

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" and "HOW TO PERFORM EFFICIENT DIAGNOSIS FOR AN ELECTRICAL INCIDENT".

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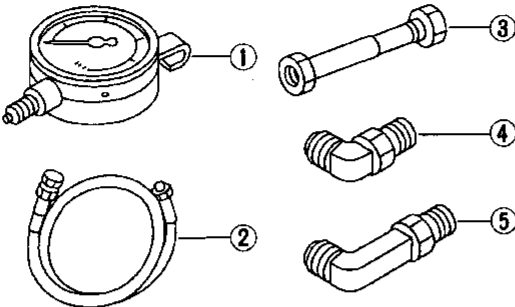
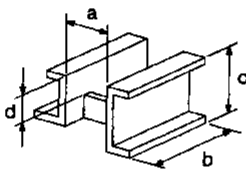
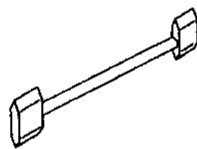
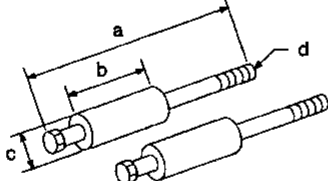
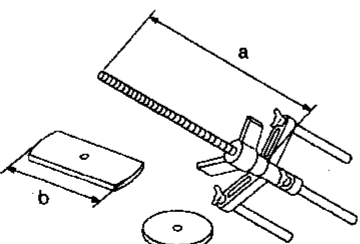
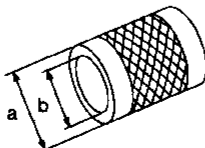
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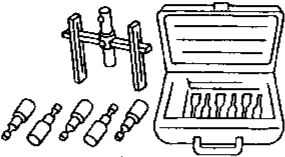
PREPARATION AND PRECAUTIONS

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description
<p>ST2505S001 (J25695-A) Oil pressure gauge set</p> <p>① ST25051001 (—) Oil pressure gauge</p> <p>② ST25052000 (—) Hose</p> <p>③ ST25053000 (—) Joint pipe</p> <p>④ ST25054000 (—) Adapter</p> <p>⑤ ST25055000 (—) Adapter</p>	<p style="text-align: right;">Measuring line pressure</p>  <p>NT097</p>
<p>ST07870000 (J37068) Transmission case stand</p>	 <p>NT421</p> <p style="text-align: right;">Disassembling and assembling A/T</p> <p style="text-align: right;">a: 182 mm (7.17 in) b: 282 mm (11.10 in) c: 230 mm (9.06 in) d: 100 mm (3.94 in)</p>
<p>KV31102100 (J37065) Torque converter one-way clutch check tool</p>	 <p>NT098</p> <p style="text-align: right;">Checking one-way clutch in torque con- verter</p>
<p>ST25850000 (J25721-A) Sliding hammer</p>	 <p>NT422</p> <p style="text-align: right;">Removing oil pump assembly</p> <p style="text-align: right;">a: 179 mm (7.05 in) b: 70 mm (2.76 in) c: 40 mm (1.57 in) dia. d: M12 x 1.75P</p>
<p>KV31102400 (J34285 and J34285-87) Clutch spring compressor</p>	 <p>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>
<p>ST33200000 (J26082) Drift</p>	 <p>NT091</p> <p style="text-align: right;">Installing oil pump housing oil seal Installing rear oil seal</p> <p style="text-align: right;">a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.</p>

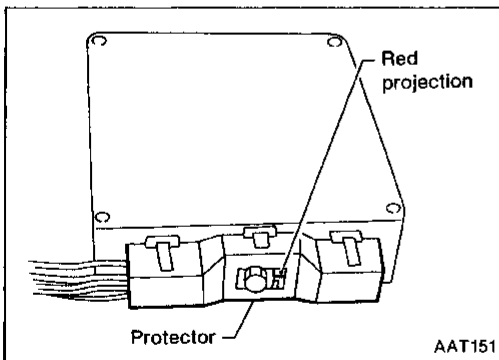
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
(J34291) Shim setting gauge set	 <p>Selecting oil pump cover bearing race and oil pump thrust washer</p> <p>NT101</p>

Service Notice

- Before proceeding with disassembly, thoroughly clean the outside of the transmission. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transmission.
- Place disassembled parts in a parts rack in order to replace them in their proper positions.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the 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.
- Flash or replace ATF cooler if excessive foreign material is found in oil pan or clogging strainer. Refer to TROUBLE DIAGNOSES Remarks, AT-17.
- After overhaul, refill the transmission with new ATF.
- After removing drain plug, A/T fluid still remains in torque converter and A/T fluid cooling system.



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

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Supplemental Restraint System "AIR BAG"

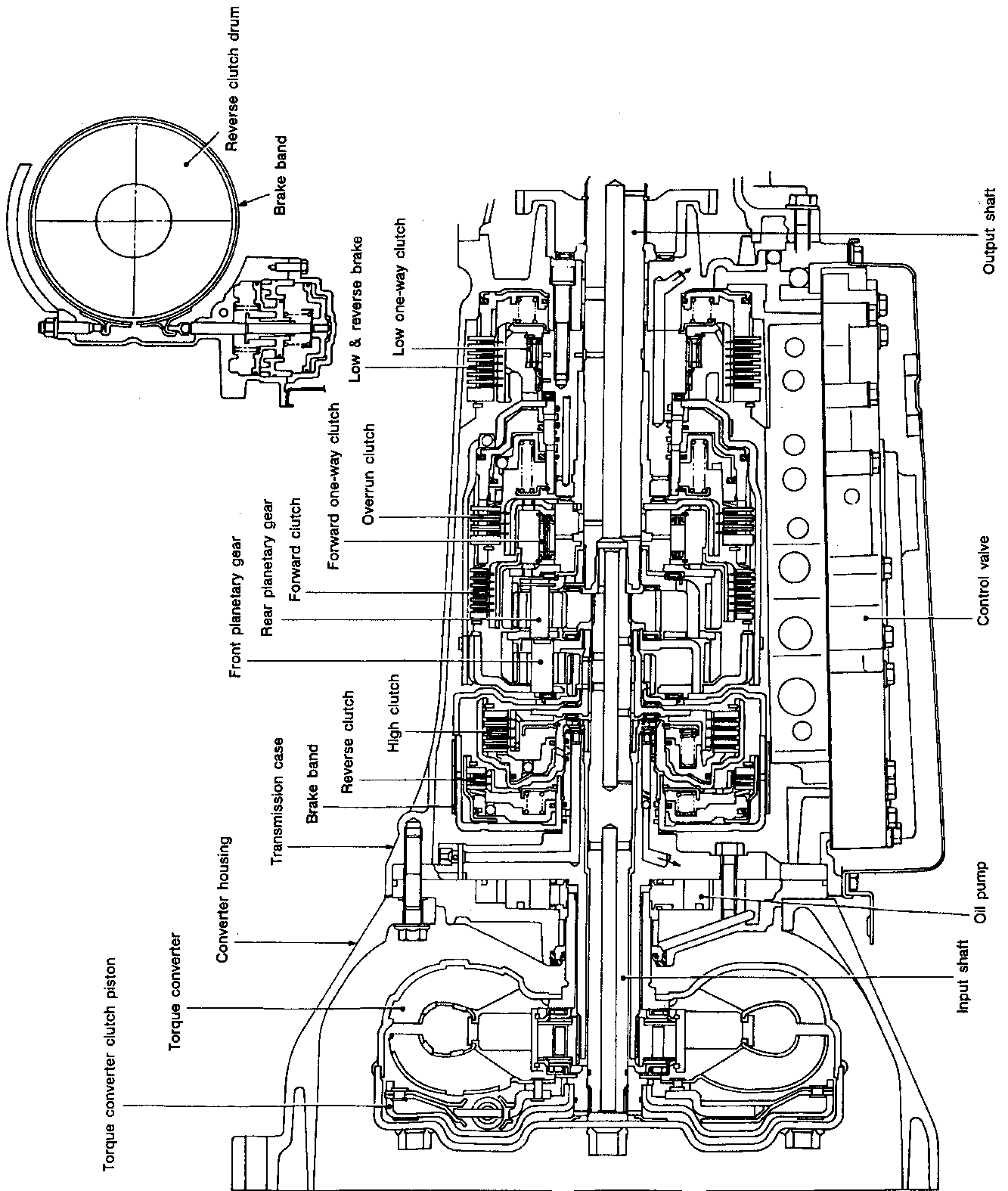
The Supplemental Restraint System "Air Bag", used along with a seat belt, helps to reduce the risk or severity of injury to the driver and front passenger in a frontal collision. The Supplemental Restraint System consists of air bag modules (located in the center of the steering wheel and on the instrument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

WARNING:

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

DESCRIPTION

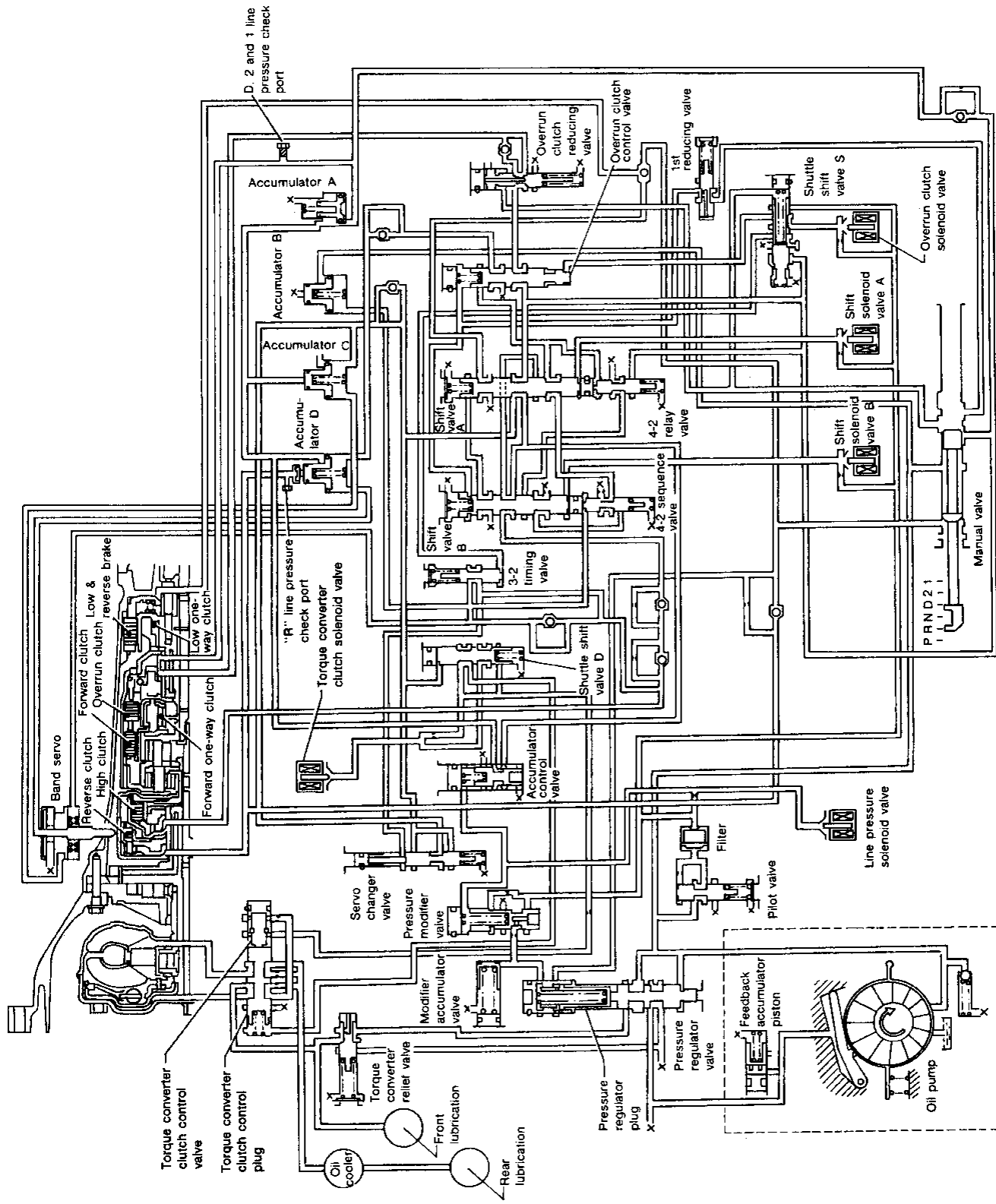
Cross-sectional View



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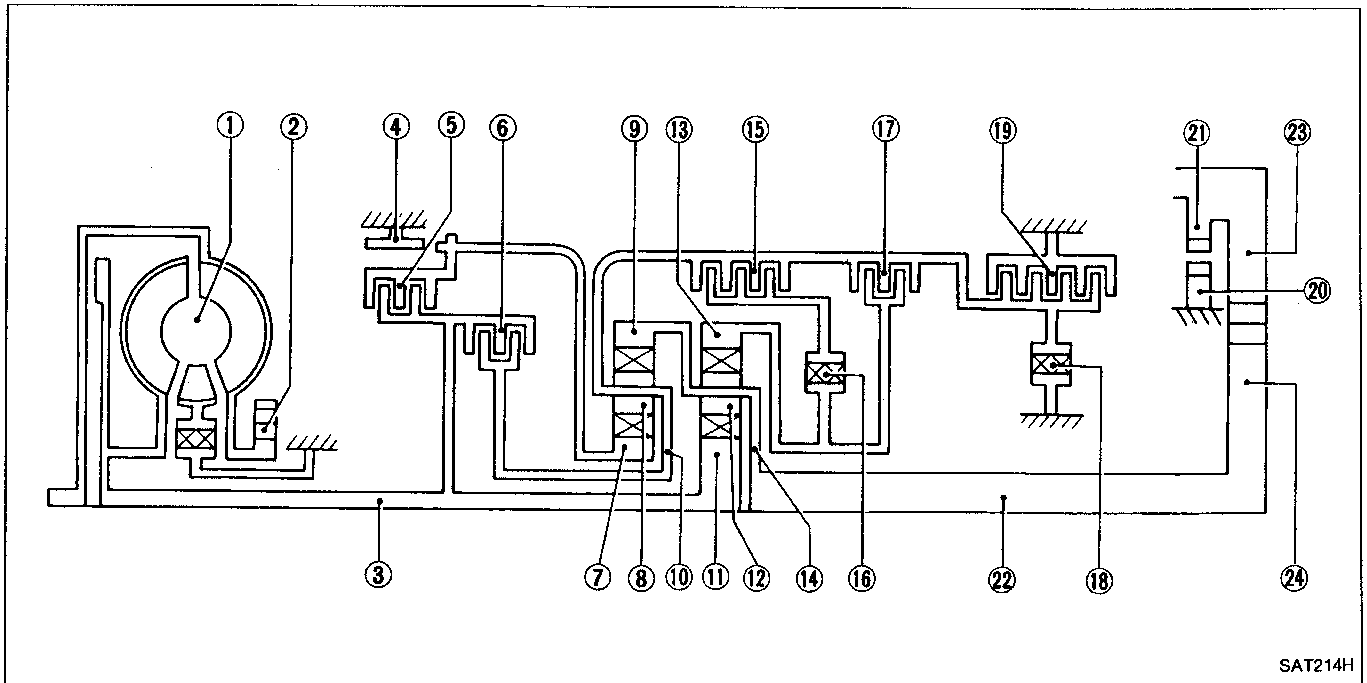
DESCRIPTION

Hydraulic Control Circuit



DESCRIPTION

Shift Mechanism CONSTRUCTION



- | | | |
|---|---|---|
| <ul style="list-style-type: none"> ① Torque converter ② Oil pump ③ Input shaft ④ Brake band ⑤ Reverse clutch ⑥ High clutch ⑦ Front sun gear ⑧ Front pinion gear | <ul style="list-style-type: none"> ⑨ Front internal gear ⑩ Front planetary carrier ⑪ Rear sun gear ⑫ Rear pinion gear ⑬ Rear internal gear ⑭ Rear planetary carrier ⑮ Forward clutch ⑯ Forward one-way clutch | <ul style="list-style-type: none"> ⑰ Overrun clutch ⑱ Low one-way clutch ⑲ Low & reverse brake ⑳ Parking pawl ㉑ Parking gear ㉒ Output shaft ㉓ Idle gear ㉔ Output gear |
|---|---|---|

FUNCTION OF CLUTCH AND BRAKE

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

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DESCRIPTION

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 ⊗	⊗		●			○	
	4th		○	⊗	*3 ⊗	⊗	○				○	
2	1st		○	⊗				●	●			Automatic shift 1 ↔ 2 ↔ 3
	2nd		○	⊙	○			●				
1	1st		○	○				●		○		Locks (held stationary) in 1st speed 1 ← 2 ← 3
	2nd		○	○	○			●				

*1: Operates when overdrive switch is being set in "OFF" position.

*2: Oil pressure is applied to both 2nd "apply" side and 3rd "release" side of band servo piston. However, brake band does not contract because oil pressure area on the "release" side is greater than that on the "apply" side.

*3: Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.

*4: A/T will not shift to 4th when overdrive switch is set in "OFF" position.

○ : Operates.

⊙ : Operates when throttle opening is less than 1/16. Engine brake activates.

● : Operates during "progressive" acceleration.

⊗ : Operates but does not affect power transmission.

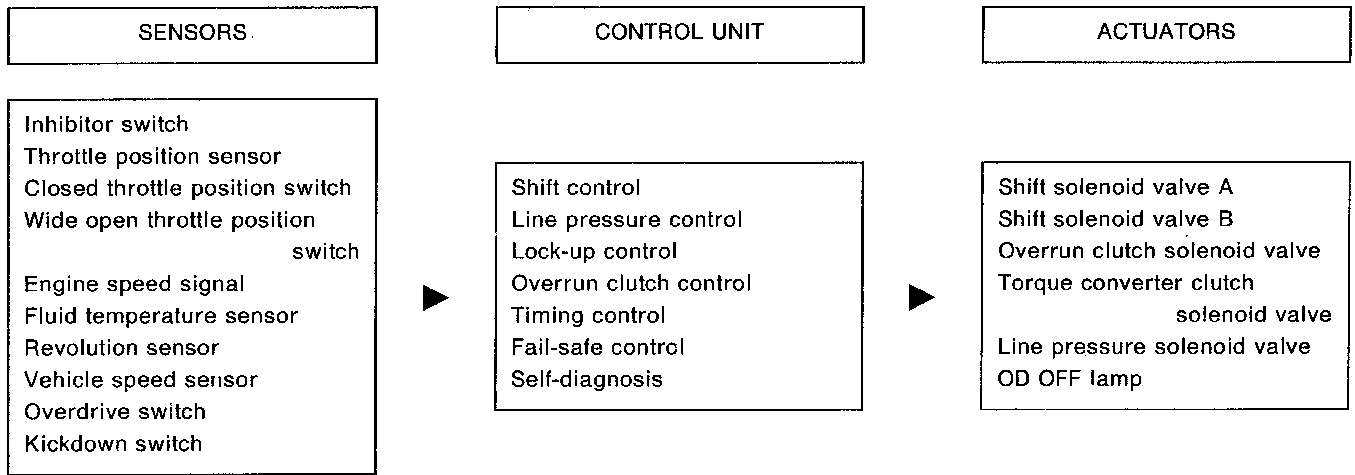
⊗ : Operates when throttle opening is less than 1/16 but does not affect engine brake.

DESCRIPTION

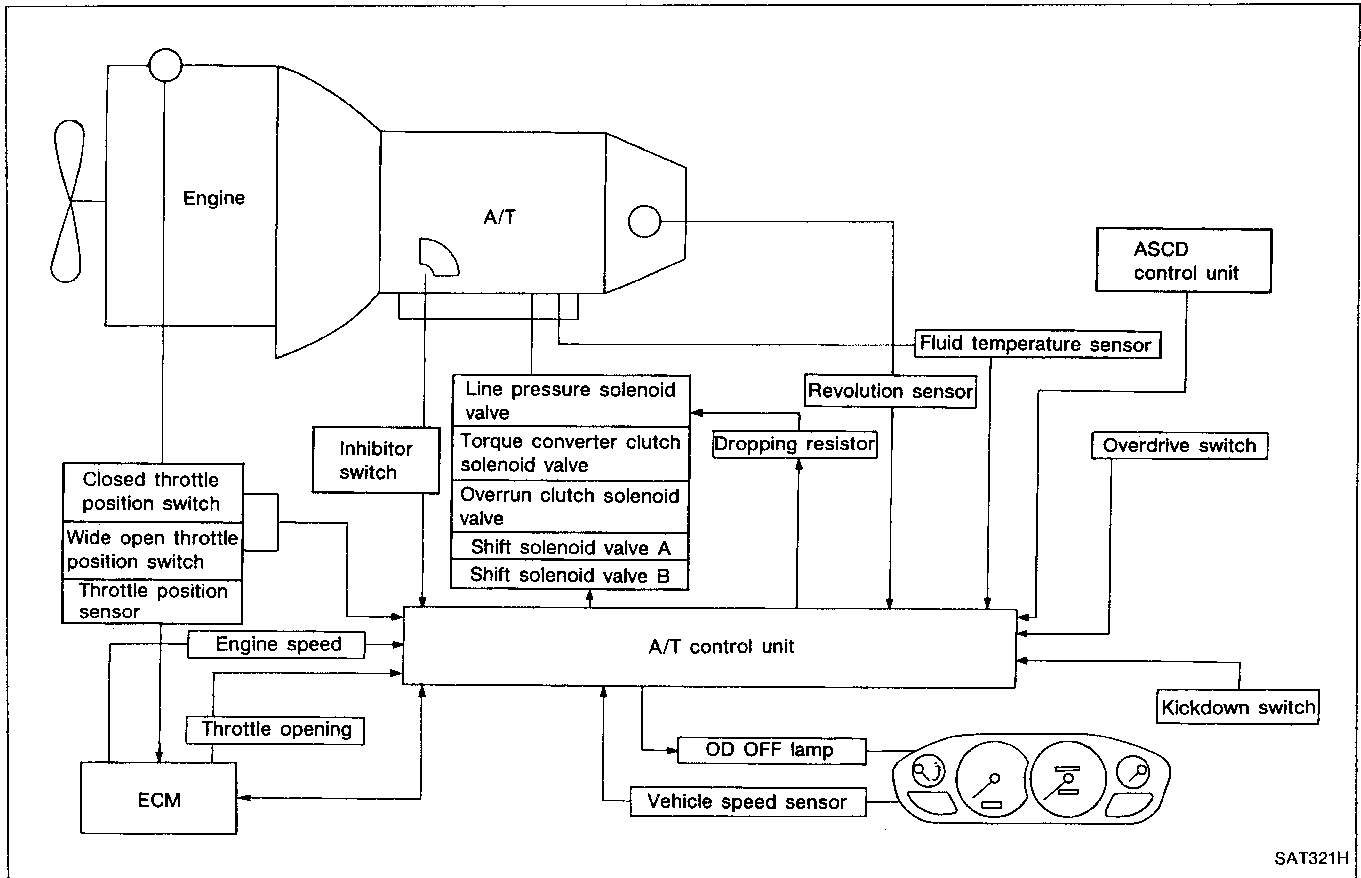
Control System

OUTLINE

The RE4R01A 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



DESCRIPTION

Control System (Cont'd)

A/T CONTROL UNIT FUNCTION

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

INPUT/OUTPUT SIGNAL OF A/T CONTROL UNIT

	Sensors and solenoid valves	Function
Input	Inhibitor switch	Detects select lever position and sends a signal to A/T control unit.
	Throttle position sensor	Detects throttle valve position and sends a signal to A/T control unit.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to A/T control unit.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle and sends a signal to A/T control unit.
	Engine speed signal	From ECM (ECCS control module).
	Fluid temperature sensor	Detects transmission fluid temperature and sends a signal to A/T control unit.
	Revolution sensor	Detects output shaft rpm and sends a signal to A/T control unit.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunctions.
	OD switch	Sends a signal, which prohibits a shift to D ₄ (OD) range, to the A/T control unit.
	Kickdown switch	Detects full throttle position (accelerator pedal fully depressed). Sends a signal to A/T control unit when throttle position sensor malfunctions.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from A/T control unit.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from A/T control unit.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from A/T control unit.
	Overrun clutch solenoid valve	Controls an "engine brake" effect suited to driving conditions in relation to a signal sent from A/T control unit.
	OD OFF lamp	Shows A/T control unit faults, when A/T control components malfunction.

TROUBLE DIAGNOSES

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SYMPTOM: Vehicle moves when it is pushed forward or backward with selector lever in "P" position.		
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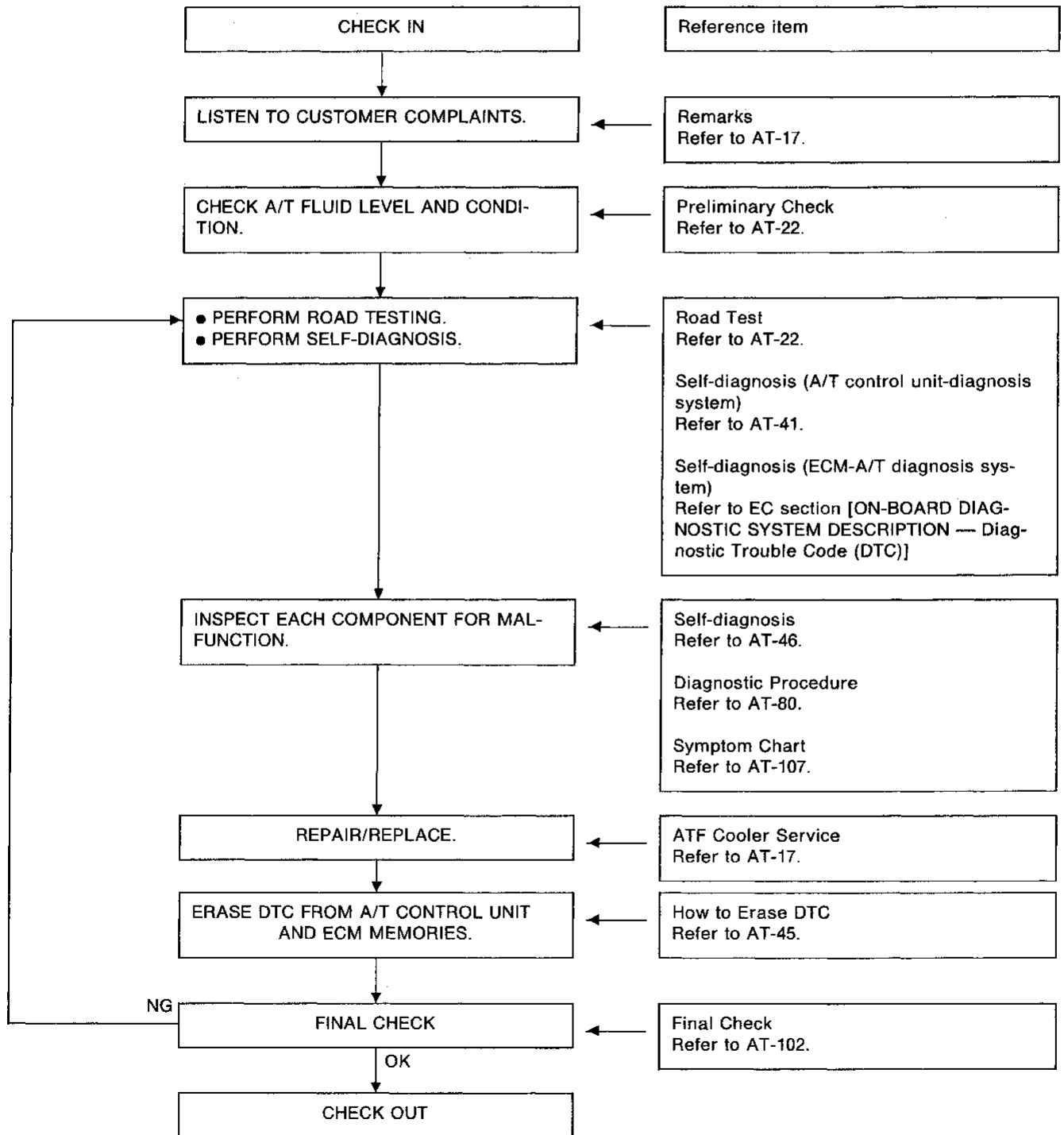
How to Perform Trouble Diagnoses for Quick and Accurate Repair

A good understanding of the malfunctioning conditions can make troubleshooting faster and more accurate.

In general, the feeling about a problem depends on each customer. It is important to fully understand the symptoms or under what conditions a customer complains.

Make good use of the two sheets provided, "Information from customer" and "Diagnostic worksheet", in order to perform the best troubleshooting possible.

WORK FLOW



TROUBLE DIAGNOSES

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

DIAGNOSTIC WORKSHEET

1.	<input type="checkbox"/> Read the Fail-safe Remarks and listen to customer complaints.	AT-17		
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-22		
3.	<input type="checkbox"/> Perform all ROAD TESTING and mark required procedures.	AT-22		
	3-1 Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items.	AT-23		
	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> A/T control unit-diagnosis system <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others </td> <td style="width: 50%; vertical-align: top;"> ECM-A/T diagnosis system <input type="checkbox"/> 111. Inhibitor switch circuit <input type="checkbox"/> 113. Improper shifting to 1st gear position <input type="checkbox"/> 114. Improper shifting to 2nd gear position <input type="checkbox"/> 115. Improper shifting to 3rd gear position <input type="checkbox"/> 116. Improper shifting to 4th gear position or TCC </td> </tr> </table>	A/T control unit-diagnosis system <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others	ECM-A/T diagnosis system <input type="checkbox"/> 111. Inhibitor switch circuit <input type="checkbox"/> 113. Improper shifting to 1st gear position <input type="checkbox"/> 114. Improper shifting to 2nd gear position <input type="checkbox"/> 115. Improper shifting to 3rd gear position <input type="checkbox"/> 116. Improper shifting to 4th gear position or TCC	
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	3-2. Check at idle <input type="checkbox"/> Diagnostic Procedure 1 (OD OFF indicator lamp came on for 2 seconds.) <input type="checkbox"/> Diagnostic Procedure 2 (Engine starts only in P and N position) <input type="checkbox"/> Diagnostic Procedure 3 (In P position, vehicle does not move when pushed) <input type="checkbox"/> Diagnostic Procedure 4 (In N position, vehicle moves) <input type="checkbox"/> Diagnostic Procedure 5 (Select shock. N → R position) <input type="checkbox"/> Diagnostic Procedure 6 (Vehicle creeps backward in R position) <input type="checkbox"/> Diagnostic Procedure 7 (Vehicle creeps forward in D, 2 or 1 position)	AT-24		
	3-3. Cruise test Part-1 <input type="checkbox"/> Diagnostic Procedure 8 (Vehicle starts from D ₁) <input type="checkbox"/> Diagnostic Procedure 9 <input type="checkbox"/> Diagnostic Procedure 10 <input type="checkbox"/> Diagnostic Procedure 11 } (A/T shift schedule: D ₁ → D ₂ /D ₂ → D ₃ /D ₃ → D ₄ /D ₄ → D ₂) <input type="checkbox"/> Diagnostic Procedure 12 (Shift schedule: Lock-up) <input type="checkbox"/> Diagnostic Procedure 13 (Lock-up condition more than 30 seconds) <input type="checkbox"/> Diagnostic Procedure 14 (Lock up released) <input type="checkbox"/> Diagnostic Procedure 15 (Engine speed return to idle. Light braking D ₄ → D ₃)	AT-25		

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TROUBLE DIAGNOSES

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

3.	<p>Part-2</p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnostic Procedure 8 (Vehicle starts from D₁) <input type="checkbox"/> Diagnostic Procedure 9 (Kickdown: D₄ → D₂) <input type="checkbox"/> Diagnostic Procedure 10 (Shift schedule: D₂ → D₃) <input type="checkbox"/> Diagnostic Procedure 11 (Shift schedule: D₃ → D₄ and engine brake) <hr/> <p>Part-3</p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnostic Procedure 17 (D₄ → D₃ when OD OFF switch ON → OFF) <input type="checkbox"/> Diagnostic Procedure 15 (Engine brake in D₃) <input type="checkbox"/> Diagnostic Procedure 18 (D₃ → 2₂ when selector lever D → 2 position) <input type="checkbox"/> Diagnostic Procedure 16 (Engine brake in 2₂) <input type="checkbox"/> Diagnostic Procedure 19 (2₂ → 1₁, when selector lever 2 → 1 position) <input type="checkbox"/> Diagnostic Procedure 20 (Engine brake in 1₁) <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>A/T control unit-diagnosis system</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others </td> <td style="width: 50%; vertical-align: top;"> <p>ECM-A/T diagnosis system</p> <ul style="list-style-type: none"> <input type="checkbox"/> 111. Inhibitor switch circuit <input type="checkbox"/> 113. Improper shifting to 1st gear position <input type="checkbox"/> 114. Improper shifting to 2nd gear position <input type="checkbox"/> 115. Improper shifting to 3rd gear position <input type="checkbox"/> 116. Improper shifting to 4th gear position or TCC </td> </tr> </table>	<p>A/T control unit-diagnosis system</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others 	<p>ECM-A/T diagnosis system</p> <ul style="list-style-type: none"> <input type="checkbox"/> 111. Inhibitor switch circuit <input type="checkbox"/> 113. Improper shifting to 1st gear position <input type="checkbox"/> 114. Improper shifting to 2nd gear position <input type="checkbox"/> 115. Improper shifting to 3rd gear position <input type="checkbox"/> 116. Improper shifting to 4th gear position or TCC 	AT-30
<p>A/T control unit-diagnosis system</p> <ul style="list-style-type: none"> <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others 	<p>ECM-A/T diagnosis system</p> <ul style="list-style-type: none"> <input type="checkbox"/> 111. Inhibitor switch circuit <input type="checkbox"/> 113. Improper shifting to 1st gear position <input type="checkbox"/> 114. Improper shifting to 2nd gear position <input type="checkbox"/> 115. Improper shifting to 3rd gear position <input type="checkbox"/> 116. Improper shifting to 4th gear position or TCC 			
4.	<ul style="list-style-type: none"> <input type="checkbox"/> Perform the Diagnostic Procedures marked in ROAD TESTING. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the components inspection orders.) 	AT-107		
5.	<p>Perform FINAL CHECK. If NG, go back to "CHECK A/T FLUID".</p> <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-102
<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 			

Remarks

FAIL-SAFE

The A/T control unit has an electronic Fail-Safe (limp home mode). This allows the vehicle to be driven even if a major electrical input/output device circuit is damaged.

Under Fail-Safe, the vehicle always runs in third gear with shift lever position of 1, 2 or D. Customer may say "Sluggish, poor acceleration".

When Fail-Safe operation occurs the next time the key is turned to the ON position, the OD OFF indicator lamp will blink for about 8 seconds. (For diagnosis, refer to AT-23.)

Fail-Safe may activate without electrical circuit damages if the vehicle is driven under extreme conditions (such as excessive wheel spins and emergency braking immediately afterwards). In this case, turn key OFF for 3 seconds and then ON to recover normal shift pattern.

The blinking of the OD OFF indicator lamp for about 8 seconds will appear only once and be cleared. The customer may resume normal driving conditions by chance.

Always follow the "WORK FLOW" (Refer to AT-13).

The SELF-DIAGNOSIS results will be as follows:

The first SELF-DIAGNOSIS will indicate the damage of the vehicle speed sensor or the revolution sensor.

During the next SELF-DIAGNOSIS performed after checking the sensor, no damages will be indicated.

ATF COOLER SERVICE

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

KA24DE engine (RE4R01A) ... fin type cooler

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

OBD-II

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

- On the former models (S13), the A/T control unit performed the self-diagnoses for A/T self-diagnostic items, and illuminated the OD OFF indicator lamp to indicate the self-diagnostic results. On this model (S14), the engine control module also receives the A/T self-diagnostic results and illuminates the malfunction indicator lamp (MIL) to indicate the results.

The number of self-diagnostic items has increased. Increased items can not be indicated by the OD OFF indicator lamp. For details, refer to the table on the next page.

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

The results stored in the memories (of both ECM and A/T control unit) must be erased each time after repairing the malfunctioning part.

- The following can be used to display the self-diagnostic results indicated by the MIL and to erase the results stored in the ECM and A/T control unit memories. For details, refer to "Self-diagnosis HOW TO ERASE DTC", AT-45.

ECM memory

CONSULT (Select ENGINE)

Generic Scan Tool (GST)

Mode selector on ECM

A/T control unit memory

CONSULT (Select A/T)

On-board self-diagnosis

- As for the malfunctions indicated by the MIL, the relevant data (sensor signals, ECM signals, etc.) obtained at the moment of detection can be verified by Freeze Frame Data. For details, refer to the EC section.

- All information on the A/T trouble diagnoses, including the self-diagnostic items indicated only by the MIL, is described in the AT section.

TROUBLE DIAGNOSES

Diagnosis by CONSULT

NOTICE

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

SELF-DIAGNOSTIC RESULT TEST MODE

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

TROUBLE DIAGNOSES

Diagnosis by CONSULT (Cont'd)

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

X : Applicable

- : Not applicable

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

DATA MONITOR DIAGNOSTIC TEST MODE

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE·A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in N or P position with vehicle stationary, CONSULT data may not indi- cate 0 km/h (0 mph).
Vehicle speed sensor 2 (Meter)	VHCL/S SE·MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sen- sor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 mph). It may not indi- cate 0 km/h (0 mph) when vehi- cle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	● Throttle position sensor sig- nal voltage is displayed.	
Fluid temperature sensor	FLUID TEMP SEN [V]	X	—	● Fluid temperature sensor sig- nal voltage is displayed. ● Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	● Source voltage of control unit is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	● Engine speed, computed from engine speed signal, is dis- played.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not run- ning.
Overdrive switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive SW is dis- played.	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	

TROUBLE DIAGNOSES

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
ASCD-cruise signal	ASCD-CRUISE [ON/OFF]	X	—	<ul style="list-style-type: none"> ● Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state 	<ul style="list-style-type: none"> ● This is displayed even when no ASCD is mounted.
ASCD-OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	<ul style="list-style-type: none"> ● Status of ASCD-OD release signal is displayed. ON ... OD released OFF ... OD not released 	<ul style="list-style-type: none"> ● This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of kickdown SW, is displayed. 	<ul style="list-style-type: none"> ● This is displayed even when no kickdown switch is equipped.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● 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	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of wide open throttle position SW, is displayed. 	
Gear position	GEAR	—	X	<ul style="list-style-type: none"> ● Gear position data used for computation by control unit, is displayed. 	
Selector lever position	SLCT LVR POSI	—	X	<ul style="list-style-type: none"> ● Selector lever position data, used for computation by control unit, is displayed. 	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Vehicle speed data, used for computation by control unit, is displayed. 	
Throttle position	THROTTLE POSI [°]	—	X	<ul style="list-style-type: none"> ● Throttle position data, used for computation by control unit, is displayed. 	<ul style="list-style-type: none"> ● A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Control value of shift solenoid valve A, computed by control unit from each input signal, is displayed. 	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Control value of overrun clutch solenoid valve computed by control unit from each input signal is displayed. 	
Self-diagnosis display lamp (OD OFF lamp)	SELF-D DP LMP [ON/OFF]	—	X	<ul style="list-style-type: none"> ● Control status of OD OFF lamp is displayed. 	

X: Applicable
 —: Not applicable

TROUBLE DIAGNOSES

Diagnosis by CONSULT (Cont'd)

DATA ANALYSIS

Item	Display form	Meaning			
Torque converter clutch solenoid valve duty	Approximately 4%	Lock-up "OFF"	GI		
	↓ Approximately 94%	↓ Lock-up "ON"			
Line pressure solenoid valve duty	Approximately 29%	Low line-pressure (Small throttle opening)	MA EM		
	↓ Approximately 94%	↓ High line-pressure (Large throttle opening)			
Throttle position sensor	Approximately 0.5V	Fully-closed throttle	LC		
	Approximately 4V	Fully-open throttle			
Fluid temperature sensor	Approximately 1.5V	Cold [20°C (68°F)]	EC		
	↓ Approximately 0.5V	↓ Hot [80°C (176°F)]			
Gear position	1	2	3	4	FE
Shift solenoid valve A	ON	OFF	OFF	ON	CL
Shift solenoid valve B	ON	ON	OFF	OFF	

GI

MA

EM

LC

EC

FE

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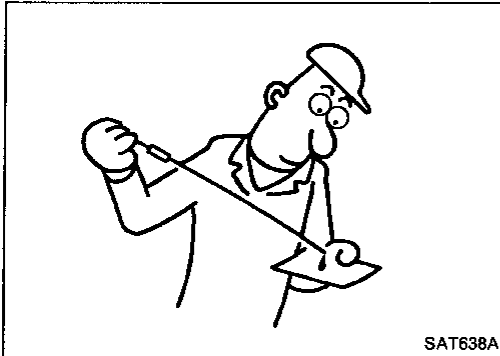
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Preliminary Check

A/T FLUID CHECK

Fluid leakage check

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



Fluid condition check

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

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

ROAD TEST PROCEDURE

1. Check before engine is started.



2. Check at idle.



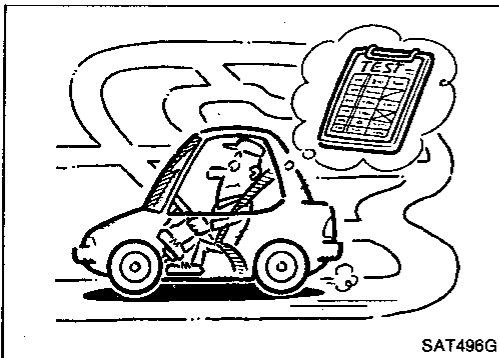
3. Cruise test.

SAT786A

ROAD TESTING

Description

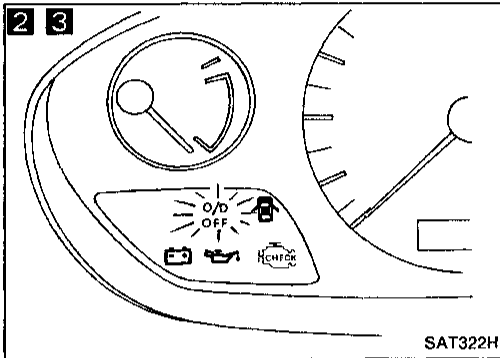
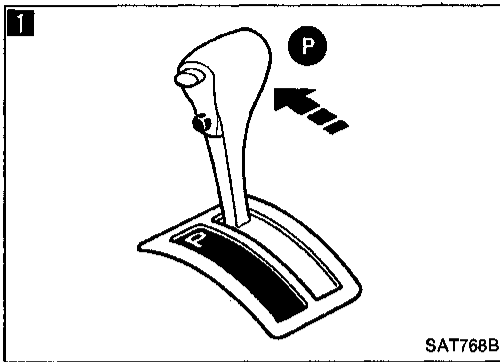
- The purpose of the test is to determine overall performance of A/T and analyze causes of problems.
- The road test consists of the following three parts:
 1. Check before engine is started
 2. Check at idle
 3. Cruise test
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to "Self-diagnosis" and "Diagnostic Procedure", AT-41, 80.



TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

1. Check before engine is started



1 2

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

No

Go to Diagnostic Procedure 1, AT-80.

Yes

3

Does OD OFF indicator lamp flicker for about 8 seconds?

Yes

Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE, AT-41.

No

1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE and note NG items.
3. Go to "ROAD TESTING — 2. Check at idle".

GI

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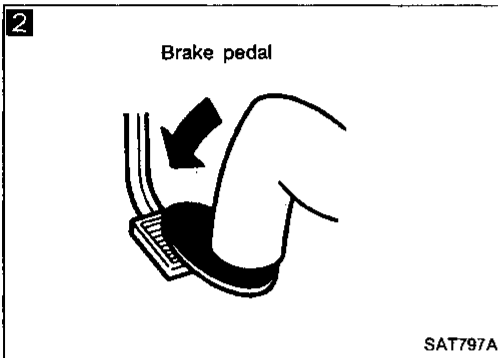
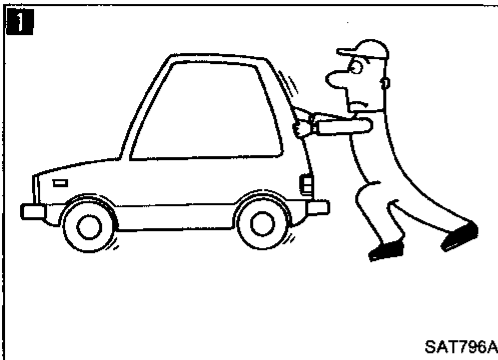
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TROUBLE DIAGNOSES

Preliminary Check (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 Diagnostic Procedure 2, AT-81.

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 Diagnostic Procedure 2, AT-81.

No

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 Diagnostic Procedure 3, AT-81.

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 Diagnostic Procedure 4, AT-82.

No

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 Diagnostic Procedure 5, AT-83.

No

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

No → Go to Diagnostic Procedure 6, AT-84.

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 Diagnostic Procedure 7, AT-85.

Yes

Go to Cruise test, AT-28.

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

3. Cruise test

- Check all items listed in Parts 1 through 3.



With CONSULT

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

GI

MA

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EC

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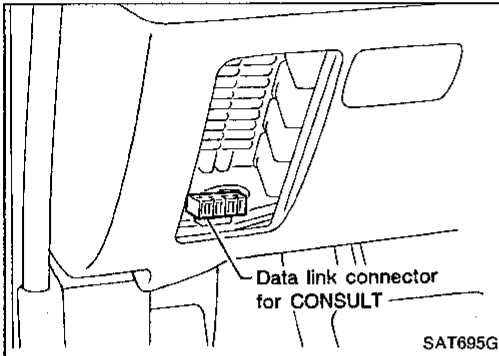
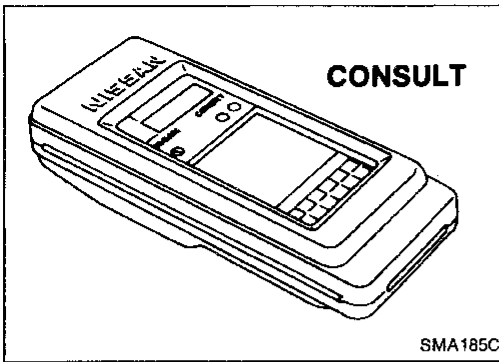
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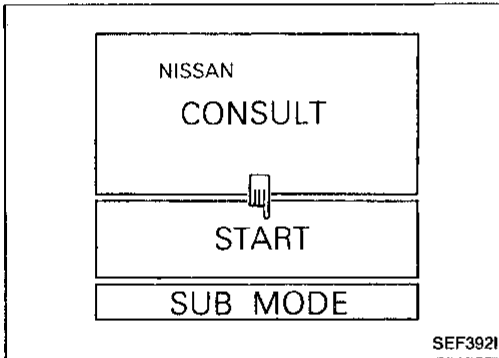
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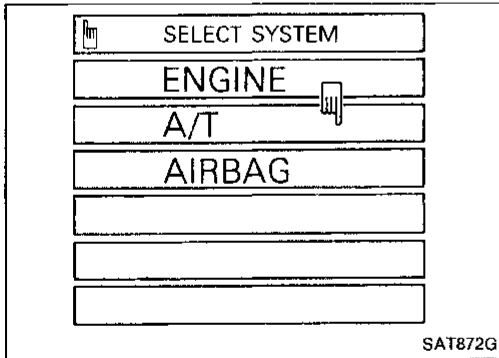
CONSULT setting procedure

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

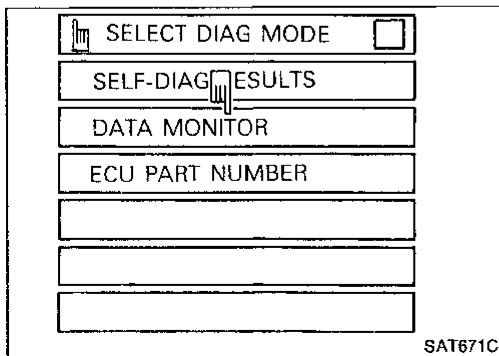
3. Turn on ignition switch.
4. Touch "START".



5. Touch "A/T".



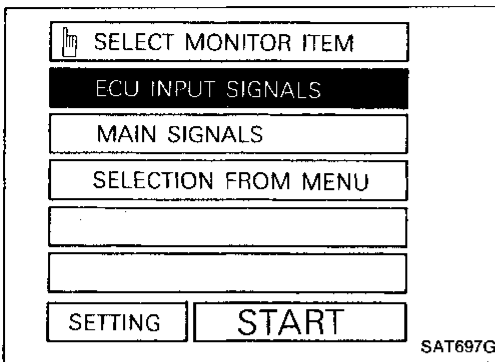
6. Touch "DATA MONITOR".



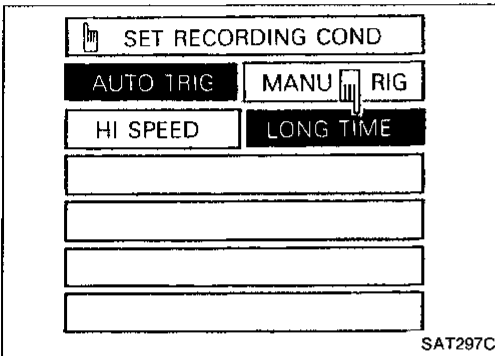
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

7. Touch "SETTING" to set recording condition.

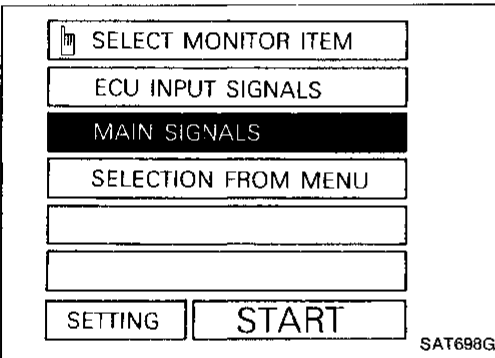


8. Touch "LONG TIME" and "ENTER" key.

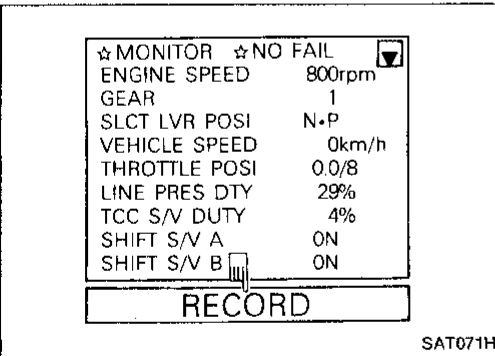


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".

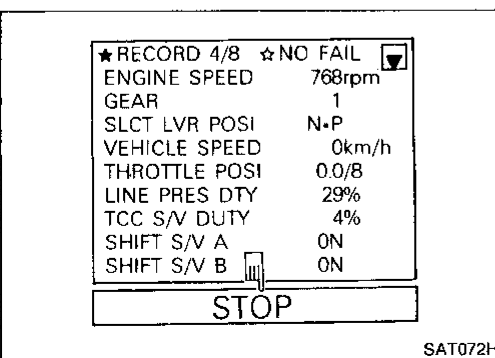
10. Touch "START".



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

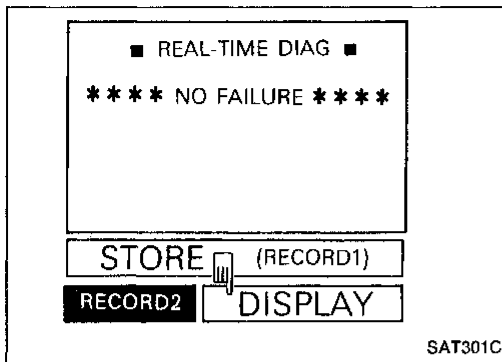


12. After finishing cruise test part 1, touch "STOP".

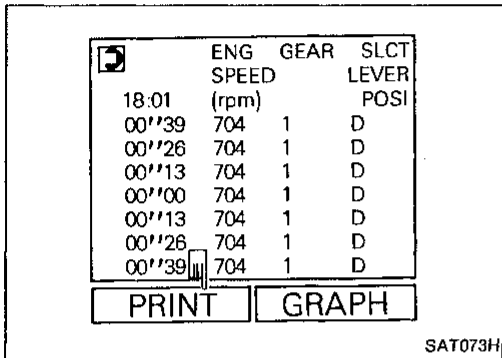


TROUBLE DIAGNOSES

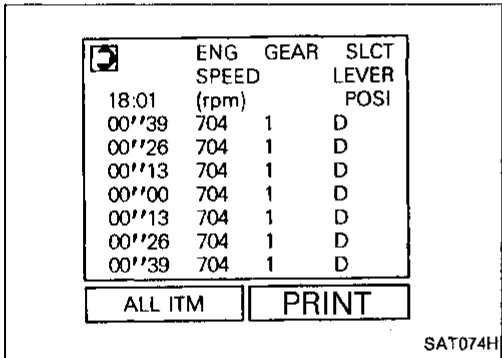
Preliminary Check (Cont'd)



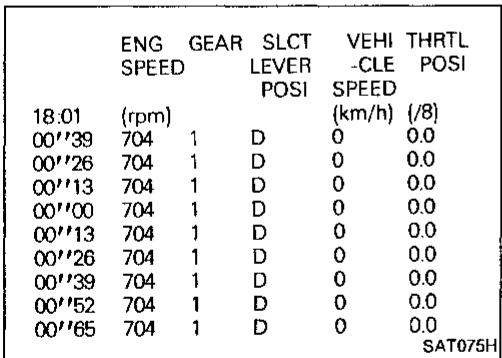
13. Touch "DISPLAY".



14. Touch "PRINT".

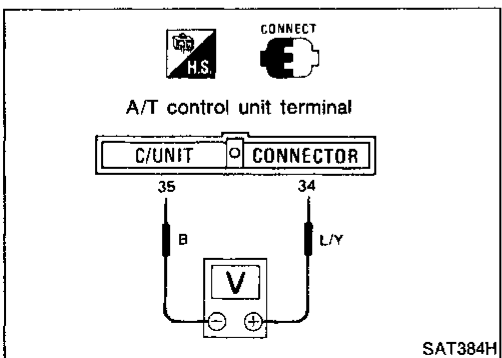


15. Touch "PRINT" again.



16. Check the monitor data printed out.

17. Continue cruise test part 2 and 3.



Without CONSULT

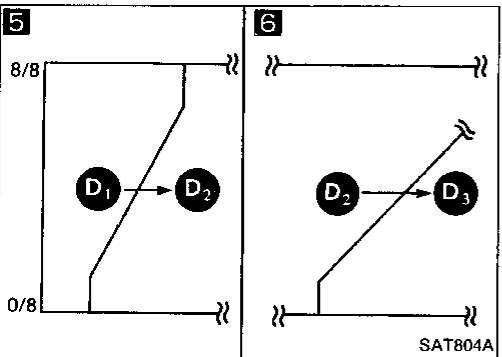
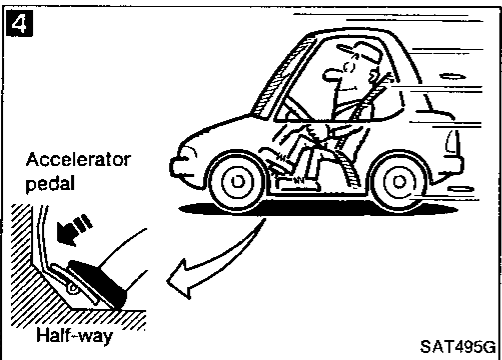
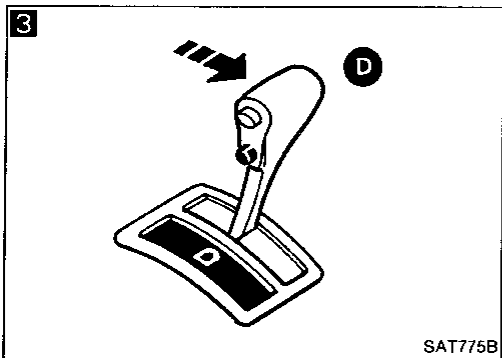
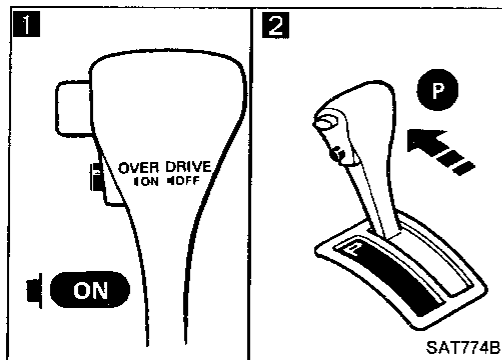
- Throttle position can be checked by voltage across terminals ④ and ⑤ of A/T control unit.

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TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Cruise test — Part 1



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

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

3
 Move selector lever to "D" position.

4
 Accelerate vehicle by constantly depressing accelerator pedal halfway.

Does vehicle start from D₁?
 Read gear position.

No → Go to Diagnostic Procedure 8, AT-86.

5
 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-33.

No → Go to Diagnostic Procedure 9, AT-87.

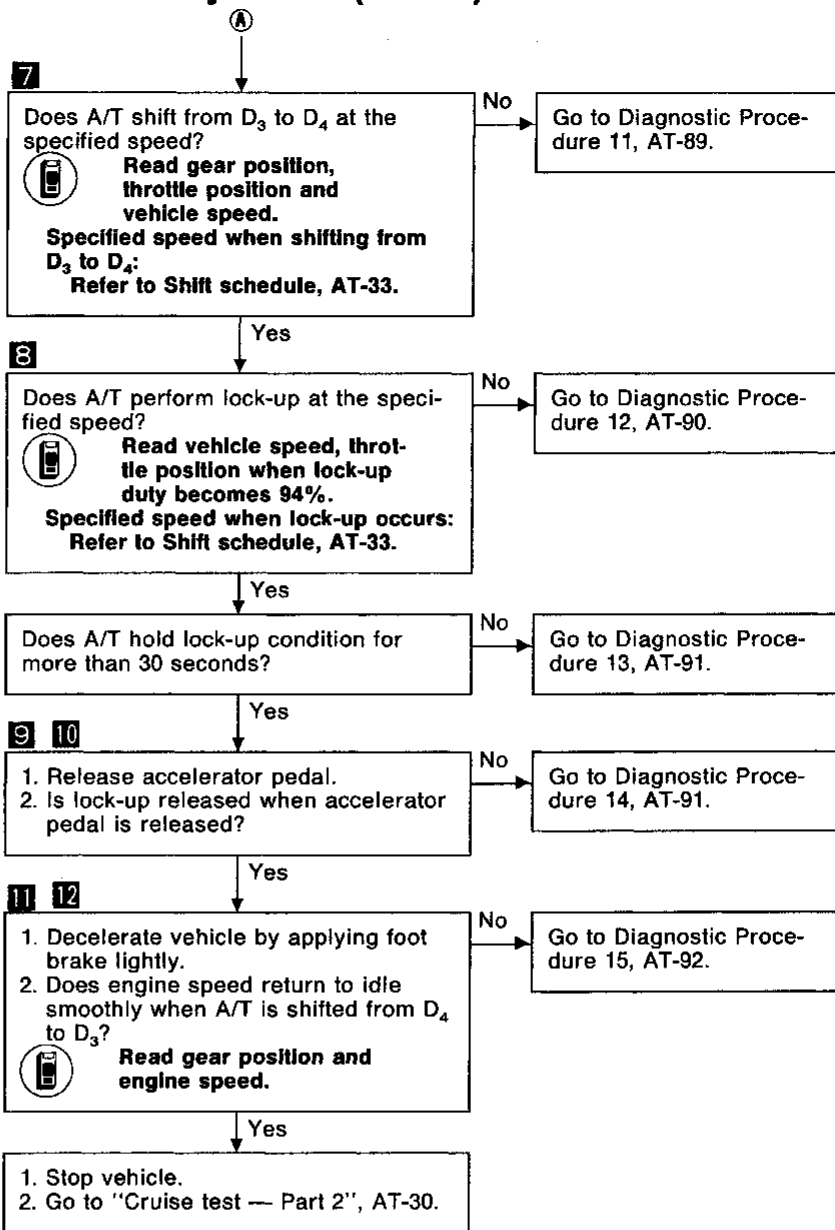
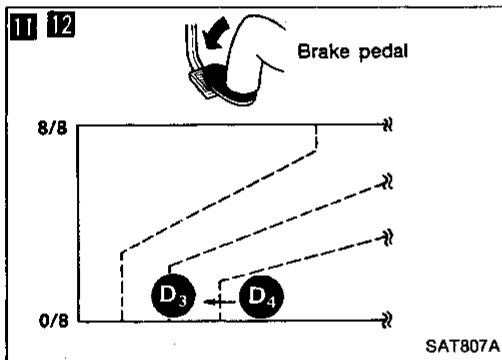
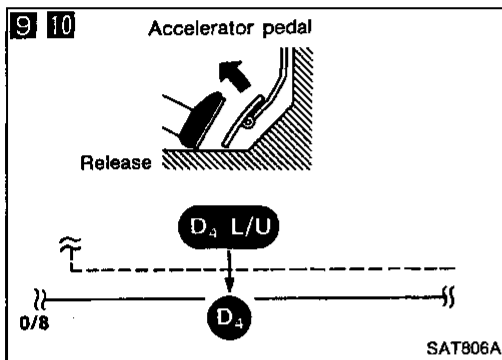
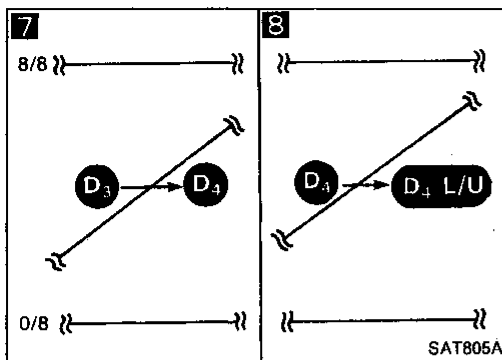
6
 Does A/T shift from D₂ to D₃ at the specified speed?
 Read gear position, throttle position and vehicle speed.
 Specified speed when shifting from D₂ to D₃:
 Refer to Shift schedule, AT-33.

No → Go to Diagnostic Procedure 10, AT-88.

Yes
 (A)

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

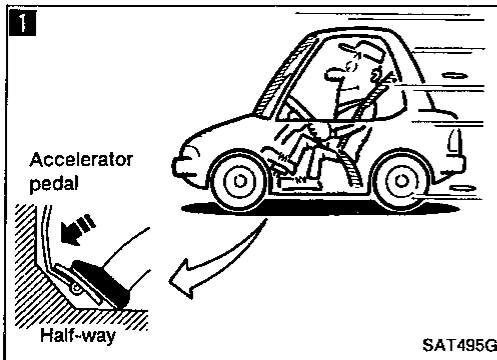


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TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Cruise test — Part 2



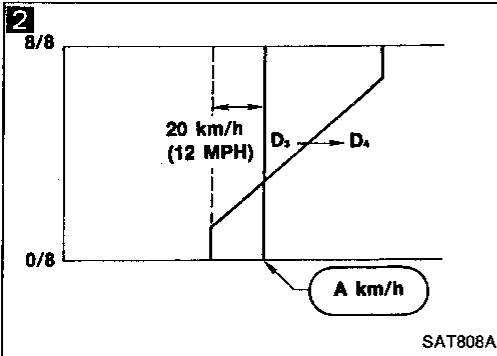
1. Confirm overdrive switch is in "ON" position.
2. Confirm selector lever is in "D" position.

1

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

Read gear position.

No → Go to Diagnostic Procedure 16, AT-93.

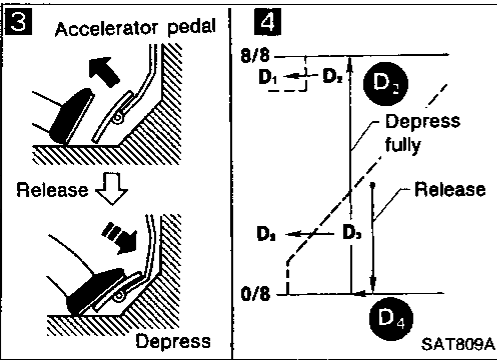


2 3 4

1. Accelerate vehicle to A km/h 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 Diagnostic Procedure 9, AT-87.



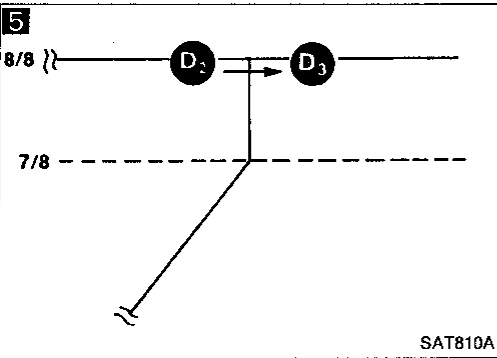
5

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

Read gear position, throttle position and vehicle speed.

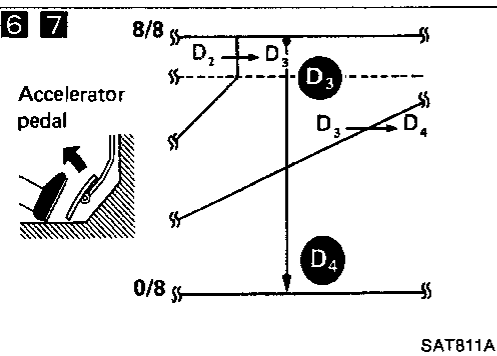
Specified speed when shifting from D₂ to D₃:
Refer to Shift schedule, AT-33.

No → Go to Diagnostic Procedure 10, AT-88.



6

Release accelerator pedal after shifting from D₂ to D₃.



7

Does A/T shift from D₃ to D₄ and does vehicle decelerate by engine brake?

Read gear position, throttle position and vehicle speed.

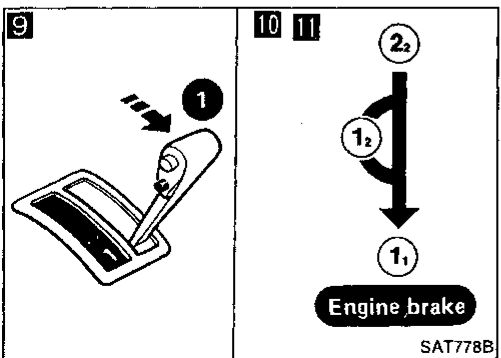
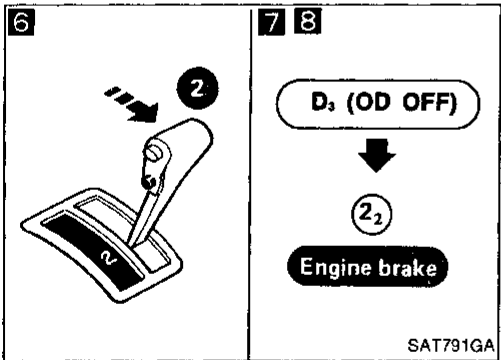
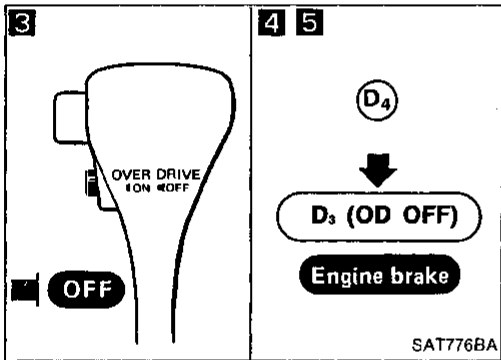
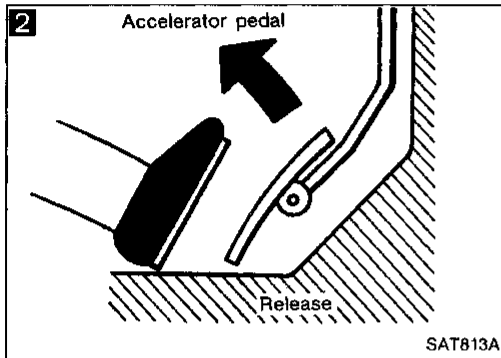
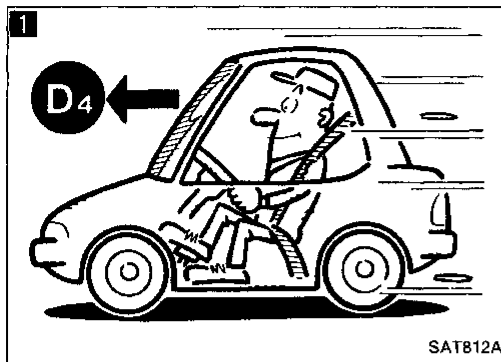
No → Go to Diagnostic Procedure 11, AT-89.

- Yes
1. Stop vehicle.
 2. Go to "Cruise test — Part 3", AT-31.

TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Cruise test — Part 3



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

1 Accelerate vehicle using half-throttle to D₄.

2 Release accelerator pedal.

3 Set overdrive switch to "OFF" position while driving in D₄ range.

4 Does A/T shift from D₄ to D₃?
Read gear position and vehicle speed.

No → Go to Diagnostic Procedure 17, AT-93.

5 Does vehicle decelerate by engine brake?
No → Go to Diagnostic Procedure 15, AT-92.

6 Move selector lever from "D" to "2" range while driving in D₃.

7 Does A/T shift from D₃ to 2₂?
Read gear position.

No → Go to Diagnostic Procedure 18, AT-94.

8 Does vehicle decelerate by engine brake?
No → Go to Diagnostic Procedure 15, AT-92.

9 10 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 Diagnostic Procedure 19, AT-94.

11 Does vehicle decelerate by engine brake?
No → Go to Diagnostic Procedure 20, AT-94.

1. Stop vehicle.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSTIC PROCEDURE, AT-41.

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TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Vehicle speed when shifting gears

Throttle position	Vehicle speed km/h (MPH)						
	D ₄ → 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	53 - 57 (33 - 35)	96 - 104 (60 - 65)	149 - 159 (91 - 99)	143 - 153 (89 - 95)	86 - 94 (53 - 58)	40 - 44 (25 - 27)	53 - 57 (33 - 35)
Half throttle	39 - 43 (24 - 27)	74 - 80 (46 - 50)	112 - 120 (70 - 75)	56 - 64 (35 - 40)	27 - 33 (17 - 21)	10 - 14 (6 - 9)	53 - 57 (33 - 35)

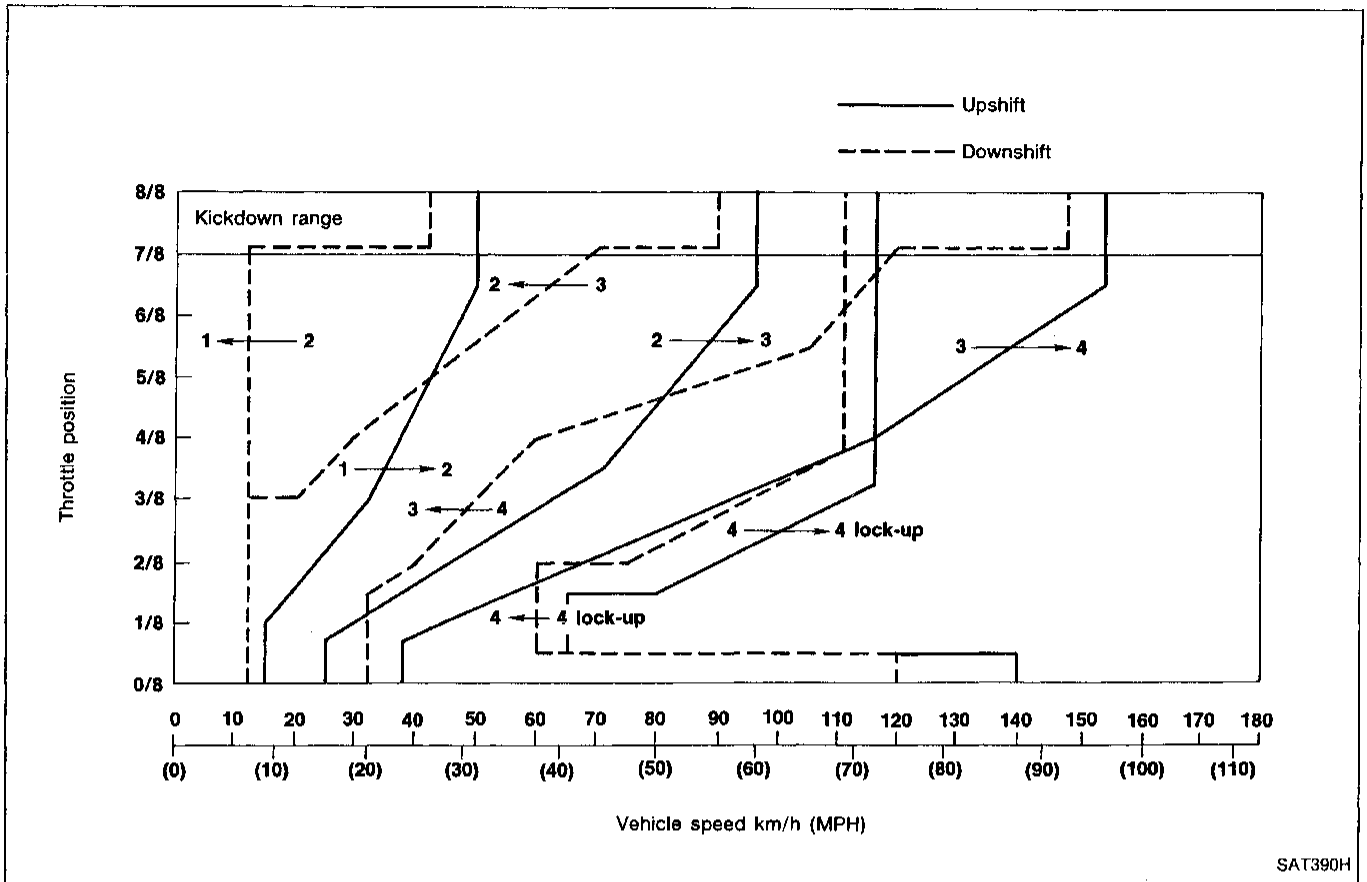
Vehicle speed when performing and releasing lock-up

Throttle position	OD switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D ₄]	150 - 158 (93 - 98)	144 - 152 (89 - 94)
	OFF [D ₃]	91 - 99 (57 - 62)	86 - 94 (53 - 58)
Half throttle	ON [D ₄]	112 - 120 (70 - 75)	107 - 115 (66 - 71)
	OFF [D ₃]	91 - 99 (57 - 62)	86 - 94 (53 - 58)

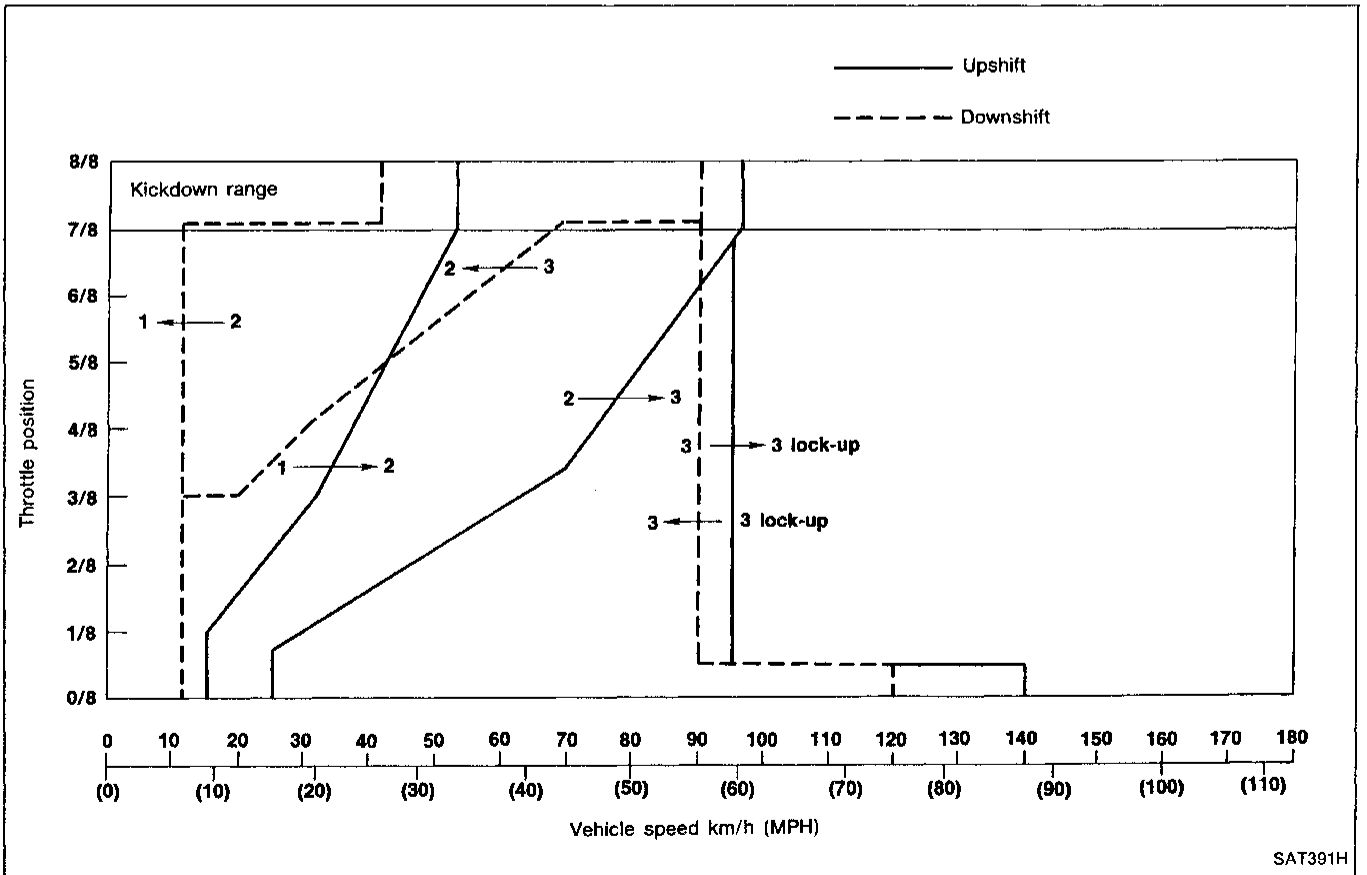
TROUBLE DIAGNOSES

Preliminary Check (Cont'd)

Shift schedule (Overdrive ON)



Shift schedule (Overdrive OFF)

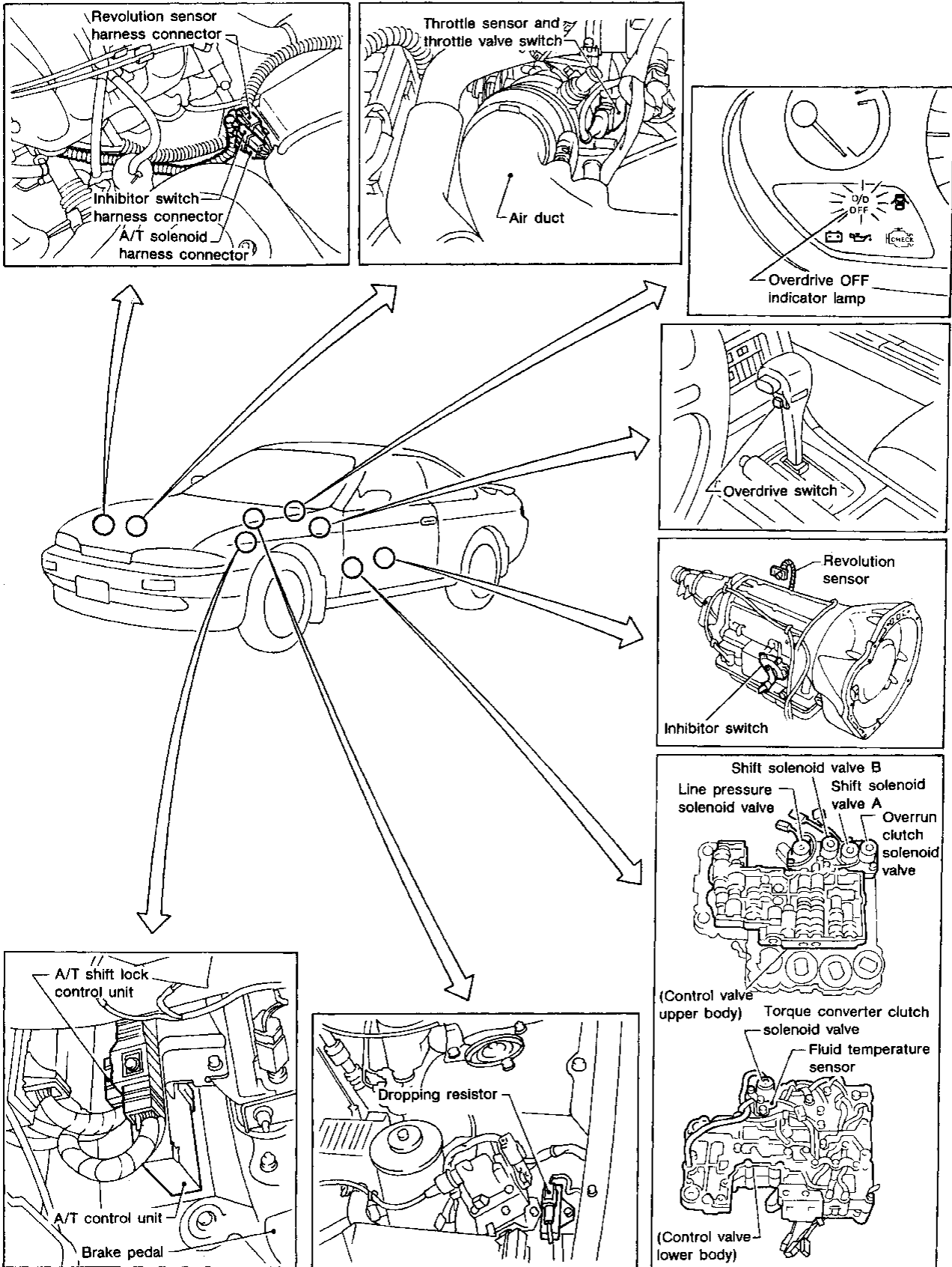


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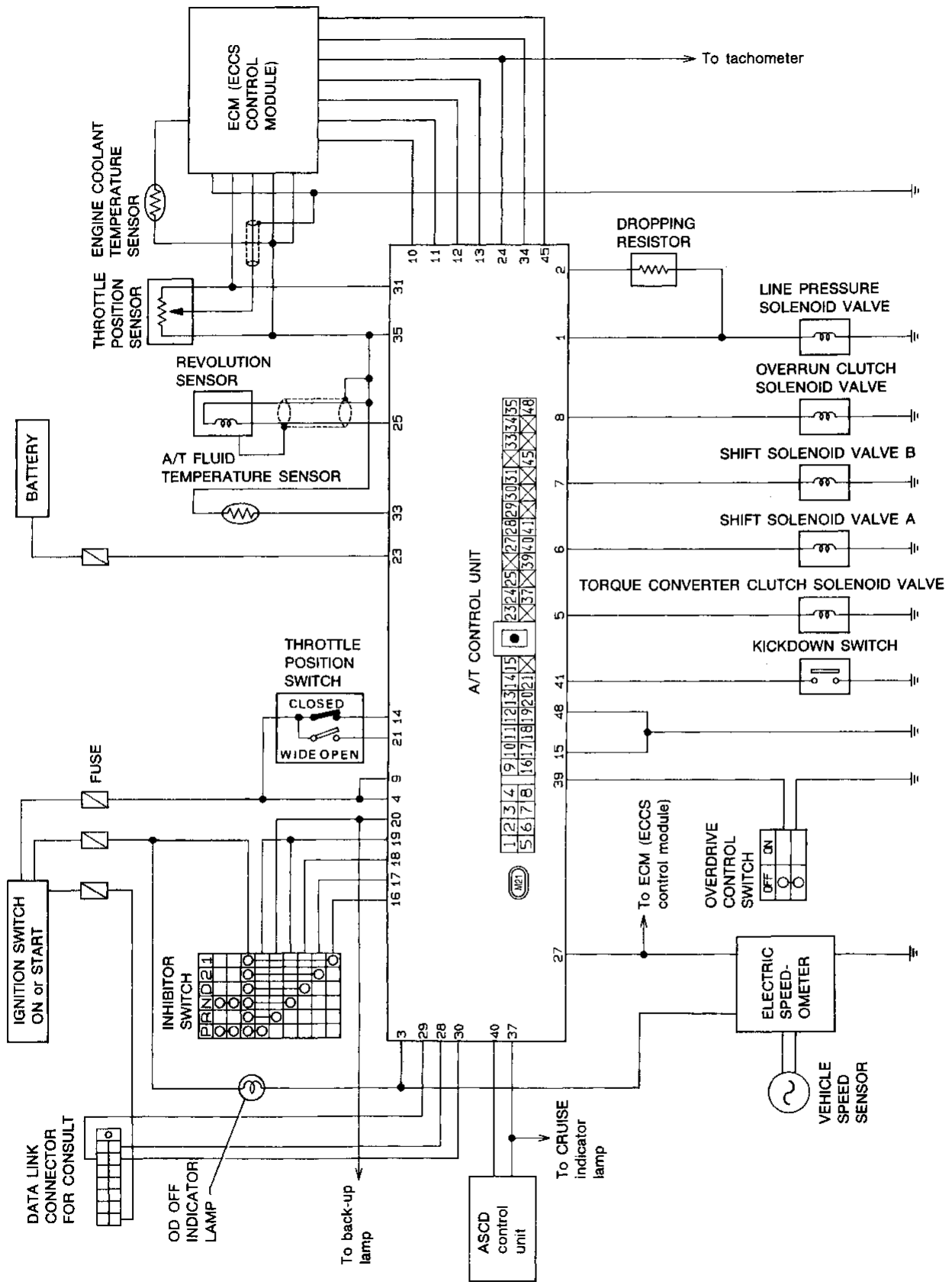
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TROUBLE DIAGNOSES

A/T Electrical Parts Location



Circuit Diagram for Quick Pinpoint Check

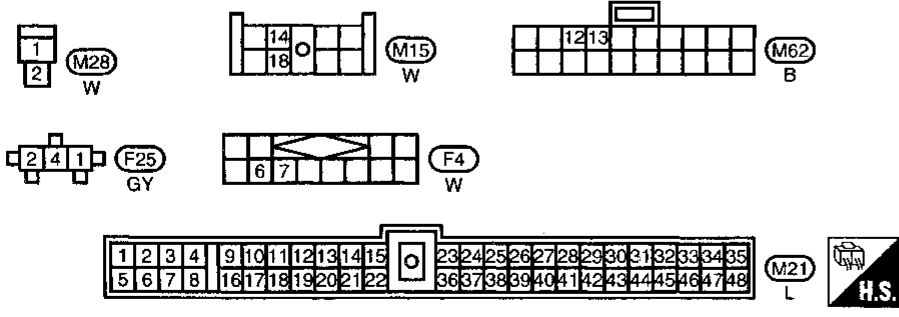
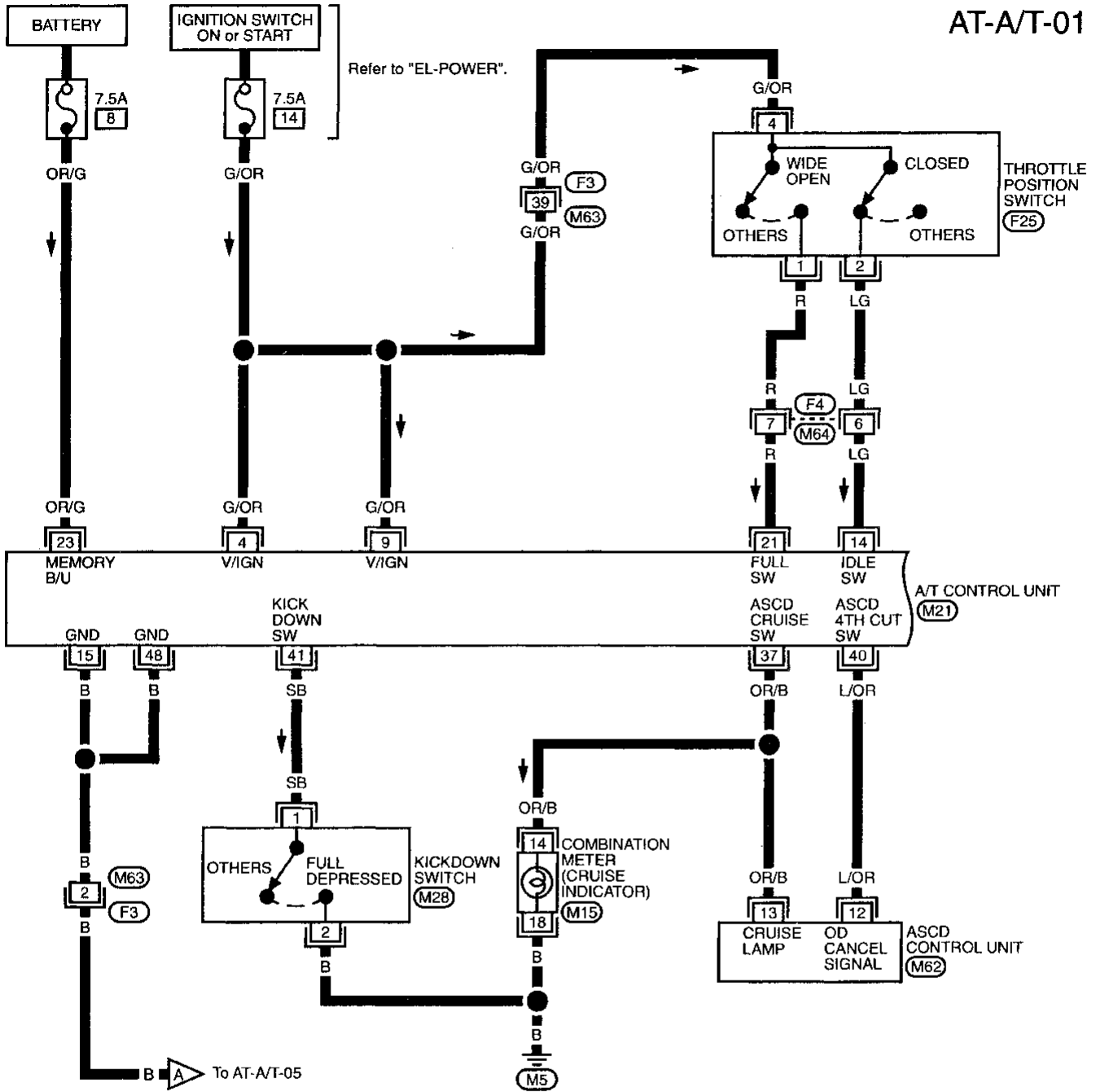


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TROUBLE DIAGNOSES

Wiring Diagram — AT —

AT-A/T-01



Refer to last page (Foldout page).

