

AUTOMATIC TRANSAXLE

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When you read wiring diagrams:

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

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

GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

RS

BT

HA

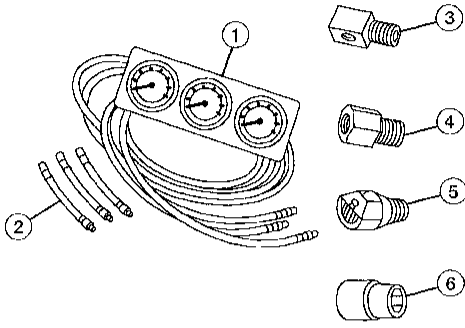
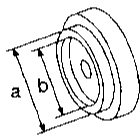
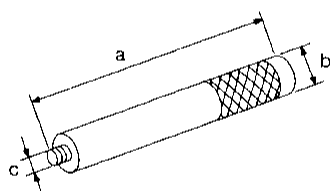
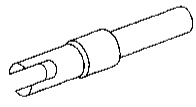
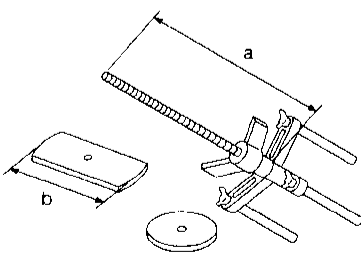
EL

IDX

PREPARATION AND PRECAUTIONS

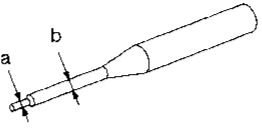
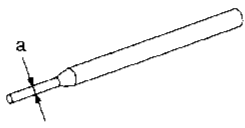
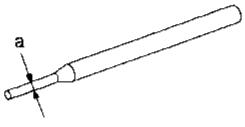
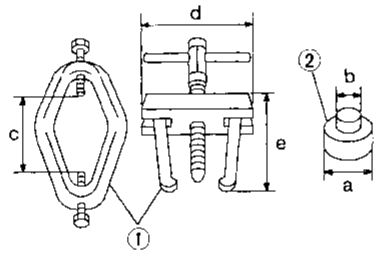
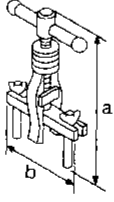
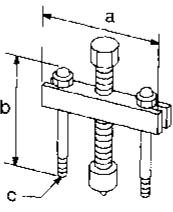
Special Service Tools

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

Tool number (Kent-Moore No.) Tool name	Description	
(J34301-C) Oil pressure gauge set ① (J34301-1) Oil pressure gauge ② (J34301-2) Hoses ③ (J34298) Adapter ④ (J34282-2) Adapter ⑤ (790-301-1230-A) 60° Adapter ⑥ (J34301-15) Square socket	 <p style="text-align: center;">AAT896</p>	Measuring line pressure and governor pressure
KV31103000 (J38982) Drift	 <p style="text-align: center;">NT105</p>	Installing differential oil seal (Use with ST35325000.) a: 59 mm (2.32 in) dia. b: 49 mm (1.93 in) dia.
ST35325000 (—) Drift	 <p style="text-align: center;">NT417</p>	Installing differential oil seal (Use with KV31103000.) a: 215 mm (8.46 in) b: 25 mm (0.98 in) dia. c: M12 x 1.5P
KV38107700 (J39027) Preload adapter	 <p style="text-align: center;">NT087</p>	— RE4F03V — ● Measuring turning torque of final drive assembly ● Measuring clearance between side gear and differential case with washer ● Selecting differential side bearing adjusting shim
KV31103200 (J34285-A and J34285-87) Clutch spring compressor	 <p style="text-align: center;">NT423</p>	Removing and installing clutch return spring a: 320 mm (12.60 in) b: 174 mm (6.85 in)

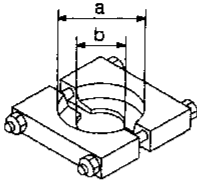
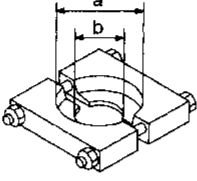
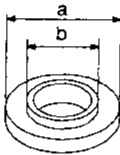
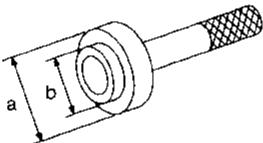
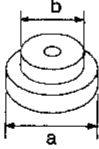
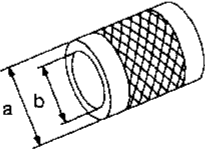
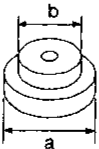
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description	
ST23540000 (J25689-A) Pin punch	 <p>NT442</p>	Removing and installing parking rod plate, manual plate and differential pinion mate shaft retaining pins a: 2.3 mm (0.091 in) dia. b: 4 mm (0.16 in) dia.
KV32101000 (J25689-A) Pin punch	 <p>NT410</p>	Installing throttle lever and manual shaft retaining pins a: 4 mm (0.16 in) dia.
ST25710000 (—) Pin punch	 <p>NT410</p>	Aligning groove of manual shaft and hole of transmission case a: 2 mm (0.08 in) dia.
ST3306S001 (J22888-D) Differential side bearing puller set ① ST33051001 (J22888-D) Puller ② ST33061000 (J8107-2) Adapter	 <p>NT413</p>	— RE4F03V — Removing differential side bearing inner race a: 39 mm (1.54 in) dia. b: 29.5 mm (1.161 in) dia. c: 130 mm (5.12 in) d: 135 mm (5.31 in) e: 120 mm (4.72 in)
KV381054S0 (J34286) Puller	 <p>NT414</p>	<ul style="list-style-type: none"> ● Removing idler gear bearing outer race ● Removing differential side oil seals — RL4F03A — <ul style="list-style-type: none"> ● Removing output shaft bearing outer race from bearing retainer ● Removing output gear bearing outer race from bearing retainer — RE4F03V — <ul style="list-style-type: none"> ● Removing differential side bearing outer race ● Removing needle bearing from bearing retainer a: 250 mm (9.84 in) b: 160 mm (6.30 in)
ST27180001 (J25726-A) Puller	 <p>NT424</p>	<ul style="list-style-type: none"> ● Removing idler gear — RL4F03A — <ul style="list-style-type: none"> ● Removing output gear a: 100 mm (3.94 in) b: 110 mm (4.33 in) c: M8 x 1.25P

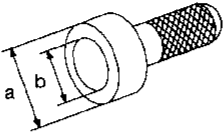
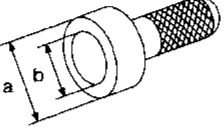
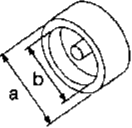
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

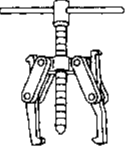
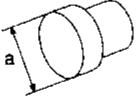
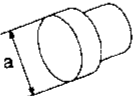
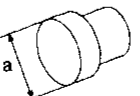
Tool number (Kent-Moore No.) Tool name	Description
ST30031000 (J22912-1) Puller	 <p style="text-align: center;">NT411</p> <p style="text-align: right;">Removing reduction gear bearing inner race</p> <p style="text-align: right;">a: 90 mm (3.54 in) dia. b: 50 mm (1.97 in) dia.</p>
ST30021000 (J22912-1) Puller	 <p style="text-align: center;">NT411</p> <p style="text-align: right;">— RL4F03A — Removing differential side bearing</p> <p style="text-align: right;">a: 110 mm (4.33 in) dia. b: 68 mm (2.68 in) dia.</p>
ST35272000 (J26092) Drift	 <p style="text-align: center;">NT426</p> <p style="text-align: right;"> <ul style="list-style-type: none"> ● Installing reduction gear bearing inner race ● Installing idler gear bearing inner race — RL4F03A — <ul style="list-style-type: none"> ● Installing output gear bearing inner race a: 72 mm (2.83 in) dia. b: 35.5 mm (1.398 in) dia. </p>
ST37830000 (—) Drift	 <p style="text-align: center;">NT427</p> <p style="text-align: right;">Installing idler gear bearing outer race</p> <p style="text-align: right;">a: 62 mm (2.44 in) dia. b: 39 mm (1.54 in) dia.</p>
ST35321000 (—) Drift	 <p style="text-align: center;">NT073</p> <p style="text-align: right;">— RE4F03V — Installing output shaft bearing</p> <p style="text-align: right;">a: 49 mm (1.93 in) dia. b: 41 mm (1.61 in) dia.</p>
ST33200000 (J37067) Drift	 <p style="text-align: center;">NT091</p> <p style="text-align: right;">— RL4F03A — Installing differential side bearing</p> <p style="text-align: right;">a: 60 mm (2.36 in) dia. b: 44.5 mm (1.752 in) dia.</p>
ST30633000 (—) Drift	 <p style="text-align: center;">NT073</p> <p style="text-align: right;">— RE4F03V — Installing differential side bearing outer race</p> <p style="text-align: right;">a: 67 mm (2.64 in) dia. b: 49 mm (1.93 in) dia.</p>

PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

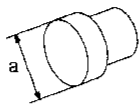
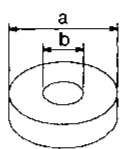
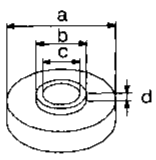
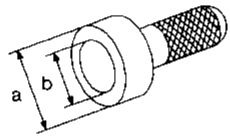
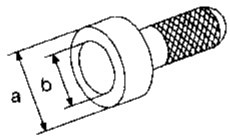
Tool number (Kent-Moore No.) Tool name	Description		
ST35271000 (J26091) Drift		<ul style="list-style-type: none"> ● Installing idler gear — RL4F03A — ● Installing output gear <p>a: 72 mm (2.83 in) dia. b: 63 mm (2.48 in) dia.</p>	GI MA EM
ST33400001 (J26082) Drift		<ul style="list-style-type: none"> ● Installing oil pump housing oil seal — RL4F03A — ● Installing output gear bearing outer race onto bearing retainer <p>a: 60 mm (2.36 in) dia. b: 47 mm (1.85 in) dia.</p>	LC EC FE
KV40104840 (—) Drift		<p>— RL4F03A —</p> <p>Installing output shaft bearing outer race onto bearing retainer</p> <p>a: 49 mm (1.93 in) dia. b: 42 mm (1.65 in) dia.</p>	CL MT

Commercial Service Tools

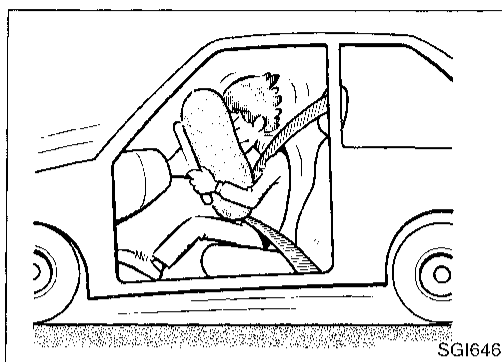
Tool name	Description		
Puller		<ul style="list-style-type: none"> ● Removing idler gear bearing inner race ● Removing and installing band servo piston snap ring — RL4F03A — ● Removing output gear bearing inner race ● Removing differential side bearing 	AT FA RA BR
Drift		<p>Removing idler gear bearing inner race</p> <p>a: 34 mm (1.34 in) dia.</p>	ST RS
Drift		<p>— RL4F03V —</p> <p>Installing needle bearing onto bearing retainer</p> <p>a: 36 mm (1.42 in) dia.</p>	BT HA
Drift		<p>— RL4F03A —</p> <ul style="list-style-type: none"> ● Installing output shaft bearing ● Removing output shaft bearing ● Removing output gear bearing inner race <p>a: 33 mm (1.30 in) dia.</p>	EL IDX

PREPARATION AND PRECAUTIONS

Commercial Service Tools (Cont'd)

Tool name	Description
Drift	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> <p>— RL4F03A — Removing differential side bearing</p> </div> </div> <p style="margin-top: 10px;">NT109</p> <p style="text-align: right; margin-top: 10px;">a: 38 mm (1.50 in) dia.</p>
Drift	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> <p>— RL4F03A — Removing output shaft bearing inner race</p> </div> </div> <p style="margin-top: 10px;">NT110</p> <p style="text-align: right; margin-top: 10px;">a: 70 mm (2.76 in) dia. b: 35 mm (1.38 in) dia.</p>
Drift	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> <p>— RL4F03A — Installing output shaft bearing inner race</p> </div> </div> <p style="margin-top: 10px;">NT111</p> <p style="text-align: right; margin-top: 10px;">a: 70 mm (2.76 in) dia. b: 34 mm (1.34 in) dia. c: 30 mm (1.18 in) dia. d: 2 mm (0.08 in)</p>
Drift	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> <p>— RE4F03V — Installing differential left side bearing</p> </div> </div> <p style="margin-top: 10px;">NT115</p> <p style="text-align: right; margin-top: 10px;">a: 86 mm (3.39 in) dia. b: 80 mm (3.15 in) dia.</p>
Drift	<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">  </div> <div style="text-align: right;"> <p>— RE4F03V — Installing differential right side bearing</p> </div> </div> <p style="margin-top: 10px;">NT115</p> <p style="text-align: right; margin-top: 10px;">a: 46 mm (1.81 in) dia. b: 40 mm (1.57 in) dia.</p>

PREPARATION AND PRECAUTIONS



Precautions For Supplemental Restraint System (SRS) "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 in 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 **RS** section of this Service Manual.

WARNING:

- To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN dealer.
- Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system.
- Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses are covered with yellow insulation either just before the harness connectors or for the complete harness, for easy identification.

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

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

CAUTION:

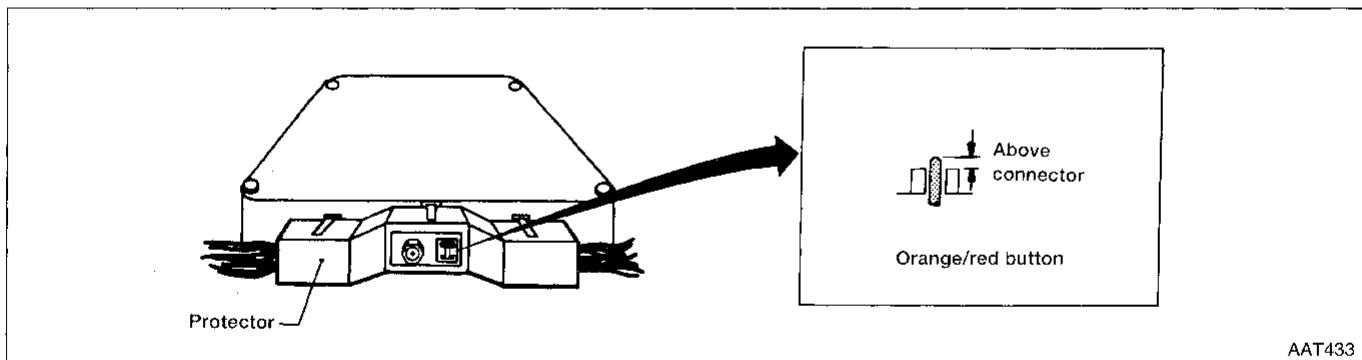
- Be sure to turn the ignition system "OFF" and disconnect the negative battery terminal before the repair or inspection work. The open/short circuit of the related switches, sensors, solenoid valves, etc. will cause the MIL to light up.
- Be sure to connect and lock the connectors securely after the work. The loose (unlocked) connector will cause the MIL to light up due to the open circuit. (Ensure that connectors are clean and dry and that they have no bent terminals.)
- Be sure to route and clamp the harnesses properly after work. The interference of a harness with a bracket, etc. may cause the MIL to light up due to a short circuit.
- Be sure to erase the unnecessary (already fixed) malfunction information in the A/T control unit or ECM before returning the vehicle to the customer.

PREPARATION AND PRECAUTIONS

Precautions

- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.
- Place disassembled parts in order to prepare for easier and proper assembly.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- When connecting A/T control unit harness connector, tighten bolt until orange/red button is above the connector.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in order, on a parts rack, so they can be put back in the valve body in the same positions and sequences. Care will also prevent springs and small parts from becoming scattered or lost.
- Properly installed valves, sleeves, plugs, etc. will slide along their bores in the valve body under their own weight.
- Before assembly, apply a coat of recommended ATF to all parts. Petroleum jelly may be applied to O-rings and seals and used to hold small bearings and washers in place during reassembly. Do not use grease.
- Extreme care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- Replace ATF cooler if excessive foreign material is found in oil pan or is clogging strainer. Refer to "ATF COOLER SERVICE" on the next page.
- After overhaul, refill the transaxle with new ATF.
- When the A/T drain plug is removed, only some of the fluid is drained. Old A/T fluid will remain in torque converter and ATF cooling system.

Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.



AAT433

Service Notice or Precautions

FAIL-SAFE

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

Under Fail-Safe, the vehicle always runs in third gear, even with a shift lever position of "1", "2" or "D". The customer complaint may be "sluggish, or poor acceleration".

When the ignition key is turned ON under Fail-Safe operation, the O/D OFF indicator lamp blinks for about 8 seconds. (For diagnosis, refer to AT-47.)

Fail-Safe may occur without electrical circuit damage if the vehicle is driven under extreme conditions (such as excessive wheel spin followed by sudden braking). To recover normal shift pattern, turn the ignition key OFF for 5 seconds, then ON.

The O/D OFF indicator lamp blinks for about 8 seconds, but will appear only once. This indicates the Fail-safe (limp home mode) is cleared. The customer may resume normal driving.

Always follow the WORK FLOW (Refer to AT-61).

The SELF-DIAGNOSIS results will be as follows:

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

During the next SELF-DIAGNOSIS, performed after checking the sensors, no damage will be indicated.

ATF COOLER SERVICE

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

GA16DE/SR20DE engine (with RL4F03A/RE4F03V) ... fin type cooler

Replace radiator assembly with a new one. Flush cooler lines using cleaning solvent and compressed air.

OBD-II SELF-DIAGNOSIS

• A/T self-diagnosis is performed by the A/T control unit in combination with the ECM. The results can be read through the blinking pattern of the O/D OFF indicator or the malfunction indicator lamp (MIL). Refer to the table on AT-47 for the indicator used to display each self-diagnostic result.

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

Always perform the procedure "HOW TO ERASE DTC" refer to AT-45 to complete the repair and avoid unnecessary blinking of the MIL.

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

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

-Improper torque converter clutch operation.

-Improper lock-up operation.

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

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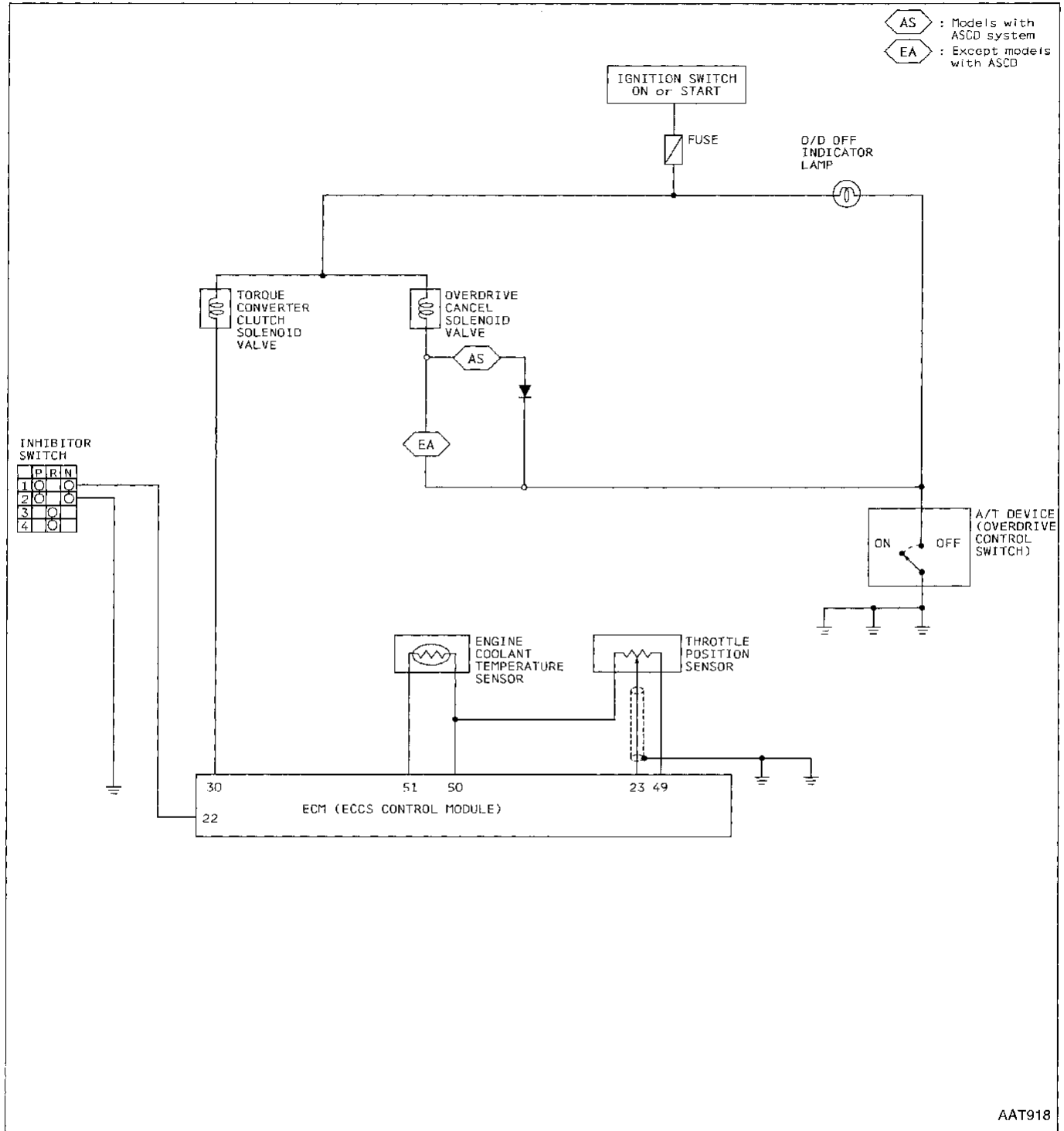
BT

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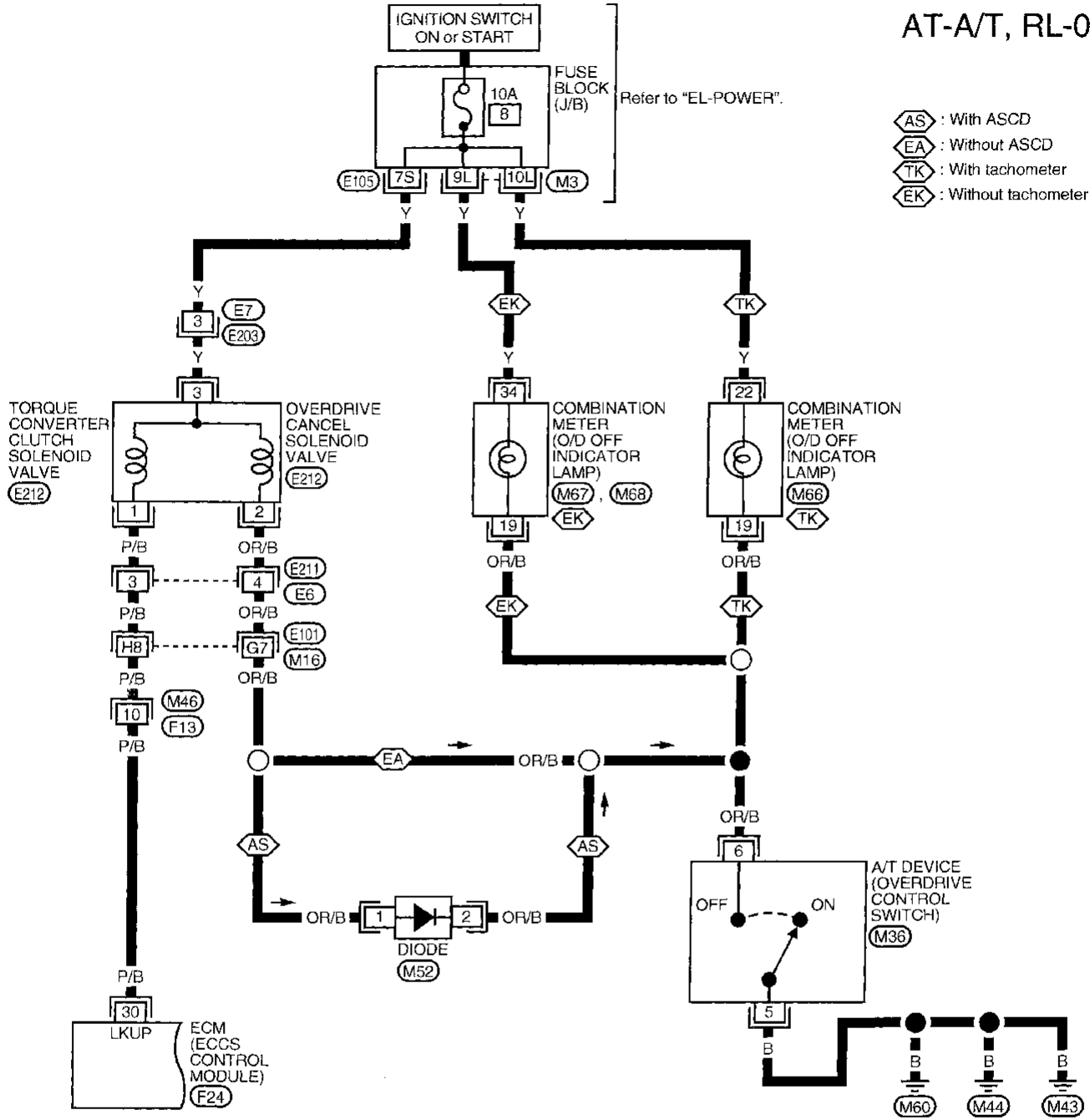
Circuit Diagram



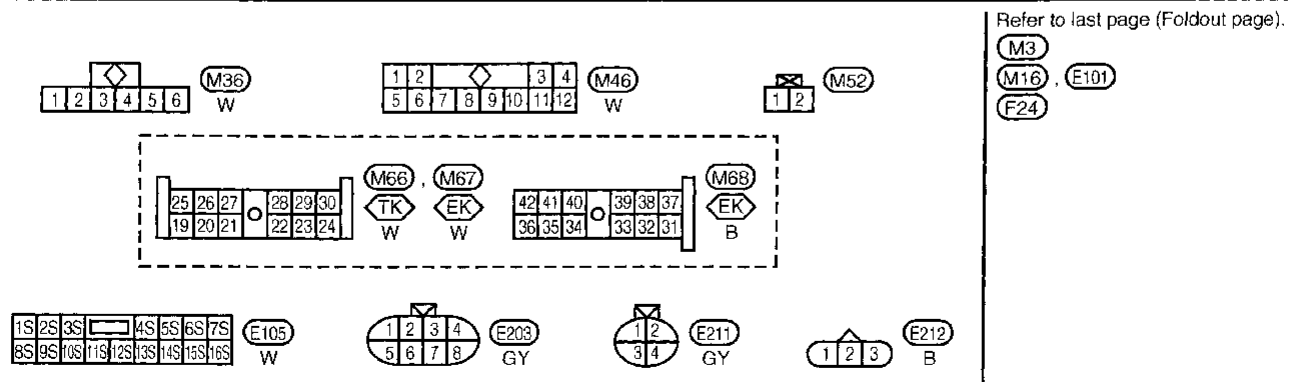
AAT918

Wiring Diagram -A/T, RL-

AT-A/T, RL-01



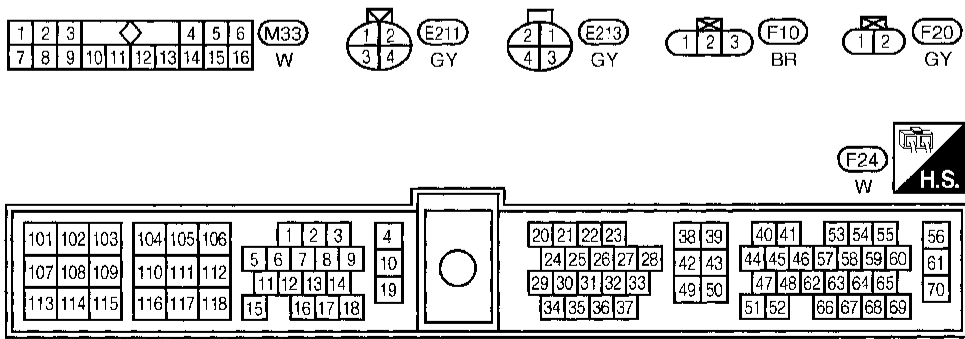
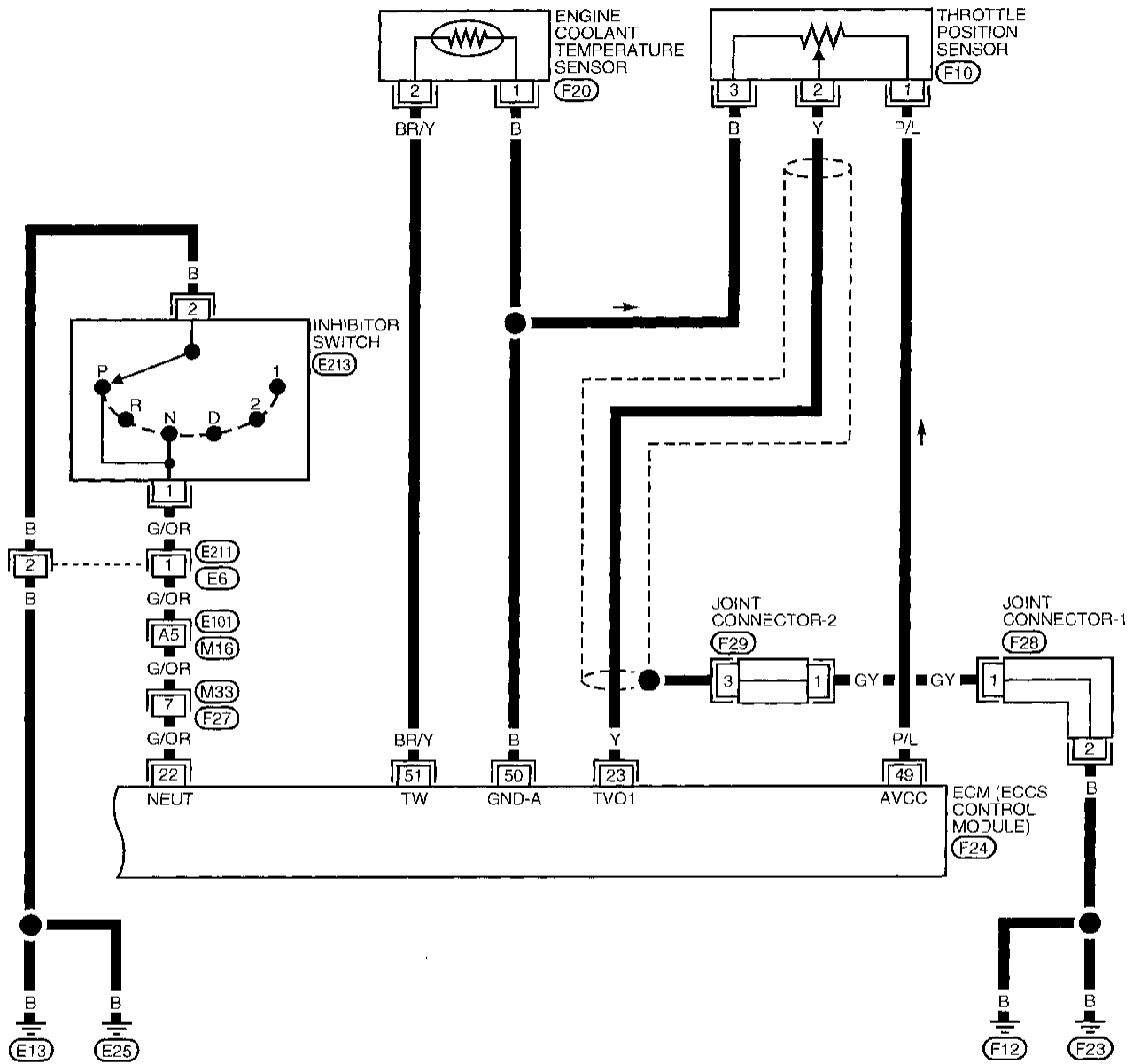
- AS : With ASCD
- EA : Without ASCD
- TK : With tachometer
- EK : Without tachometer



Refer to last page (Foldout page).

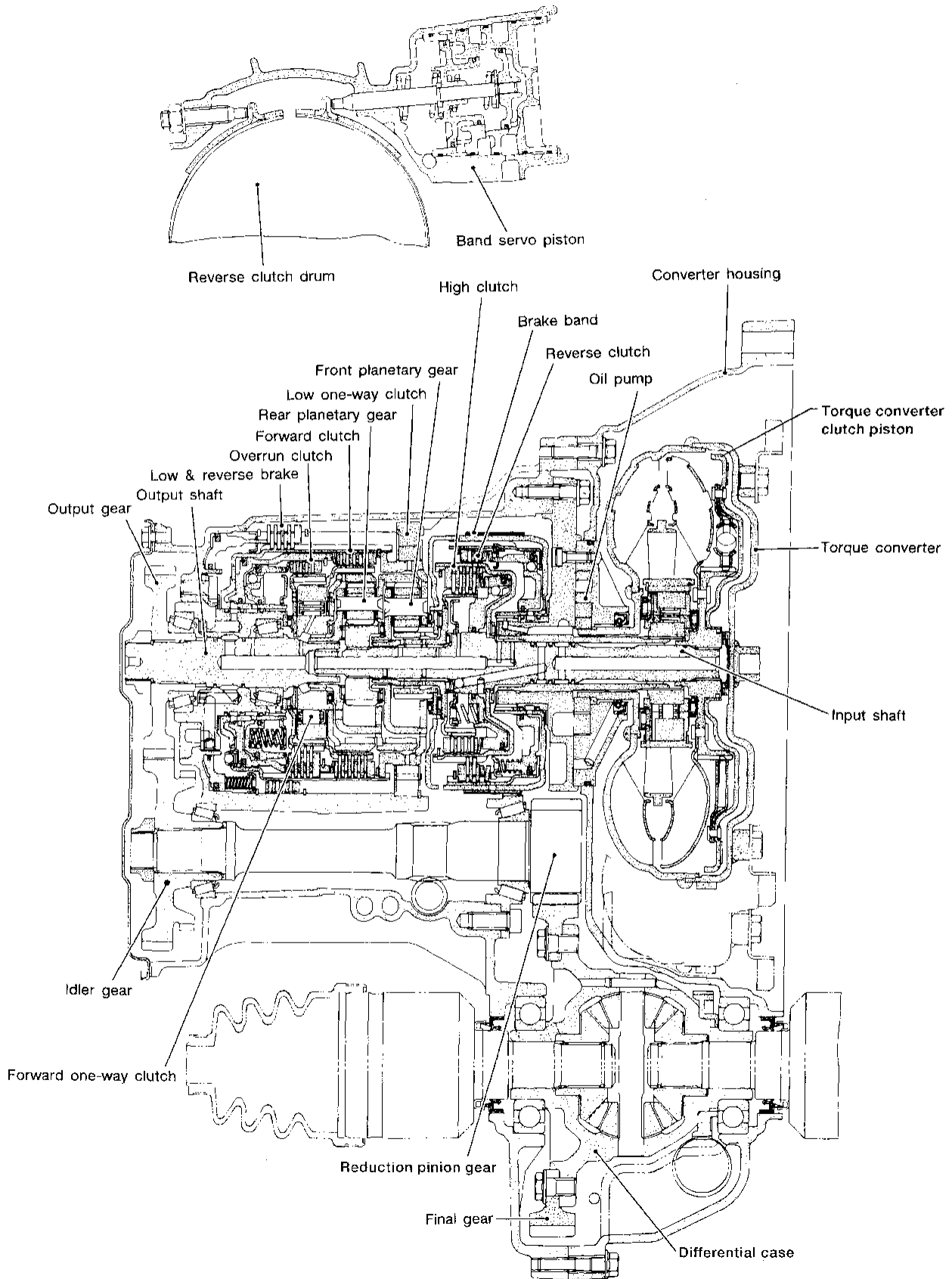
Wiring Diagram -A/T, RL- (Cont'd)

AT-A/T, RL-02



Refer to last page (Foldout page).
 M16, E101
 F28
 F29

Cross-sectional View



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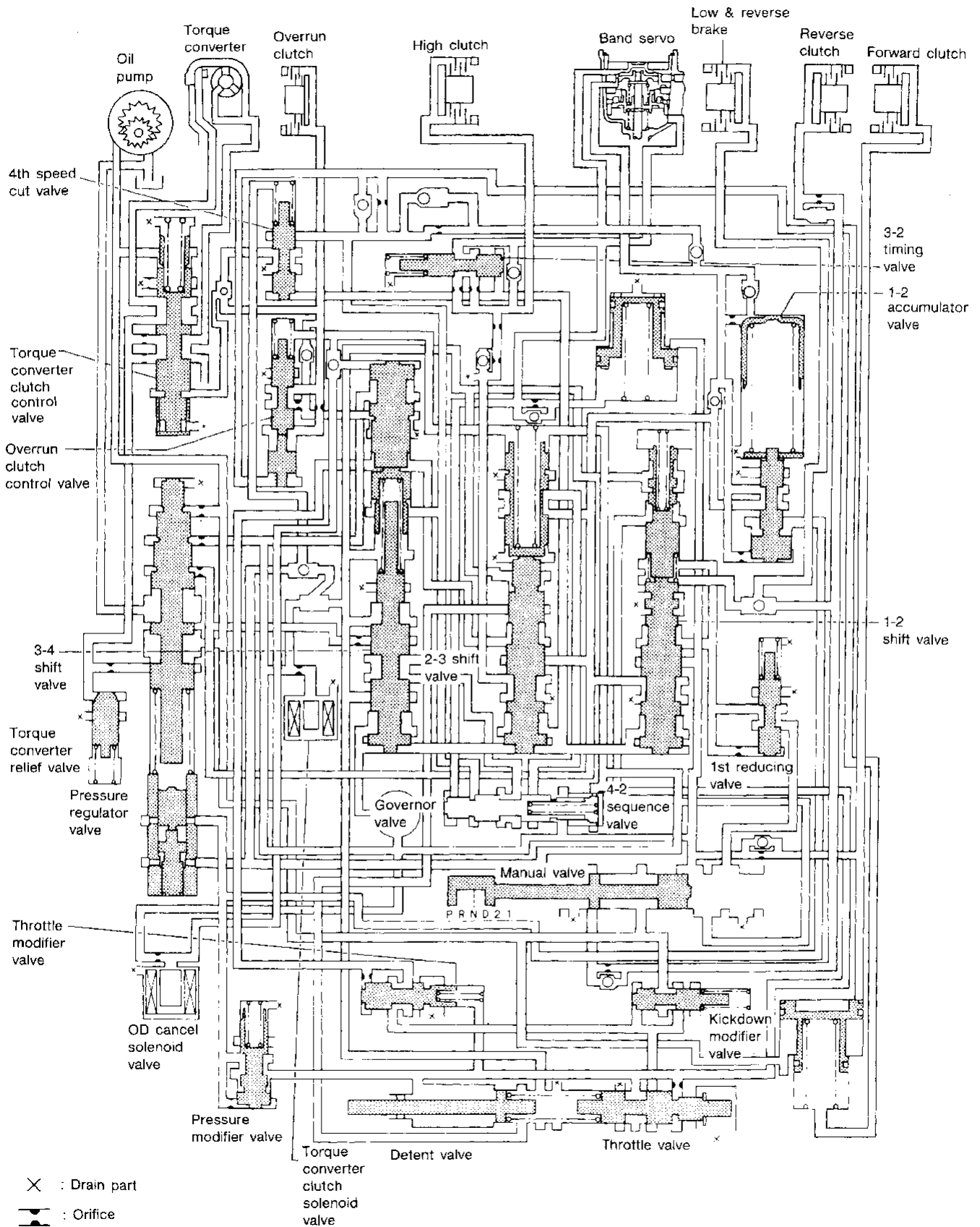
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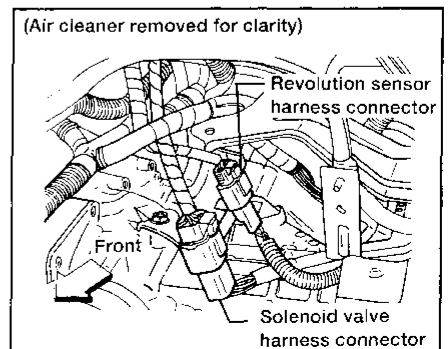
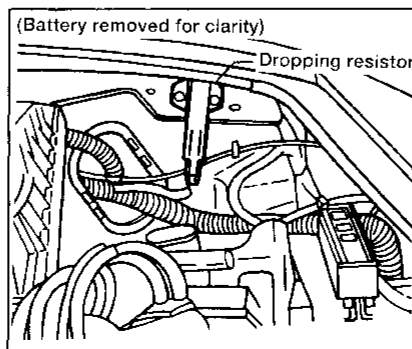
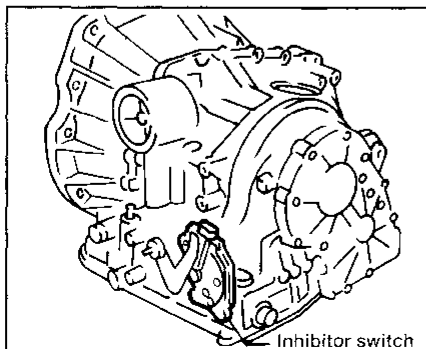
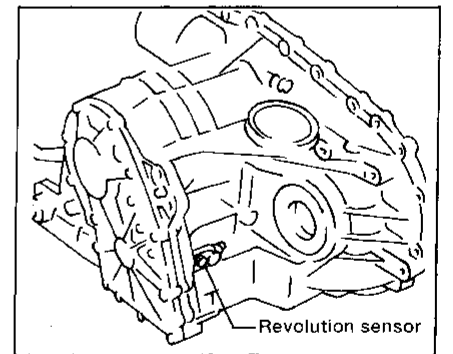
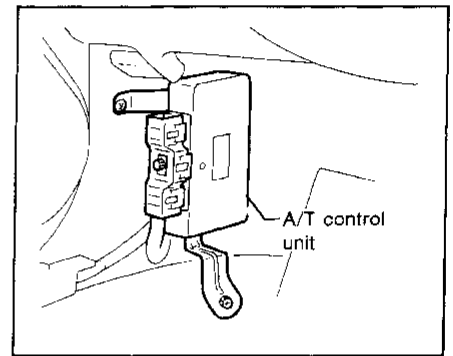
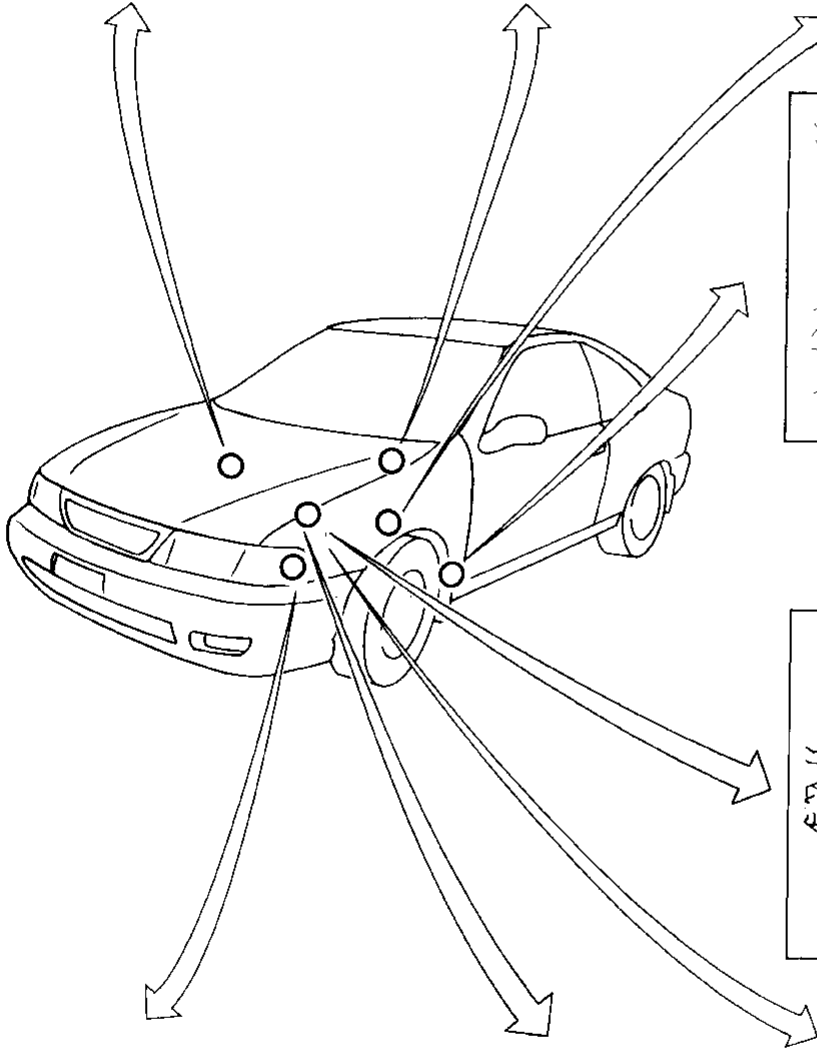
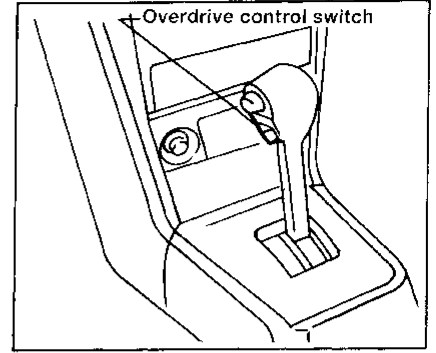
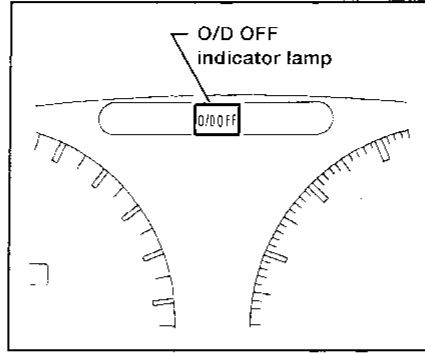
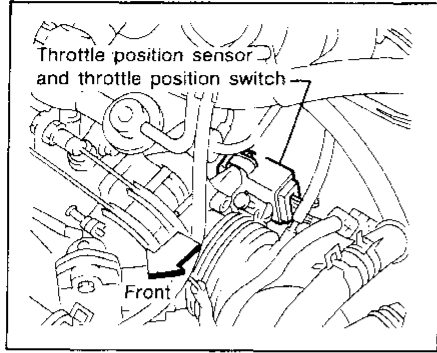
Hydraulic Control Circuit



X : Drain part
 [Symbol] : Orifice

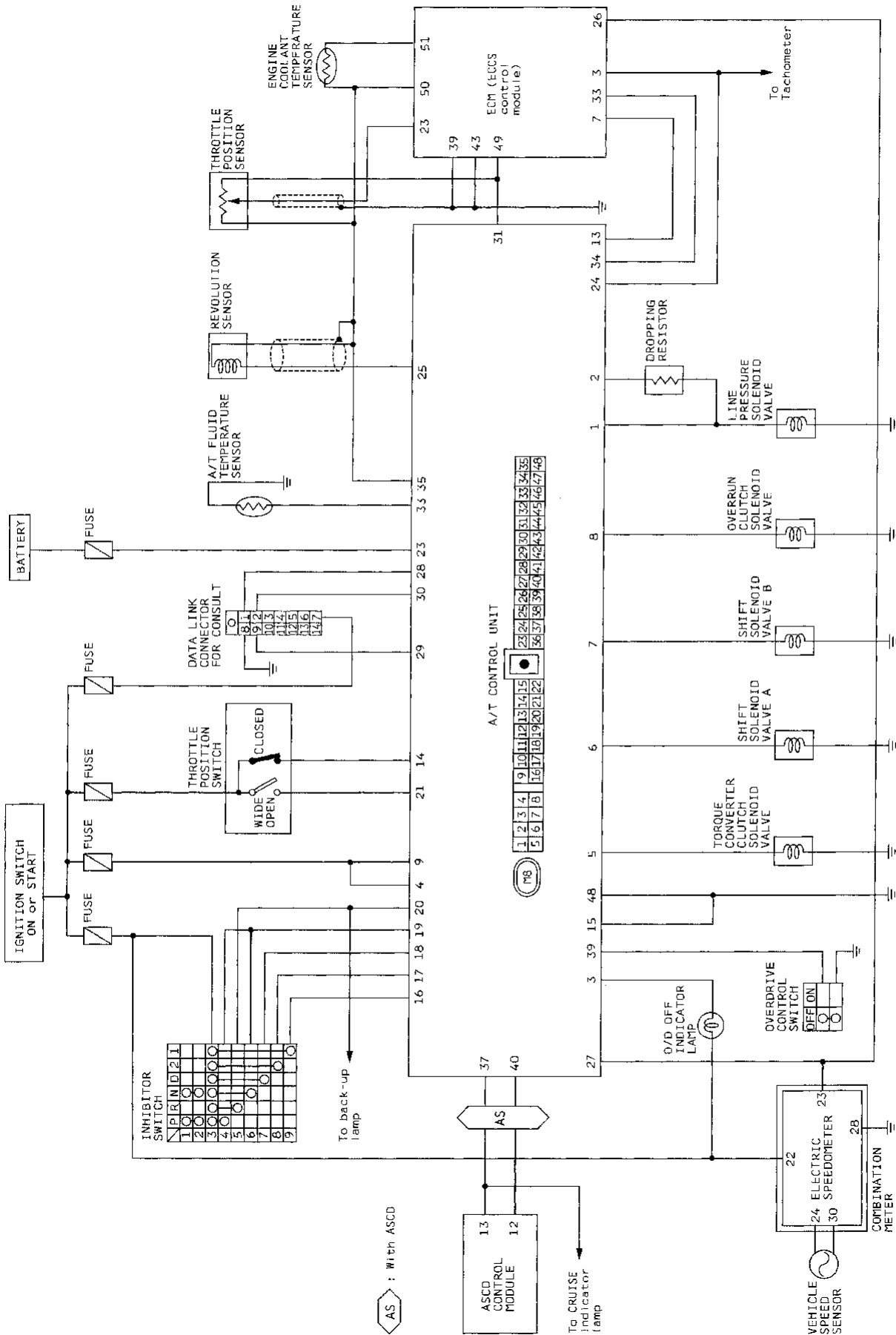
*: These two portions are actually connected.

A/T Electrical Parts Location



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Circuit Diagram



Wiring Diagram -A/T, RE-

AT-A/T, RE-01 GI

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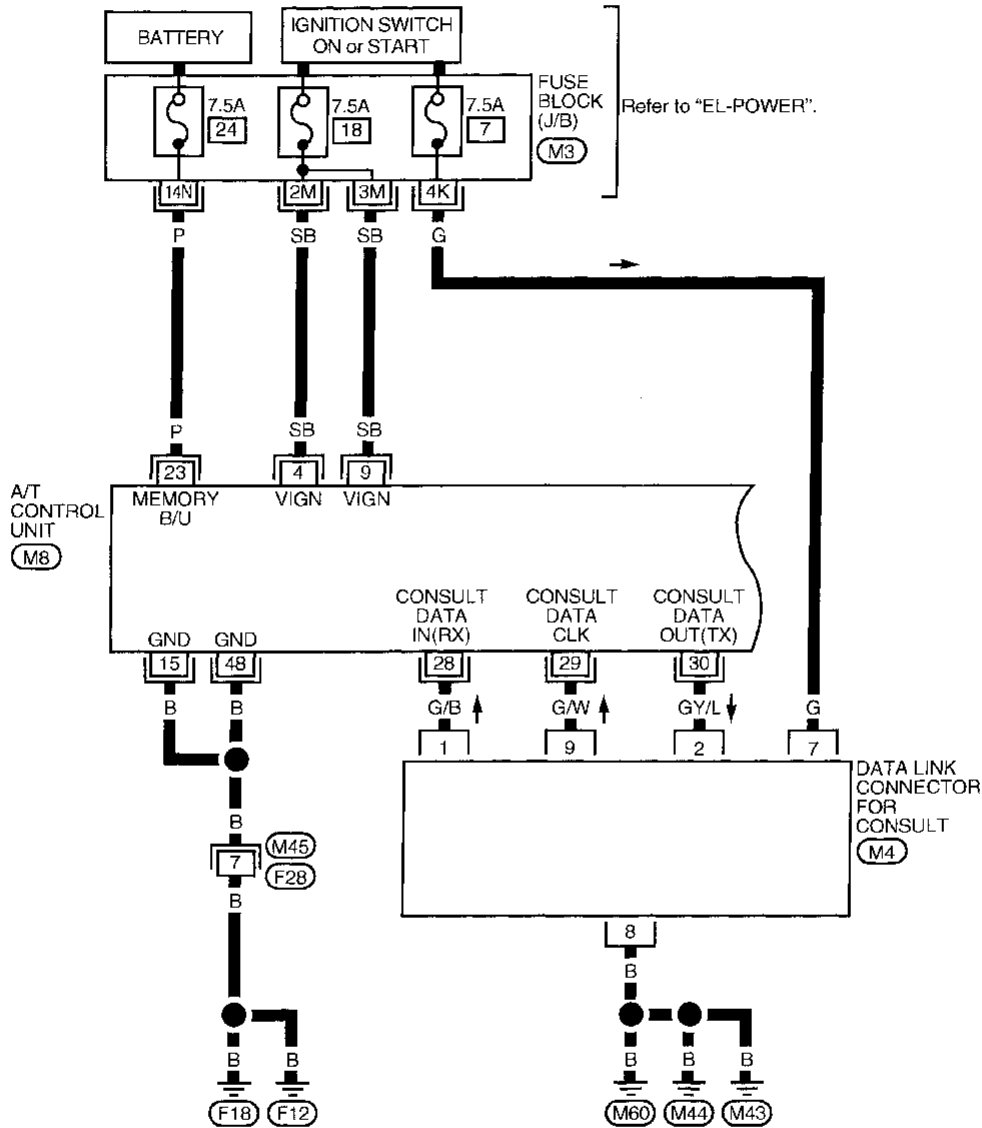
RS

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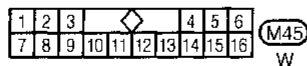
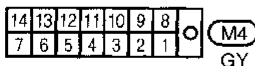
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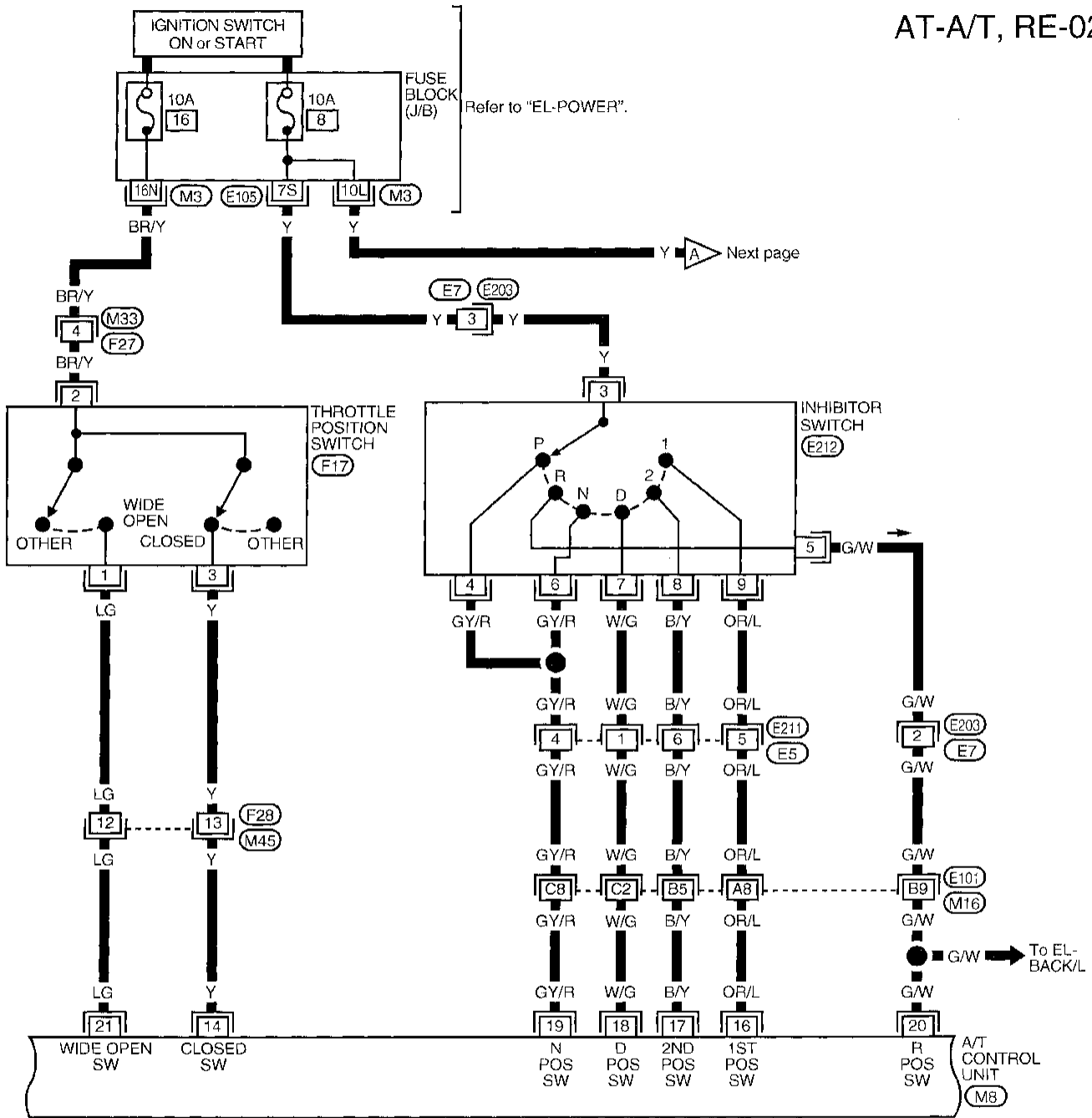
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M3

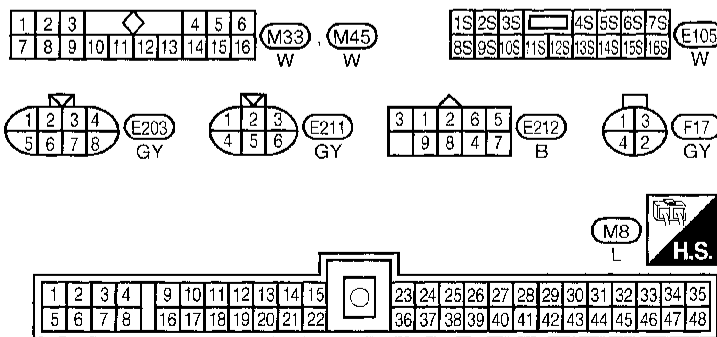


Wiring Diagram -A/T, RE- (Cont'd)

AT-A/T, RE-02



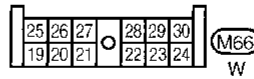
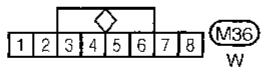
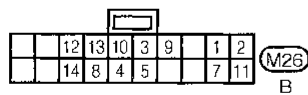
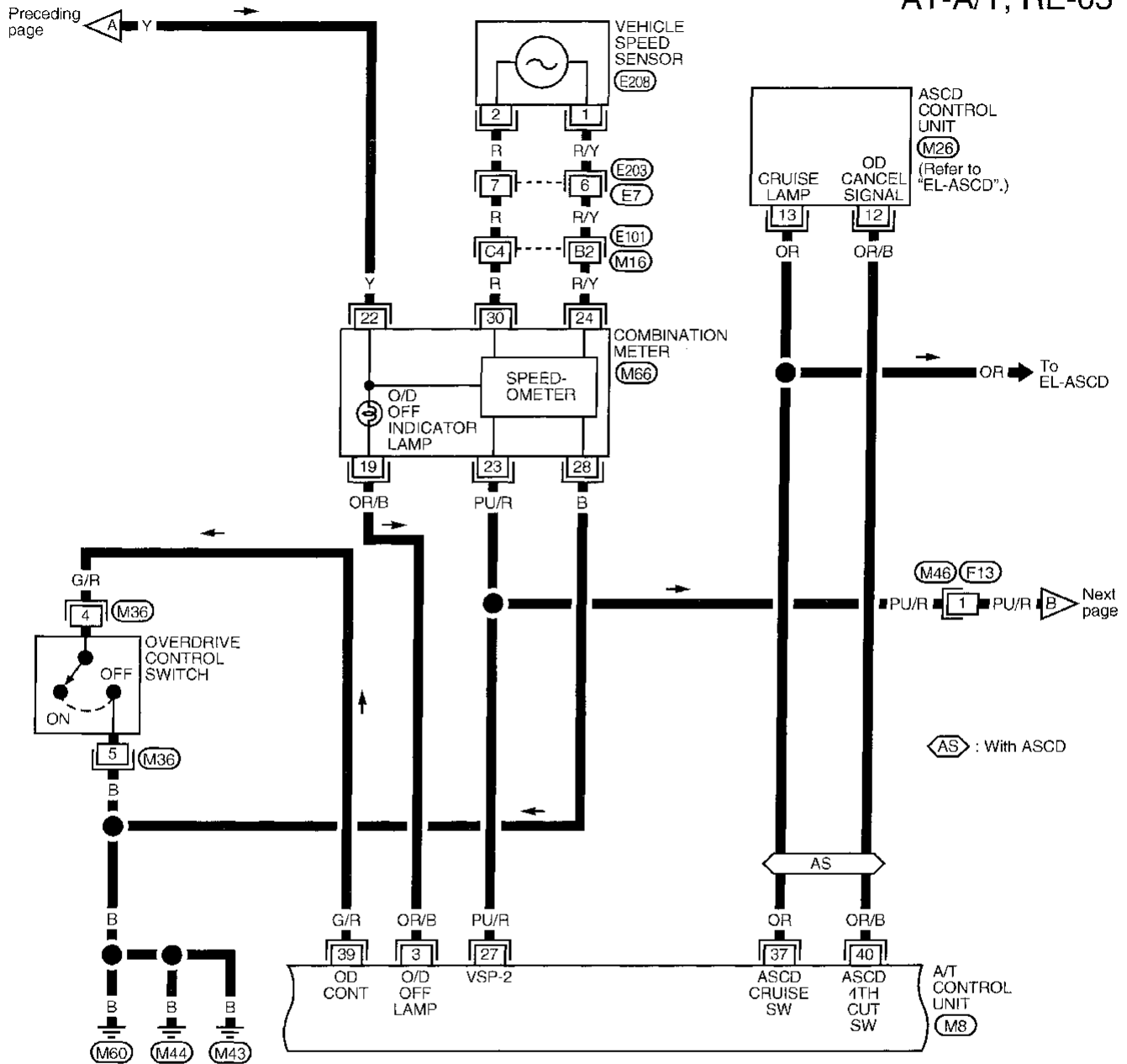
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M3
M16 E101

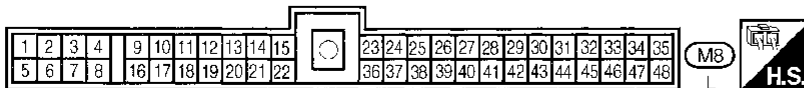
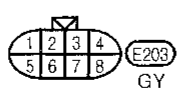
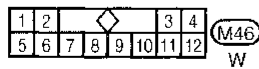
Wiring Diagram -A/T, RE- (Cont'd)

AT-A/T, RE-03



Refer to last page (Foldout page).

M16, E101



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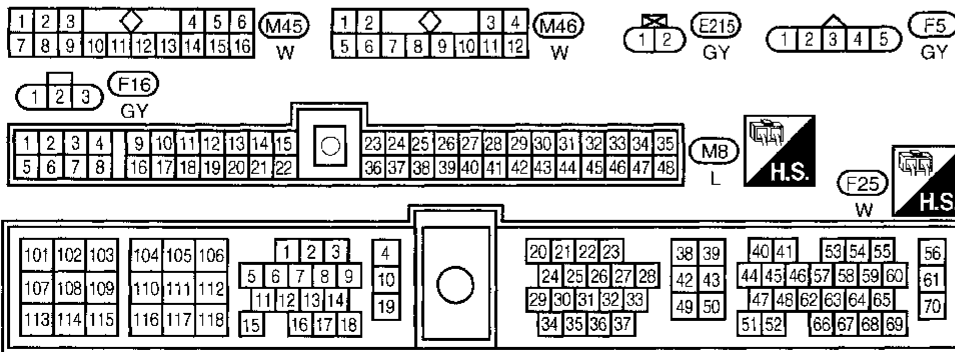
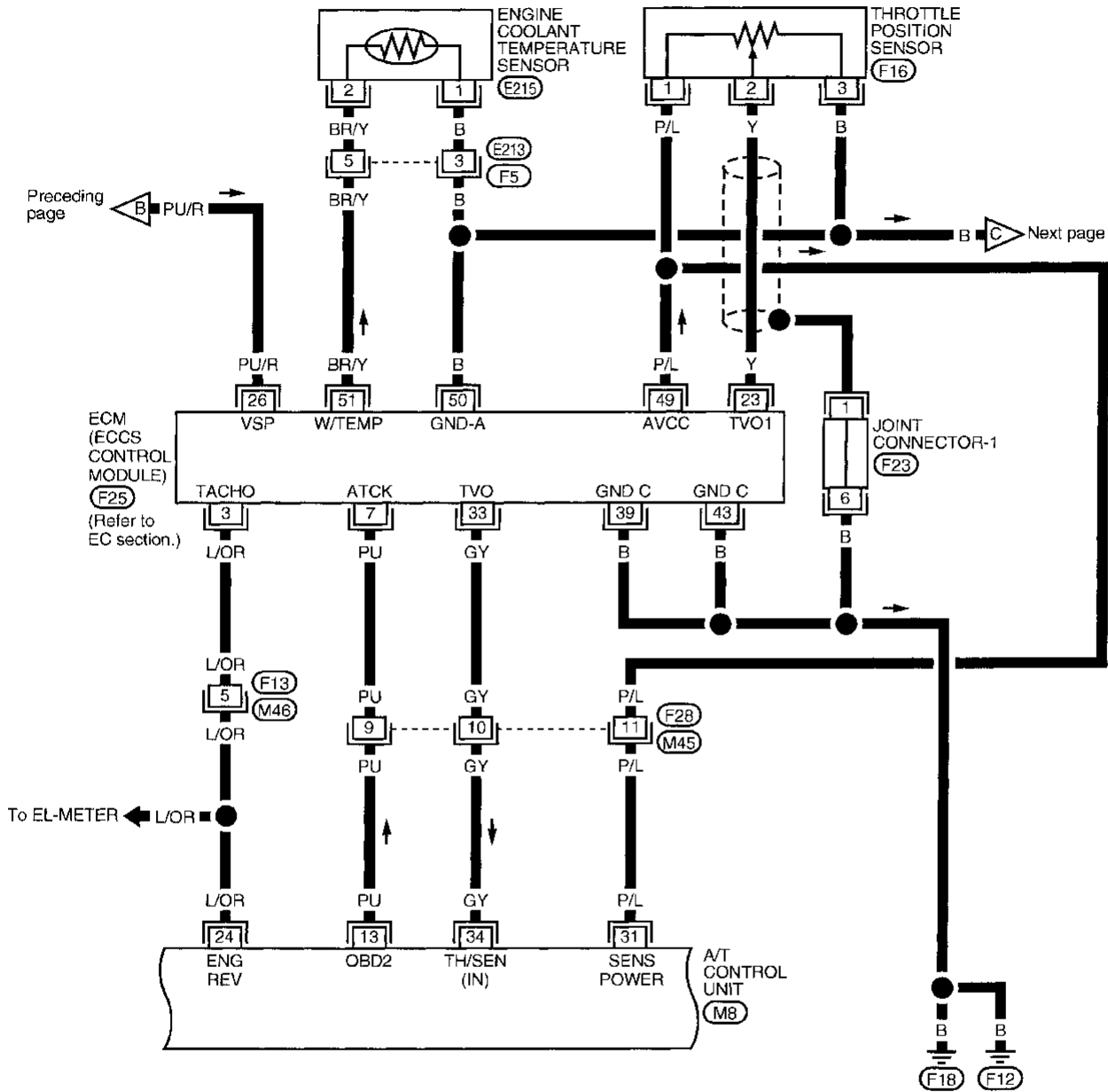
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Wiring Diagram -A/T, RE- (Cont'd)

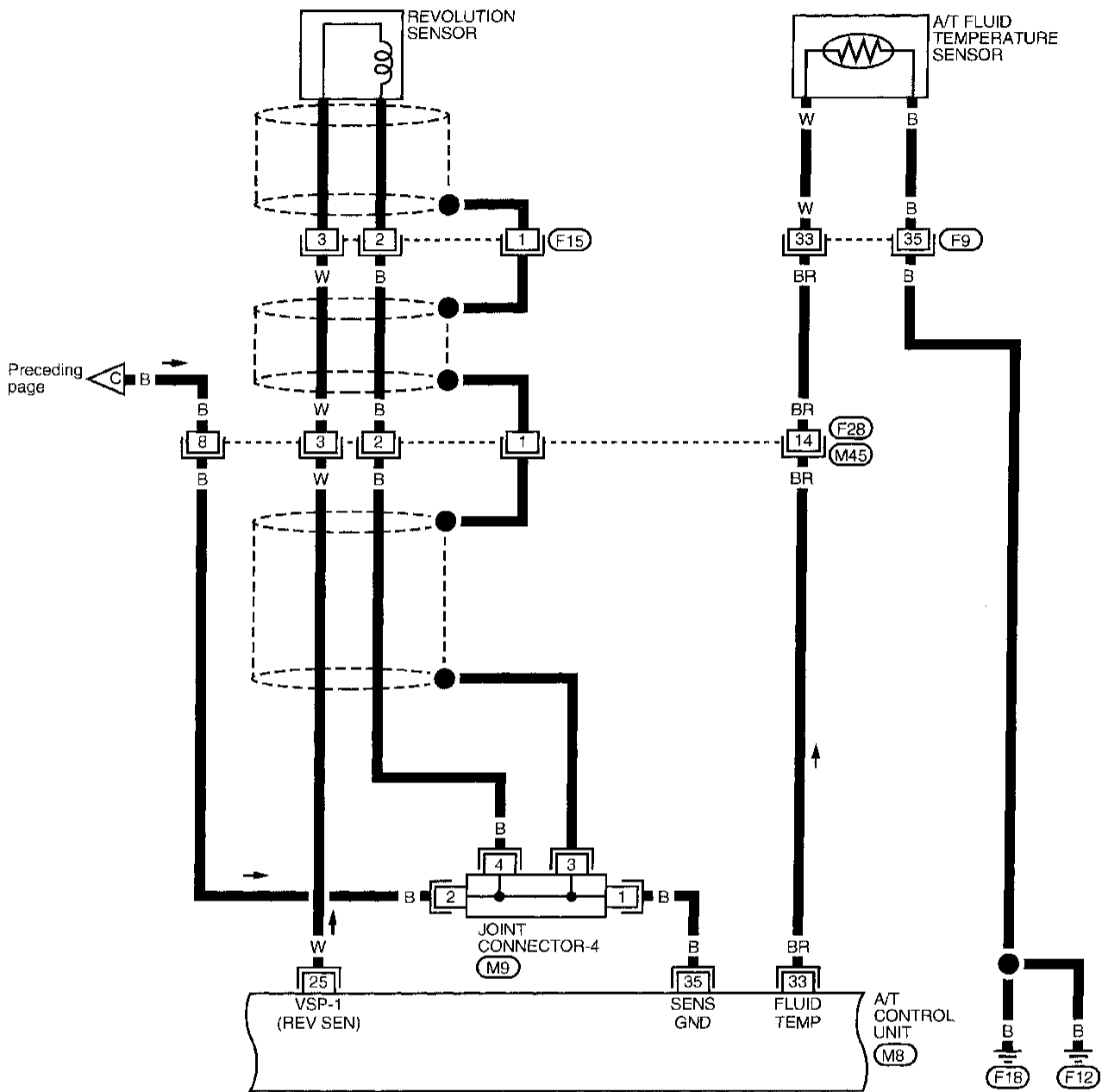
AT-A/T, RE-04



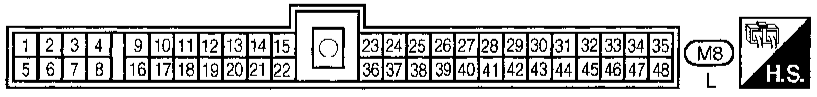
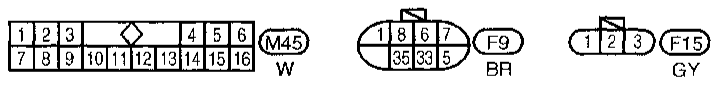
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Wiring Diagram -A/T, RE- (Cont'd)

AT-A/T, RE-05



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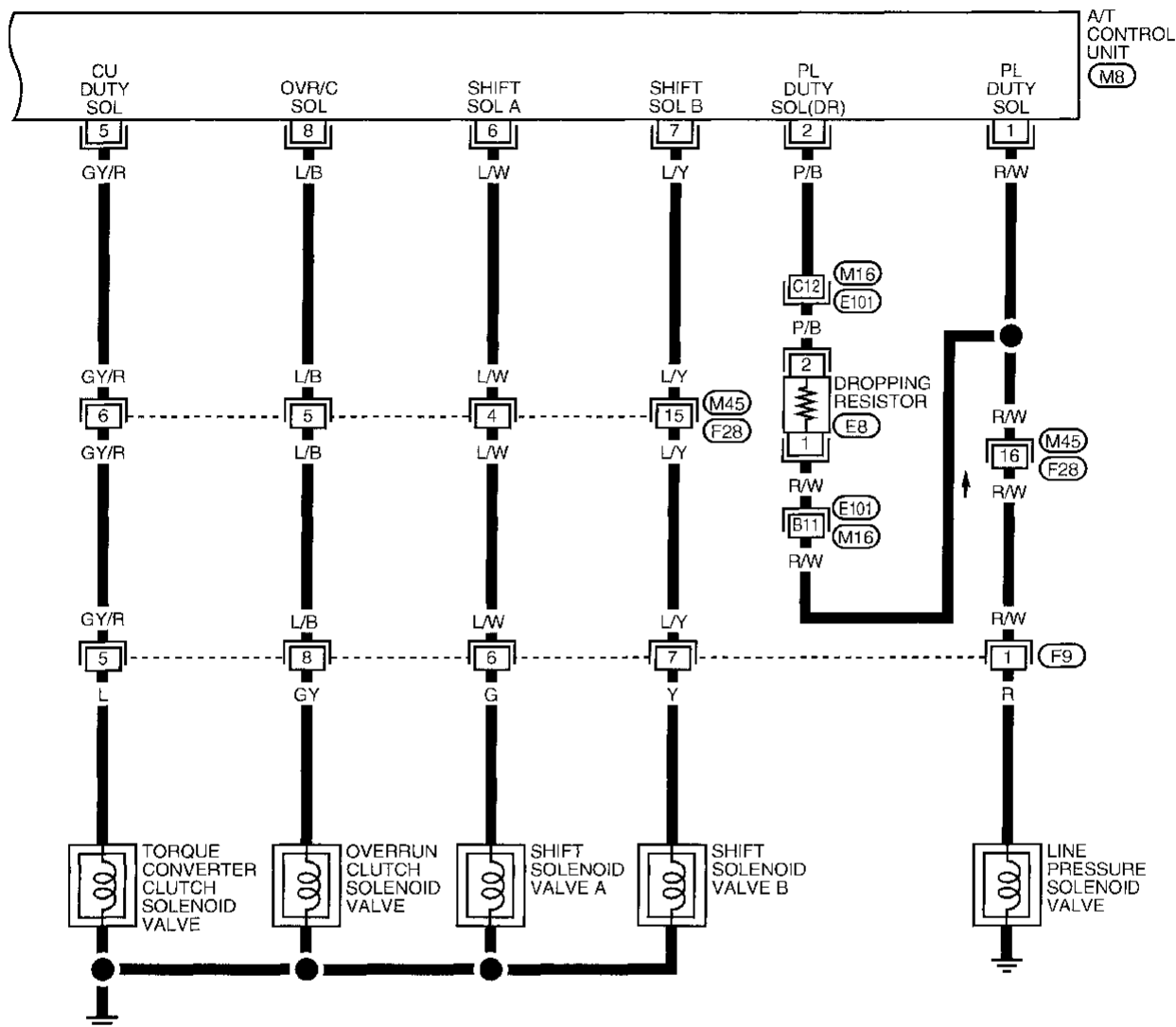


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(M9)

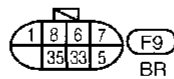
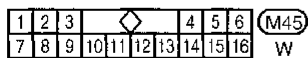
Wiring Diagram -A/T, RE- (Cont'd)

AT-A/T, RE-06

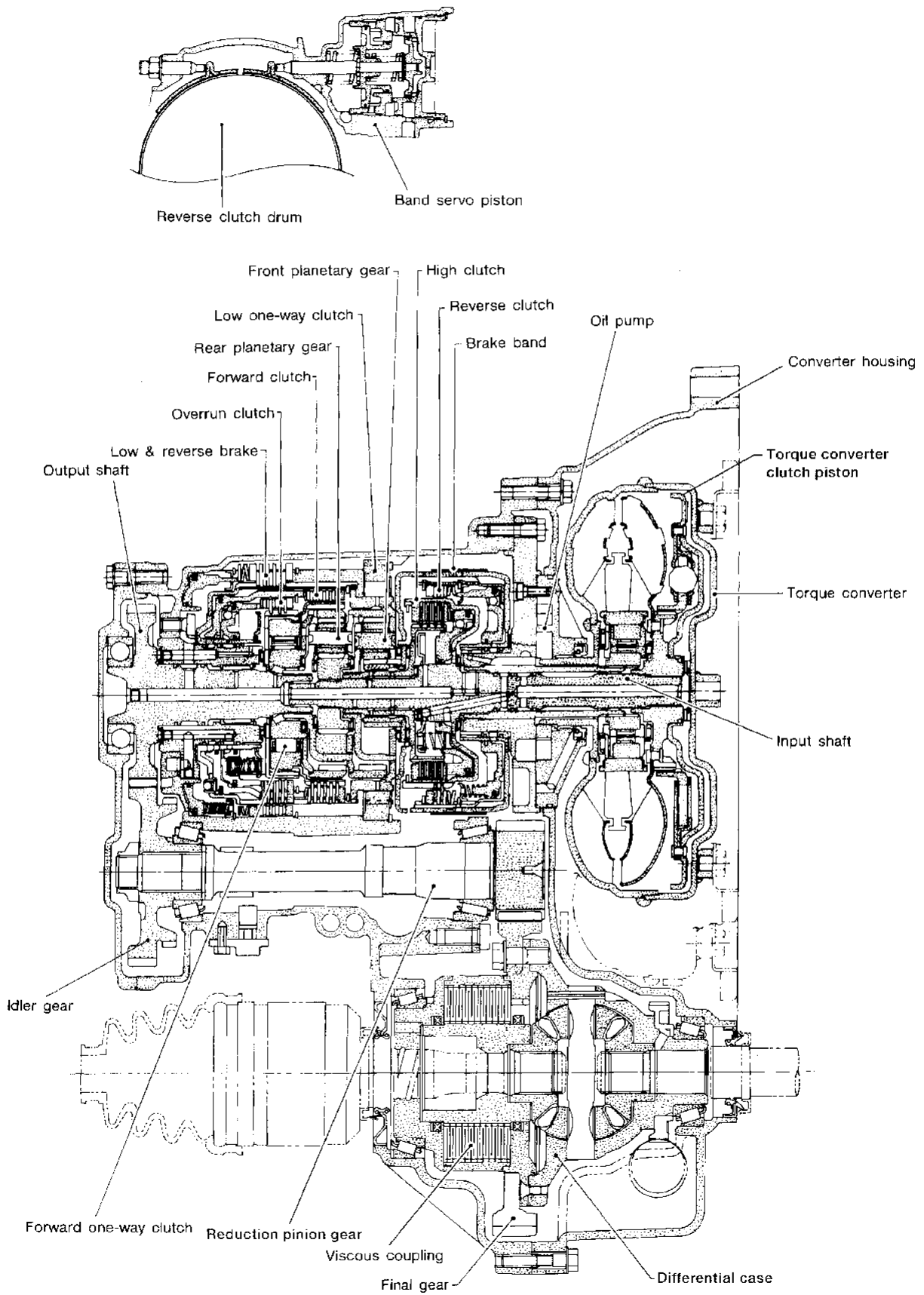


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(M16) (E101)

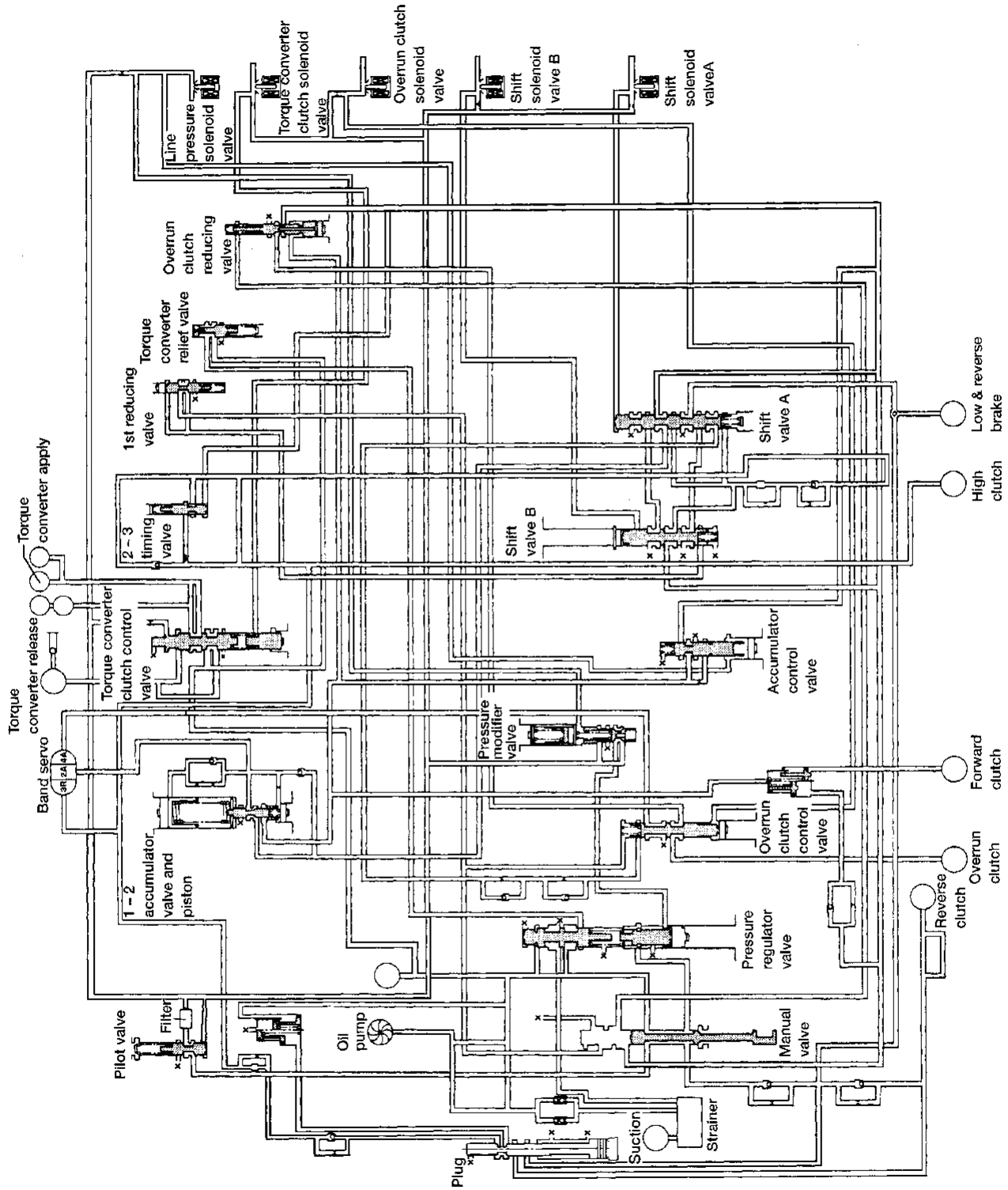


Cross-sectional View

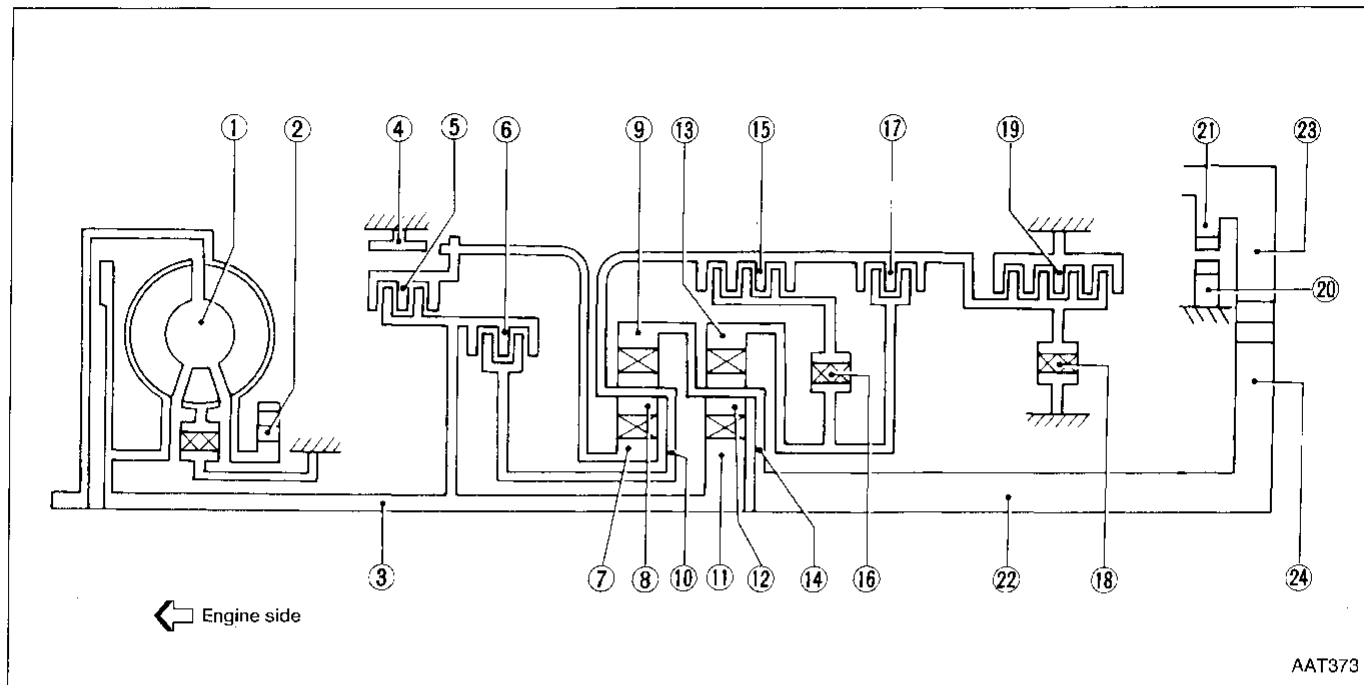


- GI
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- SI
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- EL
- IDX

Hydraulic Control Circuit



Shift Mechanism
CONSTRUCTION



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

FUNCTION OF CLUTCH AND BRAKE

Clutch and brake components	Abbr.	Function
⑤ Reverse clutch	R/C	To transmit input power to front sun gear ⑦.
⑥ High clutch	H/C	To transmit input power to front planetary carrier ⑩.
⑮ Forward clutch	F/C	To connect front planetary carrier ⑩ with forward one-way clutch ⑯.
⑰ Overrun clutch	O/C	To connect front planetary carrier ⑩ with rear internal gear ⑬.
④ Brake band	B/B	To lock front sun gear ⑦.
⑯ Forward one-way clutch	F/O.C	When forward clutch ⑮ is engaged, to stop rear internal gear ⑬ from rotating in opposite direction against engine revolution.
⑱ Low one-way clutch	L/O.C	To stop front planetary carrier ⑩ from rotating in opposite direction against engine revolution.
⑲ Low & reverse brake	L & R/B	To lock front planetary carrier ⑩.

Shift Mechanism (Cont'd)

OPERATION OF CLUTCH AND BRAKE

Shift position	Reverse clutch ⑤	High clutch ⑥	Forward clutch ⑮	Overrun clutch ⑰	Band servo			Forward one-way clutch ⑱	Low one-way clutch ⑲	Low & reverse brake ⑳	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(X)	(X)		●			*5○	
	4th		○	(X)		*3(X)	(X)	○			○	
2	1st		○	○				●	●			Automatic shift 1 ↔ 2 ↔ 3
	2nd		○	○	○			●				
1	1st		○	○				●	●	○		Locks (held stationary) in 1st speed 1 ← 2 ← 3
	2nd		○	○	○			●				

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

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

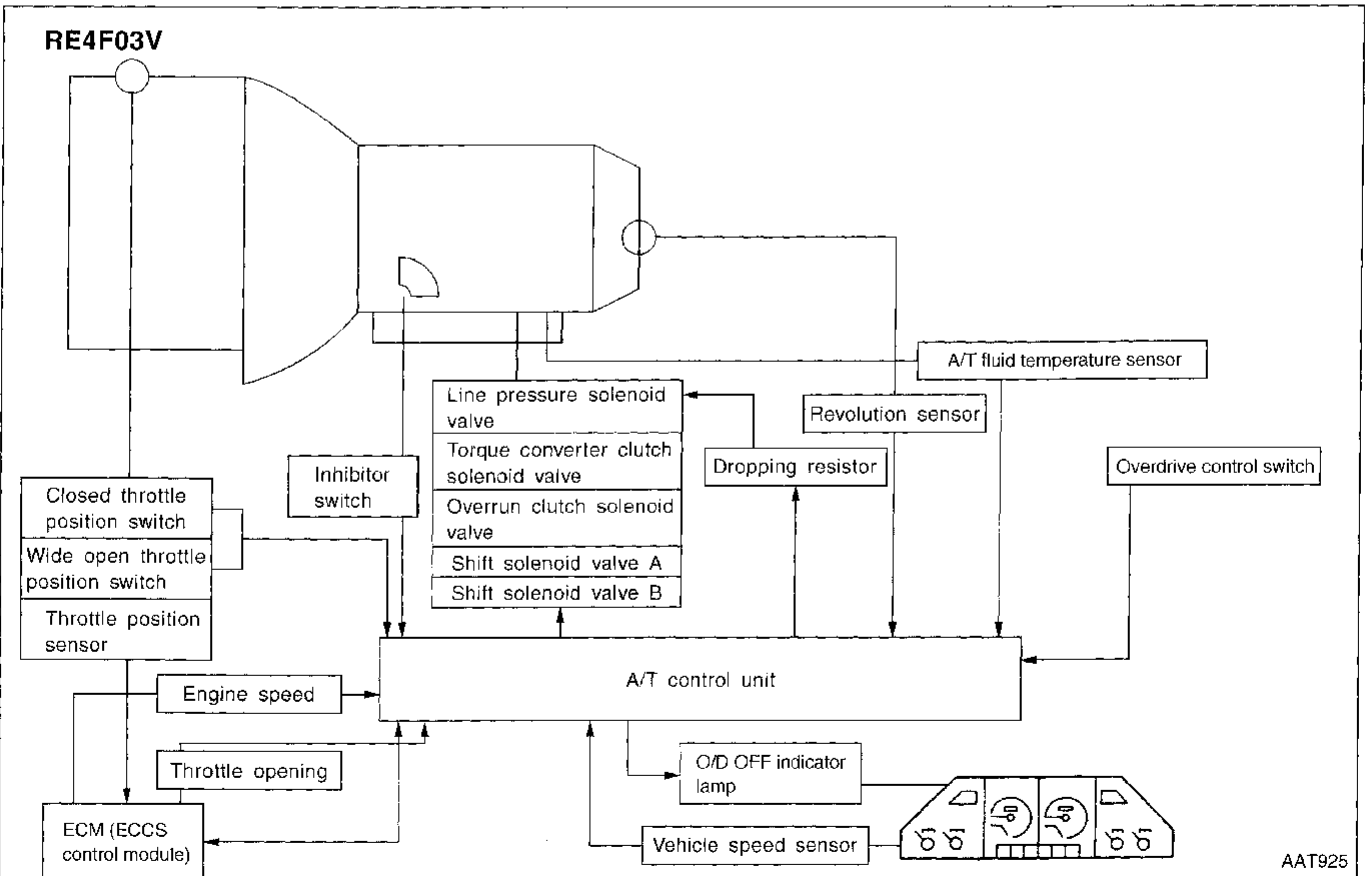
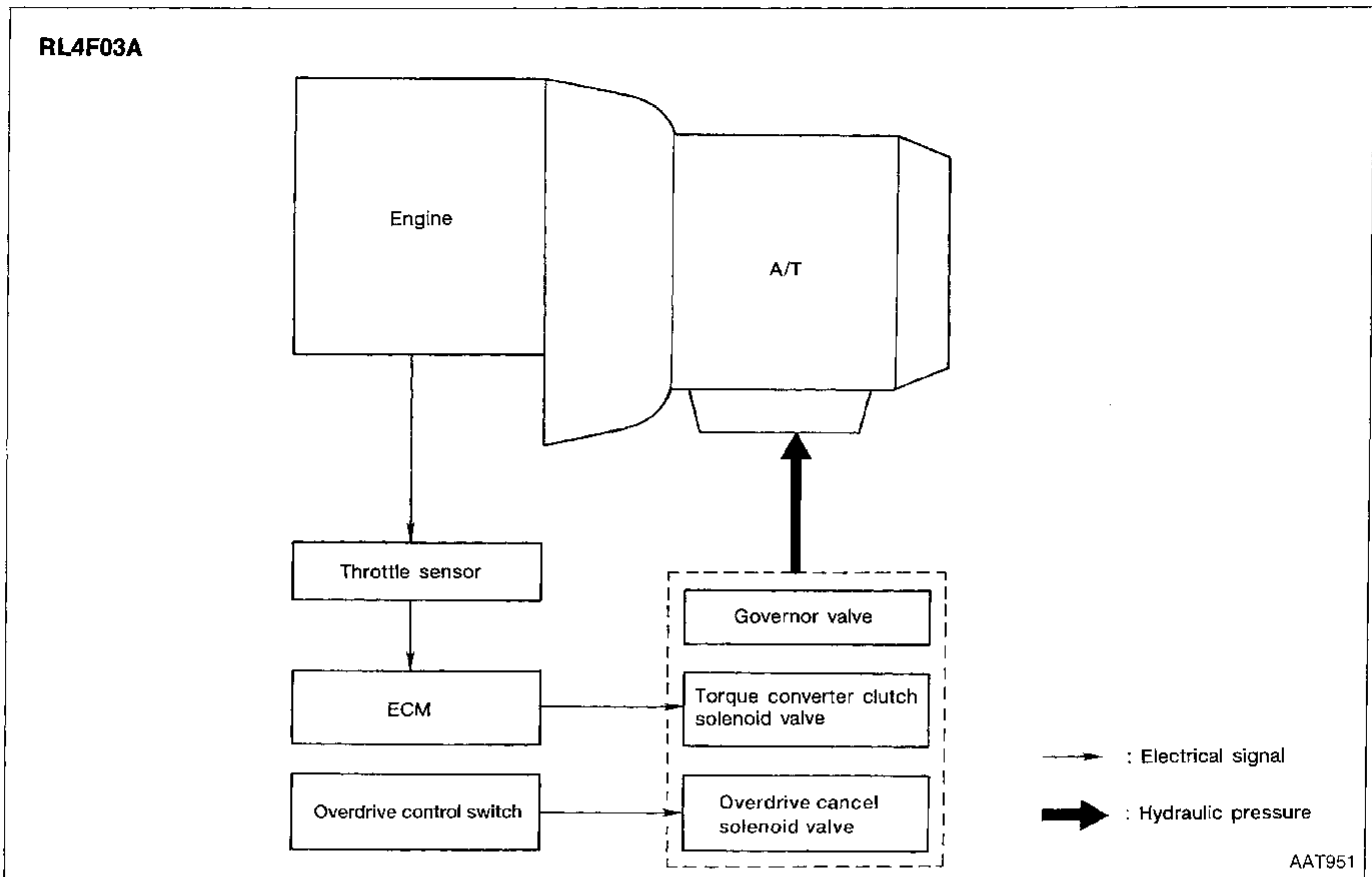
*3: Oil pressure is applied to 4th "apply" side in condition *2 above, and brake band contracts.

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

*5: Operates when overdrive control switch is OFF.

- : Operates.
- (with horizontal line) : Operates when throttle opening is less than 1/16, activating engine brake.
- : Operates during "progressive" acceleration.
- (X) : Operates but does not affect power transmission.
- (with horizontal line) : Operates when throttle opening is less than 1/16, but does not affect engine brake.

Control System



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Control System (Cont'd)

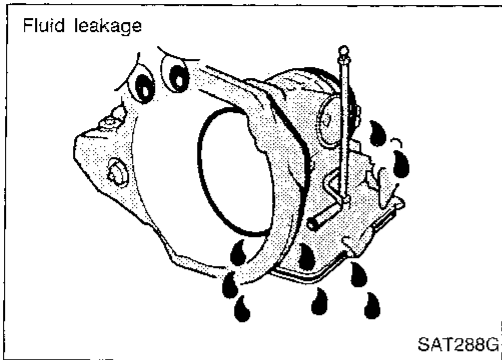
A/T CONTROL UNIT FUNCTION (RE4F03V ONLY)

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

- Receive input signals sent from various switches and sensors.
- Determine required line pressure, shifting point, lock-up operation, and engine brake operation.
- Send required output signals to the respective solenoids.

INPUT/OUTPUT SIGNAL OF A/T CONTROL UNIT

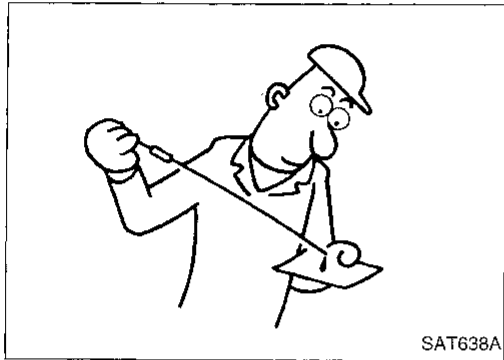
	Sensors and solenoid valves	Function
Input	Inhibitor switch	Detects select lever position and sends a signal to A/T control unit.
	Throttle position sensor	Detects throttle valve position and sends a signal to A/T control unit.
	Closed throttle position switch	Detects throttle valve's fully-closed position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



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

Road Test

Perform road tests using “Symptom” chart. Refer to AT-32.

“P” POSITION

1. Place selector lever in “P” position and start engine. Stop engine and repeat the procedure in all positions, including “N” position.
2. Stop vehicle on a slight upgrade and place selector lever in “P” position. Release parking brake to make sure vehicle remains locked.

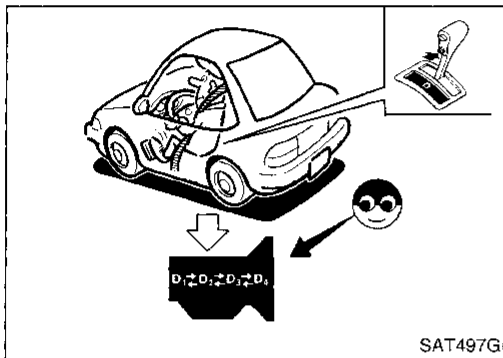
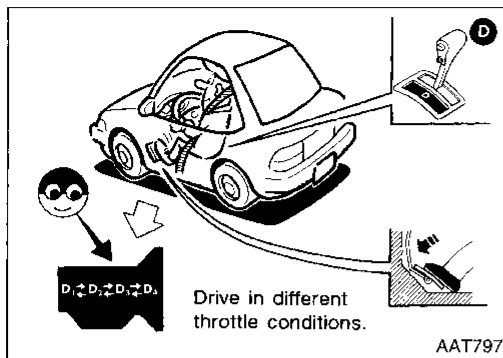
“R” POSITION

1. Manually move selector lever from “P” to “R”, and note shift quality.
2. Drive vehicle in reverse long enough to detect slippage or other abnormalities.

“N” POSITION

1. Manually move selector lever from “R” and “D” to “N” and note shift quality.
2. Release parking brake with selector lever in “N” position. Lightly depress accelerator pedal to make sure vehicle does not move. (When vehicle is new or soon after clutches have been replaced, vehicle may move slightly. This is not a problem.)

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Road Test (Cont'd)**“D” POSITION**

1. Manually shift selector lever from “N” to “D” position, and note shift quality.
2. Using the shift schedule as a reference, drive vehicle in “D” position. Record, on symptom chart, respective vehicle speeds at which up-shifting and down-shifting occur. These speeds are to be read at three different throttle positions (light, half and full), respectively. Also determine the timing at which shocks are encountered during shifting and which clutches are engaged.
3. Determine whether lock-up properly occurs while driving vehicle in proper gear position and at proper vehicle speed.
4. Check to determine if shifting to overdrive gear cannot be made while overdrive control switch is OFF.
5. Drive vehicle at 60 to 70 km/h (37 to 43 MPH) with half to light throttle position (D₃ position). Fully depress accelerator pedal to make sure transaxle downshifts from 3rd to 2nd gear.
6. Drive vehicle at 25 to 35 km/h (16 to 22 MPH) with half to light throttle position (D₂ position). Fully depress accelerator pedal to make sure transaxle downshifts from 2nd to 1st gear.

“2” POSITION

1. Shift to “2” position and make sure vehicle starts in 1st gear.
2. Increase vehicle speed to make sure transaxle upshifts from 1st to 2nd gear.
3. Further increase vehicle speed. Make sure transaxle does not upshift to 3rd gear.
4. Drive vehicle at 25 to 35 km/h (16 to 22 MPH) with half to light throttle position (2₂ position). Fully depress accelerator pedal to make sure transaxle downshifts from 2nd to 1st gear.
5. Allow vehicle to run idle while in “2” position to make sure that transaxle downshifts to 1st gear.
6. Move selector lever to “D” position and drive vehicle at 30 to 40 km/h (19 to 25 MPH). Then, move selector lever to “2” position to make sure transaxle downshifts to 2nd gear.

“1” POSITION

1. Place selector lever in “1” position and accelerate. Make sure transaxle does not shift from 1st to 2nd gear although vehicle speed increases.
2. While driving vehicle in “1” position, release accelerator pedal to make sure that engine compression acts as a brake.
3. Move selector lever to “D” or “2” position and drive vehicle at 15 to 25 km/h (9 to 16 MPH). Then, move selector lever to “1” position to make sure transaxle downshifts to 1st gear.

Shift Schedule

VEHICLE SPEED WITH SHIFTING GEARS

This check should be carried out when ATF temperature is between 50 and 80°C (122 and 176°F) after the vehicle has been driven approx. 10 minutes.

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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	51 - 59 (32 - 37)	97 - 105 (60 - 65)	—	142 - 150 (88 - 93)	88 - 96 (50 - 60)	39 - 47 (24 - 29)	48 - 56 (30 - 35)
Half throttle	29 - 37 (18 - 23)	52 - 60 (32 - 37)	101 - 109 (63 - 68)	67 - 75 (42 - 47)	41 - 49 (25 - 30)	8 - 16 (5 - 10)	48 - 56 (30 - 35)

Vehicle speed when performing lock-up


Throttle opening	Gear position	Vehicle speed km/h (MPH)	
		Lock-up ON	Lock-up OFF
2/8	D ₄	106 - 114 (66 - 71)	68 - 76 (42 - 47)













































Symptom Chart

DESCRIPTION

Numbers are arranged in order of probability. Perform inspections starting with number one and work up.

Numbers in OFF VEHICLE columns indicate that the transaxle must be removed from the vehicle to perform the inspection.

 : Valve expected to be malfunctioning

		ON VEHICLE														
		Oil level and oil quality	Control cable	Inhibitor switch and wiring	Throttle wire	Engine idling speed	Line pressure	Control valve	Throttle valve & detent valve	Manual valve	Pressure regulator valve	3-4 shift valve	2-3 shift valve	1-2 shift valve	Overrun clutch control valve	Pressure modifier valve
Sharp shocks in shifting from "N" to "D" position		1	2	.	5	3	4	7								
Shift shocks	When shifting from 1st to 2nd or 2nd to 3rd	1	2	.	4	.	3	6								
	When shifting from 3rd to 4th	1	2	.	4	.	3	5								
	When shifting from "D" to "2" and "1" position. When overdrive control switch is set from ON to OFF	1	2	.	4	.	3	5								
	When shifting from 2nd to 1st in "1" position	1	2	.	4	.	3	5								
Shift slippage when upshifting	When shifting from 1st to 2nd	1	2	.	4	.	3	5								
	When shifting from 2nd to 3rd	1	2	.	4	.	3	6								
	When shifting from 3rd to 4th	1	2	.	4	.	3	5								
Shift slippage with accelerator pedal depressed	When shifting from 4th to 2nd	1	2	.	5	.	3	6								
	When shifting from 4th to 3rd	1	2	.	4	.	3	6								
	When shifting from 4th to 1st and shifting from 3rd to 1st	1	2	.	5	.	3	6								
Poor power/acceleration	When vehicle starts	1	2	.	4	.	3	6								
	When upshifting	1	2	.	4	.	3	7								
No engine braking	When shifting from "D" to "2" and "1" position	1	2	.	4	.	3	5								
	When overdrive control switch is set from ON to OFF	1	2	.	4	.	3	7								
	When shifting from 2nd to 1st in "1" position	1	2	.	4	.	3	5								
Shift quality	Too low a gear change point from 2nd to 3rd and from 3rd to 2nd	1	.	.	3	.	2	6								
	Too high a gear change point from 2nd to 3rd and from 3rd to 2nd	1	.	.	3	.	2	6								
	Too low a gear change point from 2nd to 1st in "1" position	1	.	.	3	.	2	6								
	Too high a gear change point from 2nd to 1st in "1" position	1	.	.	3	.	2	6								


Symptom Chart (Cont'd)










ON VEHICLE														OFF VEHICLE														
Kickdown modifier valve	1-2 accumulator valve	3-2 timing valve	1st reducing valve	Torque converter relief valve	Throttle modifier valve	4th speed cut valve	Torque converter clutch control valve	4-2 sequence valve	Governor pressure	Governor valve	Overdrive cancel solenoid valve	Torque converter clutch solenoid valve	Accumulator servo release	Accumulator N-D	Ignition switch and starter motor	Overdrive control switch and wiring	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse clutch	Brake band	Parking components	
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Symptom Chart (Cont'd)

Numbers are arranged in order of probability. Perform inspections starting with number one and work up. Numbers in OFF VEHICLE columns indicate that the transaxle must be removed from the vehicle to perform the inspection.

 : Valve expected to be malfunctioning

		ON VEHICLE														
		Oil level and oil quality	Control cable	Inhibitor switch and wiring	Throttle wire	Engine idling speed	Line pressure	Control valve	Throttle valve & detent valve	Manual valve	Pressure regulator valve	3-4 shift valve	2-3 shift valve	1-2 shift valve	Overrun clutch control valve	Pressure modifier valve
Shift quality	Failure to change gear from 4th to 2nd with accelerator pedal depressed	1	.	.	3	.	2	6								
	Failure to change gear from 3rd to 2nd with accelerator pedal depressed	1	.	.	3	.	2	6								
	Failure to change gear from 1st to 2nd in "D" and "2" position	1	.	.	3	.	2	6								
	Vehicle does not start from 1st in "D" and "2" position	1	.	.	3	.	2	6								
	Failure to change gear to 3rd and 4th in "D" position	1	.	.	3	.	2	6								
	Changes gear to 1st directly when selector lever is set from "D" to "1" position	1	.	.	3	.	2	6								
	Changes gear to 2nd in "1" position	1	.	.	3	.	2	6								
Lock-up quality	Lock-up point is extremely high or low	1	.	.	3	.	2	6								
	Torque converter does not lock-up	1	.	.	3	.	2	7								
	Lock-up is not released when accelerator pedal is released	1	.	.	.	.	.	2								
Engine does not start in "P" and "N" positions or engine starts in positions other than "P" and "N" positions		.	2	3	.	.	.	.				
Vehicle moves with selector lever in "P" position		.	1	.	.	.	.	.			

Symptom Chart (Cont'd)

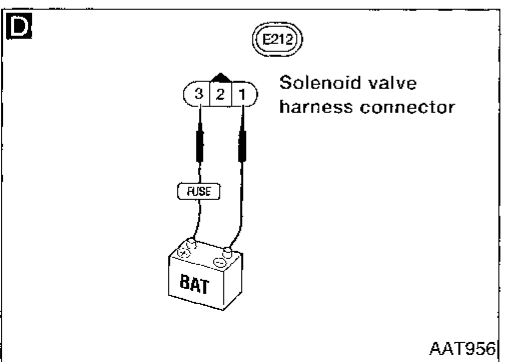
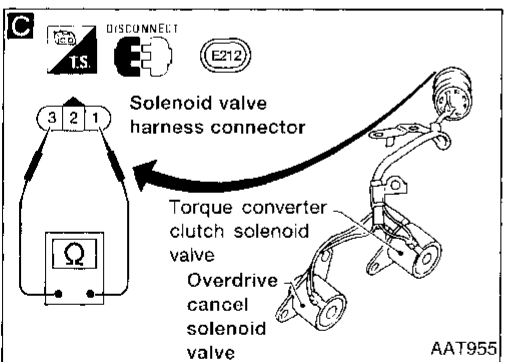
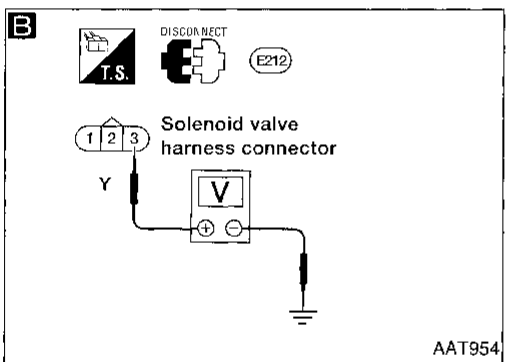
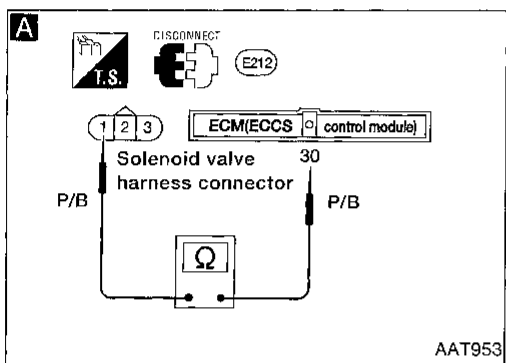
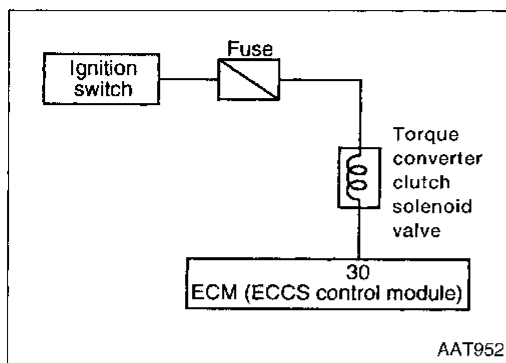
ON VEHICLE												OFF VEHICLE																
Kickdown modifier valve	1-2 accumulator valve	3-2 timing valve	1st reducing valve	Torque converter relief valve	Throttle modifier valve	4th speed cut valve	Torque converter clutch control valve	4-2 sequence valve	Governor pressure	Governor valve	Overdrive cancel solenoid valve	Torque converter clutch solenoid valve	Accumulator servo release	Accumulator N-D	Ignition switch and starter motor	Overdrive control switch and wiring	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse clutch	Brake band	Parking components	
									4	5
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Component Inspection

TORQUE CONVERTER CLUTCH SOLENOID VALVE

When the malfunction indicator lamp indicates DTC (0904) P1550, perform "TROUBLE DIAGNOSIS FOR DTC P1550" in EC section.



A
CHECK GROUND CIRCUIT.
 1. Turn ignition switch to OFF position.
 2. Disconnect ECM harness connector and torque converter clutch solenoid valve harness connector.
 3. Check resistance between terminals ① and ③.
Resistance:
 Approximately 0Ω

No → Repair or replace harness between ECM and torque converter clutch solenoid valve.

B
CHECK POWER SOURCE CIRCUIT.
 1. Turn ignition switch to ON position.
 2. Check voltage between terminal ③ and ground.
Voltage:
 Battery voltage

No → Check the following items:
 • Ignition switch and fuse Refer to EL section ("POWER SUPPLY ROUTING").
 • Harness continuity between fuse and torque converter clutch solenoid valve

C
CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE (RESISTANCE).
 Check resistance between torque converter clutch solenoid valve terminals ① and ③.
Resistance:
 Approximately 25Ω

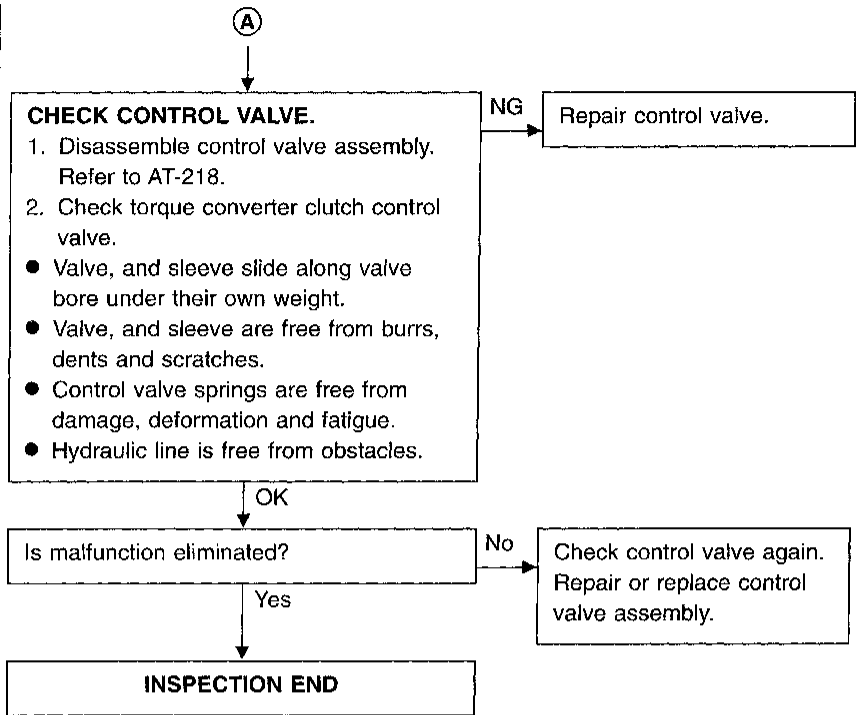
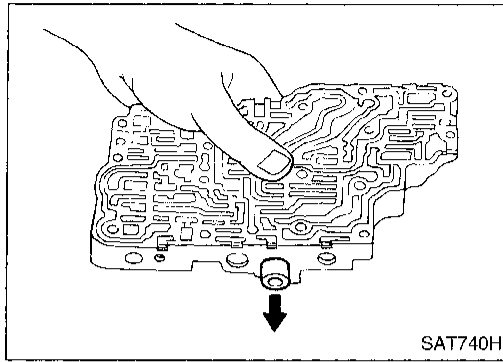
NG → Replace torque converter clutch solenoid valve.

D
CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE (OPERATION).
 1. Remove torque converter clutch solenoid valve. Refer to AT-172.
 2. Check torque converter clutch solenoid valve operation.

NG → Replace torque converter clutch solenoid valve.

OK
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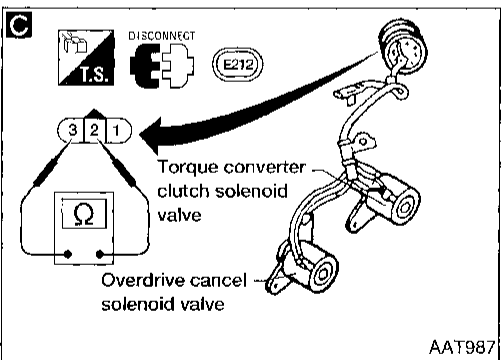
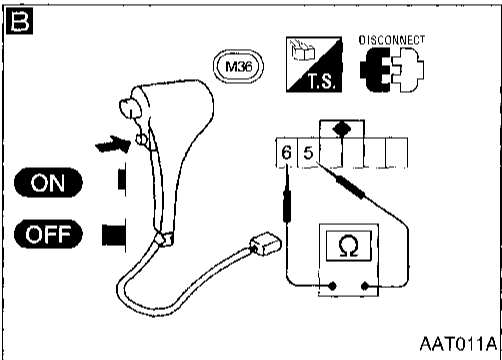
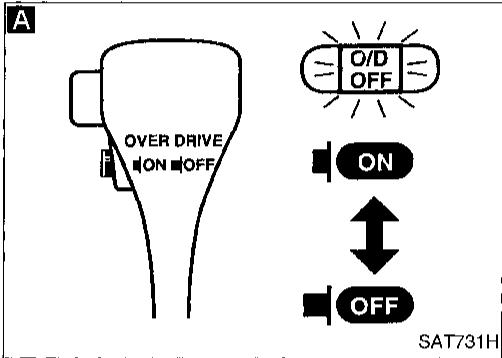
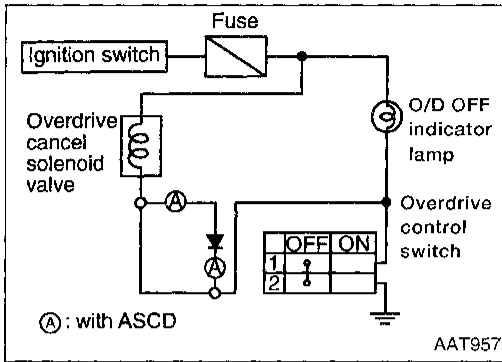
Component Inspection (Cont'd)



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Component Inspection (Cont'd)

OVERDRIVE CONTROL SWITCH AND OVERDRIVE CANCEL SOLENOID VALVE



A
CHECK OD OFF INDICATOR LAMP CIRCUIT.
 1. Turn ignition switch to ON.
 (Do not start engine.)
 2. Set overdrive control switch to OFF position.
O/D OFF indicator lamp should come on.

Check the following items:
 ● O/D OFF indicator lamp
 Refer to EL section ("METER AND GAUGES").
 ● Ignition switch and fuse
 Refer to EL section ("POWER SUPPLY ROUTING").

B
CHECK OVERDRIVE CONTROL SWITCH.
 Check continuity between overdrive control switch terminals (5) and (6).

Overdrive control switch position	Continuity
ON	No
OFF	Yes

C
CHECK OVERDRIVE CANCEL SOLENOID VALVE.
 Check resistance between overdrive cancel solenoid valve terminals (2) and (3).
Resistance:
Approximately 25Ω

Check the following items:
 ● Harness continuity between fuse and overdrive cancel solenoid valve.
 ● Harness continuity between overdrive cancel solenoid valve and overdrive control switch.
 ● Condition of diode (Only models with ASCD).

INSPECTION END

OK

Go to C

NG

OK

NG

Replace overdrive control switch.

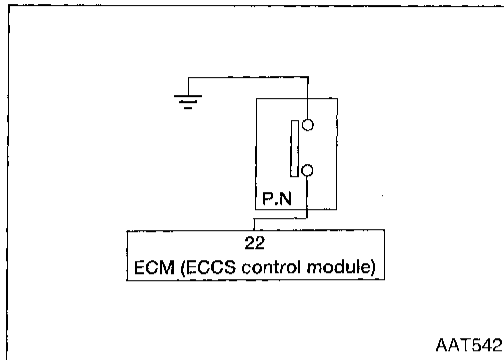
OK

NG

Replace overdrive cancel solenoid valve.

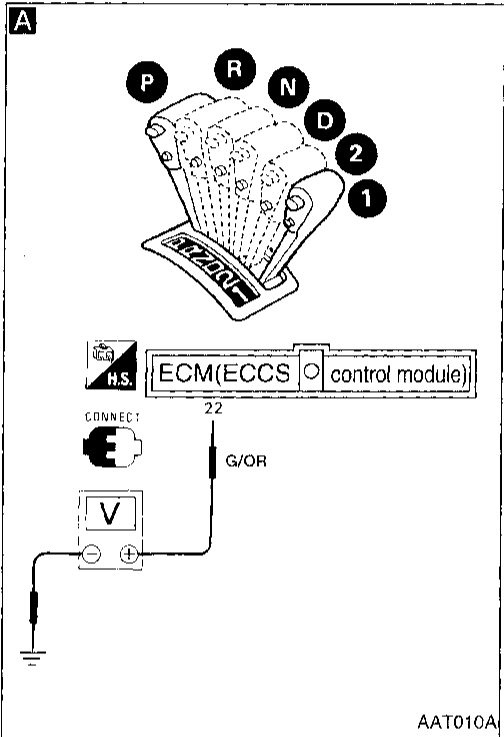
Component Inspection (Cont'd)

INHIBITOR SWITCH



A
CHECK INHIBITOR SWITCH CIRCUIT.
 1. Turn ignition switch to ON position. (Do not start engine.)
 2. Check voltage between ECM terminal ② and ground while moving selector lever through each position.
 "P", "N" position: 0V
 "R", "D", "2", "1" position: Battery voltage

OK → INSPECTION END

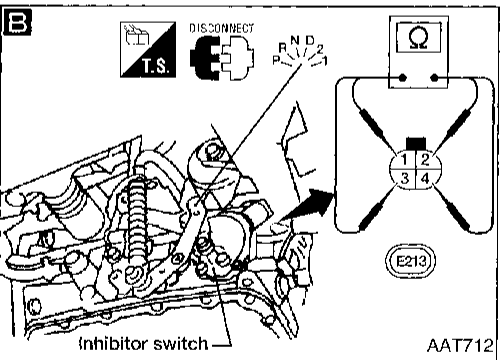


B
CHECK INHIBITOR SWITCH.
 ● Check continuity in "N", "P" and "R" positions.
 ● With manual lever held in each position, turn manual shaft 1.5° in both directions. (When manual lever is in each position, continuity normally exists within 1.5° range.) If continuity does not exist equally in either direction, properly adjust inhibitor switch. Refer to AT-174.

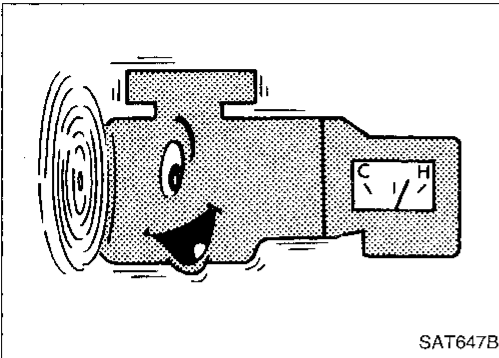
NG → Check the following items:
 ● Harness continuity between ground and inhibitor switch.
 ● Harness continuity between inhibitor switch and ECM.
 ● Harness continuity between inhibitor switch and back-up lamp.

Position	Terminal No.			
	①	②	③	④
Park/neutral position	○—○			
R			○—○	

OK → INSPECTION END



GI
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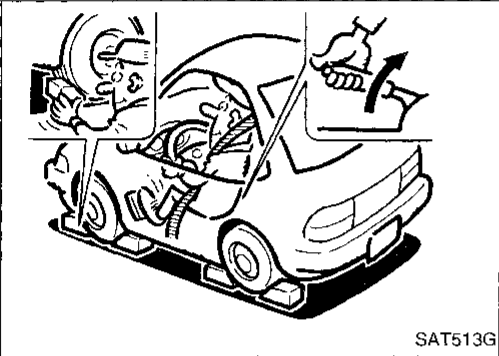
Final Check

STALL TESTING

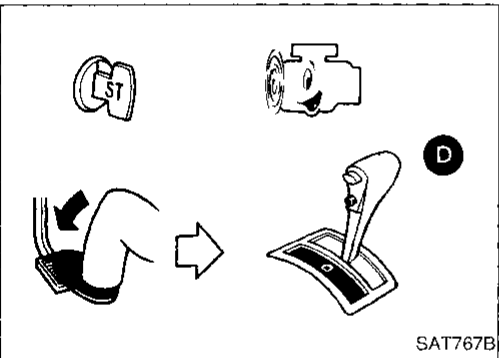
Stall test procedure

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

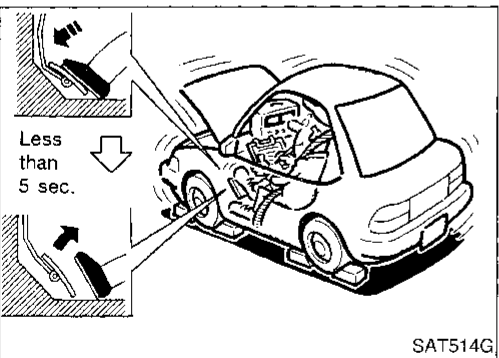
ATF operating temperature:
50 - 80°C (122 - 176°F)



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



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

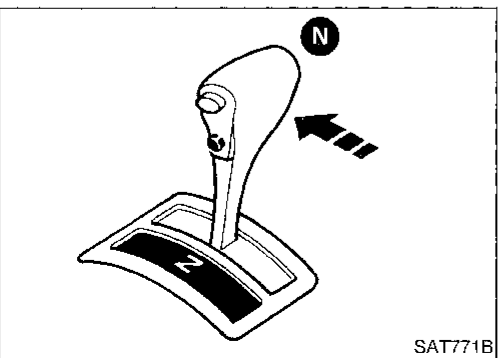


6. Accelerate to wide open throttle gradually while applying foot brake.

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

7. Quickly note the engine stall revolution and immediately release throttle.

Stall revolution standard:
2,450 - 2,750 rpm



8. Shift selector lever to "N" position.

9. Cool off ATF.

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

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

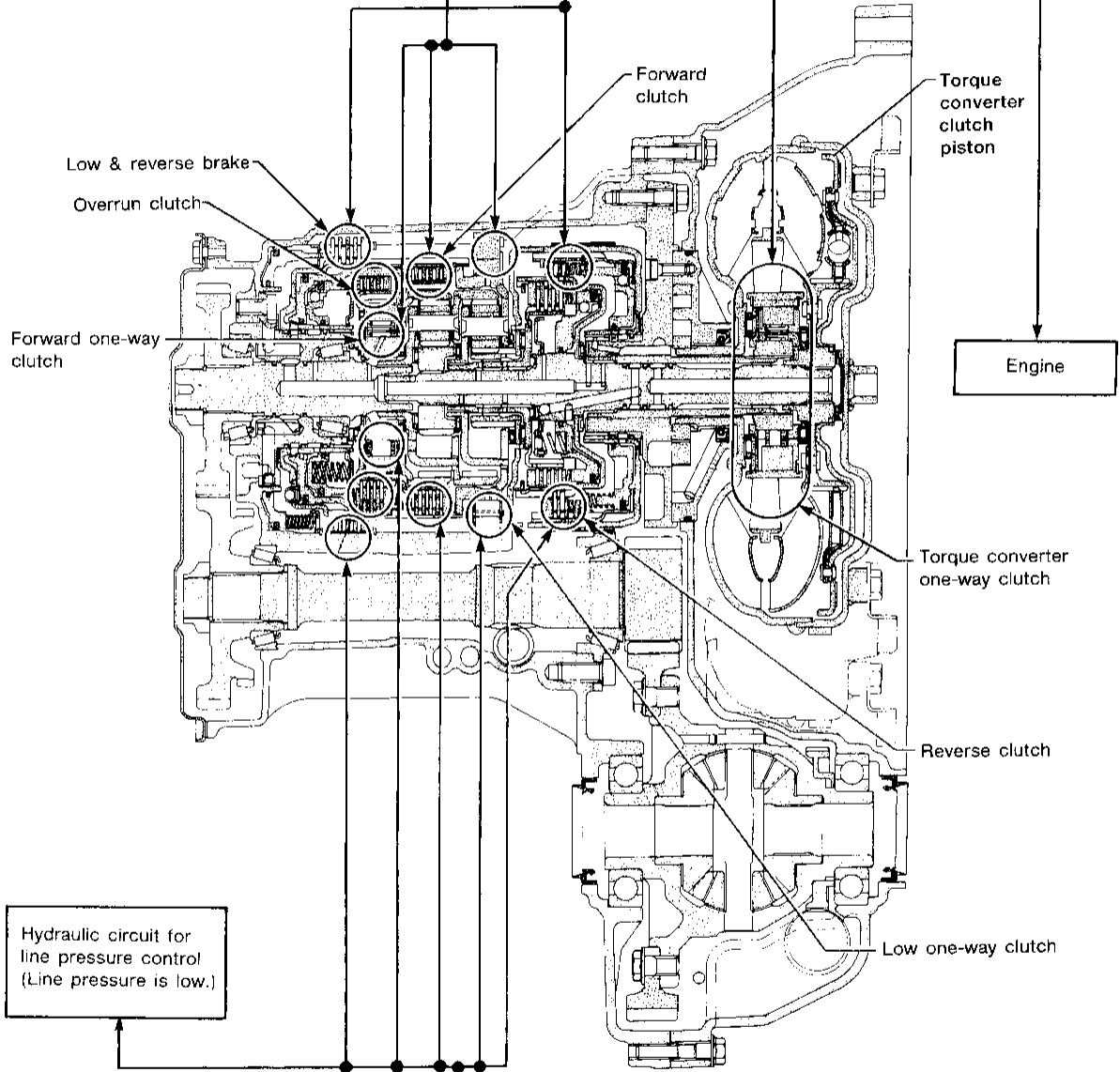
Final Check (Cont'd)

JUDGEMENT OF STALL TEST

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

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

Damaged components



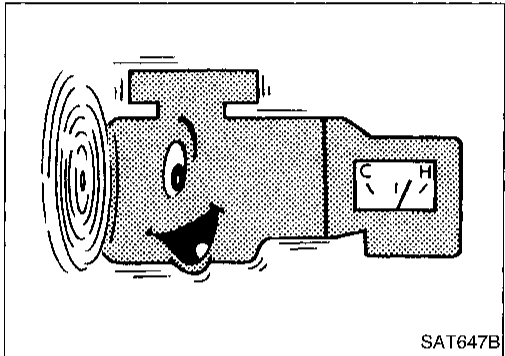
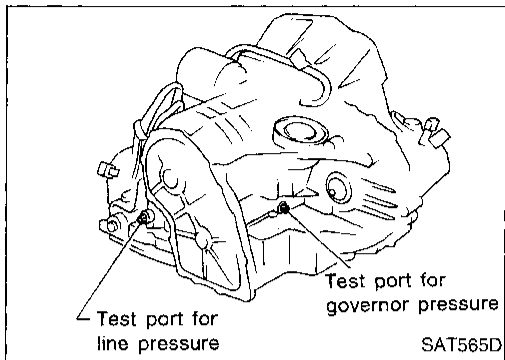
D	H	O
2	H	O
1	H	O
R	H	O
Selector lever position	Judgement	

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

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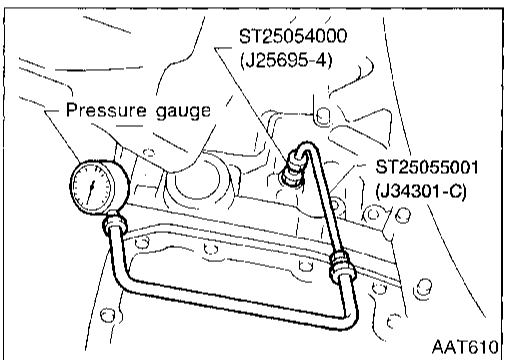
Final Check (Cont'd)**PRESSURE TESTING**

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

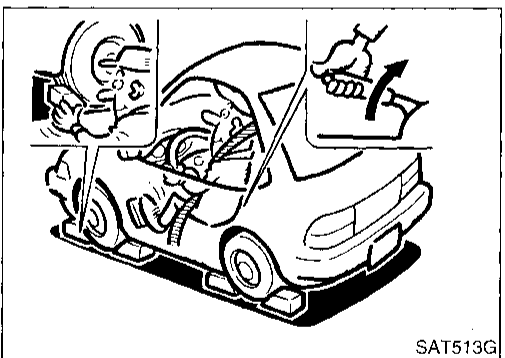
**Line pressure test procedure**

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

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

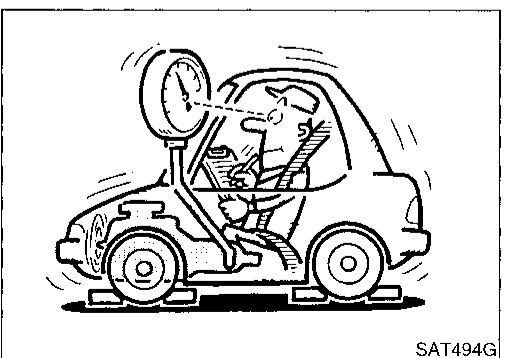


3. Install pressure gauge and Tool to line pressure port.



4. Set parking brake and block wheels.

Continue to depress brake pedal fully while performing line pressure test at stall speed.



