

AUTOMATIC TRANSMISSION

SECTION **AT**

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When you read wiring diagrams:

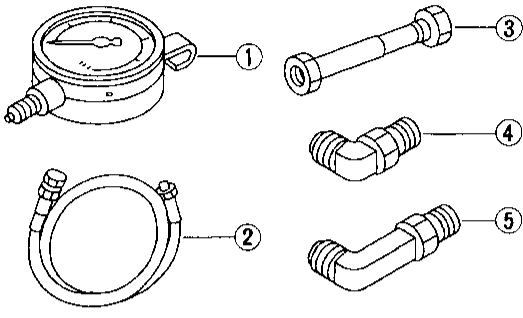
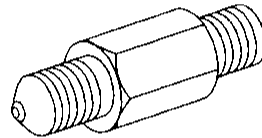
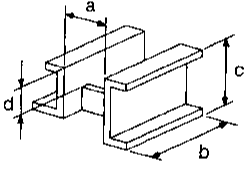
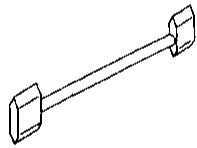
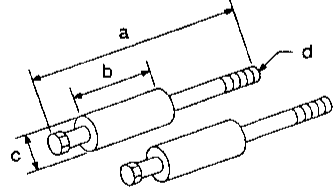
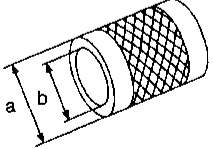
- Read GI section, "HOW TO READ WIRING DIAGRAMS".
- See EL section, "POWER SUPPLY ROUTING" for power distribution circuit.

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

PREPARATION AND PRECAUTIONS

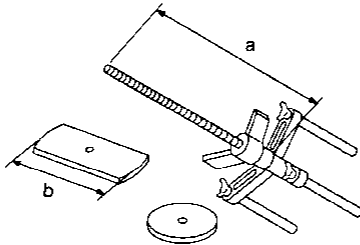
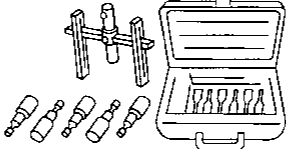
Special Service Tools

The actual shapes of Kent-Moore tools may differ from those of special service tools illustrated here.

Tool number (Kent-Moore No.) Tool name	Description	Measuring line pressure
ST2505S001 (J34301-C) Oil pressure gauge set ① ST25051001 (—) Oil pressure gauge ② ST25052000 (—) Hose ③ ST25053000 (—) Joint pipe ④ ST25054000 (—) Adapter ⑤ ST25055000 (—) Adapter	 <p>NT097</p>	Measuring line pressure
KV31101201 (—) Oil pressure gauge adapter	 <p>NT093</p>	Measuring line pressure
ST07870000 (J37068) Transmission case stand	 <p>NT421</p>	Disassembling and assembling A/T a: 182 mm (7.17 in) b: 282 mm (11.10 in) c: 230 mm (9.06 in) d: 100 mm (3.94 in)
KV31102100 (J37065) Torque converter one-way clutch check tool	 <p>NT098</p>	Checking one-way clutch in torque converter
ST25850000 (J25721-A) Sliding hammer	 <p>NT422</p>	Removing oil pump assembly a: 179 mm (7.05 in) b: 70 mm (2.76 in) c: 40 mm (1.57 in) dia. d: M12 x 1.75P
ST33200000 (J26082) Drift	 <p>NT091</p>	Installing oil pump housing oil seal Installing rear oil seal a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.

PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
KV31102400 (J34285 and J34285-87) Clutch spring compressor	<div style="text-align: center;">  </div> <p style="text-align: center;">NT423</p> <p style="text-align: right;">Removing and installing clutch return springs</p> <p style="text-align: right;">a: 320 mm (12.60 in) b: 174 mm (6.85 in)</p>
(J34291) Shim setting gauge set	<div style="text-align: center;">  </div> <p style="text-align: center;">NT101</p> <p style="text-align: right;">Selecting oil pump cover bearing race and oil pump thrust washer</p>

Supplemental Restraint System (SRS) "AIR BAG" and "SEAT BELT PRE-TENSIONER"

The Supplemental Restraint System "Air Bag" and "Seat Belt Pre-tensioner", used along with a seat belt, help 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), seat belt pre-tensioners, a diagnosis sensor unit, warning lamp, wiring harness and spiral cable. Information necessary to service the system safely is included in the **RS section** in 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 INFINITI dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.

Precautions for On Board Diagnostic (OBD) System of A/T and Engine

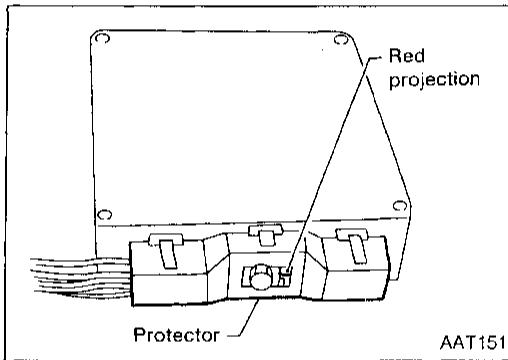
The ECM (ECCS control module) has an on board diagnostic system. It will light up the malfunction indicator lamp (MIL) to warn the driver of a malfunction causing emission deterioration.

CAUTION:

- Be sure to turn the ignition switch "OFF" and disconnect the negative battery terminal before the repair or inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Be sure to connect the connector without water, grease, dirt, bent terminals, etc. in it.)
- Be sure to route and clamp the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MIL to light up due to the short circuit.
- Be sure to erase the unnecessary (already fixed) malfunction information in the A/T control unit or ECM before returning the vehicle to the customer.

Precautions

- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- Place disassembled parts in order for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transmission is disassembled.
- When connecting A/T control unit harness connector, tighten bolt until red projection is in line with connector.
- 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.
- Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to "ATF COOLER SERVICE", on next page.
- After overhaul, refill the transmission with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system. Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.



- It is very important to perform functional tests whenever they are indicated.

Service Notice or Precautions

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 even with a shift lever position of "1", "2" or "D". Customer may complain of "sluggish or poor acceleration".

When the Fail-Safe operation occurs the next time the key is turned to the "ON" position, the O/D OFF indicator lamp will blink for about 8 seconds. (For diagnosis, refer to AT-36.)

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 the ignition key "OFF" for 5 seconds and then "ON" to recover normal shift pattern.

The blinking of the O/D 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-34).

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

Replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer.

VH41DE engine (with RE4R03A) ... 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 SELF-DIAGNOSIS

• A/T self-diagnosis is performed by the A/T control unit in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-22 for the indicator used to display each self-diagnostic result.

• The self-diagnostic results indicated by the MIL are automatically stored in both the ECM and A/T control unit memories.

Always perform the procedure "HOW TO ERASE DTC" on AT-20 to complete the repair and avoid unnecessary blinking of the MIL.

• The following self-diagnostic items can be detected using ECM self-diagnostic results mode* only when the O/D OFF indicator lamp does not indicate any malfunctions.

-Improper shifting to 1st, 2nd, 3rd, or 4th gear position

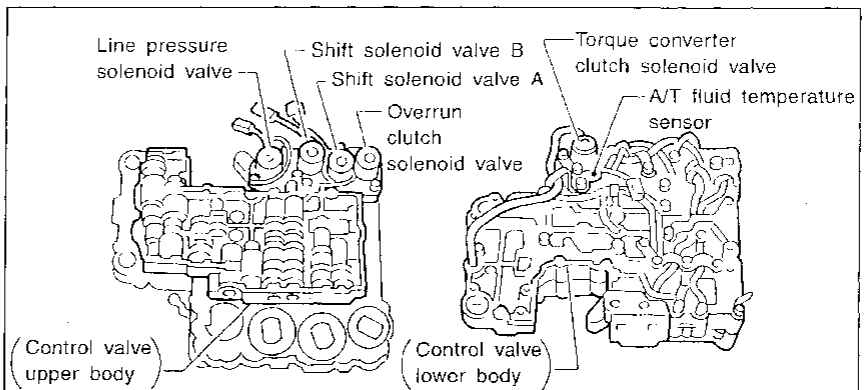
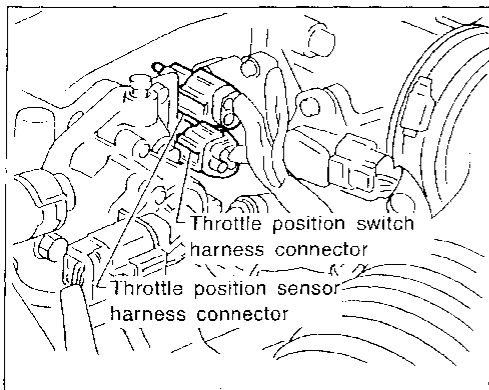
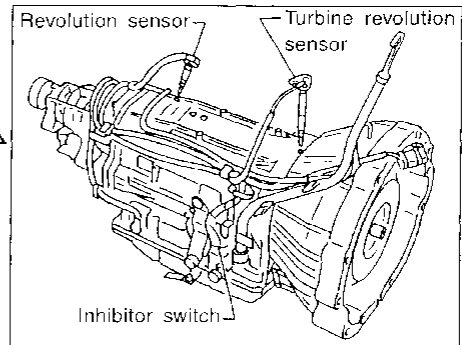
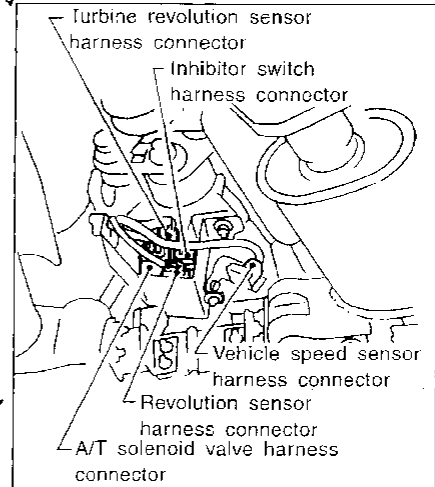
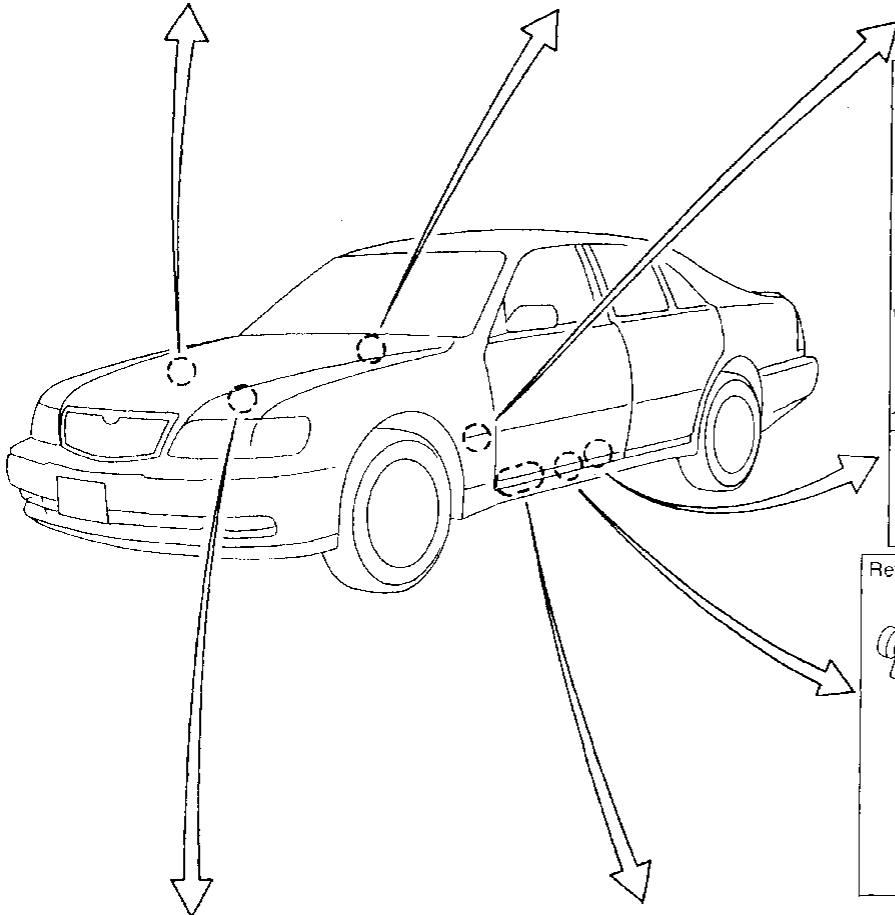
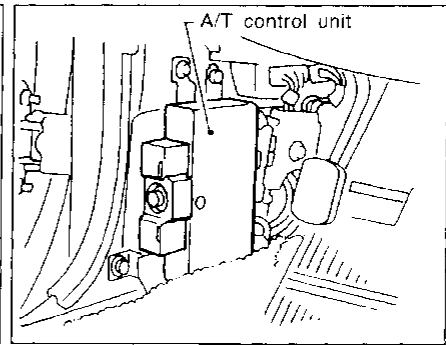
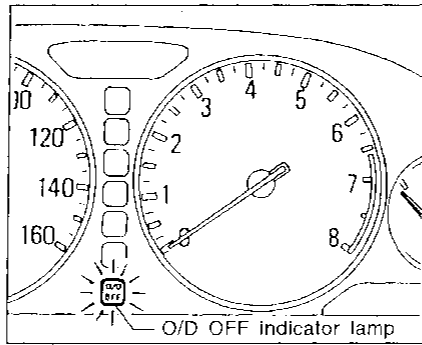
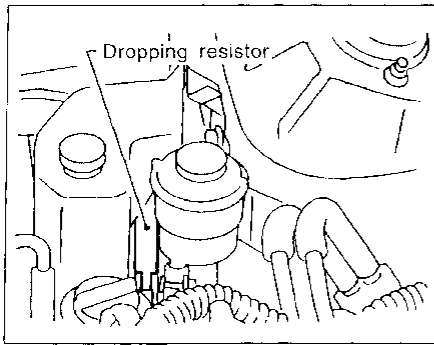
-Improper torque converter clutch operation

-Improper lock-up operation.

*: For details of OBD-II, refer to EC section ("ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

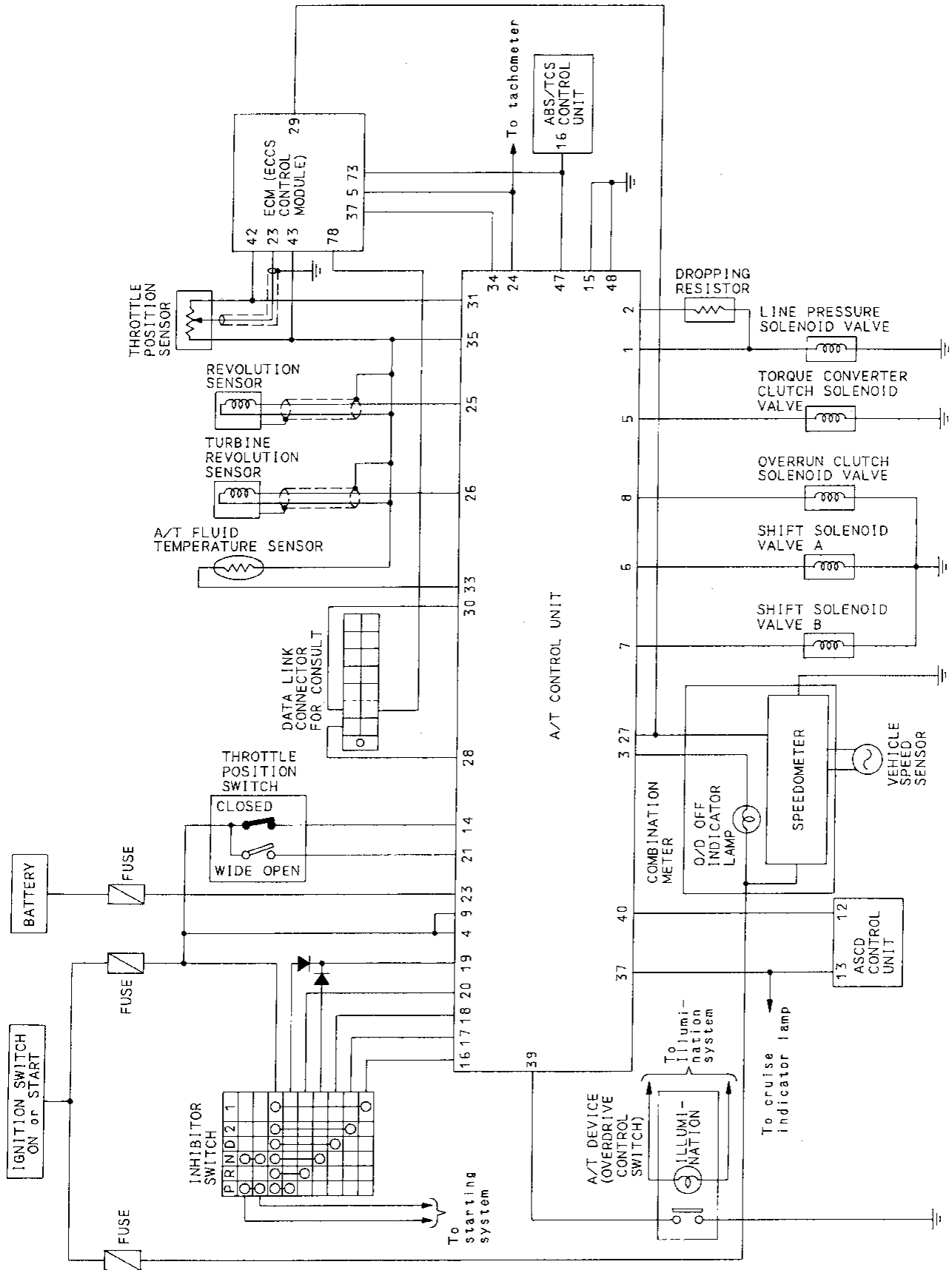
OVERALL SYSTEM

A/T Electrical Parts Location



OVERALL SYSTEM

Circuit Diagram

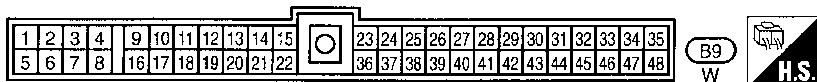
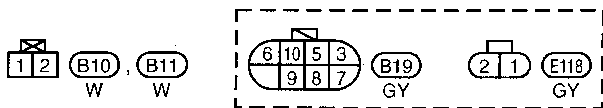
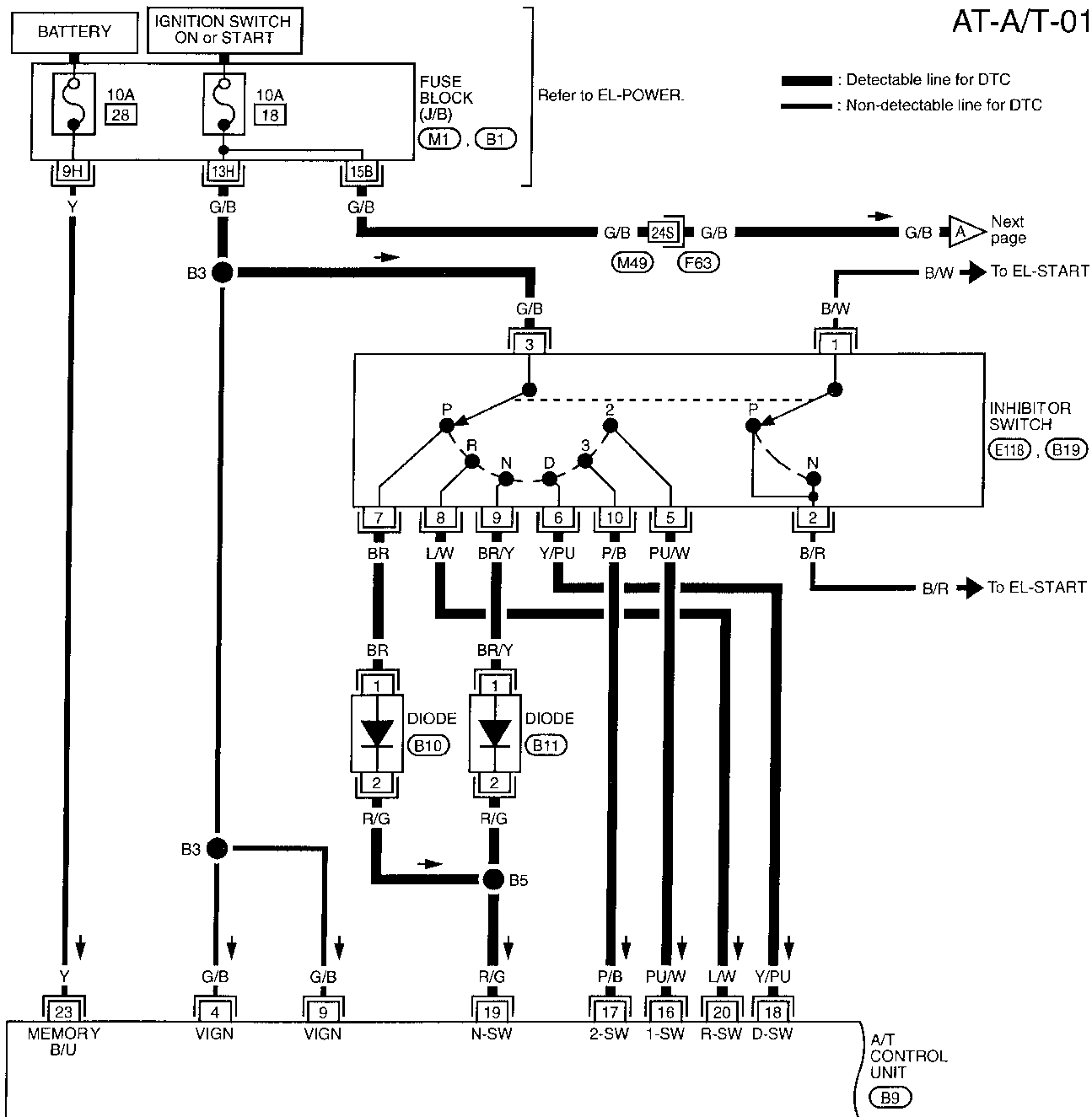


CI
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EL
IDX

OVERALL SYSTEM

Wiring Diagram

AT-A/T-01



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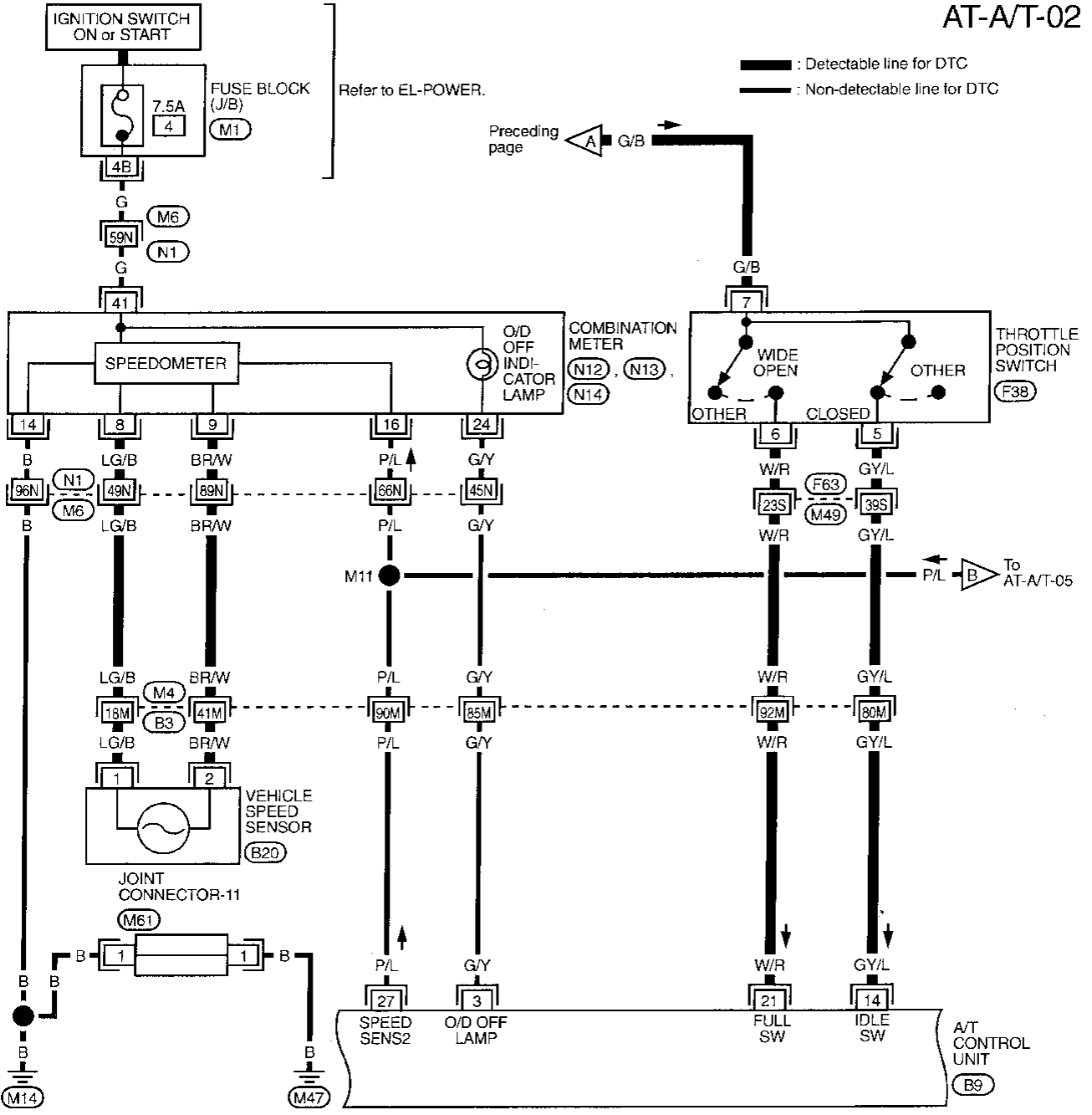
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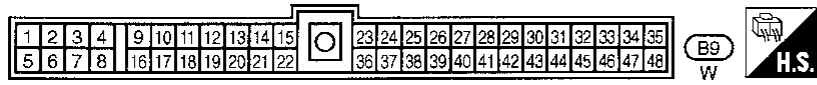
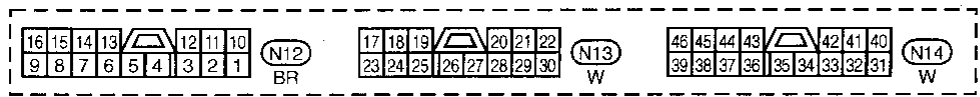
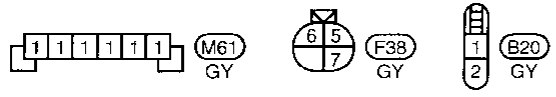
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OVERALL SYSTEM Wiring Diagram (Cont'd)

AT-A/T-02



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 ST
 RS
 BT



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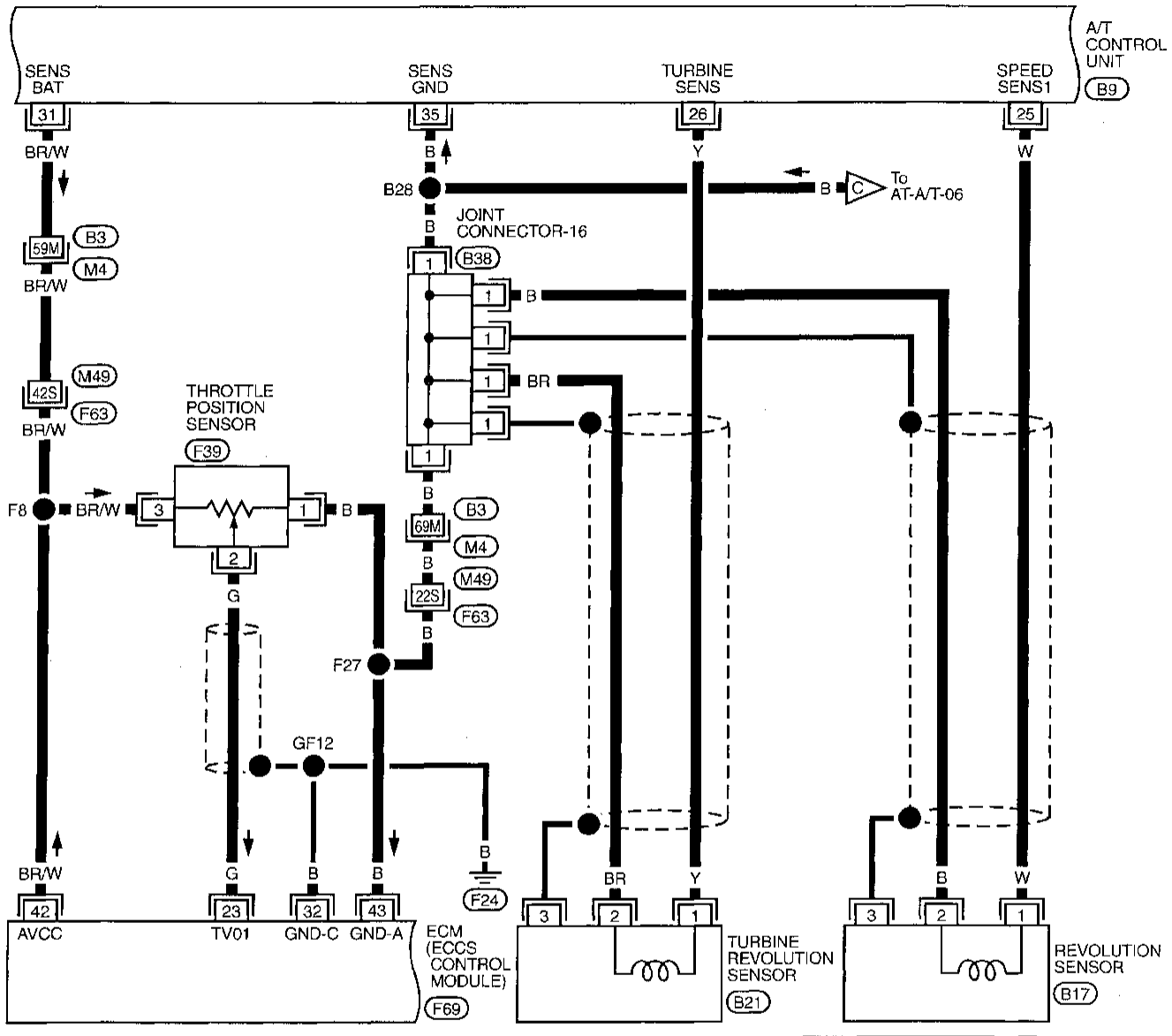
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 (M49) (F63)
 (M1)

FA
 EL
 IX

OVERALL SYSTEM Wiring Diagram (Cont'd)

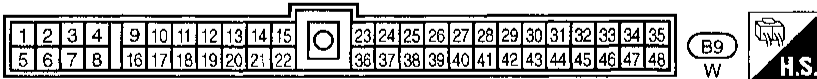
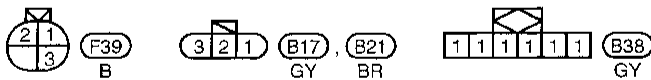
AT-A/T-03

: Detectable line for DTC
 : Non-detectable line for DTC



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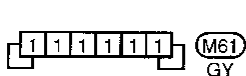
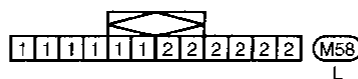
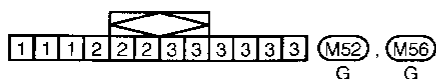
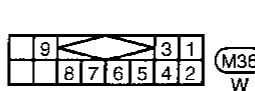
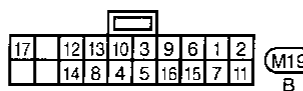
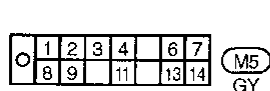
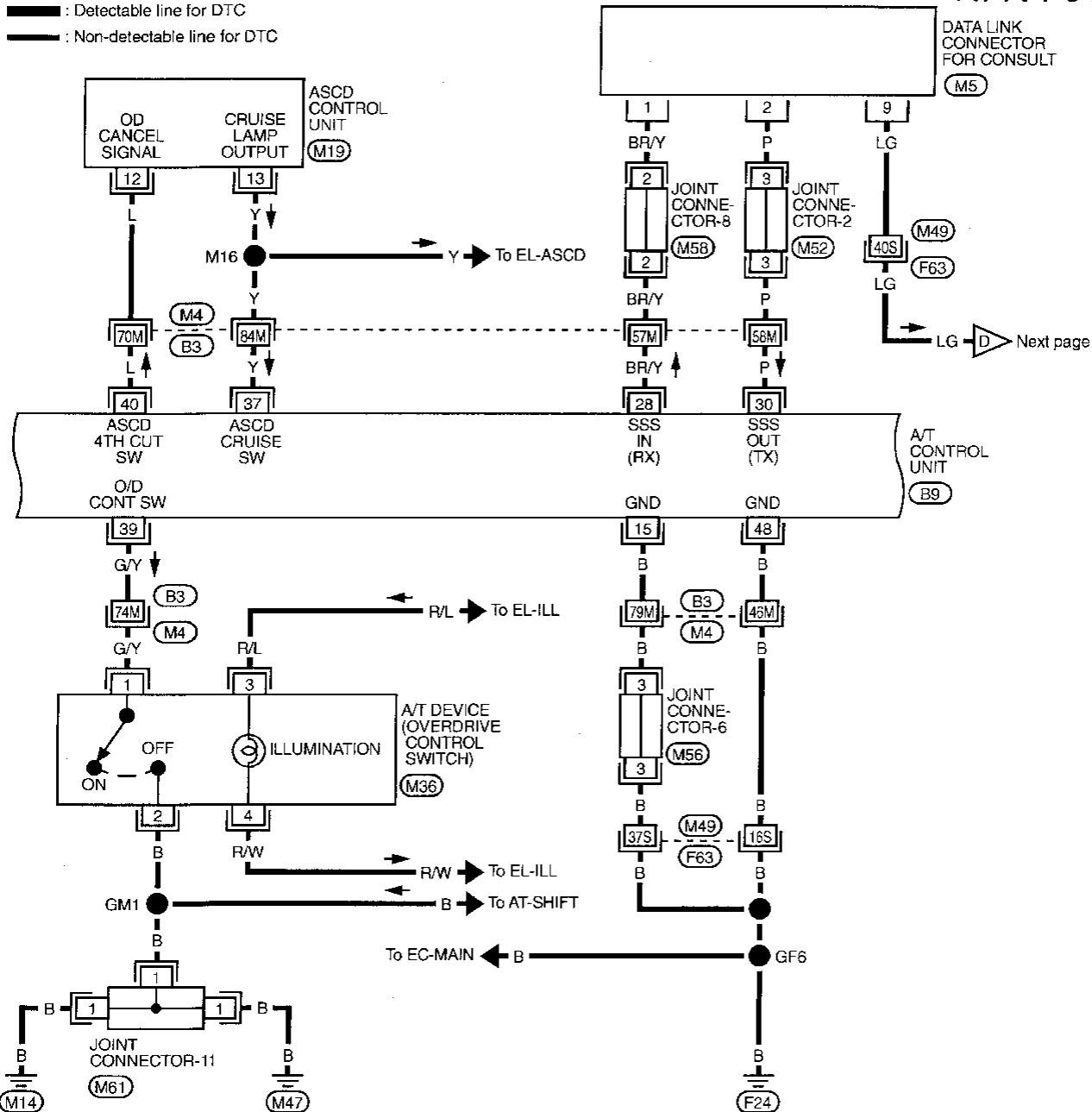
- (M4) (B3)
- (M49) (F63)
- (F69)



OVERALL SYSTEM Wiring Diagram (Cont'd)

AT-A/T-04

: Detectable line for DTC
 : Non-detectable line for DTC



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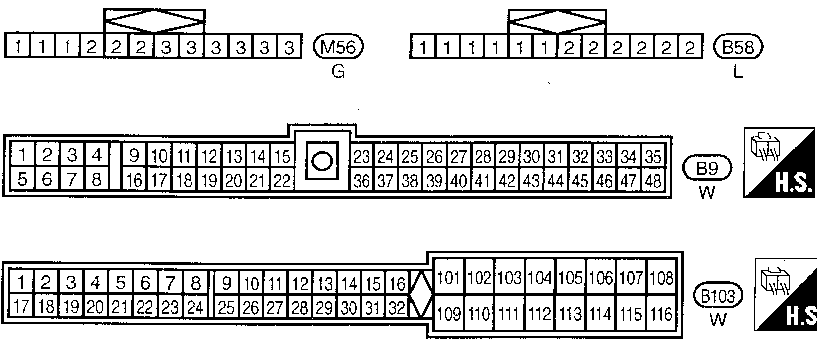
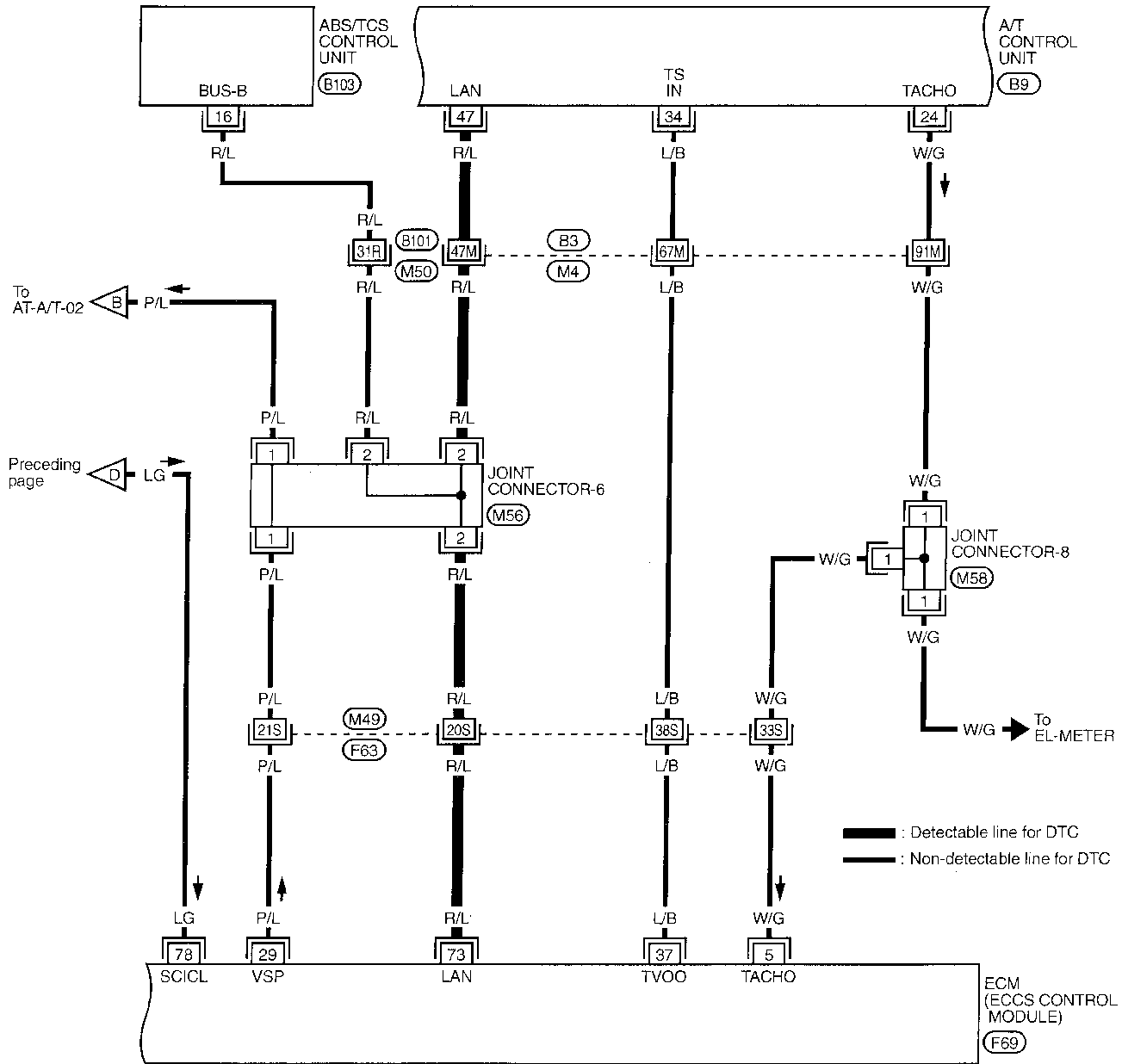
M4, B3, M49, F63



GI
MA
EM
LC
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OVERALL SYSTEM Wiring Diagram (Cont'd)

AT-A/T-05

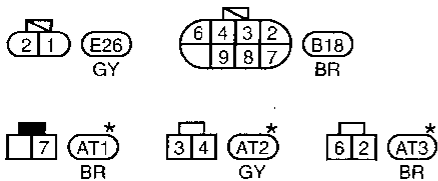
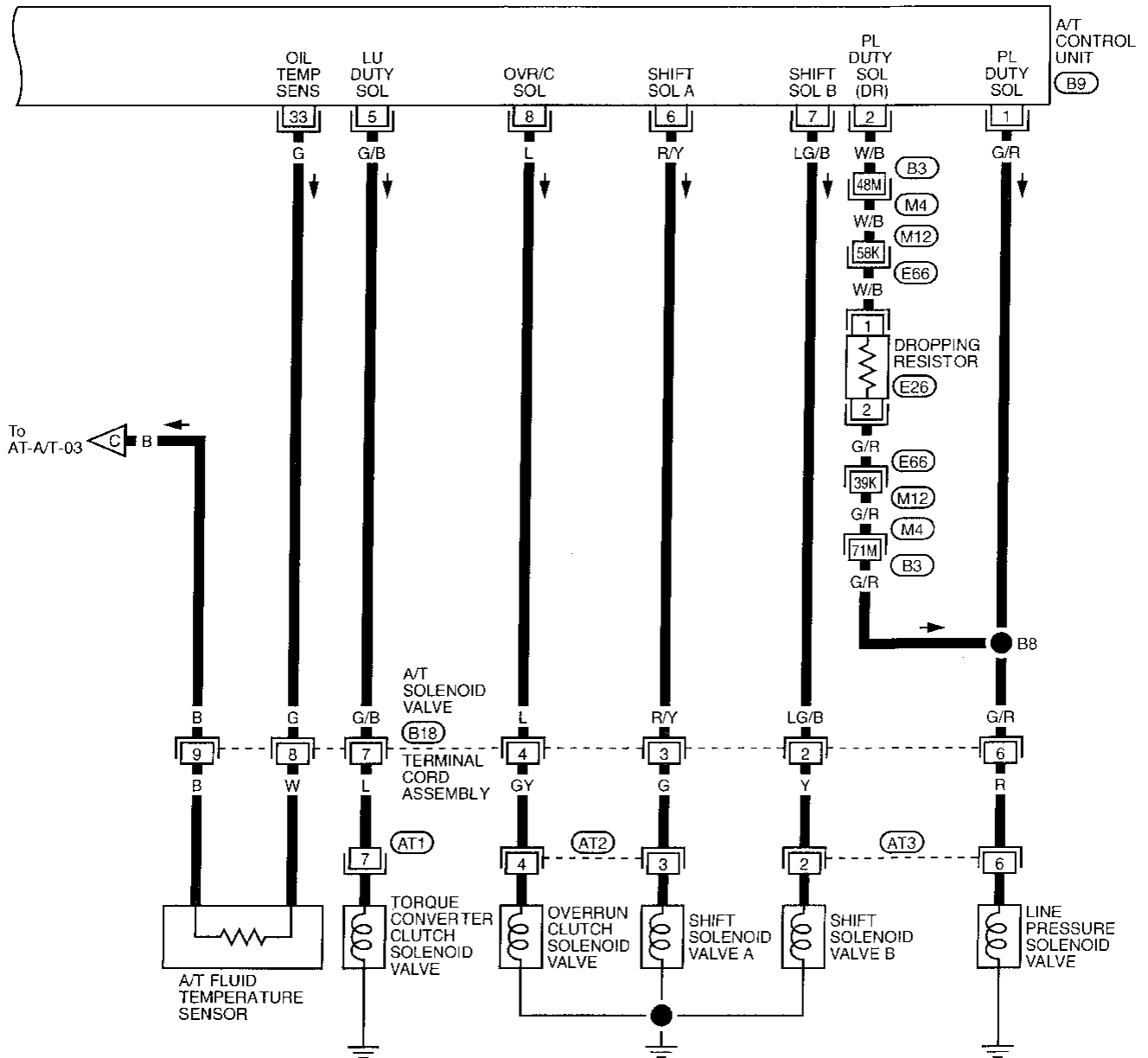


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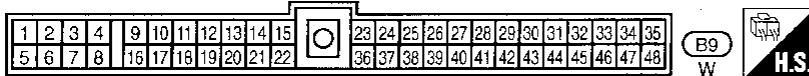
OVERALL SYSTEM Wiring Diagram (Cont'd)

AT-A/T-06

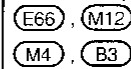
: Detectable line for DTC
 : Non-detectable line for DTC



*: This connector is not shown in "HARNESS LAYOUT", EL section.



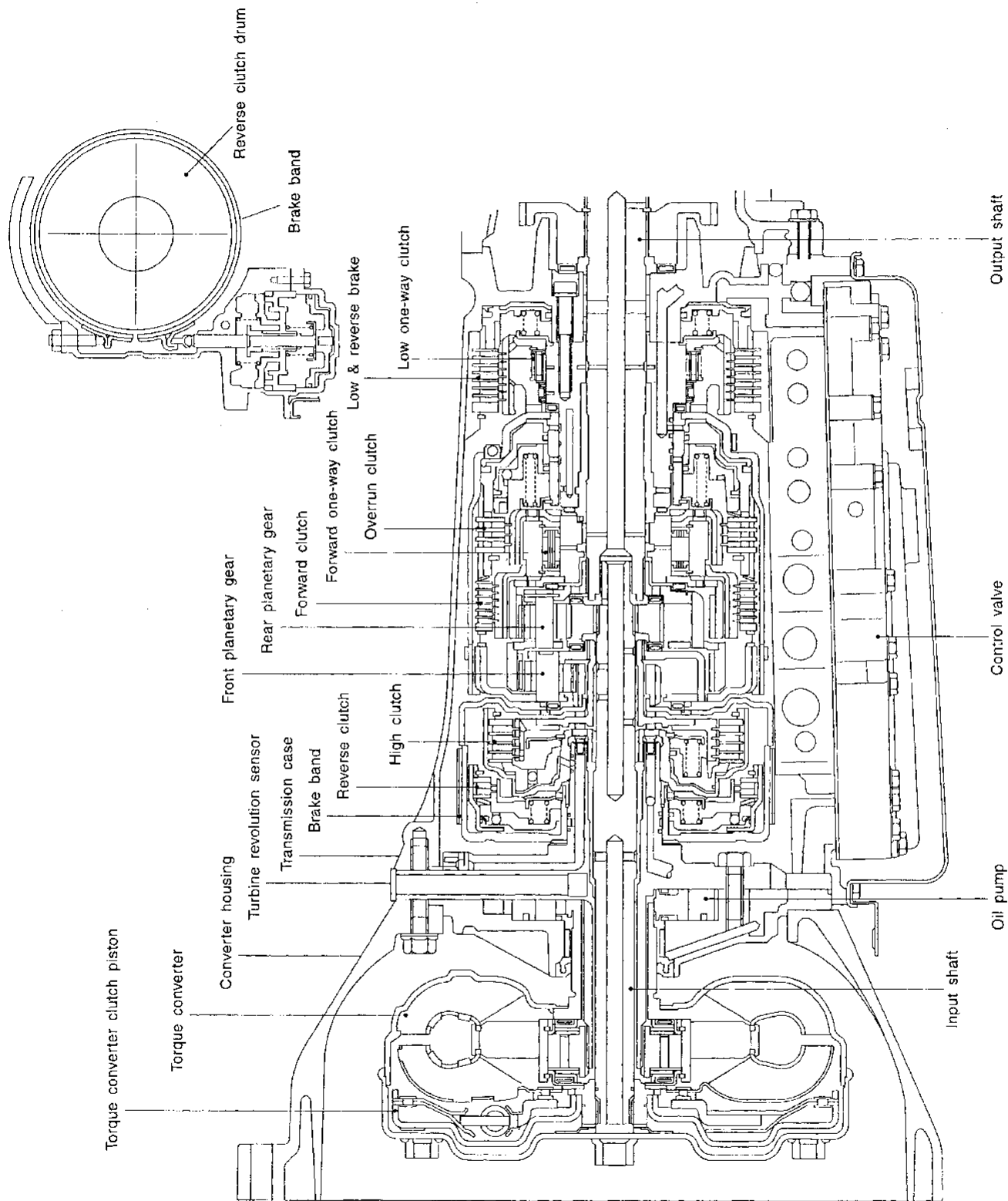
Refer to last page (Foldout page).



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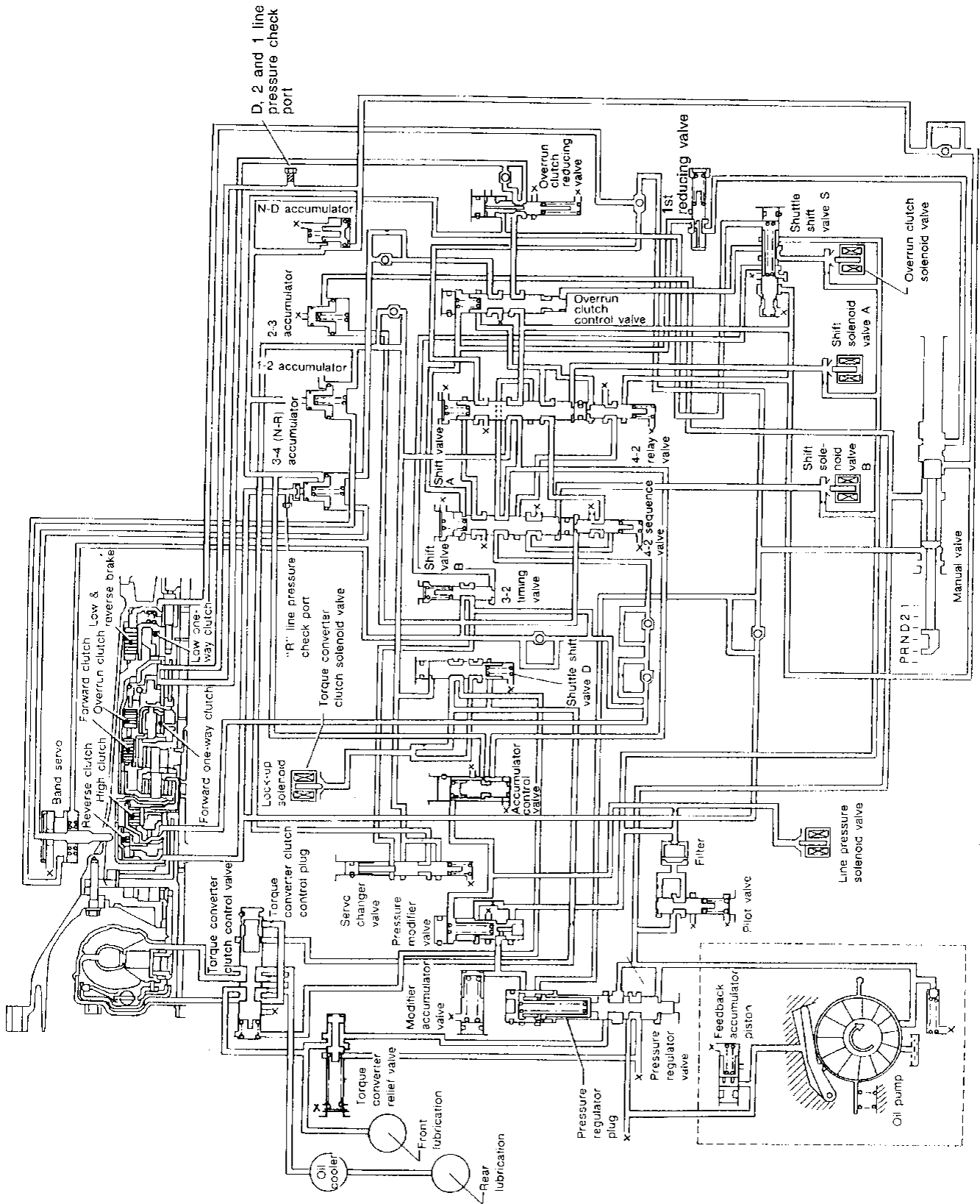
OVERALL SYSTEM

Cross-sectional View



OVERALL SYSTEM

Hydraulic Control Circuits



- GI
- MA
- EM
- LC
- EC
- FE
- AT**
- PD
- FA
- RA
- BR
- ST
- RS
- BT
- HA
- EL
- IDX

OVERALL SYSTEM

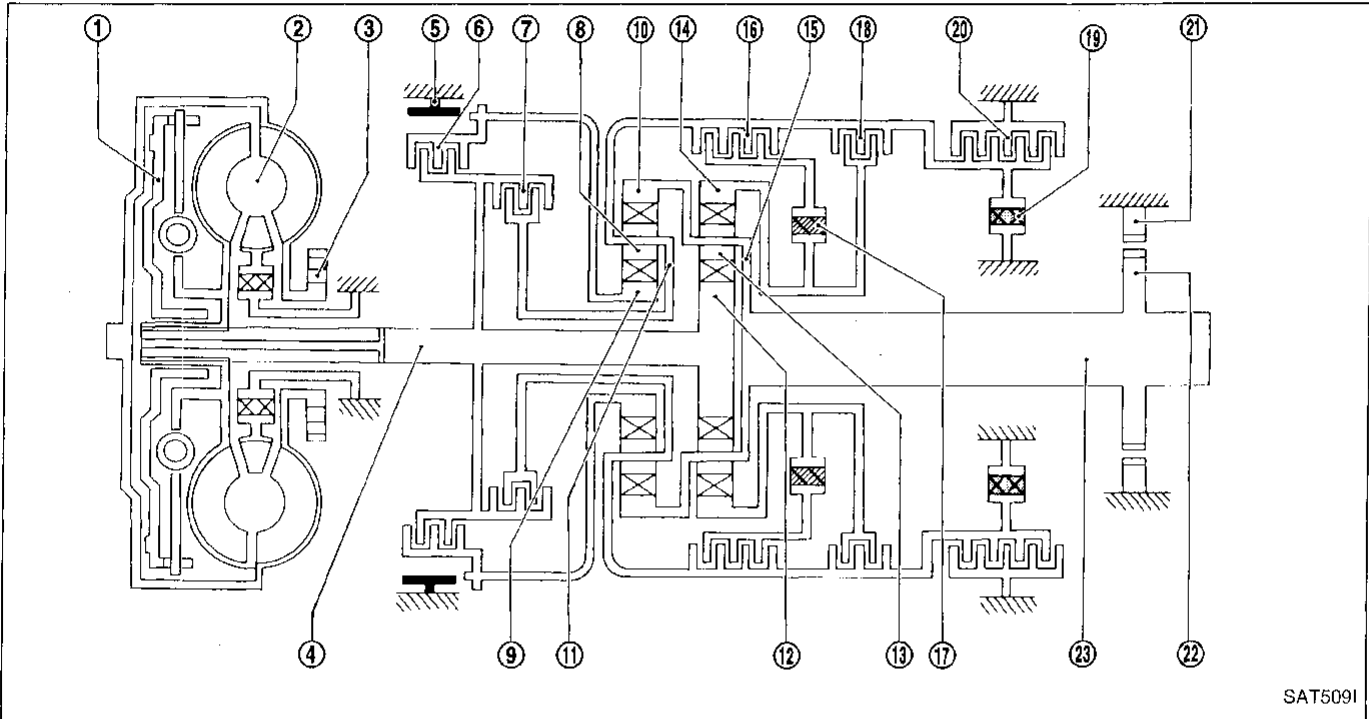
Shift Mechanism

The RE4R03A automatic transmission uses compact, dual planetary gear systems to improve power-transmission efficiency, simplify construction and reduce weight.

It also employs an optimum shift control and superwide gear ratios. They improve starting performance and acceleration during medium and high-speed operation.

Two one-way clutches are also employed: one is used for the forward clutch and the other for the low clutch. These one-way clutches, combined with four accumulators, reduce shifting shock to a minimum.

CONSTRUCTION



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

FUNCTION OF CLUTCH AND BRAKE

Control members	Abbr.	Function
⑥ Reverse clutch	R/C	To transmit input power to front sun gear ⑨.
⑦ High clutch	H/C	To transmit input power to front planetary carrier ⑪.
⑯ Forward clutch	F/C	To connect front planetary carrier ⑪ with forward one-way clutch ⑰.
⑱ Overrun clutch	O/C	To connect front planetary carrier ⑪ with rear internal gear ⑭.
⑤ Brake band	B/B	To lock front sun gear ⑨.
⑰ Forward one-way clutch	F/O.C	When forward clutch is engaged, to stop rear internal gear ⑭ from rotating in opposite direction.
⑲ Low one-way clutch	L/O.C	At D ₁ position, to prevent rear internal gear ⑭ from rotating in opposite direction.
⑳ Low & reverse brake	L & R/B	To lock rear internal gear ⑭ (2, 1 ₂ and 1 ₁), to lock front planetary carrier ⑪ (R position).

OVERALL SYSTEM

Shift Mechanism (Cont'd)

OPERATION OF CLUTCH AND BRAKE

Shift position	Reverse clutch	High clutch	Forward clutch	Overrun clutch	Band servo			Forward one-way clutch	Low one-way clutch	Low & reverse brake	Lock-up	Remarks
					2nd apply	3rd release	4th apply					
P												PARK POSITION
R	○									○		REVERSE POSITION
N												NEUTRAL POSITION
D*4	1st		○	*1⊗				●	●			Automatic shift 1 ↔ 2 ↔ 3 ↔ 4
	2nd		○	*1⊙	○			●				
	3rd		○	○	*1⊙	*2⊗	⊗	●			*5○	
	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 control 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 control switch is set in "OFF" position.

*5: Operates when overdrive control switch is "OFF".

○ : Operates

⊙ : Operates when throttle opening is less than 1/16, activating engine brake.

● : Operates during "progressive" acceleration.

⊗ : Operates but does not affect power transmission.

⊗ : Operates when throttle opening is less than 1/16, but does not affect engine brake.

GI

MA

EM

LC

EC

FE

AT

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FA

RA

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RS

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HA

EL

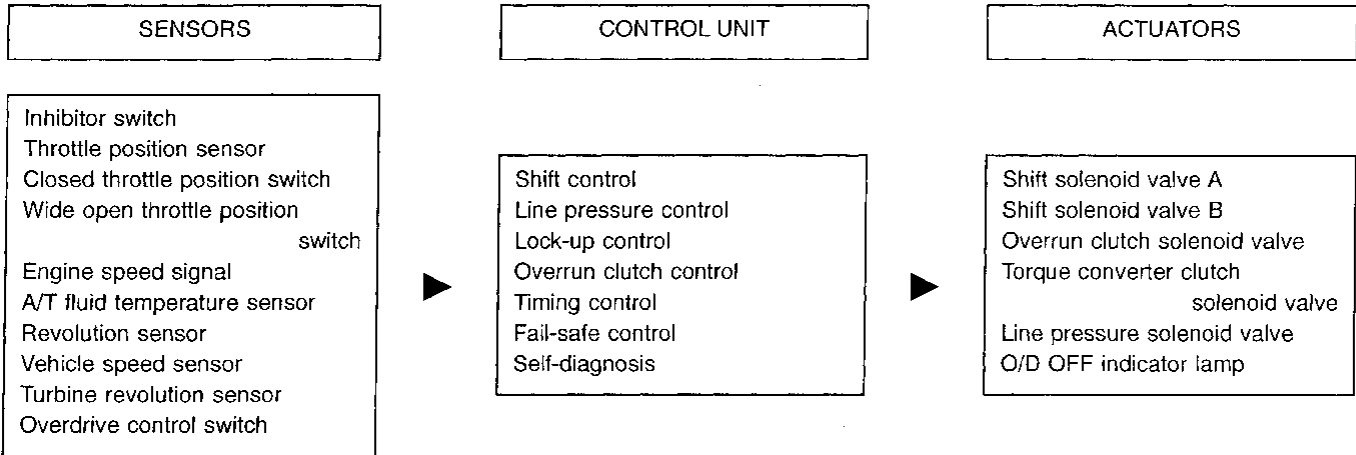
IDX

OVERALL SYSTEM

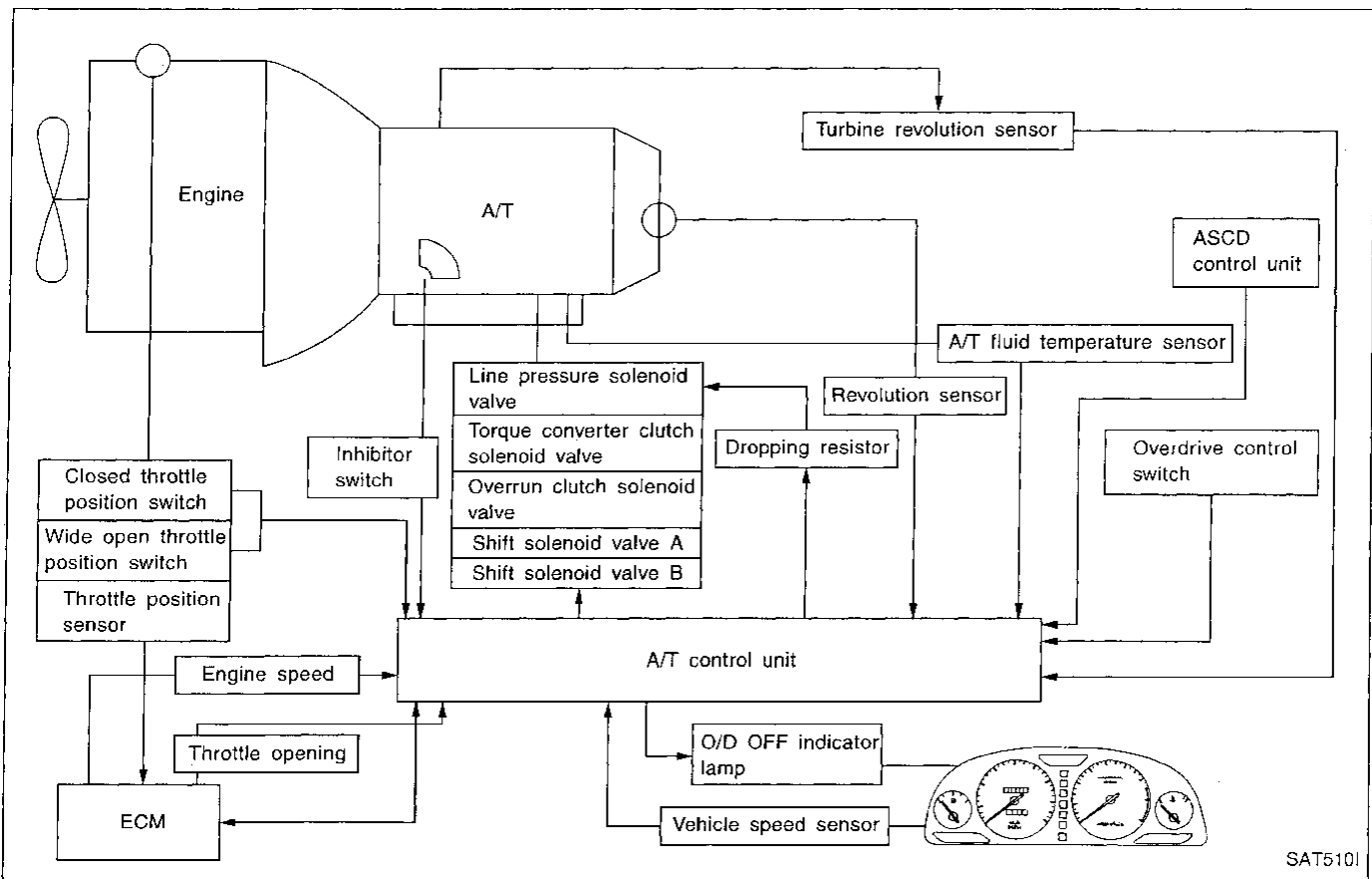
Control System

OUTLINE

The RE4R03A automatic transmission senses vehicle operating conditions through various sensors. It always controls the optimum shaft position and reduces shifting and lock-up shocks.



CONTROL SYSTEM



SAT5101

OVERALL SYSTEM

Control System (Cont'd)

A/T CONTROL UNIT FUNCTION

The function of the A/T control unit is to:

- Receive input signals sent from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, and engine brake operation.
- Send required output 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).
	A/T 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.
	Turbine revolution sensor	Sends an input shaft revolution signal.
	Overdrive control switch	Sends a signal, which prohibits a shift to "D ₄ " (overdrive) position, 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 in relation to a signal sent from A/T control unit.
	O/D OFF indicator lamp	Shows A/T control unit faults, when A/T control components malfunction.

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Introduction

The ECM (ECCS control module) provides two functions for the A/T system. One function is to receive a signal from the A/T control unit used with OBD-related parts of the A/T system. The signal is sent to the ECM when a malfunction occurs in the corresponding OBD-related part. The other function is to indicate a diagnostic result by means of the MIL (malfunction indicator lamp) on the instrument panel. Sensors, switches and solenoid valves are used as sensing elements.

The MIL automatically illuminates in One or Two Trip Detection Logic when a malfunction is sensed in relation to A/T system parts.

One or Two Trip Detection Logic

ONE TRIP DETECTION LOGIC

If a malfunction is sensed during the first test drive, the MIL will illuminate and the malfunction will be stored in the ECM memory as a DTC. The A/T control unit is not provided with such a memory function.

TWO TRIP DETECTION LOGIC

When a malfunction is sensed during the first test drive, it is stored in the ECM memory as a 1st trip DTC (diagnostic trouble code) or 1st trip freeze frame data. At this point, the MIL will not illuminate. — First Trip
If the same malfunction as that experienced during the first test drive is sensed during the second test drive, the MIL will illuminate. — Second Trip

A/T-related parts for which the MIL illuminates during the first or second test drive are listed below.

Items	MIL	
	One trip detection	Two trip detection
Shift solenoid valve A — DTC: P0750 (1108)	X	
Shift solenoid valve B — DTC: P0755 (1201)	X	
Throttle position sensor or switch — DTC: P1705 (1206)	X	
Except above		X


The “trip” in the “One or Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation.

Diagnostic Trouble Code (DTC)

HOW TO READ DTC

The diagnostic trouble code can be read by the following methods.


(Either code for the 1st trip or the 2nd trip can be read.)

-  1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 1101, 1102, 1103, 1104, etc.

These DTCs are controlled by NISSAN.

2. CONSULT or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.

 These DTCs are prescribed by SAE J2012. (CONSULT also displays the malfunctioning component or system.)

-  ● Output of a DTC indicates a malfunction. However, Mode II and GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT can identify them. Therefore, using CONSULT (if available) is recommended.

HOW TO ERASE DTC

The diagnostic trouble code can be erased by CONSULT, GST or ECM DIAGNOSTIC TEST MODE as described following.

- If the battery terminal is disconnected, the diagnostic trouble code will be lost within 24 hours.
- When you erase the DTC, using CONSULT or GST is easier and quicker than switching the mode selector on the ECM.

The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC section “Emission-related Diagnostic Information”, “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION”.

- Diagnostic trouble codes (DTC)
- 1st trip diagnostic trouble codes (1st trip DTC)
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

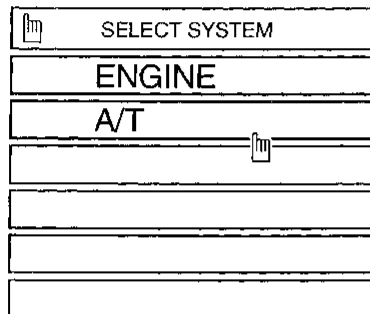
Diagnostic Trouble Code (DTC) (Cont'd)

HOW TO ERASE DTC (With CONSULT)

- If a DTC is displayed for both ECM and A/T control unit, it needs to be erased for both ECM and A/T control unit.
 - If diagnostic trouble code is not for A/T related items (Refer to AT-46), skip steps 2 through 4.
1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 5 seconds and then turn it "ON" (engine stopped) 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.) Then touch "BACK" twice.
 5. Touch "ENGINE".
 6. Touch "SELF-DIAG RESULTS".
 7. Touch "ERASE". (The DTC in the ECM will be erased.)

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 at least 5 seconds and then turn it "ON" (engine stopped) again.

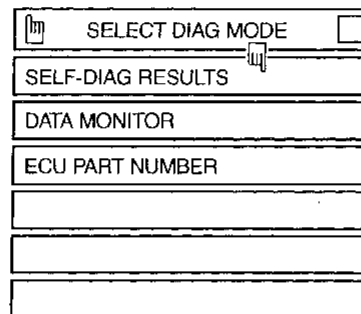


SELECT SYSTEM

ENGINE

A/T

2. Turn CONSULT "ON", and touch "A/T".



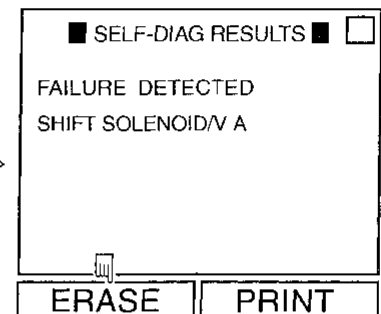
SELECT DIAG MODE

SELF-DIAG RESULTS

DATA MONITOR

ECU PART NUMBER

3. Touch "SELF-DIAG RESULTS".

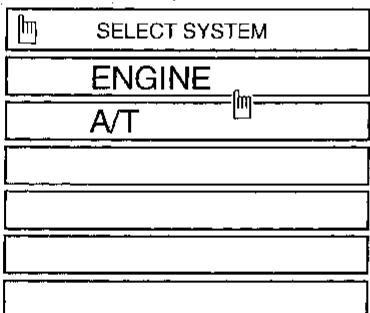


SELF-DIAG RESULTS

FAILURE DETECTED
SHIFT SOLENOID/V A

ERASE PRINT

4. Touch "ERASE". (The DTC in the A/T control unit will be erased.)

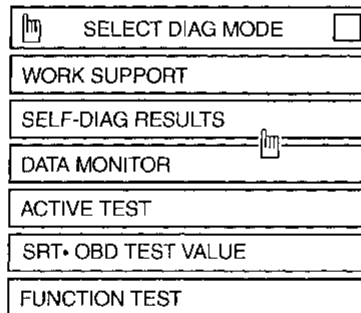


SELECT SYSTEM

ENGINE

A/T

5. Touch "ENGINE".



SELECT DIAG MODE

WORK SUPPORT

SELF-DIAG RESULTS

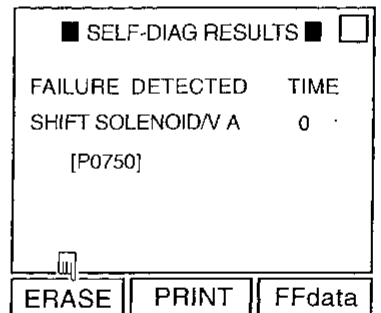
DATA MONITOR

ACTIVE TEST

SRT•OBD TEST VALUE

FUNCTION TEST

6. Touch "SELF-DIAG RESULTS".



SELF-DIAG RESULTS

FAILURE DETECTED TIME
SHIFT SOLENOID/V A 0
[P0750]

ERASE PRINT FFdata

7. Touch "ERASE". (The DTC in the ECM will be erased.)

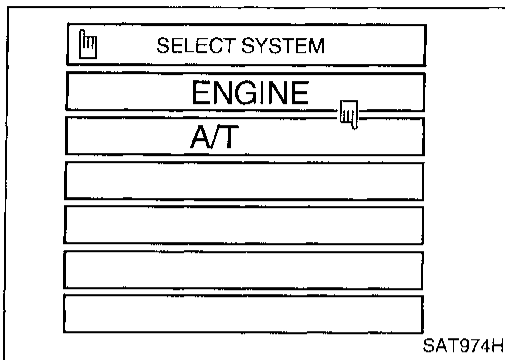
SEF372S

HOW TO ERASE DTC (With GST)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-23. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 with Generic Scan Tool (GST). For details, refer to EC section ("Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

HOW TO ERASE DTC (No Tools)

1. If the ignition switch stays "ON" after repair work, be sure to turn ignition switch "OFF" once. Wait for at least 5 seconds and then turn it "ON" (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-23. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. Refer to EC section ["HOW TO SWITCH DIAGNOSTIC TEST MODES", "Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

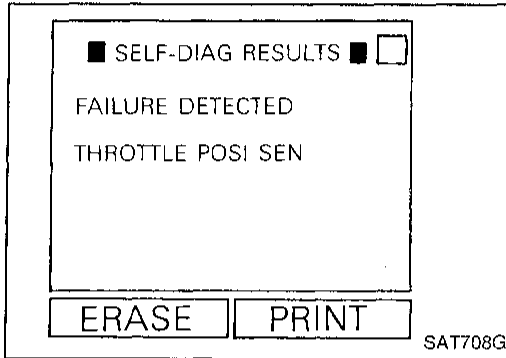


Self-diagnosis

After performing this procedure, place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-32. Reference pages are provided following the items.

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)



1. Turn on CONSULT and touch "A/T".
If A/T is not displayed, check A/T control unit power supply and ground circuit. Refer to AT-51. If result is NG, refer to EL section ("POWER SUPPLY ROUTING").
2. Touch "SELF-DIAG RESULTS".
Display shows malfunction experienced since the last erasing operation.
CONSULT performs REAL-TIME SELF-DIAGNOSIS.
Also, any malfunction detected while in this mode will be displayed at real time.



Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)	Malfunction is detected when ...	Indicator for Diagnostic Results	
		O/D OFF indicator lamp (Available when "A/T" on CONSULT is touched.)	Malfunction indicator lamp*2 (Available when "ENGINE" on CONSULT is touched.)
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 SENA/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 cannot be shifted to the 1st gear position even if electrical circuit is good.	—	X*1
Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	• A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	X*1
Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	• A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	X*1
Improper shifting to 4th gear position (A/T 4TH SIG OR TCC)	• A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	X*1
Improper lock-up operation (A/T TCC SIGNAL)	• A/T cannot perform lock-up even if electrical circuit is good.	—	X*1
Shift solenoid valve A (SHIFT SOLENOID/V A)	• A/T control unit detects an 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 an 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 an 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 an 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 an improper voltage drop when it tries to operate the solenoid valve.	X	X
Throttle position sensor Throttle position switch (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
A/T fluid temperature sensor (A/T FLUID TEMP SENSOR)	• A/T control unit receives an excessively low or high voltage from the sensor.	X	X


ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Self-diagnosis (Cont'd)

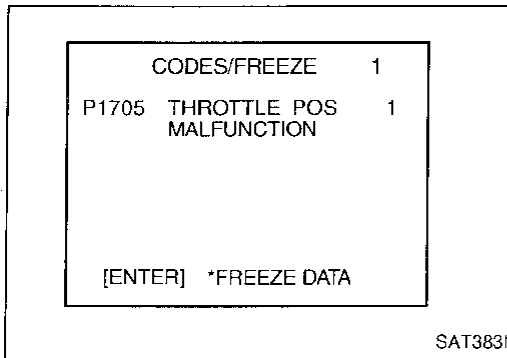
Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)	Malfunction is detected when ...	Indicator for Diagnostic Results	
		 O/D OFF indicator lamp (Available when "A/T" on CONSULT is touched.)	 Malfunction indicator lamp*2 (Available when "ENGINE" on CONSULT is touched.)
Turbine revolution sensor (TURBINE REV)	• A/T control unit does not receive the proper voltage signal from the sensor.	X	—
Engine control (A/T COMM LINE)	• The ECM-A/T communication line is open or shorted.	X	X
Initial start INITIAL START	• This is not a malfunction message (Whenever shutting off a power supply to the control unit, this message appears on the screen.)	X	—
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)	• No failure has been detected.	X	X

X : Applicable

— : Not applicable

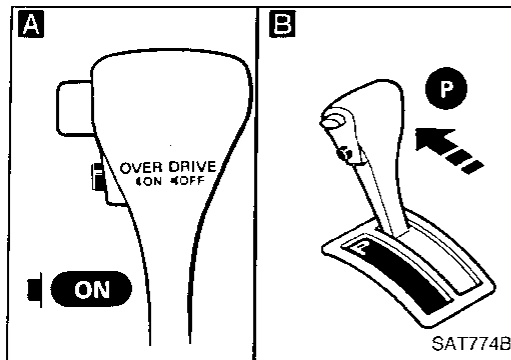
*1 : These malfunctions can not be displayed by MIL  if another malfunction is assigned to the O/D OFF indicator lamp

*2 : Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

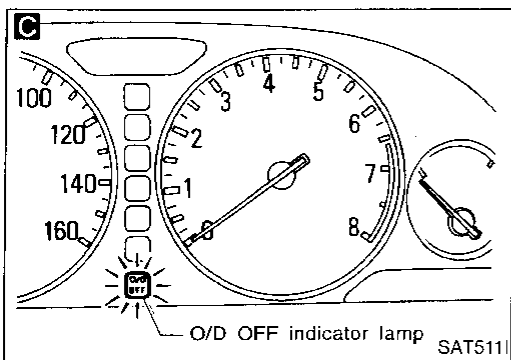
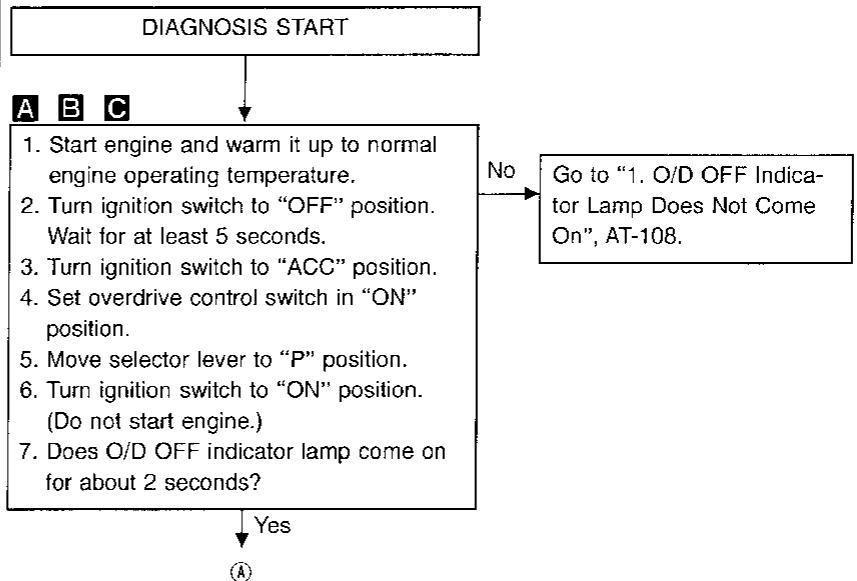


SELF-DIAGNOSTIC PROCEDURE (With GST)

Refer to EC section ["Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

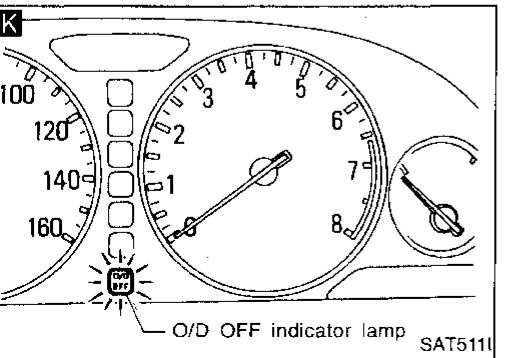
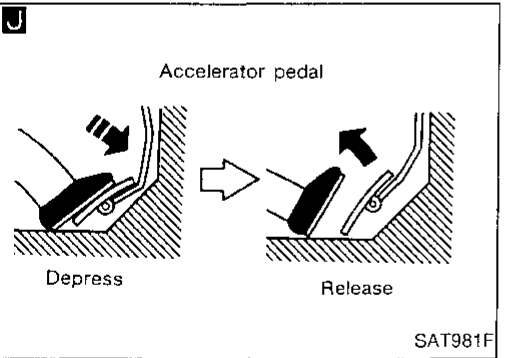
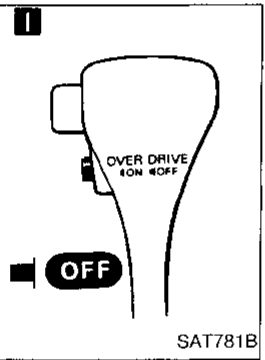
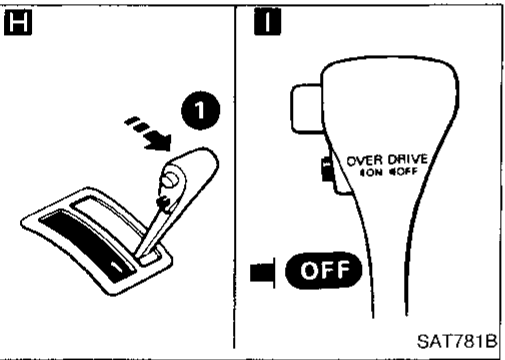
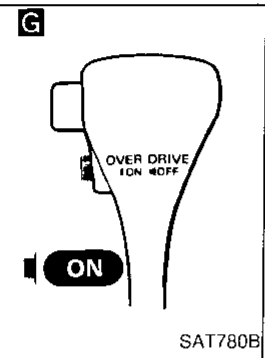
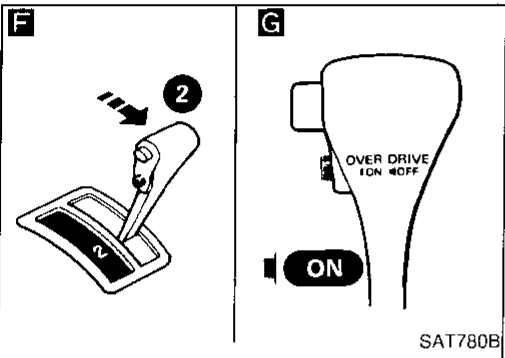
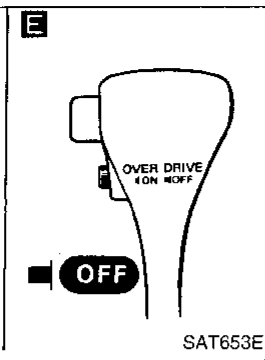
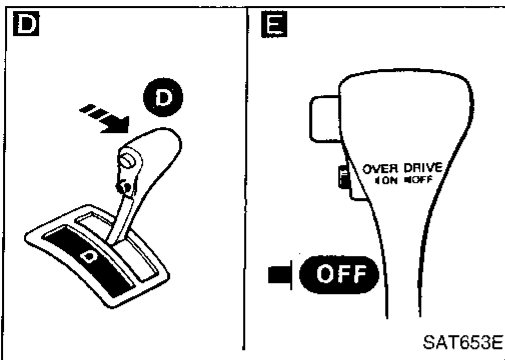


SELF-DIAGNOSTIC PROCEDURE (No Tools)



ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Self-diagnosis (Cont'd)



A

D E

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

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

F G

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

H I

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

J

Depress accelerator pedal fully and release it.

K

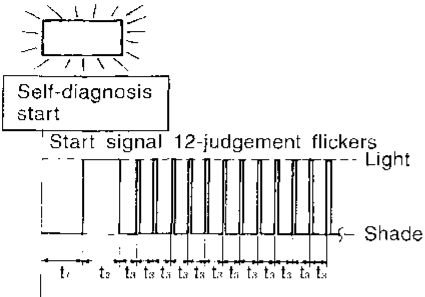
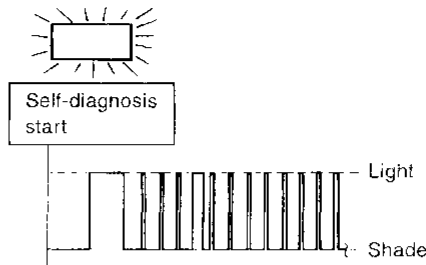
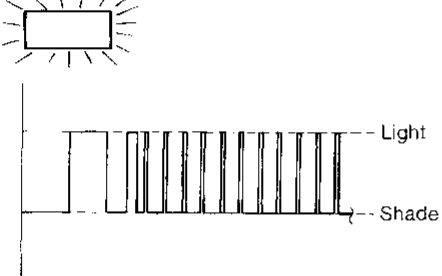
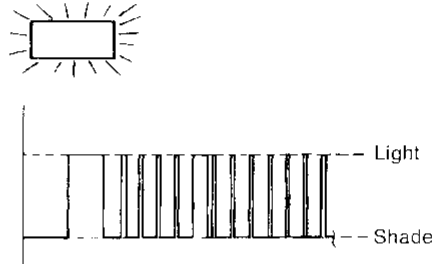
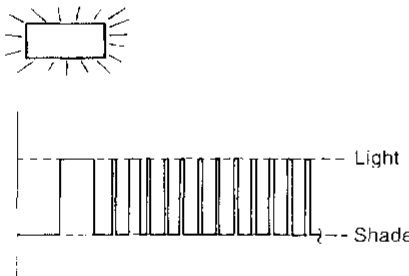
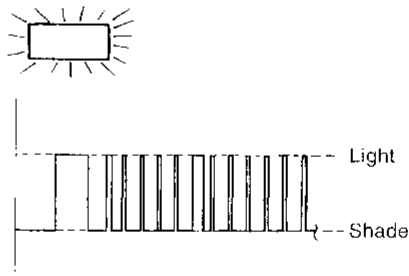
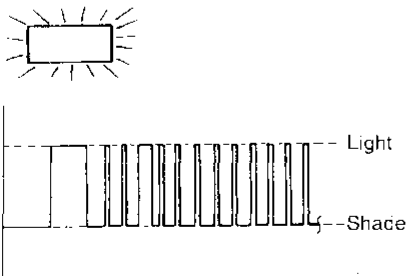
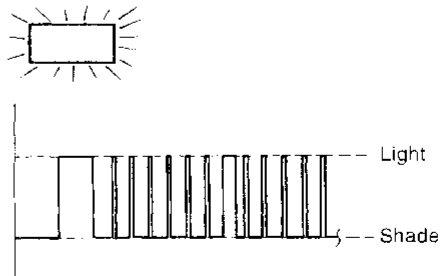
Check O/D OFF indicator lamp. Refer to JUDGEMENT OF SELF-DIAGNOSIS CODE on next page.

DIAGNOSIS END

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

O/D OFF indicator lamp	
<p>All judgement flickers are same.</p>  <p>All circuits that can be confirmed by self-diagnosis are OK. SAT666I</p>	<p>4th judgement flicker is longer than others.</p>  <p>Shift solenoid valve A circuit is short-circuited or disconnected. ➔ Go to Shift Solenoid Valve A (DTC: 1108), AT-93. SAT670I</p>
<p>1st judgement flicker is longer than others.</p>  <p>Revolution sensor circuit is short-circuited or disconnected. ➔ Go to Vehicle Speed Sensor-A/T (Revolution Sensor) (DTC: 1102), AT-66. SAT667I</p>	<p>5th judgement flicker is longer than others.</p>  <p>Shift solenoid valve B circuit is short-circuited or disconnected. ➔ Go to Shift Solenoid Valve B (DTC: 1201), AT-96. SAT671I</p>
<p>2nd judgement flicker is longer than others.</p>  <p>Vehicle speed sensor circuit is short-circuited or disconnected. ➔ Go to Vehicle Speed Sensor-MTR, AT-104. SAT668I</p>	<p>6th judgement flicker is longer than others.</p>  <p>Overrun clutch solenoid valve circuit is short-circuited or disconnected. ➔ Go to Overrun Clutch Solenoid Valve (DTC: 1203), AT-101. SAT672I</p>
<p>3rd judgement flicker is longer than others.</p>  <p>Throttle position sensor circuit is short-circuited or disconnected. ➔ Go to Throttle Position Sensor (DTC: 1206), AT-99. SAT669I</p>	<p>7th judgement flicker is longer than others.</p>  <p>Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ➔ Go to Torque Converter Clutch Solenoid Valve (DTC: 1204), AT-82. SAT673I</p>

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

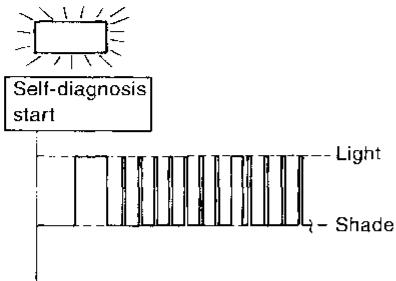
GI
 WA
 EM
 LC
 EC
 EE
AT
 PD
 FA
 RA
 BR
 ST
 PS
 BT
 HA
 EL
 IX

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Self-diagnosis (Cont'd)

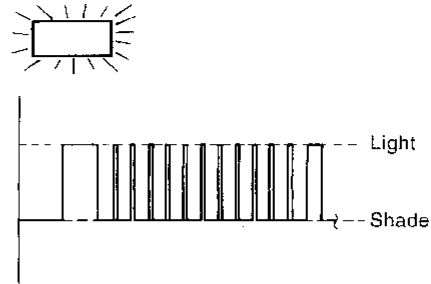
O/D OFF indicator lamp

8th judgement flicker is longer than others.



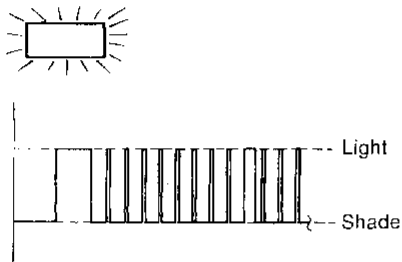
A/T fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged.
➔ Go to A/T Fluid Temperature Sensor and A/T Control Unit Power Source (DTC: 1208), AT-63. SAT674I

12th judgement flicker is longer than others.



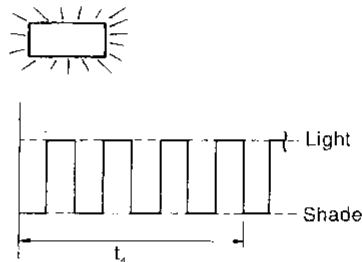
The ECM-A/T communication line is open or shorted.
➔ Go to Harness or Connector (DTC: P0600), AT-55. SAT678I

9th judgement flicker is longer than others.



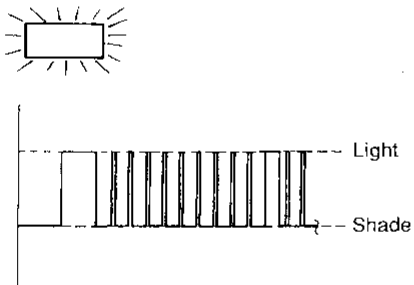
Engine speed signal circuit is short-circuited or disconnected.
➔ Go to Engine Speed Signal (DTC: 1207), AT-68. SAT675I

Flickers as shown below.



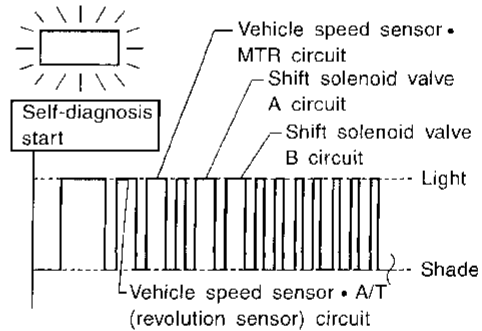
Battery power is low.
 Battery has been disconnected for a long time.
 Battery is connected conversely.
 (When reconnecting A/T control unit connectors. — This is not a problem.) SAT679I

10th judgement flicker is longer than others.



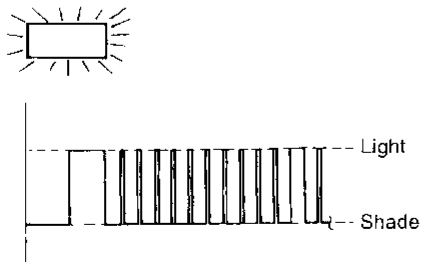
Turbine revolution sensor circuit is short-circuited or disconnected.
➔ Go to Turbine Revolution Sensor, AT-106. SAT676I

Does not come on.



Inhibitor switch, overdrive control switch or throttle position switch circuit is disconnected, or A/T control unit is damaged.
➔ Go to Inhibitor, Overdrive Control and, Throttle Position Switches (DTC: 1101), AT-57. SAT686I

11th judgement flicker is longer than others.



Line pressure solenoid valve circuit is short-circuited or disconnected.
➔ Go to Line Pressure Solenoid Valve (DTC: 1205), AT-90. SAT677I

$t_4 = 1.0$ second

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. 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

Refer to AT-22.