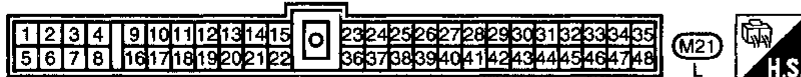
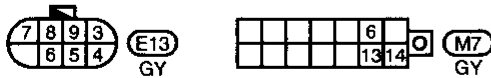
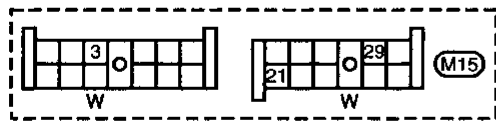
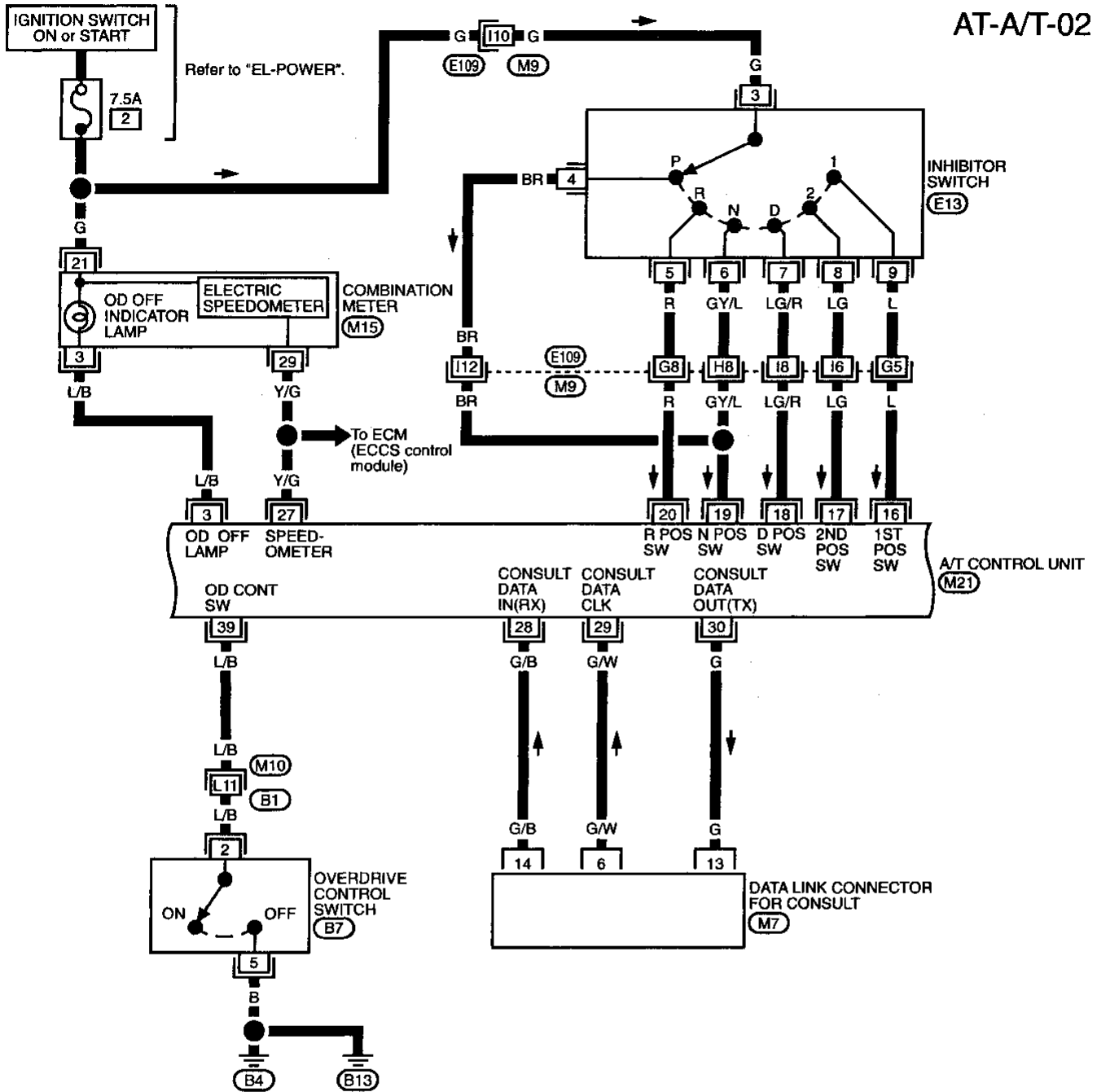
M21
F3 . M63

TROUBLE DIAGNOSES

Wiring Diagram — AT — (Cont'd)

AT-A/T-02

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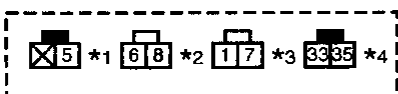
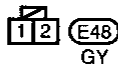
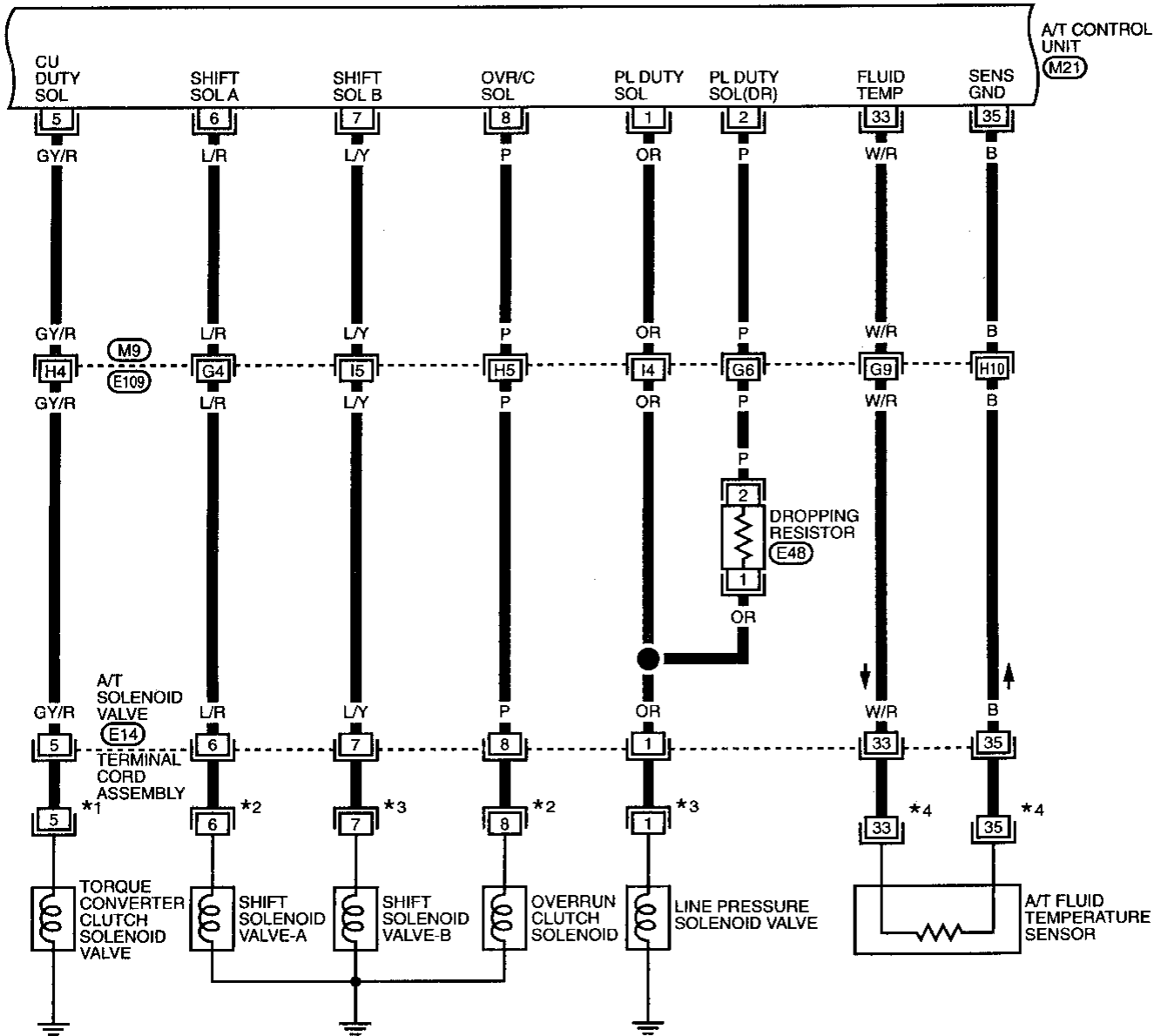
Refer to last page (Foldout page).

- (M9) (E109)
- (M10) (B1)
- (M21)

TROUBLE DIAGNOSES

Wiring Diagram — AT — (Cont'd)

AT-A/T-03



Refer to last page (Foldout page).

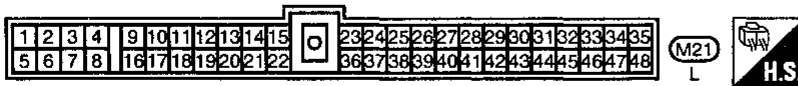
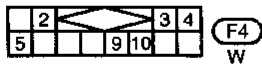
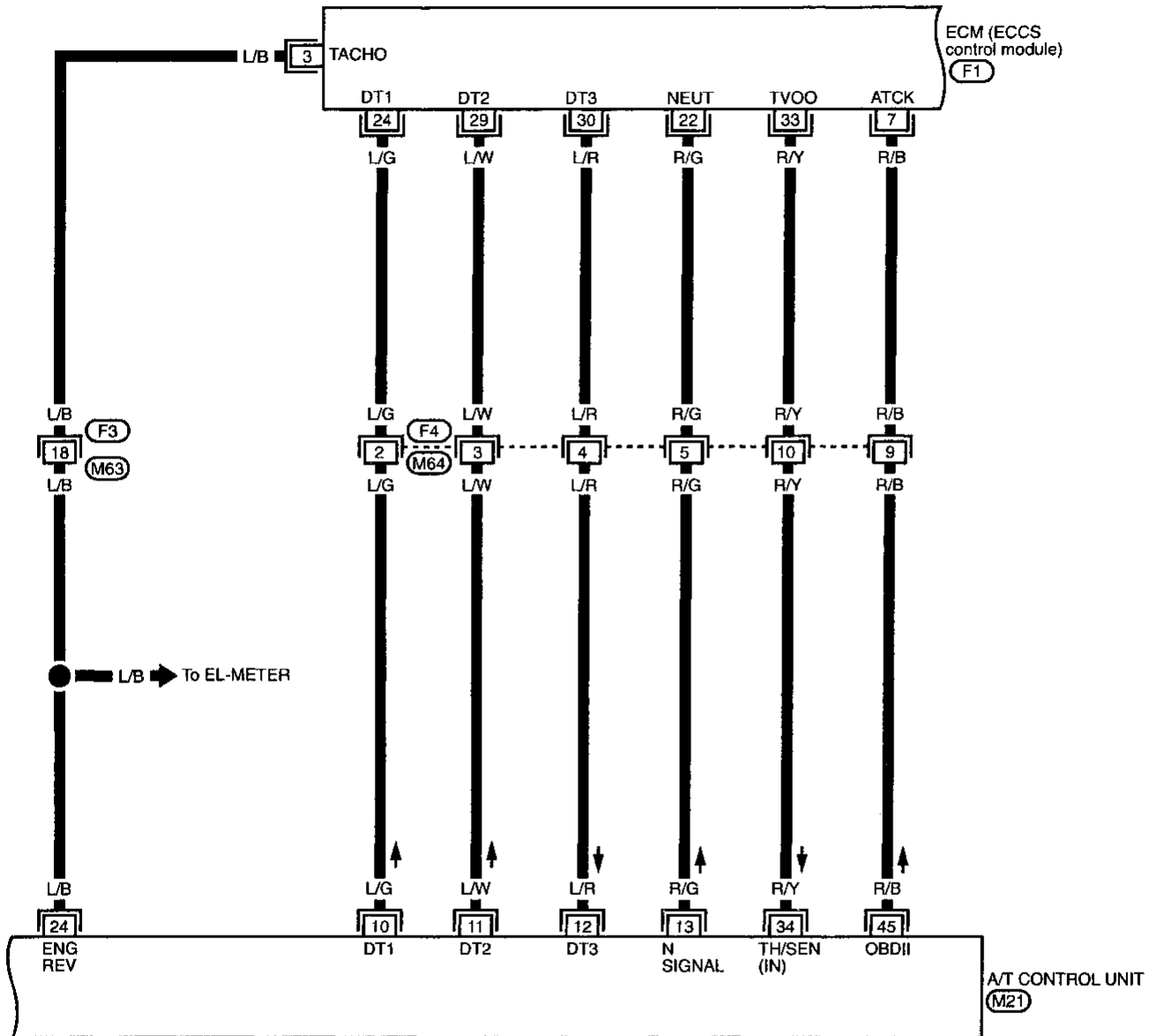
(M9), (E109)

(M21)

TROUBLE DIAGNOSES

Wiring Diagram — AT — (Cont'd)

AT-A/T-04



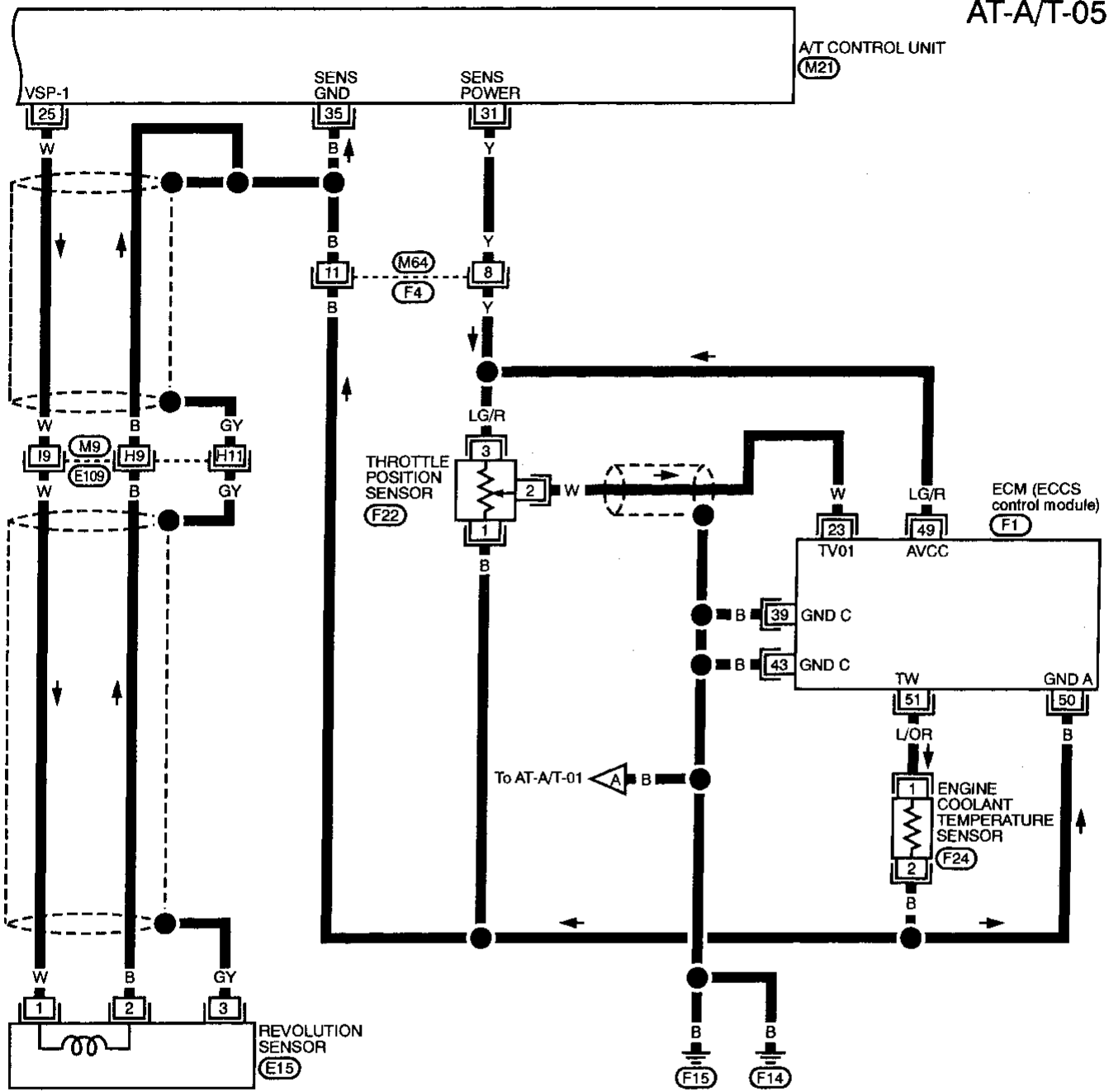
Refer to last page (Foldout page).

- (M21)
- (F1)
- (F3) , (M63)

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TROUBLE DIAGNOSES

Wiring Diagram — AT — (Cont'd)



AT-A/T-05

A/T CONTROL UNIT
(M21)

ECM (ECCS control module)
(F1)

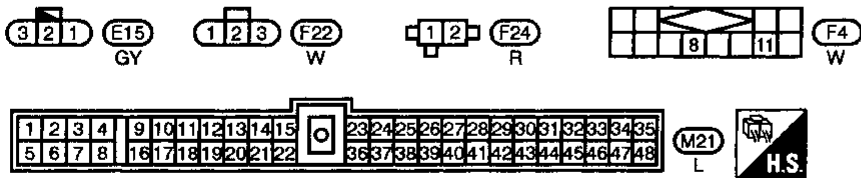
REVOLUTION
SENSOR
(E15)

THROTTLE
POSITION
SENSOR
(F22)

ENGINE
COOLANT
TEMPERATURE
SENSOR
(F24)

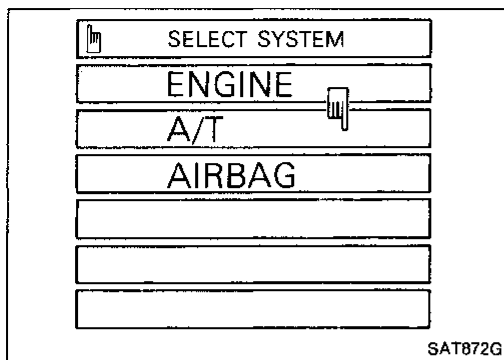
To AT-A/T-01

Refer to last page (Foldout page).



- (M9), (E109)
- (M21)
- (F1)

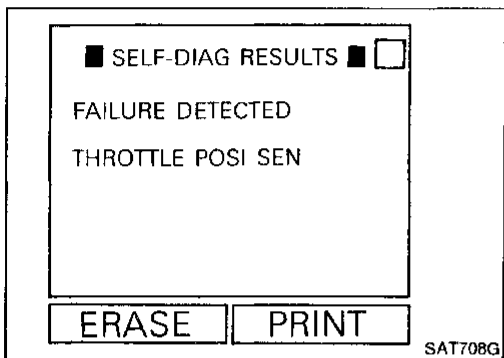
TROUBLE DIAGNOSES



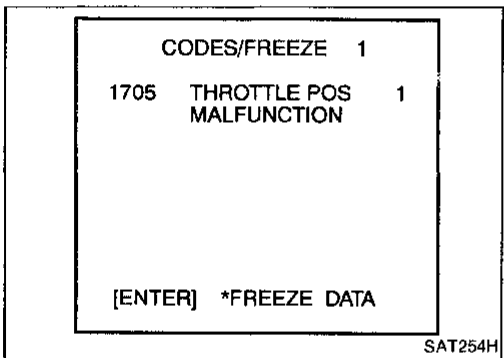
Self-diagnosis

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)

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

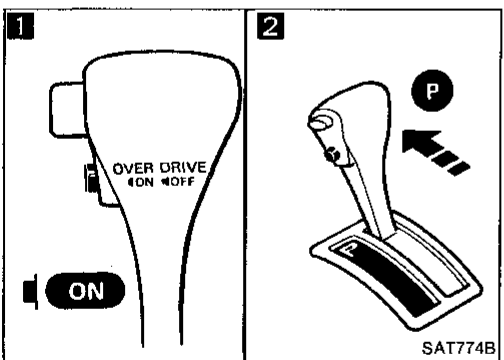


3. Touch "SELF-DIAG RESULTS".
CONSULT performs REAL-TIME SELF-DIAGNOSIS.

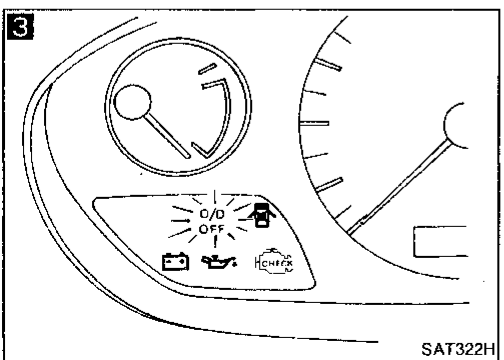
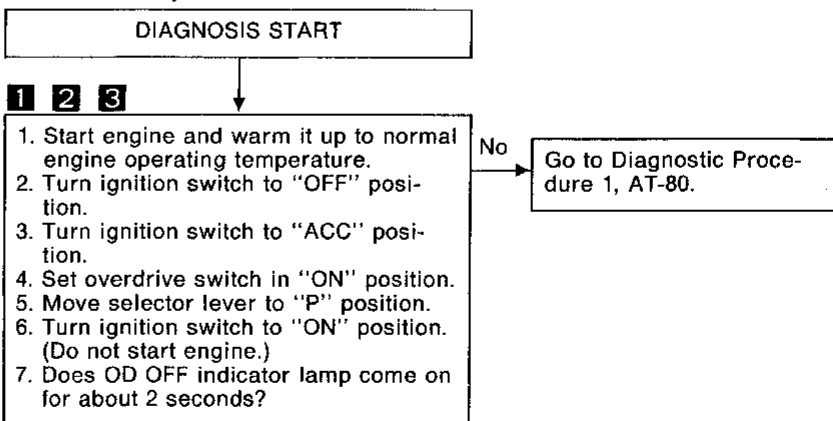


SELF-DIAGNOSTIC PROCEDURE (With Generic Scan Tool, OBD-II Scan tool (GST))

Refer to EC section.



SELF-DIAGNOSTIC PROCEDURE (Without CONSULT)



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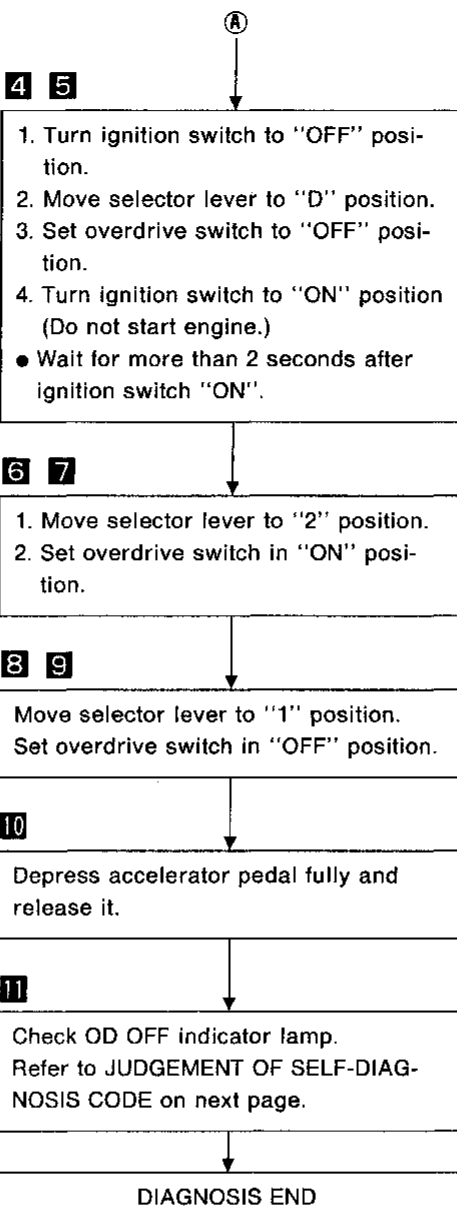
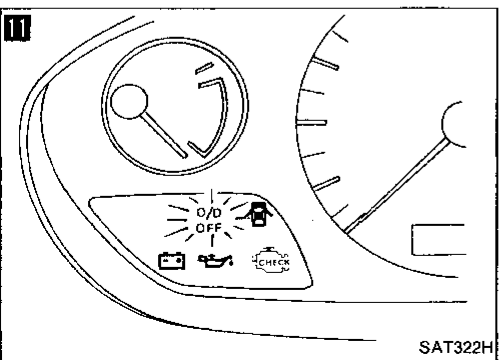
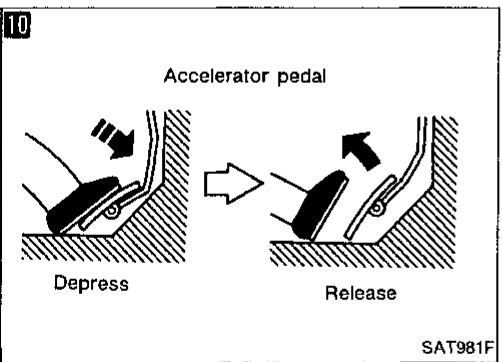
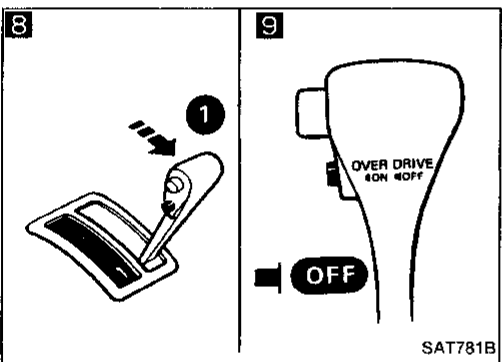
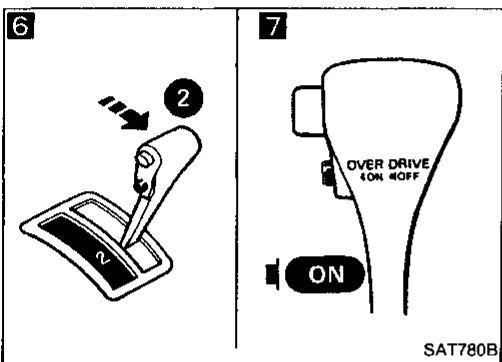
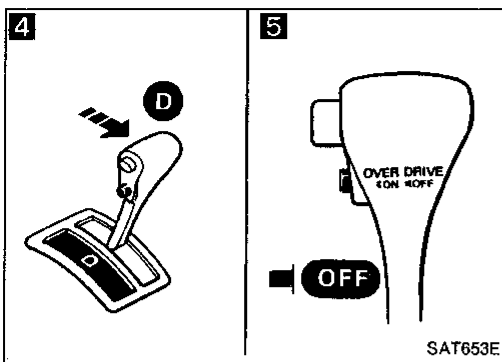
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TROUBLE DIAGNOSES

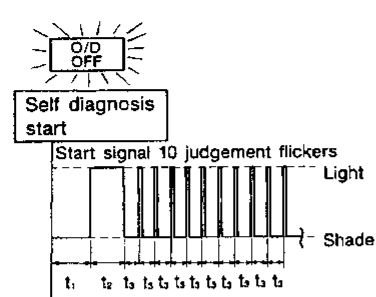
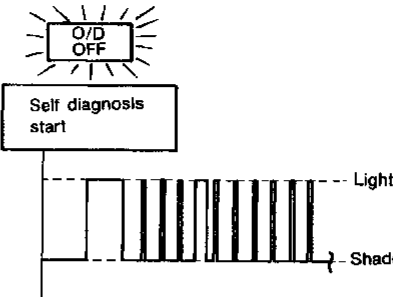
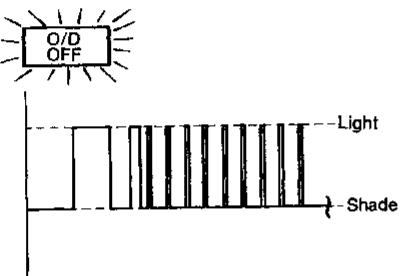
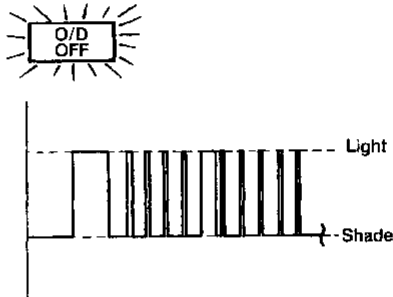
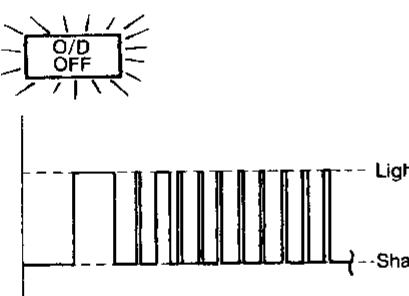
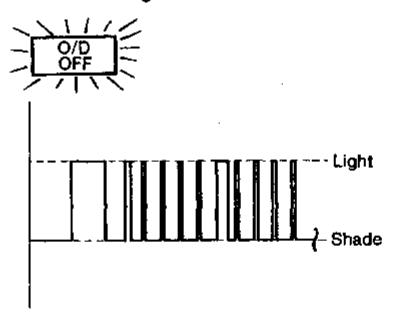
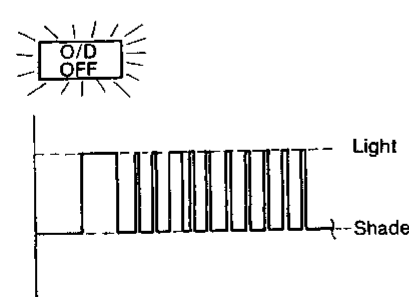
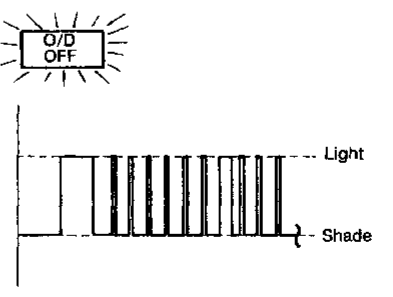
Self-diagnosis (Cont'd)



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

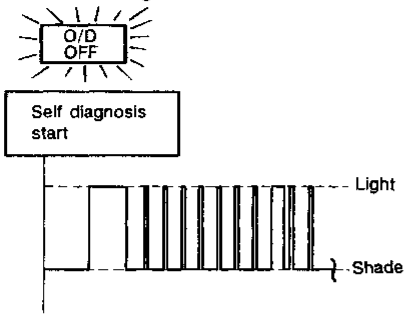
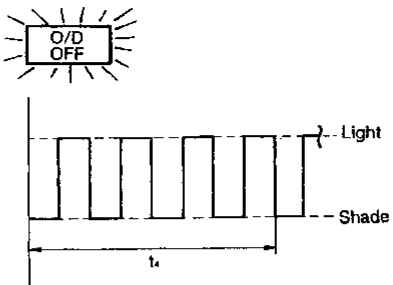
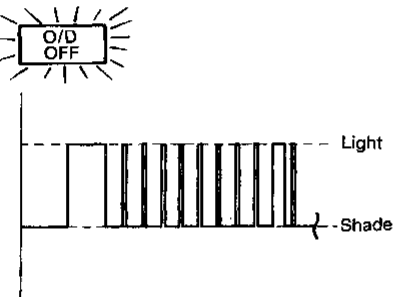
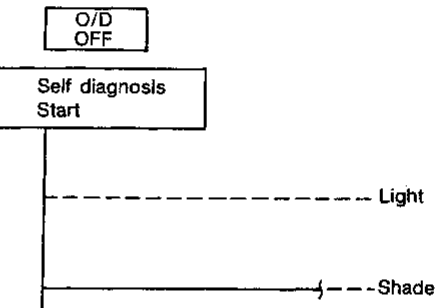
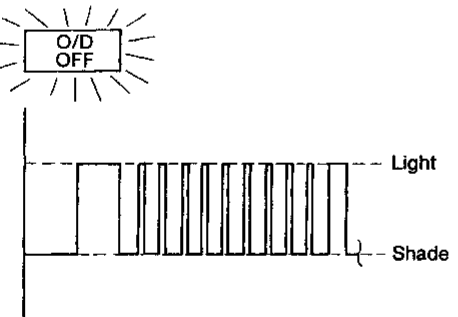
Power indicator lamp:	
<p>All judgement flickers are same.</p>  <p style="text-align: right;">SAT436F</p>	<p>4th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT443F</p> <p>Shift solenoid valve A circuit is short-circuited or disconnected. ➡ Go to SHIFT SOLENOID VALVE A CIRCUIT CHECK, AT-52.</p>
<p>All circuits that can be confirmed by self-diagnosis are OK.</p> <p>1st judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT437F</p> <p>Revolution sensor circuit is short-circuited or disconnected. ➡ Go to REVOLUTION SENSOR CIRCUIT CHECK, AT-46.</p>	<p>5th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT445F</p> <p>Shift solenoid valve B circuit is short-circuited or disconnected. ➡ Go to SHIFT SOLENOID VALVE B CIRCUIT CHECK, AT-54.</p>
<p>2nd judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT439F</p> <p>Vehicle speed sensor circuit is short-circuited or disconnected. ➡ Go to VEHICLE SPEED SENSOR CIRCUIT CHECK, AT-48.</p>	<p>6th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT447F</p> <p>Overrun clutch solenoid valve circuit is short-circuited or disconnected. ➡ Go to OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-56.</p>
<p>3rd judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT441F</p> <p>Throttle position sensor circuit is short-circuited or disconnected. ➡ Go to THROTTLE POSITION SENSOR CIRCUIT CHECK, AT-50.</p>	<p>7th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT449F</p> <p>Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ➡ Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-58.</p>

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

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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

Power indicator lamp:	
<p>8th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT451F</p> <p>Fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged. ➔Go to FLUID TEMPERATURE SENSOR AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS, AT-60.</p>	<p>Flickers as shown below.</p>  <p style="text-align: right;">SAT457F</p> <p>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.)</p>
<p>9th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT453F</p> <p>Engine speed signal circuit is short-circuited or disconnected. ➔Go to ENGINE SPEED SIGNAL CIRCUIT CHECK, AT-63.</p>	<p>Does not come on.</p>  <p style="text-align: right;">SAT414G</p> <p>Inhibitor switch, overdrive switch or throttle position switch circuit is disconnected or A/T control unit is damaged. ➔Go to INHIBITOR, OVERDRIVE AND THROTTLE POSITION SWITCH CIRCUIT CHECKS, AT-67.</p>
<p>10th judgement flicker is longer than others.</p>  <p style="text-align: right;">SAT455F</p> <p>Line pressure solenoid valve circuit is short-circuited or disconnected. ➔Go to LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK, AT-65.</p>	

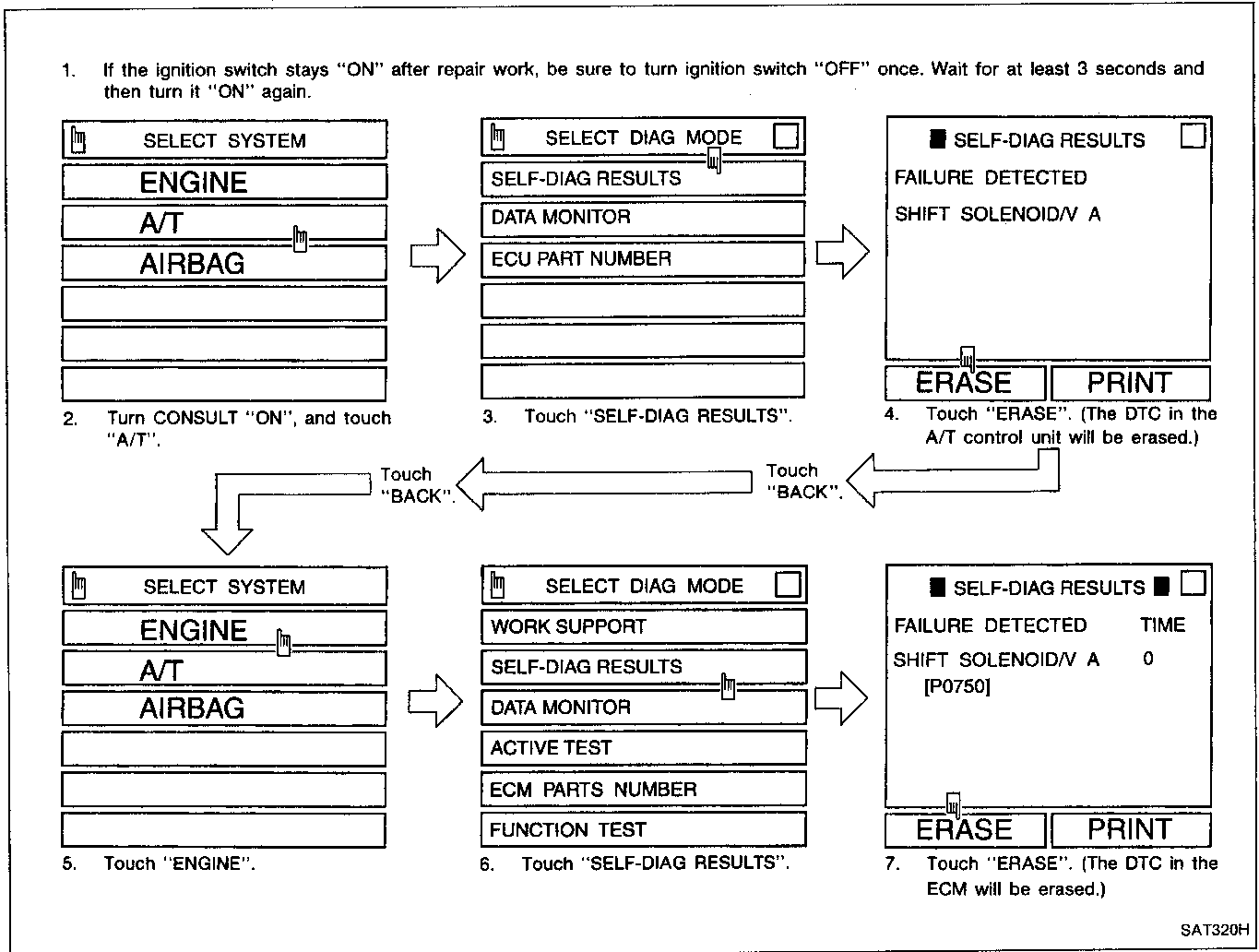
$t_4 = 1.0$ second

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

HOW TO ERASE DTC (📱 With CONSULT)

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



HOW TO ERASE DTC (🔧 Without CONSULT)

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

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TROUBLE DIAGNOSES

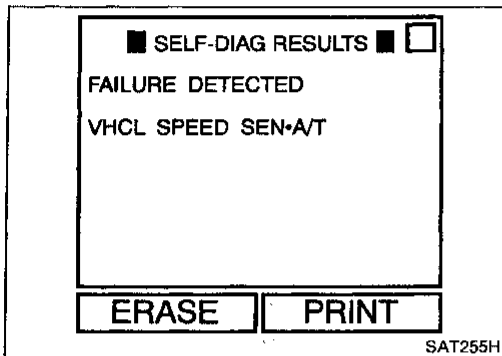
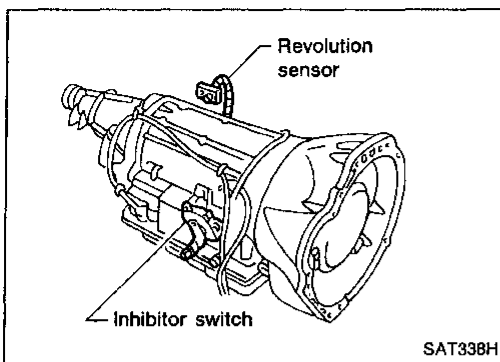
Self-diagnosis (Cont'd)




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

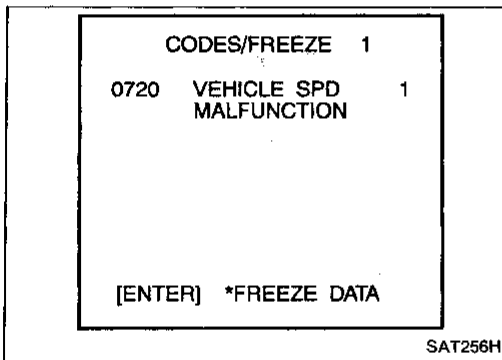
Parts description

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

Trouble judgment conditions



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 VHCL SPEED SEN-A/T  P0720  1st judgement flicker	<ul style="list-style-type: none"> ● 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.) ● Revolution sensor



Diagnostic trouble code detecting condition

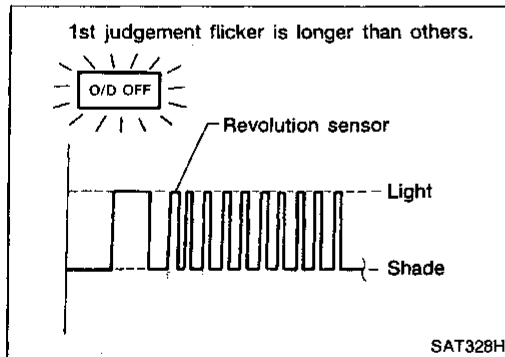
- 1) Start engine.
- 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
- 3) Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

OR

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

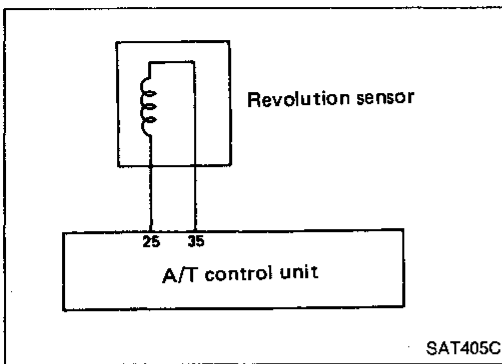
OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
- 3) Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.



TROUBLE DIAGNOSES

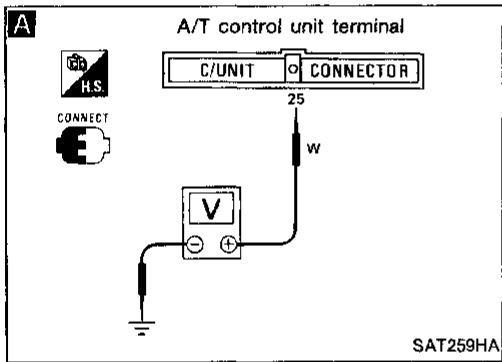
Self-diagnosis (Cont'd)



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



CHECK REVOLUTION SENSOR. —
Refer to "Electrical Components Inspection", AT-101.

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.

NG → Check the following items.

- Harness continuity between A/T control unit and revolution sensor (Main harness)
- Harness continuity between revolution sensor and ECM (Main harness)
- Ground circuit for ECM — Refer to section EC.

OR

1. Start engine.
2. Check voltage between A/T control unit terminal 25 and ground while driving. (Measure with AC range.)

Voltage:

At 0 km/h (0 MPH):

0V

At 30 km/h (19 MPH):

1V or more

(Voltage rises gradually in response to vehicle speed.)

OK

Perform self-diagnosis again after driving for a while.

NG →

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

OK

INSPECTION END

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TROUBLE DIAGNOSES

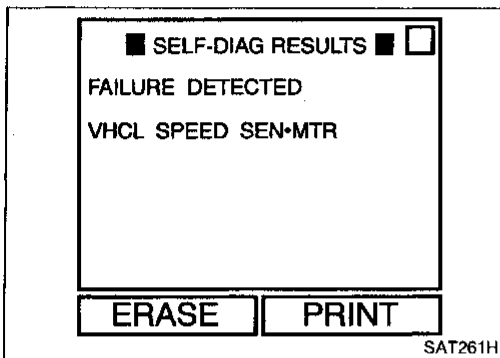
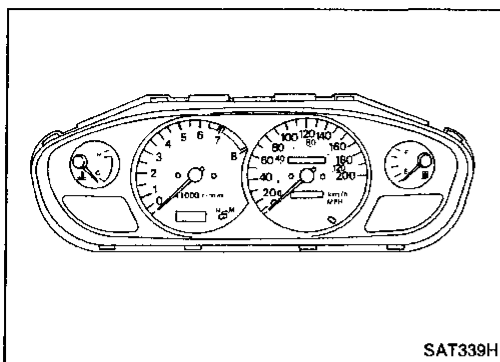
Self-diagnosis (Cont'd)



VEHICLE SPEED SENSOR-MTR CIRCUIT CHECK

Parts description


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

Trouble judgment conditions




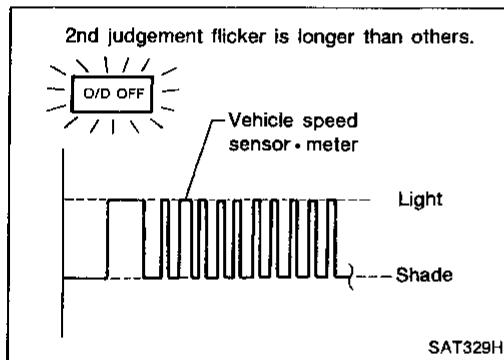
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 VHCL SPEED SEN-MTR	<ul style="list-style-type: none"> A/T control unit does not receive the proper voltage signal from the sensor. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open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

Diagnostic trouble code detecting condition

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

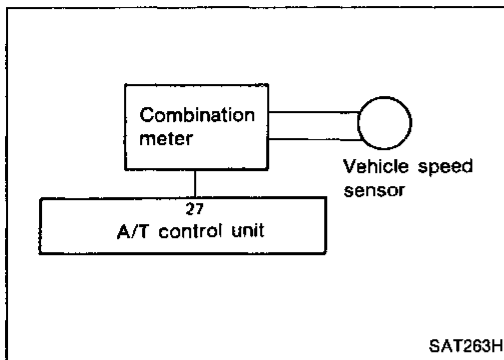
OR

-  1) Start engine.
- 2) Drive vehicle under the following conditions:
Shift lever in D and vehicle speed higher than 20 km/h (12 MPH).
- 3) Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

CHECK INPUT SIGNAL.

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

OR

1. Start engine.
2. Check voltage between A/T control unit terminal 27 and ground while driving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.

Voltage:

Varies from 0V to 5V

NG

Check the following items.

- Vehicle speed sensor and ground circuit for vehicle speed sensor — Refer to section EL.
- Harness continuity between A/T control unit and vehicle speed sensor (Main harness)

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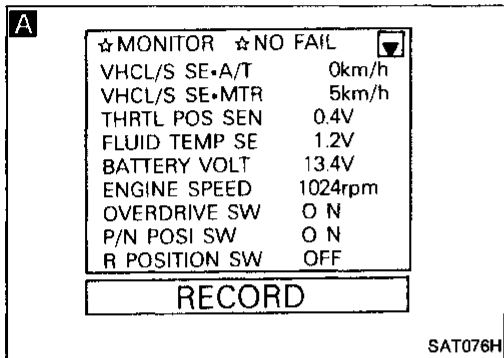
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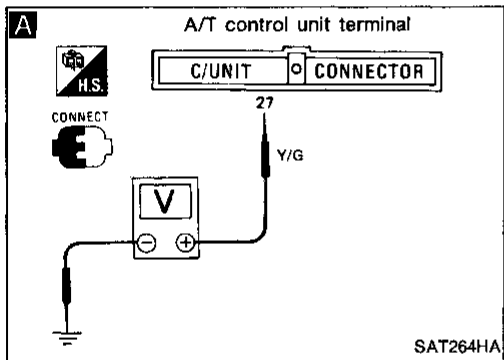
Perform self-diagnosis again after driving for a while.

NG

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

OK

INSPECTION END



TROUBLE DIAGNOSES




Self-diagnosis (Cont'd)

THROTTLE POSITION SENSOR CIRCUIT CHECK


Parts description

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


Trouble judgment conditions

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


Diagnostic trouble code detecting condition

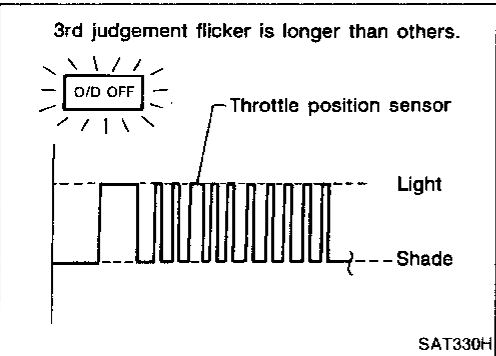
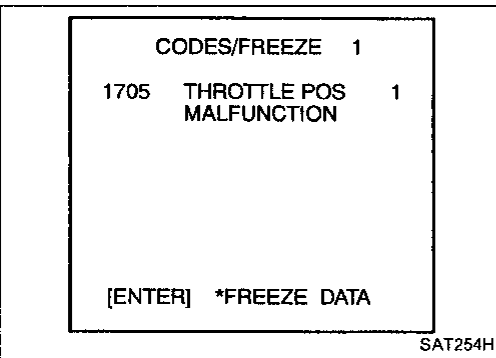
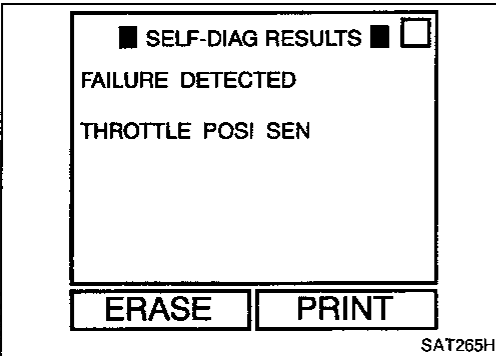
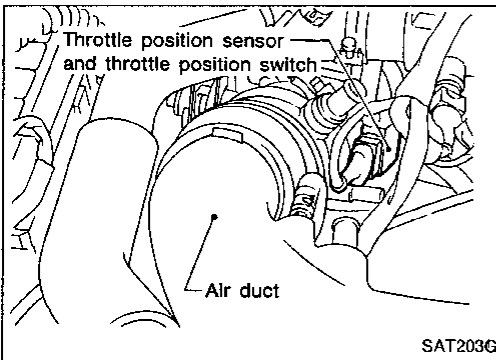
-  1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle under the following conditions:
 Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.

OR

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

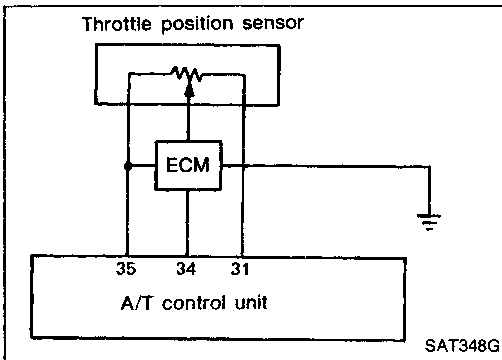
OR

-  1) Start engine.
 2) Drive vehicle under the following conditions:
 Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

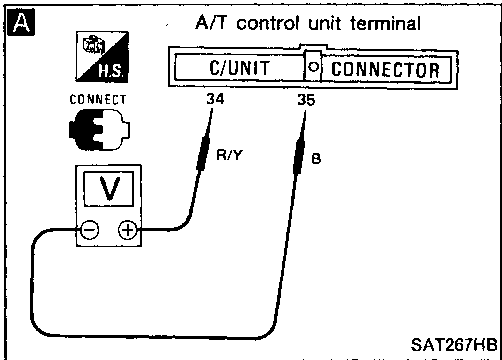


A

☆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



```

    graph TD
      Start[Perform diagnostic test mode II (self-diagnostic results) for engine control.] -- NG --> NG1[Check throttle position sensor circuit for engine control. — Refer to section EC.]
      Start -- OK --> A1[A]
      A1[CHECK INPUT SIGNAL.] -- NG --> NG2[Check harness continuity between ECM and A/T control unit regarding throttle position sensor circuit. (Main harness)]
      A1 -- OK --> A2[Perform self-diagnosis again after driving for a while.]
      A2 -- NG --> NG3[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.]
      A2 -- OK --> End[INSPECTION END]
  
```

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

NG

OK

A

CHECK INPUT SIGNAL.

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

Voltage:

Fully-closed throttle:
0.2 - 0.6V

Fully-open throttle:
2.9 - 3.9V

OR

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ④ and ⑤ while accelerator pedal is depressed slowly.

Voltage:

Fully-closed throttle valve:
0.2 - 0.6V

Fully-open throttle valve:
2.9 - 3.9V

(Voltage rises gradually in response to throttle position)

OK

NG

Perform self-diagnosis again after driving for a while.

OK

INSPECTION END

NG

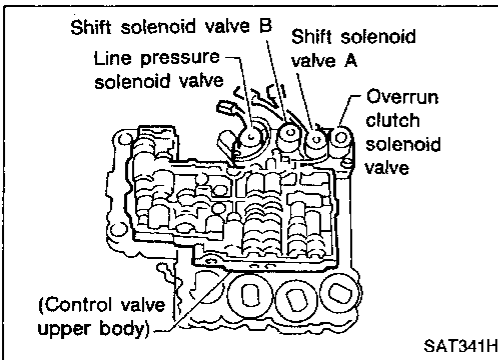
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or loose connection with harness connector.

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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK





Parts description


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

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


Trouble judgment conditions

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


Diagnostic trouble code detecting condition

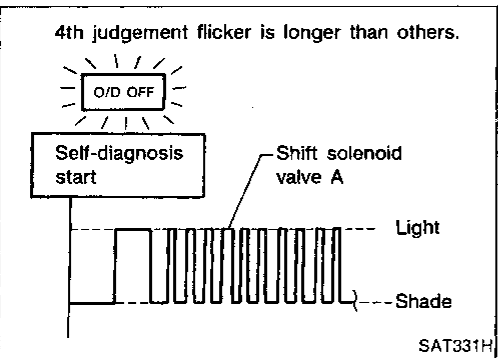
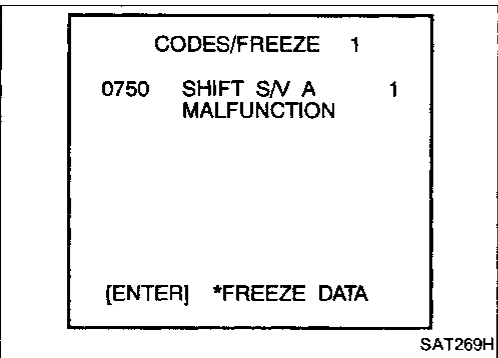
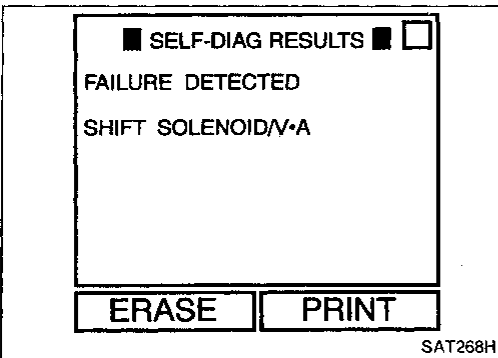
- 
 1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle in D₁ → D₂ position.

OR

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

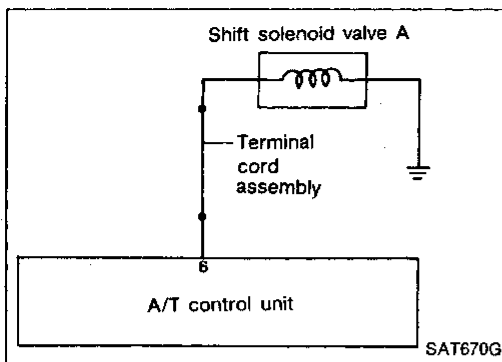
OR

- 
 1) Start engine.
 2) Drive vehicle in D₁ → D₂ position.
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

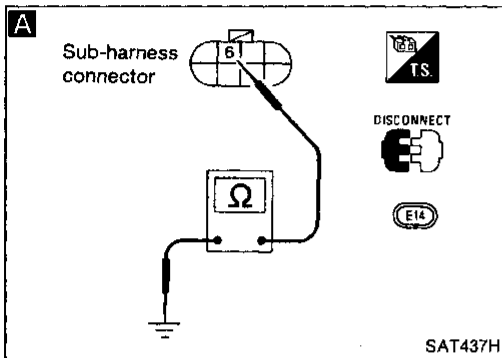
CHECK GROUND CIRCUIT.

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

Resistance: 20 - 30Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check the following items.
 - Shift solenoid valve A — Refer to "Electrical Components Inspection", AT-99.
 - Harness continuity of terminal cord assembly



B

CHECK POWER SOURCE CIRCUIT.

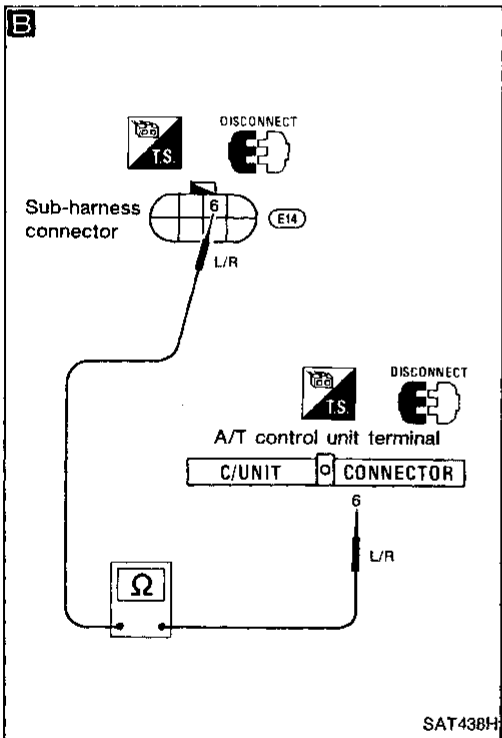
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑥ and A/T control unit terminal ⑥.

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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



OK

Perform self-diagnosis after driving for a while.

NG

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

OK

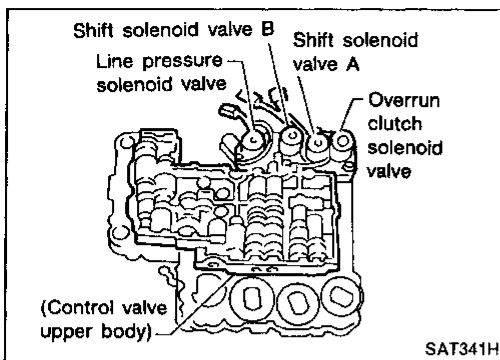
INSPECTION END

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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK






Parts description

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

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

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 SHIFT SOLENOID/V-B	<ul style="list-style-type: none"> A/T control unit detects the 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 short.) Shift solenoid valve B
 (P0755)		
 5th judgement flicker		

Diagnostic trouble code detecting condition

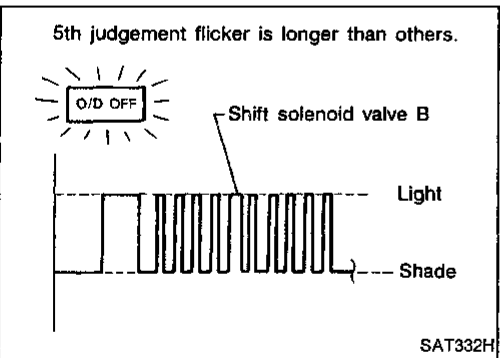
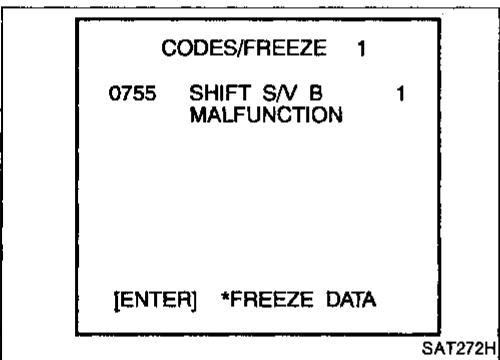
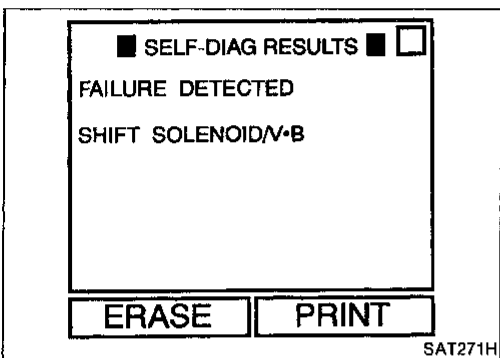
- 1) Start engine.
- 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
- 3) Drive vehicle in D₁ → D₂ → D₃ position.

OR

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

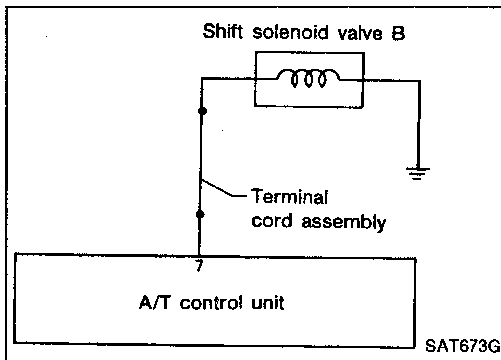
OR

- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ → D₃ position.
- 3) Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

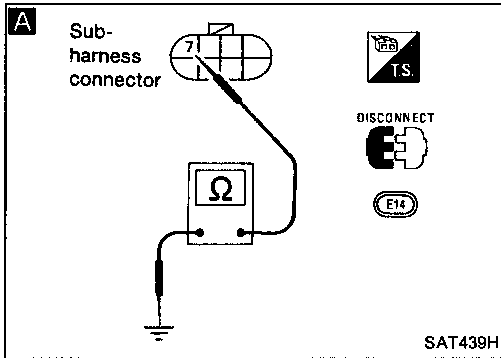
CHECK GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.

Resistance: 20 - 30Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check the following items.
 - Shift solenoid valve B — Refer to "Electrical Components Inspection", AT-99.
 - Harness continuity of terminal cord assembly



B

CHECK POWER SOURCE CIRCUIT.

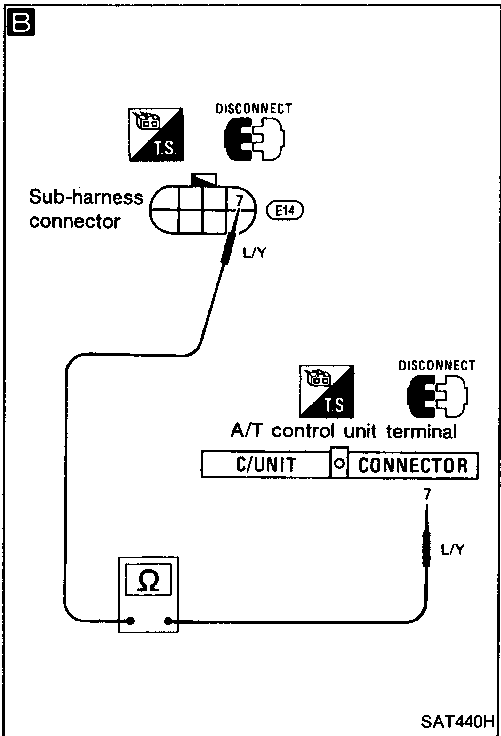
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑦ and A/T control unit terminal ⑦.

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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



OK

Perform self-diagnosis after driving for a while.

NG

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

OK

INSPECTION END

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TROUBLE DIAGNOSES

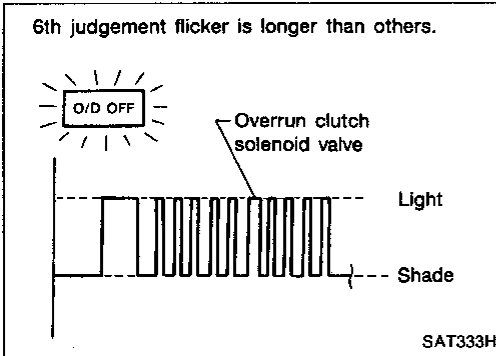
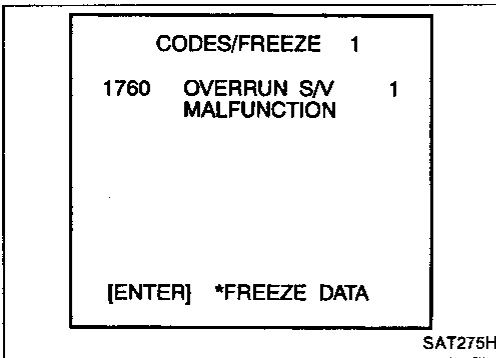
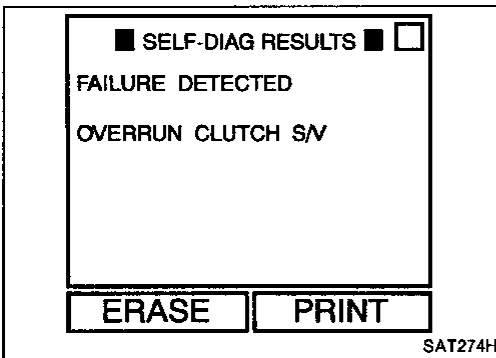
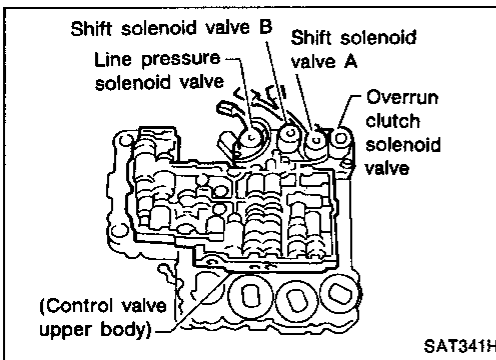
Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK

Parts description

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

Trouble judgment conditions



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 OVERRUN CLUTCH S/V P1760 6th judgement flicker	<ul style="list-style-type: none"> A/T control unit detects the 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 short.) Overrun clutch solenoid valve

Diagnostic trouble code detecting condition

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

OR

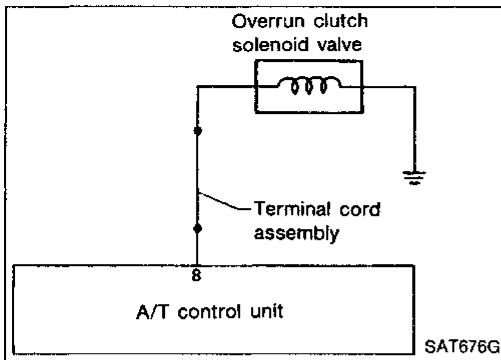
- Start engine.
- Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
- Select "MODE 3" with GST.

OR

- Start engine.
- Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position and vehicle speed higher than 10 km/h (6 MPH).
- Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

CHECK GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑧ and ground.

Resistance: 20 - 30Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check the following items.
 - Overrun clutch solenoid valve. — Refer to "Electrical Components Inspection", AT-99.
 - Harness continuity of terminal cord assembly

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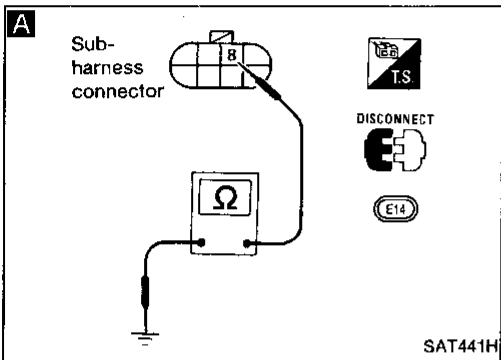
ST

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B

CHECK POWER SOURCE CIRCUIT.

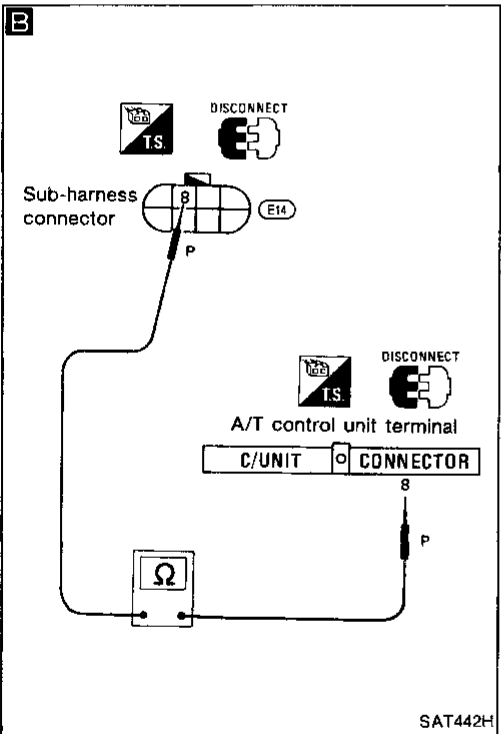
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑧ and A/T control unit terminal ⑧.

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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



OK

Perform self-diagnosis after driving for a while.

NG

INSPECTION END

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.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

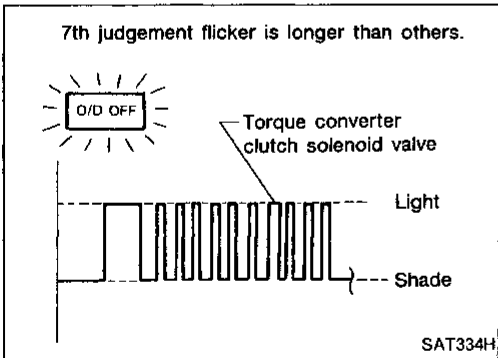
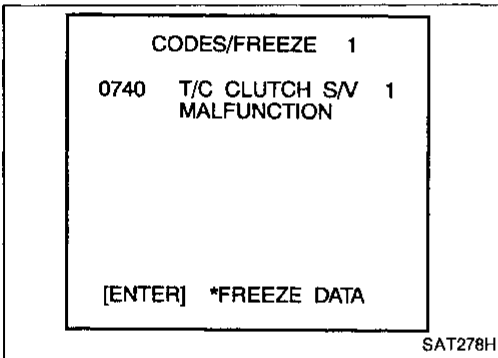
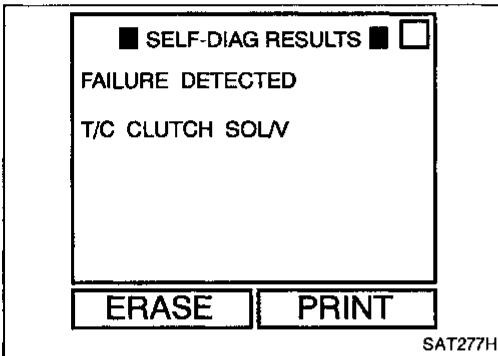
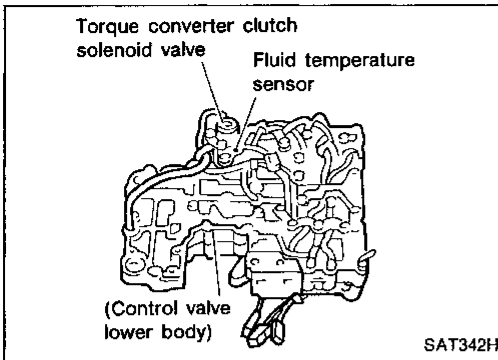
TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK




Parts description

The lock-up 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 ATF temperature is too low.

Trouble judgment conditions



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 T/C CLUTCH SOL/V  P0740  7th judgement flicker	<ul style="list-style-type: none"> A/T control unit detects the 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 short.) T/C clutch solenoid valve

Diagnostic trouble code detecting condition

- Turn ignition switch "ON".
- Select "SELF-DIAG RESULTS" mode with CONSULT.
- Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ Lock-up position.

OR

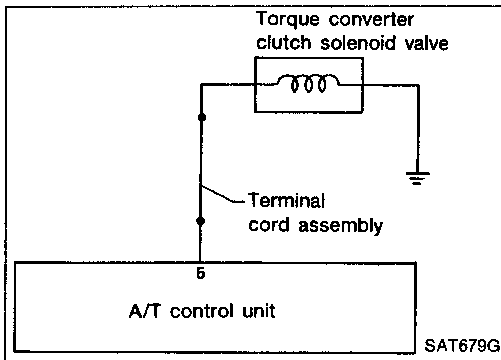
- Turn ignition switch "ON".
- Select "MODE 3" with GST.
- Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ Lock-up position.

