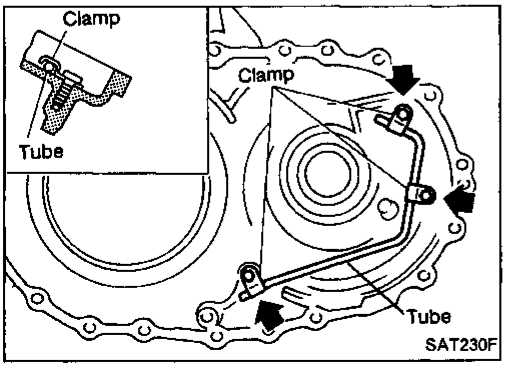
23. Remove differential side bearing adjusting shim from transmission case.



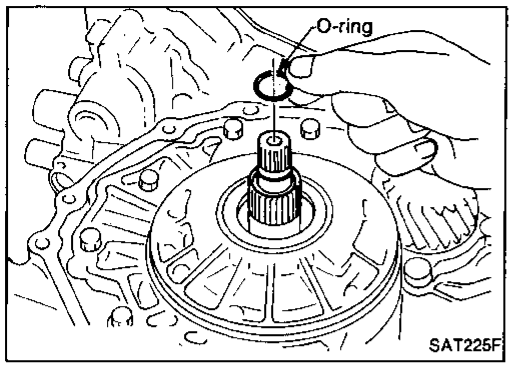
24. Remove differential side bearing outer race from converter housing.



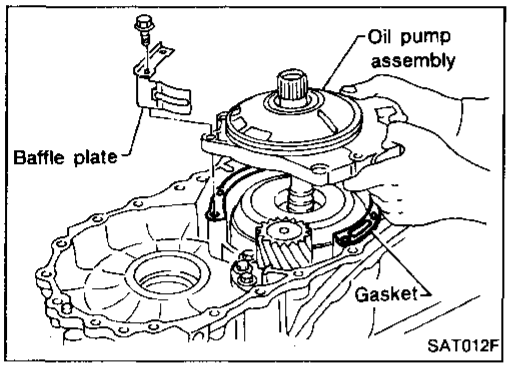
25. Remove oil seal with screwdriver from converter housing.
- **Be careful not to damage case.**



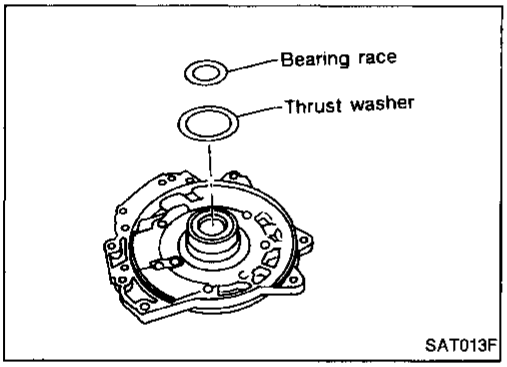
26. Remove oil tube from converter housing.



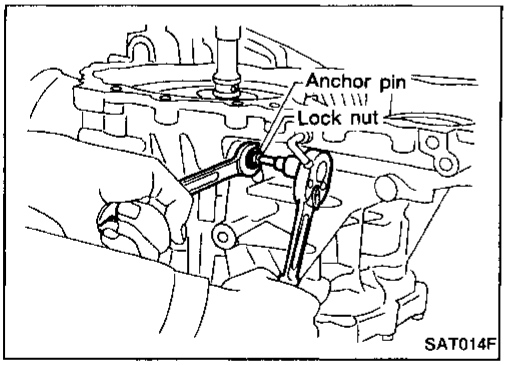
27. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.



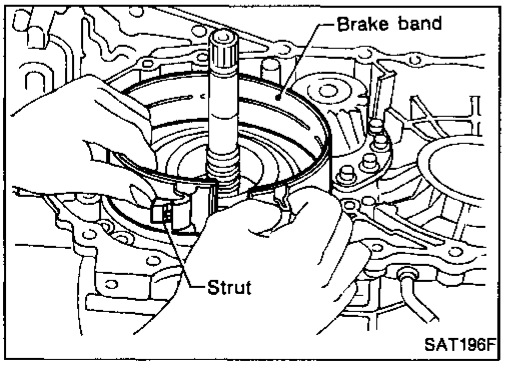
b. Remove oil pump assembly, baffle plate and gasket from transmission case.



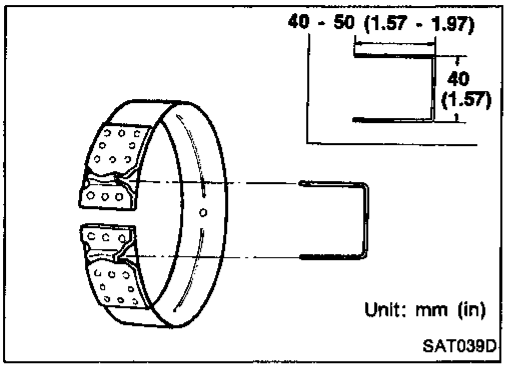
c. Remove thrust washer and bearing race from oil pump assembly.



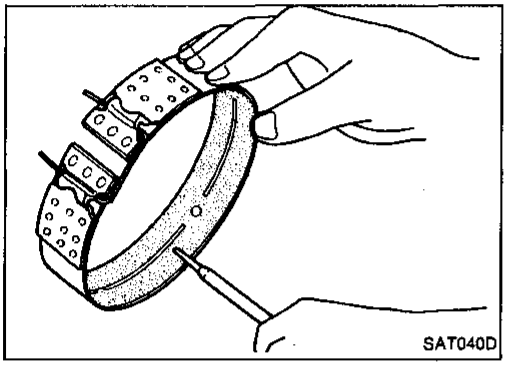
28. Remove brake band according to the following procedures.
a. Loosen lock nut, then back off band servo anchor end pin.



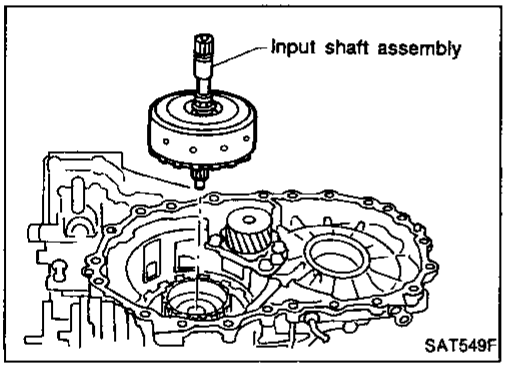
b. Remove brake band and strut from transmission case.



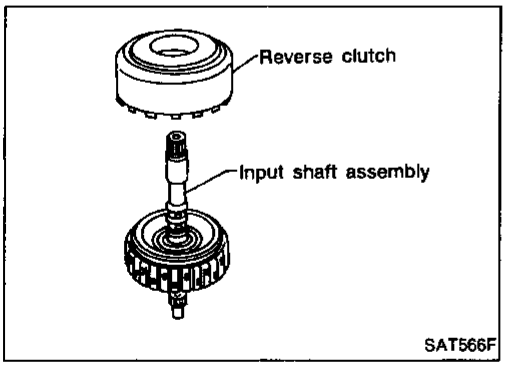
- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left.**
  Leave the clip in position after removing the brake band.



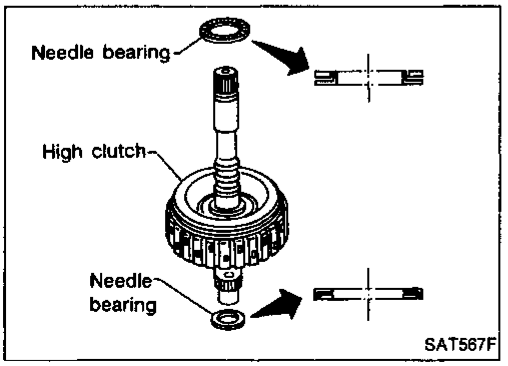
c. Check brake band facing for damage, cracks, wear or burns.



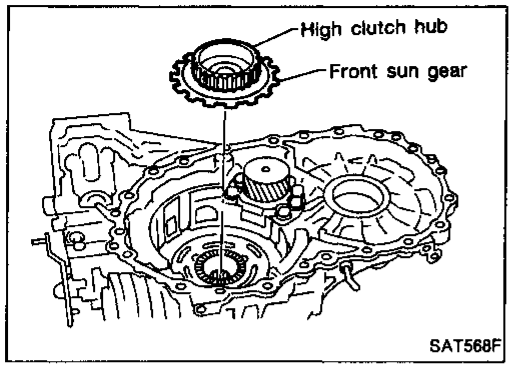
29. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.
a. Remove input shaft assembly (high clutch) with reverse clutch.



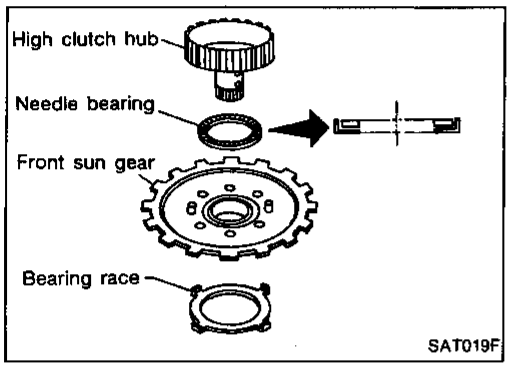
b. Remove input shaft assembly (high clutch) from reverse clutch.



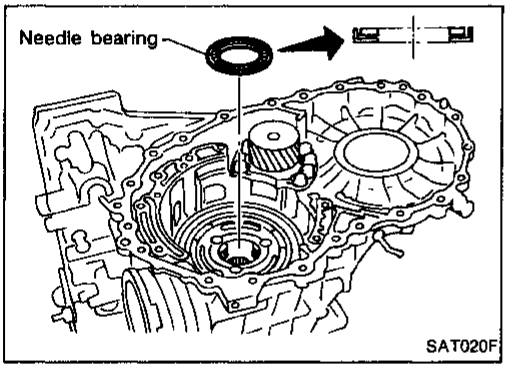
c. Remove needle bearings from high clutch drum and check for damage or wear.



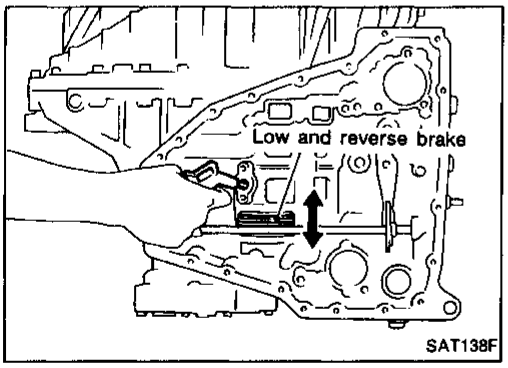
d. Remove high clutch hub and front sun gear from transmission case.



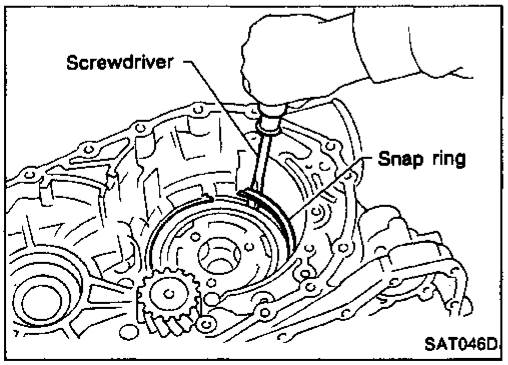
e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.
f. Remove bearing race from front sun gear and check for damage or wear.



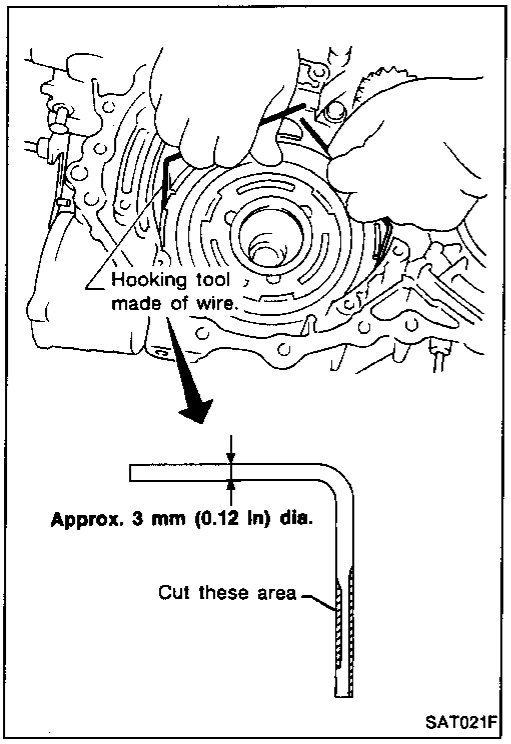
30. Remove needle bearing from transmission case and check for damage or wear.



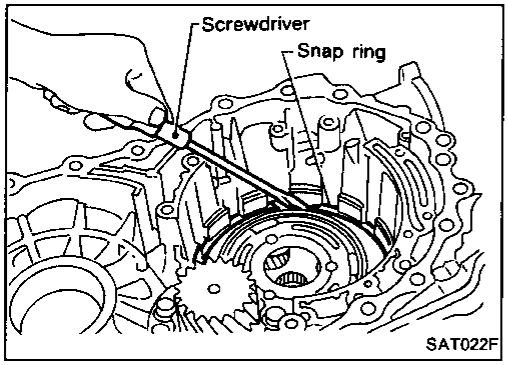
31. Apply compressed air and check to see that low and reverse brake operates.



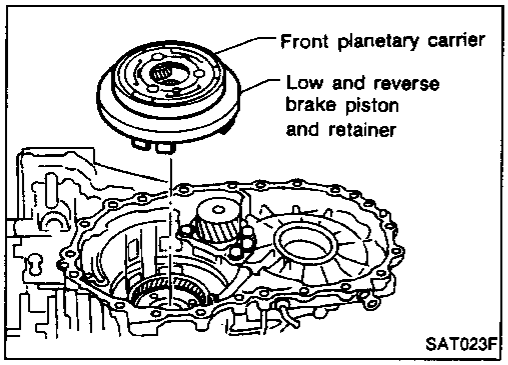
32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.
a. Remove snap ring with flat-bladed screwdriver.



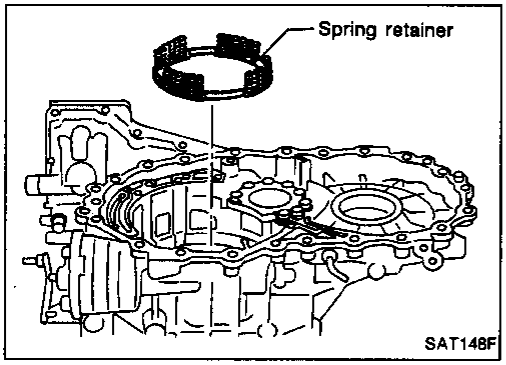
b. Remove low one way clutch with a hook made of wire.



c. Remove snap ring with flat-bladed screwdriver.

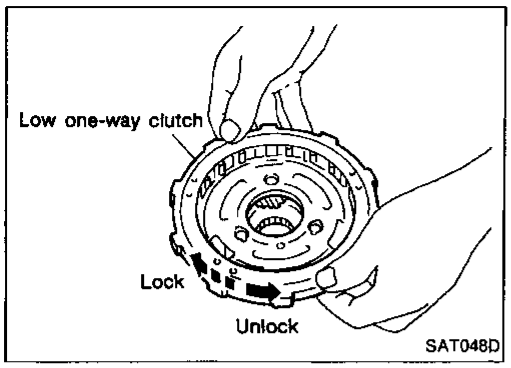


d. Remove front planetary carrier with low and reverse brake piston and retainer.

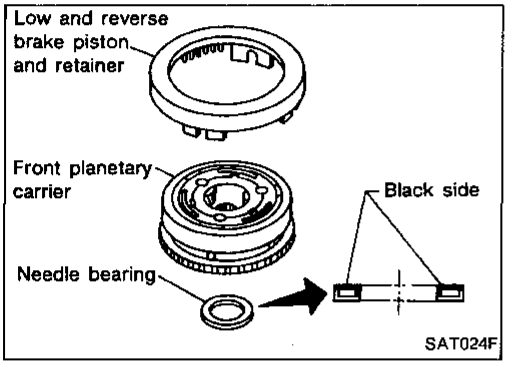


e. Remove low and reverse brake spring retainer.

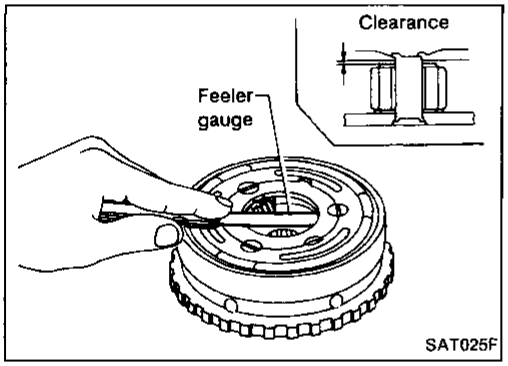
- **Do not remove return springs from spring retainer.**



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.

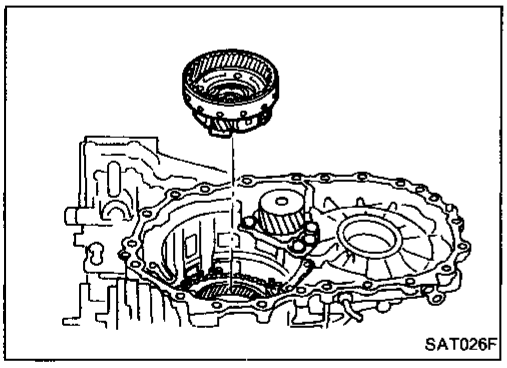
Standard clearance:

0.20 - 0.70 mm (0.0079 - 0.0276 in)

Allowable limit:

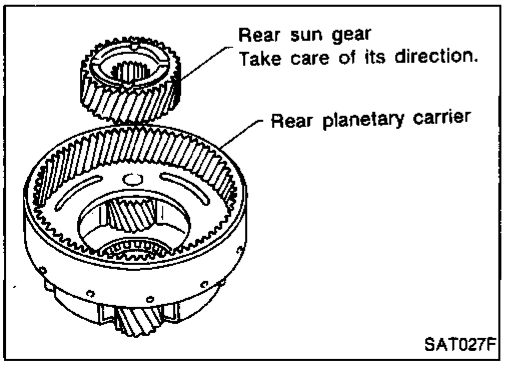
0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

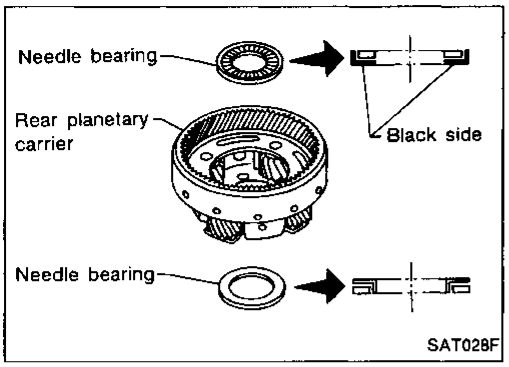


33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

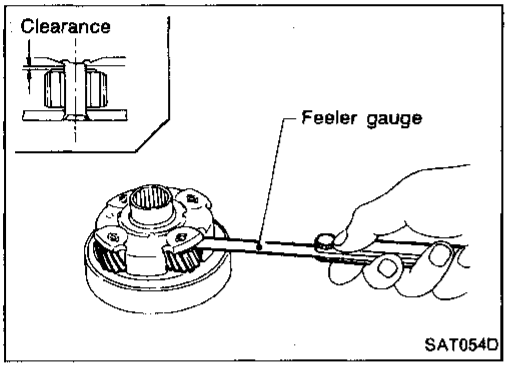
a. Remove rear planetary carrier assembly from transmission case.



b. Remove rear sun gear from rear planetary carrier.



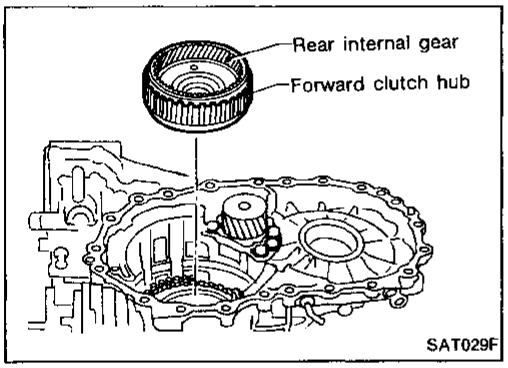
c. Remove needle bearings from rear planetary carrier assembly.



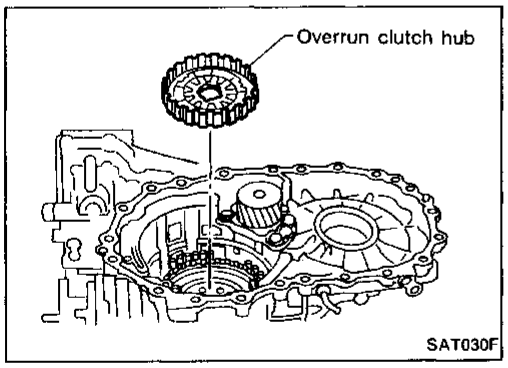
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.
e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

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

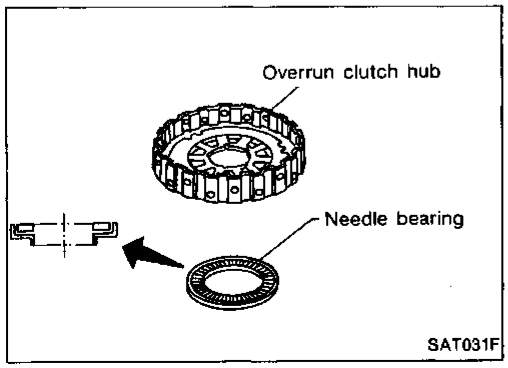
Replace rear planetary carrier if the clearance exceeds allowable limit.



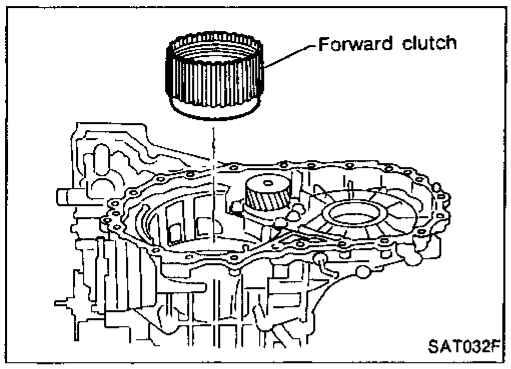
34. Remove rear internal gear and forward clutch hub from transmission case.



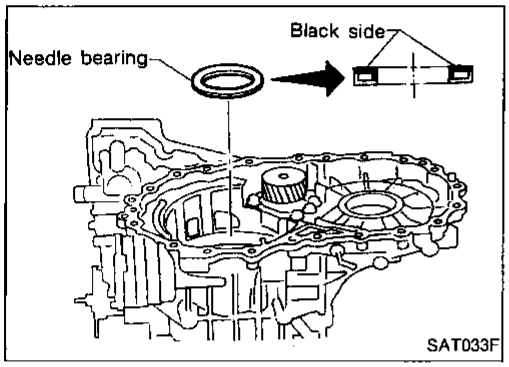
35. Remove overrun clutch hub from transmission case.



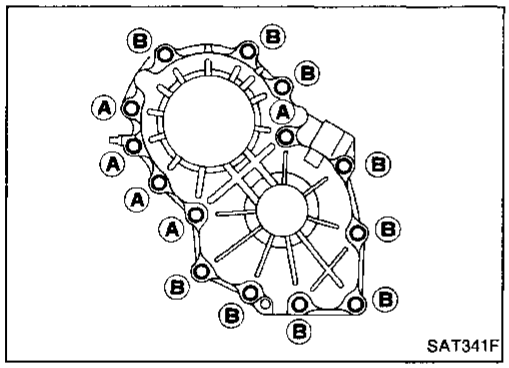
36. Remove needle bearing from overrun clutch hub and check for damage or wear.



37. Remove forward clutch assembly from transmission case.



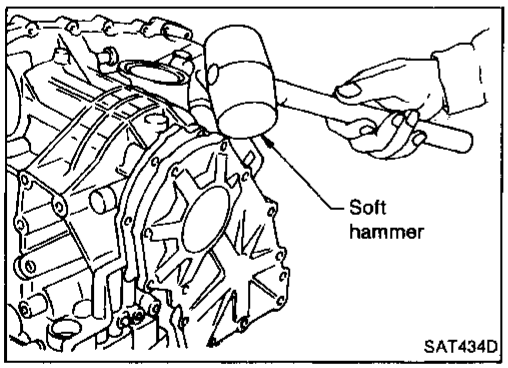
38. Remove needle bearing from transmission case.



39. Remove output shaft assembly according to the following procedures.

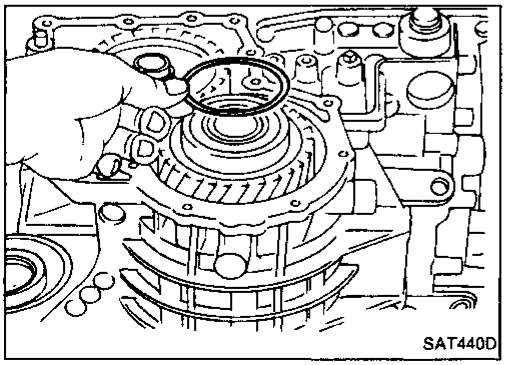
a. Remove side cover bolts.

- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**

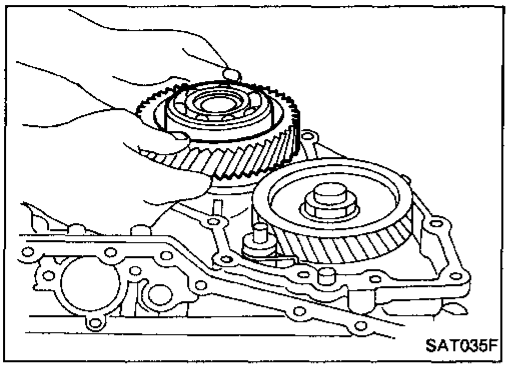


b. Remove side cover by lightly tapping it with a soft hammer.

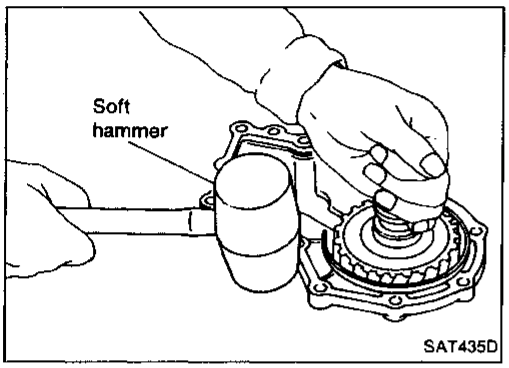
- **Be careful not to drop output shaft assembly, as it may be removed together with side cover.**



c. Remove adjusting shim.

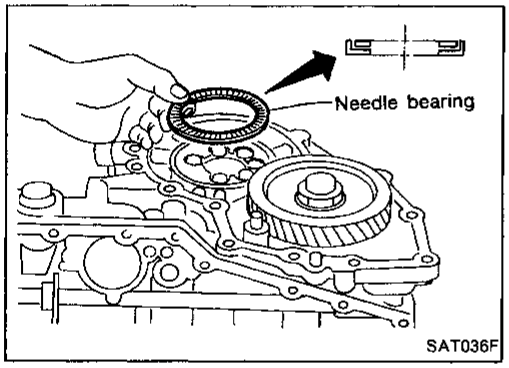

SAT035F

d. Remove output shaft assembly.



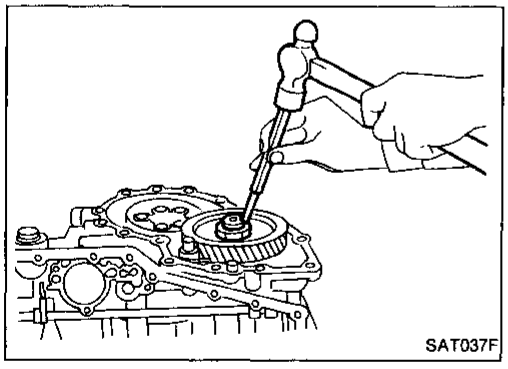
SAT435D

- If output shaft assembly was removed together with side cover, remove side cover. For removal tap the side cover with a soft hammer.

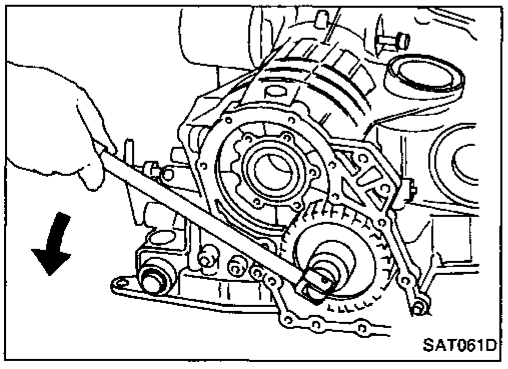


SAT036F

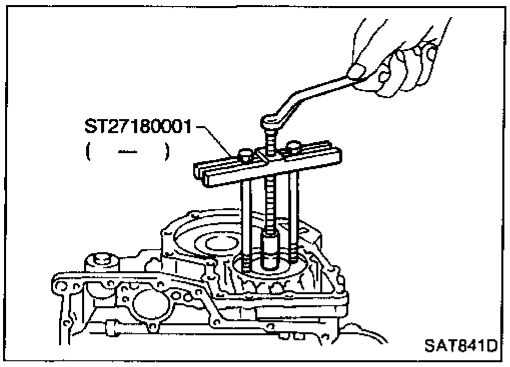
e. Remove needle bearing.


SAT037F

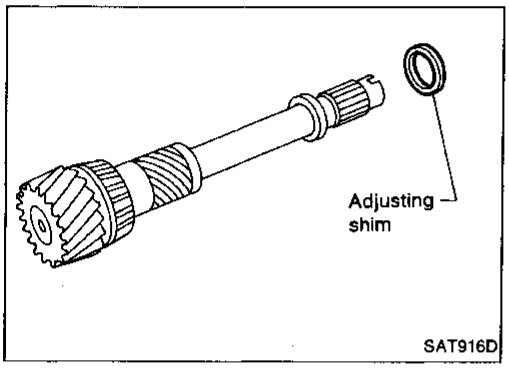
40. Disassemble reduction gear according to the following procedures.
a. Set manual lever to position "P" to fix idler gear.
b. Unlock idler gear lock nut using a pin punch.


SAT061D

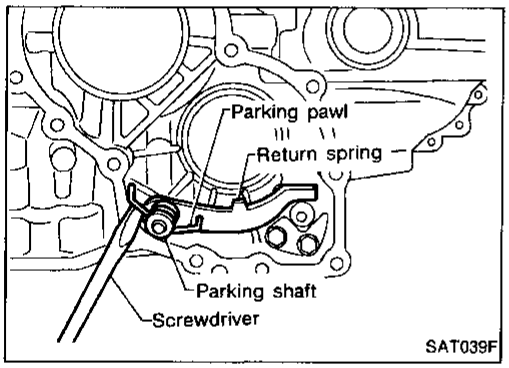
c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



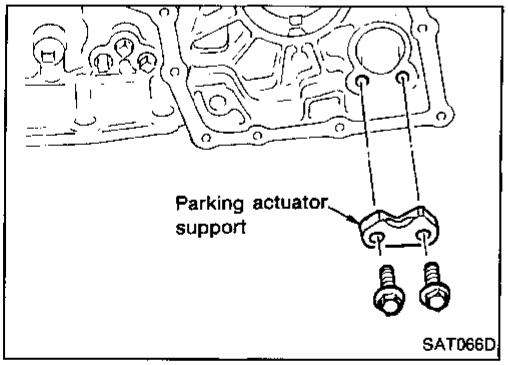
d. Remove idler gear with puller.



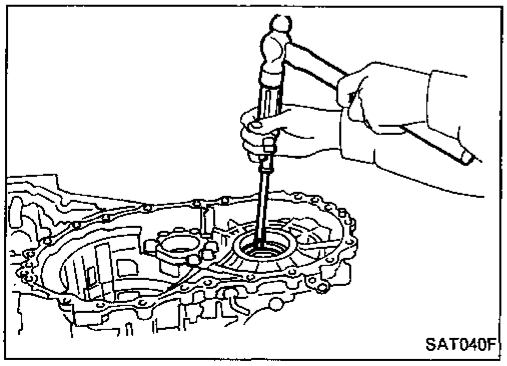
e. Remove reduction gear.
f. Remove adjusting shim from reduction gear.



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.

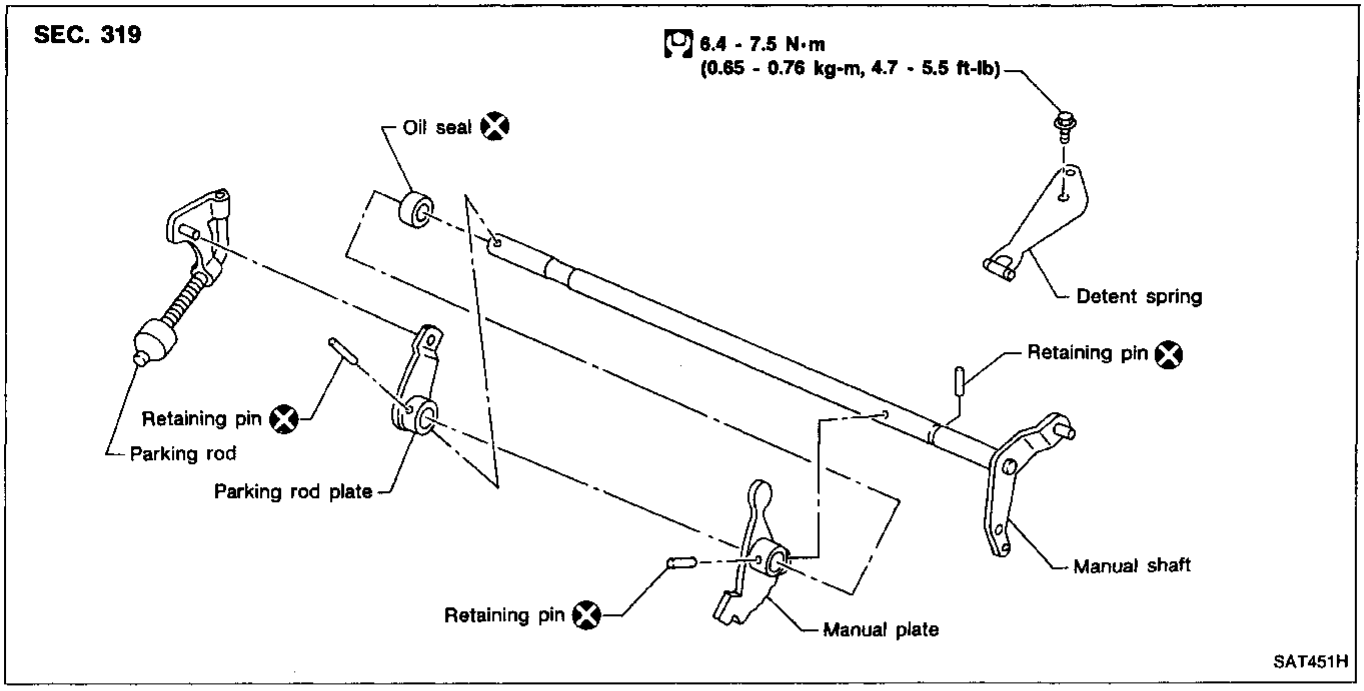


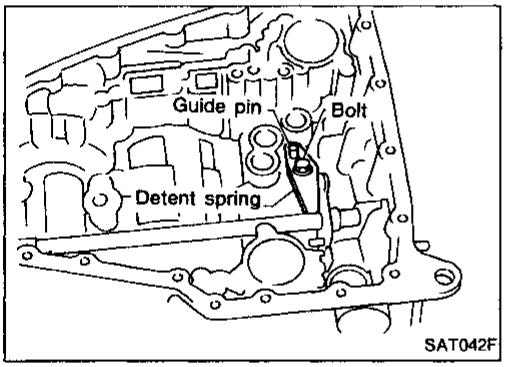
44. Remove parking actuator support from transmission case.
45. Check parking actuator support for damage or wear.



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

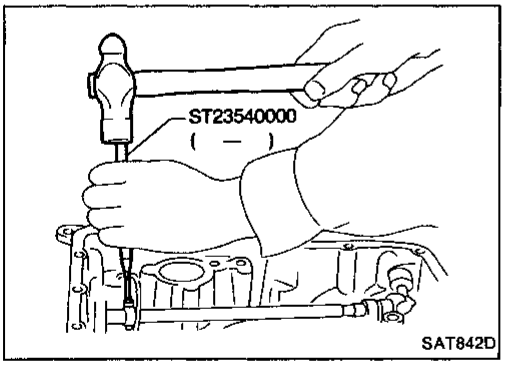
Manual Shaft



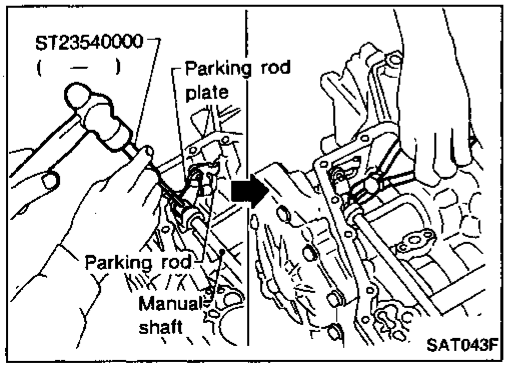


REMOVAL

1. Remove detent spring from transmission case.

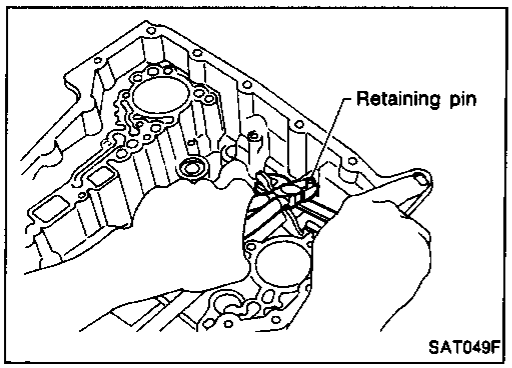


2. Drive out manual plate retaining pin.

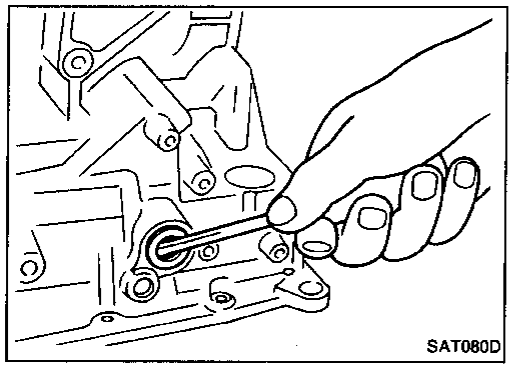


3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.

