

AUTOMATIC TRANSAXLE

SECTION **AT**

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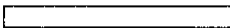

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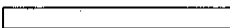
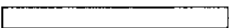
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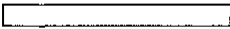

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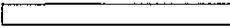
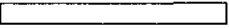
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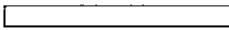
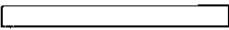
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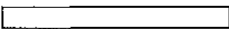
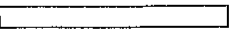
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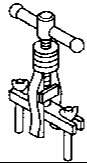
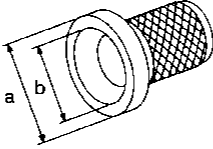
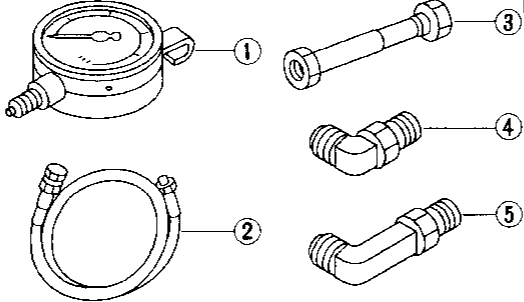
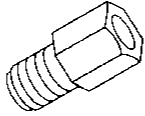
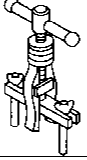
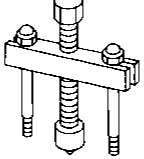
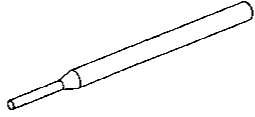
When you read wiring diagrams:

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

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

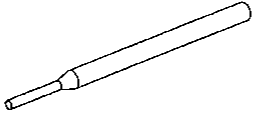
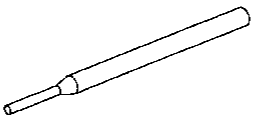
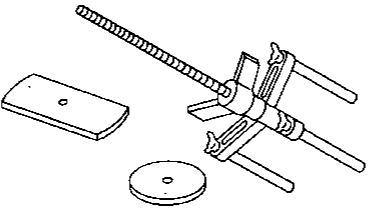
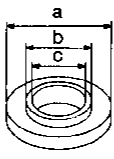
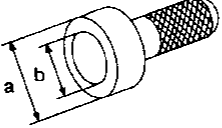
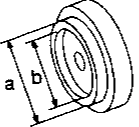
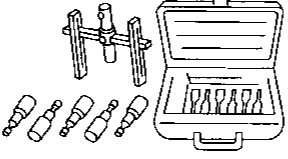
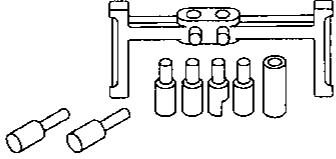
PREPARATION AND PRECAUTIONS

Special Service Tools

Tool number (Kent-Moore No.) Tool name	Description	
ST33290001 (J34286) Puller	 <p style="text-align: center;">NT076</p>	Removing differential side oils seals GI MA
ST33400001 (J26082) Drift	 <p style="text-align: center;">NT086</p>	Installing differential side oil seal (RH side of VE30 engine models) Installing oil seal on oil pump housing (VE30 engine models) a : 60 mm (2.36 in) dia. b : 47 mm (1.85 in) dia. EM LC EF & EC
ST2505S001 (J25695-A) Oil pressure gauge set ① ST25051001 (J25695-1) Oil pressure gauge ② ST25052000 (J25695-2) Hose ③ ST25053000 (J25695-3) Joint pipe ④ ST25054000 (J25695-4) Adapter ⑤ ST25055000 (J25695-5) Adapter	 <p style="text-align: center;">NT097</p>	Measuring line pressure and governor pressure FF CL WT AT
KV31101200 (J34282) Oil pressure gauge adapter	 <p style="text-align: center;">NT102</p>	Measuring oil pressure (VG30 engine models) FA RA
KV381054S0 (—) Puller	 <p style="text-align: center;">NT076</p>	<ul style="list-style-type: none"> ● Removing differential side bearing outer race ● Removing idler gear bearing outer race BF
ST27180001 (—) Puller	 <p style="text-align: center;">NT099</p>	Removing idler gear (VE30 engine models) HA EL
ST23540000 (—) Pin punch	 <p style="text-align: center;">NT070</p>	Removing and installing parking rod plate and manual plate pins (VE30 engine models) IDX

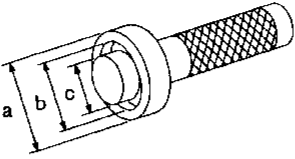
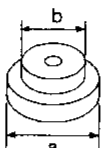
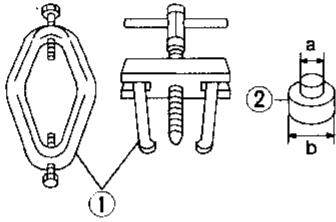
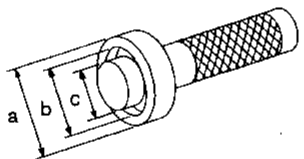
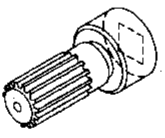
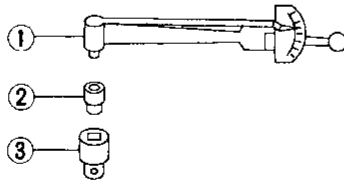
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
ST25710000 (—) Pin punch	 <p>Aligning groove of manual shaft and hole of transmission case (VE30 engine models)</p> <p>NT070</p>
KV32101000 (J25689-A) Pin punch	 <p>Installing manual shaft retaining pin. (VE30 engine models)</p> <p>NT070</p>
KV31102400 (J34285 and J34285-87) Clutch spring compressor	 <ul style="list-style-type: none"> ● Removing and installing clutch return springs ● Installing low and reverse brake piston (VE30 engine models) <p>NT096</p>
KV40100630 (—) Drift	 <ul style="list-style-type: none"> ● Installing reduction gear bearing inner race (VE30 engine models) ● Installing idler gear bearing inner race (VE30 engine models) <p>a : 67.5 mm (2.657 in) dia. b : 44 mm (1.73 in) dia. c : 38.5 mm (1.516 in) dia.</p> <p>NT107</p>
ST30720000 (J34331) Drift	 <ul style="list-style-type: none"> ● Installing idler gear bearing outer race (VE30 engine models) <p>a : 55.5 mm (2.185 in) dia. b : 77 mm (3.03 in) dia.</p> <p>NT115</p>
ST35321000 (—) Drift	 <ul style="list-style-type: none"> ● Installing output shaft bearing (VE30 engine models) <p>a : 49 mm (1.93 in) dia. b : 41 mm (1.61 in) dia.</p> <p>NT105</p>
(J34291) Shim setting gauge set	 <ul style="list-style-type: none"> ● Selecting oil pump cover bearing race and oil pump thrust washer (VE30 engine models) ● Selecting side gear thrust washer (VE30 engine models) <p>NT101</p>
(J34290) Shim selecting tool	 <p>VG30 engine models</p> <ul style="list-style-type: none"> Selecting oil pump housing bearing race Selecting clutch pack thrust washer Selecting differential side bearing adjusting shim Selecting output shaft bearing adjusting shim Selecting idler gear bearing adjusting shim <p>NT080</p>

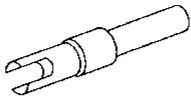
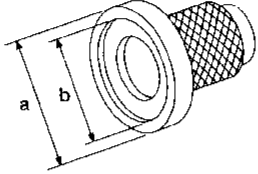
PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

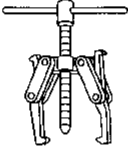
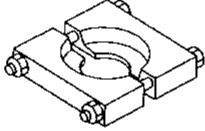
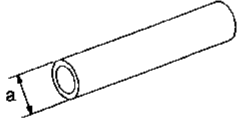
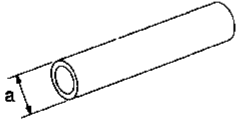
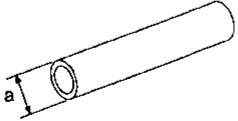
Tool number (Kent-Moore No.) Tool name	Description	
KV38100300 (—)		Installing differential side bearing inner race (RH side of VE30 engine models) a : 54 mm (2.13 in) dia. b : 46 mm (1.81 in) dia. c : 32 mm (1.26 in) dia.
	NT085	GI VA EM
ST30613000 (—)		Installing differential side bearing inner race (LH side of VE30 engine models) a : 72 mm (2.83 in) dia. b : 48 mm (1.89 in) dia.
	NT073	LC EF & EC
ST3306S001 (—) Differential side bearing puller set ① ST33051001 (—) Puller ② ST33061000 (J8107-2) Adapter		Removing differential side bearing inner race a : 28.5 mm (1.122 in) dia. b : 38 mm (1.50 in) dia.
	NT072	FE CL MT
ST33220000 (—) Drift		Selecting differential side bearing adjusting shim (VE30 engine models) a : 37 mm (1.46 in) dia. b : 31 mm (1.22 in) dia. c : 22 mm (0.87 in) dia.
	NT085	AT FA RA
KV38105210 (—) Preload adapter		<ul style="list-style-type: none"> ● Selecting differential side bearing adjusting shim (VE30 engine models) ● Checking differential side bearing preload (VE30 engine models)
	NT075	BR ST
ST3127S000 (See J25765-A) Preload gauge ① GG91030000 (J25765-A) Torque wrench ② HT62940000 (—) Socket adapter ③ HT62900000 (—) Socket adapter		Checking differential side bearing preload
	NT124	BF HA EL IDX

PREPARATION AND PRECAUTIONS

Special Service Tools (Cont'd)

Tool number (Kent-Moore No.) Tool name	Description
KV38106500 (J34284) Preload adapter	 Checking differential side bearing preload (VG30 engine models)
	NT087
ST35271000 (—) Drift	 Installing idler gear (VE30 engine models)
	a : 76 mm (2.99 in) dia. b : 67 mm (2.64 in) dia.
	NT104

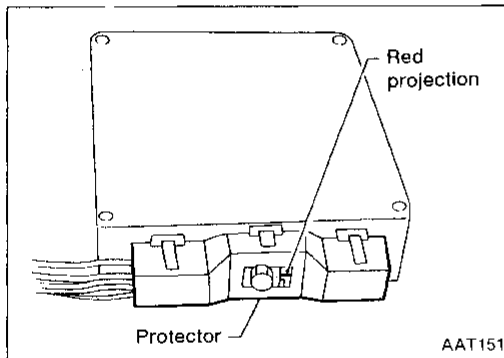
Commercial Service Tools

Tool number	Description
Puller	 <ul style="list-style-type: none"> ● Removing idler gear bearing inner race (VE30 engine models) ● Removing and installing band servo piston snap ring (VE30 engine models)
	NT077
Puller	 Removing reduction gear bearing inner race (VE30 engine models)
	NT071
Drift	 Installing differential side oil seal (Left side of VE30 engine models)
	a : 90 mm (3.54 in) dia.
	NT083
Drift	 Installing needle bearing on bearing retainer (VE30 engine models)
	a : 36 mm (1.42 in) dia.
	NT083
Drift	 Removing needle bearing from bearing retainer (VE30 engine models)
	a : 33.5 mm (1.319 in) dia.
	NT083

PREPARATION AND PRECAUTIONS

Service Notice

- Before proceeding with disassembly, thoroughly clean the outside of the transaxle. It is important to prevent the internal parts from becoming contaminated by dirt or other foreign matter.
- Disassembly should be done in a clean work area.
- Use lint-free cloth or towels for wiping parts clean. Common shop rags can leave fibers that could interfere with the operation of the transaxle.
- When disassembling parts, place them in order in a parts rack so that they can be put back into the unit in their proper positions.
- All parts should be carefully cleaned with a general purpose, non-flammable solvent before inspection or reassembly.
- Gaskets, seals and O-rings should be replaced any time the transaxle is disassembled.
- When connecting A/T control unit harness connector, tighten bolt until red projection is in-line with connector.
- It is very important to perform functional tests whenever they are indicated.
- The valve body contains precision parts and requires extreme care when parts are removed and serviced. Place removed parts in 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.
- Extremely care should be taken to avoid damage to O-rings, seals and gaskets when assembling.
- During overhaul, if excessive foreign material is found in the oil pan or clogging the strainer, flush or replace ATF cooler as required. Refer to TROUBLE DIAGNOSES Remarks, AT-25, 96.
- After overhaul, refill the transaxle with new ATF.
- Even when the drain plug is removed, the old A/T fluid will remain in the torque converter and the A/T fluid cooling system. Always follow the procedures under "Changing A/T Fluid" in the MA section when changing A/T fluid.



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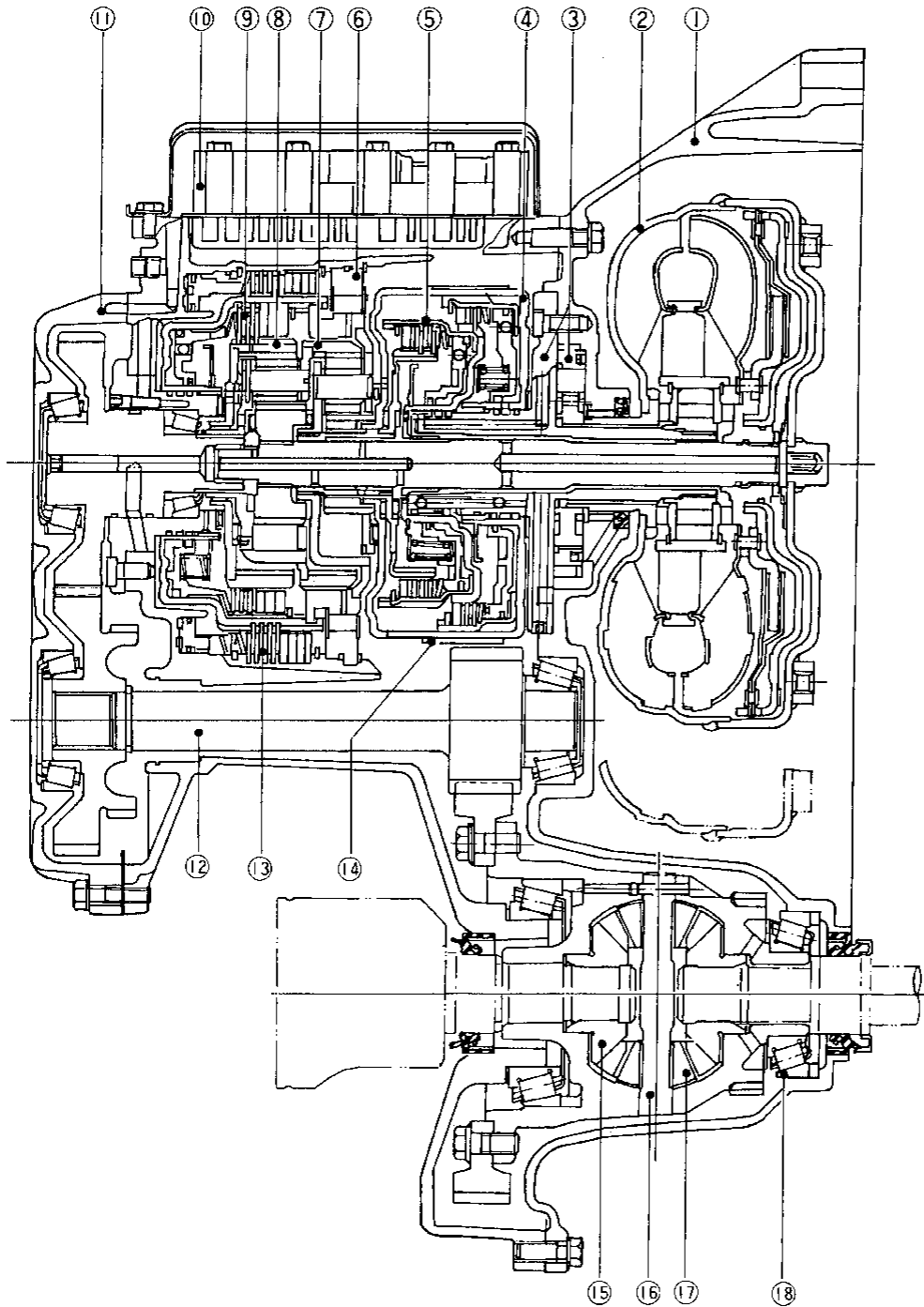
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Cross-sectional View



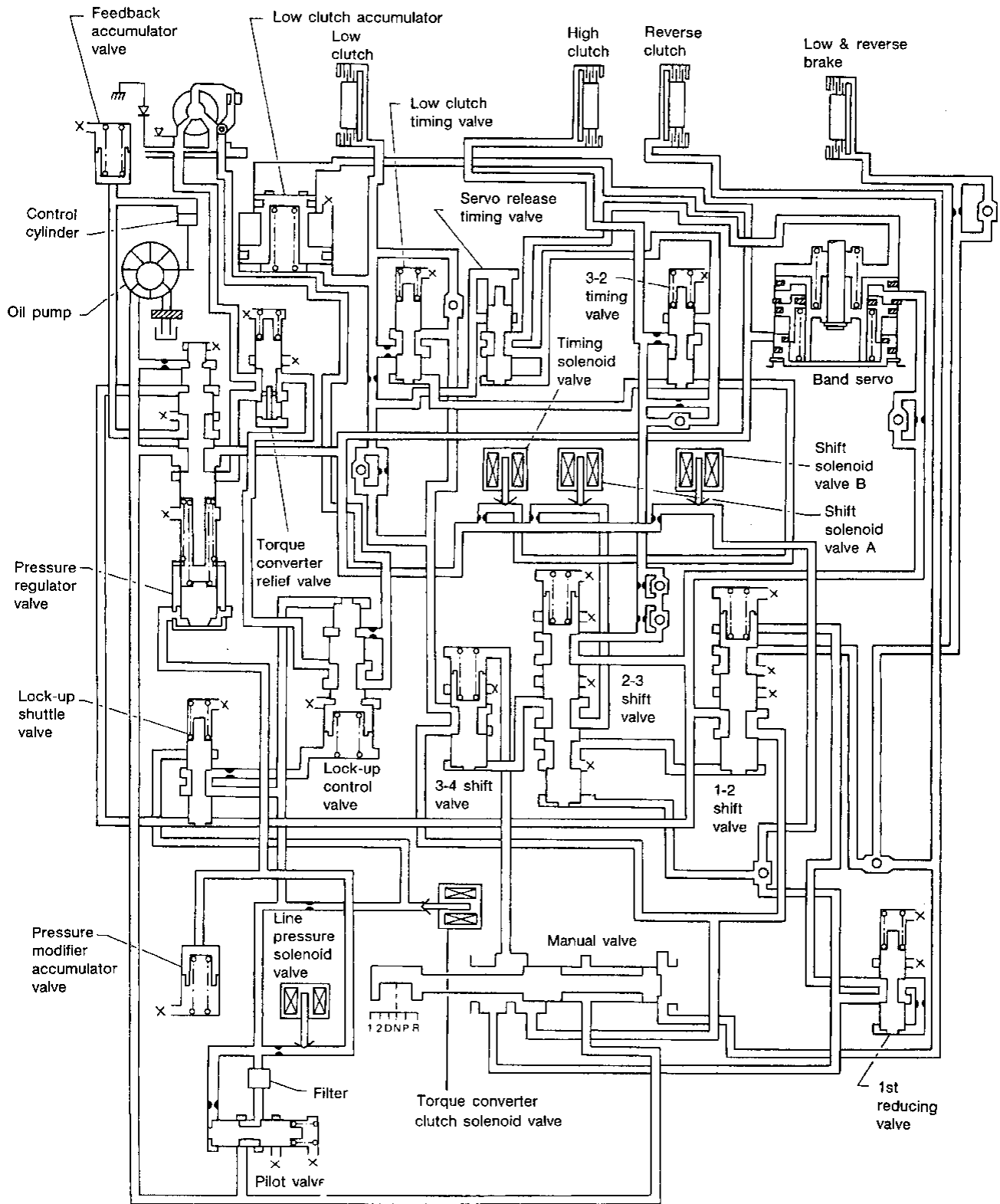
- ① Converter housing
- ② Torque converter
- ③ Oil pump
- ④ Reverse clutch
- ⑤ High clutch
- ⑥ One-way clutch

- ⑦ Front planetary gear
- ⑧ Rear planetary gear
- ⑨ Low clutch
- ⑩ Control valve
- ⑪ Side cover
- ⑫ Reduction gear

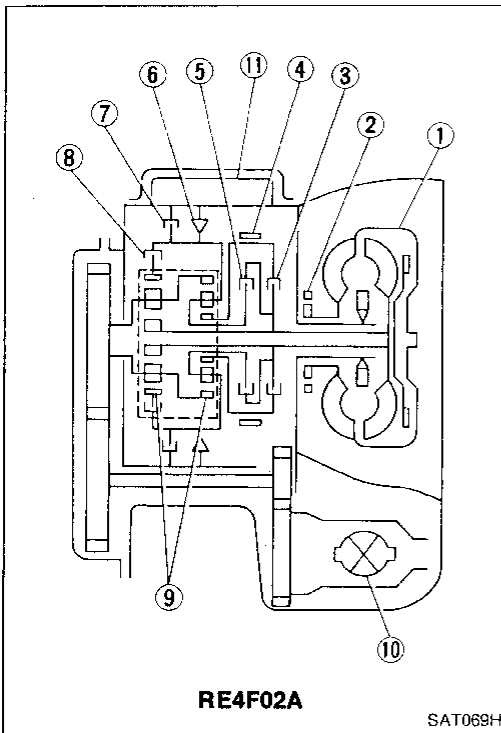
- ⑬ Low & reverse brake
- ⑭ Band brake
- ⑮ Side gear
- ⑯ Pinion mate shaft
- ⑰ Pinion mate gear
- ⑱ Differential side bearing

SAT768

Hydraulic Control Circuits



GI
 MA
 EM
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Shift Mechanism

CONSTRUCTION

- ① Torque converter
- ② Oil pump
- ③ Reverse clutch
- ④ Brake band
- ⑤ High clutch
- ⑥ One-way clutch
- ⑦ Low & reverse brake
- ⑧ Low clutch
- ⑨ Planetary gear
- ⑩ Final drive
- ⑪ Control valve

FUNCTION OF CLUTCH AND BRAKE

Control members	Abbr.	Function
Reverse clutch	(R/C)	Connects input shaft to front sun gear
High clutch	(H/C)	Connects input shaft and front carrier
Low clutch	(L/C)	Connects front carrier and rear internal gear
Low & reverse brake	(L&R/B)	Fixes front carrier
Brake band	(B/B)	Fixes front sun gear
One-way clutch	(OWC)	Fixes front carrier in the same direction as rotation

OPERATION OF CLUTCH AND BRAKE

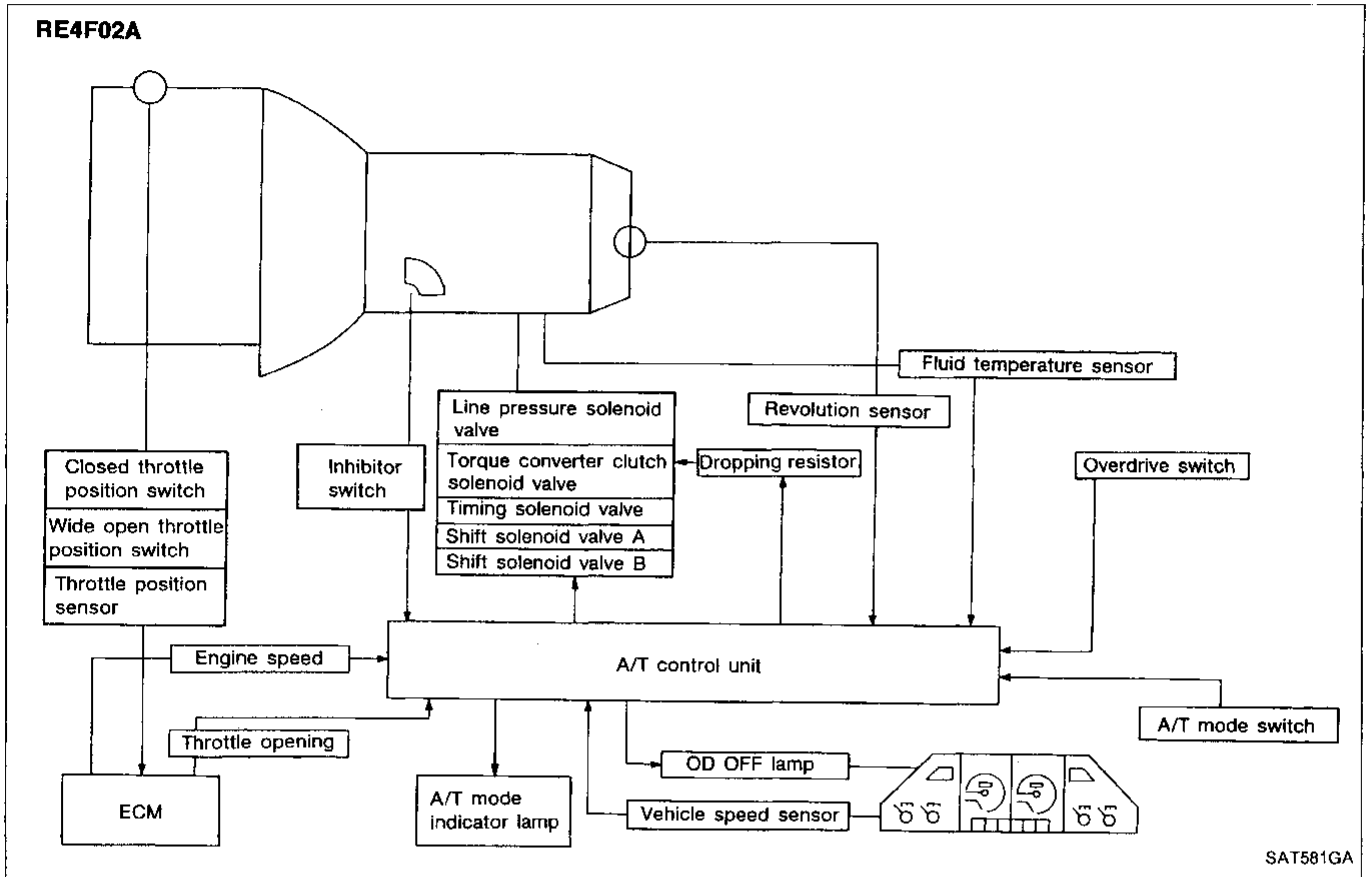
Position	Reverse clutch	High clutch	Low clutch	Band servo		Low & reverse brake	One-way clutch	Parking pawl	Lock-up
				Operation	Release				
Park position								on	
Reverse	on					on			
Neutral position									
Drive	D ₁ Low		on				on		
	D ₂ Second		on	on					
	D ₃ Top (3rd)		on	on	(on)	on			on*1
	D ₄ OD (4th)		on		on				on*2
2	2 ₁ Low		on				on		
	2 ₂ Second		on	on					
1	1 ₁ Low		on			on	on		
	1 ₂ Second		on	on					

*1: Lock-up operates in 3rd speed (lock-up) position when OD control switch is "OFF" (Overdrive not allowed).

*2: Lock-up operates in 4th speed (lock-up) position when OD control switch is "ON" (Overdrive allowed).

Control System

CONTROL SYSTEM



SAT581GA

GI
 MA
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 LC
 EF &
 EC
 FE
 CL
 MT
 AT
 FA
 RA
 BR
 ST
 BF
 HA
 EL
 IDX

Control System (Cont'd)

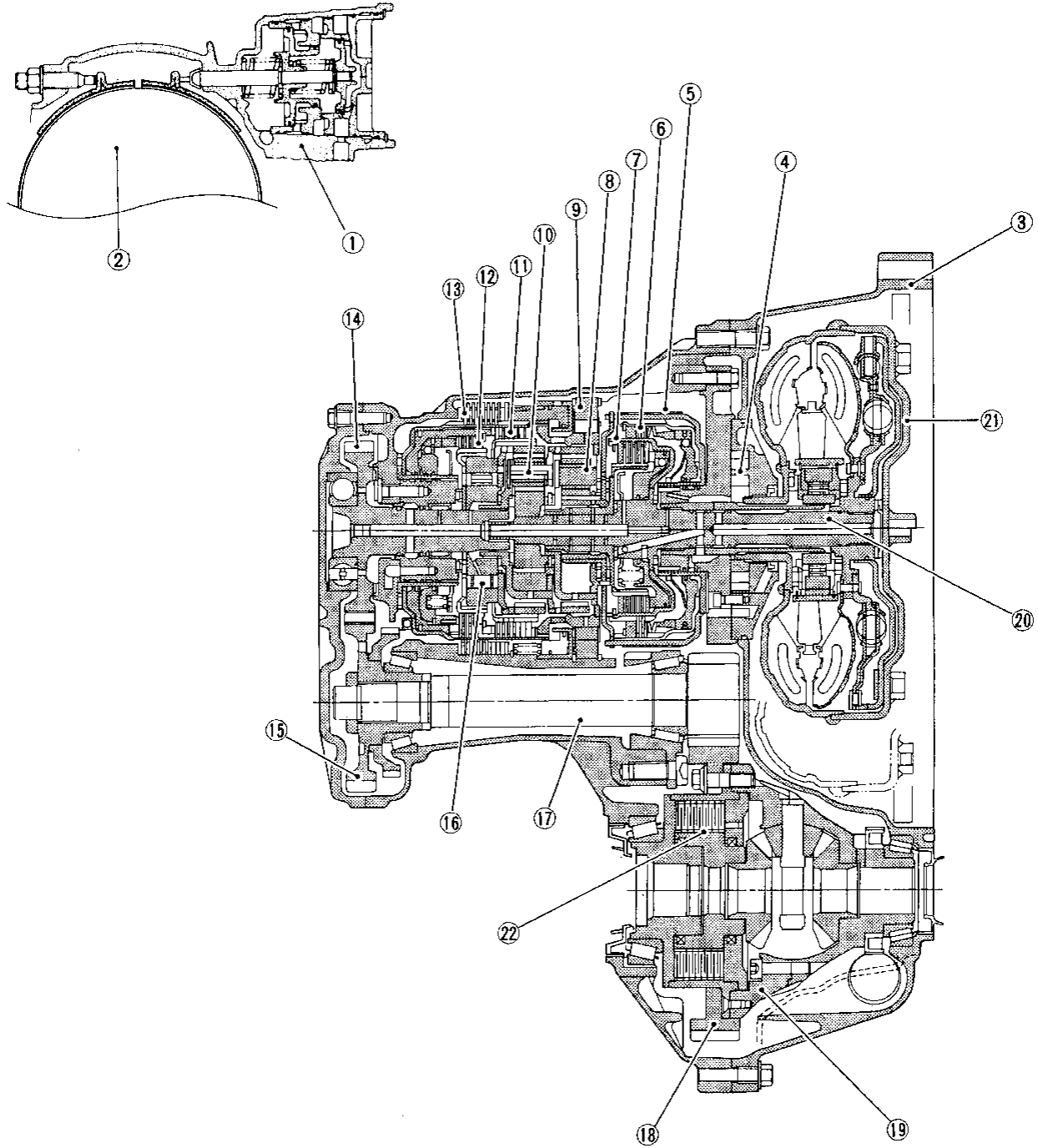
A/T CONTROL UNIT FUNCTION

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

INPUT/OUTPUT SIGNAL OF A/T CONTROL UNIT

	Sensors and solenoid valves	Function
Input	Inhibitor switch	Detects select lever position and sends a signal to A/T control unit.
	Throttle position sensor	Detects throttle valve position and sends a signal to A/T control unit.
	Closed throttle position switch	Detects throttle valve's fully-closed position and sends a signal to A/T control unit.
	Wide open throttle position switch	Detects a throttle valve position of greater than 1/2 of full throttle should throttle sensor malfunction and sends a signal to A/T control unit.
	Engine speed signal	From ECM (ECCS control module).
	Fluid temperature sensor	Detects transmission fluid temperature and sends a signal to A/T control unit.
	Revolution sensor	Detects output shaft rpm and sends a signal to A/T control unit.
	Vehicle speed sensor	Used as an auxiliary vehicle speed sensor. Sends a signal when revolution sensor (installed on transmission) malfunction.
	A/T mode switch	Detects POWER, AUTO or HOLD position selected and sends a signal to A/T control unit.
	OD switch	Sends a signal, which prohibits a shift to D ₄ (OD) range, to the A/T control unit.
Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from A/T control unit.
	Line pressure solenoid valve	Regulates (or decreases) line pressure suited to driving conditions in relation to a signal sent from A/T control unit.
	Torque converter clutch solenoid valve	Regulates (or decreases) lock-up pressure suited to driving conditions in relation to a signal sent from A/T control unit.
	Timing solenoid	Switches oil passages, which act on the band servo piston and low clutch, according to a signal sent from the A/T control unit.

Cross-sectional View



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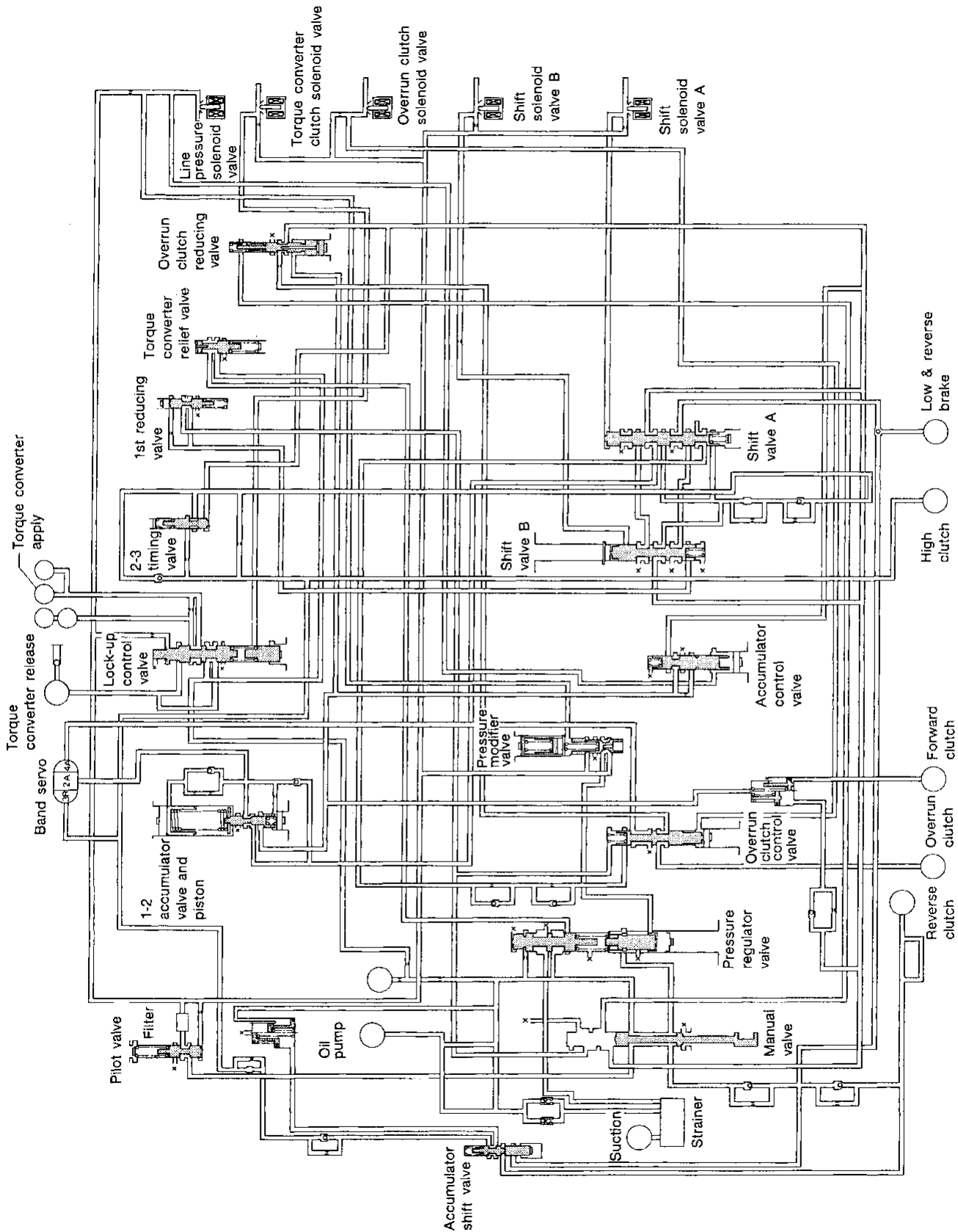
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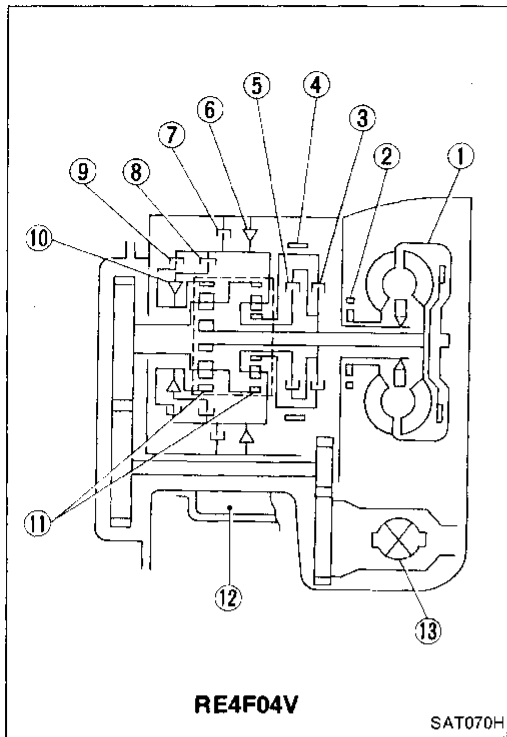
- ① Band servo piston
- ② Reverse clutch drum
- ③ Converter housing
- ④ Oil pump
- ⑤ Brake band
- ⑥ Reverse clutch
- ⑦ High clutch

- ⑧ Front planetary gear
- ⑨ Low one-way clutch
- ⑩ Rear planetary gear
- ⑪ Forward clutch
- ⑫ Overrun clutch
- ⑬ Low & reverse brake
- ⑭ Output gear

- ⑮ Idler gear
- ⑯ Forward one-way clutch
- ⑰ Pinion reduction gear
- ⑱ Final gear
- ⑲ Differential case
- ⑳ Input shaft
- ㉑ Torque converter
- ㉒ Viscous coupling

Hydraulic Control Circuits





Shift Mechanism

CONSTRUCTION

- ① Torque converter
- ② Oil pump
- ③ Reverse clutch
- ④ Brake band
- ⑤ High clutch
- ⑥ Low one-way clutch
- ⑦ Low & reverse brake
- ⑧ Forward clutch
- ⑨ Overrun clutch
- ⑩ Forward one-way clutch
- ⑪ Planetary gear
- ⑫ Control valve
- ⑬ Final drive

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FUNCTION OF CLUTCH AND BRAKE

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

Shift Mechanism (Cont'd)

OPERATION OF CLUTCH AND BRAKE

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

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

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

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

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

○ : Operates

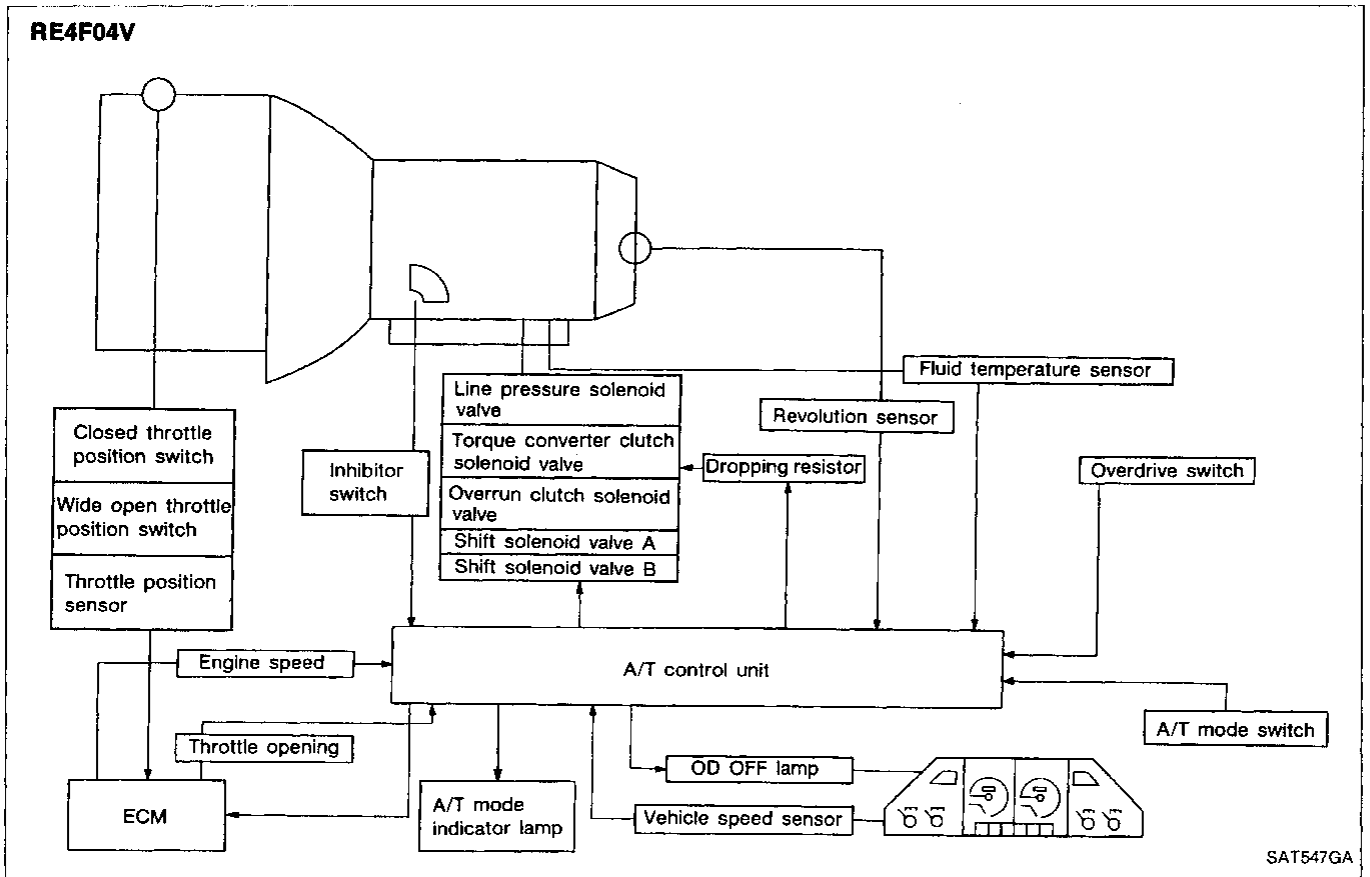
⊙ : Operates when throttle opening is less than 1/16.

● : Operates during "progressive" acceleration.

⊗ : Operates but does not affect power transmission.

Control System

CONTROL SYSTEM



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Control System (Cont'd)**A/T CONTROL UNIT FUNCTION**

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

INPUT/OUTPUT SIGNAL OF A/T CONTROL UNIT

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	Engine speed signal	From ECM (ECCS control module).
	Fluid temperature sensor	Detects transmission fluid temperature and sends a signal to A/T control unit.
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Output	Shift solenoid valve A/B	Selects shifting point suited to driving conditions in relation to a signal sent from A/T control unit.
	Line pressure solenoid valve	Regulates (or decreases) lock-up 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.

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on when turning A/T mode switch to the appropriate position.)	AT-62	FA
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(SYMP TOM: OD OFF indicator lamp does not come on when setting		
overdrive switch to "OFF" position.)	AT-62	RA
Diagnostic Procedure 4		
(SYMP TOM: Power indicator lamp does not come on for about 3		
seconds when depressing and releasing accelerator pedal fully.)	AT-62	BR
Diagnostic Procedure 5		
(SYMP TOM: Engine cannot be started with selector lever in "P" or "N" position		
or engine can be started with selector lever in "D", "2", "1" or "R" position.)	AT-63	ST
Diagnostic Procedure 6		
(SYMP TOM: Vehicle moves when it is pushed forward or backward with		
selector lever in "P" position.)	AT-63	BF
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(SYMP TOM: Vehicle moves forward or backward when selecting "N" position.)	AT-64	HA
Diagnostic Procedure 8		
(SYMP TOM: There is large shock when changing from "N" to "R" position.)	AT-65	EL
Diagnostic Procedure 9		
(SYMP TOM: Vehicle does not creep backward when selecting "R" position.)	AT-66	IDX
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(SYMP TOM: Vehicle does not creep forward when selecting "D", "2" or "1" position.)	AT-67	
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Diagnostic Procedure 18
 (SYMPTOM: A/T does not shift from D₄ to D₃ when changing
 overdrive switch to "OFF" position.) AT-74

Diagnostic Procedure 19
 (SYMPTOM: A/T does not shift from D₃ to 2₂ when changing
 selector lever from "D" to "2" position.) AT-75

Diagnostic Procedure 20
 (SYMPTOM: A/T does not shift from 2₂ to 1₁ when changing selector
 lever from "2" to "1" position.
 Vehicle does not decelerate by engine brake when shifting from 2₂ (1₂) to 1₁.) AT-75

Electrical Components Inspection AT-76

Final Check AT-83

Symptom Chart AT-87

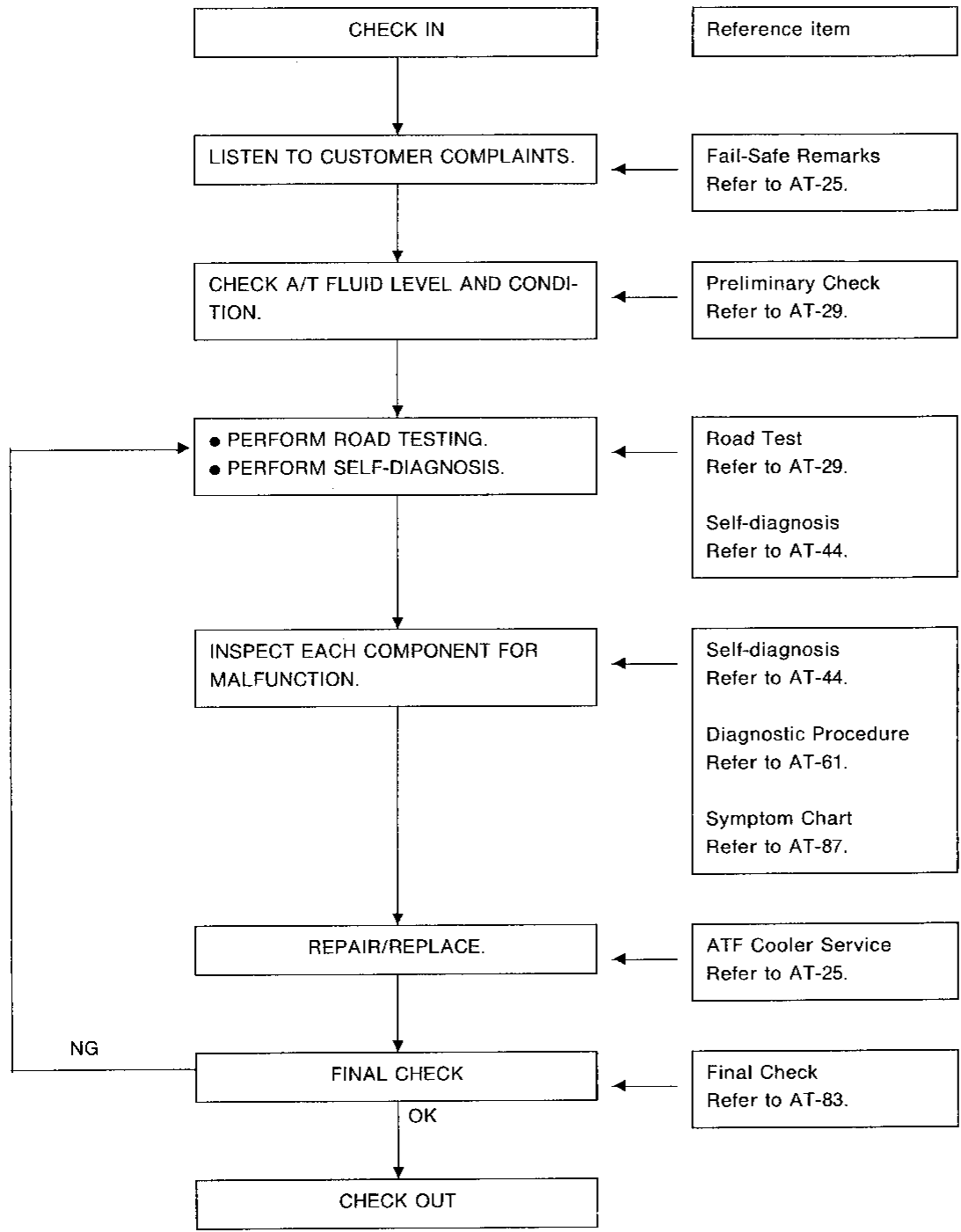
How to Perform Trouble Diagnoses for Quick and Accurate Repair

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

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

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

WORK FLOW



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

INFORMATION FROM CUSTOMER

KEY POINTS

WHAT Vehicle & A/T model

WHEN Date, Frequencies

WHERE Road conditions

HOW Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Trans. model RE4F02A	Engine VG30E	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (times a day)	
Symptoms	<input type="checkbox"/> Vehicle does not move. (<input type="checkbox"/> Any position <input type="checkbox"/> Particular position)	
	<input type="checkbox"/> No up-shift (<input type="checkbox"/> 1st → 2nd <input type="checkbox"/> 2nd → 3rd <input type="checkbox"/> 3rd → O/D)	
	<input type="checkbox"/> No down-shift (<input type="checkbox"/> O/D → 3rd <input type="checkbox"/> 3rd → 2nd <input type="checkbox"/> 2nd → 1st)	
	<input type="checkbox"/> Lockup malfunction	
	<input type="checkbox"/> Shift point too high or too low.	
	<input type="checkbox"/> Shift shock or slip (<input type="checkbox"/> N → D <input type="checkbox"/> Lockup <input type="checkbox"/> Any drive position)	
	<input type="checkbox"/> Noise or vibration	
	<input type="checkbox"/> No kickdown	
	<input type="checkbox"/> No pattern select	
	<input type="checkbox"/> Others ()	
Power indicator lamp	Flickers for about 8 seconds.	
	<input type="checkbox"/> Come on	<input type="checkbox"/> Come off

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

DIAGNOSTIC WORKSHEET

1.	<input type="checkbox"/> Read the Fail-safe Remarks and listen to customer complaints.	AT-25
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-29
3.	<input type="checkbox"/> Perform all ROAD TESTING and mark required procedures.	AT-29
	3-1 Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Timing solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve </div> <div style="width: 48%;"> <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others </div> </div>	AT-30
	3-2. Check at idle <input type="checkbox"/> Diagnostic Procedure 1 (Power indicator lamp came on for 2 seconds.) <input type="checkbox"/> Diagnostic Procedure 2 (Power or comfort indicator lamp came on.) <input type="checkbox"/> Diagnostic Procedure 3 (OD OFF indicator lamp came on.) <input type="checkbox"/> Diagnostic Procedure 4 (Power indicator lamp came on when acc. pedal was depressed.) <input type="checkbox"/> Diagnostic Procedure 5 (Engine starts only in P and N position) <input type="checkbox"/> Diagnostic Procedure 6 (In P position, vehicle does not move when pushed) <input type="checkbox"/> Diagnostic Procedure 7 (In N position, vehicle moves) <input type="checkbox"/> Diagnostic Procedure 8 (Select shock. N → R position) <input type="checkbox"/> Diagnostic Procedure 9 (Vehicle creeps backward in R position) <input type="checkbox"/> Diagnostic Procedure 10 (Vehicle creeps forward in D, 2 or 1 position)	AT-31
	3-3. Cruise test Part-1 <input type="checkbox"/> Diagnostic Procedure 11 (Vehicle starts from D ₁) <input type="checkbox"/> Diagnostic Procedure 12 <input type="checkbox"/> Diagnostic Procedure 13 <input type="checkbox"/> Diagnostic Procedure 14 } (A/T shift schedule: D ₁ → D ₂ /D ₂ → D ₃ /D ₃ → D ₄ /D ₄ → D ₂) <input type="checkbox"/> Diagnostic Procedure 15 (Shift schedule: Lock-up) <input type="checkbox"/> Diagnostic Procedure 16 (Lock-up condition more than 30 seconds) <input type="checkbox"/> Diagnostic Procedure 17 (Lock up released)	AT-32

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

	<p>Part-2</p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnostic Procedure 11 (Vehicle starts from D₁) <input type="checkbox"/> Diagnostic Procedure 12 (Kickdown: D₄ → D₂) <input type="checkbox"/> Diagnostic Procedure 13 (Shift schedule: D₂ → D₃) <input type="checkbox"/> Diagnostic Procedure 14 (Shift schedule: D₃ → D₄ and engine brake) 	<p>AT-37</p>
	<p>Part-3</p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnostic Procedure 18 (D₄ → D₃ when OD OFF switch ON → OFF) <input type="checkbox"/> Diagnostic Procedure 19 (3₃ → 2₂ when selector lever D → 2 position) <input type="checkbox"/> Diagnostic Procedure 20 (2₂ (1₂) → 1₁, when selector lever 2 → 1 position) <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <ul style="list-style-type: none"> <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Timing solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others 	<p>AT-38</p>
<p>4.</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Perform the Diagnostic Procedures marked in ROAD TESTING. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the components inspection orders.) 	<p>AT-87</p>
<p>5.</p>	<p>Perform FINAL CHECK. If NG, go back to "CHECK A/T FLUID".</p> <ul style="list-style-type: none"> <input type="checkbox"/> Stall test — Mark possible damaged components/others. <ul style="list-style-type: none"> <input type="checkbox"/> One-way clutch <input type="checkbox"/> Low clutch <input type="checkbox"/> Torque converter one-way clutch <input type="checkbox"/> Reverse clutch <input type="checkbox"/> Low & reverse brake <input type="checkbox"/> Engine <input type="checkbox"/> Line pressure is low <input type="checkbox"/> Pressure test — Suspected parts: 	<p>AT-83</p>

Remarks

FAIL-SAFE

The A/T control unit has an electronic Fail-Safe (limp home mode) to allow the vehicle to be driven even in the event of damage of a major electrical input or output device circuit.

In this condition, the vehicle runs in third gear in positions 1, 2 or D and will not upshift. Customer may say "Sluggish, poor acceleration".

When Fail-safe operation occurs the next time the key is turned to the ON position, the power indicator lamp will blink for about 8 seconds. (For diagnosis, refer to AT-30.)

If the vehicle is driven under extreme conditions such as excessive wheel spinning and emergency braking suddenly after, Fail-Safe may be activated even if all electrical circuits are undamaged.

In this case, normal shift pattern can be returned by turning key OFF for 3 seconds and then back ON.

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

Always follow the "WORK FLOW" (Refer to AT-21).

The SELF-DIAGNOSIS results will be as follows:

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

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

ATF COOLER SERVICE

During overhaul, if excessive foreign material is found in the oil pan or clogging the strainer, the ATF cooler must be serviced as follows:

VG30 engine (RE4F02A) ... tube type cooler

Flush ATF cooler and cooler line using cleaning solvent and compressed air.

VE30 engine (RE4F04V) ... fin type cooler

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

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Diagnosis by CONSULT

NOTICE

- The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
When a noticeable time difference occurs between shift timing which is manifested by shift shock and the CONSULT display, mechanical parts (except solenoids, sensors, etc.) are considered to be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
- 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.
- Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting while gear position is displayed upon completion of shifting (which is computed by A/T control unit).
- Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.

APPLICATION

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 or P position, meter will not indicate 0 km/h (0 mph) even if vehicle is stationary.
Vehicle speed sensor 2 (Meter)	VHCL/S SE-MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Error may occur under approx. 10 km/h (approx. 6 mph) and meter will not indicate 0 km/h (0 mph) even if vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
Fluid temperature sensor	FLUID TEMP 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.	Error may occur under approx. 800 rpm and meter will not indicate 0 rpm even if engine is not running.
Overdrive switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive SW is displayed.	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks	
		ECU input signals	Main signals			
ASCD-cruise signal	ASCD-CRUISE [ON/OFF]	X	—	<ul style="list-style-type: none"> Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state 	<ul style="list-style-type: none"> This is displayed even when no ASCD is mounted. 	GI
ASCD-OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	<ul style="list-style-type: none"> Status of ASCD-OD release signal is displayed. ON ... OD released OFF ... OD not released 	<ul style="list-style-type: none"> This is displayed even when no ASCD is mounted. 	MA EM
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of kickdown SW, is displayed. 		LC
Power shift switch	POWER SHIFT SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of power shift SW, is displayed. 	<ul style="list-style-type: none"> This is displayed even when no power SW is equipped. On vehicles with power SW mounted on lever, this item is invalid although displayed. 	EF & EC
Closed throttle position switch	CLOSED THRL/SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of closed throttle position SW, is displayed. 		FE
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of wide open throttle position SW, is displayed. 		CL
Hold switch	HOLD SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ON/OFF status, computed from signal of hold SW, is displayed. 		MT
Gear position	GEAR		X	<ul style="list-style-type: none"> Gear position data used for computation by control unit, is displayed. 		AT
Selector lever position	SLCT LVR POSI		X	<ul style="list-style-type: none"> Selector lever position data, used for computation by control unit, is displayed. 	<ul style="list-style-type: none"> A specific value used for control is displayed if fail-safe is activated due to error. 	FA
Vehicle speed	VEHICLE SPEED [km/h] or [mph]		X	<ul style="list-style-type: none"> Vehicle speed data, used for computation by control unit, is displayed. 		RA
Throttle position	THROTTLE POSI [θ]		X	<ul style="list-style-type: none"> Throttle position data, used for computation by control unit, is displayed. 	<ul style="list-style-type: none"> A specific value used for control is displayed if fail-safe is activated due to error. 	BR
Line pressure duty	LINE PRES DTY [%]		X	<ul style="list-style-type: none"> Control value of line pressure solenoid valve, computed by control unit from each input signal, is displayed. 		ST
Lock-up duty	TCC S/V DUTY [%]		X	<ul style="list-style-type: none"> Control value of torque converter clutch solenoid valve, computed by control unit from each input signal, is displayed. 		BF HA
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	<ul style="list-style-type: none"> Control value of shift solenoid valve A, computed by control unit from each input signal, is displayed. 	<ul style="list-style-type: none"> Control value of solenoid is displayed even if solenoid circuit is disconnected. The "OFF" signal is displayed if solenoid circuit is shorted. 	EL
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	<ul style="list-style-type: none"> Control value of shift solenoid valve B, computed by control unit from each input signal, is displayed. 		IDX
Timing solenoid valve	TIMING S/V	—	X	<ul style="list-style-type: none"> Control value of timing solenoid valve computed by control unit from each input signal is displayed. 		

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Self-diagnosis display lamp (Power shift lamp)	SELF-D DP LMP [ON/OFF]	—	X	● Control status of power shift lamp is displayed.	

X: Applicable

—: Not applicable

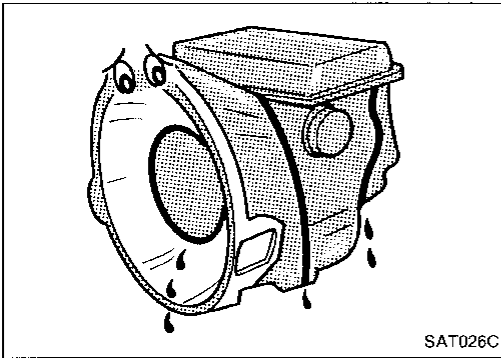
Note:

1. When select ECU input signals on CONSULT, electronic control unit input signal are set.
2. When select main signals on CONSULT, monitored items for understanding the overall operation of the system are set, and this setting is indicated by a reversed display.

DATA ANALYSIS

Item	Display form	Meaning
Lock-up duty	Approximately 4%	Lock-up "OFF"
	↓ Approximately 94%	↓ Lock-up "ON"
Line pressure duty	Approximately 29%	Low line-pressure (Small throttle opening)
	↓ Approximately 94%	↓ High line-pressure (Large throttle opening)
Throttle position sensor	Approximately 0.5V	Fully-closed throttle
	Approximately 4V	Fully-open throttle
Fluid temperature sensor	Approximately 1.5V	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



SAT026C

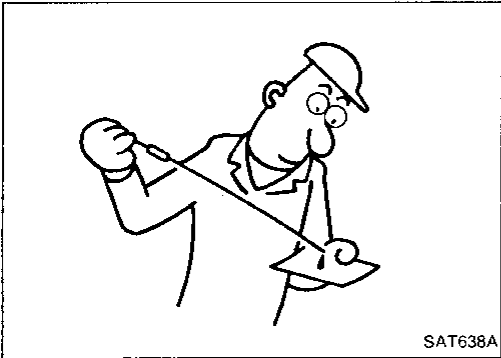
Preliminary Check

A/T FLUID CHECK

Fluid leakage check

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

GI
MA
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SAT638A

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

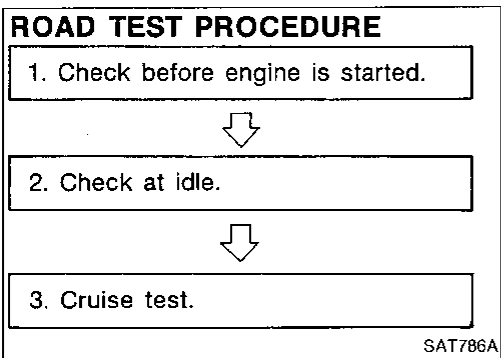
LC
EF & EC
FE
CL

Fluid level check

Refer to MA section (CHASSIS AND BODY MAINTENANCE).

MT

AT



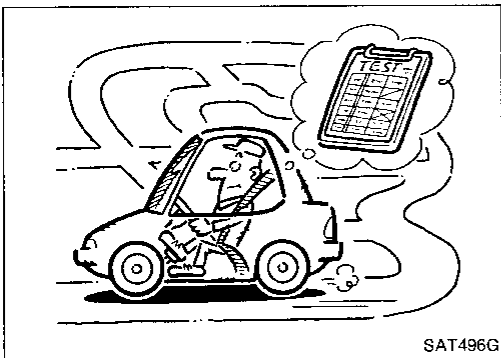
SAT786A

ROAD TESTING

Description

- The purpose of this road test is to determine overall performance of automatic transmission and analyze causes of problems.
- The road test consists of the following three parts:
 1. Check before engine is started
 2. Check at idle
 3. Cruise test
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to "Self-diagnosis" and "Diagnostic Procedure". AT-44

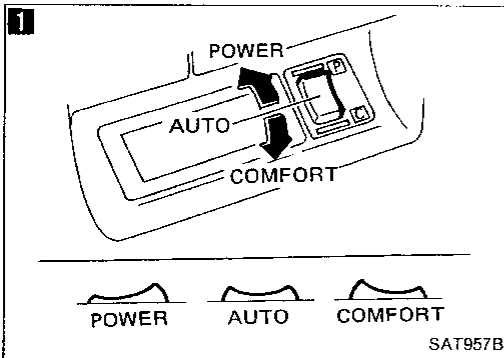
FA
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HA
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SAT496G

Preliminary Check (Cont'd)

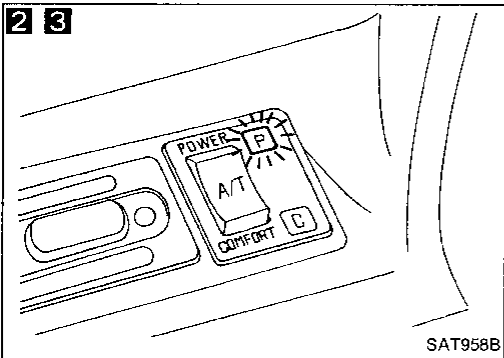
1. Check before engine is started



- 1 2**
1. Park vehicle on flat surface.
 2. Set A/T mode switch to "AUTO" position.
 3. Move selector lever to "P" position.
 4. Turn ignition switch to "ON" position. (Do not start engine.)
 5. Does power indicator lamp come on for about 2 seconds?

No → Go to Diagnostic Procedure 1. AT-61

Yes ↓



- 3**
1. Does power indicator lamp flicker for about 8 seconds?

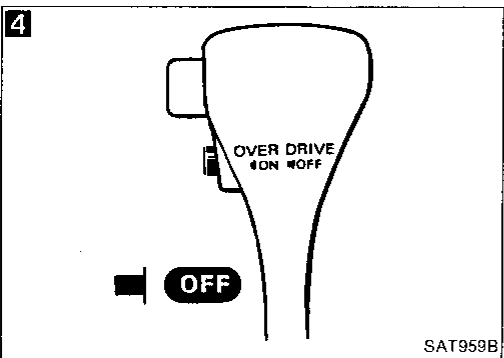
Yes → Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE. AT-44

No ↓

1. Set A/T mode switch to "POWER" position.
2. Does power indicator lamp come on?

No → Go to Diagnostic Procedure 2. AT-62

Yes ↓



1. Set A/T mode switch to "COMFORT" position.
2. Does comfort indicator lamp come on?

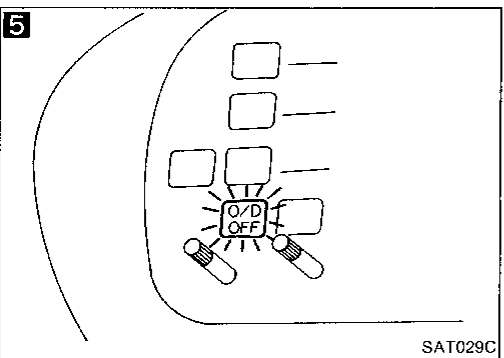
No → Go to Diagnostic Procedure 2. AT-62

Yes ↓

- 4 5**
1. Set overdrive switch to "OFF" position.
 2. Does OD OFF indicator lamp come on?

No → Go to Diagnostic Procedure 3. AT-62

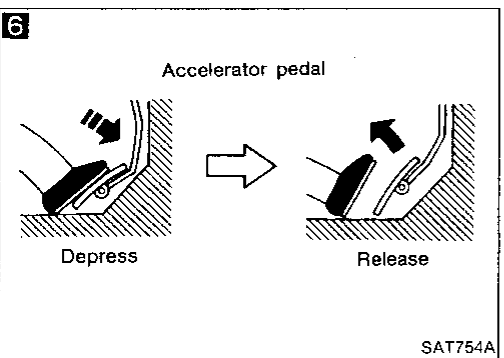
Yes ↓



- 6**
1. Move selector lever to "D" position.
 2. Set A/T mode switch to "AUTO" position.
 3. Depress and release accelerator pedal quickly.
 4. Does power indicator lamp come on for about 3 seconds after accelerator pedal is depressed?

No → Go to Diagnostic Procedure 4. AT-62

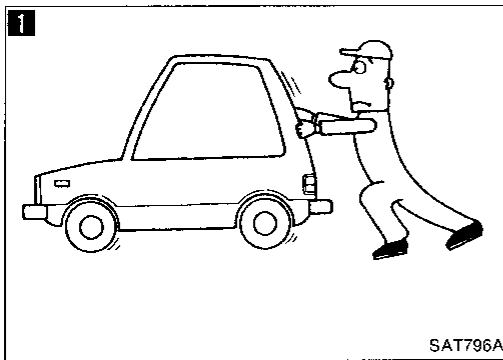
Yes ↓



1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE and note NG items.
3. Go to "ROAD TESTING — Check at idle". AT-31

Preliminary Check (Cont'd)

2. Check at idle



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

No → Go to Diagnostic Procedure 5. AT-63

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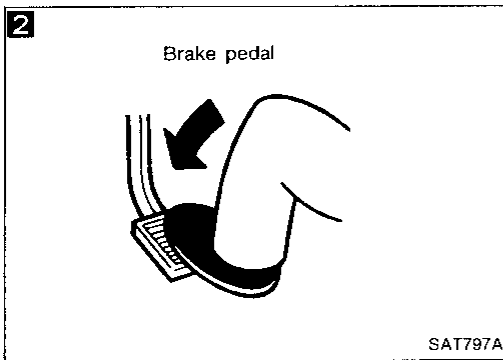
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IDX



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

Yes → Go to Diagnostic Procedure 5. AT-63

No

1. Turn ignition switch to "OFF" position.
 2. Move selector lever to "P" position.
 3. Release parking brake.
 4. Push vehicle forward or backward.
 5. Does vehicle move when it is pushed forward or backward?

Yes → Go to Diagnostic Procedure 6. AT-63

No

1. Apply parking brake.
 2. Move selector lever to "N" position.
 3. Turn ignition switch to "START" position and start engine.
 4. Release parking brake.
 5. Does vehicle move forward or backward?

Yes → Go to Diagnostic Procedure 7. AT-64

No

1. Apply foot brake.
 2. Move selector lever to "R" position.
 3. Is there large shock when changing from "N" to "R" position?

No → Go to Diagnostic Procedure 8. AT-65

Yes

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

No → Go to Diagnostic Procedure 9. AT-66

Yes

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

No → Go to Diagnostic Procedure 10. AT-67

Yes

Go to Cruise test. AT-32

Preliminary Check (Cont'd)

3. Cruise test

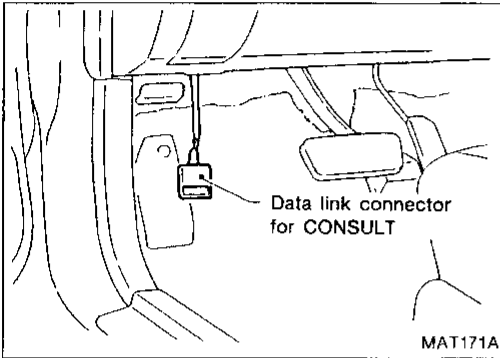
- Check all items listed in Parts 1 through 3.

 **With CONSULT**

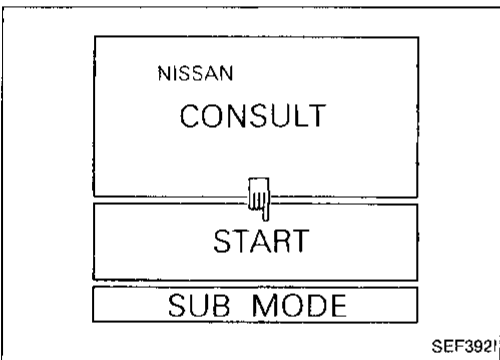
- Using CONSULT, conduct a cruise test and record the result.
- Print the result and ensure that shifts and lock-ups take place as per "Shift Schedule."

CONSULT setting procedure

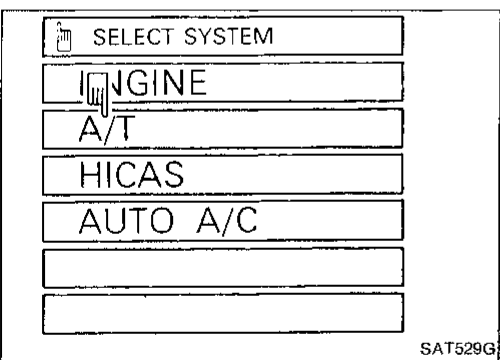
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)



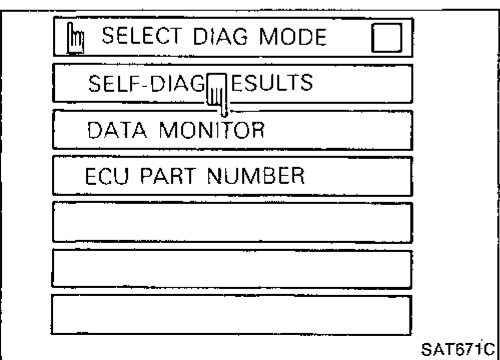
3. Turn on ignition switch.
4. Touch "START".



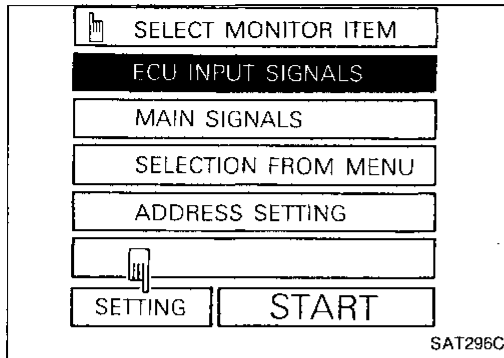
5. Touch "A/T".



6. Touch "DATA MONITOR".



Preliminary Check (Cont'd)

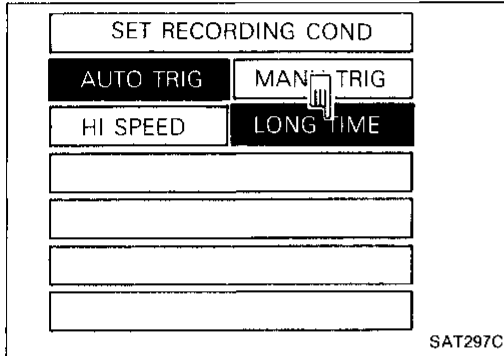


7. Touch "SETTING" to set recording condition.

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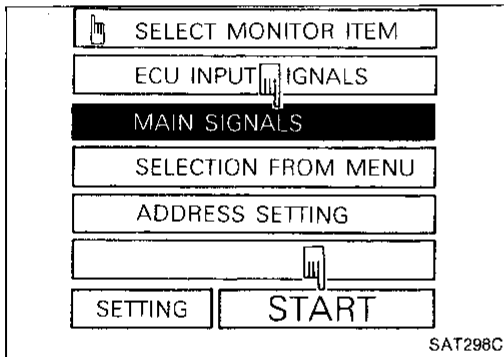
8. Touch "LONG TIME" and "ENTER" key.

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

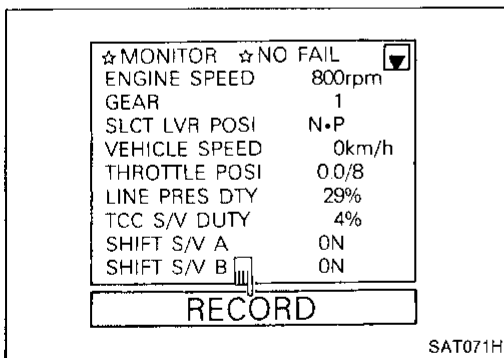
MT

10. Touch "START".

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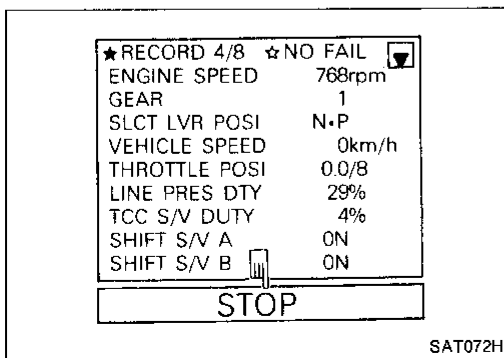
11. When performing cruise test, touch "RECORD".

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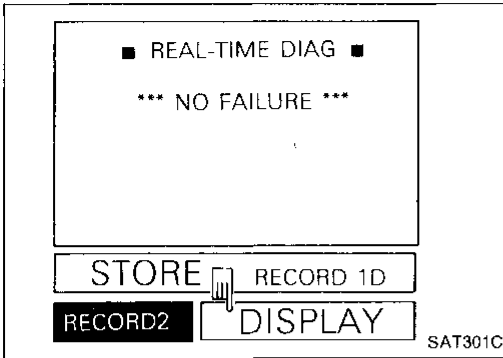
12. After finishing cruise test part 1, touch "STOP".

EL

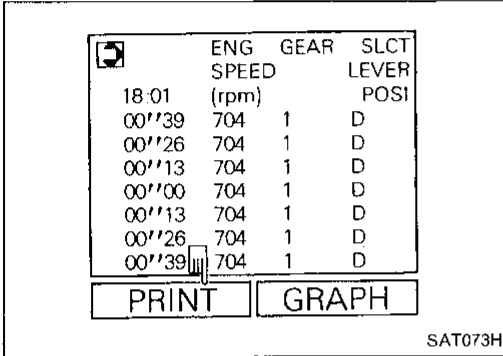
IDX

Preliminary Check (Cont'd)

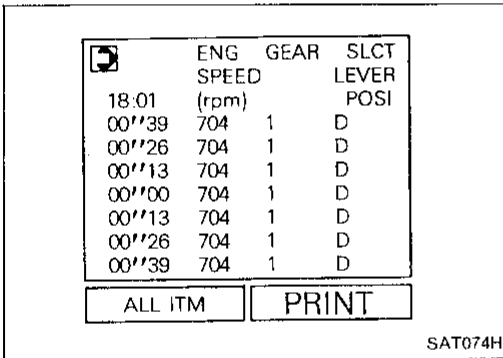
13. Touch "DISPLAY".



14. Touch "PRINT".

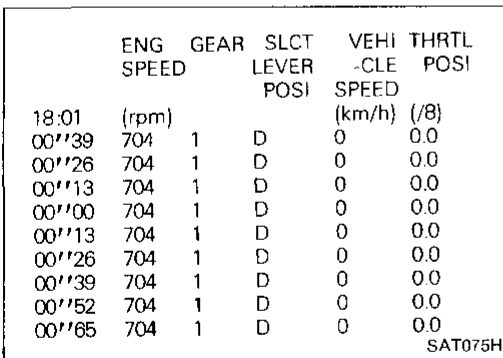


15. Touch "PRINT" again.

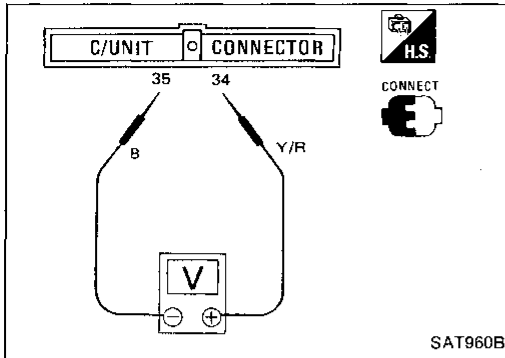


16. Check the monitor data printed out.

17. Continue cruise test part 2 and 3.



Preliminary Check (Cont'd)

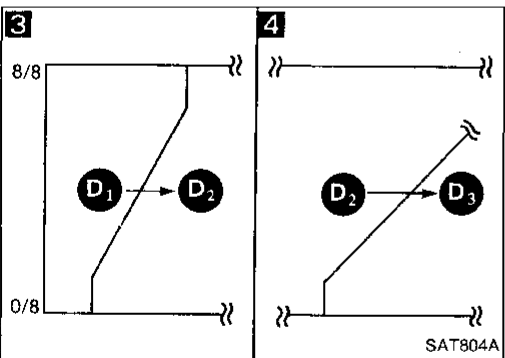
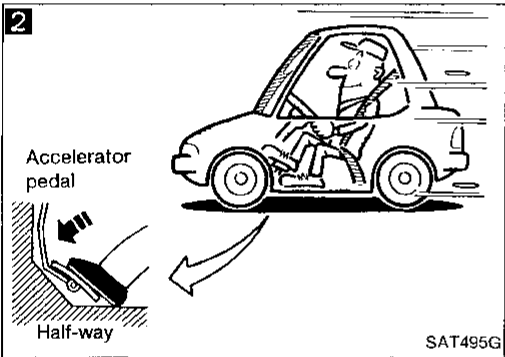
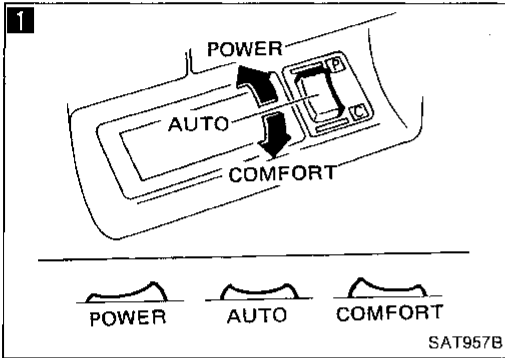


Without CONSULT

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

Cruise test — Part 1

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



1. Park vehicle on flat surface.
 2. Set A/T mode switch to "AUTO" position.
 3. Set overdrive switch to "ON" position.
 4. Move selector lever to "P" position.
 5. Turn ignition switch to "ON" position and start engine.
 6. Move selector lever to "D" position.
 7. Accelerate vehicle by constantly depressing accelerator pedal half-way.
 8. Does vehicle start from D₁?
- Read gear position.**

No → Go to Diagnostic Procedure 11. AT-68

3. 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-39

No → Go to Diagnostic Procedure 12. AT-69

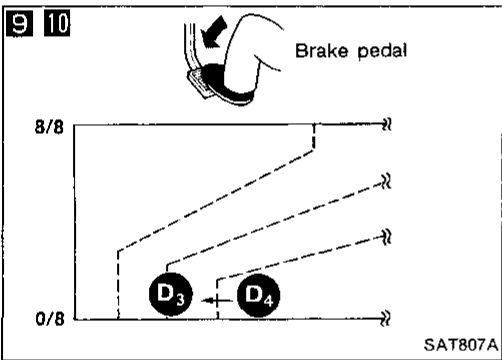
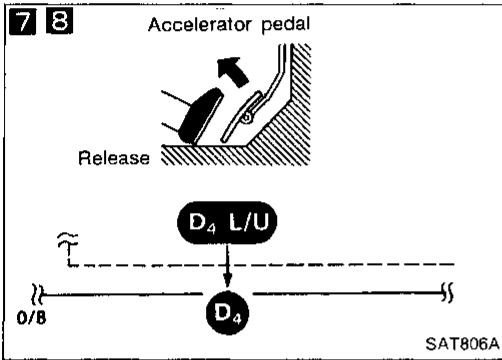
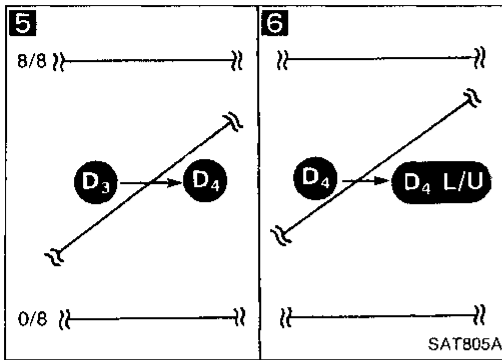
4. Does A/T shift from D₂ to D₃ at the specified speed?
- Read gear position, throttle opening and vehicle speed.**
Specified speed when shifting from D₂ to D₃:
 Refer to Shift schedule. AT-39

No → Go to Diagnostic Procedure 13. AT-70

Yes
 Ⓐ

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Preliminary Check (Cont'd)



A

5
Does A/T shift from D₃ to D₄ at the specified speed?
 (📱) **Read gear position, throttle opening and vehicle speed.**
Specified speed when shifting from D₃ to D₄:
Refer to Shift schedule, AT-39.

No → Go to Diagnostic Procedure 14. AT-71

Yes

6
Does A/T perform lock-up at tftlJ specified speed?
 (📱) **Read vehicle speed, throttle opening when lock-up duty becomes 94%.**
Specified speed when lock-up occurs:
Refer to Shift schedule, AT-39.

No → Go to Diagnostic Procedure 15. AT-72

Yes

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

No → Go to Diagnostic Procedure 16. AT-73

Yes

7 8
b1. Release accelerator pedal.
 2. Is lock-up released when accelerator pedal is released?

No → Go to Diagnostic Procedure 17. AT-73

Yes

9 10
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.**

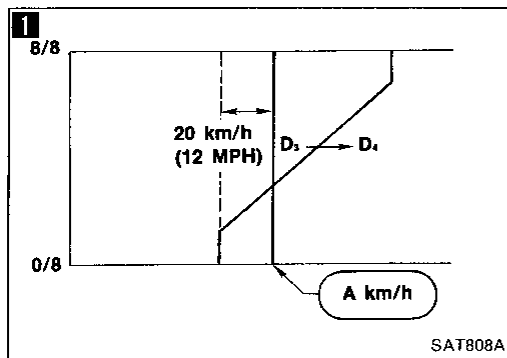
No → Go to Diagnostic Procedure 18. AT-74

Yes

1. Stop vehicle.
 2. Go to "Cruise test — Part 2". AT-37

Preliminary Check (Cont'd)

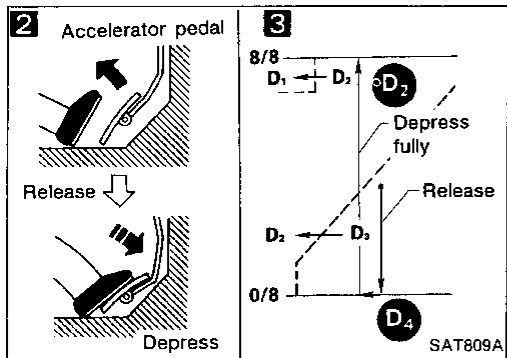
Cruise test — Part 2



1. Confirm A/T mode switch is in "Auto" position and overdrive switch is in "ON" position.
2. Confirm selector lever is in "D" position.
3. Accelerator vehicle by half throttle again.
4. Does vehicle start from D₁?
 - Rear gear position.**

No → Go to Diagnostic Procedure 19. AT-75

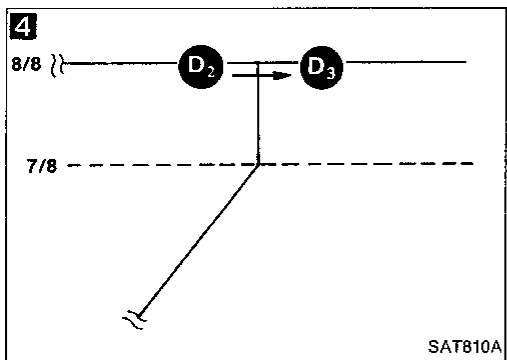
Yes →



1. Accelerate vehicle to A km/h as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D₄ to D₂ as soon as accelerator pedal is depressed fully?
 - Read gear position and throttle opening.**

No → Go to Diagnostic Procedure 12. AT-69

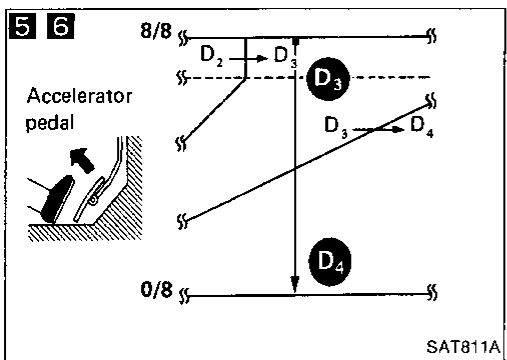
Yes →



4. Does A/T shift from D₂ to D₃ at the specified speed?
 - Read gear position, throttle opening and vehicle speed.**
 - Specified speed when shifting from D₂ to D₃:**
 - Refer to Shift schedule, AT-39.**

No → Go to Diagnostic Procedure 13. AT-70

Yes →



- 5 6. 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 opening and vehicle speed.**

No → Go to Diagnostic Procedure 14. AT-71

Yes →

1. Stop vehicle.
2. Go to "Cruise test — Part 3". AT-38

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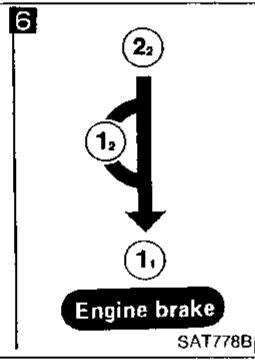
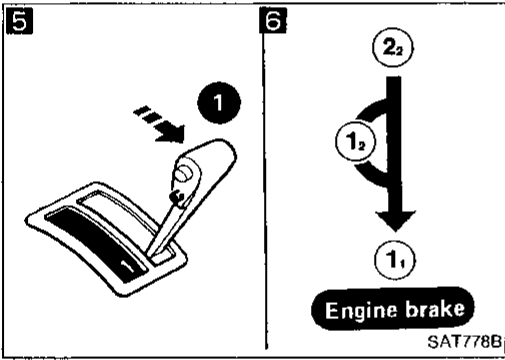
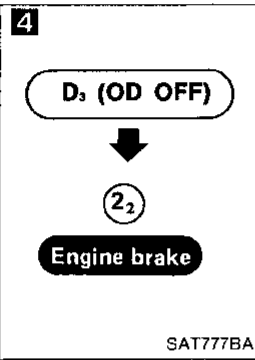
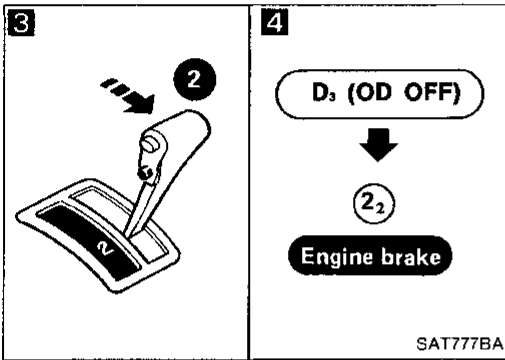
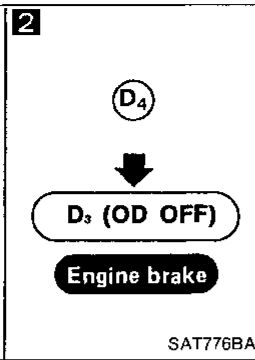
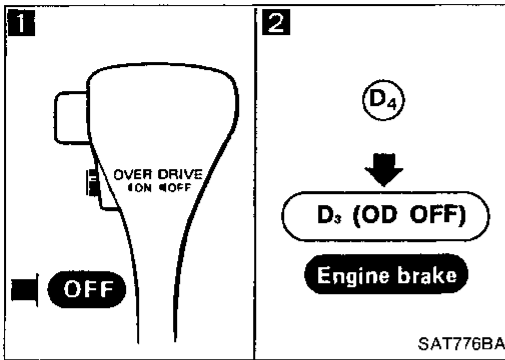
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Preliminary Check (Cont'd)

Cruise test — Part 3



1 2

1. Confirm A/T mode switch is in "Auto" position and overdrive switch is in "ON" position.
2. Confirm selector lever is in "D" position.
3. Accelerate vehicle using half-throttle to D₄.
4. Release accelerator pedal.
5. Set overdrive switch to "OFF" position while driving in D₄ position.
6. Does A/T shift from D₄ to D₃?

Read gear position and vehicle speed.

No → Go to Diagnostic Procedure 18. AT-74

3 4

1. Move selector lever from "D" to "2" position while driving in D₃.
2. Does A/T shift from D₃ to 2₂ and does vehicle decelerate by engine brake?

Read gear position.

No → Go to Diagnostic Procedure 19. AT-75

5 6

1. Move selector lever from "2" to "1" position while driving in 2₂.
2. Does A/T shift from 2₂ to 1₁ and does vehicle decelerate by engine brake?

Read gear position.