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

Line pressure:
Refer to SDS, AT-323.

Judgement of line pressure test

- **If line pressure does not rise, first check to make sure that throttle wire is connected properly.**

When line pressure while idling is low at all positions ("D", "2", "1", "R" and "P"), the problem may be due to:

- Wear on interior of oil pump

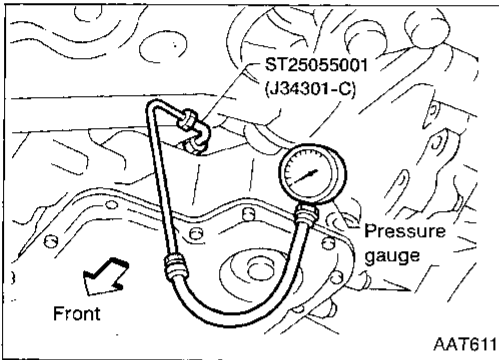
Final Check (Cont'd)

- Oil leakage at or around oil pump, control valve body, transmission case or governor
- Sticking pressure regulator valve
- Sticking pressure modifier valve

When line pressure while idling is low at a particular position, the problem may be due to the following:

- If oil leaks at or around low & reverse brake circuit, line pressure becomes low in "R" position but is normal in "P", "D", "2" or "1" position.

When line pressure is high while idling, pressure regulator valve may have stuck.

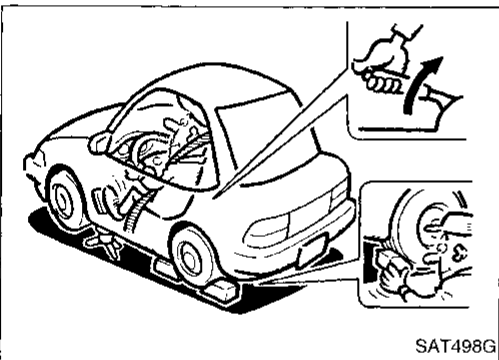


Governor pressure testing

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

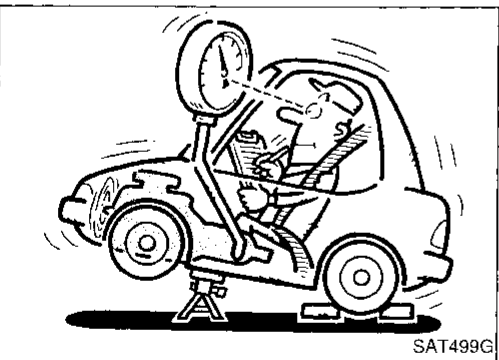
**ATF operating temperature:
50 - 80°C (122 - 176°F)**

3. Install pressure gauge to governor pressure port.



4. Set parking brake and block rear wheels.
5. Jack up front wheels.
6. Set selector lever in "D" position and gradually depress accelerator pedal.

Be careful of rotating wheels.



Governor pressure:

- Governor pressure is not generated when vehicle is stopped. (Front wheels are not rotating.)
- Governor pressure rises gradually in response to vehicle speed. (Front wheel rotating speed.)

Vehicle speed	Governor pressure kPa (kg/cm ² psi)
0 km/h (0 MPH)	0 (0, 0)
16 km/h (10 MPH)	59 - 69 (0.6 - 0.7, 9 - 10)
32 km/h (20 MPH)	108 - 127 (1.1 - 1.3, 16 - 18)
80 km/h (50 MPH)	284 - 343 (2.9 - 3.5, 41 - 50)

If not, check governor valve assembly.
Refer to AT-206.

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Introduction

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

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

One or Two Trip Detection Logic

ONE TRIP DETECTION LOGIC

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

TWO TRIP DETECTION LOGIC

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

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



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

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

Diagnostic Trouble Code (DTC)

HOW TO READ DTC

The diagnostic trouble code can be read by the following methods.
 (Either code for the 1st trip or the 2nd trip can be read.)

-  1. The number of blinks of the malfunction indicator lamp in the Diagnostic Test Mode II (Self-Diagnostic Results) Examples: 1101, 1102, 1103, 1104, etc.
 These DTCs are controlled by NISSAN.
-  2. CONSULT or GST (Generic Scan Tool) Examples: P0705, P0710, P0720, P0725, etc.
 These DTCs are prescribed by SAE J2012. (CONSULT also displays the malfunctioning component or system.)
- **Output of a DTC indicates a malfunction. However, Mode II and GST do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT can identify them. Therefore, using CONSULT (if available) is recommended.**

HOW TO ERASE DTC

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

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

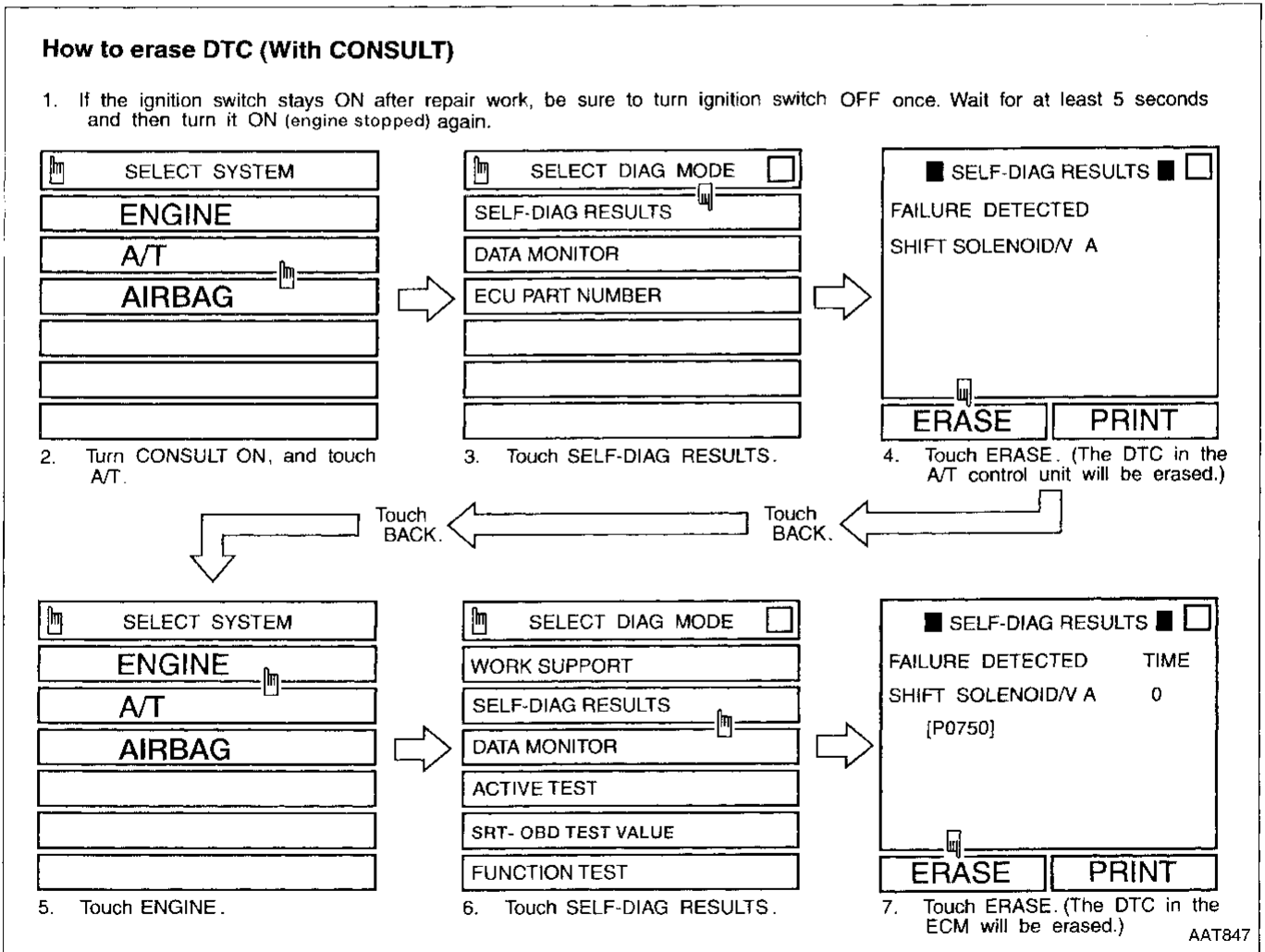
The following emission-related diagnostic information is cleared from the ECM memory when erasing DTC related to OBD-II. For details, refer to EC section "Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION".

Diagnostic Trouble Code (DTC) (Cont'd)

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

 HOW TO ERASE DTC (With CONSULT)

- If a DTC is displayed for both ECM and A/T control unit, it needs to be erased for both ECM and A/T control unit.
 - If diagnostic trouble code is not for A/T related items (Refer to AT-74), skip steps 2 through 4.
1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait for at least 5 seconds and then turn it ON (engine stopped) again.
 2. Turn CONSULT ON, and touch "A/T".
 3. Touch "SELF-DIAG RESULTS".
 4. Touch "ERASE". (The DTC in the A/T control unit will be erased.) Then touch "BACK" twice.
 5. Touch "ENGINE".
 6. Touch "SELF-DIAG RESULTS".
 7. Touch "ERASE". (The DTC in the ECM will be erased.)



Diagnostic Trouble Code (DTC) (Cont'd)**HOW TO ERASE DTC (With GST)**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait for at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (No Tools)". Refer to AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Select Mode 4 Generic Scan Tool (GST). For details, refer to EC section ("Generic Scan Tool (GST)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION").

**HOW TO ERASE DTC (No Tools)**

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait for at least 5 seconds and then turn it ON (engine stopped) again.
2. Perform "SELF-DIAGNOSTIC PROCEDURE (No Tools)" on AT-48. (The engine warm-up step can be skipped when performing the diagnosis only to erase the DTC.)
3. Change the diagnostic test mode from Mode II to Mode I by turning the mode selector on the ECM. Refer to EC section ["HOW TO SWITCH DIAGNOSTIC TEST MODES", "Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Diagnostic Trouble Code (DTC) Cont'd

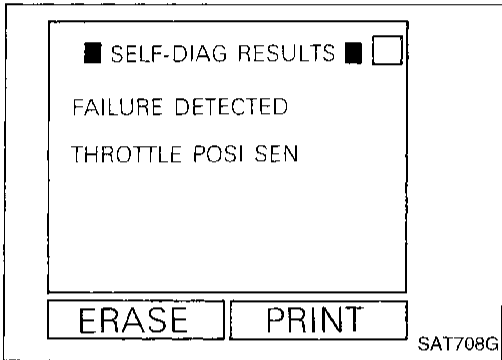
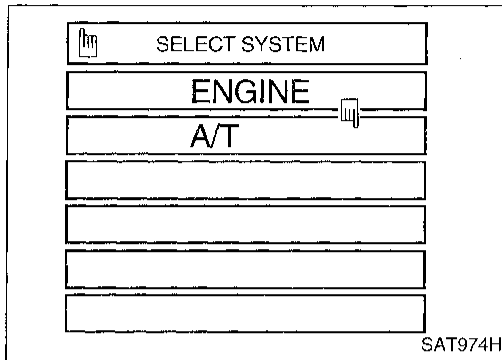
Self-diagnosis



After performing this procedure, place check marks for results on the "DIAGNOSTIC WORKSHEET", AT-59. Reference pages are provided following the items.

SELF-DIAGNOSTIC PROCEDURE (With CONSULT)



1. Turn on CONSULT and touch "A/T".
If A/T is not displayed, check A/T control unit power supply and ground circuit. Refer to AT-79. If result is NG, refer to EL section ("POWER SUPPLY ROUTING").
2. Touch "SELF-DIAG RESULTS".
Display shows malfunction experienced since the last erasing operation.
CONSULT performs REAL-TIME SELF-DIAGNOSIS.
Also, any malfunction detected while in this mode will be displayed at real time.

GI
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LC
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Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)	Diagnostic trouble code No. for CONSULT or GST	Malfunction is detected when ...	Indicator for Diagnostic Results	
			 O/D OFF indicator lamp (Available when "A/T" on CONSULT is touched.)	 Malfunction indicator lamp*2 (Available when "ENGINE" on CONSULT is touched.)
Inhibitor switch circuit (INHIBITOR SWITCH)	P0705	● 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)	P0720	● 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)	P0731	● A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	—	X*1
Improper shifting to 2nd gear position (A/T 2ND SIGNAL)	P0732	● A/T cannot be shifted to the 2nd gear position even if electrical circuit is good.	—	X*1
Improper shifting to 3rd gear position (A/T 3RD SIGNAL)	P0733	● A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	—	X*1
Improper shifting to 4th gear position (A/T 4TH SIG OR TCC)	P0734	● A/T cannot be shifted to the 4th gear position even if electrical circuit is good.	—	X*1
Improper lock-up operation (A/T TCC SIGNAL)	P0744	● A/T cannot perform lock-up even if electrical circuit is good.	—	X*1
Shift solenoid valve A (SHIFT SOLENOID/V A)	P0750	● 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)	P0755	● 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 SV)	P1760	● 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)	P0740	● 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)	P0745	● A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	X	X

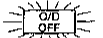
Self-diagnosis (Cont'd)

Detected items (Screen terms for CONSULT, "SELF-DIAG RESULTS" test mode)	Diagnostic trouble code No. for CON- SULT or GST	Malfunction is detected when ...	Indicator for Diagnostic Results	
			 O/D OFF indicator lamp (Available when "A/T" on CONSULT is touched.)	 Malfunction indicator lamp*2 (Available when "ENGINE" on CON- SULT is touched.)
Throttle position sensor Throttle position switch (THRTL POSI SEN-A/T)	P1705	● A/T control unit receives an excessively low or high voltage from the sensor.	X	X
Engine speed signal (ENGINE SPEED SIG)	P0725	● A/T control unit does not receive the proper voltage signal from the ECM.	X	X
A/T fluid temperature sensor (FLUID TEMP SENSOR)	P0710	● A/T control unit receives an excessively low or high voltage from the sensor.	X	X
Initial start (INITIAL START)		● This is not a malfunction message (Whenever shutting off a power supply to the control unit, this message appears on the screen.)	X	—
No failure (NO SELF DIAGNOSTIC FAILURE INDICATED FURTHER TESTING MAY BE REQUIRED**)		● No failure has been detected.	X	X

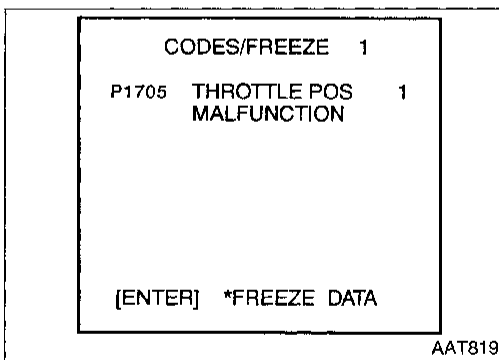
X : Applicable

- : Not applicable

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



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

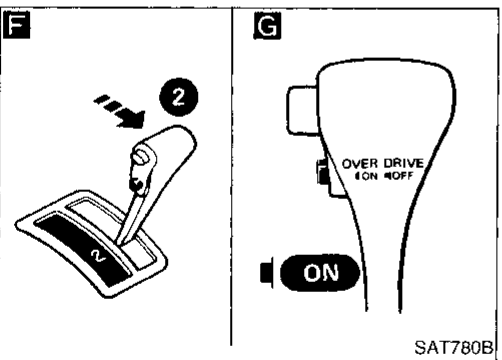
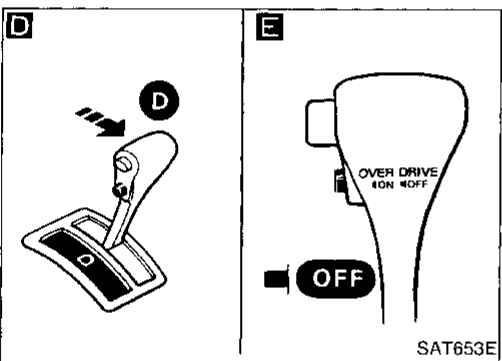
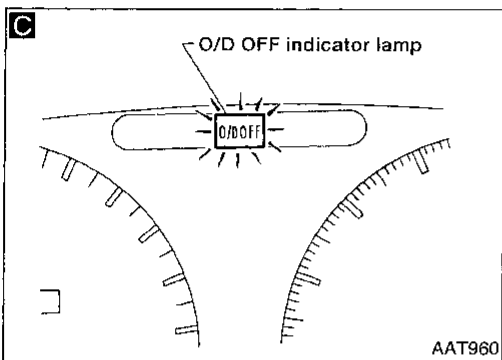
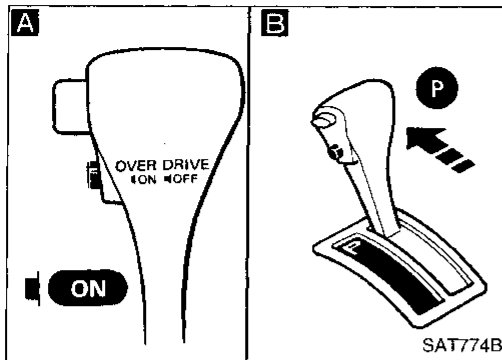


SELF-DIAGNOSTIC PROCEDURE (With GST)

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

Self-diagnosis (Cont'd)

NO TOOLS SELF-DIAGNOSTIC PROCEDURE (No Tools)



DIAGNOSIS START

- A B C**
1. Start engine and warm it up to normal engine operating temperature.
 2. Turn ignition switch to OFF position. Wait for at least 5 seconds.
 3. Turn ignition switch to ACC position.
 4. Set overdrive control switch in ON position.
 5. Move selector lever to "P" position.
 6. Turn ignition switch to ON position. (Do not start engine.)
 7. Does O/D OFF indicator lamp come on for about 2 seconds?

No → Stop procedure. Perform "1. O/D OFF Indicator Lamp Does Not Come On", AT-133 before proceeding.

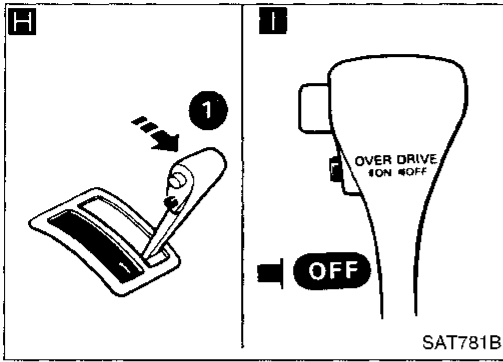
- Yes
- D E**
1. Turn ignition switch to OFF position.
 2. Turn ignition switch to ON position. (Do not start engine.)
 3. Move selector lever to "D" position.
 4. Turn ignition switch to OFF position.
 5. Set overdrive control switch to OFF position.
 6. Turn ignition switch to ON position (Do not start engine.)
- Wait for more than 2 seconds after ignition switch ON.

- F G**
1. Move selector lever to "2" position.
 2. Set overdrive control switch in ON position.

Ⓐ
(Go to next page.)

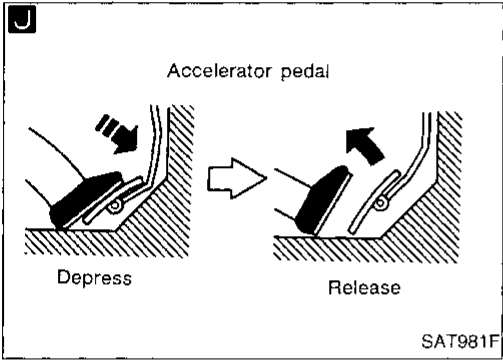
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Self-diagnosis (Cont'd)



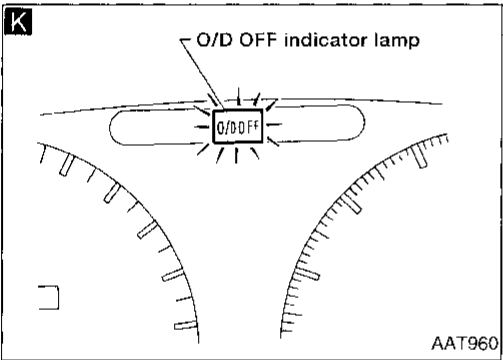
H I

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



J

Depress accelerator pedal fully and release it.



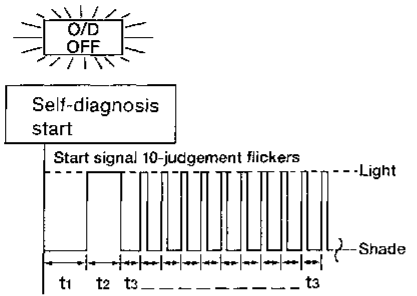
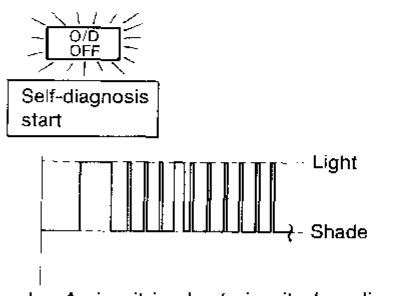
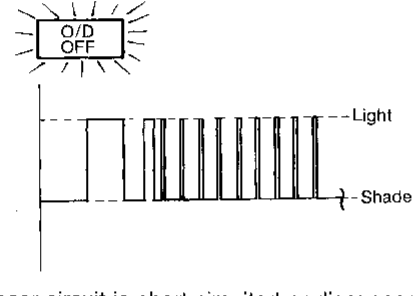
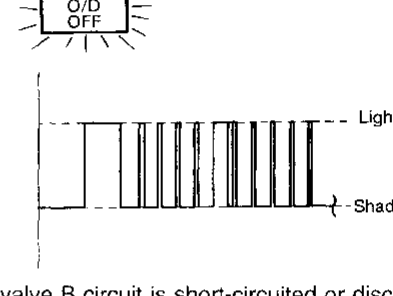
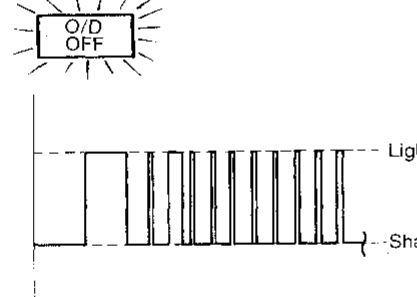
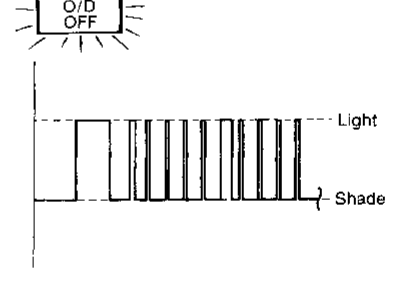
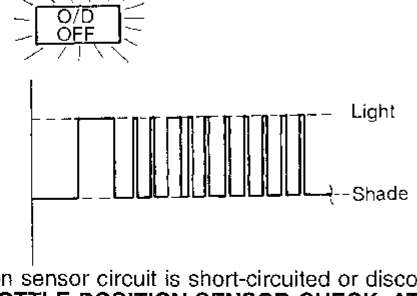
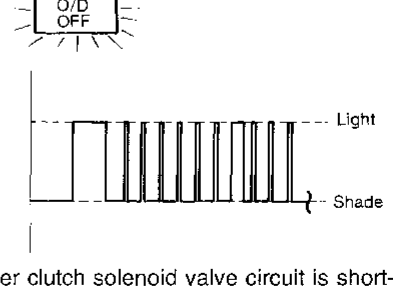
K

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

DIAGNOSIS END

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE INDICATED BY O/D OFF INDICATOR LAMP

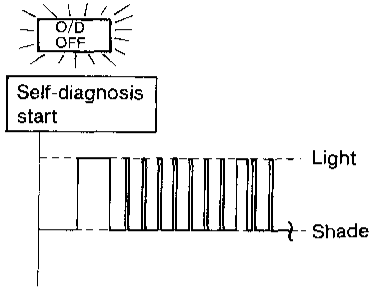
<p>All judgement flickers are same.</p>  <p>AAT671</p> <p>All circuits that can be confirmed by self-diagnosis are OK.</p>	<p>4th judgement flicker is longer than others.</p>  <p>SAT443F</p> <p>Shift solenoid valve A circuit is short-circuited or disconnected. ➔ Go to SHIFT SOLENOID VALVE A, AT-120.</p>
<p>1st judgement flicker is longer than others.</p>  <p>SAT437F</p> <p>Revolution sensor circuit is short-circuited or disconnected. ➔ Go to VEHICLE SPEED SENSOR-A/T (REVOLUTION SENSOR), AT-91.</p>	<p>5th judgement flicker is longer than others.</p>  <p>SAT445F</p> <p>Shift solenoid valve B circuit is short-circuited or disconnected. ➔ Go to SHIFT SOLENOID VALVE B, AT-123.</p>
<p>2nd judgement flicker is longer than others.</p>  <p>SAT439F</p> <p>Vehicle speed sensor circuit is short-circuited or disconnected. ➔ Go to VEHICLE SPEED SENSOR-MTR, AT-131.</p>	<p>6th judgement flicker is longer than others.</p>  <p>SAT447F</p> <p>Overrun clutch solenoid valve circuit is short-circuited or disconnected. ➔ Go to OVERRUN CLUTCH SOLENOID VALVE, AT-128.</p>
<p>3rd judgement flicker is longer than others.</p>  <p>SAT441F</p> <p>Throttle position sensor circuit is short-circuited or disconnected. ➔ Go to THROTTLE POSITION SENSOR CHECK, AT-126.</p>	<p>7th judgement flicker is longer than others.</p>  <p>SAT449F</p> <p>Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ➔ Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE, AT-109.</p>

t₁ = 2.5 seconds t₂ = 2.0 seconds t₃ = 1.0 second

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Self-diagnosis (Cont'd)

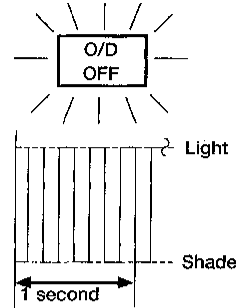
8th judgement flicker is longer than others.



SAT451F

AT fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged.
 ➔ Go to **A/T FLUID TEMPERATURE SENSOR AND A/T CONTROL UNIT POWER SOURCE, AT-88.**

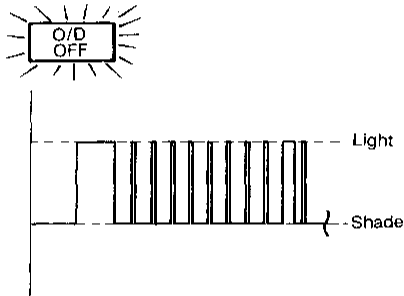
Flickers as shown below.



AAT549

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

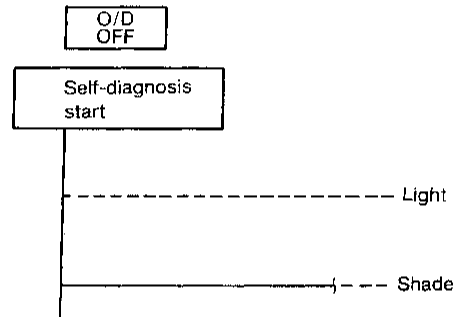
9th judgement flicker is longer than others.



SAT453F

Engine speed signal circuit is short-circuited or disconnected.
 ➔ Go to **ENGINE SPEED SIGNAL, AT-93.**

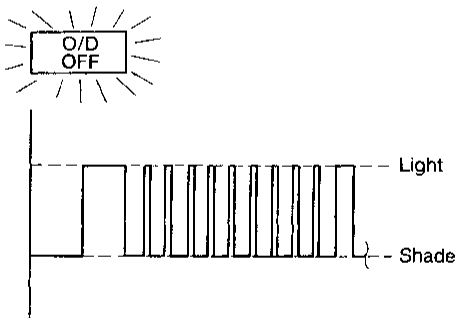
Does not come on.



SAT458F

Inhibitor switch, overdrive control switch or throttle position switch circuit is disconnected or A/T control unit is damaged.
 ➔ Go to **INHIBITOR, OVERDRIVE CONTROL AND THROTTLE POSITION SWITCH, AT-83.**

10th judgement flicker is longer than others.



SAT455F

Line pressure solenoid valve circuit is short-circuited or disconnected.
 ➔ Go to **LINE PRESSURE SOLENOID VALVE, AT-117.**

$t_4 = 1.0$ second

Diagnosis by CONSULT

NOTICE

1. The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
Check for time difference between actual shift timing and the CONSULT display. If the difference is noticeable, mechanical parts (except solenoids, sensors, etc.) may be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
2. Shift schedule (which implies gear position) displayed on CONSULT and that indicated in Service Manual may differ slightly. This occurs because of the following reasons:
 - Actual shift schedule has more or less tolerance or allowance,
 - Shift schedule indicated in Service Manual refers to the point where shifts start, 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-DIAGNOSIS RESULT TEST MODE.

Refer to AT-47.

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Diagnosis by CONSULT (Cont'd)

DATA MONITOR DIAGNOSTIC TEST MODE

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Vehicle speed sensor 1 (A/T) (Revolution sensor)	VHCL/S SE-A/T [km/h] or [mph]	X	—	● Vehicle speed computed from signal of revolution sensor is displayed.	When racing engine in N or P position with vehicle stationary, CONSULT data may not indicate 0 km/h (0 MPH).
Vehicle speed sensor 2 (Meter)	VHCL/S SE-MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Vehicle speed display may not be accurate under approx. 10 km/h (6 MPH). It may not indicate 0 km/h (0 MPH) when vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
Fluid temperature sensor	FLUID TEMP SEN [V]	X	—	● Fluid temperature sensor signal voltage is displayed. ● Signal voltage lowers as fluid temperature rises.	
Battery voltage	BATTERY VOLT [V]	X	—	● Source voltage of control unit is displayed.	
Engine speed	ENGINE SPEED [rpm]	X	X	● Engine speed, computed from engine speed signal, is displayed.	Engine speed display may not be accurate under approx. 800 rpm. It may not indicate 0 rpm even when engine is not running.
Overdrive control switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive SW is displayed.	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	
ASCD-cruise signal	ASCD-CRUISE [ON/OFF]	X	—	● Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state	● This is displayed even when no ASCD is mounted.
ASCD-OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	● Status of ASCD-OD release signal is displayed. ON ... OD released OFF ... OD not released	● This is displayed even when no ASCD is mounted.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of closed throttle position SW, is displayed.	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of wide open throttle position SW, is displayed.	
Hold switch	HOLD SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of hold SW, is displayed.	
Gear position	GEAR	—	X	● Gear position data used for computation by control unit, is displayed.	

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Selector lever position	SLCT LVR POSI	—	X	● Selector lever position data, used for computation by control unit, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]	—	X	● Vehicle speed data, used for computation by control unit, is displayed.	
Throttle position	THROTTLE POSI [%]	—	X	● Throttle position data, used for computation by control unit, is displayed.	● A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]	—	X	● Control value of line pressure solenoid valve, computed by control unit from each input signal, is displayed.	
Torque converter clutch solenoid valve duty	TCC S/V DUTY [%]	—	X	● Control value of torque converter clutch solenoid valve, computed by control unit from each input signal, is displayed.	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	● Control value of shift solenoid valve A, computed by control unit from each input signal, is displayed.	Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	● Control value of shift solenoid valve B, computed by control unit from each input signal, is displayed.	
Overrun clutch solenoid valve	OVERRUN/C S/V [ON/OFF]	—	X	● Control value of overrun clutch solenoid valve computed by control unit from each input signal is displayed.	
Self-diagnosis display lamp (O/D OFF indicator lamp)	SELF-D DP LMP [ON/OFF]	—	X	● Control status of O/D OFF indicator lamp is displayed.	

X: Applicable
 ---: Not applicable

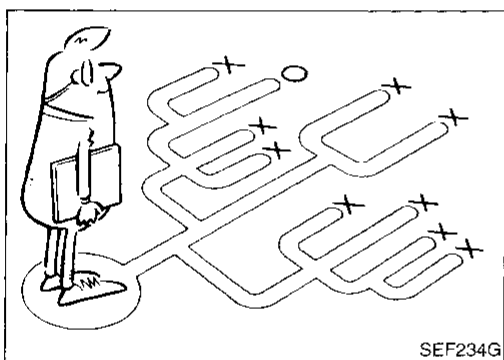
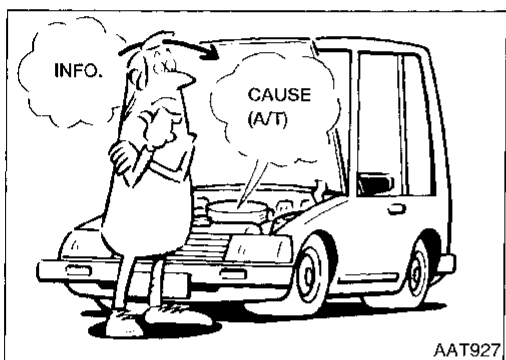
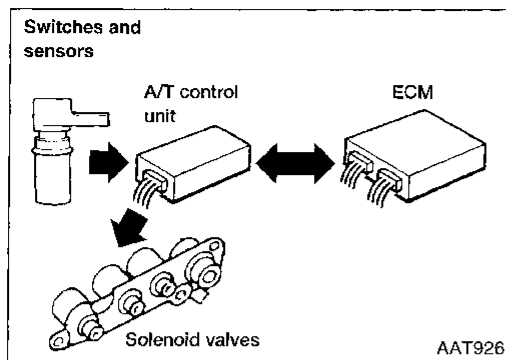
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Diagnosis by CONSULT (Cont'd)

DATA ANALYSIS

Item	Display form	Meaning
Torque converter clutch solenoid valve duty	Approximately 4%	Lock-up OFF
	↓	
	Approximately 94%	Lock-up ON
Line pressure solenoid valve duty	Approximately 0%	Low line-pressure (Small throttle opening)
	↓	
	Approximately 95%	High line-pressure (Large throttle opening)
Throttle position sensor	Approximately 0.5V	Fully-closed throttle
	Approximately 4V	Fully-open throttle
A/T fluid temperature sensor	Approximately 1.5V	Cold [20°C (68°F)]
	↓	
	Approximately 0.5V	Hot [80°C (176°F)]

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



Introduction

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

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

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

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

A visual check only may not find the cause of the problems. A road test with CONSULT (or GST) or circuit test should be performed. Follow the "Work Flow". Refer to AT-61.

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

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

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Diagnostic Worksheet

INFORMATION FROM CUSTOMER

KEY POINTS

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

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

Diagnostic Worksheet (Cont'd)

DIAGNOSTIC WORKSHEET

1.	<input type="checkbox"/> Read the Fail-safe Remarks and listen to customer complaints.	AT-9	CI
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-62	MA
3.	<input type="checkbox"/> Perform all ROAD TEST and mark required procedures.	AT-62	EM
	3-1 Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <input type="checkbox"/> Vehicle speed sensor-A/T (Revolution sensor), AT-91 <input type="checkbox"/> Vehicle speed sensor-MTR, AT-131 <input type="checkbox"/> Throttle position sensor, AT-126 <input type="checkbox"/> Shift solenoid valve A, AT-120 <input type="checkbox"/> Shift solenoid valve B, AT-123 <input type="checkbox"/> Overrun clutch solenoid valve, AT-128 <input type="checkbox"/> Torque converter clutch solenoid valve, AT-109 <input type="checkbox"/> A/T fluid temperature sensor and A/T control unit power source, AT-88 <input type="checkbox"/> Engine speed signal, AT-93 <input type="checkbox"/> Line pressure solenoid valve, AT-117 <input type="checkbox"/> Inhibitor switch , AT-84 <input type="checkbox"/> Battery, AT-52 <input type="checkbox"/> Others, AT-83	AT-63	LC EC FE CL MT
	3-2. Check at idle <input type="checkbox"/> 1. O/D OFF Indicator Lamp Does Not Come On, AT-133 <input type="checkbox"/> 2. Engine Cannot Be Started In "P" and "N" Position, AT-134 <input type="checkbox"/> 3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed, AT-134 <input type="checkbox"/> 4. In "N" Position, Vehicle Moves, AT-135 <input type="checkbox"/> 5. Large Shock. "N" → "R" Position, AT-136 <input type="checkbox"/> 6. Vehicle Does Not Creep Backward In "R" Position, AT-137 <input type="checkbox"/> 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position, AT-138	AT-64	AT FA RA
	3-3. Cruise test Part-1 <input type="checkbox"/> 8. Vehicle Cannot Be Started From D ₁ , AT-139 <input type="checkbox"/> 9. A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ , AT-140 <input type="checkbox"/> 10. A/T Does Not Shift: D ₂ → D ₃ , AT-141 <input type="checkbox"/> 11. A/T Does Not Shift: D ₃ → D ₄ , AT-142 <input type="checkbox"/> 12. A/T Does Not Perform Lock-up, AT-143 <input type="checkbox"/> 13. A/T Does Not Hold Lock-up Condition, AT-144 <input type="checkbox"/> 14. Lock-up Is Not Released, AT-144 <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Light Braking D ₄ → D ₃), AT-145	AT-66	BR ST RS BT HA EL DX

Diagnostic Worksheet (Cont'd)

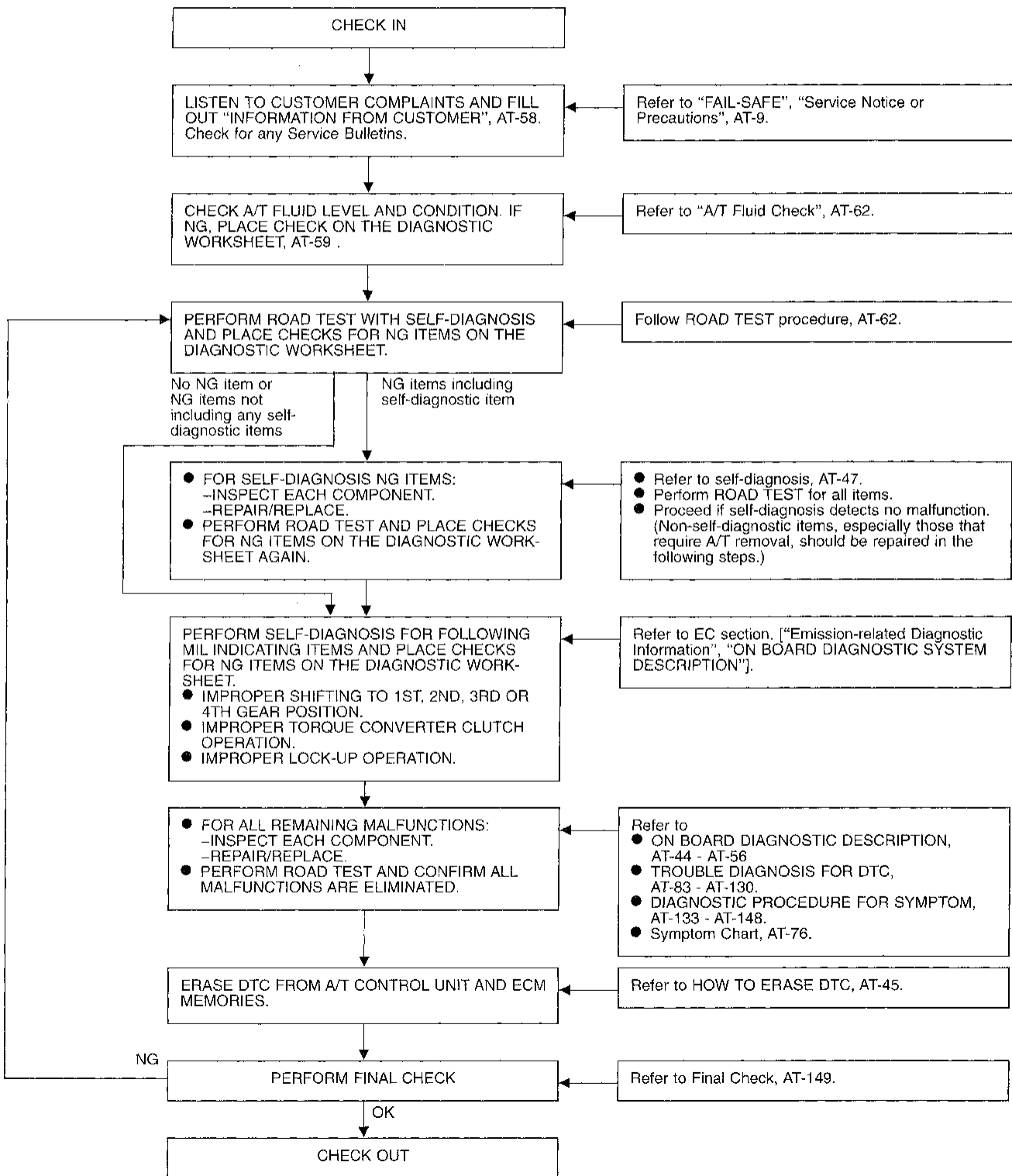
3.	<p>Part-2</p> <input type="checkbox"/> 16. Vehicle Does Not Start From D ₁ , AT-146 <input type="checkbox"/> 9. A/T Does Not Shift: D ₁ → D ₂ Or Does Not Kickdown: D ₄ → D ₂ , AT-140 <input type="checkbox"/> 10. A/T Does Not Shift: D ₂ → D ₃ , AT-141 <input type="checkbox"/> 11. A/T Does Not Shift: D ₃ → D ₄ , AT-142	AT-71
	<p>Part-3</p> <input type="checkbox"/> 17. A/T Does Not Shift: D ₄ → D ₃ When Overdrive Control Switch ON → OFF, AT-146 <input type="checkbox"/> 15. Engine Speed Does Not Return to Idle (Engine Brake In D ₃), AT-145 <input type="checkbox"/> 18. A/T Does Not Shift: D ₃ → 2 ₂ , When Selector Lever "D" → "2" Position, AT-147 <input type="checkbox"/> 15. Engine Speed Does Not Return To Idle (Engine Brake In 2 ₂), AT-145 <input type="checkbox"/> 19. A/T Does Not Shift: 2 ₂ → 1 ₁ , When Selector Lever "2" → "1" Position, AT-147 <input type="checkbox"/> 20. Vehicle Does Not Decelerate By Engine Brake, AT--148 <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <ul style="list-style-type: none"> <input type="checkbox"/> Vehicle speed sensor A/T (Revolution sensor), AT-91 <input type="checkbox"/> Vehicle speed sensor-MTR, AT-131 <input type="checkbox"/> Throttle position sensor, AT-126 <input type="checkbox"/> Shift solenoid valve A, AT-120 <input type="checkbox"/> Shift solenoid valve B, AT-123 <input type="checkbox"/> Overrun clutch solenoid valve, AT-128 <input type="checkbox"/> Torque converter clutch solenoid valve, AT-109 <input type="checkbox"/> A/T fluid temperature sensor and A/T control unit power source, AT-88 <input type="checkbox"/> Engine speed signal, AT-93 <input type="checkbox"/> Line pressure solenoid valve, AT-117 <input type="checkbox"/> Inhibitor switch , AT-84 <input type="checkbox"/> Battery, AT-52 <input type="checkbox"/> Others, AT-83 	AT-72
4.	<input type="checkbox"/> For self-diagnosis NG items, inspect each component. Repair or replace the damaged parts.	AT-47
5.	<input type="checkbox"/> Perform all ROAD TEST and re-mark required procedures.	AT-62
6.	<input type="checkbox"/> Perform SELF-DIAGNOSIS for following MIL indicating items and check out NG items. Refer to EC section ["Emission-related Diagnostic Information", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"]. <ul style="list-style-type: none"> <input type="checkbox"/> DTC (P0731, 1103) Improper shifting to 1st gear position, AT-95 <input type="checkbox"/> DTC (P0732, 1104) Improper shifting to 2nd gear position, AT-98 <input type="checkbox"/> DTC (P0733, 1105) Improper shifting to 3rd gear position, AT-101 <input type="checkbox"/> DTC (P0734, 1106) Improper shifting to 4th gear position, AT-104 <input type="checkbox"/> DTC (P0744, 1107) Improper Lock-up operation, AT-112 	EC section
7.	<input type="checkbox"/> Perform the Diagnostic Procedures for all remaining items marked NG. Repair or replace the damaged parts. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the component inspection orders.)	AT-79 AT-76
8.	<input type="checkbox"/> Erase DTC from A/T control unit and ECM memories.	AT-45
9.	<p>Perform FINAL CHECK.</p> <input type="checkbox"/> Stall test — Mark possible damaged components/others. <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 <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 <input type="checkbox"/> Pressure test — Suspected parts:	AT-149

Work Flow

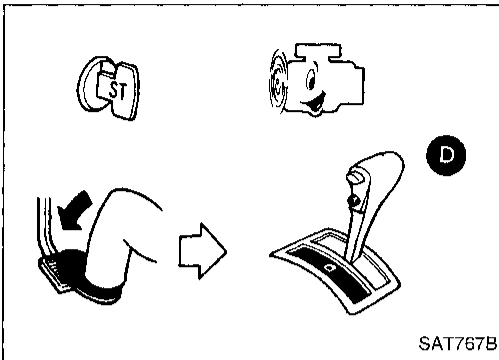
HOW TO PERFORM TROUBLE DIAGNOSES FOR QUICK AND ACCURATE REPAIR

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

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



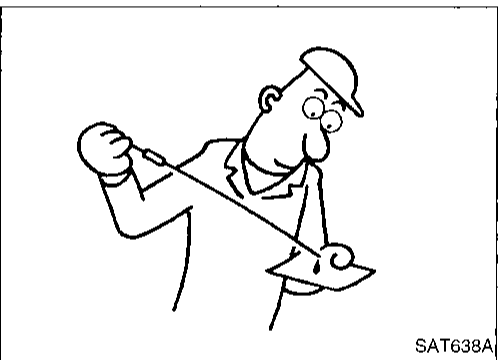
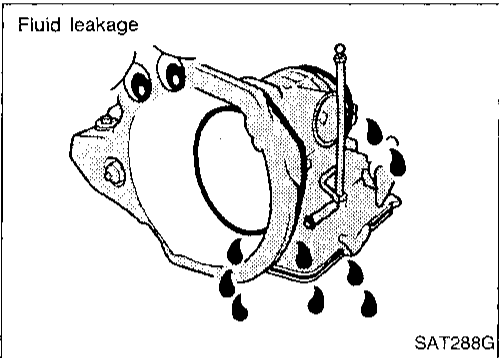
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A/T Fluid Check

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.



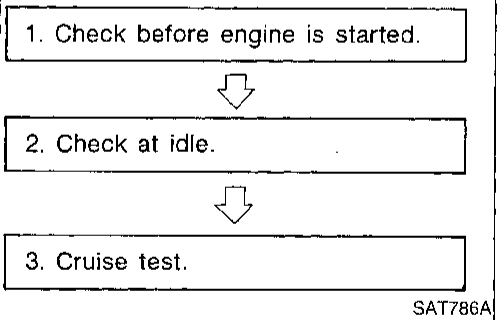
FLUID CONDITION CHECK

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

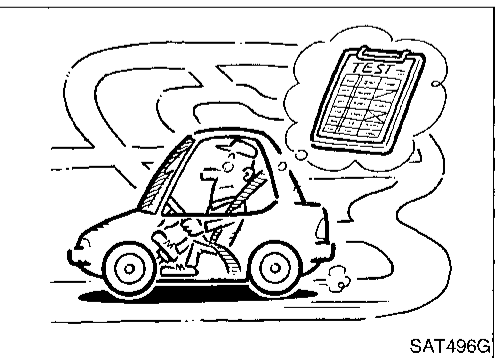
ROAD TEST PROCEDURE



Road Test

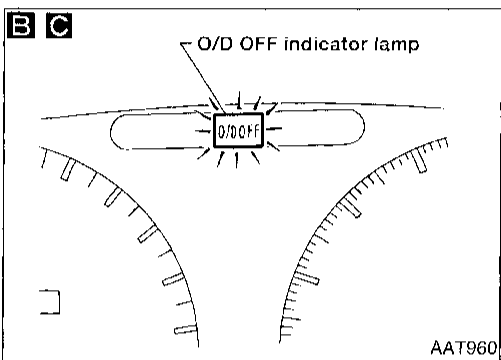
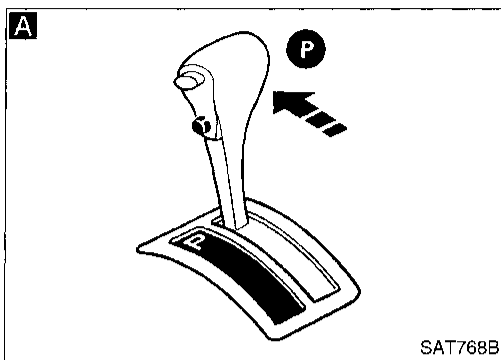
DESCRIPTION

- The purpose of a road test is to analyze overall performance and determine 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 the road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items until specified symptom is found. Troubleshoot items which check out No Good after road test. Refer to “ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION” and “DIAGNOSTIC PROCEDURE FOR SYMPTOM”, AT-47, 133.



Road Test (Cont'd)

1. CHECK BEFORE ENGINE IS STARTED



A B

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

No → Stop ROAD TEST. Perform "1. O/D OFF Indicator Lamp Does Not Come On", AT-133 before proceeding.

Yes ↓

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

Yes → Perform self-diagnosis and check NG items on the DIAGNOSTIC WORKSHEET, AT-59. Refer to SELF-DIAGNOSIS PROCEDURE, AT-47.

No ↓
Turn ignition switch to OFF position.

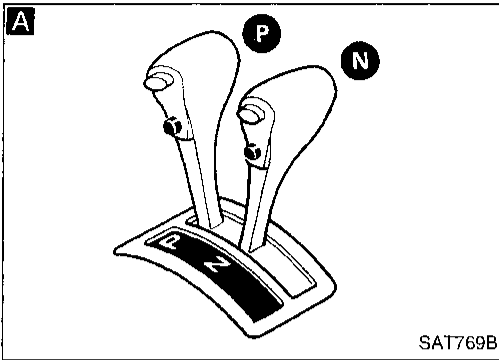
Perform self-diagnosis and note NG items. Refer to SELF-DIAGNOSIS PROCEDURE, AT-47.

Go to "2. Check at idle", AT-64.

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Road Test (Cont'd)

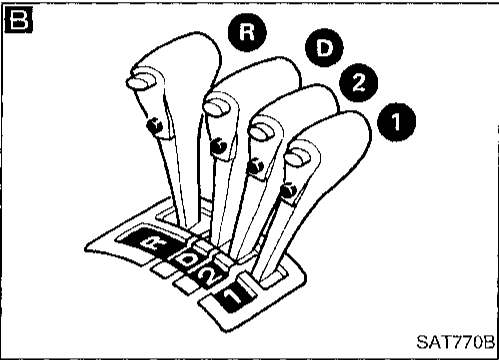
2. CHECK AT IDLE



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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "2. Engine Cannot Be Started In "P" and "N" Position", AT-134. Continue ROAD TEST.

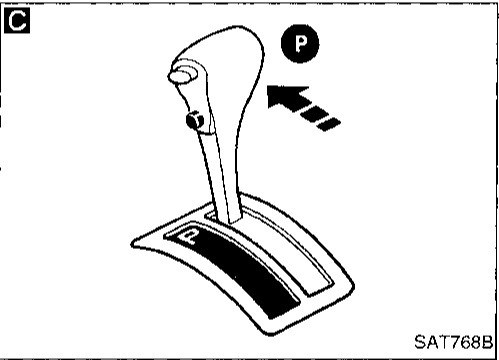
Yes → Turn ignition switch to ACC position.



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

Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "2. Engine Cannot Be Started In "P" and "N" Position", AT-134. Continue ROAD TEST.

- No →
- C**
1. Move selector lever to "P" position.
 2. Turn ignition switch to OFF position.
 3. Release parking brake.

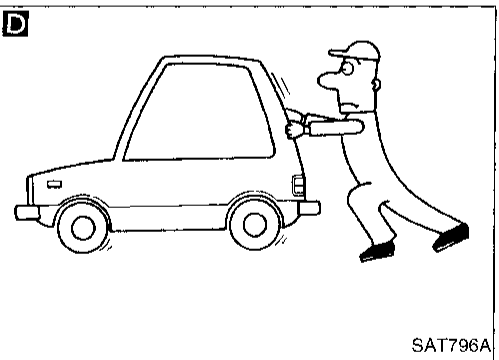


- D**
1. Push vehicle forward or backward.
 2. Does vehicle move when it is pushed forward or backward?
 3. Apply parking brake.

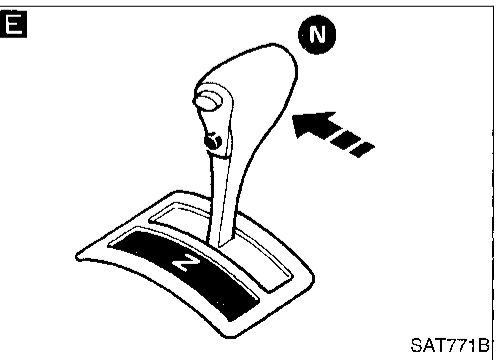
Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed", AT-134. Continue ROAD TEST.

- No →
- E**
1. Start engine.
 2. Move selector lever to "N" position.
 3. Release parking brake.
 4. Does vehicle move forward or backward?

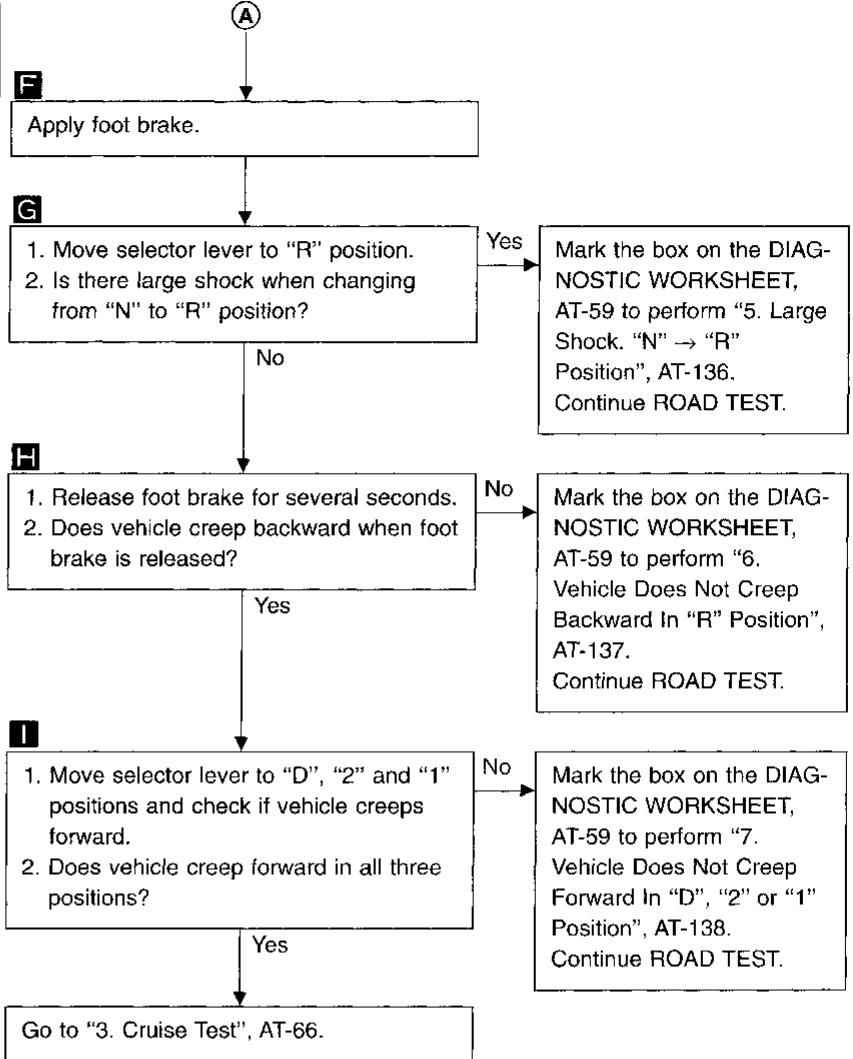
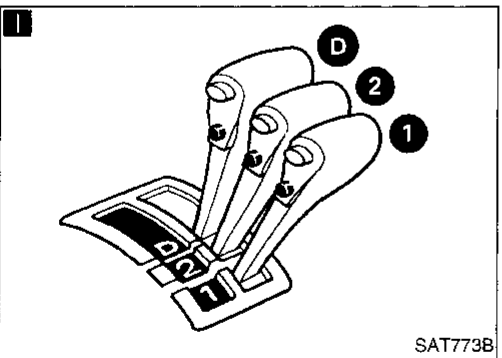
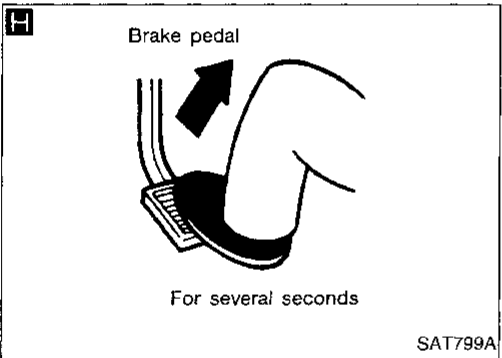
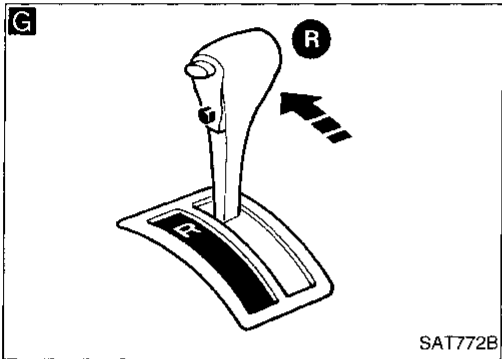
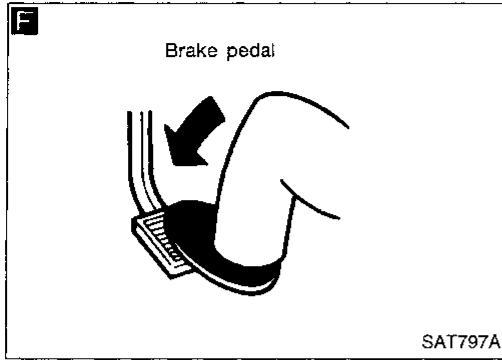
Yes → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "4. In "N" Position, Vehicle Moves", AT-135. Continue ROAD TEST.



No → **A**
(Go to next page.)



Road Test (Cont'd)



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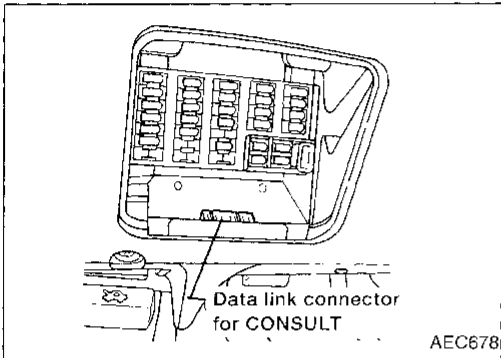
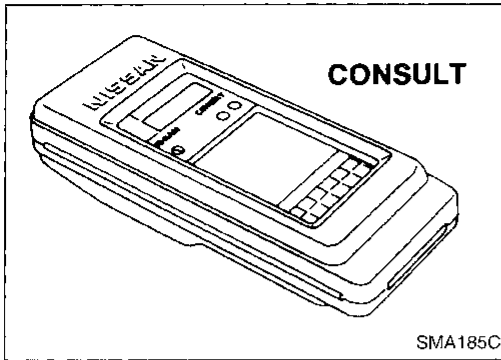
Road Test (Cont'd)

3. CRUISE TEST

- Check all items listed in Parts 1 through 3.

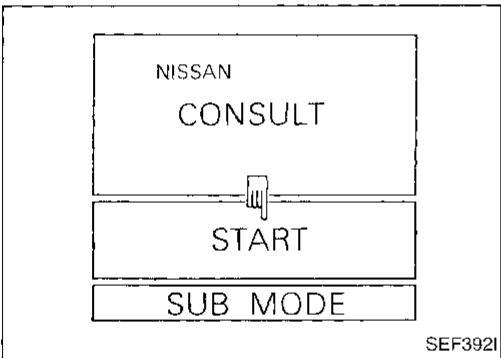
 With CONSULT

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

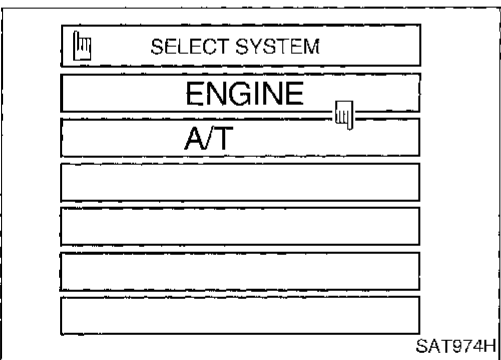


CONSULT setting procedure

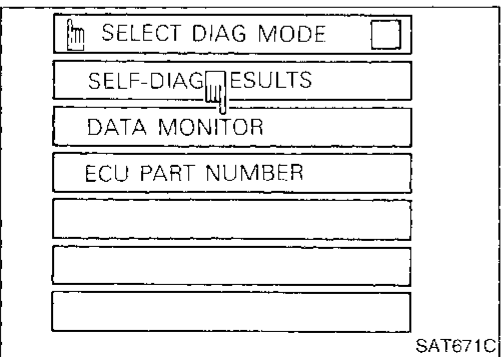
1. Turn ignition switch OFF.
2. Connect "CONSULT" to Data link connector for CONSULT. Data link connector for CONSULT is located in left side dash panel.



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

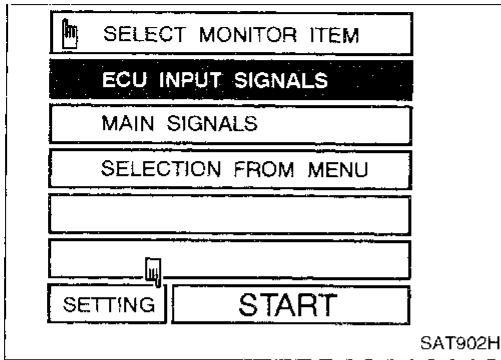


5. Touch "A/T".

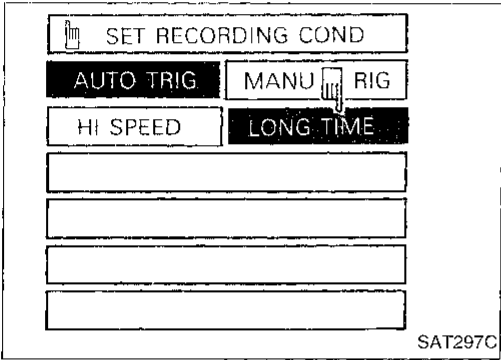


6. Touch "DATA MONITOR".

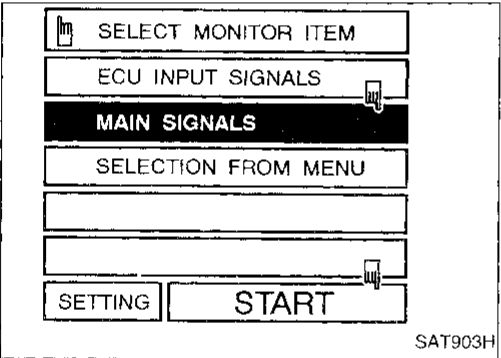
Road Test (Cont'd)



7. Touch "SETTING" to set recording condition.

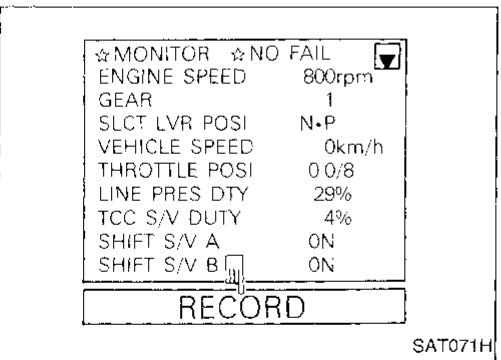


8. Touch "LONG TIME" and "ENTER" key.

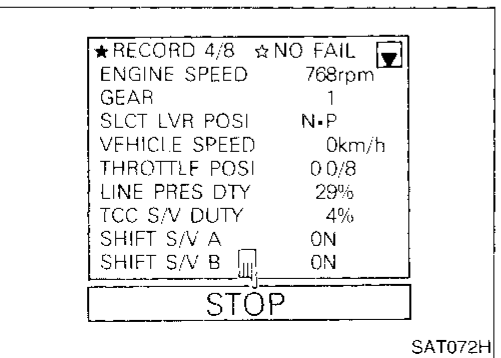


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".

10. Touch "START".



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

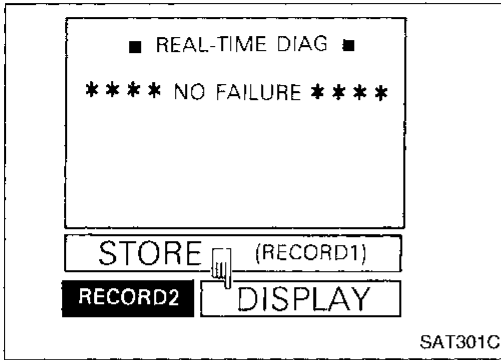


12. After finishing cruise test part 1, touch "STOP".

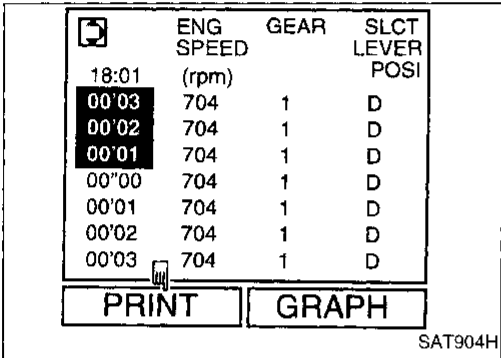
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Road Test (Cont'd)

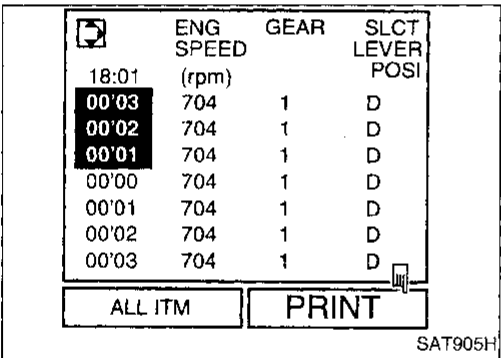
13. Touch "DISPLAY".



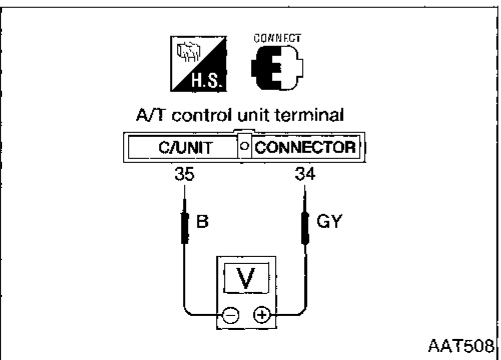
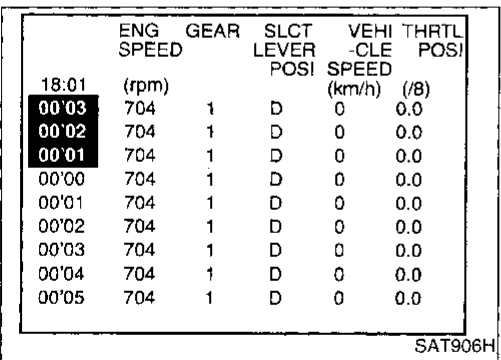
14. Touch "PRINT".



15. Touch "PRINT".



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

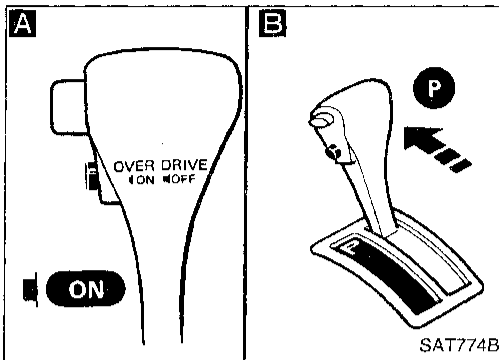


Without CONSULT

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

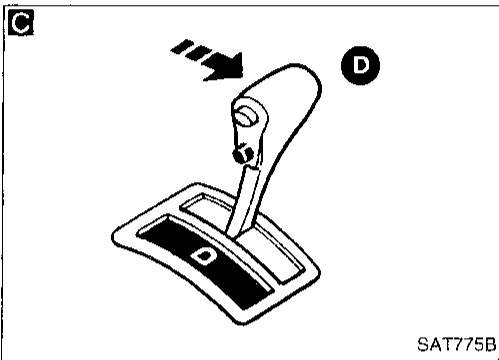
Road Test (Cont'd)

CRUISE TEST — PART 1



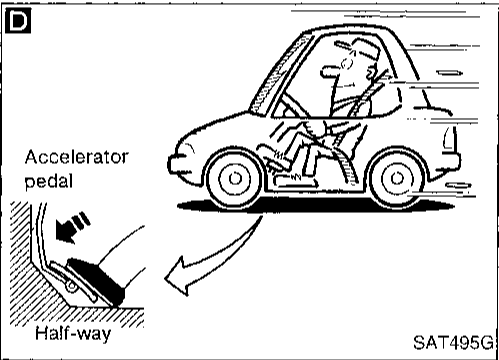
1. Drive vehicle for about 10 minutes until engine oil and ATF reach operating temperature.
ATF operating temperature:
 50 - 80°C (122 - 176°F)

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



C
 Move selector lever to "D" position.

D
 Accelerate vehicle by slowly and constantly depressing accelerator pedal half-way.

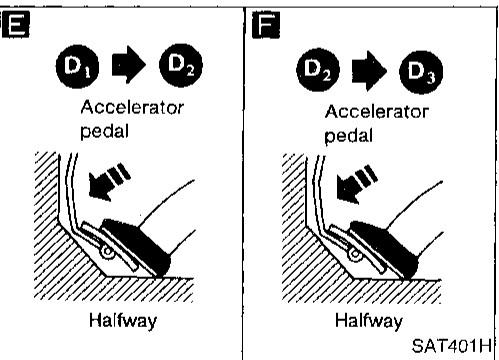


Does vehicle start from D₁?
 Read gear position.

No
 Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "8. Vehicle Cannot Be Started From D₁", AT-139. Continue ROAD TEST.

E
 Does A/T shift from D₁ to D₂ at the specified speed?
 Read gear position, throttle opening and vehicle speed.
 Specified speed when shifting from D₁ to D₂:
 Refer to Shift Schedule, AT-73.

No
 Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂", AT-140. Continue ROAD TEST.



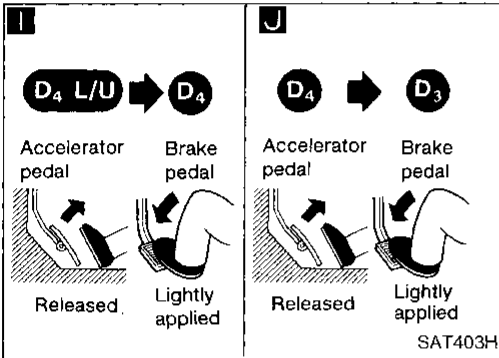
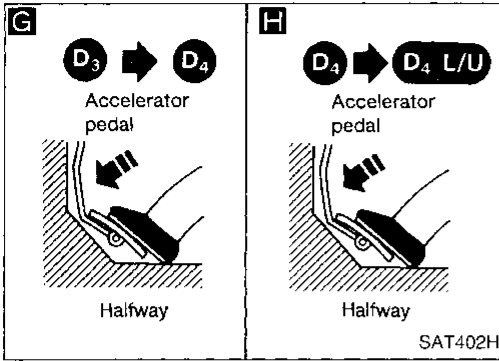
F
 Does A/T shift from D₂ to D₃ at the specified speed?
 Read gear position, throttle position and vehicle speed.
 Specified speed when shifting from D₂ to D₃:
 Refer to Shift Schedule, AT-73.

No
 Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "10. A/T Does Not Shift: D₂ → D₃", AT-141. Continue ROAD TEST.

Yes
 (Go to next page.)

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Road Test (Cont'd)



G

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

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D₃ to D₄:
Refer to Shift Schedule, AT-73.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "11. A/T Does Not Shift: D₃ → D₄", AT-142. Continue ROAD TEST.

H

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

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

Specified speed when lock-up occurs:
Refer to Shift Schedule, AT-73.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "12. A/T Does Not Perform Lock-up", AT-143. Continue ROAD TEST.

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "13. A/T Does Not Hold Lock-up Condition", AT-144. Continue ROAD TEST.

I

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

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "14. Lock-up Is Not Released", AT-144. Continue ROAD TEST.

J

1. Decelerate vehicle by applying foot brake lightly.
2. Does engine speed return to idle smoothly when A/T is shifted from D₄ to D₃?

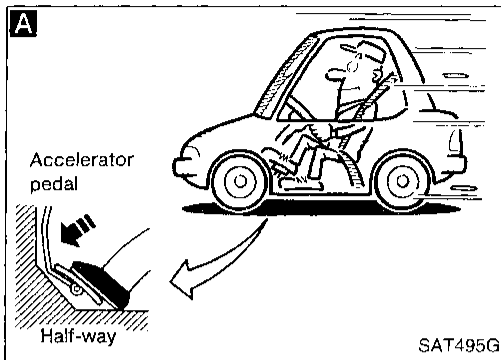
Read gear position and engine speed.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)", AT-145. Continue ROAD TEST.

1. Stop vehicle.
2. Go to "Cruise Test — Part 2", AT-71.

Road Test (Cont'd)

CRUISE TEST — PART 2



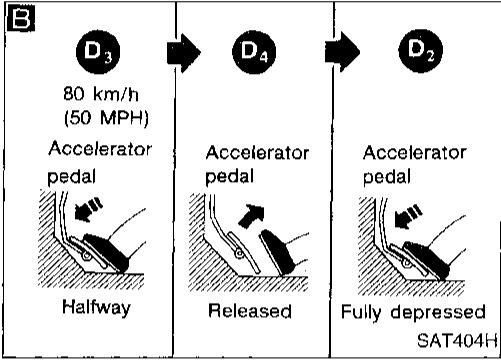
1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in "D" position.

A

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

Read gear position.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "16. Vehicle Does Not Start From D₁," AT-146. Continue ROAD TEST.

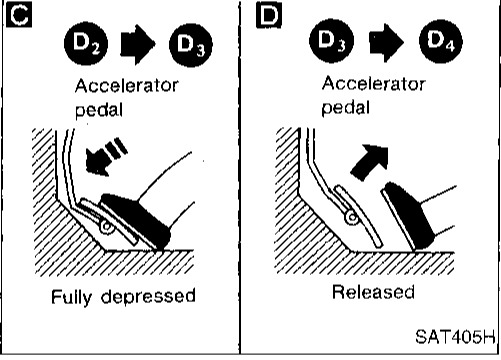


B

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

Read gear position and throttle position.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "9. A/T Does Not Shift: D₄ → D₂ Or Does Not Kickdown: D₄ → D₂," AT-140. Continue ROAD TEST.



C

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

Read gear position, throttle position and vehicle speed.

Specified speed when shifting from D₂ to D₃:
Refer to Shift Schedule, AT-73.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "10. A/T Does Not Shift: D₂ → D₃," AT-141. Continue ROAD TEST.

D

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

Read gear position, throttle position and vehicle speed.

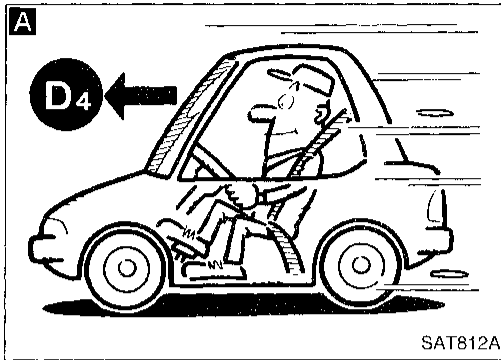
No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "11. A/T Does Not Shift: D₃ → D₄," AT-142. Continue ROAD TEST.

1. Stop vehicle.
2. Go to "Cruise Test — Part 3", AT-72.

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Road Test (Cont'd)

CRUISE TEST — PART 3

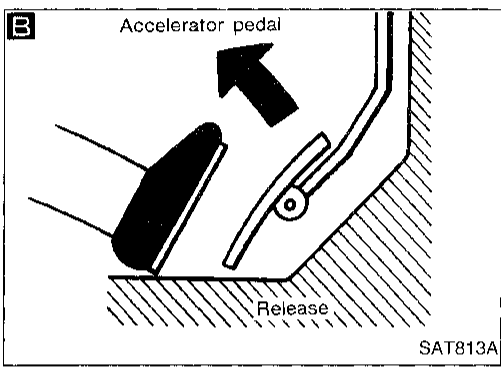


1. Confirm overdrive control switch is in ON position.
2. Confirm selector lever is in "D" position.

A
Accelerate vehicle using half-throttle to D₄.

B
Release accelerator pedal.

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

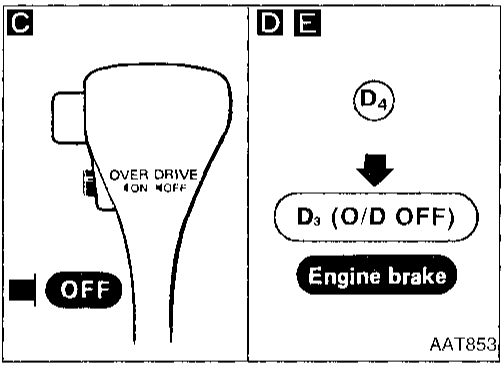


D
Does A/T shift from D₄ to D₃ (O/D OFF)?
Read gear position and vehicle speed.

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "17. A/T Does Not Shift: D₄ → D₃ when Overdrive Control Switch ON → OFF", AT-146. Continue ROAD TEST.

E
Does vehicle decelerate by engine brake?

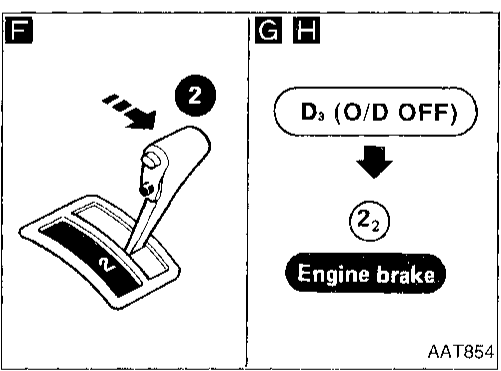
No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)", AT-145. Continue ROAD TEST.



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

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "18. A/T Does Not Shift: D₃ → 2₂, When Selector Lever "D" → "2" Position", AT-147. Continue ROAD TEST.

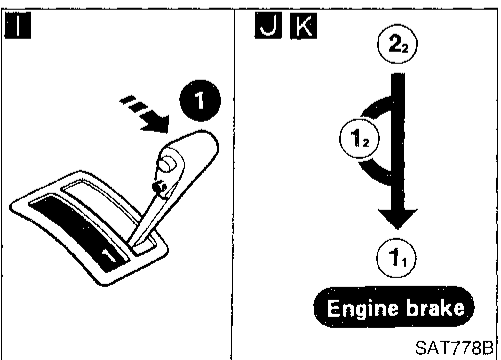


H
Does vehicle decelerate by engine brake?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "15. Engine Speed Does Not Return To Idle (Light Braking D₄ → D₃)", AT-145. Continue ROAD TEST.

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

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "19. A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position", AT-147. Continue ROAD TEST.



K
Does vehicle decelerate by engine brake?

No → Mark the box on the DIAGNOSTIC WORKSHEET, AT-59 to perform "20. Vehicle Does Not Decelerate By Engine Brake In 1₁", AT-148. Continue ROAD TEST.

1. Stop vehicle.
2. Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE, AT-47.

Shift Schedule

VEHICLE SPEED WHEN SHIFTING GEARS

Throttle position	Shift pattern	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	Comfort	56 - 64 (35 - 40)	107 - 115 (66 - 71)	169 - 177 (105 - 110)	165 - 173 (103 - 108)	97 - 105 (60 - 65)	46 - 54 (29 - 34)	54 - 62 (34 - 39)
Half throttle	Comfort	29 - 37 (18 - 23)	64 - 72 (40 - 45)	110 - 118 (68 - 73)	74 - 82 (46 - 51)	37 - 45 (23 - 28)	9 - 17 (6 - 11)	54 - 62 (34 - 39)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

Throttle position	Shift pattern	Overdrive control switch	Gear position	Vehicle speed km/h (MPH)	
				Lock-up ON	Lock-up OFF
2/8	Comfort	ON	D ₄	104 - 112 (65 - 70)	92 - 100 (57 - 62)
		OFF	D ₃	86 - 94 (53 - 58)	83 - 91 (52 - 57)

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Diagnostic Trouble Code (DTC) Chart

A/T RELATED ITEMS

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

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

Pattern 1 should meet b and c.

Pattern 2 should meet a and c.

Pattern 3 should meet a through e.

Pattern 4 should meet a and b.

Pattern 5 should meet a through c.

Pattern 6 should meet a through d.

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

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

*5: DTC P0734 is applied to A/T 4th signal only even the CONSULT screen shows "A/T 4TH OR TCC".

a: Selector lever is in "D" position.

b: Vehicle speed is over 10 km/h (6 MPH).

c: Throttle opening is over 1/8.

d: Engine speed is over 450 rpm.

e: A/T fluid temperature is 20 - 120°C (68 - 248°F).

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

X: Applicable
—: Not applicable

Check Items (Possible Cause)	DTC Confirmation Procedure Quick Ref. *1	"OVERALL FUNCTION CHECK" Quick Ref. *2	Fail Safe System	MIL Illumination	Reference Page
● Harness or connectors (The switch circuit is open or shorted.) ● Inhibitor switch	DRIVING (pattern 1)	—	—	2 trip	AT-83
● Harness or connectors (The sensor circuit is open or shorted.) ● Fluid temperature sensor	DRIVING (pattern 6)	—	X	2 trip	AT-88
● Harness or connectors (The sensor circuit is open or shorted.) ● Revolution sensor	DRIVING (pattern 2)	—	X*8	2 trip*3	AT-91
● Harness or connectors (The signal circuit is open or shorted.)	DRIVING (pattern 5)	—	X*8	2 trip*3	AT-93
● Shift solenoid valve A ● Shift solenoid valve B ● Overrun clutch solenoid valve ● Line pressure solenoid valve ● Each clutch ● Hydraulic control circuit	DRIVING (pattern 3)	—	—	2 trip	AT-95
					AT-98
					AT-101
					AT-104
● Harness or connectors (The solenoid circuit is open or shorted.) ● T/C clutch solenoid valve	IGN: ON	—	X	2 trip	AT-109
● T/C clutch solenoid valve ● Each clutch ● Hydraulic control circuit	DRIVING (pattern 3)	—	—	2 trip	AT-112
● Harness or connectors (The solenoid circuit is open or shorted.) ● Line pressure solenoid valve	IGN: ON	—	X	2 trip	AT-117
● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve A	IGN: ON	—	X*7	1 trip	AT-120
● Harness or connectors (The solenoid circuit is open or shorted.) ● Shift solenoid valve B	IGN: ON	—	X*7	1 trip	AT-123
● Harness or connectors (The sensor circuit is open or shorted.) ● Throttle position sensor ● Throttle position switch	IGN: ON	—	X*7	1 trip	AT-126
● Harness or connectors (The solenoid circuit is open or shorted.) ● Overrun clutch solenoid valve	IGN: ON	—	X	2 trip	AT-128

*1: ● This is Quick Reference of "DTC CONFIRMATION PROCEDURE".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

*2: ● The "OVERALL FUNCTION CHECK" is a simplified and effective way to inspect a component or circuit.
In some cases, the "OVERALL FUNCTION CHECK" is used rather than a "DIAGNOSTIC TROUBLE CODE CONFIRMATION PROCEDURE".
When no DTC CONFIRMATION PROCEDURE is available, the "NG" result of the OVERALL FUNCTION CHECK can be considered to mean the same as a DTC detection.

- During an "NG" OVERALL FUNCTION CHECK, the DTC or 1st trip DTC might not be confirmed.
- This is Quick Reference of "OVERALL FUNCTION CHECK".
Details are described in each TROUBLE DIAGNOSIS FOR DTC PXXXX.

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

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

Symptom Chart

Reference page (AT-)	ON vehicle										OFF vehicle																							
	62, 174	83	91, 131, 93	117	172, 120	123, 117	109, 128	88, 172	172	191, 214	248, 252	257, 267	257	263, 281	—																			
Reference page (AT-)	Fluid level	Control cable	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	A/T fluid temperature sensor	Accumulator N-D	Accumulator servo release	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components					
134	2	3															1																	
134	1	2																																
—	1		3	4 5		2													7	6														
134	1																													2				
135	1																																	
137	1						2	4			3																							
—	1 2					3	5			4																								
—			2		5	1 3	7			6					4 8																			
—	1																																	
138	1						2	4			3																							
—	1 2		3				4	6			5																							
—						1																												
137, 138	1						2	3																										
—	2	1		5			4	3																										
—	2	1		5			4	3																										
—	2	1		4				3							5																			
140, 141, 142			1	2				3	4																									
—	1															2																		
—						1	3					2																						
—			1			2	4								5	3																		
—			1			2	3																											

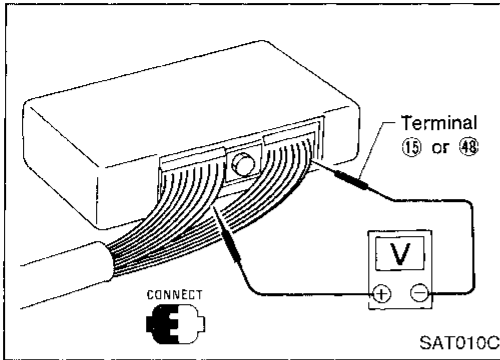
Symptom Chart (Cont'd)

Reference page (AT-)	ON vehicle										OFF vehicle					Reference page (AT-)															
	62, 174	83	91, 131, 93	117	172, 120	123, 117	109, 128	88, 172	172	191, 214	248, 252	257, 267	257	263, 281	—																
Reference page (AT-)	Fluid level	Control cable	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	A/T fluid temperature sensor	Accumulator N-D	Accumulator servo release	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components		
—	Too sharp a shock in change from "D ₃ " to "D ₄ ".	.	1	.	.	2	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	4	.	.		
—	Almost no shock or clutches slipping in change from "D ₁ " to "D ₂ ".	1	.	2	.	.	3	5	.	.	.	.	.	.	.	.	4	.	.	.	.	.	.	.	.	.	.	6	.	.	
—	Almost no shock or slipping in change from "D ₂ " to "D ₃ ".	1	.	2	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	6	.	.	
—	Almost no shock or slipping in change from "D ₃ " to "D ₄ ".	1	.	2	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	5	.	.	.	.	6	.	.	
—	Vehicle braked by gear change from "D ₁ " to "D ₂ ".	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	4	.	.	5	3	.	.	
—	Vehicle braked by gear change from "D ₂ " to "D ₃ ".	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	
—	Vehicle braked by gear change from "D ₃ " to "D ₄ ".	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.	3	2	.	.	.
—	Maximum speed not attained. Acceleration poor.	1	.	2	.	.	.	5	3	4	.	.	.	.	.	.	.	.	.	11	10	6	7	.	.	.	9	8	.	.	
—	Failure to change gear from "D ₄ " to "D ₃ ".	1	.	2	.	.	.	6	4	.	5	.	3	.	.	.	.	.	.	.	.	.	.	.	8	.	7	.	.	.	
—	Failure to change gear from "D ₃ " to "D ₂ " or from "D ₄ " to "D ₂ ".	1	.	2	.	.	.	5	3	4	.	.	.	.	.	.	.	.	.	.	.	.	6	.	.	.	.	7	.	.	.
—	Failure to change gear from "D ₂ " to "D ₁ " or from "D ₃ " to "D ₁ ".	1	.	2	.	.	.	5	3	4	.	.	.	.	.	.	.	.	.	.	.	.	7	.	.	6	.	8	.	.	.
—	Gear change shock felt during deceleration by releasing accelerator pedal.	.	.	1	.	.	2	4	.	.	.	.	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Too high a change point from "D ₄ " to "D ₃ ", from "D ₃ " to "D ₂ ", from "D ₂ " to "D ₁ ".	.	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Kickdown does not operate when depressing pedal in "D ₄ " within kickdown vehicle speed.	.	.	1	2	.	.	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Kickdown operates or engine overruns when depressing pedal in "D ₄ " beyond kickdown vehicle speed limit.	.	.	2	1	.	.	.	.	3	4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
—	Races extremely fast or slips in changing from "D ₄ " to "D ₃ " when depressing pedal.	1	.	2	.	.	3	5	.	.	4	.	.	.	.	.	.	.	.	.	.	.	6	7	.	.	.	.	.	.	.
—	Races extremely fast or slips in changing from "D ₄ " to "D ₂ " when depressing pedal.	1	.	2	.	.	3	6	5	.	4	.	.	.	.	.	.	.	.	.	.	.	.	8	.	.	.	7	.	.	.
—	Races extremely fast or slips in changing from "D ₃ " to "D ₂ " when depressing pedal.	1	.	2	.	.	3	5	.	.	4	.	.	.	6	.	.	.	.	.	.	.	9	8	.	.	.	7	.	.	.
—	Races extremely fast or slips in changing from "D ₄ " or "D ₃ " to "D ₁ " when depressing pedal.	1	.	2	.	.	3	5	.	.	4	.	.	.	.	.	.	.	.	.	.	.	6	7	.	8	.	.	.	.	.
—	Vehicle will not run in any position.	1	2	.	.	.	3	.	.	.	4	9	5	.	6	8	7	10	.	.
—	Transaxle noise in "D", "2", "1" and "R" positions.	1	2

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Symptom Chart (Cont'd)

Reference page (AT-)	ON vehicle									OFF vehicle																				
	62, 174	83	91, 131, 93	117	172, 120	123, 117	109, 128	88, 172	172	191, 214	248, 252	257, 267	257	263, 281	—															
Reference page (AT-)	Fluid level	Control cable	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling rpm	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	AT fluid temperature sensor	Accumulator N-D	Accumulator servo release	Ignition switch and starter	Torque converter	Oil pump	Reverse clutch	High clutch	Forward clutch	Forward one-way clutch	Overrun clutch	Low one-way clutch	Low & reverse brake	Brake band	Parking components	
147	Failure to change from "D ₃ " to "2 ₂ " when changing lever into "2" position.	7	1 2					6 5	4			3													9			6		
—	Gear change from "2 ₂ " to "2 ₃ " in "2" position.		1																											
147	Engine brake does not operate in "1" position.	2	1 3	4				6 5				7													8		9			
—	Gear change from "1 ₁ " to "1 ₂ " in "1" position.	2	1																											
—	Does not change from "1 ₂ " to "1 ₁ " in "1" position.		1	2				4 3				5													6		7			
—	Large shock changing from "1 ₂ " to "1 ₁ " in "1" position.							1																			2			
—	Transaxle overheats.	1		3		2 4	6		5										14	7	8	9	11	12	13	10				
—	ATF shoots out during operation. White smoke emitted from exhaust pipe during operation.	1																			2	3	5	6	7	4				
—	Offensive smell at fluid charging pipe.	1																	2	3	4	5	7	8	9	6				
—	Torque converter is not locked up.		3 1	2 4		6 8			7	5									9											
—	Torque converter clutch piston slip.	1		2		3 6		5 4											7											
143	Lock-up point is extremely high or low.			1 2			4				3																			
—	AT does not shift to "D ₄ " when driving with overdrive control 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																						

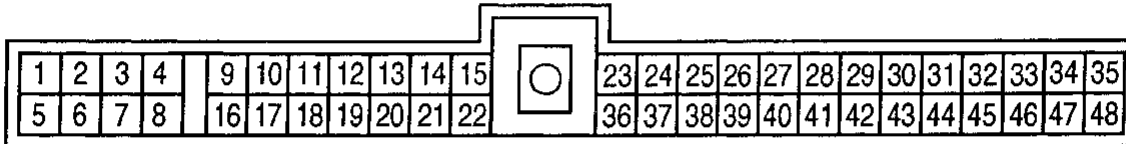


A/T Control Unit Terminals and Reference Values

PREPARATION

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

A/T CONTROL UNIT HARNESS CONNECTOR TERMINAL LAYOUT



AAT751

A/T CONTROL UNIT INSPECTION TABLE

(Data are reference values.)

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

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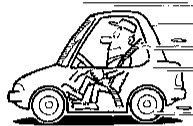
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EL

IDX

A/T Control Unit Terminals and Reference Values (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	When setting selector lever to "N" or "P" position.	1V or less
		When setting selector lever to other positions.	Approximately 5V
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 (System)	—	—
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) (for OBD-II).

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









Terminal No.	Item	Condition	Judgement standard
19	Inhibitor "N" or "P" position switch	When setting selector lever to "N" or "P" position.	Battery voltage
		When setting selector lever to other positions.	1V or less
20	Inhibitor "R" position switch	When setting selector lever to "R" position.	Battery voltage
		When setting selector lever to other positions.	1V or less
21	Wide open throttle position switch (in throttle position switch)	When depressing accelerator pedal more than half-way after warming up engine.	Battery voltage
		When releasing accelerator pedal after warming up engine.	1V or less
22	—	—	—
23	Power source (Memory back-up)	When turning ignition switch to OFF.	Battery voltage
		When turning ignition switch to ON.	Battery voltage
24	Engine speed signal	When engine runs at idle speed.	0.6 - 1.6V**
25	Revolution sensor (Measure in AC range)	When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
		When vehicle parks.	0V
26	—	—	—
27	Vehicle speed sensor	When moving vehicle at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Voltage varies between less than 1V and more than 4.5V
28*	—	—	—
29*	—	—	—
30*	—	—	—
31	Throttle position sensor (Power source)	—	4.5 - 5.5V
32	—	—	—

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

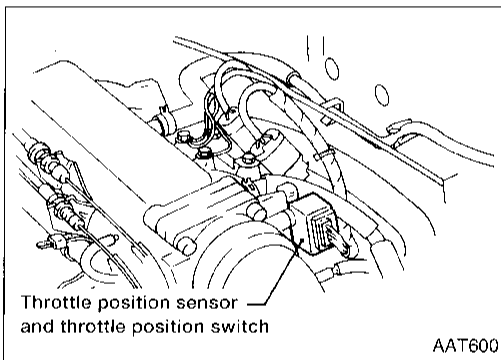
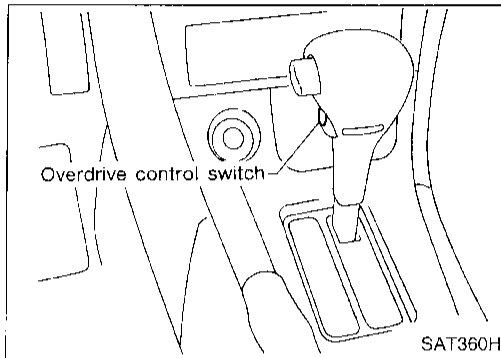
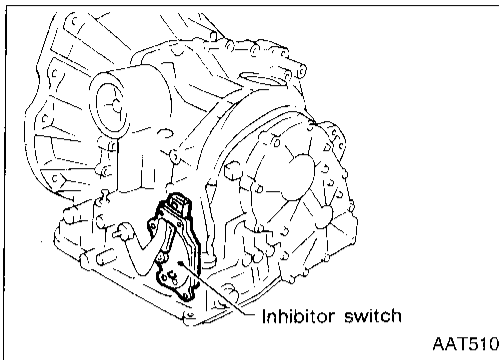
** : Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

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

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

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



Inhibitor, Overdrive Control and Throttle Position Switch

DESCRIPTION

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

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: INHIBITOR SWITCH	A/T control unit does not receive the correct voltage signal from the switch based on the gear position.	<ul style="list-style-type: none"> • Harness or connectors (The switch circuit is open or shorted.) • Inhibitor switch
: P0705		
: Does not come on		

Diagnostic trouble code (DTC) confirmation procedure

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

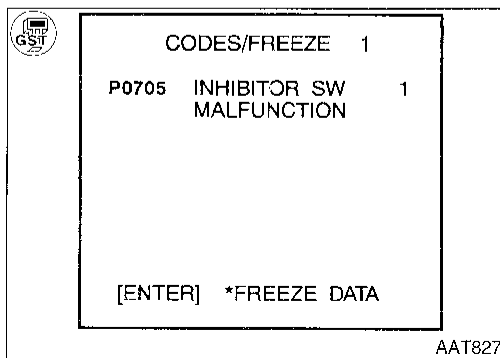
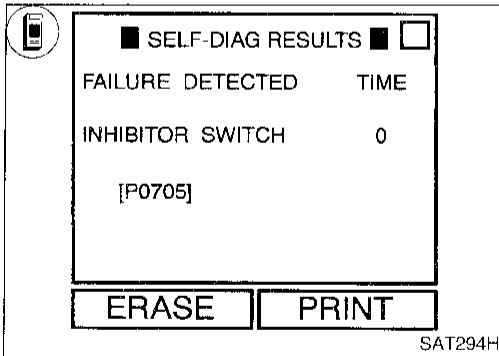
- 1) Start engine.
2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
- 3) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in OFF position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and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

OR

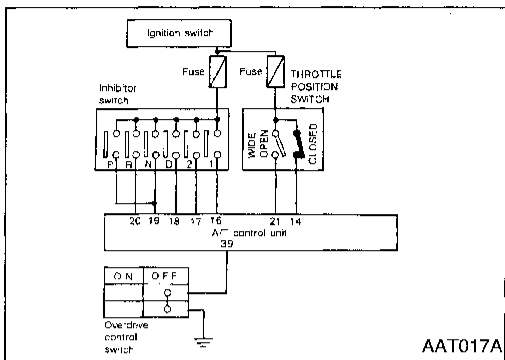
- 1) Start engine.
2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in OFF position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
- 3) Select "MODE 7" with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

OR

- 1) Start engine.
2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in OFF position, vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 5 seconds.
- 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].



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

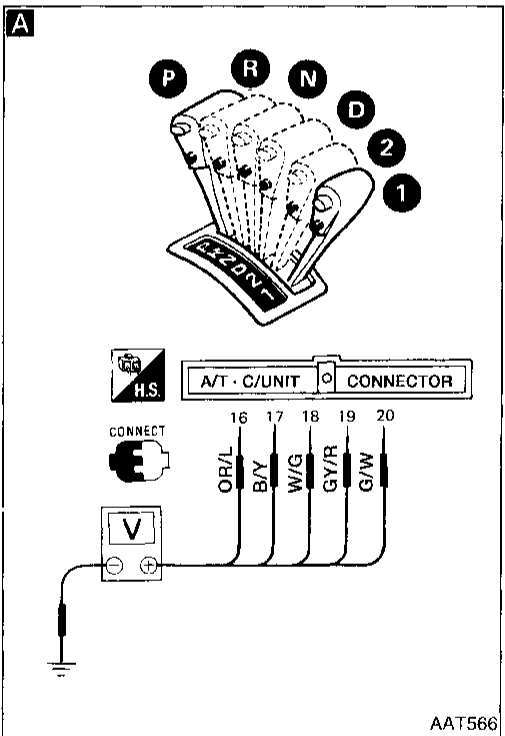


A

☆ 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 "Component Inspection", AT-87
 - Harness for short or open between ignition switch and inhibitor switch (Main harness)
 - Harness for short or open between inhibitor switch and A/T control unit (Main harness)

OR

NO TOOLS

1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals ①⑥, ①⑦, ①⑧, ①⑨, ②① and ground while moving selector lever through each position.

Voltage:
B: Battery voltage
0: 0V

Lever position	Terminal No.				
	①⑨	②①	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
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A
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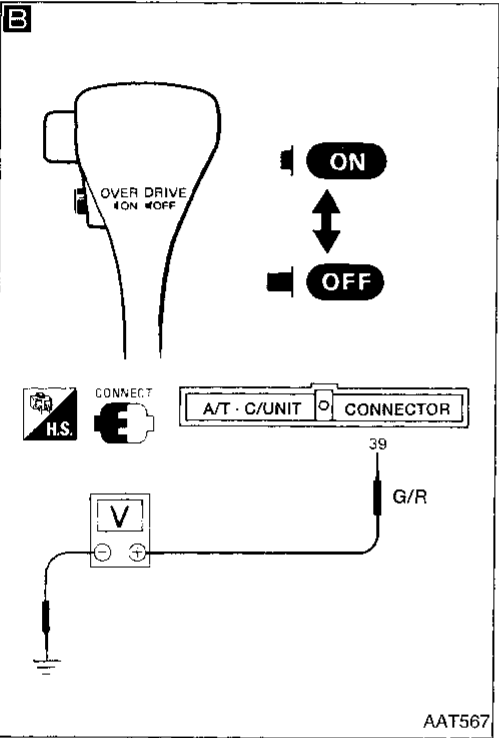
Inhibitor, Overdrive Control and Throttle Position Switch (Cont'd)

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	0rpm
OVERDRIVE SW	ON
P/N POSI SW	ON
R POSITION SW	OFF

RECORD

AAT784



B

CHECK OVERDRIVE CONTROL SWITCH CIRCUIT.

1. Turn ignition switch to ON position. (Do not start engine.)
2. Select "ECU INPUT SIGNALS" in Data Monitor.
3. Read out "OVERDRIVE SWITCH".

Check the signal of the overdrive control switch is indicated properly. (Overdrive control switch ON displayed on CONSULT means overdrive OFF.)

- NG →
- Check the following items:
- Overdrive control switch. Refer to "Component Inspection", AT-87
 - Harness for short or open between A/T control unit and overdrive control switch (Main harness)
 - Harness of ground circuit for overdrive control switch (Main harness) for short or open

OR

NO TOOLS

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

Overdrive control switch position	Voltage
ON	Battery voltage
OFF	1V or less

OK

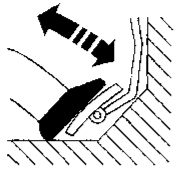
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MA
EM
LC
EC
FE
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IDX

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

C

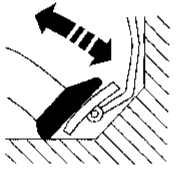
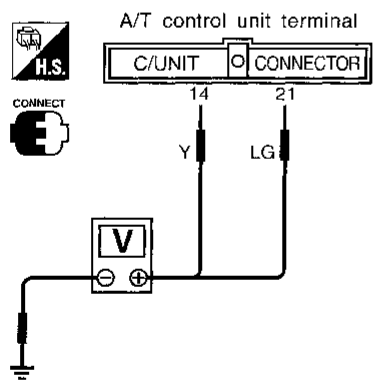


☆ MONITOR	☆ NO FAIL	
D POSITION SW	OFF	
2 POSITION SW	OFF	
1 POSITION SW	OFF	
ASCD • CRUISE	OFF	
ASCD • OD CUT	OFF	
KICKDOWN SW	OFF	
POWERSHIFT SW	OFF	
CLOSED THL/SW	ON	
W/O THRL/P-SW	OFF	

RECORD

SAT963H

C

A/T control unit terminal

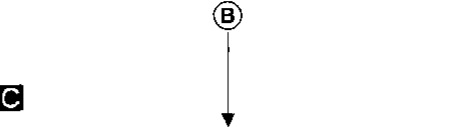
C/UNIT 14

CONNECTOR 21

Y LG

V

SAT964HA



C

CHECK THROTTLE POSITION SWITCH CIRCUIT.

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

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

3. Read out "CLOSED THL/SW" and "W/O THRL/P-SW" depressing and releasing accelerator pedal.

Check that the signal of throttle position switch is indicated properly.

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

OR

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

2. Check voltage between A/T control unit terminals (14), (21) and ground while depressing and releasing accelerator pedal slowly. (after warming up engine)

Accelerator pedal condition	Voltage	
	Terminal No. (14)	Terminal No. (21)
Released	Battery voltage	1V or less
Fully depressed	1V or less	Battery voltage

NG

Check the following items:

- Throttle position switch. Refer to "Component Inspection", AT-87
- Harness for short or open between ignition switch and throttle position switch (Main harness)
- Harness for short or open between throttle position switch and A/T control unit (Main harness)

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-83.

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

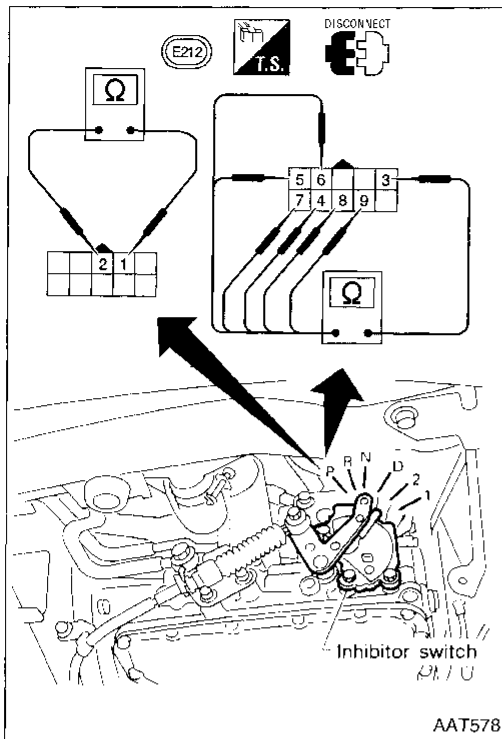
Inhibitor, Overdrive Control and Throttle Position Switch (Cont'd)

COMPONENT INSPECTION

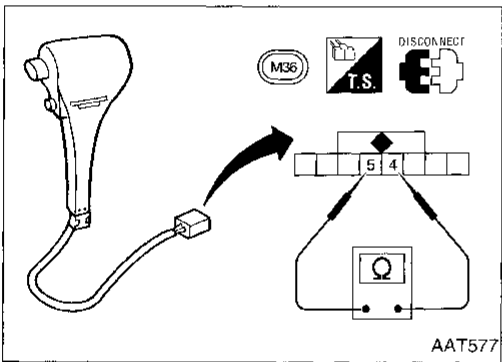
Inhibitor switch

- 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 position.

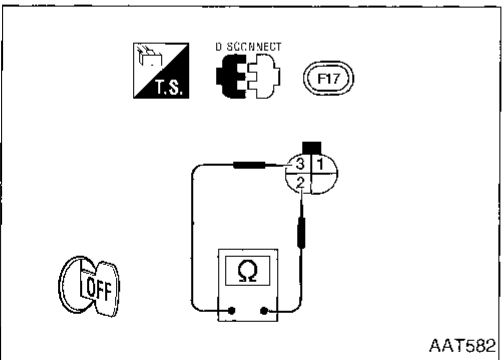
Lever position	Terminal No.
P	③ — ④, ① — ②
R	③ — ⑤
N	③ — ⑥, ① — ②
D	③ — ⑦
2	③ — ⑧
1	③ — ⑨



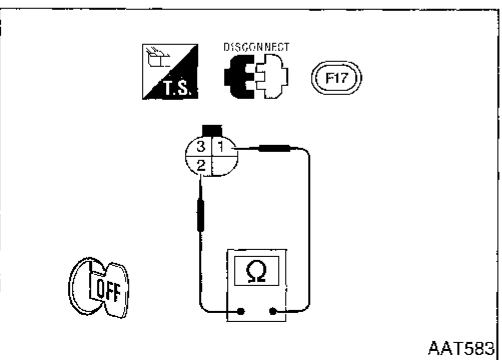
AAT578



AAT577



AAT582



AAT583

Overdrive control switch

- Check continuity between two terminals.

Overdrive control switch position	Continuity
ON	No
OFF	Yes

Throttle position switch

Closed throttle position switch (idle position)

- Check continuity between terminals ② and ③.

Accelerator pedal condition	Continuity
Released	Yes
Depressed	No

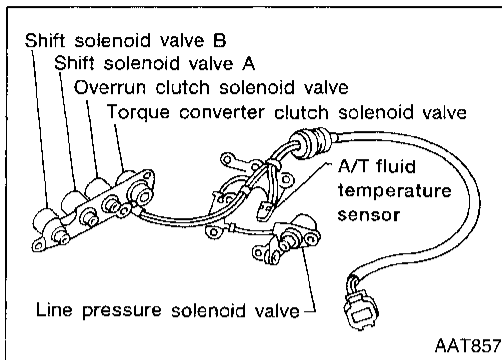
- To adjust closed throttle position switch, Refer to EC section "Basic Inspection", "TROUBLE DIAGNOSIS - General Description").

Wide open throttle position switch

- Check continuity between terminals ① and ②.

Accelerator pedal condition	Continuity
Released	No
Depressed (fully)	Yes

CI
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DX



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

DESCRIPTION

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

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

Diagnostic Trouble Code (DTC) confirmation procedure

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

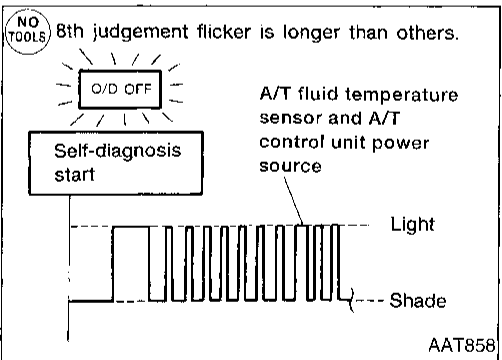
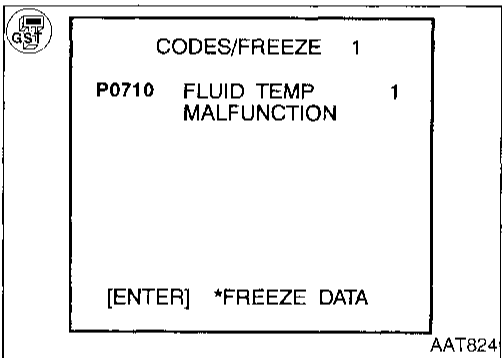
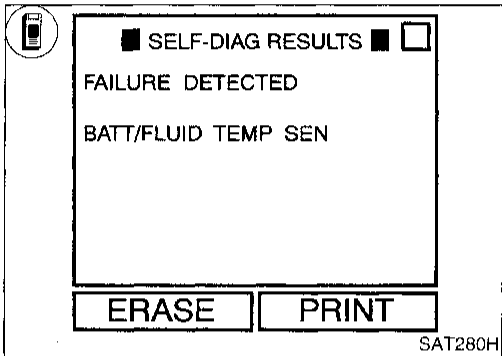
- 1) Start engine.
 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 3) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more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

OR

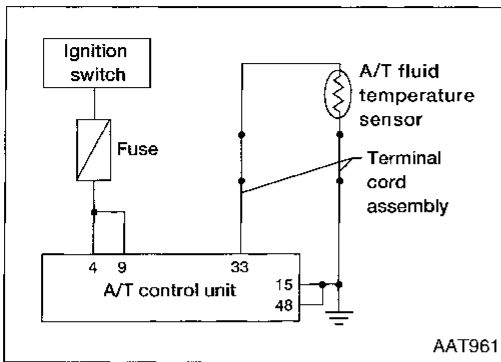
- 1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
 3) Select "MODE 7" with GST.

OR

- 1) Start engine.
 2) Drive vehicle under the following conditions:
 Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full open position, engine speed higher than 450 rpm and driving for more than 10 minutes.
 3) Perform self-diagnosis.
 Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.



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



A

CHECK A/T CONTROL UNIT POWER SOURCE.

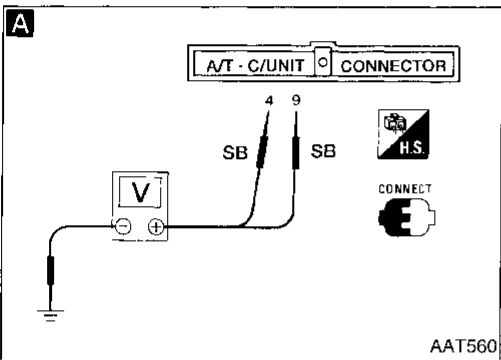
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between A/T control unit terminals (4), (9) and ground. **Battery voltage should exist.**

NG

Check the following items:

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

GI
MA
EM
LC



B

CHECK A/T FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

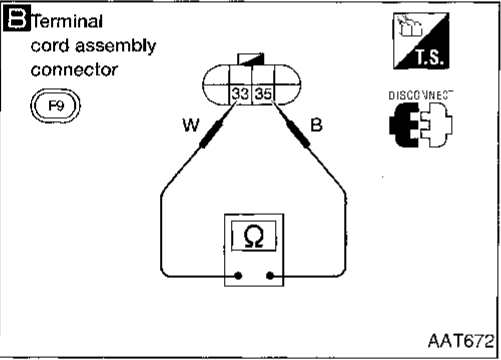
1. Turn ignition switch to OFF position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals (33) and (35) when A/T is cold. **Resistance: Cold [20°C (68°F)] Approximately 2.5 kΩ**
4. Reinstall any part removed.

NG

1. Remove oil pan.
2. Check the following items:
 - A/T fluid temperature sensor (Refer to "Component Inspection", on the next page.)
 - Harness of terminal cord assembly for short or open

EC
FE
CL
MT

AT



OK

(A)

(Go to next page.)

FA
RA
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ST
RS
BT
FA
EL
IDX

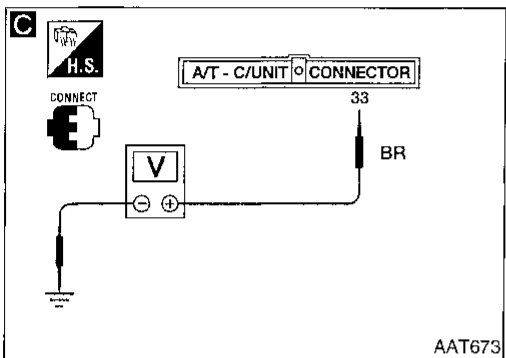
A/T Fluid Temperature Sensor and A/T Control Unit Power Source (Cont'd)

C

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

RECORD

SAT076H



C

CHECK INPUT SIGNAL OF A/T FLUID TEMPERATURE SENSOR.

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

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

OR

- Start engine.
- Check voltage between A/T control unit terminal (33) and ground while warming up A/T.

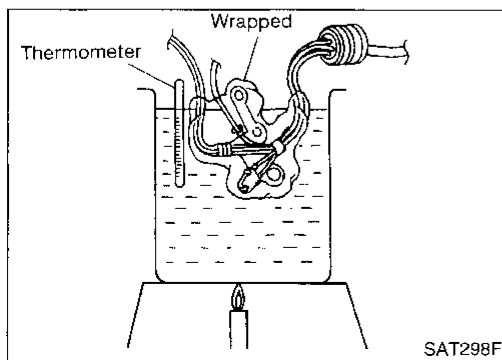
Voltage:
Cold [20°C (68°F)] →
Hot [80°C (176°F)]:
Approximately
1.5V → 0.5V

NG → Check the following item:
 • Harness for short or open between A/T control unit and terminal cord assembly (Main harness)

OK → Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-88.

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

OK → **INSPECTION END**

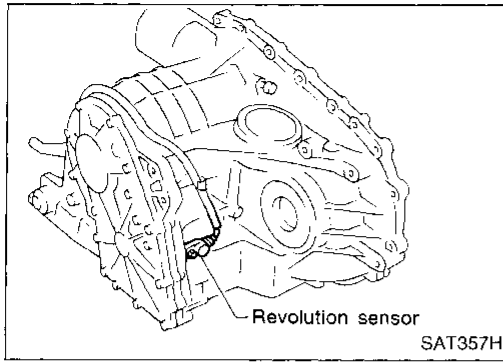


COMPONENT INSPECTION

A/T fluid temperature sensor

- For removal, refer to AT-172.
- Check resistance between terminals (33) and (35) while changing temperature as shown at left.

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

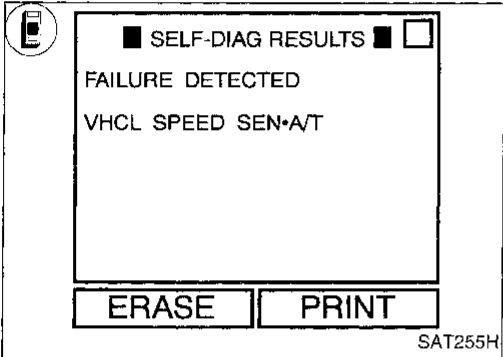


Vehicle Speed Sensor-A/T (Revolution Sensor)

DESCRIPTION

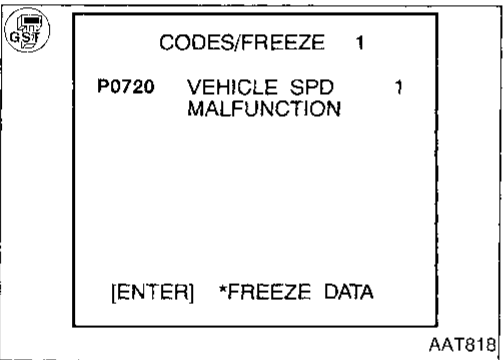
The revolution sensor detects the revolution of the idler gear and emits a pulse signal. The pulse signal is sent to the A/T control unit which converts it into vehicle speed.

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



Diagnostic Trouble Code (DTC) confirmation procedure

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



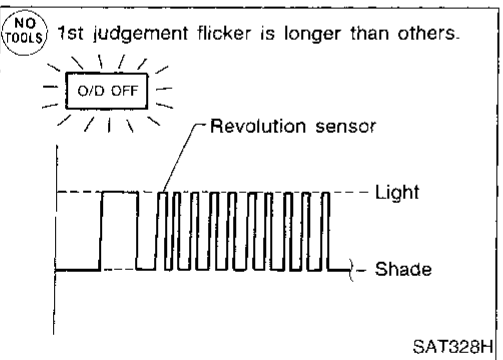
- 1) Start engine.
- 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
- 3) Drive vehicle under the following conditions: Selector lever in "D", vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.

OR

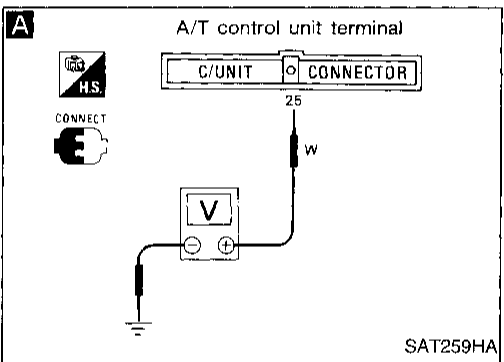
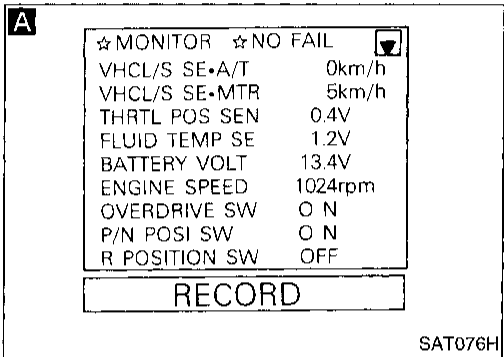
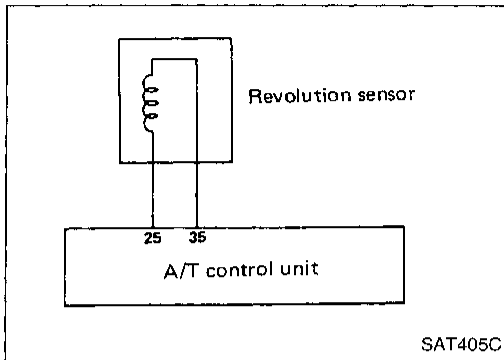
- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", vehicle speed higher than 30 km/h (19 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 5 seconds.
- 3) Select "MODE 7" with GST.

OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", vehicle speed higher than 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-DIAGNOSTIC PROCEDURE (No Tools), AT-48.



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



CHECK REVOLUTION SENSOR.
Refer to "COMPONENT INSPECTION", on this page.

NG → Repair or replace revolution sensor.

OK ↓

A
CHECK INPUT SIGNAL.

- Start engine.
- Select "ECU INPUT SIGNALS" in Data Monitor.
- 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 for short or open between A/T control unit and revolution sensor (Main harness)
- Harness for short or open between revolution sensor and ECM (Main harness)
- Ground circuit for ECM Refer to EC section "TROUBLE DIAGNOSIS FOR POWER SUPPLY".

OR

NO TOOLS

- Start engine.
- 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 Diagnostic Trouble Code (DTC) confirmation procedure, AT-91.

NG →

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

OK ↓

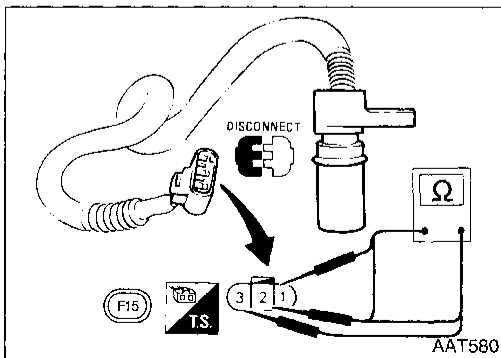
INSPECTION END

COMPONENT INSPECTION

Revolution sensor

- For Removal and Installation, refer to AT-176.
- Check resistance between terminals ①, ② and ③.




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

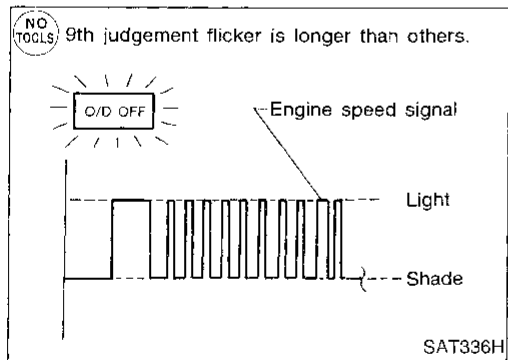
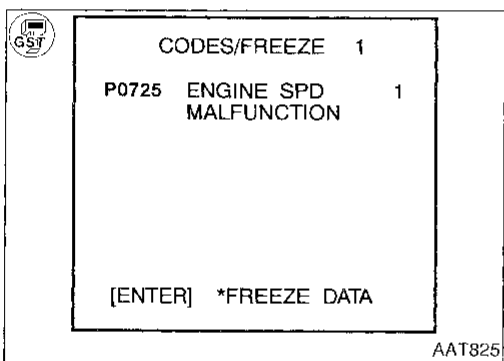
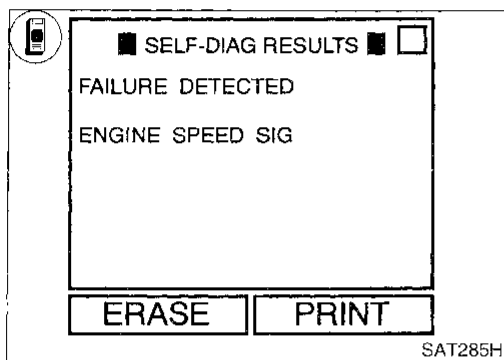


Engine Speed Signal

DESCRIPTION

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

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
<ul style="list-style-type: none">  : ENGINE SPEED SIG  : P0725  : 9th judgement flicker 	A/T control unit does not receive the proper voltage signal from ECM.	<ul style="list-style-type: none"> ● Harness or connectors (The sensor circuit is open or shorted.)



Diagnostic Trouble Code (DTC) confirmation procedure

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

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

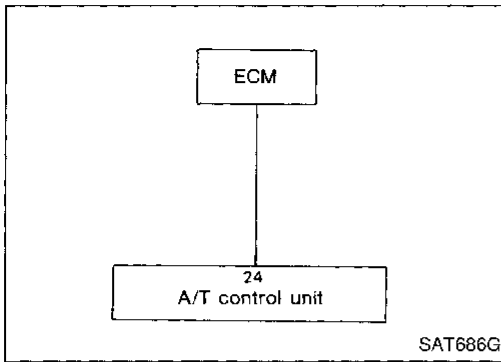
OR

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

OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/8 of the full throttle position and driving for more than 10 seconds.
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

Engine Speed Signal (Cont'd)



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

NG → Check ignition signal circuit for engine control. Refer to EC section ["Ignition signal (DTC:0201)", "TROUBLE DIAGNOSIS FOR DTC P1320"].

OK ↓

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 INPUT SIGNAL.

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

NG → Check the following items:

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

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

OR

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

OK ↓

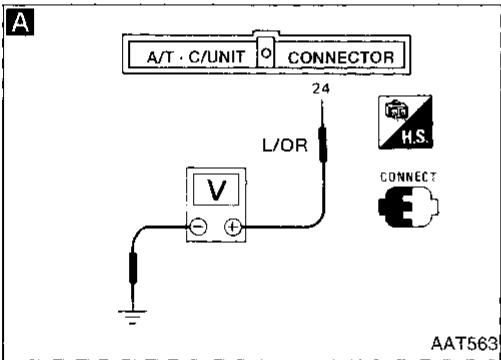
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-93.

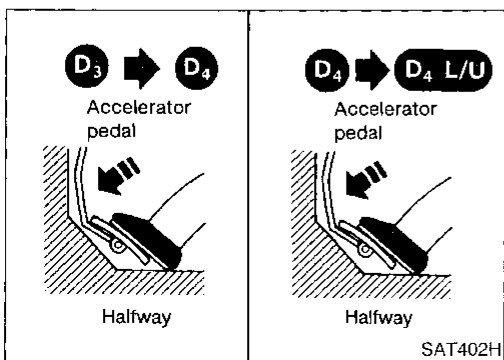
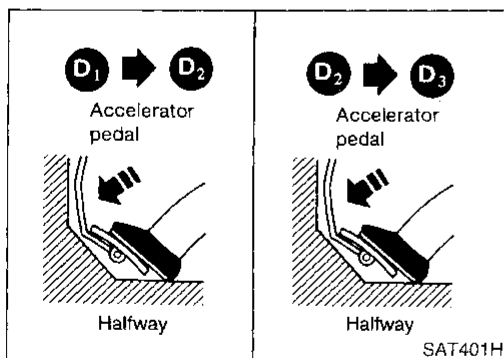
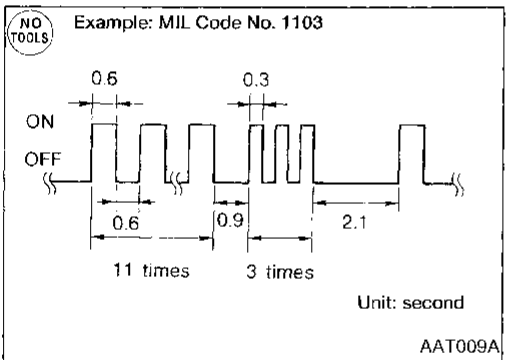
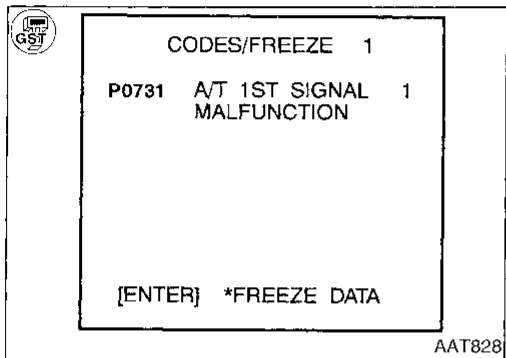
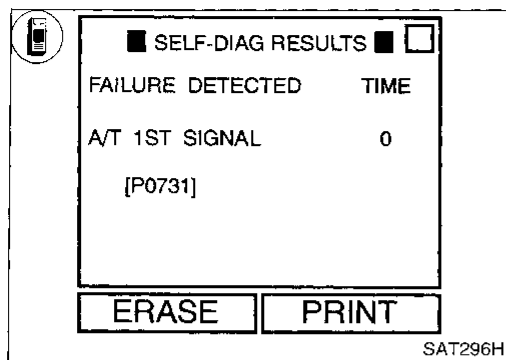
NG →

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

OK ↓

INSPECTION END





Improper Shifting to 1st Gear Position

DESCRIPTION

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

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

Diagnostic Trouble Code (DTC) confirmation procedure

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

- (NO TOOLS) 1) Start engine and warm up ATF.
 (NO TOOLS) 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 (NO TOOLS) 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.