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	—	<ul style="list-style-type: none"> ● 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	—	<ul style="list-style-type: none"> ● 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	—	<ul style="list-style-type: none"> ● Throttle position sensor signal voltage is displayed. 	
A/T fluid temperature sensor	FLUID TEMP SEN [V]	X	—	<ul style="list-style-type: none"> ● A/T fluid temperature sensor signal voltage is displayed. ● Signal voltage lowers as fluid temperature rises. 	
Battery voltage	BATTERY VOLT [V]	X	—	<ul style="list-style-type: none"> ● Source voltage of control unit is displayed. 	
Engine speed	ENGINE SPEED [rpm]	X	X	<ul style="list-style-type: none"> ● 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.
Turbine revolution sensor	TURBINE REV [rpm]	X	—	<ul style="list-style-type: none"> ● Turbine revolution computed from signal of turbine revolution sensor is displayed. 	Error may occur under approx. 800 rpm and will not indicate 0 rpm even if engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF state computed from signal of overdrive control SW is displayed. 	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF state computed from signal of P/N position SW is displayed. 	
R position switch	R POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF state computed from signal of R position SW is displayed. 	
D position switch	D POSITION SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF state computed from signal of D position SW is displayed. 	

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
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.	
ASCD-cruise signal	ASCD-CRUISE [ON/OFF]	X	—	• Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	• This is displayed even when no ASCD is mounted.
ASCD-OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	• Status of ASCD-OD release signal is displayed. ON ... OD released OFF ... OD not released	• This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of kickdown SW, is displayed.	• This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	• ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Gear position	GEAR	—	X	• Gear position data used for computation by control unit, is displayed.	
Selector lever position	SLCT LVR POSI	—	X	• Selector lever position data, used for computation by control unit, is displayed.	• A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	• Vehicle speed data, used for computation by control unit, is displayed.	
Throttle position	THROTTLE POSI [°]	—	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 (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	• Control status of O/D OFF indicator lamp is displayed.	

X: Applicable
—: Not applicable

ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION

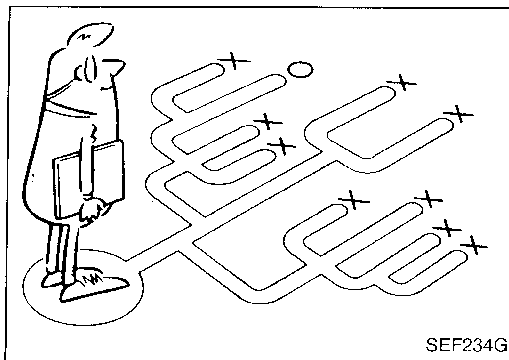
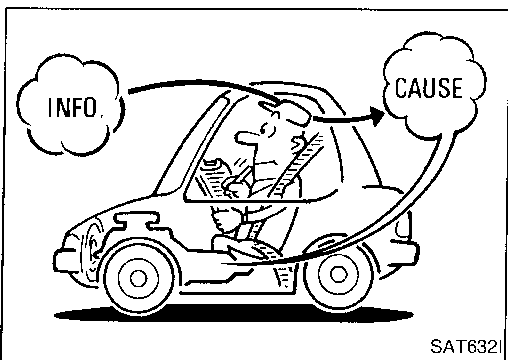
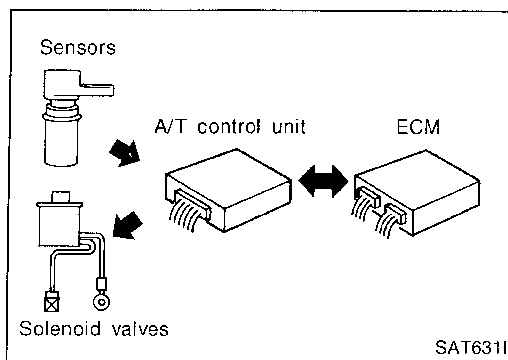
Diagnosis by CONSULT (Cont'd)

DATA ANALYSIS

Item	Display form	Meaning	
Torque converter clutch solenoid valve duty	Approximately 4%	Lock-up "OFF"	GI
	↓	Lock-up "ON"	
Line pressure solenoid valve duty	Approximately 94%	Low line-pressure (Small throttle opening)	MA
	↓	High line-pressure (Large throttle opening)	EM
Throttle position sensor	Approximately 0.5V	Fully-closed throttle	LC
	Approximately 4V	Fully-open throttle	
A/T fluid temperature sensor	Approximately 1.5V	Cold [20°C (68°F)]	EC
	↓	Hot [80°C (176°F)]	

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

PD
 FA
 RA
 BR
 ST
 RS
 BT
 HA
 EL
 IDX



Introduction

The A/T control unit receives a signal from the vehicle-speed sensor, throttle position sensor or inhibitor switch and provides shift control or lock-up control via A/T unit solenoid valves.

The A/T control unit also communicates with the ECM by means of a signal sent from sensing elements used with the OBD-related parts of the A/T system for malfunction-diagnostic purposes. The A/T control unit is capable of diagnosing malfunctioning parts while the ECM can store malfunctions in its memory.

Input and output signals must always be correct and stable in the operation of the A/T system. The A/T system must be in good operating condition and be free of valve seizure, solenoid valve malfunction, etc.

It is much more difficult to diagnose a problem that occurs intermittently rather than continuously. Most intermittent problems are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

A visual check only may not find the cause of the problems. A road test with CONSULT (or GST) or a circuit tester connected should be performed. Follow the "Work Flow". Refer to AT-34.

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such problems, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A "Diagnostic Worksheet" like the example (AT-32) should be used.

Start your diagnosis by looking for "conventional" problems first. This will help troubleshoot driveability problems on an electronically controlled engine vehicle.

Diagnostic Worksheet

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 RE4R03A	Engine VH41DE	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (times a day)	
Symptoms	<input type="checkbox"/> Vehicle does not move. (<input type="checkbox"/> Any position <input type="checkbox"/> Particular position)	
	<input type="checkbox"/> No up-shift (<input type="checkbox"/> 1st → 2nd <input type="checkbox"/> 2nd → 3rd <input type="checkbox"/> 3rd → O/D)	
	<input type="checkbox"/> No down-shift (<input type="checkbox"/> O/D → 3rd <input type="checkbox"/> 3rd → 2nd <input type="checkbox"/> 2nd → 1st)	
	<input type="checkbox"/> Lockup malfunction	
	<input type="checkbox"/> Shift point too high or too low.	
	<input type="checkbox"/> Shift shock or slip (<input type="checkbox"/> N → D <input type="checkbox"/> Lockup <input type="checkbox"/> Any drive position)	
	<input type="checkbox"/> Noise or vibration	
	<input type="checkbox"/> No kickdown	
O/D OFF indicator lamp	Blinks for about 8 seconds.	
	<input type="checkbox"/> Continuously lit	<input type="checkbox"/> Not lit
Malfunction indicator lamp (MIL)	<input type="checkbox"/> Continuously lit	<input type="checkbox"/> Not lit

GI
MA
EM
LC
EC
AT
PD
FA
RA
BR
ST
RS
BT
HA
E.
DX

TROUBLE DIAGNOSIS — Introduction

Diagnostic Worksheet (Cont'd)

DIAGNOSTIC WORKSHEET

1.	<input type="checkbox"/> Read the Fail-safe and listen to customer complaints.	AT-5
2.	<input type="checkbox"/> CHECK A/T FLUID <input type="checkbox"/> Leakage (Follow specified procedure) <input type="checkbox"/> Fluid condition <input type="checkbox"/> Fluid level	AT-35
3.	<input type="checkbox"/> Perform all ROAD TEST and mark required procedures.	AT-35
	3-1 Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <ul style="list-style-type: none"> <input type="checkbox"/> Inhibitor, overdrive control and throttle position switches, AT-57. <input type="checkbox"/> A/T fluid temperature sensor and A/T control unit power source, AT-63. <input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-66. <input type="checkbox"/> Engine speed signal, AT-68. <input type="checkbox"/> Torque converter clutch solenoid valve, AT-82. <input type="checkbox"/> Line pressure solenoid valve, AT-90. <input type="checkbox"/> Shift solenoid valve A, AT-93. <input type="checkbox"/> Shift solenoid valve B, AT-96. <input type="checkbox"/> Throttle position sensor, AT-99. <input type="checkbox"/> Overrun clutch solenoid valve, AT-101. <input type="checkbox"/> Vehicle speed sensor-MTR, AT-104. <input type="checkbox"/> Turbine revolution sensor, AT-106. <input type="checkbox"/> Engine control circuit, AT-55. <input type="checkbox"/> Battery <input type="checkbox"/> Others 	AT-36
	3-2. Check at idle <ul style="list-style-type: none"> <input type="checkbox"/> 1. O/D OFF Indicator Lamp Does Not Come On, AT-108. <input type="checkbox"/> 2. Engine Cannot Be Started In "P" And "N" Position, AT-109. <input type="checkbox"/> 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-109. <input type="checkbox"/> 4. In "N" Position, Vehicle Moves, AT-110. <input type="checkbox"/> 5. Large Shock. "N" → "R" Position, AT-111. <input type="checkbox"/> 6. Vehicle Does Not Creep Backward In "R" Position, AT-112. <input type="checkbox"/> 7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position, AT-113. 	AT-37
	3-3. Cruise test Part-1 <ul style="list-style-type: none"> <input type="checkbox"/> 8. Vehicle Cannot Be Started From D₁, AT-114. <input type="checkbox"/> 9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂, AT-115. <input type="checkbox"/> 10. A/T Does Not Shift: D₂ → D₃, AT-116. <input type="checkbox"/> 11. A/T Does Not Shift: D₃ → D₄, AT-117. <input type="checkbox"/> 12. A/T Does Not Perform Lock-up, AT-118. <input type="checkbox"/> 13. A/T Does Not Hold Lock-up Condition, AT-119. <input type="checkbox"/> 14. Lock-up Is Not Released, AT-119. <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃), AT-120. 	AT-38, AT-41

TROUBLE DIAGNOSIS — Introduction

Diagnostic Worksheet (Cont'd)

3.	<p>Part-2</p> <ul style="list-style-type: none"> <input type="checkbox"/> 16. Vehicle Does Not Start From D₁, AT-121. <input type="checkbox"/> 9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂, AT-115. <input type="checkbox"/> 10. A/T Does Not Shift: D₂ → D₃, AT-116. <input type="checkbox"/> 11. A/T Does Not Shift: D₃ → D₄, AT-117. <p>Part-3</p> <ul style="list-style-type: none"> <input type="checkbox"/> 17. A/T Does Not Shift: D₄ → D₃ When Overdrive Control Switch "ON" → "OFF", AT-121 <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In D₃), AT-120. <input type="checkbox"/> 18. A/T Does Not Shift: D₃ → 2₂, When Selector Lever "D" → "2" Position, AT-122. <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In 2₂), AT-120. <input type="checkbox"/> 19. A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position, AT-122. <input type="checkbox"/> 20. Vehicle Does Not Decelerate By Engine Brake, AT-123. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <ul style="list-style-type: none"> <input type="checkbox"/> Inhibitor, overdrive control and throttle position switches, AT-57. <input type="checkbox"/> A/T fluid temperature sensor and A/T control unit power source, AT-63. <input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-66. <input type="checkbox"/> Engine speed signal, AT-68. <input type="checkbox"/> Torque converter clutch solenoid valve, AT-82. <input type="checkbox"/> Line pressure solenoid valve, AT-90. <input type="checkbox"/> Shift solenoid valve A, AT-93. <input type="checkbox"/> Shift solenoid valve B, AT-96. <input type="checkbox"/> Throttle position sensor, AT-99. <input type="checkbox"/> Overrun clutch solenoid valve, AT-101. <input type="checkbox"/> Vehicle speed sensor-MTR, AT-104. <input type="checkbox"/> Turbine revolution sensor, AT-106. <input type="checkbox"/> Engine control circuit, AT-55. <input type="checkbox"/> Battery <input type="checkbox"/> Others 	AT-43		
		AT-44		
4.	<input type="checkbox"/> For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-22		
5.	<input type="checkbox"/> Perform all ROAD TEST and re-mark required procedures.	AT-35		
6.	<input type="checkbox"/> Perform SELF-DIAGNOSIS for following MIL indicating items and check out NG items. Refer to EC section ["Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"]. <ul style="list-style-type: none"> <input type="checkbox"/> DTC (P0731, 1103) Improper shifting to 1st gear position, AT-70. <input type="checkbox"/> DTC (P0732, 1104) Improper shifting to 2nd gear position, AT-73. <input type="checkbox"/> DTC (P0733, 1105) Improper shifting to 3rd gear position, AT-75. <input type="checkbox"/> DTC (P0734, 1106) Improper shifting to 4th gear position, AT-77. <input type="checkbox"/> DTC (P0744, 1107) Improper lock-up operation, AT-85. 	EC section		
7.	<input type="checkbox"/> Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)	AT-51 AT-48		
8.	<input type="checkbox"/> Erase DTC from A/T control unit and ECM memories.	AT-20		
9.	Perform FINAL CHECK. <ul style="list-style-type: none"> <input type="checkbox"/> Stall test — Mark possible damaged components/others. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Forward clutch <input type="checkbox"/> Overrun clutch <input type="checkbox"/> Forward one-way clutch </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> <input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Low one-way clutch <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK </td> </tr> </table> <input type="checkbox"/> Pressure test — Suspected parts: 	<ul style="list-style-type: none"> <input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Forward clutch <input type="checkbox"/> Overrun clutch <input type="checkbox"/> Forward one-way clutch 	<ul style="list-style-type: none"> <input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Low one-way clutch <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK 	AT-124
<ul style="list-style-type: none"> <input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Forward clutch <input type="checkbox"/> Overrun clutch <input type="checkbox"/> Forward one-way clutch 	<ul style="list-style-type: none"> <input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Low one-way clutch <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK 			

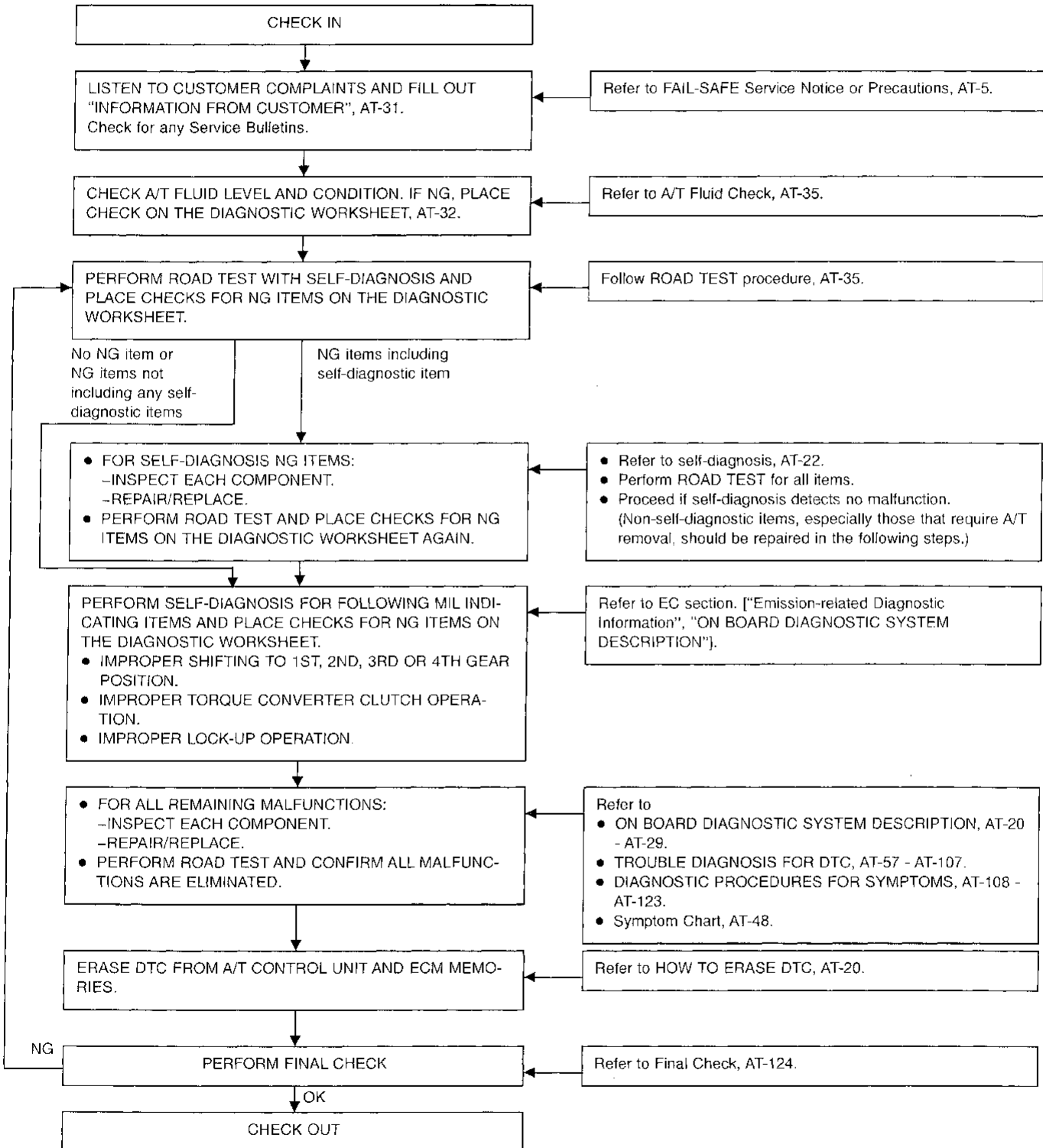
GI
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LC
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HA
EL
IDX

Work Flow

HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

A good understanding of the malfunction conditions can make troubleshooting faster and more accurate. In general, each customer feels differently about a problem. It is important to fully understand the symptoms or conditions for a customer complaint.

Make good use of the two sheets provided, "INFORMATION FROM CUSTOMER" and "DIAGNOSTIC WORKSHEET", to perform the best troubleshooting possible.



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.

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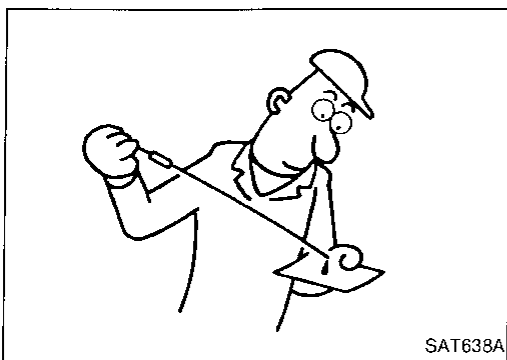
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ROAD TEST PROCEDURE

1. Check before engine is started.

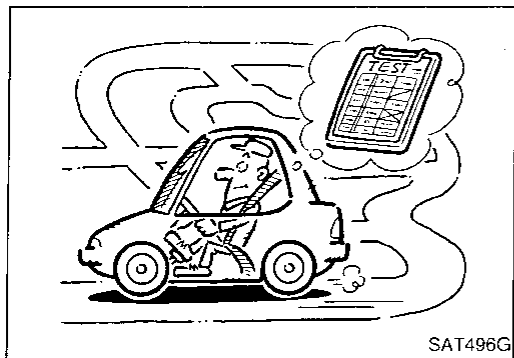


2. Check at idle.



3. Cruise test.

SAT786A



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 (“Checking A/T Fluid”, “CHASSIS AND BODY MAINTENANCE”).

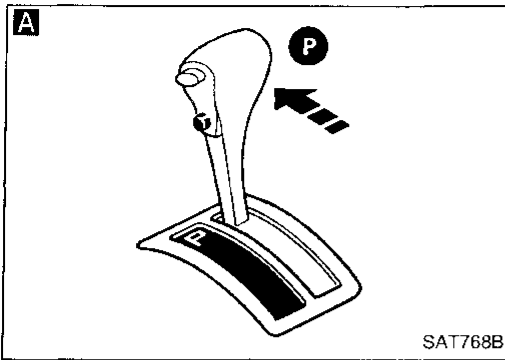
Road Test

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 until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” and “DIAGNOSTIC PROCEDURES FOR SYMPTOMS”, AT-20 - AT-29 and AT-108 - AT-123.

Road Test (Cont'd)

1. CHECK BEFORE ENGINE IS STARTED

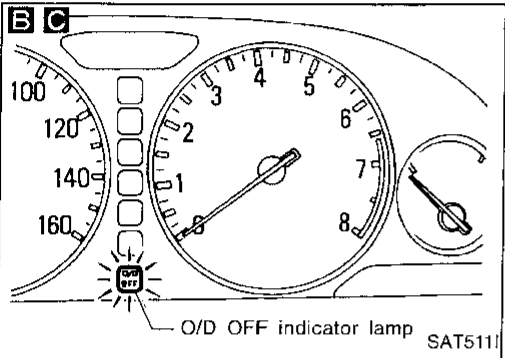


A B

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

No

Go to "1. O/D OFF Indicator Lamp Does Not Come On", AT-108.



C

Does O/D OFF indicator lamp flicker for about 8 seconds?

Yes

Perform self-diagnosis. Refer to SELF-DIAGNOSIS PROCEDURE, AT-22.

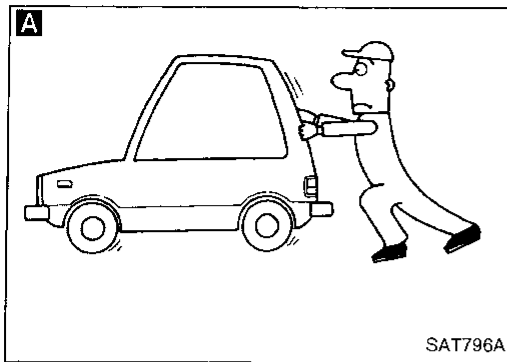
Yes

No

1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis and note NG items. Refer to SELF-DIAGNOSIS PROCEDURE, AT-22.
3. Go to "2. Check at idle", AT-37.

Road Test (Cont'd)

2. CHECK AT IDLE

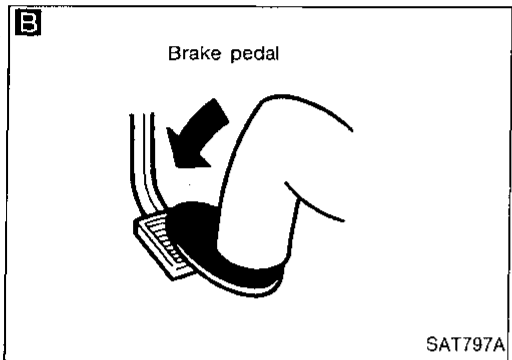


1. Park vehicle on flat surface.
2. Turn ignition switch to "OFF" position.
3. Move selector lever to "P" or "N" position.
4. Turn ignition switch to start position.
5. Is engine started?

No
Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-109.

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

Yes
Go to "2. Engine Cannot Be Started In "P" and "N" Position", AT-109.



No
A
1. Turn ignition switch to "OFF" position.
2. Move selector lever to "P" position.
3. Release parking brake.
4. Push vehicle forward or backward.
5. Does vehicle move when it is pushed forward or backward?

Yes
Go to "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-109.

No
1. Apply parking brake.
2. Move selector lever to "N" position.
3. Turn ignition switch to "START" position and start engine.
4. Release parking brake.
5. Does vehicle move forward or backward?

Yes
Go to "4. In "N" Position, Vehicle Moves", AT-110.

No
B
1. Apply foot brake.
2. Move selector lever to "R" position.
3. Is there large shock when changing from "N" to "R" position?

Yes
Go to "5. Large Shock. "N" → "R" Position", AT-111.

No
1. Release foot brake for several seconds.
2. Does vehicle creep backward when foot brake is released?

No
Go to "6. Vehicle Does Not Creep Backward In "R" Position", AT-112.

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

No
Go to "7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position", AT-113.

Yes
Go to "3. Cruise test", AT-38.

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TROUBLE DIAGNOSIS — Basic Inspection

Road Test (Cont'd)

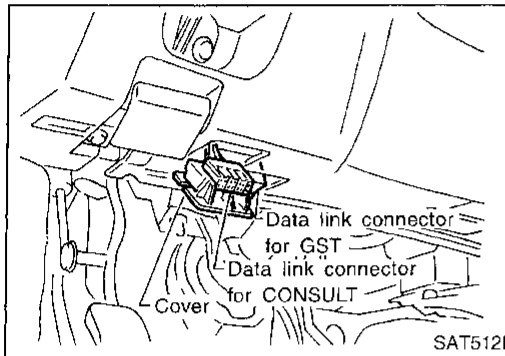
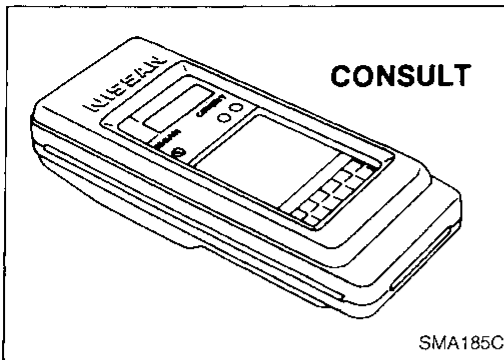
3. CRUISE TEST

- Check all items listed in Parts 1 through 3.



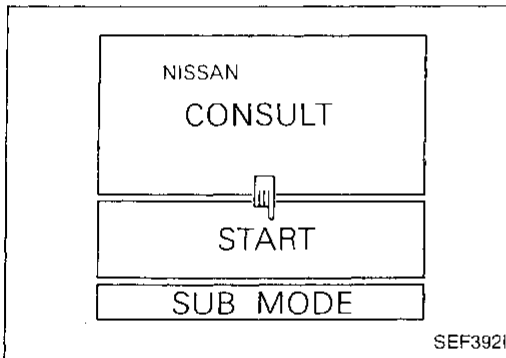
With CONSULT

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

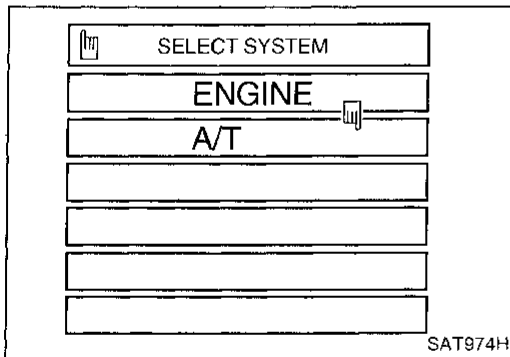


CONSULT setting procedure

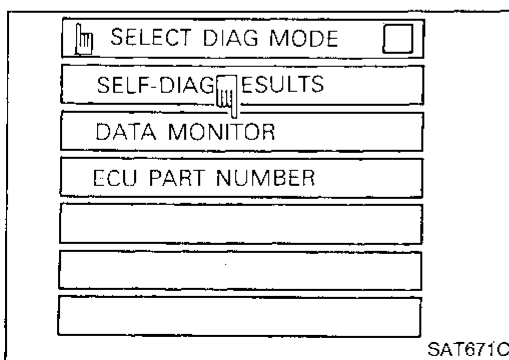
1. Turn off ignition switch.
2. Connect "CONSULT" to Data link connector for CONSULT. Data link connector for CONSULT is located behind the cover.



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



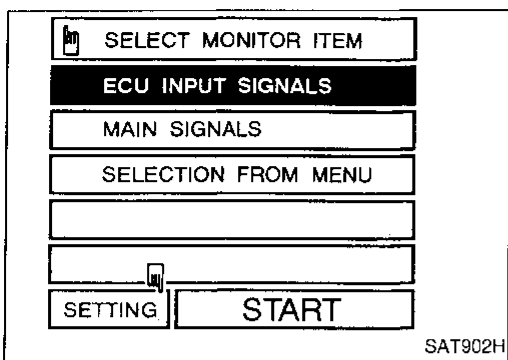
5. Touch "A/T".



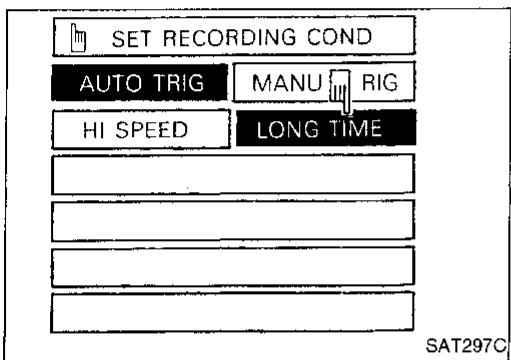
6. Touch "DATA MONITOR".

TROUBLE DIAGNOSIS — Basic Inspection

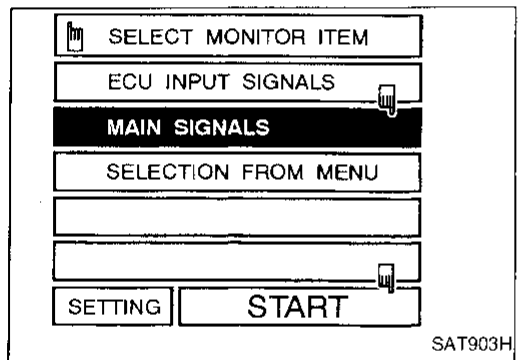
Road Test (Cont'd)



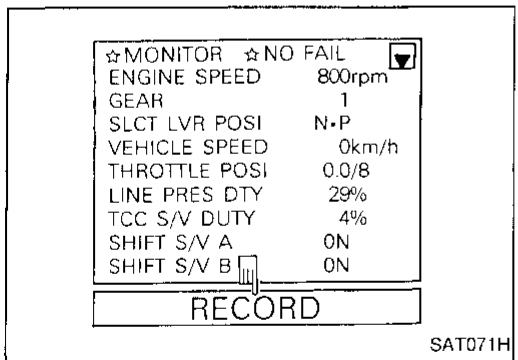
7. Touch "SETTING" to set recording condition.



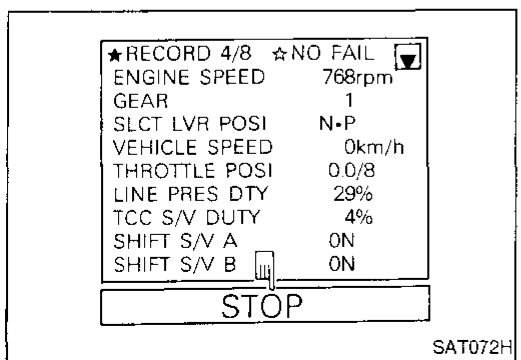
8. Touch "LONG TIME" and "ENTER" key.



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



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

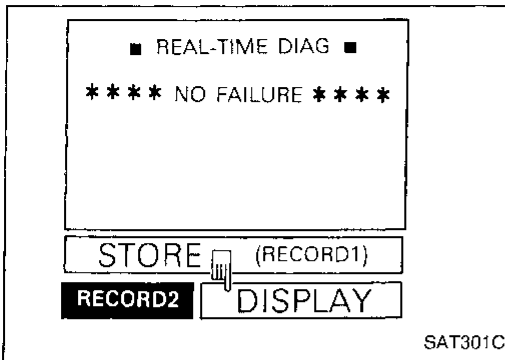


12. After finishing cruise test part 1, touch "STOP".

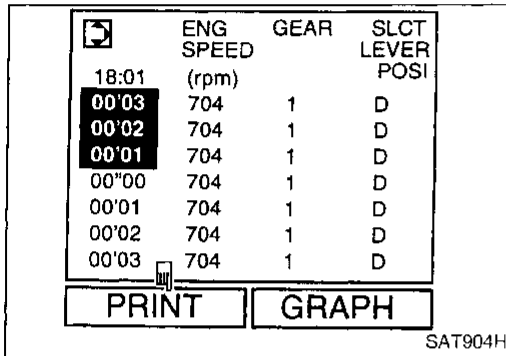
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TROUBLE DIAGNOSIS — Basic Inspection

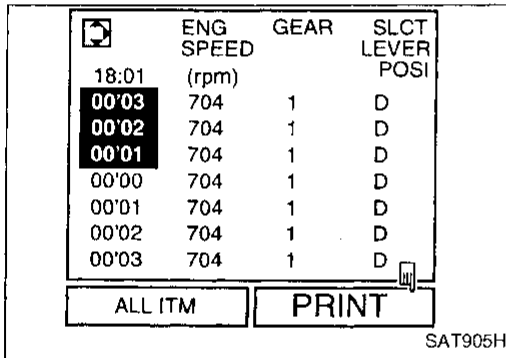
Road Test (Cont'd)



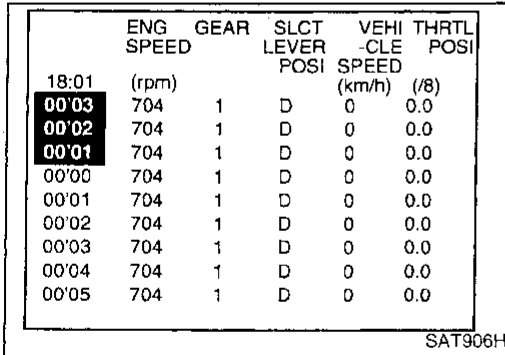
13. Touch "DISPLAY".



14. Touch "PRINT".

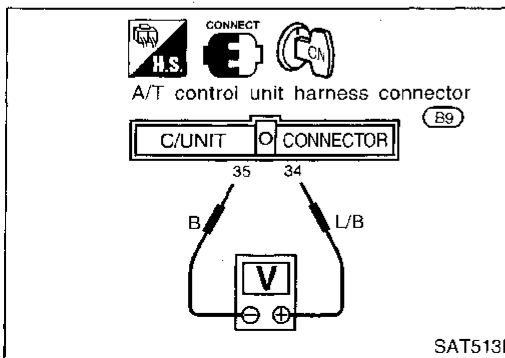


15. Touch "PRINT" again.



16. Check the monitor data printed out.

17. Continue cruise test part 2 and 3.

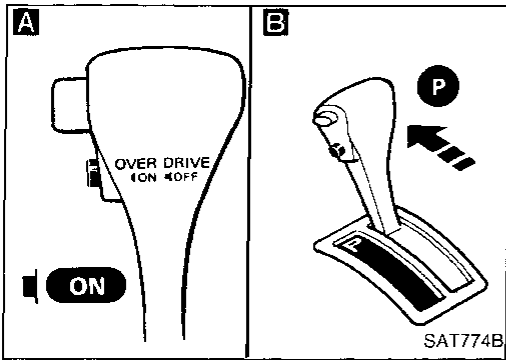


Without CONSULT

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

Road Test (Cont'd)

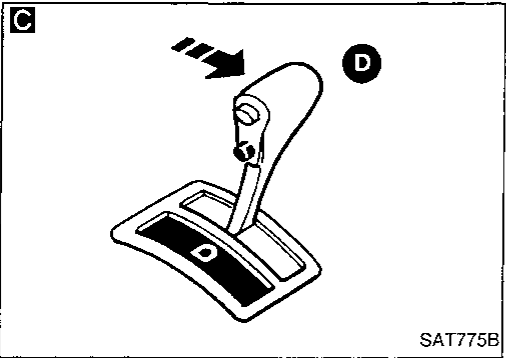
CRUISE TEST — Part 1



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

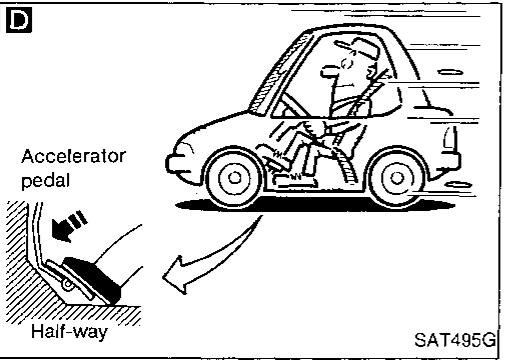
A B

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



C
 Move selector lever to "D" position.

D
 Accelerate vehicle by constantly depressing accelerator pedal halfway.



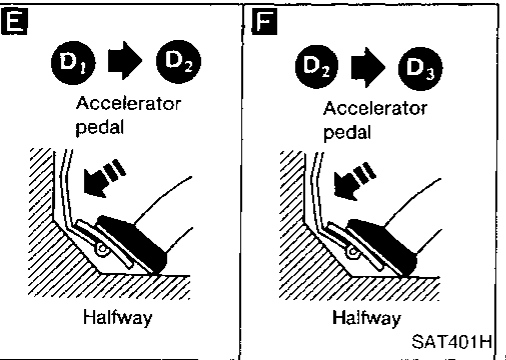
Does vehicle start from D₁?
 Read gear position.

No
 Go to "8. Vehicle Cannot Be Started From D₁", AT-114.

E

Does A/T shift from D₁ to D₂ at the specified speed?
 Read gear position, throttle opening and vehicle speed.
 Specified speed when shifting from D₁ to D₂:
 Refer to Shift schedule, AT-45.

No
 Go to "9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂", AT-115.



F

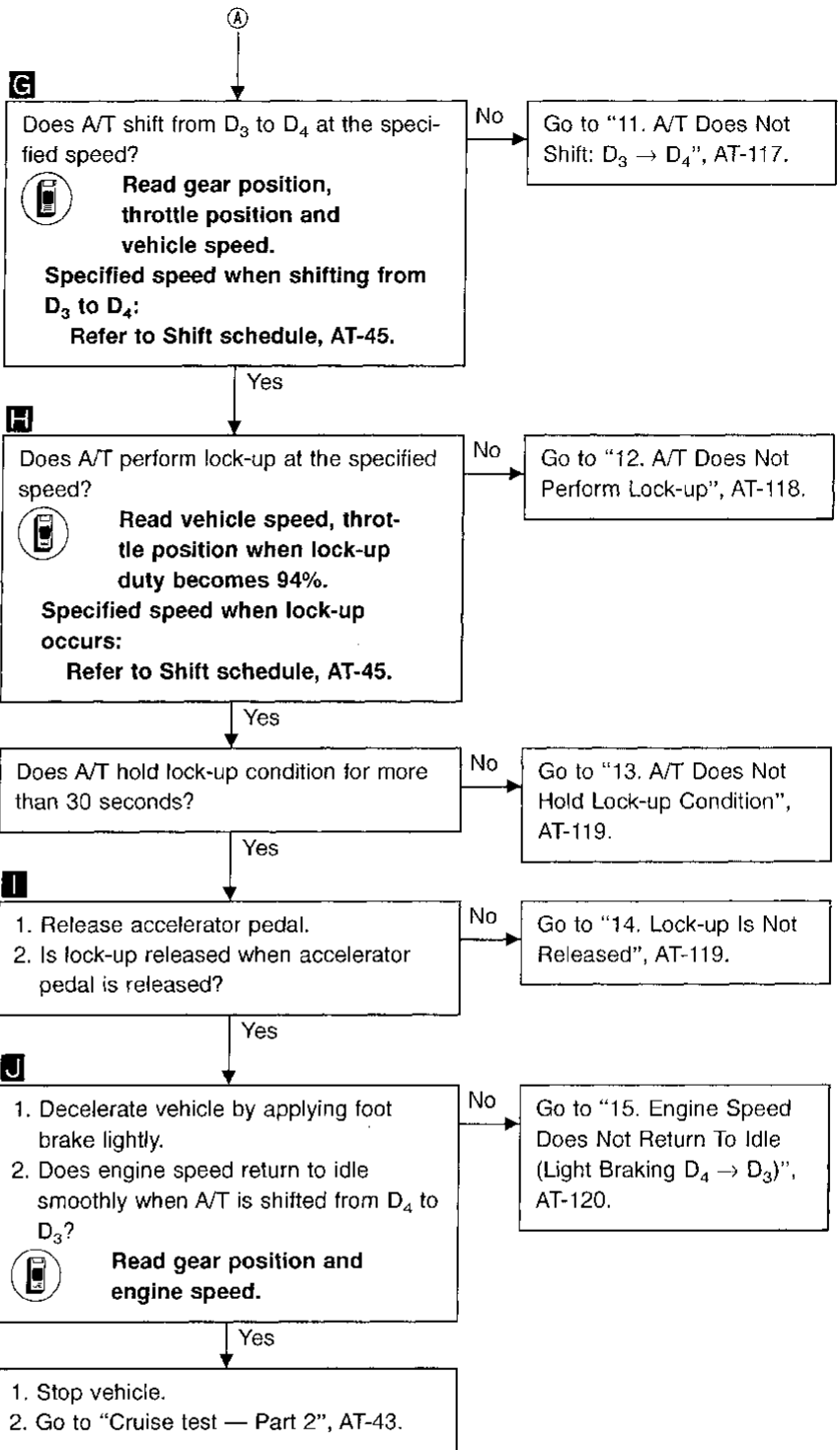
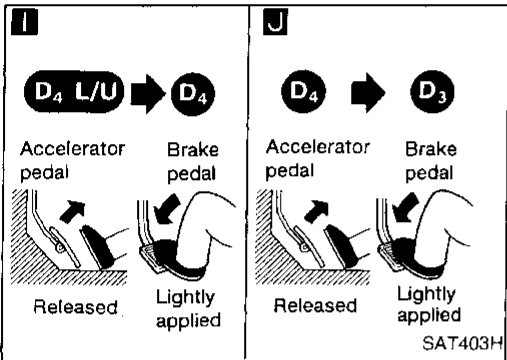
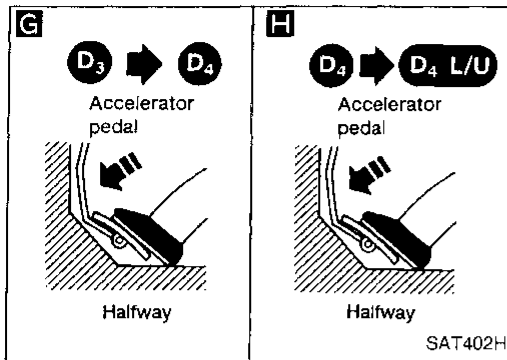
Does A/T shift from D₂ to D₃ at the specified speed?
 Read gear position, throttle position and vehicle speed.
 Specified speed when shifting from D₂ to D₃:
 Refer to Shift schedule, AT-45.

No
 Go to "10. A/T Does Not Shift: D₂ → D₃", AT-116.

Yes
 (A)

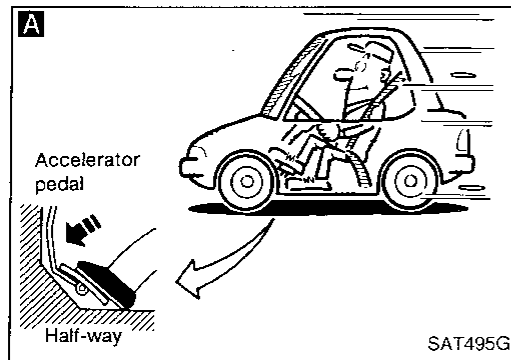
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Road Test (Cont'd)



Road Test (Cont'd)

CRUISE TEST — Part 2



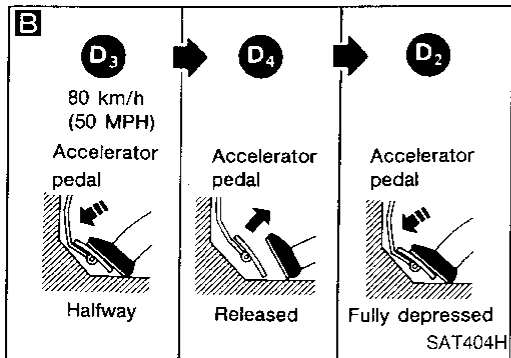
1. Confirm overdrive control switch is in "ON" position.
2. Confirm selector lever is in "D" position.

A

1. Accelerate vehicle by half throttle again.
2. Does vehicle start from D₁?

Read gear position.

No → Go to "16. Vehicle Does Not Start From D₁", AT-121.

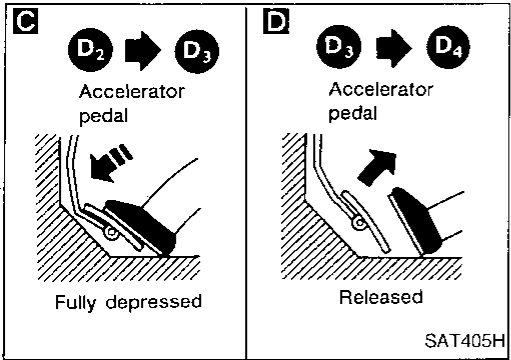


B

1. Accelerate vehicle to 80 km/h (50 MPH) as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D₄ to D₂ as soon as accelerator pedal is depressed fully?

Read gear position and throttle position.

No → Go to "9. A/T Does Not Shift: D₄ → D₂ Or Does Not Kickdown: D₄ → D₂", AT-115.



C

Does A/T shift from D₂ to D₃ at the specified speed?

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D₂ to D₃:
Refer to Shift schedule, AT-45.

No → Go to "10. A/T Does Not Shift: D₂ → D₃", AT-116.

D

Release accelerator pedal after shifting from D₂ to D₃. Does A/T shift from D₃ to D₄ and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.

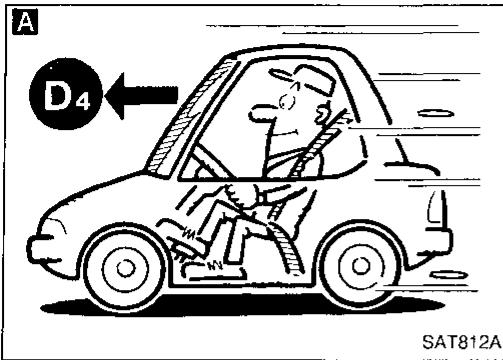
No → Go to "11. A/T Does Not Shift: D₃ → D₄", AT-117.

1. Stop vehicle.
2. Go to "Cruise test — Part 3", AT-44.

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Road Test (Cont'd)

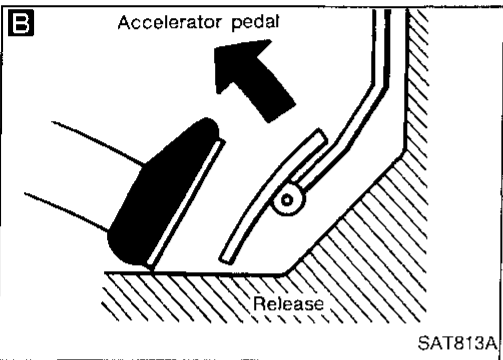
CRUISE TEST — Part 3



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

A
Accelerate vehicle using half-throttle to D₄.

B
Release accelerator pedal.

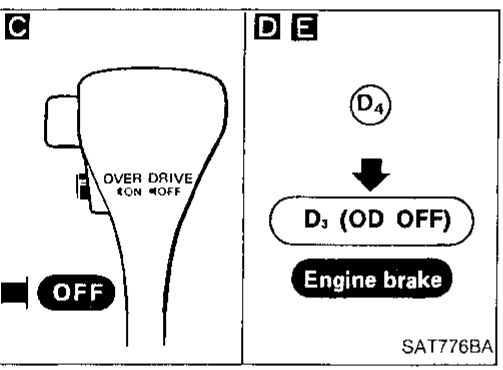


C
Set overdrive control switch to "OFF" position while driving in D₄.

D
Does A/T shift from D₄ to D₃ (O/D OFF)?
Read gear position and vehicle speed.

No → Go to "17. A/T Does Not Shift: D₄ → D₃, When Overdrive Control Switch "ON" → "OFF", AT-121.

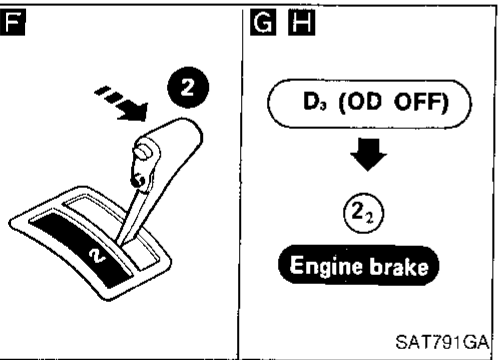
E
Does vehicle decelerate by engine brake?
Yes → Go to "15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)", AT-120.



F
Move selector lever from "D" to "2" position while driving in D₃ (O/D OFF).

G
Does A/T shift from D₃ (O/D OFF) to 2₂?
Read gear position.

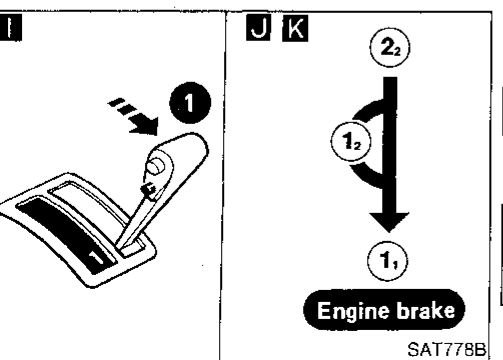
No → Go to "18. A/T Does Not Shift: D₃ → 2₂, When Selector Lever "D" → "2" Position", AT-122.



H
Does vehicle decelerate by engine brake?
Yes → Go to "15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)", AT-120.

I J
1. Move selector lever from "2" to "1" position while driving in 2₂.
2. Does A/T shift from 2₂ to 1₁ position?
Read gear position.

No → Go to "19. A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position", AT-122.



K
Does vehicle decelerate by engine brake?
Yes → Go to "20. Vehicle Does Not Decelerate By Engine Brake", AT-123.

1. Stop vehicle.
2. Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE, AT-22.

Shift Schedule

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Vehicle speed km/h (MPH)						
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁	1 ₂ → 1 ₁
Full throttle	66 - 70 (41 - 43)	120 - 128 (75 - 80)	183 - 193 (114 - 120)	177 - 187 (110 - 116)	114 - 122 (71 - 76)	43 - 47 (27 - 29)	53 - 57 (33 - 35)
Half throttle	44 - 48 (27 - 30)	80 - 86 (50 - 53)	119 - 127 (74 - 79)	81 - 89 (50 - 55)	35 - 39 (22 - 24)	7 - 11 (4 - 7)	53 - 57 (33 - 35)

GI

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VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	Overdrive control switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D ₄]	184 - 192 (114 - 119)	178 - 186 (111 - 116)
	OFF [D ₃]	91 - 99 (57 - 62)	86 - 94 (53 - 58)
Half throttle	ON [D ₄]	134 - 142 (83 - 88)	120 - 128 (75 - 80)
	OFF [D ₃]	91 - 99 (57 - 62)	81 - 89 (50 - 55)

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Diagnostic Trouble Code (DTC) Chart

A/T RELATED ITEMS

Diagnostic trouble code No.*4		Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" mode)	Malfunction is detected when ...
CONSULT GST	ECM*3		
P0705	1101	Inhibitor switch circuit (INHIBITOR SWITCH)	• A/T control unit does not receive the correct voltage signal from the switch based on the gear position.
P0710	1208	A/T fluid temperature sensor (FLUID TEMP SENSOR)	• A/T control unit receives an excessively low or high voltage from the sensor.
P0720	1102	Revolution sensor (VHCL SPEED SEN-A/T)	• A/T control unit does not receive the proper voltage signal from the sensor.
P0725	1207	Engine speed signal (ENGINE SPEED SIG)	• A/T control unit does not receive the proper voltage signal from the ECM.
P0731	1103	Improper shifting to 1st gear position (A/T 1ST SIGNAL)	• A/T cannot be shifted to the 1st gear position even if electrical circuit is good.
P0732	1104	Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	• A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.
P0733	1105	Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	• A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.
P0734	1106	Improper shifting to 4th gear position (A/T 4TH SIGNAL OR TCC*5)	• A/T cannot be shifted to the 4th gear position even if electrical circuit is good.
P0740	1204	T/C clutch solenoid valve (TOR CONV CLUTCH SV)	• A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.
P0744	1107	Improper lock-up operation (A/T TCC SIGNAL)	• A/T cannot perform lock-up even if electrical circuit is good.
P0745	1205	Line pressure solenoid valve (LINE PRESSURE S/V)	• A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.
P0750	1108	Shift solenoid valve A (SHIFT SOLENOID/V A)	• A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.
P0755	1201	Shift solenoid valve B (SHIFT SOLENOID/V B)	• A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.
P1705	1206	Throttle position sensor Throttle position switch (THRTL POSI SEN-A/T)	• A/T control unit receives an excessively low or high voltage from the sensor.
P1760	1203	Overrun clutch solenoid valve (OVERRUN CLUTCH S/V)	• A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.

*1: DRIVING pattern 1-6 means as follows:

- Pattern 1 should meet b and c.
- Pattern 2 should meet a and c.
- Pattern 3 should meet a through e.
- Pattern 4 should meet a and b.
- Pattern 5 should meet a through c.
- Pattern 6 should meet a through d.

*3: In Diagnostic Test Mode II (Self-diagnostic results)

*4: 1st trip DTC No. is the same as DTC No.

*5: Although "A/T 4TH SIGNAL OR TCC" is shown as a self-diagnostic result for P0734 with CONSULT, malfunction is present at 4th speed only.

- a: Selector lever is in "D" position.
- b: Vehicle speed is over 10 km/h (6 MPH).
- c: Throttle opening is over 1/8.
- d: Engine speed is over 450 rpm.
- e: A/T fluid temperature is 20 - 120°C (68 - 248°F).

TROUBLE DIAGNOSIS — General Description

Diagnostic Trouble Code (DTC) Chart (Cont'd)

X: Applicable
—: Not applicable

Check Items (Possible Cause)	*1 "DTC CONFIRMATION PROCEDURE" Quick Ref.	*2 "OVERALL FUNCTION CHECK" Quick Ref.	Fail Safe System	*8 MIL Illumination	Reference Page	
<ul style="list-style-type: none"> ● Harness or connectors (The switch circuit is open or shorted.) ● Inhibitor switch 	DRIVING (pattern 1)	—	—	2 trip	AT-57	GI MA
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● A/T fluid temperature sensor 	DRIVING (pattern 6)	—	X	2 trip	AT-63	EM
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Revolution sensor 	DRIVING (pattern 2)	—	X*7	2 trip*3	AT-66	LC
<ul style="list-style-type: none"> ● Harness or connectors (The signal circuit is open or shorted.) 	DRIVING (pattern 5)	—	X*7	2 trip*3	AT-68	EC
<ul style="list-style-type: none"> ● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit 	DRIVING (pattern 3)	—	—	2 trip	AT-70	FE
					AT-73	AT
					AT-75	PD
					AT-77	FA
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● T/C clutch solenoid valve 	IGN: ON	—	X	2 trip	AT-82	RA
<ul style="list-style-type: none"> ● T/C clutch solenoid valve ● Each clutch ● Hydraulic control circuit 	DRIVING (pattern 3)	—	—	2 trip	AT-85	BR
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Line pressure solenoid valve 	IGN: ON	—	X	2 trip	AT-90	ST
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve A 	IGN: ON	—	X*7	1 trip	AT-93	RS
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve B 	IGN: ON	—	X*7	1 trip	AT-96	BT
<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor ● Throttle position switch 	DRIVING (pattern 4)	—	X*7	1 trip	AT-99	HA
<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.) ● Overrun clutch solenoid valve 	IGN: ON	—	X	2 trip	AT-101	EL

*1: ● This is Quick Reference of "DTC CONFIRMATION PROCEDURE".

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.

In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".

When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

● During an "NG" OVERALL FUNCTION CHECK, the DTC or 1st trip DTC might not be confirmed.

● This is Quick Reference of "OVERALL FUNCTION CHECK".

Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*7: ● When the fail-safe operation occurs, the MIL illuminates immediately.

*8: ● The MIL illuminates after A/T control unit enters the fail-safe mode in two consecutive trips, if both the "Revolution sensor" and the "Engine speed signal" meet the fail-safe condition at the same time.

TROUBLE DIAGNOSIS — General Description

Symptom Chart

Reference page (AT-)		ON vehicle										OFF vehicle																							
		35, 145	145	66, 68, 104	127	94, 169	97, 92	84, 102	65, 143	143	143	153, 165	182, 186	188, 198	188, 196	157, 192	107, 204																		
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.	Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	A/T fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Turbine revolution sensor	Parking components		
109	Engine does not start in "N", "P" positions.	2	3																	1															
109	Engine starts in position other than "N" and "P".	1	2																																
—	Transmission noise in "P" and "N" positions.	1		3	4	5		2														7	6												
109	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	1																														2			
110	Vehicle runs in "N" position.	1																			2		4		3		5								
112	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										10						9			
—	Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" position).	1																										2							
113	Vehicle will not run in "D", "1" and "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				8		10	10		9					11					
—	Excessive creep.					1																													
112 - 113	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				
115 - 116, 117	Too high a gear change point from "D ₁ " to "D ₂ ", from "D ₂ " to "D ₃ ", from "D ₃ " to "D ₄ ".			1	2					3	4																								
—	Gear change directly from "D ₁ " to "D ₃ " occurs.	1														2															3				
—	Engine stops when shifting lever into "R", "D", "2" and "1".					1		3				2										4													
—	Too sharp a shock in change from "D ₁ " to "D ₂ ".			1			2	4							5	3															6				
—	Too sharp a shock in change from "D ₂ " to "D ₃ ".			1			2	4									3														6				

TROUBLE DIAGNOSIS — General Description

Symptom Chart (Cont'd)

Reference page (AT-)		ON vehicle										OFF vehicle																				
		35, 145	145	66, 68, 104	127	94, 169	97, 92	84, 102	65, 143	143	143	153, 165	182, 186	188, 198	188, 196	157, 192	107, 204															
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.	Fluid level Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	A/T fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Turbine revolution sensor	Parking components	
—	Too sharp a shock in change from "D ₃ " to "D ₄ ".		1		2	4										3											6		5			
—	Almost no shock or clutches slipping in change from "D ₁ " to "D ₂ ".	1		2		3	5									4													6			
—	Almost no shock or slipping in change from "D ₂ " to "D ₃ ".	1		2		3	5										4												7			
—	Almost no shock or slipping in change from "D ₃ " to "D ₄ ".	1		2		3	5											4											7			
—	Vehicle braked by gear change from "D ₁ " to "D ₂ ".	1																				2	4					5	3			
—	Vehicle braked by gear change from "D ₂ " to "D ₃ ".	1																											2			
—	Vehicle braked by gear change from "D ₃ " to "D ₄ ".	1																					4			3	2					
—	Maximum speed not attained. Acceleration poor.	1	2				5	3	4												1	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																				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 ₃ " 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																							
—	Races extremely fast or slips in changing from "D ₄ " to "D ₂ " when depressing pedal.	1		2		3	6	5	4																							
—	Races extremely fast or slips in changing from "D ₃ " to "D ₂ " when depressing pedal.	1		2		3	5		4		6		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																							
—	Vehicle will not run in any position.	1	2			3		4													3	5	6					8	7		9	
—	Transmission noise in "D", "2", "1" and "R" positions.	1																			2											

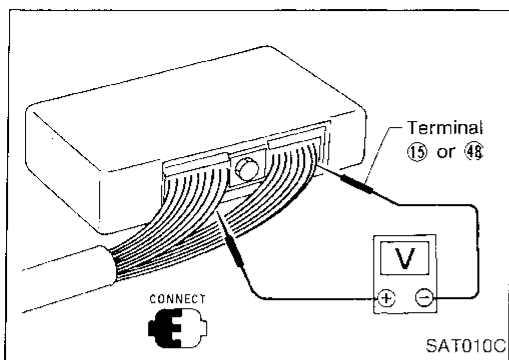
CI
 MA
 EM
 LC
 LC
 PI
AT
 PD
 FA
 RA
 BR
 ST
 PS
 ST
 FA
 EL
 IDX

TROUBLE DIAGNOSIS — General Description

Symptom Chart (Cont'd)

Reference page (AT-)		ON vehicle											OFF vehicle																						
		35, 145	145	66, 68, 104	127	94, 169	97, 92	84, 102	65, 143	143	143	153, 165	182, 186	188, 198	188, 196	157, 192	107, 204																		
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Circled numbers indicate that the transmission must be removed from the vehicle.	Fluid level	Control linkage	Inhibitor switch and 1 position switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	A/T fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Turbine revolution sensor	Parking components		
120	Failure to change from "D ₃ " to "2" when changing lever into "2" position.	7	1	2					6	5	4		3																						
-	Gear change from "2 ₂ " to "2 ₃ " in "2" position.		1																																
121	Engine brake does not operate in "1" position.	2	1	3	4				6	5			7																						
-	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																						
-	Large shock changing from "1 ₂ " to "1 ₁ " in "1" position.								1																										
-	Transmission overheats.	1		3			2	4	6			5																							
-	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	1																																	
-	Offensive smell at fluid charging pipe.	1																																	
-	Torque converter is not locked up.		3	1	2	4		6	8			7	5																						
-	Torque converter clutch piston slip	1		2			3	6		5	4																								
118	Lock-up point is extremely high or low.			1	2				4			3																							
-	A/T does not shift to "D ₄ " when driving with overdrive control switch "ON".		2	1	3		8	6	4			5	7																						
-	Engine is stopped at "R", "D", "2" and "1" positions.	1							5	4	3		2																						

TROUBLE DIAGNOSIS — General Description

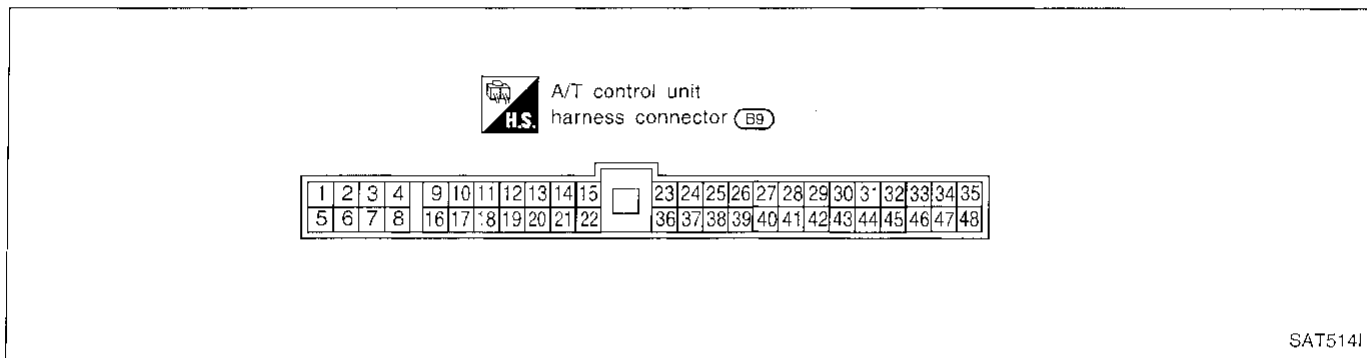


A/T Control Unit Terminals and Reference Value

PREPARATION

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

A/T CONTROL UNIT HARNESS 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	O/D OFF indicator lamp	When setting overdrive control switch in "OFF" position.	1V or less
		When setting overdrive control switch in "ON" position.	Battery voltage
4	Power source	When turning ignition switch to "ON".	Battery voltage
		When turning ignition switch to "OFF".	1V or less

TROUBLE DIAGNOSIS — General Description















A/T Control Unit Terminals and Reference Value (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	—	—	—
11	—	—	—
12	—	—	—
13	—	—	—
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



TROUBLE DIAGNOSIS — General Description








A/T Control Unit Terminals and Reference Value (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	GI
			When setting selector lever to other positions.	1V or less	MA
20	Inhibitor "R" position switch	 	When setting selector lever to "R" position.	Battery voltage	EM
			When setting selector lever to other positions.	1V or less	LC
21	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage	EC
			When releasing accelerator pedal after warming up engine.	1V or less	FE
22	—	—	—	—	
23	Power source (Memory back-up)	 or 	When turning ignition switch to "OFF".	Battery voltage	AT
			When turning ignition switch to "ON".	Battery voltage	PD
24	Engine speed signal	 	When engine runs at idle speed.	Approximately 1.1V	
			When engine runs at 3,000 rpm.	Approximately 3.3V	FA
25	Revolution sensor (Measure in AC range)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.	RA
			When vehicle parks.	0V	BR
26	Turbine revolution sensor (Measure in AC range)	 	When engine is running at 1,000 rpm	Approximately 1.2V Voltage rises gradually in response to engine speed.	ST
27	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V	RS BT
28*	—	—	—	—	
29	—		—	—	HA
30*	—	—	—	—	
31	Throttle position sensor (Power source)		—	4.5 - 5.5V	EL
32	—	—	—	—	IDX

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

TROUBLE DIAGNOSIS — General Description

A/T Control Unit Terminals and Reference Value (Cont'd)




Terminal No.	Item		Condition	Judgement standard
33	A/T 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 come on.)	1V or less
38	—		—	—
39	Overdrive control switch			When setting overdrive control switch in "ON" position
		When setting overdrive control 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	—		—	—
44	—		—	—
45	—		—	—
46	—		—	—
47*	LAN		—	—
48	Ground		—	—

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

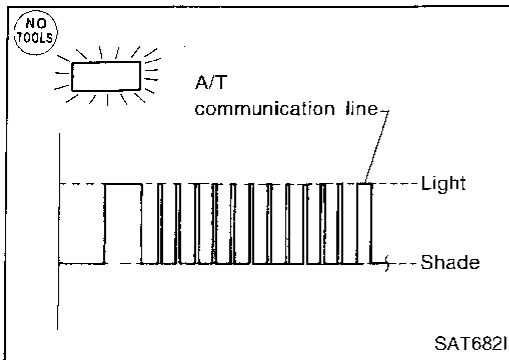
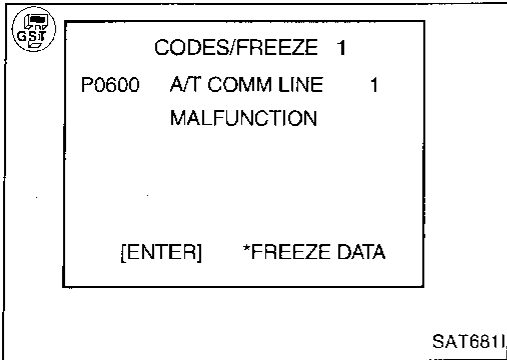
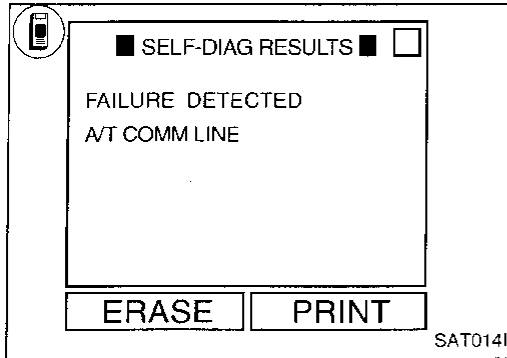
Engine Control

DESCRIPTION

The ECM and A/T control unit provide mutual communication in relation to engine output control signal (ignition timing retard signal) during rapid standing starts/acceleration. With this consistent real-time control, the shifting feel is substantially improved.




Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : A/T COMM LINE  : P0600  : 12th judgement flicker	The ECM-A/T communication line is open or shorted.	Harness or connector

CI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
FL
DX



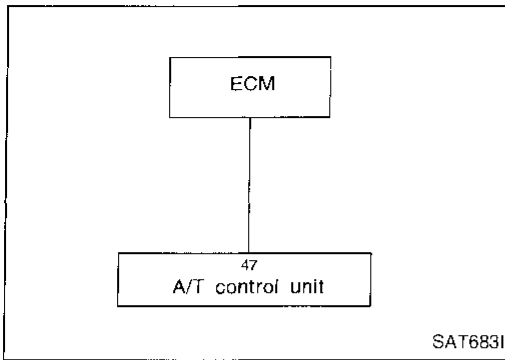
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 
 - 1) Turn ignition switch "ON".
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Wait at least 6 seconds or start engine and wait for at least 6 seconds.
- OR
- 
 - 1) Turn ignition switch "ON".
 - 2) Wait at least 6 seconds or start engine and wait for at least 6 seconds.
 - 3) Select "MODE 7" with GST.
- OR
- 
 - 1) Turn ignition switch "ON".
 - 2) Wait at least 6 seconds or start engine and wait for at least 6 seconds.
 - 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR DTC P0600

Engine Control (Cont'd)



A

CHECK CIRCUIT BETWEEN A/T CONTROL UNIT AND ECM (ECCS CONTROL MODULE).

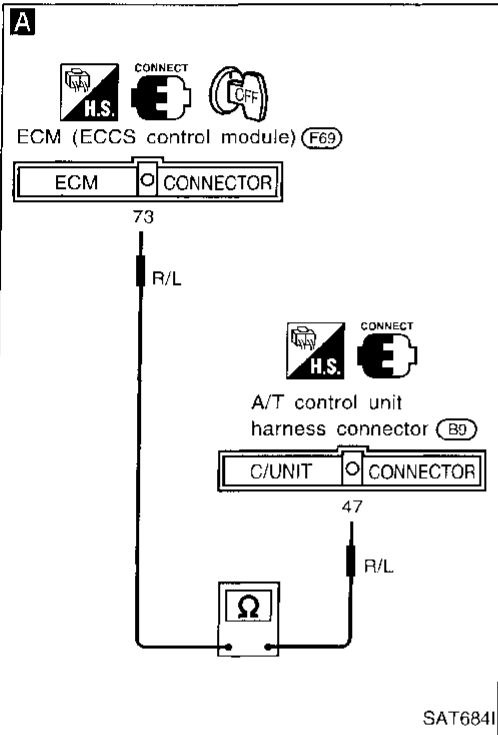
1. Turn ignition switch to "OFF" position.
2. Check continuity between A/T control unit terminal ④ and ECM (ECCS control module) terminal ④.

Continuity should exist.

NG

Repair or replace harness and connector between A/T control unit and ECM (ECCS control module).

OK



Perform self-diagnosis for engine control. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

NG

Check ECM (ECCS control module). Refer to EC section ["A/T Communication Line (DTC: 0504)", "TROUBLE DIAGNOSIS FOR DTC P0600"].

OK

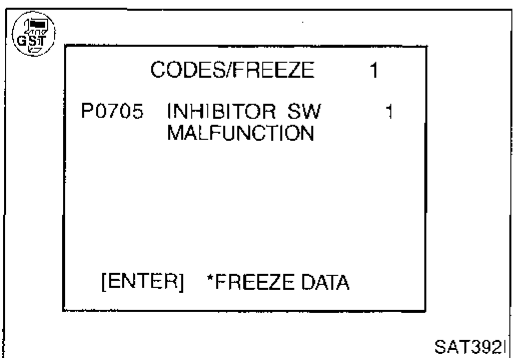
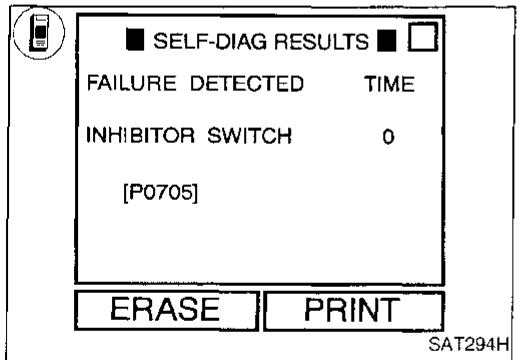
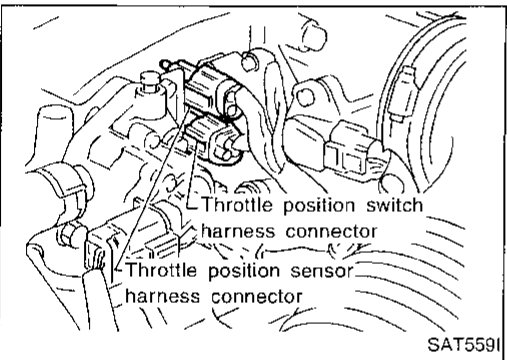
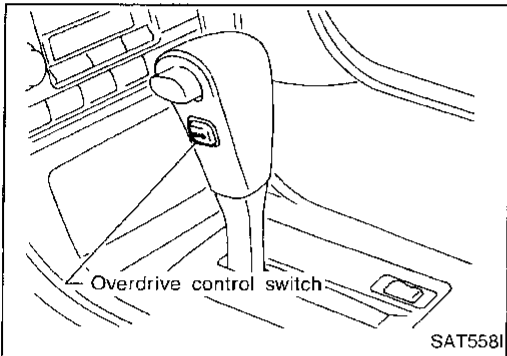
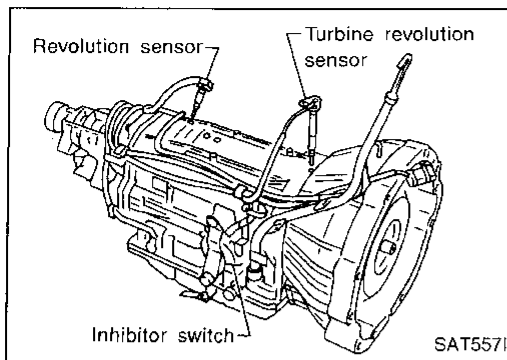
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-55.

NG

If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

OK

INSPECTION END



Inhibitor, Overdrive Control and Throttle Position Switches

DESCRIPTION

- **Inhibitor switch**
Detects the selector lever position and sends a signal to the A/T control unit.
- **Overdrive control switch**
Detects the overdrive control 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.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: INHIBITOR SWITCH	A/T control unit does not receive the correct voltage signal from the switch based on the gear position.	<ul style="list-style-type: none"> ● Harness or connectors (The inhibitor switch circuit is open or shorted.) ● Inhibitor switch
: P0705		
: MIL Code No. 1101		

Diagnostic trouble code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 1) Start engine.
- 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Drive vehicle under the following conditions:
Selector lever in "D", overdrive 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

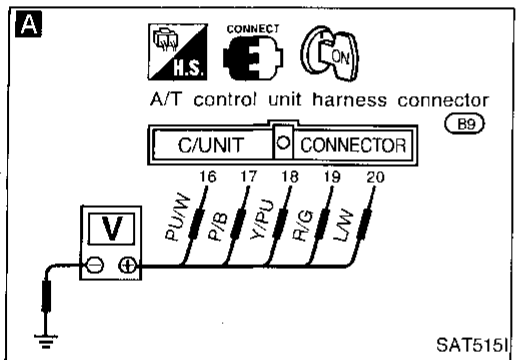
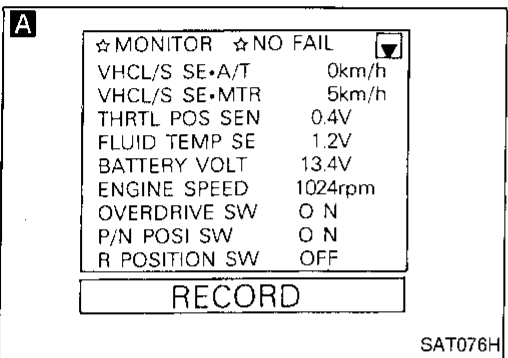
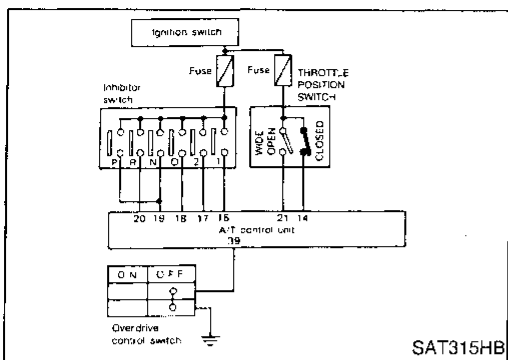
- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
- 3) Select "MODE 7" with GST.

OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive 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 ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

TROUBLE DIAGNOSIS FOR DTC P0705

Inhibitor, Overdrive Control and Throttle Position Switches (Cont'd)



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.

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.				
	⑯	⑰	⑱	⑲	⑳
P, N	B	0	0	0	0
R	0	B	0	0	0
D	0	0	B	0	0
2	0	0	0	B	0
1	0	0	0	0	B

NG

Check the following items:

- Inhibitor switch
Refer to "Component Inspection", AT-61.
- Harness for short or open between ignition switch and inhibitor switch (Main harness)
- Harness for short or open between inhibitor switch and A/T control unit (Main harness)

OK

A

(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P0705

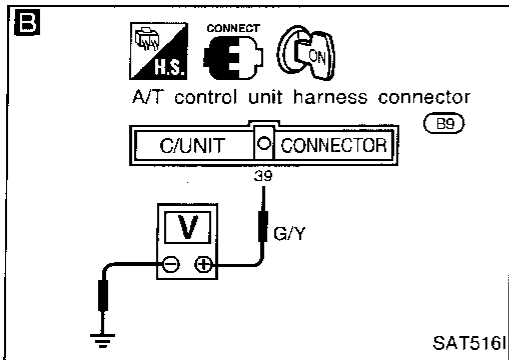
Inhibitor, Overdrive Control and Throttle Position Switches (Cont'd)

B

☆ MONITOR	☆ NO FAIL	
R POSITION SW	OFF	
D POSITION SW	OFF	
4 POSITION SW	OFF	
3 POSITION SW	OFF	
2 POSITION SW	OFF	
1 POSITION SW	OFF	
ASCD•CRUISE	OFF	
ASCD•OD CUT	OFF	
KICKDOWN SW	OFF	

RECORD

SAT118G



B

CHECK OVERDRIVE CONTROL SWITCH CIRCUIT.

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

OR

- Turn ignition switch to "ON" position. (Do not start engine.)
- Check voltage between A/T control unit terminal ③ and ground when overdrive control switch is "ON" and "OFF".

Switch position	Voltage
ON	Battery voltage
OFF	1V or less

NG

Check the following items.

- Overdrive control switch
Refer to "Component Inspection", AT-61.
- Harness for short or open between A/T control unit and overdrive control switch (Main harness)
- Harness for short or open of ground circuit for overdrive control switch (Main harness)

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
DX

OK

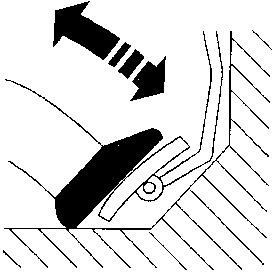
B

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TROUBLE DIAGNOSIS FOR DTC P0705

Inhibitor, Overdrive Control and Throttle Position Switches (Cont'd)

C

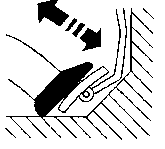


☆ MONITOR	☆ NO FAIL	↕
POWERSHIFT SW	OFF	
CLOSED THL/SW	ON	
W/O THRL/P-SW	OFF	
HOLD SW	OFF	


RECORD

SAT0521

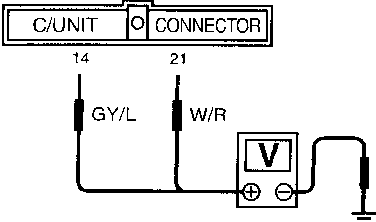
C



CONNECT



A/T control unit harness connector (B9)



SAT5171

B

C

CHECK THROTTLE POSITION SWITCH CIRCUIT.

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

NG →

Check the following items:

- Throttle position switch Refer to "Component Inspection", AT-62.
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and A/T control unit (Main harness)

Accelerator pedal condition	Data monitor	
	CLOSED THL/SW	W/O THRL/P-SW
Released	ON	OFF
Fully depressed	OFF	ON

OR

- Turn ignition switch to "ON" position. (Do not start engine.)
- Check voltage between A/T control unit terminals ⑭, ⑳ and ground while depressing, and releasing accelerator pedal slowly. (after warming up engine)

Accelerator pedal condition	Voltage	
	Terminal No. ⑭	Terminal No. ⑳
Released	Battery voltage	1V or less
Fully depressed	1V or less	Battery voltage

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-62.

OK

INSPECTION END

NG →

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

TROUBLE DIAGNOSIS FOR DTC P0705

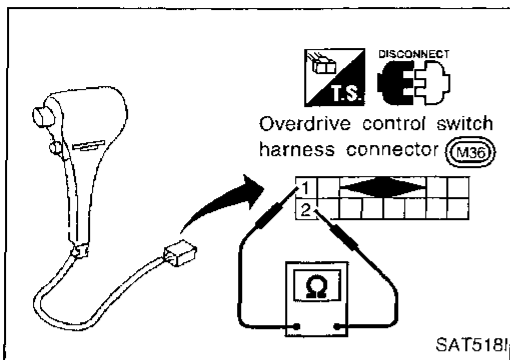
Inhibitor, Overdrive Control and Throttle Position Switches (Cont'd)

COMPONENT INSPECTION

Overdrive control switch

- Check continuity between two terminals.

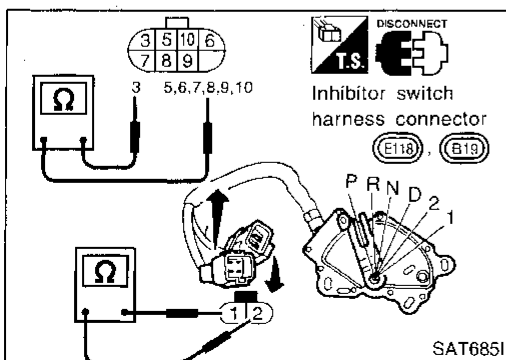
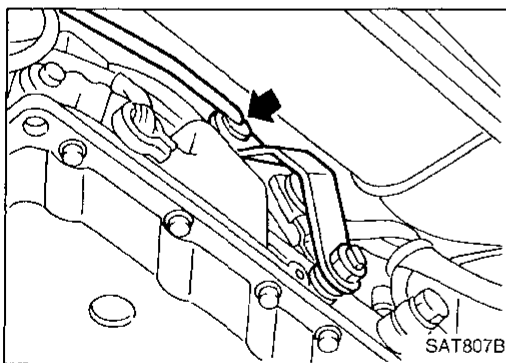
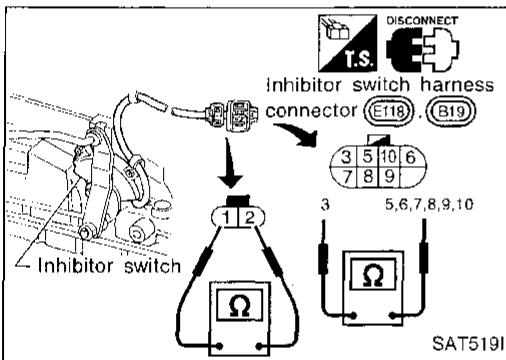
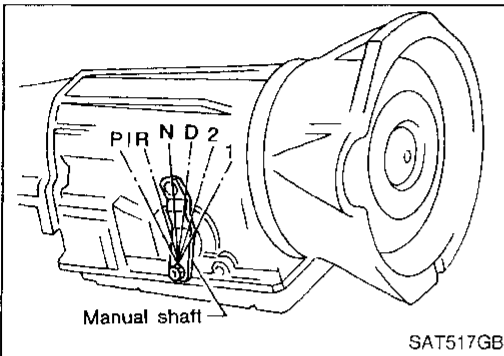
Switch position	Continuity
ON	No
OFF	Yes



Inhibitor switch

1. Check continuity between terminals ① and ② and between terminals ③ and ⑤, ⑥, ⑦, ⑧, ⑨, ⑩ while moving manual shaft through each position.

Lever position	Terminal No.	
P	① — ②	③ — ⑦
R	③ — ⑧	
N	① — ②	③ — ⑨
D	③ — ⑥	
2	③ — ⑩	
1	③ — ⑤	



2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. Refer to step 1.
3. If OK on step 2, adjust manual control linkage. Refer to AT-145.
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 AT-145.
6. If NG on step 4, replace inhibitor switch.

TROUBLE DIAGNOSIS FOR DTC P0705

Inhibitor, Overdrive Control and Throttle Position Switches (Cont'd)

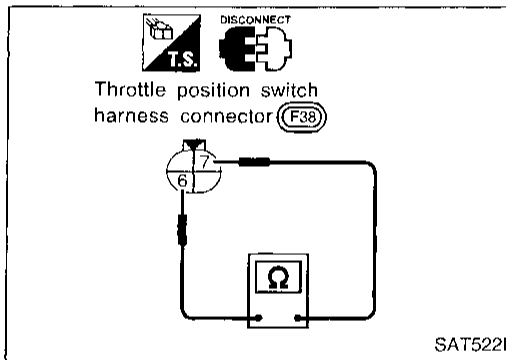
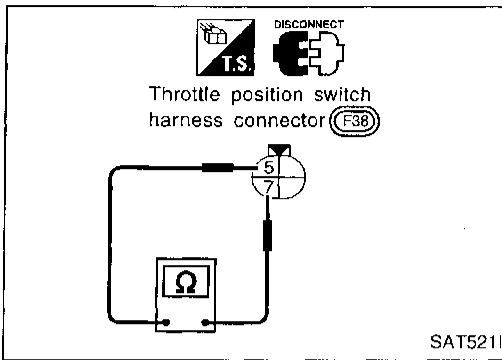
Throttle position switch

Closed throttle position switch (idle position)

- Check continuity between terminals ⑤ and ⑦.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

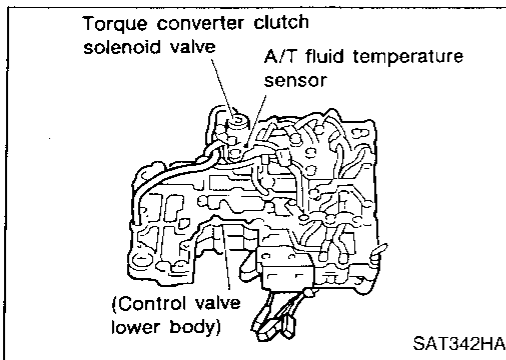
- To adjust closed throttle position switch, refer to EC section ("Basic Inspection", "TROUBLE DIAGNOSIS — Basic Inspection").



Wide open throttle position switch

- Check continuity between terminals ⑥ and ⑦.

Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

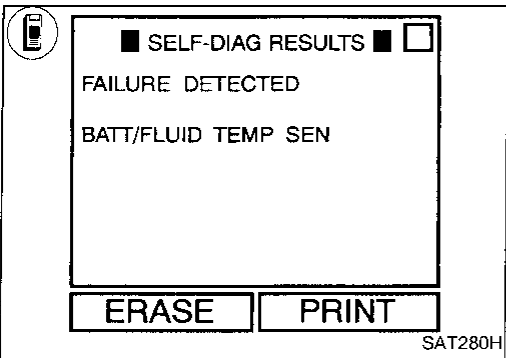


A/T Fluid Temperature Sensor Circuit and A/T Control Unit Power Source

DESCRIPTION

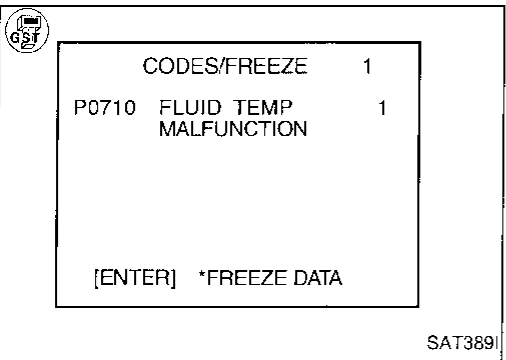
The A/T fluid temperature sensor detects the A/T fluid temperature and sends a signal to the A/T control unit.

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.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • A/T fluid temperature sensor



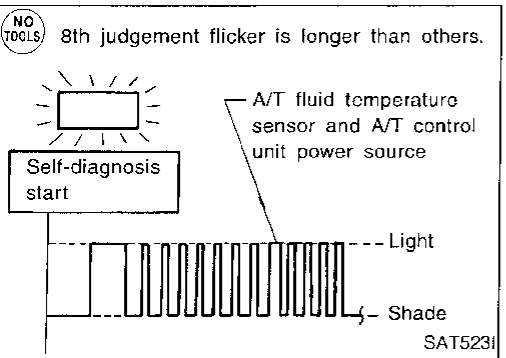
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.



- 1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle under the following conditions:
 Selector 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.

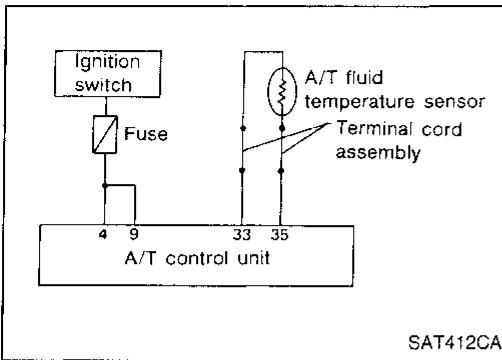
- 1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
 3) Select "MODE 7" with GST.



- 1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector 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-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR DTC P0710

A/T Fluid Temperature Sensor Circuit and A/T Control Unit Power Source (Cont'd)



A

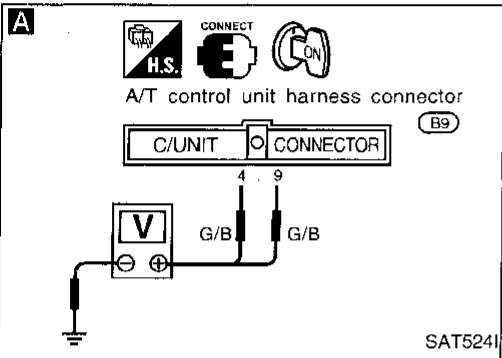
CHECK A/T CONTROL UNIT POWER SOURCE.

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 for short or open between ignition switch and A/T control unit (Main harness)
- Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").



OK ↓

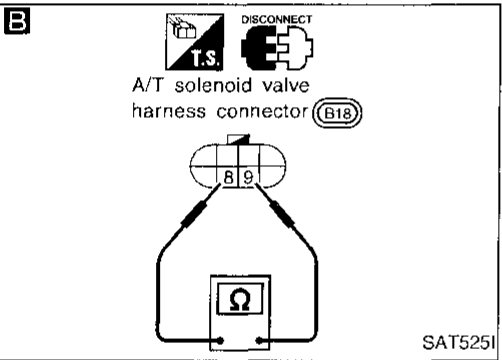
B

CHECK A/T 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 ⑧ and ⑨ 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:
 - A/T fluid temperature sensor Refer to "Component Inspection" on next page.
 - Harness of terminal cord assembly for short or open



OK ↓

Ⓐ
(Go to next page.)

TROUBLE DIAGNOSIS FOR DTC P0710

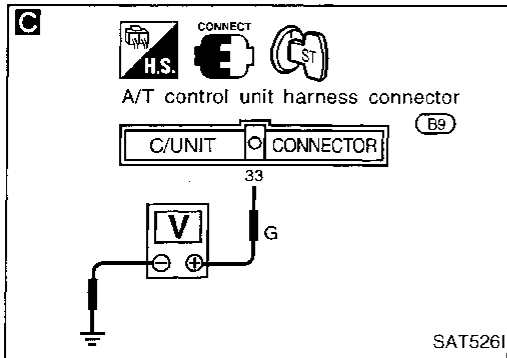
A/T Fluid Temperature Sensor Circuit and A/T Control Unit Power Source (Cont'd)

C

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

RECORD

SAT076H



C

Ⓐ

CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR.

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

Voltage:
Cold [20°C (68°F)] → Hot [80°C (176°F)]:
Approximately 1.5V → 0.5V

OR

- Start engine.
- Check voltage between A/T control unit terminal ③ and ground while warming up A/T.

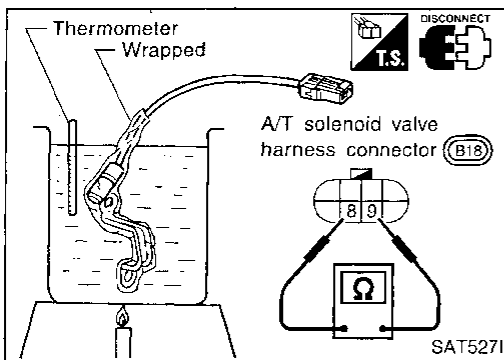
Voltage:
Cold [20°C (68°F)] → Hot [80°C (176°F)]:
Approximately 1.5V → 0.5V

Check the following item:

- Harness for short or open between A/T control unit and terminal cord assembly (Main harness)

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-63.

INSPECTION END



COMPONENT INSPECTION

A/T fluid temperature sensor

- For removal, refer to AT-143.
- Check resistance between two terminals while changing temperature as shown at left.

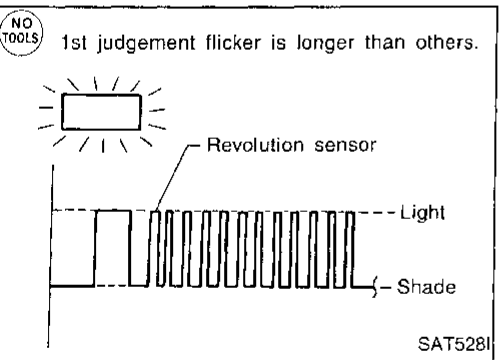
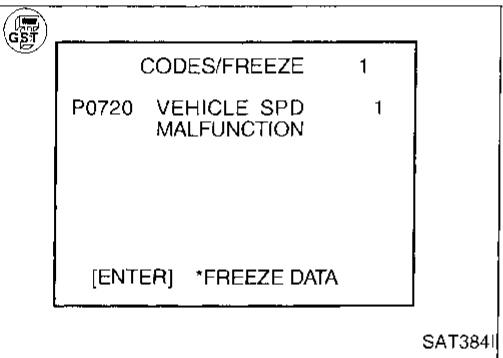
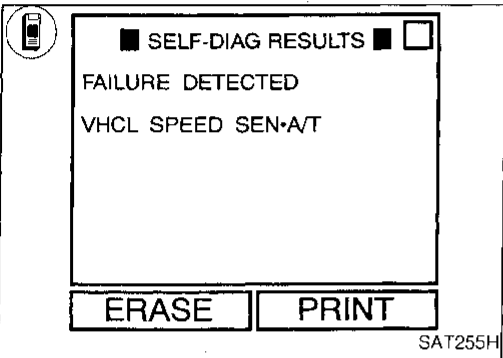
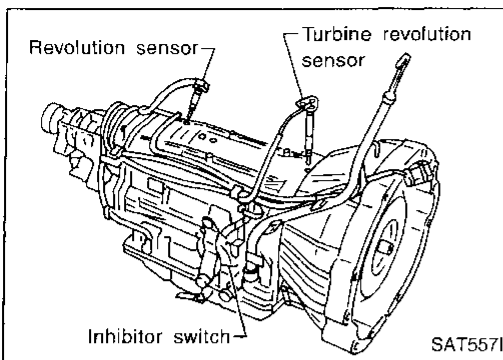
Temperature °C (°F)	Resistance
20 (68)	Approximately 2.5 kΩ
80 (176)	Approximately 0.3 kΩ

GI
MA
EM
LC
EC
FE
AT
PD
FA
RA
BR
ST
RS
BT
HA
EL
IOX

Vehicle Speed Sensor-A/T (Revolution sensor)

DESCRIPTION

The revolution sensor detects the revolution of the out put shaft 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.