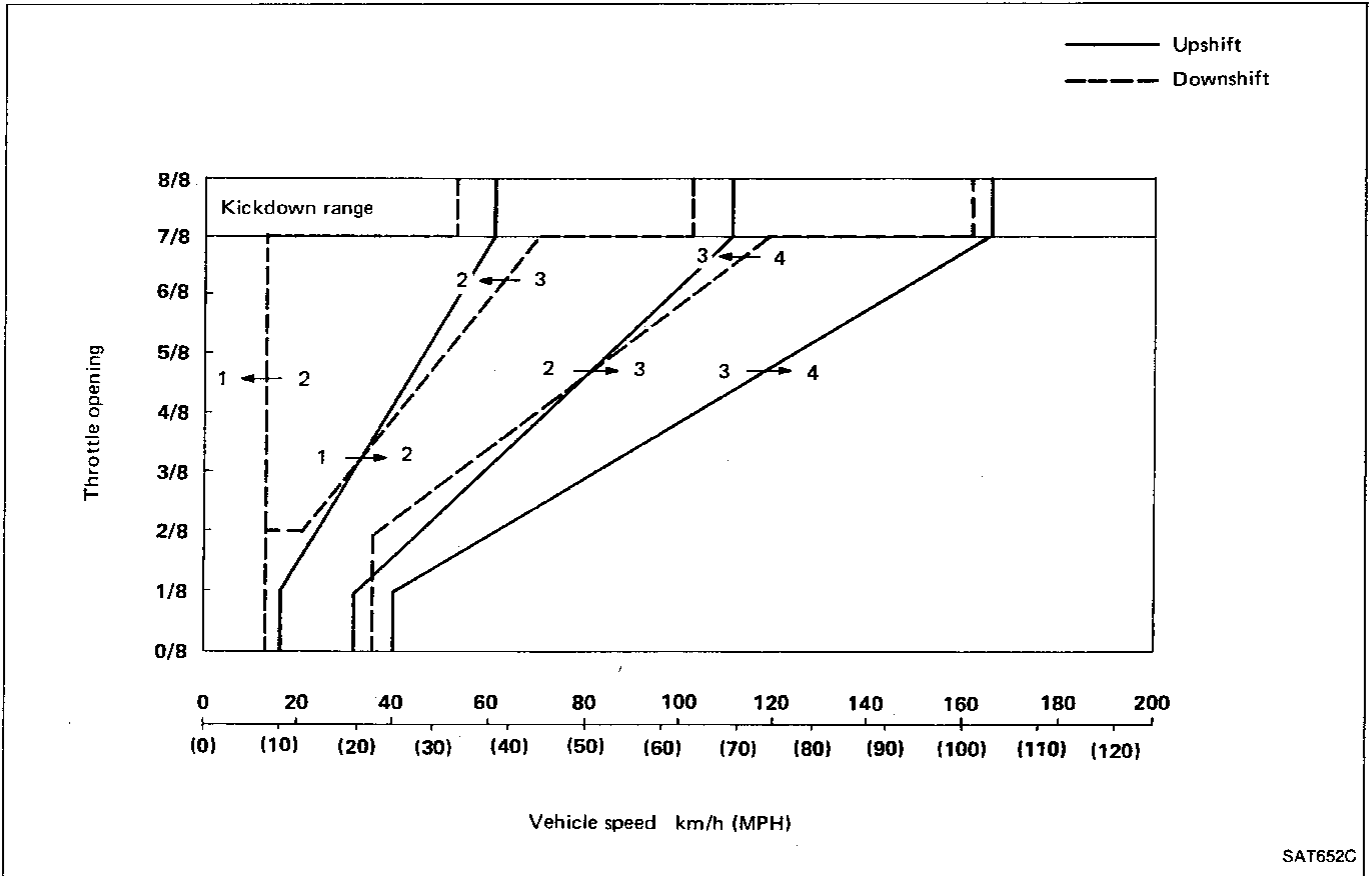
No → Go to Diagnostic Procedure 20. AT-75

Yes

Stop vehicle.
Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE. AT-44

Preliminary Check (Cont'd)

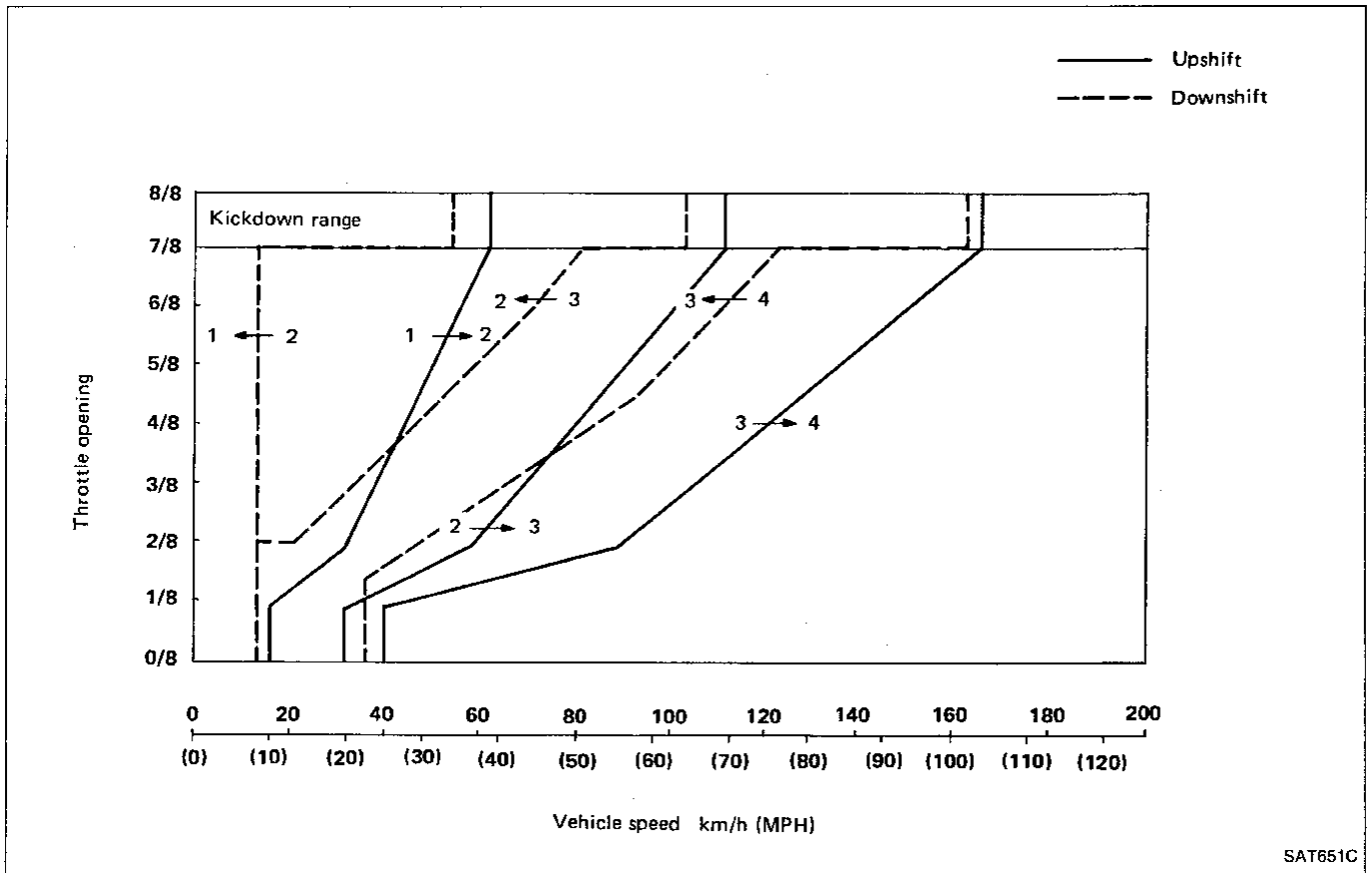
Shift schedule (Comfort pattern)



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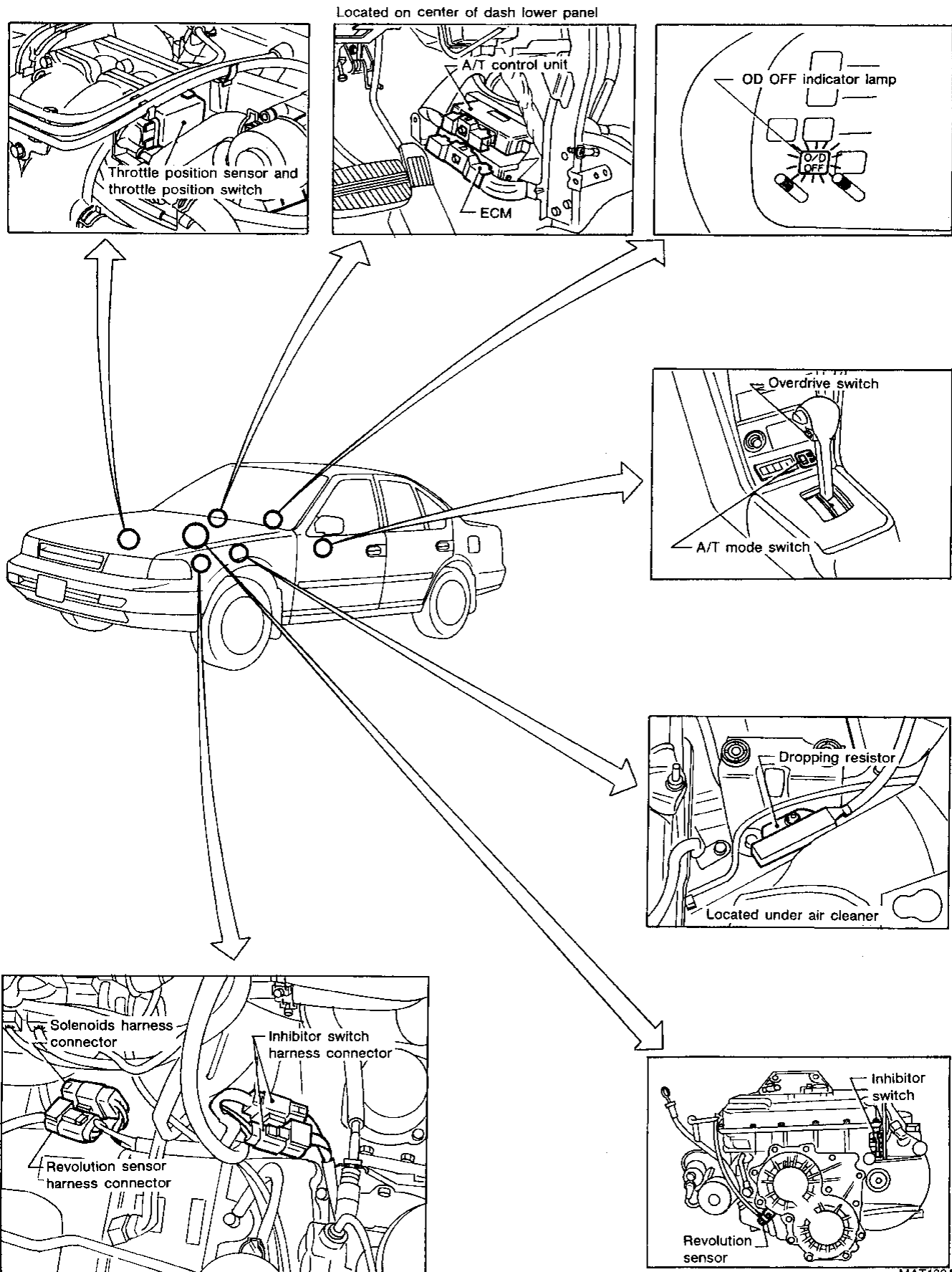
Shift schedule (Power pattern)



SAT651C

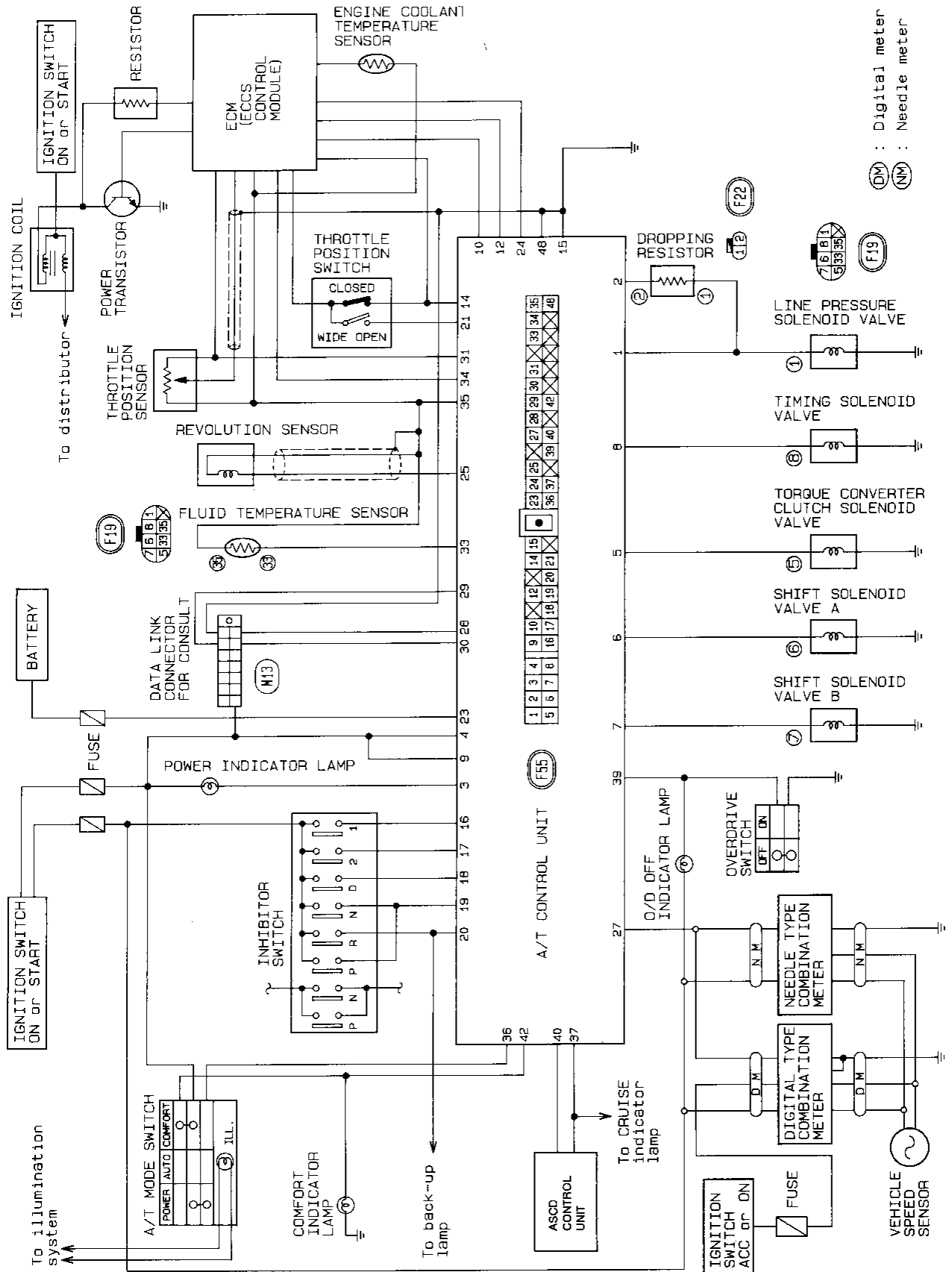
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A/T Electrical Parts Location



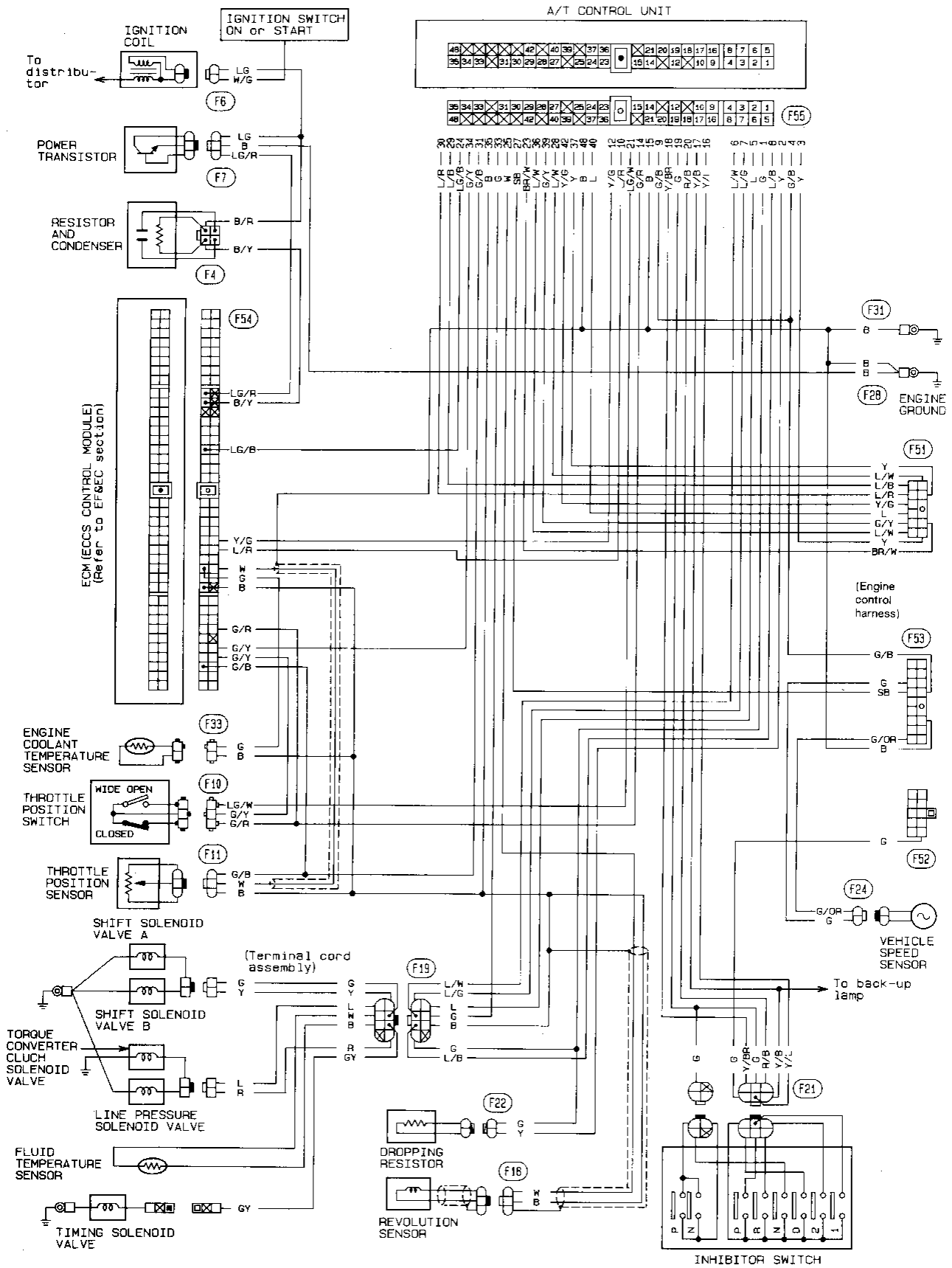
MAT132AA

Circuit Diagram for Quick Pinpoint Check



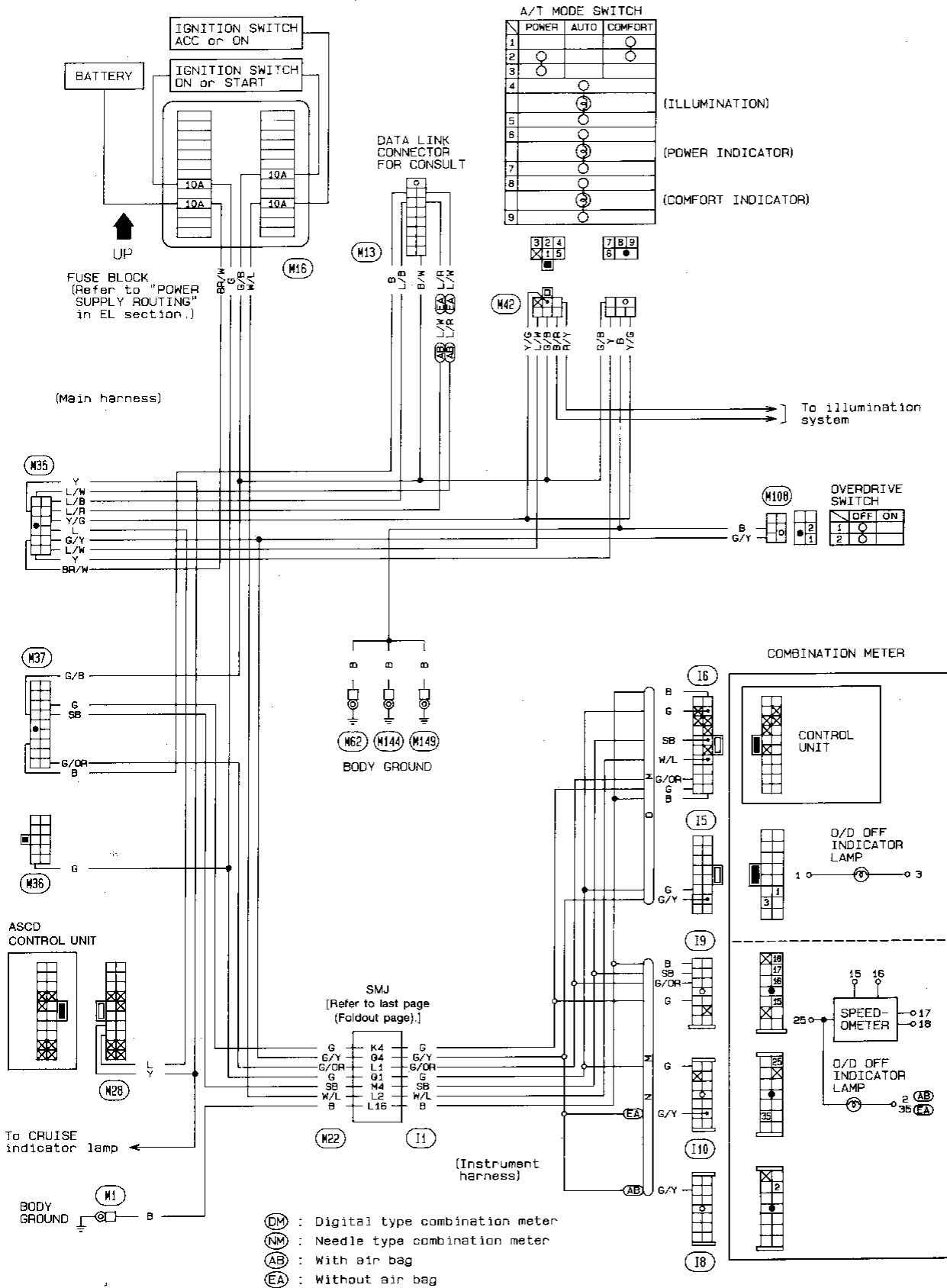
GI
 MA
 EM
 LC
 EF & EC
 FE
 CL
 MT
AT
 FA
 RA
 BR
 ST
 BF
 FA
 FL
 DX

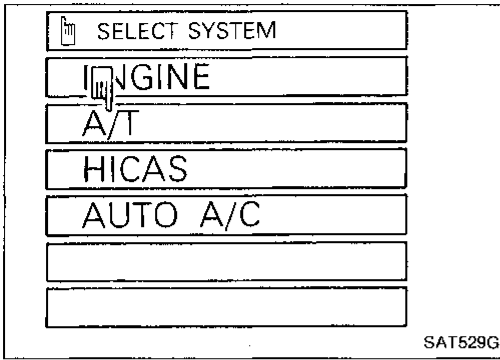
Wiring Diagram



Wiring Diagram (Cont'd)

GF
MA
EM
LC
EF & EC
FE
CL
VT
AT
FA
RA
BR
ST
BF
HA
EL
IDX

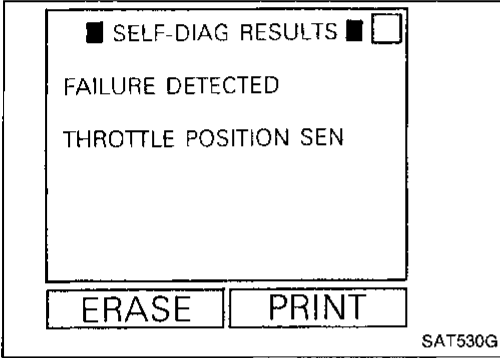




Self-diagnosis

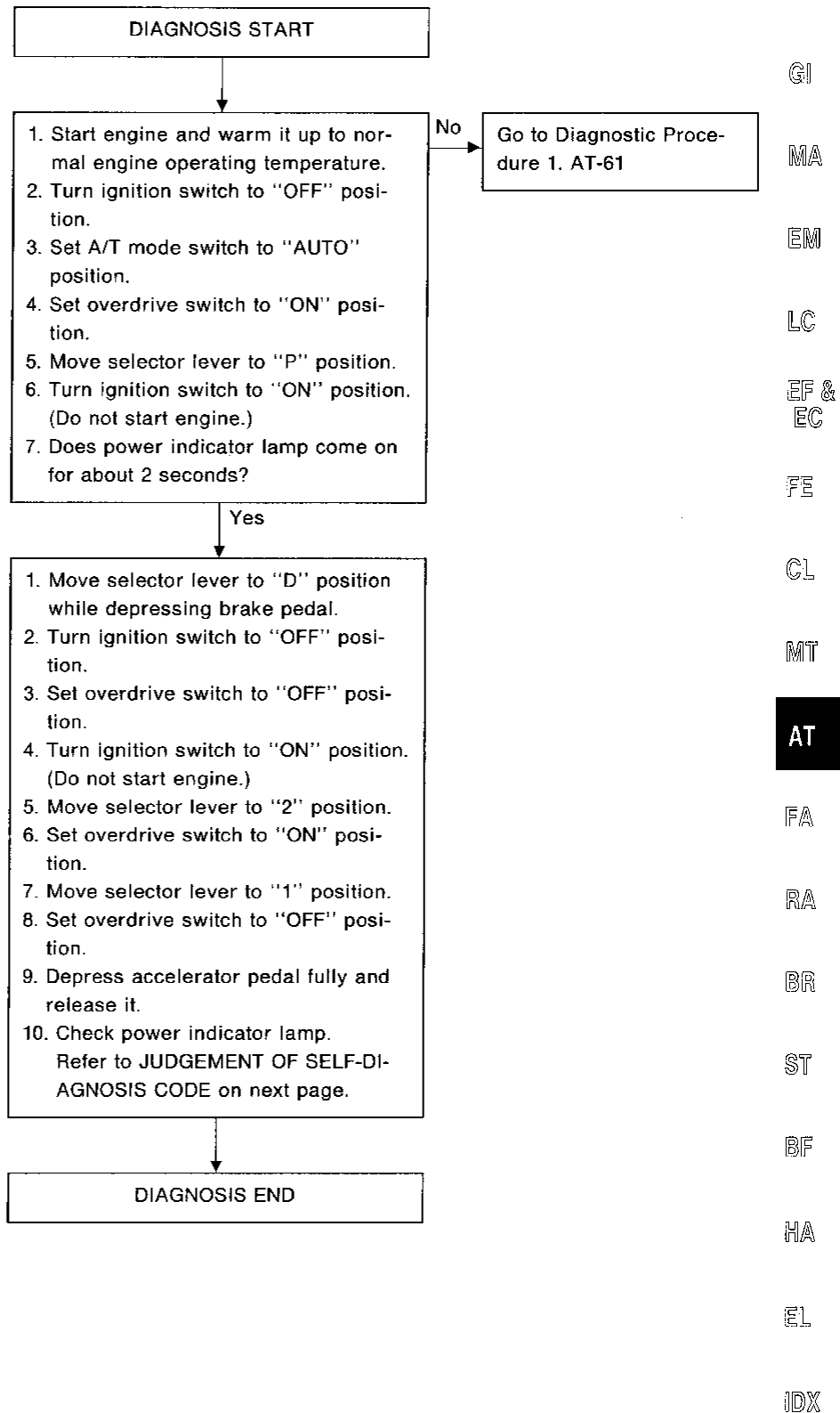
SELF-DIAGNOSTIC PROCEDURE ( With CONSULT)

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



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

Self-diagnosis (Cont'd)

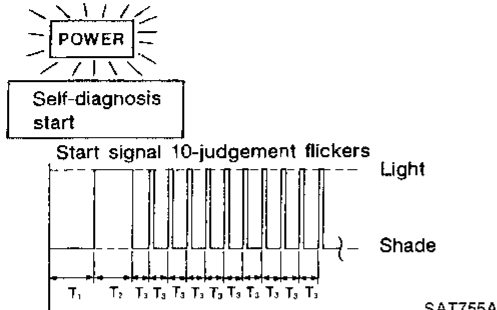
SELF-DIAGNOSTIC PROCEDURE ( Without CONSULT)

Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

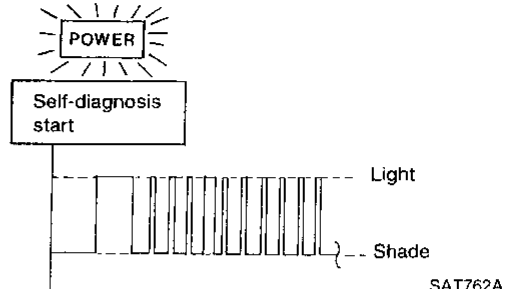
Flickers of power indicator lamp: Damaged circuit

All judgement flickers are same.



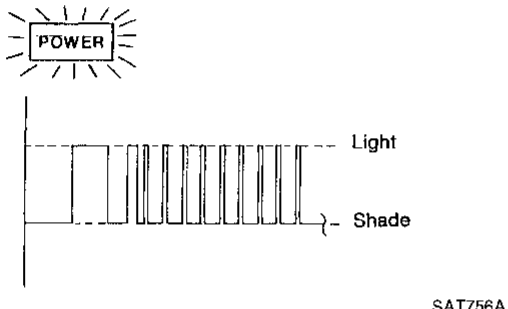
All circuits that can be confirmed by self-diagnosis are OK.

4th judgement flicker is longer than others.



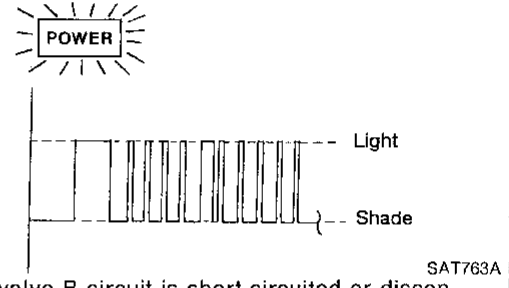
Shift solenoid valve A circuit is short-circuited or disconnected.
 ➔ Go to **SHIFT SOLENOID VALVE A CIRCUIT CHECK, AT-51.**

1st judgement flicker is longer than others.



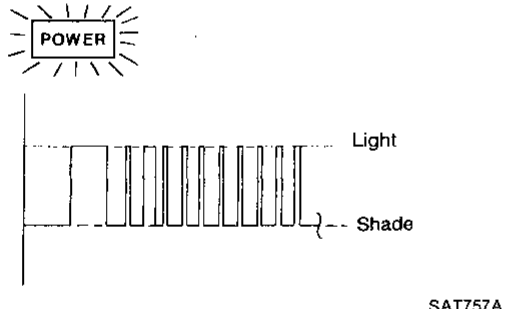
Revolution sensor circuit is short-circuited or disconnected.
 ➔ Go to **REVOLUTION SENSOR CIRCUIT CHECK, AT-48.**

5th judgement flicker is longer than others.



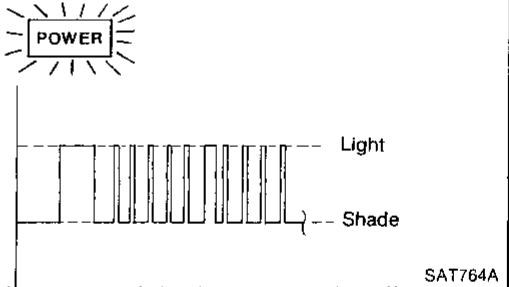
Shift solenoid valve B circuit is short-circuited or disconnected.
 ➔ Go to **SHIFT SOLENOID VALVE B CIRCUIT CHECK, AT-52.**

2nd judgement flicker is longer than others.



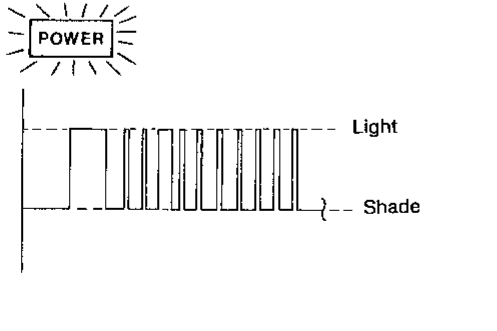
Vehicle speed sensor circuit is short-circuited or disconnected.
 ➔ Go to **VEHICLE SPEED SENSOR CIRCUIT CHECK, AT-49.**

6th judgement flicker is longer than others.



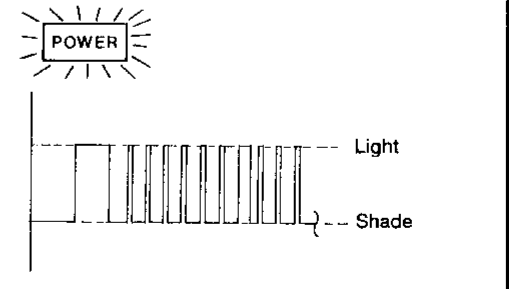
Timing solenoid valve circuit is short-circuited or disconnected.
 ➔ Go to **TIMING SOLENOID VALVE CIRCUIT CHECK, AT-53.**

3rd judgement flicker is longer than others.



Throttle position sensor circuit is short-circuited or disconnected.
 ➔ Go to **THROTTLE POSITION SENSOR CIRCUIT CHECK, AT-50.**

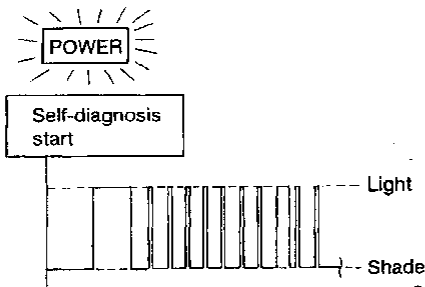
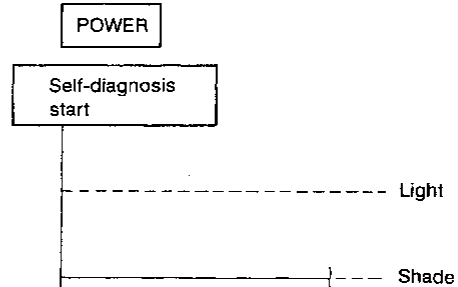
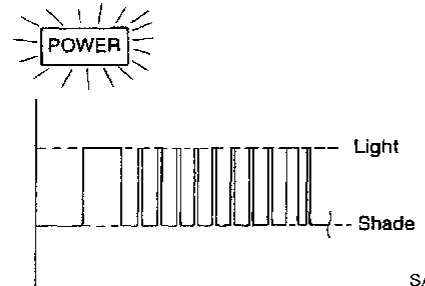
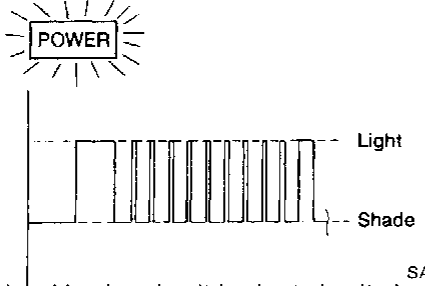
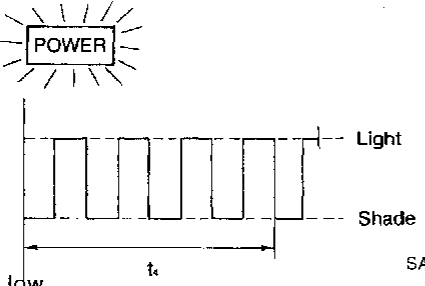
7th judgement flicker is longer than others.



Torque converter clutch solenoid valve circuit is short-circuited or disconnected.
 ➔ Go to **TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-54.**

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

Self-diagnosis (Cont'd)

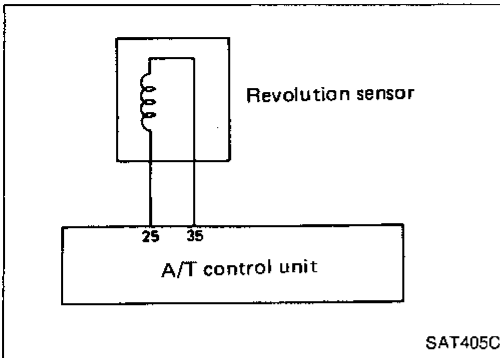
Flickers of power indicator lamp: Damaged circuit	
<p>8th judgement flicker is longer than others.</p>  <p>Fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged. ➔ Go to FLUID TEMPERATURE SENSOR AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS, AT-55.</p>	<p>Does not come on.</p>  <p>Inhibitor switch, overdrive switch or throttle position switch circuit is disconnected or A/T control unit is damaged. ➔ Go to INHIBITOR SWITCH, OVERDRIVE SWITCH AND THROTTLE POSITION SWITCH CIRCUIT CHECKS, AT-59.</p>
<p>9th judgement flicker is longer than others.</p>  <p>Engine speed signal circuit is short-circuited or disconnected. ➔ Go to ENGINE SPEED SIGNAL CIRCUIT CHECK, AT-57.</p>	
<p>10th judgement flicker is longer than others.</p>  <p>Line pressure solenoid valve circuit is short-circuited or disconnected. ➔ Go to LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK, AT-58.</p>	
<p>Flickers as shown below.</p>  <p>Battery power is low. Battery has been disconnected for a long time. Battery is conversely connected. (When reconnecting A/T control unit connectors. — This is not a problem.)</p>	

GI
MA
EM
LC
EF & EC
FE
CL
MT
AT
FA
RA
BR
ST
BF
HA
EL
IDX

t₄ = 1.0 second

Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK

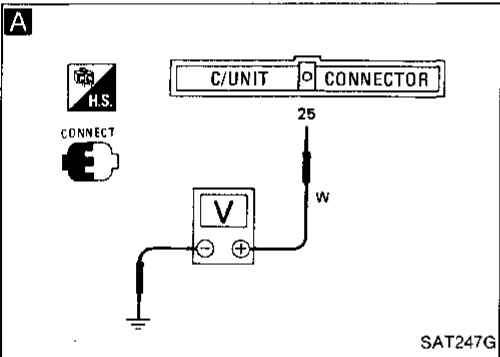


A

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

RECORD

SAT076H



```

    graph TD
      Start[CHECK REVOLUTION SENSOR. — Refer to "Electrical Components Inspection", AT-82.] -- NG --> Repair[Repair or replace revolution sensor.]
      Start -- OK --> A1[A]
      A1[CHECK INPUT SIGNAL. 1. Turn ignition switch to "START" position and start engine. 2. Select "ECU INPUT SIGNALS". Read out the value of "VEHICLE SPEED SENSOR AT" while driving. Check the value changes according to driving speed.] -- NG --> A2[Check the following items. • Harness continuity between A/T control unit and revolution sensor (Main harness) • Harness continuity between revolution sensor and ECM (Main harness)]
      A1 -- OR --> A3[Check voltage between A/T control unit terminal 25 and ground while driving. (Measure with AC position.) 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.)]
      A3 -- OK --> A4[Perform self-diagnosis again after driving for a while.]
      A4 -- NG --> A5[1. Perform A/T control unit input/output signal inspection. 2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.]
      A4 -- OK --> End[INSPECTION END]
  
```

Self-diagnosis (Cont'd)

VEHICLE SPEED SENSOR CIRCUIT CHECK

A

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

RECORD

SAT076H

A

Combination meter

Vehicle speed sensor

27 A/T control unit

At 2 - 3 km/h (1 - 2 MPH)

C/UNIT CONNECTOR

27 SB

V

SAT402G

A

CHECK INPUT SIGNAL.

1. Turn ignition switch to "START" position and start engine.

2.

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

OR

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

Voltage:
Varies from 0V to 5V

NG → Check the following items.

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

OK → Perform self-diagnosis again after driving for a while.

NG →

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

OK → INSPECTION END

GI

MA

EM

LC

EF & EC

FE

CL

MT

AT

FA

RA

BR

ST

BF

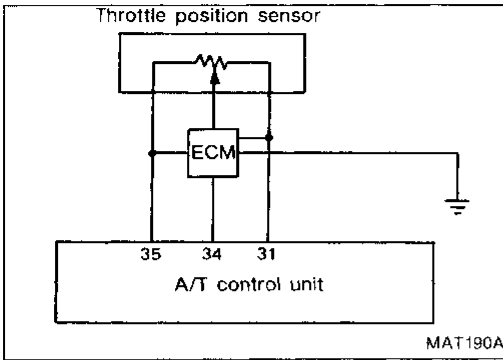
HA

EL

IDX

Self-diagnosis (Cont'd)

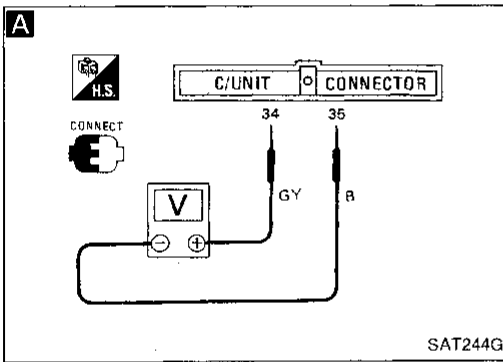
THROTTLE POSITION SENSOR CIRCUIT CHECK



A

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

SAT076H

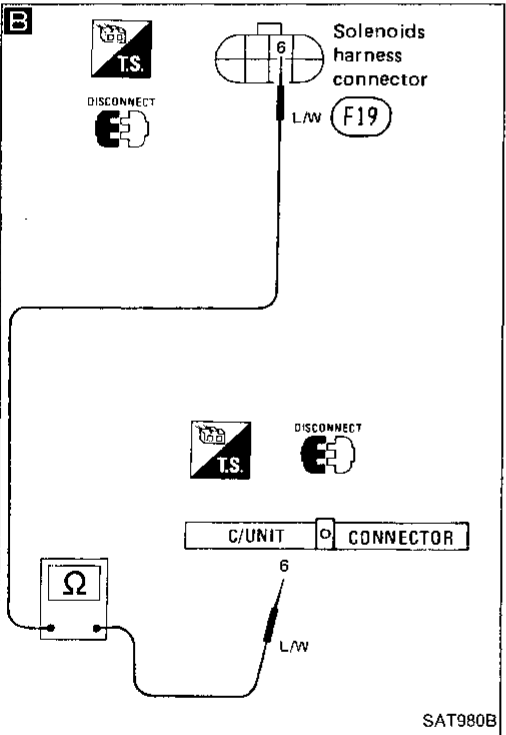
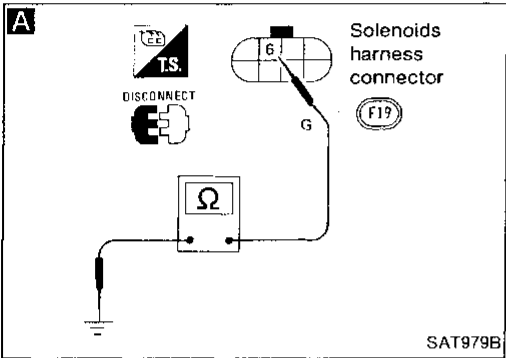
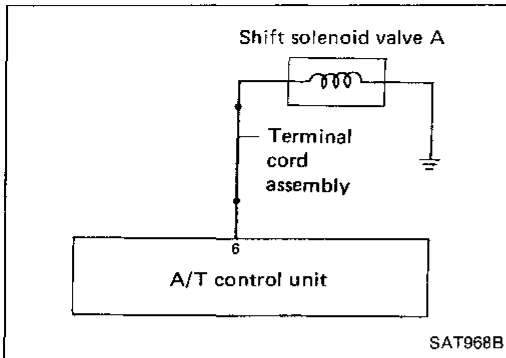


```

    graph TD
      Start[Perform self-diagnosis (Diagnostic Test Mode II Self-diagnostic results) for engine control.] -- NG --> NG1[Check throttle position sensor circuit for engine control. — Refer to section EF & EC.]
      Start -- OK --> A1[A]
      subgraph A1 [A]
        A1_1[CHECK INPUT SIGNAL.]
        A1_2[1. Turn ignition switch to "ON" position. (Do not start engine.)]
        A1_3[2.  • Select "ECU INPUT SIGNALS".  
• Read out the value of "THROTTLE POSITION SENSOR".]
        A1_4[Voltage:  
Fully-closed throttle:  
0.2 - 0.6V  
Fully-open throttle:  
2.9 - 3.9V]
        A1_5[OR]
        A1_6[ • Check voltage between A/T control unit terminals 34 and 35 while accelerator pedal is depressed slowly.]
        A1_7[Voltage:  
Fully-closed throttle:  
0.2 - 0.6V  
Fully-open throttle:  
2.9 - 3.9V  
(Voltage rises gradually in response to throttle valve opening.)]
      end
      A1 -- NG --> NG2[Check harness continuity between ECM and A/T control unit regarding throttle position sensor circuit. (Main harness)]
      A1 -- OK --> A2[Perform self-diagnosis again after driving for a while.]
      A2 -- NG --> NG3[1. Perform A/T control unit input/output signal inspection.  
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.]
      A2 -- OK --> End[INSPECTION END]
  
```

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK



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 - 40Ω

NG → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180

2. Check the following items.
 - Shift solenoid valve A — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

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

OK ↓

Perform self-diagnosis after driving for a while.

NG → 1. Perform A/T control unit input/output signal inspection.

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

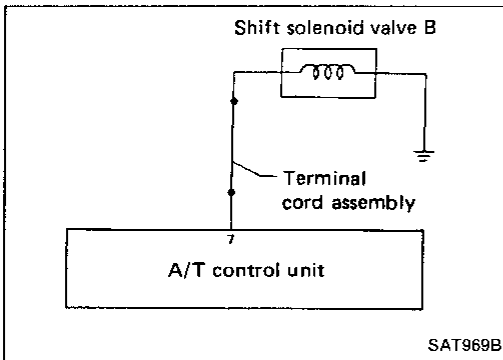
OK ↓

INSPECTION END

GI
MA
EM
LC
EF & EC
FE
CL
MT
AT
FA
RA
BR
ST
BF
HA
EL
IDX

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

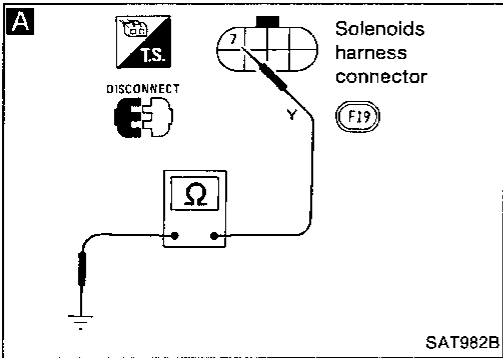
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ⑦ and ground.

Resistance: 20 - 40Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.
 - Shift solenoid valve B — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity of terminal cord assembly

OK



B

CHECK POWER SOURCE CIRCUIT.

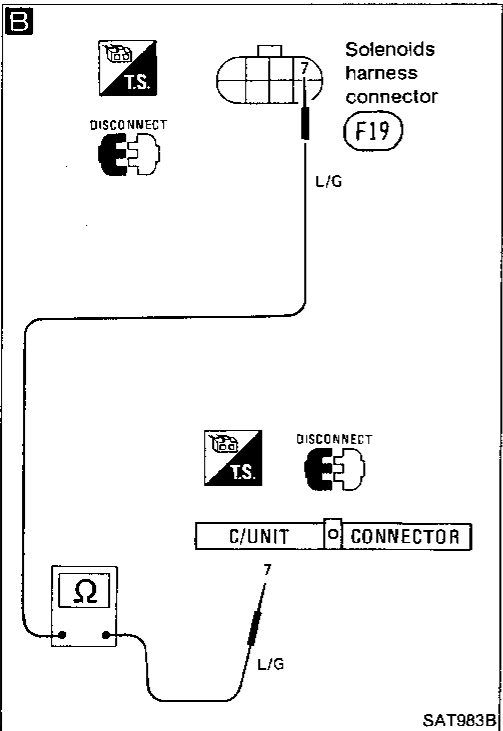
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ⑦ and A/T control unit terminal ⑦.

Resistance: Approximately 0Ω

NG

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

OK



Perform self-diagnosis after driving for a while.

NG

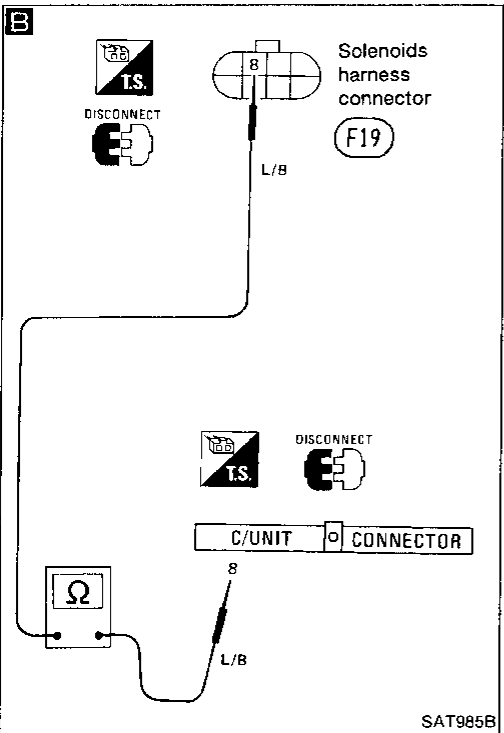
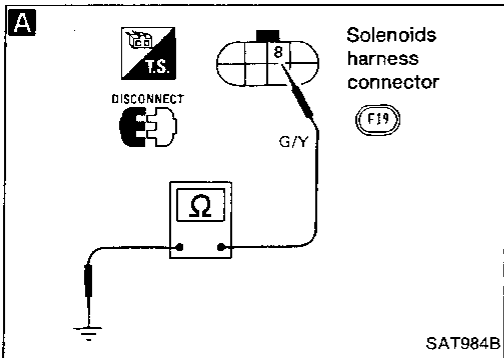
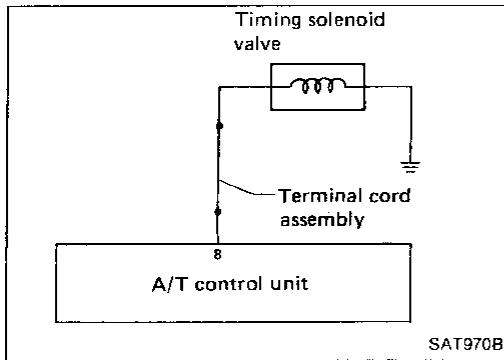
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

Self-diagnosis (Cont'd)

TIMING SOLENOID VALVE CIRCUIT CHECK



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 - 40Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.
 - Timing solenoid valve. — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity of terminal cord assembly

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

4. Reinstall any part removed.

NG

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

OK

Perform self-diagnosis after driving for a while.

NG

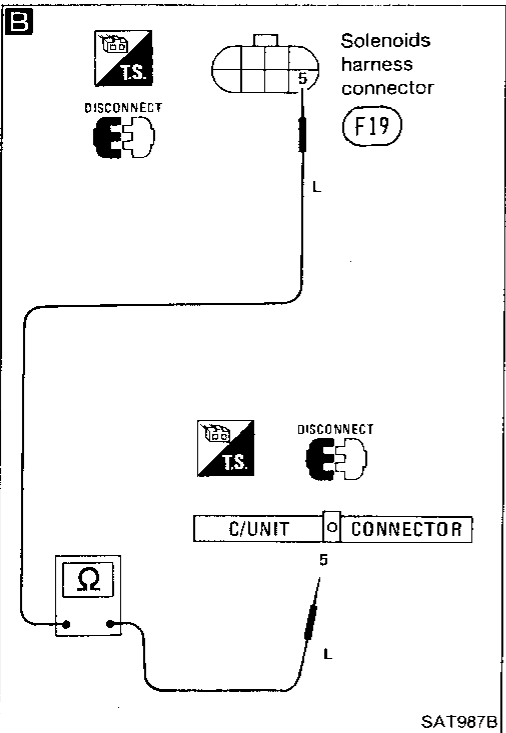
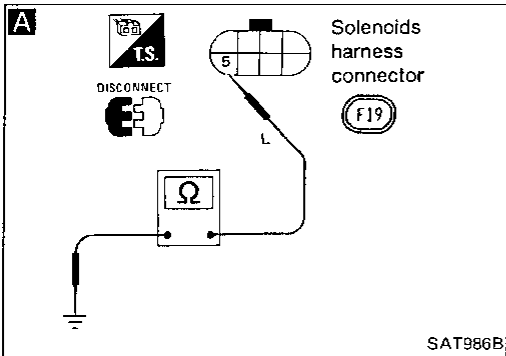
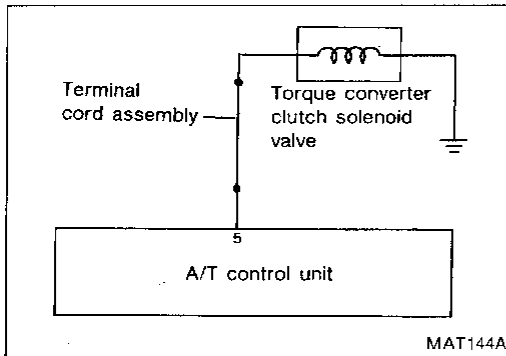
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

GI
MA
EM
LC
EF & EC
FE
CL
MT
AT
FA
RA
BR
ST
BF
HA
EL
IDX

Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE
CIRCUIT CHECK

- 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 - 20Ω

- B**
- CHECK POWER SOURCE CIRCUIT.**
1. Turn ignition switch to "OFF" position.
 2. Disconnect A/T control unit connector.
 3. Check resistance between terminal ⑤ and A/T control unit terminal ⑤.
 4. Reinstall any part removed.

Resistance:
Approximately 0Ω

- Perform self-diagnosis after driving for a while.

INSPECTION END

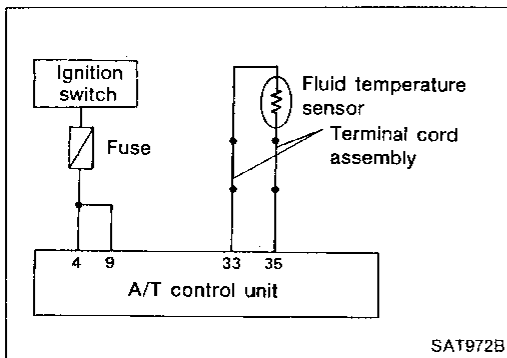
- NG
1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180
 2. Check the following items.
 - Torque converter clutch solenoid valve — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity of terminal cord assembly

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

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

Self-diagnosis (Cont'd)

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



A

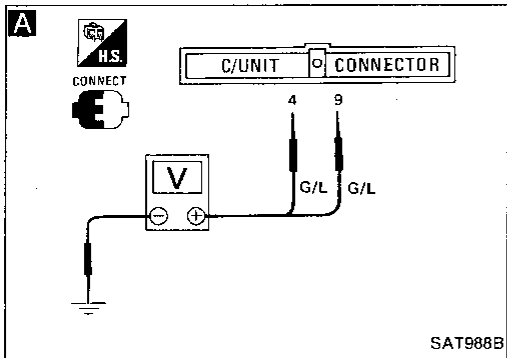
CHECK A/T CONTROL UNIT POWER SOURCE.

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

NG

Check the following items.

- Harness continuity between ignition switch and A/T control unit
- Ignition switch and fuse — Refer to section EL.



OK

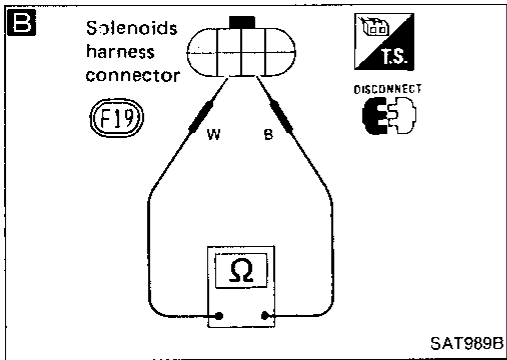
B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

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

NG

1. Remove control valve cover.
2. Check the following items.
 - Fluid temperature sensor — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity of terminal cord assembly



OK

Ⓐ

GI
 MA
 EM
 LC
 EF & EC
 FE
 CL
 MT
 AT
 FA
 RA
 BR
 ST
 BF
 HA
 EL
 IDX

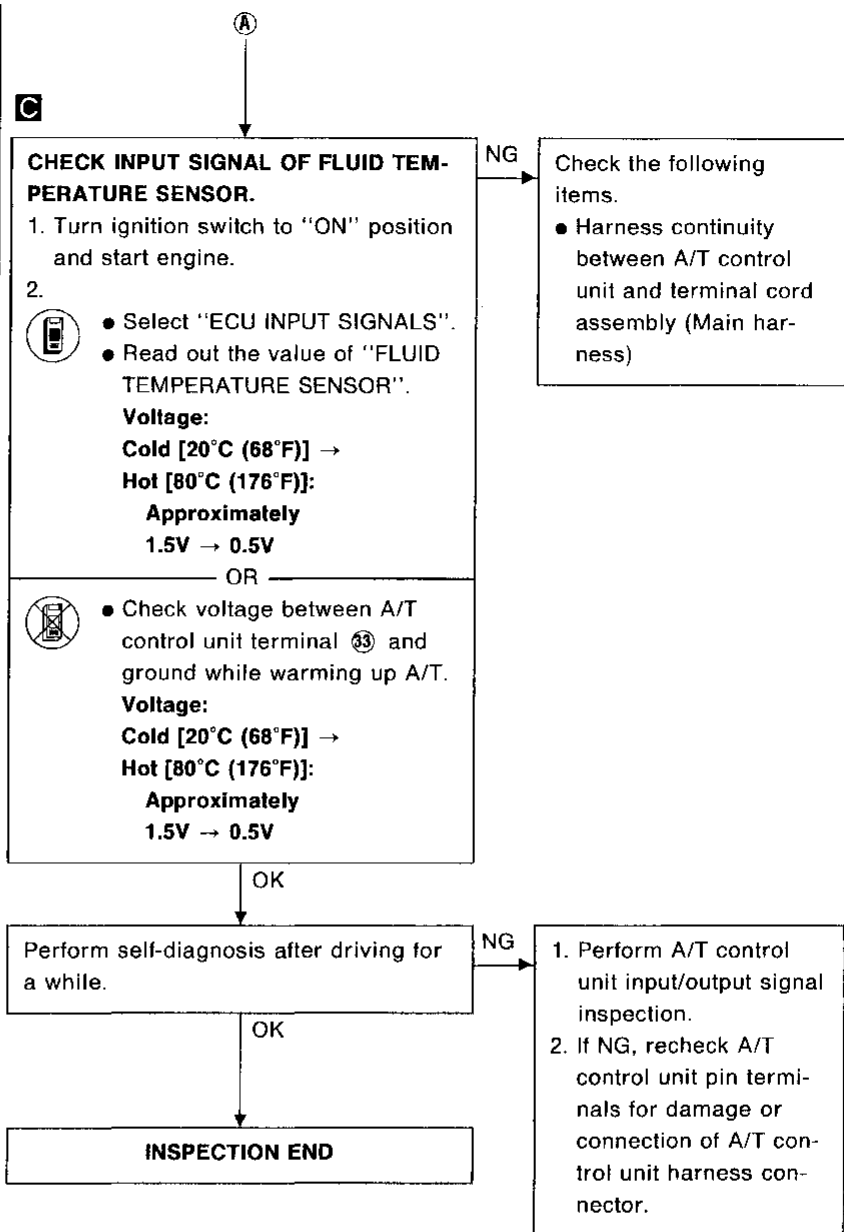
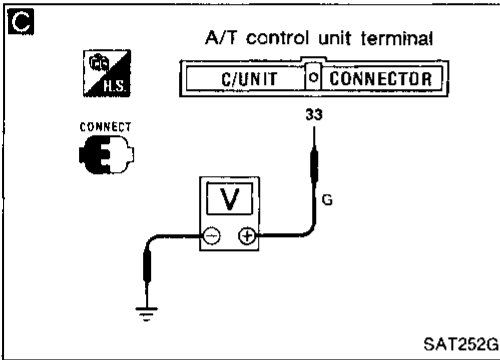
Self-diagnosis (Cont'd)

C

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

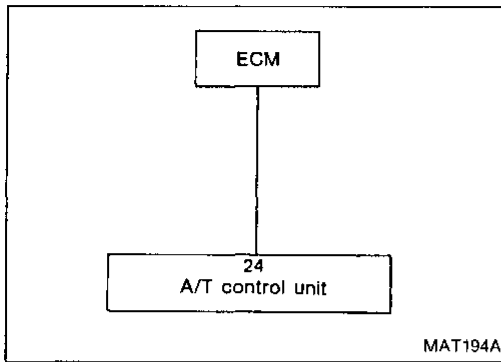
RECORD

SAT076H



Self-diagnosis (Cont'd)

ENGINE SPEED SIGNAL CIRCUIT CHECK

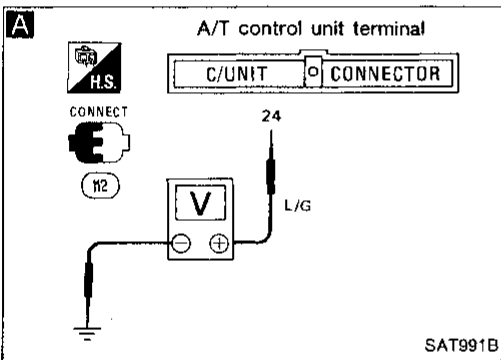


A

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

RECORD

SAT076H



Perform self-diagnosis (Diagnostic Test Mode II Self- diagnostic results) for engine control. Check camshaft position sensor circuit condition.

NG → Check camshaft position sensor circuit for engine control. — Refer to section EF & EC.

A CHECK INPUT SIGNAL.

1. Turn ignition switch to "ON" position and start engine.

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

NG → Check the following items.

- Harness continuity between A/T control unit and ignition coil.
- Resistor
- Camshaft position sensor — Refer to section EF & EC.

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

OK → Perform self-diagnosis again after driving for a while.

NG →

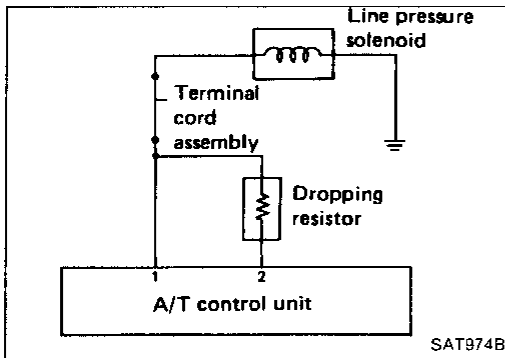
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

INSPECTION END

GI
MA
EM
LC
EF & EC
FE
CL
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EL
IDX

Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

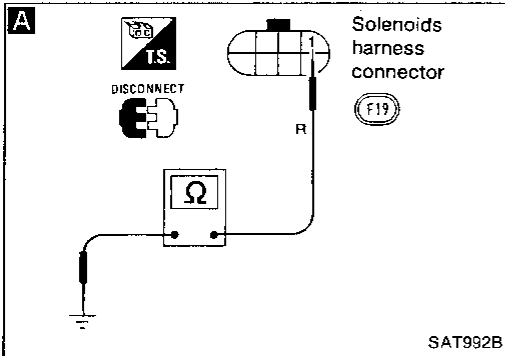
1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminal ① and ground.

Resistance: 2.5 - 5Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.
 - Line pressure solenoid valve — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity of terminal cord assembly

OK



B

CHECK POWER SOURCE CIRCUIT.

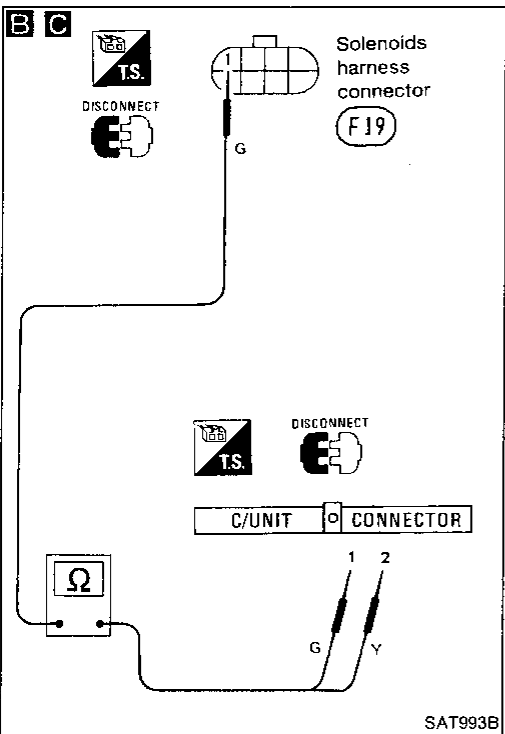
1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit connector.
3. Check resistance between terminal ① and A/T control unit terminal ②.

Resistance: 11.2 - 12.8Ω

NG

- Check the following items.
- Dropping resistor — Refer to "Electrical Components Inspection". AT-76
 - Harness continuity between A/T control unit ② and terminal cord assembly

OK



C

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

3. Reinstall any part removed.

NG

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

OK

Perform self-diagnosis after driving for a while.

NG

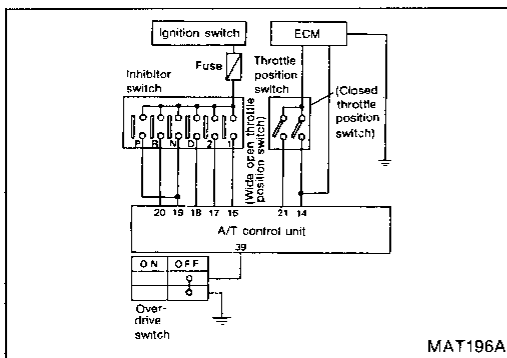
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

Self-diagnosis (Cont'd)

INHIBITOR, OVERDRIVE AND THROTTLE POSITION SWITCH CIRCUIT CHECKS



A

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

RECORD

SAT076H

A

CHECK INHIBITOR SWITCH CIRCUIT.
 1. Turn ignition switch to "ON" position. (Do not start engine.)
 2. Select "ECU INPUT SIGNALS".
 • Read out "R, N, D, 1 and 2 position switches" moving selector lever to each position.
 • Check the selector lever position is indicated properly.

NG

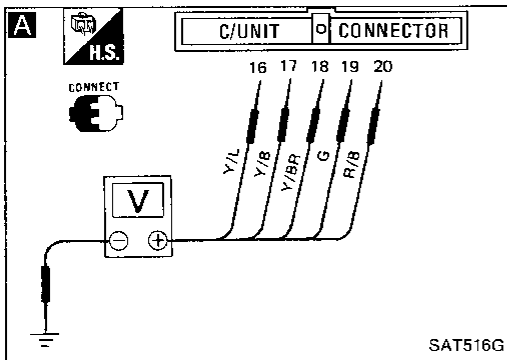
Check the following items.

- Inhibitor switch — Refer to "Electrical Components Inspection". AT-76
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

OR

Check voltage between A/T control unit terminals 16, 17, 18, 19, 20 and ground while moving selector lever through each position.
Voltage:
B: Battery voltage
0: 0V

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



B

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

RECORD

SAT076H

B

CHECK OVERDRIVE SWITCH CIRCUIT.
 1. Turn ignition switch to "ON" position. (Do not start engine.)
 2. Select "OVERDRIVE SWITCH".
 • Check the overdrive switch position is indicated properly. (Overdrive switch "ON" displayed on CONSULT means overdrive "OFF".)

NG

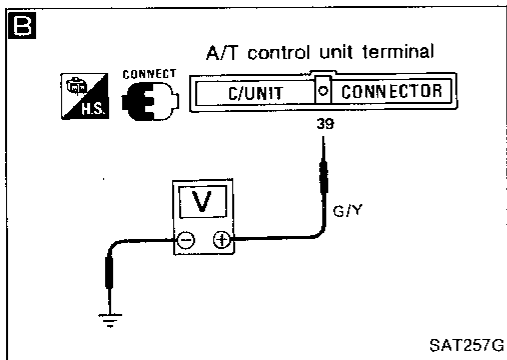
Check the following items.

- Overdrive switch — Refer to "Electrical Components Inspection". AT-76
- Harness continuity between A/T control unit and overdrive switch (Main harness)
- Harness continuity of ground circuit for overdrive switch (Main harness)

OR

Check voltage between A/T control unit terminal 39 and ground when overdrive switch is in "ON" position and in "OFF" position.

Switch position	Voltage
ON	Battery voltage
OFF	1V or less



GI
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 EF & EC
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 IDX

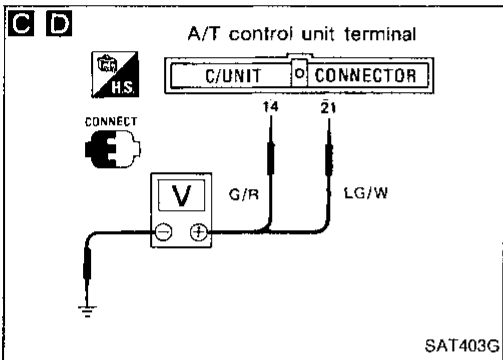
Self-diagnosis (Cont'd)

C D

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

RECORD

SAT262G



C

①

CHECK WIDE OPEN THROTTLE POSITION SWITCH CIRCUIT.

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

2.

- Select "ECU INPUT SIGNALS".
- Read out "WIDE OPEN THROTTLE POSITION SWITCH" depressing accelerator pedal fully.
- Check wide open throttle position switch position is indicated properly.

OR

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

Voltage:

When releasing accelerator pedal:
1V or less

When depressing accelerator pedal fully:
8 - 15V

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

D

OK

CHECK CLOSED THROTTLE POSITION SWITCH CIRCUIT.

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

2.

- Select "ECU INPUT SIGNALS".
- Read out "CLOSED THROTTLE POSITION SWITCH" depressing and releasing accelerator pedal.
- Check closed throttle position switch changes ON or OFF.

OR

- Check voltage between A/T control unit terminal ①④ and ground while depressing accelerator pedal slowly.

Voltage:

When releasing accelerator pedal:
8 - 15V

When depressing accelerator pedal fully:
1V or less

NG → Check closed throttle position switch circuit for engine control. — Refer to section EF & EC.

OK → Check harness continuity between A/T control unit and closed throttle position switch.

OK

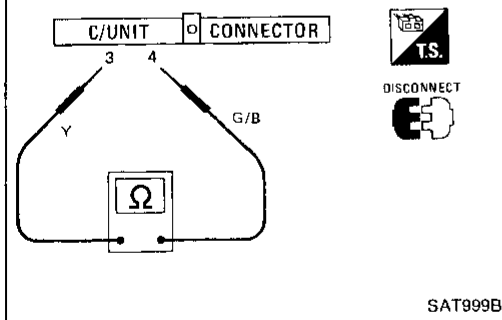
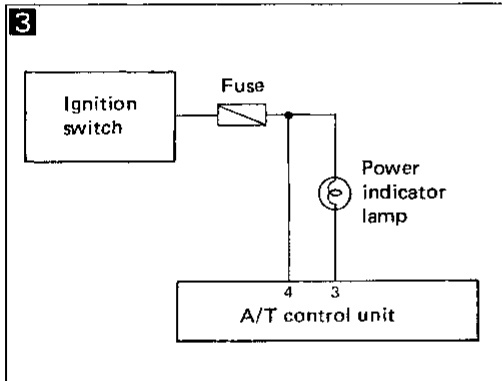
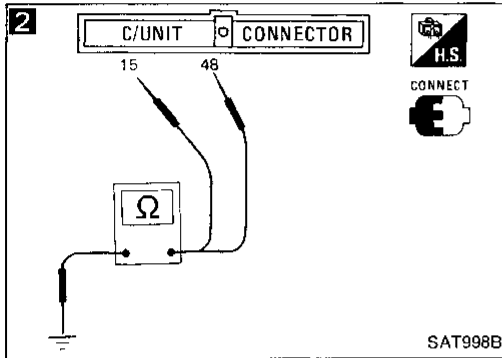
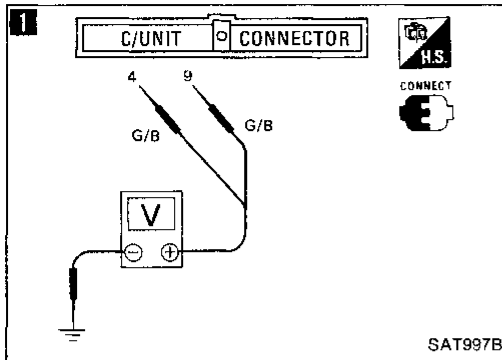
Perform self-diagnosis again after driving for a while.

NG →

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

OK

INSPECTION END



Diagnostic Procedure 1

SYMPTOM:

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

1

CHECK A/T CONTROL UNIT POWER SOURCE.

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

NG

Check the following items.

- Harness continuity between ignition switch and A/T control unit
- Ignition switch and fuse — Refer to section EL.

OK

2

CHECK A/T CONTROL UNIT GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals ⑮, ④⑧ and ground. **Resistance: Approximately 0Ω**

NG

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

OK

3

CHECK LAMP CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals ③, ④. **Resistance: 5 - 20Ω**
4. Reinstall any part removed.

NG

Check the following items.

- Power indicator lamp — Refer to section EL.
- Harness continuity between ignition switch and power indicator lamp
- Harness continuity between power indicator lamp and A/T control unit

OK

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

GI

MA

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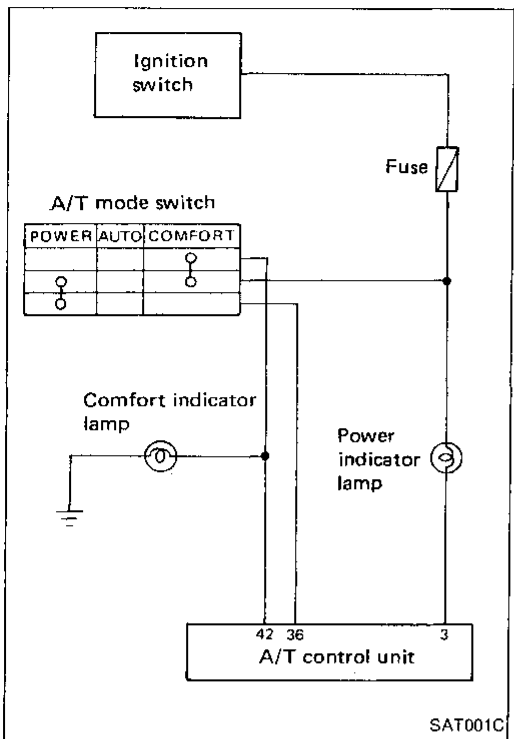
ST

BF

HA

EL

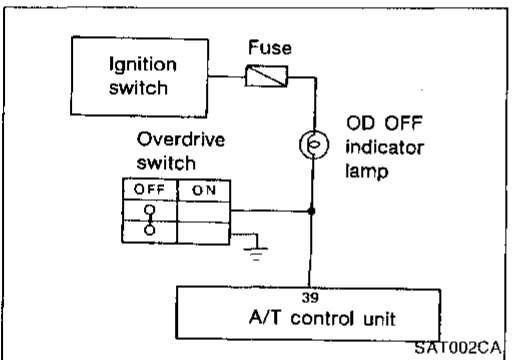
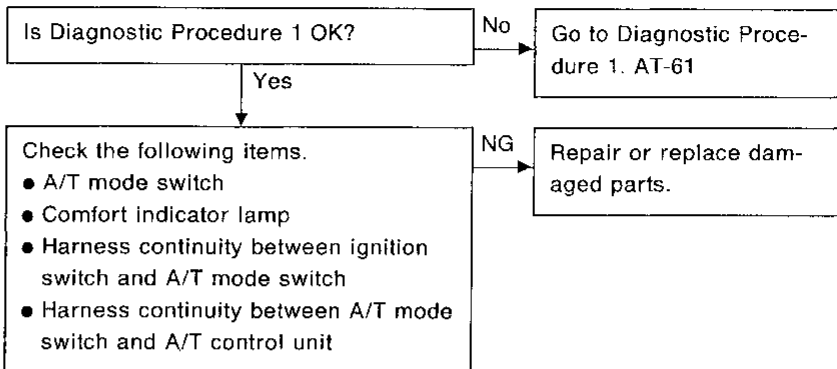
IDX



Diagnostic Procedure 2

SYMPTOM:

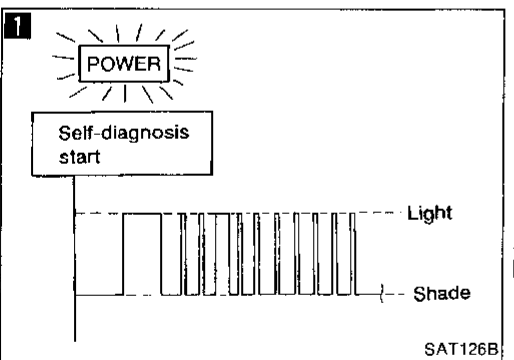
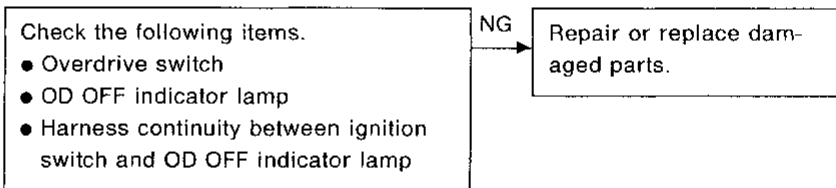
Power indicator lamp or comfort indicator lamp does not come on when turning A/T mode switch to the appropriate position.



Diagnostic Procedure 3

SYMPTOM:

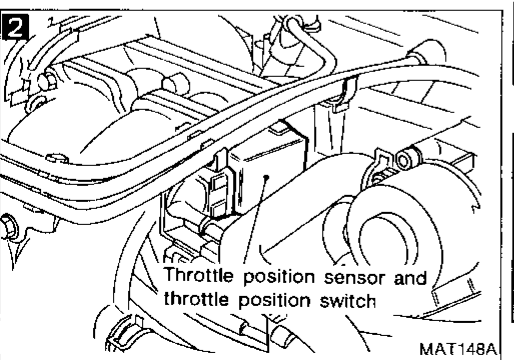
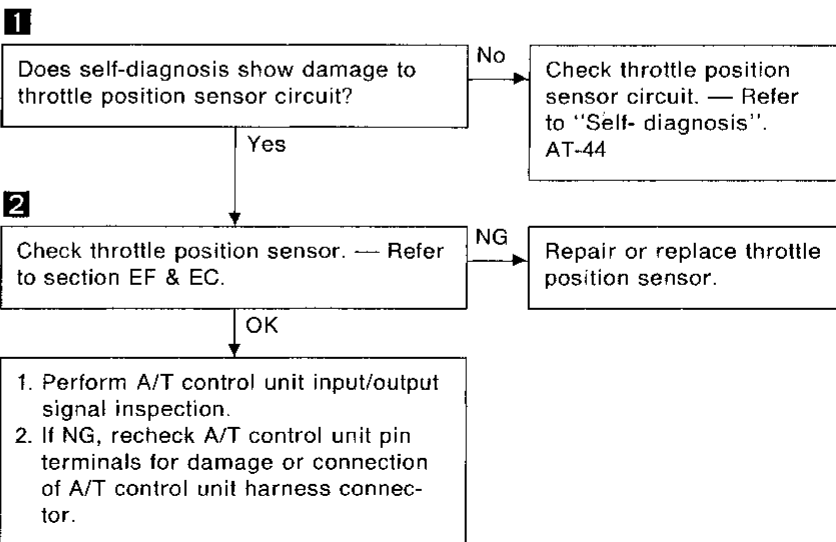
OD OFF indicator lamp does not come on when setting overdrive switch to "OFF" position.

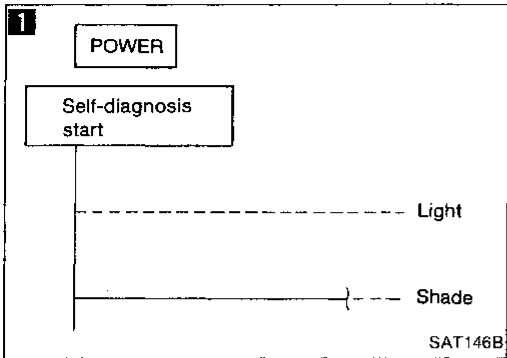


Diagnostic Procedure 4

SYMPTOM:

Power indicator lamp does not come on for about 3 seconds when depressing and releasing accelerator pedal fully.

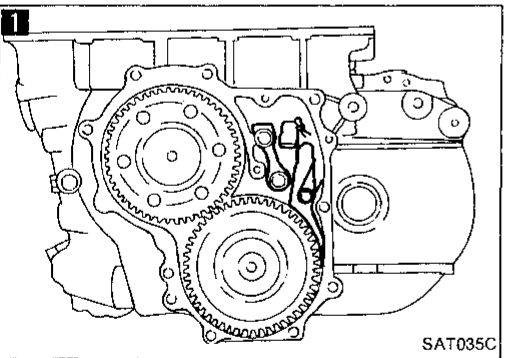
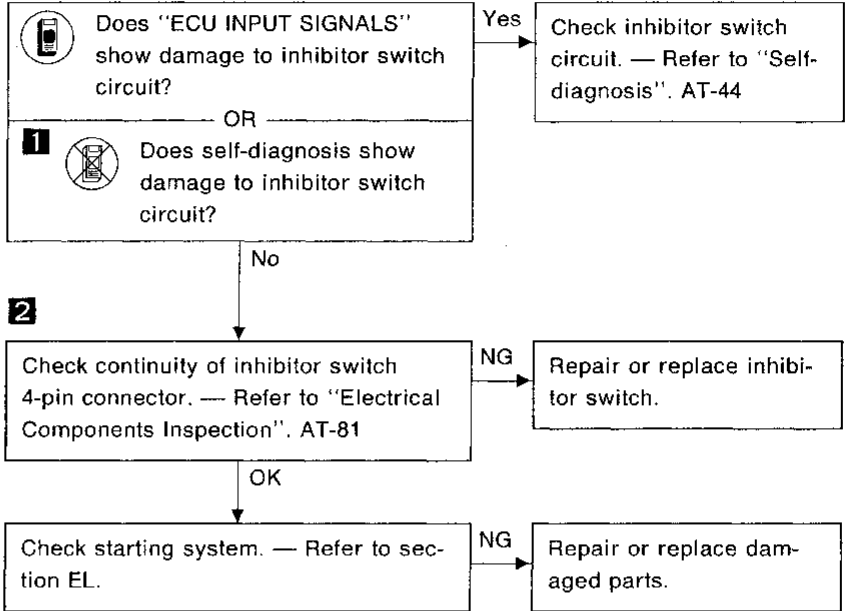
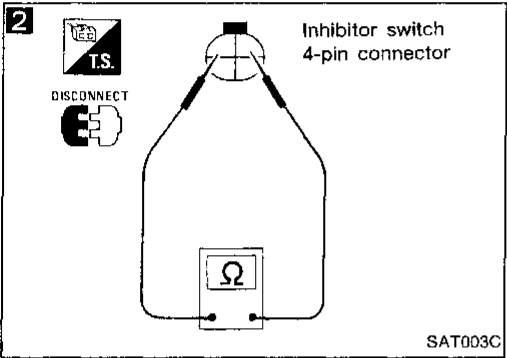




Diagnostic Procedure 5

SYMPTOM:

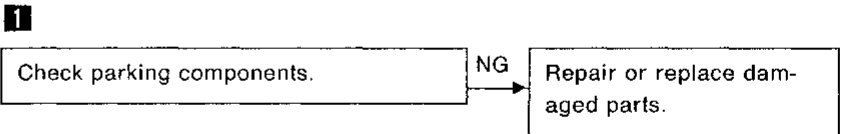
Engine cannot be started with selector lever in "P" or "N" position or engine can be started with selector lever in "D", "2", "1" or "R" position.



Diagnostic Procedure 6

SYMPTOM:

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



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EF & EC

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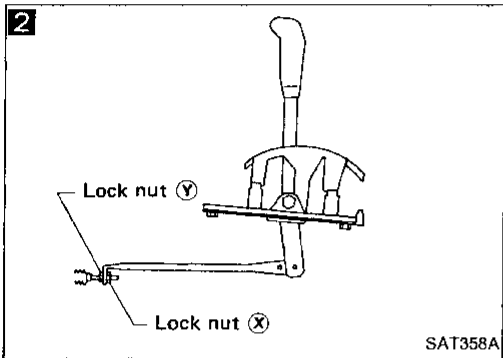
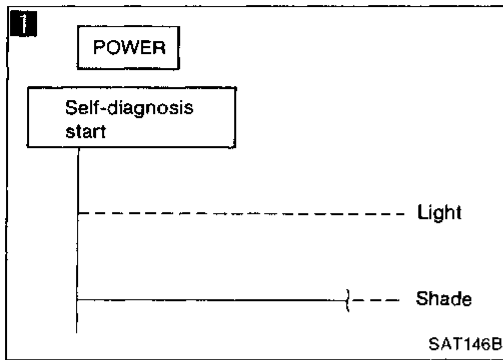
ST

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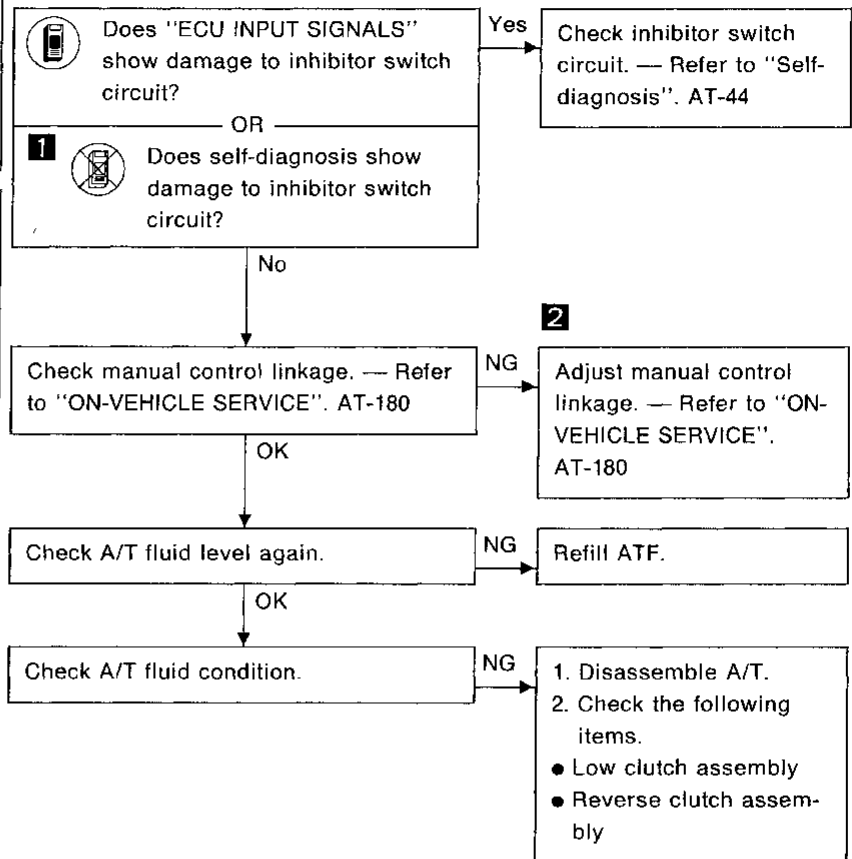
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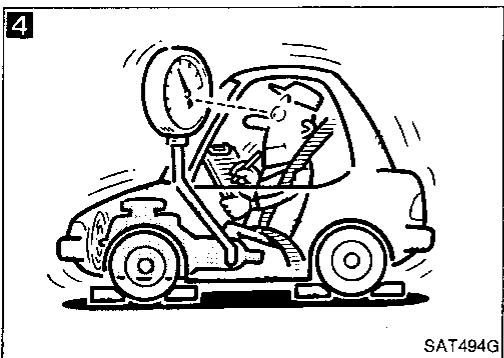
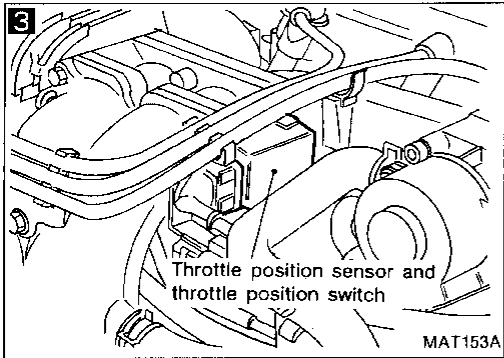
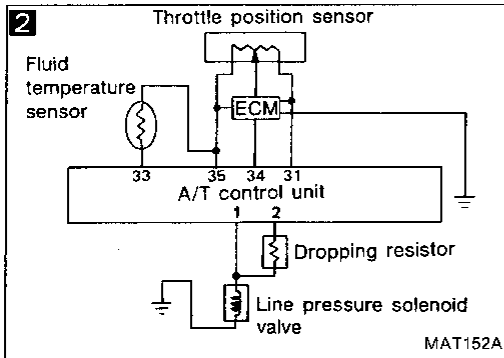
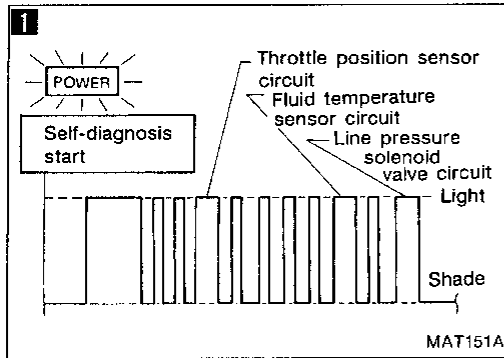


Diagnostic Procedure 7

SYMPTOM:

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





Diagnostic Procedure 8

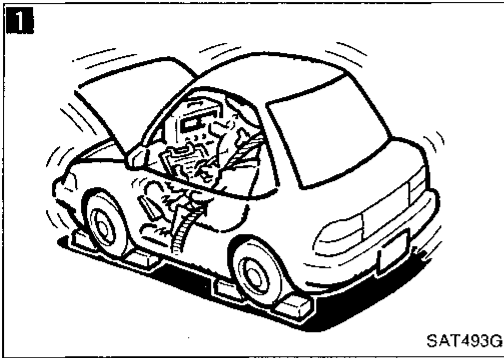
SYMPTOM:

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

```

    graph TD
        Start[Check engine idling speed.] -- NG --> Adjust[Adjust engine idling speed. — Refer to section EF & EC.]
        Start -- OK --> Q1{1 Does self-diagnosis show damage to throttle position sensor, line pressure solenoid valve or fluid temperature sensor circuit?}
        Q1 -- Yes --> CheckCircuit[2 Check damaged circuit. — Refer to "Self-diagnosis". AT-44]
        Q1 -- No --> Q2{3 Check throttle position sensor. — Refer to section EF & EC.}
        Q2 -- NG --> Repair[Repair or replace throttle position sensor.]
        Q2 -- OK --> Q3{4 Check line pressure at idle with selector lever in "D" position. — Refer to "PRESSURE TESTING". AT-85}
        Q3 -- NG --> Steps[1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180  
2. Check the following items:  
• Valves to control line pressure (Pressure regulator valve, pilot valve and oil filter)  
• Line pressure solenoid valve]
        Q3 -- OK --> Final[1. Perform A/T control unit input/output signal inspection.  
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.]
    
```

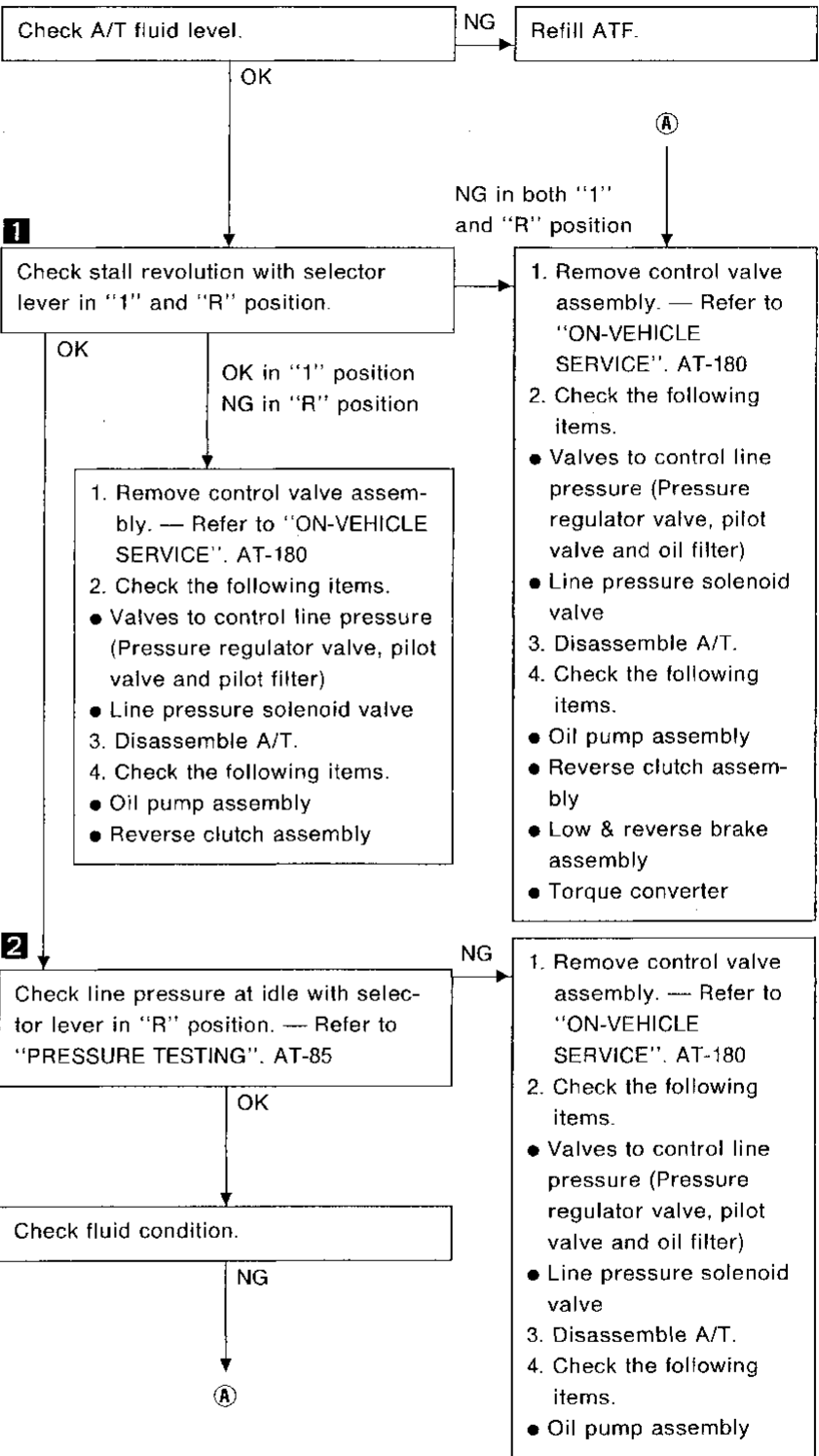
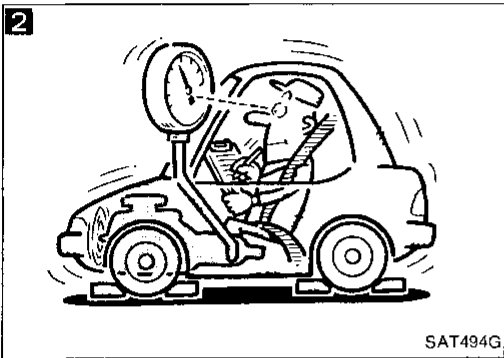
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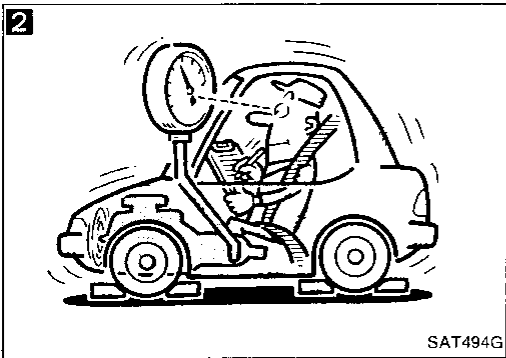
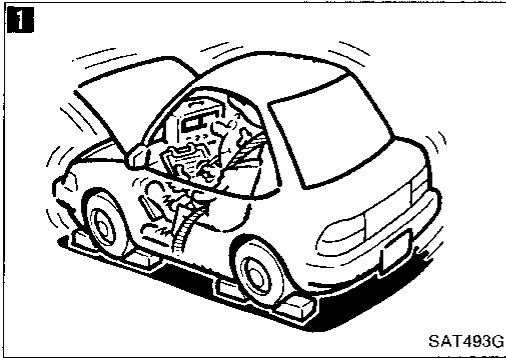


Diagnostic Procedure 9

SYMPTOM:

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

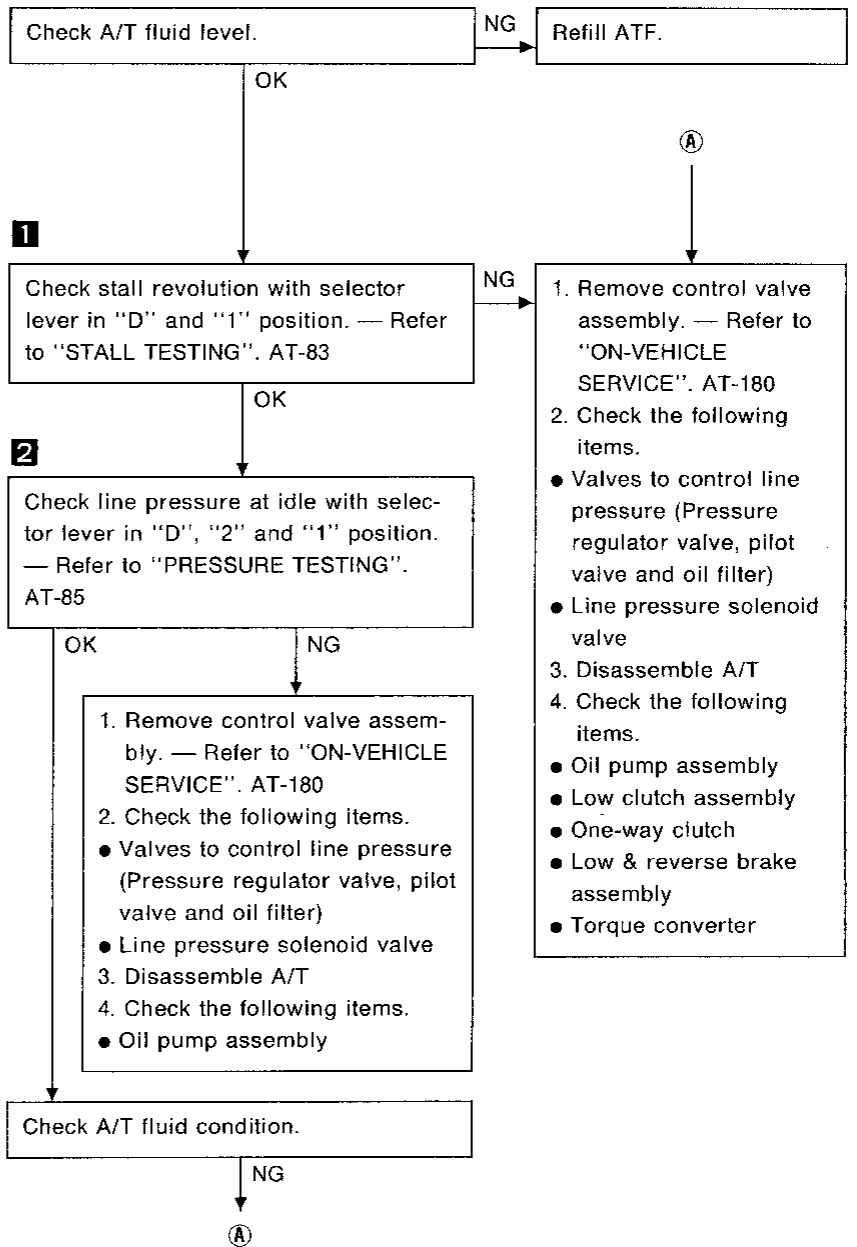




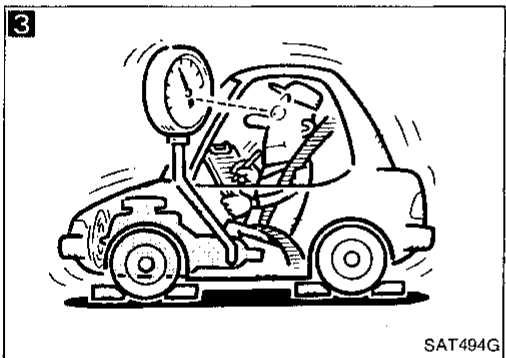
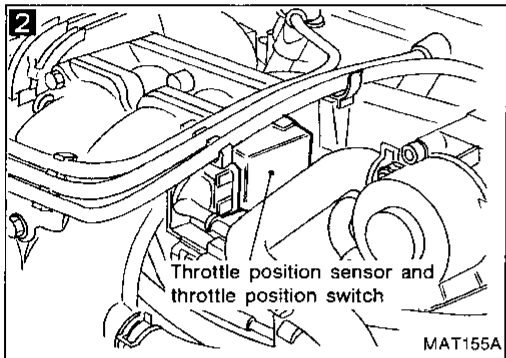
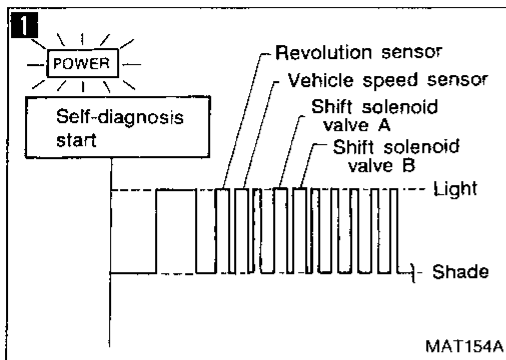
Diagnostic Procedure 10

SYMPTOM:

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

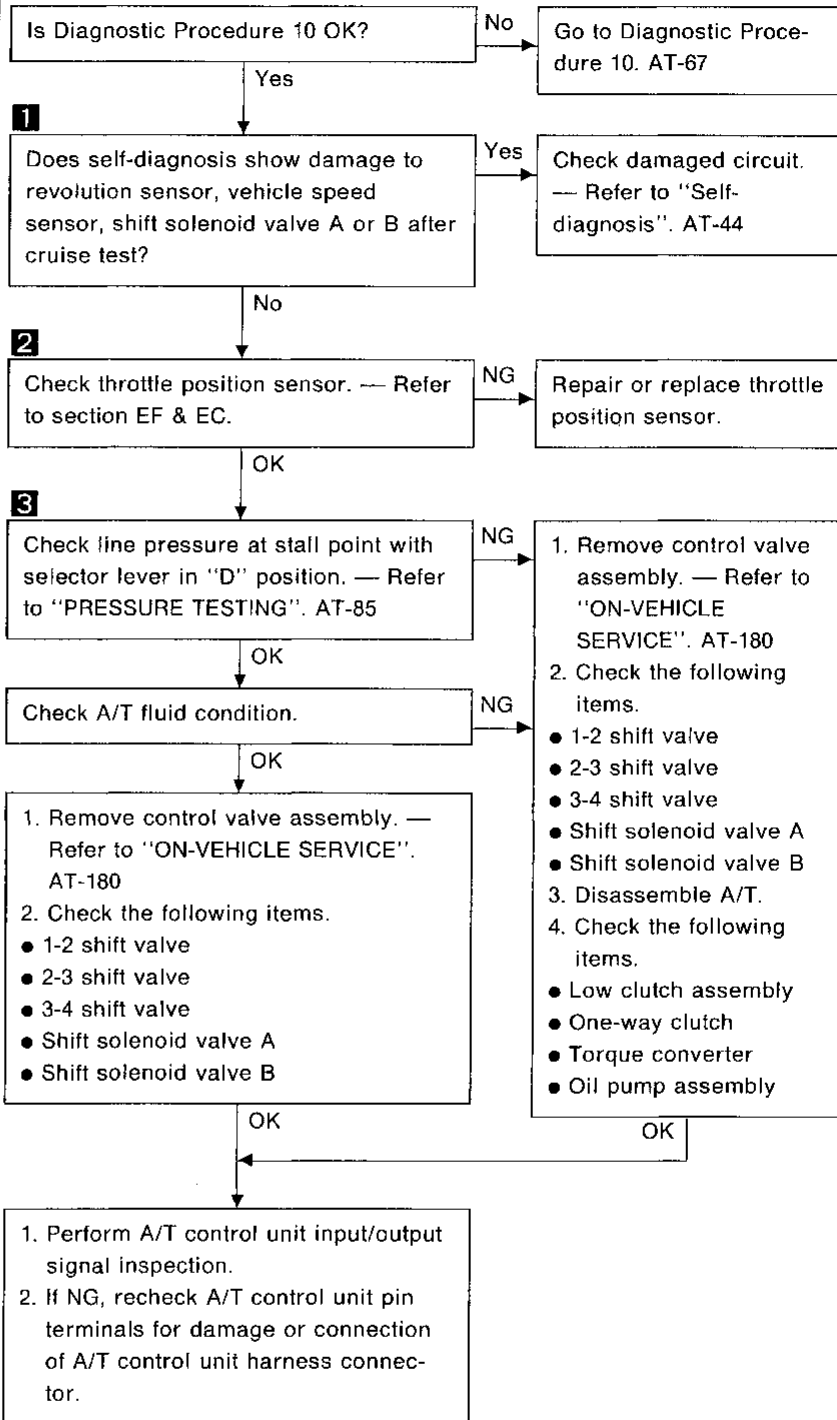


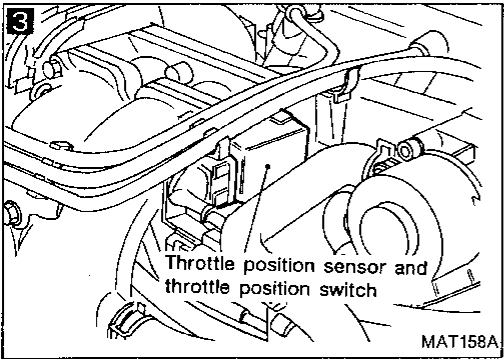
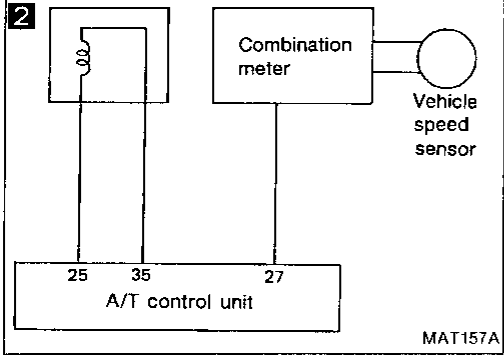
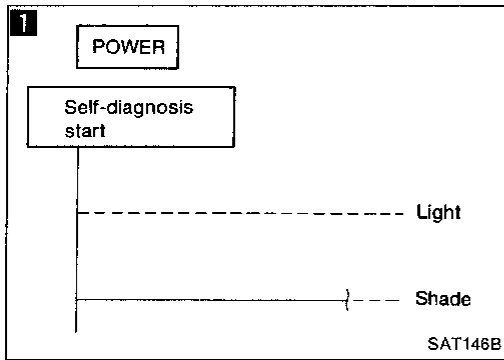
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Diagnostic Procedure 11

SYMPTOM:
Vehicle cannot be started from D₁.

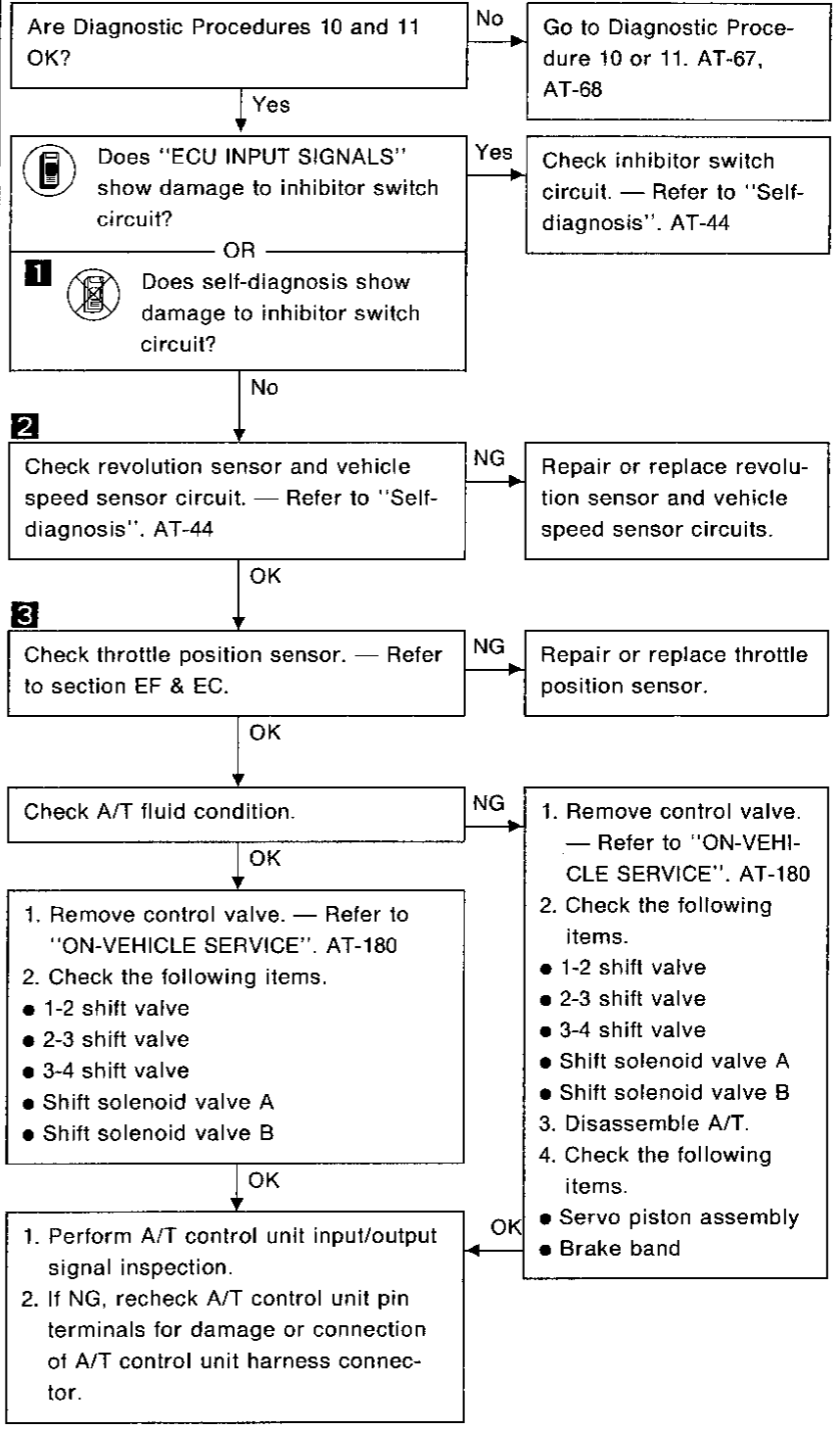




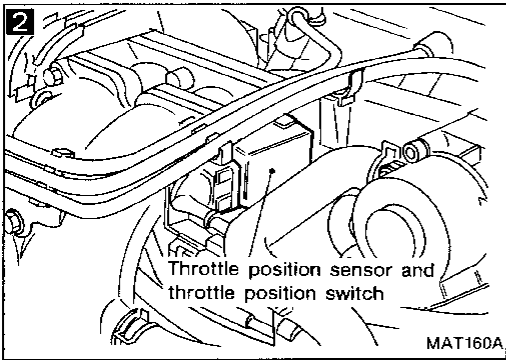
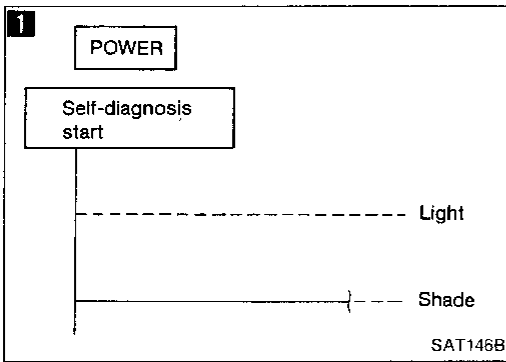
Diagnostic Procedure 12

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.**



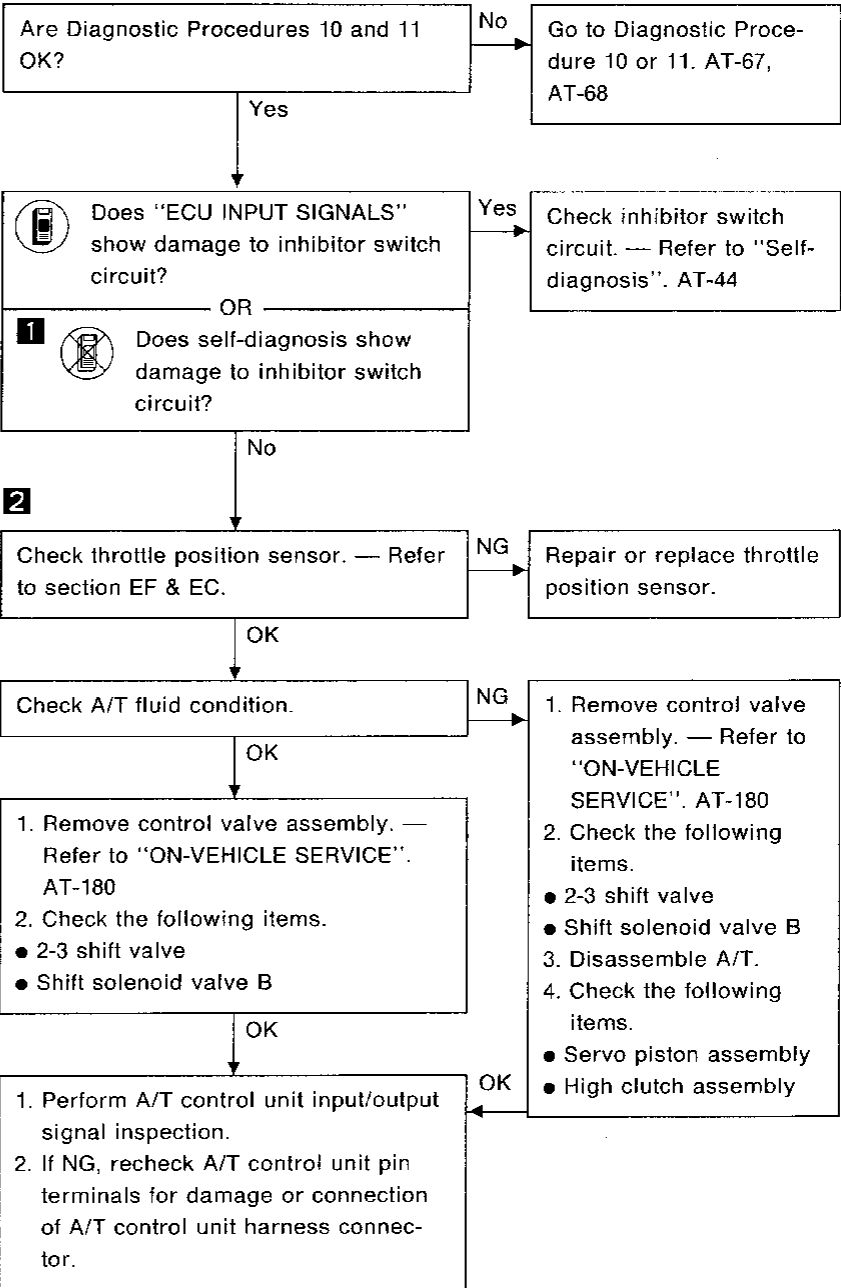
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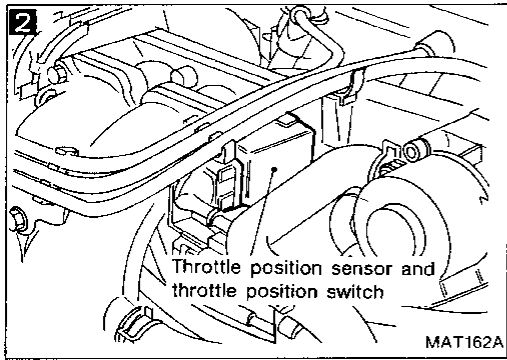
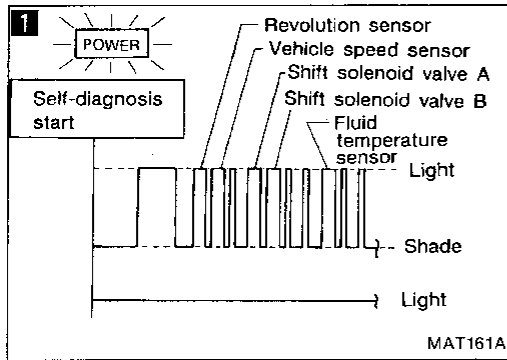


Diagnostic Procedure 13

SYMPTOM:

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

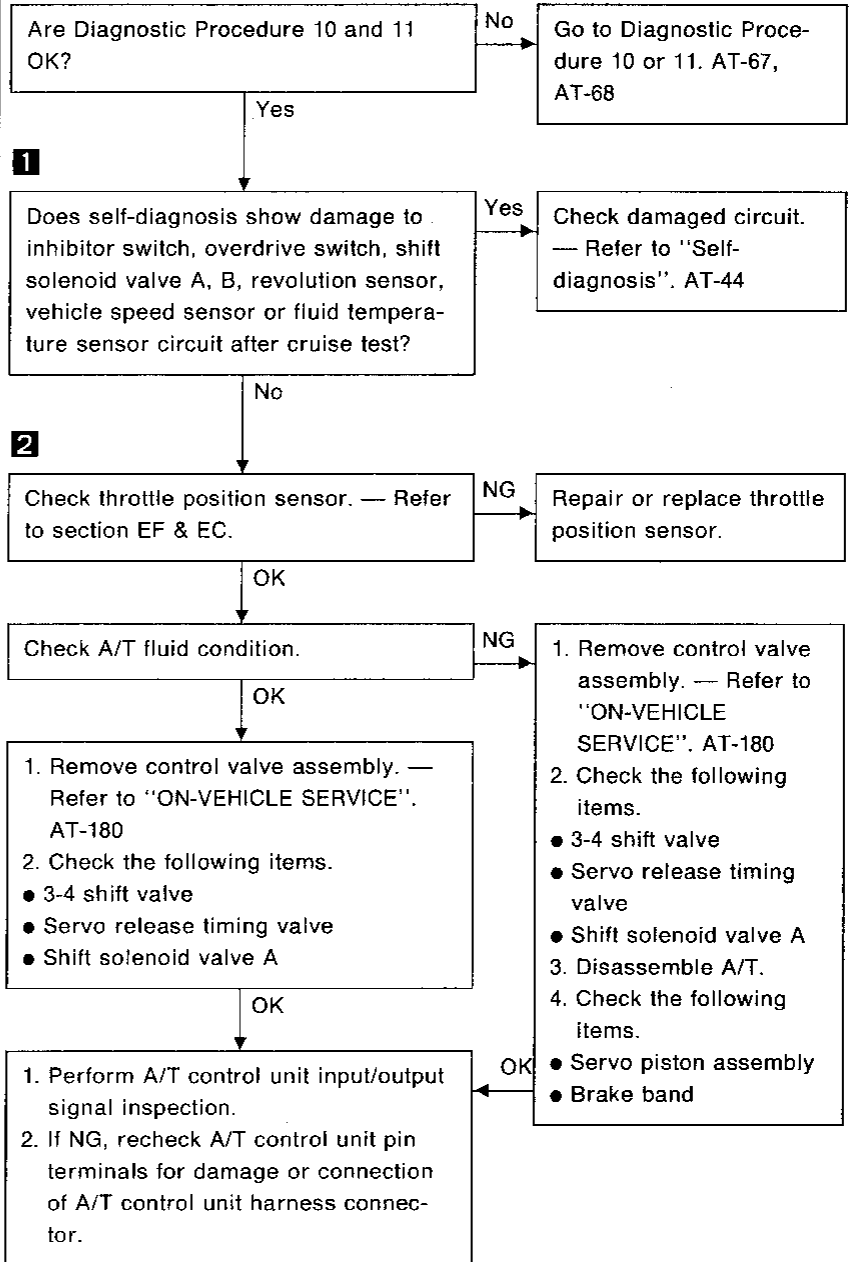




Diagnostic Procedure 14

SYMPTOM:

A/T does not shift from D₃ to D₄ at the specified speed.