OR

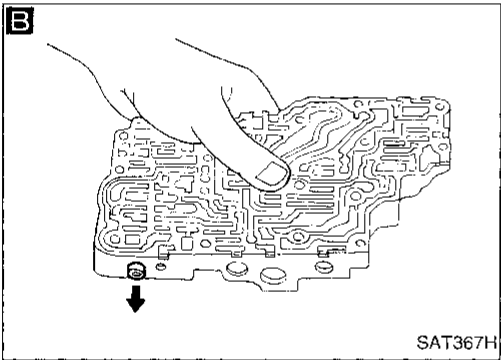
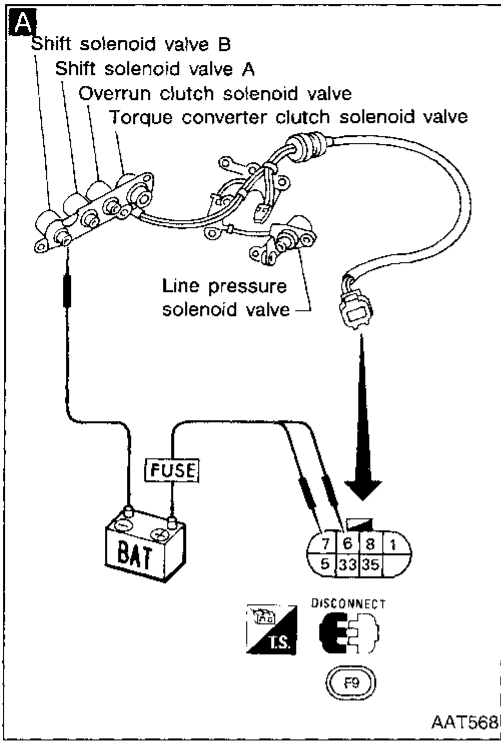
- (GST) 1) Start engine and warm up ATF.
 (GST) 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
 (GST) 3) Select "MODE 7" with GST.

OR

- (NO TOOLS) 1) Start engine and warm up ATF.
 (NO TOOLS) 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.

- (NO TOOLS) 3) Perform self-diagnosis for ECM.
 Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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



A

CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-172.
2. Check shift solenoid valve operation.
 - Shift solenoid valve "A"
 - Shift solenoid valve "B"
 Refer to "Components Inspection", on the next page.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-226.
2. Check to ensure that:
 - Valve, sleeve and plug slide along valve bore under their own weight.
 - Valve, sleeve and plug are free from burrs, dents and scratches.
 - Control valve springs are free from damage, deformation and fatigue.
 - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-95.

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

OK ↓

INSPECTION END

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

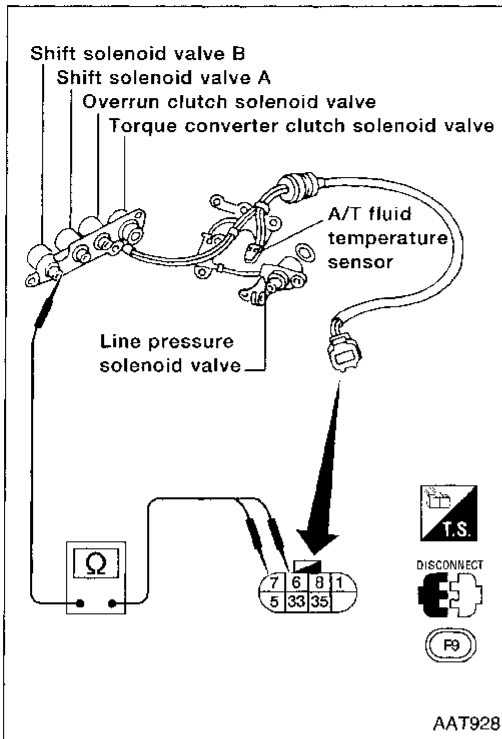
COMPONENT INSPECTION

Shift solenoid valve A and B

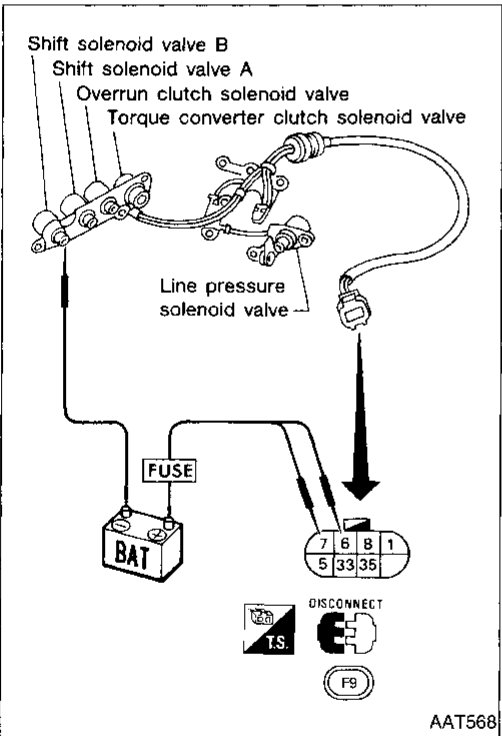
- For Removal and Installation, Refer to AT-172.

Resistance check

- Check resistance between two terminals.



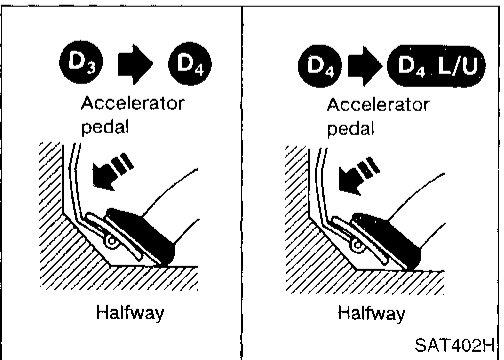
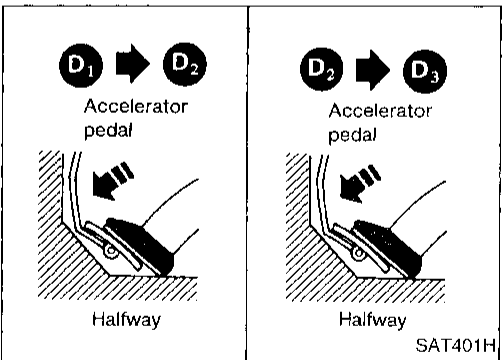
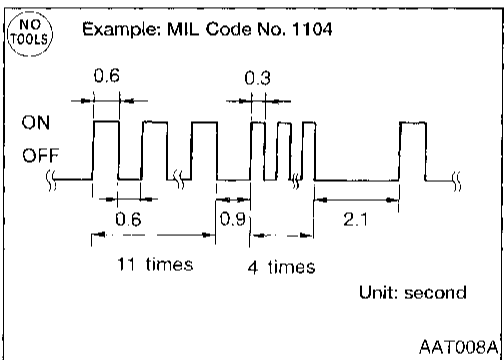
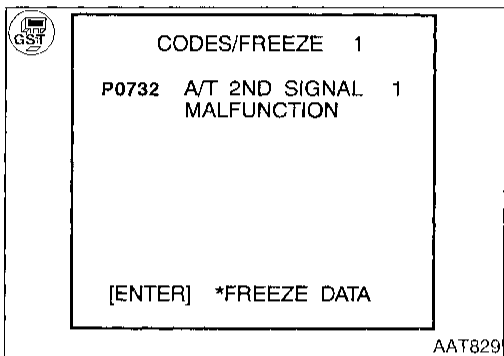
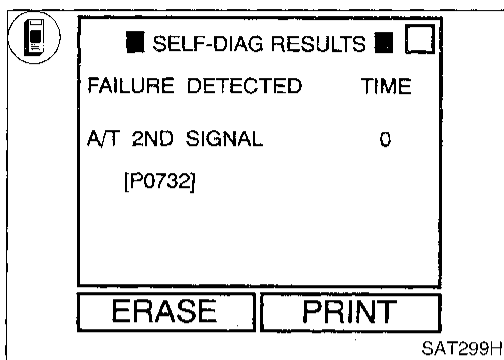
Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve "A"	⑥	Ground (Bracket)
Shift solenoid valve "B"	⑦	



Operation check

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

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Improper Shifting to 2nd Gear Position

DESCRIPTION

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

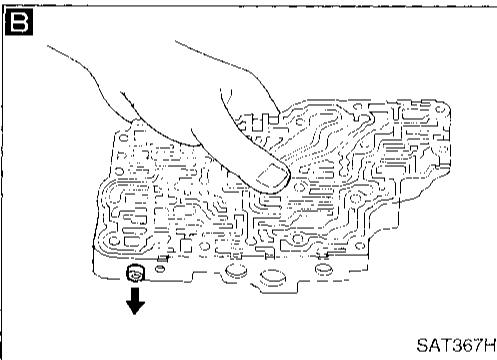
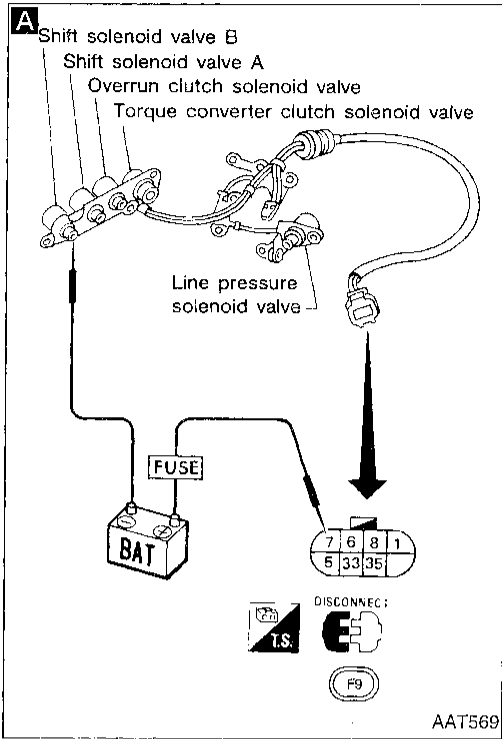
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 2ND SIGNAL : P0732 : MIL Code No. 1104	A/T cannot be shifted to the 1st gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve B • Each clutch • Hydraulic control circuit

Diagnostic Trouble Code (DTC) confirmation procedure

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

- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Perform self-diagnosis for ECM.
Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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



A

CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-172.
2. Check shift solenoid valve operation.
 - Shift solenoid valve B
Refer to "Component Inspection", on the next page.

NG → Repair or replace shift solenoid valve assembly.

OK ↓

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-226.
2. Check to ensure that:
 - Valve, sleeve and plug slide along valve bore under their own weight.
 - Valve, sleeve and plug are free from burrs, dents and scratches.
 - Control valve springs are free from damage, deformation and fatigue.
 - Hydraulic line is free from obstacles.

NG → Repair control valve assembly.

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-98.

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

OK ↓

INSPECTION END

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

COMPONENT INSPECTION

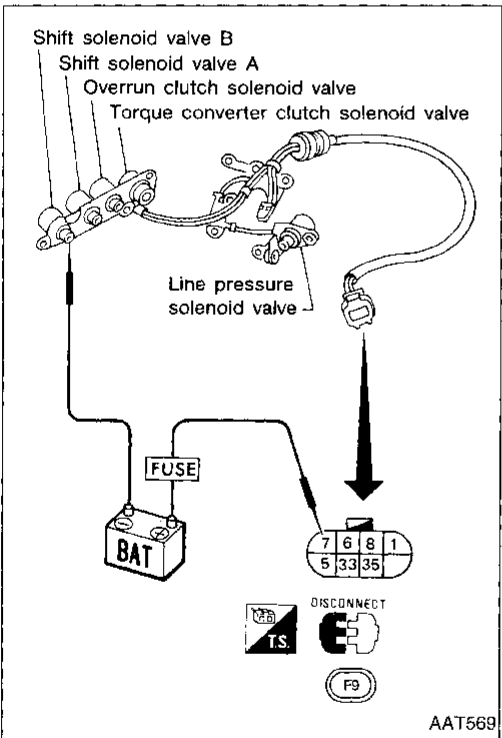
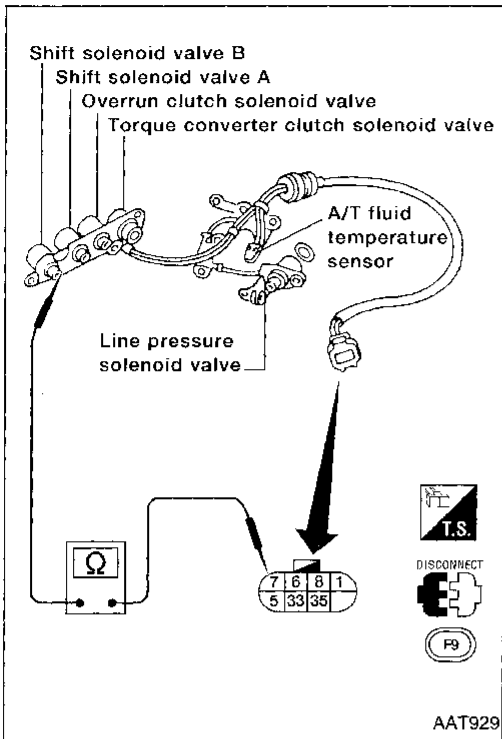
Shift solenoid valve B

- For Removal and Installation, Refer to AT-172.

Resistance check

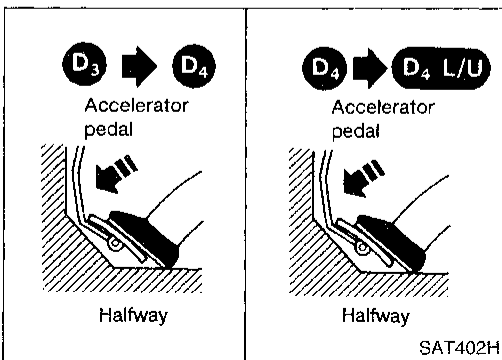
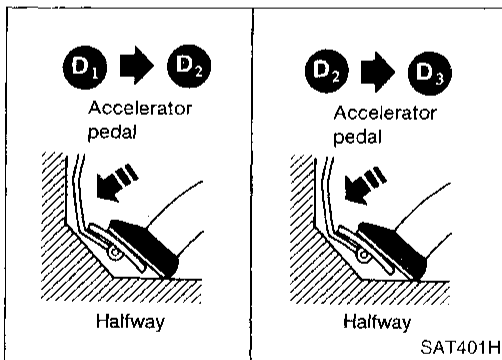
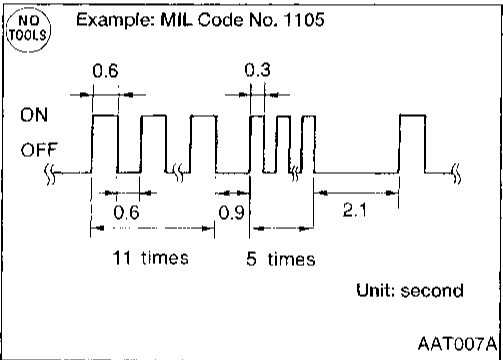
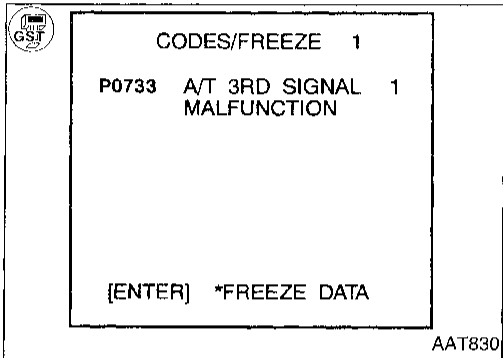
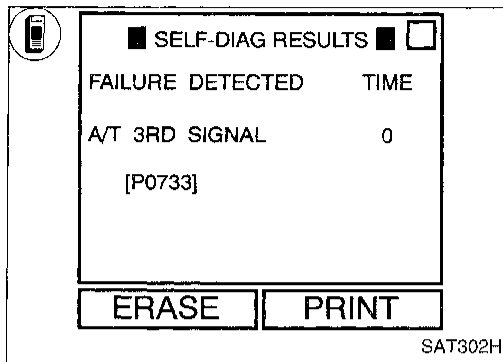
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve "B"	⑦	Ground (Bracket)	20 - 30Ω



Operation check

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



Improper Shifting to 3rd Gear Position

DESCRIPTION

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

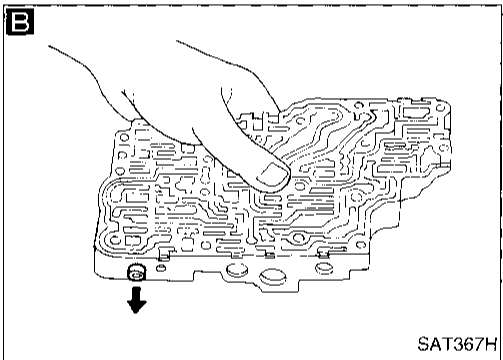
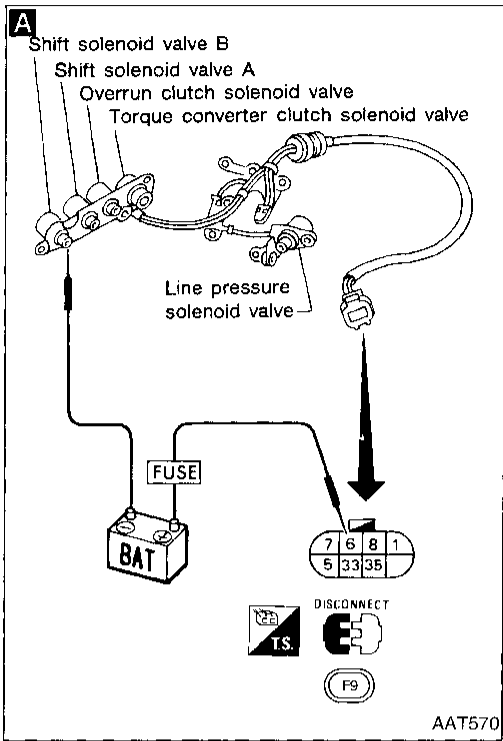
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: A/T 3RD SIGNAL : P0732 : MIL Code No. 1105	A/T cannot be shifted to the 3rd gear position even if electrical circuit is good.	<ul style="list-style-type: none"> • Shift solenoid valve A • Each clutch • Hydraulic control circuit

Diagnostic Trouble Code (DTC) confirmation procedure

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

- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

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



A

CHECK SHIFT SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-172.
2. Check shift solenoid valve operation.
 - Shift solenoid valve "A"
 Refer to "Component Inspection", on the next page.

NG → Repair or replace shift solenoid valve assembly.

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-226.
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.

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-101.

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

INSPECTION END

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

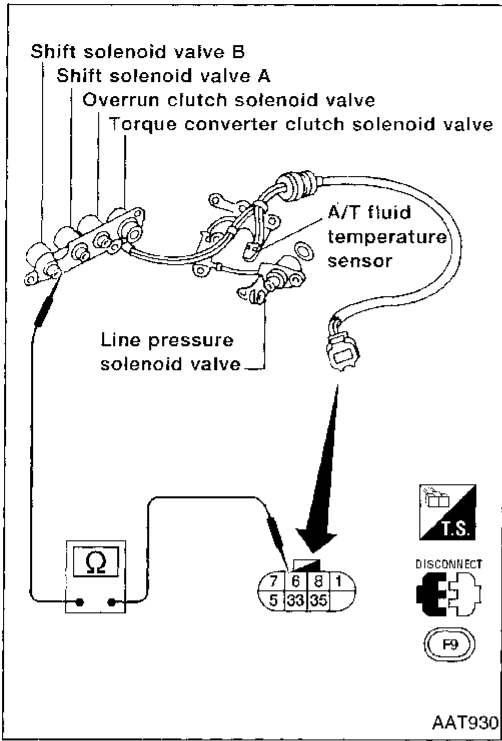
COMPONENT INSPECTION

Shift solenoid valve A

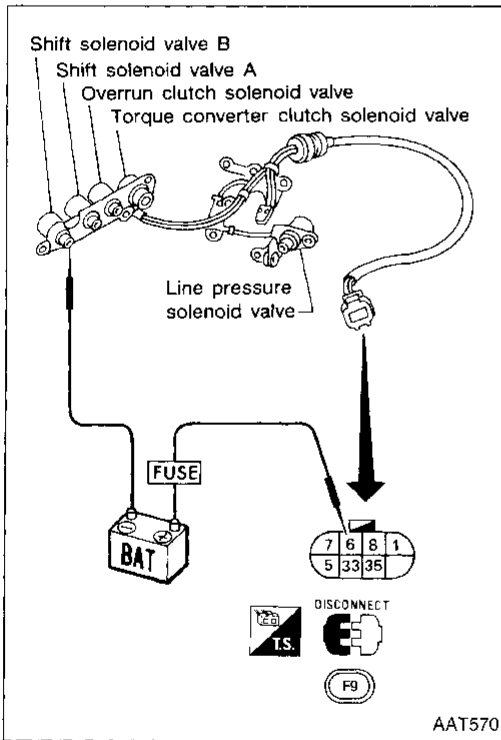
- For Removal and Installation, Refer to AT-172.

Resistance check

- Check resistance between two terminals.



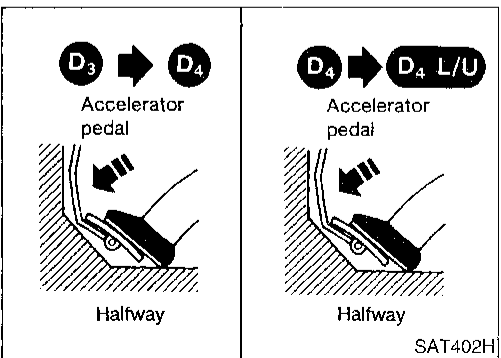
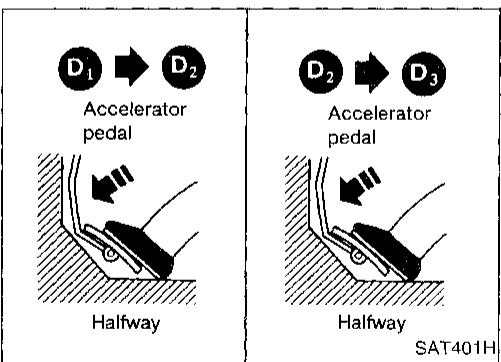
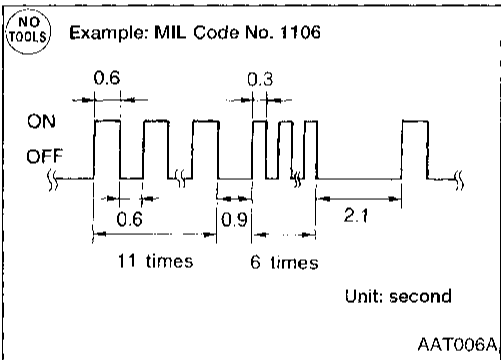
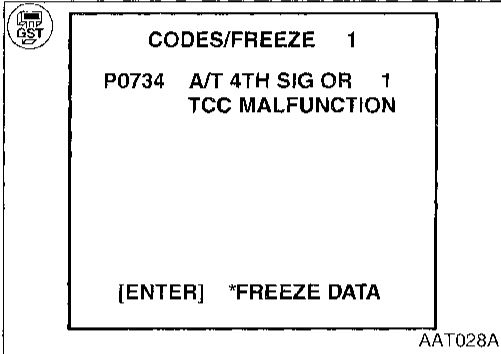
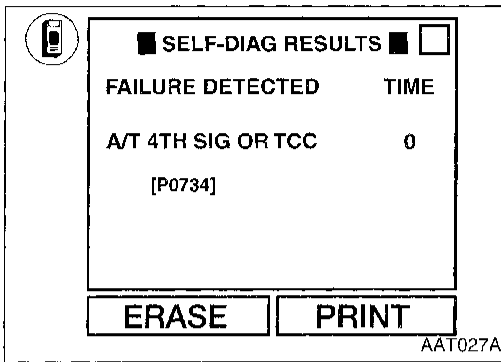
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve "A"	⑥	Ground (Bracket)	20 - 30Ω



Operation check

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

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Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch

DESCRIPTION

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

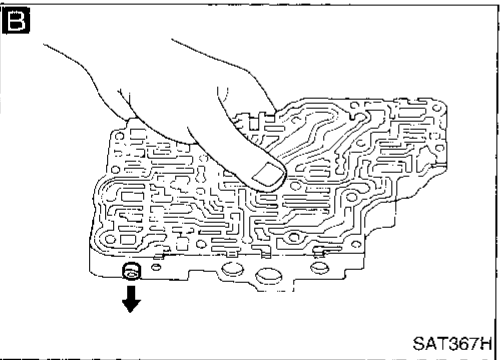
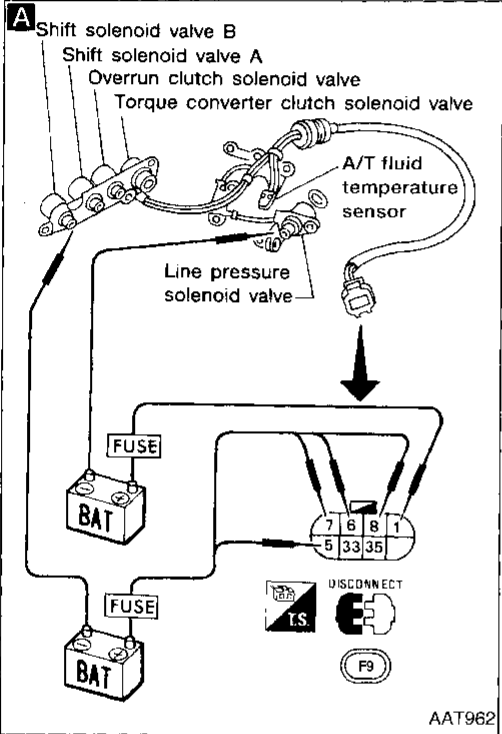
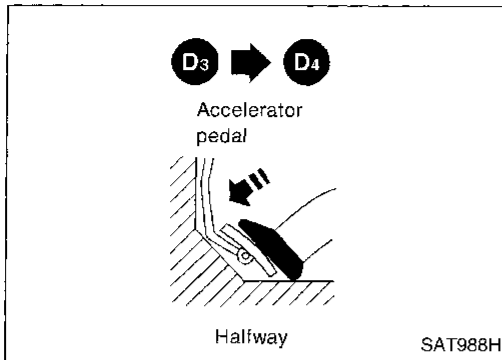
Diagnostic Trouble Code (DTC) confirmation procedure

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

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

- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-73.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)

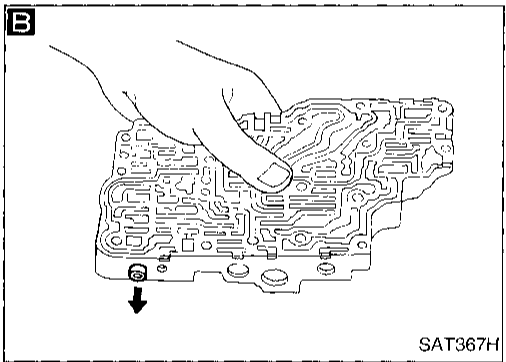
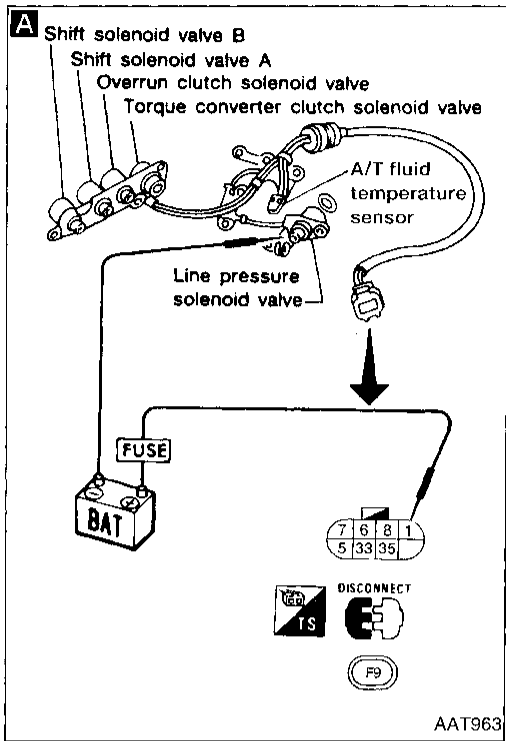


```

    graph TD
        Start[During "Cruise Test — Part 1", AT-69, does A/T shift from D3 to D4 at the specified speed?] -- Yes --> YesBox[Go to (B), AT-115 and check for proper lock-up.]
        Start -- No --> Pressure[Perform pressure test. Refer to AT-152.]
        Pressure -- NG --> ABox[Go to (A), AT-114.]
        Pressure -- OK --> A[A]
        
        subgraph A [A]
            ABox[A]
            AText[CHECK SOLENOID VALVES.  
1. Remove control valve assembly. Refer to AT-172.  
2. Check solenoid valve assembly operation. Refer to "Component Inspection", AT-116.]
        end
        
        AText -- NG --> Replace[Replace solenoid valve assembly.]
        AText -- OK --> B[B]
        
        subgraph B [B]
            BBox[B]
            BText[CHECK CONTROL VALVE.  
1. Disassemble control valve assembly. Refer to AT-226.  
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.]
        end
        
        BText -- NG --> Repair[Repair control valve.]
        BText -- OK --> ShiftCheck[Does A/T shift from D3 to D4 at the specified speed?]
        
        ShiftCheck -- NG --> Recheck[Check control valve again. Repair or replace control valve assembly.]
        ShiftCheck -- OK --> DTC[Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-104.]
        
        DTC -- NG --> B2[Go to (B), AT-115 and check for proper lock-up.]
        DTC -- OK --> End[INSPECTION END]
    
```

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Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)



A

CHECK LINE PRESSURE SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-172.
2. Check line pressure solenoid valve operation. Refer to "Component Inspection", AT-116.

NG → Replace solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-226.
2. Check line pressure circuit valves for sticking.
 - Pressure regulator valve
 - Pilot valve
 - Pressure modifier valve

NG → Repair control valve.

OK

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

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

OK

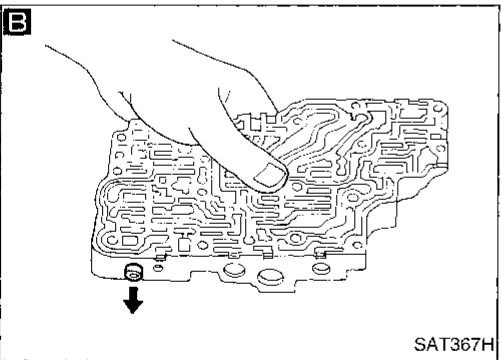
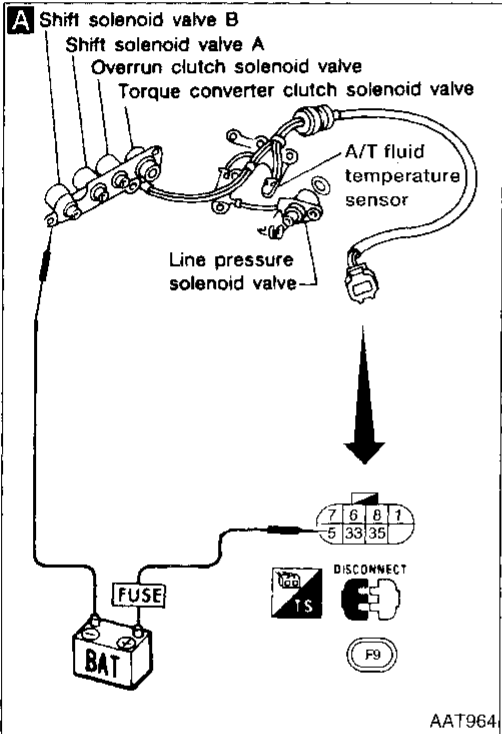
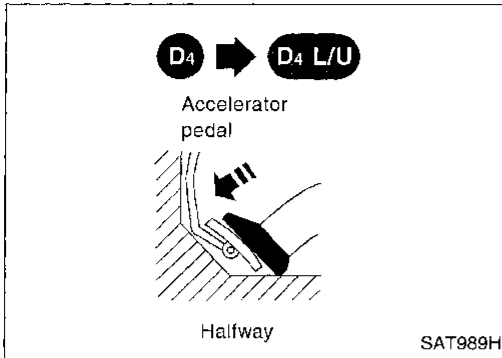
Perform Diagnostic Trouble Code (DTC) confirmation procedure AT-104.

NG → Go to **(B)**, AT-115 and check for proper lock-up.

OK

INSPECTION END

Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)



(B)

```

    graph TD
        Q1[During "Cruise Test — Part 1", AT-69, does A/T perform lock-up at the specified speed?]
        Q1 -- Yes --> A1[Perform "Cruise Test — Part 1" again and return to the start point of this flow chart.]
        Q1 -- No --> A2[A]
        
        subgraph A [A]
            C1[CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE.  
1. Remove control valve assembly. Refer to AT-172.  
2. Check torque converter clutch solenoid valve operation. Refer to "Component Inspection", on the next page.]
            C1 -- NG --> R1[Replace solenoid valve assembly.]
            C1 -- OK --> B
        end
        
        subgraph B [B]
            C2[CHECK CONTROL VALVE.  
1. Disassemble control valve assembly. Refer to AT-226.  
2. Check control valves for sticking.  
• Torque converter clutch control valve  
• Torque converter clutch relief valve]
            C2 -- NG --> R2[Repair control valve.]
            C2 -- OK --> Q2
        end
        
        Q2[Does A/T perform lock-up at the specified speed?]
        Q2 -- No --> R3[Check control valve again. Repair or replace control valve assembly.]
        Q2 -- Yes --> C3
        
        subgraph C3 [C3]
            C3[Perform "Diagnostic Trouble Code (DTC) confirmation procedure", AT-104.]
            C3 -- NG --> R4[Perform "Cruise test — Part 1" again and return to the start point of this flow chart.]
            C3 -- OK --> END[INSPECTION END]
        end
    
```

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Improper Shifting to the 4th Gear Position or Improper Torque Converter Clutch (Cont'd)

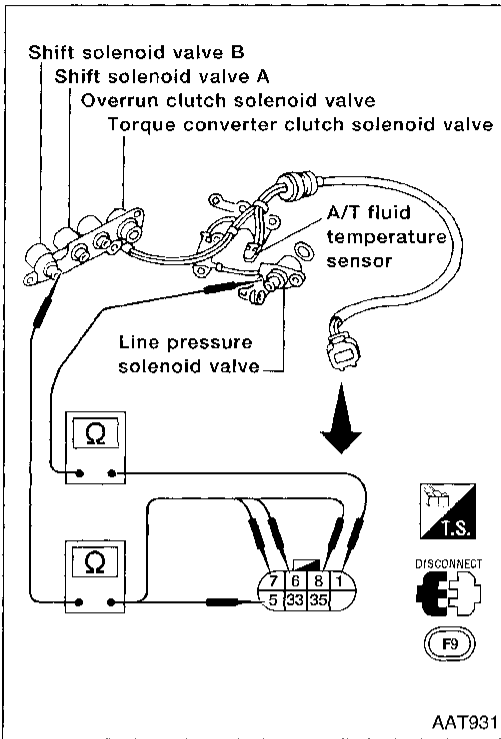
COMPONENT INSPECTION

Solenoid valves

- For Removal and Installation, Refer to AT-172.

Resistance check

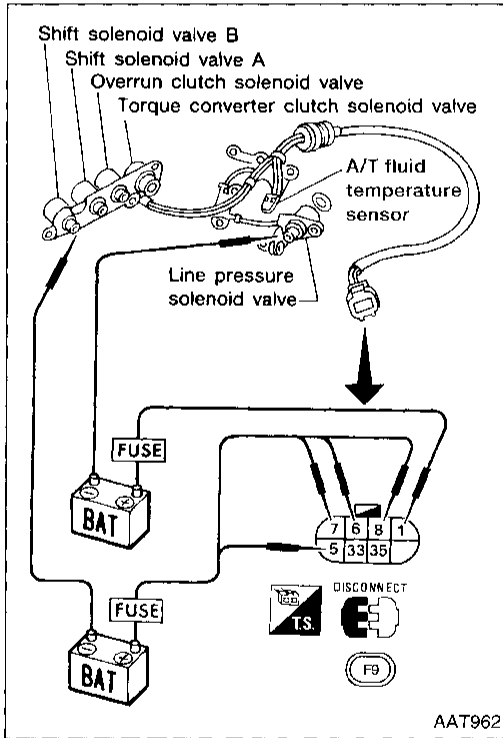
- Check resistance between two terminals.

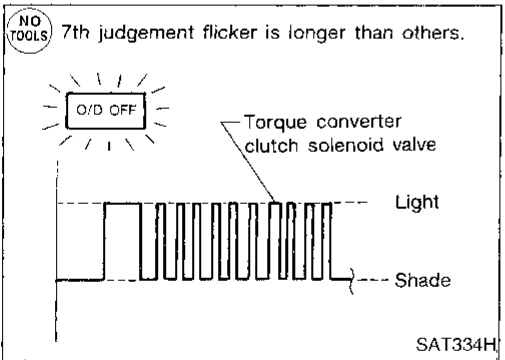
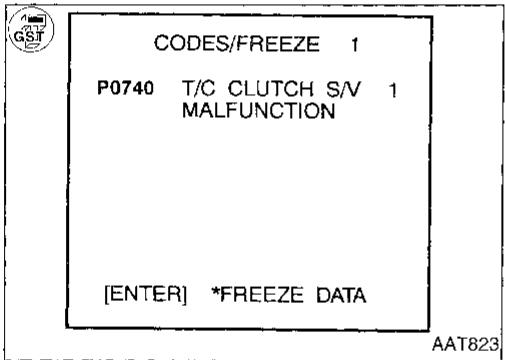
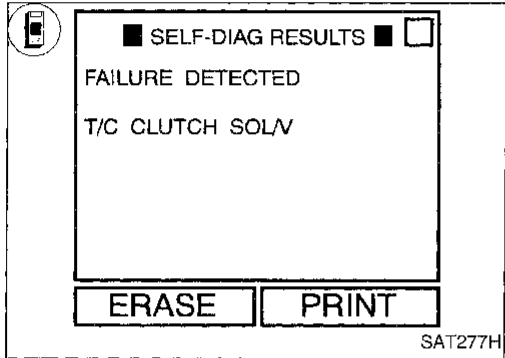
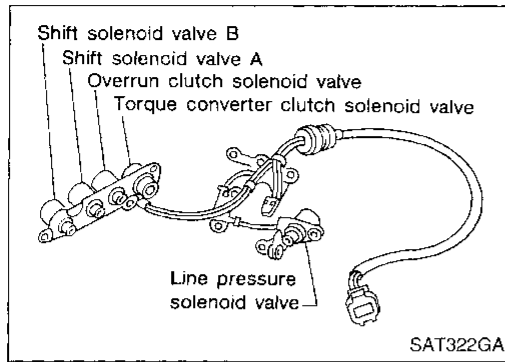


Solenoid valve	Terminal No.	Resistance (Approx.)	
Shift solenoid valve "A"	⑥	20 - 30Ω	
Shift solenoid valve "B"	⑦		
Overrun clutch solenoid valve	⑧	Ground (Bracket)	
Line pressure solenoid valve	①		2.5 - 5Ω
Torque converter clutch solenoid valve	⑤		10 - 16Ω

Operation check

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





Torque Converter Clutch Solenoid Valve

DESCRIPTION

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

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

Diagnostic Trouble Code (DTC) confirmation procedure

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

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

OR

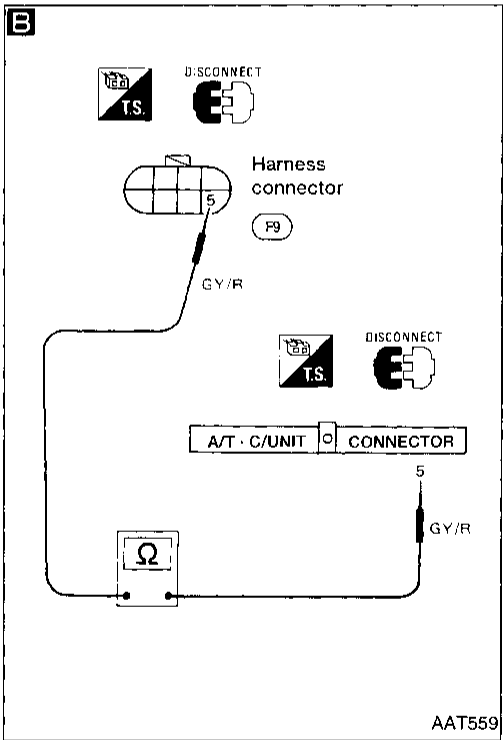
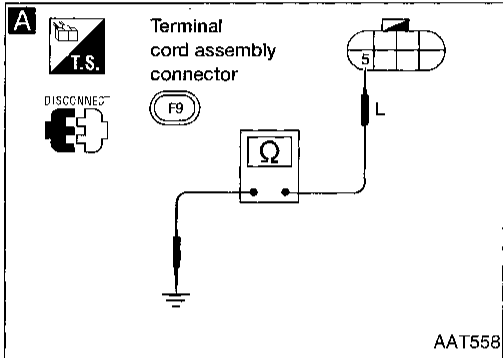
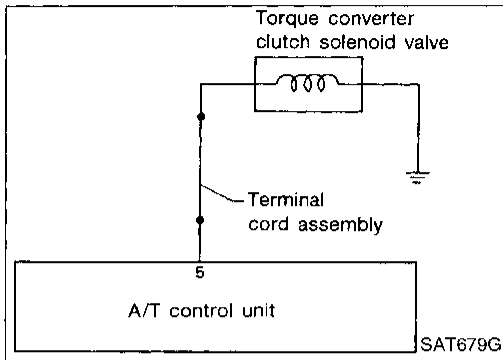
- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ lock-up position.
- 3) Select "MODE 7" with GST.

OR

- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ → D₃ → D₄ → D₄ lock-up position.
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

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Torque Converter Clutch Solenoid Valve (Cont'd)



A

CHECK GROUND CIRCUIT.

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

Resistance: 10 - 16Ω

NG

1. Remove oil pan. Refer to "ON-VEHICLE SERVICE", AT-172.
2. Check the following items:
 - Torque converter clutch solenoid valve (Refer to "Component Inspection", on the next page.)
 - Harness of terminal cord assembly for short or open

OK

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-109.

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

Torque Converter Clutch Solenoid Valve (Cont'd)

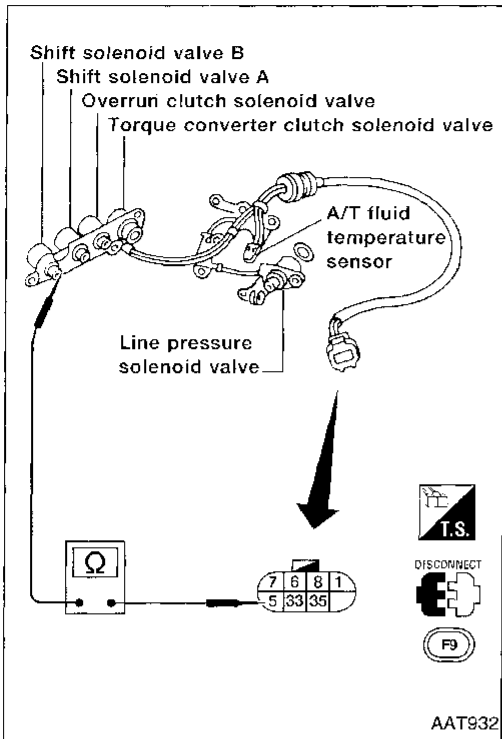
COMPONENT INSPECTION

Torque converter clutch solenoid valve

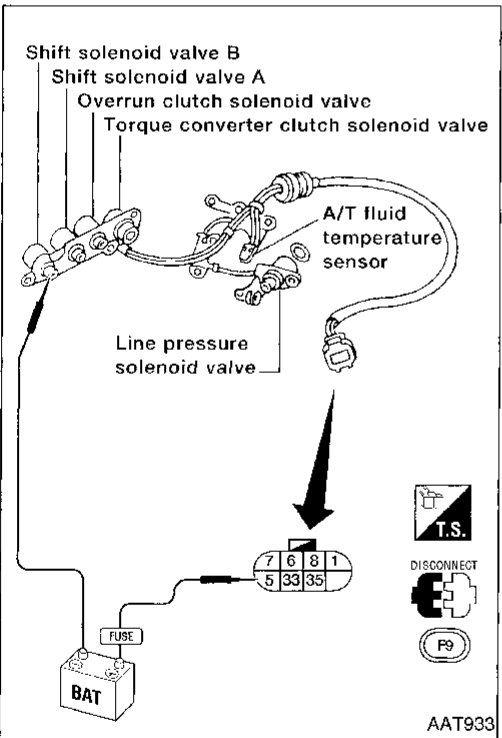
- For Removal and Installation, Refer to AT-172.

Resistance check

- Check resistance between two terminals.



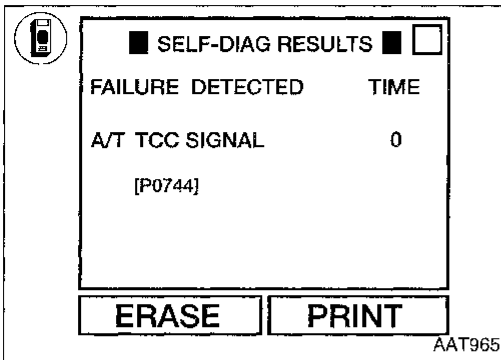
Solenoid valve	Terminal No.		Resistance (Approx.)
Torque converter clutch solenoid valve	⑤	Ground (Bracket)	10 - 16Ω



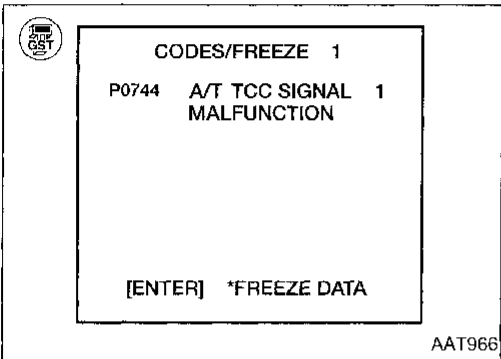
Operation check

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

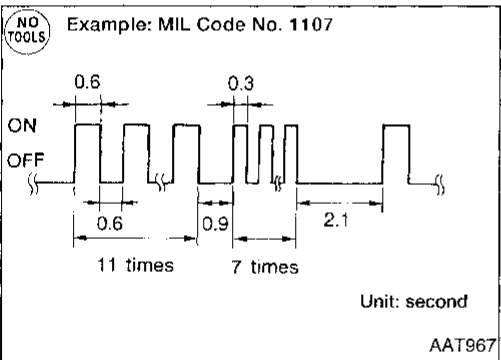
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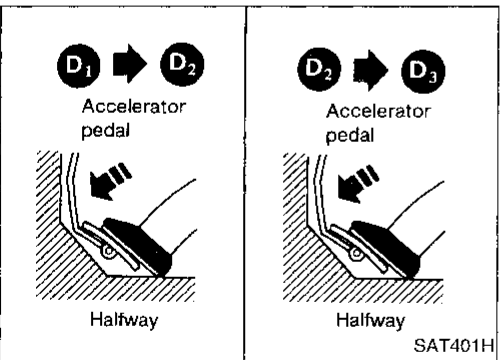
AAT965



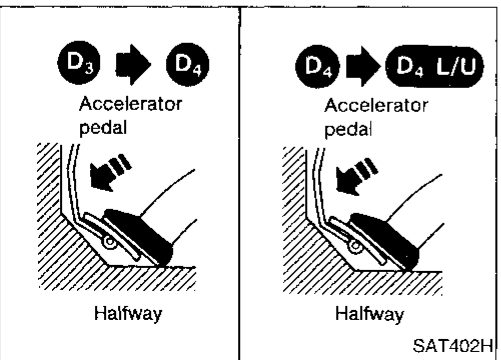
AAT966



AAT967



SAT401H



SAT402H

Improper Lock-up Operation

DESCRIPTION

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

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

Diagnostic Trouble Code (DTC) confirmation procedure

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

-
- 1) Start engine and warm up ATF.
 - 2) Select "SELF-DIAG RESULTS" mode for ECM with CONSULT.
 - 3) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-73.

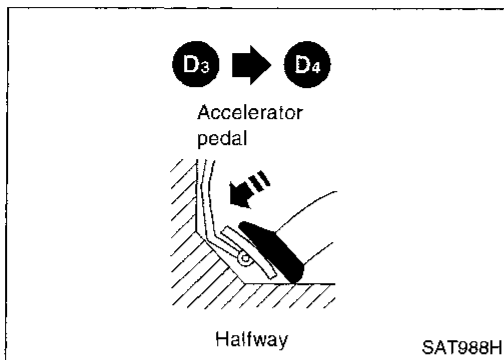
OR

-
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Select "MODE 7" with GST.

OR

-
- 1) Start engine and warm up ATF.
 - 2) Start vehicle with selector lever in "D" and throttle opening halfway. Check that vehicle runs through gear shift of D₁ → D₂ → D₃ → D₄ → D₄ lock-up, in accordance with shift schedule. Refer to shift schedule, AT-73.
 - 3) Perform self-diagnosis for ECM. Refer to EC section ["Malfunction Indicator Lamp (MIL)", "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION"].

Improper Lock-up Operation (Cont'd)



During "Cruise Test — Part 1", AT-69, does A/T shift from D₃ to D₄ at the specified speed?

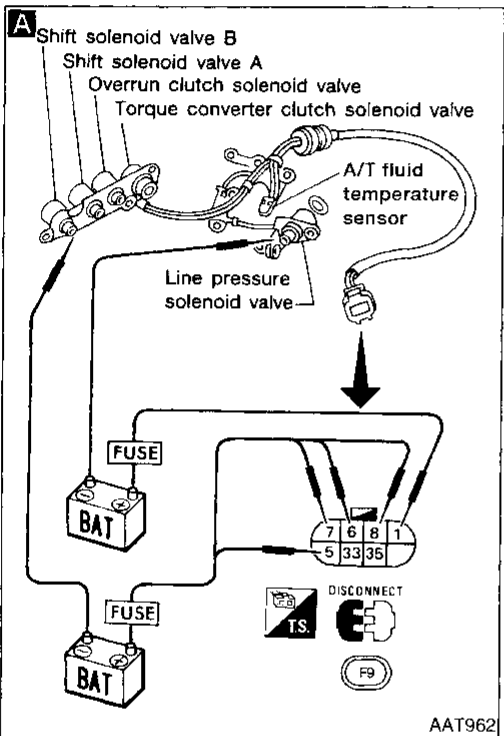
Yes → Go to (B), AT-115 and check for proper lock-up.

No → Perform pressure test. Refer to AT-152.

Perform pressure test. Refer to AT-152.

NG → Go to (A), AT-114.

OK →



A
CHECK SOLENOID VALVES.
1. Remove control valve assembly. Refer to AT-172.
2. Check solenoid valve assembly operation. Refer to "Component Inspection", AT-116.

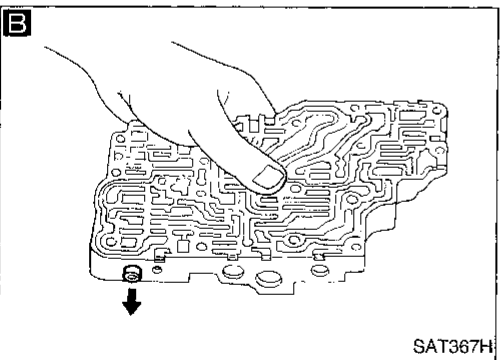
NG → Replace solenoid valve assembly.

OK →

B
CHECK CONTROL VALVE.
1. Disassemble control valve assembly. Refer to AT-226.
2. Check to ensure that:
● Valve, sleeve and plug slide along valve bore under their own weight.
● Valve, sleeve and plug are free from burrs, dents and scratches.
● Control valve springs are free from damage, deformation and fatigue.
● Hydraulic line is free from obstacles.

NG → Repair control valve.

OK →



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

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

OK →

Perform "Diagnostic Trouble Code (DTC) confirmation procedure, AT-112.

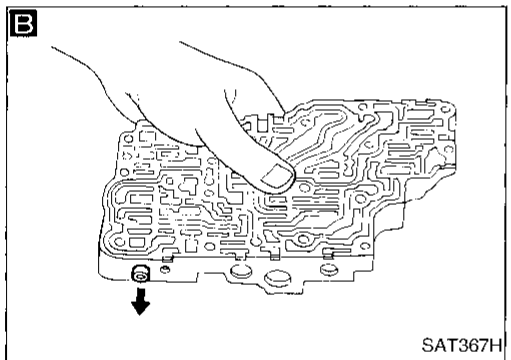
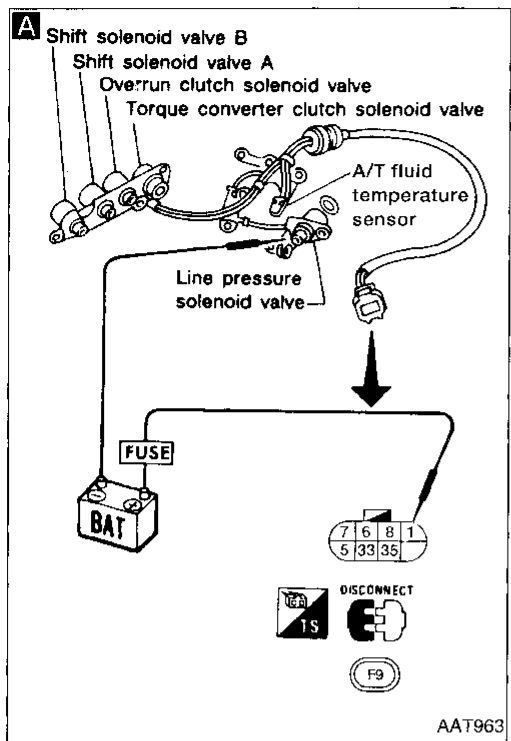
NG → Go to (B), AT-115 and check for proper lock-up.

OK →

INSPECTION END

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Improper Lock-up Operation (Cont'd)



A

A

CHECK LINE PRESSURE SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-172.
2. Check line pressure solenoid valve operation. Refer to "Component Inspection", AT-116.

NG → Replace solenoid valve assembly.

OK

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-226.
2. Check line pressure circuit valves for sticking.

- Pressure regulator valve
- Pilot valve
- Pressure modifier valve

NG → Repair control valve.

OK

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

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

OK

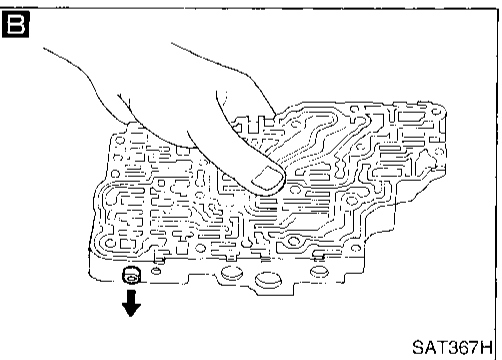
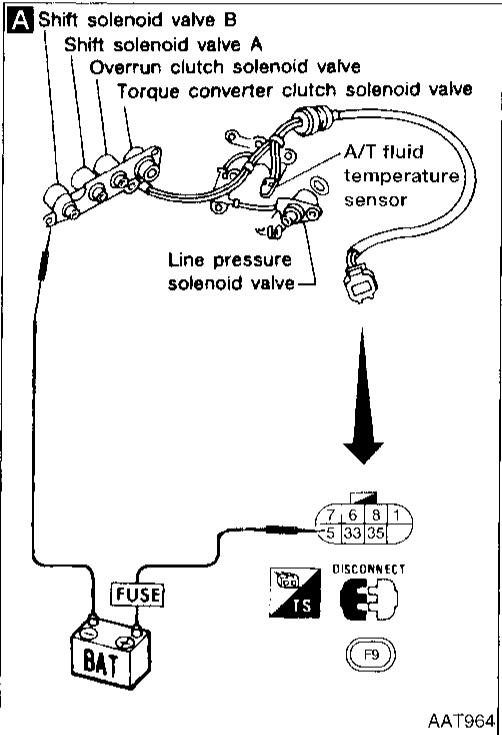
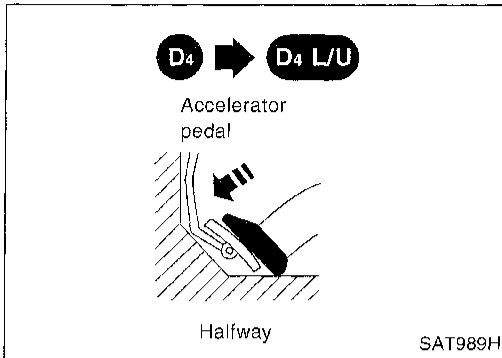
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-112.

NG → Go to (B), AT-115 and check for proper lock-up.

OK

INSPECTION END

Improper Lock-up Operation (Cont'd)



B

During "Cruise Test — Part 1", AT-69, does A/T perform lock-up at the specified speed?

Yes → Perform "Cruise Test — Part 1" again and return to the start point of this flow chart.

No → A

A

CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE.

1. Remove control valve assembly. Refer to AT-172.
2. Check torque converter clutch solenoid valve operation. Refer to "Component Inspection", AT-116.

NG → Replace solenoid valve assembly.

OK → B

B

CHECK CONTROL VALVE.

1. Disassemble control valve assembly. Refer to AT-226.
2. Check control valves for sticking.
 - Torque converter clutch control valve
 - Torque converter clutch relief valve

NG → Repair control valve.

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

No → Check control valve again. Repair or replace control valve assembly.

Yes → Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-112.

NG → Perform "Cruise Test — Part 1" again and return to the start point of this flow chart.

OK → INSPECTION END

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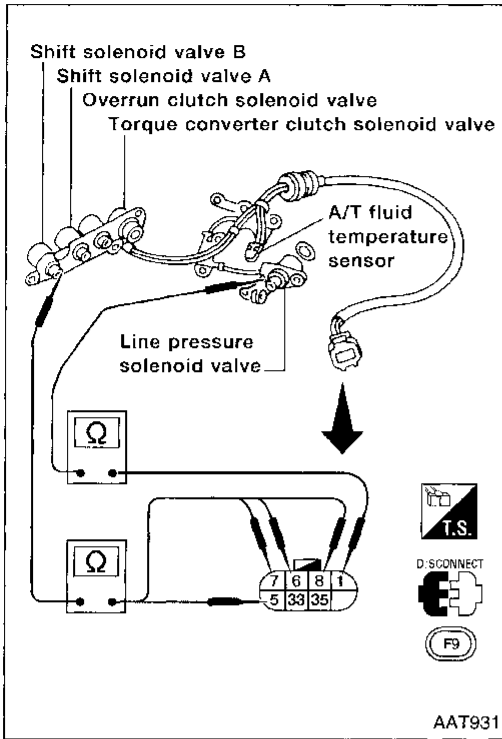
Improper Lock-up Operation (Cont'd)
COMPONENT INSPECTION

Solenoid valves

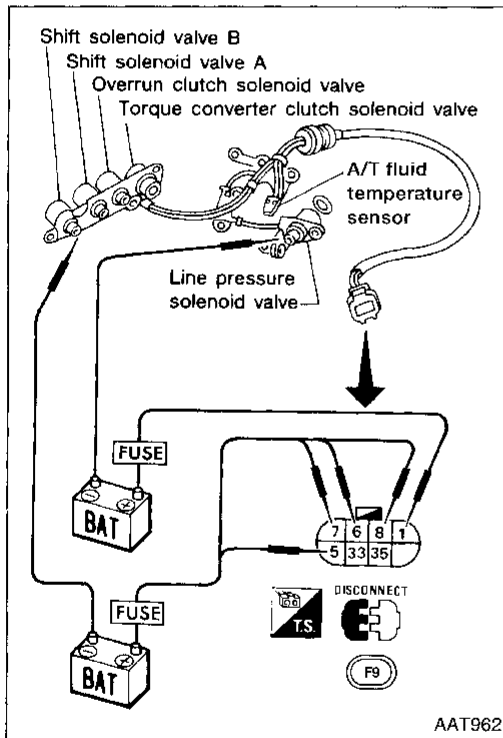
- For Removal and Installation, Refer to AT-172.

Resistance check

- Check resistance between two terminals.

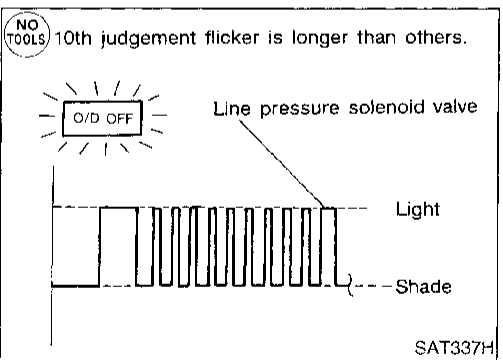
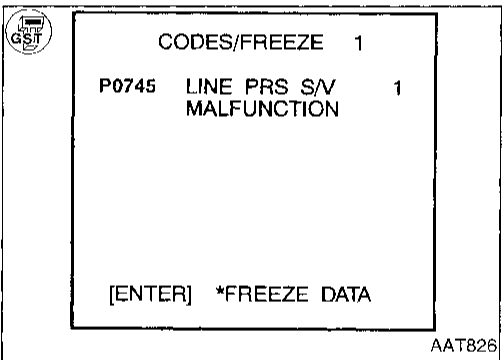
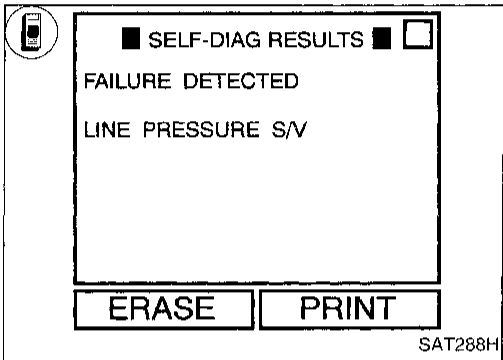
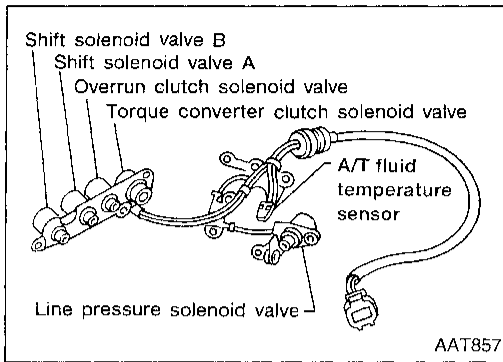


Solenoid valve	Terminal No.	Resistance (Approx.)
Shift solenoid valve "A"	⑥	20 - 30Ω
Shift solenoid valve "B"	⑦	
Overrun clutch solenoid valve	⑧	
Line pressure solenoid valve	①	2.5 - 5Ω
Torque converter clutch solenoid valve	⑤	10 - 16Ω



Operation check

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



Line Pressure Solenoid Valve

DESCRIPTION

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

Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: LINE PRESSURE S/V	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 shorted.) ● Line pressure solenoid valve
: P0745		
: 10th judgement flicker		

Diagnostic Trouble Code (DTC) confirmation procedure

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

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

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

- 1) Start engine.
- 2) With brake pedal depressed, shift the lever from P → N → D → N → P.
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

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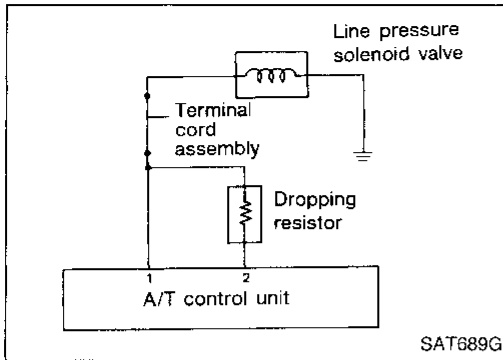
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Line Pressure Solenoid Valve (Cont'd)



A

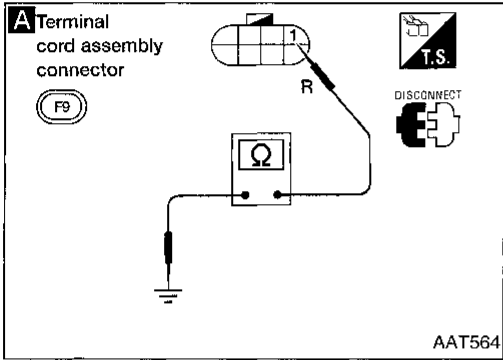
CHECK GROUND CIRCUIT.

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

Resistance: 2.5 - 5Ω

NG

1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-172.
2. Check the following items:
 - Line pressure solenoid valve (Refer to "Component Inspection", on the next page.)
 - Harness in terminal cord assembly for short or open



OK

B

CHECK POWER SOURCE CIRCUIT.

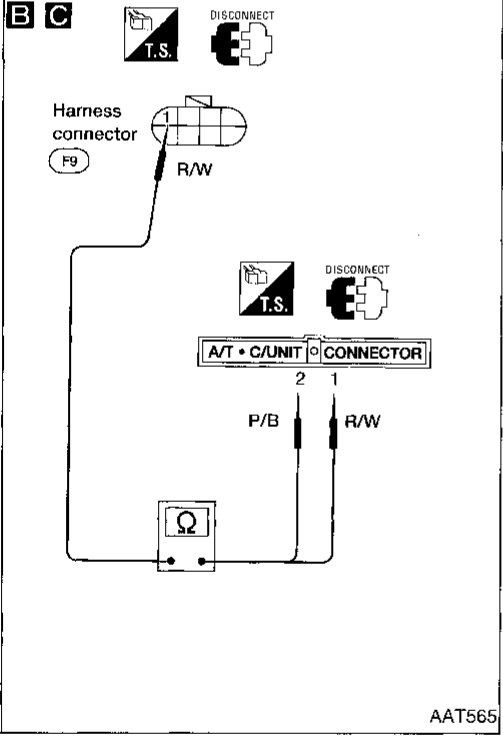
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ① and A/T control unit harness connector terminal ②.

Resistance: 11.2 - 12.8Ω

NG

Check the following items:

- Dropping resistor (Refer to "Component Inspection", on the next page.)
- Harness for short or open between A/T control unit terminal ② and terminal cord assembly (Main harness)



OK

C

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

3. Reinstall any part removed.

NG

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

OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-117.

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

**Line Pressure Solenoid Valve (Cont'd)
COMPONENT INSPECTION**

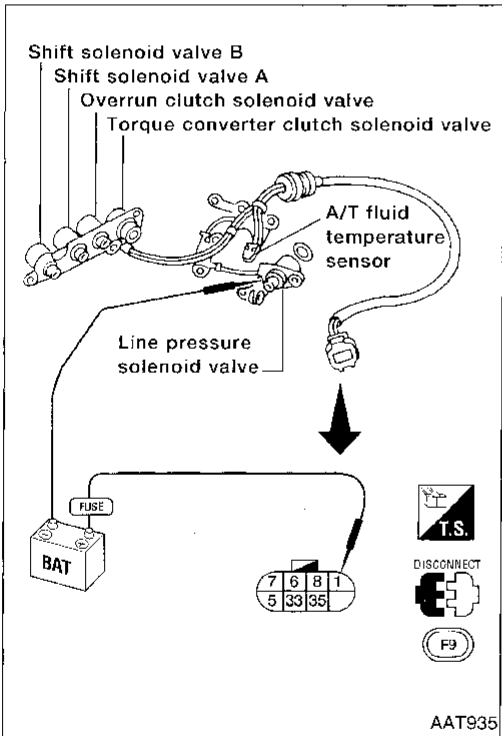
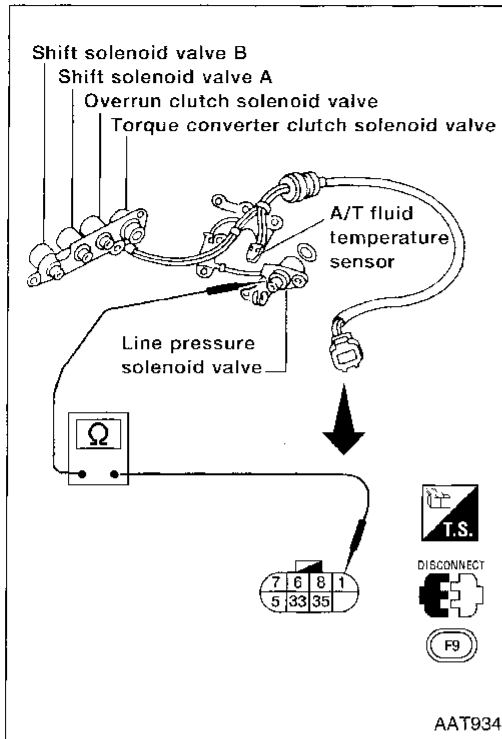
Line pressure solenoid valve

- For Removal and Installation, Refer to AT-172.

Resistance check

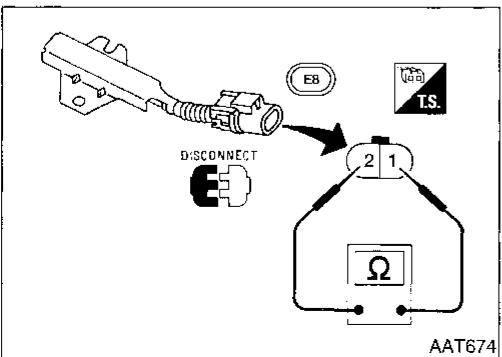
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Line pressure solenoid valve	①	Ground (Bracket)	2.5 - 5Ω



Operation check

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



Dropping resistor

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

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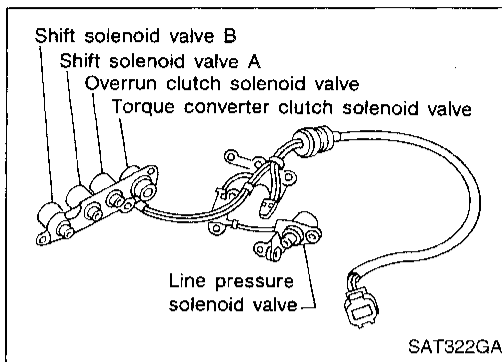
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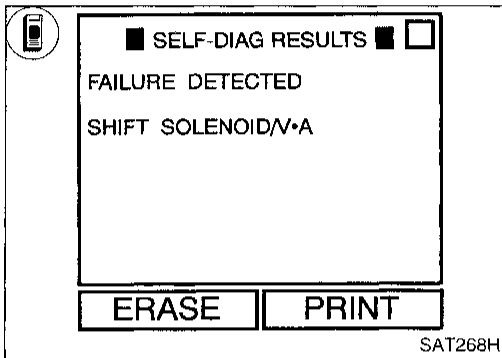


Shift Solenoid Valve A

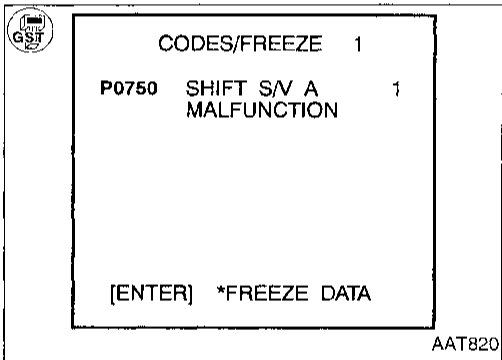
DESCRIPTION

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

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



Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
SHIFT SOLENOID/V-A	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 shorted.) Shift solenoid valve "A"
P0750		
4th judgement flicker		



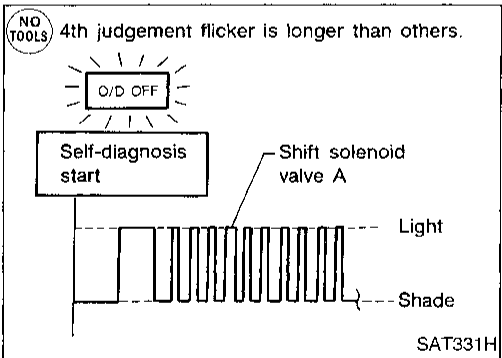
Diagnostic Trouble Code (DTC) confirmation procedure

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

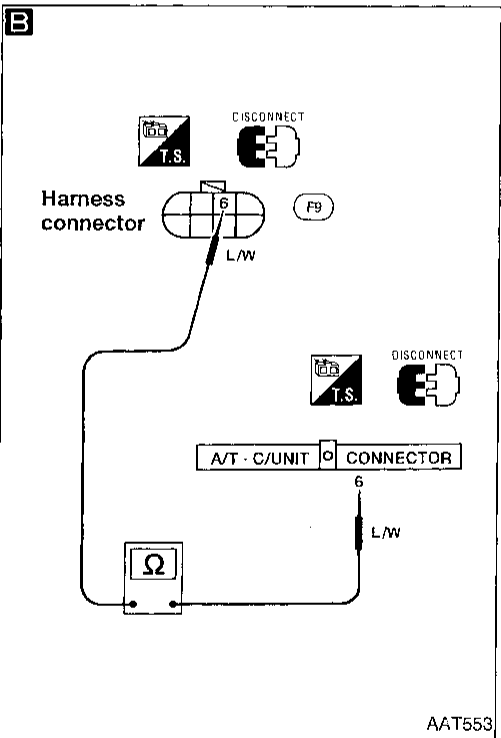
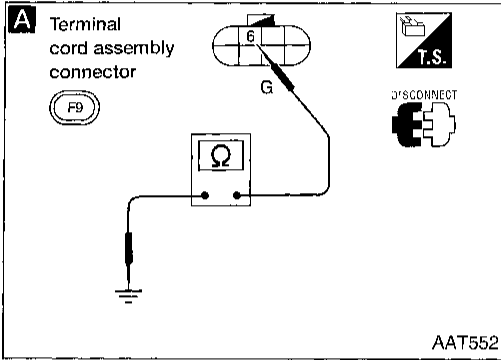
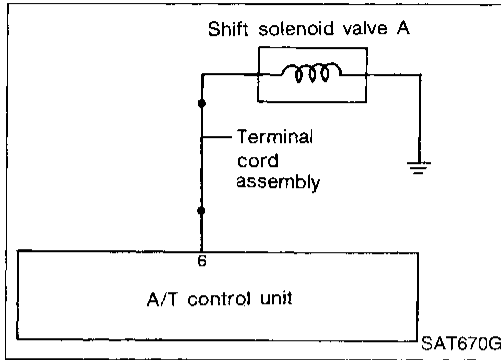
- Start engine.
- Select "SELF-DIAG RESULTS" mode with CONSULT.
- Drive vehicle in D₁ → D₂ position.

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

- OR
- Start engine.
 - Drive vehicle in D₁ → D₂ position.
 - Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.



Shift Solenoid Valve A (Cont'd)



A

CHECK GROUND CIRCUIT.

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

Resistance: 20 - 30Ω

OK

NG

1. Remove control valve assembly. Refer to AT-172.
2. Check the following items:
 - Shift solenoid valve A (Refer to "Component Inspection", on the next page.)
 - Harness for short or open 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 harness connector terminal ⑥.
4. Reinstall any part removed.

Resistance:

Approximately 0Ω

OK

NG

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

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-120.

OK

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

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Shift Solenoid Valve A (Cont'd)
COMPONENT INSPECTION

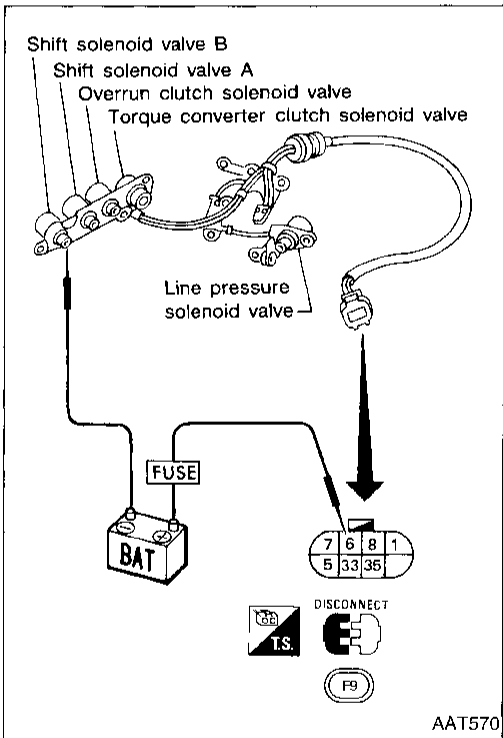
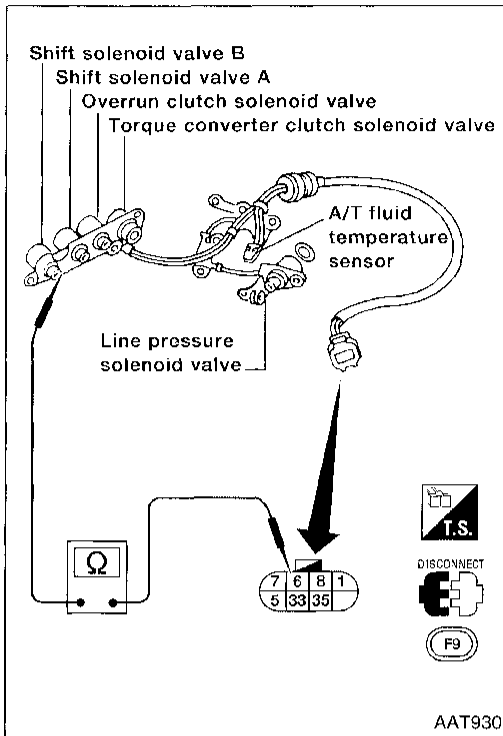
Shift solenoid valve A

- For Removal and Installation, Refer to AT-172.

Resistance check

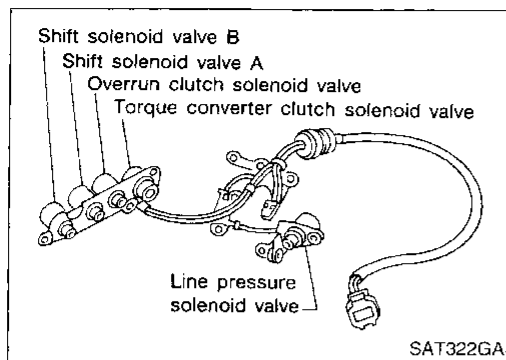
- Check resistance between two terminals.

Solenoid valve	Terminal No.		Resistance (Approx.)
Shift solenoid valve "A"	⑥	Ground (Bracket)	20 - 30Ω



Operation check

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

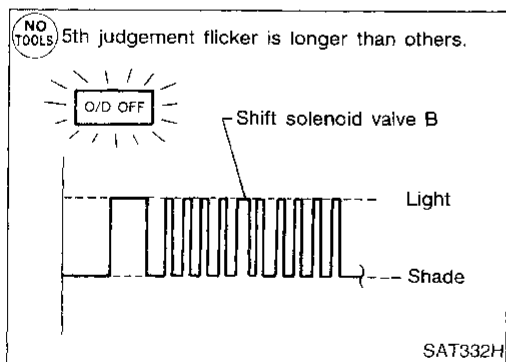
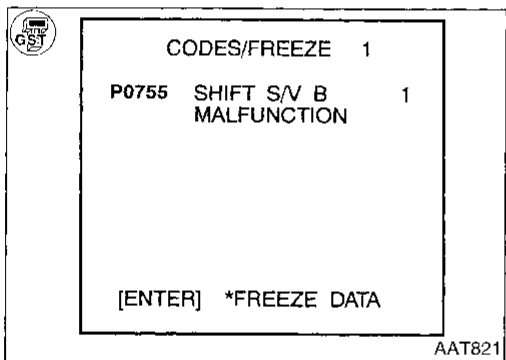
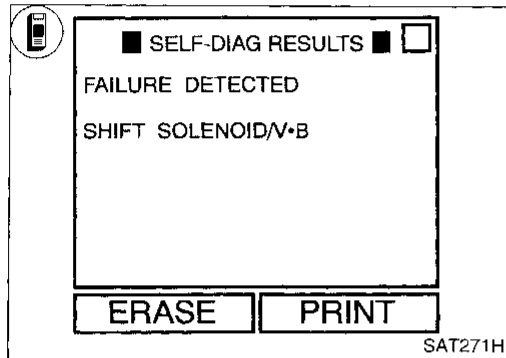


Shift Solenoid Valve B

DESCRIPTION

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

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



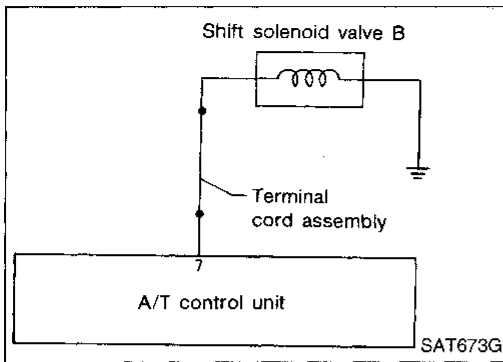
Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
<ul style="list-style-type: none"> : SHIFT SOLENOID/V-B : P0755 : 5th judgement flicker 	A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none">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

Diagnostic Trouble Code (DTC) confirmation procedure

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

- 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 7" with GST. OR
- 1) Start engine.
- 2) Drive vehicle in D₁ → D₂ → D₃ position.
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

Shift Solenoid Valve B (Cont'd)



A

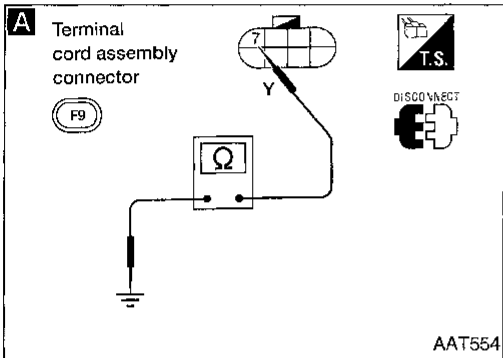
CHECK GROUND CIRCUIT.

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

Resistance: 20 - 30Ω

NG

1. Remove control valve assembly. Refer to AT-172.
2. Check the following items:
 - Shift solenoid valve B (Refer to "Component Inspection", on the next page.)
 - Harness of terminal cord assembly for short or open



B

CHECK POWER SOURCE CIRCUIT.

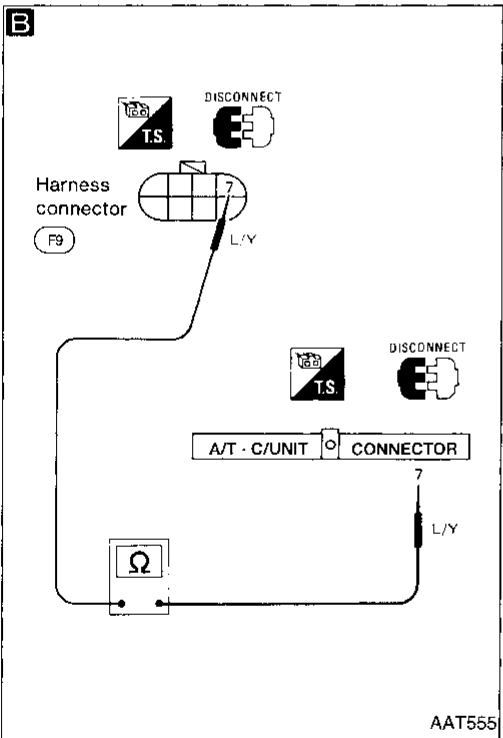
1. Turn ignition switch to OFF position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑦ and A/T control unit harness connector terminal ⑦.

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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



OK

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-123.

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

Shift Solenoid Valve B (Cont'd)

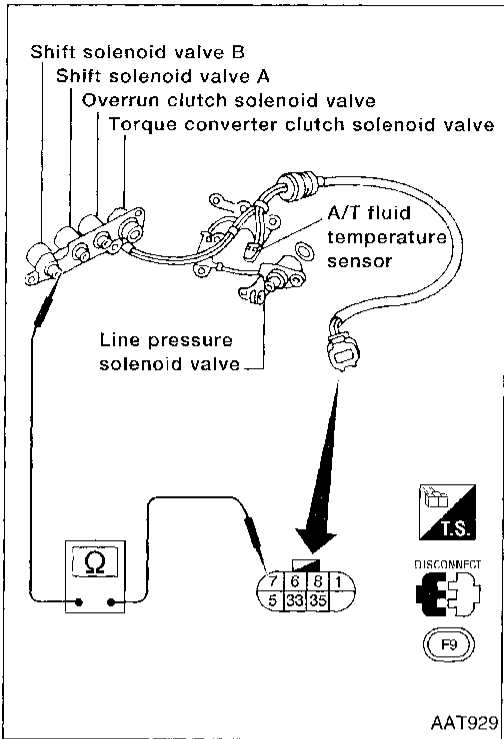
COMPONENT INSPECTION

Shift solenoid valve B

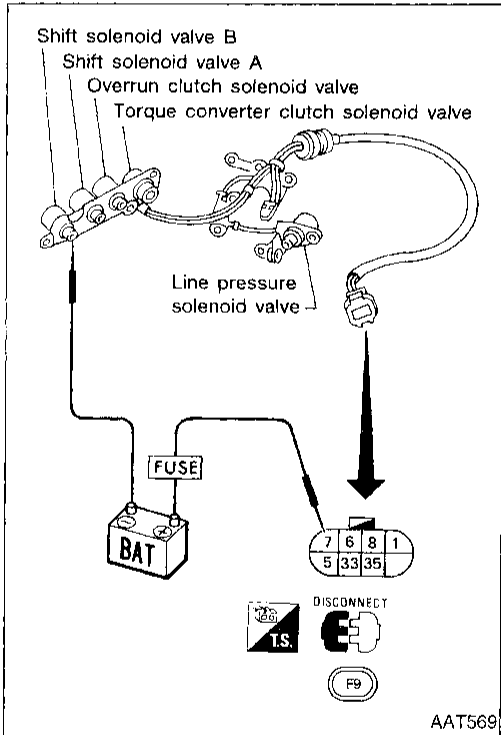
- For Removal and Installation, Refer to AT-172.

Resistance check

- Check resistance between two terminals.



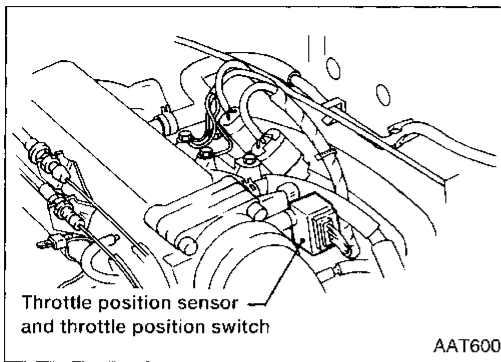
Solenoid valve	Terminal No.		Resistance (Approx.)
Shift Solenoid valve "B"	⑦	Ground (Bracket)	20 - 30Ω



Operation check

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

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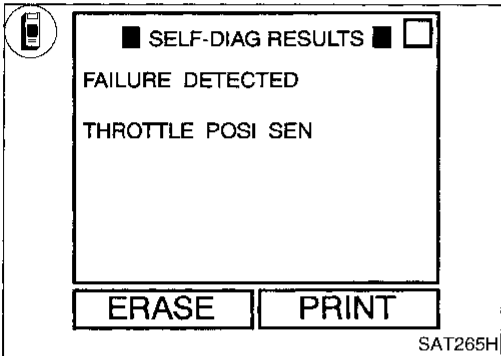


Throttle Position Sensor

DESCRIPTION

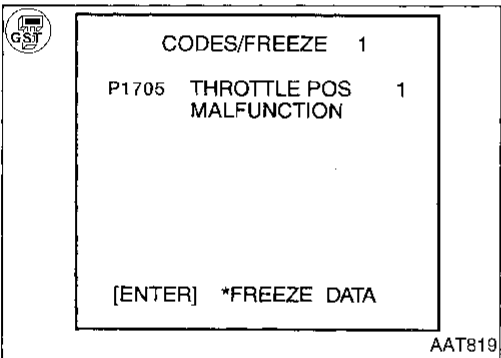
The throttle position sensor detects the throttle valve position and sends a signal to the A/T control unit.

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



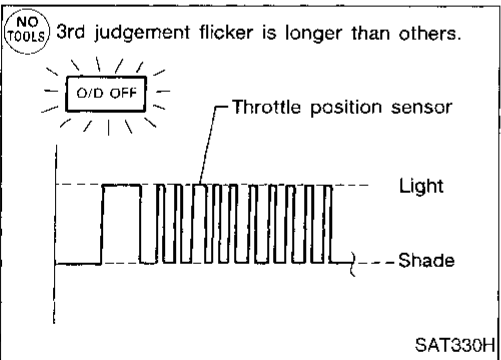
Diagnostic Trouble Code (DTC) confirmation procedure

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



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

OR

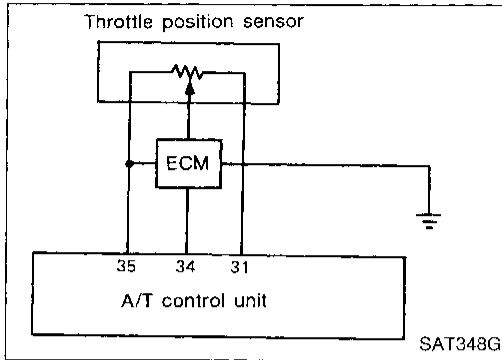


- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
- 3) Select "MODE 7" with GST.

OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D", vehicle speed higher than 10 km/h (6 MPH), throttle opening greater than 1/2 of the full throttle position and driving for more than 3 seconds.
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

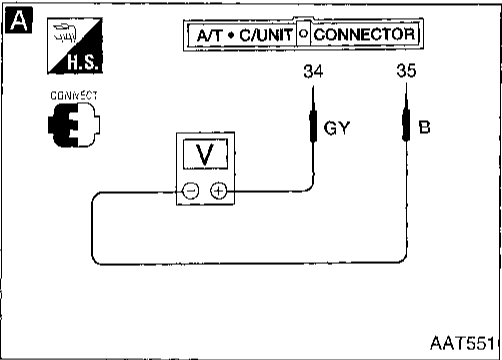
Throttle Position Sensor (Cont'd)



A

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

AAT784



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

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

OK ↓

A

CHECK INPUT SIGNAL.

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

Voltage:

Fully-closed throttle:
Approximately 0.5V

Fully-open throttle:
Approximately 4V

OR

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

NO TOOLS

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

Voltage:

Fully-closed throttle valve:
Approximately 0.5V

Fully-open throttle valve:
Approximately 4V
(Voltage rises gradually in response to throttle position)

OK ↓

CHECK THROTTLE POSITION SWITCH. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", "CHECK THROTTLE POSITION SWITCH CIRCUIT" AT-86.

NG → Repair or replace damaged parts.

OK ↓

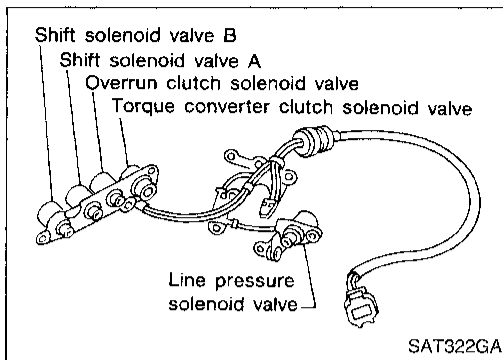
Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-126.

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

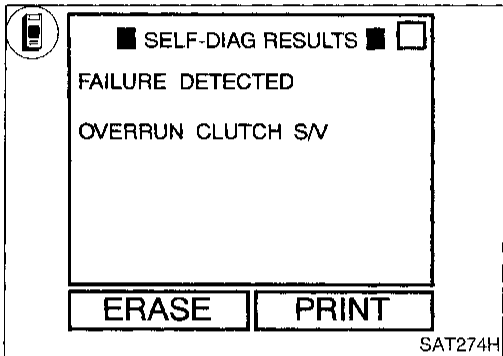
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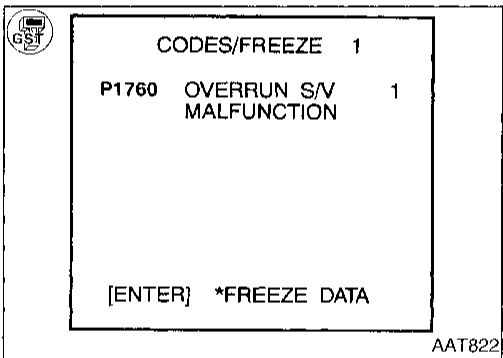
Overrun Clutch Solenoid Valve

DESCRIPTION

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

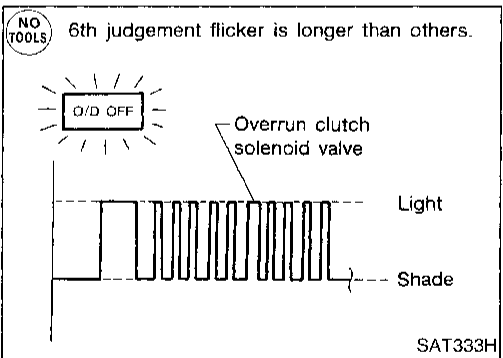


Diagnostic trouble code	Malfunction is detected when ...	Check item (Possible cause)
: OVERRUN CLUTCH S/V	A/T control unit detects the improper voltage drop when it tries to operate the solenoid valve.	<ul style="list-style-type: none"> ● Harness or connectors (The solenoid circuit is open or shorted.)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



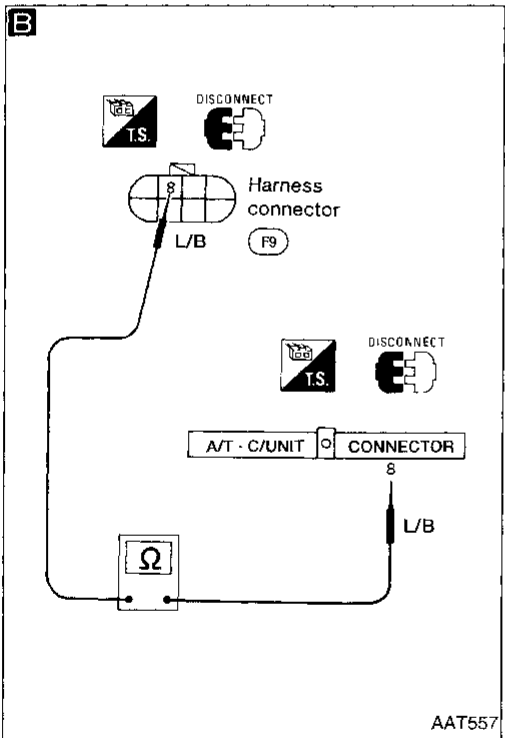
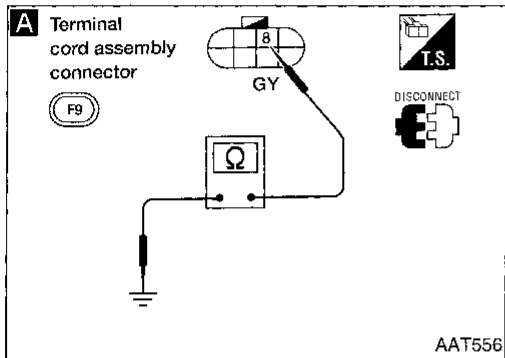
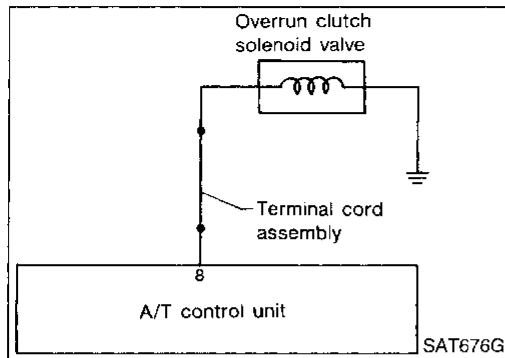
Diagnostic Trouble Code (DTC) confirmation procedure

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



- 1) Start engine.
 - 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
 - 3) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in OFF position and vehicle speed higher than 10 km/h (6 MPH).
- OR
- 1) Start engine.
 - 2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in OFF position and vehicle speed higher than 10 km/h (6 MPH).
 - 3) Select "MODE 7" with GST.
- OR
- 1) Start engine.
 - 2) Drive vehicle under the following conditions:
Selector lever in "D", overdrive control switch in OFF position and vehicle speed higher than 10 km/h (6 MPH).
 - 3) Perform self-diagnosis.
Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-48.

Overrun Clutch Solenoid Valve (Cont'd)



A

CHECK GROUND CIRCUIT.

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

Resistance: 20 - 30Ω

NG → 1. Remove control valve assembly. Refer to "ON-VEHICLE SERVICE", AT-172.

2. Check the following items:

- Overrun clutch solenoid valve. (Refer to "Component Inspection", on the next page.)
- Harness of terminal cord assembly for short or open

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

4. Reinstall any part removed.

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

OK ↓

Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-128.

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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**Overrun Clutch Solenoid Valve (Cont'd)
COMPONENT INSPECTION**

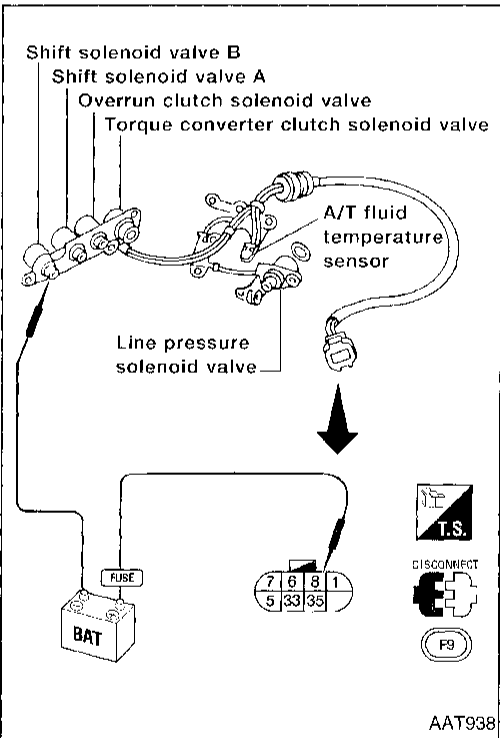
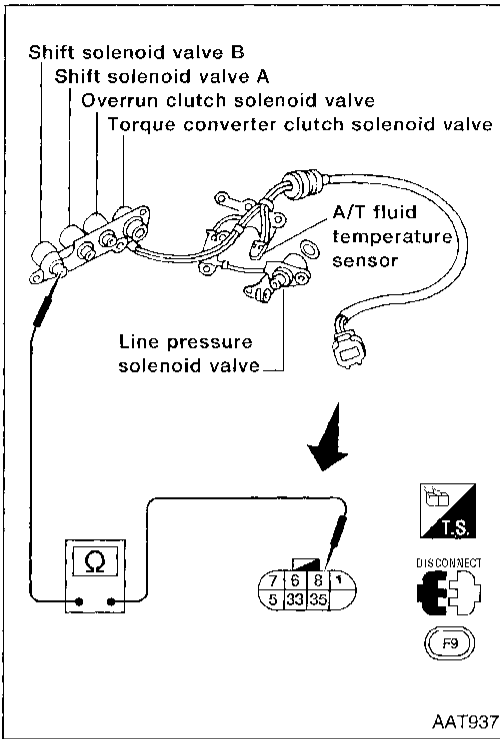
Overrun clutch solenoid valve

- For Removal and Installation, Refer to AT-172.

Resistance check

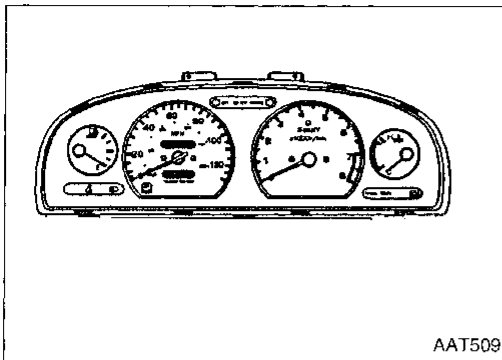
- Check resistance between two terminals.

Solenoid valve	Terminal No.	Resistance (Approx.)
Overrun clutch solenoid valve	Ⓑ	Ground (Bracket)
		20 - 30Ω

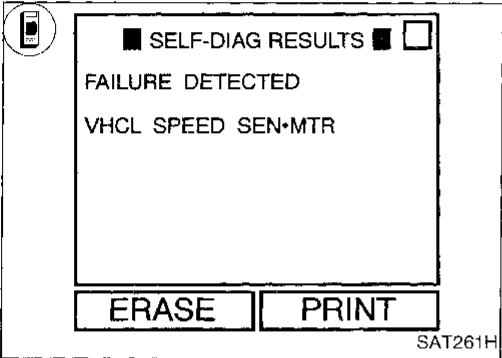


Operation check

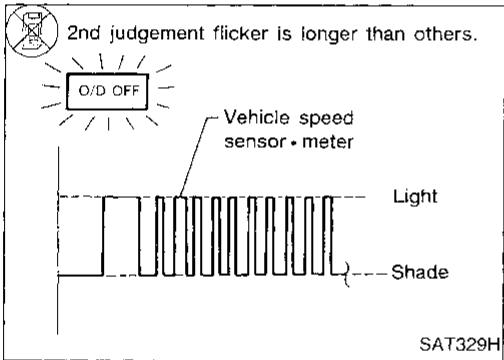
- Check solenoid valve by listening for its operating sound while applying battery voltage to the terminal and ground (bracket).



AAT509



SAT261H



SAT329H

Vehicle Speed Sensor-MTR

DESCRIPTION

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

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

Diagnostic Trouble Code (DTC) confirmation procedure

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

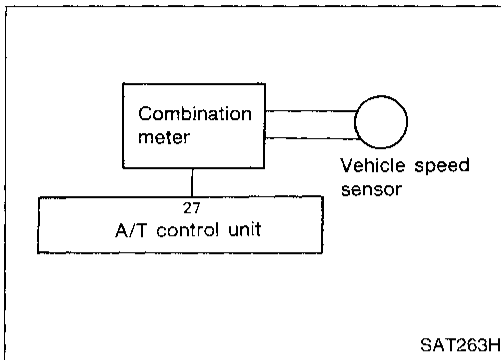
- 1) Start engine.
- 2) Select "SELF-DIAG RESULTS" mode with CONSULT.
- 3) Drive vehicle under the following conditions: Selector lever in "D" and vehicle speed higher than 20 km/h (12 MPH).

OR

- 1) Start engine.
- 2) Drive vehicle under the following conditions: Selector lever in "D" and vehicle speed higher than 20 km/h (12 MPH).
- 3) Perform self-diagnosis. Refer to SELF-DIAGNOSTIC PROCEDURE (No Tools), AT-49.

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Vehicle Speed Sensor·MTR (Cont'd)

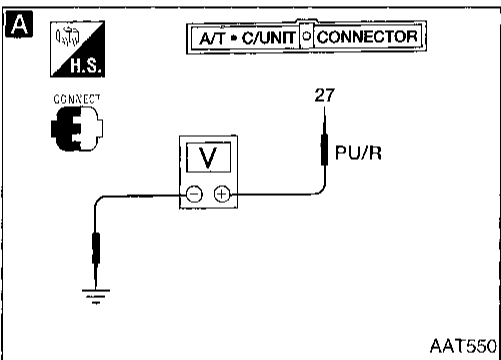


☆ MONITOR ☆ NO FAIL

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	○ N
P/N POSI SW	○ N
R POSITION SW	OFF

RECORD

SAT076H



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 that 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:
Voltage varies between less than 1V and more than 4.5V

NG → Check the following items:

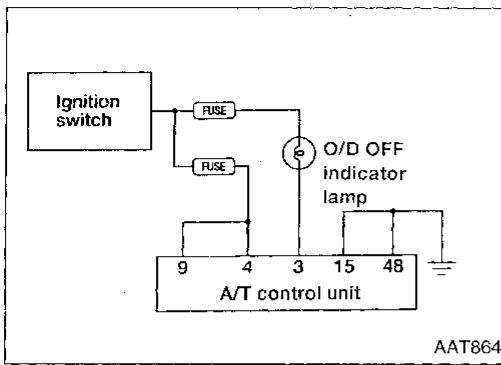
- Vehicle speed sensor and ground circuit for vehicle speed sensor Refer to EL section ("METERS AND GAUGES").
- Harness for short or open between A/T control unit and vehicle speed sensor (Main harness)

OK → Perform Diagnostic Trouble Code (DTC) confirmation procedure, AT-131.

NG →

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

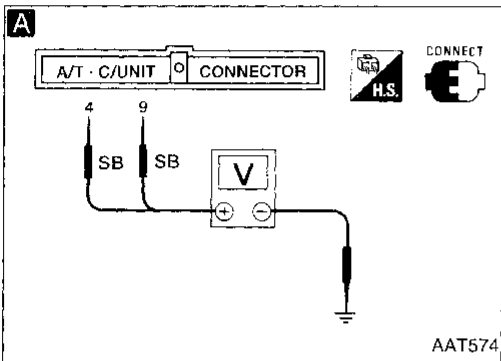
OK → INSPECTION END



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

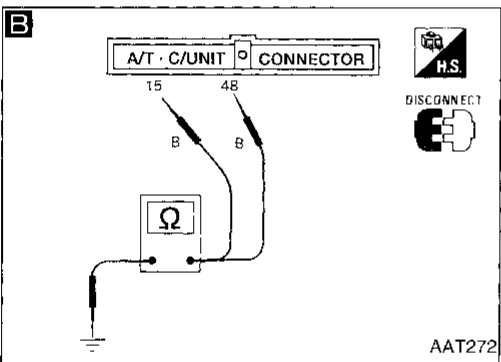
SYMPTOM:

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



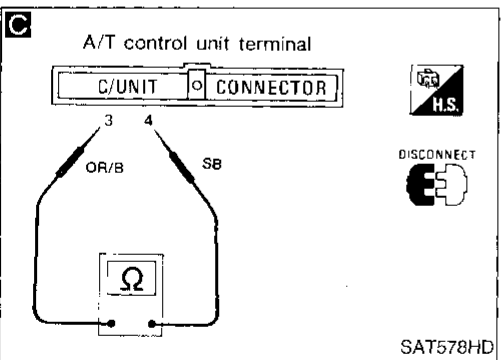
A
CHECK A/T CONTROL UNIT POWER SOURCE.
 1. Turn ignition switch to ON position. (Do not start engine.)
 2. Check voltage between A/T control unit terminals (4), (9) and ground.
Battery voltage should exist.

NG → Check the following items:
 ● Harness for short or open between ignition switch and A/T control unit (Main harness)
 ● Ignition switch and fuse
 Refer to EL section ("POWER SUPPLY ROUTING").



B
CHECK A/T CONTROL UNIT GROUND CIRCUIT.
 1. Turn ignition switch to OFF position.
 2. Disconnect A/T control unit harness connector.
 3. Check resistance between A/T control unit harness connector terminals (15), (48) and ground.
Resistance: Approximately 0Ω

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



C
CHECK LAMP CIRCUIT.
 1. Turn ignition switch to OFF position.
 2. Check resistance between A/T control unit harness connector terminals (3) and (4).
Resistance: 50 - 100Ω
 3. Reinstall any part removed.

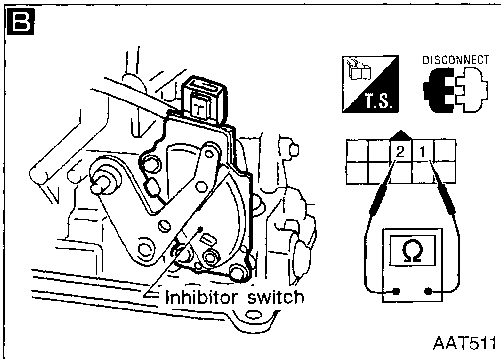
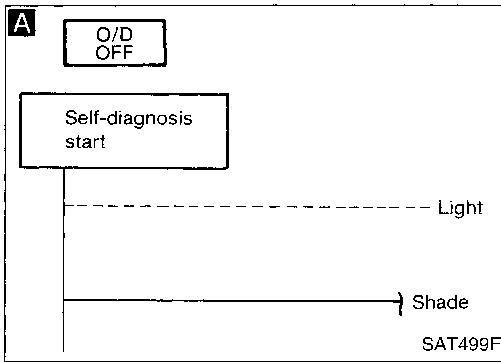
NG → Check the following items.
 ● O/D OFF indicator lamp (Refer to EL section.)
 ● Harness for short or open between ignition switch and O/D OFF indicator lamp (Main harness)
 ● Harness for short or open between O/D OFF indicator lamp and A/T control unit

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

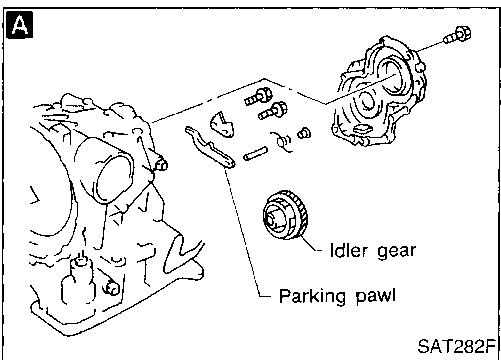
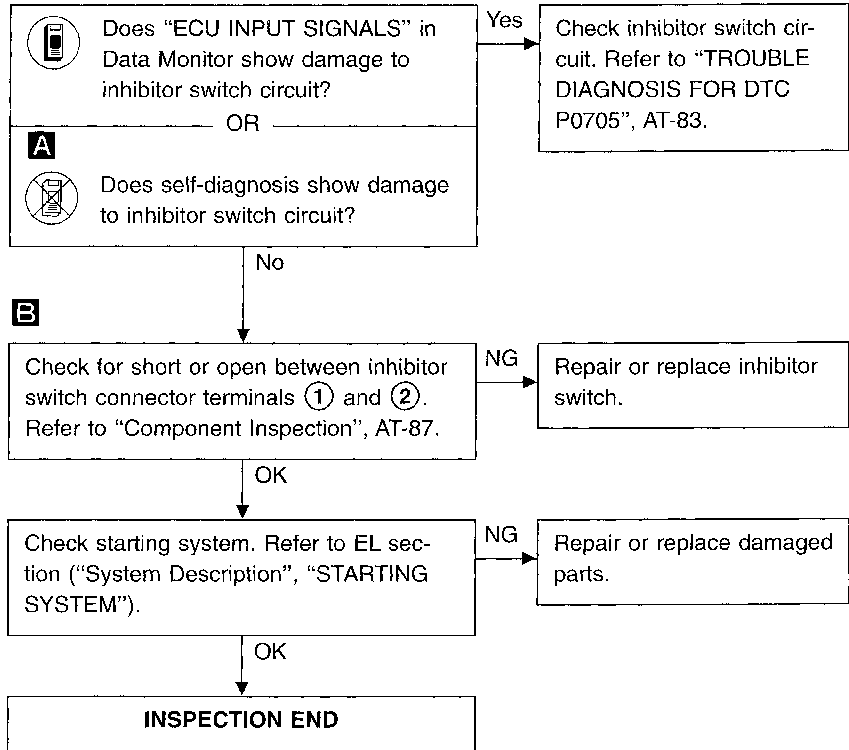
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2. Engine Cannot Be Started In "P" and "N" Position

SYMPTOM:

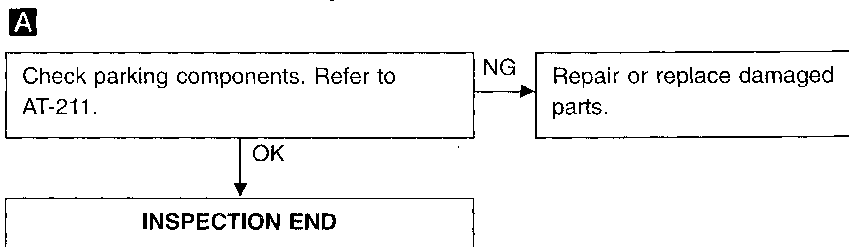
- Engine cannot be started with selector lever in "P" or "N" position.
- Engine can be started with selector lever in "D", "2", "1" or "R" position.

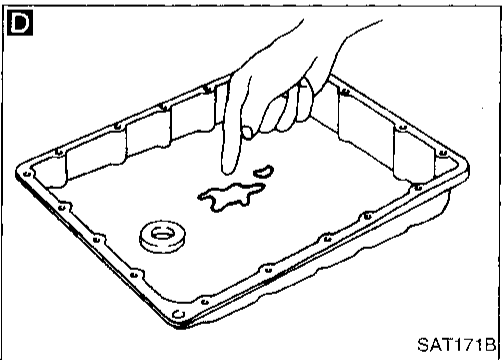
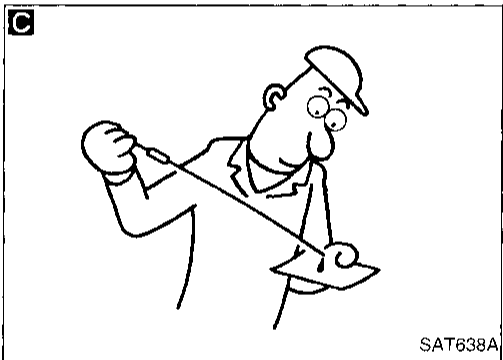
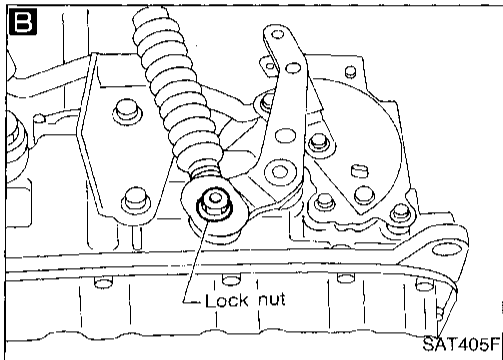
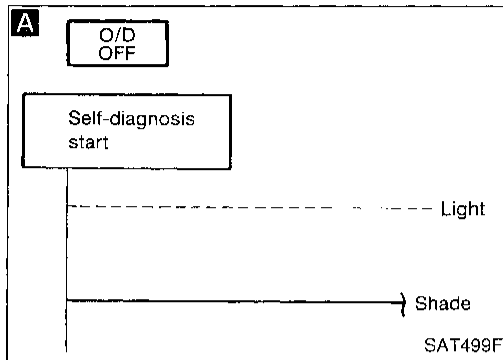


3. In "P" Position, Vehicle Moves Forward Or Backward When Pushed

SYMPTOM:

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

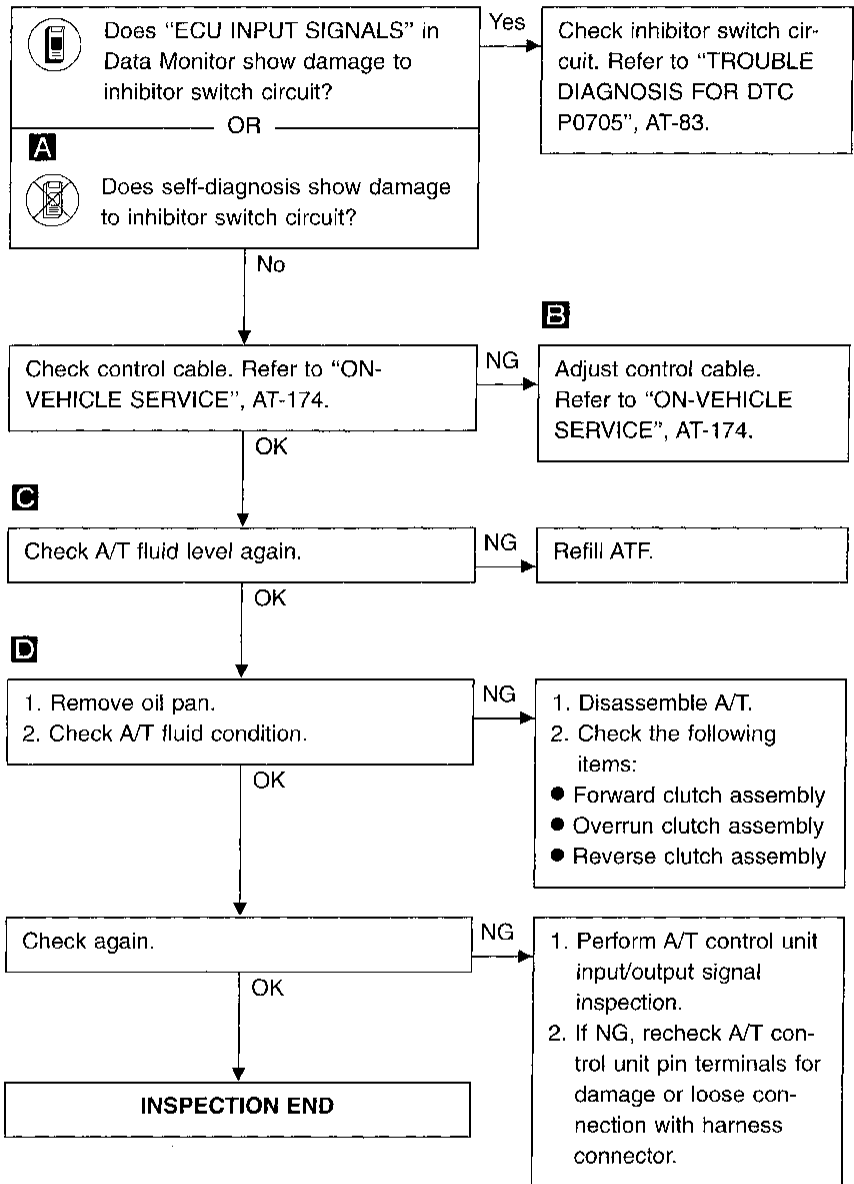




4. In "N" Position, Vehicle Moves

SYMPTOM:

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

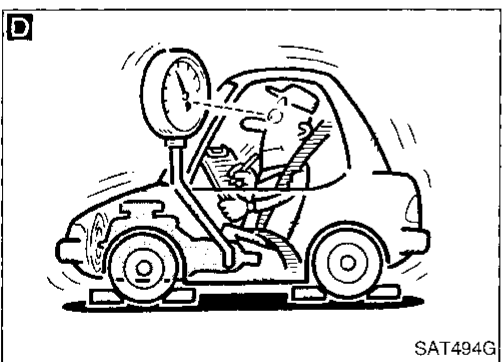
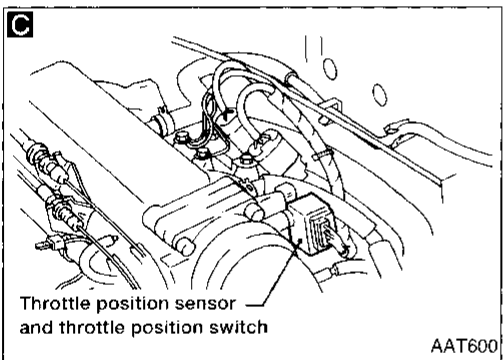
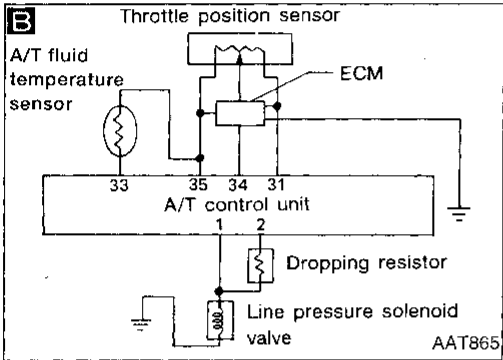
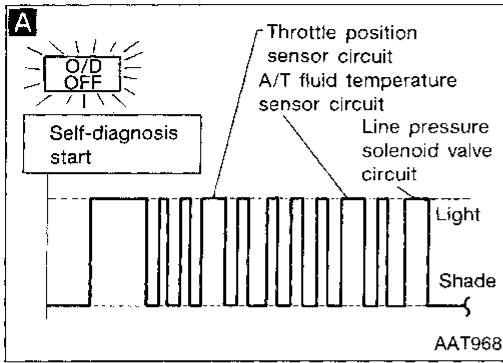


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5. Large Shock "N" → "R" Position

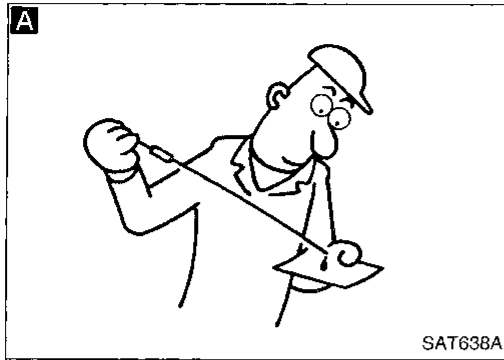
SYMPTOM:

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



```

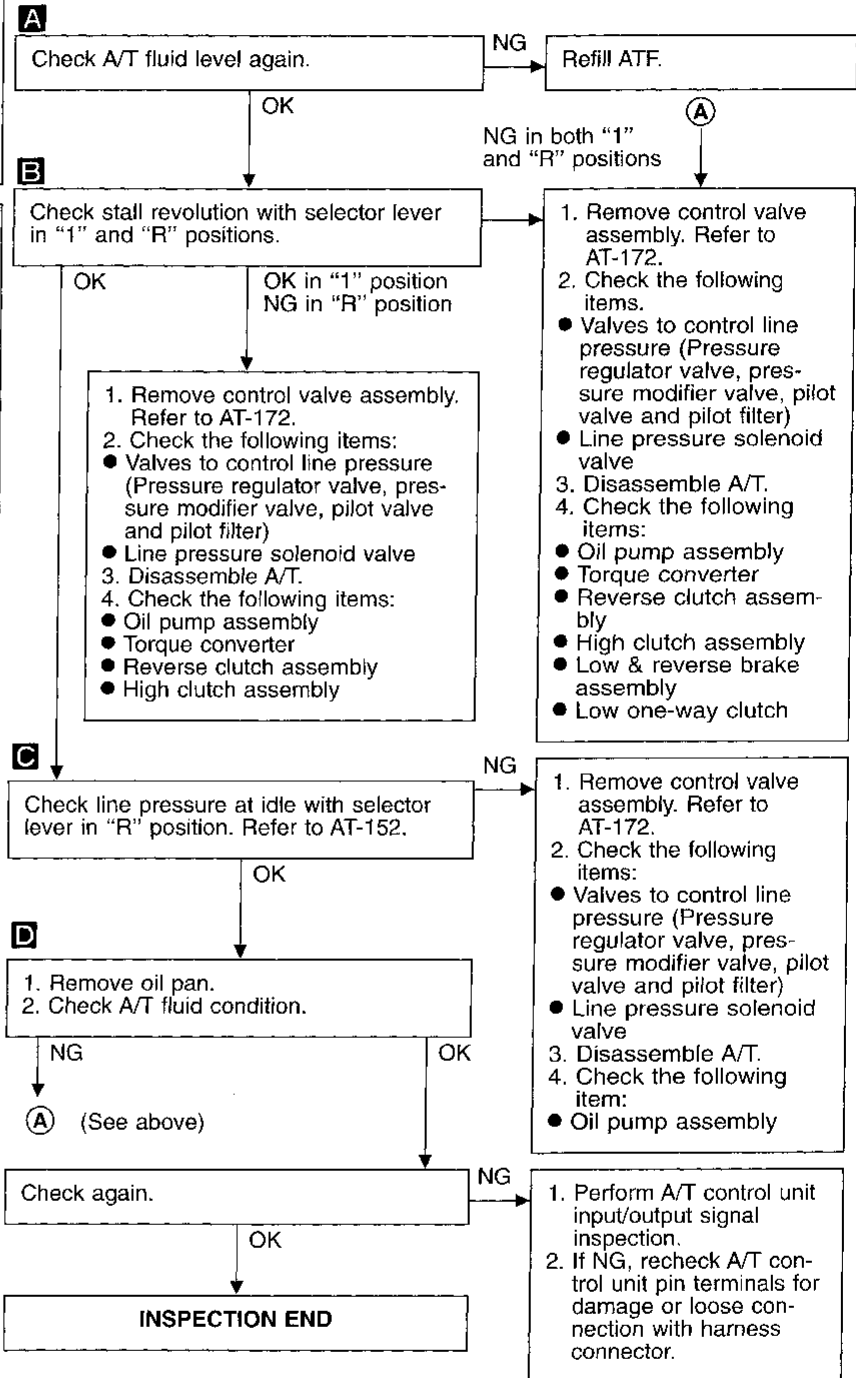
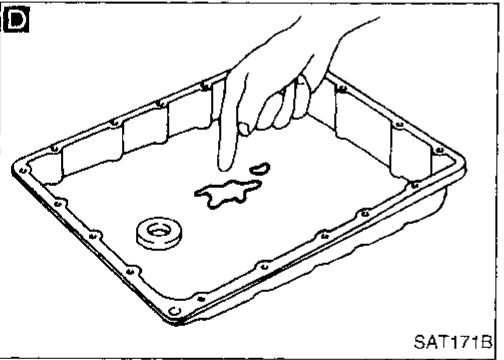
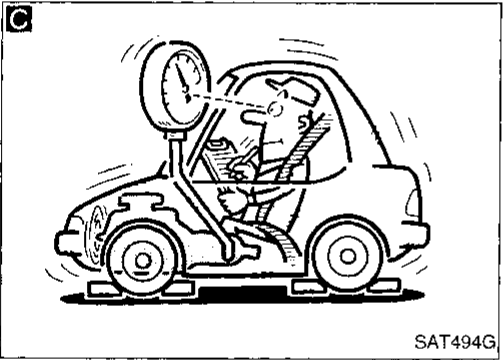
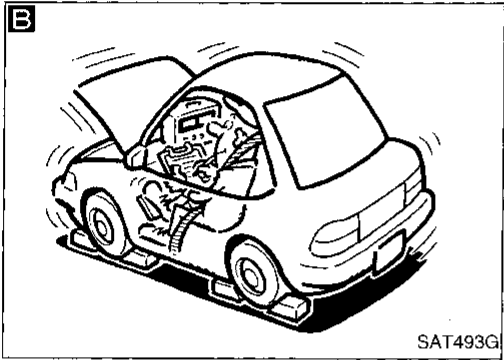
    graph TD
        A{A: Does self-diagnosis show damage to A/T fluid temperature sensor, line pressure solenoid valve or throttle position sensor circuit?} -- Yes --> B{B: Check damaged circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0710, P0745 or P1705", AT-88, AT-117 or AT-126.}
        A -- No --> C{C: Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC:0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].}
        C -- NG --> C1{Repair or replace throttle position sensor.}
        C -- OK --> D{D: Check line pressure at idle with selector lever in "D" position. Refer to AT-152.}
        D -- NG --> D1[1. Remove control valve assembly. Refer to AT-172.  
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]
        D -- OK --> D2{Check again.}
        D2 -- NG --> D3[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.]
        D2 -- OK --> END[INSPECTION END]
    
```



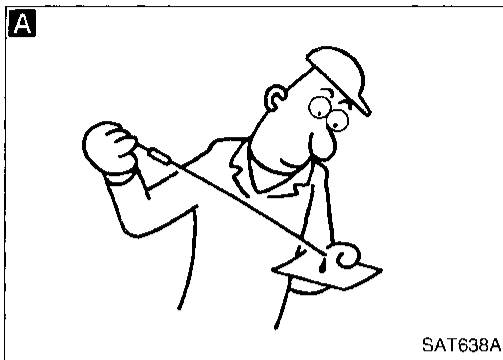
6. Vehicle Does Not Creep Backward in "R" Position

SYMPTOM:

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



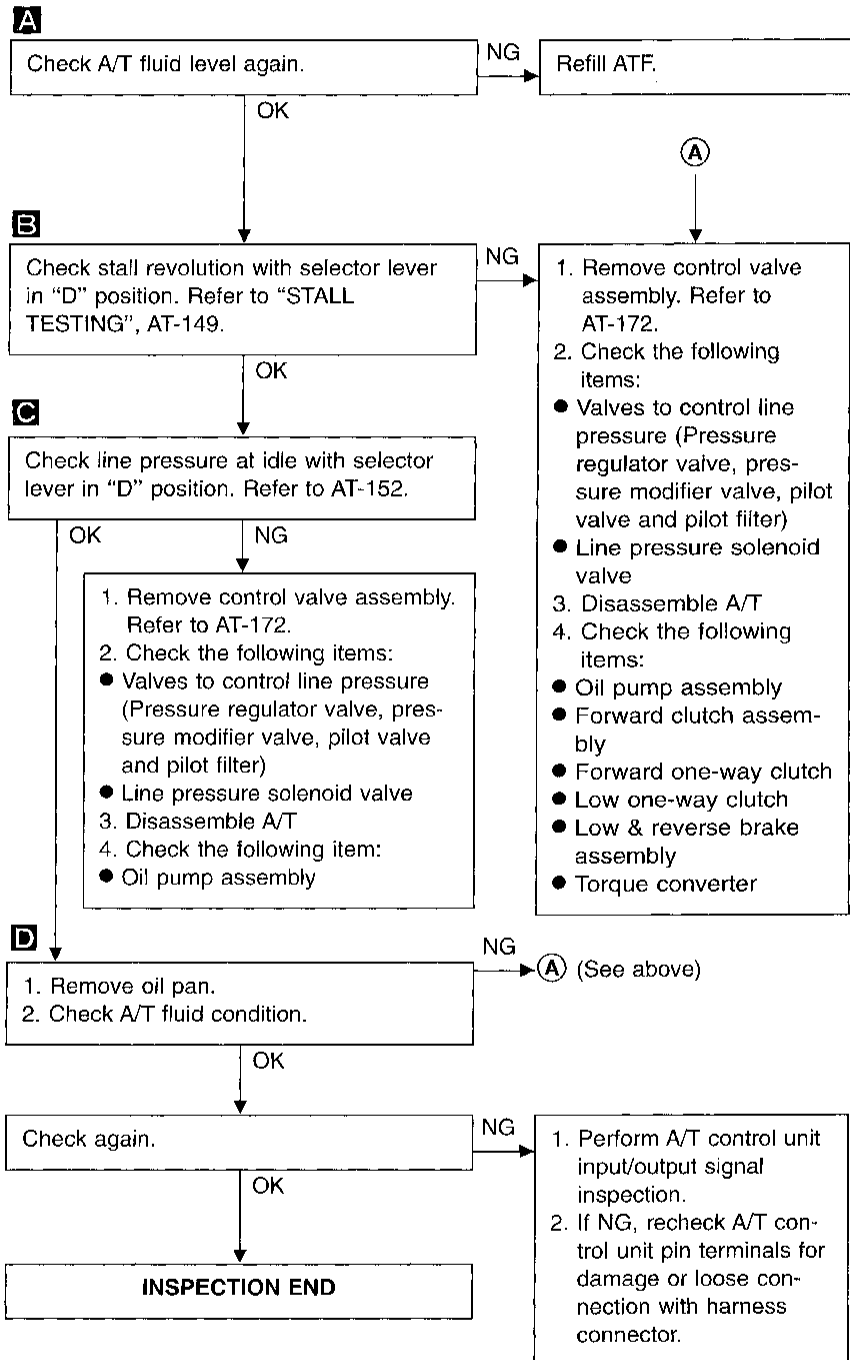
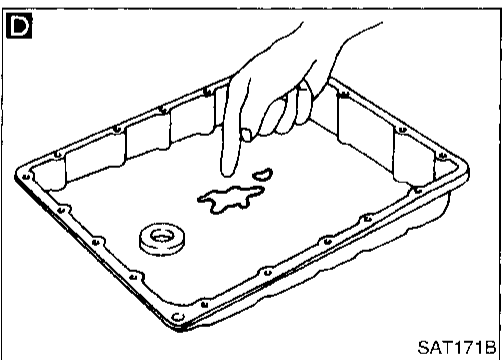
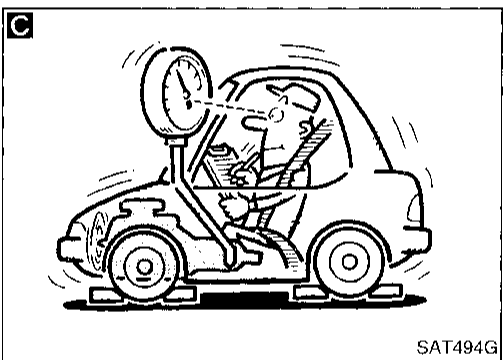
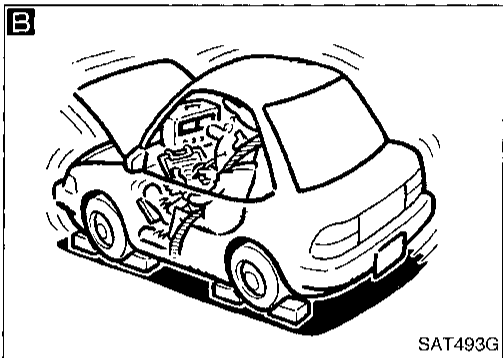
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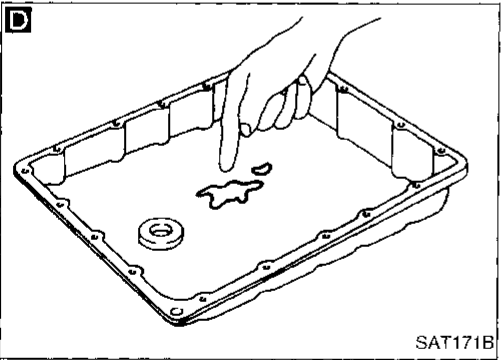
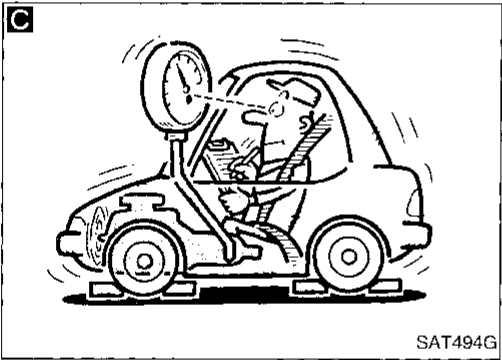
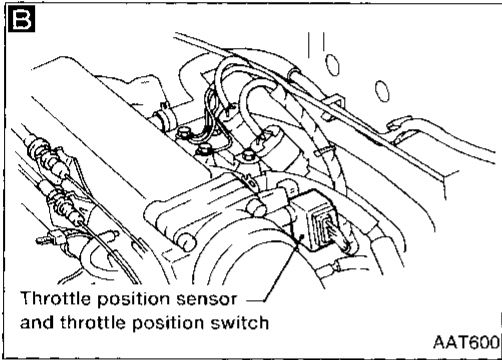
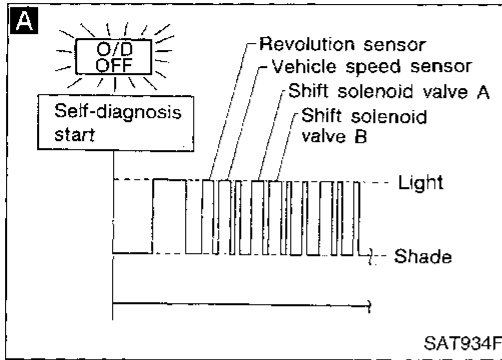


7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position

SYMPTOM:

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

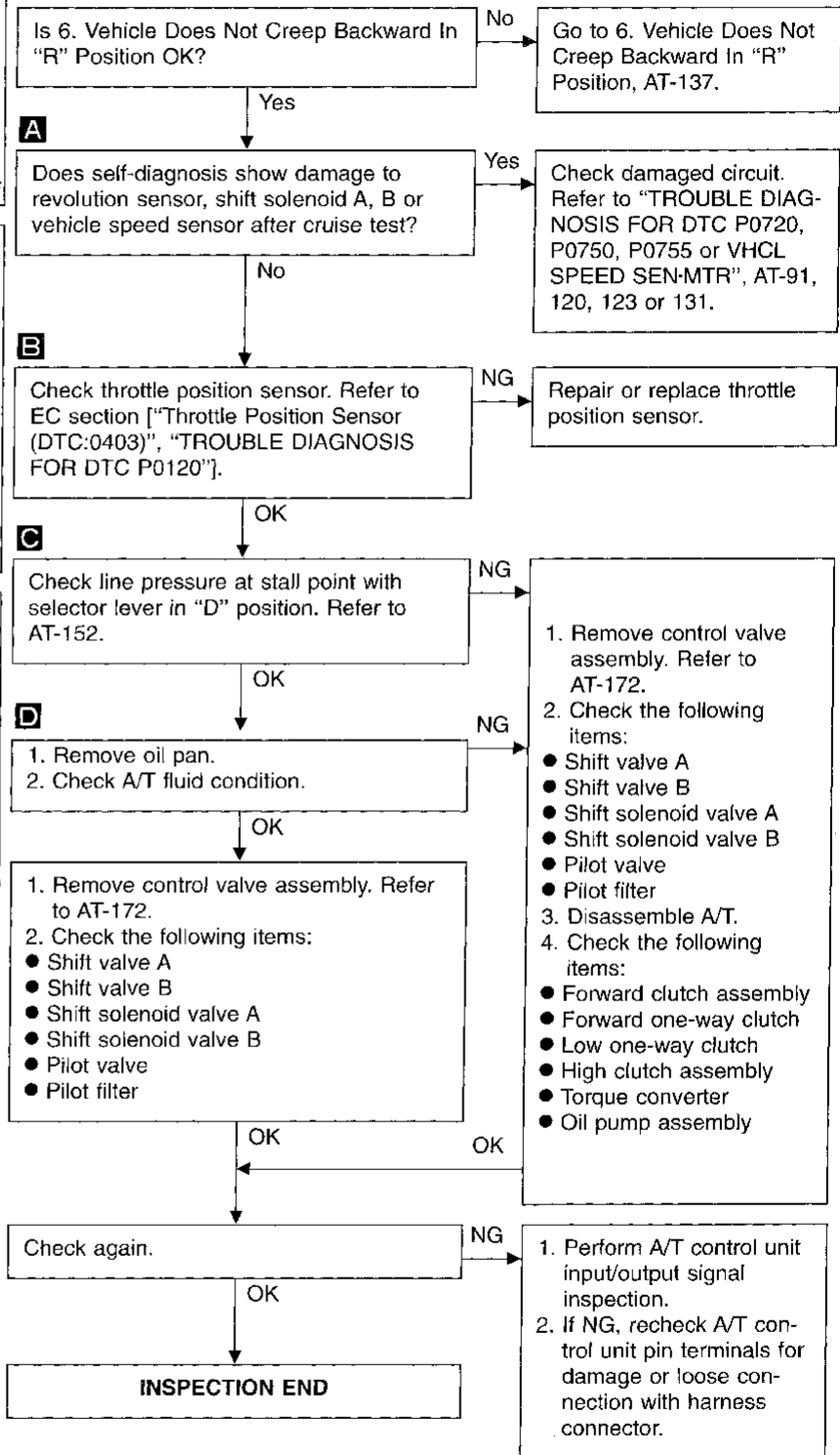




8. Vehicle Cannot Be Started From D₁

SYMPTOM:

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

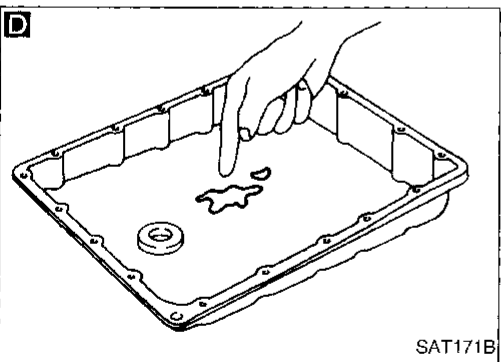
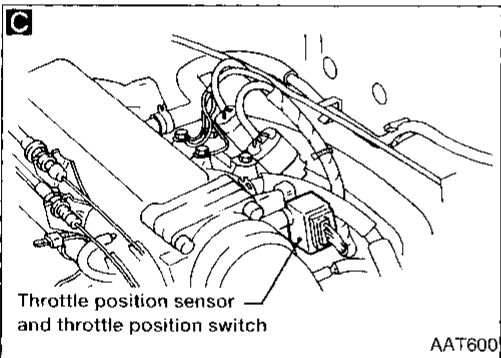
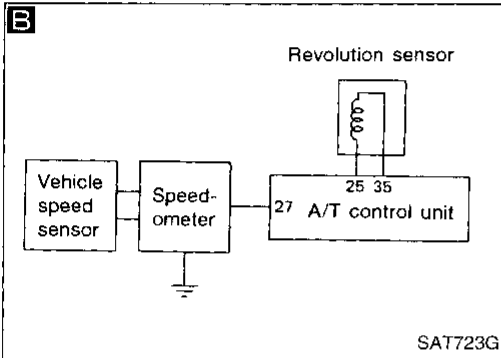
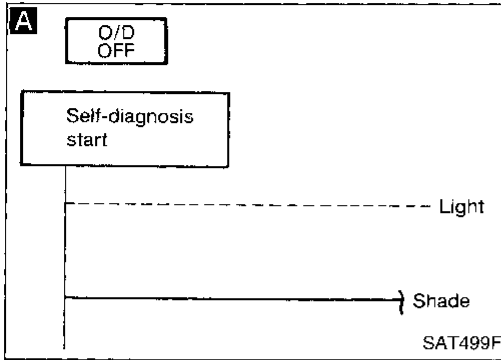


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9. A/T Does Not Shift: D₁ → D₂ Or Does Not Kickdown: D₄ → D₂

SYMPTOM:

- A/T does not shift from D₁ to D₂ at the specified speed.
- A/T does not shift from D₄ to D₂ when depressing accelerator pedal fully at the specified speed.