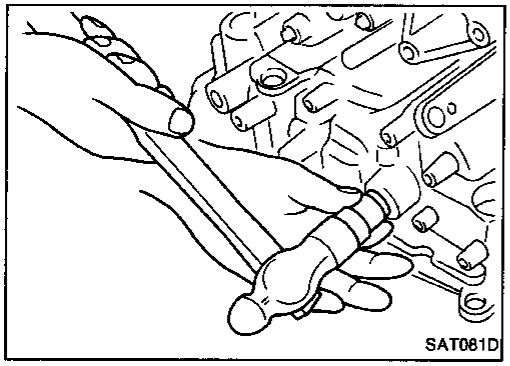
Manual Shaft (Cont'd)



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



8. Remove manual shaft oil seal.

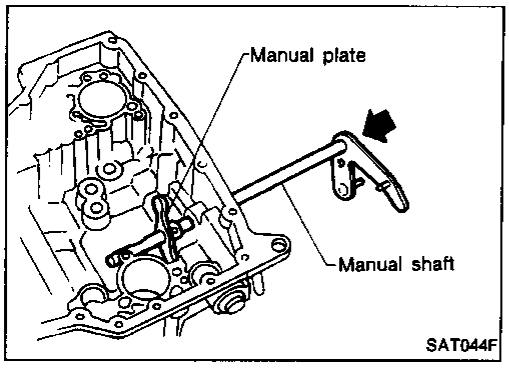


INSPECTION

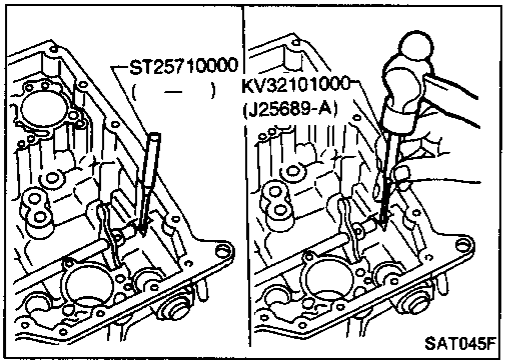
- Check component parts for wear or damage. Replace if necessary.

INSTALLATION

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

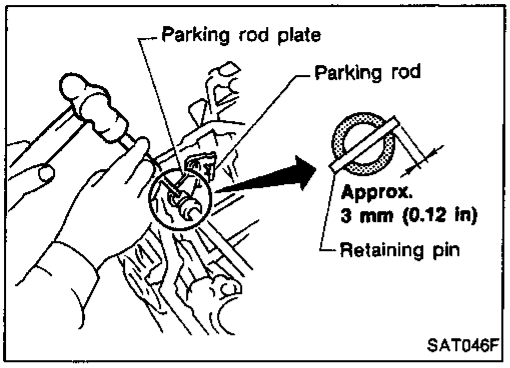


2. Install manual shaft and manual plate.



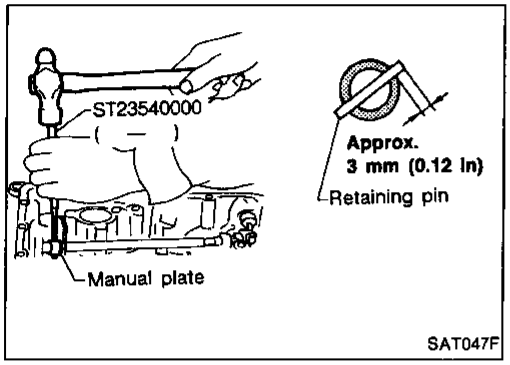
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.

Manual Shaft (Cont'd)



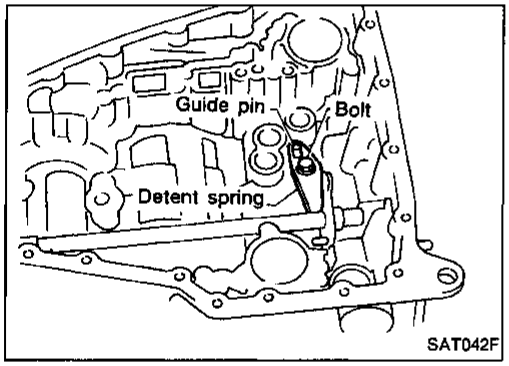
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.

Both ends of pin should protrude.



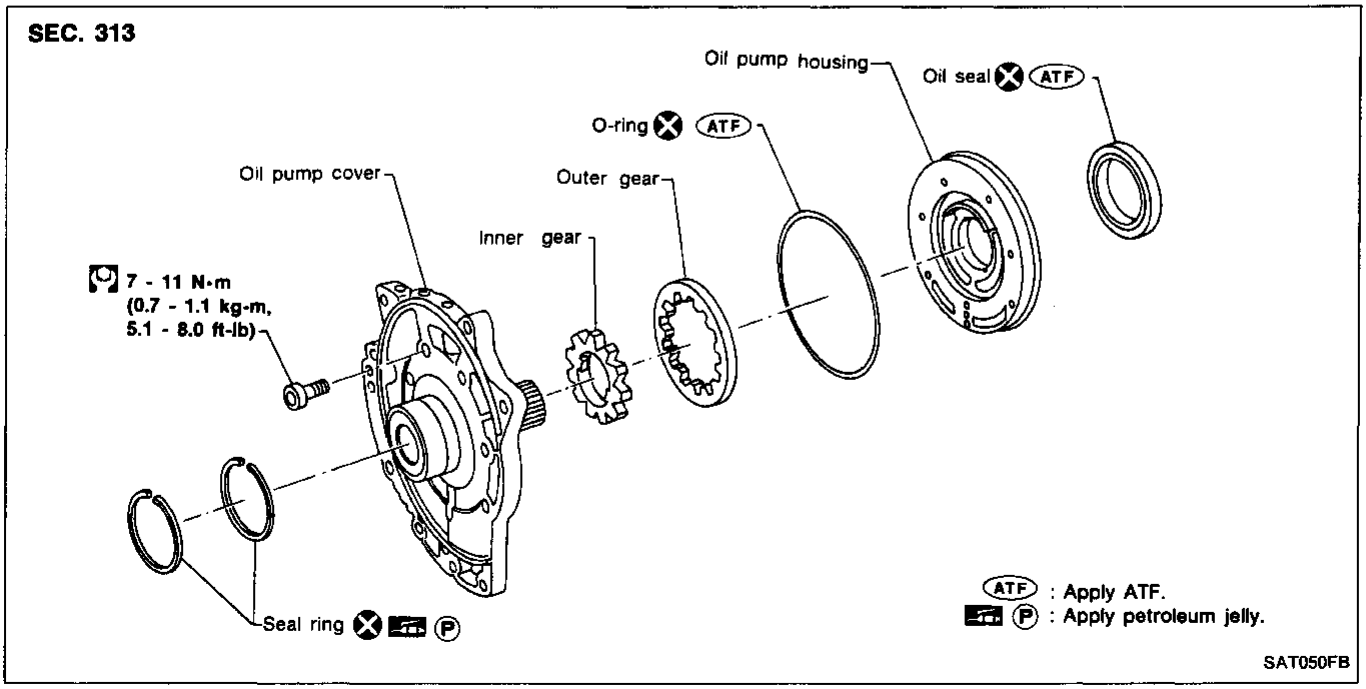
7. Drive manual plate retaining pin.

Both ends of pin should protrude.



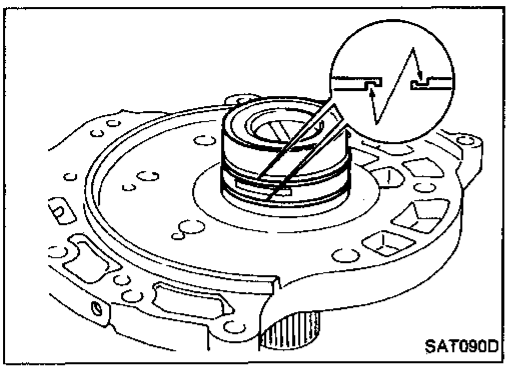
8. Install detent spring.

Oil Pump

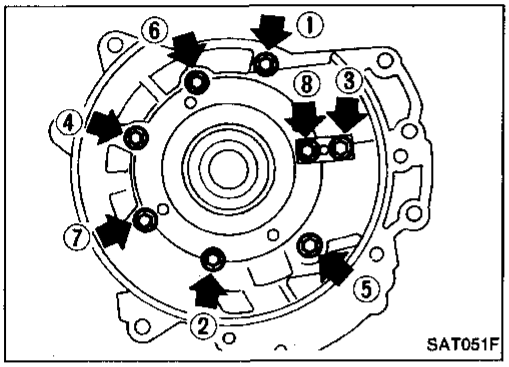


Oil Pump (Cont'd)

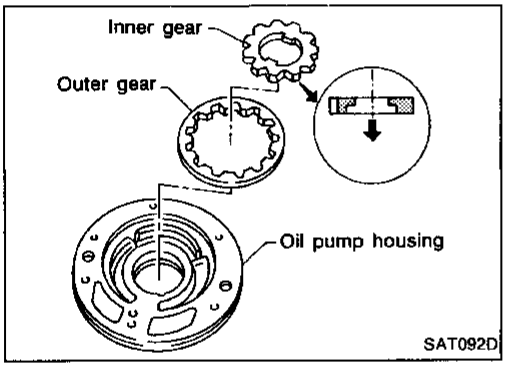
DISASSEMBLY



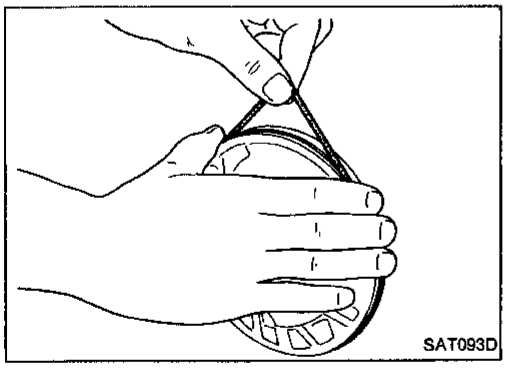
1. Remove seal rings by undoing hooks.



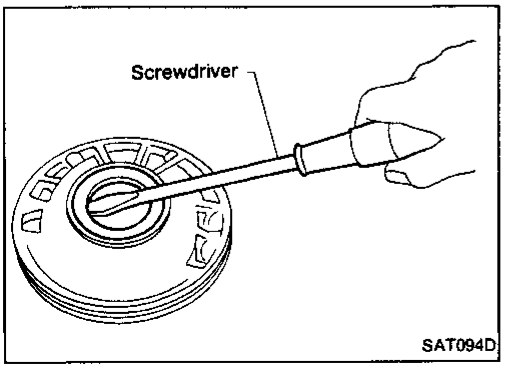
2. Loosen bolts in a crisscross pattern and remove oil pump cover.



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



4. Remove O-ring from oil pump housing.



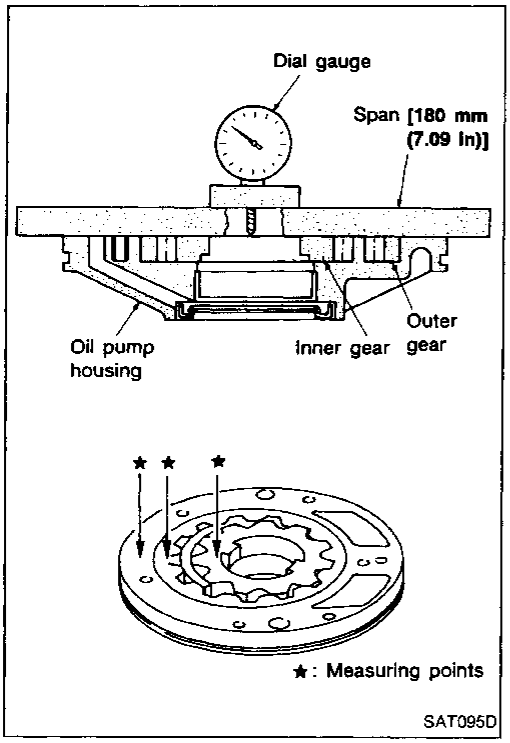
5. Remove oil pump housing oil seal.

Oil Pump (Cont'd)

INSPECTION

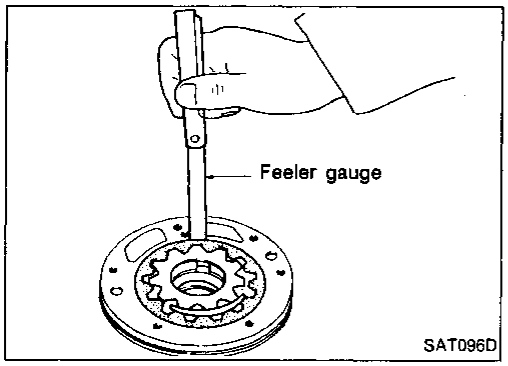
Oil pump housing, oil pump cover, inner gear and outer gear

- Check for wear or damage.

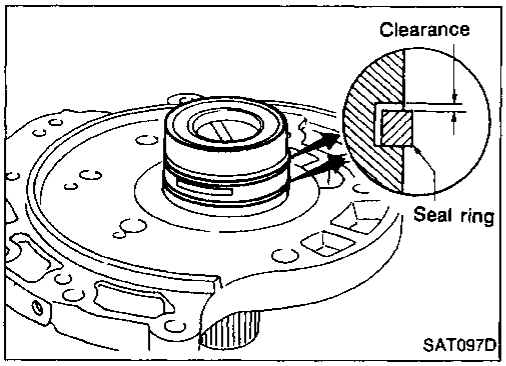


Side clearance

- Measure side clearance between end of oil pump housing and inner and outer gears. Perform measurement in at least four places along their circumferences. Maximum measured values should be within specified positions.
  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 SDS. AT-230
- 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.

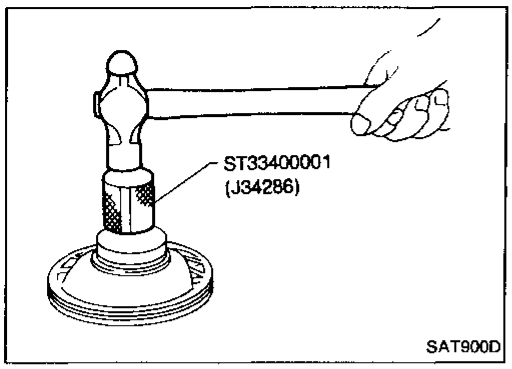


Seal ring clearance

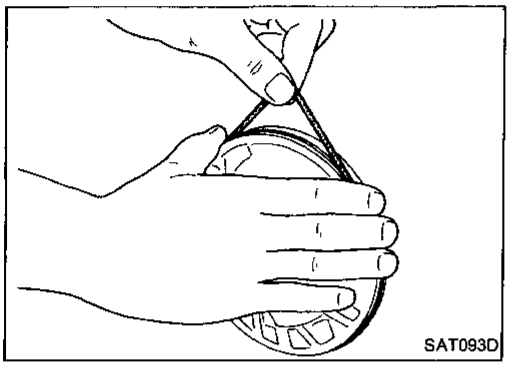
- Measure clearance between seal ring and ring groove.
  Standard clearance:
  0.036 - 0.176 mm (0.0014 - 0.0069 in)
  Allowable limit:
  0.176 mm (0.0069 in)
- If not within allowable limit, replace oil pump cover assembly.

Oil Pump (Cont'd)

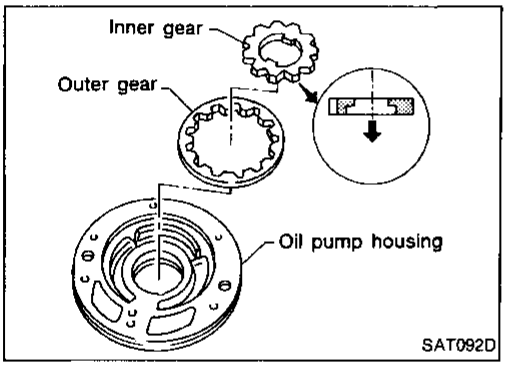
ASSEMBLY



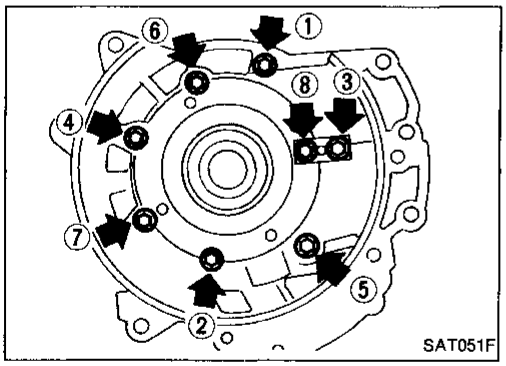
1. Install oil seal on oil pump housing.



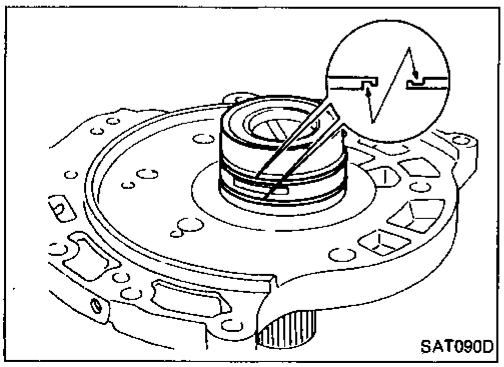
2. Install O-ring on oil pump housing.
- **Apply ATF to O-ring.**



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



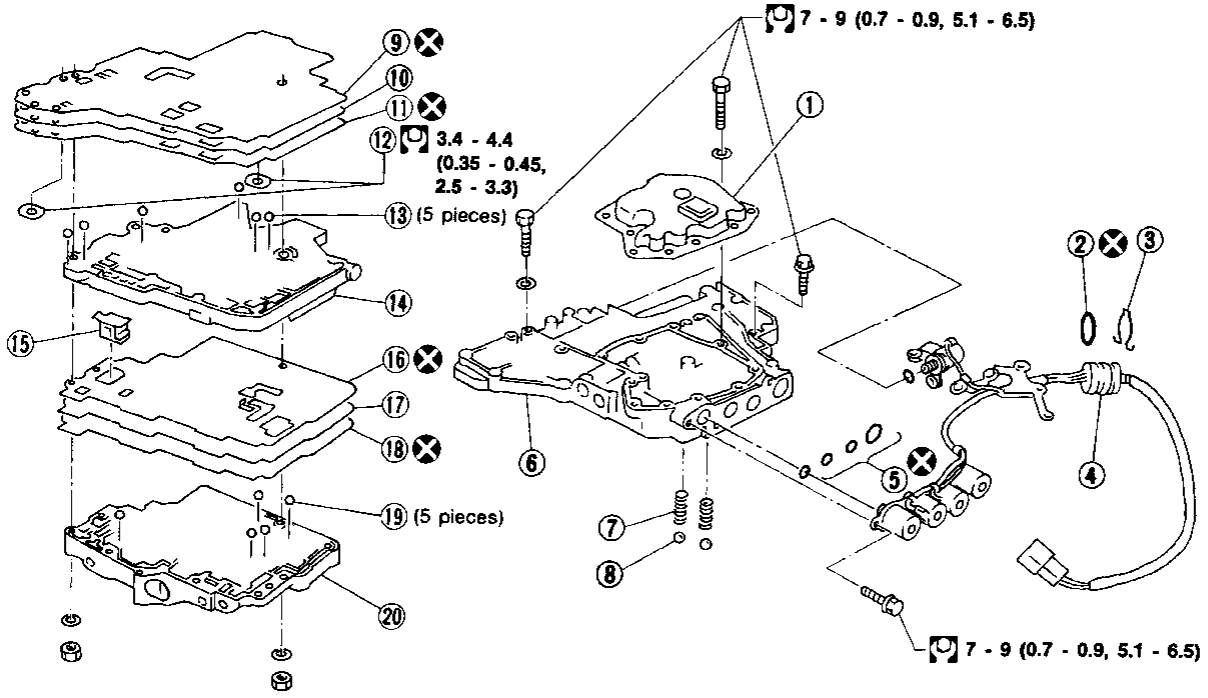
4. Install oil pump cover on oil pump housing.
a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
b. Tighten bolts in a crisscross pattern.



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

SEC. 317



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

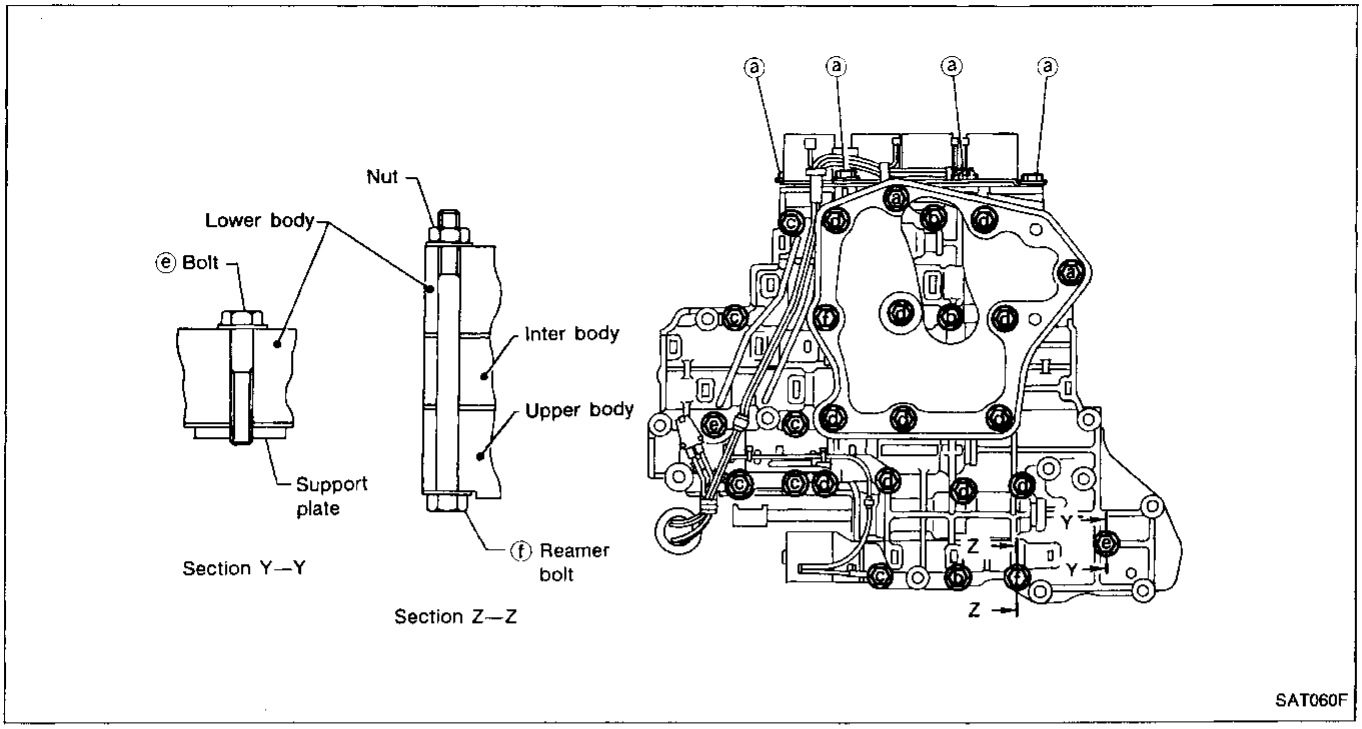
Disassemble upper, inter and lower bodies.

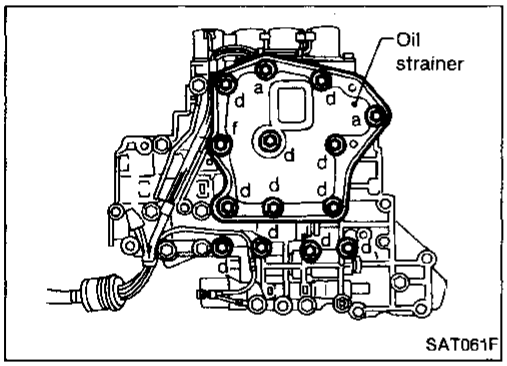
Bolt length, number and location:

Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in)	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

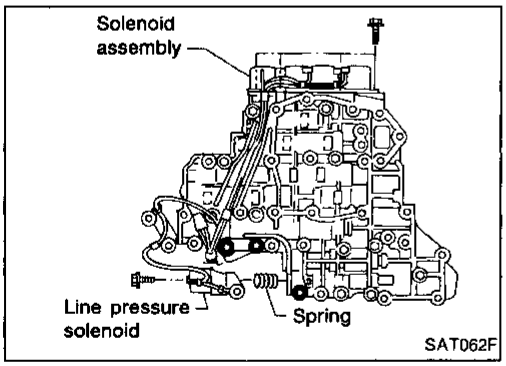
f: Reamer bolt and nut.

Control Valve Assembly (Cont'd)

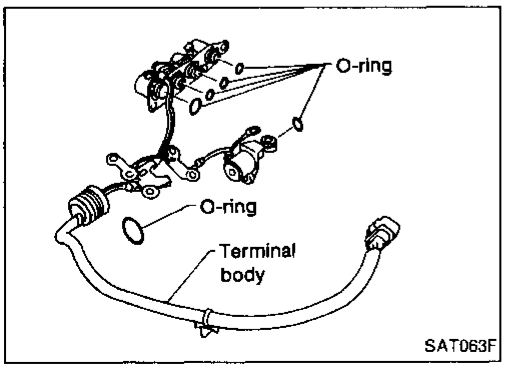




a. Remove bolts ⓐ, ⓓ and nut ⓕ and remove oil strainer from control valve assembly.

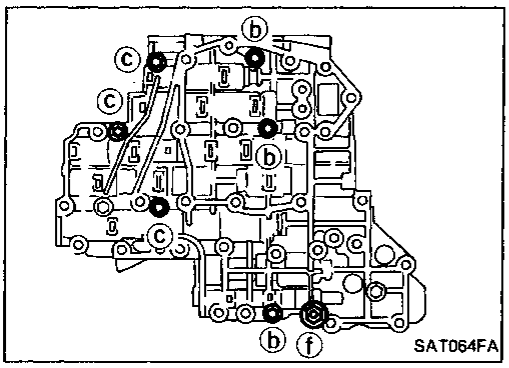


b. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.

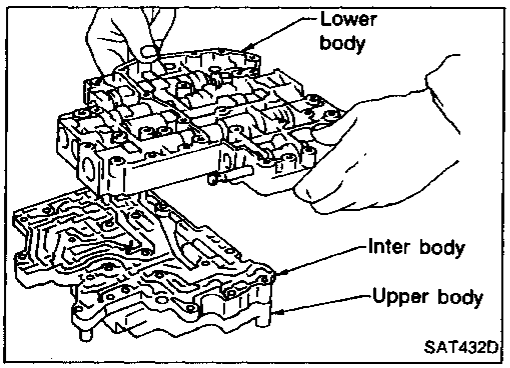


c. Remove O-rings from solenoid valves and terminal body.

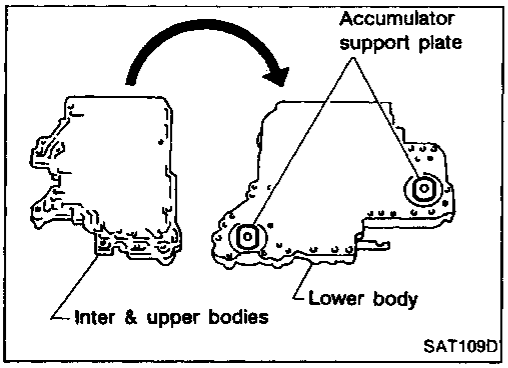
Control Valve Assembly (Cont'd)



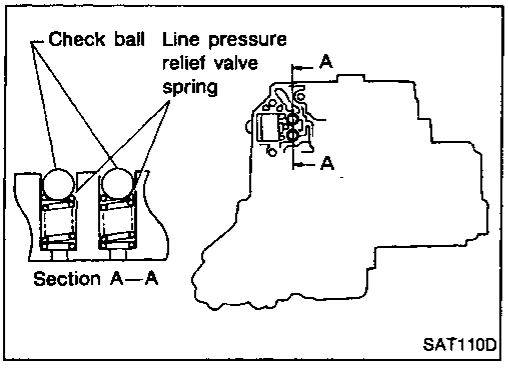
d. Place upper body facedown, and remove bolts ⓑ, ⓒ and nut ⓕ.



e. Remove inter body from lower body.

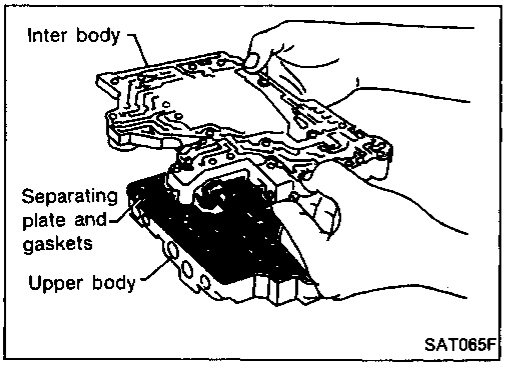


f. Turn over lower body, and remove accumulator support plate.



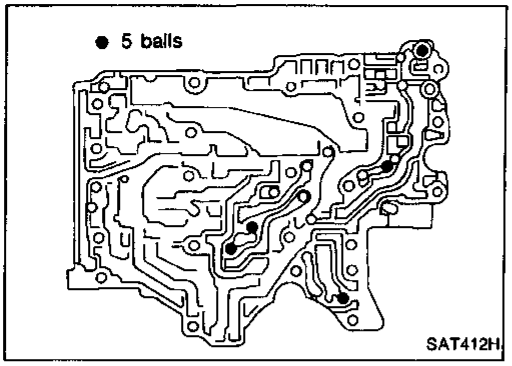
g. Remove bolts ⓔ, separating plate and separating gasket from lower body.
h. Remove steel balls and relief valve springs from lower body.

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



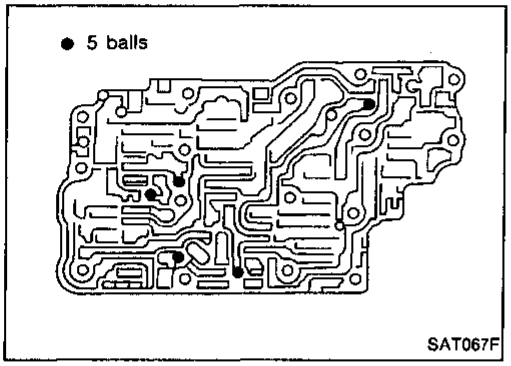
i. Remove inter body from upper body.

Control Valve Assembly (Cont'd)



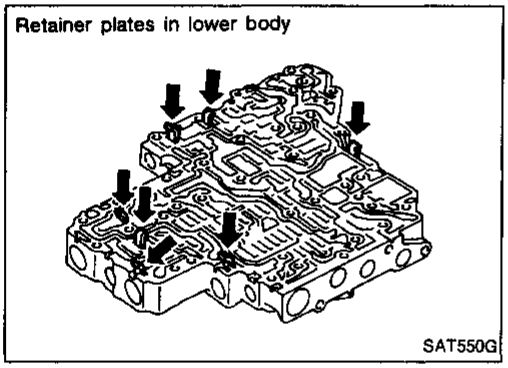
j. Check to see that steel balls are properly positioned in inter body. Then remove them from inter body.

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



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

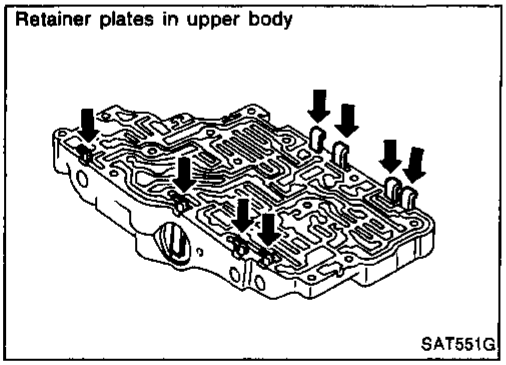
- **Be careful not to lose steel balls.**



INSPECTION

Lower and upper bodies

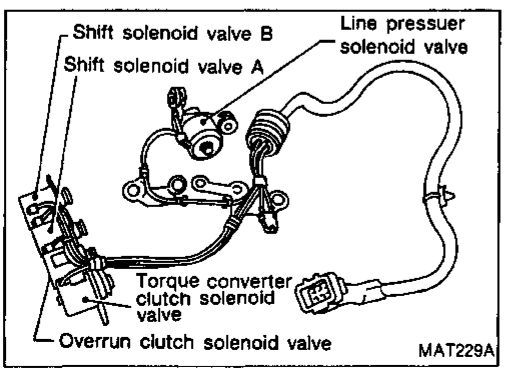
- Check to see that retainer plates are properly positioned in lower body.



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

Oil strainer

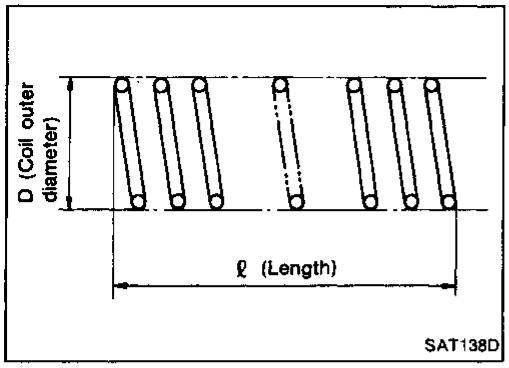
- Check wire netting of oil strainer for damage.



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

- Measure resistance — Refer to "Electrical Components Inspection". AT-104

Control Valve Assembly (Cont'd)



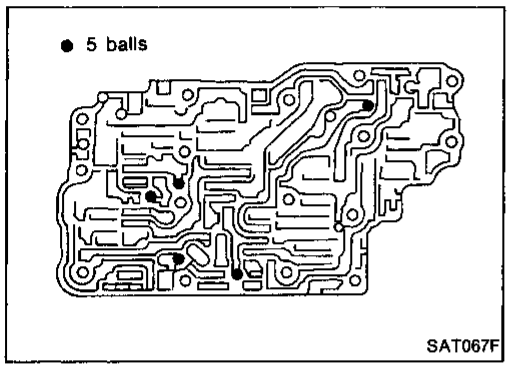
Oil cooler relief valve spring.

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

Inspection standard:

Unit: mm (in)

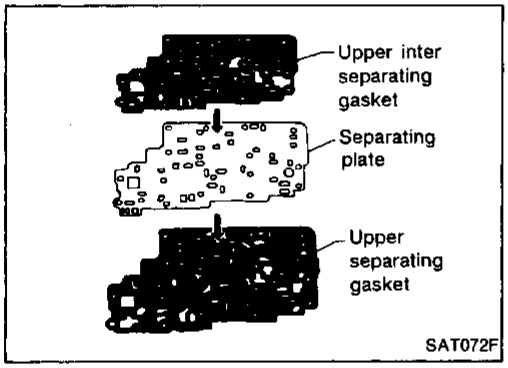
Part No.	ℓ	D
31872-31X00	17.02 (0.6701)	8.0 (0.315)



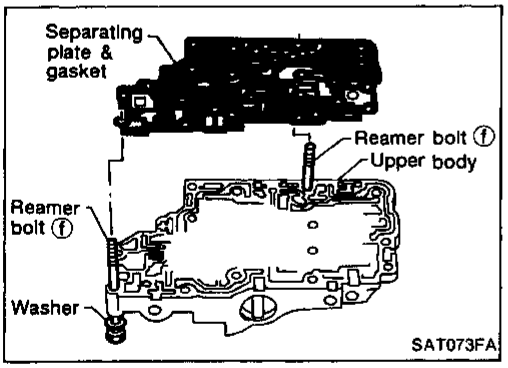
ASSEMBLY

1. Install upper, inter and lower body.

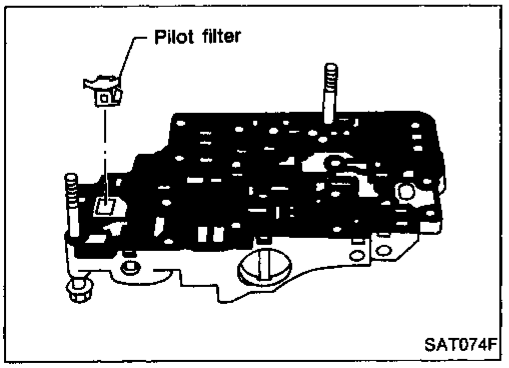
a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



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

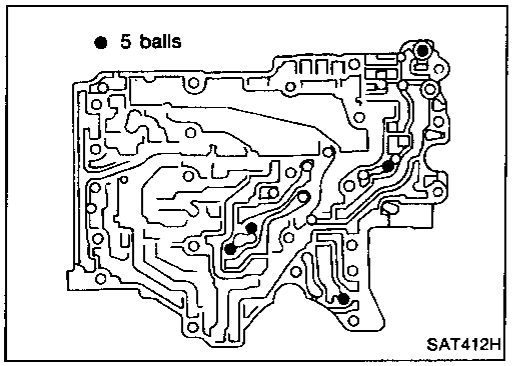


c. Install reamer bolts ⓕ from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set on upper body.

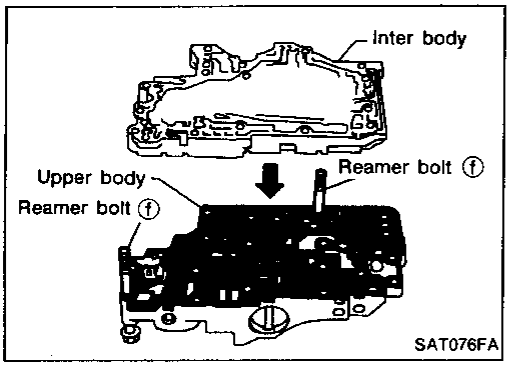


d. Install pilot filter.

Control Valve Assembly (Cont'd)

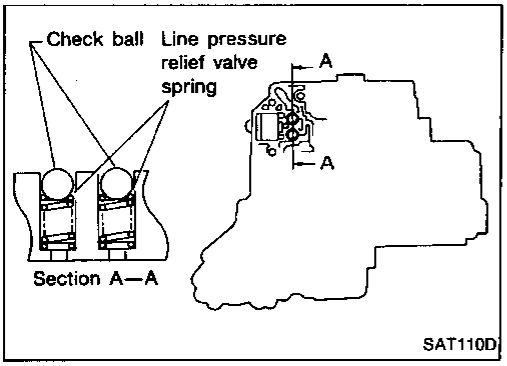


e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

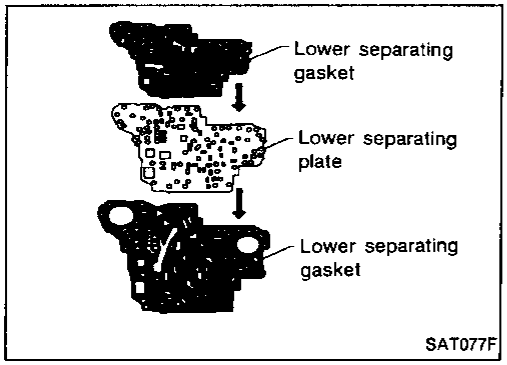


f. Install inter body on upper body using reamer bolts ⓕ as guides.

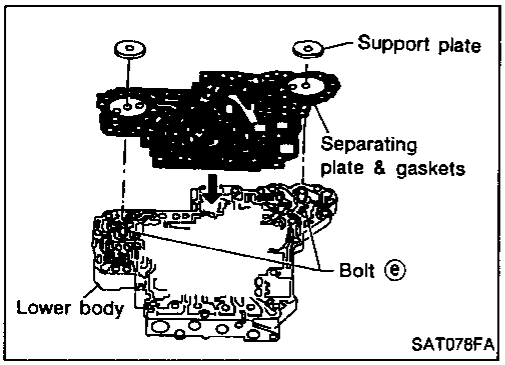
- **Be careful not to dislocate or drop steel balls.**



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



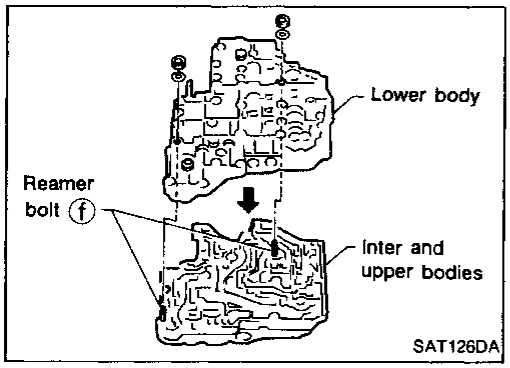
h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in illustration.