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
(NO TOOLS) : VHCL SPEED : SEN-A/T	A/T control unit does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Revolution sensor
(GST) : P0720		
(NO TOOLS) : 1st judgement flicker		

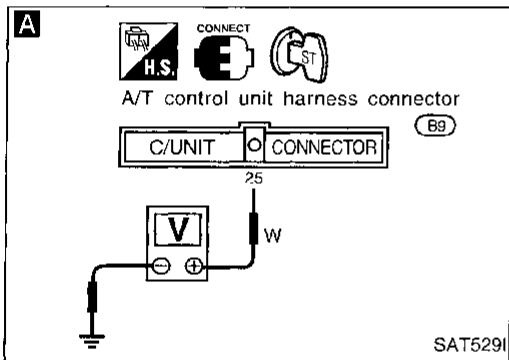
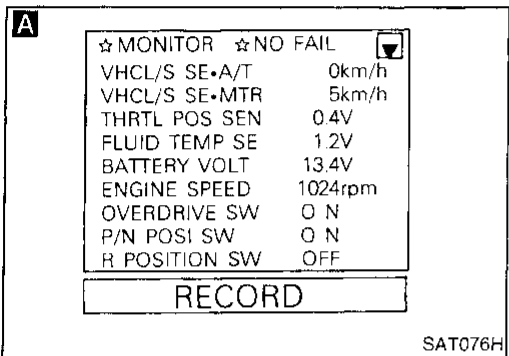
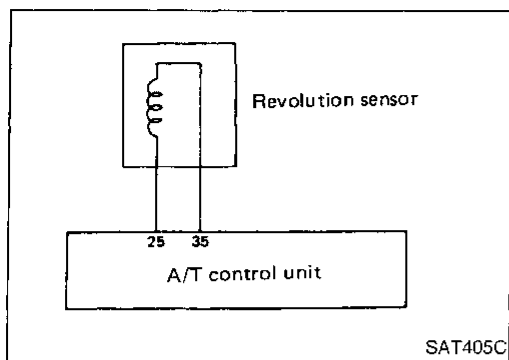
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- (NO TOOLS) 1) Start engine.
- (GST) 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
- (GST) 3) Drive vehicle under the following conditions:
Selector 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
- (GST) 1) Start engine.
- (GST) 2) Drive vehicle under the following conditions:
Selector 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.
- (GST) 3) Select "MODE 7" with GST.
- OR
- (NO TOOLS) 1) Start engine.
- (NO TOOLS) 2) Drive vehicle under the following conditions:
Selector 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.
- (NO TOOLS) 3) Perform self-diagnosis.
Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR DTC P0720

Vehicle Speed Sensor-A/T (Revolution sensor) (Cont'd)



CHECK REVOLUTION SENSOR.
Refer to "Component Inspection" below.

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 ② 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 for short or open between A/T control unit and revolution sensor (Main harness)
- Harness for short or open between revolution sensor and ECM (Main harness)
- Ground circuit for ECM Refer to EC section ("TROUBLE DIAGNOSIS FOR POWER SUPPLY").

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-66.

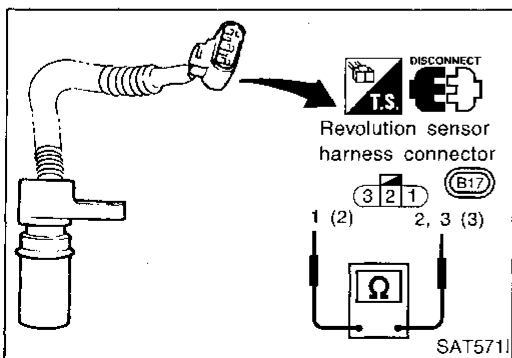
NG

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



COMPONENT INSPECTION

Revolution sensor




- For removal, refer to AT-143.
- Check resistance between terminals ①, ② and ③.

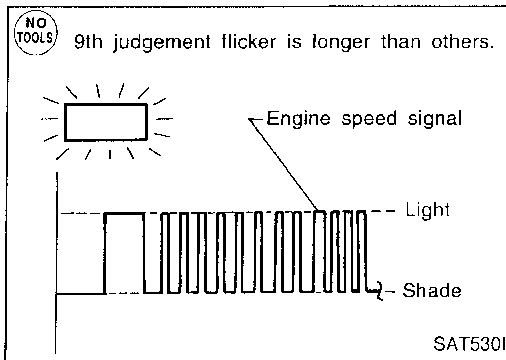
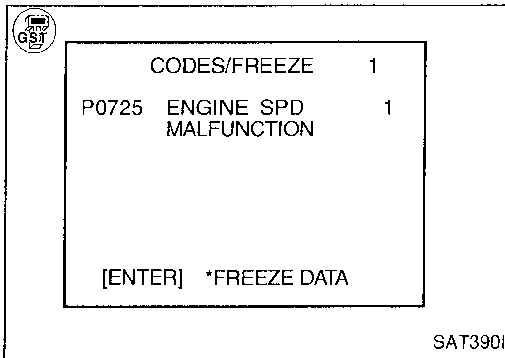
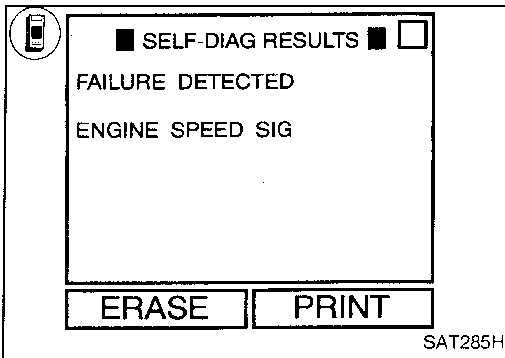
Terminal No.		Resistance
①	②	500 - 650Ω
②	③	No continuity
①	③	No continuity

Engine Speed Signal

DESCRIPTION


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

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.	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or shorted.)




Diagnostic Trouble Code (DTC) confirmation procedure


After the repair, perform the following procedure to confirm the malfunction is eliminated.

-  1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle under the following conditions:
 Selector 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

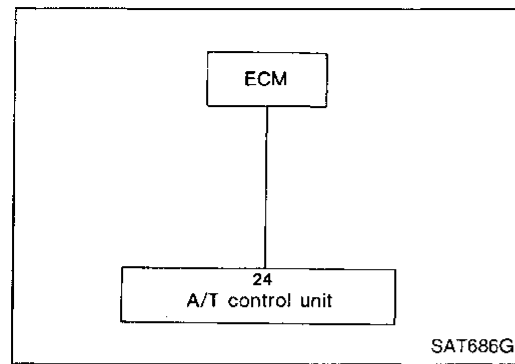
-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
 3) Select "MODE 7" with GST.

OR

-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector 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-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR DTC P0725

Engine Speed Signal (Cont'd)

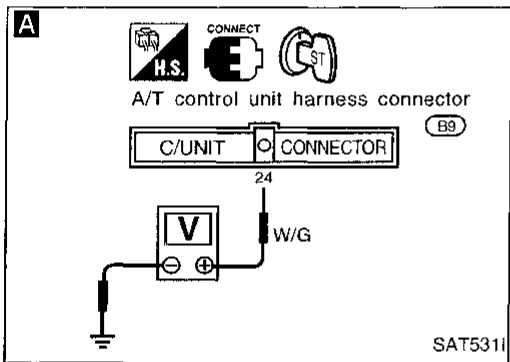


A

☆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



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 EC section ["Ignition Signal (DTC: 0201)", TROUBLE DIAGNOSIS FOR DTC P1320"].

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 for short or open between A/T control unit and ignition coil.
- Resistor
- Ignition coil

Refer to EC section ["Ignition Signal (DTC: 0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].

OR

1. Start engine.
2. Check voltage between A/T control unit terminal 24 and ground.
Voltage: 0.9 - 4.5V

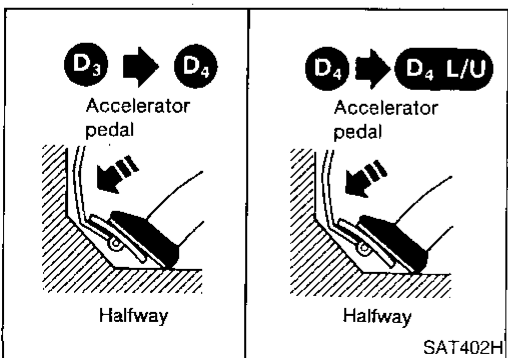
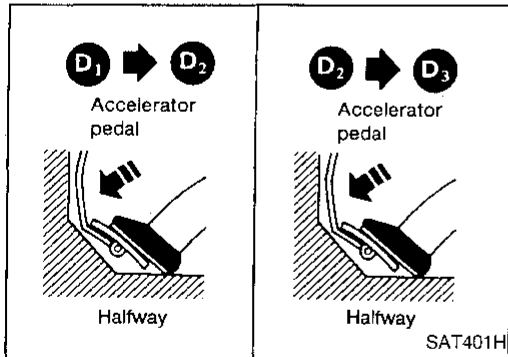
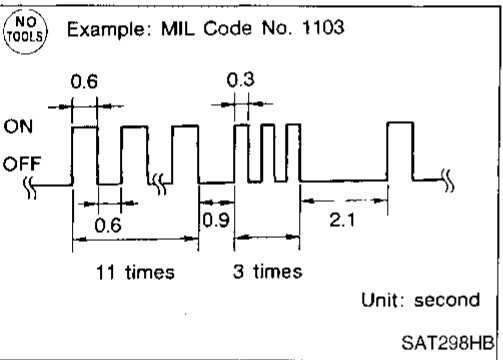
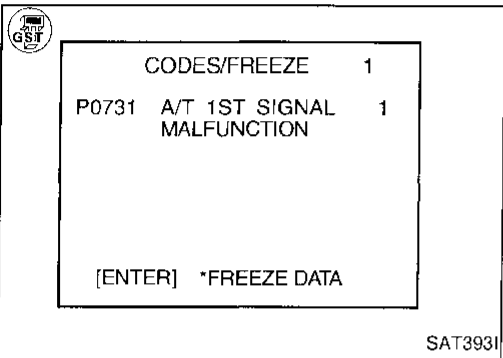
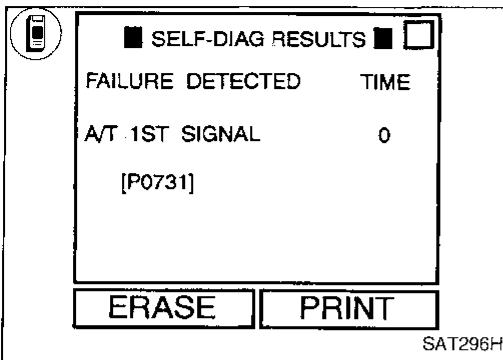
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-68.

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.

INSPECTION END

GI
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EL
IDX



Improper Shifting to 1st Gear Position

DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into first gear position as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 1ST SIGNAL : P0731 : MIL Code No. 1103	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve A • Shift solenoid valve B • Each clutch • Hydraulic control circuit

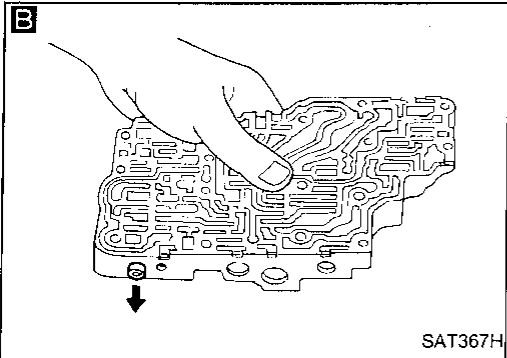
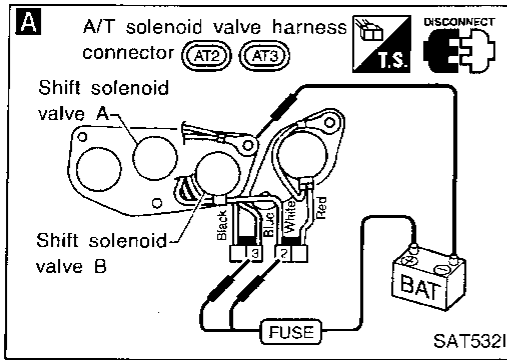
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-45.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-45.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-45.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

TROUBLE DIAGNOSIS FOR DTC P0731

Improper Shifting to 1st Gear Position (Cont'd)



A

CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-143.
2. Check shift solenoid valve operation.
 - Shift solenoid valve A
 - Shift solenoid valve B
 Refer to "Component Inspection" on next page.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-169.
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.

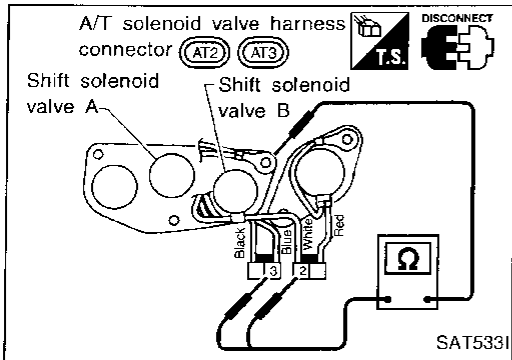
OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-70.

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

INSPECTION END



COMPONENT INSPECTION

Shift solenoid valve A and B

- For removal, refer to AT-143.

Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	③	Ground	20 - 40Ω
Shift solenoid valve B	②		

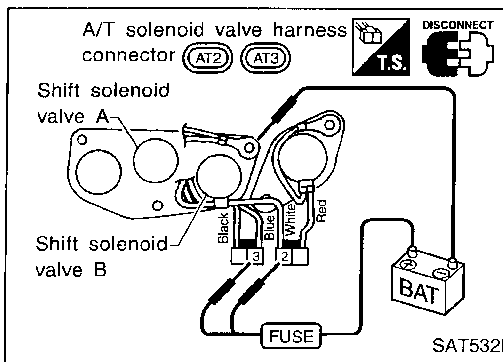
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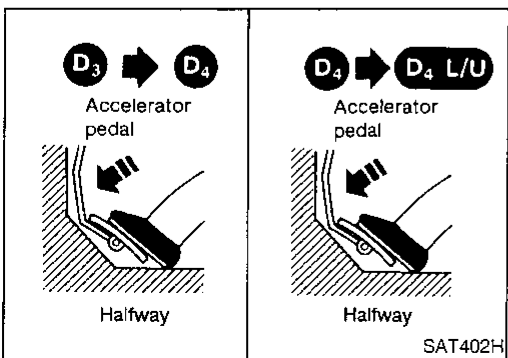
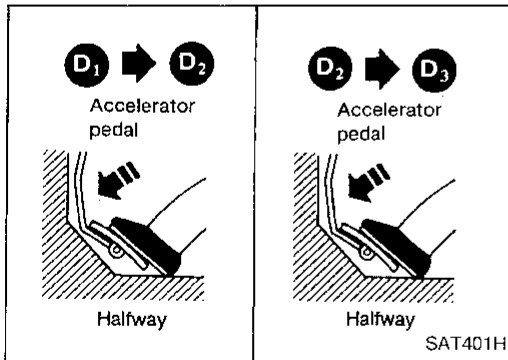
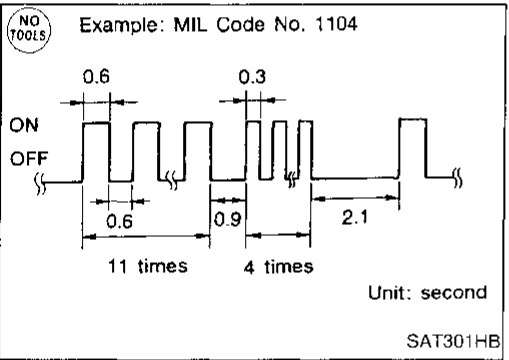
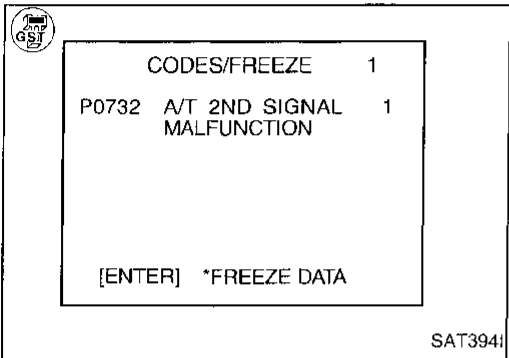
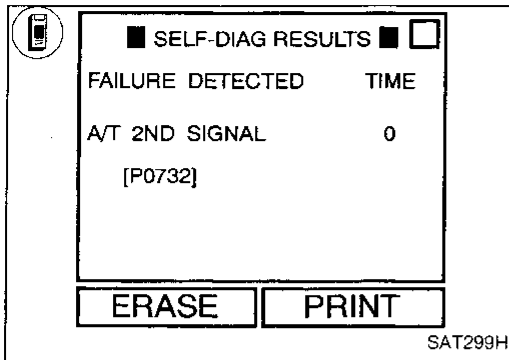
TROUBLE DIAGNOSIS FOR DTC P0731

Improper Shifting to 1st Gear Position (Cont'd)

Operation check

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





Improper Shifting to 2nd Gear Position

DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into second gear position as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, etc.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 2ND SIGNAL : P0732 : MIL Code No. 1104	A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve B • Each clutch • Hydraulic control circuit

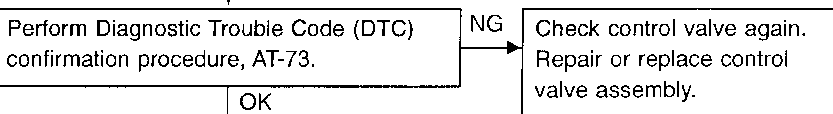
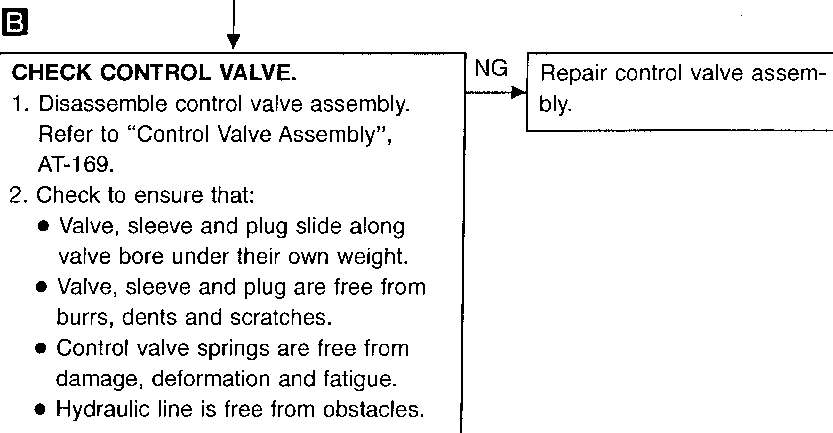
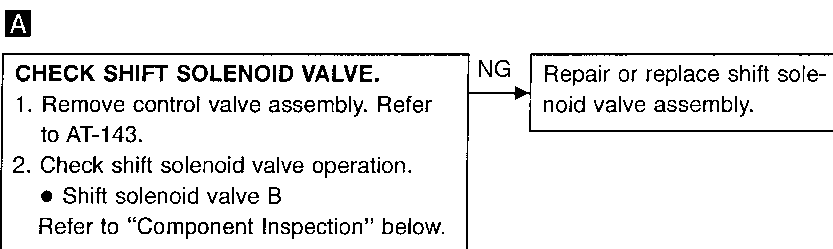
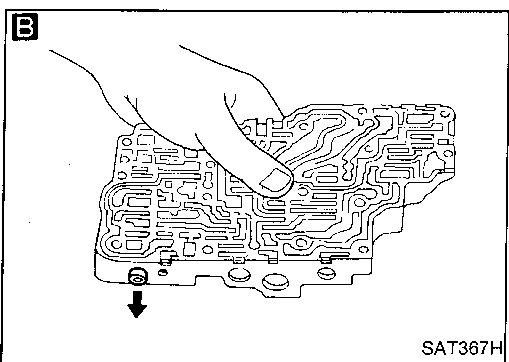
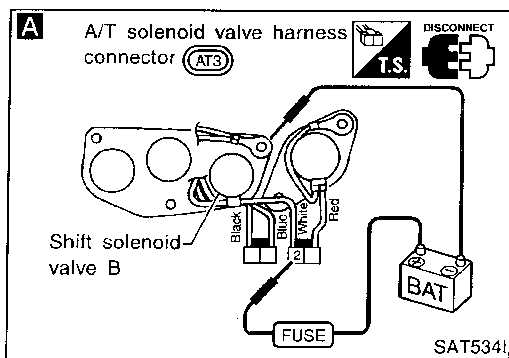
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

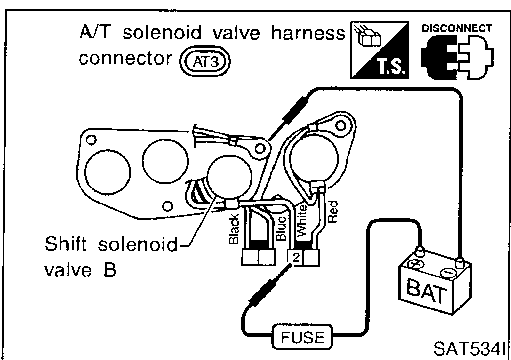
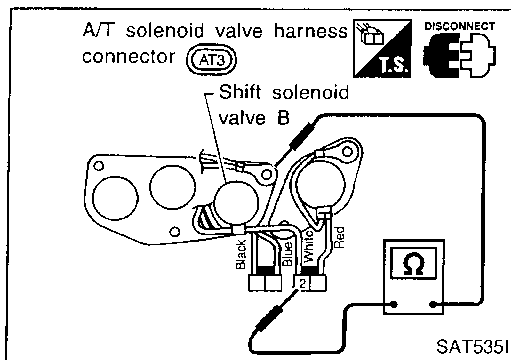
- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-45.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector 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-45.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector 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-45.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

TROUBLE DIAGNOSIS FOR DTC P0732

Improper Shifting to 2nd Gear Position (Cont'd)



INSPECTION END



COMPONENT INSPECTION

Shift solenoid valve B

- For removal, refer to AT-143.

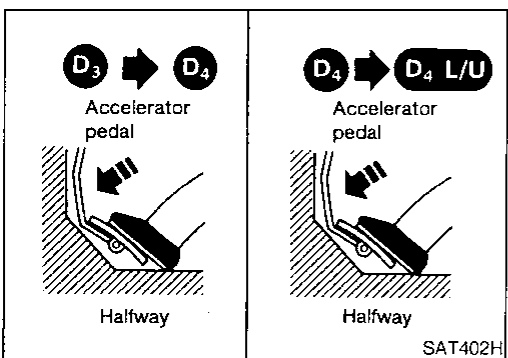
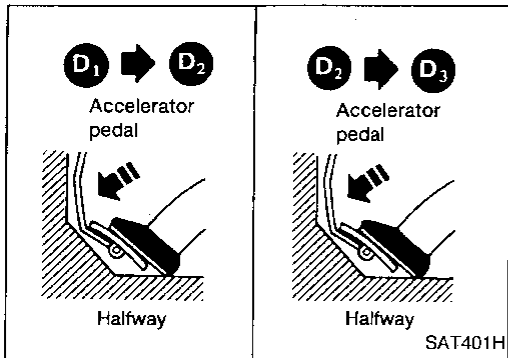
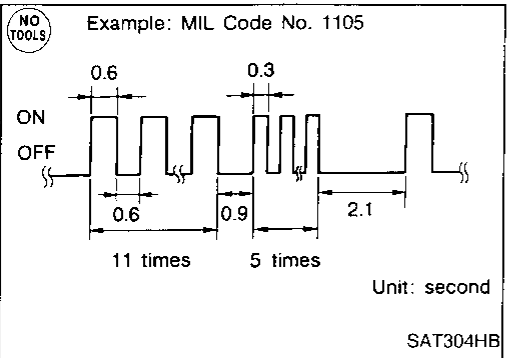
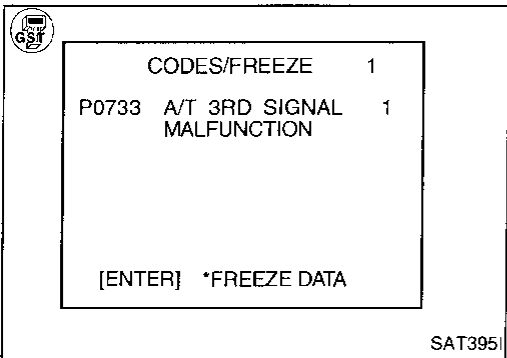
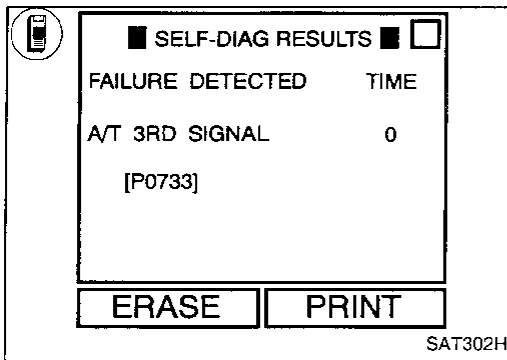
Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	②	Ground	20 - 40Ω

Operation check

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



Improper Shifting to 3rd Gear Position

DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into third gear position as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning servo piston or brake band, etc.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 3RD SIGNAL : P0733 : MIL Code No. 1105	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve A • Each clutch • Hydraulic control circuit

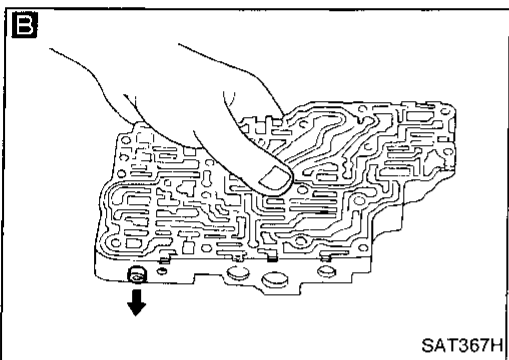
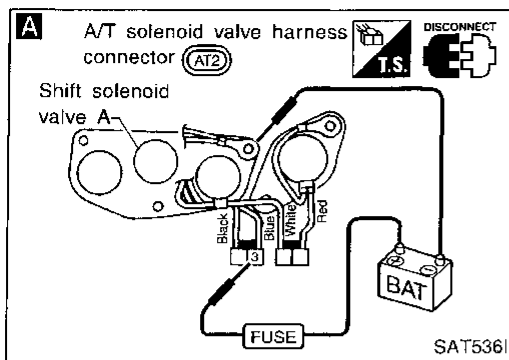
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector 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-45.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector 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-45.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector 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-45.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

TROUBLE DIAGNOSIS FOR DTC P0733

Improper Shifting to 3rd Gear Position (Cont'd)



A

CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-143.
2. Check shift solenoid valve operation.
 - Shift solenoid valve A
 Refer to "Component Inspection" below.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "Control Valve Assembly", AT-169.
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.

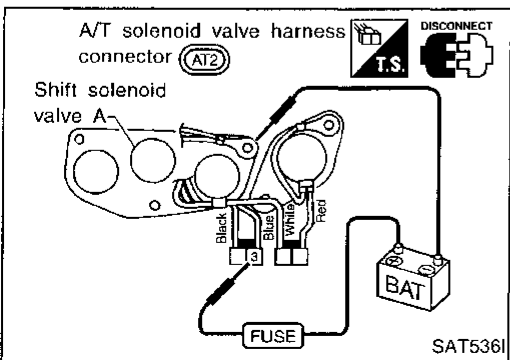
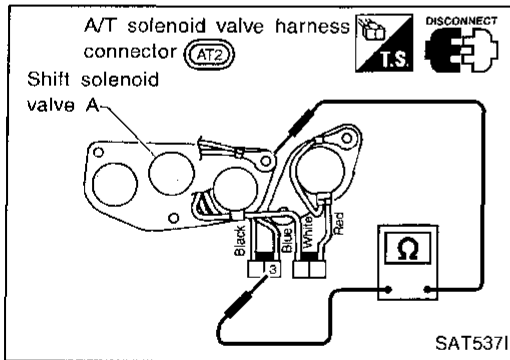
OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-75.

NG → Check control valve again. Repair or replace control valve assembly.

OK ↓

INSPECTION END



COMPONENT INSPECTION

Shift solenoid valve A

- For removal, refer to AT-143.

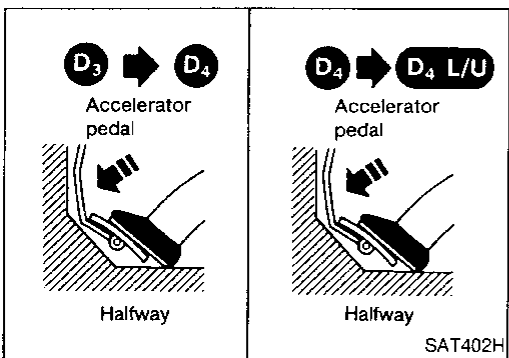
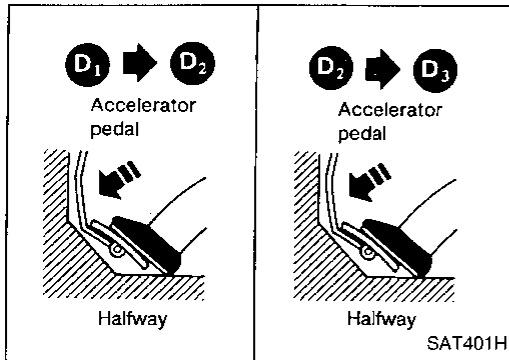
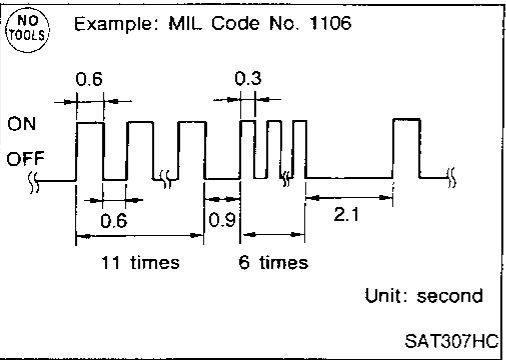
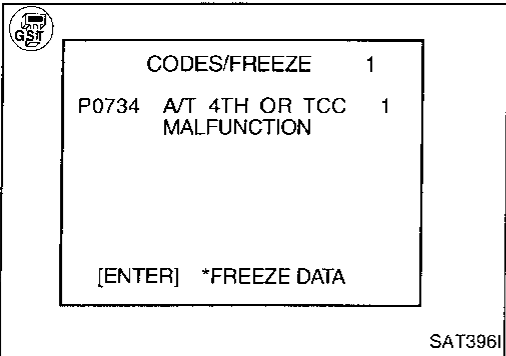
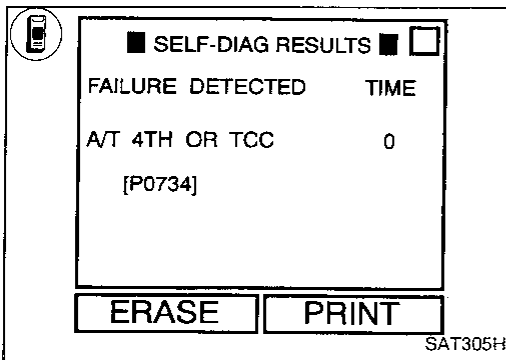
Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	③	Ground	20 - 40Ω

Operation check

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



Improper Shifting to 4th Gear Position

DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 4TH SIGNAL : P0734 : MIL Code No. 1106	A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve A • Shift solenoid valve B • Overrun clutch solenoid valve • Line pressure solenoid valve • Each clutch • Hydraulic control circuit

Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 1) Start engine and warm up ATF.
- 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-45.

OR

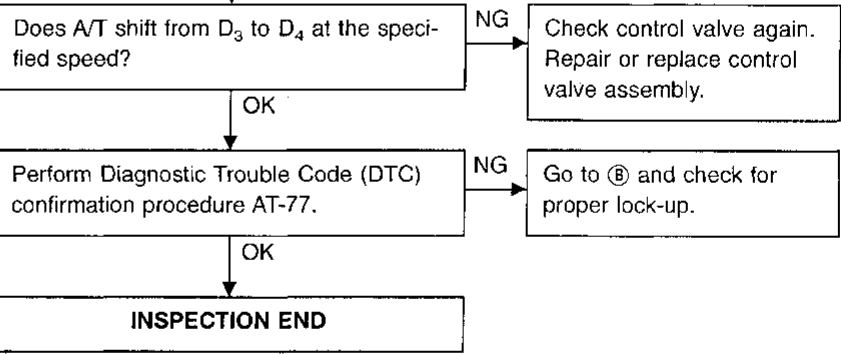
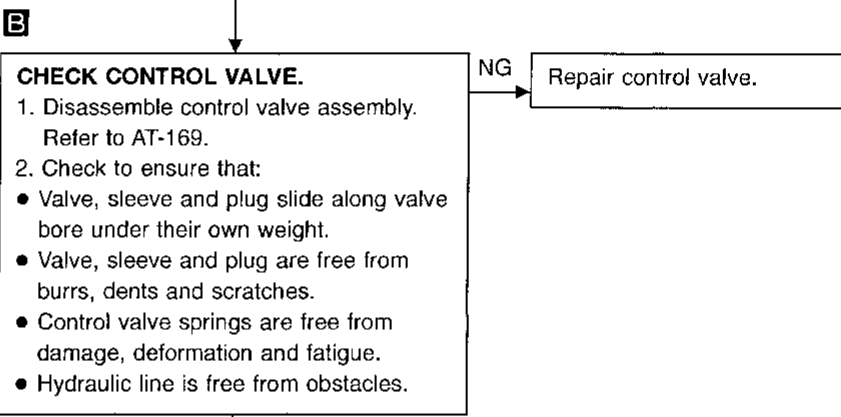
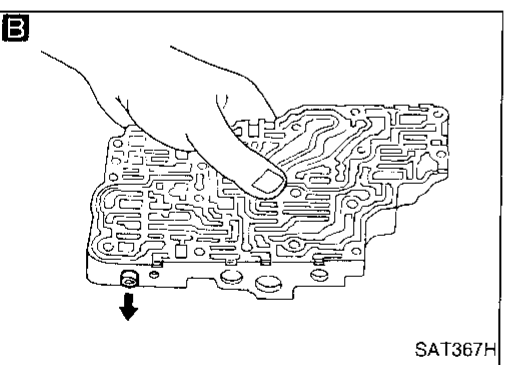
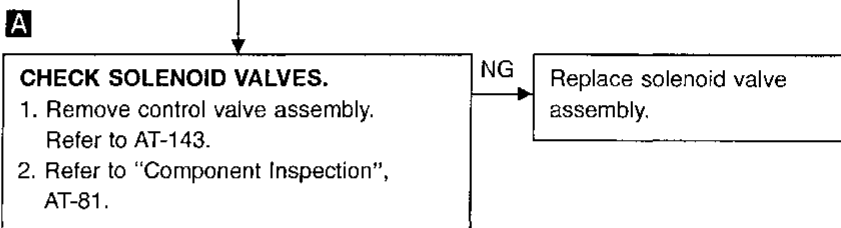
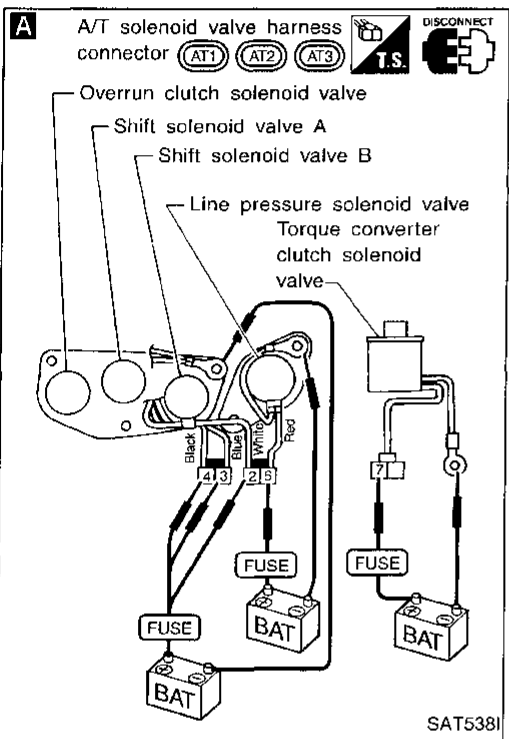
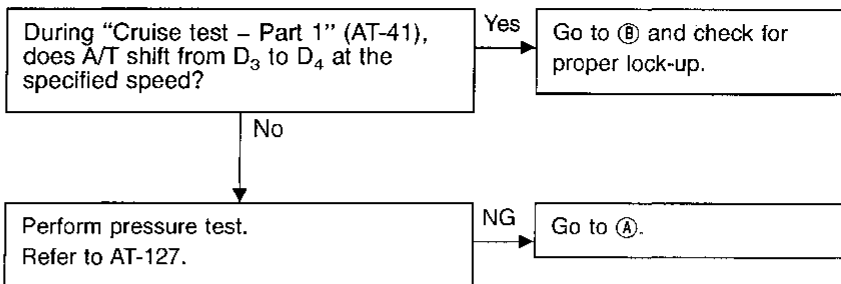
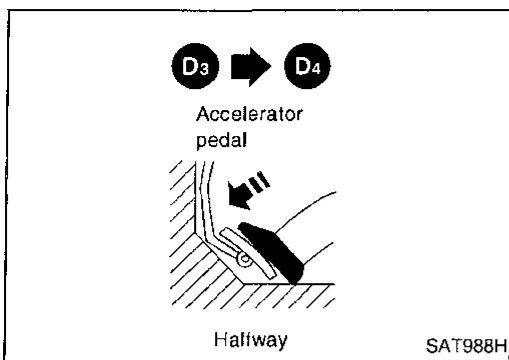
- 1) Start engine and warm up ATF.
- 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-45.
- 3) Select "MODE 7" with GST.

OR

- 1) Start engine and warm up ATF.
- 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-45.
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

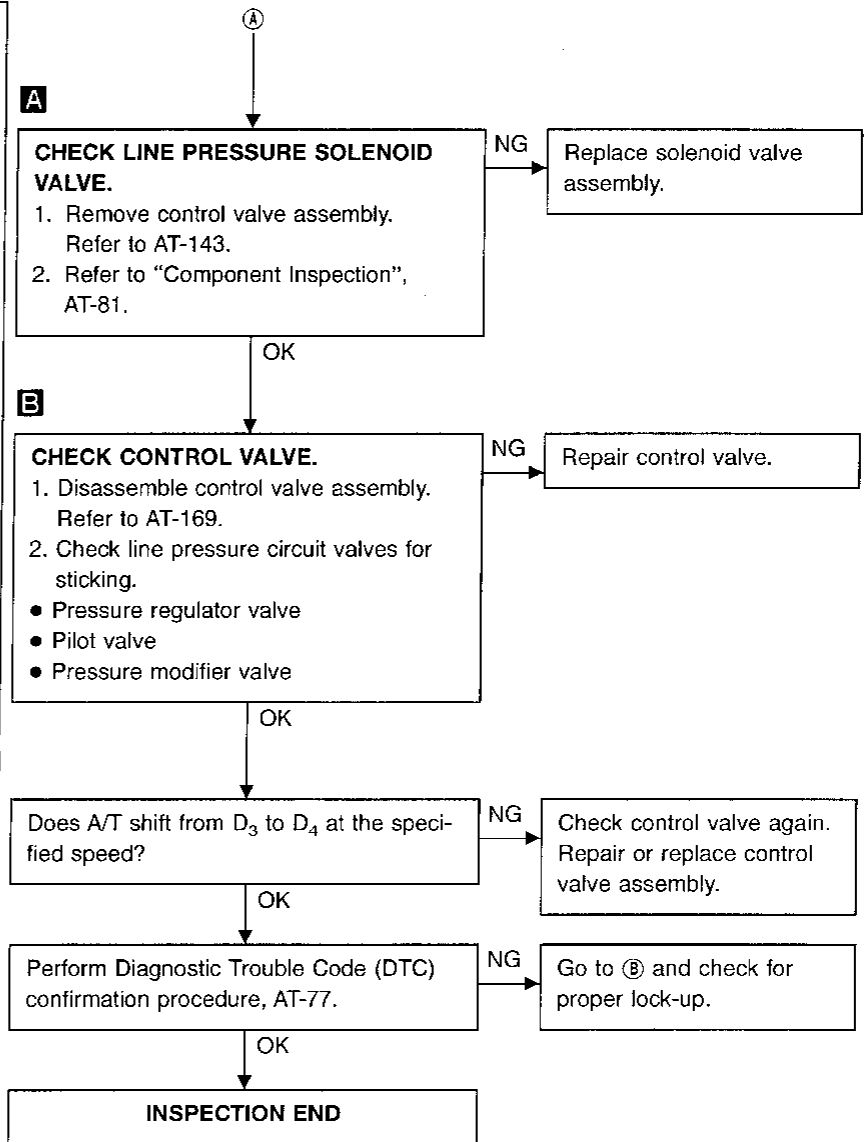
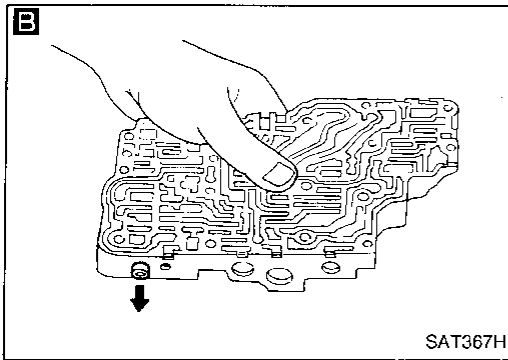
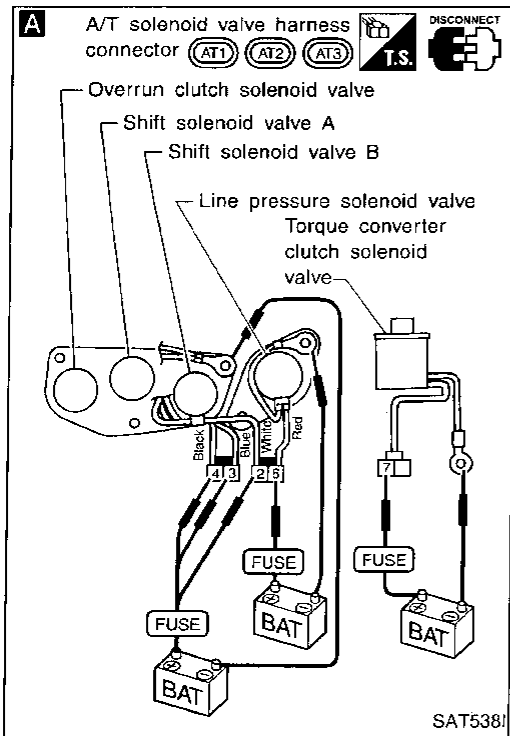
TROUBLE DIAGNOSIS FOR DTC P0734

Improper Shifting to 4th Gear Position (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P0734

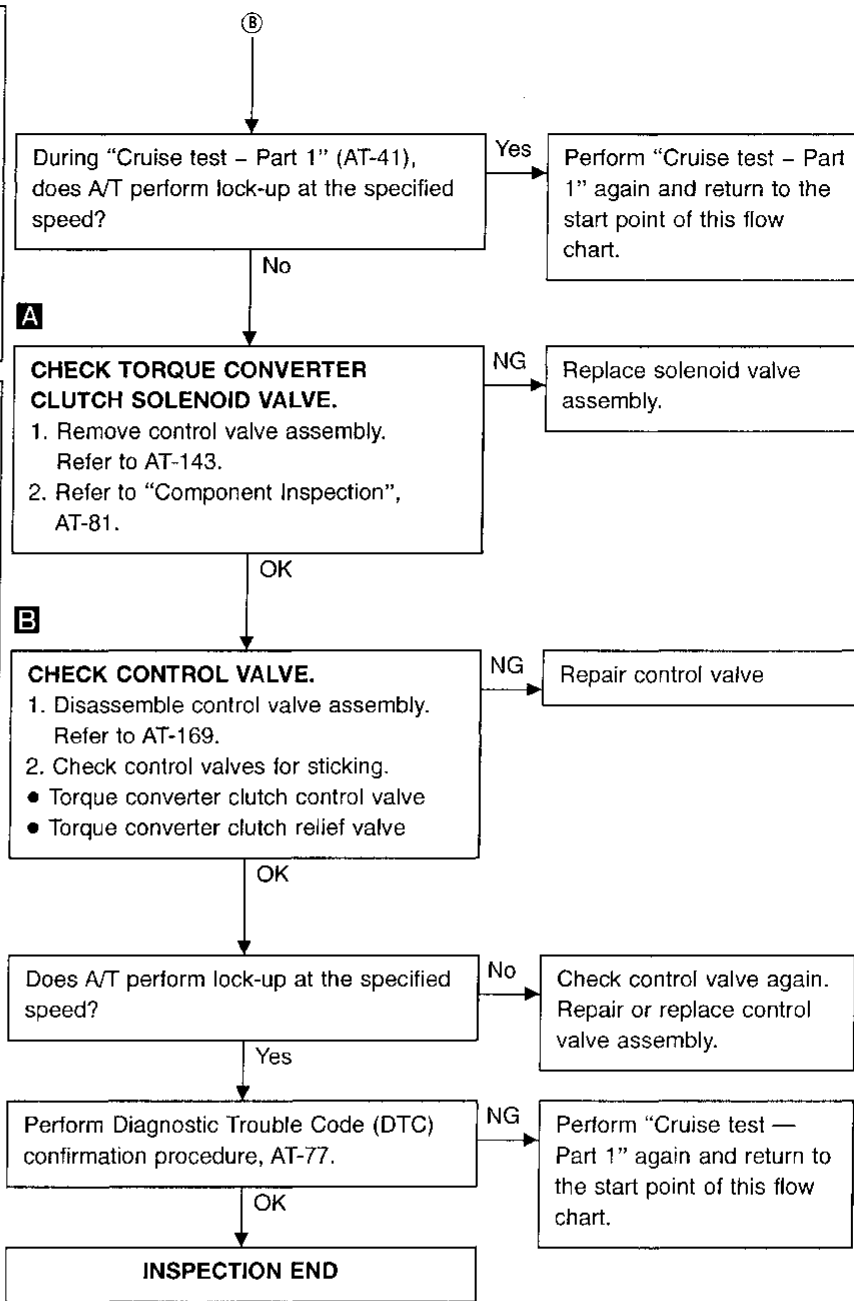
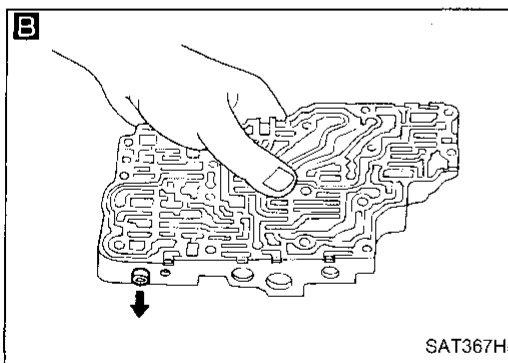
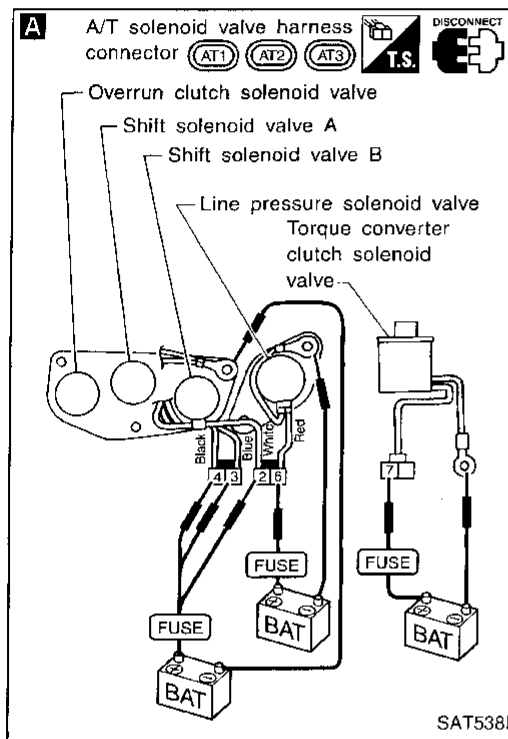
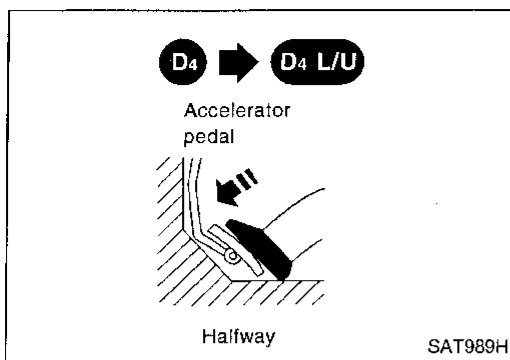
Improper Shifting to 4th Gear Position (Cont'd)



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TROUBLE DIAGNOSIS FOR DTC P0734

Improper Shifting to 4th Gear Position (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P0734

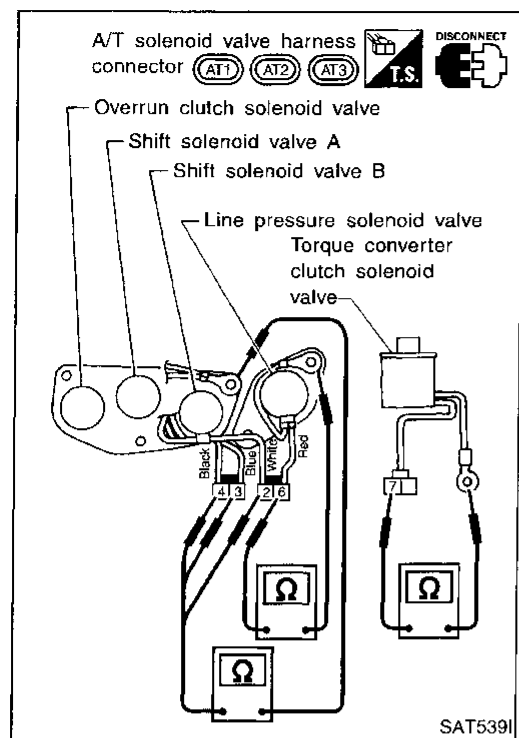
Improper Shifting to 4th Gear Position (Cont'd) COMPONENT INSPECTION

Solenoid valves

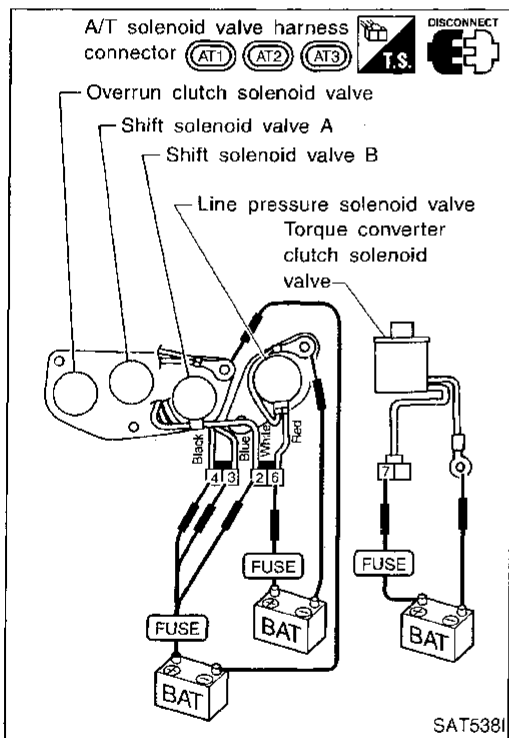
- For removal, refer to AT-143.

Resistance check

- Check resistance between two terminals.



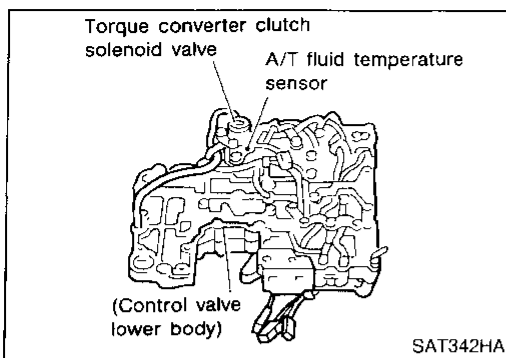
Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve A	③	20 - 40Ω
Shift solenoid valve B	②	
Overrun clutch solenoid valve	④	
Line pressure solenoid valve	⑥	2.5 - 5Ω
Torque converter clutch solenoid valve	⑦	10 - 16Ω



Operation check

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

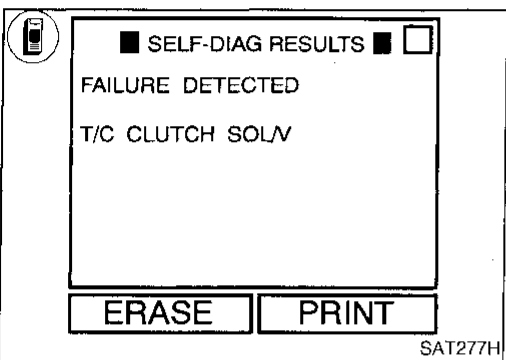
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Torque Converter Clutch Solenoid Valve

DESCRIPTION

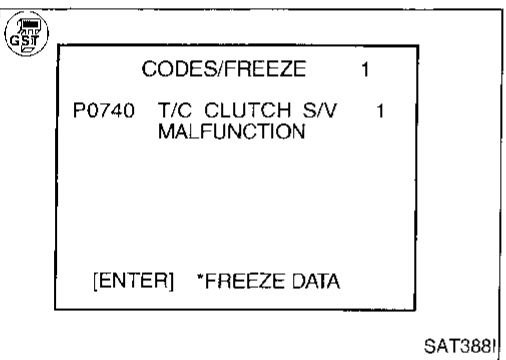
The torque converter clutch solenoid valve is activated, with the gear in D₄, by the A/T control unit in response to signals sent from the vehicle speed and throttle position sensors. Lock-up piston operation will then be controlled. Lock-up operation, however, is prohibited when A/T fluid temperature is too low.



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: T/C CLUTCH SOL/V	A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • T/C clutch solenoid valve
: P0740		
: 7th judgement flicker		

Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.



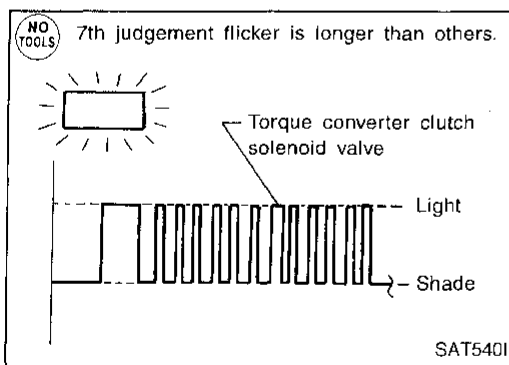
- 1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ lock-up position.

OR

- 1) Start engine.
 2) Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ lock-up position.
 3) Select "MODE 7" with GST.

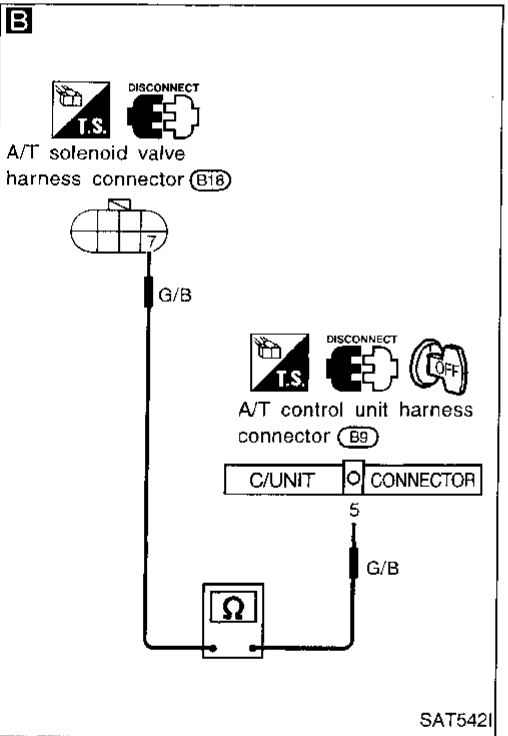
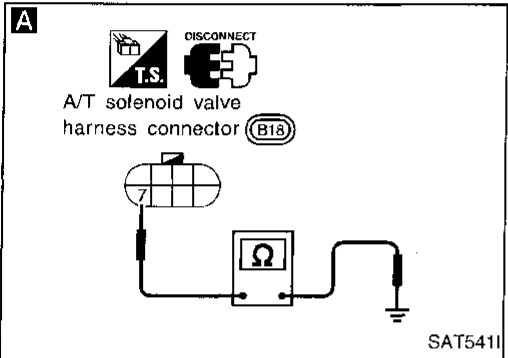
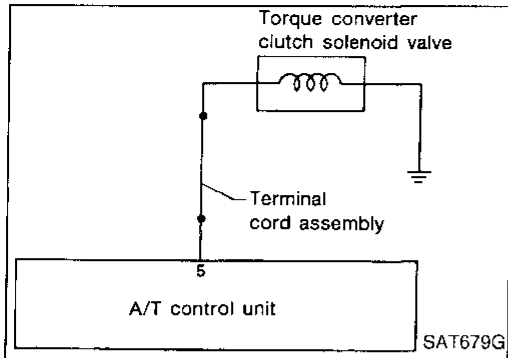
OR

- 1) Start engine.
 2) Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ lock-up position.
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23.



TROUBLE DIAGNOSIS FOR DTC P0740

Torque Converter Clutch Solenoid Valve (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: 10 - 20Ω

NG → 1. Remove oil pan. Refer to AT-143.
2. Check the following items:
• Torque converter clutch solenoid valve Refer to "Component Inspection" on next page.
• Harness of terminal cord assembly for short or open

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 harness connector 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 Diagnostic Trouble Code (DTC) confirmation procedure, AT-82.

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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TROUBLE DIAGNOSIS FOR DTC P0740

Torque Converter Clutch Solenoid Valve (Cont'd)

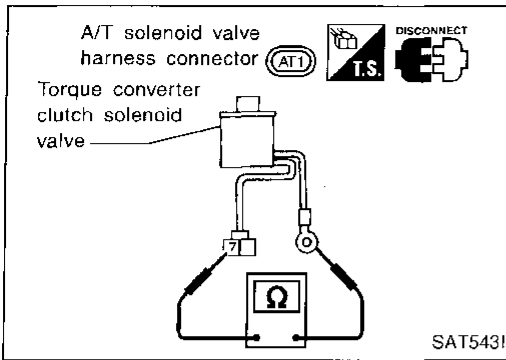
COMPONENT INSPECTION

Torque converter clutch solenoid valve

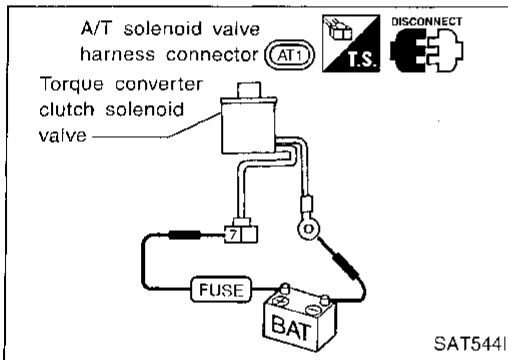
- For removal, refer to AT-143.

Resistance check

- Check resistance between two terminals.

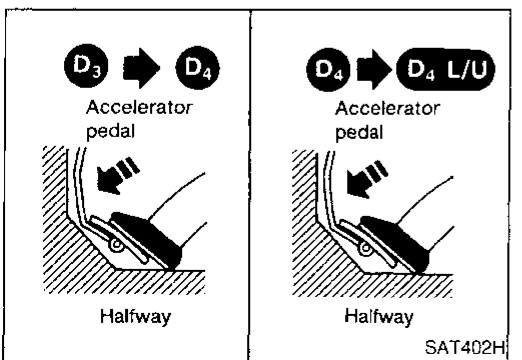
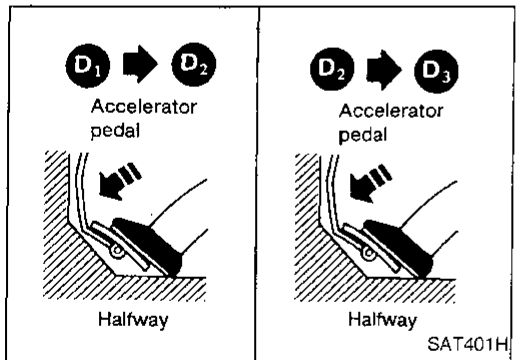
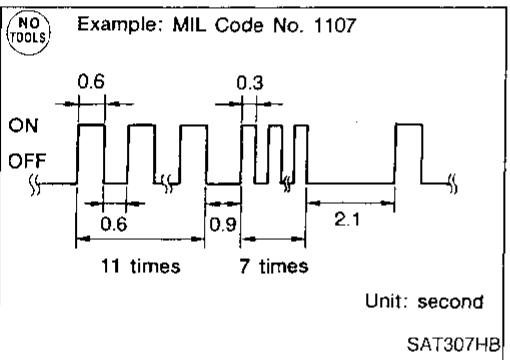
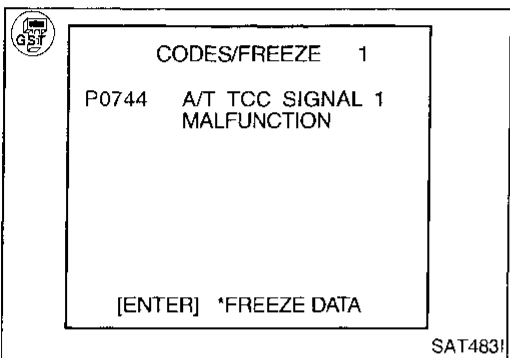
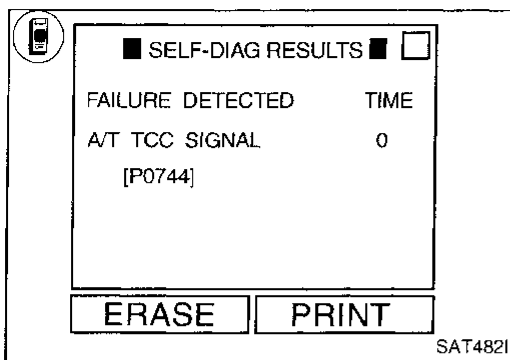


Solenoid valve	Terminal No.		Resistance (Approx.)
	⑦	Ground	
Torque converter clutch solenoid valve	⑦	Ground	10 - 16Ω



Operation check

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



Improper Lock-up Operation

DESCRIPTION

- This is one of the items indicated by the MIL.
- This malfunction will not be detected while the O/D OFF indicator lamp is indicating another self-diagnosis malfunction.
- This malfunction is detected when the A/T does not shift into fourth gear position or the torque converter clutch does not lock up as instructed by the A/T control unit. This is not caused by electrical malfunction (circuits open or shorted) but by mechanical malfunction such as control valve sticking, improper solenoid valve operation, malfunctioning oil pump or torque converter clutch, etc.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T TCC SIGNAL	A/T cannot perform lock-up even if electrical circuit is good.	<ul style="list-style-type: none"> • Torque converter clutch solenoid valve • Each clutch • Hydraulic control circuit
: P0744		
: MIL Code No. 1107		

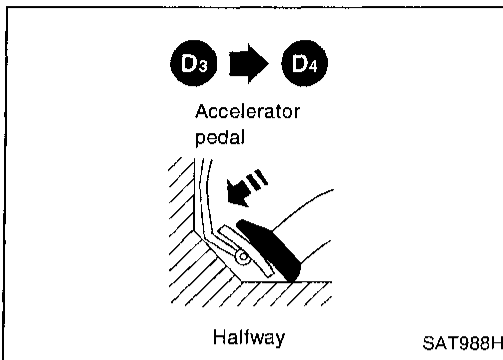
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-45.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-45.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-45.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

TROUBLE DIAGNOSIS FOR DTC P0744

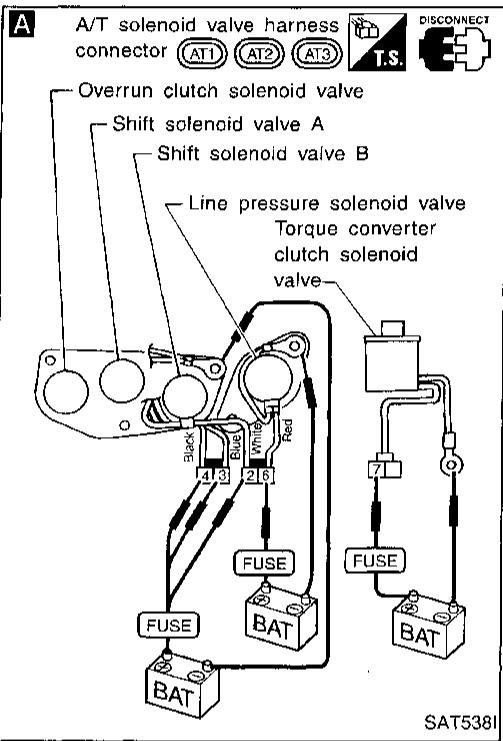
Improper Lock-up Operation (Cont'd)



During "Cruise test – Part 1" (AT-41), does A/T shift from D₃ to D₄ at the specified speed?

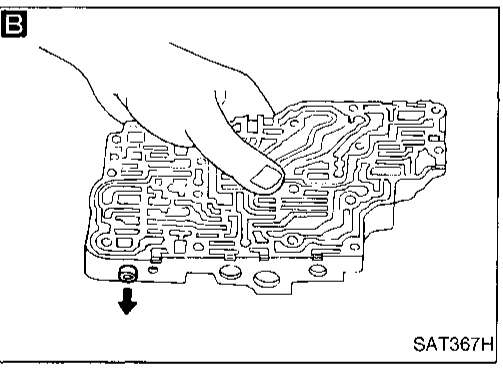
Yes → Go to ② and check for proper lock-up.

No
Perform pressure test. Refer to AT-127.
NG → Go to ①.
OK →



A
CHECK SOLENOID VALVES.
1. Remove control valve assembly. Refer to AT-143.
2. Check solenoid valve assembly operation. Refer to AT-89.
NG → Replace solenoid valve assembly.
OK →

B
CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to AT-169.
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.
OK →



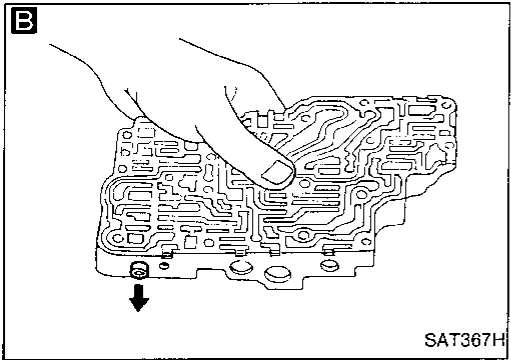
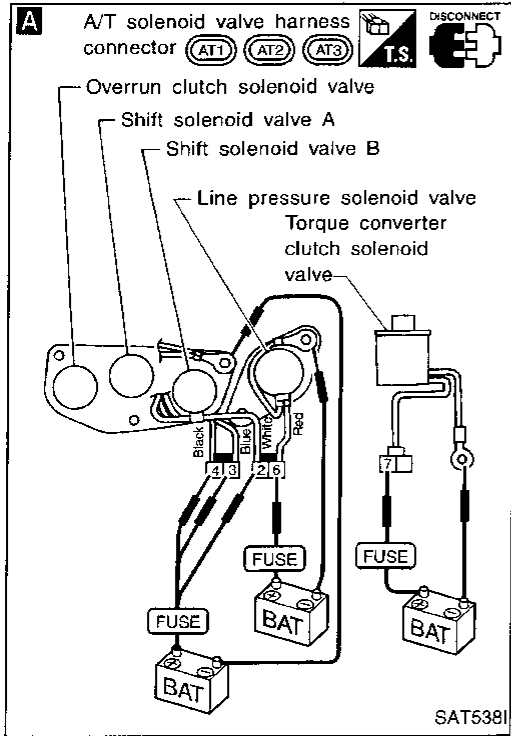
Does A/T shift from D₃ to D₄ at the specified speed?
NG → Check control valve again. Repair or replace control valve assembly.
OK →

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-85.
NG → Go to ② and check for proper lock-up.
OK →

INSPECTION END

TROUBLE DIAGNOSIS FOR DTC P0744

Improper Lock-up Operation (Cont'd)



A

CHECK LINE PRESSURE SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-143.
2. Check line pressure solenoid valve operation. Refer to AT-89.

NG → Replace solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-169.
2. Check line pressure circuit valves for sticking.
 - Pressure regulator valve
 - Pilot valve
 - Pressure modifier valve

NG → Repair control valve.

OK

Does A/T shift from D₃ to D₄ at the specified speed?

NG → Check control valve again. Repair or replace control valve assembly.

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-85.

NG → Go to ③ and check for proper lock-up.

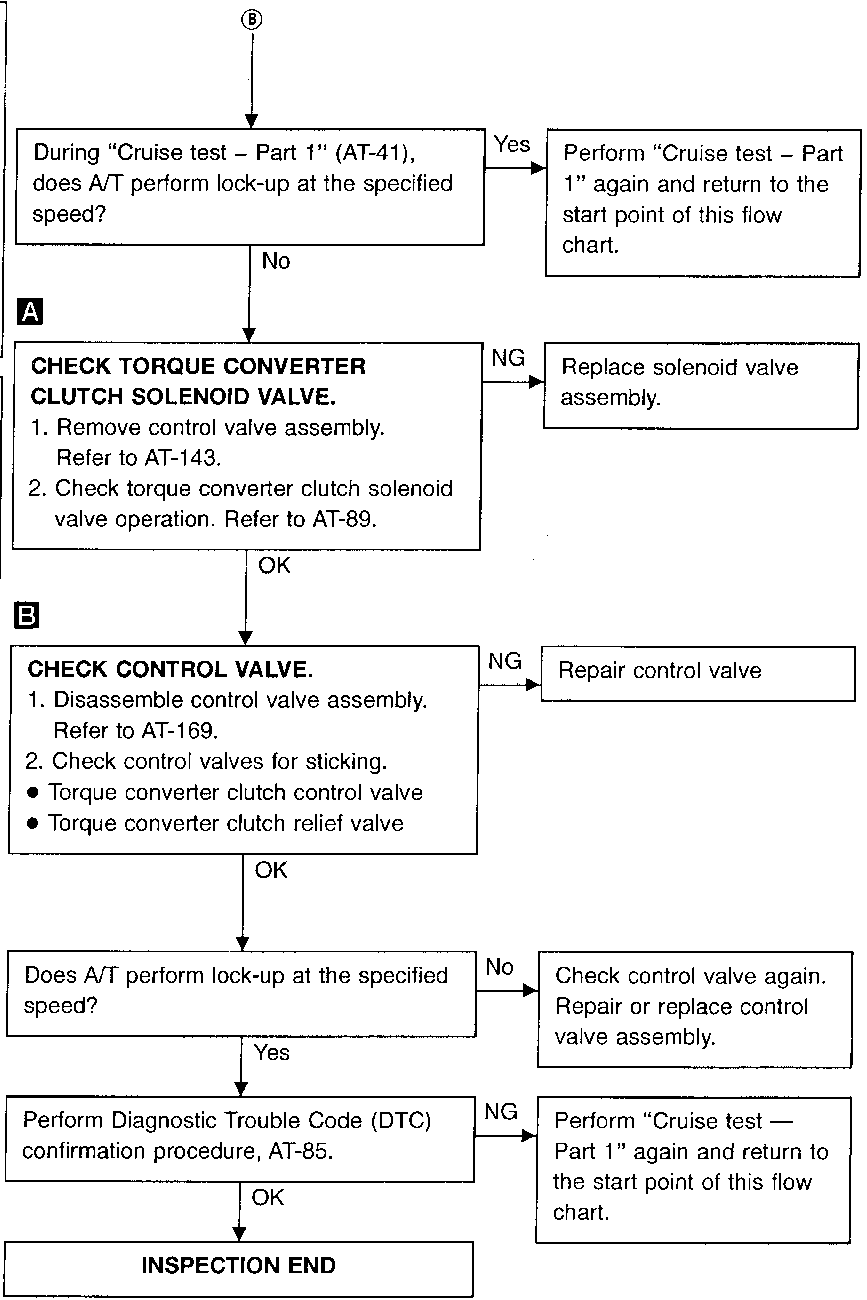
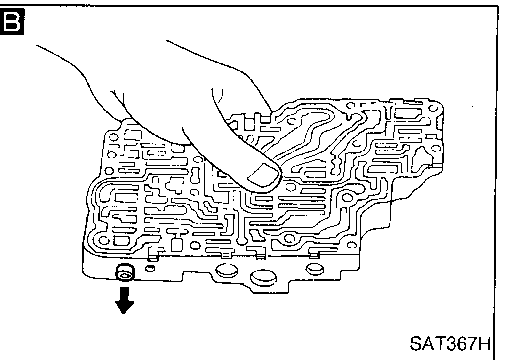
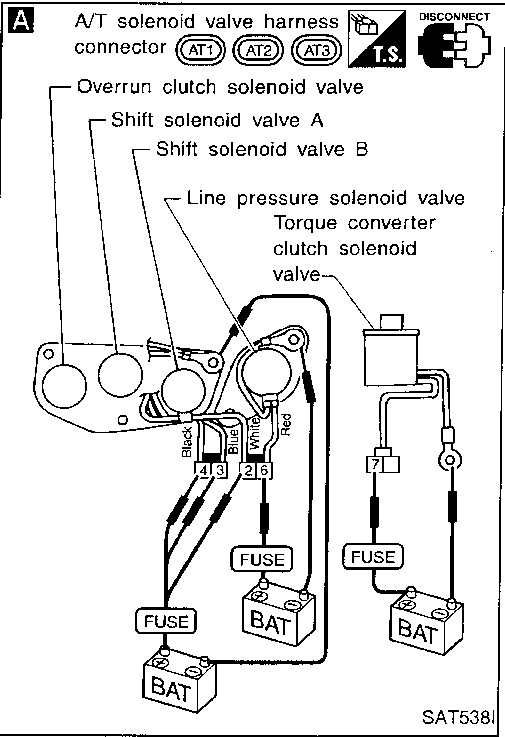
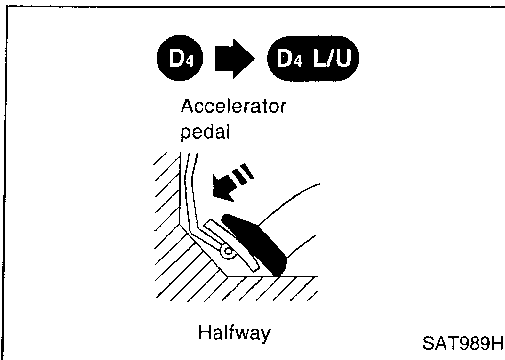
OK

INSPECTION END

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TROUBLE DIAGNOSIS FOR DTC P0744

Improper Lock-up Operation (Cont'd)



TROUBLE DIAGNOSIS FOR DTC P0744

Improper Lock-up Operation (Cont'd)

COMPONENT INSPECTION

Solenoid valves

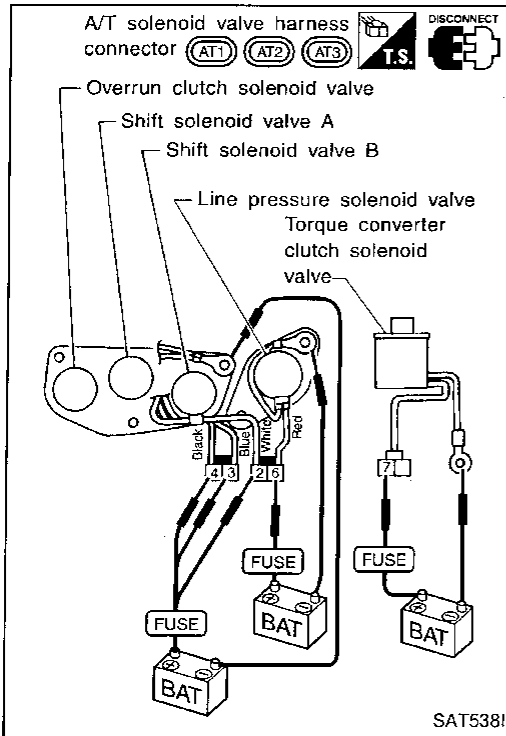
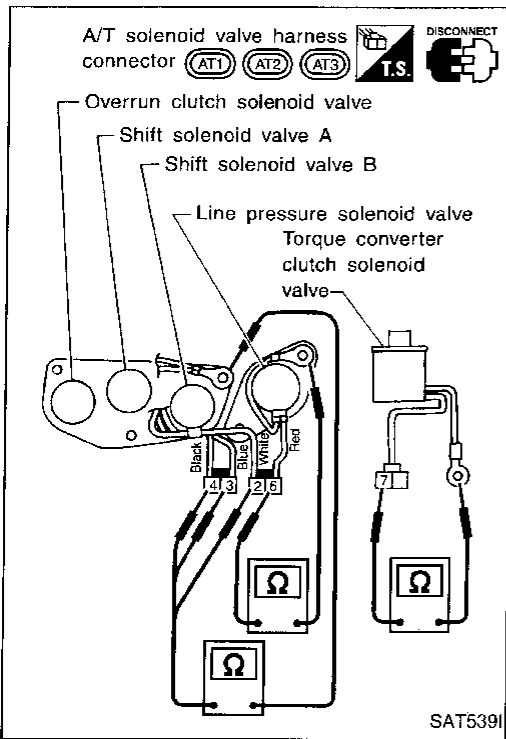
- For removal, refer to AT-143.

Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve A	③	20 - 40Ω
Shift solenoid valve B	②	
Overrun clutch solenoid valve	④	2.5 - 5Ω
Line pressure solenoid valve	⑥	
Torque converter clutch solenoid valve	⑦	

Ground



Operation check

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

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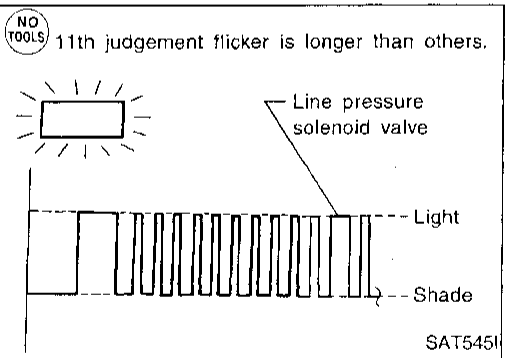
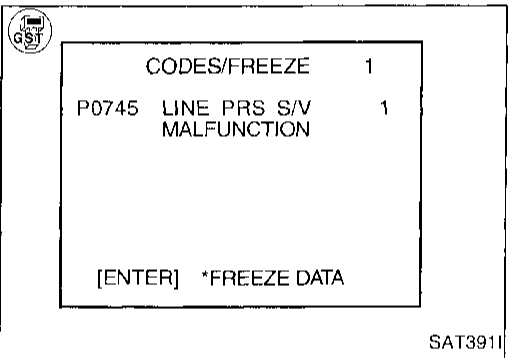
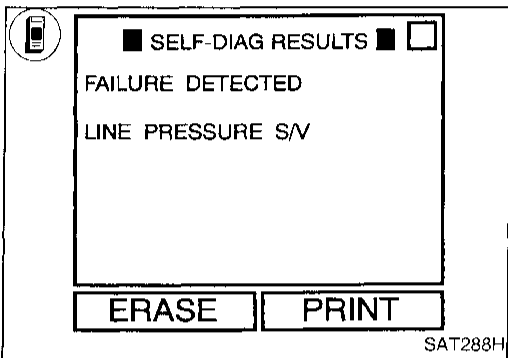
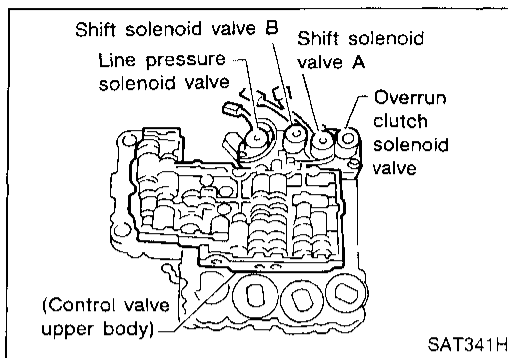
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Line Pressure Solenoid Valve

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.



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: LINE PRESSURE S/V : P0745 : 11th judgement flicker	A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Line pressure solenoid valve

Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 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

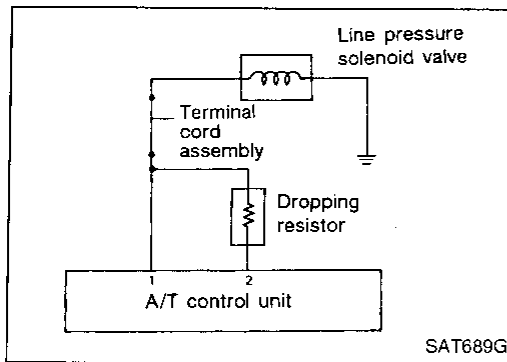
- 1) Start engine.
 2) With brake pedal depressed, shift the lever from "P" → "N" → "D" → "N" → "P".
 3) Select "MODE 7" with GST.

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-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR DTC P0745

Line Pressure Solenoid Valve (Cont'd)



A

CHECK GROUND CIRCUIT.

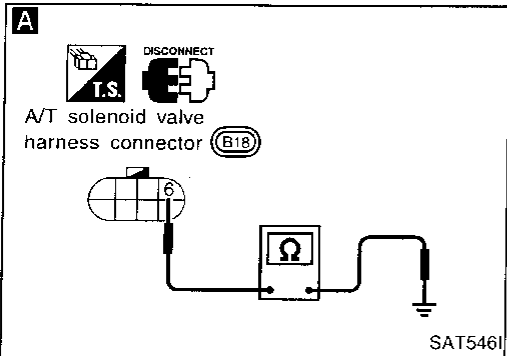
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑥ and ground.

Resistance: 2.5 - 5Ω

NG

1. Remove control valve assembly. Refer to AT-143.
2. Check the following items:
 - Line pressure solenoid valve
Refer to "Component Inspection" on next page.
 - Harness of terminal cord assembly for short or open

OK



B

CHECK POWER SOURCE CIRCUIT.

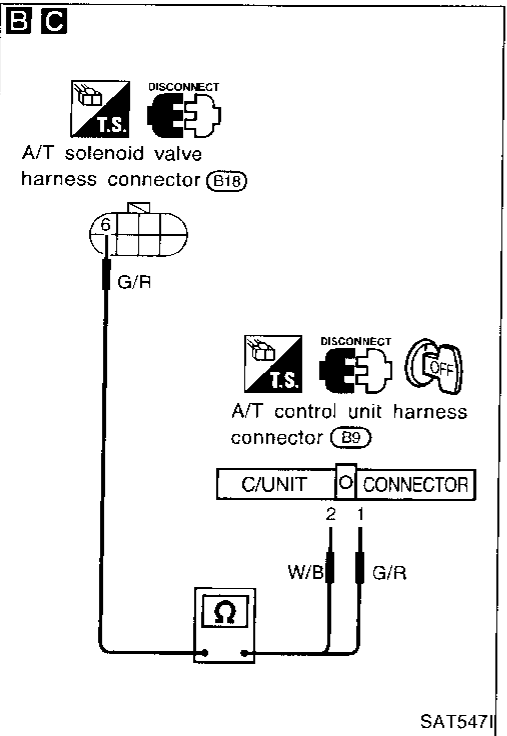
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑥ and A/T control unit harness connector terminal ②.

Resistance: 11.2 - 12.8Ω

NG

- Check the following items:
- Dropping resistor
Refer to "Component Inspection" on next page.
 - Harness for short or open between A/T control unit terminal 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 ⑥ and A/T control unit harness connector terminal ①.

Resistance: Approximately 0Ω

3. Reinstall any part removed.

NG

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

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-90.

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

TROUBLE DIAGNOSIS FOR DTC P0745

Line Pressure Solenoid Valve (Cont'd)

COMPONENT INSPECTION

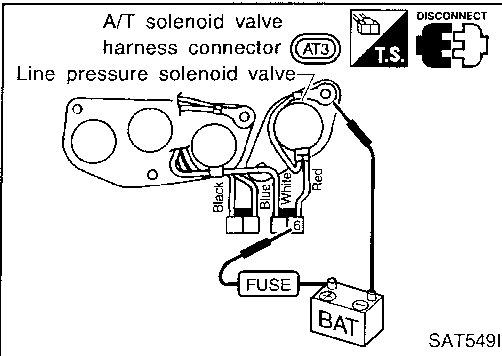
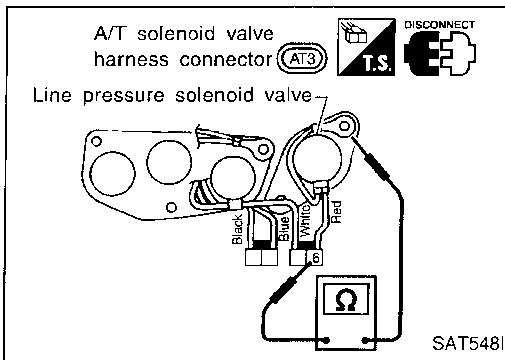
Line pressure solenoid valve

- For removal, refer to AT-143.

Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	⑥	Ground	2.5 - 5Ω

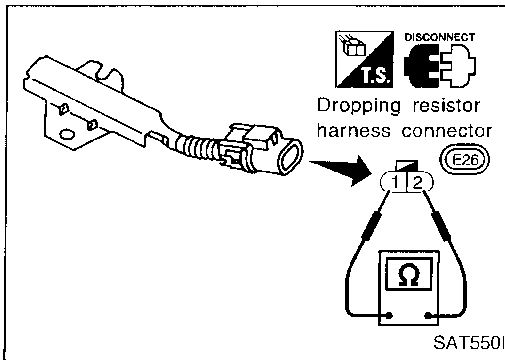


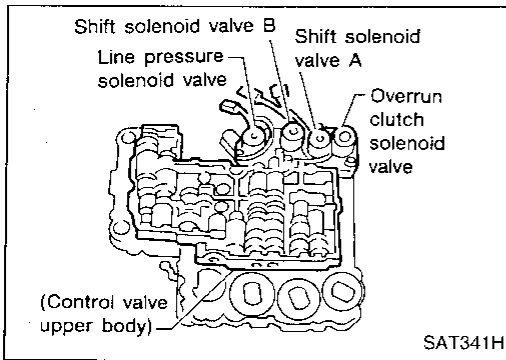
Operation check

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

Dropping resistor

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



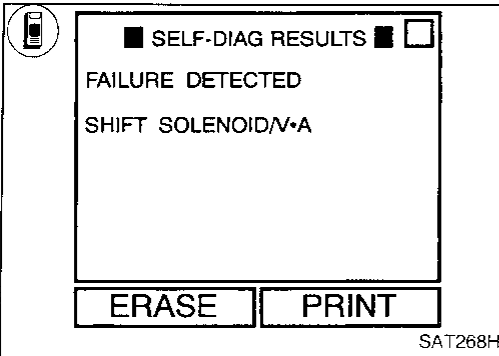


Shift Solenoid Valve A

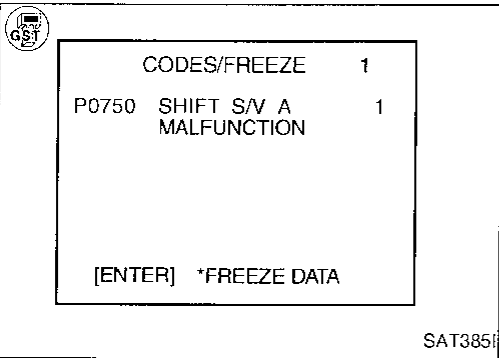
DESCRIPTION

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



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
<ul style="list-style-type: none"> : SHIFT SOLENOID/V-A : P0750 : 4th judgement flicker 	A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve A



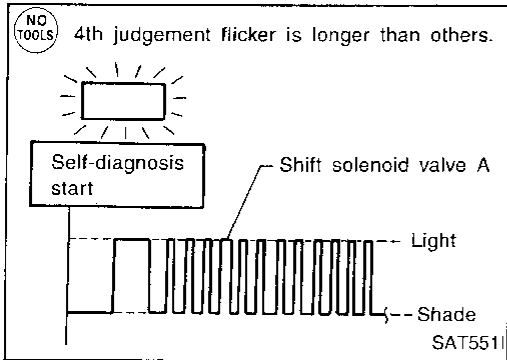
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

- 1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle in D₁ → D₂ position.
- OR

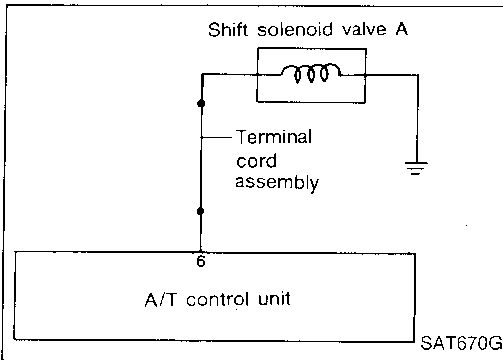
- 1) Start engine.
 2) Drive vehicle in D₁ → D₂ position.
 3) Select "MODE 7" with GST.
- OR

- 1) Start engine.
 2) Drive vehicle in D₁ → D₂ position.
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23.



TROUBLE DIAGNOSIS FOR DTC P0750

Shift Solenoid Valve A (Cont'd)



A

CHECK GROUND CIRCUIT.

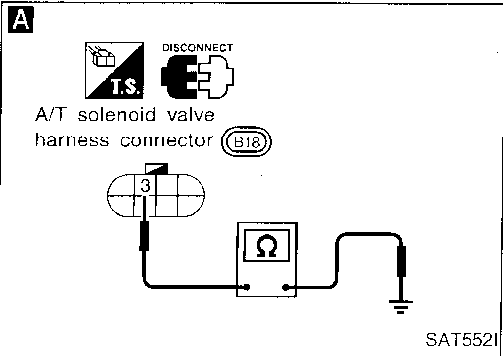
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ③ and ground.

Resistance: 20 - 40Ω

NG

1. Remove control valve assembly. Refer to AT-143.
2. Check the following items:
 - Shift solenoid valve A Refer to "Component Inspection" below.
 - Harness of terminal cord assembly for short or open

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 ③ and A/T control unit harness connector terminal ⑥.

Resistance:

Approximately 0Ω

NG

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

OK

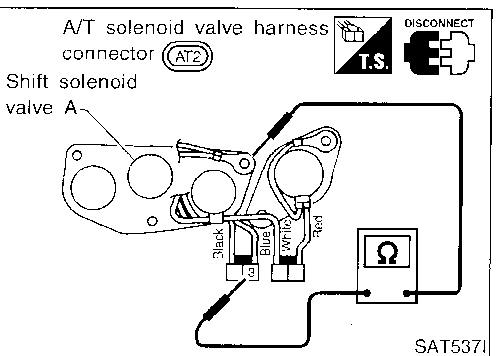
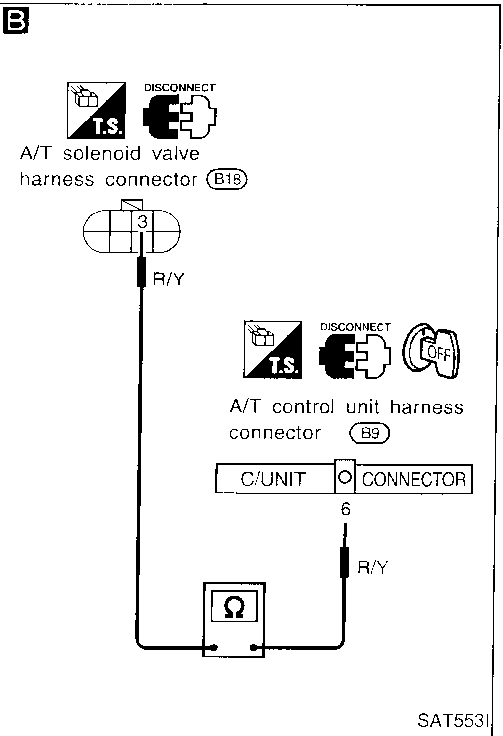
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-93.

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



COMPONENT INSPECTION

Shift solenoid valve A

- For removal, refer to AT-143.