Are 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From D₁, OK?

No → Go to 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From D₁, AT-138 or AT-139.

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

Yes → Check inhibitor switch circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705", AT-83.

OR

Does self-diagnosis show damage to inhibitor switch circuit?

No → Check revolution sensor and vehicle speed sensor circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0720 and VHCL SPEED SEN-MTR", AT-91.

NG → Repair or replace revolution sensor and vehicle speed sensor circuits.

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

NG → Repair or replace throttle position sensor.

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

NG → 1. Remove control valve. Refer to AT-172.
2. Check the following items:
• Shift valve A
• Shift solenoid valve A
• Pilot valve
3. Disassemble A/T.
4. Check the following items:
• Servo piston assembly
• Brake band
• Oil pump assembly

OK → 1. Remove control valve. Refer to AT-172.
2. Check the following items:
• Shift valve A
• Shift solenoid valve A
• Pilot valve
• Pilot filter

OK → Check again.

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

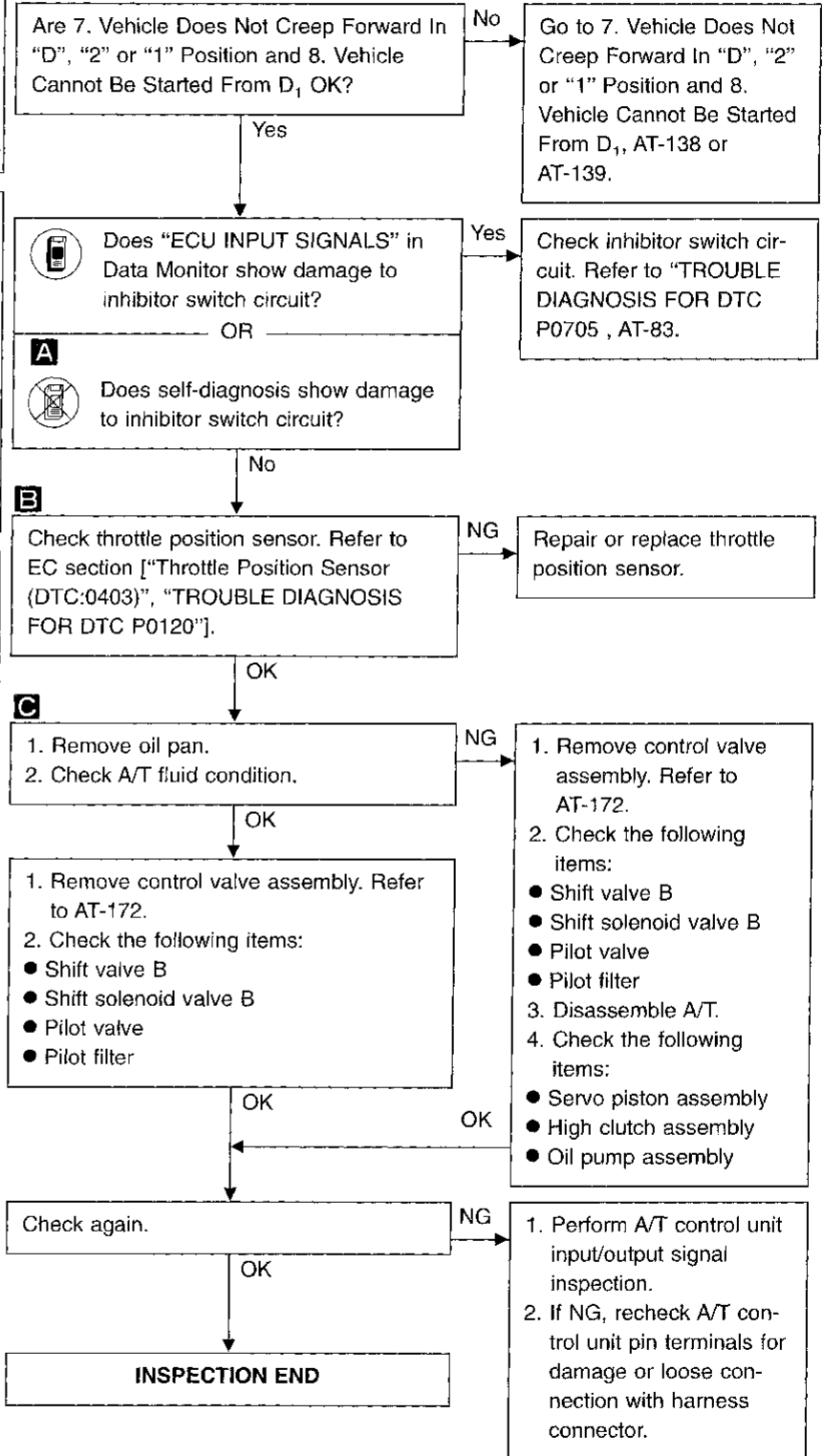
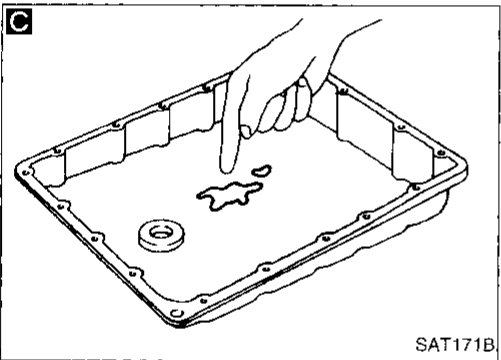
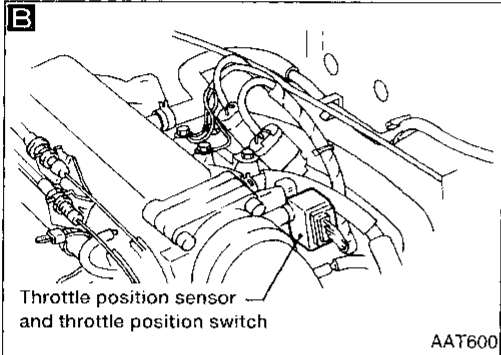
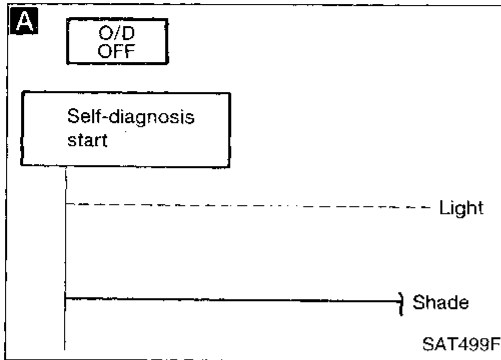
OK → **INSPECTION END**

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10. A/T Does Not Shift: D₂ → D₃

SYMPTOM:

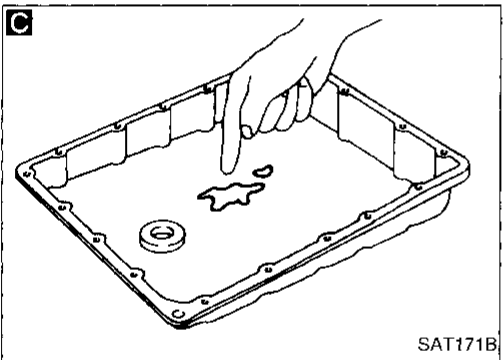
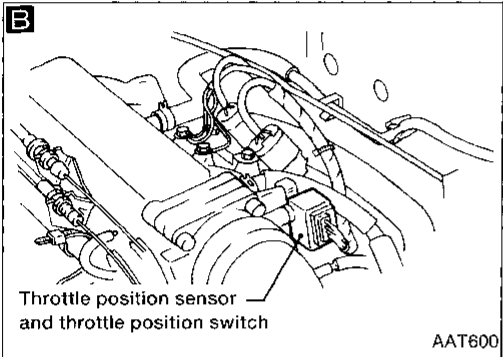
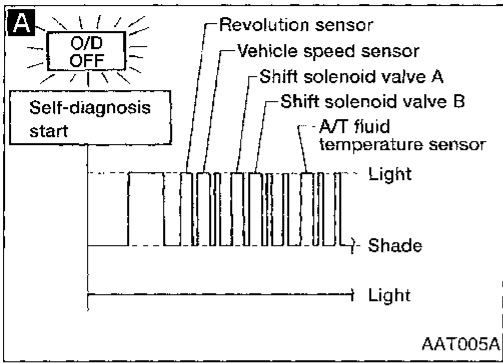
A/T does not shift from D₂ to D₃ at the specified speed.



11. A/T Does Not Shift: D₃ → D₄

SYMPTOM:

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



Are 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From D₁, OK?
 No → Go to 7. Vehicle Does Not Creep Forward In "D", "2" or "1" Position and 8. Vehicle Cannot Be Started From D₁, AT-138 or AT-139.
 Yes →

A Does self-diagnosis, after cruise test, show damage to any of the following circuits?
 Yes → Check damaged circuit. Refer to "TROUBLE DIAGNOSIS FOR DTC P0705, P0710, P0720, P0750, P0755 or VHCL SPEED SEN-MTR".
 No →

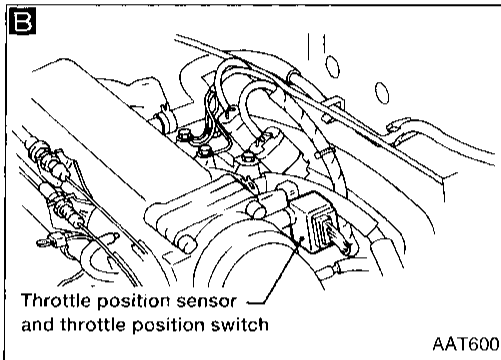
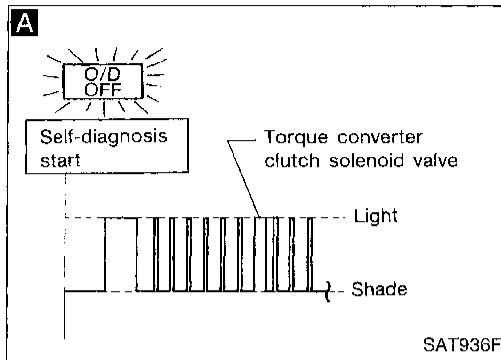
- Inhibitor switch
- Overdrive control switch
- A/T fluid temperature sensor
- Revolution sensor
- Shift solenoid valve A or B
- Vehicle speed sensor

B Check throttle position sensor. Refer to EC section ["Throttle Position Sensor (DTC:0403)", "TROUBLE DIAGNOSIS FOR DTC P0120"].
 NG → Repair or replace throttle position sensor.
 OK →

C 1. Remove oil pan. 2. Check A/T fluid condition.
 NG → 1. Remove control valve assembly. Refer to AT-172. 2. Check the following items: ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter
 OK → 1. Remove control valve assembly. Refer to AT-172. 2. Check the following items: ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter
 OK → 1. Remove control valve assembly. Refer to AT-172. 2. Check the following items: ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter
 OK → 3. Disassemble A/T. 4. Check the following items: ● Servo piston assembly ● Brake band ● Torque converter ● Oil pump assembly

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

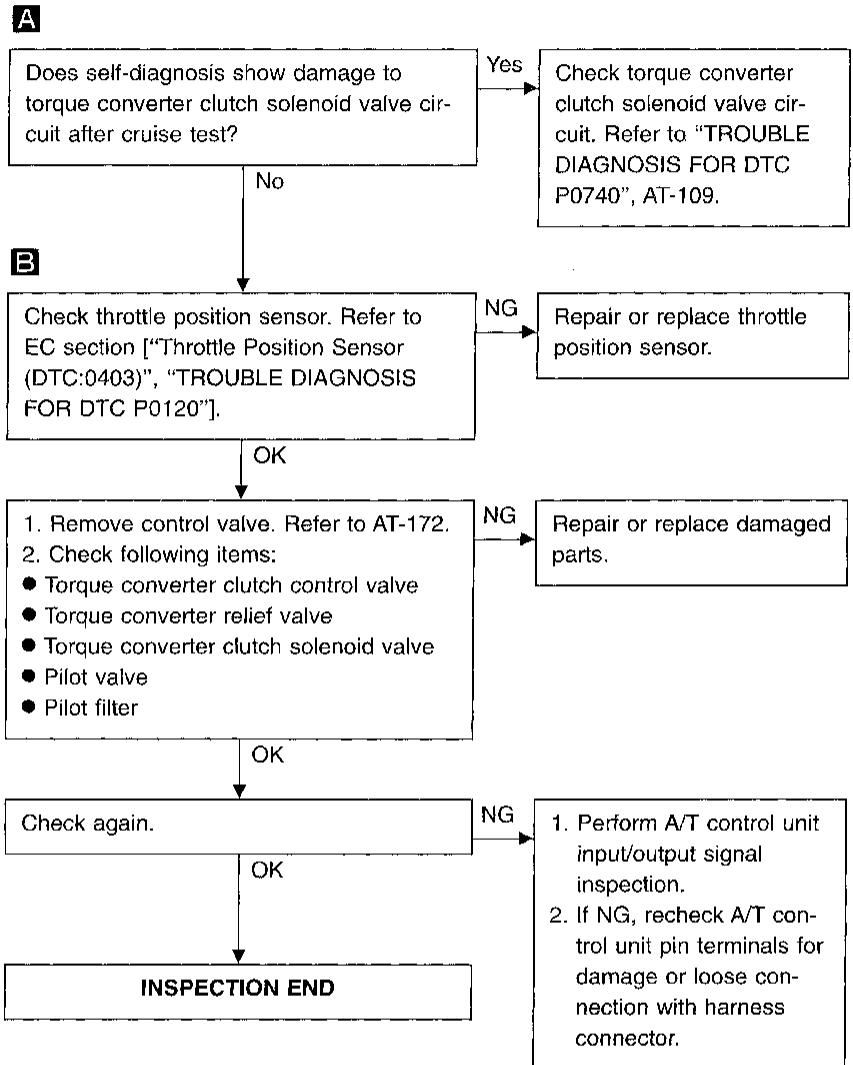
INSPECTION END



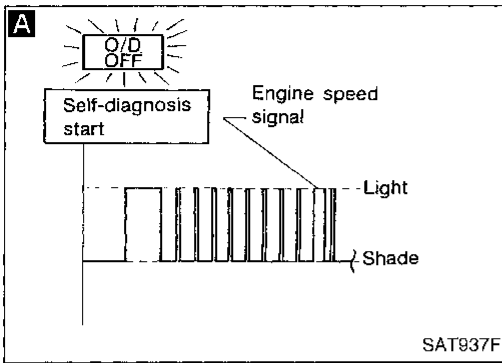
12. A/T Does Not Perform Lock-up

SYMPTOM:

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



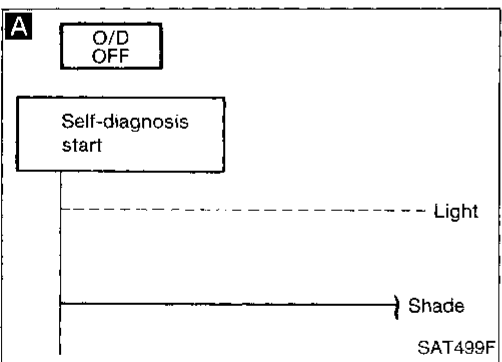
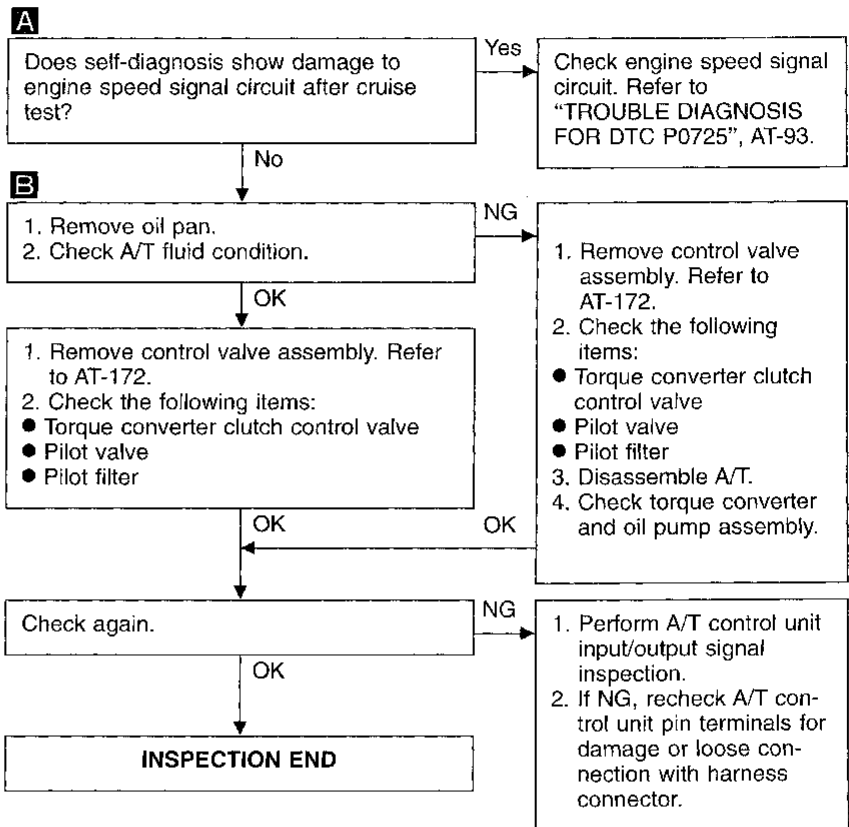
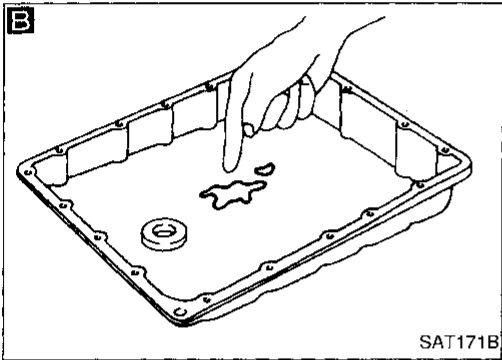
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13. A/T Does Not Hold Lock-up Condition

SYMPTOM:

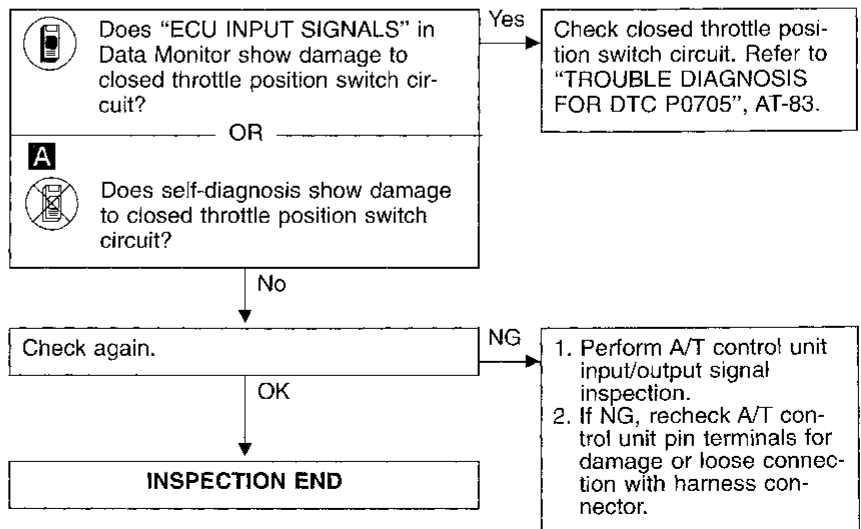
A/T does not hold lock-up condition for more than 30 seconds.

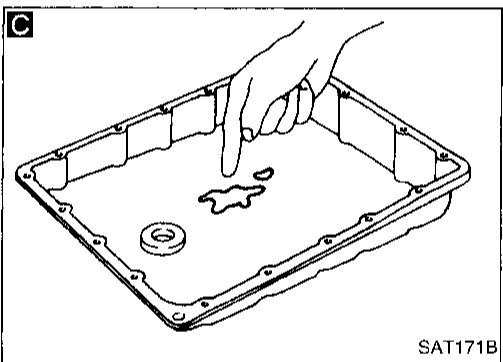
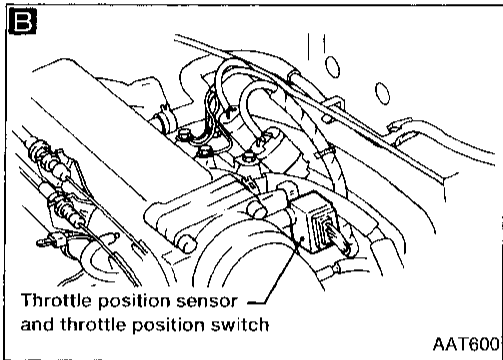
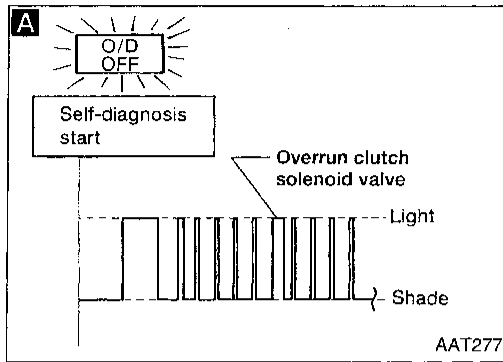


14. Lock-up Is Not Released

SYMPTOM:

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

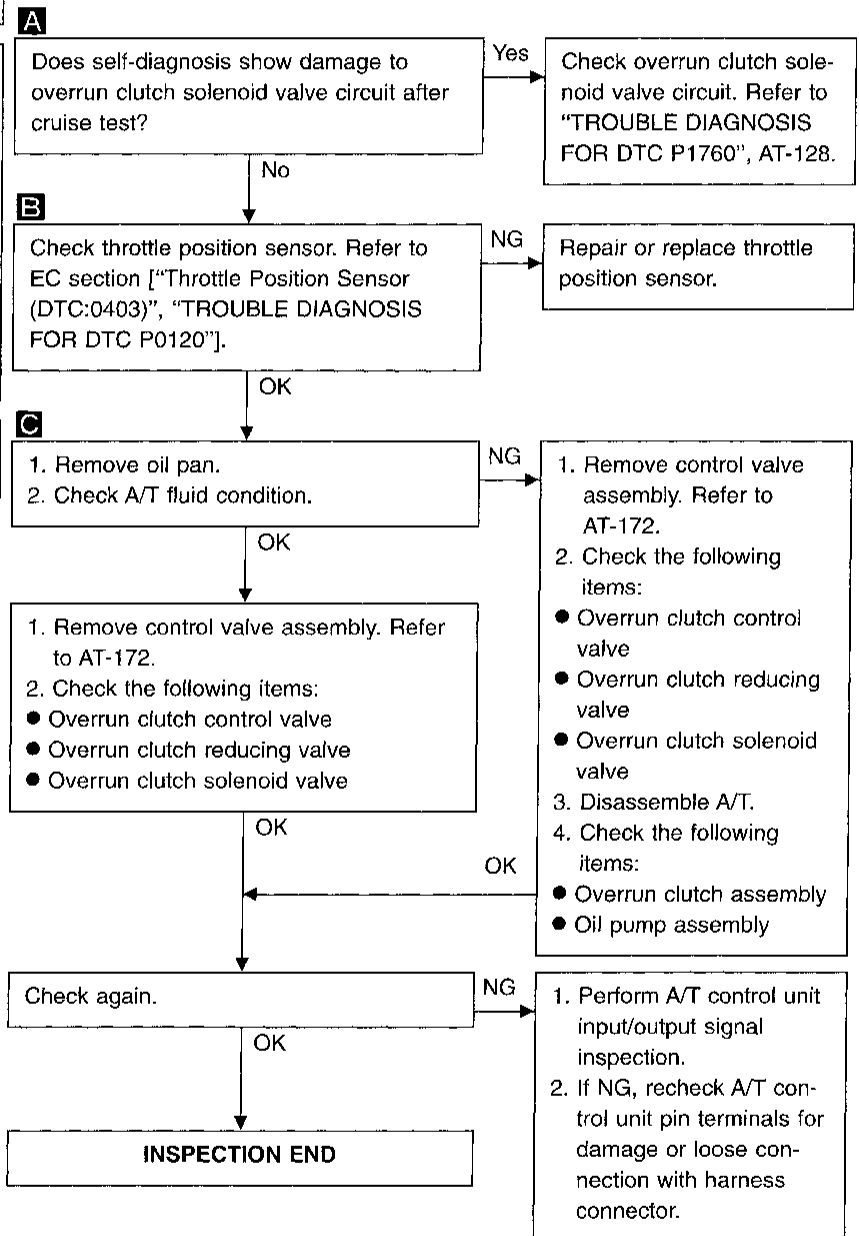




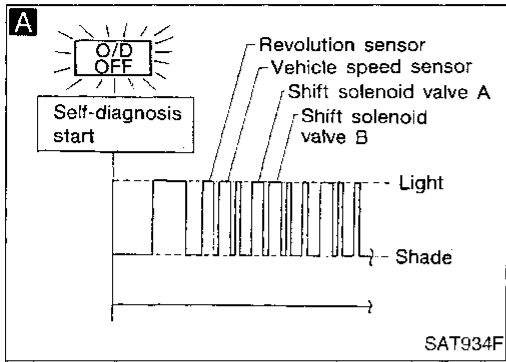
15. Engine Speed Does Not Return to Idle (Light Braking D₄ → D₃)

SYMPTOM:

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



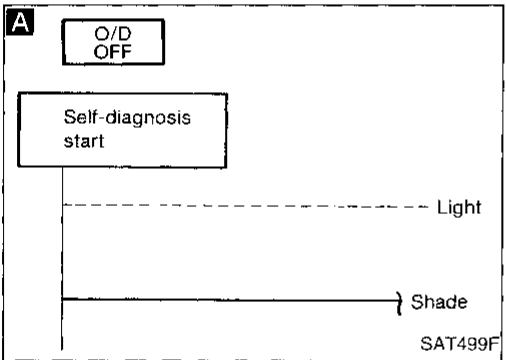
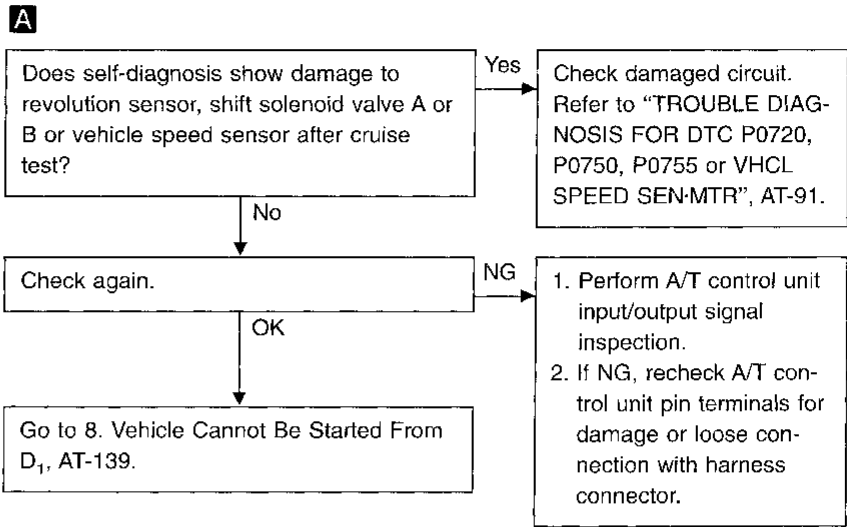
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16. Vehicle Does Not Start From D₁

SYMPTOM:

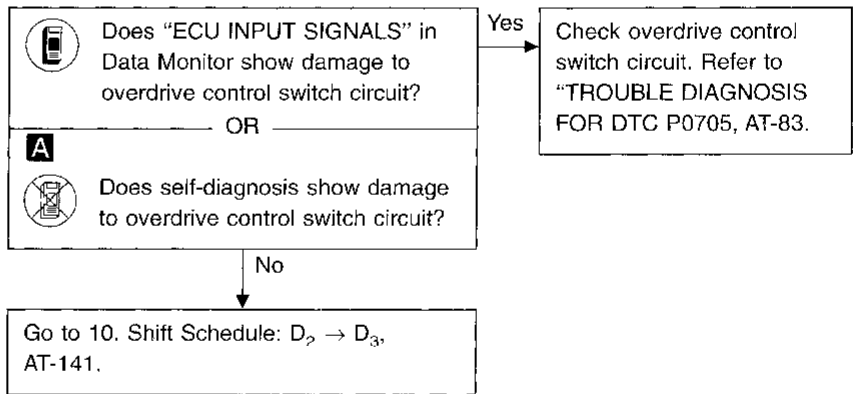
Vehicle does not start from D₁ on Cruise Test — Part 2.

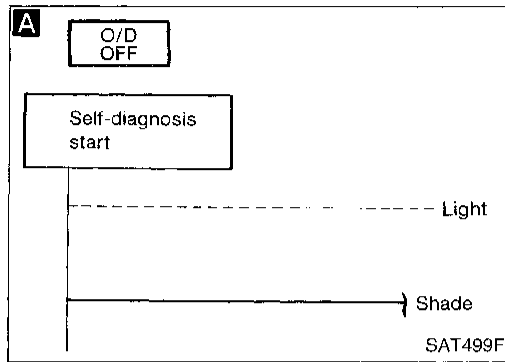


17. A/T Does Not Shift: D₄ → D₃ When Overdrive Control Switch ON → OFF

SYMPTOM:

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

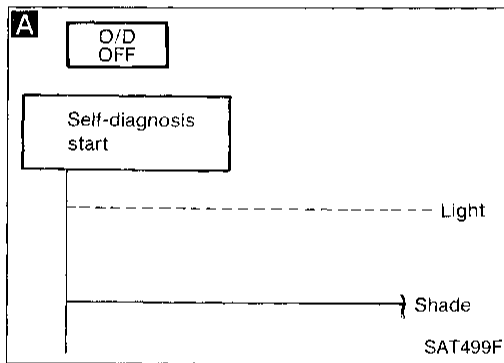
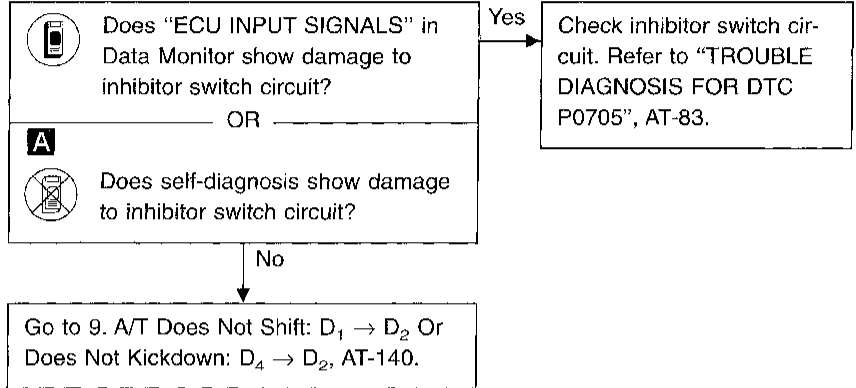




18. A/T Does Not Shift: D₃ → 2₂ When Selector Lever "D" → "2" Position

SYMPTOM:

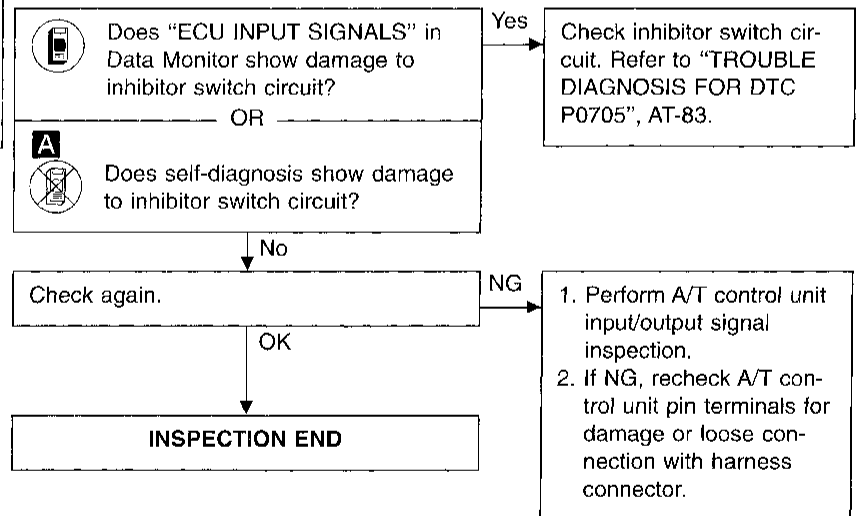
A/T does not shift from D₃ to 2₂ when changing selector lever from "D" to "2" position.



19. A/T Does Not Shift: 2₂ → 1₁, When Selector Lever "2" → "1" Position

SYMPTOM:

A/T does not shift from 2₂ to 1₁, when changing selector lever from "2" to "1" position.

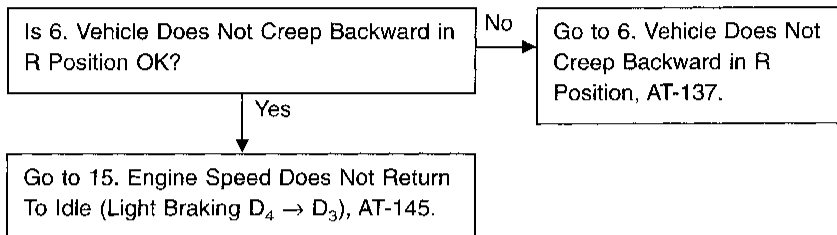


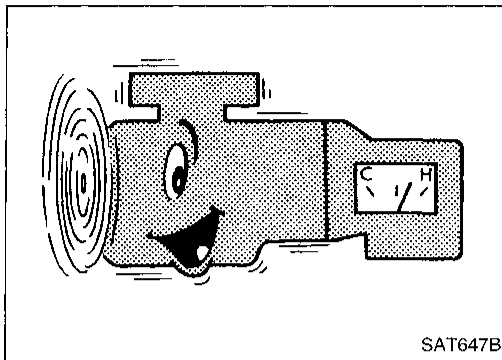
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20. Vehicle Does Not Decelerate By Engine Brake

SYMPTOM:

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





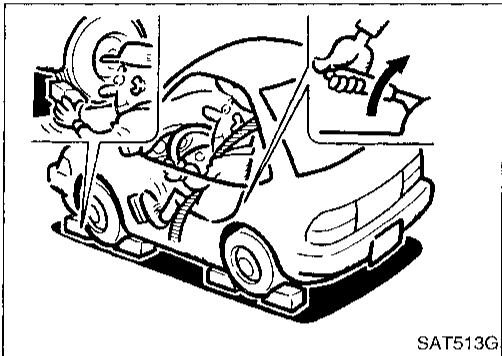
Final Check

STALL TESTING

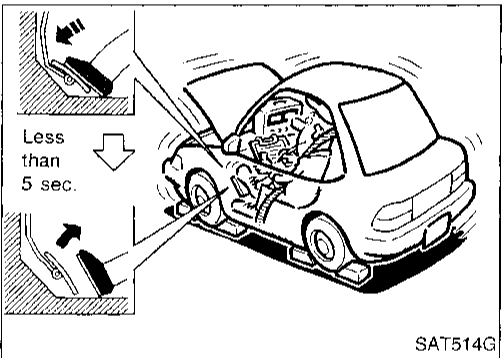
Stall test procedure

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

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



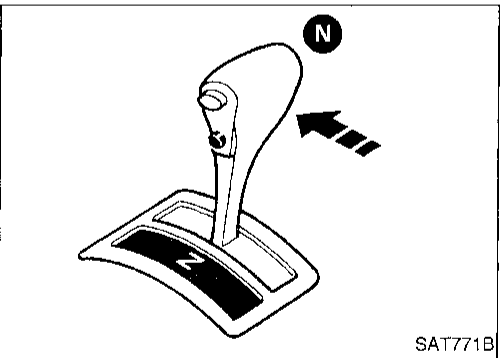
3. Set parking brake and block wheels.
 4. Install a tachometer where it can be seen by driver during test.
- It is good practice to put a mark indicating the point of specified engine rpm on the indicator.



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:
1,850 - 2,150 rpm



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

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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 chart shown in AT-61.

Note:**Stall revolution is too high in "D", "2" or "1" position:**

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

Stall revolution is too high in "R" position:

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

Stall revolution within specifications:

- Vehicle does not achieve speed of more than 80 km/h (50 MPH). ... One-way clutch seizure in torque converter housing.

CAUTION:**Be careful since automatic transmission fluid temperature increases abnormally.**

- Slippage occurs in 3rd and 4th gears in "D" position. ... High clutch slippage.
- Slippage occurs in 2nd and 4th gear in "D" position. ... Brake band slippage.
- Engine brake does not function in 2nd and 3rd gears in "D" position, 2nd gear in "2" position, and 1st gear in "1" position with overdrive control switch set to OFF.

Stall revolution less than specifications:

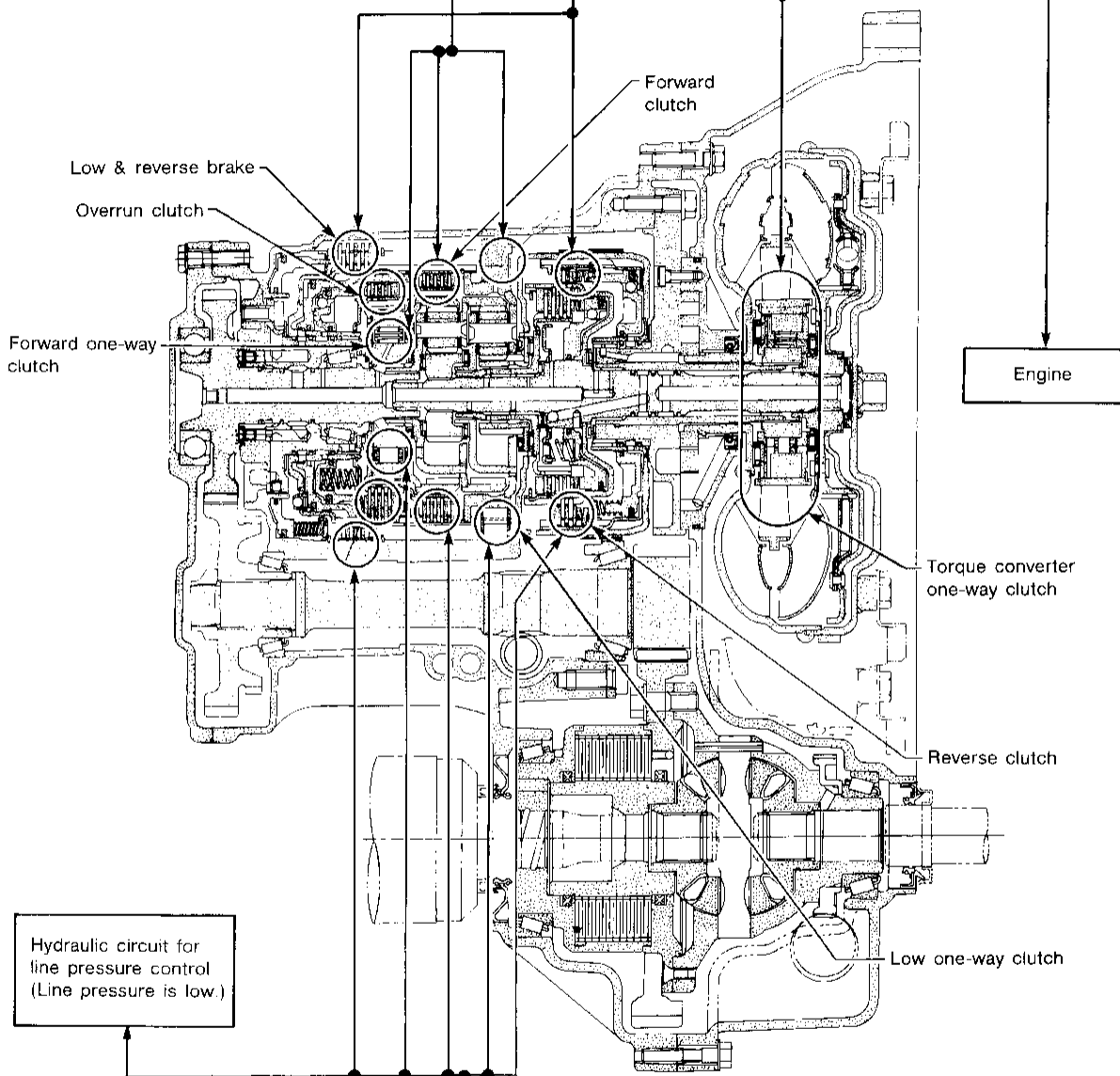
- Poor acceleration during starts. ... One-way clutch seizure in torque converter.

JUDGEMENT OF STALL TEST

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

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

Damaged components



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

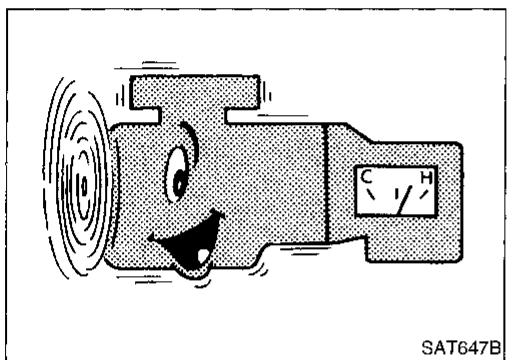
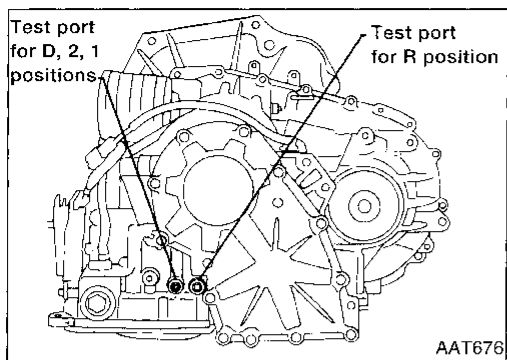
Clutches and brakes except high clutch, brake band and overrun clutch are OK.
 (Condition of high clutch, brake band and overrun clutch cannot be confirmed by stall test.)

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Final Check (Cont'd)

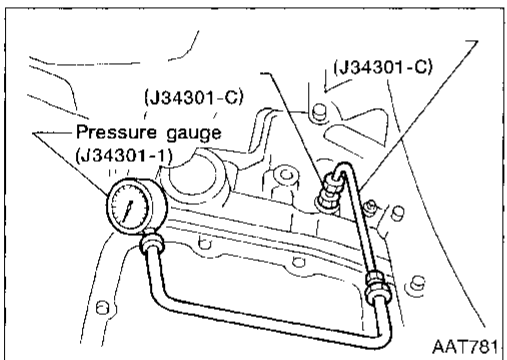
PRESSURE TESTING

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

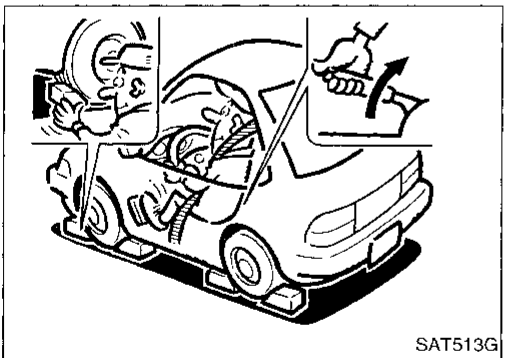


Line pressure test procedure

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

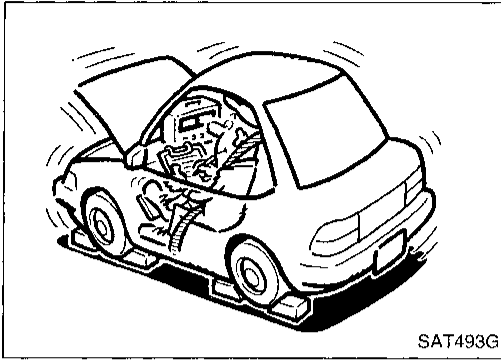


3. Install pressure gauge to corresponding line pressure port.



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

Final Check (Cont'd)



- 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-323.

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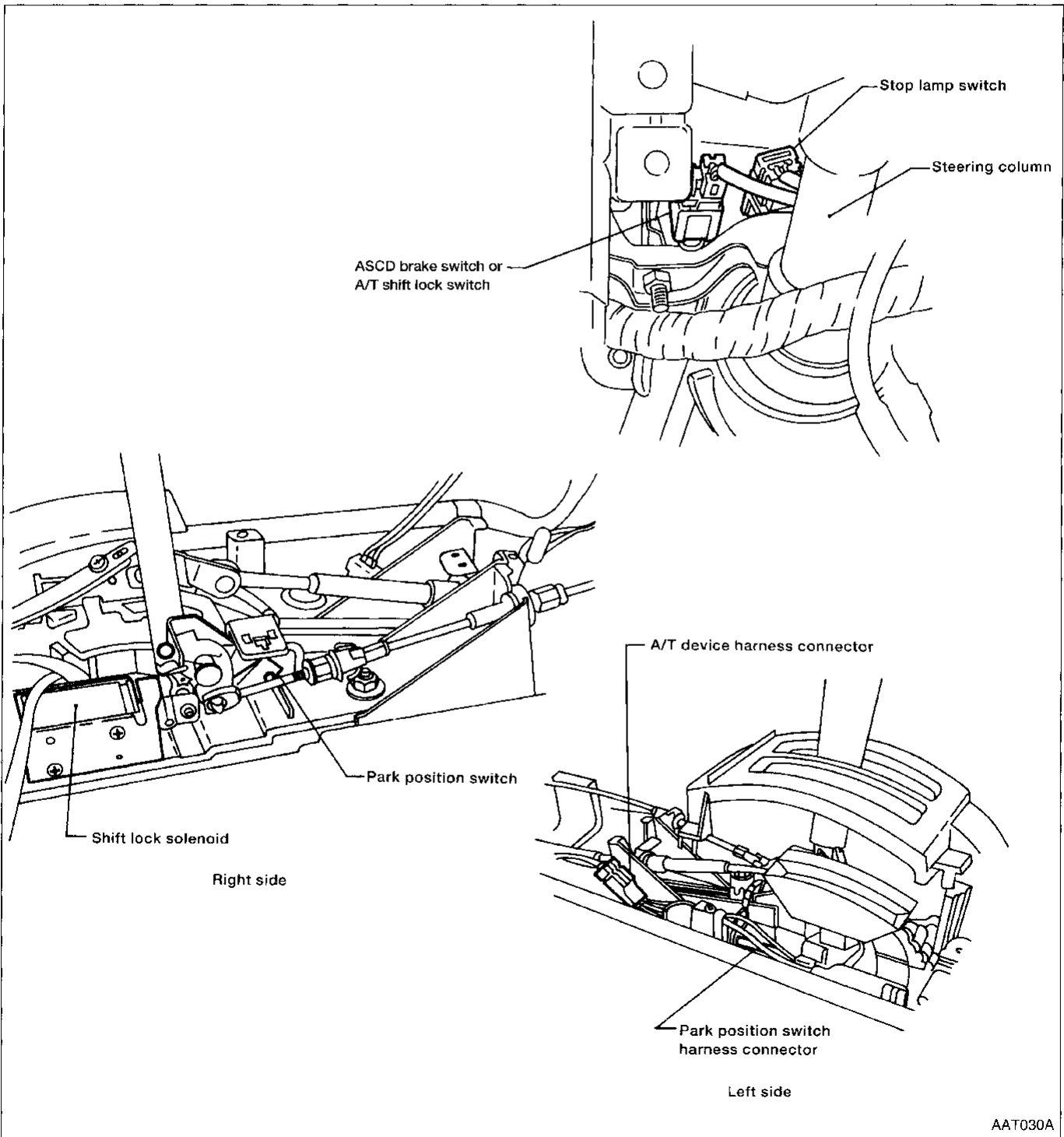
JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	<ul style="list-style-type: none"> • Oil pump wear • Control piston damage • Pressure regulator valve or plug sticking • Spring for pressure regulator valve damaged • Fluid pressure leakage between oil strainer and pressure regulator valve • Clogged strainer
	Line pressure is low in particular position.	<ul style="list-style-type: none"> • Fluid pressure leakage between manual valve and particular clutch • For example, line pressure is: <ul style="list-style-type: none"> — Low in "R" and "1" positions, but — Normal in "D" and "2" positions. Therefore, fluid leakage exists at or around low and reverse brake circuit. Refer to "OPERATION OF CLUTCH AND BRAKE", AT-26.
	Line pressure is high.	<ul style="list-style-type: none"> • Maladjustment of throttle position sensor • Fluid temperature sensor damaged • Line pressure solenoid valve sticking • Short circuit of line pressure solenoid valve circuit • Pressure modifier valve sticking • Pressure regulator valve or plug sticking • Open in dropping resistor circuit
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> • Maladjustment 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

Description

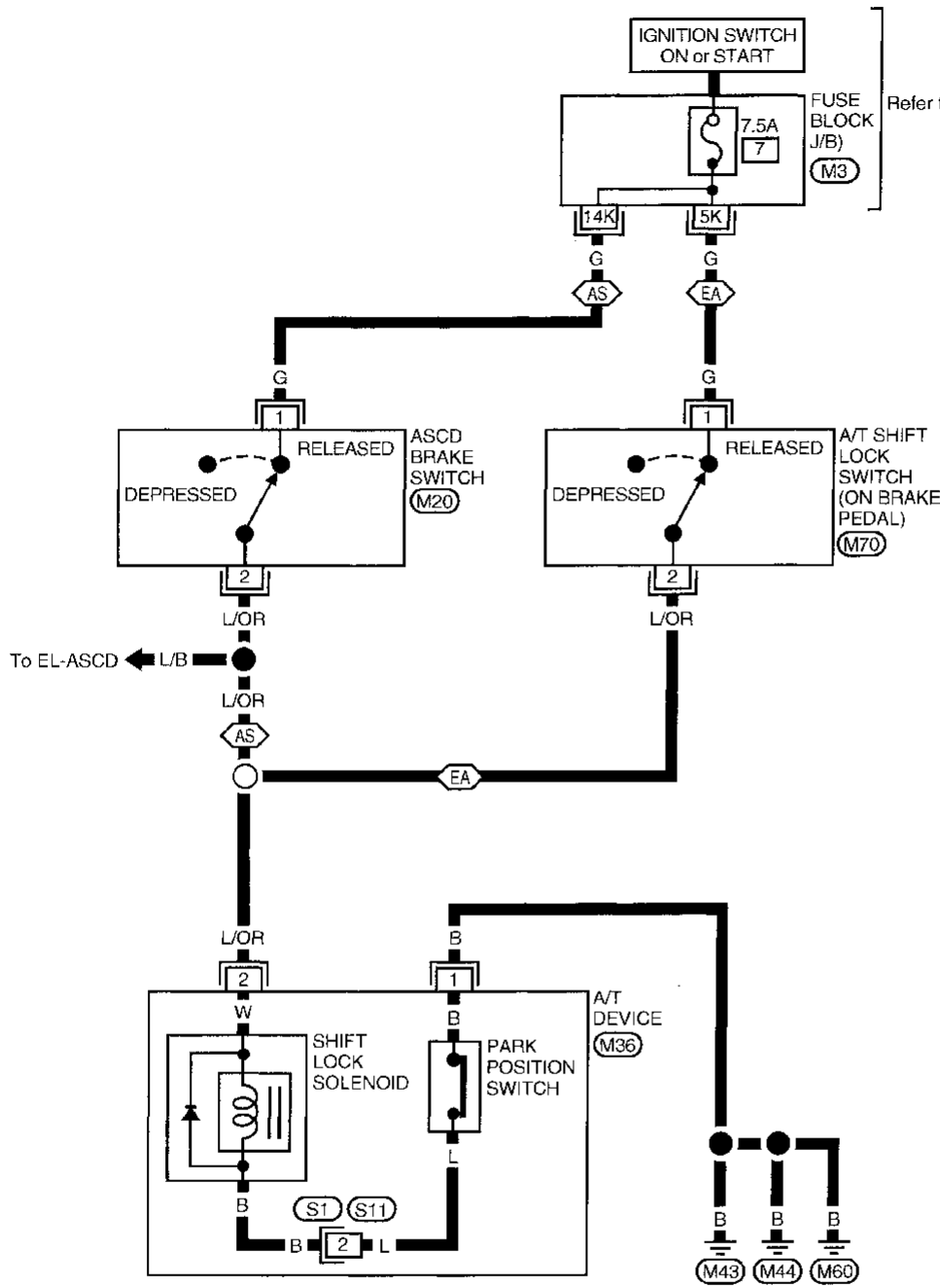
- The mechanical key interlock mechanism also operates as a shift lock:
 - With the key switch turned to ON, the selector lever cannot be shifted from "P" (parking) to any other position unless the brake pedal is depressed.
 - With the key removed, the selector lever cannot be shifted from "P" to any other position.
 - The key cannot be removed unless the selector lever is placed in "P".
- The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder.

Shift Lock System Electrical Parts Location



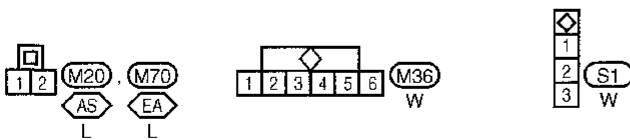
Wiring Diagram — SFT, RL —

AT-SFT,RL-01



Refer to last page (Foldout page).

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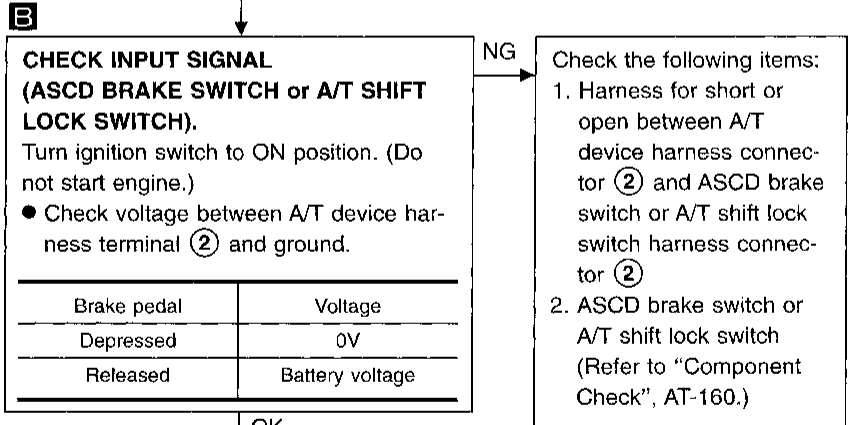
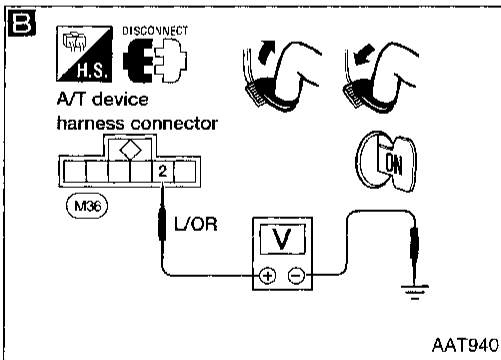
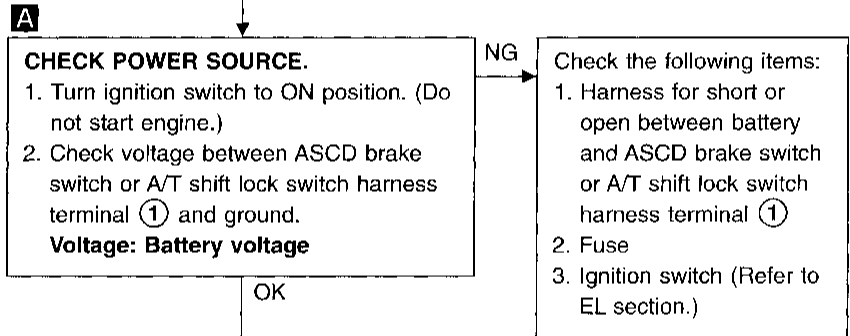
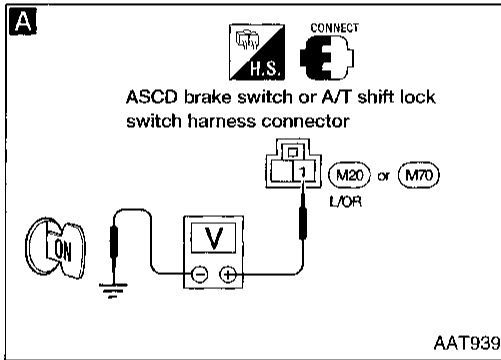
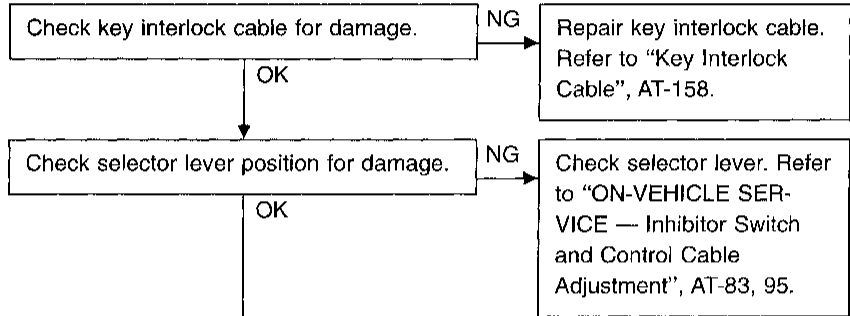
Diagnostic Procedure

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:

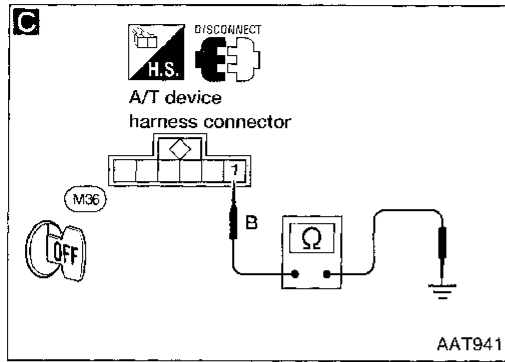
Ignition key cannot be removed when selector lever is set to “P” position. It can be removed when selector lever is set to any position except “P”.



Ⓐ

(Go to next page.)

Diagnostic Procedure (Cont'd)