OR

- Turn ignition switch "ON".
- Perform self-diagnosis. Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.
- Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ Lock-up position.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

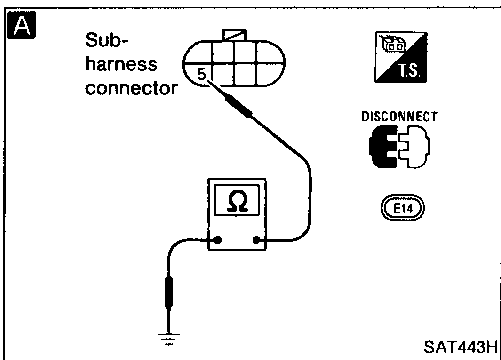
CHECK GROUND CIRCUIT.

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

Resistance: 10 - 16Ω

NG

1. Remove oil pan. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check the following items.
 - Torque converter clutch solenoid valve — Refer to "Electrical Components Inspection", AT-99.
 - Harness continuity of terminal cord assembly



B

CHECK POWER SOURCE CIRCUIT.

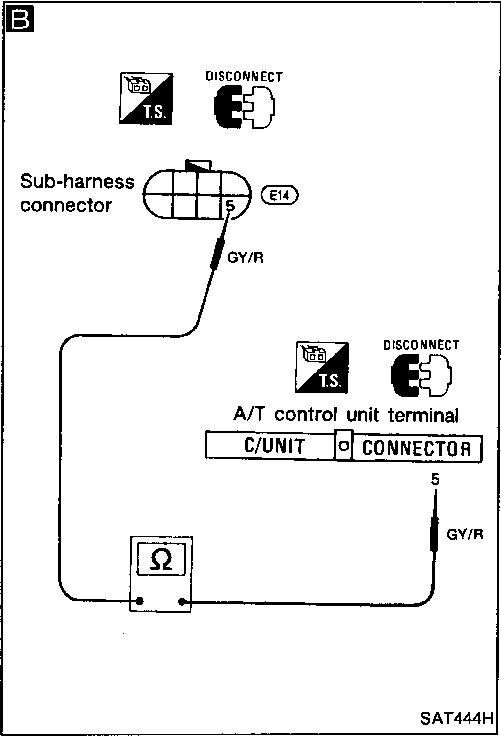
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑤ and A/T control unit terminal ⑤.

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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



OK

Perform self-diagnosis after driving for a while.

NG

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

OK

INSPECTION END

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TROUBLE DIAGNOSES

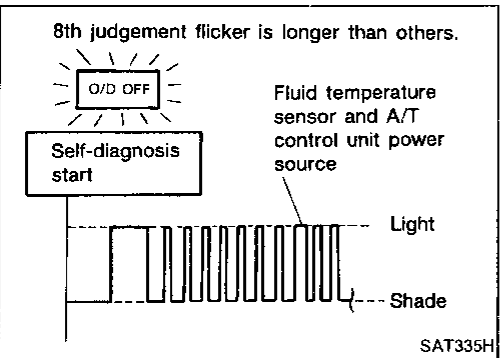
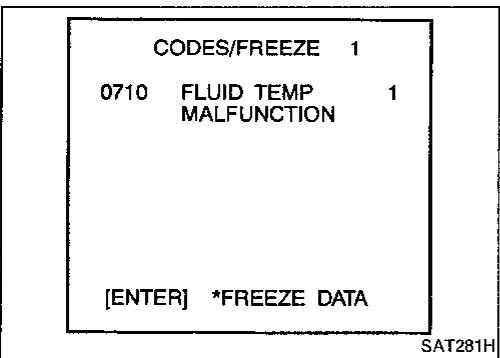
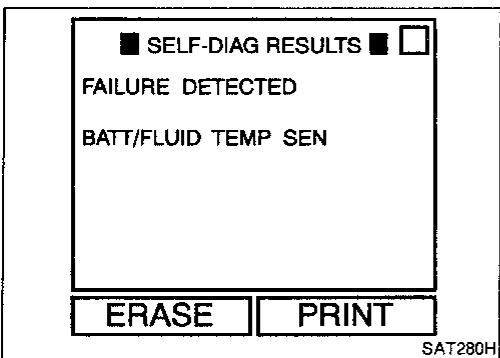
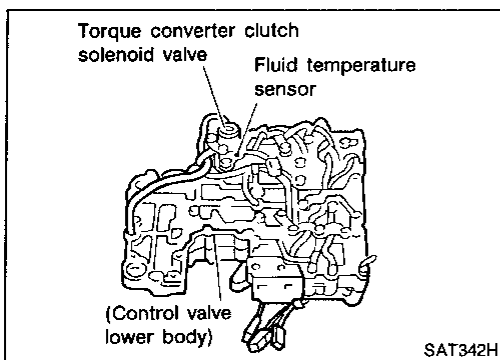
Self-diagnosis (Cont'd)

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

Parts description

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

Trouble judgment conditions



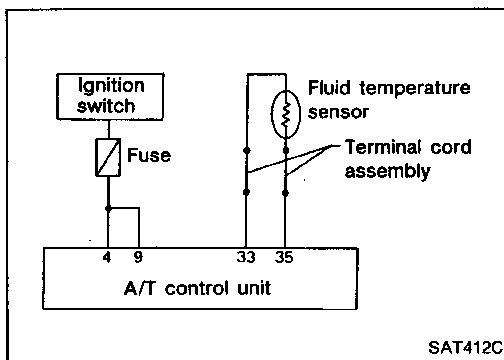
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
BATT/FLUID TEMP P0710 8th judgement flicker	<ul style="list-style-type: none"> A/T control unit receives an excessively low or high voltage from the sensor. 	<ul style="list-style-type: none"> Harness or connectors (The sensor circuit is open or short.) Fluid temperature sensor

Diagnostic trouble code detecting condition

- Start engine.
 - Select "SELF-DIAG RESULTS" mode with CONSULT.
 - Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
- OR
- Start engine.
 - Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
 - Select "MODE 3" with GST.
- OR
- Start engine.
 - Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
 - Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

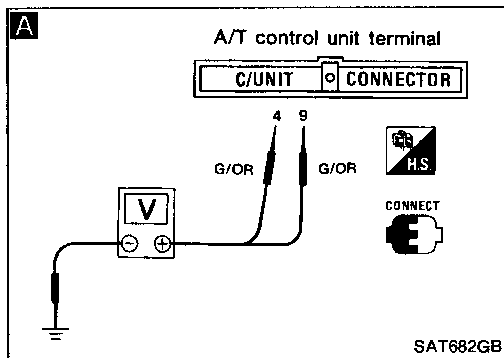
CHECK A/T CONTROL UNIT POWER SOURCE.

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

NG

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

OK



B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ③③ and ④④ when A/T is cold.

Resistance:

Cold [20°C (68°F)]

Approximately 2.5 kΩ

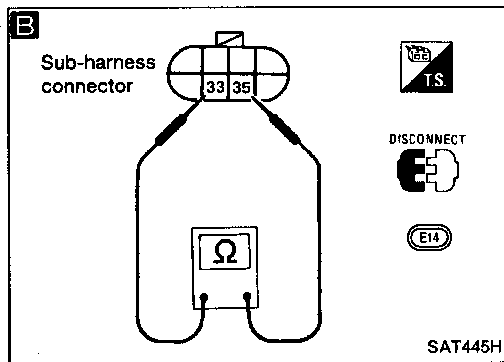
4. Reinstall any part removed.

NG

1. Remove oil pan.
2. Check the following items.
 - Fluid temperature sensor — Refer to "Electrical Components Inspection", AT-99.
 - Harness continuity of terminal cord assembly

OK

A



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TROUBLE DIAGNOSES

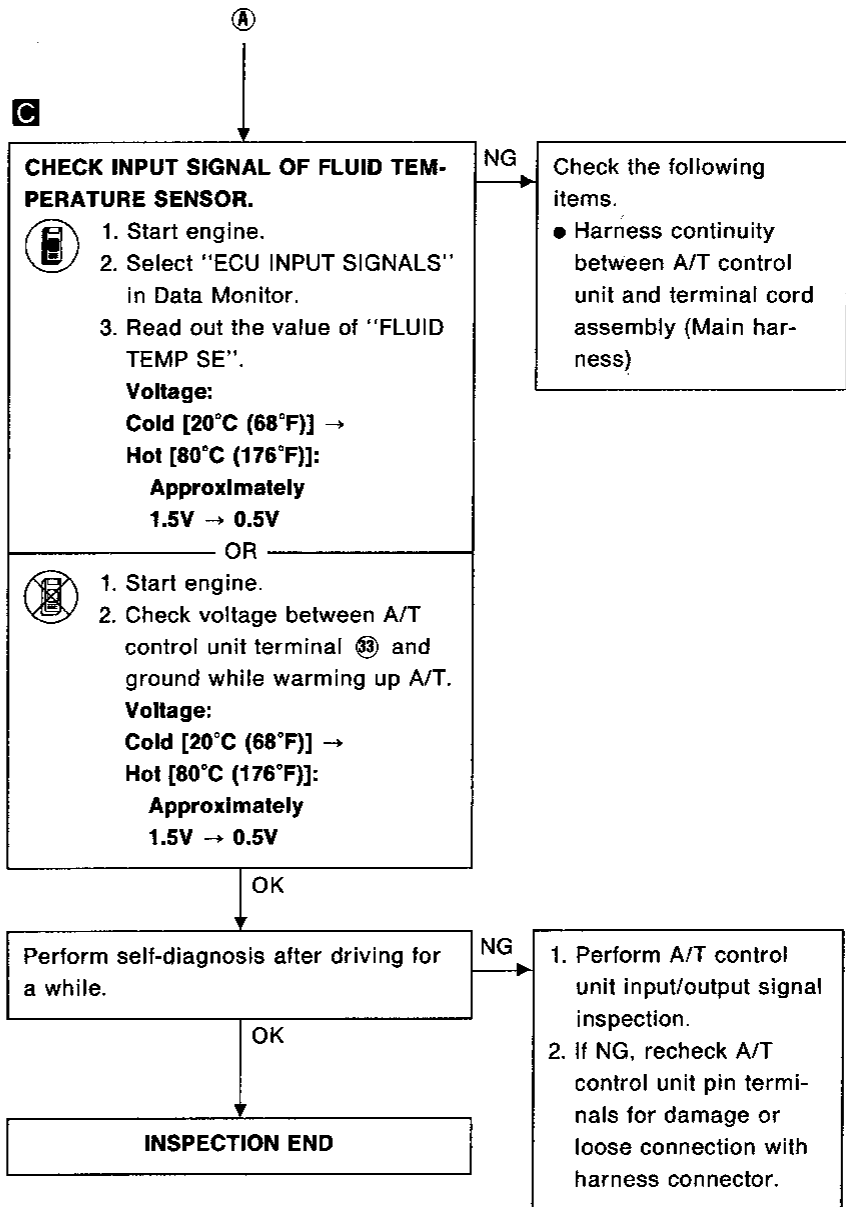
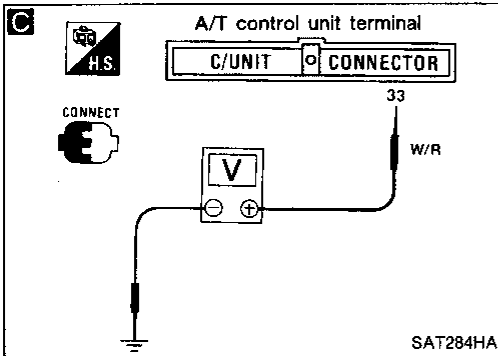
Self-diagnosis (Cont'd)

C

☆MONITOR	☆NO FAIL	<input type="checkbox"/>
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



TROUBLE DIAGNOSES




Self-diagnosis (Cont'd)

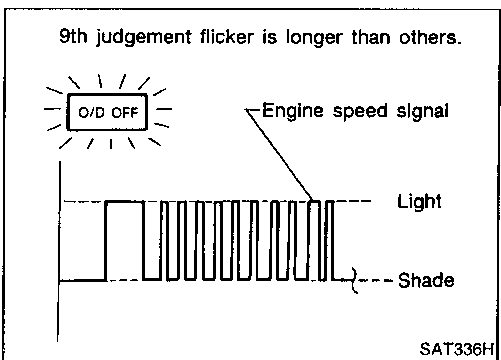
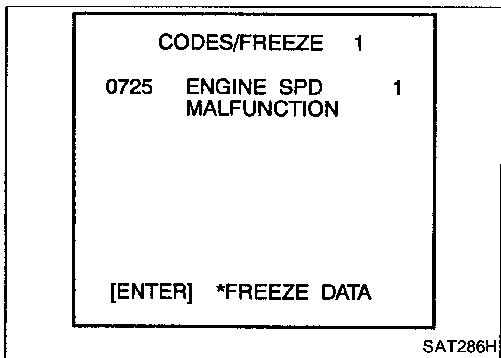
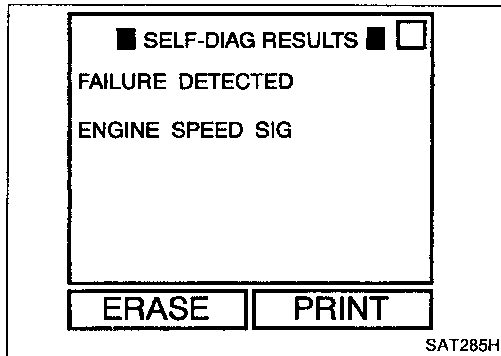
ENGINE SPEED SIGNAL CIRCUIT CHECK

Parts description

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

Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 ENGINE SPEED SIG  P0725  9th judgement flicker	<ul style="list-style-type: none"> 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 short.)



Diagnostic trouble code detecting condition

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

OR

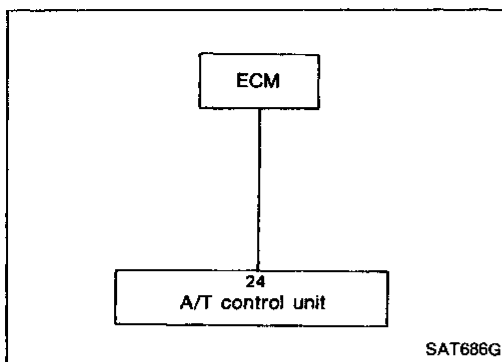
- Start engine.
- Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
- Select "MODE 3" with GST.

OR

- Start engine.
- Drive vehicle under the following conditions:
Shift lever in D, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
- Perform self-diagnosis.
Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.

TROUBLE DIAGNOSES

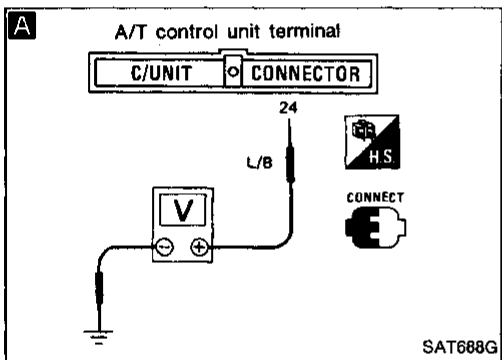
Self-diagnosis (Cont'd)



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 section EC.

OK

A

CHECK INPUT SIGNAL.



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

NG

Check the following items.

- Harness continuity between A/T control unit and ignition coil.
- Resistor
- Ignition coil — Refer to section EC.

OR



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

OK

Perform self-diagnosis again after driving for a while.

NG

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

OK

INSPECTION END

TROUBLE DIAGNOSES




Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK


Parts description

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


Trouble judgment conditions

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
 LINE PRESSURE S/V  P0745  10th judgement flicker	<ul style="list-style-type: none"> A/T control unit detects the 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 short.) Line pressure solenoid valve


Diagnostic trouble code detecting condition

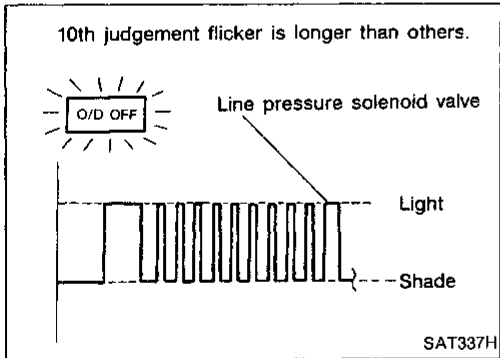
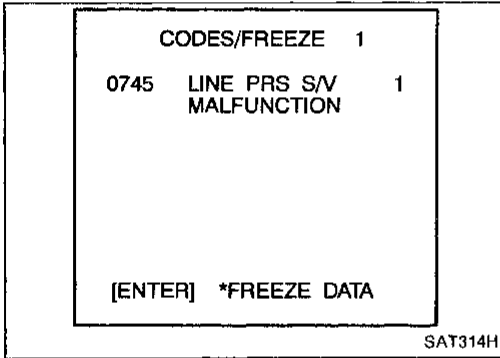
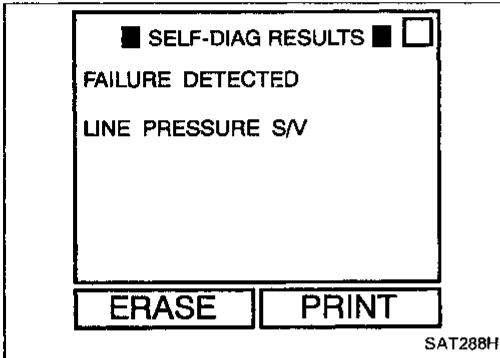
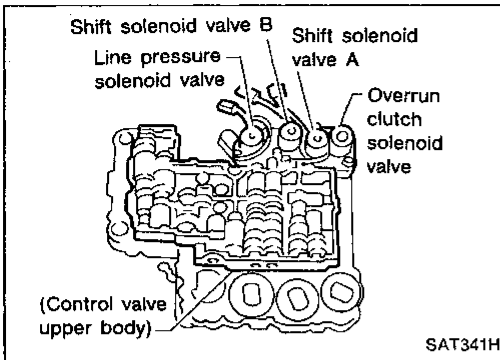
-  1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) With brake pedal depressed, shift the lever from P → N → D → N → P.

OR

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

OR

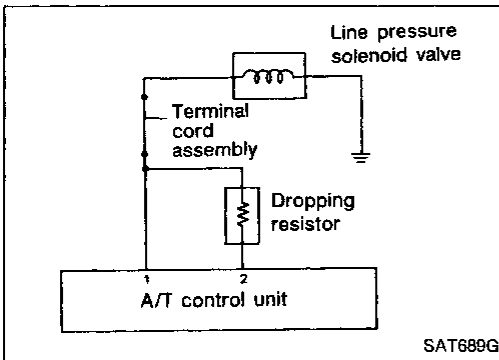
-  1) Start engine.
 2) With brake pedal depressed, shift the lever from P → N → D → N → P.
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSIS PROCEDURE (Without CONSULT), AT-41.



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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



A

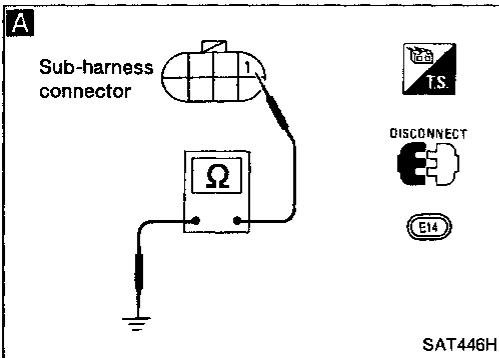
CHECK GROUND CIRCUIT.

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

Resistance: 2.5 - 5Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check the following items.
 - Line pressure solenoid valve — Refer to "Electrical Components Inspection".
 - Harness continuity of terminal cord assembly



B

CHECK POWER SOURCE CIRCUIT.

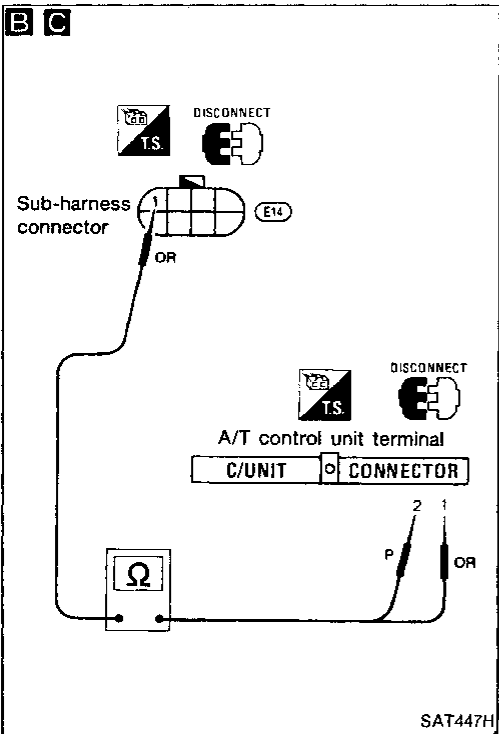
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ① and A/T control unit terminal ②.

Resistance: 11.2 - 12.8Ω

NG

Check the following items.

- Dropping resistor — Refer to "Electrical Components Inspection", AT-101.
- Harness continuity between A/T control unit ② and terminal cord assembly (Main harness)



C

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

3. Reinstall any part removed.

NG

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

Perform self-diagnosis after driving for a while.

NG

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

INSPECTION END

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

INHIBITOR, OVERDRIVE AND THROTTLE POSITION SWITCH CIRCUIT CHECKS

Parts description

Inhibitor switch

Detects the selector lever position and sends a signal to the A/T control unit.

Overdrive switch

Detects the overdrive switch position (ON or OFF) and sends a signal to the A/T control unit.

Throttle position switch

Consists of a wide-open throttle position switch and a closed throttle position switch.

The wide-open position switch sends a signal to the A/T control unit when the throttle valve is open at least 1/2 of the full throttle position. The closed throttle position switch sends a signal to the A/T control unit when the throttle valve is fully closed.

Overall function check



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

OR

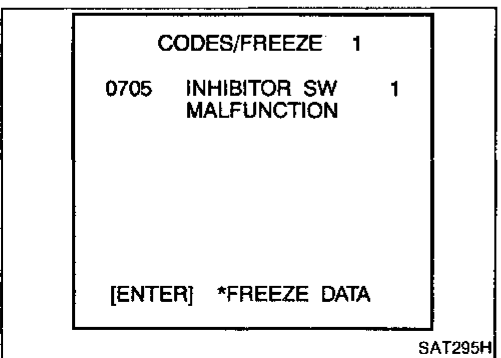
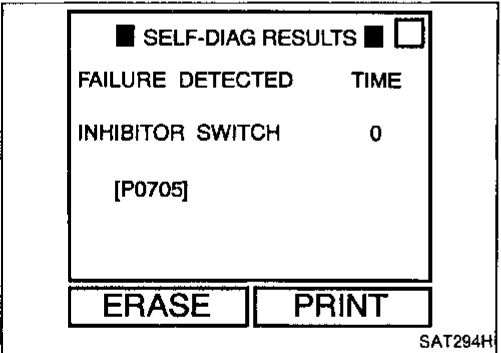
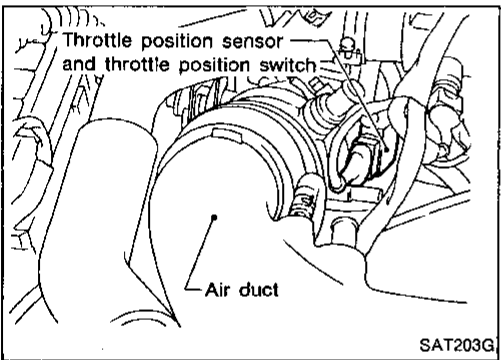
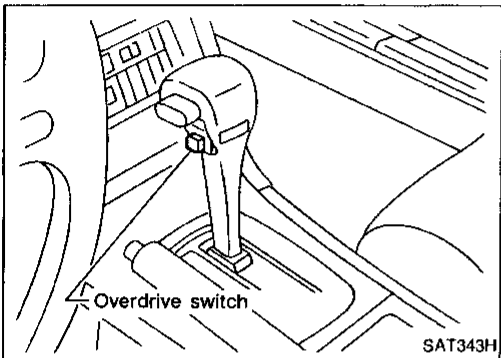
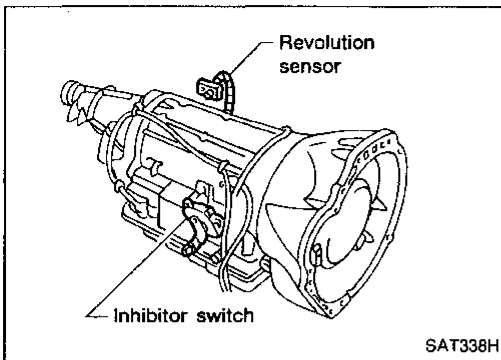


- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
- 3) Select "MODE 3" with GST.

OR



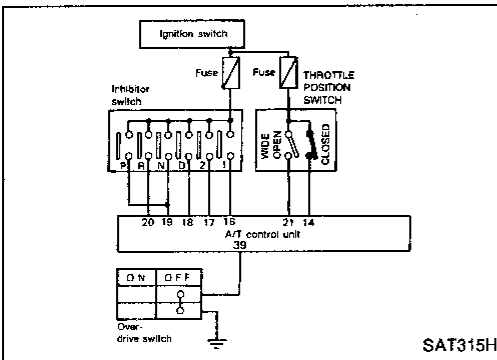
- 1) Start engine.
- 2) Drive vehicle under the following conditions:
Shift lever in D, OD control switch in "OFF" position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
- 3) Perform self-diagnosis for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



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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

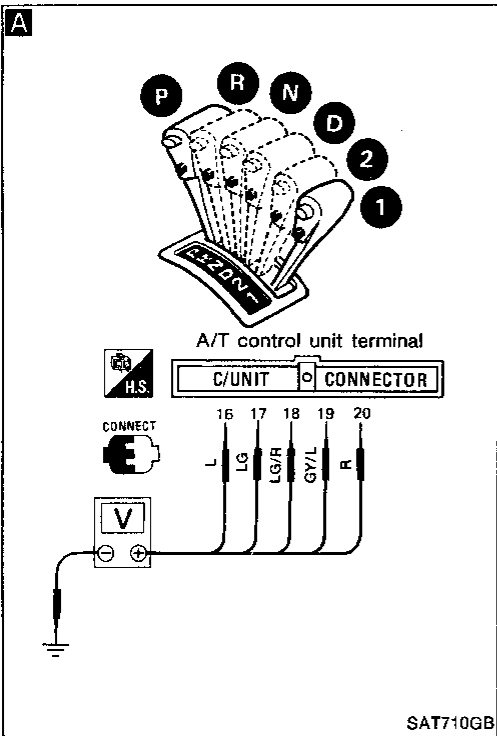


A

☆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



A

CHECK INHIBITOR SWITCH CIRCUIT.

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

Check the signal of the selector lever position is indicated properly.

NG

Check the following items.

- Inhibitor switch — Refer to "Electrical Components Inspection", AT-100.
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

OR

1. Turn ignition switch to "ON" position. (Do not start engine.)
2. Check voltage between A/T control unit terminals 16, 17, 18, 19, 20 and ground while moving selector lever through each position.

Voltage:
B: Battery voltage
0: 0V

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

OK

A

TROUBLE DIAGNOSES

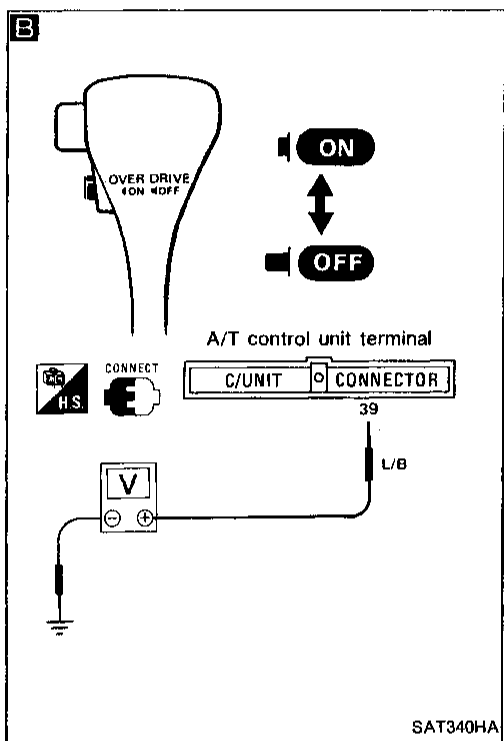
Self-diagnosis (Cont'd)

B

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

RECORD

SAT076H



B

CHECK OVERDRIVE 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 switch is indicated properly.
(Overdrive 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 ③⑨ and ground when overdrive switch is "ON" and "OFF".

Switch position	Voltage
ON	Battery voltage
OFF	1V or less

NG

Check the following items.

- Overdrive switch — Refer to "Electrical Components Inspection", AT-100.
- Harness continuity between A/T control unit and overdrive switch (Main harness)
- Harness continuity of ground circuit for overdrive switch (Main harness)

OK

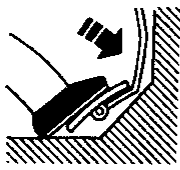
B

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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

C D


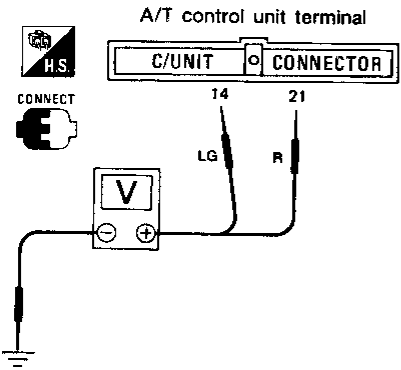


☆ MONITOR	☆ NO FAIL	
D POSITION SW	OFF	
2 POSITION SW	OFF	
1 POSITION SW	OFF	
ASCD•CRUISE	OFF	
ASCD•OD CUT	OFF	
KICKDOWN SW	OFF	
POWERSHIFT SW	OFF	
CLOSED THL/SW	O N	
W/O THRL/P-SW	OFF	

RECORD

SAT714G

C D

A/T control unit terminal

C/UNIT CONNECTOR

14 LG 21 R

V

CONNECT

SAT715GB

B

C

CHECK WIDE OPEN THROTTLE POSITION SWITCH CIRCUIT.

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

2. Select "ECU INPUT SIGNALS" in Data Monitor.

3. Read out "W/O THRL/P-SW" depressing accelerator pedal fully.
Check the signal of wide open throttle position switch is indicated properly.

OR

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

2. Check voltage between A/T control unit terminal ① and ground while depressing accelerator pedal slowly.
(after warming up engine)

Voltage:

When releasing accelerator pedal:

1V or less

When depressing accelerator pedal fully:

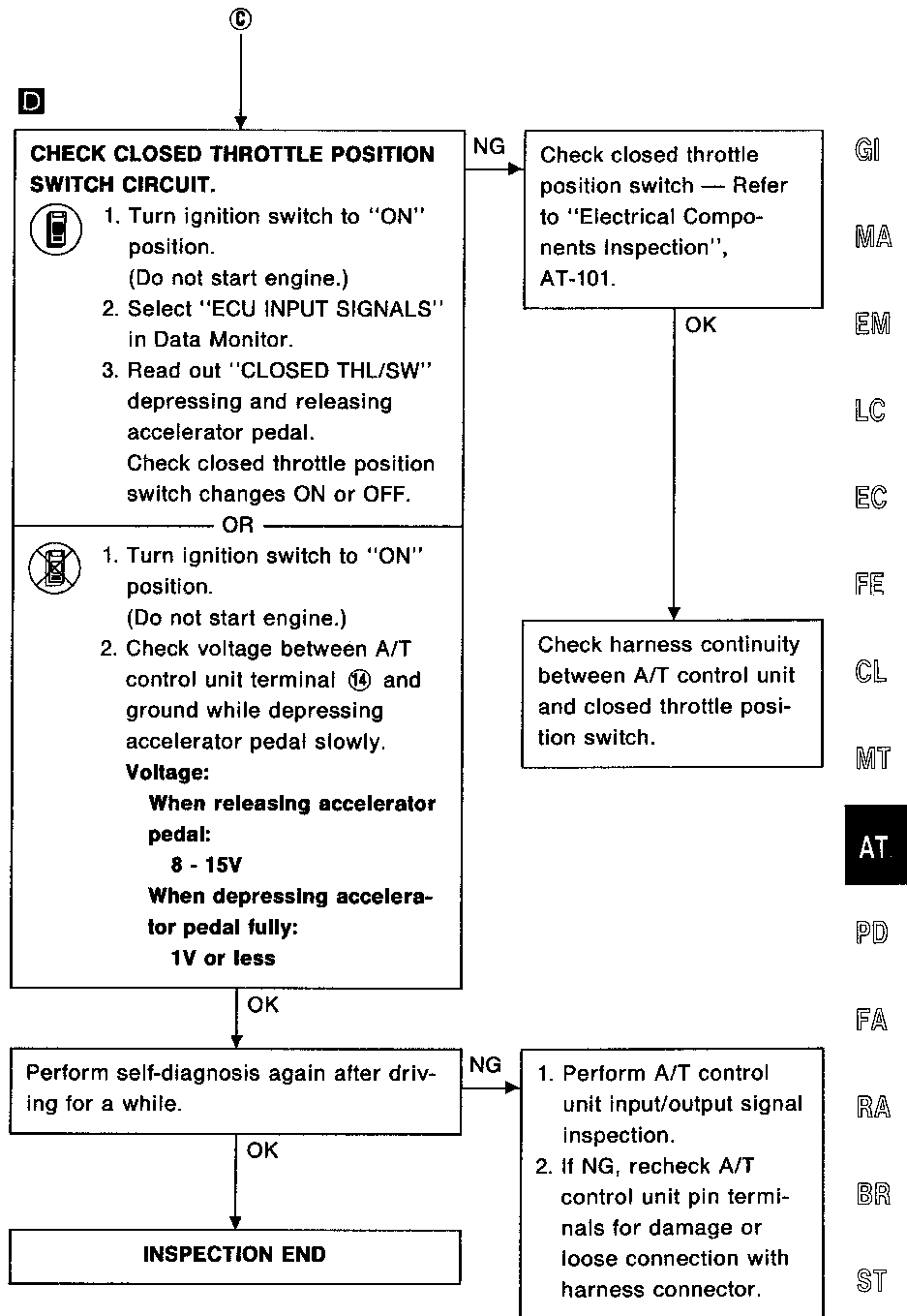
8 - 15V

NG → Check harness continuity between A/T control unit and wide open throttle position switch — Refer to "Electrical Components Inspection", AT-101.

OK → **C**

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

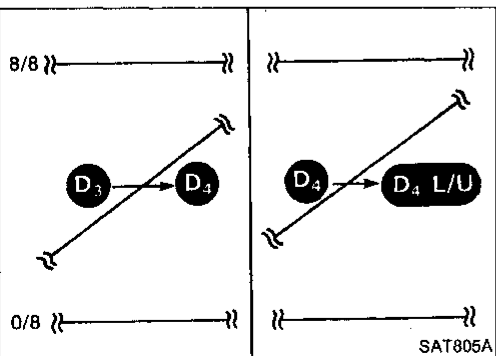
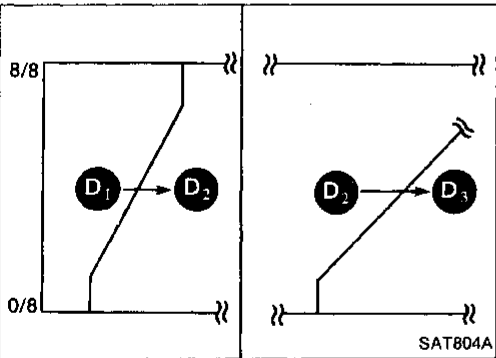
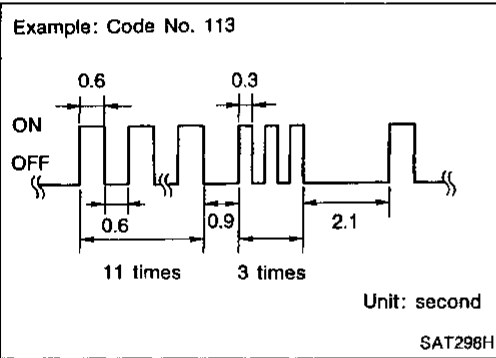
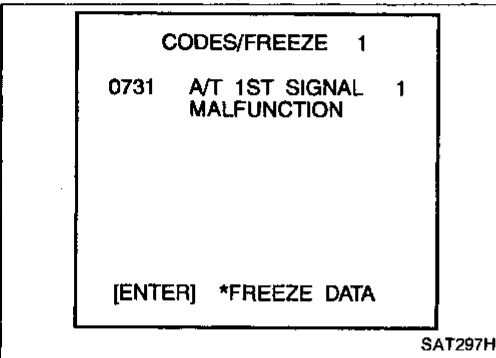
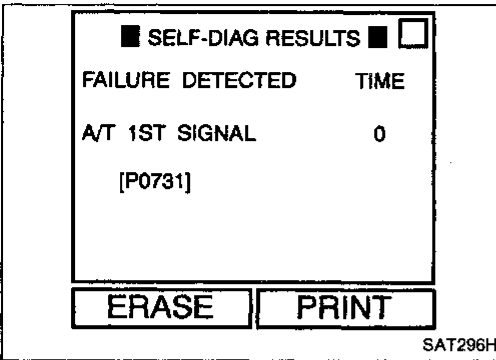
IMPROPER SHIFTING TO 1ST GEAR POSITION

Description

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

Overall function check

- 1) Start engine and warm up ATF.
- 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. 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-33.



OR

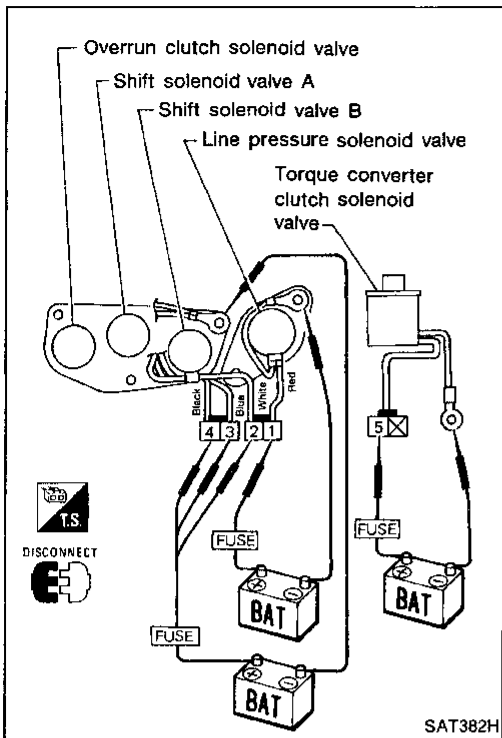
- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Select "MODE 3" with GST.

OR

- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. 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-33.
- 3) Perform self-diagnosis for ECM. Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).

TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



CHECK SHIFT SOLENOID VALVE.

- 1 Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check shift solenoid valve operation.
 - Shift solenoid valve A
 - Shift solenoid valve B
 Refer to "Electrical components Inspection", AT-99.

NG

Repair or replace shift solenoid valve assembly.

OK

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS — Control Valve Assembly —", AT-147.
2. Check to ensure that:
 - Valve, sleeve and plug slide along valve bore under their own weight.
 - Valve, sleeve and plug are free from burrs, dents and scratches.
 - Control valve springs are free from damage, deformation and fatigue.
 - Hydraulic line is free from obstacles.

NG

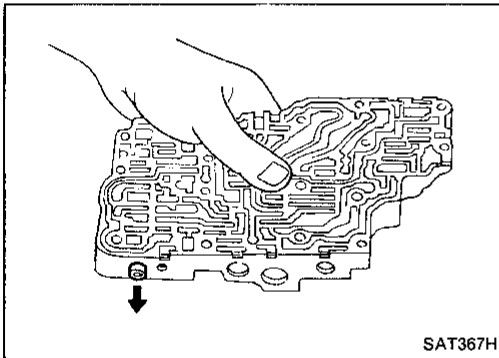
Repair control valve assembly.

OK

Check again.

OK

INSPECTION END



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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

IMPROPER SHIFTING TO 2ND GEAR POSITION

Description

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

Overall function check

- 1) Start engine and warm up ATF.
- 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. 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-33.

OR

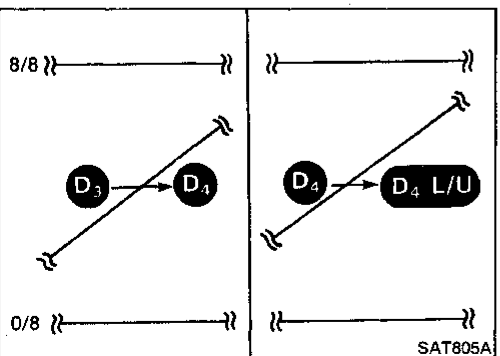
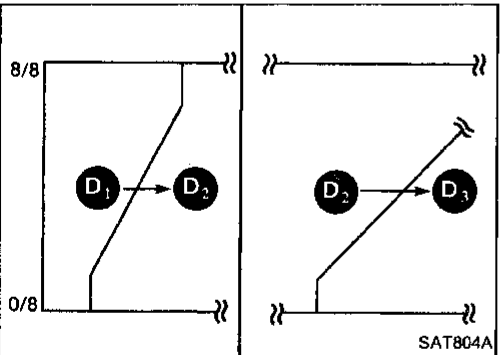
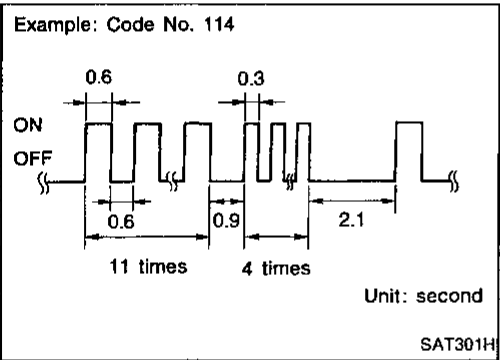
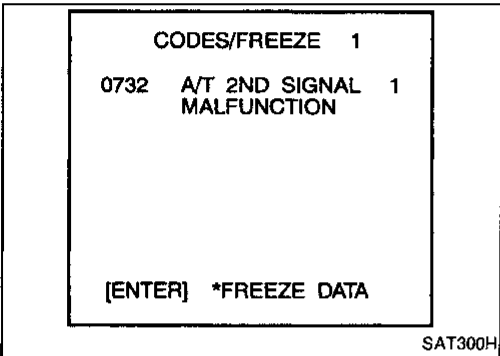
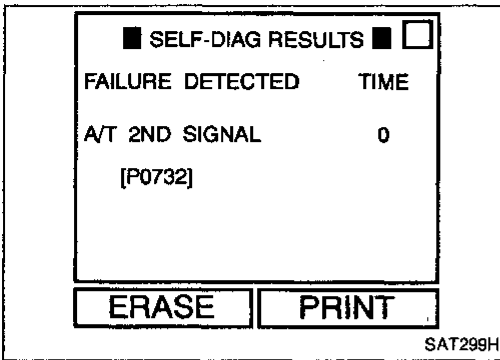


- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Select "MODE 3" with GST.

OR

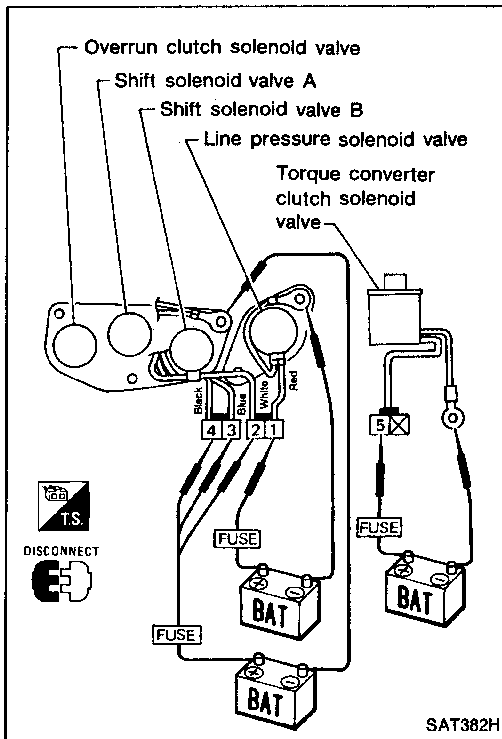


- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Perform self-diagnosis for ECM. Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check shift solenoid valve operation.
 - Shift solenoid valve B Refer to "Electrical components Inspection", AT-99.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS — Control Valve Assembly —", AT-147.
2. Check to ensure that:
 - Valve, sleeve and plug slide along valve bore under their own weight.
 - Valve, sleeve and plug are free from burrs, dents and scratches.
 - Control valve springs are free from damage, deformation and fatigue.
 - Hydraulic line is free from obstacles.

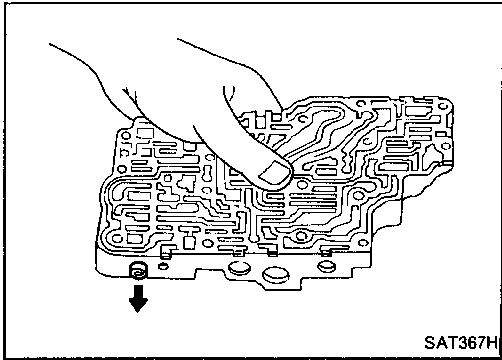
NG → Repair control valve assembly.

OK ↓

Check again.

OK ↓

INSPECTION END



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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

IMPROPER SHIFTING TO 3RD GEAR POSITION

Description

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

Overall function check



- 1) Start engine and warm up ATF.
- 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. 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-33.

OR

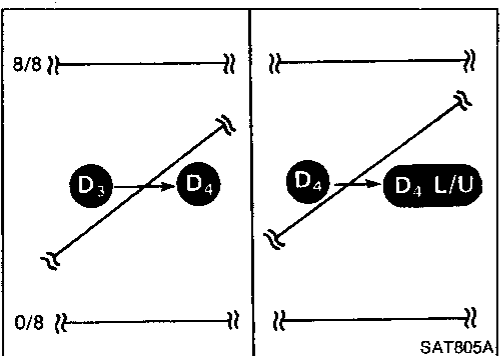
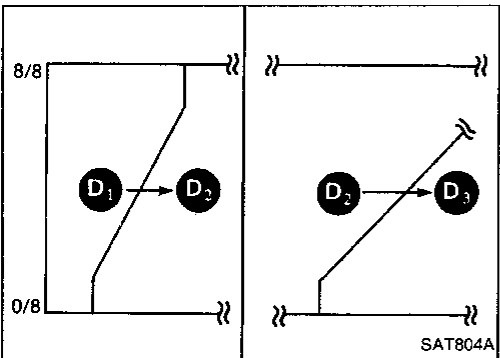
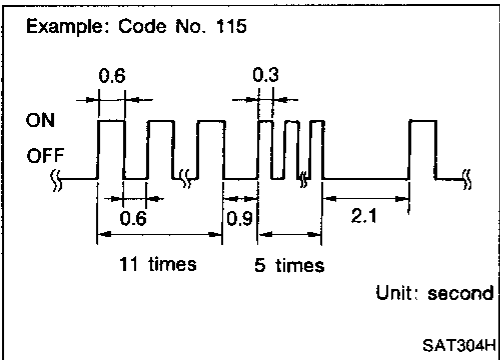
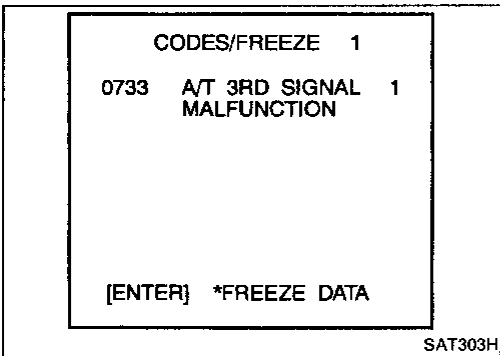
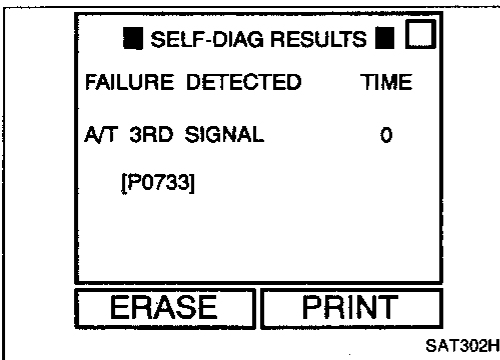


- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Select "MODE 3" with GST.

OR

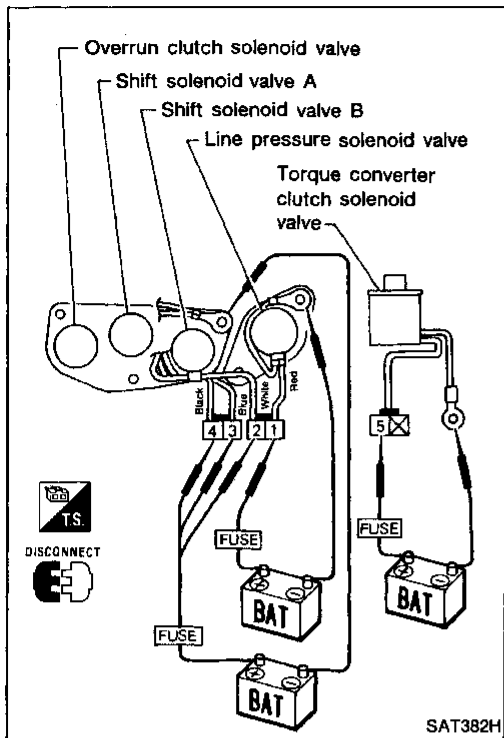


- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4$, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Perform self-diagnosis for ECM.
Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).



TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)



CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check shift solenoid valve operation.
 - Shift solenoid valve A
 Refer to "Electrical components Inspection", AT-99.

NG

Repair or replace shift solenoid valve assembly.

OK

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS — Control Valve Assembly —", AT-147.
2. Check to ensure that:
 - Valve, sleeve and plug slide along valve bore under their own weight.
 - Valve, sleeve and plug are free from burrs, dents and scratches.
 - Control valve springs are free from damage, deformation and fatigue.
 - Hydraulic line is free from obstacles.

NG

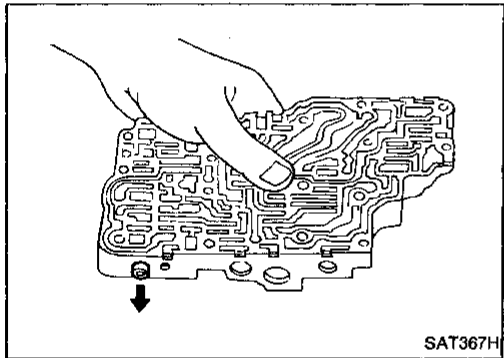
Repair control valve assembly.

OK

Check again.

OK

INSPECTION END



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TROUBLE DIAGNOSES

Self-diagnosis (Cont'd)

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

Description

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

Overall function check



- 1) Start engine and warm up ATF.
- 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-33.

OR



- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Select "MODE 3" with GST.

OR



- 1) Start engine and warm up ATF.
- 2) Start vehicle with shift lever in D and throttle opening greater than 1/8 of full throttle. Check that vehicle runs through gear shift of $D_1 \rightarrow D_2 \rightarrow D_3 \rightarrow D_4 \rightarrow D_4$ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-33.
- 3) Perform self-diagnosis for ECM. Refer to EC section, On-board Diagnostic System — Diagnostic Test Mode II (Self-diagnostic results).

■ SELF-DIAG RESULTS ■ □

FAILURE DETECTED	TIME
A/T 4TH OR TCC	0
[P0734]	

ERASE
PRINT

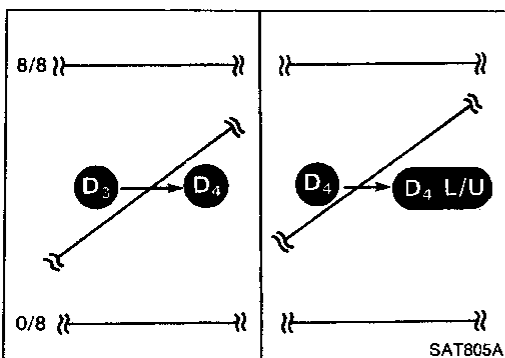
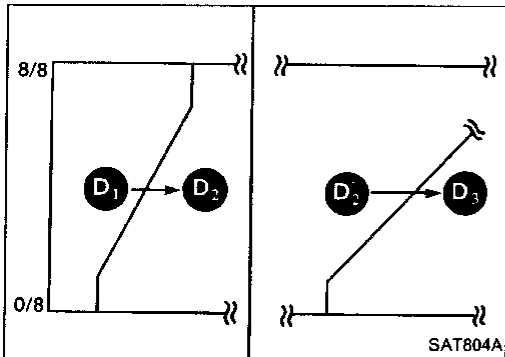
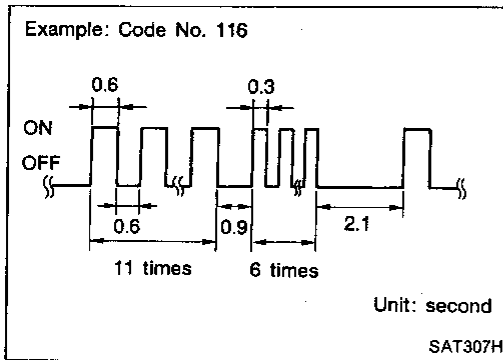
SAT305H

CODES/FREEZE 1

0734 A/T 4TH OR TCC 1
MALFUNCTION

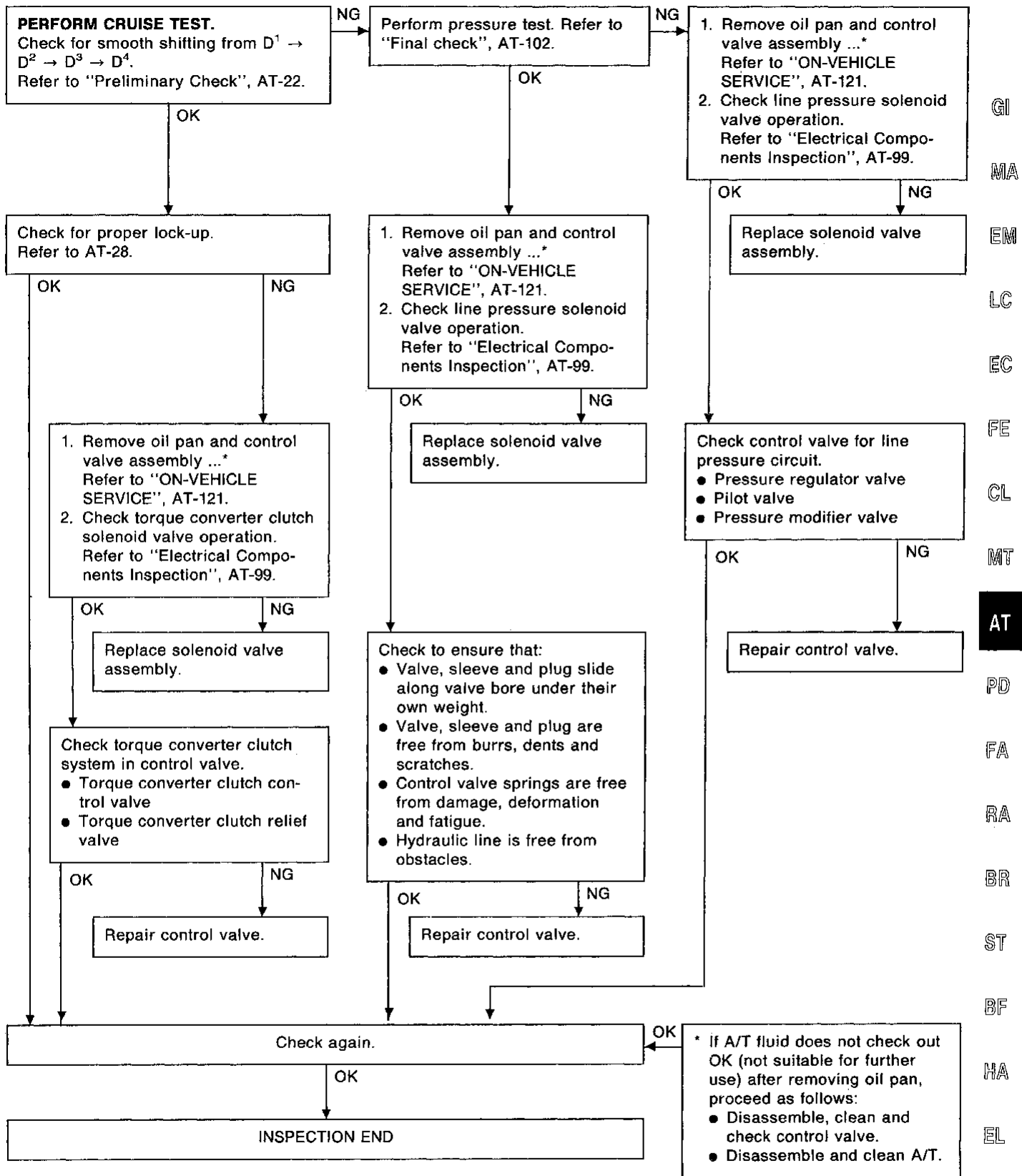
[ENTER] *FREEZE DATA

SAT306H



TROUBLE DIAGNOSES

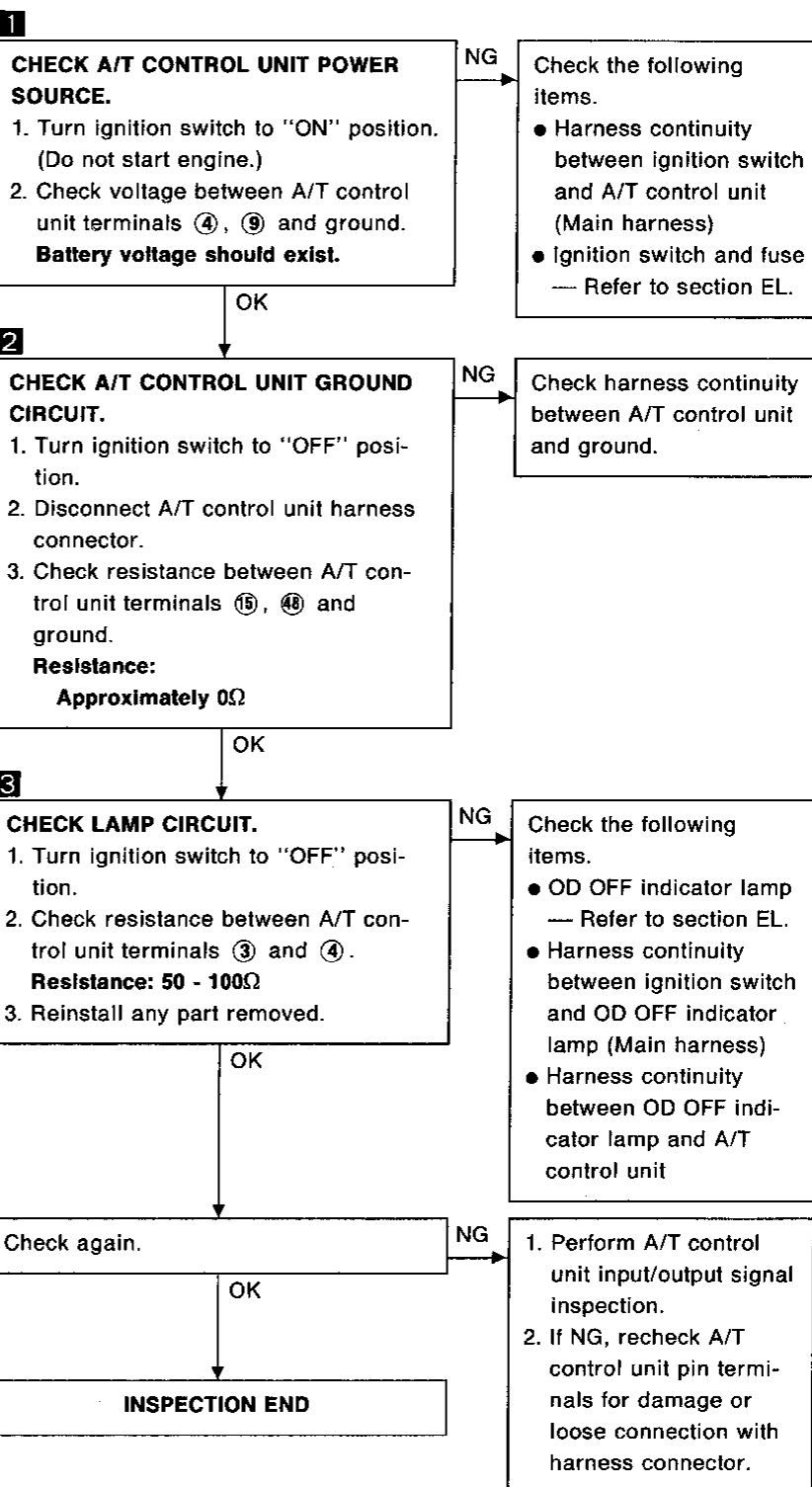
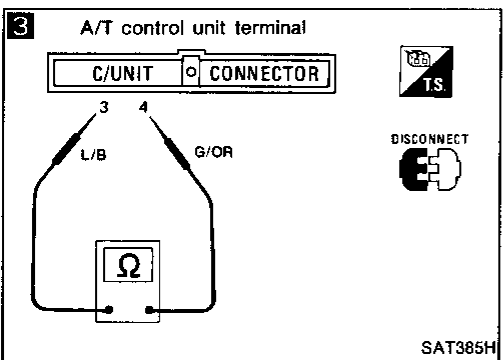
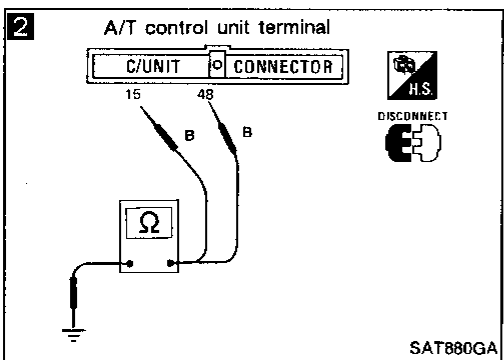
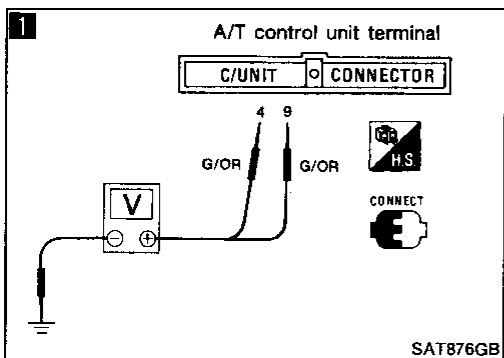
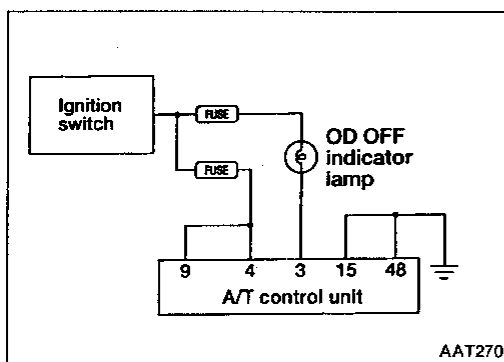
Self-diagnosis (Cont'd)

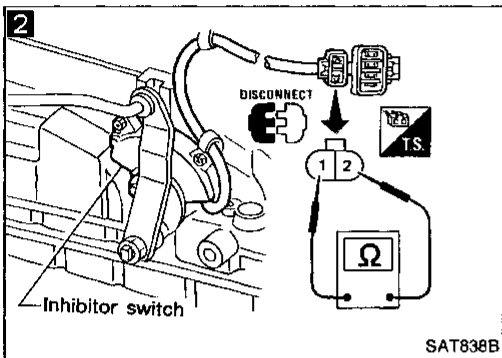
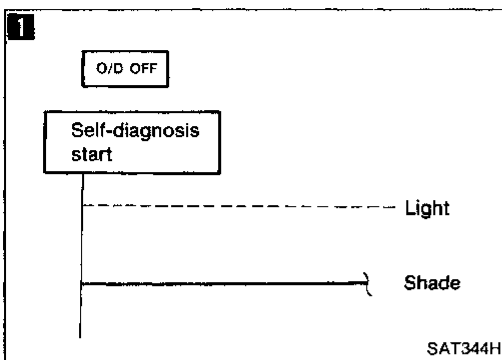


Diagnostic Procedure 1

SYMPTOM:

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

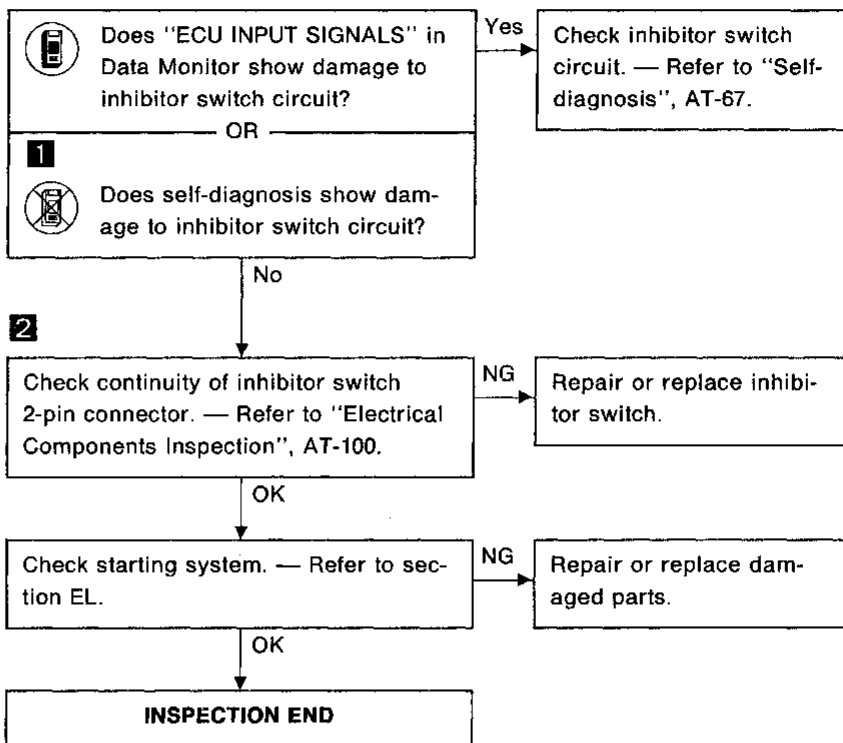




Diagnostic Procedure 2

SYMPTOM:

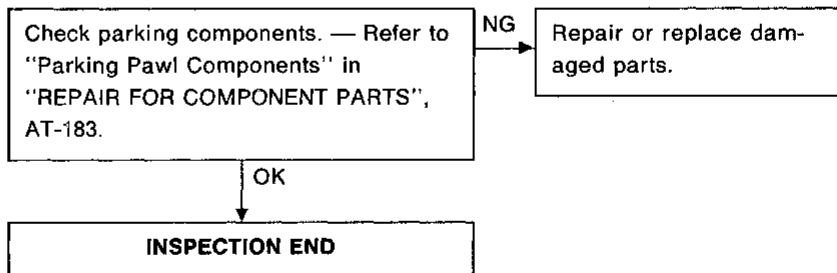
Engine cannot be started with selector lever in "P" or "N" position. Or engine can be started with selector lever in "D", "2", "1" or "R" position.



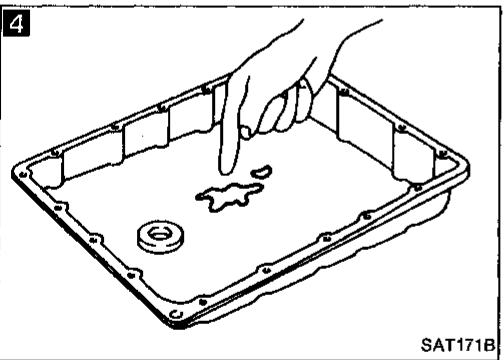
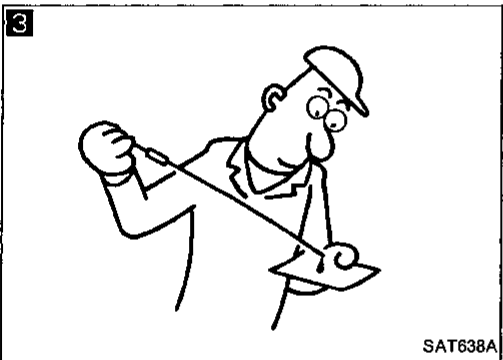
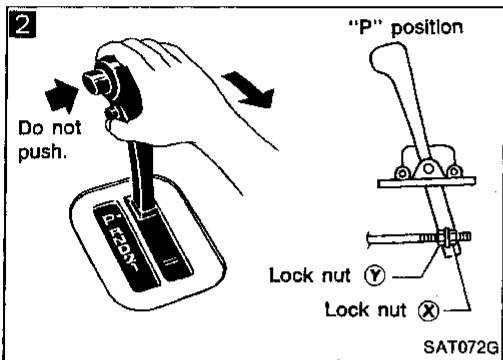
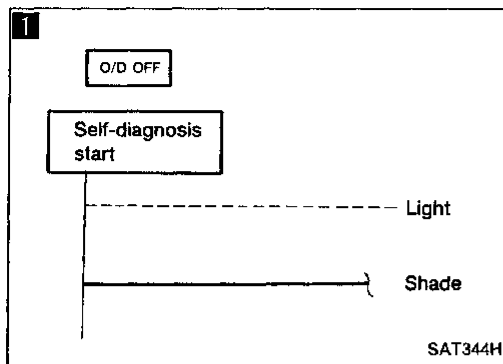
Diagnostic Procedure 3

SYMPTOM:

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



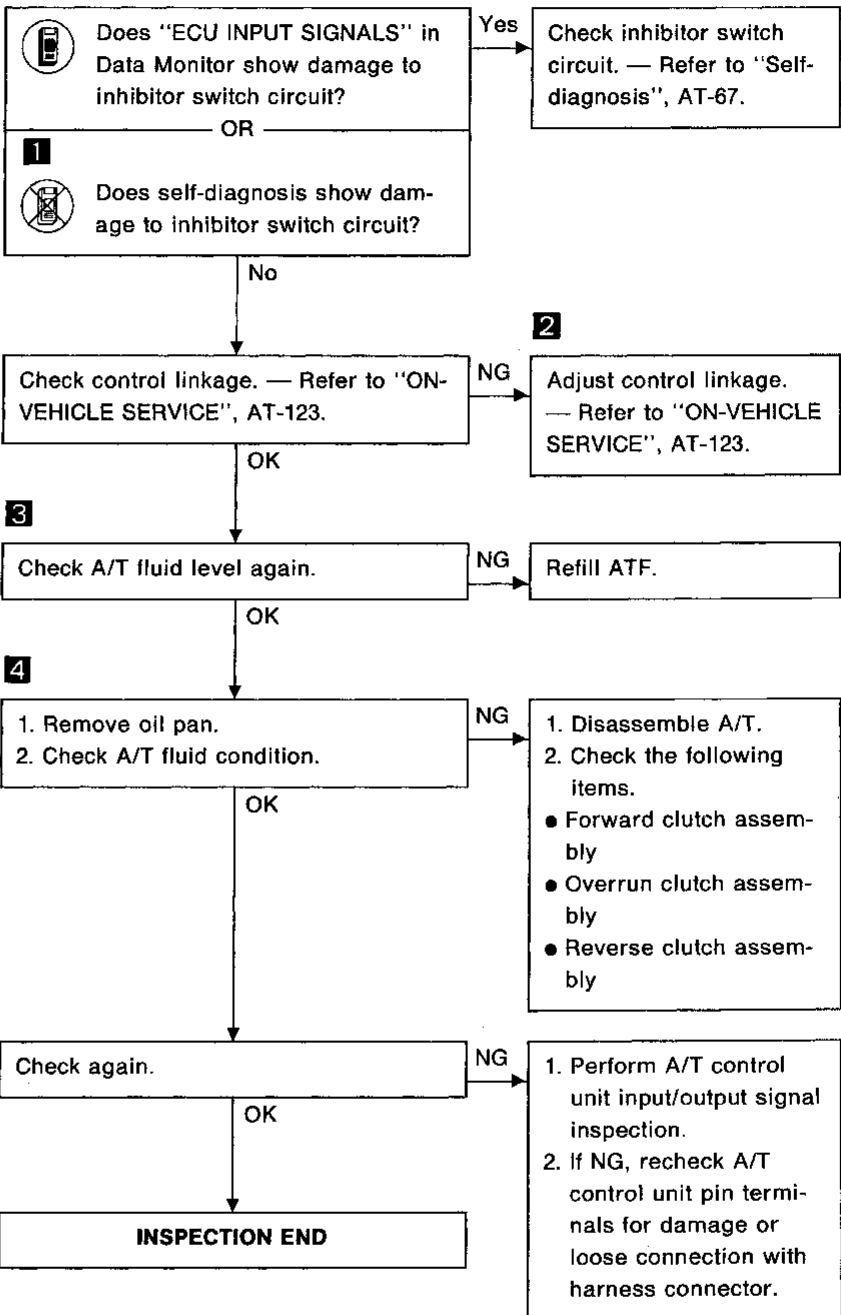
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Diagnostic Procedure 4

SYMPTOM:

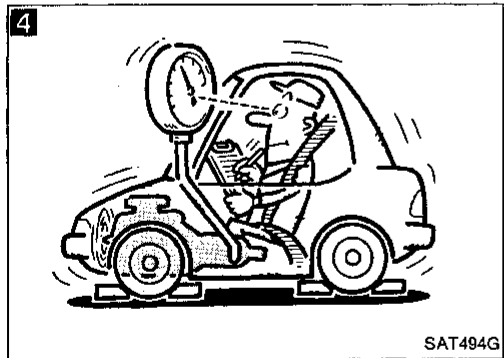
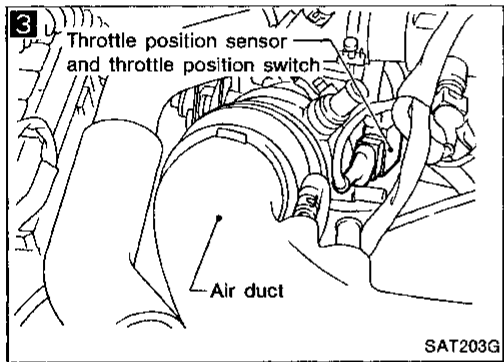
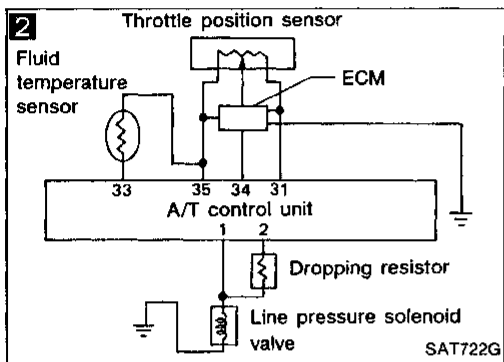
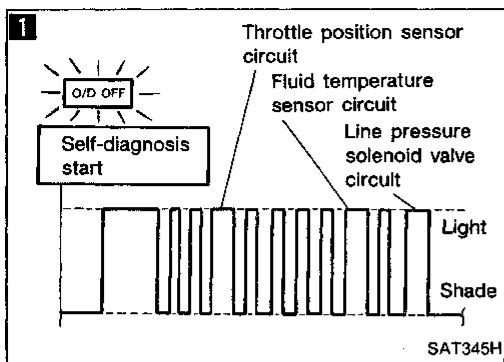
Vehicle moves forward or backward when selecting "N" position.