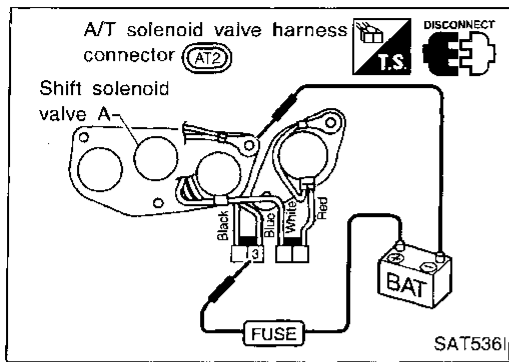
Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	③	Ground	20 - 40Ω

TROUBLE DIAGNOSIS FOR DTC P0750

Shift Solenoid Valve A (Cont'd)



Operation check

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

GI

MA

EM

LC

EC

FE

AT

PD

FA

RA

BR

ST

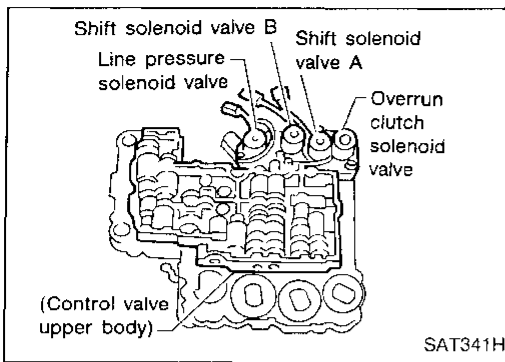
RS

BT

HA

EL

IDX

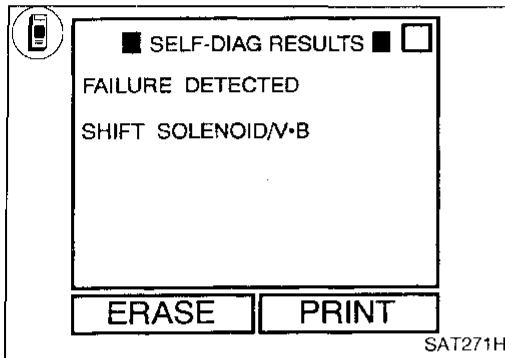


Shift Solenoid Valve B

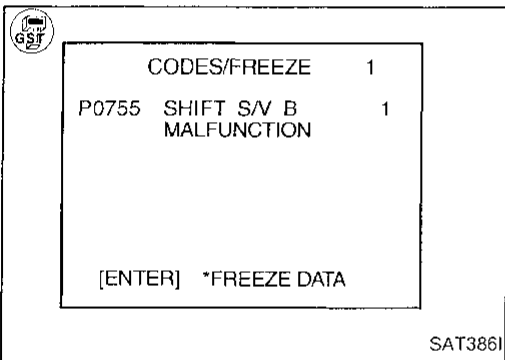
DESCRIPTION

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



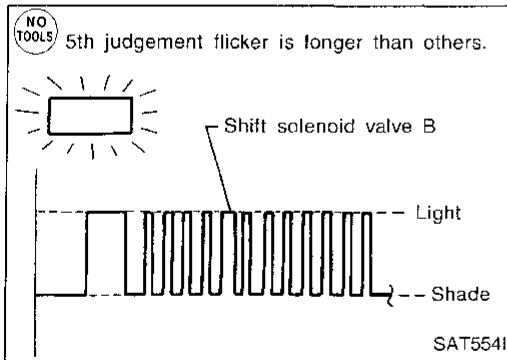
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: SHIFT SOLENOID/V-B : P0755 : 5th judgement flicker	A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Shift solenoid valve B



Diagnostic Trouble Code (DTC) confirmation procedure

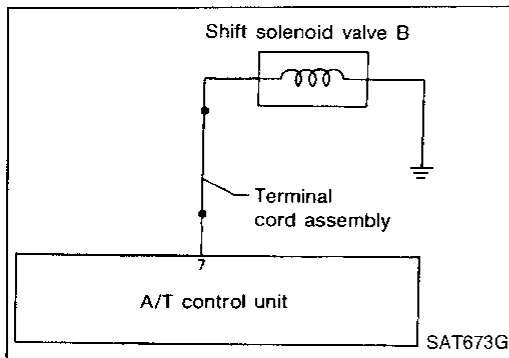
After the repair, perform the following procedure to confirm the malfunction is eliminated.

- | | | |
|----|---|----|
| | 1) Start engine.
2) Select "SELF-DIAG RESULTS" mode with CONSULT.
3) Drive vehicle in D ₁ → D ₂ → D ₃ position. | OR |
| | 1) Start engine.
2) Drive vehicle in D ₁ → D ₂ → D ₃ position.
3) Select "MODE 7" with GST. | |
| OR | | |
| | 1) Start engine.
2) Drive vehicle in D ₁ → D ₂ → D ₃ position.
3) Perform self-diagnosis.
Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23. | |



TROUBLE DIAGNOSIS FOR DTC P0755

Shift Solenoid Valve B (Cont'd)



A

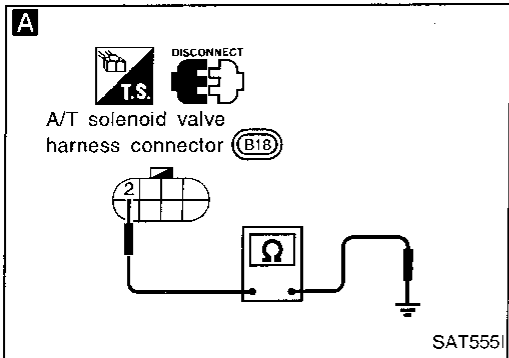
CHECK GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
 2. Disconnect terminal cord assembly connector in engine compartment.
 3. Check resistance between terminal ② and ground.
- Resistance: 20 - 40Ω**

NG

1. Remove control valve assembly. Refer to AT-143.
2. Check the following items:
 - Shift solenoid valve B Refer to "Component Inspection" below.
 - Harness of terminal cord assembly for short or open

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 ② and A/T control unit harness connector 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

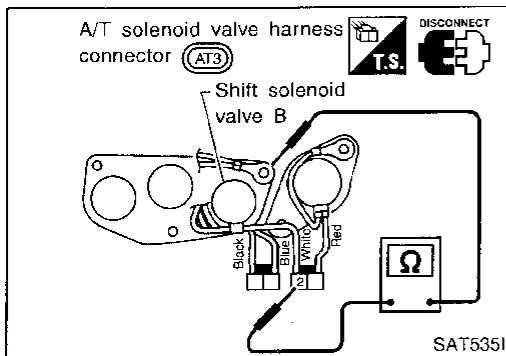
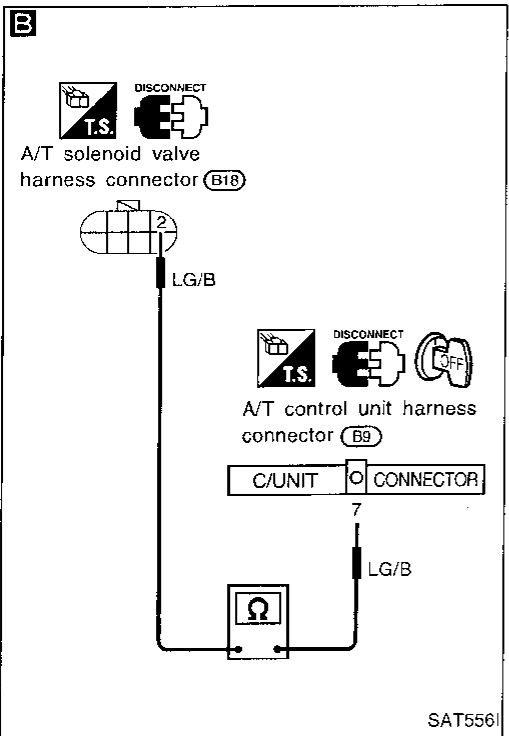
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-96.

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



COMPONENT INSPECTION

Shift solenoid valve B

- For removal, refer to AT-143.

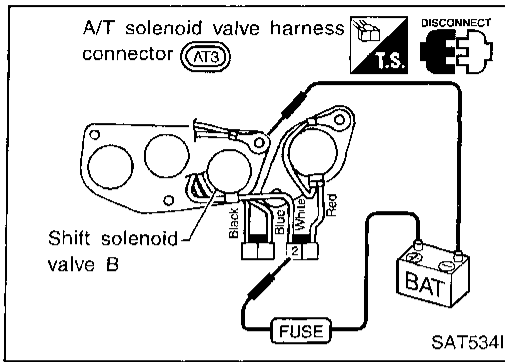
Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve B	②	Ground	20 - 40Ω

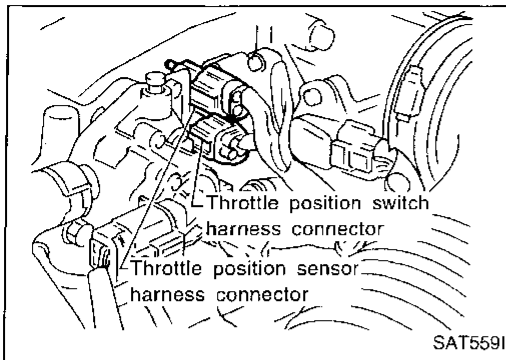
TROUBLE DIAGNOSIS FOR DTC P0755

Shift Solenoid Valve B (Cont'd)



Operation check




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

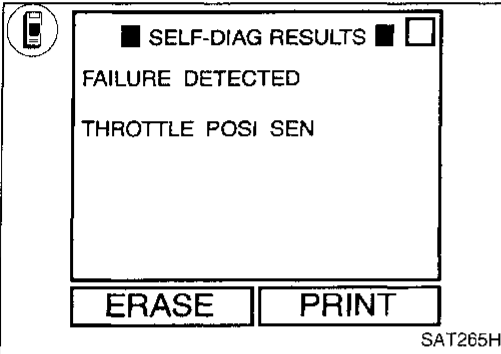


Throttle Position Sensor

DESCRIPTION


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

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : THROTTLE POSITION  : P1705  : 3rd judgement flicker	A/T control unit receives an excessively low or high voltage from the sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Throttle position sensor




Diagnostic Trouble Code (DTC) confirmation procedure


After the repair, perform the following procedure to confirm the malfunction is eliminated.

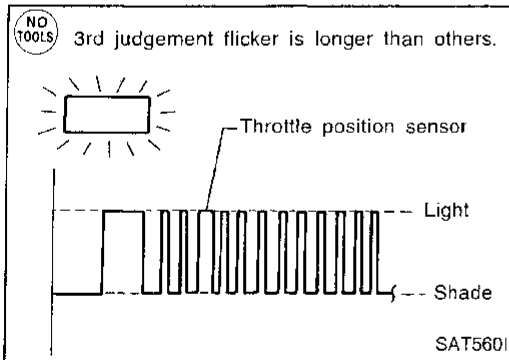
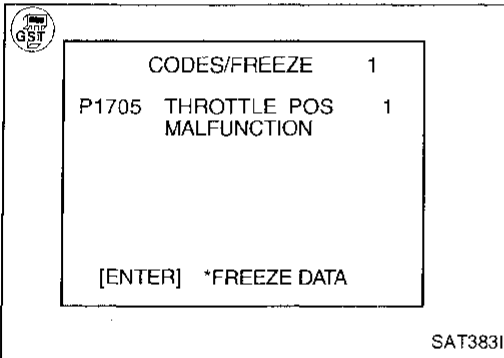
-  1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.

OR

-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector 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 7" with GST.

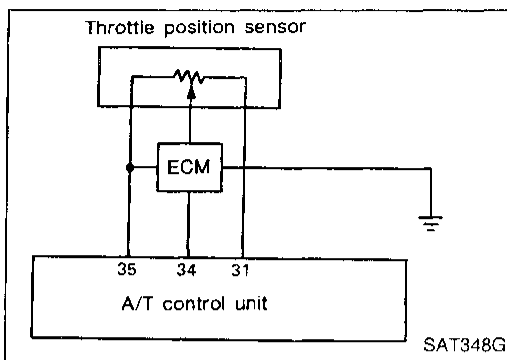
OR

-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector 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-DIAGNOSTIC PROCEDURE (No Tools), AT-23.



TROUBLE DIAGNOSIS FOR DTC P1705

Throttle Position Sensor (Cont'd)

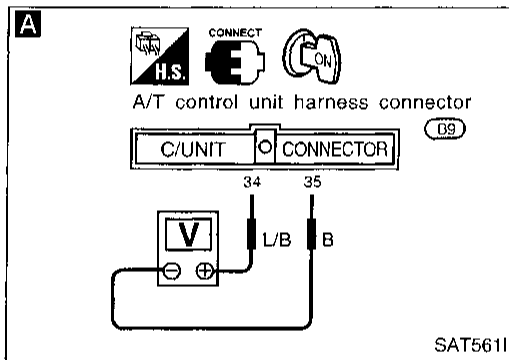


A

☆ 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



Perform diagnostic test mode II (self-diagnostic results) for engine control. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

NG → Check throttle position sensor circuit for engine control. Refer to EC section ["Throttle Position Sensor (DTC : 0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].

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:
Approximately 0.5V

Fully-open throttle:
Approximately 4V

NG → Check harness for short or open 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:
Approximately 0.5V

Fully-open throttle valve:
Approximately 4V

(Voltage rises gradually in response to throttle position)

OK ↓

CHECK THROTTLE POSITION SWITCH. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", "CHECK THROTTLE POSITION SWITCH CIRCUIT", AT-60.

NG → Repair or replace damaged parts.

OK ↓

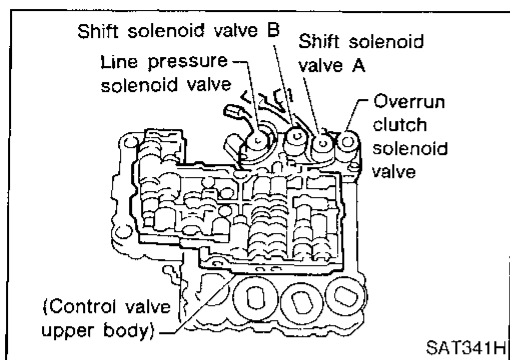
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-99.

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 ↓

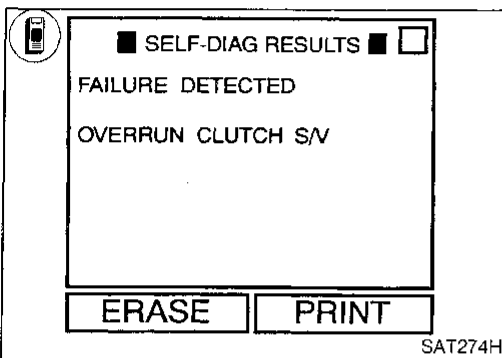
INSPECTION END



Overrun Clutch Solenoid Valve

DESCRIPTION

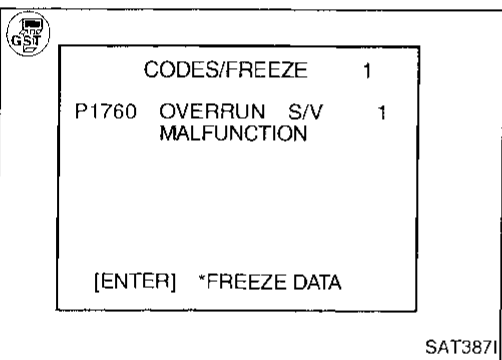
The overrun clutch solenoid valve is activated by the A/T control unit in response to signals sent from the inhibitor switch, overdrive control switch, vehicle speed and throttle position sensors. The overrun clutch operation will then be controlled.



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
<ul style="list-style-type: none"> : OVERRUN CLUTCH S/V : P1760 : 6th judgement flicker 	A/T control unit detects an improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> • Harness or connectors (The solenoid circuit is open or shorted.) • Overrun clutch solenoid valve

Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

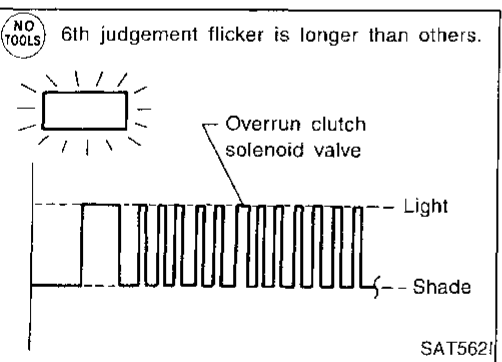


- 1) Start engine.
- 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
- 3) Drive vehicle under the following conditions: Selector lever in "D", overdrive control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).

OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", overdrive control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
- 3) Select "MODE 7" with GST.

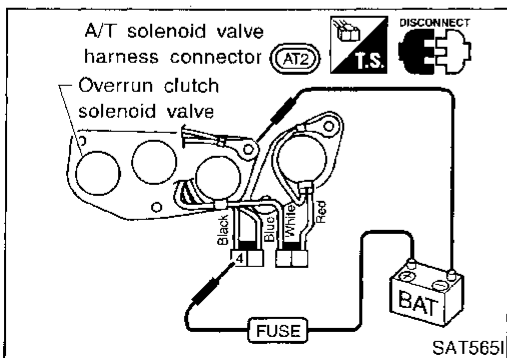
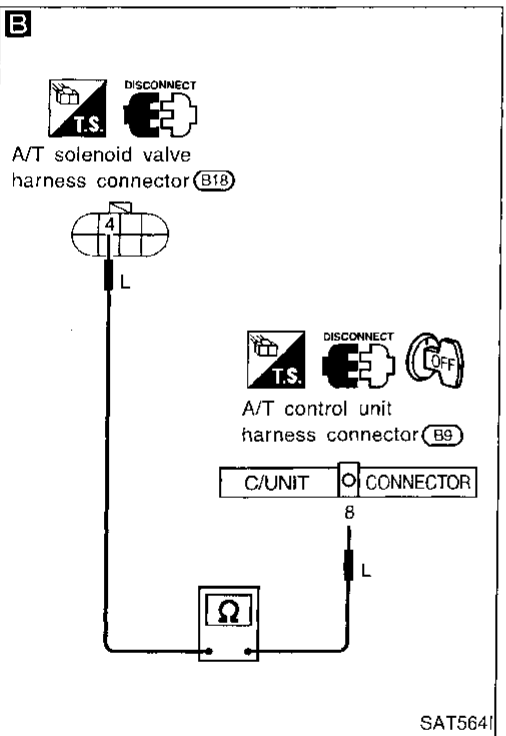
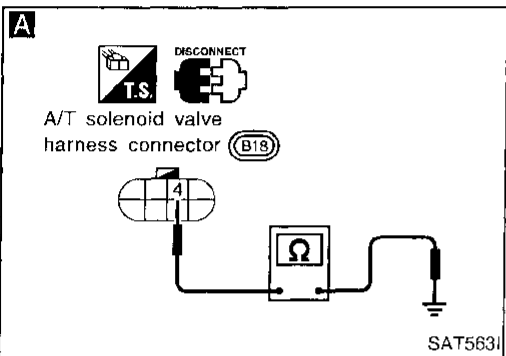
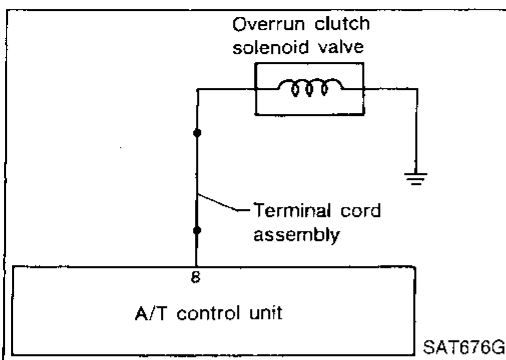
OR



- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", overdrive control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR DTC P1760

Overrun Clutch Solenoid Valve (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 ④ and ground.

Resistance: 20 - 40Ω

NG

1. Remove control valve assembly. Refer to AT-143.
2. Check the following items:
 - Overrun clutch solenoid valve
 Refer to "Component Inspection" below.
 - Harness of terminal cord assembly for short or open

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 ④ and A/T control unit harness connector 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 Diagnostic Trouble Code (DTC) confirmation procedure, AT-101.

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

COMPONENT INSPECTION

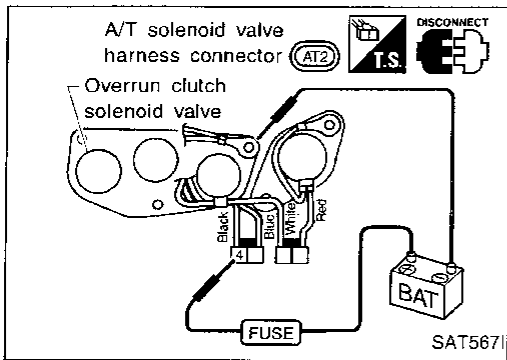
Overrun clutch solenoid valve

- For removal, refer to AT-143.
- #### Resistance check
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Overrun clutch solenoid valve	④	Ground	20 - 40Ω

TROUBLE DIAGNOSIS FOR DTC P1760

Overrun Clutch Solenoid Valve (Cont'd)



Operation check

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

GI

MA

EM

LC

EC

FE

AT

PD

FA

RA

BR

ST

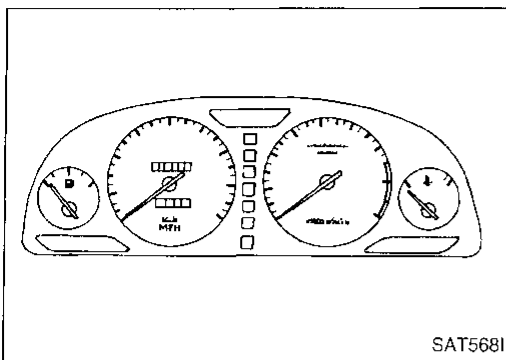
RS

BT

HA

EL



IDX

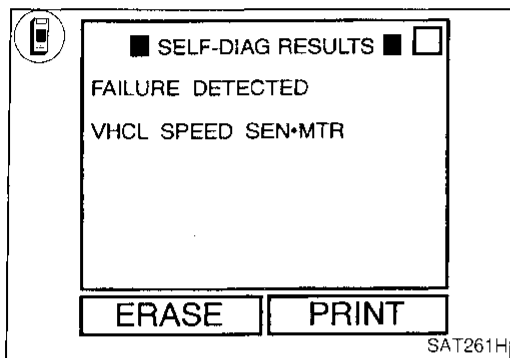


Vehicle Speed Sensor·MTR

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.

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : VHCL SPEED SEN·MTR	A/T control unit does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or shorted.) • Vehicle speed sensor
 : 2nd judgement flicker		




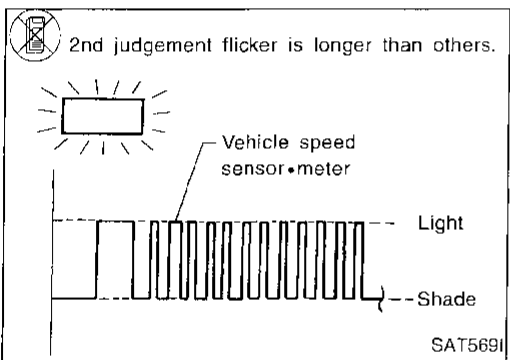
Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

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

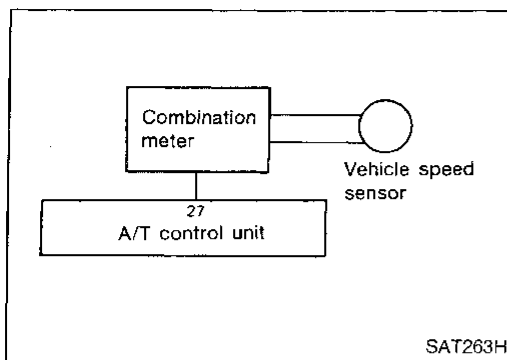
OR

-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector lever in "D" and vehicle speed higher than 20 km/h (12 MPH).
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-23.



TROUBLE DIAGNOSIS FOR VHCL SPEED SEN-MTR

Vehicle Speed Sensor-MTR (Cont'd)

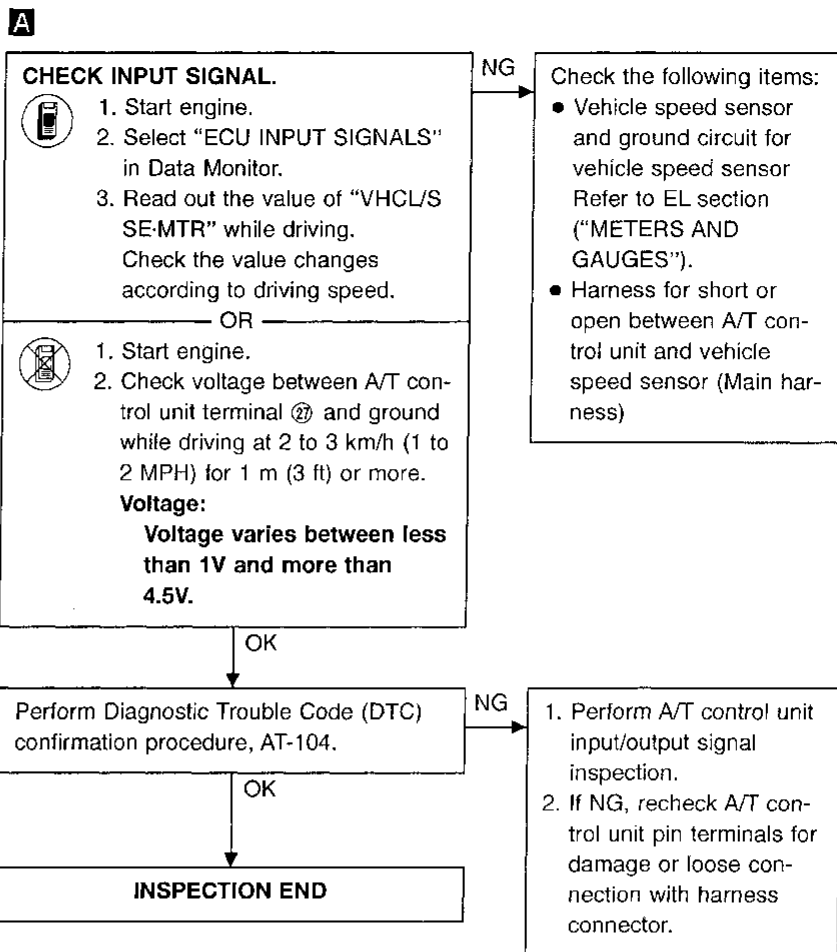
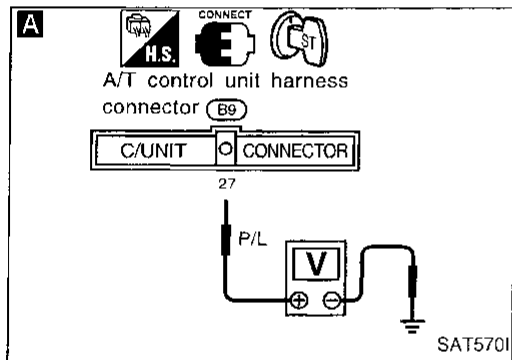


A

☆ 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



GI

MA

EW

LC

EC

FE

AT

PD

FA

RA

BR

ST

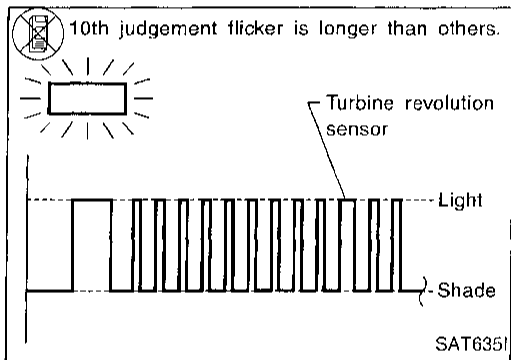
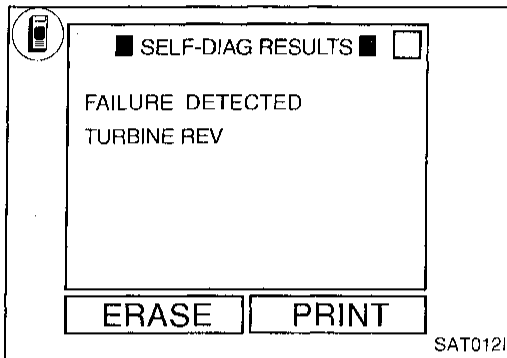
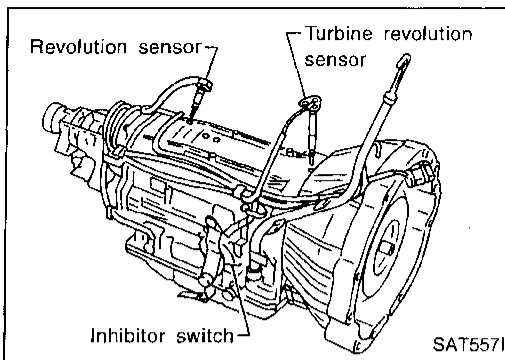
RS

BT

HA

EL



IDX



Turbine Revolution Sensor


DESCRIPTION

The turbine revolution sensor detects input shaft rpm (revolutions per minute). It is located on the input side of the automatic transmission. The vehicle speed sensor A/T (Revolution sensor) is located on the output side of the automatic transmission. With the two sensors, input and output shaft rpms are accurately detected. The result is optimal shift timing during deceleration and improved shifting.


Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 : TURBINE REV	A/T control unit does not receive the proper voltage signal from the sensor.	<ul style="list-style-type: none"> • Harness or connectors (The sensor circuit is open or short.) • Turbine revolution sensor
 : 10th judgement flicker		

Diagnostic Trouble Code (DTC) confirmation procedure

After the repair, perform the following procedure to confirm the malfunction is eliminated.

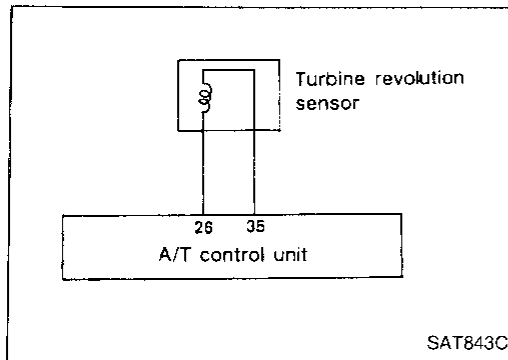
-  1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

OR

-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 40 km/h (25 MPH), engine speed higher than 1,500 rpm, 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-DIAGNOSTIC PROCEDURE (No Tools), AT-23.

TROUBLE DIAGNOSIS FOR TURBINE REV

Turbine Revolution Sensor (Cont'd)

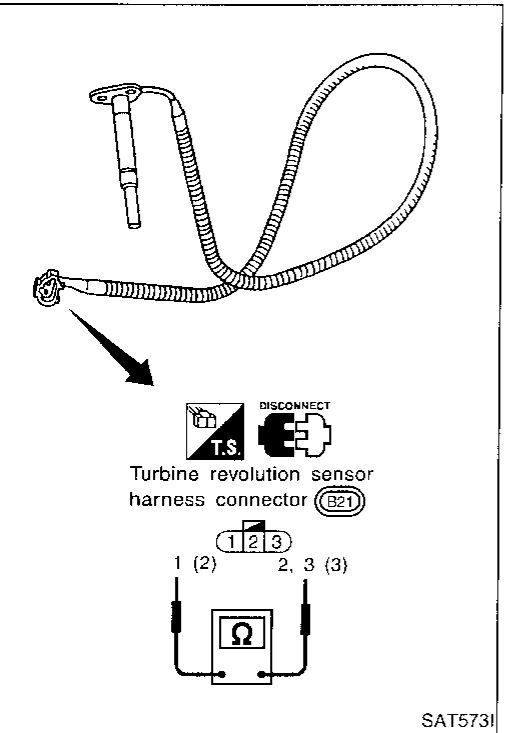
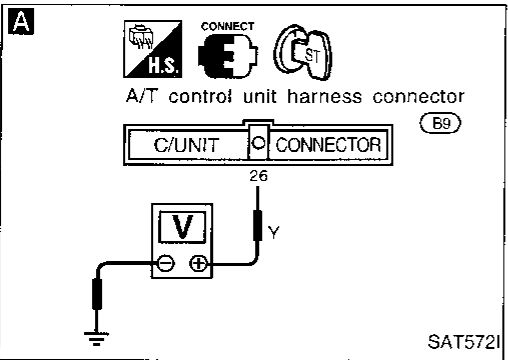


A

☆MONITOR	☆NO FAIL	
VHCL/S SE-A/T		0km/h
VHCL/S SE-MTR		5km/h
THRTL POS SEN		0.4V
FLUID TEMP SE		0.9V
BATTERY VOLT		13.3V
ENGINE SPEED		704rpm
TURBINE REV		672rpm
OVERDRIVE SW		OFF
P/N POSI SW		O N

RECORD

SAT109G



CHECK TURBINE REVOLUTION SENSOR. Refer to "Component Inspection" below.

NG → Repair or replace turbine revolution sensor.

OK →

A

CHECK INPUT SIGNAL.

- Turn ignition switch to "START" position and start engine.
- Select "ECU INPUT SIGNALS".
 - Read out the value of "TURBINE REV".
 - Check the value changes according to engine speed.

OR

Check voltage between A/T control unit terminal 26 and ground. (Measure in AC range.)

Voltage:
Approximately 1.2V

NG → Check harness for short or open between A/T control unit and turbine revolution sensor.

OK →

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-106.

NG →

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

OK →

INSPECTION END

COMPONENT INSPECTION

Turbine revolution sensor

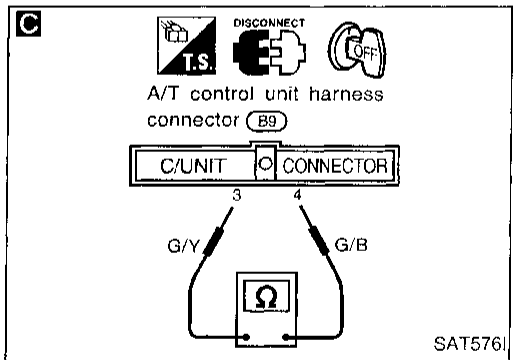
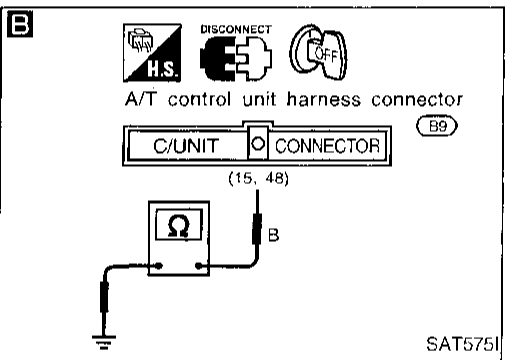
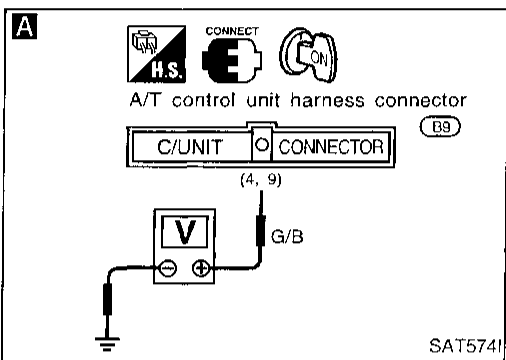
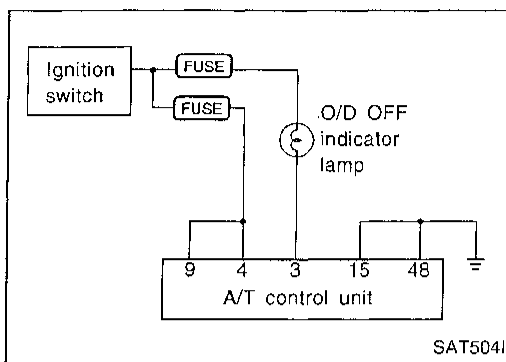
- Check resistance between terminals ①, ② and ③.

Terminal No.		Resistance
①	②	2,200 - 2,800Ω
①	③	No continuity
②	③	No continuity

1. O/D OFF Indicator Lamp Does Not Come On

SYMPTOM:

O/D OFF indicator lamp does not come on for about 2 seconds when turning ignition switch to "ON".



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 for short or open between ignition switch and A/T control unit (Main harness)
 - Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").

OK

B

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 for short or open between A/T control unit and ground.

OK

C

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:
- O/D OFF indicator lamp Refer to EL section.
 - Harness for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
 - Harness for short or open between O/D OFF indicator lamp and A/T control unit

OK

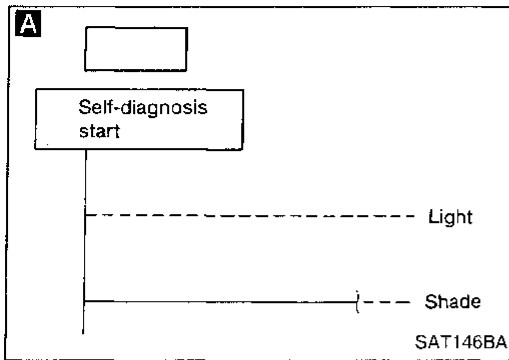
Check again.

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

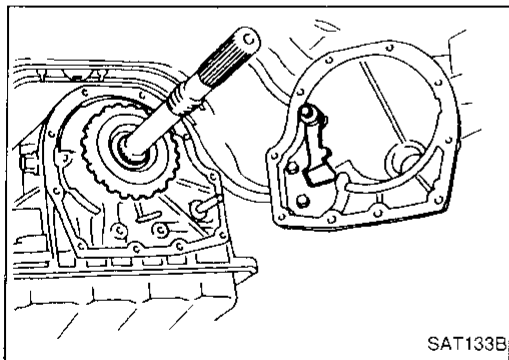
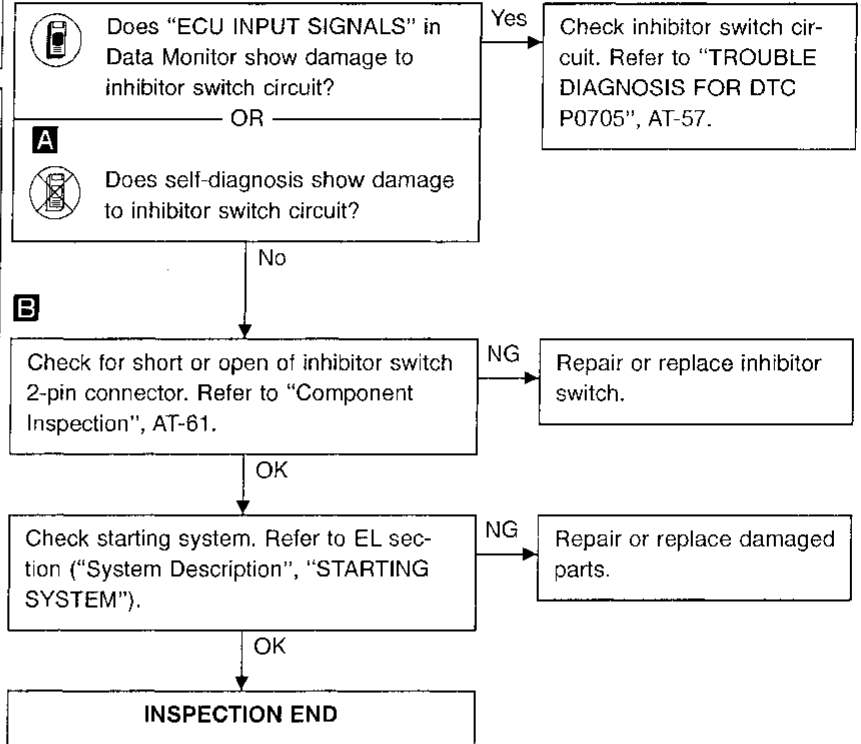
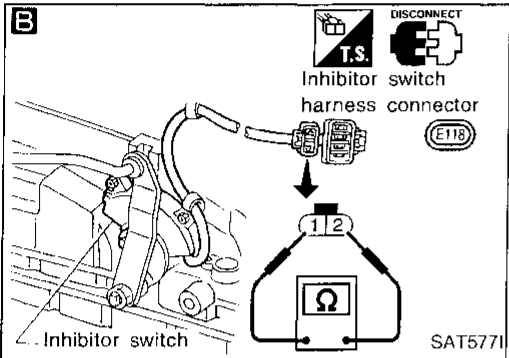
INSPECTION END



2. Engine Cannot Be Started In "P" and "N" Position

SYMPTOM:

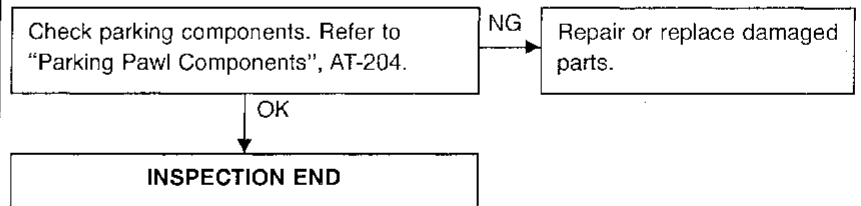
- Engine cannot be started with selector lever in "P" or "N" position.
- Engine can be started with selector lever in "D", "2", "1" or "R" position.

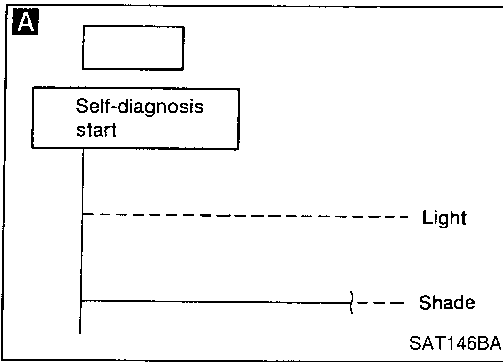


3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed

SYMPTOM:

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

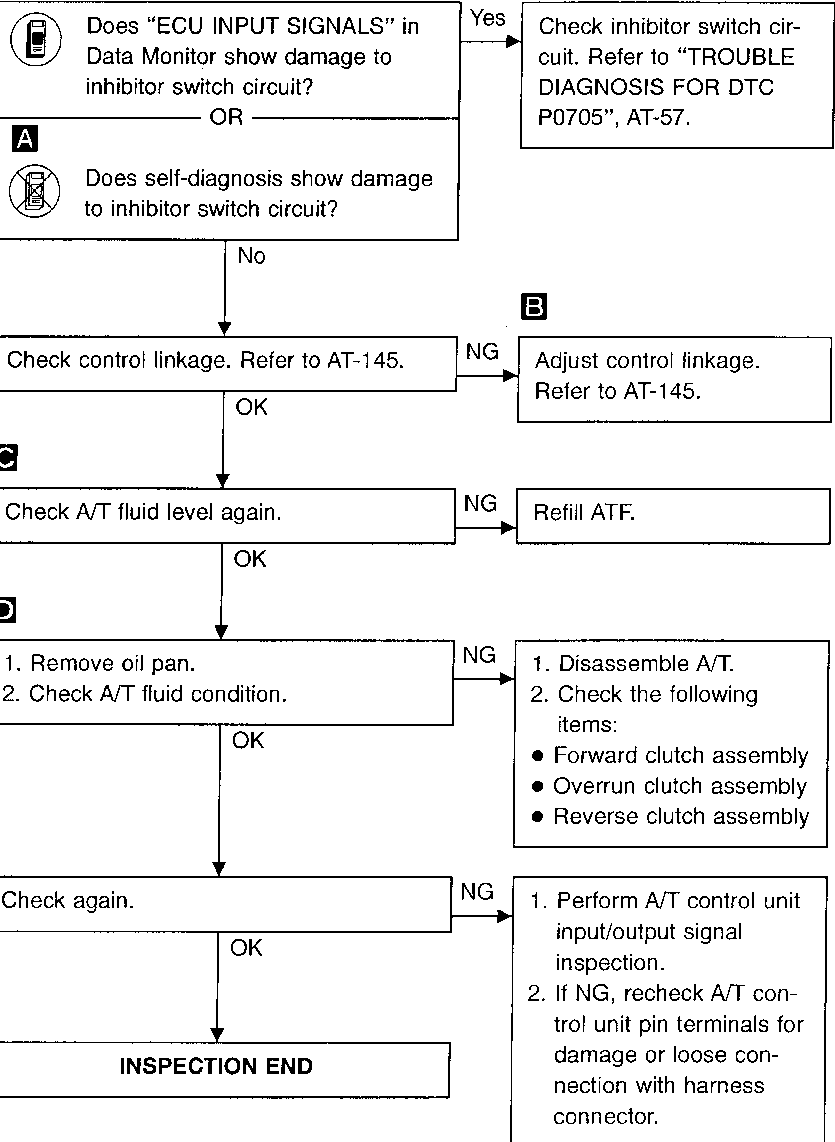
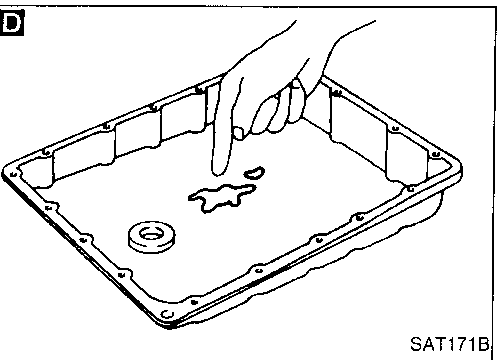
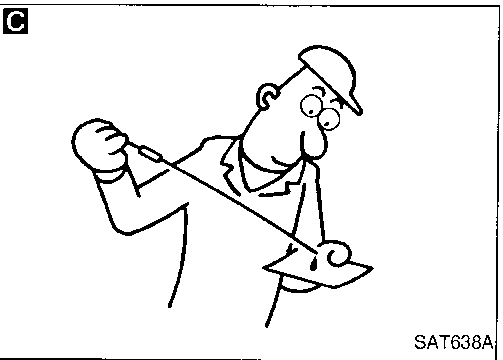
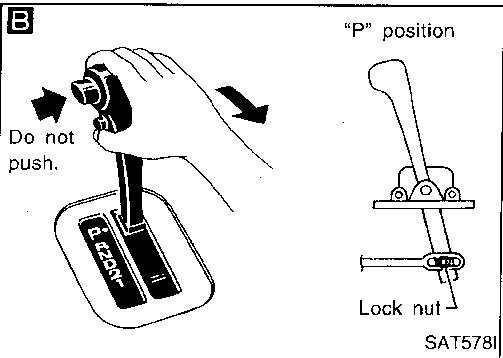




4. In "N" Position, Vehicle Moves

SYMPTOM:

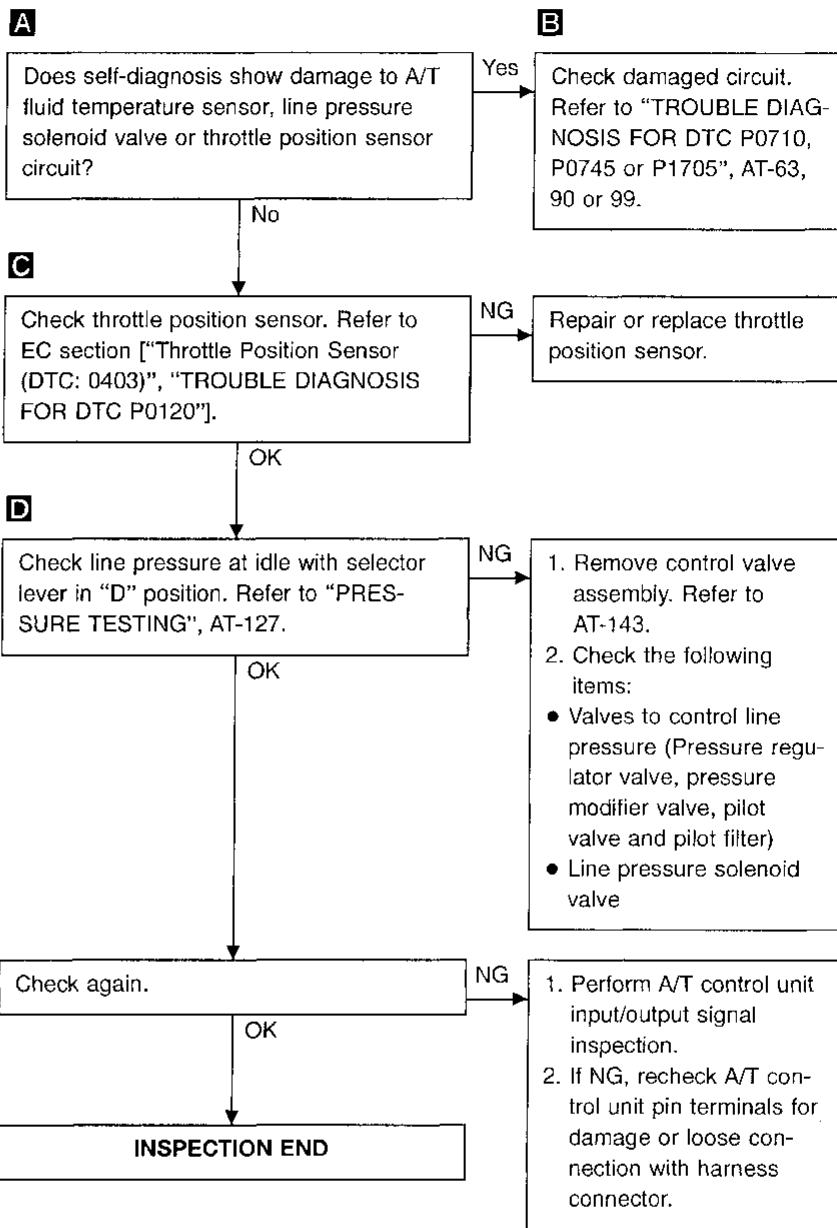
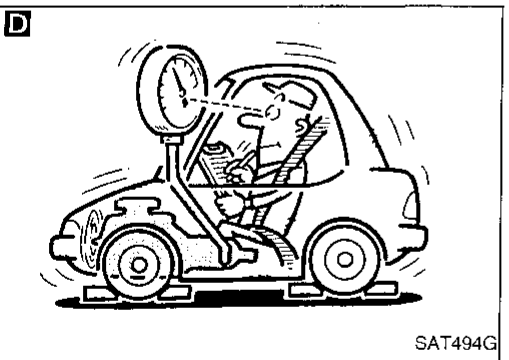
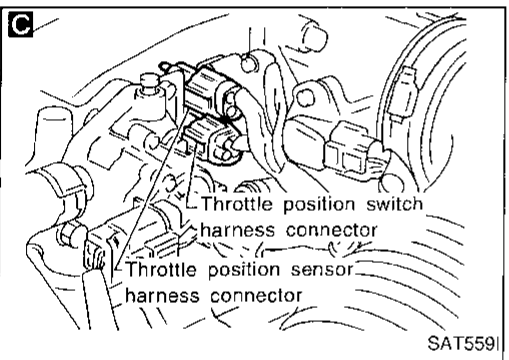
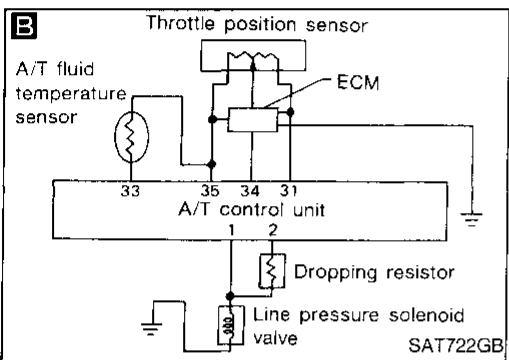
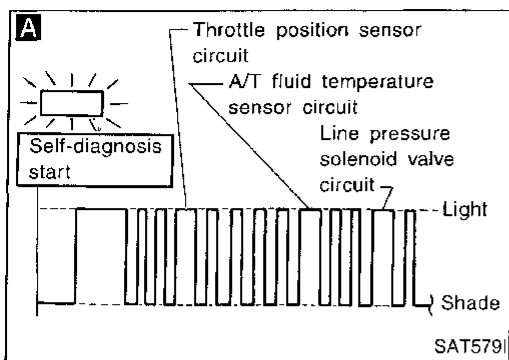
Vehicle moves forward or backward when selecting "N" position.



5. Large Shock. "N" → "R" Position

SYMPTOM:

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

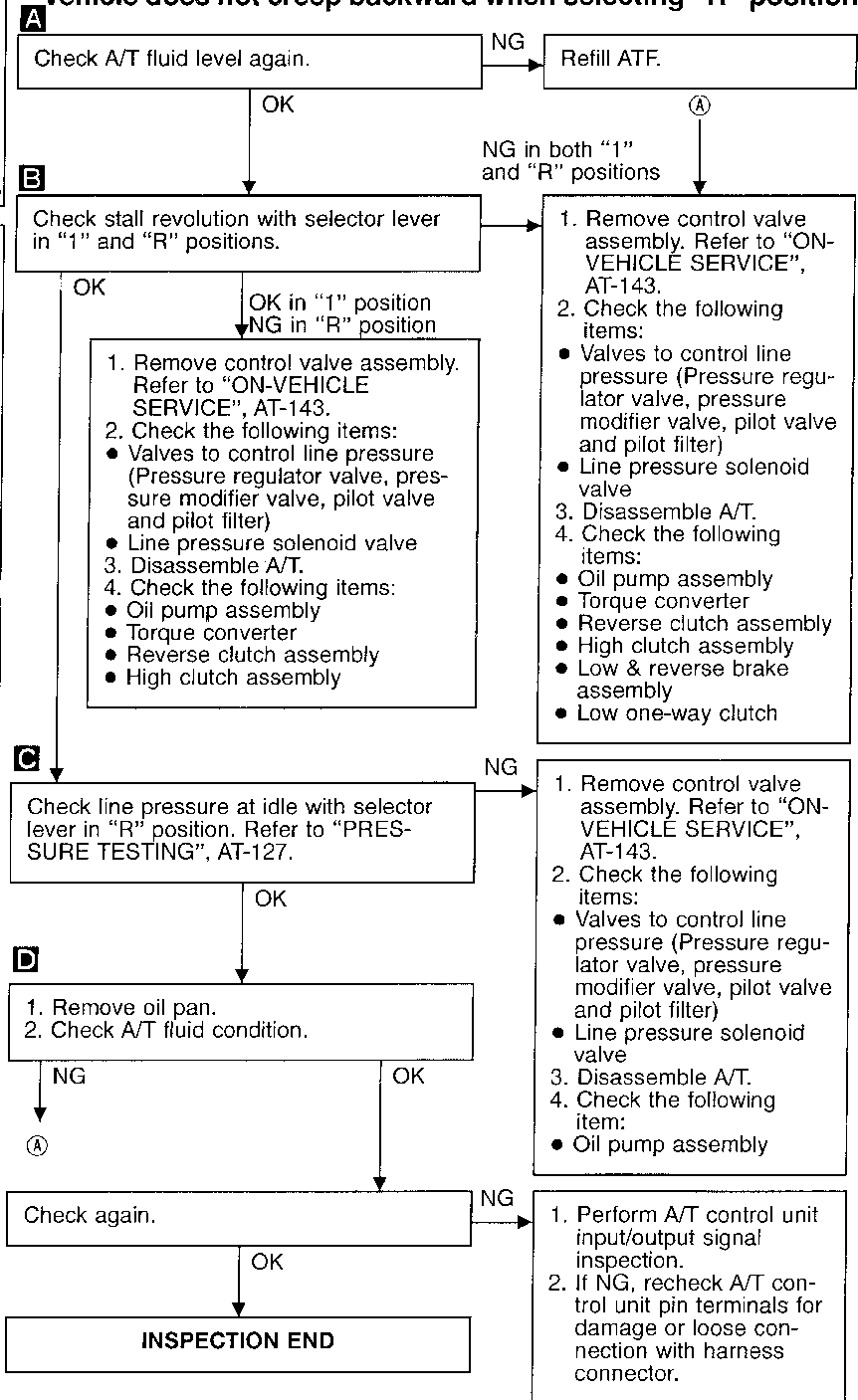
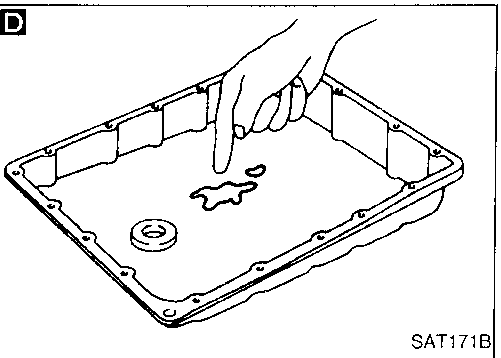
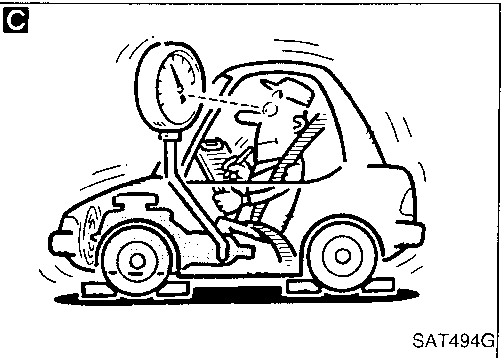
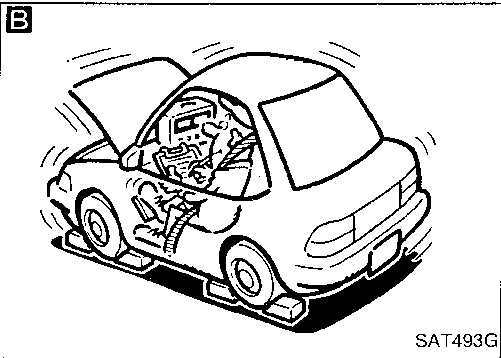
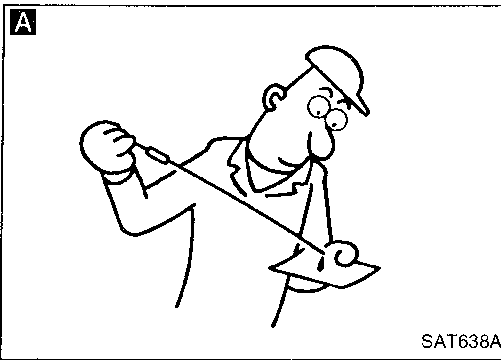


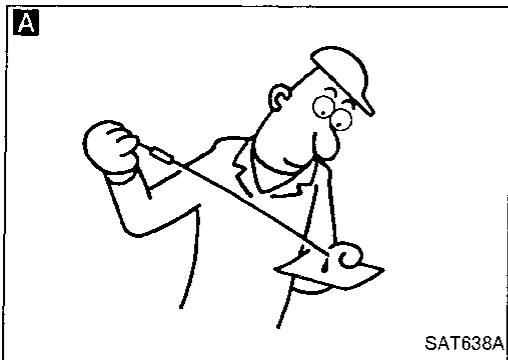
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6. Vehicle Does Not Creep Backward In "R" Position

SYMPTOM:

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

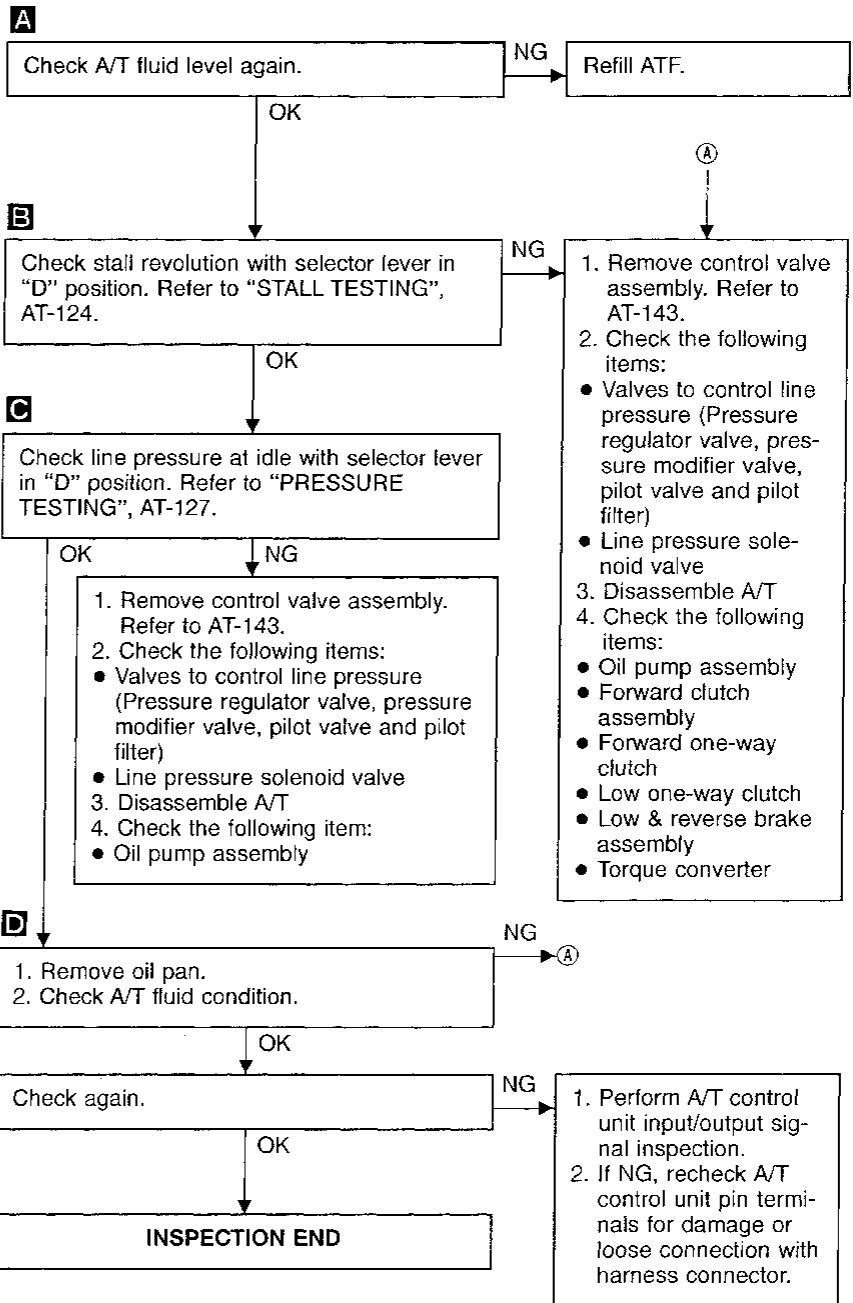
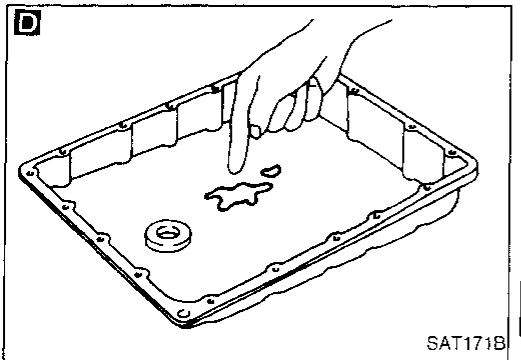
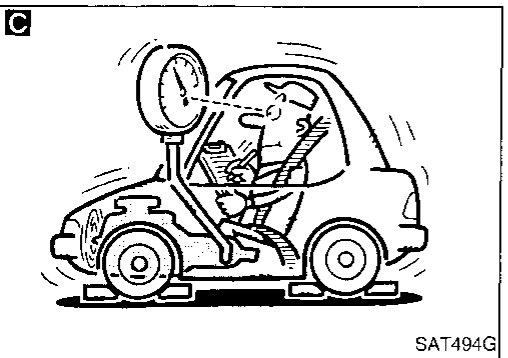
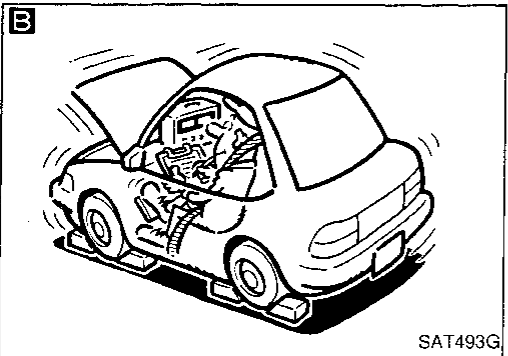




7. Vehicle Does Not Creep Forward In "D", "2" Or "1" Position

SYMPTOM:

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

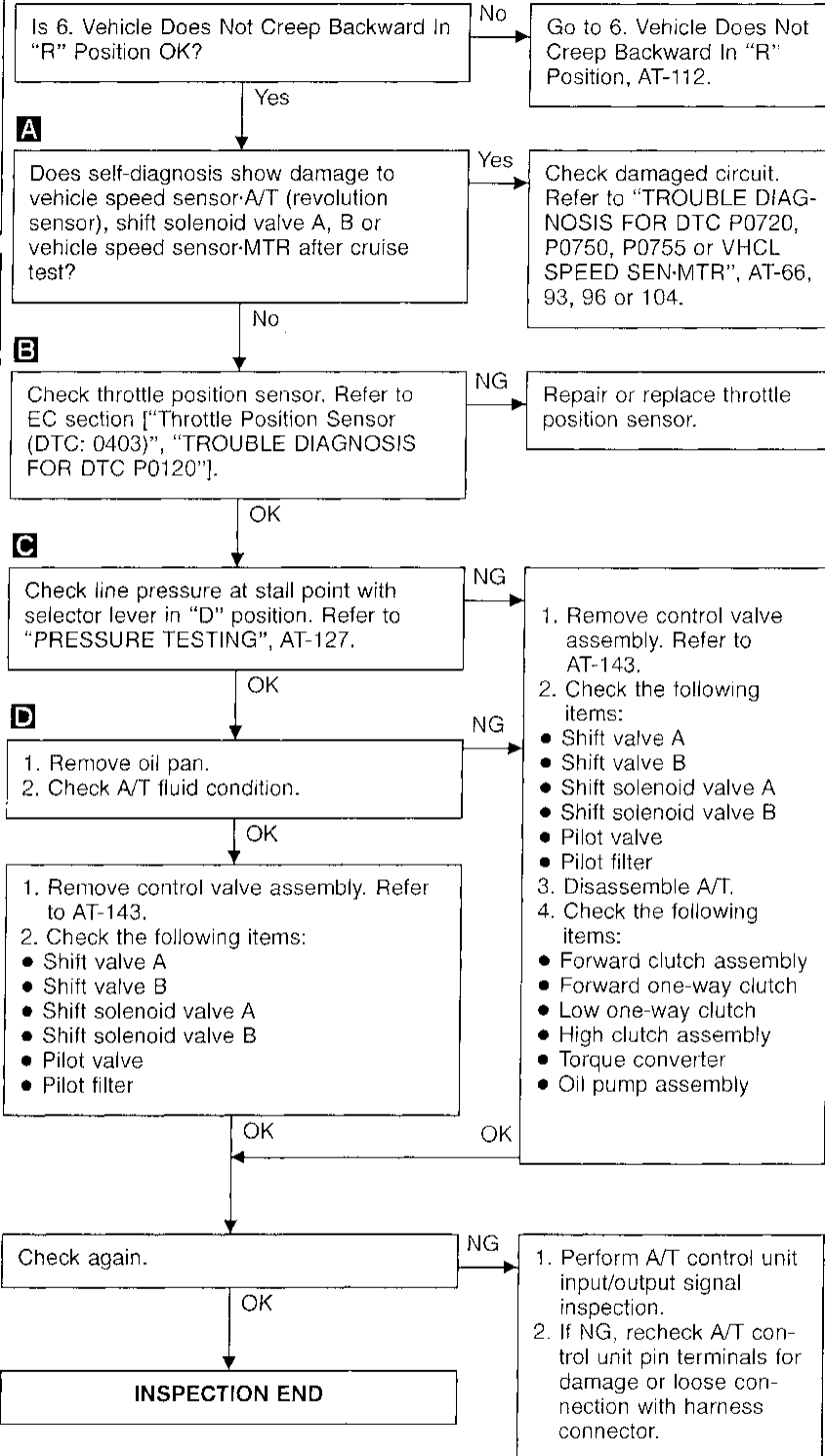
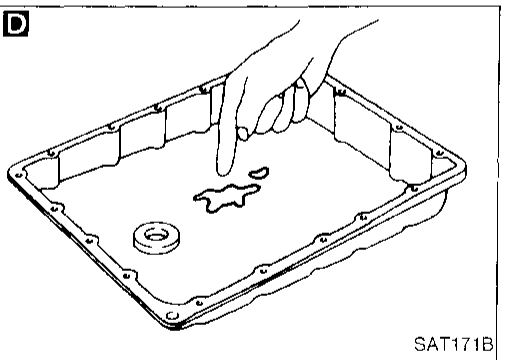
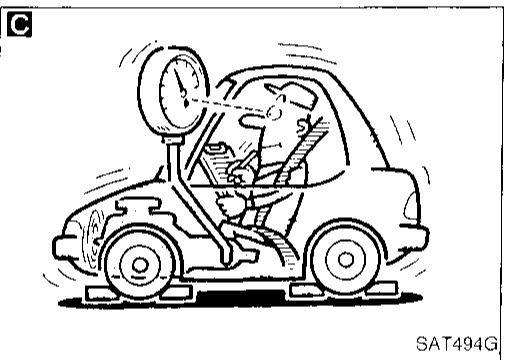
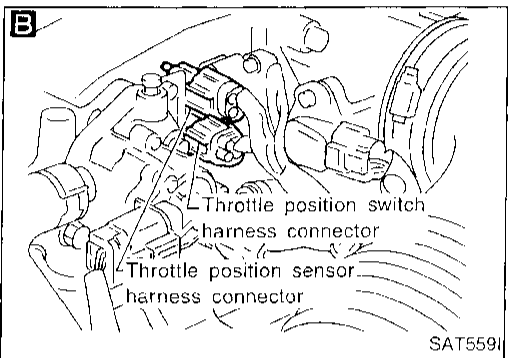
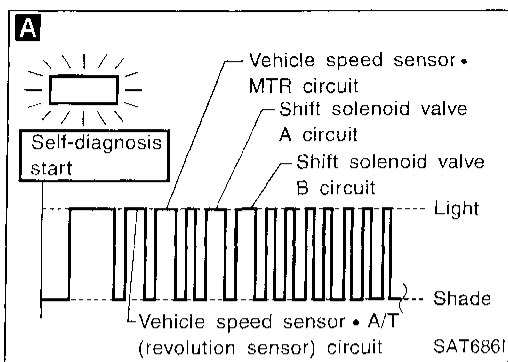


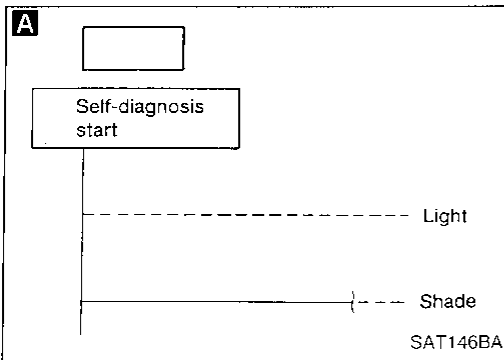
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8. Vehicle Cannot Be Started From D₁

SYMPTOM:

Vehicle cannot be started from D₁ on Cruise test — Part 1.

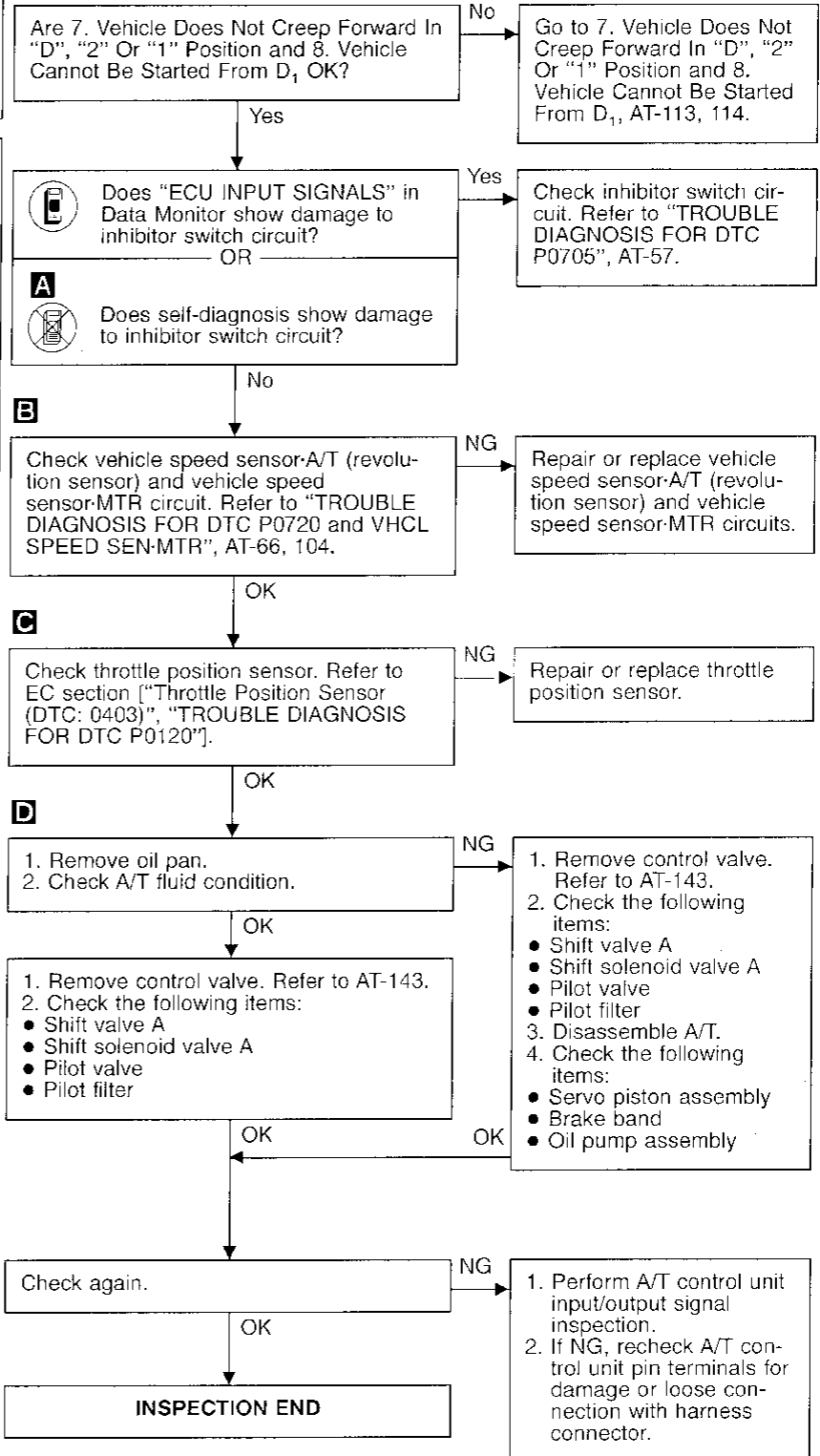
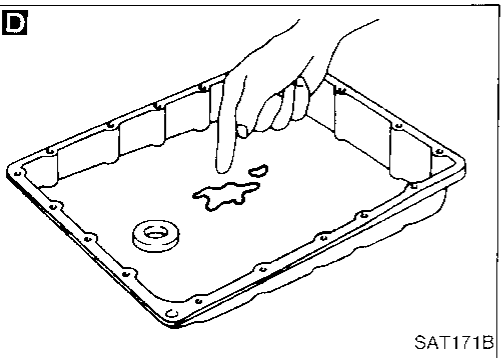
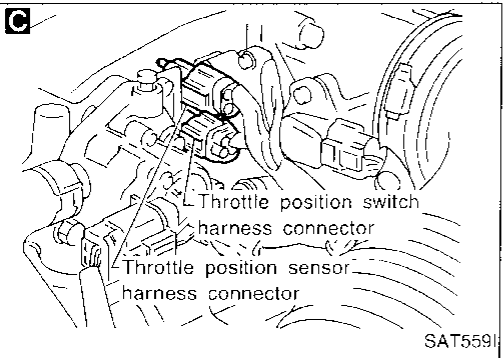
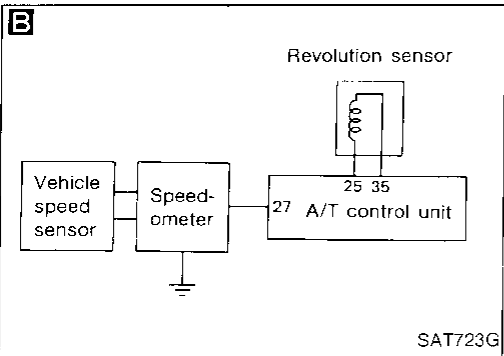




9. A/T Does Not Shift: $D_1 \rightarrow D_2$ Or Does Not Kickdown: $D_4 \rightarrow D_2$

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.



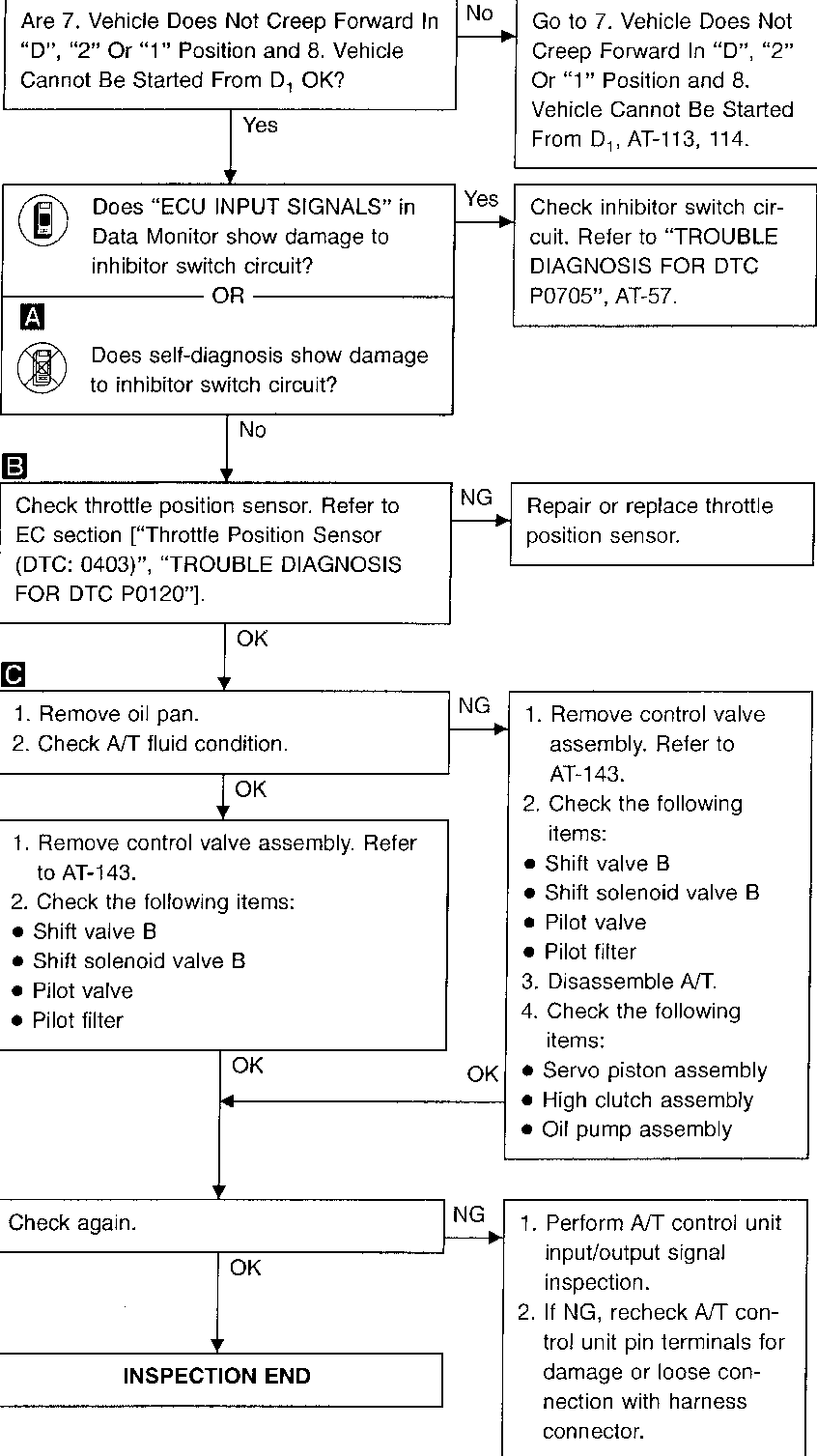
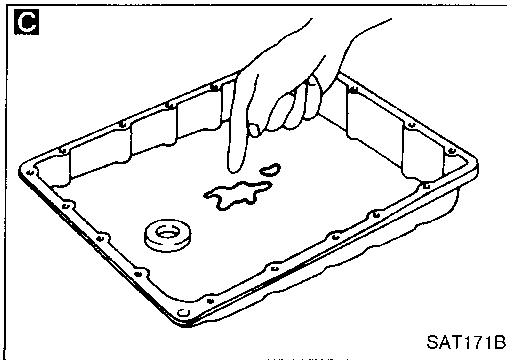
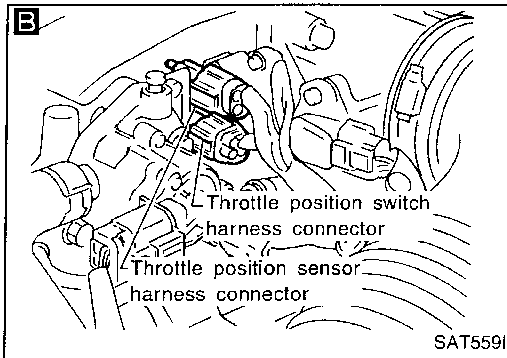
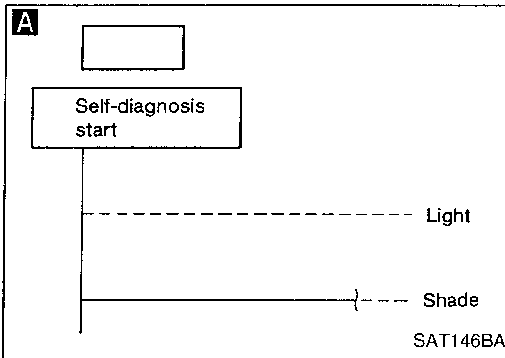
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DIAGNOSTIC PROCEDURES FOR SYMPTOMS

10. A/T Does Not Shift: $D_2 \rightarrow D_3$

SYMPTOM:

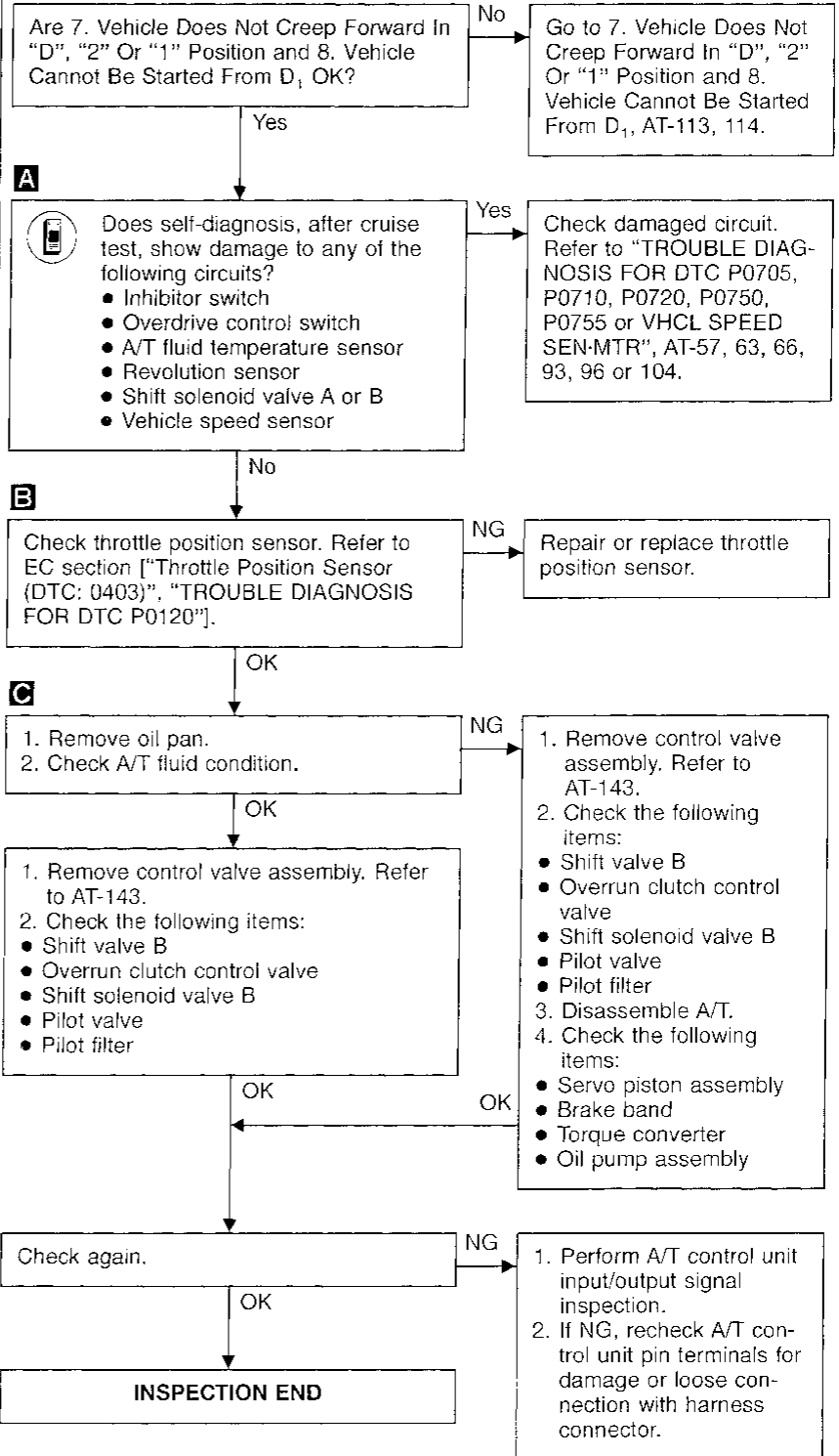
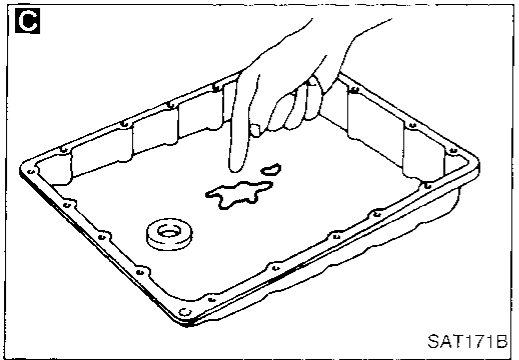
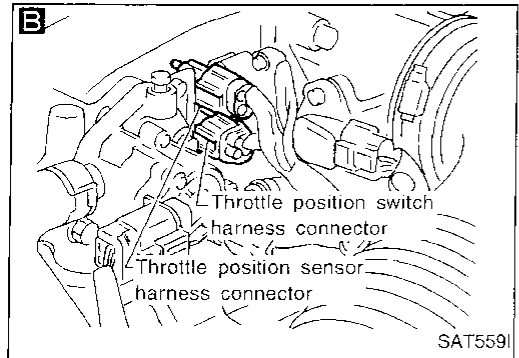
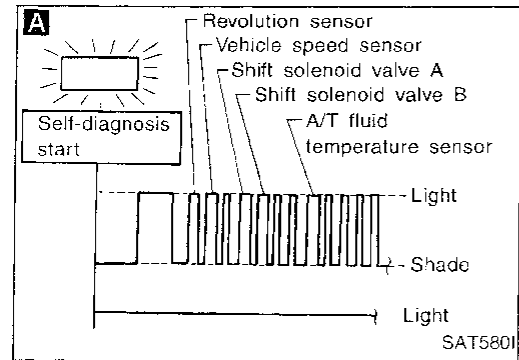
A/T does not shift from D_2 to D_3 at the specified speed.



11. A/T Does Not Shift: D₃ → D₄

SYMPTOM:

- A/T does not shift from D₃ to D₄ at the specified speed.
- A/T must be warm before D₃ to D₄ shift will occur.

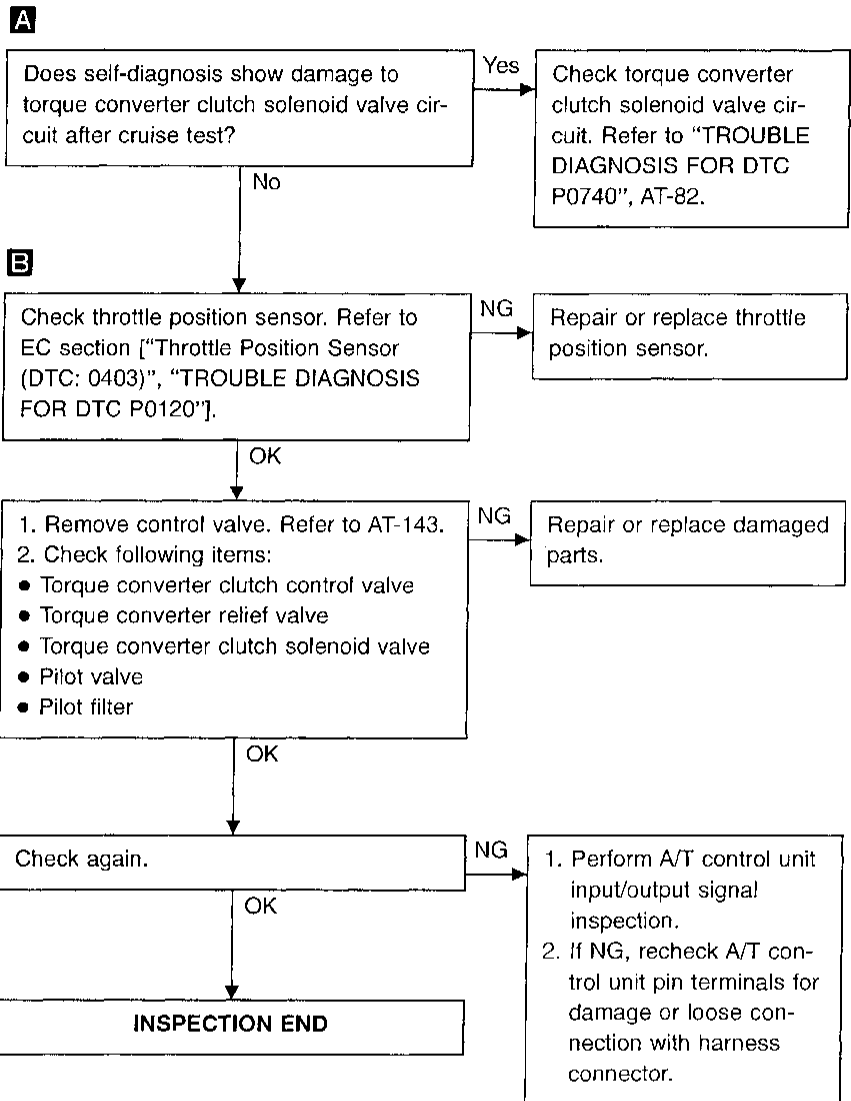
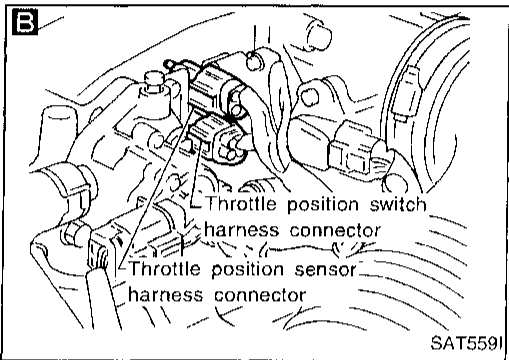
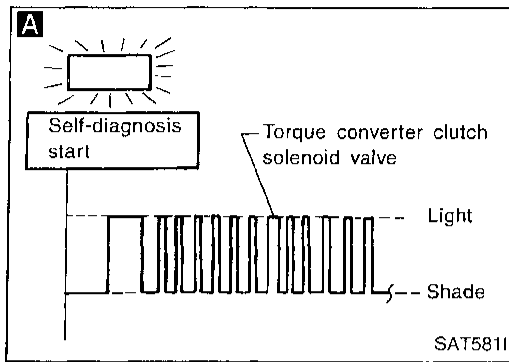


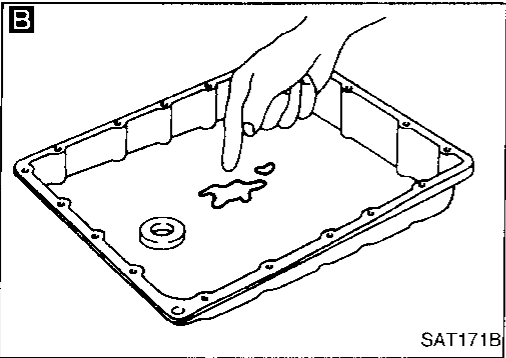
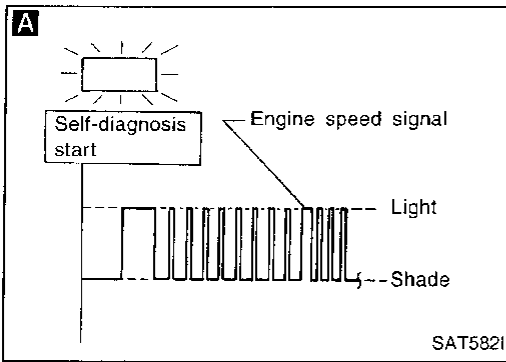
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12. A/T Does Not Perform Lock-up

SYMPTOM:

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

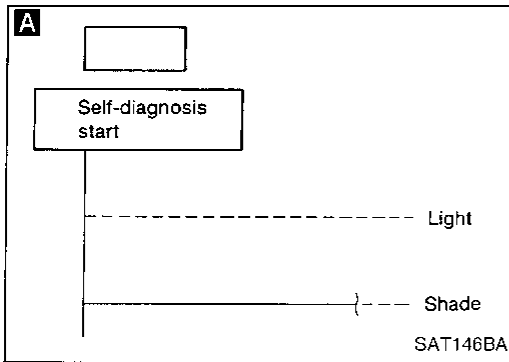
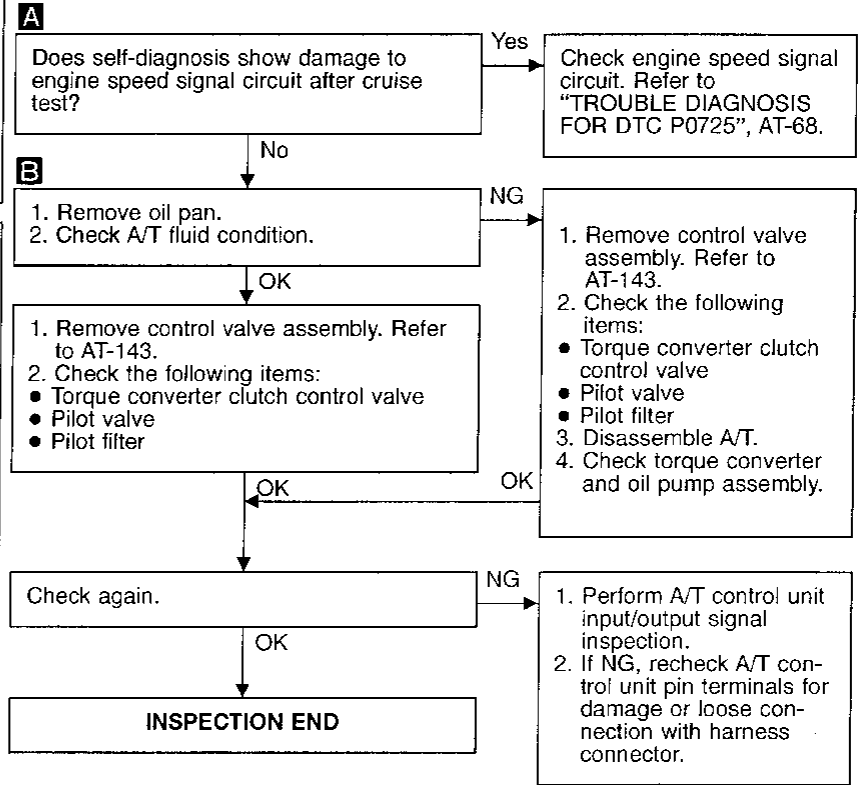




13. A/T Does Not Hold Lock-up Condition

SYMPTOM:

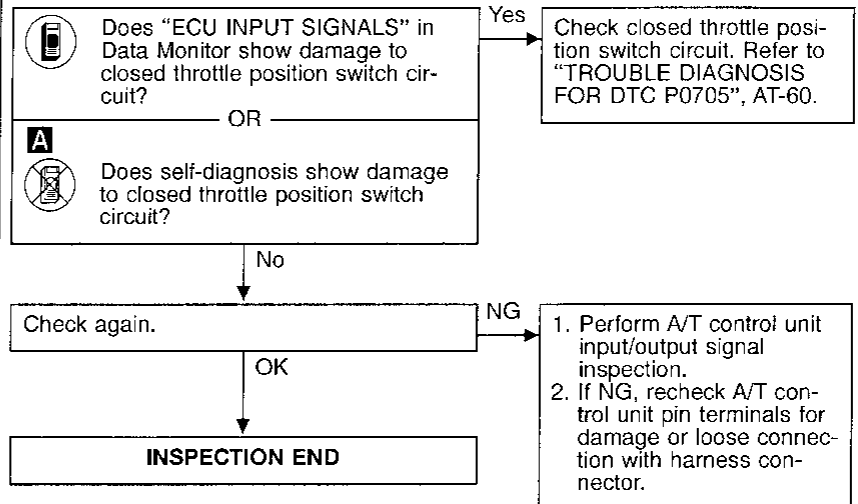
A/T does not hold lock-up condition for more than 30 seconds.