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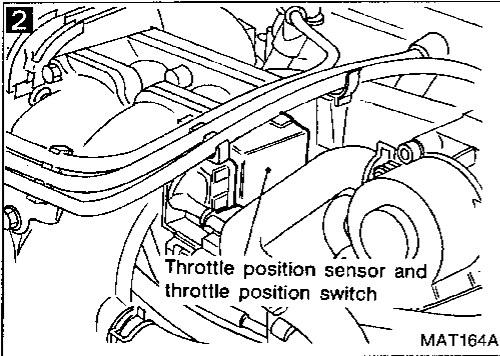
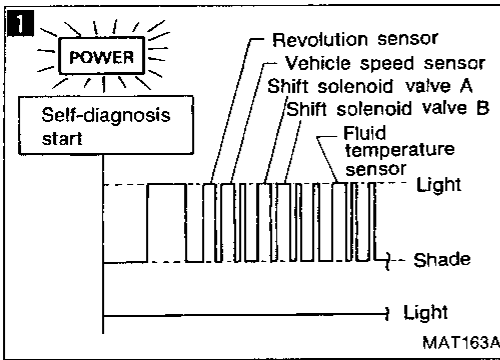
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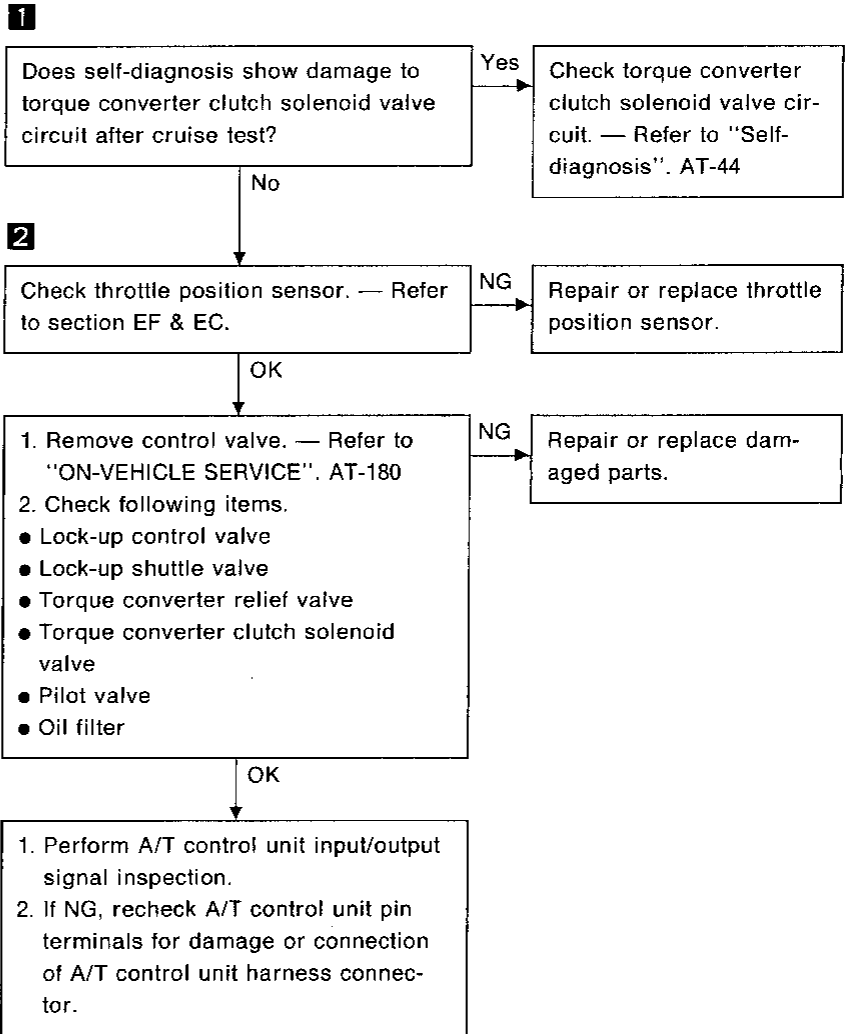
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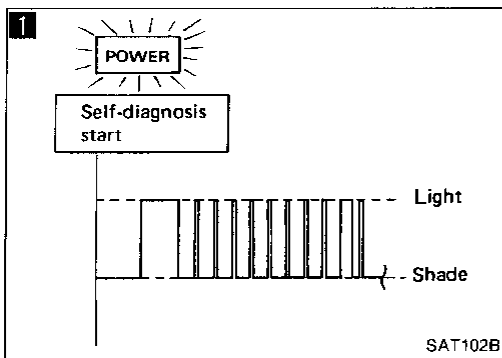


Diagnostic Procedure 15

SYMPTOM:

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

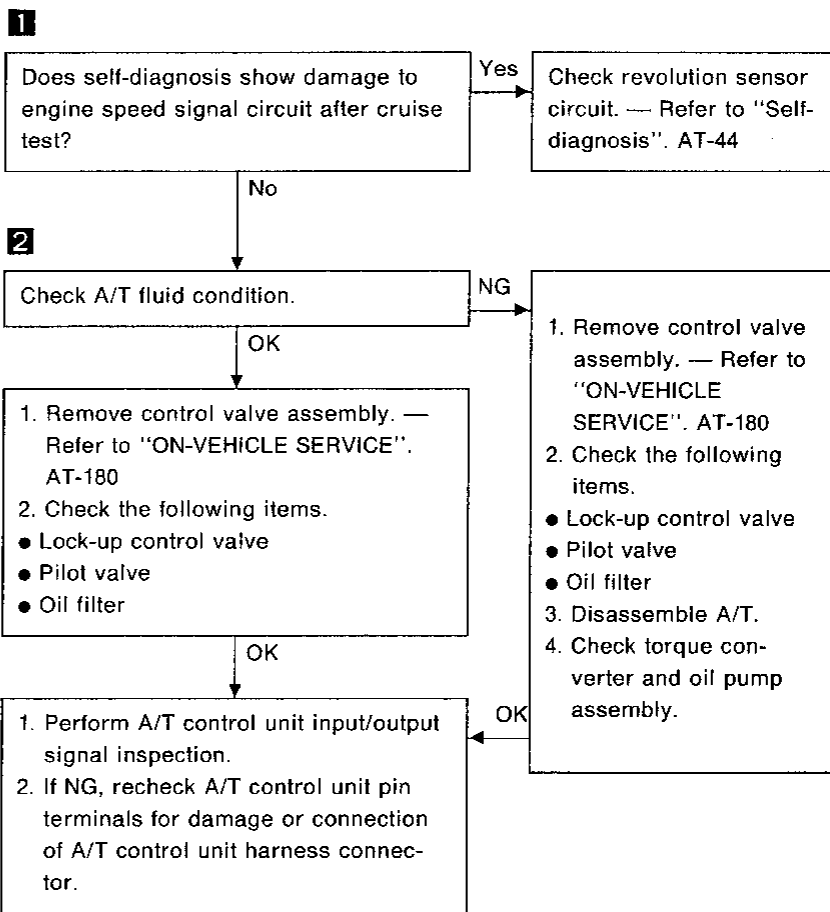




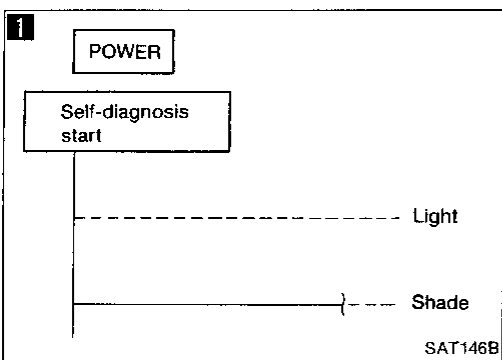
Diagnostic Procedure 16

SYMPTOM:

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



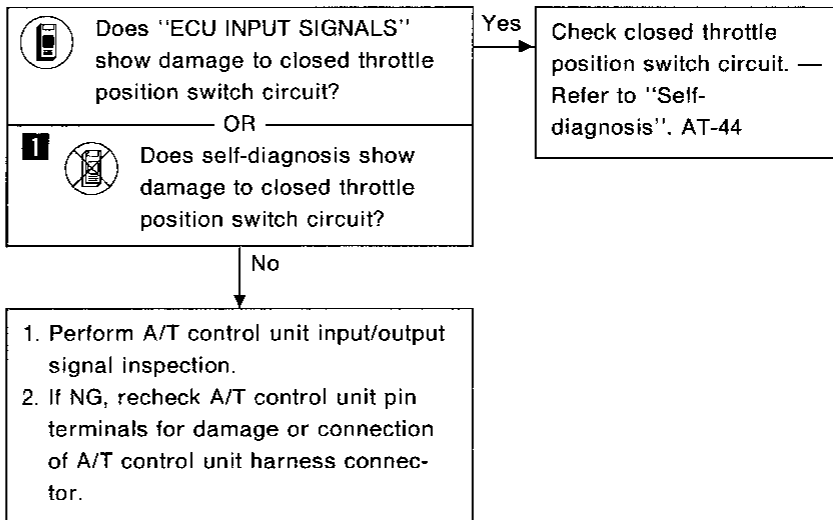
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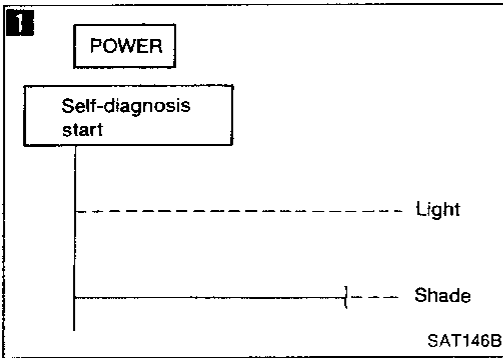
Diagnostic Procedure 17

SYMPTOM:

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



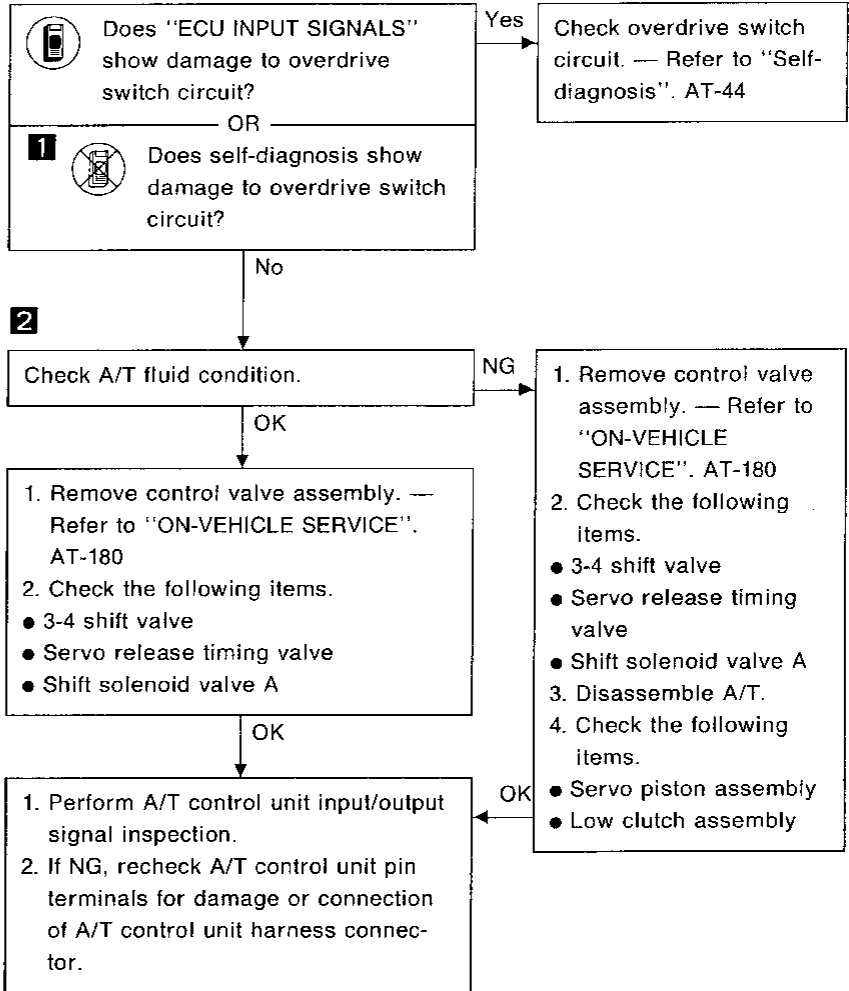
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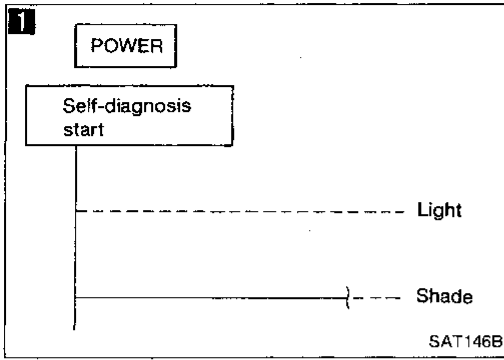


Diagnostic Procedure 18

SYMPTOM:

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

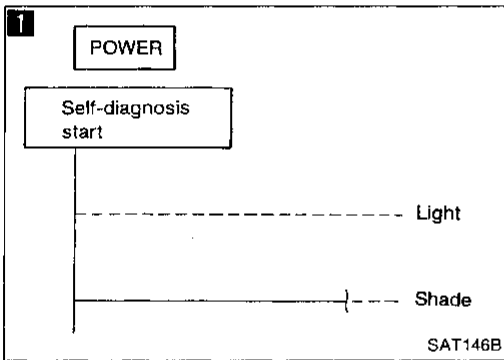
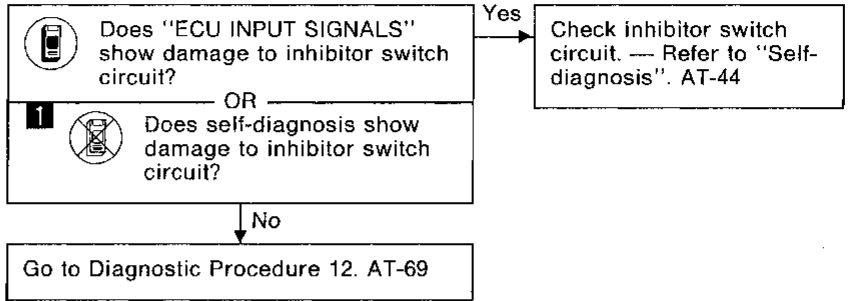




Diagnostic Procedure 19

SYMPTOM:

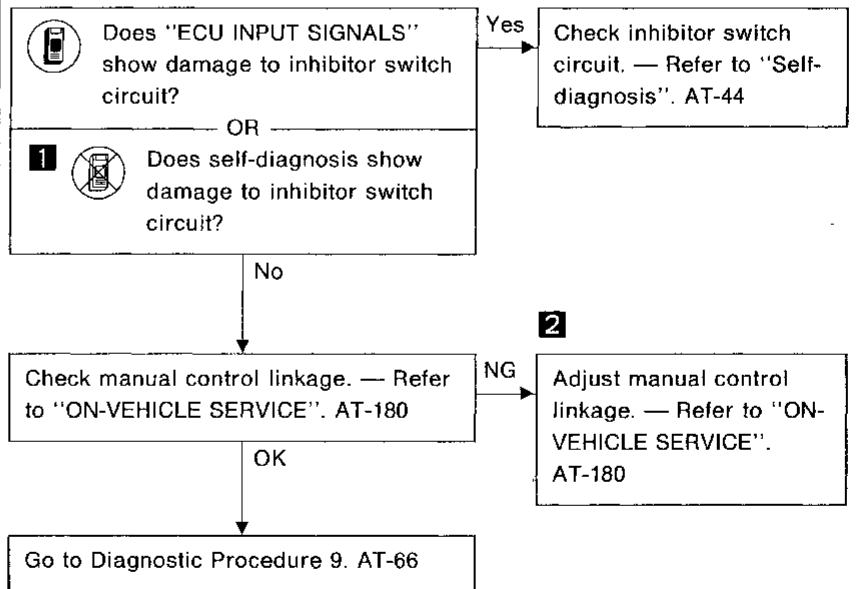
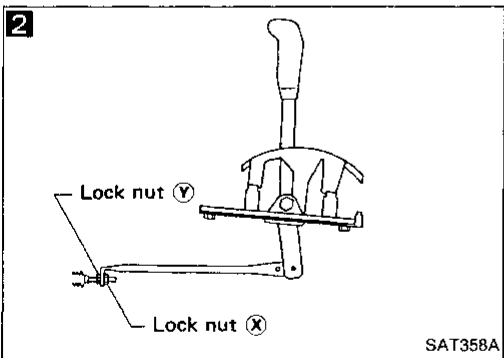
A/T does not shift from D_3 to 2_2 when changing selector lever from "D" to "2" position.



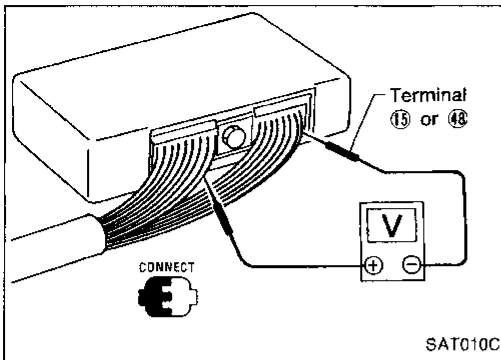
Diagnostic Procedure 20

SYMPTOM:

A/T does not shift from 2_2 to 1_1 when changing selector lever from "2" to "1" position.
Vehicle does not decelerate by engine brake when shifting from 2_2 (1_2) to 1_1 .



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Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

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

- Pin connector terminal layout.

1	2	3	4	9	10	11	12	13	14	15	23	24	25	26	27	28	29	30	31	32	33	34	35
5	6	7	8	16	17	18	19	20	21	22	36	37	38	39	40	41	42	43	44	45	46	47	48



SAT011C

Electrical Components Inspection (Cont'd)

A/T CONTROL UNIT INSPECTION TABLE

(Data are reference values.)

Terminal No.	Item	Condition	Judgement standard	
1	Line pressure solenoid valve	When accelerator pedal is released after warming up engine.	1.5 - 2.5V	GI
		When accelerator pedal is depressed fully after warming up engine.	0.5V or less	MA
2	Line pressure solenoid valve (with dropping resistor)	When accelerator pedal is released after warming up engine.	5 - 14V	EM
		When accelerator pedal is depressed fully after warming up engine.	0.5V or less	LC
3	Power indicator lamp	When A/T mode switch is set in "POWER" position.	1V or less	EF & EC
		When A/T mode switch is set in any position except in "POWER" position.	Battery voltage	FE
4	Power source	When ignition switch is turned to "ON".	Battery voltage	CL
		When ignition switch is turned to "OFF".	1V or less	MT
5	Torque converter clutch solenoid valve	When A/T is performing lock-up.	8 - 15V	AT
		When A/T is not performing lock-up.	1V or less	
6	Shift solenoid valve A	When shift solenoid valve A is operating. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage	FA
		When shift solenoid valve A is not operating. (When driving in "D ₂ " or "D ₃ ".)	1V or less	RA
7	Shift solenoid valve B	When shift solenoid valve B is operating. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage	BR
		When shift solenoid valve B is not operating. (When driving in "D ₃ " or "D ₄ ".)	1V or less	ST
8	Timing solenoid valve	When timing solenoid valve is operating. (When driving in "D ₁ " or "D ₄ ".)	Battery voltage	BF
		When timing solenoid valve is not operating. (When driving in "D ₂ " or "D ₃ ".)	1V or less	HA



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Electrical Components Inspection (Cont'd)

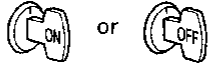








Terminal No.	Item	Condition	Judgement standard
9	Power source		Same as No. 4
10*	—	—	—
11	—	—	—
12	—	—	—
13	—	—	—
14	Closed throttle position switch (in throttle position switch)	When accelerator pedal is released after warming up engine.	8 - 15V
		When accelerator pedal is depressed after warming up engine.	1V or less
15	Ground	—	—
16	Inhibitor "1" position switch	When selector lever is set to "1" position.	Battery voltage
		When selector lever is set to other position.	1V or less
17	Inhibitor "2" position switch	When selector lever is set to "2" position.	Battery voltage
		When selector lever is set to other position.	1V or less
18	Inhibitor "D" position switch	When selector lever is set to "D" position.	Battery voltage
		When selector lever is set to other position.	1V or less
19	Inhibitor "N" or "P" position switch	When selector lever is set to "N" position.	Battery voltage
		When selector lever is set to other position.	1V or less
20	Inhibitor "R" position switch	When selector lever is set to "R" position.	Battery voltage
		When selector lever is set to other position.	1V or less
21	Wide open throttle position switch	When accelerator pedal is depressed more than half-way after warming up engine.	8 - 15V
		When accelerator pedal is released after warming up engine.	1V or less
22	—	—	—



*: This terminal is connected to terminal No. 36 of ECM control unit.



When code No. 54 appears during engine self-diagnosis, check line between above terminals for proper continuity.

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition	Judgement standard	
23	Power source (Back-up)	 or 	When ignition switch is turned to "OFF".	Battery voltage
			When ignition switch is turned to "ON".	Battery voltage
24	Engine speed signal	 	When engine is running at idle speed.	0.9V
			When engine is running at 3,000 rpm.	Approximately 3.7V
25	Revolution sensor (Measure in AC position)		When vehicle is cruising at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
			When vehicle is parked.	0V
26	—	—	—	
27	Vehicle speed sensor		When vehicle is moving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V
28	—	—	—	
29	—	—	—	
30	—	—	—	
31	Throttle position sensor (Power source)	—	—	4.5 - 5.5V
32	—	—	—	—
33	Fluid temperature sensor		When ATF temperature is 20°C (68°F).	1.56V
			When ATF temperature is 80°C (176°F).	0.45V
34	Throttle position sensor	 	When accelerator pedal is depressed slowly after warming up engine.	Fully-closed throttle: 0.2 - 0.6V Fully-open throttle: 2.9 - 3.9V Voltage rises gradually in response to throttle opening angle.
			—	—
35	Throttle position sensor (Ground)	—	—	—
36	A/T mode switch "POWER"	—	When A/T mode switch is set in "POWER" position.	Battery voltage
			When A/T mode switch is set in any position except in "POWER" position.	1V or less

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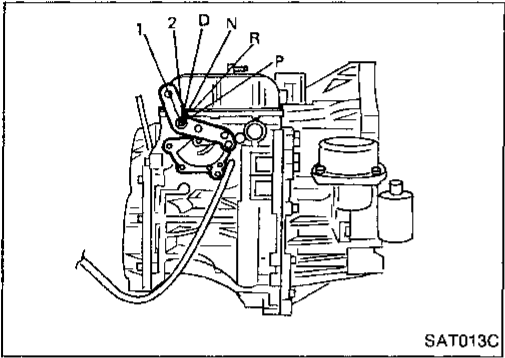
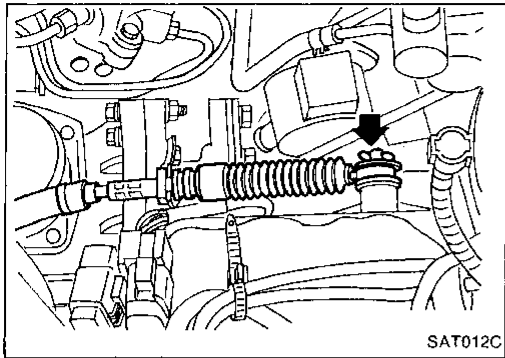
Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition	Judgement standard
37	—	—	—
38	—	—	—
39	Overdrive switch	When overdrive switch is set in "ON" position	Battery voltage
		When overdrive switch is set in "OFF" position	1V or less
40	—	—	—
41	—	—	—
42	A/T mode switch "COMFORT"	 When A/T mode switch is set in "COMFORT" position.	Battery voltage
		 When A/T mode switch is set in any position except in "COMFORT" position.	1V or less
43	—	—	—
44	—	—	—
45	—	—	—
46	—	—	—
47	—	—	—
48	Ground	—	—

Electrical Components Inspection (Cont'd)

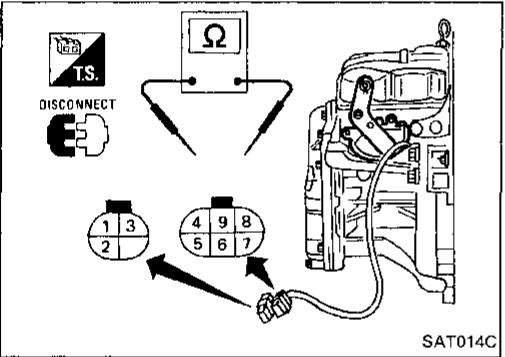
INHIBITOR SWITCH

1. Disconnect control cable from manual shaft.

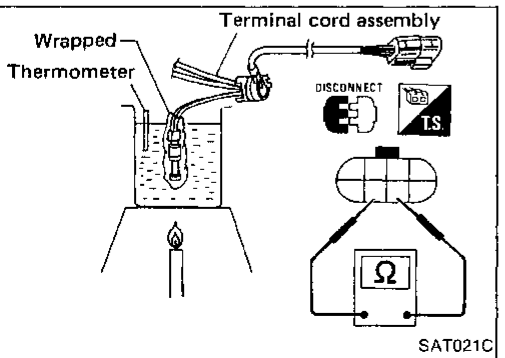
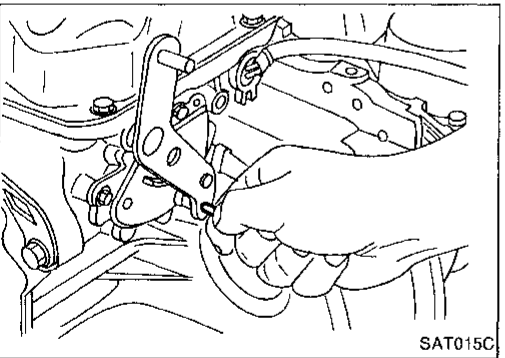


2. Check continuity between terminals ① and ③ and between terminals ④ and ②, ⑤, ⑥, ⑦, ⑧, ⑨ while moving selector lever through each position.

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



3. If NG, adjust inhibitor switch.
4. Check terminal continuity again.
5. If NG, replace inhibitor switch.



FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE". AT-180
- Check resistance between two terminals while changing temperature as shown as left.

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

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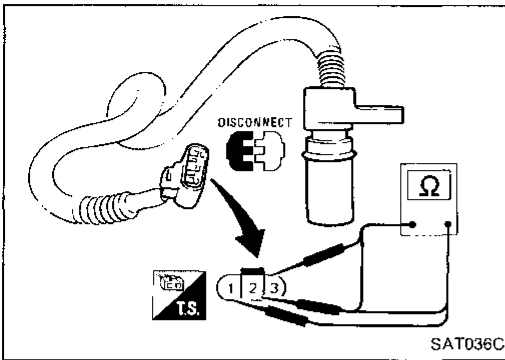
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Electrical Components Inspection (Cont'd)

REVOLUTION SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE". AT-180
- Check resistance between terminals ①, ② and ③.

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

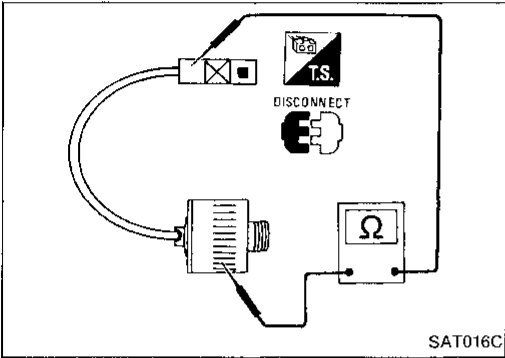


TIMING SOLENOID VALVE

- For removal and installation, refer to "ON-VEHICLE SERVICE". AT-180
- Check resistance between two terminals.

Resistance:

Timing solenoid valve 20 - 40Ω



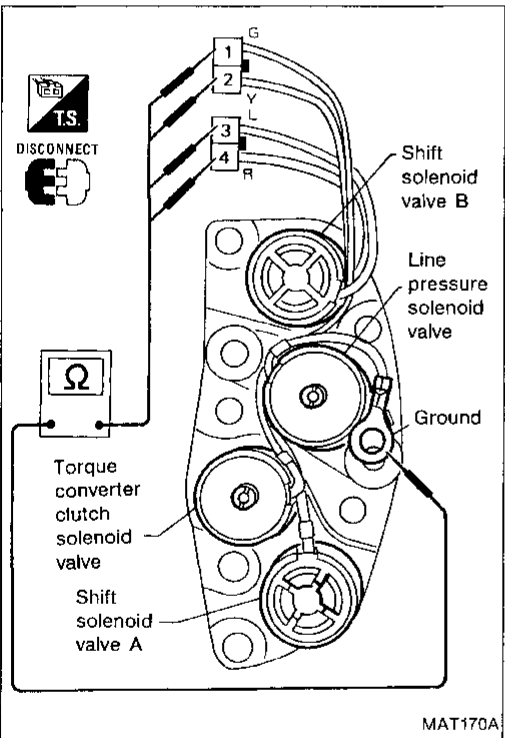
4-UNIT SOLENOID VALVE ASSEMBLY

(Shift solenoid valve A, B, torque converter clutch solenoid valve and line pressure solenoid valve)

- For removal and installation, refer to "ON-VEHICLE SERVICE". AT-180
- Check resistance between terminals of each solenoid.

Solenoid	Terminal No.	Resistance Ω
Shift solenoid valve A	①	20 - 40
Shift solenoid valve B	②	
Torque converter clutch solenoid valve	③	10 - 20
Line pressure solenoid valve	④	

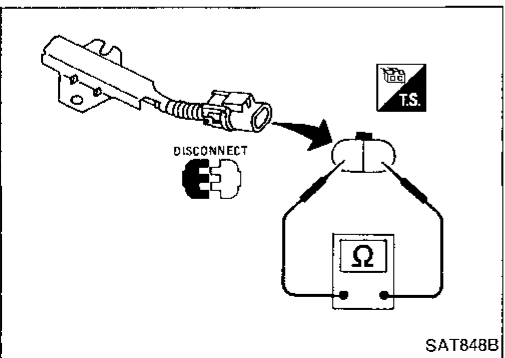
Ground terminal

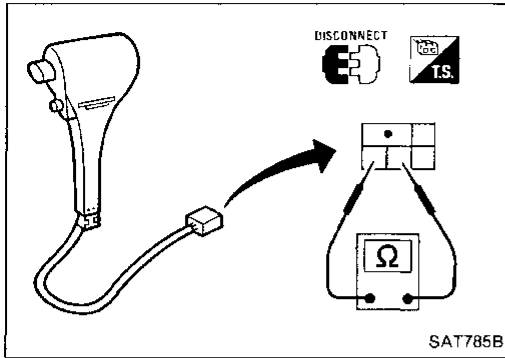


DROPPING RESISTOR

- Check resistance between two terminals.

Resistance: 11.2 - 12.8Ω





Electrical Components Inspection (Cont'd)

OVERDRIVE SWITCH

- Check continuity between two terminals.

OD switch position	Continuity
ON	No
OFF	Yes

Final Check

STALL TESTING

Stall test procedure

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

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

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

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

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

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

Stall revolution:

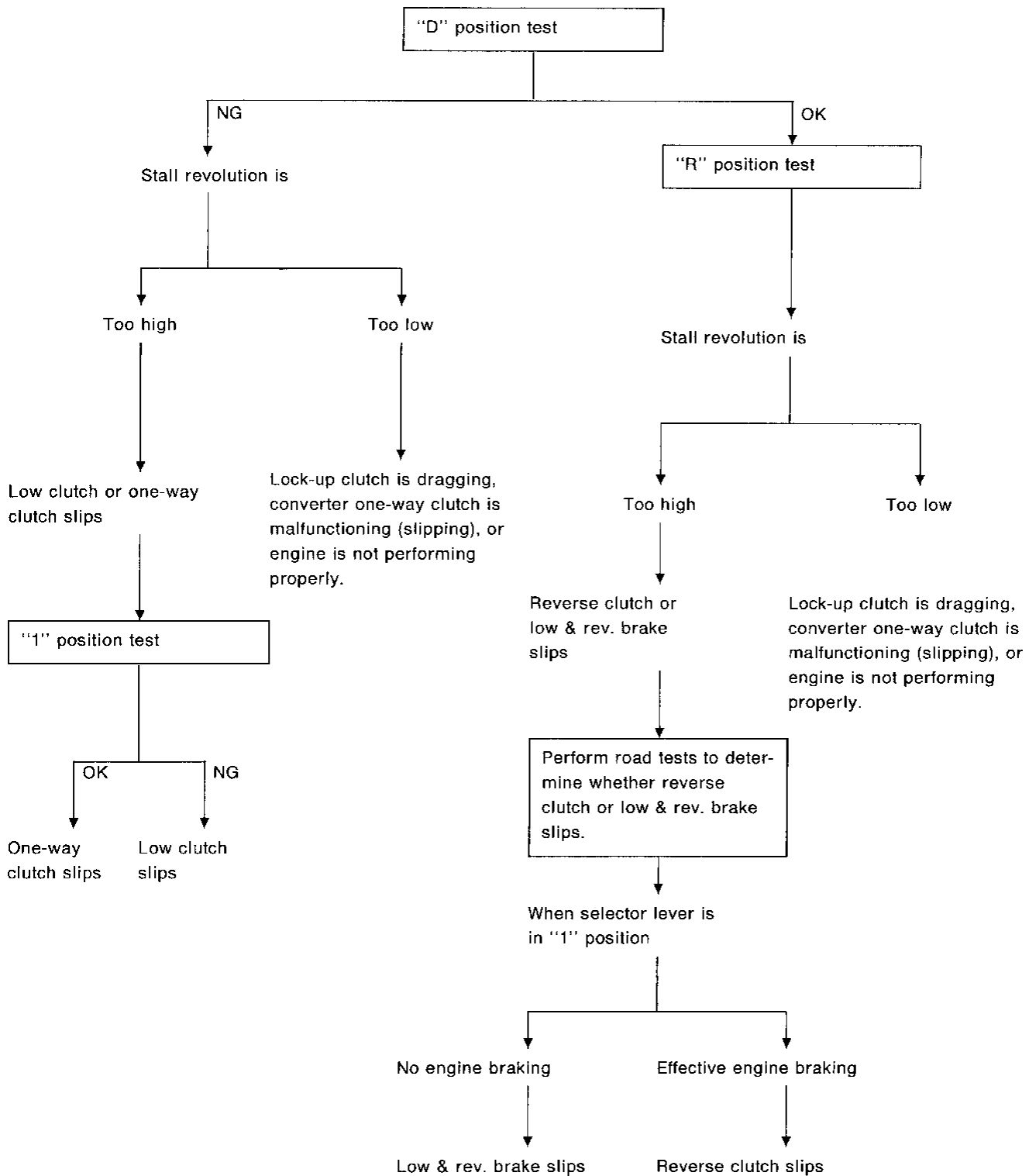
2,050 - 2,350 rpm

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 "1" and "R", respectively.

Final Check (Cont'd)
JUDGEMENT OF STALL TEST



If converter one-way clutch is frozen, vehicle will have poor high-speed performance and low engine speed when it is raced in "N" position. If converter one-way clutch is slipping, vehicle will be sluggish up to 50 or 60 km/h (30 or 40 MPH).

Final Check (Cont'd)

PRESSURE TESTING

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

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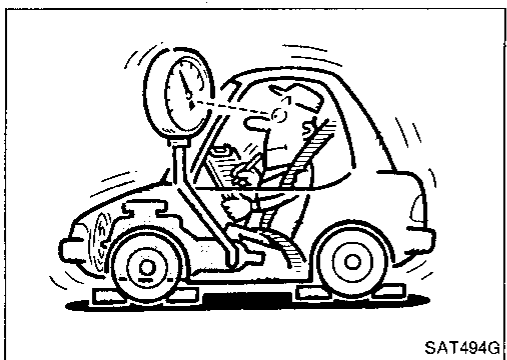
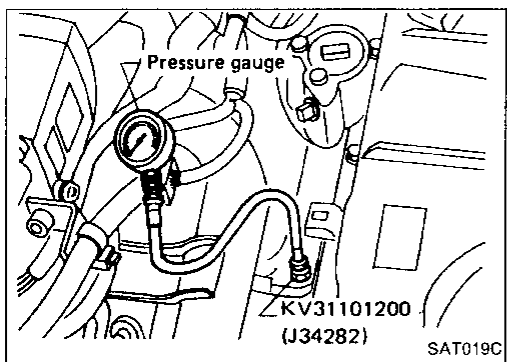
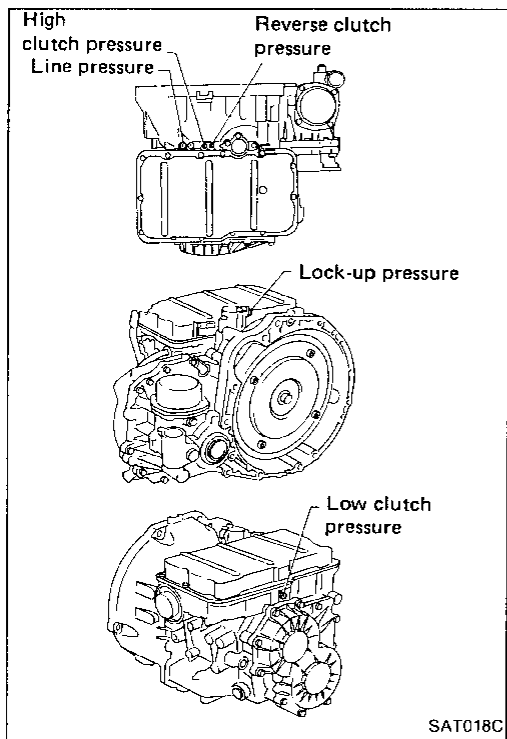
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Line pressure test procedure

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

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

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

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

- **When measuring line pressure at stall speed, follow the stall test procedure.**

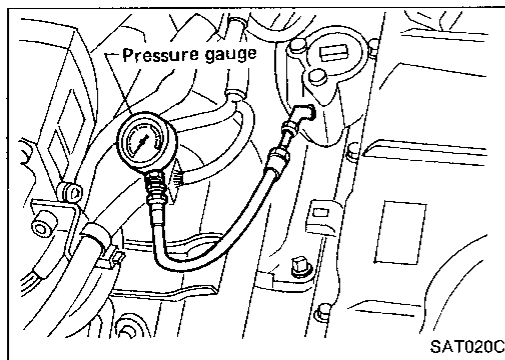
Line pressure:

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)
	D, 2, 1 and R positions
Idle	98 (1.0, 14)
Stall	843 (8.6, 122)

Final Check (Cont'd)

JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	<ul style="list-style-type: none"> ● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve
	Line pressure is low in particular position.	<ul style="list-style-type: none"> ● Fluid pressure leakage between manual valve and particular clutch. ● For example: If line pressure is low in "R" and "1" position but is normal in "D" and "2" position, fluid leakage exists at or around low & reverse brake circuit.
	Line pressure is high.	<ul style="list-style-type: none"> ● Mal-adjustment of throttle position sensor ● Fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure regulator valve or plug sticking
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> ● Mal-adjustment of throttle position sensor ● Control piston damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure regulator valve or plug sticking ● Pilot valve sticking



LOCK-UP TEST

Install pressure gauge to lock-up pressure port. Shift selector lever in "D" position.

Condition	Torque converter lock-up pressure kPa (kg/cm ² , psi)
Lock-up "ON"	49 (0.5, 7) or less
Lock-up "OFF"	196 (2, 28) or more

If lock-up pressure is not within specifications, refer to Diagnostic Procedures 15 and 16. AT-72, AT-73

Symptom Chart

Reference page (AT-)	ON vehicle											OFF vehicle																
	29 183	182	48, 49, 55	58	51, 200	52, 58	53, 54	191, 216	—	83	184, 196	210, 214	213, 194	215, 216	216	235												
Reference page (AT-)	Numbers are arranged in order of probability. Perform inspections starting with number one and working up.																											
	Fuse/signal			Fluid temperature sensor	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Timing solenoid valve	Low clutch accumulator	Band servo accumulator	Ignition switch and starter	Overdrive switch	A/T mode switch	Torque converter	Oil pump	Reverse clutch	High clutch	Low clutch	One-way clutch	Low & reverse brake	Brake band	Band servo piston	Parking components	
63	1	3	4											2														
63		1	2																									
—		1	3	4	5	2												7	6									
63		1																									2	
64		1																	3	2								
66		1			2	4		3											5	6	7	8						
—		1	2		3	5		4												6	8		7					
—			2	6	5	1	3	8		7	4	9									10							
—		1																				2						
67		1			2	4		3			5								6	7	8	9						
—		1	3	4		5	7		6			8						13	12	10	9	11	2					
—					1																							
66, 67		1			2	3												6	5		4							
—	1		5	2			3	4																				
—		2	1	5			4	3															6					
—		2	1	5			4	3												6			7					
—		3	1	5	6		4									2							7					
69, 70, 71			1	2			4	5									3											
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TROUBLE DIAGNOSES

RE4F02A

Symptom Chart (Cont'd)

Reference page (AT-)	ON vehicle											OFF vehicle					
	29, 183	182	48, 49, 49	58	51, 200	52, 58	53, 54	191, 216	—	83	184, 196	210, 214	213, 194	215, 216	216	235	
Reference page (AT-)	Fuse	Fluid level Control linkage inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor Engine speed signal Fluid temperature sensor	Engine idling speed Line pressure	Control valve assembly Shift solenoid valve A	Shift solenoid valve B Line pressure solenoid valve	Torque converter clutch solenoid valve Timing solenoid valve	Low clutch accumulator Band servo accumulator	Ignition switch and starter Overdrive switch	A/T mode switch	Torque converter Oil pump	Reverse clutch High clutch	Low clutch One-way clutch	Low & reverse brake Brake band	Band servo piston Parking components	
— Too sharp a shock in change from "D ₃ " to "D ₄ ".			1		2	4	3									5	
— Almost no shock or clutches slipping in change from "D ₁ " to "D ₂ ".	1		2		3	7		4	6						8	5	
— Almost no shock or slipping in change from "D ₂ " to "D ₃ ".	1		2		3	6	4					7				5	
— Almost no shock or slipping in change from "D ₃ " to "D ₄ ".	1		2		3	4	8					6			7	5	
— Vehicle braked by gear change from "D ₄ " 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											3	2				
— Maximum speed not attained. Acceleration poor.	1	2			5	3	4			6	12	11	7	8	10	9	
— Failure to change gear from "D ₄ " to "D ₃ ".	1		2		6	4	5	3					8	7			
— Failure to change gear from "D ₃ " to "D ₂ " or from "D ₄ " to "D ₂ ".	1		2		5	3	4					7		8	6		
— 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				6	5				
— 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						3							
— 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		3		4	6	5	2				7					
— Races extremely fast or slips in changing from "D ₄ " to "D ₂ " when depressing pedal.	1		3		4	7	6	5	2						8		
— Races extremely fast or slips in changing from "D ₃ " to "D ₂ " when depressing pedal.	1		3		4	6	5	2				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			
— Vehicle will not run in any position.	1	2			3		4				10	6	7	9	8	5	11
— Transaxle noise in "D", "2", "1" and "R" position.	1										2						

TROUBLE DIAGNOSES

RE4F02A

Symptom Chart (Cont'd)

Reference page (AT-)	ON vehicle													OFF vehicle																							
	29, 183	182	48, 49, 49	58	51, 200	52, 58	53, 54	191, 216	83	184, 196	210, 214	213, 194	215, 216	216	235																						
Reference page (AT-)	Fuse	Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Fluid temperature sensor	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Timing solenoid valve	Low clutch accumulator	Band servo accumulator	Ignition switch and starter	Overdrive switch	A/T mode switch	Torque converter	Oil pump	Reverse clutch	High clutch	Low clutch	One-way clutch	Low & reverse brake	Brake band	Band servo piston	Parking components						
75			6	1 2							5 4	3																									
			2	1																																	
75			2	1	3						5 4															6	7										
			2	1																																	
				1	2						4 3																5	6									
											1																		2								
		1		3					2 4	6			5										13 7	8 9	11	12 10											
		1																							2 3	5	6 4										
		1																					2 3	4 5	7	8 6											
				3 1	2 4 5				6 8						7								9														
		1		2					3 6			5 4											7														
72				1 2	4				5				3																								
				3 2	4 8				9 7 5						6																						
		1							5 4 3				2																								
				5	4				1				2 3											7 6													
		4		3					5																												

GI
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FM
LC
EF & EC
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CL
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AT
FA
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BR
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BF
HA
EL
IDX

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when turning ignition switch to "ON".)	AT-133
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(SYMPTOM: Power indicator lamp or comfort indicator lamp does not come	
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(SYMPTOM: Power indicator lamp does not come on for about 3	
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Contents — RE4F04V (Cont'd)

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(SYMPTOM: Vehicle does not shift from 2 ₂ on 1 ₁ when changing selector lever from "2" to "1" position.)	AT-149	
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		EL
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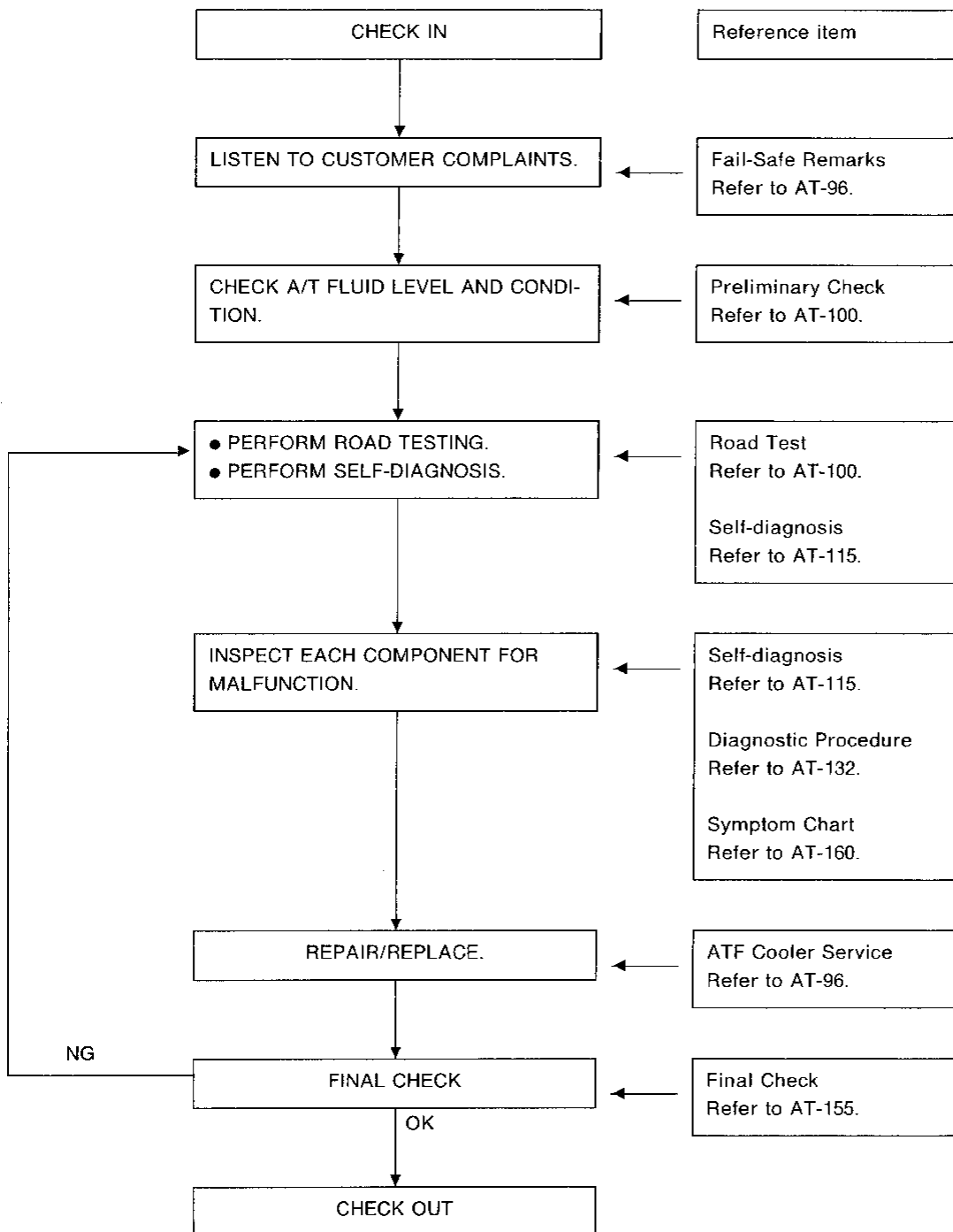
How to Perform Trouble Diagnoses for Quick and Accurate Repair

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

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

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

WORK FLOW



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

INFORMATION FROM CUSTOMER

KEY POINTS

WHAT Vehicle & A/T model

WHEN Date, Frequencies

WHERE Road conditions

HOW Operating conditions, Symptoms

Customer name MR/MS	Model & Year	VIN
Trans. model RE4F04V	Engine VE30DE	Mileage
Incident Date	Manuf. Date	In Service Date
Frequency	<input type="checkbox"/> Continuous <input type="checkbox"/> Intermittent (times a day)	
Symptoms	<input type="checkbox"/> Vehicle does not move. (<input type="checkbox"/> Any position <input type="checkbox"/> Particular position)	
	<input type="checkbox"/> No up-shift (<input type="checkbox"/> 1st → 2nd <input type="checkbox"/> 2nd → 3rd <input type="checkbox"/> 3rd → O/D)	
	<input type="checkbox"/> No down-shift (<input type="checkbox"/> O/D → 3rd <input type="checkbox"/> 3rd → 2nd <input type="checkbox"/> 2nd → 1st)	
	<input type="checkbox"/> Lockup malfunction	
	<input type="checkbox"/> Shift point too high or too low.	
	<input type="checkbox"/> Shift shock or slip (<input type="checkbox"/> N → D <input type="checkbox"/> Lockup <input type="checkbox"/> Any drive position)	
	<input type="checkbox"/> Noise or vibration	
	<input type="checkbox"/> No kickdown	
	<input type="checkbox"/> No pattern select	
	<input type="checkbox"/> Others ()	
Power indicator lamp	Flickers for about 8 seconds.	
	<input type="checkbox"/> Come on	<input type="checkbox"/> Come off

GI

MA

EM

LC

EF &
FC

FE

CL

MT

AT

FA

RA

BR

ST

BF

HA

EL

DX

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

DIAGNOSTIC WORKSHEET

1.	<input type="checkbox"/> Read the Fail-safe Remarks and listen to customer complaints.	AT-96		
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-100		
3.	<input type="checkbox"/> Perform all ROAD TESTING and mark required procedures.	AT-100		
	3-1 Check before engine is started. <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <table style="width: 100%; border: none;"> <tbody> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others </td> </tr> </tbody> </table>	<input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve	<input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others	AT-101
<input type="checkbox"/> 1. Revolution sensor <input type="checkbox"/> 2. Vehicle speed sensor <input type="checkbox"/> 3. Throttle position sensor <input type="checkbox"/> 4. Shift solenoid valve A <input type="checkbox"/> 5. Shift solenoid valve B <input type="checkbox"/> 6. Overrun clutch solenoid valve <input type="checkbox"/> 7. Torque converter clutch solenoid valve	<input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source <input type="checkbox"/> 9. Engine speed signal <input type="checkbox"/> 10. Line pressure solenoid valve <input type="checkbox"/> 11. Battery <input type="checkbox"/> 12. Others			
	3-2. Check at idle <input type="checkbox"/> Diagnostic Procedure 1 (Power indicator lamp came on for 2 seconds.) <input type="checkbox"/> Diagnostic Procedure 2 (Power or comfort indicator lamp came on.) <input type="checkbox"/> Diagnostic Procedure 3 (OD OFF indicator lamp came on.) <input type="checkbox"/> Diagnostic Procedure 4 (Power indicator lamp came on when acc. pedal was depressed.) <input type="checkbox"/> Diagnostic Procedure 5 (Engine starts only in P and N position) <input type="checkbox"/> Diagnostic Procedure 6 (In P position, vehicle does not move when pushed) <input type="checkbox"/> Diagnostic Procedure 7 (In N position, vehicle moves) <input type="checkbox"/> Diagnostic Procedure 8 (Select shock. N → R position) <input type="checkbox"/> Diagnostic Procedure 9 (Vehicle creeps backward in R position) <input type="checkbox"/> Diagnostic Procedure 10 (Vehicle creeps forward in D, 2 or 1 position)	AT-102		
	3-3. Cruise test Part-1 <input type="checkbox"/> Diagnostic Procedure 11 (Vehicle starts from D ₁) <input type="checkbox"/> Diagnostic Procedure 12 <input type="checkbox"/> Diagnostic Procedure 13 <input type="checkbox"/> Diagnostic Procedure 14 } (A/T shift schedule: D ₁ → D ₂ /D ₂ → D ₃ /D ₃ → D ₄ /D ₄ → D ₂) <input type="checkbox"/> Diagnostic Procedure 15 (Shift schedule: Lock-up) <input type="checkbox"/> Diagnostic Procedure 16 (Lock-up condition more than 30 seconds) <input type="checkbox"/> Diagnostic Procedure 17 (Lock up released) <input type="checkbox"/> Diagnostic Procedure 18 (Engine speed return to idle. Light braking D ₄ → D ₃)	AT-103		

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

	<p>Part-2</p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnostic Procedure 11 (Vehicle starts from D₁) <input type="checkbox"/> Diagnostic Procedure 12 (Kickdown: D₄ → D₂) <input type="checkbox"/> Diagnostic Procedure 13 (Shift schedule: D₂ → D₃) <input type="checkbox"/> Diagnostic Procedure 14 (Shift schedule: D₃ → D₄ and engine brake) 	AT-108														
	<p>Part-3</p> <ul style="list-style-type: none"> <input type="checkbox"/> Diagnostic Procedure 20 (D₄ → D₃ when OD OFF switch ON → OFF) <input type="checkbox"/> Diagnostic Procedure 18 (Engine brake in D₃) <input type="checkbox"/> Diagnostic Procedure 21 (3₃ → 2₂ when selector lever D → 2 position) <input type="checkbox"/> Diagnostic Procedure 18 (Engine brake in 2₂) <input type="checkbox"/> Diagnostic Procedure 22 (2₂ → 1₁, when selector lever 2 → 1 position) <input type="checkbox"/> Diagnostic Procedure 23 (Engine brake in 1₁) <input type="checkbox"/> SELF-DIAGNOSTIC PROCEDURE — Mark detected items. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><input type="checkbox"/> 1. Revolution sensor</td> <td style="width: 50%;"><input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source</td> </tr> <tr> <td><input type="checkbox"/> 2. Vehicle speed sensor</td> <td><input type="checkbox"/> 9. Engine speed signal</td> </tr> <tr> <td><input type="checkbox"/> 3. Throttle position sensor</td> <td><input type="checkbox"/> 10. Line pressure solenoid valve</td> </tr> <tr> <td><input type="checkbox"/> 4. Shift solenoid valve A</td> <td><input type="checkbox"/> 11. Battery</td> </tr> <tr> <td><input type="checkbox"/> 5. Shift solenoid valve B</td> <td><input type="checkbox"/> 12. Others</td> </tr> <tr> <td><input type="checkbox"/> 6. Overrun clutch solenoid valve</td> <td></td> </tr> <tr> <td><input type="checkbox"/> 7. Torque converter clutch solenoid valve</td> <td></td> </tr> </table> 	<input type="checkbox"/> 1. Revolution sensor	<input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source	<input type="checkbox"/> 2. Vehicle speed sensor	<input type="checkbox"/> 9. Engine speed signal	<input type="checkbox"/> 3. Throttle position sensor	<input type="checkbox"/> 10. Line pressure solenoid valve	<input type="checkbox"/> 4. Shift solenoid valve A	<input type="checkbox"/> 11. Battery	<input type="checkbox"/> 5. Shift solenoid valve B	<input type="checkbox"/> 12. Others	<input type="checkbox"/> 6. Overrun clutch solenoid valve		<input type="checkbox"/> 7. Torque converter clutch solenoid valve		AT-109
<input type="checkbox"/> 1. Revolution sensor	<input type="checkbox"/> 8. Fluid temperature sensor and A/T control unit power source															
<input type="checkbox"/> 2. Vehicle speed sensor	<input type="checkbox"/> 9. Engine speed signal															
<input type="checkbox"/> 3. Throttle position sensor	<input type="checkbox"/> 10. Line pressure solenoid valve															
<input type="checkbox"/> 4. Shift solenoid valve A	<input type="checkbox"/> 11. Battery															
<input type="checkbox"/> 5. Shift solenoid valve B	<input type="checkbox"/> 12. Others															
<input type="checkbox"/> 6. Overrun clutch solenoid valve																
<input type="checkbox"/> 7. Torque converter clutch solenoid valve																
4.	<ul style="list-style-type: none"> <input type="checkbox"/> Perform the Diagnostic Procedures marked in ROAD TESTING. Refer to the Symptom Chart when you perform the procedures. (The chart also shows some other possible symptoms and the components inspection orders.) 	AT-161														
5.	<p>Perform FINAL CHECK. If NG, go back to "CHECK A/T FLUID".</p> <ul style="list-style-type: none"> <input type="checkbox"/> Stall test — Mark possible damaged components/others. <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;"><input type="checkbox"/> Torque converter one-way clutch</td> <td style="width: 50%;"><input type="checkbox"/> Low one-way clutch</td> </tr> <tr> <td><input type="checkbox"/> Reverse clutch</td> <td><input type="checkbox"/> Engine</td> </tr> <tr> <td><input type="checkbox"/> Forward clutch</td> <td><input type="checkbox"/> Line pressure is low</td> </tr> <tr> <td><input type="checkbox"/> Overrun clutch</td> <td><input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK</td> </tr> <tr> <td><input type="checkbox"/> Forward one-way clutch</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Low & reverse brake</td> <td></td> </tr> </table> <input type="checkbox"/> Pressure test — Suspected parts: 	<input type="checkbox"/> Torque converter one-way clutch	<input type="checkbox"/> Low one-way clutch	<input type="checkbox"/> Reverse clutch	<input type="checkbox"/> Engine	<input type="checkbox"/> Forward clutch	<input type="checkbox"/> Line pressure is low	<input type="checkbox"/> Overrun clutch	<input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK	<input type="checkbox"/> Forward one-way clutch		<input type="checkbox"/> Low & reverse brake		AT-156		
<input type="checkbox"/> Torque converter one-way clutch	<input type="checkbox"/> Low one-way clutch															
<input type="checkbox"/> Reverse clutch	<input type="checkbox"/> Engine															
<input type="checkbox"/> Forward clutch	<input type="checkbox"/> Line pressure is low															
<input type="checkbox"/> Overrun clutch	<input type="checkbox"/> Clutches and brakes except high clutch and brake band are OK															
<input type="checkbox"/> Forward one-way clutch																
<input type="checkbox"/> Low & reverse brake																

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Remarks

FAIL-SAFE

The A/T control unit has an electronic Fail-Safe (limp home mode) to allow the vehicle to be driven even in the event of damage of a major electrical input or output device circuit.

In this condition, the vehicle runs in third gear in positions 1, 2 or D and will not upshift. Customer may say "Sluggish, poor acceleration".

When Fail-safe operation occurs the next time the key is turned to the ON position, the power indicator lamp will blink for about 8 seconds. (For diagnosis, refer to AT-101.)

If the vehicle is driven under extreme conditions such as excessive wheel spinning and emergency braking suddenly after, Fail-Safe may be activated even if all electrical circuits are undamaged.

In this case, normal shift pattern can be returned by turning key OFF for 3 seconds and then back ON.

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

Always follow the "WORK FLOW" (Refer to AT-92).

The SELF-DIAGNOSIS results will be as follows:

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

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

ATF COOLER SERVICE

During overhaul, if excessive foreign material is found in the oil pan or clogging the strainer, the ATF cooler must be serviced as follows:

VG30 engine (RE4F02A) ... tube type cooler

Flush ATF cooler and cooler line using cleaning solvent and compressed air.

VE30 engine (RE4F04V) ... fin type cooler

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

Diagnosis by CONSULT

NOTICE

- The CONSULT electrically displays shift timing and lock-up timing (that is, operation timing of each solenoid).
When a noticeable time difference occurs between shift timing which is manifested by shift shock and the CONSULT display, mechanical parts (except solenoids, sensors, etc.) are considered to be malfunctioning. Check mechanical parts using applicable diagnostic procedures.
- 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.
- Shift solenoid valve "A" or "B" is displayed on CONSULT at the start of shifting while gear position is displayed upon completion of shifting (which is computed by A/T control unit).
- Additional CONSULT information can be found in the Operation Manual supplied with the CONSULT unit.

APPLICATION

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 or P position, meter will not indicate 0 km/h (0 mph) even if vehicle is stationary.
Vehicle speed sensor 2 (Meter)	VHCL/S SE-MTR [km/h] or [mph]	X	—	● Vehicle speed computed from signal of vehicle speed sensor is displayed.	Error may occur under approx. 10 km/h (approx. 6 mph) and meter will not indicate 0 km/h (0 mph) even if vehicle is stationary.
Throttle position sensor	THRTL POS SEN [V]	X	—	● Throttle position sensor signal voltage is displayed.	
Fluid temperature sensor	FLUID TEMP 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.	Error may occur under approx. 800 rpm and meter will not indicate 0 rpm even if engine is not running.
Overdrive switch	OVERDRIVE SW [ON/OFF]	X	—	● ON/OFF state computed from signal of overdrive SW is displayed.	
P/N position switch	P/N POSI SW [ON/OFF]	X	—	● ON/OFF state computed from signal of P/N position SW is displayed.	
R position switch	R POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of R position SW is displayed.	
D position switch	D POSITION SW [ON/OFF]	X	—	● ON/OFF state computed from signal of D position SW is displayed.	
2 position switch	2 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 2 position SW, is displayed.	
1 position switch	1 POSITION SW [ON/OFF]	X	—	● ON/OFF status, computed from signal of 1 position SW, is displayed.	

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
ASCD-cruise signal	ASCD-CRUISE [ON/OFF]	X	—	<ul style="list-style-type: none"> ● Status of ASCD cruise signal is displayed. ON ... Cruising state OFF ... Normal running state 	<ul style="list-style-type: none"> ● This is displayed even when no ASCD is mounted.
ASCD-OD cut signal	ASCD-OD CUT [ON/OFF]	X	—	<ul style="list-style-type: none"> ● Status of ASCD-OD release signal is displayed. ON ... OD released OFF ... OD not released 	<ul style="list-style-type: none"> ● This is displayed even when no ASCD is mounted.
Kickdown switch	KICKDOWN SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of kickdown SW, is displayed. 	
Power shift switch	POWERSHIFT SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of power shift SW, is displayed. 	<ul style="list-style-type: none"> ● This is displayed even when no power SW is equipped. On vehicles with power SW mounted on lever, this item is invalid although displayed.
Closed throttle position switch	CLOSED THL/SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of closed throttle position SW, is displayed. 	
Wide open throttle position switch	W/O THRL/P-SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of wide open throttle position SW, is displayed. 	
Hold switch	HOLD SW [ON/OFF]	X	—	<ul style="list-style-type: none"> ● ON/OFF status, computed from signal of hold SW, is displayed. 	
Gear position	GEAR		X	<ul style="list-style-type: none"> ● Gear position data used for computation by control unit, is displayed. 	
Selector lever position	SLCT LVR POSI		X	<ul style="list-style-type: none"> ● Selector lever position data, used for computation by control unit, is displayed. 	<ul style="list-style-type: none"> ● A specific value used for control is displayed if fail-safe is activated due to error.
Vehicle speed	VEHICLE SPEED [km/h] or [mph]		X	<ul style="list-style-type: none"> ● Vehicle speed data, used for computation by control unit, is displayed. 	
Throttle position	THROTTLE POSI [1/8]		X	<ul style="list-style-type: none"> ● Throttle position data, used for computation by control unit, is displayed. 	<ul style="list-style-type: none"> ● A specific value used for control is displayed if fail-safe is activated due to error.
Line pressure duty	LINE PRES DTY [%]		X	<ul style="list-style-type: none"> ● Control value of line pressure solenoid valve, computed by control unit from each input signal, is displayed. 	
Lock-up duty	TCC S/V DUTY [%]		X	<ul style="list-style-type: none"> ● Control value of torque converter clutch solenoid valve, computed by control unit from each input signal, is displayed. 	
Shift solenoid valve A	SHIFT S/V A [ON/OFF]	—	X	<ul style="list-style-type: none"> ● Control value of shift solenoid valve A, computed by control unit from each input signal, is displayed. 	<ul style="list-style-type: none"> ● Control value of solenoid is displayed even if solenoid circuit is disconnected. ● The "OFF" signal is displayed if solenoid circuit is shorted.
Shift solenoid valve B	SHIFT S/V B [ON/OFF]	—	X	<ul style="list-style-type: none"> ● Control value of shift solenoid valve B, computed by control unit from each input signal, is displayed. 	

Diagnosis by CONSULT (Cont'd)

Item	Display	Monitor item		Description	Remarks
		ECU input signals	Main signals		
Overrun clutch solenoid valve	OVRRUN/C S/V [ON/OFF]	—	X	● Control value of overrun clutch solenoid valve computed by control unit from each input signal is displayed.	
Self-diagnosis display lamp (Power shift lamp)	SELF-D DP LMP [ON/OFF]	—	X	● Control status of power shift lamp is displayed.	

X: Applicable
 —: Not applicable

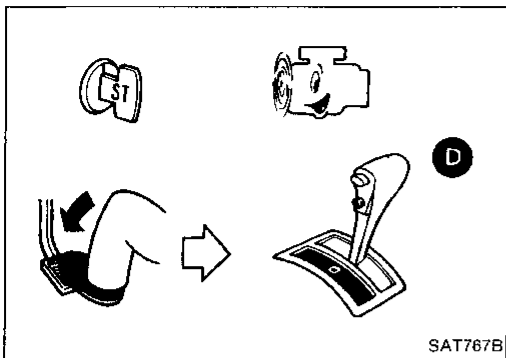
Note:

- When select ECU input signals on CONSULT, electronic control unit input signal are set.
- When select main signals on CONSULT, monitored items for understanding the overall operation of the system are set, and this setting is indicated by a reversed display.

DATA ANALYSIS

Item	Display form	Meaning
Lock-up duty	Approximately 4%	Lock-up "OFF"
	↓ Approximately 94%	↓ Lock-up "ON"
Line pressure duty	Approximately 29%	Low line-pressure (Small throttle opening)
	↓ Approximately 94%	↓ High line-pressure (Large throttle opening)
Throttle position sensor	Approximately 0.5V	Fully-closed throttle
	Approximately 4V	Fully-open throttle
Fluid temperature sensor	Approximately 1.5V	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



Preliminary Check

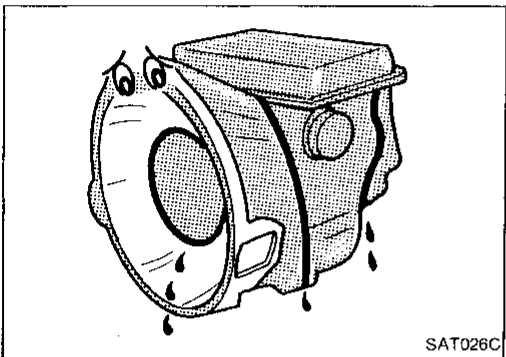
A/T FLUID CHECK

Fluid leakage check

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

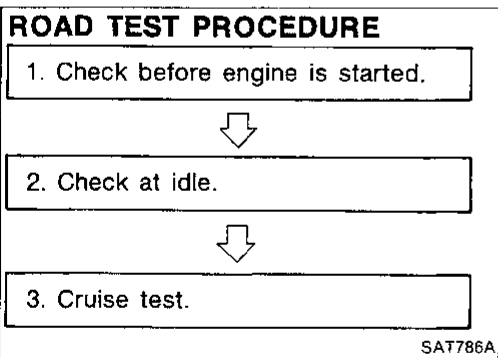
Fluid condition check

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



Fluid level check

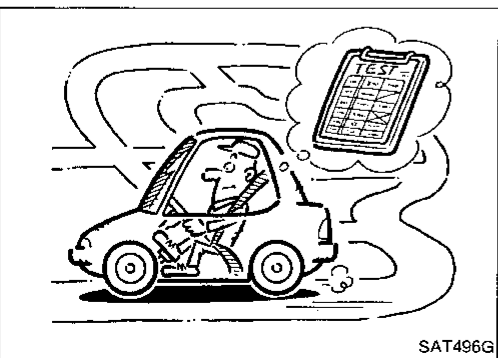
Refer to MA section (CHASSIS AND BODY MAINTENANCE).



ROAD TESTING

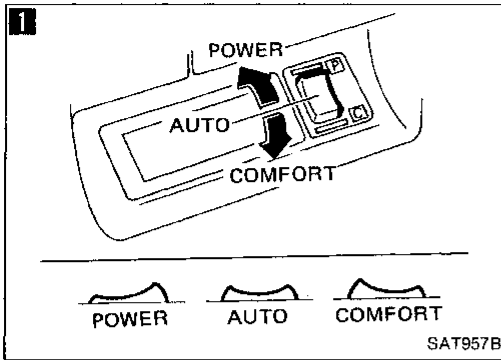
Description

- The purpose of this road test is to determine overall performance of automatic transaxle and analyze causes of problems.
- The road test consists of the following three parts:
 1. Check before engine is started.
 2. Check at idle.
 3. Cruise test.
- Before road test, familiarize yourself with all test procedures and items to check.
- Conduct tests on all items. Troubleshoot items which check out No Good after road test. Refer to “Self-diagnosis” and “Diagnostic Procedure”. AT-116



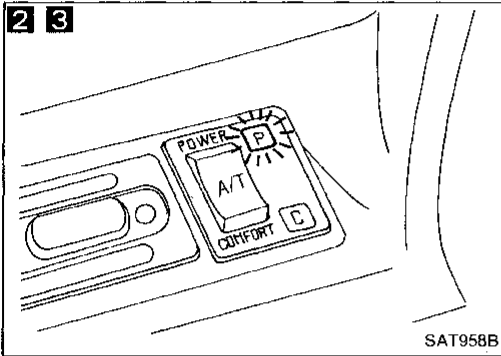
Preliminary Check (Cont'd)

1. Check before engine is started



- 1 2**
1. Park vehicle on flat surface.
 2. Set A/T mode switch to "AUTO" position.
 3. Move selector lever to "P" position.
 4. Turn ignition switch to "ON" position. (Do not start engine.)
 5. Does power indicator lamp come on for about 2 seconds?

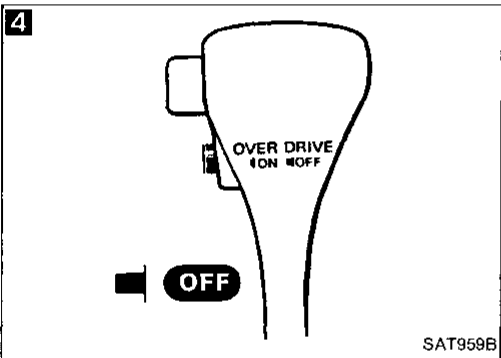
No → Go to Diagnostic Procedure 1. AT-133



- 3**
- Does power indicator lamp flicker for about 8 seconds?
1. Set A/T mode switch to "POWER" position.
 2. Does power indicator lamp come on?

Yes → Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE. AT-116

No → Go to Diagnostic Procedure 2. AT-134

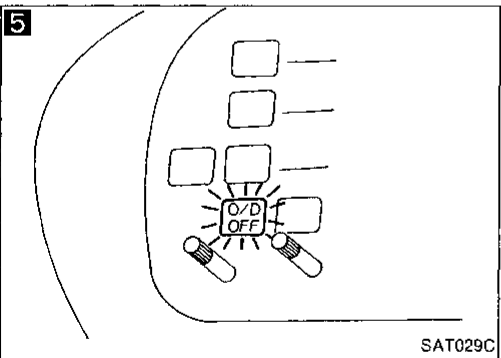


1. Set A/T mode switch to "COMFORT" position.
2. Does comfort indicator lamp come on?

No → Go to Diagnostic Procedure 2. AT-134

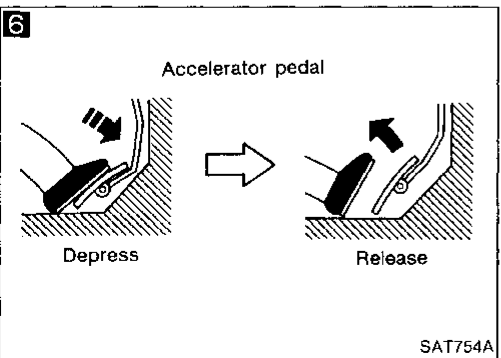
- 4 5**
1. Set overdrive switch to "OFF" position.
 2. Does OD OFF indicator lamp come on?

No → Go to Diagnostic Procedure 3. AT-134



- 6**
1. Move selector lever to "D" position.
 2. Set A/T mode switch to "AUTO" position.
 3. Depress and release accelerator pedal quickly.
 4. Does power indicator lamp come on for about 3 seconds after accelerator pedal is depressed?

No → Go to Diagnostic Procedure 4. AT-134

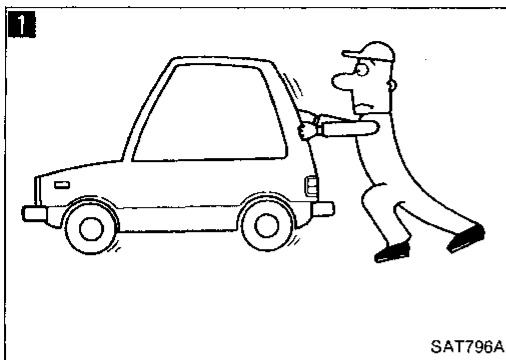


1. Turn ignition switch to "OFF" position.
2. Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE and note NG items.
3. Go to "ROAD TESTING — Check at idle". AT-102

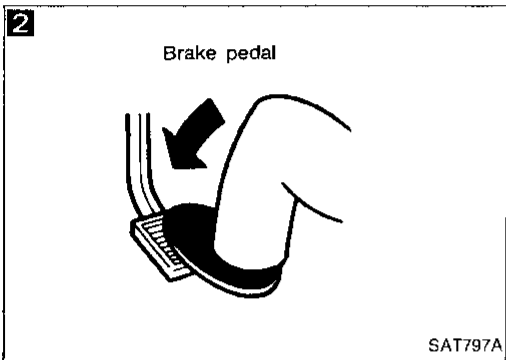
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Preliminary Check (Cont'd)

2. Check at idle

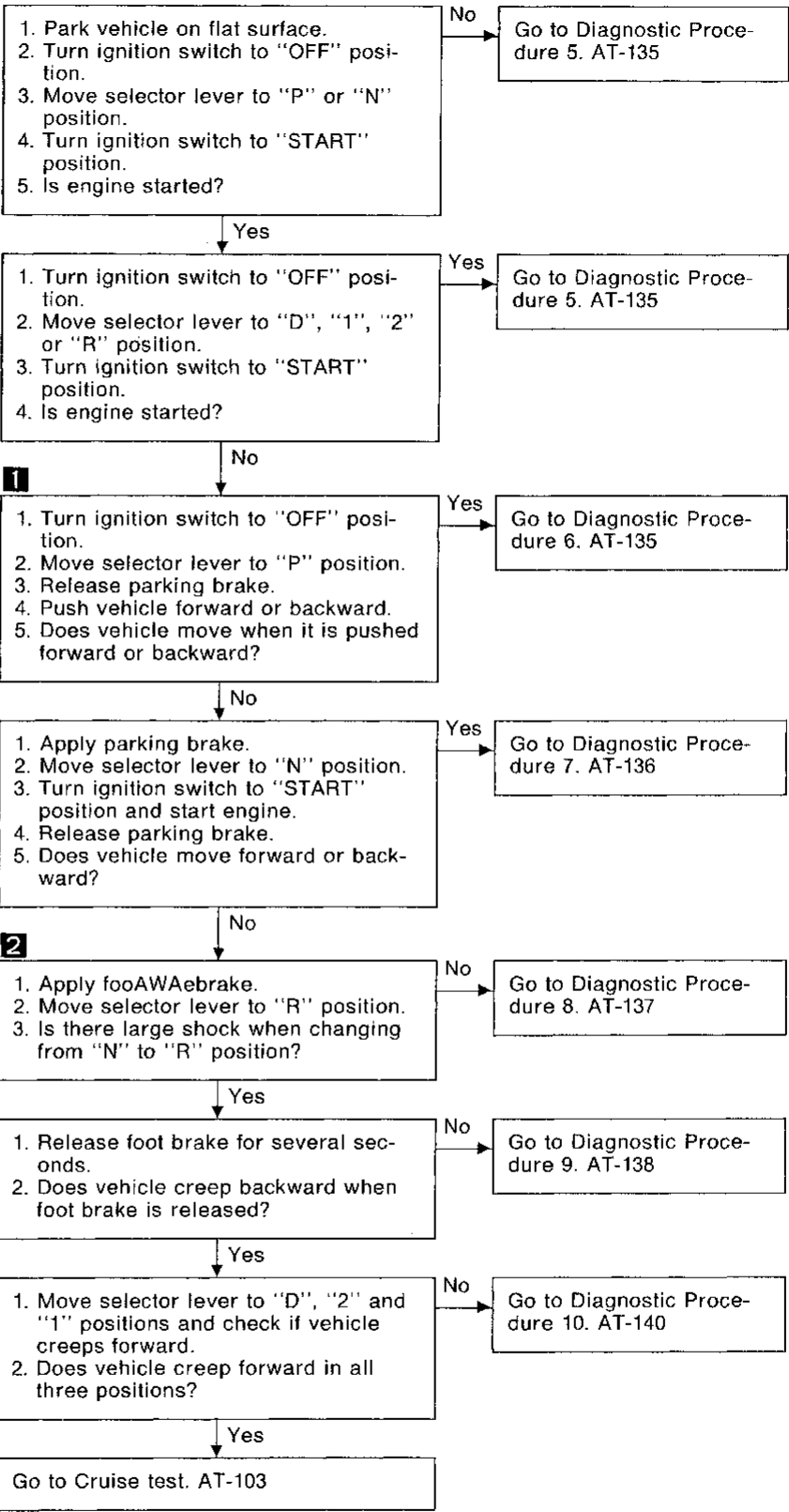


SAT796A



Brake pedal

SAT797A



Preliminary Check (Cont'd)

3. Cruise test

- Check all items listed in Parts 1 through 3.



With CONSULT

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

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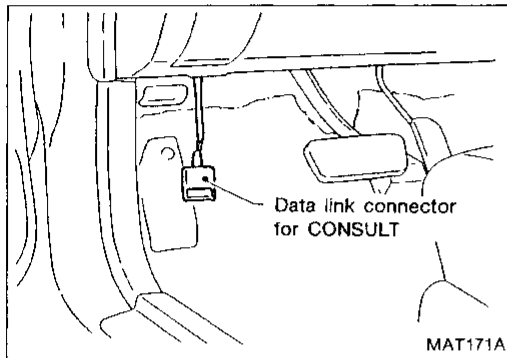
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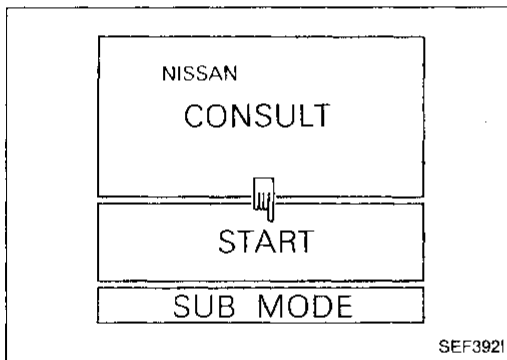
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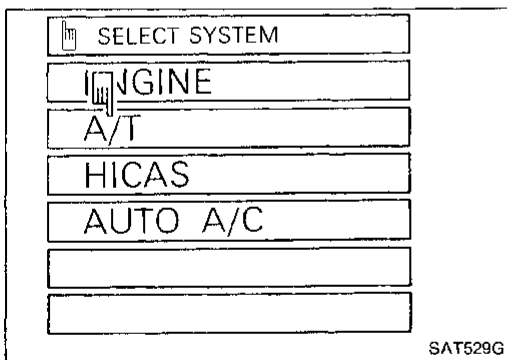


CONSULT setting procedure

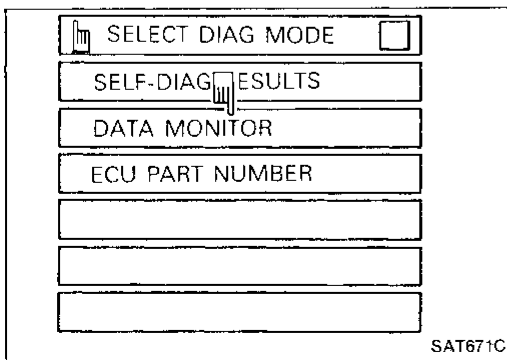
1. Turn off ignition switch.
2. Connect "CONSULT" to data link connector for CONSULT. (Data link connector for CONSULT is located in left dash side panel.)



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

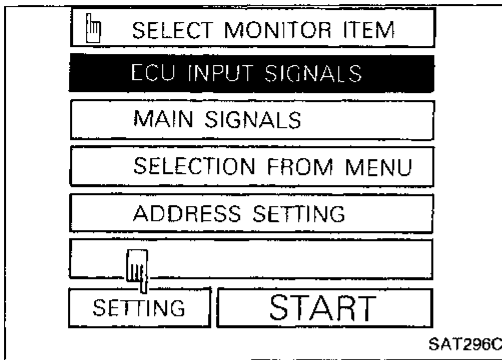


5. Touch "A/T".

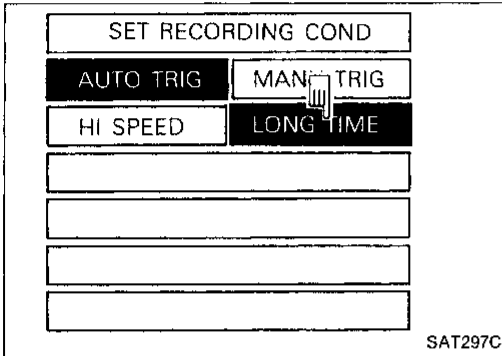


6. Touch "DATA MONITOR".

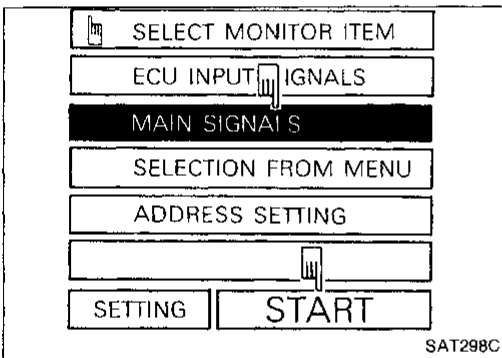
Preliminary Check (Cont'd)



7. Touch "SETTING" to set recording condition.

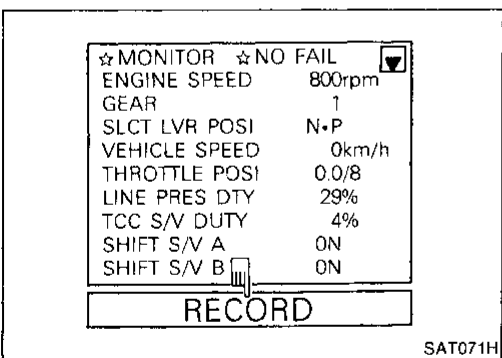


8. Touch "LONG TIME" and "ENTER" key.

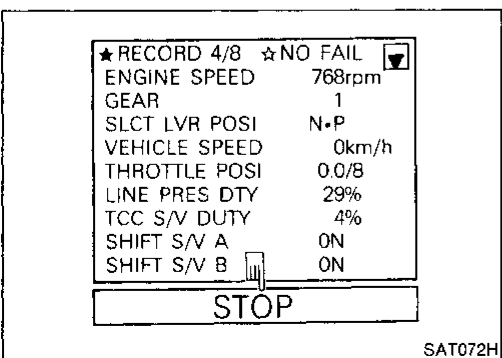


9. Go back to SELECT MONITOR ITEM and touch "MAIN SIGNALS".

10. Touch "START".



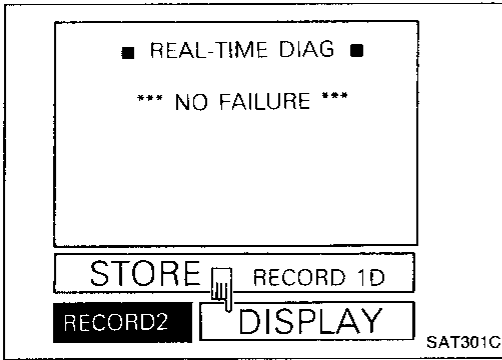
11. When performing cruise test, touch "RECORD".



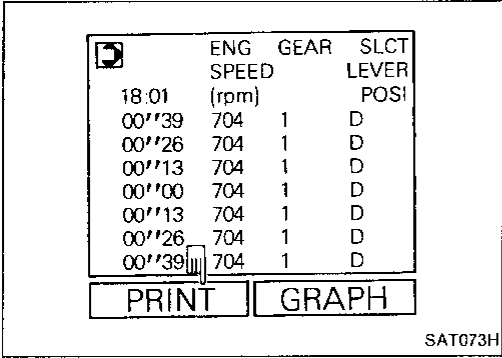
12. After finishing cruise test part 1, touch "STOP".

Preliminary Check (Cont'd)

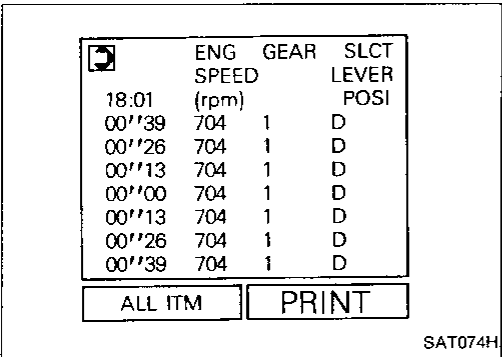
13. Touch "DISPLAY".



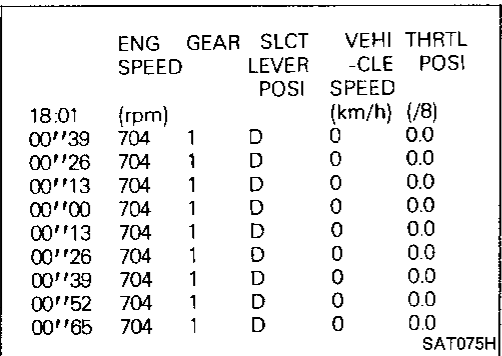
14. Touch "PRINT".



15. Touch "PRINT" again.



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



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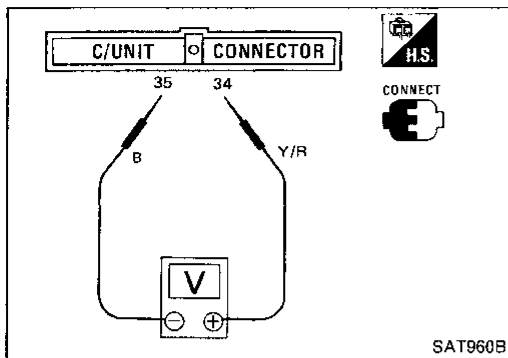
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Preliminary Check (Cont'd)



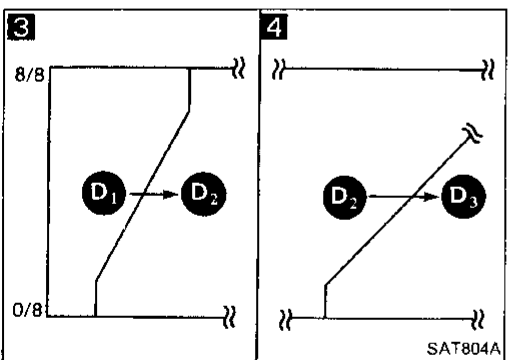
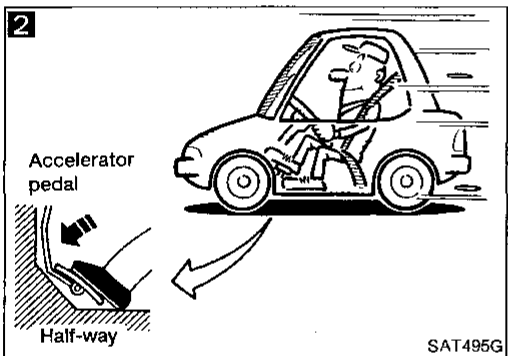
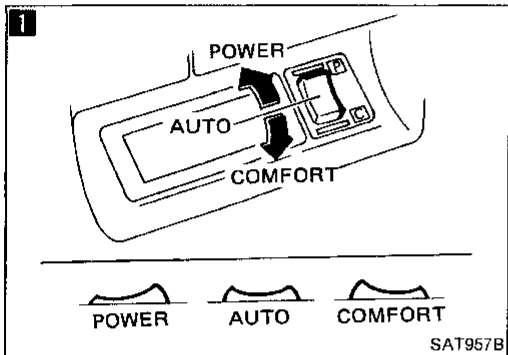
Without CONSULT

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

Cruise test — Part 1

Warm up engine until engine oil and ATF reach operating temperature after vehicle has been driven approx. 10 minutes.

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



1 2

1. Park vehicle on flat surface.
2. Set A/T mode switch to "AUTO" position.
3. Set overdrive switch to "ON" position.
4. Move selector lever to "P" position.
5. Turn ignition switch to "ON" position and start engine.
6. Move selector lever to "D" position.
7. Accelerate vehicle by constantly depressing accelerator pedal half-way.
8. Does vehicle start from D₁?

Read gear position.

No → Go to Diagnostic Procedure 11. AT-141

3

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-110.

No → Go to Diagnostic Procedure 12. AT-142

4

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

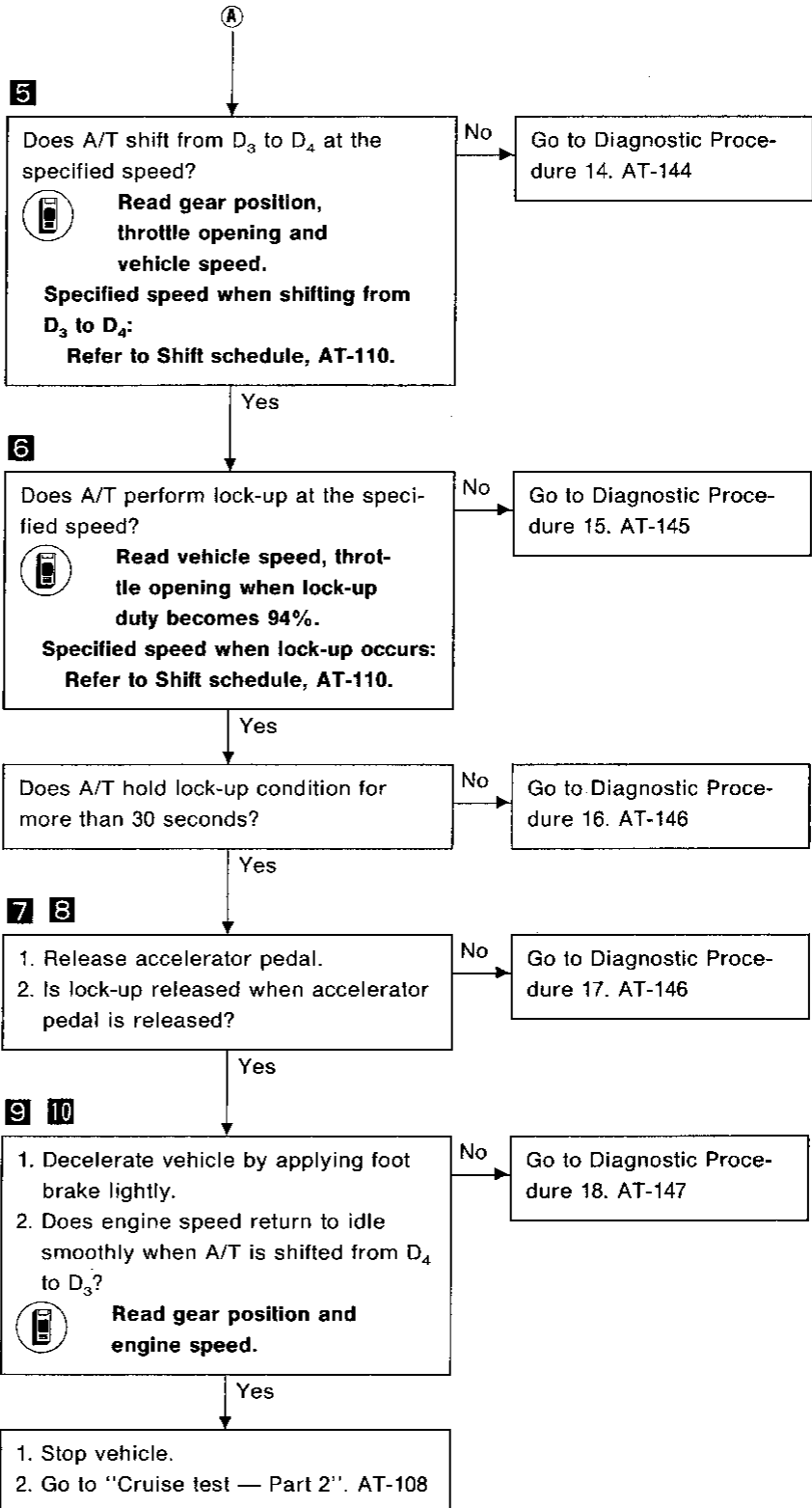
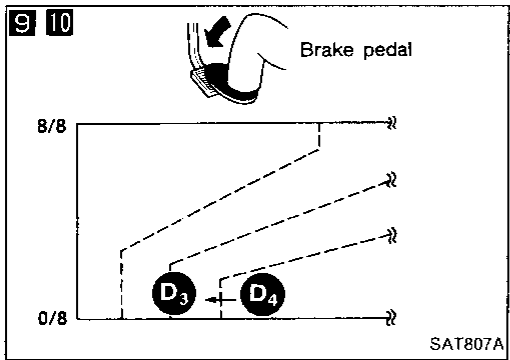
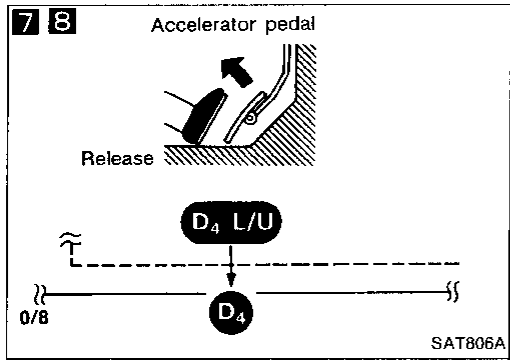
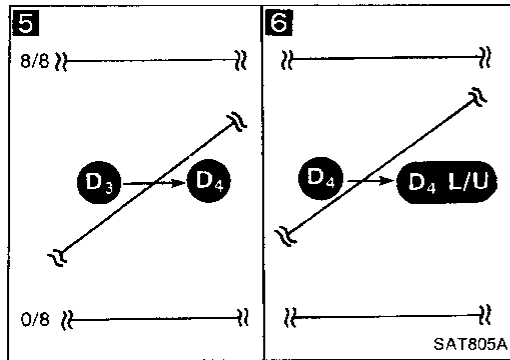
Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D₂ to D₃:
Refer to Shift schedule, AT-110.

No → Go to Diagnostic Procedure 13. AT-143

Yes → (A)

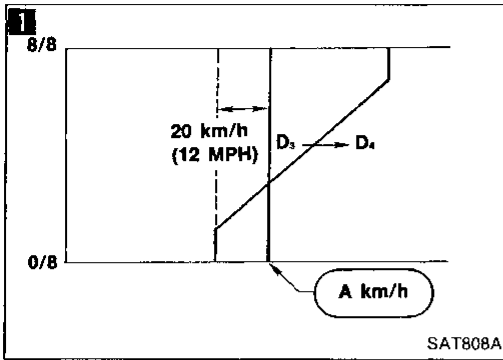
Preliminary Check (Cont'd)



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Preliminary Check (Cont'd)

Cruise test — Part 2



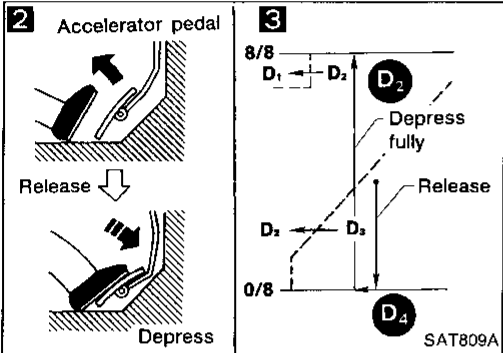
1. Confirm A/T mode switch is in "Auto" position and overdrive switch is in "ON" position.
2. Confirm selector lever is in "D" position.
3. Accelerator vehicle by half throttle again.
4. Does vehicle start from D₁?



Rear gear position.

No → Go to Diagnostic Procedure 19. AT-148

Yes



1 2 3

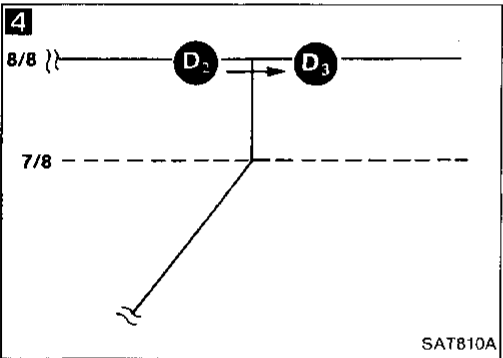
1. Accelerate vehicle to A km/h as shown in illustration.
2. Release accelerator pedal and then quickly depress it fully.
3. Does A/T shift from D₄ to D₂ as soon as accelerator pedal is depressed fully?



Read gear position and throttle opening.

No → Go to Diagnostic Procedure 12. AT-142

Yes



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



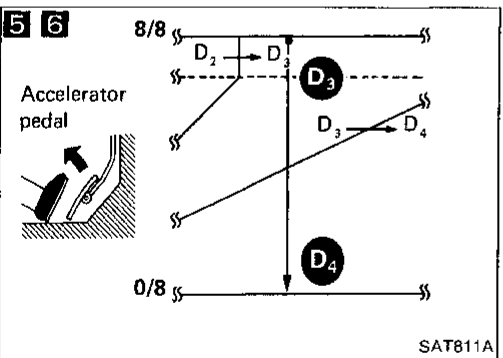
Read gear position, throttle opening and vehicle speed.

Specified speed when shifting from D₂ to D₃:

Refer to Shift schedule, AT-110.

No → Go to Diagnostic Procedure 13. AT-143

Yes



- 5 6. 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 opening and vehicle speed.

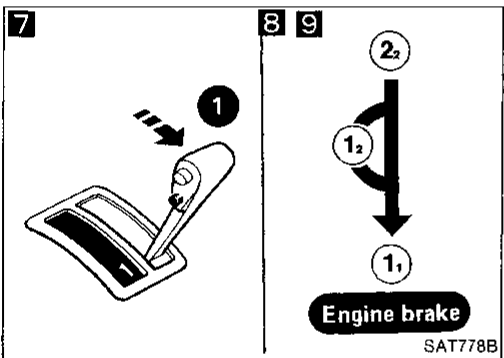
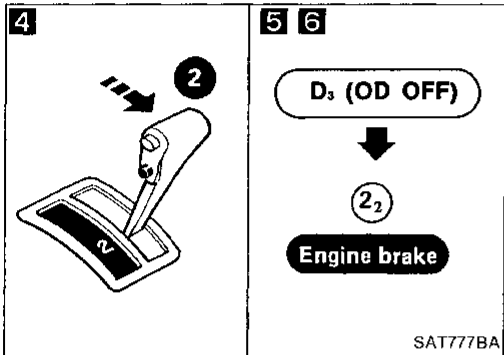
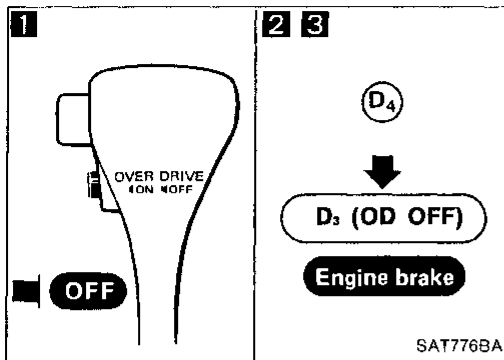
No → Go to Diagnostic Procedure 14. AT-144

Yes

1. Stop vehicle.
2. Go to "Cruise test — Part 3". AT-109

Preliminary Check (Cont'd)

Cruise test — Part 3



1 2

1. Confirm A/T mode switch is in "Auto" position and overdrive switch is in "ON" position.

2. Confirm selector lever is in "D" position.

3. Accelerate vehicle using half-throttle to D₄.

4. Release accelerator pedal.

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

6. Does A/T shift from D₄ to D₃?

Read gear position and vehicle speed.

No → Go to Diagnostic Procedure 20. AT-148

Yes

3

Does vehicle decelerate by engine brake?

No → Go to Diagnostic Procedure 18. AT-147

Yes

4 5

1. Move selector lever from "D" to "2" position while driving in D₃.

2. Does A/T shift from D₃ to 2₂?

Read gear position.

No → Go to Diagnostic Procedure 21. AT-149

Yes

6

Does vehicle decelerate by engine brake?

No → Go to Diagnostic Procedure 18. AT-147

Yes

7 8

1. Move selector lever from "2" to "1" position while driving in 2₂.

2. Does A/T shift from 2₂ to 1₁ position?

Read gear position.

No → Go to Diagnostic Procedure 22. AT-149

Yes

9

Does vehicle decelerate by engine brake?