Diagnostic Procedure 5

SYMPTOM:

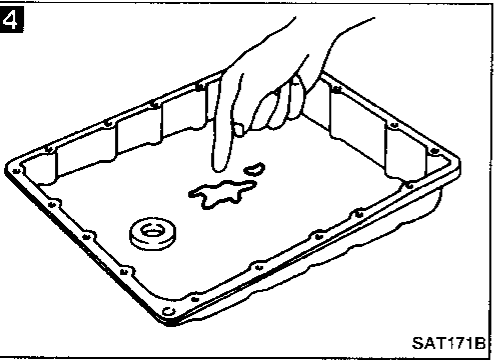
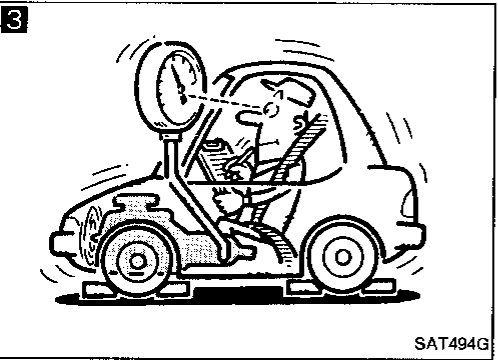
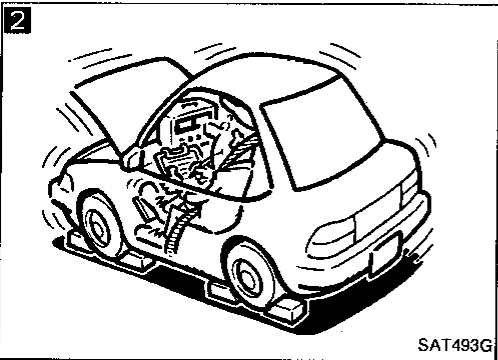
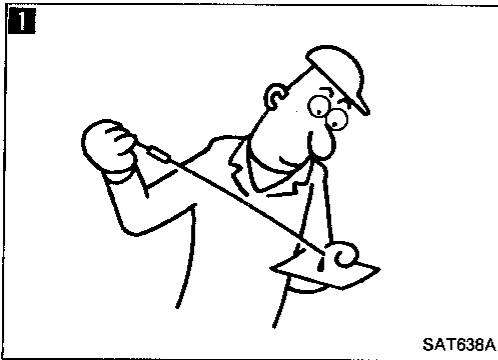
There is large shock when changing from "N" to "R" position.



```

    graph TD
        Q1[1 Does self-diagnosis show damage to throttle position sensor, line pressure solenoid valve or fluid temperature sensor circuit?] -- Yes --> A2[2 Check damaged circuit. — Refer to "Self-diagnosis", AT-50.]
        Q1 -- No --> Q3[3 Check throttle position sensor. — Refer to section EC.]
        Q3 -- NG --> A3[Repair or replace throttle position sensor.]
        Q3 -- OK --> Q4[4 Check line pressure at idle with selector lever in "D" position. — Refer to "PRESSURE TESTING", AT-105.]
        Q4 -- NG --> A4[1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.  
2. Check the following items.  
• Valves to control line pressure (Pressure regulator valve, pressure modifier valve, pilot valve and pilot filter)  
• Line pressure solenoid valve]
        Q4 -- OK --> Q5[Check again.]
        Q5 -- NG --> A5[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.]
        Q5 -- OK --> END[INSPECTION END]
    
```

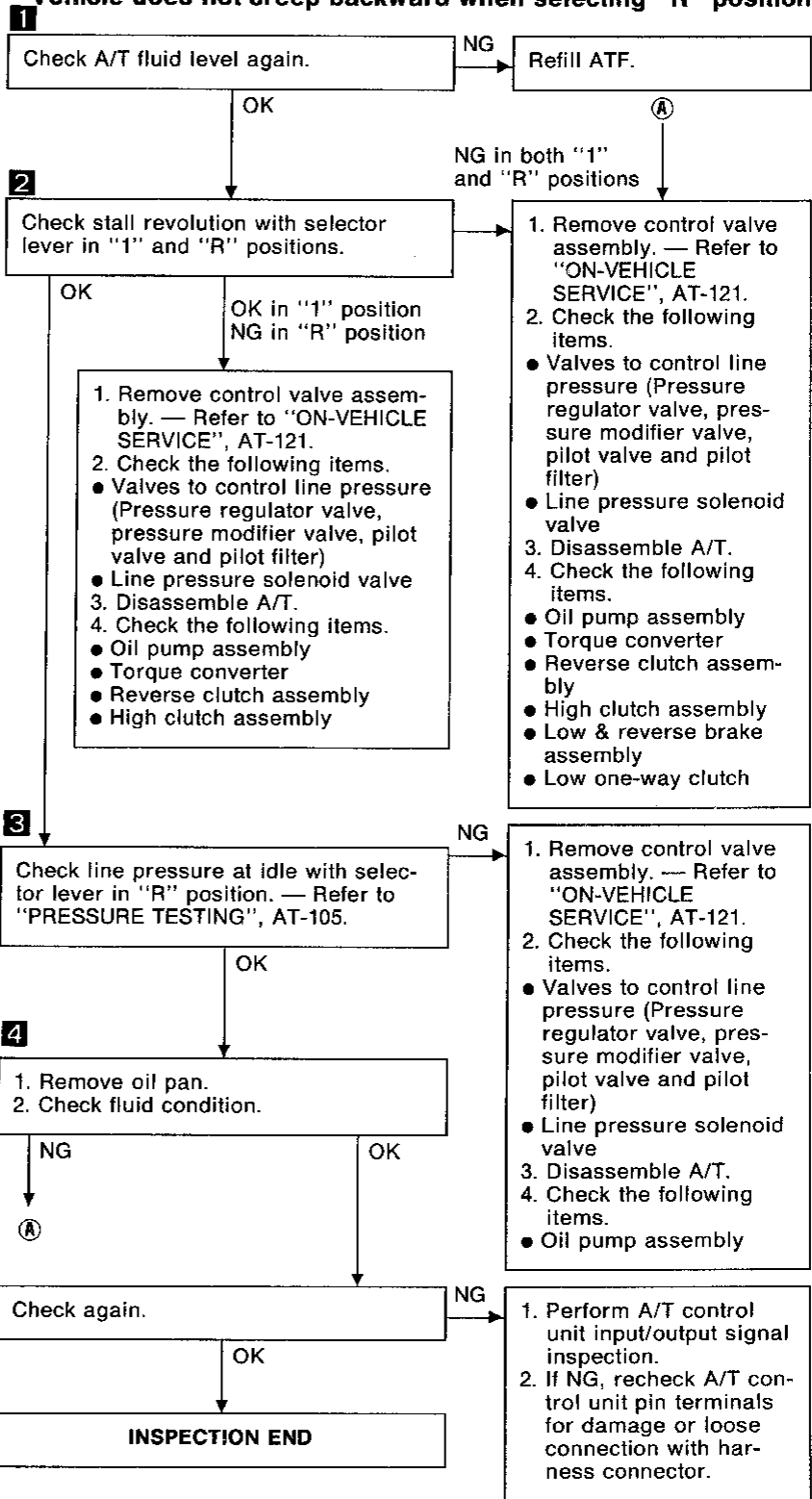
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Diagnostic Procedure 6

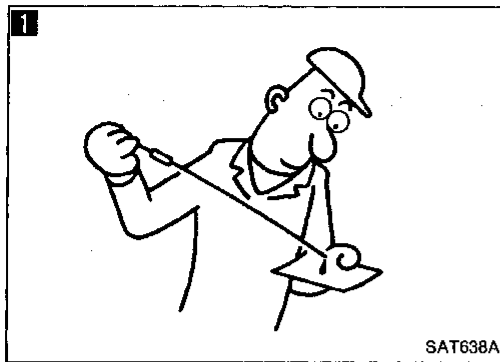
SYMPTOM:

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



TROUBLE DIAGNOSES

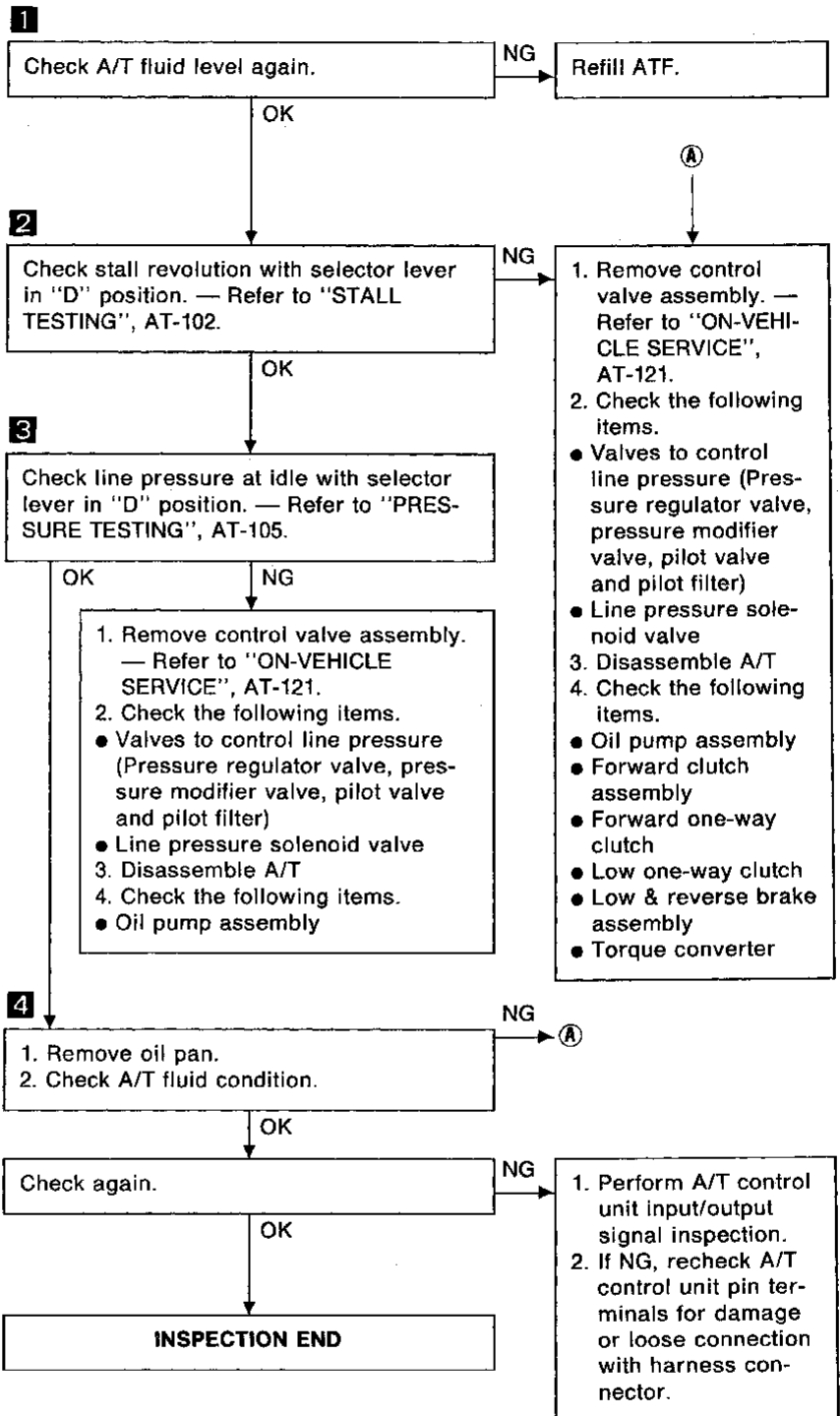
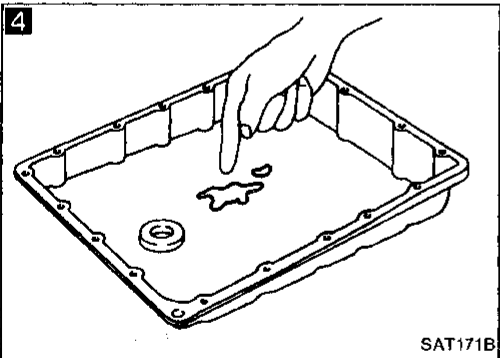
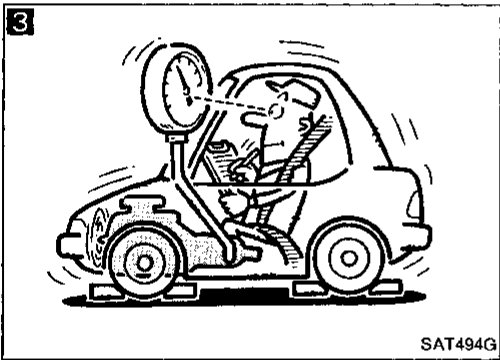
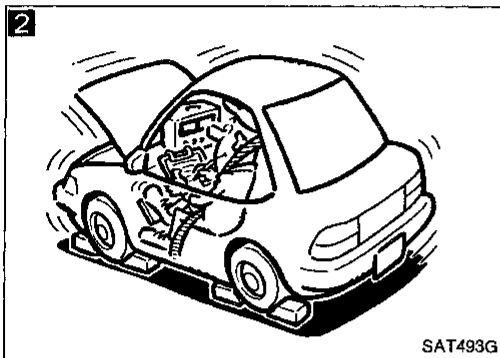
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Diagnostic Procedure 7

SYMPTOM:

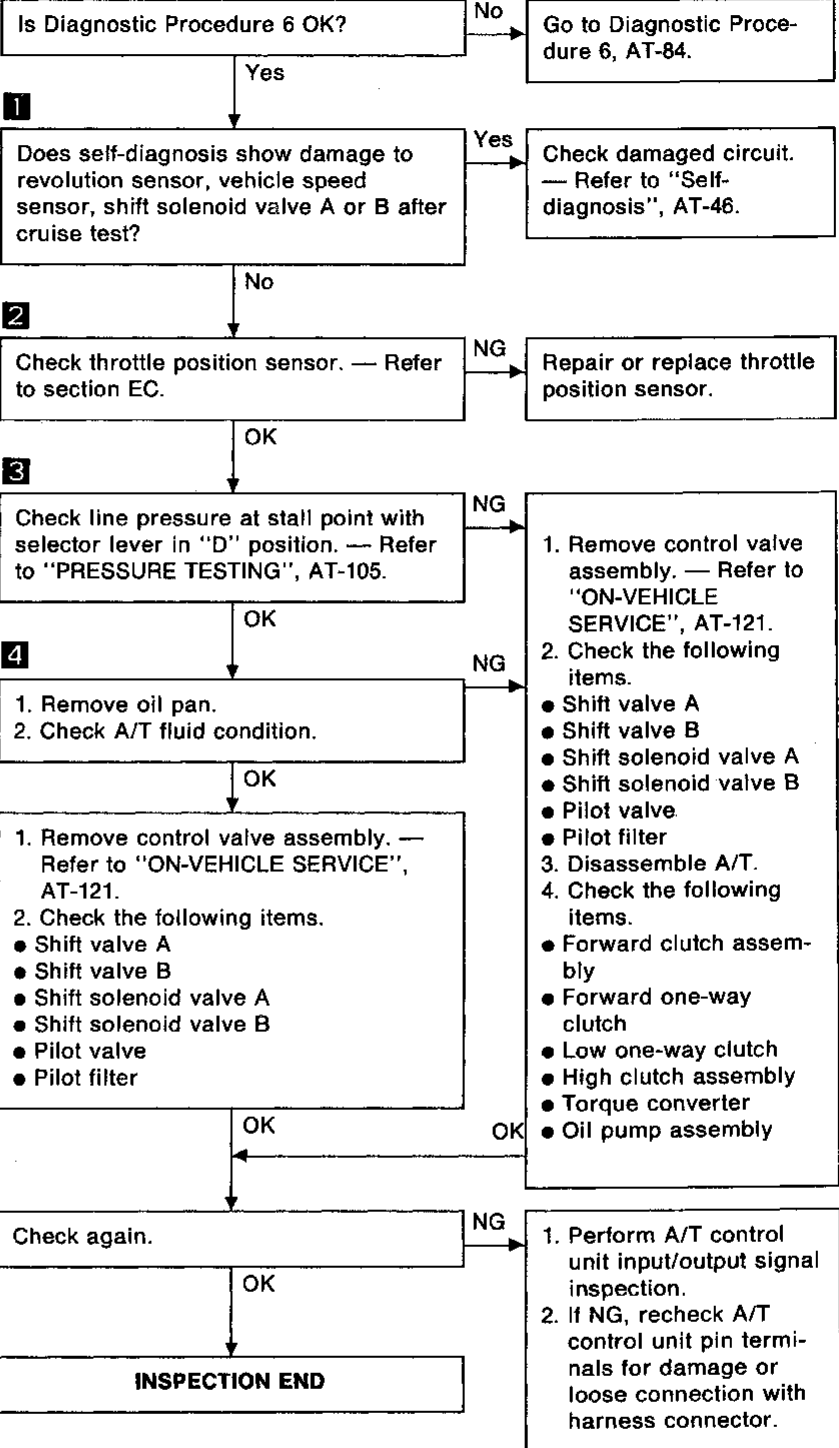
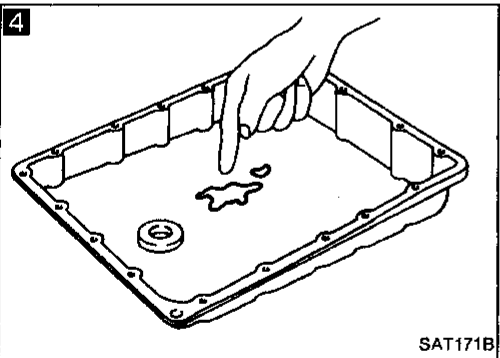
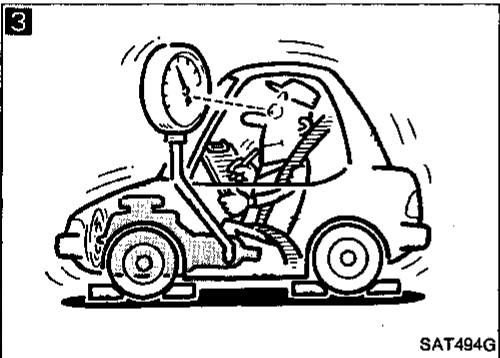
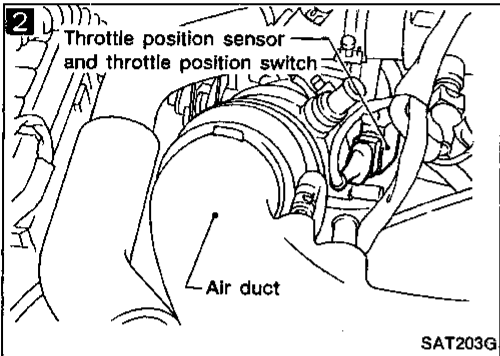
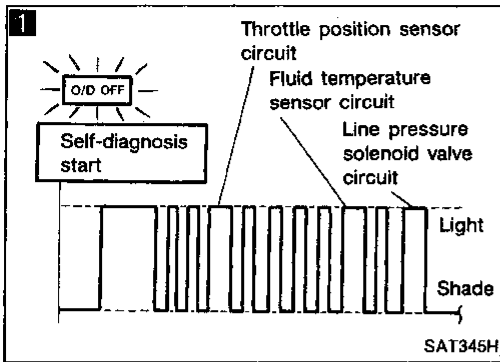
Vehicle does not creep forward when selecting "D", "2" or "1" position.

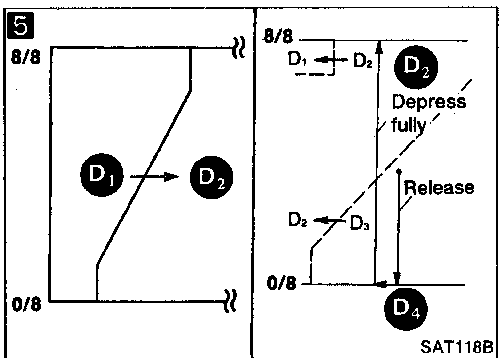
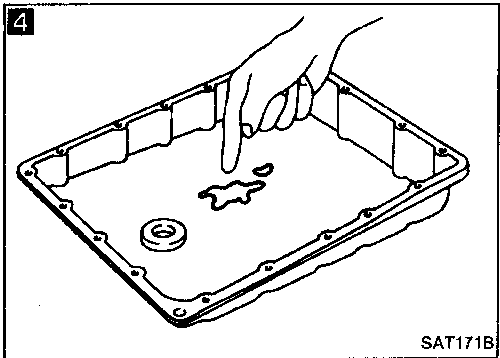
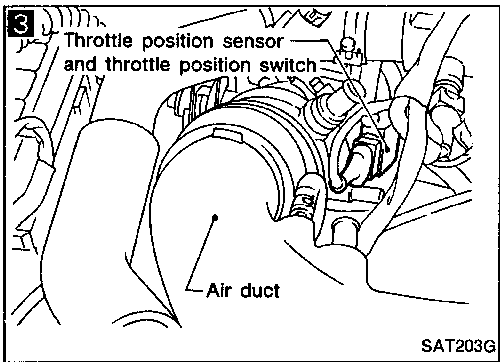
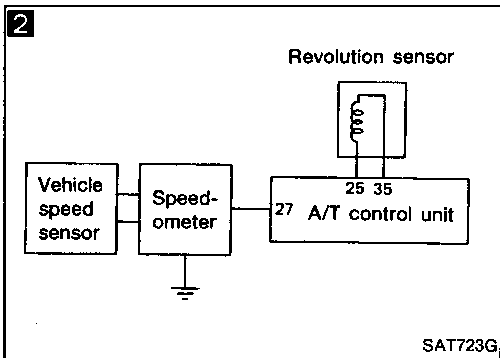
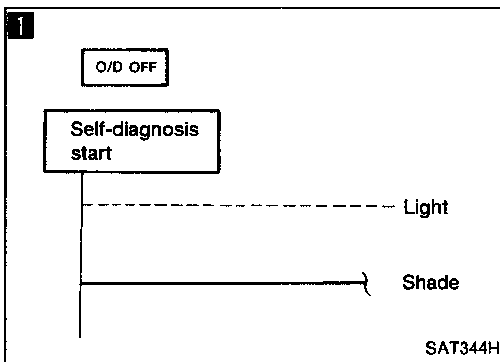


Diagnostic Procedure 8

SYMPTOM:

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



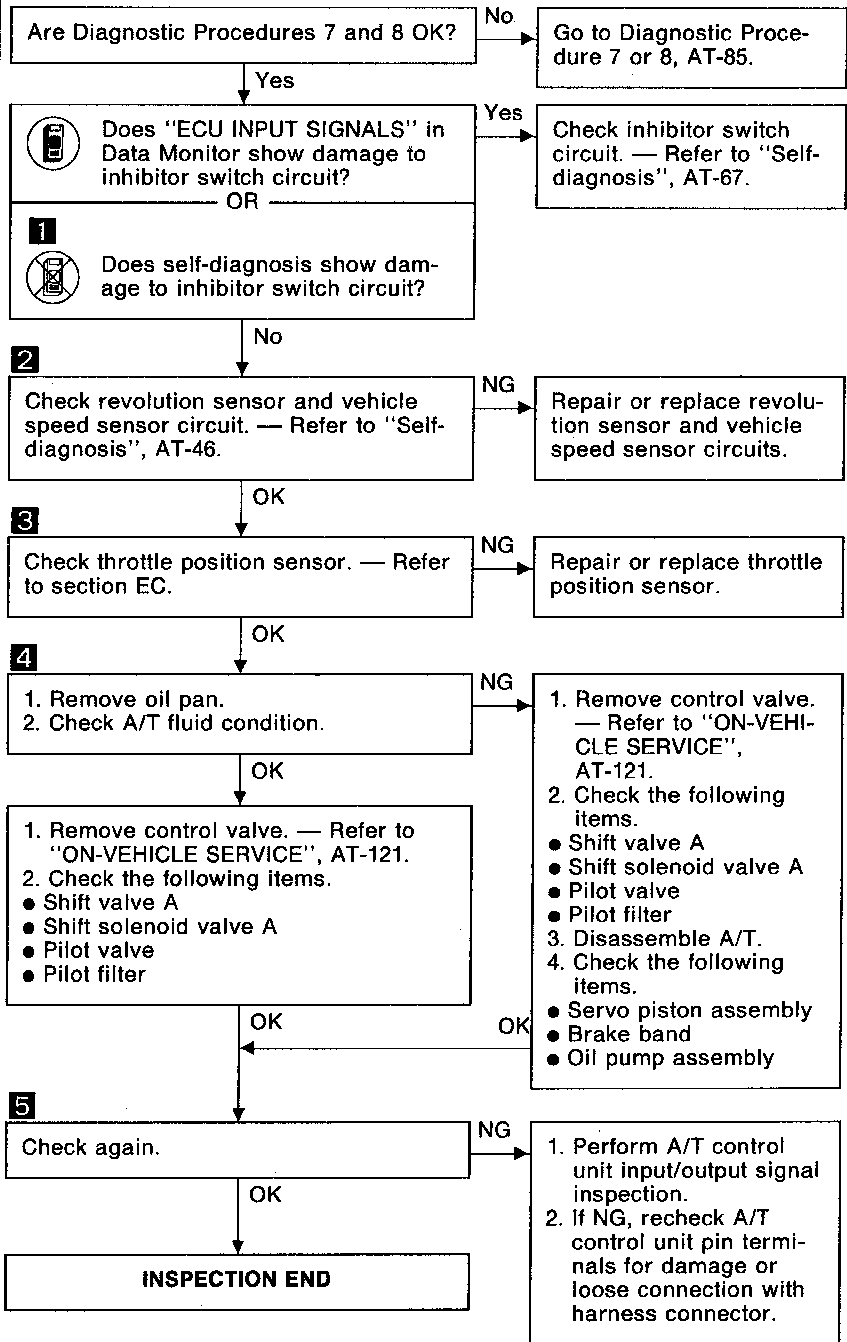


Diagnostic Procedure 9

SYMPTOM:

A/T does not shift from D_1 to D_2 at the specified speed.

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

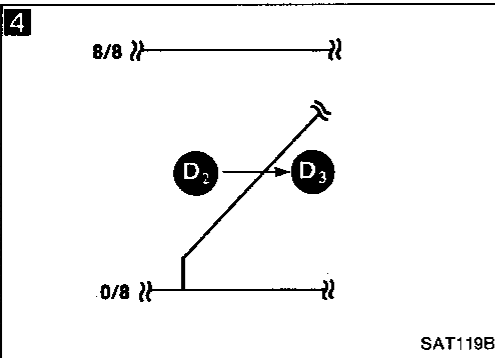
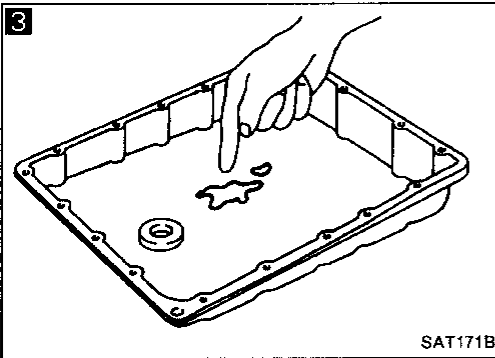
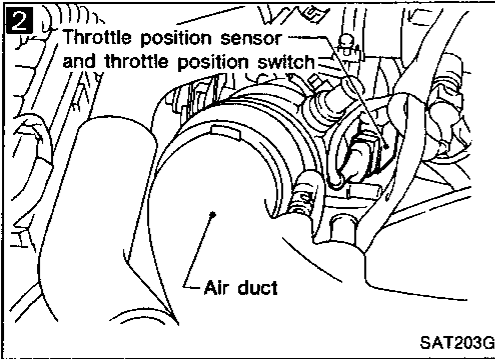
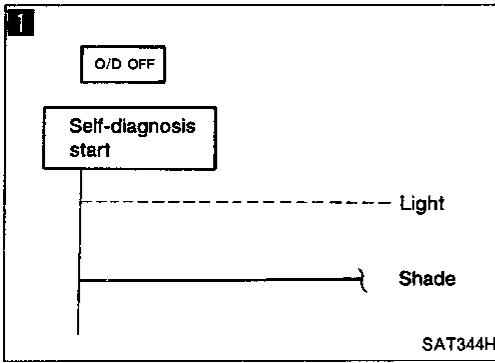


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Diagnostic Procedure 10

SYMPTOM:

A/T does not shift from D₂ to D₃ at the specified speed.



Are Diagnostic Procedures 7 and 8 OK?

No → Go to Diagnostic Procedure 7 or 8, AT-85.

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

Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis", AT-67.

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

2 Check throttle position sensor. — Refer to section EC.

NG → Repair or replace throttle position sensor.

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

NG → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.

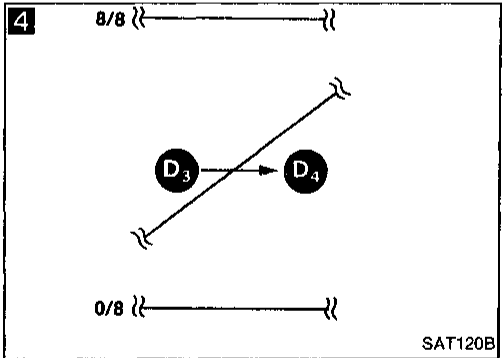
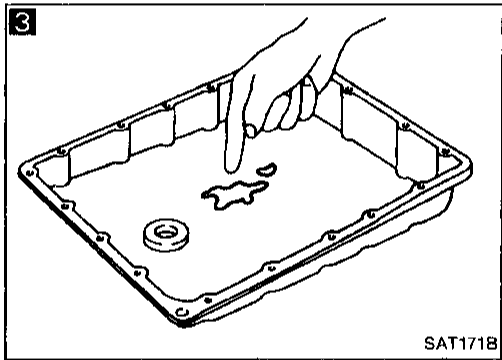
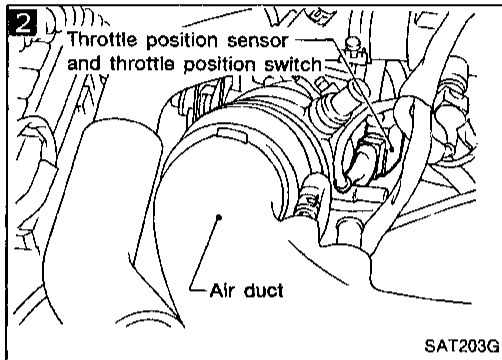
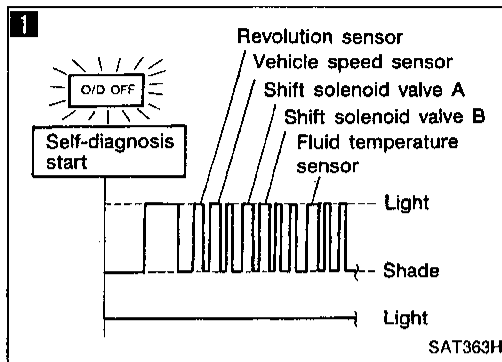
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE", AT-121.
2. Check the following items.
● Shift valve B
● Shift solenoid valve B
● Pilot valve
● Pilot filter

2. Check the following items.
● Shift valve B
● Shift solenoid valve B
● Pilot valve
● Pilot filter
3. Disassemble A/T.
4. Check the following items.
● Servo piston assembly
● High clutch assembly
● Oil pump assembly

4 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.

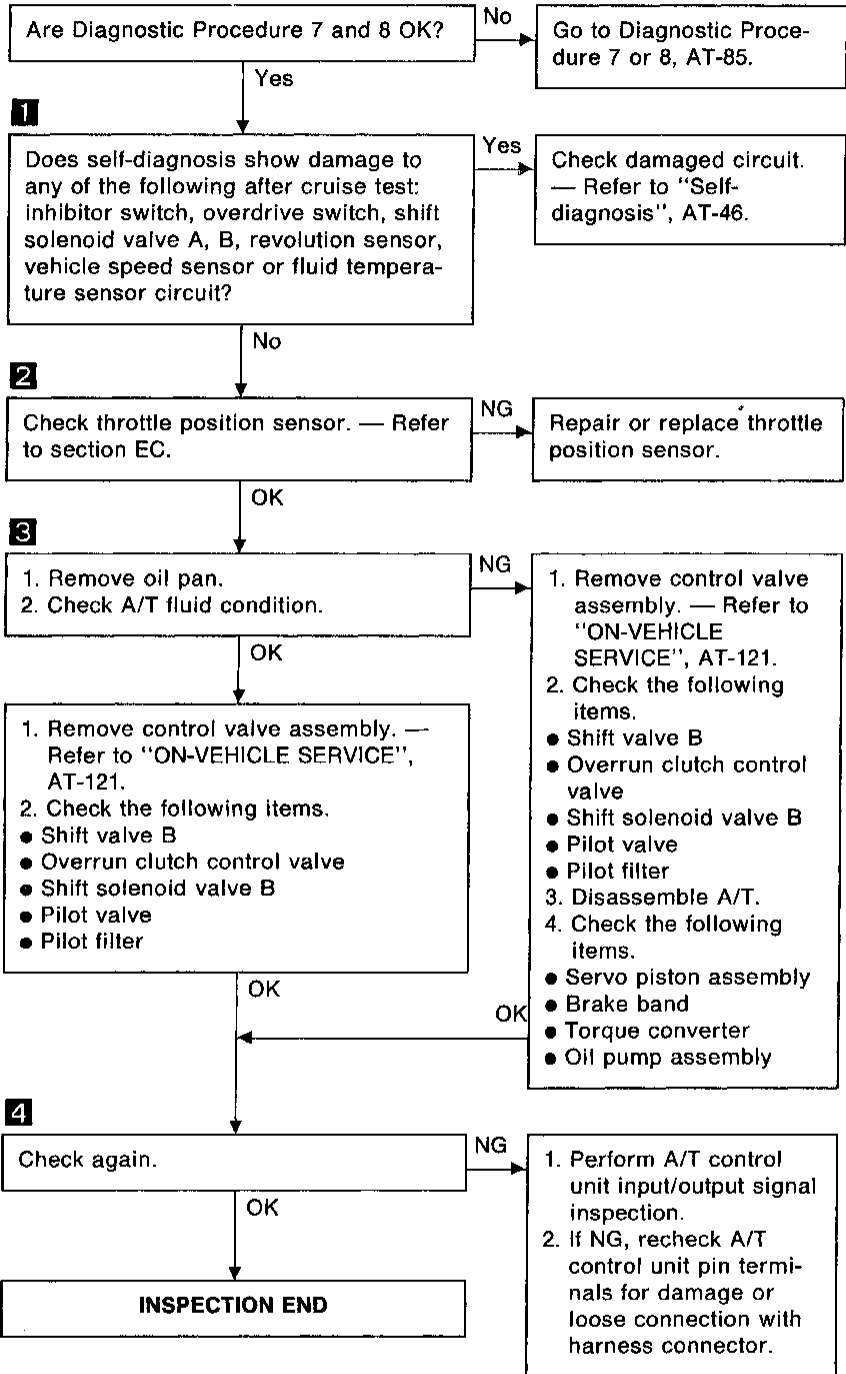
INSPECTION END



Diagnostic Procedure 11

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.**



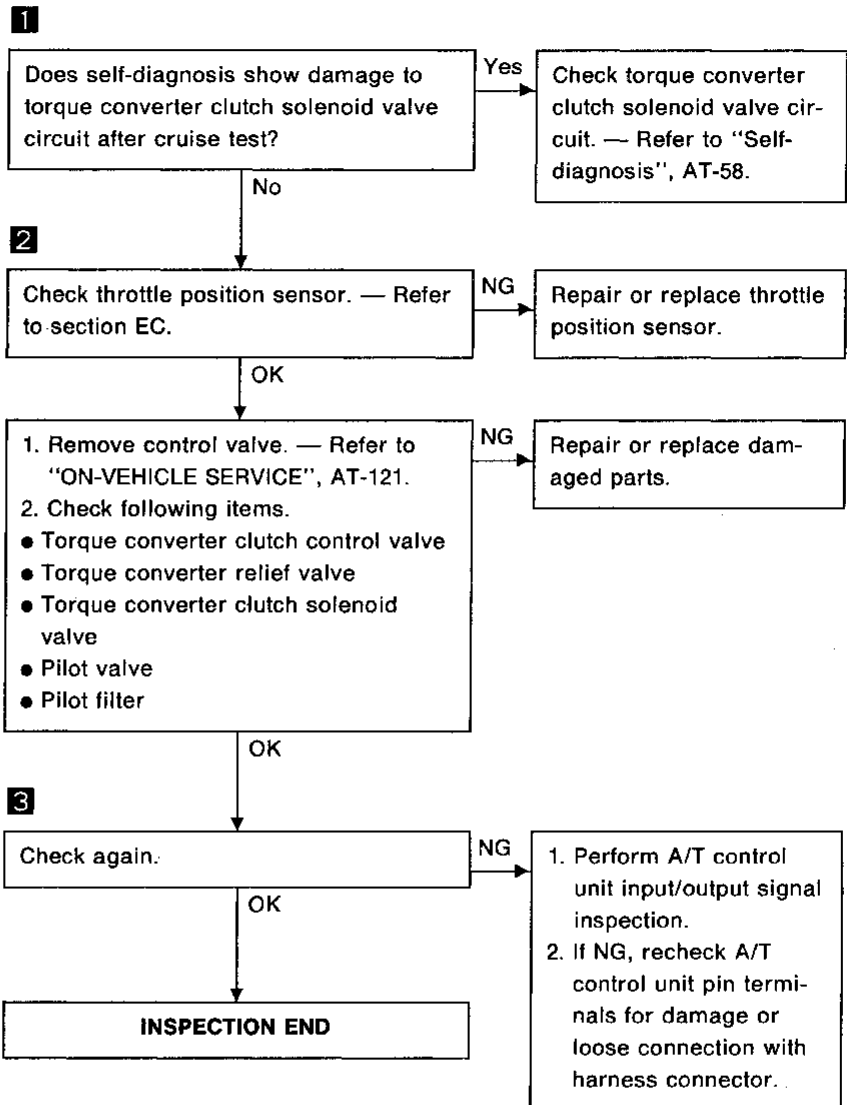
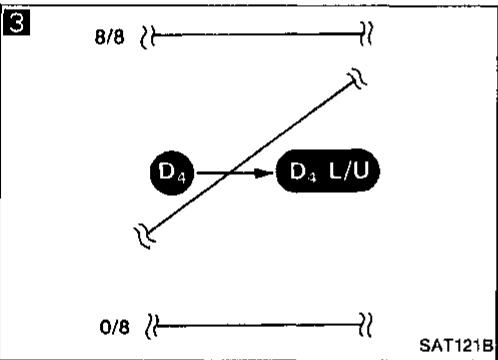
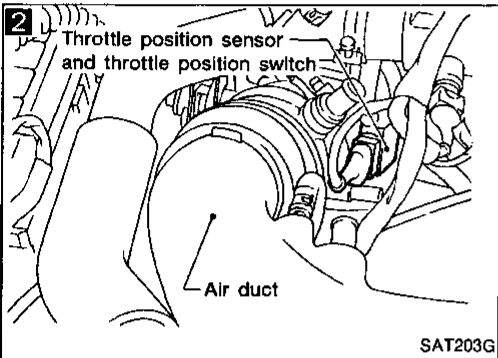
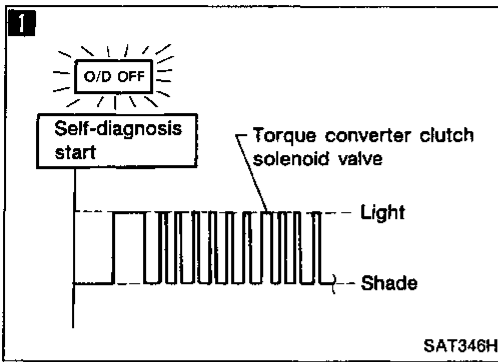
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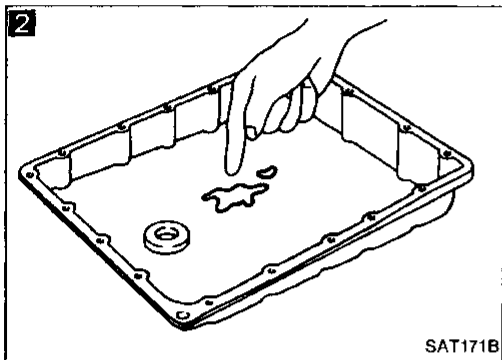
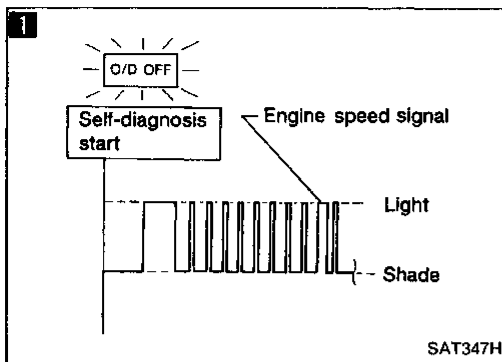
TROUBLE DIAGNOSES

Diagnostic Procedure 12

SYMPTOM:

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

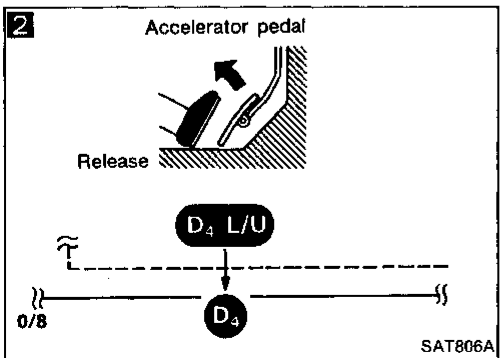
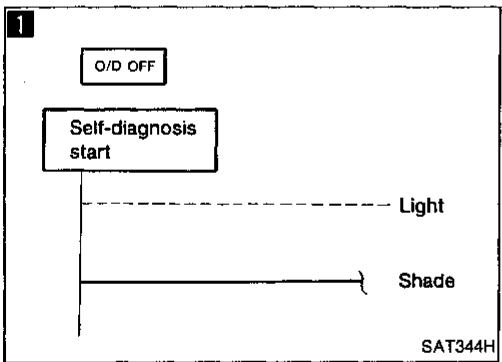
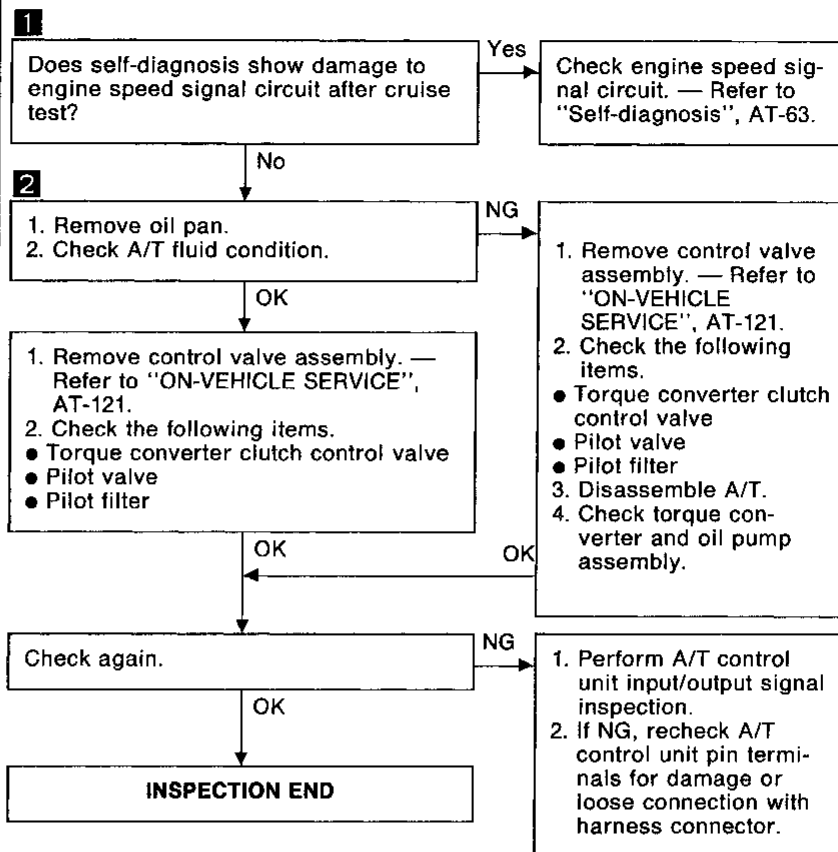




Diagnostic Procedure 13

SYMPTOM:

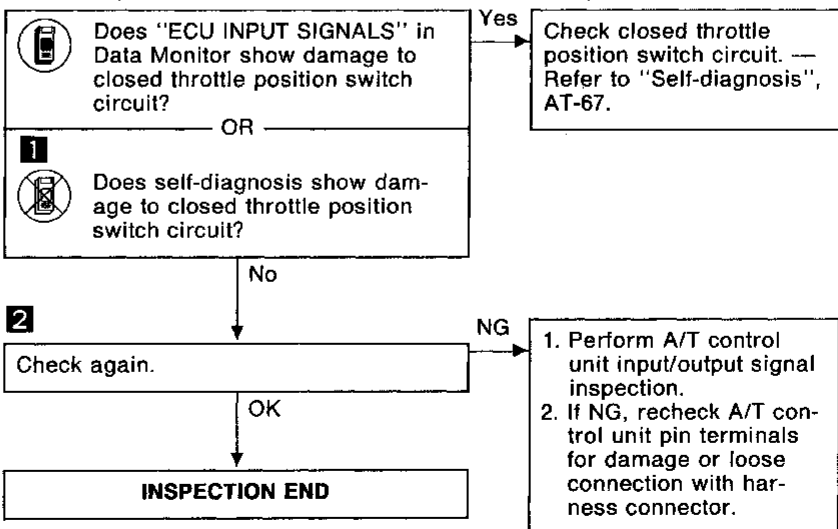
A/T does not hold lock-up condition for more than 30 seconds.



Diagnostic Procedure 14

SYMPTOM:

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

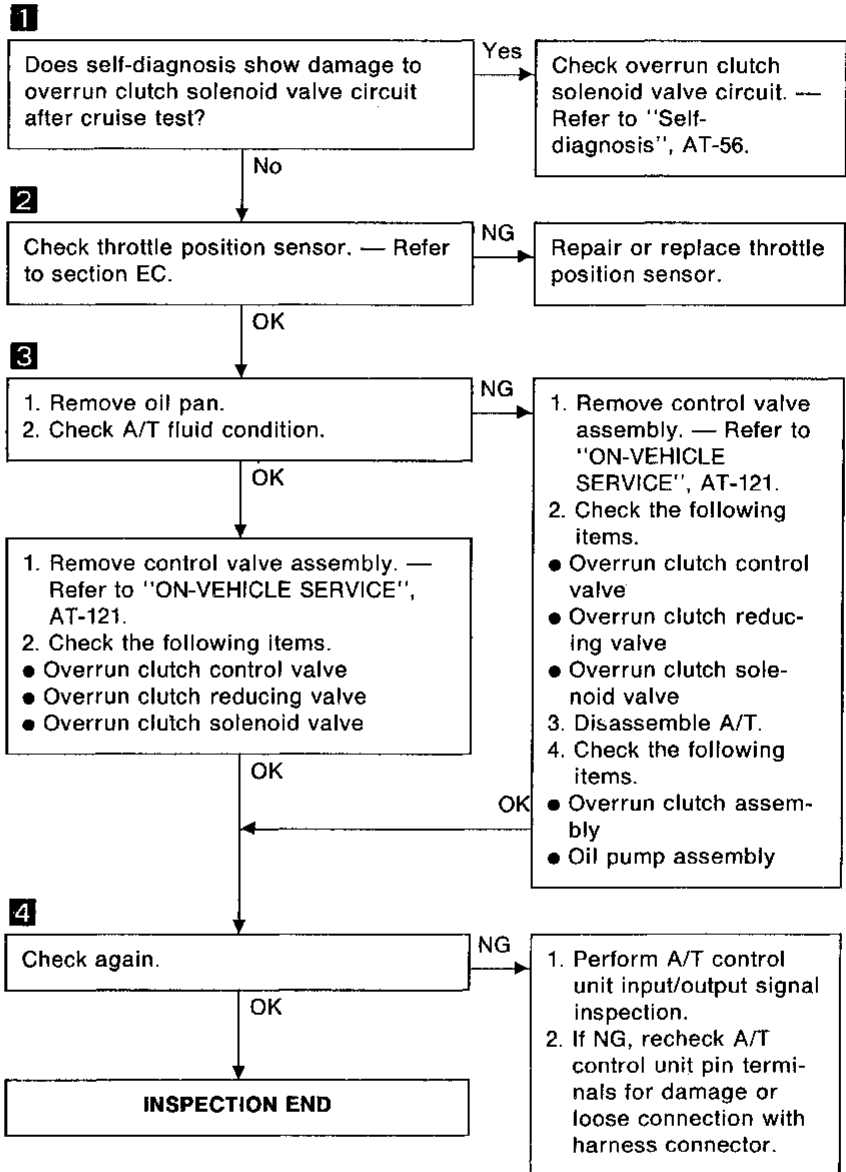
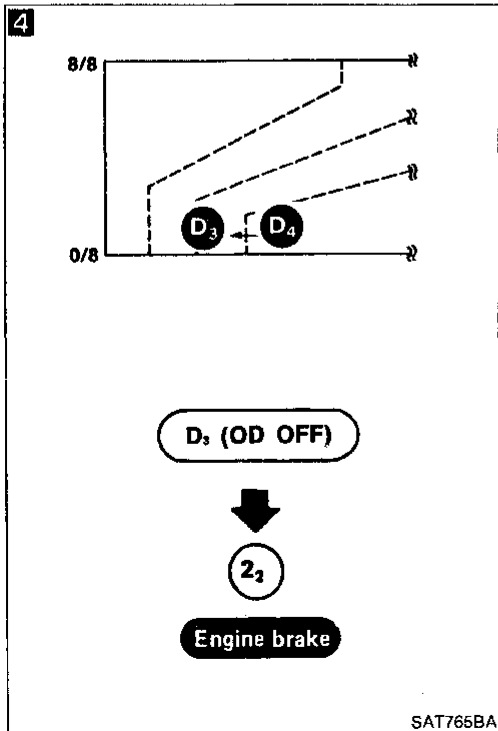
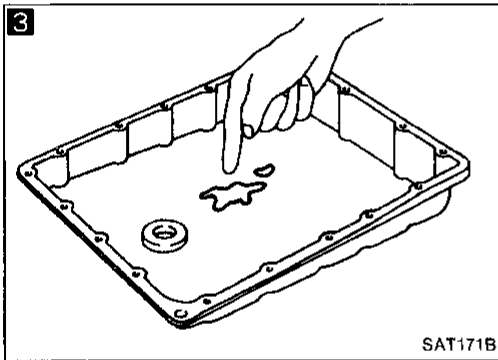
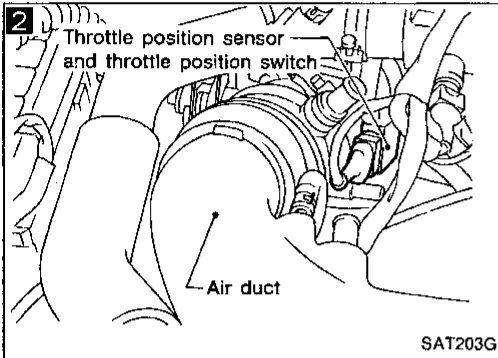
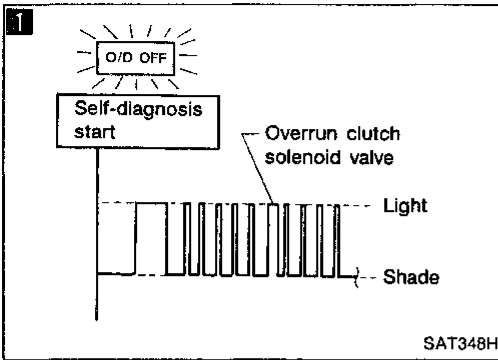


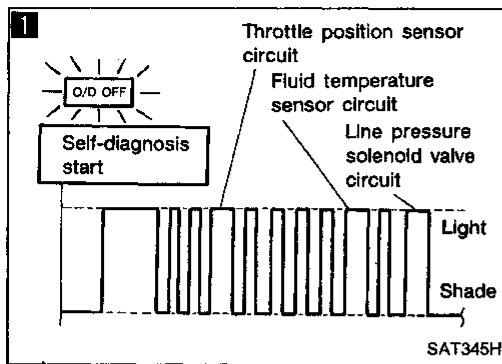
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Diagnostic Procedure 15

SYMPTOM:

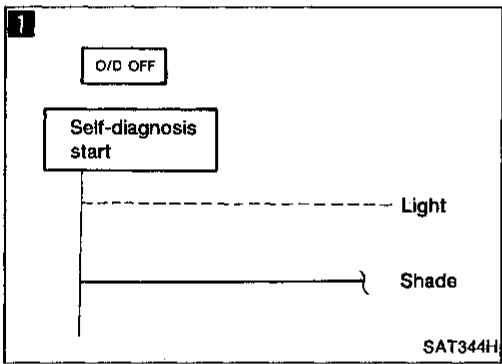
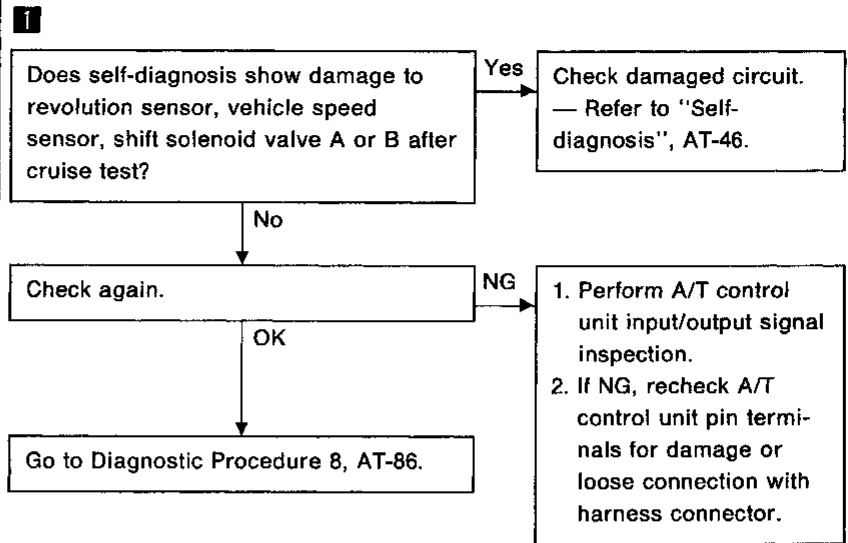
Engine speed does not return to idle smoothly when A/T is shifted from D₄ to D₃ (with accelerator pedal released).
 When turning overdrive switch OFF (with accelerator pedal released), vehicle does not decelerate by engine brake.
 When shifting A/T from "D" to "2" (with accelerator pedal released), vehicle does not decelerate by engine brake.





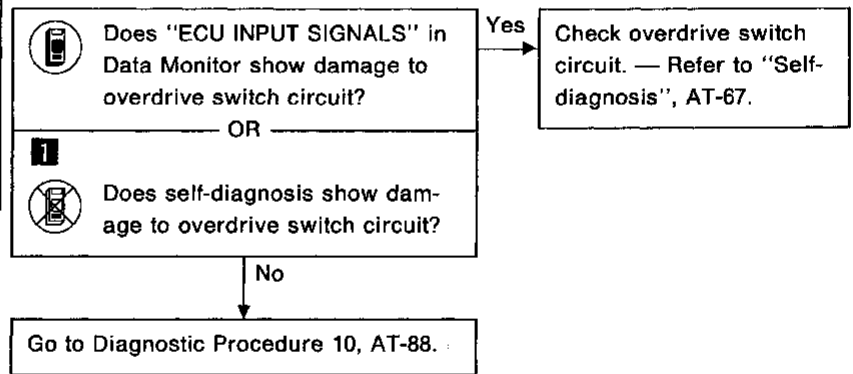
Diagnostic Procedure 16

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



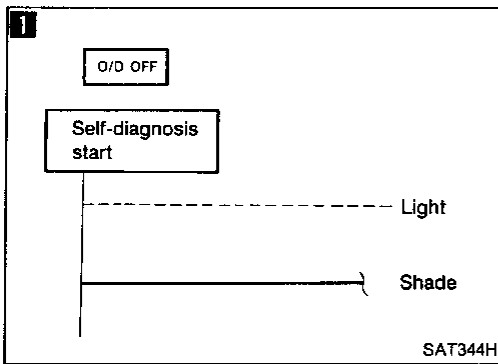
Diagnostic Procedure 17

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



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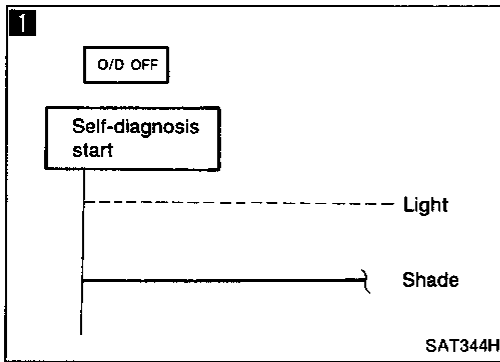
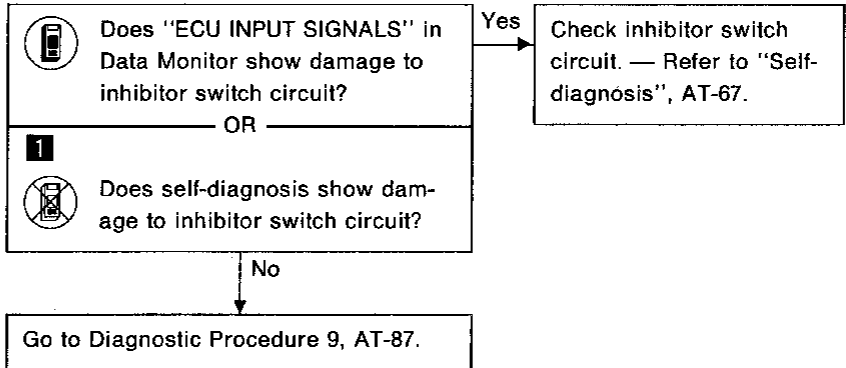
TROUBLE DIAGNOSES



Diagnostic Procedure 18

SYMPTOM:

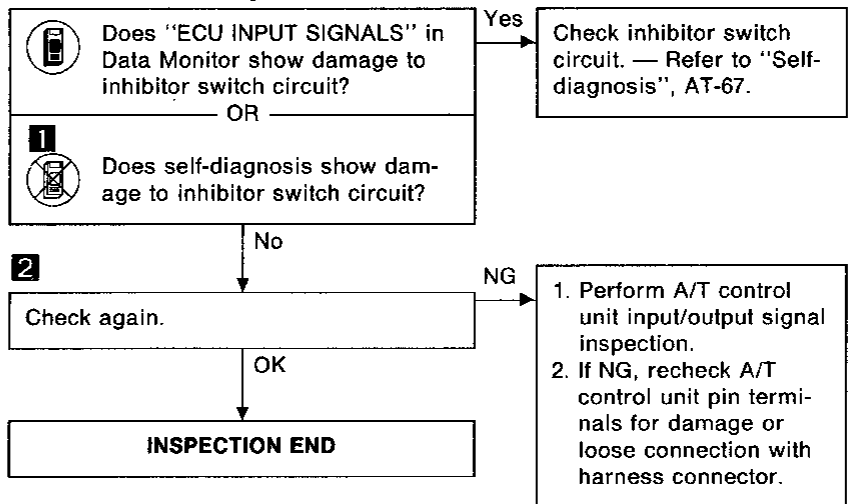
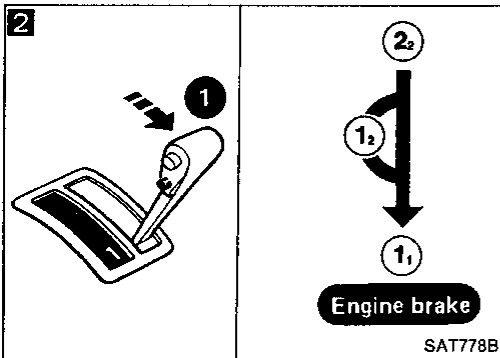
A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" position.



Diagnostic Procedure 19

SYMPTOM:

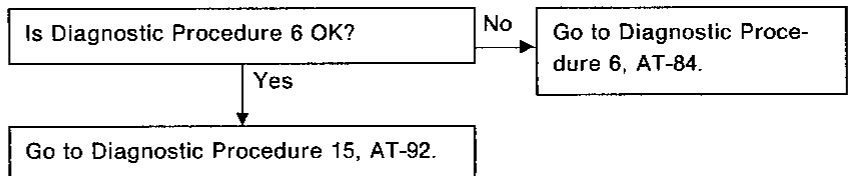
A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.



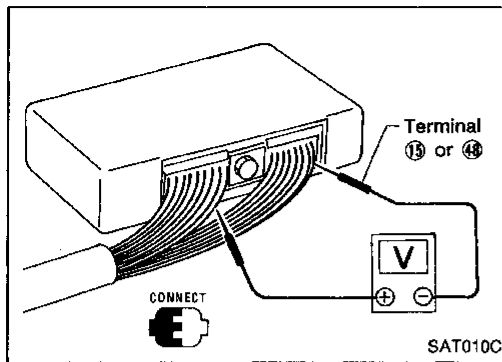
Diagnostic Procedure 20

SYMPTOM:

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



TROUBLE DIAGNOSES

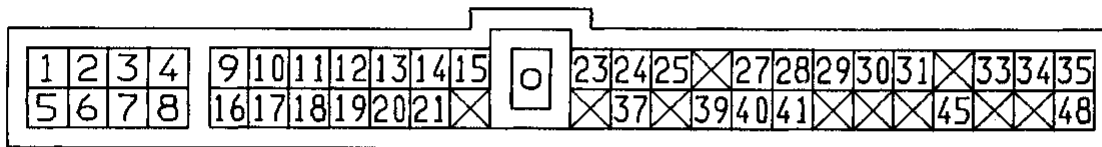


Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

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

- Pin connector terminal layout



SAT389H

A/T CONTROL UNIT INSPECTION TABLE

(Data are reference values.)

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

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TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)




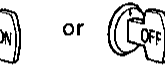

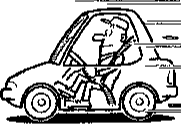
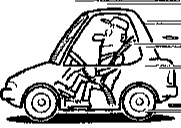

Terminal No.	Item	Condition	Judgement standard
5	Torque converter clutch solenoid valve	When A/T performs lock-up.	8 - 15V
		When A/T does not perform lock-up.	1V or less
6	Shift solenoid valve A	When shift solenoid valve A operates. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage
		When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less
7	Shift solenoid valve B	When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage
		When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	1V or less
8	Overrun clutch solenoid valve	When overrun clutch solenoid valve operates.	Battery voltage
		When overrun clutch solenoid valve does not operate.	1V or less
9	Power source	Same as No. 4	
10*	DT1	—	—
11*	DT2	—	—
12*	DT3	—	—
13*	"N" position signal	—	—
14	Closed throttle position switch (in throttle position switch)	When releasing accelerator pedal after warming up engine.	Battery voltage
		When depressing accelerator pedal after warming up engine.	1V or less
15	Ground	—	—
16	Inhibitor "1" position switch	When setting selector lever to "1" position.	Battery voltage
		When setting selector lever to other positions.	1V or less
17	Inhibitor "2" position switch	When setting selector lever to "2" position.	Battery voltage
		When setting selector lever to other positions.	1V or less
18	Inhibitor "D" position switch	When setting selector lever to "D" position.	Battery voltage
		When setting selector lever to other positions.	1V or less



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

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition	Judgement standard		
19	Inhibitor "N" or "P" position switch		When setting selector lever to "N" or "P" position.	Battery voltage	GI
			When setting selector lever to other positions.	1V or less	
20	Inhibitor "R" position switch		When setting selector lever to "R" position.	Battery voltage	MA
			When setting selector lever to other positions.	1V or less	EM
21	Wide open throttle position switch (in throttle position switch)		When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage	LC
			When releasing accelerator pedal after warming up engine.	1V or less	EC
22	—	—	—	—	
23	Power source (Back-up)		When turning ignition switch to "OFF".	Battery voltage	FE
			When turning ignition switch to "ON".	Battery voltage	CL
24	Engine speed signal		When engine runs at idle speed.	0.6V	MT
			When engine runs at 4,000 rpm.	Approximately 2.2V	
25	Revolution sensor (Measure in AC position)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.	AT
			When vehicle parks.	0V	PD
26	—	—	—	—	FA
27	Vehicle speed sensor		When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V	RA
28*	—	—	—	—	
29*	—	—	—	—	
30*	—	—	—	—	BR
31	Throttle position sensor (Power source)		—	4.5 - 5.5V	ST
32	—	—	—	—	BF

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

HA

EL

IDX

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition	Judgement standard
33	Fluid temperature sensor	When ATF temperature is 20°C (68°F).	Approximately 1.5V
		When ATF temperature is 80°C (176°F).	Approximately 0.5V
34	Throttle position sensor	When depressing accelerator pedal slowly after warming up engine. (Voltage rises gradually in response to throttle position.)	Fully-closed throttle: 0.2 - 0.6V Fully-open throttle: 2.9 - 3.9V
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 OFF indicator lamp	When setting overdrive switch in "ON" position	Battery voltage
		When setting overdrive switch in "OFF" position	1V or less
40	ASCD OD cut signal	When "ACCEL" set switch on ASCD cruise is released.	5 - 8V
		When "ACCEL" set switch on ASCD cruise is applied.	1V or less
41	Kickdown switch	When accelerator pedal is released after warming up engine.	3 - 8V
		When accelerator pedal is depressed fully after warming up engine.	1V or less
42	—	—	—
43	—	—	—
44	—	—	—
45*	OBD-II	—	—
46	—	—	—
47	—	—	—
48	Ground	—	—

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

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

SOLENOID VALVES AND FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE", AT-121.

Solenoid valves

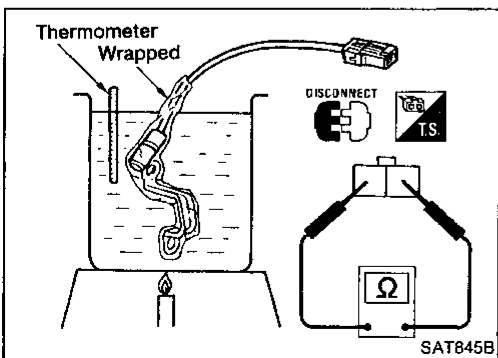
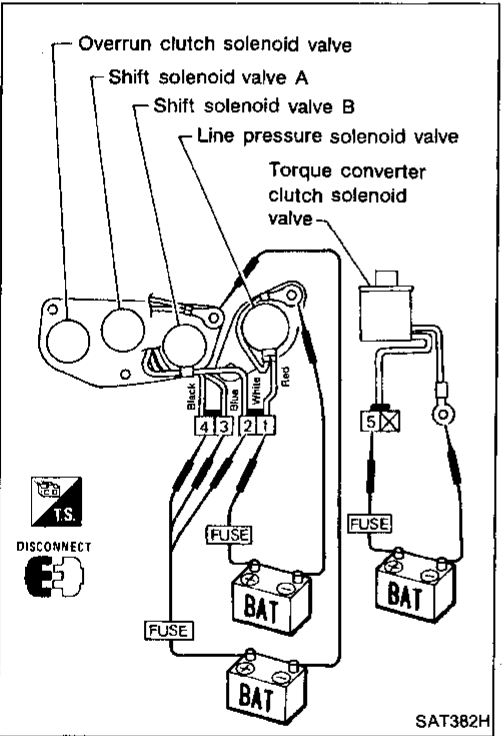
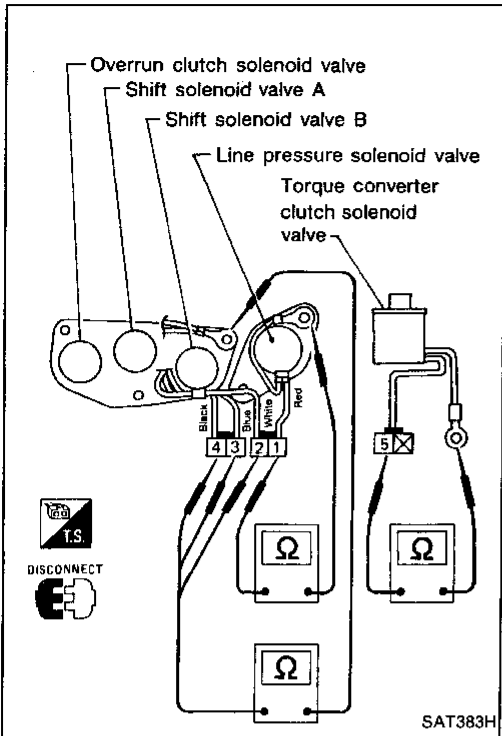
Resistance check

- Check resistance between two terminals.

Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve A	③	20 - 30Ω
Shift solenoid valve B	②	
Overrun clutch solenoid valve	④	2.5 - 5Ω
Line pressure solenoid valve	①	
Torque converter clutch solenoid valve	⑤	
	Ground	10 - 16Ω

Operation check

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



FLUID TEMPERATURE SENSOR

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

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

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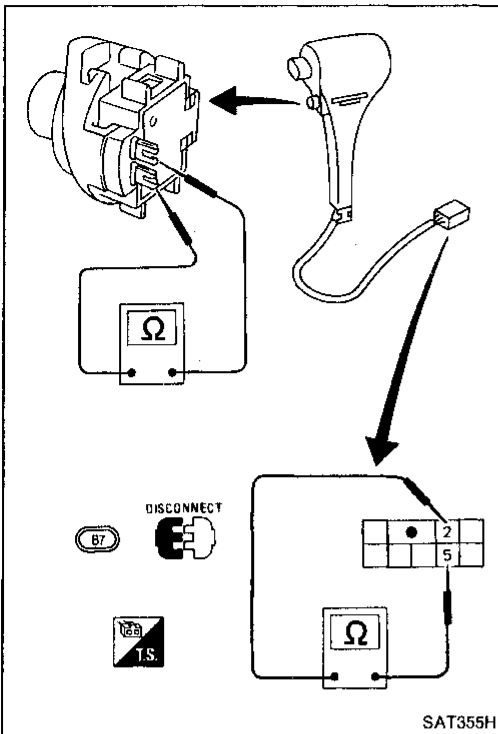
TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

OVERDRIVE SWITCH

- Check continuity between two terminals.

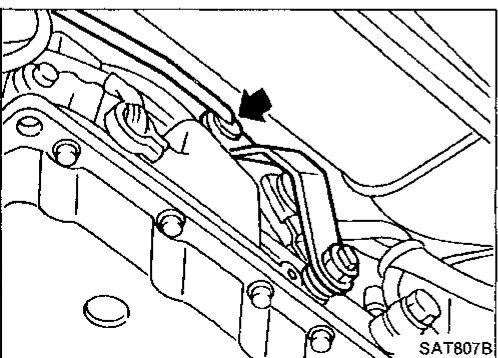
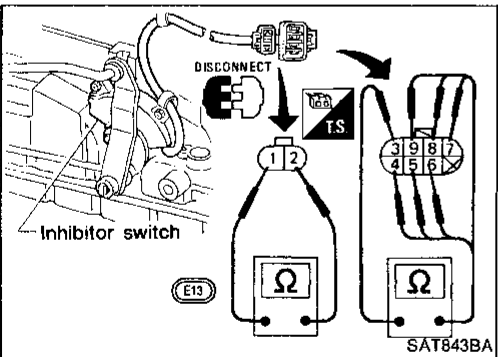
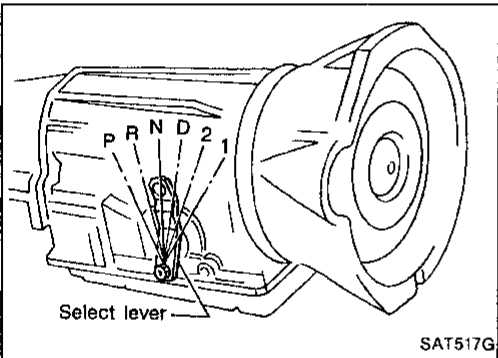
OD switch position	Continuity
ON	No
OFF	Yes



INHIBITOR SWITCH

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

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



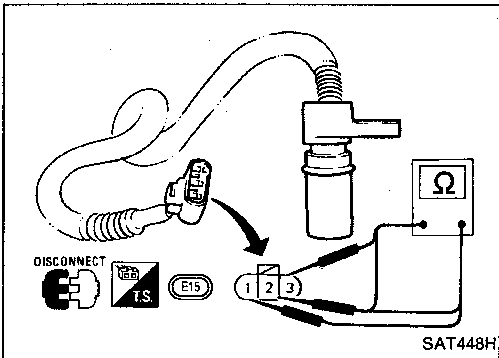
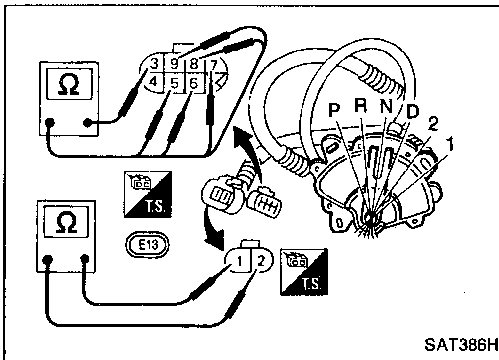
2. If NG, check again with manual control linkage disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If OK on step 2, adjust manual control linkage. — Refer to "ON-VEHICLE SERVICE", AT-123.

TROUBLE DIAGNOSES

Electrical Components Inspection (Cont'd)

4. If NG on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminals. — Refer to step 1.
5. If OK on step 4, adjust inhibitor switch. — Refer to "ON-VEHICLE SERVICE", AT-123.
6. If NG on step 4, replace inhibitor switch.

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EM

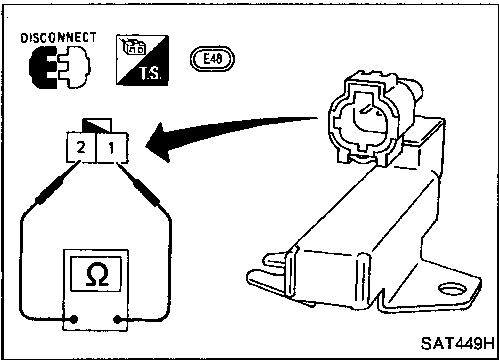


REVOLUTION SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE", AT-121.
- Check resistance between terminals ①, ② and ③.

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

LC
EC
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CL



DROPPING RESISTOR

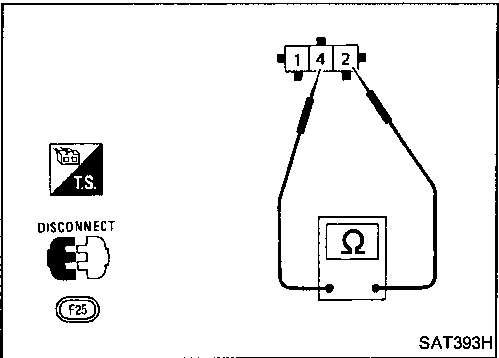
- Check resistance between two terminals.
Resistance: 11.2 - 12.8Ω

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THROTTLE POSITION SWITCH

Closed throttle position switch (idle position)

- Check continuity between terminals ② and ④.

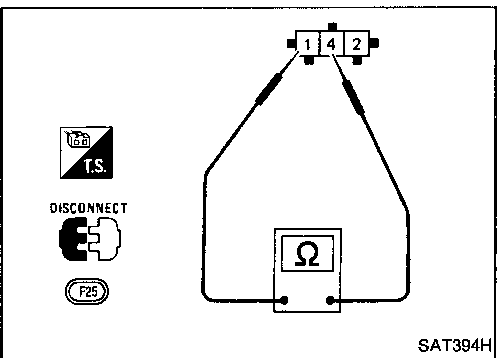
Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

RA

BR

ST

BF



Wide open throttle position switch

- Check continuity between terminals ① and ④.

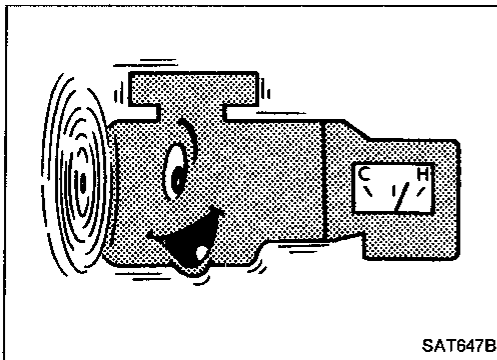
Accelerator pedal condition	Continuity
Released	No
Depressed	Yes

HA

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TROUBLE DIAGNOSES



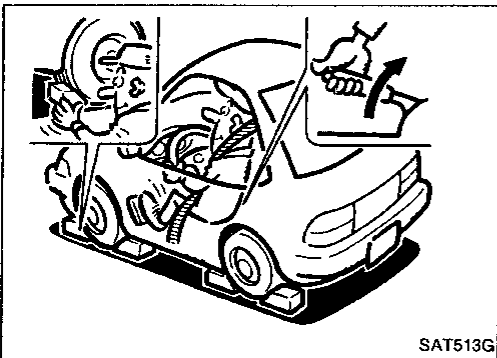
Final Check

STALL TESTING

Stall test procedure

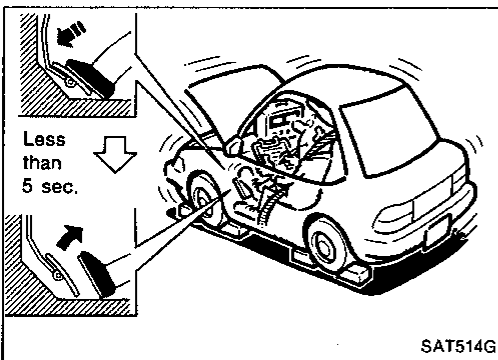
1. Check A/T and engine fluid levels. If necessary, add.
2. Drive vehicle for about 10 minutes to warm engine oil and ATF up to operating temperature.

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



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

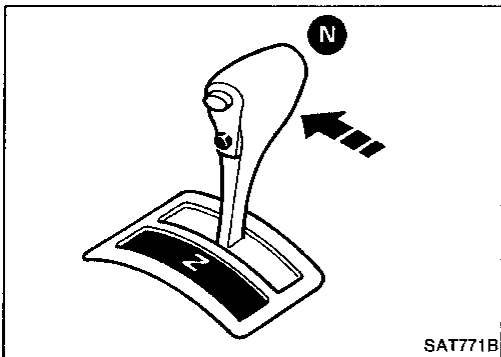
- It is good practice to put a mark on point of specified engine rpm on indicator.



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:
2,050 - 2,250 rpm



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

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

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

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-13.

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 GI
- Slippage occurs at the following gears:
1st through 3rd gears in "D" position and engine brake functions. MA
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 EM

Stall revolution is too high in "R" position:

- Engine brake does not function in "1" position. Low & reverse brake slippage LC
- 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 EC

CAUTION:

Be careful since automatic fluid temperature increases abnormally.

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

Stall revolution less than specifications:

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

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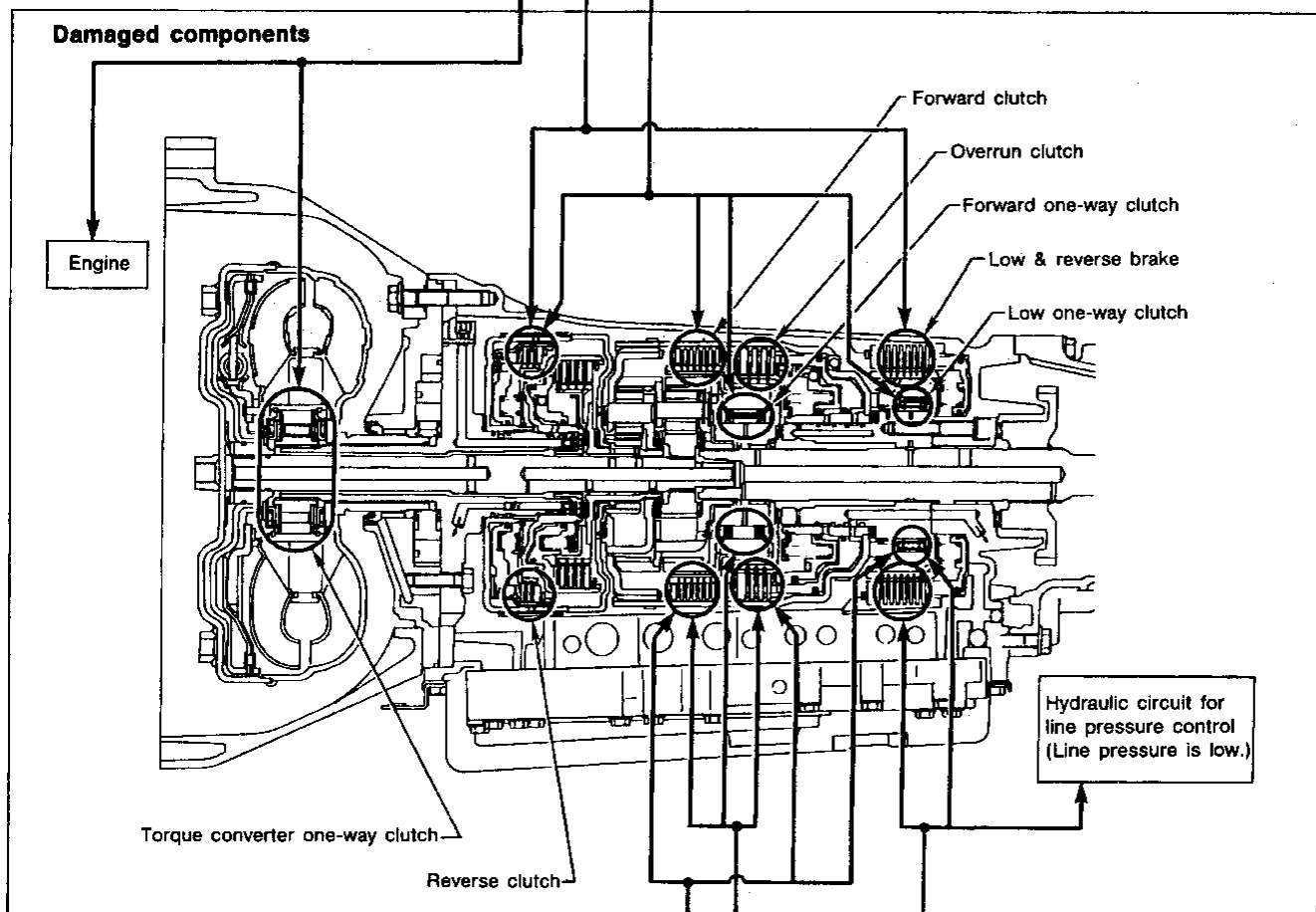
TROUBLE DIAGNOSES

Final Check (Cont'd)

Judgement of stall test

Selector lever position	Judgement		
	L	O	H
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.



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.

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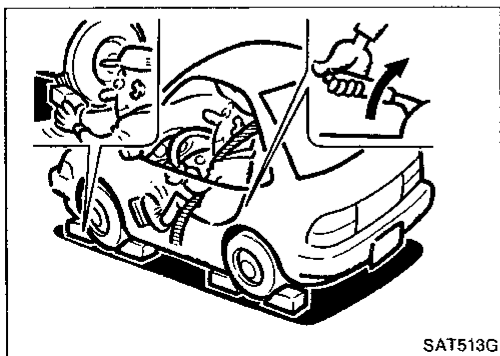
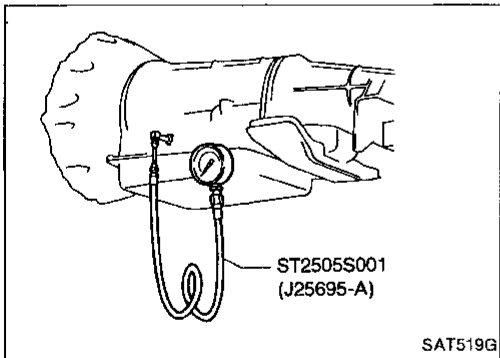
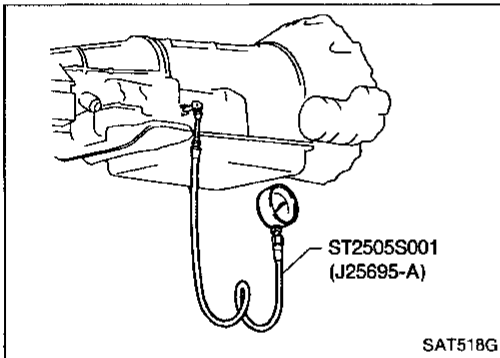
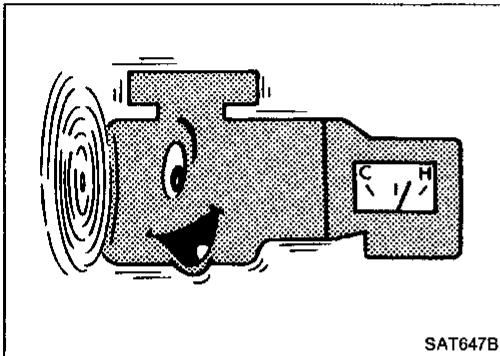
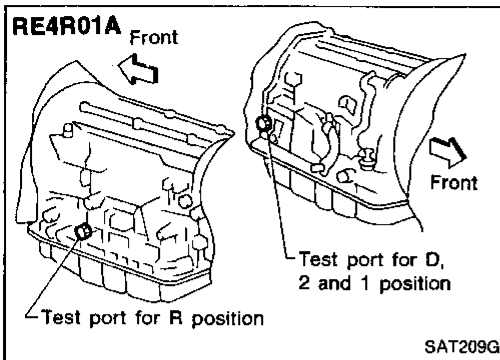
ST

BF

HA

EL

IDX



Line pressure test procedure

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

ATF operating temperature:

50 - 80°C (122 - 176°F)

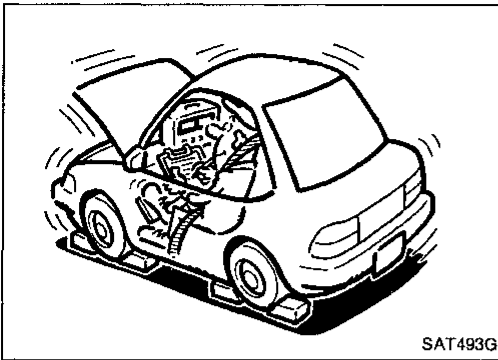
3. Install pressure gauge to corresponding line pressure port.

4. Set parking brake and block wheels.

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

TROUBLE DIAGNOSES

Final Check (Cont'd)



5. Start engine and measure line pressure at idle and stall speed.
 - When measuring line pressure at stall speed, follow the stall test procedure.

Line pressure: Refer to SDS, AT-203.