14. Lock-up Is Not Released

SYMPTOM:

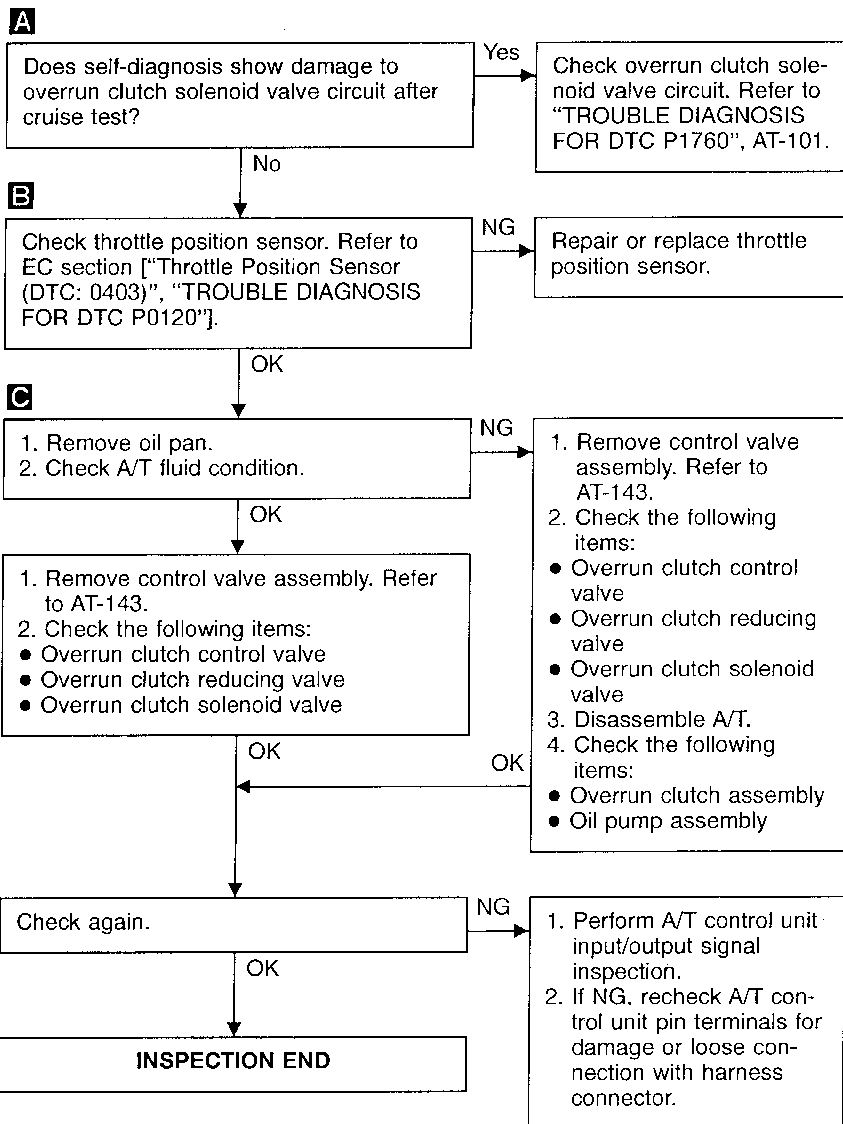
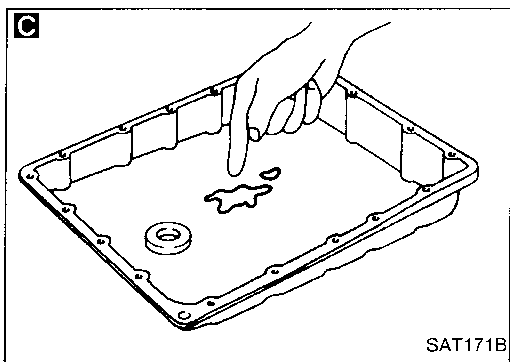
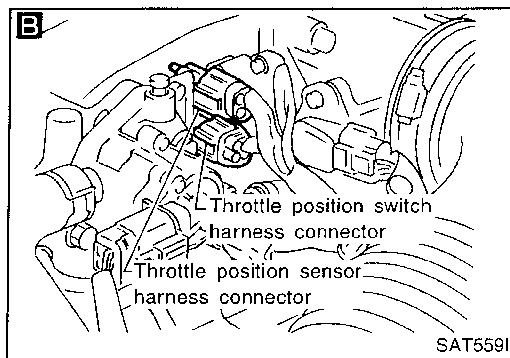
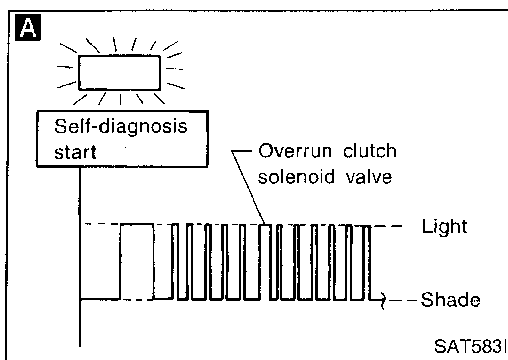
Lock-up is not released when accelerator pedal is released.

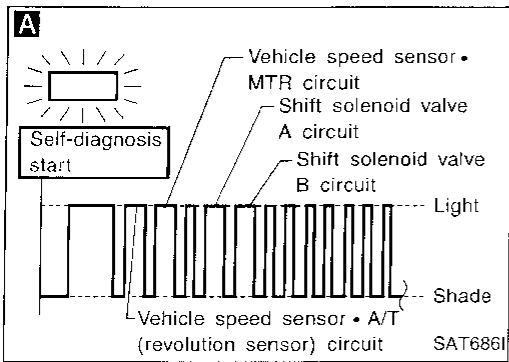


15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)

SYMPTOM:

- Engine speed does not smoothly return to idle when A/T shifts from D₄ to D₃.
- Vehicle does not decelerate by engine brake when turning overdrive control switch OFF.
- Vehicle does not decelerate by engine brake when shifting A/T from "D" to "2" position.

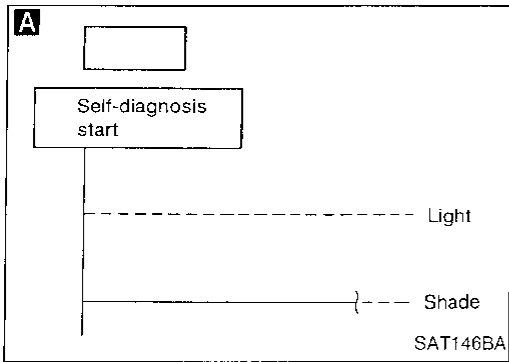
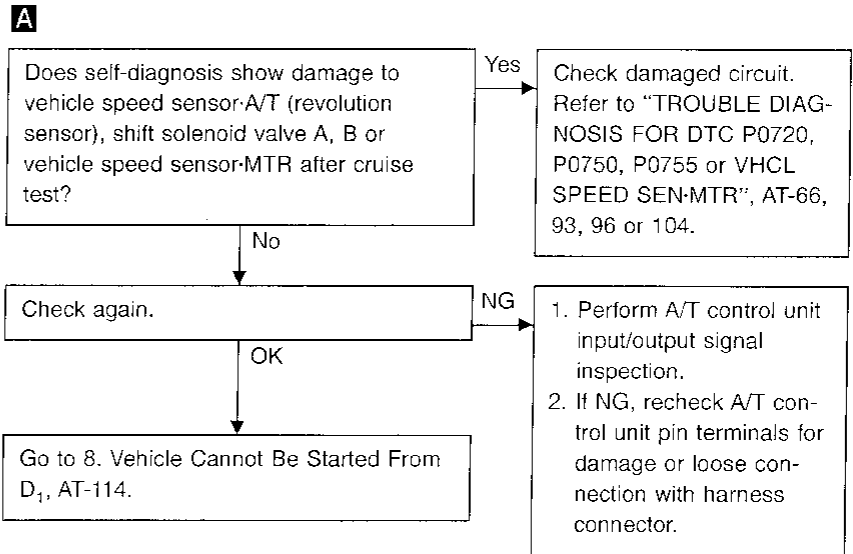




16. Vehicle Does Not Start From D₁

SYMPTOM:

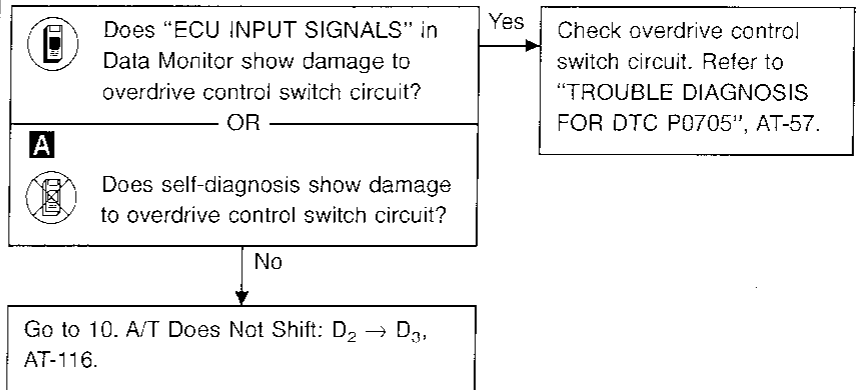
Vehicle does not start from D₁ on Cruise test — Part 2.



17. A/T Does Not Shift: D₄ → D₃, When Overdrive Control Switch "ON" → "OFF"

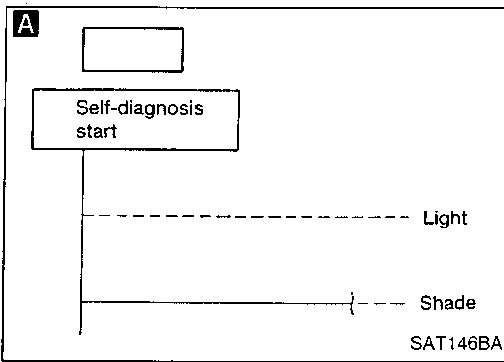
SYMPTOM:

A/T does not shift from D₄ to D₃ when changing overdrive control switch to "OFF" position.



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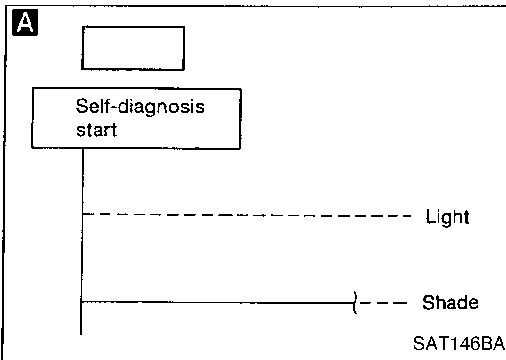
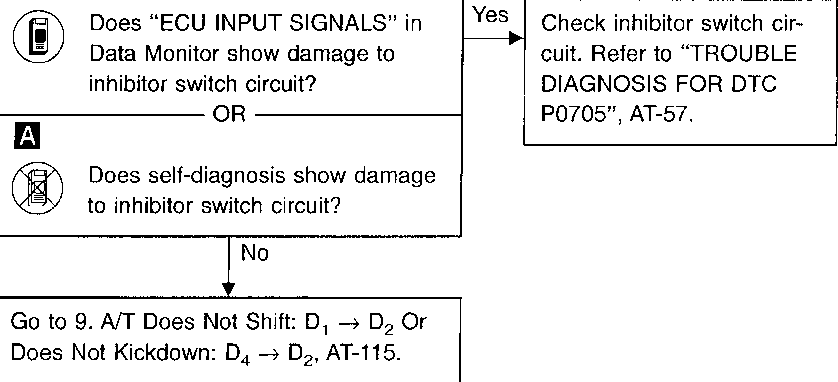
DIAGNOSTIC PROCEDURES FOR SYMPTOMS



18. A/T Does Not Shift: $D_3 \rightarrow 2_2$, When Selector Lever "D" \rightarrow "2" Position

SYMPTOM:

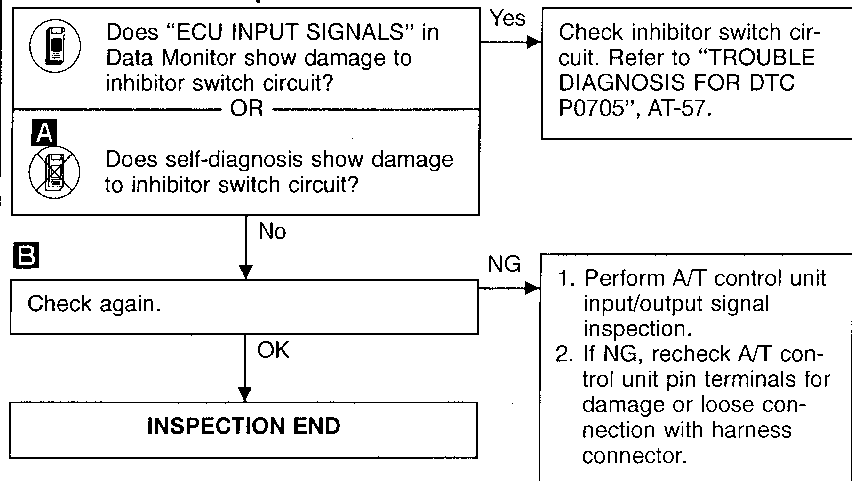
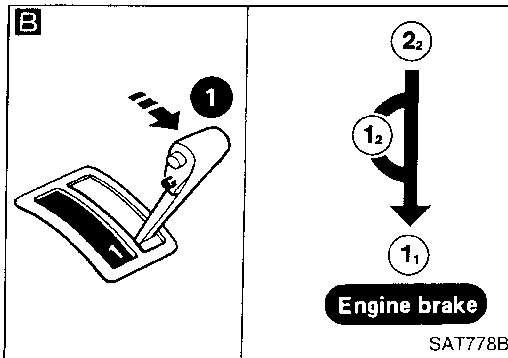
A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" position.



19. A/T Does Not Shift: $2_2 \rightarrow 1_1$, When Selector Lever "2" \rightarrow "1" Position

SYMPTOM:

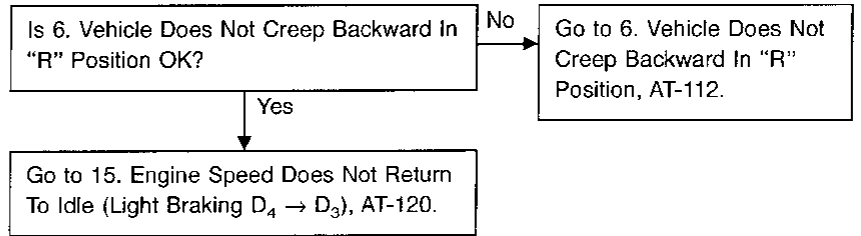
A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.



20. Vehicle Does Not Decelerate By Engine Brake

SYMPTOM:

Vehicle does not decelerate by engine brake when shifting from 2₂ (1₂) to 1₁.



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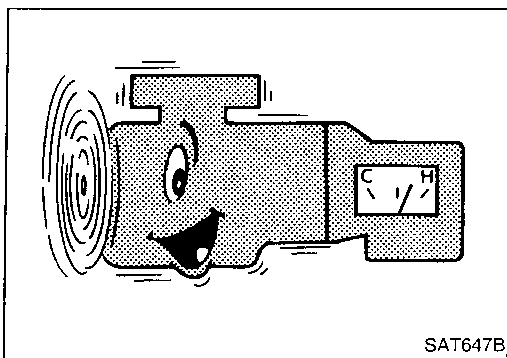
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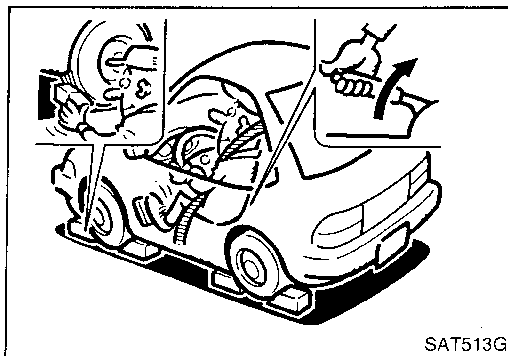


Final Check STALL TESTING

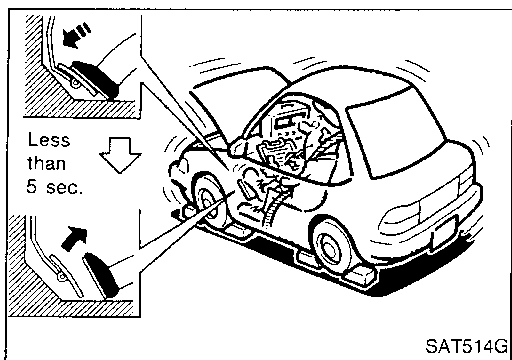
Stall test procedure

1. Check A/T and engine fluid levels. If necessary, add.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

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



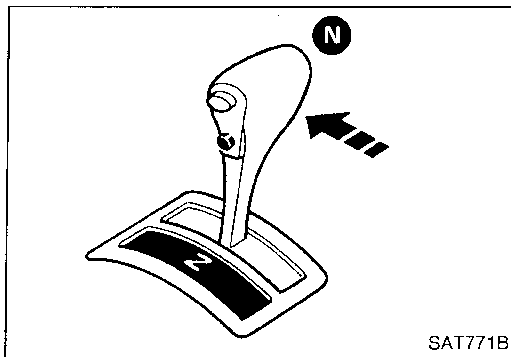
3. Set parking brake and block wheels.
4. Install a tachometer where it can be seen by driver during test.
 - It is good practice to put a mark on point of specified engine rpm on indicator.



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:
2,300 - 2,500 rpm



8. Move selector lever to "N" position.
9. Cool off ATF.
 - **Run engine at idle for at least one minute.**
10. Repeat steps 5 through 9 with selector lever in "2", "1" and "R" positions.

TROUBLE DIAGNOSES

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-34.

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.
 - 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

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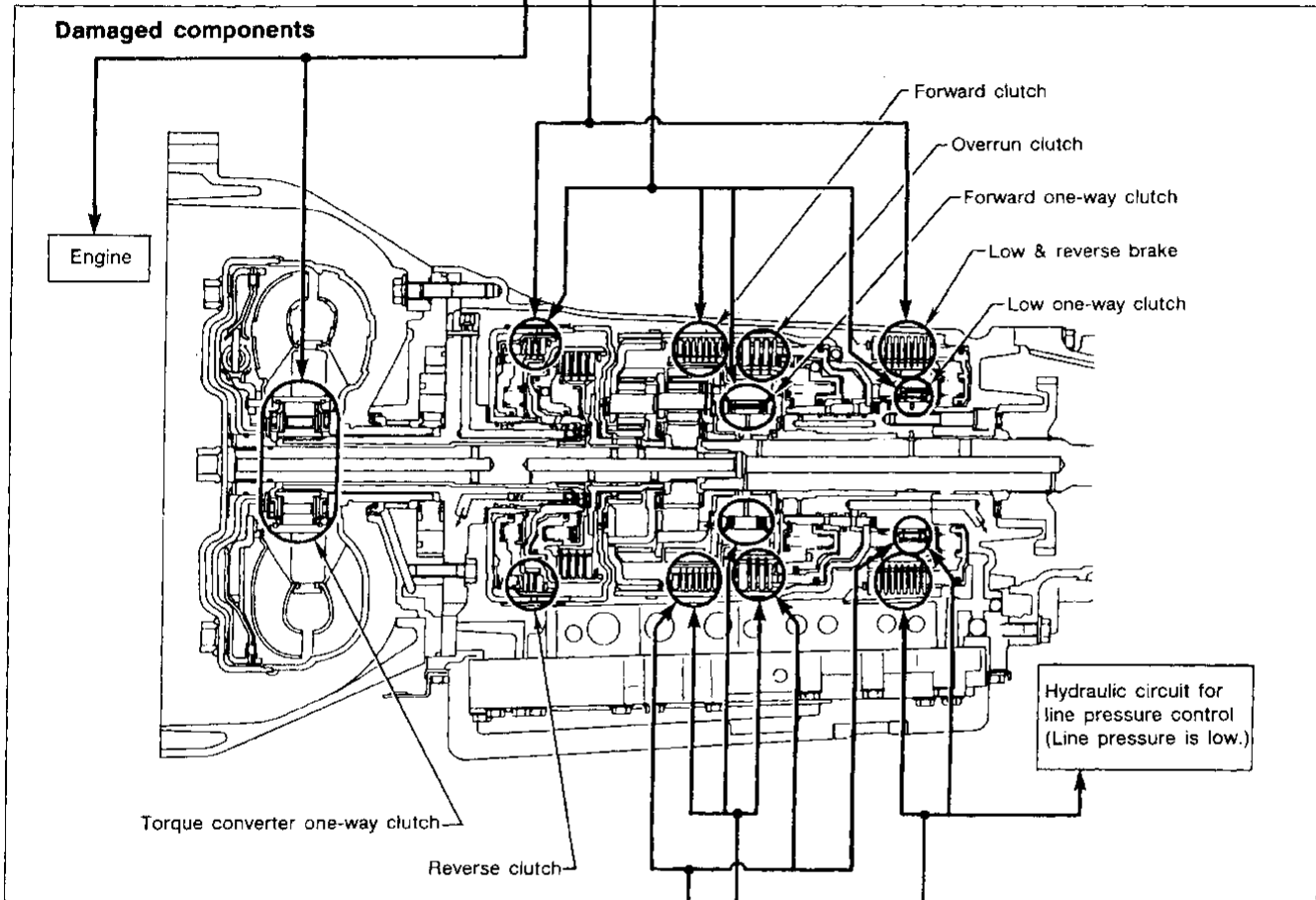
TROUBLE DIAGNOSES

Final Check (Cont'd)

JUDGEMENT OF STALL TEST

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

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



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

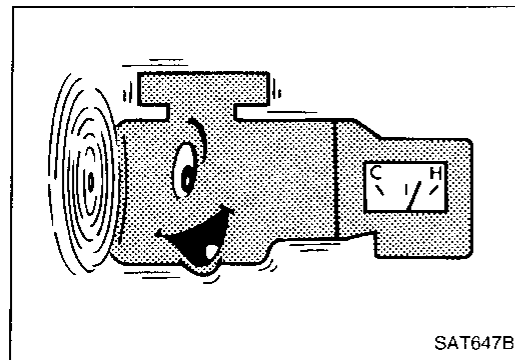
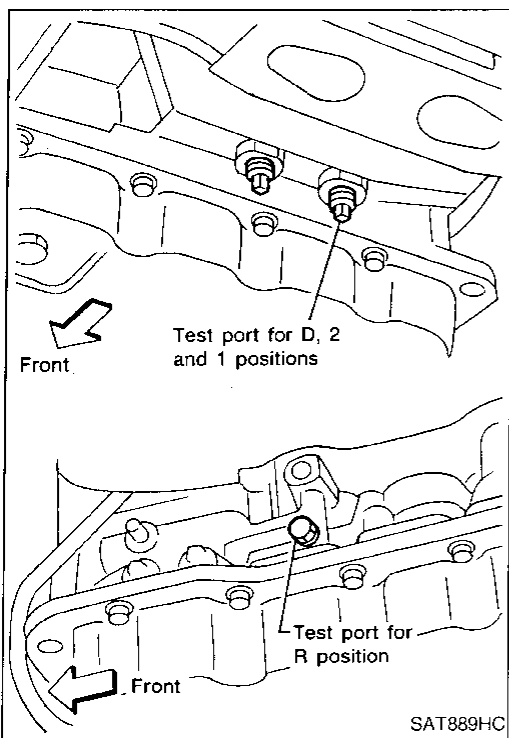
D	H	H	H	O
2	H	H	H	O
1	O	H	H	O
R	O	O	H	O
Selector lever position	Judgement			

TROUBLE DIAGNOSES

Final Check (Cont'd)

PRESSURE TESTING

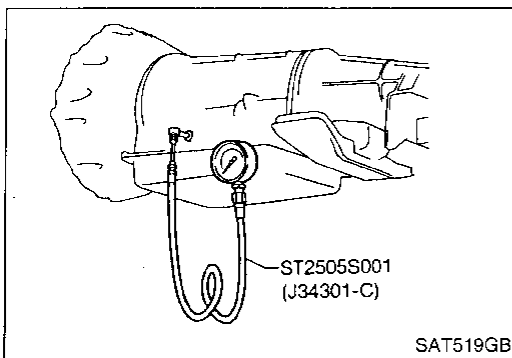
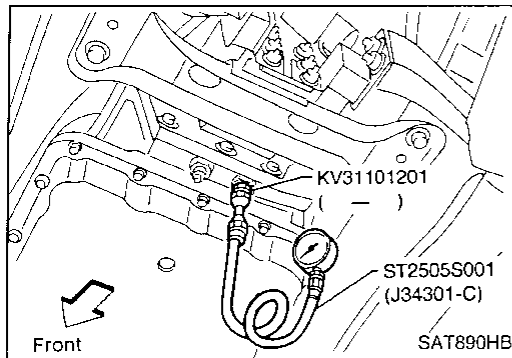
- Location of pressure test ports.
- Always replace line pressure plugs as they are self-sealing bolts.



Line pressure test procedure

1. Check A/T and engine fluid levels. If necessary, add fluid.
2. Drive vehicle for approx. 10 minutes or until engine oil and ATF reach operating temperature.

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

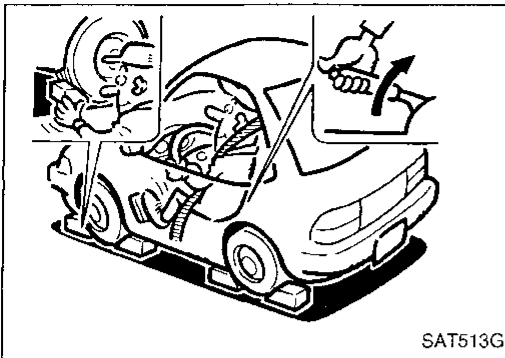


3. Install pressure gauge to corresponding line pressure port.

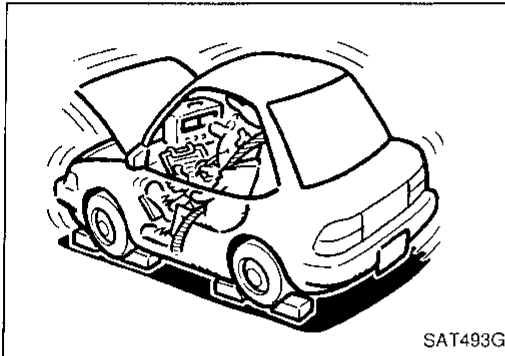
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TROUBLE DIAGNOSES

Final Check (Cont'd)



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

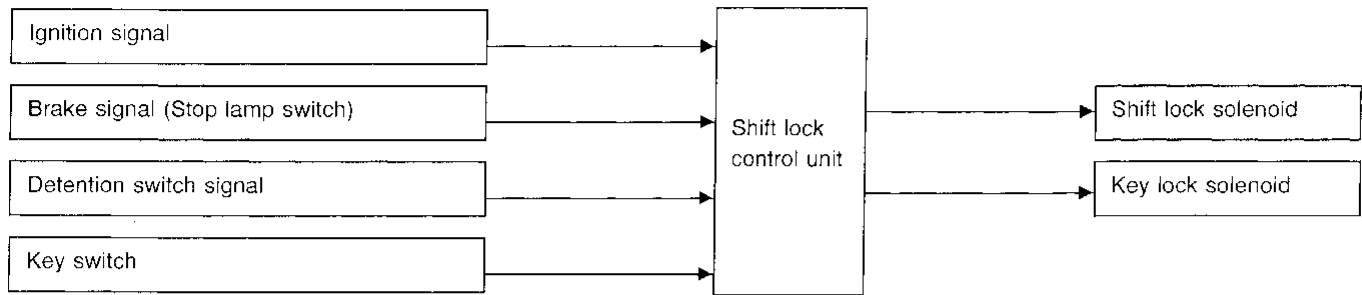


5. Start engine and measure line pressure at idle and stall speed.
 - **When measuring line pressure at stall speed, follow the stall test procedure.**
 Line pressure:
 Refer to SDS, AT-225.

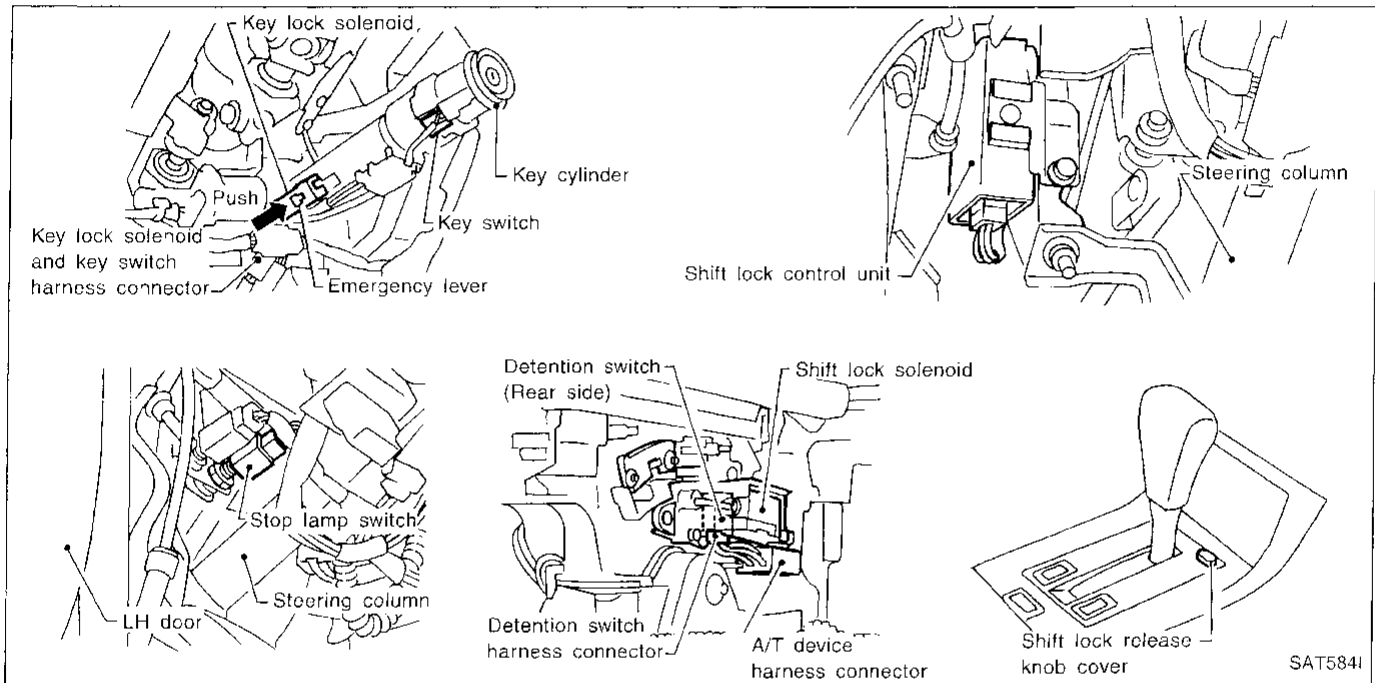
JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	<ul style="list-style-type: none"> ● 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 ● Clogged strainer
	Line pressure is low in particular position.	<ul style="list-style-type: none"> ● Fluid pressure leakage between manual valve and particular clutch ● For example, line pressure is: <ul style="list-style-type: none"> — Low in "R" and "1" positions, but — Normal in "D" and "2" positions. Then, fluid leakage exists at or around low and reverse brake circuit.
	Line pressure is high.	<ul style="list-style-type: none"> ● 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 ● Open in dropping resistor circuit
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> ● 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

A/T Shift Lock System INPUT/OUTPUT SIGNAL FLOW



SHIFT LOCK SYSTEM ELECTRICAL PARTS LOCATION



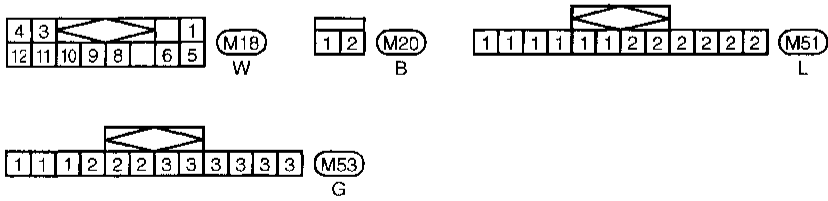
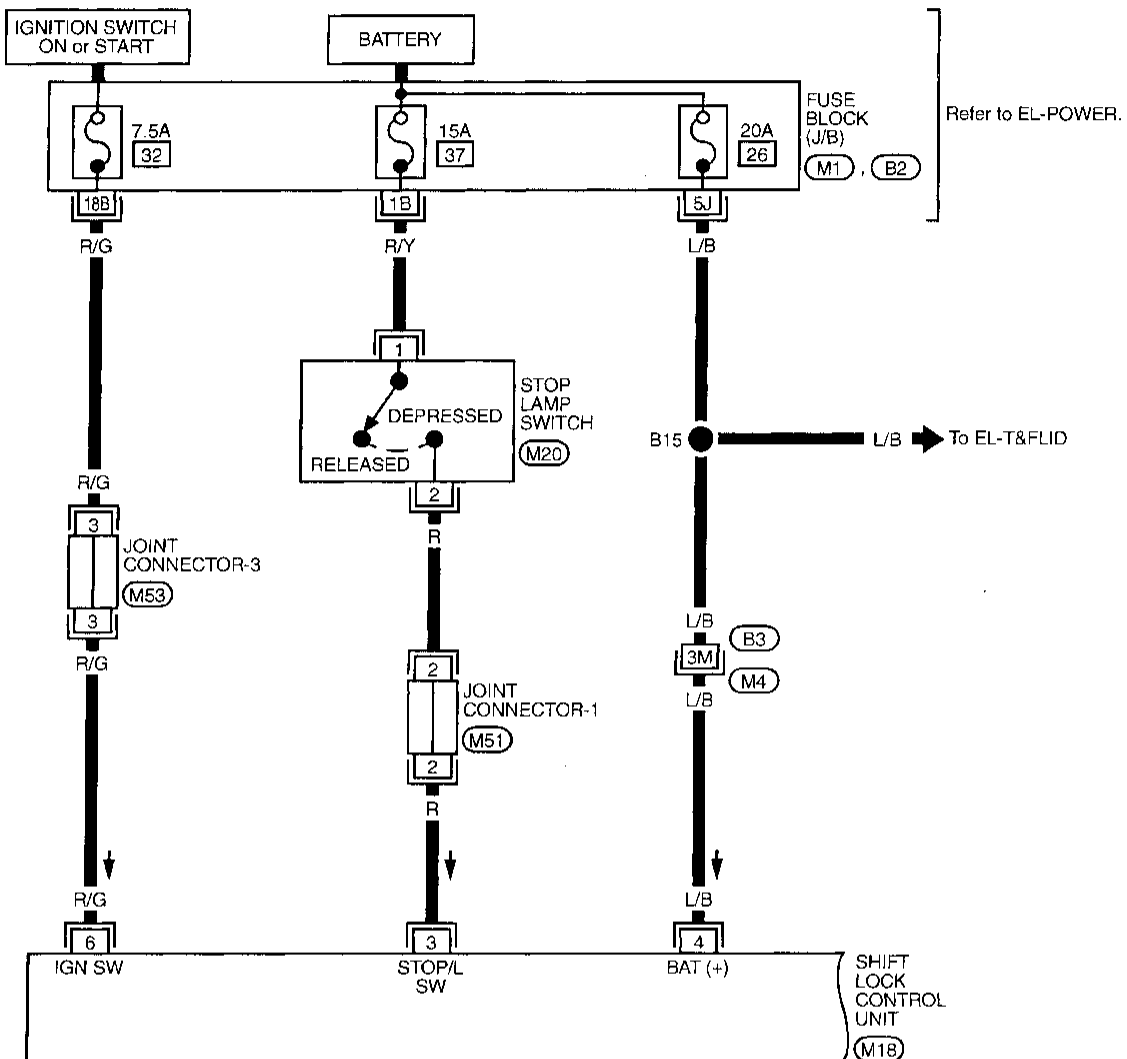
Emergency lever: Used only in case of emergency (when the battery runs down and the ignition key cannot be removed from the key cylinder).

DESCRIPTION

- The electrical key interlock mechanism also operates as a shift lock:
 With the key switch turned to "ON", the selector lever cannot be shifted from "P" (parking) to any other position unless the brake pedal is depressed.
 With the key switch turned to "OFF" or with the key removed, the selector lever cannot be shifted from "P" to any other position. The key cannot be removed unless the selector lever is placed in "P".
- The shift lock and key interlock mechanisms are controlled by shift lock control unit.
 The shift lock control unit sends each ON-OFF signal to the shift lock solenoid and the key lock solenoid. Then the shift lock solenoid operates the lock lever to hold the shift lever in "P" position. And the key lock solenoid operates the stopper to prevent removing the ignition key from the key cylinder.

Wiring Diagram

AT-SHIFT-01

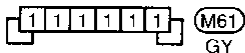
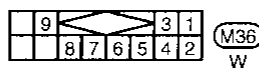
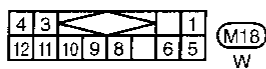
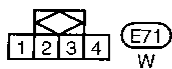
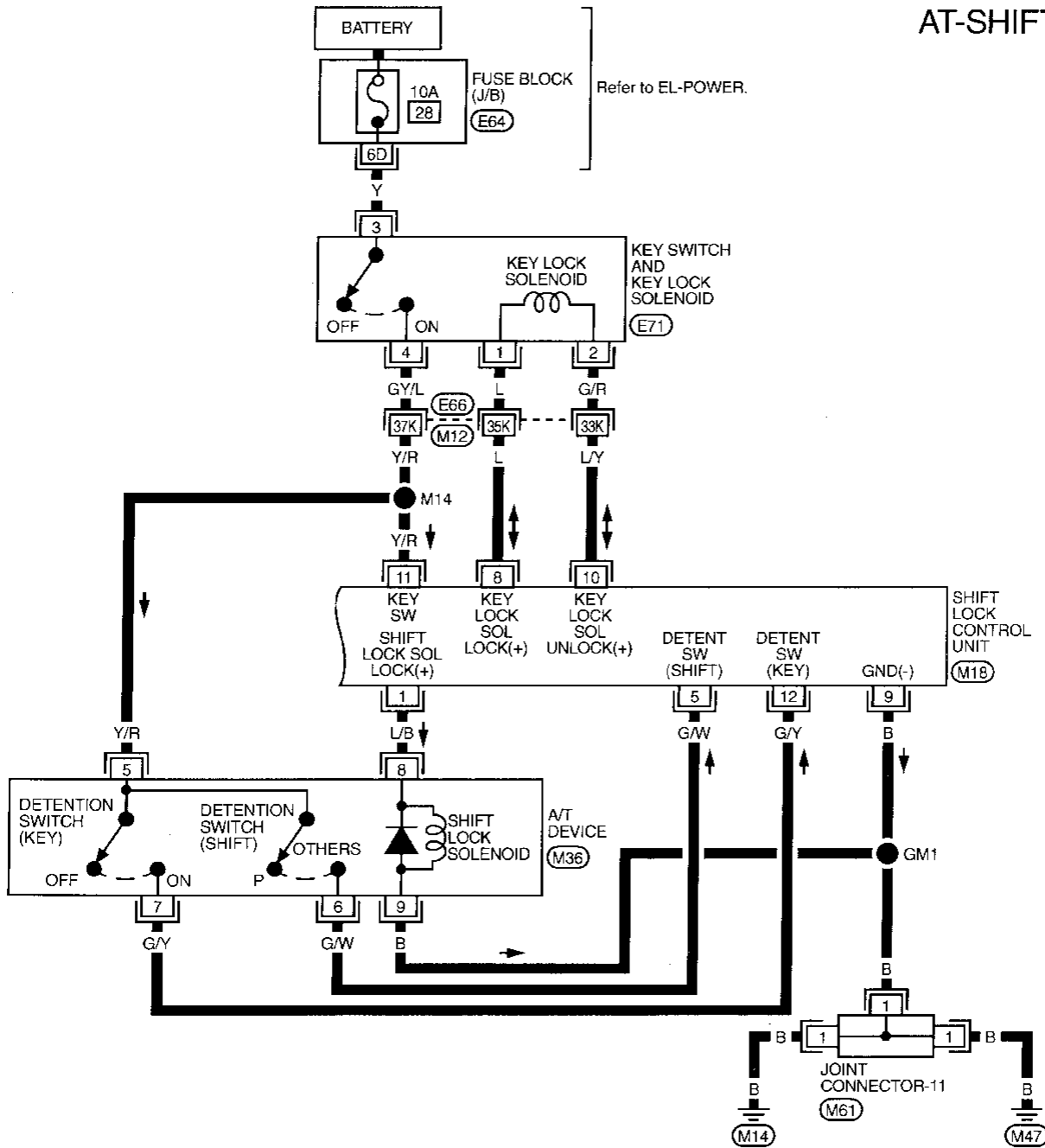


Refer to last page (Foldout page).
 (M4), (B3)
 (M1)
 (B2)

TROUBLE DIAGNOSES — A/T Shift Lock System

Wiring Diagram (Cont'd)

AT-SHIFT-02



Refer to last page (Foldout page).

E66, M12
E64

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Diagnostic Procedure 1

SYMPTOM:

Selector lever cannot be moved from "P" position when applying brake pedal. It can be moved when releasing brake pedal. Selector lever can be moved from "P" position when key is removed from key cylinder.

A

CHECK POWER SOURCE.
 1. Turn ignition switch to "OFF" position.
 2. Check voltage between shift lock control unit harness terminal ④ and ground.
Battery voltage should exist.

NG → Check the following items:
 1. Harness for short or open between battery and shift lock control unit harness terminal ④
 2. Fuse

OK ↓

B

CHECK IGNITION SIGNAL.
 1. Turn ignition switch to "OFF" position.
 2. Check voltage between shift lock control unit harness terminal ⑥ and ground.
0V
 3. Turn ignition switch from "OFF" to "ON" position.
 (Do not start engine.)
 4. Check voltage between shift lock control unit harness terminal ⑥ and ground.
Battery voltage should exist.

NG → Check the following items:
 1. Harness for short or open between battery and shift lock control unit harness terminal ⑥
 2. Fuse
 3. Ignition switch

OK ↓

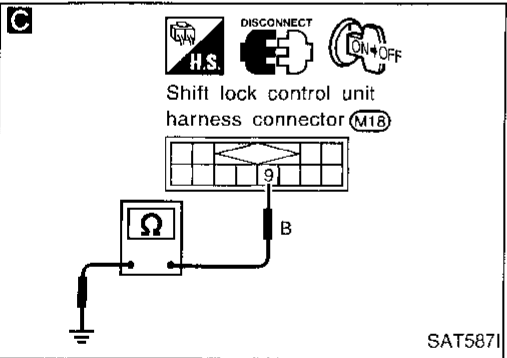
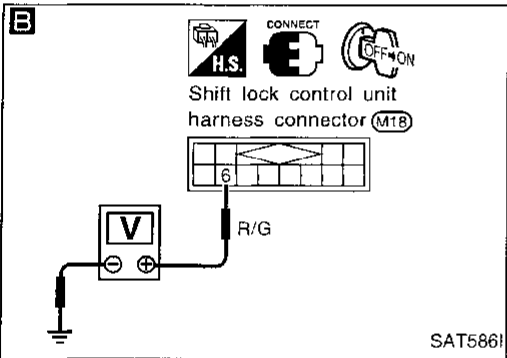
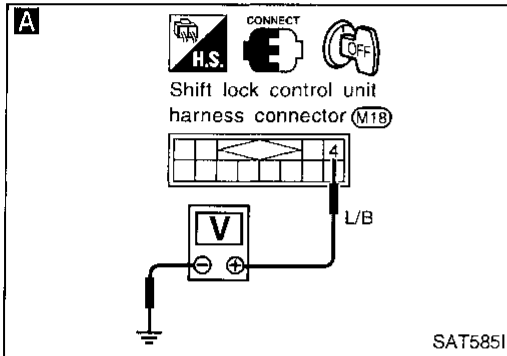
C

CHECK GROUND CIRCUIT FOR CONTROL UNIT.
 1. Turn ignition switch from "ON" to "OFF" position.
 2. Disconnect shift lock control unit harness connector.
 3. Check continuity between shift lock control unit harness terminal ⑨ and ground.
Continuity should exist.

NG → Repair harness or connector.

OK ↓

Ⓐ



TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 1 (Cont'd)

A

D

CHECK INPUT SIGNAL (KEY SWITCH).

1. Reconnect shift lock control unit harness connector.
2. Remove key from ignition switch.
3. Check voltage between shift lock control unit terminal ① and ground.
0V

NG

Check key switch.
(Refer to "COMPONENT CHECK", AT-142.)

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E

1. Insert key into ignition switch.
2. Check voltage between shift lock control unit harness terminal ① and ground.
Battery voltage should exist.

NG

Check the following items:

1. Harness for short or open between shift lock control unit harness terminal ① and key switch harness terminal ④.
2. Harness for short or open between key switch harness terminal ③ and fuse
3. Key switch (Refer to "COMPONENT CHECK", AT-142.)

OK

F G

CHECK INPUT SIGNAL (DETENTION SWITCH-SHIFT).

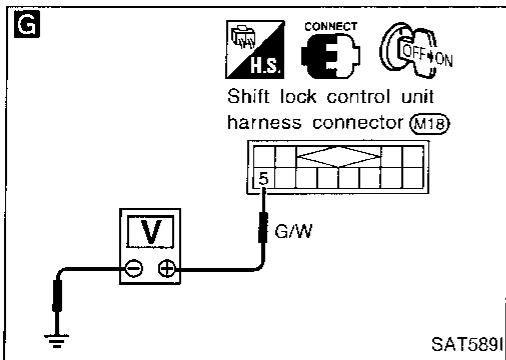
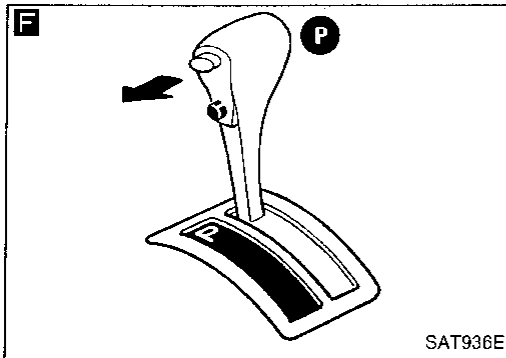
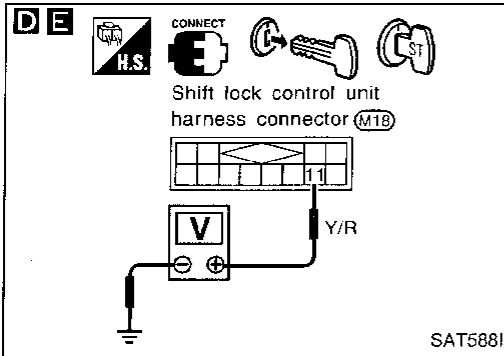
1. Turn ignition switch from "OFF" to "ON" position
(Do not start engine.)
2. Set selector lever in "P" position and release selector lever button.
3. Check voltage between shift lock control unit harness terminal ⑤ and ground.
0V

NG

Check detention switch - shift.
(Refer to "COMPONENT CHECK", AT-141.)

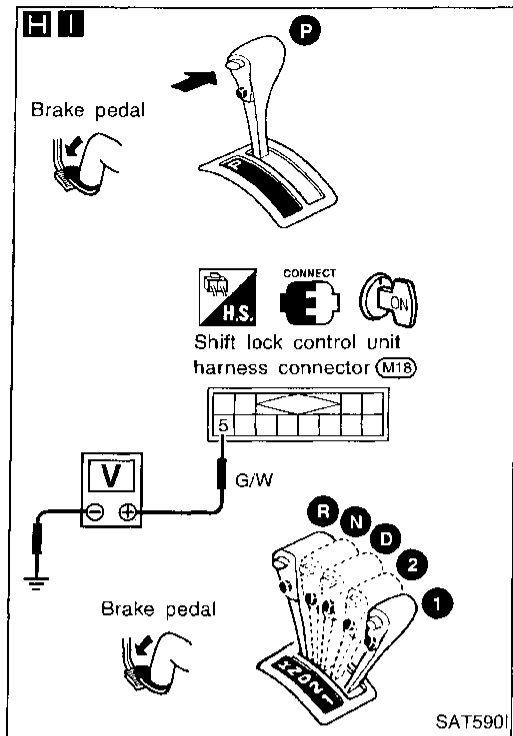
OK

B



TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 1 (Cont'd)



H I

CHECK INPUT SIGNAL (DETENTION SWITCH-SHIFT).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Depress brake pedal. Push selector lever button. Check voltage between shift lock control unit harness terminal ⑤ and ground.

Battery voltage should exist.

3. Set selector lever in any position except "P". Check voltage between shift lock control unit harness terminal ⑤ and ground.

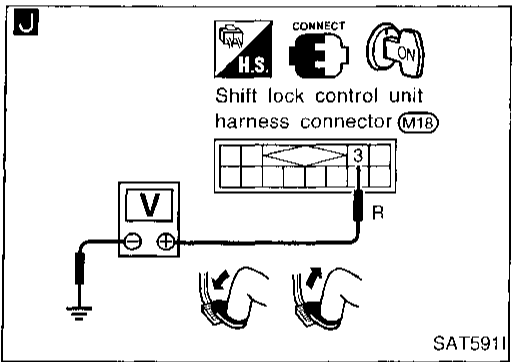
When selector lever cannot be moved from "P" position with brake pedal depressed, push shift lock release knob. (Remove shift lock release knob cover.)

Battery voltage should exist.

NG

Check the following items:

1. Harness for short or open between shift lock control unit harness terminal ⑤ and detention switch harness terminal ⑥
2. Harness for short or open between detention switch harness terminal ⑤ and key switch harness terminal ④
3. Detention switch - shift (Refer to "COMPONENT CHECK", AT-141.)



J

CHECK INPUT SIGNAL (STOP LAMP SWITCH).

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

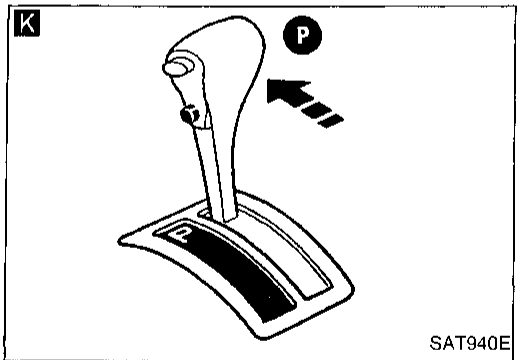
- Check voltage between shift lock control unit harness terminal ③ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

NG

Check the following items:

1. Harness for short or open between shift lock control unit harness terminal ③ and stop lamp switch harness terminal ②
2. Harness for short or open between stop lamp switch harness terminal ① and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK", AT-142.)



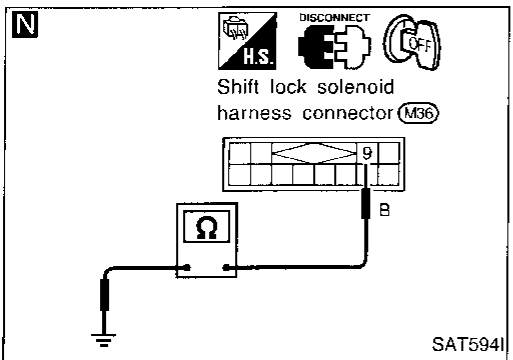
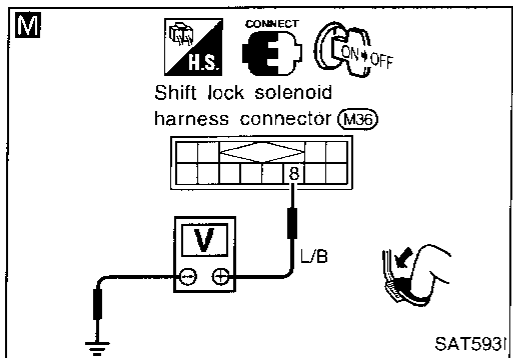
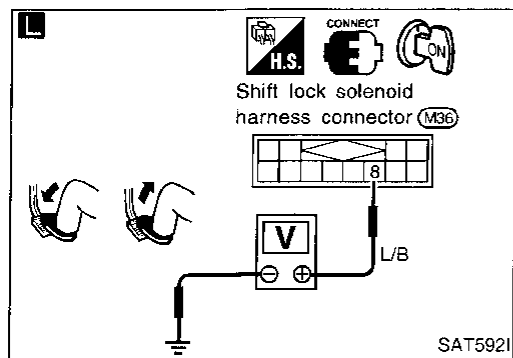
K

Set selector lever in "P" position.

©

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 1 (Cont'd)



L M

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between shift lock solenoid harness connector terminal ⑧ and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

3. Turn ignition switch from "ON" to "OFF" position.
4. Check voltage between shift lock solenoid harness connector terminal ⑧ and ground with brake pedal depressed. **0V**

NG → Check harness for short or open between shift lock control unit harness terminal ① and shift lock solenoid harness terminal ⑧.

N

CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.

1. Turn ignition switch to "OFF" position.
2. Disconnect shift lock harness connector.
3. Check continuity between shift lock harness terminal ⑨ and ground. **Continuity should exist.**

NG → Repair harness or connector.

OK → Check shift lock solenoid. (Refer to "COMPONENT CHECK", AT-141.)

NG → Replace A/T shift lock control device assembly.

1. Reconnect shift lock harness connector.
2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
3. Recheck shift lock operation.

NG → 1. Perform control unit input/output signal inspection test.
2. If NG, recheck harness connector connection.

OK → **INSPECTION END**

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Diagnostic Procedure 2

SYMPTOM:

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".

A

CHECK POWER SOURCE.

1. Turn ignition switch to "OFF" position.
2. Check voltage between shift lock control unit harness terminal ④ and ground.
Battery voltage should exist.

NG

Check the following items:

1. Harness for short or open between battery and shift lock control unit harness terminal ④
2. Fuse

OK

B

CHECK IGNITION SIGNAL.

1. Turn ignition switch to "OFF" position.
2. Check voltage between shift lock control unit harness terminal ⑥ and ground.
0V
3. Turn ignition switch "OFF" to "ON" position.
(Do not start engine.)
4. Check voltage between shift lock control unit harness terminal ⑥ and ground.
Battery voltage should exist.

NG

Check the following items:

1. Harness for short or open between battery and shift lock control unit harness terminal ⑥
2. Fuse
3. Ignition switch

OK

C

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

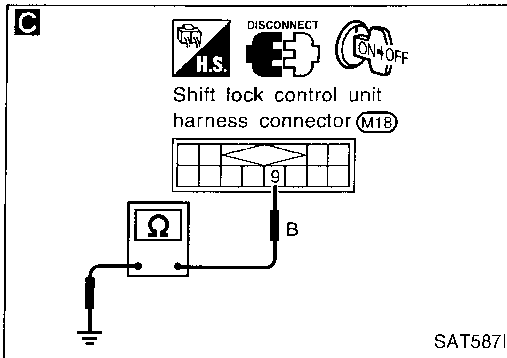
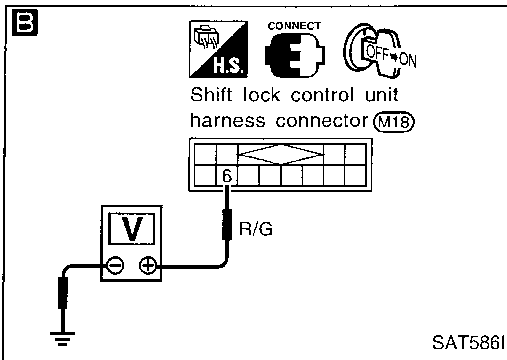
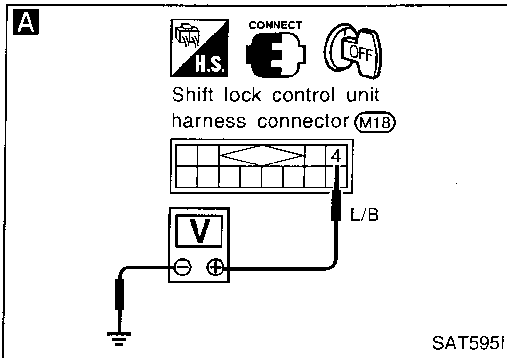
1. Turn ignition switch from "ON" to "OFF" position.
2. Disconnect shift lock control unit harness connector.
3. Check continuity between shift lock control unit harness terminal ⑨ and ground.
Continuity should exist.

NG

Repair harness or connector.

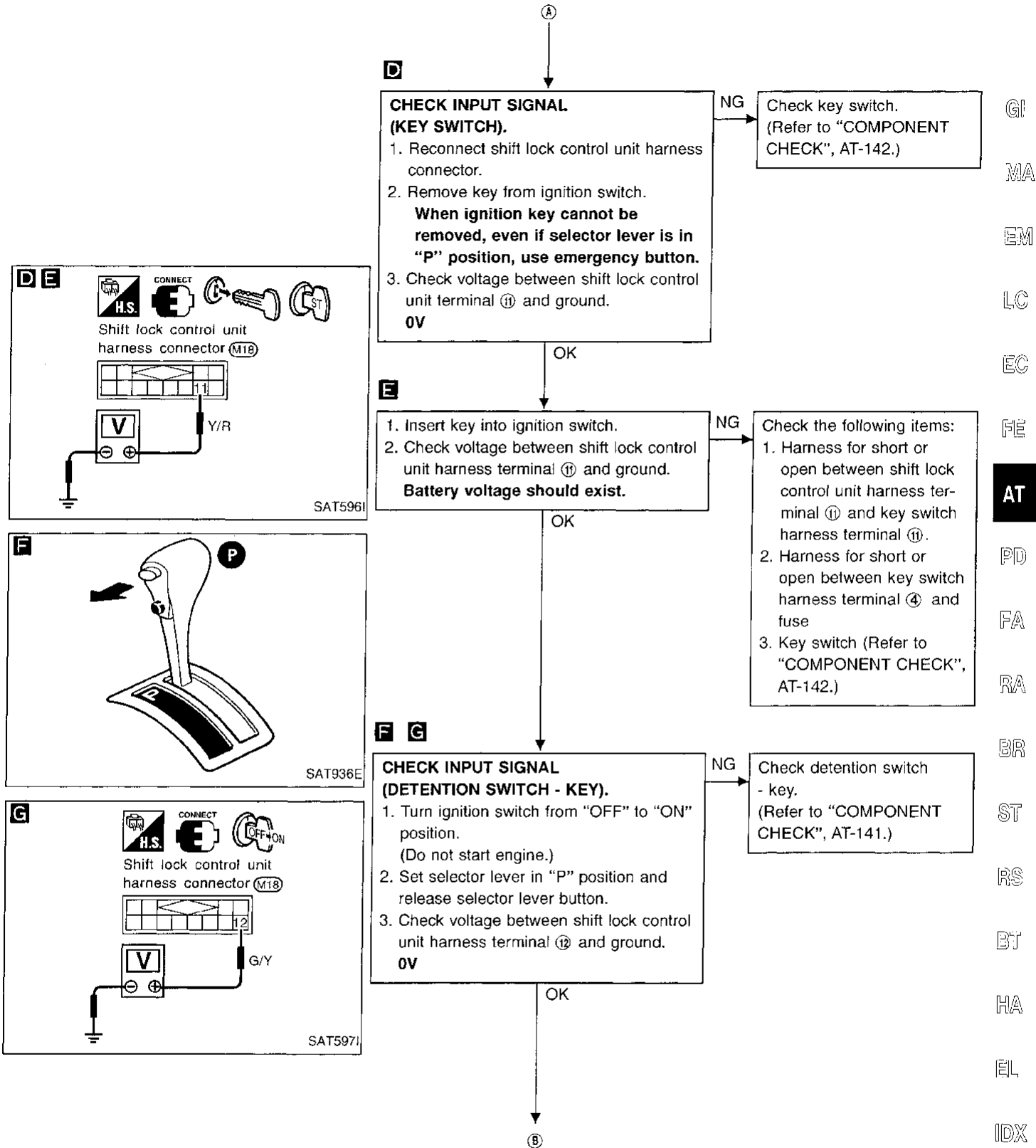
OK

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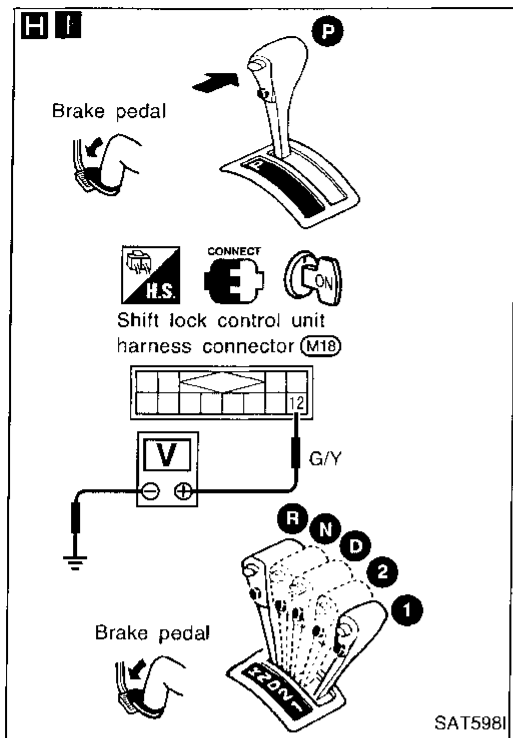
TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 2 (Cont'd)



TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 2 (Cont'd)



H I

CHECK INPUT SIGNAL (DETENTION SWITCH-KEY).

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between shift lock control unit harness terminal ⑫ and ground with brake pedal depressed and selector lever button pushed. **Battery voltage should exist.**
3. Check voltage between shift lock control unit harness terminal ⑫ and ground with selector lever set in any position except "P". **Battery voltage should exist.**

NG

Check the following items:

1. Harness for short or open between shift lock control unit harness terminal ⑫ and detention switch harness terminal ⑦
2. Harness for short or open between detention switch harness terminal ⑤ and key switch harness terminal ④
3. Detention switch - key (Refer to "COMPONENT CHECK", AT-141.)

OK

J K

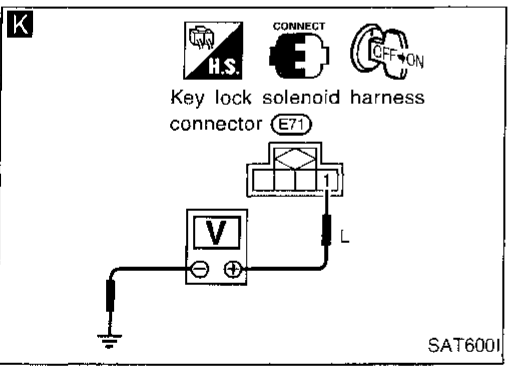
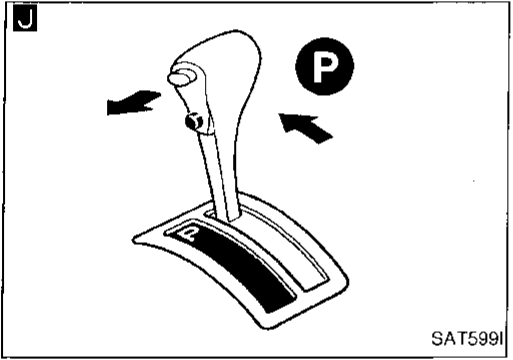
1. Set selector lever in "P" position and release selector lever button.
2. Turn ignition switch from "ON" to "OFF" position.

CHECK OUTPUT SIGNAL (KEY LOCK SIGNAL).

3. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
4. Check voltage between key lock solenoid harness terminal ① and ground at the moment ignition key is turned from "OFF" to "ON". **Battery voltage should exist for approximately 0.1 seconds.**

NG

Check harness for short or open between shift lock solenoid harness terminal ① and control unit harness terminal ⑧.



OK

NG

Repair harness or connector.

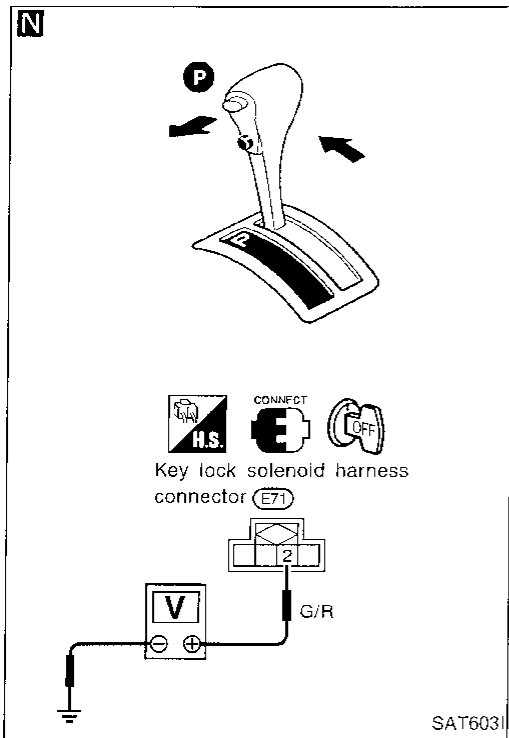
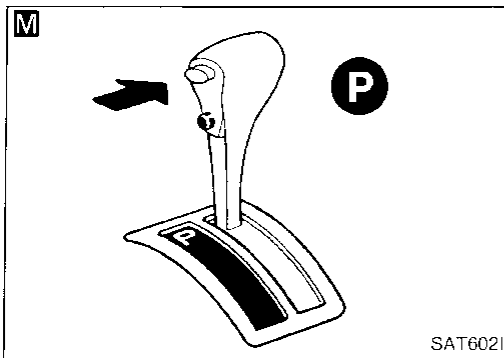
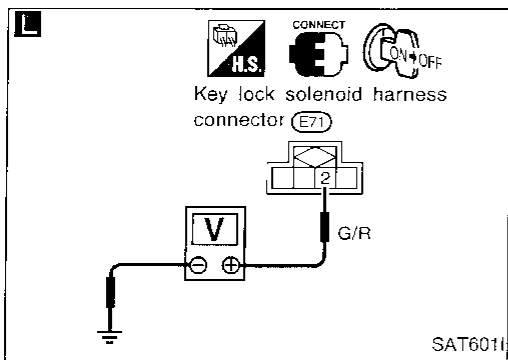
Replace control unit.

OK

③

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 2 (Cont'd)



L

CHECK OUTPUT SIGNAL (KEY UNLOCK SIGNAL CAUSED BY IGNITION SIGNAL).

1. Turn ignition switch from "ON" to "OFF" position.
2. Check voltage between key lock solenoid harness terminal ② and ground at the moment ignition key is turned from ON to OFF.

Battery voltage should exist for approximately 0.1 seconds.

NG → Check harness for short or open between key lock solenoid harness terminal ② and control unit harness terminal shift lock ①.

OK →

NG → Repair harness or connector.

Replace shift lock control unit.

M N

1. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
2. Push selector lever button with brake pedal depressed.
3. Turn ignition switch from "ON" to "OFF" position.

When turning ignition key, keep selector lever button pushed and brake pedal depressed.

CHECK OUTPUT SIGNAL (KEY UNLOCK SIGNAL CAUSED BY DETENTION SWITCH - KEY).

4. Turn ignition switch to "OFF" position.
5. Check voltage between key lock solenoid harness terminal ② and ground at the moment selector lever button is released.

Battery voltage should exist for approximately 0.1 seconds.

NG → Replace shift lock control unit.

OK →

Check key lock solenoid. (Refer to "COMPONENT CHECK", AT-141.)

NG → Replace key lock solenoid.

OK →

Recheck key lock operation.

NG →

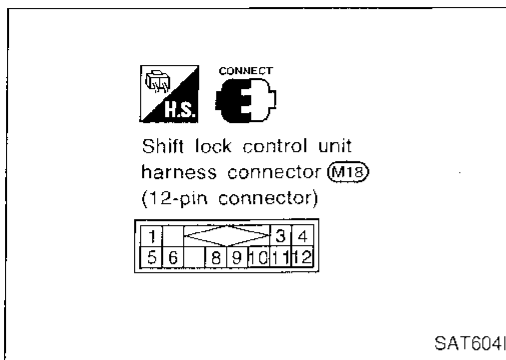
1. Perform control unit input/output signal inspection test.
2. If NG, recheck harness connector connection.

OK →

INSPECTION END

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TROUBLE DIAGNOSES — A/T Shift Lock System






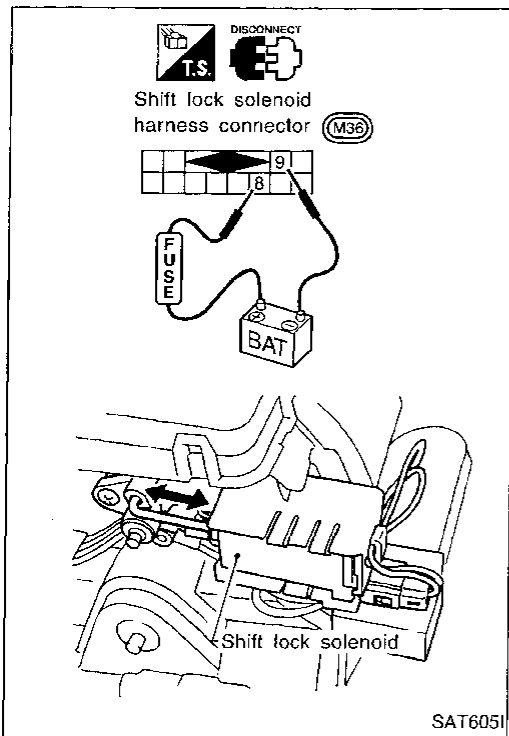
Shift Lock Control Unit Inspection

- Measure voltage between each terminal by following "SHIFT LOCK CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout.

Shift Lock Control Unit Inspection Table

(Data are reference values.)

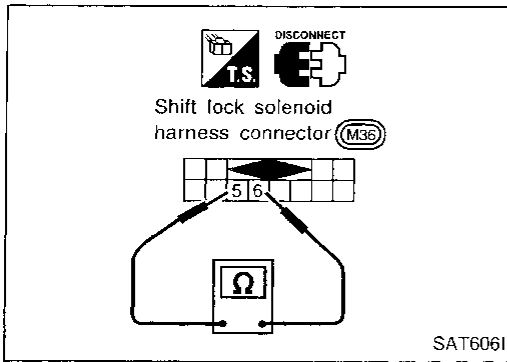
Terminal No.		Item	Condition	Judgment standard
⊕	⊖			
1		Shift lock signal	 When selector lever is set in "P" position and brake pedal is depressed	Battery voltage
			Except above	0V
3		Stop lamp switch	When brake pedal is depressed	Battery voltage
			When brake pedal is released	0V
4		Power source		Battery voltage
5	9	Detention switch (Shift)	<ul style="list-style-type: none"> • When the key is in key cylinder, selector lever is in "P" position, and selector lever button pushed. • When the key is in key cylinder, selector lever is set in any position except "P", and selector lever button released. 	Battery voltage
			Except above	0V
6		Ignition signal		Battery voltage
8	10	Key lock signal	When ignition switch is turned from LOCK, OFF or ACC to ON.	Battery voltage (Approximately 0.1 seconds)
			Except above	0V
9	—	Ground	—	—
10	8	Key unlock signal	Selector lever in "P" position with button released, and ignition key turned to LOCK, OFF or ACC.	Battery voltage (Approximately 0.1 seconds)
			Except above	0V
11	9	Key switch	When key is inserted into key cylinder	Battery voltage
			When key is removed from key cylinder	0V
12	9	Detention switch (Key)	<ul style="list-style-type: none"> • When the key is in key cylinder, selector lever is in "P" position, and selector lever button pushed. • When the key is in key cylinder, selector lever is set in any position except "P", and selector lever button released. 	Battery voltage
			Except above	0V



Component Check

SHIFT LOCK SOLENOID

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

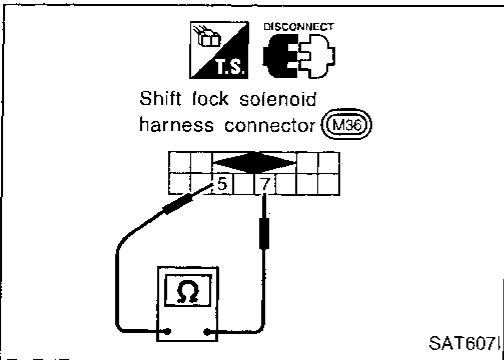


DETENTION SWITCH

Shift

- Check continuity between terminals ⑤ and ⑥ of shift lock solenoid harness connector.

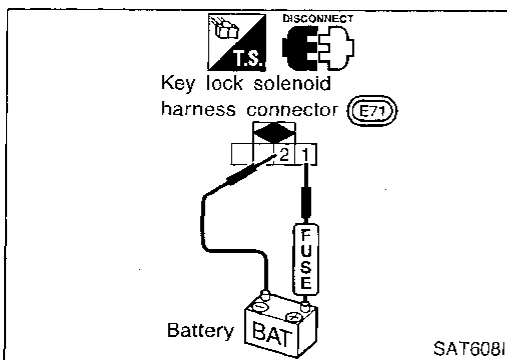
Condition	Continuity
<ul style="list-style-type: none"> • When selector lever is set in "P" position, and selector lever button pushed. • When selector lever is set in any position except "P", and selector lever button released. 	Yes
Except the above	No



Key

- Check continuity between terminals ⑤ and ⑦ of shift lock solenoid harness connector.

Condition	Continuity
<ul style="list-style-type: none"> • When selector lever is set in "P" position, and selector lever button pushed. • When selector lever is set in any position except "P", and selector lever button released. 	Yes
Except the above	No



KEY LOCK SOLENOID

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

Operating sound must be emitted.

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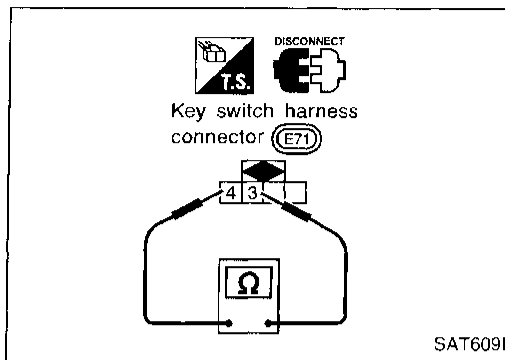
TROUBLE DIAGNOSES — A/T Shift Lock System

Component Check (Cont'd)

KEY SWITCH

- Check continuity between terminals ③ and ④ of key switch harness connector.

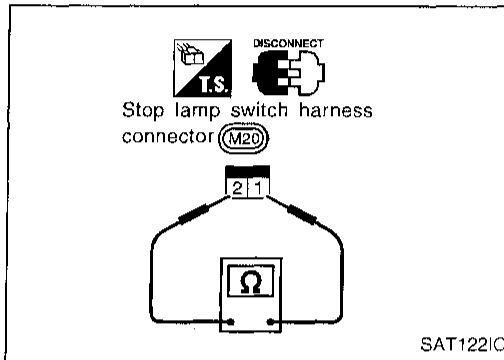
Condition	Continuity
When key is inserted into key cylinder	Yes
When key is removed from key cylinder	No



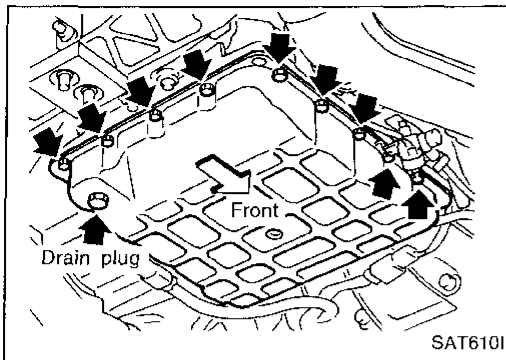
STOP LAMP SWITCH

- Check continuity between terminals ① and ② 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 BR section (BRAKE PEDAL AND BRACKET, Adjustment).




Control Valve Assembly and Accumulators

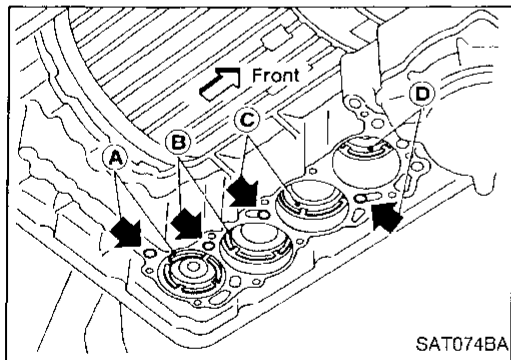
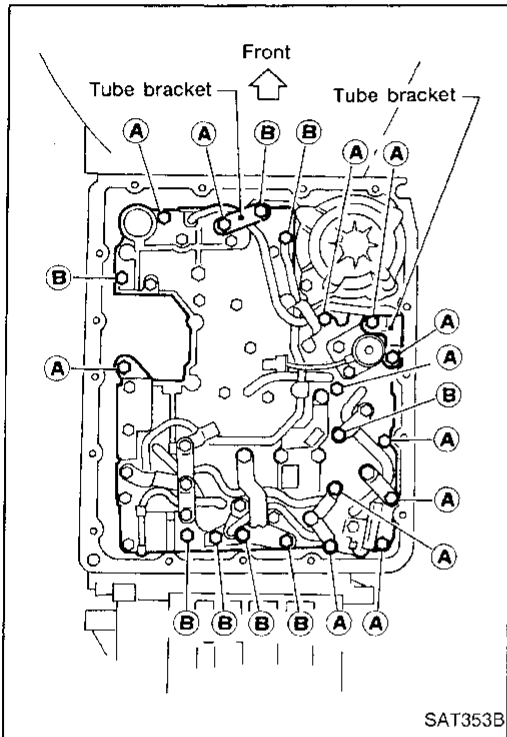
REMOVAL

1. Drain ATF.
2. Remove oil pan and gasket.
3. Remove oil strainer.
4. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

Bolt length and location

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

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



7. Remove accumulators Ⓐ, Ⓑ, Ⓒ and Ⓓ by applying compressed air if necessary.

- Hold each piston with rag.

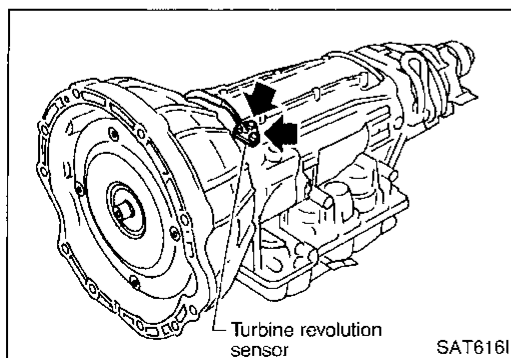
Note:

- Ⓐ: N-D Accumulator
- Ⓑ: 2-3 Accumulator
- Ⓒ: 1-2 Accumulator
- Ⓓ: 3-4 (N-R) Accumulator

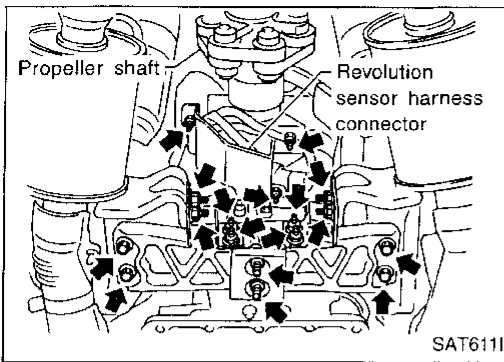
8. Reinstall any part removed.
- Always use new sealing parts.

Turbine Revolution Sensor Replacement

1. Remove A/T assembly, Refer to "Removal", "REMOVAL AND INSTALLATION", AT-146.
2. Remove turbine revolution sensor from A/T assembly upper side.
3. Reinstall any part removed.
- Always use new sealing parts.

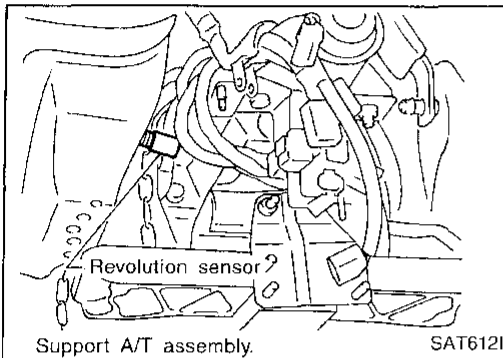


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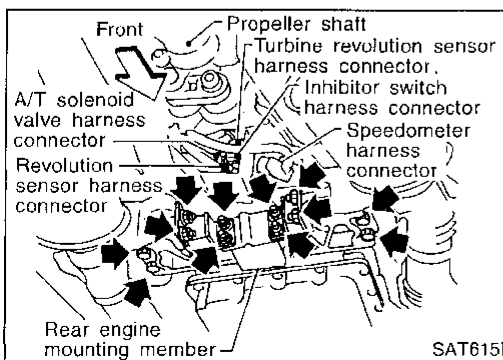
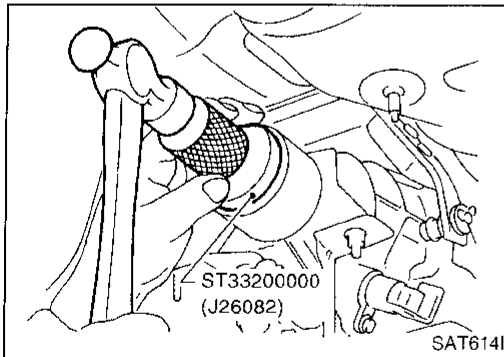
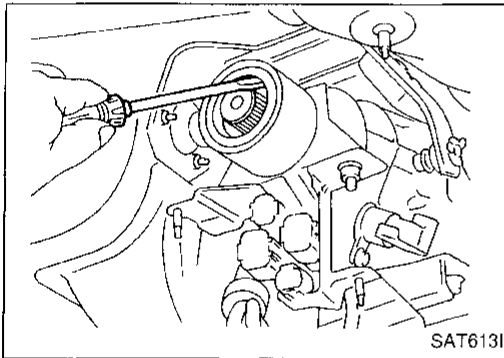
Revolution Sensor Replacement

1. Remove exhaust tube, muffler and heat insulator. Refer to FE section ("EXHAUST SYSTEM").
 2. Remove propeller shaft from vehicle. Refer to PD section ("Removal", "PROPELLER SHAFT").
 3. Remove rear engine mounting member from body while supporting A/T with a jack. Tighten rear engine mounting member bolts to the specified torque. Refer to EM section ("ENGINE REMOVAL").
 4. Remove revolution sensor from A/T assembly.
 5. Reinstall any part removed.
- **Always use new sealing parts.**



Rear Oil Seal Replacement

1. Remove exhaust tube, muffler and heat insulator. Refer to FE section ("EXHAUST SYSTEM").
 2. Remove propeller shaft from vehicle. Refer to PD section ("Removal", "PROPELLER SHAFT").
 3. Remove rear oil seal.
 4. Install rear oil seal.
- **Apply ATF before installing.**
5. Reinstall any part removed.



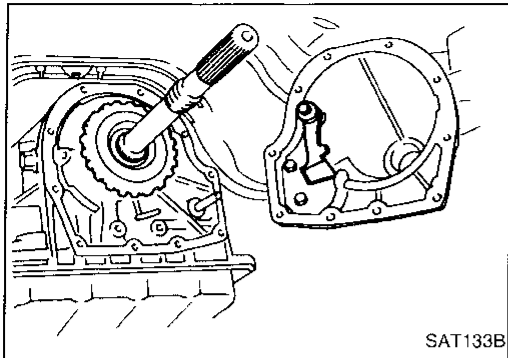
Parking Pawl Components Inspection

REMOVAL

1. Remove exhaust tube, muffler and heat insulator. Refer to FE section ("EXHAUST SYSTEM").
2. Remove propeller shaft from vehicle. Refer to PD section ("Removal", "PROPELLER SHAFT").
3. Disconnect A/T harness connectors and speed sensor harness connector.
4. Remove rear engine mounting member from A/T assembly while supporting A/T with a jack.

ON-VEHICLE SERVICE

Parking Pawl Components Inspection (Cont'd)



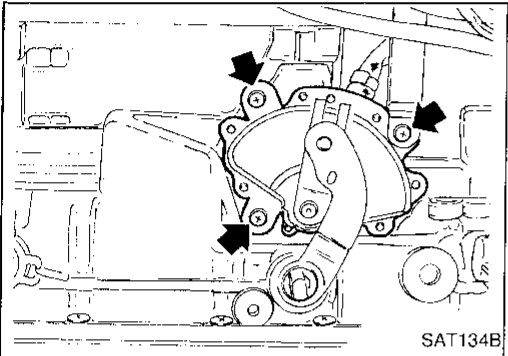
5. Remove rear extension from transmission case.
 6. Replace parking pawl components if necessary.
 7. Reinstall any part removed.
- Always use new sealing parts.

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Inhibitor Switch Adjustment



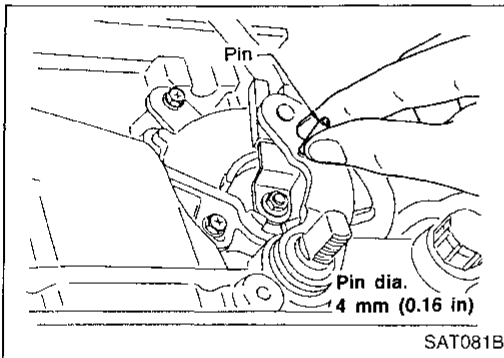
1. Remove manual control linkage from manual shaft of A/T assembly.
2. Set manual shaft of A/T assembly in "N" position.
3. Loosen inhibitor switch fixing bolts.

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4. Insert pin into adjustment holes in both inhibitor switch and manual shaft of A/T assembly as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. Refer to "Component Inspection", AT-61.

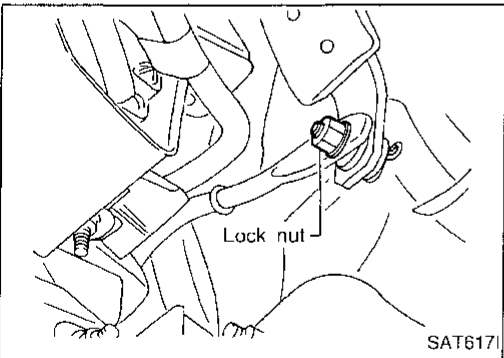
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Manual Control Linkage Adjustment



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

1. Place selector lever in "P" position.
2. Loosen lock nuts.

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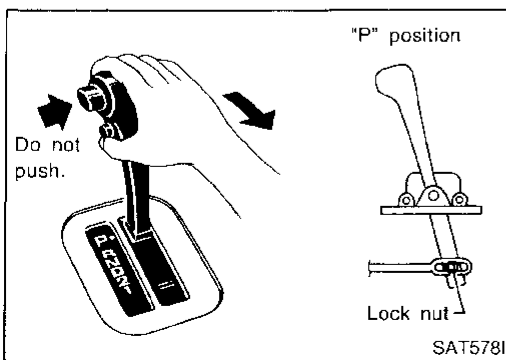
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3. Place manual shaft in "P" position.
4. Tighten lock nut to the specified torque.