No → Go to Diagnostic Procedure 23. AT-149

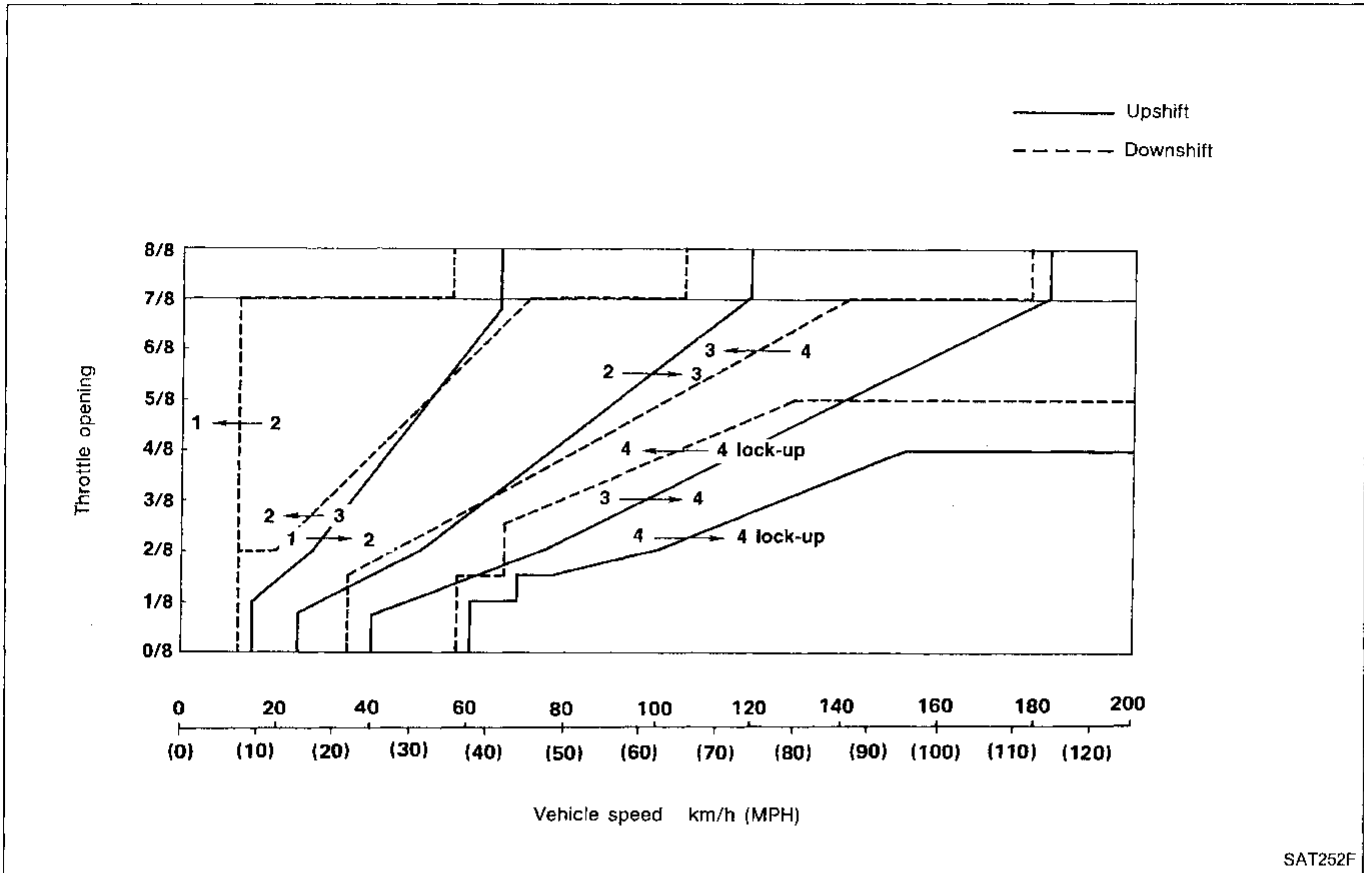
Yes

Stop vehicle.
Perform self-diagnosis. — Refer to SELF-DIAGNOSIS PROCEDURE. AT-116

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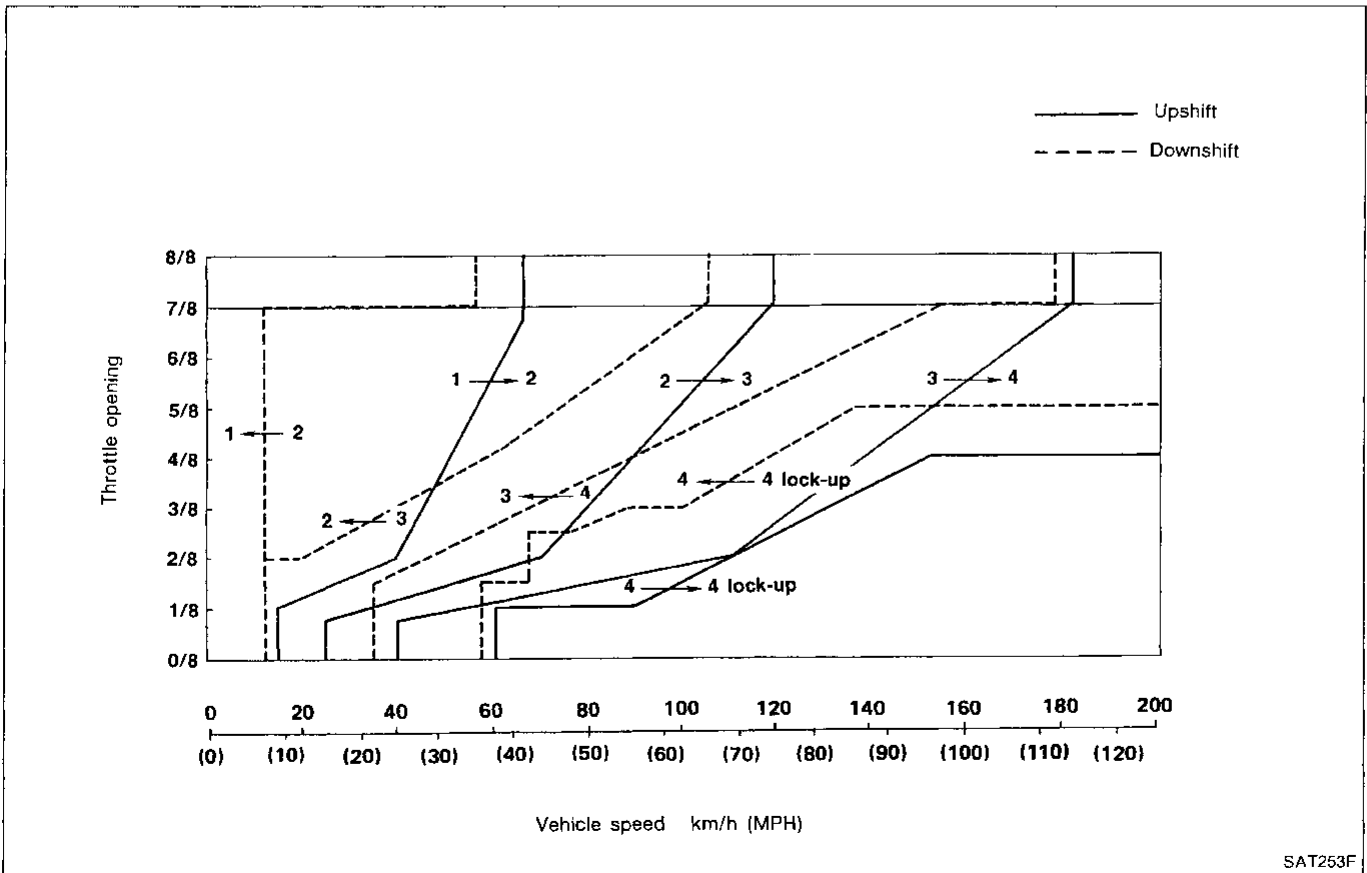
Preliminary Check (Cont'd)

Shift schedule (Comfort pattern)



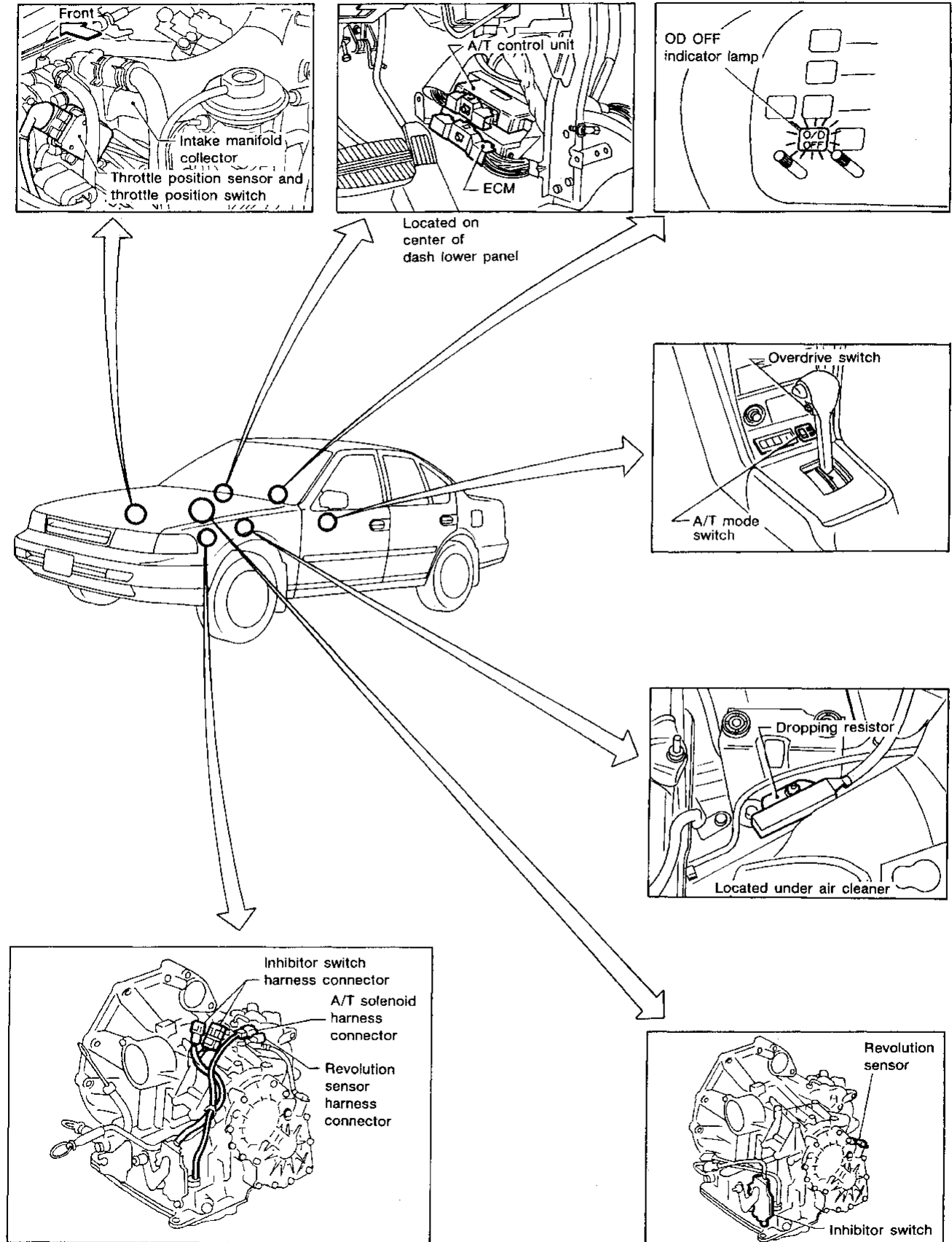
SAT252F

Shift schedule (Power pattern)



SAT253F

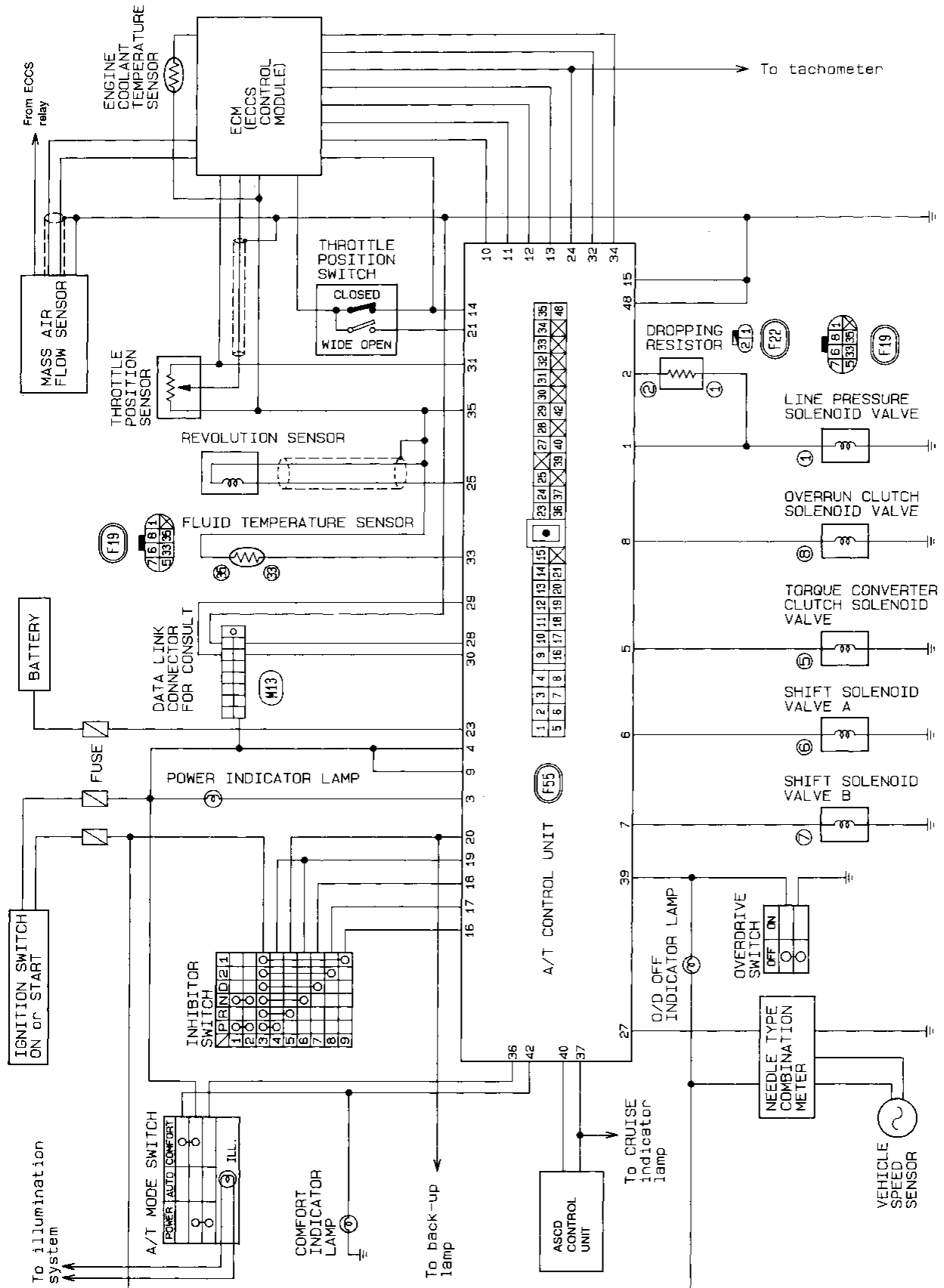
A/T Electrical Parts Location



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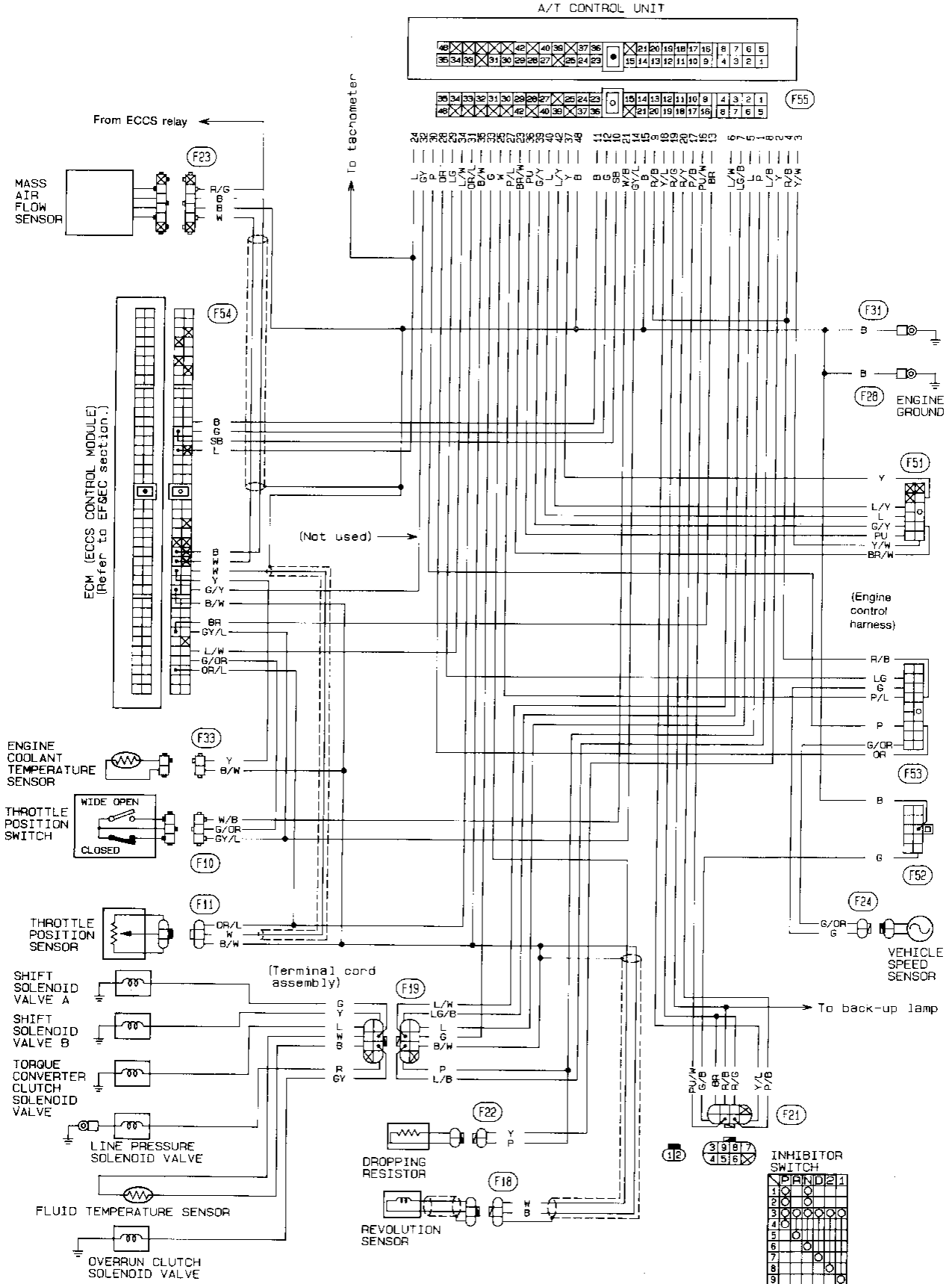
NOTE

Circuit Diagram for Quick Pinpoint Check

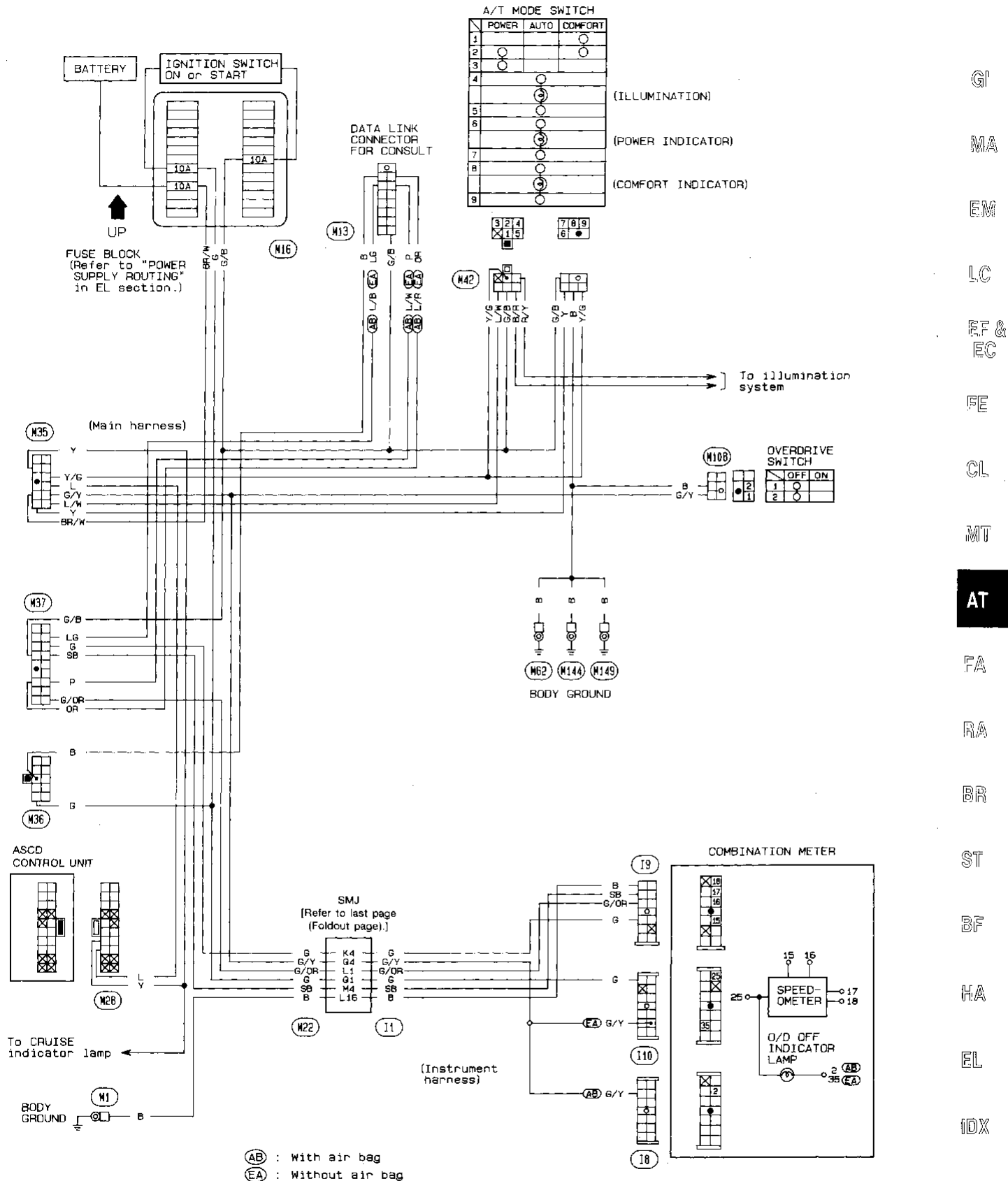


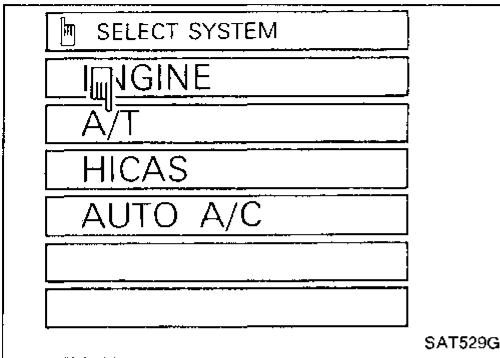
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Wiring Diagram



Wiring Diagram (Cont'd)

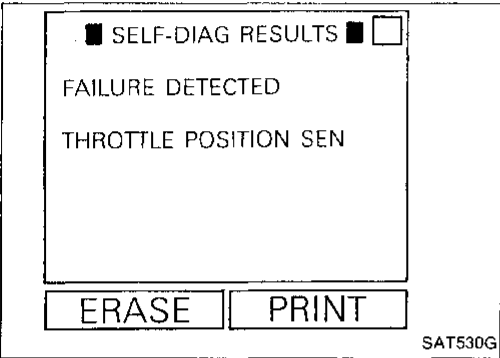




Self-diagnosis

SELF-DIAGNOSTIC PROCEDURE ( With CONSULT)

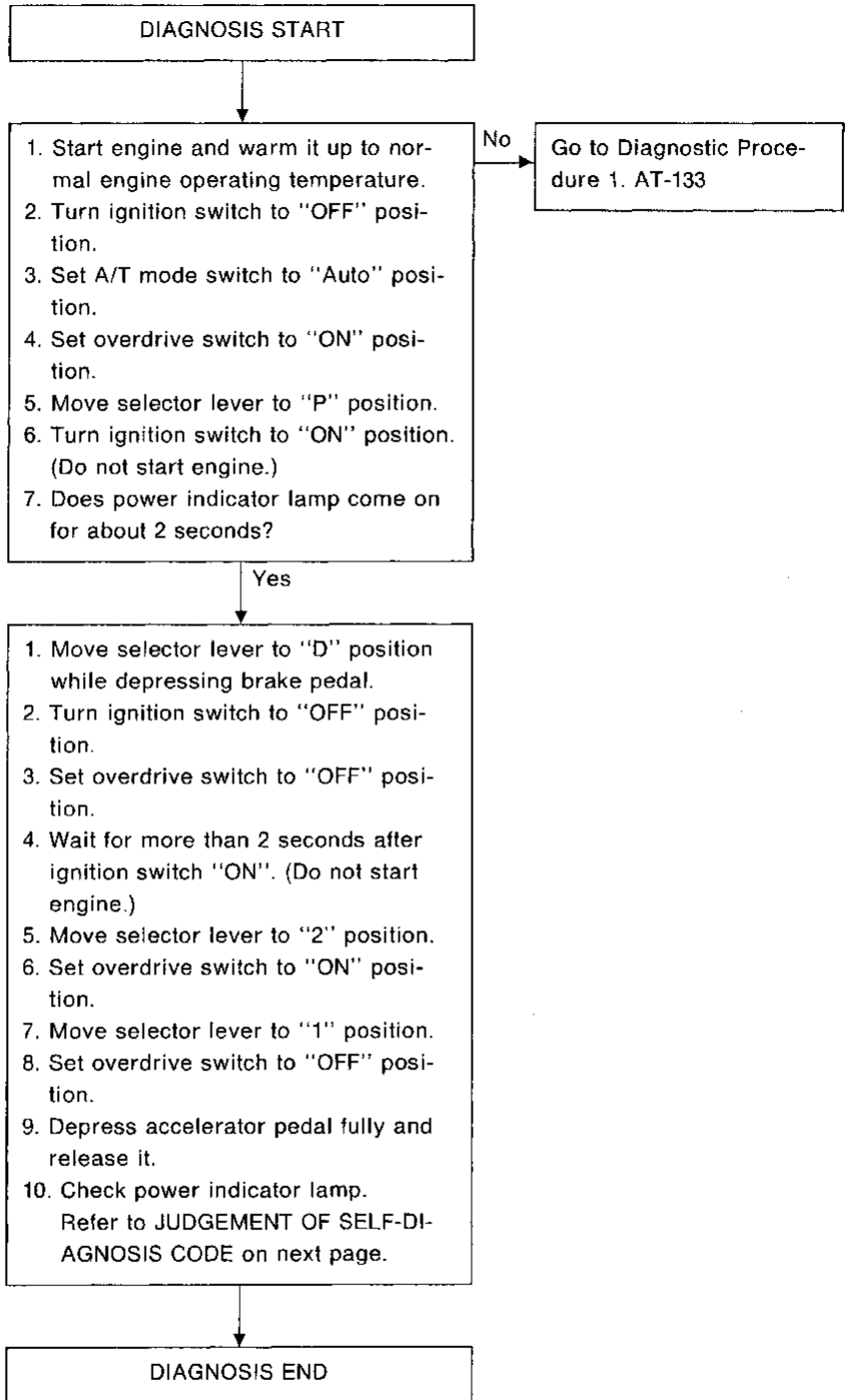
1. Turn on CONSULT.
2. Touch "A/T".



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

Self-diagnosis (Cont'd)

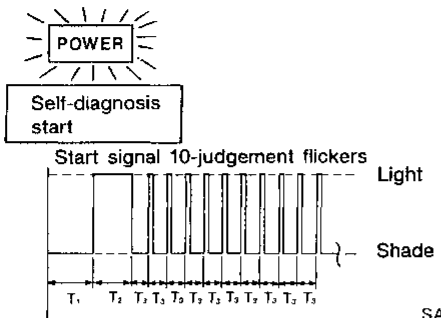
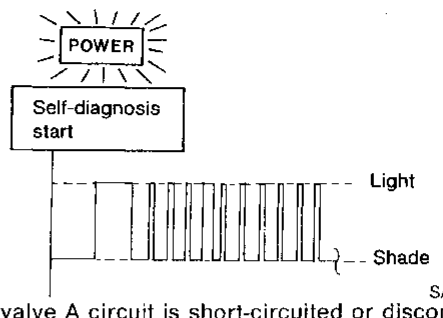
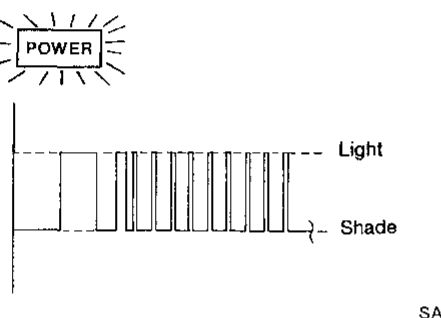
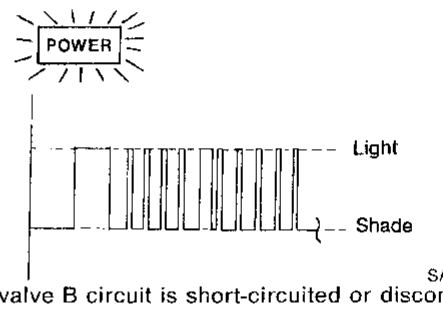
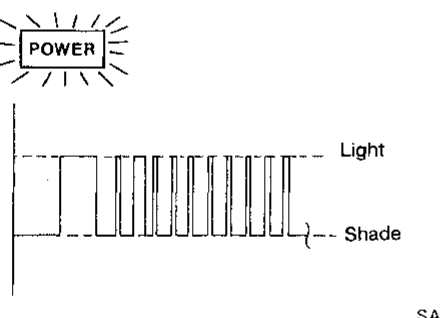
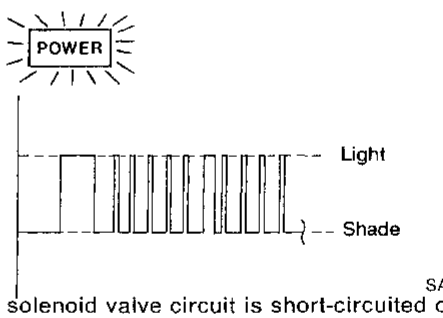
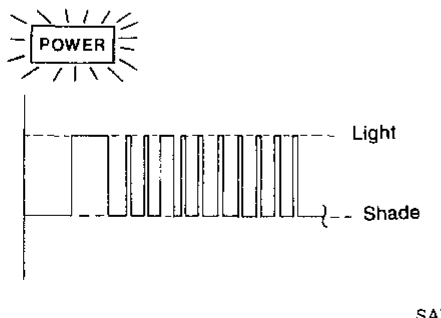
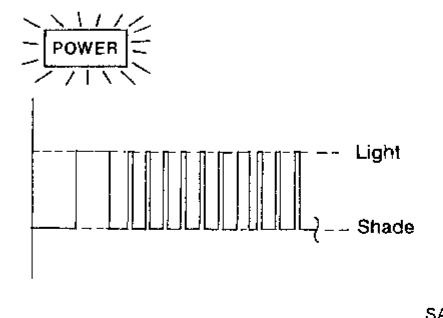
SELF-DIAGNOSTIC PROCEDURE ( Without CONSULT)



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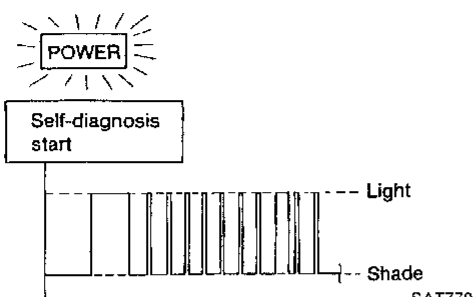
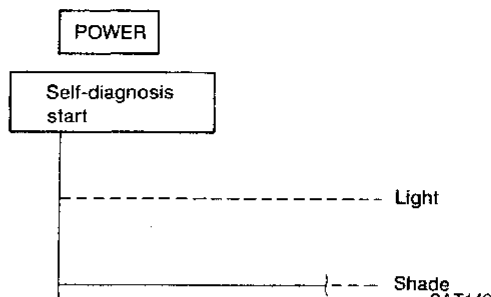
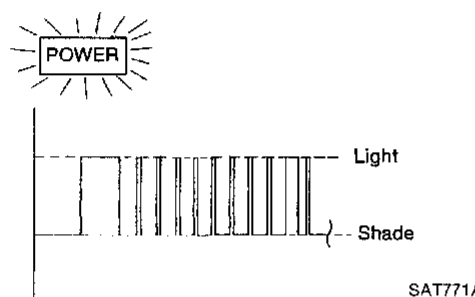
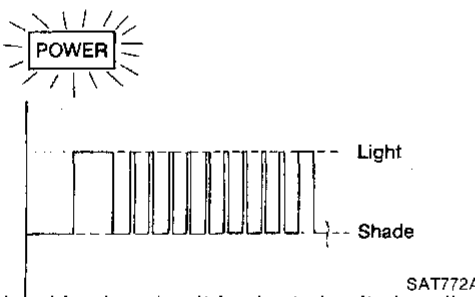
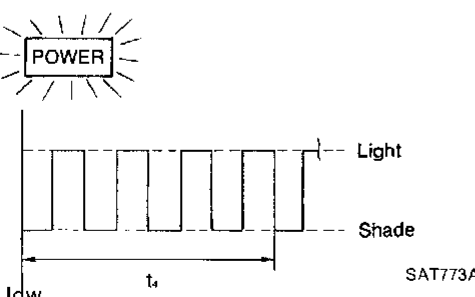
Self-diagnosis (Cont'd)

JUDGEMENT OF SELF-DIAGNOSIS CODE

Flickers of power indicator lamp: Damaged circuit	
<p>All judgement flickers are same.</p>  <p>SAT755A</p> <p>All circuits that can be confirmed by self-diagnosis are OK.</p>	<p>4th judgement flicker is longer than others.</p>  <p>SAT762A</p> <p>Shift solenoid valve A circuit is short-circuited or disconnected. ➔ Go to SHIFT SOLENOID VALVE A CIRCUIT CHECK, AT-123.</p>
<p>1st judgement flicker is longer than others.</p>  <p>SAT756A</p> <p>Revolution sensor circuit is short-circuited or disconnected. ➔ Go to REVOLUTION SENSOR CIRCUIT CHECK, AT-120.</p>	<p>5th judgement flicker is longer than others.</p>  <p>SAT763A</p> <p>Shift solenoid valve B circuit is short-circuited or disconnected. ➔ Go to SHIFT SOLENOID VALVE B CIRCUIT CHECK, AT-124.</p>
<p>2nd judgement flicker is longer than others.</p>  <p>SAT757A</p> <p>Vehicle speed sensor circuit is short-circuited or disconnected. ➔ Go to VEHICLE SPEED SENSOR CIRCUIT CHECK, AT-121.</p>	<p>6th judgement flicker is longer than others.</p>  <p>SAT764A</p> <p>Overrun clutch solenoid valve circuit is short-circuited or disconnected. ➔ Go to OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-125.</p>
<p>3rd judgement flicker is longer than others.</p>  <p>SAT758A</p> <p>Throttle position sensor circuit is short-circuited or disconnected. ➔ Go to THROTTLE POSITION SENSOR CIRCUIT CHECK, AT-122.</p>	<p>7th judgement flicker is longer than others.</p>  <p>SAT765A</p> <p>Torque converter clutch solenoid valve circuit is short-circuited or disconnected. ➔ Go to TORQUE CONVERTER CLUTCH SOLENOID VALVE CIRCUIT CHECK, AT-126.</p>

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

Self-diagnosis (Cont'd)

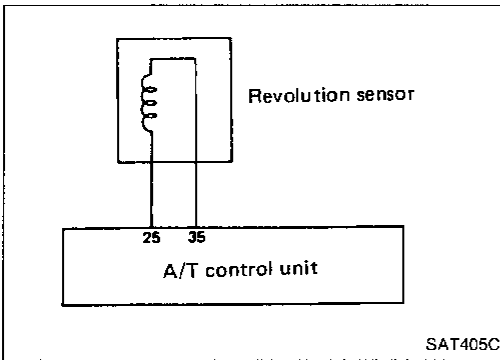
Flickers of power indicator lamp: Damaged circuit	
<p>8th judgement flicker is longer than others.</p>  <p>Fluid temperature sensor is disconnected or A/T control unit power source circuit is damaged. ➔ Go to FLUID TEMPERATURE SENSOR AND A/T CONTROL UNIT POWER SOURCE CIRCUIT CHECKS, AT-127.</p>	<p>Does not come on.</p>  <p>Inhibitor switch, overdrive switch or throttle position switch circuit is disconnected or A/T control unit is damaged. ➔ Go to INHIBITOR SWITCH, OVERDRIVE SWITCH AND THROTTLE POSITION SWITCH CIRCUIT CHECKS, AT-131.</p>
<p>9th judgement flicker is longer than others.</p>  <p>Engine speed signal circuit is short-circuited or disconnected. ➔ Go to ENGINE SPEED SIGNAL CIRCUIT CHECK, AT-129.</p>	
<p>10th judgement flicker is longer than others.</p>  <p>Line pressure solenoid valve circuit is short-circuited or disconnected. ➔ Go to LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK, AT-130.</p>	
<p>Flickers as shown below.</p>  <p>Battery power is low. Battery has been disconnected for a long time. Battery is conversely connected. (When reconnecting A/T control unit connectors. — This is not a problem.)</p>	

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t₄ = 1.0 second

Self-diagnosis (Cont'd)

REVOLUTION SENSOR CIRCUIT CHECK

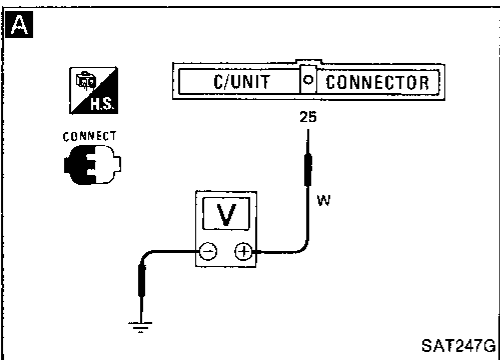


A

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

RECORD

SAT076H



CHECK REVOLUTION SENSOR. —
Refer to "Electrical Components Inspection", AT-155.

NG → Repair or replace revolution sensor.

OK ↓

A **CHECK INPUT SIGNAL.**

1. Turn ignition switch to "START" position and start engine.
2.
 - Select "ECU INPUT SIGNALS".
 - Read out the value of "VEHICLE SPEED SENSOR A/T" while driving.
 - Check the value changes according to driving speed.

NG → Check the following items.

- Harness continuity between A/T control unit and revolution sensor (Main harness)
- Harness continuity between revolution sensor and ECM (Main harness)

OR

⊘ Check voltage between A/T control unit terminal 25 and ground while driving.
(Measure with AC position.)
Voltage:
At 0 km/h (0 MPH):
0V
At 30 km/h (19 MPH):
1V or more
(Voltage rises gradually in response to vehicle speed.)

OK ↓

Perform self-diagnosis again after driving for a while.

NG →

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

OK ↓

INSPECTION END

Self-diagnosis (Cont'd)

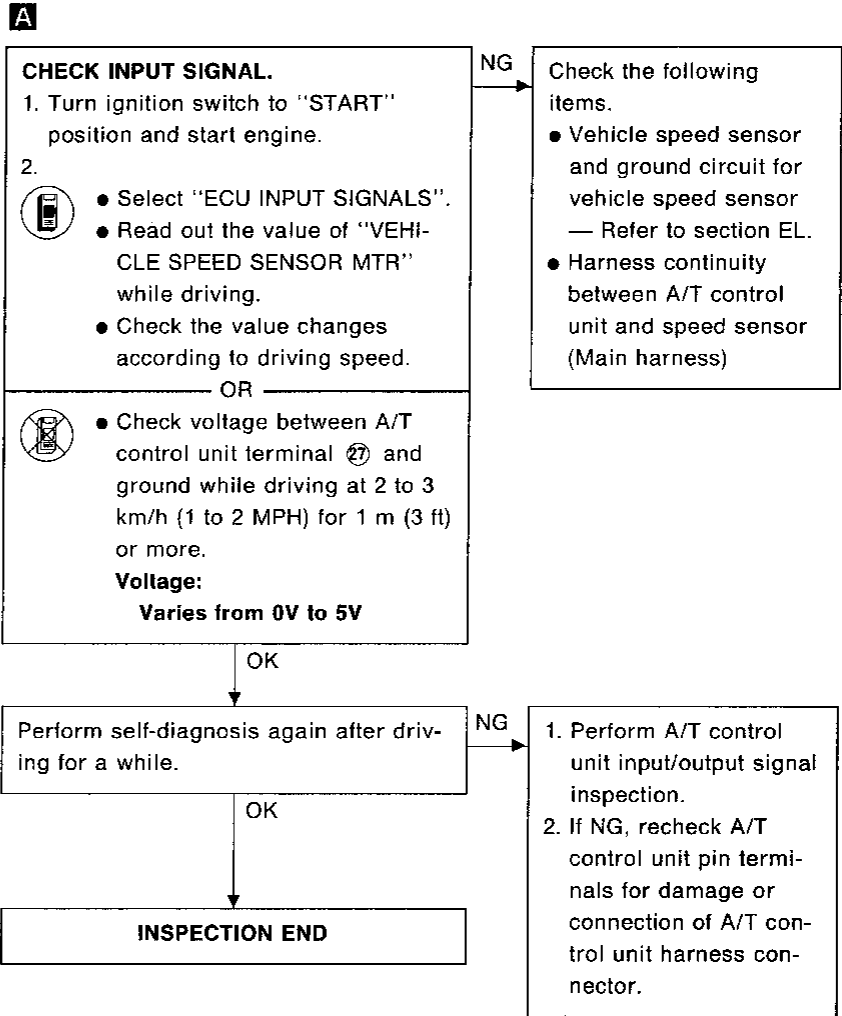
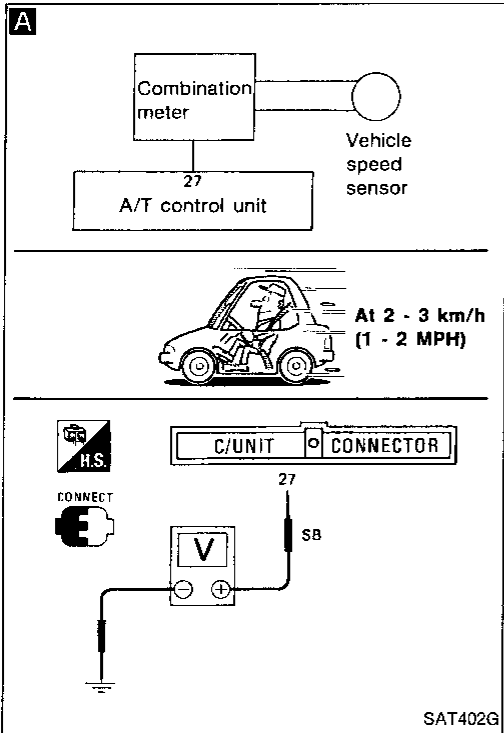
VEHICLE SPEED SENSOR CIRCUIT CHECK

A

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

RECORD

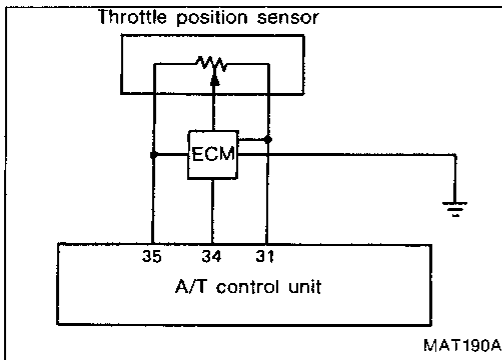
SAT076H



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Self-diagnosis (Cont'd)

THROTTLE POSITION SENSOR CIRCUIT CHECK

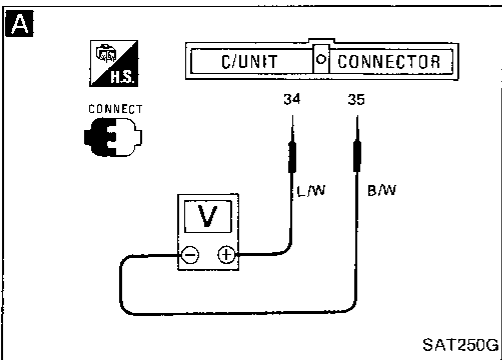


A

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

RECORD

SAT076H



Perform self-diagnosis (Diagnostic Test Mode II Self-diagnostic results) for engine control.

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

OK

A CHECK INPUT SIGNAL.

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



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

Voltage:

Fully-closed throttle:

0.2 - 0.6V

Fully-open throttle:

2.9 - 3.9V

OR



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

Voltage:

Fully-closed throttle:

0.2 - 0.6V

Fully-open throttle:

2.9 - 3.9V

(Voltage rises gradually in response to throttle valve opening.)

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

NG

OK

Perform self-diagnosis again after driving for a while.

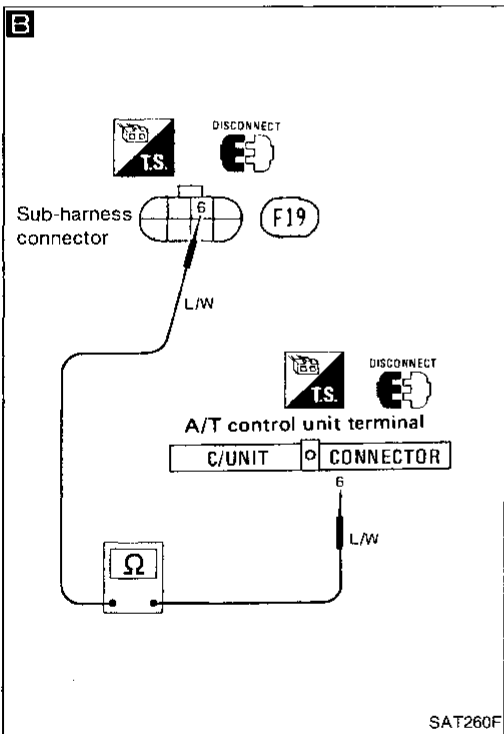
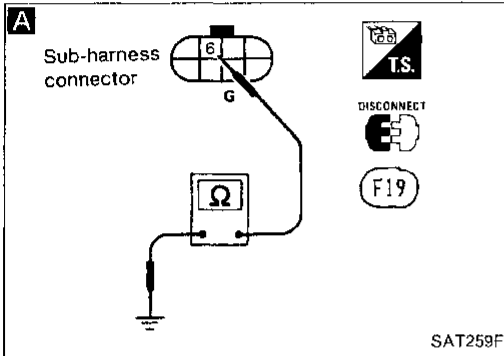
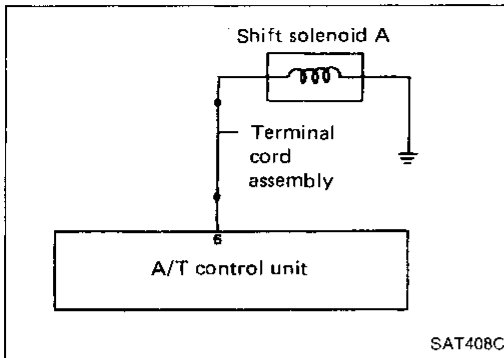
NG → 1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE A CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

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

Resistance: 20 - 30Ω

NG

1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.
 - Shift solenoid valve A — Refer to "Electrical Components Inspection". AT-150
 - Harness continuity of terminal cord assembly

OK

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance:

Approximately 0Ω

4. Reinstall any part removed.

NG

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

OK

Perform self-diagnosis after driving for a while.

NG

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

OK

INSPECTION END

GI

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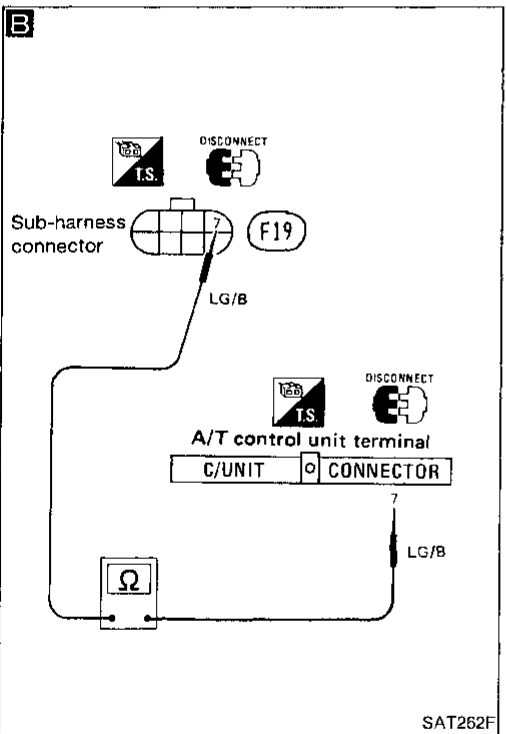
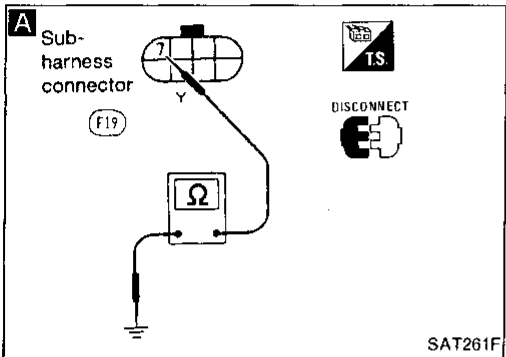
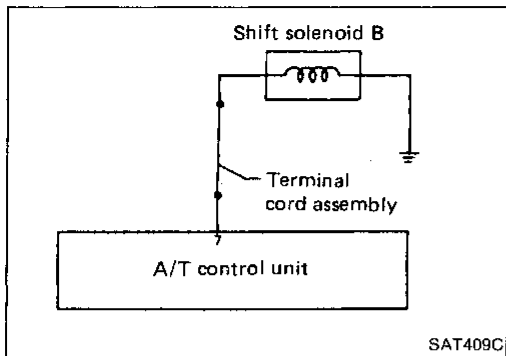
HA

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IDX

Self-diagnosis (Cont'd)

SHIFT SOLENOID VALVE B CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

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

Resistance: 20 - 30Ω

NG → 1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180

2. Check the following items.
 - Shift solenoid valve B — Refer to "Electrical Components Inspection". AT-150
 - Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance: Approximately 0Ω

4. Reinstall any part removed.

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

OK ↓

Perform self-diagnosis after driving for a while.

NG → 1. Perform A/T control unit input/output signal inspection.

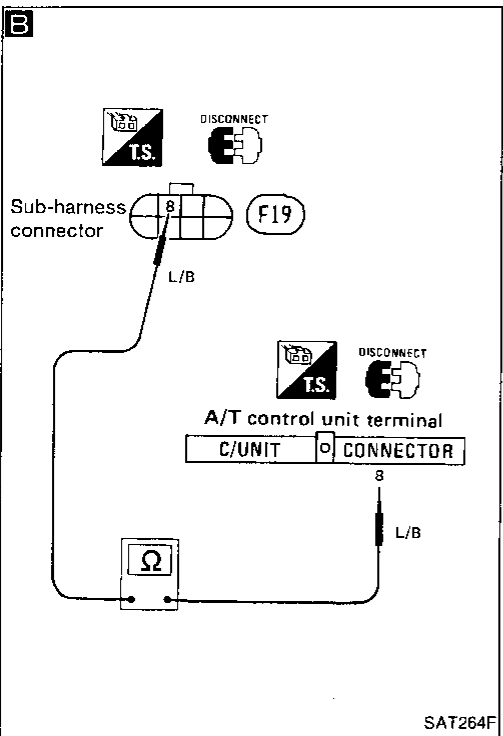
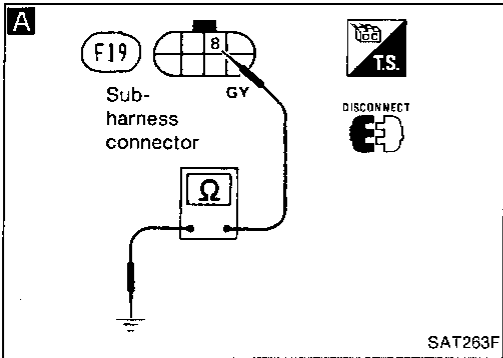
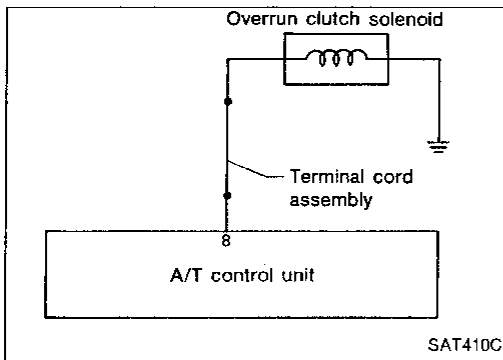
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK ↓

INSPECTION END

Self-diagnosis (Cont'd)

OVERRUN CLUTCH SOLENOID VALVE CIRCUIT CHECK



A

CHECK GROUND CIRCUIT.

1. 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-180

2. Check the following items.
 - Overrun clutch solenoid valve. — Refer to "Electrical Components Inspection". AT-150
 - Harness continuity of terminal cord assembly

OK ↓

B

CHECK POWER SOURCE CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit harness connector.
3. Check resistance between terminal ⑧ and A/T control unit terminal ⑧.
Resistance: Approximately 0Ω
4. Reinstall any part removed.

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

OK ↓

Perform self-diagnosis after driving for a while.

NG → 1. Perform A/T control unit input/output signal inspection.

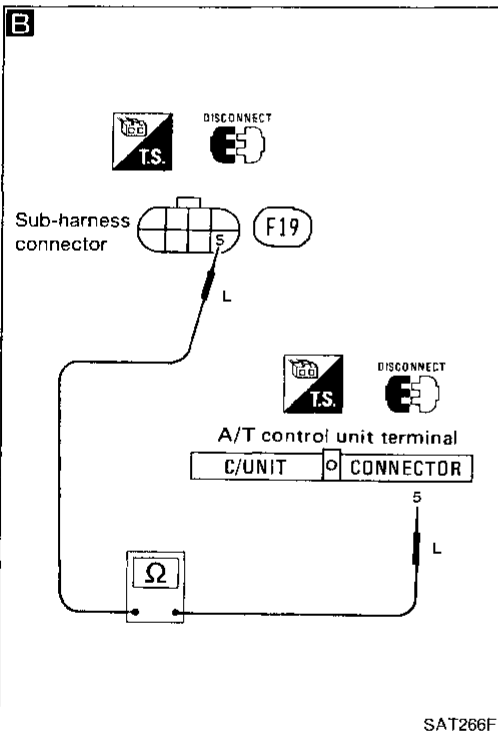
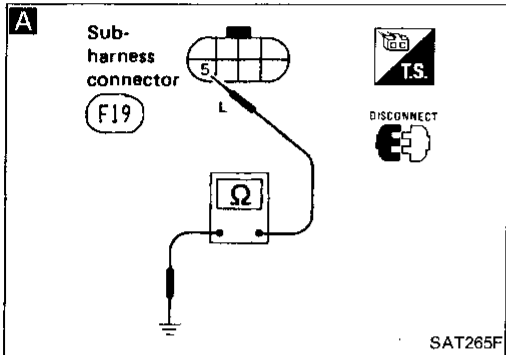
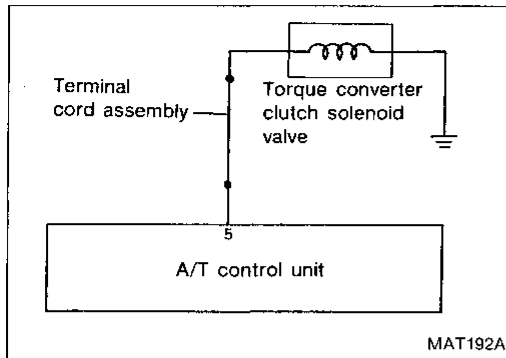
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK ↓

INSPECTION END

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Self-diagnosis (Cont'd)

TORQUE CONVERTER CLUTCH SOLENOID VALVE
CIRCUIT CHECK

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: 2.5 - 5Ω

NG

1. Remove oil pan. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.
 - Torque converter clutch solenoid valve — Refer to "Electrical Components Inspection". AT-150
 - Harness continuity of terminal cord assembly

OK

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance:**Approximately 0Ω**

4. Reinstall any part removed.

NG

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

OK

Perform self-diagnosis after driving for a while.

NG

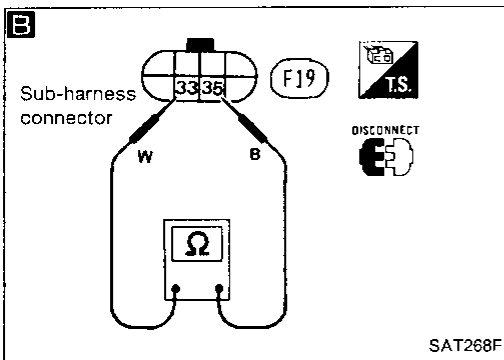
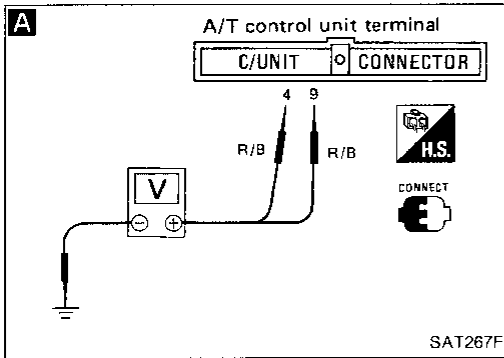
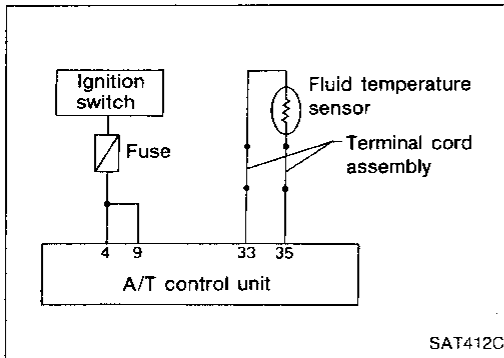
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

Self-diagnosis (Cont'd)

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



A

CHECK A/T CONTROL UNIT POWER SOURCE.

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

NG → Check the following items.

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

OK

B

CHECK FLUID TEMPERATURE SENSOR WITH TERMINAL CORD ASSEMBLY.

1. Turn ignition switch to "OFF" position.
2. Disconnect terminal cord assembly connector in engine compartment.
3. Check resistance between terminals ③③ and ③⑤ when A/T is cold.

NG →

1. Remove oil pan.
2. Check the following items.
 - Fluid temperature sensor — Refer to "Electrical Components Inspection", AT-150
 - Harness continuity of terminal cord assembly

Resistance:

Cold [20°C (68°F)]

Approximately 2.5 kΩ

4. Reinstall any part removed.

OK

Ⓐ

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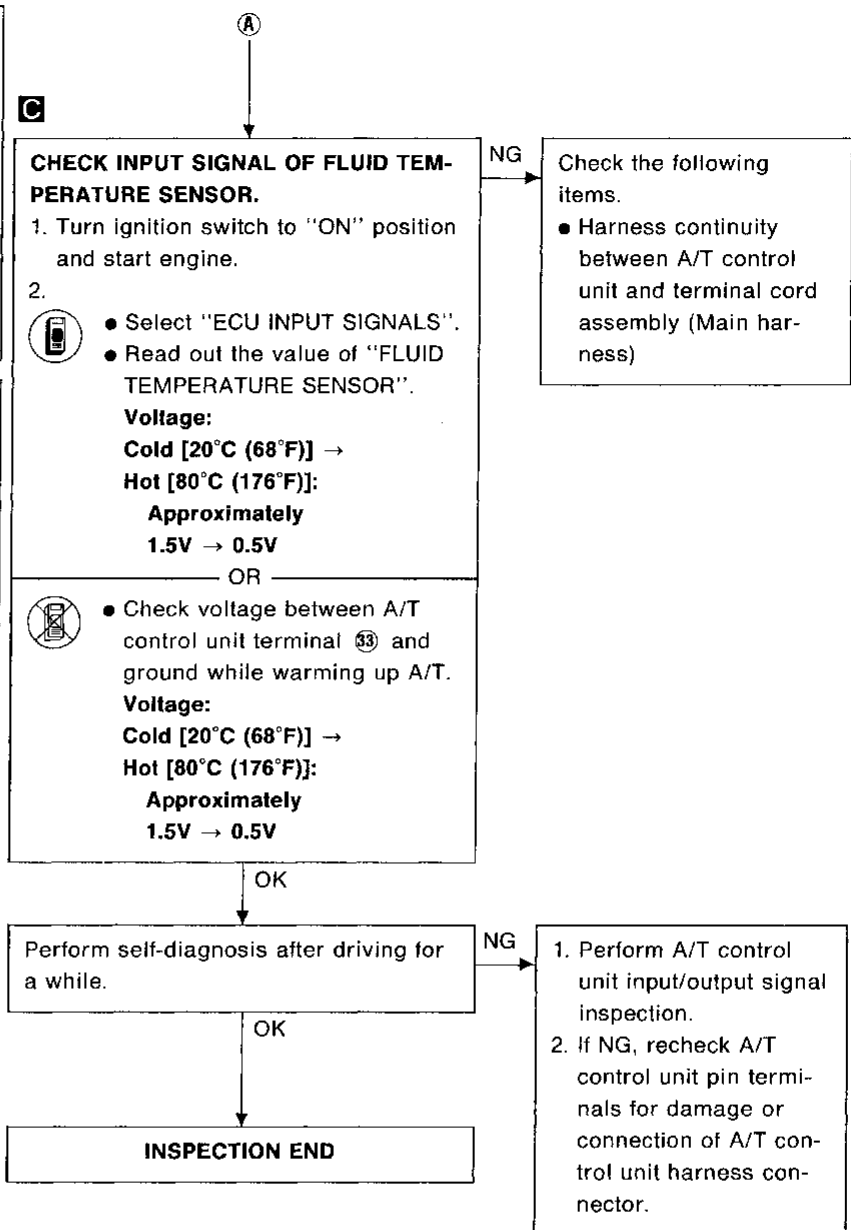
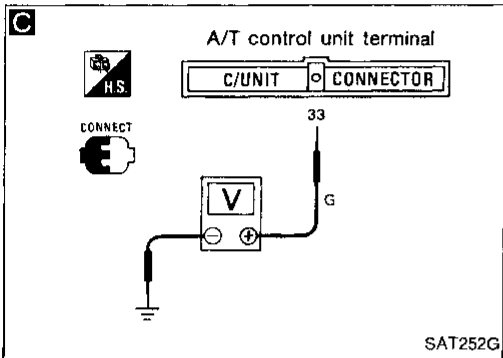
Self-diagnosis (Cont'd)

C

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

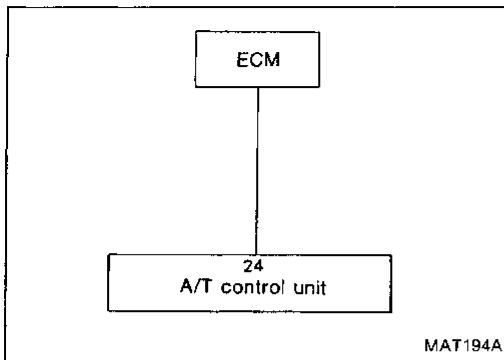
RECORD

SAT076H



Self-diagnosis (Cont'd)

ENGINE SPEED SIGNAL CIRCUIT CHECK

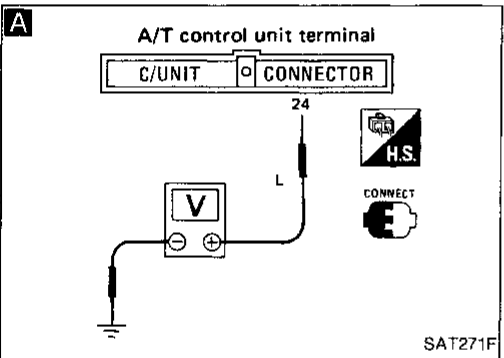


A

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

RECORD

SAT076H



Perform self-diagnosis (Diagnostic Test Mode II Self-diagnostic results) for engine control. Check camshaft position sensor circuit condition.

NG → Check camshaft position sensor circuit for engine control. — Refer to section EF & EC.

OK

A

CHECK INPUT SIGNAL.

1. Turn ignition switch to "ON" position and start engine.

2.

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

OR

- Check voltage between A/T control unit terminal 24 and ground.

Voltage: 0.9 - 4.5V

NG → Check the following items.

- Harness continuity between A/T control unit and ignition coil.
- Resistor
- Camshaft position sensor — Refer to section EF & EC.

OK

Perform self-diagnosis again after driving for a while.

NG →

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

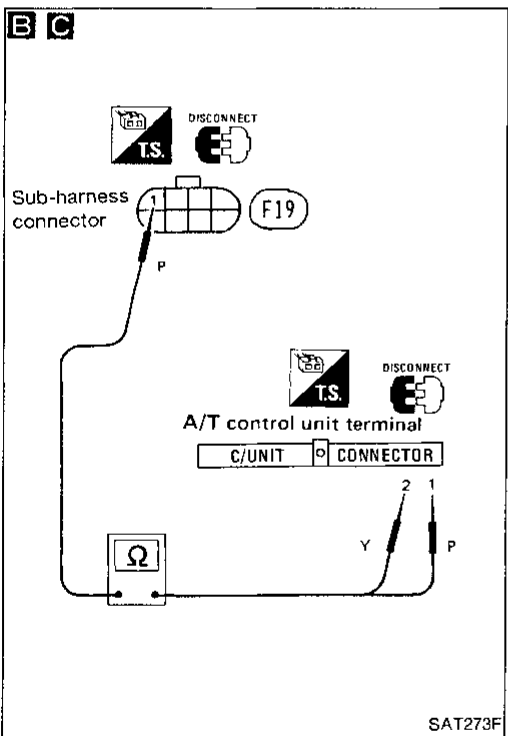
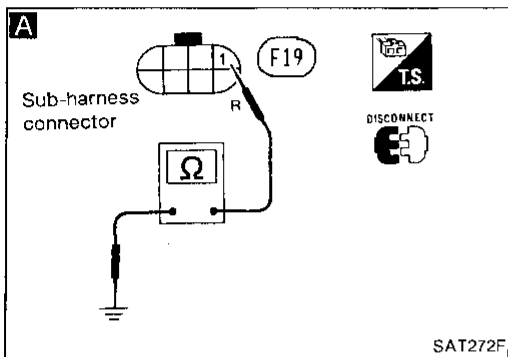
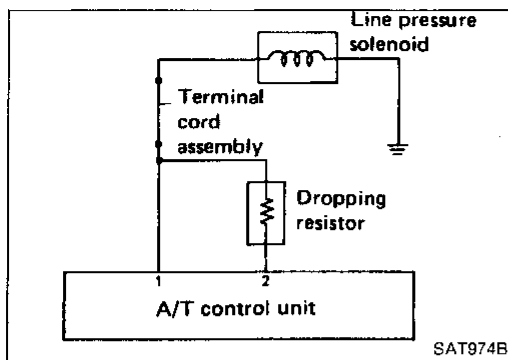
OK

INSPECTION END

CI
MA
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IDX

Self-diagnosis (Cont'd)

LINE PRESSURE SOLENOID VALVE CIRCUIT CHECK



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-180
2. Check the following items.
 - Line pressure solenoid valve — Refer to "Electrical Components Inspection". AT-150
 - Harness continuity of terminal cord assembly

OK

B

CHECK POWER SOURCE CIRCUIT.

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

Resistance: 11.2 - 12.8Ω

NG

Check the following items.

- Dropping resistor — Refer to "Electrical Components Inspection". AT-150
- Harness continuity between A/T control unit ② and terminal cord assembly (Main harness)

OK

C

CHECK POWER SOURCE CIRCUIT.

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

Resistance:

Approximately 0Ω

3. Reinstall any part removed.

NG

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

OK

Perform self-diagnosis after driving for a while.

NG

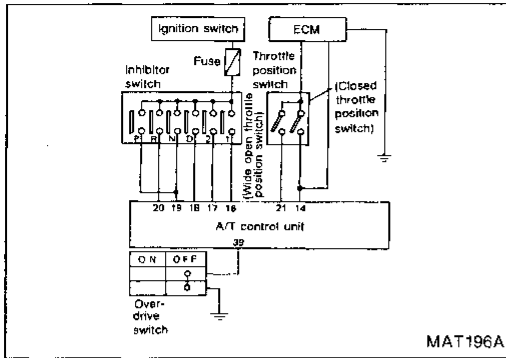
1. Perform A/T control unit input/output signal inspection.
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.

OK

INSPECTION END

Self-diagnosis (Cont'd)

INHIBITOR, OVERDRIVE AND THROTTLE POSITION SWITCH CIRCUIT CHECKS

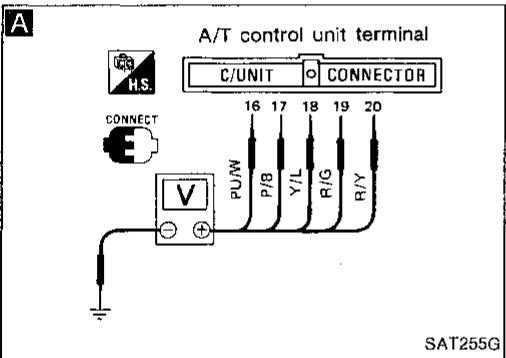


A

☆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

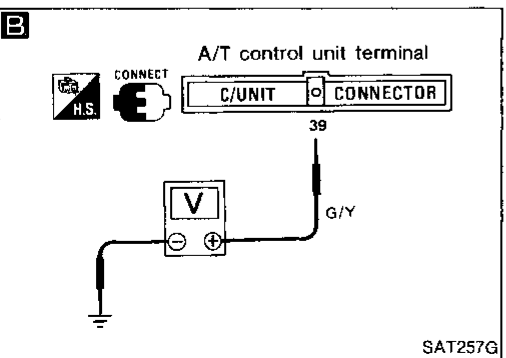


B

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

RECORD

SAT076H



A

CHECK INHIBITOR SWITCH CIRCUIT.

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

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

OR

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

Voltage:
B: Battery voltage
0: 0V

Terminal No.	19	20	16	17	18
Lever position					
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

B

CHECK OVERDRIVE SWITCH CIRCUIT.

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

2. ● Select "ECU INPUT SIGNALS".
● Read out "OVERDRIVE SWITCH".
● Check the overdrive switch position is indicated properly. (Overdrive switch "ON" displayed on CONSULT means overdrive "OFF".)

OR

● Check voltage between A/T control unit terminal 39 and ground when overdrive switch is in "ON" position and in "OFF" position.

Switch position	Voltage
ON	Battery voltage
OFF	1V or less

OK

B

NG

Check the following items.

- Inhibitor switch — Refer to "Electrical Components Inspection". AT-150
- Harness continuity between ignition switch and inhibitor switch (Main harness)
- Harness continuity between inhibitor switch and A/T control unit (Main harness)

NG

Check the following items.

- Overdrive switch — Refer to "Electrical Components Inspection". AT-150
- Harness continuity between A/T control unit and overdrive switch (Main harness)
- Harness continuity of ground circuit for overdrive switch (Main harness)

GI
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LC
EF & EC
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IDX

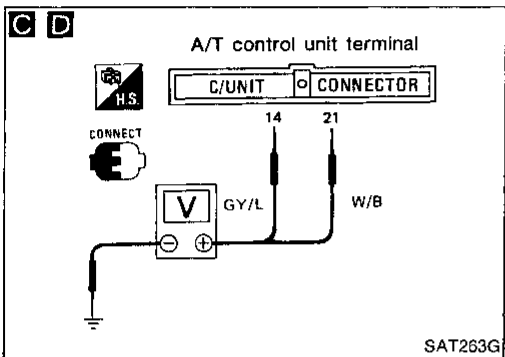
Self-diagnosis (Cont'd)

C D

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

RECORD

SAT262G



C

⑧

CHECK WIDE OPEN THROTTLE POSITION SWITCH CIRCUIT.

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

2.

- Select "ECU INPUT SIGNALS".
- Read out "WIDE OPEN THROTTLE POSITION SWITCH" depressing accelerator pedal fully.
- Check wide open throttle position switch position is indicated properly.

OR

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

Voltage:

When releasing accelerator pedal:
1V or less

When depressing accelerator pedal fully:
8 - 15V

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

D

OK

CHECK CLOSED THROTTLE POSITION SWITCH CIRCUIT.

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

2.

- Select "ECU INPUT SIGNALS".
- Read out "CLOSED THROTTLE POSITION SWITCH" depressing and releasing accelerator pedal.
- Check closed throttle position switch changes ON or OFF.

OR

- Check voltage between A/T control unit terminal ⑭ and ground while depressing accelerator pedal slowly.

Voltage:

When releasing accelerator pedal:
8 - 15V

When depressing accelerator pedal fully:
1V or less

NG → Check closed throttle position switch circuit for engine control. — Refer to section EF & EC.

OK → Check harness continuity between A/T control unit and closed throttle position switch.

OK

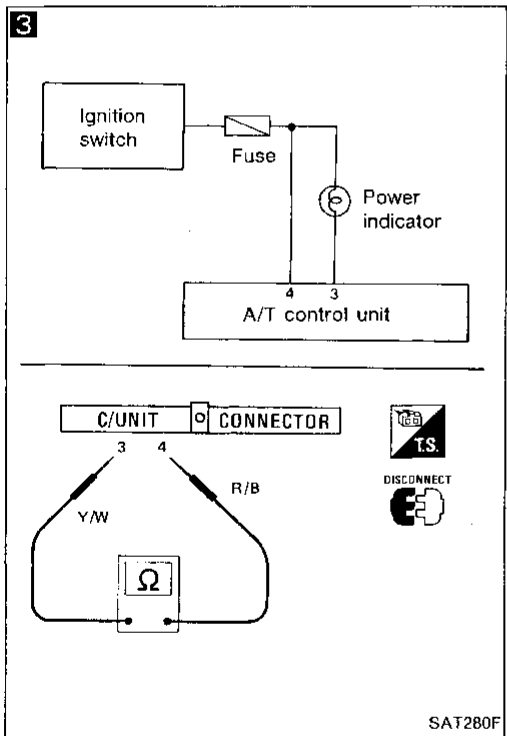
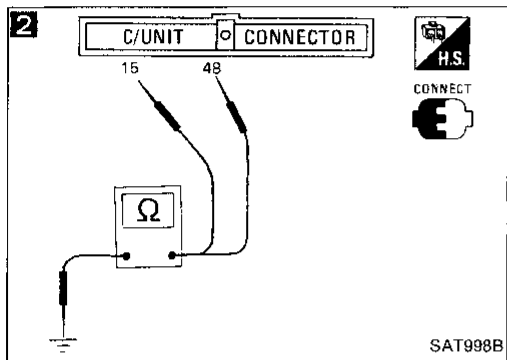
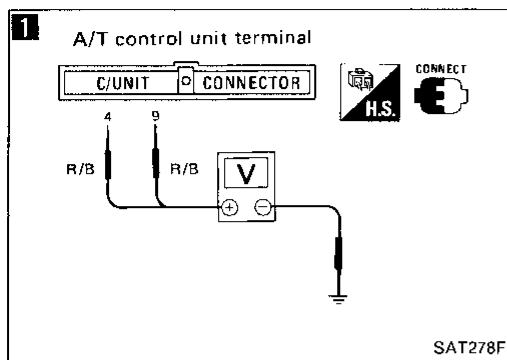
Perform self-diagnosis again after driving for a while.

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

OK

INSPECTION END

GI
MA
EM
LC
EF & EC
FE
CL
MT
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BF
HA
EL
IDX



Diagnostic Procedure 1

SYMPTOM:

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

1

CHECK A/T CONTROL UNIT POWER SOURCE.

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

NG → Check the following items.

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

OK ↓

2

CHECK A/T CONTROL UNIT GROUND CIRCUIT.

1. Turn ignition switch to "OFF" position.
2. Disconnect A/T control unit connector.
3. Check resistance between A/T control unit terminals (15), (4B) and ground. **Resistance: Approximately 0Ω**

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

OK ↓

3

CHECK LAMP CIRCUIT.

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

NG → Check the following items.

- Power indicator lamp — Refer to section EL.
- Harness continuity between ignition switch and power indicator lamp (Main harness)
- Harness continuity between power indicator lamp and A/T control unit

OK ↓

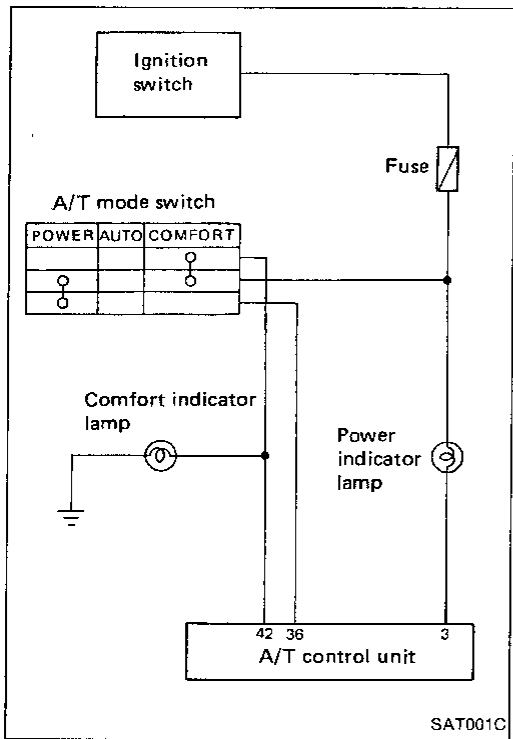
Check again.

NG →

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

OK ↓

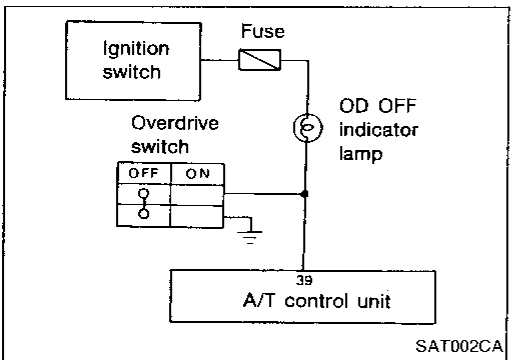
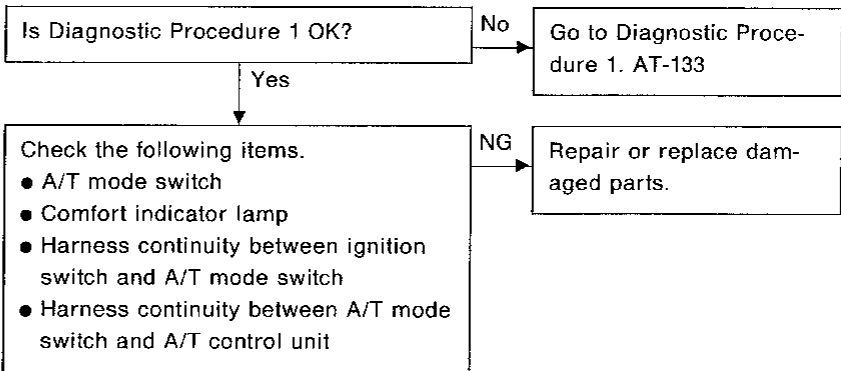
INSPECTION END



Diagnostic Procedure 2

SYMPTOM:

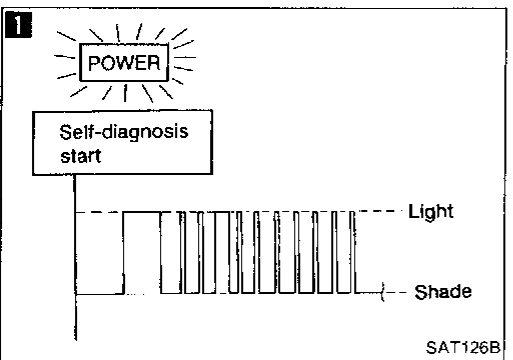
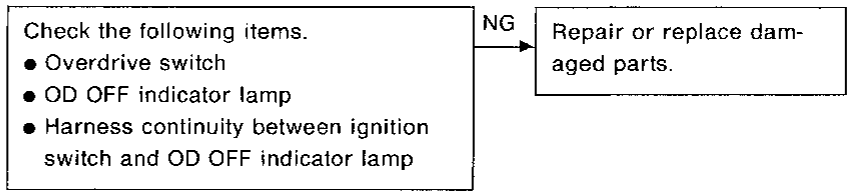
Power indicator lamp or comfort indicator lamp does not come on when turning A/T mode switch to the appropriate position.



Diagnostic Procedure 3

SYMPTOM:

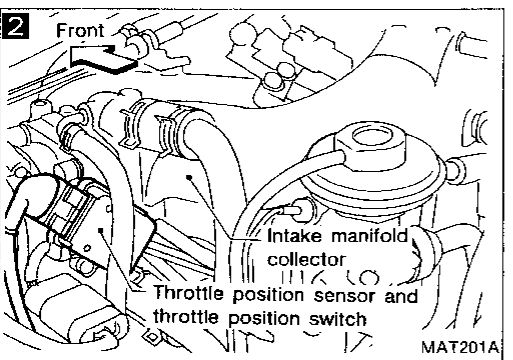
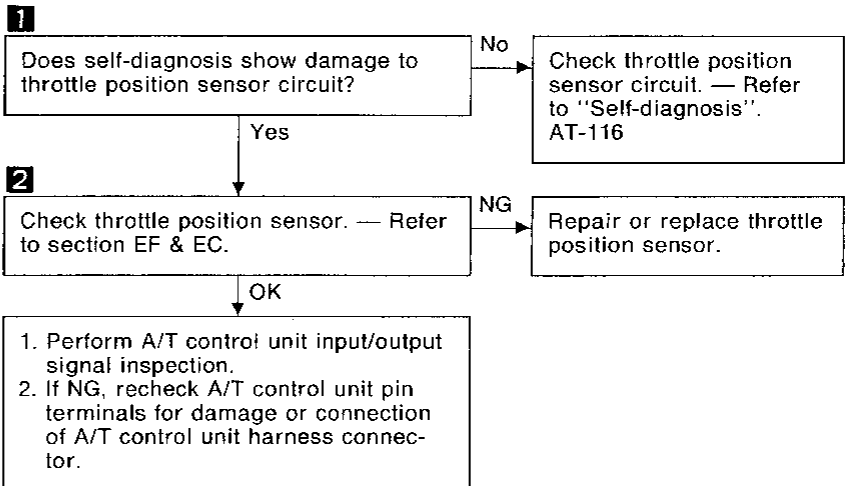
OD OFF indicator lamp does not come on when setting overdrive switch to "OFF" position.

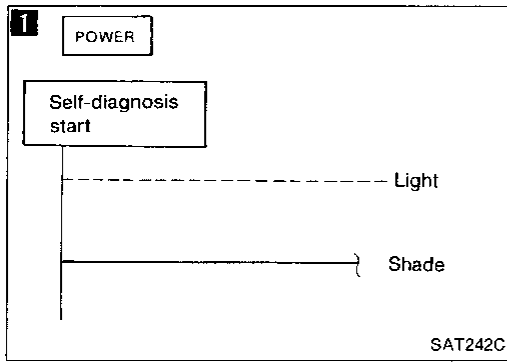


Diagnostic Procedure 4

SYMPTOM:

Power indicator lamp does not come on for about 3 seconds when depressing and releasing accelerator pedal fully.

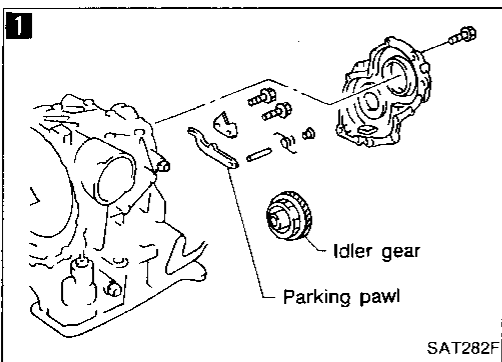
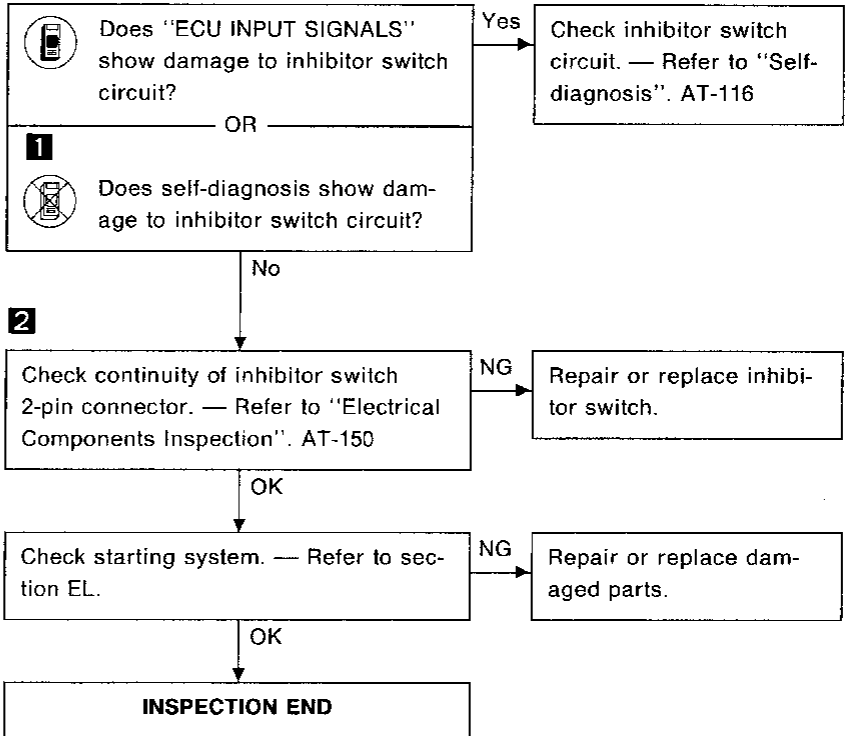
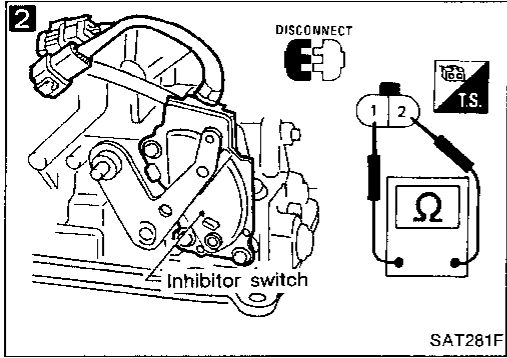




Diagnostic Procedure 5

SYMPTOM:

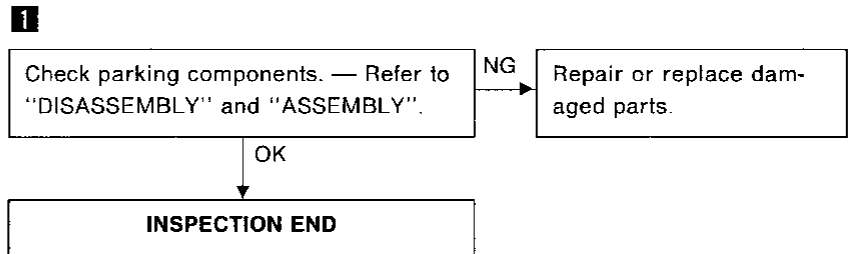
Engine cannot be started with selector lever in "P" or "N" position or engine can be started with selector lever in "D", "2", "1" or "R" position.



Diagnostic Procedure 6

SYMPTOM:

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



GI

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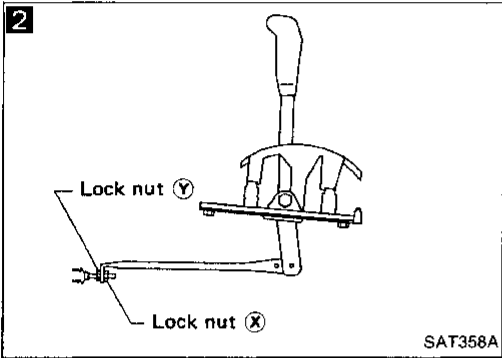
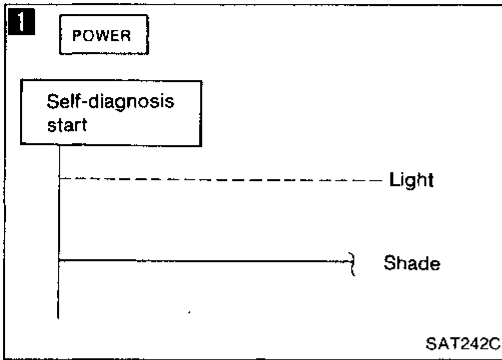
ST

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HA

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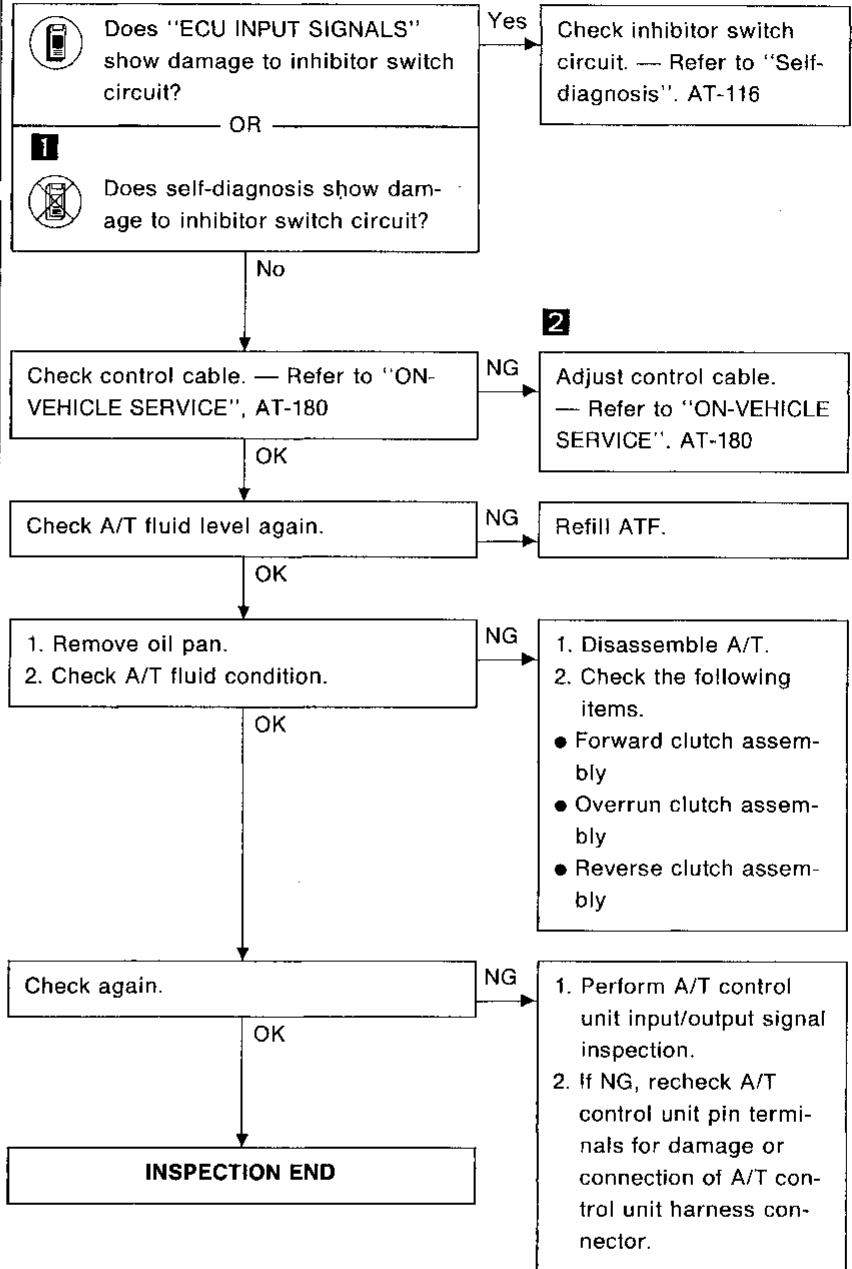
IDX



Diagnostic Procedure 7

SYMPTOM:

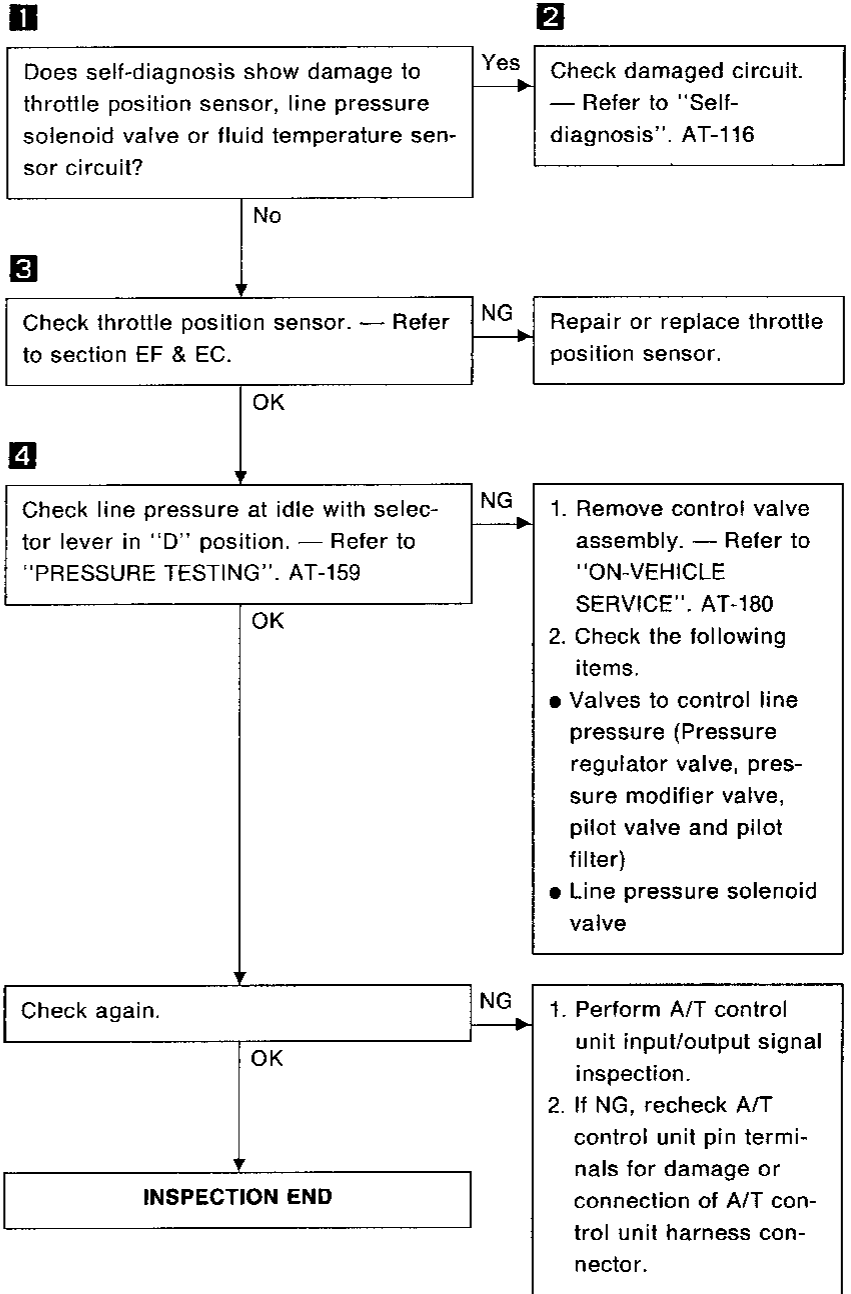
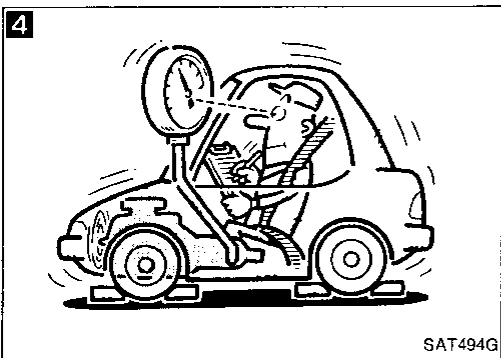
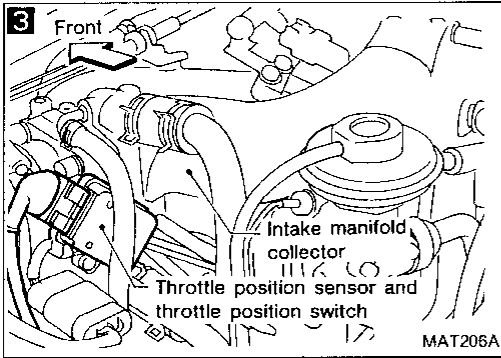
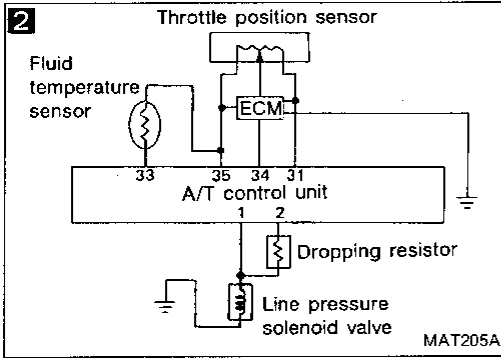
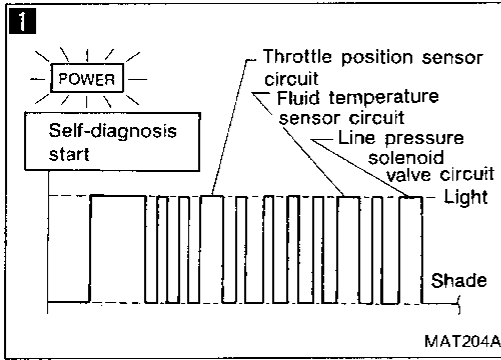
Vehicle moves forward or backward when selecting "N" position.



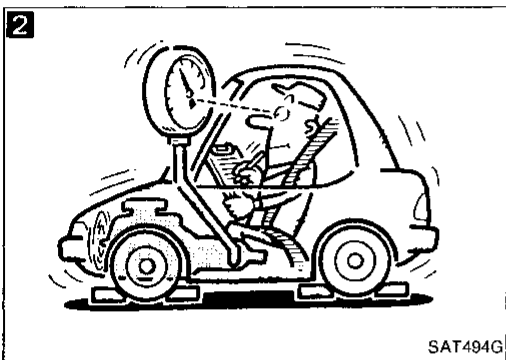
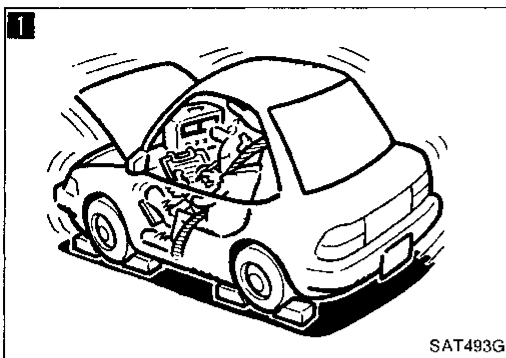
Diagnostic Procedure 8

SYMPTOM:

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



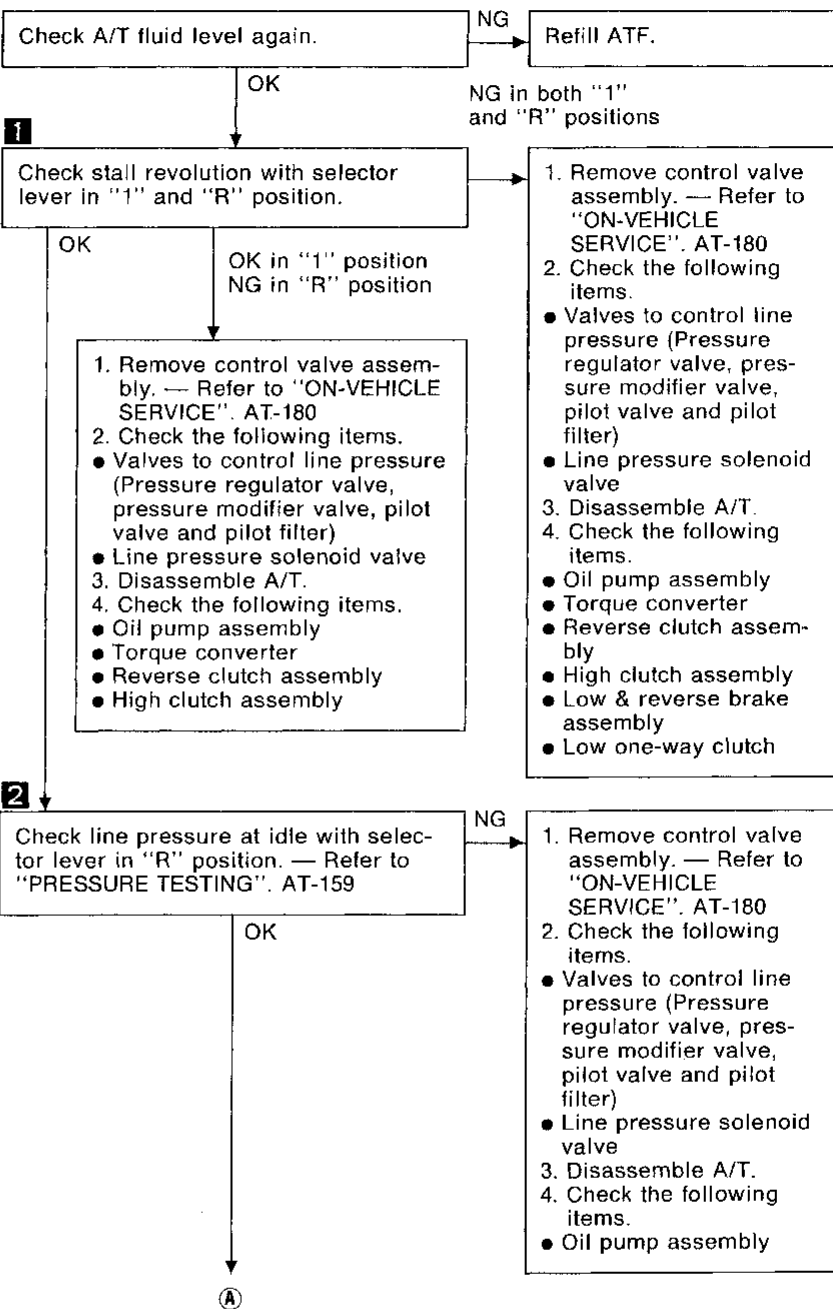
GI
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EF & EC
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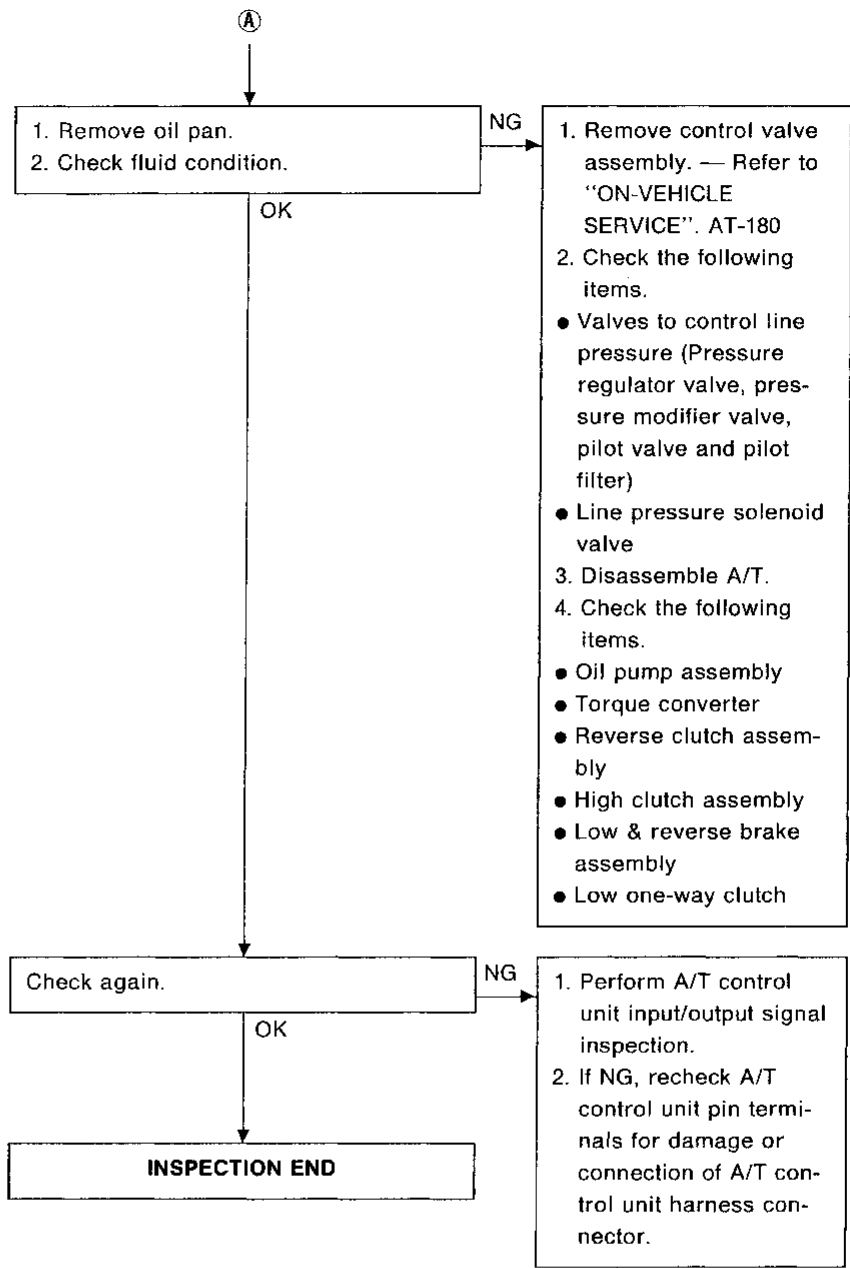
Diagnostic Procedure 9

SYMPTOM:

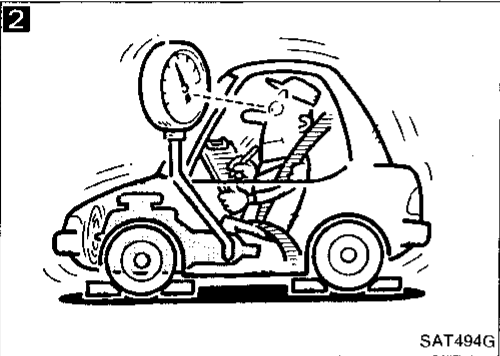
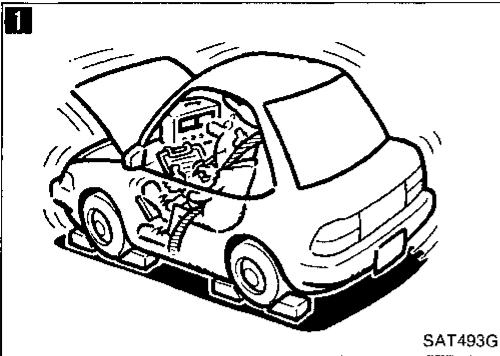
Vehicle does not creep backward when selecting "R" position.