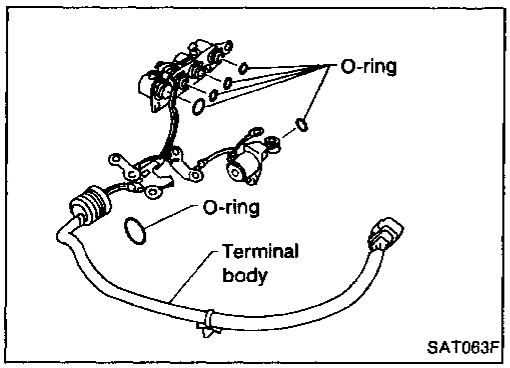
i. Install bolts ⓔ from bottom of lower body. Using bolt ⓔ as guides, install separating plate and gaskets as a set on lower body.

j. Temporarily install support plates on lower body.

Control Valve Assembly (Cont'd)



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

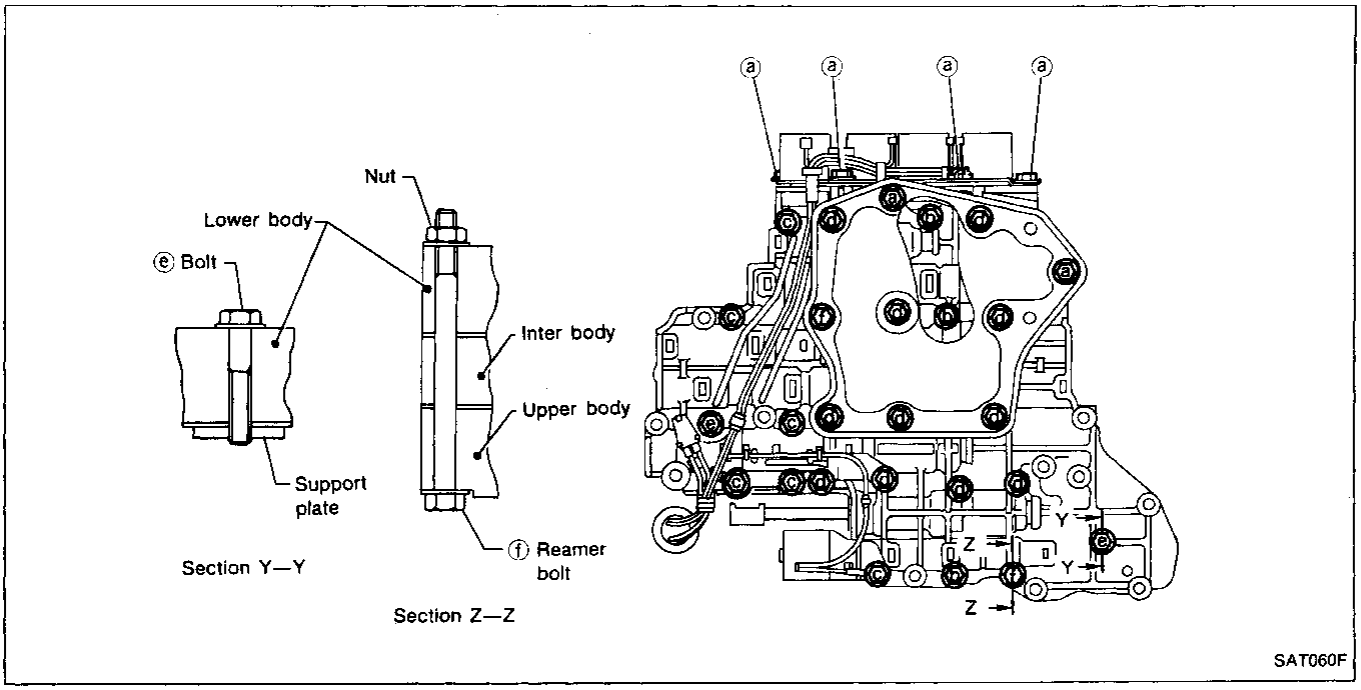


2. Install O-rings to solenoid valves and terminal body.
- **Apply ATF to O-rings.**

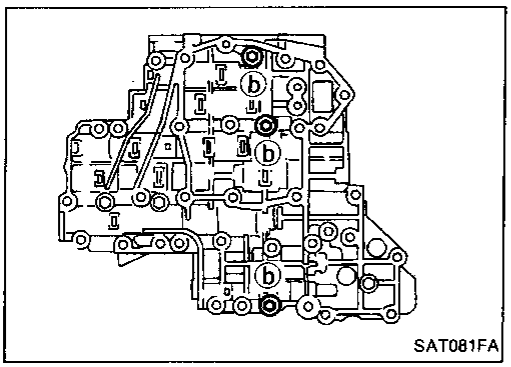
3. Install and tighten bolts.

Bolt length, number and location:

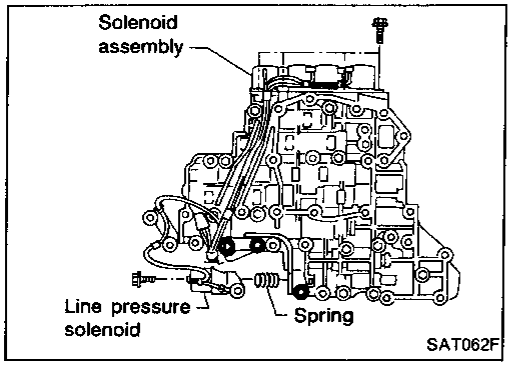
Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2



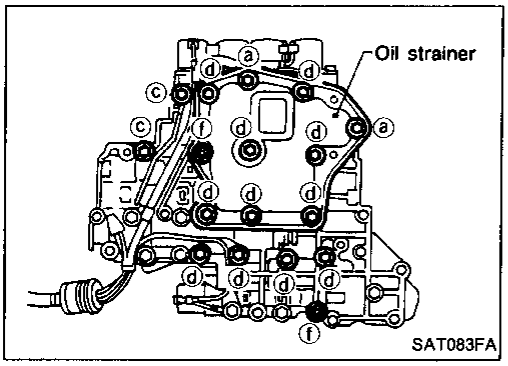
Control Valve Assembly (Cont'd)



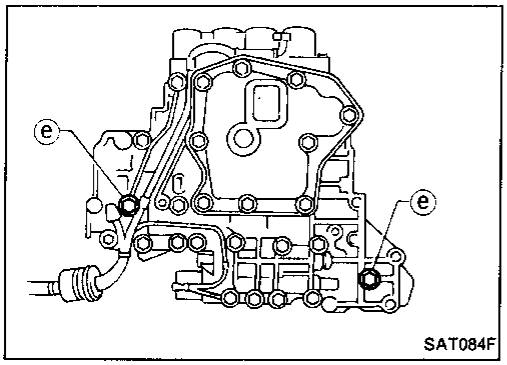
a. Install and tighten bolts ⓑ to specified torque.



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



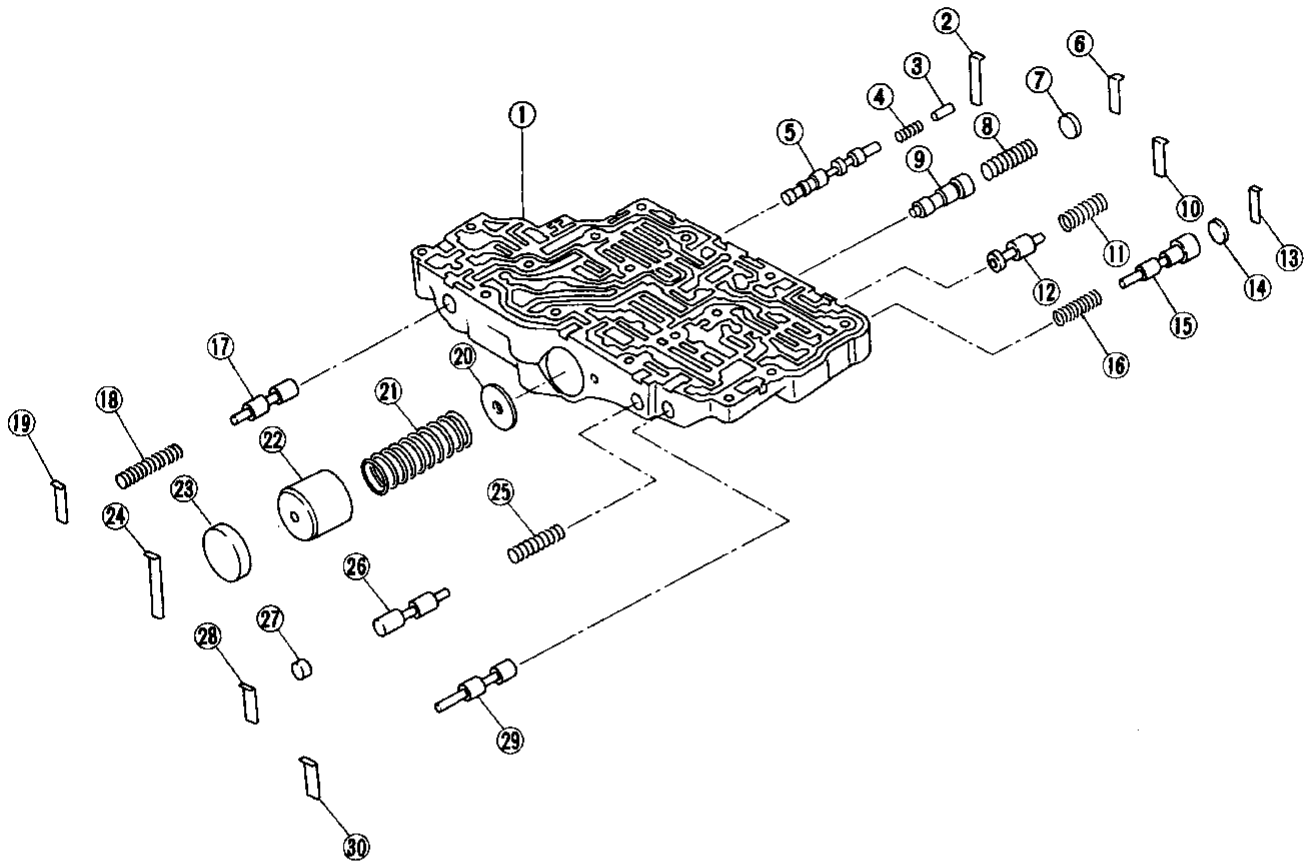
c. Set oil strainer, then tighten bolts ⓐ, ⓒ, ⓓ and nuts ⓕ to specified torque.



d. Tighten bolts ⓔ to specified torque.

Control Valve Upper Body

SEC. 317

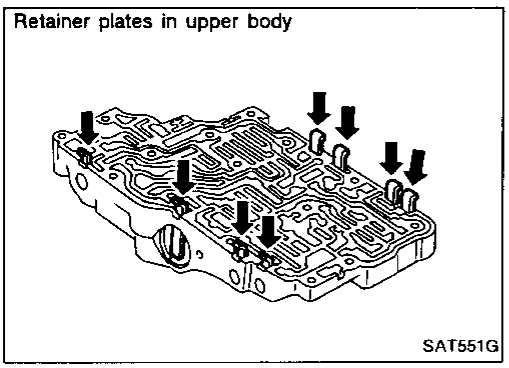


SAT413H

① Upper body
② Retainer plate
③ Plug
④ Return spring
⑤ Lock-up control valve
⑥ Retainer plate
⑦ Plug
⑧ Return spring
⑨ 1-2 accumulator 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 Retainer plate

Control Valve Upper Body (Cont'd)

Retainer plates in upper body

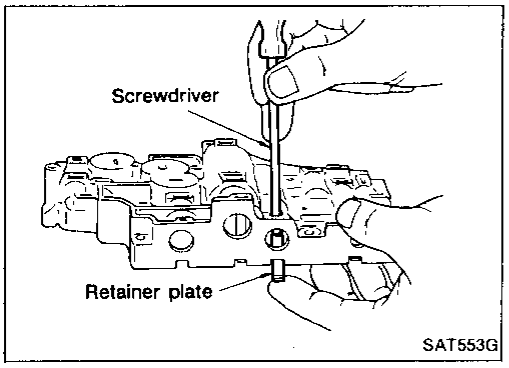


SAT551G

DISASSEMBLY

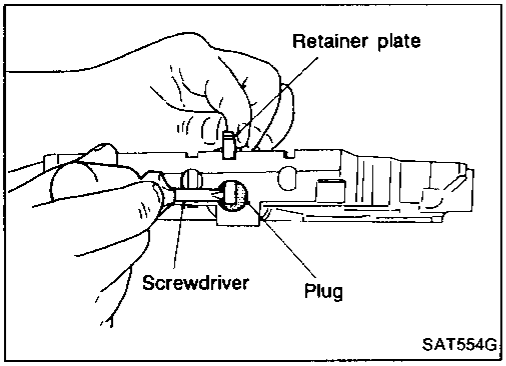
1. Remove valves at retainer plates.

- **Do not use a magnetic "hand".**



SAT553G

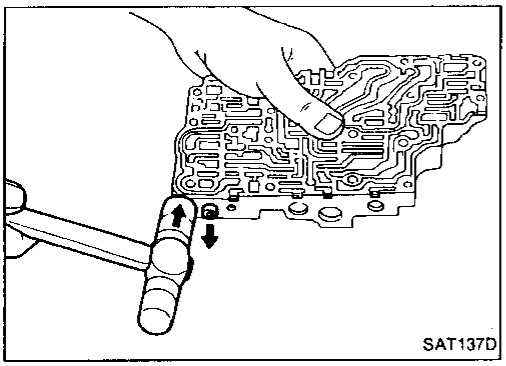
a. Use a screwdriver to pry out retainer plates.



SAT554G

b. Remove retainer plates while holding spring, plugs or sleeves.

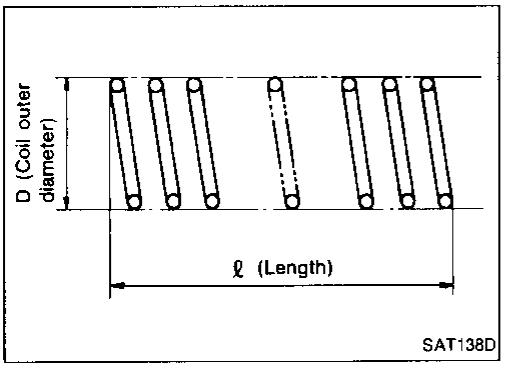
- **Remove plugs slowly to prevent internal parts from jumping out.**



SAT137D

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.**



SAT138D

INSPECTION

Valve spring

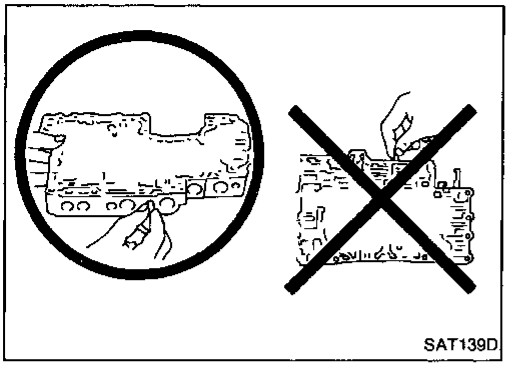
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
  Inspection standard: Refer to SDS. AT-225
- Replace valve springs if deformed or fatigued.

Control valves

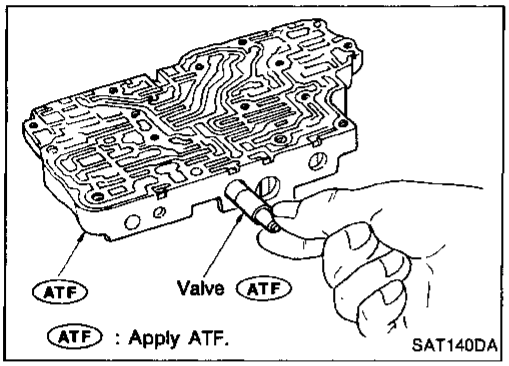
- Check sliding surfaces of valves, sleeves and plugs.

Control Valve Upper Body (Cont'd)

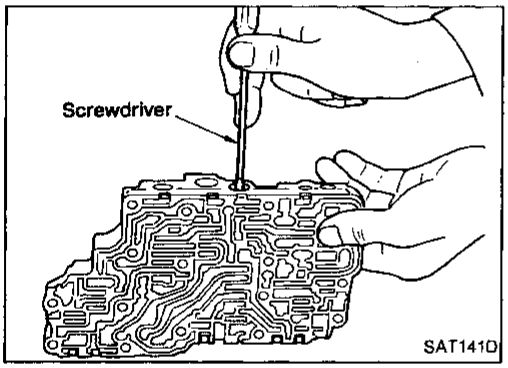
ASSEMBLY



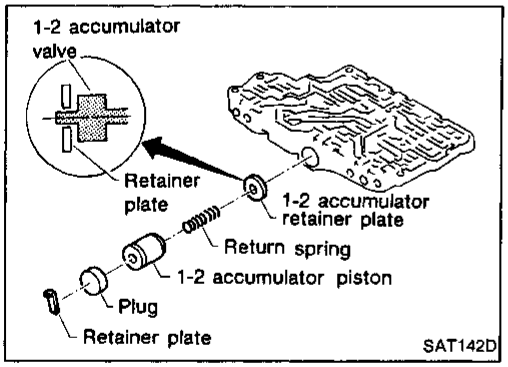
- **Lay control valve body down when installing valves. Do not stand the control valve body upright.**



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.**

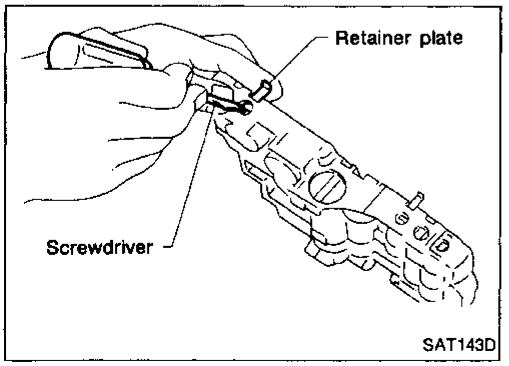


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



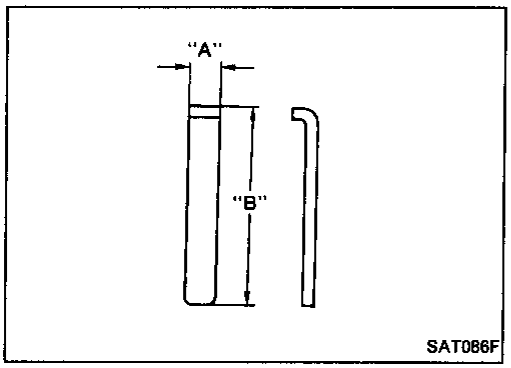
1-2 accumulator valve

- Install 1-2 accumulator valve. 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.

Control Valve Upper Body (Cont'd)



Retainer plate

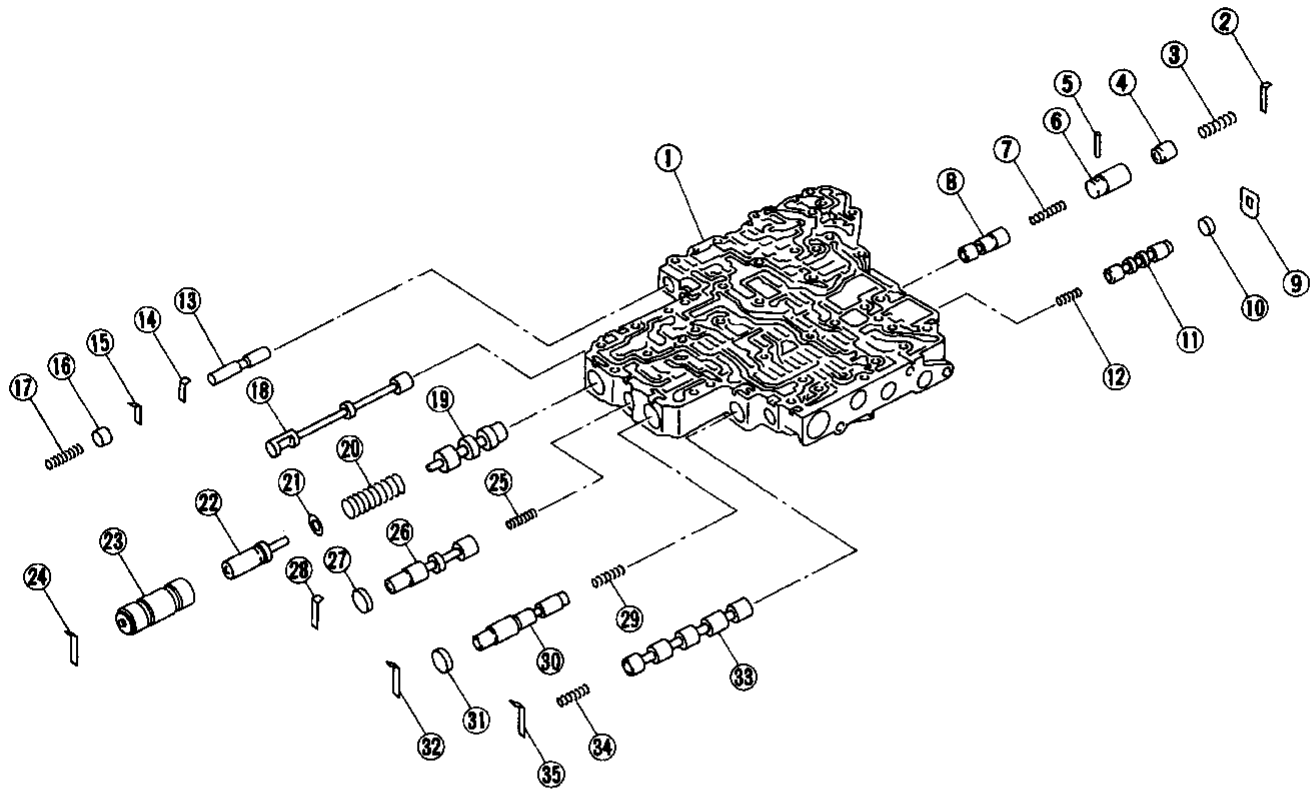
Unit: mm (in)

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)
Overrun clutch reducing valve		24.0 (0.945)
Torque converter relief valve		21.5 (0.846)
Lock-up control valve		28.0 (1.102)

- Install proper retainer plates.

Control Valve Lower Body

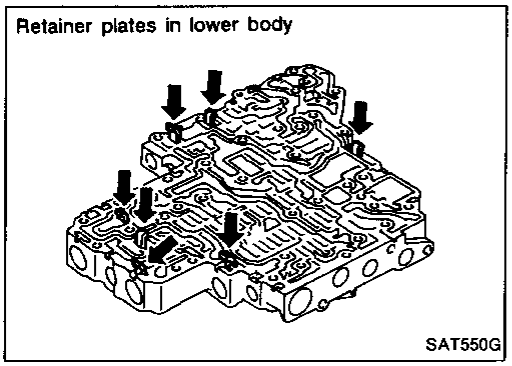
SEC. 317



SAT414H

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 Accumulator shift valve
⑭ Retaining plate
⑮ Retaining plate
⑯ Plug
⑰ Return spring
⑱ Manual valve
⑲ Pressure regulator valve
⑳ Return spring
㉑ Spring seat
㉒ Plug
㉓ Sleeve
㉔ Retainer plate
㉕ Return spring
㉖ Overrun clutch control valve
㉗ Plug
㉘ Retainer plate
㉙ Return spring
㉚ Accumulator control valve
㉛ Plug
㉜ Retainer plate
㉝ Shift valve A
㉞ Retainer spring
㉟ Retainer plate

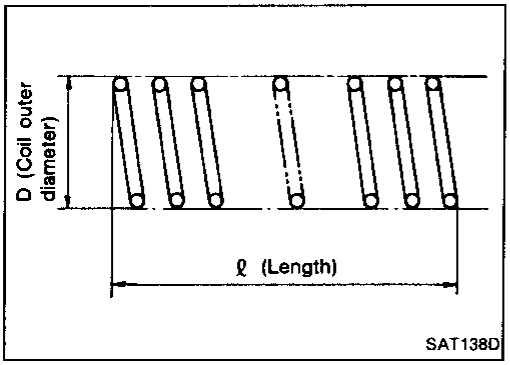
Control Valve Lower Body (Cont'd)



DISASSEMBLY

Remove valves at retainer plate.

For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body. AT-162



INSPECTION

Valve springs

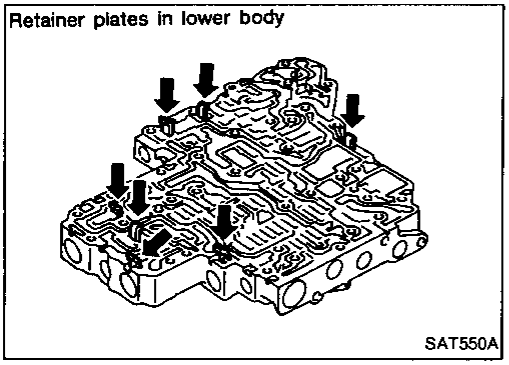
- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
  Inspection standard: Refer to SDS. AT-225
- Replace valve springs if deformed or fatigued.

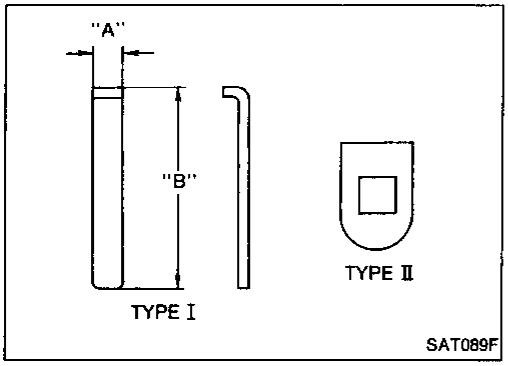
Control valves

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

ASSEMBLY

- Install control valves.
  For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body. AT-163





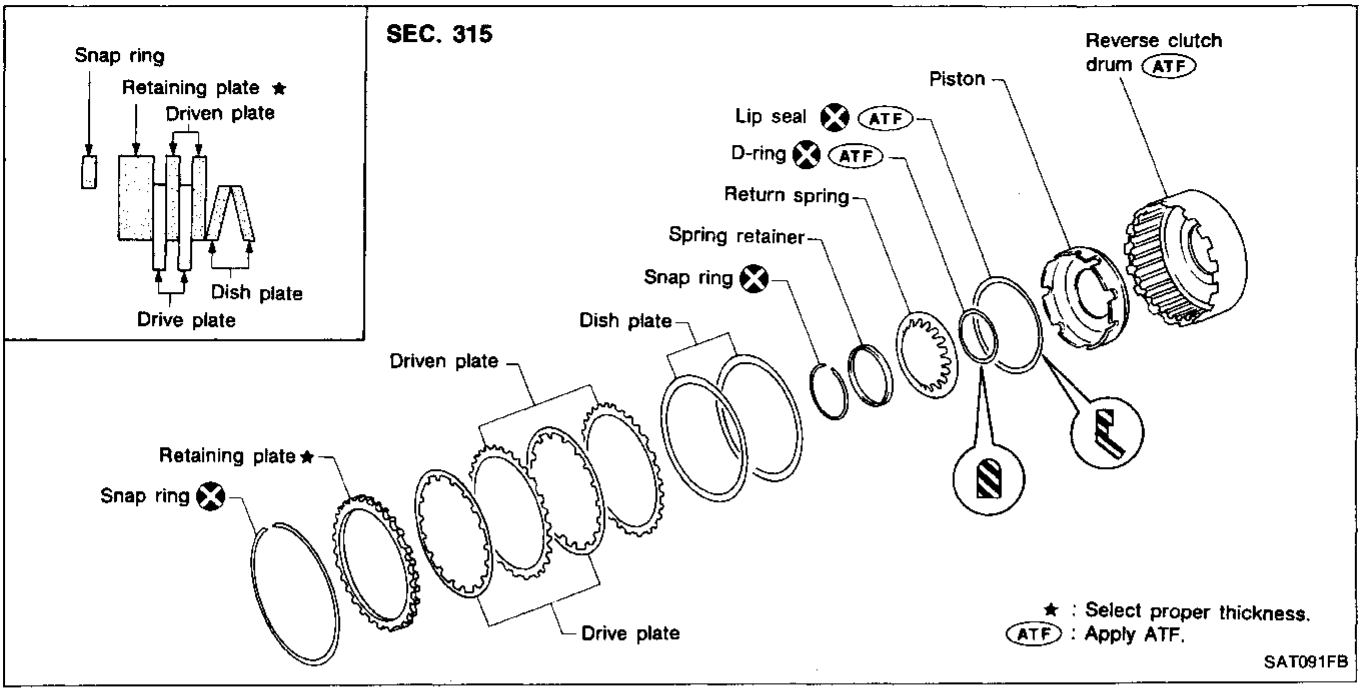
Retainer plate

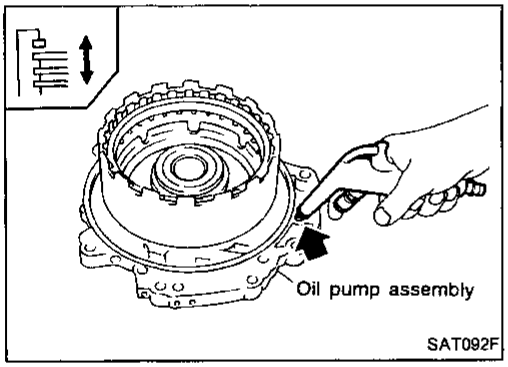
Unit: mm (in)

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.

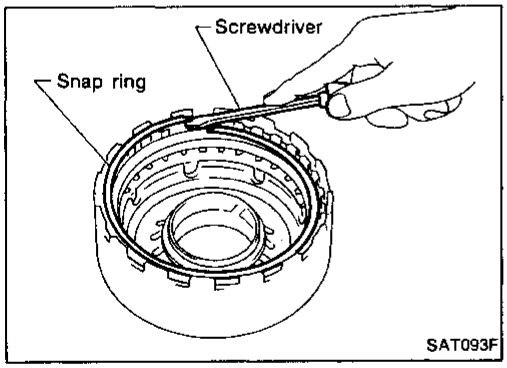
Reverse Clutch



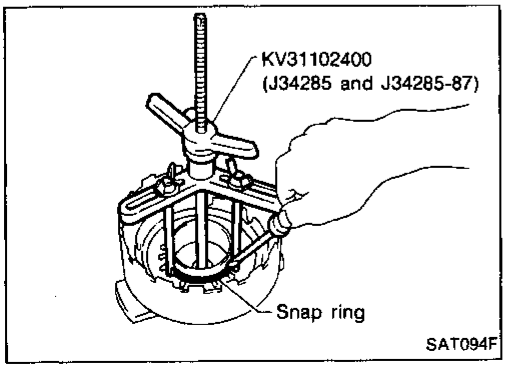


DISASSEMBLY

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. Otherwise, fluid may be leaking at piston check ball.

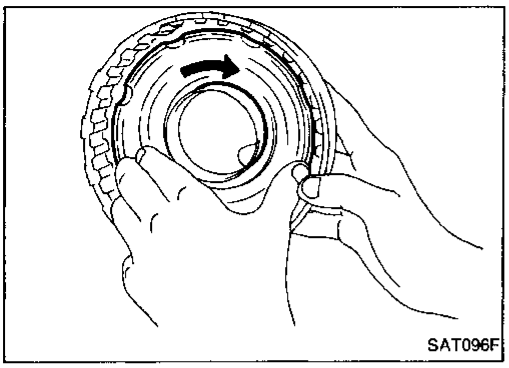


2. Remove snap ring.
3. Remove drive plates, driven plates, retaining plate, and dish plates.

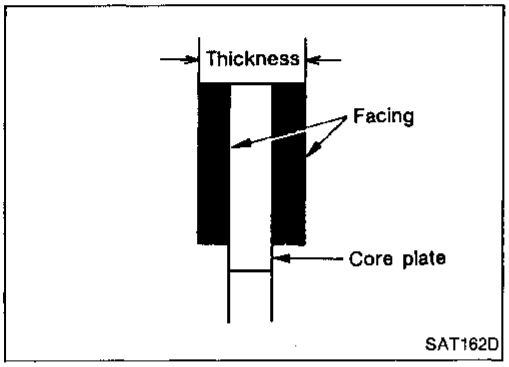


4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**
5. Remove spring retainer and return springs.

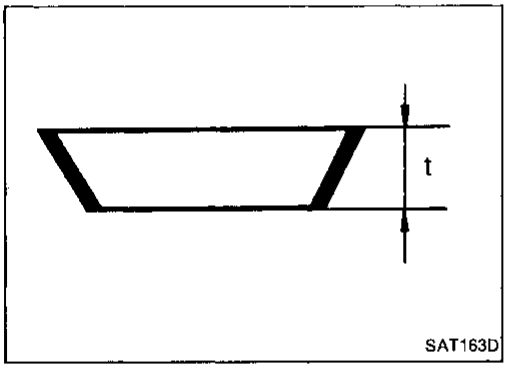
Reverse Clutch (Cont'd)


SAT096F

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



SAT162D



SAT163D

INSPECTION

Reverse clutch snap ring, spring retainer and return springs

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

Reverse clutch drive plates

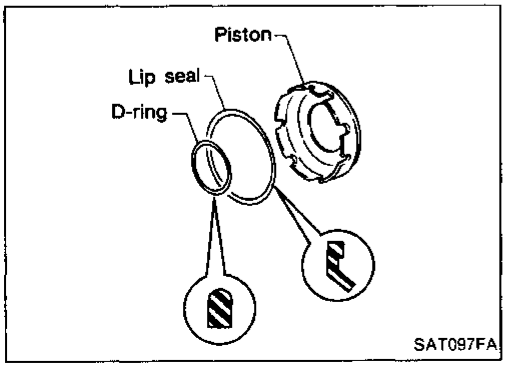
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value: 2.0 mm (0.079 in)
  Wear limit: 1.8 mm (0.071 in)
- If not within wear limit, replace.

Reverse clutch dish 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. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.



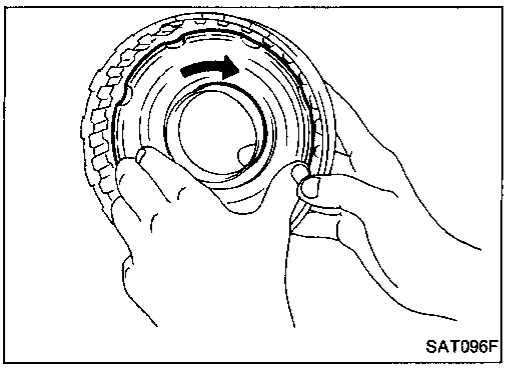
SAT097FA

ASSEMBLY

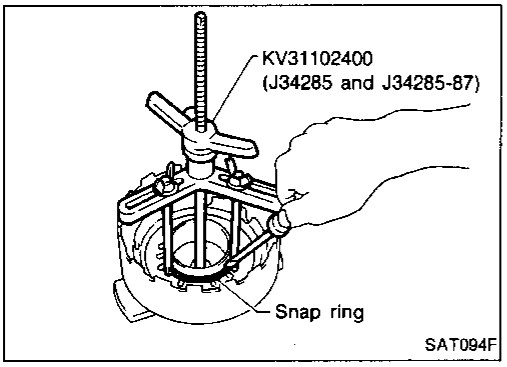
1. Install D-ring and lip seal on piston.

- **Take care with the direction of lip seal.**
- **Apply ATF to both parts.**

Reverse Clutch (Cont'd)

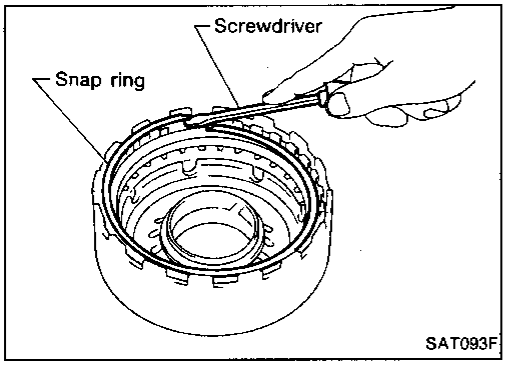

SAT096F

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



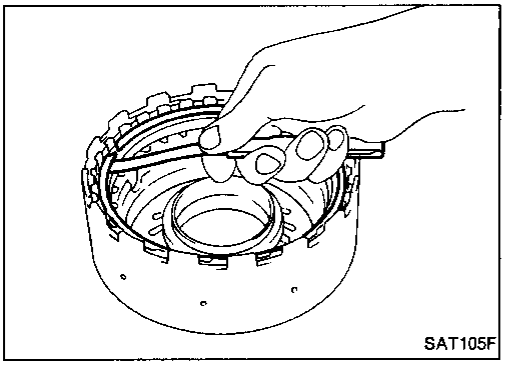
SAT094F

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.**

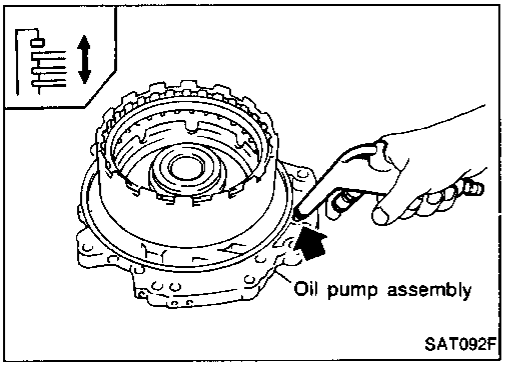


SAT093F

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


SAT105F

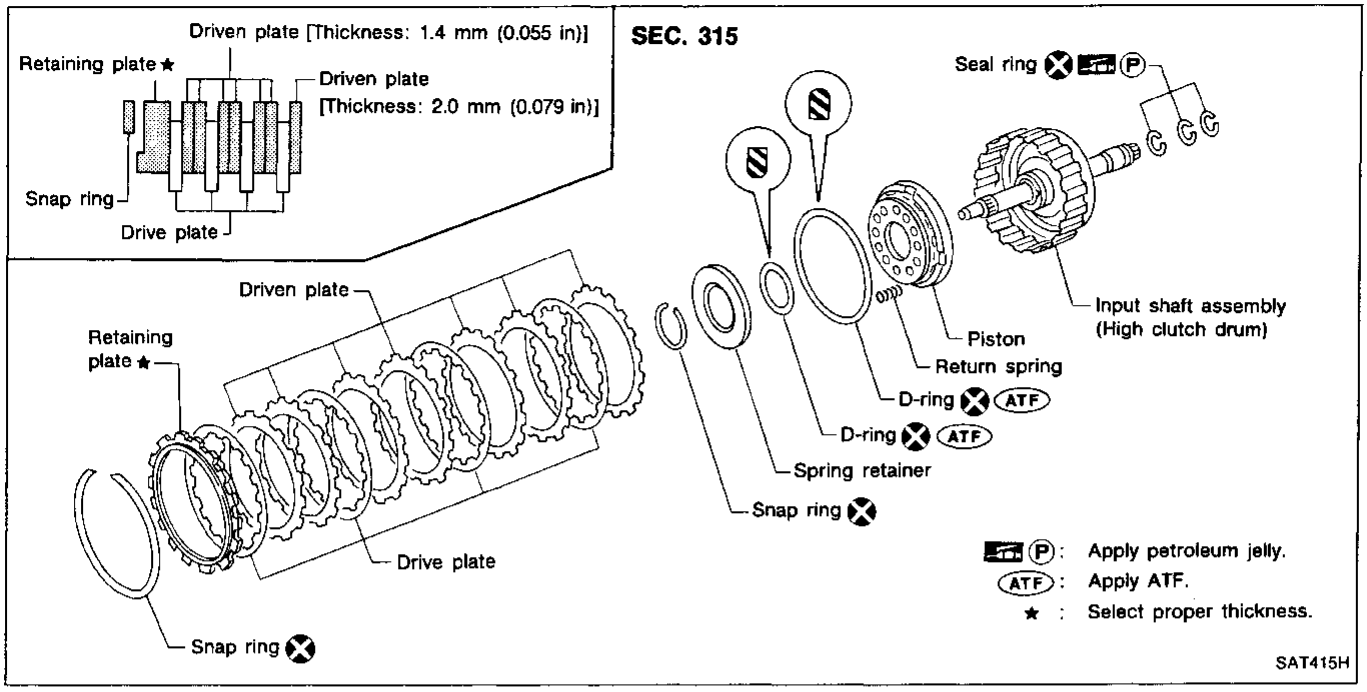
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.5 - 0.8 mm (0.020 - 0.031 in)
   Allowable limit 1.2 mm (0.047 in)
   Retaining plate: Refer to SDS. AT-226

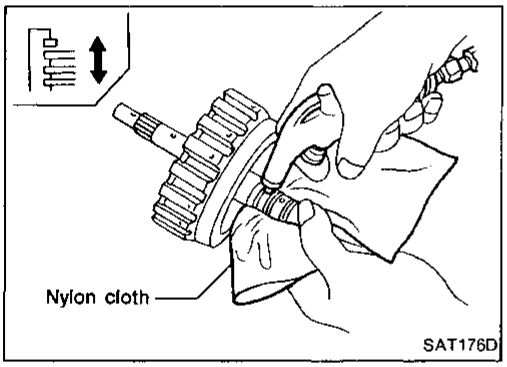


SAT092F

8. Check operation of reverse clutch.
   Refer to "DISASSEMBLY" of Reverse Clutch. AT-167

High Clutch





DISASSEMBLY

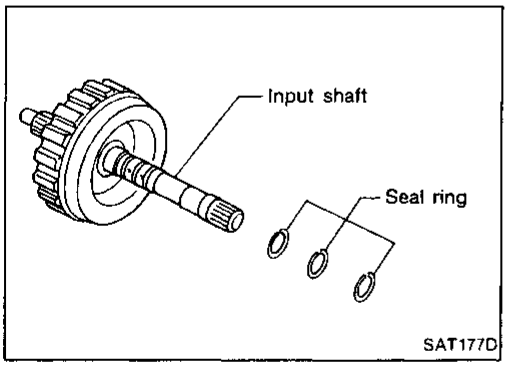
1. Check operation of high clutch.