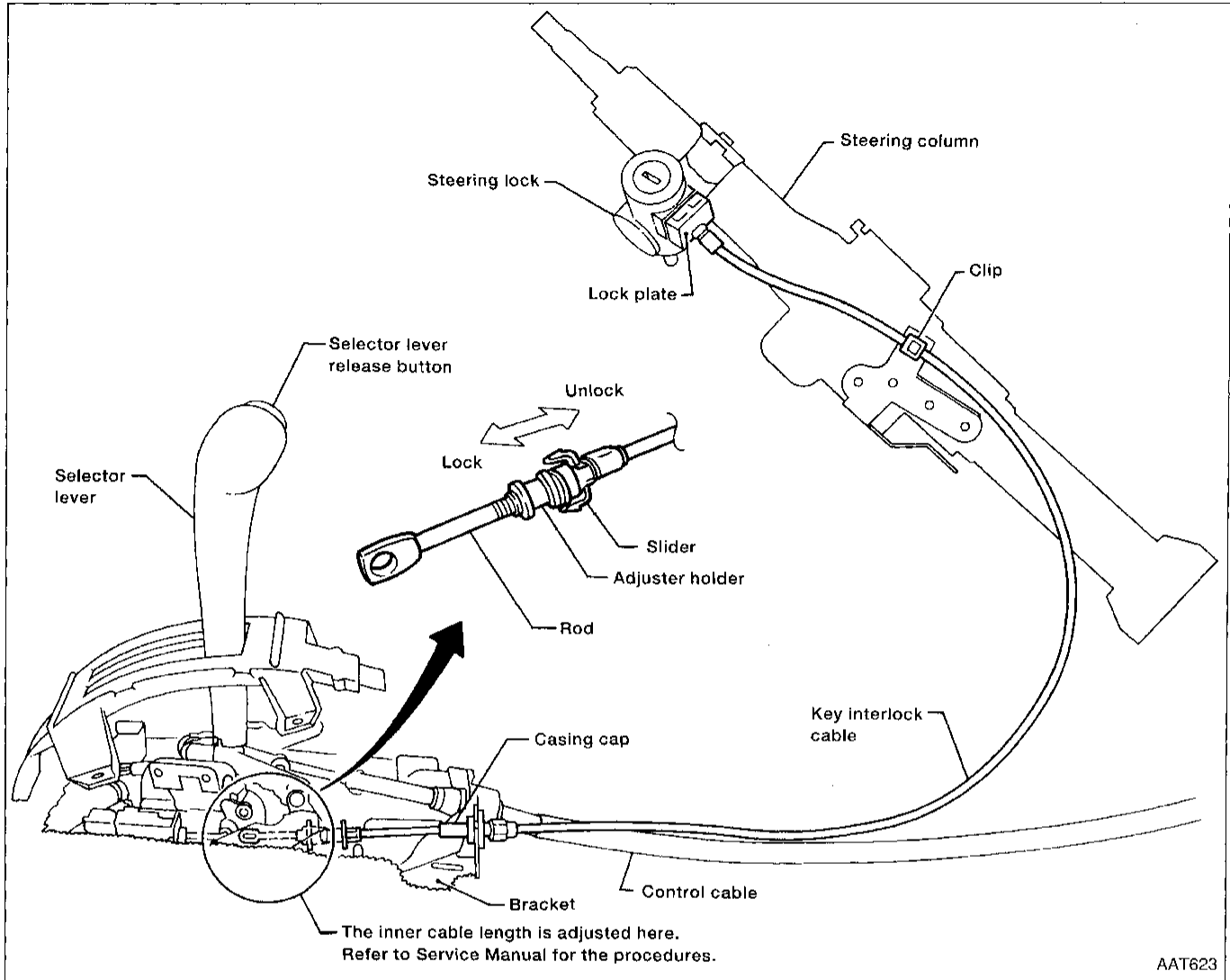


```

    graph TD
        A((A)) --> B[CHECK GROUND CIRCUIT.  
1. Turn ignition switch to OFF position.  
2. Disconnect A/T device harness connector.  
3. Check continuity between A/T device harness terminal ① and ground.  
Continuity should exist.]
        B -- NG --> B1[Repair harness or connector.]
        B -- OK --> C[CHECK PARK POSITION SWITCH.  
Refer to "Component Check", AT-159.]
        C -- NG --> C1[Replace park position switch.]
        C -- OK --> D[CHECK SHIFT LOCK SOLENOID.  
Refer to "Component Check", AT-159.]
        D -- NG --> D1[Replace shift lock solenoid.]
        D -- OK --> E[Reconnect shift lock harness connector.]
        E --> F[Turn ignition switch from OFF to ON position.  
(Do not start engine.)]
        F --> G[Recheck shift lock operation.]
        G -- NG --> G1[1. Perform A/T device input/output signal inspection test.  
2. If NG, recheck harness connector connection.]
        G -- OK --> H[INSPECTION END]
    
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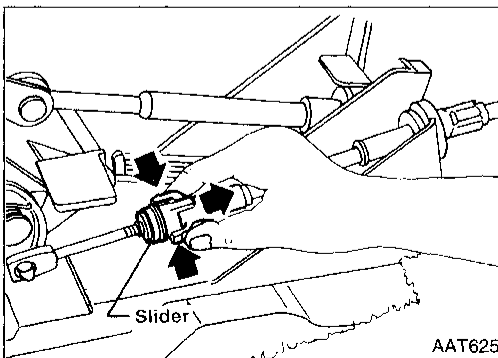
Key Interlock Cable



AAT623

CAUTION:

- Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.
- After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed with an external load of less than 39.2 N (4.0 kg, 8.8 lb), replace key interlock cable with new one.



AAT625

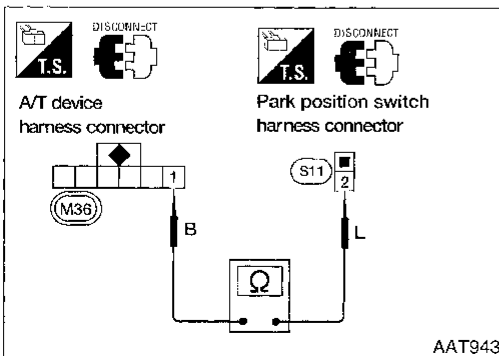
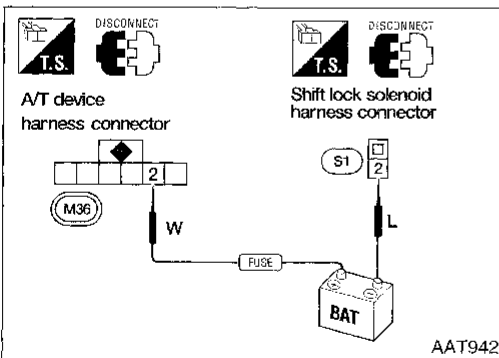
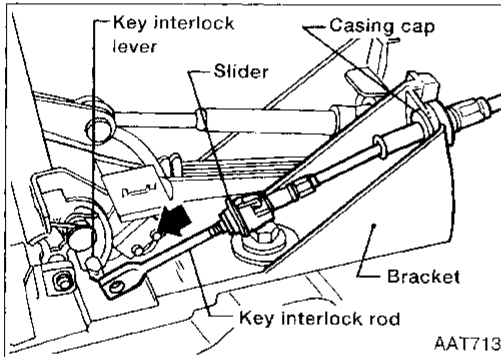
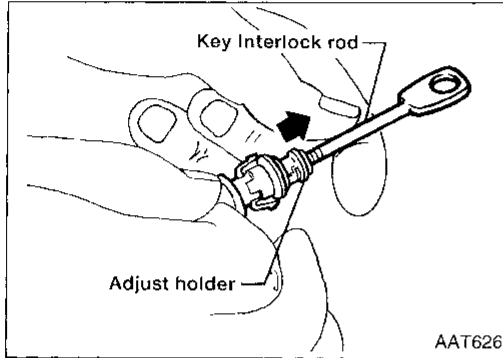
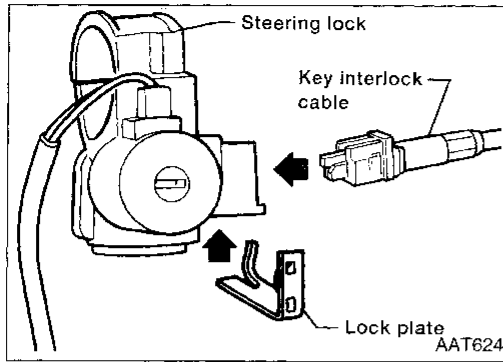
REMOVAL

Unlock slider from adjuster holder and remove rod from cable.

Key Interlock Cable (Cont'd)

INSTALLATION

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



Component Check

SHIFT LOCK SOLENOID

- Check operation by applying battery voltage to A/T device and shift lock solenoid harness terminal.

PARK POSITION SWITCH

- Check continuity between A/T device harness terminal ① and park position switch harness terminal ②.

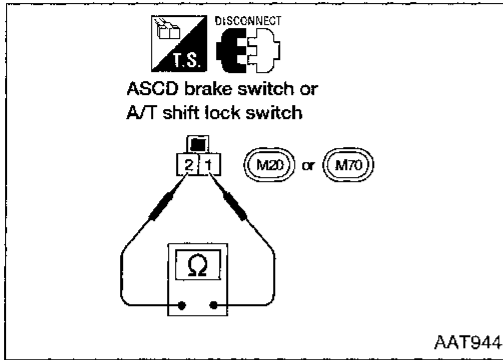
Condition	Continuity
When selector lever is set in "P" position and selector lever button is released	Yes
Except above	No

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Component Check (Cont'd)

ASC D BRAKE SWITCH OR A/T SHIFT LOCK SWITCH

- Check continuity between terminals ① and ②.



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

Check ASC D brake switch or A/T shift lock switch after adjusting brake pedal — refer to BR section.

Description

- The electrical key interlock mechanism also operates as a shift lock:
 With the key switch turned to ON, the selector lever cannot be shifted from "P" (parking) to any other position unless the brake pedal is depressed.
 With the key removed, the selector lever cannot be shifted from "P" to any other position.
 The key cannot be removed unless the selector lever is placed in "P".
- The shift lock and key interlock mechanisms are controlled by the ON-OFF operation of the shift lock solenoid and by the operation of the rotator and slider located inside the key cylinder, respectively.

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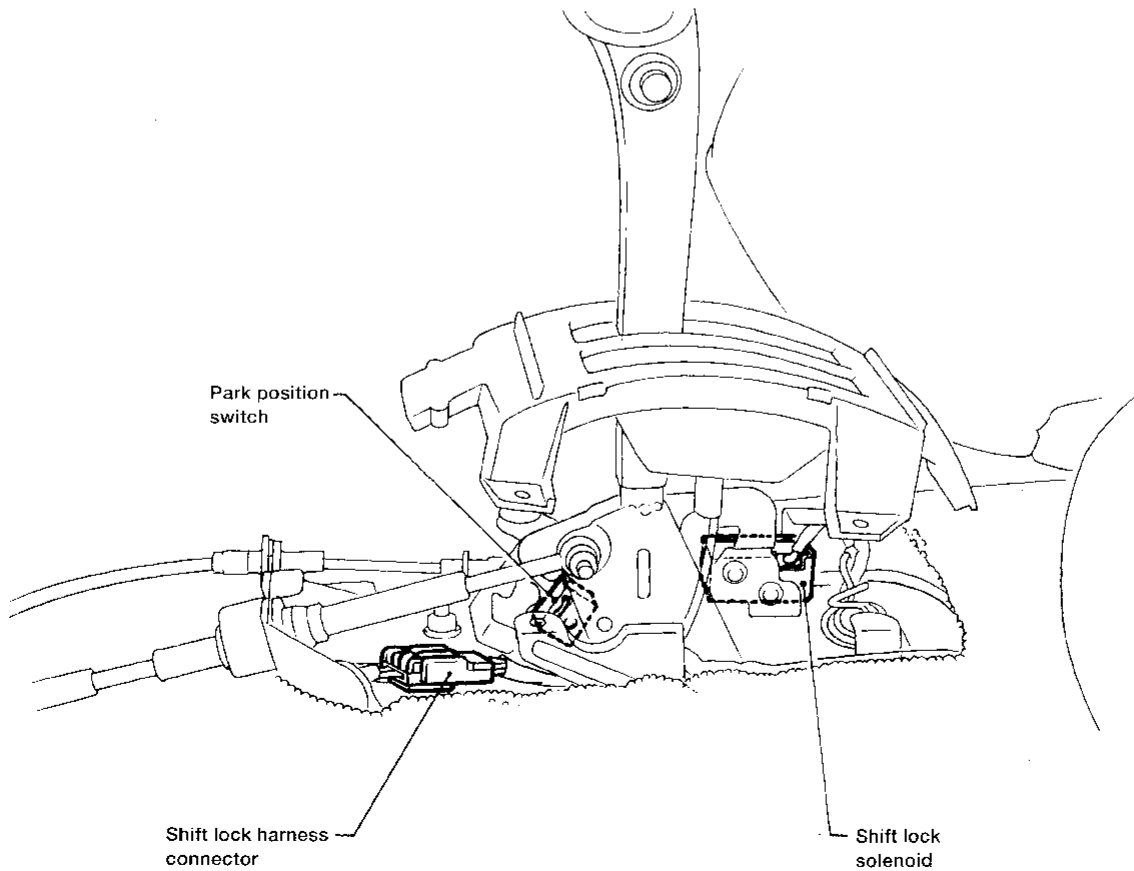
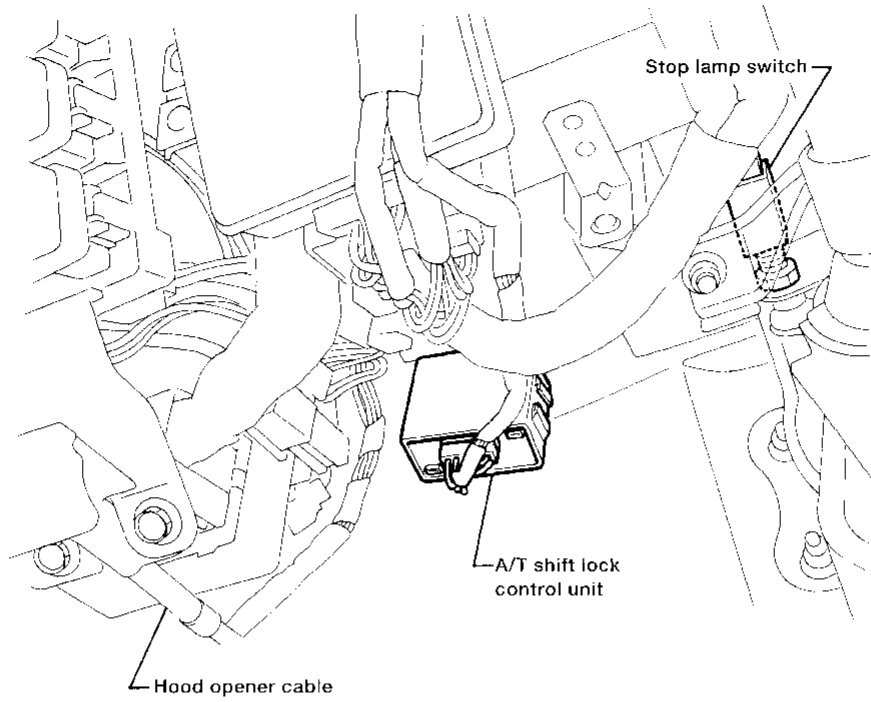
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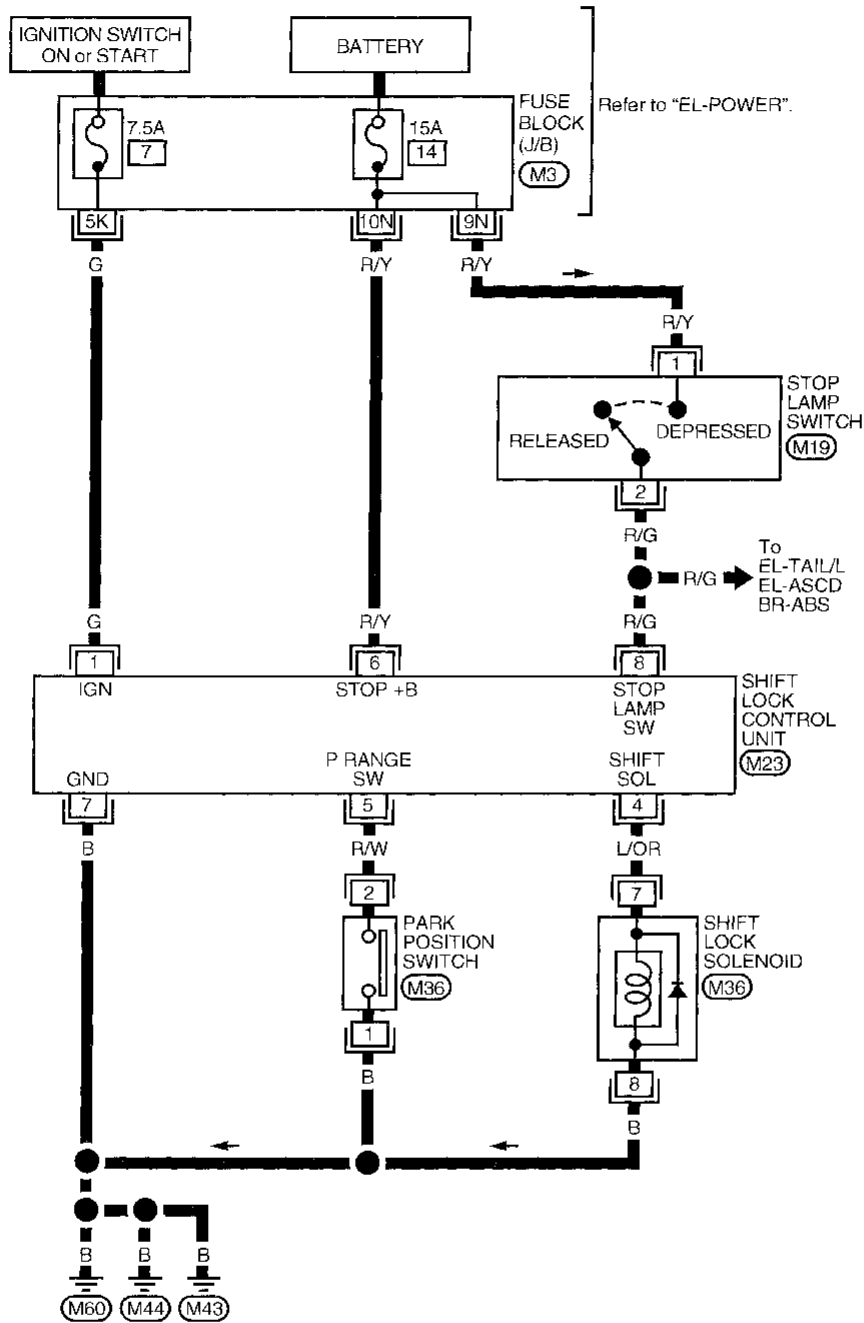
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Shift Lock System Electrical Parts Location



Wiring Diagram —SFT, RE—

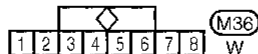
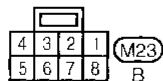
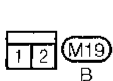
AT-SFT,RE-01



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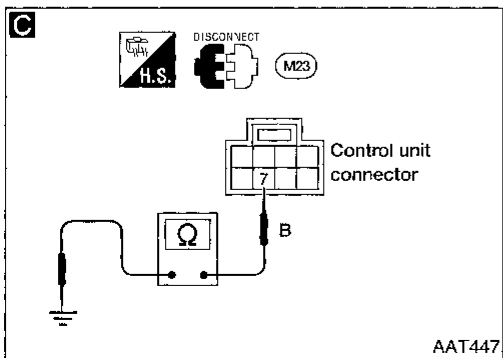
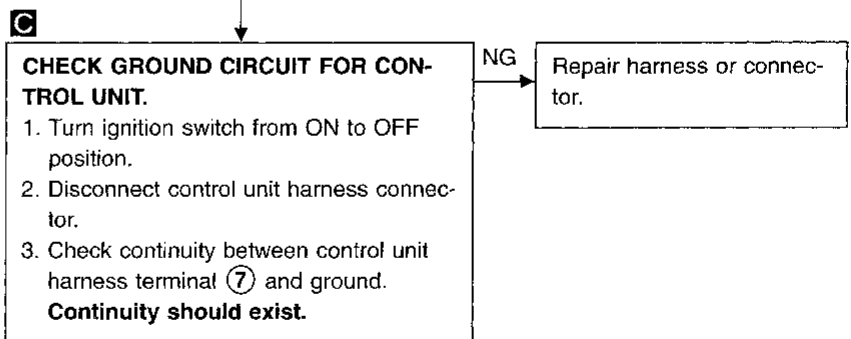
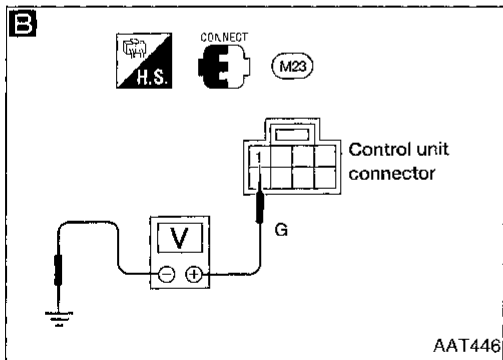
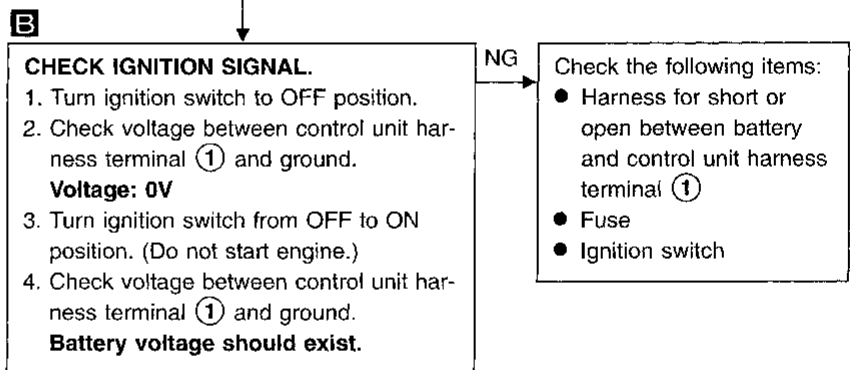
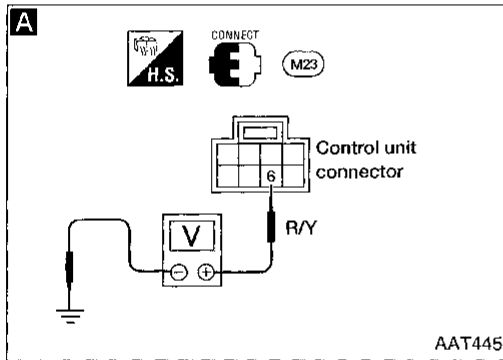
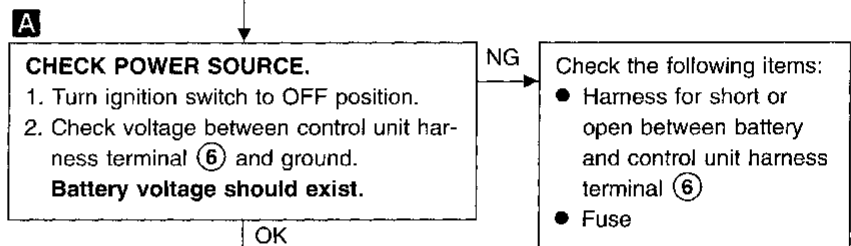
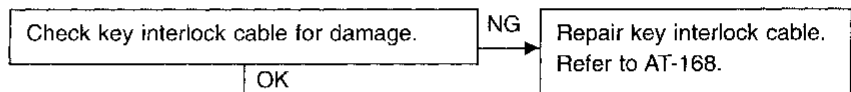
Diagnostic Procedure

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.

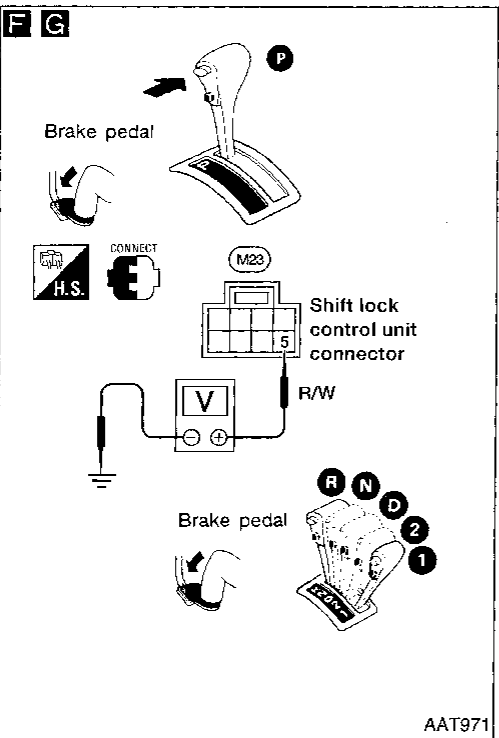
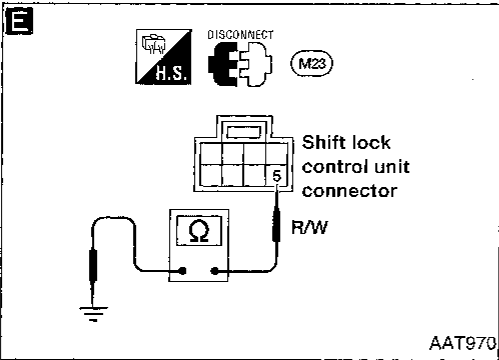
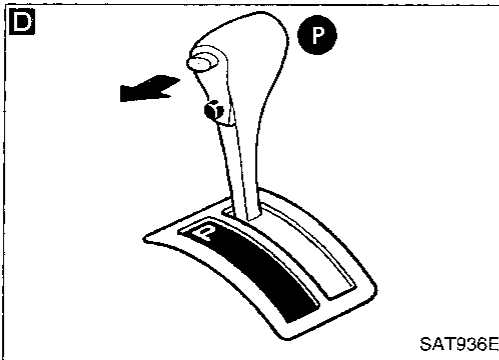
SYMPTOM 2:

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”.



(Go to next page.)

Diagnostic Procedure (Cont'd)



CHECK INPUT SIGNAL (PARK POSITION SWITCH).

1. Reconnect shift lock control unit harness connector.
2. Turn ignition switch from OFF to ON position. (Do not start engine.)
- D** 3. Set selector lever in "P" position and release selector lever button.
- E** 4. Disconnect shift lock control unit harness connector.
5. Check continuity between shift lock control unit harness terminal ⑤ and ground.
Continuity should not exist.

NG → Check park position switch. (Refer to "COMPONENT CHECK", AT-171.)

CHECK INPUT SIGNAL (PARK POSITION SWITCH).

1. Turn ignition switch to ON position. (Do not start engine.)
- F** 2. Check voltage between shift lock control unit harness terminal ⑤ and ground. Check while depressing brake pedal with selector lever button pushed.
Voltage: 0V
- G** 3. Check voltage between shift lock control unit harness terminal ⑤ 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.

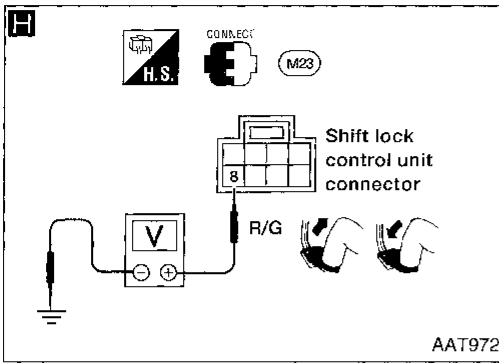
NG → Check the following items:

- Harness for short or open between shift lock control unit harness terminal ⑤ and park position switch harness terminal ②
- Harness for short or open between park position switch harness terminal ① and ground
- Park position switch (Refer to AT-171.)

OK → (Go to next page.)

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Diagnostic Procedure (Cont'd)



H

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

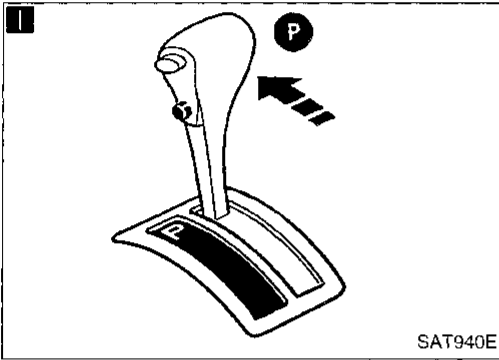
- Check voltage between shift lock control unit harness terminal **8** and stop lamp switch harness terminal **2**.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

NG

Check the following items:

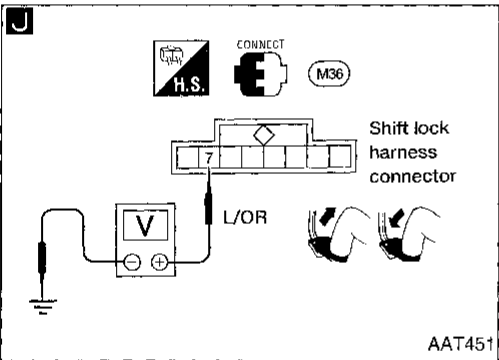
- Harness for short or open between shift lock control unit harness terminal **8** and stop lamp switch harness terminal **2**
- Harness for short or open between stop lamp switch harness terminal **1** and fuse
- Stop lamp switch (Refer to AT-171.)



OK

I

Set selector lever in "P" position.



J

CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

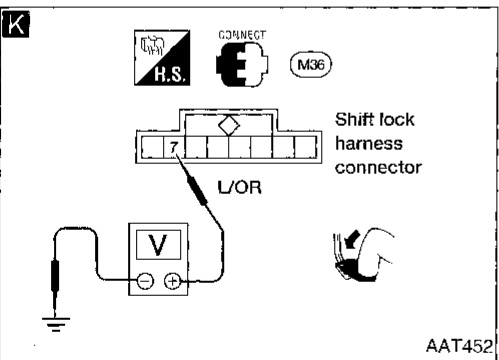
1. Turn ignition switch to ON position. (Do not start engine.)
2. Check voltage between shift lock harness connector terminal **7** and body ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

3. Turn ignition switch from ON to OFF position.
4. Check voltage between shift lock harness connector terminal **7** and ground with brake pedal depressed.
Voltage: 0V

NG

Check harness for short or open between shift lock control unit harness terminal **4** and shift lock solenoid harness terminal **7**.



OK

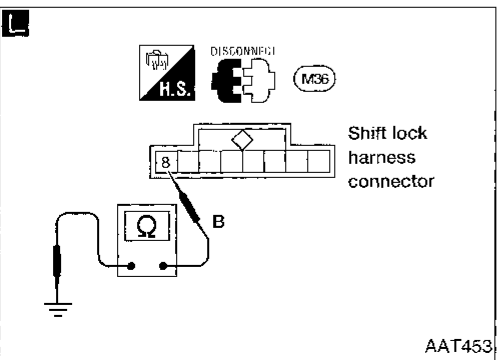
K

CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.

1. Disconnect shift lock harness connector.
2. Check continuity between shift lock harness terminal **8** and ground.
Continuity should exist.

NG

Repair harness or connector.

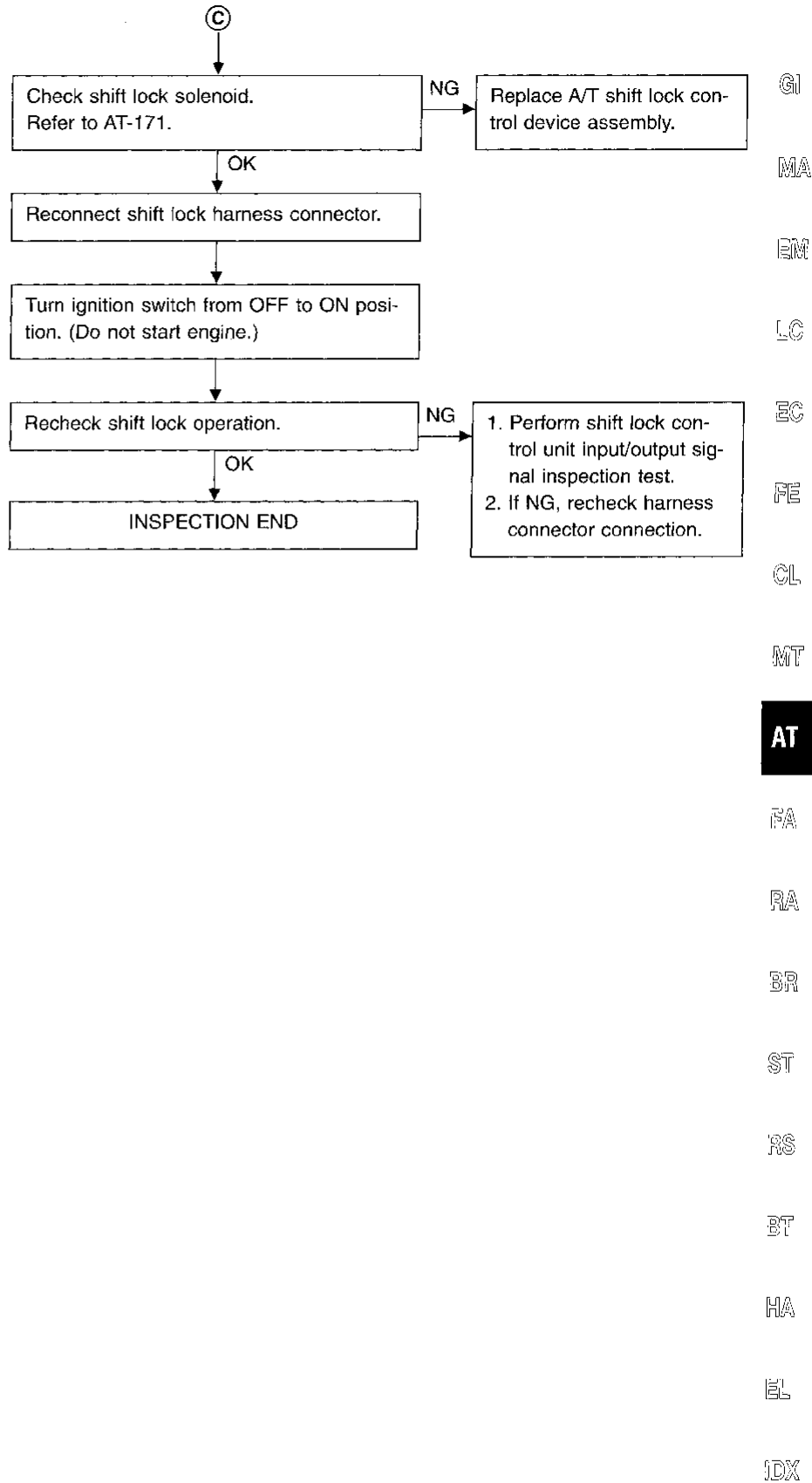


OK

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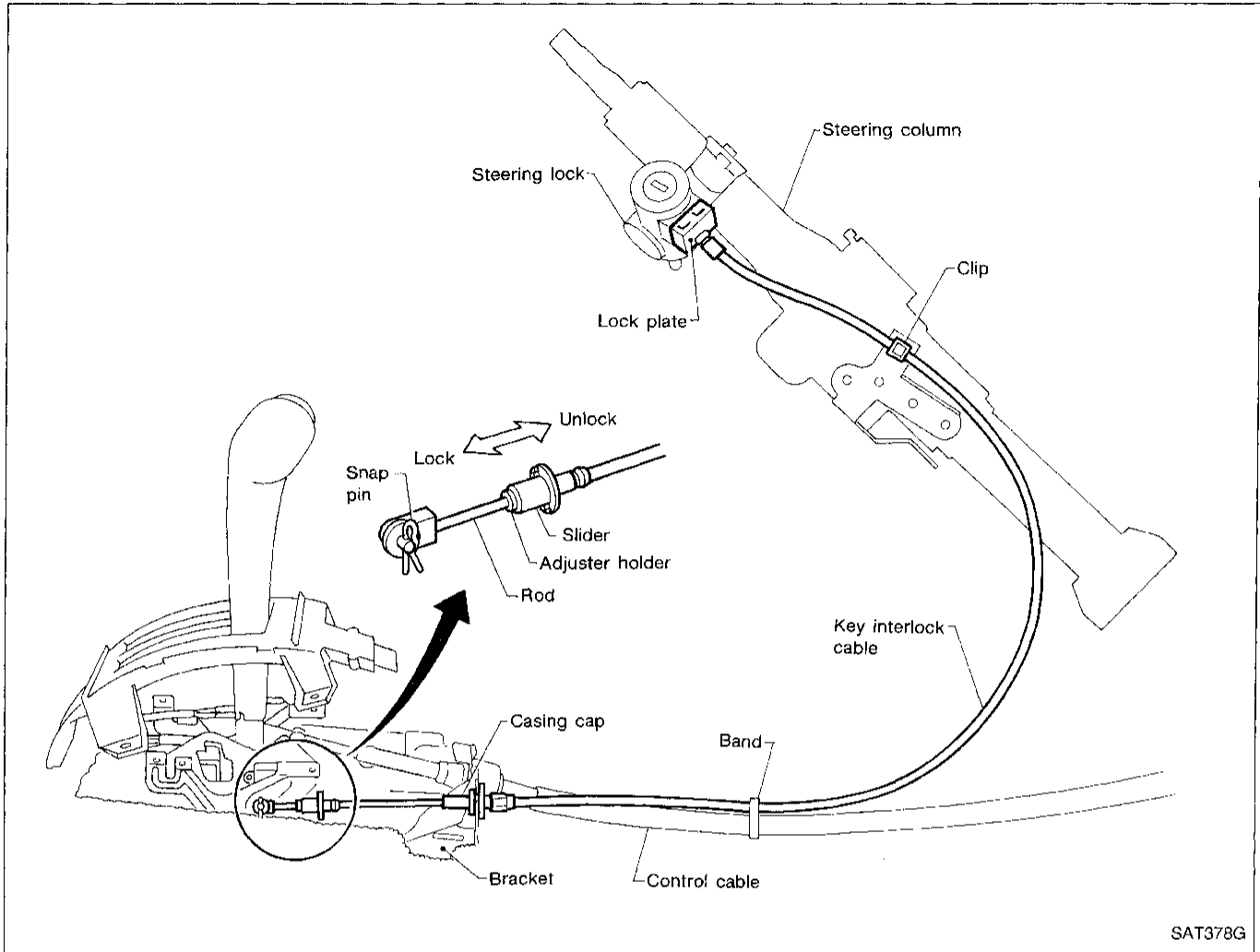
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Diagnostic Procedure (Cont'd)

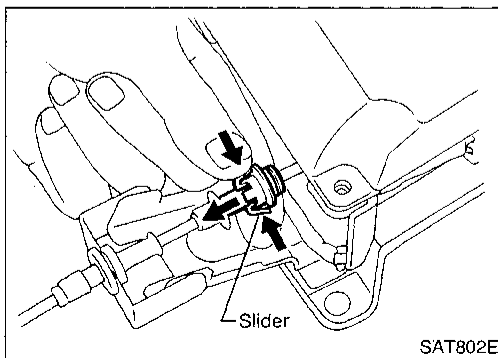


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Key Interlock Cable

**CAUTION:**

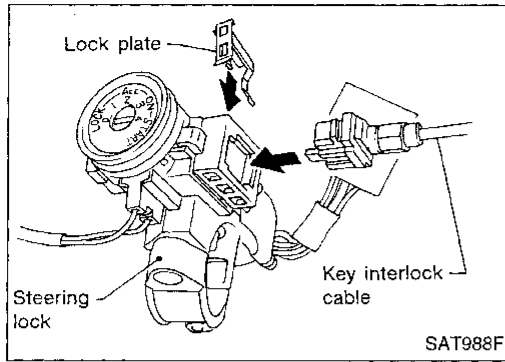
- Install key interlock cable in such a way that it will not be damaged by sharp bends, twists or interference with adjacent parts.
- After installing key interlock cable to control device, make sure that casing cap and bracket are firmly secured in their positions. If casing cap can be removed with an external load of less than 39.2 N (4.0 kg, 8.8 lb), replace key interlock cable with new one.

**REMOVAL**

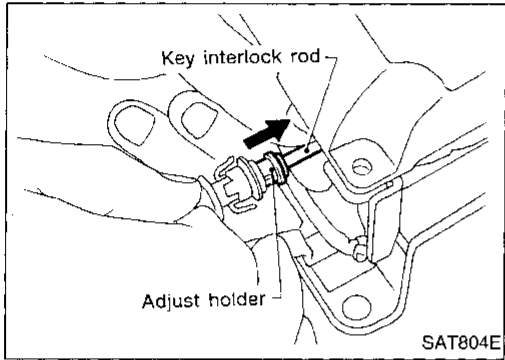
Unlock slider from adjuster holder and remove rod from cable.

Key Interlock Cable (Cont'd)

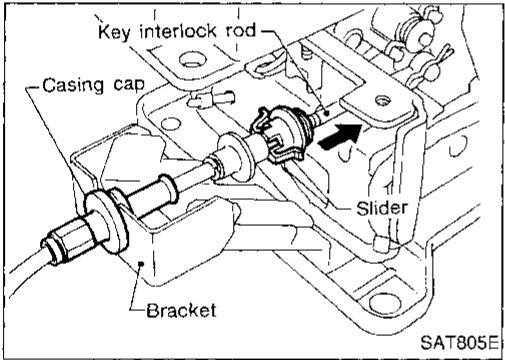
INSTALLATION



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.

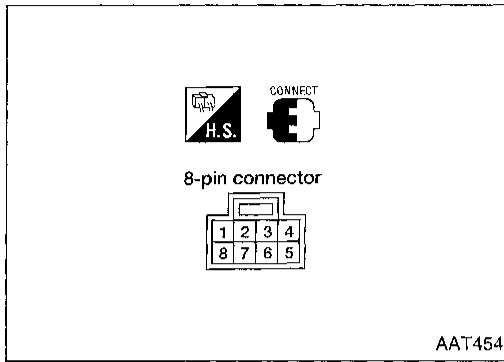


4. Insert interlock rod into adjuster holder.



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

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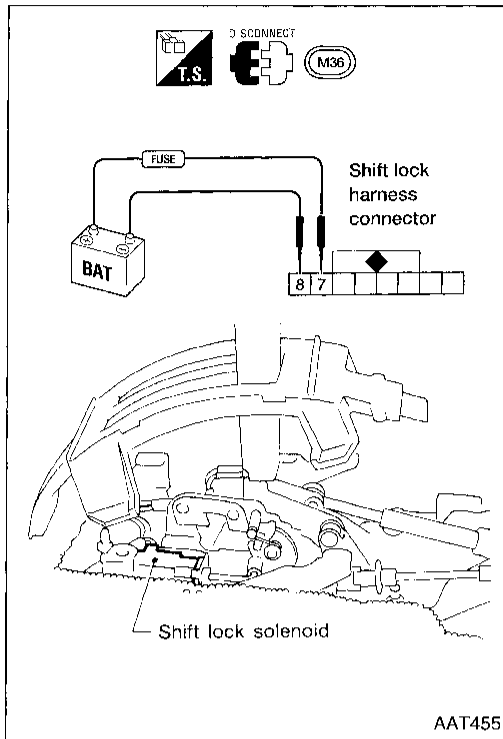
Shift Lock Control Unit Inspection

- Measure voltage between each terminal and terminal ⑦ by following “Shift Lock Control Unit Inspection Table”.
- Pin connector terminal layout.

Shift Lock Control Unit Inspection Table

(Data are reference values.)

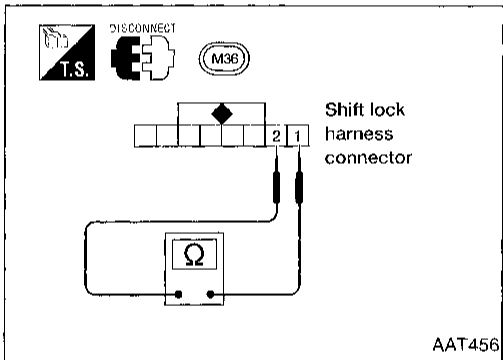
Terminal No.		Item	Condition	Judgement standard
⊕	⊖			
1	7	Ignition signal	● Turn ignition switch to ON or START position.	Battery voltage
			● Except above	0V
6		Power source	● Any condition	Battery voltage
4		Shift lock signal	● Turn ignition switch to ON position	Battery voltage
			● When selector lever is set in “P” position and brake pedal is depressed.	
		● Except above	0V	
8	Stop lamp switch	● When brake pedal is depressed.	Battery voltage	
		● When brake pedal is released.	0V	
5	Park position switch	● When key is in key cylinder, selector lever is in “P” position, and selector lever button pushed.	Battery voltage	
		● When selector lever is set in any position except “P”.		
	● Except above	0V		



Component Check

SHIFT LOCK SOLENOID

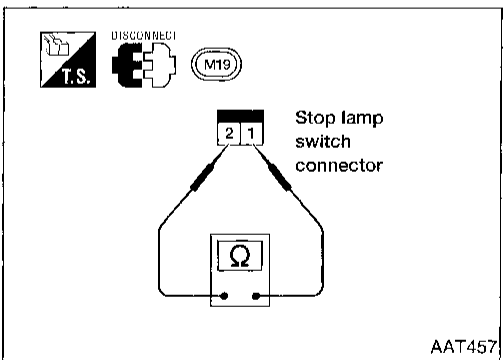
- Check operation by applying battery voltage to shift lock harness connector.



PARK POSITION SWITCH

- Check continuity between terminals ② and ① of park position switch harness connector

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



STOP LAMP SWITCH

- Check continuity between terminals ① and ② of stop lamp switch harness connector

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

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

GI

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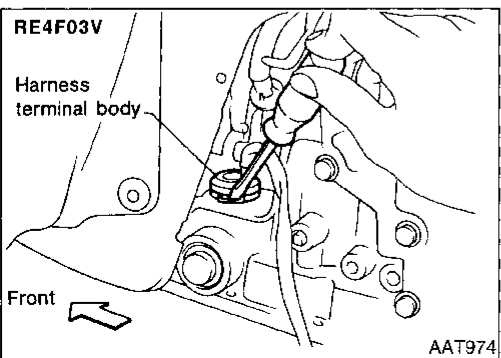
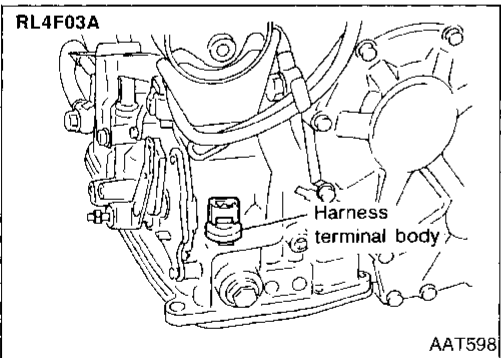
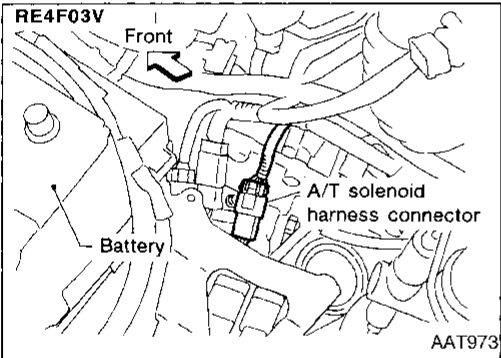
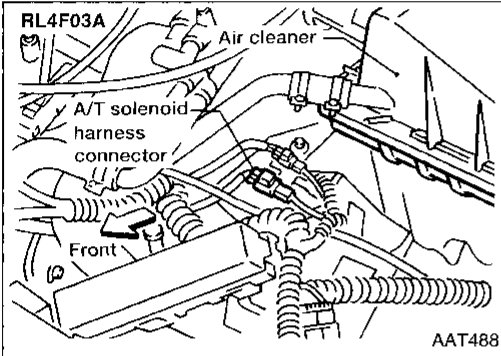
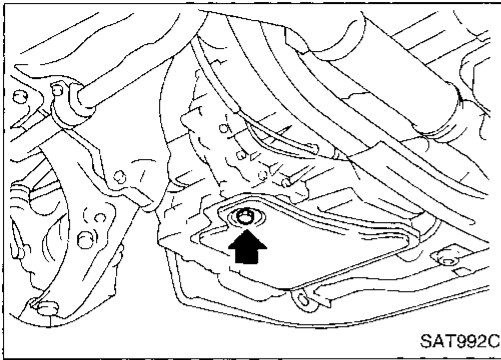
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Control Valve Assembly and Accumulator REMOVAL

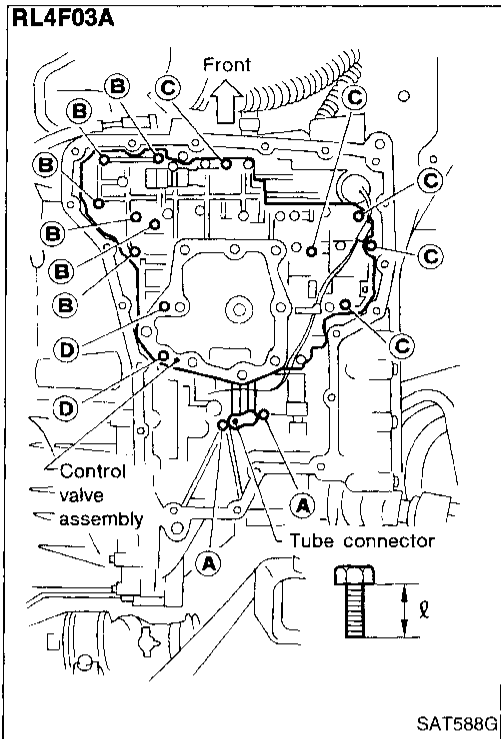
— RL4F03A & RE4F03V —

1. Drain ATF from transaxle.
2. Remove oil pan and gasket.
3. Disconnect A/T solenoid harness connector.
4. Remove stopper ring from A/T solenoid harness terminal body.
5. Remove A/T solenoid harness by pushing terminal body into transmission case.



ON-VEHICLE SERVICE

Control Valve Assembly and Accumulator (Cont'd)



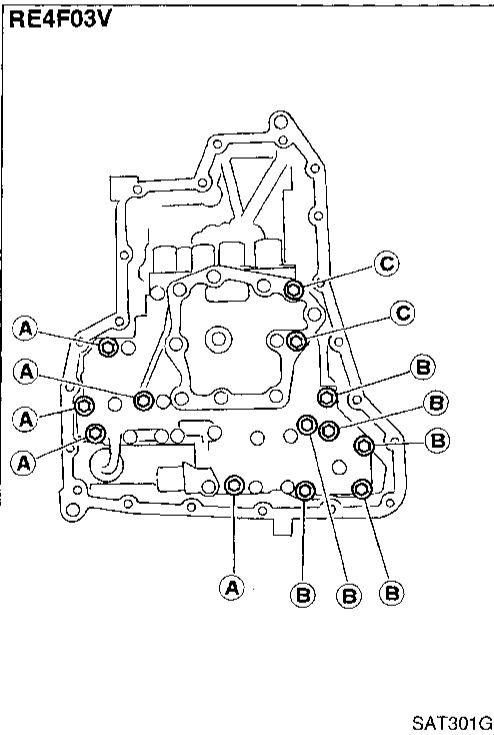
— RL4F03A —

6. Remove control valve assembly by removing fixing bolts.

Bolt length, number and location:

Bolt symbol		(A)	(B)	(C)	(D)
Bolt length "ℓ"	mm (in)	25.0 (0.984)	33.0 (1.299)	40.0 (1.575)	43.5 (1.713)
Number of bolts		2	6	5	2

- Be careful not to drop manual valve, tube connector, tubes and servo release accumulator return spring.
7. Disassemble and inspect control valve assembly if necessary. Refer to AT-218.



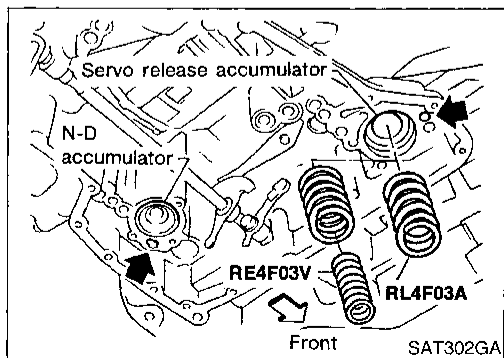
— RE4F03V —

6. Remove control valve assembly by removing fixing bolts.

Bolt length, number and location:

Bolt symbol		(A)	(B)	(C)
Bolt length "ℓ"	mm (in)	40.0 (1.575)	33.0 (1.299)	43.5 (1.713)
Number of bolts		5	6	2

- Be careful not to drop manual valve and servo release accumulator return springs.
7. Disassemble and inspect control valve assembly if necessary. Refer to AT-226.



— RL4F03A & RE4F03V —

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

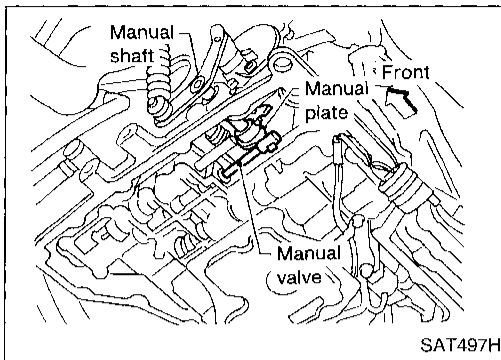
- Hold each piston with a rag.

ON-VEHICLE SERVICE

Control Valve Assembly and Accumulator (Cont'd)

INSTALLATION

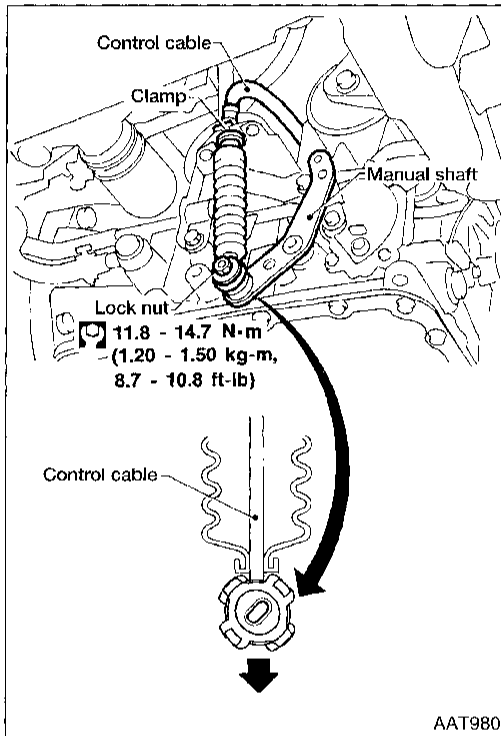
- Tighten fixing bolts to specification.
 🔩 : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)
- Set manual shaft in Neutral position, then align manual plate with groove in manual valve.
- After installing control valve assembly to transmission case, make sure that selector lever can be moved to all positions.



Control Cable Adjustment

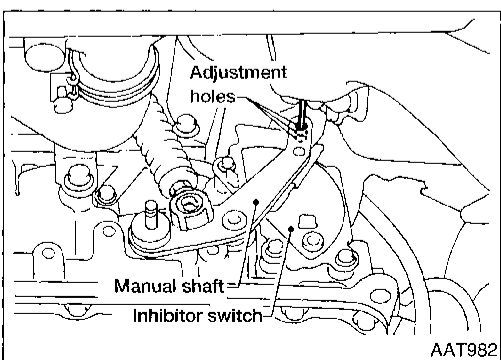
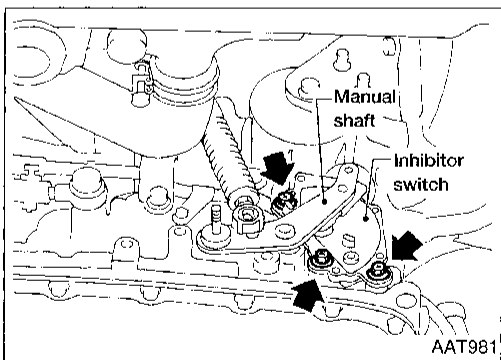
Move selector lever from the "P" position to the "1" position. You should be able to feel the detents in each position. If the detents cannot be felt or if the pointer indicating the position is improperly aligned, the control cable needs adjustment.

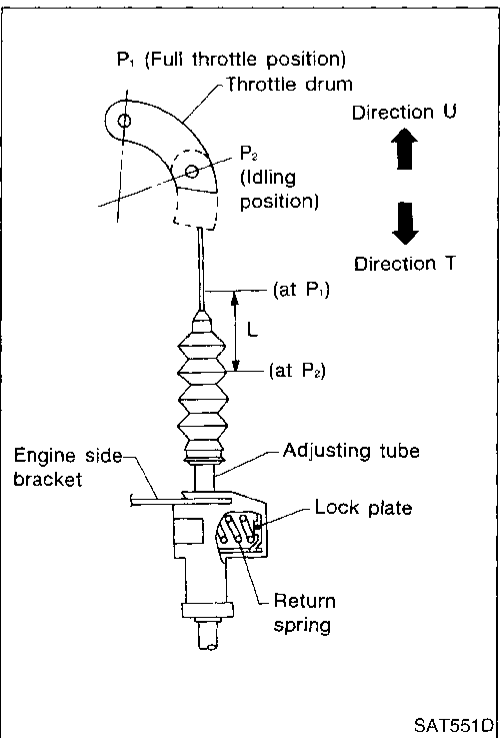
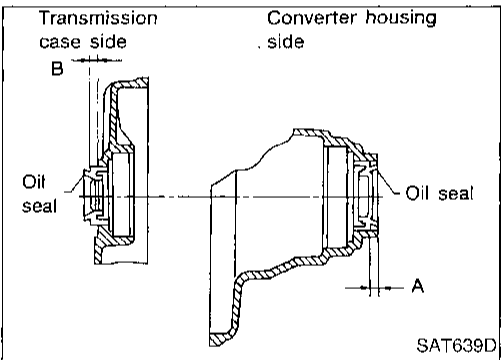
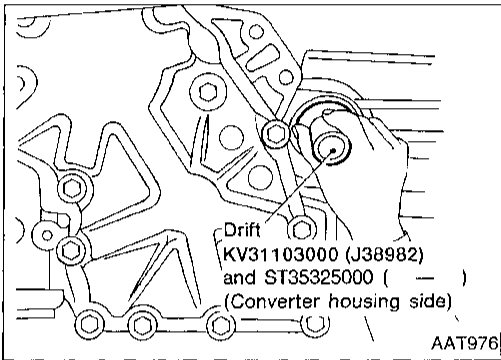
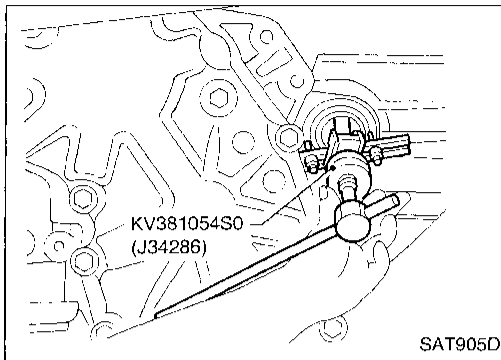
1. Place selector lever in "P" position.
2. Loosen control cable lock nut and place manual shaft in "P" position.
3. Pull control cable, by specified force, in the direction of the arrow shown in the illustration.
Specified force: 6.9 N (0.7 kg, 1.5 lb)
4. Return control cable in the opposite direction of the arrow for 1.0 mm (0.039 in).
5. Tighten control cable lock nut.
6. Move selector lever from "P" to "1" position again. Make sure that selector lever moves smoothly.
7. Apply grease to contacting areas of selector lever and control cable. Install any part removed.



Inhibitor Switch Adjustment

1. Remove control cable end from manual shaft.
2. Set manual shaft in "N" position.
3. Loosen inhibitor switch fixing bolts.
4. Use a 4mm (0.157 in) pin for this adjustment.
 - a) Insert the pin straight into the manual shaft adjustment hole.
 - b) Rotate inhibitor switch until the pin can also be inserted straight into hole in inhibitor switch.
5. Tighten inhibitor switch fixing bolts.
6. Remove pin from adjustment hole after adjusting inhibitor switch.
7. Reinstall any part removed.
8. Adjust control cable. Refer to "Control Cable Adjustment".
9. Check continuity of inhibitor switch. Refer to AT-87.





Differential Side Oil Seal Replacement

1. Remove drive shaft assemblies. Refer to FA section ("Drive Shaft", "FRONT AXLE").
2. Remove oil seals.

3. Install oil seals.
 - **Apply ATF to oil seal surface before installing.**

- **Install oil seals so that dimensions "A" and "B" are within specifications.**

Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	0.5 (0.020) or less

4. Reinstall any part removed.

Throttle Wire Adjustment

— RL4F03A only —

1. Turn ignition switch OFF.
2. While pressing lock plate, move adjusting tube in Direction T.
3. Release lock plate. (Adjusting tube is locked at this time.)
4. Move throttle drum from P₂ (Idling position) to P₁ (Full throttle position) quickly and release.
5. Ensure that throttle wire stroke "L" is within the specified range, between full throttle and idle.

Throttle wire stroke "L":

40 - 42 mm (1.57 - 1.65 in)

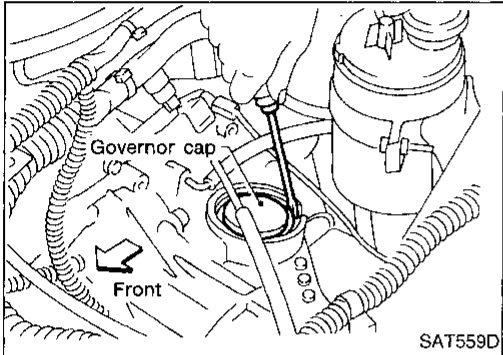
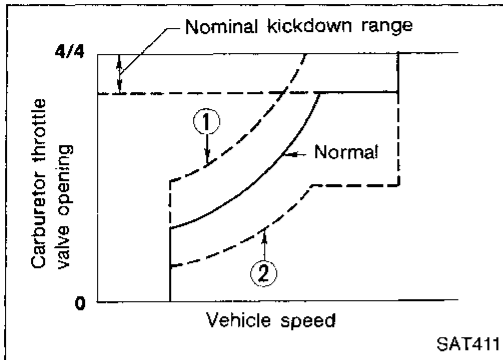
- **Adjust throttle wire stroke after accelerator wire is installed and adjusted.**
- **When connecting throttle wire to throttle drum, do not use tools. Manually hook wire.**
- **Put mark on throttle wire for measuring wire stroke.**

ON-VEHICLE SERVICE

Throttle Wire Adjustment (Cont'd)

If throttle wire stroke is improperly adjusted the following problems may arise.

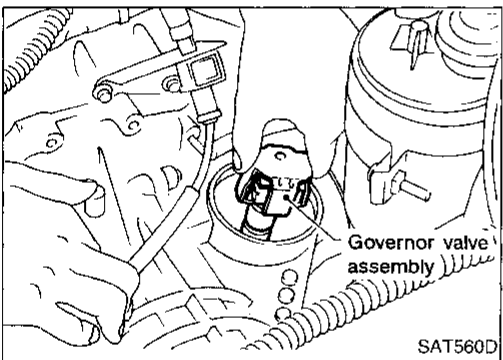
- When the throttle drum fully-open position "P₁" is too far toward Direction T, the shift schedule will be as shown by ② in the figure, and the kickdown range will greatly increase.
- When the throttle drum fully-open position "P₁" is too far toward Direction U, the shift schedule will be as shown by ① in the figure, and kickdown will not occur.



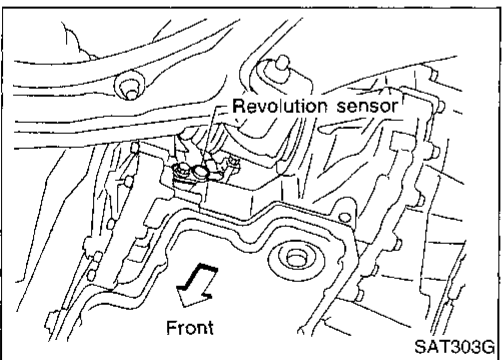
Governor Valve

— RL4F03A only —

1. Remove governor cap snap ring.
2. Remove governor cap.



3. Remove governor valve assembly from transaxle.
4. Check governor valve assembly for damage or wear.



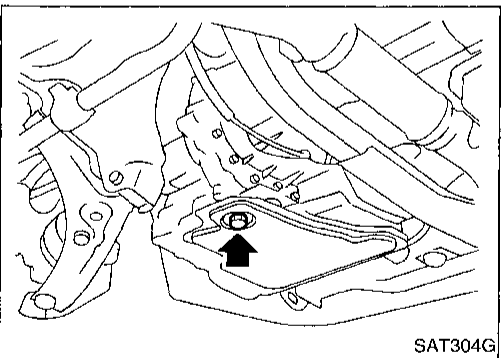
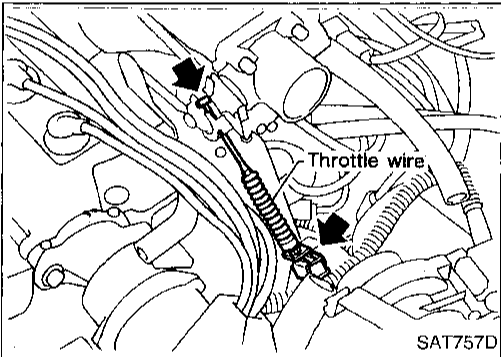
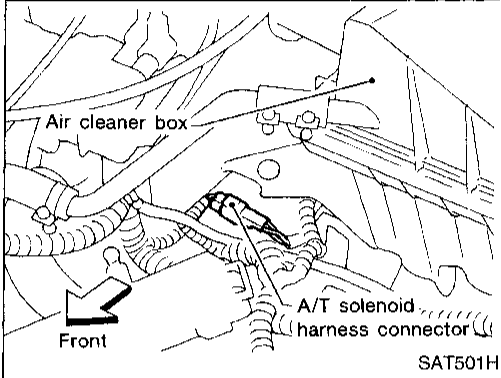
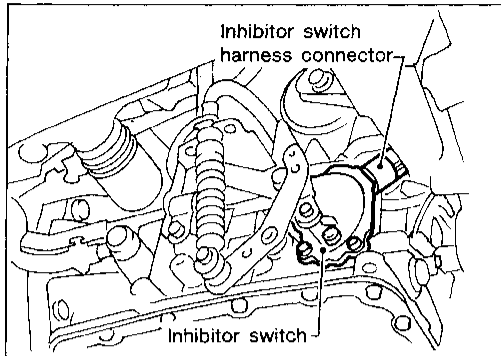
Revolution Sensor Replacement

— RE4F03V only —

1. Disconnect revolution sensor harness connector.
2. Remove harness bracket from A/T.
3. Remove revolution sensor from A/T.
4. Reinstall any part removed.

Always use new sealing parts.

REMOVAL AND INSTALLATION



Removal

CAUTION:

Before separating transaxle from engine, remove the crankshaft position sensor (OBD) from transaxle. Be careful not to damage sensor. (RE4F03V)

1. Remove battery and bracket.
2. Remove air duct between throttle body and air cleaner.
3. Disconnect A/T solenoid harness connector, inhibitor switch harness connector and revolution sensor harness connector (RE4F03V).
4. Remove torque converter clutch solenoid valve harness connector, inhibitor switch harness connector and vehicle speed sensor harness connector (RL4F03A).
5. Remove crankshaft position sensor (OBD) from transaxle.

6. Disconnect throttle wire at engine side (RL4F03A).

7. Drain ATF from transaxle.
8. Disconnect control cable from transaxle.
9. Disconnect oil cooler hoses.
10. Remove drive shafts. Refer to FA section ("Drive Shaft", "FRONT AXLE").
11. Remove the intake manifold support bracket. Refer to EM section ("SR or GA", "OUTER COMPONENT PARTS").
12. Remove starter motor from transaxle.

Tighten bolts to specified torque.

GA engine models

: 31 - 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)

SR engine models

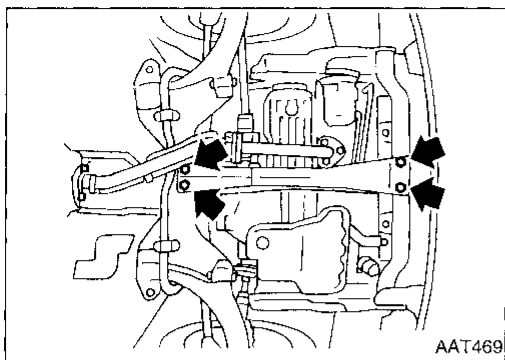
: 41 - 52 N·m (4.2 - 5.3 kg-m, 30 - 38 ft-lb)

13. Remove upper bolts fixing transaxle to engine.
14. Support transaxle with a jack.

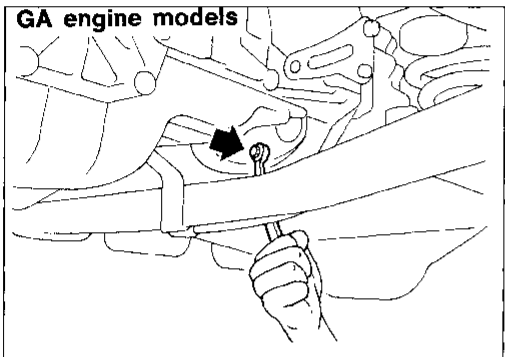
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REMOVAL AND INSTALLATION

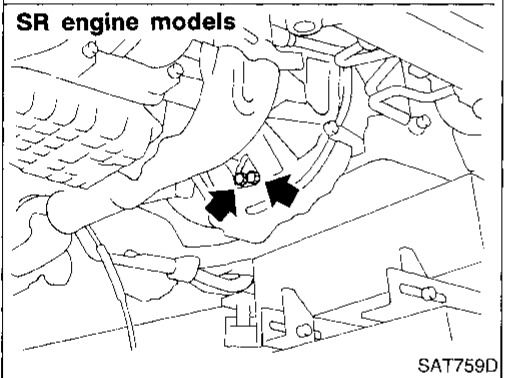
Removal (Cont'd)



15. Remove center member.
 - Tighten center member fixing bolts to specified torque, Refer to EM section ("SR or GA", "ENGINE REMOVAL").



16. Remove front and rear gussets and engine rear plate (GA engine models).
17. Remove rear plate cover (SR engine models).
18. Remove torque converter bolts.
Rotate crankshaft to gain access to securing bolts.
19. Remove rear transaxle to engine bracket. Refer to EM section ("SR or GA", "ENGINE REMOVAL").
20. Support engine with a jack.
21. Remove rear transaxle mount. Refer to EM section ("SR or GA", "ENGINE REMOVAL").
22. Remove lower bolts fixing transaxle to engine.
23. Lower transaxle with an A/T jack.



SAT759D

Installation

1. Check drive plate runout.

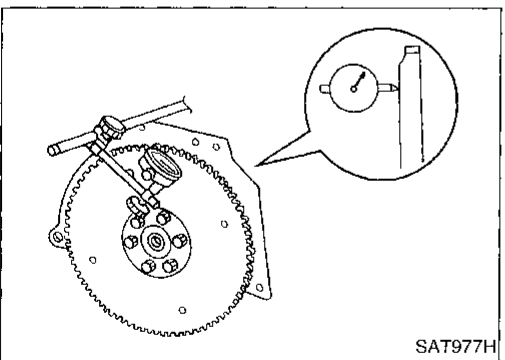
CAUTION:

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

Maximum allowable runout:

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

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



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

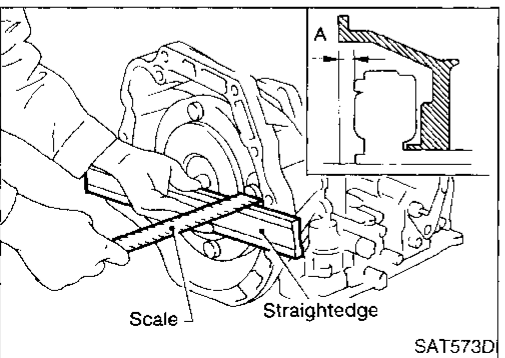
Distance "A":

GA engine models

21.1 mm (0.831 in) or more

SR engine models

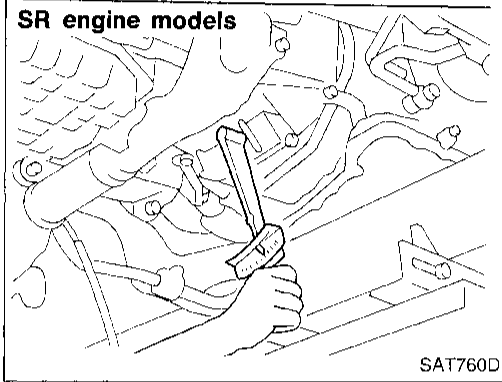
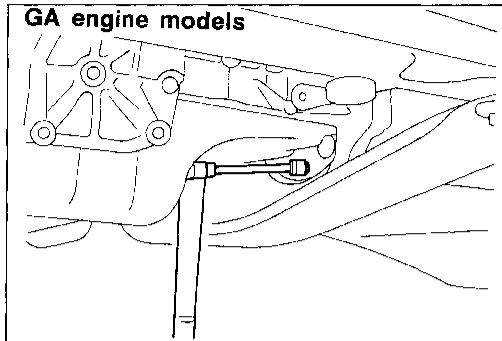
15.9 mm (0.626 in) or more



SAT573D

REMOVAL AND INSTALLATION

Installation (Cont'd)



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

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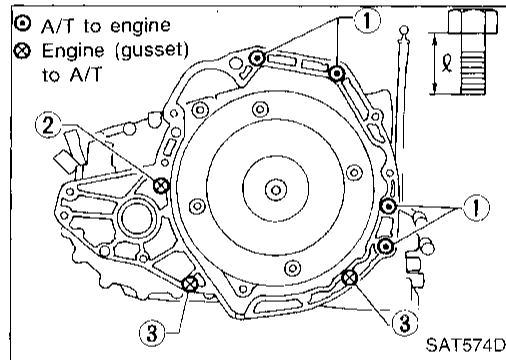
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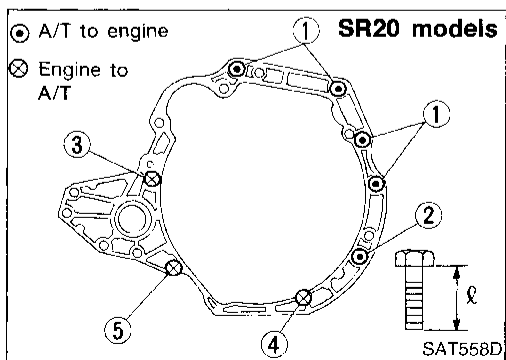
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4. Tighten bolts fixing transaxle

RL4F03A

Bolt No.	Tightening torque N-m (kg-m, ft-lb)	Bolt length "l" mm (in)
①	30 - 40 (3.1 - 4.1, 22 - 30)	50 (1.97)
②	30 - 40 (3.1 - 4.1, 22 - 30)	30 (1.18)
③	16 - 21 (1.6 - 2.1, 12 - 15)	25 (0.98)
Front gusset to engine	30 - 40 (3.1 - 4.1, 22 - 30)	20 (0.79)
Rear gusset to engine	16 - 21 (1.6 - 2.1, 12 - 15)	16 (0.63)



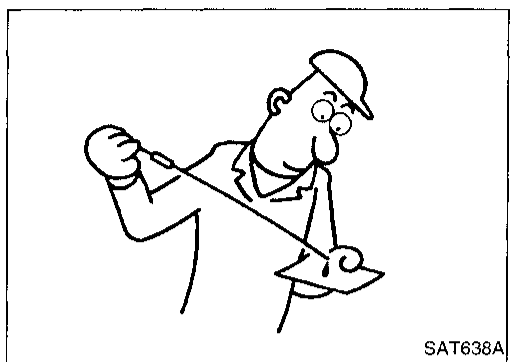
RE4F03V

Bolt No.	Tightening torque N-m (kg-m, ft-lb)	Bolt length "l" mm (in)
①	70 - 79 (7.1 - 8.1, 51 - 59)	55 (2.17)
②	70 - 79 (7.1 - 8.1, 51 - 59)	50 (1.97)
③	70 - 79 (7.1 - 8.1, 51 - 59)	65 (2.56)
④	16 - 21 (1.6 - 2.1, 12 - 15)	35 (1.38)
⑤	16 - 21 (1.6 - 2.1, 12 - 15)	45 (1.77)

5. Reinstall any part removed.

REMOVAL AND INSTALLATION

Installation (Cont'd)

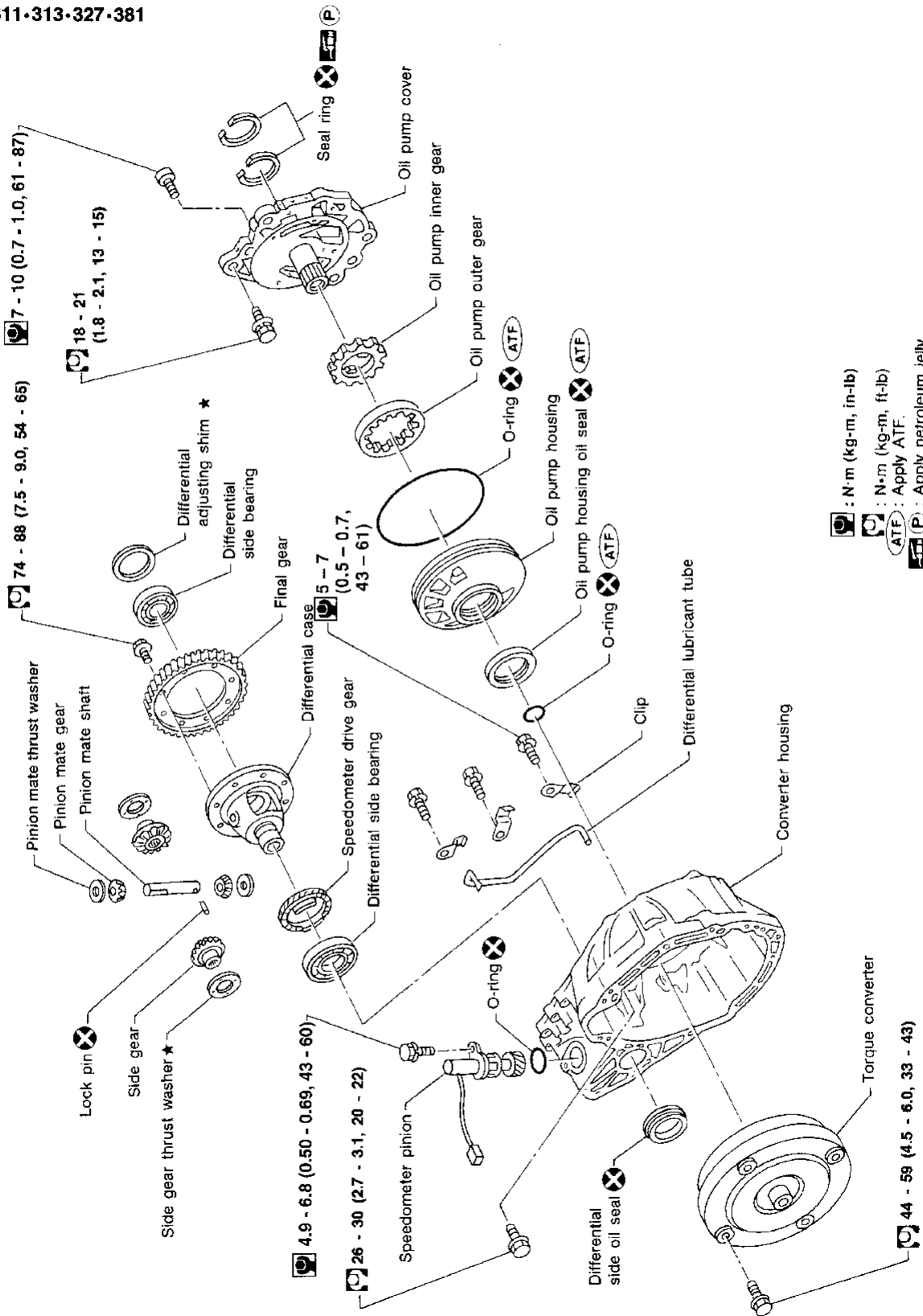


6. Adjust control cable. Refer to AT-174.
7. Adjust throttle wire. Refer to AT-175. (RL4F03A only)
8. Check continuity of inhibitor switch. Refer to AT-39 (RL4F03A) or AT-87 (RE4F03V).
9. Refill transaxle with ATF and check fluid level.
10. Move selector lever through all positions to be sure that transaxle operates correctly. With parking brake applied, idle engine. Move selector lever through "N" to "D", to "2", to "1" and "R" positions. A slight shock should be felt through the hand gripping the selector each time the transaxle is shifted.
11. Perform road test. Refer to AT-29 (RL4F03A) or AT-62 (RE4F03V).

MAJOR OVERHAUL

RL4F03A

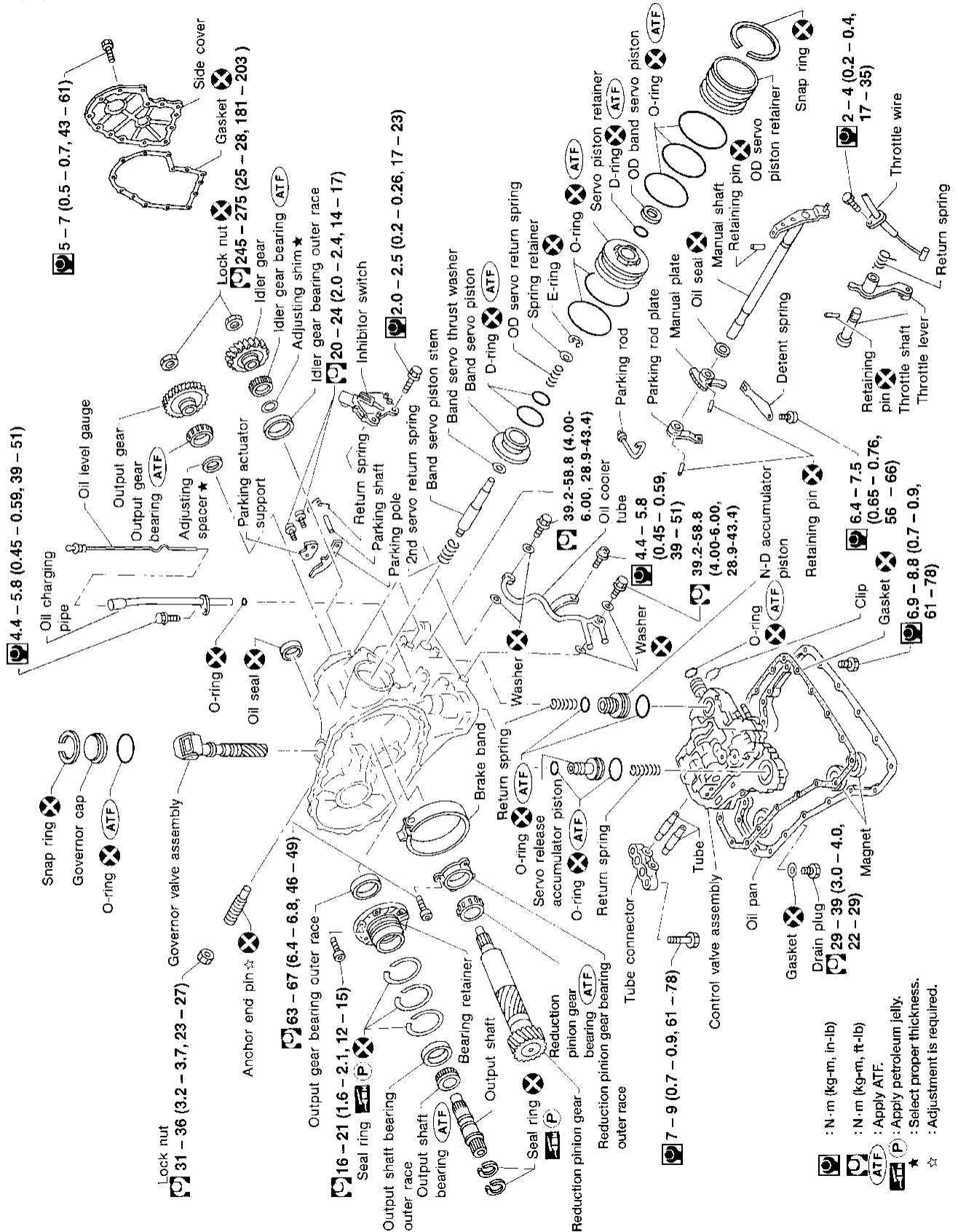
SEC. 311-313-327-381



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MAJOR OVERHAUL RL4F03A (Cont'd)

SEC. 310-311-312-314-315-317-319



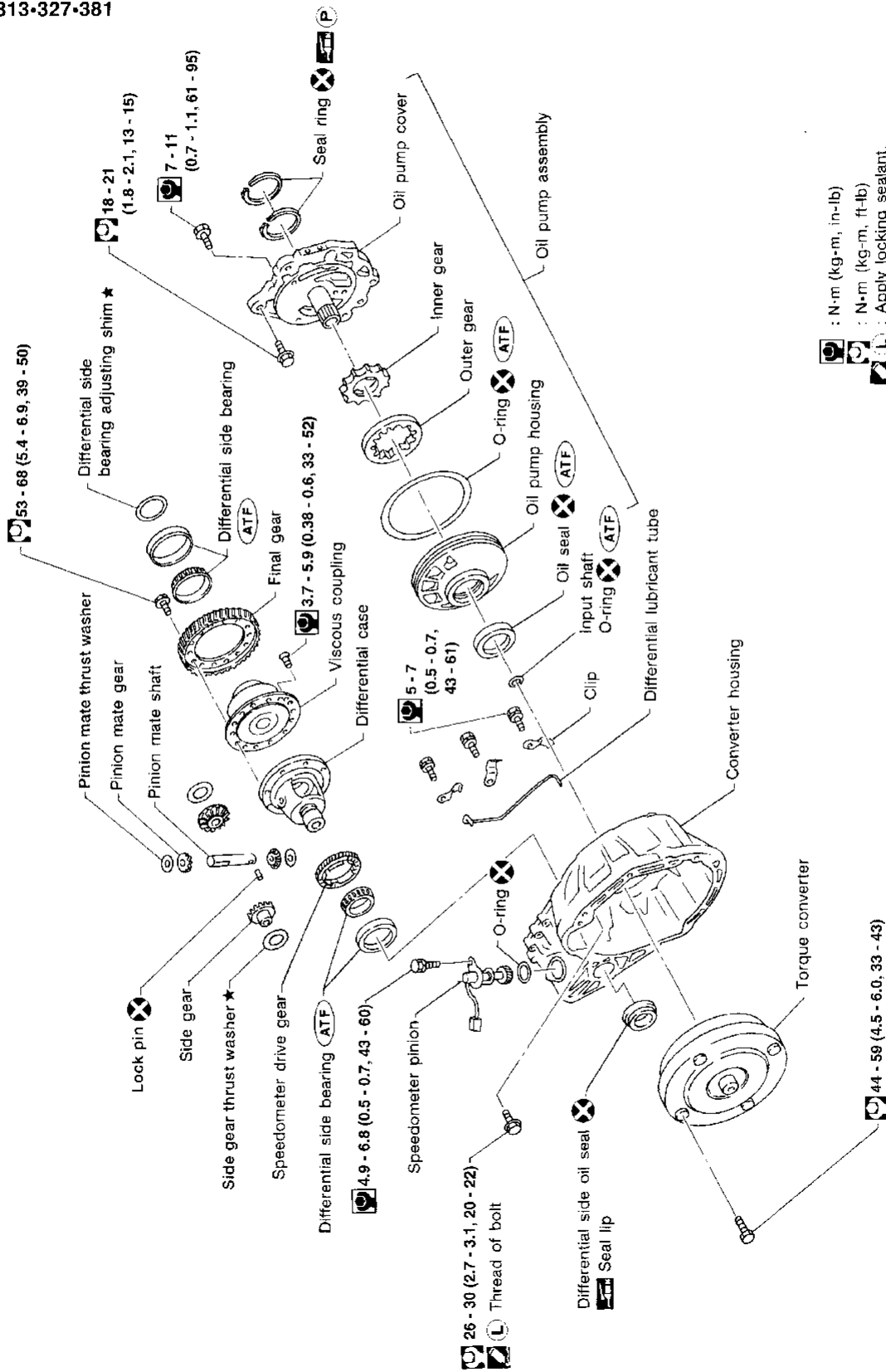
: N-m (kg-m, in-lb)
 : N-m (kg-m, ft-lb)
 ATF : Apply ATF.
 ★ : Apply petroleum jelly.
 ☆ : Select proper thickness.
 ☆ : Adjustment is required.

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MAJOR OVERHAUL

RE4F03V

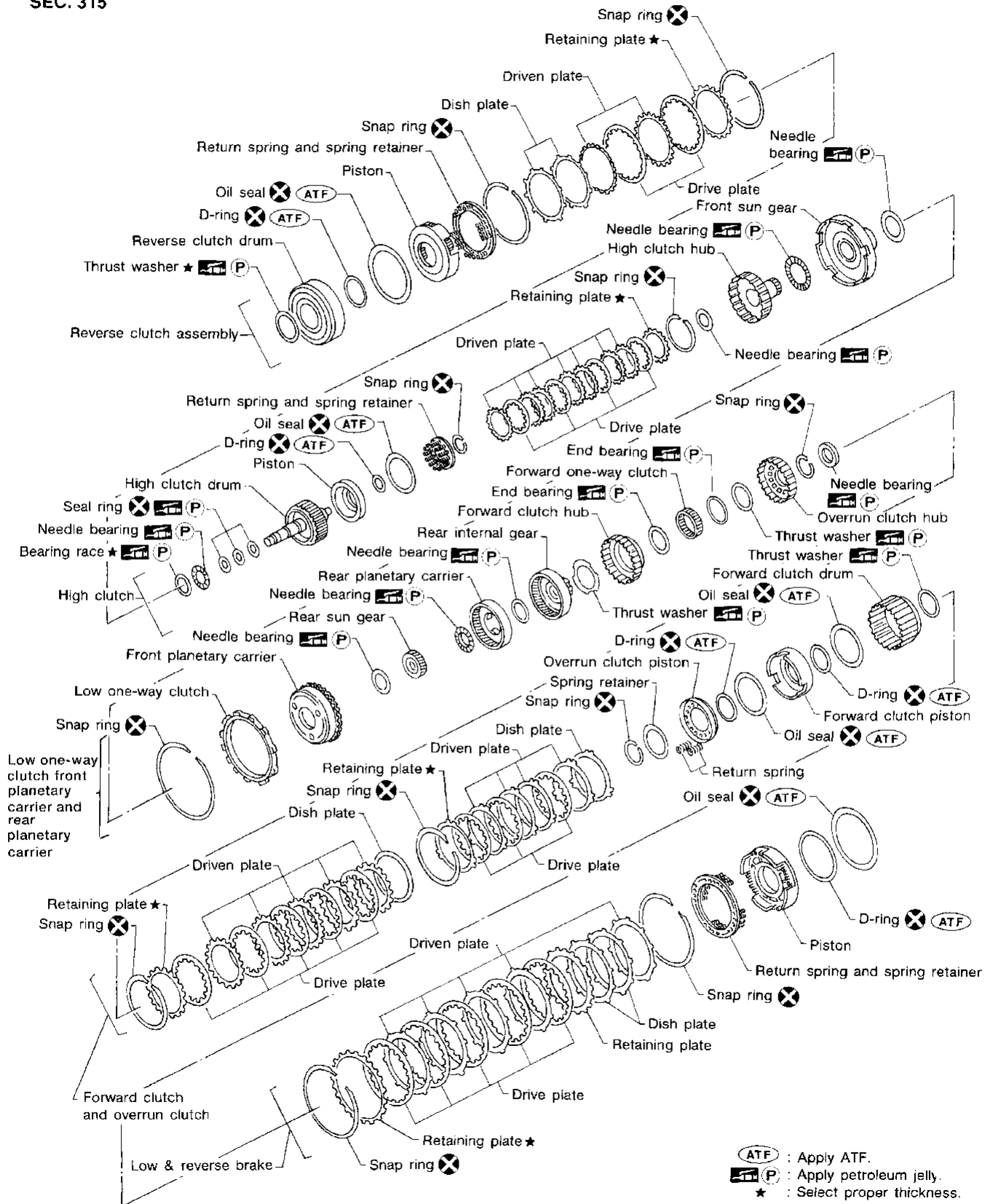
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- : N·m (kg·m, in·lb)
- : N·m (kg·m, ft·lb)
- : Apply locking sealant.
- : Apply ATF.
- : Apply petroleum jelly.
- : Select proper thickness.

MAJOR OVERHAUL RE4F03V (Cont'd)

SEC. 315

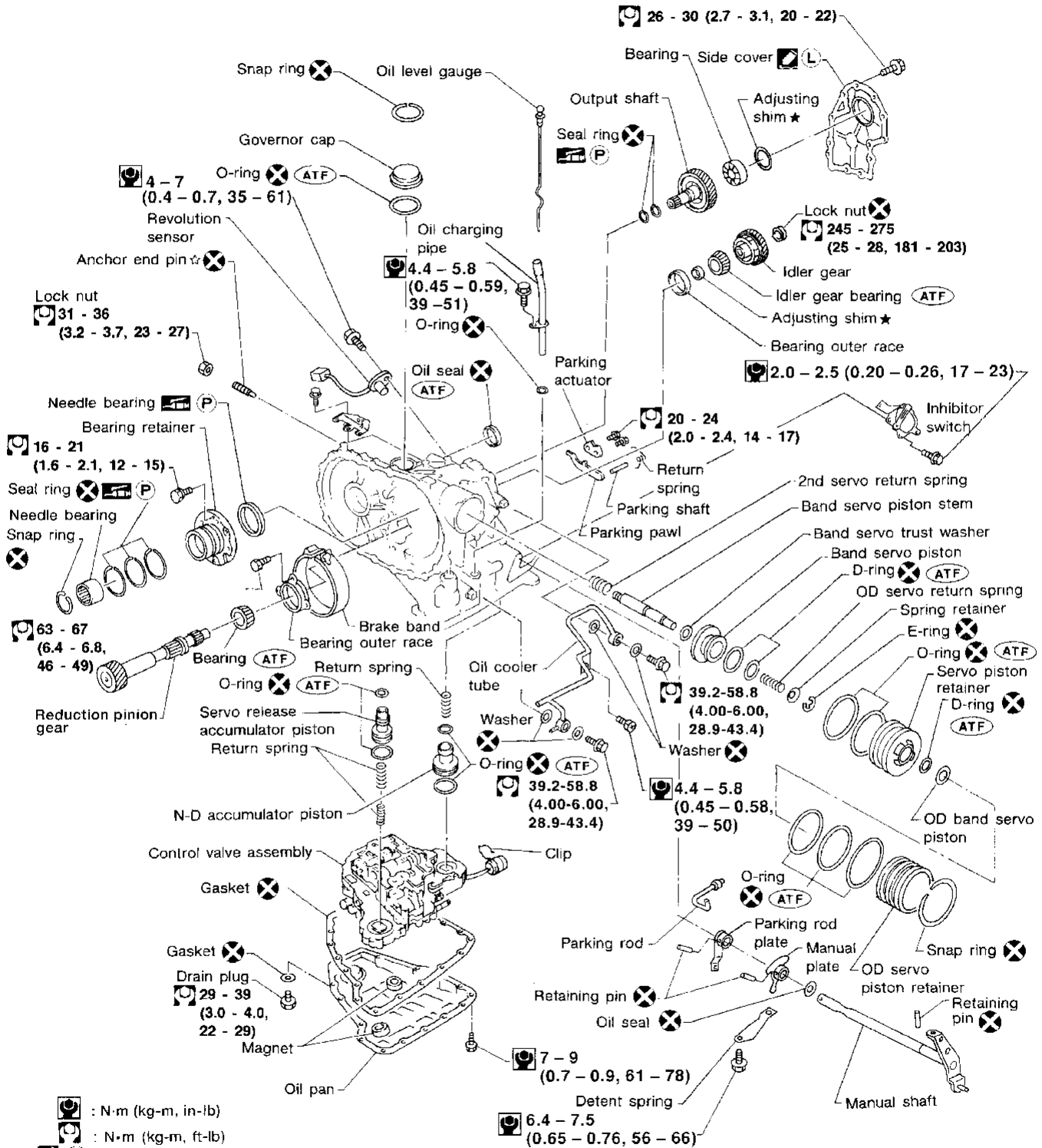


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MAJOR OVERHAUL RE4F03V (Cont'd)

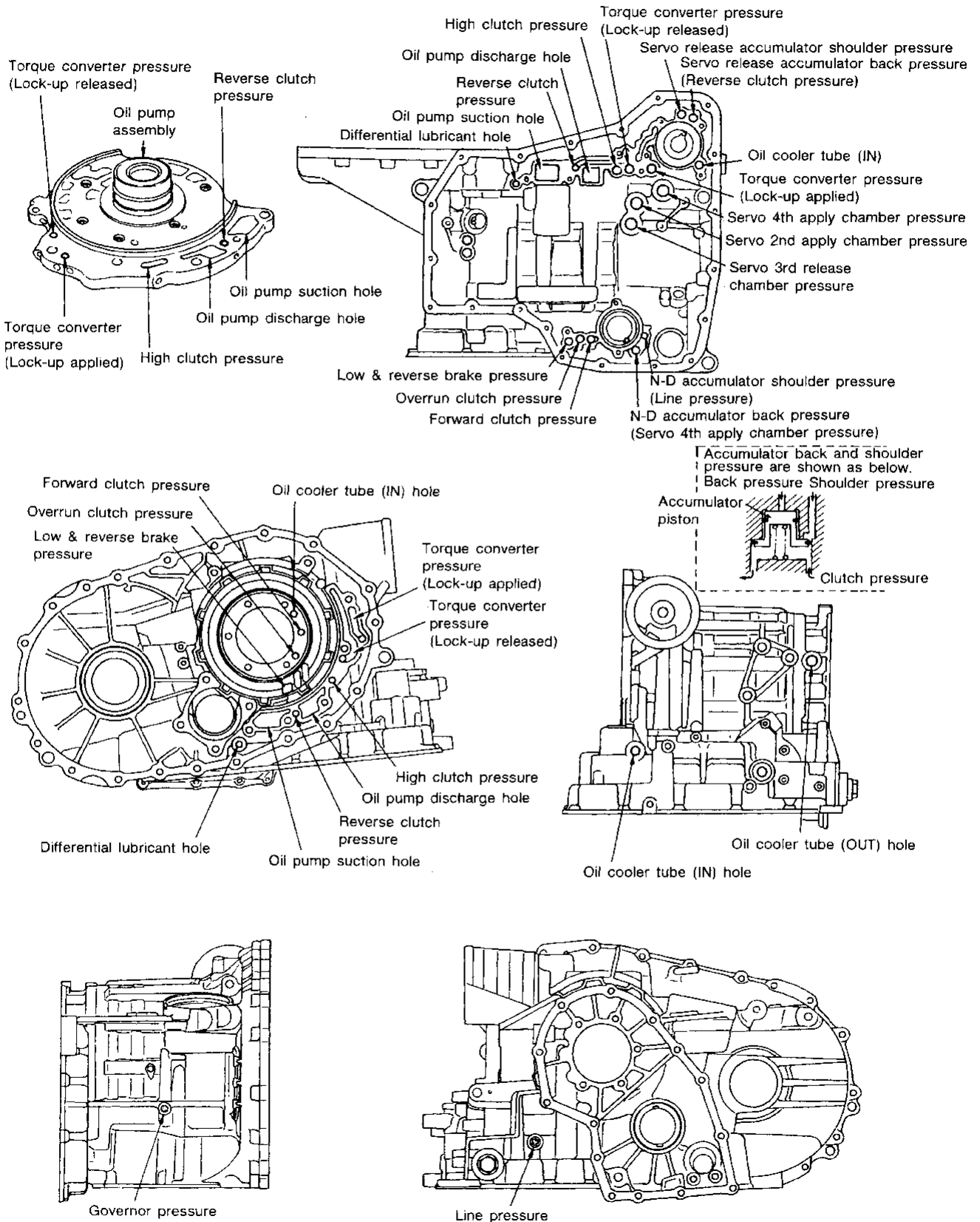
SEC. 310-311-312-314-315-317-319



- : N·m (kg-m, in-lb)
- : N·m (kg-m, ft-lb)
- : Apply locking sealant.
- : Apply ATF.
- : Apply petroleum jelly.
- : Select proper thickness.
- : Adjustment is required.

MAJOR OVERHAUL

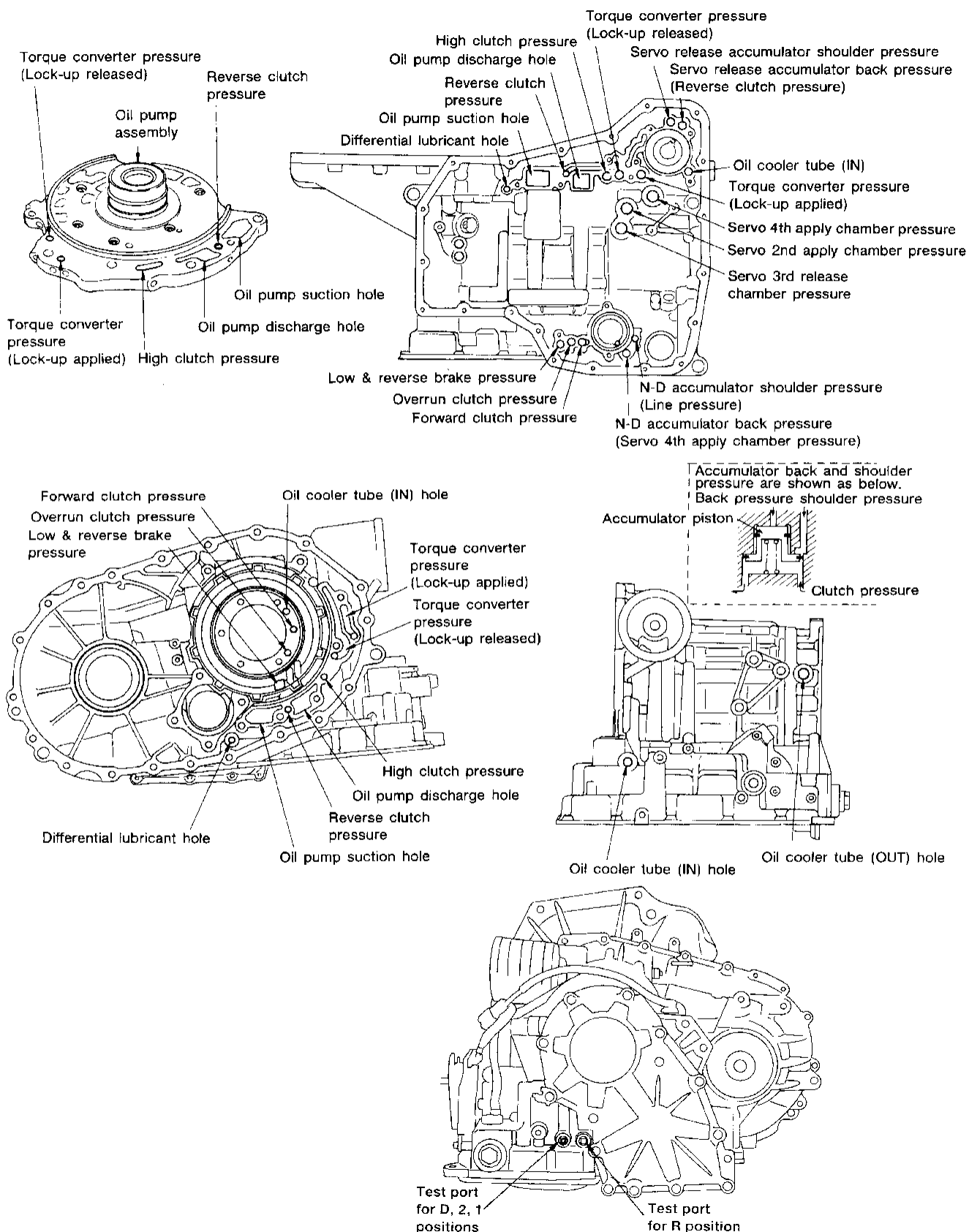
Oil Channel — RL4F03A



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Oil Channel — RE4F03V



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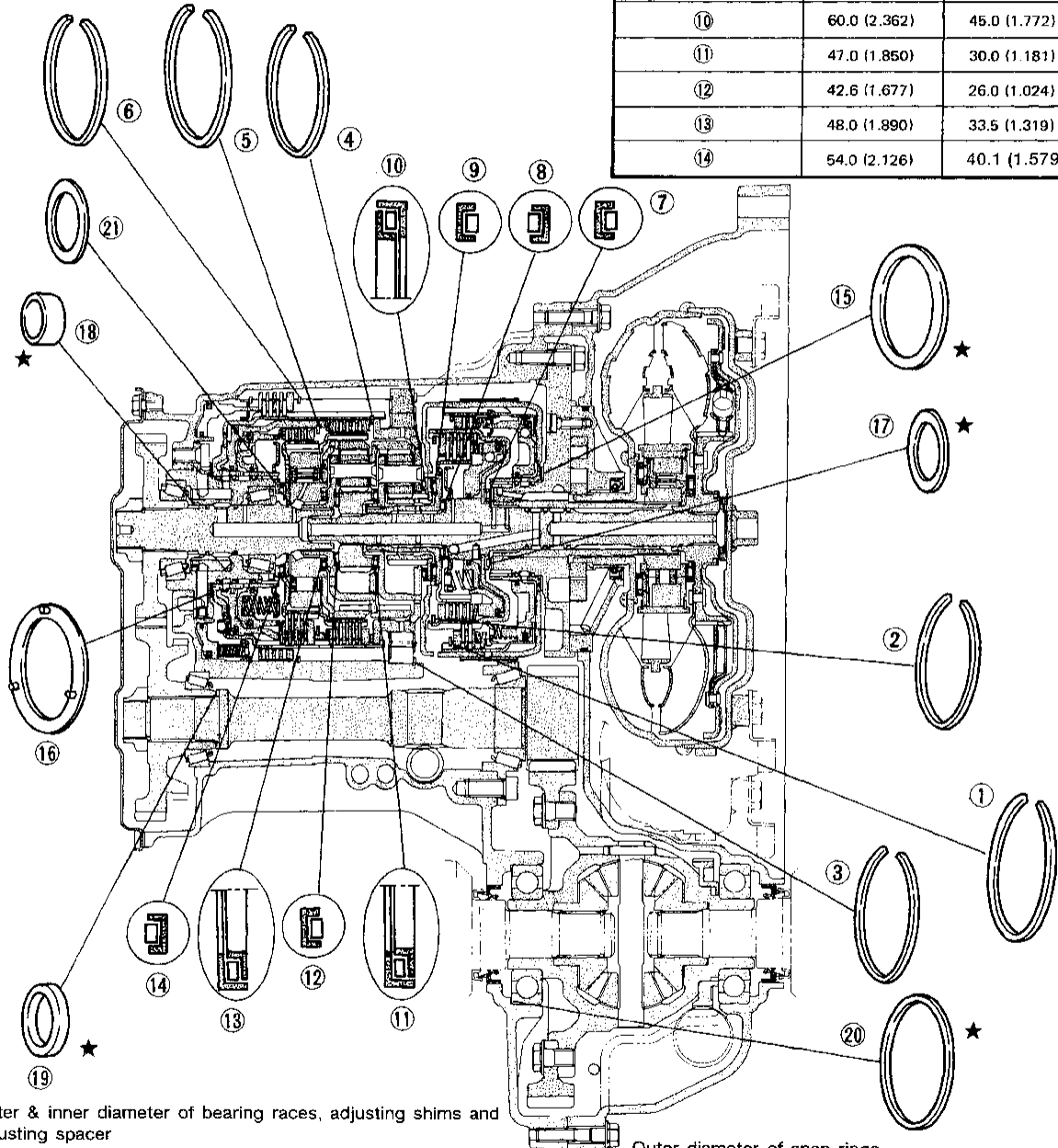
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings — RL4F03A

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
15	72.0 (2.835)	black
16	78.5 (3.091)	

Outer and inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
7	47.0 (1.850)	32.0 (1.260)
8	35.0 (1.378)	20.1 (0.791)
9	60.0 (2.362)	42.0 (1.654)
10	60.0 (2.362)	45.0 (1.772)
11	47.0 (1.850)	30.0 (1.181)
12	42.6 (1.677)	26.0 (1.024)
13	48.0 (1.890)	33.5 (1.319)
14	54.0 (2.126)	40.1 (1.579)



Outer & inner diameter of bearing races, adjusting shims and adjusting spacer

Item number	Outer diameter mm (in)	Inner diameter mm (in)
17	48.0 (1.890)	33 (1.30)
18	29.0 (1.142)	25.0 (0.984)
19	34.5 (1.358)	26.1 (1.028)
20	79.5 (3.130)	72.0 (2.835)
21	55.0 (2.165)	42.0 (1.654)

★: Select proper thickness

Outer diameter of snap rings

Item number	Outer diameter mm (in)
1	142.0 (5.59)
2	113.0 (4.45)
3	162.4 (6.39)
4	135.4 (5.33)
5	126.0 (4.96)
6	161.5 (6.36)

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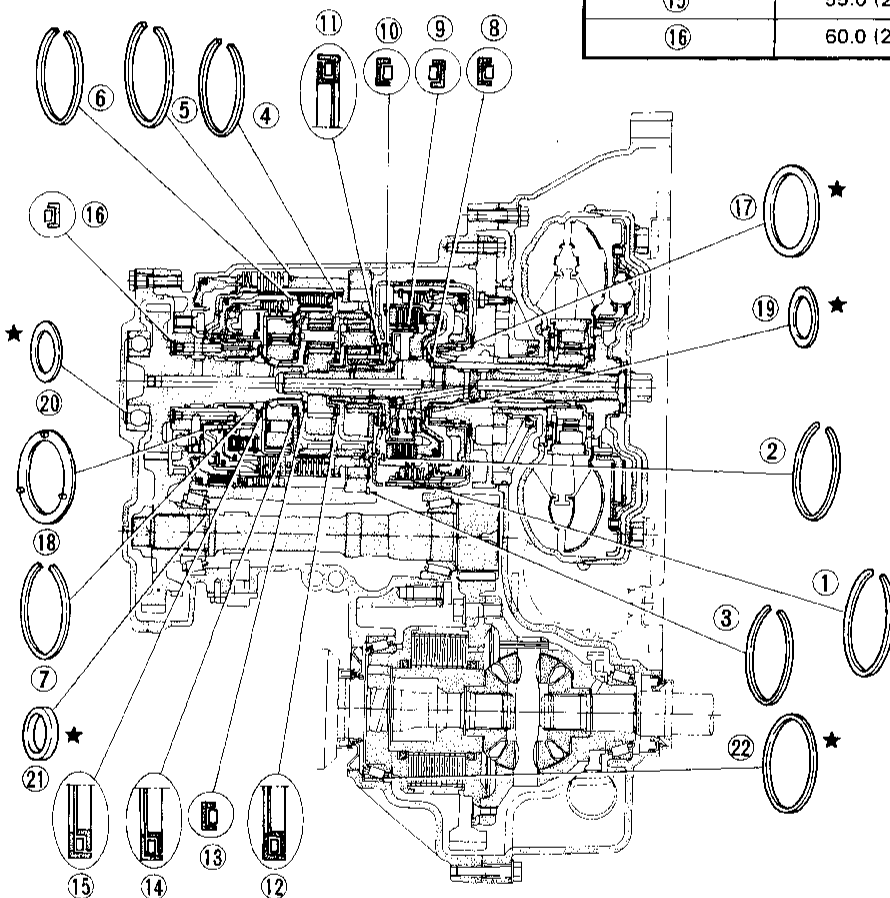
Locations of Adjusting Shims, Needle Bearings, Thrust Washers and Snap Rings — RE4F03V

Outer diameter and color of thrust washers

Item number	Outer diameter mm (in)	Color
⑰	72.0 (2.835)	Black
⑱	78.5 (3.091)	

Outer & inner diameter of needle bearings

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑧	47.0 (1.850)	32.0 (1.260)
⑨	35.0 (1.378)	20.1 (0.791)
⑩	60.0 (2.362)	42.0 (1.654)
⑪	60.0 (2.362)	45.0 (1.772)
⑫	47.0 (1.850)	30.0 (1.181)
⑬	42.6 (1.677)	26.0 (1.024)
⑭	48.0 (1.890)	33.5 (1.319)
⑮	55.0 (2.165)	40.5 (1.594)
⑯	60.0 (2.362)	40.1 (1.579)



★: Select proper thickness.

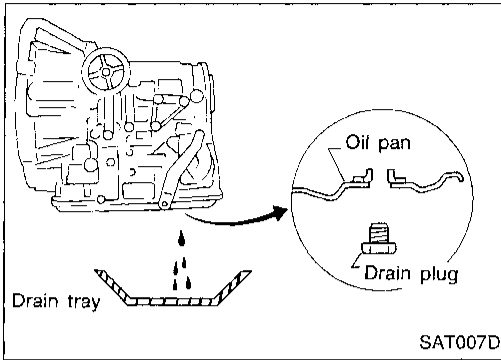
Outer & inner diameter of bearing race and adjusting shims

Item number	Outer diameter mm (in)	Inner diameter mm (in)
⑲	48.0 (1.890)	33.0 (1.299)
⑳	72.0 (2.835)	61.0 (2.402)
㉑	34.5 (1.358)	26.1 (1.028)
㉒	105.0 (4.13)	96.0 (3.78)

Outer diameter of snap rings

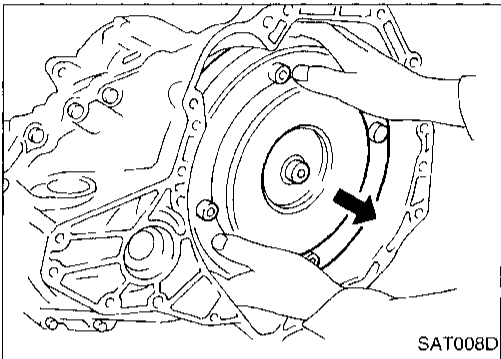
Item number	Out diameter mm (in)
①	142.0 (5.59)
②	113.0 (4.45)
③	162.4 (6.39)
④	135.4 (5.33)
⑤	161.5 (6.36)
⑥	126.0 (4.96)
⑦	40.5 (1.594)

DISASSEMBLY

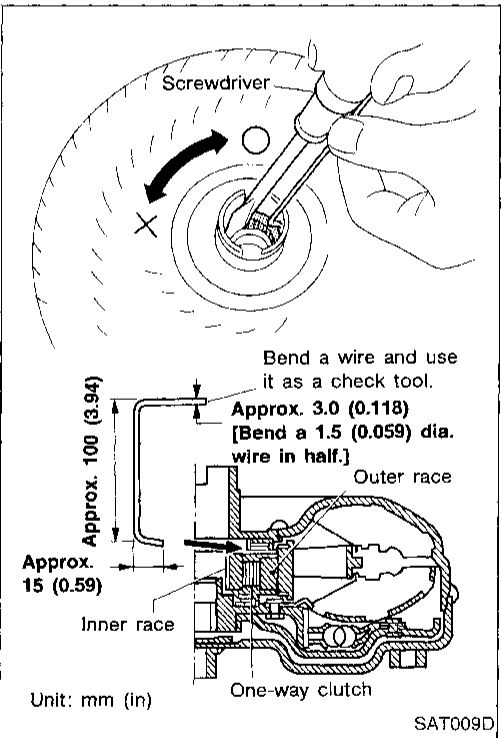


— RL4F03A & RE4F03V —

1. Drain ATF through drain plug.



2. Remove torque converter.

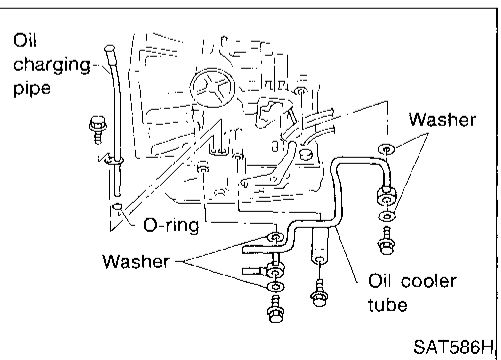


3. Check torque converter one-way clutch using check tool as shown at left.

a. Insert check tool into the groove of bearing support built into one-way clutch outer race.

b. While fixing bearing support with check tool, rotate one-way clutch spline using flat-bladed screwdriver.

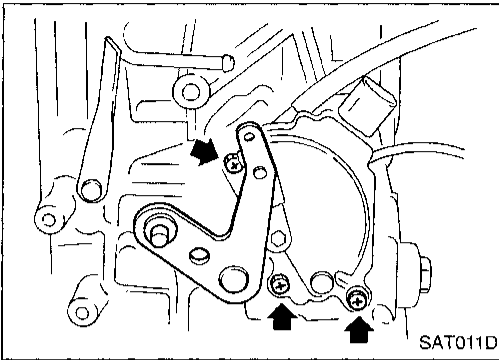
c. Check inner race rotates clockwise only. If not, replace torque converter assembly.



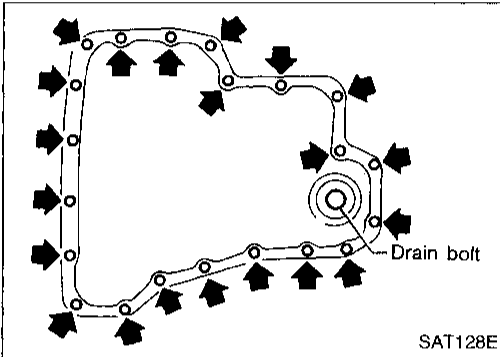
4. Remove oil charging pipe and oil cooler tube.

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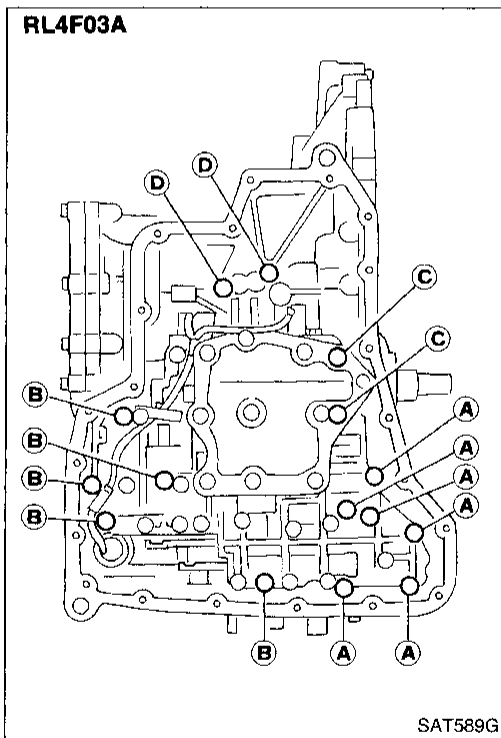
DISASSEMBLY



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

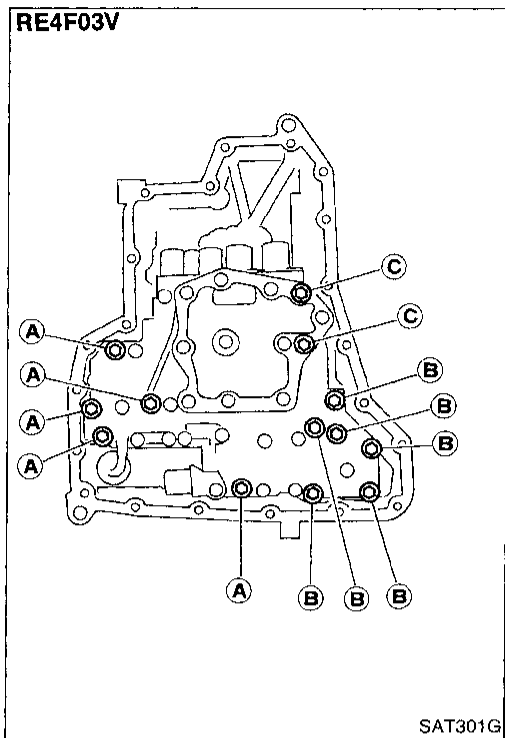


7. Remove oil pan and oil pan gasket.
 - **Do not reuse oil pan bolts.**
8. Check foreign materials in oil pan to help determine cause of malfunction. If the fluid is very dark, smells burned, or contains foreign particles, the frictional material (clutches, band) may need replacement. A tacky film that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



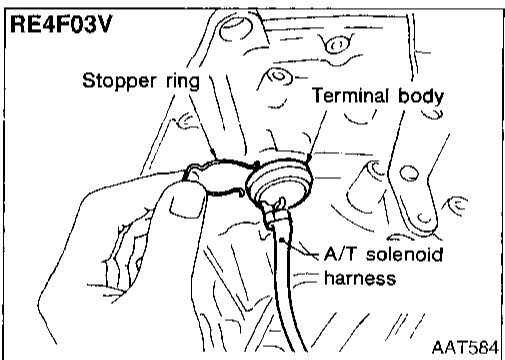
9. Remove control valve assembly according to the following procedures.
 - **RL4F03A** —
 - a. Remove control valve assembly mounting bolts (A), (B), (C) and (D).

DISASSEMBLY

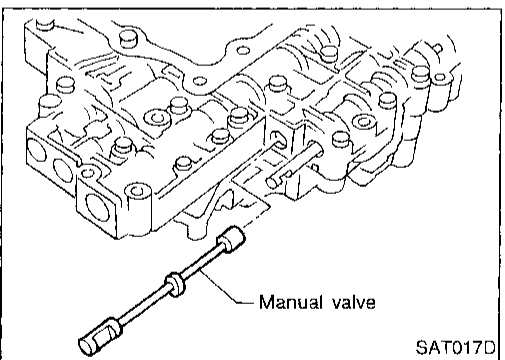


— RE4F03V —

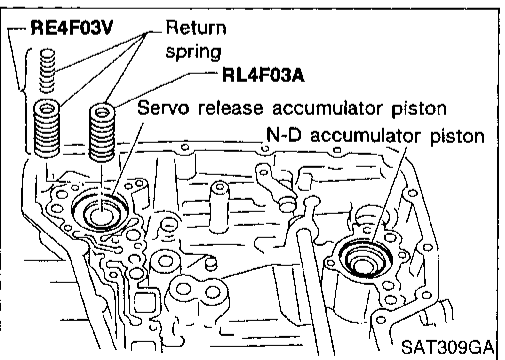
- a. Remove control valve assembly mounting bolts (A), (B) and (C).



- b. Remove stopper ring from terminal body.
- c. Push terminal body into transmission case and draw out solenoid harness.



10. Remove manual valve from control valve assembly as a precaution.



11. Remove return spring from servo release accumulator piston.

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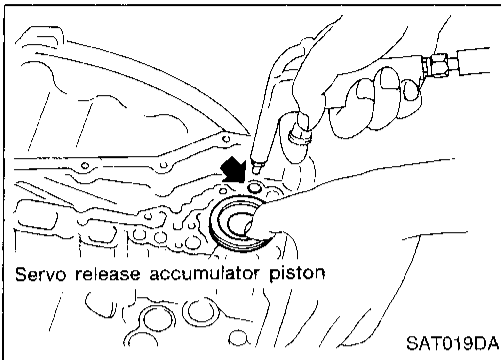
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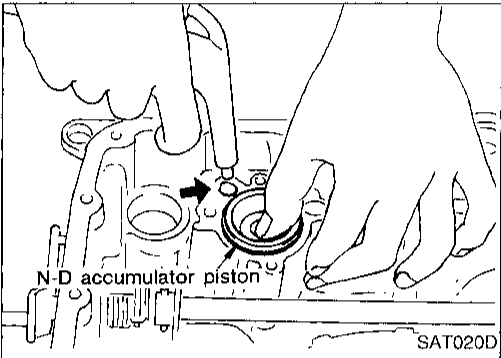
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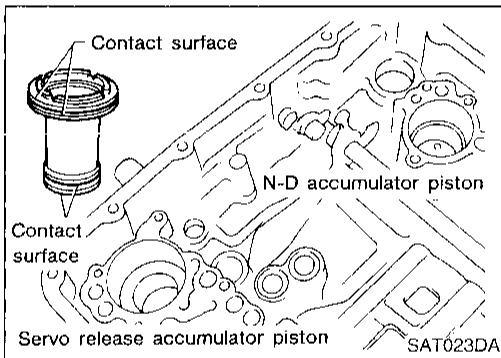
DISASSEMBLY



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

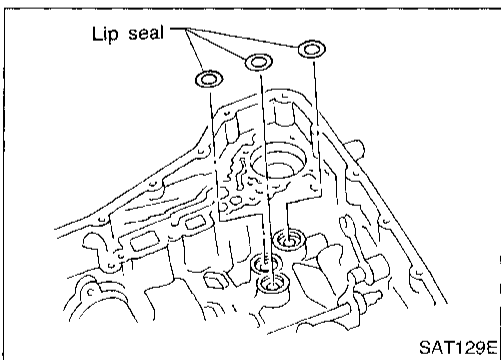


14. Remove N-D accumulator piston and return spring with compressed air.
15. Remove O-rings from N-D accumulator piston.

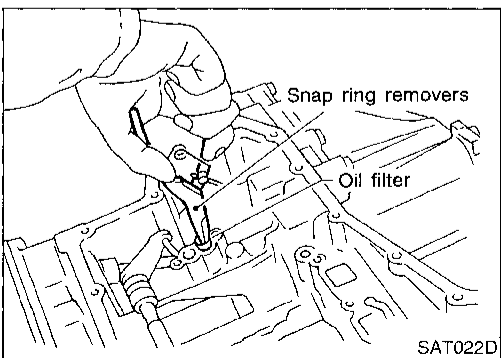


16. Check accumulator pistons and contact surface of transmission case for damage.
17. Check accumulator return springs for damage and free length.

Return springs:
Refer to SDS, AT-331.

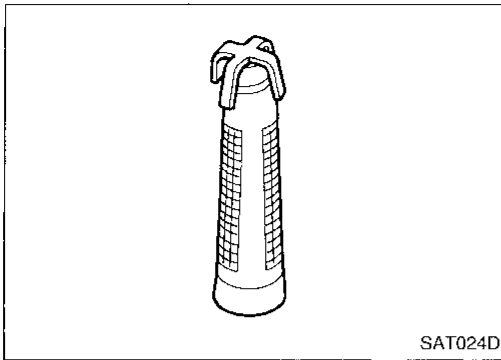


18. Remove lip seals from band servo oil port.

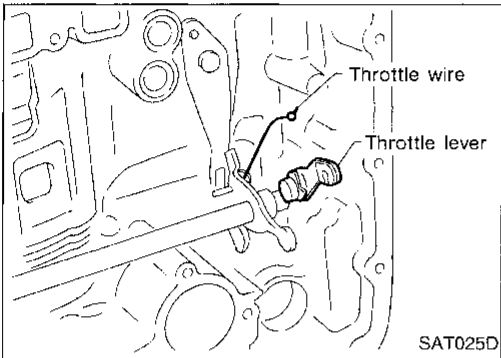


- RL4F03A only —
19. Remove oil filter for governor.

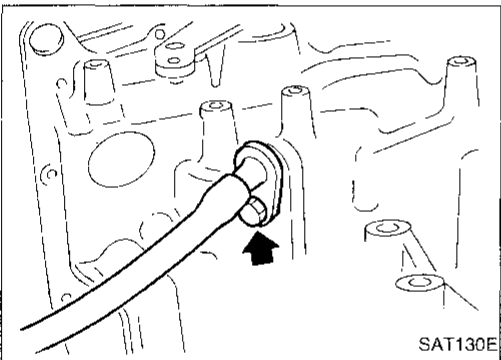
DISASSEMBLY



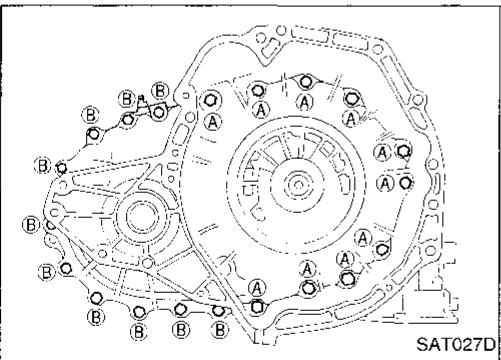
20. Check oil filter for governor for damage or clogging.



21. Remove throttle wire from throttle lever.



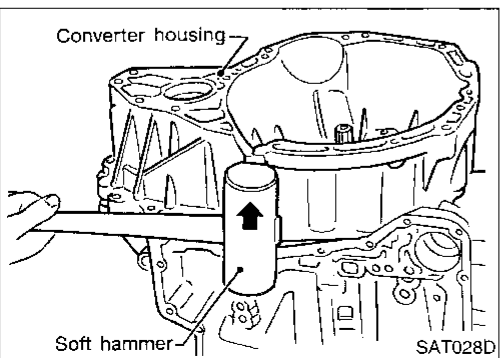
22. Remove throttle wire mounting bolt.
23. Draw out throttle wire from transmission case.



— RL4F03A & RE4F03V —

24. Remove converter housing according to the following procedures.

a. Remove converter housing mounting bolts (A) and (B).



b. Remove converter housing.

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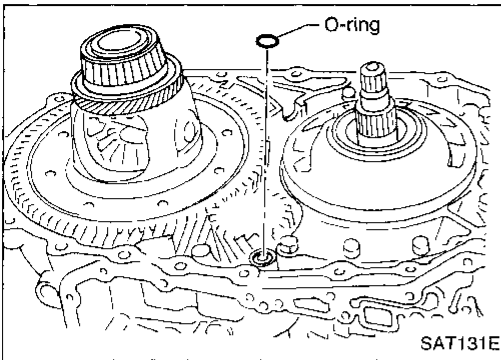
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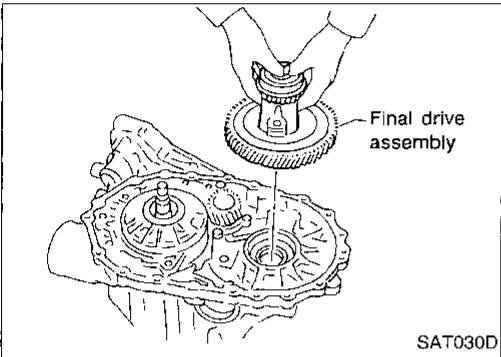
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JDX

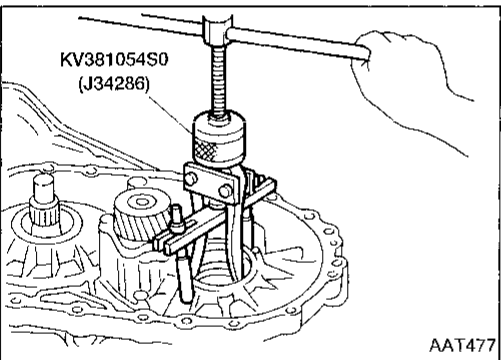
DISASSEMBLY



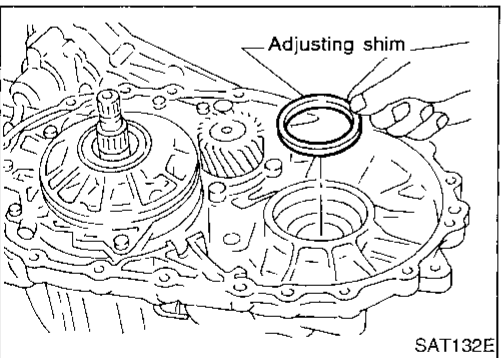
c. Remove O-ring from differential oil port.



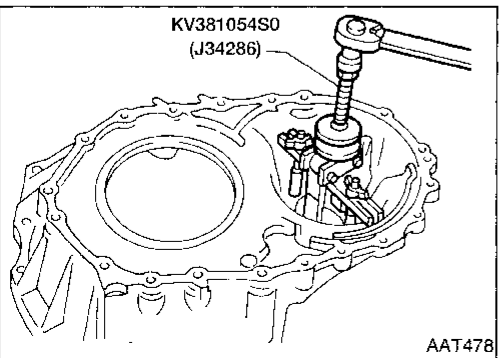
25. Remove final drive assembly from transmission case.
If it is difficult to lift up by hand, tap final drive slightly with a soft hammer (RL4F03A).



26. Remove differential side bearing outer race from transmission case (RE4F03V).

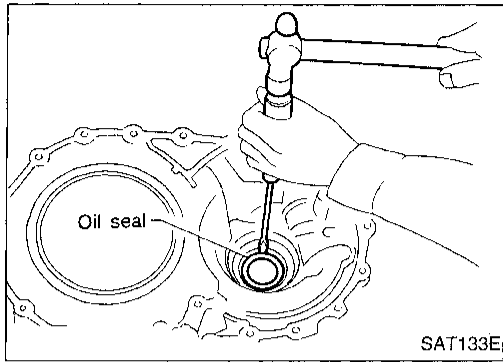


27. Remove differential side bearing adjusting shim from transmission case.



28. Remove differential side bearing outer race from converter housing (RE4F03V).

DISASSEMBLY



29. Remove oil seal from converter housing using a screwdriver.

- Be careful not to damage case.

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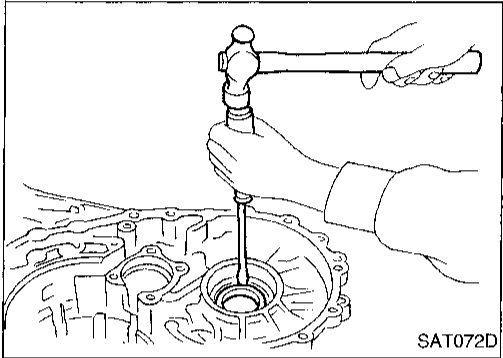
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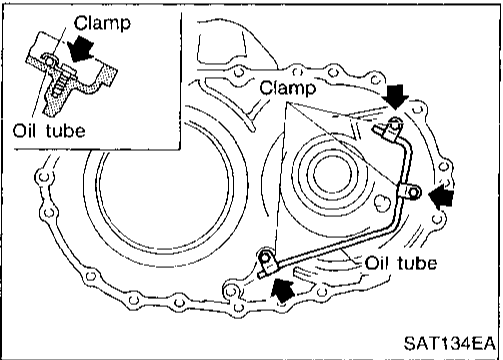
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30. Remove side oil seal from transmission case using a screwdriver.



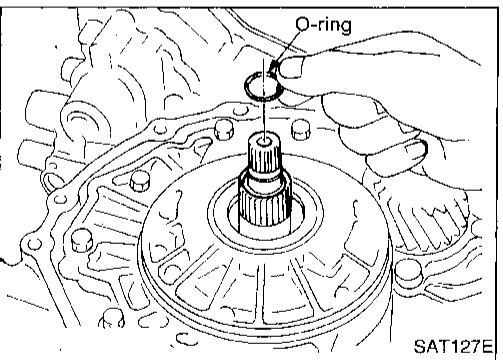
31. Remove oil tube from converter housing.

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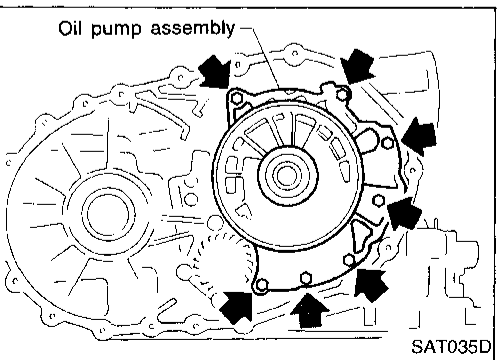
32. Remove oil pump according to the following procedures.
a. Remove O-ring from input shaft.

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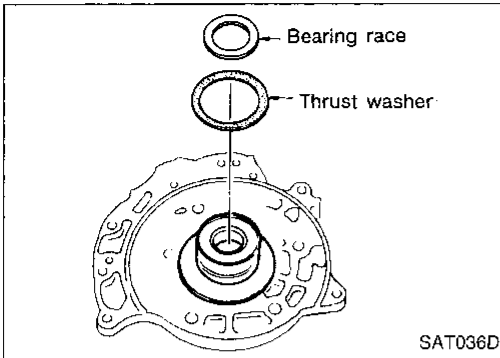


b. Remove oil pump assembly from transmission case.

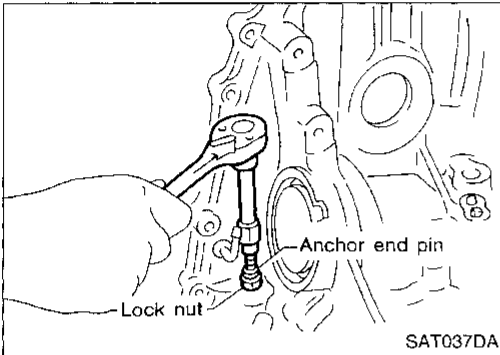
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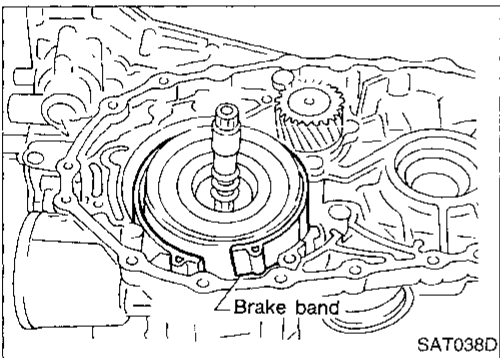
DISASSEMBLY



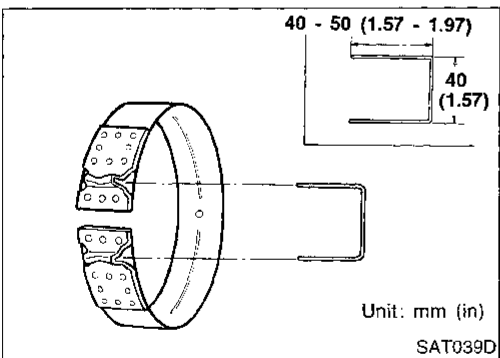
- c. Remove thrust washer and bearing race from oil pump assembly.



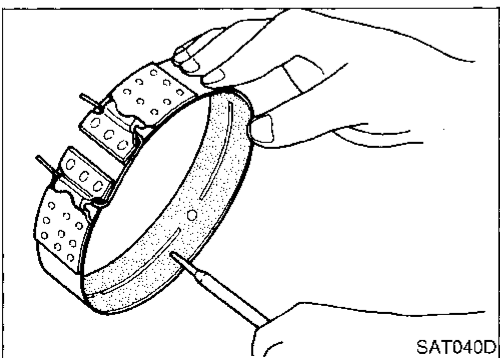
33. Remove brake band according to the following procedures.
- a. Loosen lock nut, then back off anchor end pin.
- **Do not reuse anchor end pin.**



- b. Remove brake band from transmission case.

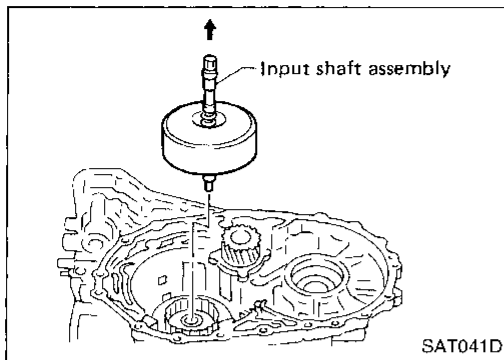


- **To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.**

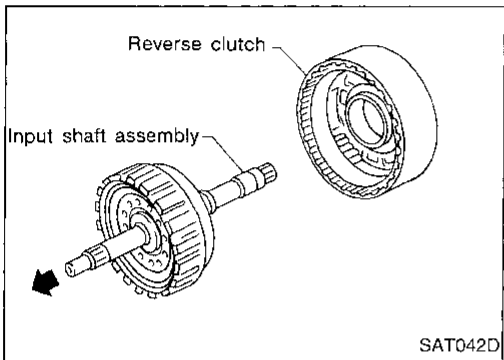


- c. Check brake band facing for damage, cracks, wear or burns.

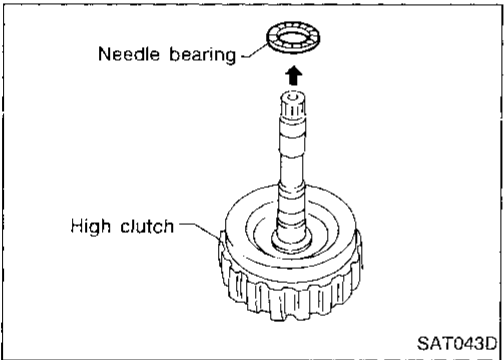
DISASSEMBLY



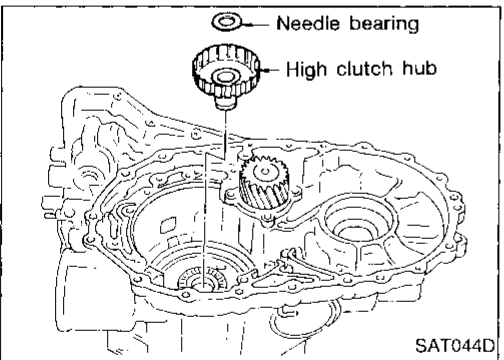
34. Remove input shaft assembly (high clutch) and reverse clutch according to the following procedures.
- Remove input shaft assembly (high clutch) with reverse clutch.



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

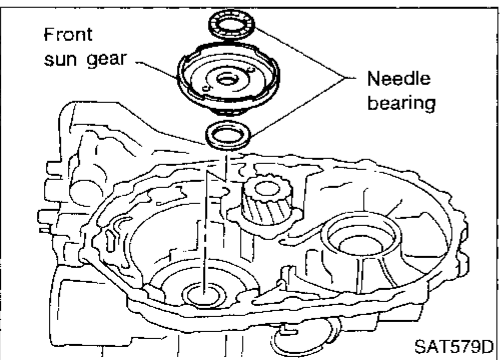


- Remove needle bearing from high clutch drum.
- Check input shaft assembly and needle bearing for damage or wear.



35. Remove high clutch hub and needle bearing from transmission case.

36. Check high clutch hub and needle bearing for damage or wear.



37. Remove front sun gear and needle bearings from transmission case.

38. Check front sun gear and needle bearings for damage or wear.

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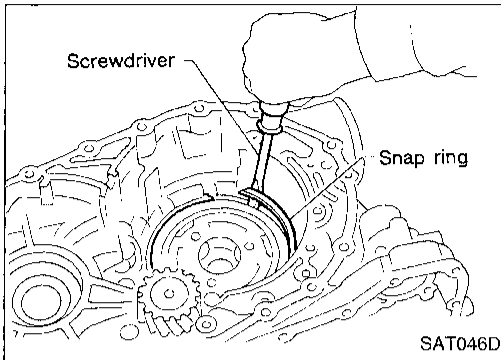
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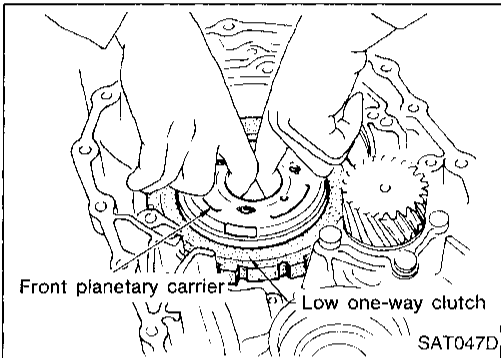
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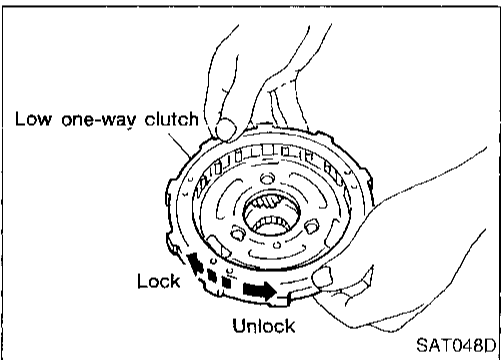
DISASSEMBLY



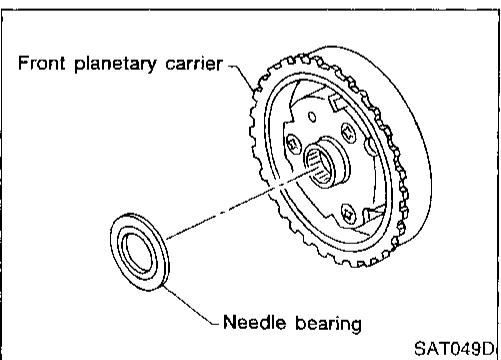
39. Remove front planetary carrier assembly and low one-way clutch according to the following procedures.
- Remove snap ring using a screwdriver.



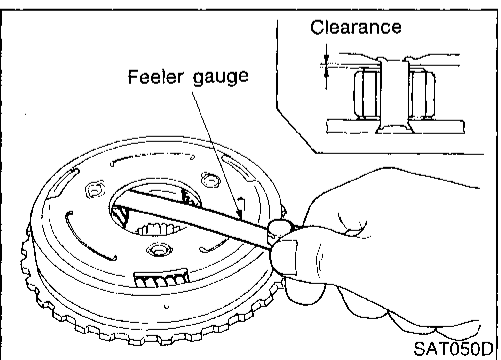
- Remove front planetary carrier with low one-way clutch.



- Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.
- Remove low one-way clutch from front planetary carrier by rotating it in the direction of unlock.



- Remove needle bearing from front planetary carrier.



- Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.
- Check clearance between pinion washer and planetary carrier using feeler gauge.

Standard clearance:

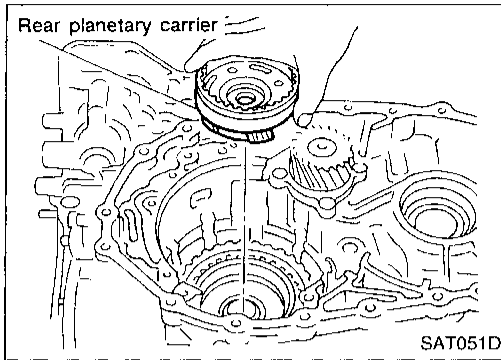
0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit:

0.80 mm (0.0315 in)

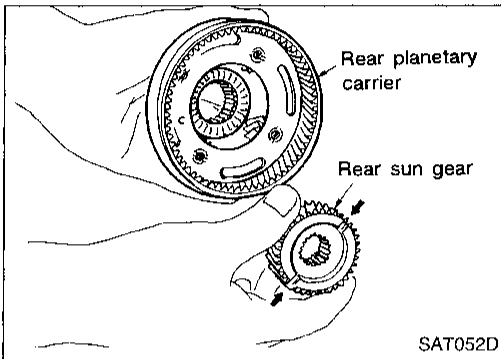
Replace front planetary carrier if the clearance exceeds allowable limit.

DISASSEMBLY



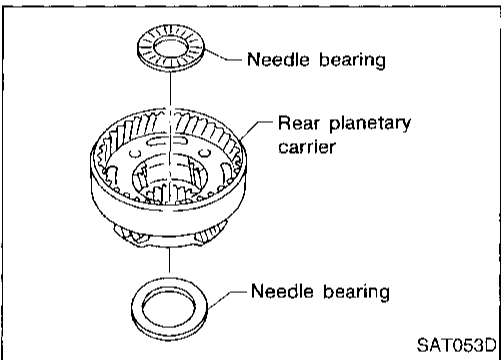
40. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.
- a. Remove rear planetary carrier assembly from transmission case.

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- b. Remove rear sun gear from rear planetary carrier.

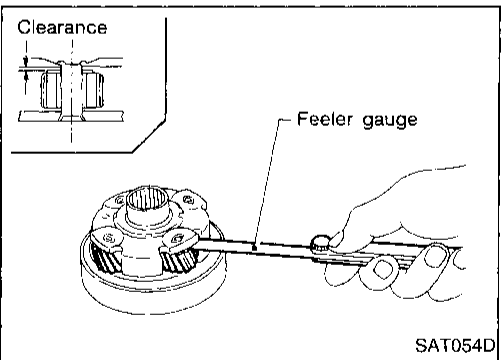
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- c. Remove needle bearings from rear planetary carrier assembly.

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

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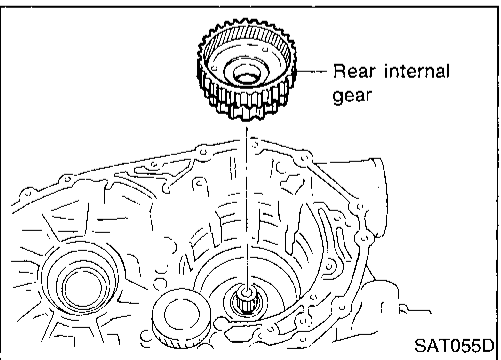
Standard clearance:
0.15 - 0.70 mm (0.0059 - 0.0276 in)

Allowable limit:
0.80 mm (0.0315 in)

Replace rear planetary carrier if the clearance exceeds allowable limit.

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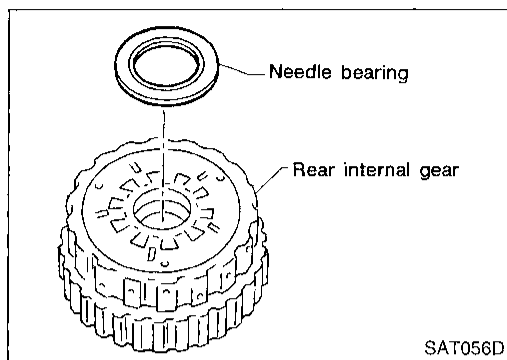
BT



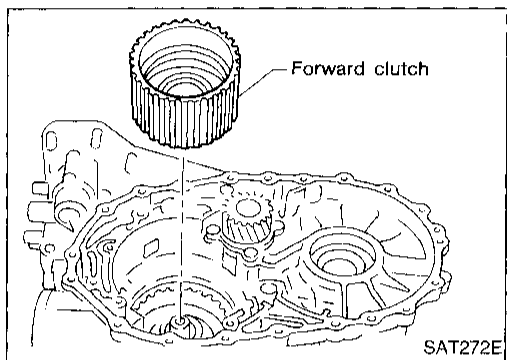
41. Remove rear internal gear from transmission case.

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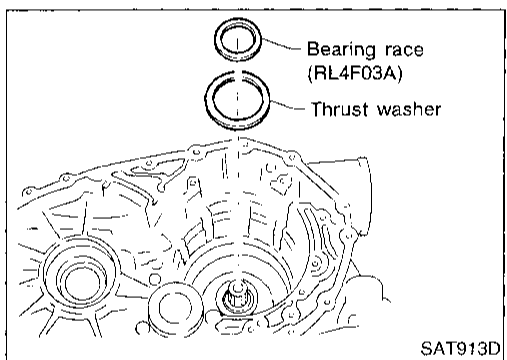
DISASSEMBLY



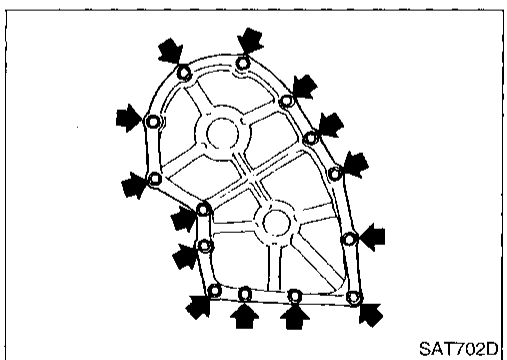
42. Remove needle bearing from rear internal gear.
- Check needle bearing for damage or wear.



43. Remove forward clutch assembly from transmission case.



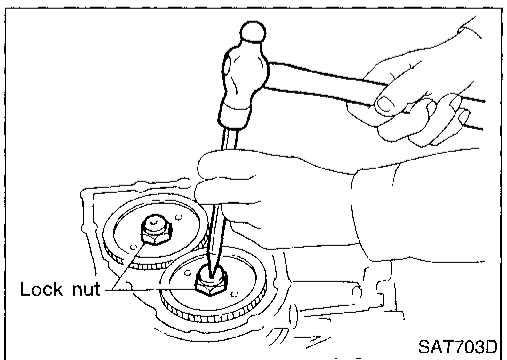
44. Remove thrust washer and bearing race (only RL4F03A) from transmission case.



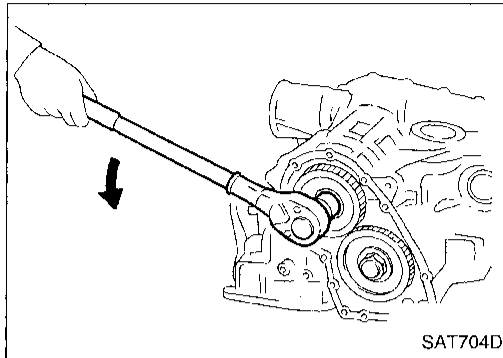
— RL4F03A —

45. Remove output shaft, output gear and reduction pinion gear according to the following procedures.

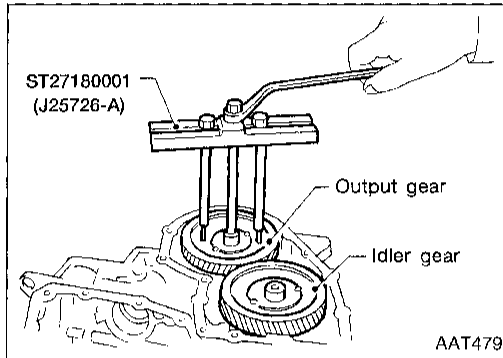
- Remove side cover.
 - Do not reuse side cover bolts.**
- Set manual shaft to "P" position to fix idler gear and output gear.
 - Unlock both idler gear and output gear lock nuts using a pin punch.



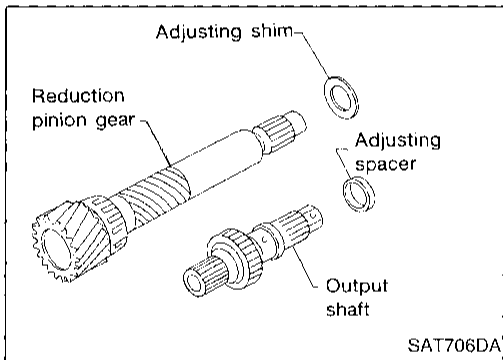
DISASSEMBLY



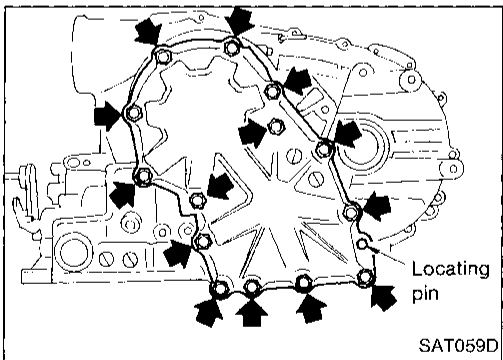
- d. Remove idler gear and output gear lock nuts.
- **Do not reuse idler gear and output gear lock nuts.**



- e. Remove idler gear and output gear using a puller.



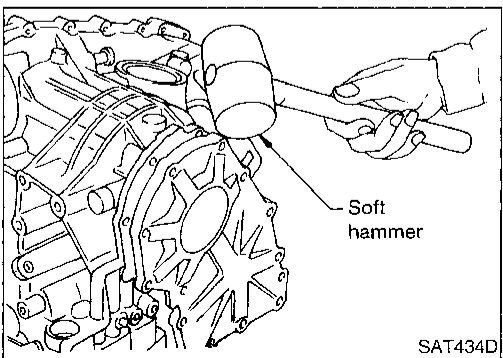
- f. Remove reduction pinion gear and output shaft.
- g. Remove adjusting shim from reduction pinion gear.
- h. Remove adjusting spacer from output shaft.



— RE4F03V —

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

- a. Remove side cover bolts.



- b. Remove side cover by lightly tapping it with a soft hammer.
- **Be careful not to drop output shaft assembly. It might come out when removing side cover.**

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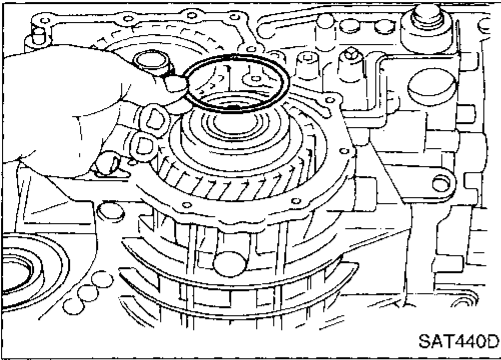
BT

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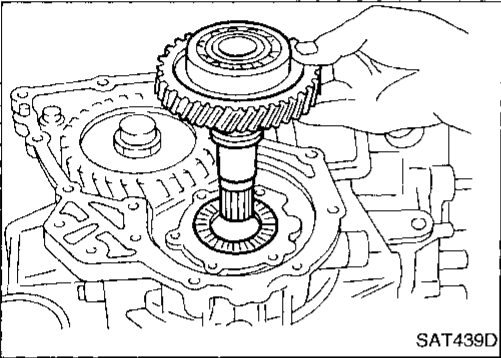
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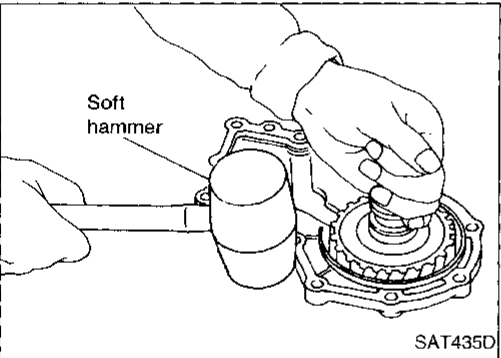
DISASSEMBLY



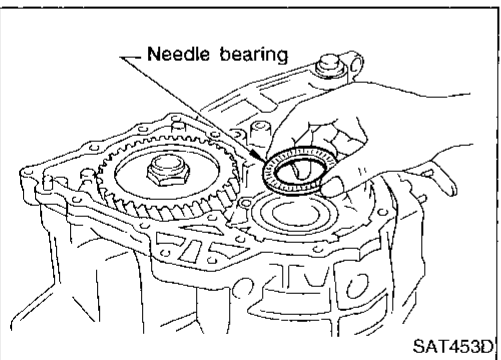
c. Remove adjusting shim.



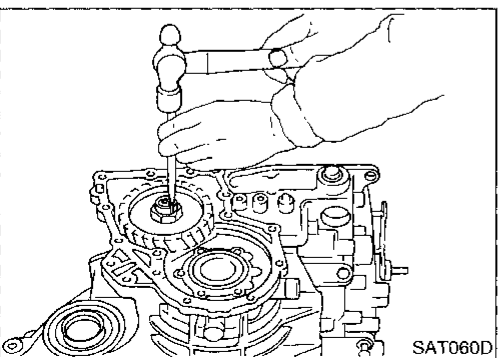
d. Remove output shaft assembly.



- If output shaft assembly came off with side cover, tap cover with a soft hammer to separate.

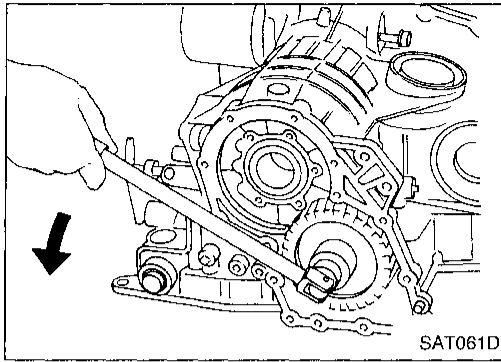


e. Remove needle bearing.

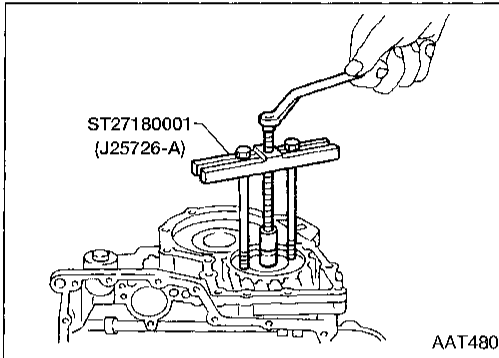


46. Disassemble reduction pinion gear according to the following procedures.
- a. Set manual shaft to position "P" to fix idler gear.
 - b. Unlock idler gear lock nut using a pin punch.

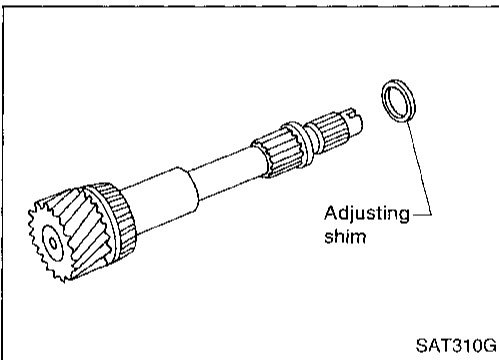
DISASSEMBLY



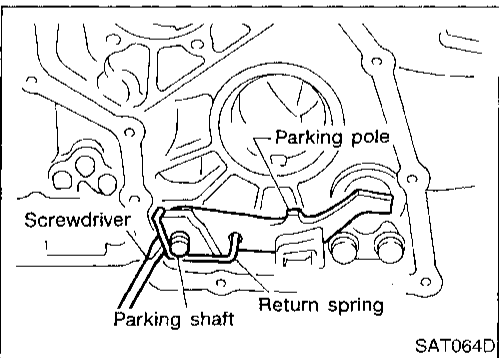
- c. Remove idler gear lock nut.
- **Do not reuse idler gear lock nut.**



- d. Remove idler gear with puller.

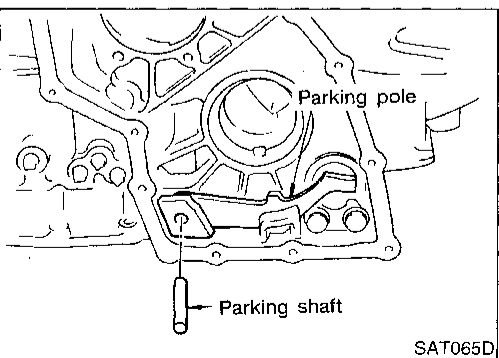


- e. Remove reduction pinion gear.
- f. Remove adjusting shim from reduction pinion gear.



— RL4F03A & RE4F03V —

- 47. Remove return spring from parking shaft using a screwdriver.



- 48. Draw out parking shaft and remove parking pole from transmission case.
- 49. Check parking pole and shaft for damage or wear.

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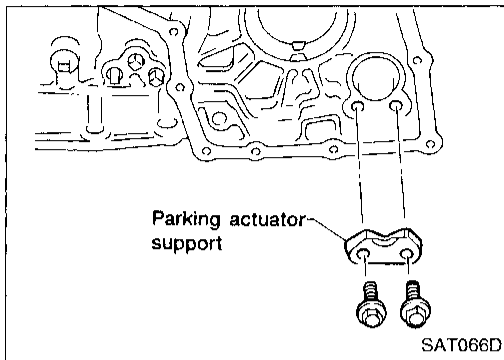
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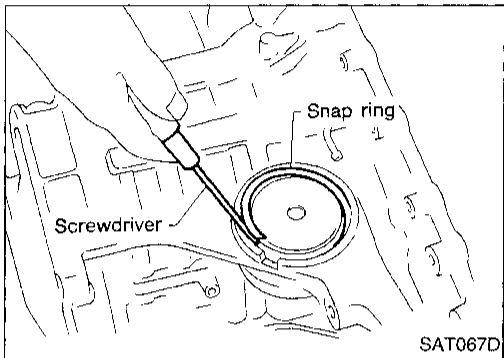
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DISASSEMBLY



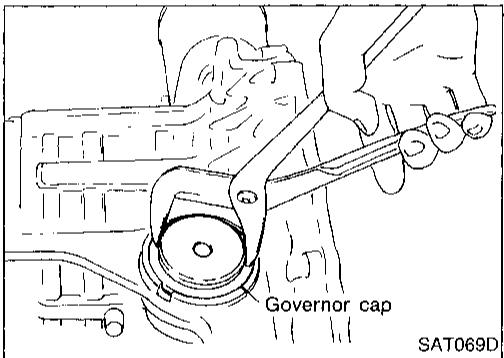
50. Remove parking actuator support from transmission case.
- Check parking actuator support for damage or wear.



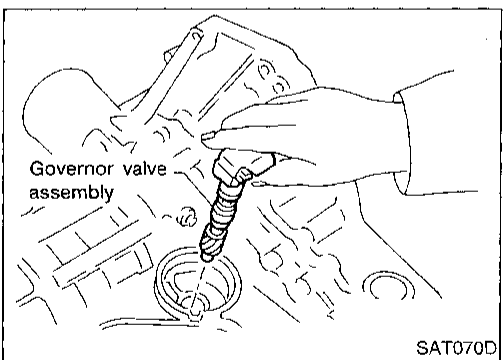
— RL4F03A only —

51. Remove governor valve assembly according to the following procedures.

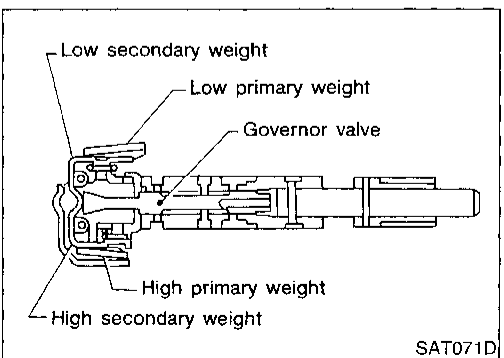
- a. Remove snap ring using a screwdriver.



- b. Remove governor cap using pliers.
c. Remove O-ring from governor cap.

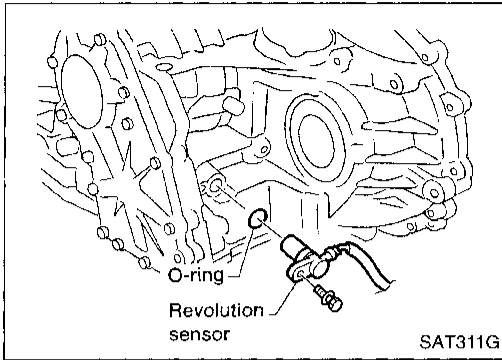


- d. Remove governor valve assembly.



- e. With low primary weight closed, place top of governor valve assembly down. Make sure governor valve properly lowers easily.