Diagnostic Procedure 9 (Cont'd)



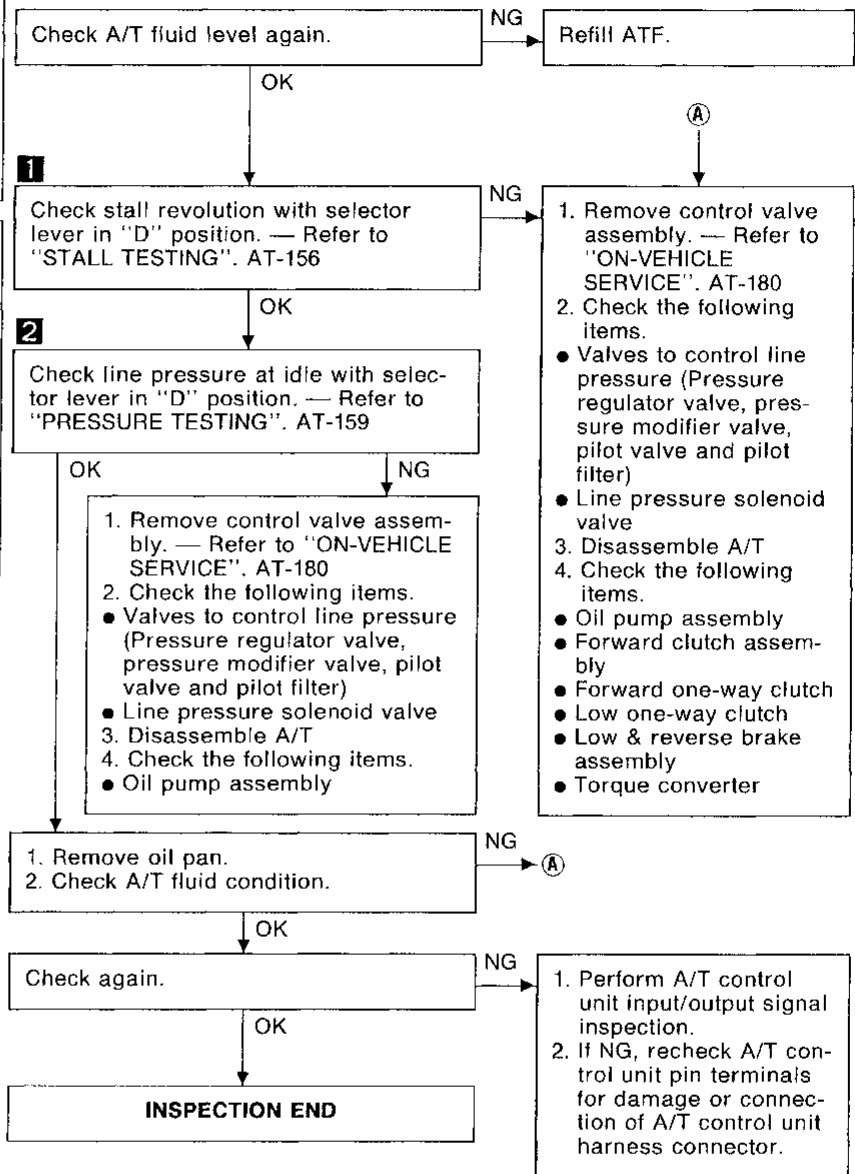
GI
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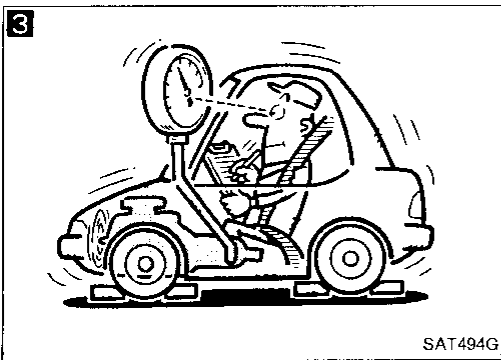
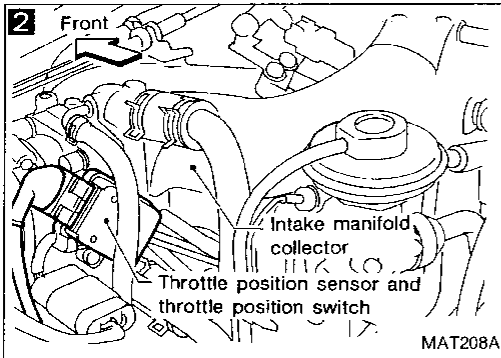
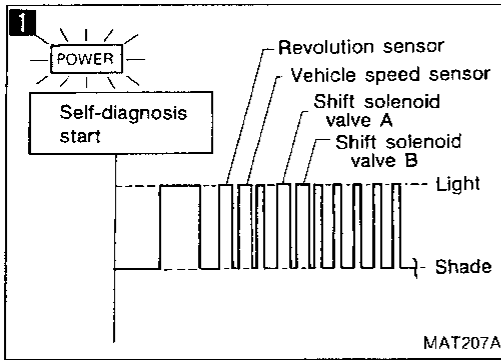


Diagnostic Procedure 10

SYMPTOM:

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

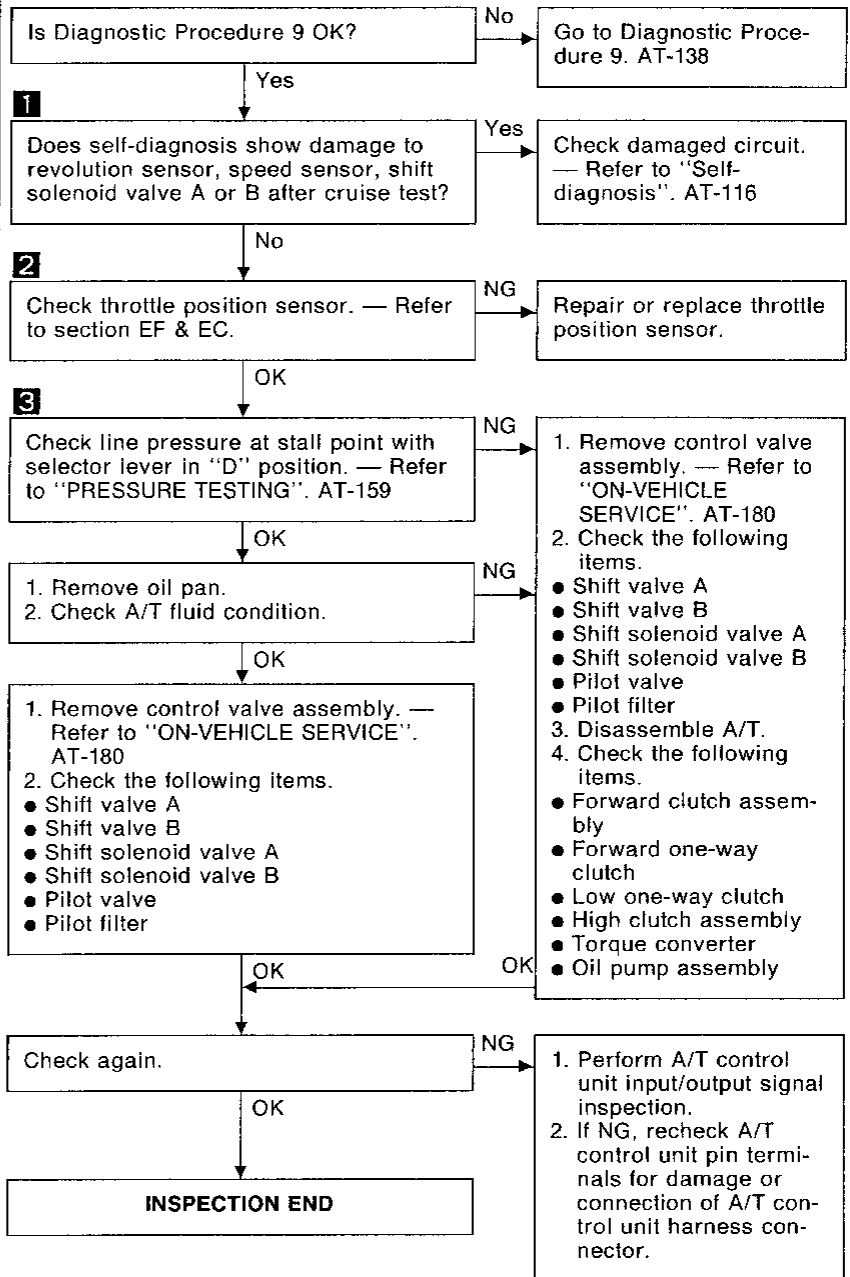




Diagnostic Procedure 11

SYMPTOM:

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

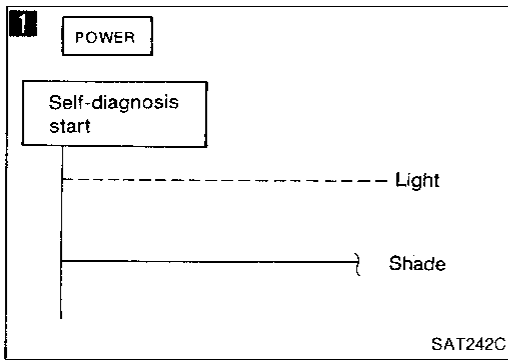


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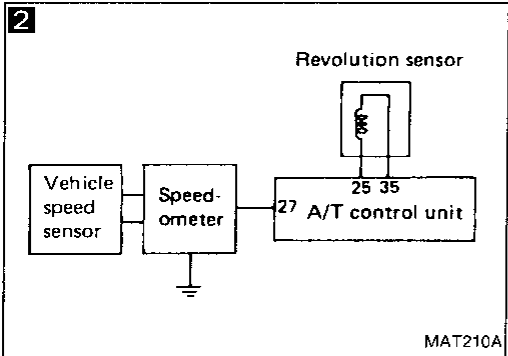
Diagnostic Procedure 12

SYMPTOM:

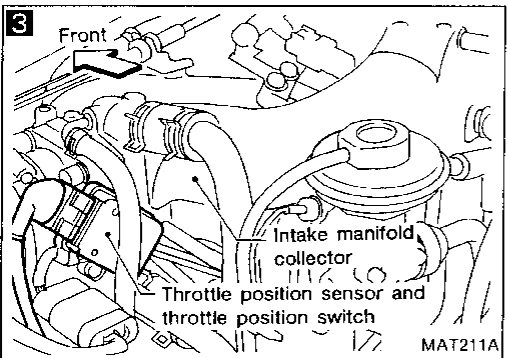
A/T does not shift from D₁ to D₂ at the specified speed.
A/T does not shift from D₄ to D₂ when depressing accelerator pedal fully at the specified speed.



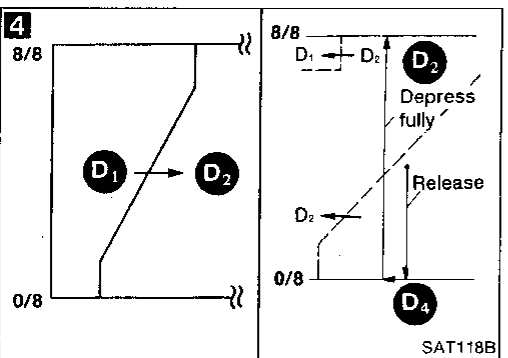
SAT242C



MAT210A



MAT211A



SAT118B

Are Diagnostic Procedures 10 and 11 OK?

No → Go to Diagnostic Procedure 10 or 11. AT-140, AT-141

Yes →

Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit? — OR — Does self-diagnosis show damage to inhibitor switch circuit?

Yes → Check inhibitor switch circuit. — Refer to "Self-diagnosis". AT-116

No →

Check revolution sensor and speed sensor circuit. — Refer to "Self-diagnosis". AT-116

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

OK →

Check throttle position sensor. — Refer to section EF & EC.

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 "ON-VEHICLE SERVICE". AT-180
2. Check the following items.

- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK →

1. Remove control valve. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.

- Shift valve A
- Shift solenoid valve A
- Pilot valve
- Pilot filter

OK →

1. Remove control valve. — Refer to "ON-VEHICLE SERVICE". AT-180
2. Check the following items.

- Servo piston assembly
- Brake band
- Oil pump assembly

OK →

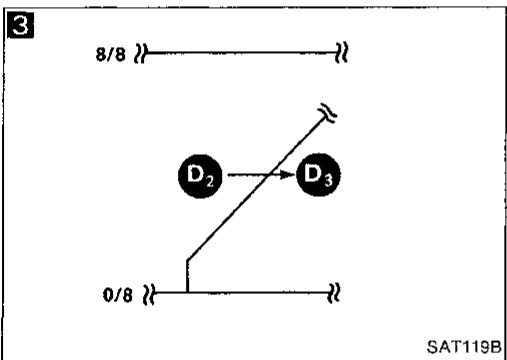
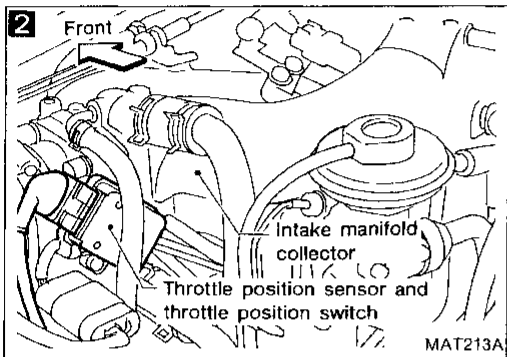
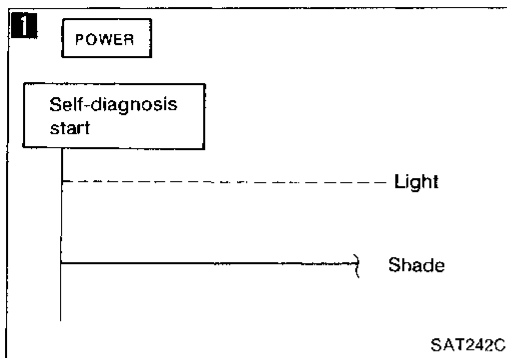
Check again.

NG →

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

OK →

INSPECTION END



Diagnostic Procedure 13

SYMPTOM:

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

```

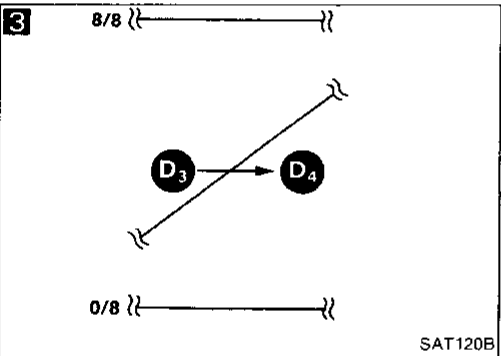
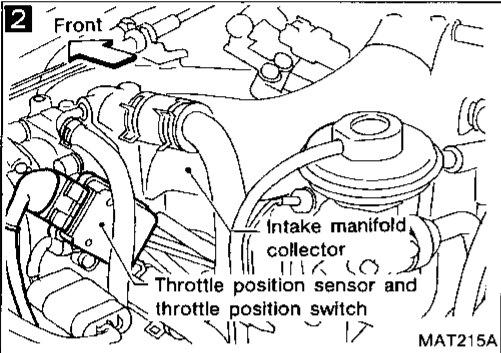
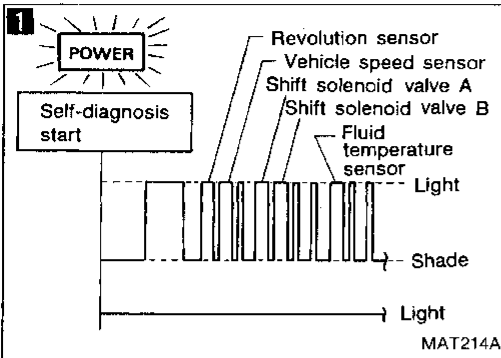
    graph TD
        Q1{Are Diagnostic Procedures 10 and 11 OK?} -- No --> A1011[Go to Diagnostic Procedure 10 or 11. AT-140, AT-141]
        Q1 -- Yes --> Q2{Does "ECU INPUT SIGNALS" show damage to inhibitor switch circuit?}
        Q2 -- Yes --> A211[Check inhibitor switch circuit. — Refer to "Self-diagnosis". AT-116]
        Q2 -- OR --> Q3{Does self-diagnosis show damage to inhibitor switch circuit?}
        Q3 -- No --> Q4{Check throttle position sensor. — Refer to section EF & EC.}
        Q4 -- NG --> A41[Repair or replace throttle position sensor.]
        Q4 -- OK --> Q5{1. Remove oil pan.  
2. Check A/T fluid condition.}
        Q5 -- NG --> A51[1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180  
2. Check the following items.  
• Shift valve B  
• Shift solenoid valve B  
• Pilot valve  
• Pilot filter]
        Q5 -- OK --> Q6{1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180  
2. Check the following items.  
• Shift valve B  
• Shift solenoid valve B  
• Pilot valve  
• Pilot filter}
        Q6 -- OK --> Q7{1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180  
2. Check the following items.  
• Shift valve B  
• Shift solenoid valve B  
• Pilot valve  
• Pilot filter}
        Q7 -- OK --> Q8{1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180  
2. Check the following items.  
• Servo piston assembly  
• High clutch assembly  
• Oil pump assembly}
        Q8 -- OK --> Q9{Check again.}
        Q9 -- NG --> A91[1. Perform A/T control unit input/output signal inspection.  
2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.]
        Q9 -- OK --> END[INSPECTION END]
    
```

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Diagnostic Procedure 14

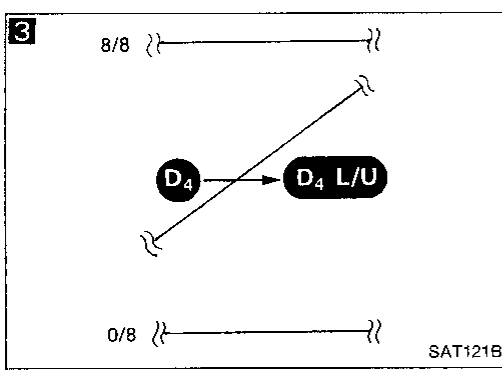
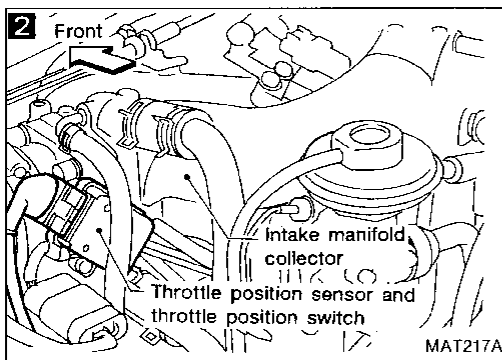
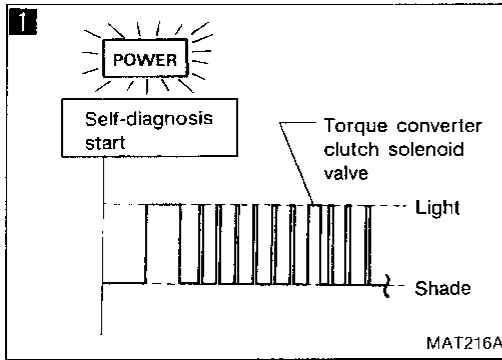
SYMPTOM:

A/T does not shift from D₃ to D₄ at the specified speed.



```

    graph TD
        Q1{Are Diagnostic Procedure 10 and 11 OK?}
        Q1 -- No --> R1[Go to Diagnostic Procedure 10 or 11. AT-140, AT-141]
        Q1 -- Yes --> Q2{Does self-diagnosis show damage to inhibitor switch, overdrive switch, shift solenoid valve A, B, revolution sensor, speed sensor or fluid temperature sensor circuit after cruise test?}
        Q2 -- Yes --> R2[Check damaged circuit. — Refer to "Self-diagnosis". AT-116]
        Q2 -- No --> Q3{Check throttle position sensor. — Refer to section EF & EC.}
        Q3 -- NG --> R3[Repair or replace throttle position sensor.]
        Q3 -- OK --> Q4[1. Remove oil pan. 2. Check A/T fluid condition.]
        Q4 -- NG --> R4[1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180 2. Check the following items. ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter 3. Disassemble A/T. 4. Check the following items. ● Servo piston assembly ● Brake band ● Torque converter ● Oil pump assembly]
        Q4 -- OK --> Q5[1. Remove control valve assembly. — Refer to "ON-VEHICLE SERVICE". AT-180 2. Check the following items. ● Shift valve B ● Overrun clutch control valve ● Shift solenoid valve B ● Pilot valve ● Pilot filter]
        Q5 -- OK --> Q6[Check again.]
        Q6 -- NG --> R5[1. Perform A/T control unit input/output signal inspection. 2. If NG, recheck A/T control unit pin terminals for damage or connection of A/T control unit harness connector.]
        Q6 -- OK --> END[INSPECTION END]
    
```



Diagnostic Procedure 15

SYMPTOM:

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

1

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

Yes → Check torque converter clutch solenoid valve circuit. — Refer to "Self-diagnosis". AT-116

No

2

Check throttle position sensor. — Refer to section EF & EC.

NG → Repair or replace throttle position sensor.

OK

1. Remove control valve. — Refer to "ON-VEHICLE SERVICE". AT-180

2. Check following items.

- Lock-up control valve
- Torque converter relief valve
- Torque converter clutch solenoid valve
- Pilot valve
- Pilot filter

NG → Repair or replace damaged parts.

OK

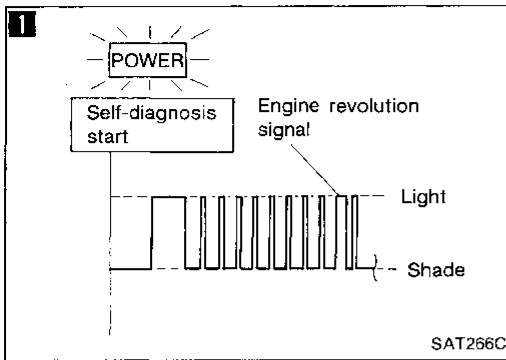
3

Check again.

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

OK → **INSPECTION END**

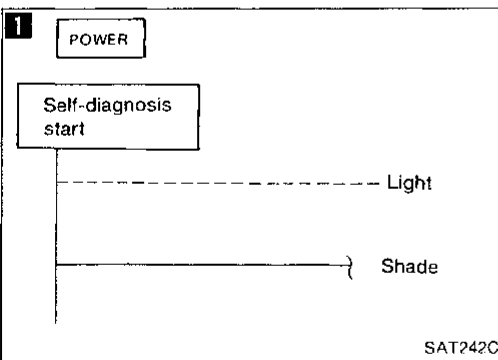
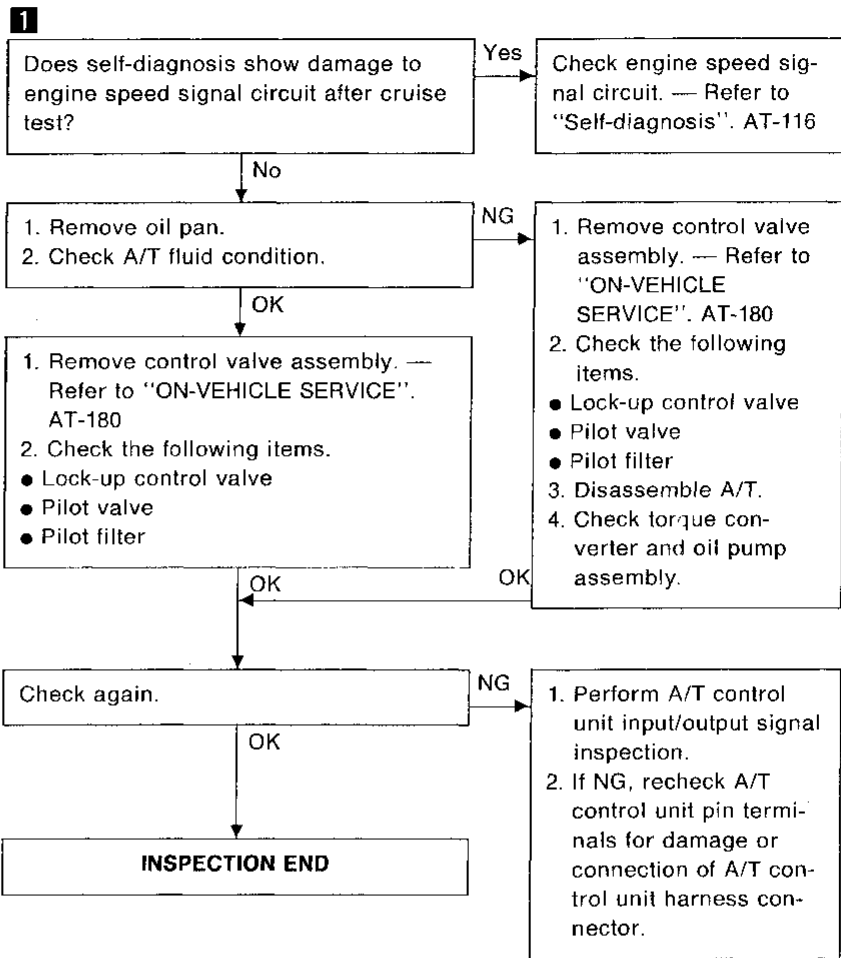
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Diagnostic Procedure 16

SYMPTOM:

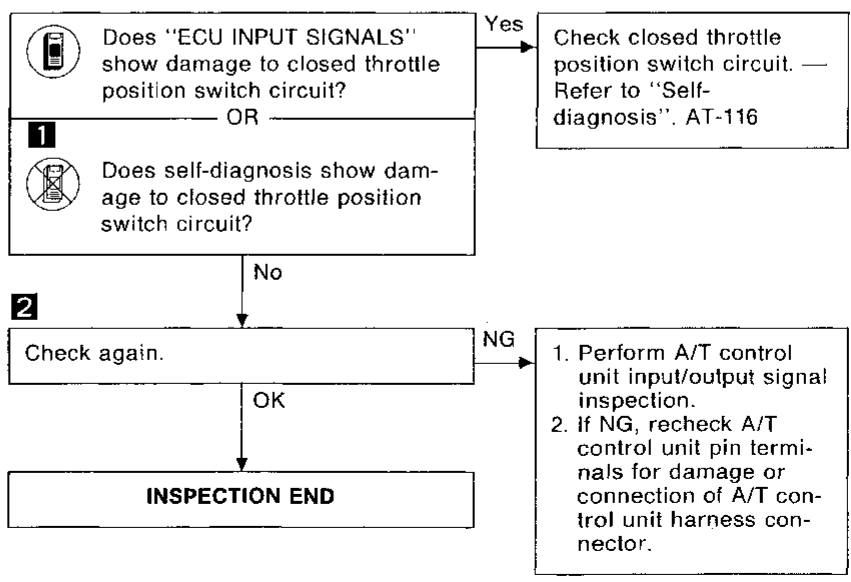
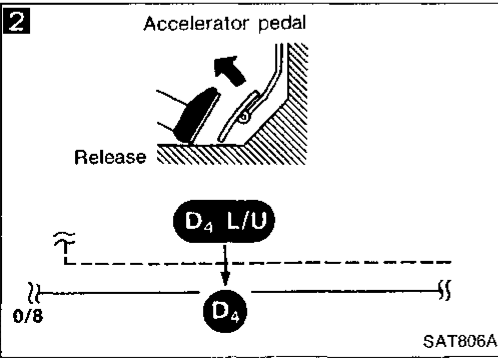
A/T does not hold lock-up condition for more than 30 seconds.

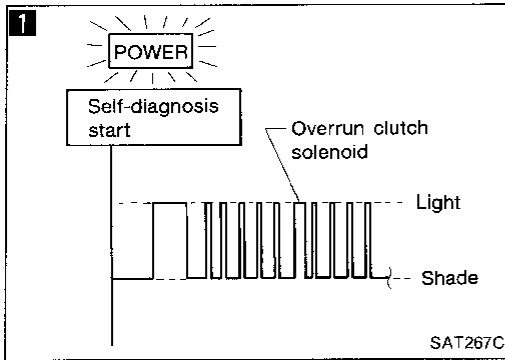


Diagnostic Procedure 17

SYMPTOM:

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





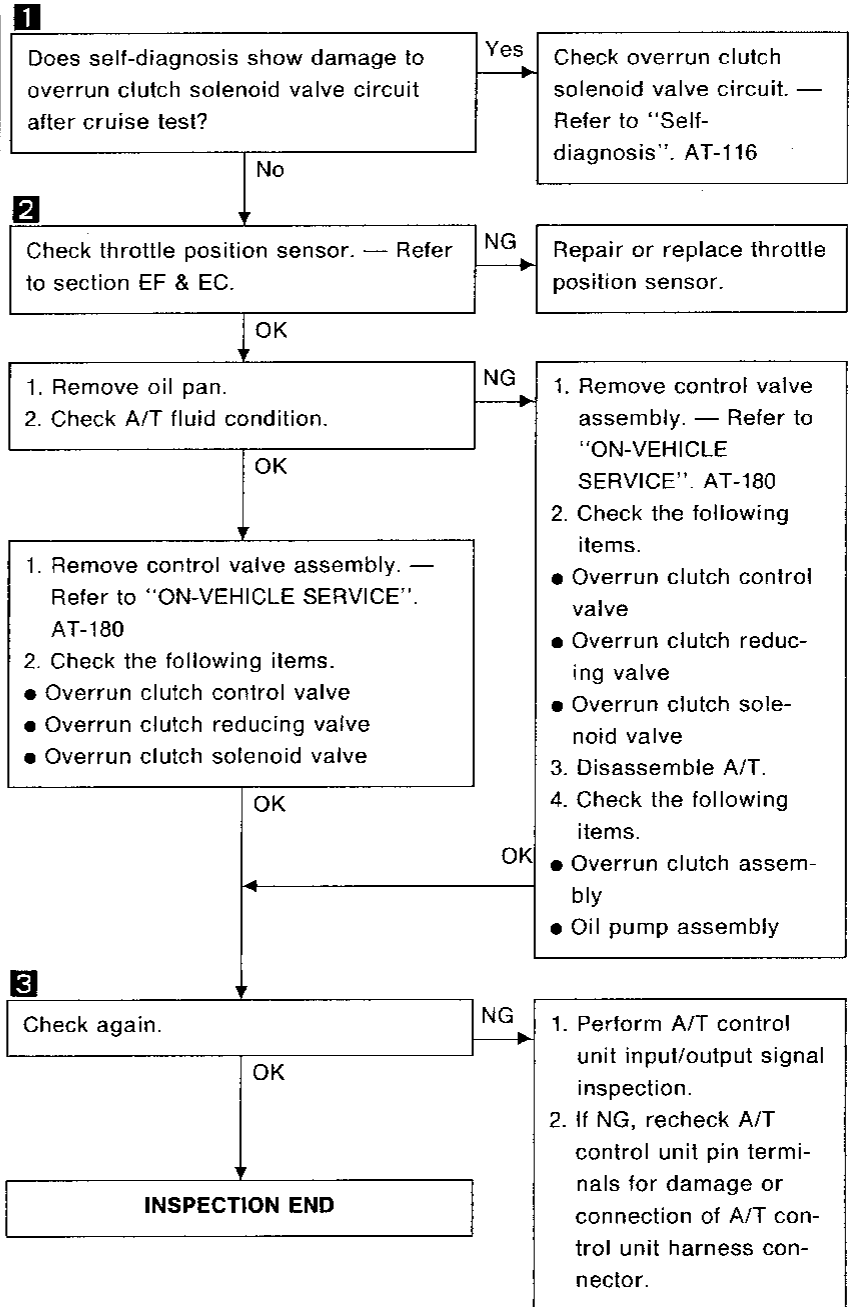
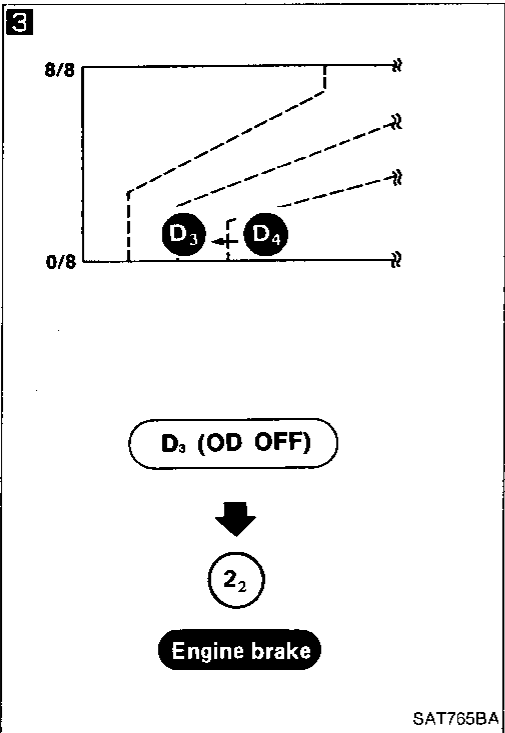
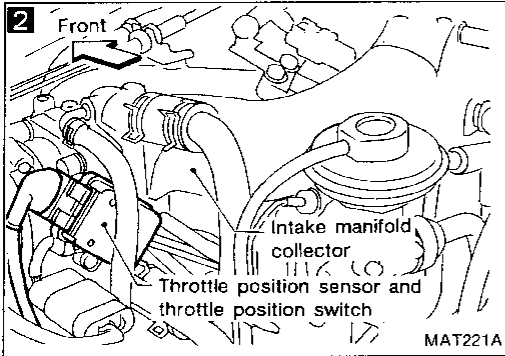
Diagnostic Procedure 18

SYMPTOM:

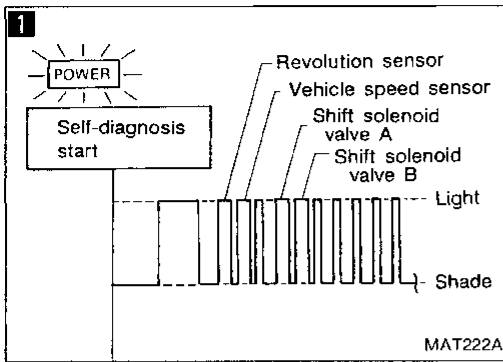
Engine speed does not return to idle smoothly when A/T is shifted from D₄ to D₃ with accelerator pedal released.

Vehicle does not decelerate by engine brake when changing overdrive switch to "OFF" position with accelerator pedal released.

Vehicle does not decelerate by engine brake when changing selector lever from "D" to "2" position with accelerator pedal released.



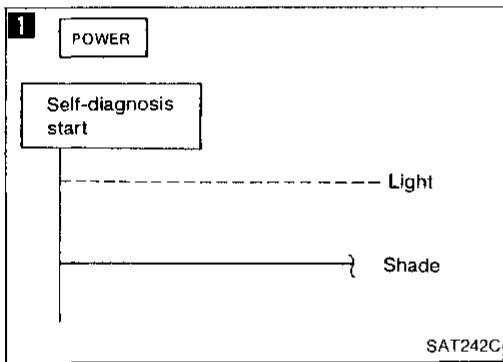
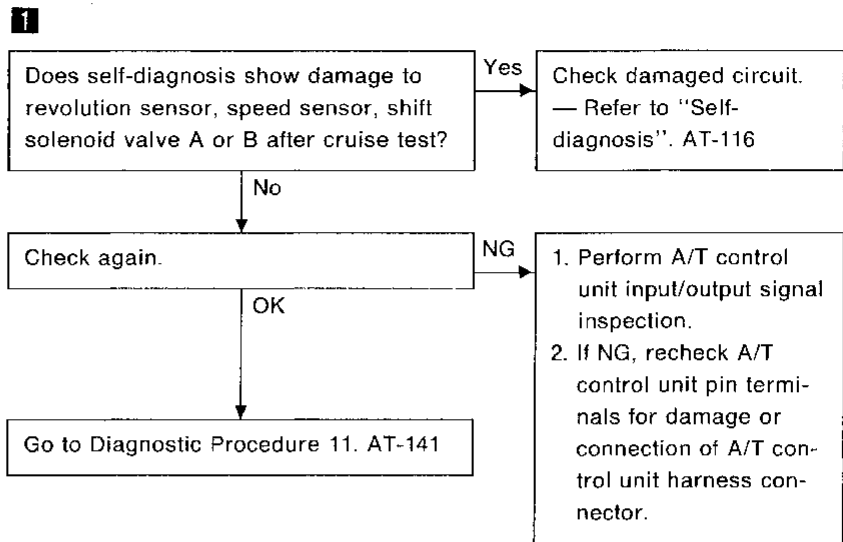
GI
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Diagnostic Procedure 19

SYMPTOM:

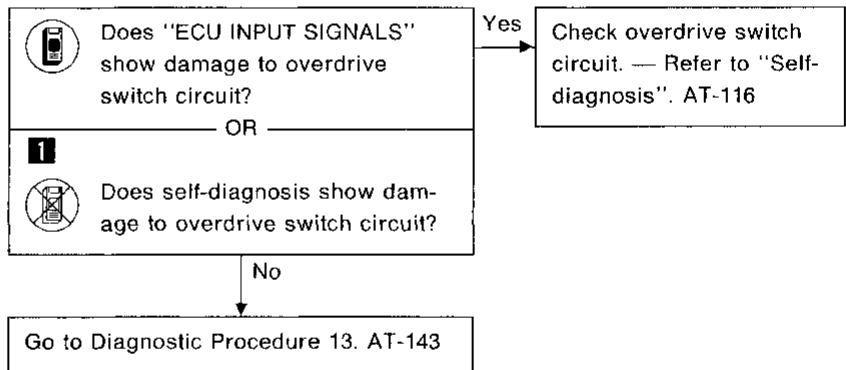
Vehicle does not start from D₁ on Cruise test — Part 2.

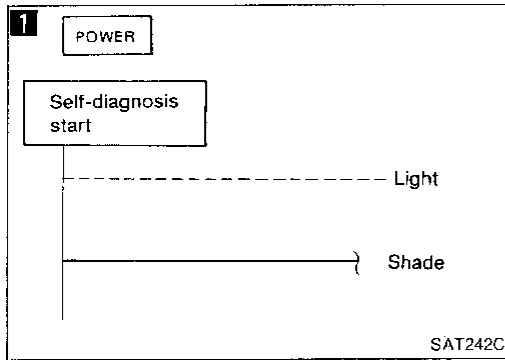


Diagnostic Procedure 20

SYMPTOM:

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

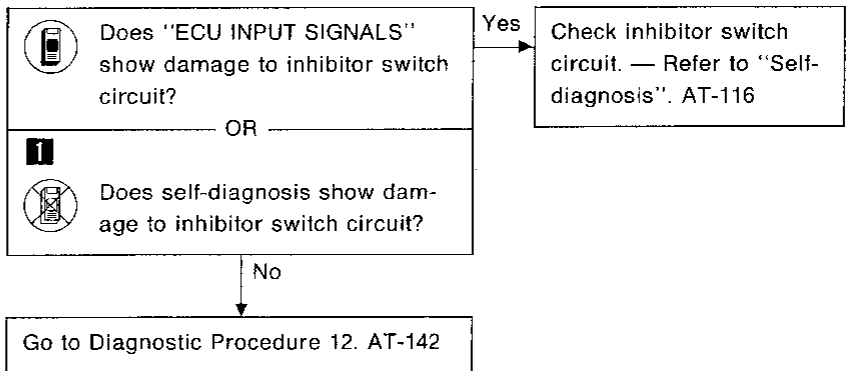




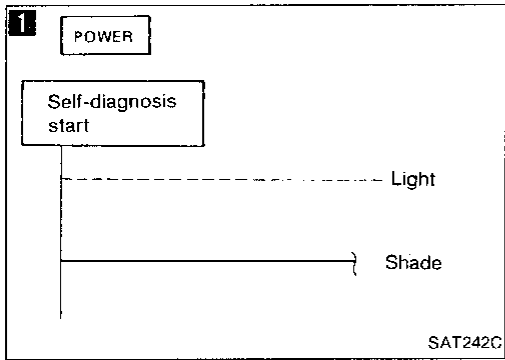
Diagnostic Procedure 21

SYMPTOM:

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



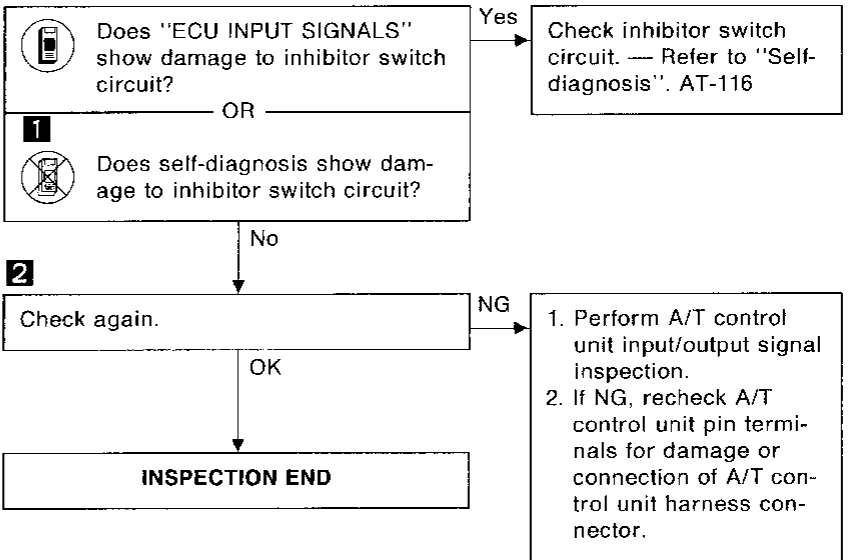
GI
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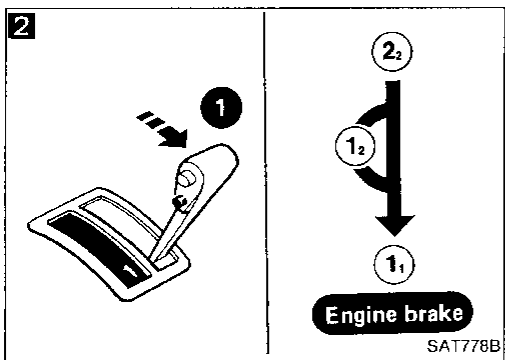
Diagnostic Procedure 22

SYMPTOM:

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



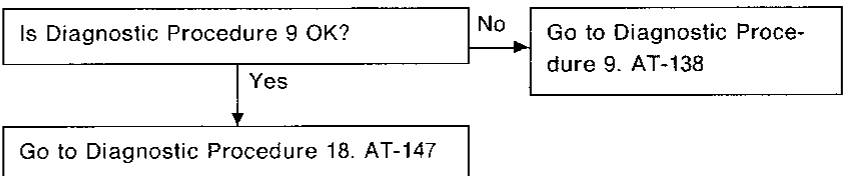
CL
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FA
RA
BR
ST
BF
HA



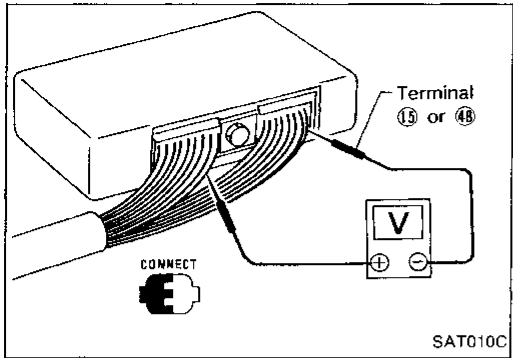
Diagnostic Procedure 23

SYMPTOM:

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



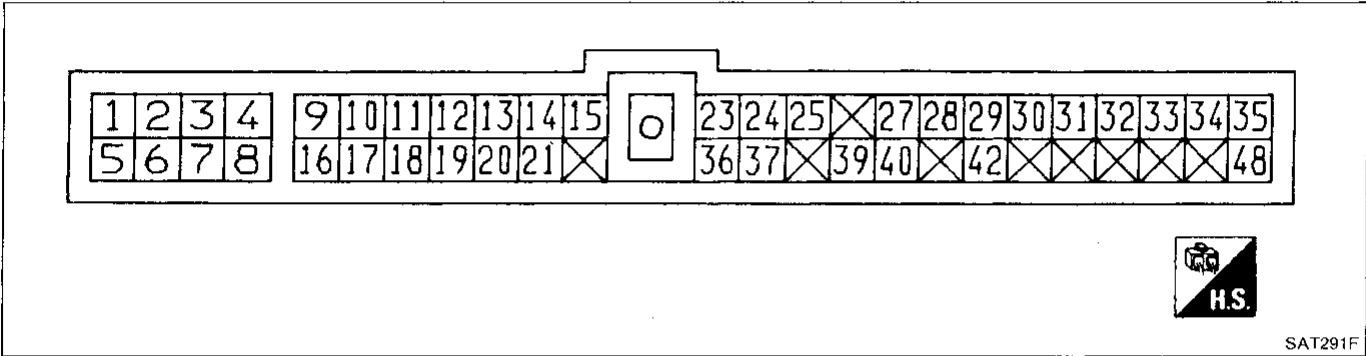
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Electrical Components Inspection

INSPECTION OF A/T CONTROL UNIT

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



A/T CONTROL UNIT INSPECTION TABLE




(Data are reference values.)

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

TROUBLE DIAGNOSES

RE4F04V











Electrical Components Inspection (Cont'd)

Terminal No.	Item		Condition	Judgement standard	
5	Torque converter clutch solenoid valve		When A/T performs lock-up.	8 - 15V	GI
			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	MA
			When shift solenoid valve A does not operate. (When driving in "D ₂ " or "D ₃ ".)	1V or less	EM
7	Shift solenoid valve B		When shift solenoid valve B operates. (When driving in "D ₁ " or "D ₂ ".)	Battery voltage	LC
			When shift solenoid valve B does not operate. (When driving in "D ₃ " or "D ₄ ".)	1V or less	EF & EC
8	Overrun clutch solenoid valve		When overrun clutch solenoid valve operates.	Battery voltage	FE
			When overrun clutch solenoid valve does not operate.	1V or less	CL
9	Power source		Same as No. 4		MT
10*	—		—	—	
11*	—		—	—	AT
12*	—		—	—	
13*	—		—	—	FA
14	Closed throttle position switch (in throttle position switch)		When releasing accelerator pedal after warming up engine.	8 - 15V	RA
			When depressing accelerator pedal after warming up engine.	1V or less	RA
15	Ground		—	—	BR
16	Inhibitor "1" position switch		When setting selector lever to "1" position.	Battery voltage	ST
			When setting selector lever to other positions.	1V or less	ST
17	Inhibitor "2" position switch		When setting selector lever to "2" position.	Battery voltage	BF
			When setting selector lever to other positions.	1V or less	HA
18	Inhibitor "D" position switch		When setting selector lever to "D" position.	Battery voltage	EL
			When setting selector lever to other positions.	1V or less	EL

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








IDX

Electrical Components Inspection (Cont'd)

Terminal No.	Item	Condition		Judgement standard
19	Inhibitor "N" or "P" position switch		When setting selector lever to "N" 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.	8 - 15V
			When releasing accelerator pedal after warming up engine.	1V or less
22	—	—	—	—
23	Power source (Back-up)	 or 	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.	0.6V
			When engine runs at 4,000 rpm.	Approximately 2.2V
25	Revolution sensor (Measure in AC position)		When vehicle cruises at 30 km/h (19 MPH).	1V or more Voltage rises gradually in response to vehicle speed.
			When vehicle park positions.	0V
26	—	—	—	—
27	Vehicle speed sensor		When vehicle is moving at 2 to 3 km/h (1 to 2 MPH) for 1 m (3 ft) or more.	Vary from 0 to 5V
28**	—	—	—	—
29**	—	—	—	—
30**	—	 	—	—
31	Throttle position sensor (Power source)		—	4.5 - 5.5V
32	—	—	—	—

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

Electrical Components Inspection (Cont'd)

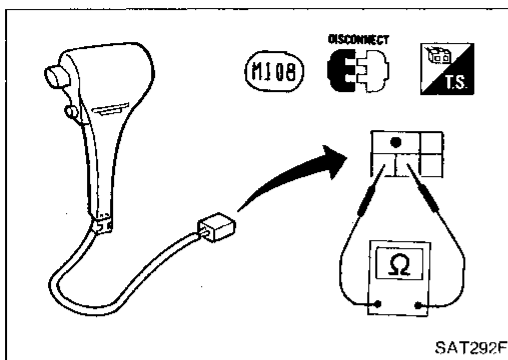
Terminal No.	Item	Condition	Judgement standard		
33	Fluid temperature sensor	When ATF temperature is 20°C (68°F).	1.56V	GI	
		When ATF temperature is 80°C (176°F).	0.45V		
34	Throttle position sensor	 When depressing accelerator pedal slowly after warming up engine. Voltage rises gradually in response to throttle opening angle.	Fully-closed throttle: 0.2 - 0.6V Fully-open throttle: 2.9 - 3.9V	MA EV	
			35	Throttle position sensor (Ground)	—
36	A/T mode switch "POWER"	When setting A/T mode switch in "POWER" position.			Battery voltage
		When setting A/T mode switch except in "POWER" position.	1V or less	FE	
37	ASCD cruise signal		When ASCD cruise is being performed. ("CRUISE" light comes on.)	Battery voltage	CL
			When ASCD cruise is not being performed. ("CRUISE" light does not come on.)	1V or less	MT
38	—	—	—	AT	
39	Overdrive switch	 	When setting overdrive switch in "ON" position	Battery voltage	FA
			When setting overdrive switch in "OFF" position	1V or less	RA
40	ASCD OD cut signal		When "ACCEL" set switch on ASCD cruise is released.	5 - 8V	BR
			When "ACCEL" set switch on ASCD cruise is applied.	1V or less	
41	—	—	—	ST	
42	A/T mode switch "COMFORT"		When setting A/T mode switch in "COMFORT" position.	Battery voltage	BF
			When setting A/T mode switch except in "COMFORT" position.	1V or less	
43	—	—	—	HA	
44	—	—	—		
45	—	—	—		
46	—		—	—	EL
			—	—	
47	—	—	—		
48	Ground	—	—	IDX	

Electrical Components Inspection (Cont'd)

OVERDRIVE SWITCH

- Check continuity between two terminals.

OD switch position	Continuity
ON	No
OFF	Yes

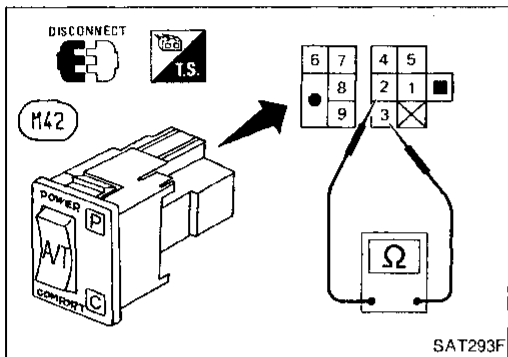


SAT292F

A/T MODE SWITCH

- Check continuity between A/T mode switch terminal.

A/T mode switch position	Continuity
POWER	② - ③
AUTO	No
COMFORT HOLD	① - ②

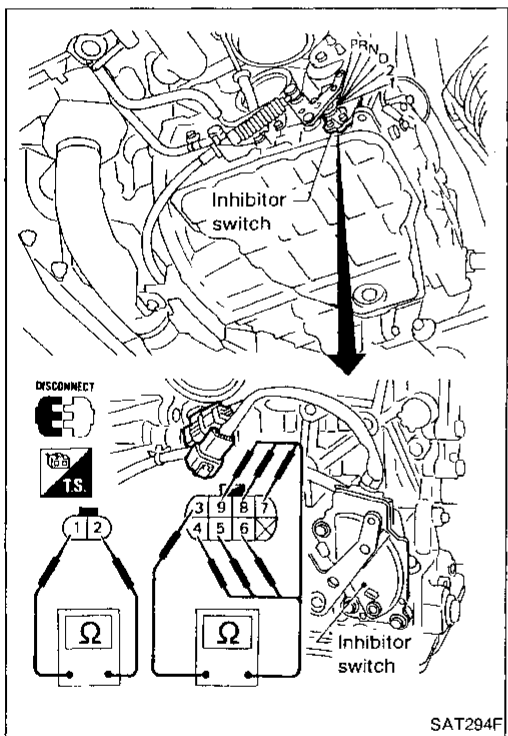


SAT293F

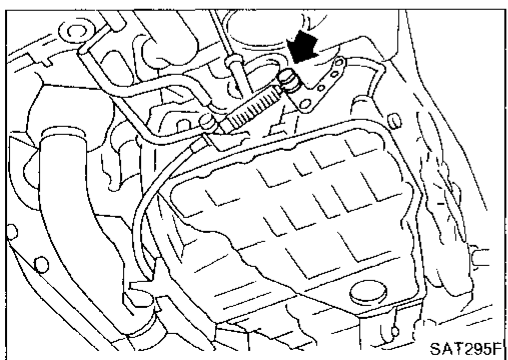
INHIBITOR SWITCH

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



SAT294F



SAT295F

2. If NG, check again with control cable disconnected from manual shaft of A/T assembly. — Refer to step 1.
3. If OK on step 2, adjust control cable. — Refer to "ON-VEHICLE SERVICE". AT-180

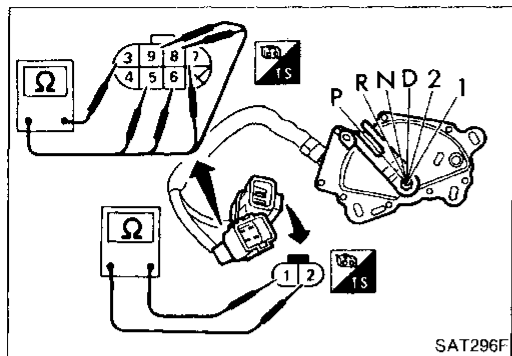
Electrical Components Inspection (Cont'd)

4. If NG on step 2, remove inhibitor switch from A/T and check continuity of inhibitor switch terminal. — Refer to step 1.
5. If OK on step 4, adjust inhibitor switch. — Refer to "ON-VEHICLE SERVICE". AT-180
6. If NG on step 4, replace inhibitor switch.

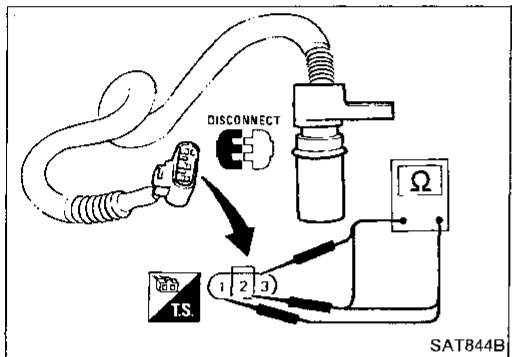
GI

MA

EM



SAT296F



SAT844B

REVOLUTION SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE". AT-180
- Check resistance between terminals ①, ② and ③.

LC

EF & EC

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

FE

CL

SOLENOIDS AND FLUID TEMPERATURE SENSOR

- For removal and installation, refer to "ON-VEHICLE SERVICE". AT-180
- Check resistance between two terminals.

MT

Solenoids

AT

Solenoid	Terminal No.		Resistance (Approx.)
Shift solenoid valve A	②	Ground (Bracket)	25Ω
Shift solenoid valve B	①		
Overrun clutch solenoid valve	③		
Line pressure solenoid valve	④		
Torque converter clutch solenoid valve	⑤		

FA

RA

BR

ST

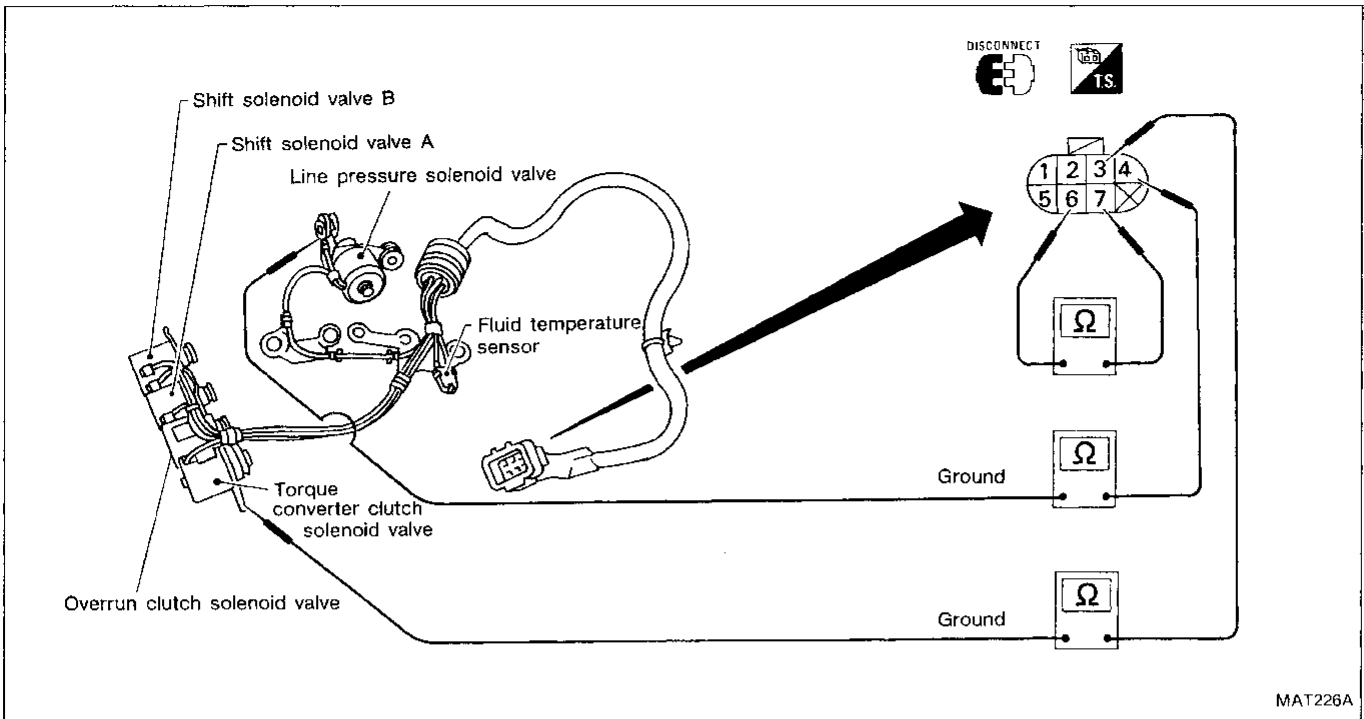
BF

HA

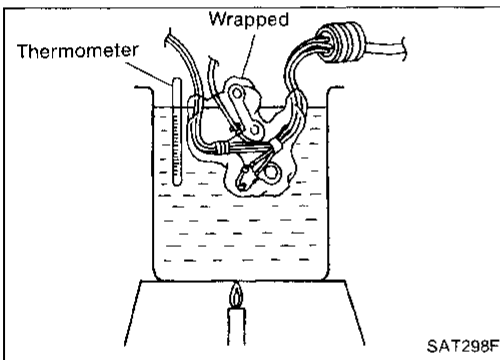
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Electrical Components Inspection (Cont'd)



MAT226A

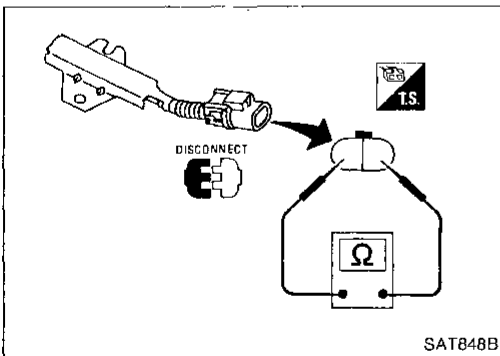


SAT298F

Fluid temperature sensor

Check resistance between terminals ⑥ and ⑦ while changing temperature as shown at left.

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



SAT848B

DROPPING RESISTOR

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

Final Check

STALL TESTING

Stall test procedure

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

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

Final Check (Cont'd)

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

GF

WA

EM

LC

FF &
EC

FE

CL

MT

AT

FA

RA

BR

ST

BF

HA

EL

IDX

JUDGEMENT OF STALL TEST

The test result and possible damaged components relating to each result are shown in the illustration. In order to pinpoint the possible damaged components, follow the WORK FLOW shown in AT-92.

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

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

Stall revolution is too high in "R" position:

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

Stall revolution within specifications:

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

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

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

Stall revolution less than specifications:

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

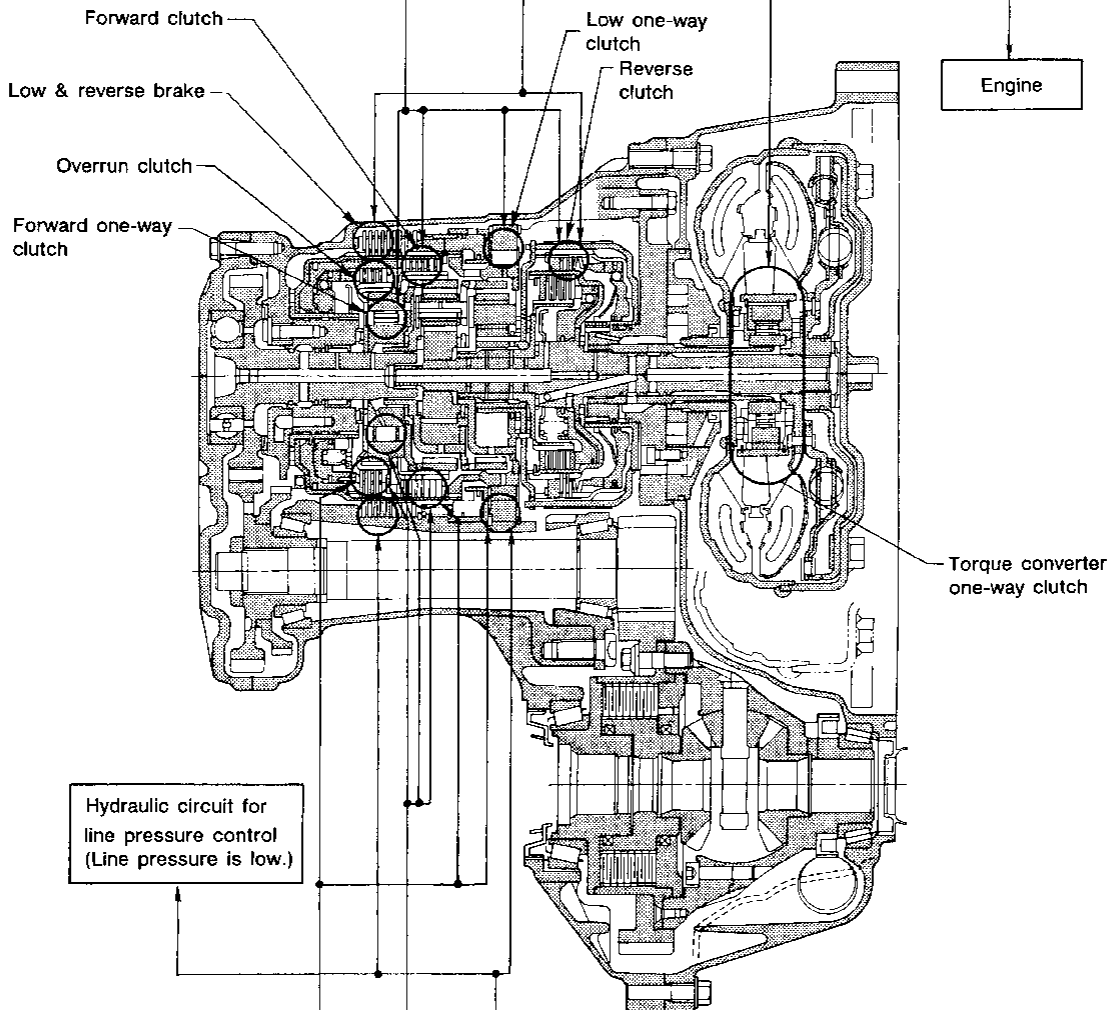
Final Check (Cont'd)

Judgement of stall test

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

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

Damaged components



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

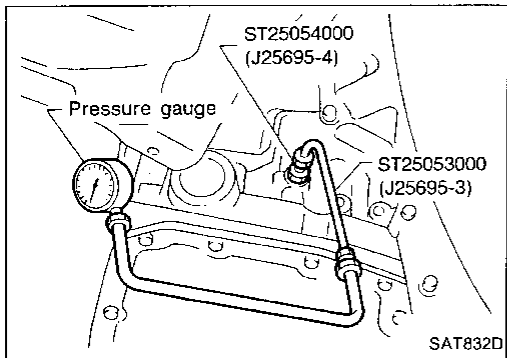
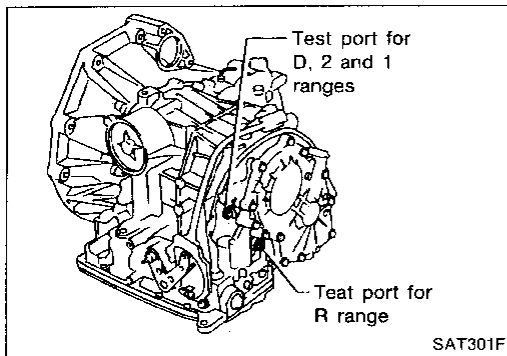
Clutch and brakes except high clutch and brake band are OK (Condition of high clutch and brake band cannot be confirmed by stall test.)

Final Check (Cont'd)

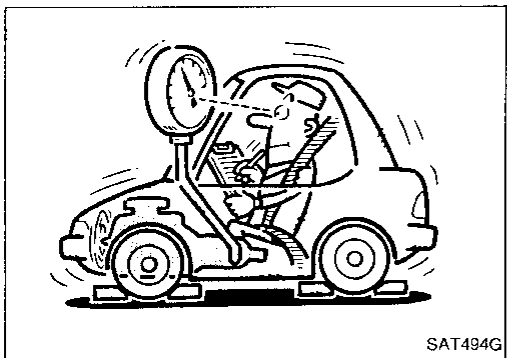
PRESSURE TESTING

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

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Line pressure test procedure

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

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

AT

Line pressure:

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

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Final Check (Cont'd)

JUDGEMENT OF LINE PRESSURE TEST

Judgement		Suspected parts
At idle	Line pressure is low in all positions.	<ul style="list-style-type: none"> ● Oil pump wear ● Control piston damage ● Pressure regulator valve or plug sticking ● Spring for pressure regulator valve damaged ● Fluid pressure leakage between oil strainer and pressure regulator valve
	Line pressure is low in particular position.	<ul style="list-style-type: none"> ● Fluid pressure leakage between manual valve and particular clutch. ● For example: If line pressure is low in "R" and "1" positions but is normal in "D" and "2" position, fluid leakage exists at or around low & reverse brake circuit.
	Line pressure is high.	<ul style="list-style-type: none"> ● Mal-adjustment of throttle position sensor ● Fluid temperature sensor damaged ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure modifier valve sticking ● Pressure regulator valve or plug sticking
At stall speed	Line pressure is low.	<ul style="list-style-type: none"> ● Mal-adjustment of throttle position sensor ● Line pressure solenoid valve sticking ● Short circuit of line pressure solenoid valve circuit ● Pressure regulator valve or plug sticking ● Pressure modifier valve sticking ● Pilot valve sticking

Symptom Chart

Reference page (AT-)	ON vehicle										OFF vehicle																				
	100, 183	182	120, 121, 130	130	123, 180	124, 130	125, 126	127, 181	181	184, 259	277, 280	284, 292	284	290, 301	311																
Reference page (AT-)	Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	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		
135	Engine does not start in "N", "P" positions.	2	3															1													
135	Engine starts in position other than "N" and "P" positions.	1	2																												
—	Transmission noise in "P" and "N" positions.	1	3	4	5	2													7	6											
135	Vehicle moves when changing into "P" position or parking gear does not disengage when shifted out of "P" position.	1																											2		
136	Vehicle runs in "N" position.	1																			3		2		4						
138	Vehicle will not run in "R" position (but runs in "D", "2" and "1" positions). Clutch slips. Very poor acceleration.	1				2	4			3											5	6	7		8		9				
—	Vehicle braked when shifting into "R" position.	1	2			3	5			4												6	8		9			7			
—	Sharp shock in shifting from "N" to "D" position.		2	5	1	3	7			6			4	8									9								
—	Vehicle will not run in "D" and "2" positions (but runs in "1" and "R" positions).	1																							2						
140	Vehicle will not run in "D", "1", "2" positions (but runs in "R" position). Clutch slips. Very poor acceleration.	1				2	4			3												6	7	8	9		10				
—	Clutches or brakes slip somewhat in starting.	1	2	3		4	6			5									12	11	9		8				10				
—	Excessive creep.				1																										
138, 140	No creep at all.	1				2	3												6	5			4								
—	Failure to change gear from "D ₁ " to "D ₂ ".	2	1	5		4	3																					6			
—	Failure to change gear from "D ₂ " to "D ₃ ".	2	1	5		4	3															6						7			
—	Failure to change gear from "D ₃ " to "D ₄ ".	2	1	4		3									5													6			
142, 143, 144	Too high a gear change point from "D ₁ " to "D ₂ ", from "D ₂ " to "D ₃ ", from "D ₃ " to "D ₄ ".			1	2					3	4																				
—	Gear change directly from "D ₁ " to "D ₃ " occurs.	1															2											3			
—	Engine stops when shifting lever into "R", "D", "2" and "1".					1	3					2							4												
—	Too sharp a shock in change from "D ₁ " to "D ₂ ".			1		2	4						5	3														5			
—	Too sharp a shock in change from "D ₂ " to "D ₃ ".			1		2	3															4						5			

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Symptom Chart (Cont'd)

Reference page (AT-)	ON vehicle									OFF vehicle																			
	100, 183	182	120, 121, 130	130	123, 180	124, 130	125, 126	127	181	184, 259	277, 280	284, 292	284	290, 301	311														
Reference page (AT-)	Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	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
— Numbers are arranged in order of probability. Perform inspections starting with number one and working up. Circled numbers indicate that the transmission must be removed from the vehicle.																													
— 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			8											⑨	⑦				⑥	
— Races extremely fast or slips in changing from "D ₄ " or "D ₃ " to "D ₁ " when depressing pedal.	1		2			3	5		4															⑥	⑦	⑧			
— Vehicle will not run in any position.	1	2				3			4											⑨	⑤	⑥					⑧	⑦	⑩
— Transmission noise in "D", "2", "1" and "R" positions.	1																			②									

Symptom Chart (Cont'd)

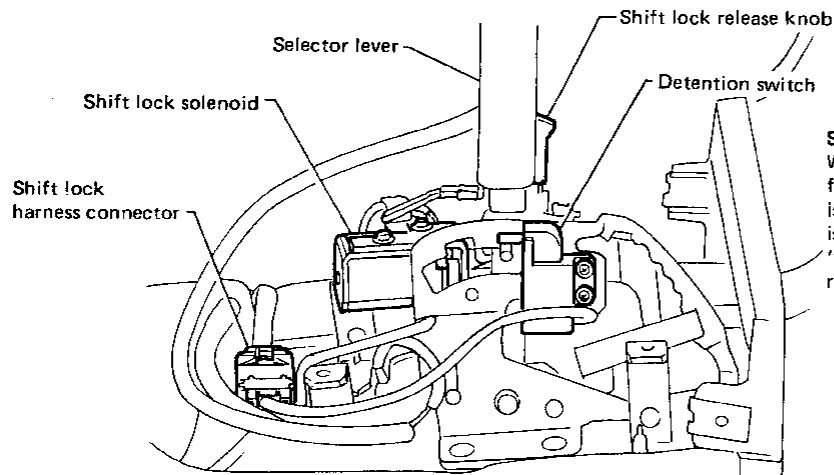
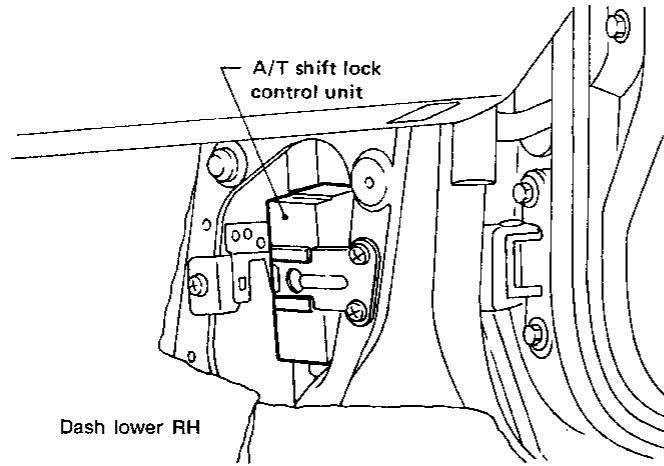
Reference page (AT-)	ON vehicle										OFF vehicle																								
	100, 183	182	120, 121, 130	130	123, 180	124, 130	125, 126	127	181	184, 259	277, 280	284, 292	284	290, 301	311																				
Reference page (AT-)	Fluid level	Control linkage	Inhibitor switch	Throttle position sensor (Adjustment)	Revolution sensor and vehicle speed sensor	Engine speed signal	Engine idling speed	Line pressure	Control valve assembly	Shift solenoid valve A	Shift solenoid valve B	Line pressure solenoid valve	Torque converter clutch solenoid valve	Overrun clutch solenoid valve	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 ₃ " when changing lever into "2" position.	7	1	2					6	5	4			3																					
—	Gear change from "2 ₂ " to "2 ₃ " in "2" position.		1																																
149	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							
—	Transmission overheats.	1		3			2	4	6		5									14	7	8	9	11		12		10	10						
—	ATF shoots out during operation.	1																																	
—	White smoke emitted from exhaust pipe during operation.																																		
—	Offensive smell at fluid charging pipe.	1																		2	3	4	5	7		8		9	6						
—	Torque converter is not locked up.		3	1	2	4		6	8				7	5						9															
—	Lock-up piston slip.	1		2			3	6		5	4									7															
145	Lock-up point is extremely high or low.			1	2				4					3																					
—	A/T does not shift to "D ₄ " when driving with overdrive switch "ON".		2	1	3			8	6	4				5	7												10				9				
—	Engine is stopped at "R", "D", "2" and "1" positions.	1							5	4	3		2																						

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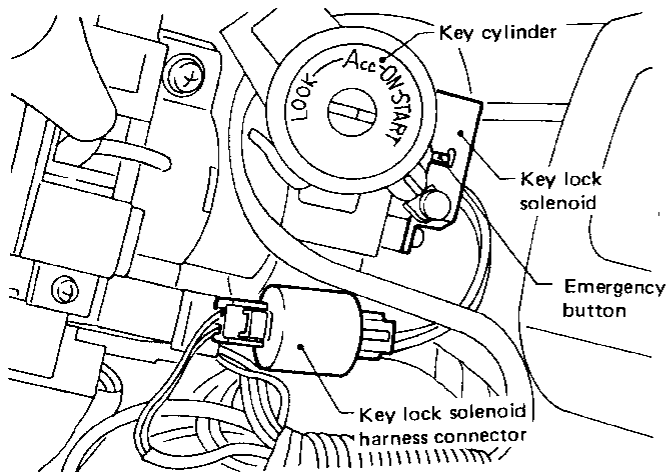
Contents

Shift Lock System Electrical Parts Location	AT-165
Circuit Diagram for Quick Pinpoint Check	AT-166
Wiring Diagram	AT-167
Diagnostic Procedure 1	AT-168
SYMPTOM: Selector lever cannot be moved from "P" position when applying brake pedal or can be moved when releasing brake pedal. Selector lever can be moved from "P" position when key is removed from key cylinder.	
Diagnostic Procedure 2	AT-172
SYMPTOM: Ignition key cannot be removed when selector lever is set to "P" position or can be removed when selector lever is set to any position except "P".	
Shift Lock Control Unit Inspection	AT-176
Shift Lock Control Unit Inspection Table	AT-177
Component Check	AT-178

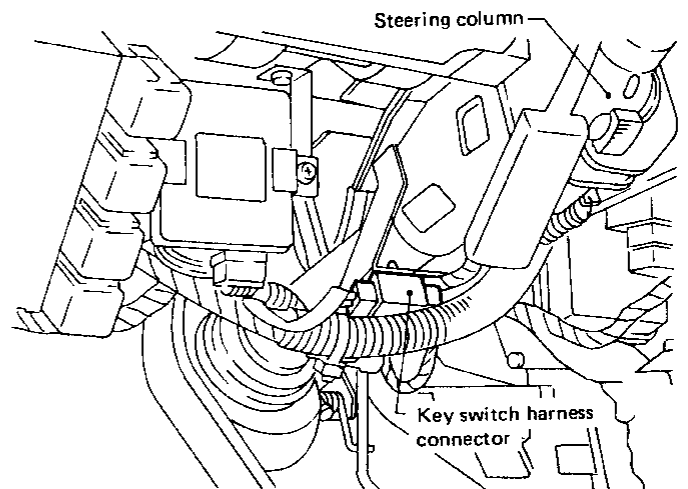
Shift Lock System Electrical Parts Location



Shift lock release knob:
When selector lever cannot be moved from "P" range even if ignition switch is in "ON" position and brake pedal is depressed, move selector lever from "P" range while pushing shift lock release knob.



Emergency button:
When ignition key cannot be removed, even if selector lever is in "P" position, push emergency button and remove ignition key.



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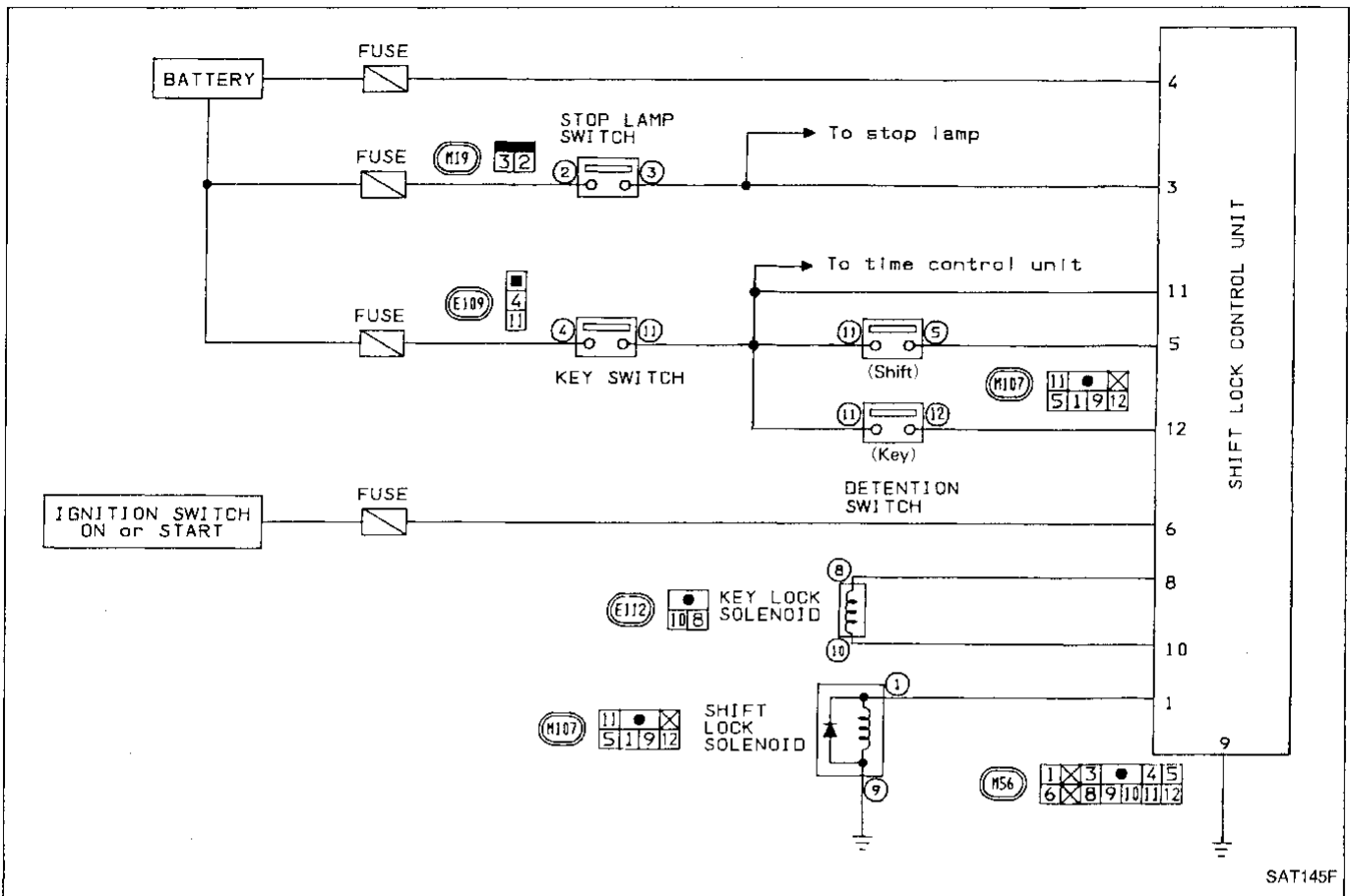
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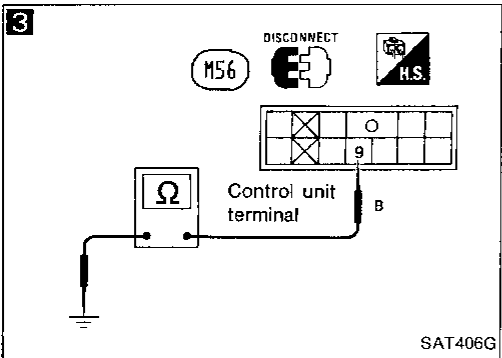
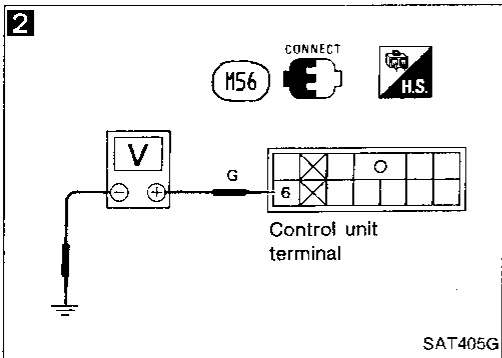
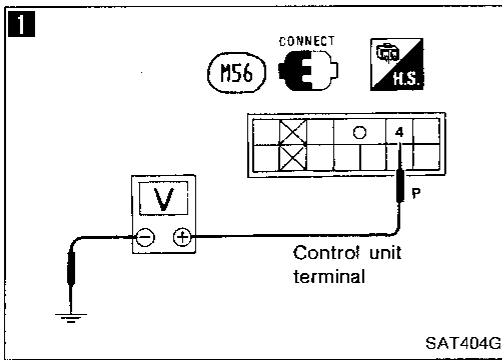
Circuit Diagram for Quick Pinpoint Check



Diagnostic Procedure 1

SYMPTOM:

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



1

CHECK POWER SOURCE.

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

NG

Check the following items:

1. Harness continuity between battery and control unit harness terminals ④
2. Fuse

OK

2

CHECK IGNITION SIGNAL.

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

NG

Check the following items:

1. Harness continuity between battery and control unit harness terminal ⑥
2. Fuse
3. Ignition switch

OK

3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

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

NG

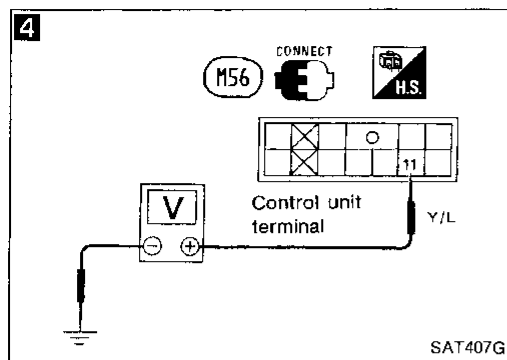
Repair harness or connector.

OK

Ⓐ

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 1 (Cont'd)

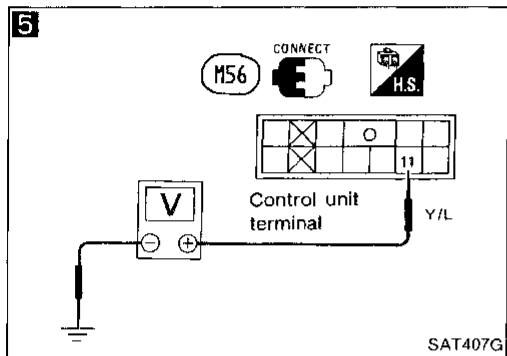


4

CHECK INPUT SIGNAL (KEY SWITCH).

1. Reconnect control unit harness connector.
 2. Remove key from ignition switch.
 3. Check voltage between control unit terminal ⑪ and ground.
- 0V**

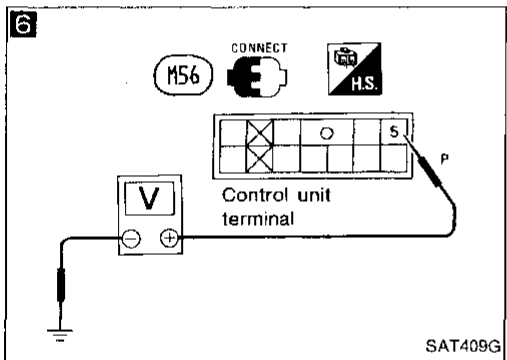
NG → Check key switch. (Refer to "COMPONENT CHECK".) AT-178



- 5
1. Remove key from ignition switch.
 2. Check voltage between control unit harness terminal ⑪ and ground.
- Battery voltage should exist.**

NG → Check the following items:

1. Harness continuity between control unit harness terminal ⑪ and key switch harness terminal ④.
2. Harness continuity between key switch harness terminal ④ and fuse
3. Key switch (Refer to "COMPONENT CHECK".) AT-178



- 6
- ### CHECK INPUT SIGNAL (DETENTION SWITCH—SHIFT).
1. Turn ignition switch from "OFF" to "ON" position.
 2. Set selector lever to "P" position and release selector lever button.
 3. Check voltage between control unit harness terminal ⑤ and ground.
- 0V**

NG → Check detention switch—shift. (Refer to "COMPONENT CHECK".) AT-178

OK → B

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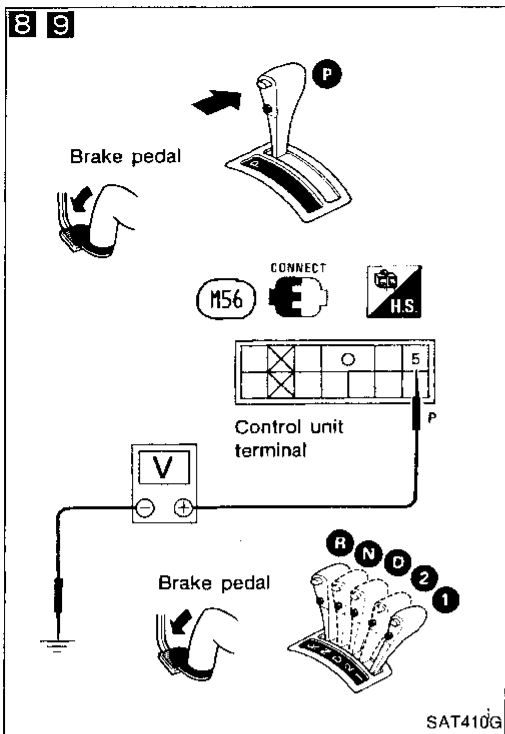
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TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 1 (Cont'd)



B

CHECK INPUT SIGNAL (DETENTION SWITCH—SHIFT).

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

8 2. Check voltage between control unit harness terminal ⑤ and ground with brake pedal depressed and selector lever button pushed.

Battery voltage should exist.

9 3. Check voltage between control unit harness terminal ⑤ and ground with selector lever set in any position except "P".

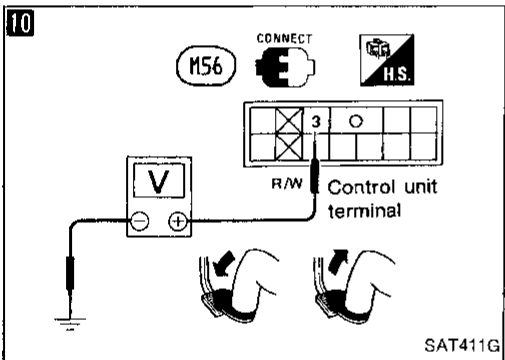
When selector lever cannot be moved from "P" position with brake pedal depressed, push shift lock release knob.

Battery voltage should exist.

NG

Check the following items:

1. Harness continuity between control unit harness terminal ⑤ and detention switch harness terminal ⑤
2. Harness continuity between detention switch harness terminal ⑪ and key switch harness terminal ⑪
3. Detention switch—shift (Refer to "COMPONENT CHECK".) AT-178



10

CHECK INPUT SIGNAL (STOP LAMP SWITCH).

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

2. Check voltage between control unit harness terminal ③ and ground.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

NG

Check the following items:

1. Harness continuity between control unit harness terminal ③ and stop lamp harness terminal ③
2. Harness continuity between stop lamp harness terminal ② and fuse
3. Stop lamp switch (Refer to "COMPONENT CHECK".) AT-178

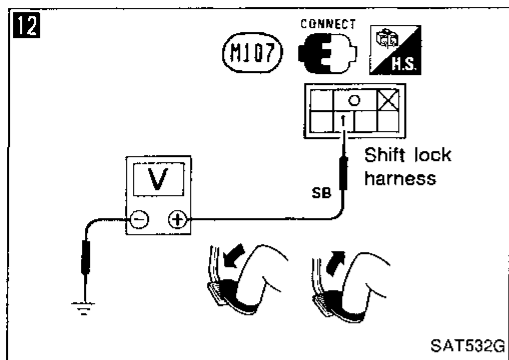
OK

Set selector lever to "P" position.

C

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 1 (Cont'd)



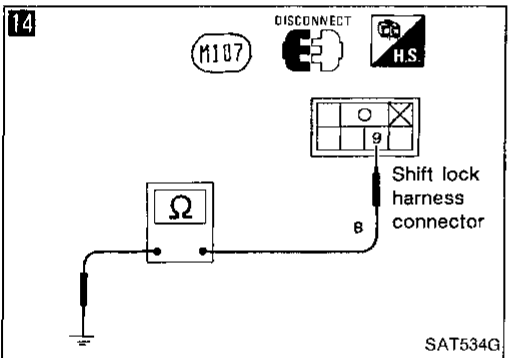
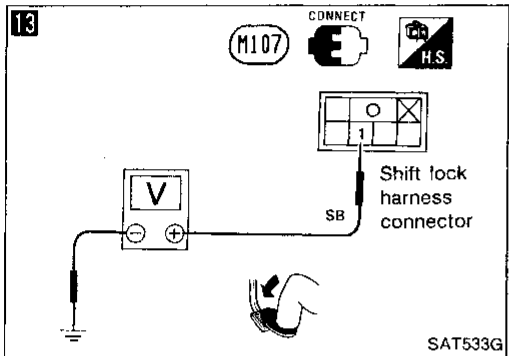
CHECK OUTPUT SIGNAL (SHIFT LOCK SOLENOID).

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

NG → Check harness continuity between control unit harness terminal ① and shift lock solenoid harness terminal ①.

Brake pedal	Voltage
Depressed	Battery voltage
Released	0V

3. Turn ignition switch from "ON" to "OFF" position.
- 13** 4. Check voltage between shift lock harness connector terminal ① and ground with brake pedal depressed. **0V**



CHECK GROUND CIRCUIT FOR SHIFT LOCK SOLENOID.

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

NG → Repair harness or connector.

Check shift lock solenoid. (Refer to "COMPONENT CHECK". AT-178)

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

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

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

INSPECTION END

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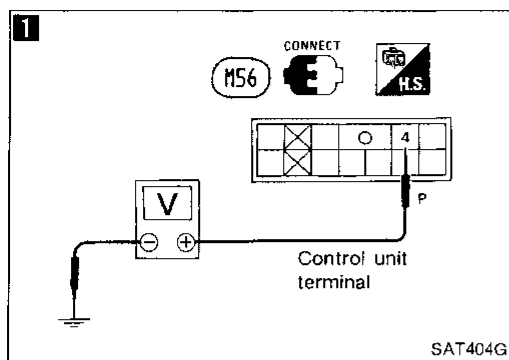
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Diagnostic Procedure 2

SYMPTOM:

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



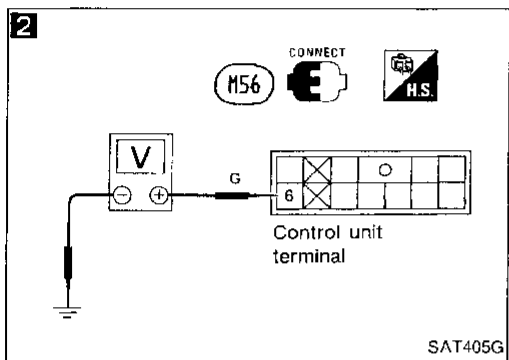
1

CHECK POWER SOURCE.

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

NG → Check the following items:

1. Harness continuity between battery and control unit harness terminal ④
2. Fuse



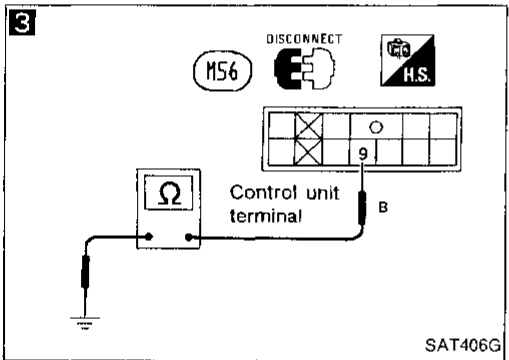
2

CHECK IGNITION SIGNAL.

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

NG → Check the following items:

1. Harness continuity between battery and control unit harness terminal ⑥
2. Fuse
3. Ignition switch



3

CHECK GROUND CIRCUIT FOR CONTROL UNIT.

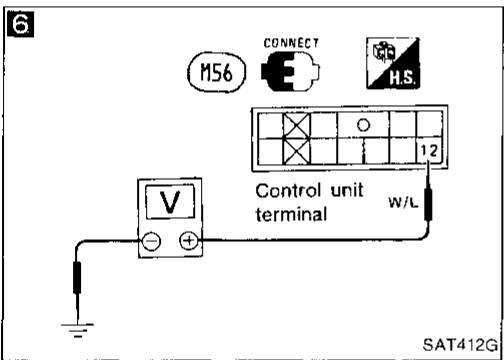
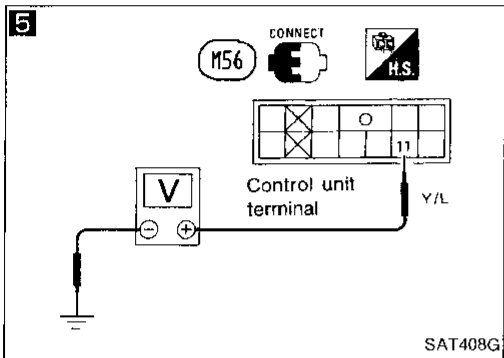
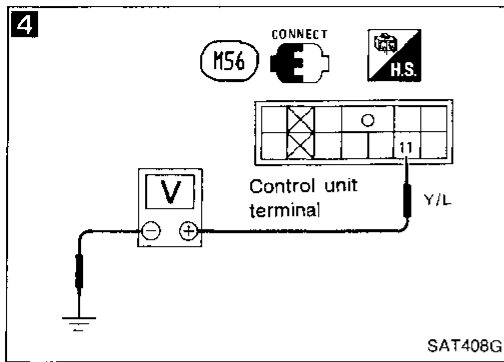
1. Turn ignition switch from "ON" to "OFF" position.
2. Disconnect control unit harness connector.
3. Check continuity between control unit harness terminal ⑨ and ground.
Continuity should exist.

NG → Repair harness or connector.

OK
↓
A

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 2 (Cont'd)



4

CHECK INPUT SIGNAL (KEY SWITCH).

1. Reconnect control unit harness connector.
2. Remove key from key cylinder.
When ignition key cannot be removed, even if selector lever is in "P" position, use emergency lever.
3. Check voltage between control unit terminal ⑪ and ground.
0V

NG → Check key switch. (Refer to "COMPONENT CHECK". AT-178)

OK →

5

1. Insert key into key cylinder.
2. Check voltage between control unit harness terminal ⑪ and ground.
Battery voltage should exist.

NG → Check the following items:

1. Harness continuity between control unit harness terminal ⑪ and key switch harness terminal ⑪.
2. Harness continuity between key switch harness terminal ④ and fuse
3. Key switch (Refer to "COMPONENT CHECK". AT-178)

OK →

6

CHECK INPUT SIGNAL (DETENTION SWITCH—KEY).

1. Turn ignition switch from "ON" to "OFF" position.
(Do not start engine.)
2. Set selector lever to "P" position and release selector lever button.
3. Check voltage between control unit harness terminal ⑫ and ground.
0V

NG → Check detention switch—key. (Refer to "COMPONENT CHECK". AT-178)

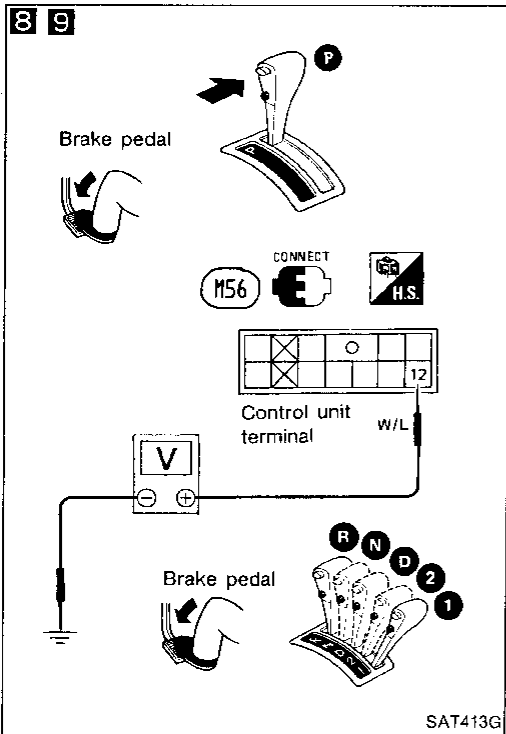
OK →

Ⓑ

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TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 2 (Cont'd)



CHECK INPUT SIGNAL (DETENTION SWITCH—KEY).

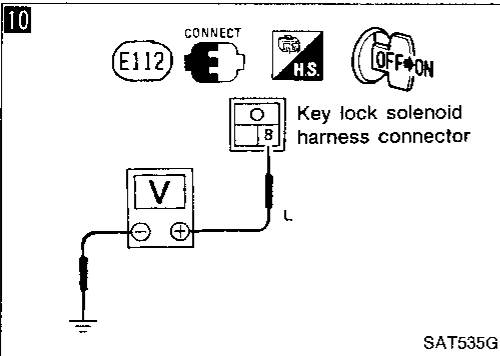
Turn ignition switch to "ON" position.
(Do not start engine.)

- 8** 1. Check voltage between control unit harness terminal ⑫ and ground with brake pedal depressed and selector lever button pushed.
Battery voltage should exist.
- 9** 2. Check voltage between control unit harness terminal ⑫ and ground with selector lever set in any position except "P".
Battery voltage should exist.

NG

Check the following items:

1. Harness continuity between control unit harness terminal ⑫ and detention switch harness terminal ⑫
2. Harness continuity between detention switch harness terminal ⑪ and key switch harness terminal ⑪
3. Detention switch—key
(Refer to "COMPONENT CHECK". AT-178)



CHECK OUTPUT SIGNAL (KEY LOCK SIGNAL).

- 10**
1. Set selector lever to "P" position and release selector lever button.
 2. Turn ignition switch to "ON" position.
(Do not start engine.)
 3. Check voltage between key lock solenoid harness terminal ⑧ and ground at the moment ignition key is turned from OFF to ON.
Battery voltage should exist for approximately 0.1 seconds.

NG

Check harness continuity between shift lock solenoid harness terminal ⑧ and control unit harness terminal ⑧.

OK

NG

Repair harness or connector.