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.**

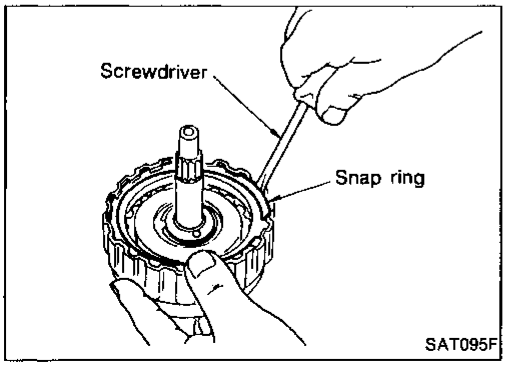
b. Check to see that retaining plate moves to snap ring.

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



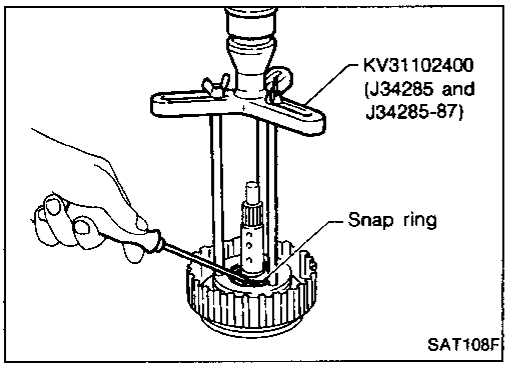
2. Remove seal rings from input shaft.

- **Always replace when removed.**



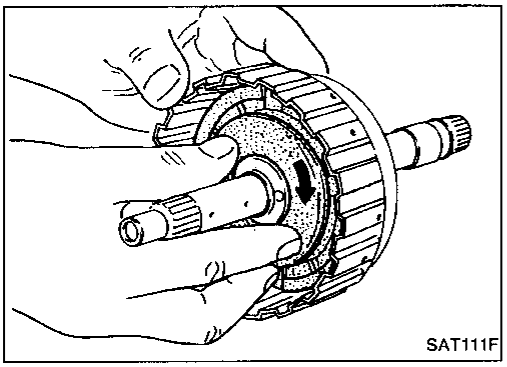
3. Remove snap ring.
4. Remove drive plates, driven plates and retaining plate.

High Clutch (Cont'd)

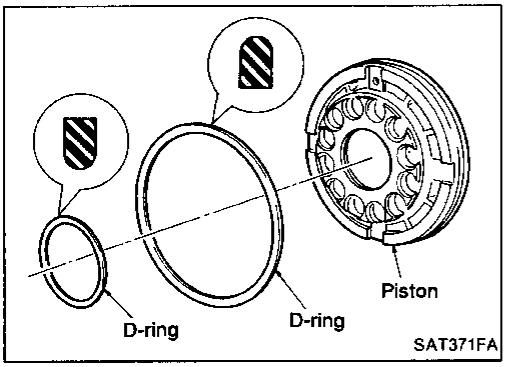


5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.
- **Set Tool directly over springs.**
- **Do not expand snap ring excessively.**

6. Remove spring retainer and return springs.



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

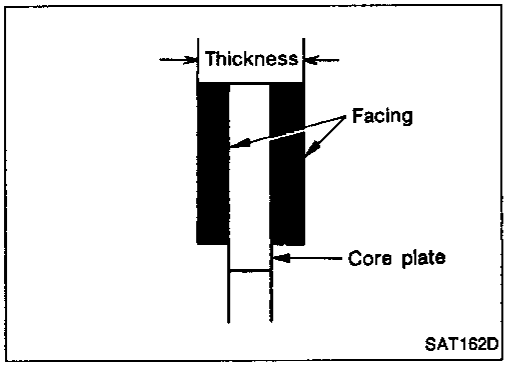


8. Remove D-rings from piston.

INSPECTION

High clutch snap ring, spring retainer and return springs.

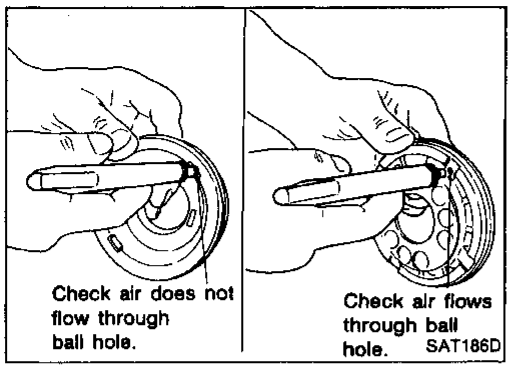
- Check for deformation, fatigue or damage. If necessary, replace.
- **When replacing spring retainer and return springs, replace them as a set.**



High clutch drive plates

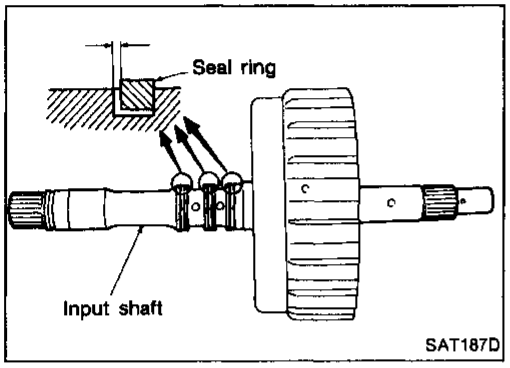
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Standard value 1.6 mm (0.063 in)
  Wear limit 1.4 mm (0.055 in)
- If not within wear limit, replace.

High Clutch (Cont'd)



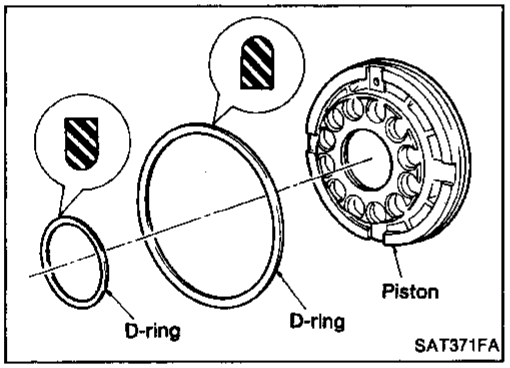
High clutch piston

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



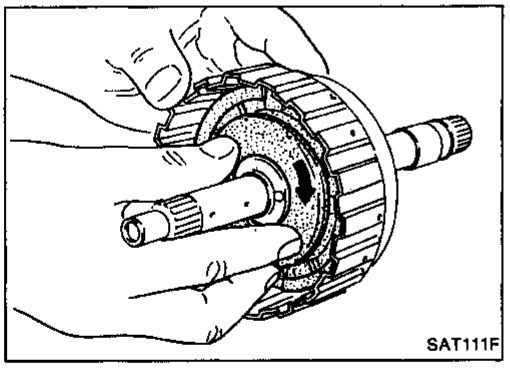
Seal ring clearance

- 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.

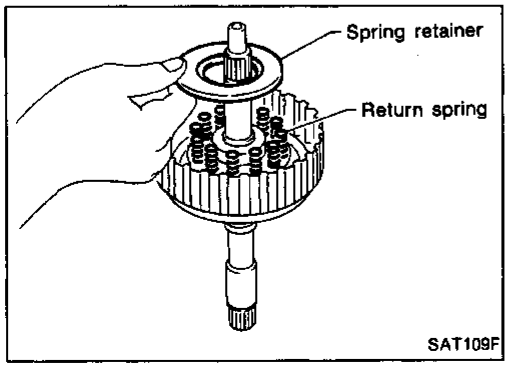


ASSEMBLY

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

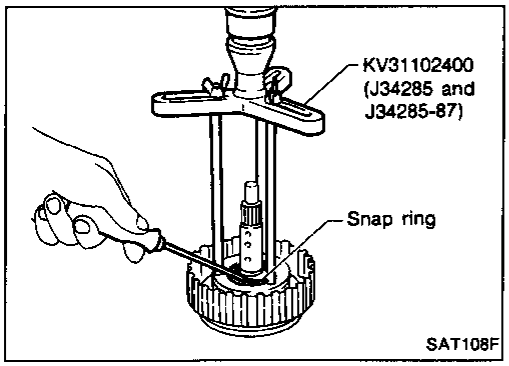


2. Install piston assembly by turning it slowly.
- **Apply ATF to inner surface of drum.**

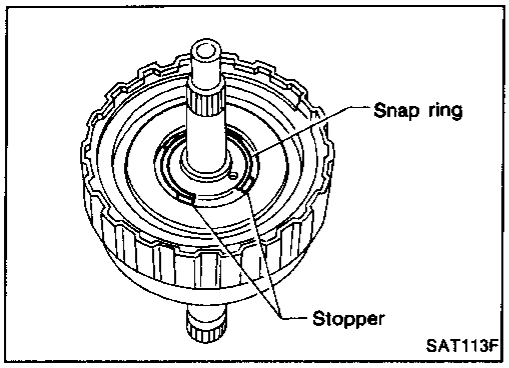


3. Install return springs and spring retainer on piston.

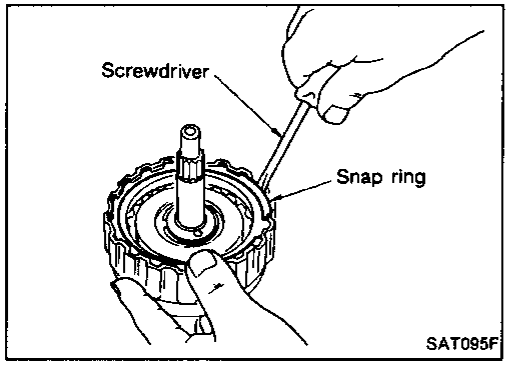
High Clutch (Cont'd)



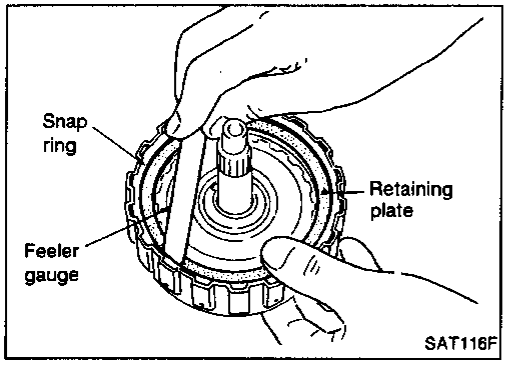
4. Set Tool on spring retainer and install snap ring while compressing return springs.
- **Set Tool directly over return springs.**



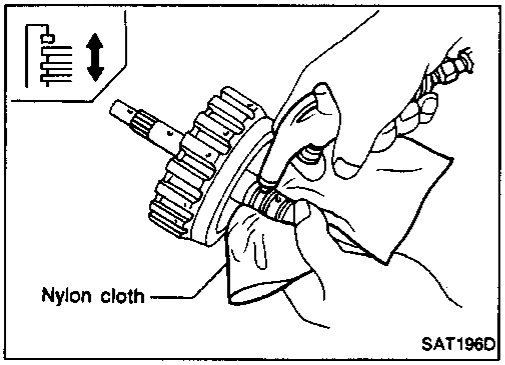
- **Do not align snap ring gap with spring retainer stopper.**



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

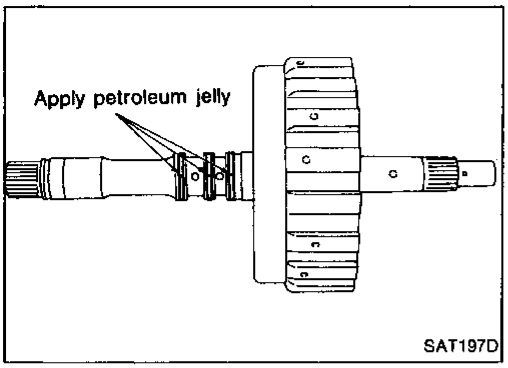


7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.
Specified clearance:
Standard 1.8 - 2.2 mm (0.071 - 0.087 in)
Allowable limit 3.0 mm (0.118 in)
Retaining plate: Refer to SDS. AT-226

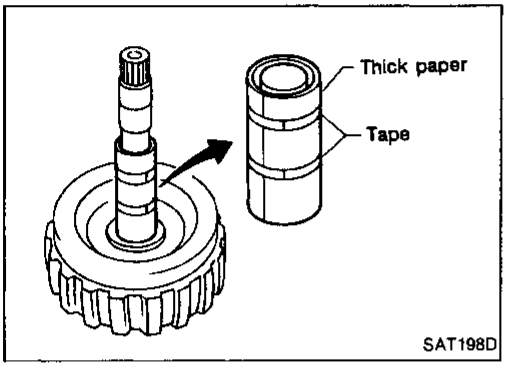


8. Check operation of high clutch.
Refer to "DISASSEMBLY" of High Clutch. AT-170

High Clutch (Cont'd)

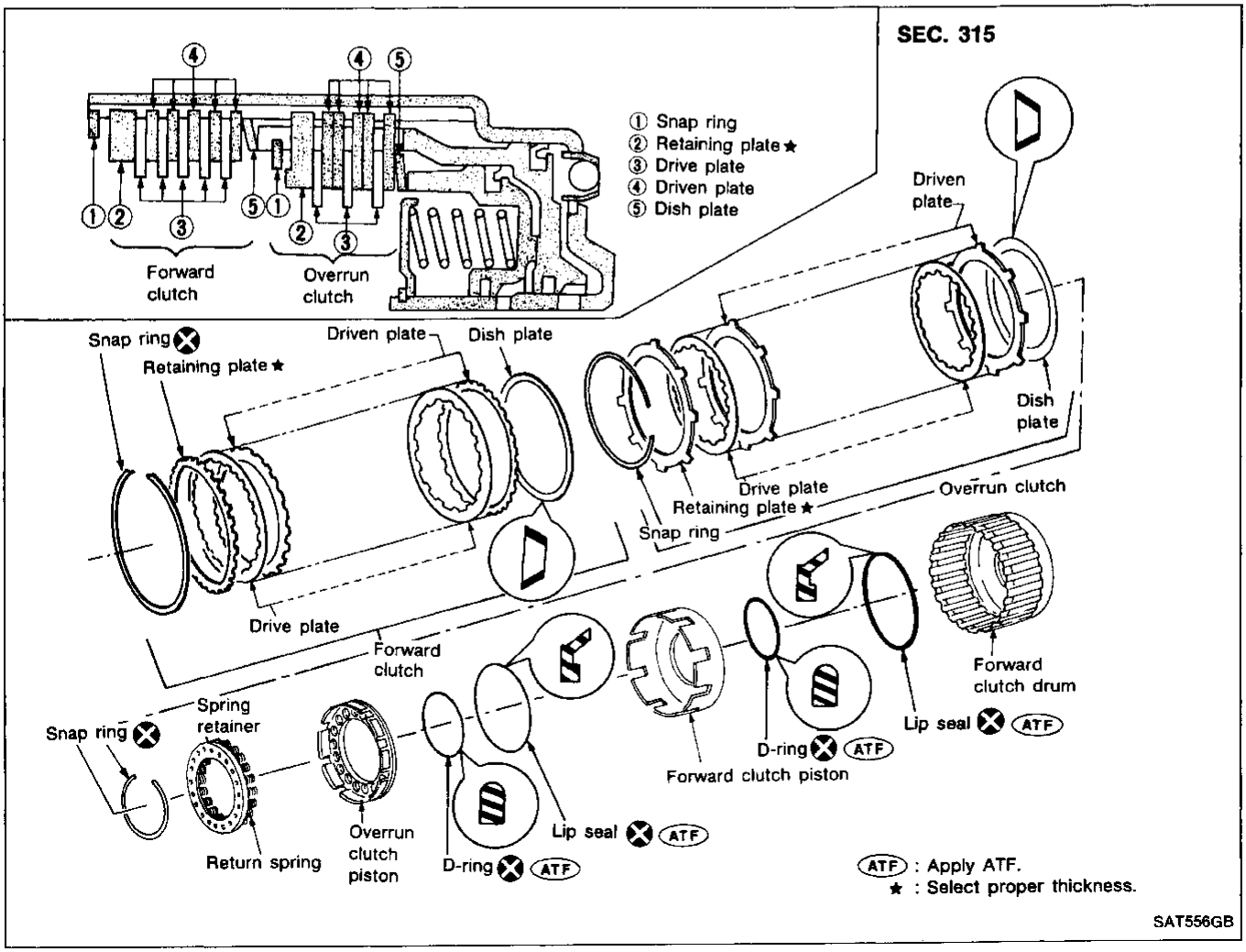


9. Install seal rings to input shaft.
- **Apply petroleum jelly to seal rings.**
- **Always replace when removed.**



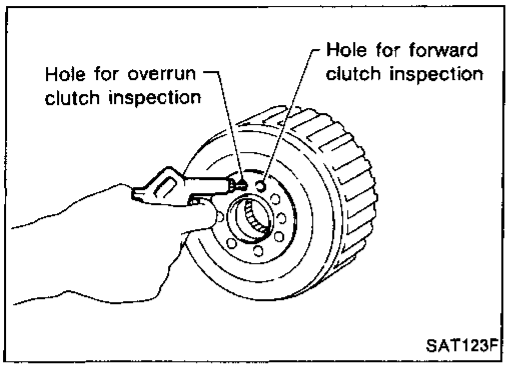
- **Roll paper around seal rings to prevent seal rings from spreading.**

Forward Clutch and Overrun Clutch

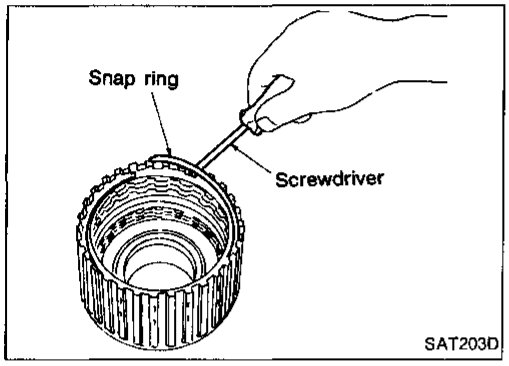


Forward Clutch and Overrun Clutch (Cont'd)

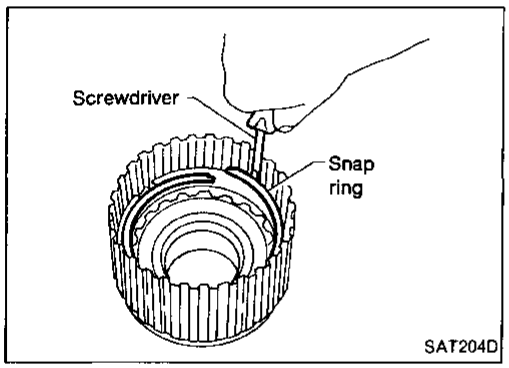
DISASSEMBLY



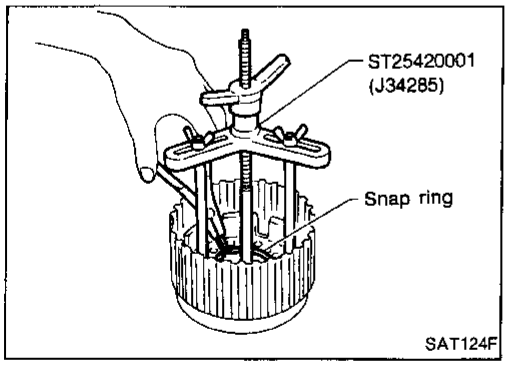
1. Check operation of forward clutch and overrun clutch.
a. Install bearing retainer on forward clutch drum.
b. Apply compressed air to oil hole of forward clutch drum.
c. Check to see that retaining plate moves to snap ring.
d. If retaining plate does not move to snap ring, D-ring or lip seal may be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

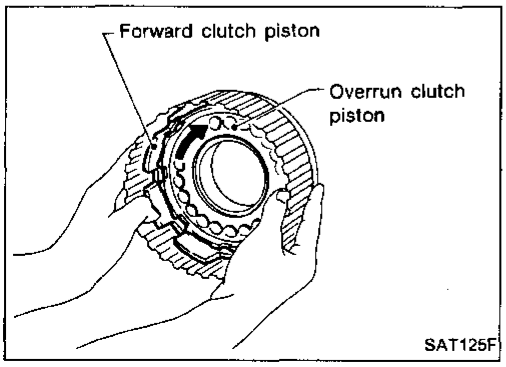


4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



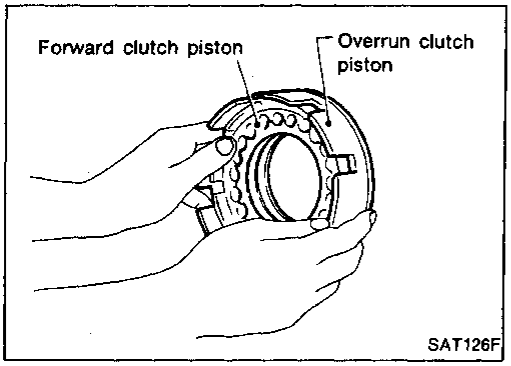
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
- **Set Tool directly over return springs.**
- **Do not expand snap ring excessively.**

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

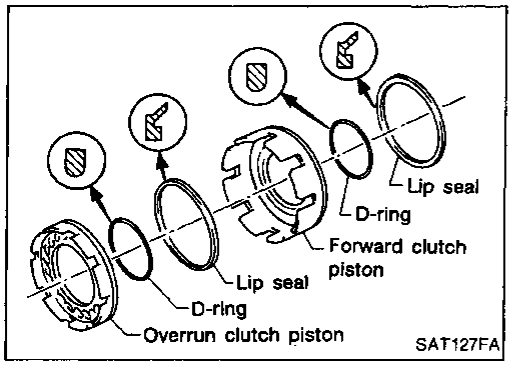


8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.

Forward Clutch and Overrun Clutch (Cont'd)



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

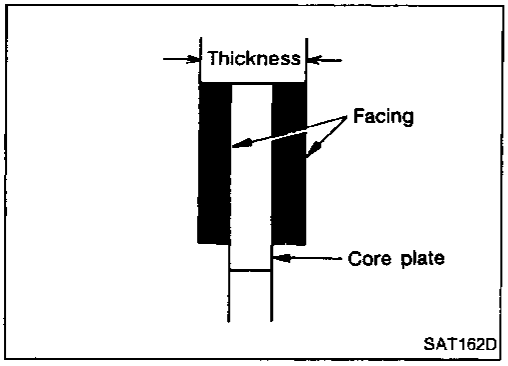


10. Remove D-rings and lip seals from forward clutch piston and overrun clutch piston.

INSPECTION

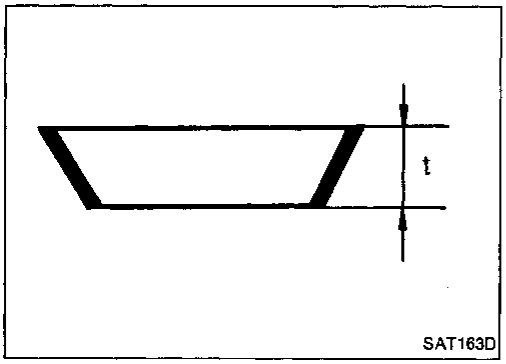
Snap rings, spring retainer and return springs

- 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

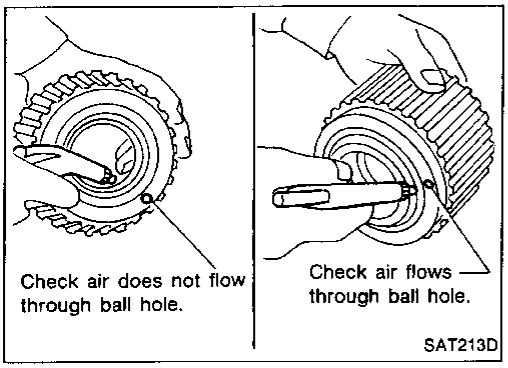
- Check facing for burns, cracks or damage.
- Measure thickness of facing.
  Thickness of drive plate:
  Forward clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
  Overrun clutch
  Standard value: 1.6 mm (0.063 in)
  Wear limit: 1.4 mm (0.055 in)
- If not within wear limit,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



Forward clutch and overrun clutch dish plates

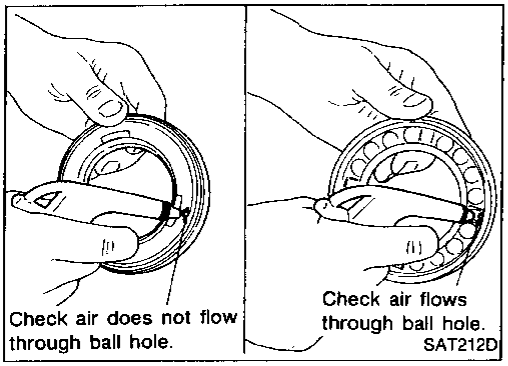
- Check for deformation or damage.
- Measure thickness of dish plate.
  Thickness of dish plate:
  Forward clutch 2.7 mm (0.106 in)
  Overrun clutch 2.7 mm (0.106 in)
- If deformed or fatigued, replace.

Forward Clutch and Overrun Clutch (Cont'd)



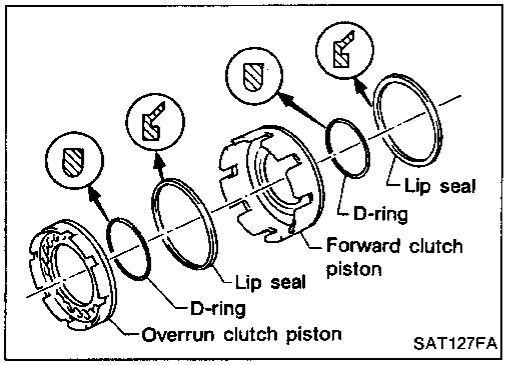
Forward clutch drum

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



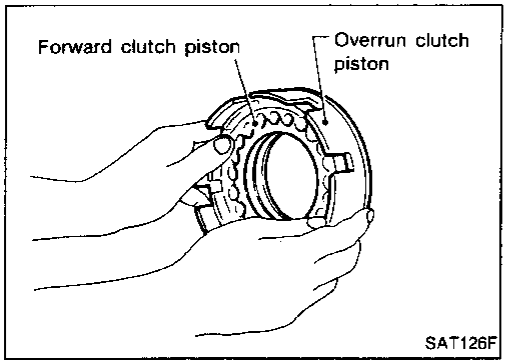
Overrun clutch piston

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

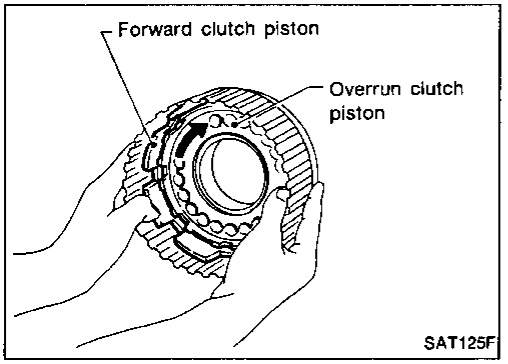


ASSEMBLY

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.**

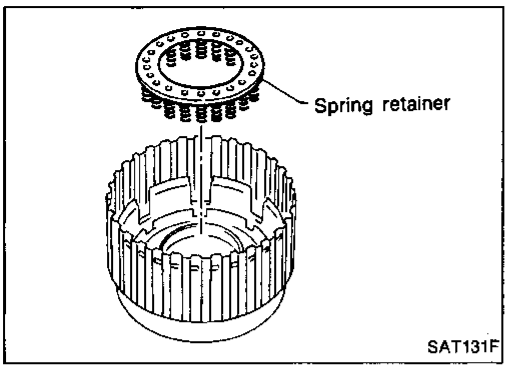


2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
- **Apply ATF to inner surface of forward clutch piston.**

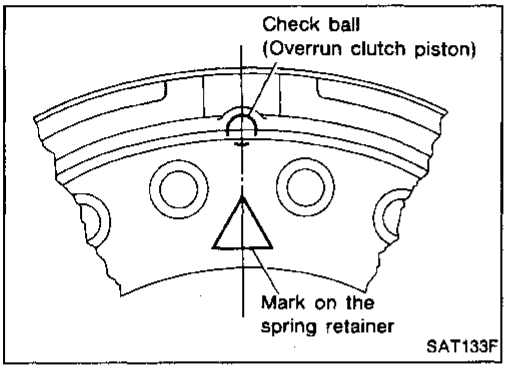


3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
- **Apply ATF to inner surface of drum.**

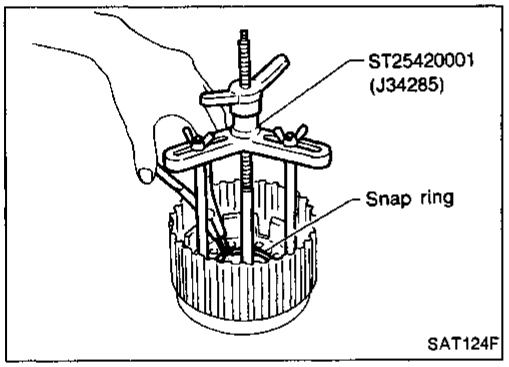
Forward Clutch and Overrun Clutch (Cont'd)



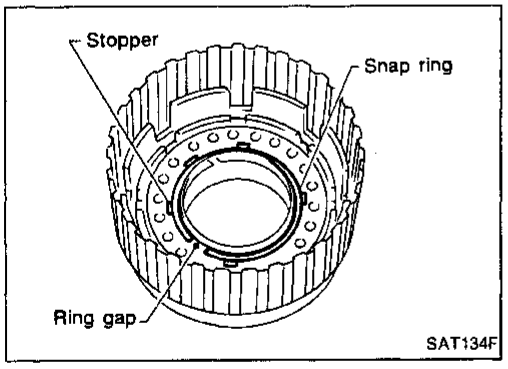
4. Install return spring on overrun clutch piston.



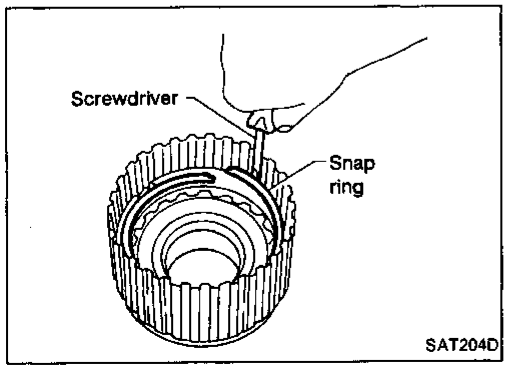
- Align the mark on spring retainer with check ball in overrun clutch piston.



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

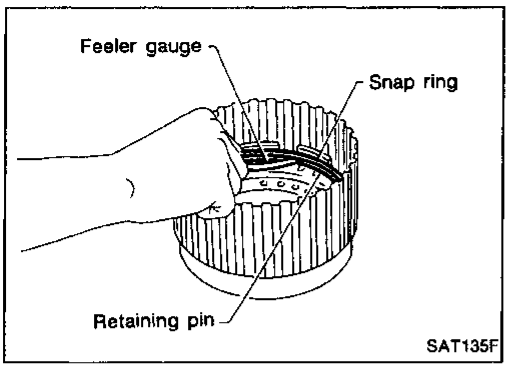


- **Do not align snap ring gap with spring retainer stopper.**

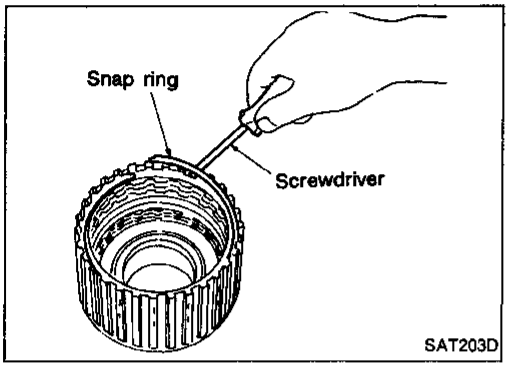


6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- **Take care with order of plates.**
7. Install snap ring for overrun clutch.

Forward Clutch and Overrun Clutch (Cont'd)

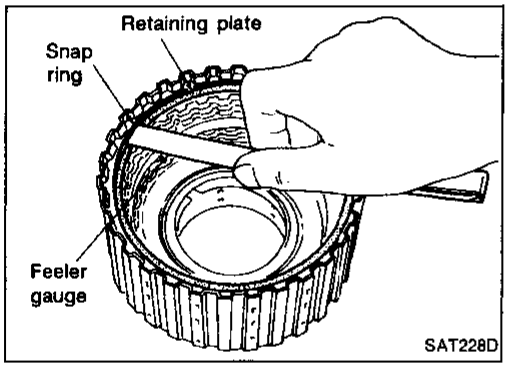


8. Measure clearance between overrun clutch retaining plate and snap ring.
   If not within allowable limit, select proper retaining plate.
   Specified clearance:
   Standard 0.7 - 1.1 mm (0.028 - 0.043 in)
   Allowable limit 1.7 mm (0.067 in)
   Overrun clutch retaining plate: Refer to SDS. AT-227

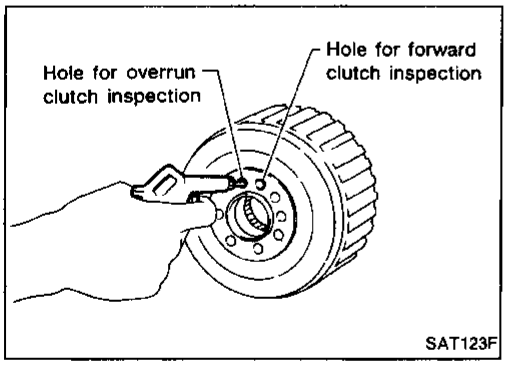


9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.
- **Take care with order of plates.**

10. Install snap ring for forward clutch.

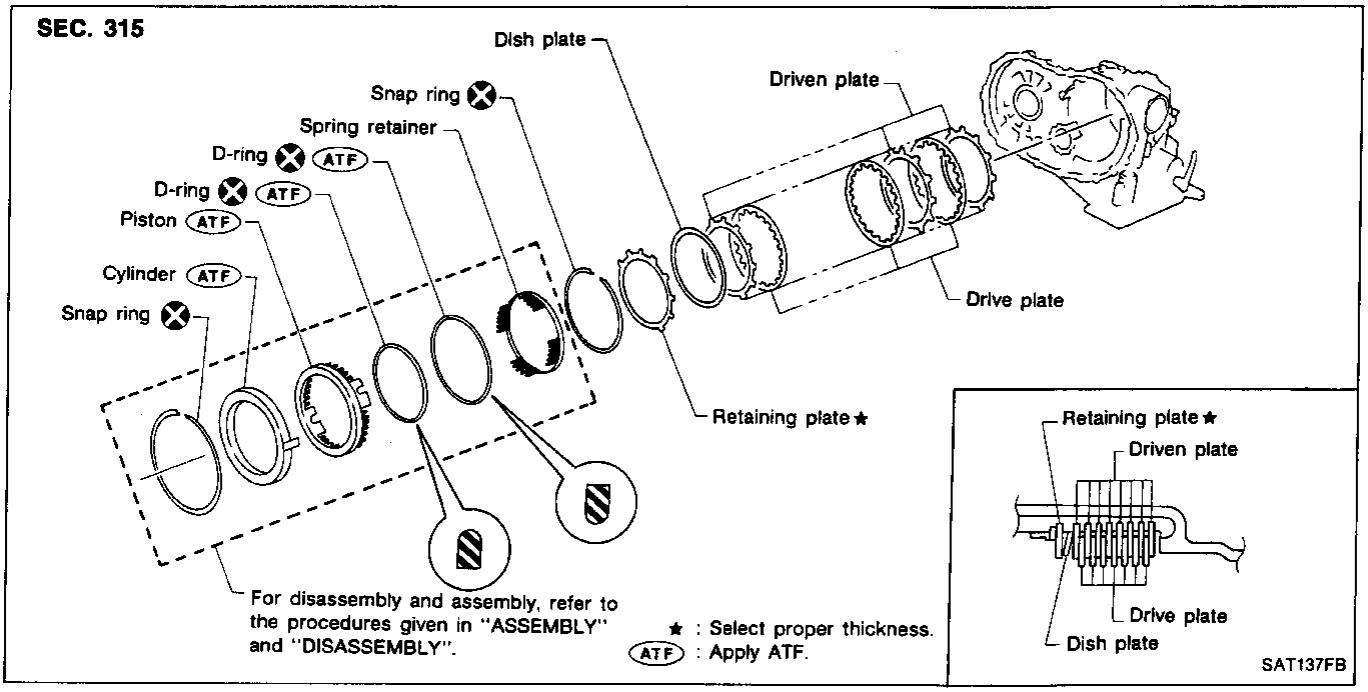


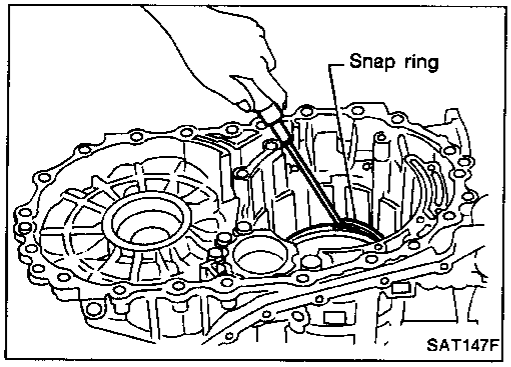
11. Measure clearance between forward clutch retaining plate and snap ring.
    If not within allowable limit, select proper retaining plate.
    Specified clearance:
    Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)
    Allowable limit 1.85 mm (0.0728 in)
    Forward clutch retaining plate: Refer to SDS. AT-227



12. Check operation of forward clutch.
    Refer to "DISASSEMBLY" of Forward Clutch and Overrun Clutch. AT-175
13. Check operation of overrun clutch.
    Refer to "DISASSEMBLY" of Forward Clutch and Overrun Clutch. AT-175

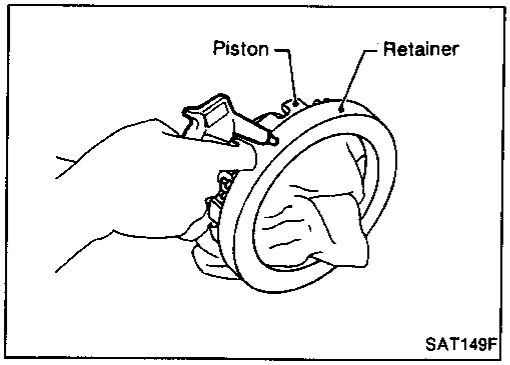
Low & Reverse Brake





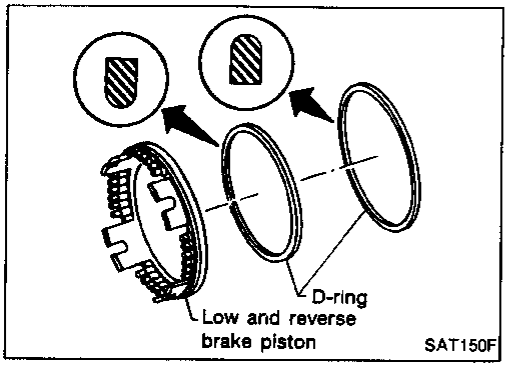
DISASSEMBLY

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.**



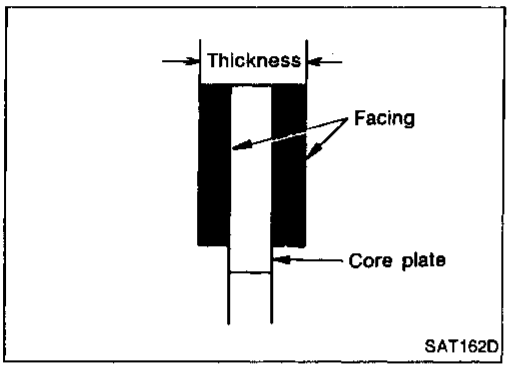
5. Remove D-rings from piston.