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
	Line pressure is low in particular position.	<ul style="list-style-type: none"> ● Fluid pressure leakage between manual valve and particular clutch ● For example: If line pressure is low in "R" and "1" positions but is normal in "D" and "2" positions: Fluid leakage exists at or around low & reverse brake circuit.
	Line pressure is high.	<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
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

TROUBLE DIAGNOSES

Symptom Chart

Reference page (AT-)	Reference page (AT-)	ON vehicle										OFF vehicle																					
		22, 123	123	46, 48, 63	105	52, 121	54, 65	58, 58	60, 121	121	121	132, 143	160, 164	166	166, 175	170, 179	183																
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 speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	Fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components	
81	Engine does not start in "N", "P" positions.	2	3																	1													
81	Engine starts in position other than "N" and "P" positions.	1	2																														
—	Transmission noise in "P" and "N" positions.	1		3	4	5		2														7	6										
81	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	1																														2	
82	Vehicle runs in "N" position.	1																		2				4		3		5					
84	Vehicle will not run in "R" position (but runs in "D", "2" and "1" positions). Clutch slips. Very poor acceleration.	1					2	4			3													5	6	7		8		9			
—	Vehicle braked when shifting into "R" position.	1	2				3	5		4														6	8		9			7			
—	Sharp shock in shifting from "N" to "D" position.			2		5	1	3	7		6			4	8											9							
—	Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions).	1																										2					
85	Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). Clutch slips. Very poor acceleration.	1					2	4			3					5								6	7	8	9		10				
—	Clutches or brakes slip somewhat in starting.	1	2	3			4	6		5						7			8			13	12	10		9			11				
—	Excessive creep.					1																											
84, 85	No creep at all.	1					2	3															5	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			
87, 88, 89	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																5			
—	Too sharp a shock in change from "D ₂ " to "D ₃ ".		1			2	4										3													6			

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TROUBLE DIAGNOSES

Symptom Chart (Cont'd)

Reference page (AT-)	Reference page (AT-)	ON vehicle										OFF vehicle																					
		22, 123	123	46, 48, 63	105	52, 121	54, 65	58, 56	60, 121	121	121	132, 143	160, 164	166	166, 175	170, 179	183																
Reference page (AT-)		Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	Fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components	
—	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.																																
—	Too sharp a shock in change from "D ₃ " to "D ₄ ".			1				2	4											3								5		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						5						7		
—	Almost no shock or slipping in change from "D ₃ " to "D ₄ ".	1		2				3	5											4					6						7		
—	Vehicle braked by gear change from "D ₁ " to "D ₂ ".	1																						2	4				5	3			
—	Vehicle braked by gear change from "D ₂ " to "D ₃ ".	1																													2		
—	Vehicle braked by gear change from "D ₃ " to "D ₄ ".	1																						4			3	2					
—	Maximum speed not attained. Acceleration poor.	1	2						5	3	4												11	10	6	7				9	8		
—	Failure to change gear from "D ₄ " to "D ₃ ".	1		2					6	4		5	3															6		7			
—	Failure to change gear from "D ₃ " to "D ₂ " or from "D ₄ " to "D ₂ ".	1		2					5	3	4														5						7		
—	Failure to change gear from "D ₂ " to "D ₁ " or from "D ₃ " to "D ₁ ".	1		2					5	3	4														7			6		8			
—	Gear change shock felt during deceleration by releasing accelerator pedal.			1			2	4					3																				
—	Too high a change point from "D ₄ " to "D ₃ ", from "D ₃ " to "D ₂ ", from "D ₂ " to "D ₁ ".			1	2																												
—	Kickdown does not operate when depressing pedal in "D ₄ " within kickdown vehicle speed.			1	2					3	4																						
—	Kickdown operates or engine overruns when depressing pedal in "D ₄ " beyond kickdown vehicle speed limit.			2	1					3	4																						
—	Races extremely fast or slips in changing from "D ₄ " to "D ₃ " when depressing pedal.	1		2				3	5		4														6	7							
—	Races extremely fast or slips in changing from "D ₄ " to "D ₂ " when depressing pedal.	1		2				3	6	5	4																8				7		
—	Races extremely fast or slips in changing from "D ₃ " to "D ₂ " when depressing pedal.	1		2				3	5		4			6		7										14	9				8		
—	Races extremely fast or slips in changing from "D ₄ " or "D ₃ " to "D ₁ " when depressing pedal.	1		2				3	5		4																6	7		8			
—	Vehicle will not run in any position.	1	2					3			4												9	5	6					8	7	10	
—	Transmission noise in "D", "2", "1" and "R" positions.	1																					2										

TROUBLE DIAGNOSES

Symptom Chart (Cont'd)

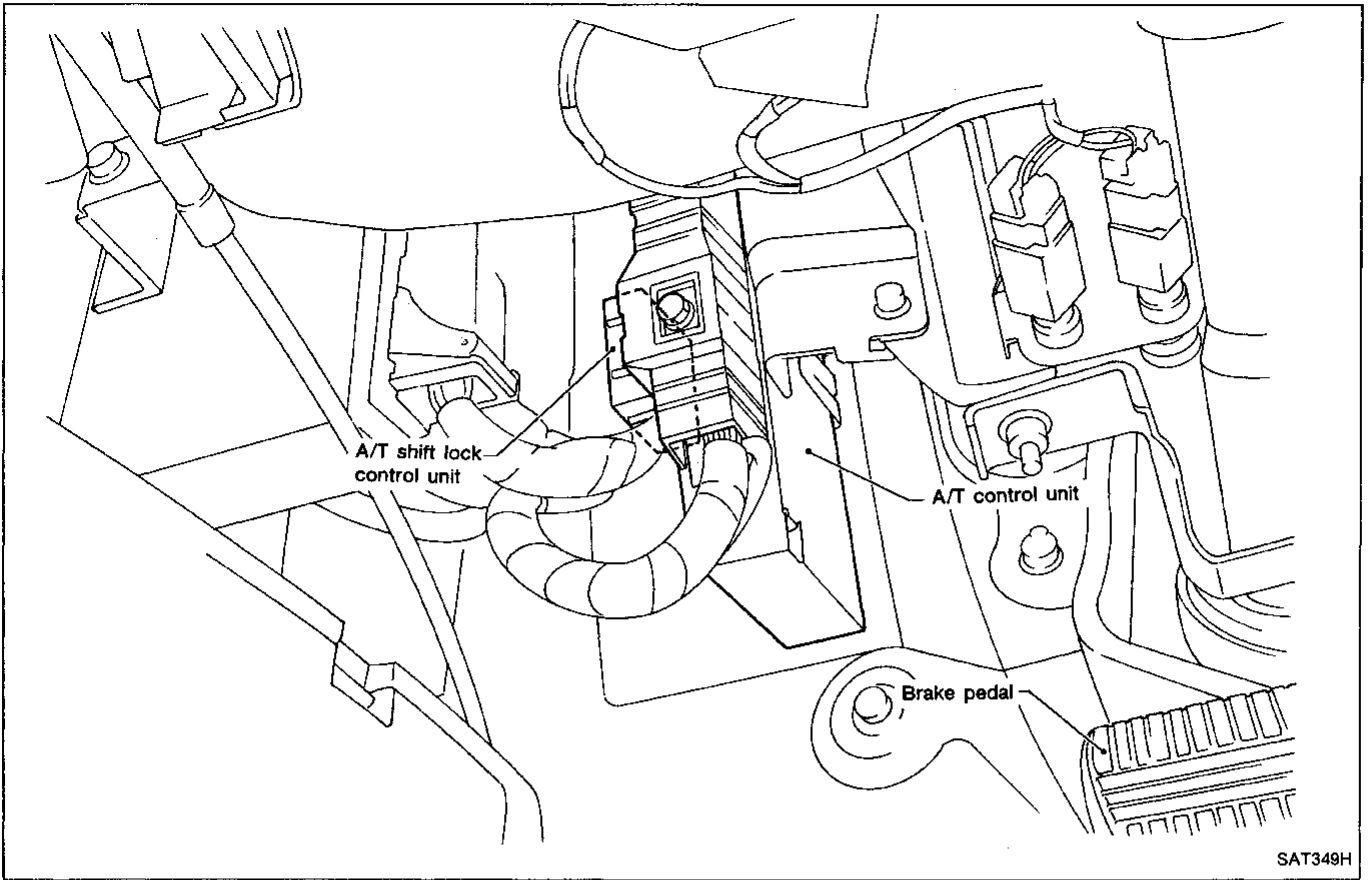
Reference page (AT-)	Reference page (AT-)	ON vehicle											OFF vehicle																				
		22, 123	123	46, 48, 63	105	52, 121	54, 65	58, 56	60, 121	121	121	132, 143	160, 164	166	166, 175	170, 179	183																
	Numbers are arranged in order of probability. Perform inspections starting with 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 speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	Fluid temperature sensor	Accumulator N-D	Accumulator 1-2	Accumulator 2-3	Accumulator 3-4 (N-R)	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components	
92	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" to "3" in "2" position.		1																														
93	Engine brake does not operate in "1" position.	2	1	3	4				6	5			7															8		9			
	Gear change from "1" to "2" in "1" position.	2	1																														
	Does not change from "1 ₂ " to "1 ₁ " in "1" position.		1		2				4	3			5														6		7				
	Large shock changing from "1 ₂ " to "1 ₁ " in "1" position.								1																				2				
	Transmission overheats.	1		3			2	4	6			5										14	7	8	9	11	12	13	10				
	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	1																					2	3	5		6		7	4			
	Offensive smell at fluid charging pipe.	1																				2	3	4	5	7		8		9	6		
	Torque converter is not locked up.		3	1	2	4		6	8				7	5								9											
	Torque converter clutch piston slip.	1		2			3	6		5	4											7											
90	Lock-up point is extremely high or low.			1	2				4				3																				
	A/T does not shift to "D ₄ " when driving with overdrive switch "ON".		2	1	3		8	6	4				5	7														10		9			
	Engine is stopped at "R", "D", "2" and "1" positions.	1							5	4	3		2																				

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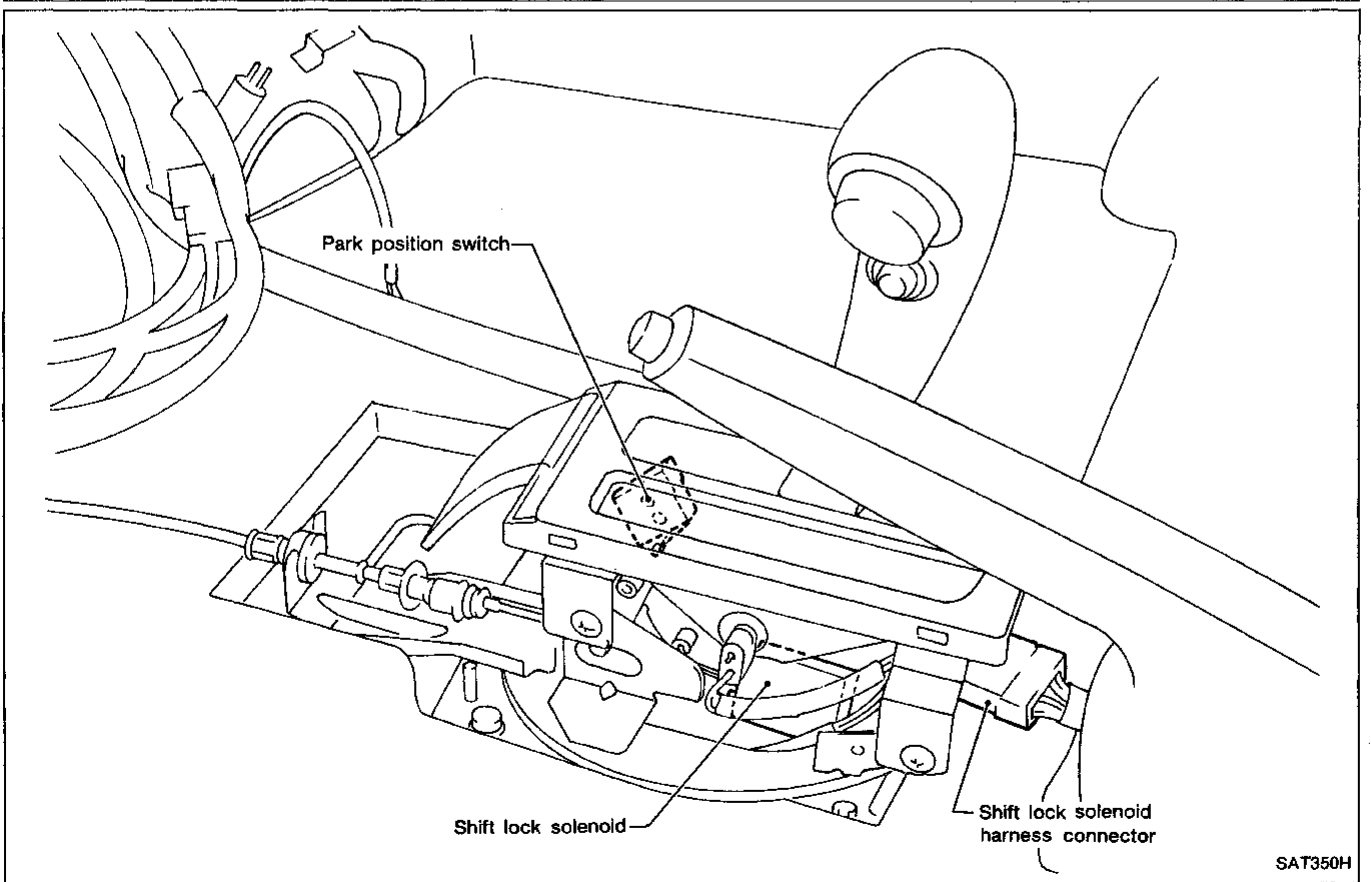
Contents

Shift Lock System Electrical Parts Location	AT-111
Wiring Diagram — SHIFT —	AT-112
Diagnostic Procedure	AT-113
SYMPTOM 1:	
● Selector lever cannot be moved from "P" position with key in "ON" position and brake pedal applied.	
● Selector lever can be moved from "P" position with key in "ON" position and brake pedal released.	
● Selector lever can be moved from "P" position when key is removed from key cylinder.	
SYMPTOM 2: Ignition key cannot be removed when selector lever is set to "P" position. It can be removed when selector lever is set to any position except "P".	
Key Interlock Cable	AT-117
Shift Lock Control Unit Inspection	AT-119
Shift Lock Control Unit Inspection Table	AT-119
Component Check	AT-120

Shift Lock System Electrical Parts Location



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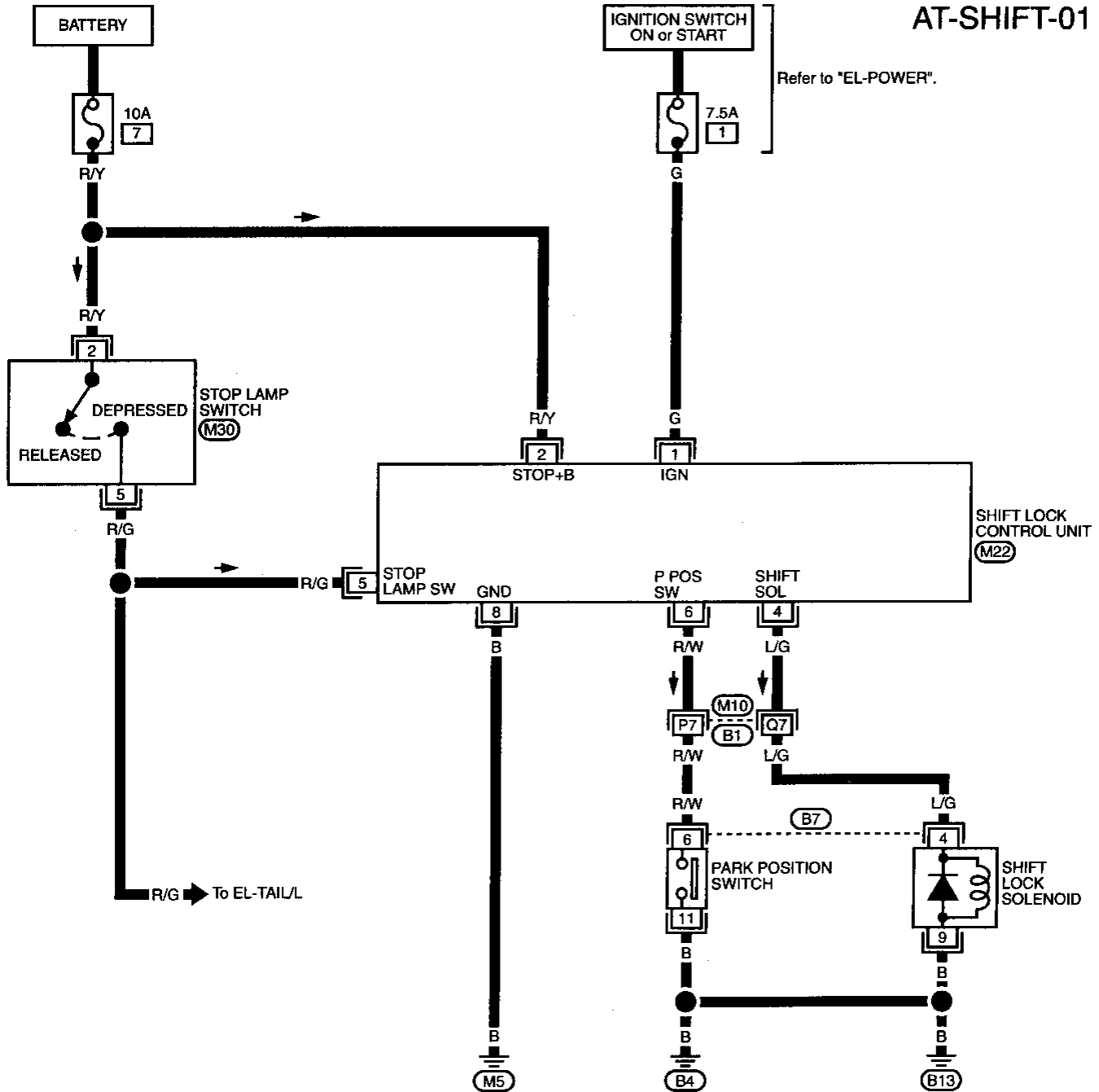


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Wiring Diagram — SHIFT —

AT-SHIFT-01

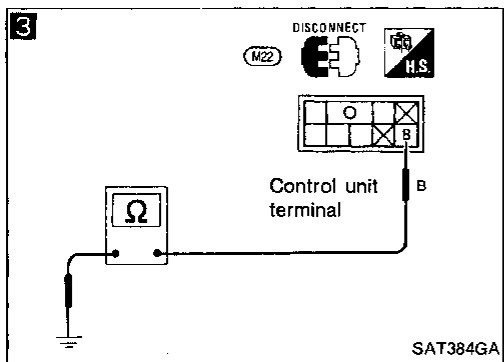
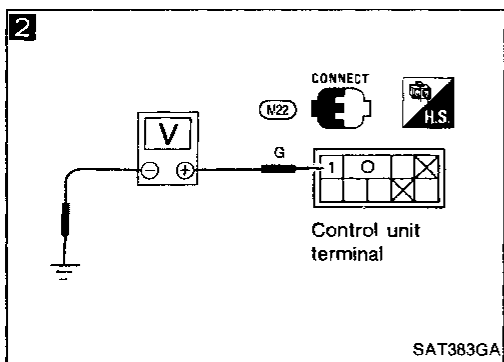
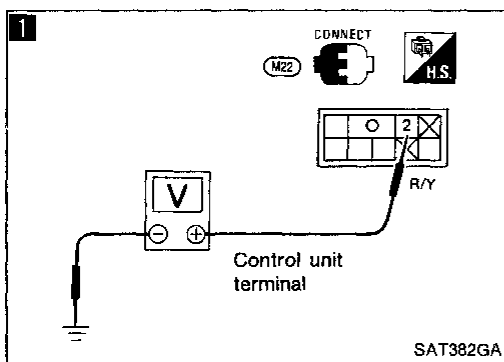
Refer to "EL-POWER".



Refer to last page (Foldout page).

M10, B1





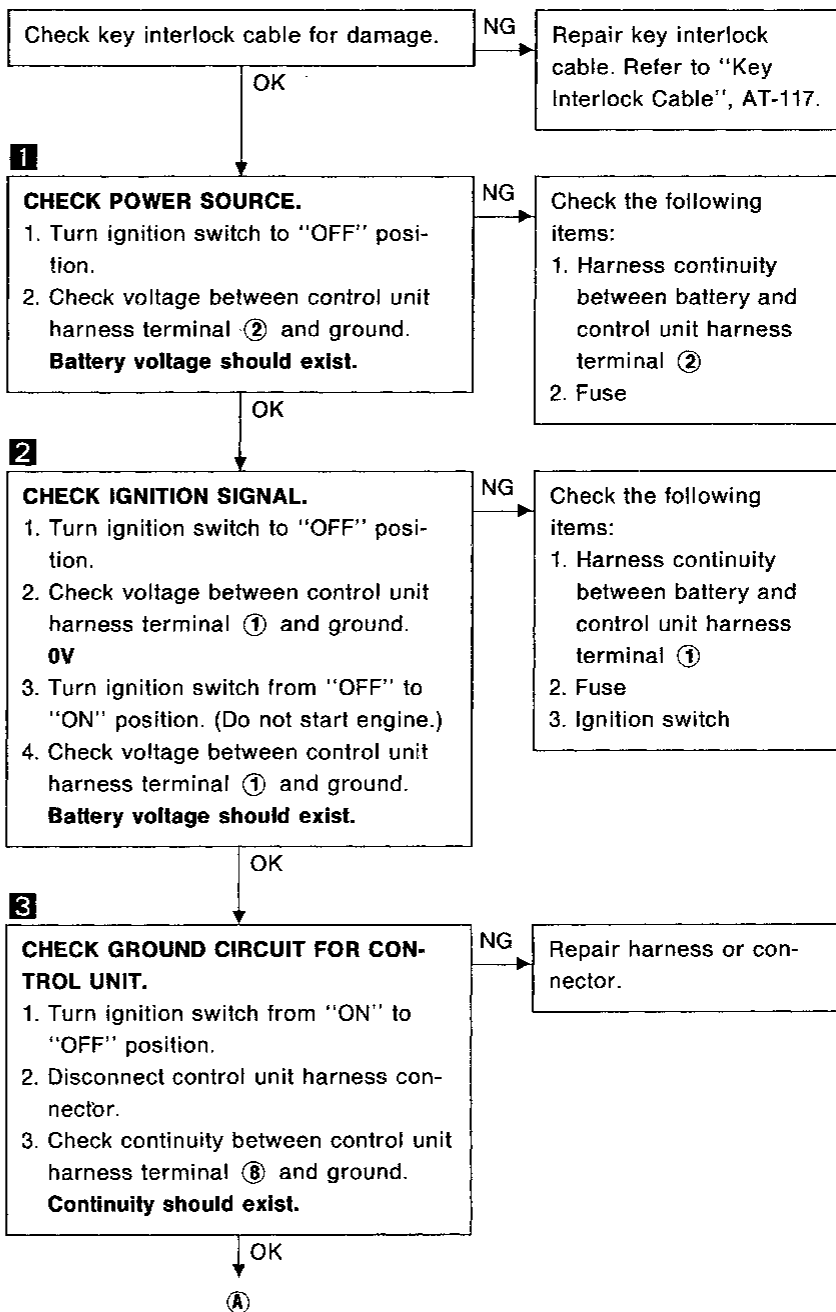
Diagnostic Procedure

SYMPTOM 1:

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

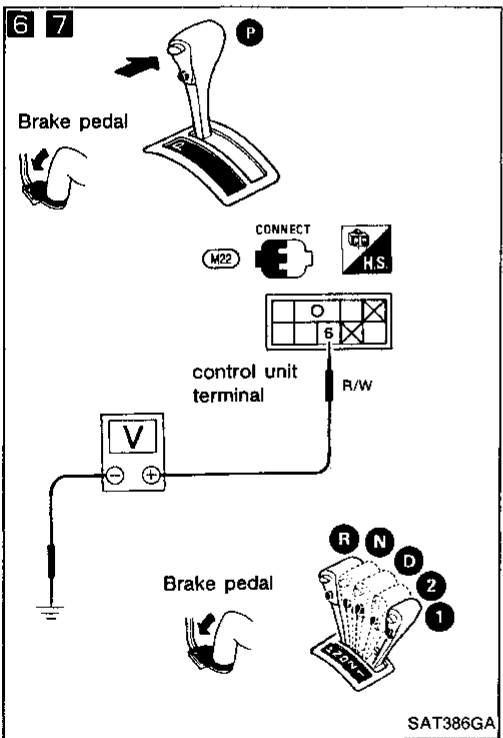
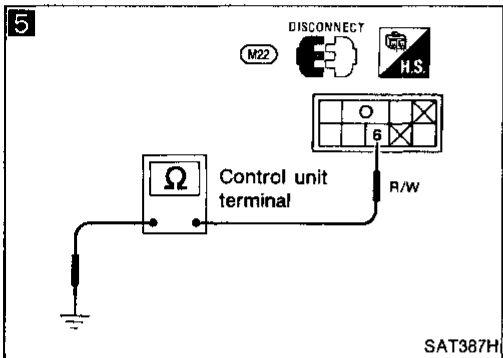
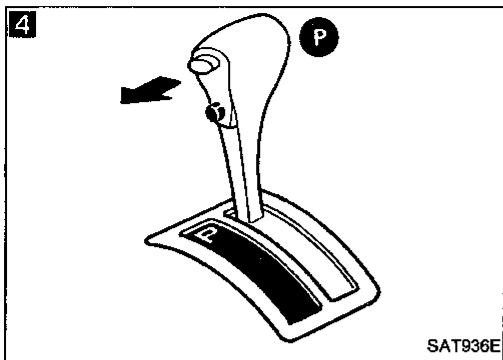
SYMPTOM 2:

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



TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure (Cont'd)



A

CHECK INPUT SIGNAL (PARK POSITION SWITCH).

1. Reconnect control unit harness connector.
2. Turn ignition switch from "OFF" to "ON" position. (Do not start engine.)
4. Set selector lever in "P" position and release selector lever button.
5. Disconnect control unit harness connector.
5. Check continuity between control unit harness terminal ⑥ and ground.

Continuity should not exist.

NG → Check park position switch.
(Refer to "COMPONENT CHECK", AT-120.)

OK

CHECK INPUT SIGNAL (PARK POSITION SWITCH).

1. Turn ignition switch to "ON" position. (Do not start engine.)
6. Check voltage between control unit harness terminal ⑥ and ground. Check while depressing brake pedal with selector lever button pushed.
- 0V
7. Check voltage between control unit harness terminal ⑥ and ground. Check while selector lever is set in any position except "P".

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

NG → Check the following items:

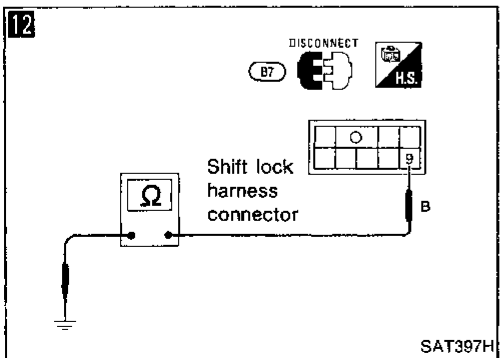
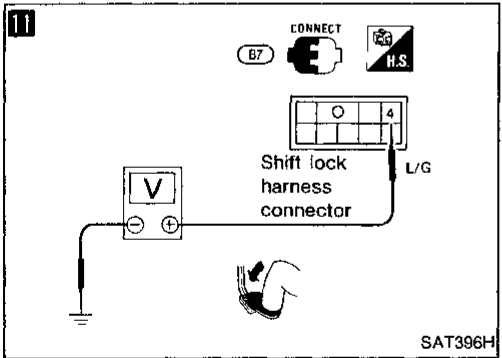
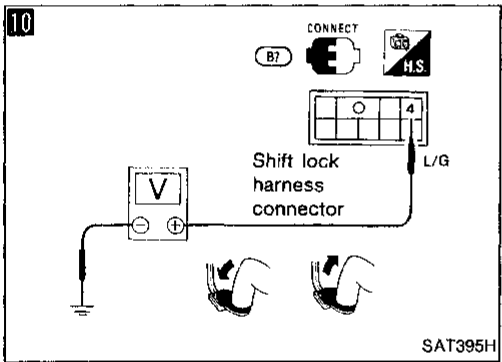
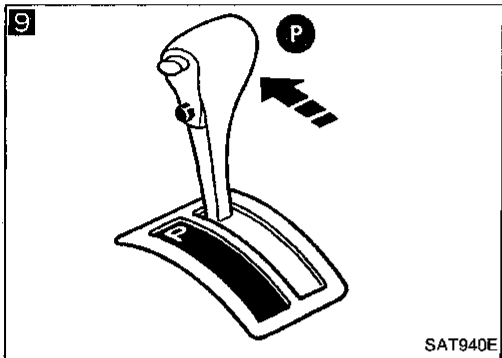
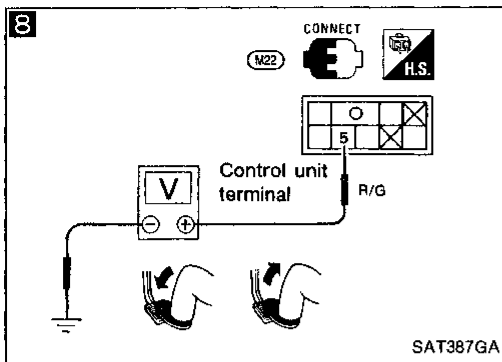
1. Harness continuity between control unit harness terminal ⑥ and park position switch harness terminal ⑥
2. Harness continuity between park position switch harness terminal ⑥ and ground
3. Park position switch (Refer to "COMPONENT CHECK", AT-120.)

OK

B

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure (Cont'd)



8

CHECK INPUT SIGNAL (STOP LAMP SWITCH).
Turn ignition switch to "ON" position. (Do not start engine.)

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

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

NG → Check the following items:

1. Harness continuity between control unit harness terminal ⑤ and stop lamp switch harness terminal ②
2. Harness continuity between stop lamp switch harness terminal ① and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK", AT-120.)

OK

9 Set selector lever in "P" position.

10

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

1. Turn ignition switch to "ON" position. (Do not start engine.)
- 10** 2. Check voltage between shift lock harness connector terminal ④ and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

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

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

0V

OK

12

CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.

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

NG → Repair harness or connector.

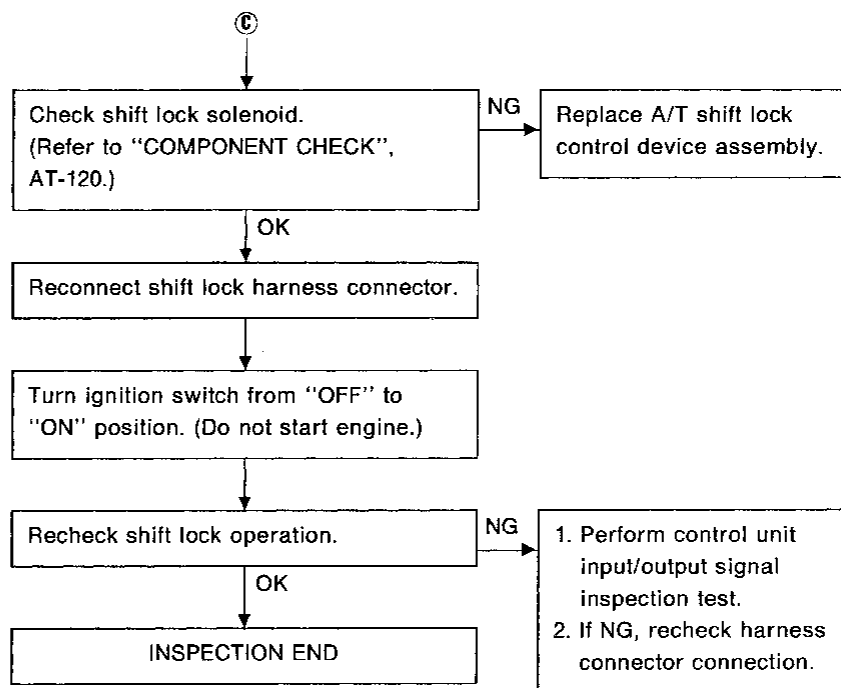
OK

⑥

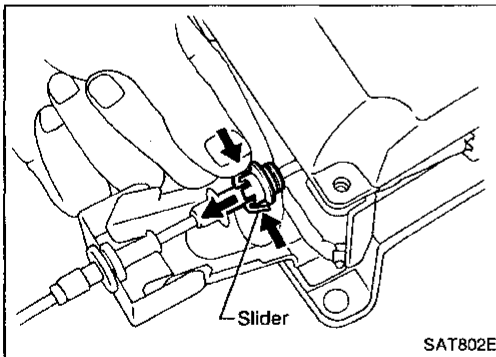
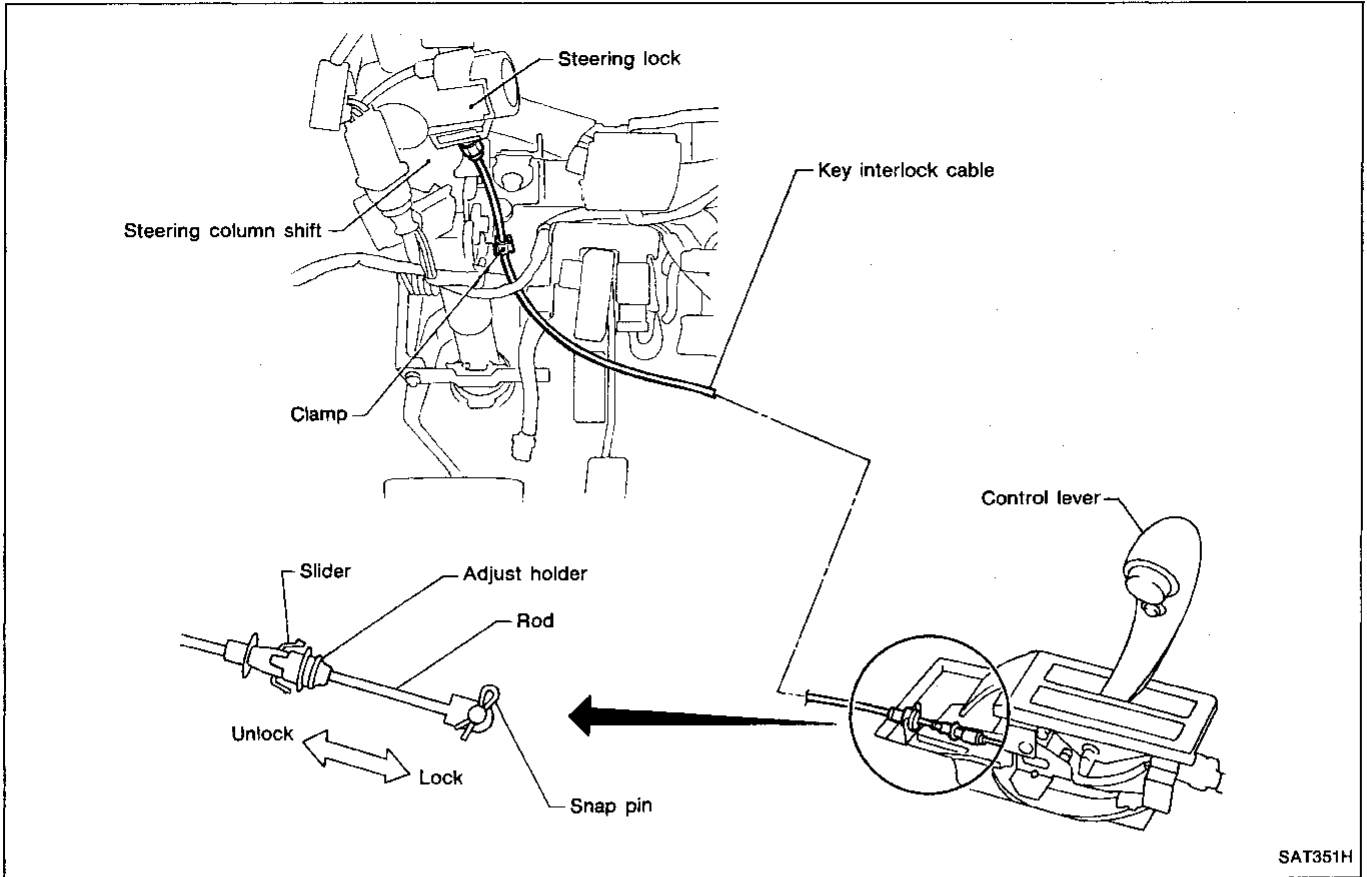
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TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure (Cont'd)

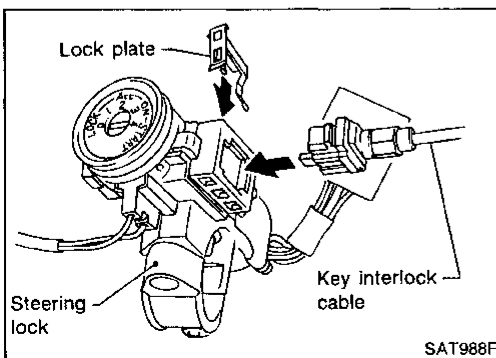


Key Interlock Cable



REMOVAL

Unlock slider from adjuster holder and remove rod from cable.



INSTALLATION

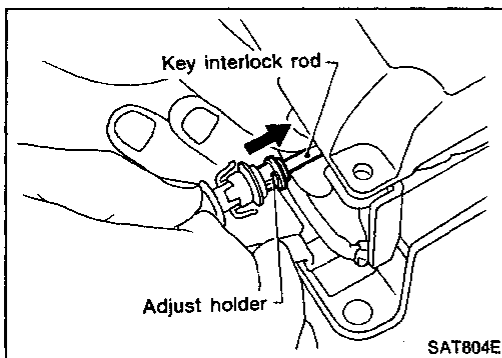
1. Set key interlock cable to steering lock assembly and install lock plate.
2. Clamp cable to steering column and fix to control cable with band.
3. Set control lever to P position.

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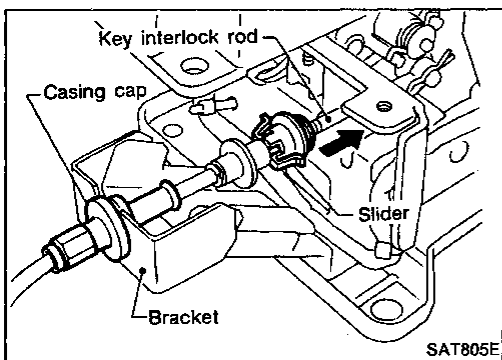
TROUBLE DIAGNOSES — A/T Shift Lock System

Key Interlock Cable (Cont'd)

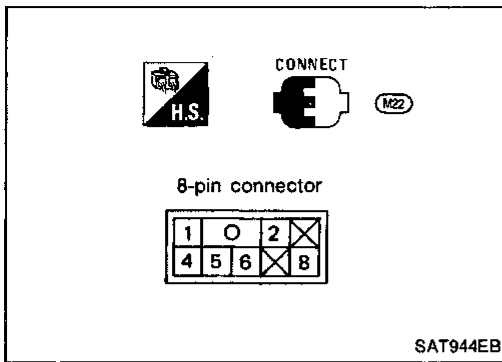
4. Insert interlock rod into adjuster holder.



5. Install casing cap to bracket.
6. Move slider in order to fix adjuster holder to interlock rod.



TROUBLE DIAGNOSES — A/T Shift Lock System



Shift Lock Control Unit Inspection

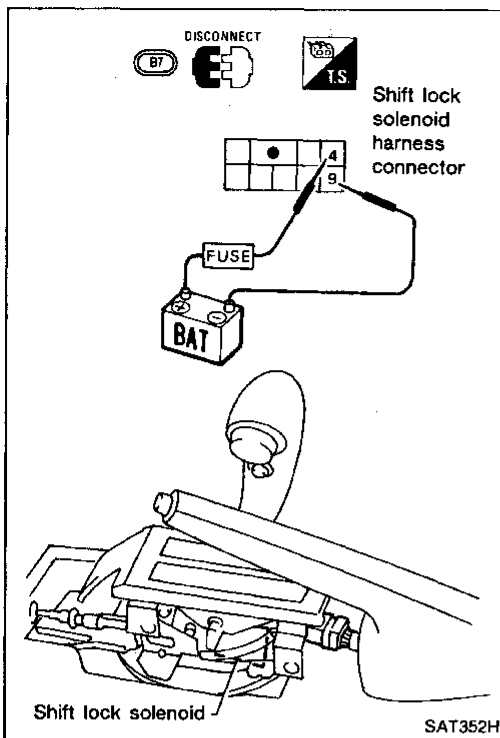
- Measure voltage between each terminal and terminal ⑧ by following "Shift Lock Control Unit Inspection Table".
- Pin connector terminal layout.

Shift Lock Control Unit Inspection Table

(Data are reference values.)

Terminal No.		Item	Condition	Judgment standard
⊕	⊖			
1	8	Ignition signal	Turn ignition switch to "ON" position.	Battery voltage
			Except above	0V
2		Power source	Any condition	Battery voltage
4		Shift lock signal	<ul style="list-style-type: none"> ● Turn ignition switch to "ON" position ● When selector lever is set in "P" position and brake pedal is depressed. 	Battery voltage
			Except above	0V
5		Stop lamp switch	When brake pedal is depressed.	Battery voltage
			When brake pedal is released.	0V
6		Park position switch	<ul style="list-style-type: none"> ● When key is inserted into key cylinder. Selector lever is set in "P" position. Selector lever button is pushed. ● When selector lever is set in any position except "P". 	Battery voltage
			Except above	0V

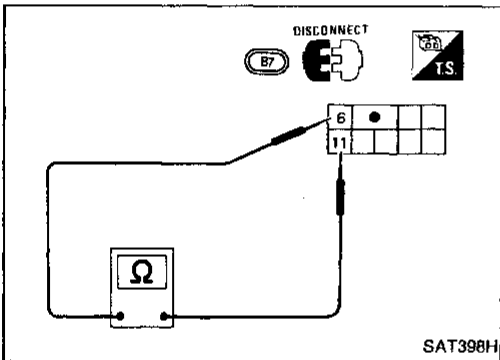
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Component Check

SHIFT LOCK SOLENOID

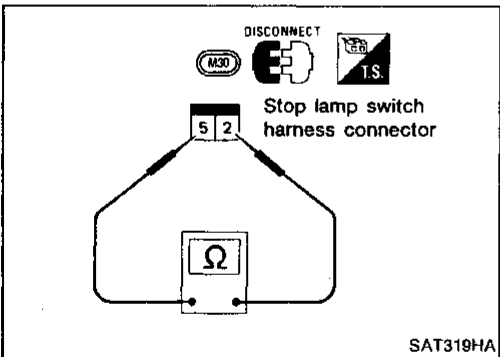
- Check operation by applying battery voltage to shift lock harness connector.



PARK POSITION SWITCH

- Check continuity between terminals ⑥ and ⑪ of shift lock harness connector.

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

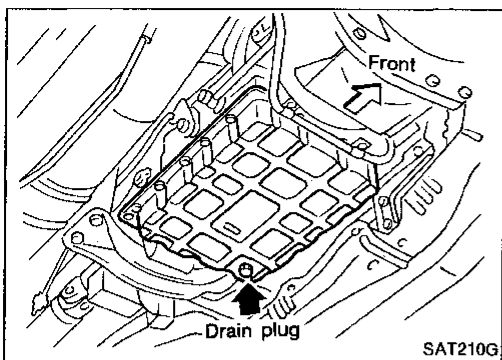


STOP LAMP SWITCH

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

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

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



Control Valve Assembly and Accumulators Inspection

1. Drain fluid from drain plug.
2. Remove oil pan and gasket.
3. Remove oil strainer.

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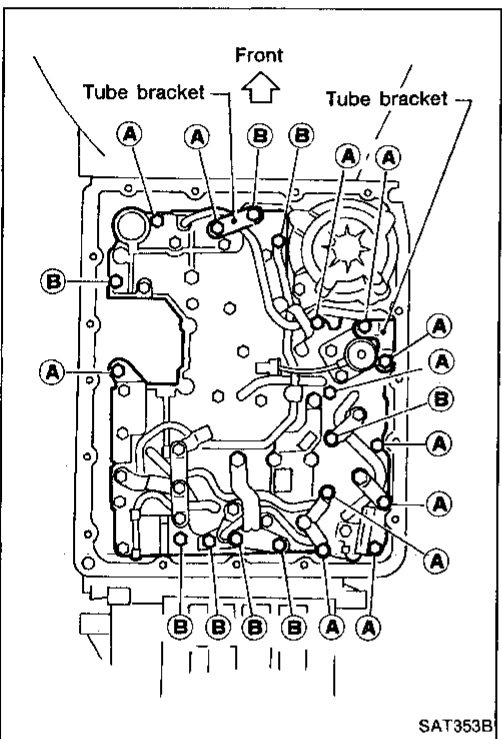
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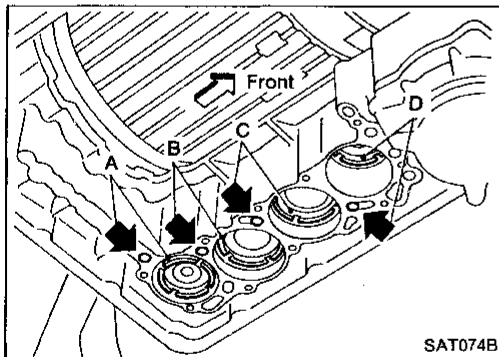


4. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

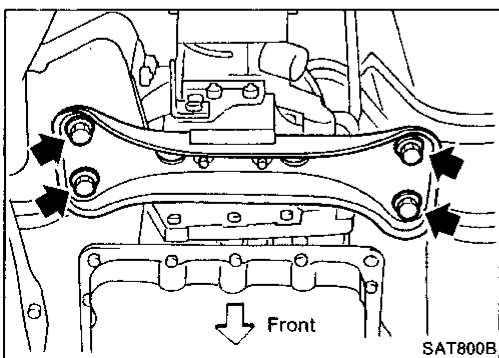
Bolt length and location

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

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



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

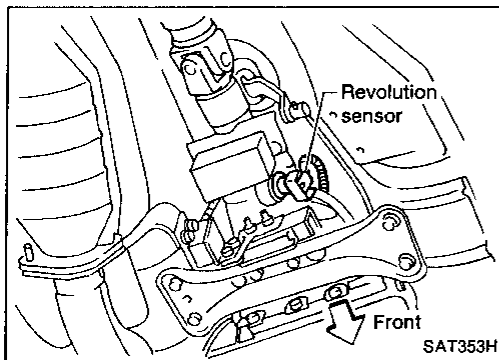


Revolution Sensor Replacement

1. Remove rear engine mounting member from body panel while supporting A/T with jack.
2. Lower A/T assembly as much as possible.

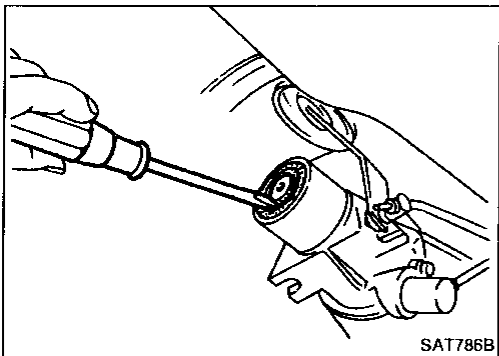
ON-VEHICLE SERVICE

Revolution Sensor Replacement (Cont'd)

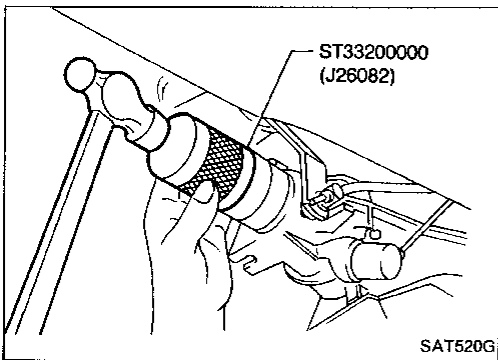


3. Remove revolution sensor from A/T assembly.
 4. Reinstall any part removed.
- **Always use new sealing parts.**

Rear Oil Seal Replacement

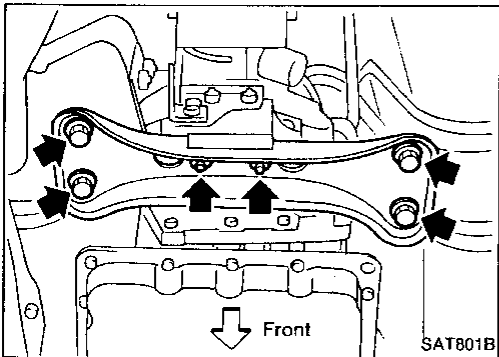


1. Remove propeller shaft from vehicle. — Refer to section PD.
2. Remove rear oil seal.

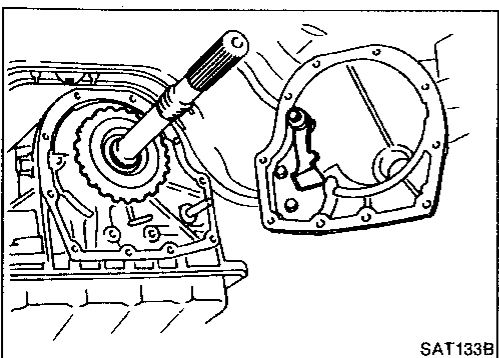


3. Install rear oil seal.
- **Apply ATF before installing.**
4. Reinstall any part removed.

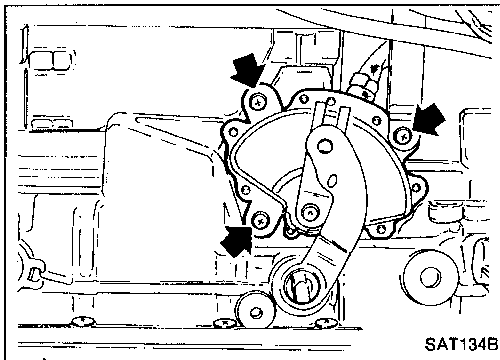
Parking Components Inspection



1. Remove propeller shaft from vehicle. — Refer to section PD.
2. Remove rear engine mounting member from A/T assembly.

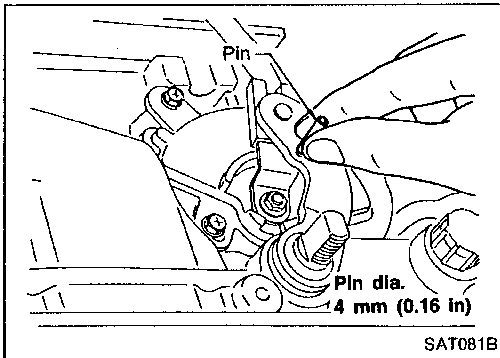


3. Remove rear extension from transmission case.
 4. Replace parking components if necessary.
 5. Reinstall any part removed.
- **Always use new sealing parts.**

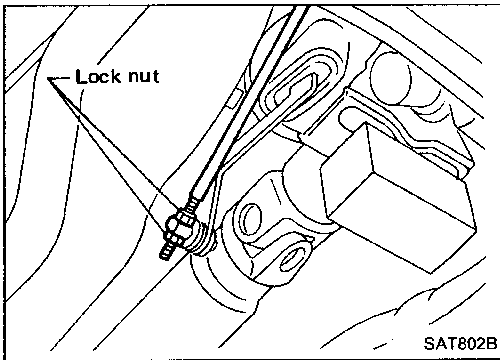


Inhibitor Switch Adjustment

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



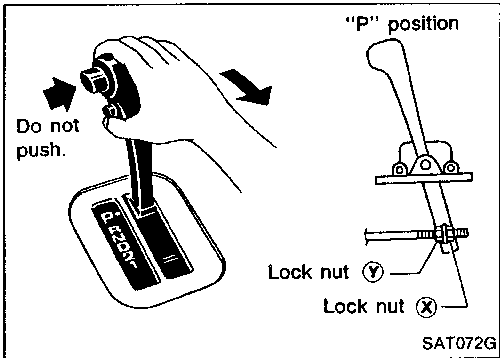
4. Insert pin into adjustment holes in both inhibitor switch and manual shaft of A/T assembly. Be sure to insert as vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — Refer to "Electrical Components Inspection", AT-100.



Manual Control Linkage Adjustment

Move selector lever from "P" position to "1" position. You should be able to feel the detentes in each position. If no detentes are felt or the position pointer is not aligned properly, adjust the linkage.

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

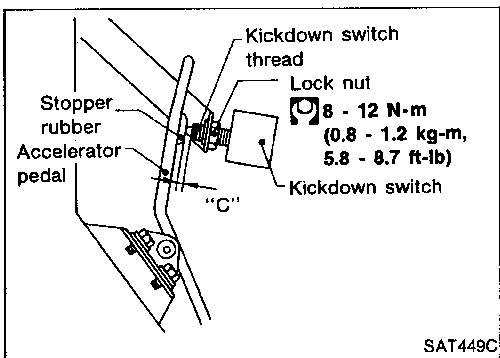


3. Tighten lock nut (X) until it touches trunnion pulling selector lever toward "R" position side without pushing button.
4. Back off lock nut (X) 1 turn and tighten lock nut (Y) to the specified torque.

Lock nut:

⊗: 11 - 15 N·m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)

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

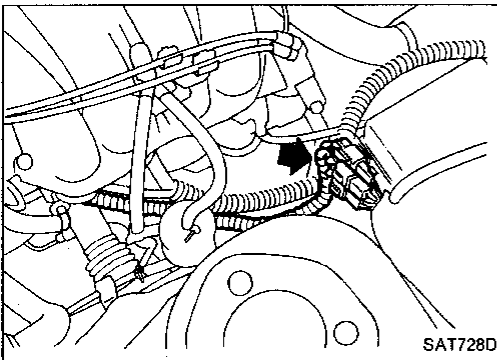


Kickdown Switch Adjustment

1. Adjust accelerator cable—Refer to section FE.
2. Adjust clearance "C" between stopper rubber and end of kickdown switch thread while depressing accelerator pedal fully.

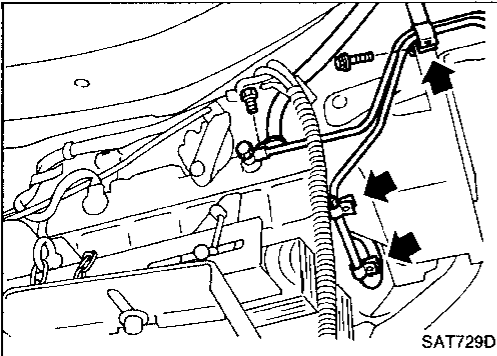
Clearance "C": 0.3 - 1.0 mm (0.012 - 0.039 in)

REMOVAL AND INSTALLATION



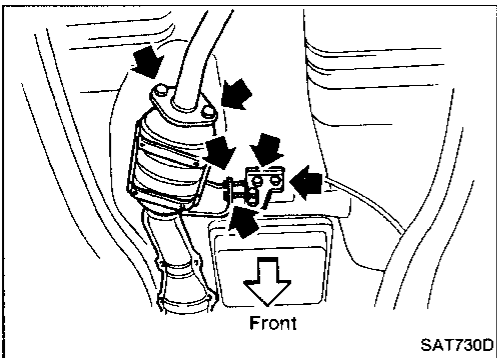
Removal

- Disconnect A/T harness connector and clamps.

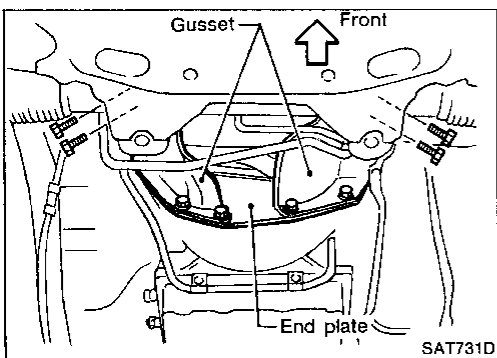


- Remove fluid charging pipe and oil cooler pipe at right side of A/T assembly. Plug up openings.
- Remove oil cooler pipe clamp at engine oil pan.
- Disconnect speed sensor harness connector.
- Remove control linkage from selector lever.

- Remove propeller shaft — Refer to section PD.
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.



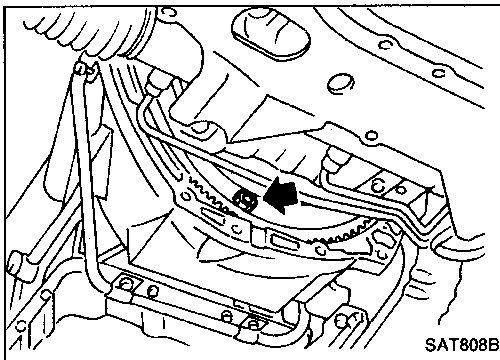
- Remove heat insulator from catalytic converter.
- Remove exhaust tube bracket and separate rear exhaust tube from converter.
- Remove starter motor.



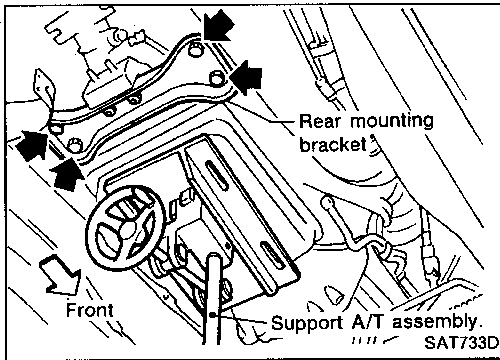
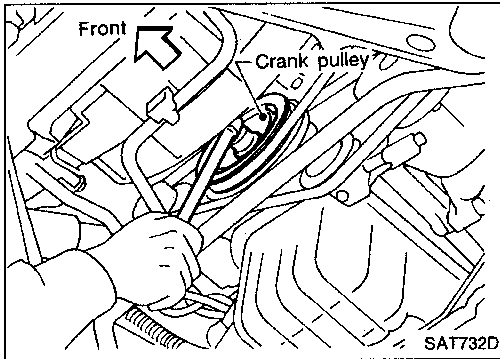
- Remove gussets and end plate.

REMOVAL AND INSTALLATION

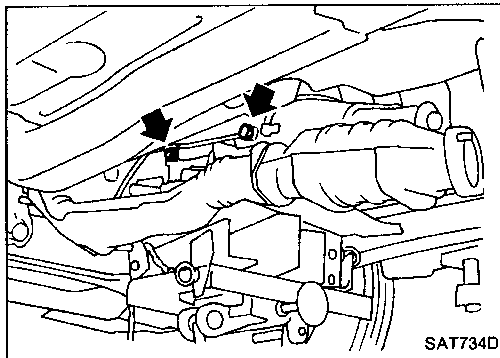
Removal (Cont'd)



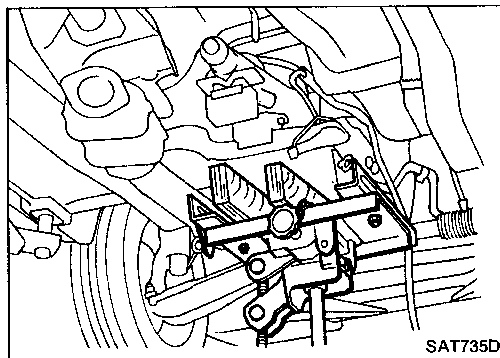
- Remove bolts securing torque converter to drive plate. Gain access to bolts by turning crankshaft.



- Support A/T assembly by placing a jack under oil pan.
- Remove rear mounting bracket from body.



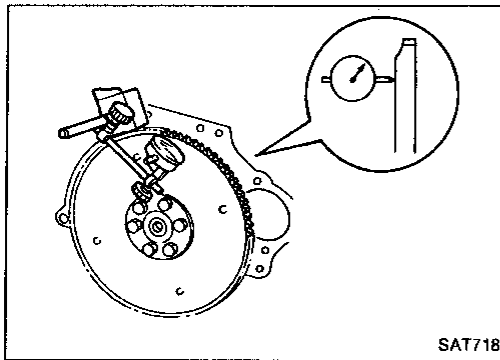
- Lower A/T assembly as much as possible.
- Remove oil cooler pipe from left side of A/T assembly. Plug up openings.



- Remove bolts securing A/T assembly to engine.
- Remove and lower A/T assembly. Be careful not to damage steering gear and tubes.

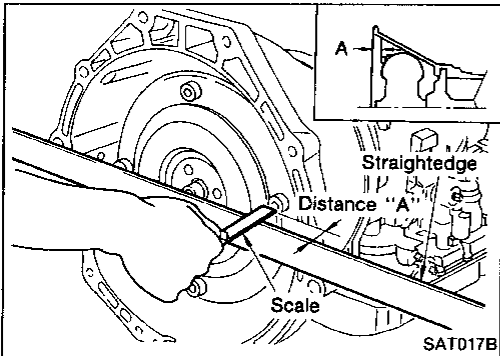
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REMOVAL AND INSTALLATION



Installation

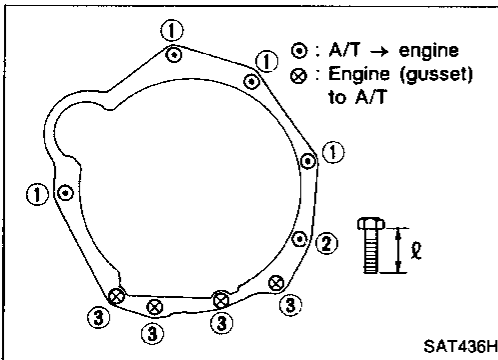
- Drive plate runout
**Maximum allowable runout:
 0.5 mm (0.020 in)**
 If this runout is out of allowance, replace drive plate with ring gear.



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

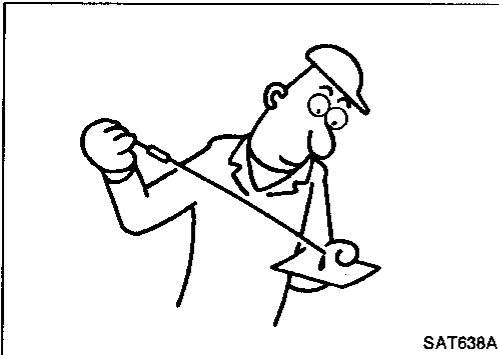
**Distance "A":
 26.0 mm (1.024 in) or more**

- Install converter to drive plate.
- Reinstall any part removed.
- **After converter is installed to drive plate, rotate crankshaft several turns and check to be sure that transmission rotates freely without binding.**



- Tighten bolts securing transmission.

Bolt No.	Tightening torque N·m (kg-m, ft-lb)	Bolt length "L" mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	40 (1.57)
2	39 - 49 (4.0 - 5.0, 29 - 36)	50 (1.97)
3	29 - 39 (3.0 - 4.0, 22 - 29)	25 (0.98)
Gusset to engine (4 bolts)	29 - 39 (3.0 - 4.0, 22 - 29)	20 (0.79)



- Reinstall any part removed.
- Check fluid level in transmission.
- Move selector lever through all positions to be sure that transmission operates correctly.
 With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R" positions. A slight shock should be felt by hand gripping selector each time transmission is shifted.
- Perform road test. — Refer to "ROAD TESTING", AT-22.

REMOVAL AND INSTALLATION

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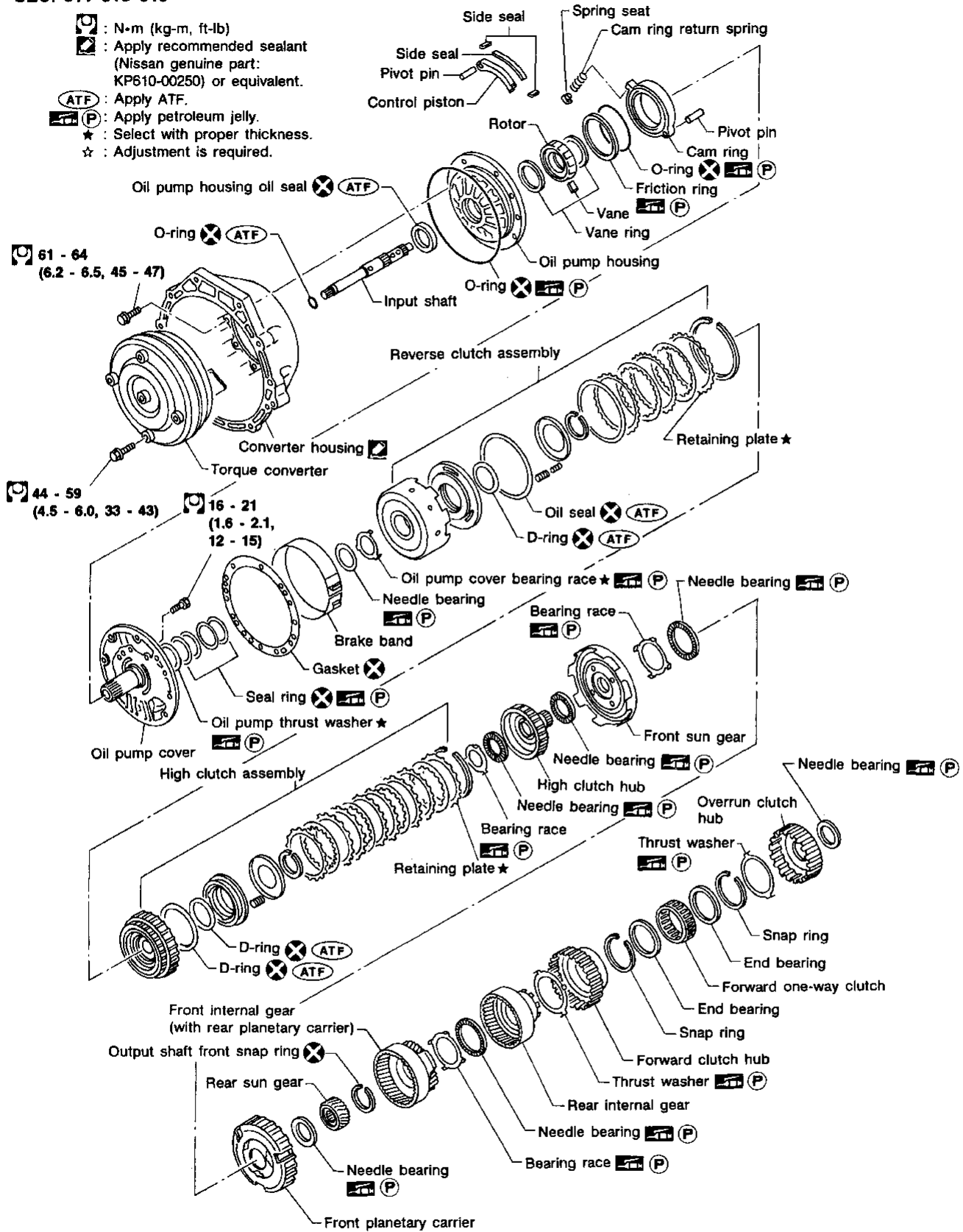
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MAJOR OVERHAUL

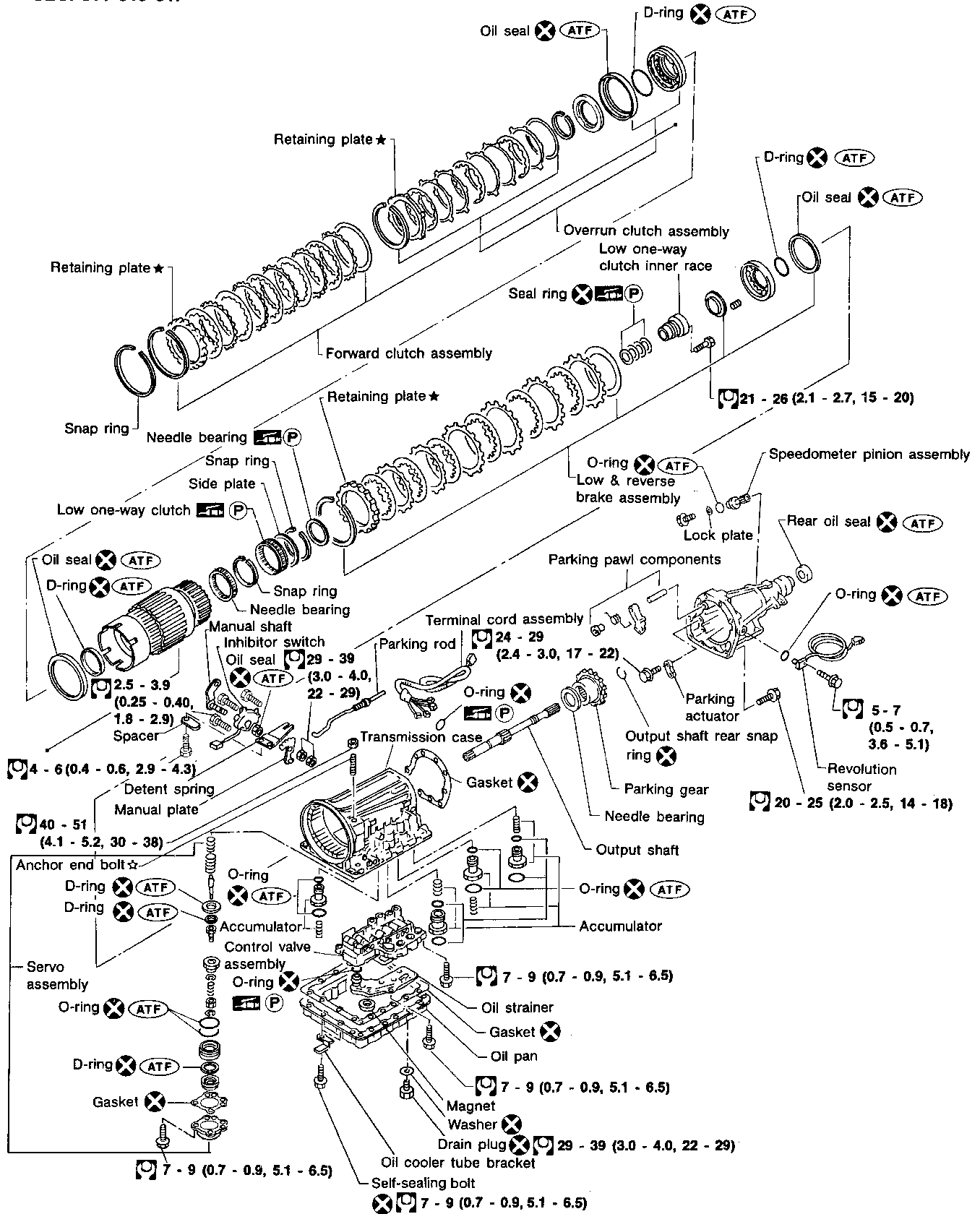
SEC. 311-313-315

- : 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.
- ☆ : Adjustment is required.



MAJOR OVERHAUL

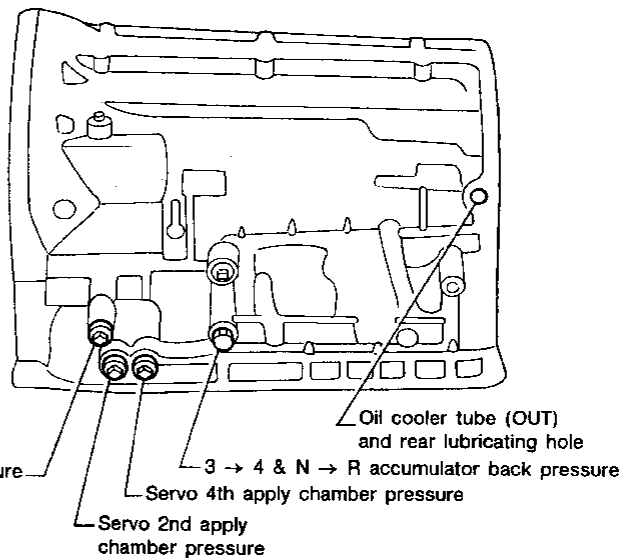
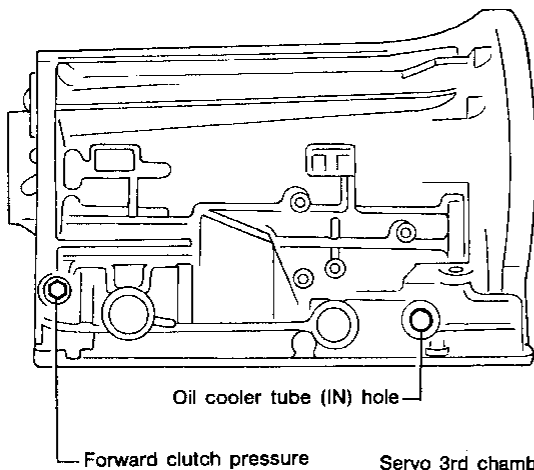
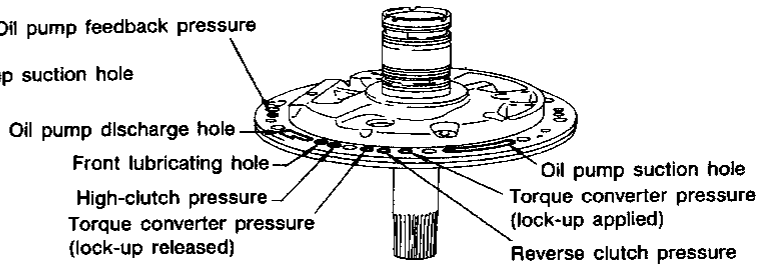
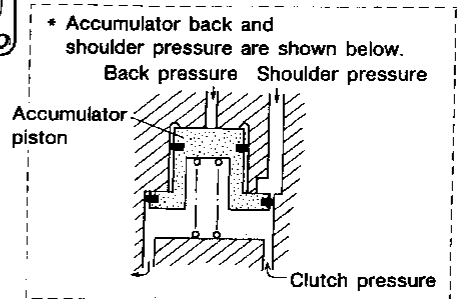
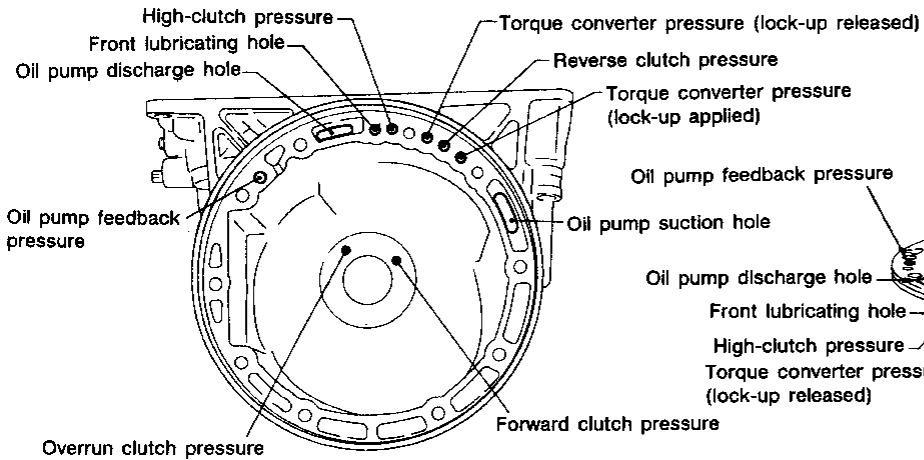
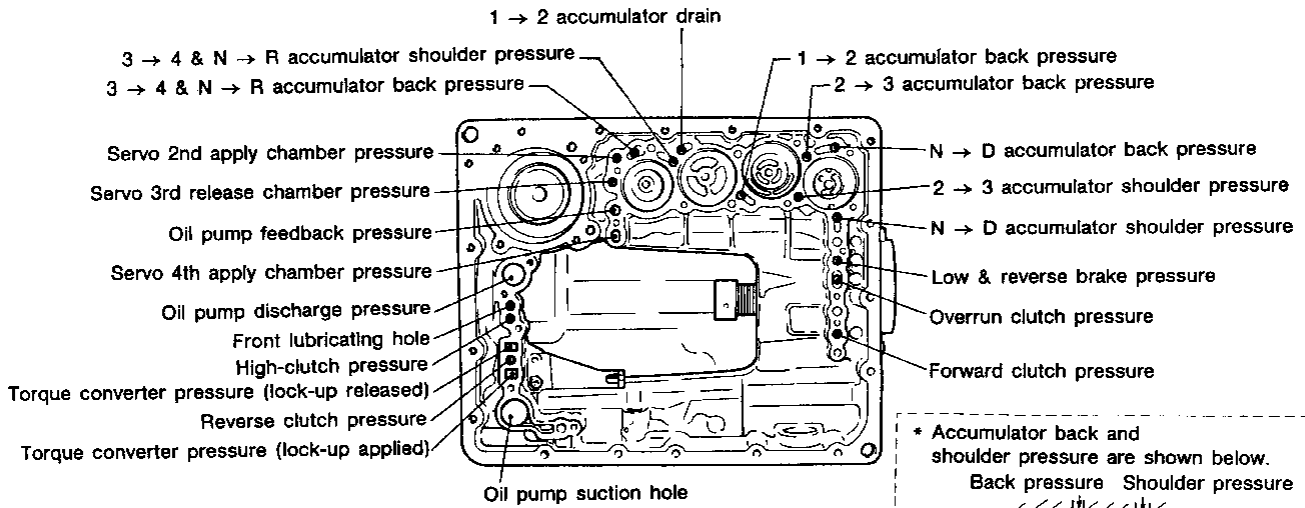
SEC. 311-315-317



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MAJOR OVERHAUL

Oil Channel



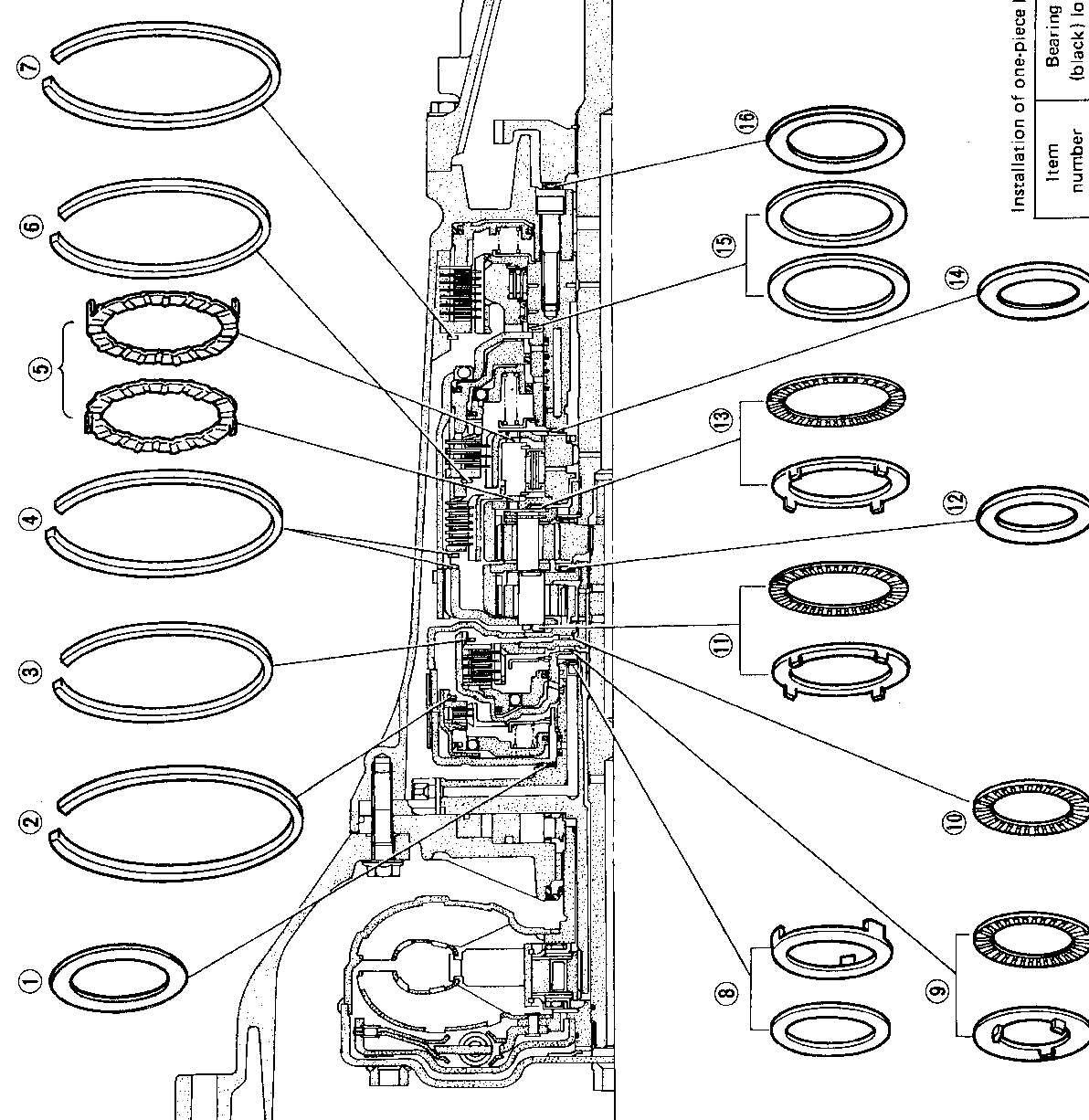
Locations of Needle Bearings, Thrust Washers and Snap Rings

Outer diameter of snap rings	
Item number	Outer diameter mm (in)
②	161.0 (6.34)
③	140.1 (5.52)
④	156.4 (6.16)
⑥	142.0 (5.59)
⑦	159.2 (6.27)

Thrust washers	
Item number	Color
①	Black
⑤	White

Outer diameter of needle bearings	
Item number	Outer diameter mm (in)
⑧	47 (1.85)
⑨	53 (2.09)
⑩	53 (2.09)
⑪	78 (3.07)
⑫	53 (2.09)
⑬	78 (3.07)
⑭	59 (2.32)
⑮	78 (3.07)
⑯	64 (2.52)

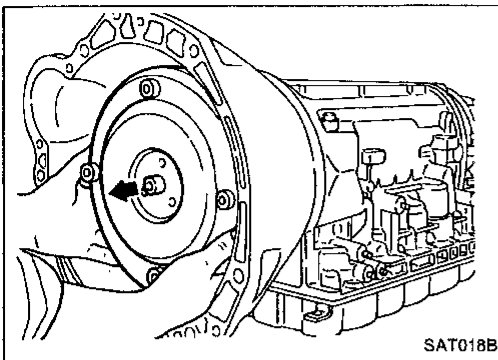
Inner diameter of bearing races	
Item number	Outer diameter mm (in)
⑪	58 (2.28)
⑬	58.8 (2.315)



Installation of one-piece bearings	
Item number	Bearing race (black) location
⑫	Front
⑮	Rear side
⑯	Rear side

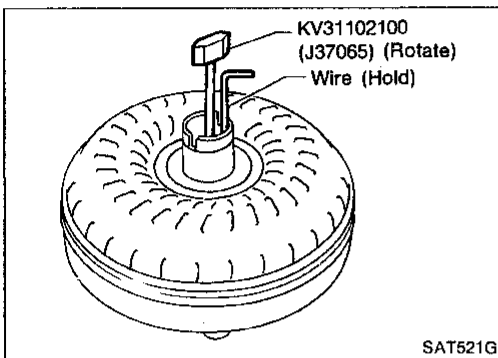
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DISASSEMBLY

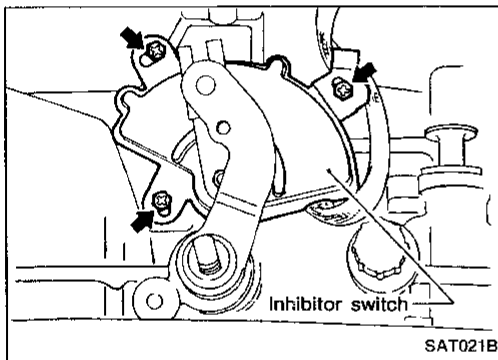


Disassembly

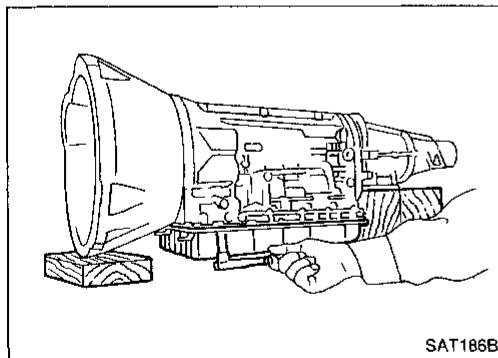
1. Drain ATF through drain plug.
2. Remove torque converter by holding it firmly and turning while pulling straight out.