f. Place top of governor assembly down. Operate both low and high secondary weights to make sure governor valve functions properly.

DISASSEMBLY



— RE4F03V only —

52. Remove revolution sensor from transmission case.

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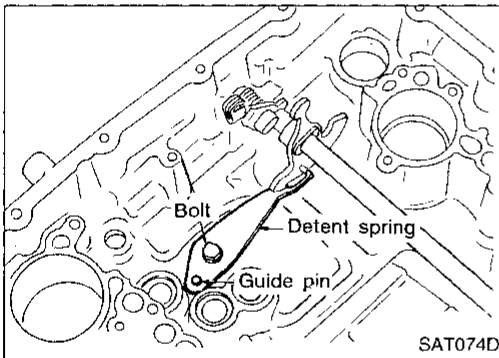
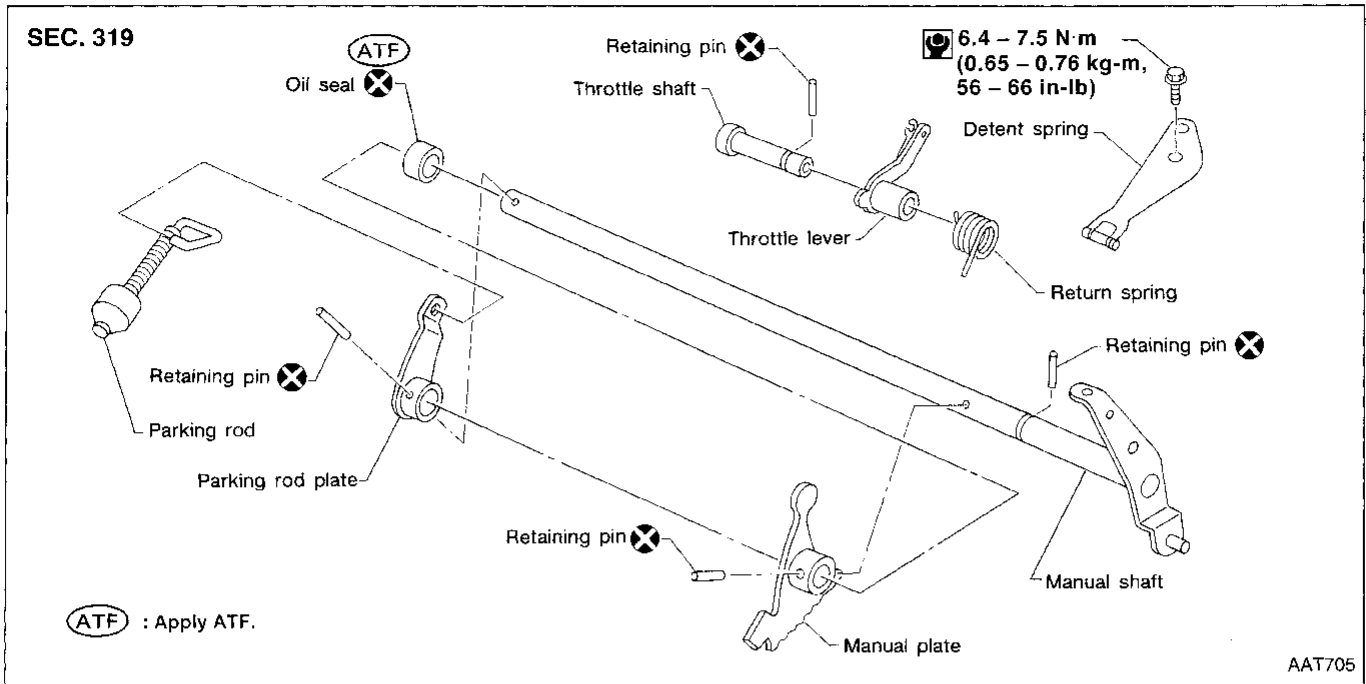
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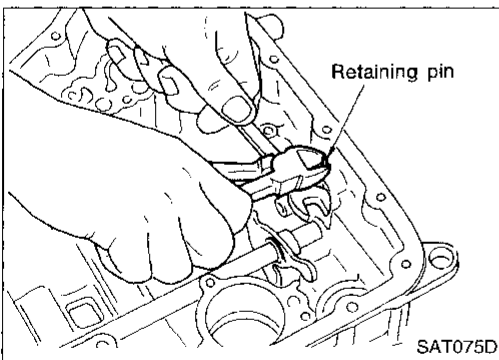
REPAIR FOR COMPONENT PARTS

Manual Shaft and Throttle Lever — RL4F03A

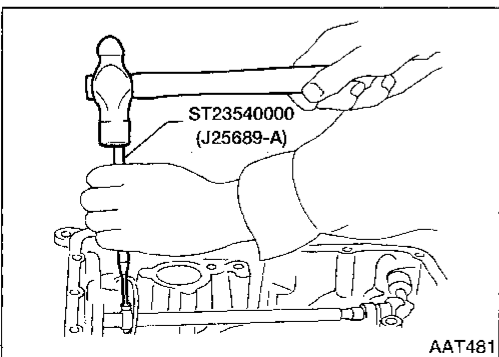


REMOVAL

1. Remove detent spring from transmission case.



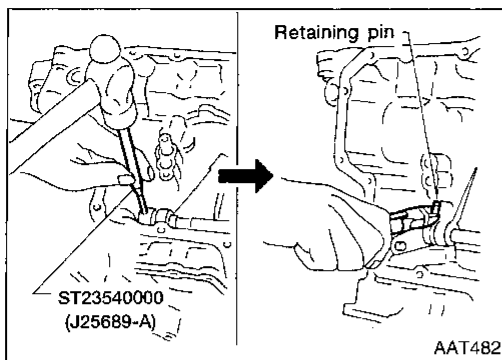
2. Pull out throttle shaft retaining pin, then draw out throttle shaft from transmission case.



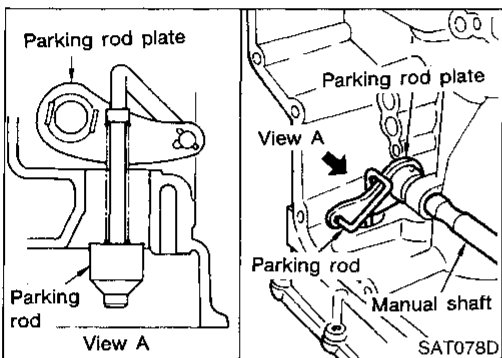
3. Drive out manual plate retaining pin.

REPAIR FOR COMPONENT PARTS

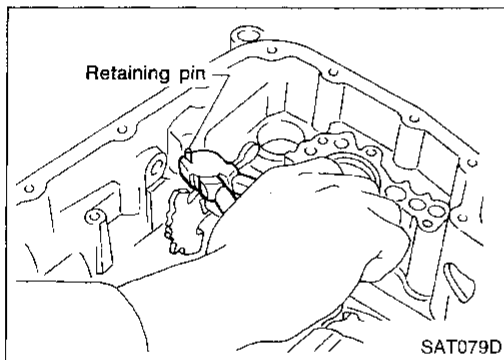
Manual Shaft and Throttle Lever — RL4F03A (Cont'd)



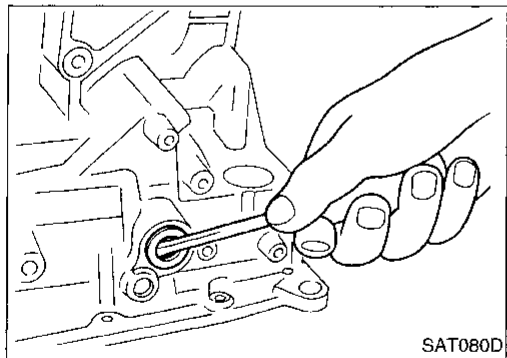
4. Drive and then pull out parking rod plate retaining pin.



5. Remove parking rod plate from manual shaft.
6. Draw out parking rod from transmission case.



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



9. Remove manual shaft oil seal.

INSPECTION

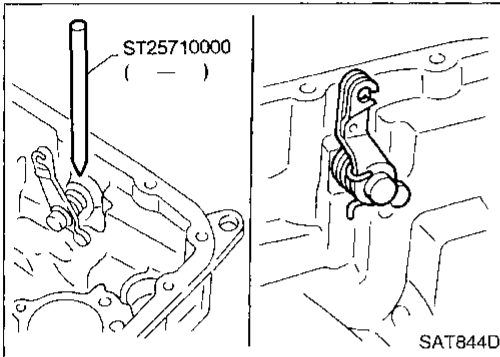
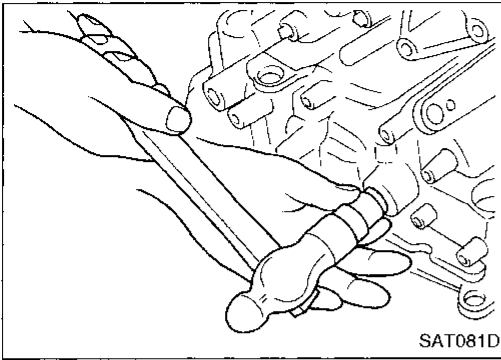
- Check component parts for wear or damage. Replace if necessary.

REPAIR FOR COMPONENT PARTS

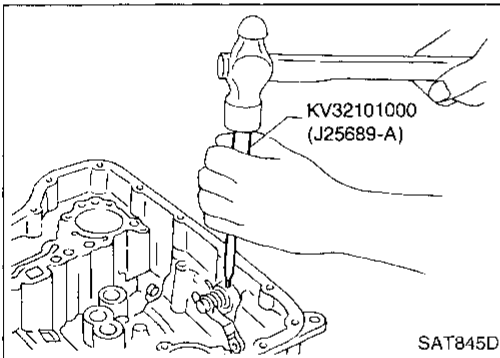
Manual Shaft and Throttle Lever — RL4F03A (Cont'd)

INSTALLATION

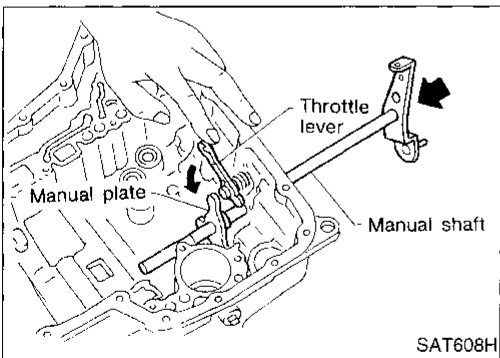
1. Install manual shaft oil seal.
 - Apply ATF to outer surface of oil seal.



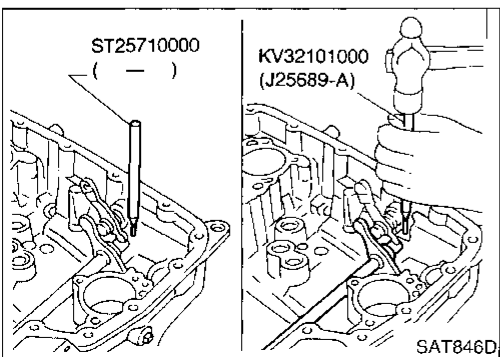
2. Install throttle lever and return spring on throttle shaft.
3. Install throttle lever assembly on transmission case.



4. Align groove of throttle shaft and hole of transmission case.
5. Install throttle shaft retaining pin.



6. Move throttle lever in the direction of the arrow.
7. Install manual shaft and manual plate.

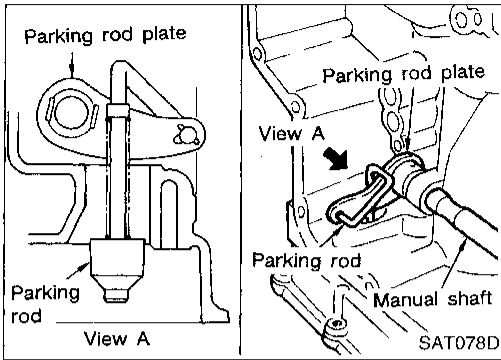


8. Align groove of manual shaft and hole of transmission case.
9. Install manual shaft retaining pin.

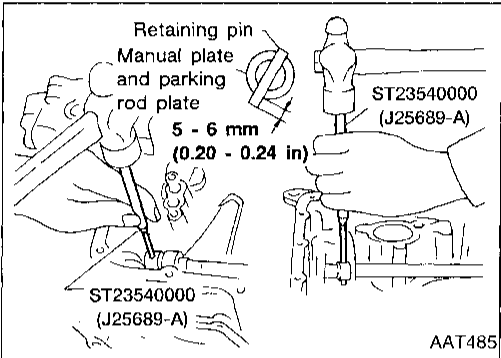
REPAIR FOR COMPONENT PARTS

Manual Shaft and Throttle Lever — RL4F03A

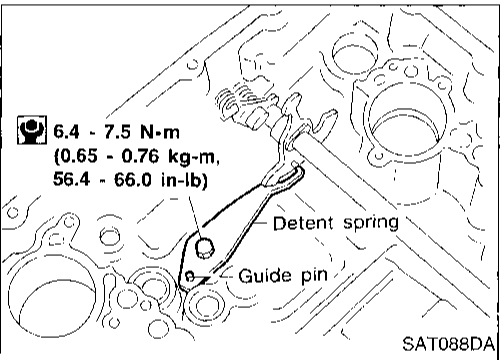
(Cont'd)



10. Install parking rod to parking rod plate.
11. Install parking rod assembly to manual shaft.

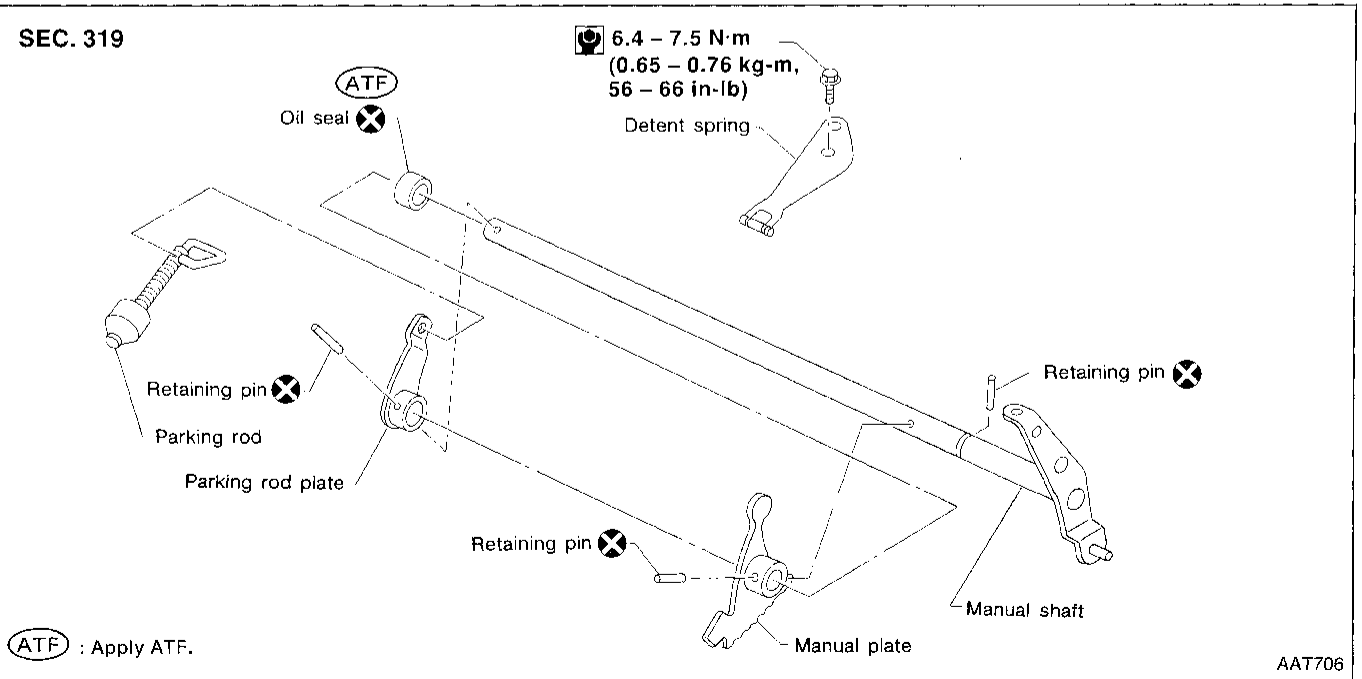


12. Install manual plate retaining pin and parking rod plate retaining pin.



13. Install detent spring.

Manual Shaft — RE4F03V



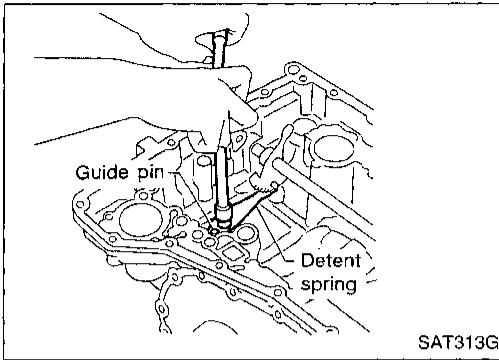
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REPAIR FOR COMPONENT PARTS

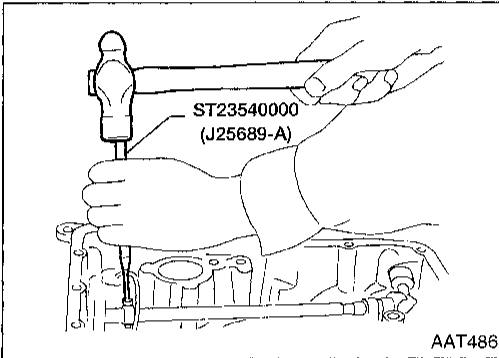
Manual Shaft — RE4F03V (Cont'd)

REMOVAL

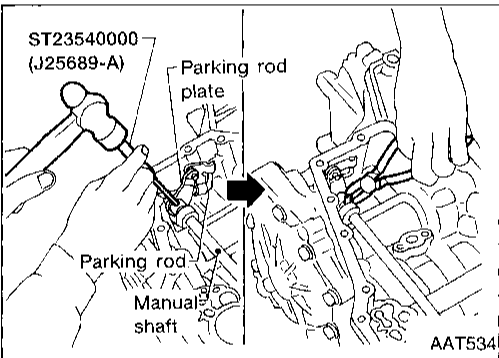
1. Remove detent spring from transmission case.



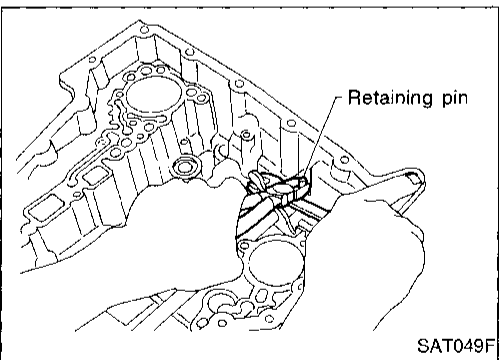
2. Drive out manual plate retaining pin.



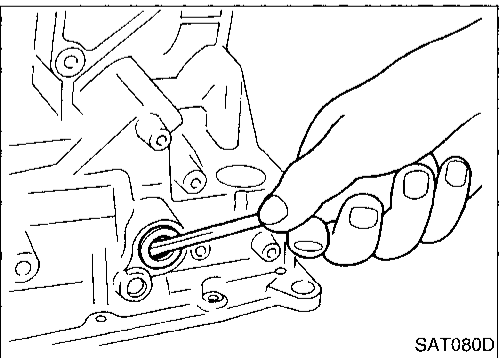
3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.



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



8. Remove manual shaft oil seal.



REPAIR FOR COMPONENT PARTS

Manual Shaft — RE4F03V (Cont'd)

INSPECTION

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

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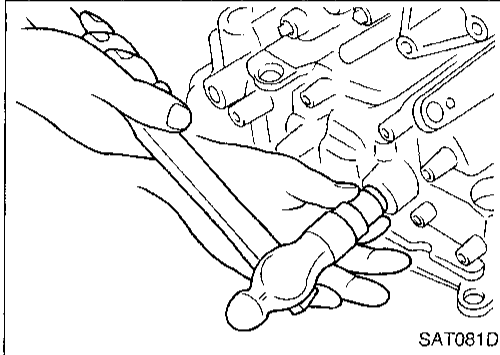
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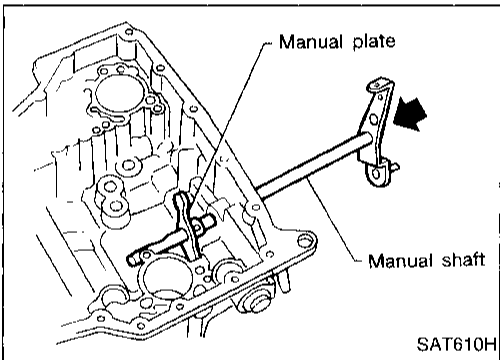
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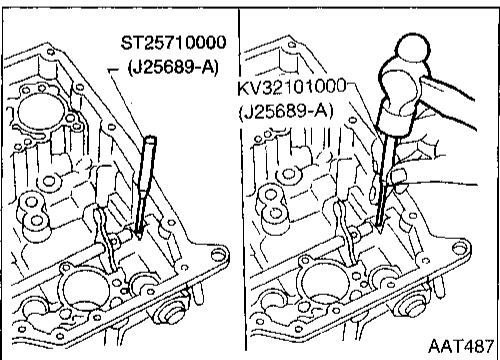


INSTALLATION

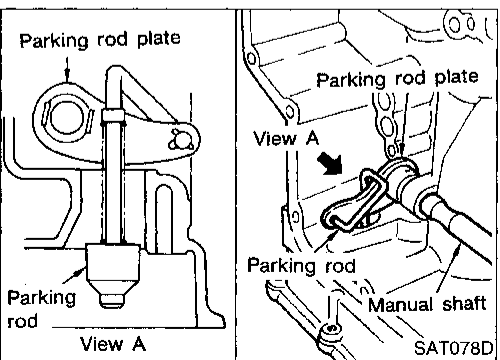
1. Install manual shaft oil seal.
- Apply ATF to outer surface of oil seal.



2. Install manual shaft and manual plate.



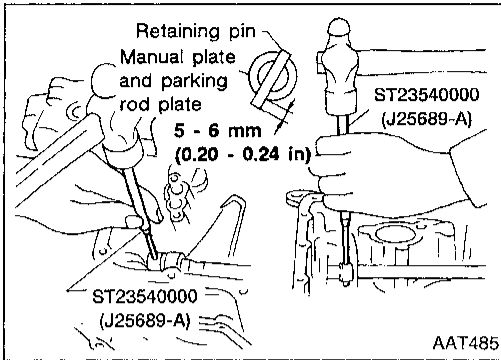
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin.



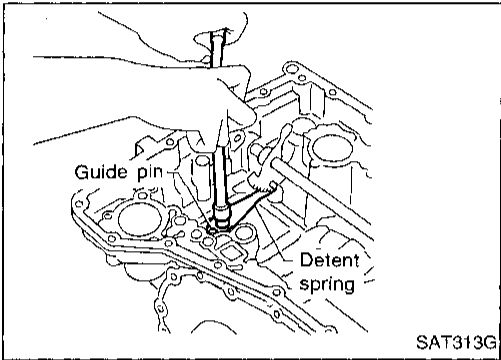
5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft.

REPAIR FOR COMPONENT PARTS

Manual Shaft — RE4F03V (Cont'd)

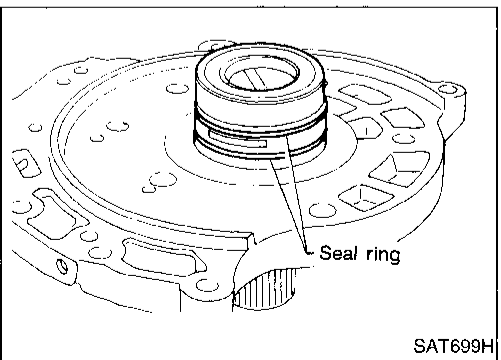
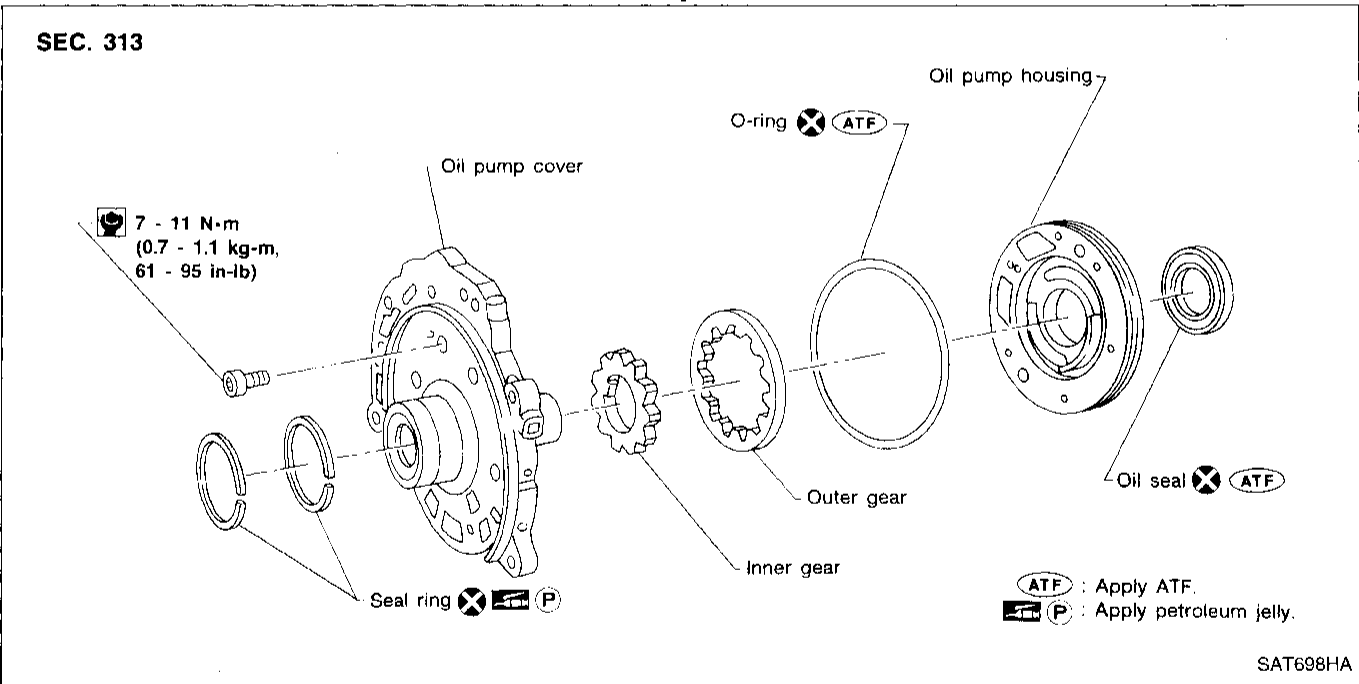


7. Drive in manual plate retaining pin and parking rod plate retaining pin.



8. Install detent spring.

Oil Pump

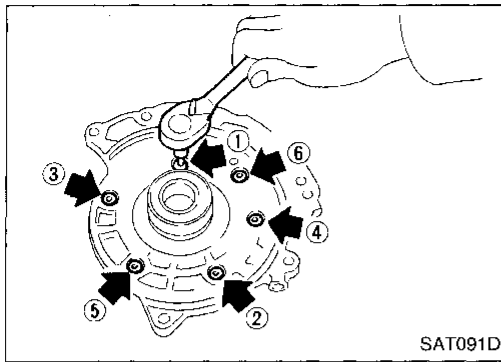


DISASSEMBLY

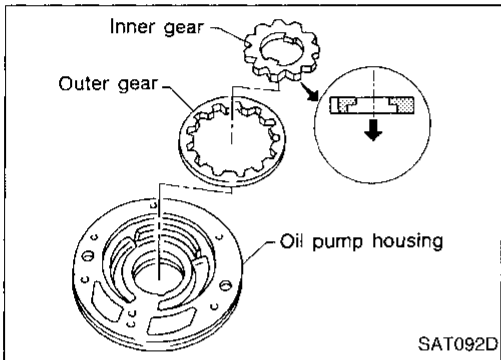
1. Remove seal rings.

REPAIR FOR COMPONENT PARTS

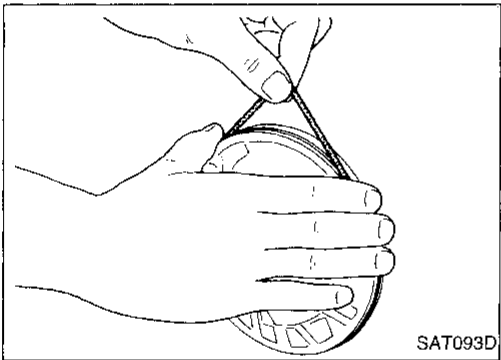
Oil Pump (Cont'd)



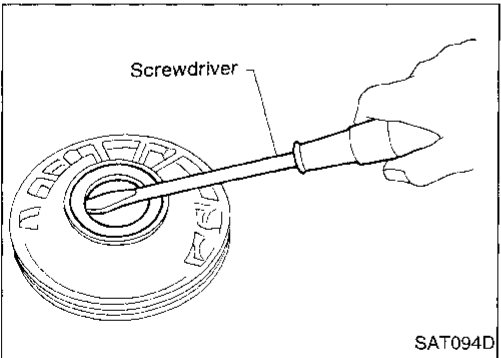
2. Loosen bolts in numerical order and remove oil pump cover.



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



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.

INSPECTION

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

- Check for wear or damage.

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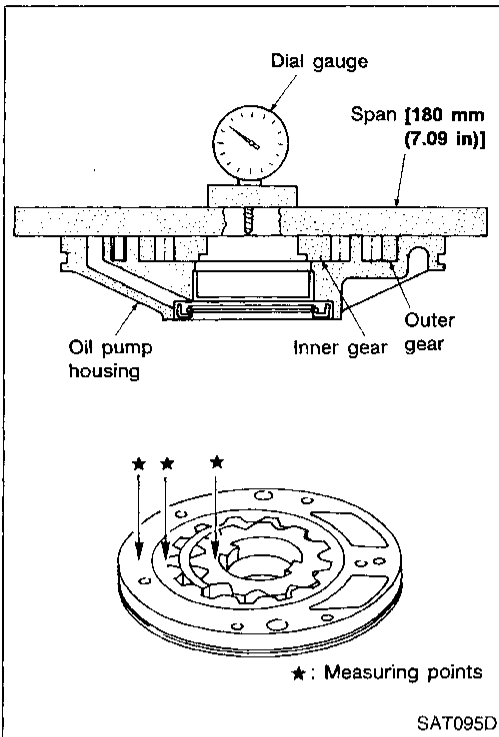
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REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)

Side clearance



- Measure side clearance of inner and outer gears in at least four places around each outside edge. Maximum measured values should be within specified range.

Standard clearance:

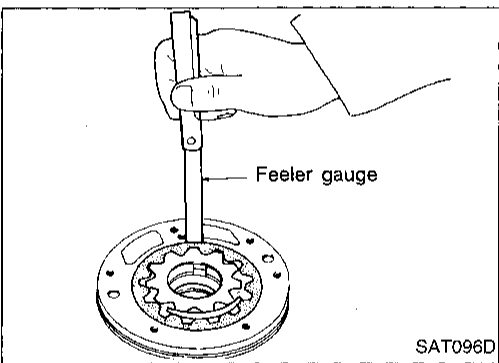
0.02 - 0.04 mm (0.0008 - 0.0016 in)

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

Inner and outer gear:

Refer to SDS, AT-326.

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.



- Measure clearance between outer gear and oil pump housing.

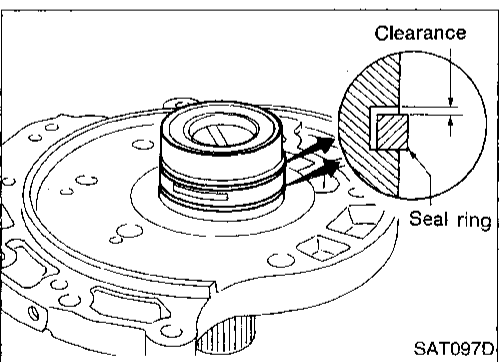
Standard clearance:

0.08 - 0.15 mm (0.0031 - 0.0059 in)

Allowable limit:

0.15 mm (0.0059 in)

- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



Seal ring clearance

- Install new seal rings onto oil pump cover.
- Measure clearance between seal ring and ring groove.

Standard clearance:

0.1 - 0.25 mm (0.0039 - 0.0098 in)

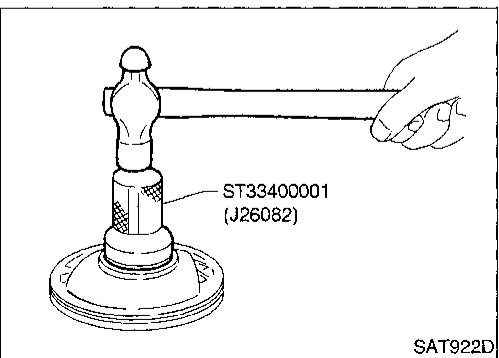
Allowable limit:

0.25 mm (0.0098 in)

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

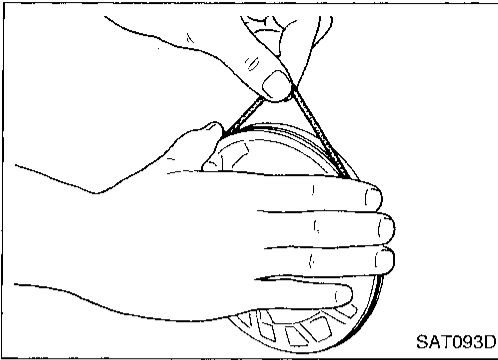
ASSEMBLY

1. Install oil seal on oil pump housing.



REPAIR FOR COMPONENT PARTS

Oil Pump (Cont'd)



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

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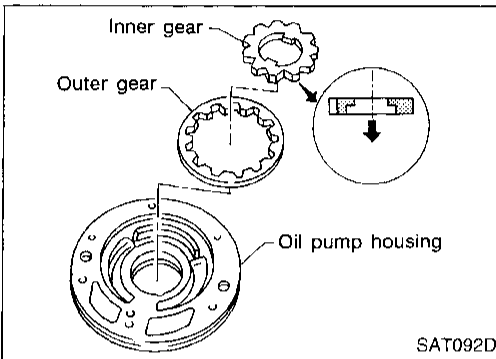
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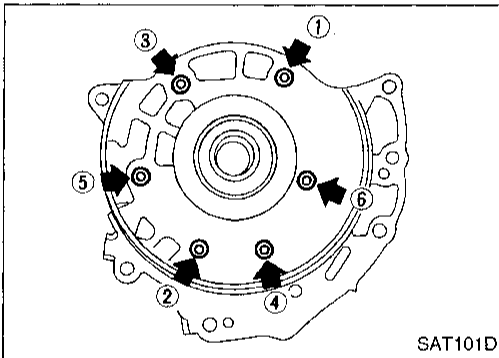
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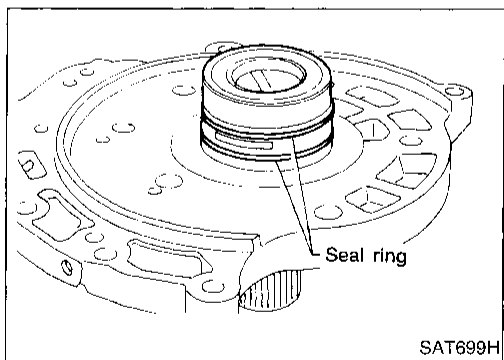
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3. Install inner and outer gears on oil pump housing.
 - Take care with the direction of the inner gear.

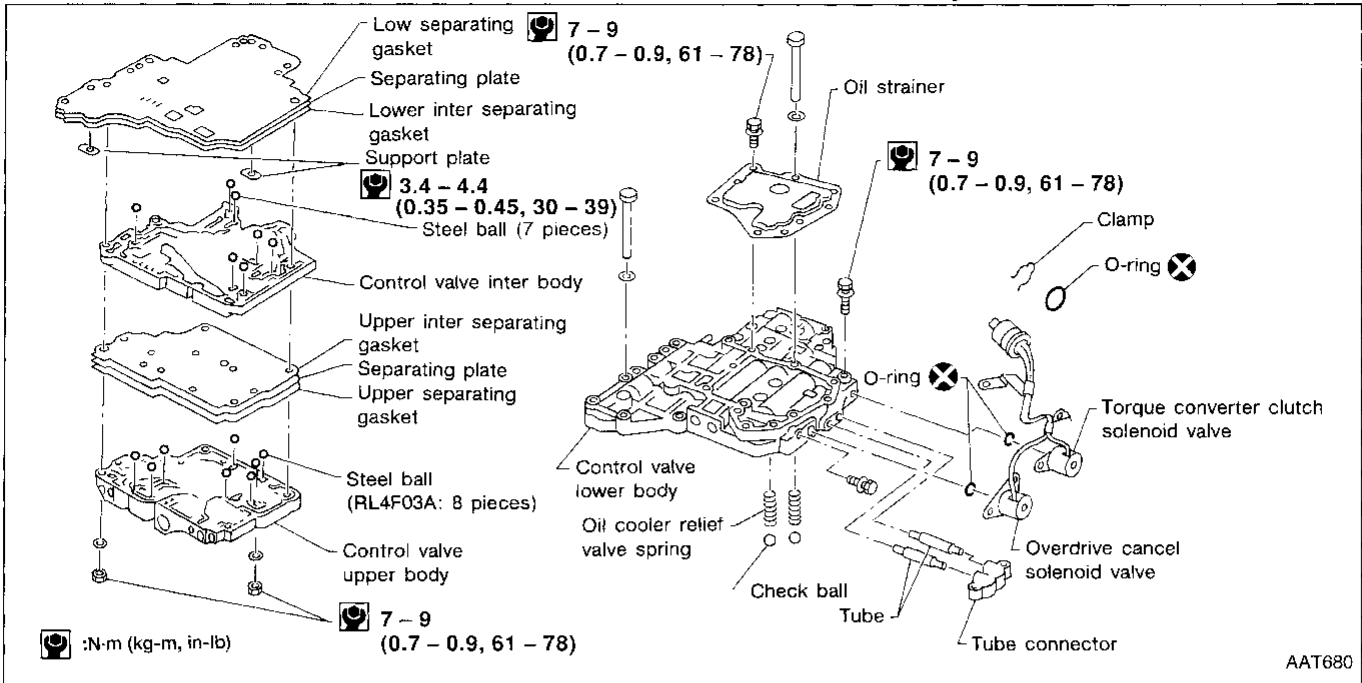


4. Install oil pump cover on oil pump housing.
 - a. Wrap masking tape around splines of oil pump cover assembly to protect seal. Position oil pump cover assembly on oil pump housing assembly, then remove masking tape.
 - b. Tighten bolts in numerical order.

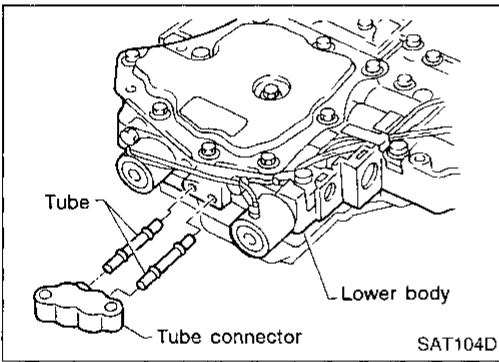


5. Install new seal rings carefully after packing ring groove with petroleum jelly.
 - Do not spread gap of seal ring excessively while installing. It may deform the ring.

Control Valve Assembly — RL4F03A

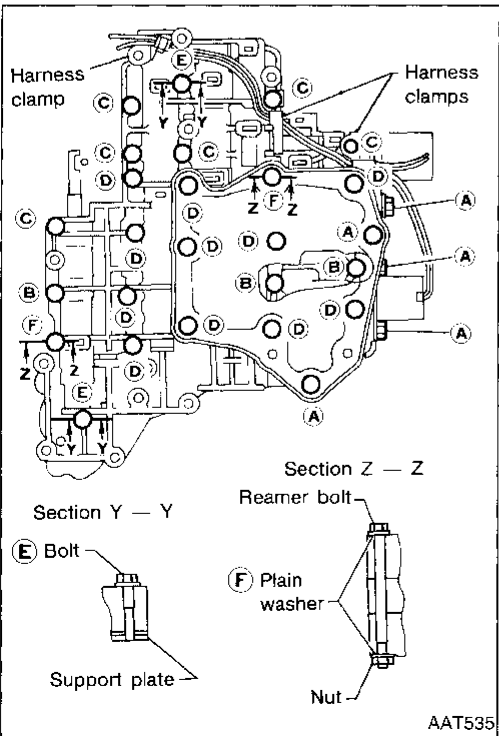


AAT680



DISASSEMBLY

1. Remove tube connector and tube from control valve lower body.



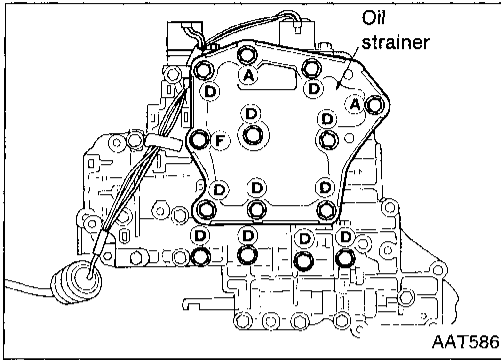
2. Disassemble upper, inter and lower bodies.

Bolt length, number and location:

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "ℓ" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	5	3	6	11	2	2

REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RL4F03A (Cont'd)



- a. Remove bolts (A), (D) and (F) and remove oil strainer from control valve assembly.

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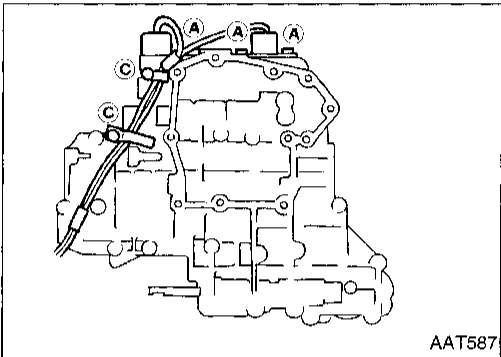
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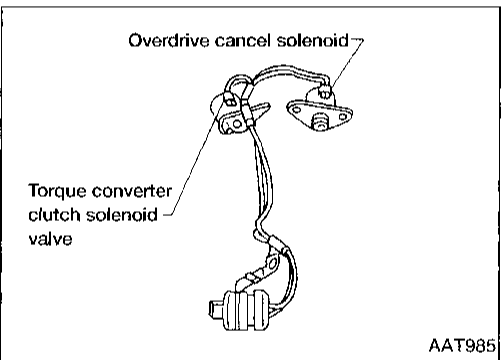
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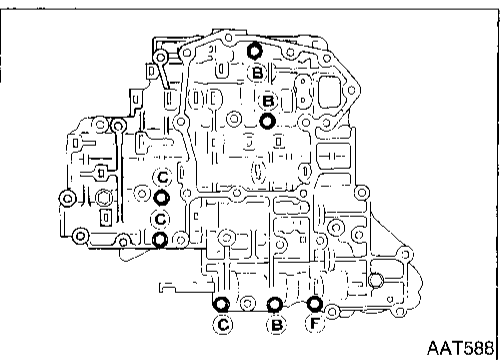
IDX



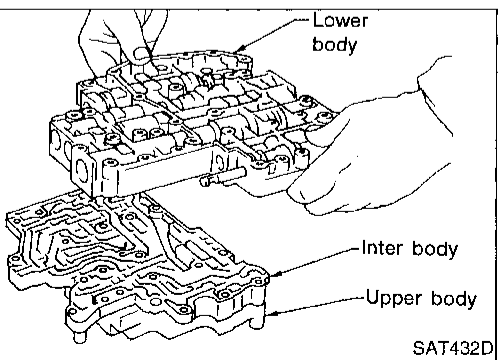
- b. Remove overdrive cancel solenoid valve and torque converter clutch solenoid valve from control valve assembly.



- c. Remove O-rings from overdrive cancel solenoid valve, torque converter clutch solenoid valve and harness terminal body.



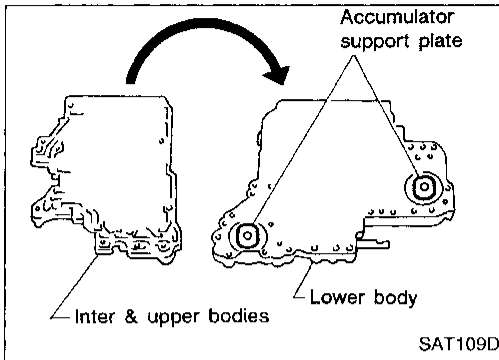
- d. Place upper body facedown, and remove bolts (B), (C) and (F).



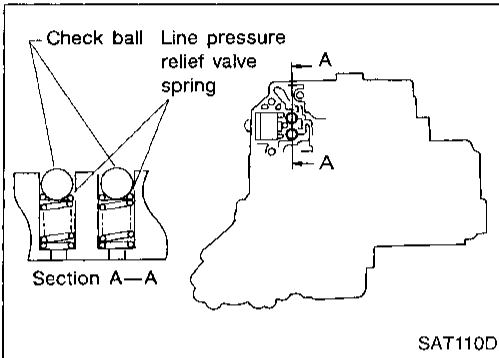
- e. Remove inter body from lower body.

REPAIR FOR COMPONENT PARTS

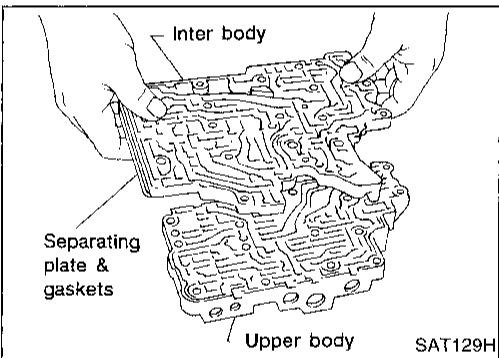
Control Valve Assembly — RL4F03A (Cont'd)



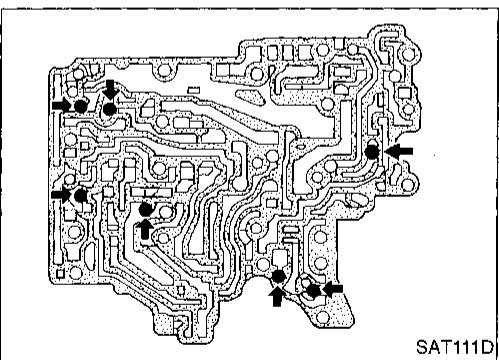
- f. Turn over lower body, and remove accumulator support plate.



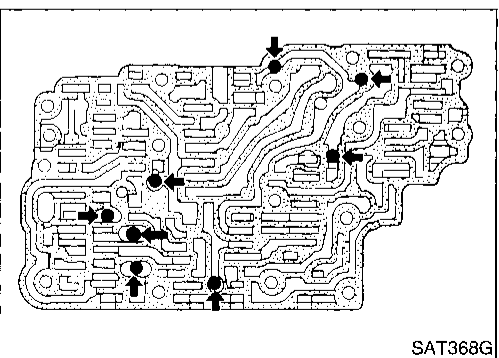
- g. Remove separating plate and separating gasket from lower body.
h. Remove steel balls and relief valve springs from lower body.
• **Be careful not to lose steel balls and relief valve springs.**



- i. Remove inter body with separating plate and separating gasket from upper body.



- j. Check to see that steel balls are properly positioned in inter body and then remove them.
• **Be careful not to lose steel balls.**



- k. Check to see that steel balls are properly positioned in upper body and then remove them.
• **Be careful not to lose steel balls.**

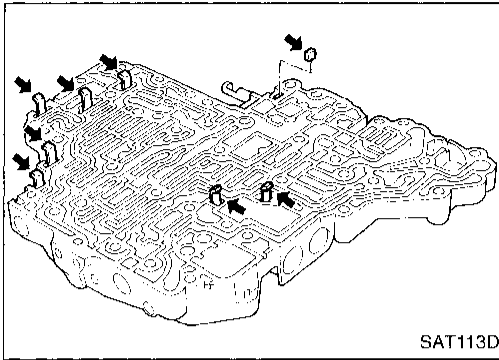
REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RL4F03A (Cont'd)

INSPECTION

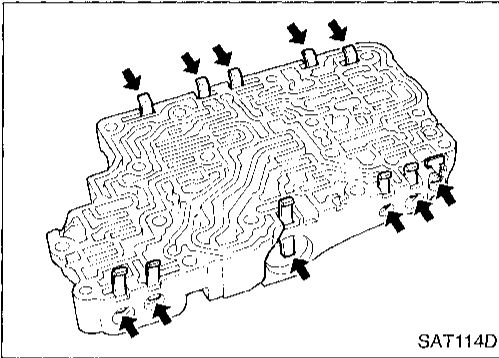
Lower and upper bodies

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



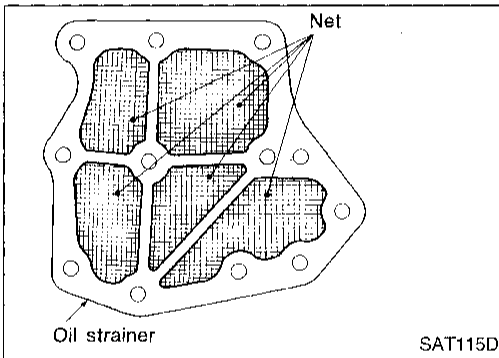
- Check to see that retainer plates are properly positioned in upper body.

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



Oil strainer

- Check wire netting of oil strainer for damage.

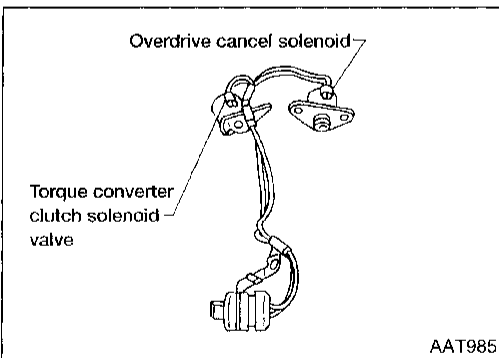


Overdrive cancel solenoid valve

- Measure resistance. Refer to AT-38.

Torque converter clutch solenoid valve

- Measure resistance. Refer to AT-36.

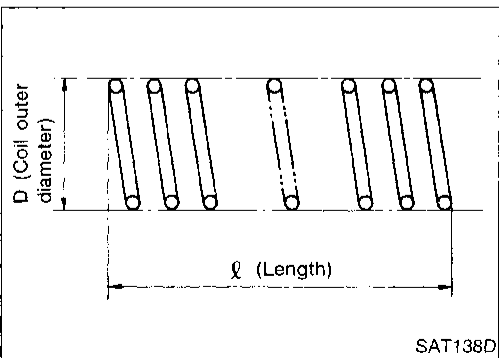


Oil cooler relief valve spring.

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

Inspection standard:

Refer to SDS, AT-324.



GI

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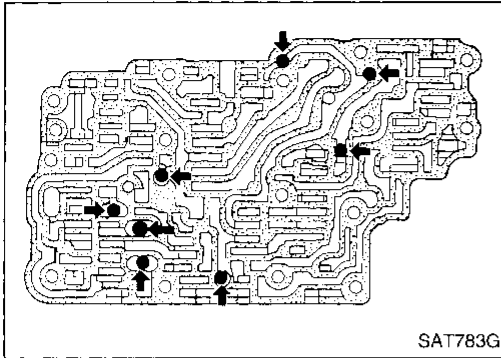
HA

EL

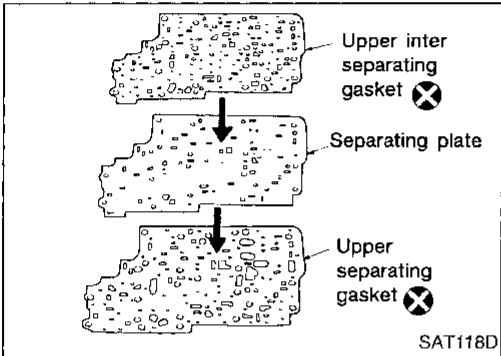
DX

REPAIR FOR COMPONENT PARTS

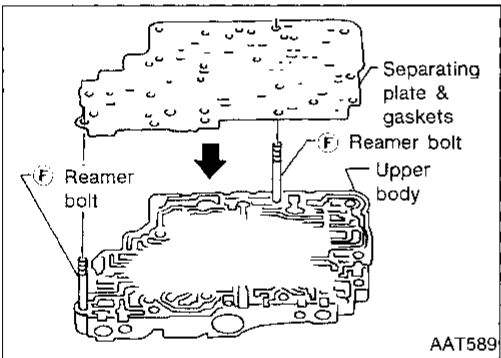
Control Valve Assembly — RL4F03A (Cont'd) ASSEMBLY



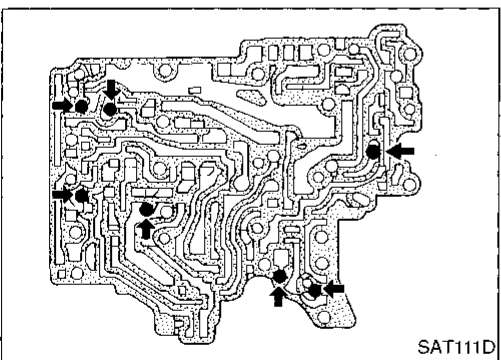
1. Install upper, inter and lower body.
 - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.



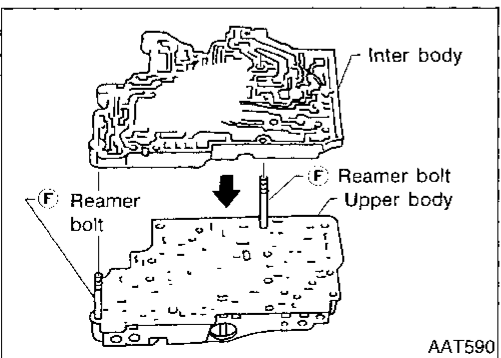
- b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.



- c. Install reamer bolts (F) from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a set.



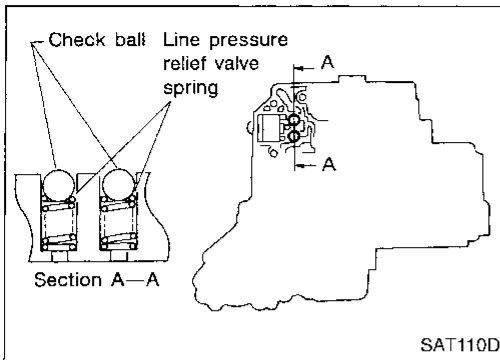
- d. Place lower body side of inter body face up. Install steel balls in their proper positions.



- e. Install inter body on upper body using reamer bolts (F) as guides.
 - Be careful not to dislocate or drop steel balls.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RL4F03A (Cont'd)



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

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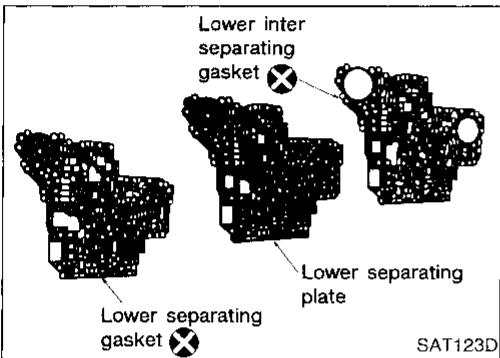
RS

BT

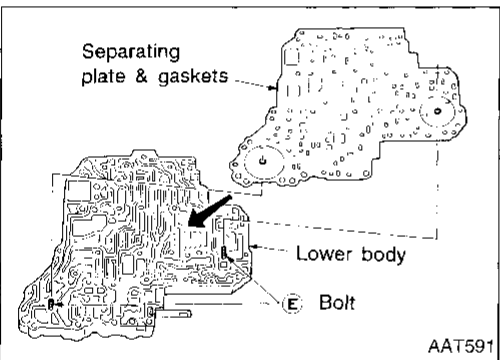
HA

EL

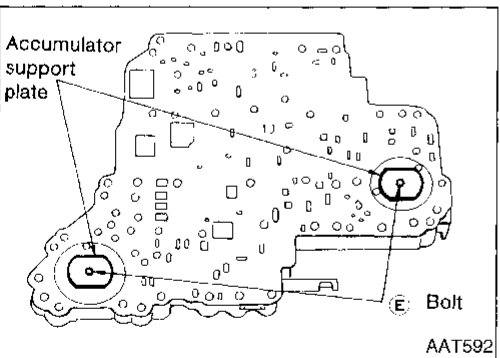
IDX



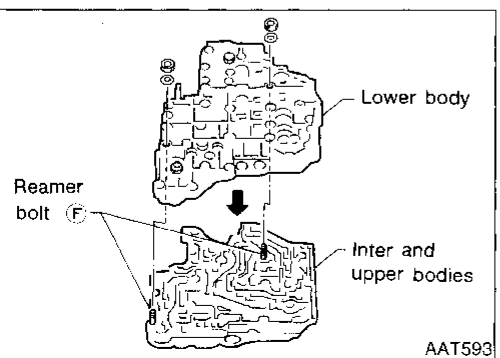
- g. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in illustration.



- h. Install bolts (E) from bottom of lower body. Using bolts (E) as guides, install separating plate and gaskets as a set.



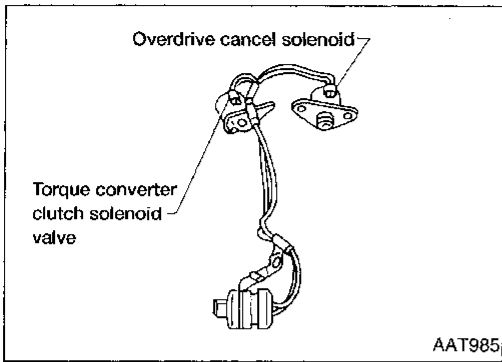
- i. Temporarily install support plates on lower body.



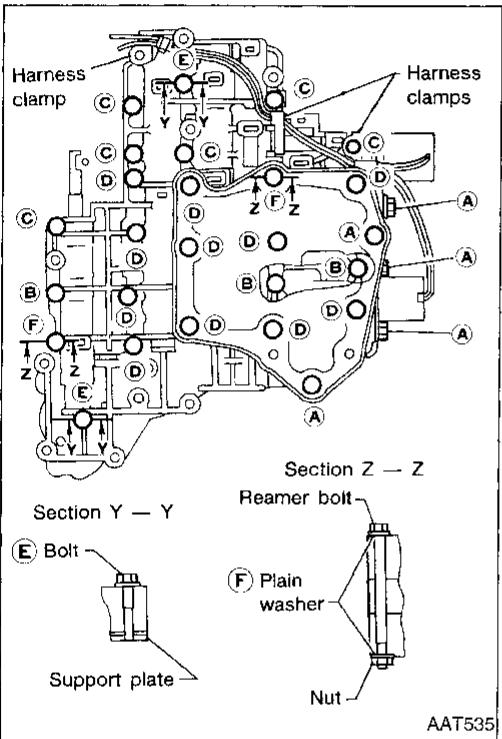
- j. Install lower body on inter body using reamer bolts (F) as guides and tighten reamer bolts (F) slightly.

REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RL4F03A (Cont'd)



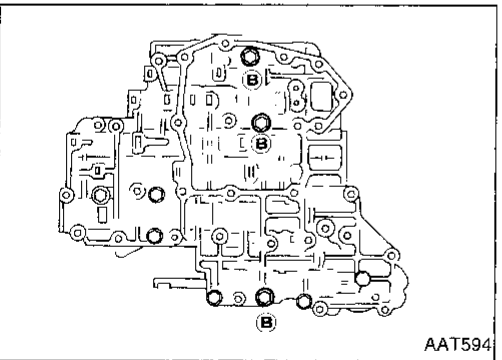
2. Install O-rings to overdrive cancel solenoid valve, torque converter clutch solenoid valve and harness connector.
 - Apply ATF to O-rings.



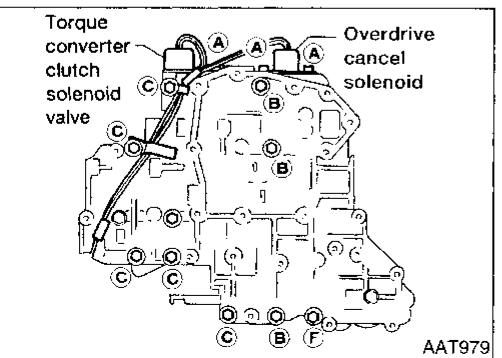
3. Install and tighten bolts.

Bolt length, number and location:

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "L" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	5	3	6	11	2	2



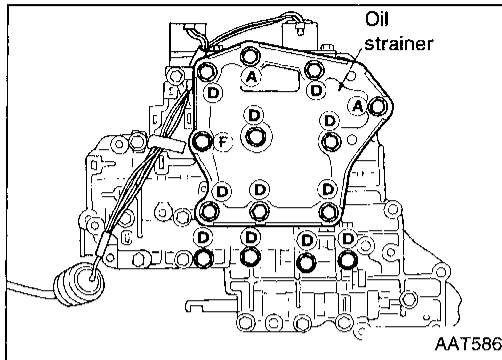
- a. Install and tighten bolts (B) slightly.



- b. Install overdrive cancel solenoid valve and torque converter clutch solenoid valve to lower body.
- c. Install and tighten bolts (A) and (C) slightly.
- d. Remove both reamer bolts (F) previously installed as guides. Install one reamer bolt (F) (marked in illustration) from lower body side.
- e. Tighten bolts (A), (B), (C) and (F) to specified torque.
 - ☛ : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)

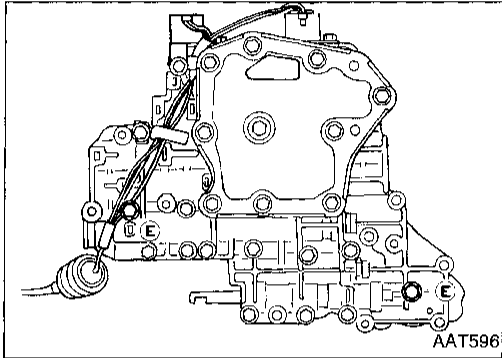
REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RL4F03A (Cont'd)



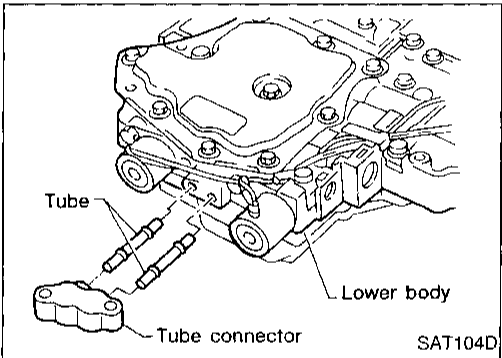
- f. Install oil strainer and the other reamer bolt (F) (marked in illustration), then tighten bolts (A), (D) and (F) to specified torque.

☛ : 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in·lb)



- g. Install support plates and tighten bolts (E) to specified torque.

☛ : 3.4 - 4.4 N·m (0.35 - 0.45 kg·m, 30.4 - 39.1 in·lb)



- h. Install tube connector and tubes to lower body.
- Install oil circuit side of tube connector face up.

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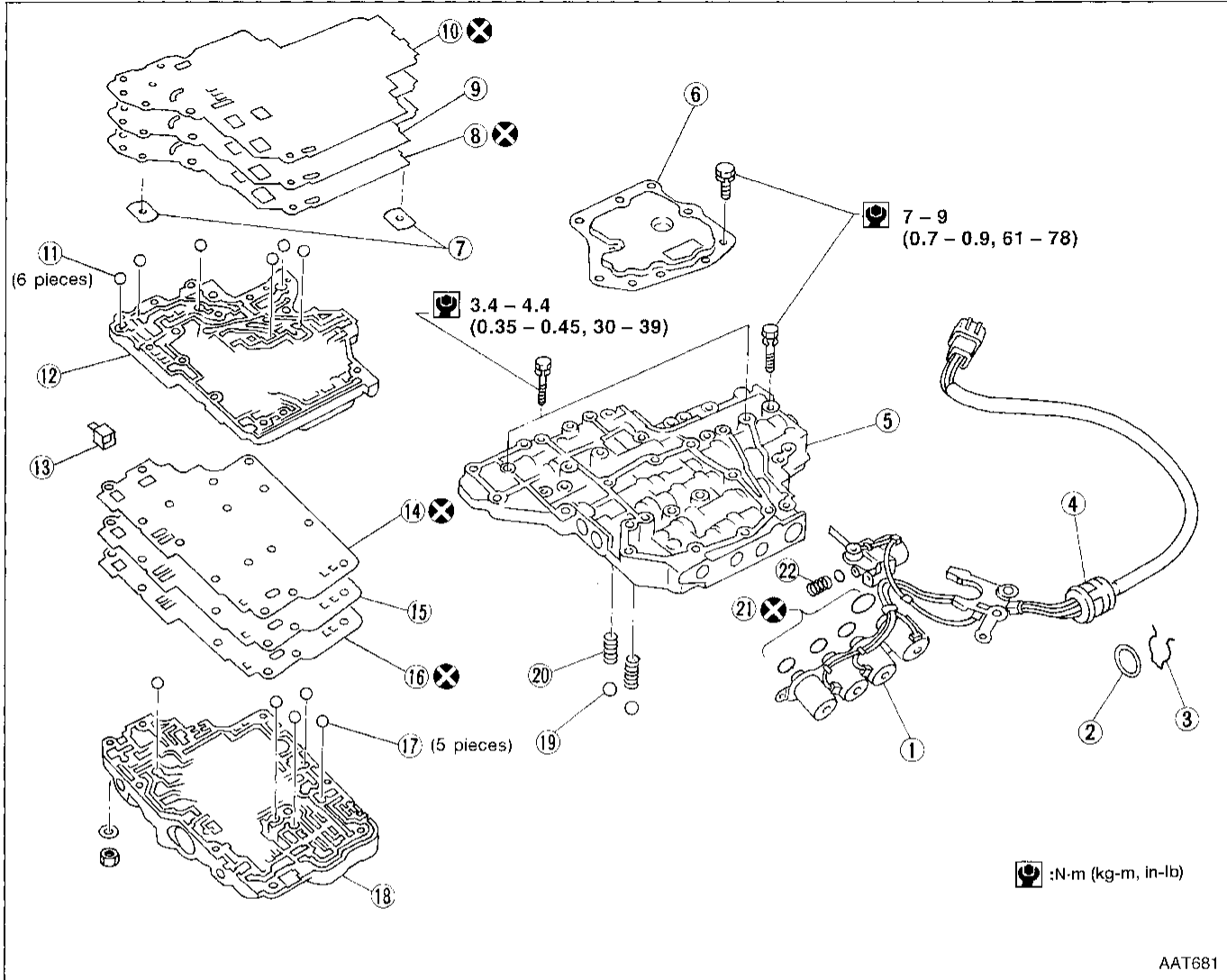
HA

EL

IDX

REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RE4F03V



AAT681

- | | | |
|---------------------------------|---------------------------------|---------------------------------------|
| ① Solenoid valve assembly | ⑨ Separating plate | ⑰ Steel ball |
| ② O-ring | ⑩ Lower separating gasket | ⑱ Control valve upper body |
| ③ Clip | ⑪ Steel ball | ⑲ Check ball |
| ④ Terminal body | ⑫ Control valve inter body | ⑳ Oil cooler relief valve spring |
| ⑤ Control valve lower body | ⑬ Pilot filter | ㉑ O-ring |
| ⑥ Oil strainer | ⑭ Upper inter separating gasket | ㉒ Line pressure solenoid valve spring |
| ⑦ Support plate | ⑮ Separating plate | |
| ⑧ Lower inter separating gasket | ⑯ Upper separating gasket | |

DISASSEMBLY

- Disassemble upper, inter and lower bodies.

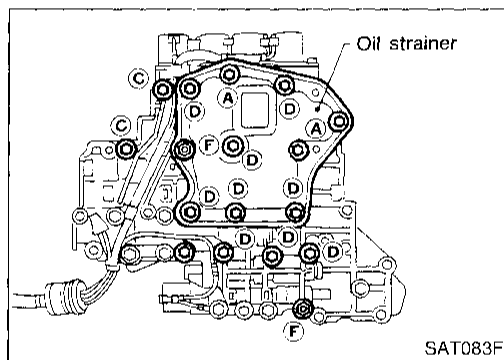
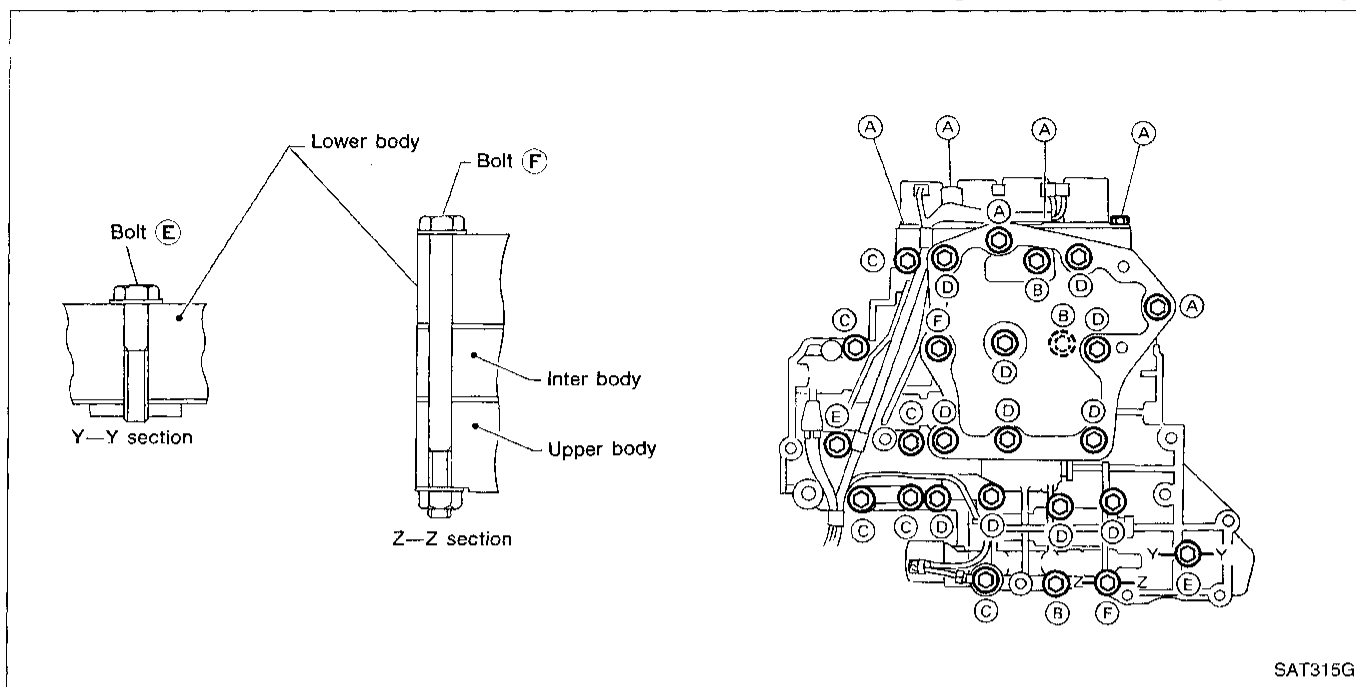
Bolt length, number and location:

Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "L" mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

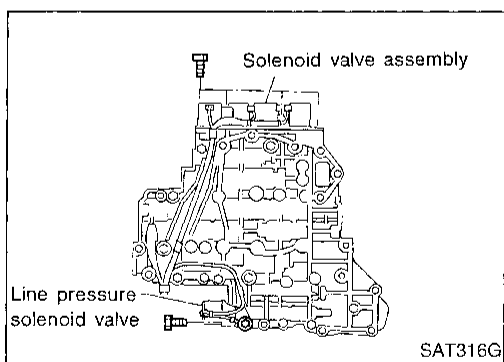
F: Reamer bolt with nut

REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RE4F03V (Cont'd)

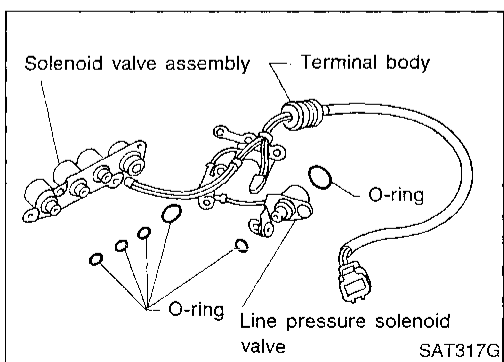


- a. Remove bolts (A), (D) and (F), and remove oil strainer from control valve assembly.



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

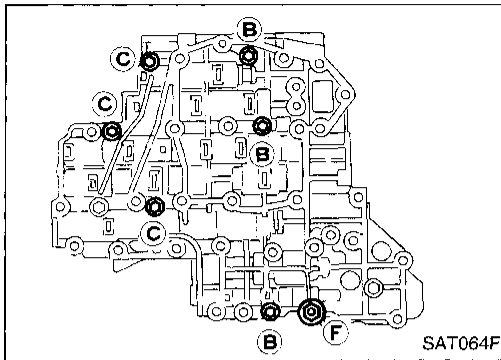
- **Be careful not to lose the line pressure solenoid valve spring.**



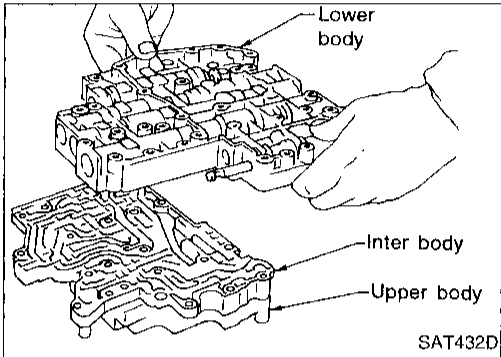
- c. Remove O-rings from solenoid valves and terminal body.

REPAIR FOR COMPONENT PARTS

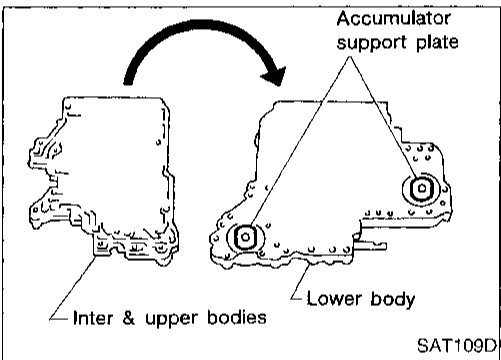
Control Valve Assembly — RE4F03V (Cont'd)



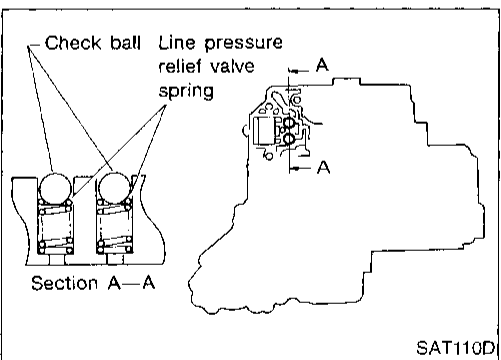
- d. Place upper body facedown, and remove bolts (B), (C) and (F).



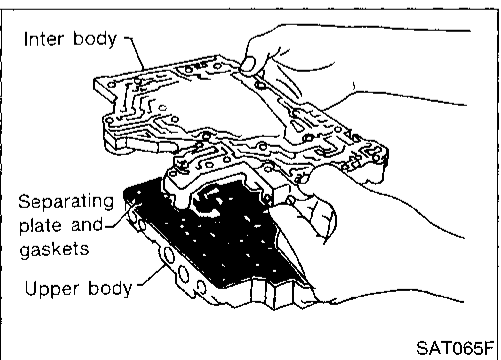
- e. Remove lower body from inter body.



- f. Turn over lower body, and accumulator support plates.



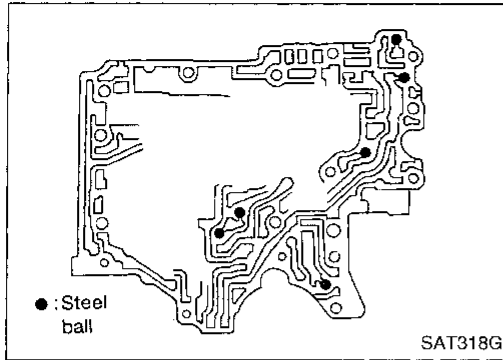
- g. Remove bolts (E), separating plate and separating gaskets from lower body.
h. Remove steel balls and relief valve springs from lower body.
• **Be careful not to lose steel balls and relief valve springs.**



- i. Remove inter body from upper body.
j. Remove pilot filter, separating plate and gaskets from upper body.

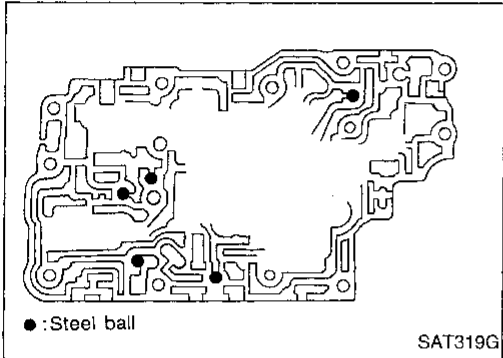
REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RE4F03V (Cont'd)



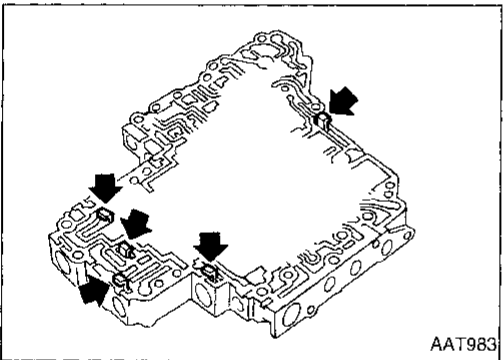
k. Check to see that steel balls are properly positioned in inter body and then remove them.

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



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

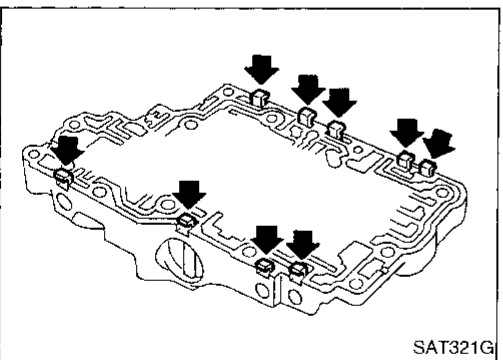
- **Be careful not to lose steel balls.**



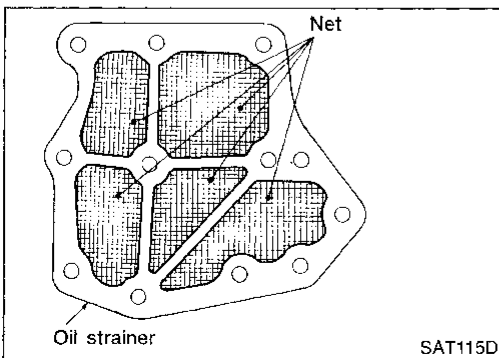
INSPECTION

Lower and upper bodies

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



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



Oil strainer

- Check wire netting of oil strainer for damage.

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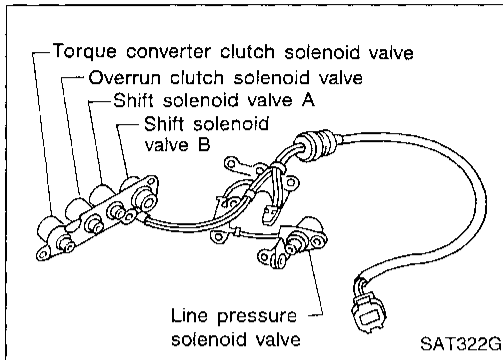
IDX

REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RE4F03V (Cont'd)

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

- Measure resistance. Refer to AT-116.



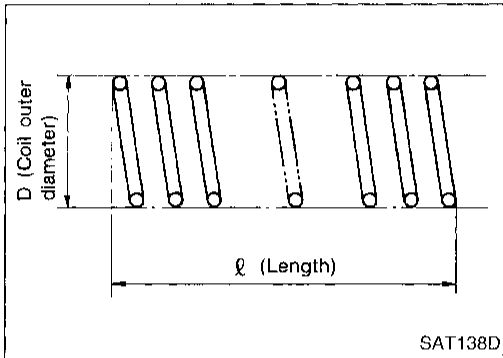
Oil cooler relief valve spring

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

Inspection standard:

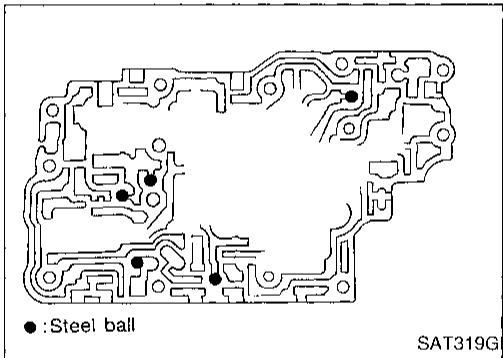
Unit: mm (in)

Part No.	ℓ	D
31872 31X00	17.02 (1.6701)	8.0 (0.315)



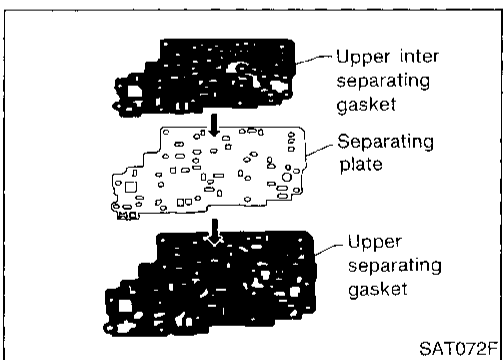
ASSEMBLY

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

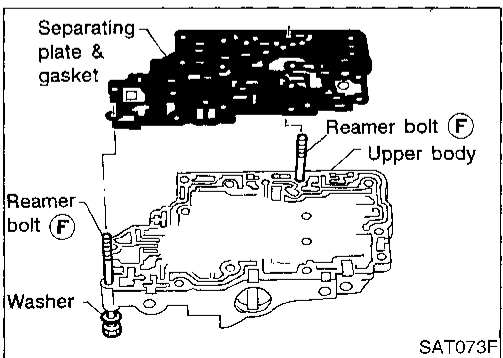


- b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.

- Always use new gaskets.

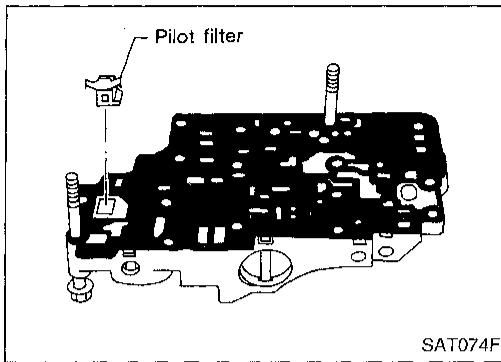


- c. Install reamer bolts (F) from bottom of upper body. Using reamer bolts as guides, install separating plate and gaskets as a seat.

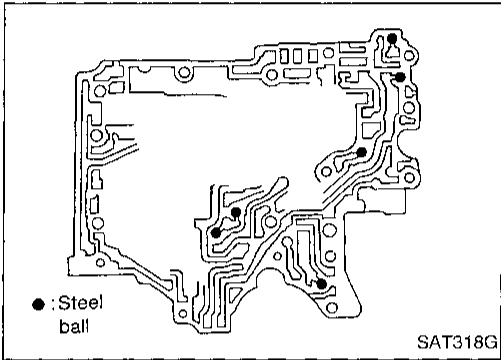


REPAIR FOR COMPONENT PARTS

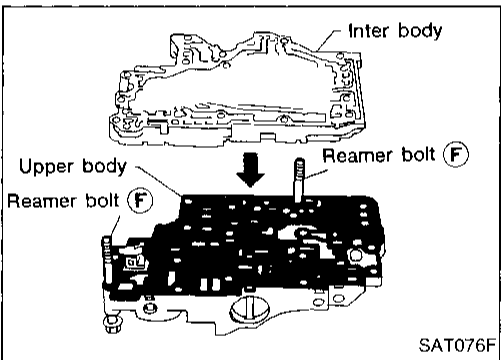
Control Valve Assembly — RE4F03V (Cont'd)



d. Install pilot filter.

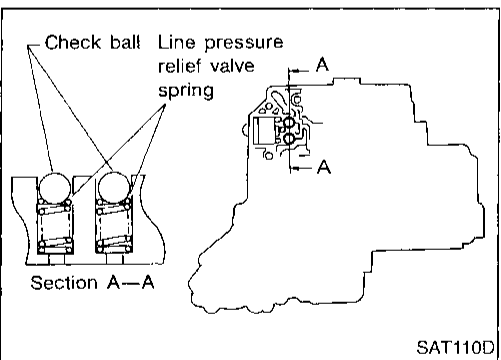


e. Place inter body as shown in the illustration. Install steel balls in their proper positions.

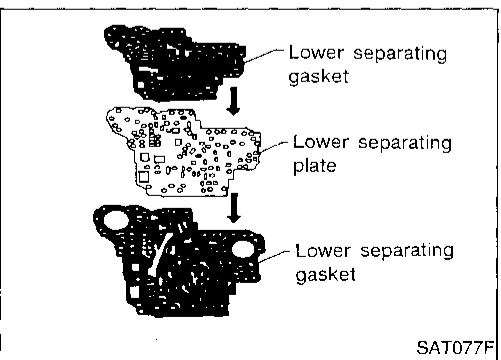


f. Install inter body on upper body using reamer bolts (F) as guides.

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



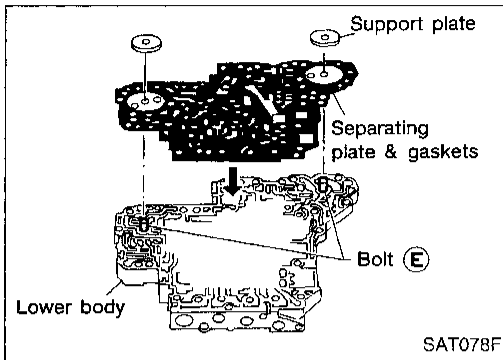
g. Install steel balls and relief valve springs in their proper positions in lower body.



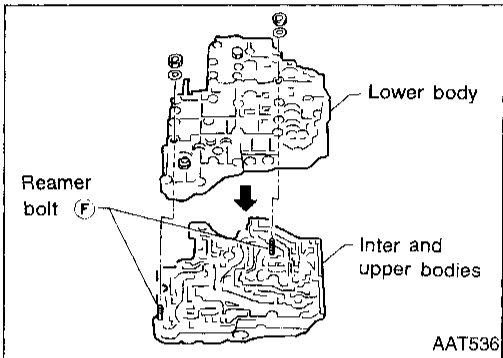
h. Install lower separating gasket, inner separating gasket and lower separating plate in order shown in the illustration.

REPAIR FOR COMPONENT PARTS

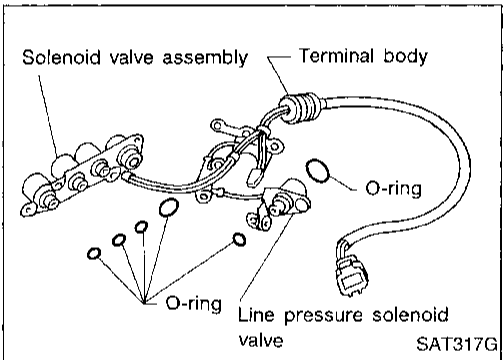
Control Valve Assembly — RE4F03V (Cont'd)



- i. Install bolts (E) from bottom of lower body. Using bolt (E) as guides, install separating plate and gaskets as a set.
- j. Install support plates on lower body.



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



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

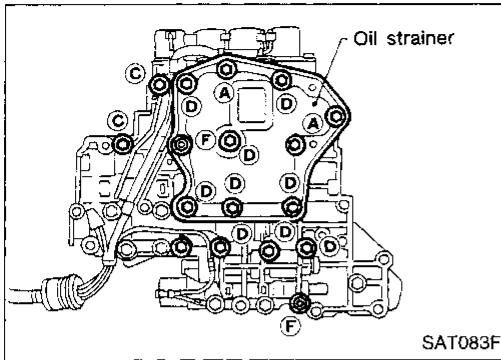
3. Install and tighten bolts.

Bolt length, number and location:


Bolt symbol	(A)	(B)	(C)	(D)	(E)	(F)
Bolt length "l" mm (in)	13.5 (0.531)	58.0 (2.283)	44.0 (1.732)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2

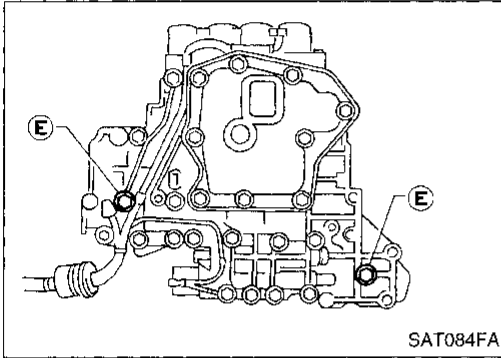
REPAIR FOR COMPONENT PARTS

Control Valve Assembly — RE4F03V (Cont'd)




e. Tighten bolts (A), (C), (D) and (F) to specified torque.

 : 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

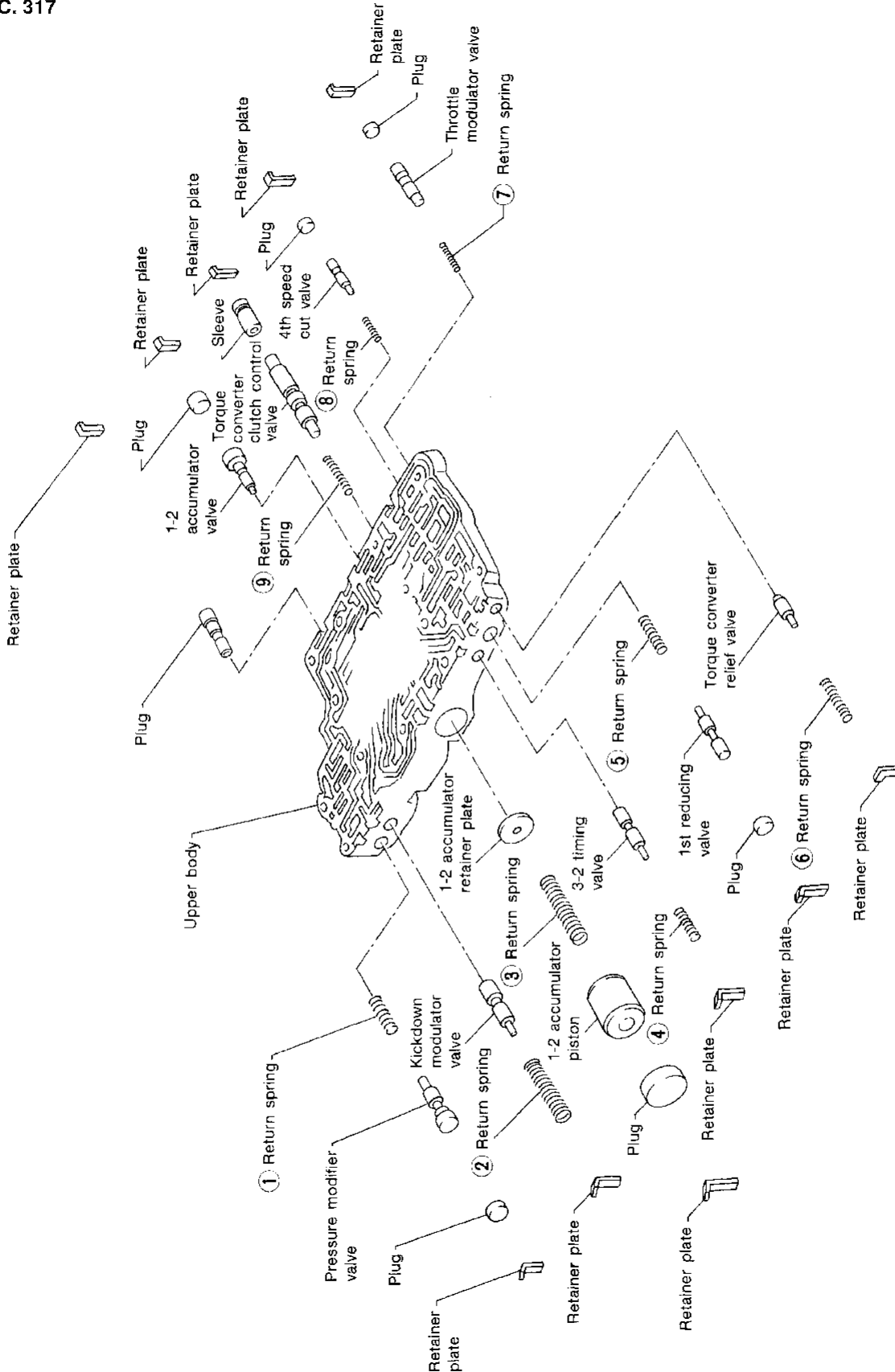


f. Tighten bolts (E) to specified torque.

 : 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 30.4 - 39.1 in-lb)

Control Valve Upper Body — RL4F03A

SEC. 317



Apply ATF to all components before their installation.

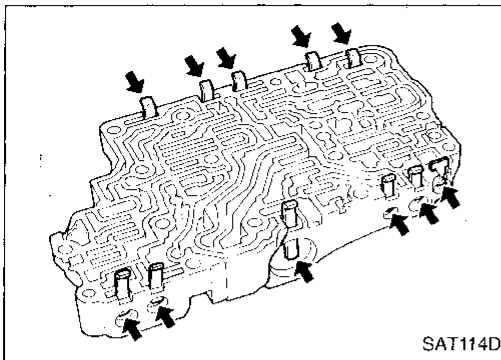
Numbers preceding valve springs correspond with those shown in SDS table on page AT-324.

CI
MA
EM
LG
EC
FE
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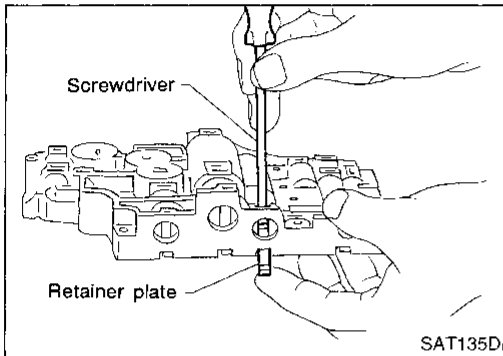
REPAIR FOR COMPONENT PARTS

Control Valve Upper Body — RL4F03A (Cont'd)

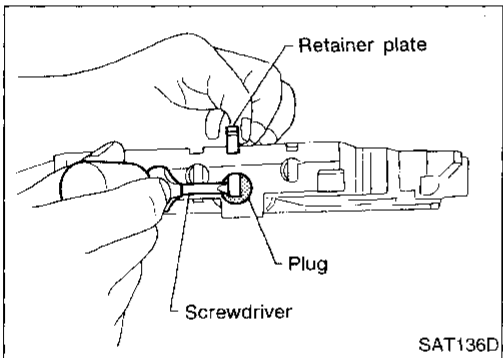
DISASSEMBLY



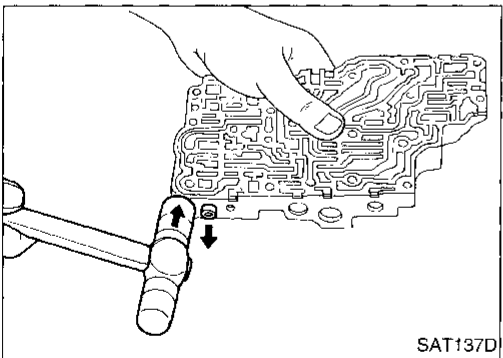
1. Remove valves at retainer plates.
 - Do not use a magnetic "hand".



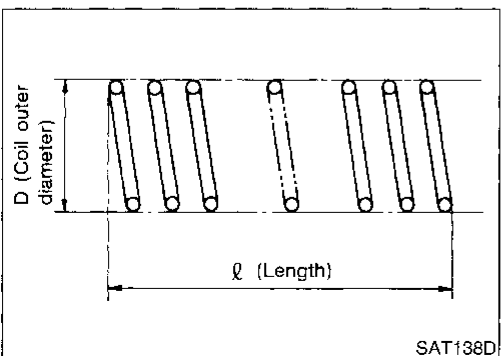
- a. Use a screwdriver to remove retainer plates.



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



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



INSPECTION

Valve spring

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

Inspection standard:

Refer to SDS, AT-324.

- Replace valve springs if deformed or fatigued.

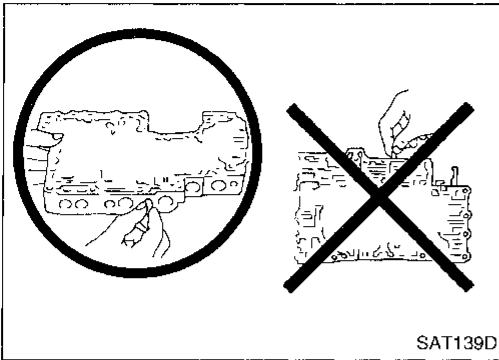
Control valves

- Check sliding surfaces of valves, sleeves and plugs.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body — RL4F03A (Cont'd)

ASSEMBLY



- Lay the control valve body down when installing valves. Do not stand the control valve body on edge.

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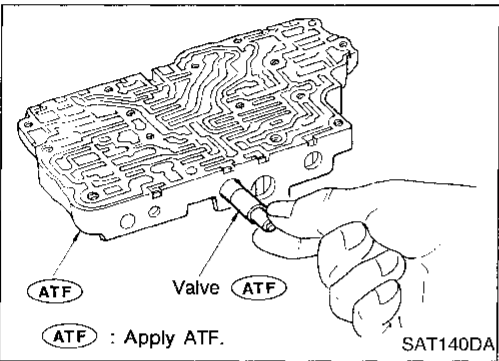
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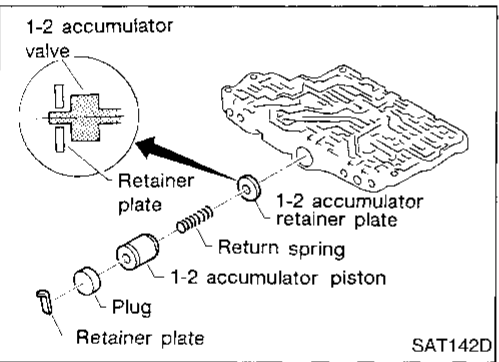
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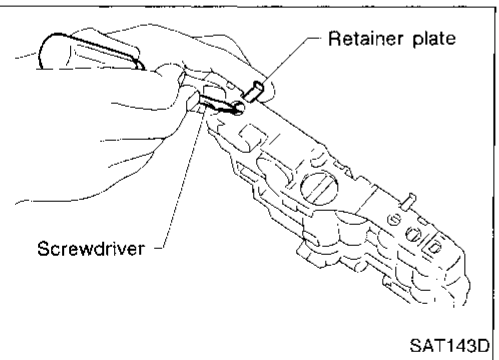
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- Be careful not to scratch or damage valve body.
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



1-2 accumulator valve

- Install 1-2 accumulator valve. Align 1-2 accumulator retainer plate from opposite side of control valve body.
- Install return spring and 1-2 accumulator piston.



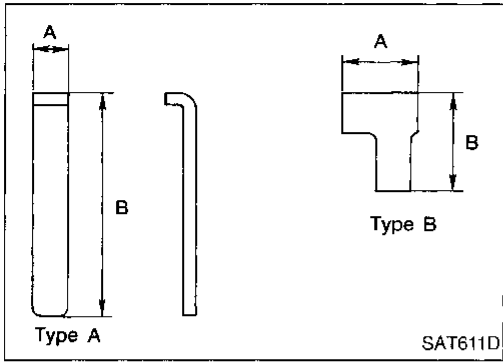
2. Install retainer plates
- While pushing plug or return spring, install retainer plate.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body — RL4F03A (Cont'd)

Retainer plate:

Unit: mm (in)

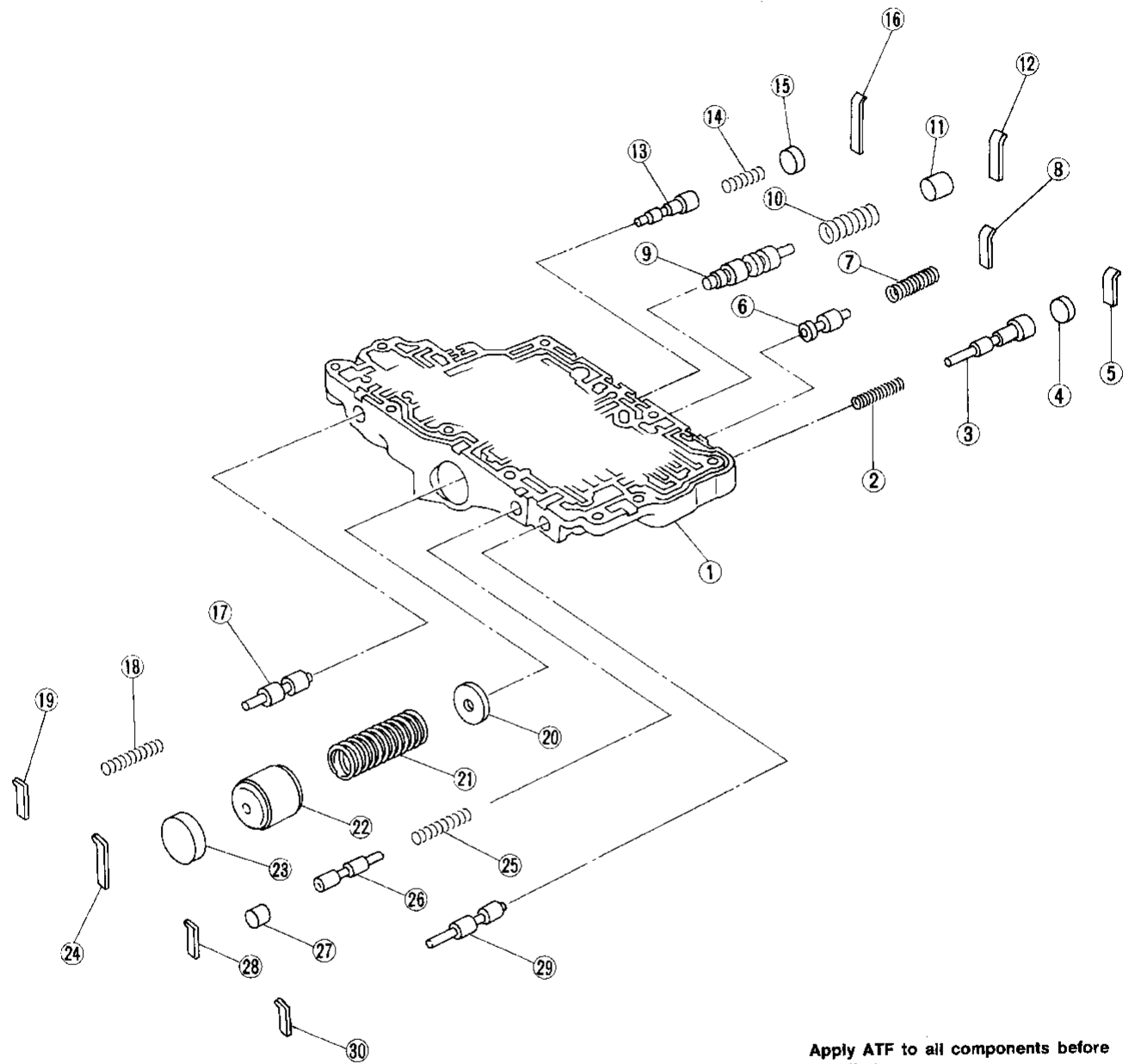


Name of control valves	Length A	Length B	Type	
Pressure modifier valve	6.0 (0.236)	27.0 (1.063)	A	
Torque converter clutch control valve				
Plug	6.0 (0.236)	21.5 (0.846)		
Kickdown modulator valve				
3-2 timing valve				
1st reducing valve				
Throttle modulator valve	6.0 (0.236)	38.5 (1.516)		
4th speed cut valve				
1-2 accumulator valve	13.0 (0.512)	17.0 (0.669)		B
Torque converter relief valve				

- Install proper retainer plates.

Control Valve Upper Body — RE4F03V

SEC. 317



Apply ATF to all components before installation.

Numbers preceding valve springs correspond with those shown in SDS table on page AT-324.

AAT524

- | | | |
|---|-------------------------|----------------------------------|
| ① Control valve upper body | ⑪ Plug | ⑳ 1-2 accumulator retainer plate |
| ② Return spring | ⑫ Retainer plate | ㉑ Return spring |
| ③ Overrun clutch reducing valve | ⑬ 1-2 accumulator valve | |
| ④ Plug | ⑭ Return spring | |
| ⑤ Retainer plate | ⑮ Plug | |
| ⑥ Torque converter relief valve | ⑯ Retainer plate | |
| ⑦ Return spring | ⑰ Pilot valve | |
| ⑧ Retainer plate | ⑱ Return spring | |
| ⑨ Torque converter clutch control valve | ㉒ Retainer plate | |
| ⑩ Return spring | ㉓ Plug | |
| | ㉔ Retainer plate | |
| | ㉕ Retainer plate | |
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| | ㊿ Retainer plate | |

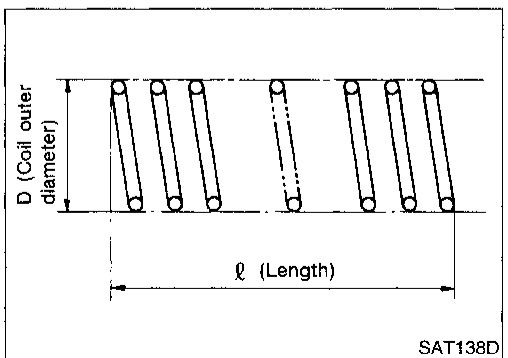
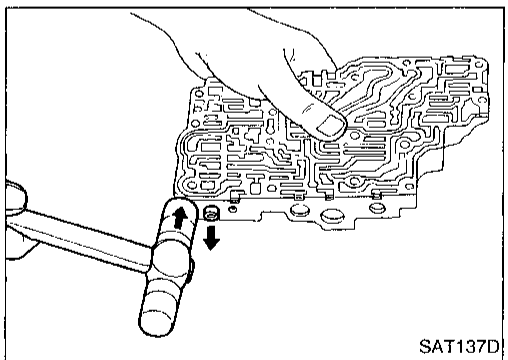
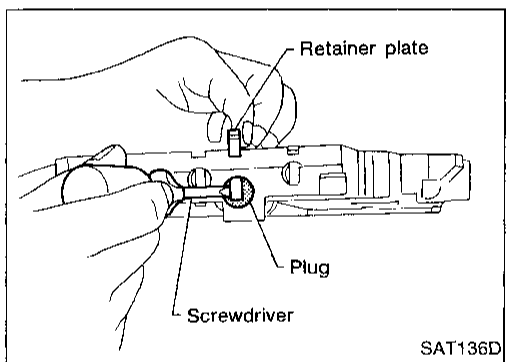
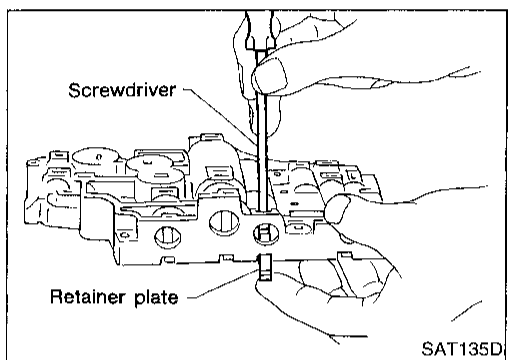
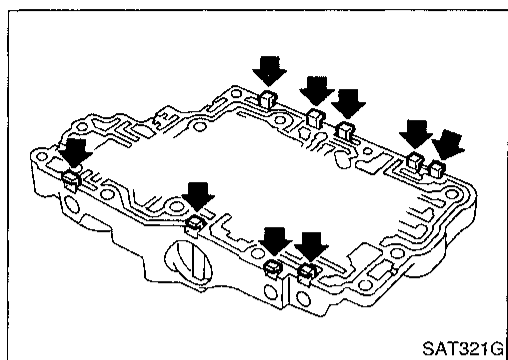
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REPAIR FOR COMPONENT PARTS

Control Valve Upper Body — RE4F03V (Cont'd)

DISASSEMBLY

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



- a. Use a screwdriver to remove retainer plates.

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

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

INSPECTION

Valve spring

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

Inspection standard:

Refer to SDS, AT-324.

- Replace valve springs if deformed or fatigued.

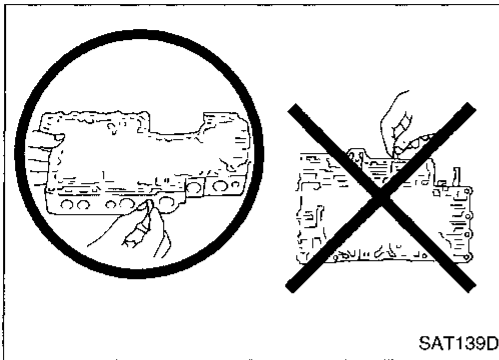
Control valves

- Check sliding surfaces of valves, sleeves and plugs.

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body — RE4F03V (Cont'd)

ASSEMBLY



SAT139D

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

GI

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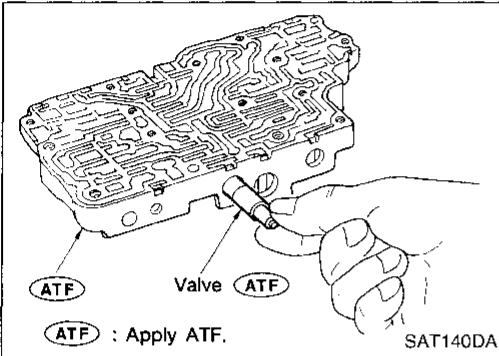
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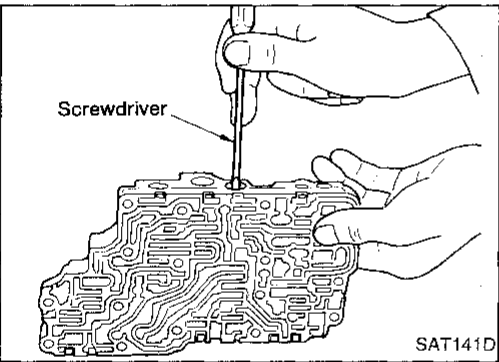
DX



SAT140DA

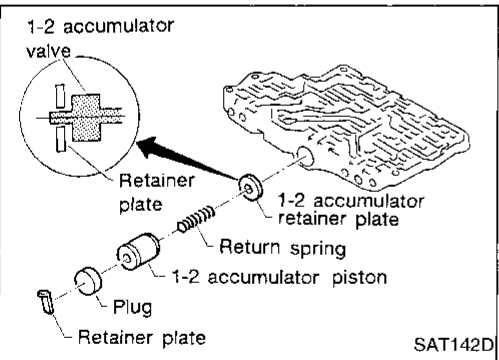
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

- Be careful not to scratch or damage valve body.



SAT141D

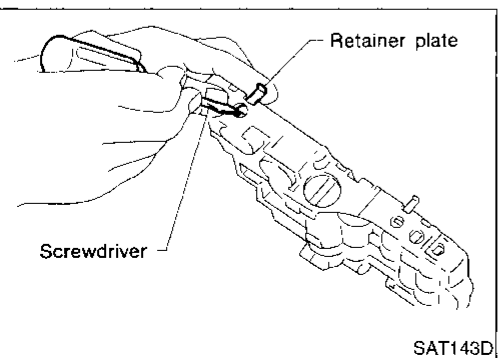
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



SAT142D

1-2 accumulator valve

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



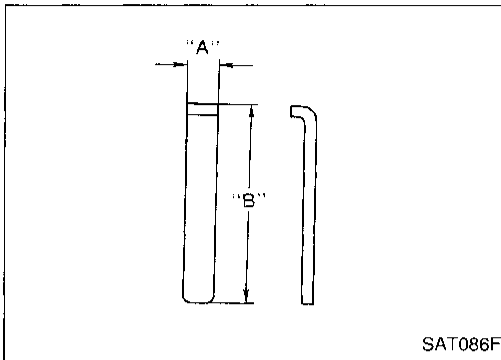
SAT143D

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

REPAIR FOR COMPONENT PARTS

Control Valve Upper Body — RE4F03V (Cont'd)

Retainer plate



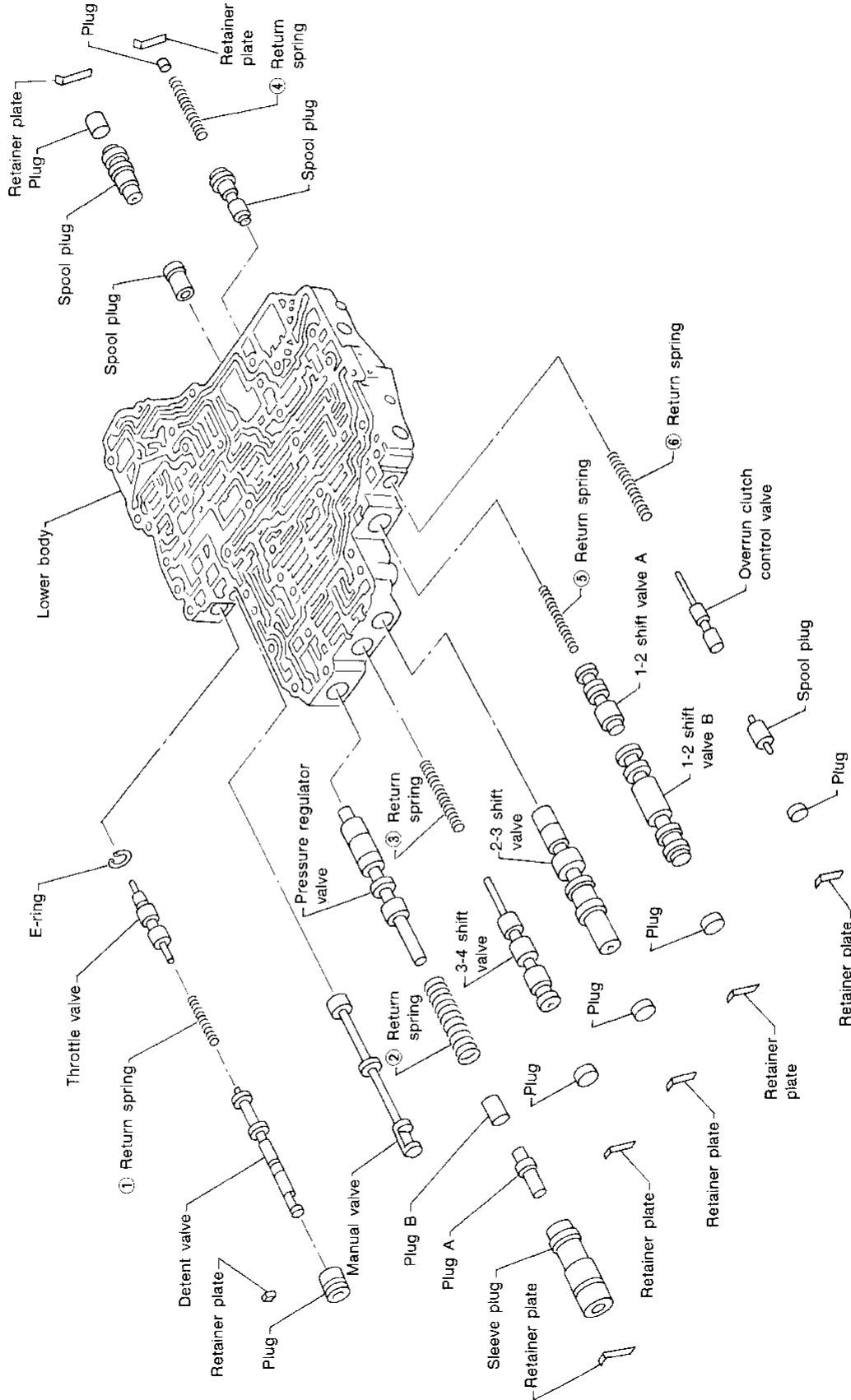
Unit: mm (in)

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

- Install proper retainer plates.

Control Valve Lower Body — RL4F03A

SEC. 317



Apply ATF to all components before installation.

Numbers preceding valve springs correspond with those shown in SDS table on page AT-324.

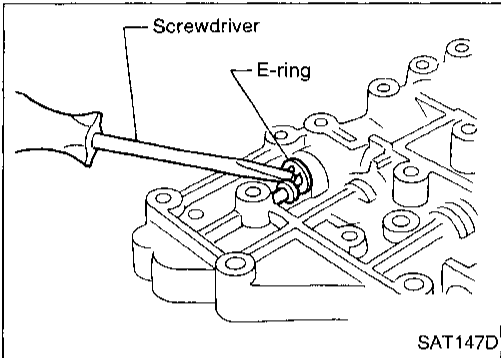
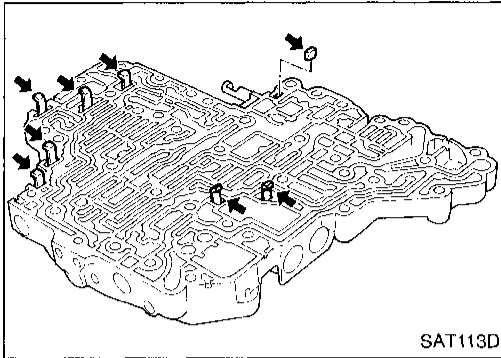
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REPAIR FOR COMPONENT PARTS

Control Valve Lower Body — RL4F03A (Cont'd)

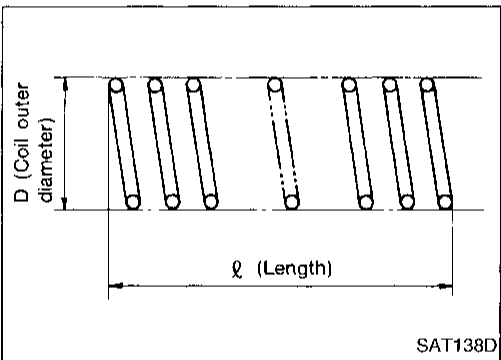
DISASSEMBLY

1. Remove valves at retainer plate.
For removal procedures, Refer to AT-236.



Throttle valve

- Remove throttle valve at E-ring.



INSPECTION

Valve springs

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

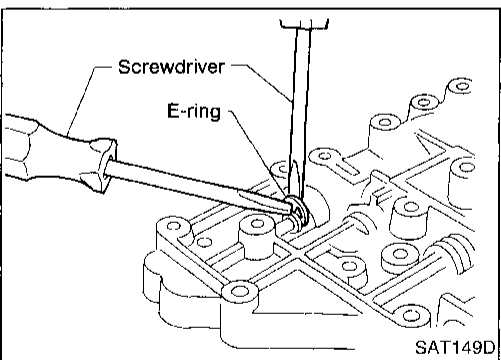
Inspection standard:

Refer to SDS, AT-324.

- Replace valve springs if deformed or fatigued.

Control valves

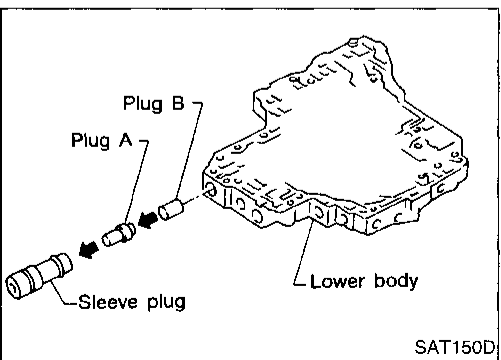
- Check sliding surfaces of control valves, sleeves and plugs for damage.



ASSEMBLY

Throttle valve

- Insert throttle valve to control valve body and then install E-ring to throttle valve.

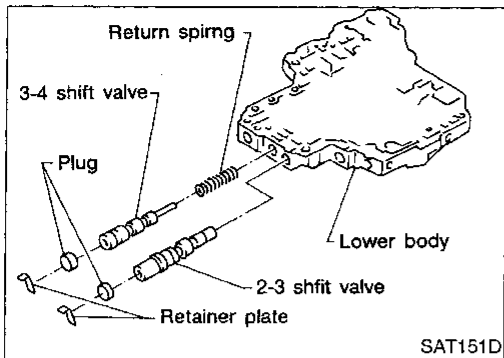


Pressure regulator valve

- Install pressure regulator valve after assembling sleeve plug, plug A and plug B.

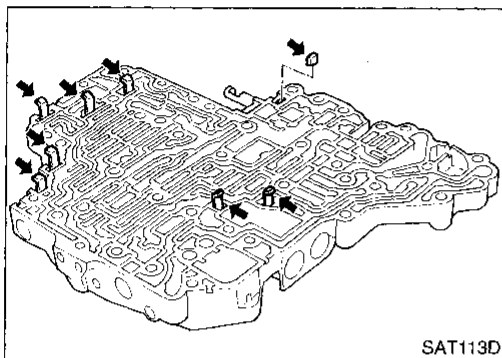
REPAIR FOR COMPONENT PARTS

Control Valve Lower Body — RL4F03A (Cont'd)

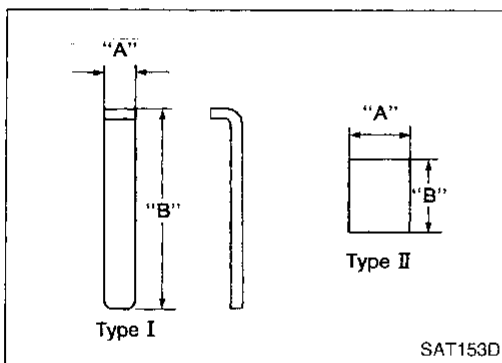


3-4 shift valve and 2-3 shift valve

- Install 3-4 shift valve and 2-3 shift valve after fixing plugs to retainer plates on the opposite side.



- Install control valves.
For installation procedures, refer to AT-237.



Retainer plate:

Unit: mm (in)

Name of control valve	Length A	Length B	Type
Throttle valve & detent valve	6.0 (0.236)	7.2 (0.283)	II
Pressure regulator valve	6.0 (0.236)	27.0 (1.063)	I
3-4 shift valve			
2-3 shift valve			
1-2 shift valve			
Overrun clutch control valve			

- Install proper retainer plates

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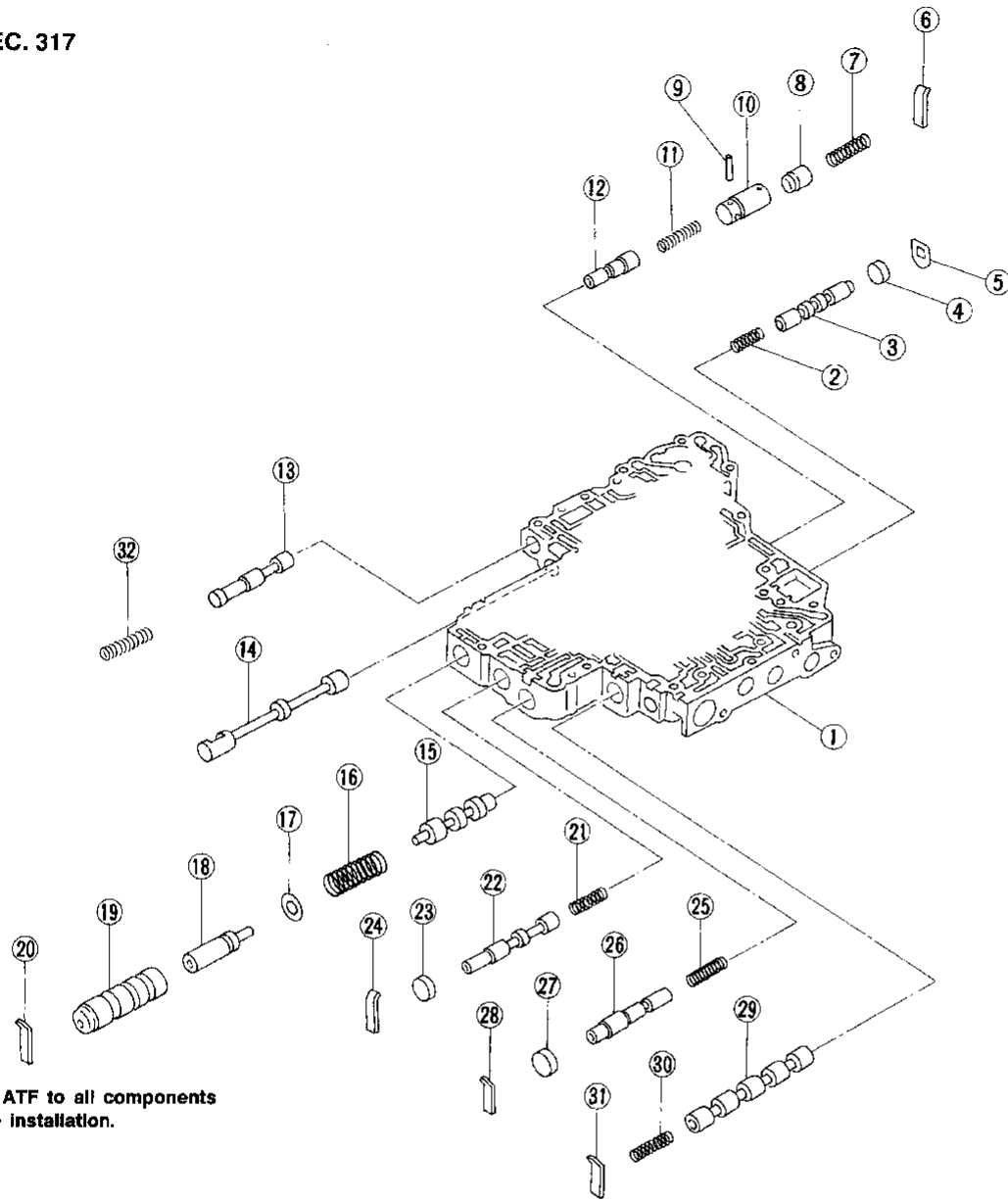
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Control Valve Lower Body — RE4F03V

SEC. 317



Apply ATF to all components before installation.

AAT946

Numbers preceding valve springs correspond with those shown in SDS table on page AT-324.

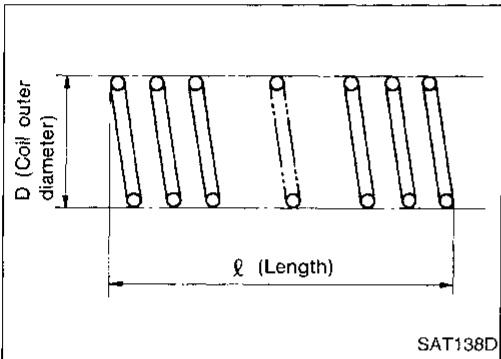
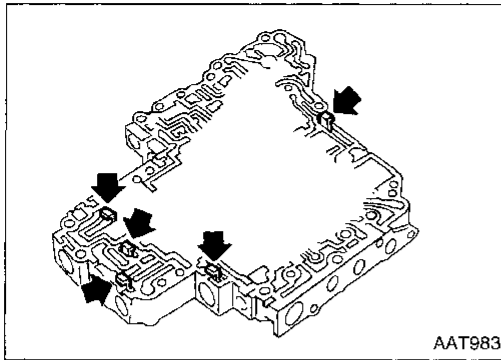
- | | | |
|----------------------------|--------------------------------|-----------------------------|
| ① Control valve lower body | ⑫ Pressure modifier valve | ⑳ Plug |
| ② Return spring | ⑬ Plug | ㉑ Retainer plate |
| ③ Shift valve B | ⑭ Manual valve | ㉒ Return spring |
| ④ Plug | ⑮ Pressure regulator valve | ㉓ Accumulator control valve |
| ⑤ Retainer plate | ⑯ Return spring | ㉔ Plug |
| ⑥ Retainer plate | ⑰ Spring seat | ㉕ Retainer plate |
| ⑦ Return spring | ⑱ Plug | ㉖ Shift valve A |
| ⑧ Piston | ㉒ Sleeve | ㉗ Return spring |
| ⑨ Parallel pin | ㉓ Retainer plate | ㉘ Retainer plate |
| ⑩ Sleeve | ㉔ Return spring | ㉙ Return spring |
| ⑪ Return spring | ㉕ Overrun clutch control valve | |

REPAIR FOR COMPONENT PARTS

Control Valve Lower Body — RE4F03V (Cont'd)

DISASSEMBLY

Remove valves at retainer plate.
For removal procedures, Refer to AT-240.



INSPECTION

Valve springs

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

Inspection standard:

Refer to SDS, AT-324.

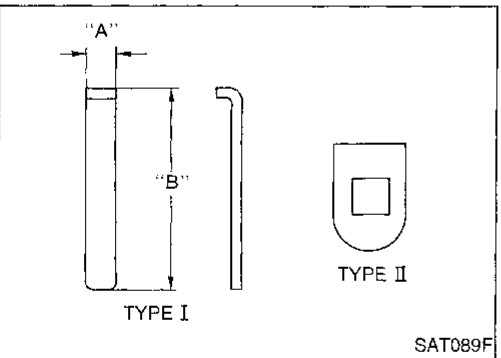
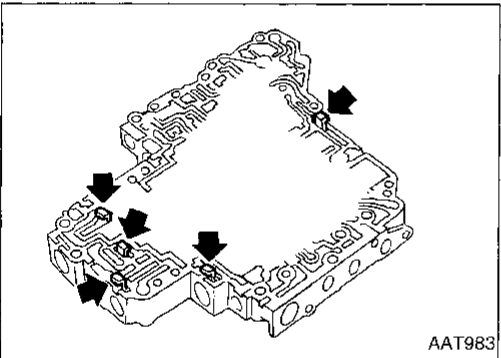
- Replace valve springs if deformed or fatigued.

Control valves

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

ASSEMBLY

- Install control valves.
For installation procedures, refer to AT-241.



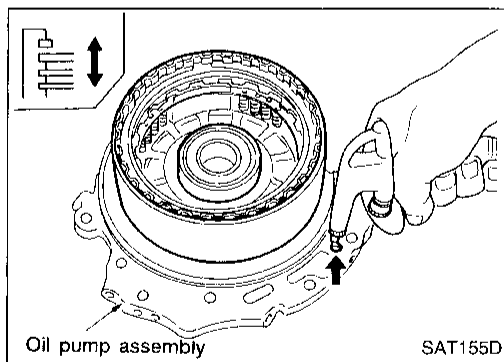
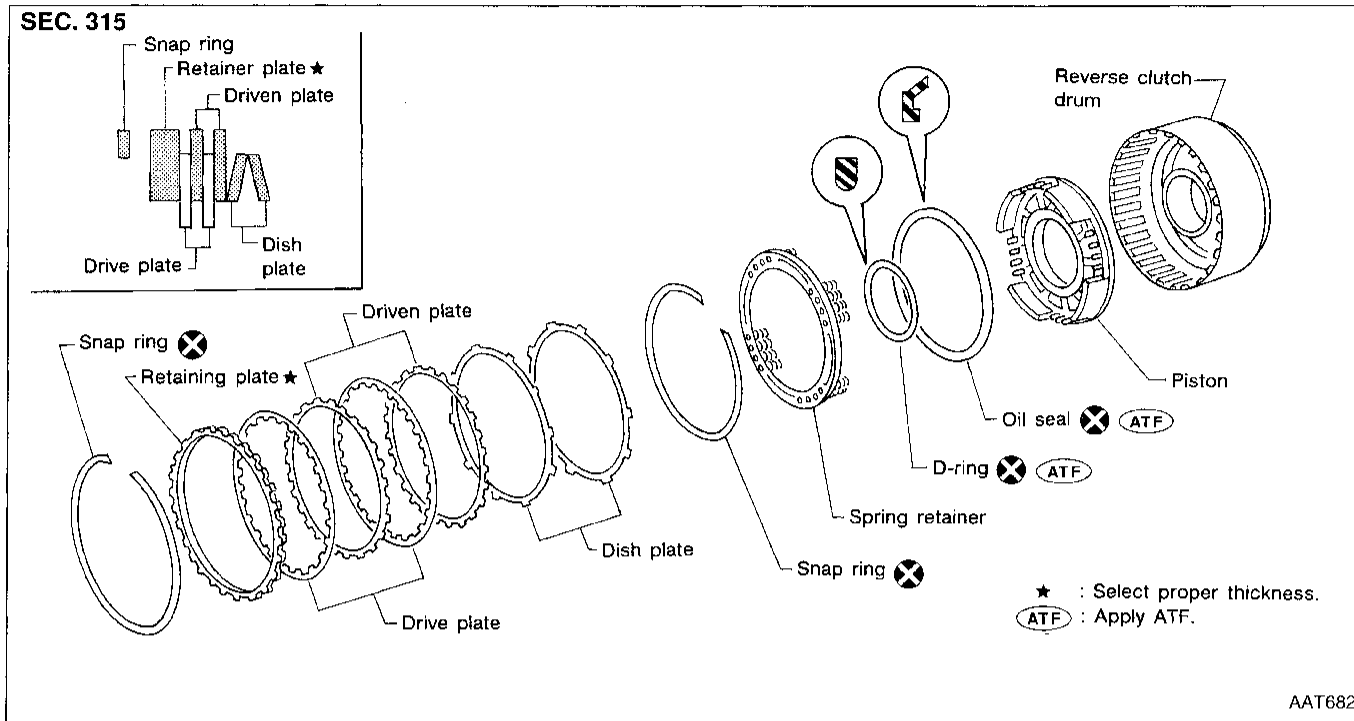
Retainer plate

Unit: mm (in)

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

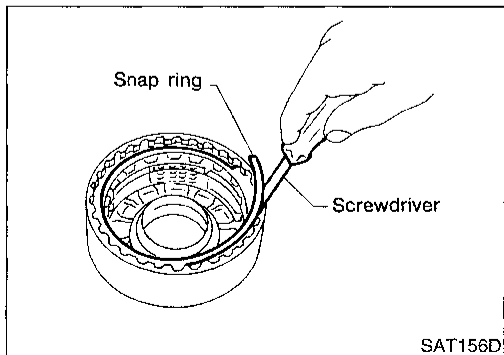
- Install proper retainer plates.

Reverse Clutch



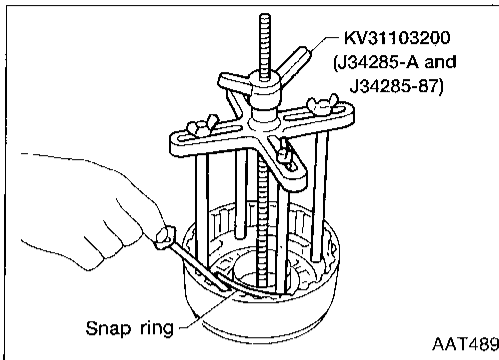
DISASSEMBLY

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



REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.

- Set Tool directly above springs.
- Do not expand snap ring excessively.

5. Remove spring retainer and return springs.

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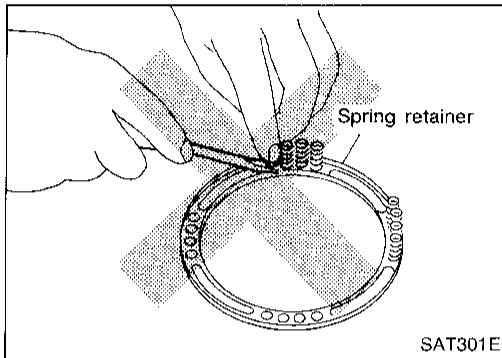
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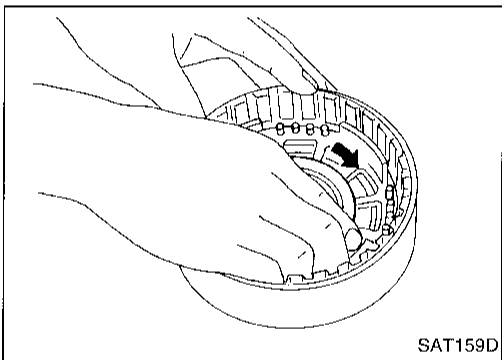
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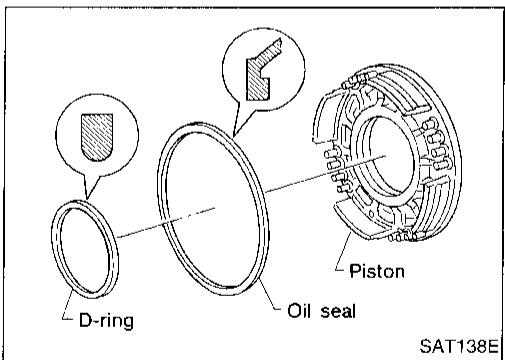
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- Do not remove return springs from spring retainer.



6. Remove piston from reverse clutch drum by turning it.



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

INSPECTION

Reverse clutch snap ring, spring retainer and return springs

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

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

Reverse clutch drive plates

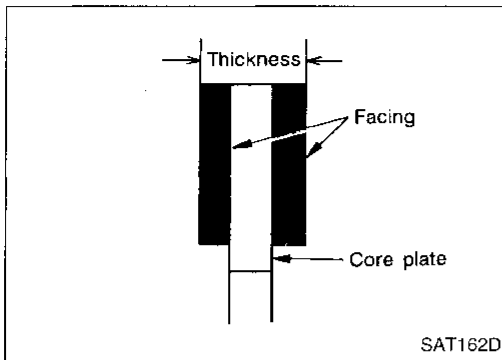
- Check facing for burns, cracks or damage.
- Measure thickness of facing.

Thickness of drive plate:

Standard value: 2.0 mm (0.079 in)

Wear limit: 1.8 mm (0.071 in)

- If not within wear limit, replace.

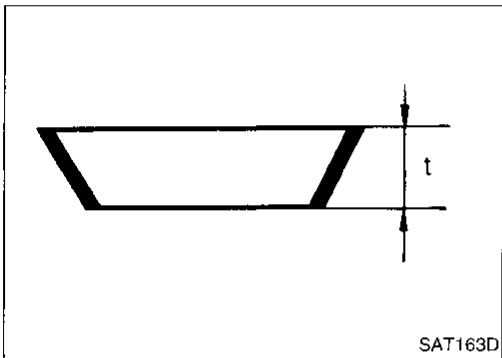


Reverse clutch dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.

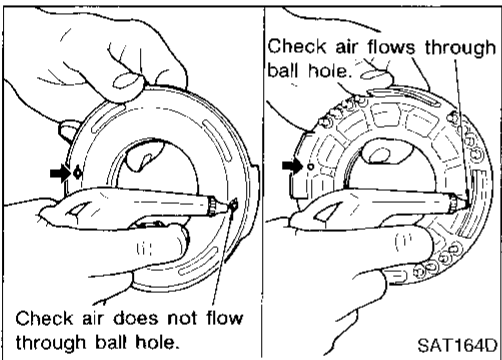
Thickness of dish plate "t": 2.8 mm (0.110 in)

- If deformed or fatigued, replace.



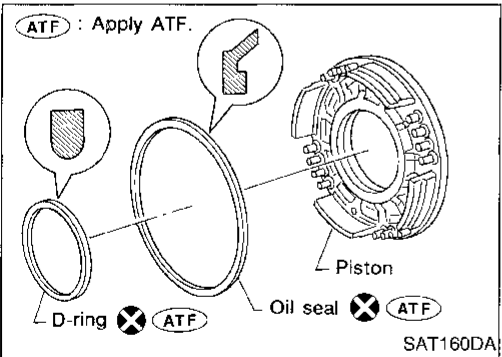
Reverse clutch piston

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

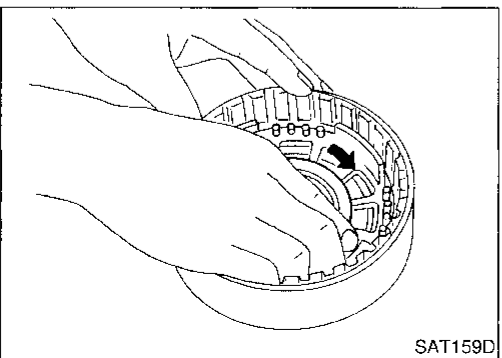


ASSEMBLY

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

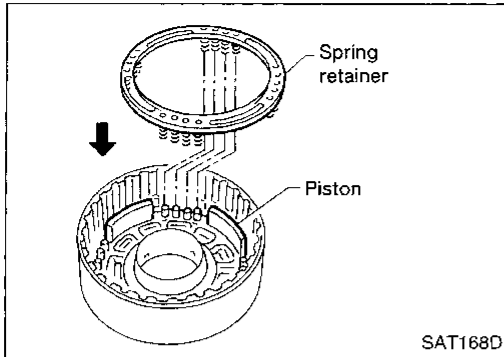


2. Install piston assembly by turning it slowly.
 - **Apply ATF to inner surface of drum.**



REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)



3. Install return springs and spring retainer on piston.

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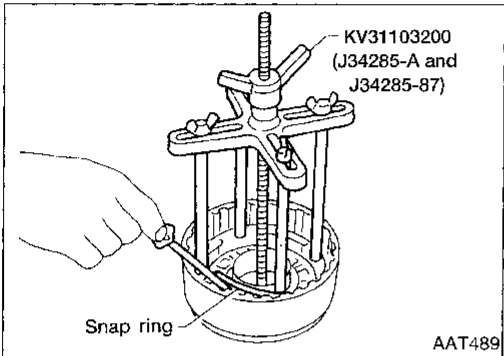
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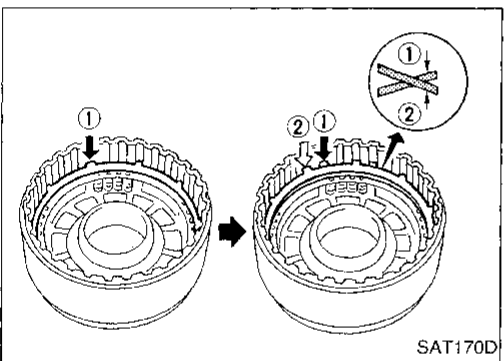
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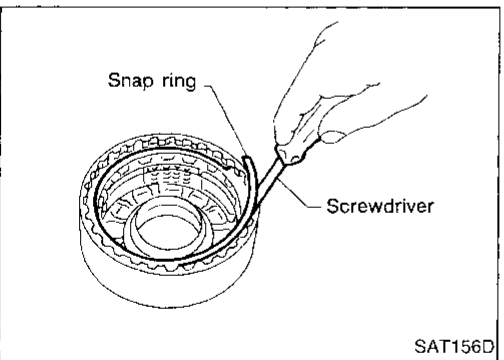
4. Set Tool on spring retainer and install snap ring while compressing return springs.

- Set Tool directly above return springs.

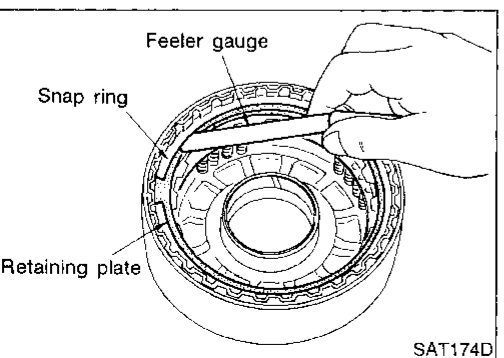


5. Install drive plates, driven plates, retaining plate and dish plates.

- Do not align the projections of any two dish plates.
- Take care with the order and direction of plates.



6. Install snap ring.



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

Specified clearance:

Standard: 0.5 - 0.8 mm (0.020 - 0.031 in)

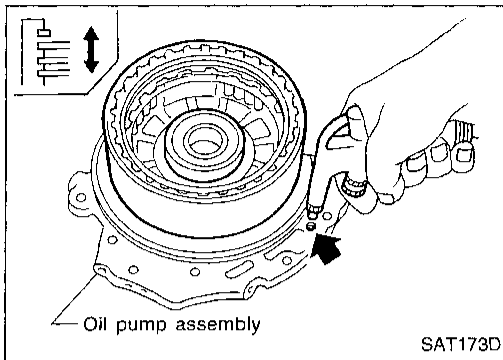
Allowable limit: 1.2 mm (0.047 in)

Retaining plate: Refer to SDS, AT-325.

REPAIR FOR COMPONENT PARTS

Reverse Clutch (Cont'd)

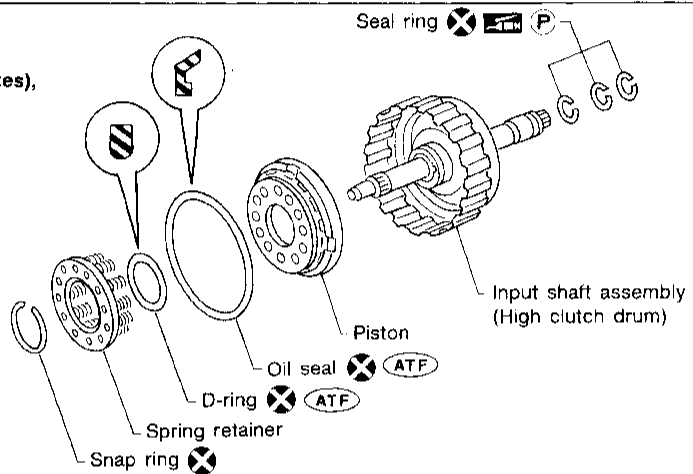
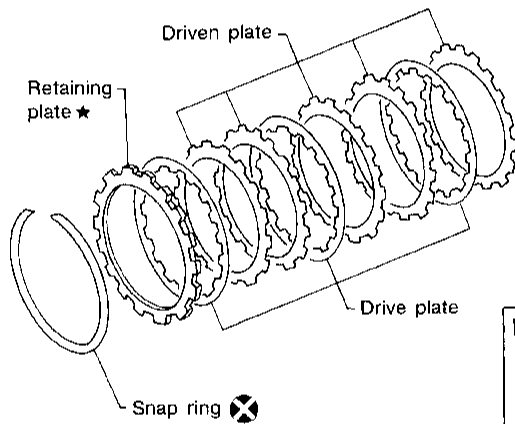
8. Check operation of reverse clutch.
Refer to AT-248.



High Clutch

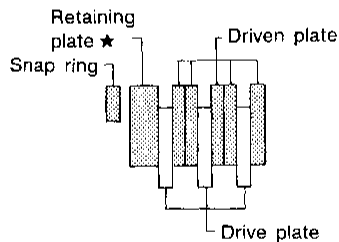
SEC. 315

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

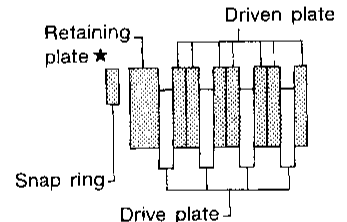


- (P) : Apply petroleum jelly.
- (ATF) : Apply ATF.
- ★ : Select proper thickness.

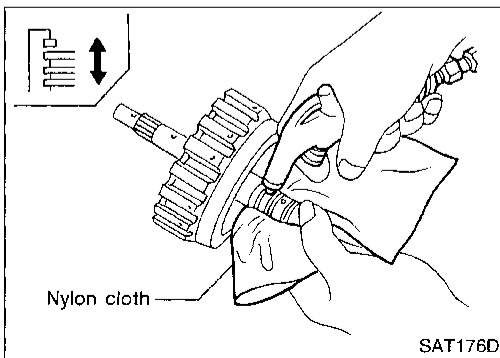
RL4F03A



RE4F03V



AAT526



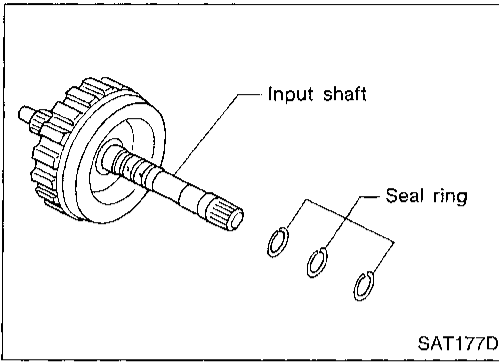
DISASSEMBLY

1. Check operation of high clutch.
 - a. Apply compressed air to oil hole of input shaft.
 - **Stop up a hole on opposite side of input shaft.**
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring:
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.

REPAIR FOR COMPONENT PARTS

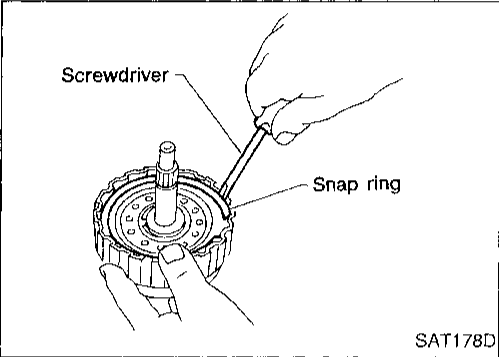
High Clutch (Cont'd)

2. Remove seal rings from input shaft.



3. Remove snap ring.

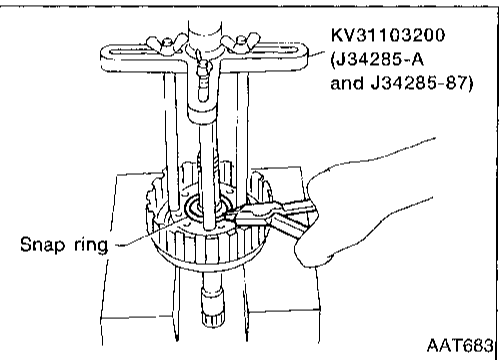
4. Remove drive plates, driven plates and retaining plate.



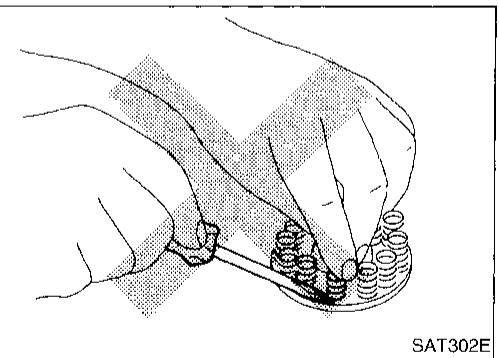
5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.

- **Set Tool directly above springs.**
- **Do not expand snap ring excessively.**

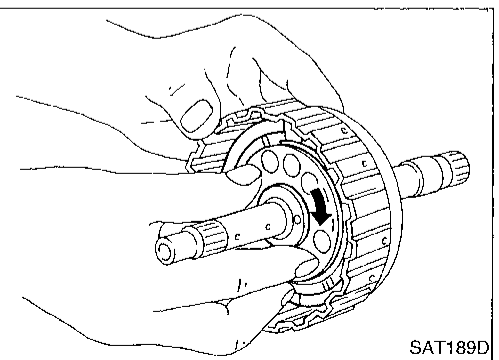
6. Remove spring retainer and return springs.



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



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



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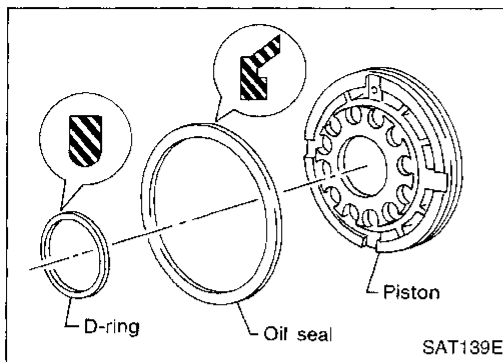
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REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)

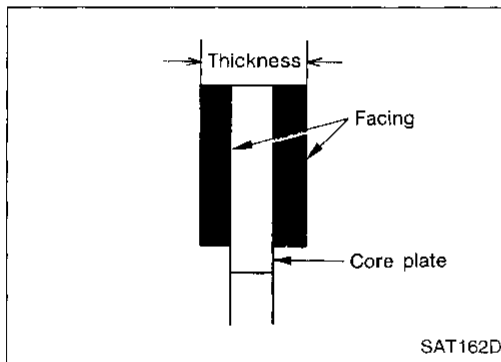
- Remove D-ring and oil seal from piston.



INSPECTION

Reverse clutch snap ring, spring retainer and return springs

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



High clutch drive plates

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

Thickness of drive plate:

RL4F03A

Standard value: 2.0 mm (0.079 in)

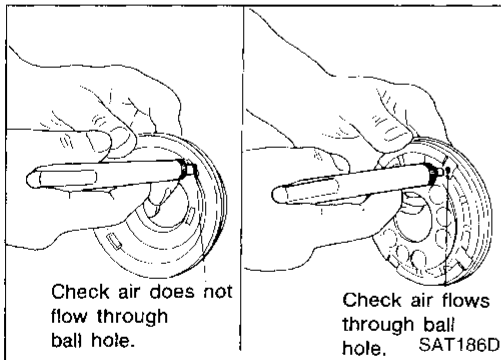
Wear limit: 1.8 mm (0.071 in)

RE4F03V

Standard value: 1.6 mm (0.063 in)

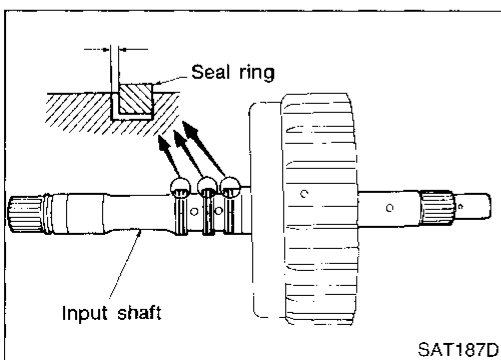
Wear limit: 1.4 mm (0.055 in)

- If not within wear limit, replace.



High clutch piston

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



Seal ring clearance

- Install new seal rings onto input shaft.
- Measure clearance between seal ring and ring groove.

Standard clearance:

0.08 - 0.23 mm (0.0031 - 0.0091 in)

Allowable limit:

0.23 mm (0.0091 in)

- If not within wear limit, replace input shaft assembly.

REPAIR FOR COMPONENT PARTS

High Clutch (Cont'd)

ASSEMBLY

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

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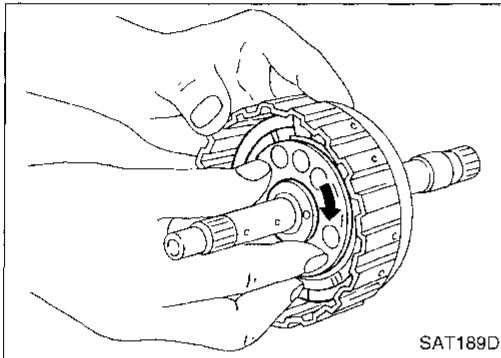
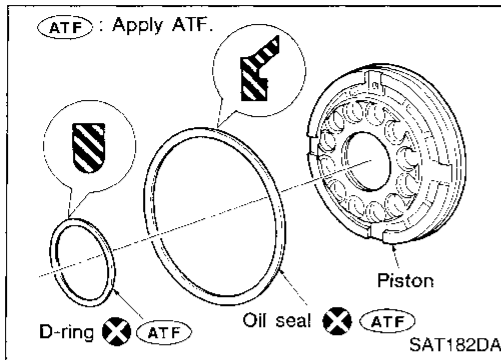
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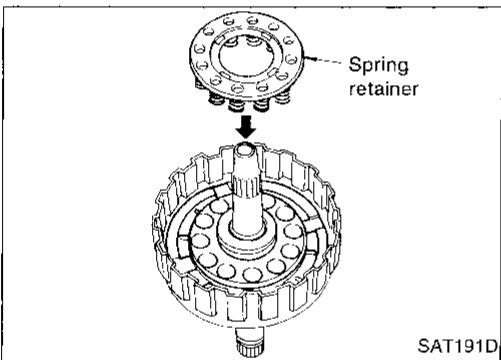
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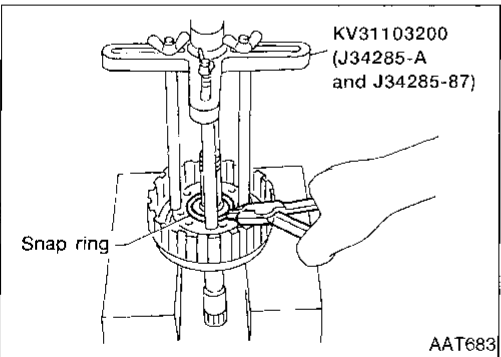
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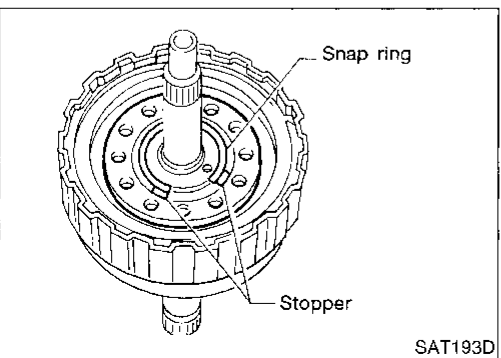
2. Install piston assembly by turning it slowly.
 - Apply ATF to inner surface of drum.



3. Install return springs and spring retainer on piston.



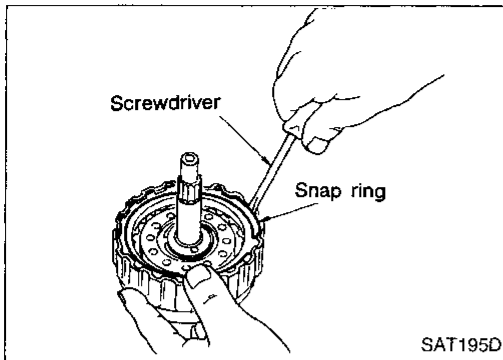
4. Set Tool on spring retainer and install snap ring while compressing return springs.
 - Set Tool directly above return springs.



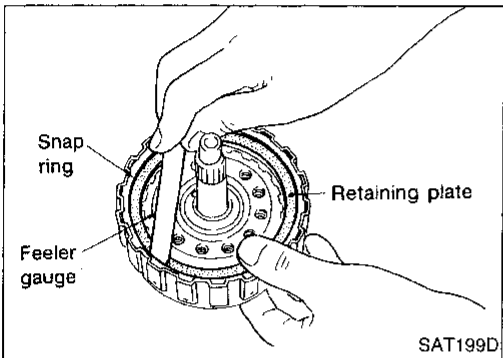
- Do not align snap ring gap with spring retainer stopper.

REPAIR FOR COMPONENT PARTS

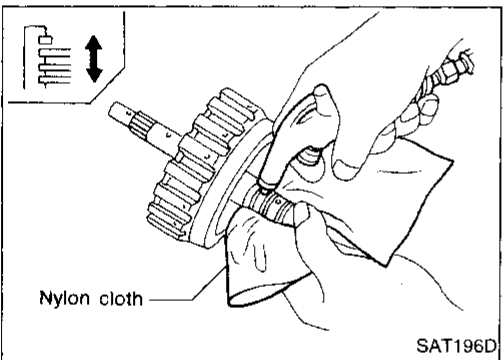
High Clutch (Cont'd)



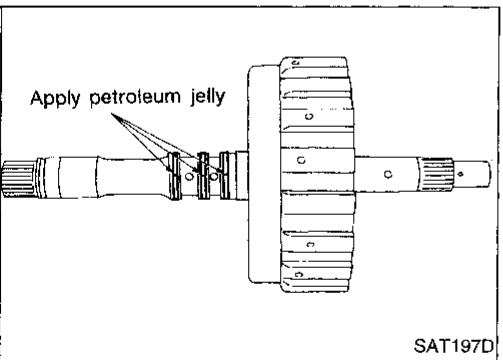
5. Install drive plates, driven plates and retaining plate.
Take care with the order and direction of plates.
6. Install snap ring.



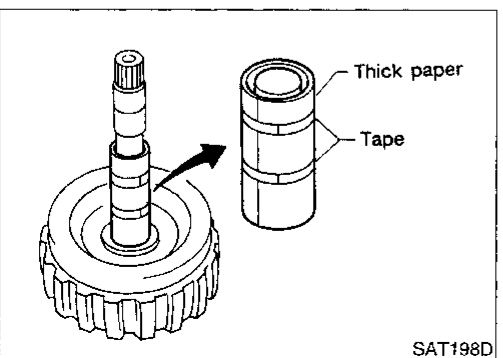
7. Measure clearance between retaining plate and snap ring.
If not within allowable limit, select proper retaining plate.
Specified clearance:
Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)
Allowable limit:
RL4F03A 2.4 mm (0.094 in)
RE4F03V 2.6 mm (0.102 in)
Retaining plate:
Refer to SDS, AT-325.



8. Check operation of high clutch.
Refer to "DISASSEMBLY", "High Clutch", AT-252.



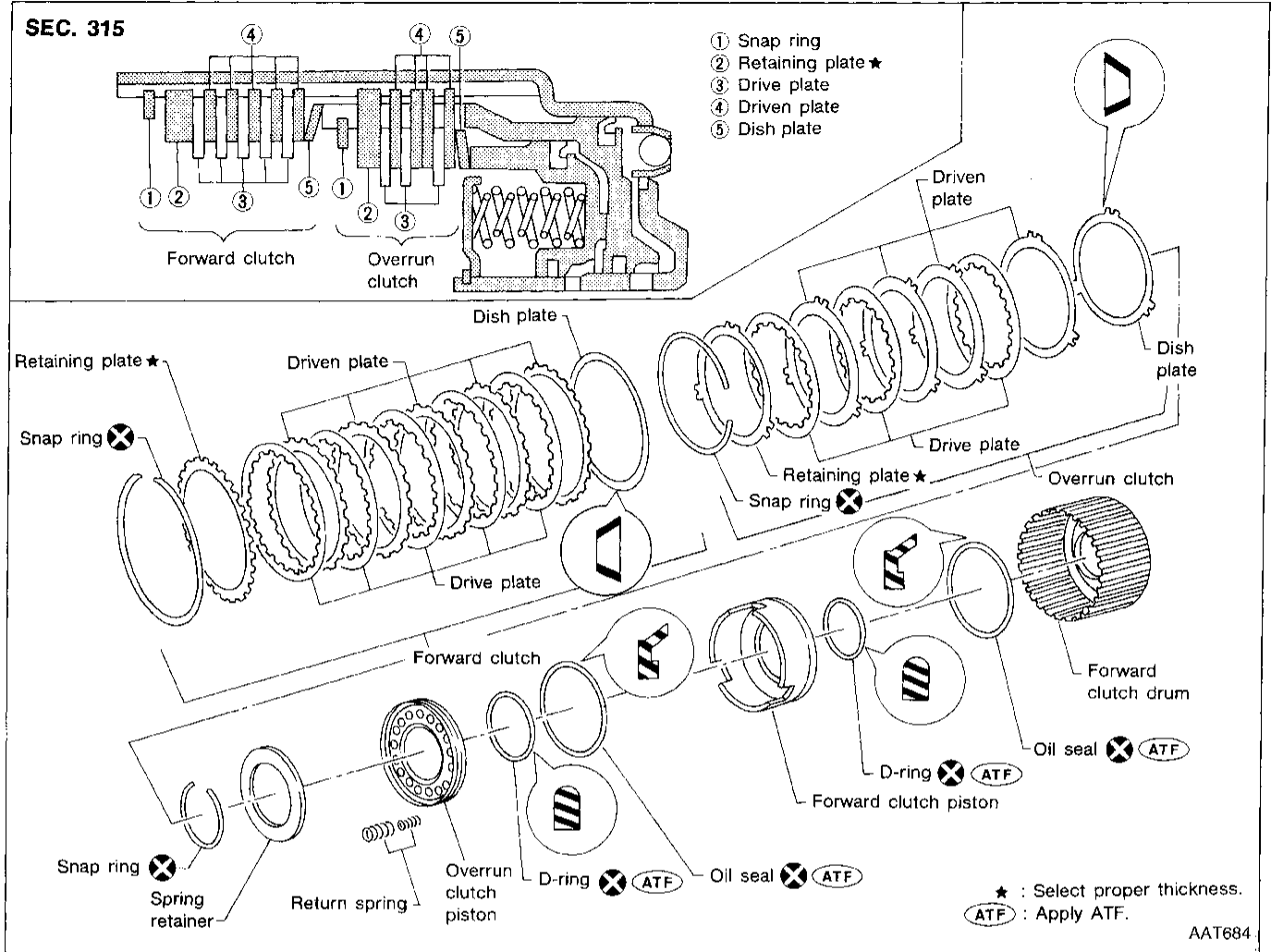
9. Install seal rings to input shaft.
 - **Apply petroleum jelly to seal rings.**



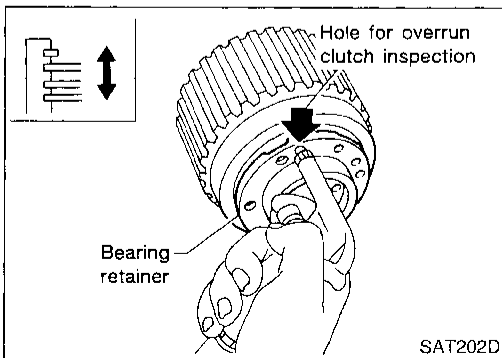
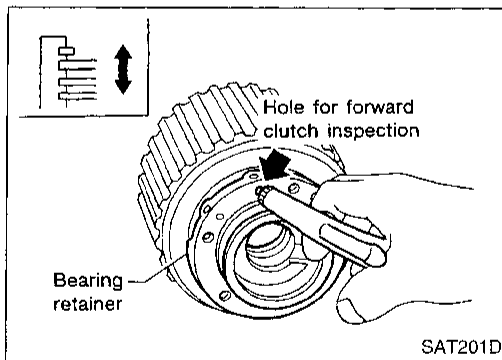
- **Roll paper around seal rings to prevent seal rings from spreading.**

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch



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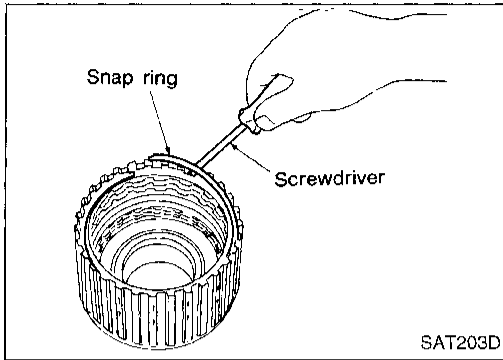


DISASSEMBLY

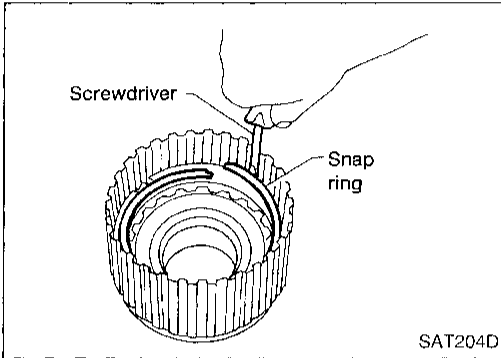
1. Check operation of forward clutch and overrun clutch.
 - a. Install bearing retainer on forward clutch drum.
 - b. Apply compressed air to oil hole of forward clutch drum.
 - c. Check to see that retaining plate moves to snap ring.
- d. If retaining plate does not contact snap ring:
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.

REPAIR FOR COMPONENT PARTS

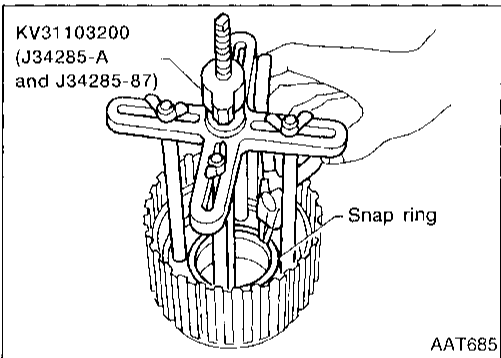
Forward Clutch and Overrun Clutch (Cont'd)



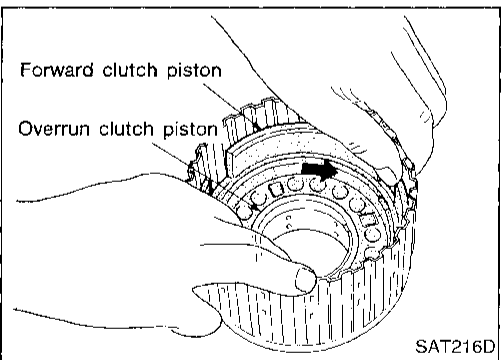
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.



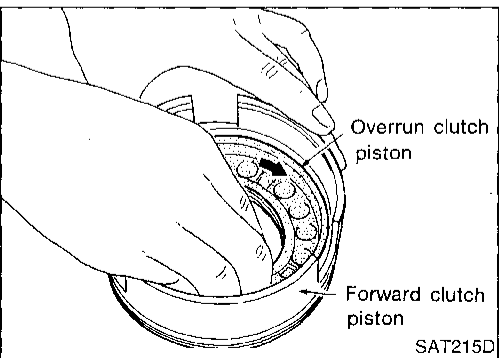