Low & Reverse Brake (Cont'd)

INSPECTION

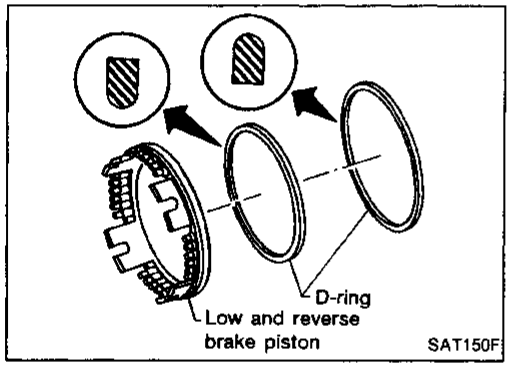
Low & reverse clutch snap ring, spring retainer and return springs

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



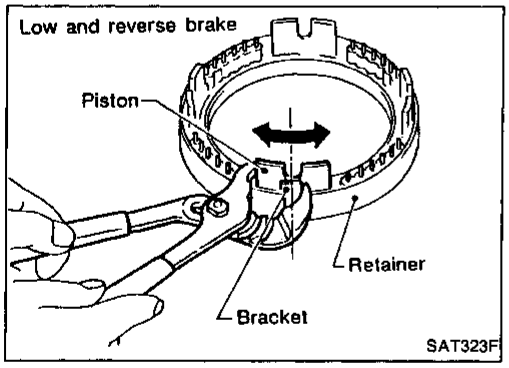
Low & reverse brake drive plate

- 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.

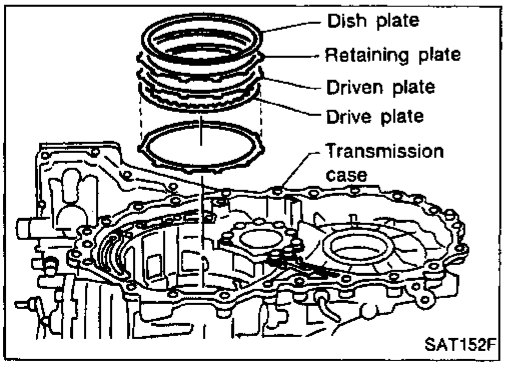


ASSEMBLY

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

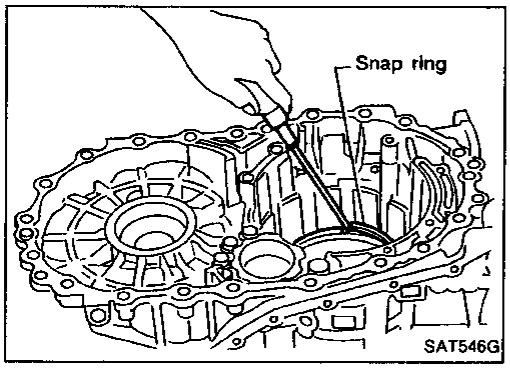


2. Set and align piston with retainer.
- **This operation is required in order to engage the protrusions of piston to return springs correctly. Further procedures are given in "ASSEMBLY".**

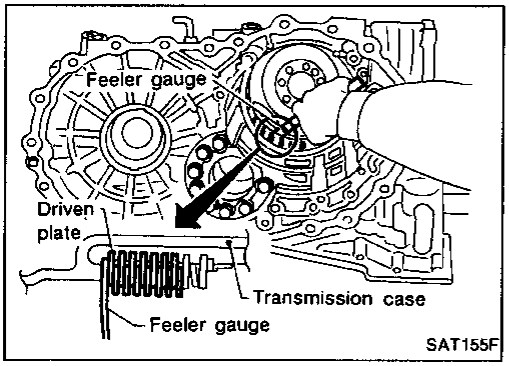


3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
- **Take care with order of plates and direction of dish plate.**

Low & Reverse Brake (Cont'd)



4. Install snap ring.



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

Specified clearance:

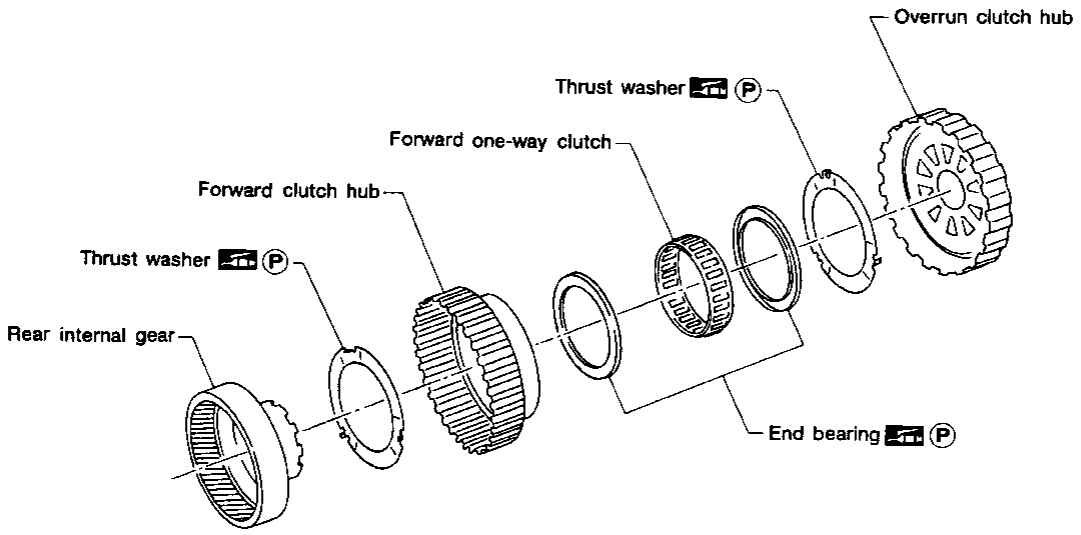
Standard 1.7 - 2.1 mm (0.067 - 0.083 in)

Allowable limit 3.5 mm (0.138 in)

Retaining plate: Refer to SDS. AT-228

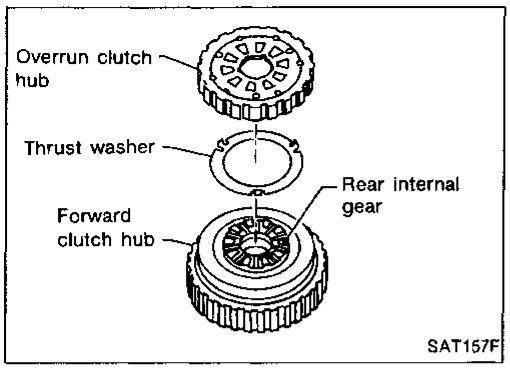
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub

SEC. 315

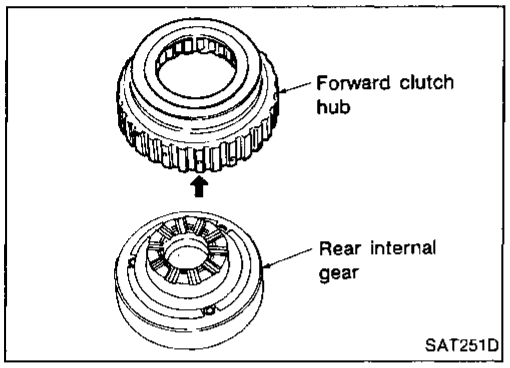


Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)

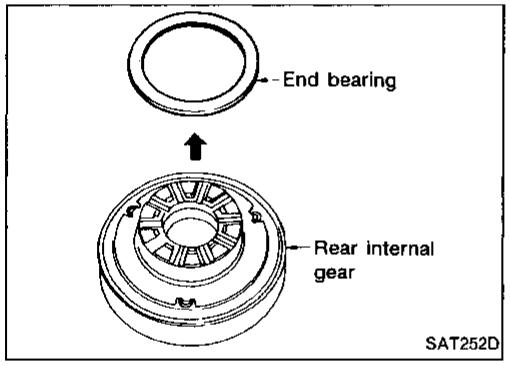
DISASSEMBLY



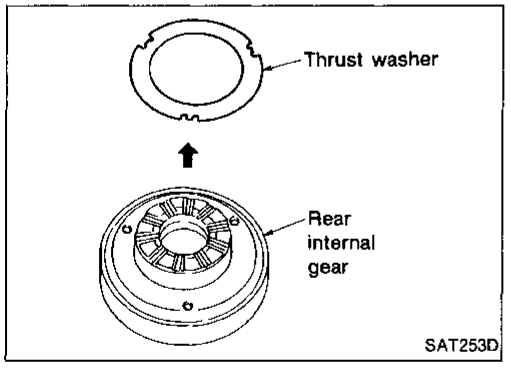
1. Remove overrun clutch hub and thrust washer from forward clutch hub.



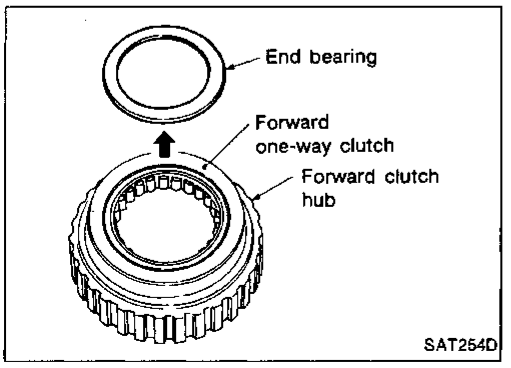
2. Remove forward clutch hub from rear internal gear.



3. Remove end bearing from rear internal gear.

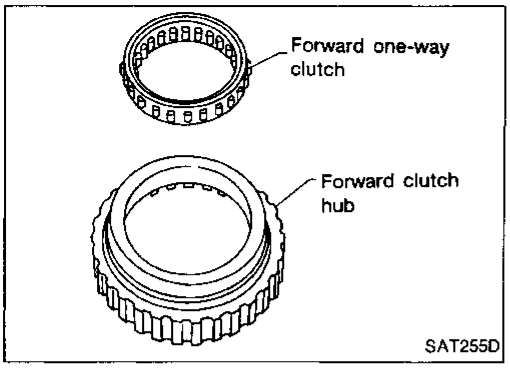


4. Remove thrust washer from rear internal gear.

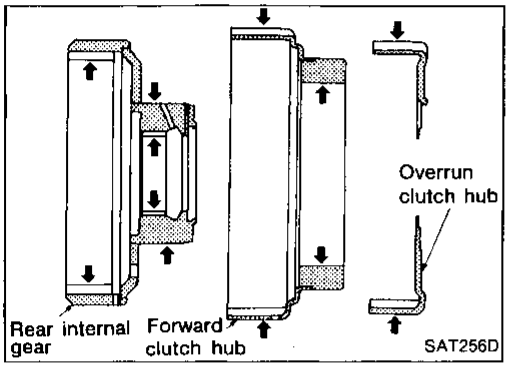


5. Remove end bearing from forward one-way clutch.

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



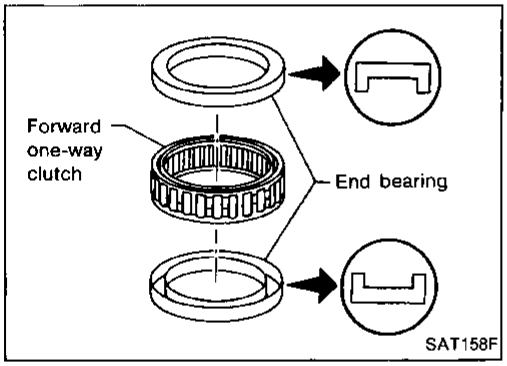
6. Remove forward one-way clutch from forward clutch hub.



INSPECTION

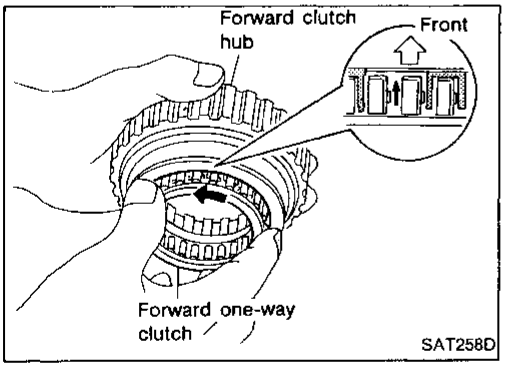
Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surfaces for wear or damage.



End bearings and forward one-way clutch

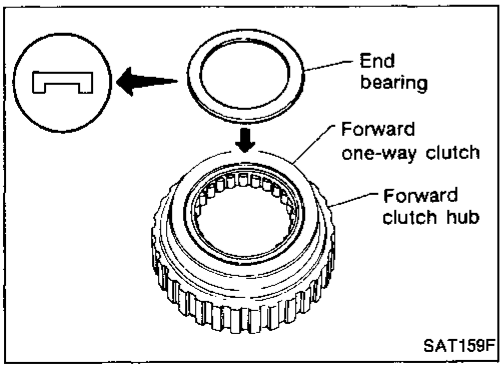
- Check end bearings for deformation and damage.
- Check forward one-way clutch for wear and damage.



ASSEMBLY

1. Install forward one-way clutch on forward clutch.

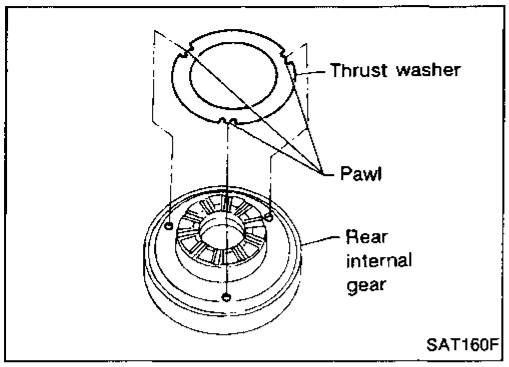
- **Take care with the direction of forward one-way clutch.**



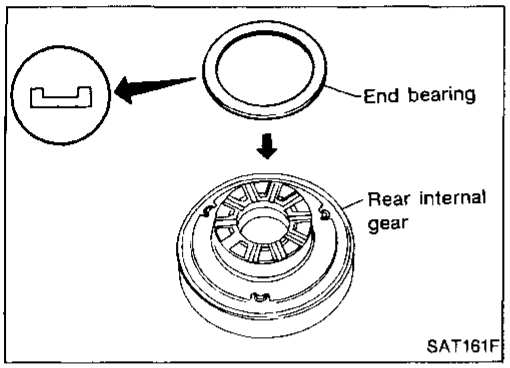
2. Install end bearing on forward one-way clutch.

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

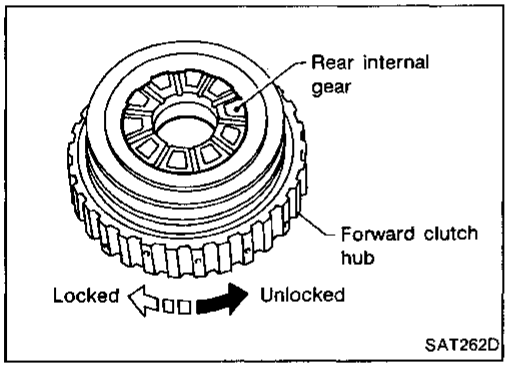
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



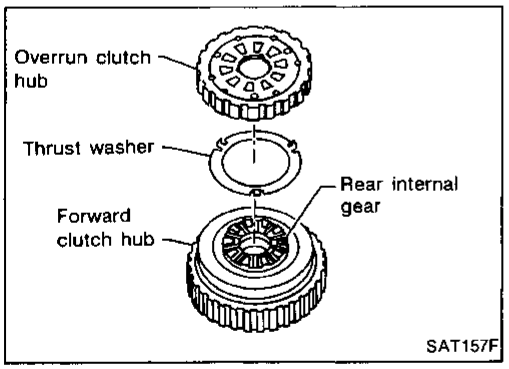
3. Install thrust washer on rear internal gear.
- **Apply petroleum jelly to thrust washer.**
- **Align hooks of thrust washer with holes of rear internal gear.**



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

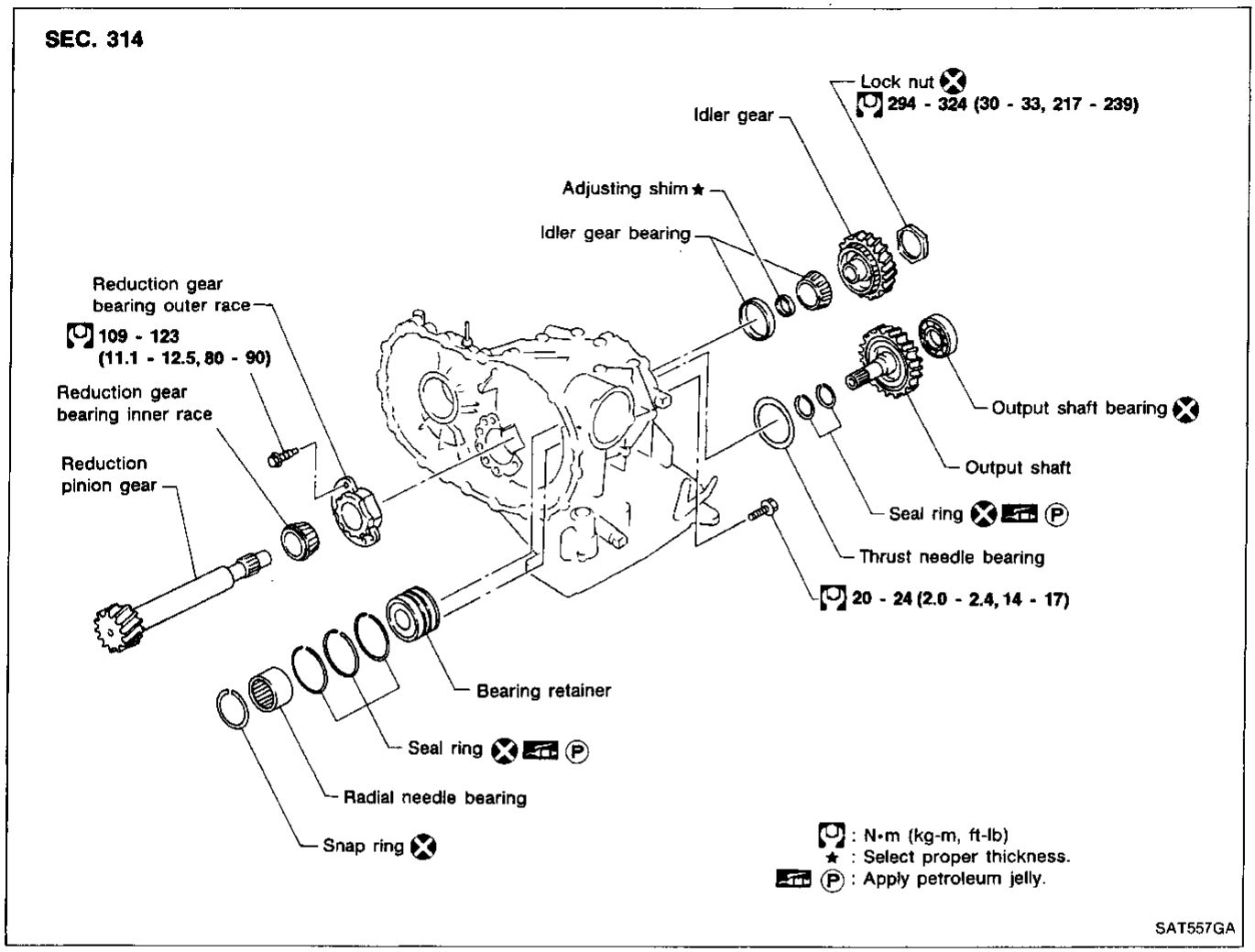


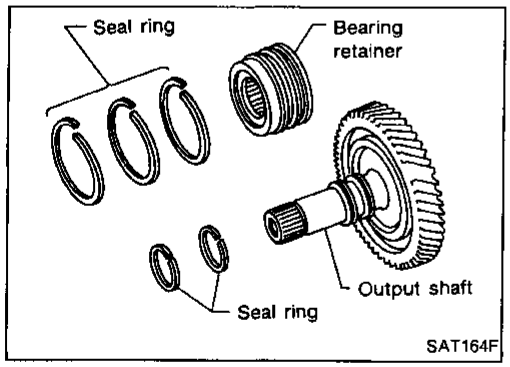
5. Install forward clutch hub on rear internal gear.
- **Check operation of forward one-way clutch.**



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.**

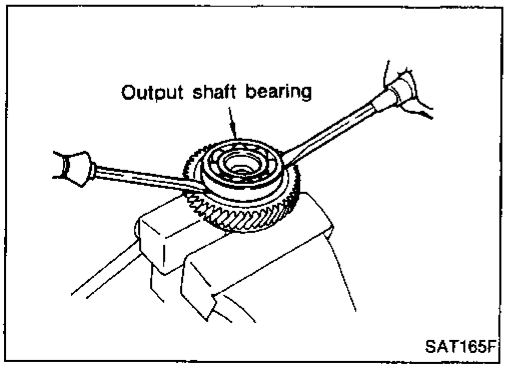
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer





DISASSEMBLY

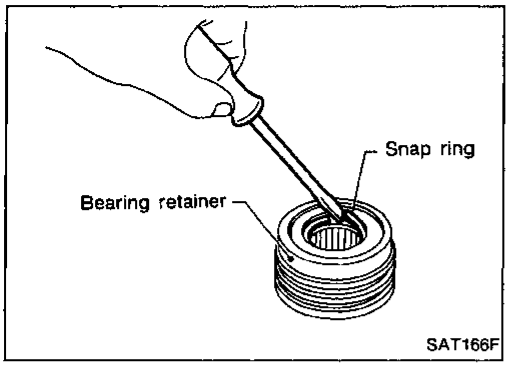
1. Remove seal rings from output shaft and bearing retainer.



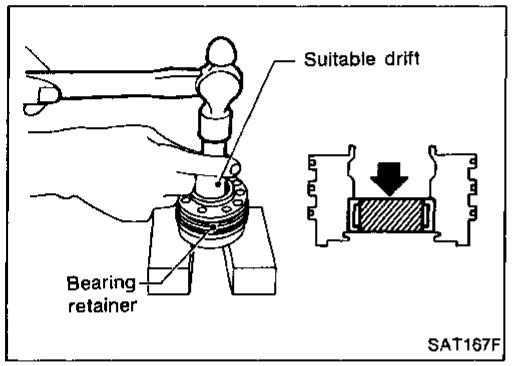
2. Remove output shaft bearing with screwdrivers.

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

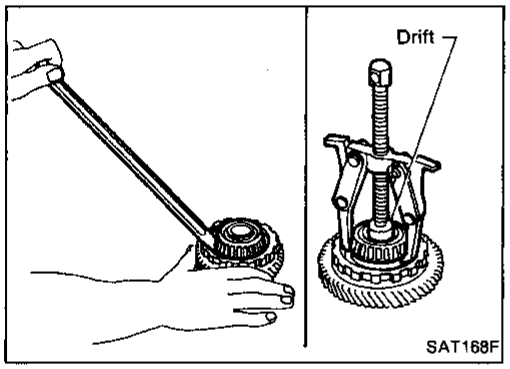
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



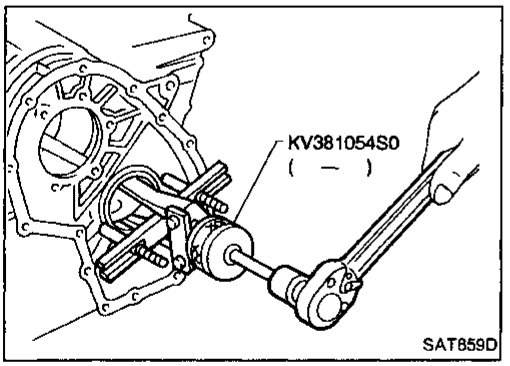
3. Remove snap ring from bearing retainer.



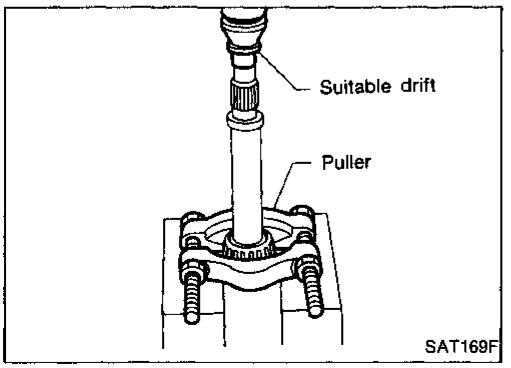
4. Remove needle bearing from bearing retainer.



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

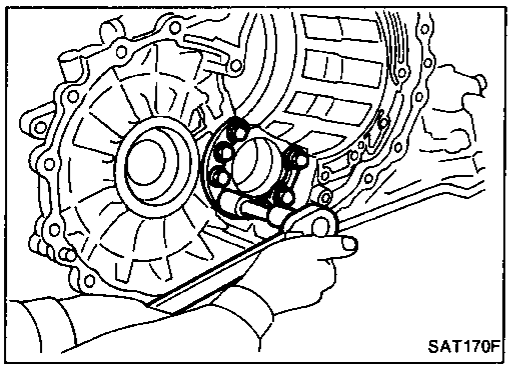


6. Remove idler gear bearing outer race from transmission case.



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

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

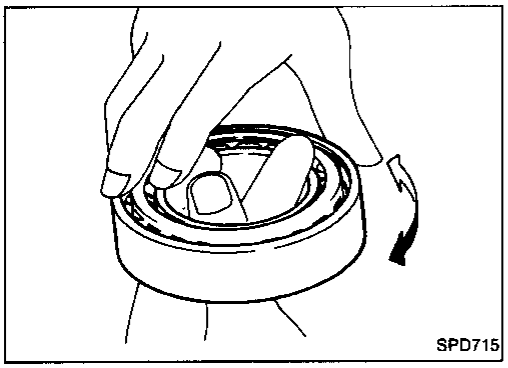

SAT170F

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

INSPECTION

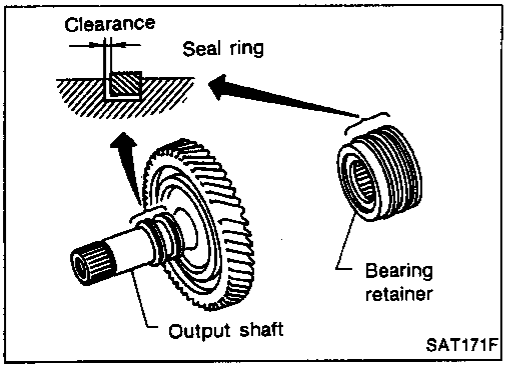
Output shaft, idler gear and reduction gear

- 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.**



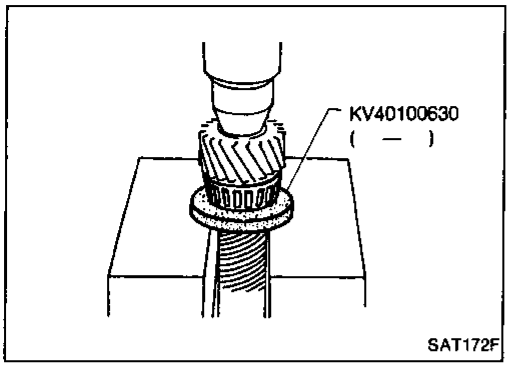
SAT171F

Seal ring clearance

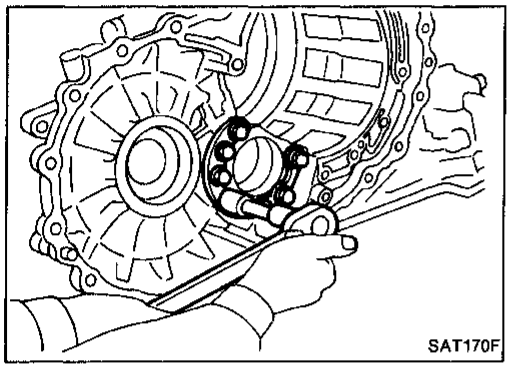
- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.
  Standard clearance:
  0.10 - 0.25 mm (0.0039 - 0.0098 in)
  Allowable limit:
  0.25 mm (0.0098 in)
- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing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

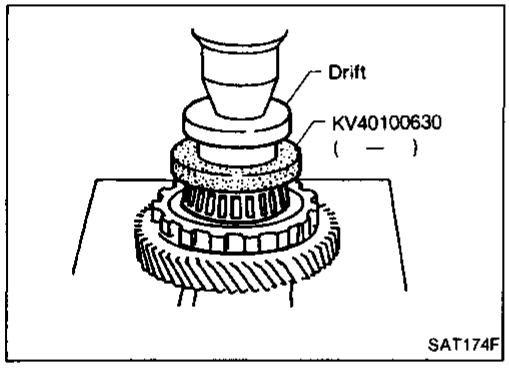
ASSEMBLY



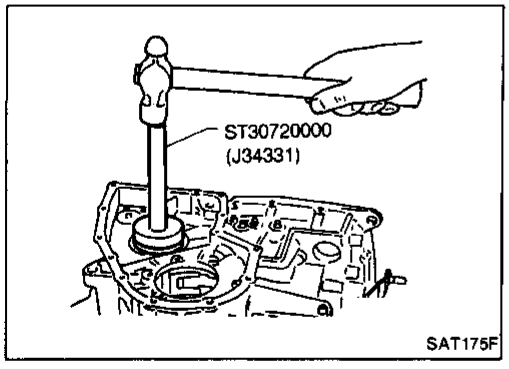
1. Press reduction gear bearing inner race on reduction gear.



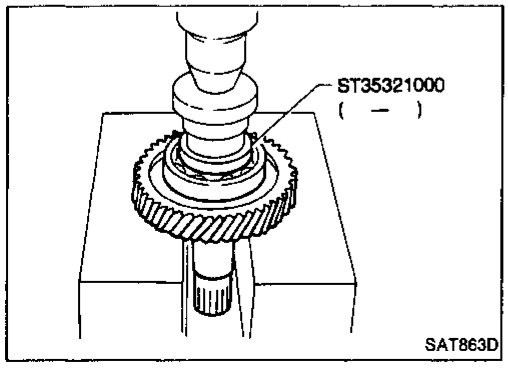
2. Install reduction gear bearing outer race on transmission case.



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

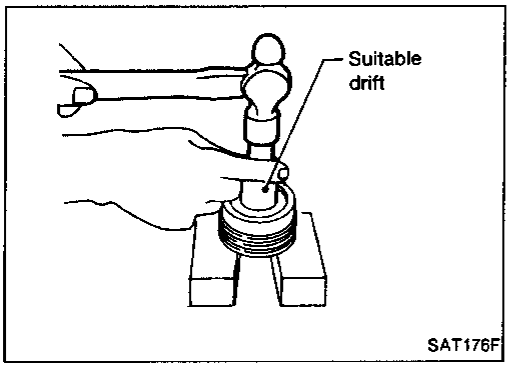


4. Install idler gear bearing outer race on transmission case.

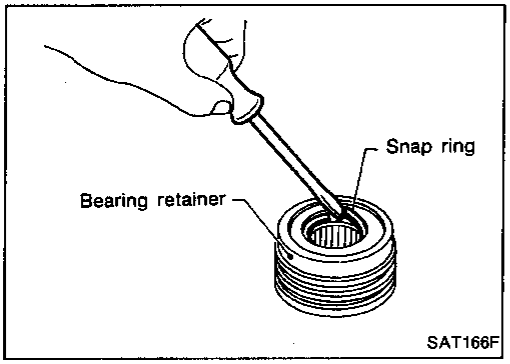


5. Press output shaft bearing on output shaft.

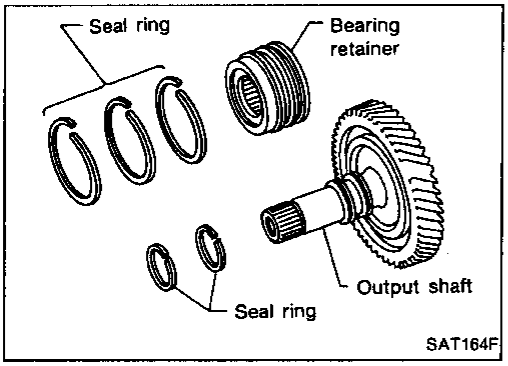
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



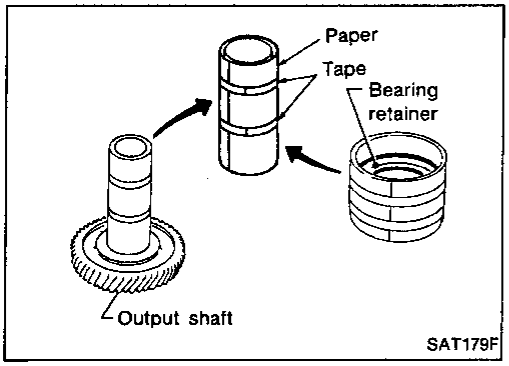
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.

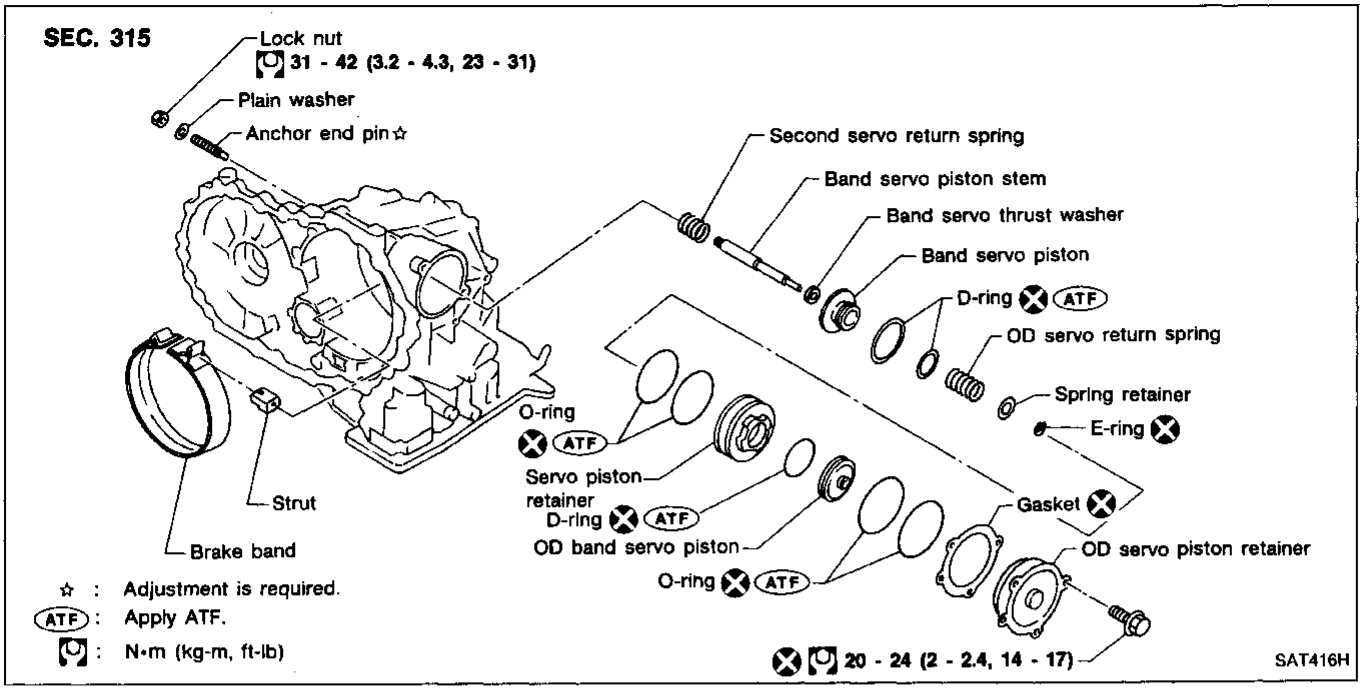


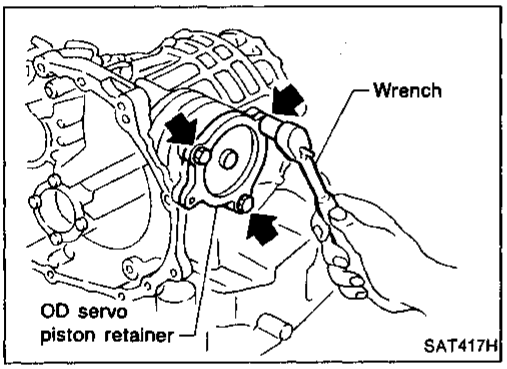
8. Install new seal rings to output shaft and bearing retainer carefully after packing ring grooves with petroleum jelly.