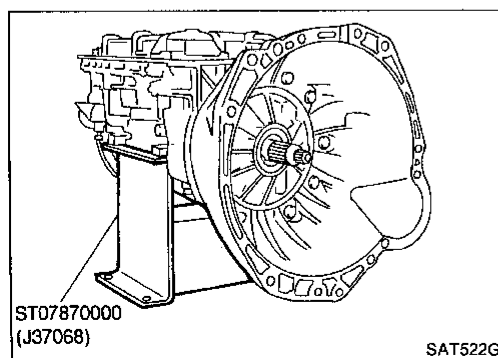
3. Check torque converter one-way clutch.
 - a. Insert Tool into spline of one-way clutch inner race.
 - b. Hook bearing support unitized with one-way clutch outer race with suitable wire.
 - c. Check that one-way clutch inner race rotates only clockwise with Tool while holding bearing support with wire.



4. Remove inhibitor switch from transmission case.



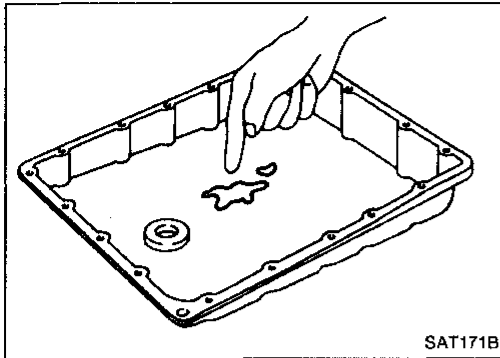
5. Remove oil pan.
 - Always place oil pan straight down so that foreign particles inside will not move.



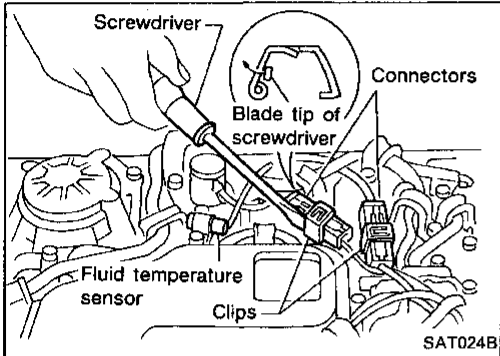
6. Place transmission into Tool with the control valve facing up.

DISASSEMBLY

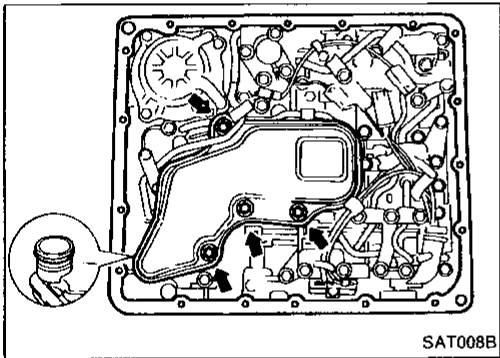
Disassembly (Cont'd)



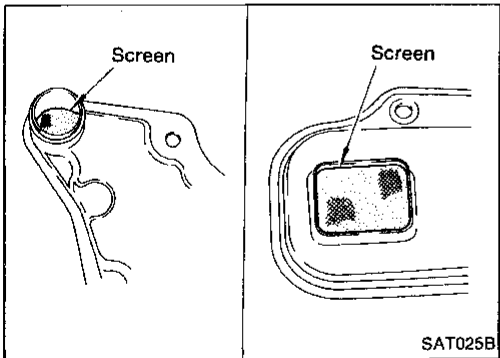
7. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that will not wipe clean indicates varnish build up. It can cause valves,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



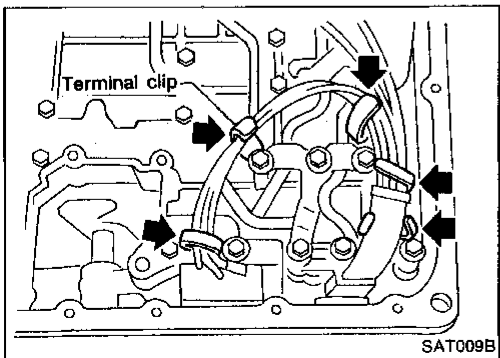
8. Remove torque converter clutch solenoid valve and fluid temperature sensor connectors.
- **Be careful not to damage connector.**



9. 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.



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

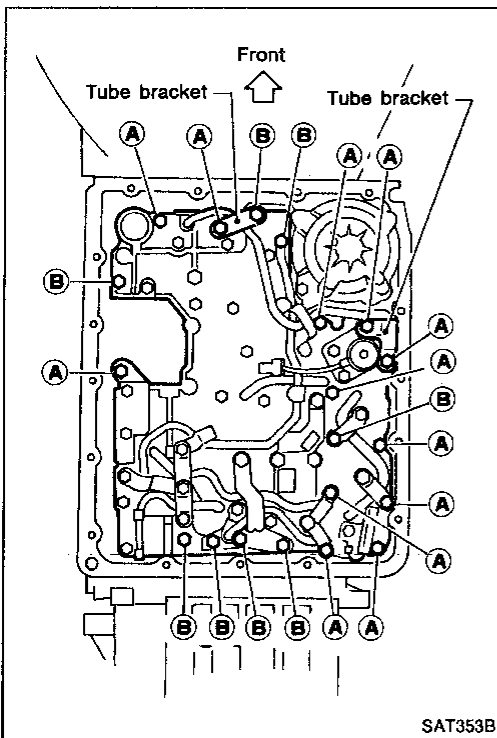
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DISASSEMBLY

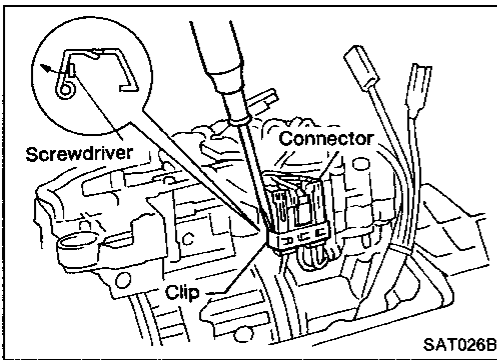
Disassembly (Cont'd)

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

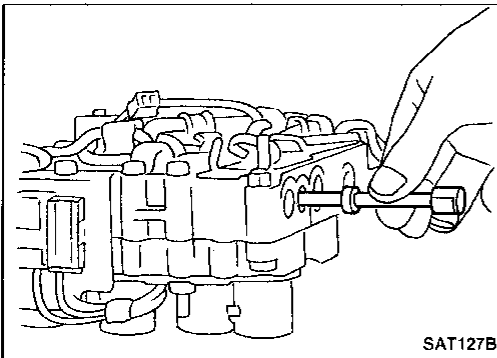
Bolt symbol	Length mm (in)
(A)	33 (1.30)
(B)	45 (1.77)



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

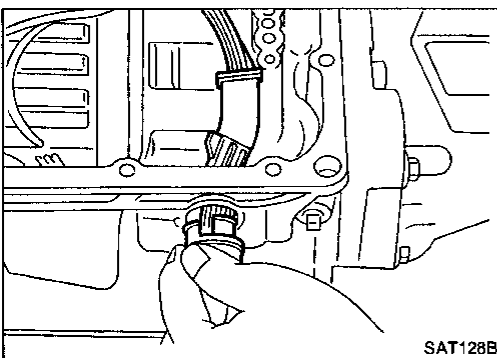


- d. Remove manual valve from control valve assembly.



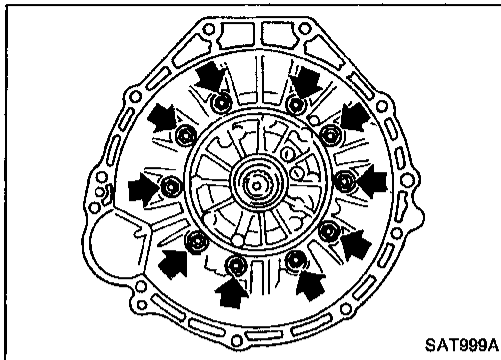
11. Remove terminal cord assembly from transmission case while pushing on stopper.

- **Be careful not to damage cord.**
- **Do not remove terminal cord assembly unless it is damaged.**



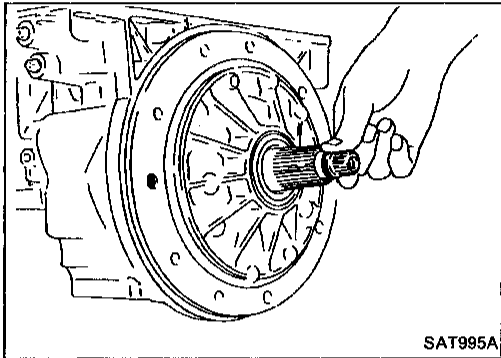
DISASSEMBLY

Disassembly (Cont'd)

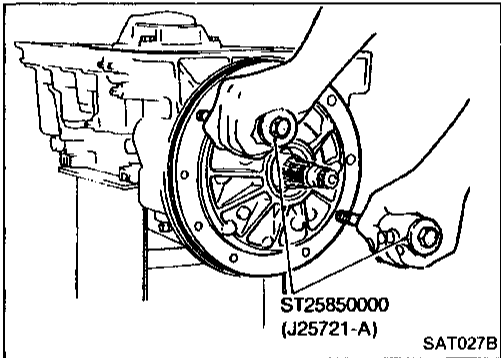


12. Remove converter housing from transmission case.

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

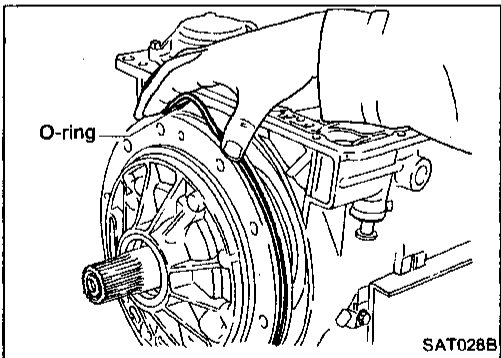


13. Remove O-ring from input shaft.



14. Remove oil pump assembly.

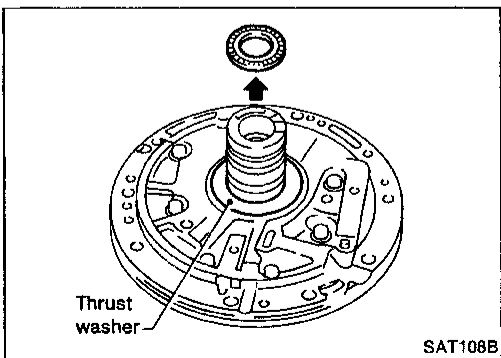
- a. Attach Tool to oil pump assembly and extract it evenly from transmission case.



b. Remove O-ring from oil pump assembly.

c. Remove traces of sealant from oil pump housing.

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



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

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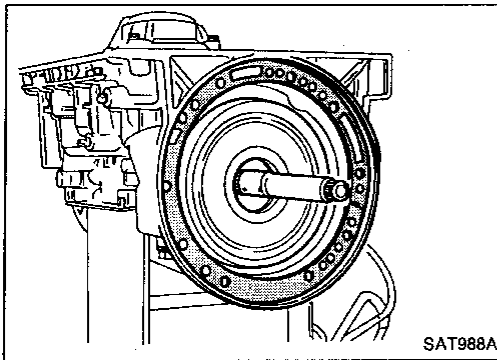
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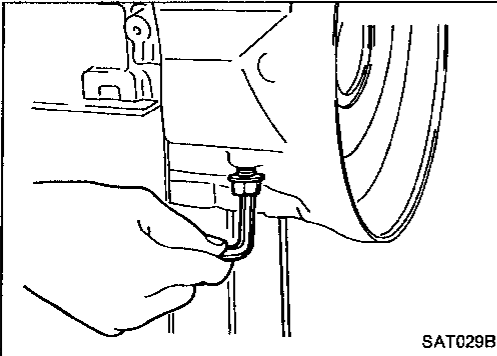
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DISASSEMBLY

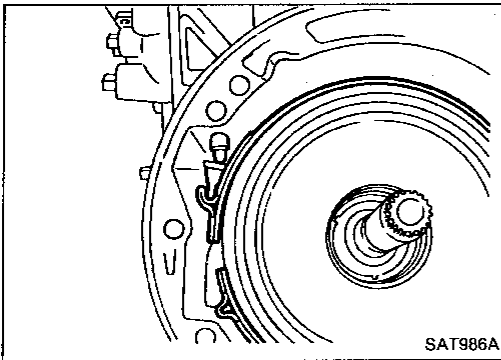
Disassembly (Cont'd)



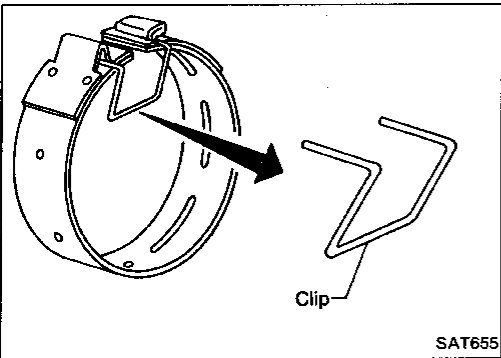
15. Remove input shaft and oil pump gasket.



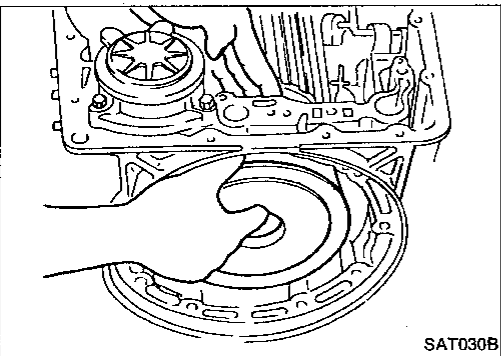
16. Remove brake band and band strut.
a. Loosen lock nut and remove band servo anchor end pin from transmission case.



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



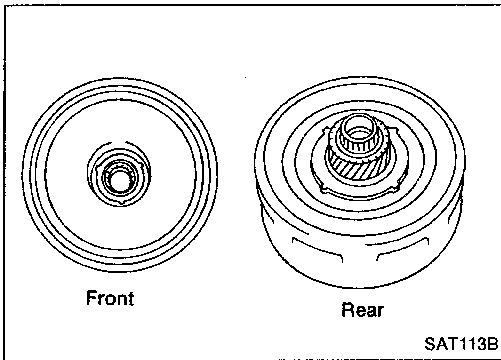
- c. Hold brake band in a circular shape with clip.



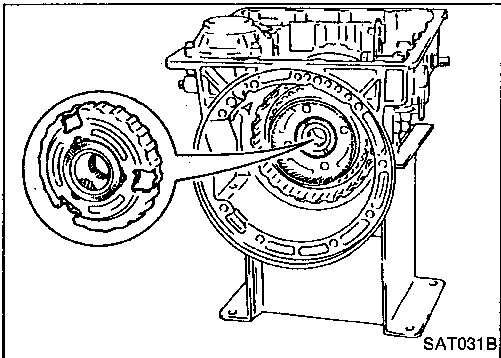
17. Remove front side clutch and gear components.
a. Remove clutch pack (reverse clutch, high clutch and front sun gear) from transmission case.

DISASSEMBLY

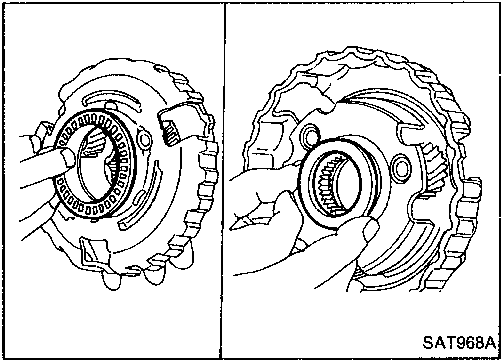
Disassembly (Cont'd)



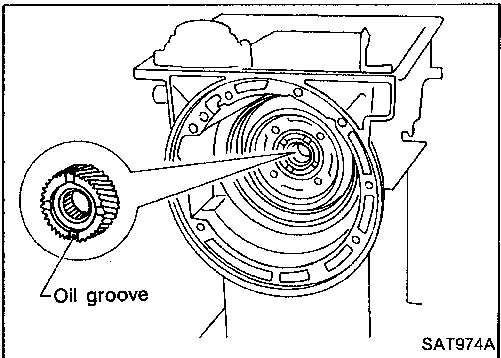
- b. Remove front bearing race from clutch pack.
- c. Remove rear bearing race from clutch pack.



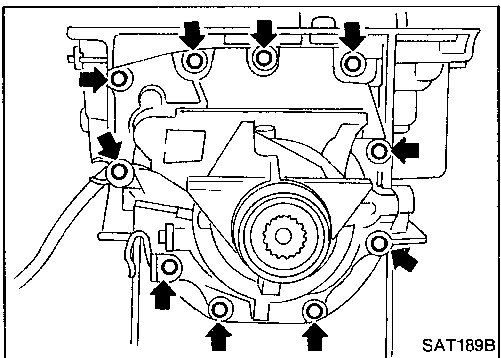
- d. Remove front planetary carrier from transmission case.



- e. Remove front needle bearing from front planetary carrier.
- f. Remove rear bearing from front planetary carrier.



- g. 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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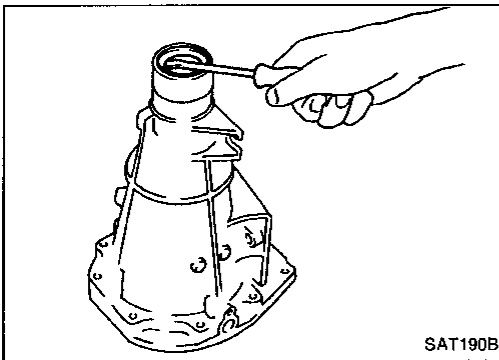
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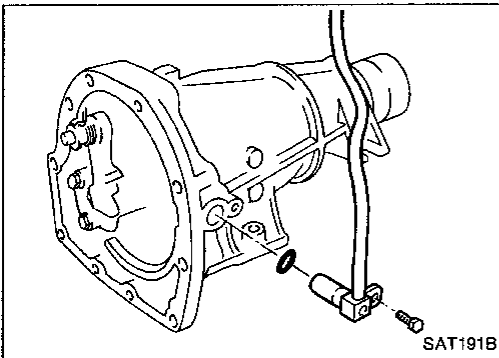
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DISASSEMBLY

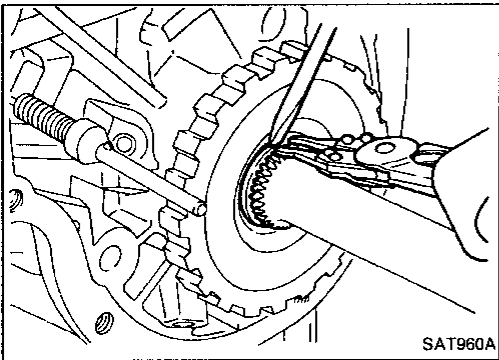
Disassembly (Cont'd)



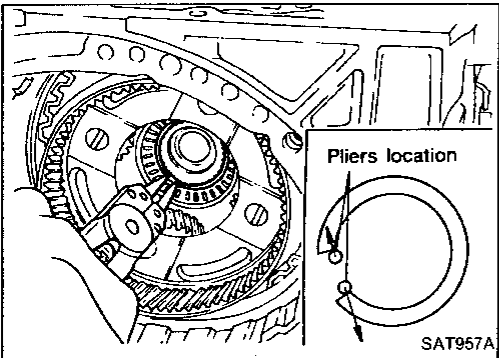
- c. Remove oil seal from rear extension.
- **Do not remove oil seal unless it is to be replaced.**



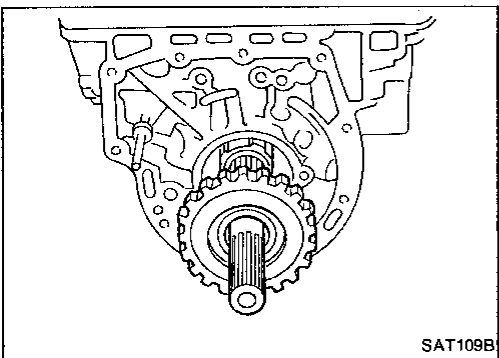
- d. Remove revolution sensor from rear extension.
- e. Remove O-ring from revolution sensor.



- 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.

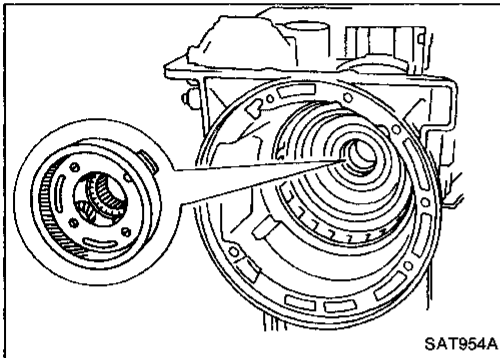
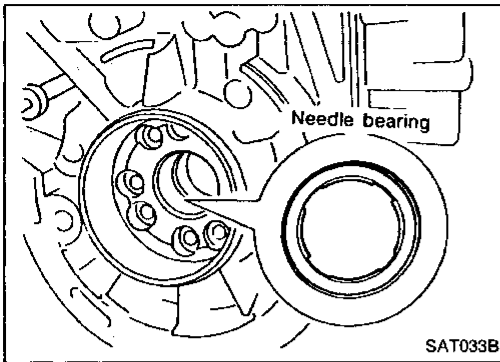


- d. Remove output shaft and parking gear as a unit from transmission case.
- e. Remove parking gear from output shaft.

DISASSEMBLY

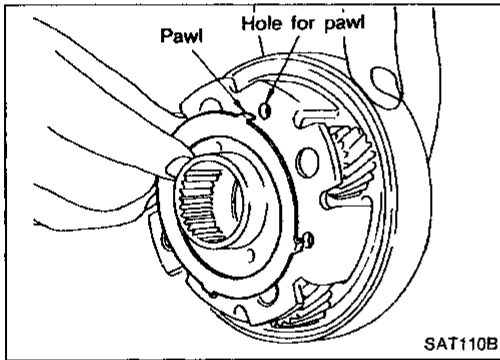
Disassembly (Cont'd)

f. Remove needle bearing from transmission case.

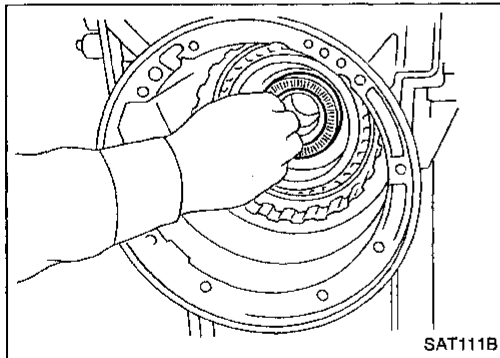


20. Remove rear side clutch and gear components.

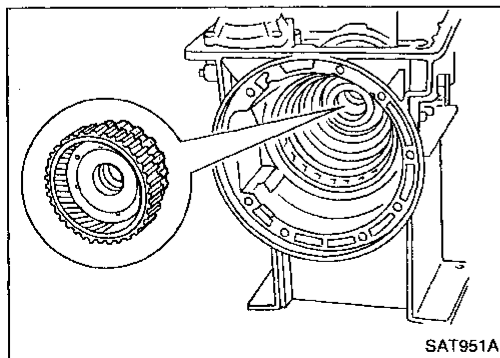
a. Remove front internal gear.



b. Remove bearing race from front internal gear.



c. Remove needle bearing from rear internal gear.



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

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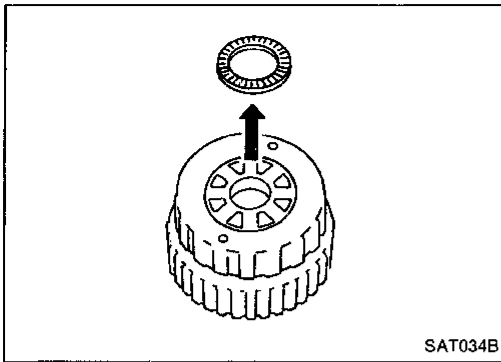
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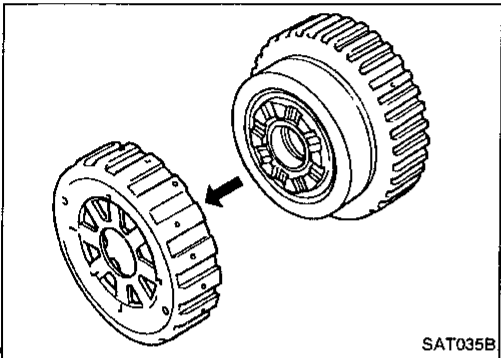
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DISASSEMBLY

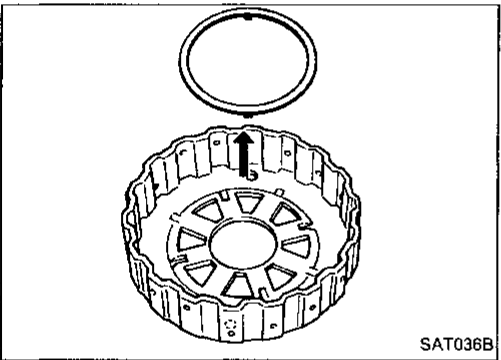
Disassembly (Cont'd)



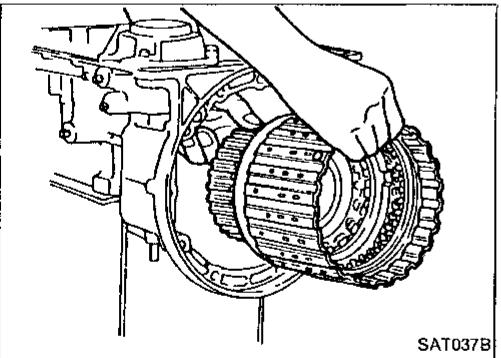
e. Remove needle bearing from overrun clutch hub.



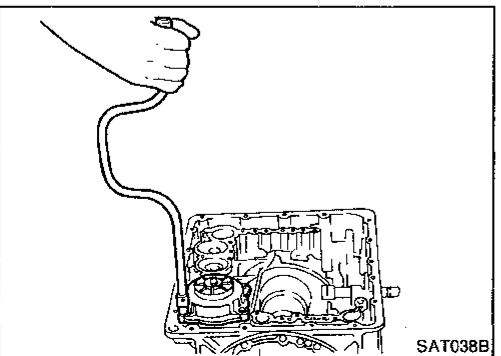
f. Remove overrun clutch hub from rear internal gear and forward clutch hub.



g. Remove thrust washer from overrun clutch hub.



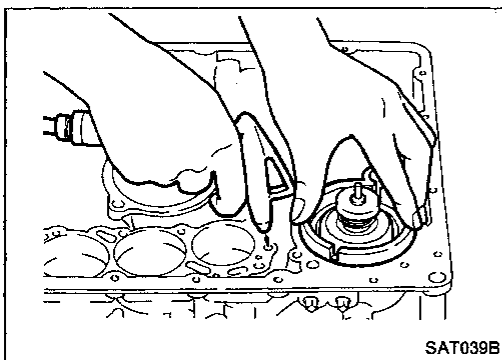
h. Remove forward clutch assembly from transmission case.



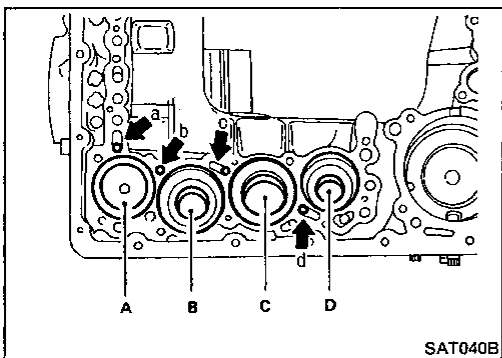
21. Remove band servo and accumulator components.
a. Remove band servo retainer from transmission case.

DISASSEMBLY

Disassembly (Cont'd)

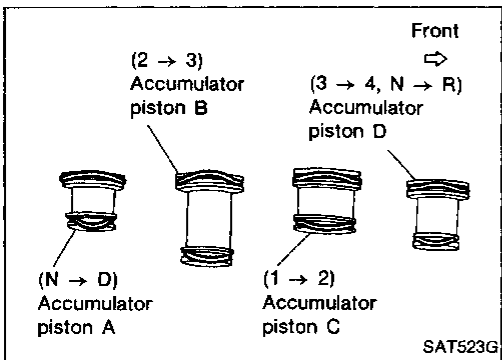


- b. Apply compressed air to oil hole until band servo piston comes out of transmission case.
- **Hold piston with a rag and gradually direct air to oil hole.**
- c. Remove return springs.

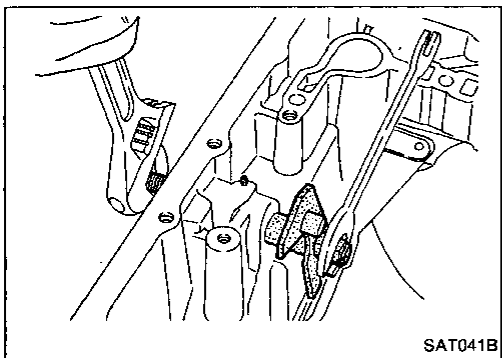


- d. Remove springs from accumulator pistons B, C and D.
- e. Apply compressed air to each oil hole until piston comes out.
- **Hold piston with a rag and gradually direct air to oil hole.**

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

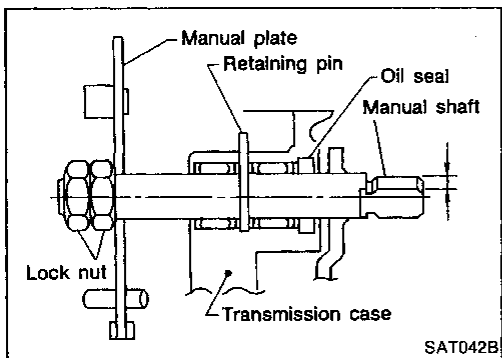


- f. Remove O-ring from each piston.



- 22. Remove manual shaft components, if necessary.

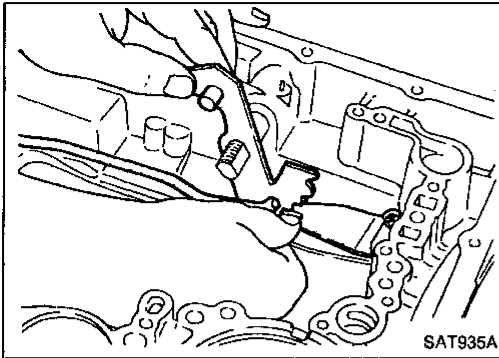
- a. Hold width across flats of manual shaft (outside the transmission case) and remove lock nut from shaft.



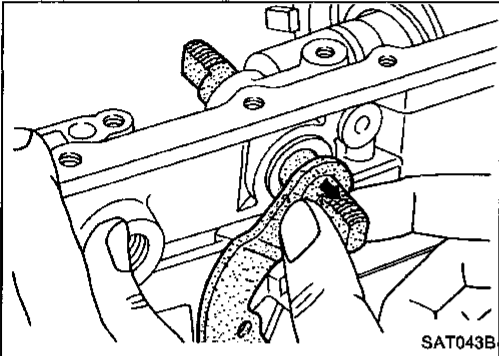
- b. Remove retaining pin from transmission case.

DISASSEMBLY

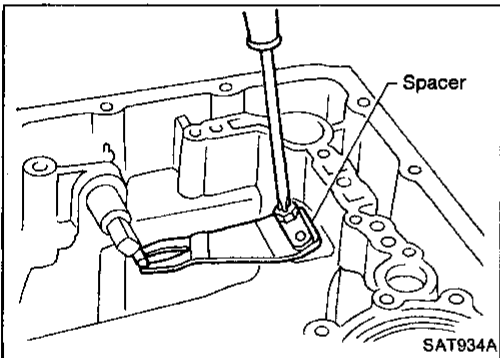
Disassembly (Cont'd)



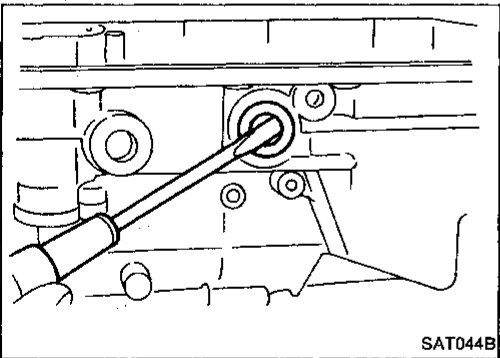
- c. While pushing detent spring down, remove manual plate and parking rod from transmission case.



- d. Remove manual shaft from transmission case.

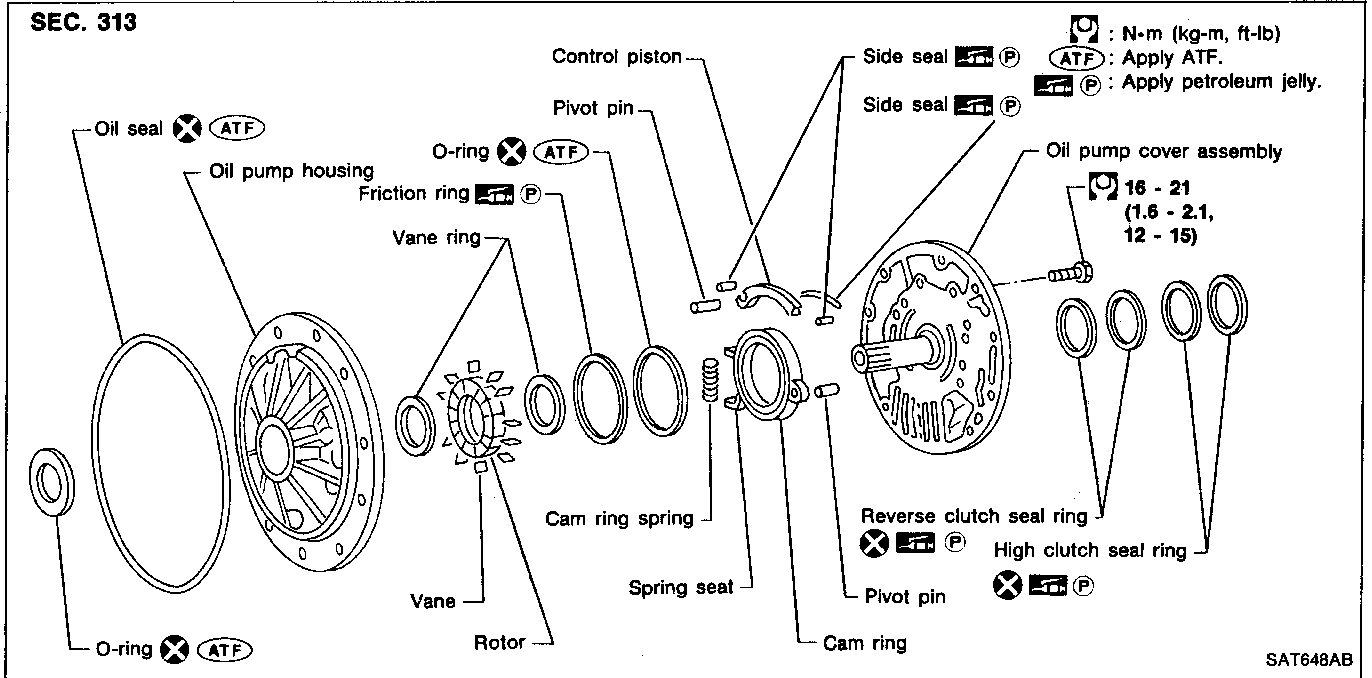


- e. Remove spacer and detent spring from transmission case.

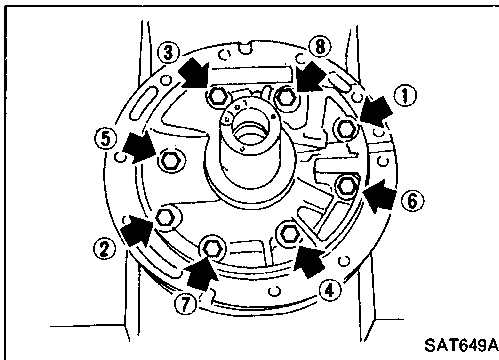


- f. Remove oil seal from transmission case.

Oil Pump



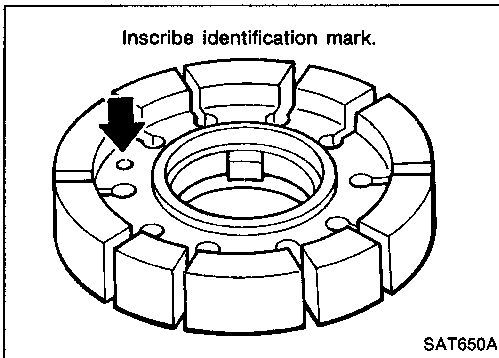
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DISASSEMBLY

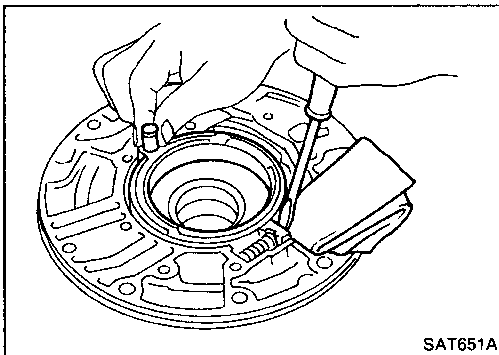
- Loosen bolts in numerical order and remove oil pump cover.

MT



- 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.

AT



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

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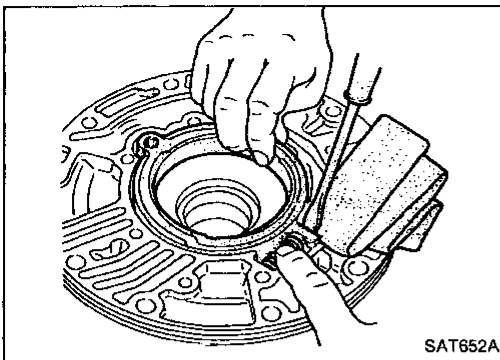
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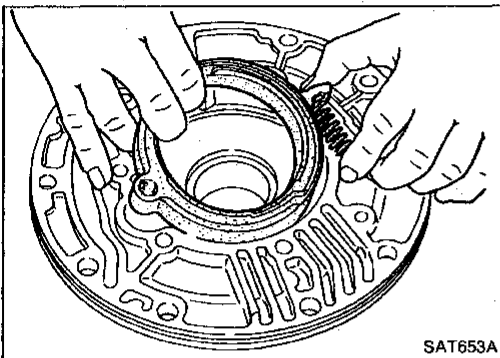
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REPAIR FOR COMPONENT PARTS

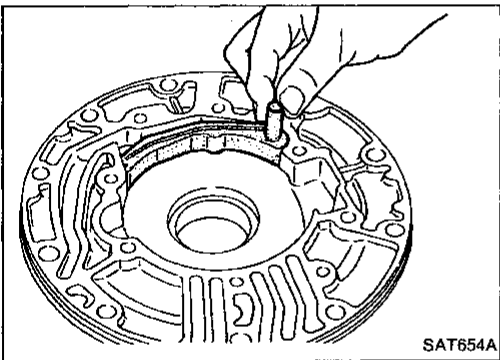
Oil Pump (Cont'd)



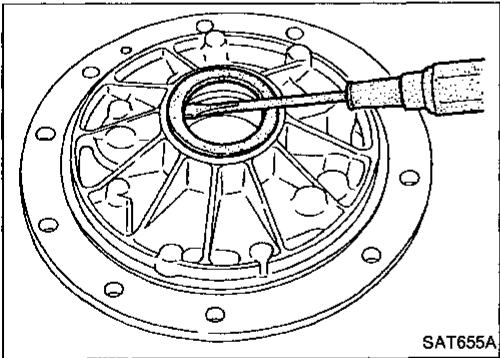
4. While holding cam ring and spring lift out cam ring spring.
 - Be careful not to damage oil pump housing.
 - Hold cam ring spring to prevent it from jumping.



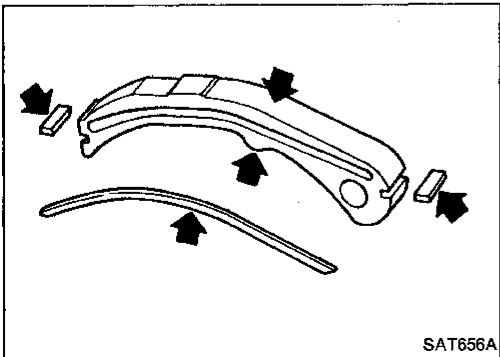
5. Remove cam ring and cam ring spring from oil pump housing.



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. Measure in at least four places along their circumferences. Maximum measured values should be within specified positions.
- **Before measurement, check that friction rings, O-ring, control piston side seals and cam ring spring are removed.**
Standard clearance (Cam ring, rotor, vanes and control piston):

Refer to SDS, AT-206.

- 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.

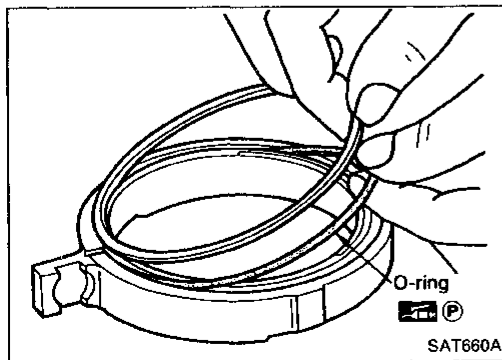
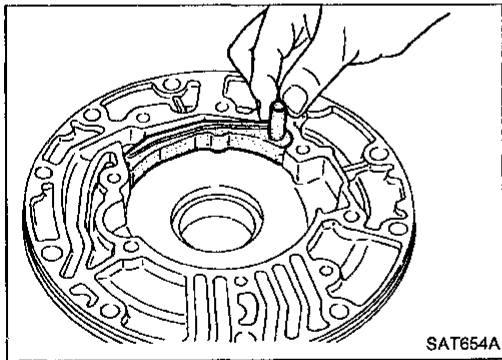
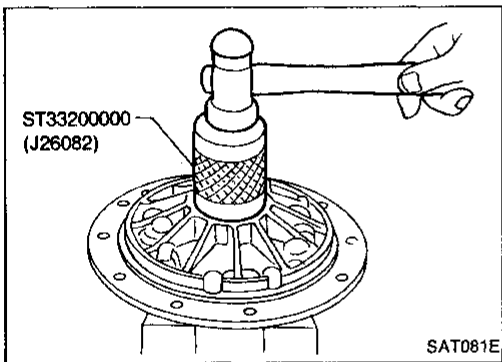
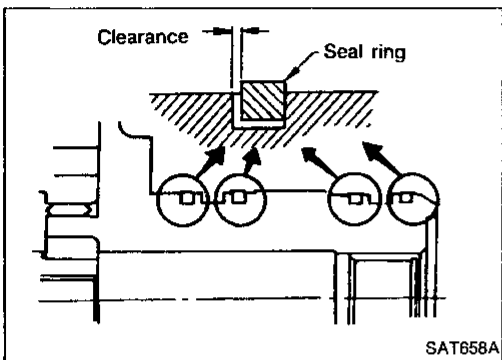
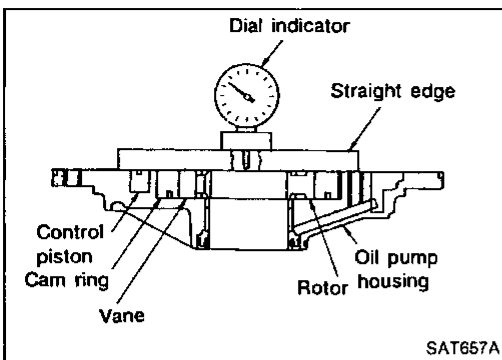
Standard clearance:

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.**

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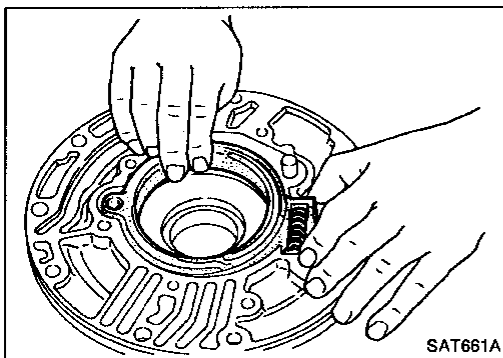
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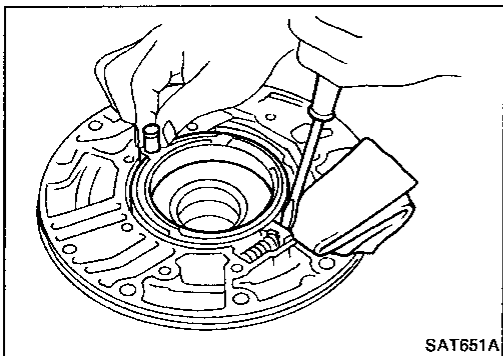
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REPAIR FOR COMPONENT PARTS

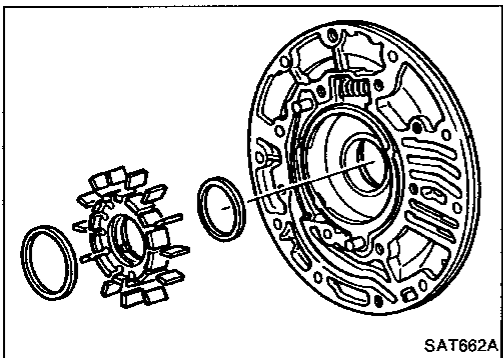
Oil Pump (Cont'd)



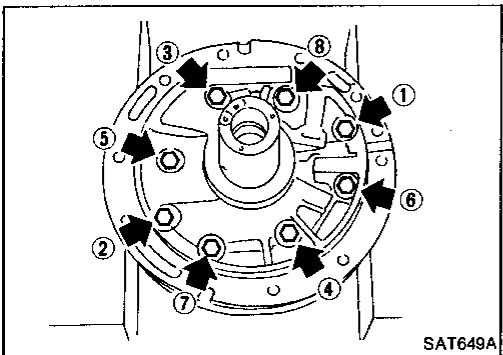
- d. Assemble cam ring, cam ring spring and spring seat. Install spring by pushing it against pump housing.



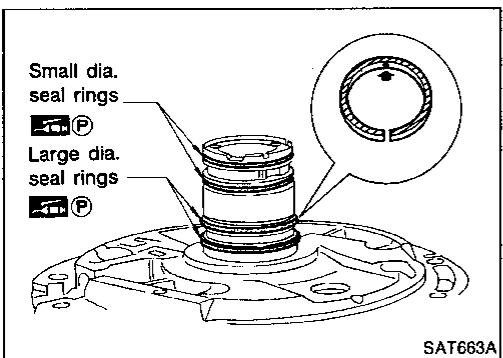
- e. While pushing on cam ring install pivot pin.



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



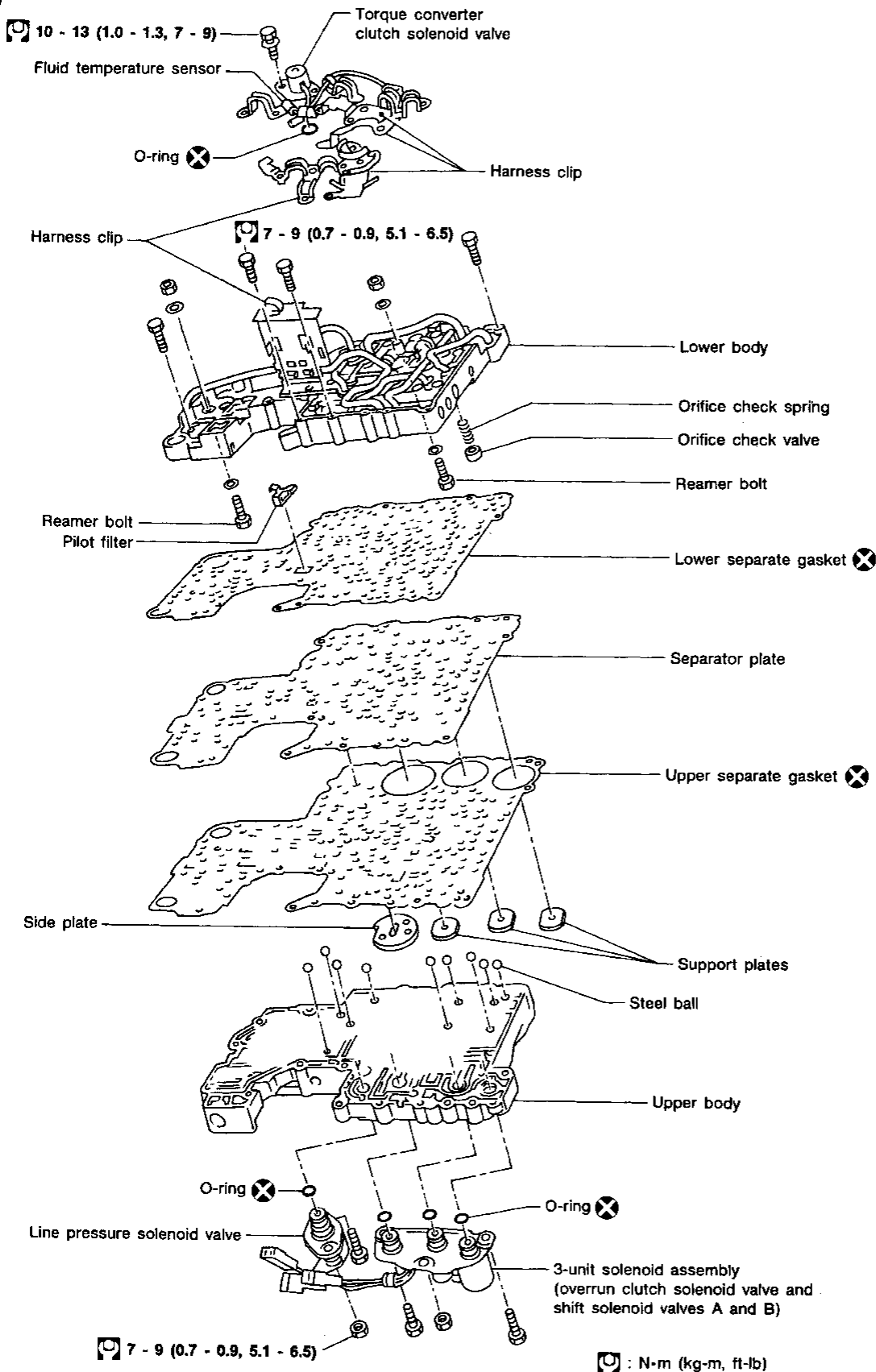
4. Install oil pump housing and oil pump cover.
 a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly in oil pump housing assembly, then remove masking tape.
 b. Tighten bolts in a criss-cross pattern.



5. Install new 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



: N·m (kg·m, ft·lb)

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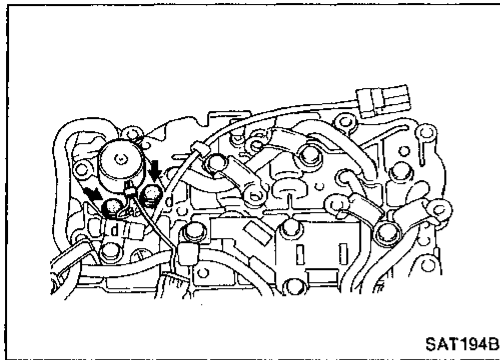
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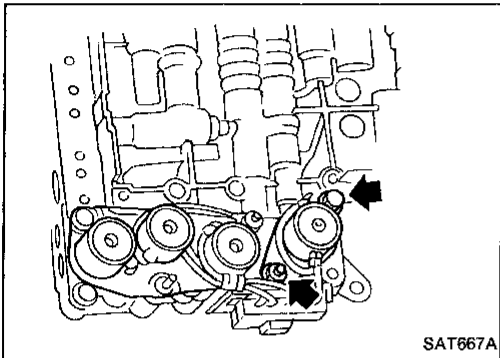
REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

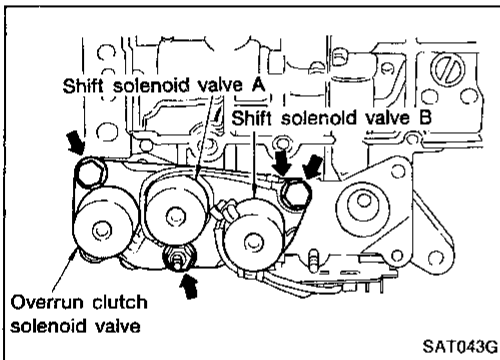
DISASSEMBLY



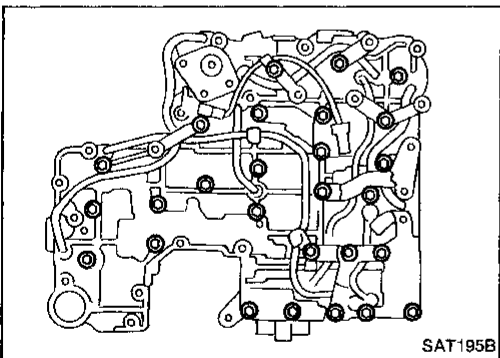
1. Remove solenoids.
 - a. Remove torque converter clutch solenoid valve and side plate from lower body.
 - b. Remove O-ring from solenoid.



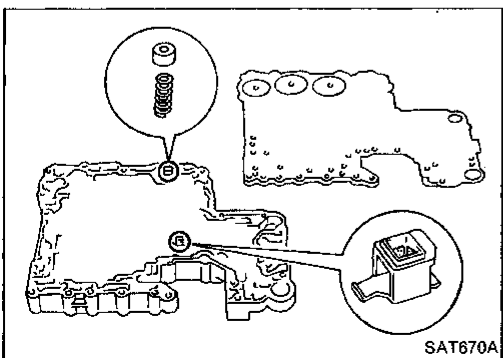
- c. Remove line pressure solenoid valve from upper body.
 - d. Remove O-ring from solenoid.



- 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.**

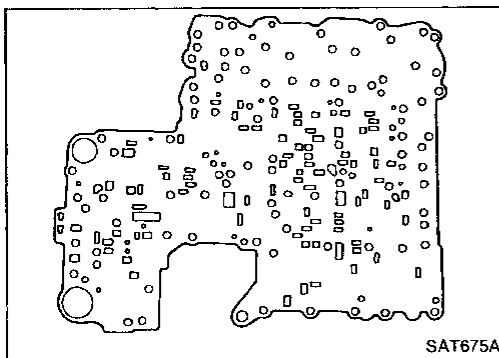
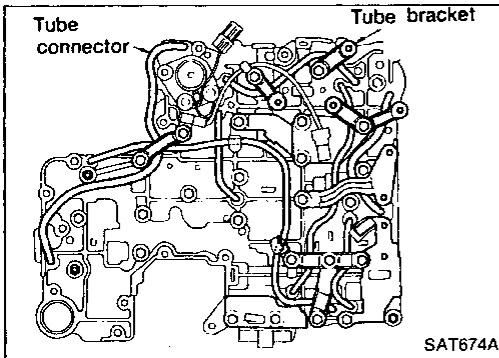
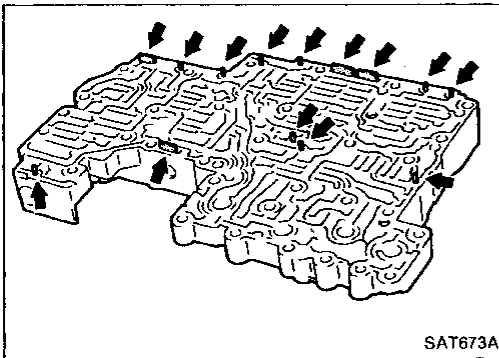
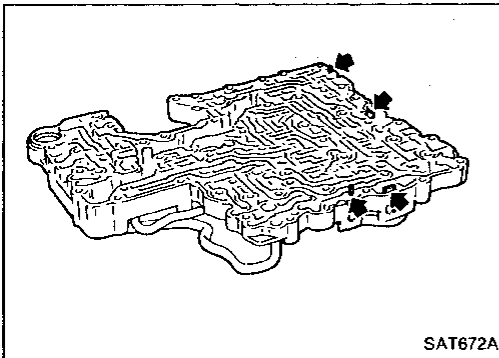
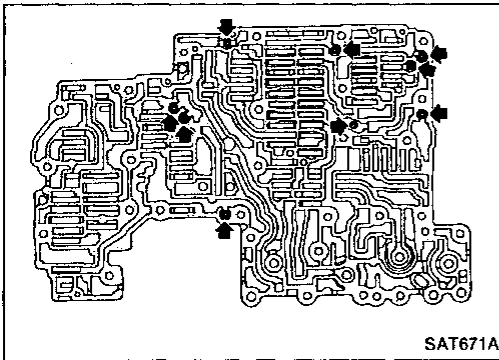


- c. Place lower body facedown, and remove separate gasket and separator plate.
 - d. Remove pilot filter, orifice check valve and orifice check spring.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

- e. Check to see that steel balls are properly positioned in upper body. 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

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

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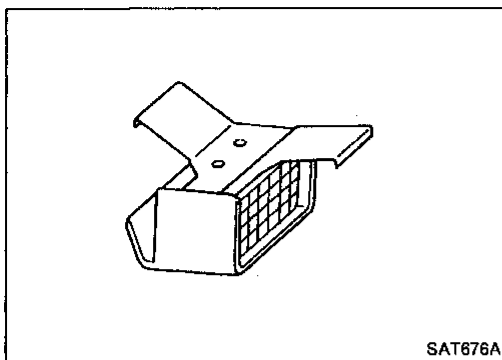
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REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

Pilot filter

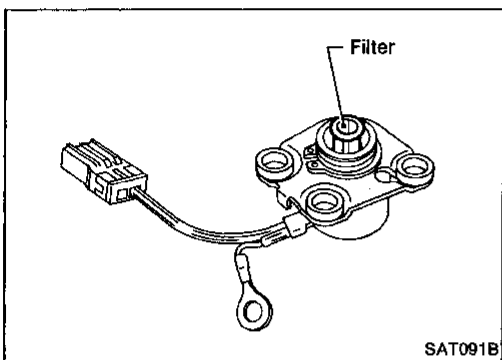
- Check to make sure that filter is not clogged or damaged.



SAT676A

Torque converter clutch solenoid valve

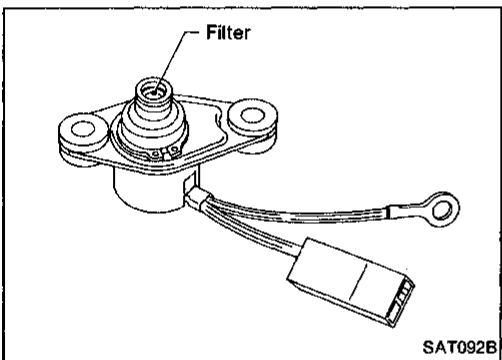
- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection", AT-99.



SAT091B

Line pressure solenoid valve

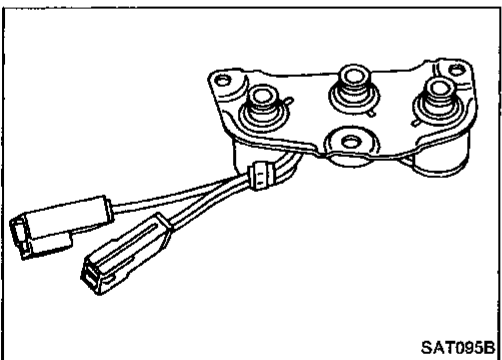
- Check that filter is not clogged or damaged.
- Measure resistance. — Refer to "Electrical Components Inspection", AT-99.



SAT092B

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

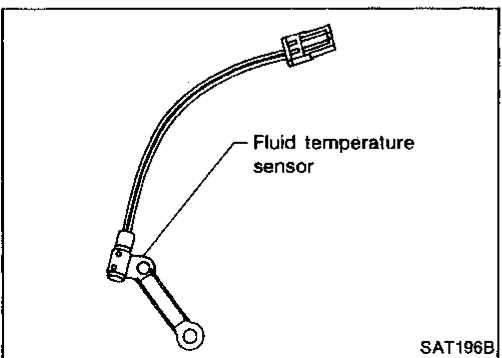
- Measure resistance of each solenoid. — Refer to "Electrical Components Inspection", AT-99.



SAT095B

Fluid temperature sensor

- Measure resistance. — Refer to "Electrical Components Inspection", AT-99.

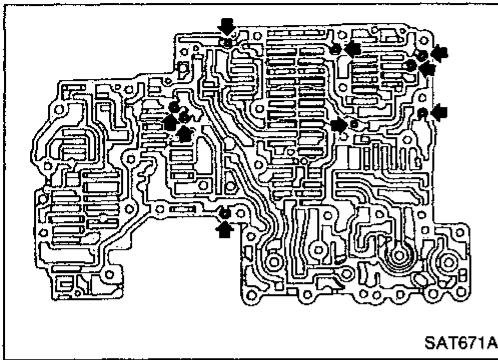


SAT196B

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)

ASSEMBLY



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

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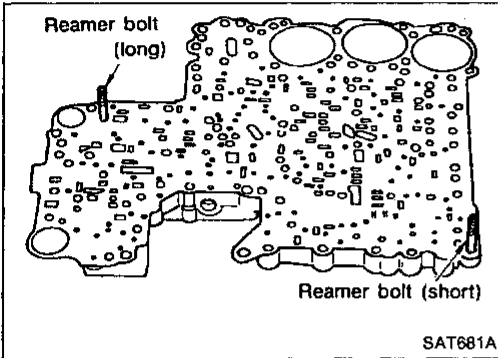
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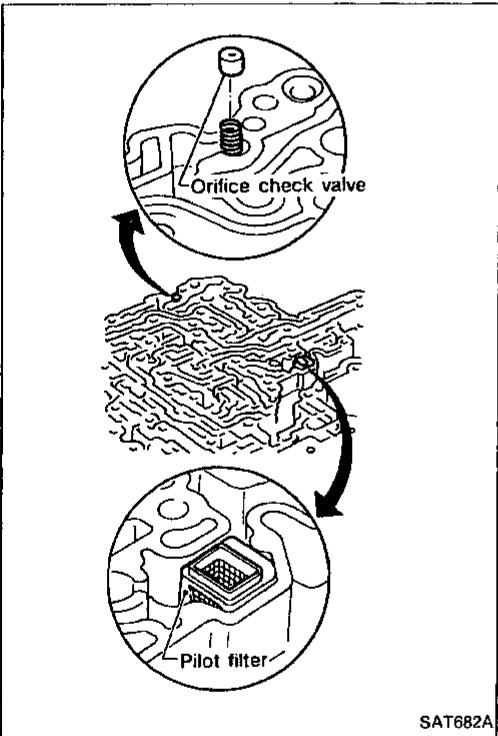
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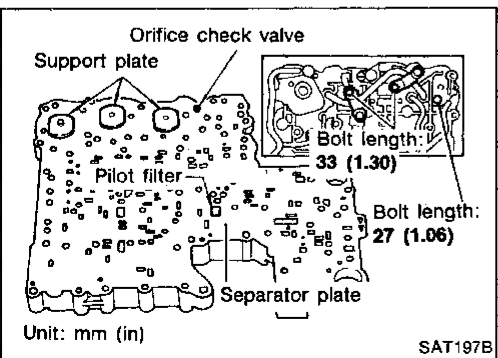
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- b. Install reamer bolts from bottom of upper body and install separate gaskets.



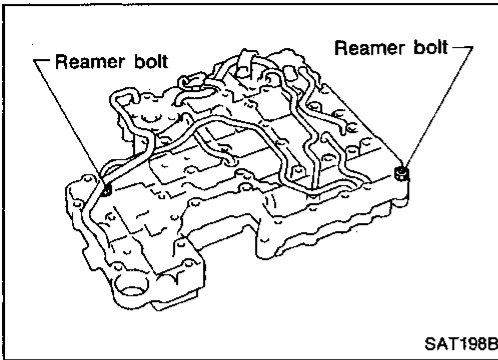
- c. Place oil circuit of lower body face up. Install orifice check spring, orifice check valve and pilot filter.



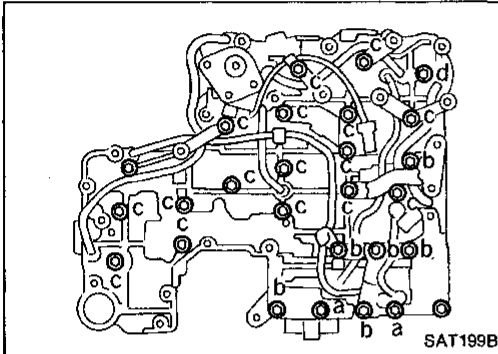
- d. Install lower separate gaskets and separator plates on lower body.
 - e. Install and temporarily tighten support plates, fluid temperature sensor and tube brackets.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly (Cont'd)



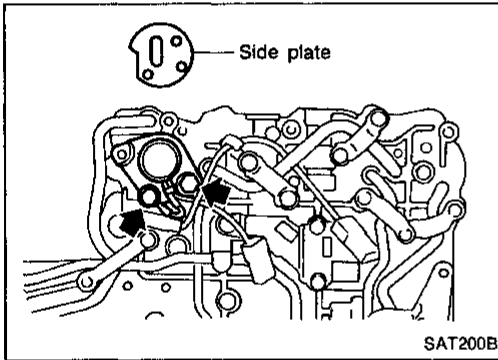
- f. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.
- **Be careful not to dislocate or drop steel balls, orifice check spring, orifice check valve and pilot filter.**



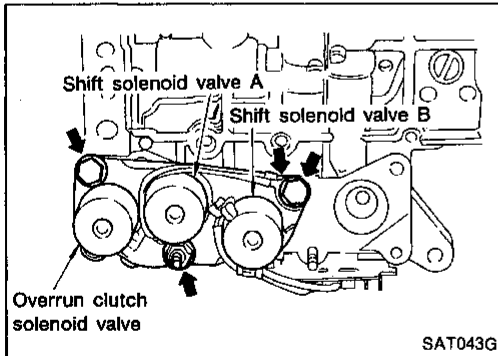
- g. Install and temporarily tighten bolts and tube brackets in their proper locations.

Bolt length and location:

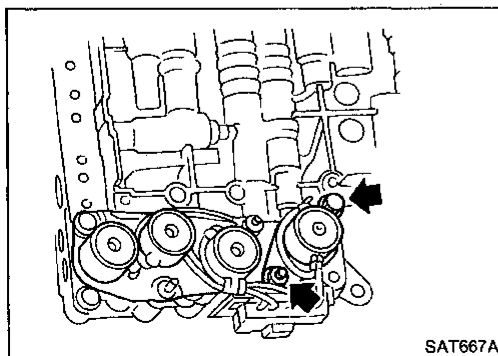
Bolt symbol	a	b	c	d
Bolt length	70 (2.76)	50 (1.97)	33 (1.30)	27 (1.06)



2. Install solenoids.
- a. Attach O-ring and install torque converter clutch solenoid valve and side plates onto lower body.

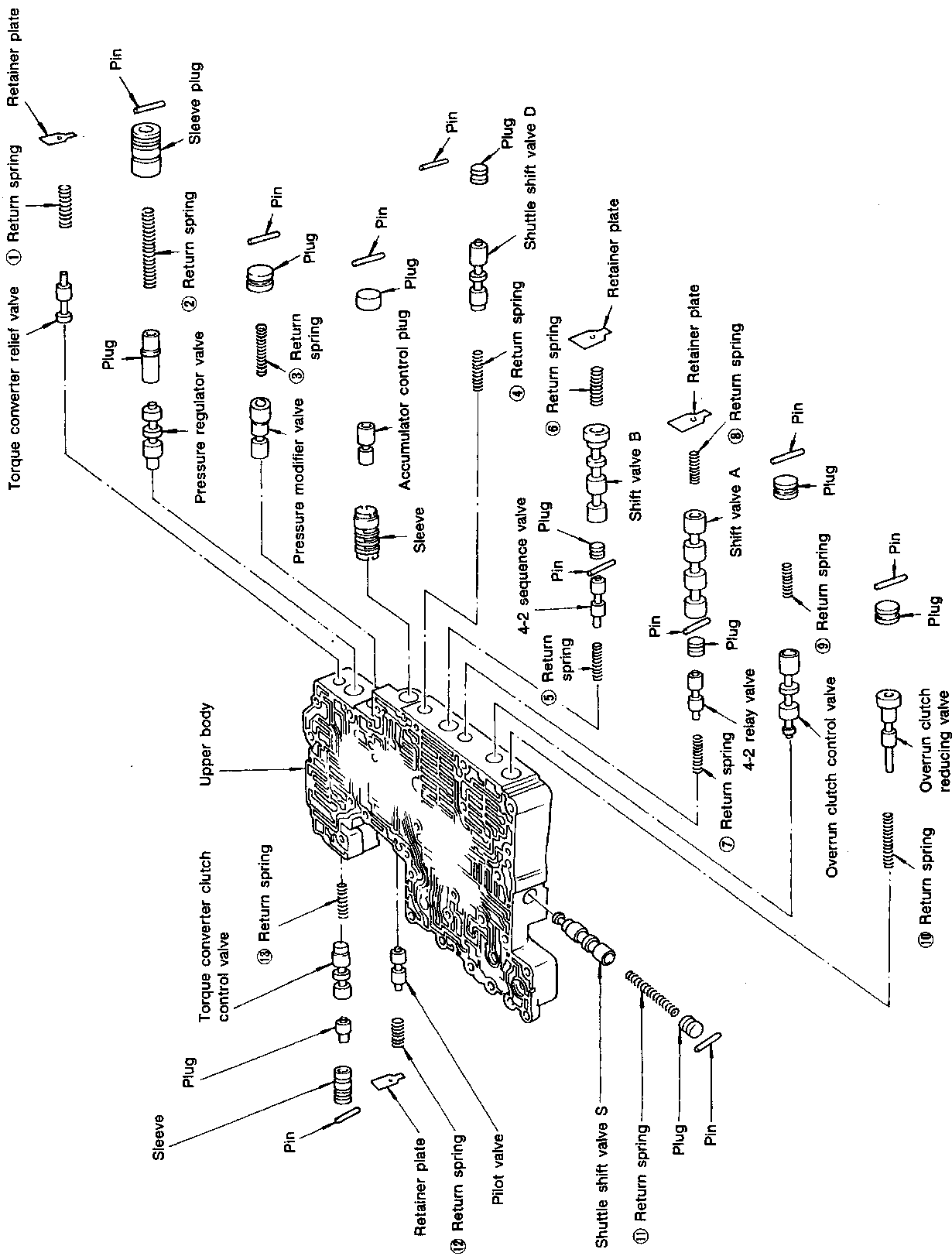


- b. Attach O-rings and install 3-unit solenoids assembly onto upper body.



- c. Attach O-ring and install line pressure solenoid valve onto upper body.
3. Tighten all bolts.

Control Valve Upper Body



SEC. 317

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Numbers preceding valve springs correspond with those shown in SDS on page AT-204.
Apply ATF to all components before their installation.

SAT837BA

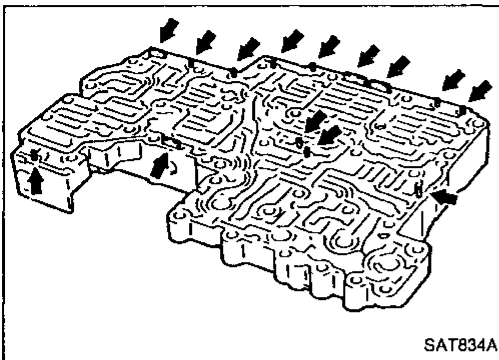
REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

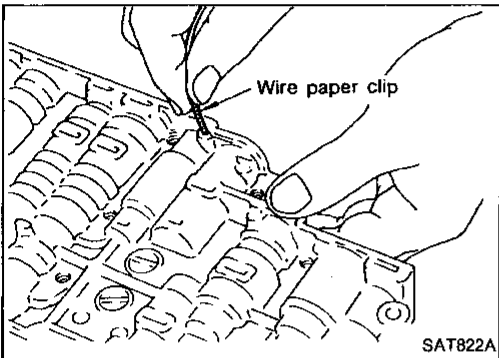
DISASSEMBLY

1. Remove valves at parallel pins.

- Do not use a magnetic hand.

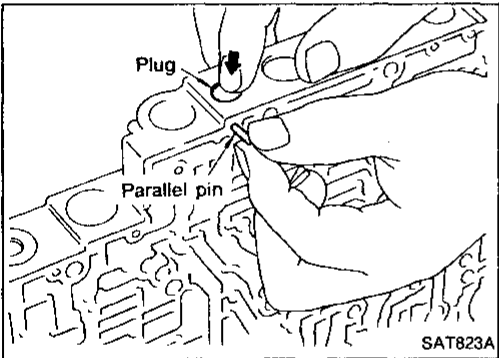


a. Use a wire paper clip to push out parallel pins.



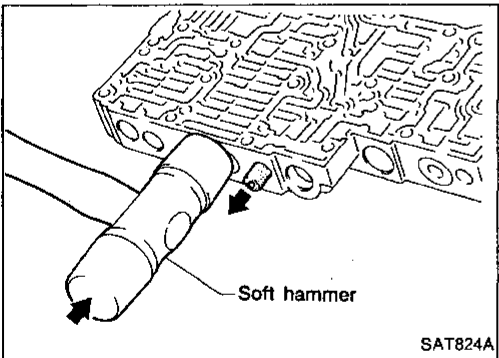
b. Remove parallel pins while pressing their corresponding plugs and sleeves.

- Remove plug slowly to prevent internal parts from jumping out.



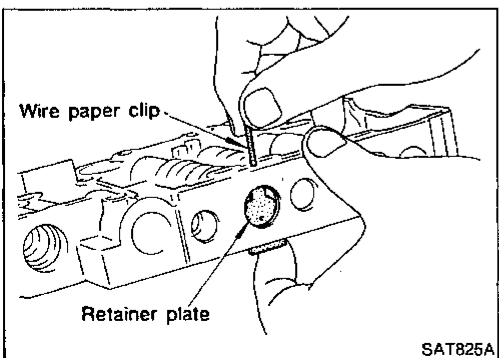
c. Place mating surface of valve facedown, and remove internal parts.

- 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.



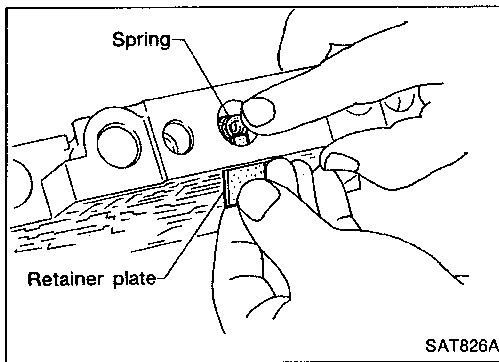
2. Remove valves at retainer plates.

a. Pry out retainer plate with wire paper clip.

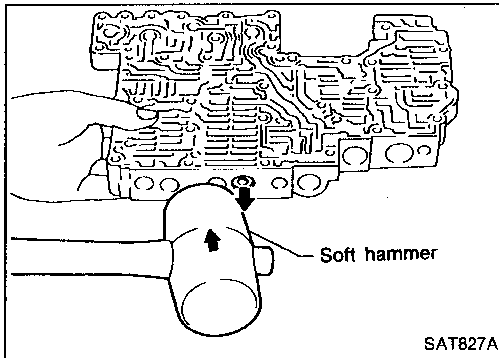


REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

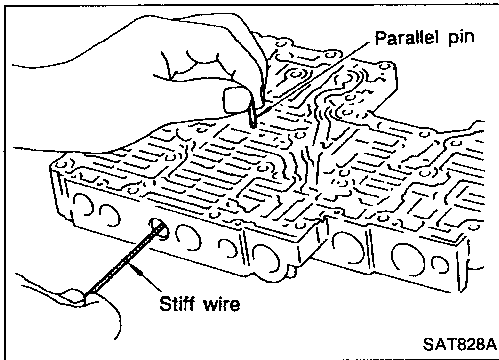


b. Remove retainer plates while holding spring.



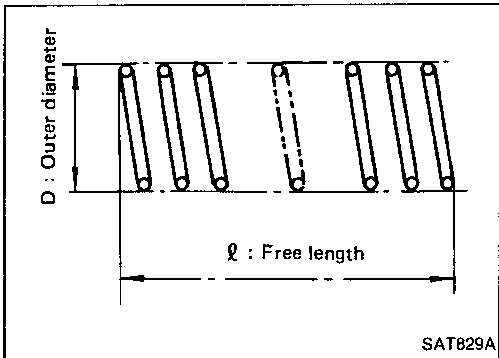
c. Place mating surface of valve facedown, and remove internal parts.

- 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

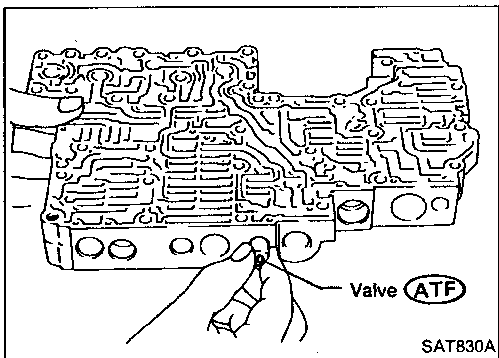
- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.

Inspection standard: Refer to SDS, AT-204.

- Replace valve springs if deformed or fatigued.

Control valves

- Check sliding surfaces of valves, sleeves and plugs.



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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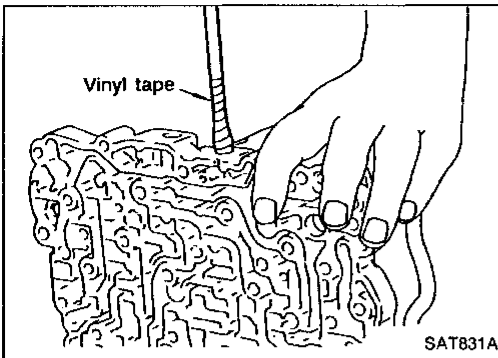
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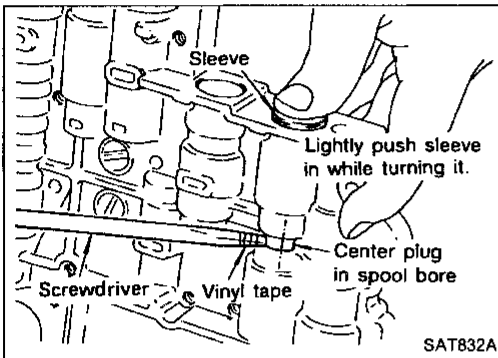
IDX

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body (Cont'd)

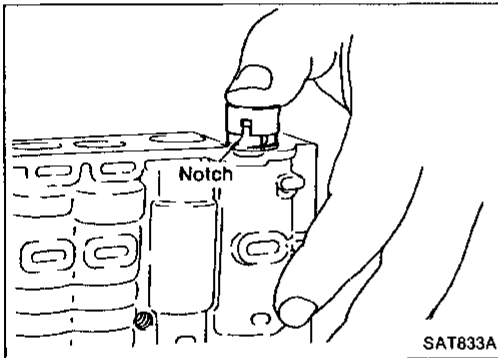


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



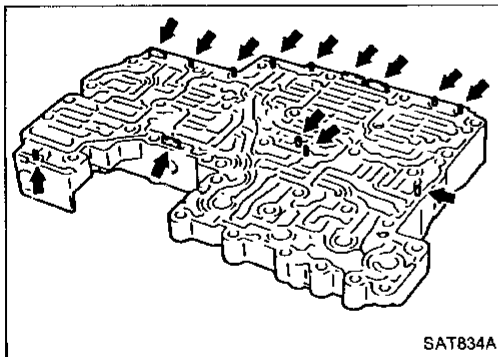
Pressure regulator valve

- 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.