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.



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



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

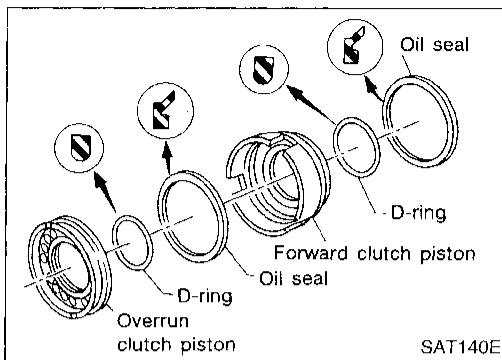


9. Remove overrun clutch piston from forward clutch piston by turning it.

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)

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



INSPECTION

Snap rings and spring retainer

- Check for deformation, fatigue or damage.

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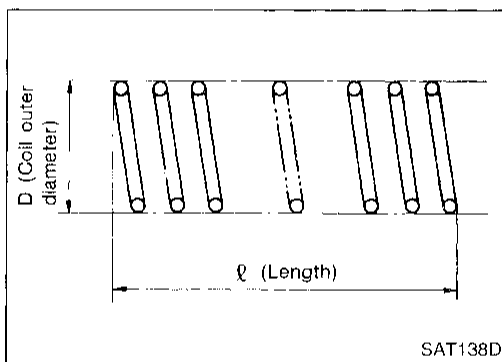
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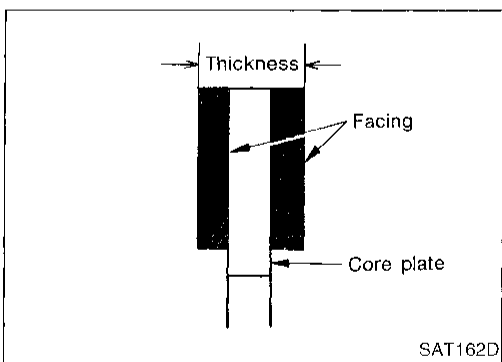
Forward clutch and overrun clutch return springs

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

Inspection standard:

Refer to SDS, AT-326.

- Replace if deformed or fatigued.



Forward clutch and overrun clutch drive plates

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

Thickness of drive plate:

Forward clutch

Standard value: 1.8 mm (0.071 in)

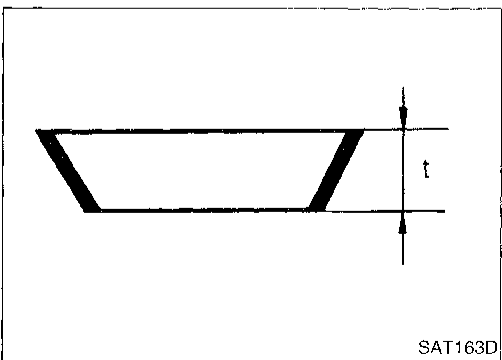
Wear limit: 1.6 mm (0.063 in)

Overrun clutch

Standard value: 1.6 mm (0.063 in)

Wear limit: 1.4 mm (0.055 in)

- If not within wear limit, replace.



Forward clutch and overrun clutch dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate "t":

Forward clutch: 2.5 mm (0.098 in)

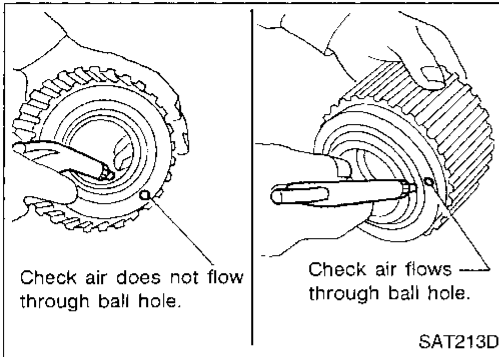
Overrun clutch: 2.15 mm (0.0846 in)

- If deformed or fatigued, replace.

REPAIR FOR COMPONENT PARTS

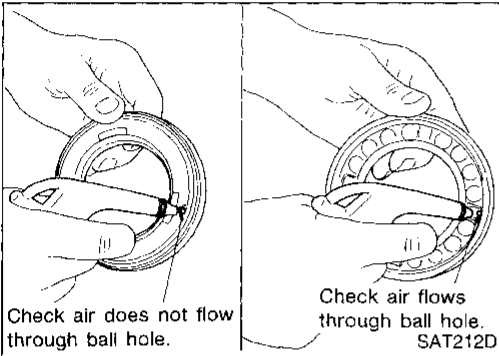
Forward Clutch and Overrun Clutch (Cont'd)

Forward clutch drum



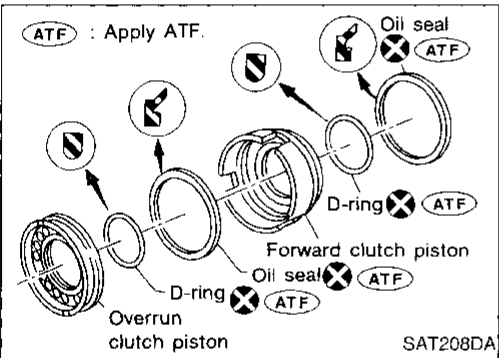
- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole from outside of forward clutch drum. Make sure air leaks past ball.
- Apply compressed air to oil hole from inside of forward clutch drum. Make sure there is no air leakage.

Overrun clutch piston

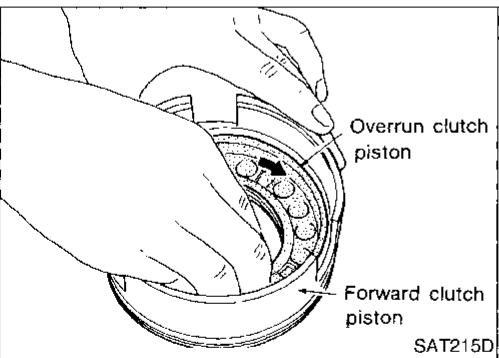


- Make sure check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring. Make sure there is no air leakage.
- Apply compressed air to oil hole on return spring side. Make sure air leaks past ball.

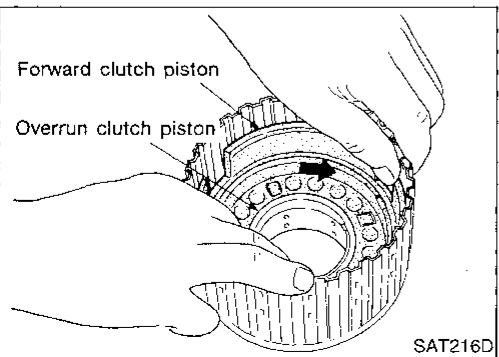
ASSEMBLY



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



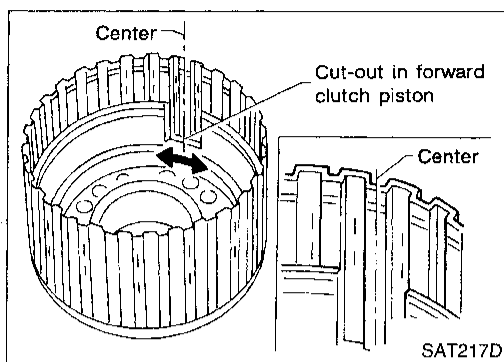
2. Install overrun clutch piston assembly on forward clutch piston while turning it slowly.
 - Apply ATF to inner surface of forward clutch piston.



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

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



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

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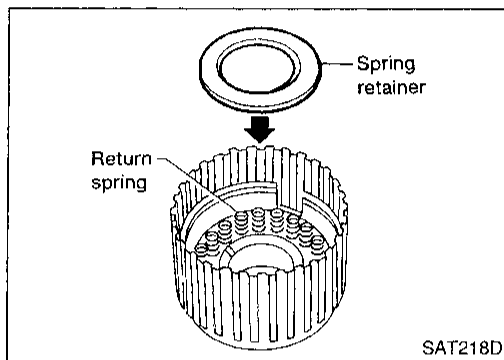
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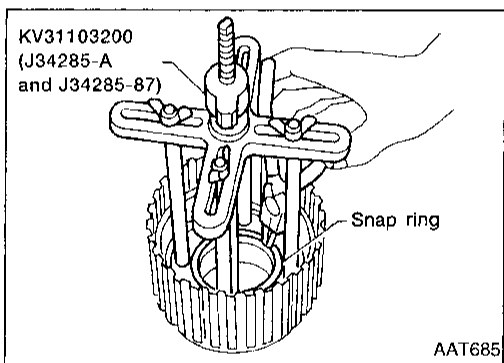
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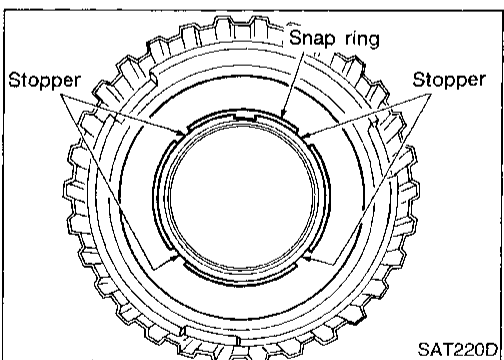


- Install return spring on piston.
- Install spring retainer on return springs.

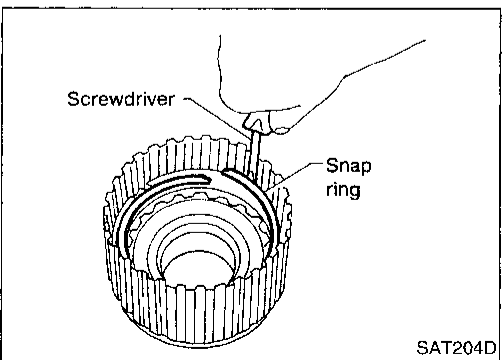


- Set Tool on spring retainer and install snap ring while compressing return springs.

- Set Tool directly above return springs.



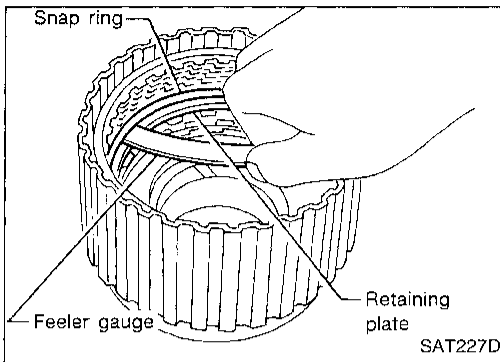
- Do not align snap ring gap with spring retainer stopper.



- Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.
- Install snap ring for overrun clutch.

REPAIR FOR COMPONENT PARTS

Forward Clutch and Overrun Clutch (Cont'd)



10. Measure clearance between overrun clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

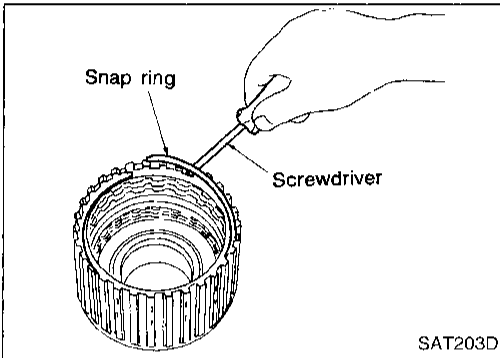
Specified clearance:

Standard: 1.0 - 1.4 mm (0.039 - 0.055 in)

Allowable limit: 2.0 mm (0.079 in)

Overrun clutch retaining plate:

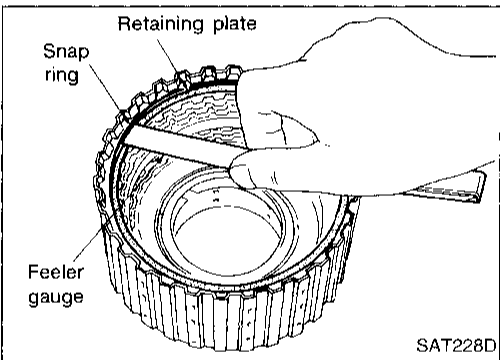
Refer to SDS, AT-325.



11. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.

Take care with the order and direction of plates.

12. Install snap ring for forward clutch.



13. Measure clearance between forward clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

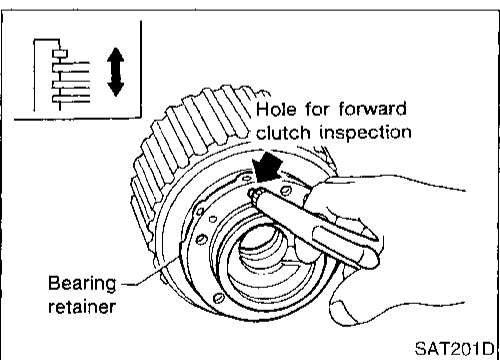
Specified clearance:

Standard: 0.45 - 0.85 mm (0.0177 - 0.0335 in)

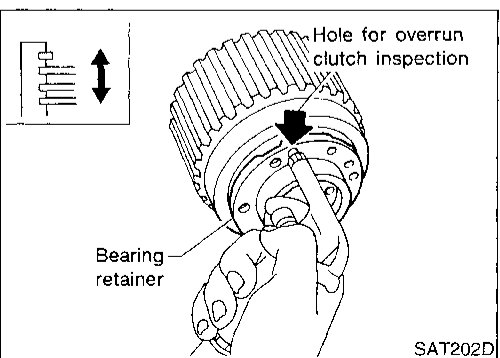
Allowable limit: 1.85 mm (0.0728 in)

Forward clutch retaining plate:

Refer to SDS, AT-325.

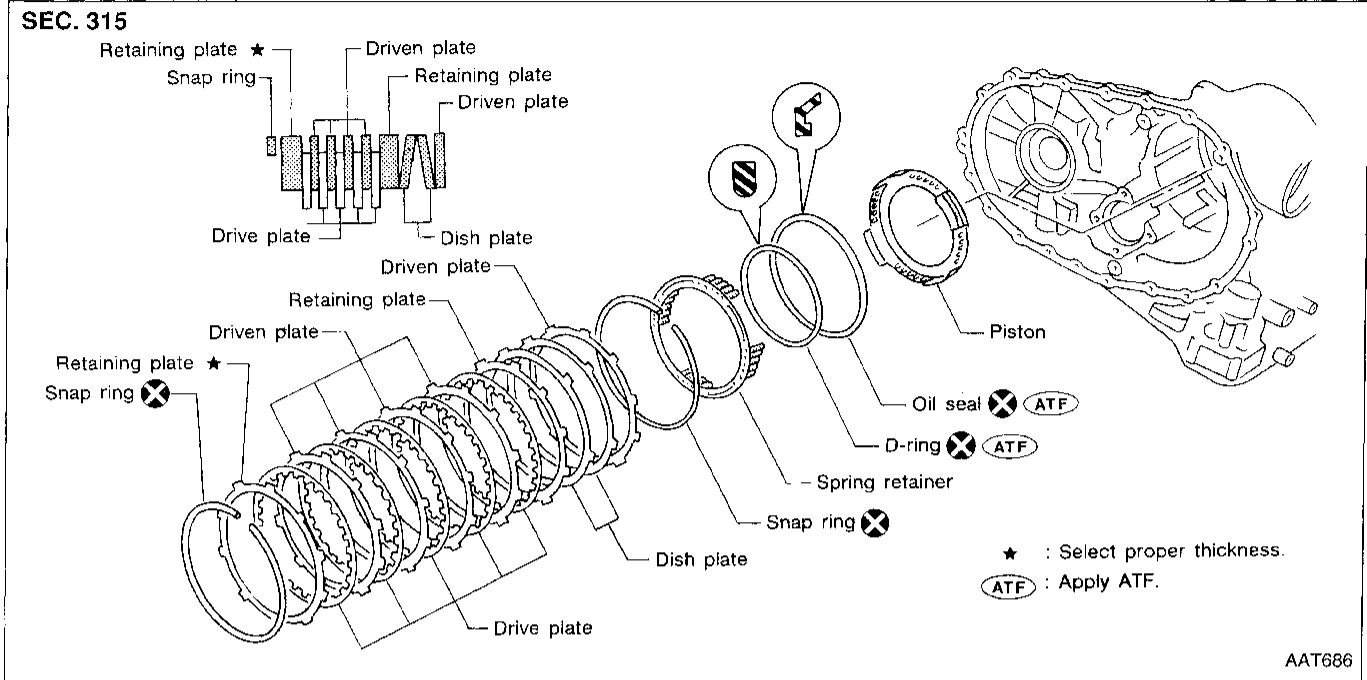


14. Check operation of forward clutch.
Refer to AT-257.

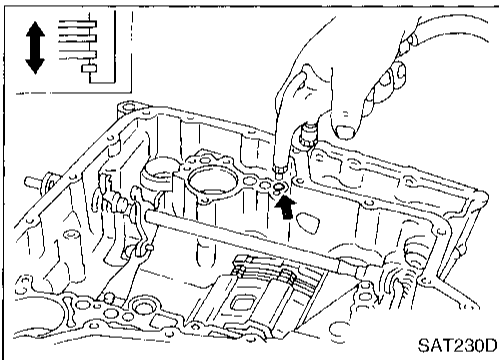


15. Check operation of overrun clutch.
Refer to "DISASSEMBLY" in "Forward Clutch and Overrun Clutch", AT-257.

Low & Reverse Brake

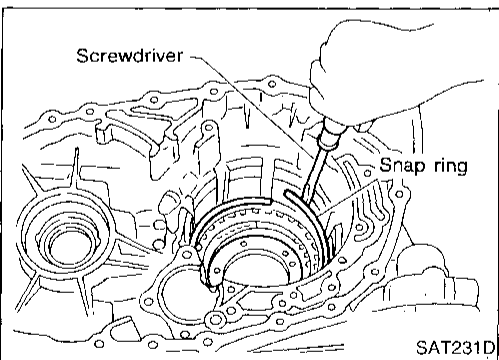


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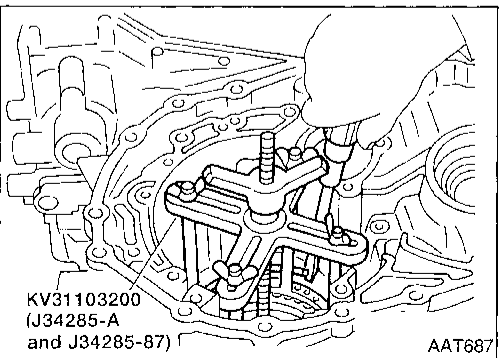


DISASSEMBLY

1. Check operation of low & reverse brake.
 - a. Apply compressed air to oil hole of transmission case.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not contact snap ring:
 - D-ring might be damaged.
 - Oil seal might be damaged.
 - Fluid might be leaking past piston check ball.



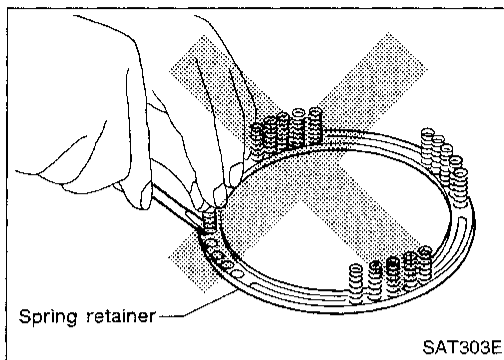
2. Stand transmission case.
3. Remove snap ring.
4. Remove drive plates, driven plates, retaining plate from transmission case.



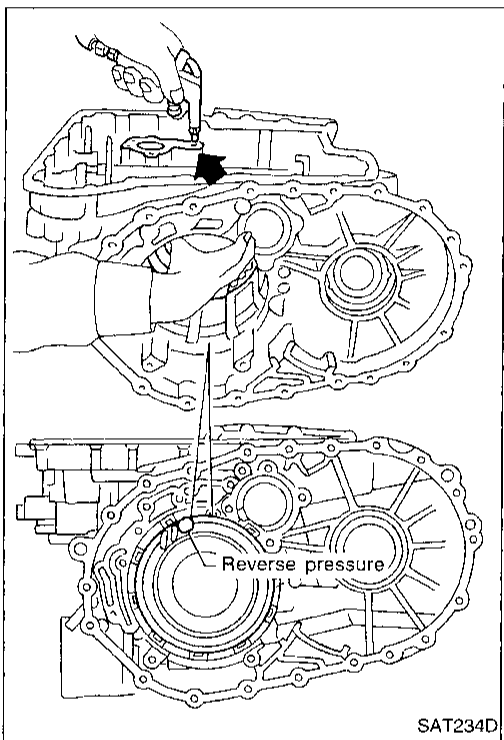
5. Set Tool on spring retainer and remove snap ring while compressing return springs.
 - Set Tool directly above return springs.
 - Do not expand snap ring excessively.
6. Remove spring retainer and return springs.

REPAIR FOR COMPONENT PARTS

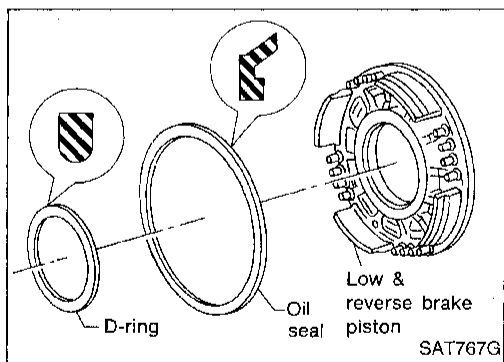
Low & Reverse Brake (Cont'd)



- Do not remove return springs from spring retainer.



7. Apply compressed air to oil hole of transmission case while holding piston.
8. Remove piston from transmission case by turning it.



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

INSPECTION

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

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

REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

Low & reverse brake drive plate

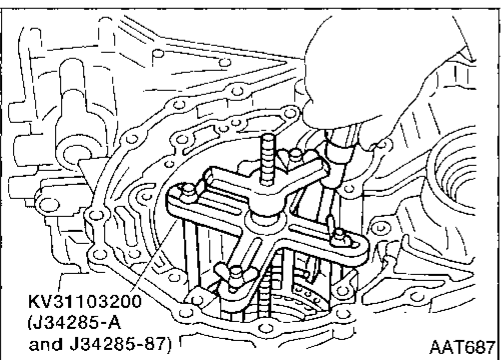
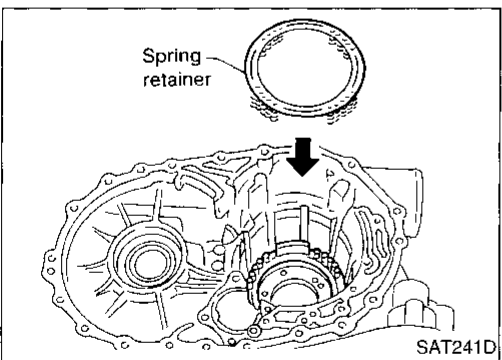
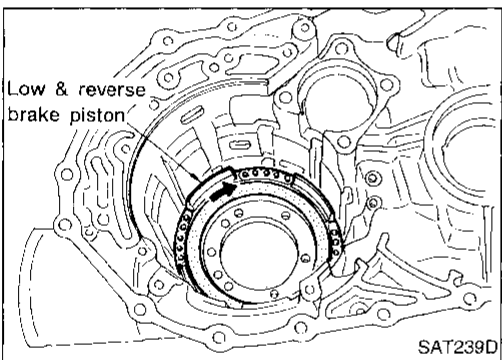
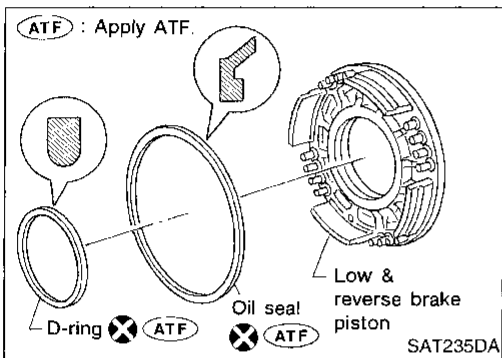
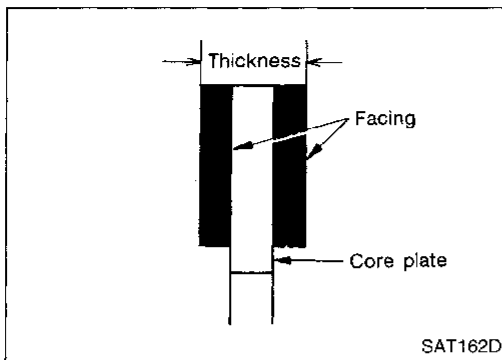
- Check facing for burns, cracks or damage.
- Measure thickness of facing.

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.



ASSEMBLY

1. Install D-ring and oil seal on piston.
 - Take care with the direction of the oil seal.
 - Apply ATF to both parts.
2. Stand transmission case.
3. Install piston assembly on transmission case while turning it slowly.
 - Apply ATF to inner surface of transmission case.
4. Install return springs and spring retainer on piston.
5. Install snap ring while compressing return springs.
 - Set Tool directly above return springs.

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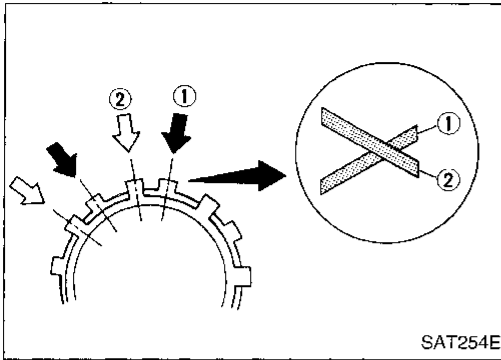
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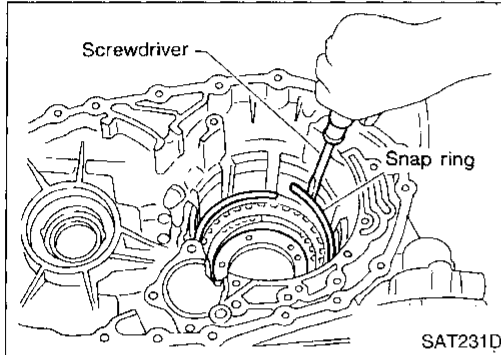
REPAIR FOR COMPONENT PARTS

Low & Reverse Brake (Cont'd)

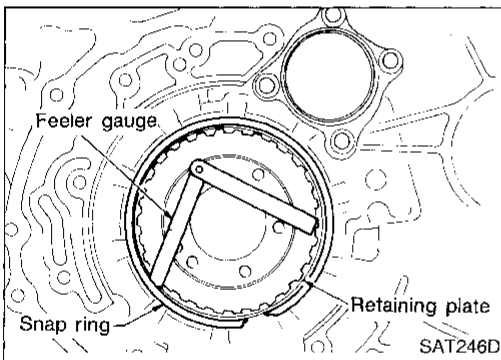


6. Install drive plates, driven plates, retaining plates and dished plates.

- Do not align the projections on the two dished plates.
- Make sure to put the plates in the correct order and direction.



7. Install snap ring.



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

Specified clearance:

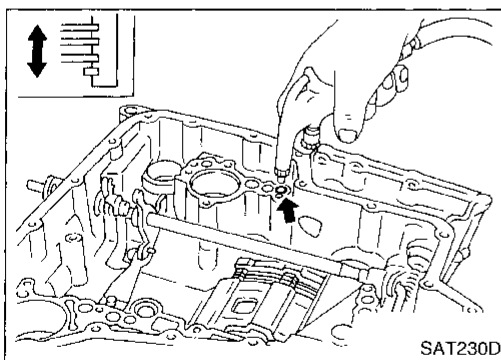
Standard: 1.4 - 1.8 mm (0.055 - 0.071 in)

Allowable limit:

2.8 mm (0.110 in)

Retaining plate:

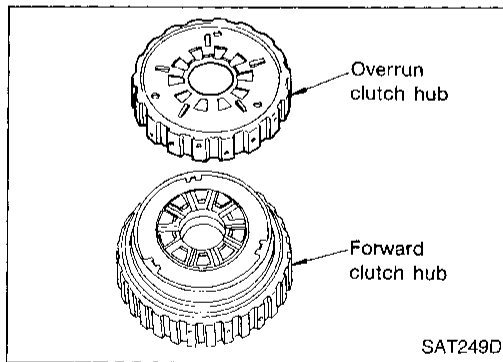
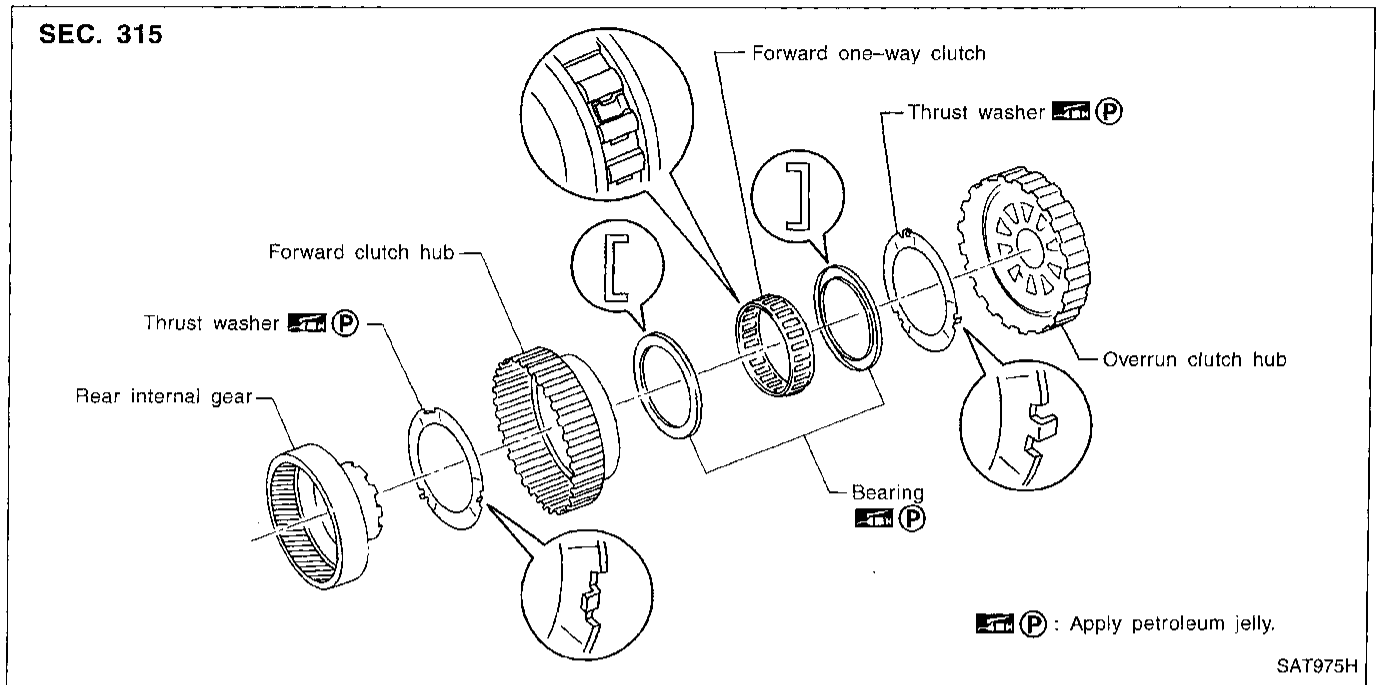
Refer to SDS, AT-326.



9. Check operation of low & reverse brake.

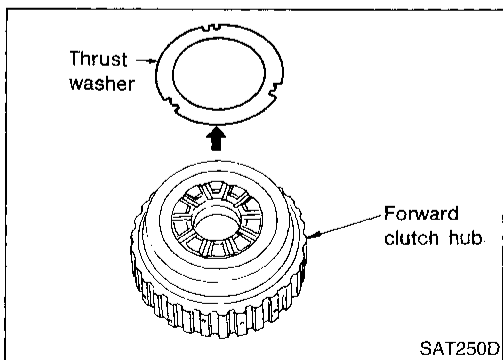
Refer to "DISASSEMBLY", "Low & Reverse Brake", AT-263.

Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub



DISASSEMBLY

1. Remove snap ring from overrun clutch hub.
2. Remove overrun clutch hub from forward clutch hub.



3. Remove thrust washer from forward clutch hub.

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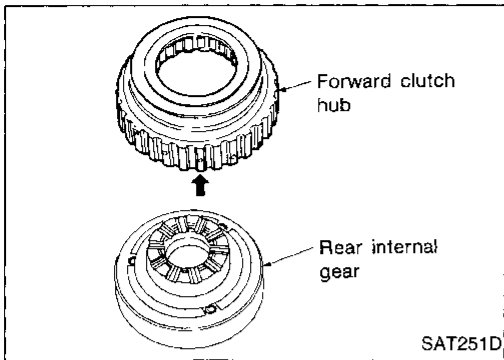
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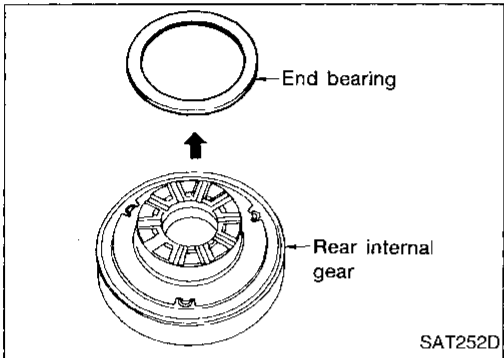
IDX

REPAIR FOR COMPONENT PARTS

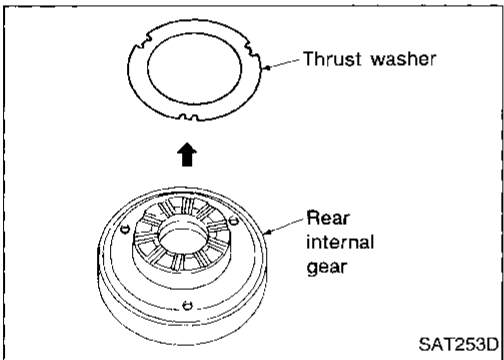
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



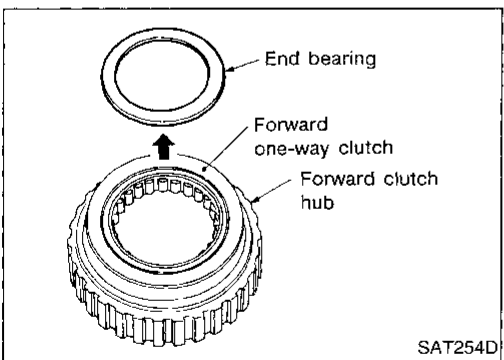
4. Remove forward clutch hub from rear internal gear.



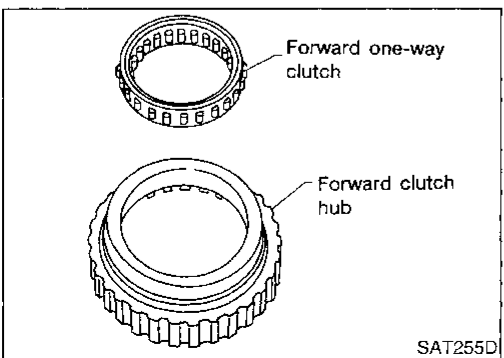
5. Remove end bearing from rear internal gear.



6. Remove thrust washer from rear internal gear.



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



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

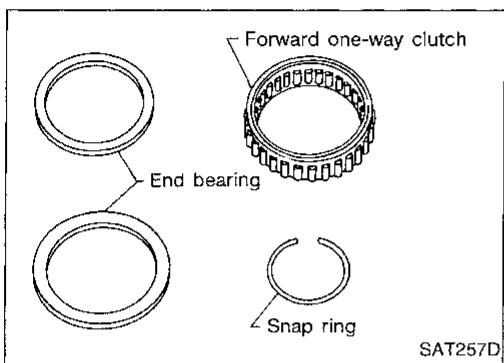
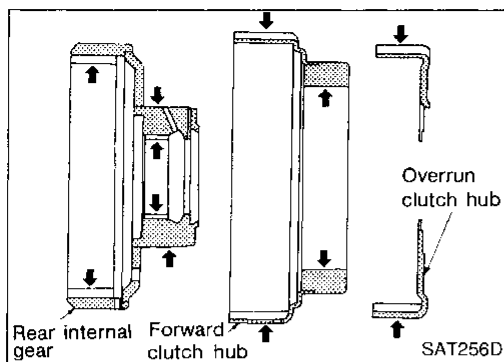
REPAIR FOR COMPONENT PARTS

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

INSPECTION

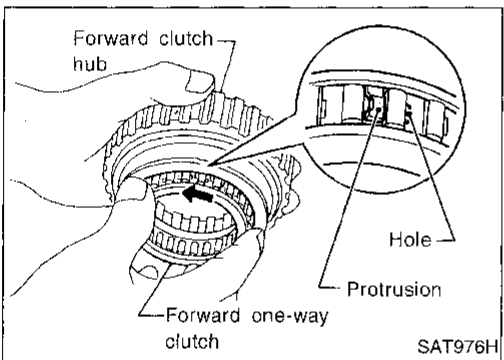
Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surfaces for wear or damage.



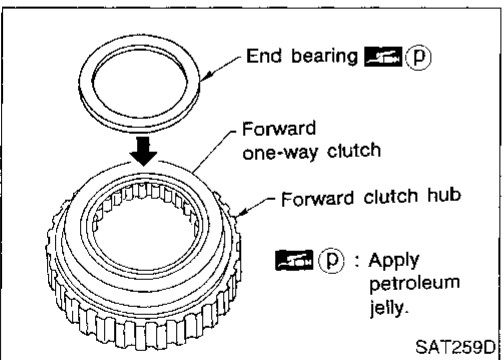
Snap ring, end bearings and forward one-way clutch

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

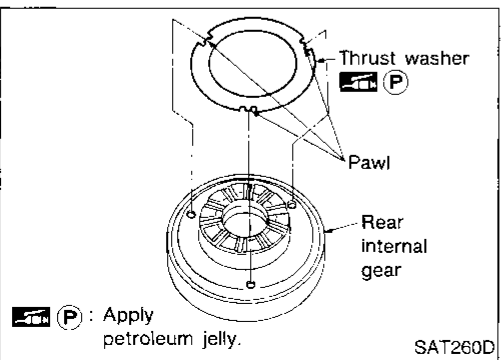


ASSEMBLY

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



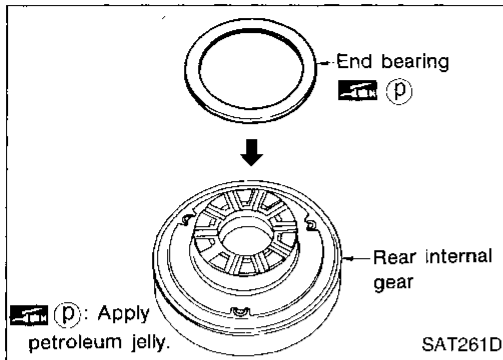
2. Install end bearing on forward one-way clutch.
 - **Apply petroleum jelly to end bearing.**



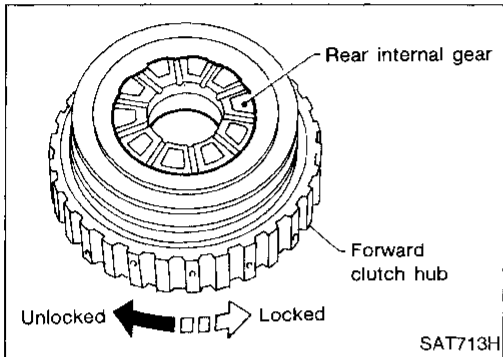
3. Install thrust washer on rear internal gear.
 - **Apply petroleum jelly to thrust washer.**
 - **Align pawls of thrust washer with holes of rear internal gear.**

REPAIR FOR COMPONENT PARTS

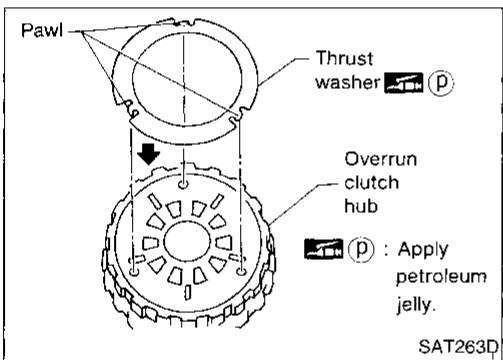
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub (Cont'd)



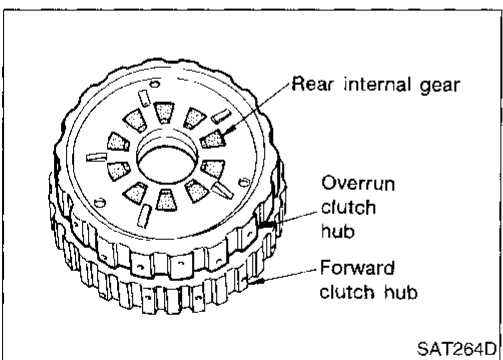
4. Install end bearing on rear internal gear.
 - Apply petroleum jelly to end bearing.



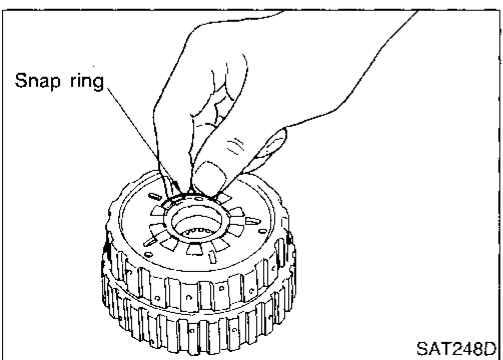
5. Install forward clutch hub on rear internal gear.
 - Check operation of forward one-way clutch. Hold rear internal gear and turn forward clutch hub. Check forward clutch hub for correct locking and unlocking directions.
 - If not as shown in illustration, check installation direction of forward one-way clutch.



6. Install thrust washer and overrun clutch hub.
 - Apply petroleum jelly to thrust washer.
 - Align pawls of thrust washer with holes of overrun clutch hub.



7. Install overrun clutch hub on rear internal gear.
 - Align projections of rear internal gear with holes of overrun clutch hub.

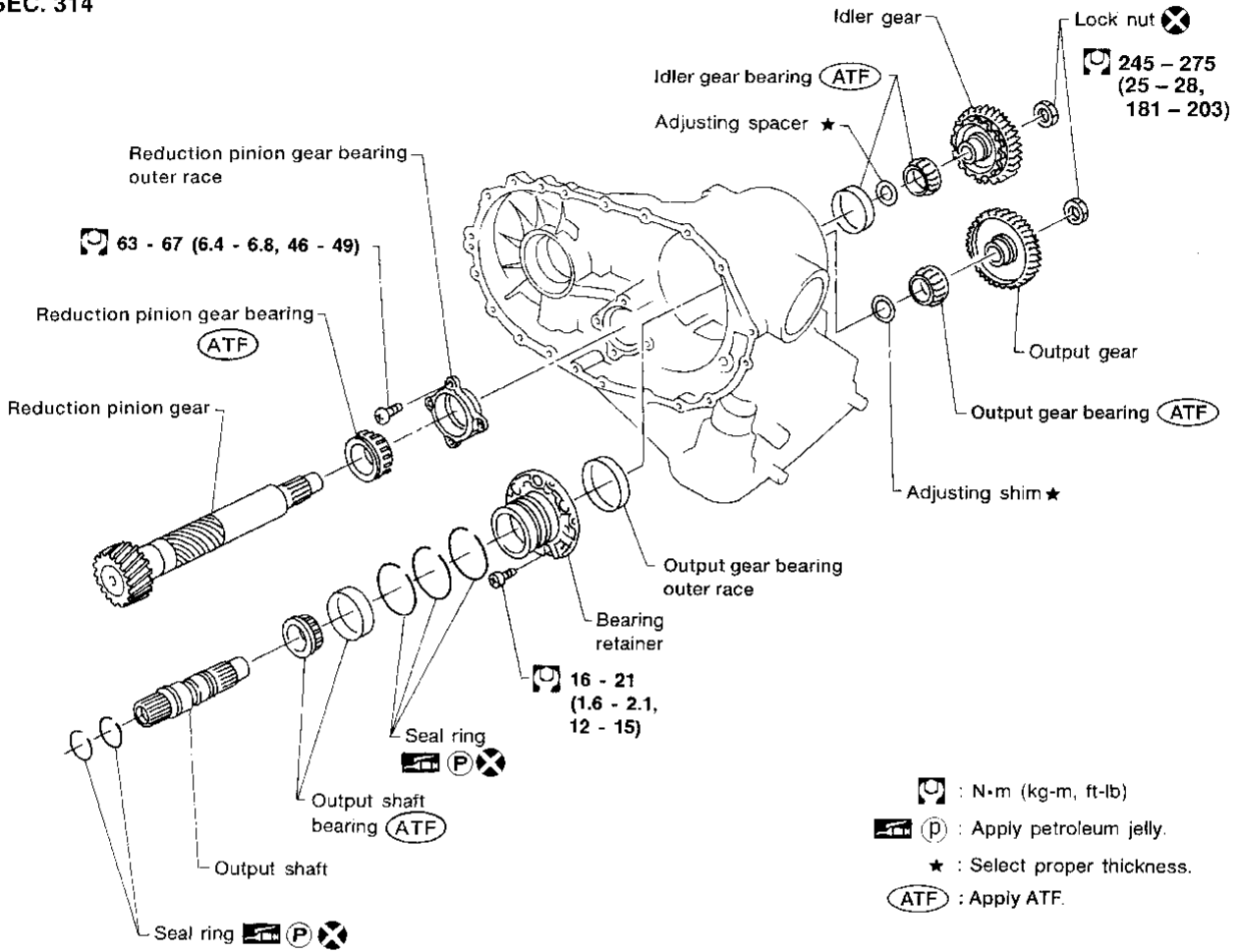


8. Install snap ring to groove of rear internal gear.

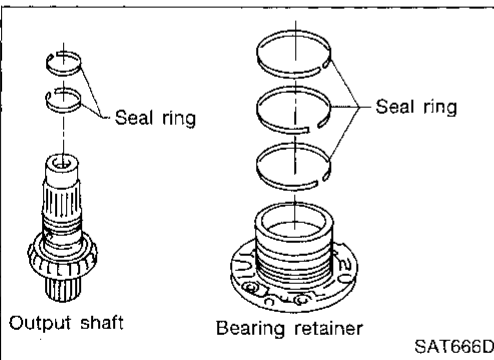
REPAIR FOR COMPONENT PARTS

Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RL4F03A

SEC. 314

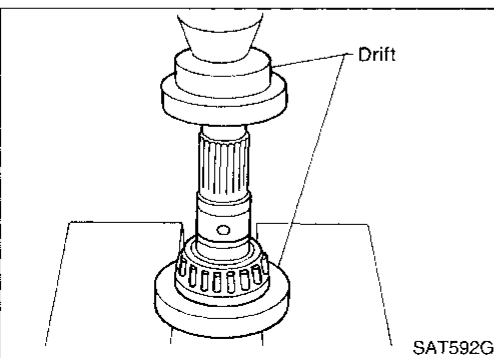


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DISASSEMBLY

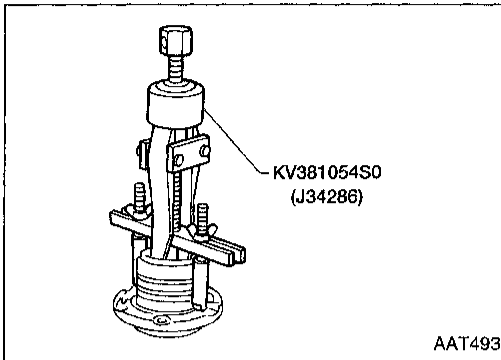
1. Remove seal rings from output shaft and bearing retainer.



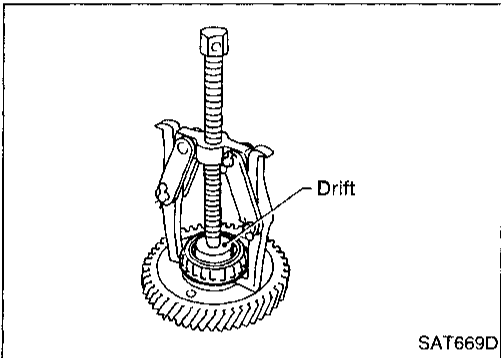
2. Press out output shaft bearing inner race.

REPAIR FOR COMPONENT PARTS

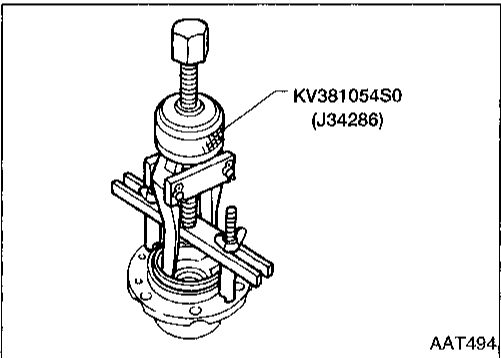
Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RL4F03A (Cont'd)



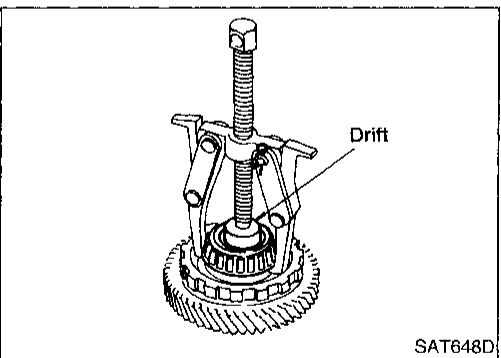
3. Remove output shaft bearing outer race from bearing retainer.



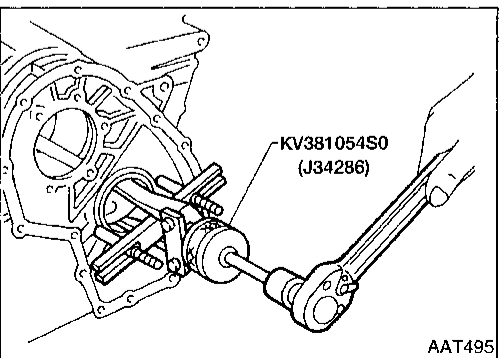
4. Remove output gear bearing inner race.



5. Remove output gear bearing outer race from bearing retainer.



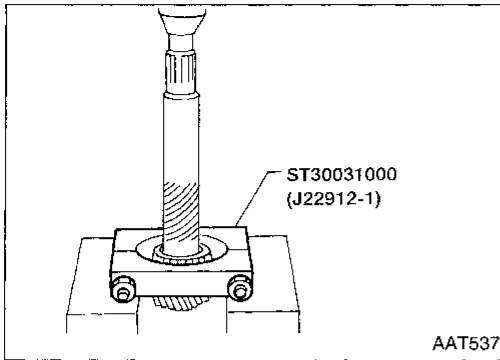
6. Remove idler gear bearing inner race.



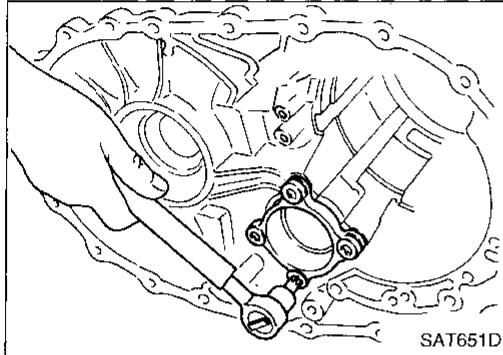
7. Remove idler gear bearing outer race from transmission case.

REPAIR FOR COMPONENT PARTS

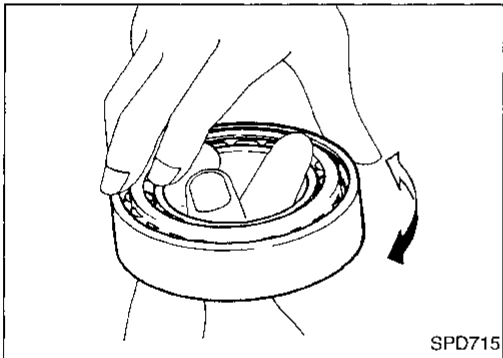
Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RL4F03A (Cont'd)



8. Press out reduction pinion gear bearing from reduction pinion gear.



9. Remove reduction pinion gear bearing outer race from transmission case.



INSPECTION

Output shaft, output gear, idler gear and reduction pinion gear

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

Bearings

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

Seal ring clearance

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

- If not within wear limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.

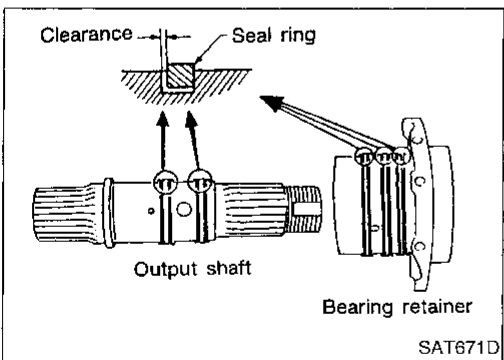
Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Wear limit:

0.25 mm (0.0098 in)

- If not within wear limit, replace bearing retainer.

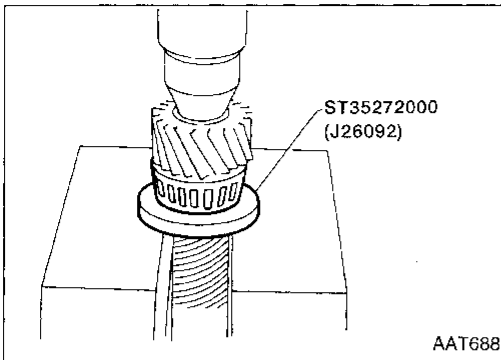


REPAIR FOR COMPONENT PARTS

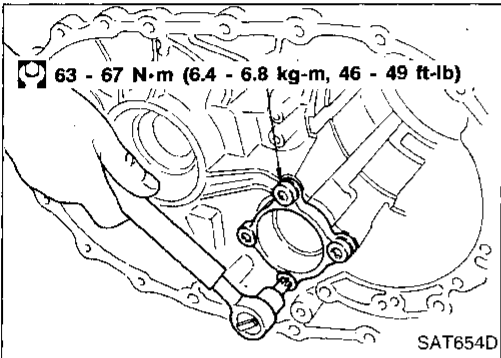
Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RL4F03A (Cont'd)

ASSEMBLY

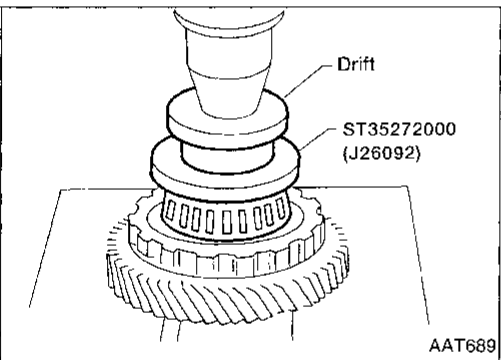
1. Press reduction pinion gear bearing on reduction pinion gear.



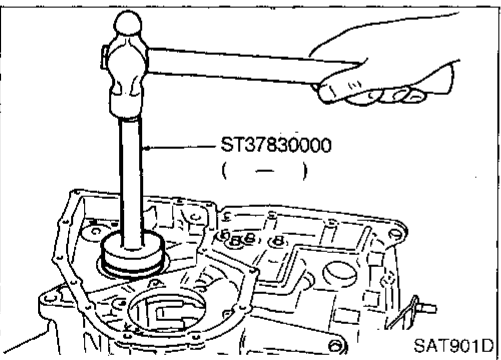
2. Install reduction pinion gear bearing outer race on transmission case.



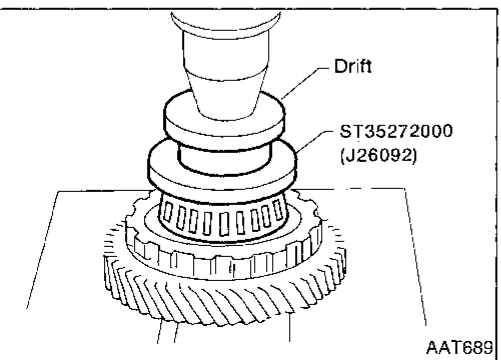
3. Press idler gear bearing inner race on idler gear.



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

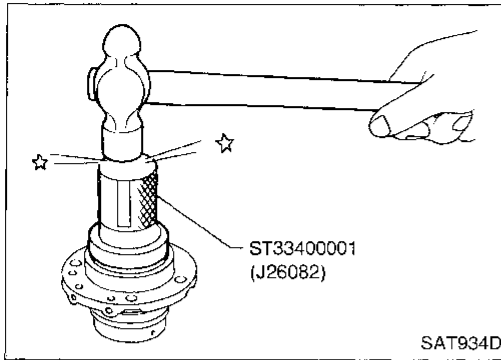


5. Press output gear bearing inner race on output gear.



REPAIR FOR COMPONENT PARTS

Output Shaft, Output Gear, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RL4F03A (Cont'd)



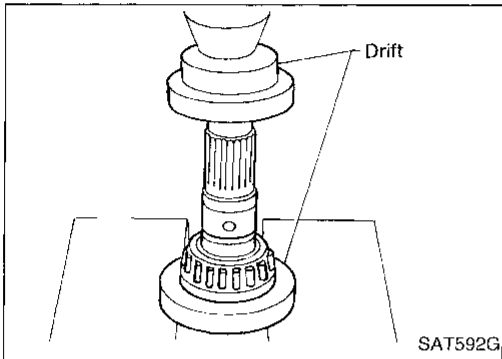
6. Install output gear bearing outer race on bearing retainer.

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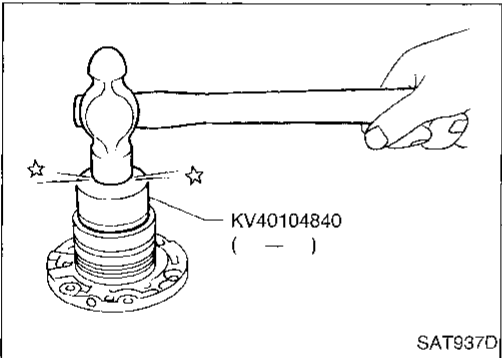


7. Press output shaft bearing inner race on output shaft.

EC

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CL



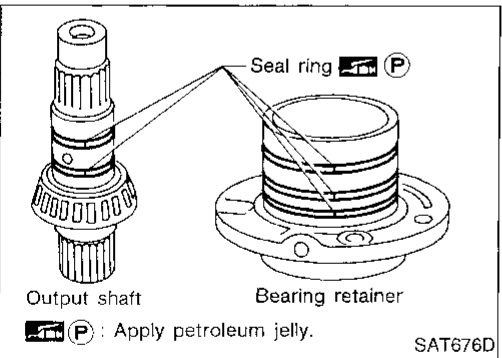
8. Install output shaft bearing outer race on bearing retainer.

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9. Install new seal rings onto output shaft and bearing retainer.
 • Apply petroleum jelly to seal rings.

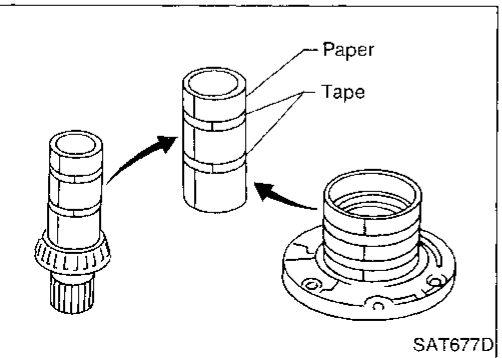
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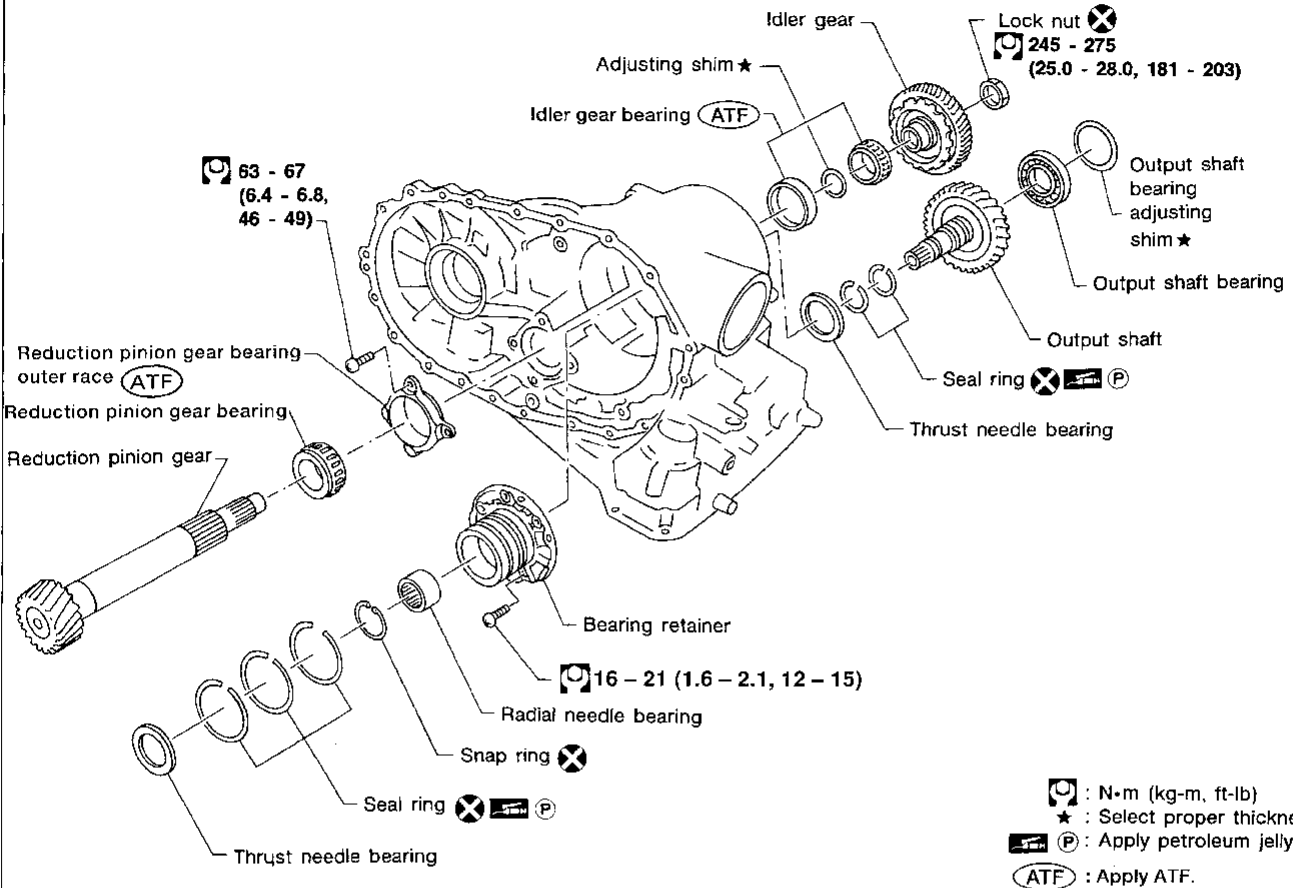
10. Roll paper around seal rings to prevent seal rings from spreading.

EL

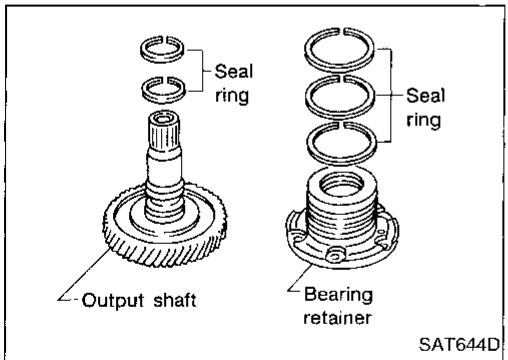
IDX

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RE4F03V

SEC. 314

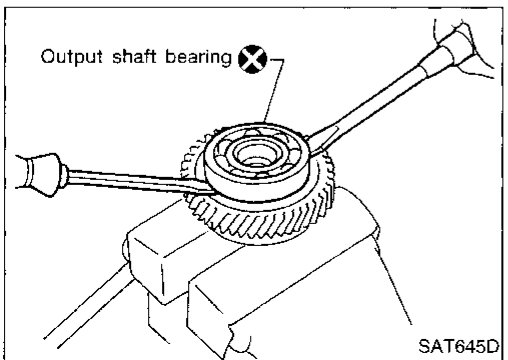


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DISASSEMBLY

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

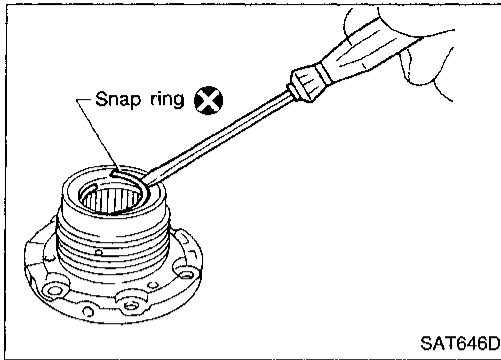


2. Remove output shaft bearing with screwdrivers.

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

REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RE4F03V (Cont'd)



3. Remove snap ring from bearing retainer.

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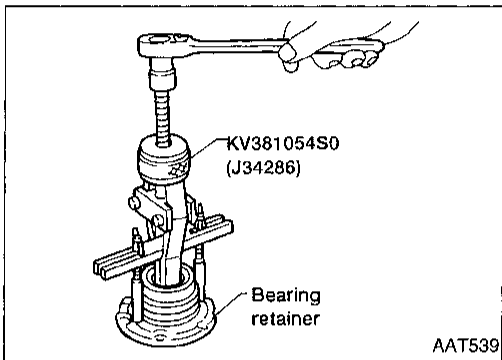
RS

BT

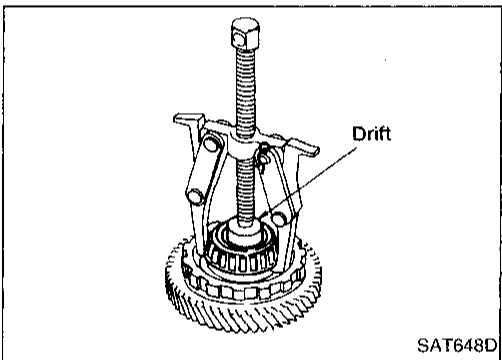
HA

EL

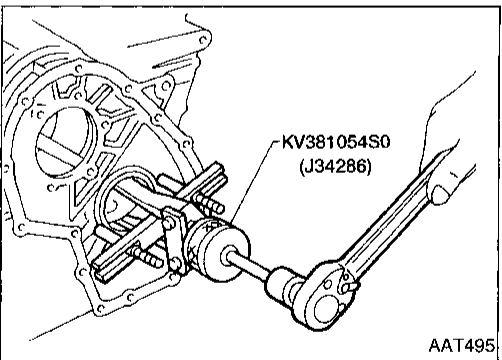
IDX



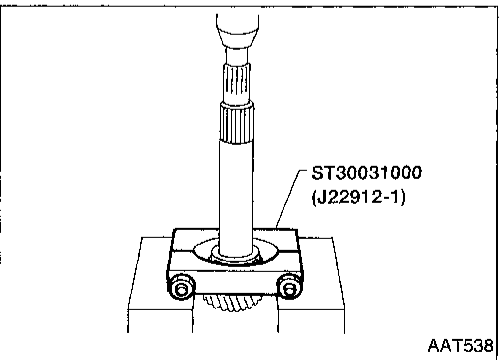
4. Remove needle bearing from bearing retainer.



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



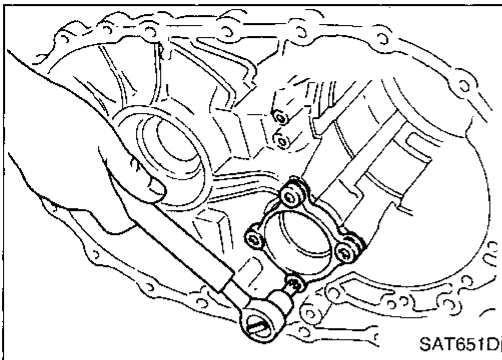
6. Remove idler gear bearing outer race from transmission case.



7. Press out reduction pinion gear bearing from reduction pinion gear.

REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RE4F03V (Cont'd)

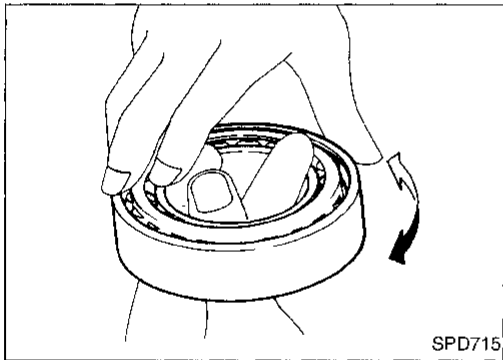


8. Remove reduction pinion gear bearing outer race from transmission case.

INSPECTION

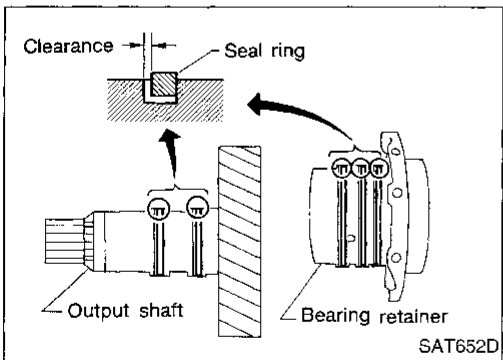
Output shaft, idler gear and reduction pinion gear

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



Bearing

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



Seal ring clearance

- Install new seal rings to output shaft.
- Measure clearance between seal ring and ring groove of output shaft.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit:

0.25 mm (0.0098 in)

- If not within allowable limit, replace output shaft.
- Install new seal rings to bearing retainer.
- Measure clearance between seal ring and ring groove of bearing retainer.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

Allowable limit:

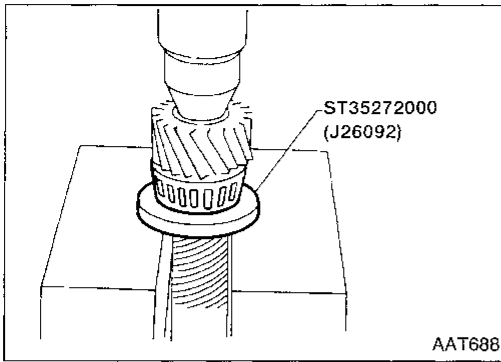
0.25 mm (0.0098 in)

- If not within allowable limit, replace bearing retainer.

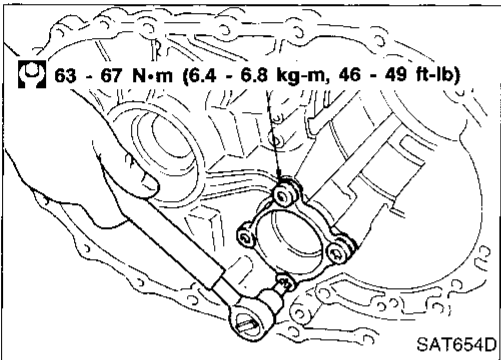
REPAIR FOR COMPONENT PARTS

Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RE4F03V (Cont'd)

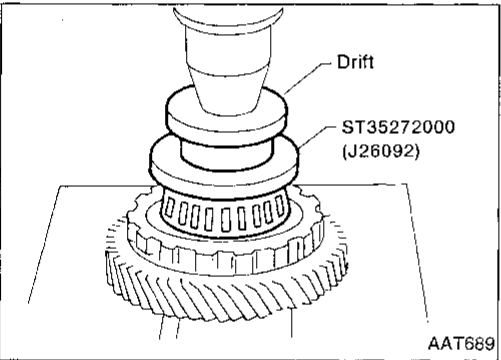
ASSEMBLY



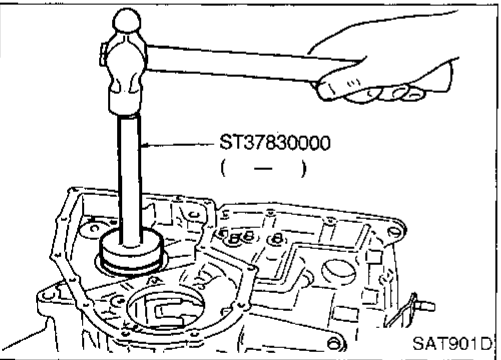
1. Press reduction pinion gear bearing on reduction pinion gear.



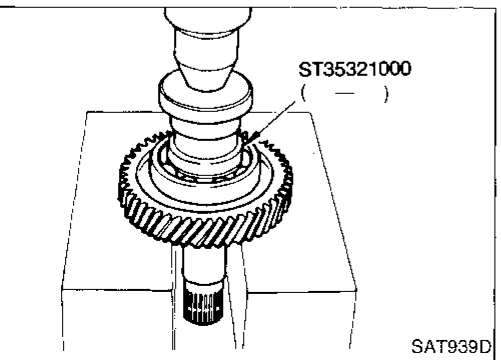
2. Install reduction pinion gear bearing outer race on transmission case.



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



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



5. Press output shaft bearing on output shaft.

GI

MA

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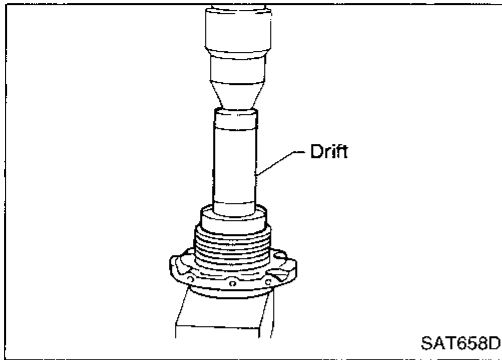
HA

EL

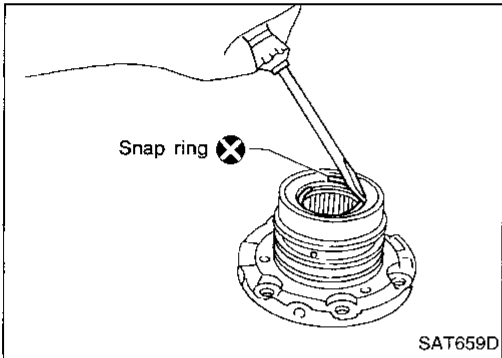
IDX

REPAIR FOR COMPONENT PARTS

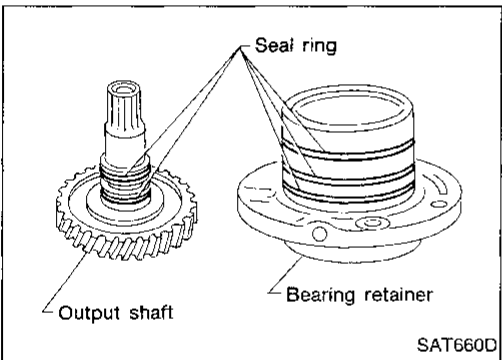
Output Shaft, Idler Gear, Reduction Pinion Gear and Bearing Retainer — RE4F03V (Cont'd)



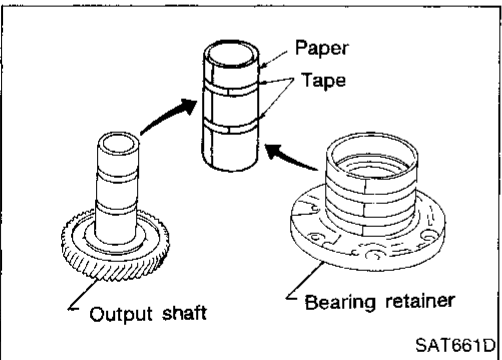
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.

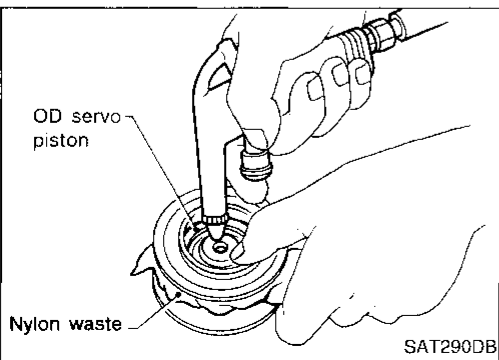
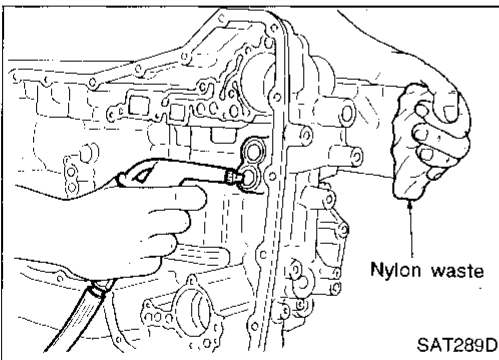
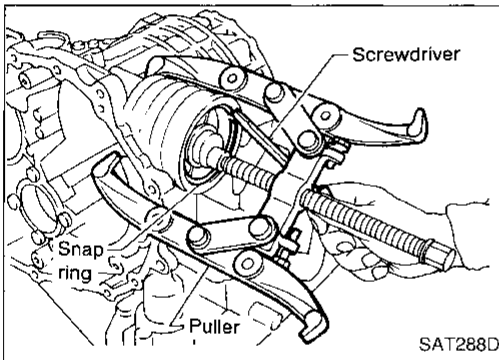
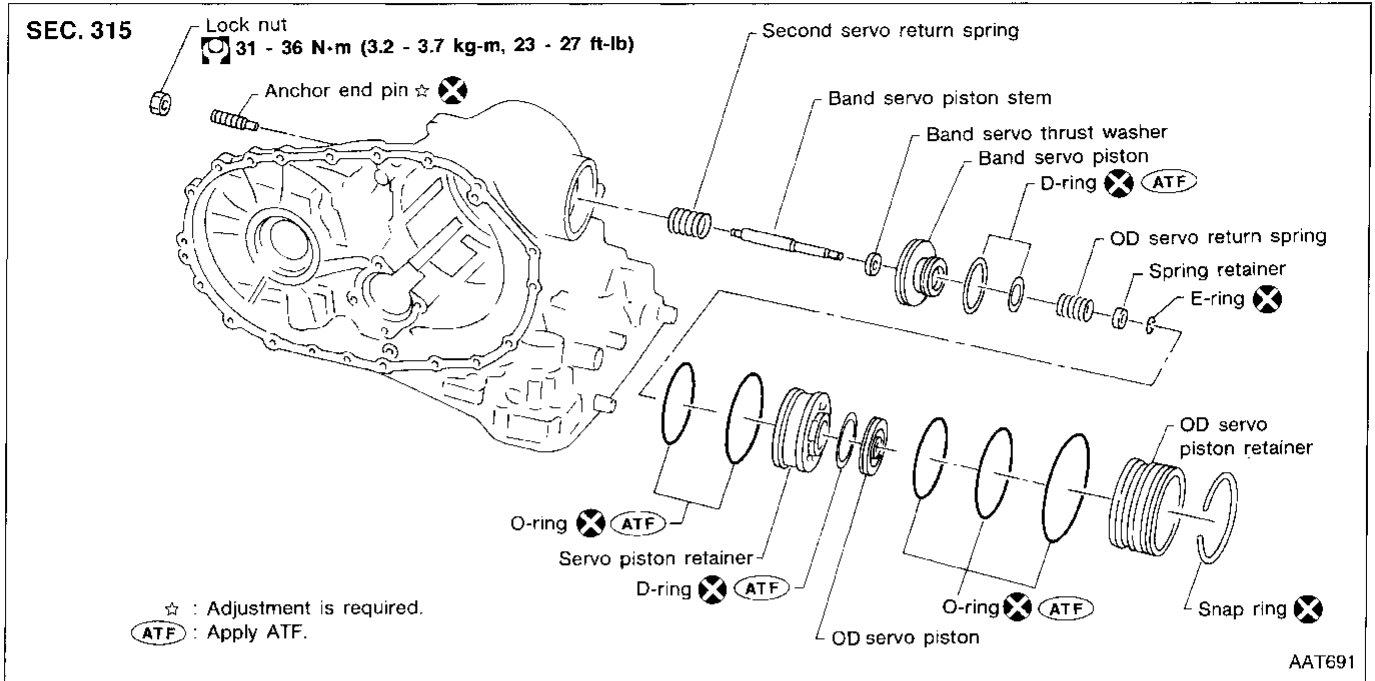


8. After packing ring grooves with petroleum jelly, carefully install new seal rings on output shaft and bearing retainer.



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

Band Servo Piston Assembly



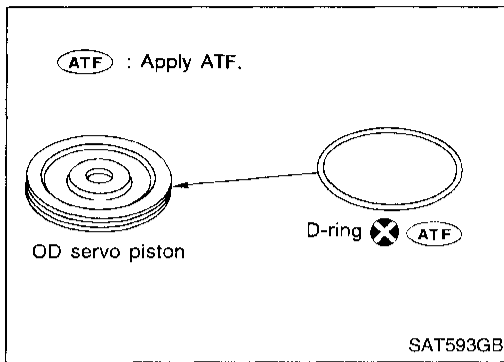
DISASSEMBLY

1. Remove band servo piston snap ring.
 - AT
2. Apply compressed air to oil hole in transmission case to remove OD servo piston retainer and band servo piston assembly.
 - FA
 - RA
 - BR
 - ST
 - RS
 - BT
 - HA
 - EL
3. Apply compressed air to oil hole in OD servo piston retainer to remove OD servo piston from retainer.
 - EL
 - IDX

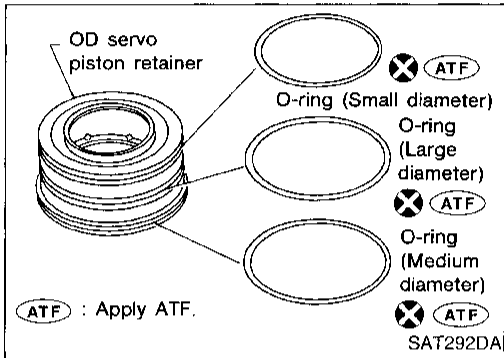
REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)

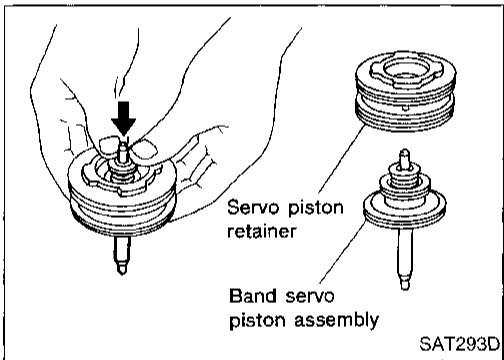
4. Remove D-ring from OD servo piston.



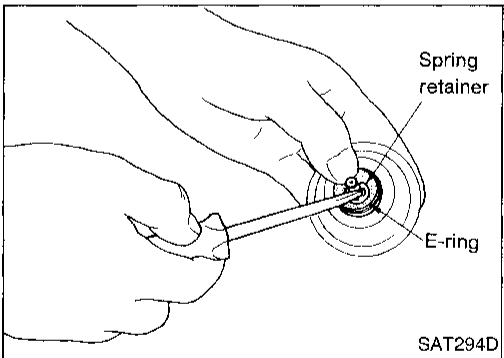
5. Remove O-rings from OD servo piston retainer.



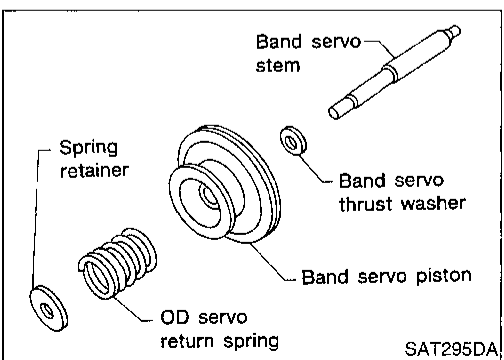
6. Remove band servo piston assembly from servo piston retainer by pushing it forward.



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

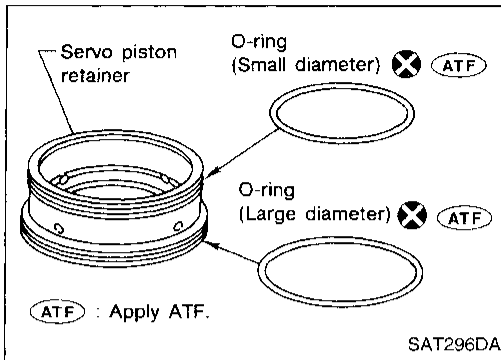


8. Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

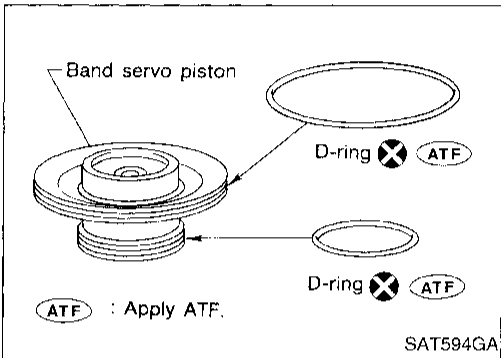


REPAIR FOR COMPONENT PARTS

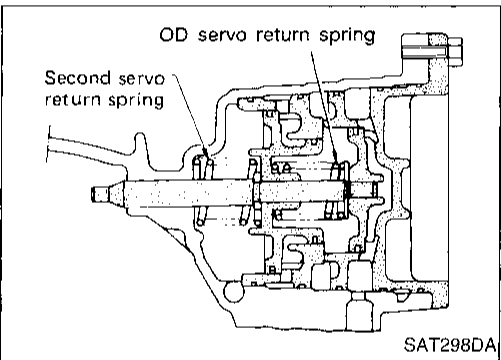
Band Servo Piston Assembly (Cont'd)



9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



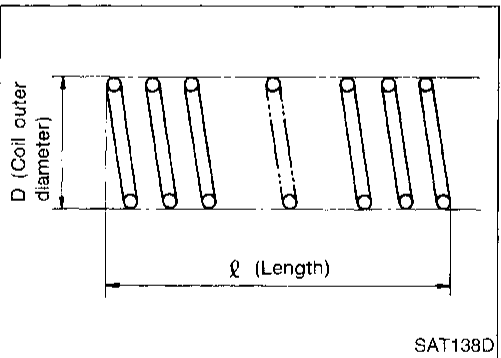
INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

Return springs

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



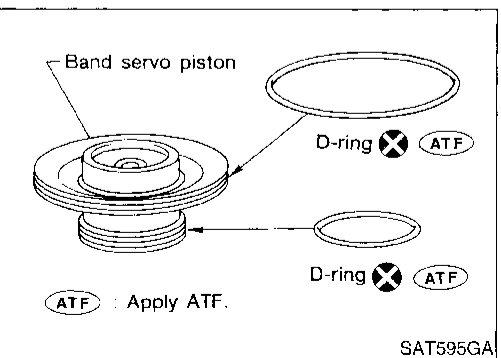
Inspection standard:

Refer to SDS, AT-331.

ASSEMBLY

1. Install D-rings to servo piston retainer.

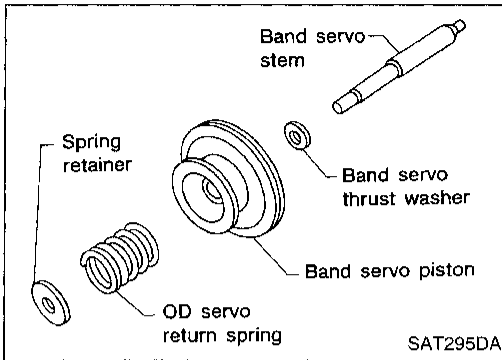
- Apply ATF to O-rings.
- Pay attention to position of each O-ring.



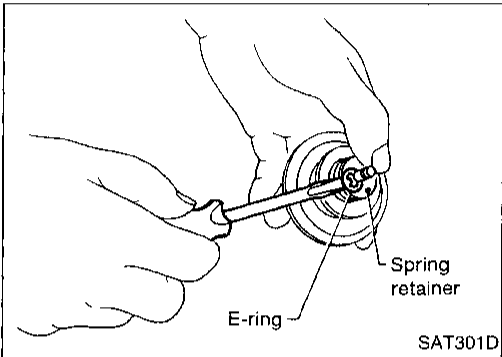
CI
MA
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REPAIR FOR COMPONENT PARTS

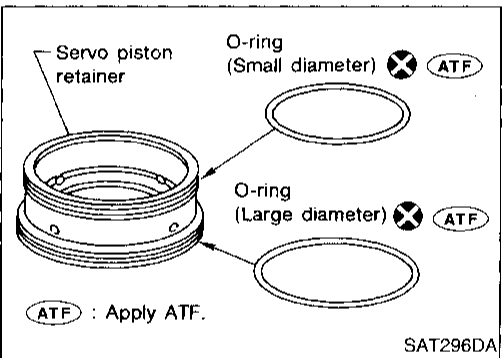
Band Servo Piston Assembly (Cont'd)



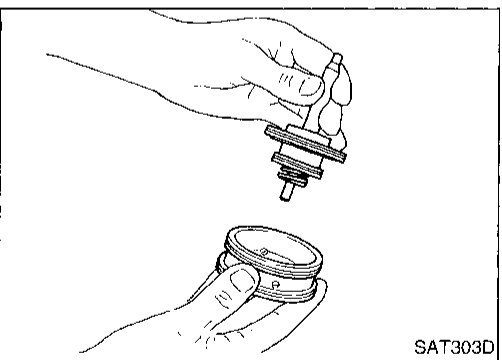
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



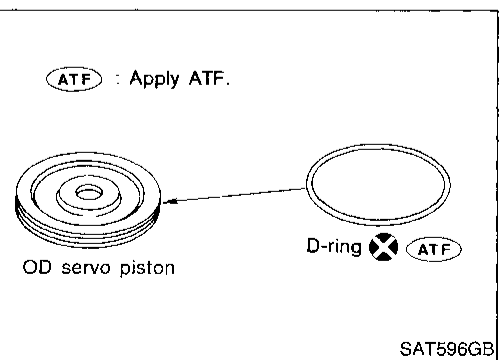
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



4. Install O-rings to servo piston retainer.
 - Apply ATF to O-rings.
 - Pay attention to the positions of the O-rings.



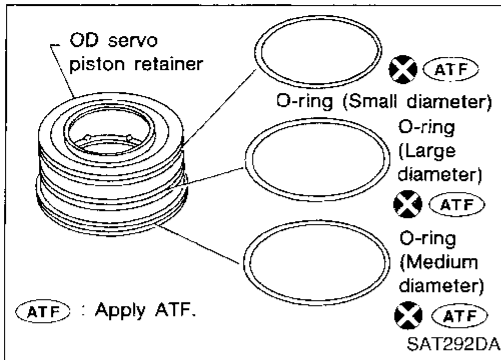
5. Install band servo piston assembly to servo piston retainer by pushing it inward.



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

REPAIR FOR COMPONENT PARTS

Band Servo Piston Assembly (Cont'd)



7. Install O-rings to OD servo piston retainer.
 - Apply ATF to O-rings.
 - Pay attention to the positions of the O-rings.

GI

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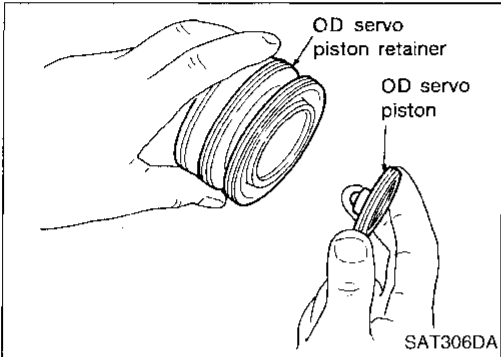
RS

BT

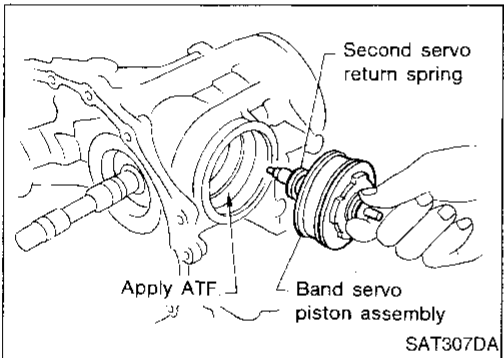
HA

EL

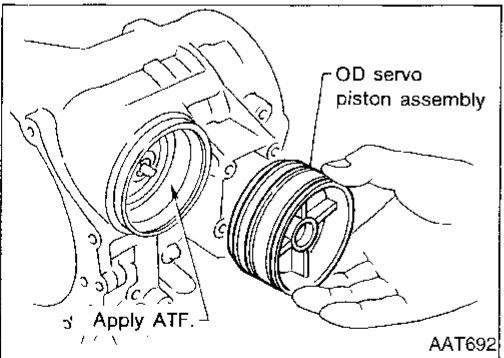
IDX



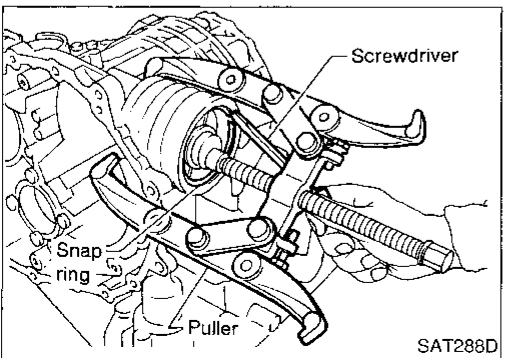
8. Install OD servo piston to OD servo piston retainer.



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

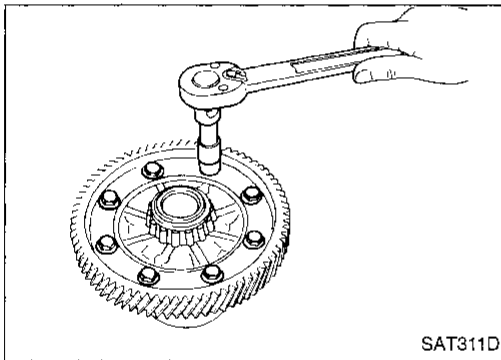
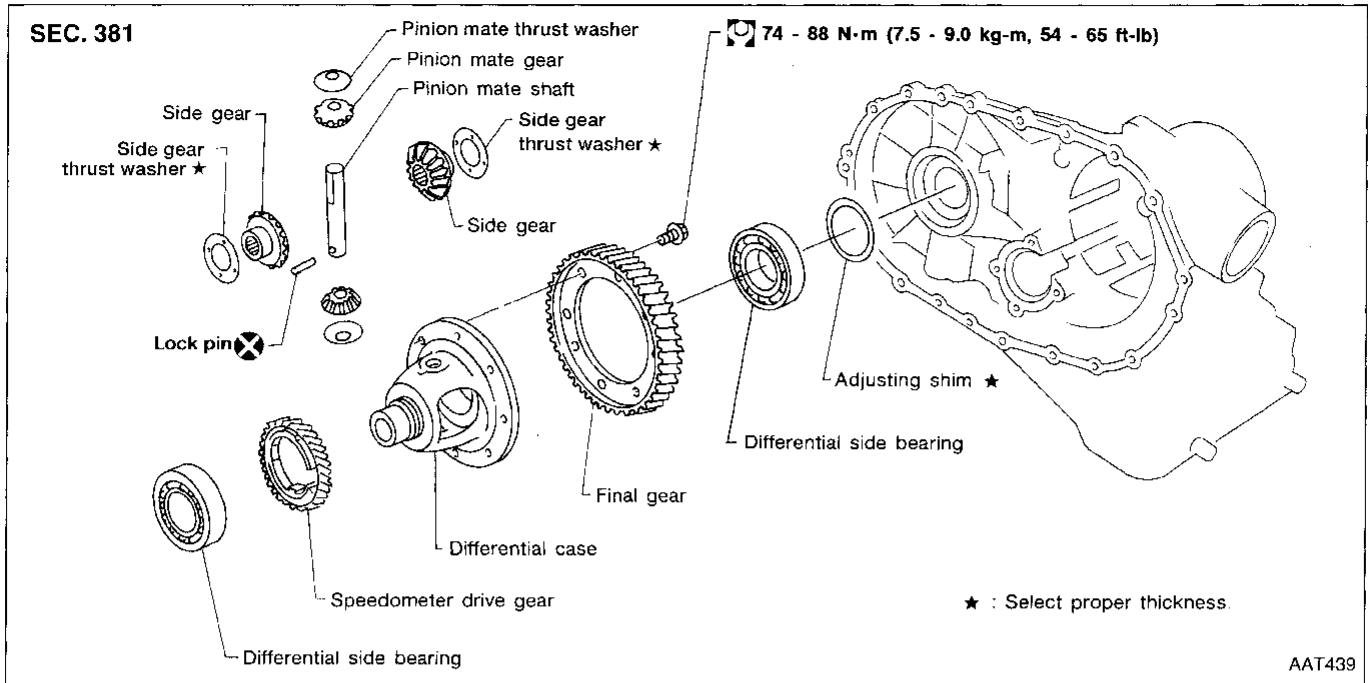


10. Install OD servo piston assembly to transmission case.
 - Apply ATF to O-ring of band servo piston and transmission case.



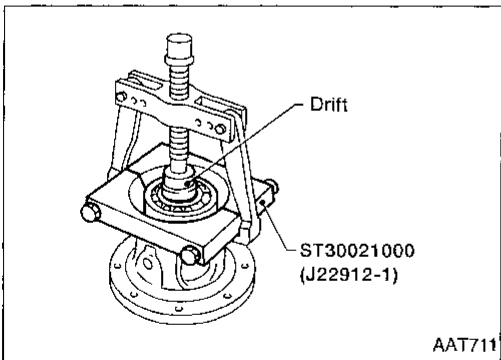
11. Install band servo piston snap ring to transmission case.

Final Drive — RL4F03A

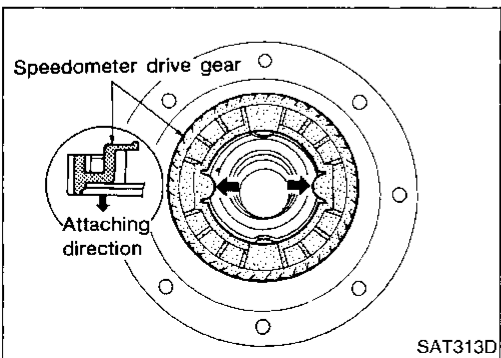


DISASSEMBLY

1. Remove final gear.



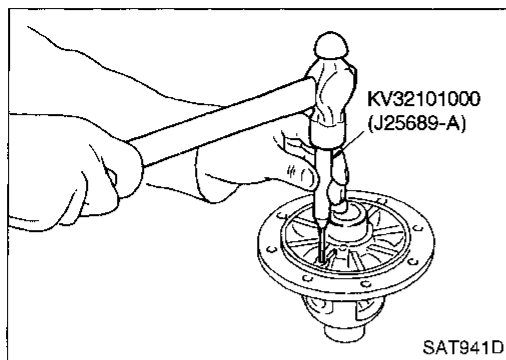
2. Press out differential side bearings.



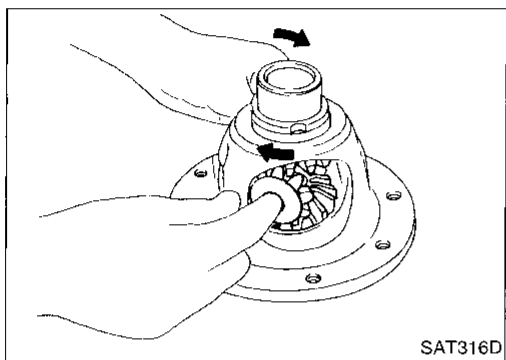
3. Remove speedometer drive gear.

REPAIR FOR COMPONENT PARTS

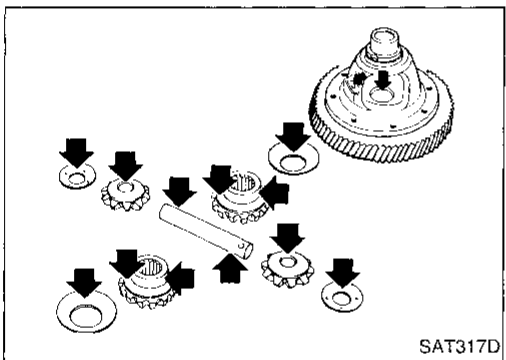
Final Drive — RL4F03A (Cont'd)



4. Drive out pinion mate shaft retaining pin.



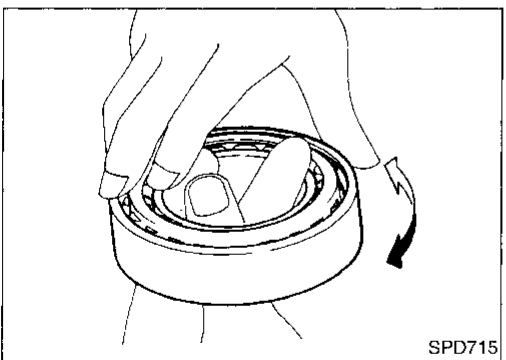
5. Draw out pinion mate shaft from differential case.
6. Remove pinion mate gears and side gears.



INSPECTION

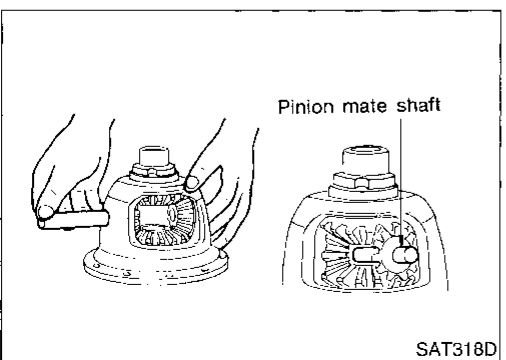
Gear, washer, shaft and case

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



Bearings

- Make sure bearings roll freely and are free from noise, cracks, pitting or wear.



ASSEMBLY

1. Install side gears and thrust washers in differential case.
 2. Install pinion mate gears and thrust washers in the differential case while rotating them.
- Apply ATF to all parts.

GI

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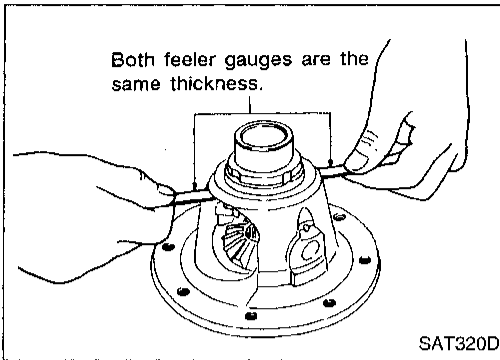
HA

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IDX

REPAIR FOR COMPONENT PARTS

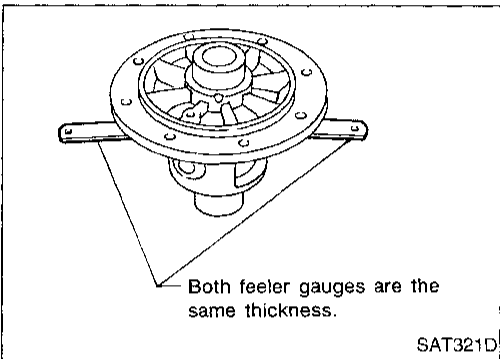
Final Drive — RL4F03A (Cont'd)



3. Measure clearance between side gear and differential case with washers.

Clearance between side gear and differential case with washers:

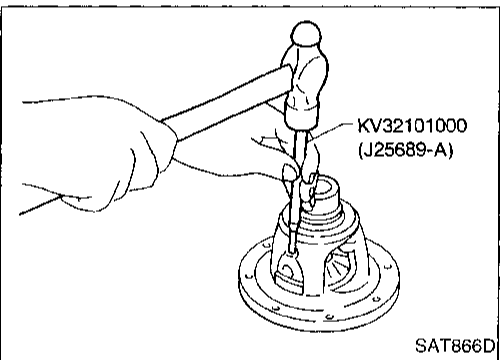
0.1 - 0.2 mm (0.004 - 0.008 in)



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

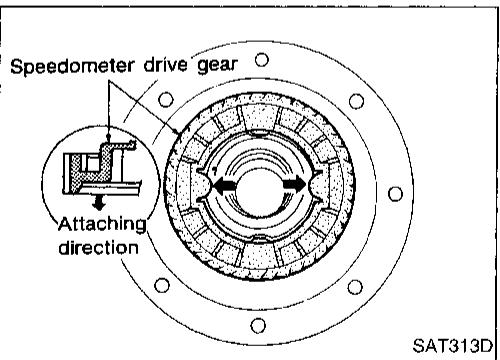
Side gear thrust washer:

Refer to SDS, AT-327.



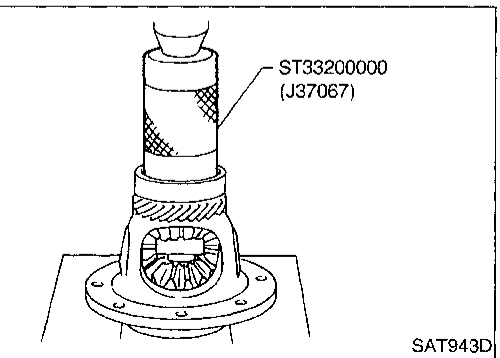
4. Install retaining pin.

- **Make sure that retaining pin is flush with case.**



5. Install speedometer drive gear on differential case.

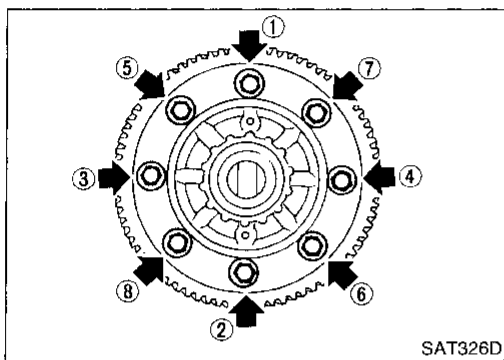
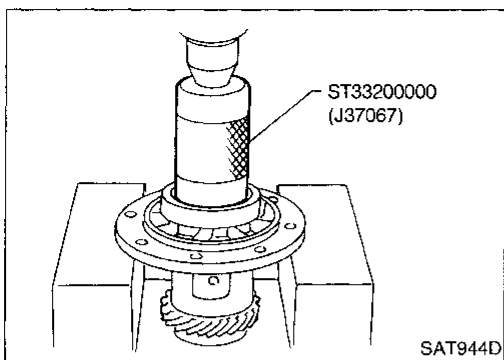
- **Align projection of speedometer drive gear with groove of differential case.**



6. Press differential side bearings on differential case.

REPAIR FOR COMPONENT PARTS

Final Drive — RL4F03A (Cont'd)



7. Install final gear and tighten fixing bolts in numerical order.

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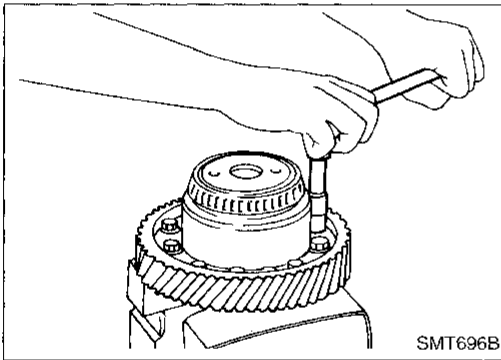
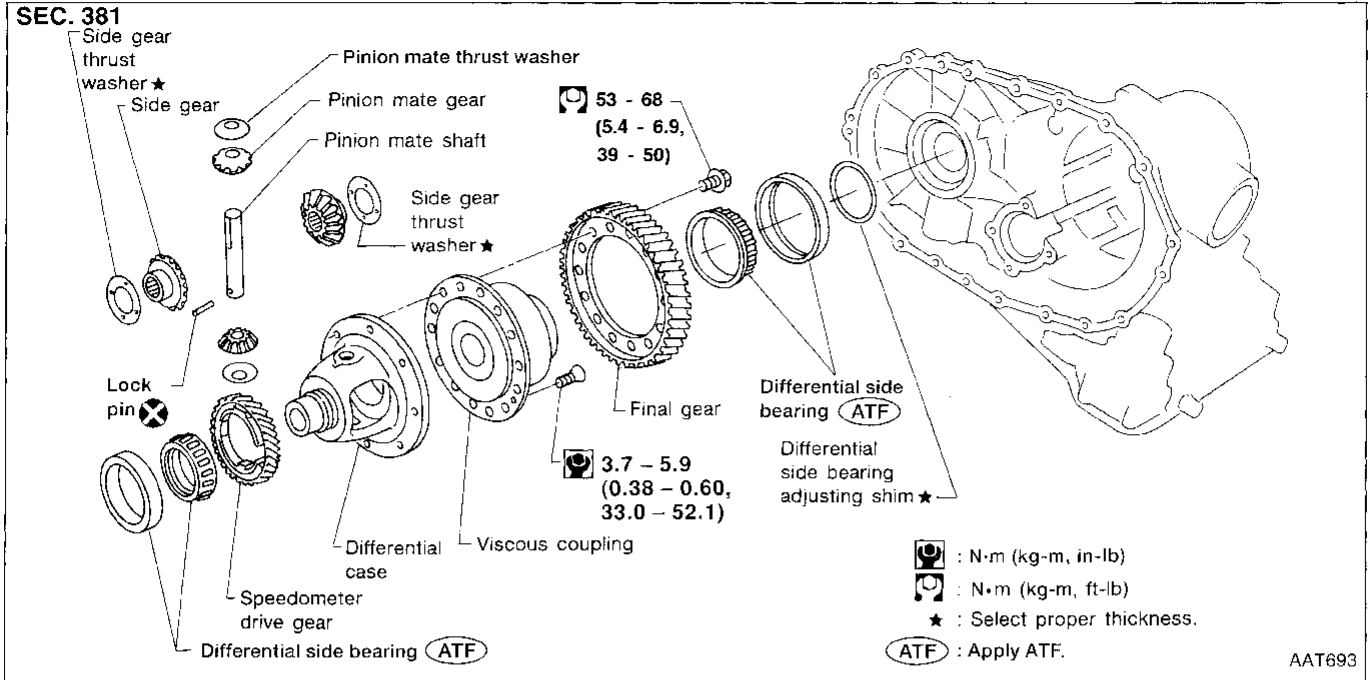
BT

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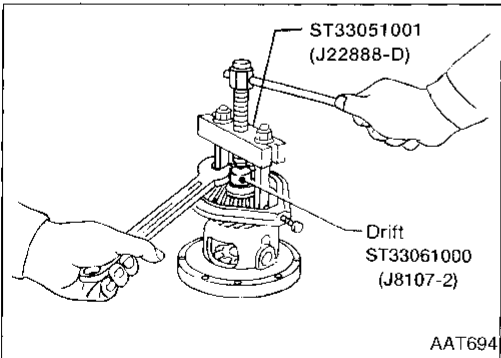
IDX

Final Drive — RE4F03V

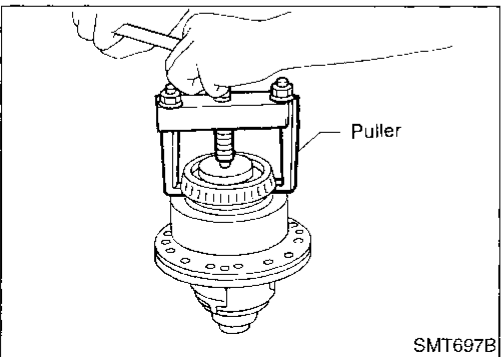


DISASSEMBLY

1. Remove final gear.

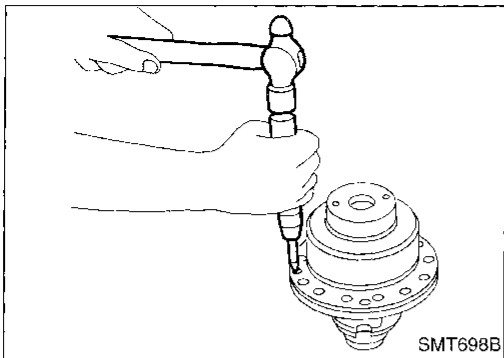


2. Press out differential side bearings.

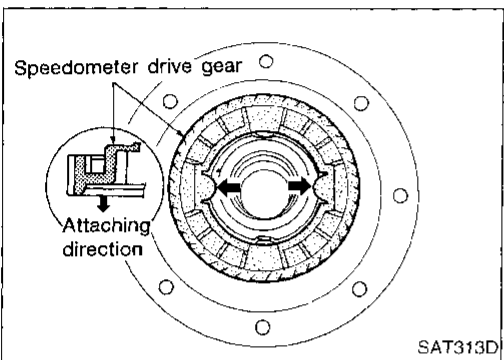


REPAIR FOR COMPONENT PARTS

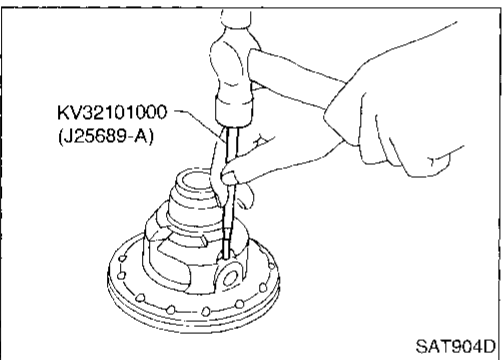
Final Drive — RE4F03V (Cont'd)



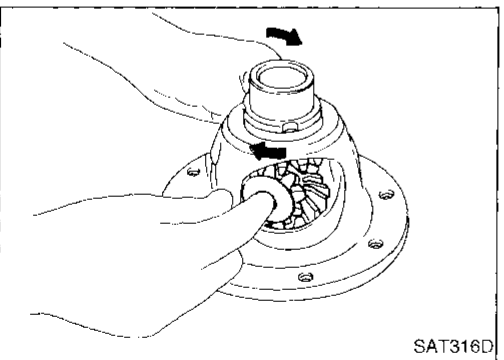
3. Remove viscous coupling.



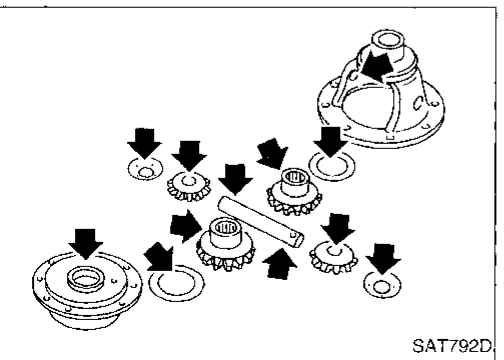
4. Remove speedometer drive gear.



5. Drive out pinion mate shaft retaining pin.



6. Draw out pinion mate shaft from differential case.
7. Remove pinion mate gears and side gears.



INSPECTION

Gear, washer, shaft and case

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

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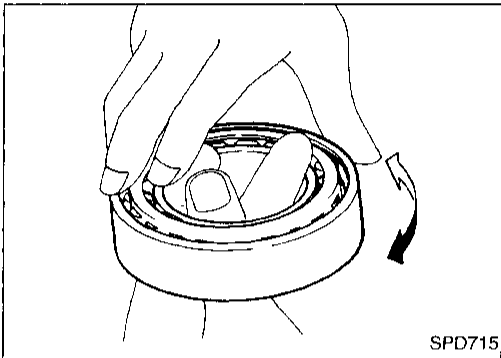
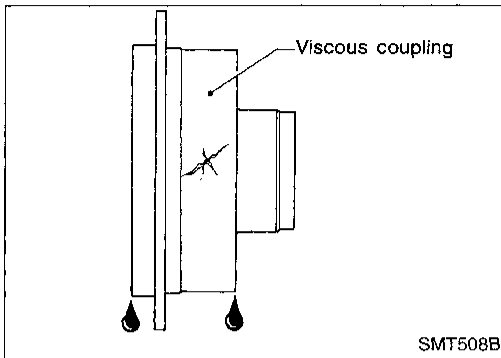
IDX

REPAIR FOR COMPONENT PARTS

Final Drive — RE4F03V (Cont'd)

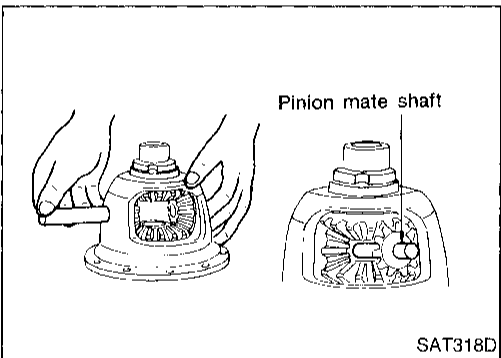
Viscous coupling

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



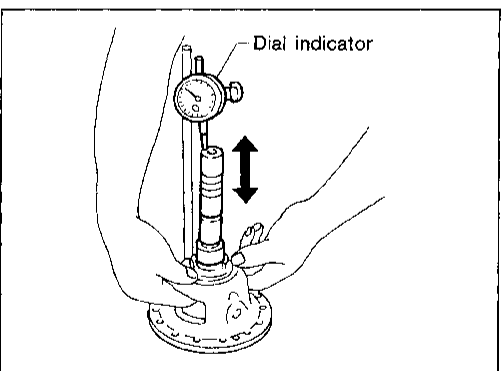
Bearings

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



ASSEMBLY

1. Install side gear and thrust washers in differential case.
 2. Install pinion mate gears and thrust washers in differential case while rotating them.
- **Apply ATF to any parts.**



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

Differential case side

- a. Set Tool and dial indicator on side gear.
- b. Move side gear up and down to measure dial indicator deflection.

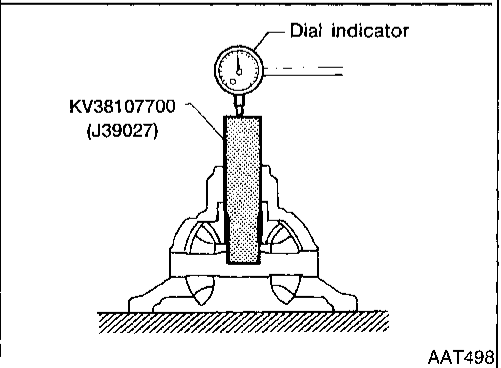
Clearance between side gear and differential case with washers:

0.1 - 0.2 mm (0.004 - 0.008 in)

- c. If not within specification adjust clearance by changing thickness of side gear thrust washer.

Side gear thrust washers for differential case side:

Refer to SDS, AT-327.



REPAIR FOR COMPONENT PARTS

Final Drive — RE4F03V (Cont'd)

Viscous coupling side

- Place side gear and thrust washer on pinion mate gears installed on differential case.
 - Measure dimension X.
- Measure dimension X in at least two places.

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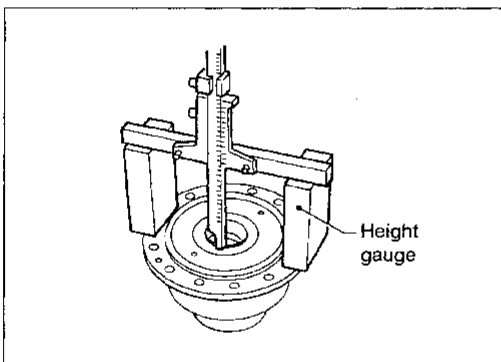
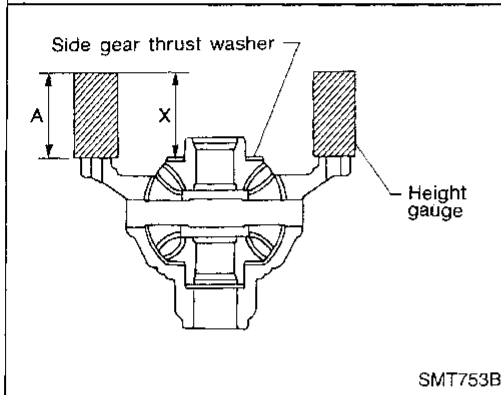
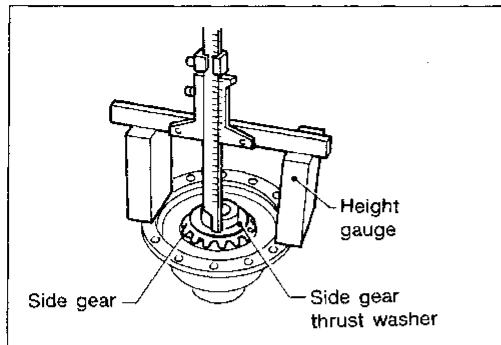
RS

BT

HA

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IDX

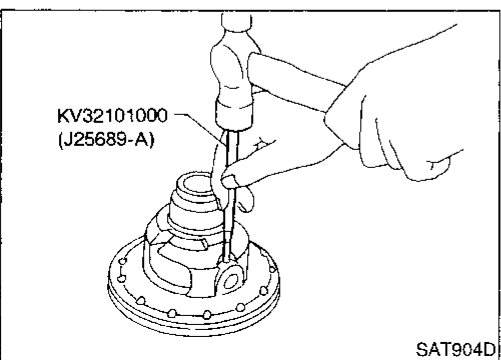
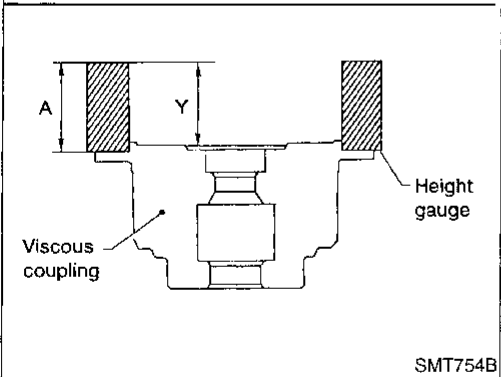


- Measure dimension Y.

- Measure dimension Y in at least two places.
Clearance between side gear and viscous coupling = $X + Y - 2A$: 0.1 - 0.2 mm (0.004 - 0.008 in)
A: Height of gauge

- If not within specification, adjust clearance by changing thickness of side gear thrust washer.

**Side gear thrust washers for viscous coupling side:
Refer to SDS, AT-327.**

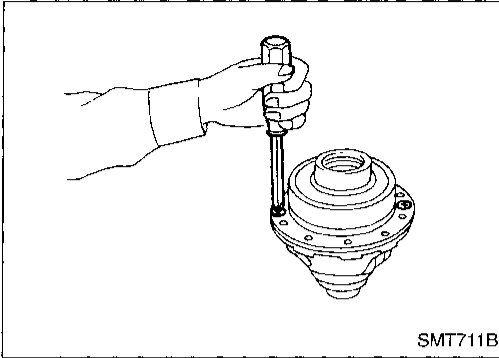


- Install retaining pin.

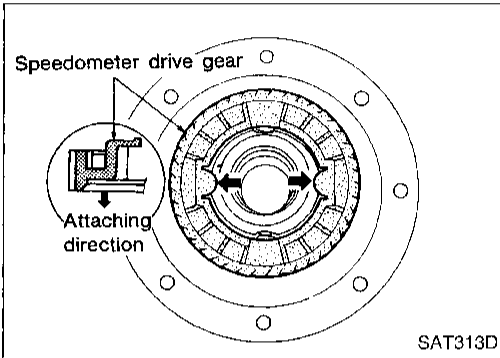
- Make sure that retaining pin is flush with case.

REPAIR FOR COMPONENT PARTS

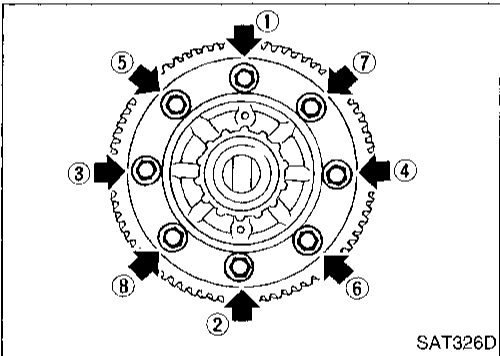
Final Drive — RE4F03V (Cont'd)



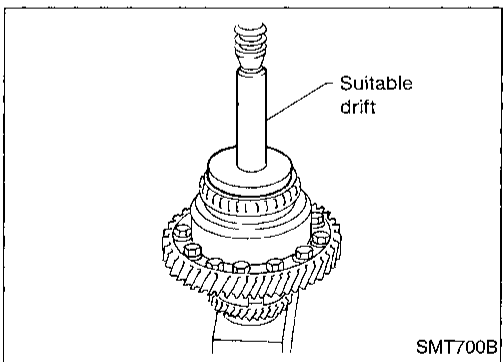
5. Install side gear (viscous coupling side) on differential case and then install viscous coupling.



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

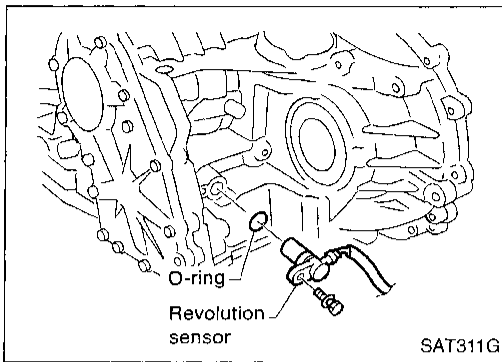


7. Install final gear and tighten fixing bolts in numerical order.



8. Press on differential side bearings.

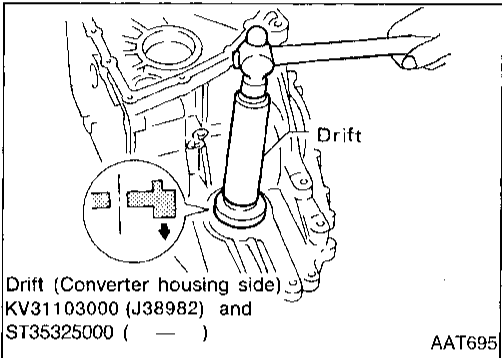
ASSEMBLY



Assembly 1

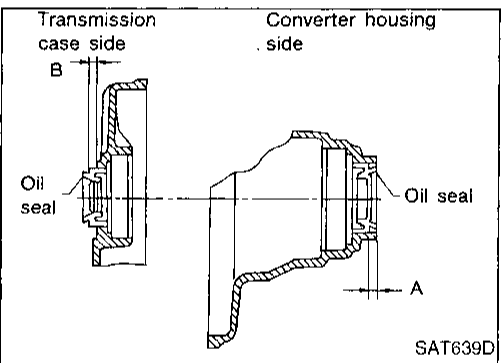
— RE4F03V only —

1. Install revolution sensor onto transmission case.
Always use new sealing parts.



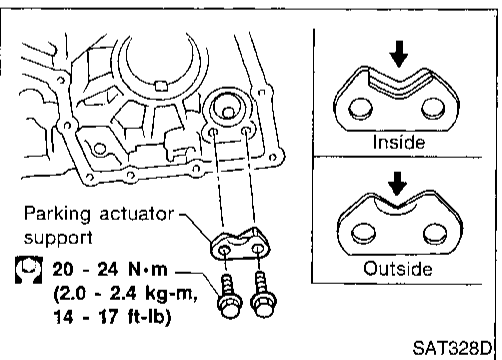
— RL4F03A & RE4F03V —

2. Install differential side oil seals on transmission case and converter housing, so that "A" and "B" are within specifications.

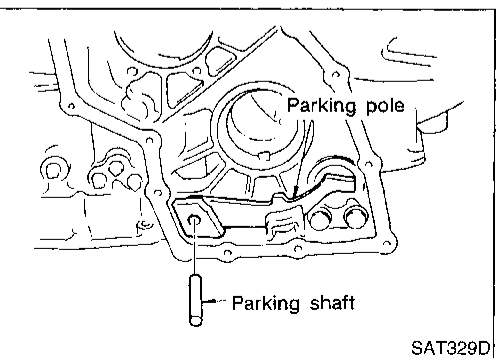


Unit: mm (in)

A	B
5.5 - 6.5 (0.217 - 0.256)	0.5 (0.020) or less



3. Install parking actuator support to transmission case.
• **Pay attention to direction of parking actuator support.**

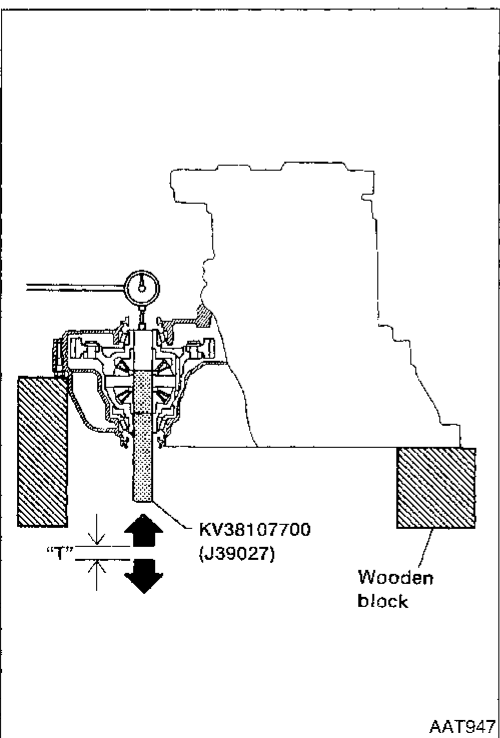
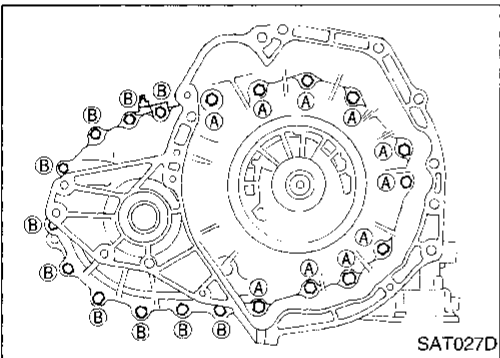
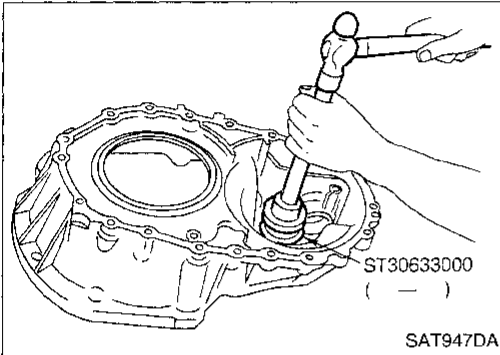
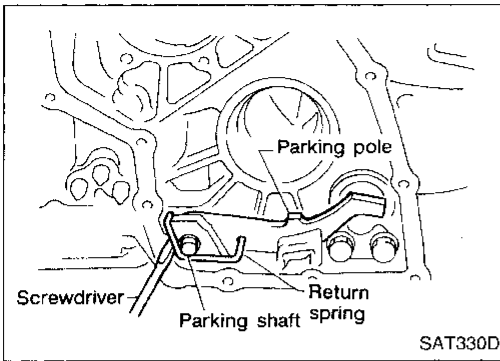


4. Install parking pawl on transmission case and fix it with parking shaft.

ASSEMBLY

Assembly 1 (Cont'd)

5. Install return spring.



Adjustment 1

DIFFERENTIAL SIDE BEARING PRELOAD

— RE4F03V —

1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.
3. Place final drive assembly on transmission case.
4. Install transmission case on converter housing. Tighten transmission case fixing bolts (A) and (B) to the specified torque.

5. Attach dial indicator on differential case at transmission case side.
6. Insert Tool into differential side gear from converter housing.
7. Move Tool up and down and measure dial indicator deflection.

Differential side bearing preload "T":

0.04 mm - 0.09 mm (0.0016 in. - 0.0035 in.)

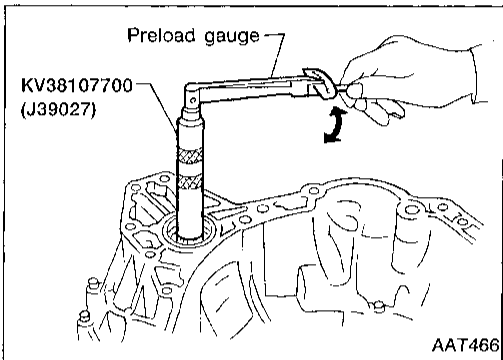
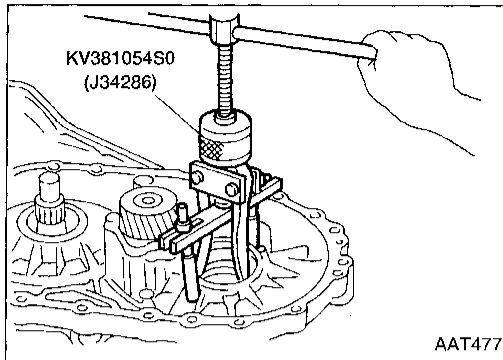
8. Select proper thickness of differential side bearing adjusting shim(s) using SDS table as a guide.

Differential side bearing adjusting shim:

Refer to SDS, AT-328.

ASSEMBLY

Adjustment 1 (Cont'd)



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

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

- Turn final drive assembly in both directions several times to seat bearing rollers correctly.

Turning torque of final drive assembly (New bearing):

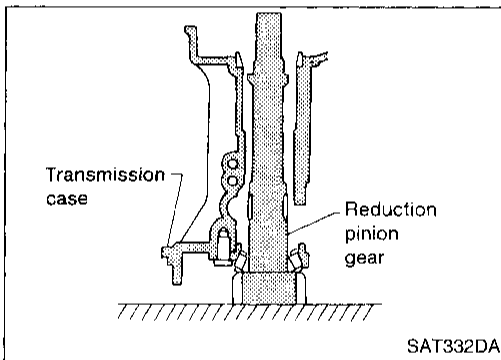
0.49 - 1.08 N·m (5.0 - 11.0 kg·cm, 4.3 - 9.5 in·lb)

- When old bearing is used again, turning torque will be slightly less than the above.
- Make sure torque is close to the specified range.

REDUCTION PINION GEAR BEARING PRELOAD

— RL4F03A & RE4F03V —

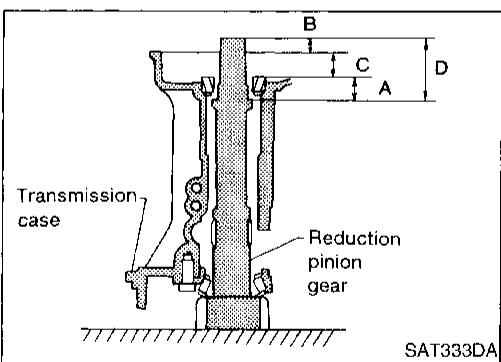
1. Remove transmission case and final drive assembly from converter housing.
2. Select proper thickness of reduction pinion gear bearing adjusting shim using the following procedures.
 - a. Place reduction pinion gear on transmission case as shown.



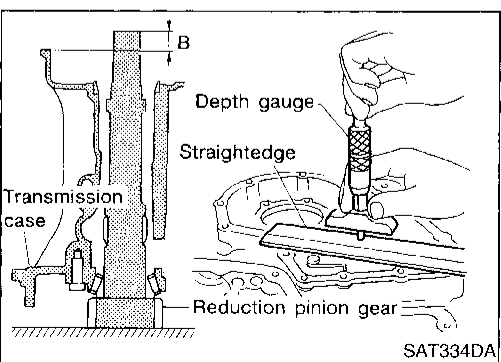
- b. Place idler gear bearing on transmission case.
 - c. Measure dimensions "B" "C" and "D" and calculate dimension "A".

$$A = D - (B + C)$$

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

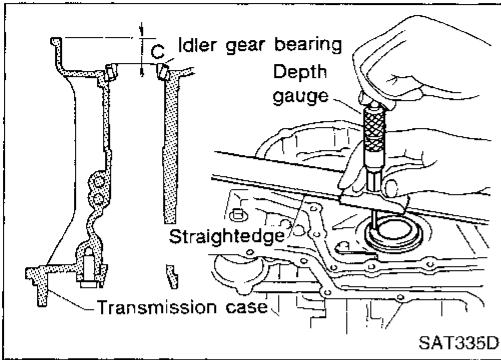


- Measure dimension "B" between the end of reduction pinion gear and the surface of transmission case.
- Measure dimension "B" in at least two places.

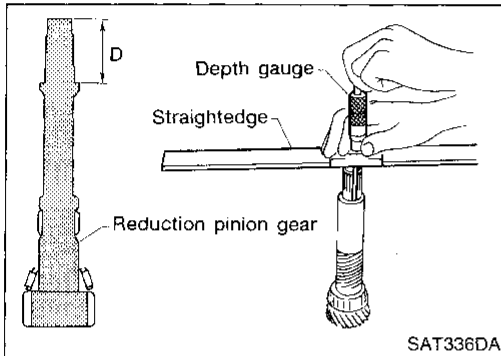


ASSEMBLY

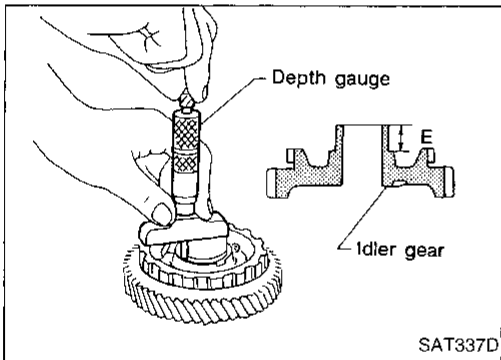
Adjustment 1 (Cont'd)



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



- Measure dimension "D" between the end of reduction pinion gear and the adjusting shim mating surface of reduction pinion gear.
- **Measure dimension "D" in at least two places.**
- Calculate dimension "A"
 $A = D - (B + C)$



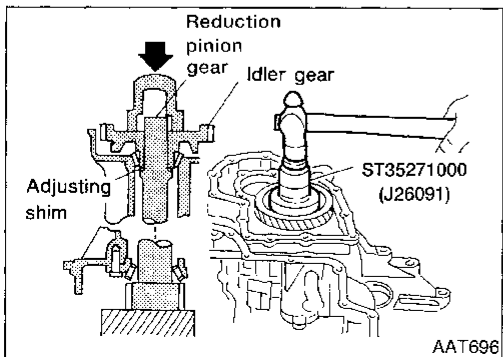
- d. Measure dimension "E" between the end of idler gear and the idler gear bearing inner race mating surface of idler gear.
- **Measure dimension "E" in at least two places.**

- e. Calculate "T" and select proper thickness of reduction pinion gear bearing adjusting shim using SDS table as a guide.

$$T = A - E$$

Reduction pinion gear bearing adjusting shim:

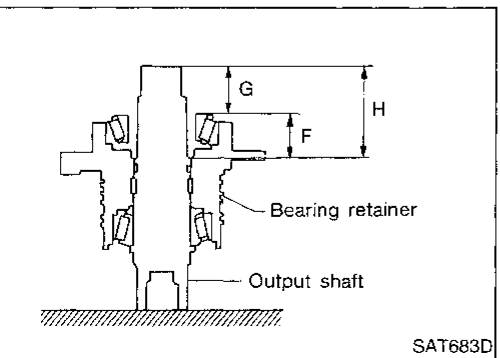
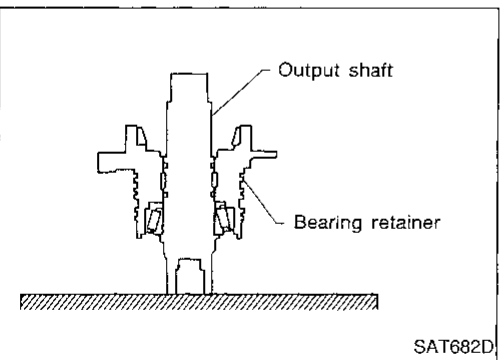
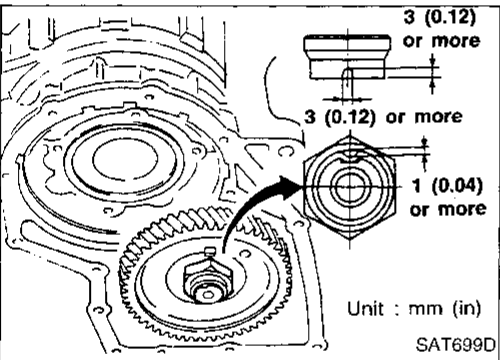
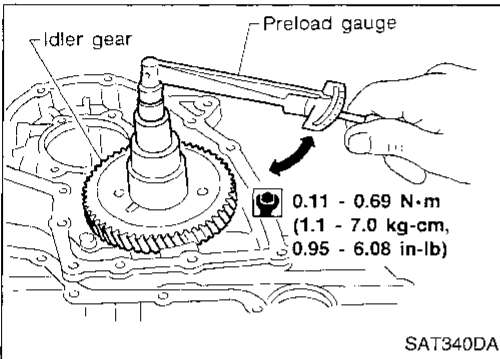
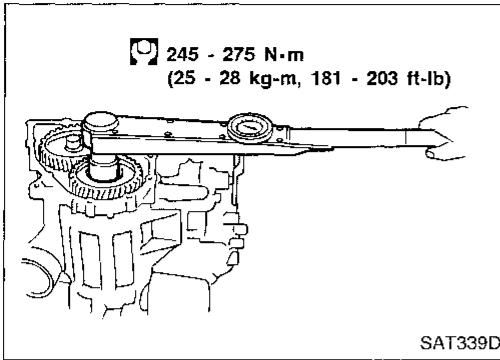
Refer to SDS, AT-329.



3. Install reduction pinion gear and reduction pinion gear bearing adjusting shim selected in step 2-e on transmission case.
 4. Press idler gear bearing inner race on idler gear.
 5. Press idler gear on reduction pinion gear.
- **Press idler gear so that idler gear can be locked by parking pawl.**

ASSEMBLY

Adjustment 1 (Cont'd)



6. Tighten idler gear lock nut to the specified torque.
 - Lock idler gear with parking pawl when tightening lock nut.

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

Turning torque of reduction pinion gear:

0.11 - 0.69 N·m (1.1 - 7.0 kg·cm, 0.95 - 6.08 in·lb)

8. After properly adjusting turning torque, clinch idler gear lock nut as shown (only RL4F03V).

OUTPUT SHAFT BEARING PRELOAD

— RL4F03A —

1. Select proper thickness of output shaft bearing adjusting spacer using the following procedures.
 - a. Remove paper rolled around output shaft.
 - b. Place bearing retainer on output shaft.

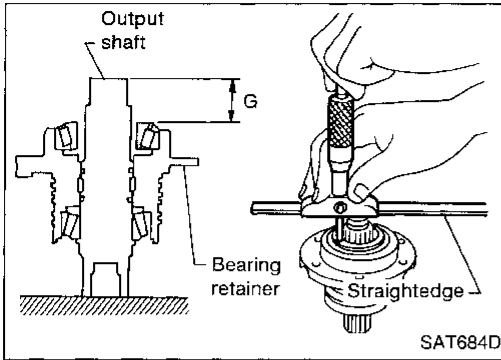
- c. Place output gear bearing inner race on bearing retainer.
- d. Measure dimensions "G" and "H" and calculate dimension "F".

"F": Distance between the surface of output gear bearing inner race and adjusting shim mating surface of output shaft.

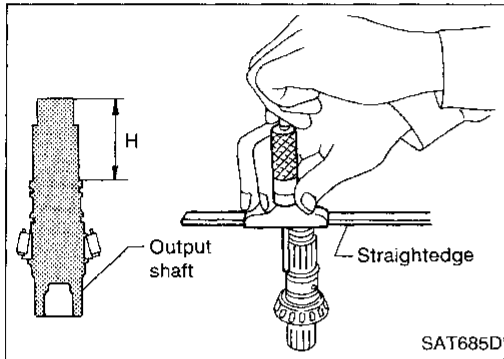
$$F = H - G$$

ASSEMBLY

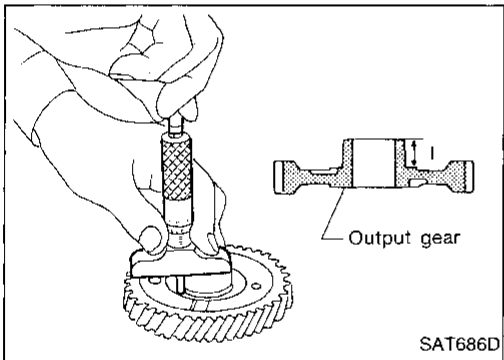
Adjustment 1 (Cont'd)



- Measure dimension "G" between end of output shaft and surface of output gear bearing inner race.
- **Measure in at least two places.**



- Measure dimension "H" between end of output shaft and adjusting spacer mating surface of output shaft.
- **Measure in at least two places.**
- Calculate dimension "F".
$$F = H - G$$



- e. Measure distance "I" between end of output gear (adjusting spacer mating surface) and bearing inner race fitting surface.

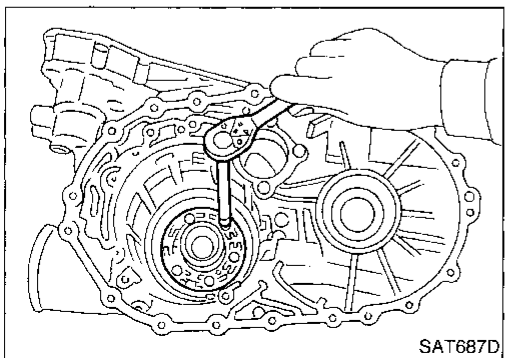
- f. Calculate dimension " T_2 ".

" T_2 ": Distance between adjusting spacer mating surface of output gear and output shaft

$$T_2 = F - I$$

- g. Select proper thickness of output shaft bearing adjusting spacer using SDS table as a guide.

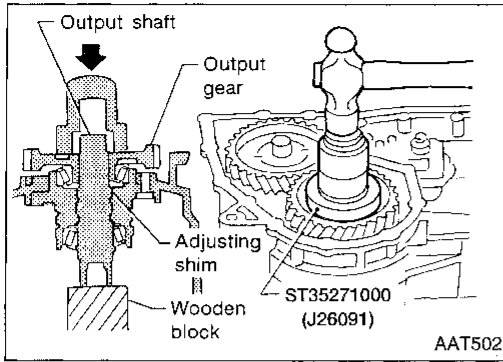
**Output shaft bearing adjusting spacer:
Refer to SDS, AT-330.**



- 2. Install bearing retainer on transmission case.

ASSEMBLY

Adjustment 1 (Cont'd)



3. Place output shaft on bearing retainer.
4. Place output shaft bearing adjusting spacer selected in step 1-g on output shaft.
5. Press output gear bearing inner race on output gear.
6. Press output gear on output shaft.

GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

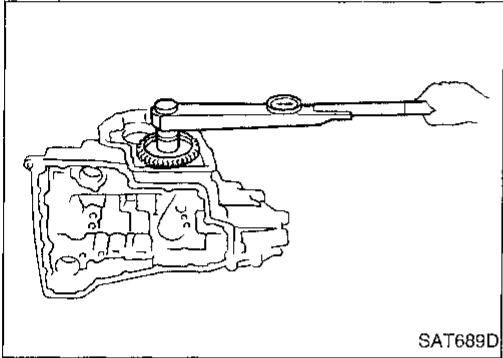
RS

BT

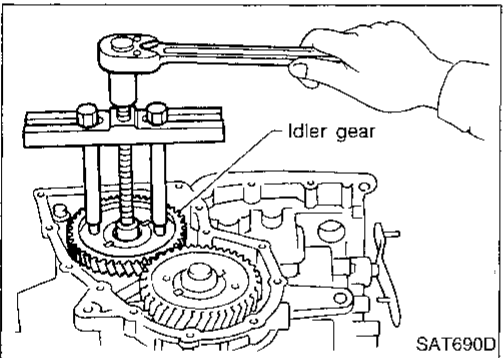
HA

EL

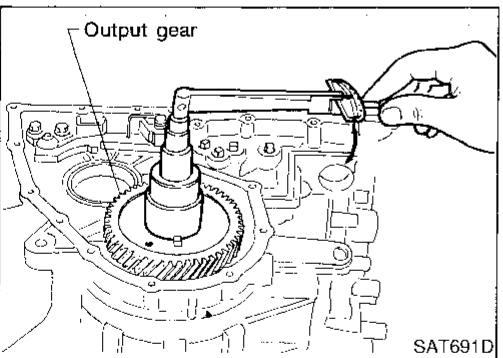
IDX



7. Tighten output gear lock nut to specified torque.

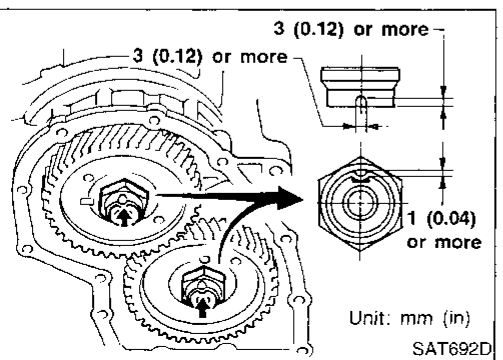


8. Remove idler gear to measure output shaft preload.



9. Measure turning torque of output shaft.
 - When measuring turning torque, turn output shaft in both directions several times to seat bearing rollers correctly.

Turning torque of output shaft:
0.25 - 0.88 N·m
(2.5 - 9.0 kg·cm, 2.2 - 7.8 in·lb)

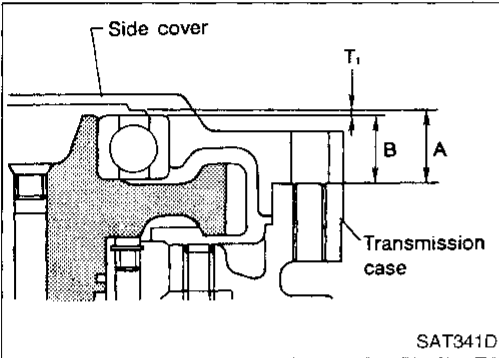
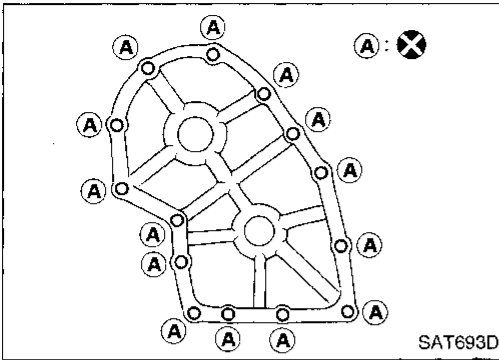


10. Install idler gear and tighten lock nut to specified torque.
11. After properly adjusting "turning" torque, clinch idler gear and output gear lock nuts as shown.

ASSEMBLY

Adjustment 1 (Cont'd)

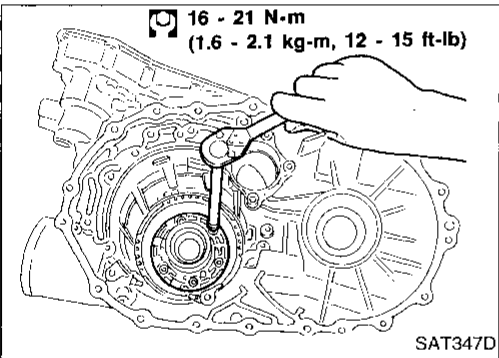
12. Install new gasket and side cover on transmission case.



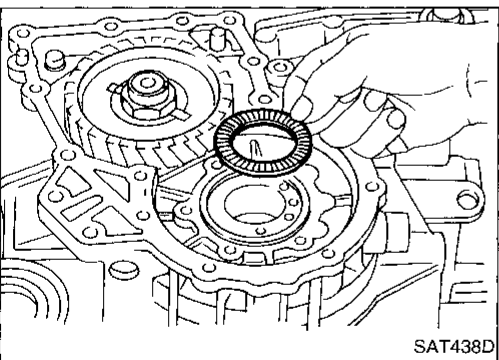
OUTPUT SHAFT END PLAY

— RE4F03V —

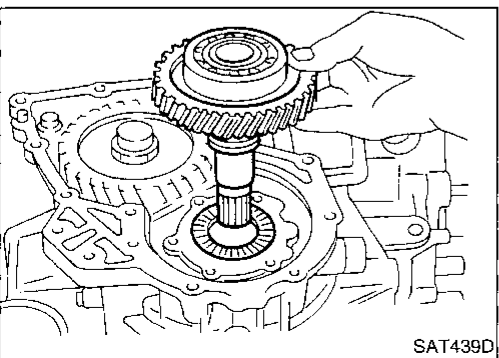
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



1. Install bearing retainer for output shaft.



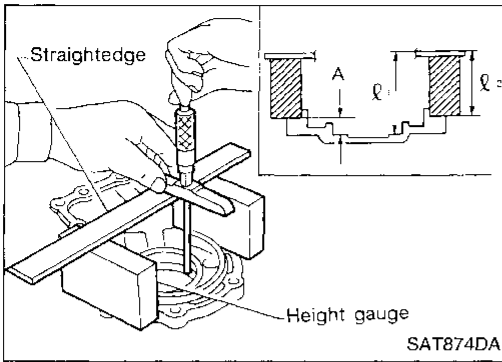
2. Install output shaft thrust needle bearing on bearing retainer.



3. Install output shaft on transmission case.

ASSEMBLY

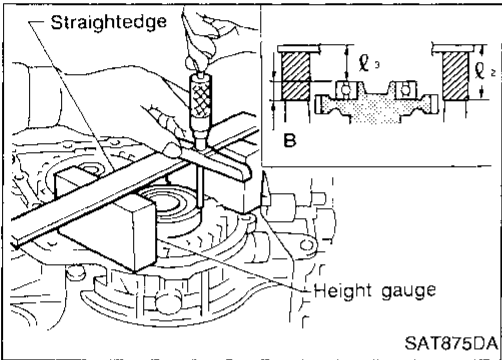
Adjustment 1 (Cont'd)



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

- Measure dimension " l_1 " and " l_2 " in at least two places.
- "A": Distance between transmission case fitting surface and adjusting shim mating surface.

$$A = l_1 - l_2 \quad l_2: \text{Height of gauge}$$

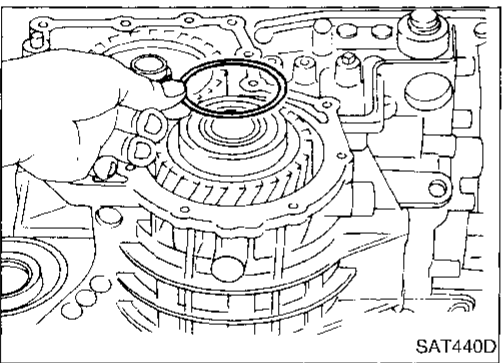


5. Measure dimensions " l_2 " and " l_3 " and then calculate dimension "B".

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

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

$$B = l_2 - l_3 \quad l_2: \text{Height of gauge}$$



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

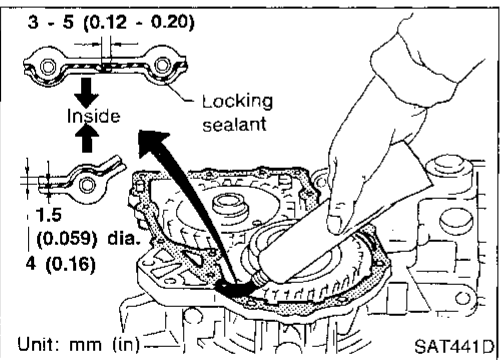
Output shaft end play (A - B):

0 - 0.5 mm (0 - 0.020 in)

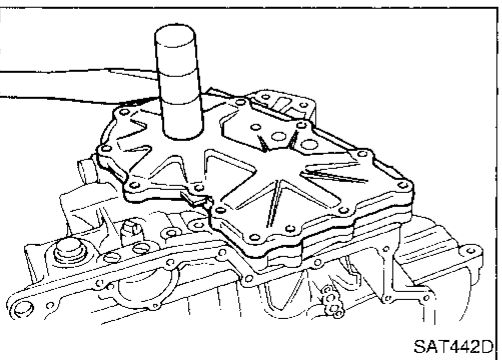
Output shaft end play adjusting shim:

Refer to SDS, AT-331.

7. Install adjusting shim on output shaft bearing.



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

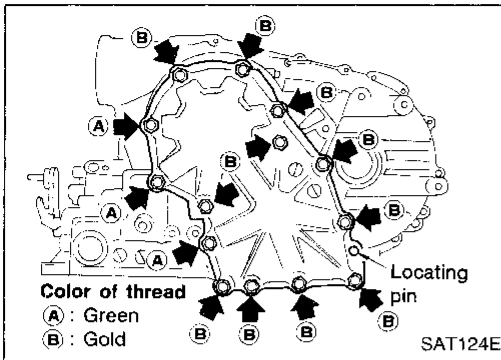


9. Install side cover on transmission case.

- Apply locking sealant to the mating surface of transmission case.

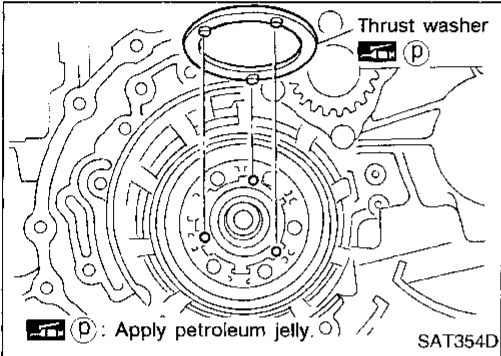
ASSEMBLY

Adjustment 1 (Cont'd)



10. Tighten side cover fixing bolts to specified torque.

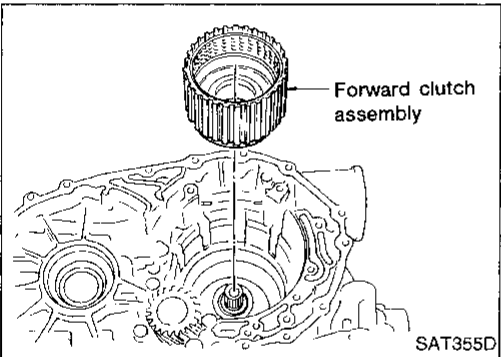
- Do not mix bolts (A) and (B).
- Always replace bolts (A) as they are self-sealing bolts.



Assembly 2

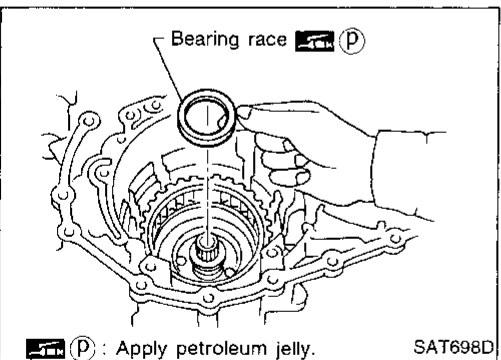
— RL4F03A & RE4F03V —

1. Remove paper rolled around bearing retainer.
 2. Install thrust washer on bearing retainer.
- Apply petroleum jelly to thrust washer.



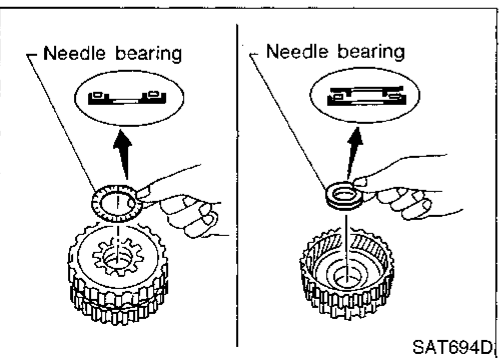
3. Install forward clutch assembly.

- Align teeth of low & reverse brake drive plates before installing.
- Make sure that bearing retainer seal rings are not spread.



— RL4F03A —

4. Install bearing race on bearing retainer.
- Apply petroleum jelly to bearing race.



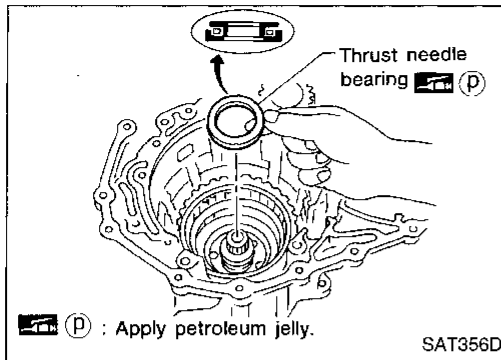
5. Install needle bearings on rear internal gear.

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

ASSEMBLY

Assembly 2 (Cont'd)

— RE4F03V —



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

GI

MA

EM

LC

EC

FE

CL

MT

AT

FA

RA

BR

ST

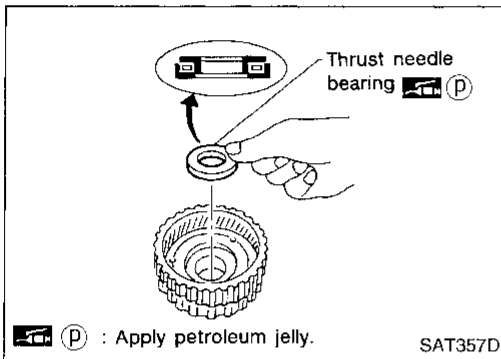
RS

BT

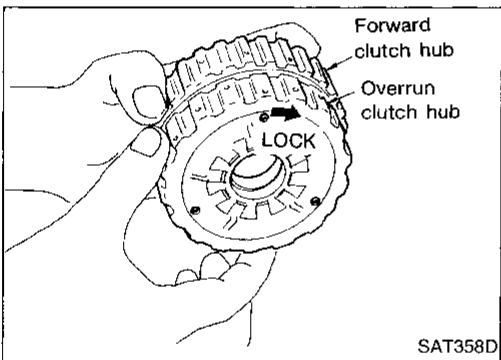
HA

EL

IDX

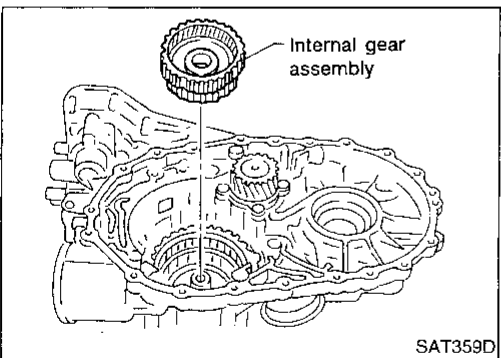


5. Install thrust needle bearing on rear internal gear.
 - Apply petroleum jelly to thrust needle bearing.