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

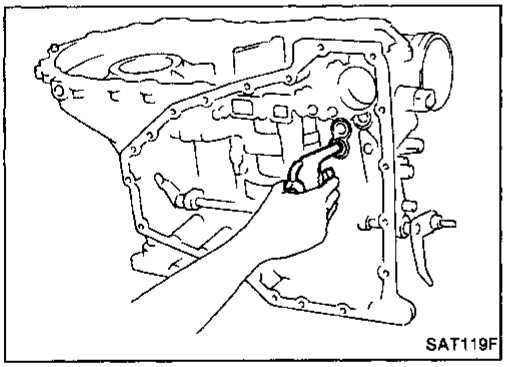
Band Servo Piston Assembly



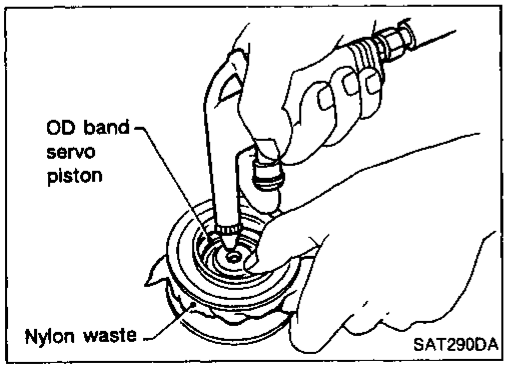


DISASSEMBLY

1. Remove band servo piston fixing bolts.

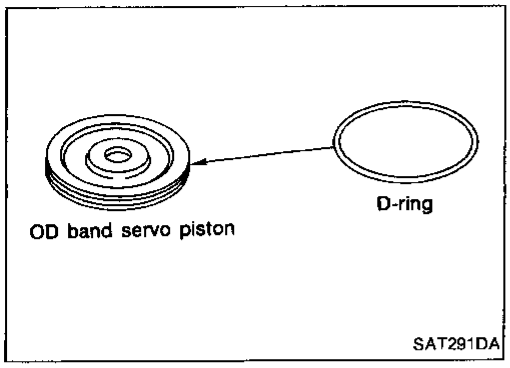


2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.
   - **Hold band servo piston assembly with a rag.**

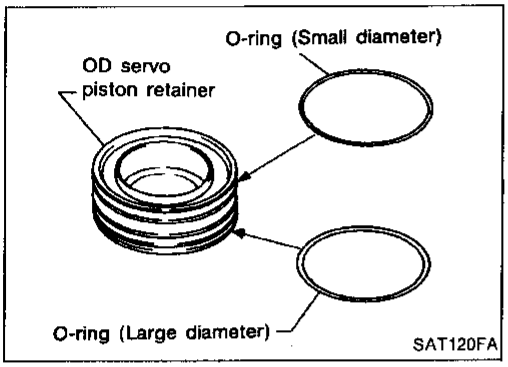


3. Apply compressed air to oil hole in OD servo piston retainer to remove OD band servo piston from retainer.
   - **Hold OD band servo piston while applying compressed air.**

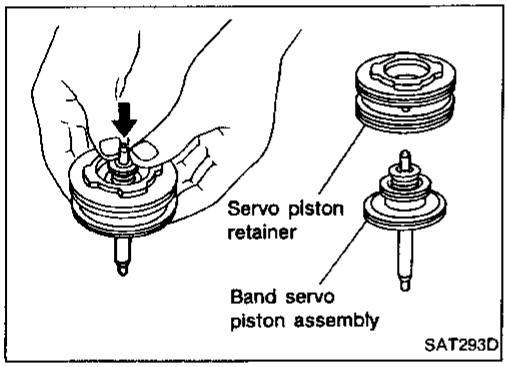
Band Servo Piston Assembly (Cont'd)



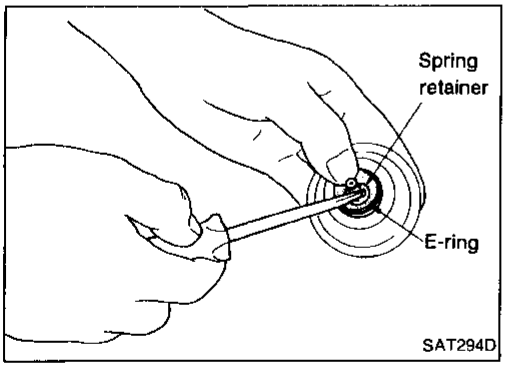
4. Remove D-ring from OD band servo piston.



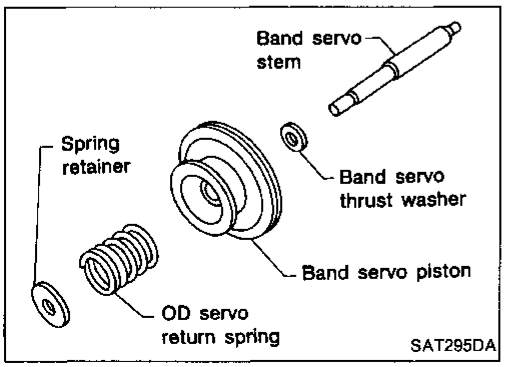
5. Remove O-rings from OD servo piston retainer.



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

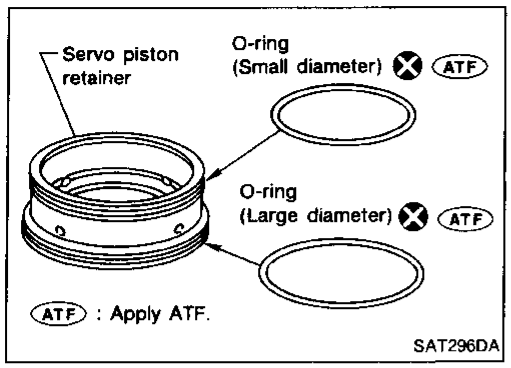


7. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

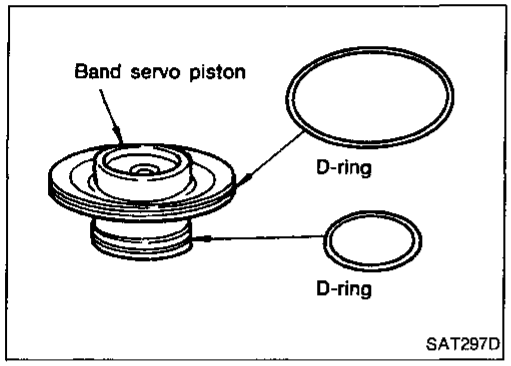


8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

Band Servo Piston Assembly (Cont'd)



9. Remove O-rings from servo piston retainer.

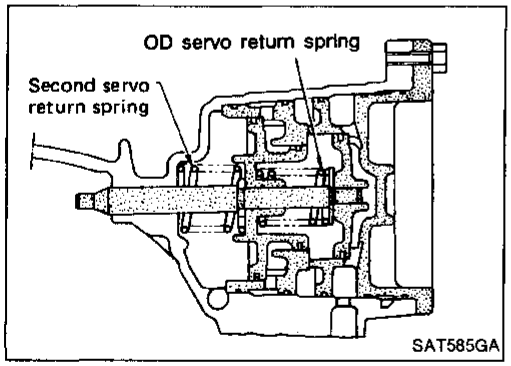


10. Remove D-rings from band servo piston.

INSPECTION

Pistons, retainers and piston stem

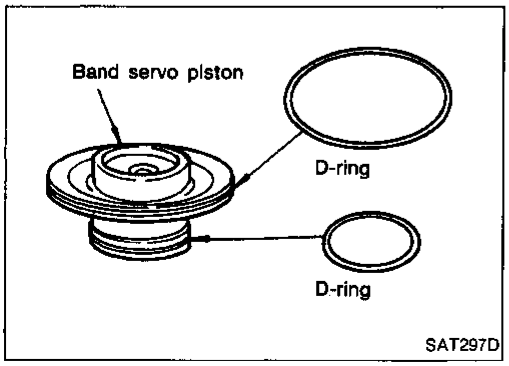
- Check frictional surfaces for abnormal wear or damage.



Return springs

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

Inspection standard: Refer to SDS. AT-232

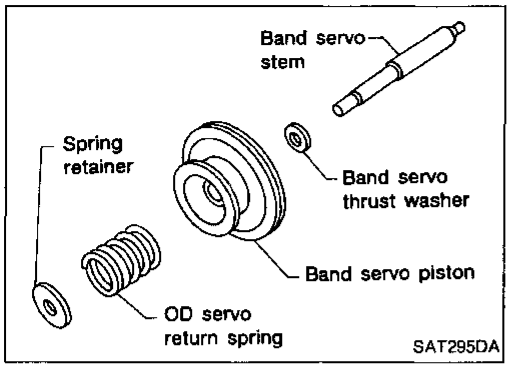


ASSEMBLY

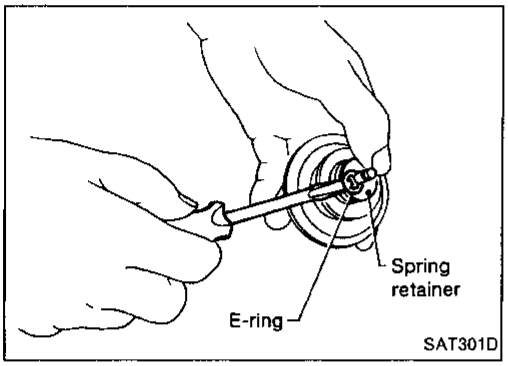
1. Install D-rings to servo piston retainer.

- **Apply ATF to D-rings.**
- **Pay attention to position of each O-ring.**

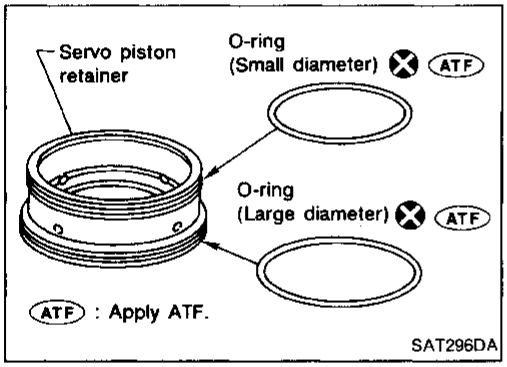
Band Servo Piston Assembly (Cont'd)



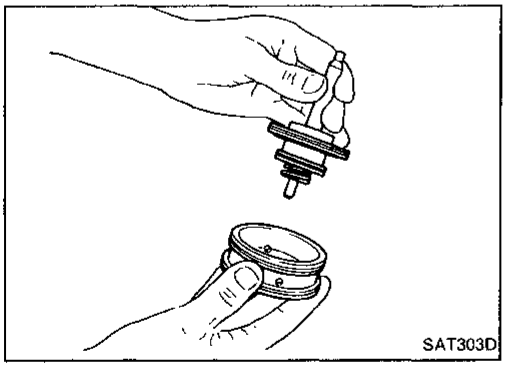
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



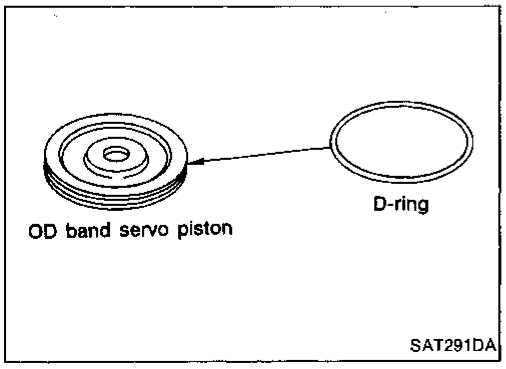
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



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

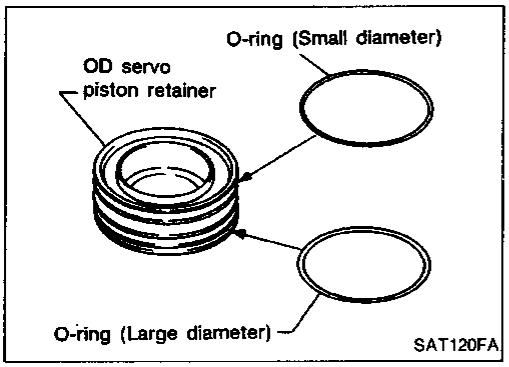


5. Install band servo piston assembly to servo piston retainer by pushing it inward.

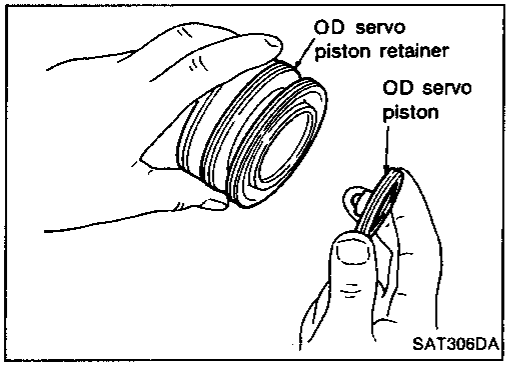


6. Install D-ring to OD band servo piston.
- **Apply ATF to D-ring.**

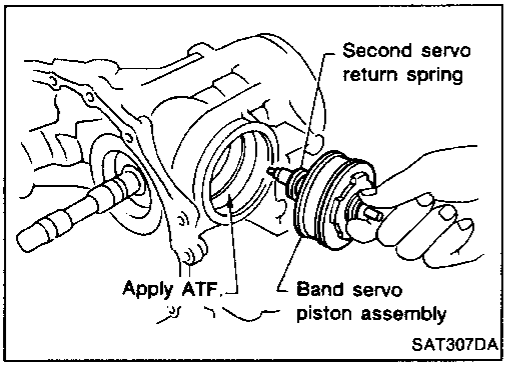
Band Servo Piston Assembly (Cont'd)



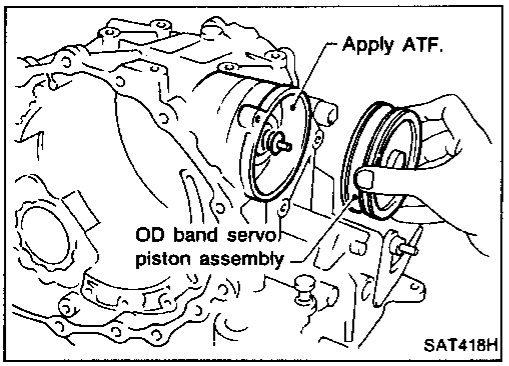
7. Install O-rings to OD servo piston retainer.
- **Apply ATF to O-rings.**
- **Pay attention to position of each O-ring.**



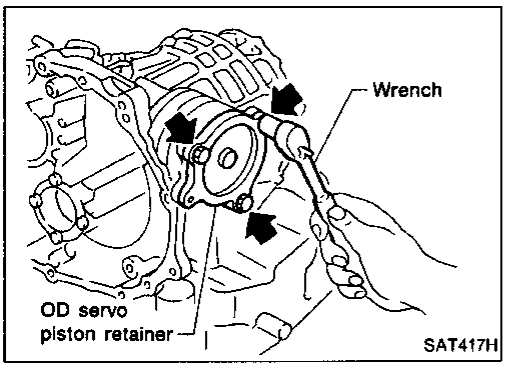
8. Install OD band servo piston to OD servo piston retainer.



9. 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.**

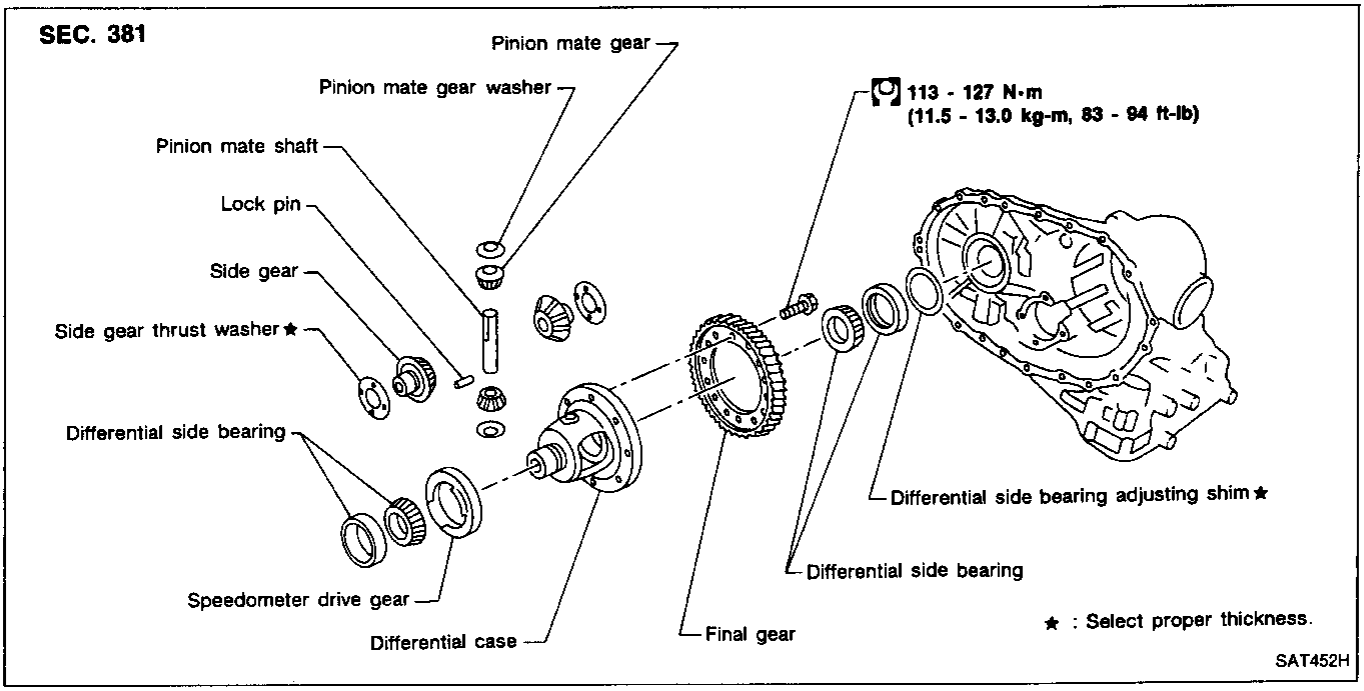


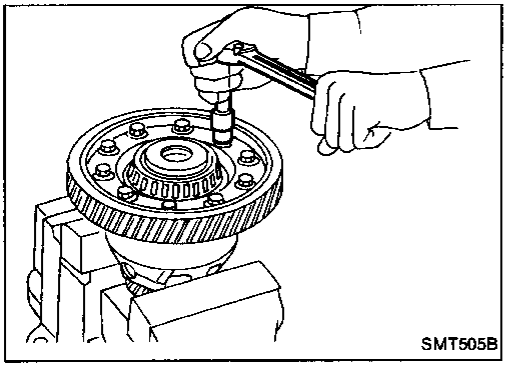
10. Install OD band servo piston assembly to transmission case.
- **Apply ATF to O-ring of band servo piston and transmission case.**



11. Install band servo piston snap ring to transmission case.

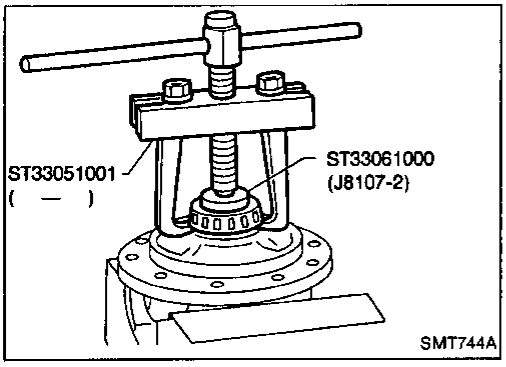
Final Drive — RE4F04A





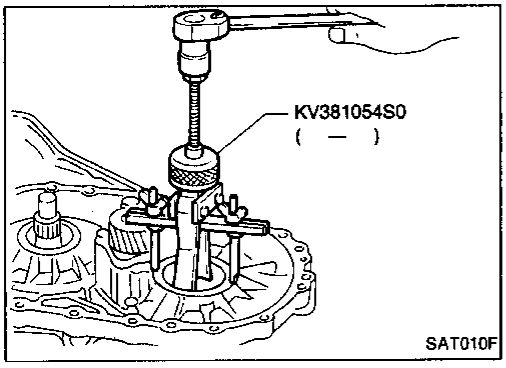
DISASSEMBLY

1. Remove final gear.



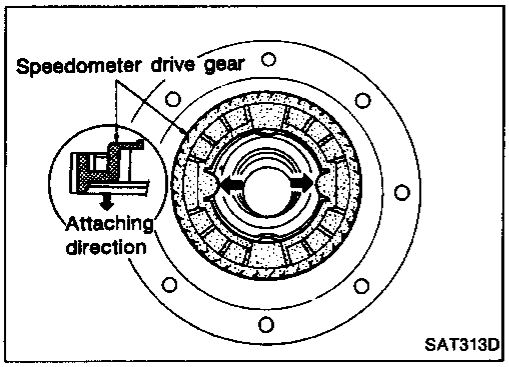
2. Press out differential side bearings.

- **Be careful not to mix up the right and left bearings.**

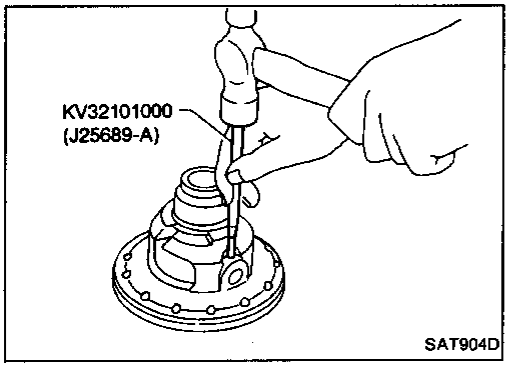


3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

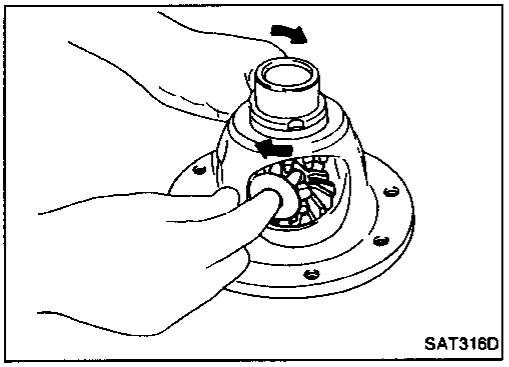
Final Drive — RE4F04A (Cont'd)



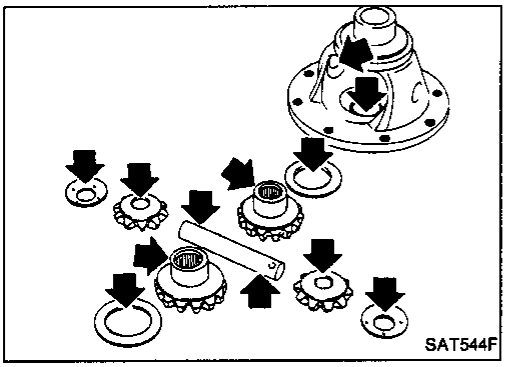
4. Remove speedometer drive gear.



5. Drive out pinion mate shaft lock pin.



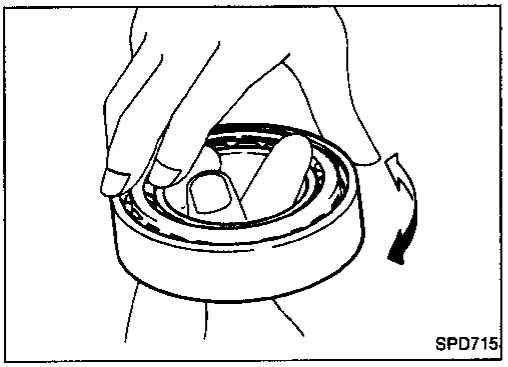
6. Draw out pinion mate shaft lock pin.
7. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

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

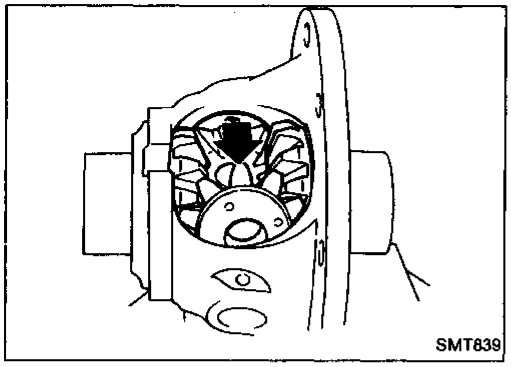


Bearings

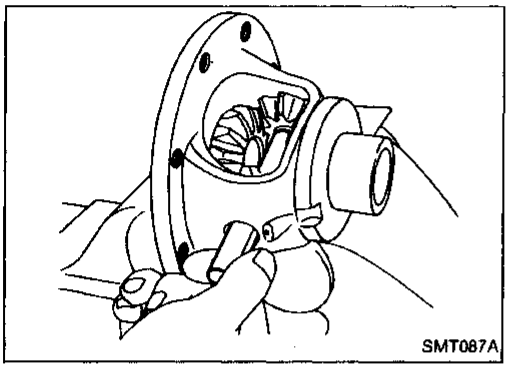
- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.
- **When replacing taper roller bearing, replace outer and inner race as a set.**

Final Drive — RE4F04A (Cont'd)

ASSEMBLY

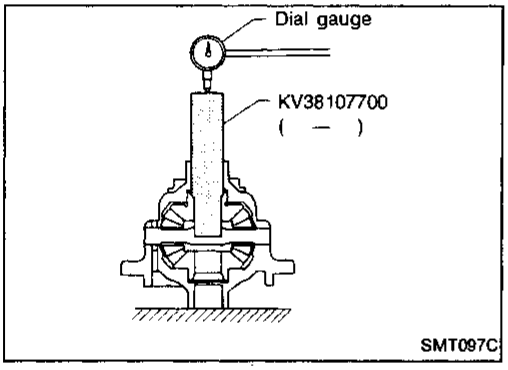

SMT839

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


SMT087A

2. Insert pinion mate shaft.

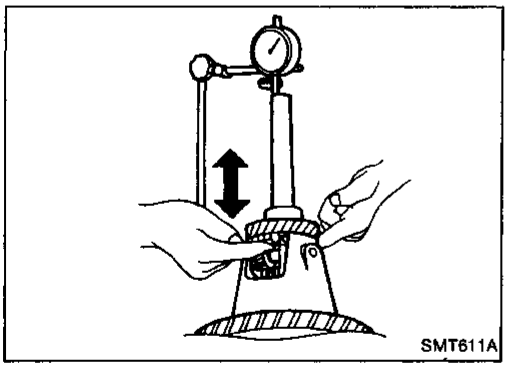
- **When inserting, be careful not to damage pinion mate gear washers.**



SMT097C

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

a. Set Tool and dial indicator on side gear.


SMT611A

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:

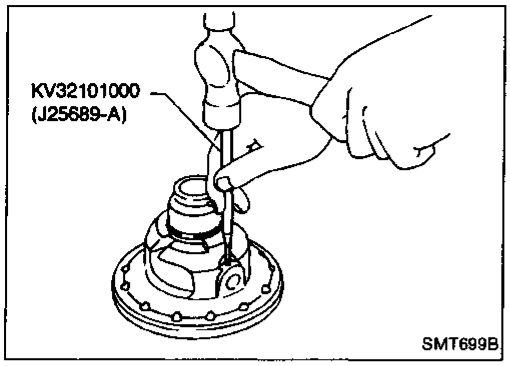
0.1 - 0.2 mm (0.004 - 0.008 in)

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

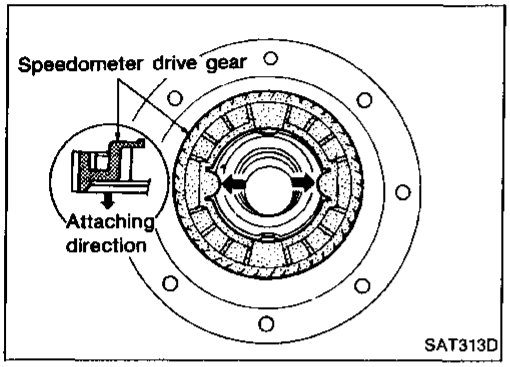
Side gear thrust washer:

Refer to AT-228.

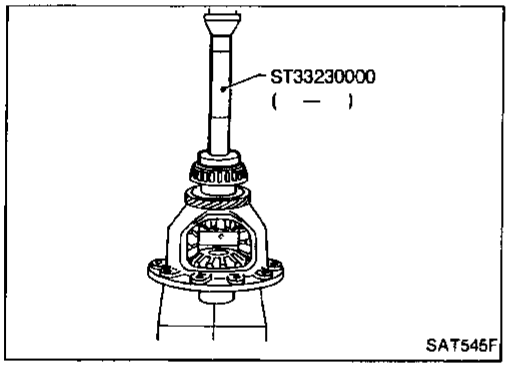
Final Drive — RE4F04A (Cont'd)



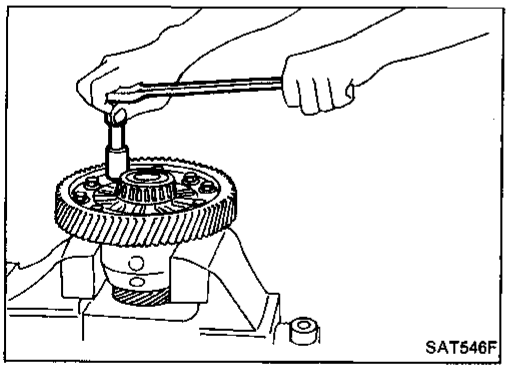
4. Install lock pin.
- **Make sure that lock pin is flush with case.**



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

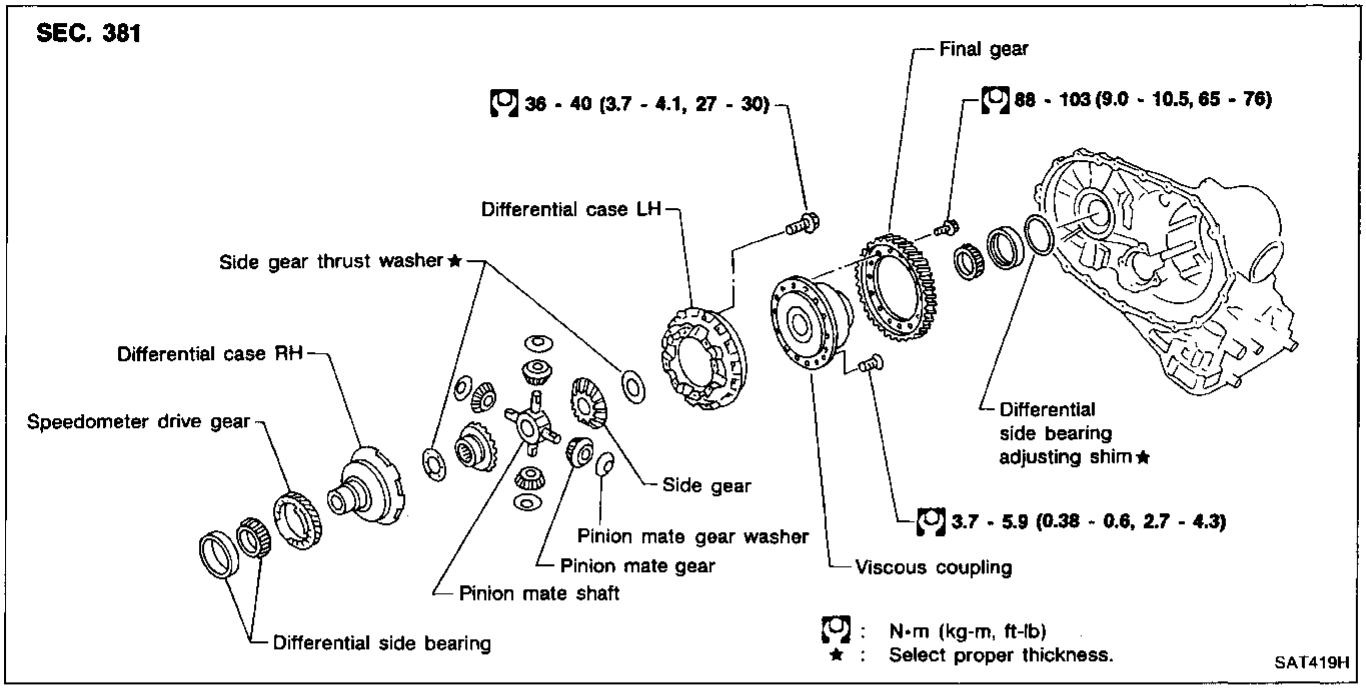


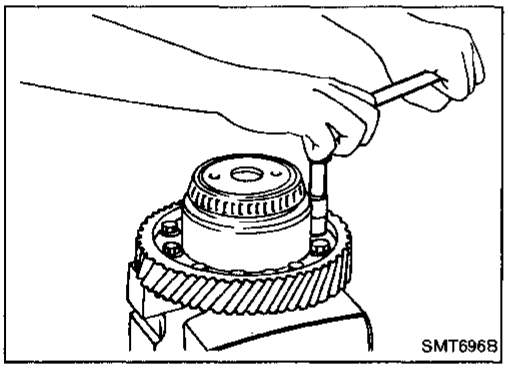
6. Press on differential side bearings.



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

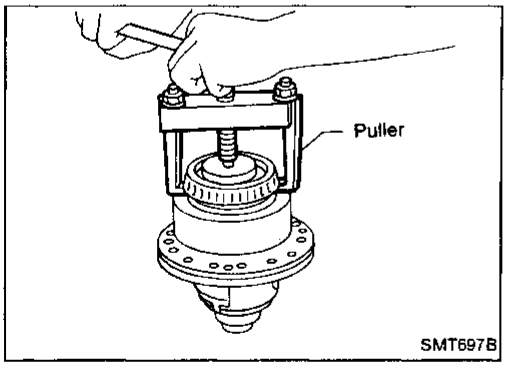
Final Drive — RE4F04V



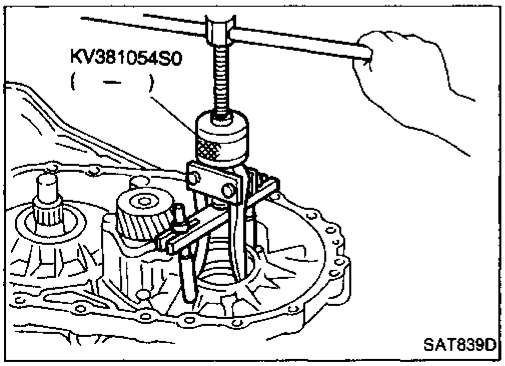


DISASSEMBLY

1. Remove final gear.

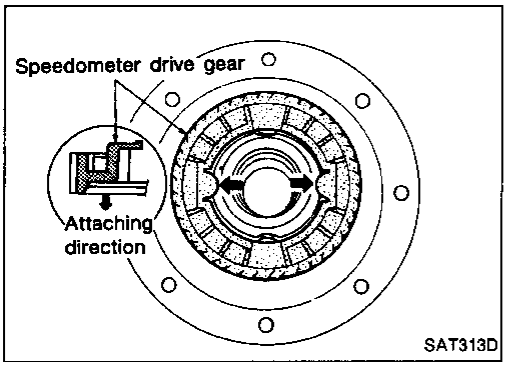


2. Press out differential side bearings.

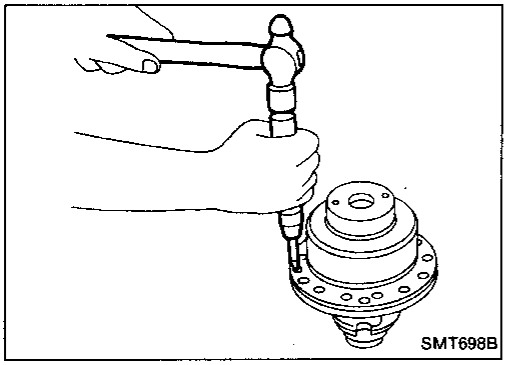


3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

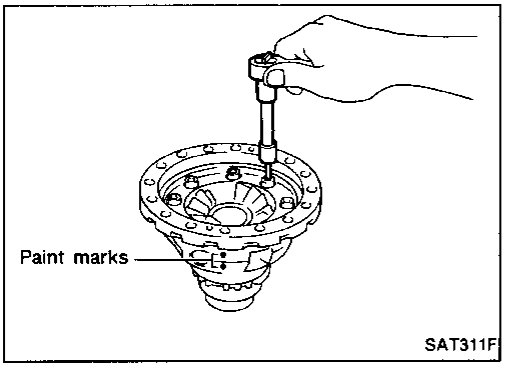
Final Drive — RE4F04V (Cont'd)



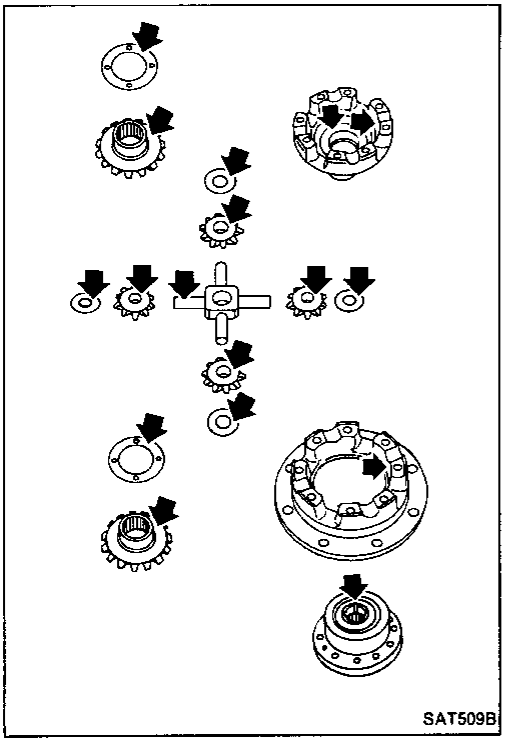
4. Remove speedometer drive gear.



5. Remove viscous coupling.



6. Separate differential cases. Make paint marks to identify their original position.
7. Remove pinion mate shaft with gears.

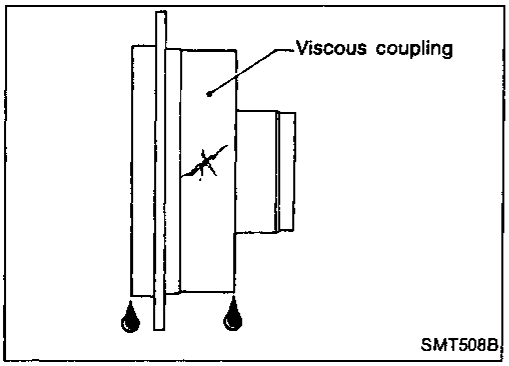


INSPECTION

Gear, washer, shaft and case

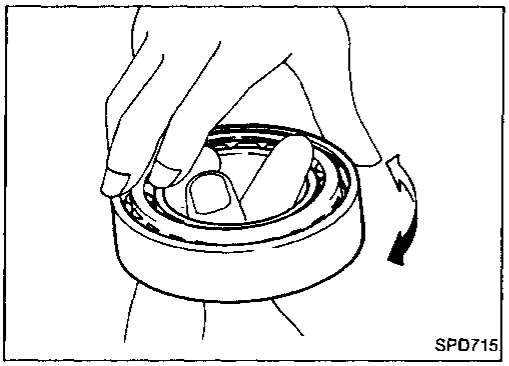
- Check mating surfaces of differential case, side gears, pinion mate gears and viscous coupling.
- Check washers for wear.

Final Drive — RE4F04V (Cont'd)



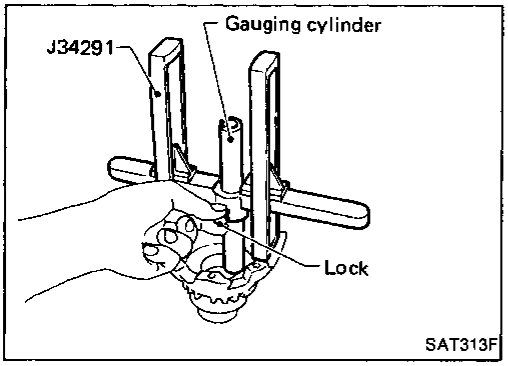
Viscous coupling

- Check case for cracks.
- Check silicone oil for leakage.



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.**

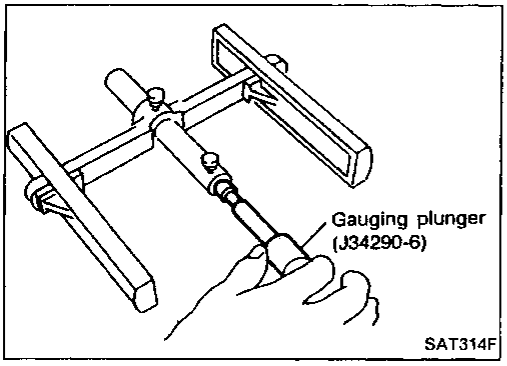


ASSEMBLY

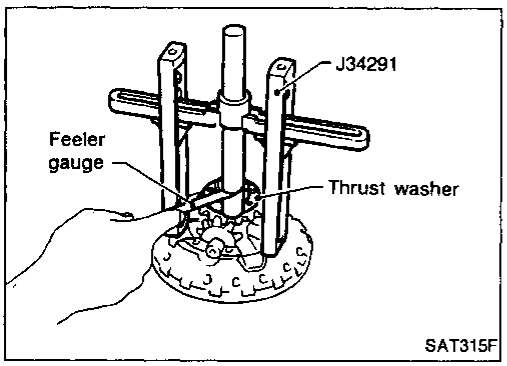
1. Measure clearance between side gear and differential case & viscous coupling with washers using the following procedure:

Differential case side

a. Set tool on the differential case and lock gauging cylinder in place with set screw.