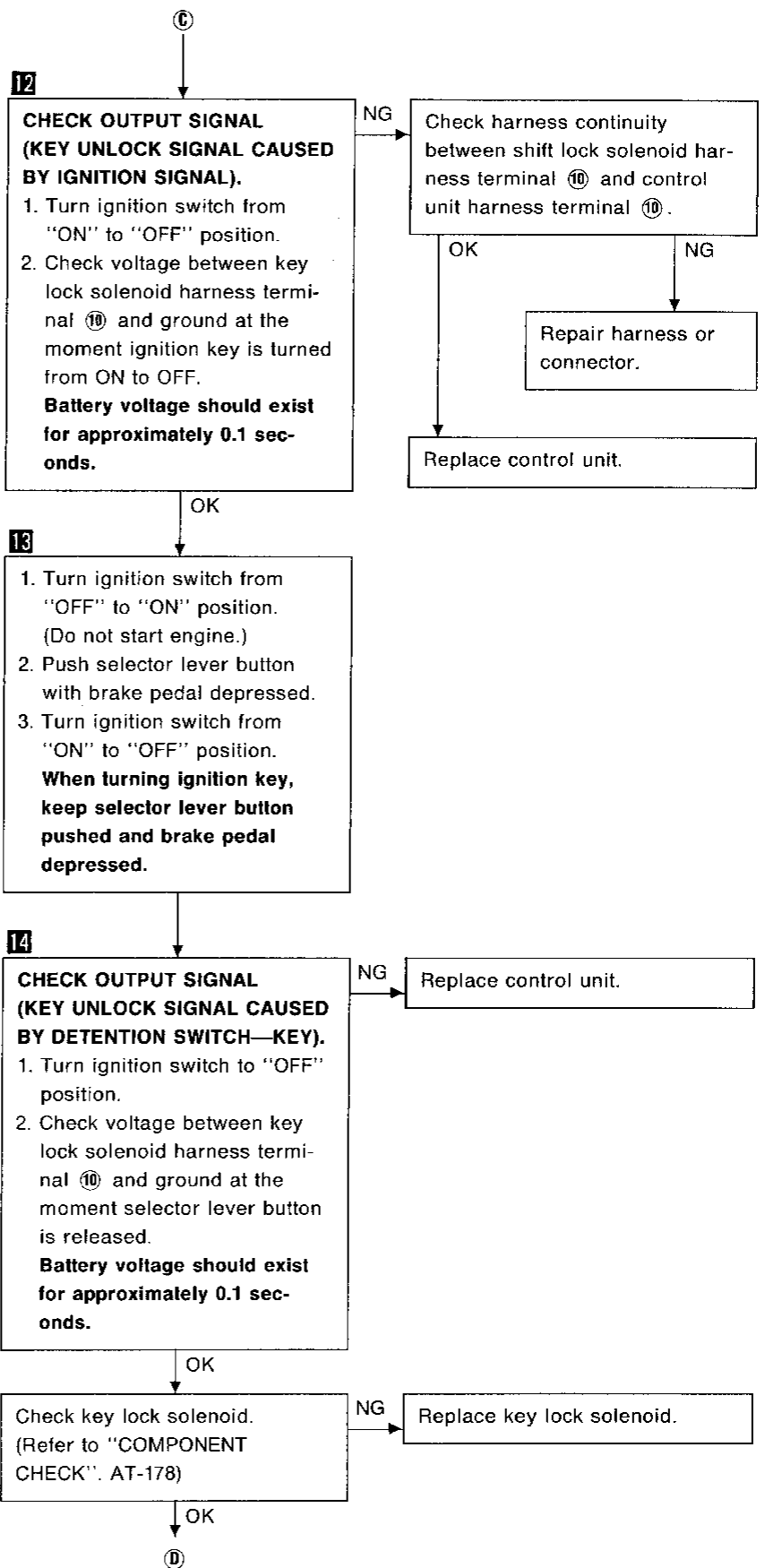
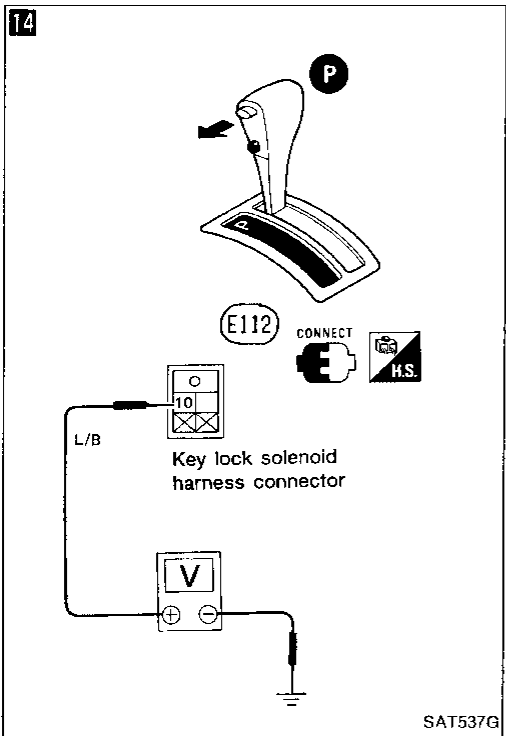
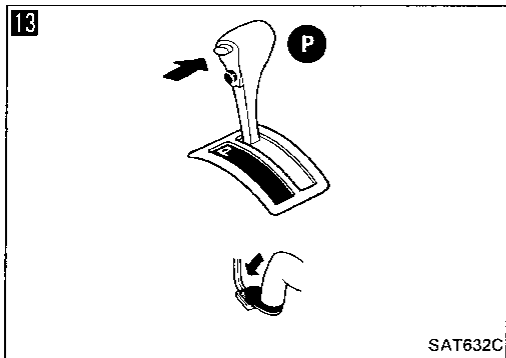
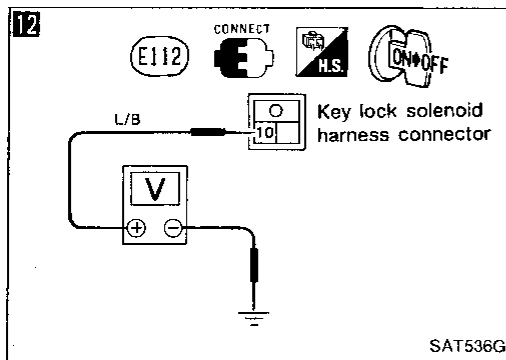
Replace control unit.

OK

⑬

TROUBLE DIAGNOSES — A/T Shift Lock System

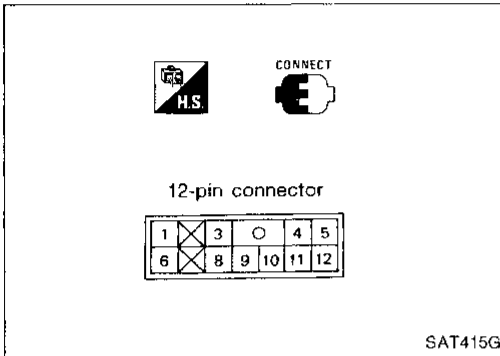
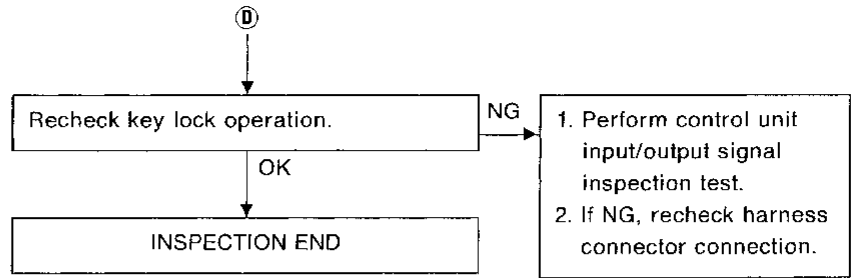
Diagnostic Procedure 2 (Cont'd)



GI
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EF & EC
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FA
RA
BR
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BF
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IDX

TROUBLE DIAGNOSES — A/T Shift Lock System

Diagnostic Procedure 2 (Cont'd)



Shift Lock Control Unit Inspection

- Measure voltage between each terminal and terminal ⑨ by following "SHIFT LOCK CONTROL UNIT INSPECTION TABLE".
- Pin connector terminal layout.

TROUBLE DIAGNOSES — A/T Shift Lock System

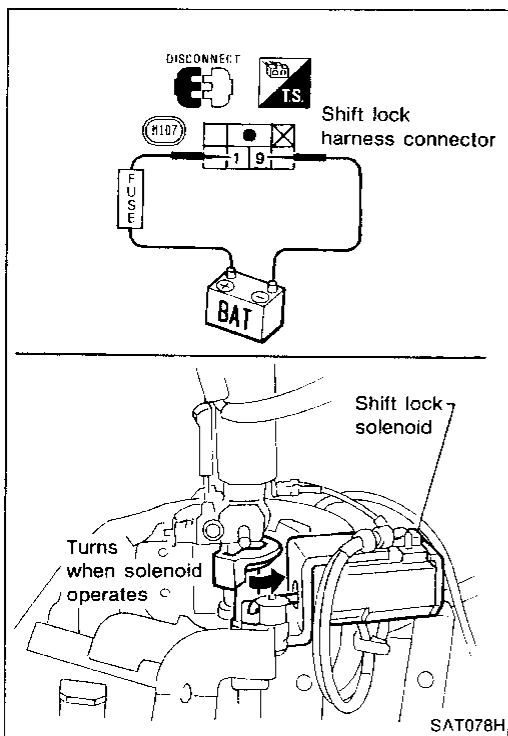
Shift Lock Control Unit Inspection Table

Terminal No.		Item	Condition	Judgment standard	
⊕	⊖				
1	9	Shift lock signal	<ul style="list-style-type: none"> ● Ignition switch "ON" position ● When selector lever is set in "P" position and brake pedal is depressed 	Battery voltage	GI
			Except above	0V	MA
3		Stop lamp switch	When brake pedal is depressed	Battery voltage	
			When brake pedal is released	0V	EM
4		Power source	Any condition	Battery voltage	
5		Detention switch (Shift)	<ul style="list-style-type: none"> ● When key is inserted into key cylinder and selector lever is set in "P" position with selector lever button pushed ● When selector lever is set in any position except "P" 	Battery voltage	LC EF & EC
			Except above	0V	FE
6		Ignition signal	Ignition switch "ON" position	Battery voltage	
			Except above	0V	CL
8		10	Key lock signal	When ignition switch is turned from LOCK, OFF or ACC to ON.	Battery voltage (Approximately 0.1 seconds)
	Except above			0V	AT
9	—	Ground	—	—	AT
10	8	Key unlock signal	When selector lever is set in "P" position and ignition key is turned from ON to LOCK, OFF or ACC with selector lever button released.	Battery voltage (Approximately 0.1 seconds)	FA
			Except above	0V	
11	9	Key switch	When key is inserted into key cylinder	Battery voltage	RA
			When key is removed into key cylinder	0V	
12		Detention switch (Key)	<ul style="list-style-type: none"> ● When key is inserted into key cylinder and selector lever is set in "P" position with selector lever button pushed ● When selector lever is set in any position except "P" 	Battery voltage	BR ST
			Except above	0V	BF
					HA EL IDX

Component Check

SHIFT LOCK SOLENOID

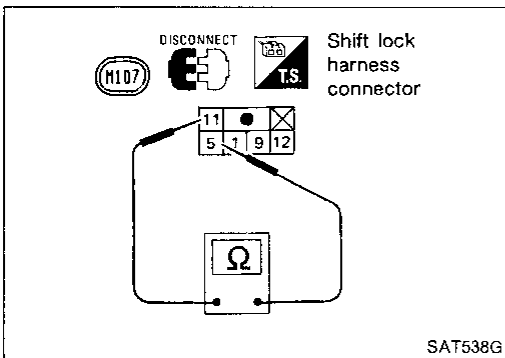
- Check operation by applying battery voltage to shift lock harness connector.



DETENTION SWITCH — SHIFT

- Check continuity between terminals ⑤ and ⑪ of shift lock harness connector.

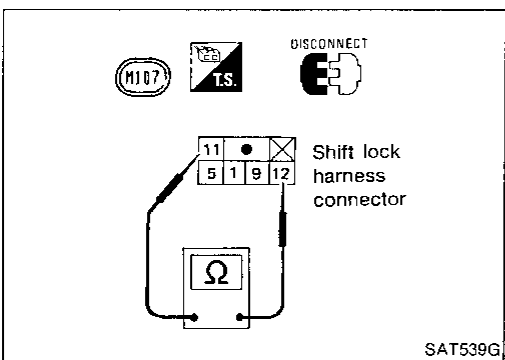
Condition	Continuity
When selector lever is set in "P" position and selector lever button is released	No
Except the above	Yes



DETENTION SWITCH — KEY

- Check continuity between terminals ⑪ and ⑫ of shift lock harness connector.

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

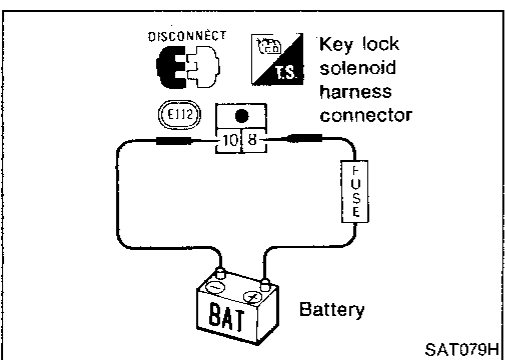


KEY LOCK SOLENOID

Operation of locking mechanism

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

Operating sound must be emitted.



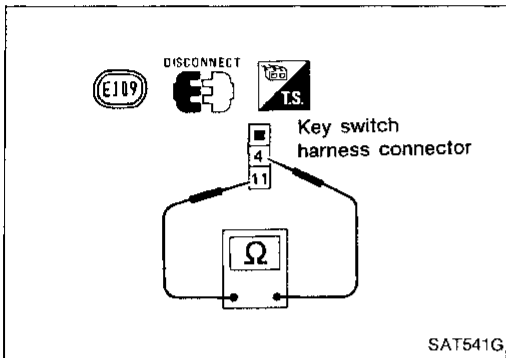
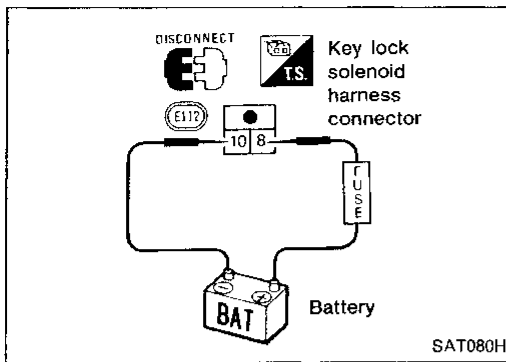
TROUBLE DIAGNOSES — A/T Shift Lock System

Component Check (Cont'd)

Operation of unlocking mechanism

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

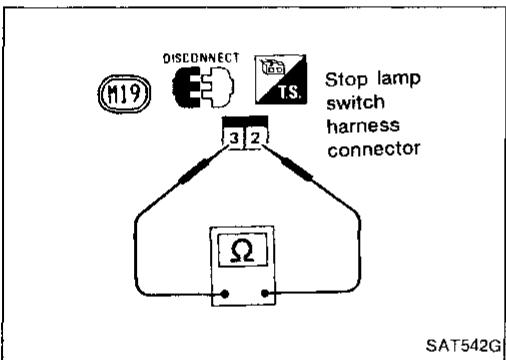
Operating sound must be emitted.



KEY SWITCH

- Check continuity between terminals ④ and ⑪ of key switch harness connector.

Condition	Continuity
When key is inserted into key cylinder	Yes
When key is removed from key cylinder	Yes



STOP LAMP SWITCH

- Check continuity between terminals ② and ③ of stop lamp switch harness connector.

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

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

CI

MA

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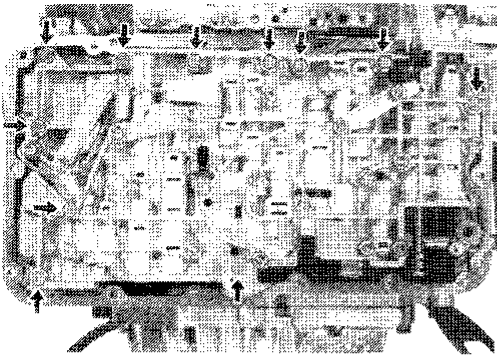
ST

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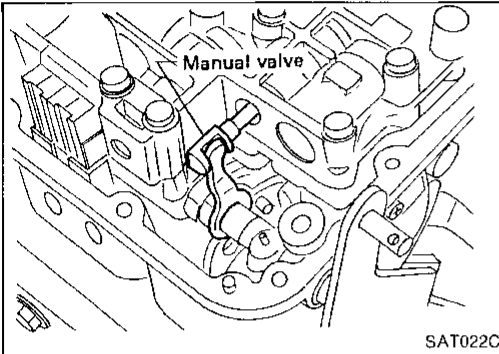
IDX



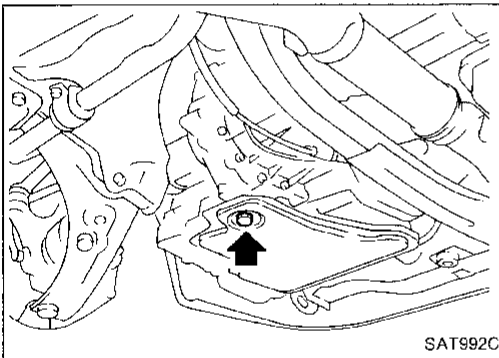
Control Valve Assembly — RE4F02A

1. Remove air cleaner, battery and its bracket.
2. Remove control valve cover.
3. Remove control valve assembly by removing fixing bolts and disconnecting harness connector.

Be careful not to drop manual valve out of valve body.



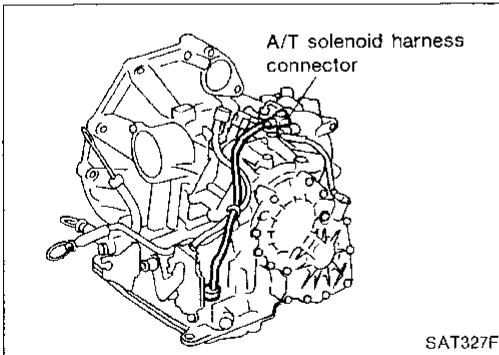
4. Disassemble, inspect and assemble control valve assembly. Refer to "REPAIR FOR COMPONENT PARTS", AT-200.
 - Set manual shaft in "N" position, then align manual plate with groove in manual valve of control valve assembly.
 - After installing control valve to transmission case, make sure that selector lever can be moved to all positions.



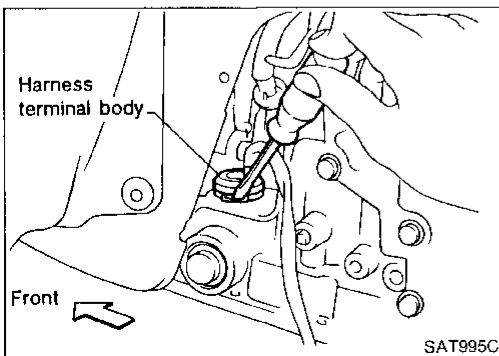
Control Valve Assembly and Accumulator — RE4F04V

REMOVAL

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



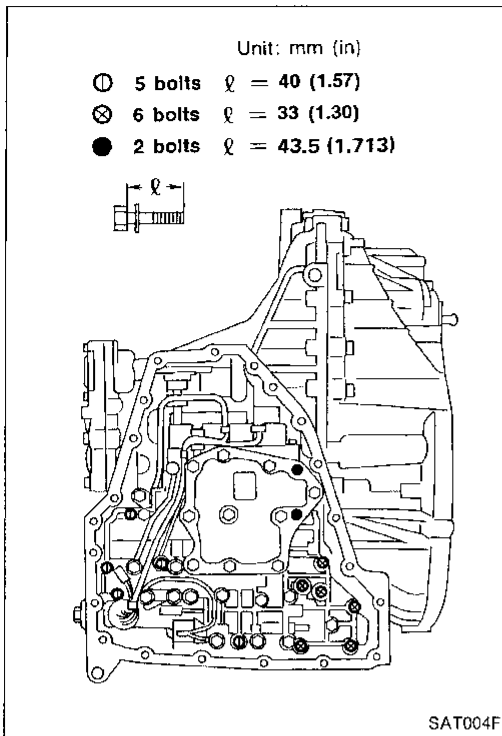
3. Disconnect A/T solenoid harness connector.



4. Remove stopper ring from A/T solenoid harness terminal body.
5. Remove A/T solenoid harness from transmission case by pushing on terminal body.

ON-VEHICLE SERVICE

Control Valve Assembly and Accumulator — RE4F04V (Cont'd)

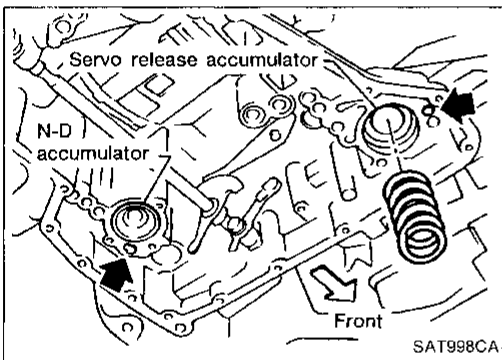


6. Remove control valve assembly by removing fixing bolts.

Bolt length, number and location:

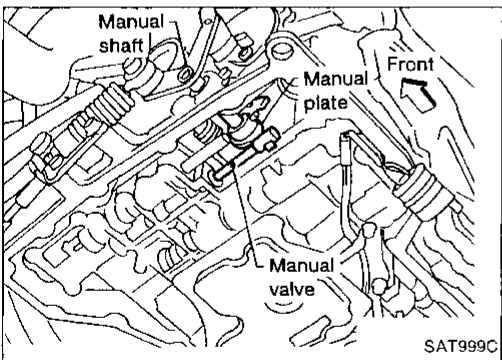
Bolt symbol	⊙	⊗	●
Bolt length "ℓ"	40.0	33.0	43.5
mm (in)	(1.575)	(1.299)	(1.713)
Number of bolts	5	6	2

- Be careful not to drop manual valve, tube connector, tubes and servo release accumulator return spring.
7. Disassemble and inspect control valve assembly if necessary — Refer to "REPAIR FOR COMPONENT PARTS", AT-263.



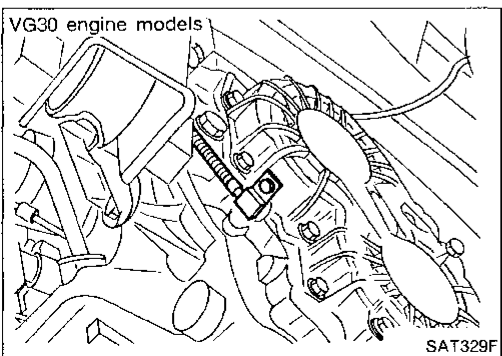
8. Remove servo release and N-D accumulators by applying compressed air if necessary.

- Hold each piston with a rag.



INSTALLATION

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



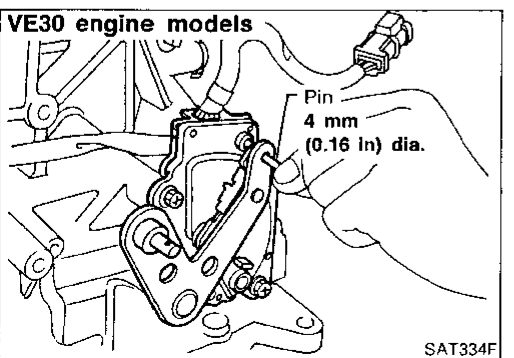
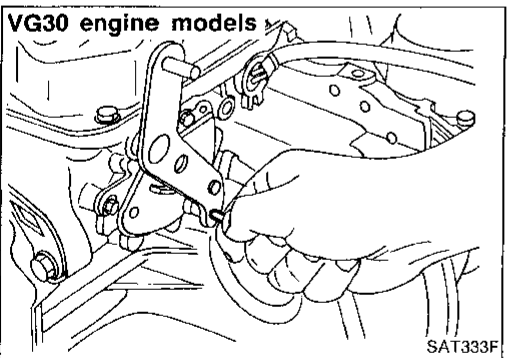
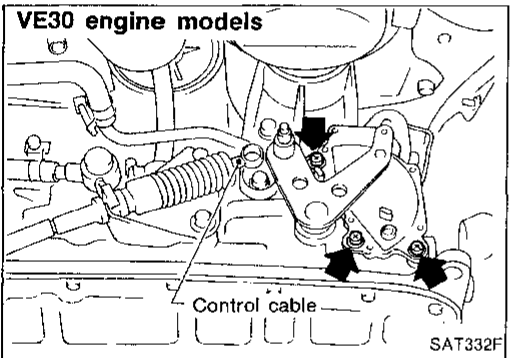
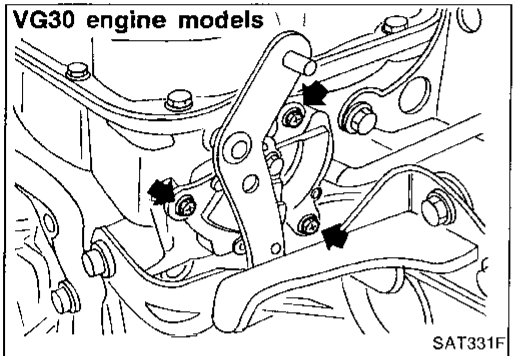
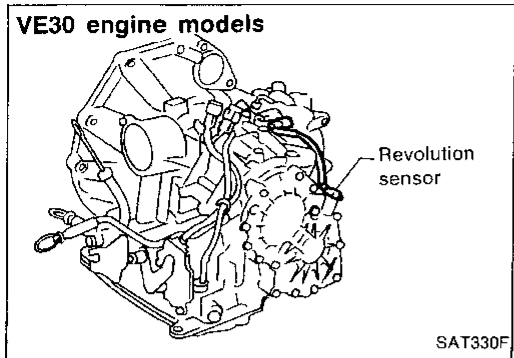
Revolution Sensor Replacement

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

Always use new sealing parts.

ON-VEHICLE SERVICE

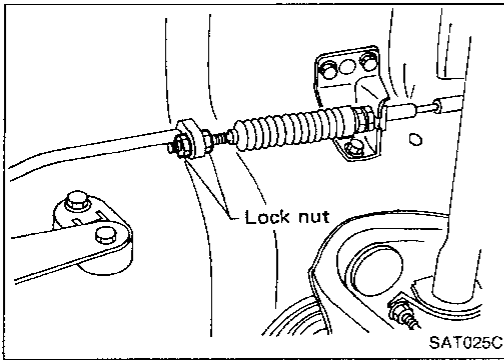
Revolution Sensor Replacement (Cont'd)



Inhibitor Switch Adjustment

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

4. Insert pin into adjustment holes in both inhibitor switch and manual shaft as near vertical as possible.
5. Reinstall any part removed.
6. Check continuity of inhibitor switch. — Refer to "Electrical Components Inspection".
VG30 engine (RE4F02A) AT-76
VE30 engine (RE4F04V) AT-150

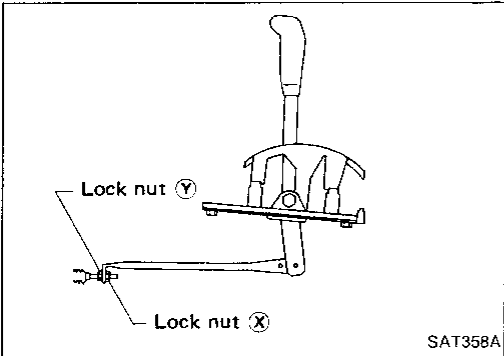


Control Cable Adjustment

Move selector lever from "P" position to "1" position. You should be able to feel the detents in each position.

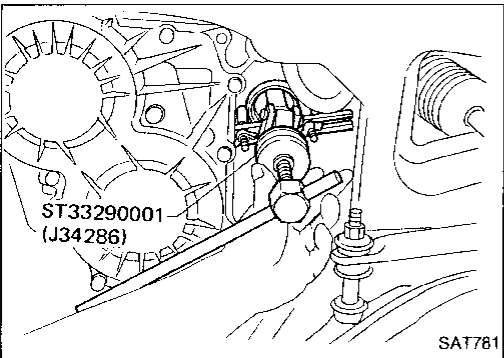
If the detents cannot be felt or the pointer indicating the position is improperly aligned, the linkage needs adjustment.

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



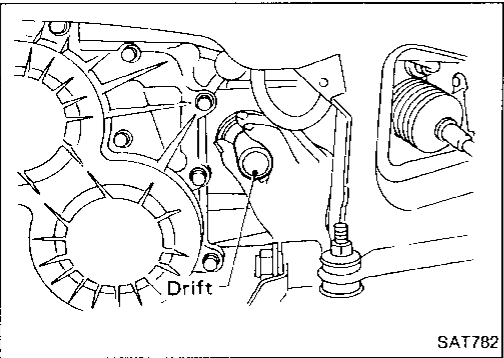
3. Screw lock nut (X) until it touches select rod end while holding select rod horizontal, and tighten lock nut (Y).

4. Move selector lever from "P" position to "1" position again. Make sure selector lever moves smoothly.



Differential Side Oil Seal Replacement

1. Remove drive shaft assembly. — Refer to section FA.
2. Remove oil seal.



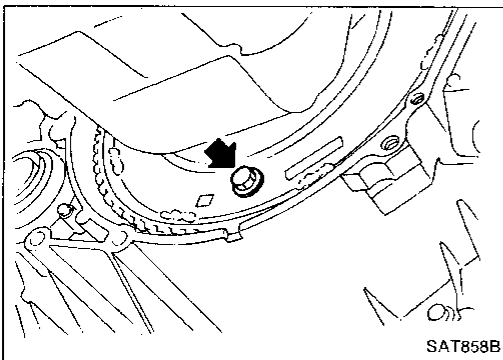
3. Install oil seal.

Apply ATF before installing.

4. Reinstall any part removed.

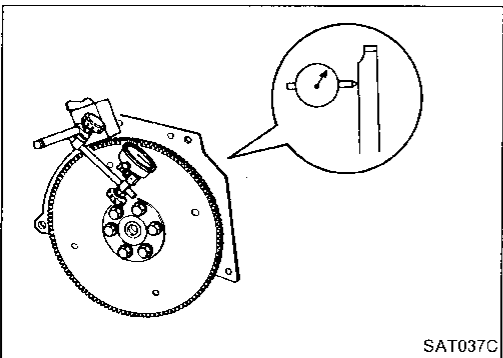
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REMOVAL AND INSTALLATION



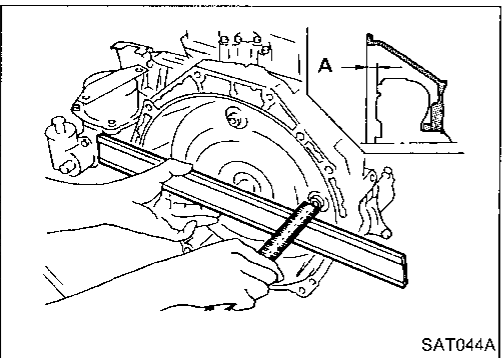
Removal

- Disconnect drive shafts. Refer to Drive Shaft (section FA) for removal.
- Remove bolts securing torque converter to drive plate.
 - a. Remove those bolts by turning crankshaft.
 - b. Immediately after transaxle is disconnected, inscribe matching marks on torque converter and drive plate so that they may be reinstalled in their original positions.
- Plug up openings such as oil charging pipe, etc.



Installation

- Drive plate runout
 - Maximum allowable runout:
Refer to EM section ("Inspection", "CYLINDER BLOCK".)
- If this runout is out of allowance, replace drive plate and ring gear.



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

Distance "A":

VG30 engine models

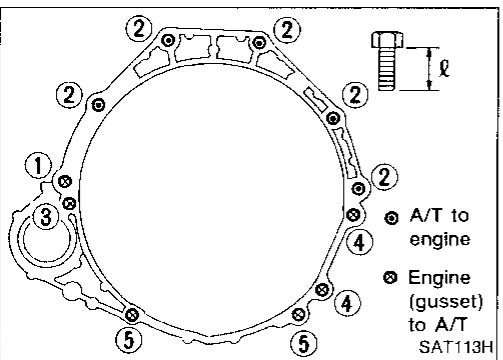
18 mm (0.71 in) or more

VE30 engine models

14 mm (0.55 in) or more

- Install converter to drive plate.

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



VG30 engine models — RE4F02A

- Tighten bolts securing transaxle.

Bolt No.	Tightening torque N·m (kg·m, ft·lb)	ℓ mm (in)
1	30 - 40 (3.1 - 4.1, 22 - 30)	60 (2.36)
2	39 - 49 (4.0 - 5.0, 29 - 36)	45 (1.77)
3	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)
4	6 - 8 (0.6 - 0.8, 4.3 - 5.8)	20 (0.79)
5*	30 - 40 (3.1 - 4.1, 22 - 30)	28 (1.10)

*Nuts and washers.

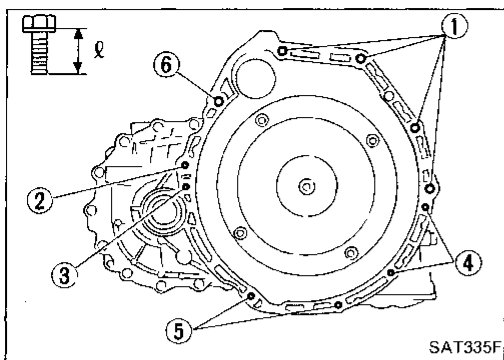
- Reinstall any part removed.

REMOVAL AND INSTALLATION

Installation (Cont'd)

VE30 engine models — RE4F04V

1. Tighten bolts securing transaxle.



Bolt No.	Tightening torque N-m (kg-m, ft-lb)	ℓ mm (in)
1	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
2	39 - 49 (4.0 - 5.0, 29 - 36)	60 (2.36)
3	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)
4	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)
5*	30 - 40 (3.1 - 4.1, 22 - 30)	—
6	43 - 58 (4.4 - 5.9, 32 - 43)	115 (4.53)
Front gusset or Rear gusset to engine	30 - 40 (3.1 - 4.1, 22 - 30)	25 (0.98)

*: Nuts and washers.

2. Reinstall any part removed.
3. Check fluid level in transaxle.
4. Move selector lever through all positions to be sure that transaxle operates correctly.
With parking brake applied, rotate engine at idling. Move selector lever through "N" to "D", to "2", to "1" and to "R". A slight shock should be felt by hand gripping selector each time transaxle is shifted.
5. Perform road test — Refer to "Road Testing".
VG30 (RE4F02A) AT-29
VE30 (RE4F04V) AT-100

GI

MA

EM

LC

EF &
EC

FE

CL

MT

AT

FA

RA

BR

ST

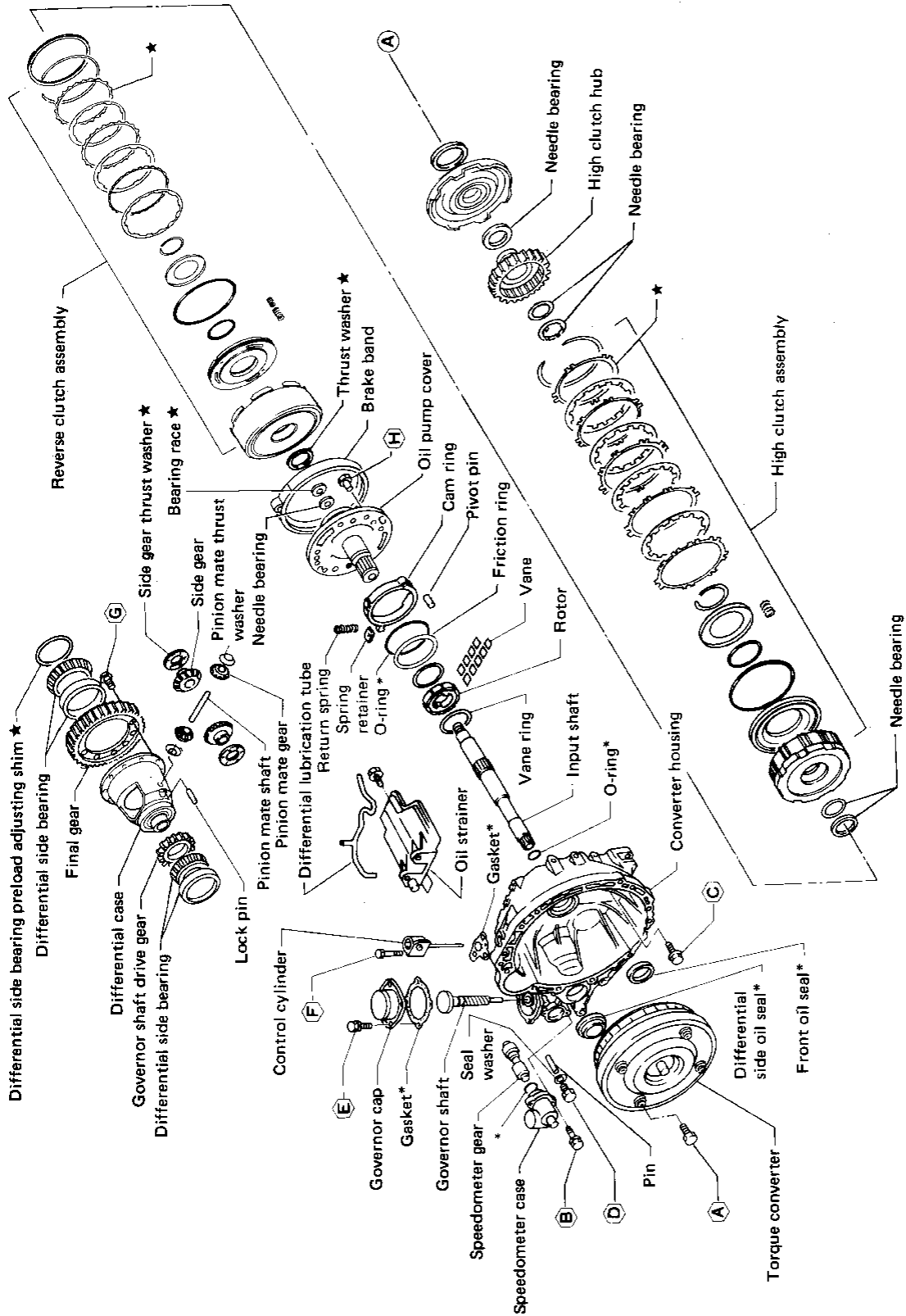
BF

HA

EL

IDX

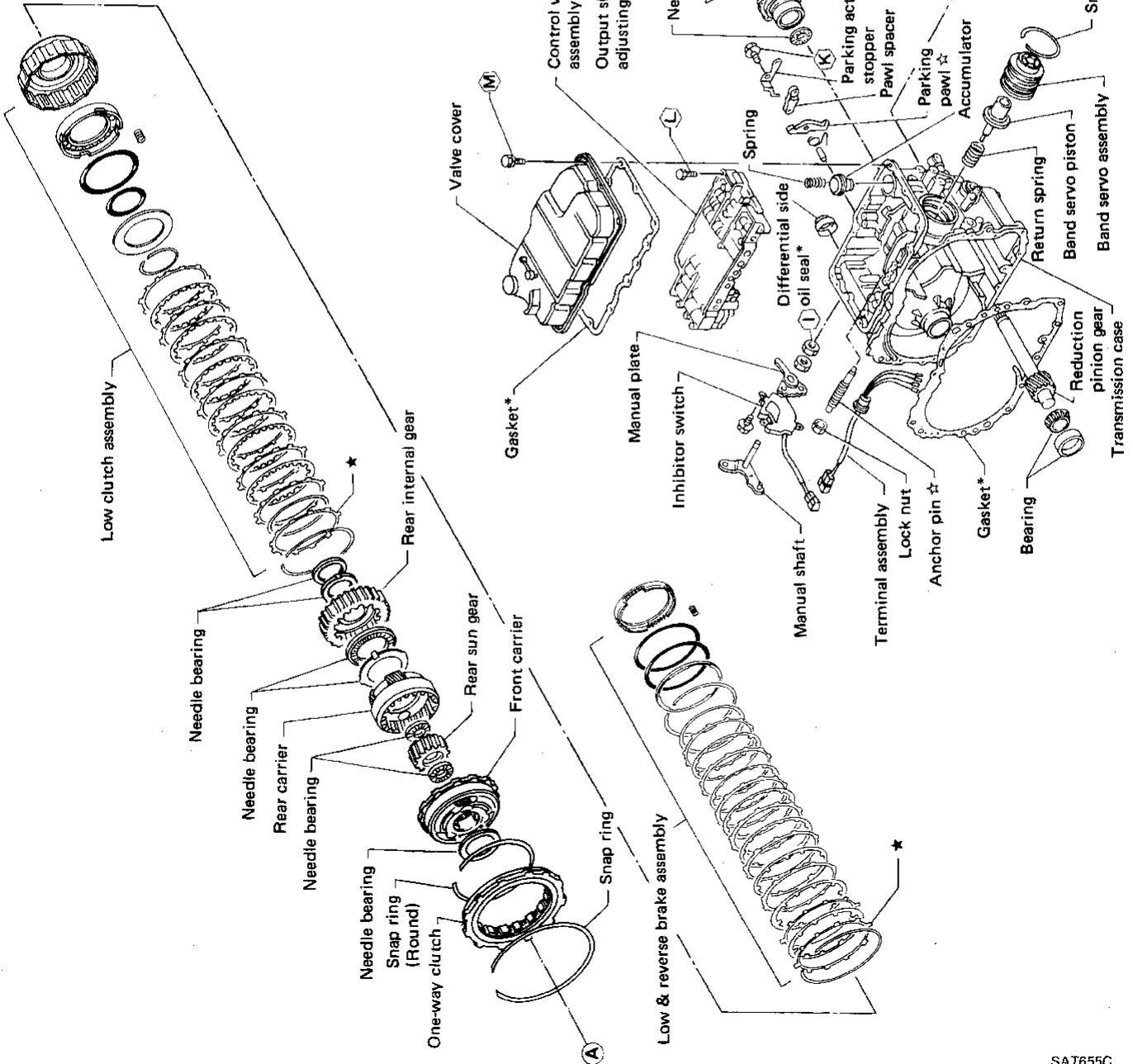
RE4F02A



- * : Always replace when disassembled.
- ★ : Select with proper thickness.
- ☆ : Adjustment is required.

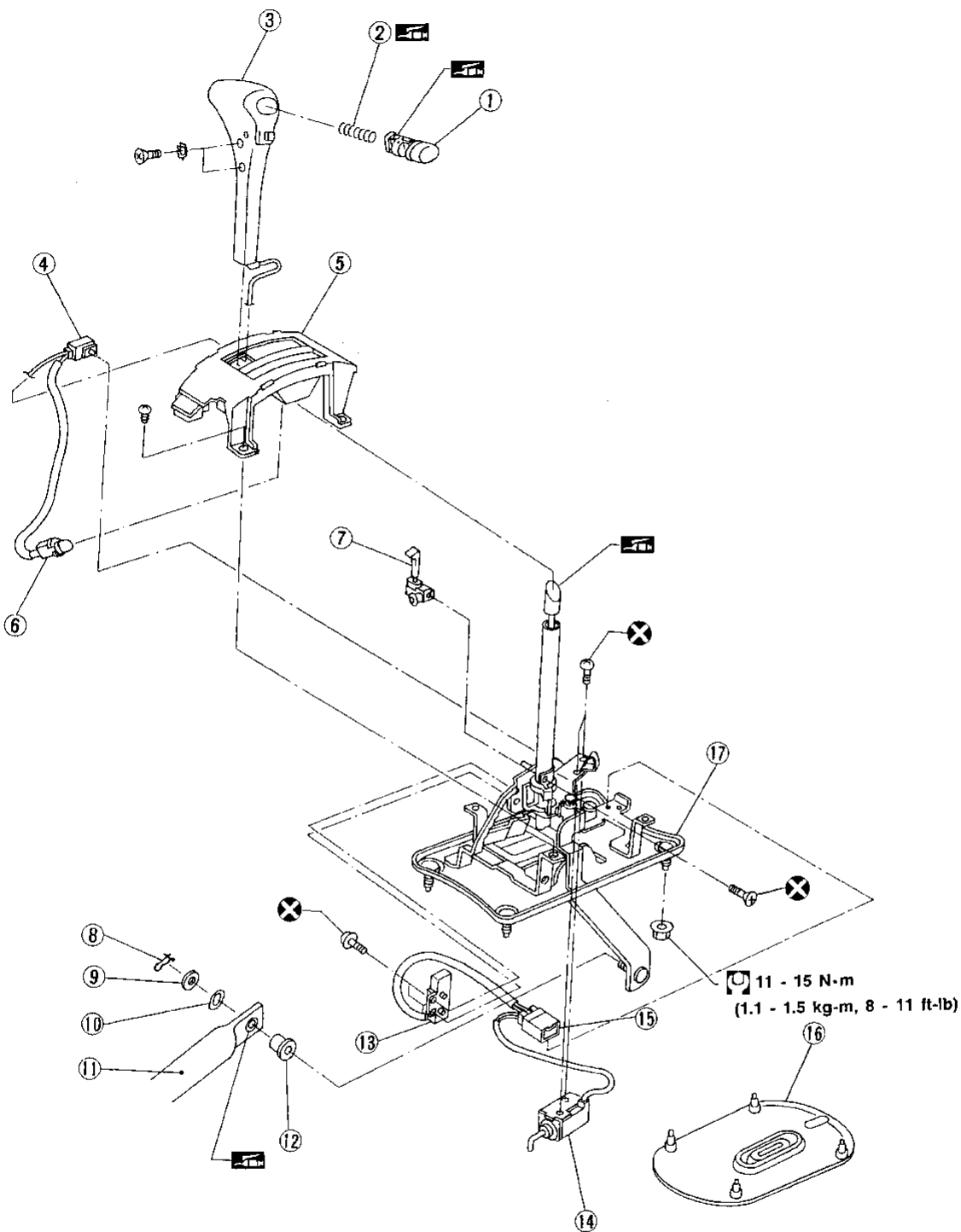
RE4F02A (Cont'd)

- Ⓜ : N·m (kg·m, ft·lb)
- Ⓐ : 44 - 59 (4.5 - 6.0, 33 - 43)
- Ⓑ : 6.3 - 8.3 (0.64 - 0.85, 4.6 - 6.1)
- Ⓒ : Refer to section "ASSEMBLY".
- Ⓓ : 20 - 26 (2.0 - 2.7, 14 - 20)
- Ⓔ : 5 - 7 (0.5 - 0.7, 3.6 - 5.1)
- Ⓕ : 6.3 - 8.3 (0.64 - 0.85, 4.6 - 6.1)
- Ⓖ : 74 - 88 (7.5 - 9.0, 54 - 65)
- Ⓗ : 16 - 21 (1.6 - 2.1, 12 - 15)
- Ⓘ : 31 - 42 (3.2 - 4.3, 23 - 31)
- Ⓛ : { 7 - 9 (0.7 - 0.9, 5.1 - 6.5)
- 3.7 - 5.0 (0.38 - 0.51, 2.7 - 3.7)
- Ⓜ : 5 - 7 (0.5 - 0.7, 3.6 - 5.1)



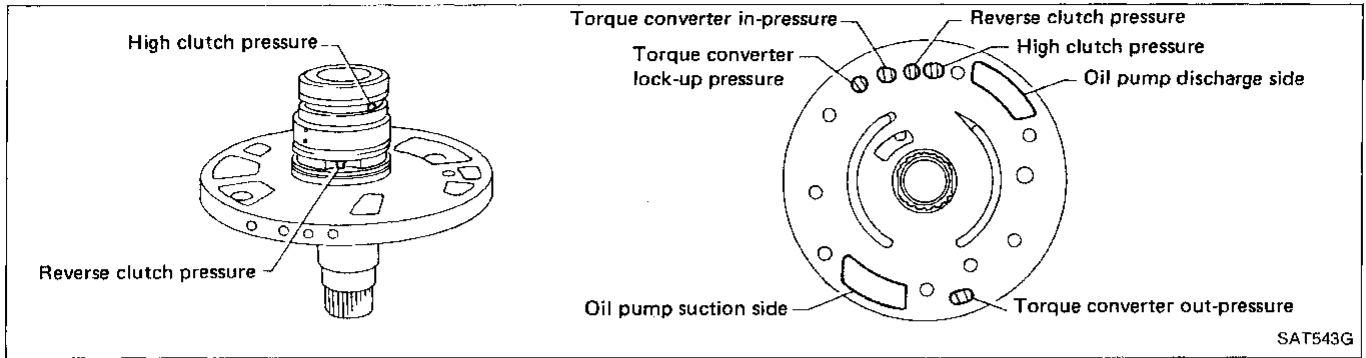
- GI
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Shift Control Components

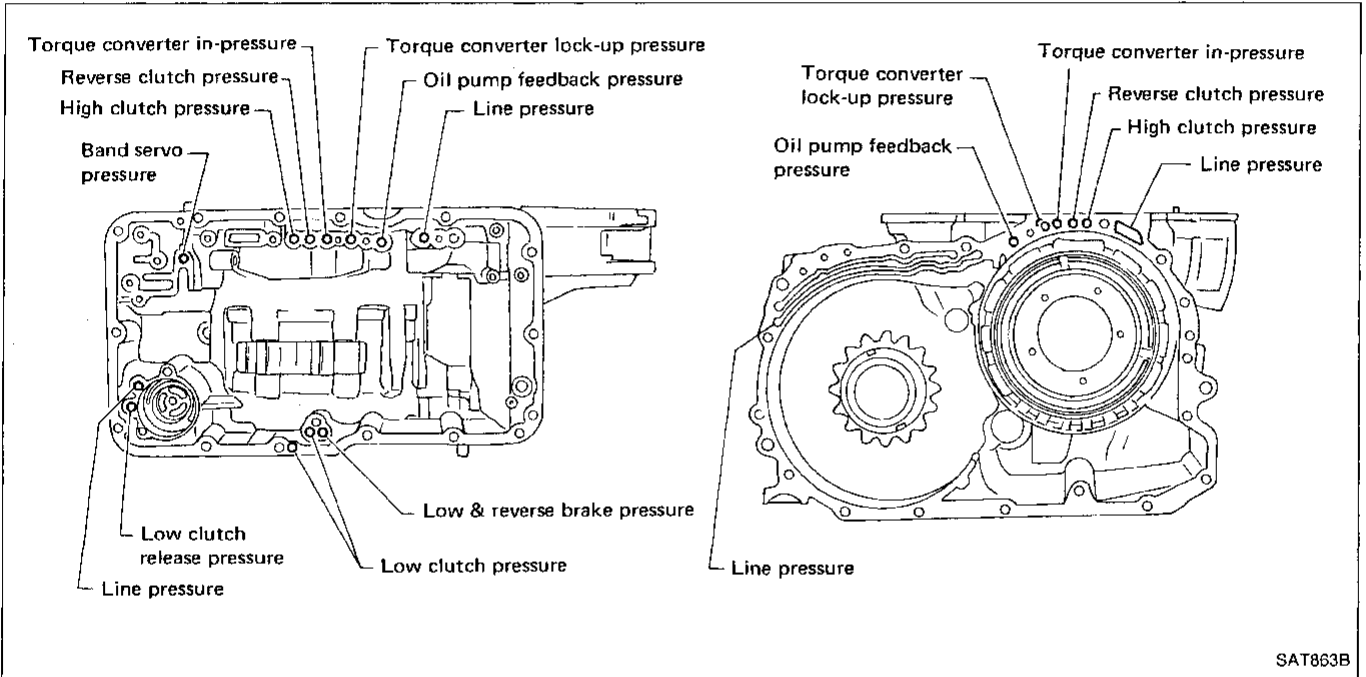


- | | | |
|---|---------------------------|--|
| ① Selector lever release button | ⑥ Position indicator lamp | ⑬ Detention switch (Shift and key) |
| ② Return spring | ⑦ Shift lock release knob | ⑭ Shift lock solenoid |
| ③ Selector lever knob | ⑧ Snap pin | ⑮ Shift lock solenoid and detention switch harness connector |
| ④ O.D. control switch and position indicator lamp harness connector | ⑨ Washer | ⑯ Dust cover |
| ⑤ Position indicator | ⑩ Wave washer | ⑰ Selector lever assembly |
| | ⑪ Selector rod | |
| | ⑫ Insulator | |

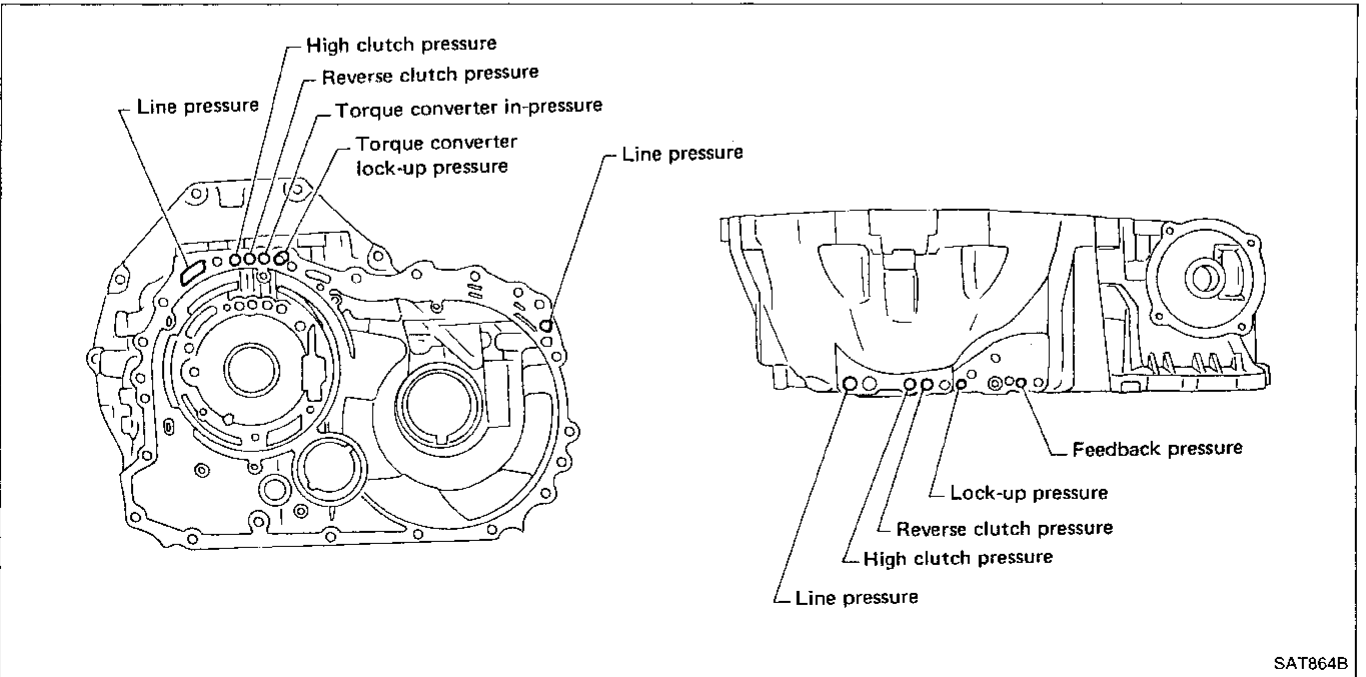
Oil Channel
OIL CHANNELS IN OIL PUMP COVER



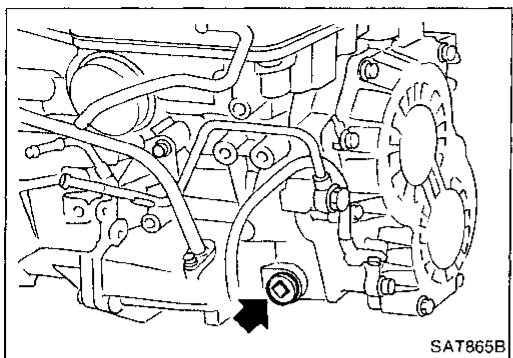
OIL CHANNELS IN TRANSMISSION CASE



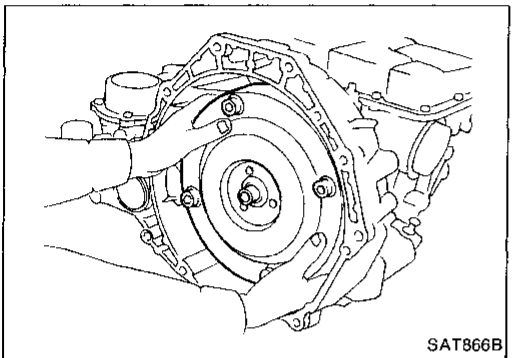
OIL CHANNELS IN CONVERTER HOUSING



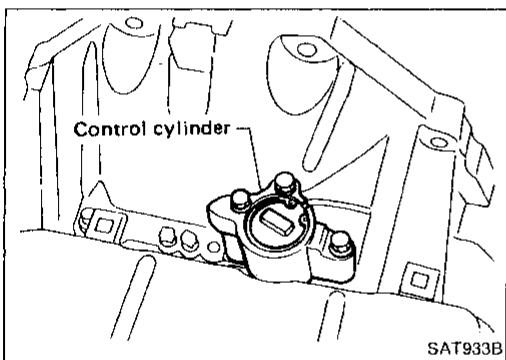
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**Disassembly**

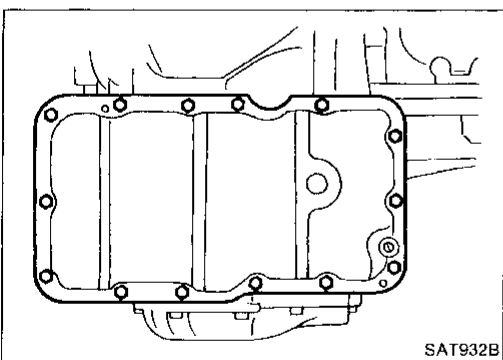
1. Drain ATF through drain hole.



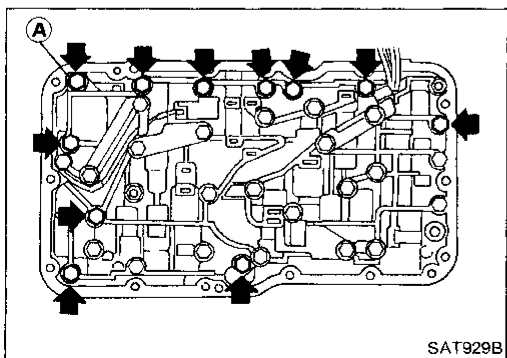
2. Remove torque converter.



3. Remove control cylinder.

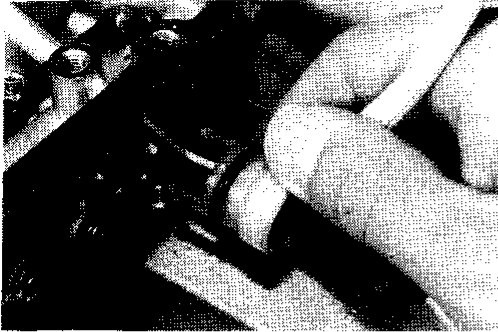


4. Remove control valve cover.



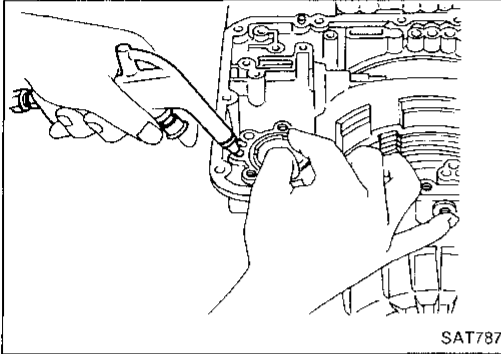
5. Disconnect harness connectors on control valve and remove control valve assembly.

Disassembly (Cont'd)

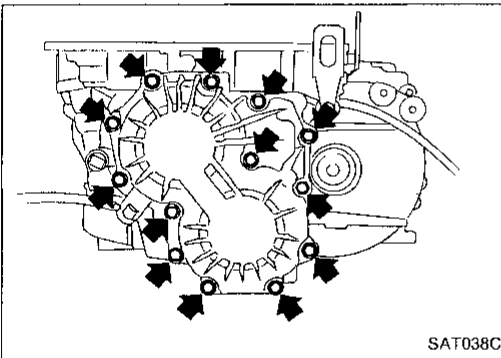


6. Remove terminal assembly.

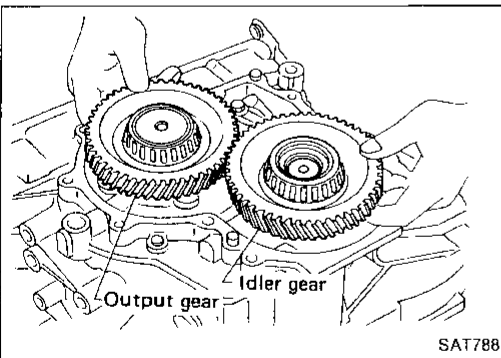
The terminal retrieving hooks will break if they are forced inward too far. Bend them gently inward while pulling carefully outward on the terminal. Do not pull on the wires.



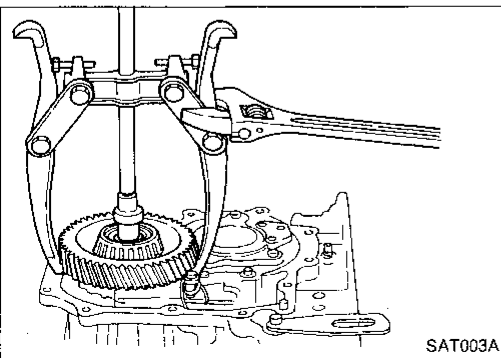
7. Remove accumulator.



8. Remove side cover.



9. Remove output gear.



10. Draw out idler gear.

GI

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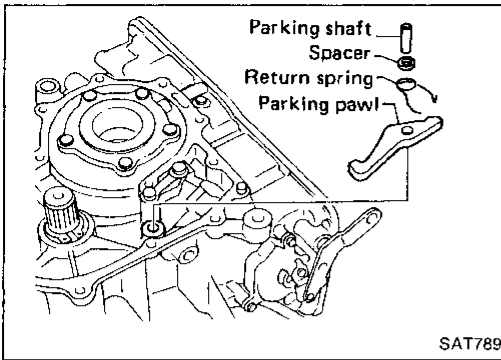
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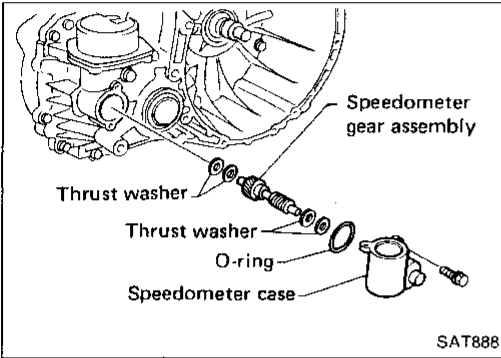
EL

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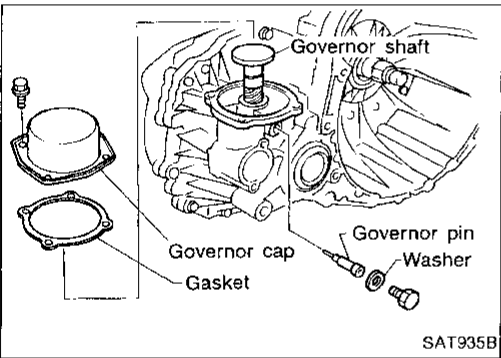
Disassembly (Cont'd)



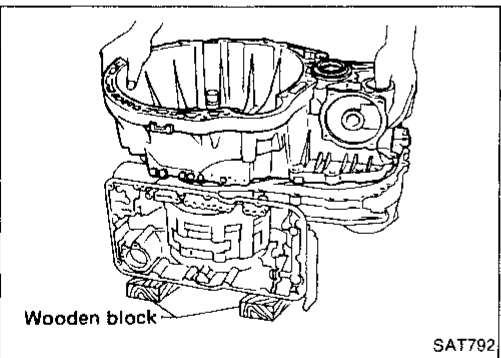
11. Remove parking pawl, return spring, parking shaft and spacer.



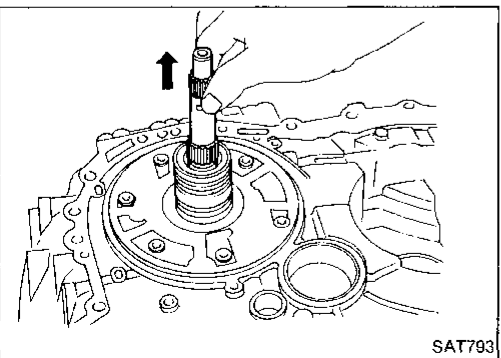
12. Remove speedometer and speedometer gear.



13. Remove governor shaft.



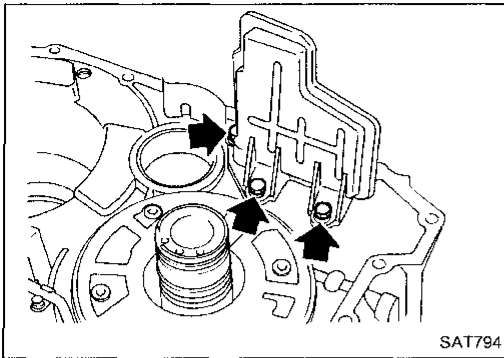
14. Put transaxle assembly on wooden block and remove converter housing.



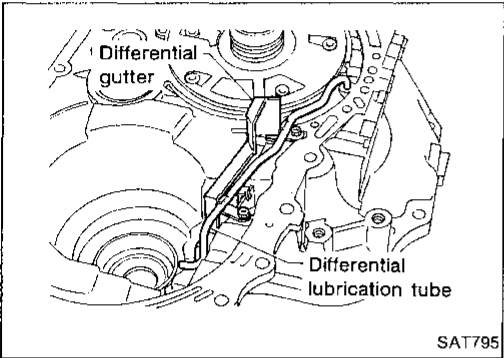
15. Remove final drive assembly and reduction pinion gear.
 16. After removing O-ring from input shaft, extract input shaft from converter housing.

Disassembly (Cont'd)

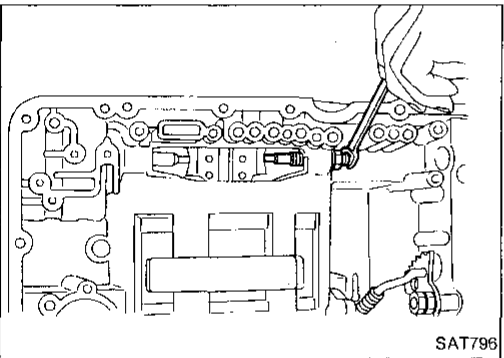
17. Remove oil strainer.



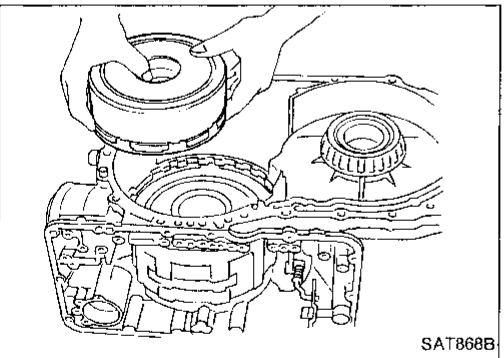
18. Remove differential lubrication tube and gutter.



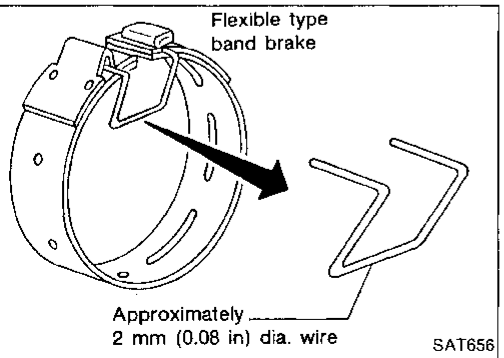
19. Loosen band brake stem lock nut, then back off piston stem.



20. Remove brake band and high clutch & reverse clutch pack.



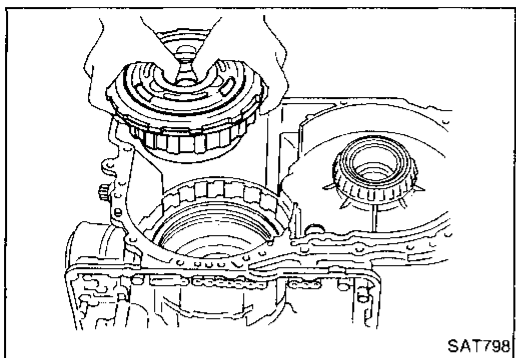
- To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. Before removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.



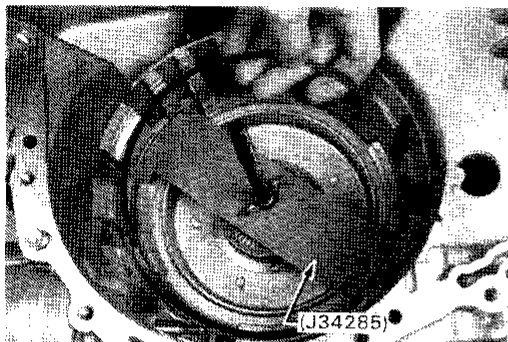
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Disassembly (Cont'd)

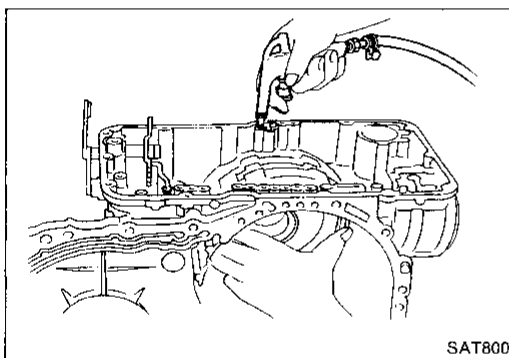
21. Remove one-way clutch, front carrier, rear carrier and low clutch as a set.



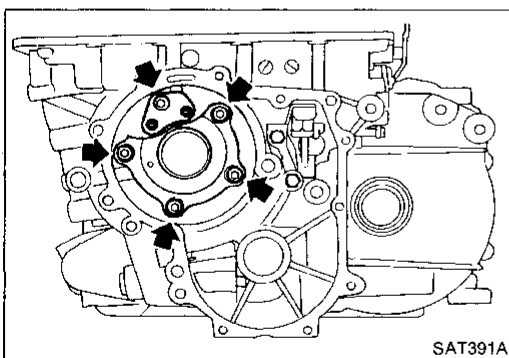
22. Remove low & reverse brake clutches, and detach low & reverse brake retainer snap ring pushing retainer.



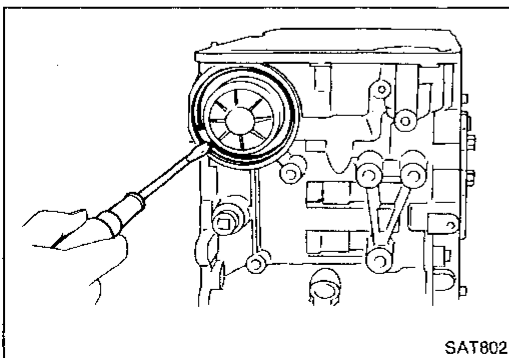
23. Remove low and reverse brake piston with compressed air.



24. Remove bearing retainer assembly.

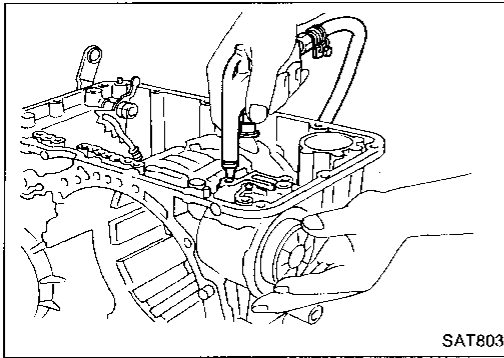


25. Remove band servo snap ring.

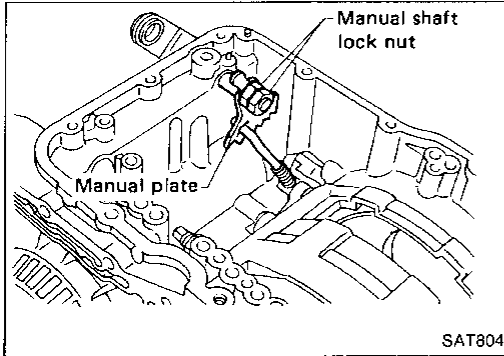


Disassembly (Cont'd)

26. Remove band brake servo, retainer and return spring.



27. Loosen manual shaft lock nuts and remove manual plate.
28. Pull out retaining pin, then remove manual shaft.



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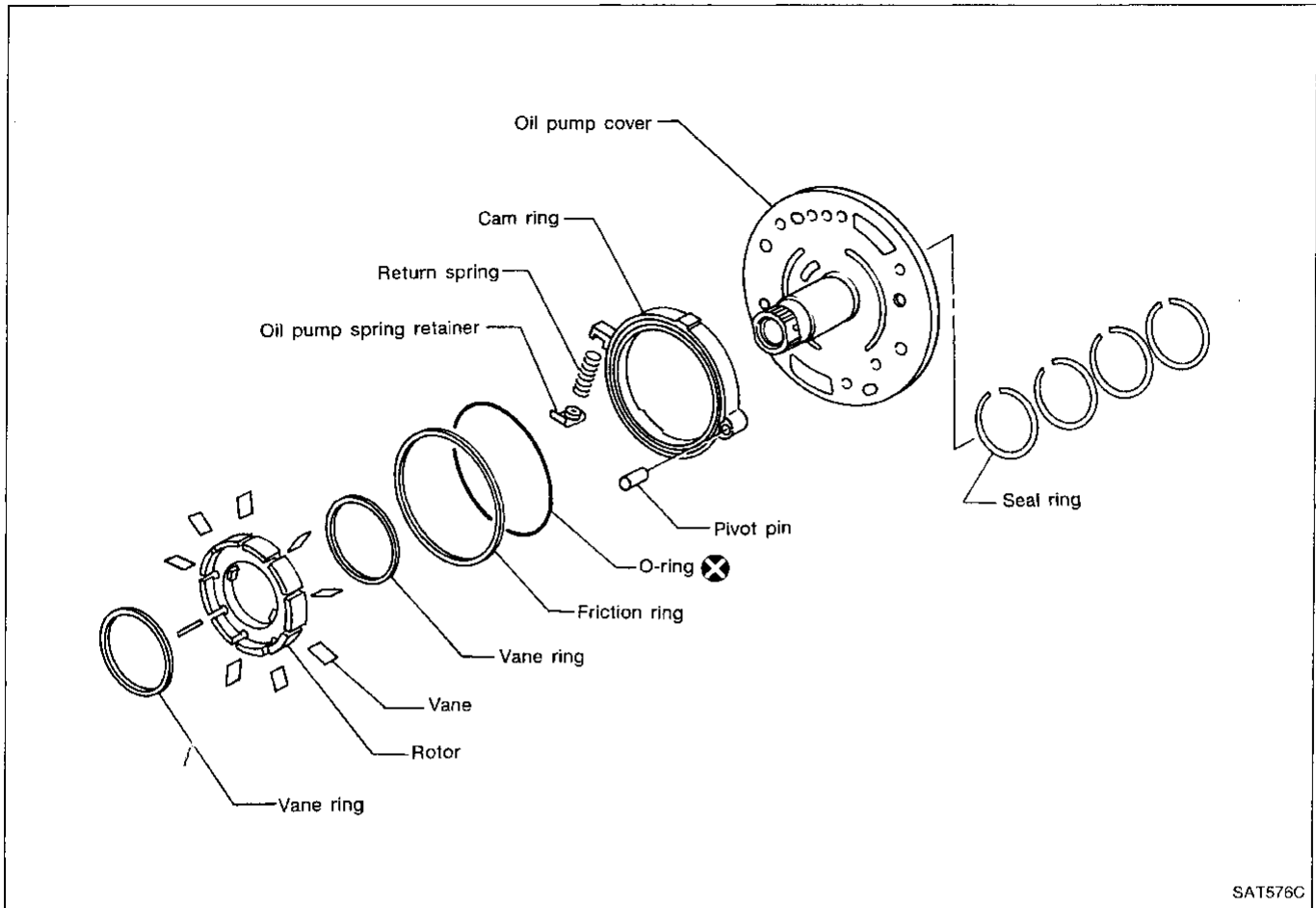
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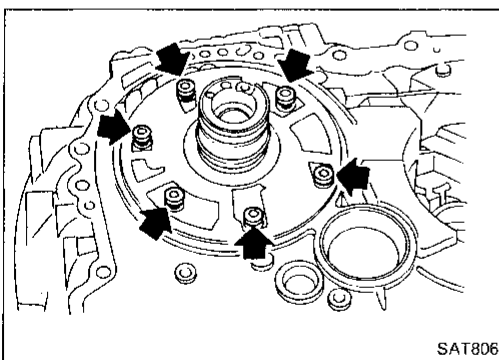
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Oil Pump



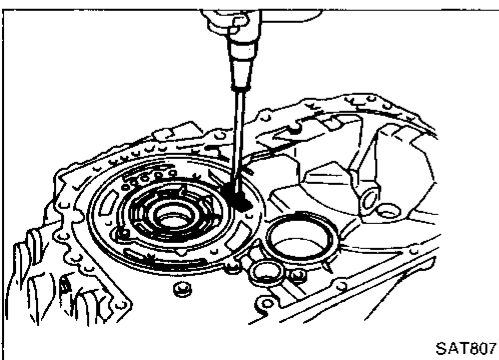
SAT1576C



SAT806

DISASSEMBLY

1. Remove oil pump cover.

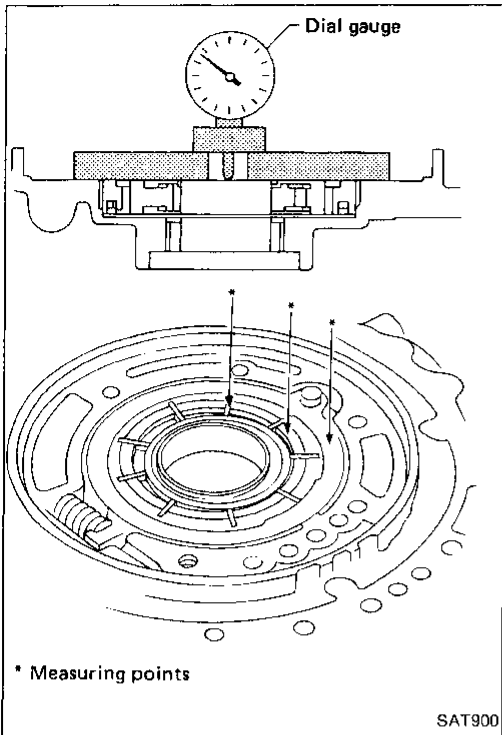


SAT807

2. Remove return spring taking care not to damage converter housing.

Oil Pump (Cont'd)

INSPECTION



1. Inspect oil pump cover, cam ring, rotor and vanes for damage and visible wear.
2. Measure clearance between clutch housing and cam ring, rotor and vanes in at least four places along their circumstances. The maximum measured value should be within the specified range.

- Be sure to remove friction ring and vane ring when measuring clearance.

Standard clearance:

0.010 - 0.024 mm (0.0004 - 0.0009 in)

(Cam ring to oil pump cover)

0.017 - 0.031 mm (0.0007 - 0.0012 in)

(Rotor to oil pump cover)

0.017 - 0.031 mm (0.0007 - 0.0012 in)

(Vane to oil pump cover)

Wear limit:

Cam ring 0.024 mm (0.0009 in)

Rotor 0.031 mm (0.0012 in)

Vane 0.031 mm (0.0012 in)

If the clearance is out of above specification, replace oil pump as an assembly.

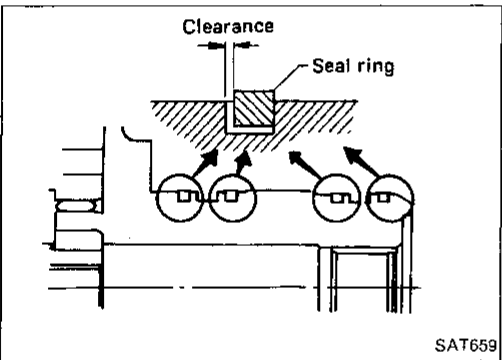
3. Measure clearance between seal ring and ring groove.

Standard clearance:

0.10 - 0.25 mm (0.0039 - 0.0098 in)

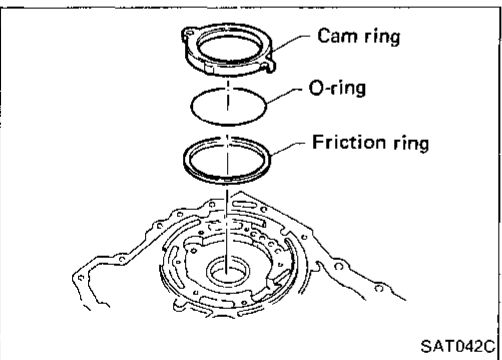
Wear limit:

0.25 mm (0.0098 in)

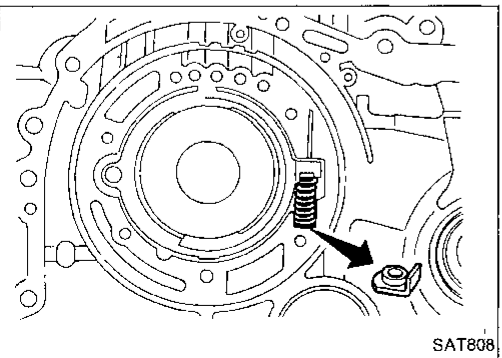


ASSEMBLY

1. Install cam ring, O-ring and friction ring.



2. Install return spring and spring retainer.



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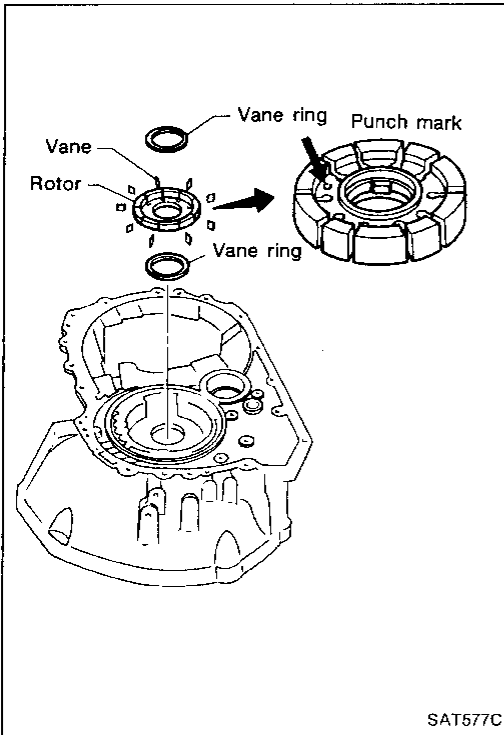
BF

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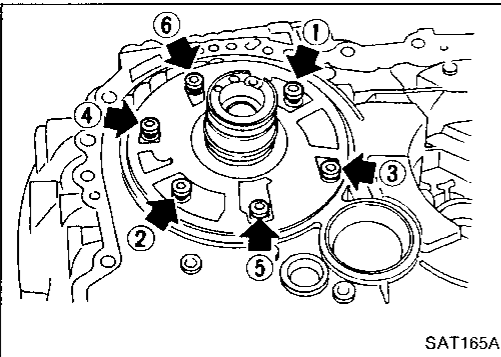
EL

DX

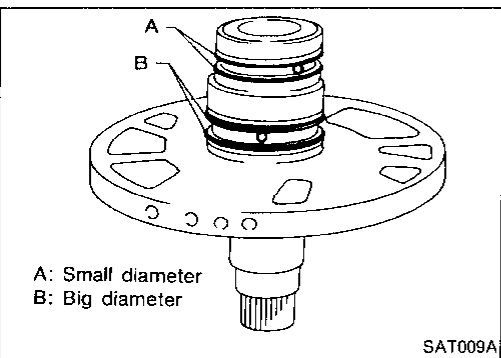
Oil Pump (Cont'd)



- Assemble rotor, vanes, rotor support ring and vane rings. Pay attention to direction of rotor.



- Install oil pump cover. Tighten down cover evenly in a criss-cross type pattern.



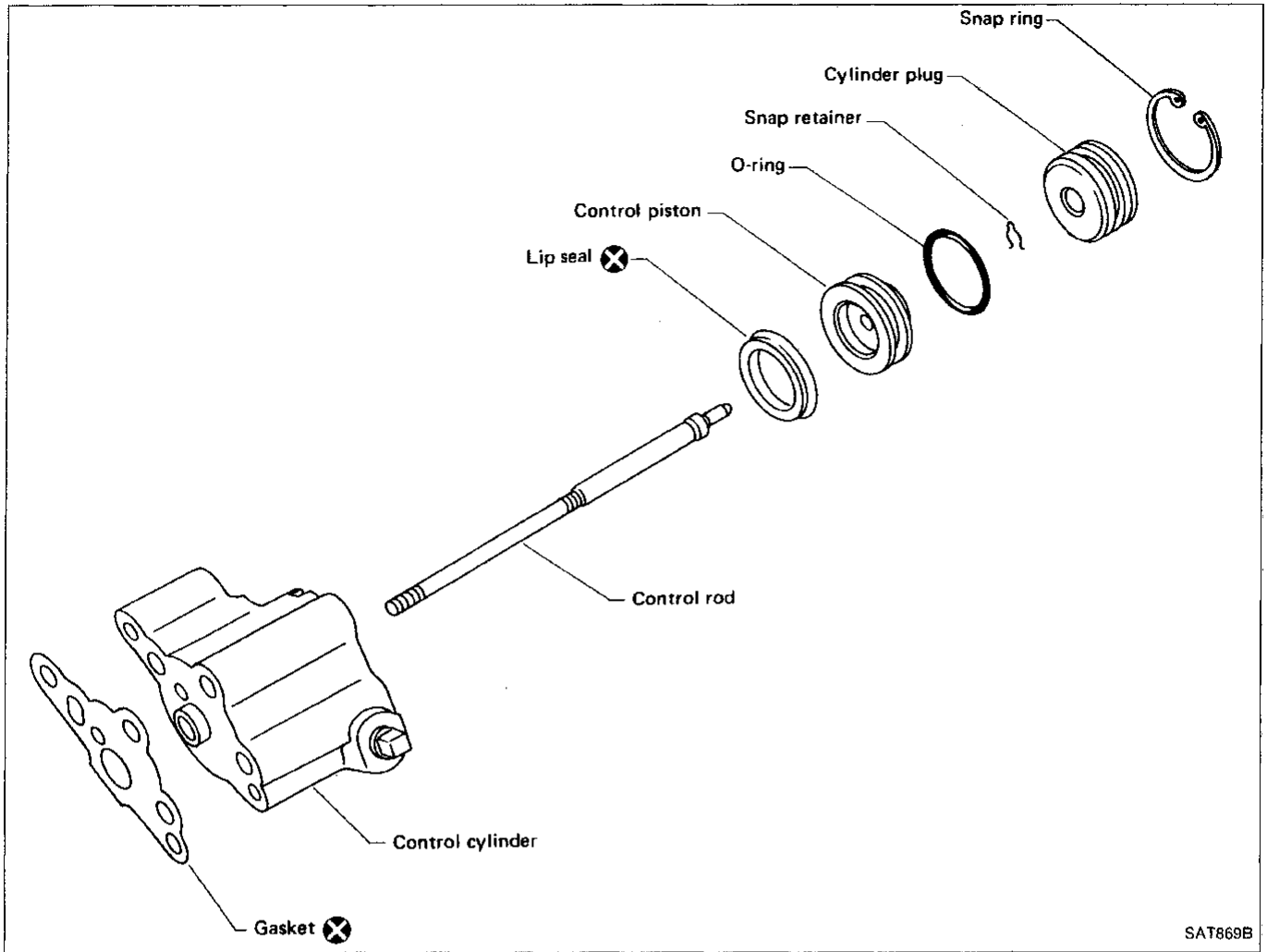
- Rotate the pump when it has been assembled to ensure that all parts have been correctly assembled.
- Install seal rings.

Refer to the figure at left for proper locations of the two different types of seal rings.



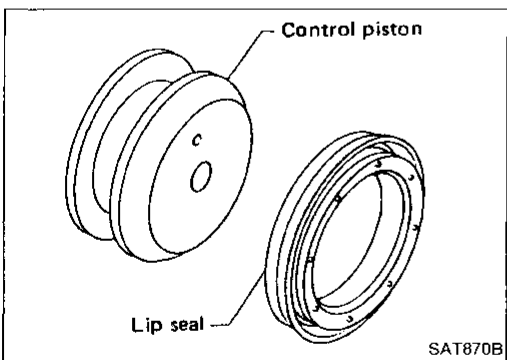
- These seal rings can be cut or deformed if they are improperly seated in their grooves when the drum is installed. Clean the ring grooves carefully and fill them with petroleum jelly. Then install the rings making sure they fit into the grooves as tightly as possible.

Control Cylinder



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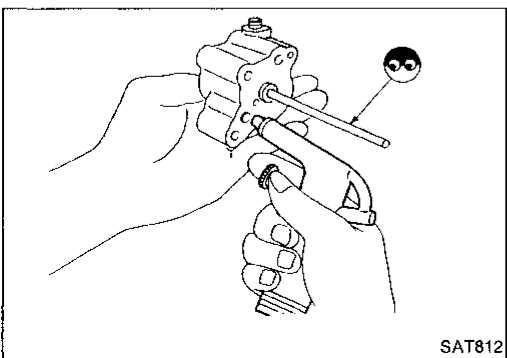
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INSPECTION AND ASSEMBLY

- Inspect control cylinder body, control piston and cylinder plug for scratches or damage. Replace if necessary.
- When assembling, pay attention to the direction of lip seal.

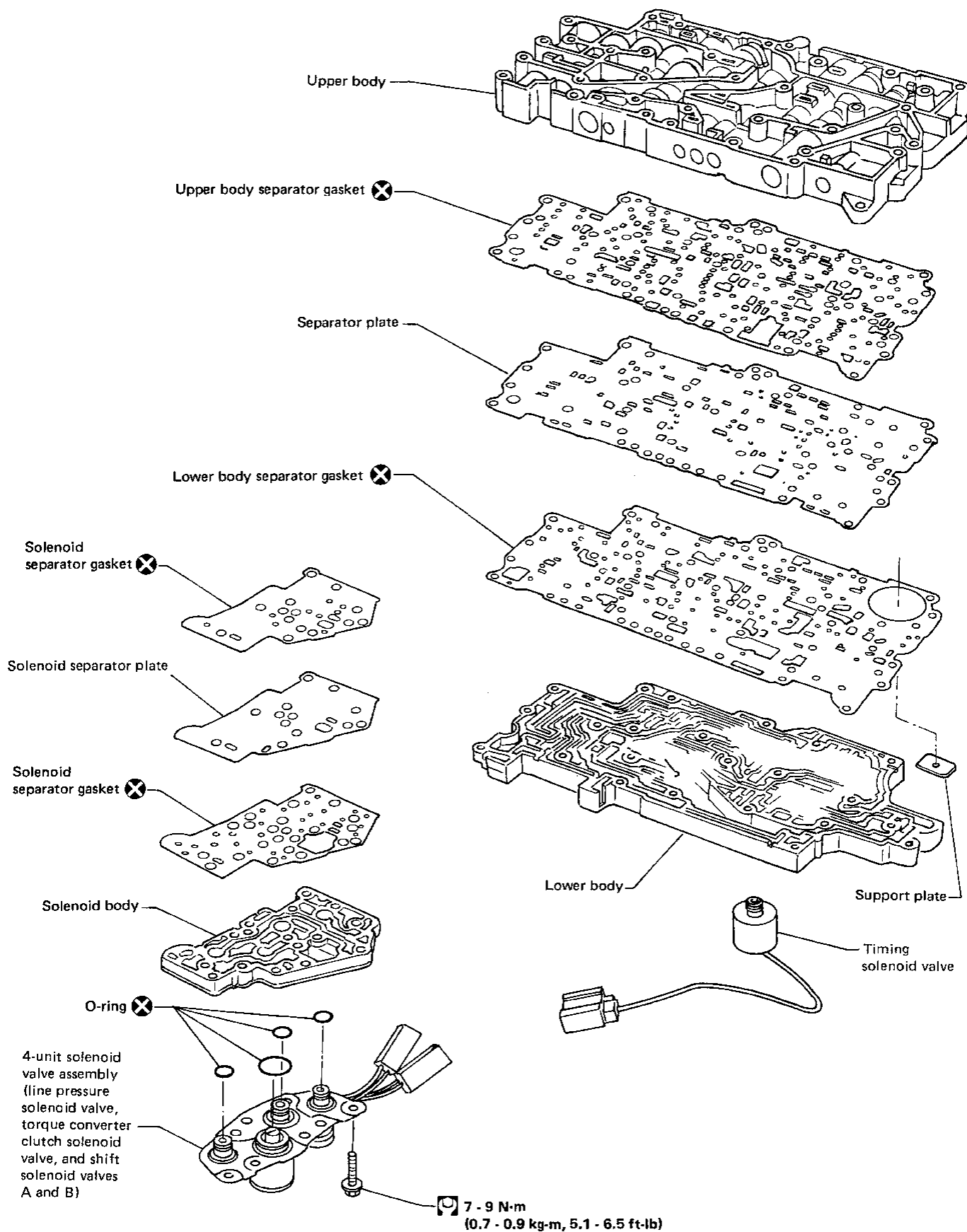
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- After assembling, check the operation.

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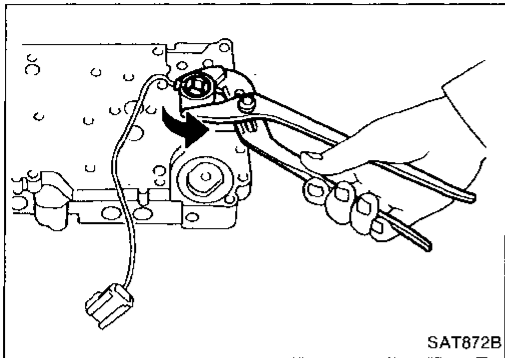
Control Valve Assembly



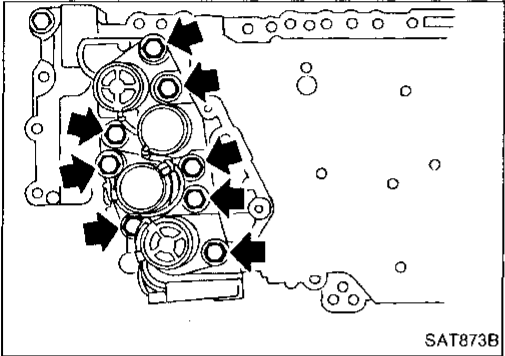
MAT227A

Control Valve Assembly (Cont'd)

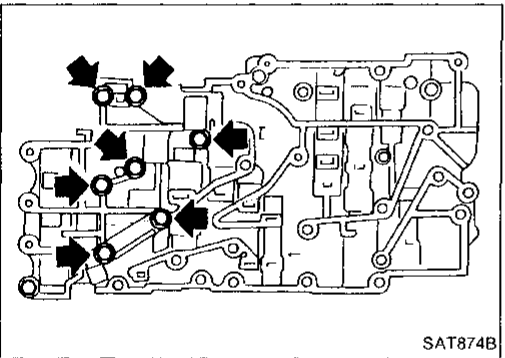
DISASSEMBLY



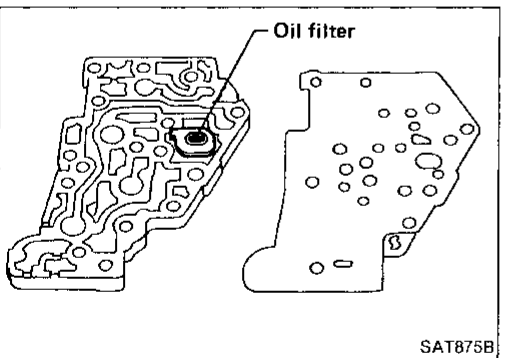
1. Remove solenoids.
 - a. Remove timing solenoid valve.
 - b. Remove O-ring from solenoid.



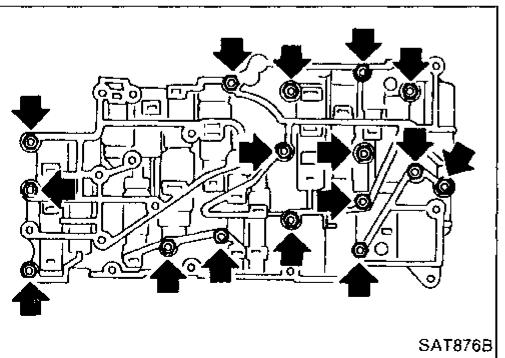
- c. Remove shift solenoid valve A, shift solenoid valve B, line pressure solenoid valve and torque converter clutch solenoid valve.
- d. Remove O-rings from solenoids.



2. Remove solenoid body.
 - a. Place lower body facedown and remove bolts.
- Be careful not to drop solenoid body.**



- b. Place upper body face down, and remove solenoid body with separator gaskets and separator plate.
- c. Remove separator gaskets, separator plate and oil filter from solenoid body.



3. Disassemble upper and lower bodies.
 - a. Place lower body facedown, and remove bolts, reamer bolts and support plate.

GI

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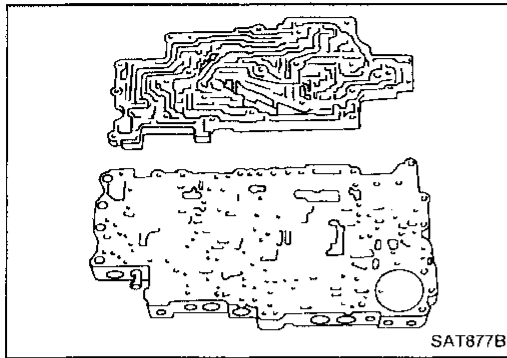
BF

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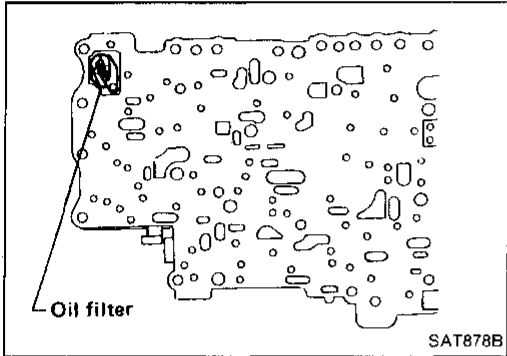
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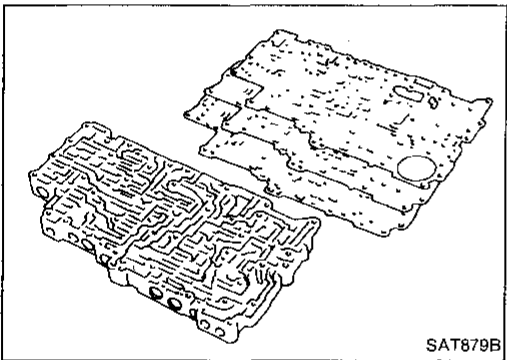
Control Valve Assembly (Cont'd)



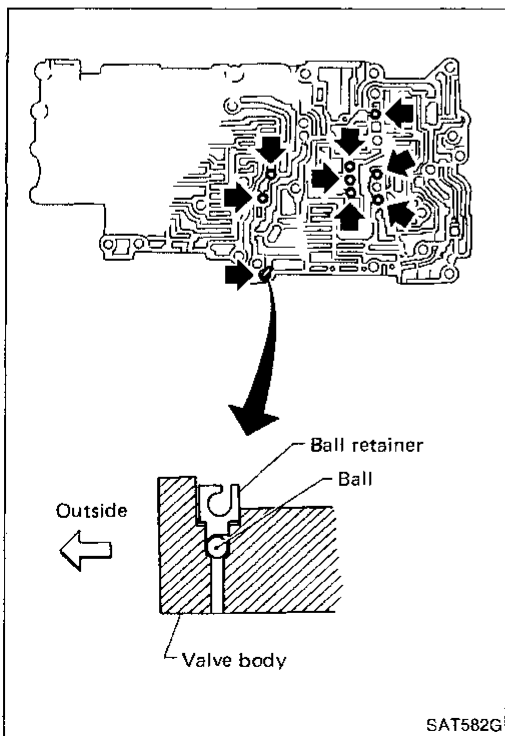
- b. Position upper body downward. Remove lower body with separator plate and separator gasket attached to upper body.



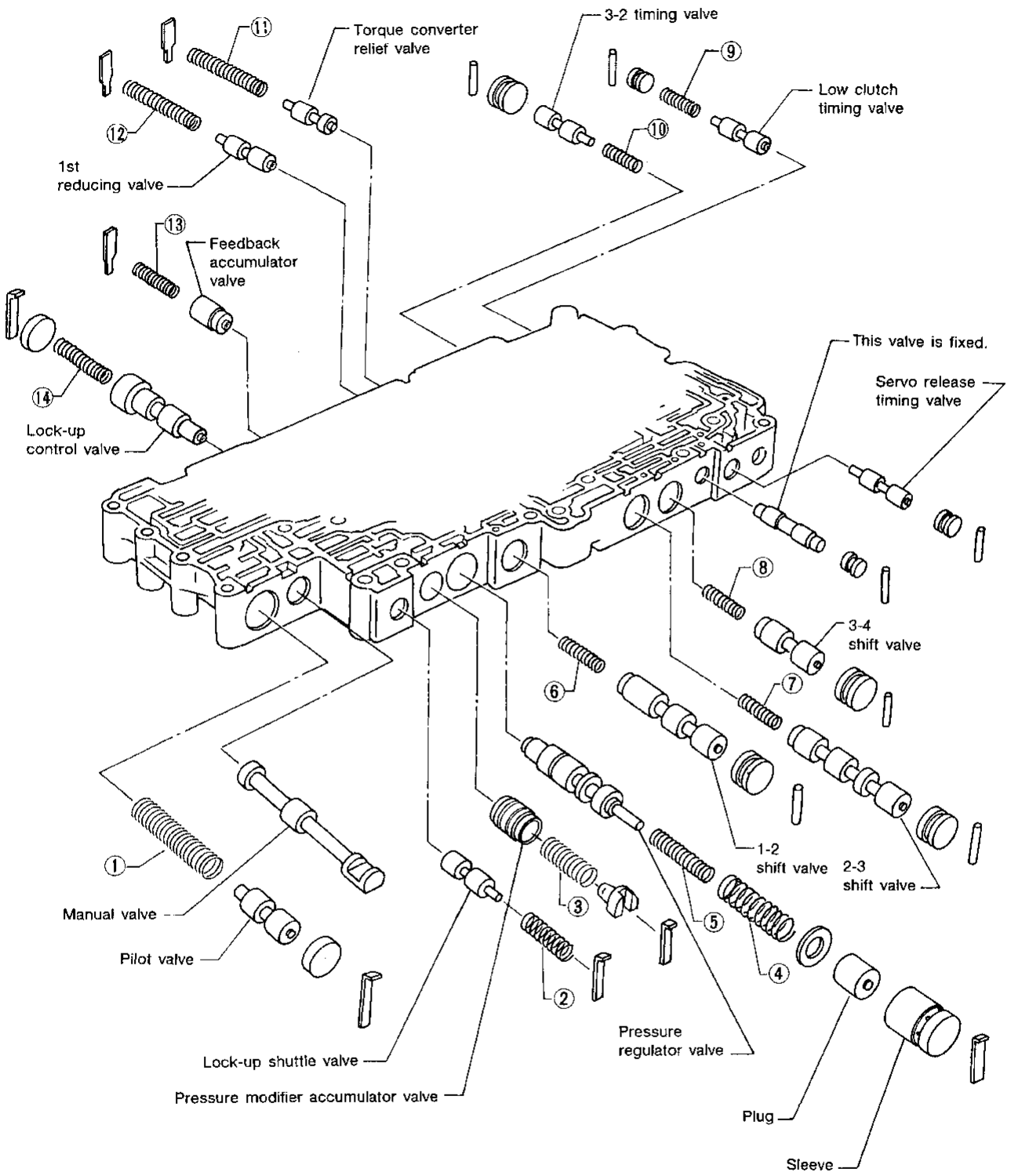
- c. Remove oil filter, separator gaskets and separator plate from upper body.