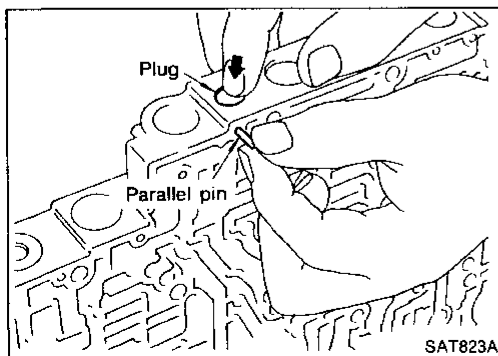


Accumulator control plug

- 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.



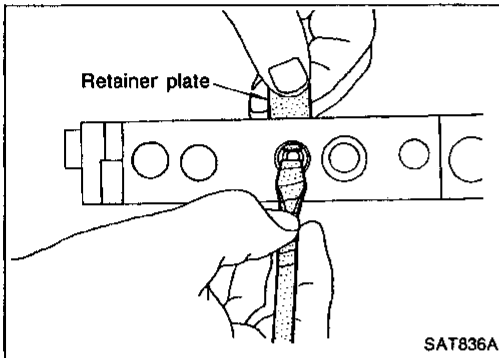
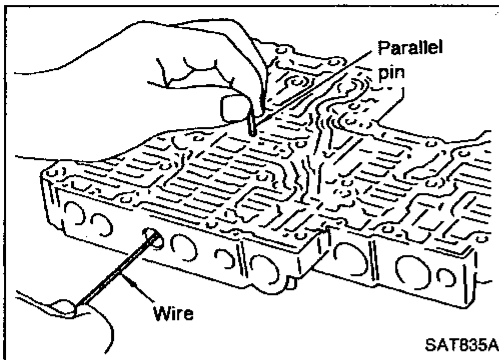
- While pushing plug, install parallel pin.

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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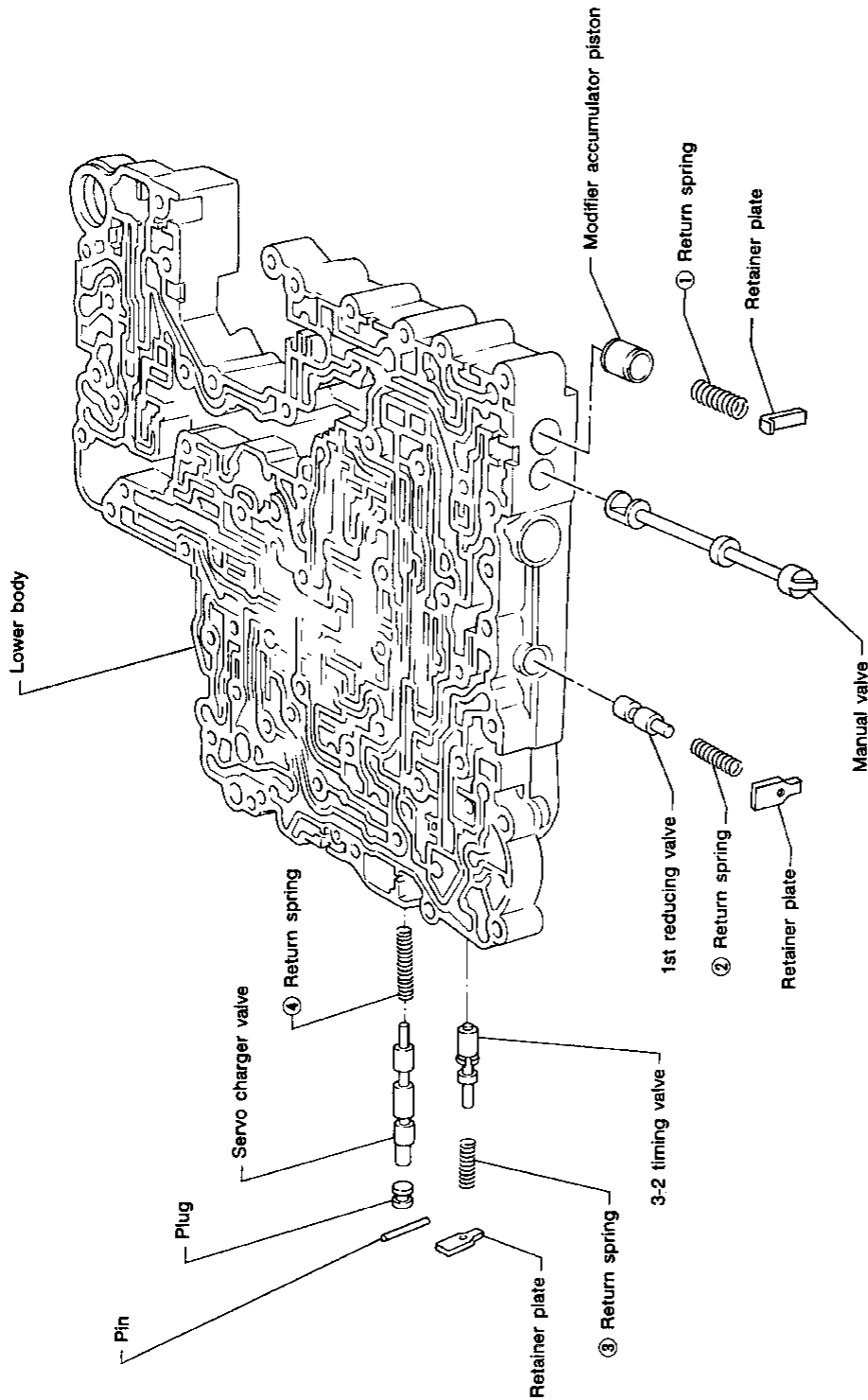
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Control Valve Lower Body



SEC. 317

Apply ATF to all components before their installation.

Numbers preceding valve-springs correspond with those shown in SDS on page AT-204.

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" of Control Valve Upper Body.

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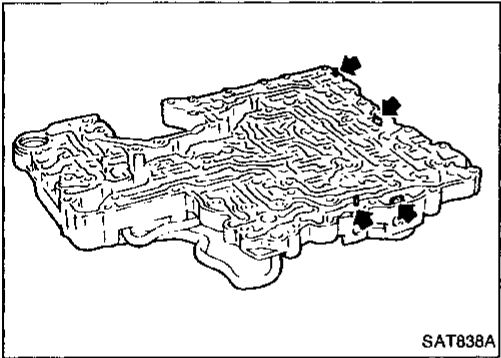
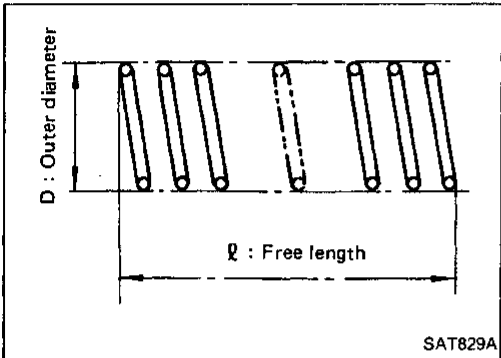
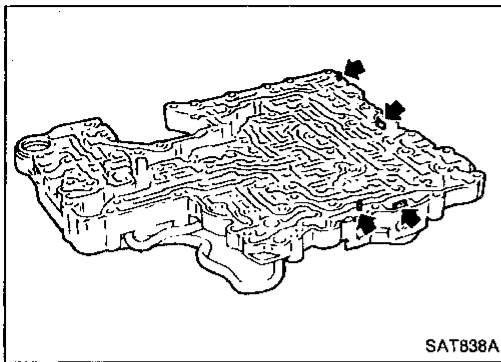
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INSPECTION

Valve springs

- Check each valve spring for damage or deformation. Also measure free length and outer diameter.
Inspection standard: Refer to SDS, AT-204.
- Replace valve springs if deformed or fatigued.

Control valves

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

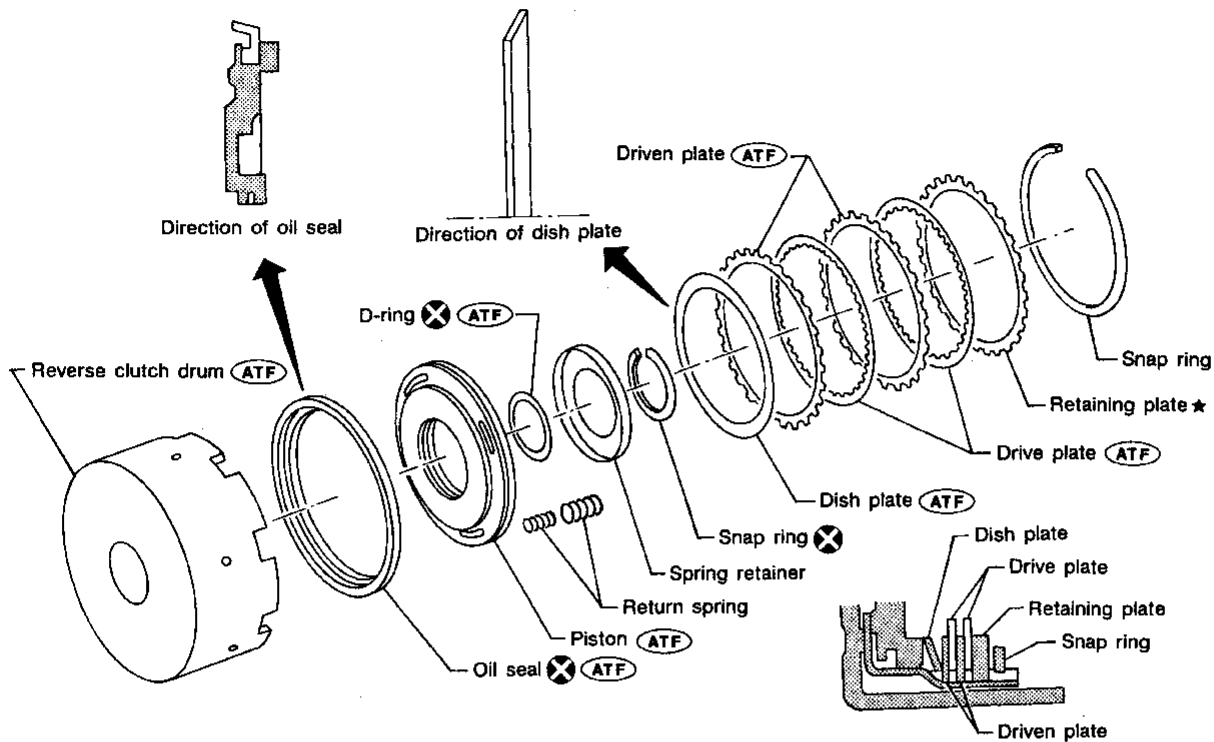
ASSEMBLY

- Install control valves.
For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body, AT-155.

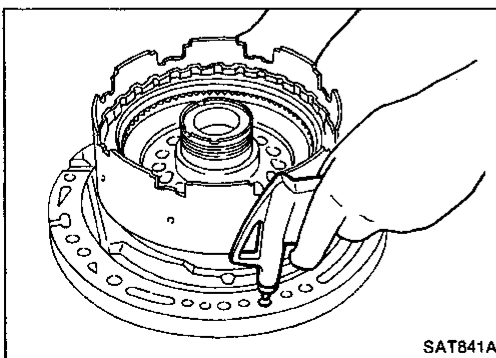
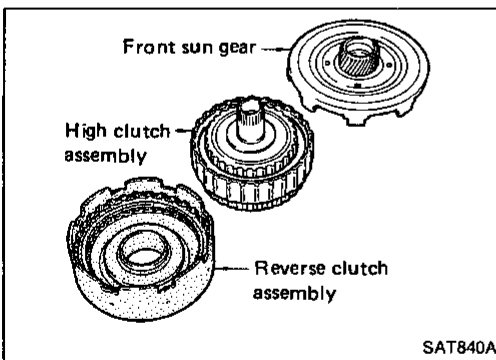
Reverse Clutch

SEC. 315

(ATF) : Apply ATF.
 ★ : Select with proper thickness.



SAT082EB

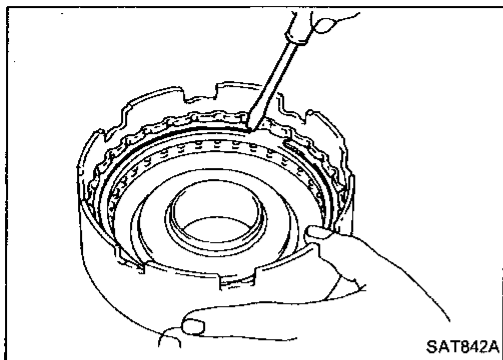


DISASSEMBLY

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

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



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

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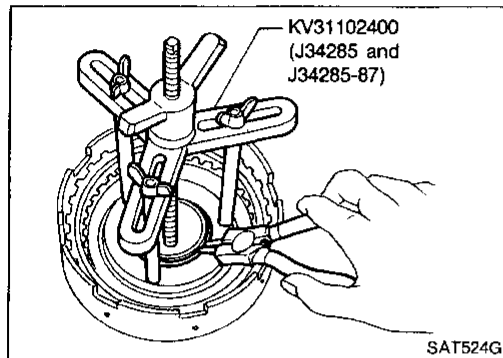
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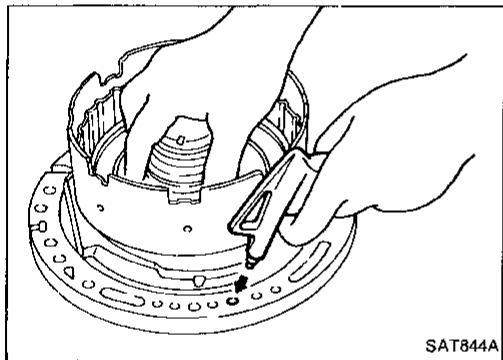
IDX



4. Remove snap ring from clutch drum while compressing clutch springs.

- Do not expand snap ring excessively.

5. Remove spring retainer and return spring.



6. 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.

7. Remove D-ring and oil seal from piston.

INSPECTION

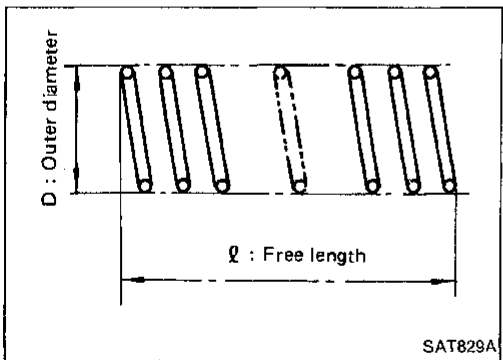
Reverse clutch snap ring and spring retainer

- 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-204.



Reverse clutch drive plates

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

Thickness of drive plate:

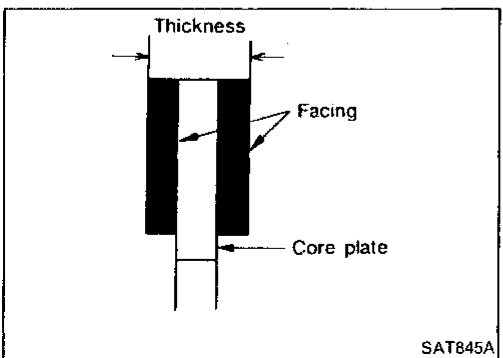
Standard value: 2.0 mm (0.079 in)

Wear limit: 1.8 mm (0.071 in)

- If not within wear limit, replace.

Reverse clutch dish plate

- Check for deformation or damage.

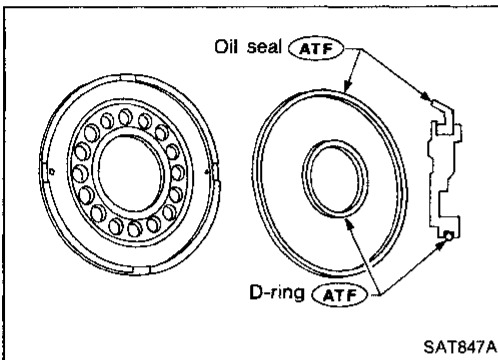
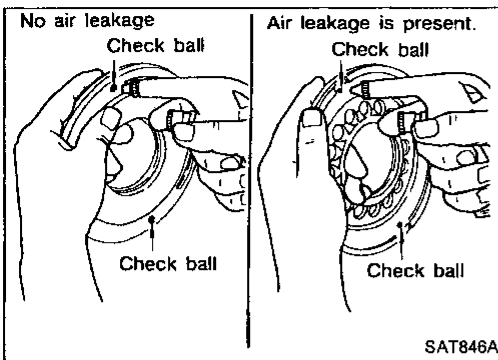


REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

Reverse clutch piston

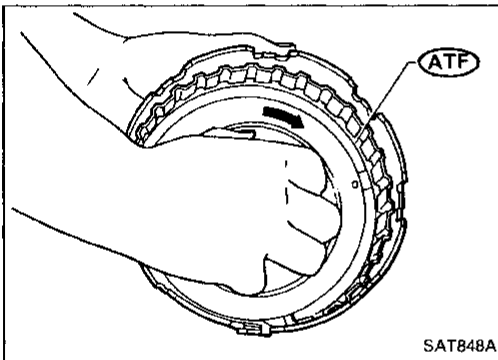
- Shake piston to assure that balls are not seized.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Also apply compressed air to oil hole on return spring side to assure that air leaks past ball.



ASSEMBLY

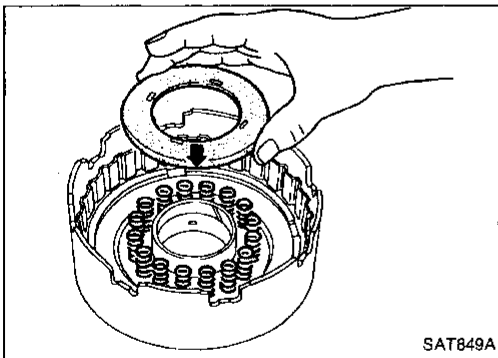
1. Install D-ring and oil seal on piston.

- Apply ATF to both parts.

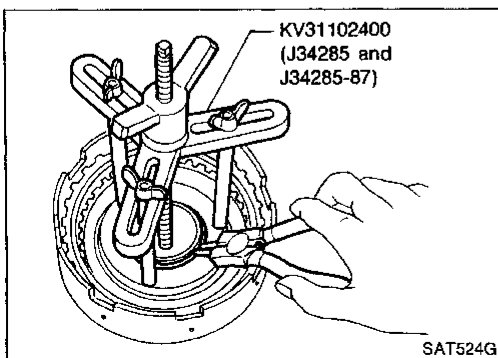


2. Install piston assembly by turning it slowly and evenly.

- Apply ATF to inner surface of drum.



3. Install return springs and spring retainer.

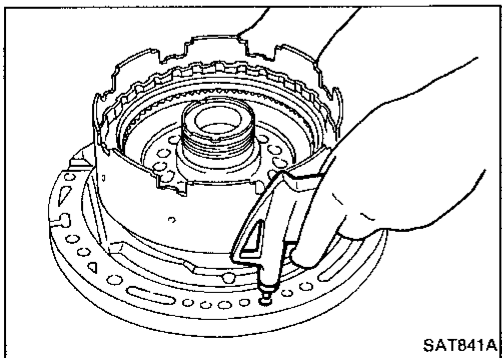
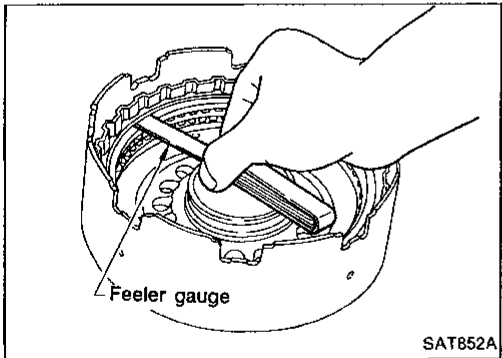
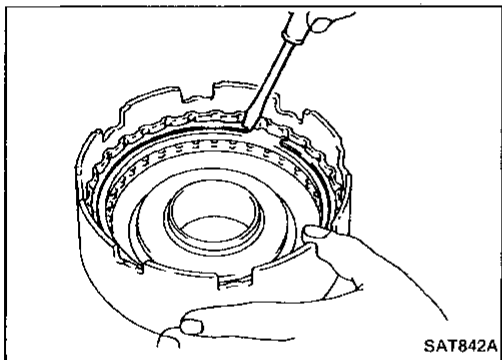
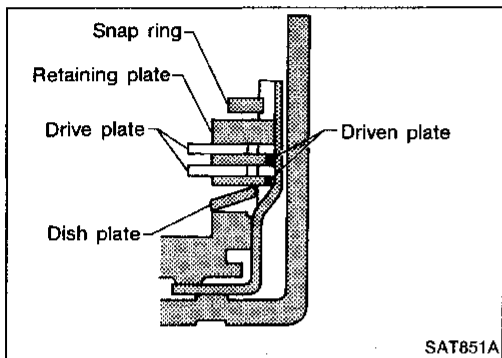
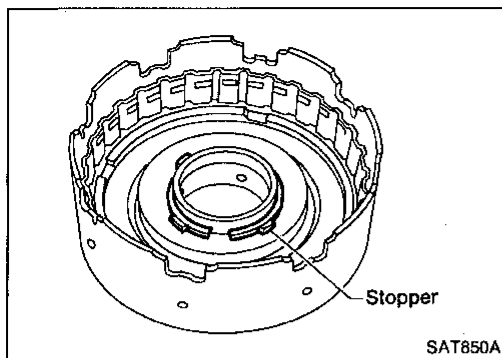


4. Install snap ring while compressing clutch springs.

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

0.5 - 0.8 mm (0.020 - 0.031 in)

Allowable limit

1.2 mm (0.047 in)

Retaining plate:

Refer to SDS, AT-205.

8. Check operation of reverse clutch. Refer to "DISASSEMBLY" of Reverse Clutch, AT-160.

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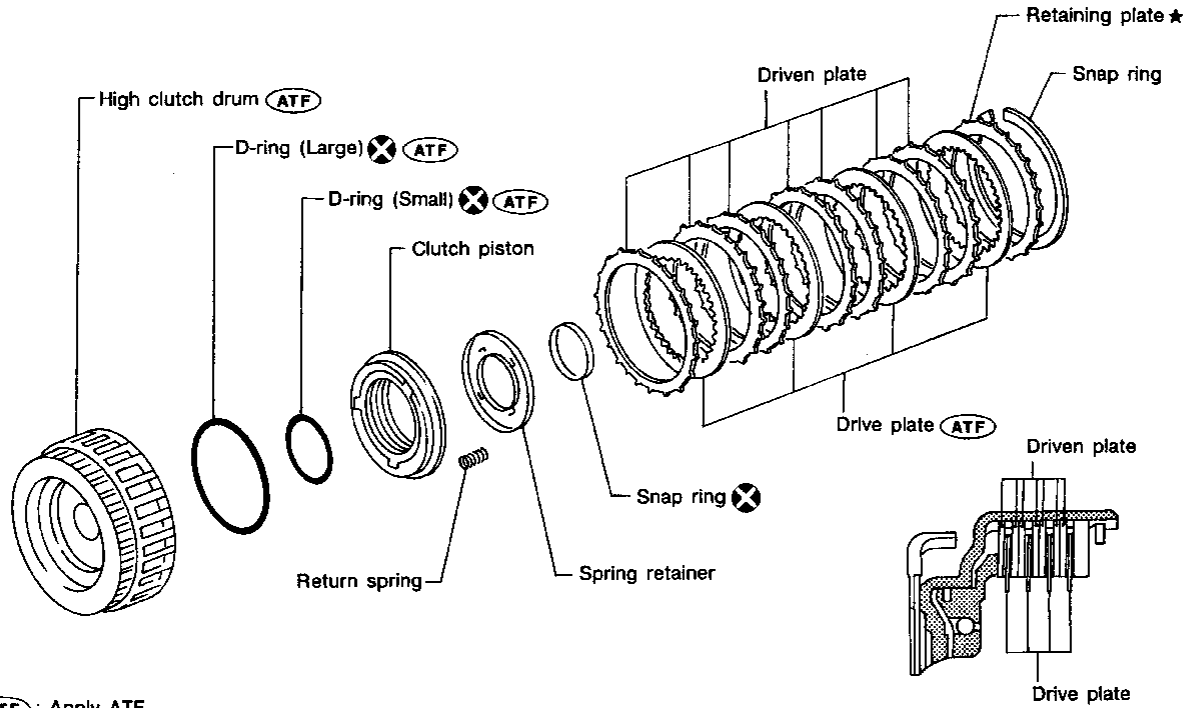
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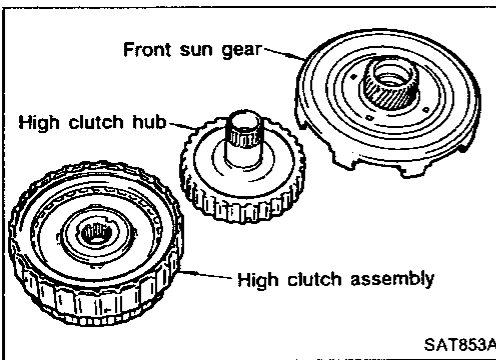
High Clutch

SEC. 315



(ATF) : Apply ATF.
 ★ : Select with proper thickness.

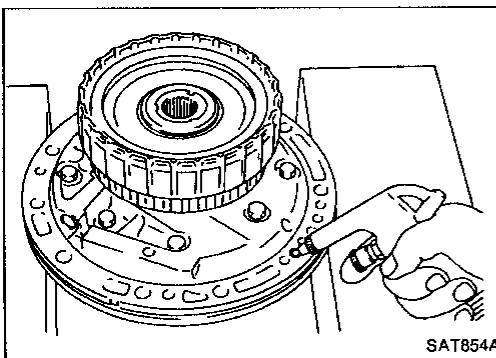
SAT022EA



SAT853A

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

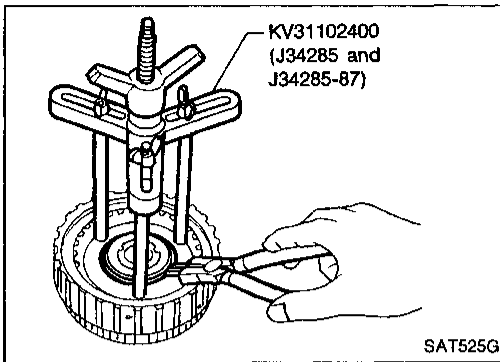
- Check of high clutch operation



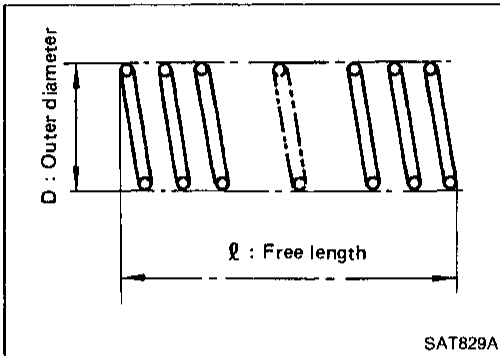
SAT854A

REPAIR FOR COMPONENT PARTS

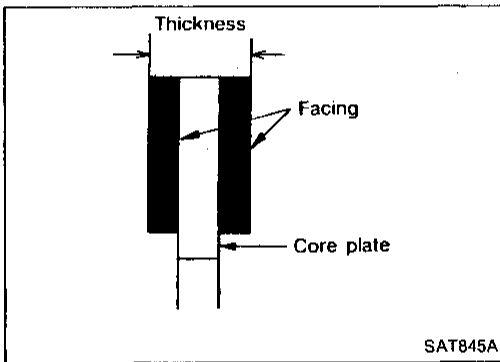
High Clutch (Cont'd)



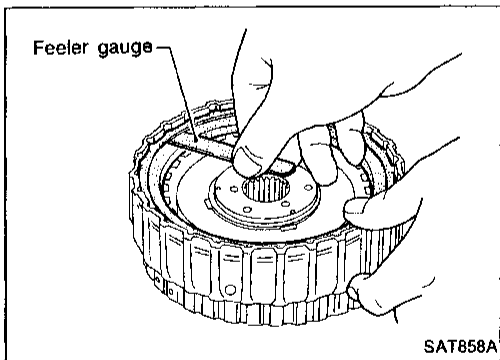
- Removal and installation of return spring



- Inspection of high clutch return springs
Inspection standard: Refer to SDS, AT-204.



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



- Measurement of clearance between retaining plate and snap ring
Specified clearance:
Standard
1.8 - 2.2 mm (0.071 - 0.087 in)
Allowable limit
3.0 mm (0.118 in)
Retaining plate:
Refer to SDS, AT-205.

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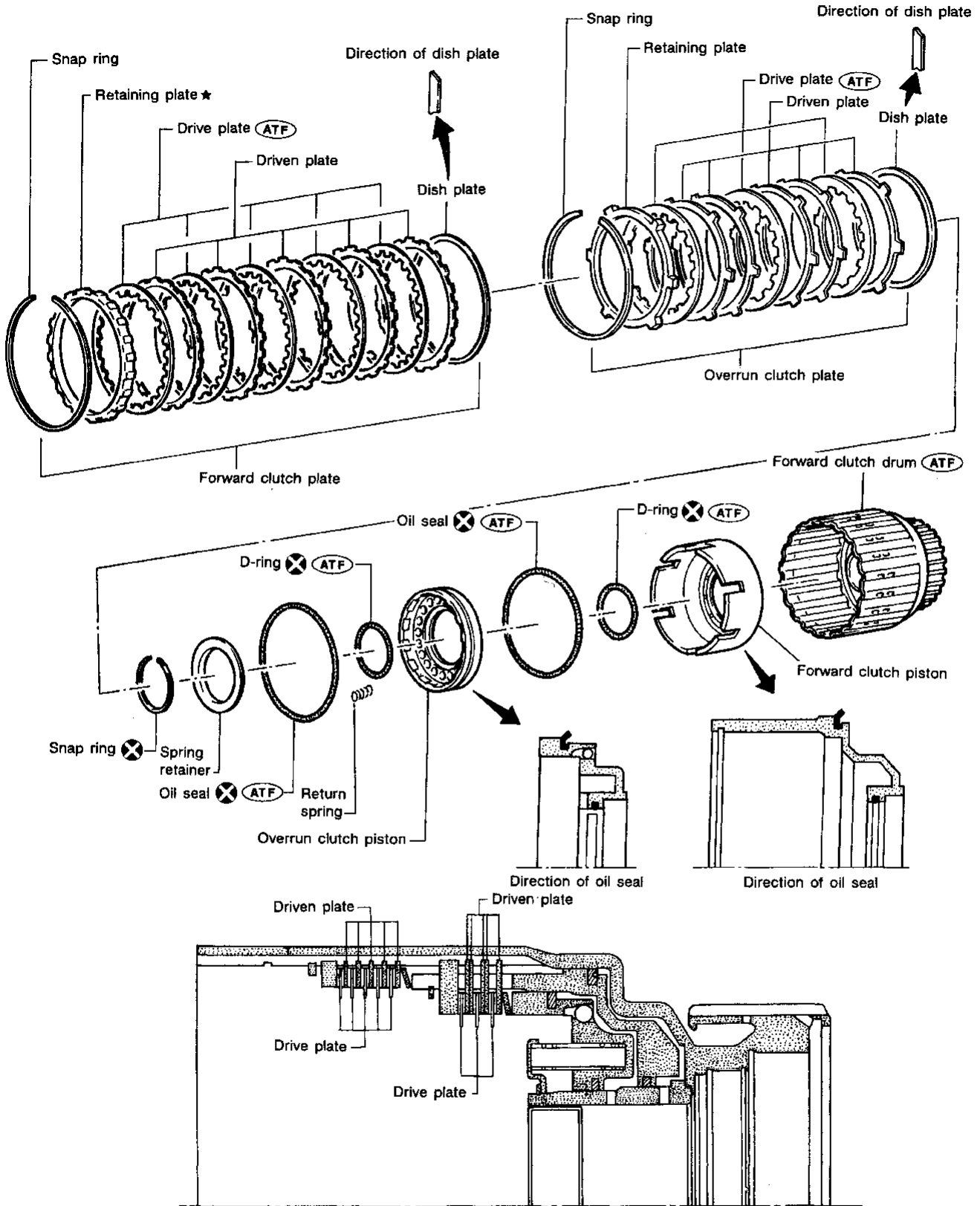
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Forward and Overrun Clutches

SEC. 315



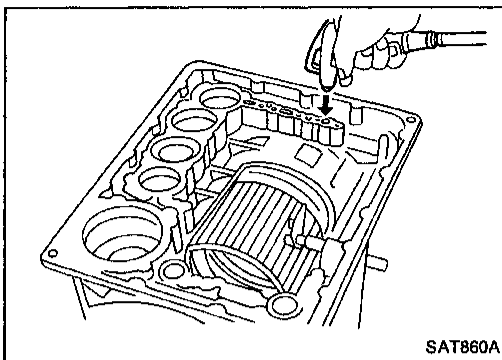
(ATF) : Apply ATF.
 ★ : Select with proper thickness.

REPAIR FOR COMPONENT PARTS

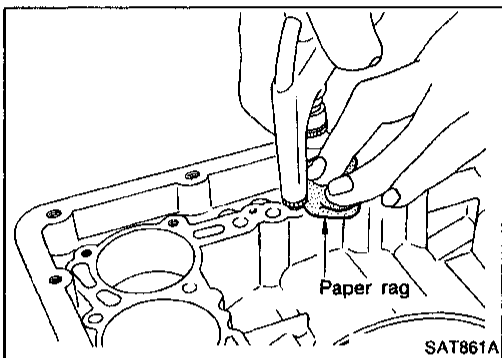
Forward and Overrun Clutches (Cont'd)

Forward and overrun clutches are serviced essentially the same way as reverse clutch is serviced. However, note the following exceptions.

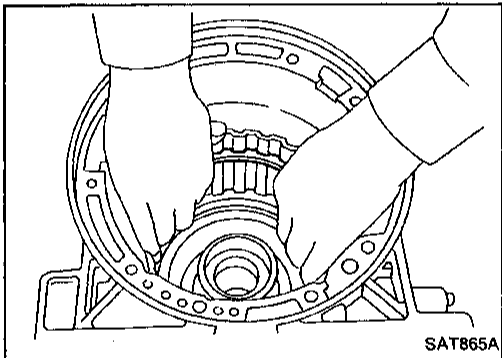
- Check of forward clutch operation.



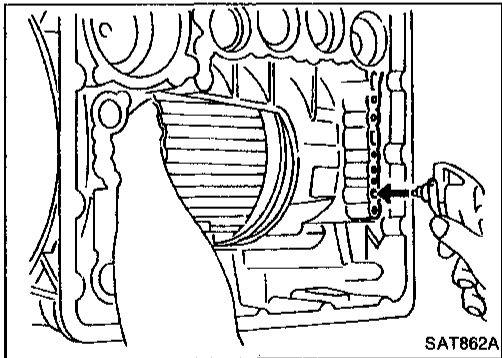
- Check of overrun clutch operation.



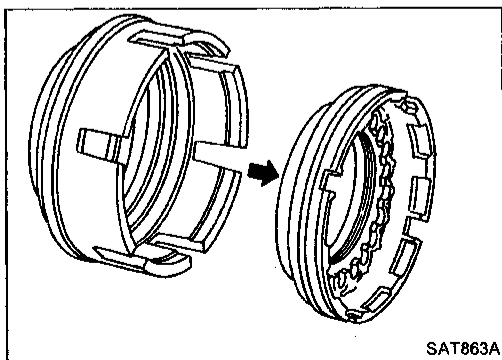
- Removal of forward clutch drum
Remove forward clutch drum from transmission case by holding snap ring.



- Removal of forward clutch and overrun clutch pistons
 1. While holding overrun clutch piston, gradually apply compressed air to oil hole.



2. Remove overrun clutch from forward clutch.



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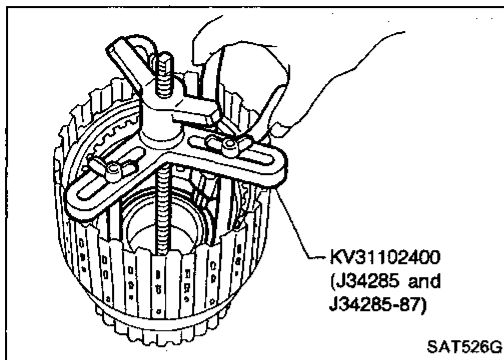
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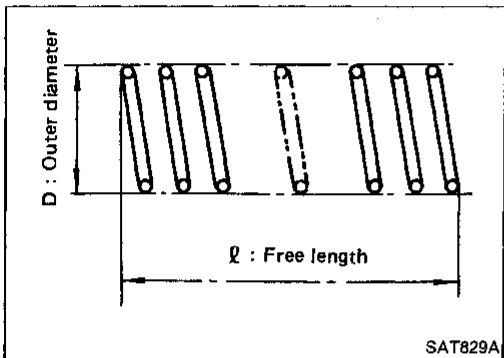
IDX

REPAIR FOR COMPONENT PARTS

Forward and Overrun Clutches (Cont'd)

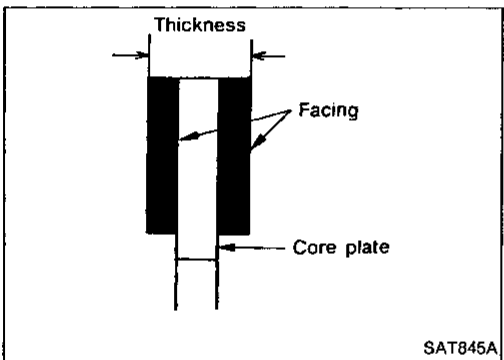


- Removal and installation of return springs



- Inspection of forward clutch and overrun clutch return springs

Inspection standard: Refer to SDS, AT-204.



- Inspection of forward clutch drive plates

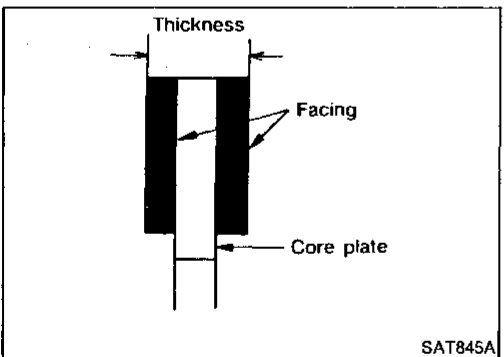
Thickness of drive plate:

Standard

2.0 mm (0.079 in)

Wear limit

1.8 mm (0.071 in)



- Inspection of overrun clutch drive plates

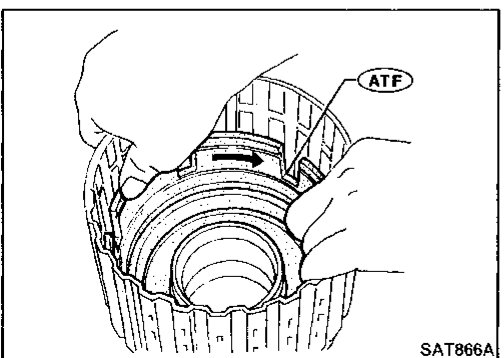
Thickness of drive plate:

Standard

2.0 mm (0.079 in)

Wear limit

1.8 mm (0.071 in)



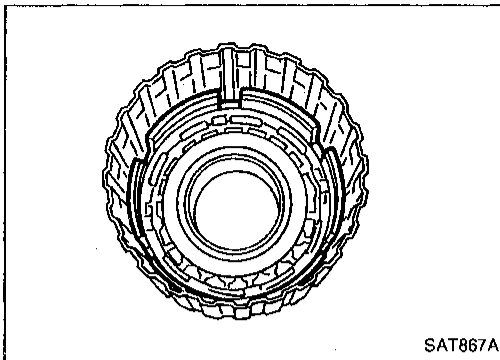
- Installation of forward clutch piston and overrun clutch piston

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

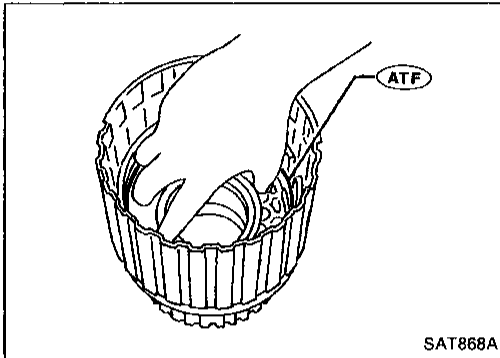
- **Apply ATF to inner surface of clutch drum.**

REPAIR FOR COMPONENT PARTS

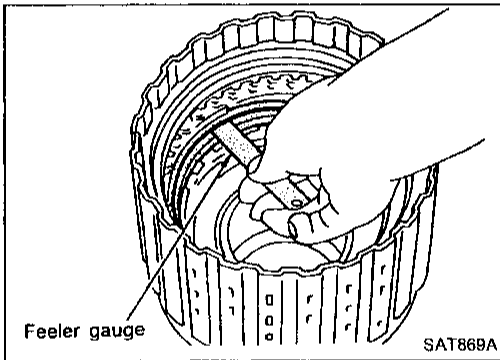
Forward and Overrun Clutches (Cont'd)



- 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

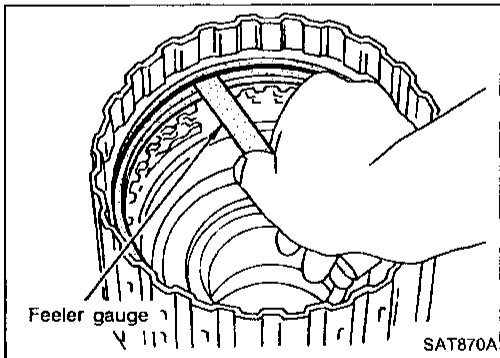
1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit

2.0 mm (0.079 in)

Retaining plate:

Refer to SDS, AT-205.



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

Specified clearance:

Standard

0.45 - 0.85 mm (0.0177 - 0.0335 in)

Allowable limit

1.85 mm (0.0728 in)

Retaining plate:

Refer to SDS, AT-205.

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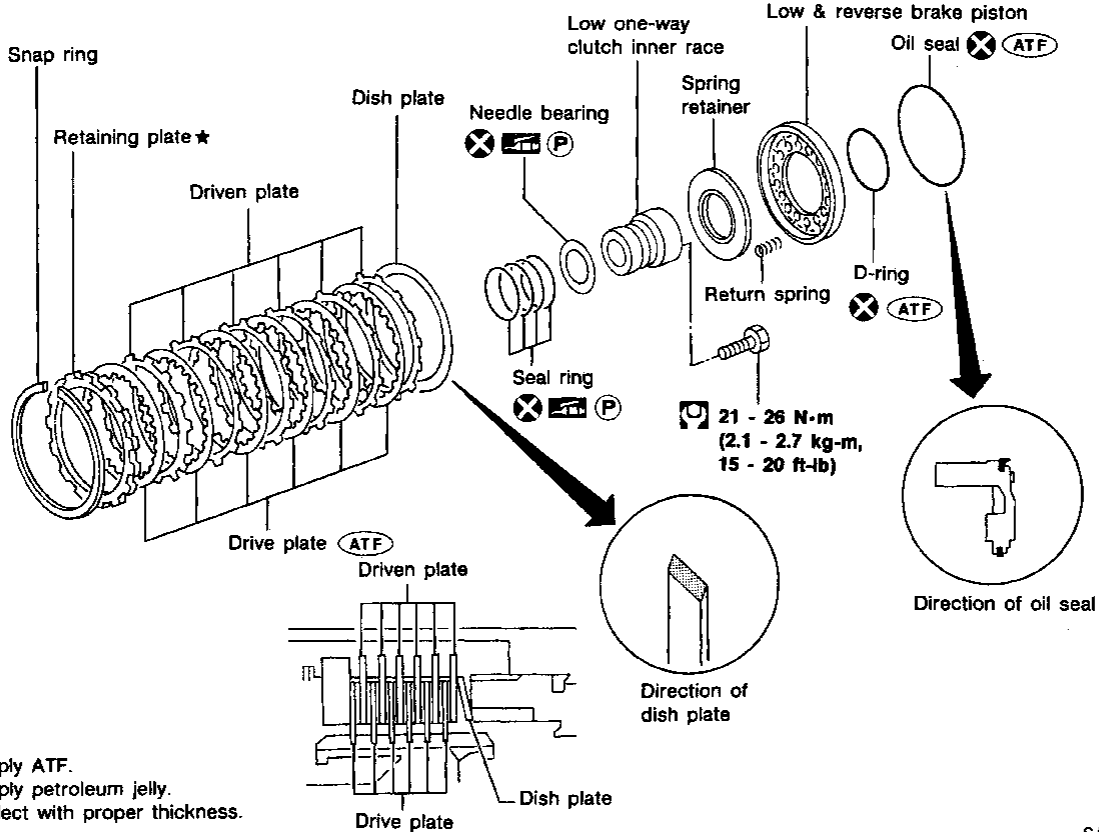
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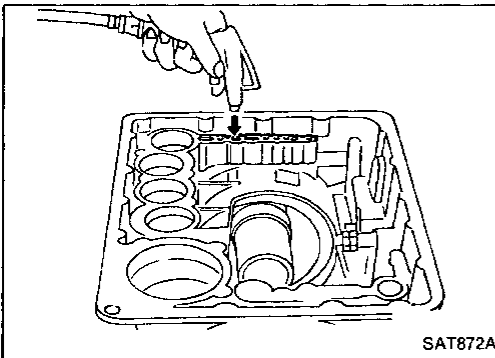
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Low & Reverse Brake

SEC. 315

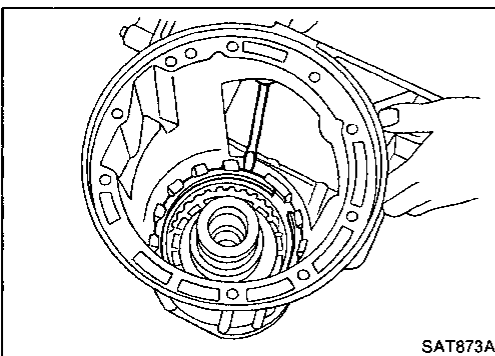


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DISASSEMBLY

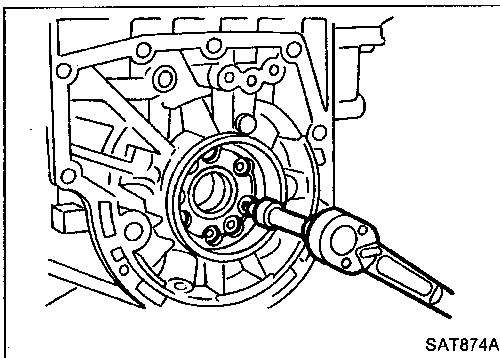
1. Check operation of low and reverse brake.
 - a. Install seal ring onto oil pump cover and install reverse clutch. Apply compressed air to oil hole.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not move to snap ring, D-ring or oil seal may be damaged, otherwise,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



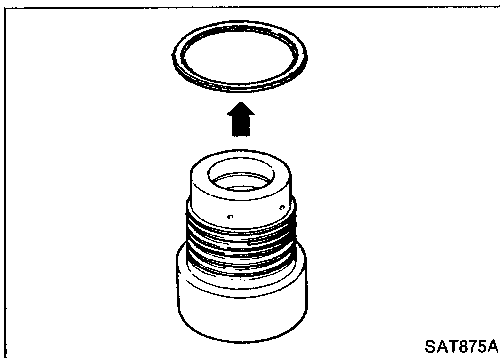
2. Remove snap ring, low and reverse brake drive plates, driven plates and dish plate.

REPAIR FOR COMPONENT PARTS

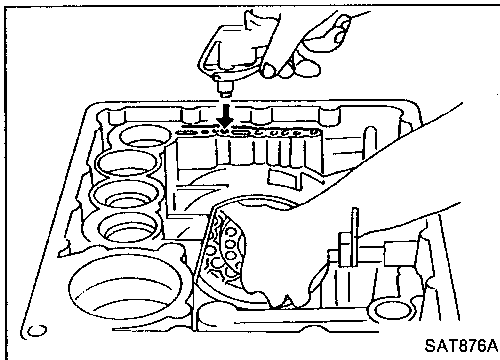
Low & Reverse Brake (Cont'd)



- Remove low one-way clutch inner race, spring retainer and return spring from transmission case.



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

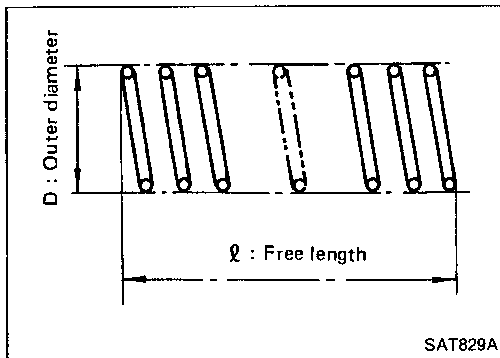


- Remove low and reverse brake piston using compressed air.
- Remove oil seal and D-ring from piston.

INSPECTION

Low and reverse brake snap ring and spring retainer

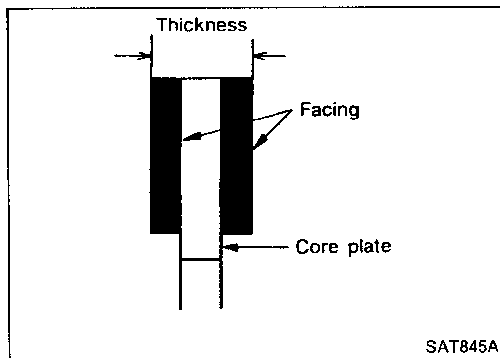
- Check for deformation, or damage.



Low and reverse brake return springs

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

Inspection standard: Refer to SDS, AT-204.



Low and reverse brake drive plates

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

Thickness of drive plate:

Standard value

2.0 mm (0.079 in)

Wear limit

1.8 mm (0.071 in)

- If not within wear limit, replace.

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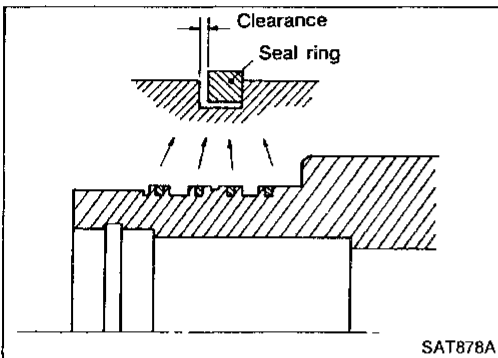
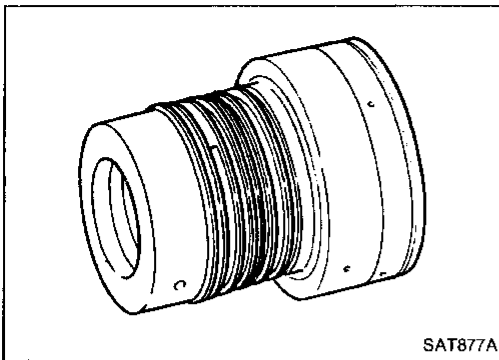
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REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

Low one-way clutch inner race

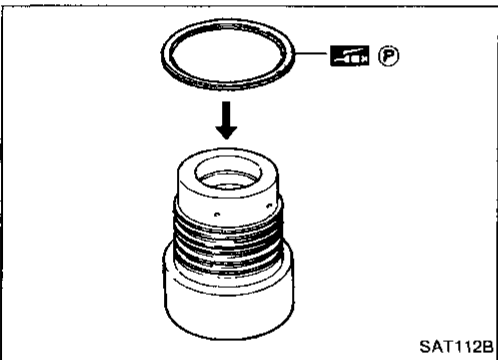
- Check frictional surface of inner race for wear or damage.



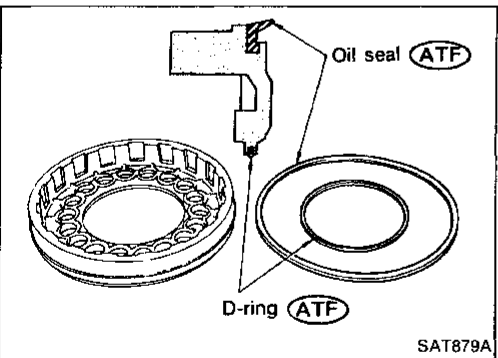
- Install a new seal rings onto low one-way clutch inner race.
- **Be careful not to expand seal ring gap excessively.**
- Measure seal ring-to-groove clearance.
Inspection standard:
Standard value: 0.10 - 0.25 mm (0.0039 - 0.0098 in)
Allowable limit: 0.25 mm (0.0098 in)
- If not within allowable limit, replace low one-way clutch inner race.

ASSEMBLY

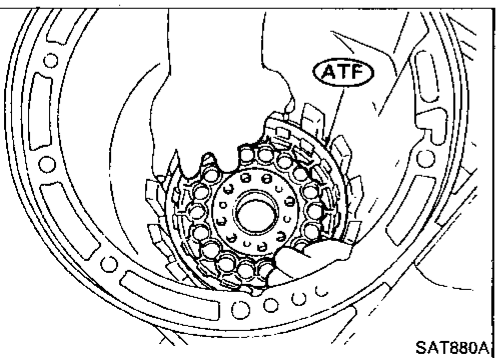
1. Install bearing onto one-way clutch inner race.
 - Pay attention to its direction — **Black surface goes to rear side.**
 - **Apply petroleum jelly to needle bearing.**



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

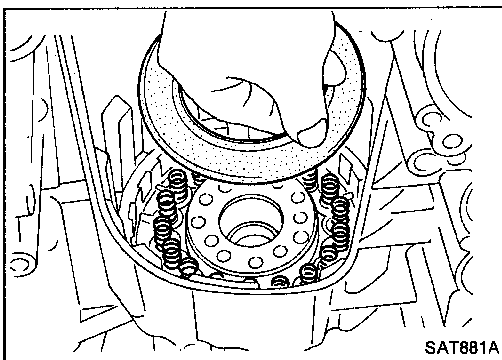


3. Install piston by rotating it slowly and evenly.
 - **Apply ATF to inner surface of transmission case.**

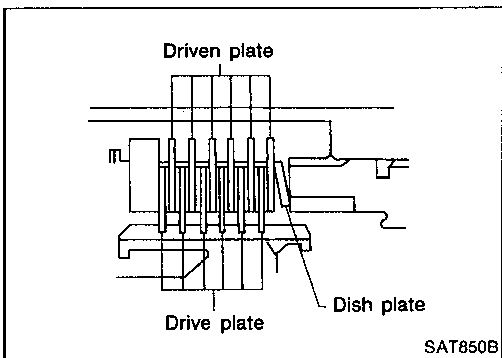


REPAIR FOR COMPONENT PARTS

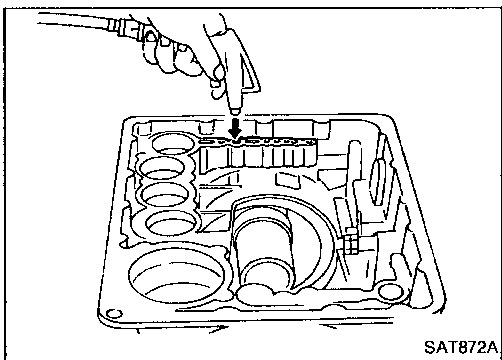
Low & Reverse Brake (Cont'd)



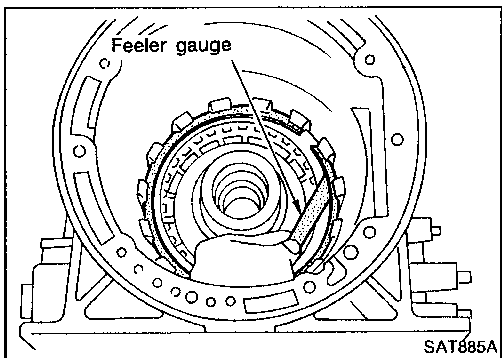
4. Install return springs, spring retainer and low one-way clutch inner race onto transmission case.



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-170.



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

Specified clearance:

Standard

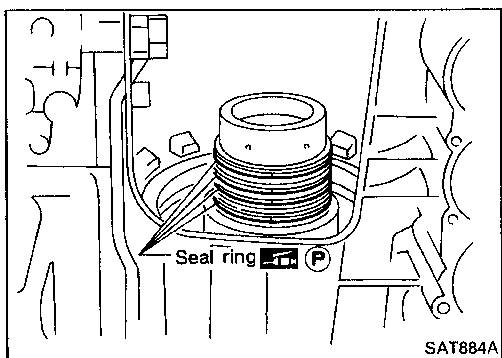
0.7 - 1.1 mm (0.028 - 0.043 in)

Allowable limit

2.3 mm (0.091 in)

Retaining plate:

Refer to SDS, AT-206.



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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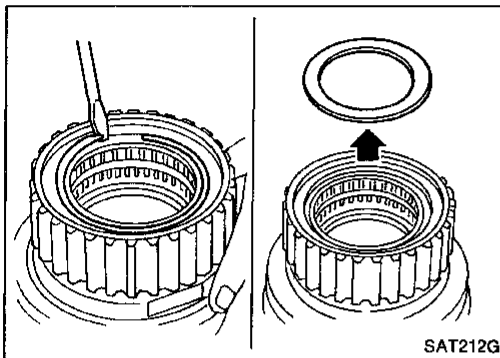
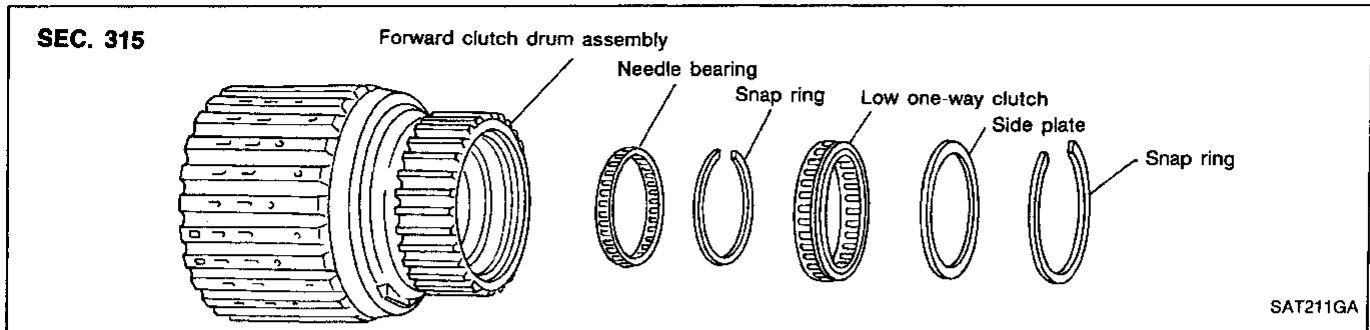
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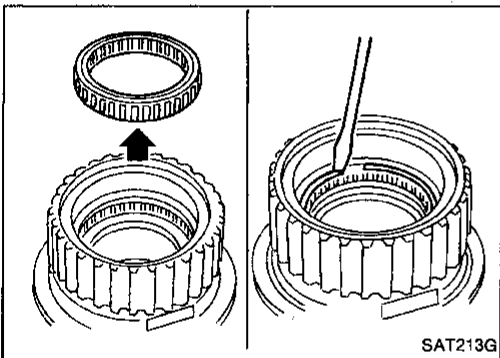
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Forward Clutch Drum Assembly

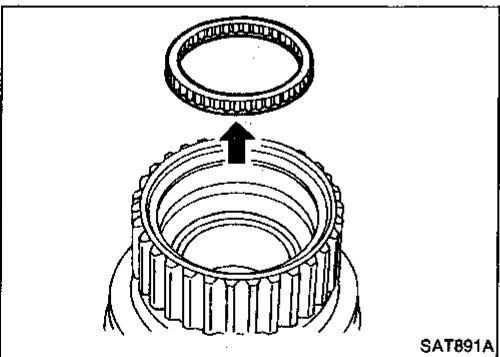


DISASSEMBLY

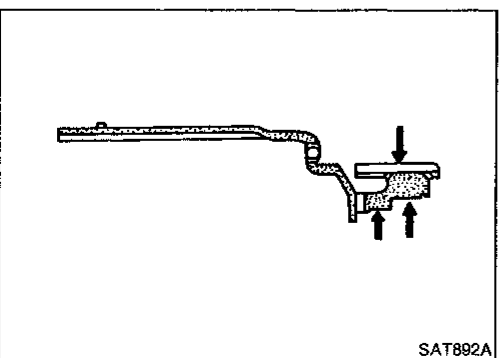
1. Remove snap ring from forward clutch drum.
2. Remove side plate from forward clutch drum.



3. Remove low one-way clutch from forward clutch drum.
4. Remove snap ring from forward clutch drum.



5. Remove needle bearing from forward clutch drum.



INSPECTION

Forward clutch drum

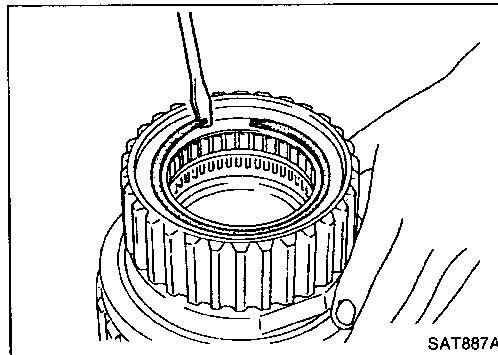
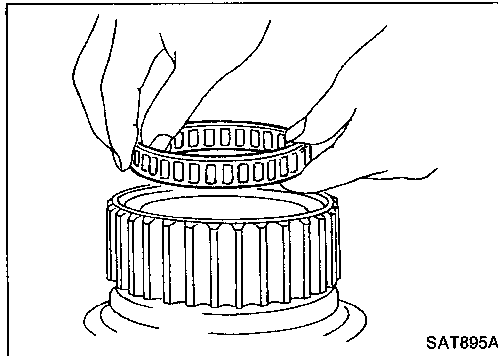
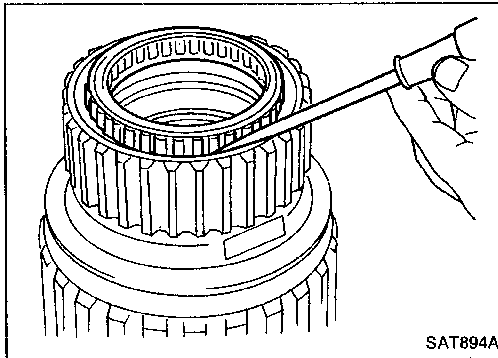
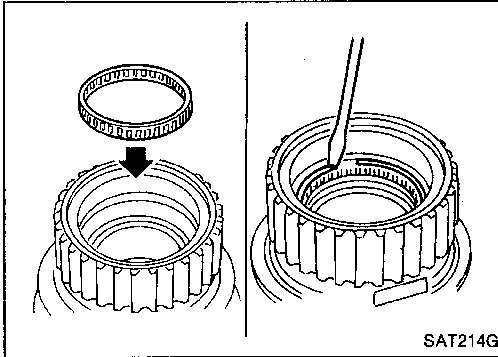
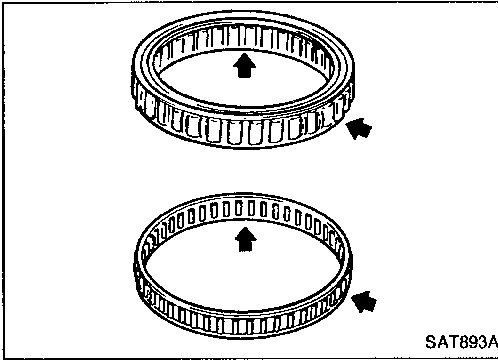
- Check spline portion for wear or damage.
- Check frictional surfaces of low one-way clutch and needle bearing for wear or damage.

REPAIR FOR COMPONENT PARTS

Forward Clutch Drum Assembly (Cont'd)

Needle bearing and low one-way clutch

- Check frictional surface for wear or damage.



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.
5. Install snap ring onto forward clutch drum.

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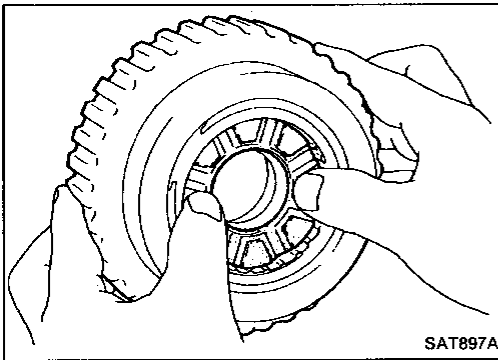
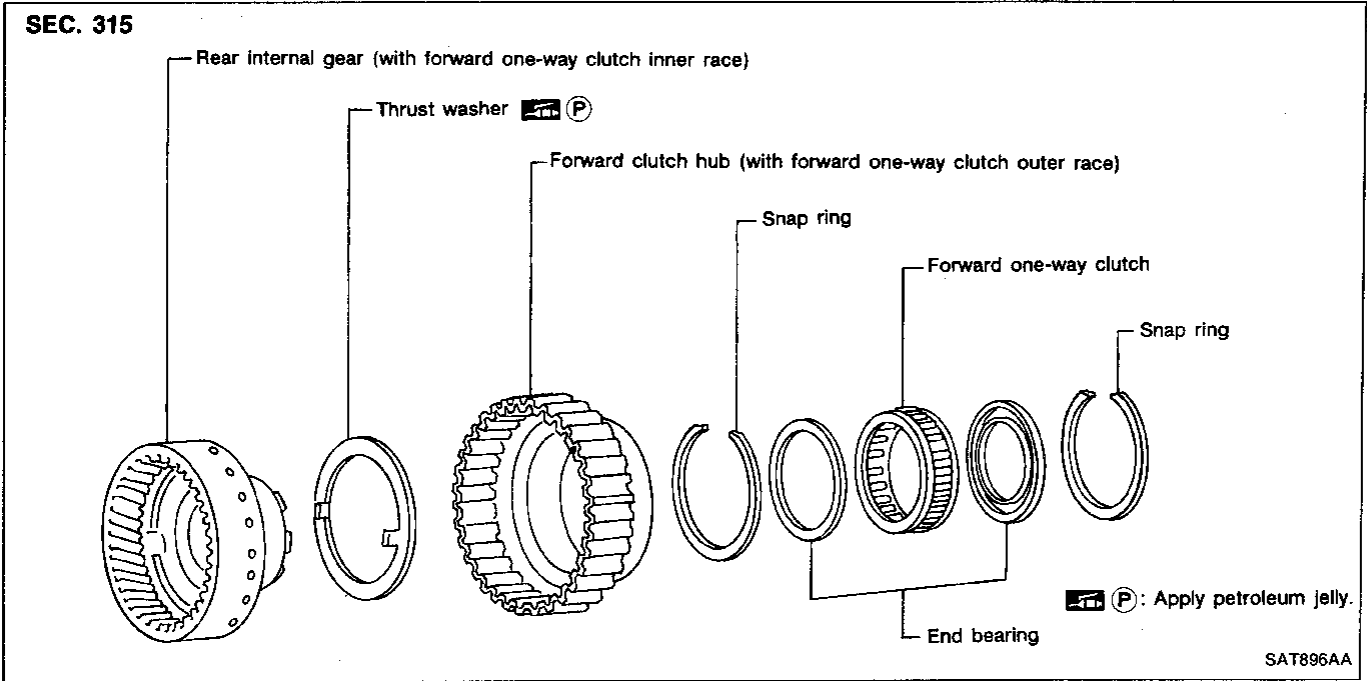
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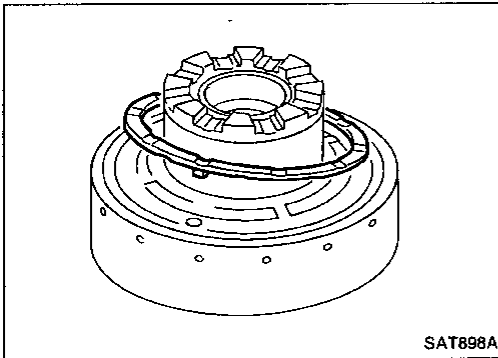
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Rear Internal Gear and Forward Clutch Hub

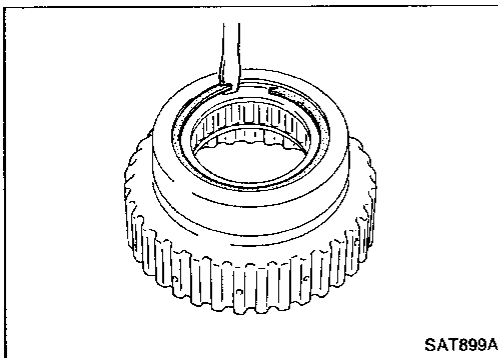


DISASSEMBLY

1. Remove rear internal gear by pushing forward clutch hub forward.



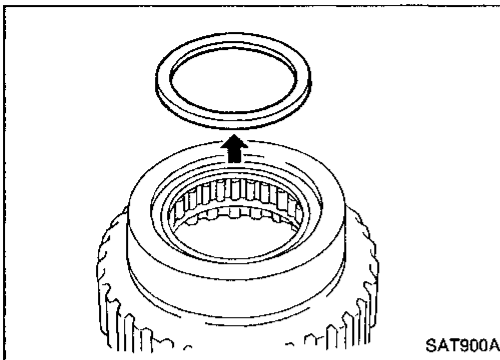
2. Remove thrust washer from rear internal gear.



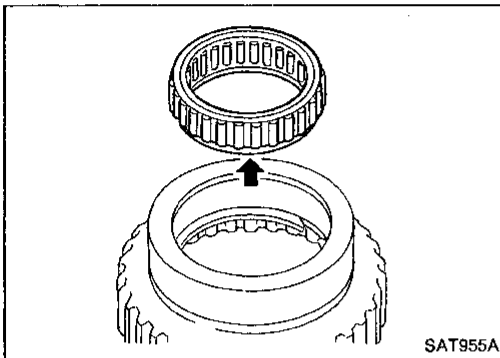
3. Remove snap ring from forward clutch hub.

REPAIR FOR COMPONENT PARTS

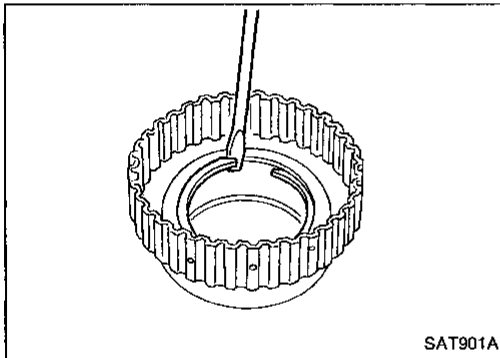
Rear Internal Gear and Forward Clutch Hub (Cont'd)



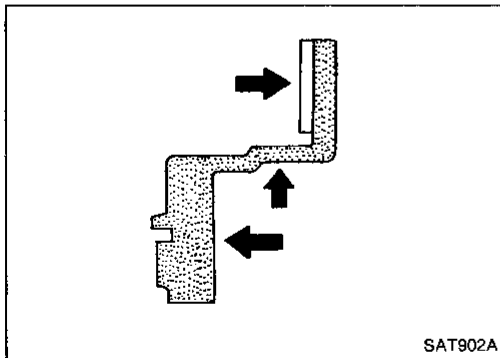
4. Remove end bearing.



5. Remove forward one-way clutch and end bearing as a unit from forward clutch hub.



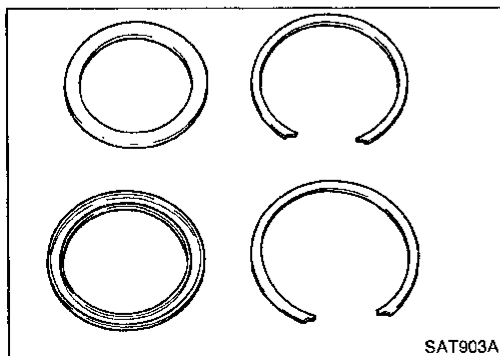
6. Remove snap ring from forward clutch hub.



INSPECTION

Rear internal gear and forward clutch hub

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



Snap ring and end bearing

- Check for deformation or damage.

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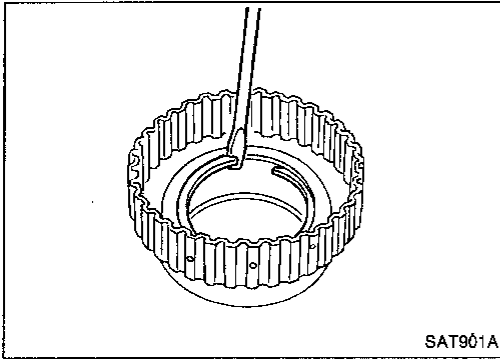
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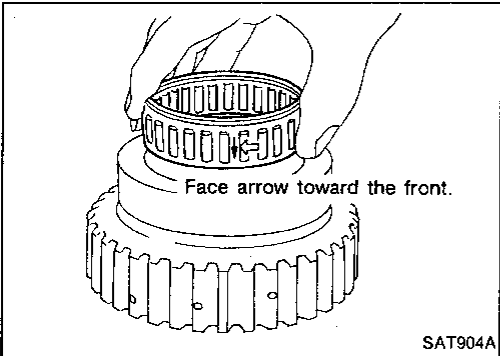
REPAIR FOR COMPONENT PARTS

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

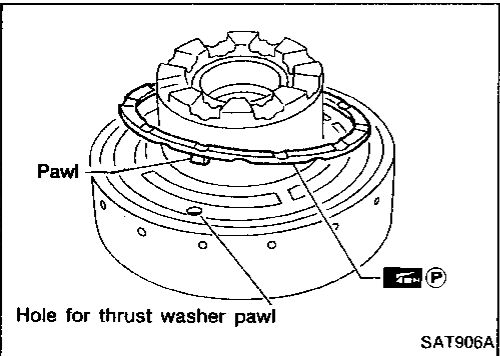
ASSEMBLY



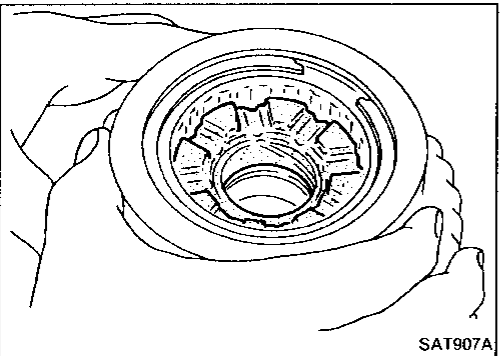
1. Install snap ring onto forward clutch hub.
2. Install end bearing.



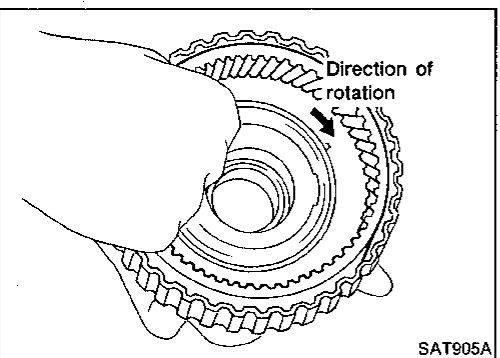
3. Install forward one-way clutch onto clutch hub.
 - **Install forward one-way clutch with flange facing rearward.**
4. Install end bearing.
5. Install snap ring onto forward clutch hub.



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.**

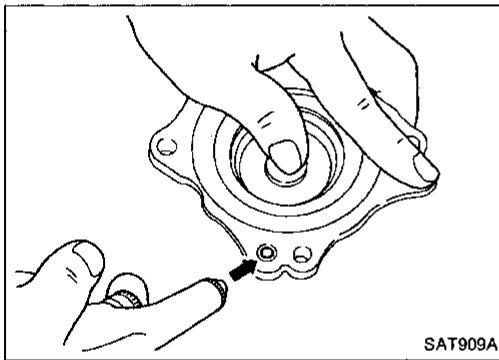
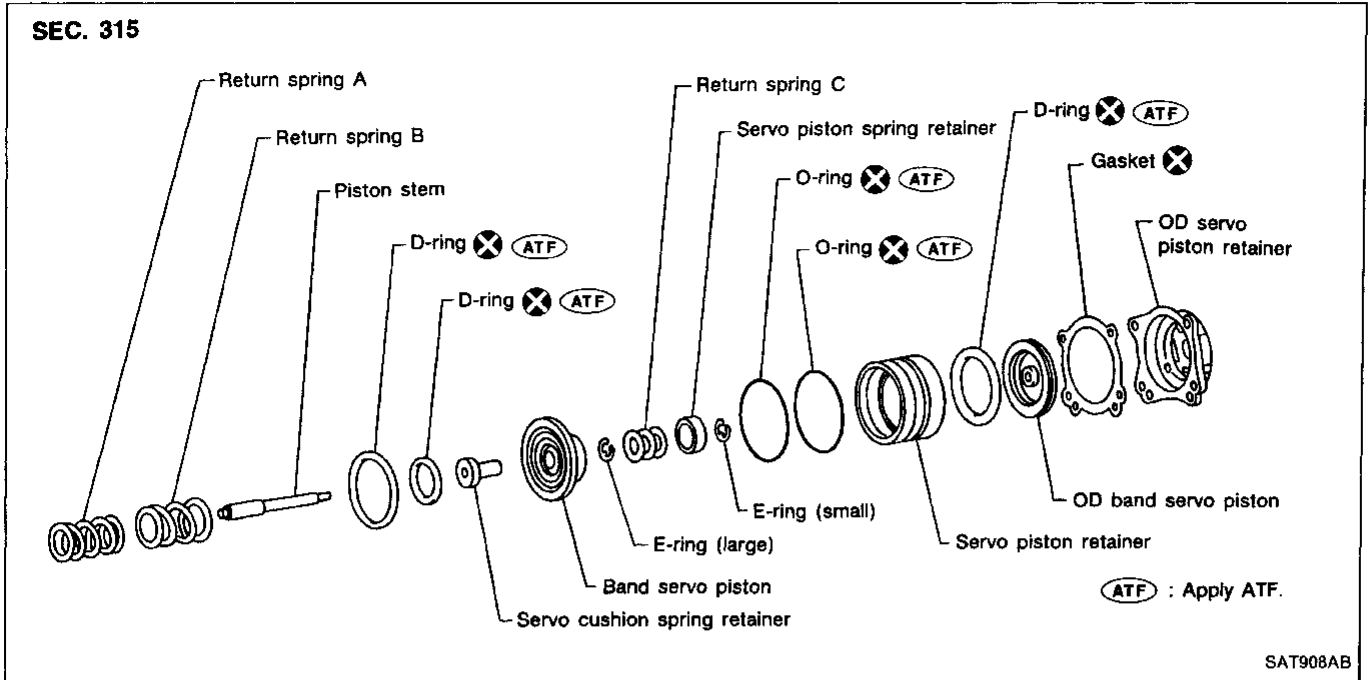


7. Position forward clutch hub in rear internal gear.



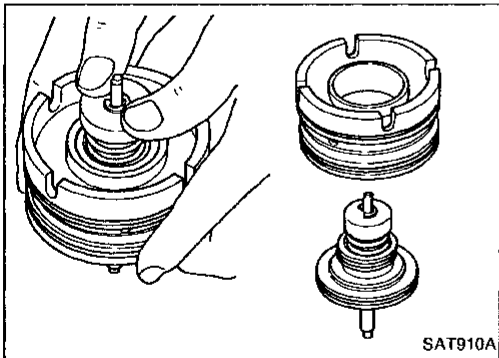
8. After installing, check to assure that forward clutch hub rotates clockwise.

Band Servo Piston Assembly

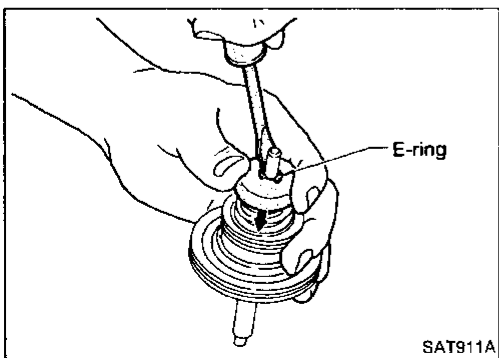


DISASSEMBLY

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.



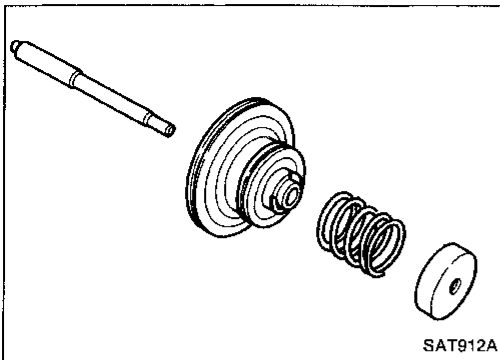
4. Remove band servo piston assembly from servo piston retainer by pushing it forward.