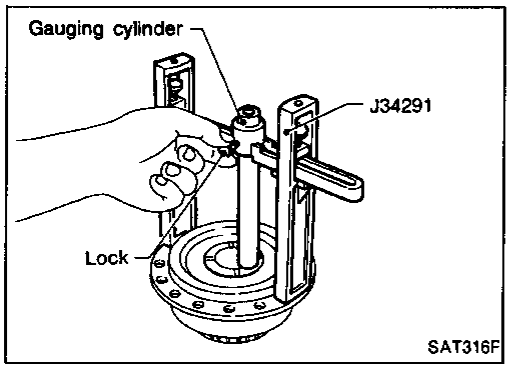


b. Install gauging plunger into cylinder.
c. Install pinion mate gears and side gear with thrust washer on differential case.
d. Set tool and allow gauging plunger to rest on side gear thrust washer.
e. Measure gap between plunger and cylinder.
This measurement should give exact clearance between side gear and differential case with washers.
Standard clearance:
0.1 - 0.2 mm (0.004 - 0.008 in)



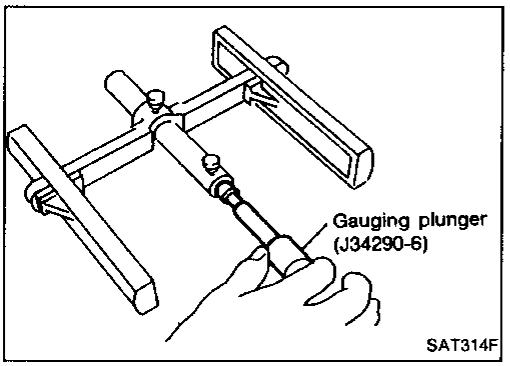
f. If not within specification adjust clearance by changing thickness of side gear thrust washer.
Side gear thrust washers for differential case side:
Refer to SDS. AT-228

Final Drive — RE4F04V (Cont'd)

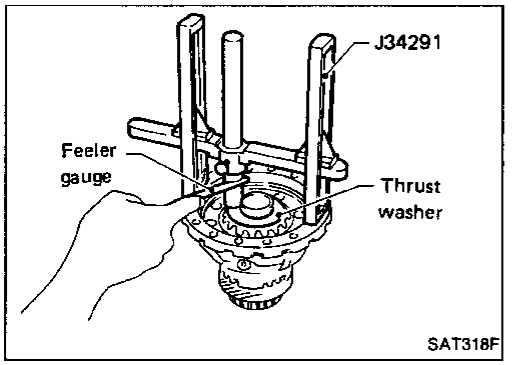


Viscous coupling side

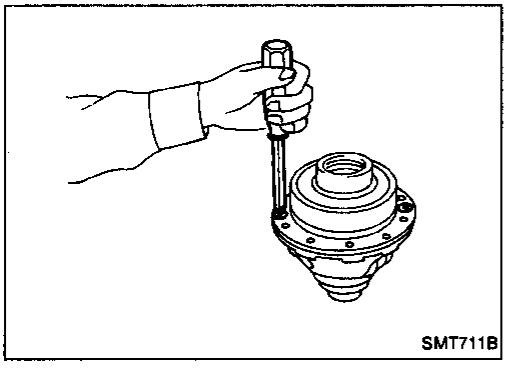
a. Set tool on viscous coupling and lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.

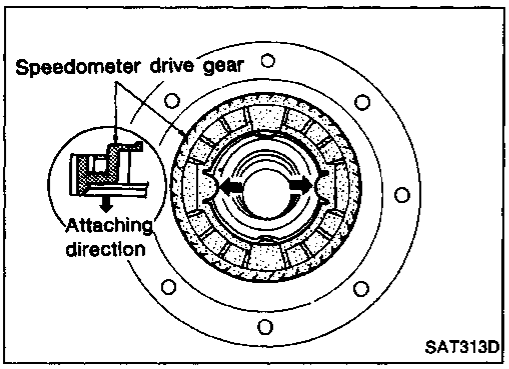


c. Install pinion mate gears and side gears with original washers on differential cases.
   Align paint marks.
d. Tighten differential case bolts.
e. Set tool and allow plunger to rest on side gear thrust washer.
f. Measure gap between plunger and cylinder.
   This measurement should give exact clearance between side gear and differential case with washers.
   Standard clearance:
   0.1 - 0.2 mm (0.004 - 0.008 in)
g. If not within specification, adjust clearance by changing thickness of side gear thrust washer.
   Side gear thrust washers for viscous coupling side:
   Refer to SDS. AT-228

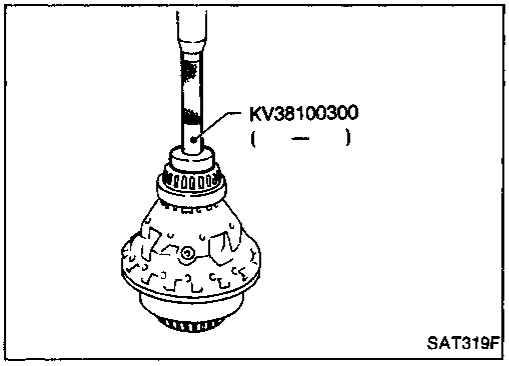


2. Install viscous coupling.

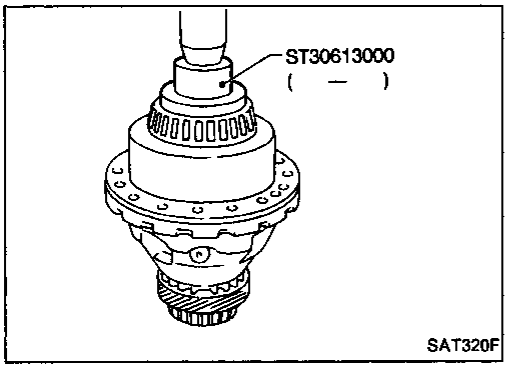
Final Drive — RE4F04V (Cont'd)

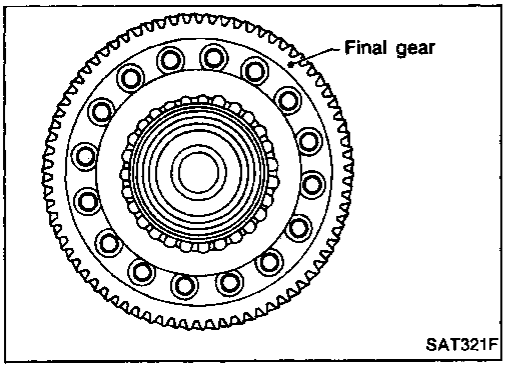


3. Install speedometer drive gear on differential case.
- **Align the projection of speedometer drive gear with the groove of differential case.**

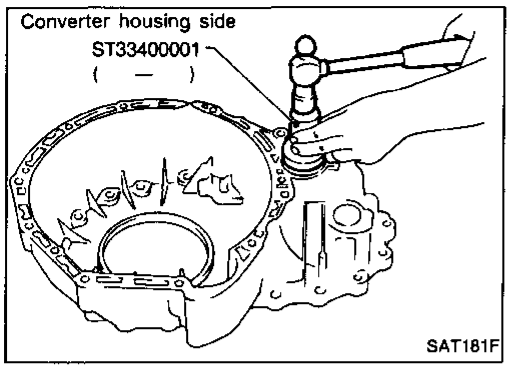


4. Press differential side bearings on differential case.



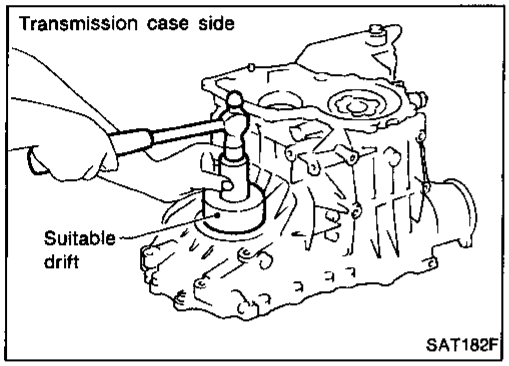


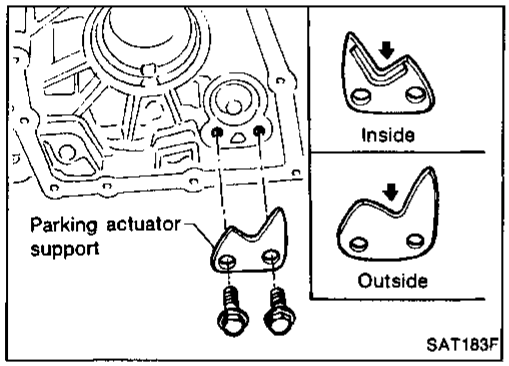
5. Install final gear and tighten fixing bolts in a crisscross pattern.



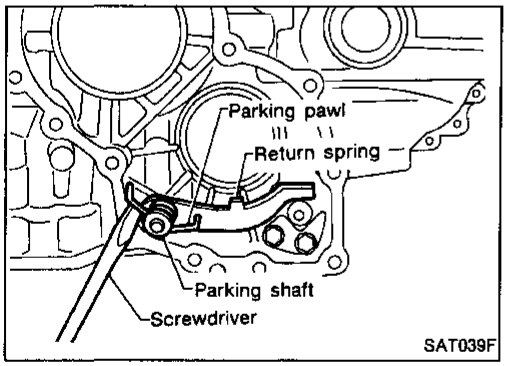
Assembly 1

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

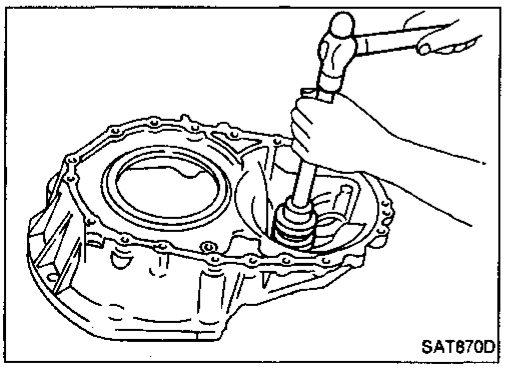




2. Install parking actuator support to transmission case.
- **Pay attention to direction of parking actuator support.**



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

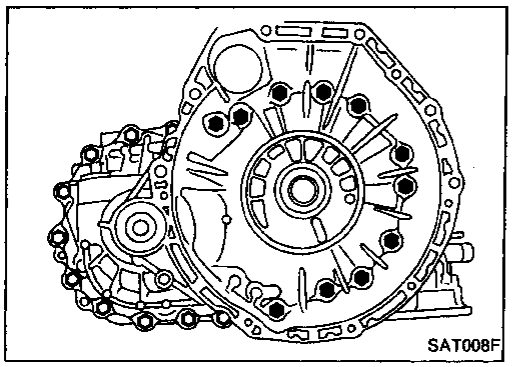


Adjustment 1

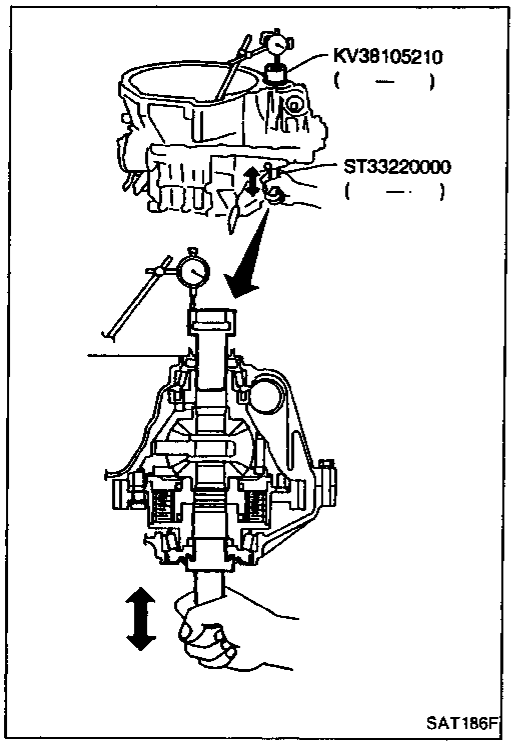
DIFFERENTIAL SIDE BEARING PRELOAD

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

Adjustment 1 (Cont'd)



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.

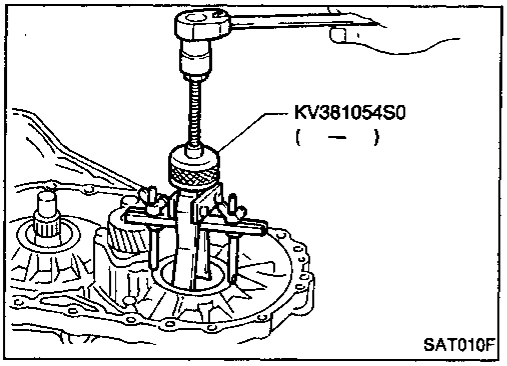


5. Set Tool on differential case at converter housing side and attach dial indicator on Tool.
6. Insert the other Tool viscous coupling from transmission case side.
7. Move Tool up and down and measure dial indicator deflection.
8. Select proper thickness of differential side bearing adjusting shim(s).

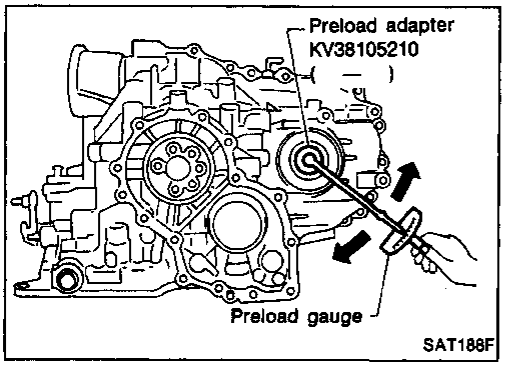
Suitable shim thickness = Dial indicator deflection + Specified bearing preload

Differential side bearing adjusting shim:
Refer to SDS. AT-229

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



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.



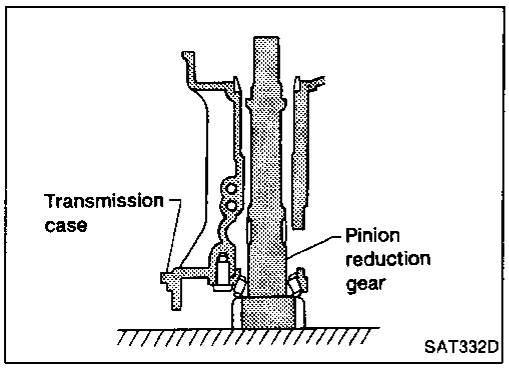
14. Insert Tool into viscous coupling and measure turning torque of final drive assembly.

- **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.**

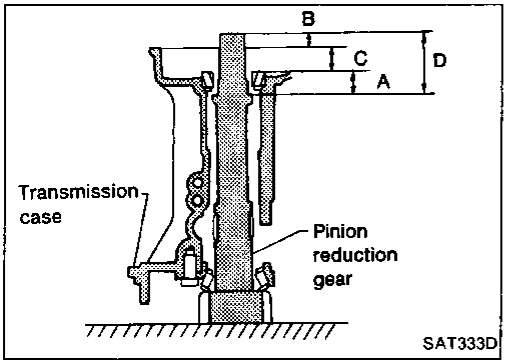
Adjustment 1 (Cont'd)

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.

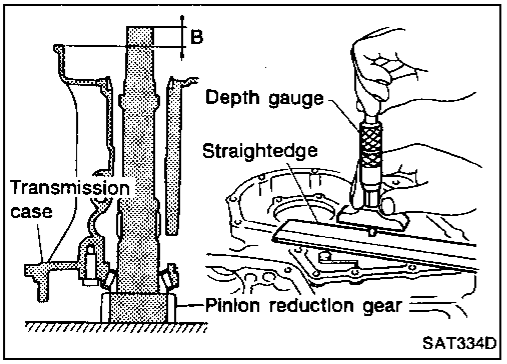
a. Place reduction gear on transmission case as shown.



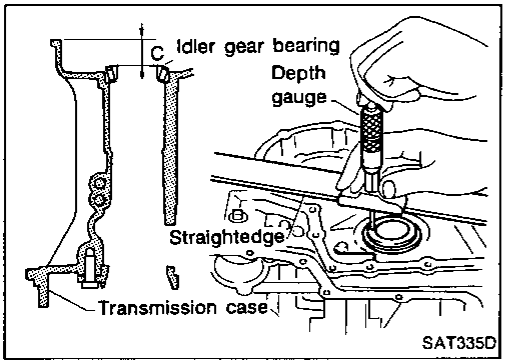
b. Place idler gear bearing on transmission case.
c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

A = D – (B + C)

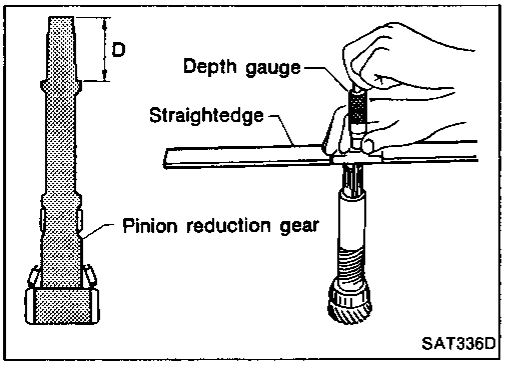
"A": Distance between the surface of idler gear bearing inner race and the adjusting shim mating surface of reduction gear.



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



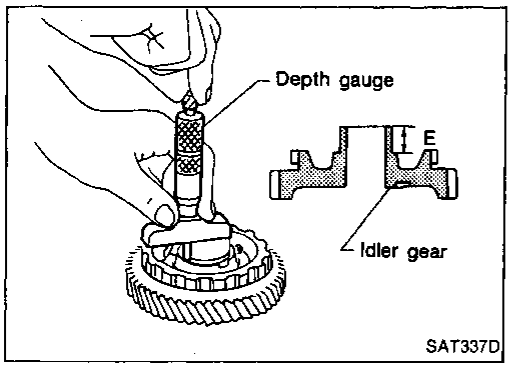
- Measure dimension "C" between the surface of idler gear bearing inner race and the surface of transmission case.
- **Measure dimension "C" in at least two places.**



- 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 1 (Cont'd)



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

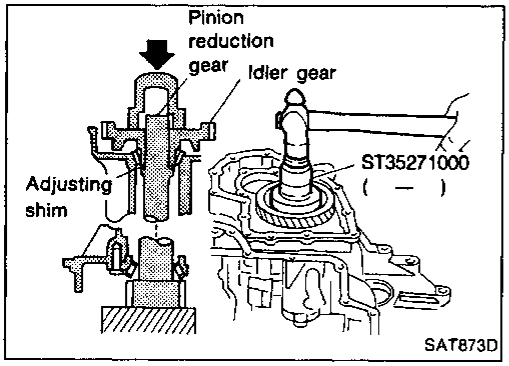
- **Measure dimension "E" in at least two places.**

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

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

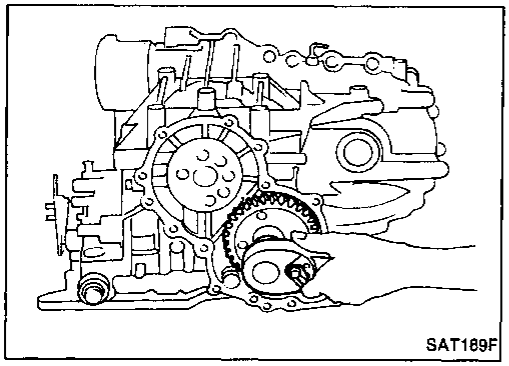
(* ... Bearing preload)

Reduction gear bearing adjusting shim: Refer to SDS. AT-231



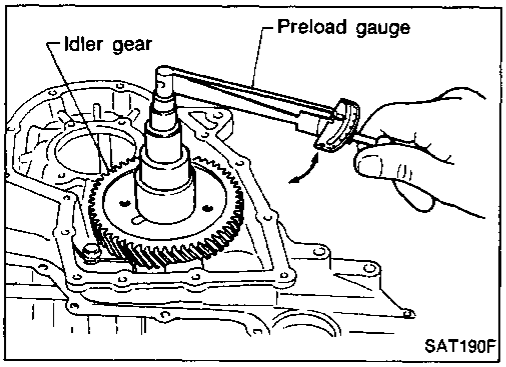
3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.
4. Press idler gear bearing inner race on idler gear.
5. Press idler gear on reduction gear.

- **Press idler gear until idler gear fully contacts adjusting shim.**



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.

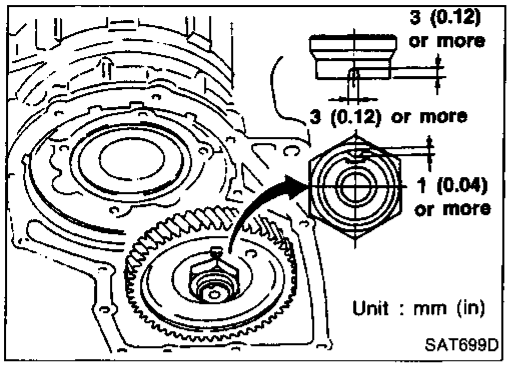
- **When measuring turning torque, turn reduction gear in both directions several times to seat bearing rollers correctly.**

  Turning torque of reduction gear:

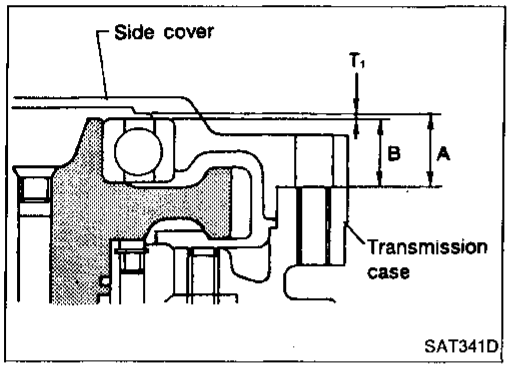
  0.05 - 0.39 N·m (0.5 - 4.0 kg-cm, 0.43 - 3.47 in-lb)

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

Adjustment 1 (Cont'd)

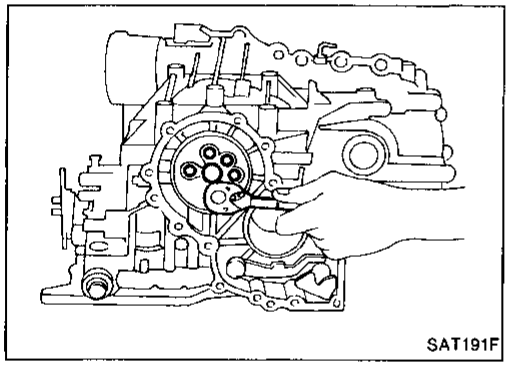


8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

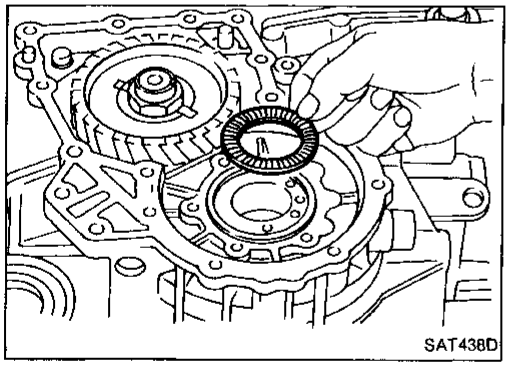


OUTPUT SHAFT END PLAY

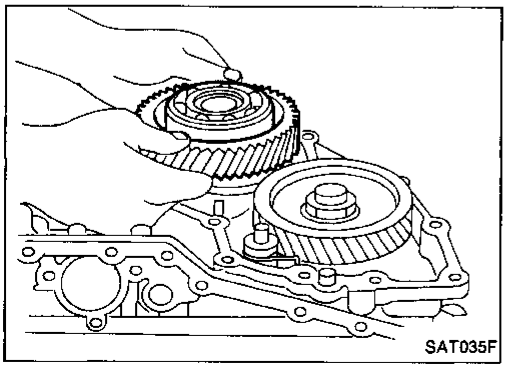
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



1. Install bearing retainer for output shaft.

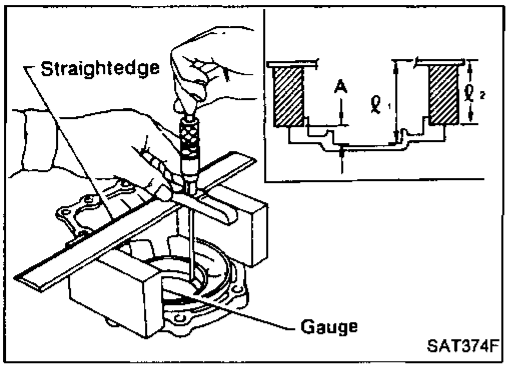


2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

Adjustment 1 (Cont'd)

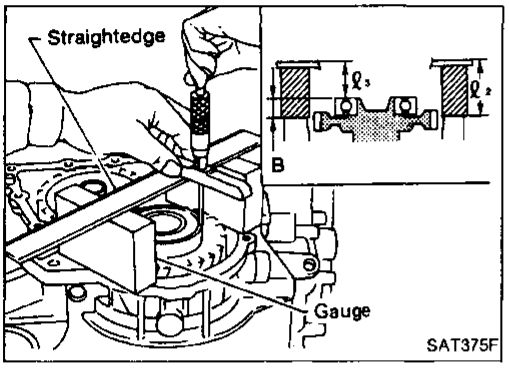


4. Measure dimensions "ℓ_1" and "ℓ_2" at side cover and then calculate dimension "A".

- **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

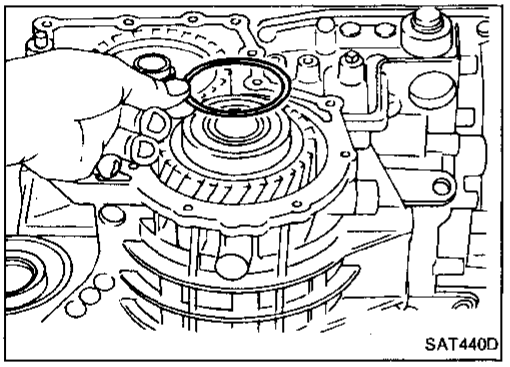


5. Measure dimensions "ℓ_2" and "ℓ_3" and then calculate dimension "B".

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.

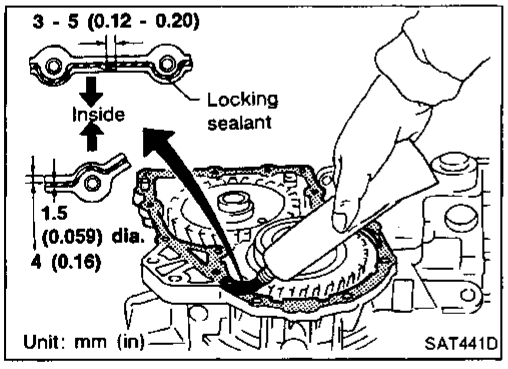
$B = \ell_2 - \ell_3$ ℓ_2: Height of gauge



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

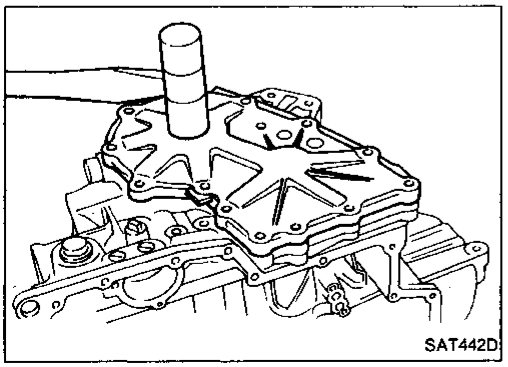
Output shaft end play (A – B):
0 - 0.15 mm (0 - 0.0059 in)
Output shaft end play adjusting shim:
Refer to SDS. AT-232

7. Install adjusting shim on output shaft bearing.



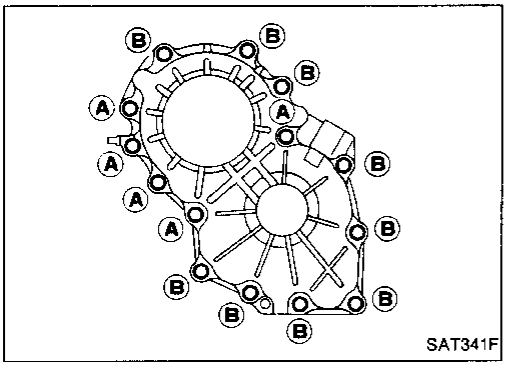
Assembly 2

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

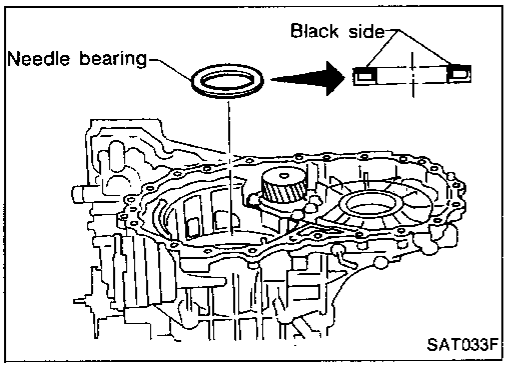


2. Set side cover on transmission case.

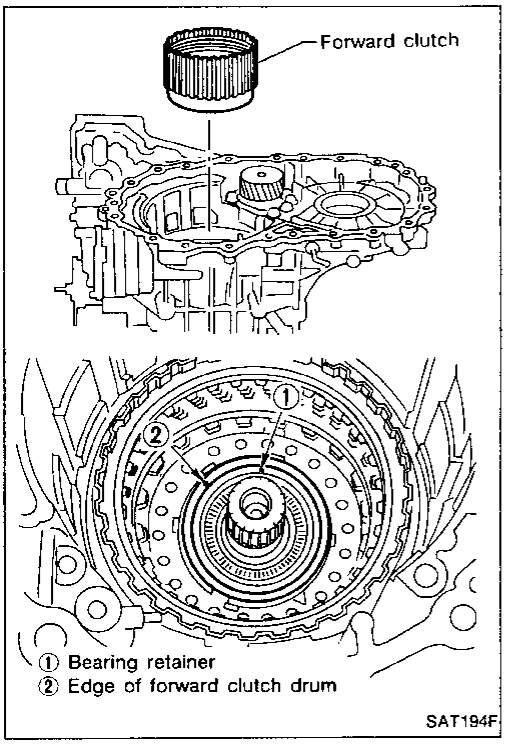
Assembly 2 (Cont'd)



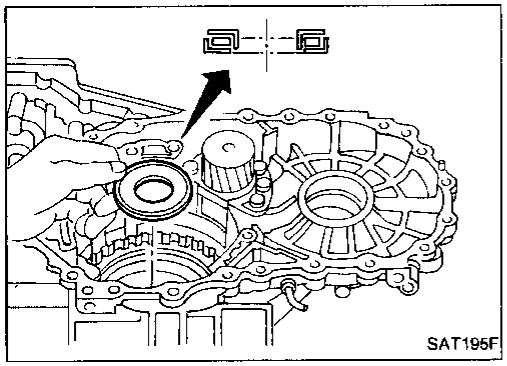
3. Tighten side cover fixing bolts to specified torque.
- **Do not mix bolts Ⓐ and Ⓑ.**
- **Always replace bolts Ⓐ as they are self-sealing bolts.**



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

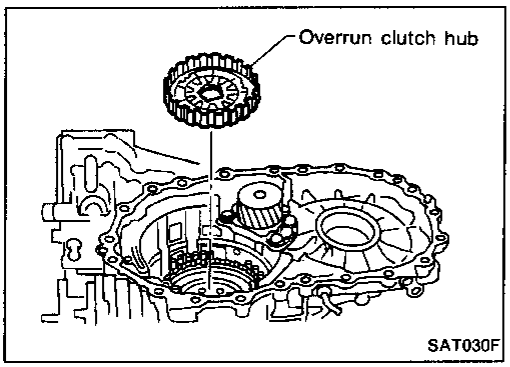


6. Install forward clutch assembly.
- **Align teeth of low & reverse brake drive plates before installing.**
- **Make sure that bearing retainer seal rings are not spread.**
- **If forward clutch assembly is correctly seated, points ① and ② are at almost same level.**

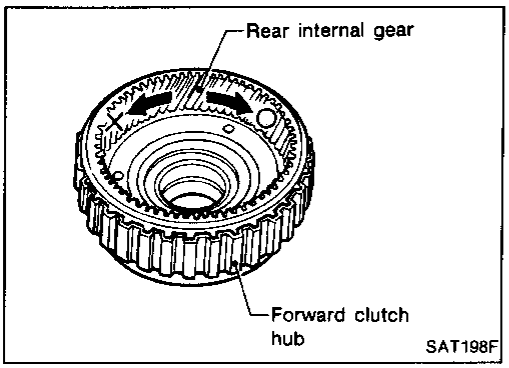


7. Install thrust needle bearing on bearing retainer.
- **Apply petroleum jelly to thrust needle bearing.**
- **Pay attention to direction of thrust needle bearing.**

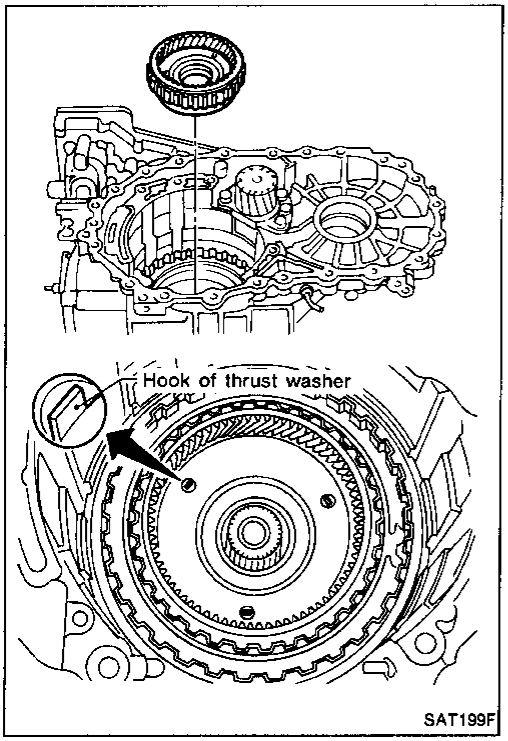
Assembly 2 (Cont'd)



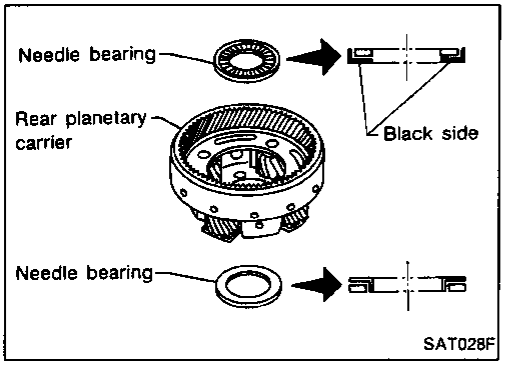
8. Install overrun clutch hub.
- **Apply petroleum jelly to thrust washers.**
- **Align teeth of overrun clutch drive plates before installing.**



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.**



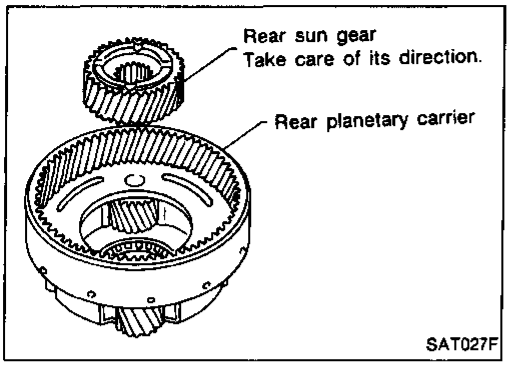
10. Install forward clutch hub and rear internal gear assembly.
- **Align teeth of forward clutch drive plates before installing.**
- **Check three hooks of thrust washer are correctly aligned after installing.**



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

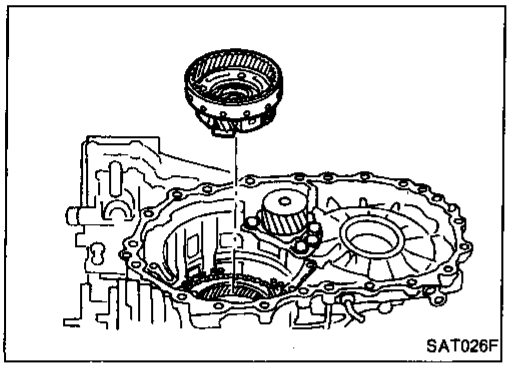
a. Install needle bearings on rear planetary carrier.
- **Apply petroleum jelly to needle bearings.**
- **Pay attention to direction of needle bearings.**

Assembly 2 (Cont'd)

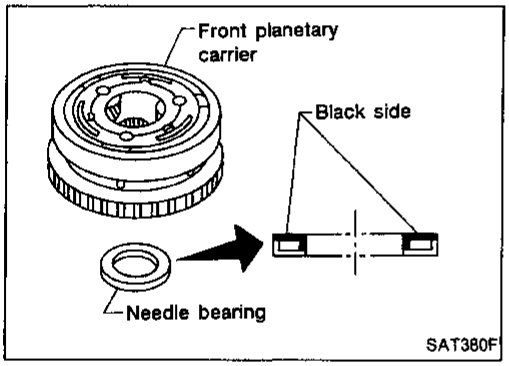


b. Install rear sun gear on rear planetary carrier.

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

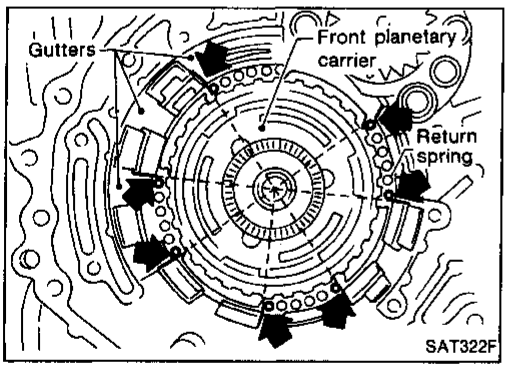


c. Install rear planetary carrier on transmission case.



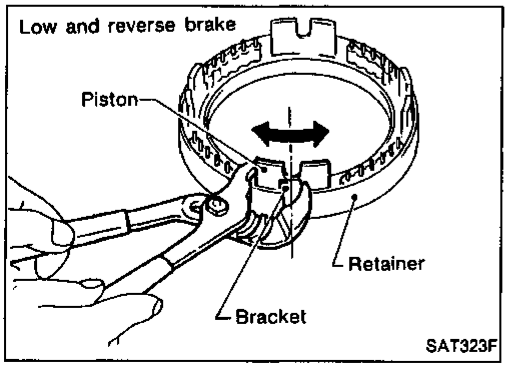
12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.

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



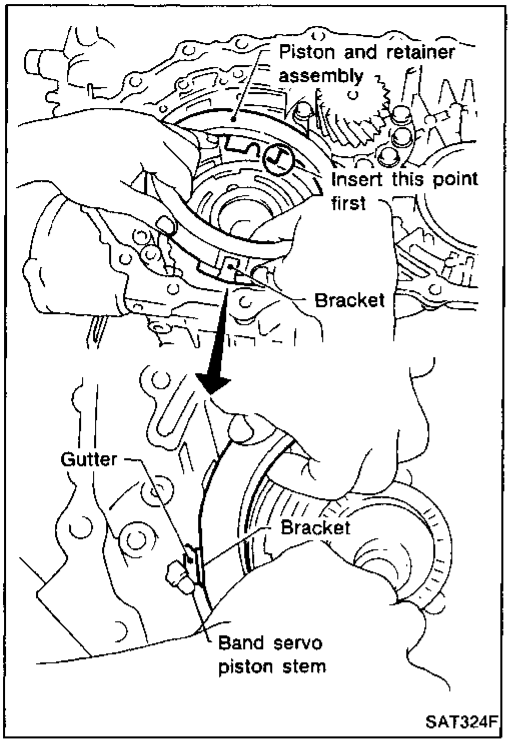
13. Install low and reverse brake piston according to the following procedures.

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



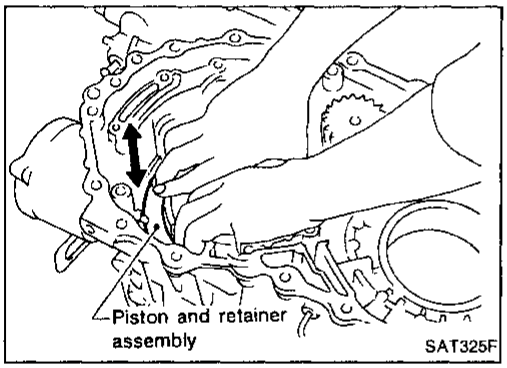
b. Set and align piston with retainer.