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

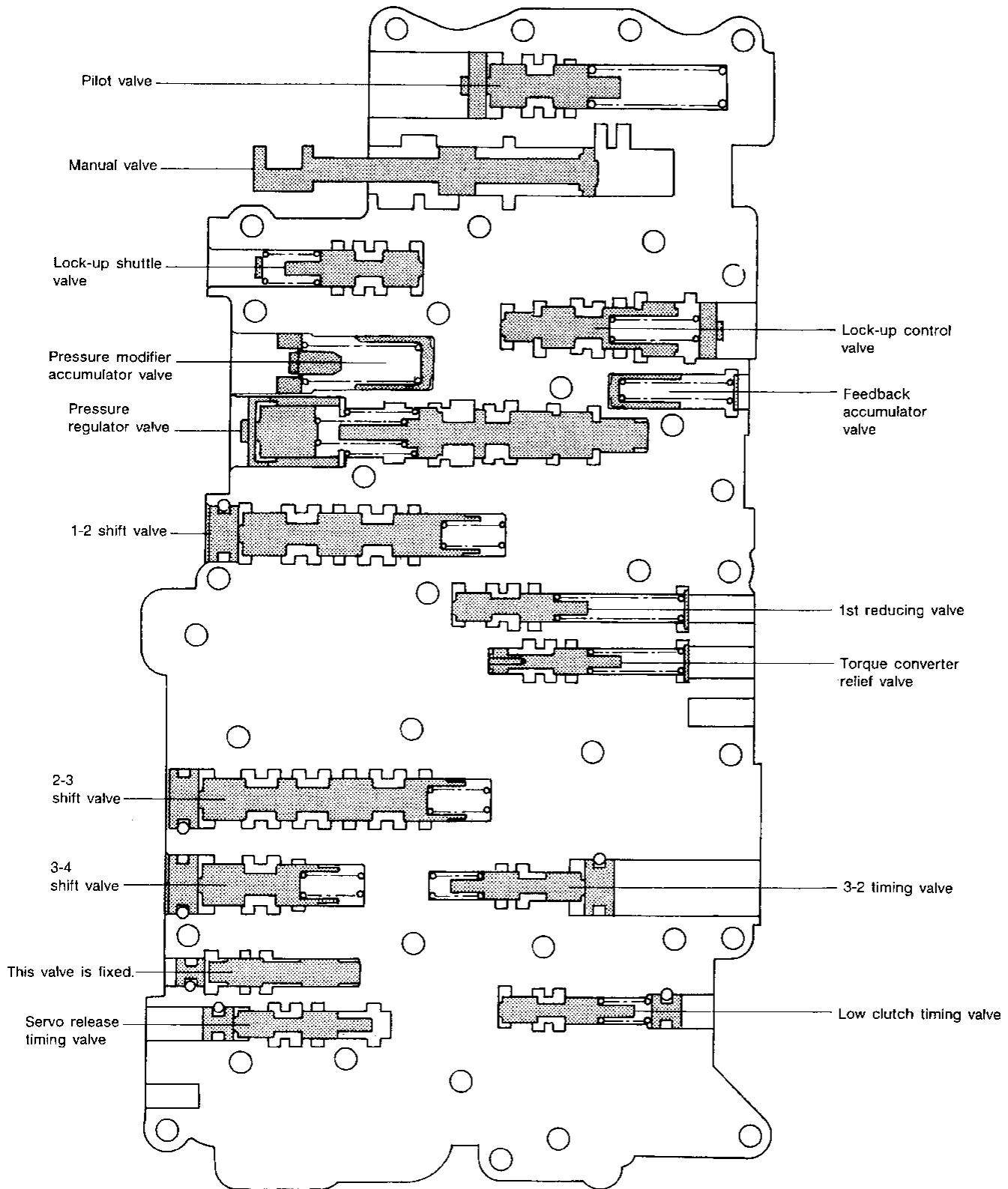


Control Valve Upper Body



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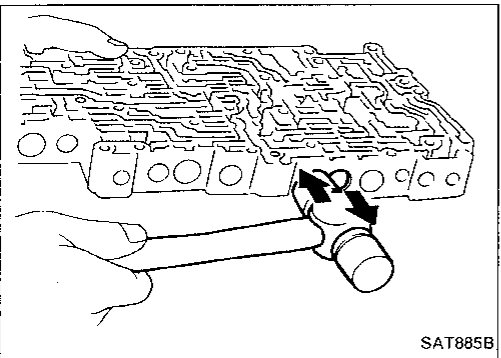
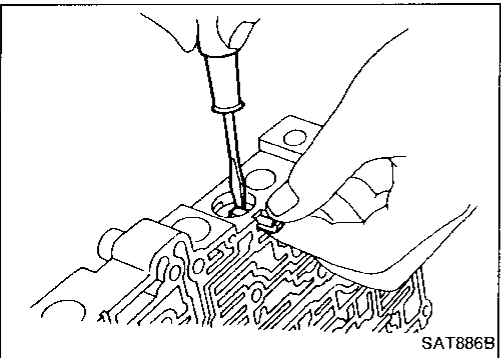
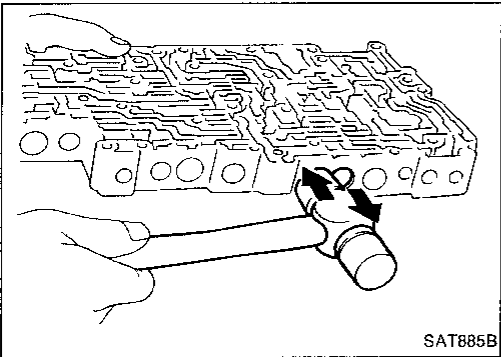
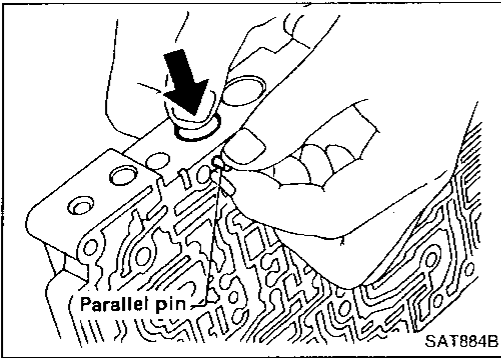
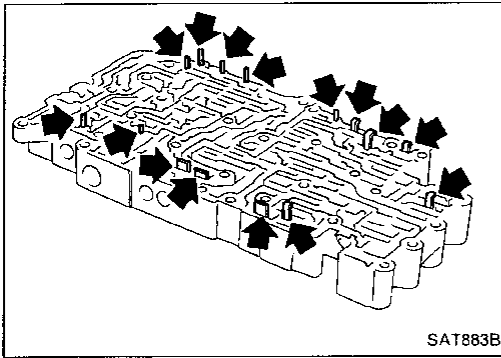
Control Valve Upper Body (Cont'd)



Control Valve Upper Body (Cont'd)

DISASSEMBLY

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



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

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

2. Remove valves at retainer plates.
 - a. Remove retainer plates while pressing their corresponding plugs, sleeves or springs.

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

GI

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Control Valve Upper Body (Cont'd)

INSPECTION

Valve springs

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
Inspection standard: Refer to SDS. AT-331
- Numbers of each valve spring in the figure on AT-203 are the same as those in the SDS table.
- Replace valve springs if deformed or fatigued.

Control valves

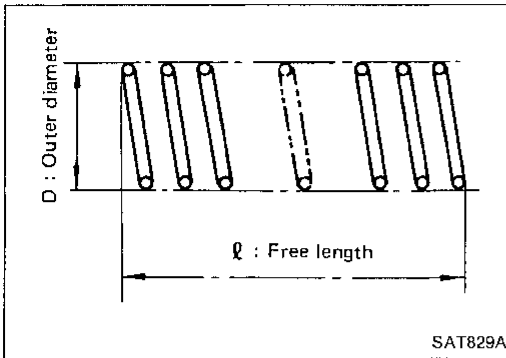
- Check sliding surfaces of valves, sleeves and plugs.

ASSEMBLY

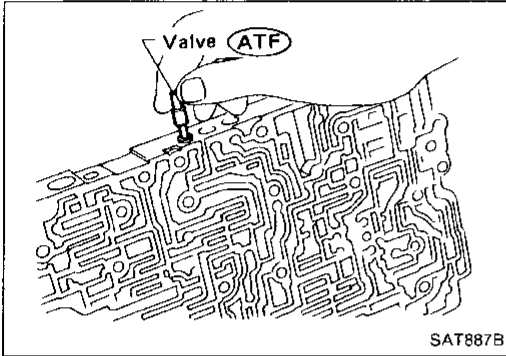
1. Lubricate the control valve body and all valves with ATF. Install control valves by sliding them carefully into their bores.

Be careful not to scratch or damage valve body.

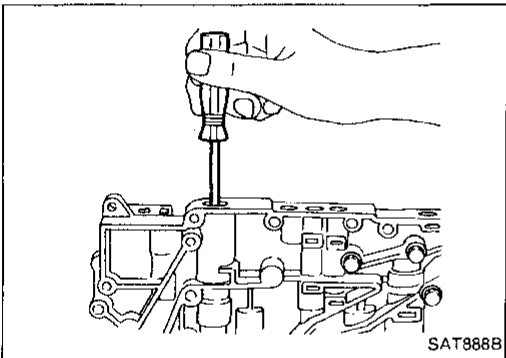
- Wrap a small screwdriver with vinyl tape and use it to insert the valves into proper position.



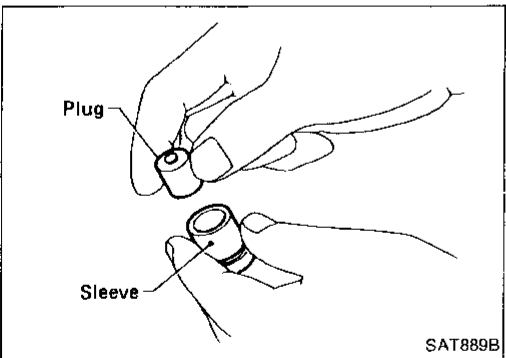
SAT829A



SAT887B



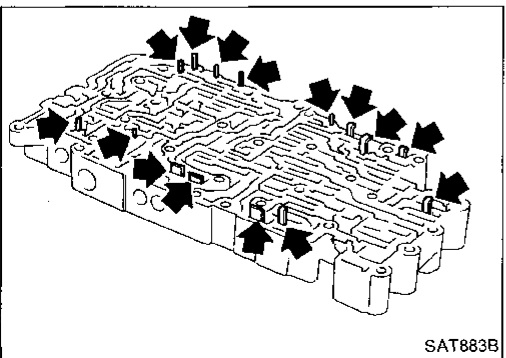
SAT888B



SAT889B

— Pressure regulator valve —

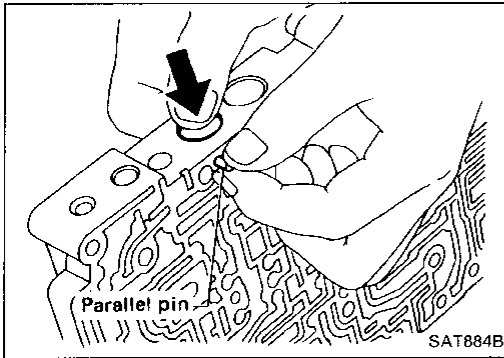
Position plug in sleeve and install pressure regulator valve on upper body.



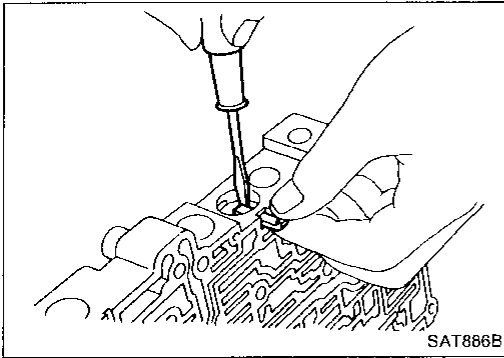
SAT883B

2. Install parallel pins and retainer plates.

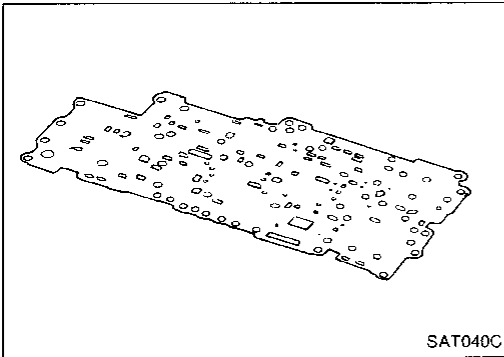
Control Valve Upper Body (Cont'd)



- While pushing plug, install parallel pin.



- Insert retainer plate while pressing their corresponding plugs, sleeves or springs.

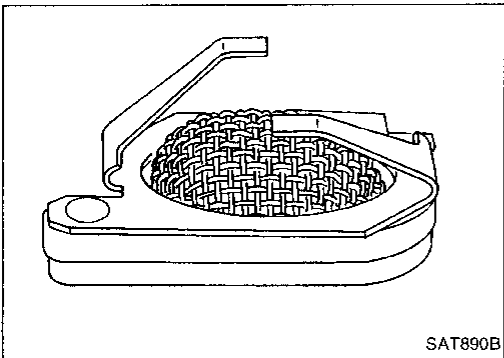


Control Valve Assembly

INSPECTION

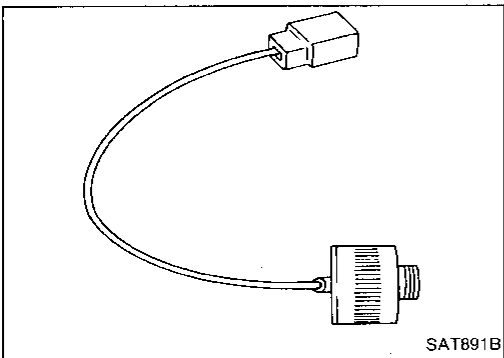
Separator plates

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



Oil filter

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



Timing solenoid valve

Measure resistance — Refer to "Electrical Components Inspection". AT-82

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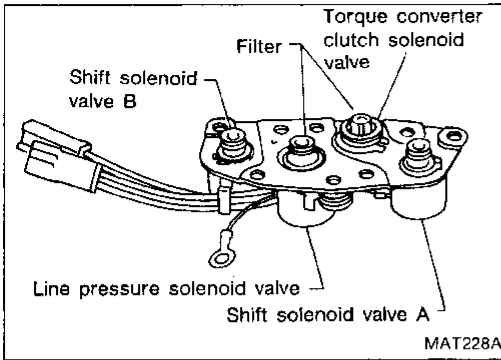
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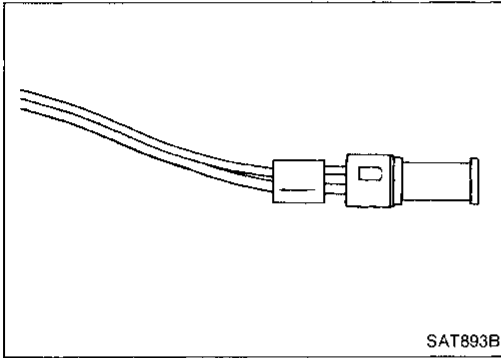
Control Valve Assembly (Cont'd)



4-unit solenoid valve assembly (Line pressure solenoid valve, torque converter clutch solenoid valve and shift solenoid valves A and B)

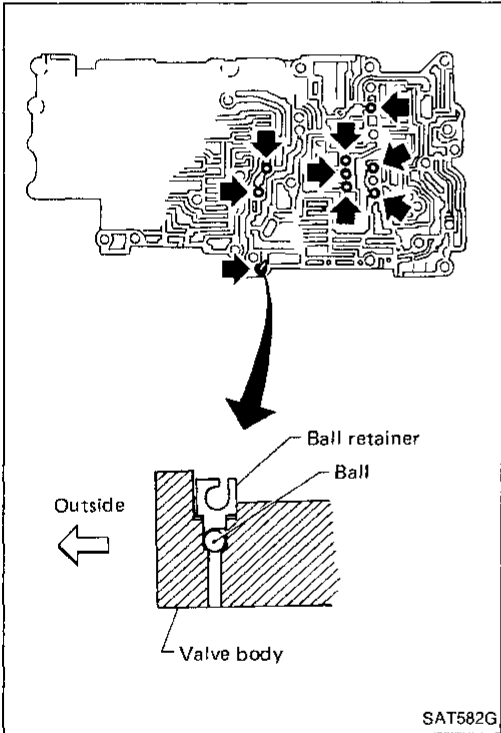
- Check that filter is not clogged or damaged (line pressure solenoid valve and torque converter clutch solenoid valve).
- Measure resistance of each solenoid valve — Refer to "Electrical Components Inspection". AT-82

Fluid temperature sensor

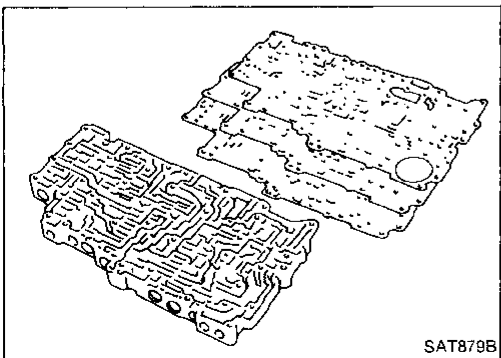


Measure resistance — Refer to "Electrical Components Inspection". AT-81

ASSEMBLY

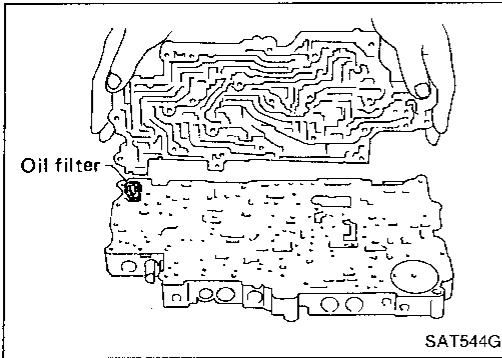


1. Assemble upper and lower bodies.
 - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.

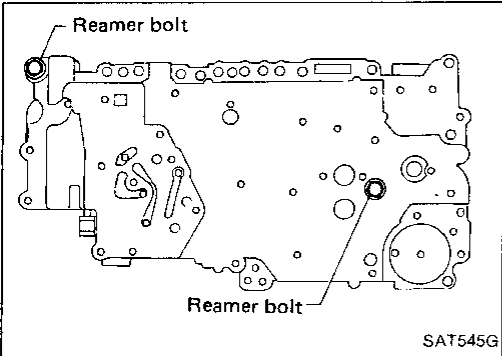


- b. Install upper body separator gasket, separator plate and lower body separator gasket on upper body.

Control Valve Assembly (Cont'd)

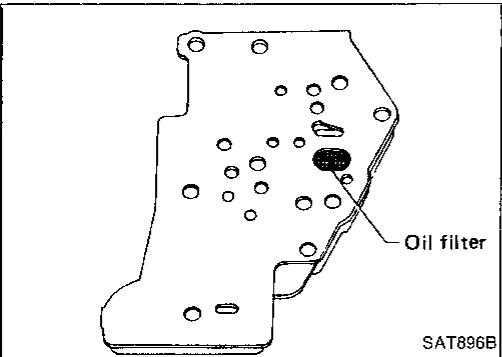


c. Fit oil filter and install lower body on upper body.



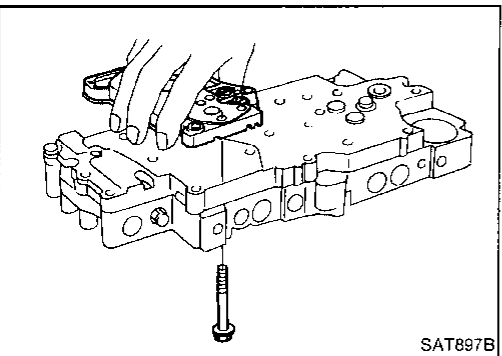
d. Temporarily assemble lower and upper bodies, using reamer bolt as a guide.

Be careful not to dislocate or drop steel balls and oil filter.

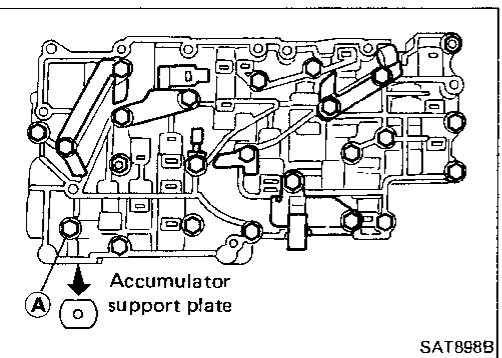


2. Install solenoid body on control valve body.

a. Fit oil filter and install solenoid body separator gaskets and separator plate on solenoid body.



b. Install solenoid body on control valve body and temporarily tighten bolts.



c. Install accumulator support plate and harness clips in their proper locations, and tighten all bolts.

Bolt A:

: 3.4 - 4.4 N·m (0.35 - 0.45 kg-m, 2.5 - 3.3 ft-lb)

Other bolts:

: 7 - 9 N·m (0.7 - 0.9 kg-m, 5.1 - 6.5 ft-lb)

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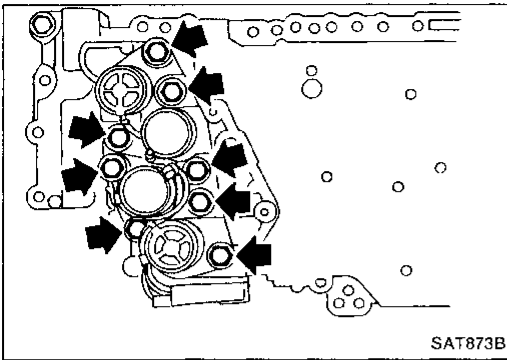
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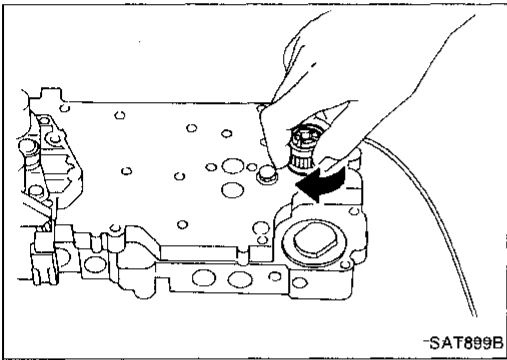
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Control Valve Assembly (Cont'd)

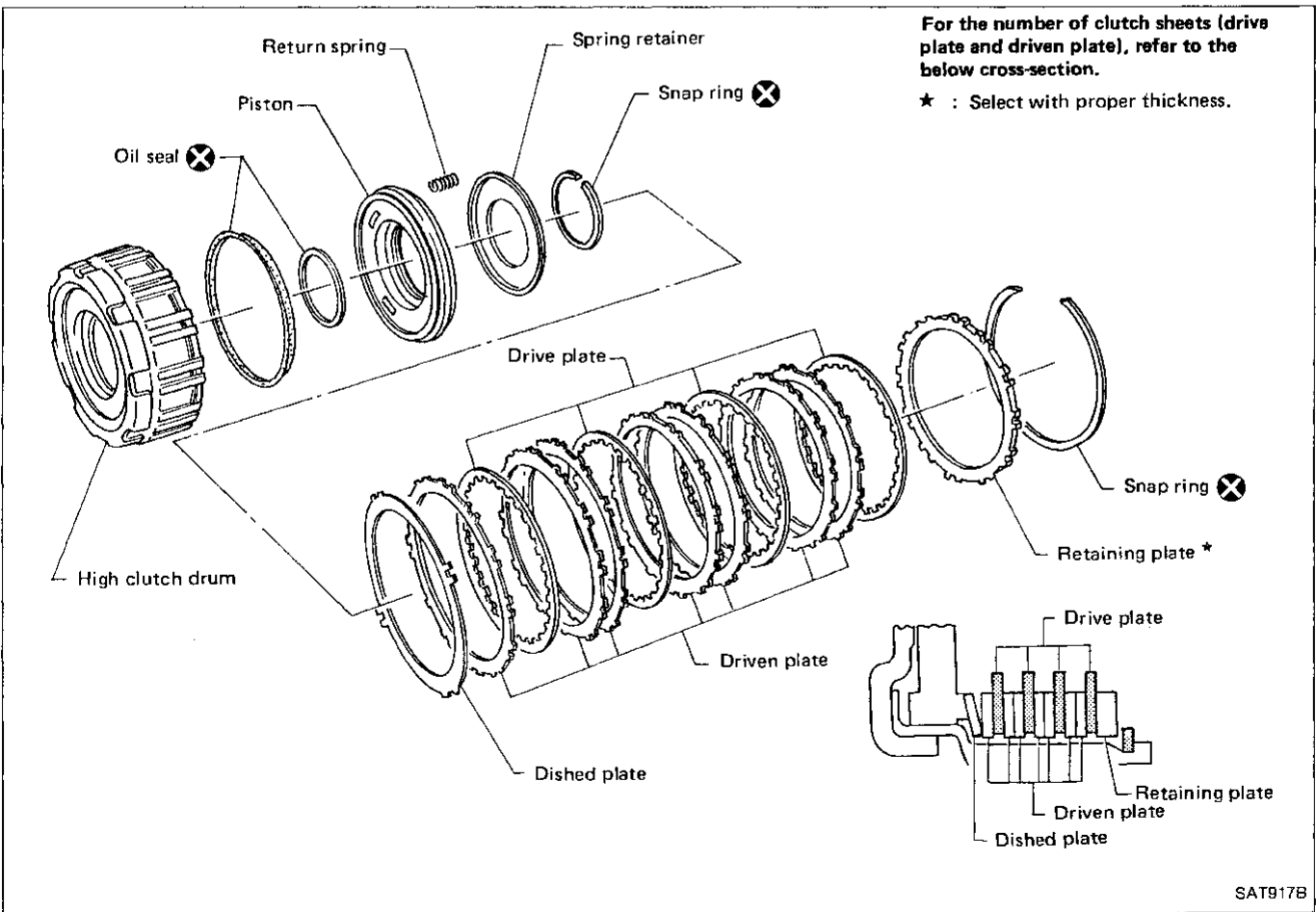


3. Install solenoid valves.
 - a. Attach O-ring and install 4-unit solenoid valve assembly on solenoid body.
 - ⊗: 7 - 9 N·m (0.7 - 0.9 kg·m, 5.1 - 6.5 ft·lb)



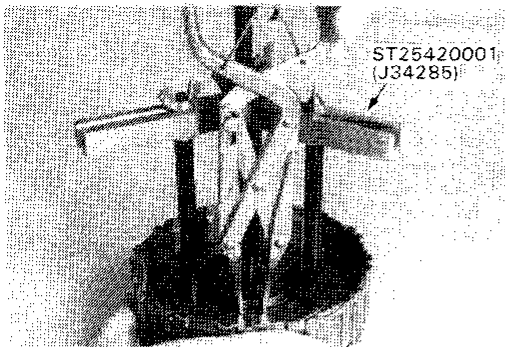
- b. Attach O-ring, and install and tighten timing solenoid valve firmly.

High Clutch

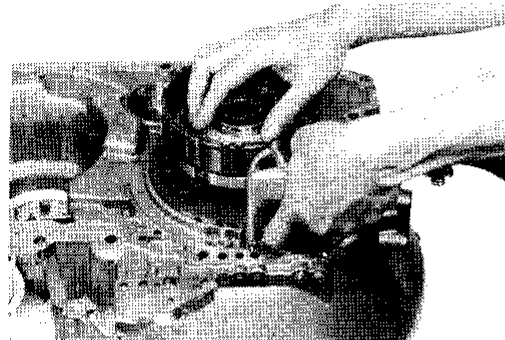


High Clutch (Cont'd)

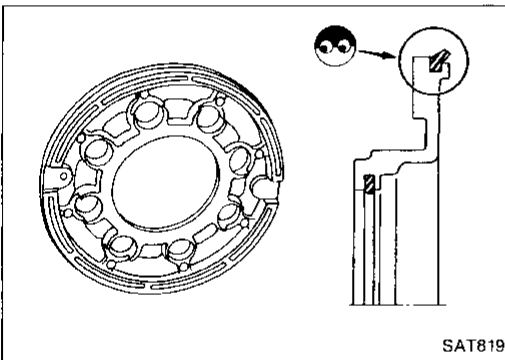
DISASSEMBLY



- Compress clutch springs and remove snap ring from spring retainer.



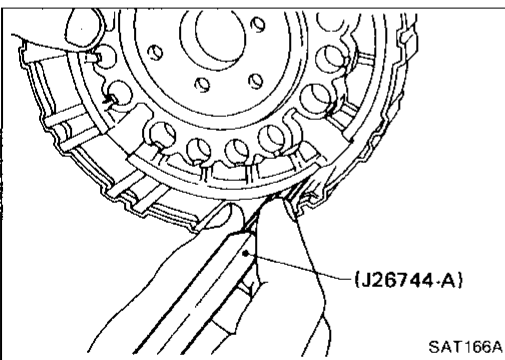
- Place clutch drum onto oil pump, and withdraw clutch piston with compressed air.



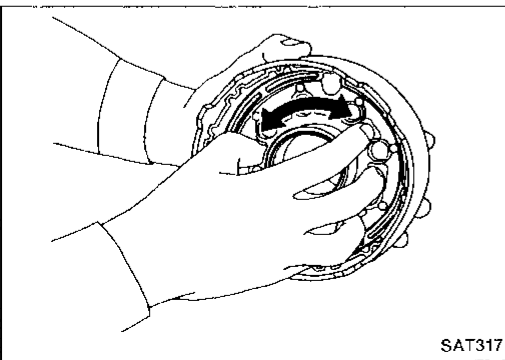
INSPECTION AND ASSEMBLY

1. Check clutch drive plate facing for wear or damage.
**Standard drive plate thickness:
 1.6 mm (0.063 in)**
2. Check for wear on snap ring, weak or broken coil springs, and warped spring retainer.
3. Lubricate clutch drum bushing, and install inner seal and piston seal as illustrated. Be careful not to stretch seals during installation.
 - Never assemble clutch dry; always lubricate its components thoroughly.
 - Always install piston seal in direction shown in figure at left.
4. Assemble piston, being careful not to allow seal to kink or become damaged during installation.

Use Tool, which does not damage lip seal, to make sure the lip seal goes into place.

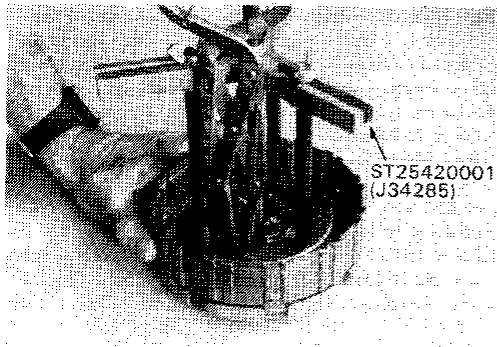


- After installing piston, turn piston by hand to ensure that there is no binding.

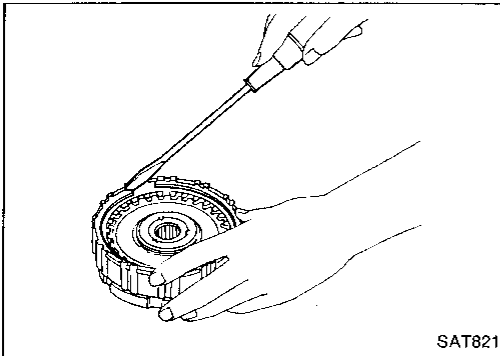


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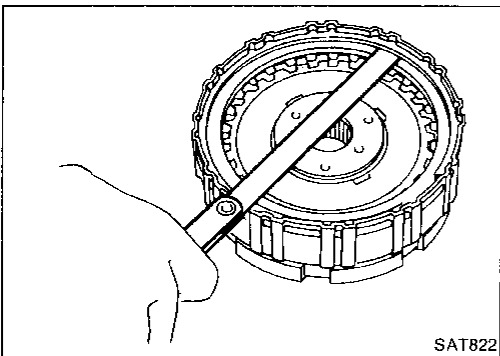
High Clutch (Cont'd)



5. Install clutch springs.
6. Reinstall snap ring. Be sure snap ring is properly seated.



7. Install driven plates, drive plates, and secure with snap ring.



8. Measure clearance between retaining plate and snap ring. Always measure the existing minimum clearance, since snap ring is a wave type.

Specified clearance:

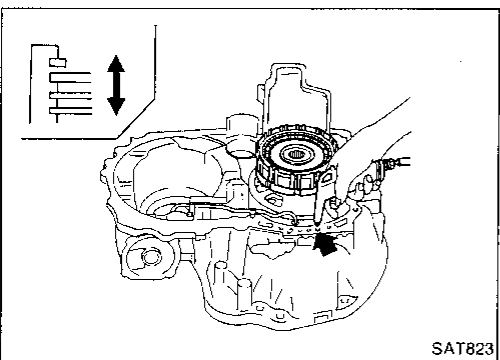
Standard

1.4 - 1.8 mm (0.055 - 0.071 in)

Allowable limit

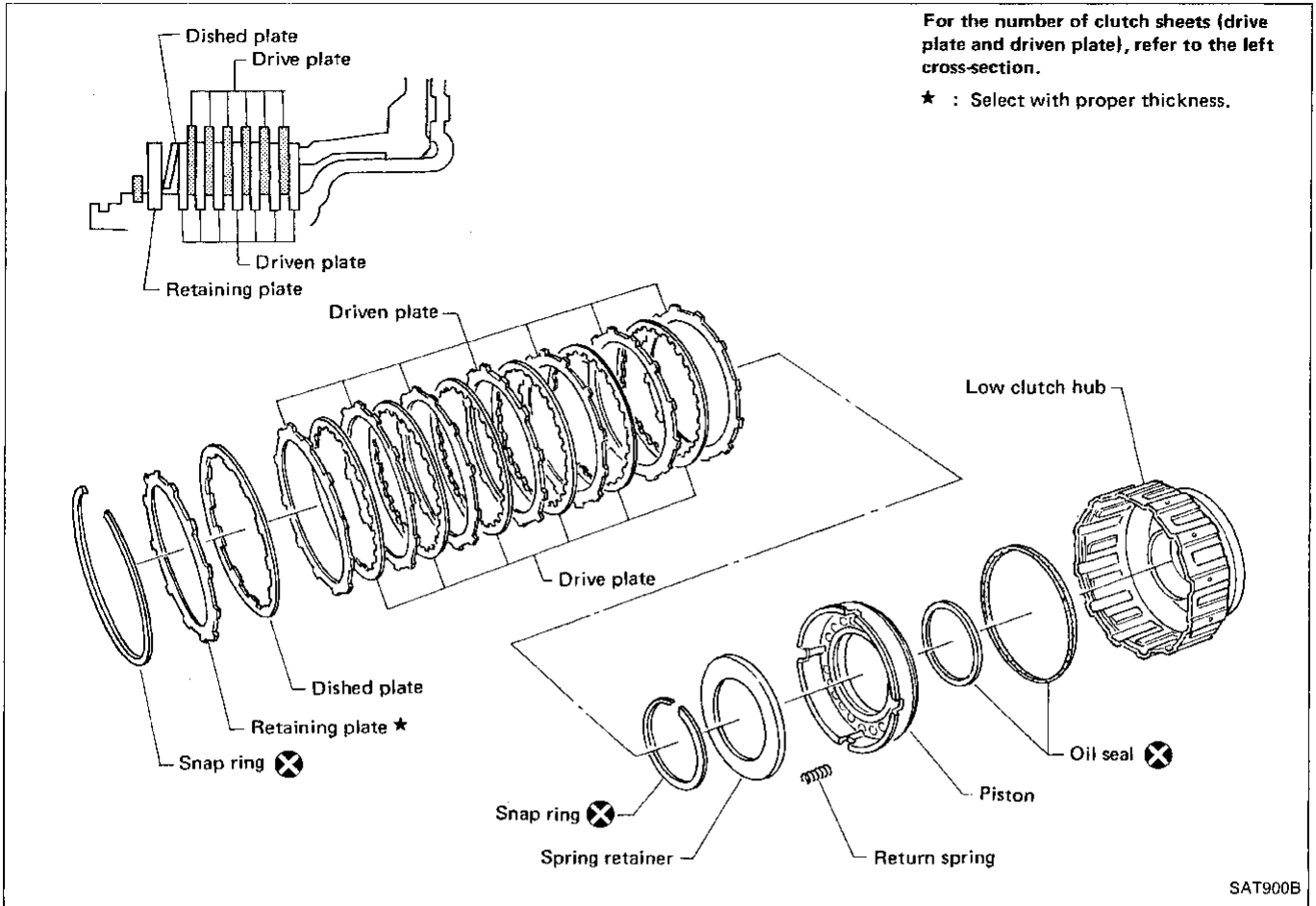
2.6 mm (0.102 in)

Retaining plate of high clutch: Refer to SDS. AT-333



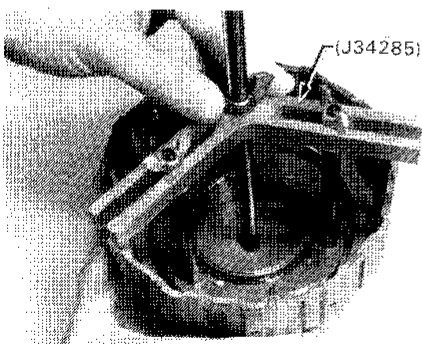
9. Check high clutch operation using compressed air.

Low Clutch

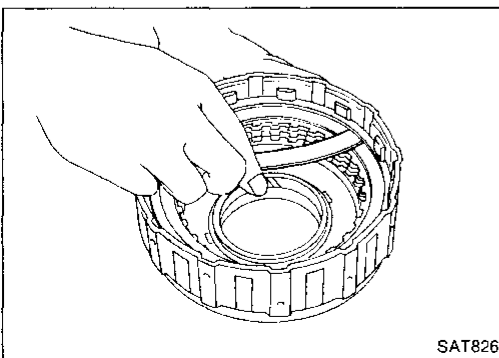


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- Use Tool to remove the clutch spring snap ring.



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

Specified clearance between retaining plate and snap ring:

Standard

0.5 - 0.8 mm (0.020 - 0.031 in)

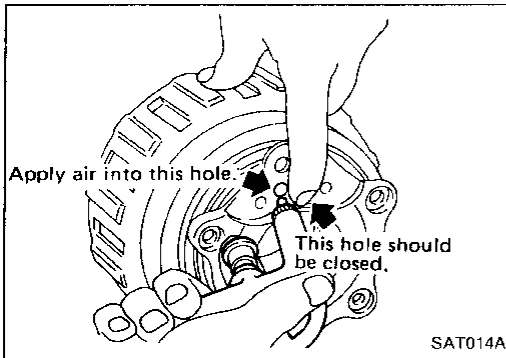
Allowable limit

2.0 mm (0.079 in)

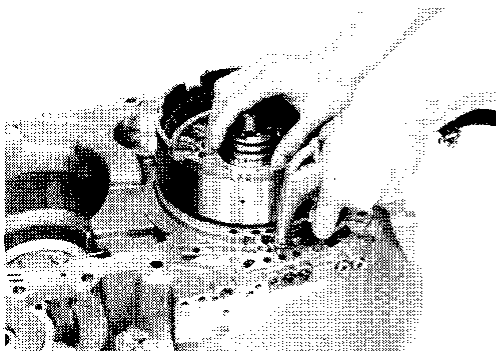
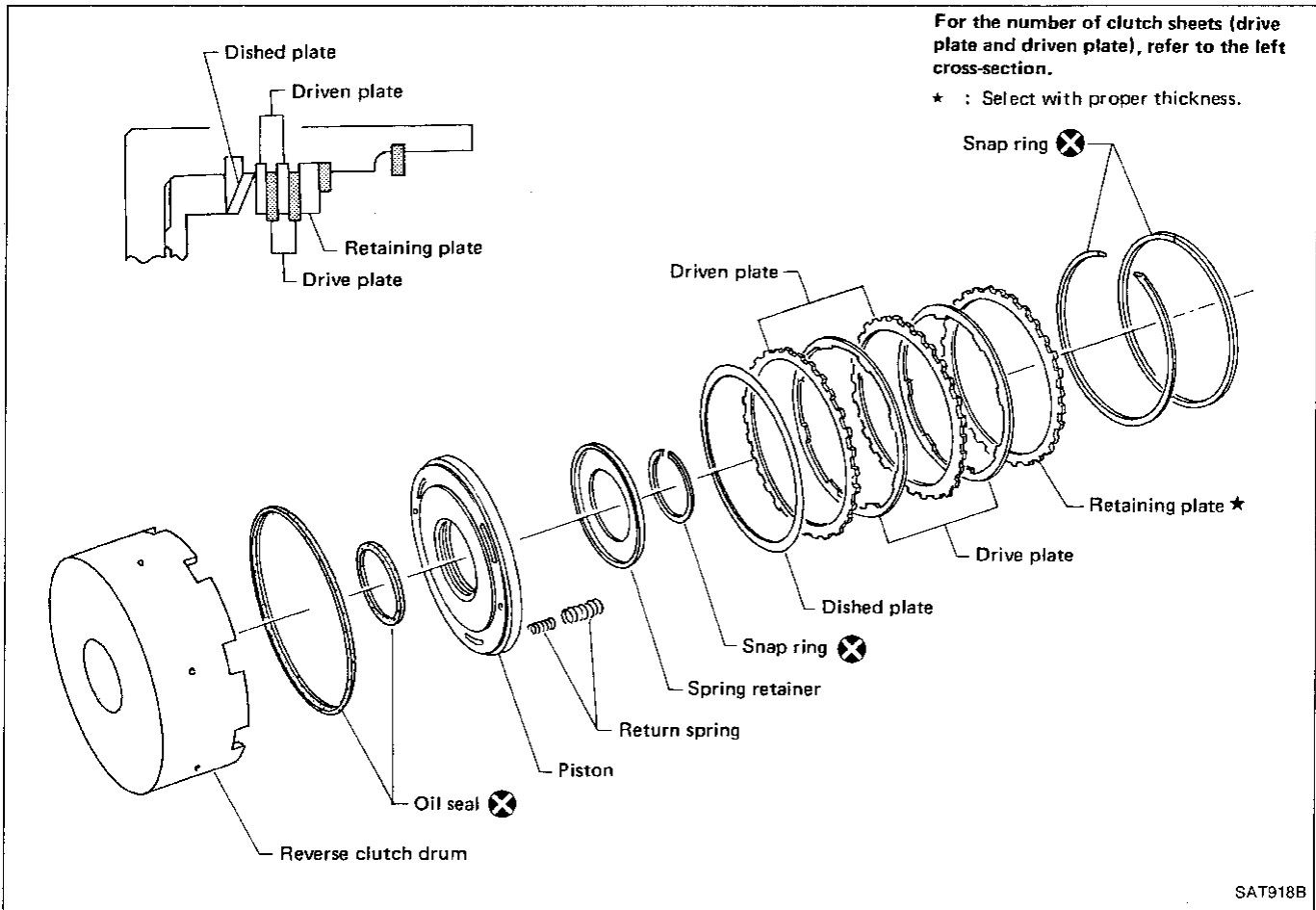
Retaining plate of low clutch: Refer to SDS. AT-333

Low Clutch (Cont'd)

- After assembly, check the operation of clutch.



Reverse Clutch



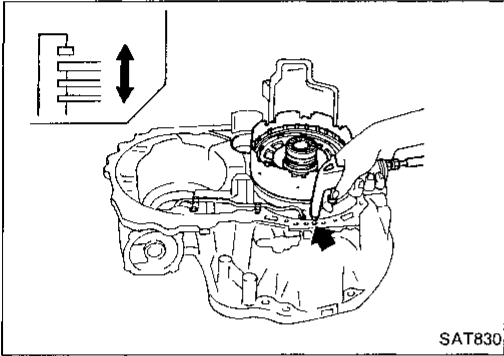
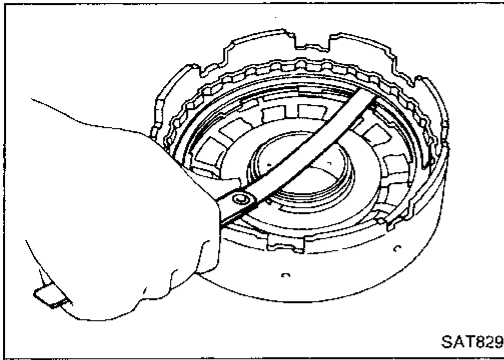
Service procedures for reverse clutch are essentially the same as those for high clutch, with the following exception:

- Remove reverse clutch piston.

Reverse Clutch (Cont'd)

Specified clearance between retaining plate and snap ring:

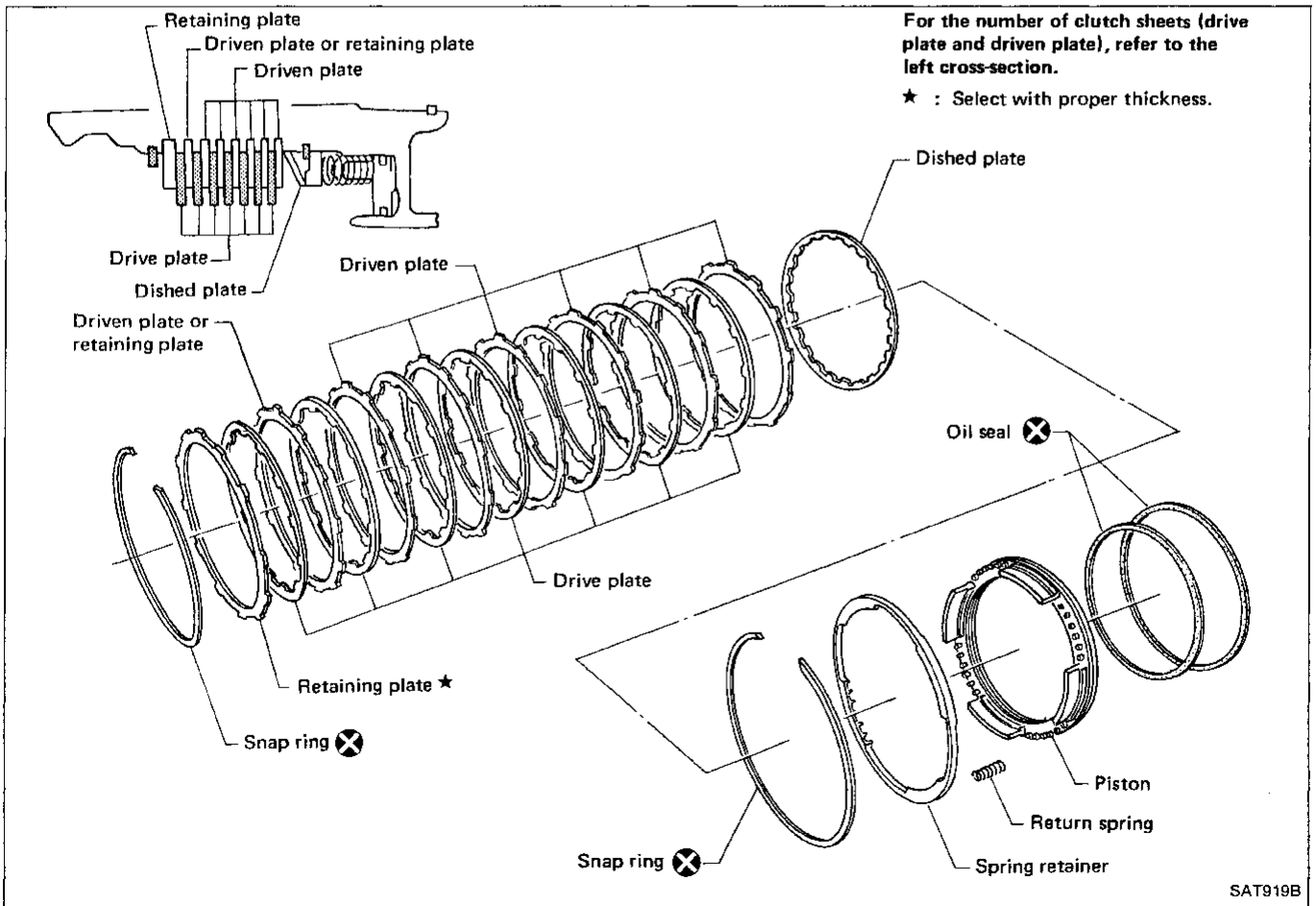
- Standard
0.5 - 0.8 mm (0.020 - 0.031 in)
- Allowable limit
1.2 mm (0.047 in)



Retaining plate of reverse clutch: Refer to SDS. AT-333

- After assembly, check the operation of clutch.

Low & Reverse Brake



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Low & Reverse Brake (Cont'd)

INSPECTION

- Examine low and reverse brake for damaged clutch drive plate facing and worn snap ring.
- Check drive plate facing for wear or damage; if necessary, replace.

Specified clearance between retaining plate and snap ring:

Standard

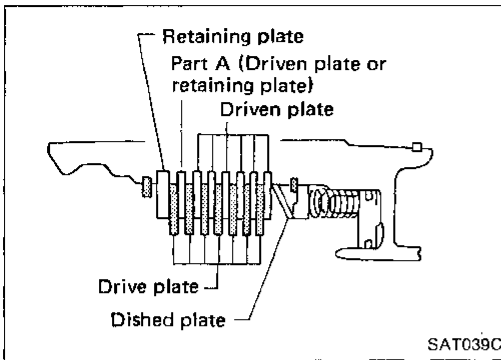
1.2 - 1.6 mm (0.047 - 0.063 in)

Allowable limit

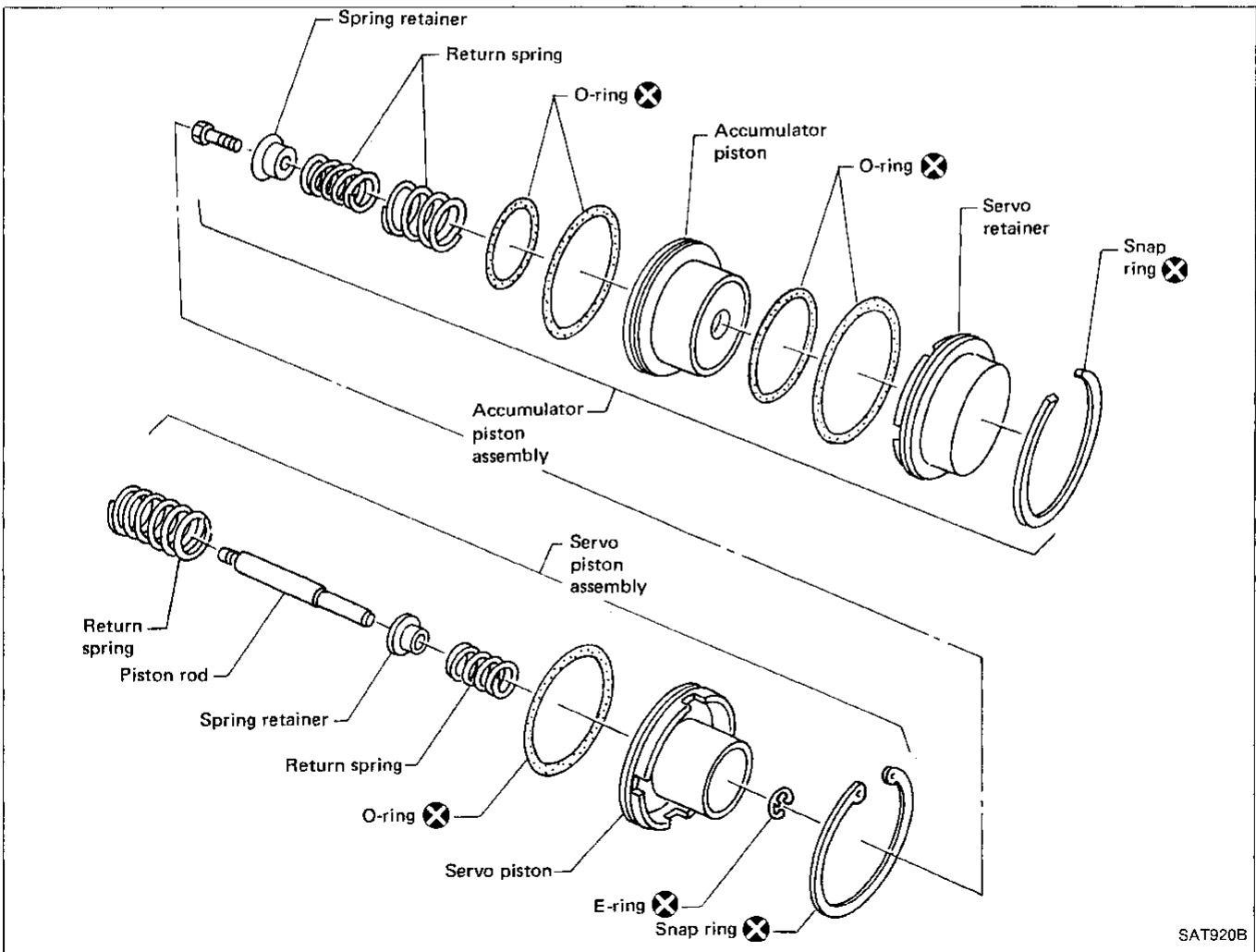
3.0 mm (0.118 in)

Retaining plate of low & reverse brake: Refer to SDS. AT-335

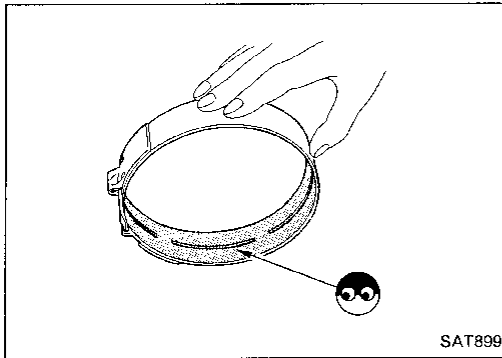
Adjust clearance using driven plate at part A first. If clearance exceeds specified value after using 5.0 mm (0.197 in) retaining plate (31667-23X08), remove driven plate and install 3.4 mm (0.134 in) retaining plate (31667-23X00). Readjust clearance by using another suitable retaining plate.



Brake Band and Band Servo



Brake Band and Band Servo (Cont'd)



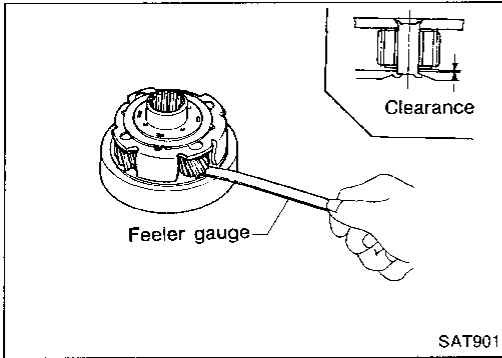
INSPECTION

- Inspect band friction material for wear. If cracked, chipped or burnt spots are apparent, replace the band.
- Check band servo components for wear and scoring.

GI

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Planetary Carrier

INSPECTION

- Check clearance between pinion washer and planetary carrier with a feeler gauge.

Standard clearance:

Front carrier 0.15 - 0.70 mm (0.0059 - 0.0276 in)

Rear carrier 0.20 - 0.70 mm (0.0079 - 0.0276 in)

Replace if the clearance exceeds 0.80 mm (0.0315 in).

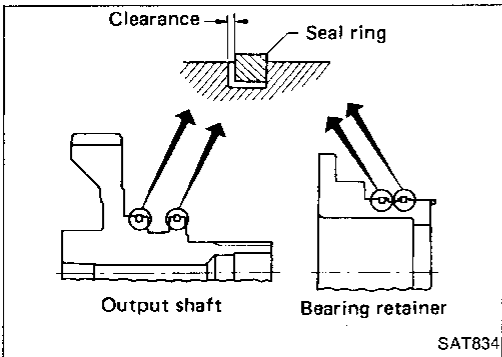
- Check planetary gear sets and bearings for damaged or worn gears.

LC

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Bearing Retainer and Output Shaft

INSPECTION

Measure clearance between seal ring and ring groove.

Standard clearance:

Refer to SDS. AT-340

Wear limit:

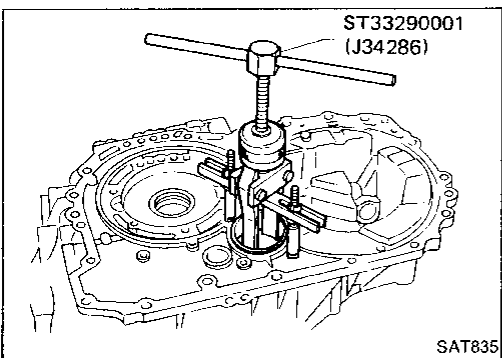
Refer to SDS. AT-340

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Converter Housing and Transmission Case

BEARING OUTER RACE

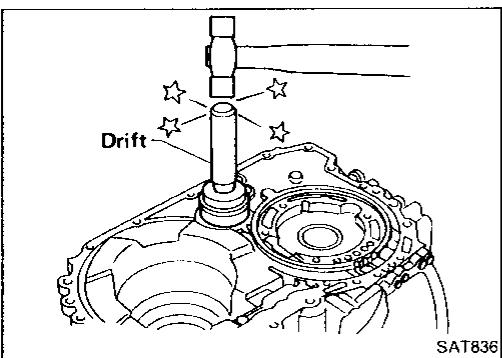
- Reduction pinion gear front bearing outer race.

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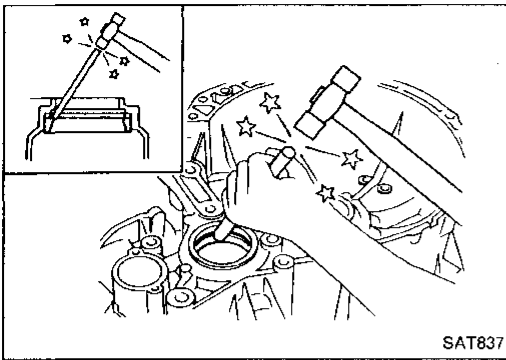


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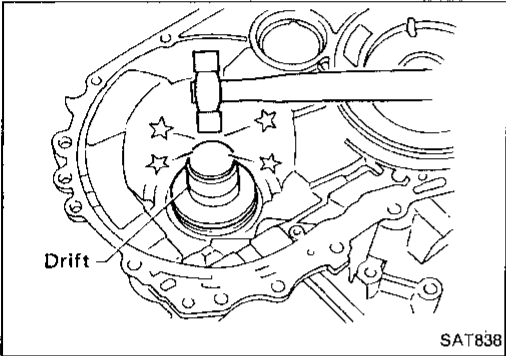
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**Converter Housing and Transmission Case
(Cont'd)**

- Differential side bearing outer race



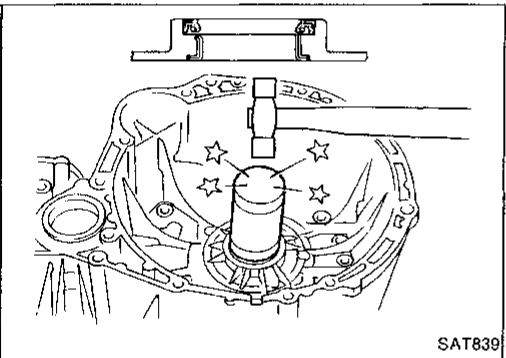
SAT837



SAT838

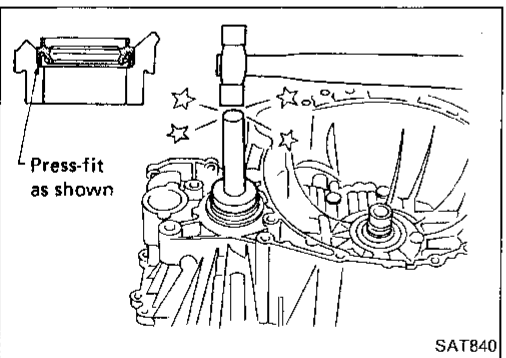
OIL SEAL

- Torque converter oil seal



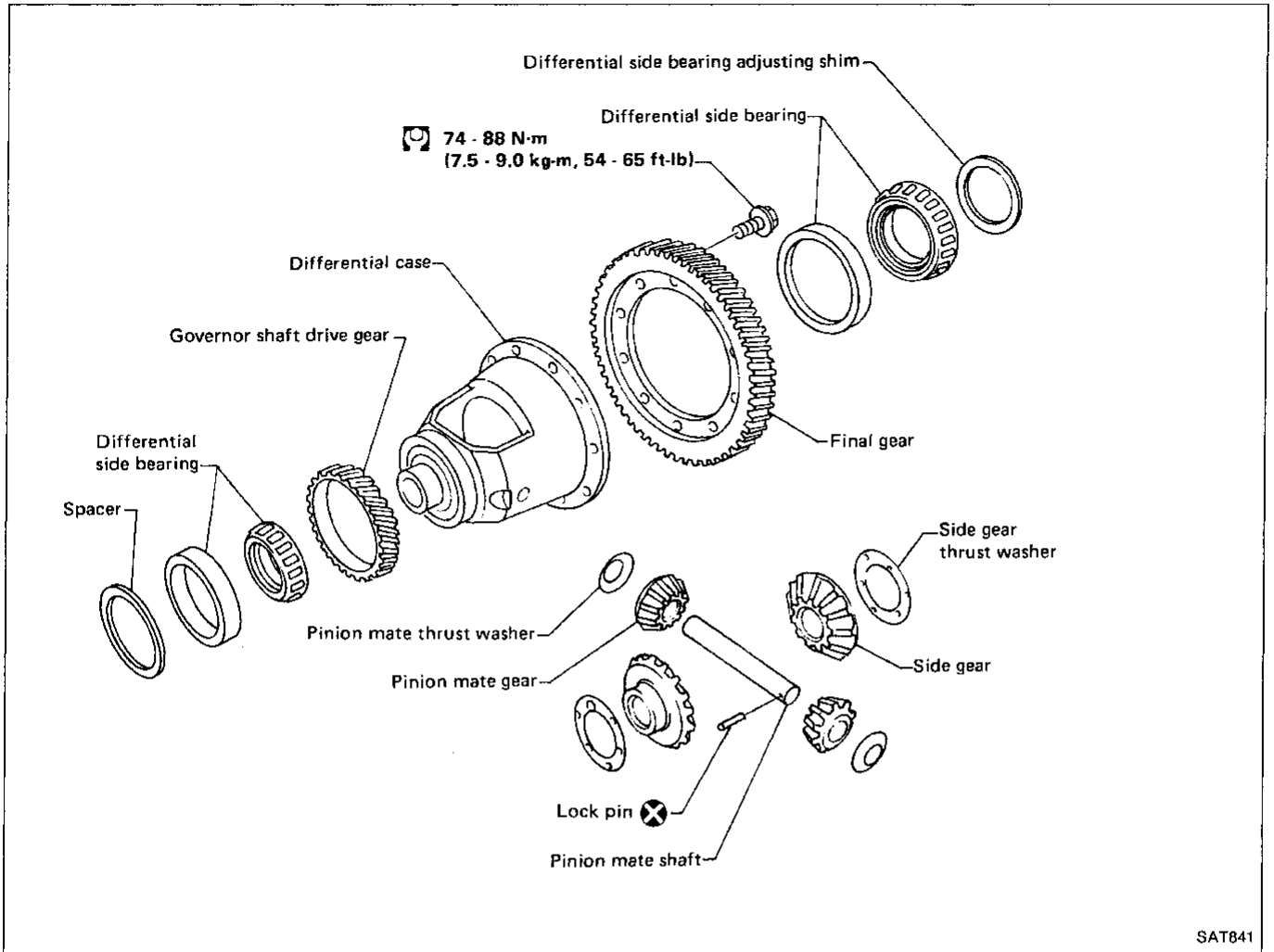
SAT839

- Differential side oil seal

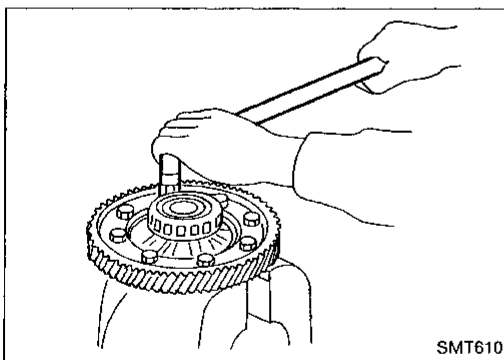


SAT840

Final Drive

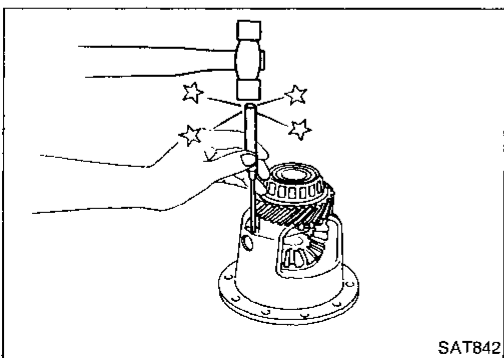


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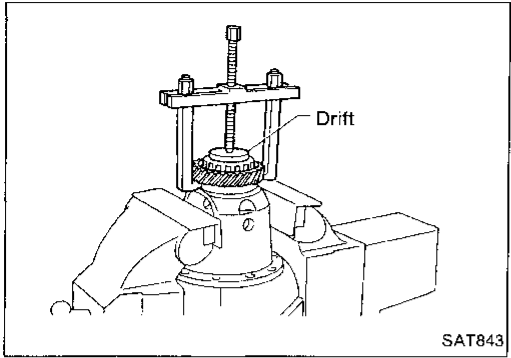
DISASSEMBLY

1. Remove final gear.

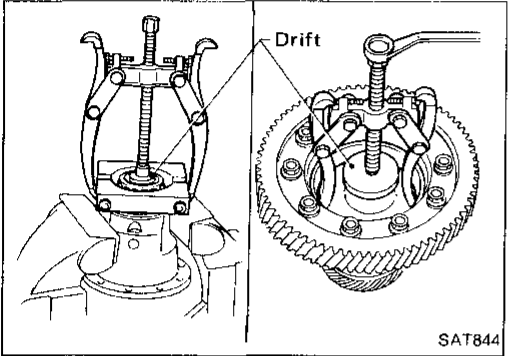


2. Drive out pinion mate shaft lock pin and draw out pinion mate shaft.

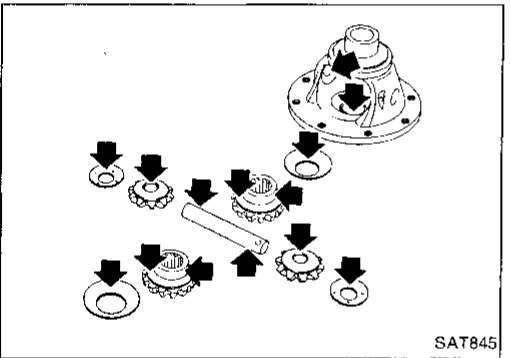
Final Drive (Cont'd)



3. Remove governor shaft drive gear.

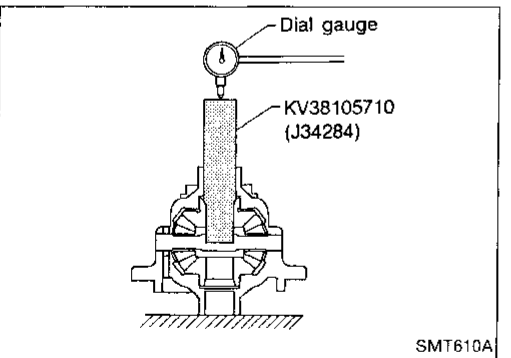


4. Drive out differential side bearing outer race and inner cone.



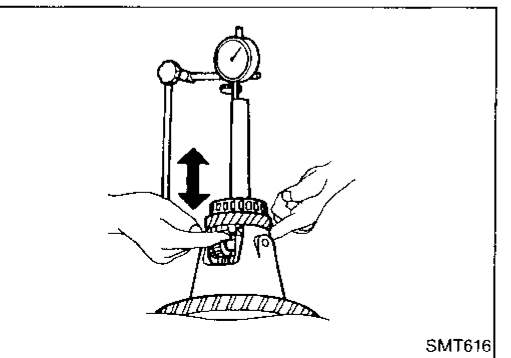
INSPECTION

1. Check mating surface of differential case, side gears and pinion mate gears. Replace as required.



2. Check clearance between side gear and differential case with washer following the procedure below.

a. Set Tool and dial gauge on side gear.



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

Clearance between side gear and differential case with washer:

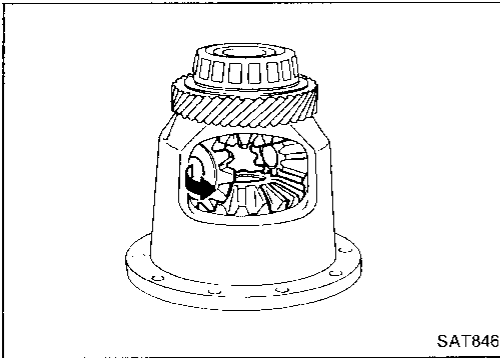
0.1 - 0.2 mm (0.004 - 0.008 in)

c. If clearance exceeds the specified value, check for wear and replace necessary parts.

3. Check tapered roller bearings for wear, scratches, pitching or flaking.

Final Drive (Cont'd)

ASSEMBLY

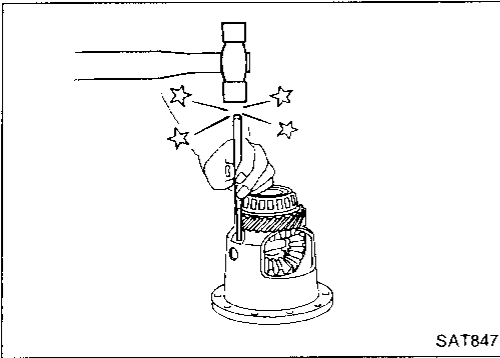


1. Install the side gear and thrust washer in the differential case.
2. Install the pinion mate gear and thrust washer in the differential case while rotating them.

GI

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EM



3. Insert pinion mate shaft.
4. Measure clearance between side gear and pinion mate gear, referring to "Inspection". If necessary, adjust.

Side gear to pinion mate clearance:

0.1 - 0.2 mm (0.004 - 0.008 in)

Side gear thrust washer:

Refer to SDS. AT-335

5. Install pinion mate shaft lock pin using a punch.

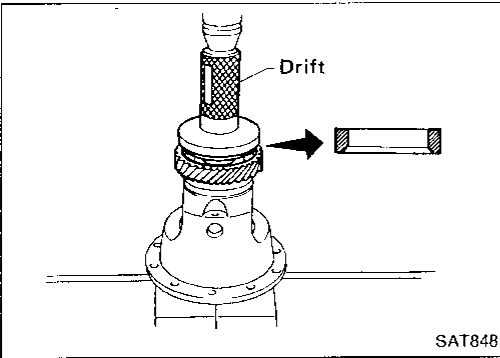
Make sure that lock pin is flush with case.

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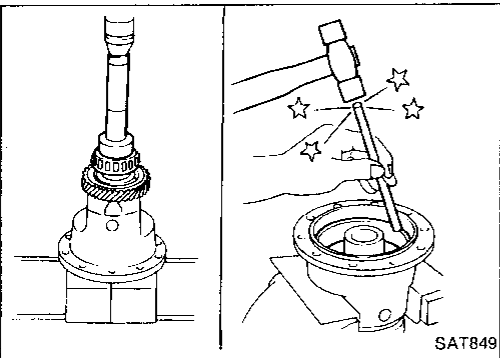
6. Install governor shaft drive gear.

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7. Press on differential side bearing inner cone and outer race.
8. Install final gear.

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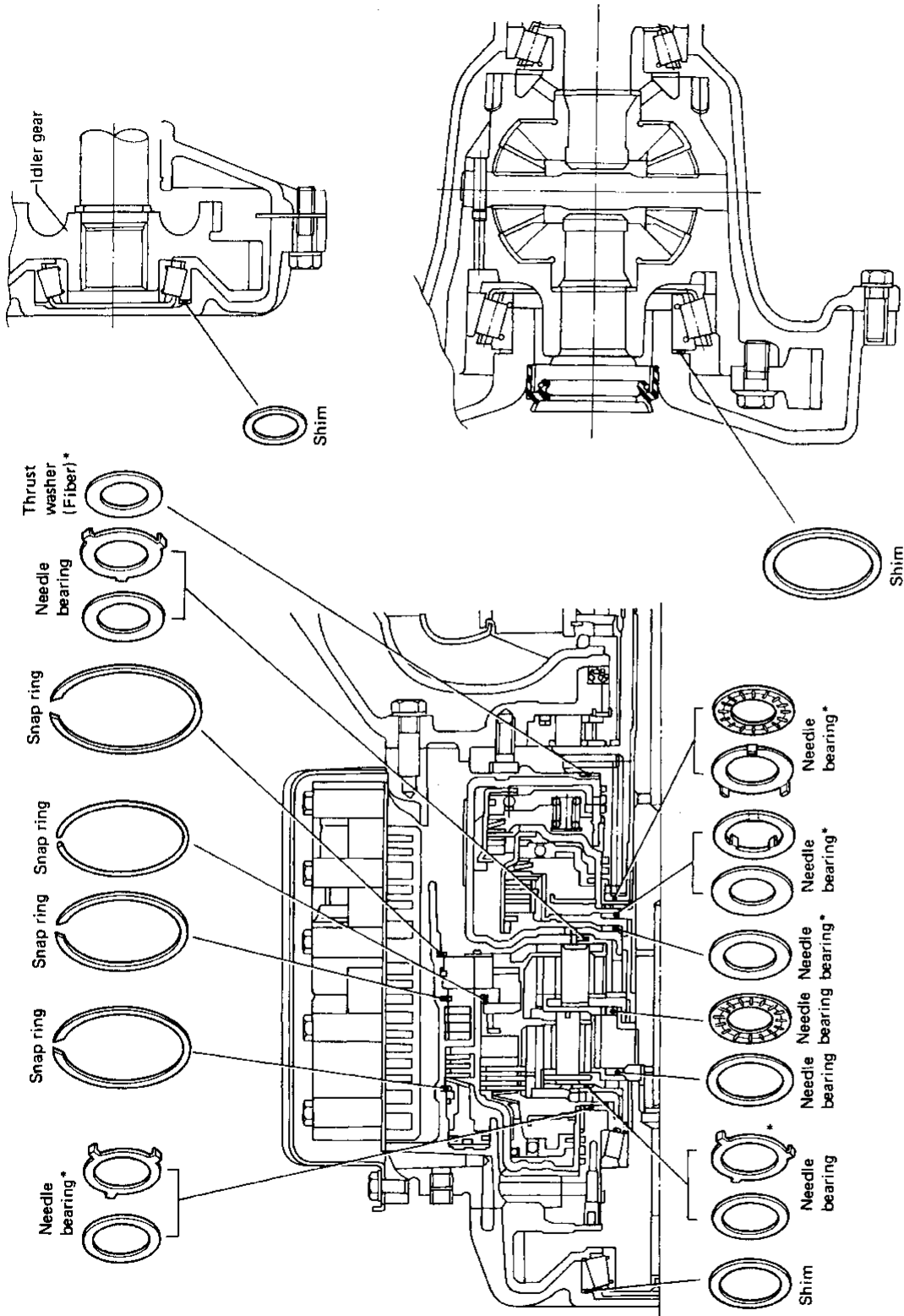
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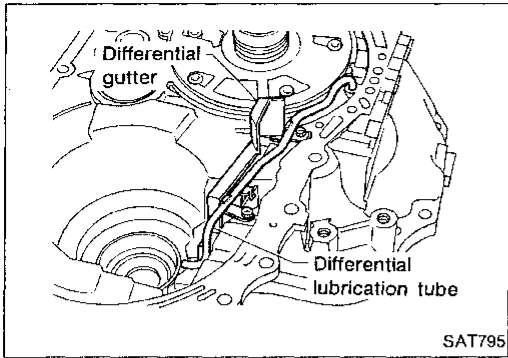
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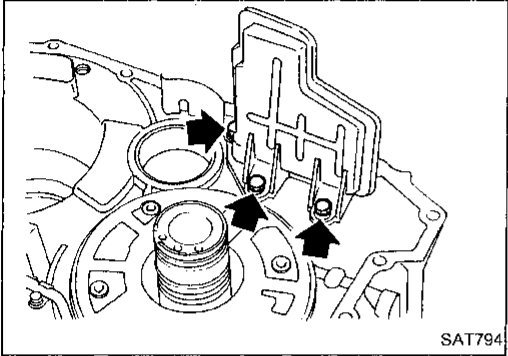
When installing/assembling needle bearing and bearing race, use the following illustrations as a guide to installation procedures and locations.



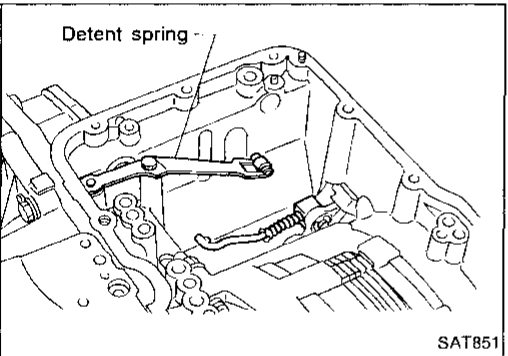
When installing, apply vaseline to parts with "*" so that they will not drop off.



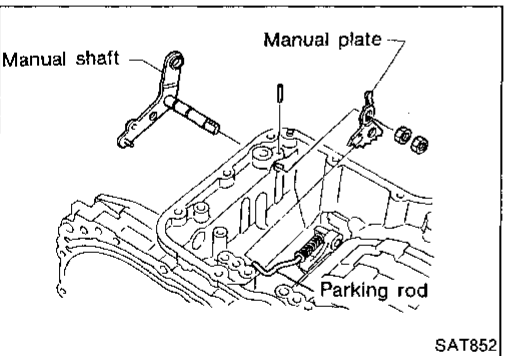
1. Install differential lubrication tube and differential gutter to converter housing.



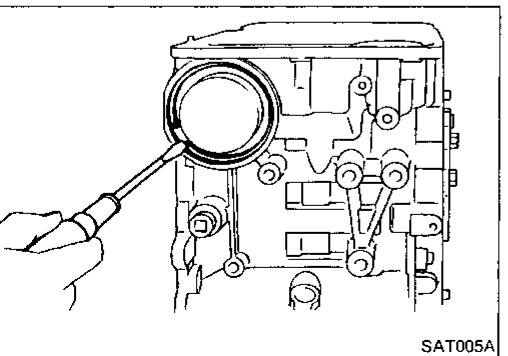
2. Install oil strainer.



3. Install detent spring assembly.



4. Pass parking rod into the hole in the manual plate and then install manual plate on manual shaft.



5. Install band brake servo, retainer and return spring and secure with snap ring.

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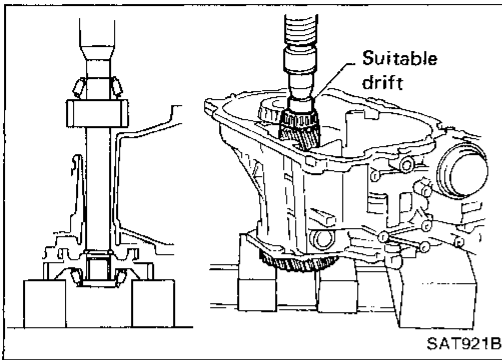
ST

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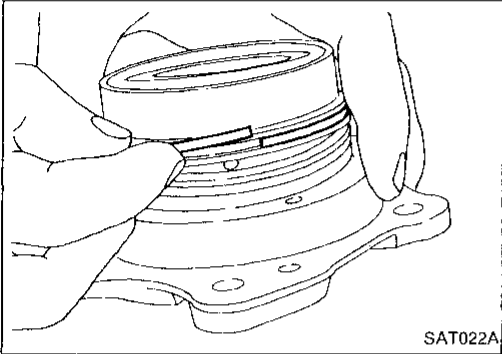
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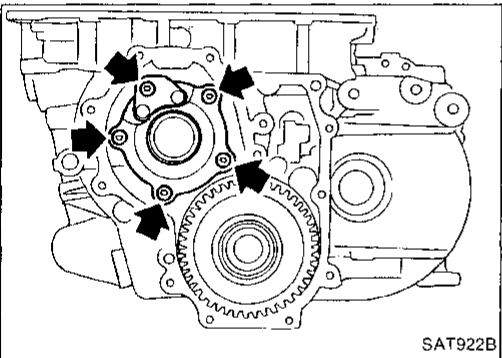
IDX



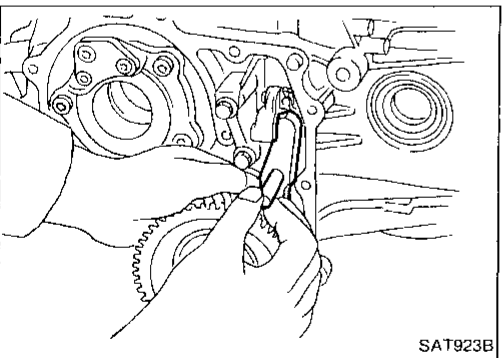
6. Install reduction gear.
 - a. Position reduction gear in transmission case so that it meshes with idler gear.
 - b. Press reduction gear into place using a drift, and install idler gear.



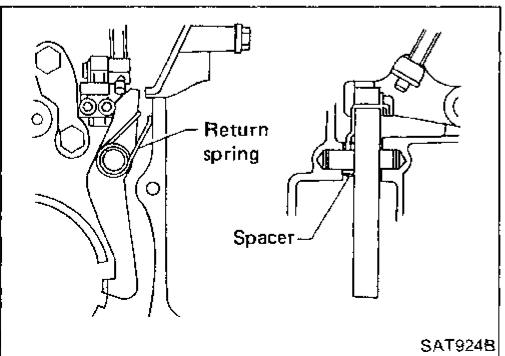
7. Install bearing retainer assembly.
 - a. Install seal rings onto bearing retainer with great care. Clean the grooves and liberally apply petroleum jelly to hold the rings in place. Otherwise, they could be cut or deformed when the low clutch and carrier assembly are installed.



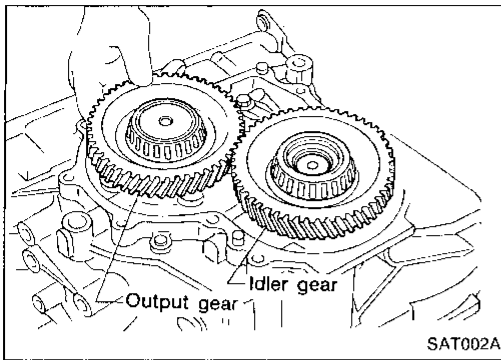
- b. Install bearing retainer assembly.



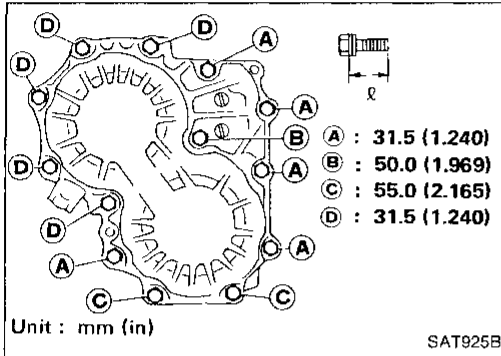
8. Install parking pawl and parking shaft.



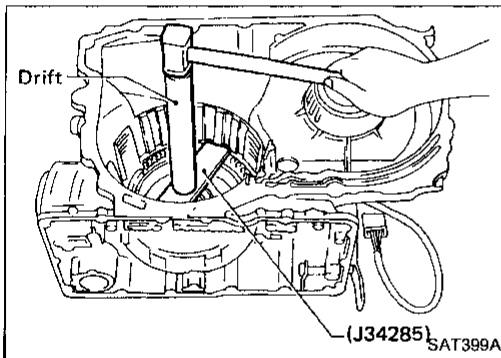
9. Install spacer and return spring.



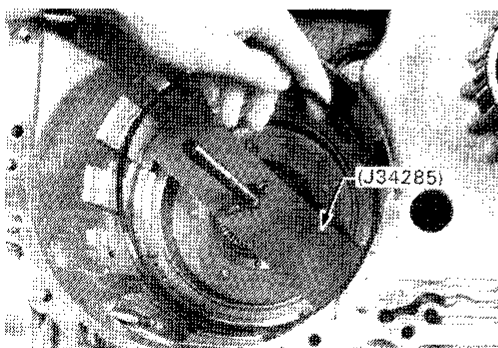
10. Install output gear.



11. Temporarily install side cover and gasket.



12. Lubricate low and reverse brake piston seal, then install piston by tapping it evenly with Tool.



13. Install low and reverse brake retainer, and secure with snap ring.

14. Install low and reverse brake driven & drive plates and retaining plate, then secure with snap ring.

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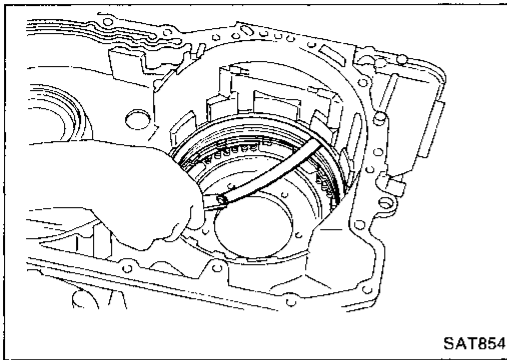
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15. After low and reverse brake has been completely assembled, measure clearance between snap ring and retainer plate. If measurement exceeds specifications, it can be adjusted by replacing retainer plate with one of a different thickness.

Low and reverse brake clearance:

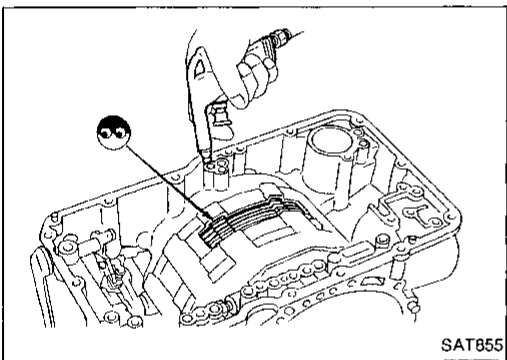
Standard

1.2 - 1.6 mm (0.047 - 0.063 in)

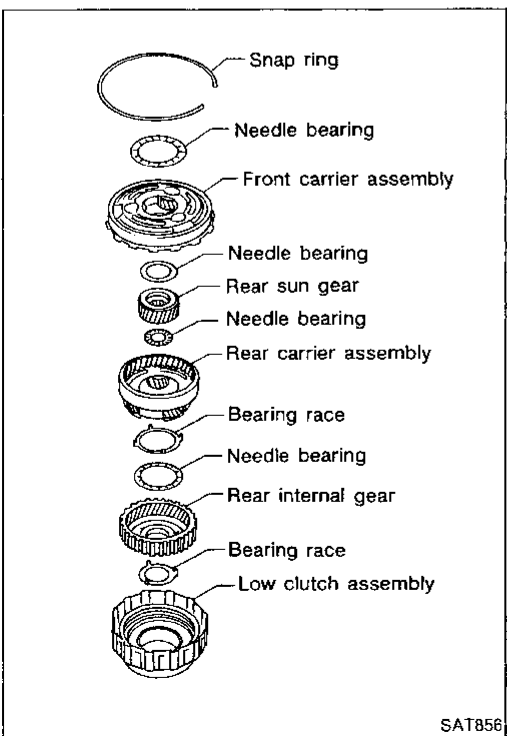
Allowable limit

3.0 mm (0.118 in)

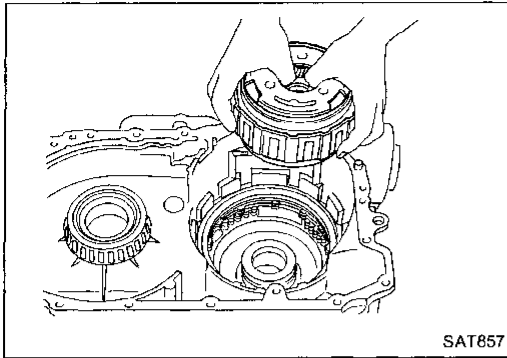
Retaining plate of low & reverse brake: Refer to SDS. AT-335



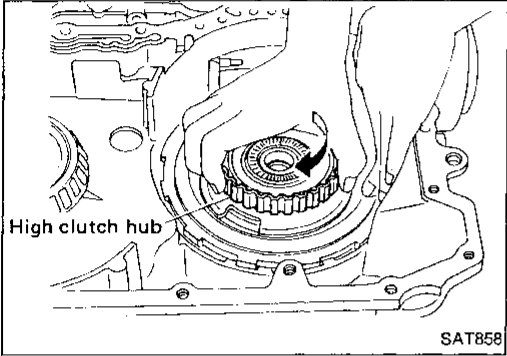
- Check low & reverse brake operation using air.



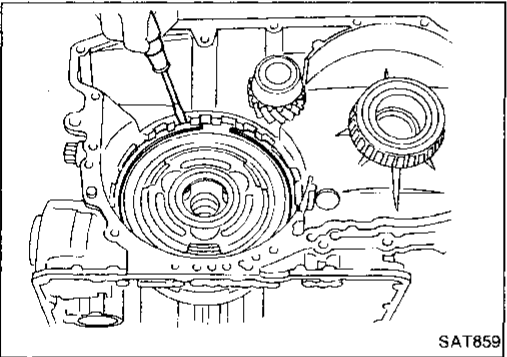
16. Assemble front carrier, rear carrier and low clutch.



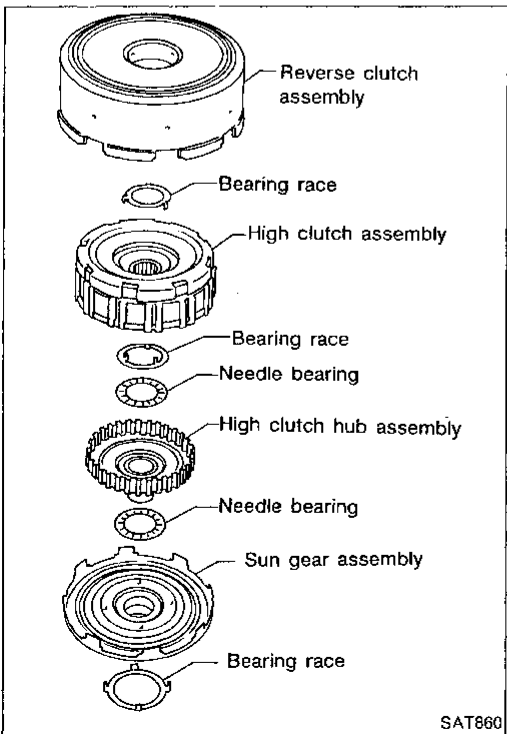
17. Install carrier set.



18. Install one-way clutch assembly while rotating front carrier with high clutch hub.



19. Remove high clutch hub, and install clutch snap ring.



20. Assemble reverse clutch and high clutch.

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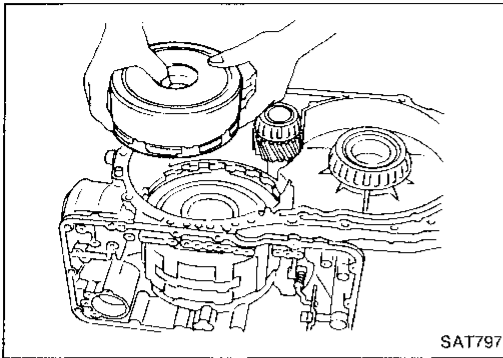
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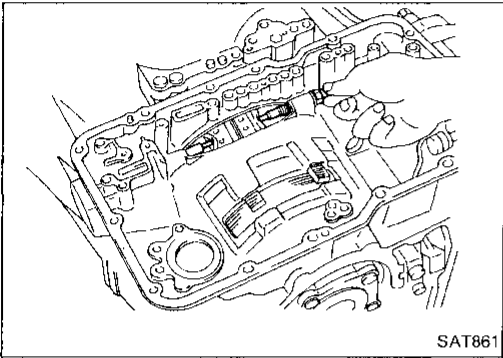
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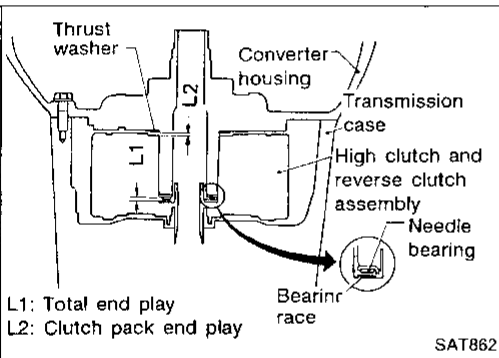
IDX



21. Install reverse and high clutch as a pack.



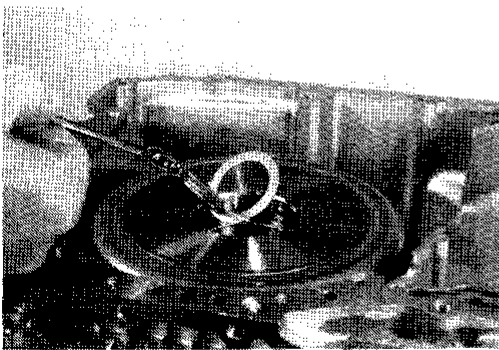
22. Install brake band and anchor pin. Temporarily tighten anchor bolt by hand.



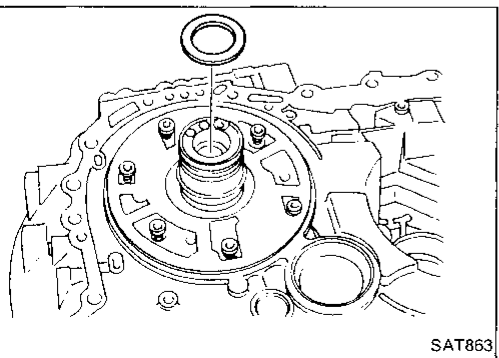
23. Adjust total end play and clutch pack end play as follows:

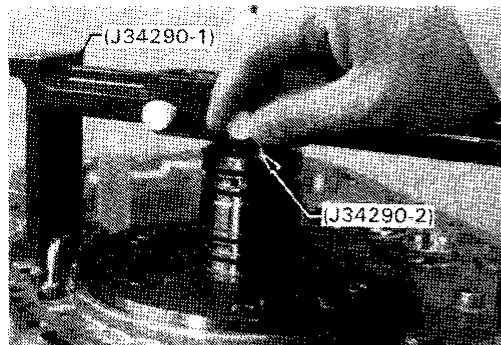
— Total end play —

a. Remove thrust bearing race from high clutch drum.

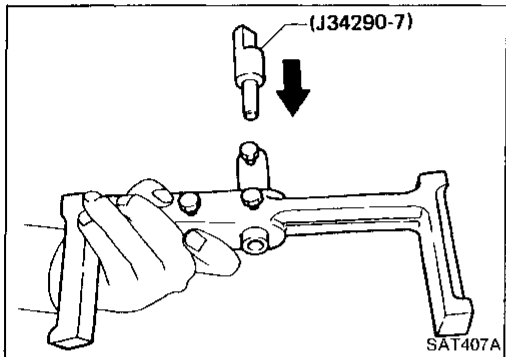


b. Install needle bearing on top of oil pump cover.

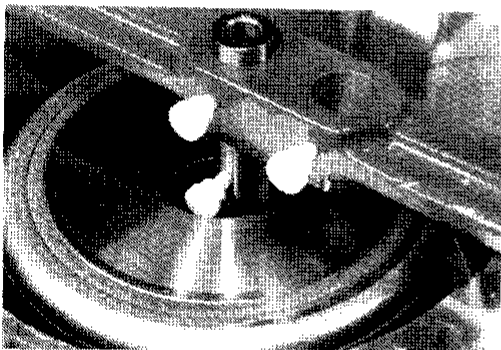




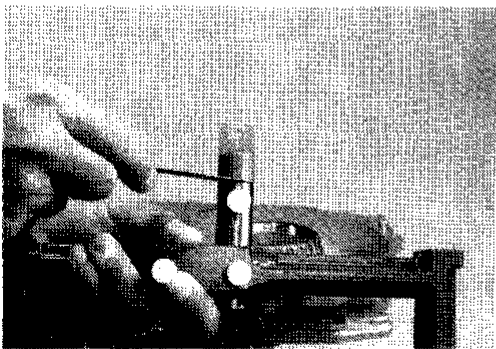
c. Place Tools (bridge and gauging cylinder) on machined gasket surface of converter housing. Allow gauging cylinder to rest on needle bearing and lock it in place with thumbscrew.



d. Insert Tool (total end play gauging plunger) into gauging cylinder.



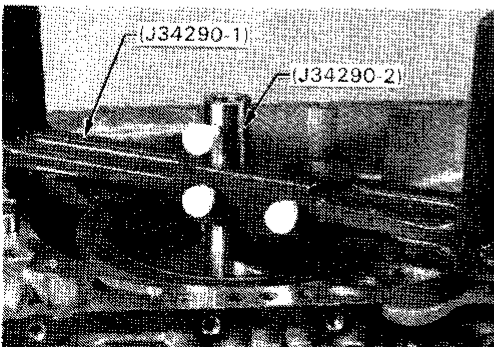
e. Place bridge, legs up, onto machined gasket surface of transmission case, allowing gauging plunger to rest on surface where bearing race was removed. Lock plunger in place.



f. Remove bridge and use feeler gauge to measure gap between gauging cylinder and shoulder of gauging plunger.

g. Use your feeler gauge reading to select appropriate bearing race thickness from following chart:

Oil pump housing bearing race: Refer to SDS. AT-340



— Clutch pack end play —

a. Place Tools (bridge and gauging cylinder) onto machined gasket surface of transmission case and allow cylinder to rest on high clutch drum. Lock cylinder into place.

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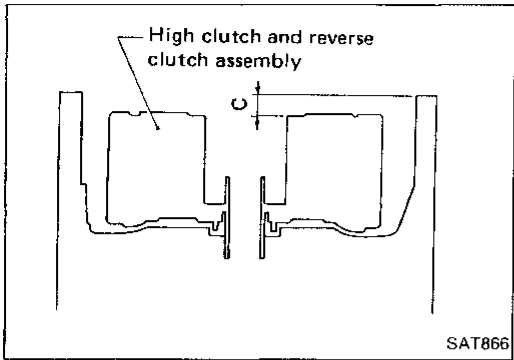
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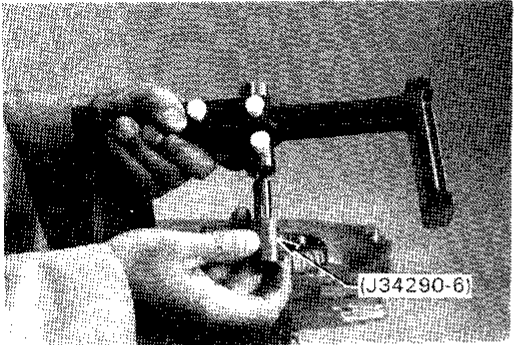
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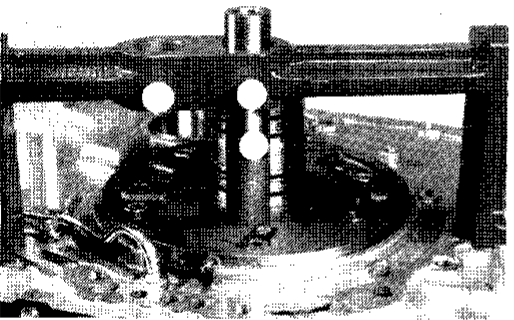
DX



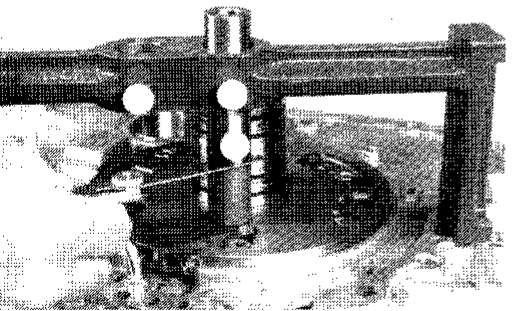
- You are now measuring dimension "C".



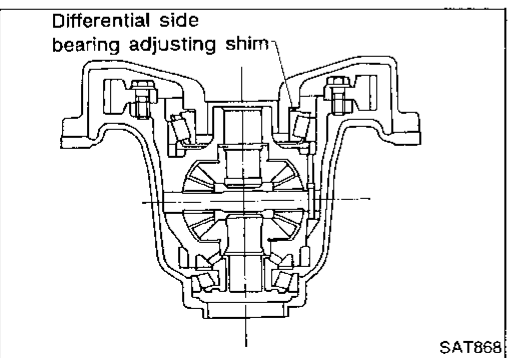
- b. Now, insert Tool (clutch pack gauging plunger) into gauging cylinder.



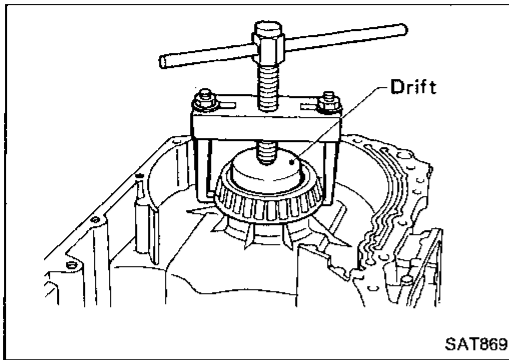
- c. Place bridge, gauging cylinder, and gauging plunger onto machined gasket surface of converter housing. Make sure thrust washer is removed. Lock gauging plunger in place.
- d. Use feeler gauge to measure gap between gauging cylinder and shoulder of gauging plunger.
- e. Use your feeler gauge measurement and following thrust washer chart to select correct washer thickness to give proper clutch pack end play:



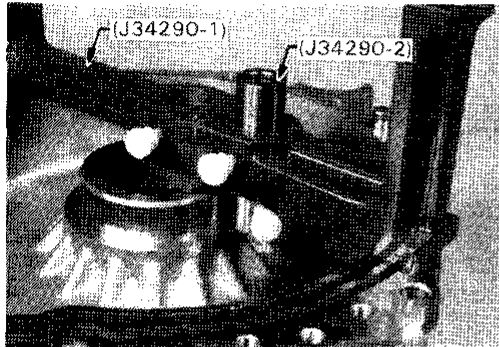
Clutch pack thrust washer: Refer to SDS. AT-339



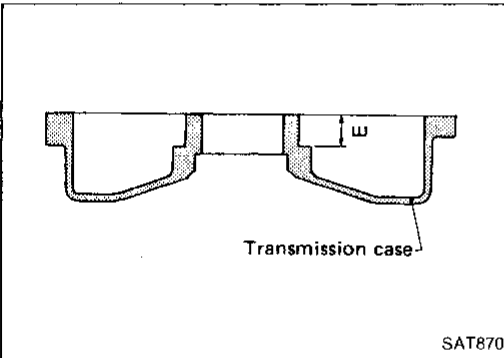
- 24. Adjust differential side bearing preload as follows:



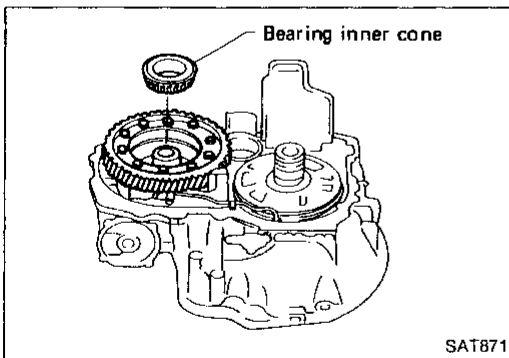
- a. Remove left side bearing inner cone from transmission case.



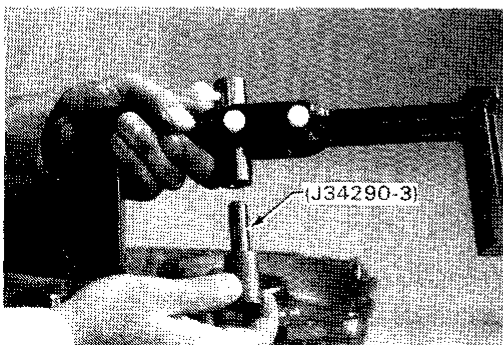
- b. Place Tools (bridge and gauging cylinder) onto machined gasket surface of transmission case and allow gauging cylinder to rest on bearing mating surface. Lock cylinder into place.



- You are now measuring dimension "E".



- c. Put final drive assembly into converter housing, then put side bearing inner cone on differential case.
- d. Hold inner bearing cone in place while spinning final drive assembly in order to seat bearings.



- e. Insert Tool (differential side bearing gauging plunger) into gauging cylinder.

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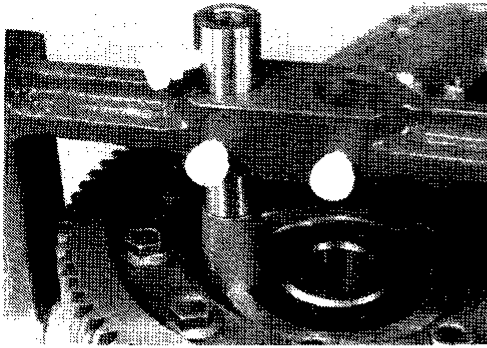
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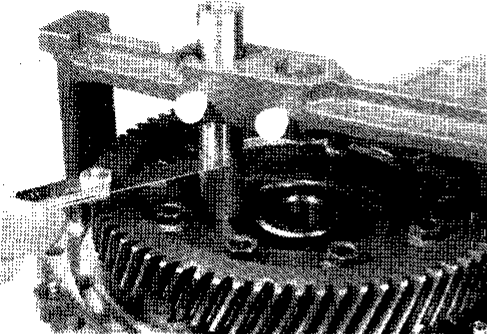
EL

IDX

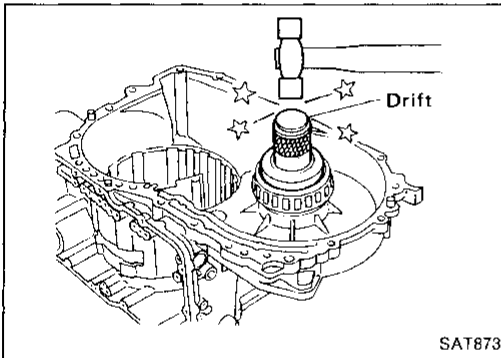


- f. Place bridge, gauging cylinder, and gauging plunger onto machined gasket surface of converter housing and allow gauging plunger to rest on surface of bearing inner cone. Lock plunger in place.
- g. Use feeler gauge to measure clearance between gauging cylinder and shoulder of the gauging plunger.
- h. Use your feeler gauge reading and following chart to select appropriate side bearing preload shim(s).

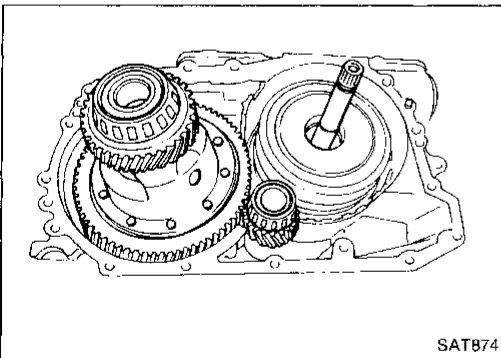
Differential side bearing adjusting shim: Refer to SDS. AT-336



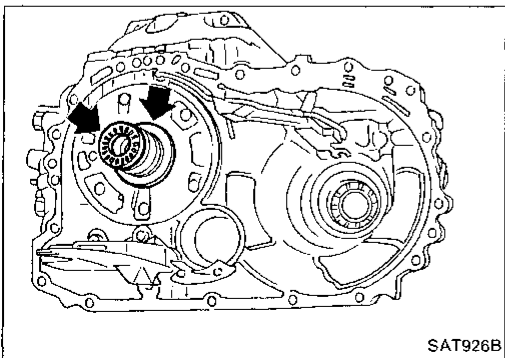
- i. Install selected shims and left side bearing inner cone.