 - Pay attention to direction of thrust needle bearing.

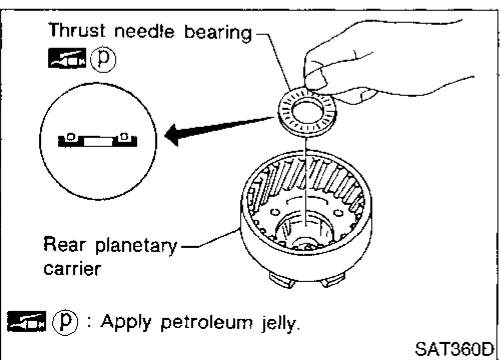


— RL4F03A & RE4F03V —

6. Hold forward clutch hub and turn overrun clutch hub. Check overrun clutch hub for directions of lock and unlock.
 - If not as shown in illustration, check installed direction of forward one-way clutch.



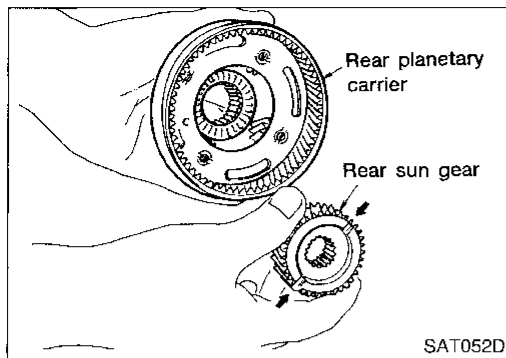
7. Install rear internal gear assembly.
 - Align teeth of forward clutch and overrun clutch drive plate.



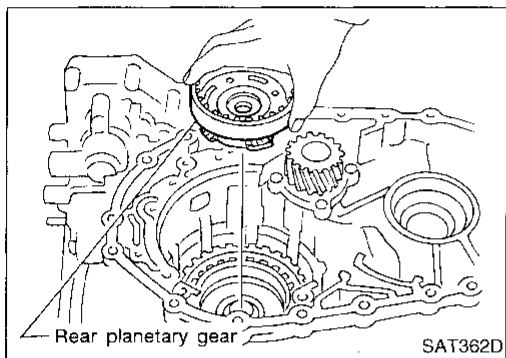
8. Install needle bearing on rear planetary carrier.
 - Apply petroleum jelly to needle bearing.
 - Pay attention to direction of needle bearing.

ASSEMBLY

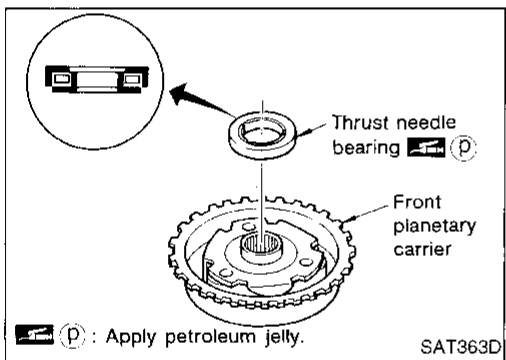
Assembly 2 (Cont'd)



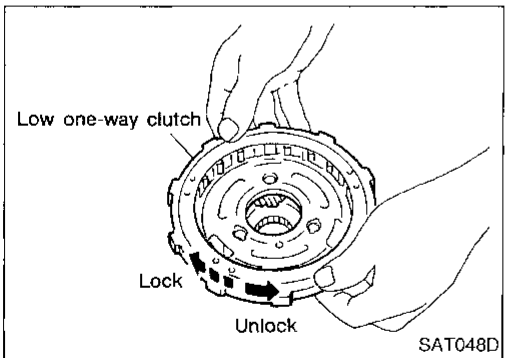
9. Install rear sun gear on rear planetary carrier.
- Pay attention to direction of rear sun gear.



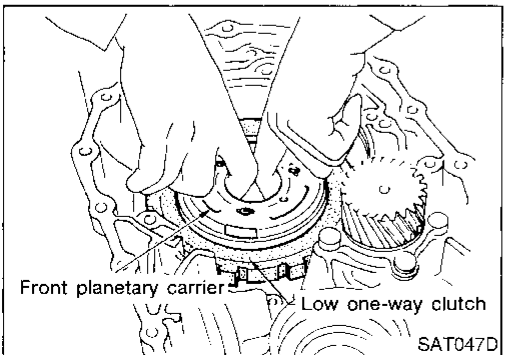
10. Install rear planetary carrier on transmission case.



11. Install thrust needle bearing on front planetary carrier.
- Apply petroleum jelly to thrust needle bearing.
 - Pay attention to direction of thrust needle bearing.



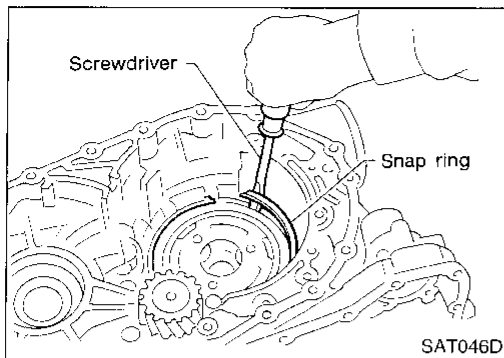
12. Install low one-way clutch to front planetary carrier by turning it in the direction of the arrow as shown.
13. While holding front planetary carrier, turn low one-way clutch. Check low one-way clutch for correct directions of lock and unlock.



14. Install front planetary carrier assembly on transmission case.

ASSEMBLY

Assembly 2 (Cont'd)



15. Install snap ring with screwdriver.

- Forward clutch and bearings must be correctly installed for snap ring to fit groove of transmission case.

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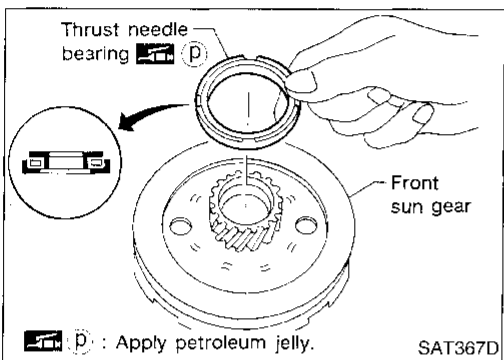
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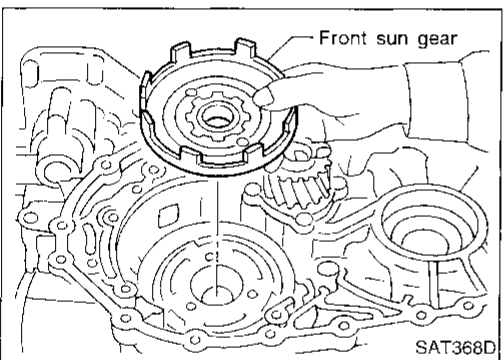
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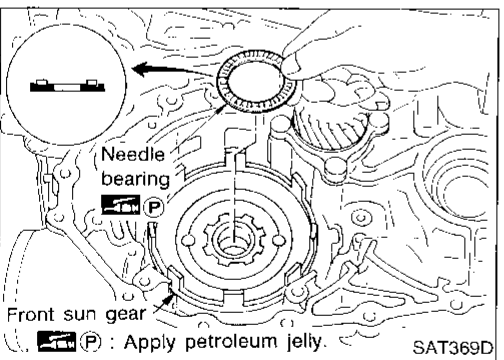


16. Install needle bearing on front sun gear.

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

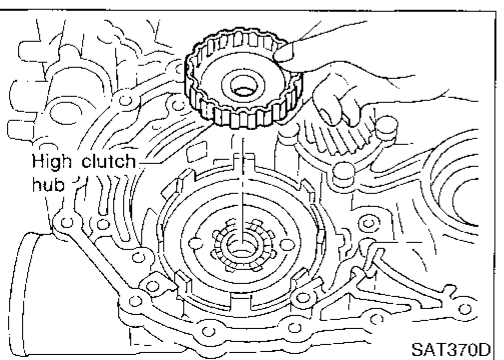


17. Install front sun gear on front planetary carrier.



18. Install needle bearing on front sun gear.

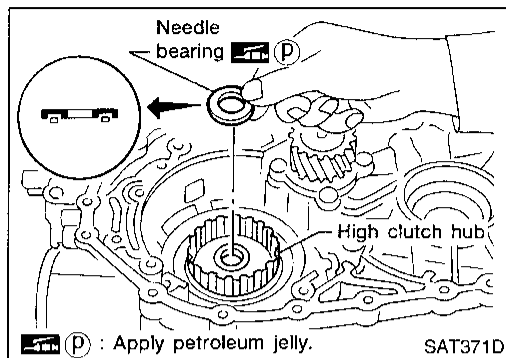
- Apply petroleum jelly to needle bearing.
- Pay attention to direction of needle bearing.



19. Install high clutch hub on front sun gear.

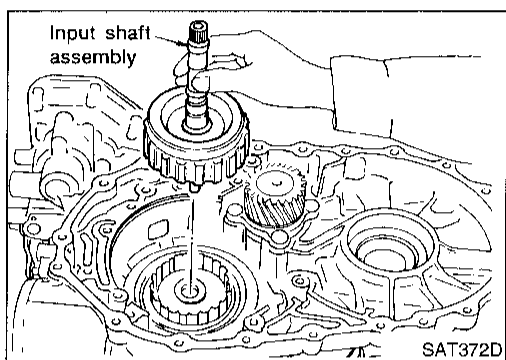
ASSEMBLY

Assembly 2 (Cont'd)



20. Install needle bearing on high clutch hub.

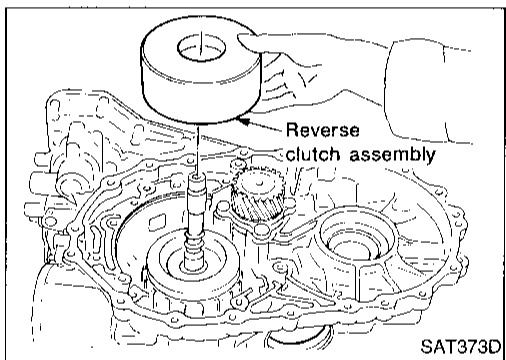
- Apply petroleum jelly to needle bearing.
- Pay attention to direction of needle bearing.



21. Remove paper rolled around input shaft.

22. Install input shaft assembly.

- Align teeth of high clutch drive plates before installing.



23. Install reverse clutch assembly.

- Align teeth of reverse clutch drive plates before installing.

Adjustment 2

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

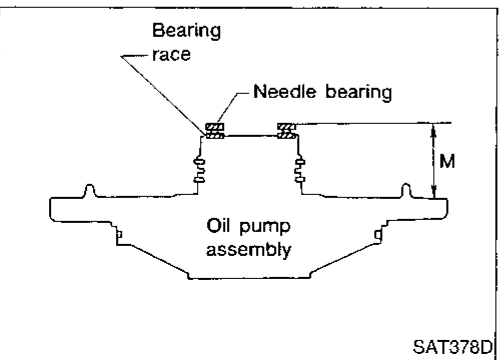
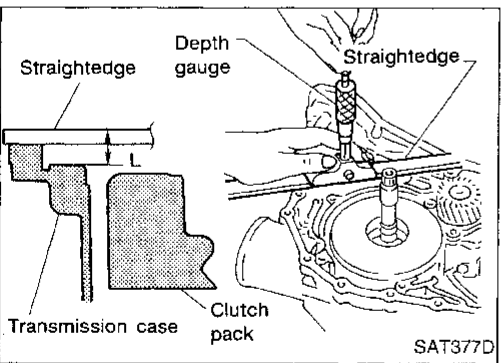
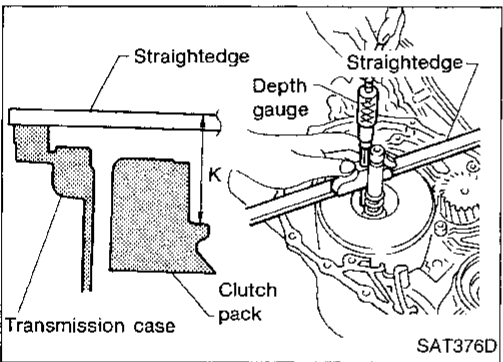
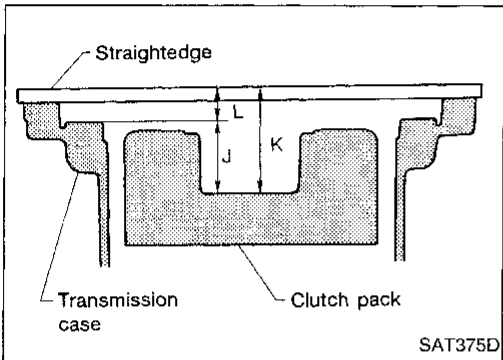
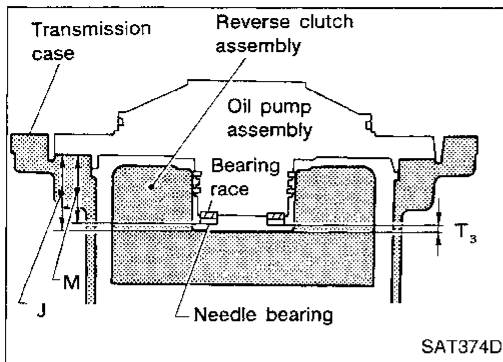
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	—	●

ASSEMBLY

Adjustment 2 (Cont'd)

TOTAL END PLAY

- Measure clearance between reverse clutch drum and needle bearing for oil pump cover.
- Select proper thickness of bearing race so that end play is within specifications.



1. Measure dimensions "K" and "L" and then calculate dimension "J".

- a. Measure dimension "K".

- b. Measure dimension "L".
- c. Calculate dimension "J".

"J": Distance between oil pump fitting surface of transmission case and needle bearing mating surface of high clutch drum.

$$J = K - L$$

2. Measure dimension "M".

- a. Place bearing race and needle bearing on oil pump assembly.

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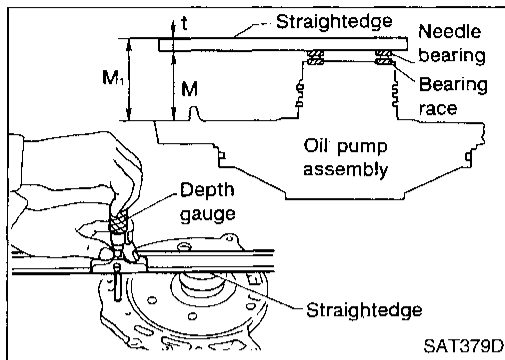
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ASSEMBLY

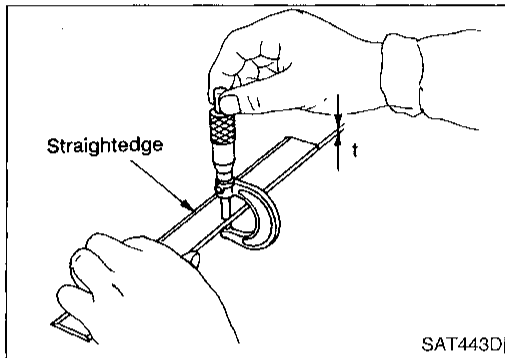
Adjustment 2 (Cont'd)



b. Measure dimension "M".

"M": Distance between transmission case fitting surface and needle bearing on oil pump cover.

"M₁": Indication of gauge.



c. Measure thickness of straightedge "t".

$$M = M_1 - t$$

3. Adjust total end play "T₃".

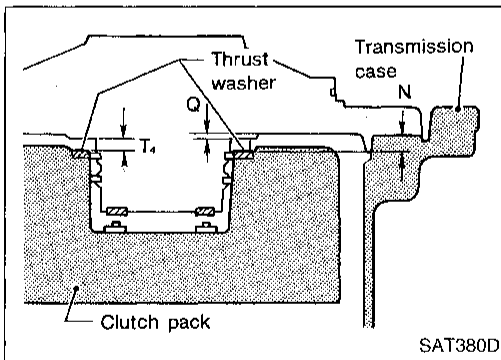
$$T_3 = J - M$$

Total end play "T₃":

0.25 - 0.55 mm (0.0098 - 0.0217 in)

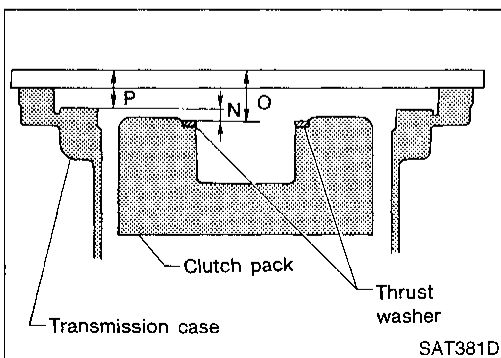
- Select proper thickness of bearing race so that total end play is within specifications.

Bearing races: Refer to SDS, AT-331.



REVERSE CLUTCH END PLAY

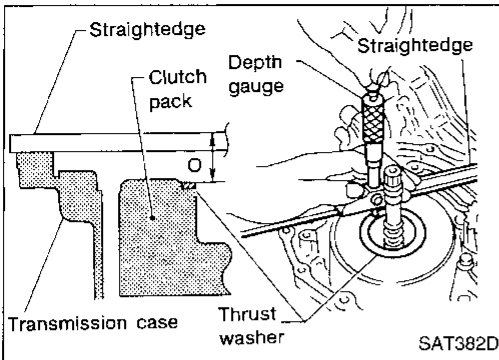
- Measure clearance between oil pump cover and thrust washer for reverse clutch drum.
- Select proper thickness of thrust washer so that end play is within specifications.



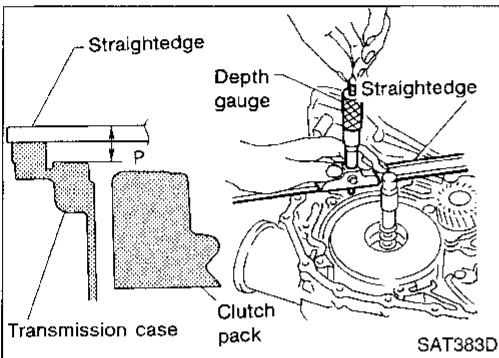
1. Measure dimensions "O" and "P" and then calculate dimension "N".

ASSEMBLY

Adjustment 2 (Cont'd)



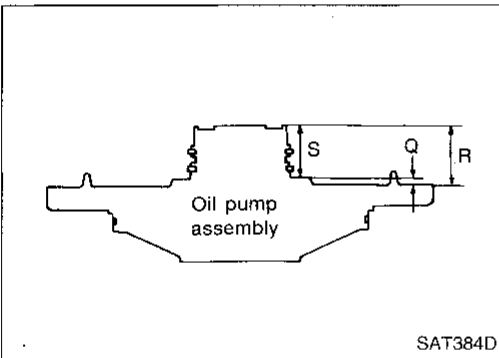
- Place thrust washer on reverse clutch drum.
- Measure dimension "O".



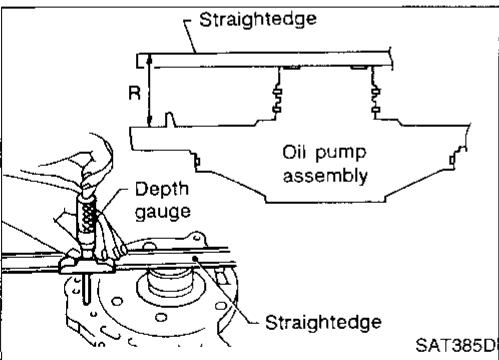
- Measure dimension "P".
- Calculate dimension "N".

"N": Distance between oil pump fitting surface of transmission case and thrust washer on reverse clutch drum.

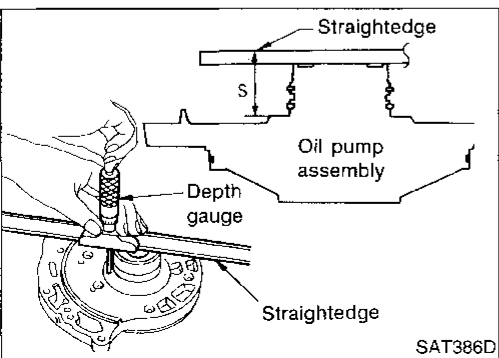
$$N = O - P$$



- Measure dimensions "R" and "S" and then calculate dimension "Q".



- Measure dimension "R".



- Measure dimension "S".
- Calculate dimension "Q".

"Q": Distance between transmission case fitting surface and thrust washer mating surface.

$$Q = R - S$$

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ASSEMBLY

Adjustment 2 (Cont'd)

- Adjust reverse clutch end play "T₄".

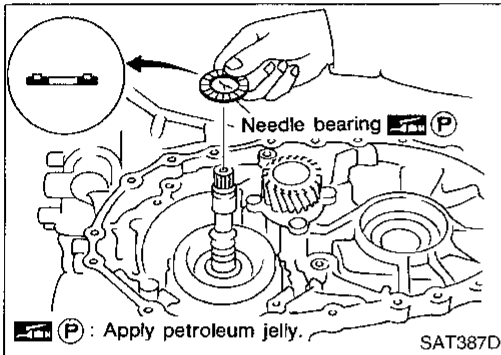
$$T_4 = N - Q$$

Reverse clutch end play:

0.65 - 1.00 mm (0.0256 - 0.0394 in)

- Select proper thickness of thrust washer so that reverse clutch end play is within specifications.

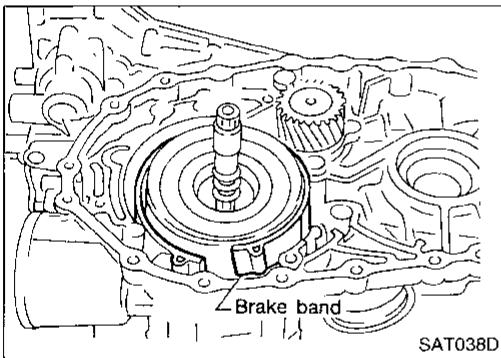
Thrust washer: Refer to SDS, AT-331.



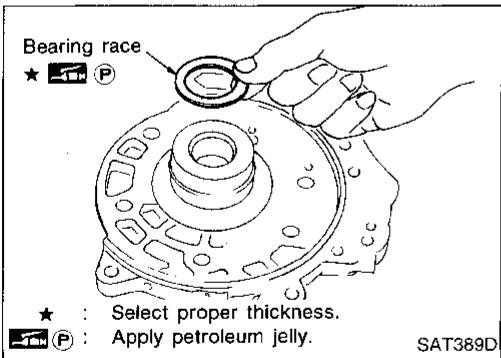
Assembly 3

- Remove reverse clutch assembly and install needle bearing on high clutch assembly.

- Pay attention to direction of needle bearing.
- Install reverse clutch assembly.

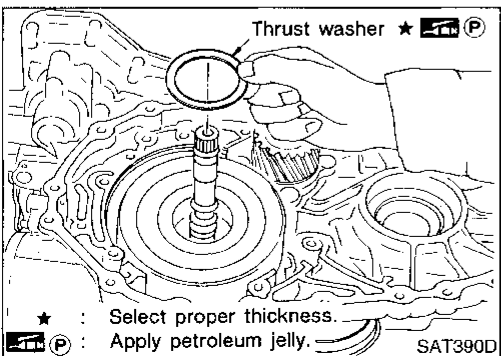


- Install anchor end pin and lock nut on transmission case.
- Place brake band on outside of reverse clutch drum. Tighten anchor end pin just enough so that brake band is evenly fitted on reverse clutch drum.



- Place bearing race selected in total end play adjustment step on oil pump cover.

- Apply petroleum jelly to bearing race.



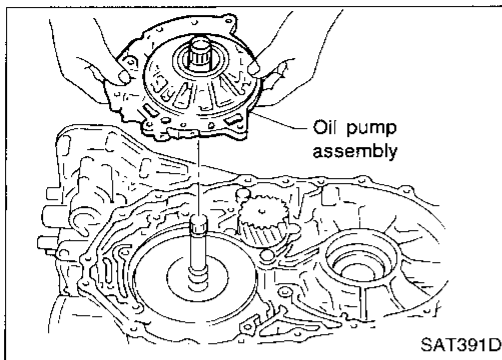
- Place thrust washer selected in reverse clutch end play step on reverse clutch drum.

- Apply petroleum jelly to thrust washer.

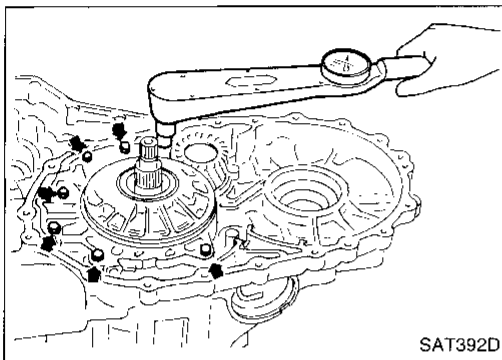
ASSEMBLY

Assembly 3 (Cont'd)

7. Install oil pump assembly on transmission case.

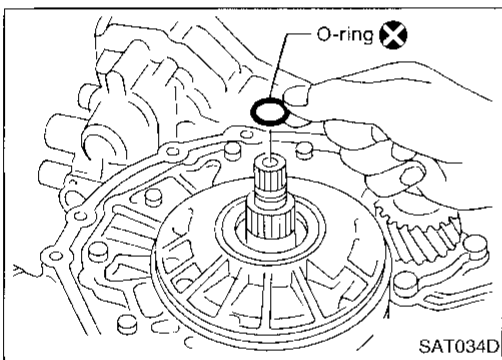


8. Tighten oil pump fixing bolts to specified torque.



9. Install O-ring to input shaft.


- Apply ATF to O-ring.

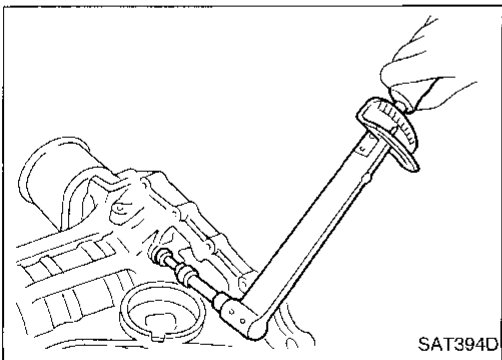


10. Adjust brake band.

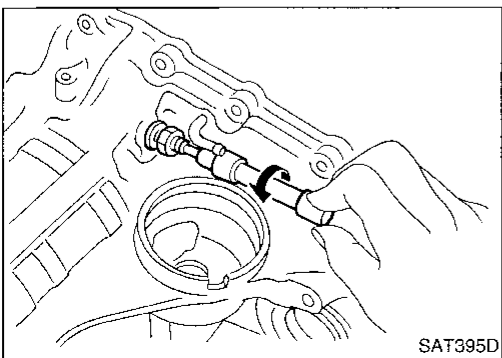
- a. Tighten anchor end pin to specified torque.

Anchor end pin:

 : 3.9 - 5.9 N·m (0.4 - 0.6 kg-m, 35 - 52 in-lb)



- b. Back off anchor end pin two and a half turns.



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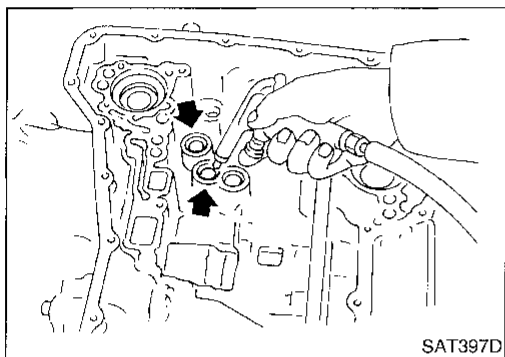
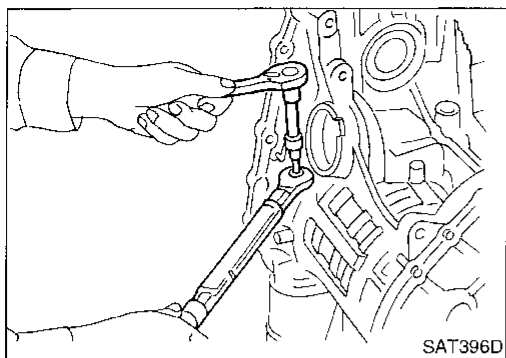
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ASSEMBLY

Assembly 3 (Cont'd)

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



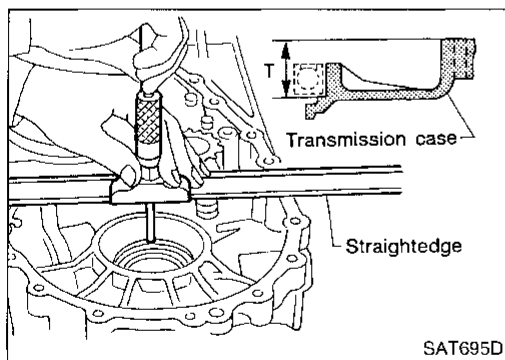
11. Apply compressed air to oil holes of transmission case and check operation of brake band.

Adjustment 3

FINAL DRIVE END PLAY

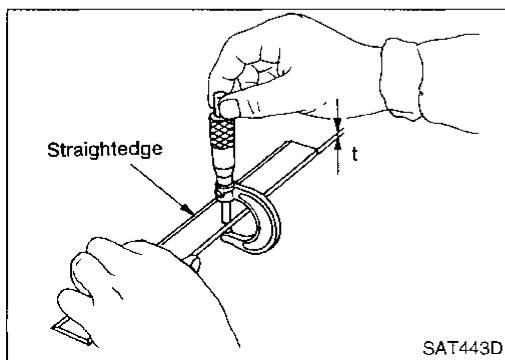
— RL4F03A —

- Measure clearance between differential side bearing and transmission case.
- Select proper thickness of adjusting shim so that end play is within specifications.



1. Measure dimension "T" between side bearing fitting surface of transmission case and converter housing fitting surface of transmission case.

"T₁": indication of gauge

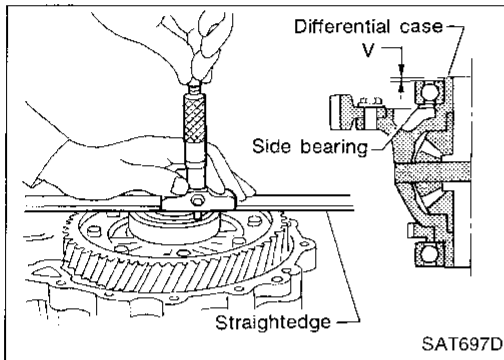
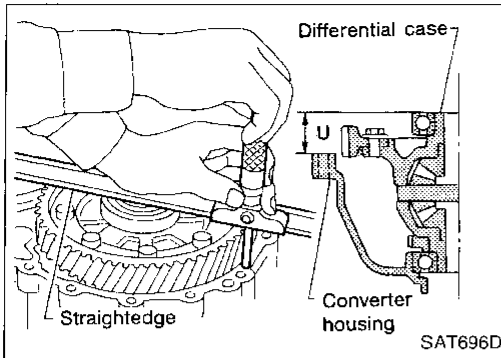


2. Measure thickness of straightedge "t".

$$T = T_1 - t$$

ASSEMBLY

Adjustment 3 (Cont'd)



3. Place final drive assembly on converter housing.
4. Measure dimension "U" between end of differential case and transmission case fitting surface of converter housing.

5. Measure dimension "V" between end of differential case and adjusting shim mating surface of differential side bearing.

6. Calculate final drive end play.

Final drive end play:

$$T - U + V$$

7. Select proper thickness of differential side bearing adjusting shim so that final drive end play is within specifications.

Final drive end play:

$$0 - 0.15 \text{ mm } (0 - 0.0059 \text{ in})$$

Differential side bearing adjusting shim:

Refer to SDS, AT-327.

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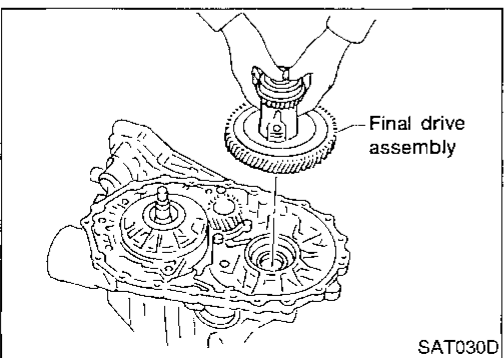
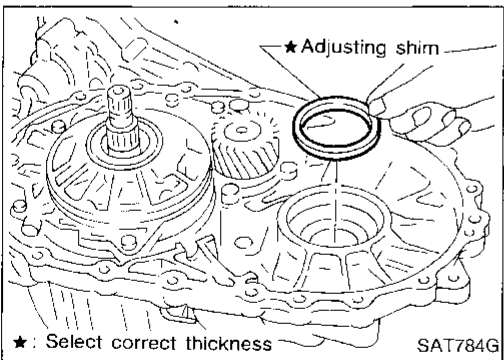
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Assembly 4

— RL4F03A & RE4F03V —

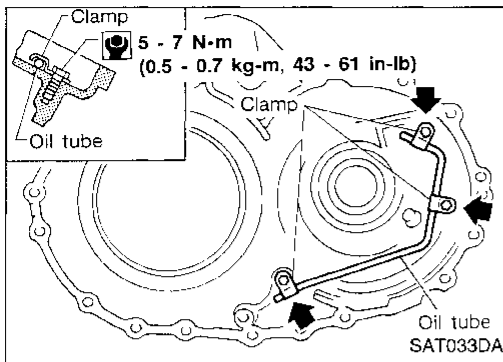
1. Install differential side bearing adjusting shim selected in final drive end play adjustment step on transmission case (only RL4F03A).

2. Install final drive assembly on transmission case.

ASSEMBLY

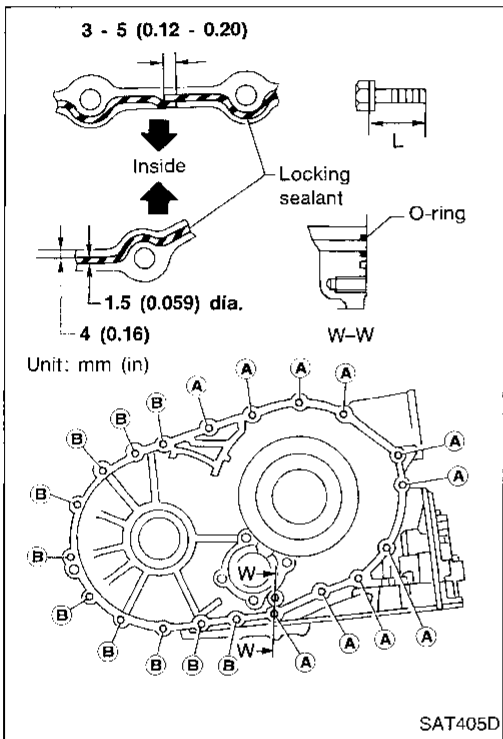
Assembly 4 (Cont'd)

3. Install oil tube on converter housing.

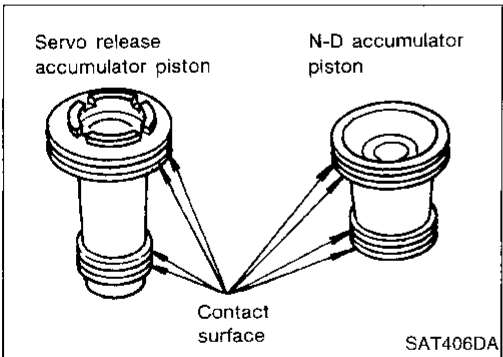


4. Install O-ring on differential oil port of transmission case.
5. Install converter housing on transmission case.
- **Apply locking sealant to mating surface of converter housing.**

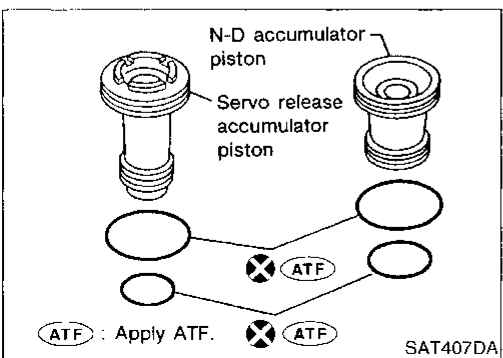
Bolt	Length mm (in)
(A)	32.8 (1.291)
(B)	40 (1.57)



6. Install accumulator piston.
- a. Check contact surface of accumulator piston for damage.

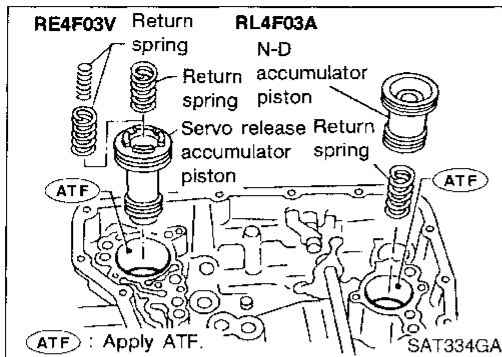


- b. Install O-rings on accumulator piston.
- Apply ATF to O-rings.
**Accumulator piston O-rings:
Refer to SDS, AT-331.**



ASSEMBLY

Assembly 4 (Cont'd)



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

- **Apply ATF to inner surface of transmission case.**
Return springs:
Refer to SDS, AT-331.

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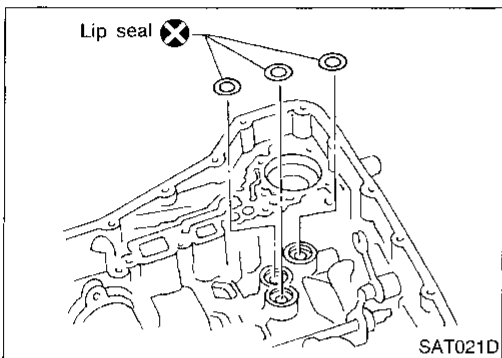
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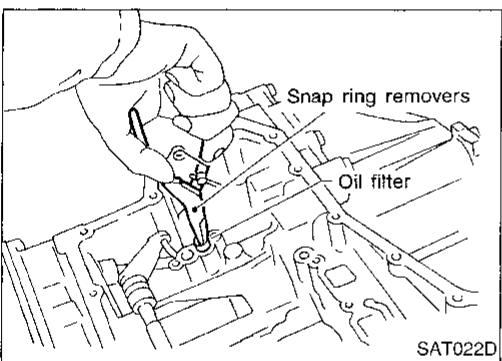
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7. Install lip seals for band servo oil holes on transmission case.

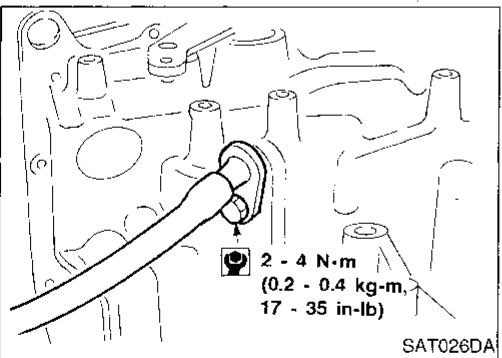
- **Apply petroleum jelly to lip seals.**



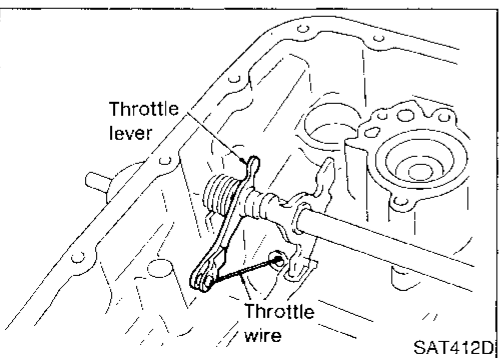
— RL4F03A only —

8. Install oil filter for governor valve.

- **Take care with its direction.**



9. Install throttle wire to transmission case.

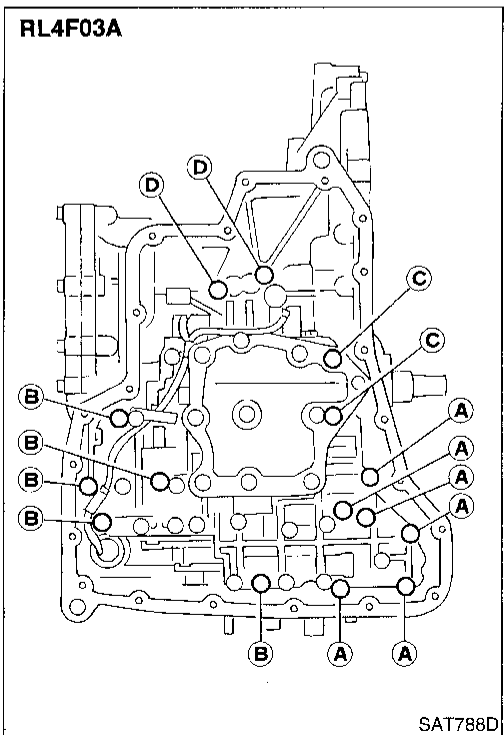
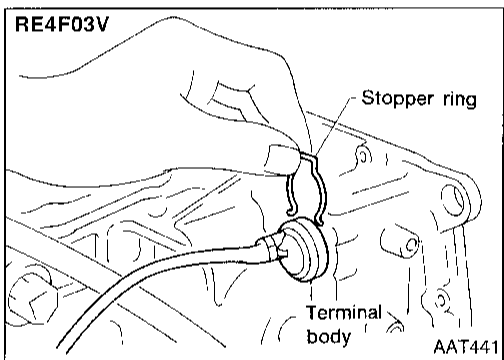
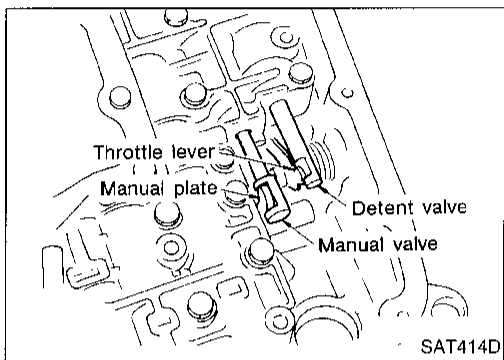
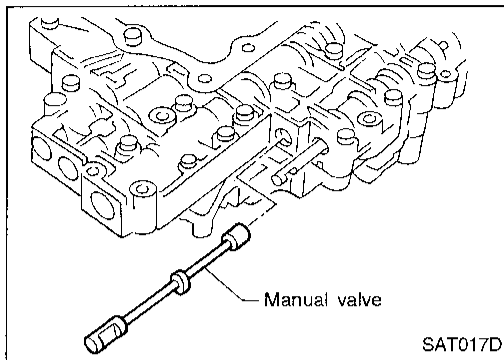


10. Install throttle wire to throttle lever.

ASSEMBLY

Assembly 4 (Cont'd)

— RL4F03A & RE4F03V —



11. Install control valve assembly.
- Insert manual valve into control valve assembly.
 - Apply ATF to manual valve.

- Set manual shaft in Neutral position.
- Install control valve assembly on transmission case while aligning manual valve with manual plate and detent valve with throttle lever. (RL4F03A only)
- Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.

- Install stopper ring to terminal body.

— RL4F03A —

- f. Tighten bolts (A), (B), (C) and (D).

: 7 - 9 N·m (0.7 - 0.9 kg-m, 61 - 78 in-lb)

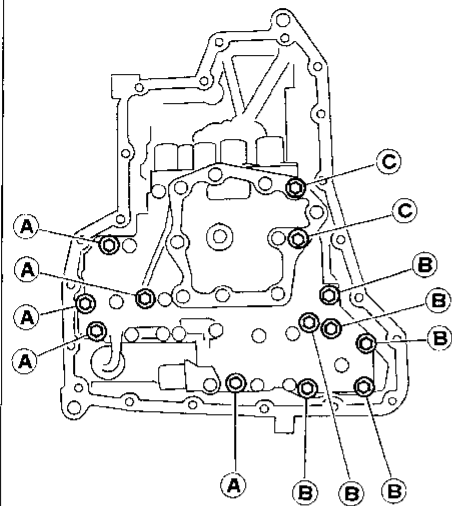
Bolt length, number and location:

Bolt symbol	(A)	(B)	(C)	(D)
Bolt length "l" mm (in)	33.0 (1.299)	40.0 (1.575)	43.5 (1.713)	25.0 (0.984)
Number of bolts	6	5	2	2

ASSEMBLY

Assembly 4 (Cont'd)

RE4F03V



SAT301G

— RE4F03V —

f. Tighten bolts (A), (B) and (C).

: 7 - 9 N·m (0.7 - 0.9 kg·m, 61 - 78 in-lb)

Bolt length, number and location

Bolt symbol	(A)	(B)	(C)
Bolt length "ℓ" mm (in)	40.0 (1.575)	33.0 (1.299)	43.5 (1.713)
Number of bolts	5	6	2

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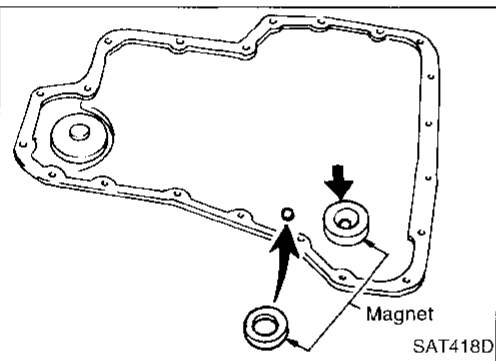
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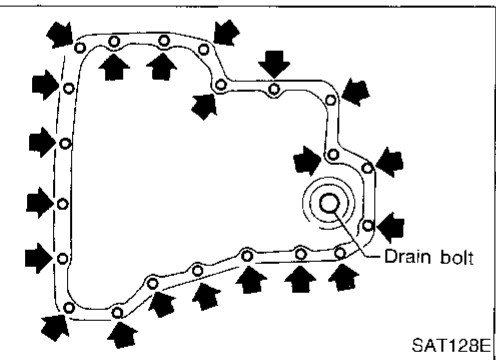


SAT418D

— RL4F03A & RE4F03V —

12. Install oil pan.

a. Attach magnet to oil pan.



SAT128E

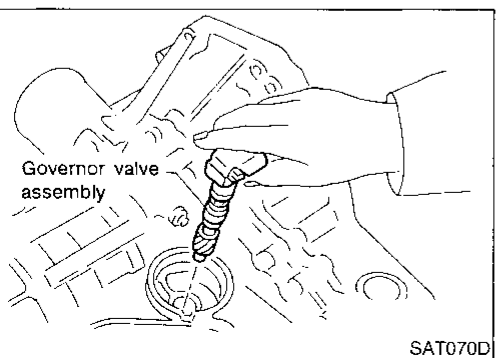
b. Install new oil pan gasket on transmission case.

c. Install oil pan on transmission case.

• **Always replace oil pan bolts as they are self-sealing bolts.**

• **Tighten the four bolts in a criss-cross pattern to prevent dislocation of gasket.**

d. Tighten drain plug to specified torque.



SAT070D

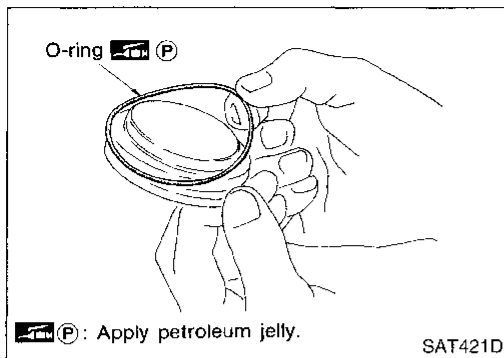
— RL4F03A only —

13. Install governor valve.

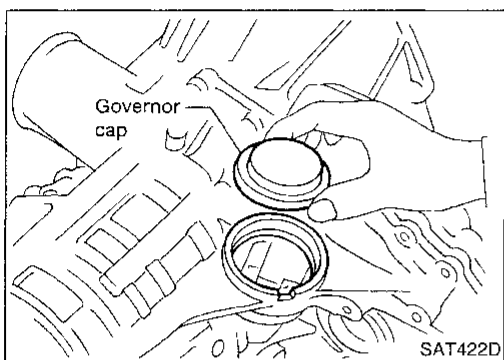
a. Install governor valve assembly into transmission case.

ASSEMBLY

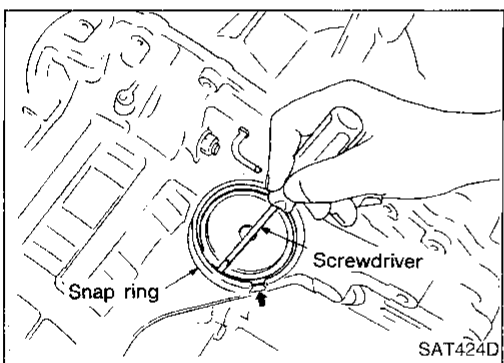
Assembly 4 (Cont'd)



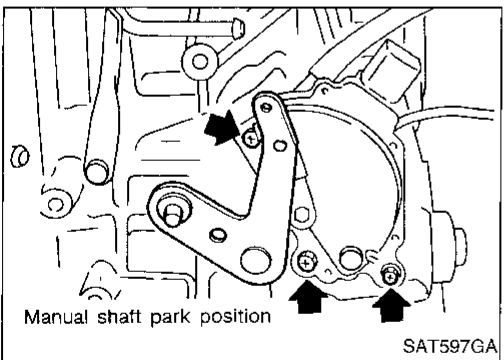
- b. Install O-ring to governor cap.
- Apply ATF to O-ring.



- c. Install governor cap onto transmission case.

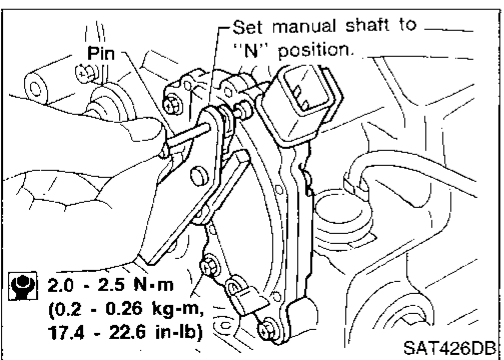


- d. Install snap ring onto transmission case with a screwdriver.
- Align snap ring gap with the notch of transmission case.



— RL4F03A & RE4F03V —

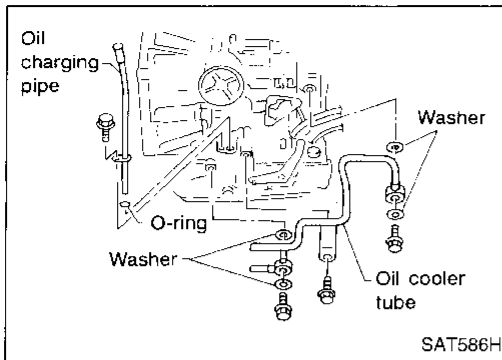
14. Install inhibitor switch.
- Set manual shaft in "P" position.
 - Temporarily install inhibitor switch on manual shaft.
 - Move selector lever to "N" position.



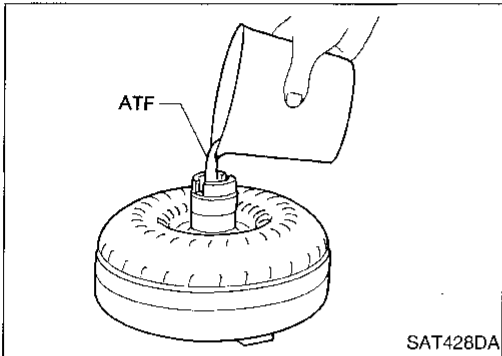
- Use a 4 mm (0.157 in) pin for this adjustment.
 - 1) Insert the pin straight into the manual shaft adjustment hole.
 - 2) Rotate inhibitor switch until the pin can also be inserted straight into hole in inhibitor switch.
- Tighten inhibitor switch fixing bolts.
 - Remove pin from adjustment hole after adjusting inhibitor switch.

ASSEMBLY

Assembly 4 (Cont'd)



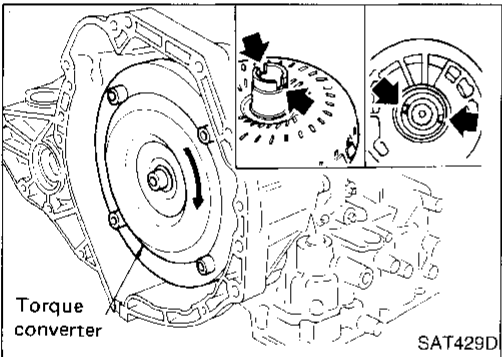
15. Install oil charging pipe and oil cooler tube to transmission case.



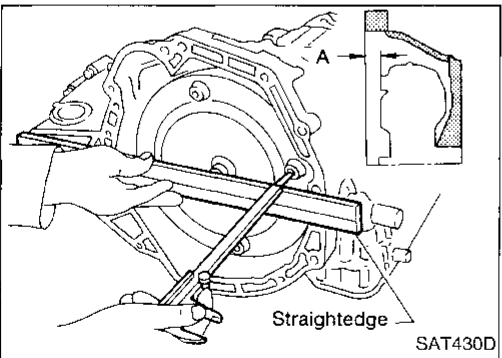
16. Install torque converter.

a. Pour ATF into torque converter.

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



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



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

Distance "A":

GA engine models

21.1 mm (0.831 in) or more

SR engine models

15.9 mm (0.626 in) or more

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IX

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Engine	GA16DE	SR20DE
Automatic transaxle model	RL4F03A	RE4F03V
Automatic transaxle assembly		
Model code number	35X61	35X64
Transaxle gear ratio		
1st		2.861
2nd		1.562
3rd		1.000
4th		0.697
Reverse		2.310
Final drive		3.827
Recommended oil	Nissan Matic "D" (Continental U.S. and Alaska) or Genuine Nissan Automatic Transmission Fluid (Canada)*1	
Oil capacity	7.0 (7-3/8, 6-1/8)	
	ℓ (US qt, Imp qt)	

*1: Refer to MA section ("Fluids and Lubricants", "RECOMMENDED FLUIDS AND LUBRICANTS").

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments

VEHICLE SPEED WHEN SHIFTING GEARS

— RL4F03A —

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	51 - 59 (32 - 37)	97 - 105 (60 - 65)	—	142 - 150 (88 - 93)	88 - 96 (55 - 60)	39 - 47 (24 - 29)	48 - 56 (30 - 35)
Half throttle	29 - 37 (18 - 23)	52 - 60 (32 - 37)	101 - 109 (63 - 68)	67 - 75 (42 - 47)	41 - 49 (25 - 30)	8 - 16 (5 - 10)	48 - 56 (30 - 35)

— RE4F03V —

Throttle position	Shift pattern	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	Comfort	56 - 64 (35 - 40)	107 - 115 (66 - 71)	169 - 177 (105 - 110)	165 - 173 (103 - 108)	97 - 105 (60 - 65)	46 - 54 (29 - 34)	54 - 62 (34 - 39)
Half throttle	Comfort	29 - 37 (18 - 23)	64 - 72 (40 - 45)	110 - 118 (68 - 73)	74 - 82 (46 - 51)	37 - 45 (23 - 28)	9 - 17 (6 - 11)	54 - 62 (34 - 39)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

— RL4F03A —

Throttle opening	Gear position	Vehicle speed km/h (MPH)	
		Lock-up ON	Lock-up OFF
2/8	D ₄	106 - 114 (66 - 71)	68 - 76 (42 - 47)

— RE4F03V —

Throttle opening	OD switch	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up ON	Lock-up OFF
2/8	ON (D ₄)	Comfort	104 - 112 (65 - 70)	92 - 100 (57 - 62)
	OFF (D ₃)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)

STALL REVOLUTION

Engine	Stall revolution rpm
GA16DE	2,450 - 2,750
SR20DE	1,850 - 2,150

THROTTLE WIRE ADJUSTMENT — RL4F03A —

Throttle wire stroke	mm (in)
	40 - 42 (1.57 - 1.65)

LINE PRESSURE

— RL4F03A —

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)			
	R position	D position	2 position	1 position
Idle	883 (9.0, 128)	637 (6.5, 92)	1,147 (11.7, 166)	1,147 (11.7, 166)
Stall	1,765 (18.0, 256)	1,275 (13.0, 185)	1,275 (13.0, 185)	1,275 (13.0, 185)

— RE4F03V —

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)			
	R position	D position	2 position	1 position
Idle	902 (9.2, 131)	579 (5.9, 84)	598 (6.1, 87)	598 (6.1, 87)
Stall	1,706 (17.4, 247)	1,098 (11.2, 159)	1,098 (11.2, 159)	1,098 (11.2, 159)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

CONTROL VALVES — RL4F03A —

Control valve return springs

Unit: mm (in)

Parts		Part No.	Free length	Outer diameter	
Upper body	①	Pressure modifier valve spring	31742-31X64	25.0 (0.984)	7.9 (0.311)
	②	Kickdown modulator valve spring	31742-31X03	40.5 (1.594)	9.0 (0.354)
	③	1-2 accumulator valve spring	31742-31X04	51.14 (2.0134)	17.0 (0.669)
	④	3-2 timing valve spring	31736-21X00	26.3 (1.035)	7.2 (0.283)
	⑤	1st reducing valve spring	31835-21X08	22.6 (0.890)	7.3 (0.287)
	⑥	Torque converter relief valve spring	31742-31X06	23.5 (0.925)	7.4 (0.291)
	⑦	Throttle modulator valve spring	31742-31X18	29.5 (1.161)	5.5 (0.217)
	⑧	4th speed cut valve spring	31756-24X00	30.0 (1.181)	7.0 (0.276)
	⑨	Torque converter clutch control valve spring	31742-31X08	39.5 (1.555)	5.0 (0.197)
—	Oil cooler relief valve spring	31872-31X00	17.02 (0.6701)	8.0 (0.315)	
Lower body	①	Throttle valve and detent valve spring	31802-31X07	33.0 (1.299)	10.0 (0.394)
	②	Pressure regulator valve spring	31742-31X00	52.24 (2.0567)	15.0 (0.591)
	③	3-4 shift valve spring	31762-31X13	52.0 (2.047)	7.45 (0.2933)
	④	2-3 shift valve spring	31762-31X01	52.7 (2.075)	7.0 (0.276)
	⑤	1-2 shift valve spring	31762-31X02	45.9 (1.807)	5.3 (0.209)
	⑥	Overrun clutch control valve spring	31742-31X60	48.9 (1.925)	7.0 (0.276)

CONTROL VALVES — RE4F03V —

Control valve and plug return springs

Unit: mm (in)

Parts		Part No.	Free length	Outer diameter	
Upper body	⑱	Pilot valve spring	31742-80X14	36.0 (1.417)	8.1 (0.319)
	⑭	1-2 accumulator valve spring	31742-80X10	20.5 (0.807)	7.0 (0.276)
	⑳	1-2 accumulator piston spring	31742-33X01	50.5 (1.988)	19.8 (0.780)
	㉕	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	②	Overrun clutch reducing valve spring	31742-80X06	37.5 (1.476)	7.0 (0.276)
	⑦	Torque converter relief valve spring	31742-33X00	31.0 (1.220)	8.9 (0.350)
	⑩	Torque converter clutch control valve	31742-80X17	39.5 (1.555)	11.0 (0.433)
	—	Oil cooler relief valve spring	31872-31X00	17.02 (0.6701)	8.0 (0.315)
Lower body	㉓	Plug spring	31742-80X11	17.0 (0.669)	10.7 (0.421)
	⑯	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	㉑	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	㉖	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	⑳	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	②	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	⑦	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	⑪		31742-80X16	32.0 (1.260)	6.9 (0.272)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

CLUTCHES AND BRAKES

Model	RL4F03A	RE4F03V		
Reverse clutch				
Number of drive plates	2			
Number of driven plates	2			
Drive plate thickness mm (in)				
Standard	2.0 (0.079)			
Allowable limit	1.8 (0.071)			
Clearance mm (in)				
Standard	0.5 - 0.8 (0.020 - 0.031)			
Allowable limit	1.2 (0.047)			
Thickness of retaining plates	Thickness mm (in)	Part number		
	4.4 (0.173)	31537-31X00		
	4.6 (0.181)	31537-31X01		
	4.8 (0.189)	31537-31X02		
	5.0 (0.197)	31537-31X03		
	5.2 (0.205)	31537-31X04		
High clutch				
Number of drive plates	3	4		
Number of driven plates	5	6 + 1		
Drive plate thickness mm (in)				
Standard	2.0 (0.079)	1.6 (0.063)		
Allowable limit	1.8 (0.071)	1.4 (0.055)		
Clearance mm (in)				
Standard	1.4 - 1.8 (0.055 - 0.071)	1.4 - 1.8 (0.055 - 0.071)		
Allowable limit	2.4 (0.094)	2.6 (0.102)		
Thickness of retaining plates	Thickness mm (in)	Part number	Thickness mm (in)	Part number
	3.8 (0.150)	31537-31X11	3.8 (0.150)	31537-31X11
	4.0 (0.157)	31537-31X12	4.0 (0.157)	31537-31X12
	4.2 (0.165)	31537-31X13	4.2 (0.165)	31537-31X13
	4.4 (0.173)	31537-31X14	4.4 (0.173)	31537-31X14
	4.6 (0.181)	31537-31X15	4.6 (0.181)	31537-31X15
	4.8 (0.189)	31537-31X16	4.8 (0.189)	31537-31X16
			5.0 (0.197)	31537-31X17

Model	RL4F03A	RE4F03V
Forward clutch		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	1.8 (0.071)	
Allowable limit	1.6 (0.063)	
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
	3.6 (0.142)	31537-31X60
	3.8 (0.150)	31537-31X61
	4.0 (0.157)	31537-31X62
	4.2 (0.165)	31537-31X63
	4.4 (0.173)	31537-31X64
	4.6 (0.181)	31537-31X65
Overrun clutch		
Number of drive plates	3	
Number of driven plates	4	
Drive plate thickness mm (in)		
Standard	1.6 (0.063)	
Allowable limit	1.4 (0.055)	
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
	3.6 (0.142)	31567-31X79
	3.8 (0.150)	31567-31X80
	4.0 (0.157)	31567-31X81
	4.2 (0.165)	31567-31X82
	4.4 (0.173)	31567-31X83

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Model	RL4F03A	RE4F03V
Low & reverse brake		
Number of drive plates	5	
Number of driven plates	5	
Drive plate thickness mm (in)		
Standard	2.0 (0.079)	
Allowable limit	1.8 (0.071)	
Clearance mm (in)		
Standard	1.4 - 1.8 (0.055 - 0.071)	
Allowable limit	2.8 (0.110)	
Thickness of retaining plate	Thickness mm (in)	Part number
	3.6 (0.142)	31667-31X10
	3.8 (0.150)	31667-31X11
	4.0 (0.157)	31667-31X12
	4.2 (0.165)	31667-31X13
	4.4 (0.173)	31667-31X14
4.6 (0.181)	31667-31X15	
Brake band		
Anchor end pin tightening torque N-m (kg-m, in-lb)	3.9 - 5.9 (0.4 - 0.6, 35 - 52)	
Number of returning revolutions for anchor end pin	2.5±0.125	
Lock nut tightening torque N-m (kg-m, ft-lb)	31 - 36 (3.2 - 3.7, 23 - 27)	

Clutch and brake return springs

Unit: mm (in)

Parts		Free length	Outer diameter
Forward clutch (Over-run clutch) (16 pcs)	Outer	26.6 (1.047)	10.6 (0.417)
	Inner	26.3 (1.035)	7.7 (0.303)
Reverse clutch (16 pcs)		18.6 (0.732)	8.0 (0.315)
High clutch (12 pcs)		19.7 (0.776)	11.1 (0.437)

OIL PUMP

Oil pump side clearance mm (in)	0.02 - 0.04 (0.0008 - 0.0016)	
Thickness of inner gears and outer gears	Inner gear	
	Thickness mm (in)	Part number
	9.99 - 10.00 (0.3933 - 0.3937)	31346-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31346-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31346-31X02
	Outer gear	
	Thickness mm (in)	Part number
	9.99 - 10.00 (0.3933 - 0.3937)	31347-31X00
	9.98 - 9.99 (0.3929 - 0.3933)	31347-31X01
	9.97 - 9.98 (0.3925 - 0.3929)	31347-31X02
Clearance between oil pump housing and outer gear mm (in)		
Standard	0.08 - 0.15 (0.0031 - 0.0059)	
Allowable limit	0.15 (0.0059)	
Oil pump cover seal ring clearance mm (in)		
Standard	0.1 - 0.25 (0.0039 - 0.0098)	
Allowable limit	0.25 (0.0098)	

INPUT SHAFT

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

PLANETARY CARRIER

Clearance between planetary carrier and pinion washer mm (in)	
Standard	0.15 - 0.70 (0.0059 - 0.0276)
Allowable limit	0.80 (0.0315)

FINAL DRIVE — RL4F03A —

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)
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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Differential side gear thrust washers

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115

Differential case end play

Differential case end play mm (in)	0 - 0.15 (0 - 0.0059)
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Differential side bearing adjusting shims

Thickness mm (in)	Part number
0.48 (0.0189)	38454-M8001
0.56 (0.0220)	38454-M8003
0.64 (0.0252)	38454-M8005
0.72 (0.0283)	38454-M8007
0.80 (0.0315)	38454-M8009
0.88 (0.0346)	38454-M8011
0.96 (0.0378)	38454-M8013
1.04 (0.0409)	38454-M8015

FINAL DRIVE — RE4F03V —

Differential side gear clearance

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

	Thickness mm (in)	Part number
Viscous coupling side	0.70 - 0.75 (0.0276 - 0.0295)	38424-D2110
	0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
	0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
	0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
	0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
	0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115
	1.00 - 1.05 (0.0394 - 0.0413)	38424-D2116
	1.05 - 1.10 (0.0413 - 0.0433)	38424-D2117
	1.10 - 1.15 (0.0433 - 0.0453)	38424-D2118
	1.15 - 1.20 (0.0453 - 0.0472)	38424-D2119
Differential case side	1.20 - 1.25 (0.0472 - 0.0492)	38424-D2120
	1.25 - 1.30 (0.0492 - 0.0512)	38424-D2121
	1.30 - 1.35 (0.0512 - 0.0531)	38424-D2122
	0.75 - 0.80 (0.0295 - 0.0315)	38424-D2111
	0.80 - 0.85 (0.0315 - 0.0335)	38424-D2112
	0.85 - 0.90 (0.0335 - 0.0354)	38424-D2113
	0.90 - 0.95 (0.0354 - 0.0374)	38424-D2114
0.95 - 1.00 (0.0374 - 0.0394)	38424-D2115	

Bearing preload

Differential side bearing preload "T" mm (in)	0.04 - 0.09 (0.0016 - 0.0035)
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Turning torque

Turning torque of final drive assembly N·m (kg·cm, in·lb)	0.49 - 1.08 (5.0 - 11.0, 4.3 - 9.5)
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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Differential side bearing adjusting shims

Table for selecting differential side bearing adjusting shim(s)

Thickness mm (in)	Part number
0.28 (0.0110)	31439-31X00
0.32 (0.0126)	31439-31X01
0.36 (0.0142)	31439-31X02
0.40 (0.0157)	31439-31X03
0.44 (0.0173)	31439-31X04
0.48 (0.0189)	31439-31X05
0.52 (0.0205)	31439-31X06
0.56 (0.0220)	31439-31X07
0.60 (0.0236)	31439-31X08
0.64 (0.0252)	31439-31X09
0.68 (0.0268)	31439-31X10
0.72 (0.0283)	31439-31X11
0.76 (0.0299)	31439-31X12
0.80 (0.0315)	31439-31X13
0.84 (0.0331)	31439-31X14
0.88 (0.0346)	31439-31X15
0.92 (0.0362)	31439-31X16
0.96 (0.0378)	31439-31X17
1.44 (0.0567)	31439-31X18

Unit: mm (in)

Dial indicator deflection	Suitable shim(s)
0.19 - 0.23 (0.0075 - 0.0091)	0.28 (0.0110)
0.23 - 0.27 (0.0091 - 0.0106)	0.32 (0.0126)
0.27 - 0.31 (0.0106 - 0.0122)	0.36 (0.0142)
0.31 - 0.35 (0.0122 - 0.0138)	0.40 (0.0157)
0.35 - 0.39 (0.0138 - 0.0154)	0.44 (0.0173)
0.39 - 0.43 (0.0154 - 0.0169)	0.48 (0.0189)
0.43 - 0.47 (0.0169 - 0.0185)	0.52 (0.0205)
0.47 - 0.51 (0.0185 - 0.0201)	0.56 (0.0220)
0.51 - 0.55 (0.0201 - 0.0217)	0.60 (0.0236)
0.55 - 0.59 (0.0217 - 0.0232)	0.64 (0.0252)
0.59 - 0.63 (0.0232 - 0.0248)	0.68 (0.0268)
0.63 - 0.67 (0.0248 - 0.0264)	0.72 (0.0283)
0.67 - 0.71 (0.0264 - 0.0280)	0.76 (0.0299)
0.71 - 0.75 (0.0280 - 0.0295)	0.80 (0.0315)
0.75 - 0.79 (0.0295 - 0.0311)	0.84 (0.0331)
0.79 - 0.83 (0.0311 - 0.0327)	0.88 (0.0346)
0.83 - 0.87 (0.0327 - 0.0343)	0.92 (0.0362)
0.87 - 0.91 (0.0343 - 0.0358)	0.48 (0.0189) + 0.48 (0.0189)
0.91 - 0.95 (0.0358 - 0.0374)	0.48 (0.0189) + 0.52 (0.0205)
0.95 - 0.99 (0.0374 - 0.0390)	0.52 (0.0205) + 0.52 (0.0205)
0.99 - 1.03 (0.0390 - 0.0406)	0.52 (0.0205) + 0.56 (0.0220)
1.03 - 1.07 (0.0406 - 0.0421)	0.56 (0.0220) + 0.56 (0.0220)
1.07 - 1.11 (0.0421 - 0.0437)	0.56 (0.0220) + 0.60 (0.0236)
1.11 - 1.15 (0.0437 - 0.0453)	0.60 (0.0236) + 0.60 (0.0236)
1.15 - 1.19 (0.0453 - 0.0469)	0.60 (0.0236) + 0.64 (0.0252)
1.19 - 1.23 (0.0469 - 0.0484)	0.64 (0.0252) + 0.64 (0.0252)
1.23 - 1.27 (0.0484 - 0.0500)	0.64 (0.0252) + 0.68 (0.0268)
1.27 - 1.31 (0.0500 - 0.0516)	0.68 (0.0268) + 0.68 (0.0268)
1.31 - 1.35 (0.0516 - 0.0531)	0.68 (0.0268) + 0.72 (0.0283)
1.35 - 1.39 (0.0531 - 0.0547)	1.44 (0.0567)
1.39 - 1.43 (0.0547 - 0.0563)	0.72 (0.0283) + 0.76 (0.0299)
1.43 - 1.47 (0.0563 - 0.0579)	0.76 (0.0299) + 0.76 (0.0299)
1.47 - 1.51 (0.0579 - 0.0594)	0.76 (0.0299) + 0.80 (0.0315)
1.51 - 1.55 (0.0594 - 0.0610)	0.80 (0.0315) + 0.80 (0.0315)
1.55 - 1.59 (0.0610 - 0.0626)	0.80 (0.0315) + 0.84 (0.0331)
1.59 - 1.63 (0.0626 - 0.0642)	0.84 (0.0331) + 0.84 (0.0331)
1.63 - 1.67 (0.0642 - 0.0657)	0.84 (0.0331) + 0.88 (0.0346)
1.67 - 1.71 (0.0657 - 0.0673)	0.88 (0.0346) + 0.88 (0.0346)
1.71 - 1.75 (0.0673 - 0.0689)	0.88 (0.0346) + 0.92 (0.0362)
1.75 - 1.79 (0.0689 - 0.0705)	0.92 (0.0362) + 0.92 (0.0362)
1.79 - 1.83 (0.0705 - 0.0720)	0.92 (0.0362) + 0.96 (0.0378)
1.83 - 1.87 (0.0720 - 0.0736)	0.96 (0.0378) + 0.96 (0.0378)
1.87 - 1.91 (0.0736 - 0.0752)	0.52 (0.0205) + 1.44 (0.0567)
1.91 - 1.95 (0.0752 - 0.0768)	0.56 (0.0220) + 1.44 (0.0567)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

REDUCTION PINION GEAR

Bearing preload

Reduction pinion gear bearing preload mm (in)	0.05 (0.0020)
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Turning torque

Turning torque of reduction pinion gear N·m (kg·cm, in·lb)	0.11 - 0.69 (1.1 - 7.0, 0.95 - 6.08)
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Reduction pinion gear bearing adjusting shims

Thickness mm (in)	Part number
1.74 (0.0685)	31438-31X16
1.78 (0.0701)	31438-31X17
1.82 (0.0717)	31438-31X18
1.86 (0.0732)	31438-31X19
1.90 (0.0748)	31438-31X20
1.92 (0.0756)	31439-31X60
1.94 (0.0764)	31438-31X21
1.96 (0.0772)	31439-31X61
1.98 (0.0780)	31438-31X22
2.00 (0.0787)	31439-31X62
2.02 (0.0795)	31438-31X23
2.04 (0.0803)	31439-31X63
2.06 (0.0811)	31438-31X24
2.08 (0.0819)	31439-31X64
2.10 (0.0827)	31438-31X60
2.12 (0.0835)	31439-31X65
2.14 (0.0843)	31438-31X61
2.16 (0.0850)	31439-31X66
2.18 (0.0858)	31438-31X62
2.20 (0.0866)	31439-31X67
2.22 (0.0874)	31438-31X63
2.24 (0.0882)	31439-31X68
2.26 (0.0890)	31438-31X64
2.28 (0.0898)	31439-31X69
2.30 (0.0906)	31438-31X65
2.34 (0.0921)	31438-31X66
2.38 (0.0937)	31438-31X67
2.42 (0.0953)	31438-31X68
2.46 (0.0969)	31438-31X69
2.50 (0.0984)	31438-31X70
2.54 (0.1000)	31438-31X71
2.58 (0.1016)	31438-31X72
2.62 (0.1031)	31438-31X73
2.66 (0.1047)	31438-31X74

Table for selecting reduction pinion gear bearing adjusting shim

Dimension "T"	Suitable shim(s)
1.77 - 1.81 (0.0697 - 0.0713)	1.74 (0.0685)
1.81 - 1.85 (0.0713 - 0.0728)	1.78 (0.0701)
1.85 - 1.89 (0.0728 - 0.0744)	1.82 (0.0717)
1.89 - 1.93 (0.0744 - 0.0760)	1.86 (0.0732)
1.93 - 1.96 (0.0760 - 0.0772)	1.90 (0.0748)
1.96 - 1.98 (0.0772 - 0.0780)	1.92 (0.0756)
1.98 - 2.00 (0.0780 - 0.0787)	1.94 (0.0764)
2.00 - 2.02 (0.0787 - 0.0795)	1.96 (0.0772)
2.02 - 2.04 (0.0795 - 0.0803)	1.98 (0.0780)
2.04 - 2.06 (0.0803 - 0.0811)	2.00 (0.0787)
2.06 - 2.08 (0.0811 - 0.0819)	2.02 (0.0795)
2.08 - 2.10 (0.0819 - 0.0827)	2.04 (0.0803)
2.10 - 2.12 (0.0827 - 0.0835)	2.06 (0.0811)
2.12 - 2.14 (0.0835 - 0.0843)	2.08 (0.0819)
2.14 - 2.16 (0.0843 - 0.0850)	2.10 (0.0827)
2.16 - 2.18 (0.0850 - 0.0858)	2.12 (0.0835)
2.18 - 2.20 (0.0858 - 0.0866)	2.14 (0.0843)
2.20 - 2.22 (0.0866 - 0.0874)	2.16 (0.0850)
2.22 - 2.24 (0.0874 - 0.0888)	2.18 (0.0858)
2.24 - 2.26 (0.0882 - 0.0890)	2.20 (0.0866)
2.26 - 2.28 (0.0890 - 0.0898)	2.22 (0.0874)
2.28 - 2.30 (0.0898 - 0.0906)	2.24 (0.0882)
2.30 - 2.32 (0.0906 - 0.0913)	2.26 (0.0890)
2.32 - 2.34 (0.0913 - 0.0921)	2.28 (0.0898)
2.34 - 2.37 (0.0921 - 0.0933)	2.30 (0.0906)
2.37 - 2.41 (0.0933 - 0.0949)	2.34 (0.0921)
2.41 - 2.45 (0.0949 - 0.0965)	2.38 (0.0937)
2.45 - 2.49 (0.0965 - 0.0980)	2.42 (0.0953)
2.49 - 2.53 (0.0980 - 0.0996)	2.46 (0.0969)
2.53 - 2.57 (0.0996 - 0.1012)	2.50 (0.0984)
2.57 - 2.61 (0.1012 - 0.1028)	2.54 (0.1000)
2.61 - 2.65 (0.1028 - 0.1043)	2.58 (0.1016)
2.65 - 2.69 (0.1043 - 0.1059)	2.62 (0.1031)
2.69 - 2.73 (0.1059 - 0.1075)	2.66 (0.1047)

OUTPUT SHAFT — RL4F03A —

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

Bearing preload

Output shaft bearing preload mm (in)	0.03 - 0.08 (0.0012 - 0.0031)
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GI
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SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Turning torque

Turning torque of output shaft N-m (kg-cm, in-lb)	0.25 - 0.88 (2.5 - 9.0, 2.2 - 7.8)
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Output shaft bearing adjusting spacers

Thickness mm (in)	Part number
6.26 (0.2465)	31437-31X16
6.30 (0.2480)	31437-31X17
6.34 (0.2496)	31437-31X18
6.38 (0.2512)	31437-31X19
6.42 (0.2528)	31437-31X20
6.46 (0.2543)	31437-31X21
6.50 (0.2559)	31437-31X22
6.54 (0.2575)	31437-31X23
6.58 (0.2591)	31437-31X24
6.62 (0.2606)	31437-31X60
6.64 (0.2614)	31437-31X78
6.66 (0.2622)	31437-31X61
6.68 (0.2630)	31437-31X79
6.70 (0.2638)	31437-31X62
6.72 (0.2646)	31437-31X80
6.74 (0.2654)	31437-31X63
6.76 (0.2661)	31437-31X81
6.78 (0.2669)	31437-31X64
6.80 (0.2677)	31437-31X82
6.82 (0.2685)	31437-31X65
6.84 (0.2693)	31437-31X83
6.86 (0.2701)	31437-31X66
6.88 (0.2709)	31437-31X84
6.90 (0.2717)	31437-31X67
6.92 (0.2724)	31437-31X46
6.94 (0.2732)	31437-31X68
6.96 (0.2740)	31437-31X47
6.98 (0.2748)	31437-31X69
7.00 (0.2756)	31437-31X48
7.02 (0.2764)	31437-31X70
7.06 (0.2780)	31437-31X71
7.10 (0.2795)	31437-31X72
7.14 (0.2811)	31437-31X73
7.18 (0.2827)	31437-31X74
7.22 (0.2843)	31437-31X75

Table for selecting output shaft bearing adjusting spacer

Unit: mm (in)

Dimension "T"	Suitable spacer
6.29 - 6.33 (0.2476 - 0.2492)	6.26 (0.2465)
6.33 - 6.37 (0.2492 - 0.2508)	6.30 (0.2480)
6.37 - 6.41 (0.2508 - 0.2524)	6.34 (0.2496)
6.41 - 6.45 (0.2524 - 0.2539)	6.38 (0.2512)
6.45 - 6.49 (0.2539 - 0.2555)	6.42 (0.2528)
6.49 - 6.53 (0.2555 - 0.2571)	6.46 (0.2543)
6.53 - 6.57 (0.2571 - 0.2587)	6.50 (0.2559)
6.57 - 6.61 (0.2587 - 0.2602)	6.54 (0.2575)
6.61 - 6.65 (0.2602 - 0.2618)	6.58 (0.2591)
6.65 - 6.68 (0.2618 - 0.2630)	6.62 (0.2606)
6.68 - 6.70 (0.2630 - 0.2638)	6.64 (0.2614)
6.70 - 6.72 (0.2638 - 0.2646)	6.66 (0.2622)
6.72 - 6.74 (0.2646 - 0.2654)	6.68 (0.2630)
6.74 - 6.76 (0.2654 - 0.2661)	6.70 (0.2638)
6.76 - 6.78 (0.2661 - 0.2669)	6.72 (0.2646)
6.78 - 6.80 (0.2669 - 0.2677)	6.74 (0.2654)
6.80 - 6.82 (0.2677 - 0.2685)	6.76 (0.2661)
6.82 - 6.84 (0.2685 - 0.2693)	6.78 (0.2669)
6.84 - 6.86 (0.2693 - 0.2701)	6.80 (0.2677)
6.86 - 6.88 (0.2701 - 0.2709)	6.82 (0.2685)
6.88 - 6.90 (0.2709 - 0.2717)	6.84 (0.2693)
6.90 - 6.92 (0.2717 - 0.2724)	6.86 (0.2701)
6.92 - 6.94 (0.2724 - 0.2732)	6.88 (0.2707)
6.94 - 6.96 (0.2732 - 0.2740)	6.90 (0.2717)
6.96 - 6.98 (0.2740 - 0.2748)	6.92 (0.2724)
6.98 - 7.00 (0.2748 - 0.2756)	6.94 (0.2732)
7.00 - 7.02 (0.2756 - 0.2764)	6.96 (0.2790)
7.02 - 7.04 (0.2764 - 0.2772)	6.98 (0.2748)
7.04 - 7.06 (0.2772 - 0.2780)	7.00 (0.2756)
7.06 - 7.09 (0.2780 - 0.2791)	7.02 (0.2764)
7.09 - 7.13 (0.2791 - 0.2807)	7.06 (0.2780)
7.13 - 7.17 (0.2807 - 0.2823)	7.10 (0.2795)
7.17 - 7.21 (0.2823 - 0.2839)	7.14 (0.2811)
7.21 - 7.25 (0.2839 - 0.2854)	7.18 (0.2827)
7.25 - 7.29 (0.2854 - 0.2870)	7.22 (0.2843)

OUTPUT SHAFT — RE4F03V —

Seal ring clearance

Output shaft seal ring clearance mm (in)	
Standard	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.25 (0.0098)

End play

Output shaft end play mm (in)	0 - 0.5 (0 - 0.020)
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Output shaft adjusting shims

Thickness mm (in)	Part number
0.56 (0.0220)	31438-31X46
0.96 (0.0378)	31438-31X47
1.36 (0.0535)	31438-31X48

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

BEARING RETAINER

Seal ring clearance

Bearing retainer 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 mm (in)	0.25 - 0.55 (0.0098 - 0.0217)
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Bearing race for adjusting total end play

Thickness mm (in)	Part number
0.6 (0.024)	31435-31X01
0.8 (0.031)	31435-31X02
1.0 (0.039)	31435-31X03
1.2 (0.047)	31435-31X04
1.4 (0.055)	31435-31X05
1.6 (0.063)	31435-31X06
1.8 (0.071)	31435-31X07
2.0 (0.079)	31435-31X08

REVERSE CLUTCH END PLAY

Reverse clutch end play mm (in)	0.65 - 1.00 (0.0256 - 0.0394)
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Thrust washers for adjusting reverse clutch end play

Thickness mm (in)	Part number
0.65 (0.0256)	31508-31X00
0.80 (0.0315)	31508-31X01
0.95 (0.0374)	31508-31X02
1.10 (0.0433)	31508-31X03
1.25 (0.0492)	31508-31X04
1.40 (0.0551)	31508-31X05

ACCUMULATOR

O-ring

	Unit: mm (in)	
Accumulator	Diameter (Small)	Diameter (Large)
Servo release accumulator	26.9 (1.059)	44.2 (1.740)
N-D accumulator	34.6 (1.362)	39.4 (1.551)

Return spring

RL4F03A

	Unit: mm (in)	
Accumulator	Free length	Outer diameter
Servo release accumulator spring	56.4 (2.220)	21.0 (0.827)
N-D accumulator spring	43.5 (1.713)	28.0 (1.102)

RE4F03V

	Unit: mm (in)		
Accumulator		Free length	Outer diameter
Servo release accumulator spring	Outer	52.5 (2.067)	21.1 (0.831)
	Inner	52.0 (2.047)	13.1 (0.516)
N-D accumulator spring		43.5 (1.713)	28.0 (1.102)

BAND SERVO

Return spring

	Unit: mm (in)	
Return spring	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31.0 (1.220)	21.7 (0.854)

REMOVAL AND INSTALLATION

	Unit: mm (in)	
Engine	GA16DE	SR20DE
Distance between end of converter housing and torque converter	21.1 (0.831) or more	15.9 (0.626) or more