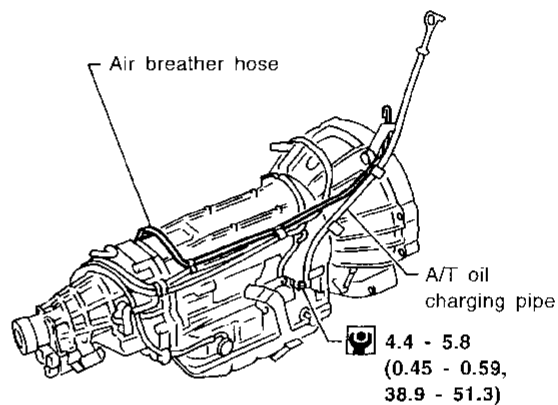
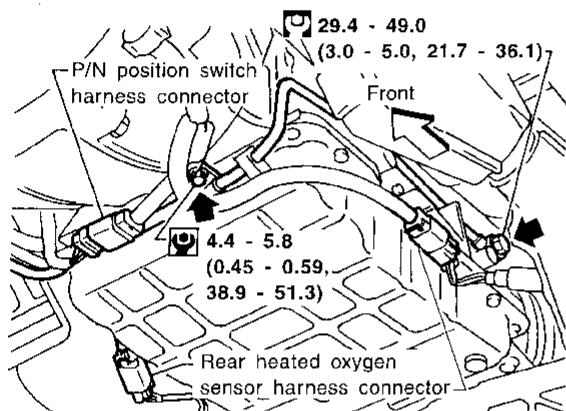
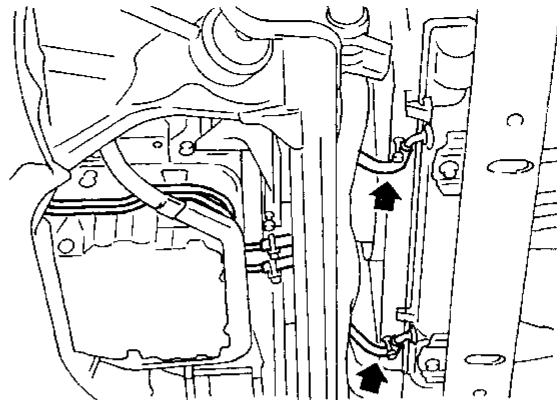
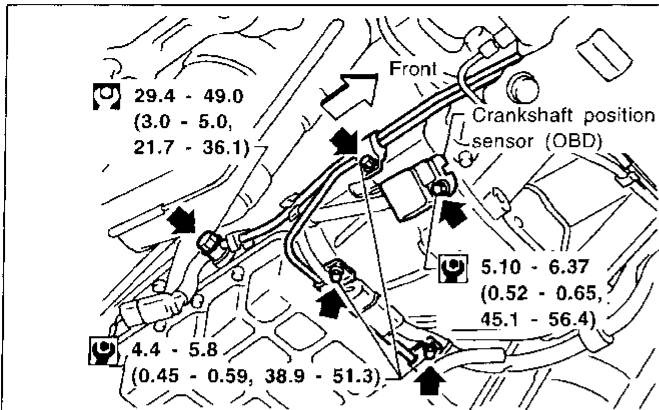
Lock nut:

: 18 - 23 N-m (1.8 - 2.3 kg-m, 13 - 17 ft-lb)

5. Move selector lever from "P" position to "1" position. Make sure that selector lever can move smoothly.

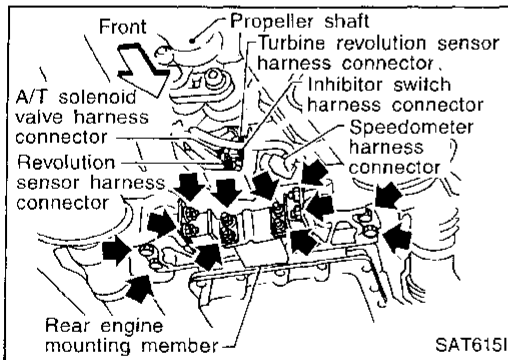
REMOVAL AND INSTALLATION

Removal



: N·m (kg-m, ft-lb)
 : N·m (kg-m, in-lb)

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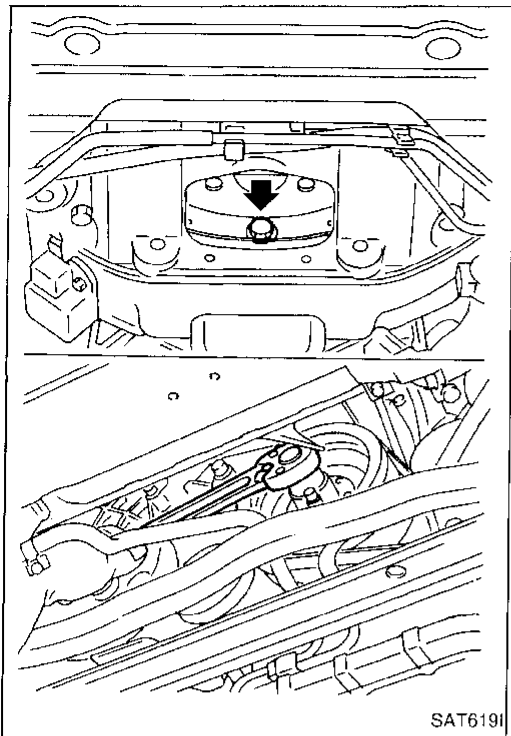
CAUTION:

When removing the A/T assembly from engine, first remove the crankshaft position sensor (OBD) from the assembly. Be careful not to damage sensor edge.

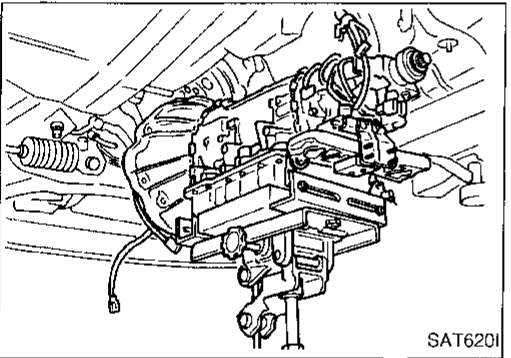
1. Remove battery negative terminal.
 2. Remove crankshaft position sensor (OBD) from A/T assembly.
 3. Remove rear heated oxygen sensor harness connector.
 4. Remove exhaust tube, muffler and heat insulator. Refer to FE section ("EXHAUST SYSTEM").
 5. Remove fluid charging pipe from A/T assembly.
 6. Remove oil cooler pipe clamps.
 7. Remove oil cooler pipe from A/T assembly.
 8. Disconnect A/T harness connectors and speed sensor harness connector.
 9. Remove control linkage from selector lever.
 10. Plug up openings such as the oil charging pipe hole, etc.
 11. Remove propeller shaft. Refer to PD section ("Removal", "PROPELLER SHAFT").
- Insert plug into rear oil seal after removing propeller shaft.
 - Be careful not to damage spline, sleeve yoke and rear oil seal, when removing propeller shaft.

REMOVAL AND INSTALLATION

Removal (Cont'd)



12. Remove rear cover plate and bolts securing torque converter to drive plate. Tighten rear plate cover bolts to the specified torque. Refer to EM section ("OIL PAN").
13. Remove engine under cover.
 - Remove the bolts by turning crankshaft.



14. Support A/T assembly by placing a jack under oil pan.
15. Remove rear engine mounting member from body. Tighten rear engine mounting member bolts to the specified torque. Refer to EM section ("ENGINE REMOVAL").
16. Remove bolts securing A/T assembly to engine.
17. Lower A/T assembly.

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Installation

- Check drive plate runout.

CAUTION:

Do not allow any magnetic materials to contact the ring gear teeth.

Maximum allowable runout:

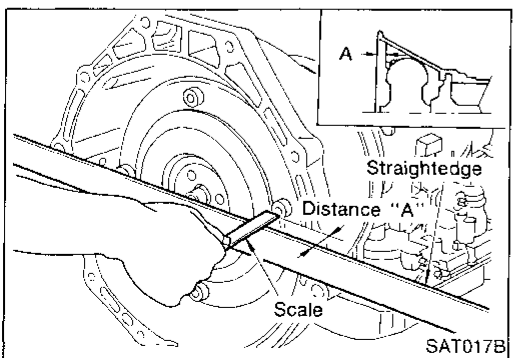
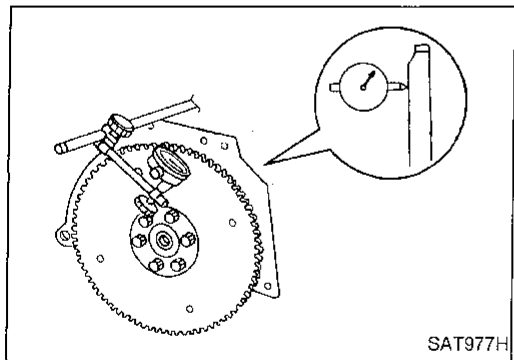
Refer to EM section ("Inspection", "CYLINDER BLOCK").

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

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

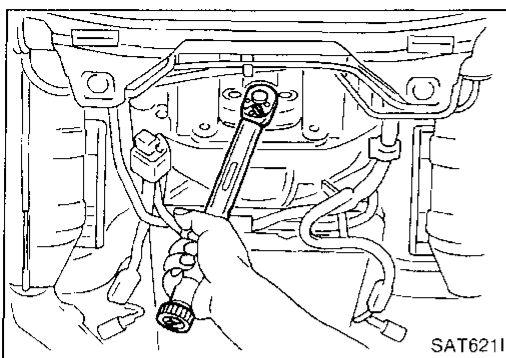
Distance "A":

22.0 mm (0.866 in) or more

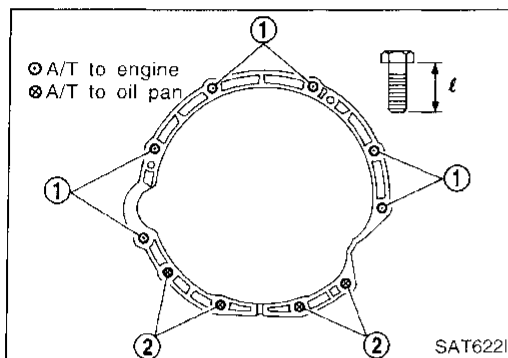


REMOVAL AND INSTALLATION

Installation (Cont'd)



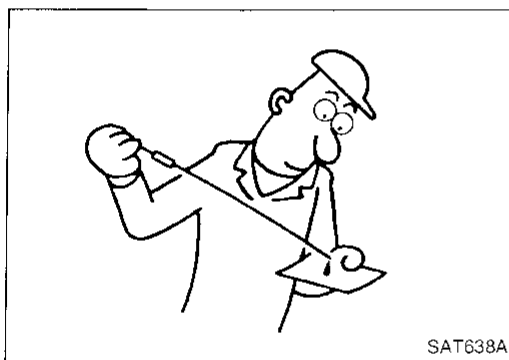
- Install bolts securing converter to drive plate.
- **After installing converter to drive plate, rotate crankshaft several turns. Make sure that transmission rotates freely without binding.**



- Tighten bolts securing transmission to engine.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "l" mm (in)
①	108 - 118 (11.0 - 12.0, 80 - 87)	70 (2.76)
②	69 - 78 (7.0 - 8.0, 51 - 58)	90 (3.54)

- Reinstall any part removed.



- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "3" to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. Refer to "ROAD TEST", AT-35.

MAJOR OVERHAUL

SEC. 311-313-315

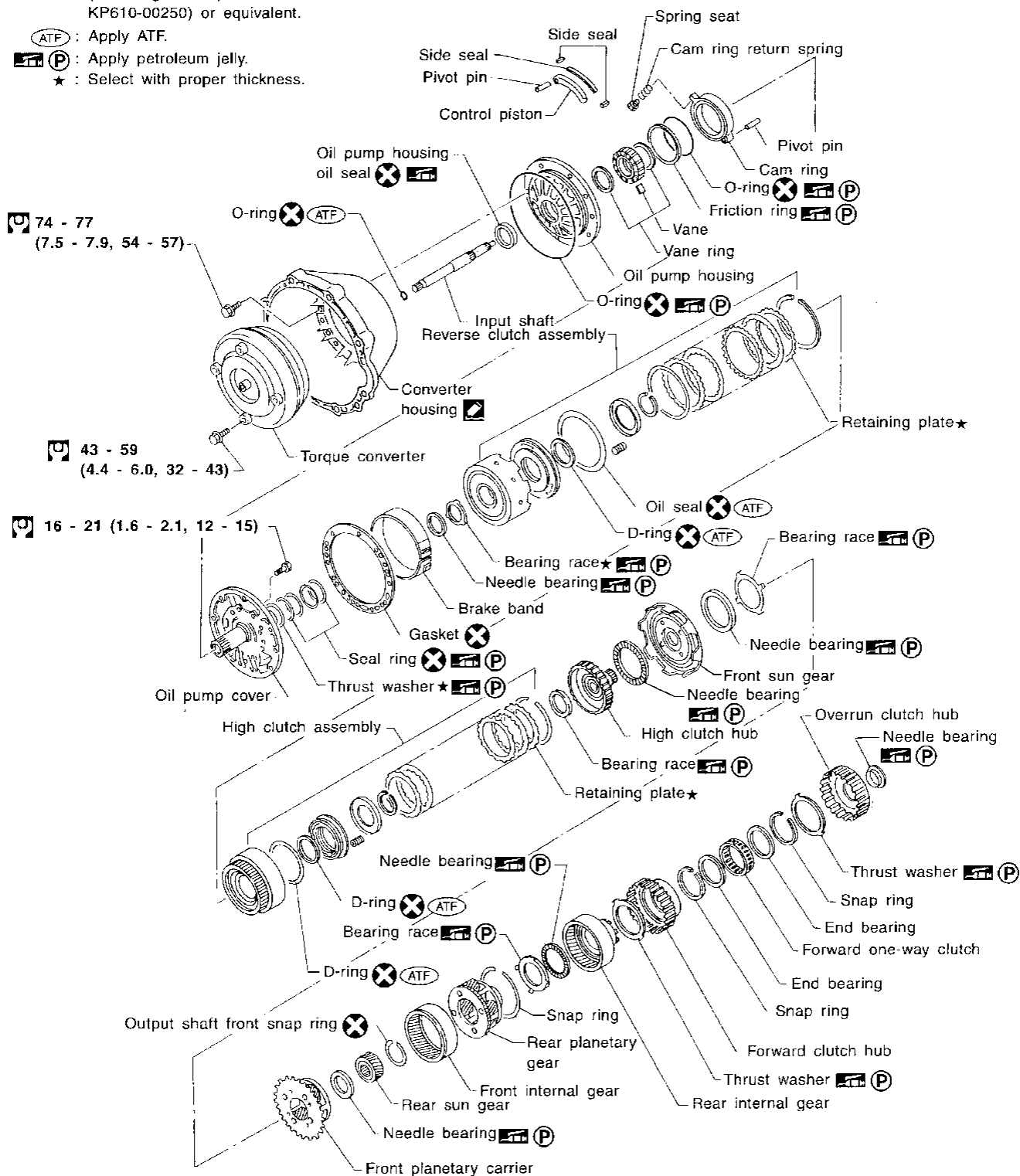
: N·m (kg-m, ft-lb)

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

: Apply ATF.

: Apply petroleum jelly.

★ : Select with proper thickness.



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MAJOR OVERHAUL

SEC. 311•315•317

: N·m (kg-m, in-lb)

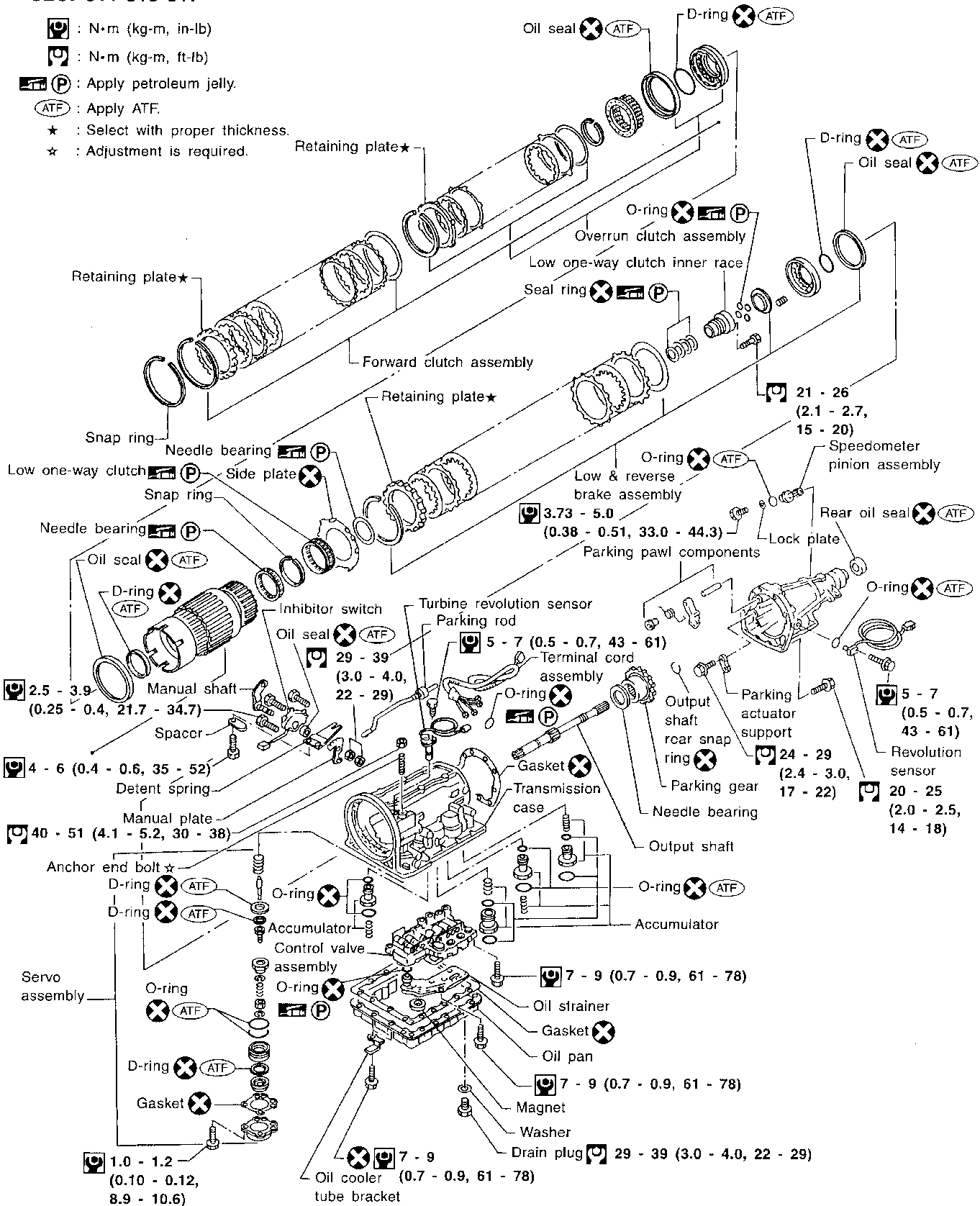
: N·m (kg-m, ft-lb)

(P) : Apply petroleum jelly.

: Apply ATF.

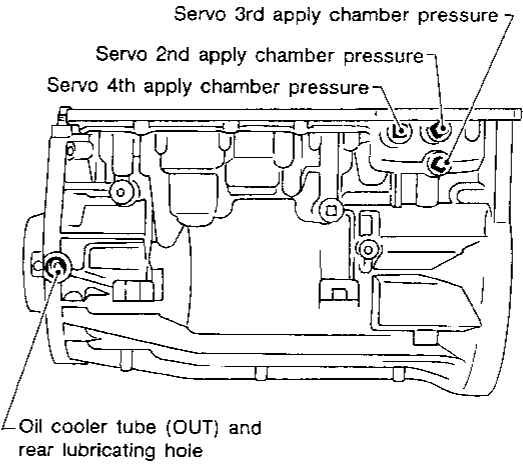
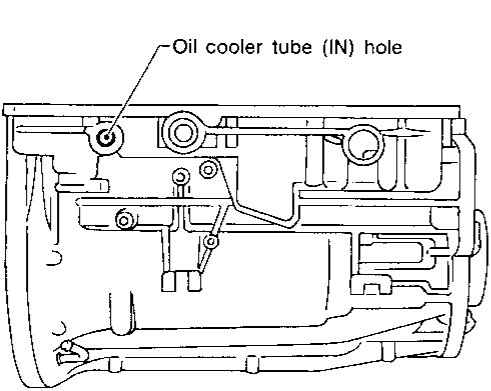
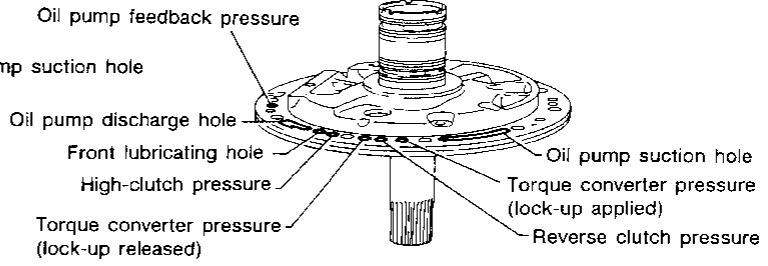
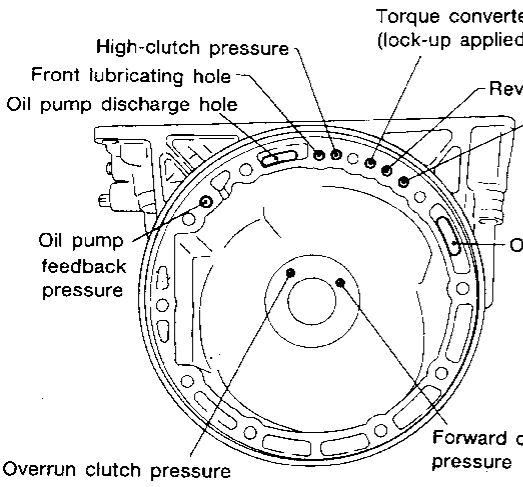
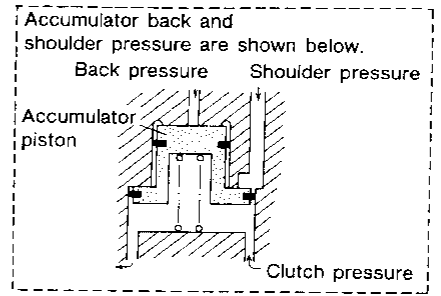
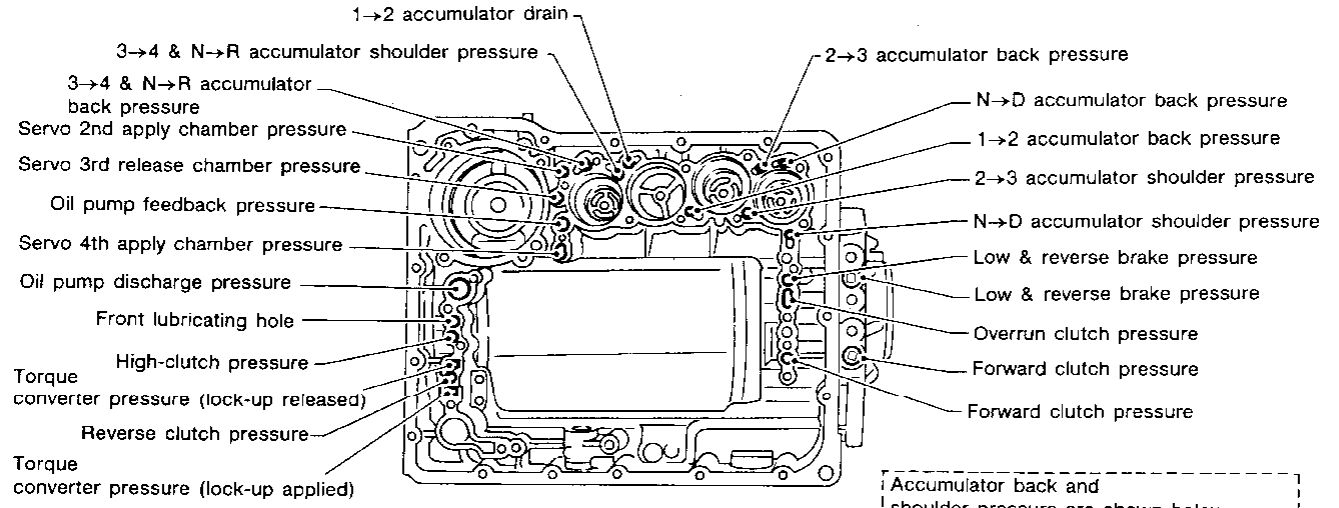
★ : Select with proper thickness.

☆ : Adjustment is required.



MAJOR OVERHAUL

Oil Channel



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MAJOR OVERHAUL

Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings

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

Thrust washers

Item number	Color
①	Black
④	White

Outer diameter of bearing races

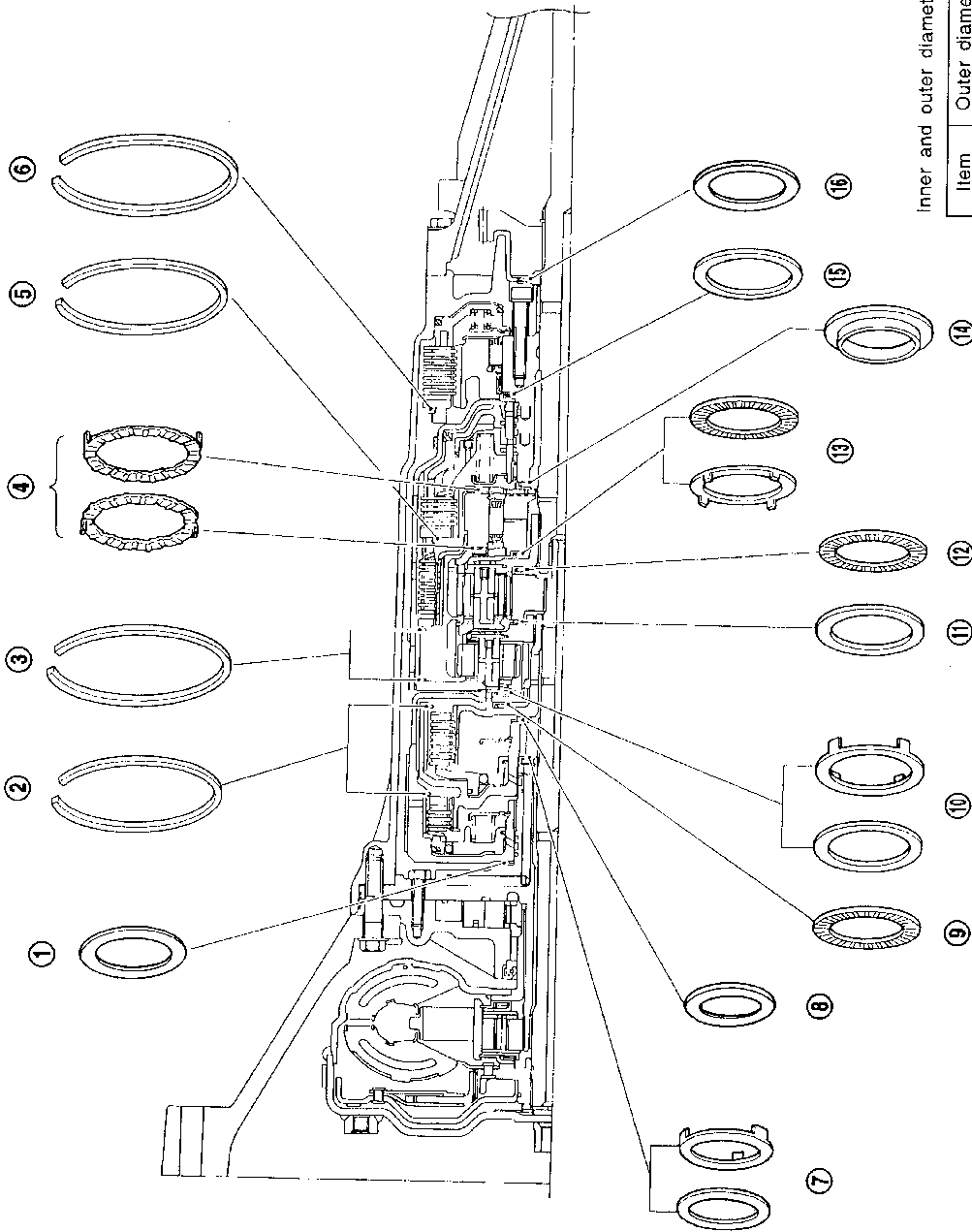
Item number	Outer diameter mm (in)
⑦	43.5 (1.713)
⑩	82.0 (3.228)
⑬	63.2 (2.488)

Installation of one-piece bearings

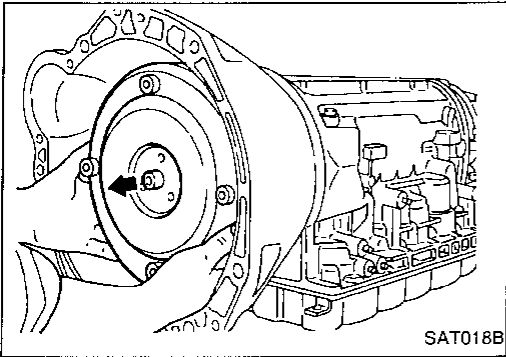
Item number	Bearing race (black) location
⑮	Rear side
⑯	Rear side

Inner and outer diameter of needle bearings

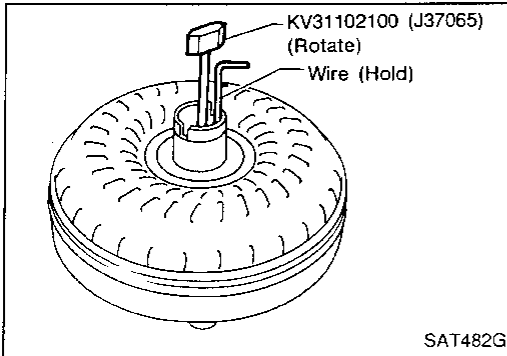
Item number	Outer diameter mm (in)	Inner diameter mm (in)	Number of needles
⑦	47.0 (1.850)	30.0 (1.181)	—
⑧	53.0 (2.087)	35.1 (1.382)	—
⑨, ⑩	85.0 (3.346)	62.7 (2.468)	—
⑪, ⑫	64.0 (2.520)	45.0 (1.772)	52
⑬	64.0 (2.520)	45.0 (1.772)	50
⑭	59.5 (2.343)	38.0 (1.496)	—
⑮	78.1 (3.075)	64.4 (2.535)	—
⑯	64.0 (2.520)	45.0 (1.772)	—



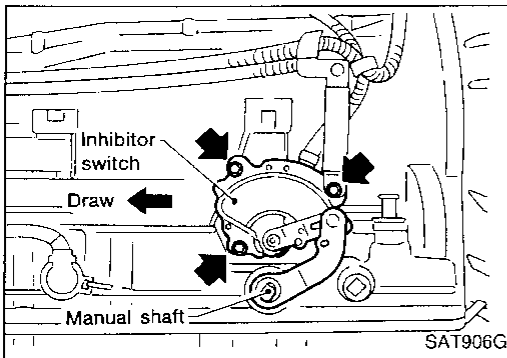
DISASSEMBLY



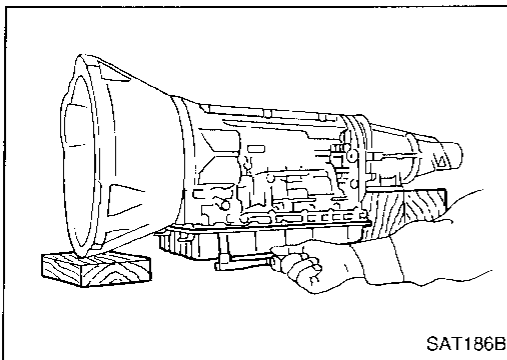
1. Remove torque converter by holding it firmly and turning while pulling straight out.



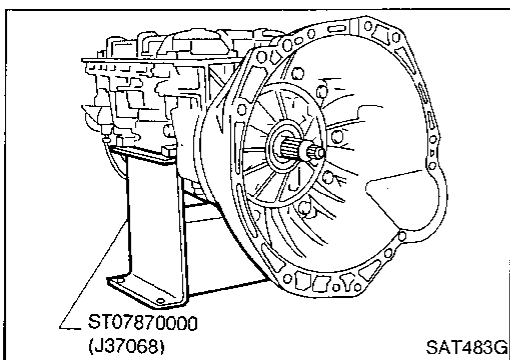
2. Check torque converter one-way clutch.
 - a. Insert Tool into spline of one-way clutch inner race.
 - b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
 - c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



3. Remove inhibitor switch from transmission case.



4. Remove oil pan.
 - a. Drain ATF from drain plug.
 - b. Raise oil pan by placing wooden blocks under converter housing and rear extension.
 - c. Separate the oil pan and transmission case.
 - **Always place oil pan straight down so that foreign particles inside will not move.**



5. Place transmission into Tool with the control valve facing up.

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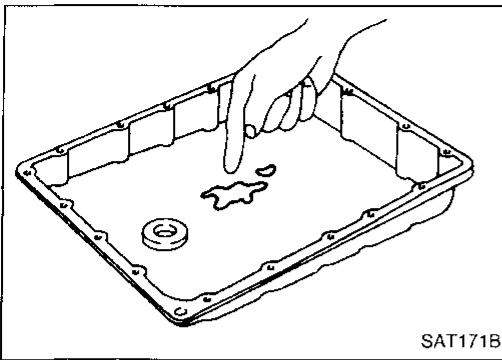
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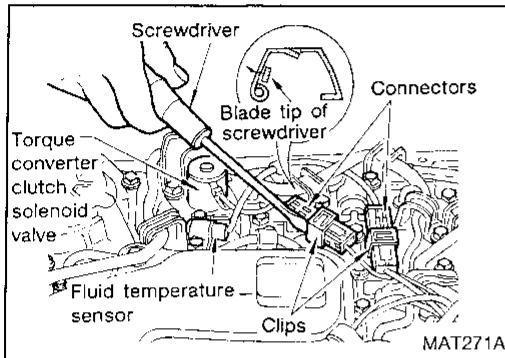
IDX

DISASSEMBLY

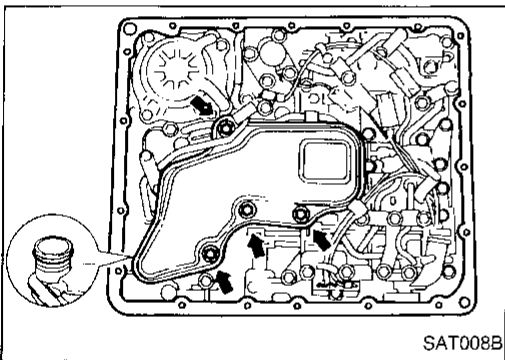


6. Check oil pan and oil strainer for accumulation of foreign particles.
 - If materials of clutch facing are found, clutch plates may be worn.
 - If metal filings are found, clutch plates, brake bands, etc. may be worn.
 - If aluminum filings are found, bushings or aluminum cast parts may be worn.

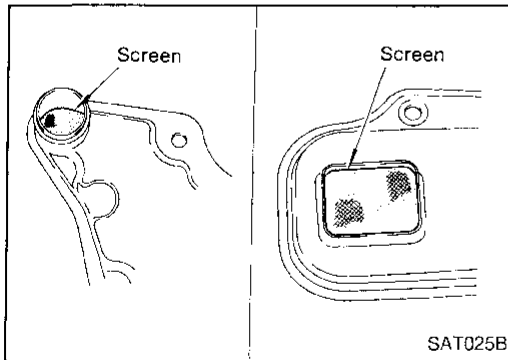
In above cases, replace torque converter and check unit for cause of particle accumulation.



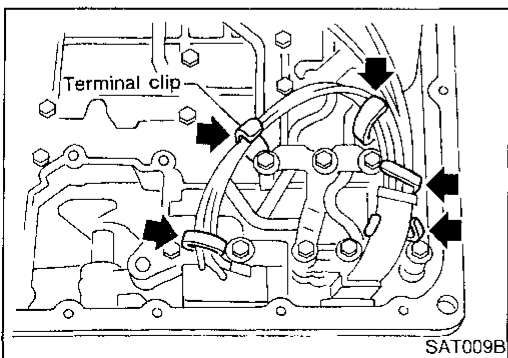
7. Remove torque converter clutch solenoid valve and fluid temperature sensor connectors.
 - **Be careful not to damage connector.**



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

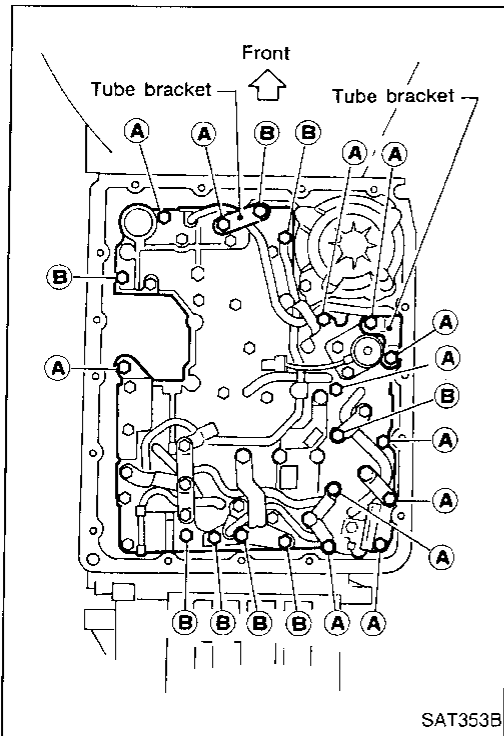


- b. Check oil strainer screen for damage.




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

DISASSEMBLY



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

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

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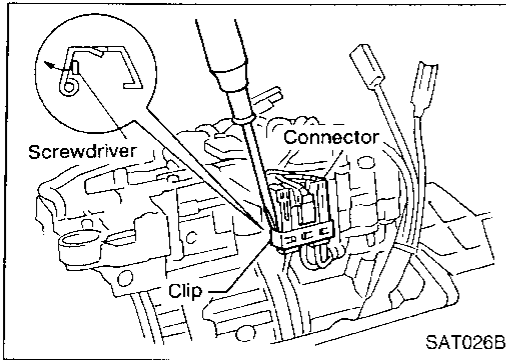
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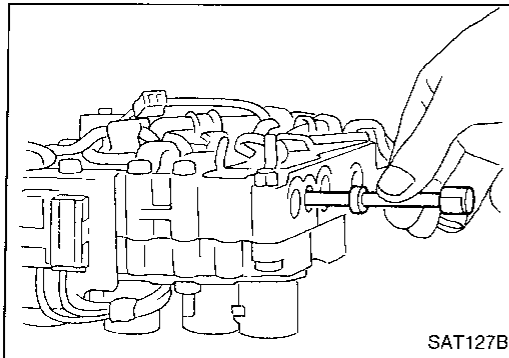
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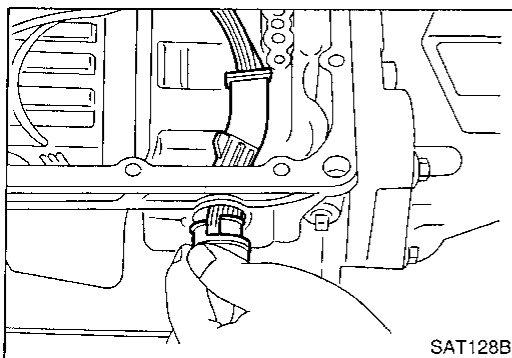
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c. Remove solenoid connector.
 • **Be careful not to damage connector.**

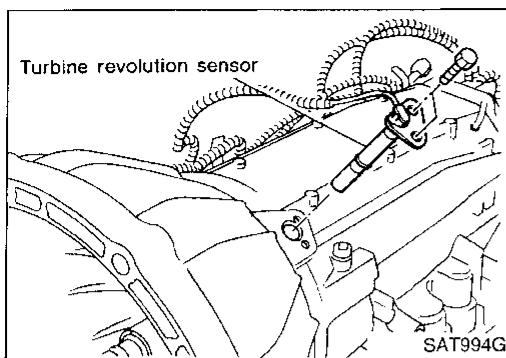


d. Remove manual valve from control valve assembly.

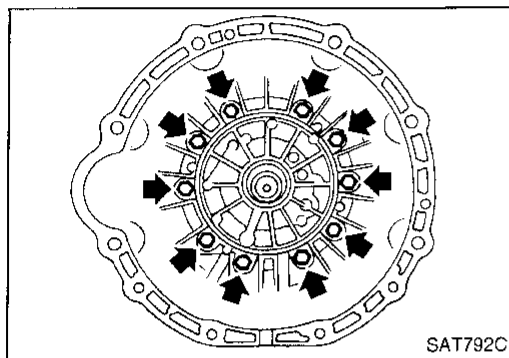


10. Remove terminal cord assembly from transmission case while pushing on stopper.
 • **Be careful not to damage cord.**
 • **Do not remove terminal cord assembly unless it is damaged.**

DISASSEMBLY

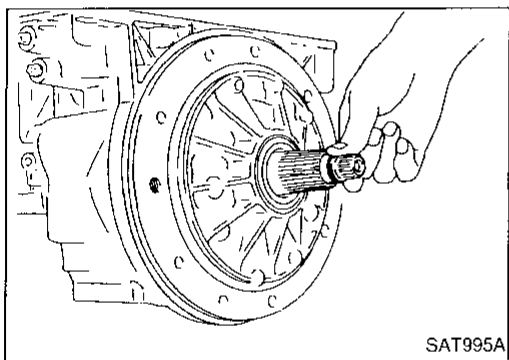


11. Remove turbine revolution sensor.

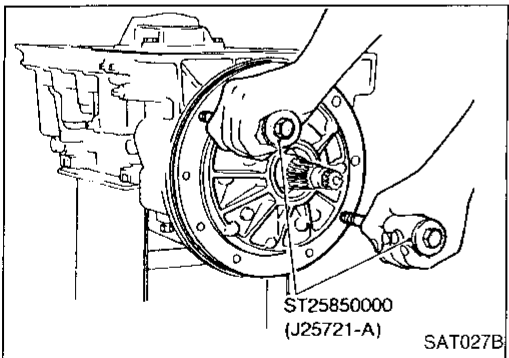


12. Remove converter housing.
a. Remove converter housing from transmission case.
b. Remove traces of sealant

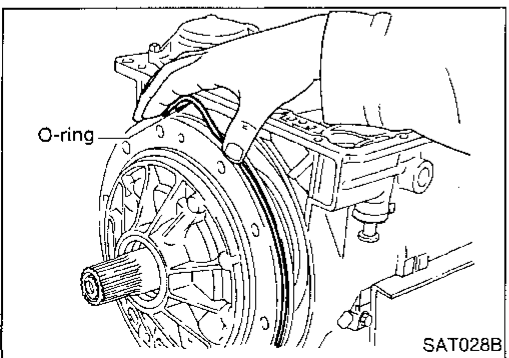
- **Be careful not to scratch converter housing.**



13. Remove O-ring from input shaft.



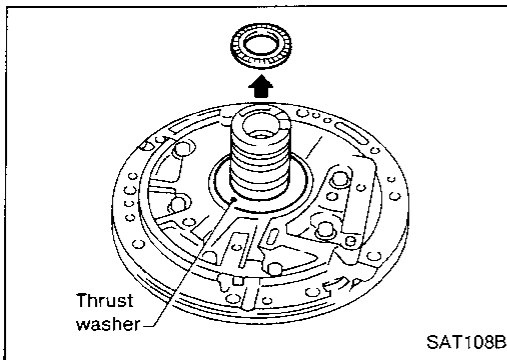
14. Remove oil pump assembly.
a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



b. Remove O-ring from oil pump assembly.
c. Remove traces of sealant from oil pump housing.

- **Be careful not to scratch pump housing.**

DISASSEMBLY

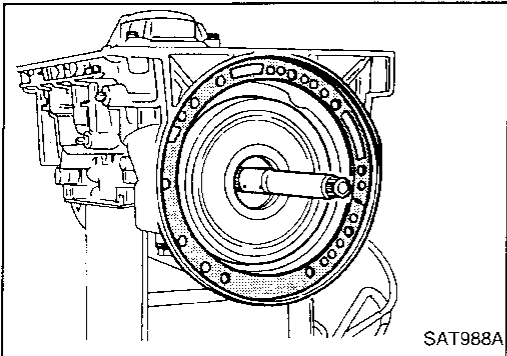


- d. Remove needle bearing and thrust washer from oil pump assembly.

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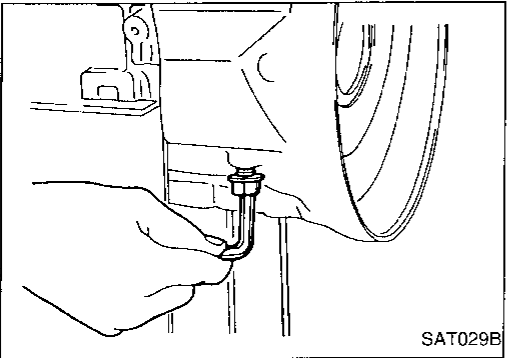
15. Remove input shaft and oil pump gasket.

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16. Remove brake band and band strut.

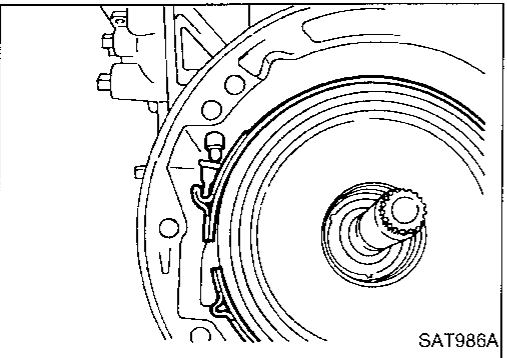
- a. Loosen lock nut and remove band servo anchor end pin from transmission case.

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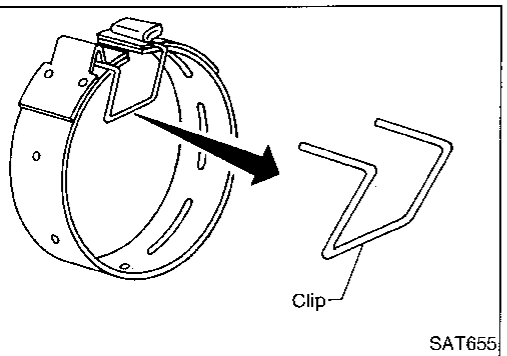
- b. Remove brake band and band strut from transmission case.

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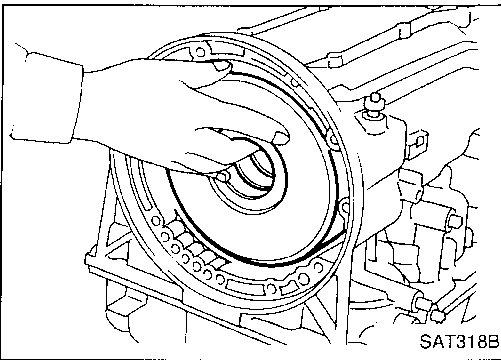


- c. Hold brake band in a circular shape with clip. Check brake band facing for damage, cracks, wear or burns.

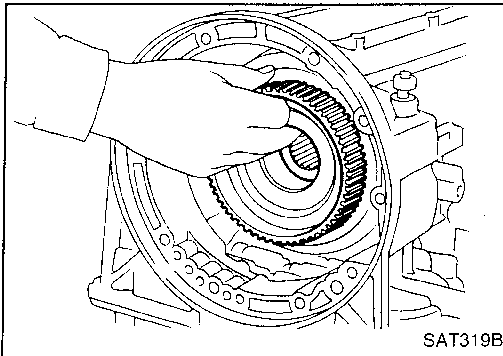
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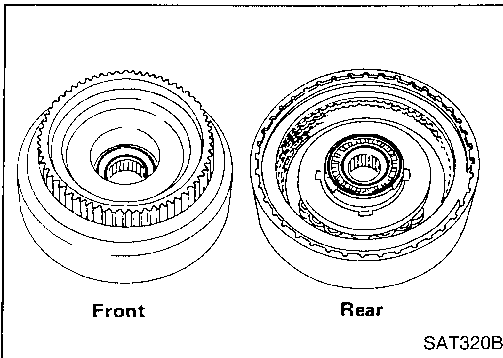
DISASSEMBLY



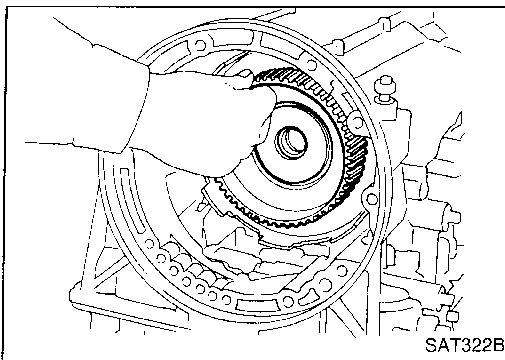
17. Remove front side clutch and gear components.
 - a. Remove reverse clutch assembly from transmission case.



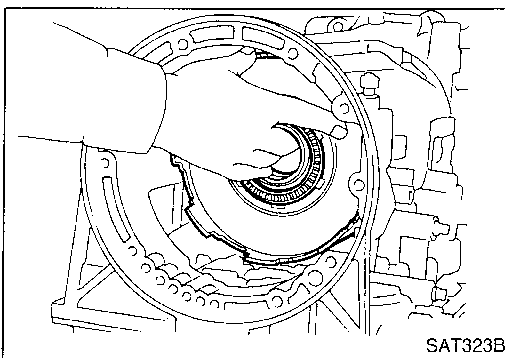
- b. Remove high clutch assembly from transmission case.



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

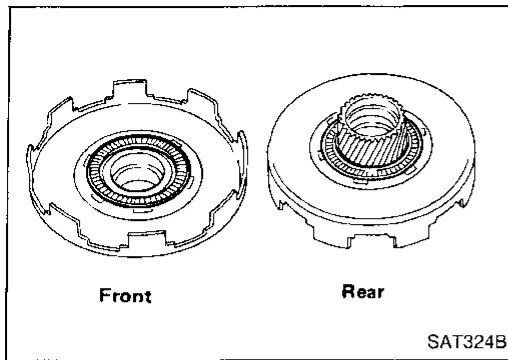


- e. Remove high clutch hub from transmission case.

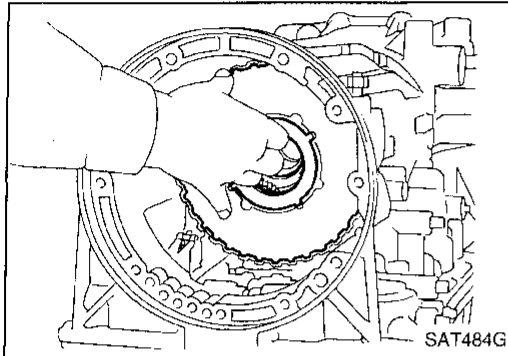


- f. Remove front sun gear from transmission case.

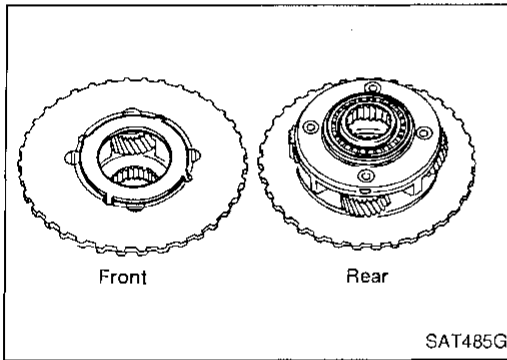
DISASSEMBLY



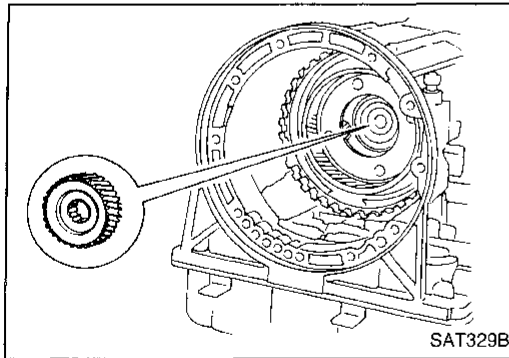
- g. Remove front needle bearing from front sun gear.
- h. Remove rear needle bearing from front sun gear.



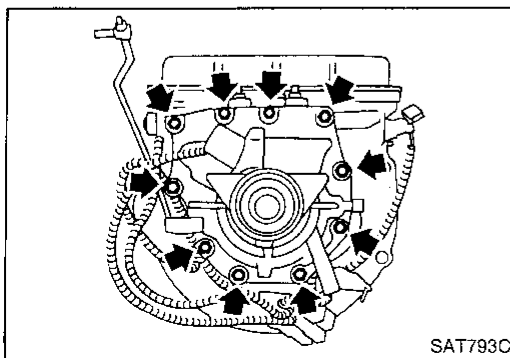
- i. Remove front planetary carrier from transmission case.



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



- l. Remove rear sun gear from transmission case.



- 18. Remove rear extension.
 - a. Remove rear extension from transmission case.
 - b. Remove rear extension gasket from transmission case.

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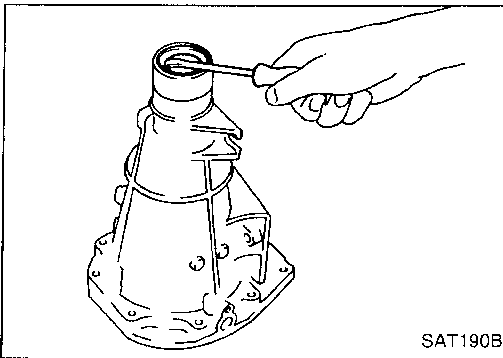
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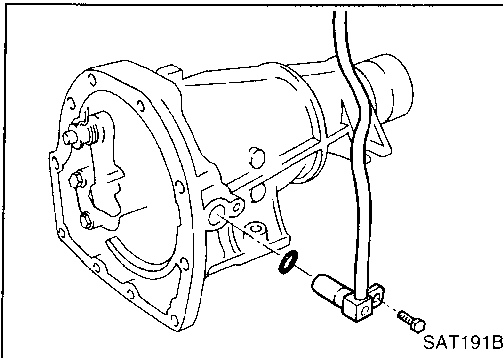
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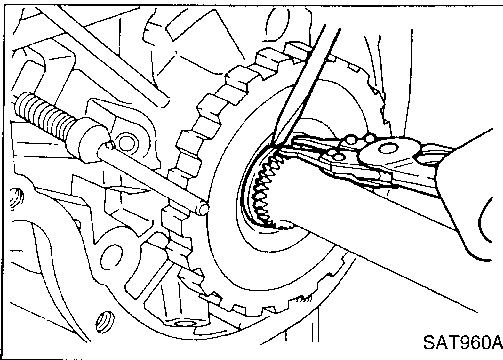
DISASSEMBLY



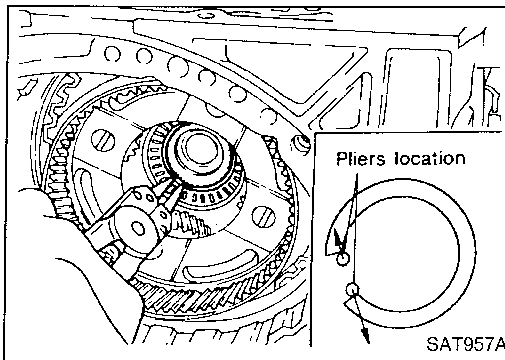
- c. Remove oil seal from rear extension.
- **Do not remove oil seal unless it is to be replaced.**



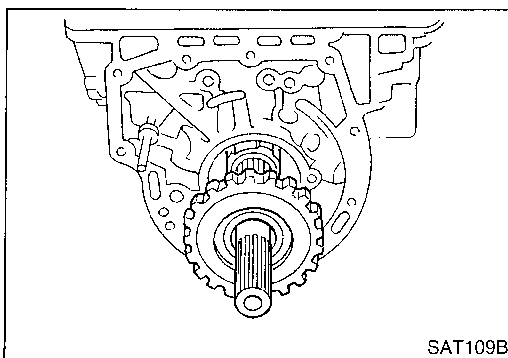
- d. Remove revolution sensor from rear extension.
- e. Remove O-ring from revolution sensor.



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

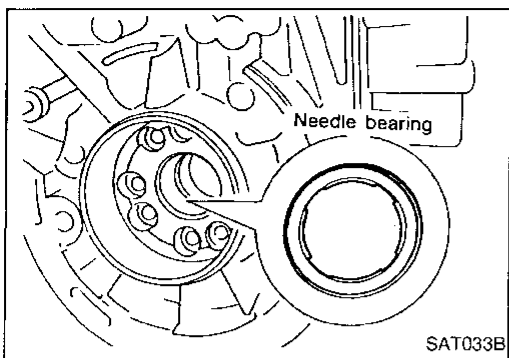


- b. Slowly push output shaft all the way forward.
- **Do not use excessive force.**
- c. Remove snap ring from output shaft.



- d. Remove output shaft and parking gear as a unit from transmission case.
- e. Remove parking gear from output shaft.

DISASSEMBLY



f. Remove needle bearing from transmission case.

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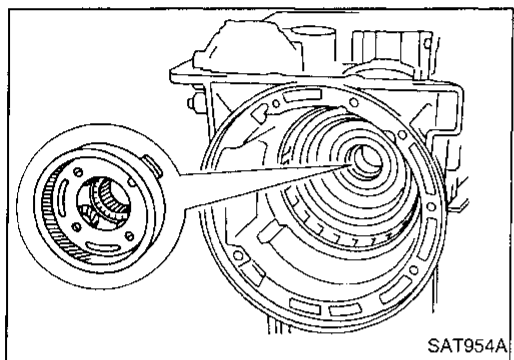
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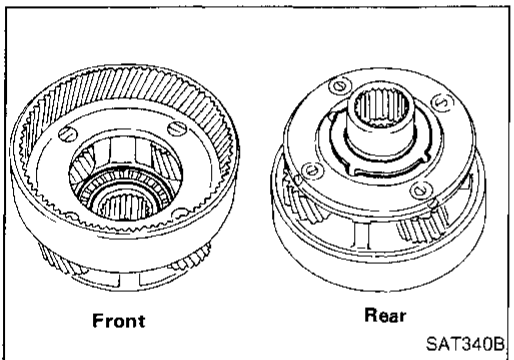
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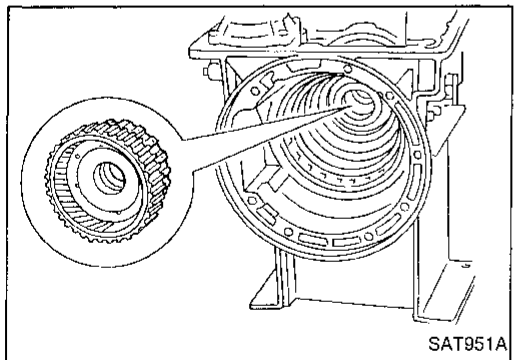
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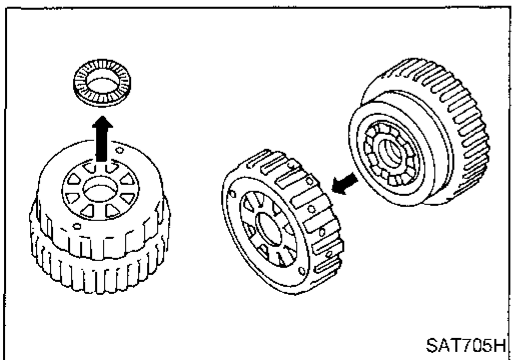
20. Remove rear side clutch and gear components.
a. Remove front internal gear.



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

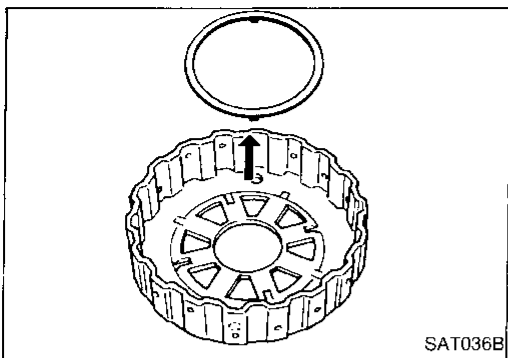


d. Remove rear internal gear, forward clutch hub and overrun clutch hub as a set from transmission case.

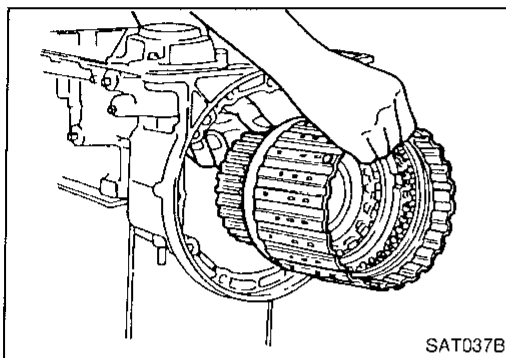


e. Remove needle bearing from overrun clutch hub.
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.

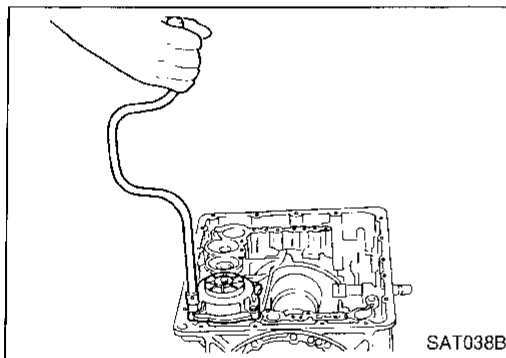
DISASSEMBLY



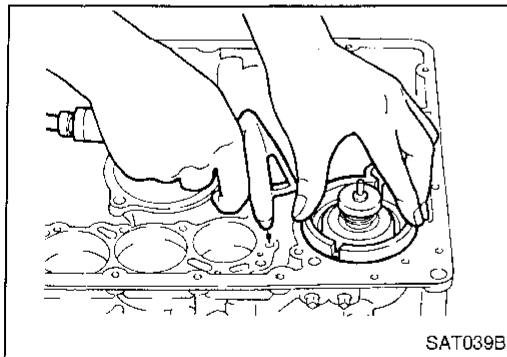
g. Remove thrust washer from overrun clutch hub.



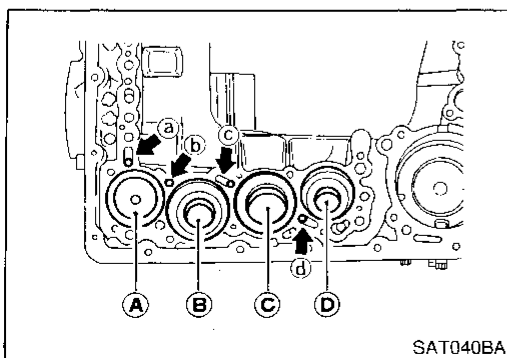
h. Remove forward clutch assembly from transmission case.



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



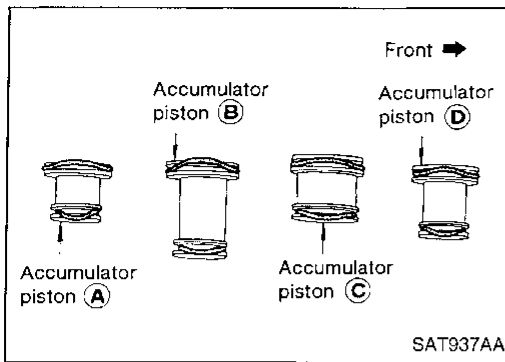
b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
● **Hold piston with a rag and gradually direct air to oil hole.**
c. Remove return spring.



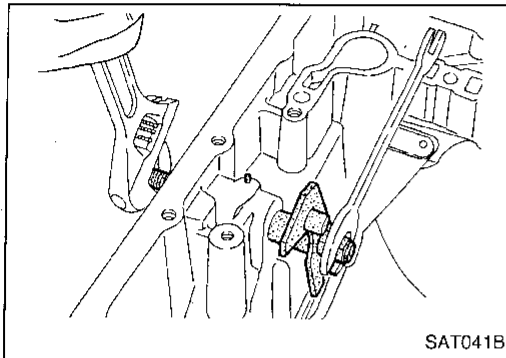
d. Remove springs from accumulator pistons (B), (C) and (D).
e. Apply compressed air to each oil hole until piston comes out.
● **Hold piston with a rag and gradually direct air to oil hole.**

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

DISASSEMBLY

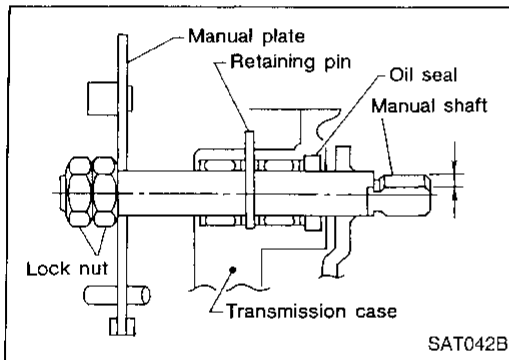


f. Remove O-ring from each piston.

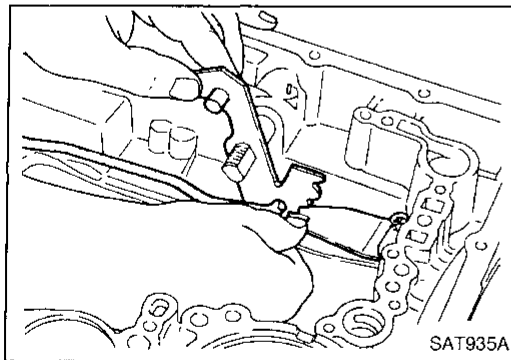


22. Remove manual shaft components, if necessary.

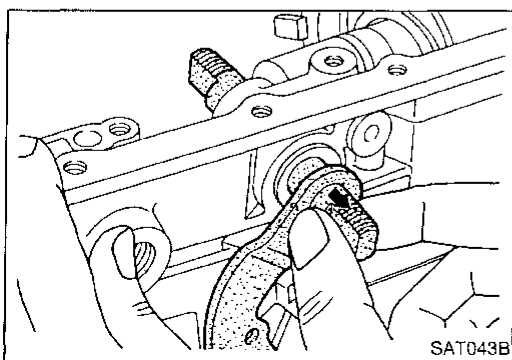
a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.



b. Remove retaining pin from transmission case.



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



d. Remove manual shaft from transmission case.

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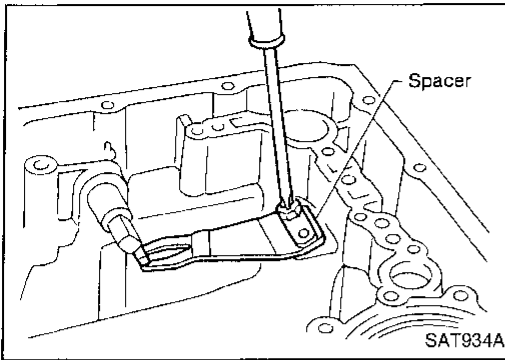
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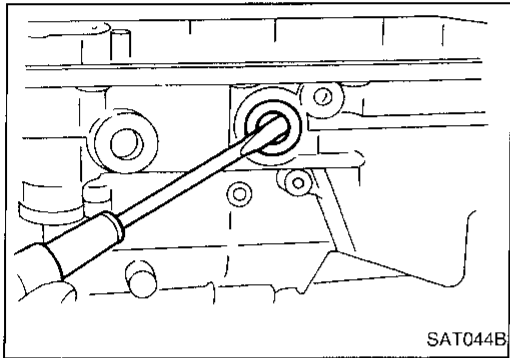
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DISASSEMBLY

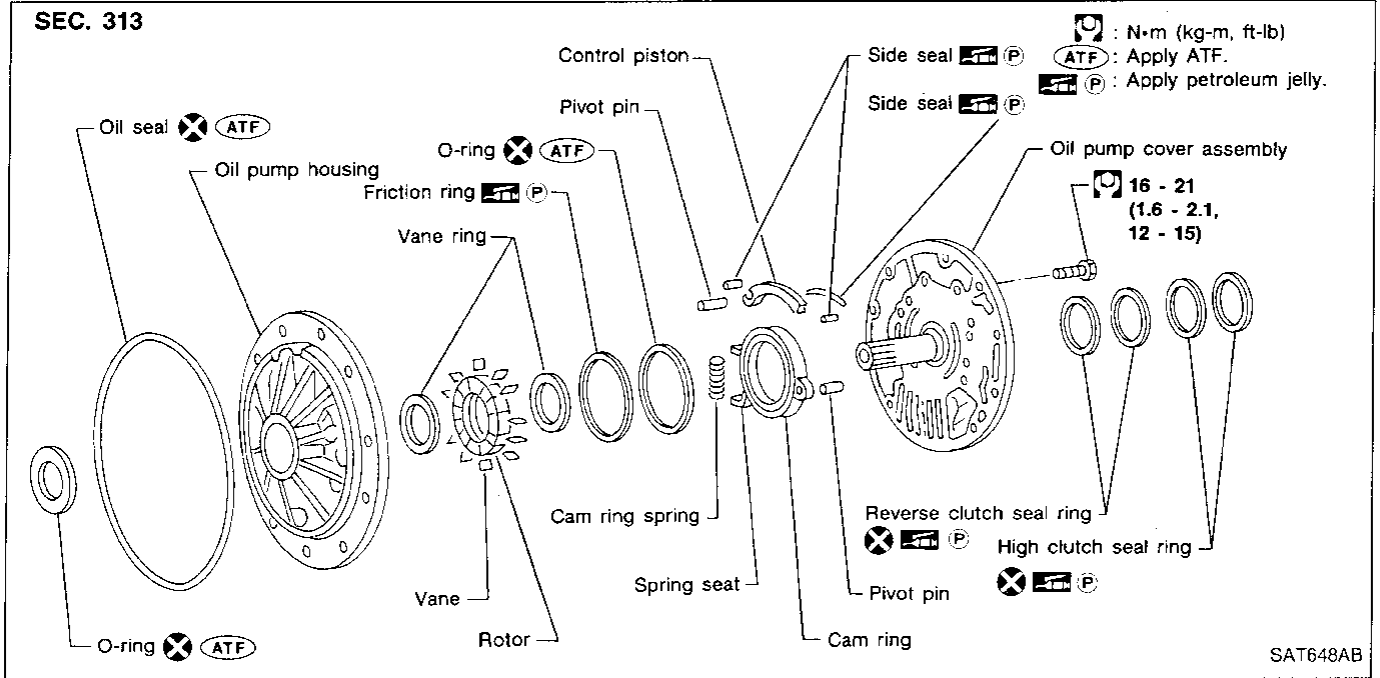


- e. Remove spacer and detent spring from transmission case.



- f. Remove oil seal from transmission case.

Oil Pump

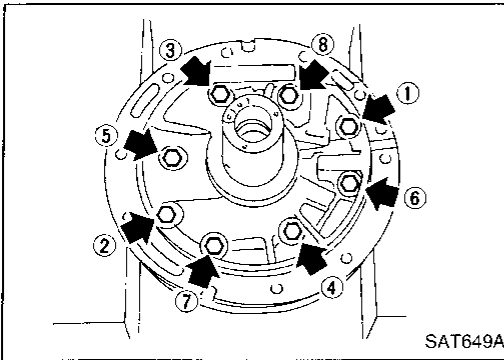


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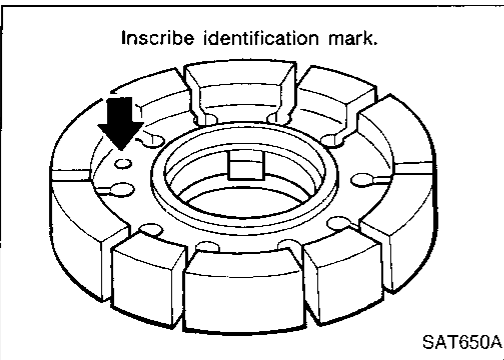
- Loosen bolts in numerical order and remove oil pump cover.

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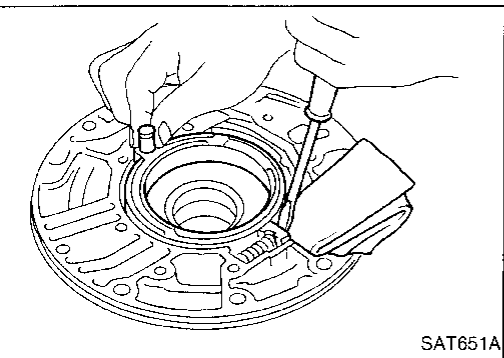
- Remove rotor, vane rings and vanes.
 - Inscribe a mark on back of rotor for identification of fore-aft direction when reassembling rotor. Then remove rotor.

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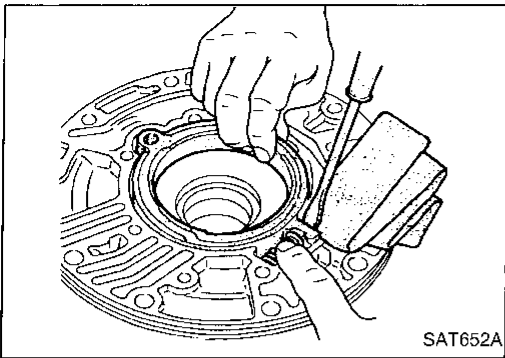
- While pushing on cam ring remove pivot pin.
 - Be careful not to scratch oil pump housing.

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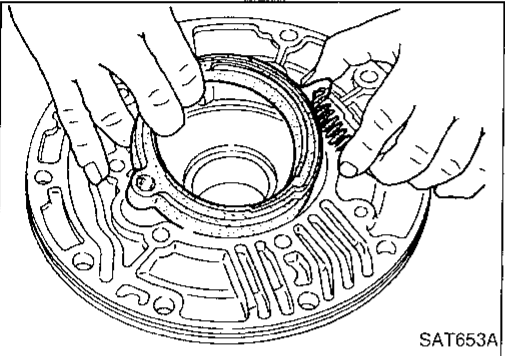


REPAIR FOR COMPONENT PARTS

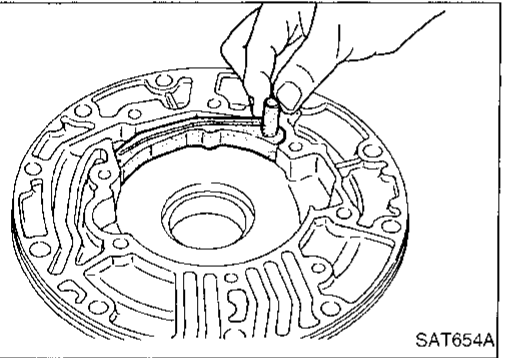
Oil Pump (Cont'd)



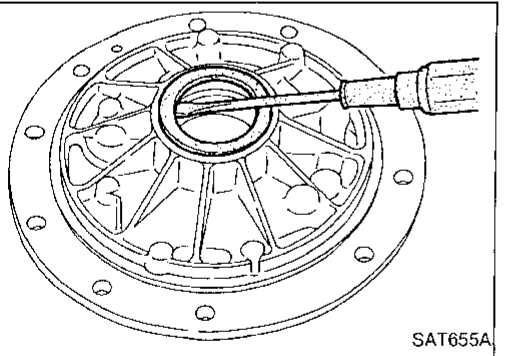
4. While holding cam ring and spring lift out cam ring spring.
 - Be careful not to damage oil pump housing.
 - Hold cam ring spring to prevent it from jumping.



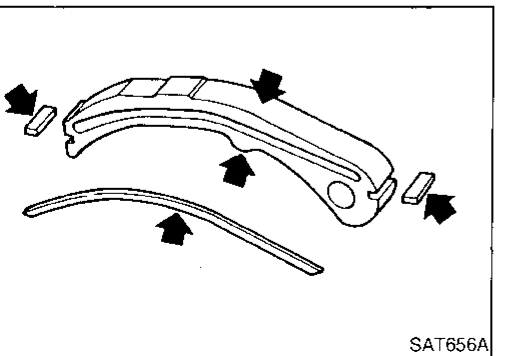
5. Remove cam ring and cam ring spring from oil pump housing.



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



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



INSPECTION

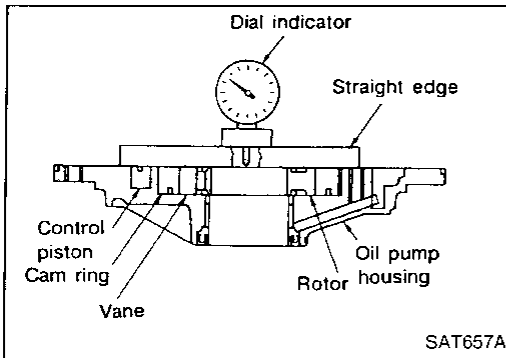
Oil pump cover, rotor, vanes, control piston, side seals, cam ring and friction ring

- Check for wear or damage.

REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

Side clearances



- Measure side clearances between end of oil pump housing and cam ring, rotor, vanes and control piston in at least four places along their circumferences. Maximum measured values should be within specified ranges.

- **Before measuring side clearance, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**

Standard clearance:

Cam ring

0.01 - 0.024 mm (0.0004 - 0.0009 in)

Rotor, vanes, control piston

0.03 - 0.044 mm (0.0012 - 0.0017 in)

- If not within standard clearance, replace oil pump assembly except oil pump cover assembly.

Seal ring clearance

- Measure clearance between seal ring and ring groove.

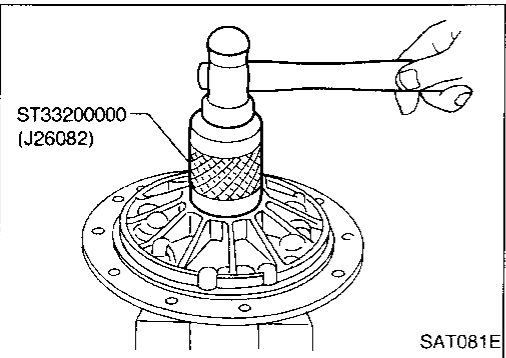
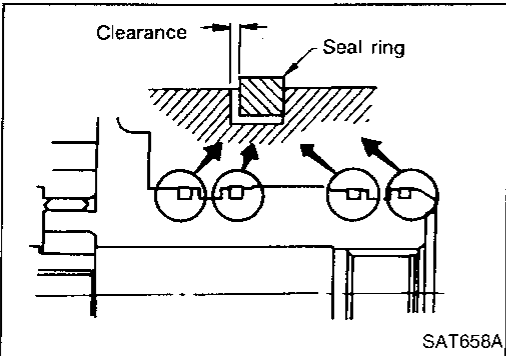
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

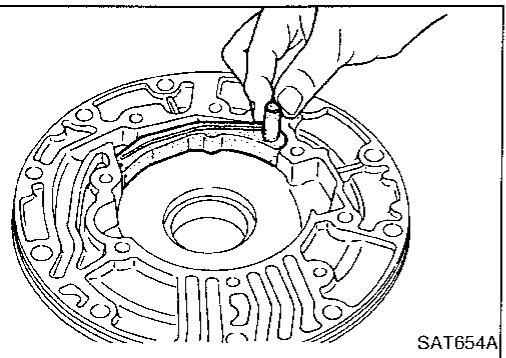
- If not within wear limit, replace oil pump cover assembly.



ASSEMBLY

1. Drive oil seal into oil pump housing.

- **Apply ATF to outer periphery and lip surface.**



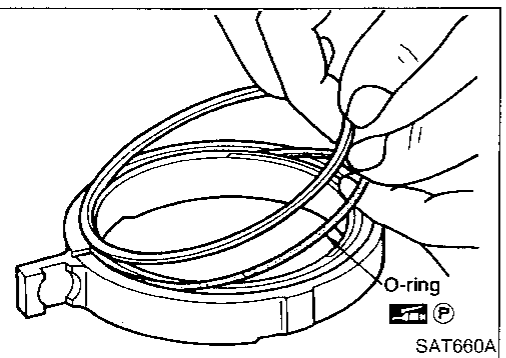
2. Install cam ring in oil pump housing by the following steps.

- a. Install side seal on control piston.

- **Pay attention to its direction — Black surface goes toward control piston.**

- **Apply petroleum jelly to side seal.**

- b. Install control piston on oil pump.

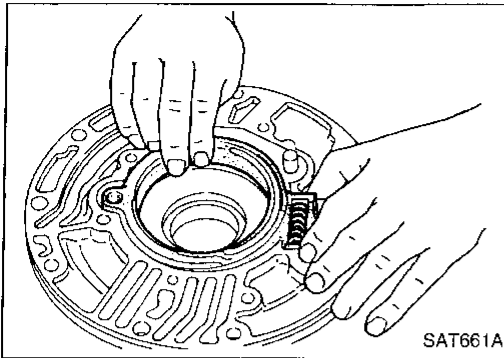


- c. Install O-ring and friction ring on cam ring.

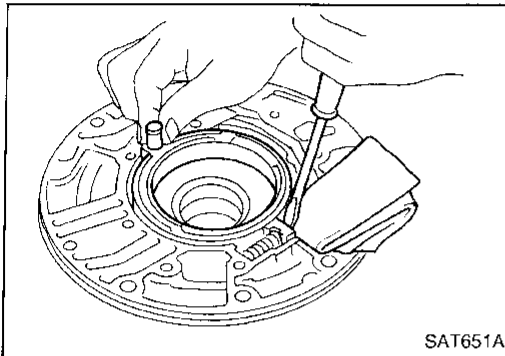
- **Apply petroleum jelly to O-ring.**

REPAIR FOR COMPONENT PARTS

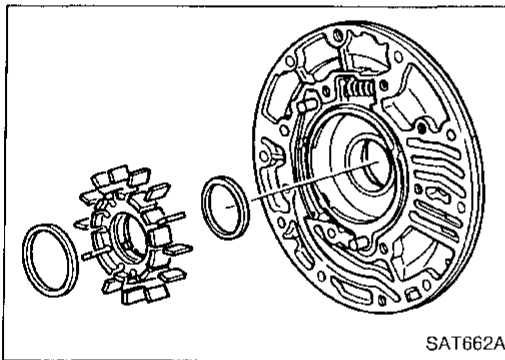
Oil Pump (Cont'd)



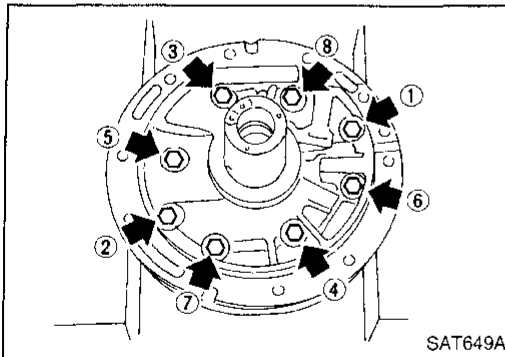
- d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.



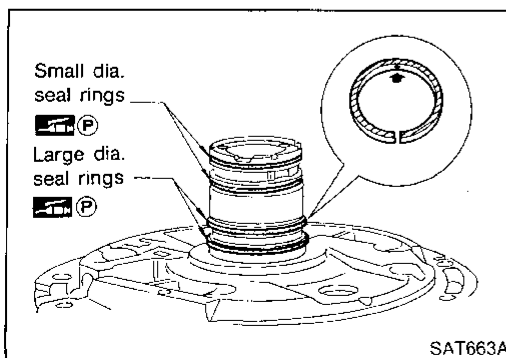
- e. While pushing on cam ring install pivot pin.



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



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



5. Install seal rings carefully after packing ring grooves with petroleum jelly. Press rings down into jelly to a close fit.

- Seal rings come in two different diameters. Check fit carefully in each groove.

Small dia. seal ring:

No mark

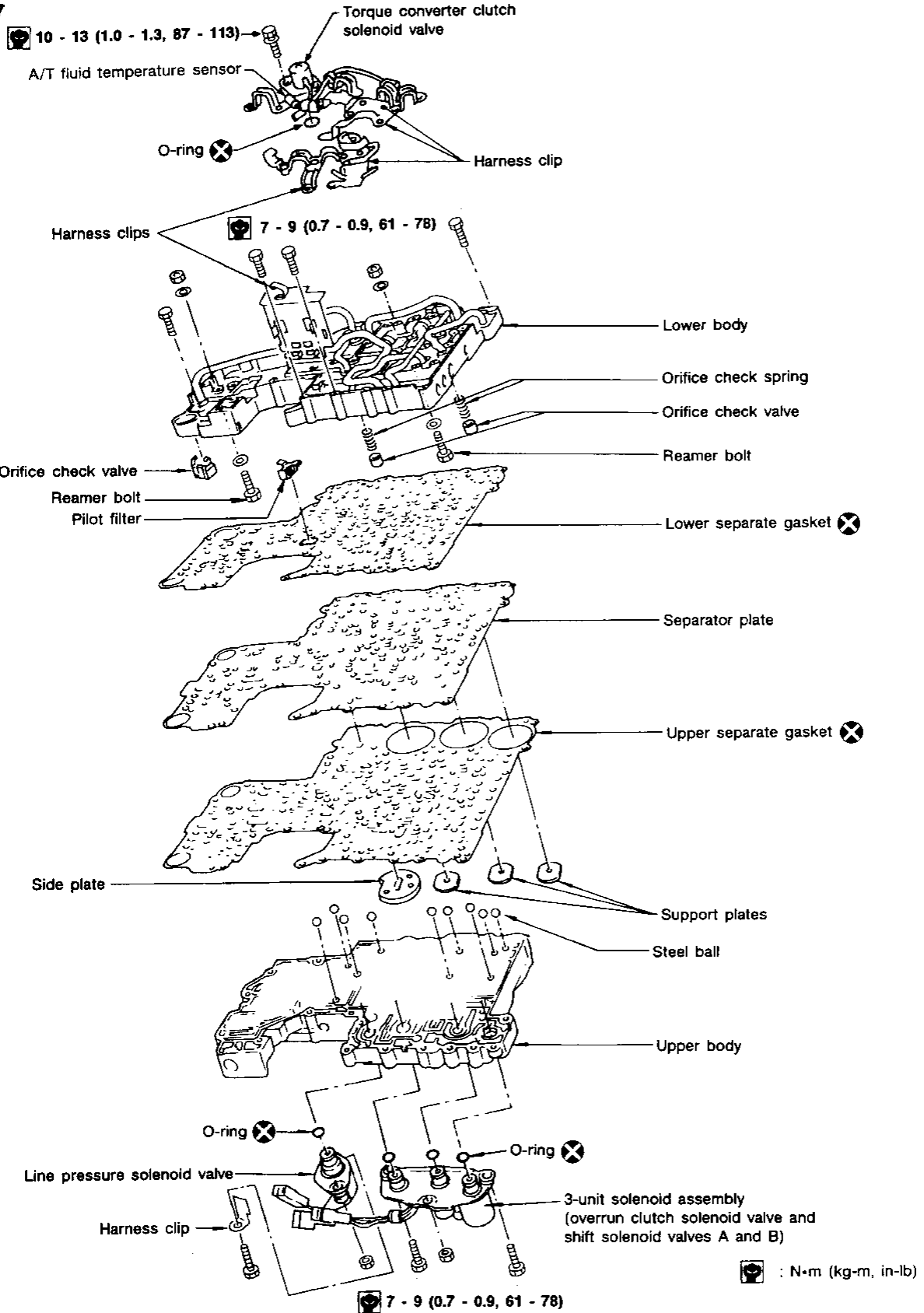
Large dia. seal ring:

Yellow mark in area shown by arrow

- Do not spread gap of seal ring excessively while installing. It may deform ring.

Control Valve Assembly

SEC. 317



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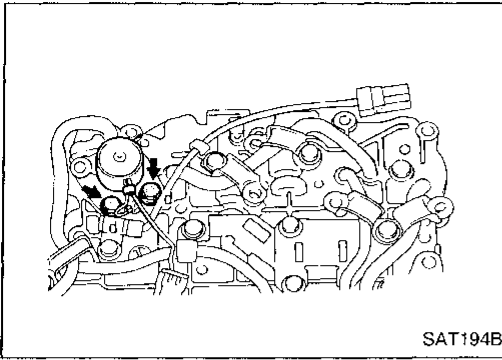
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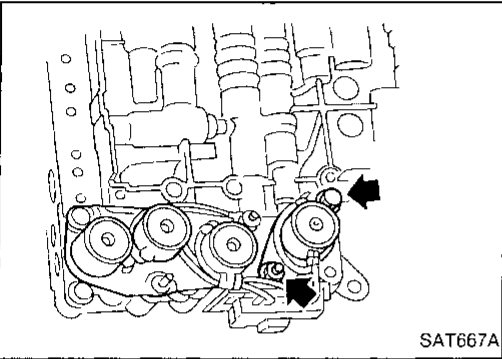
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

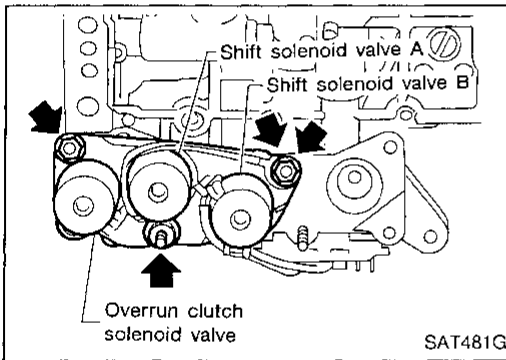
DISASSEMBLY



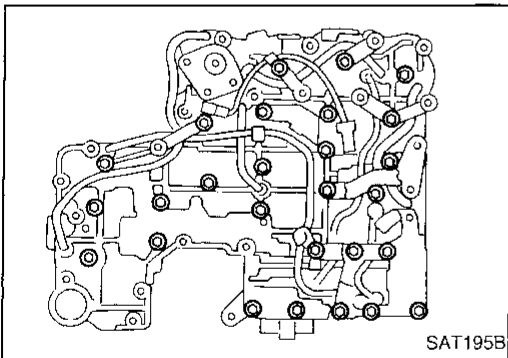
1. Remove solenoids.
 - a. Remove torque converter clutch solenoid valve and side plate from lower body.
 - b. Remove O-ring from solenoid.



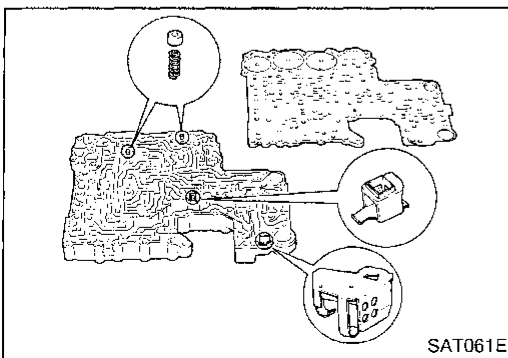
- c. Remove line pressure solenoid valve from upper body.
 - d. Remove O-ring from solenoid.



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



2. Disassemble upper and lower bodies.
 - a. Place upper body facedown, and remove bolts, reamer bolts and support plates.
 - b. Remove lower body, separator plate and separate gasket as a unit from upper body.
 - **Be careful not to drop pilot filter, orifice check valve, spring and steel balls.**

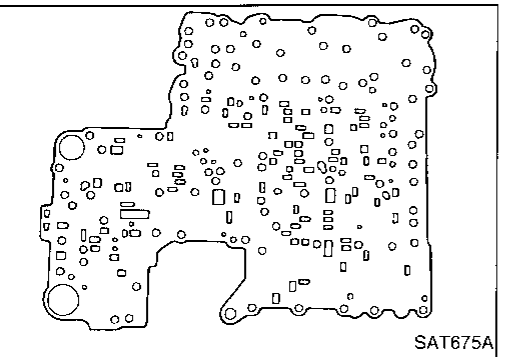
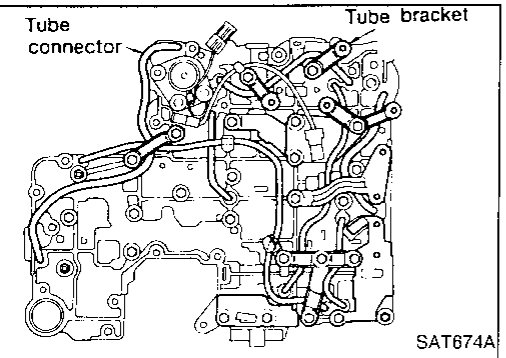
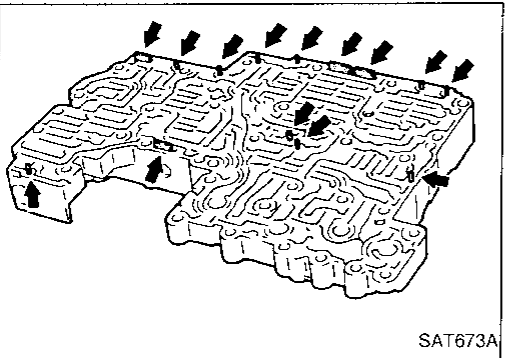
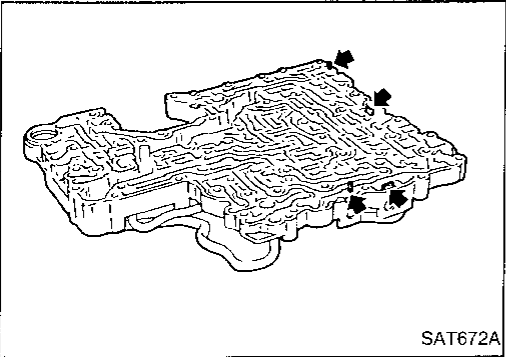
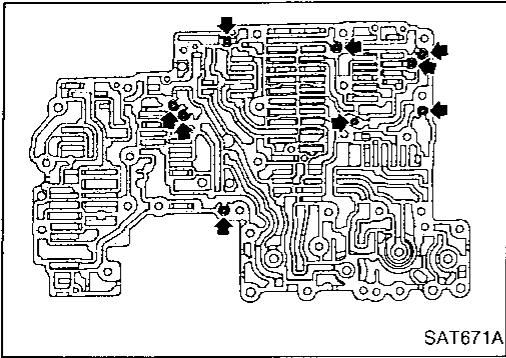


- c. Place lower body facedown, and remove separate gasket and separator plate.
 - d. Remove pilot filter, orifice check valves and orifice check springs.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

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



INSPECTION

Lower and upper bodies

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

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

- **Be careful not to lose these parts.**

- Check to make sure that oil circuits are clean and free from damage.

- Check tube brackets and tube connectors for damage.