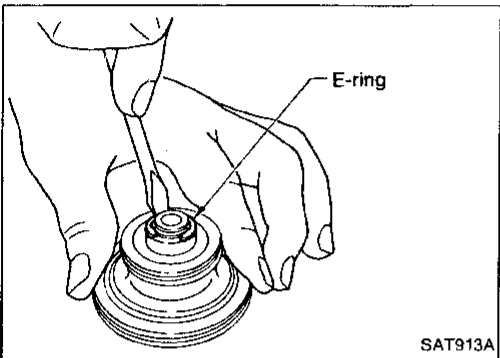
5. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, remove E-ring.

REPAIR FOR COMPONENT PARTS

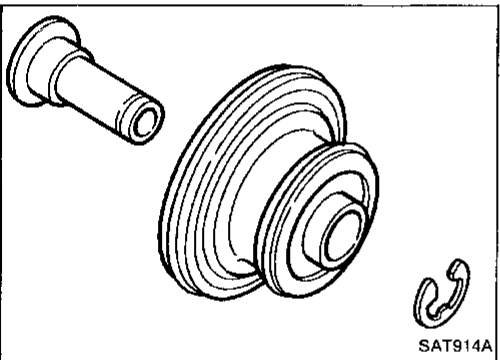
Band Servo Piston Assembly (Cont'd)



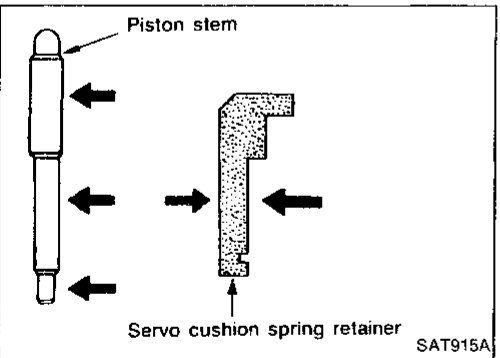
6. Remove servo piston spring retainer, return spring C and piston stem from band servo piston.



7. Remove E-ring from band servo piston.



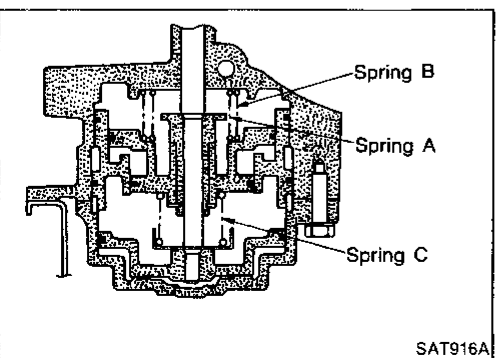
8. Remove servo cushion spring retainer from band servo piston.
9. Remove D-rings from band servo piston.
10. Remove O-rings from servo piston retainer.



INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.



Return springs

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

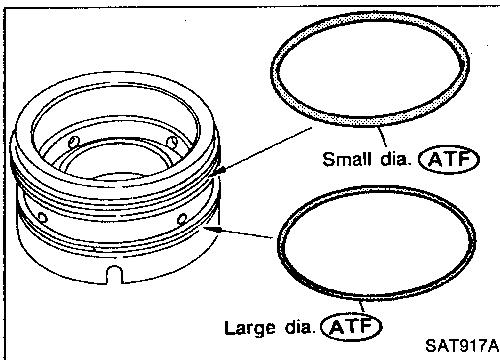
Inspection standard: Refer to SDS, AT-204.

REPAIR FOR COMPONENT PARTS

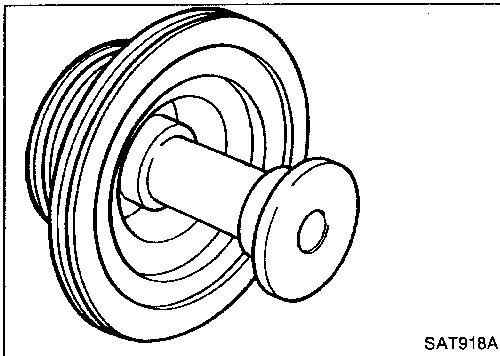
Band Servo Piston Assembly (Cont'd)

ASSEMBLY

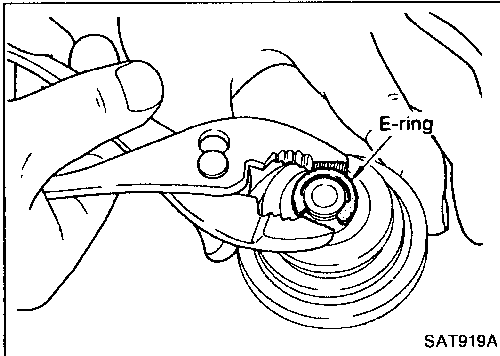
1. Install O-rings onto servo piston retainer.
 - Apply ATF to O-rings.
 - Pay attention to position of each O-ring.



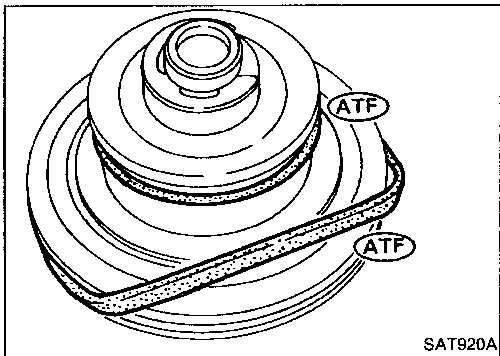
2. Install servo cushion spring retainer onto band servo piston.



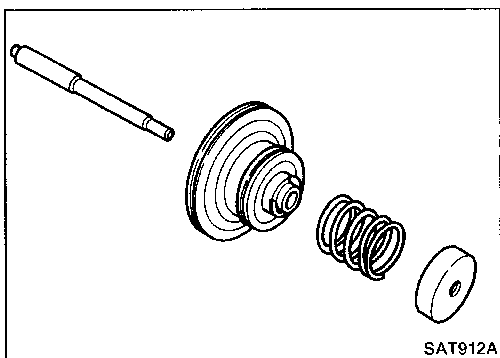
3. Install E-ring onto servo cushion spring retainer.



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



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



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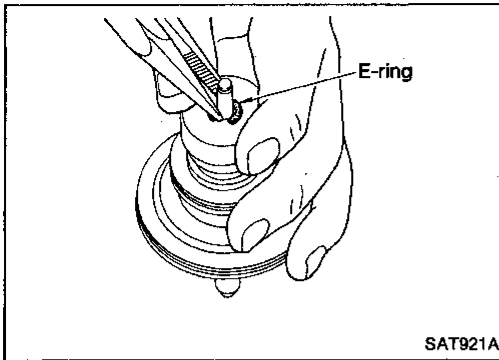
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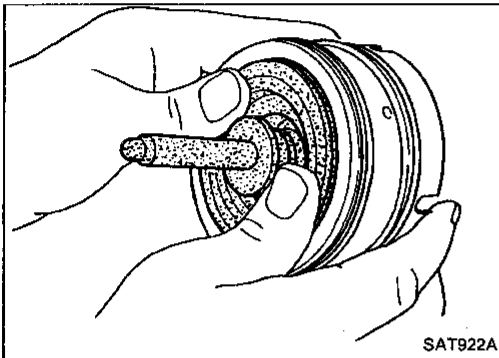
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REPAIR FOR COMPONENT PARTS

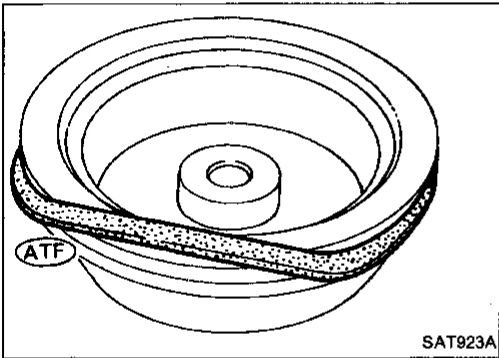
Band Servo Piston Assembly (Cont'd)



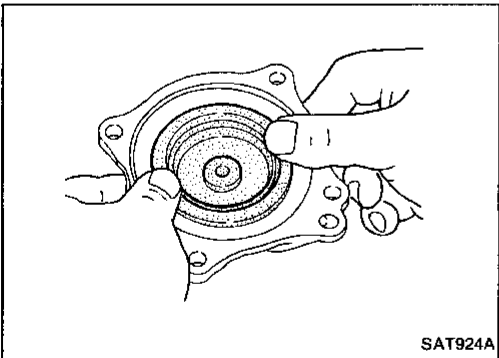
6. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



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

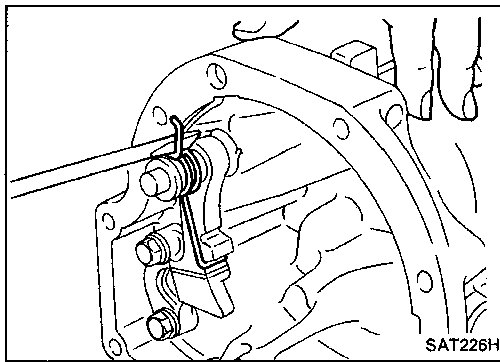
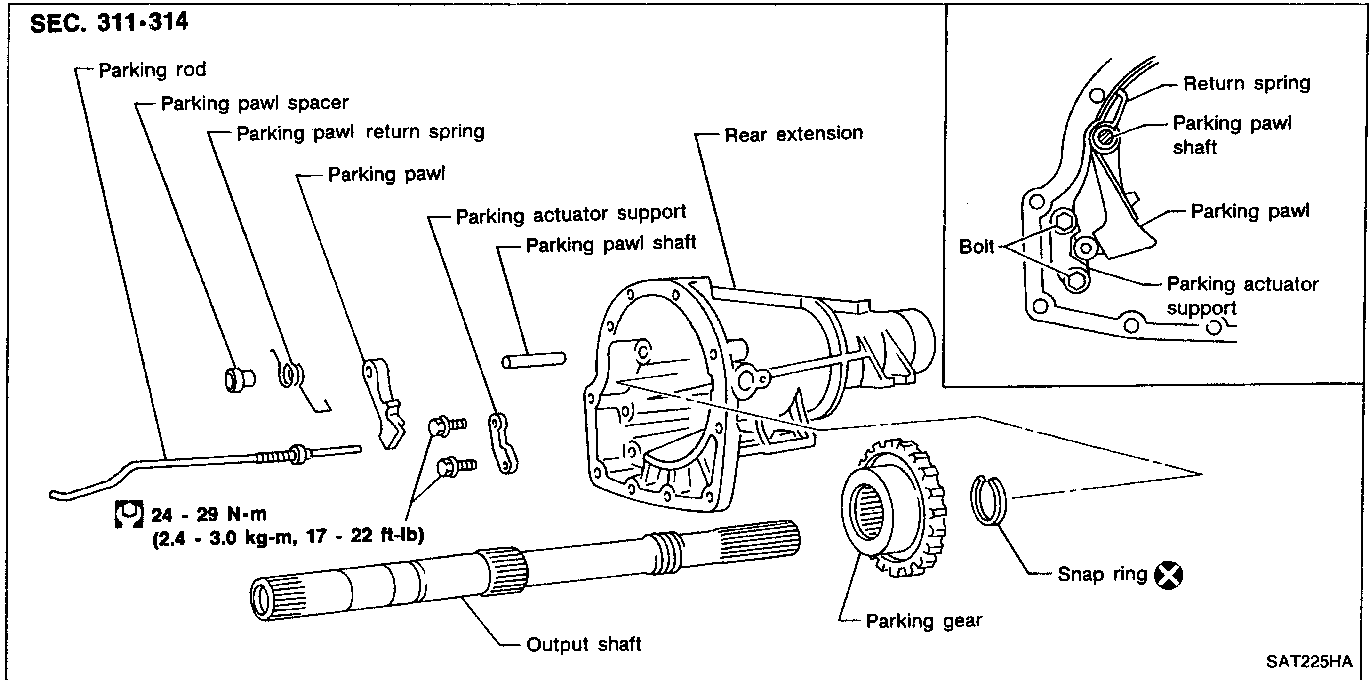


8. Install D-ring on OD band servo piston.
● **Apply ATF to D-ring.**



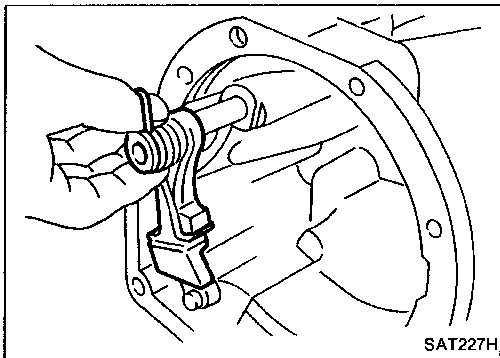
9. Install OD band servo piston onto servo piston retainer by pushing it inward.

Parking Pawl Components

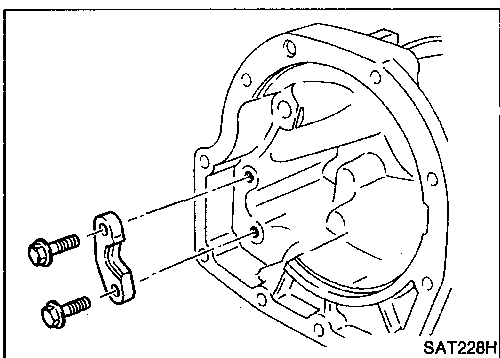


DISASSEMBLY

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 and rod guide from rear extension.

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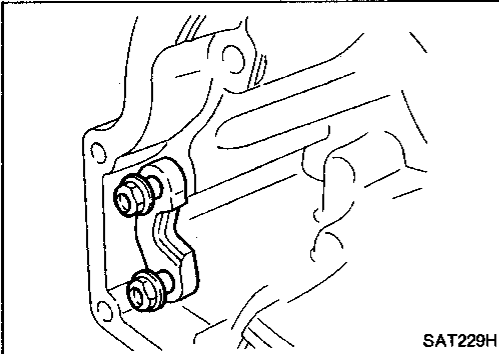
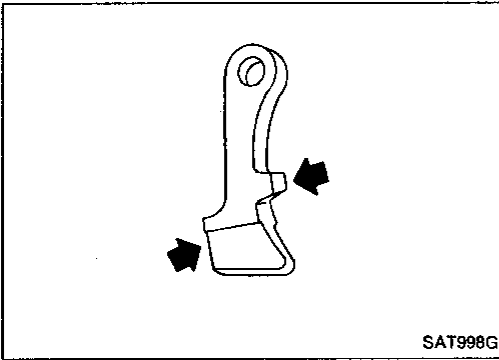
REPAIR FOR COMPONENT PARTS

Parking Pawl Components (Cont'd)

INSPECTION

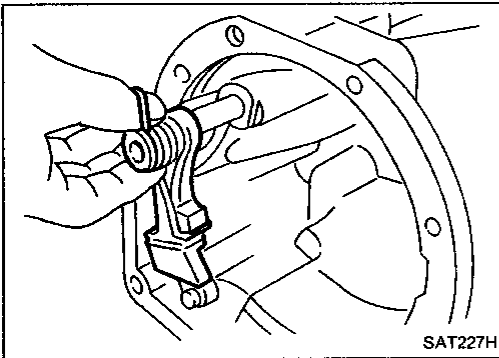
Parking pawl and parking actuator support

- Check contact surface of parking rod for wear.

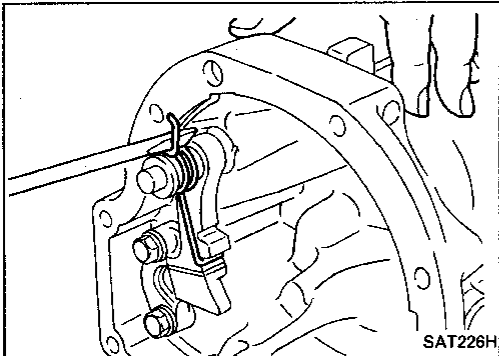


ASSEMBLY

1. Install rod guide and parking actuator support onto rear extension.
2. Insert parking pawl shaft into rear extension.

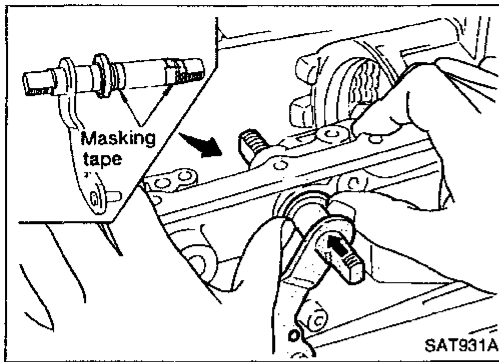


3. Install return spring, pawl spacer and parking pawl onto parking pawl shaft.



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

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.

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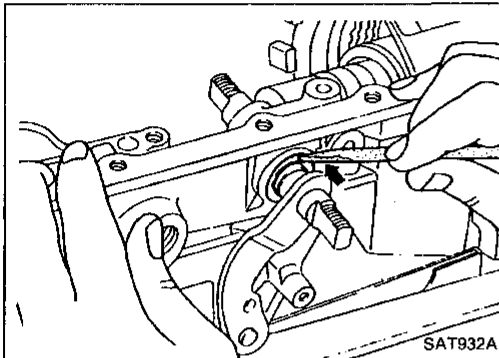
- d. Push oil seal evenly and install it onto transmission case.

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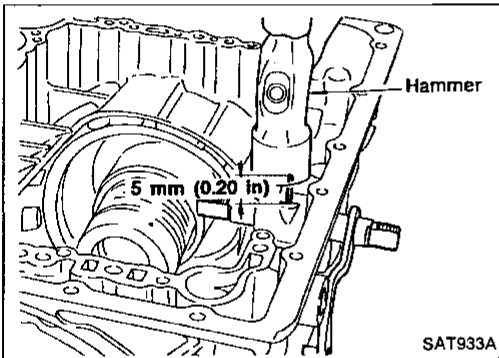
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- e. Align groove in shaft with drive pin hole, then drive pin into position as shown in figure at left.

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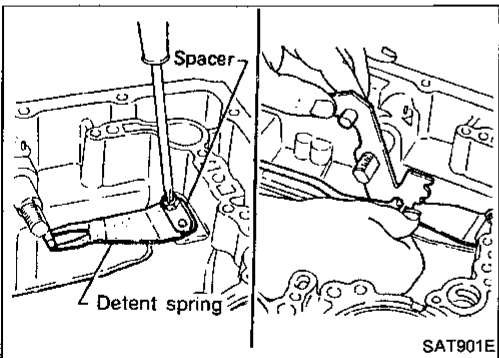
- f. Install detent spring and spacer.
- g. While pushing detent spring down, install manual plate onto manual shaft.

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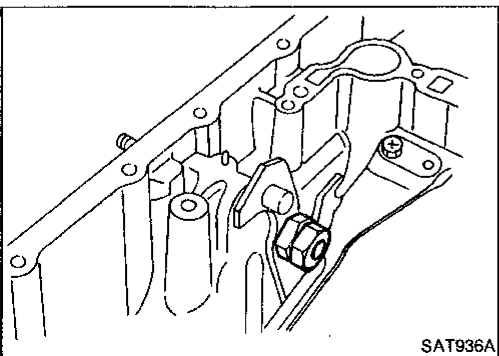


- h. Install lock nuts onto manual shaft.

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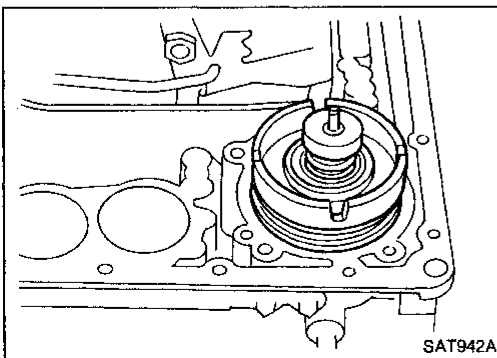
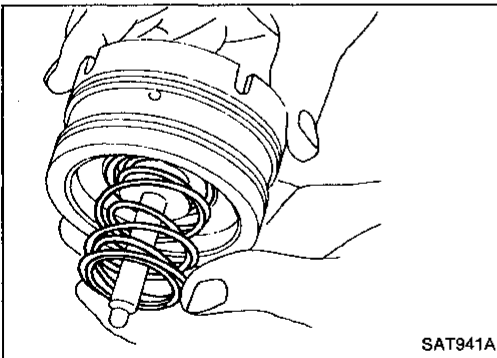
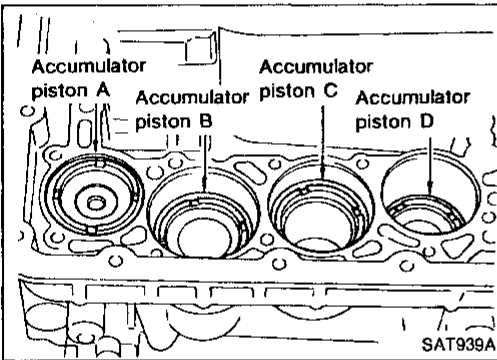
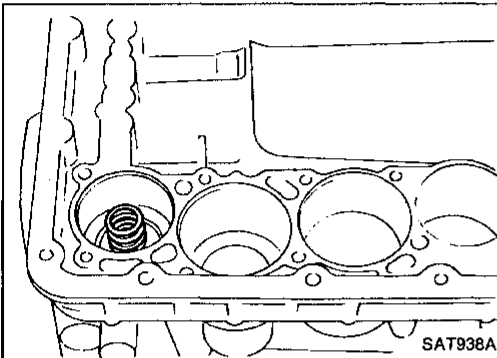
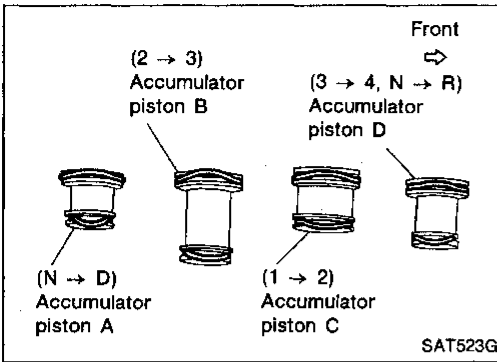
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ASSEMBLY

Assembly (1) (Cont'd)



2. Install accumulator piston.
 - a. Install O-rings onto accumulator piston.
 - **Apply ATF to O-rings.**

Accumulator piston O-rings

Unit: mm (in)

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

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

Free length of return spring: Refer to SDS, AT-204.

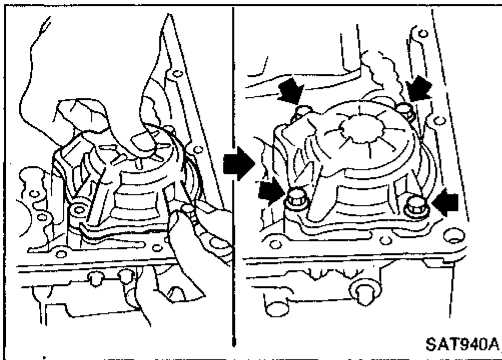
- c. Install accumulator pistons A, B, C and D.
 - **Apply ATF to transmission case.**

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

- 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.

ASSEMBLY

Assembly (1) (Cont'd)



d. Install band servo retainer onto transmission case.

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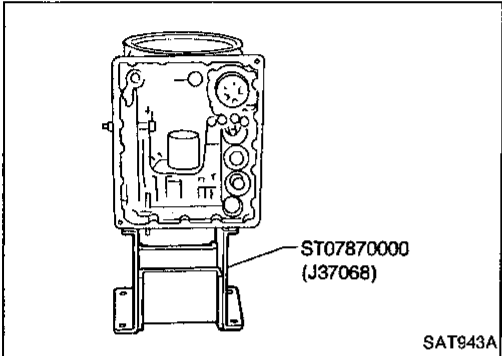
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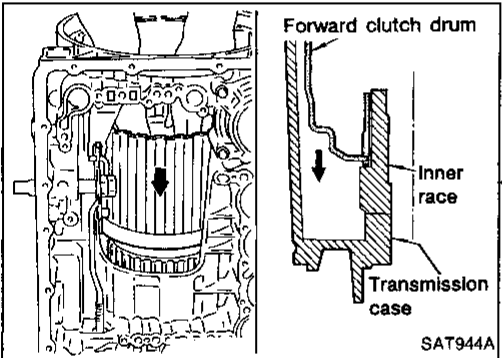
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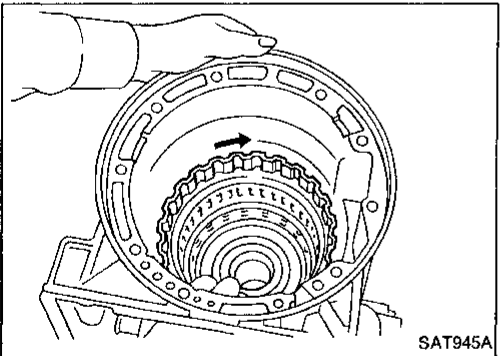
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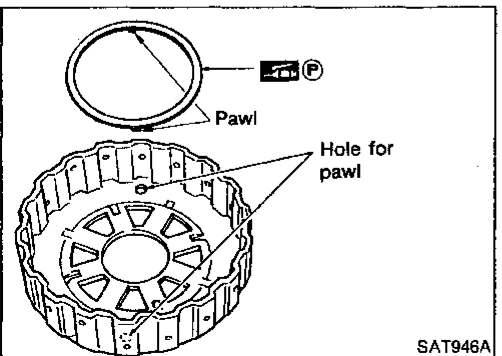
4. Install rear side clutch and gear components.
a. Place transmission case in vertical position.



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



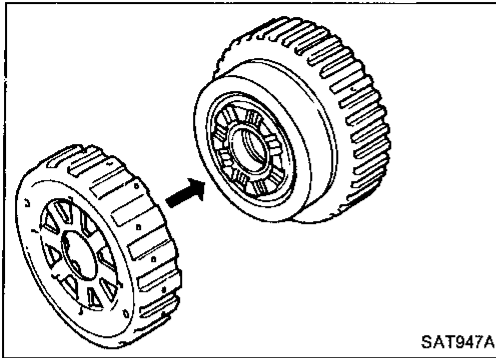
c. Check to be sure that rotation direction of forward clutch assembly is correct.



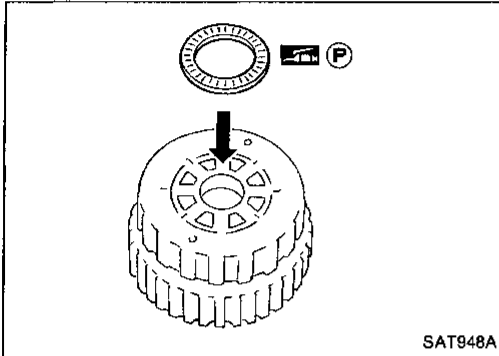
d. Install thrust washer onto front of overrun clutch hub.
● Apply petroleum jelly to the thrust washer.
● Insert pawls of thrust washer securely into holes in overrun clutch hub.

ASSEMBLY

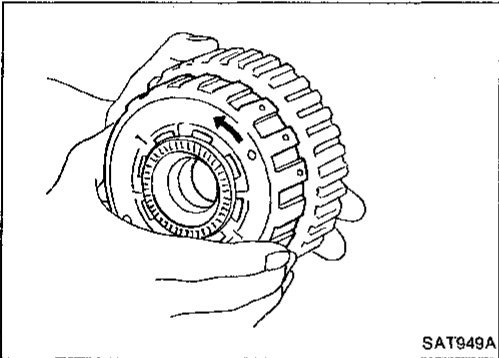
Assembly (1) (Cont'd)



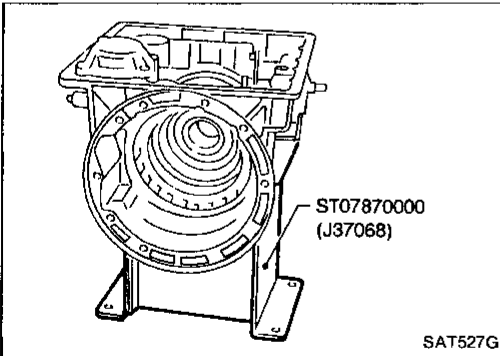
- e. Install overrun clutch hub onto rear internal gear assembly.



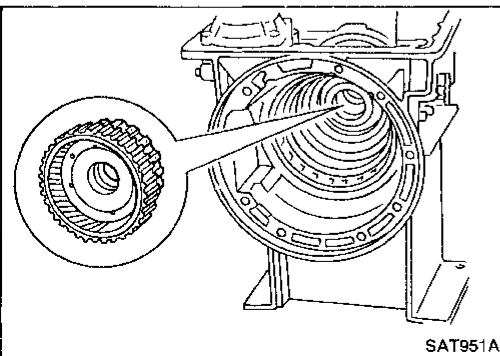
- f. Install needle bearing onto rear of overrun clutch hub.
● Apply petroleum jelly to needle bearing.



- g. Check that overrun clutch hub rotates as shown while holding forward clutch hub.



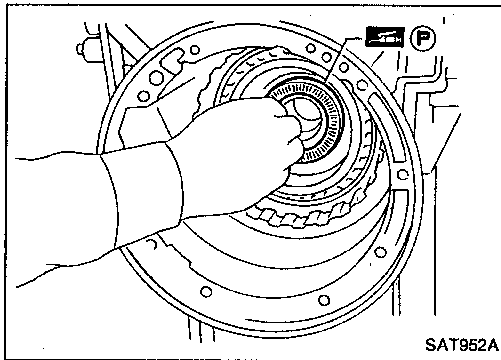
- h. Place transmission case into horizontal position.



- i. Install rear internal gear, forward clutch hub and overrun clutch hub as a unit onto transmission case.

ASSEMBLY

Assembly (1) (Cont'd)



- j. Install needle bearing onto rear internal gear.
- Apply petroleum jelly to needle bearing.

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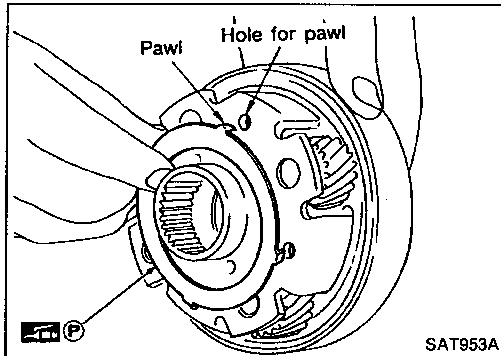
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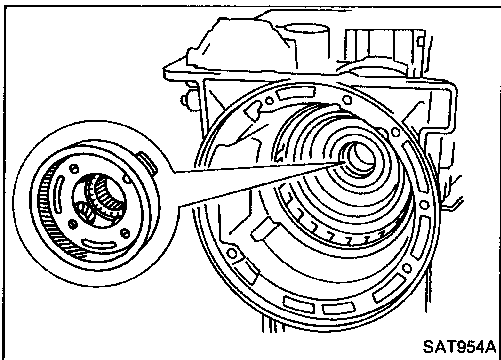
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- k. Install bearing race onto rear of front internal gear.
- Apply petroleum jelly to bearing race.
- Securely engage pawls of bearing race with holes in front internal gear.



- l. Install front internal gear on transmission case.

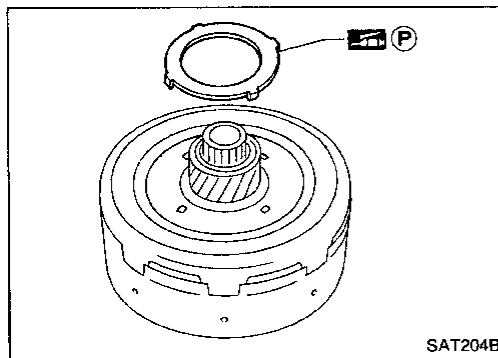
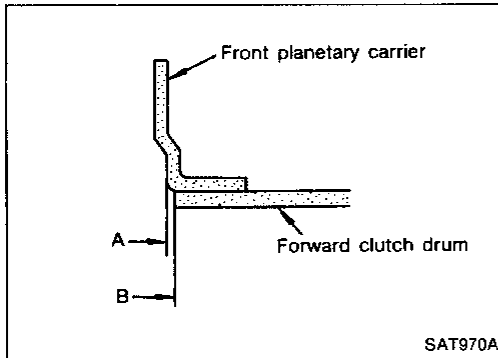
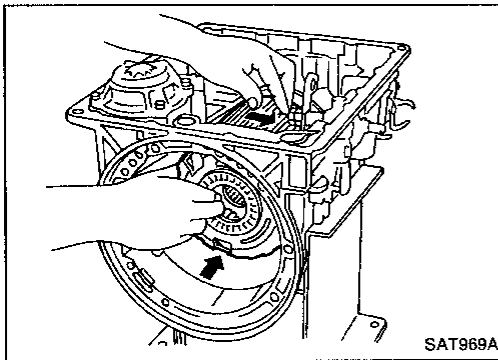
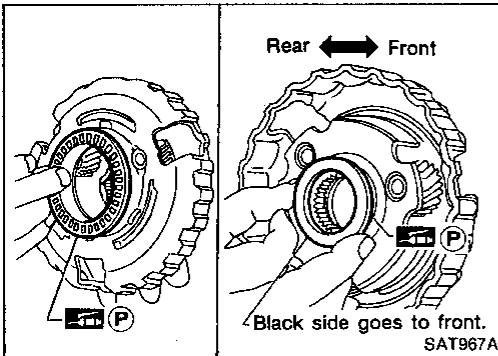
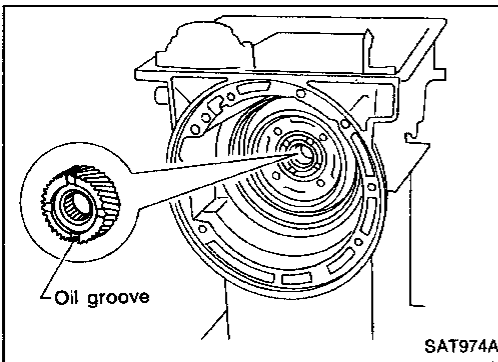
Adjustment

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

Part name	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	—	●

ASSEMBLY

Adjustment (Cont'd)

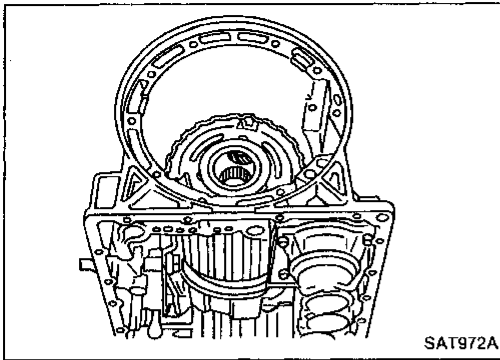


1. Install front side clutch and gear components.
 - a. Install rear sun gear on transmission case.
 - **Pay attention to its direction.**
 - b. Install needle bearing on front of front planetary carrier.
 - **Apply petroleum jelly to needle bearing.**
 - c. Install needle bearing on rear of front planetary carrier.
 - **Apply petroleum jelly to bearing.**
 - **Pay attention to its direction — Black side goes to front.**
 - d. While rotating forward clutch drum clockwise, install front planetary carrier on forward clutch drum.
 - **Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.**
 - e. Install bearing races on rear of clutch pack.
 - **Apply petroleum jelly to bearing races.**
 - **Securely engage pawls of bearing race with hole in clutch pack.**

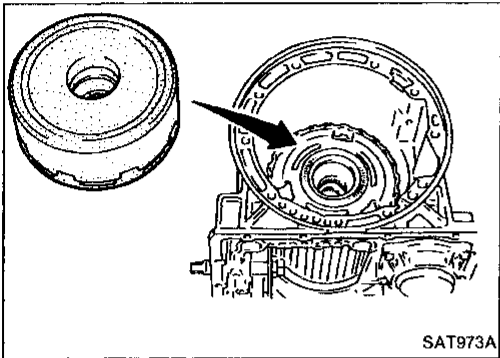
ASSEMBLY

Adjustment (Cont'd)

f. Place transmission case in vertical position.



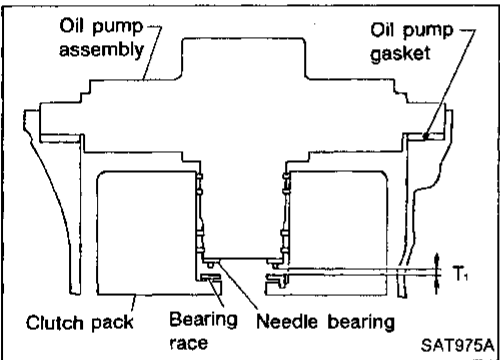
g. Install clutch pack into transmission case.



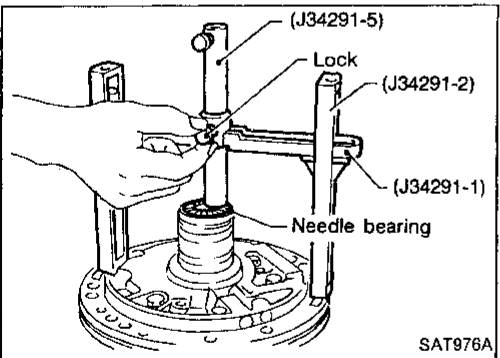
2. Adjust total end play.

Total end play "T₁":

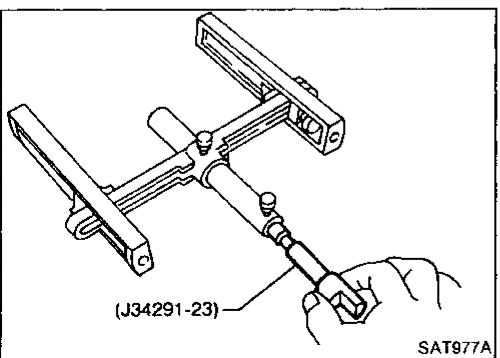
0.25 - 0.55 mm (0.0098 - 0.0217 in)



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. The 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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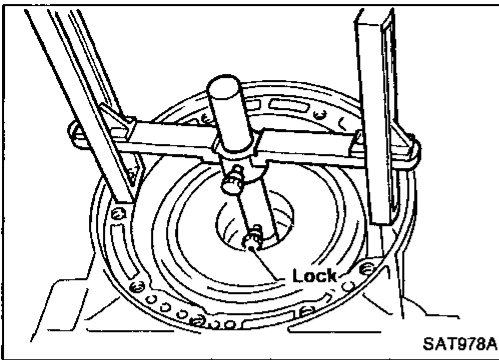
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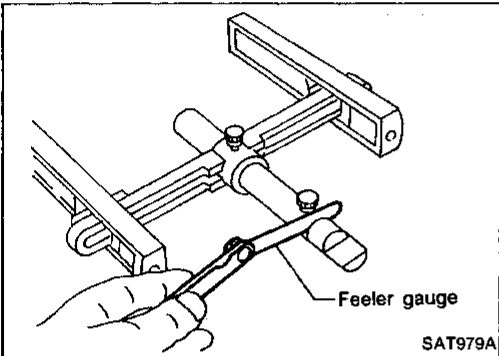
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ASSEMBLY

Adjustment (Cont'd)



- c. Install original bearing race inside reverse clutch drum. Place shim selecting gauge with its legs on machined surface of transmission case (no gasket). 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.

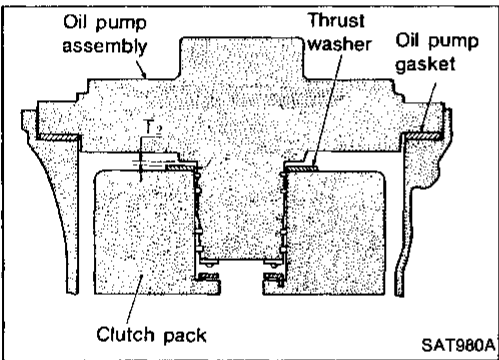
Total end play "T₁":

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:

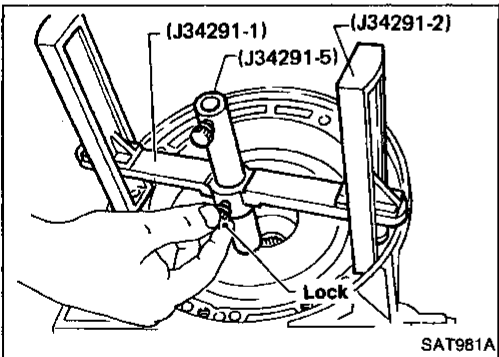
Refer to SDS, AT-206.



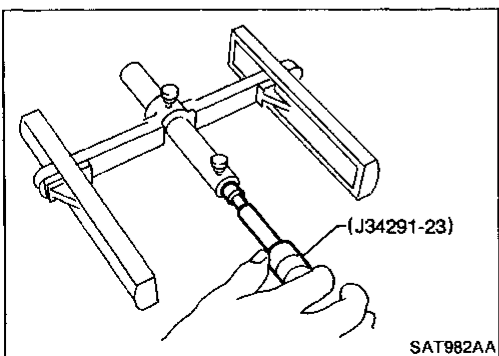
3. Adjust reverse clutch drum end play.

Reverse clutch drum end play "T₂":

0.55 - 0.90 mm (0.0217 - 0.0354 in)



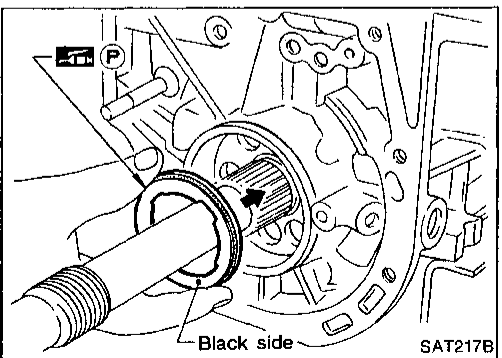
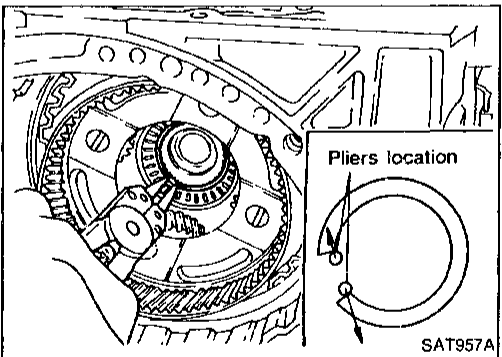
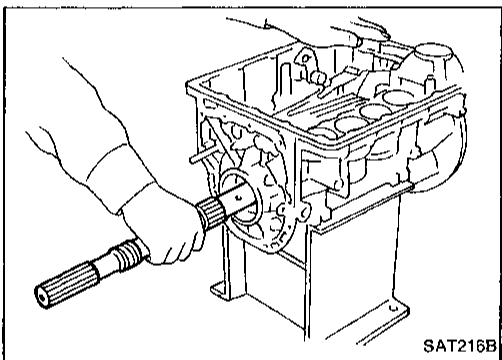
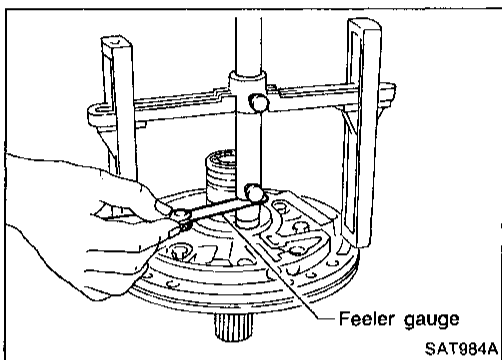
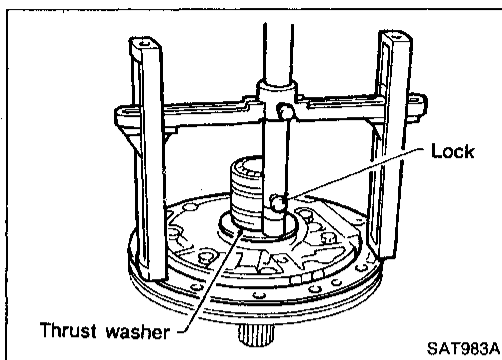
- a. Place J34291-1 (bridge), J34291-2 (legs) and J34291-5 (gauging cylinder) on machined surface of transmission case (no gasket). Allow gauging cylinder to rest on front thrust surface of reverse clutch drum. Lock cylinder in place with set screw.



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

ASSEMBLY

Adjustment (Cont'd)



c. Install original thrust washer on oil pump. Place shim setting gauge legs onto machined surface of oil pump assembly. 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-206.

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.**

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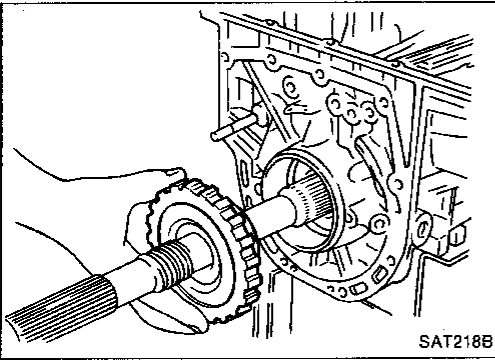
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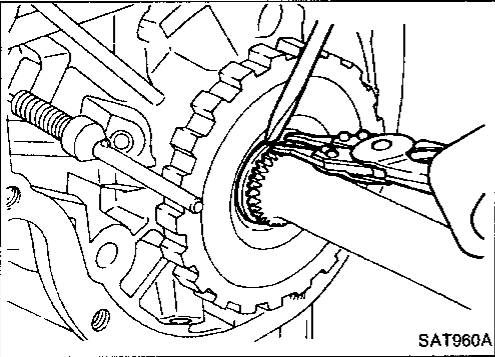
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ASSEMBLY

Assembly (2) (Cont'd)

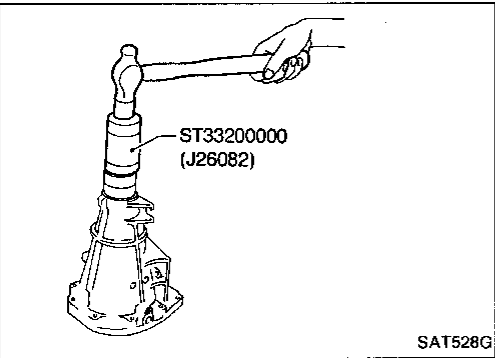


d. Install parking gear on transmission case.



e. Install snap ring on rear of output shaft.

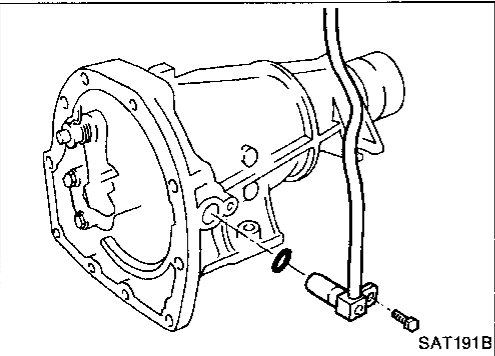
- **Check to be sure output shaft cannot be removed in forward direction.**



2. Install rear extension.

a. Install oil seal on rear extension.

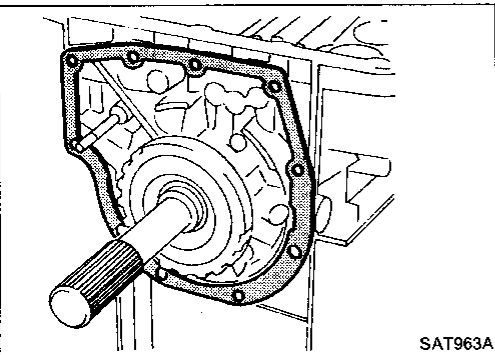
- **Apply ATF to oil seal.**



b. Install O-ring on revolution sensor.

- **Apply ATF to O-ring.**

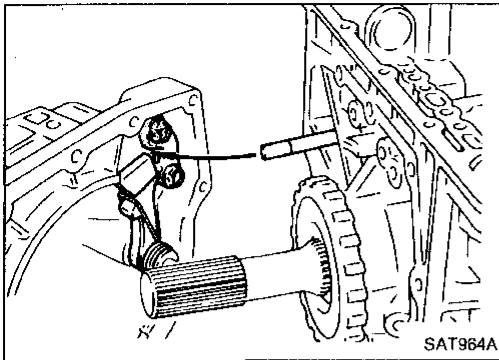
c. Install revolution sensor on rear extension.



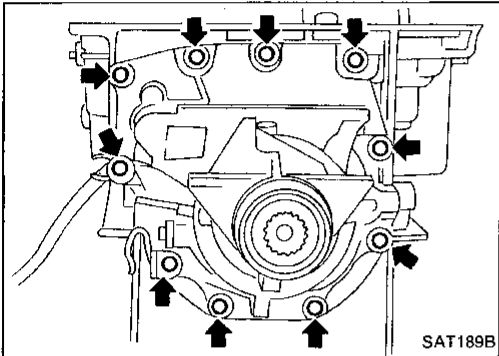
d. Install rear extension gasket on transmission case.

ASSEMBLY

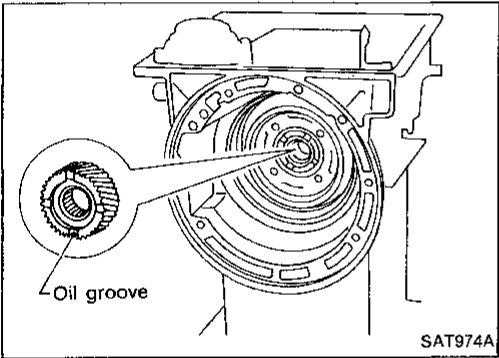
Assembly (2) (Cont'd)



e. Install parking rod on transmission case.



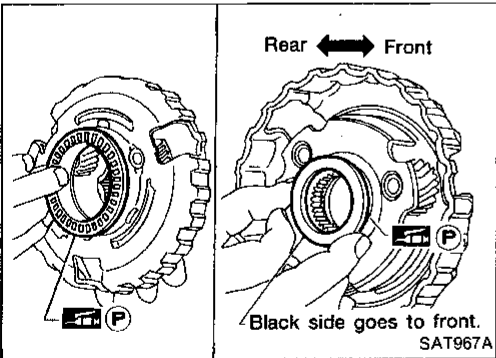
f. Install rear extension on transmission case.



3. Install front side clutch and gear components.

a. Install rear sun gear on transmission case.

- Pay attention to its direction.



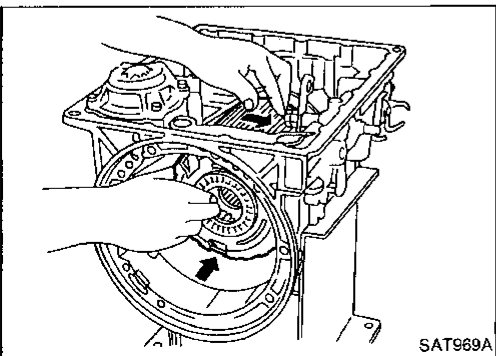
b. Make sure needle bearing is on front of front planetary carrier.

- 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.

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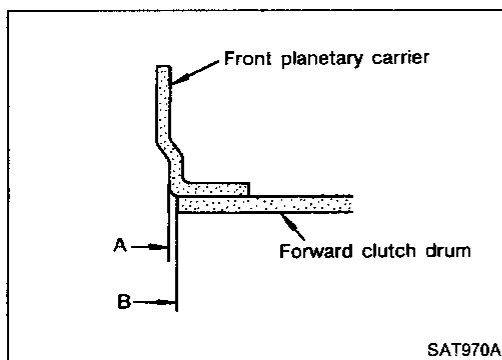
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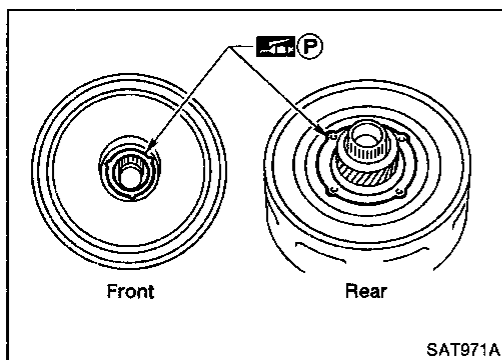
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ASSEMBLY

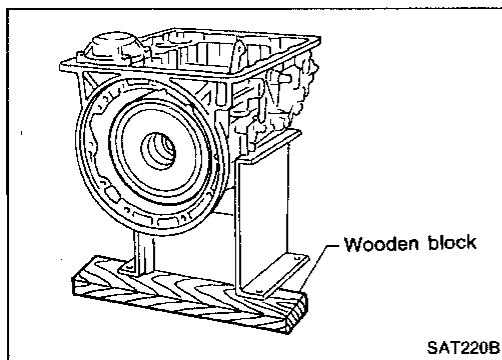
Assembly (2) (Cont'd)



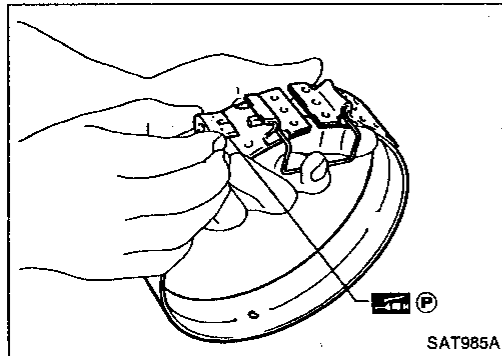
- Check that portion A of front planetary carrier protrudes approximately 2 mm (0.08 in) beyond portion B of forward clutch assembly.



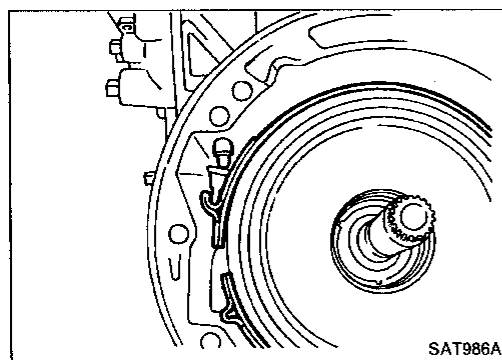
- e. Make sure bearing races are on front and rear of clutch pack.
- Apply petroleum jelly to bearing races.
- Securely engage pawls of bearing races with holes in clutch pack.



- f. Install clutch pack into transmission case.



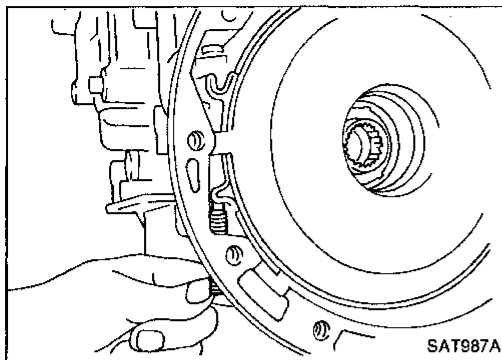
- 4. Install brake band and band strut.
 - a. Install band strut on brake band.
 - Apply petroleum jelly to band strut.



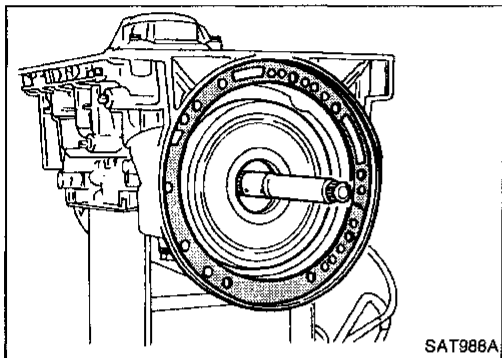
- b. Place brake band on periphery of reverse clutch drum, and insert band strut into end of band servo piston stem.

ASSEMBLY

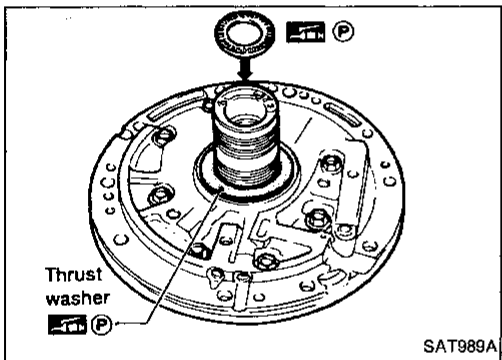
Assembly (2) (Cont'd)



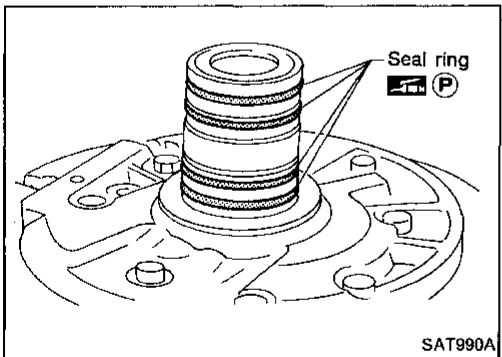
- c. Install anchor end bolt on transmission case. Then, tighten anchor end bolt just enough so that reverse clutch drum (clutch pack) will not tilt forward.



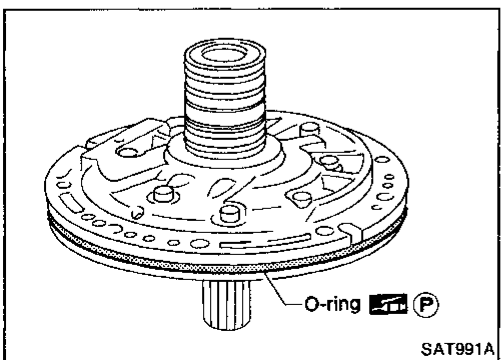
5. Install input shaft on transmission case.
● Pay attention to its direction — O-ring groove side is front.
6. Install gasket on transmission case.



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.

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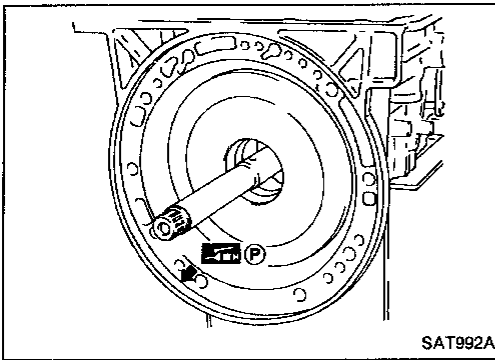
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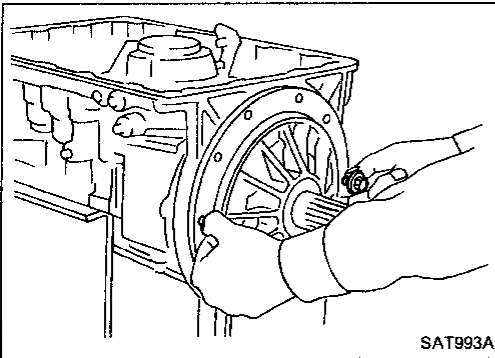
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ASSEMBLY

Assembly (2) (Cont'd)

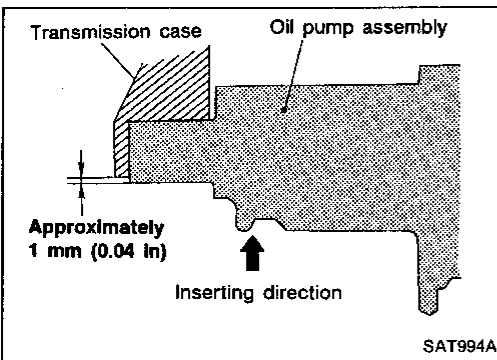


- e. Apply petroleum jelly to mating surface of transmission case and oil pump assembly.

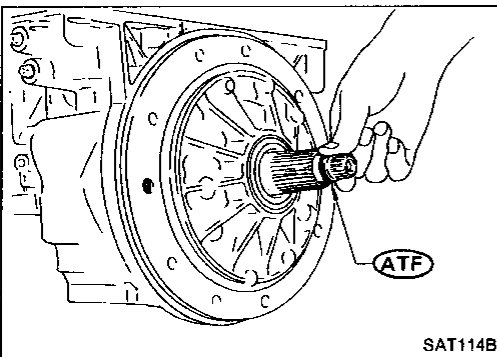


- f. Install oil pump assembly.

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

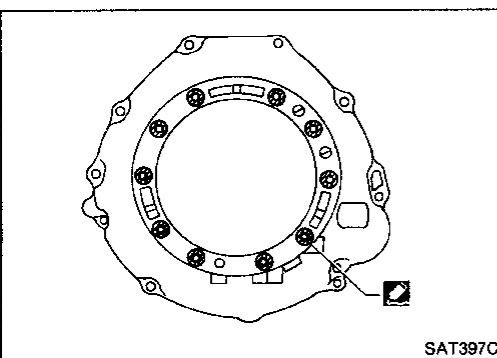


- Insert oil pump assembly to the specified position in transmission, as shown at left.



8. Install O-ring on input shaft.

- Apply ATF to O-rings.



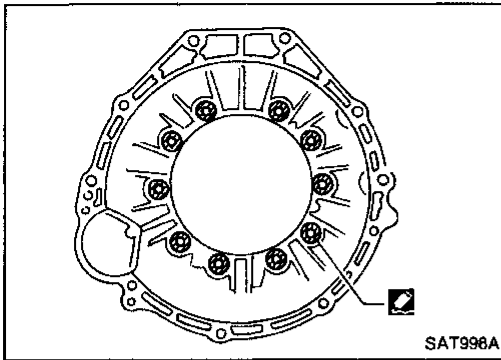
9. Install converter housing.

- a. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to outer periphery of bolt holes in converter housing.

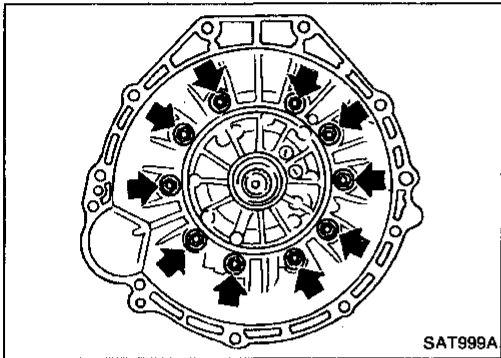
- Do not apply too much sealant.

ASSEMBLY

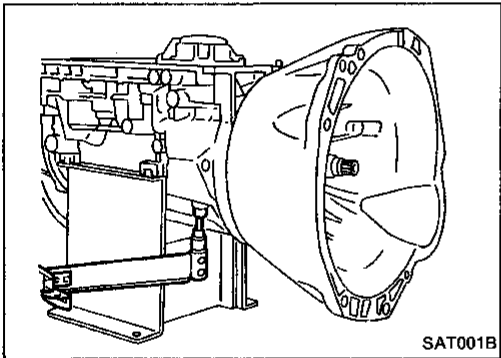
Assembly (2) (Cont'd)



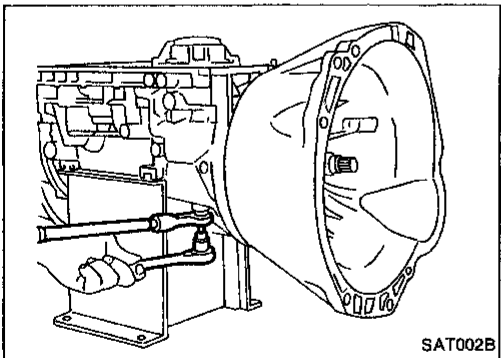
- b. Apply recommended sealant (Nissan genuine part: KP610-00250 or equivalent) to seating surfaces of bolts that secure front of converter housing.



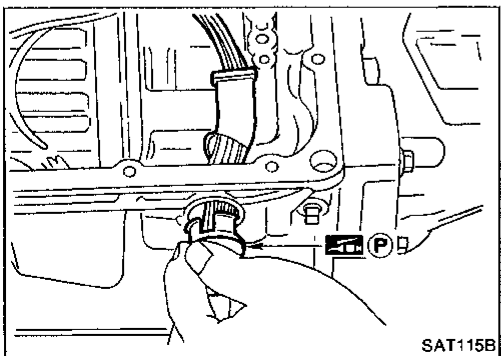
- c. Install converter housing on transmission case.



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



- c. While holding anchor end pin, tighten lock nut.

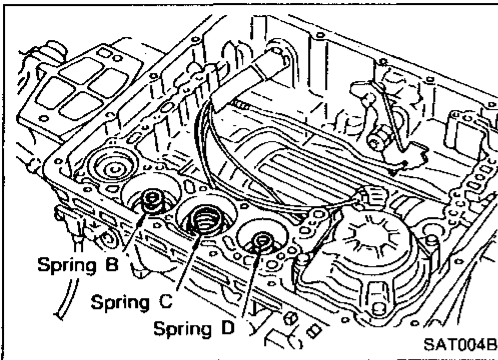


11. Install terminal cord assembly.
- a. Install O-ring on terminal cord assembly.
- **Apply petroleum jelly to O-ring.**
- b. Compress terminal cord assembly stopper and install terminal cord assembly on transmission case.

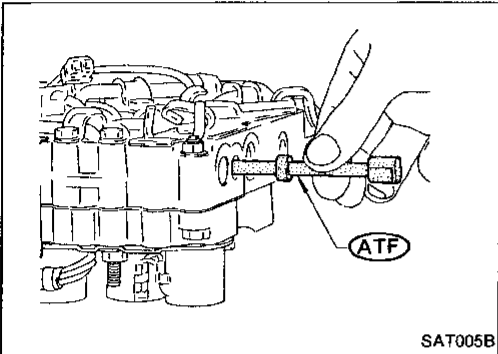
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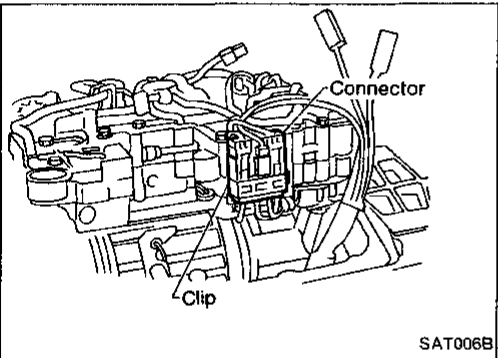
Assembly (2) (Cont'd)



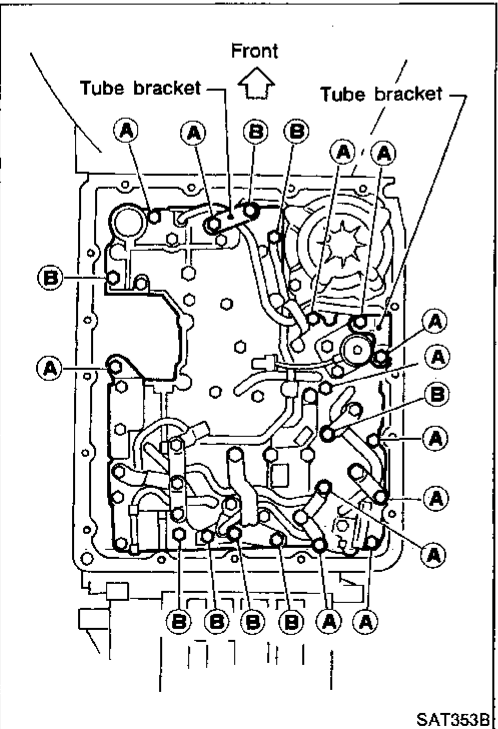
12. Install control valve assembly.
 - a. Install accumulator piston return springs B, C and D.
Free length of return springs: Refer to SDS, AT-204.



- 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.



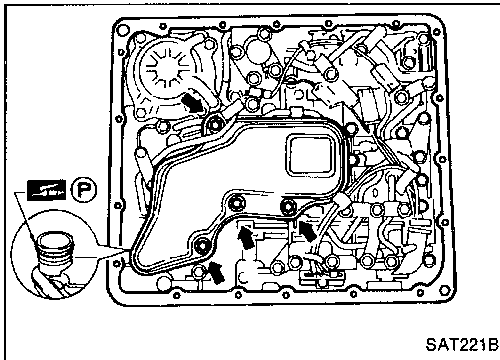
- e. Install control valve assembly on transmission case.
 - f. Install connector tube brackets and tighten bolts **(A)** and **(B)**.

- **Check that terminal assembly does not catch.**

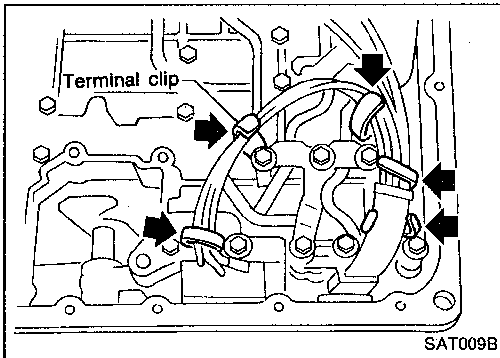
Bolt symbol	ℓ mm (in)	ϕ
(A)	33 (1.30)	
(B)	45 (1.77)	

ASSEMBLY

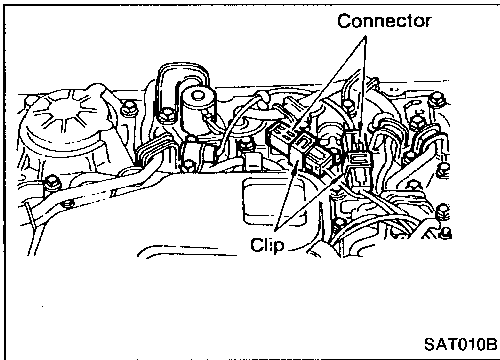
Assembly (2) (Cont'd)



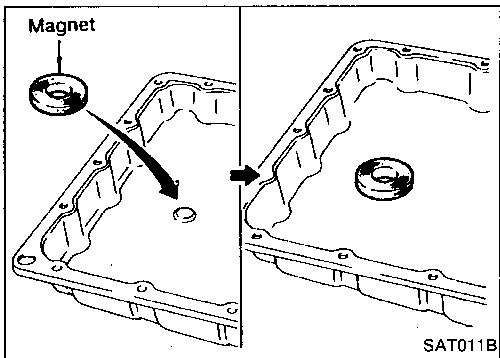
- g. Install O-ring on oil strainer.
- **Apply petroleum jelly to O-ring.**
- h. Install oil strainer on control valve.



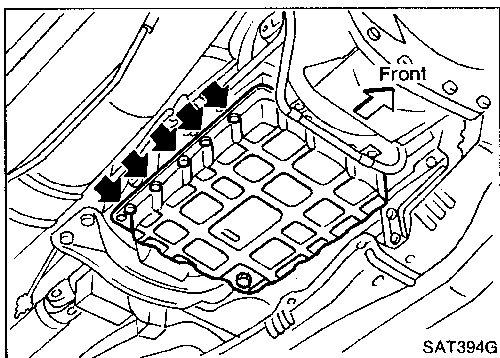
- i. Securely fasten terminal harness with clips.



- j. Install torque converter clutch solenoid valve and fluid temperature sensor connectors.



- 13. 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 dislocation of gasket.**
- d. Tighten drain plug.

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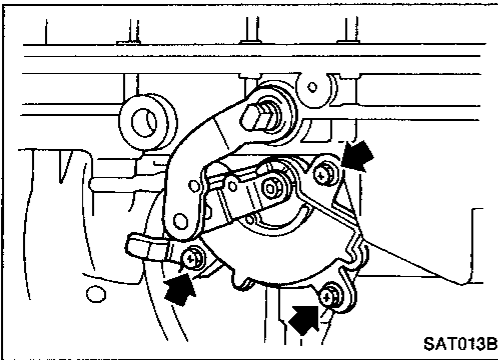
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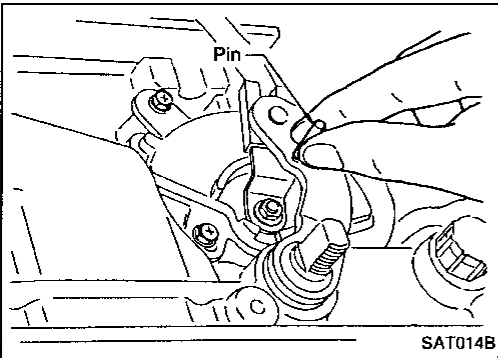
ASSEMBLY

Assembly (2) (Cont'd)



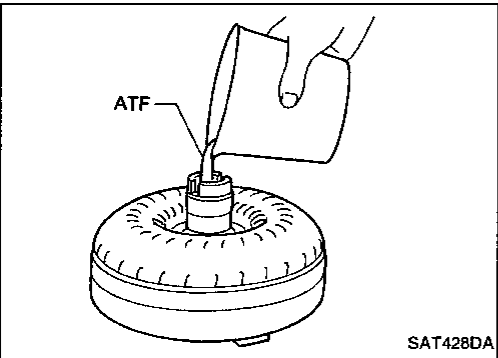
SAT013B

14. 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".



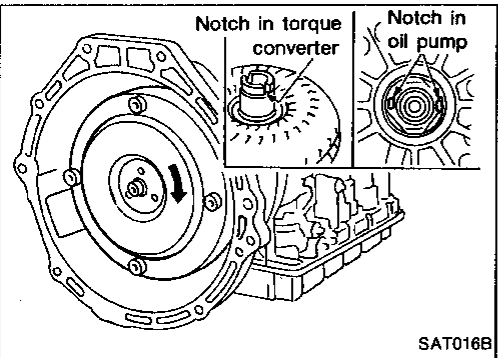
SAT014B

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



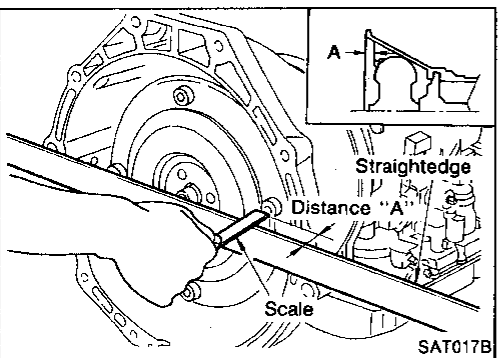
SAT428DA

15. 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.



SAT016B

- b. Install torque converter while aligning notches and oil pump.



SAT017B

- c. Measure distance A to check that torque converter is in proper position.

Distance "A":

26.0 mm (1.024 in) or more

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Engine	KA24DE
Automatic transmission model	RE4R01A
Transmission model code number	45X81
Stall torque ratio	2.0 : 1
Transmission gear ratio	
1st	2.785
2nd	1.545
Top	1.000
OD	0.694
Reverse	2.272
Recommended oil	Genuine Nissan ATF or equivalent type DEXRON™ II
Oil capacity ℓ (US qt, Imp qt)	8.3 (8-3/4, 7-1/4)

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	53 - 57 (33 - 35)	96 - 104 (60 - 65)	149 - 159 (93 - 99)	143 - 153 (89 - 95)	86 - 94 (53 - 58)	40 - 44 (25 - 27)	53 - 57 (33 - 35)
Half throttle	39 - 43 (24 - 27)	74 - 80 (46 - 50)	112 - 120 (70 - 75)	56 - 64 (35 - 40)	27 - 33 (17 - 21)	10 - 14 (6 - 9)	53 - 57 (33 - 35)

VEHICLE SPEED WHEN PERFORMING AND RELEASING LOCK-UP

Throttle position	OD switch [Shift position]	Vehicle speed km/h (MPH)	
		Lock-up "ON"	Lock-up "OFF"
Full throttle	ON [D ₄]	150 - 158 (93 - 98)	144 - 152 (89 - 94)
	OFF [D ₃]	91 - 99 (57 - 62)	86 - 94 (53 - 58)
Half throttle	ON [D ₄]	112 - 120 (70 - 75)	107 - 115 (66 - 71)
	OFF [D ₃]	91 - 99 (57 - 62)	86 - 94 (53 - 58)

STALL REVOLUTION

Stall revolution rpm
2,050 - 2,250

LINE PRESSURE

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)	
	D, 2 and 1 positions	R position
Idle	432 - 471 (4.41 - 4.80, 62.6 - 68.3)	686 - 715 (7.00 - 7.29, 99.5 - 103.7)
Stall	1,039 - 1,118 (10.60 - 11.40, 150.7 - 162.1)	1,480 - 1,558 (15.10 - 15.89, 214.6 - 225.9)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

RETURN SPRINGS

Unit: mm (in)

Parts		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	44.0 (1.732)	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	31742-41X20	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 Lock-up 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 (0.2657)
		③ 3-2 timing valve spring	31742-41X08	20.55 (0.8091)	6.75 (0.2657)
		④ Servo charger valve spring	31742-41X06	23.0 (0.906)	6.7 (0.264)
	Reverse clutch	16 pcs	31505-41X02	19.69 (0.7752)	11.6 (0.457)
	High clutch	16 pcs	31505-21X03	22.1 (0.870)	11.6 (0.457)
Forward clutch (Overrun clutch)	20 pcs	31505-41X01	35.77 (1.4083)	9.7 (0.382)	
Low & reverse brake	18 pcs	31521-21X00	23.7 (0.933)	11.6 (0.457)	
Band servo	Spring A	31605-41X05	45.6 (1.795)	34.3 (1.350)	
	Spring B	31605-41X00	53.8 (2.118)	40.3 (1.587)	
	Spring C	31605-41X01	29.7 (1.169)	27.6 (1.087)	
Accumulator	Accumulator A	31605-41X02	43.0 (1.693)	—	
	Accumulator B	31605-41X10	66.0 (2.598)	—	
	Accumulator C	31605-41X09	45.0 (1.772)	—	
	Accumulator D	31605-41X06	58.4 (2.299)	—	

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

ACCUMULATOR O-RING

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

CLUTCHES AND BRAKES

Reverse clutch		
Number of drive plates	2	
Number of driven plates	2	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.5 - 0.8 (0.020 - 0.031)	
Allowable limit	1.2 (0.047)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.6 (0.181)	31537-42X01
	4.8 (0.189)	31537-42X02
	5.0 (0.197)	31537-42X03
	5.2 (0.205)	31537-42X04
	5.4 (0.213)	31537-42X05
5.6 (0.220)	31537-42X06	
High clutch		
Number of drive plates	4	
Number of driven plates	7	
Thickness of drive plate mm (in)		
Standard	1.6 (0.063)	
Wear limit	1.4 (0.055)	
Clearance mm (in)		
Standard	1.8 - 2.2 (0.071 - 0.087)	
Allowable limit	3.0 (0.118)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.0 (0.118)	31537-41X69
	3.2 (0.126)	31537-41X70
	3.4 (0.134)	31537-41X71
	3.6 (0.142)	31537-41X61
	3.8 (0.150)	31537-41X62
	4.0 (0.157)	31537-41X63
	4.2 (0.165)	31537-41X64
4.4 (0.173)	31537-41X65	

Forward clutch		
Number of drive plates	5	
Number of driven plates	5	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.45 - 0.85 (0.0177 - 0.0335)	
Allowable limit	1.85 (0.0728)	
Thickness of retaining plate	Thickness mm (in)	Part number
	8.0 (0.315)	31537-41X00
	8.2 (0.323)	31537-41X01
	8.4 (0.331)	31537-41X02
	8.6 (0.339)	31537-41X03
	8.8 (0.346)	31537-41X04
	9.0 (0.354)	31537-41X05
	9.2 (0.362)	31537-41X06
Overrun clutch		
Number of drive plates	3	
Number of driven plates	5	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	1.0 - 1.4 (0.039 - 0.055)	
Allowable limit	2.0 (0.079)	
Thickness of retaining plate	Thickness mm (in)	Part number
	4.0 (0.157)	31537-41X79
	4.2 (0.165)	31537-41X80
	4.4 (0.173)	31537-41X81
	4.6 (0.181)	31537-41X82
	4.8 (0.189)	31537-41X83
	5.0 (0.197)	31537-41X84
5.2 (0.205)	31537-41X20	

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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustment (Cont'd)

Low & reverse brake		
Number of drive plates	6	
Number of driven plates	6	
Thickness of drive plate mm (in)		
Standard	2.0 (0.079)	
Wear limit	1.8 (0.071)	
Clearance mm (in)		
Standard	0.7 - 1.1 (0.028 - 0.043)	
Allowable limit	2.3 (0.091)	
Thickness of retaining plate	Thickness mm (in)	Part number
	9.0 (0.354)	31667-41X05
	9.2 (0.362)	31667-41X06
	9.4 (0.370)	31667-41X09
	9.6 (0.378)	31667-41X10
	9.8 (0.386)	31667-41X18
	10.0 (0.394)	31667-41X19
Brake band		
Anchor end bolt tightening torque N-m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)	
Number of returning revolutions for anchor end bolt	2.5	

OIL PUMP AND LOW ONE-WAY CLUTCH

Oil pump clearance mm (in)	
Cam ring — oil pump housing	
Standard	0.01 - 0.024 (0.0004 - 0.0009)
Rotor, vanes and control piston — oil pump housing	
Standard	0.03 - 0.044 (0.0012 - 0.0017)
Seal ring clearance mm (in)	
Standard	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)	31429-41X01
	1.0 (0.039)	31429-41X02
	1.2 (0.047)	31429-41X03
	1.4 (0.055)	31429-21X03
	1.6 (0.063)	31429-21X04
	1.8 (0.071)	31429-21X05
2.0 (0.079)	31429-21X06	

REVERSE CLUTCH DRUM END PLAY

Reverse clutch drum end play "T ₂ "	0.55 - 0.90 mm (0.0217 - 0.0354 in)	
Thickness of oil pump thrust washer	Thickness mm (in)	Part number
	0.7 (0.028)	31528-21X00
	0.9 (0.035)	31528-21X01
	1.1 (0.043)	31528-21X02
	1.3 (0.051)	31528-21X03
	1.5 (0.059)	31528-21X04
	1.7 (0.067)	31528-21X05
1.9 (0.075)	31528-21X06	

REMOVAL AND INSTALLATION

Manual control linkage	
Number of returning revolutions for lock nut	1
Lock nut tightening torque	11 - 15 N-m (1.1 - 1.5 kg-m, 8 - 11 ft-lb)
Distance between end of clutch housing and torque converter	26.0 mm (1.024 in) or more
Drive plate runout limit	0.5 mm (0.020 in)