Assembly 2 (Cont'd)



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

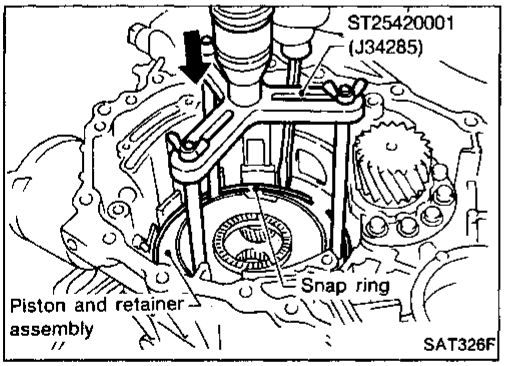
- **Align bracket to specified gutter as indicated in illustration.**



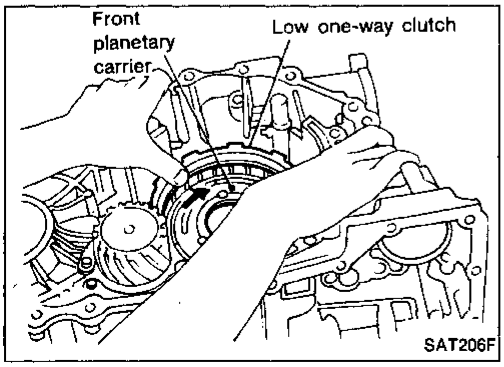
d. Check that each protrusions of piston is correctly set to corresponding return spring as follows.

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".

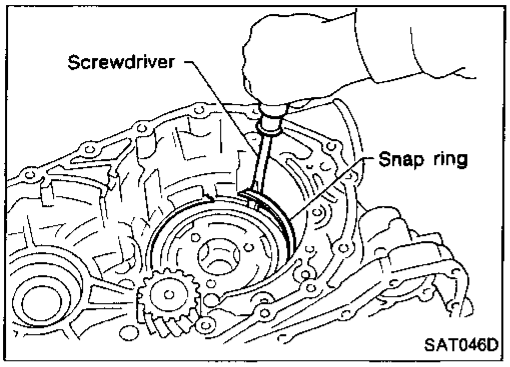


e. Push down piston and retainer assembly and install snap ring.

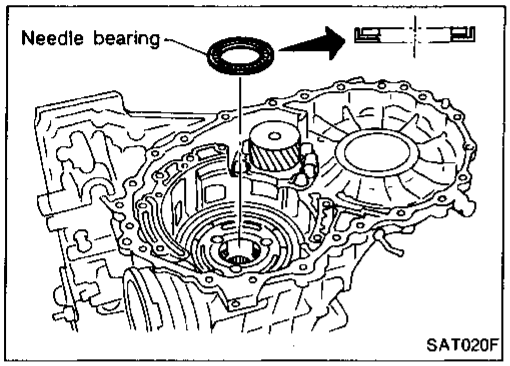


14. Install low one-way clutch to front planetary carrier by turning carrier in the direction of the arrow shown.

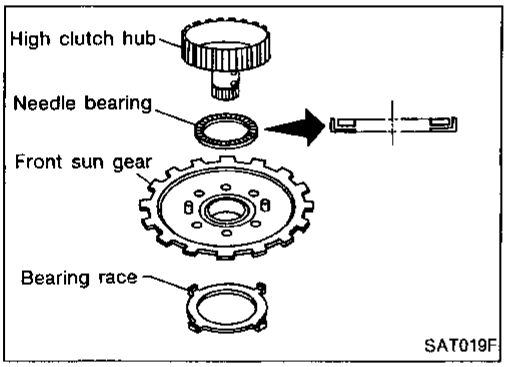
Assembly 2 (Cont'd)



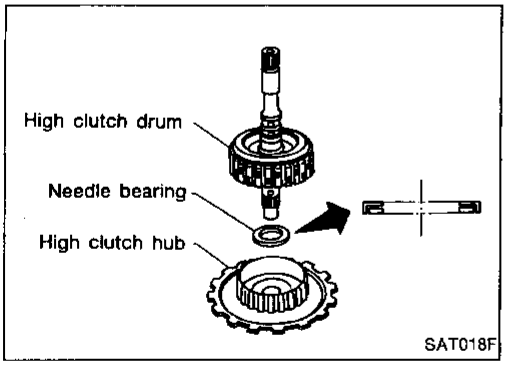
15. Install snap ring with screwdriver.



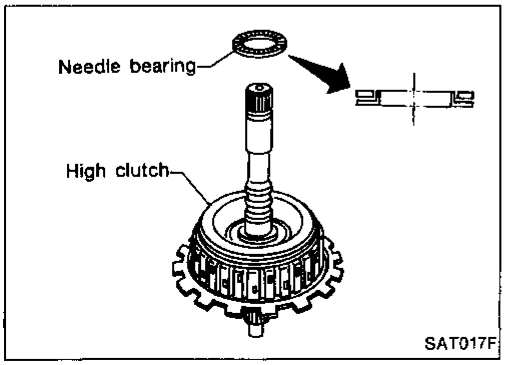
16. Install needle bearing on transmission case.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**



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.**

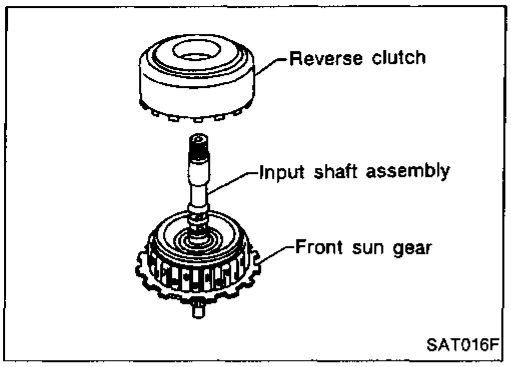


18. Install needle bearing and high clutch drum on high clutch hub.

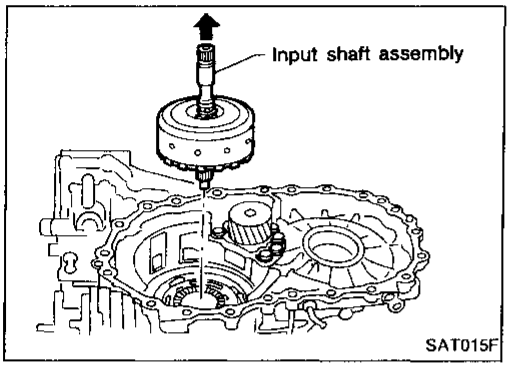


19. Install needle bearing on high clutch drum.
- **Apply petroleum jelly to needle bearing.**
- **Pay attention to direction of needle bearing.**

Assembly 2 (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.**

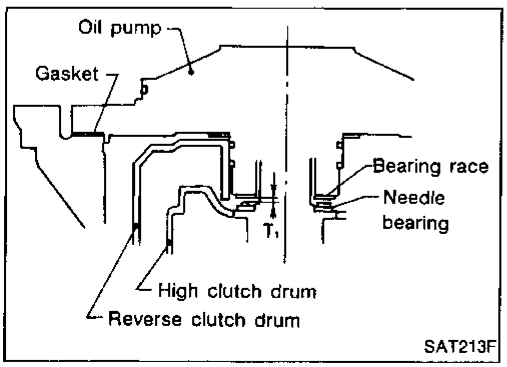


22. Install reverse clutch assembly on transmission case.
- **Align teeth of high clutch drive plates before installing.**

Adjustment 2

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

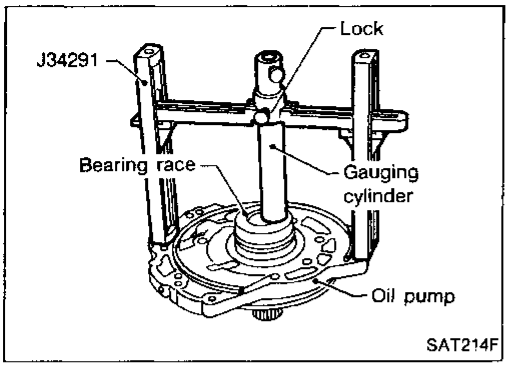
Part name	Total end play	Reverse clutch end play
Transmission case	•	•
Overrun clutch hub	•	•
Rear internal gear	•	•
Rear planetary carrier	•	•
Rear sun gear	•	•
Front planetary carrier	•	•
Front sun gear	•	•
High clutch hub	•	•
High clutch drum	•	•
Oil pump cover	•	•
Reverse clutch drum	—	•



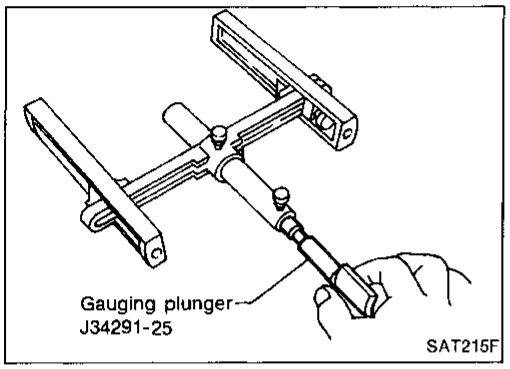
TOTAL END PLAY

1. Adjust total end play "T_1".

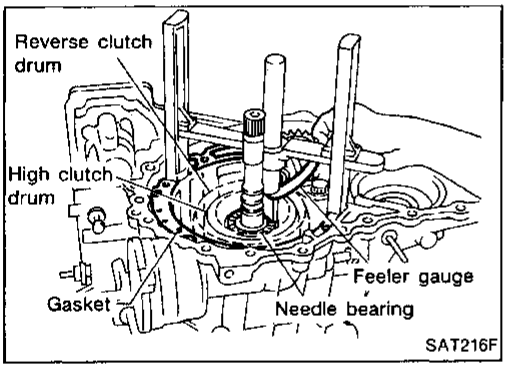
Adjustment 2 (Cont'd)



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. The gauging cylinder should rest on top of bearing race. Lock gauging cylinder in place with set screw.



b. Install gauging plunger into cylinder.



c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket). Then allow plunger to rest on needle bearing.

d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

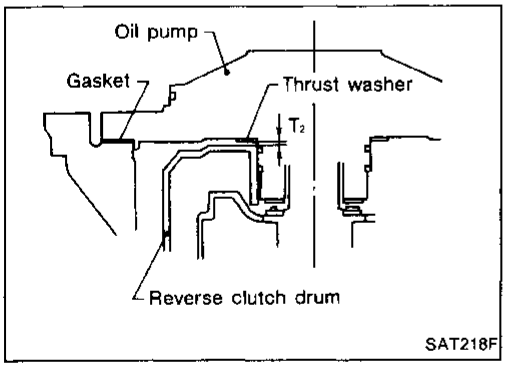
Total end play "T_1":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

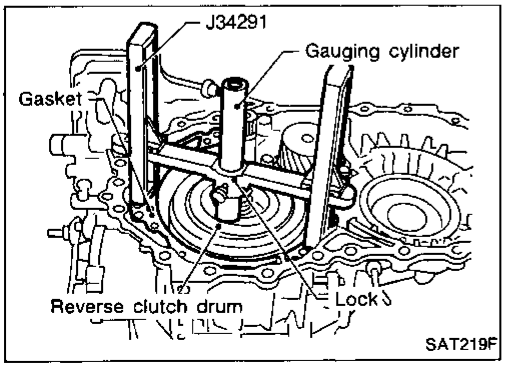
- If end play is out of specification, decrease or increase thickness of bearing race as necessary.

Available bearing race:

Refer to SDS. AT-232

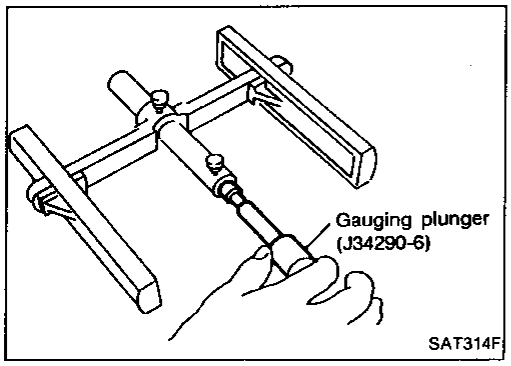


2. Adjust reverse clutch drum end play "T_2".



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

Adjustment 2 (Cont'd)

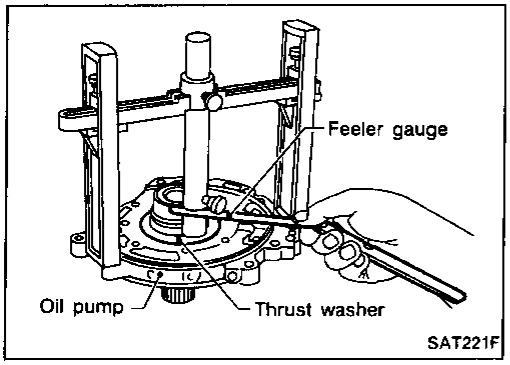


b. Install gauging plunger into cylinder.
c. With original thrust washer installed on oil pump, place Tool legs onto machined surface of oil pump assembly. Then allow plunger to rest on thrust washer.
d. Measure gap between cylinder and plunger with feeler gauge. This measurement should give exact reverse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

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

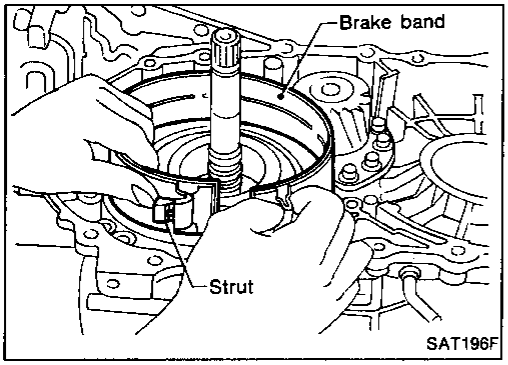
- If end play is out of specification, decrease or increase thickness of thrust washer as necessary.

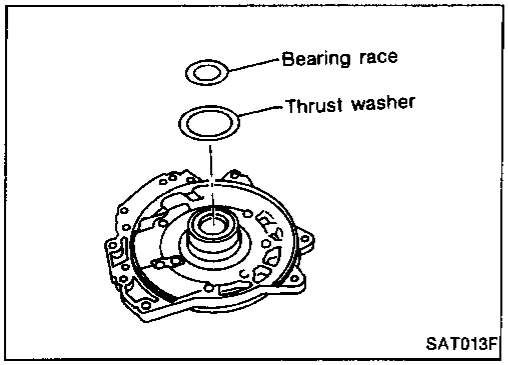
Available thrust washer:
Refer to SDS. AT-231



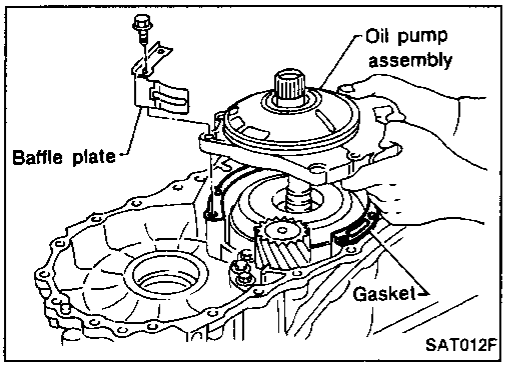
Assembly 3

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.



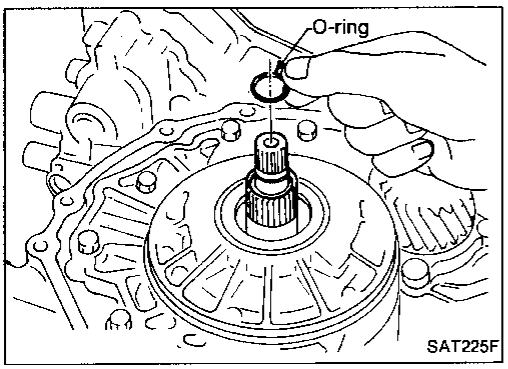


3. Place bearing race selected in total end play adjustment step on oil pump cover.
- **Apply petroleum jelly to bearing race.**
4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.
- **Apply petroleum jelly to thrust washer.**

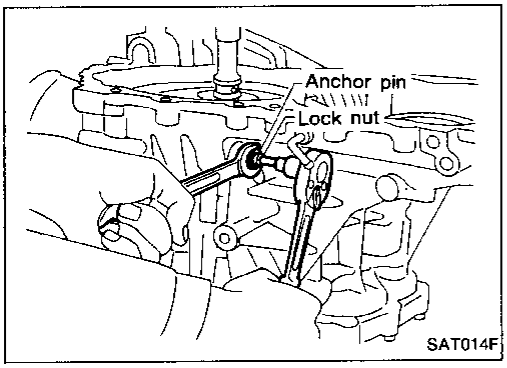


5. Install oil pump assembly, baffle plate and gasket on transmission case.
6. Tighten oil pump fixing bolts to the specified torque.

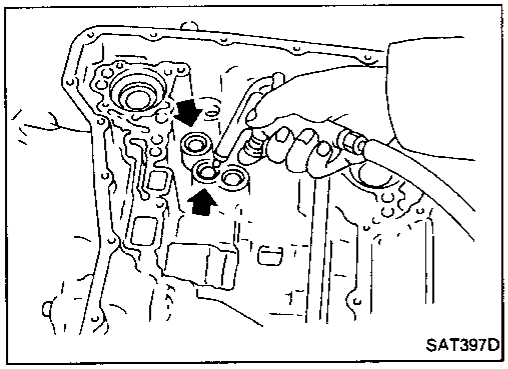
Assembly 3 (Cont'd)



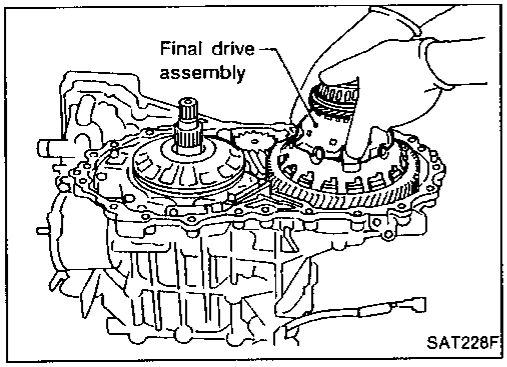
7. Install O-ring to input shaft.
- **Apply ATF to O-ring.**



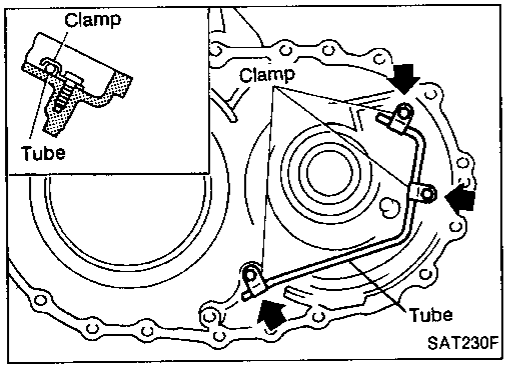
8. Adjust brake band.
a. Tighten anchor end pin to the specified torque.
   Anchor end pin:
   : 4 - 6 N·m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)
b. Back off anchor end pin two and a half turns.
c. While holding anchor end pin, tighten lock nut.



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

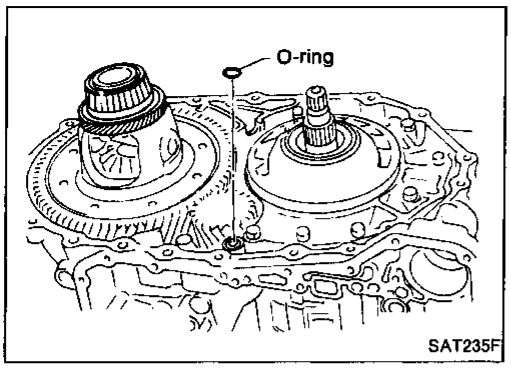


10. Install final drive assembly on transmission case.

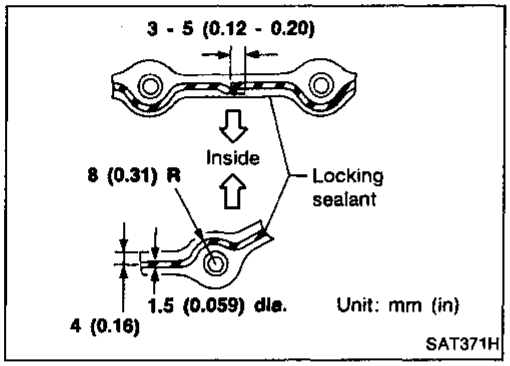


11. Install oil tube on converter housing.

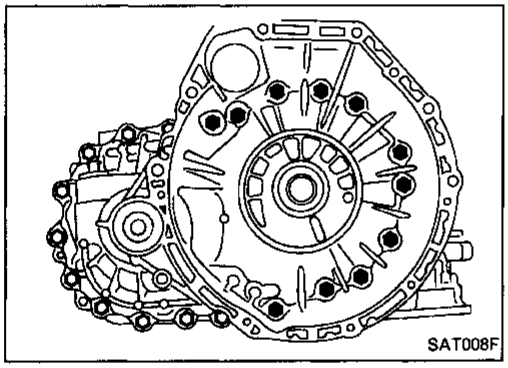
Assembly 3 (Cont'd)

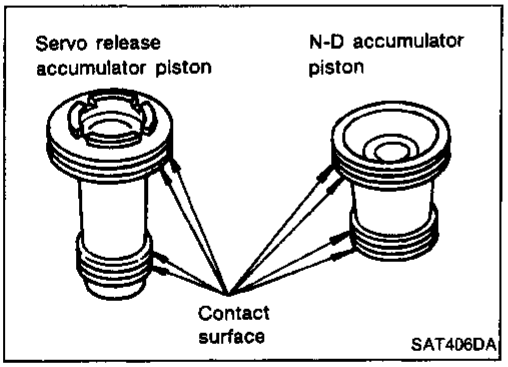


12. Install O-ring on differential oil port of transmission case.

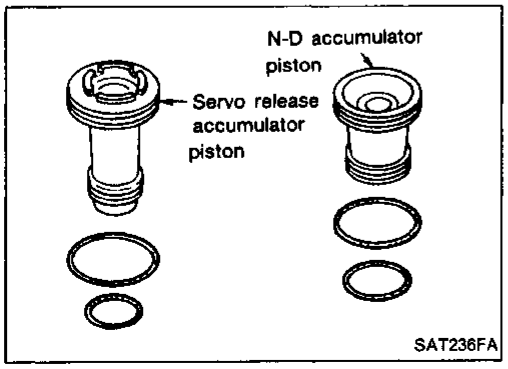


13. Install converter housing on transmission case.
- **Apply locking sealant to mating surface of converter housing.**





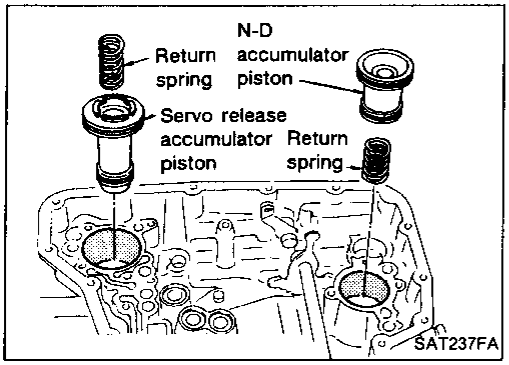
14. Install accumulator piston.
a. Check contact surface of accumulator piston for damage.



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

Accumulator piston O-rings: Refer to SDS. AT-231

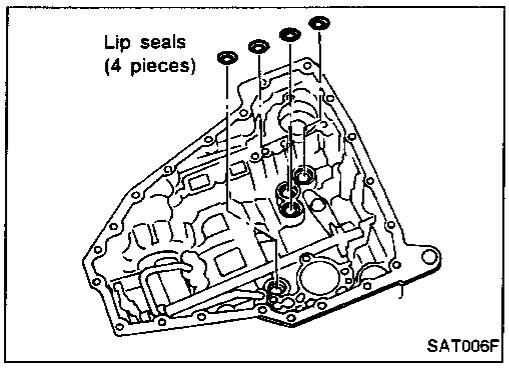
Assembly 3 (Cont'd)



c. Install accumulator pistons and return springs on transmission case.

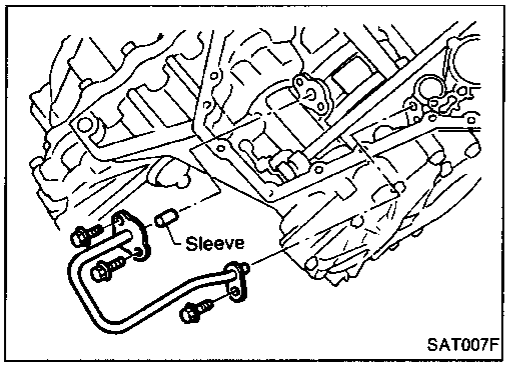
- **Apply ATF to inner surface of transmission case.**

Return springs: Refer to SDS. AT-231

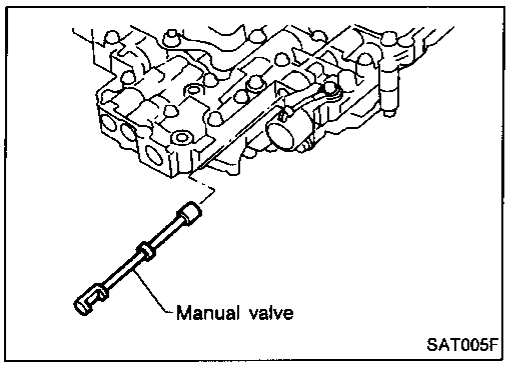


15. Install lip seals for band servo oil holes on transmission case.

- **Apply petroleum jelly to lip seals.**

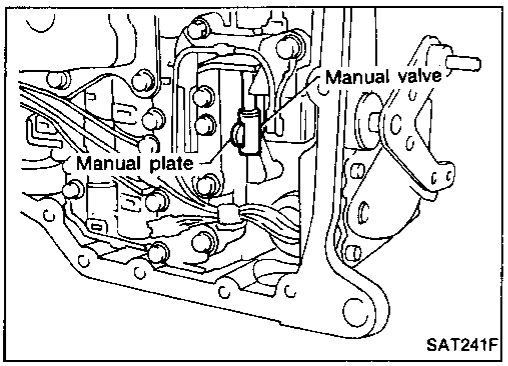


16. Install tube and sleeve.



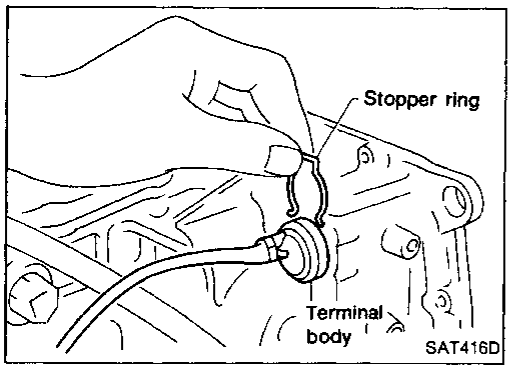
17. Install control valve assembly.
a. Insert manual valve into control valve assembly.

- **Apply ATF to manual valve.**

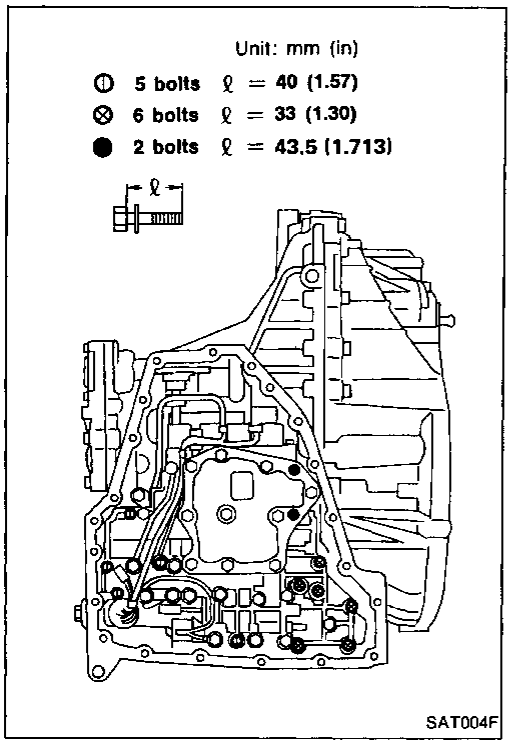


b. Set manual shaft in Neutral position.
c. Install control valve assembly on transmission case while aligning manual valve with manual plate.

Assembly 3 (Cont'd)



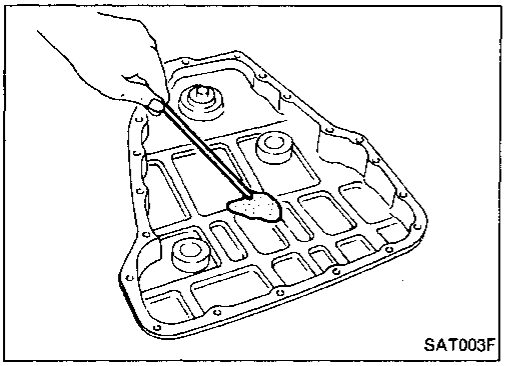
d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
e. Install stopper ring to terminal body.



f. Tighten bolts ①, ⊗ and ●.

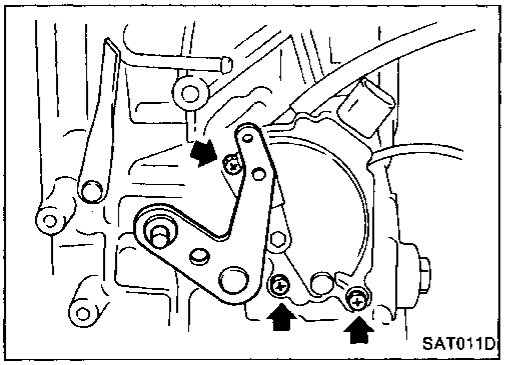
Bolt length, number and location:

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



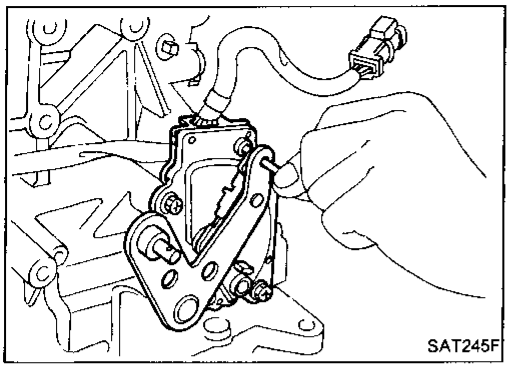
18. Install oil pan.
a. Attach a magnet to oil pan.
b. Install new oil pan gasket on transmission case.
c. Install oil pan on transmission case.
- **Always replace oil pan bolts as they are self-sealing bolts.**
- **Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to the specified torque.

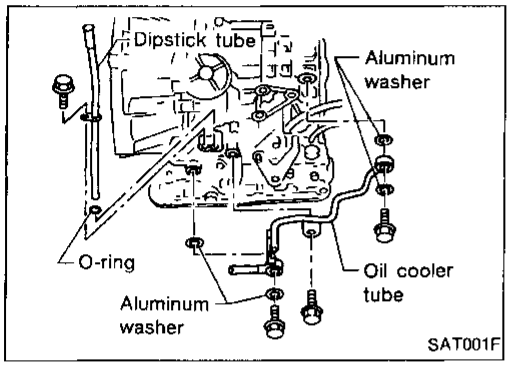


19. Install inhibitor switch.
a. Set manual lever in "P" position.
b. Temporarily install inhibitor switch on manual shaft.
c. Move selector lever to "N" position.

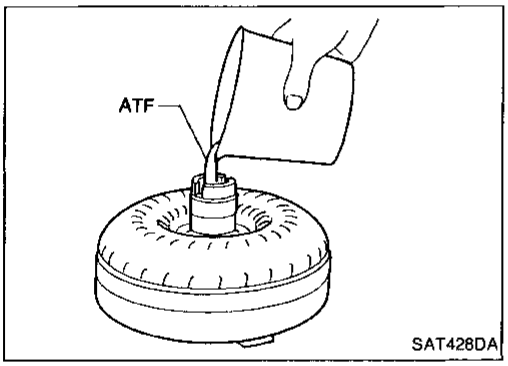
Assembly 3 (Cont'd)



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.

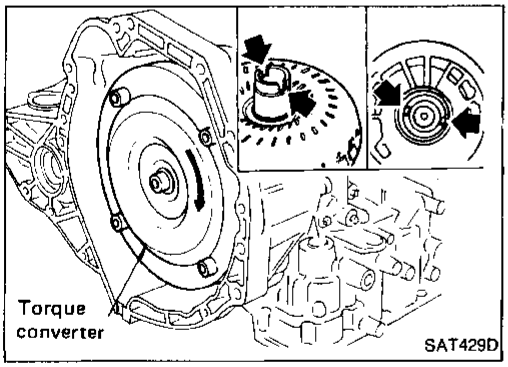


20. Install oil charging pipe and oil cooler tube to transmission case.

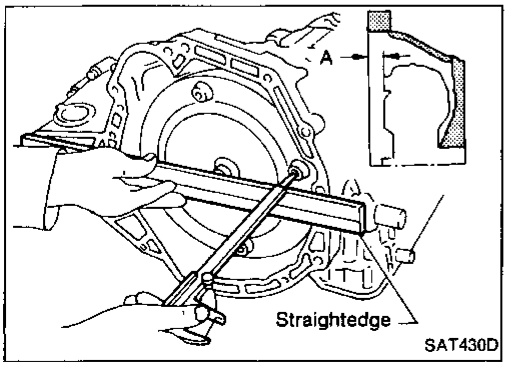


21. Install torque converter.
a. Pour ATF into torque converter.

- **Approximately 1 liters (1-1/8 US qt, 7/8 Imp qt) of fluid are 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	VQ30DE	
Automatic transaxle model	RE4F04A	RE4F04V
Automatic transaxle assembly Model code number	80X17	80X18
Transaxle gear ratio		
1st	2.785	
2nd	1.545	
3rd	1.000	
4th	0.694	
Reverse	2.272	
Final drive	3.619	
Recommended oil	Genuine Nissan ATF or equivalent type DEXRON™II-E	
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	61 - 69 (38 - 43)	113 - 121 (70 - 75)	177 - 185 (110 - 115)	173 - 181 (108 - 112)	103 - 111 (64 - 69)	54 - 62 (34 - 39)	61 - 69 (38 - 43)
	Auto power	61 - 69 (38 - 43)	113 - 121 (70 - 75)	177 - 185 (110 - 115)	173 - 181 (108 - 112)	103 - 111 (64 - 69)	54 - 62 (34 - 39)	61 - 69 (38 - 43)
Half throttle	Comfort	39 - 47 (24 - 29)	73 - 81 (45 - 50)	113 - 121 (70 - 75)	79 - 87 (49 - 54)	36 - 44 (22 - 27)	5 - 13 (3 - 8)	61 - 69 (38 - 43)
	Auto power	46 - 54 (29 - 34)	85 - 93 (53 - 58)	134 - 142 (83 - 88)	85 - 93 (53 - 58)	51 - 59 (32 - 37)	5 - 13 (3 - 8)	61 - 69 (38 - 43)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

Throttle position	Shift pattern	OD switch	Shift range	Vehicle speed km/h (MPH)	
				Lock-up "ON"	Lock-up "OFF"
2/8	Comfort	ON	D_4	102 - 110 (63 - 68)	90 - 98 (56 - 61)
			D_3	—	38 - 46 (24 - 29)
		OFF	D_3	86 - 94 (53 - 58)	83 - 91 (52 - 57)
	Auto power	ON	D_4	102 - 110 (63 - 68)	90 - 98 (56 - 61)
			D_3	—	38 - 46 (24 - 29)
		OFF	D_3	86 - 94 (53 - 58)	83 - 91 (52 - 57)

STALL REVOLUTION

Engine	Stall revolution rpm
VQ30DE	2,000 - 2,300

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm², psi)	
	D, 2 and 1 positions	R position
Idle	500 (5.1, 73)	853 (8.7, 124)
Stall	1,098 (11.2, 159)	1,863 (19.0, 270)

Specifications and Adjustments (Cont'd)

CONTROL VALVES

Control valve return springs

Unit: mm (in)

Parts			Item		
			Part No.	Free length	Outer diameter
Lower body	㉘	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	㉕	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	㉙	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	㉞	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)
	⑰	Line pressure solenoid valve spring	31742-80X11	17.0 (0.669)	10.7 (0.421)
Upper body	⑱	Pilot valve spring	31742-80X14	36.0 (1.417)	8.1 (0.319)
	⑧	1-2 accumulator valve spring	31742-80X10	20.5 (0.807)	7.0 (0.276)
	㉑	1-2 accumulator piston spring	31742-80X19	49.3 (1.941)	19.6 (0.772)
	㉕	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	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)
	④	Lock-up control valve	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	2.0 (0.079)
Allowable limit	1.8 (0.071)
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	6 + 1
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		7
Number of driven plates		8
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		3.5 (0.138)

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 bolt tightening torque	N·m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)
Number of returning revolutions for anchor end bolt		2.5
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

RE4F04A

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

RE4F04V

	Thickness mm (in)	Part number
Viscous coupling side	0.43 - 0.45 (0.0169 - 0.0177)	38424-51E10
	0.52 - 0.54 (0.0205 - 0.0213)	38424-51E11
	0.61 - 0.63 (0.0240 - 0.0248)	38424-51E12
	0.70 - 0.72 (0.0276 - 0.0283)	38424-51E13
	0.79 - 0.81 (0.0311 - 0.0319)	38424-51E14
Differential case side	0.75 - 0.80 (0.0295 - 0.0315)	38424-E3000
	0.80 - 0.85 (0.0315 - 0.0335)	38424-E3001
	0.85 - 0.90 (0.0335 - 0.0354)	38424-E3002
	0.90 - 0.95 (0.0354 - 0.0374)	38424-E3003

Specifications and Adjustments (Cont'd)

Differential side bearing preload adjusting shims

RE4F04A

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

RE4F04V

Thickness mm (in)	Part number
0.36 (0.0142)	38753-56E00
0.40 (0.0157)	38753-56E01
0.44 (0.0173)	38753-56E02
0.48 (0.0189)	38753-56E03
0.52 (0.0205)	38753-56E04
0.56 (0.0220)	38753-56E05
0.60 (0.0236)	38753-56E06
0.64 (0.0252)	38753-56E07
0.68 (0.0268)	38753-56E08
0.72 (0.0283)	38753-56E09
0.76 (0.0299)	38753-56E10
0.80 (0.0315)	38753-56E11
0.84 (0.0331)	38753-56E12
0.88 (0.0346)	38753-56E13
0.92 (0.0362)	38753-56E14
0.12 (0.0047)	38753-56E15
0.16 (0.0063)	38753-56E16
0.20 (0.0079)	38753-56E17
0.24 (0.0094)	38753-56E18
0.28 (0.0110)	38753-56E19
0.32 (0.0126)	38753-56E20

Bearing preload — RE4F04V

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

Turning torque — RE4F04V

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 — RE4F04V

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)

Specifications and Adjustments (Cont'd)

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 - 3.47)

Reduction gear bearing adjusting shims

Thickness mm (in)	Part number
5.10 (0.2008)	31439-81X05
5.12 (0.2016)	31439-81X06
5.14 (0.2024)	31439-81X07
5.16 (0.2031)	31439-81X08
5.18 (0.2039)	31439-81X09
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
6.52 (0.2567)	31439-82X22
6.54 (0.2575)	31439-82X23
6.56 (0.2583)	31439-82X24
6.58 (0.2591)	31439-82X60
6.60 (0.2598)	31439-82X61

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)

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)	28.0 (1.102)

Specifications and Adjustments (Cont'd)

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	31.0 (1.220)	21.7 (0.854)

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