Separator plates

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

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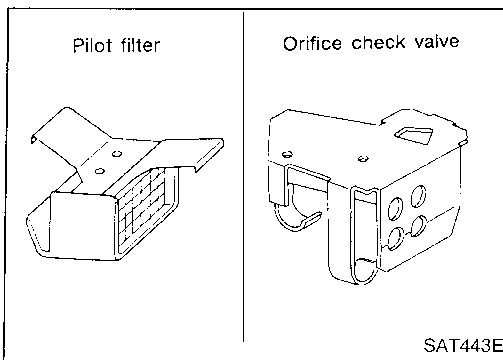
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REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

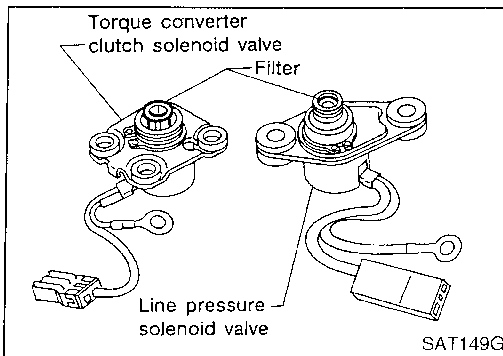


Pilot filter

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

Orifice check valve

- Check that orifice check valve is not damaged.

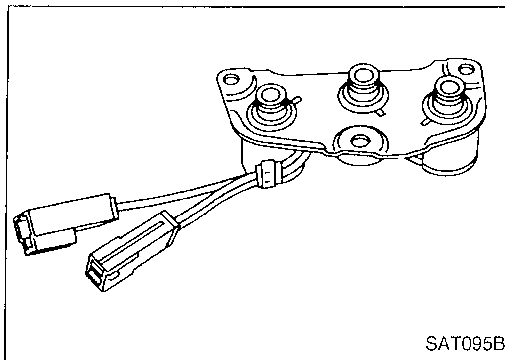


Torque converter clutch solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-81.

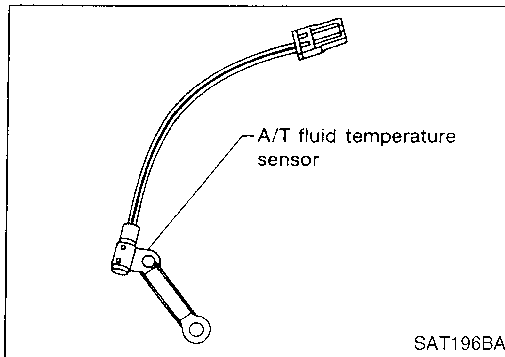
Line pressure solenoid valve

- Check that filter is not clogged or damaged.
- Measure resistance. Refer to "Component Inspection", AT-81.



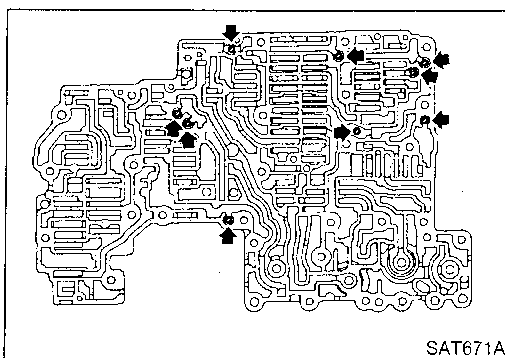
3-unit solenoid assembly (Overrun clutch solenoid valve and shift solenoid valves A and B)

- Measure resistance of each solenoid. Refer to "Component Inspection", AT-81.



A/T fluid temperature sensor

- Measure resistance. Refer to "Component Inspection", AT-65.

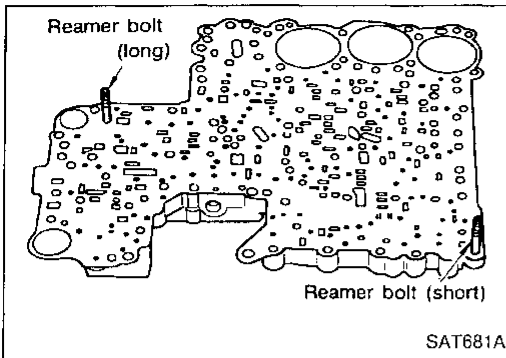


ASSEMBLY

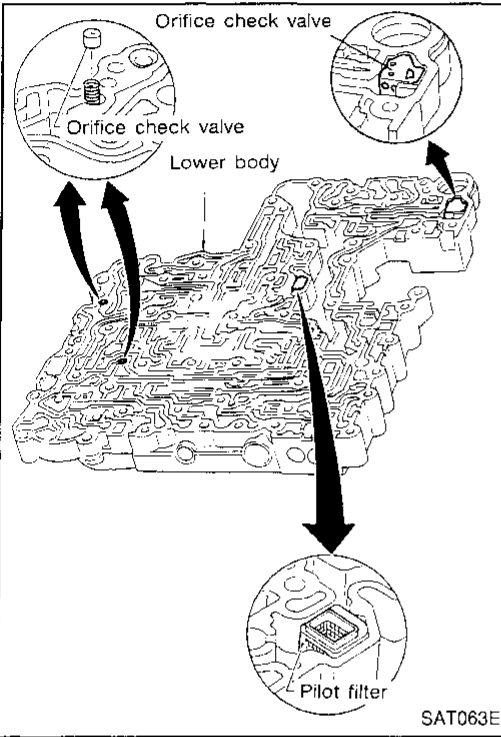
1. Install upper and lower bodies.
 - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

REPAIR FOR COMPONENT PARTS

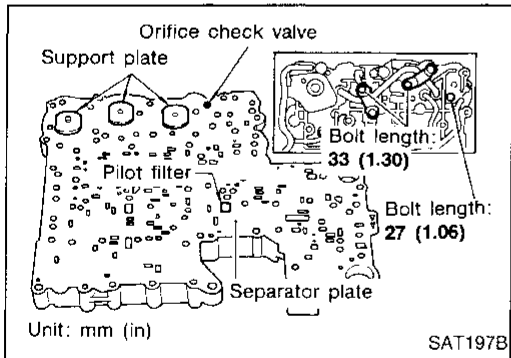
Control Valve Assembly (Cont'd)



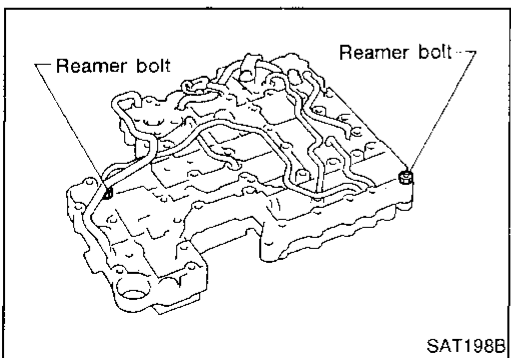
- b. Install reamer bolts from bottom of upper body and install separate gaskets.



- c. Place oil circuit of lower body face up. Install orifice check springs, orifice check valves and pilot filter.



- d. Install lower separate gaskets and separator plates on lower body.
 e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets.



- f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.
 • **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**

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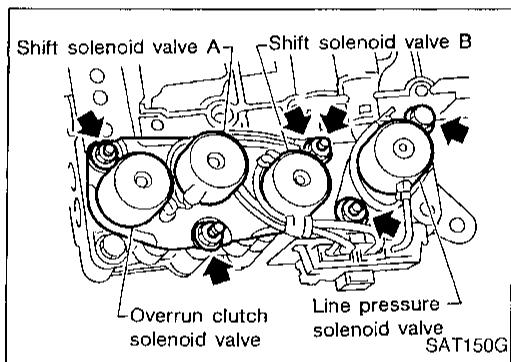
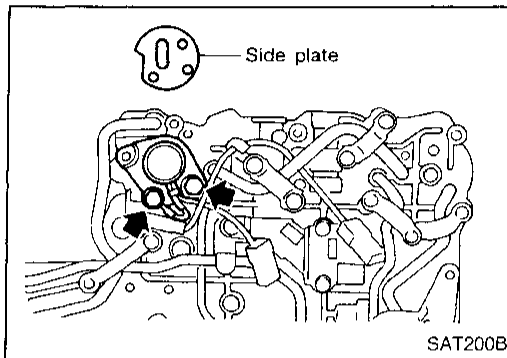
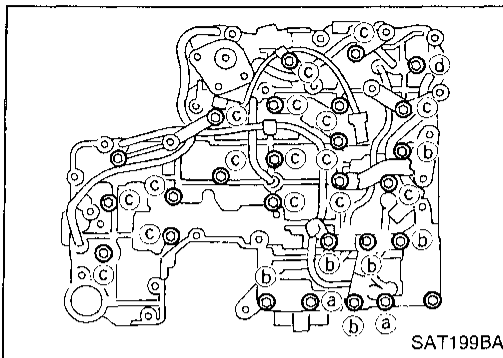
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

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

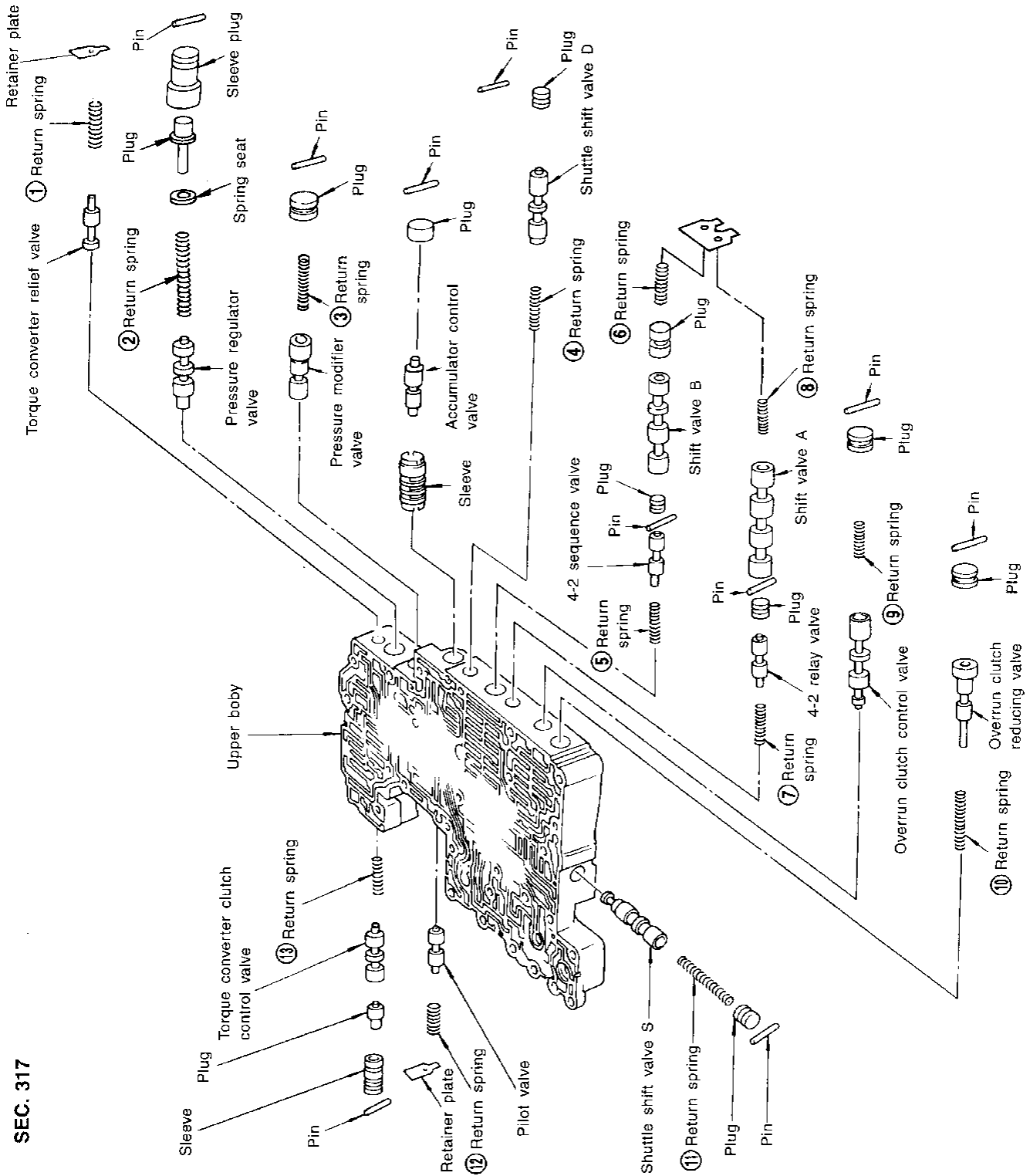
Bolt length and location:

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



2. Install solenoids.
 - a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.
 - b. Attach O-rings and install 3-unit solenoids assembly onto upper body.
 - c. Attach O-ring and install line pressure solenoid valve onto upper body.
3. Tighten all bolts.

Control Valve Upper Body



SEC. 317

Number preceding valve spring correspond with those shown in SDS table on page AT-226.
Apply ATF to all components before their installation.

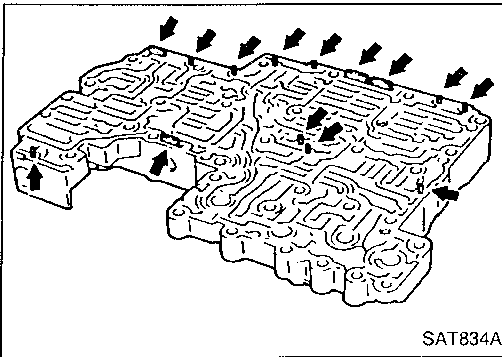
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REPAIR FOR COMPONENT PARTS

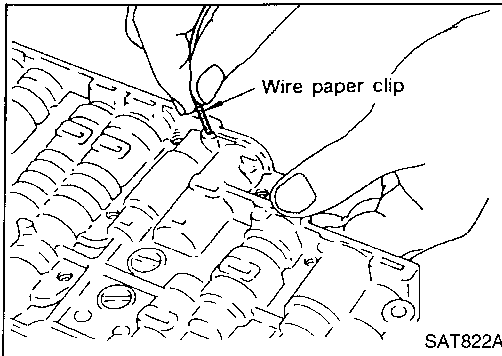
Control Valve Upper Body (Cont'd)

DISASSEMBLY

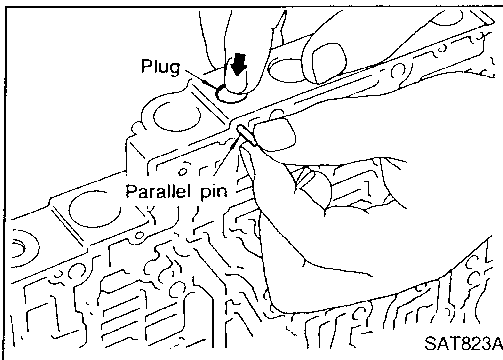
1. Remove valves at parallel pins.
 - Do not use a magnetic hand.



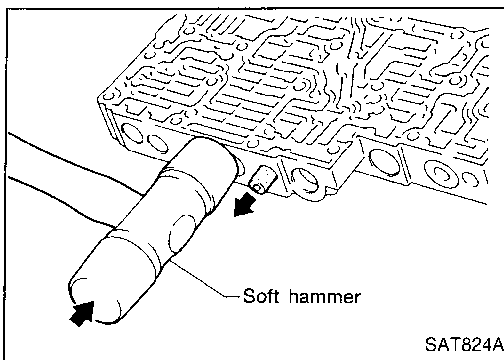
- a. Use a wire paper clip to push out parallel pins.



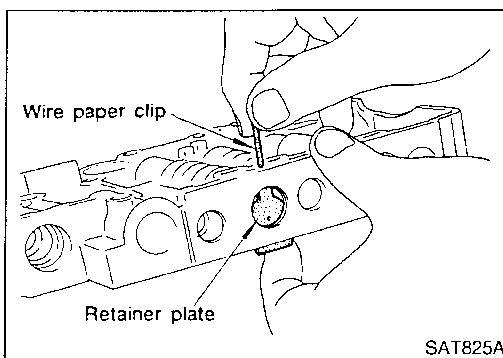
- b. Remove parallel pins while pressing their corresponding plugs and sleeves.
 - Remove plug slowly to prevent internal parts from jumping out.



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

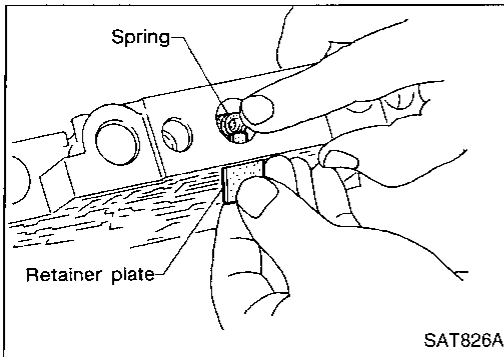


2. Remove valves at retainer plates.
 - a. Pry out retainer plate with wire paper clip.

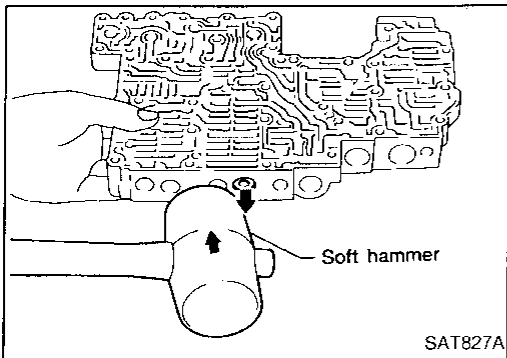


REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

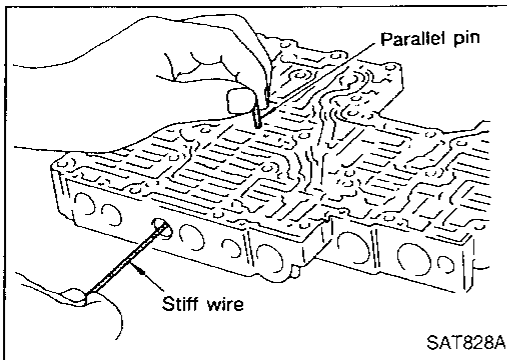


b. Remove retainer plates while holding spring.



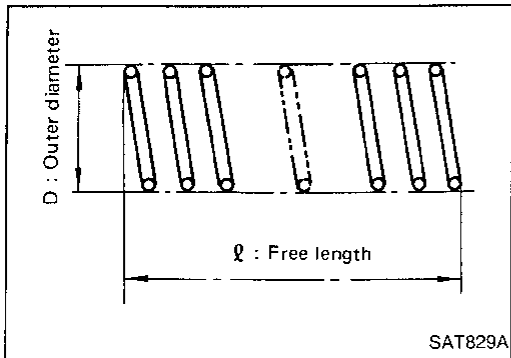
c. Place mating surface of valve facedown, and remove internal parts.

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



● 4-2 sequence valve and relay valve are located far back in upper body. If they are hard to remove, carefully push them out using stiff wire.

- Be careful not to scratch sliding surface of valve with wire.



INSPECTION

Valve springs

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

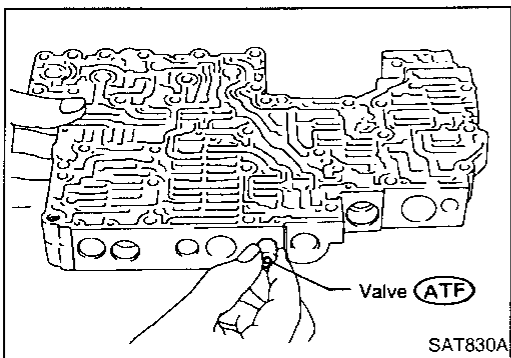
Inspection standard:

Refer to SDS, AT-226.

- Replace valve springs if deformed or fatigued.

Control valves

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



ASSEMBLY

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.

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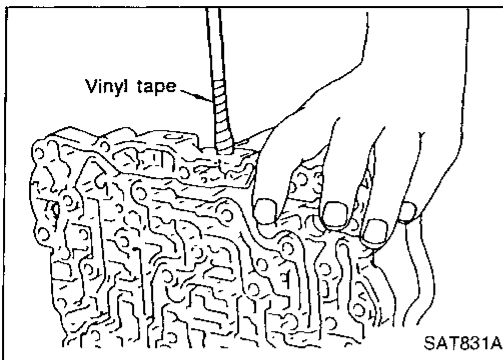
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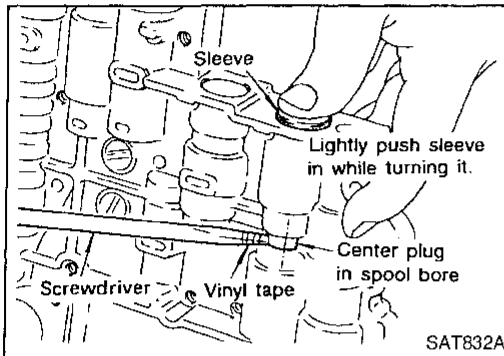
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REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

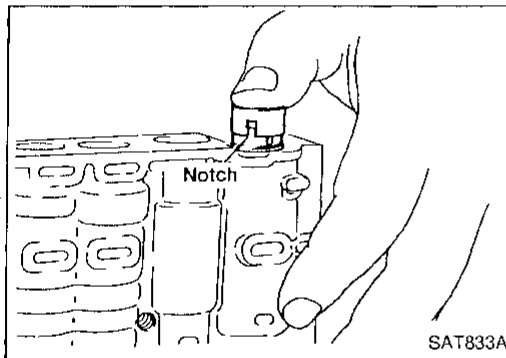


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



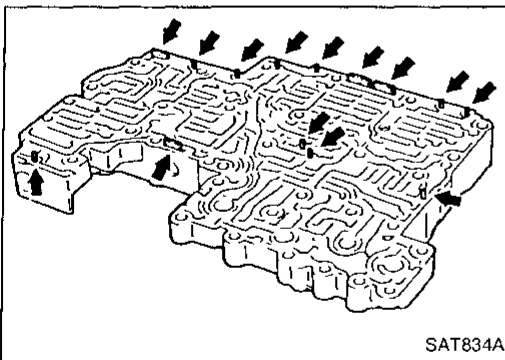
Pressure regulator valve

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

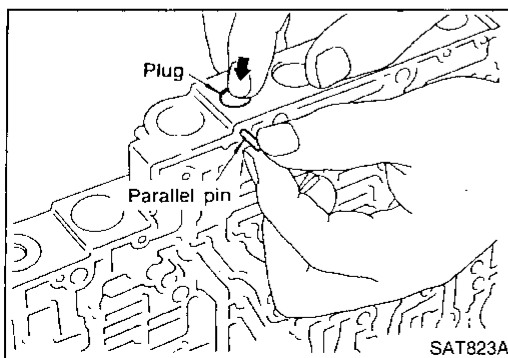


Accumulator control plug

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



2. Install parallel pins and retainer plates.



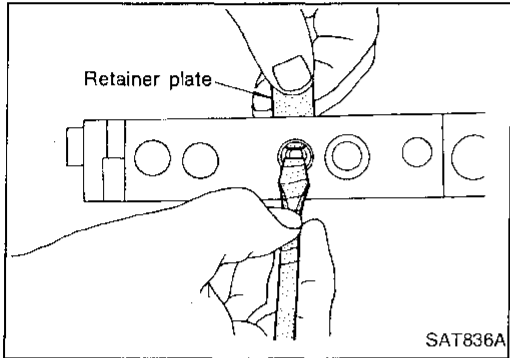
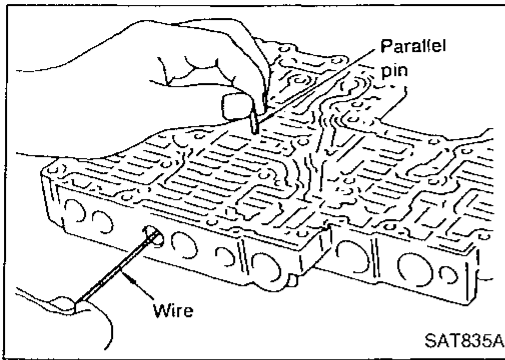
- While pushing plug, install parallel pin.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

4-2 sequence valve and relay valve

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



- Insert retainer plate while pushing spring.

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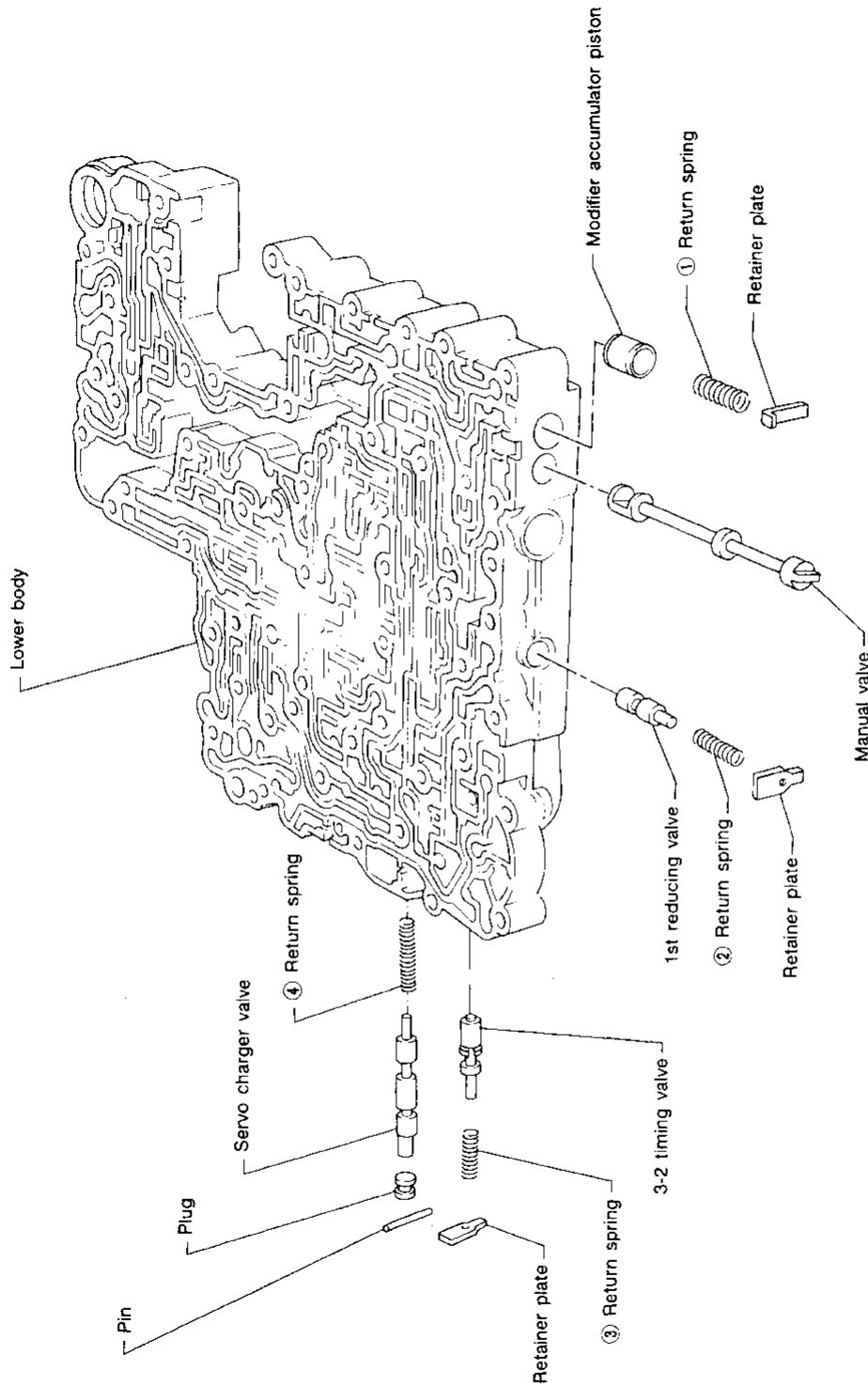
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Control Valve Lower Body

SEC. 317



Numbers preceding valve springs correspond with those shown in SDS table on page AT-226.
Apply ATF to all components before their installation.

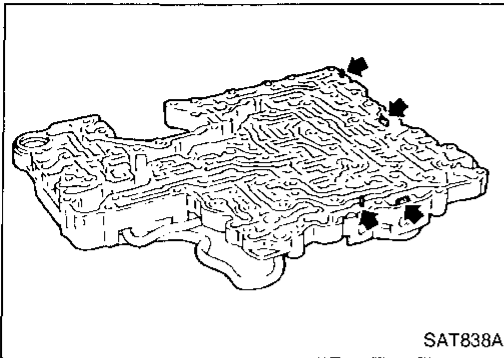
SAT997GC

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body (Cont'd)

DISASSEMBLY

1. Remove valves at parallel pins.
2. Remove valves at retainer plates.
For removal procedures, refer to "DISASSEMBLY" in "Control Valve Upper Body", AT-176.



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INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.

Inspection standard:

Refer to SDS, AT-226.

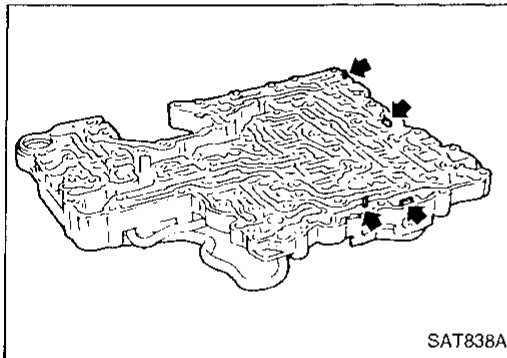
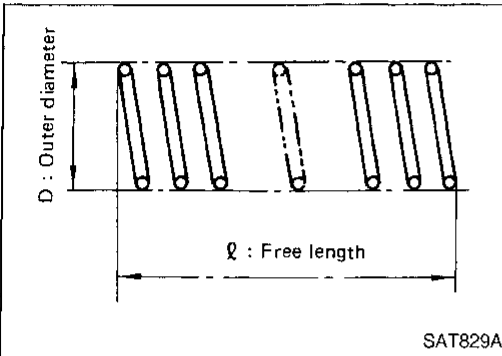
- Replace valve springs if deformed or fatigued.

Control valves

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

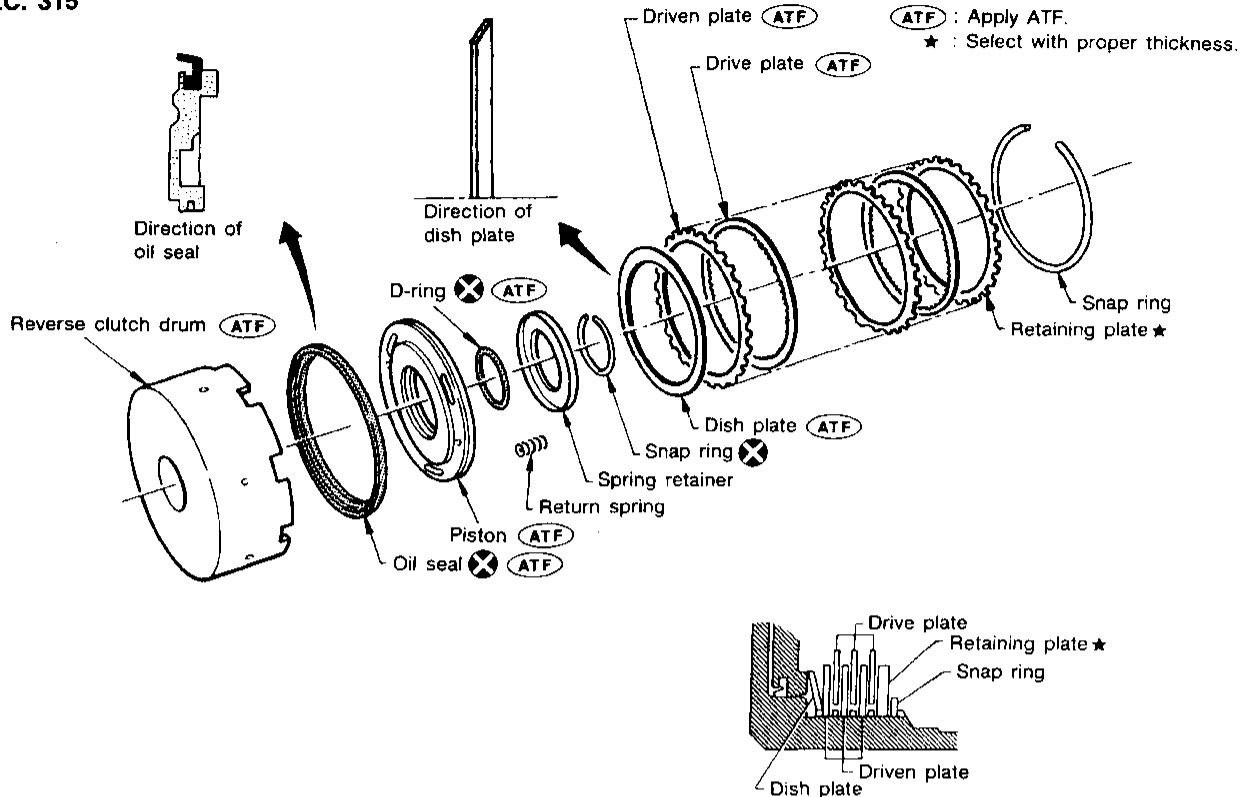
ASSEMBLY

- Install control valves.
For installation procedures, refer to "ASSEMBLY" in "Control Valve Upper Body", AT-177.

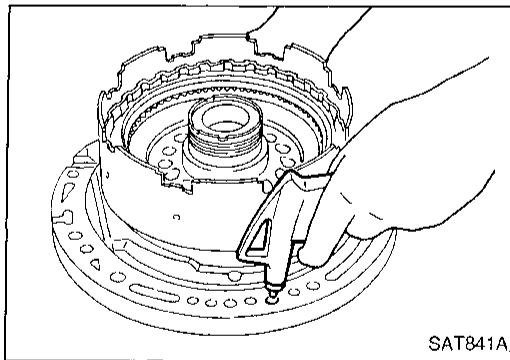


Reverse Clutch

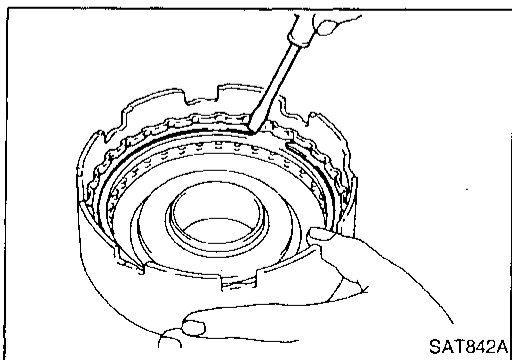
SEC. 315



SAT169EC



SAT841A



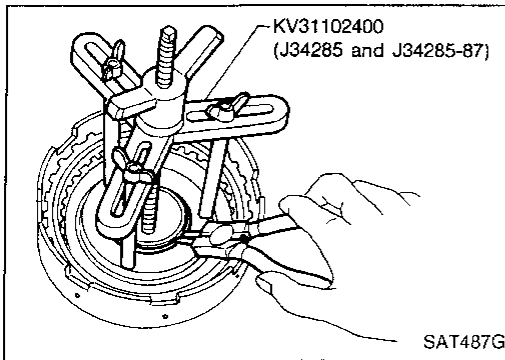
SAT842A

DISASSEMBLY

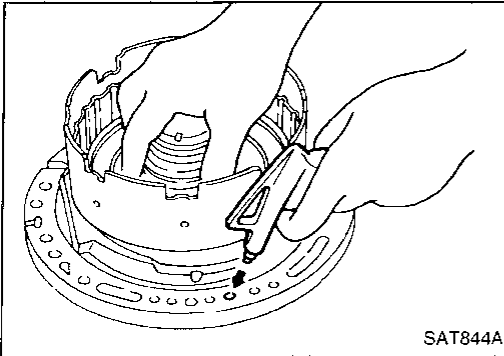
1. Check operation of reverse clutch.
 - a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring,
 - D-ring might be damaged.
 - Oil seal might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

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



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

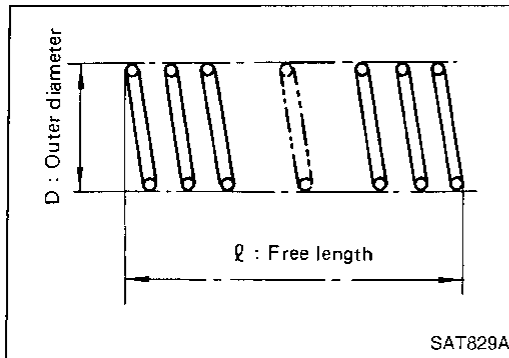


5. Install seal ring onto oil pump cover and install reverse clutch drum. While holding piston, gradually apply compressed air to oil hole until piston is removed.
 - **Do not apply compressed air abruptly.**
6. Remove D-ring and oil seal from piston.

INSPECTION

Reverse clutch snap ring and spring retainer

- Check for deformation, fatigue or damage.

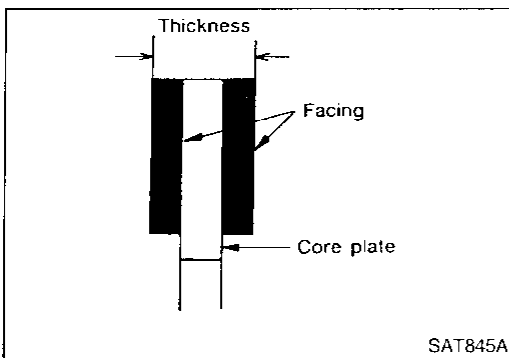


Reverse clutch return springs

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

Inspection standard:

Refer to SDS, AT-226.



Reverse clutch drive plates

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

Thickness of drive plate:

Standard value: 1.90 - 2.05 mm (0.0748 - 0.0807 in)

Wear limit: 1.8 mm (0.071 in)

- If not within wear limit, replace.

Reverse clutch dish plate

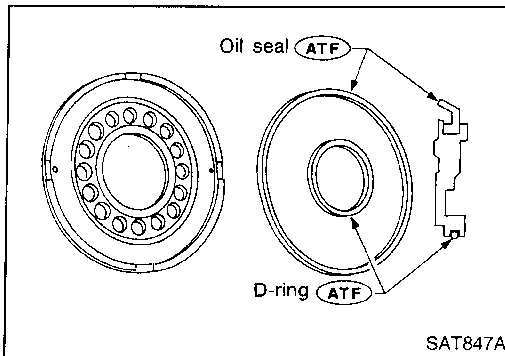
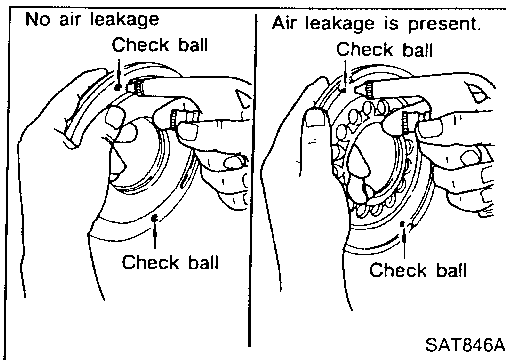
- Check for deformation or damage.

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

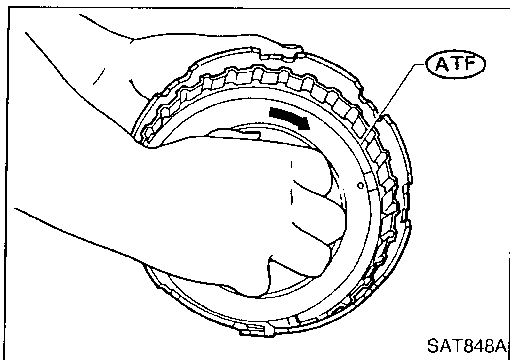
Reverse clutch piston

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

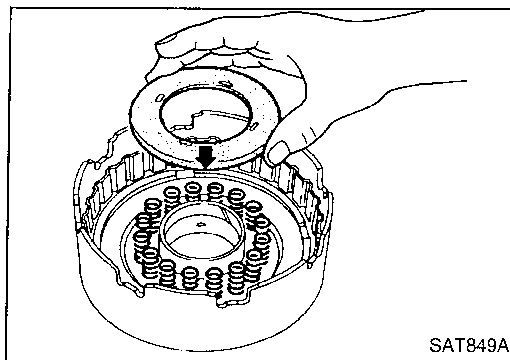


ASSEMBLY

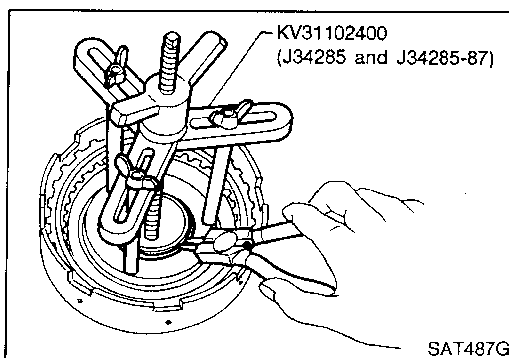
1. Install D-ring and oil seal on piston.
 - Apply ATF to both parts.



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



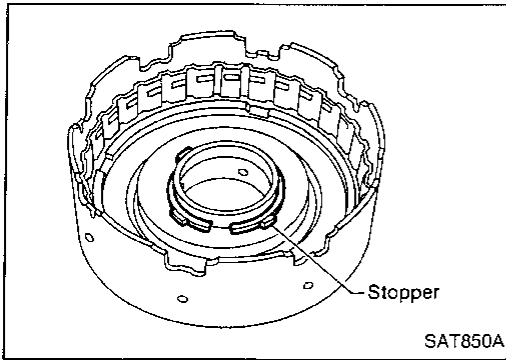
3. Install return springs and spring retainer.



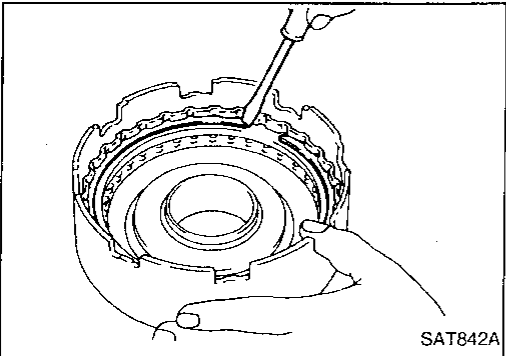
4. Install snap ring while compressing clutch springs.

REPAIR FOR COMPONENT PARTS

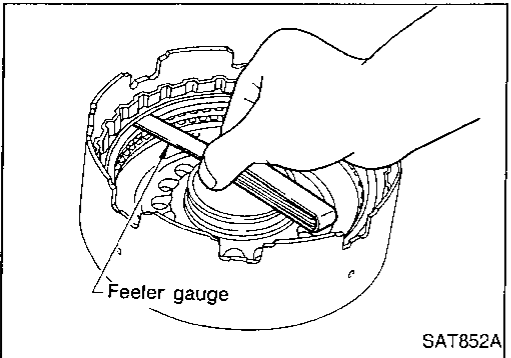
Reverse Clutch (Cont'd)



- Do not align snap ring gap with spring retainer stopper.
5. Install drive plates, driven plates, retaining plate and dish plate.



6. Install snap ring.



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

Specified clearance:

Standard

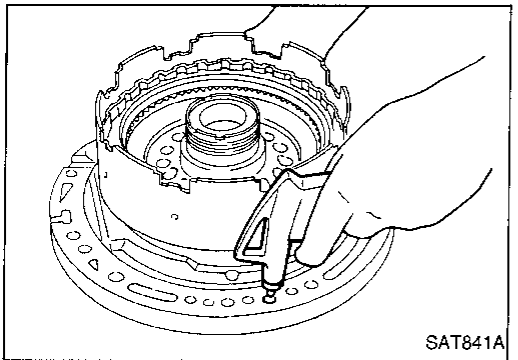
0.6 - 0.9 mm (0.024 - 0.035 in)

Allowable limit

1.4 mm (0.055 in)

Retaining plate:

Refer to SDS, AT-227.



8. Check operation of reverse clutch.
Refer to "DISASSEMBLY" in "Reverse Clutch", AT-182.

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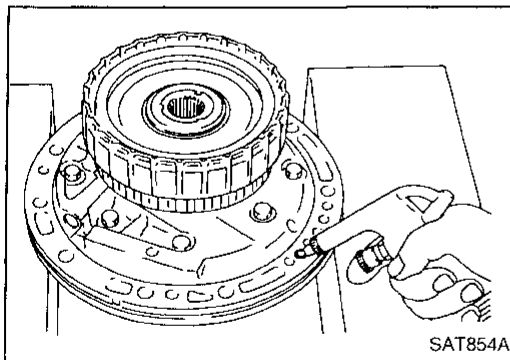
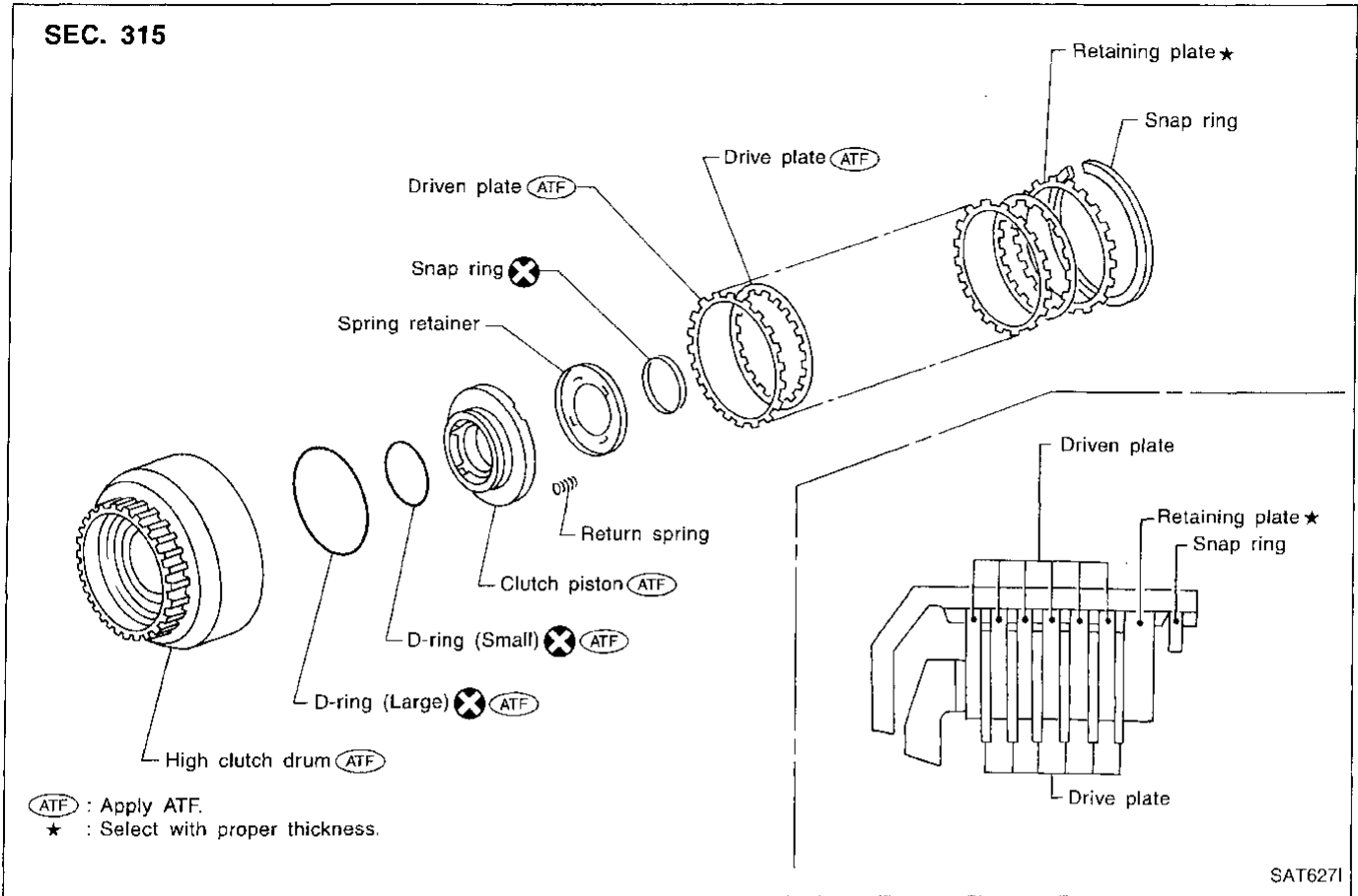
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High Clutch

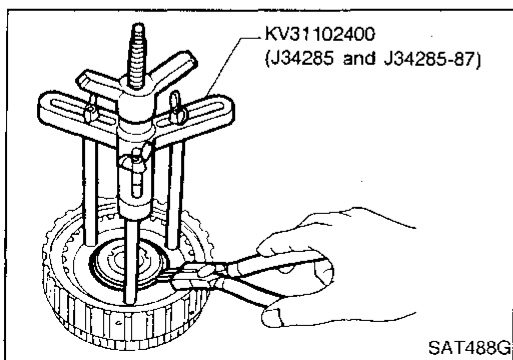
SEC. 315



DISASSEMBLY AND ASSEMBLY

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

- Check of high clutch operation
- Removal and installation of return spring



REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)

INSPECTION

High clutch snap ring and spring retainer

- Check for deformation, fatigue or damage.

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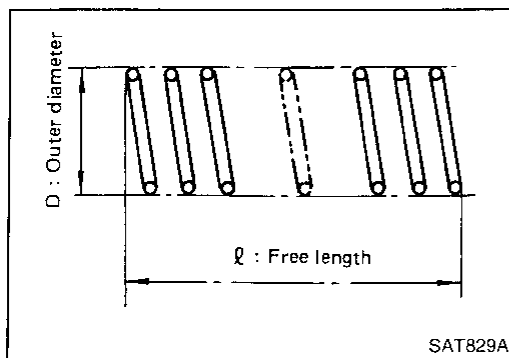
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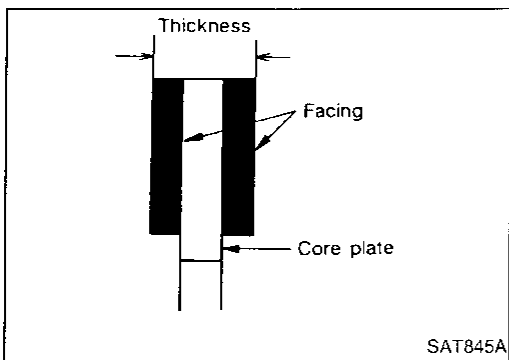
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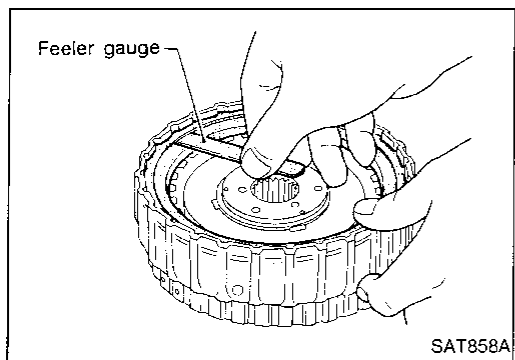
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- Inspection of high clutch return springs
Inspection standard:
Refer to SDS, AT-226.



- Inspection of high clutch drive plate
Thickness of drive plate:
Standard
1.92 - 2.07 mm (0.0756 - 0.0815 in)
Wear limit
1.4 mm (0.055 in)

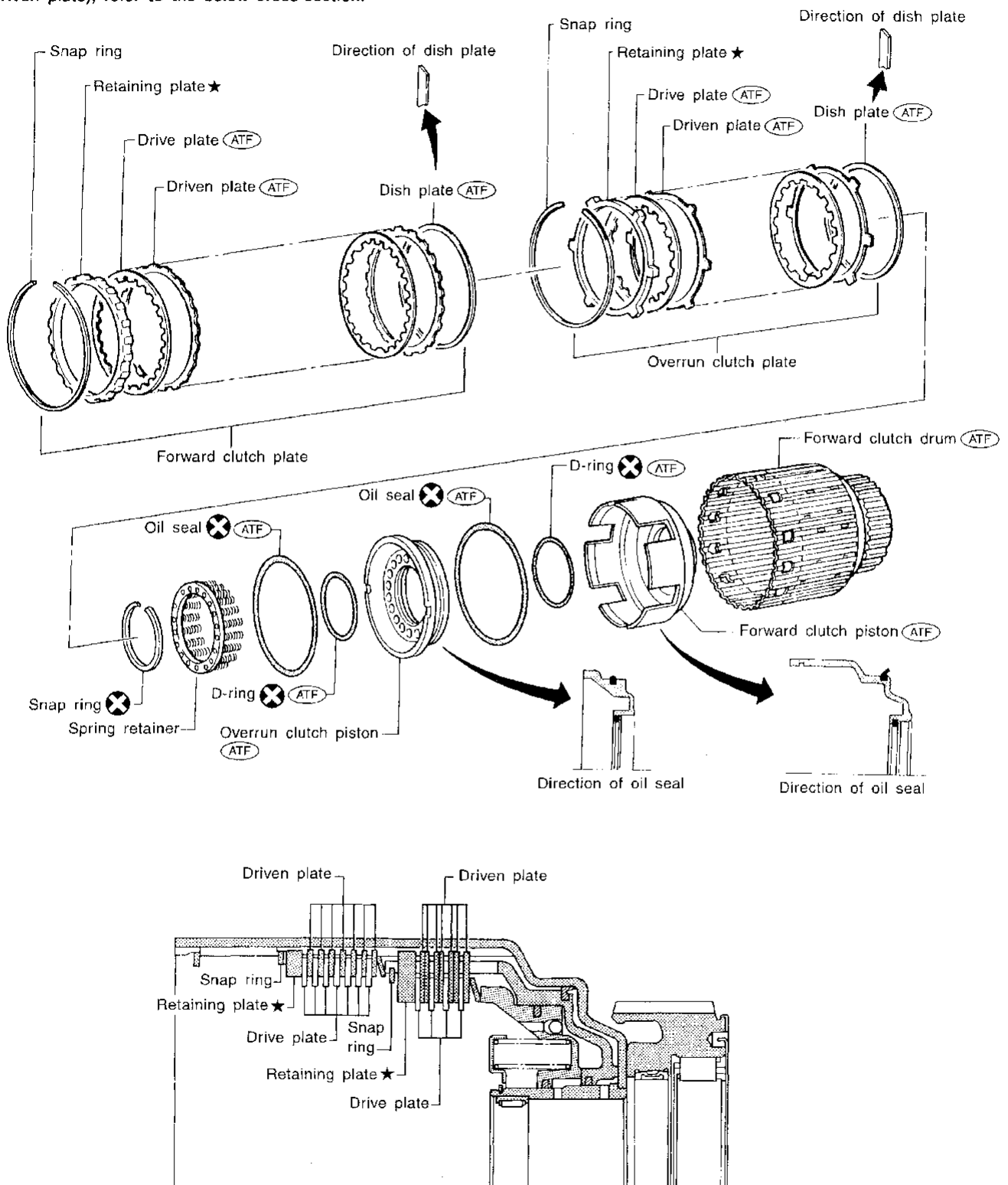


- Measurement of clearance between retaining plate and snap ring
Specified clearance:
Standard
1.8 - 2.2 mm (0.071 - 0.087 in)
Allowable limit
3.4 mm (0.134 in)
Retaining plate:
Refer to SDS, AT-227.

Forward and Overrun Clutches

SEC. 315

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



(ATF) : Apply ATF.

★ : Select with proper thickness.

REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)

DISASSEMBLY AND ASSEMBLY

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

- Check of forward clutch operation.

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- Check of overrun clutch operation.

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- Removal of forward clutch drum

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

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- Removal of forward clutch and overrun clutch pistons

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

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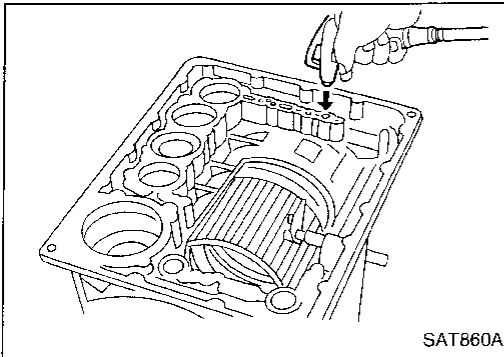
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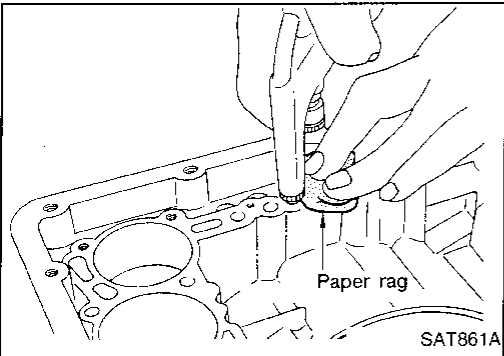
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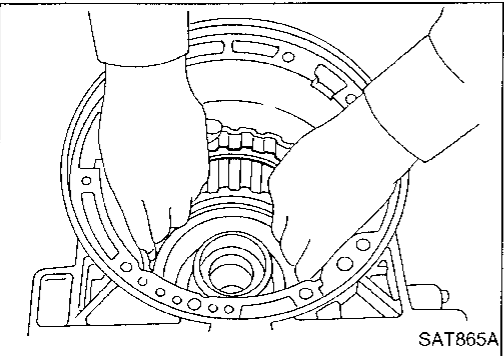
2. Remove overrun clutch from forward clutch.



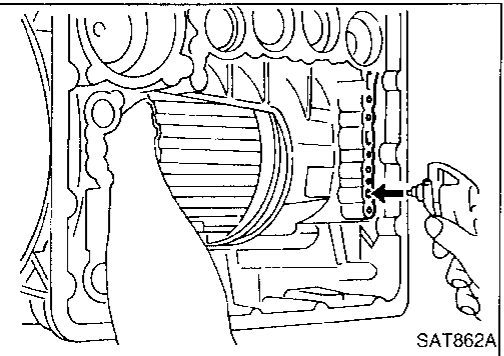
SAT860A



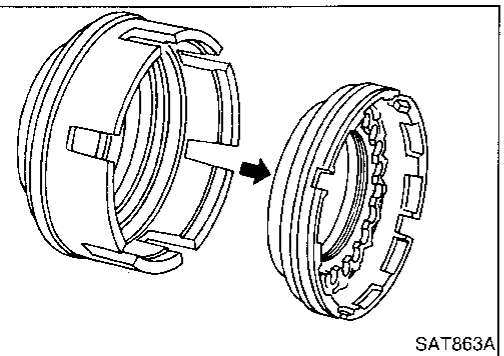
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SAT865A



SAT862A

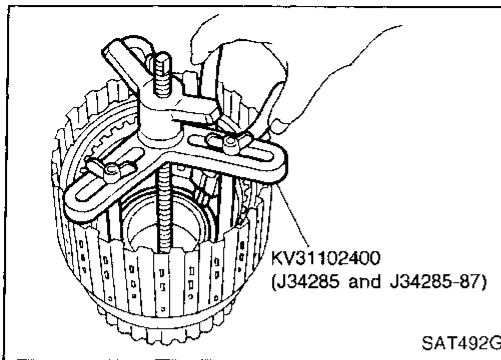


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REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)

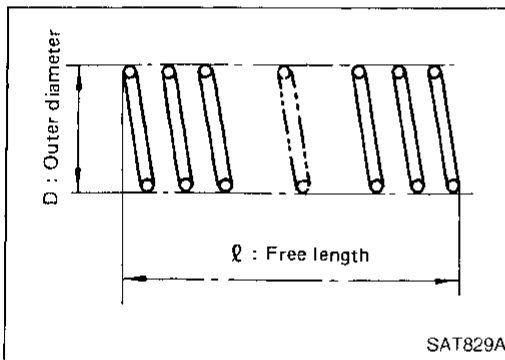
- Removal and installation of return springs



INSPECTION

Forward and overrun clutch snap rings and spring retainers

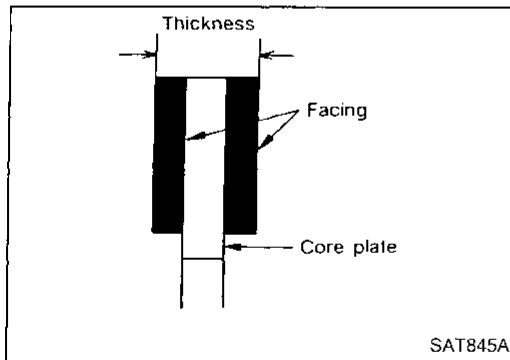
- Check for deformation, fatigue or damage.



- Inspection of forward clutch and overrun clutch return springs

Inspection standard:

Refer to SDS, AT-226.



- Inspection of forward clutch drive plates

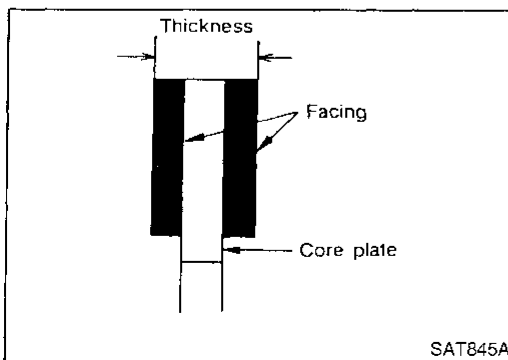
Thickness of drive plate:

Standard

1.90 - 2.05 mm (0.0748 - 0.0807 in)

Wear limit

1.8 mm (0.071 in)



- Inspection of overrun clutch drive plates

Thickness of drive plate:

Standard

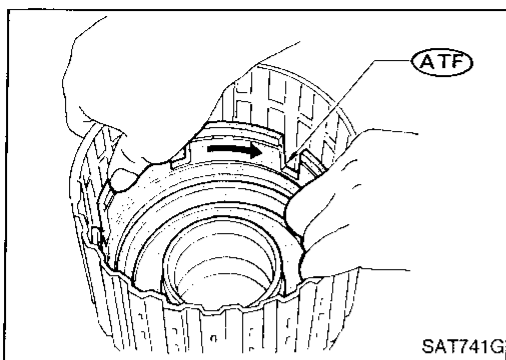
1.52 - 1.67 mm (0.0598 - 0.0657 in)

Wear limit

1.8 mm (0.071 in)

REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)



- Installation of forward clutch piston and overrun clutch piston
- 1. Install forward clutch piston by turning it slowly and evenly.
- Apply ATF to inner surface of clutch drum.

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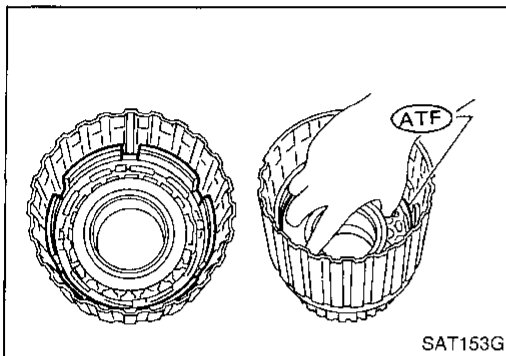
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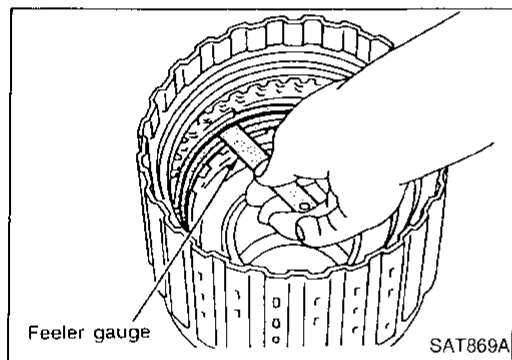
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- Align notch in forward clutch piston with groove in forward clutch drum.
- 2. Install overrun clutch by turning it slowly and evenly.
- Apply ATF to inner surface of forward clutch piston.



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

Specified clearance:

Standard

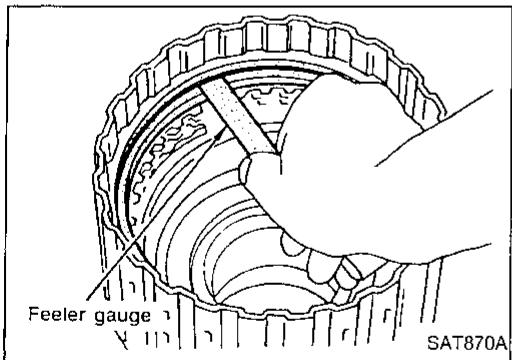
1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.0 mm (0.079 in)

Retaining plate:

Refer to SDS, AT-227.



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

Specified clearance:

Standard

0.35 - 0.75 mm (0.0138 - 0.0295 in)

Allowable limit

2.2 mm (0.087 in)

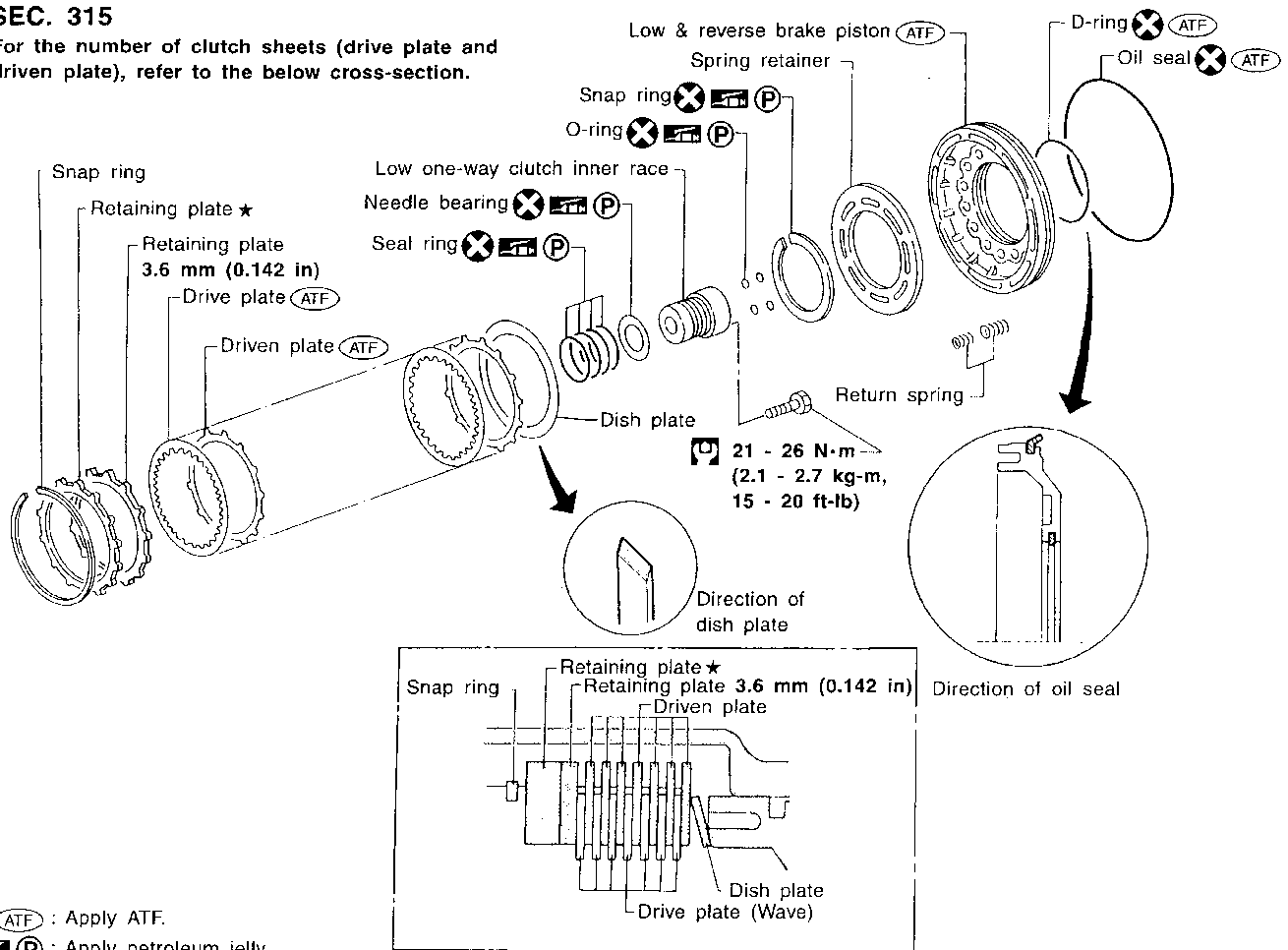
Retaining plate:

Refer to SDS, AT-227.

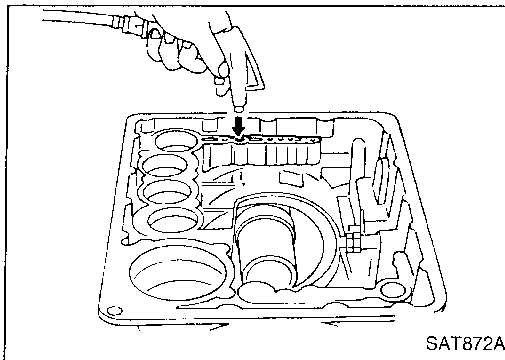
Low & Reverse Brake

SEC. 315

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

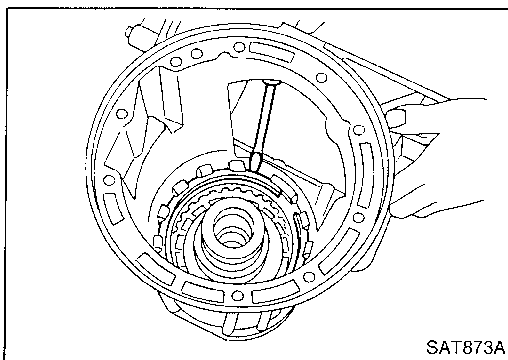


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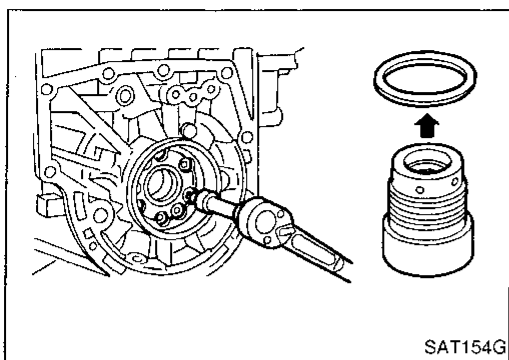
DISASSEMBLY

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

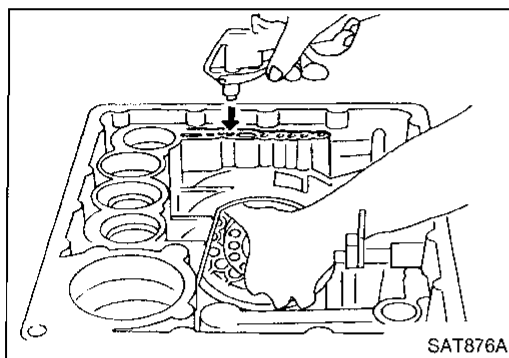


REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)



3. Remove low one-way clutch inner race, spring retainer and return spring from transmission case.
4. Remove seal rings from low one-way clutch inner race.
5. Remove needle bearing from low one-way clutch inner race.

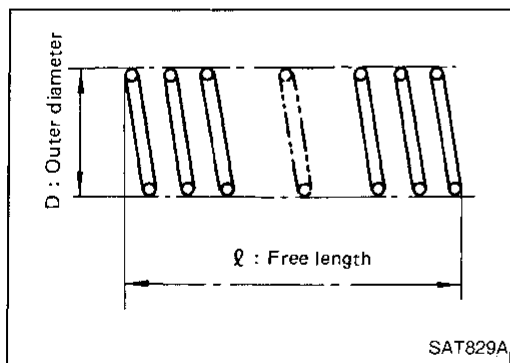


6. Remove low and reverse brake piston using compressed air.
7. Remove oil seal and D-ring from piston.

INSPECTION

Low and reverse brake snap ring and spring retainer

- Check for deformation, fatigue or damage.

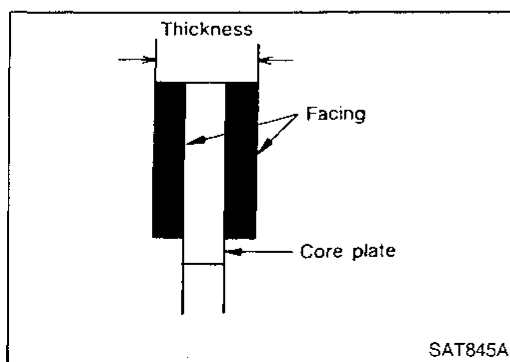


Low and reverse brake return springs

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

Inspection standard:

Refer to SDS, AT-226.



Low and reverse brake drive plates

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

Thickness of drive plate:

Standard value

1.52 - 1.67 mm (0.0598 - 0.0657 in)

Wear limit

1.4 mm (0.055 in)

- If not within wear limit, replace.

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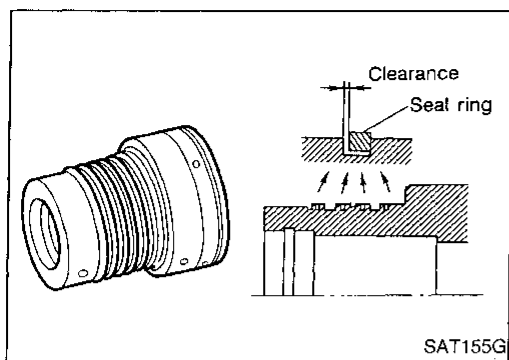
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REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

Low one-way clutch inner race



- Check frictional surface of inner race for wear or damage.
- Install new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.

Inspection standard:

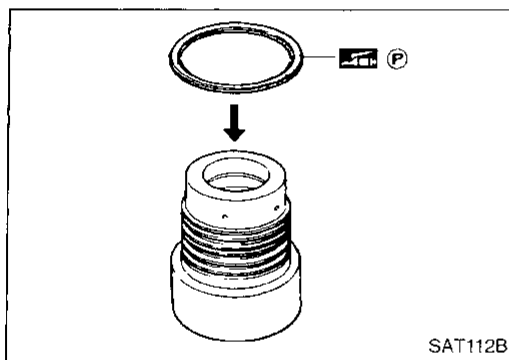
Standard value

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit

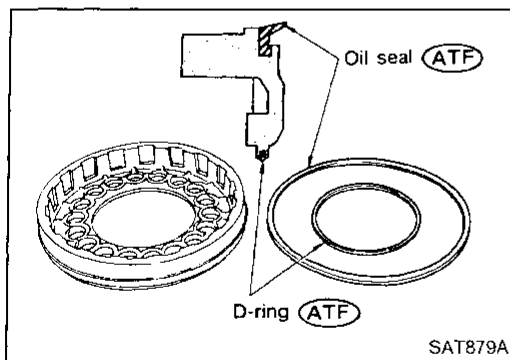
0.25 mm (0.0098 in)

- If not within allowable limit, replace low one-way clutch inner race.

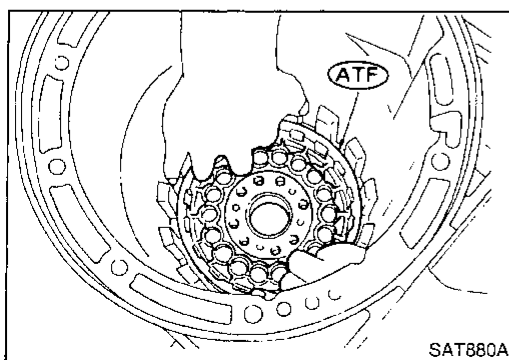


ASSEMBLY

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



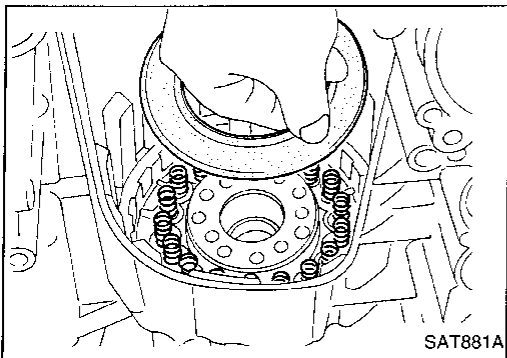
2. Install oil seal and D-ring onto piston.
 - Apply ATF to oil seal and D-ring.



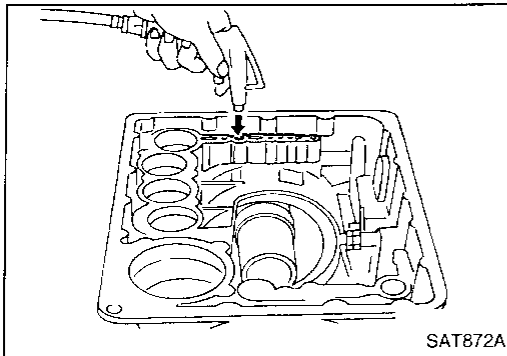
3. Install piston by rotating it slowly and evenly.
 - Apply ATF to inner surface of transmission case.

REPAIR FOR COMPONENT PARTS

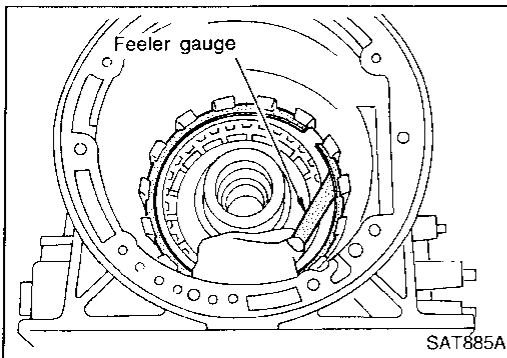
Low & Reverse Brake (Cont'd)



4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.
5. Install dish plate, low and reverse brake drive plates, driven plates and retaining plate.
6. Install snap ring on transmission case.



7. Check operation of low and reverse brake clutch piston. Refer to "DISASSEMBLY", AT-192.



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

Specified clearance:

Standard

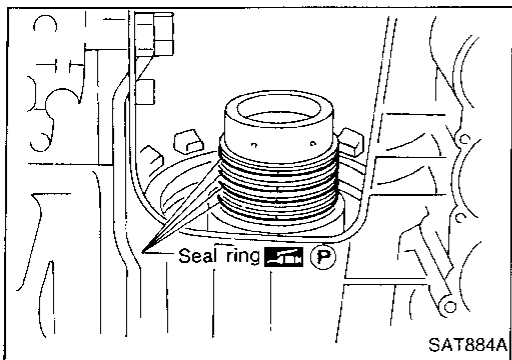
0.90 - 1.20 mm (0.0354 - 0.0472 in)

Allowable limit

2.4 mm (0.094 in)

Retaining plate:

Refer to SDS, AT-228.



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

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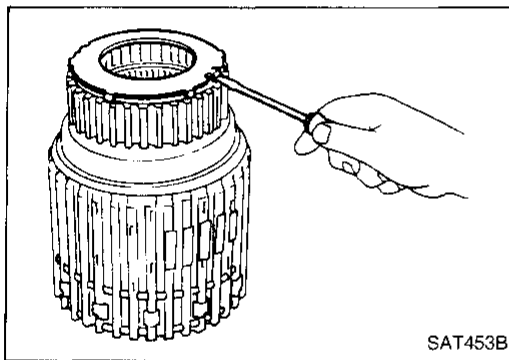
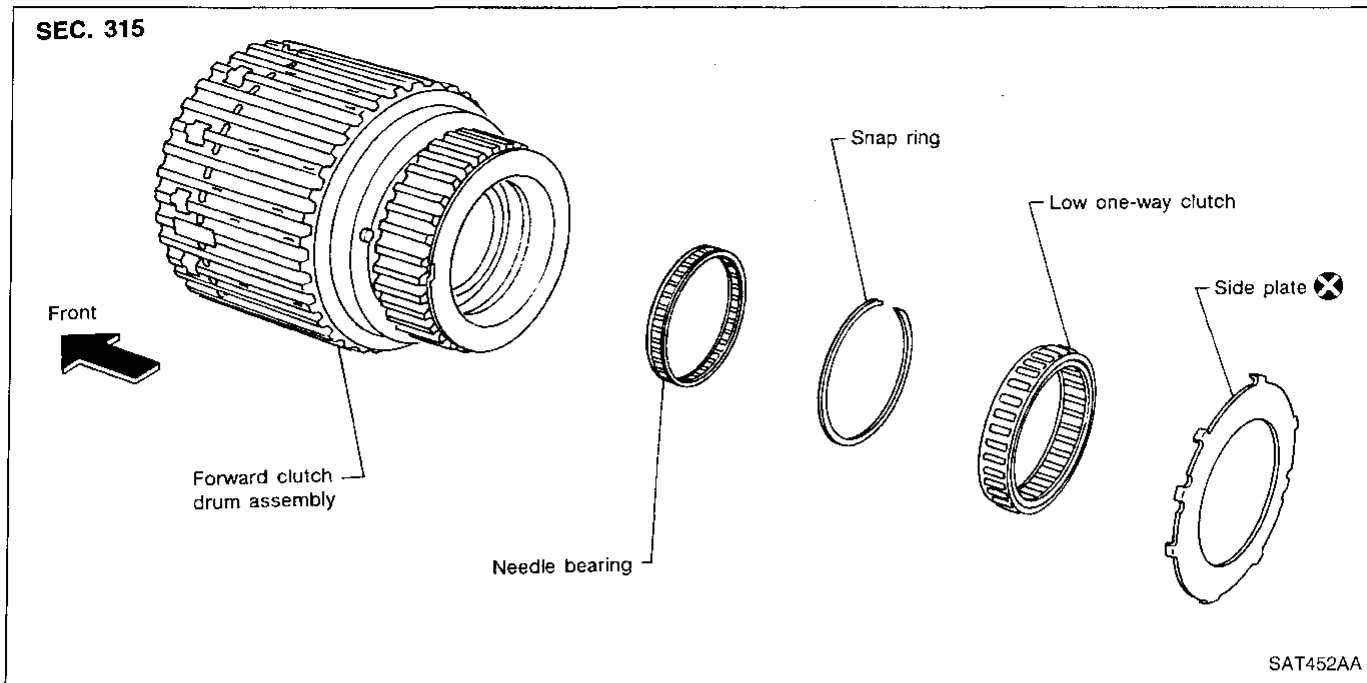
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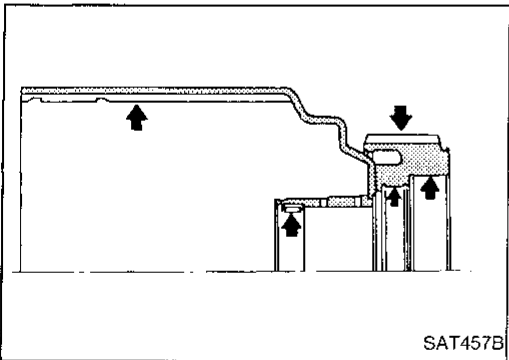
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Forward Clutch Drum Assembly



DISASSEMBLY

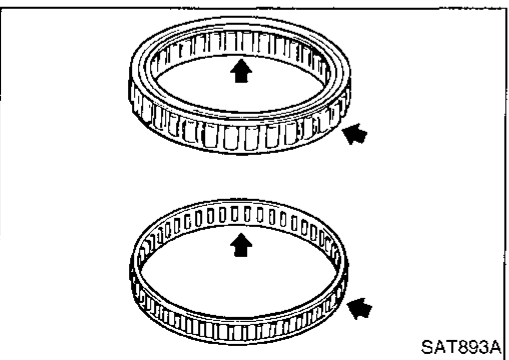
1. Remove side plate from forward clutch drum.
2. Remove low one-way clutch from forward clutch drum.
3. Remove snap ring from forward clutch drum.
4. Remove needle bearing from forward clutch drum.



INSPECTION

Forward clutch drum

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



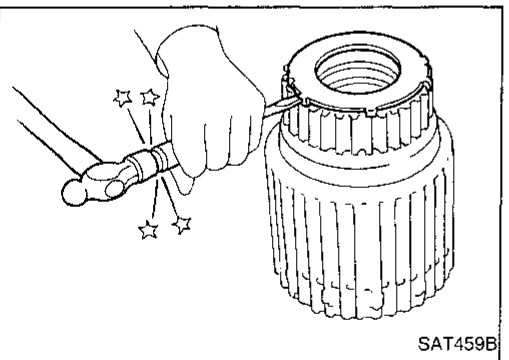
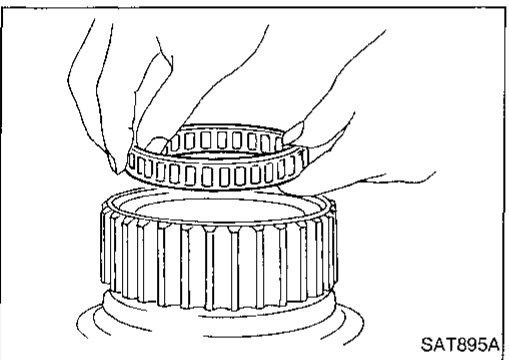
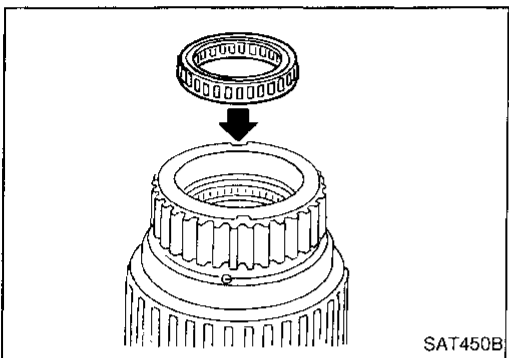
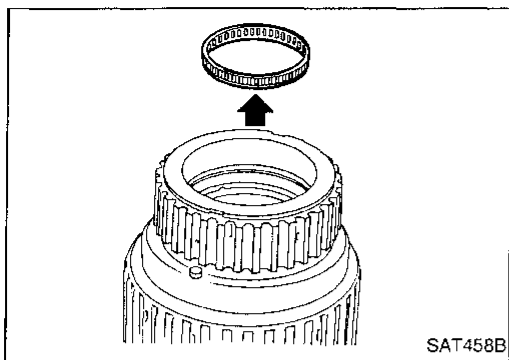
Needle bearing and low one-way clutch

- Check frictional surface for wear or damage.

REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)

ASSEMBLY



1. Install needle bearing in forward clutch drum.
2. Install snap ring onto forward clutch drum.

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

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

4. Install side plate onto forward clutch drum.

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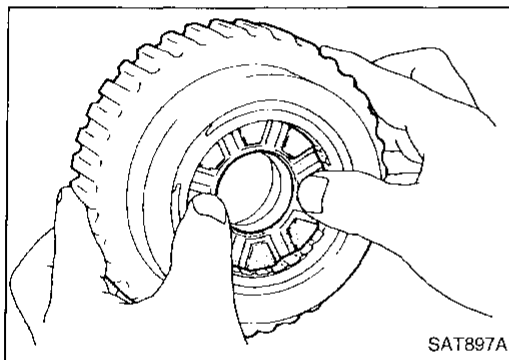
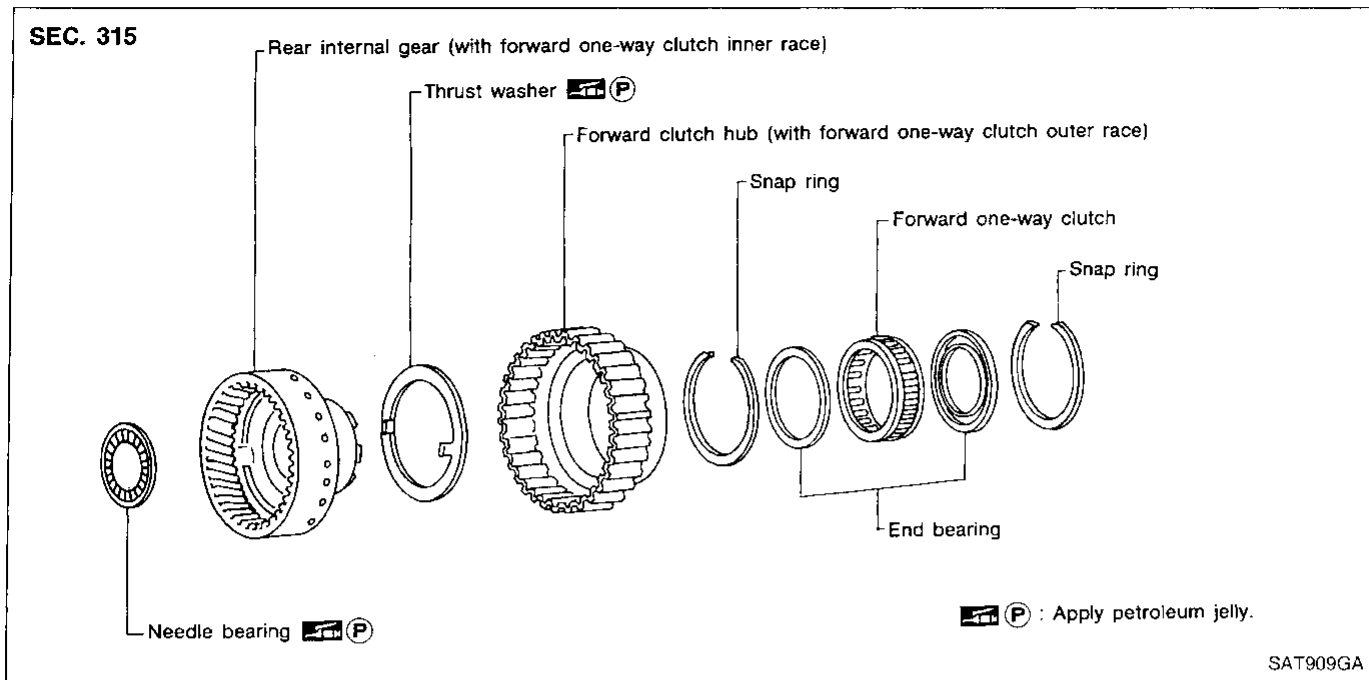
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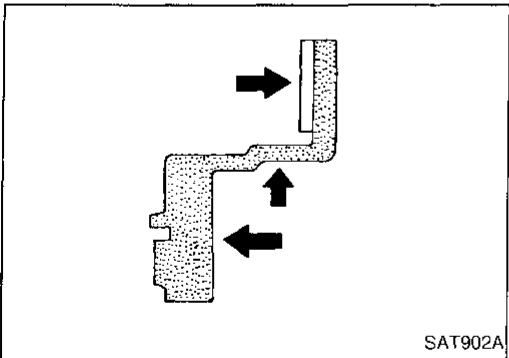
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Rear Internal Gear and Forward Clutch Hub



DISASSEMBLY

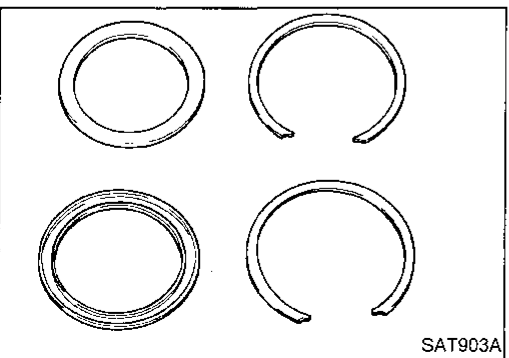
1. Remove needle bearing from rear internal gear.
2. Remove rear internal gear by pushing forward clutch hub forward.
3. Remove thrust washer from rear internal gear.
4. Remove snap ring from forward clutch hub.
5. Remove end bearing.
6. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.
7. Remove snap ring from forward clutch hub.



INSPECTION

Rear internal gear and forward clutch hub

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



Snap ring and end bearing

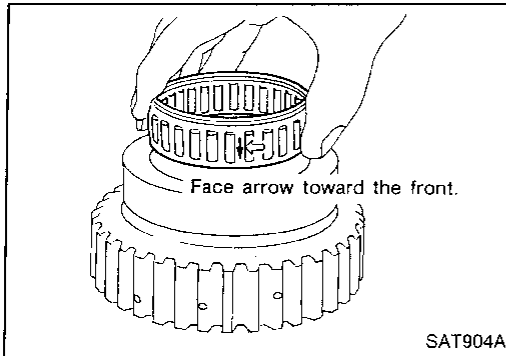
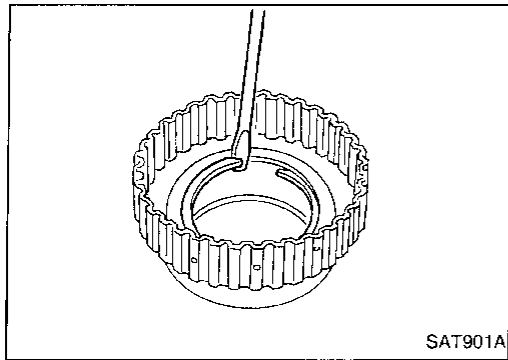
- Check for deformation or damage.

REPAIR FOR COMPONENT PARTS

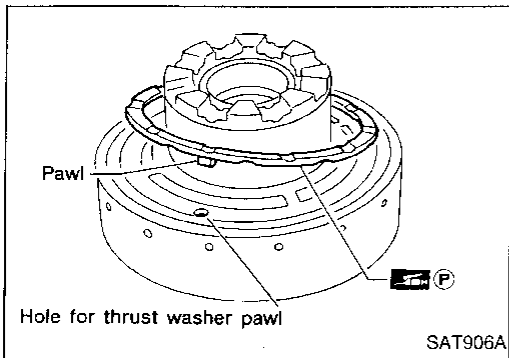
Rear Internal Gear and Forward Clutch Hub (Cont'd)

ASSEMBLY

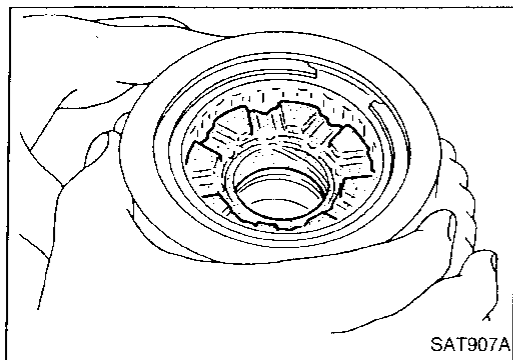
1. Install snap ring onto forward clutch hub.
2. Install end bearing.



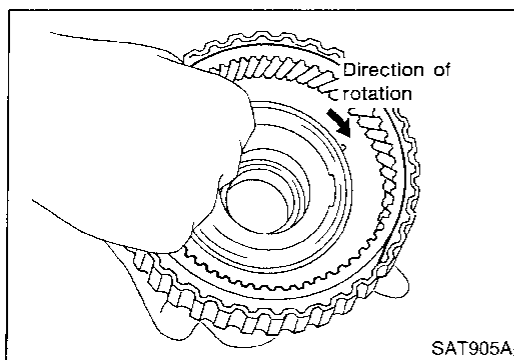
3. Install forward one-way clutch onto clutch hub.
 - **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.



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



7. Position forward clutch hub in rear internal gear.



8. After installing, check to assure that forward clutch hub rotates clockwise.

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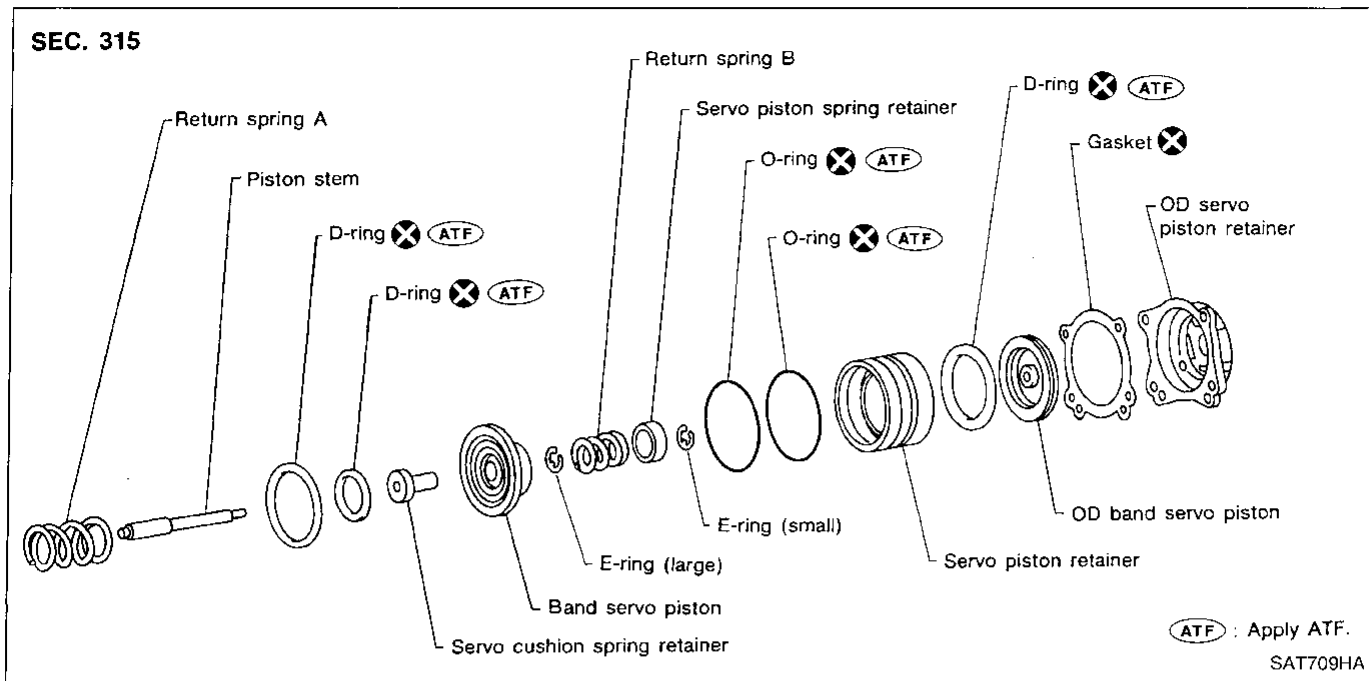
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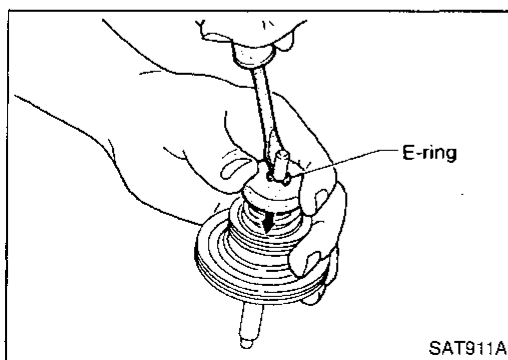
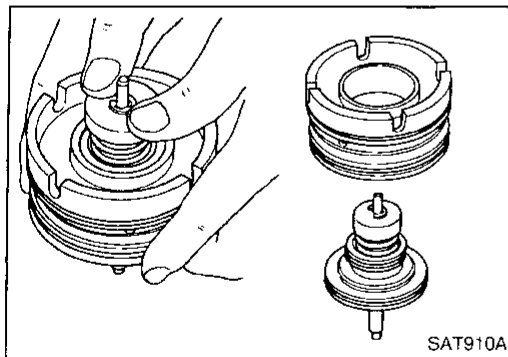
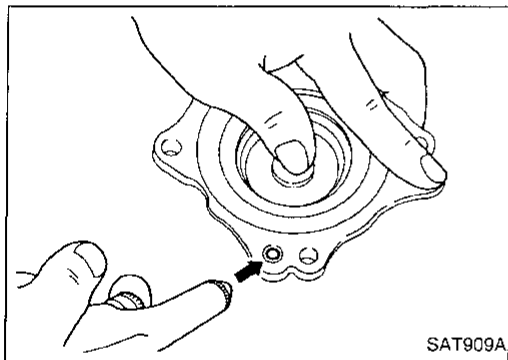
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Band Servo Piston Assembly



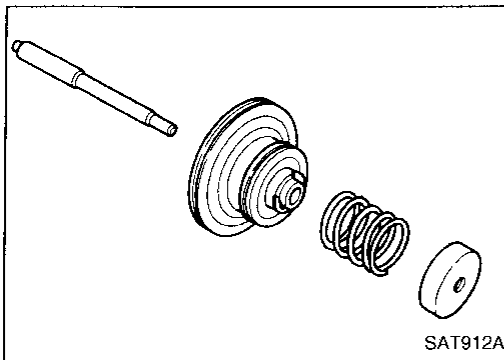
DISASSEMBLY

1. Block one oil hole in OD servo piston retainer and the center hole in OD band servo piston.
2. Apply compressed air to the other oil hole in piston retainer to remove OD band servo piston from retainer.
3. Remove D-ring from OD band servo piston.
4. Remove band servo piston assembly from servo piston retainer by pushing it forward.
5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

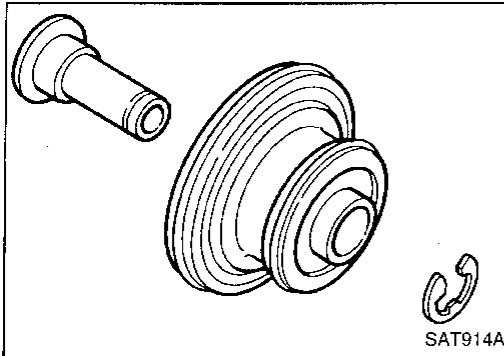


REPAIR FOR COMPONENT PARTS

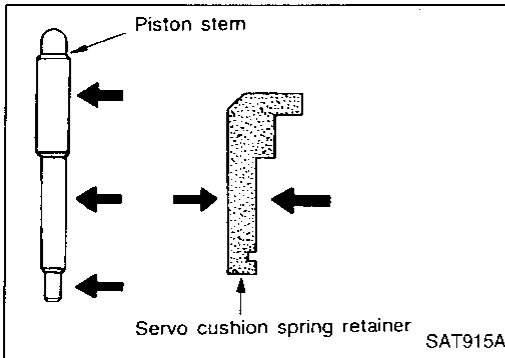
Band Servo Piston Assembly (Cont'd)



6. Remove servo piston spring retainer, return spring B and piston stem from band servo piston.
7. Remove E-ring from band servo piston.



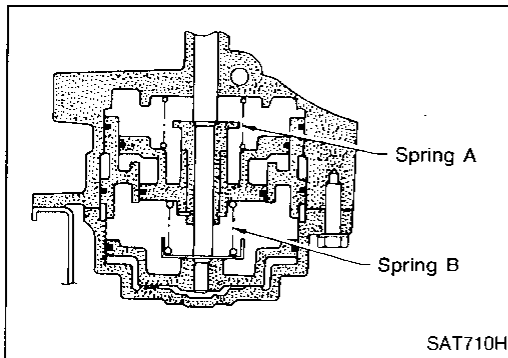
8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.



INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

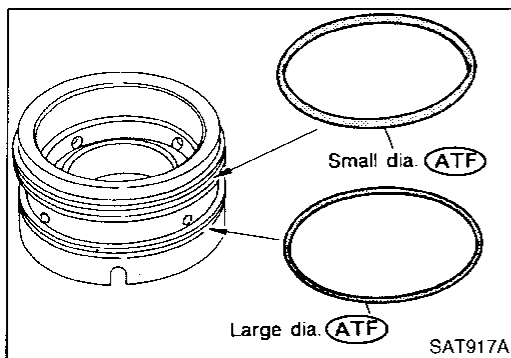


Return springs

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

Inspection standard:

Refer to SDS, AT-226.



ASSEMBLY

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

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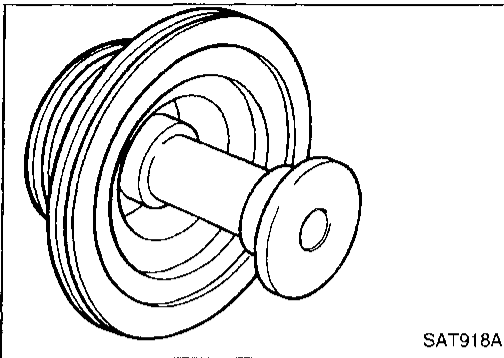
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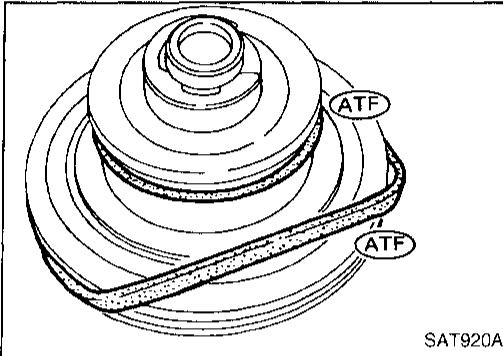
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REPAIR FOR COMPONENT PARTS

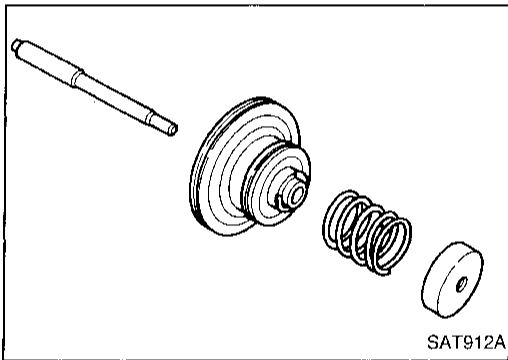
Band Servo Piston Assembly (Cont'd)



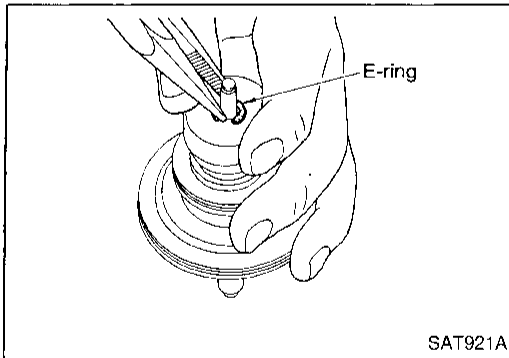
2. Install servo cushion spring retainer onto band servo piston.
3. Install E-ring onto servo cushion spring retainer.



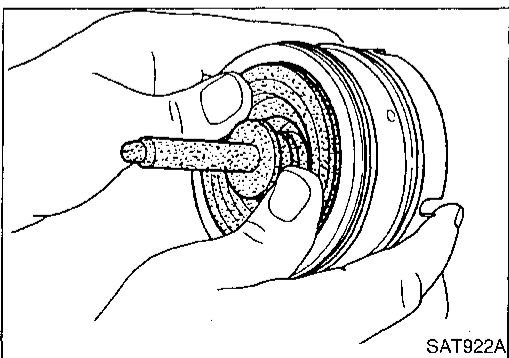
4. Install D-rings onto band servo piston.
 - **Apply ATF to D-rings.**



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



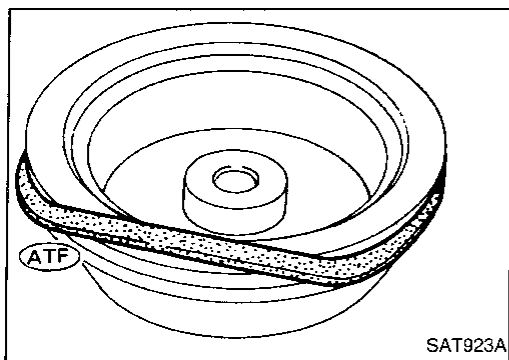
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



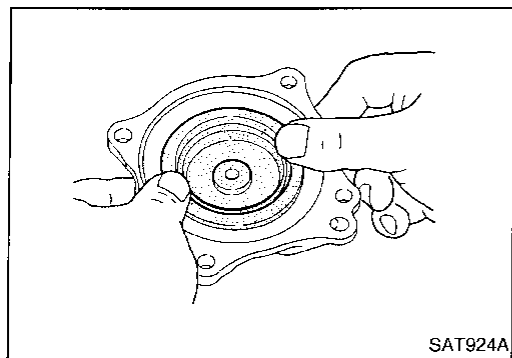
7. Install band servo piston assembly onto servo piston retainer by pushing it inward.

REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)



8. Install D-ring on OD band servo piston.
 - Apply ATF to D-ring.



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

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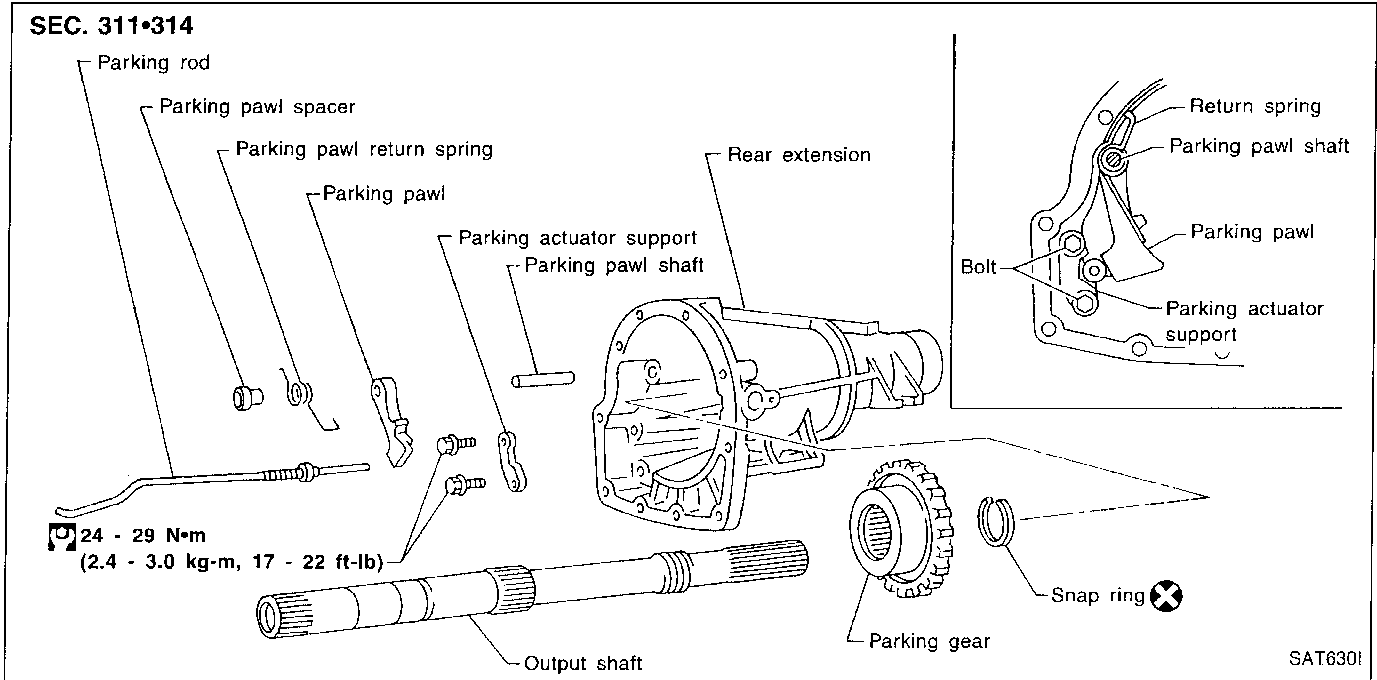
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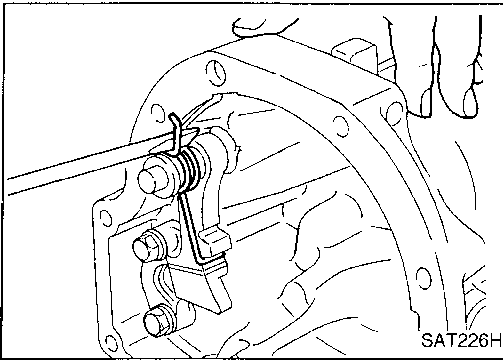
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Parking Pawl Components

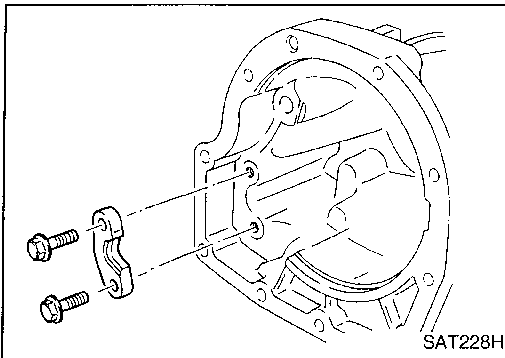


DISASSEMBLY

1. Slide return spring to the front of rear extension flange.



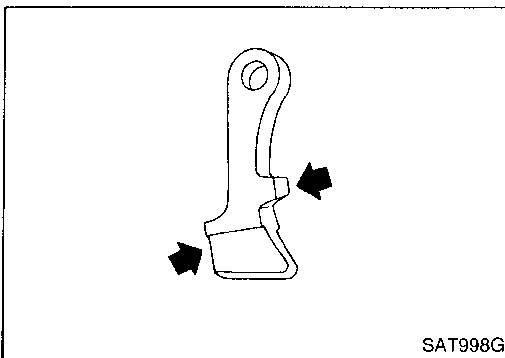
2. Remove return spring, pawl spacer and parking pawl from rear extension.
3. Remove parking pawl shaft from rear extension.
4. Remove parking actuator support from rear extension.



INSPECTION

Parking pawl and parking actuator support

- Check contact surface of parking rod for wear.

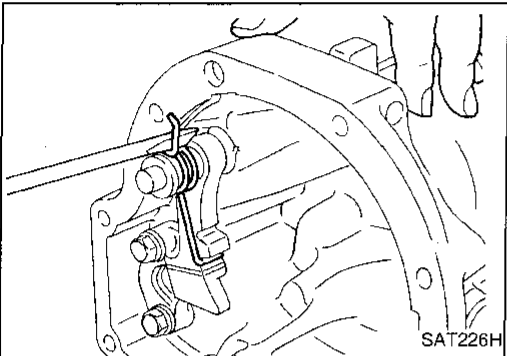
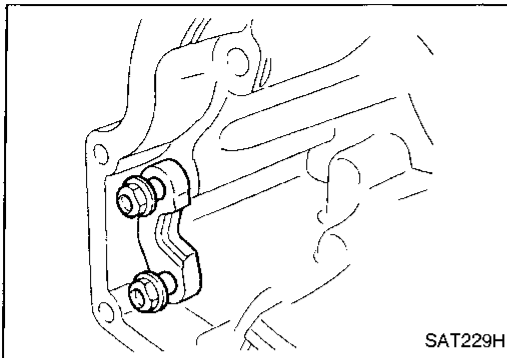


REPAIR FOR COMPONENT PARTS

Parking Pawl Components (Cont'd)

ASSEMBLY

1. Install parking actuator support onto rear extension.
2. Insert parking pawl shaft into rear extension.
3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



4. Bend return spring upward and install it onto rear extension.

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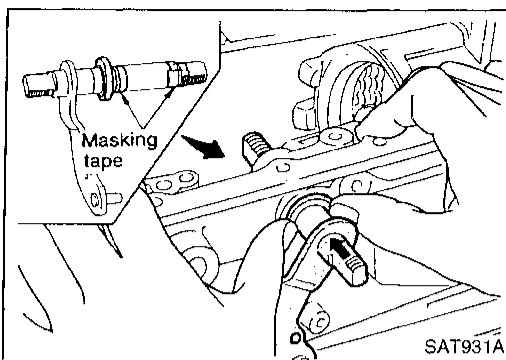
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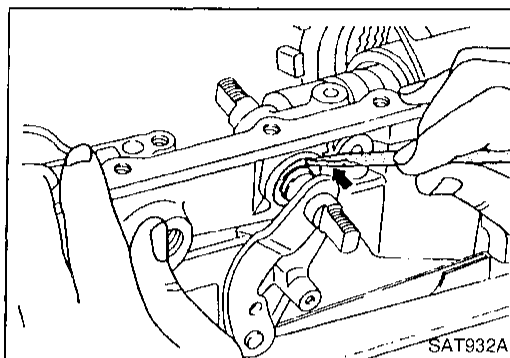
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ASSEMBLY

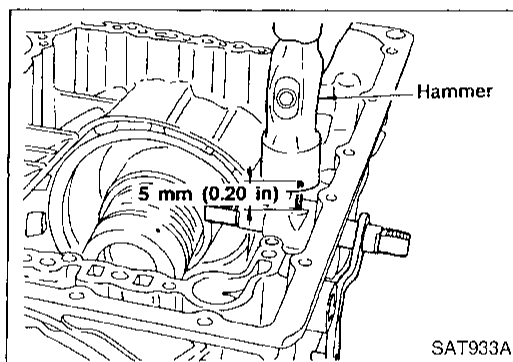


Assembly (1)

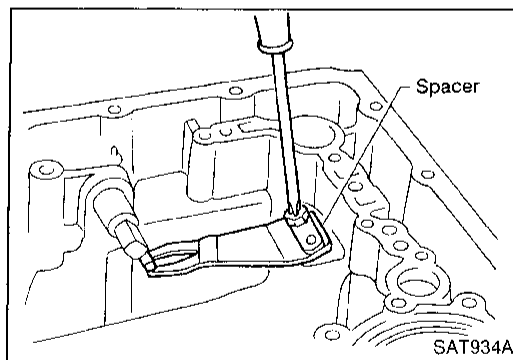
1. Install manual shaft components.
 - a. Install oil seal onto manual shaft.
 - **Apply ATF to oil seal.**
 - **Wrap threads of manual shaft with masking tape.**
 - b. Insert manual shaft and oil seal as a unit into transmission case.
 - c. Remove masking tape.



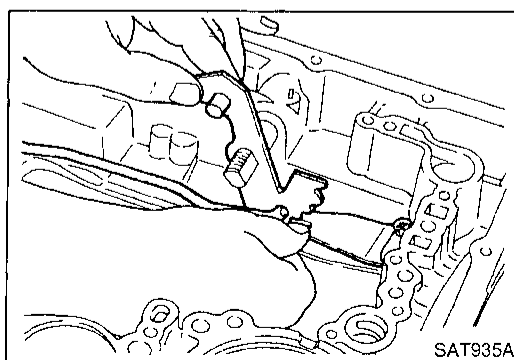
- d. Push oil seal evenly and install it onto transmission case.



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



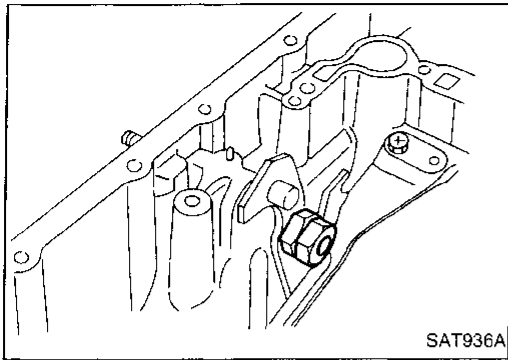
- f. Install detent spring and spacer.



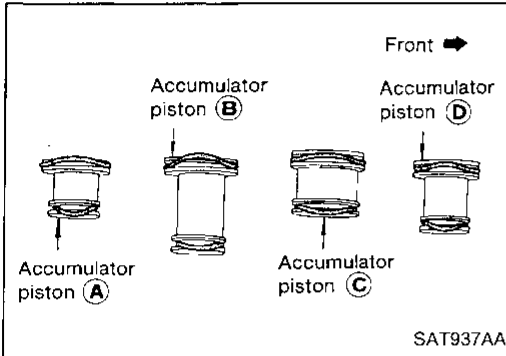
- g. While pushing detent spring down, install manual plate onto manual shaft.

ASSEMBLY

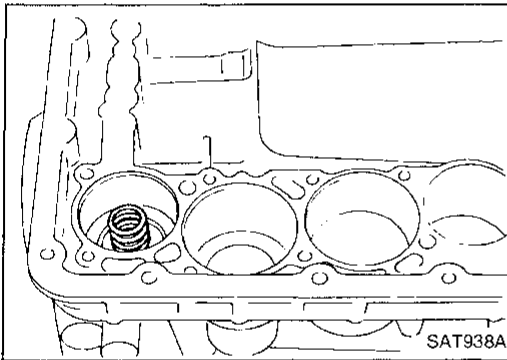
Assembly (1) (Cont'd)



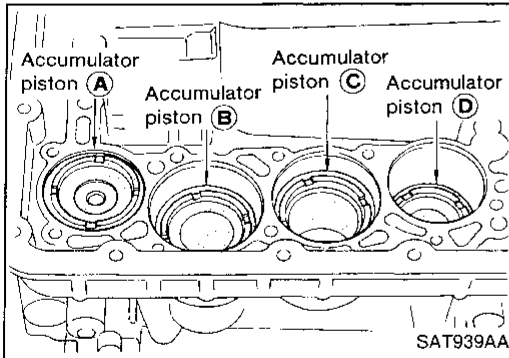
h. Install lock nuts onto manual shaft.



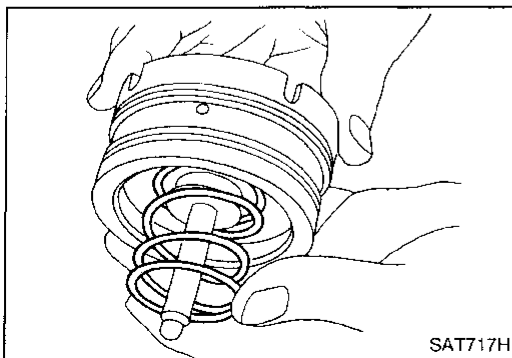
2. Install accumulator piston.
 - a. Install O-rings onto accumulator piston.
 - **Apply ATF to O-rings.**
Accumulator piston O-rings:
Refer to SDS, AT-227.



- b. Install return spring for accumulator (A) onto transmission case.
Free length of return spring:
Refer to SDS, AT-226.



- c. Install accumulator pistons (A), (B), (C) and (D).
 - **Apply ATF to transmission case.**



3. Install band servo piston.
 - a. Install return spring onto servo piston.

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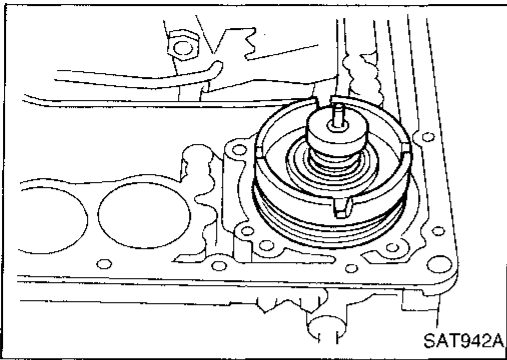
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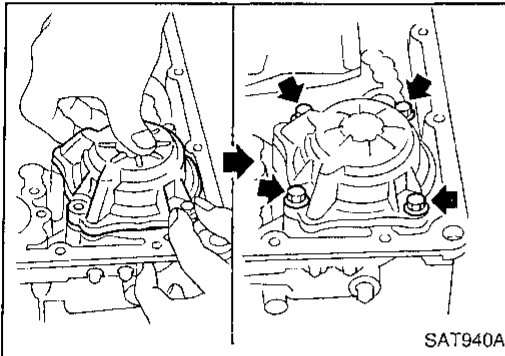
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ASSEMBLY

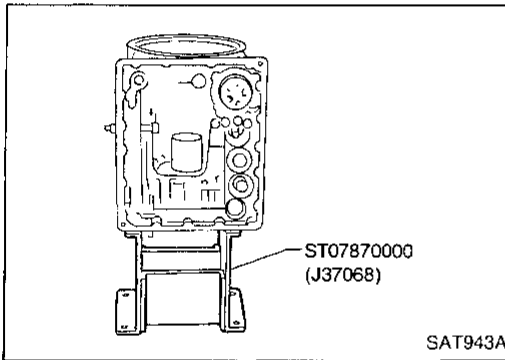
Assembly (1) (Cont'd)



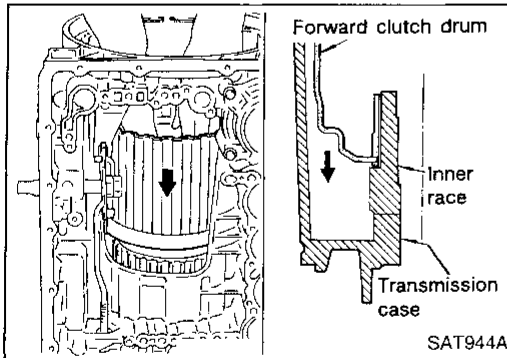
- b. Install band servo piston onto transmission case.
- Apply ATF to O-ring of band servo piston and transmission case.
- c. Install gasket for band servo onto transmission case.



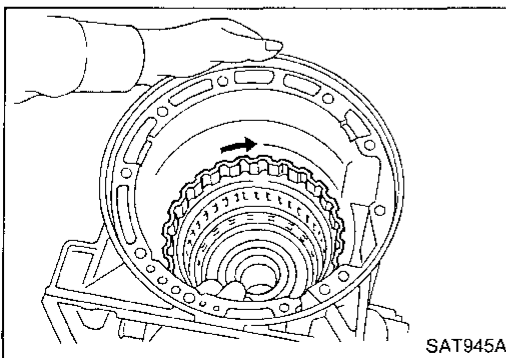
- d. Install band servo retainer onto transmission case.



- 4. Install rear side clutch and gear components.
- a. Place transmission case in vertical position.



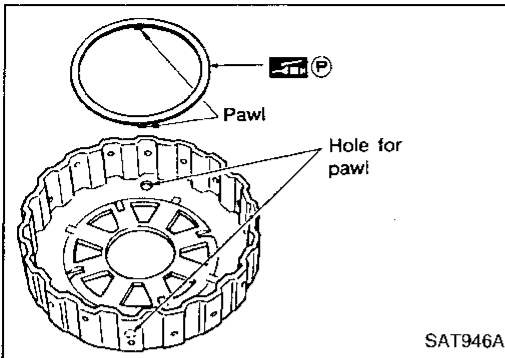
- b. Slightly lift forward clutch drum assembly and slowly rotate it clockwise until its hub passes fully over the clutch inner race inside transmission case.



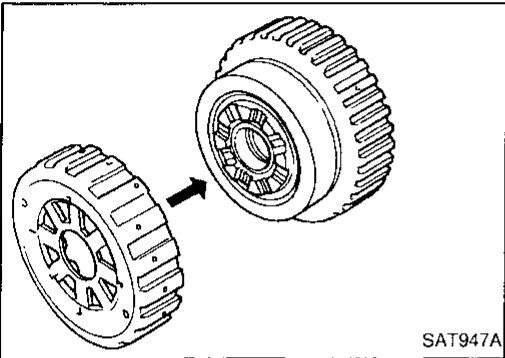
- c. Check to be sure that rotation direction of forward clutch assembly is correct.

ASSEMBLY

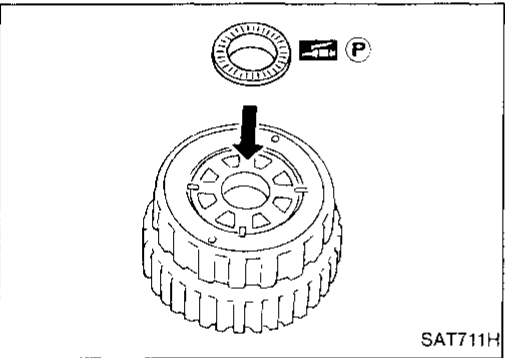
Assembly (1) (Cont'd)



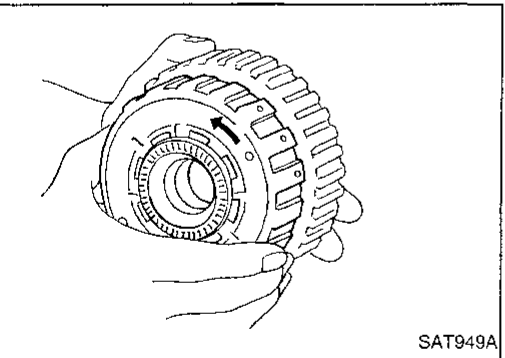
- d. Install thrust washer onto front of overrun clutch hub.
- Apply petroleum jelly to the thrust washer.
 - Insert pawls of thrust washer securely into holes in overrun clutch hub.



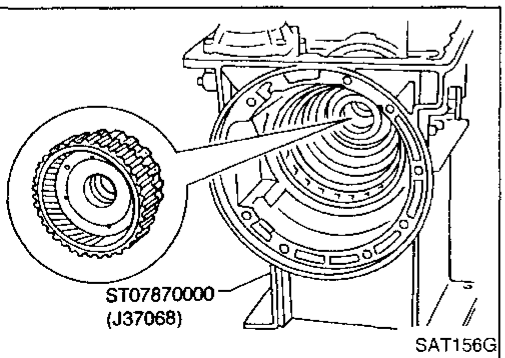
- e. Install overrun clutch hub onto rear internal gear assembly.



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



- g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.
- h. Place transmission case into horizontal position.



- i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.
- j. Install needle bearing onto rear internal gear.
- Apply petroleum jelly to needle bearing.

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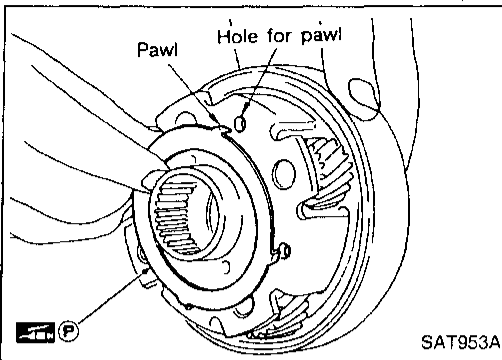
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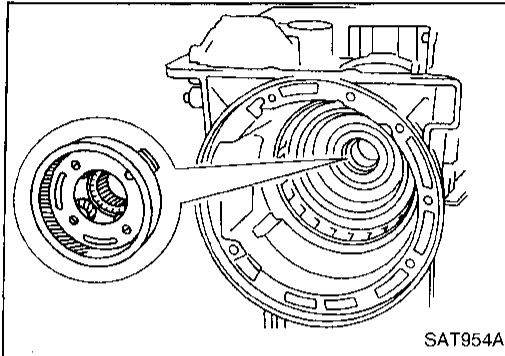
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ASSEMBLY

Assembly (1) (Cont'd)



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



- l. Install front internal gear on transmission case.

Adjustment

When any parts listed below are replaced, adjust total end play and reverse clutch end play.

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

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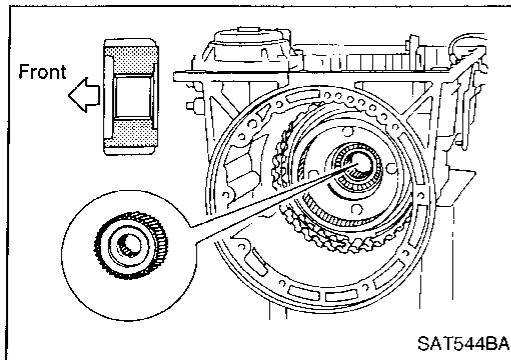
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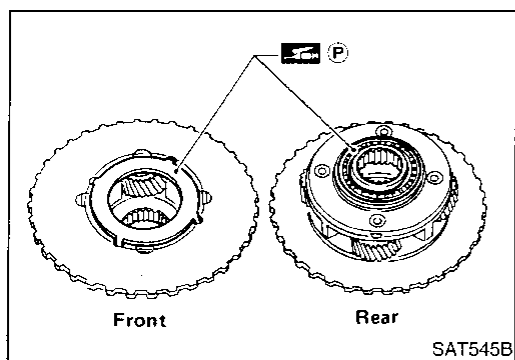
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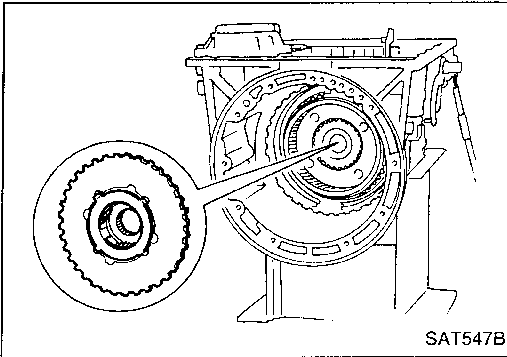


SAT545B

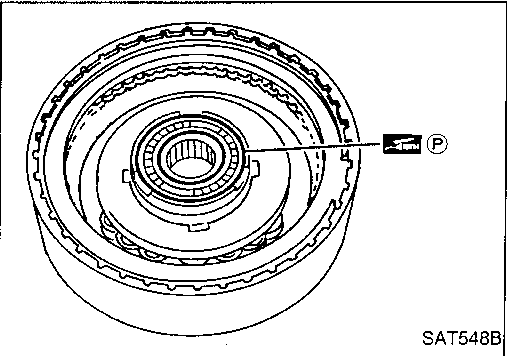
1. Install front side clutch and gear components.
 - a. Install rear sun gear on transmission case.
 - **Pay attention to its direction.**
 - b. Install needle bearing race on front of front planetary carrier.
 - **Apply petroleum jelly to needle bearing.**
 - c. Install needle bearing on rear of front planetary carrier.
 - **Apply petroleum jelly to bearing.**
 - **Pay attention to its direction — Black side goes to front.**

ASSEMBLY

Adjustment (Cont'd)

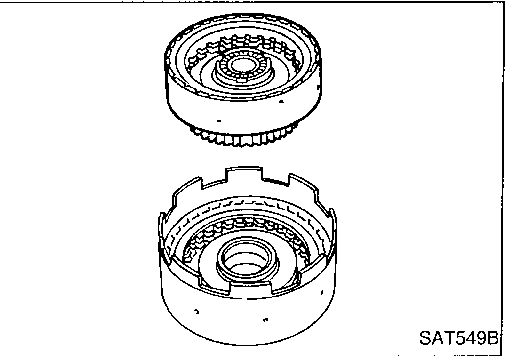


d. Install front planetary carrier on forward clutch drum.

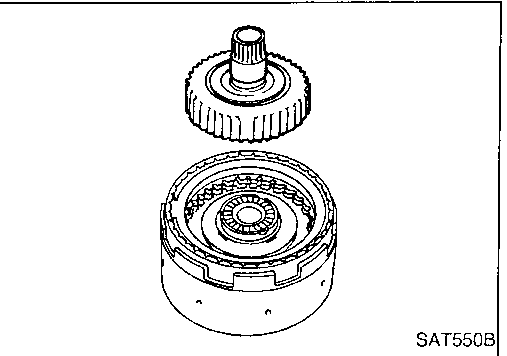


e. Install needle bearing on rear of high clutch.

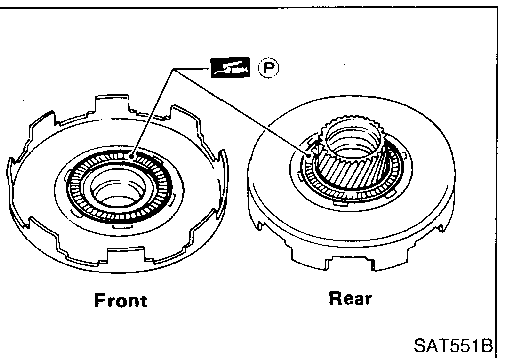
- Apply petroleum jelly to bearing.



f. Install high clutch assembly onto reverse clutch assembly.



g. Install high clutch hub onto high clutch assembly.

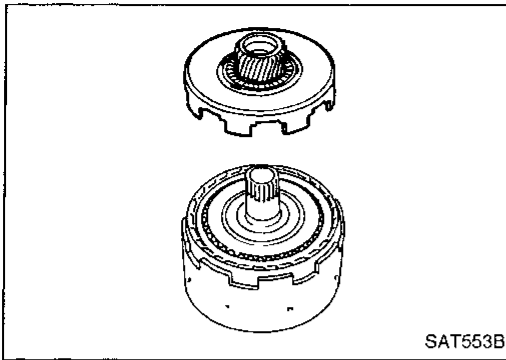


h. Install needle bearings onto front sun gear.

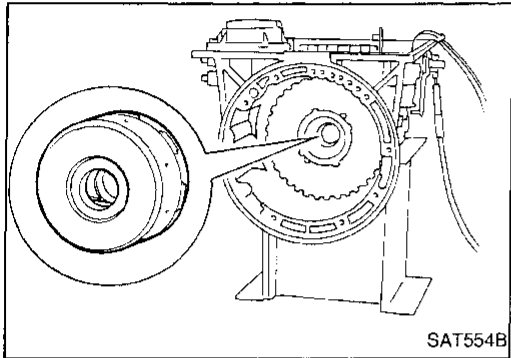
- Apply petroleum jelly to needle bearings.

ASSEMBLY

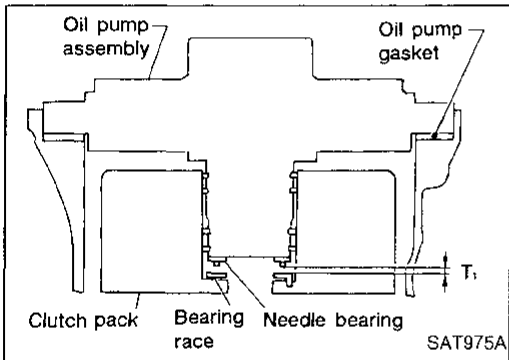
Adjustment (Cont'd)



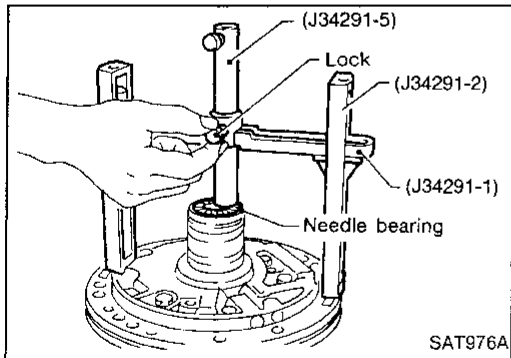
i. Install front sun gear onto reverse clutch assembly.



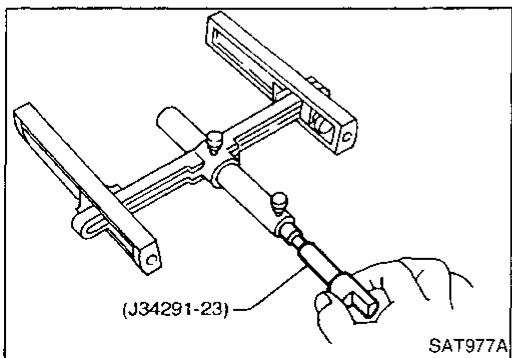
j. Install clutch pack into transmission case.



2. Adjust total end play.
Total end play "T₁":
0.25 - 0.55 mm (0.0098 - 0.0217 in)



a. With needle bearing installed, place J34291-1 (bridge), J34291-2 (legs) and the J34291-5 (gauging cylinder) onto oil pump. The long ends of legs should be placed firmly on machined surface of oil pump assembly and gauging cylinder should rest on top of the needle bearing. Lock gauging cylinder in place with set screw.



b. Install J34291-23 (gauging plunger) into gauging cylinder.

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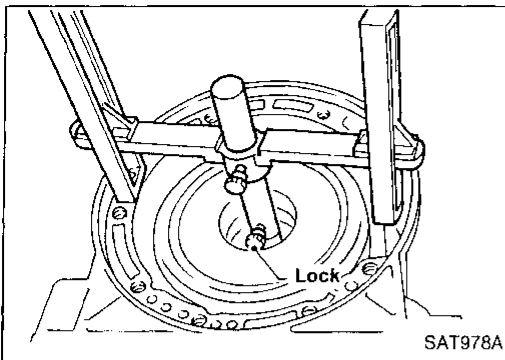
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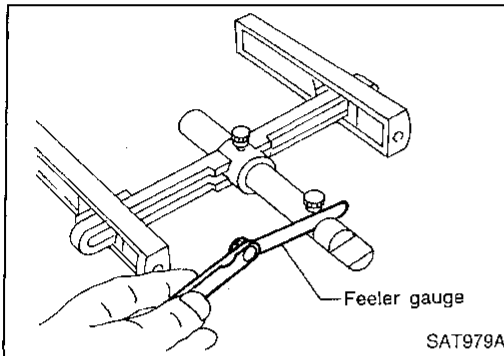
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ASSEMBLY

Adjustment (Cont'd)



- c. With original bearing race installed inside reverse clutch drum, place shim selecting race gauge with its legs on machined surface of transmission case (no gasket) and allow gauging plunger to rest on bearing race. Lock gauging plunger in place with set screw.



- d. Remove Tool and use feeler gauge to measure gap between gauging cylinder and gauging plunger. This measurement should give exact total end play.

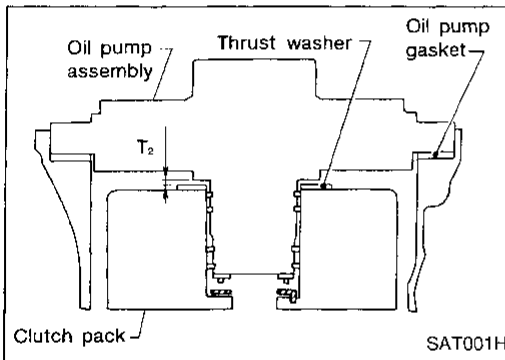
Total end play "T₁":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

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

Available oil pump cover bearing race:

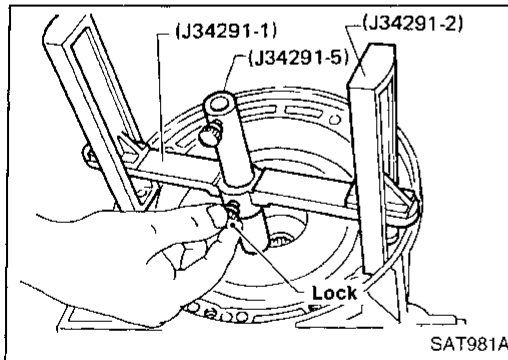
Refer to SDS, AT-228.



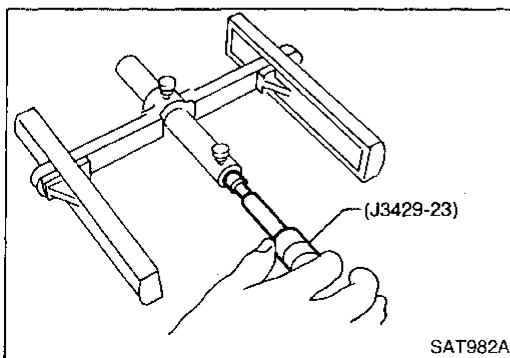
3. Adjust reverse clutch drum end play.

Reverse clutch drum end play "T₂":

0.55 - 0.90 mm (0.0217 - 0.0354 in)



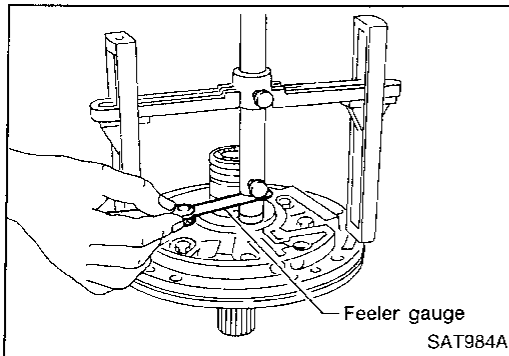
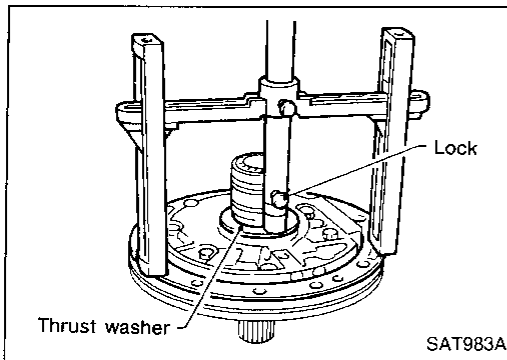
- a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket) and allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



- b. Install J34291-23 (gauging plunger) into gauging cylinder.

ASSEMBLY

Adjustment (Cont'd)



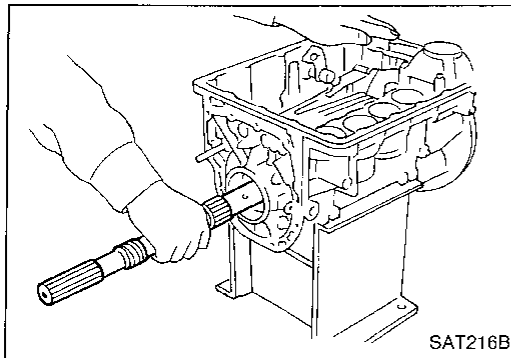
- c. With original thrust washer installed on oil pump, place shim setting gauge legs onto machined surface of oil pump assembly and allow gauging plunger to rest on thrust washer. Lock plunger in place with set screw.

- d. Use feeler gauge to measure gap between gauging plunger and gauging cylinder. This measurement should give you exact reverse clutch drum end play.

Reverse clutch drum end play "T₂":
0.55 - 0.90 mm (0.0217 - 0.0354 in)

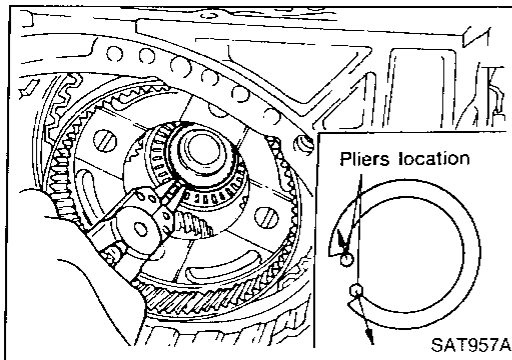
- If end play is out of specification, decrease or increase thickness of oil pump thrust washer as necessary.

Available oil pump thrust washer:
Refer to SDS, AT-228.

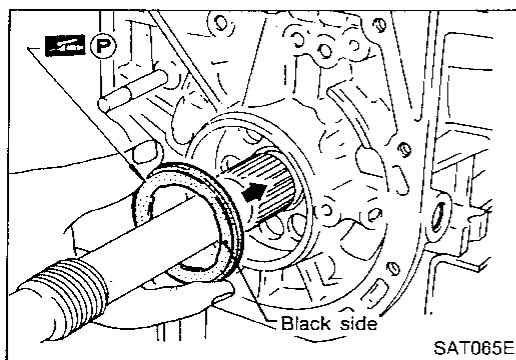


Assembly (2)

1. Install output shaft and parking gear.
 - a. Insert output shaft from rear of transmission case while slightly lifting front internal gear.
- **Do not force output shaft against front of transmission case.**



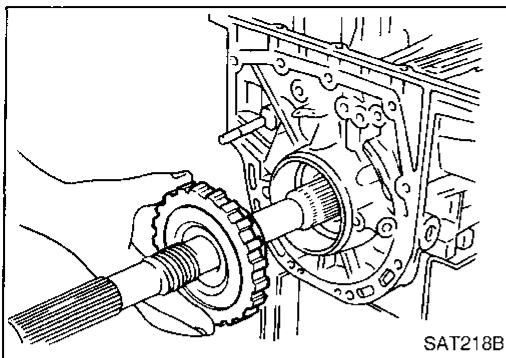
- b. Carefully push output shaft against front of transmission case. Install snap ring on front of output shaft.
- **Check to be sure output shaft cannot be removed in rear direction.**



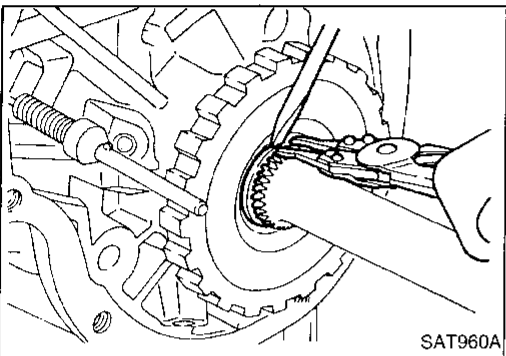
- c. Install needle bearing on transmission case.
 - **Pay attention to its direction — Black side goes to rear.**
 - **Apply petroleum jelly to needle bearing.**

ASSEMBLY

Assembly (2) (Cont'd)

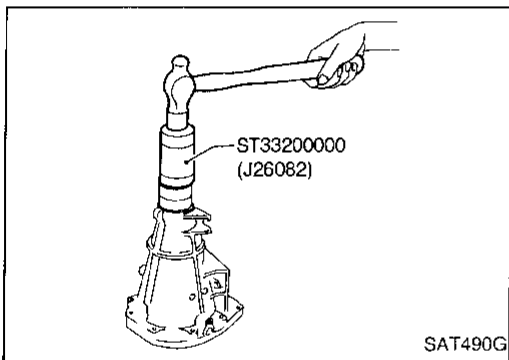


d. Install parking gear on transmission case.



e. Install snap ring on rear of output shaft.

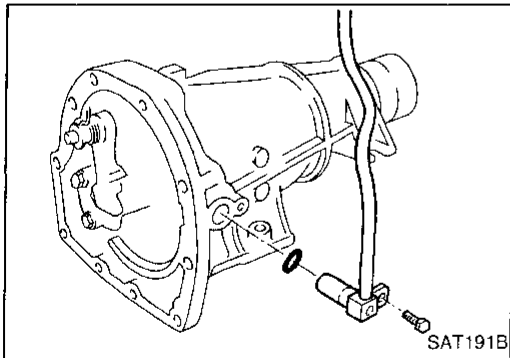
- Check to be sure output shaft cannot be removed in forward direction.



2. Install rear extension.

a. Install oil seal on rear extension.

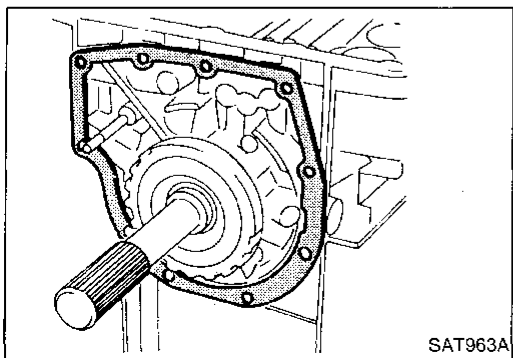
- Apply ATF to oil seal.



b. Install O-ring on revolution sensor.

- Apply ATF to O-ring.

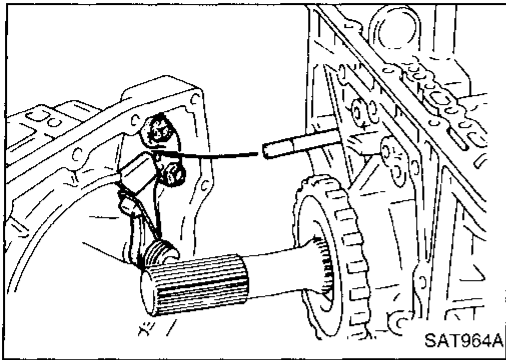
c. Install revolution sensor on rear extension.



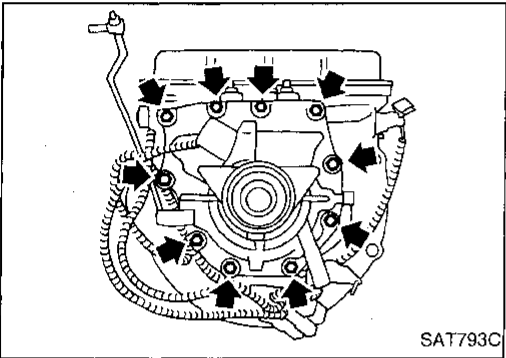
d. Install rear extension gasket on transmission case.

ASSEMBLY

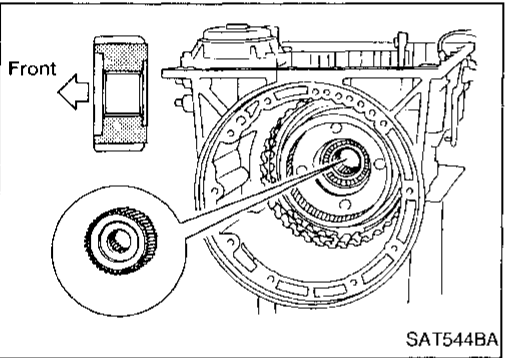
Assembly (2) (Cont'd)



e. Install parking rod on transmission case.



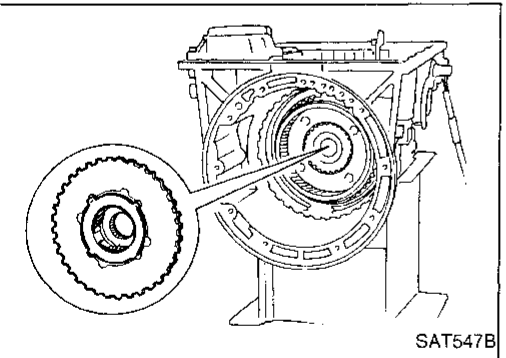
f. Install rear extension on transmission case.



3. Install front side clutch and gear components.

a. Install rear sun gear on transmission case.

● **Pay attention to its direction.**



b. Make sure needle bearing is on front of front planetary carrier.

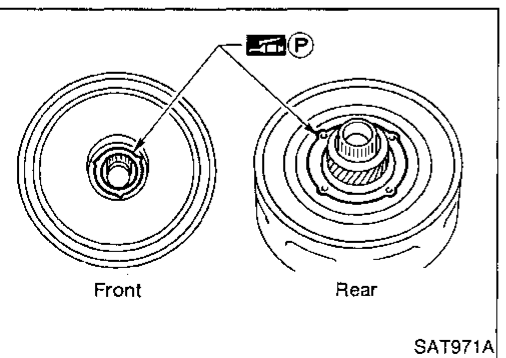
● **Apply petroleum jelly to needle bearing.**

c. Make sure needle bearing is on rear of front planetary carrier.

● **Apply petroleum jelly to bearing.**

● **Pay attention to its direction — Black side goes to front.**

d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.



e. Make sure bearing races are on front and rear of clutch pack.

● **Apply petroleum jelly to bearing races.**

● **Securely engage pawls of bearing races with holes in clutch pack.**

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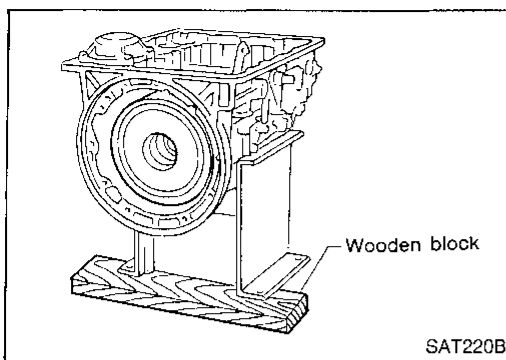
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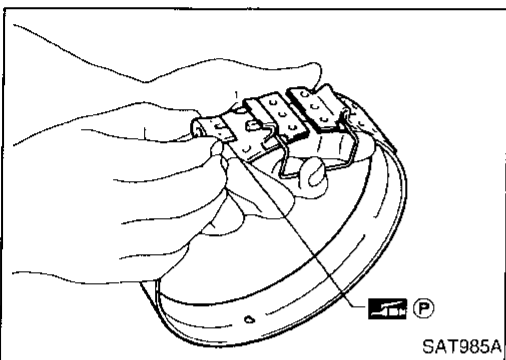
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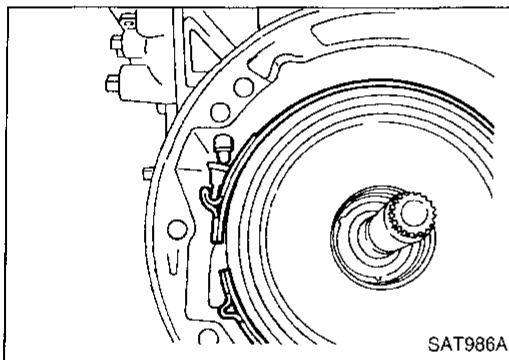
Assembly (2) (Cont'd)



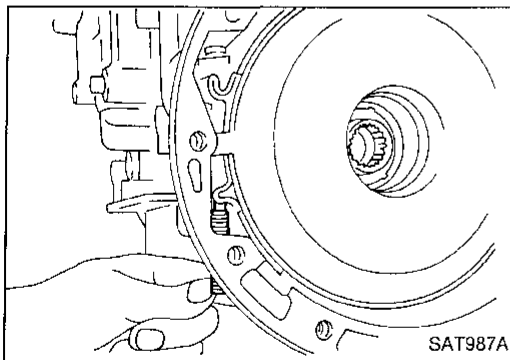
- f. Install clutch pack into transmission case.



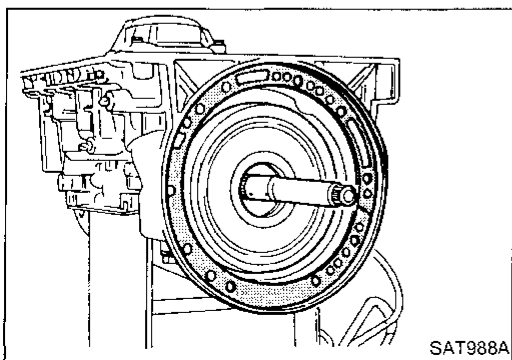
4. Install brake band and band strut.
a. Install band strut on brake band.
● **Apply petroleum jelly to band strut.**



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



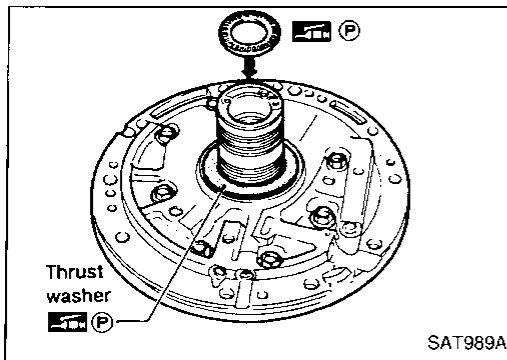
- c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.



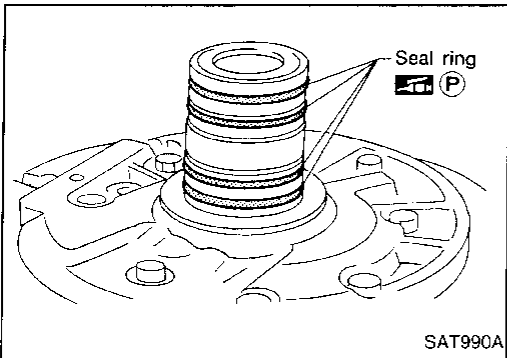
5. Install input shaft on transmission case.
● **Pay attention to its direction — O-ring groove side is front.**
6. Install gasket on transmission case.

ASSEMBLY

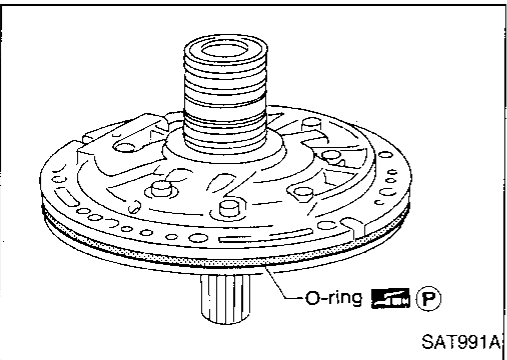
Assembly (2) (Cont'd)



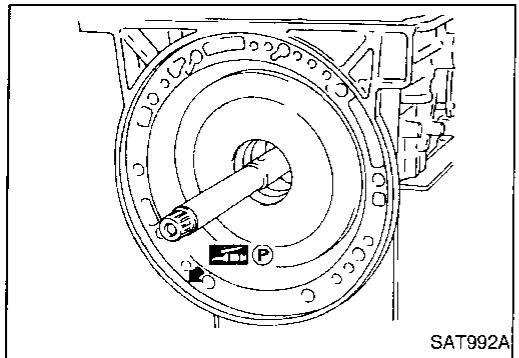
7. Install oil pump assembly.
 - a. Install needle bearing on oil pump assembly.
 - **Apply petroleum jelly to the needle bearing.**
 - b. Install selected thrust washer on oil pump assembly.
 - **Apply petroleum jelly to thrust washer.**



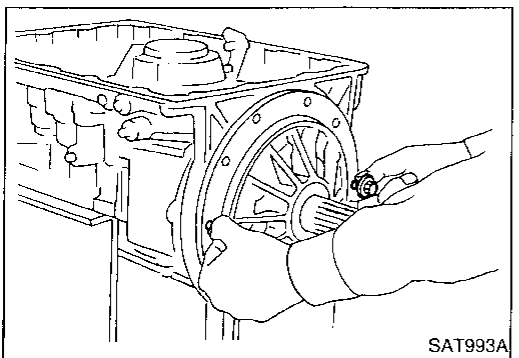
- c. Carefully install seal rings into grooves and press them into the petroleum jelly so that they are a tight fit.



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



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



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

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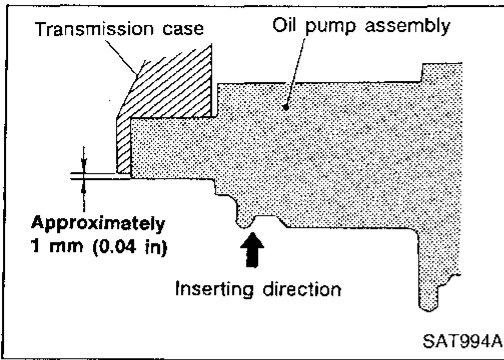
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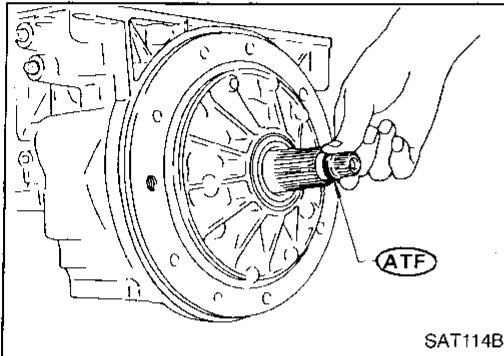
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ASSEMBLY

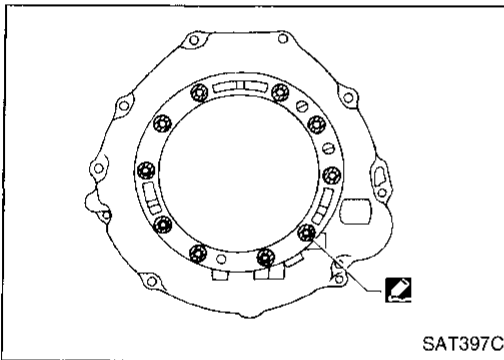
Assembly (2) (Cont'd)



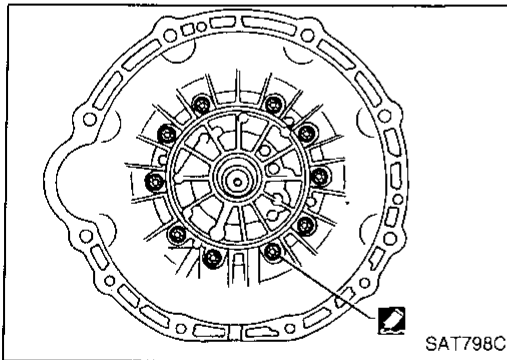
- Insert oil pump assembly to the specified position in transmission, as shown at left.



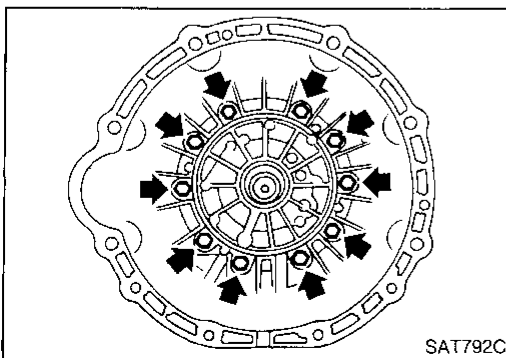
8. Install O-ring on input shaft.
- Apply ATF to O-rings.



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



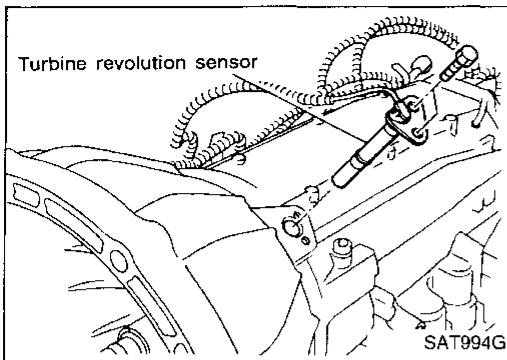
- b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.



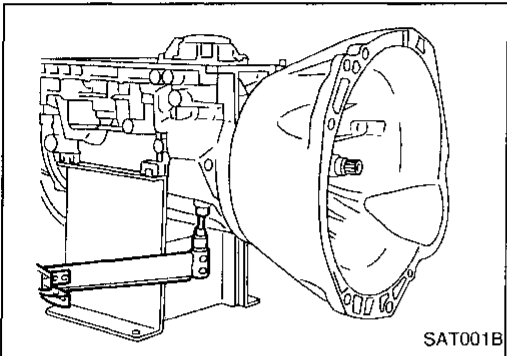
- c. Install converter housing on transmission case.

ASSEMBLY

Assembly (2) (Cont'd)




10. Install turbine revolution sensor.



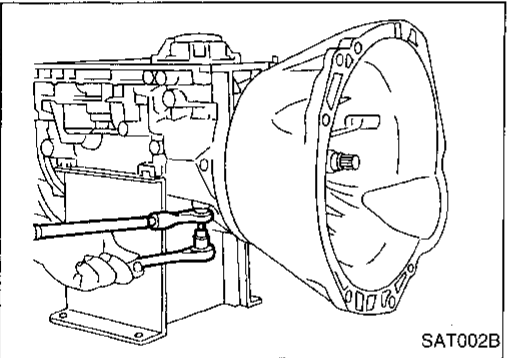
11. Adjust brake band.

a. Tighten anchor end bolt to specified torque.

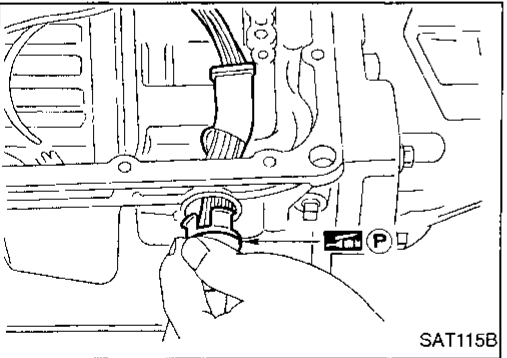
Anchor end bolt:

 : 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)

b. Back off anchor end bolt two and a half turns.



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

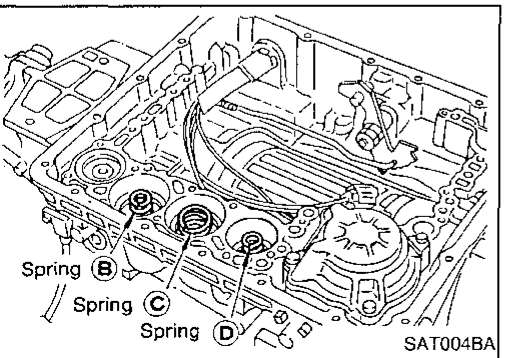


12. Install terminal cord assembly.

a. Install O-ring on terminal cord assembly.

● **Apply petroleum jelly to O-ring.**

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



13. Install control valve assembly.

a. Install accumulator piston return springs B, C and D.

Free length of return springs:

Refer to SDS, AT-226.

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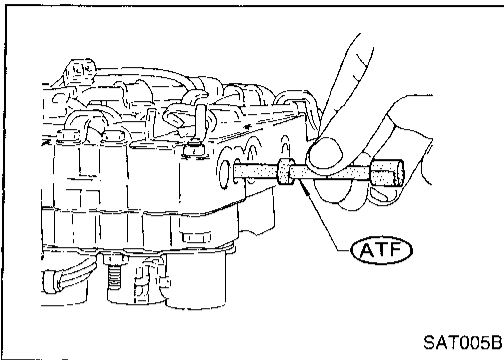
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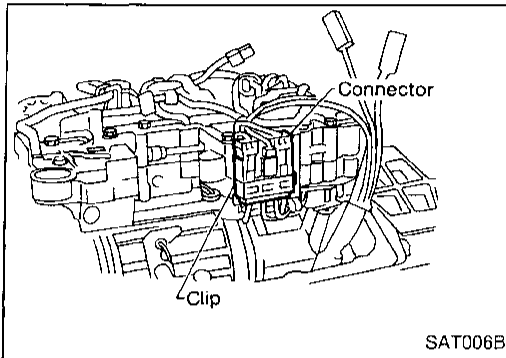
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ASSEMBLY

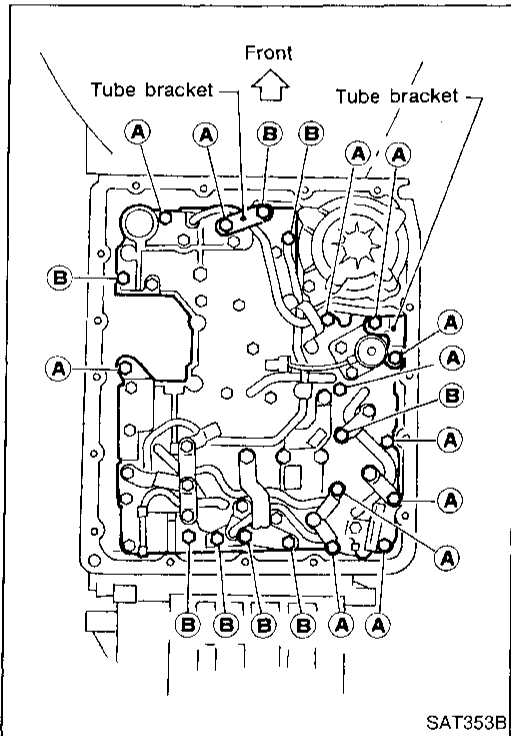
Assembly (2) (Cont'd)




- b. Install manual valve on control valve.
- **Apply ATF to manual valve.**

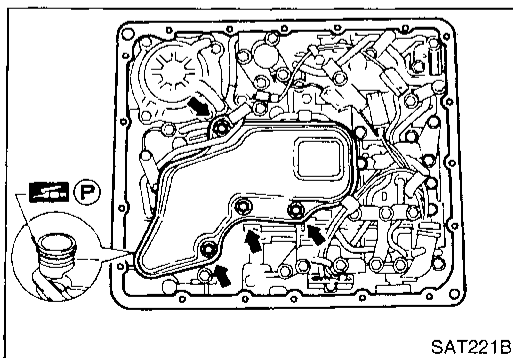


- c. Place control valve assembly on transmission case. Connect solenoid connector for upper body.
- d. Install connector clip.



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

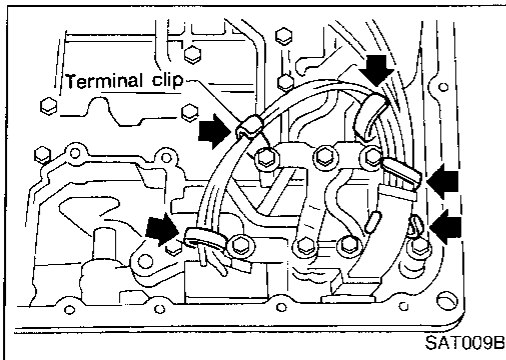
Bolt	ℓ mm (in)	 ℓ
(A)	33 (1.30)	
(B)	45 (1.77)	



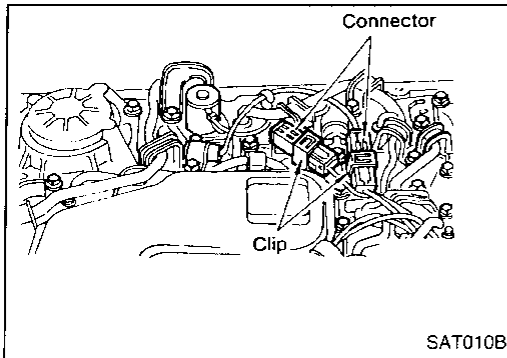
- g. Install O-ring on oil strainer.
- **Apply petroleum jelly to O-ring.**
- h. Install oil strainer on control valve.

ASSEMBLY

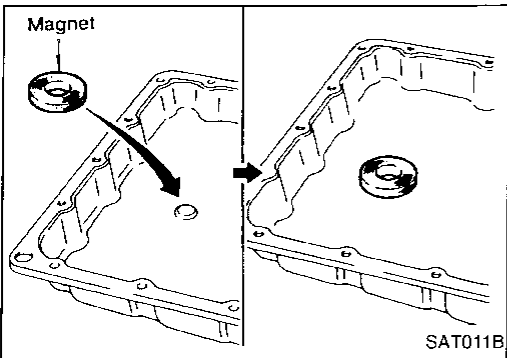
Assembly (2) (Cont'd)



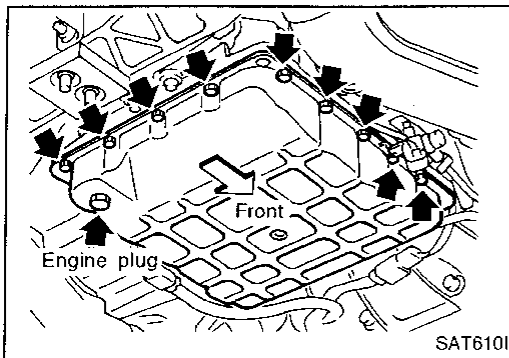
- i. Securely fasten terminal harness with clips.



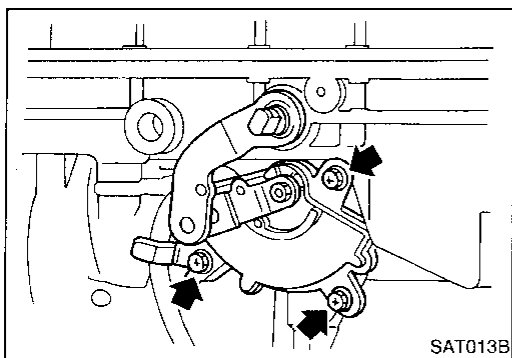
- j. Install torque converter clutch solenoid valve and fluid temperature sensor connectors.



14. Install oil pan.
 - a. Attach a magnet to oil pan.



- b. Install new oil pan gasket on transmission case.
- c. Install oil pan and bracket on transmission case.
 - Always replace oil pan bolts as they are self-sealing bolts.
 - Before installing bolts, remove traces of sealant and oil from mating surface and thread holes.
 - Tighten four bolts in a criss-cross pattern to prevent displacement of gasket.
- d. Tighten drain plug.



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

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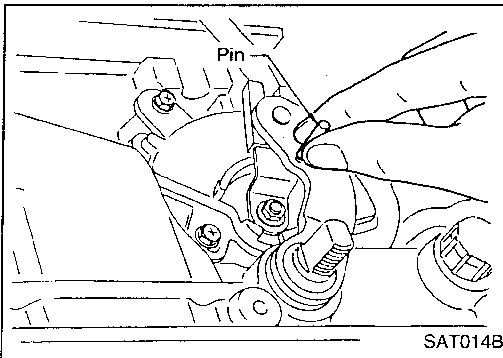
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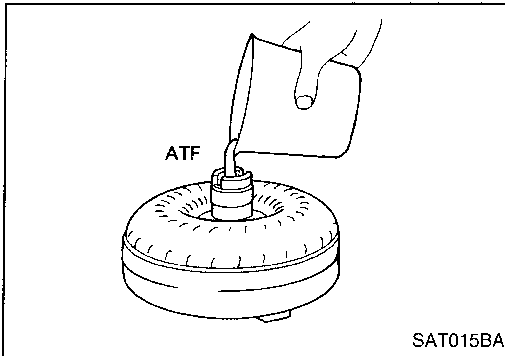
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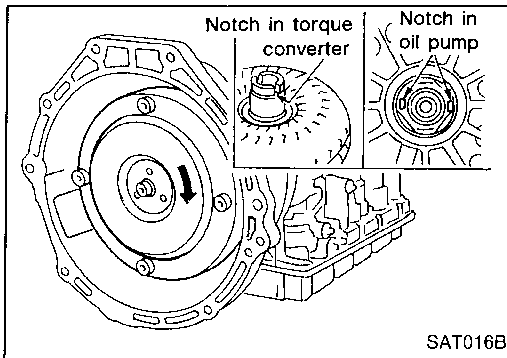
Assembly (2) (Cont'd)



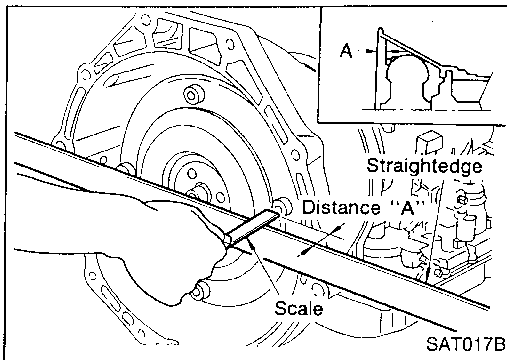
- d. Tighten bolts while inserting 4.0 mm (0.157 in) dia. pin vertically into locating holes in inhibitor switch and manual shaft.



16. Install torque converter.
- a. Pour ATF into torque converter.
- Approximately 2 liters (2-1/8 US qt, 1-3/4 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 and oil pump.



- c. Measure distance A to check that torque converter is in proper position.

Distance "A":
22 mm (0.87 in) or more
Refer to SDS, AT-228.

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Engine	VH41DE
Automatic transmission model	RE4R03A
Transmission model code number	52X14
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.569
2nd	1.479
Top	1.000
OD	0.694
Reverse	2.275
Recommended oil	Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*
Oil capacity ℓ (US qt, Imp qt)	10.5 (11-1/8, 9-1/4)

*: Refer to MA section ("Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS").

Specifications and Adjustment

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Vehicle speed km/h (MPH)						
	D ₁ → D ₂	D ₂ → D ₃	D ₃ → D ₄	D ₄ → D ₃	D ₃ → D ₂	D ₂ → D ₁	1 ₂ → 1 ₁
Full throttle	66 - 70 (41 - 43)	120 - 128 (75 - 80)	183 - 193 (114 - 120)	177 - 187 (110 - 116)	114 - 122 (71 - 76)	43 - 47 (27 - 29)	53 - 57 (33 - 35)
Half throttle	44 - 48 (27 - 30)	80 - 86 (50 - 53)	119 - 127 (74 - 79)	81 - 89 (50 - 55)	35 - 39 (22 - 24)	7 - 11 (4 - 7)	53 - 57 (33 - 35)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	Selector lever position [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	D [D ₄]	184 - 192 (114 - 119)	178 - 186 (111 - 116)
	3 [3 _s]	91 - 99 (57 - 62)	86 - 94 (53 - 58)
Half throttle	D [D ₄]	134 - 142 (83 - 88)	120 - 128 (75 - 80)
	3 [3 _s]	91 - 99 (57 - 62)	81 - 89 (50 - 55)

STALL REVOLUTION

Stall revolution rpm
2,300 - 2,500

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)	
	D, 3, 2 and 1 positions	R position
Idle	422 - 461 (4.3 - 4.7, 61 - 67)	677 - 716 (6.9 - 7.3, 98 - 104)
Stall	1,020 - 1,098 (10.4 - 11.2, 148 - 159)	1,422 - 1,510 (14.5 - 15.4, 206 - 219)

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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

Parts			Item			
			Part No.	Free length	Outer diameter	
Control valve	Upper body	①	Torque converter relief valve spring	31742-41X23	38.0 (1.496)	9.0 (0.354)
		②	Pressure regulator valve spring	31742-41X24	44.02 (1.7331)	14.0 (0.551)
		③	Pressure modifier valve spring	31742-41X19	31.95 (1.2579)	6.8 (0.268)
		④	Shuttle shift valve D spring	31762-41X00	26.5 (1.043)	6.0 (0.236)
		⑤	4-2 sequence valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		⑥	Shift valve B spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		⑦	4-2 relay valve spring	31756-41X00	29.1 (1.146)	6.95 (0.2736)
		⑧	Shift valve A spring	31762-41X01	25.0 (0.984)	7.0 (0.276)
		⑨	Overrun clutch control valve spring	31762-41X03	23.6 (0.929)	7.0 (0.276)
		⑩	Overrun clutch reducing valve spring	31742-41x63	32.5 (1.280)	7.0 (0.276)
		⑪	Shuttle shift valve S spring	31762-41X04	51.0 (2.008)	5.65 (0.2224)
		⑫	Pilot valve spring	31742-41X13	25.7 (1.012)	9.1 (0.358)
		⑬	Torque converter clutch control valve spring	31742-41X22	18.5 (0.728)	13.0 (0.512)
	Lower body	①	Modifier accumulator piston spring	31742-27X70	31.4 (1.236)	9.8 (0.386)
		②	1st reducing valve spring	31756-41X05	25.4 (1.000)	6.75 (0.266)
		③	3-2 timing valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
④		Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)	
Reverse clutch		16 pcs	31505-51X00	37.18 (1.4638)	14.8 (0.583)	
High clutch		16 pcs	31505-21X03	22.06 (0.8685)	11.6 (0.457)	
Forward clutch (Overrun clutch)		20 pcs	32521-51X01 (Assembly)	36.8 (1.449)	10.7 (0.421)	
Low & reverse brake	Inner spring	16 pcs	31505-51X06	20.43 (0.8043)	10.3 (0.406)	
	Outer spring	16 pcs	31505-51X05	20.35 (0.8012)	13.0 (0.512)	
Band servo	Spring (A)		31605-41X17	52.0 (2.047)	38.7 (1.524)	
	Spring (B)		31605-41X01	29.0 (1.142)	27.6 (1.087)	
Accumulator	Accumulator (A)		31605-41X02	43.0 (1.693)	18 (0.71)	
	Accumulator (B)		31605-41X10	66.0 (2.598)	18.8 (0.740)	
	Accumulator (C)		31605-51X01	45.0 (1.772)	29.3 (1.154)	
	Accumulator (D)		31605-41X06	58.4 (2.299)	17.3 (0.681)	

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

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

CLUTCHES AND BRAKES

Reverse clutch		
Number of drive plates	3	
Number of driven plates	3	
Thickness of drive plate mm (in)	1.90 - 2.05 (0.0748 - 0.0807)	
Standard	1.90 - 2.05 (0.0748 - 0.0807)	
Wear limit	1.8 (0.071)	
Clearance mm (in)	0.6 - 0.9 (0.024 - 0.035)	
Standard	0.6 - 0.9 (0.024 - 0.035)	
Allowable limit	1.4 (0.055)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.4 (0.173)	31537-51X61
	4.6 (0.181)	31537-51X00
	4.8 (0.189)	31537-51X01
	5.0 (0.197)	31537-51X02
High clutch		
Number of drive plates	6	
Number of driven plates	6	
Thickness of drive plate mm (in)	1.52 - 1.67 (0.0598 - 0.0657)	
Standard	1.52 - 1.67 (0.0598 - 0.0657)	
Wear limit	1.4 (0.055)	
Clearance mm (in)	1.8 - 2.2 (0.071 - 0.087)	
Standard	1.8 - 2.2 (0.071 - 0.087)	
Allowable limit	3.4 (0.134)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.4 (0.173)	31537-51X61
	4.6 (0.181)	31537-51X00
	4.8 (0.189)	31537-51X01
	5.0 (0.197)	31537-51X02
	5.2 (0.205)	31537-51X03
5.4 (0.213)	31537-51X04	

Forward clutch		
Number of drive plates	7	
Number of driven plates	7	
Thickness of drive plate mm (in)	1.90 - 2.05 (0.0748 - 0.0807)	
Standard	1.90 - 2.05 (0.0748 - 0.0807)	
Wear limit	1.8 (0.071)	
Clearance mm (in)	0.35 - 0.75 (0.0138 - 0.0295)	
Standard	0.35 - 0.75 (0.0138 - 0.0295)	
Allowable limit	2.2 (0.087)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.6 (0.181)	31537-51X06
	4.8 (0.189)	31537-51X07
	5.0 (0.197)	31537-51X08
	5.2 (0.205)	31537-51X09
	5.4 (0.213)	31537-51X10
5.6 (0.220)	31537-51X69	
Overrun clutch		
Number of drive plates	4	
Number of driven plates	7	
Thickness of drive plate mm (in)	1.52 - 1.67 (0.0598 - 0.0657)	
Standard	1.52 - 1.67 (0.0598 - 0.0657)	
Wear limit	1.8 (0.071)	
Clearance mm (in)	1.0 - 1.4 (0.039 - 0.055)	
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	2.0 (0.079)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.8 (0.150)	31537-51X11
	4.0 (0.157)	31537-51X12
	4.2 (0.165)	31537-51X13
	4.4 (0.173)	31537-51X14
	4.6 (0.181)	31537-51X15
4.8 (0.189)	31537-51X64	

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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

Low & reverse brake			
Number of drive plates		7	
Number of driven plates		7	
Thickness of drive plate mm (in)			
Standard		1.52 - 1.67 (0.0598 - 0.0657)	
Wear limit		1.4 (0.055)	
Clearance mm (in)			
Standard		0.90 - 1.20 (0.0354 - 0.0472)	
Allowable limit		2.4 (0.094)	
Thickness of retaining plate	Thickness mm (in)	Part number	
		3.6 (0.142)	31667-51X12
		4.0 (0.157)	31667-51X11
		4.2 (0.165)	31667-51X10
		4.4 (0.173)	31667-51X00
		4.6 (0.181)	31667-51X01
		4.8 (0.189)	31667-51X02
		5.0 (0.197)	31667-51X03
		5.2 (0.205)	31667-51X04
		5.4 (0.213)	31667-51X05
		5.6 (0.220)	31667-51X06
	5.8 (0.228)	31667-51X07	
	6.0 (0.236)	31667-51X08	
	6.2 (0.244)	31667-51X09	

Brake band		
Anchor end bolt tightening torque N-m (kg-m, in-lb)		3.9 - 5.9 (0.4 - 0.6, 35 - 52)
Number of returning revolutions for anchor end bolt		2.5

OIL PUMP AND LOW ONE-WAY CLUTCH

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

TOTAL END PLAY

Total end play "T ₁ "	0.25 - 0.55 mm (0.0098 - 0.0217 in)	
Thickness of oil pump cover bearing race	Thickness mm (in)	Part number
	0.8 (0.031)	31435-41X01
	1.0 (0.039)	31435-41X02
	1.2 (0.047)	31435-41X03
	1.4 (0.055)	31435-41X04
	1.6 (0.063)	31435-41X05
	1.8 (0.071)	31435-41X06
	2.0 (0.079)	31435-41X07

REVERSE CLUTCH DRUM END PLAY

Reverse clutch drum end play "T ₂ "	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number
	0.9 (0.035)	31528-21X01
	1.1 (0.043)	31528-21X02
	1.3 (0.051)	31528-21X03
	1.5 (0.059)	31528-21X04
	1.7 (0.067)	31528-21X05
	1.9 (0.075)	31528-21X06

REMOVAL AND INSTALLATION

Manual control linkage	
Number of returning revolutions for lock nut	1
Lock nut tightening torque	11 - 15 N-m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)
Distance between end of clutch housing and torque converter	22.0 mm (0.866 in) or more