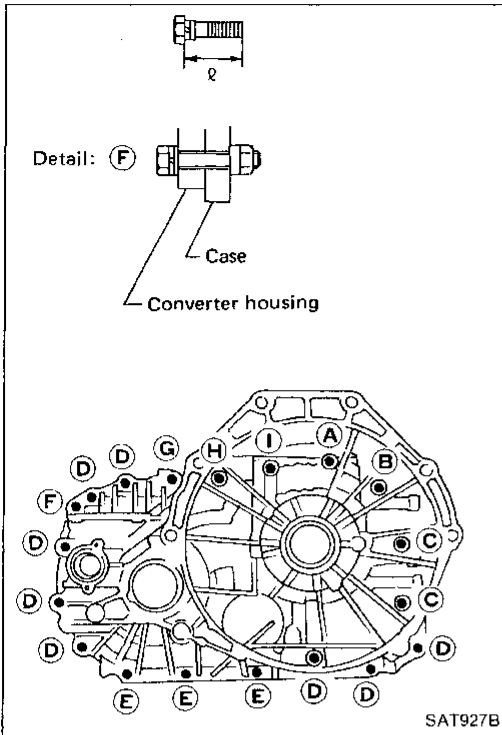


- 25. Install input shaft.



- 26. Install selected thrust washer and bearing on oil pump cover.

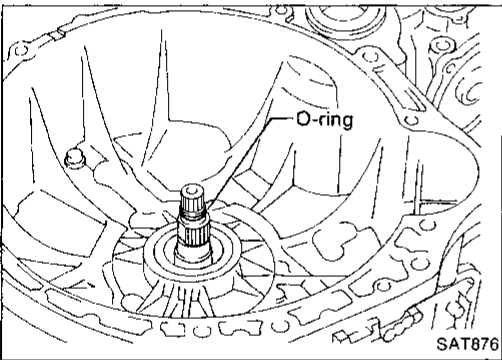




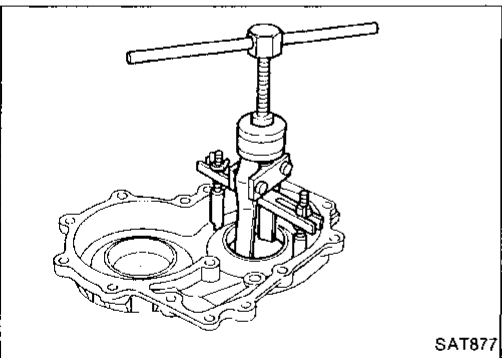
27. Place gasket on transmission case and install converter housing.

Bolt	Tightening torque N·m (kg·m, ft·lb)	ℓ mm (in)
Ⓐ	21 - 23 (2.1 - 2.3, 15 - 17)	31.5 (1.240)
Ⓑ		27 (1.06)
Ⓒ	19 - 23 (1.9 - 2.3, 14 - 17)	31.5 (1.240)
Ⓓ		35 (1.38)
Ⓔ	43 - 47 (4.4 - 4.8, 32 - 35)	50 (1.97)
Ⓕ	43 - 47 (4.4 - 4.8, 32 - 35)	39 (1.54)
Ⓖ		35 (1.38)
Ⓗ	45 - 47 (4.6 - 4.8, 33 - 35)	
Ⓘ		

Always use new bolts at portions Ⓐ, Ⓑ, Ⓗ and Ⓘ as they are self-sealing bolts. Apply ATF to thread of other bolts by that fix converter housing to transmission case when installing them.

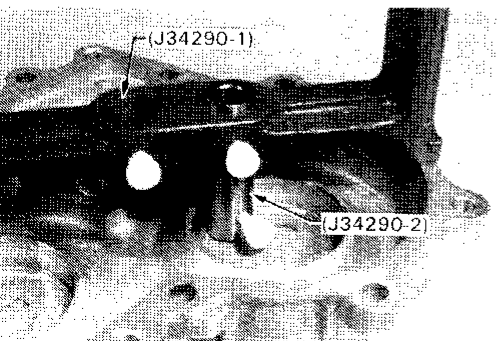


28. Install O-ring onto input shaft.

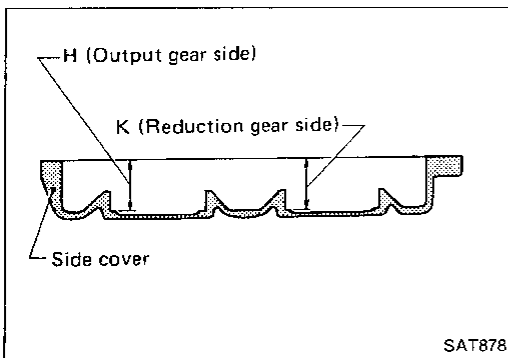


29. Adjust output shaft and idler gear bearing preload as follows:

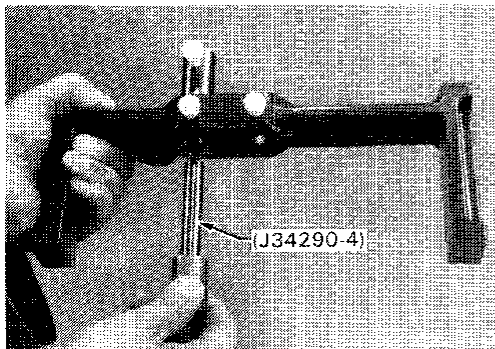
- a. Remove side cover temporarily installed.
- b. Remove output gear and idler gear bearing outer races and shims. (The races will interchange, so be sure to keep each race with its correct bearing.)



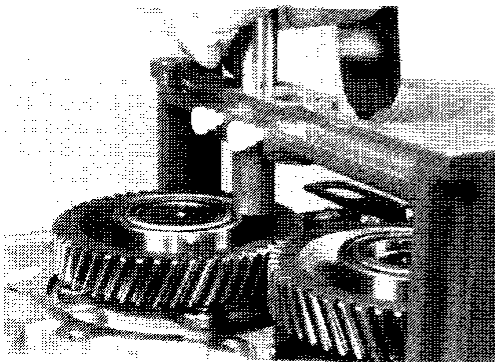
- c. Place Tools (bridge and gauging cylinder) onto machined gasket surface of side cover. Allow gauging cylinder to drop into output gear bearing race bore until it bottoms. Lock cylinder in place with the thumbscrew.



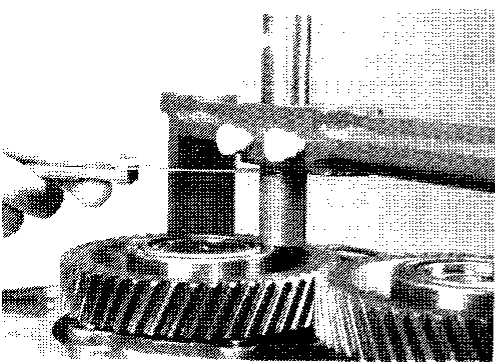
- You are now measuring dimension "H".
- d. Put correct bearing races on the output gear and idler gear bearings, and turn races to seat bearing.



- e. Place Tool (output gauging plunger) into the gauging cylinder.

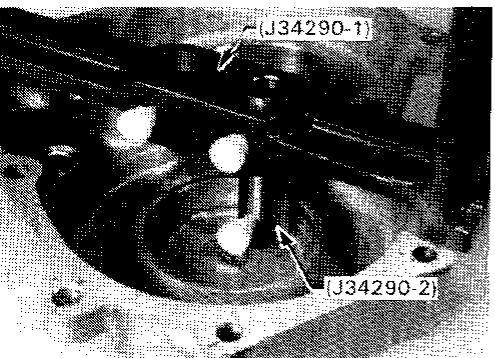


- f. Now, place bridge onto machined gasket surface of transmission case and allow gauging plunger to drop onto rear surface of output gear bearing race.

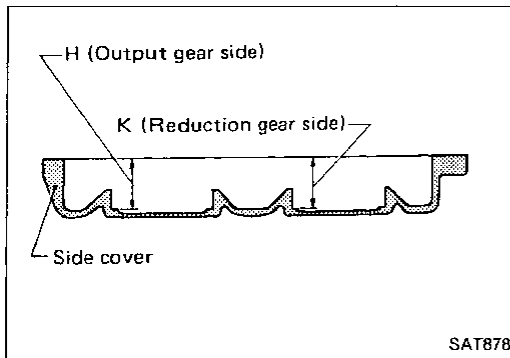


- g. Lock gauging plunger in place with thumbscrew. Use feeler gauge to measure gap between gauging cylinder and shoulder of gauging plunger.
- h. Use feeler gauge reading to select the correct shim(s) from following chart:

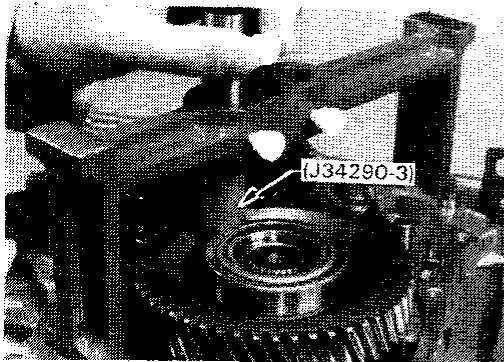
Output shaft bearing adjusting shim: Refer to SDS. AT-338



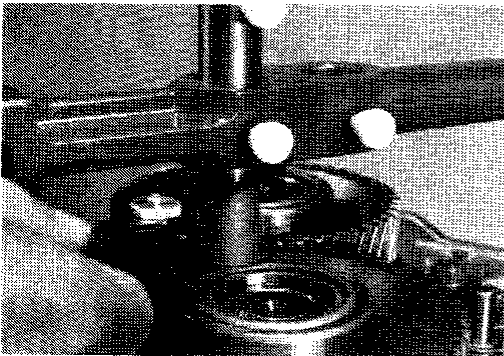
- i. Now, measure for the correct preload shims at the idler gear bearing in the same way. Place bridge onto machined surface of side cover and allow gauging cylinder to drop until it contacts idler bearing race mating surface.



- You are now measuring dimension "K".



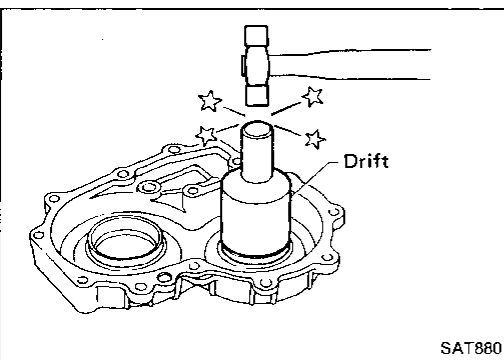
- j. Lock gauging cylinder in place. Insert Tool (gauging plunger) into gauging cylinder and place bridge onto machined surface of case, so that gauging plunger meets idler bearing race rear surface.



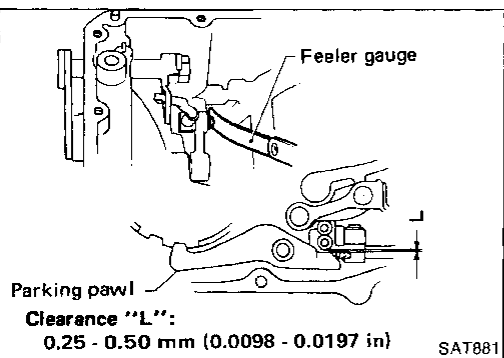
- k. Lock gauging plunger in place and use feeler gauge to measure gap between gauging cylinder and gauging plunger.

- l. Use your measured distance and the following chart to select correct shim(s) for idler gear bearing preload.

Idler gear bearing adjusting shim: Refer to SDS. AT-338



- m. Install selected shim(s) and bearing outer races.

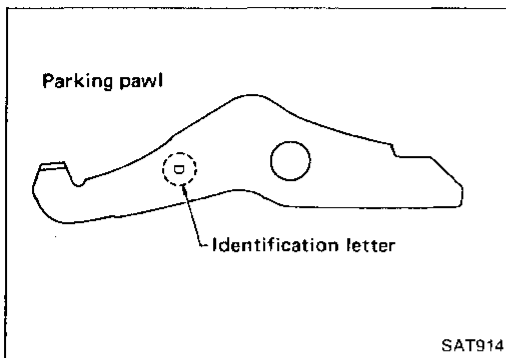


- 30. Move manual lever until parking pawl engages idler gear. Measure clearance between parking pawl and parking actuator.

If clearance is outside specifications, replace parking pawl.

Parking pawl: : Refer to SDS. AT-339

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Example:

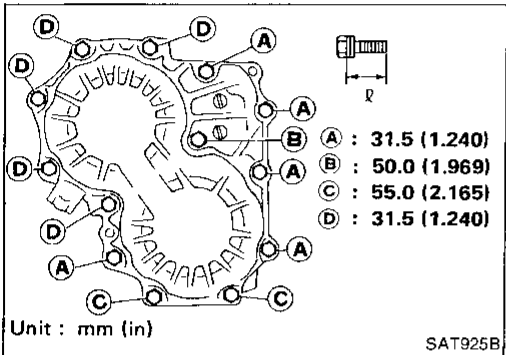
When parking pawl with identification letter "E" is used:

Clearance "L" is larger.

→ Replace with parking pawl with identification letter "D".

Clearance "L" is smaller.

→ Replace with parking pawl with identification letter "F".



31. Install side cover and gasket.

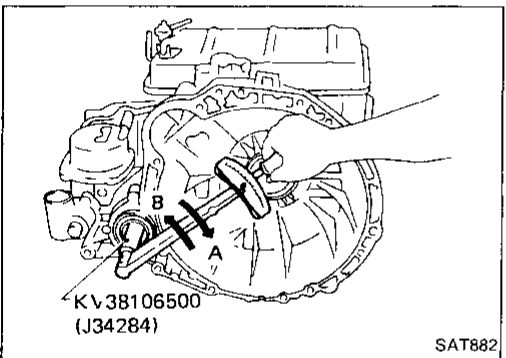
Always use new bolts at portions B and D as they are self-sealing bolts. Apply ATF to thread of other bolts by that fix side cover to transmission case when installing them.

Bolts A and C :

: 19 - 23 N·m (1.9 - 2.3 kg-m, 14 - 17 ft-lb)

Bolts B and D :

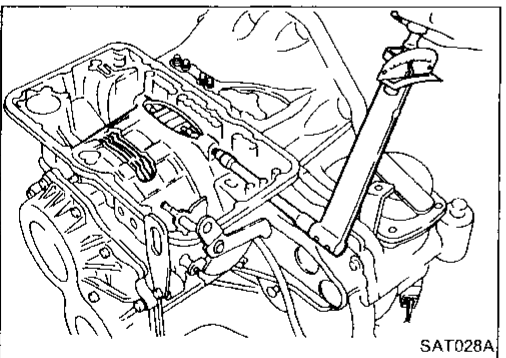
: 21 - 23 N·m (2.1 - 2.3 kg-m, 15 - 17 ft-lb)



32. Insert Tool into final drive portion to see if internal parts rotates smoothly. Rotating in direction "B" is slightly harder than in direction "A".

If abnormalities are noted, proceed with the following:

- Disassemble parts to see if they are properly assembled.
- Readjust bearing preloads of final drive, output shaft and idler gear.



33. Adjust brake band.

a. First tighten anchor end pin.

Anchor end pin:

: 4 - 6 N·m (0.4 - 0.6 kg-m, 2.9 - 4.3 ft-lb)

b. Back off anchor end pin "N" turns.

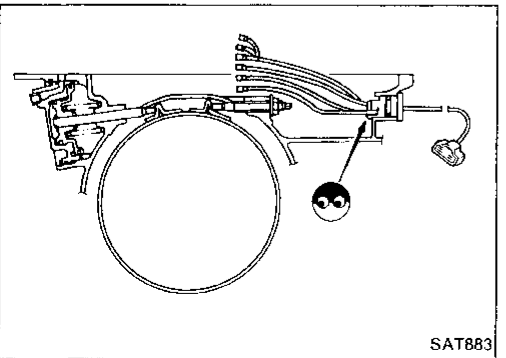
Number of returning revolutions for anchor end pin "N":

5.25 turn

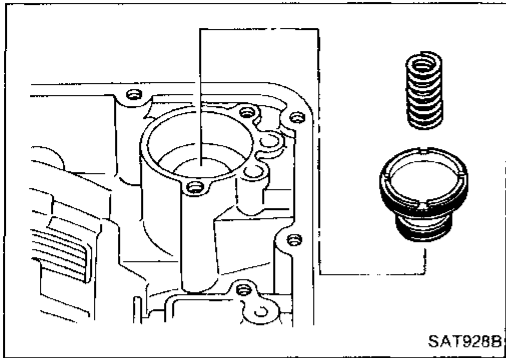
c. Tighten lock nut while holding anchor end pin stationary.

Lock nut:

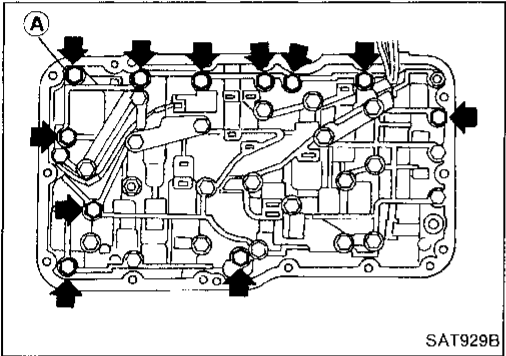
: 31 - 42 N·m (3.2 - 4.3 kg-m, 23 - 31 ft-lb)



34. Install terminal assembly, paying attention to the direction of its hook.

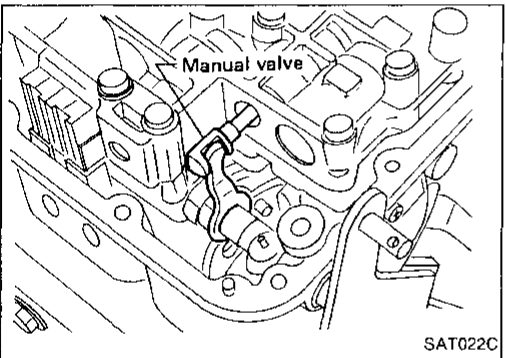


35. Install accumulator and spring.

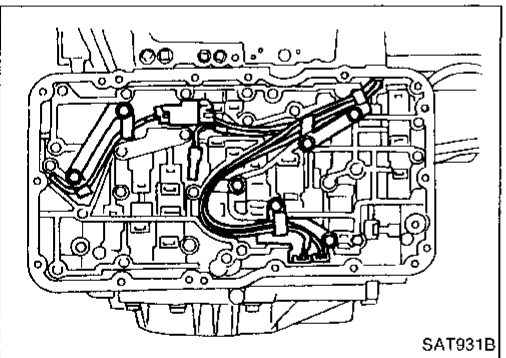


36. Insert manual valve to control valve body, then assemble them to transmission case.

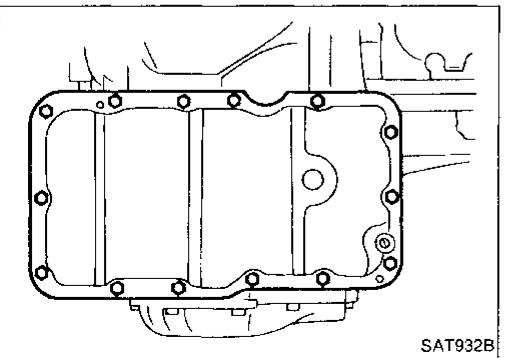
- Bolt A :**
- : 3.7 - 5.0 N·m (0.38 - 0.51 kg-m, 2.7 - 3.7 ft-lb)
- Other bolts:**
- : 7 - 9 N·m (0.7 - 0.9 kg-m, 5.1 - 6.5 ft-lb)



● Pay attention to the direction of manual valve groove.

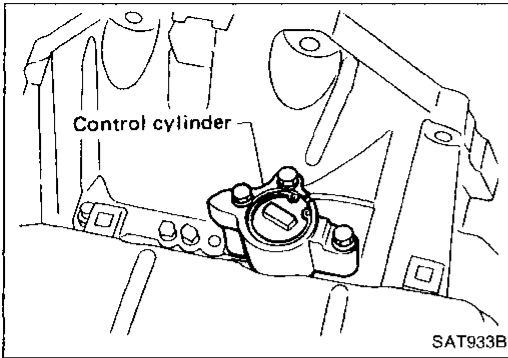


37. Connect harness connectors between terminal assembly and solenoids.

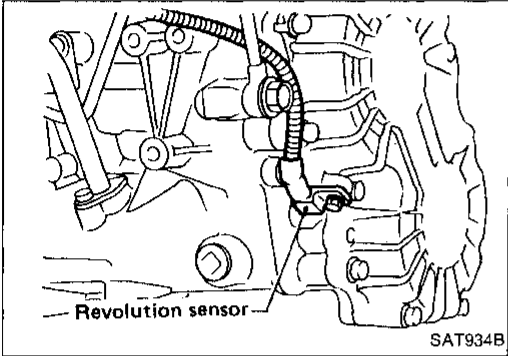


38. Put gasket on transmission case and install valve cover. Always use new bolts as they are self-sealing bolts.

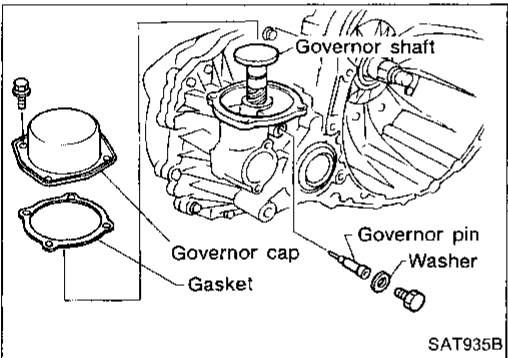
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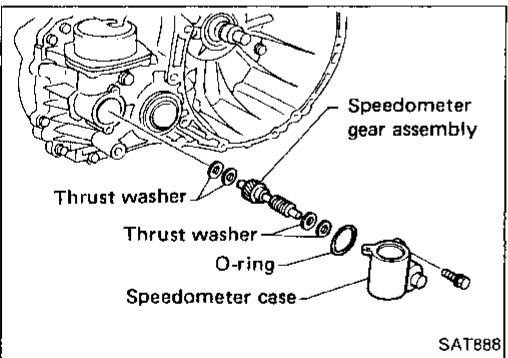
39. Install control cylinder.



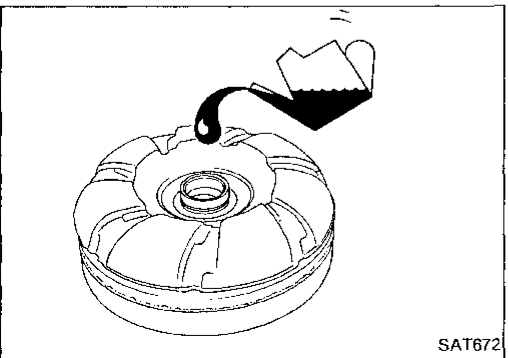
40. Install revolution sensor.



41. Install governor shaft.



42. Install speedometer parts.



43. Pour approx. 2 liters (2-1/8 US qt, 1-3/4 Imp qt) of automatic transmission fluid into converter housing.

44. Install torque converter to converter housing.

Be careful not to scratch front oil seal.

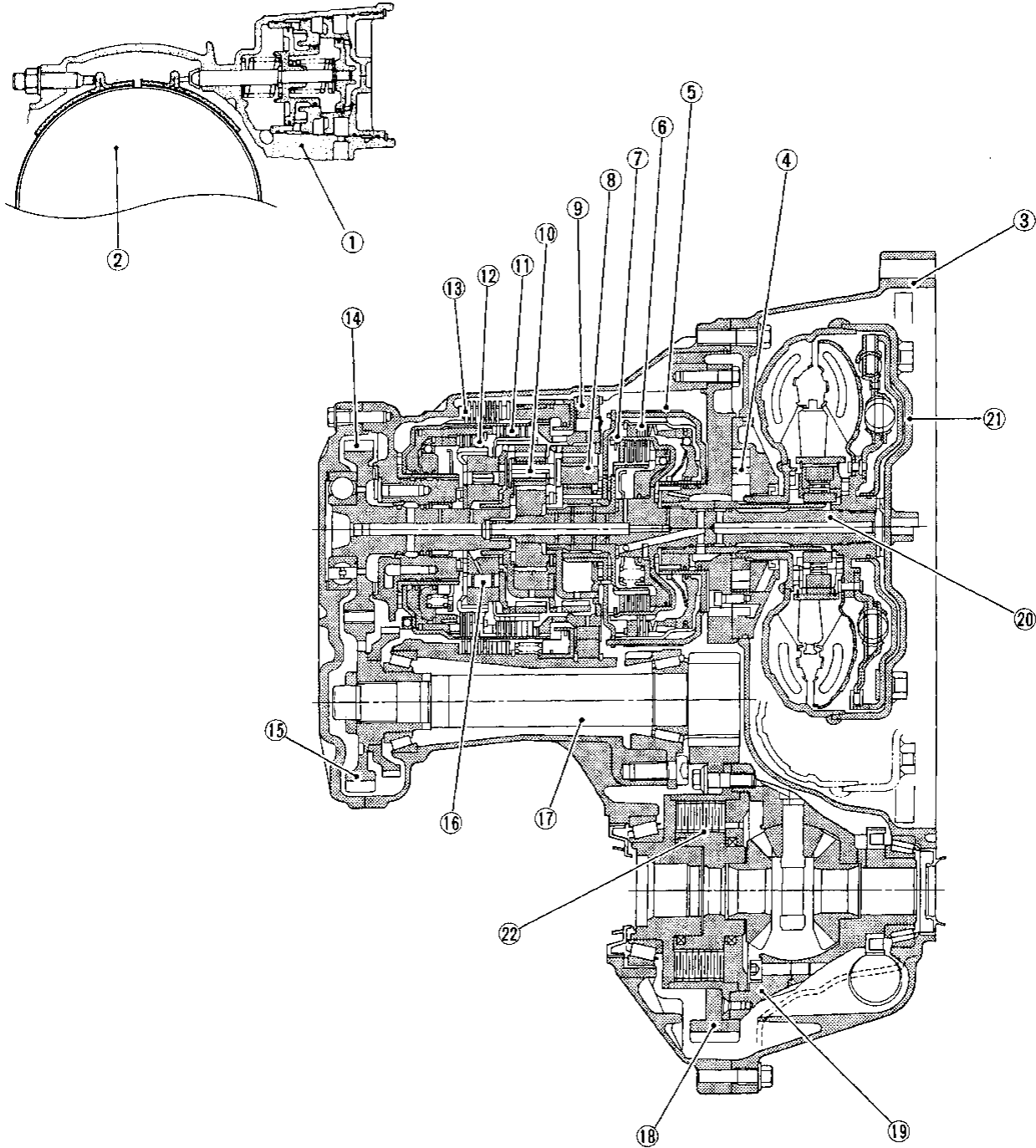
45. Apply sealant to threads of drain plug and install it in place.

46. Install inhibitor switch to transmission case.

47. Adjust inhibitor switch. Refer to On-vehicle Service. AT-182

48. Make sure that manual lever operates smoothly.

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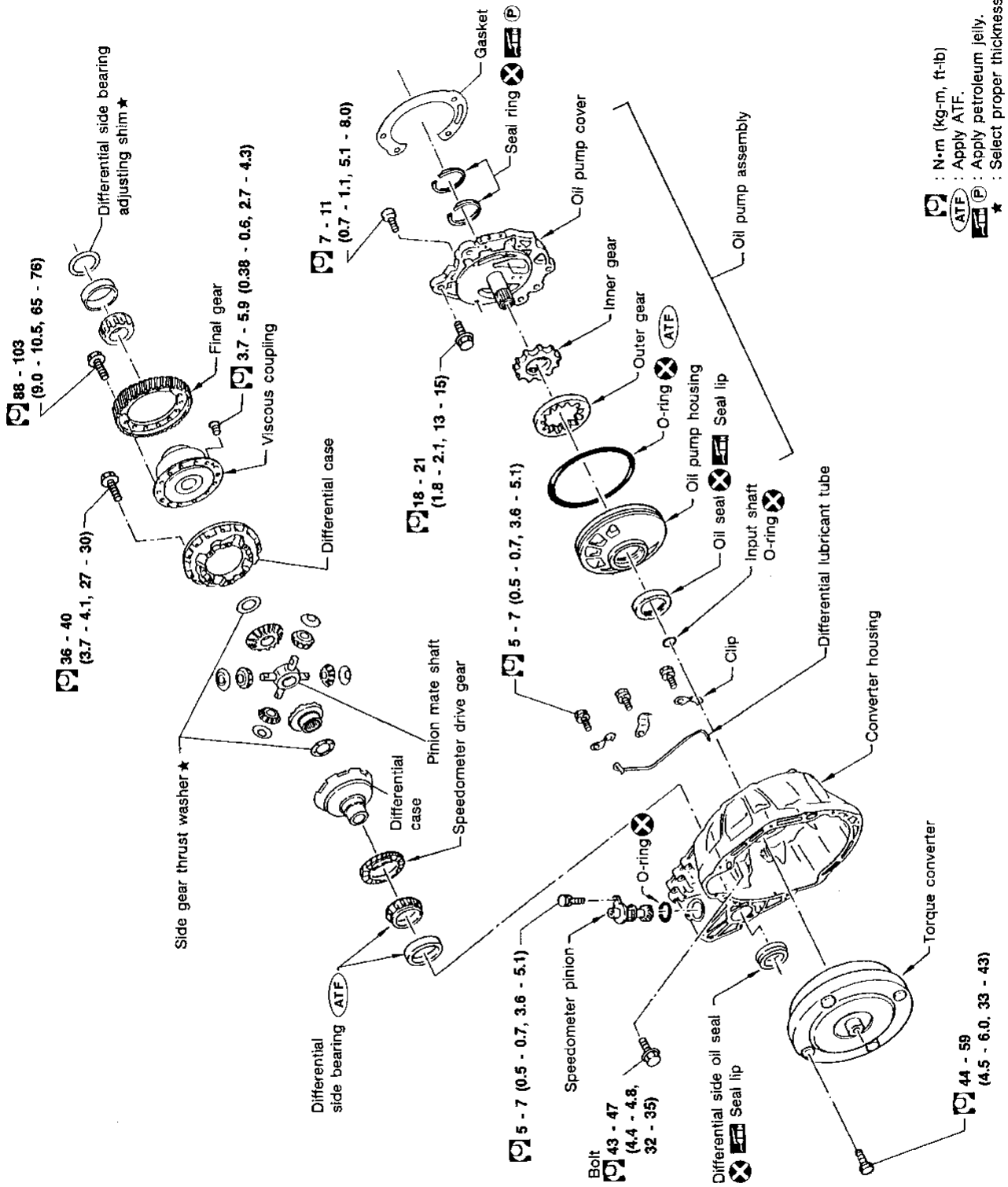


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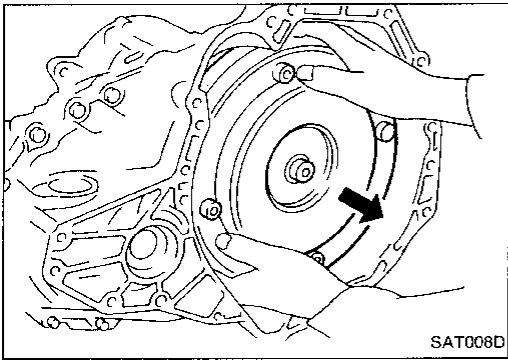
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- | | | |
|------------------------|-----------------------|--------------------------|
| ① Band servo piston | ⑨ Low one-way clutch | ⑯ Forward one-way clutch |
| ② Reverse clutch drum | ⑩ Rear planetary gear | ⑰ Pinion reduction gear |
| ③ Converter housing | ⑪ Forward clutch | ⑱ Final gear |
| ④ Oil pump | ⑫ Overrun clutch | ⑲ Differential case |
| ⑤ Brake band | ⑬ Low & reverse brake | ⑳ Input shaft |
| ⑥ Reverse clutch | ⑭ Output gear | ㉑ Torque converter |
| ⑦ High clutch | ⑮ Idler gear | ㉒ Viscous coupling |
| ⑧ Front planetary gear | | |

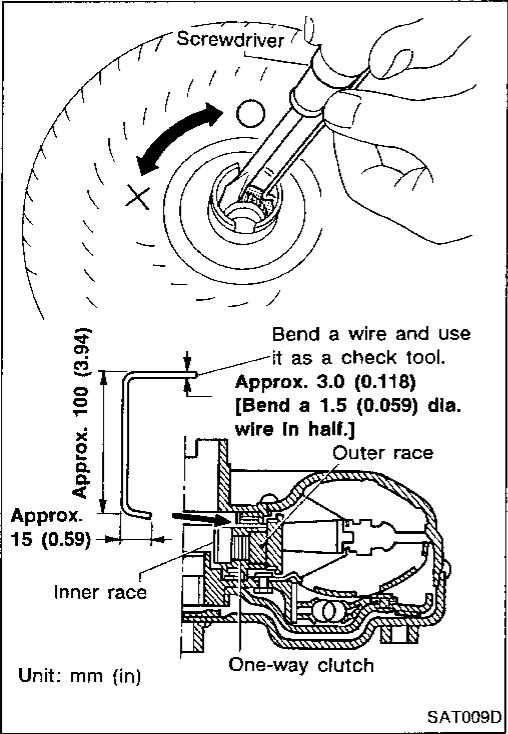
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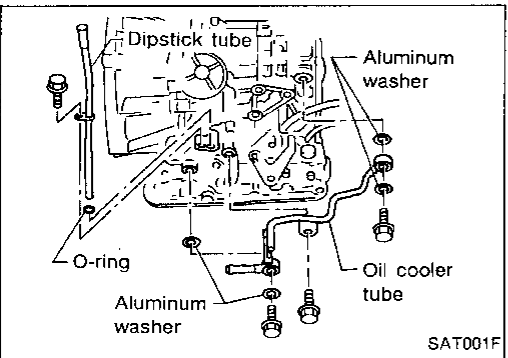
: N·m (kg-m, ft-lb)
 : Apply ATF.
 : Apply petroleum jelly.
 ★ : Select proper thickness.



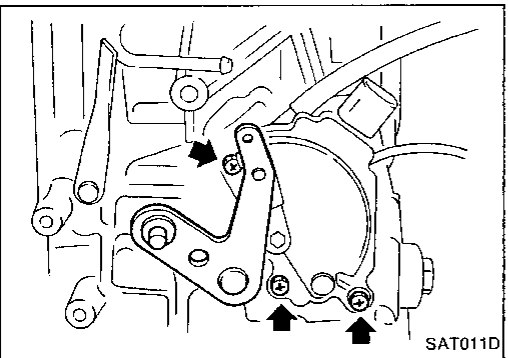
1. Drain ATF through drain plug.
2. Remove torque converter.



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



4. Remove oil charging pipe and oil cooler tube.



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

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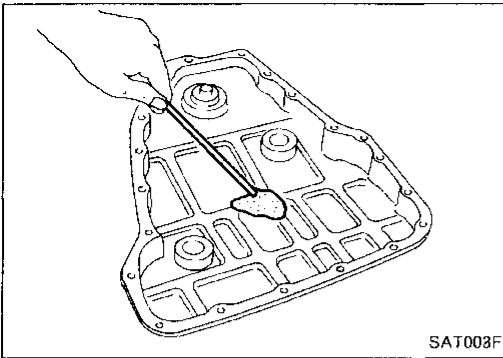
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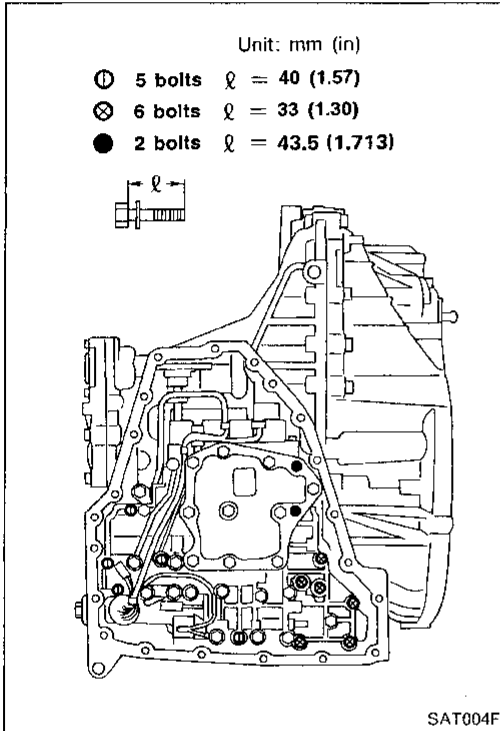
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7. Remove oil pan and oil pan gasket.

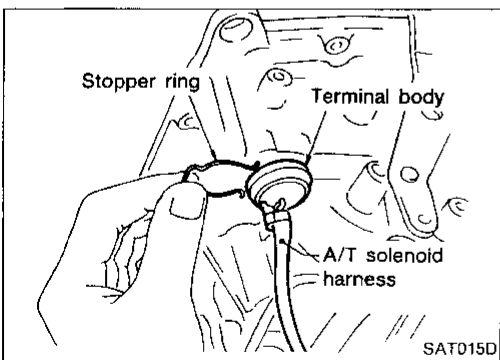
- **Do not reuse oil pan bolts.**

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

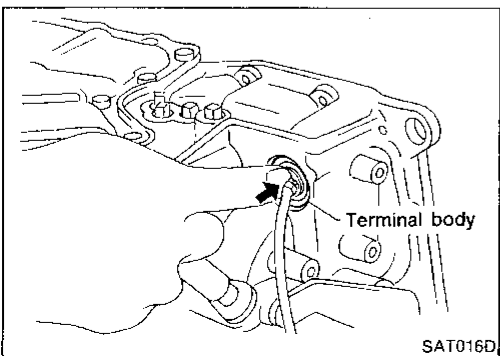


9. Remove control valve assembly according to the following procedures.

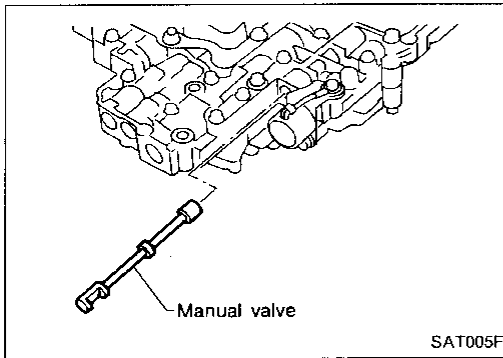
a. Remove control valve assembly mounting bolts ①, ⊗ and ●.



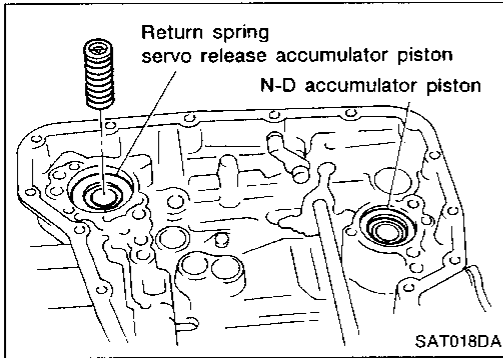
b. Remove stopper ring from terminal body.



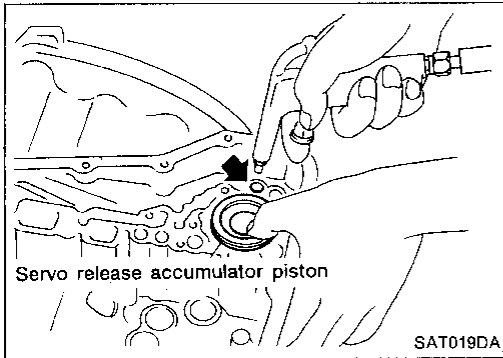
c. Push terminal body into transmission case and draw out solenoid harness.



10. Remove manual valve from control valve assembly.

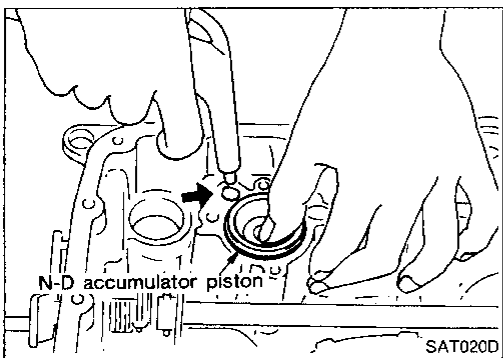


11. Remove return spring from servo release accumulator piston.



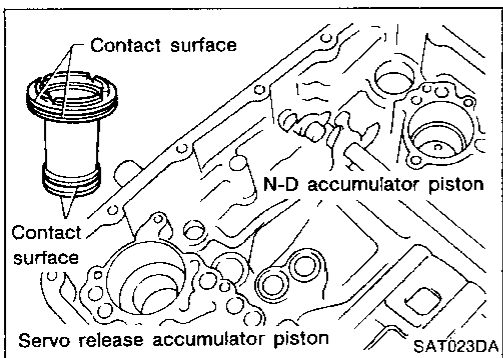
12. Remove servo release accumulator piston with compressed air.

13. Remove O-rings from servo release accumulator piston.



14. Remove N-D accumulator piston and return spring with compressed air.

15. Remove O-rings from N-D accumulator piston.



16. Check accumulator pistons and contact surface of transmission case for damage.

17. Check accumulator return springs for damage and free length.

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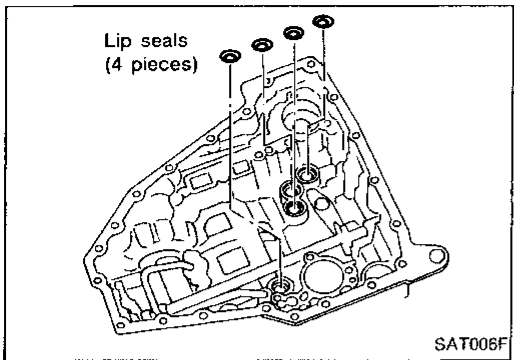
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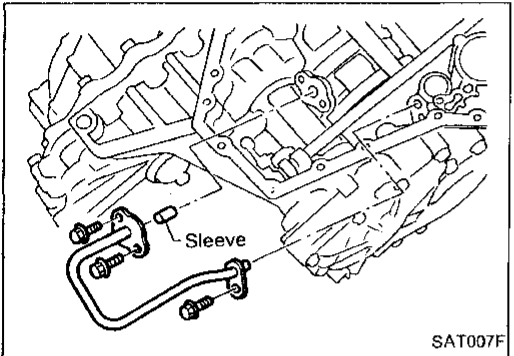
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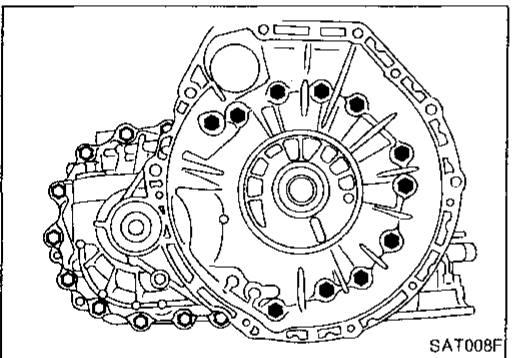
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18. Remove lip seals.

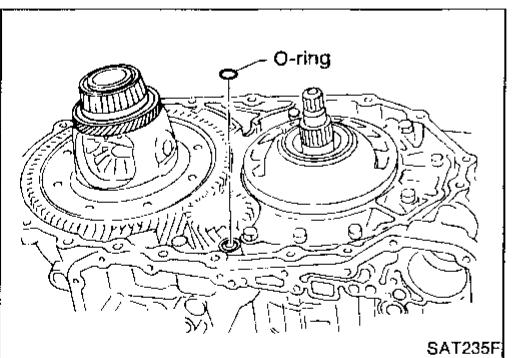


19. Remove tube and sleeve.

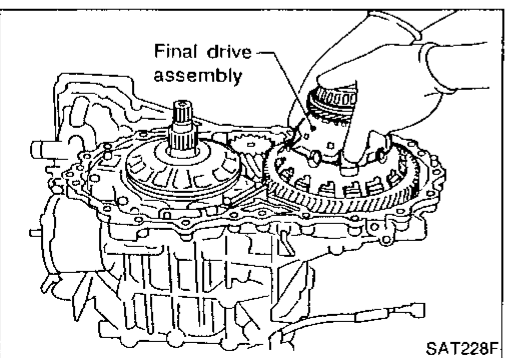


20. Remove converter housing according to the following procedures.

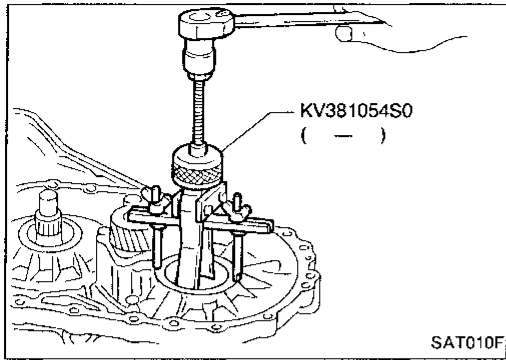
- a. Remove converter housing mounting bolts.
- b. Remove converter housing by tapping it lightly.



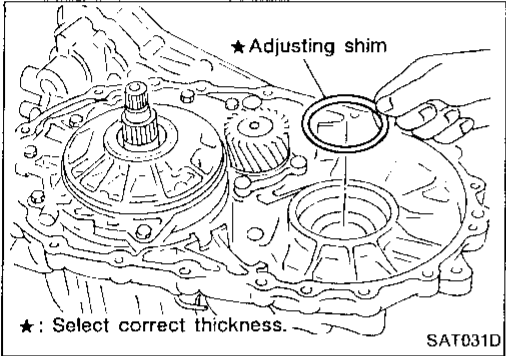
c. Remove O-ring from differential oil port.



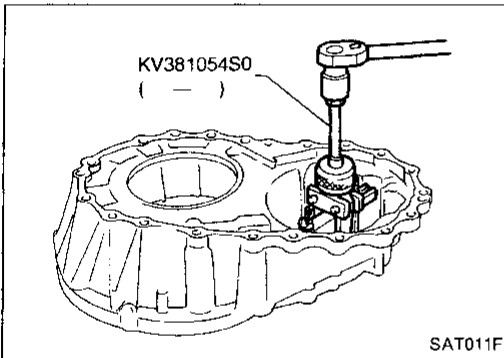
21. Remove final drive assembly from transmission case.



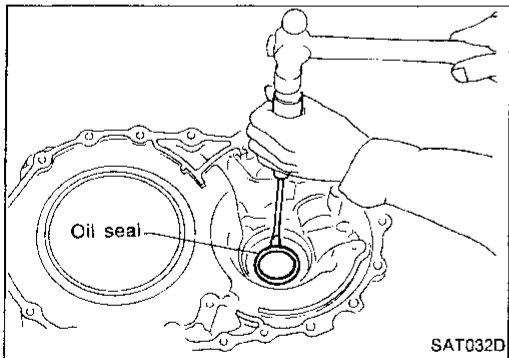
22. Remove differential side bearing outer race from transmission case.



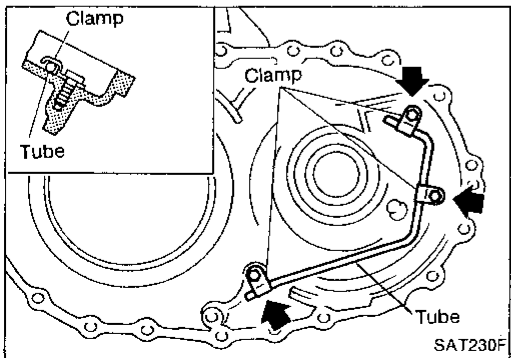
23. Remove differential side bearing adjusting shim from transmission case.



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

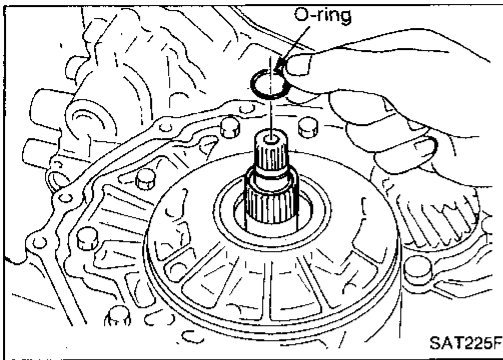


25. Remove oil seal with screwdriver from converter housing.
● Be careful not to damage case.

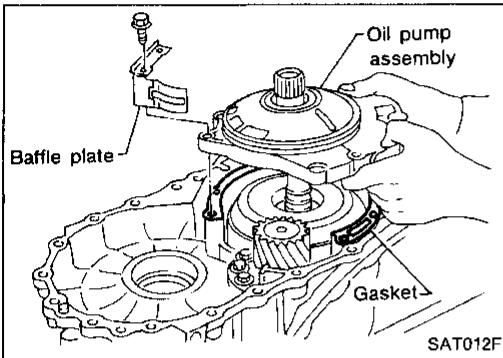


26. Remove oil tube from converter housing.

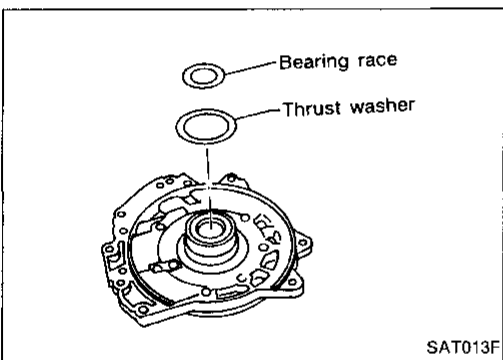
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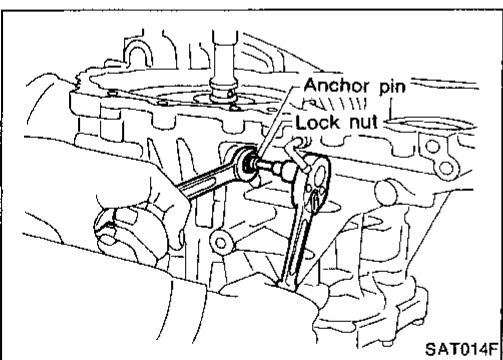
27. Remove oil pump according to the following procedures.
- a. Remove O-ring from input shaft.



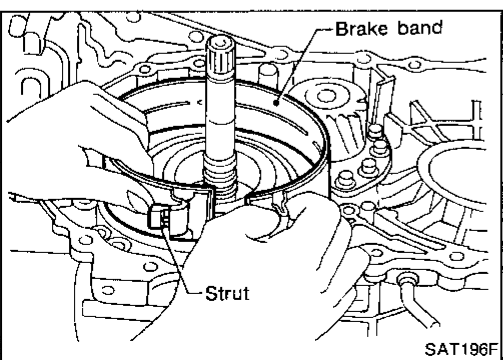
- b. Remove oil pump assembly, baffle plate and gasket from transmission case.



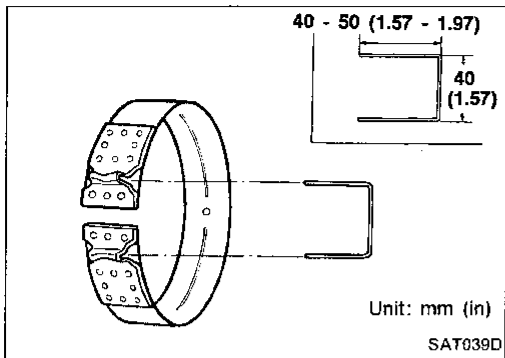
- c. Remove thrust washer and bearing race from oil pump assembly.



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



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

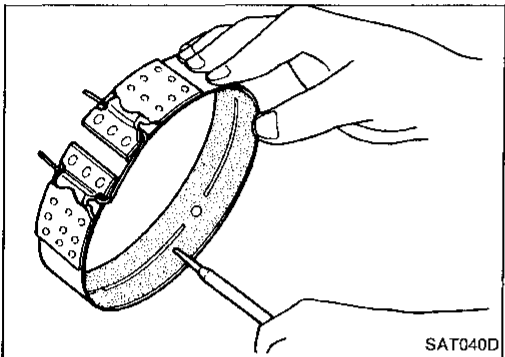


- To prevent brake linings from cracking or peeling, do not stretch the flexible band unnecessarily. When removing the brake band, always secure it with a clip as shown in the figure at left. Leave the clip in position after removing the brake band.

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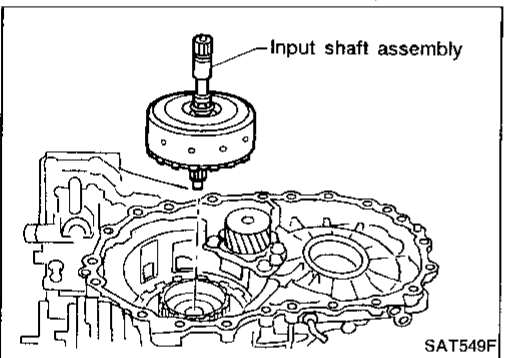
- Check brake band facing for damage, cracks, wear or burns.

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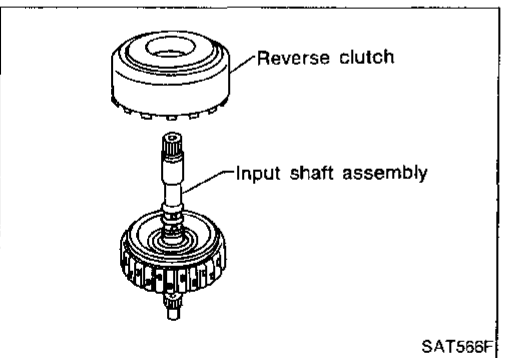
- Remove input shaft assembly (high clutch), reverse clutch and front sun gear according to the following procedures.
 - Remove input shaft assembly (high clutch) with reverse clutch.

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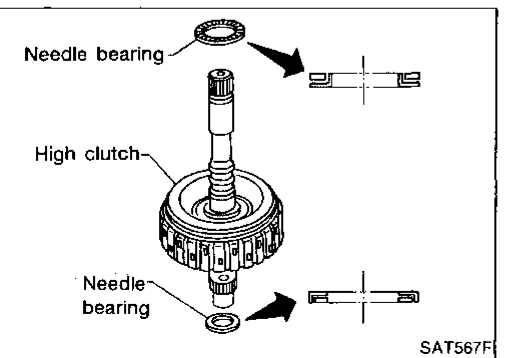
- Remove input shaft assembly (high clutch) from reverse clutch.

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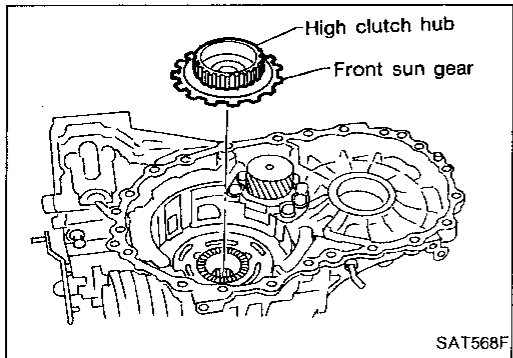
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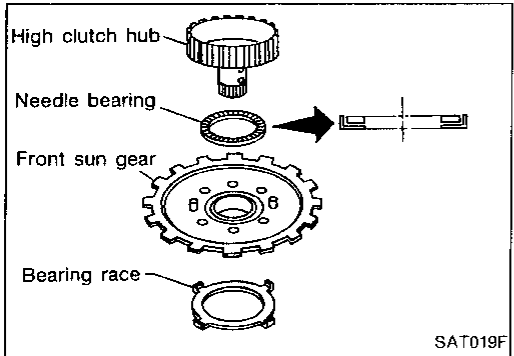
- Remove needle bearings from high clutch drum and check for damage or wear.

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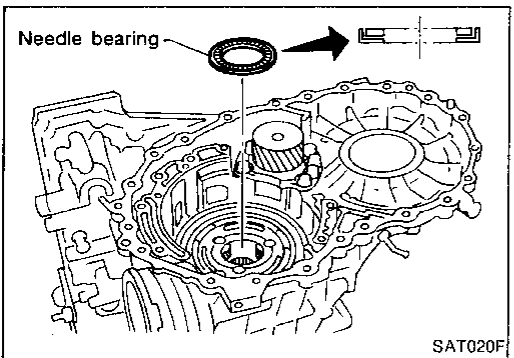
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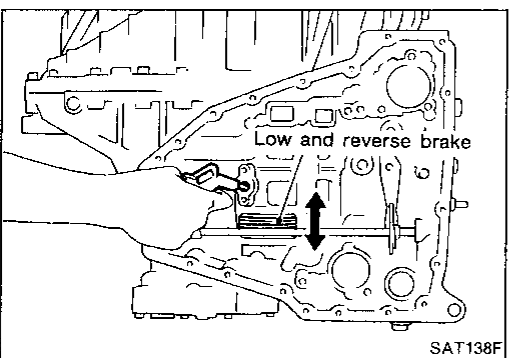
- d. Remove high clutch hub and front sun gear from transmission case.



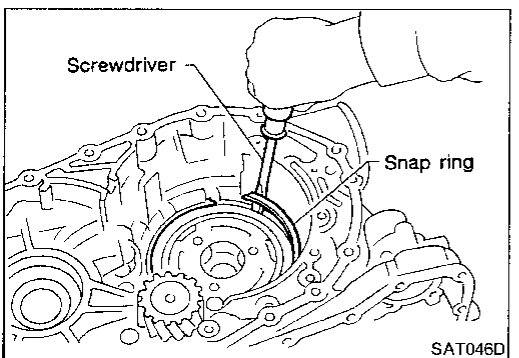
- e. Remove front sun gear and needle bearing from high clutch hub and check for damage or wear.
f. Remove bearing race from front sun gear and check for damage or wear.



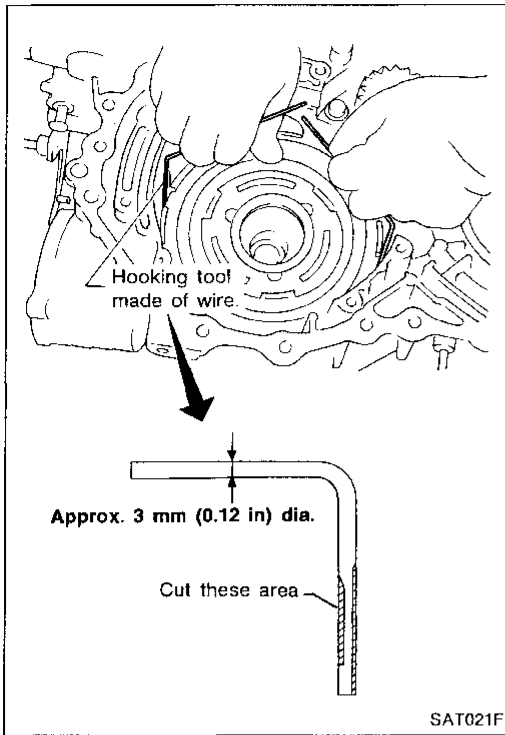
30. Remove needle bearing from transmission case and check for damage or wear.



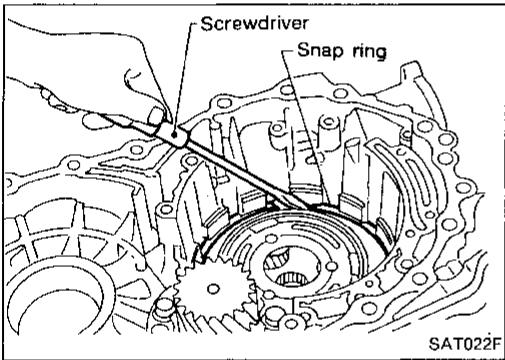
31. Apply compressed air and check to see that low and reverse brake operates.



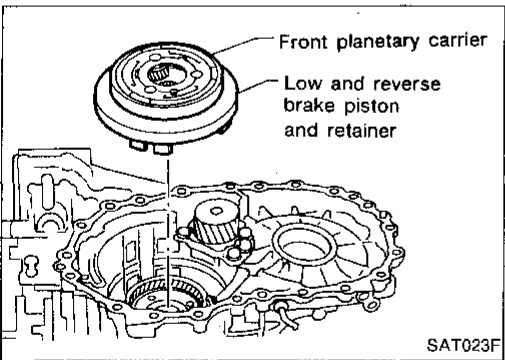
32. Remove low one-way clutch and front planetary carrier assembly according to the following procedures.
a. Remove snap ring with flat-bladed screwdriver.



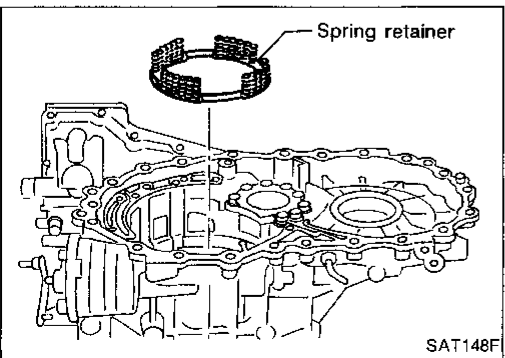
b. Remove low one way clutch with a hook made of wire.



c. Remove snap ring with flat-bladed screwdriver.



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



e. Remove low and reverse brake spring retainer.
 ● Do not remove return springs from spring retainer.

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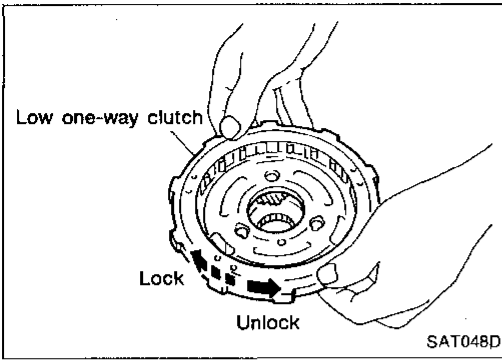
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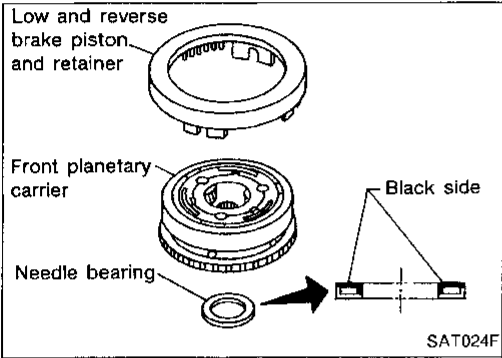
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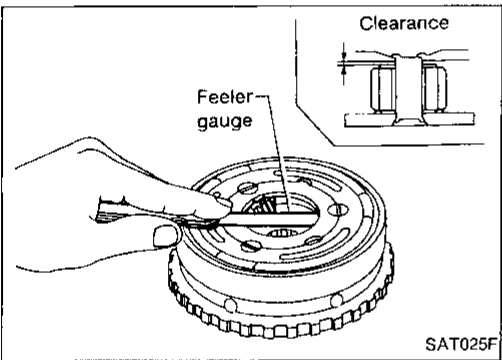
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- f. Check that low one-way clutch rotates in the direction of the arrow and locks in the opposite direction.



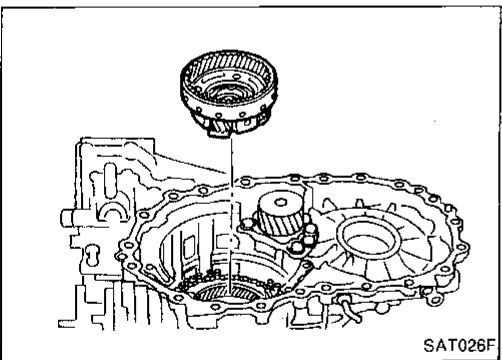
- g. Remove needle bearing, low and reverse brake piston and retainer from front planetary carrier.



- h. Check front planetary carrier, low one-way clutch and needle bearing for damage or wear.
- i. Check clearance between planetary gears and planetary carrier with feeler gauge.

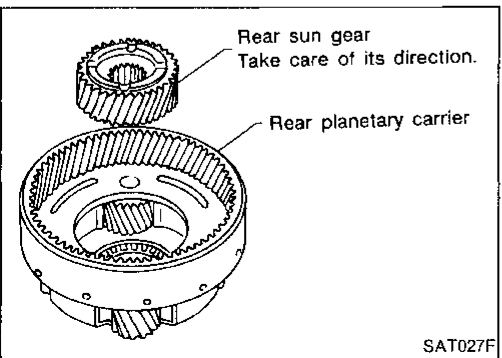
Standard clearance:
 0.20 - 0.70 mm (0.0079 - 0.0276 in)
Allowable limit:
 0.80 mm (0.0315 in)

Replace front planetary carrier if the clearance exceeds allowable limit.

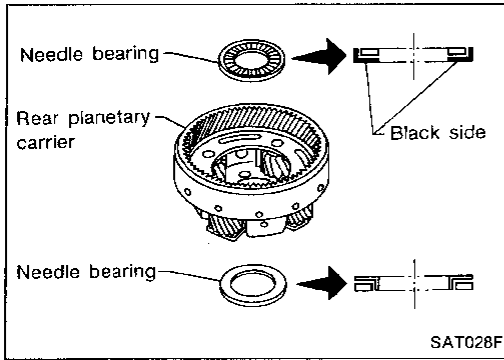


- 33. Remove rear planetary carrier assembly and rear sun gear according to the following procedures.

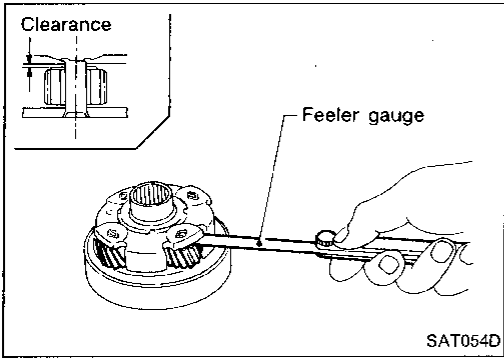
- a. Remove rear planetary carrier assembly from transmission case.



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



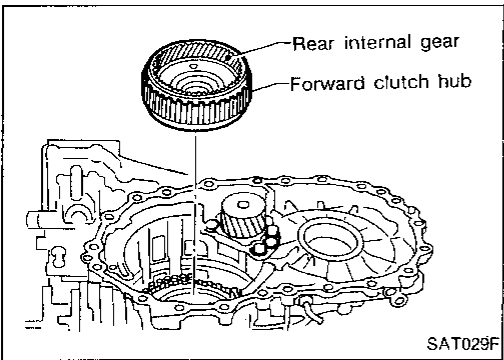
c. Remove needle bearings from rear planetary carrier assembly.



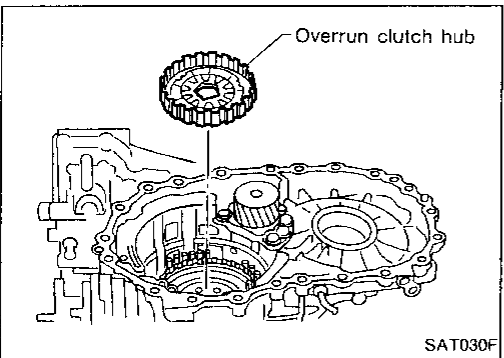
d. Check rear planetary carrier, rear sun gear and needle bearings for damage or wear.
 e. Check clearance between pinion washer and rear planetary carrier with feeler gauge.

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

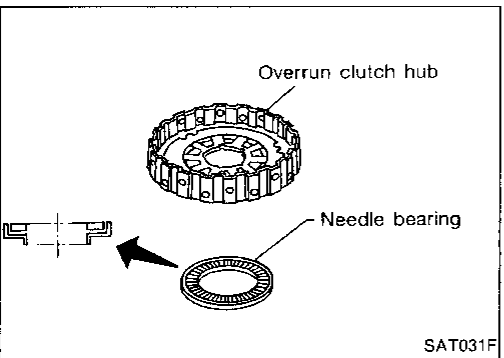
Replace rear planetary carrier if the clearance exceeds allowable limit.



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



35. Remove overrun clutch hub from transmission case.



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

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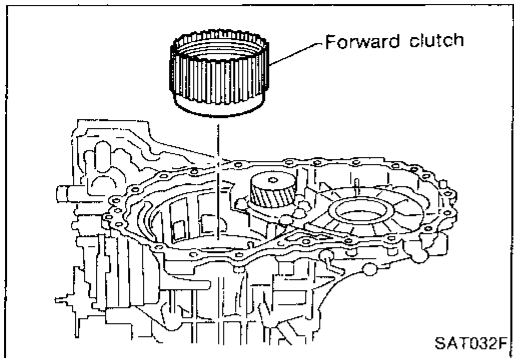
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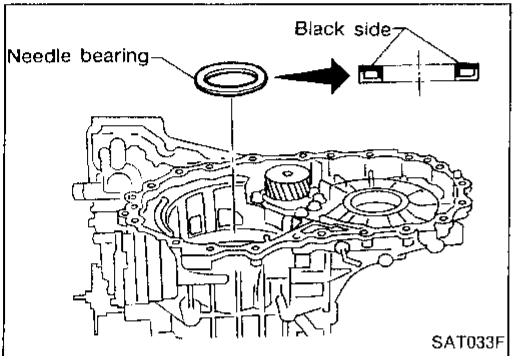
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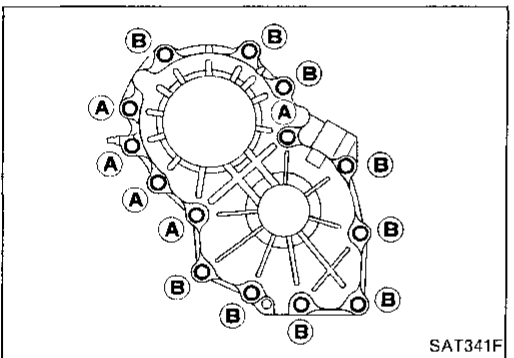
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37. Remove forward clutch assembly from transmission case.



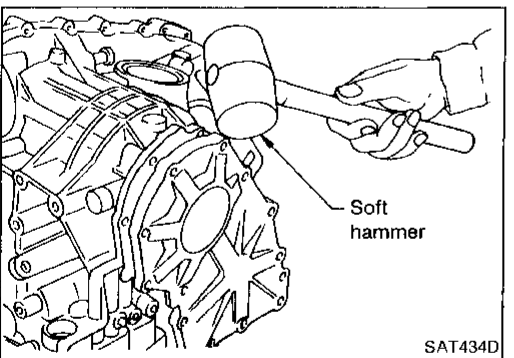
38. Remove needle bearing from transmission case.



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

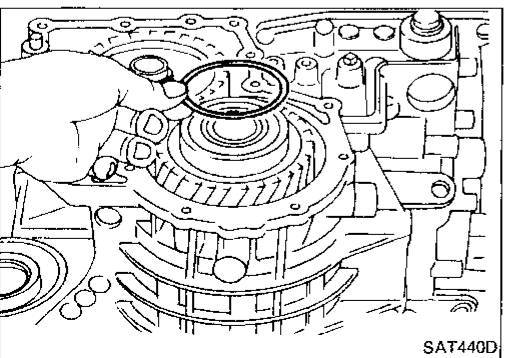
a. Remove side cover bolts.

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

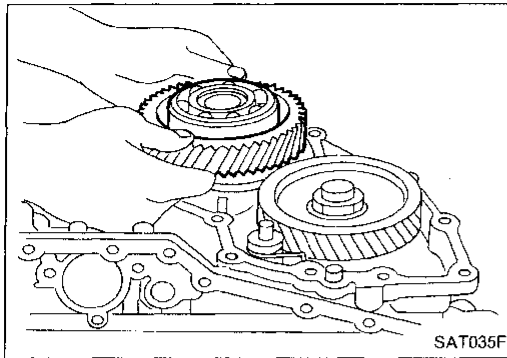


b. Remove side cover by lightly tapping it with a soft hammer.

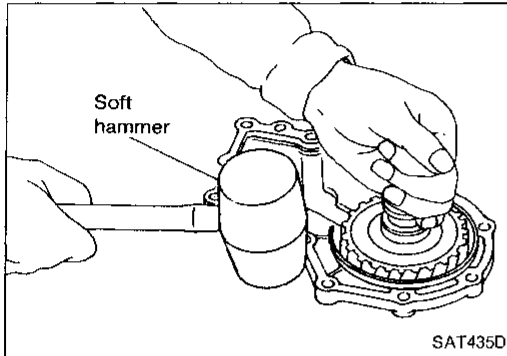
- Be careful not to drop output shaft assembly as output shaft assembly may be removed together with side cover.



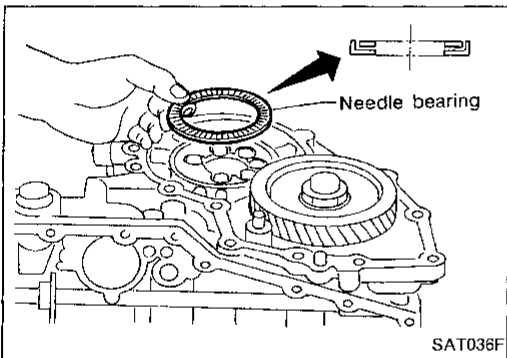
c. Remove adjusting shim.



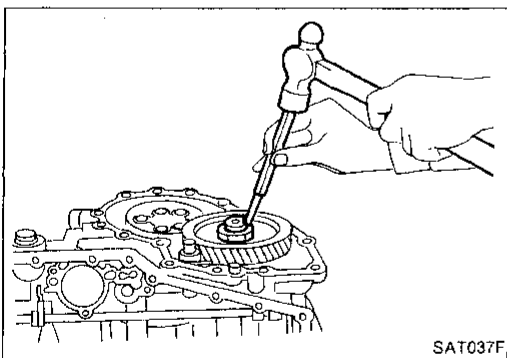
d. Remove output shaft assembly.



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

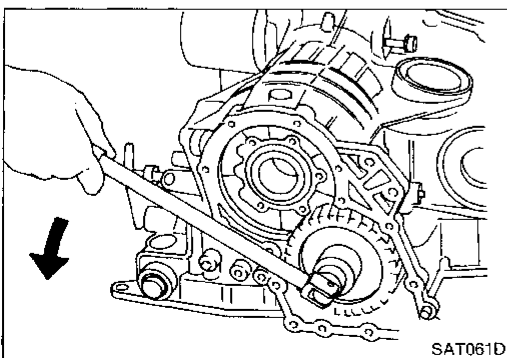


e. Remove needle bearing.



40. Disassemble reduction gear according to the following procedures.

- Set manual lever to position "P" to fix idler gear.
- Unlock idler gear lock nut using a pin punch.



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

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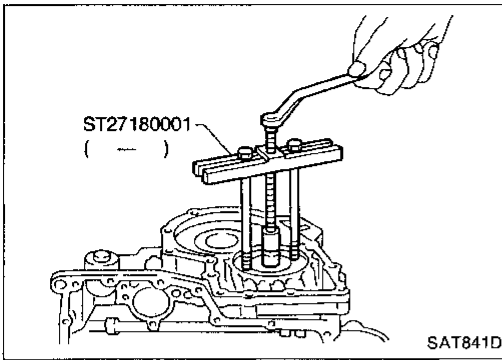
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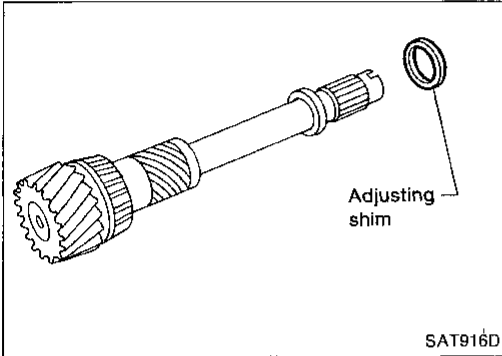
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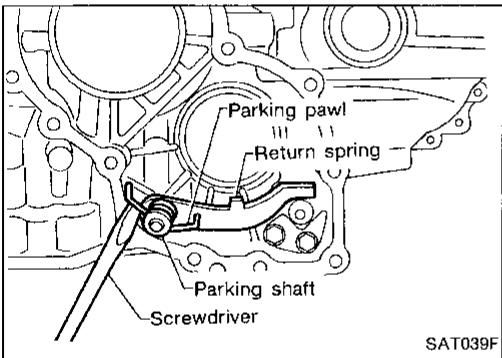


d. Remove idler gear with puller.



e. Remove reduction gear.

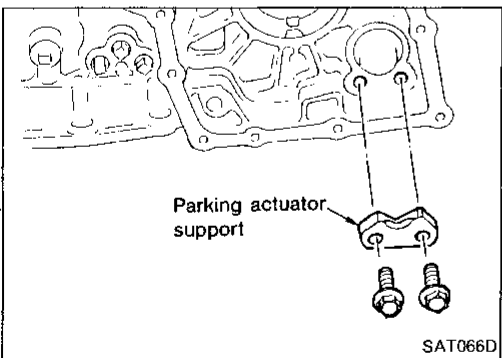
f. Remove adjusting shim from reduction gear.



41. Remove return spring from parking shaft with screwdriver.

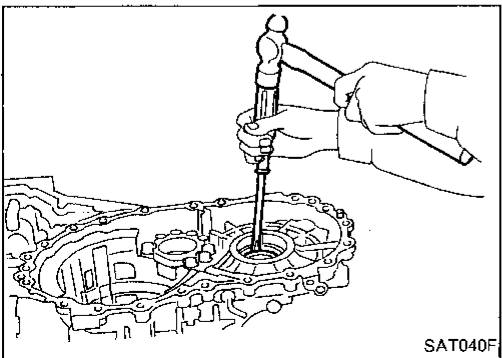
42. Draw out parking shaft and remove parking pawl from transmission case.

43. Check parking pawl and shaft for damage or wear.



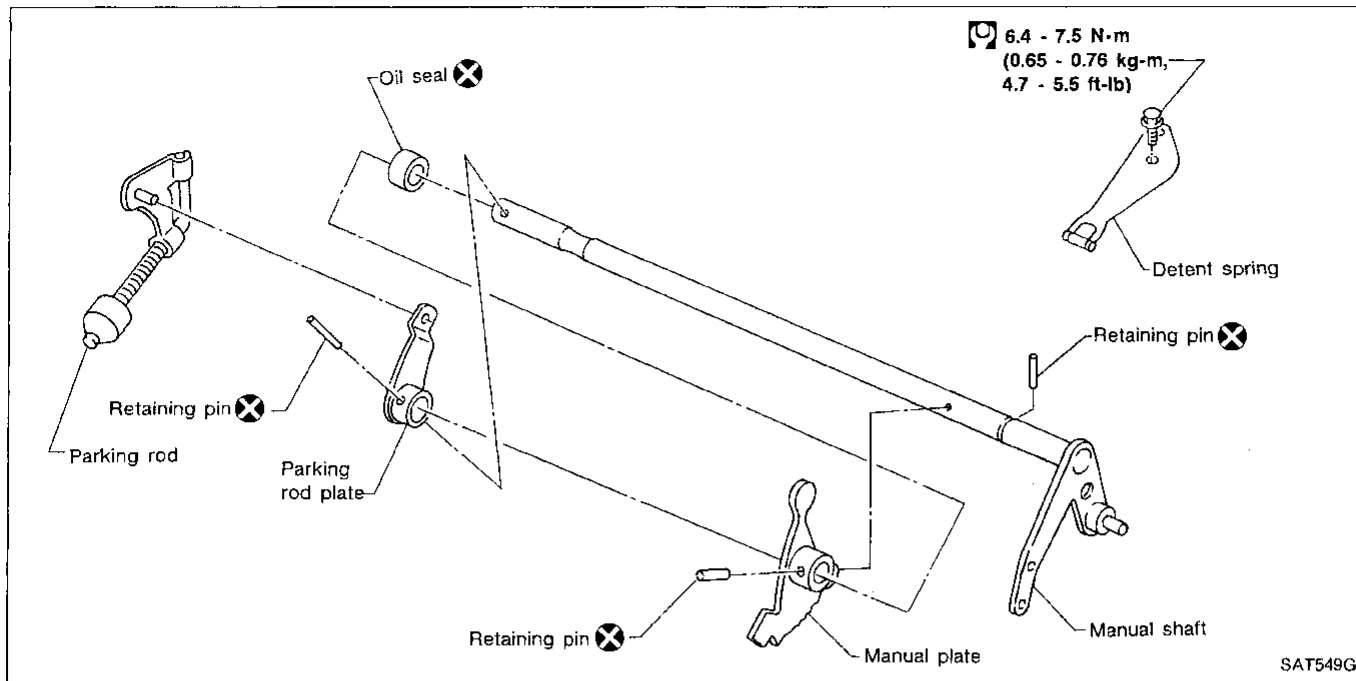
44. Remove parking actuator support from transmission case.

45. Check parking actuator support for damage or wear.

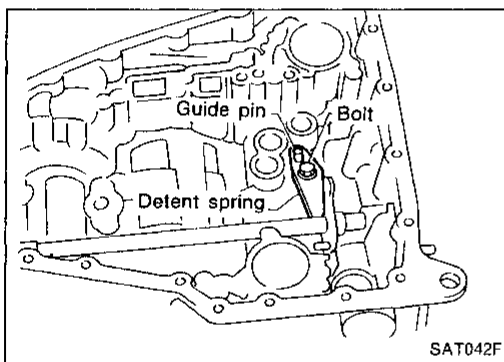


46. Remove side oil seal with screwdriver from transmission case.

Manual Shaft



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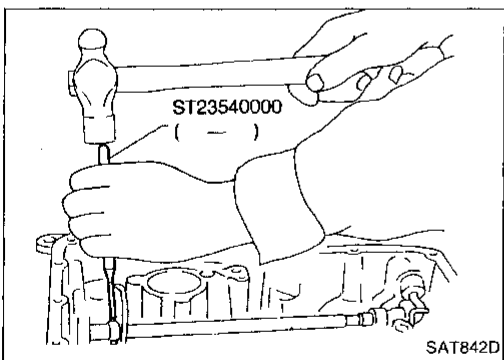


REMOVAL

1. Remove detent spring from transmission case.

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2. Drive out manual plate retaining pin.

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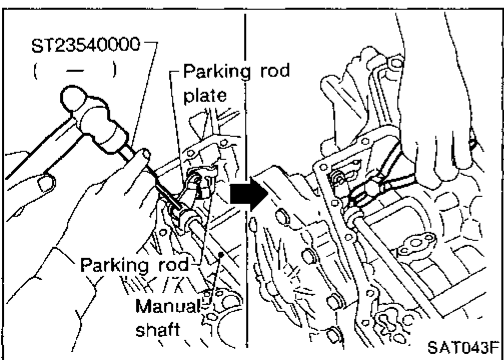
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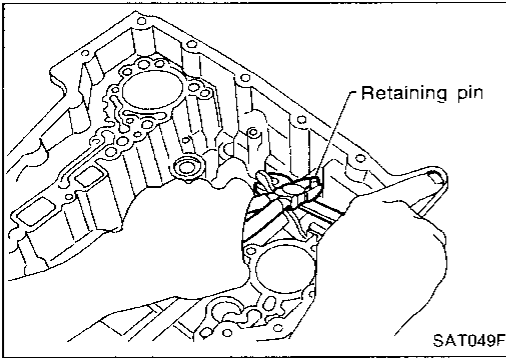


3. Drive and pull out parking rod plate retaining pin.
4. Remove parking rod plate from manual shaft.
5. Draw out parking rod from transmission case.

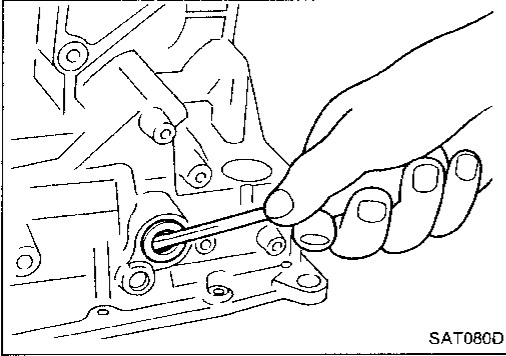
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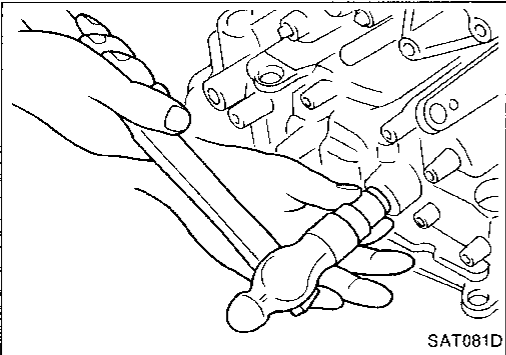
Manual Shaft (Cont'd)



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



8. Remove manual shaft oil seal.

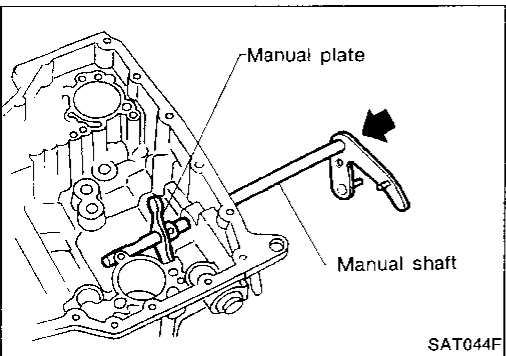


INSPECTION

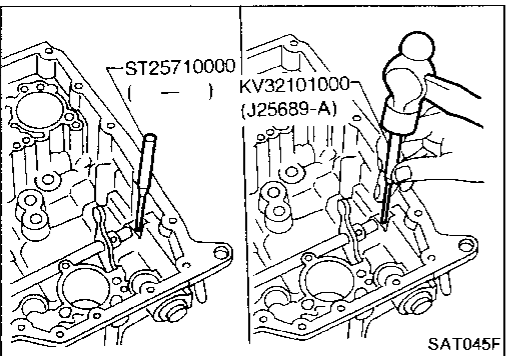
- Check component parts for wear or damage. Replace if necessary.

INSTALLATION

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

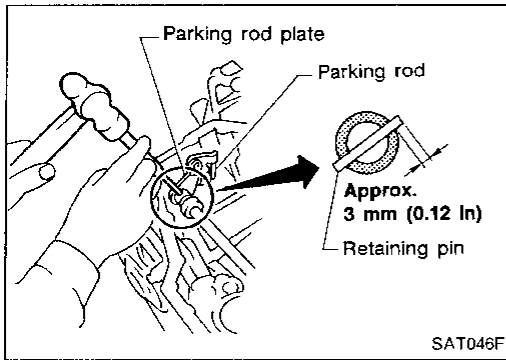


2. Install manual shaft and manual plate.



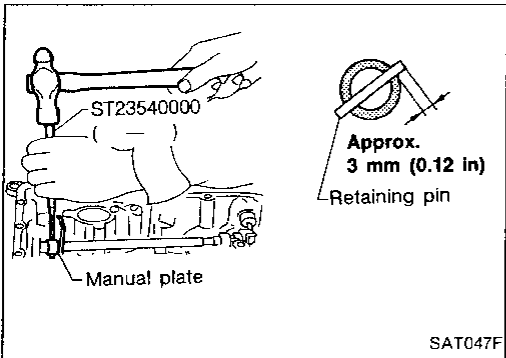
3. Align groove of manual shaft and hole of transmission case.
4. Install manual shaft retaining pin up to bottom of hole.

Manual Shaft (Cont'd)

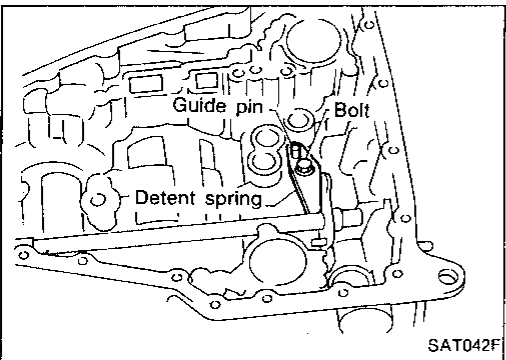


5. Install parking rod to parking rod plate.
6. Set parking rod assembly onto manual shaft and drive retaining pin.

Both ends of pin should protrude.

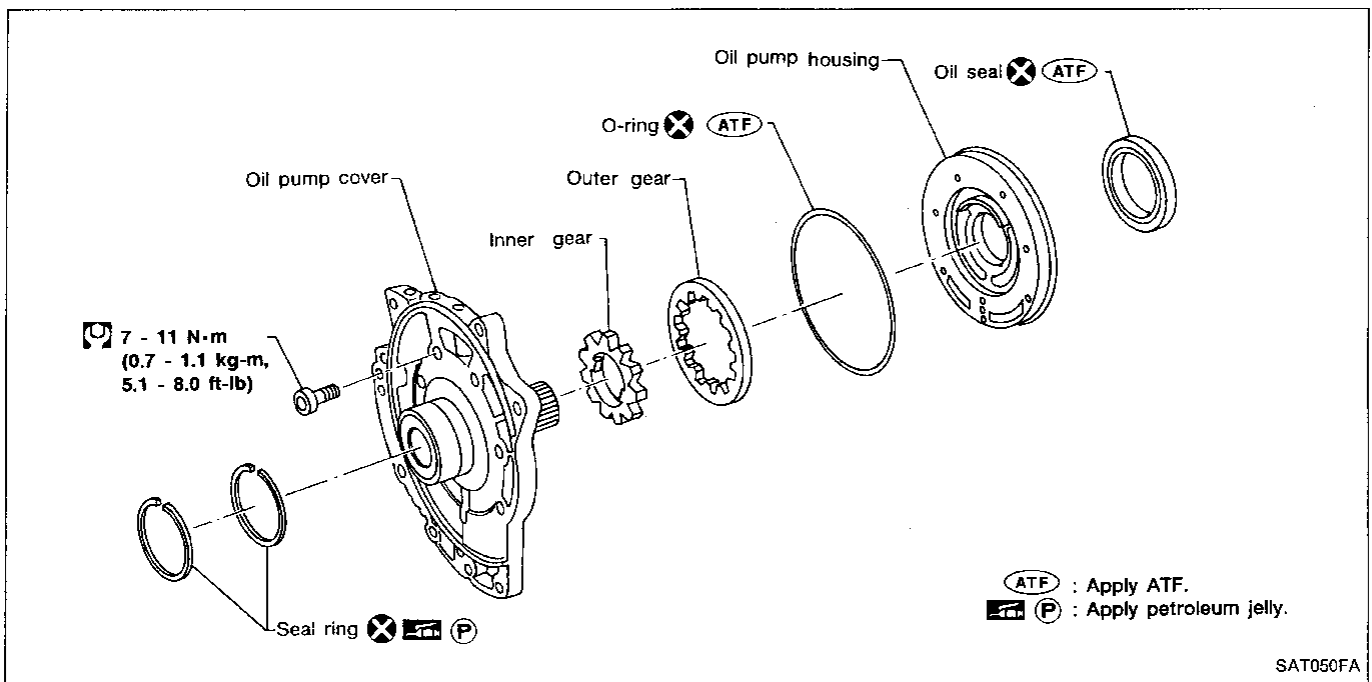


7. Drive manual plate retaining pin.
- Both ends of pin should protrude.



8. Install detent spring.

Oil Pump

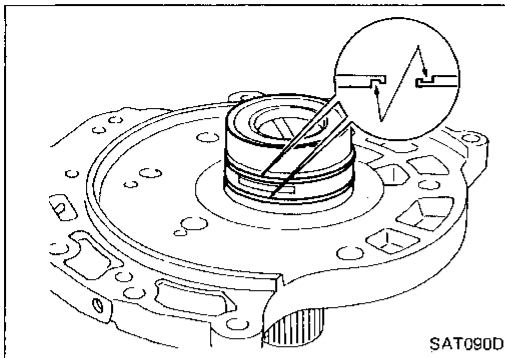


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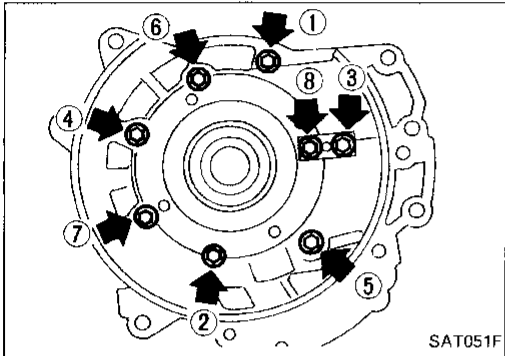
Oil Pump (Cont'd)

DISASSEMBLY

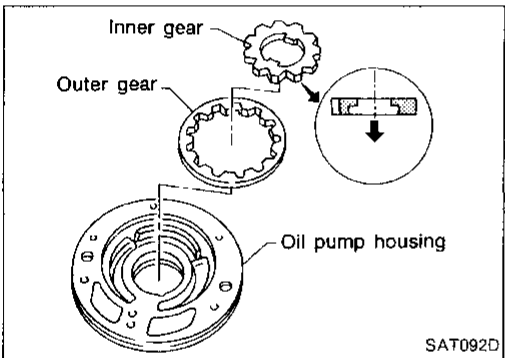
1. Remove seal rings by undoing hooks.



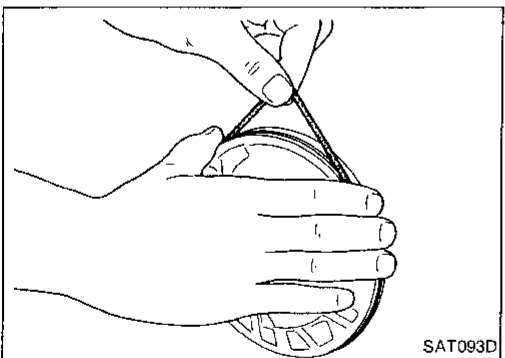
2. Loosen bolts in a crisscross pattern and remove oil pump cover.



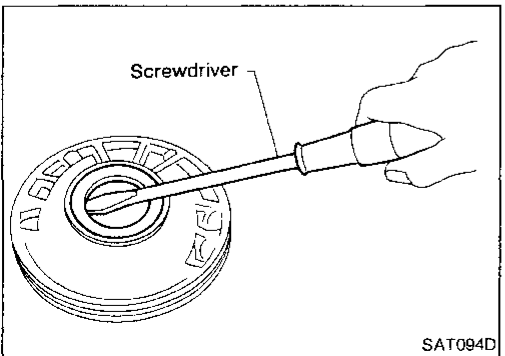
3. Remove inner and outer gear from oil pump housing.



4. Remove O-ring from oil pump housing.



5. Remove oil pump housing oil seal.



Oil Pump (Cont'd)

INSPECTION

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

- Check for wear or damage.

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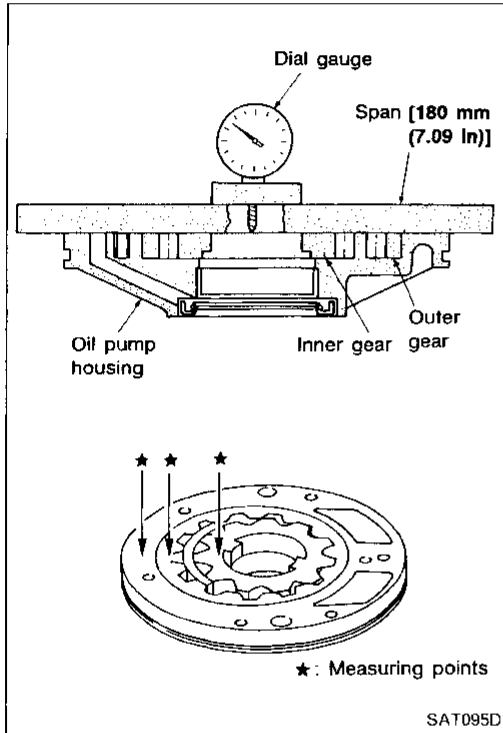
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Side clearance

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

Standard clearance:

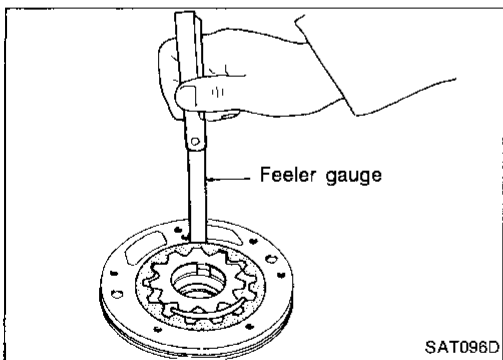
0.030 - 0.050 mm (0.0012 - 0.0020 in)

- If clearance is less than standard, select inner and outer gear as a set so that clearance is within specifications.

Inner and outer gear:

Refer to SDS. AT-337

- If clearance is more than standard, replace whole oil pump assembly except oil pump cover.



- Measure clearance between outer gear and oil pump housing.

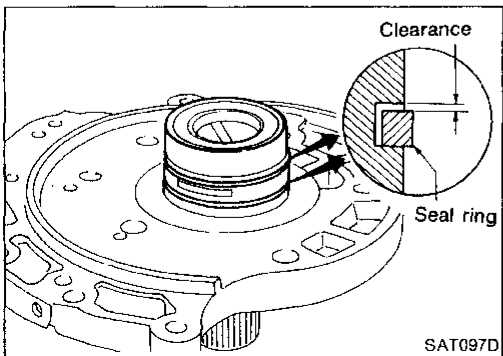
Standard clearance:

0.111 - 0.181 mm (0.0044 - 0.0071 in)

Allowable limit:

0.181 mm (0.0071 in)

- If not within allowable limit, replace whole oil pump assembly except oil pump cover.



Seal ring clearance

- Measure clearance between seal ring and ring groove.

Standard clearance:

0.036 - 0.176 mm (0.0014 - 0.0069 in)

Allowable limit:

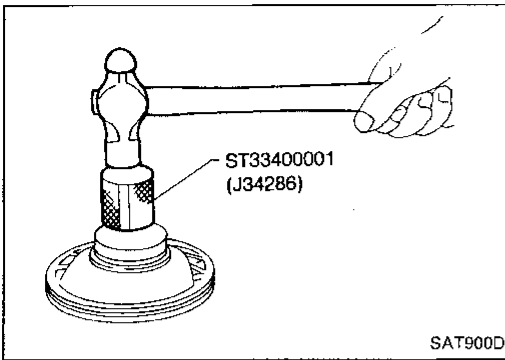
0.176 mm (0.0069 in)

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

Oil Pump (Cont'd)

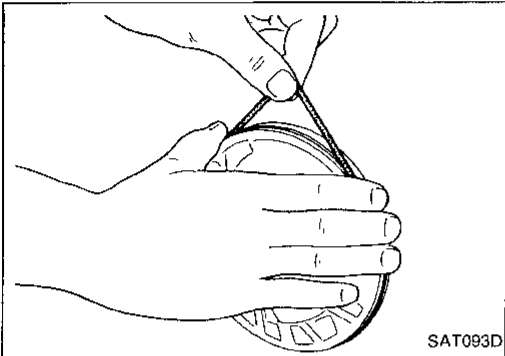
ASSEMBLY

1. Install oil seal on oil pump housing.



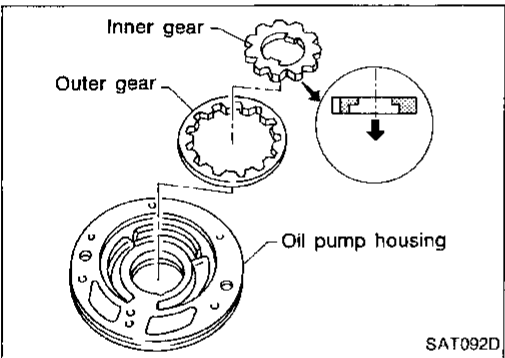
2. Install O-ring on oil pump housing.

- Apply ATF to O-ring.



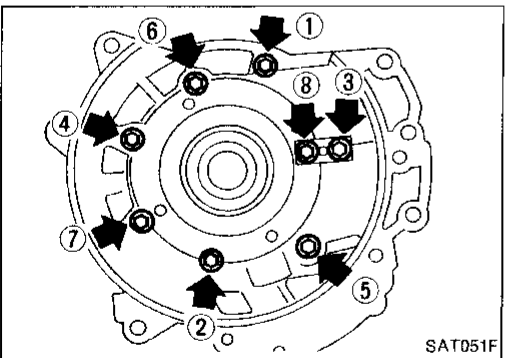
3. Install inner and outer gears on oil pump housing.

- Be careful of direction of inner gear.



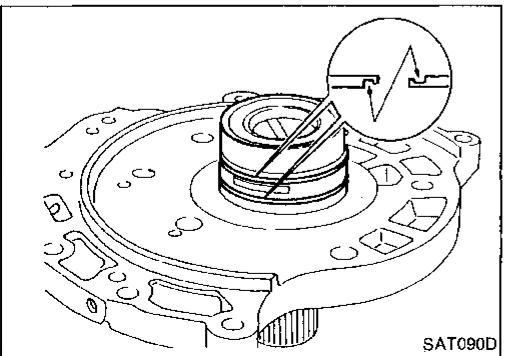
4. Install oil pump cover on oil pump housing.

- 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.
- Tighten bolts in a crisscross pattern.

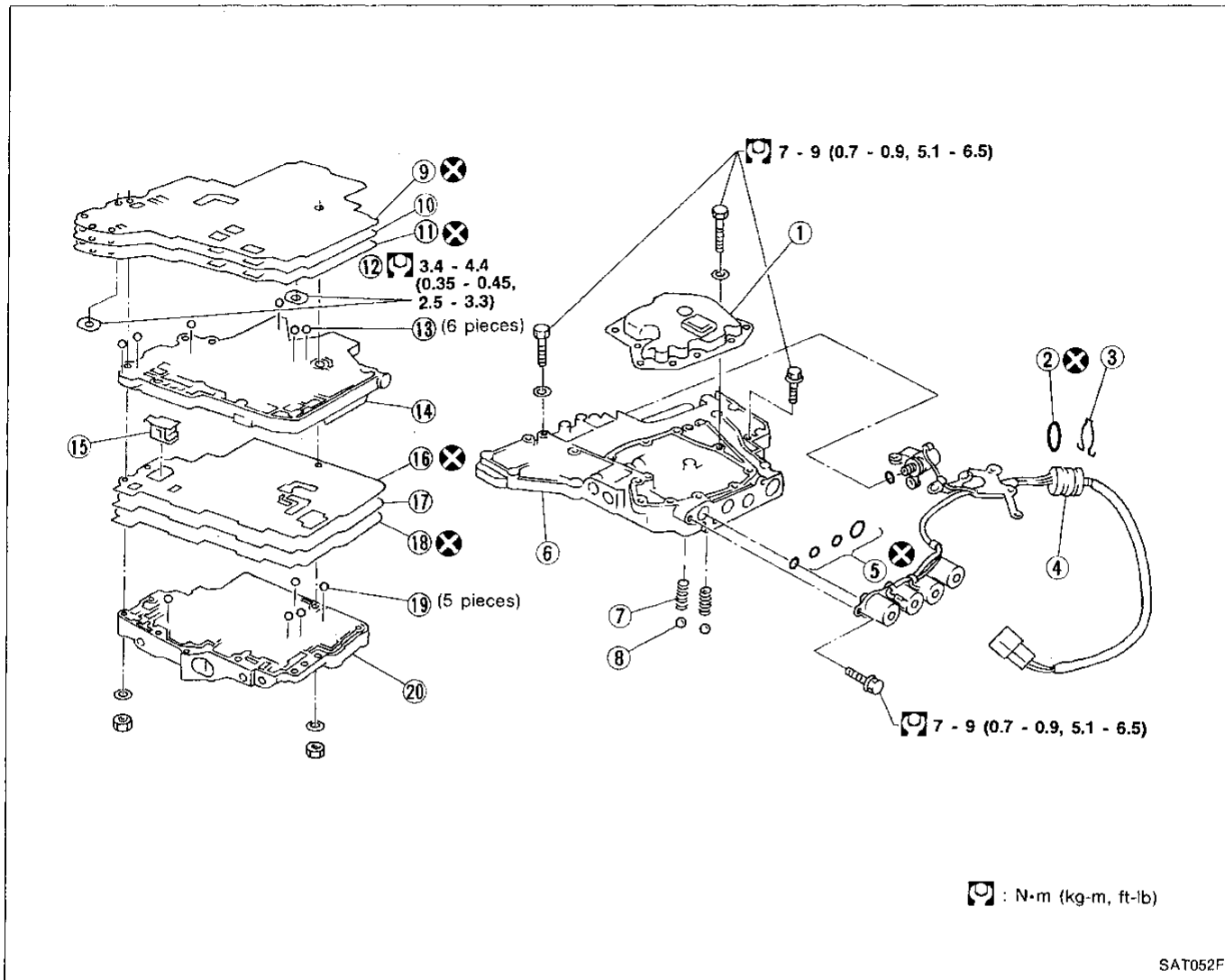


5. Install new seal rings carefully after packing ring groove with petroleum jelly and attach hooks.

- Do not spread gap of seal ring excessively while installing. The ring may be deformed.



Control Valve Assembly




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

DISASSEMBLY

Disassemble upper, inter and lower bodies.

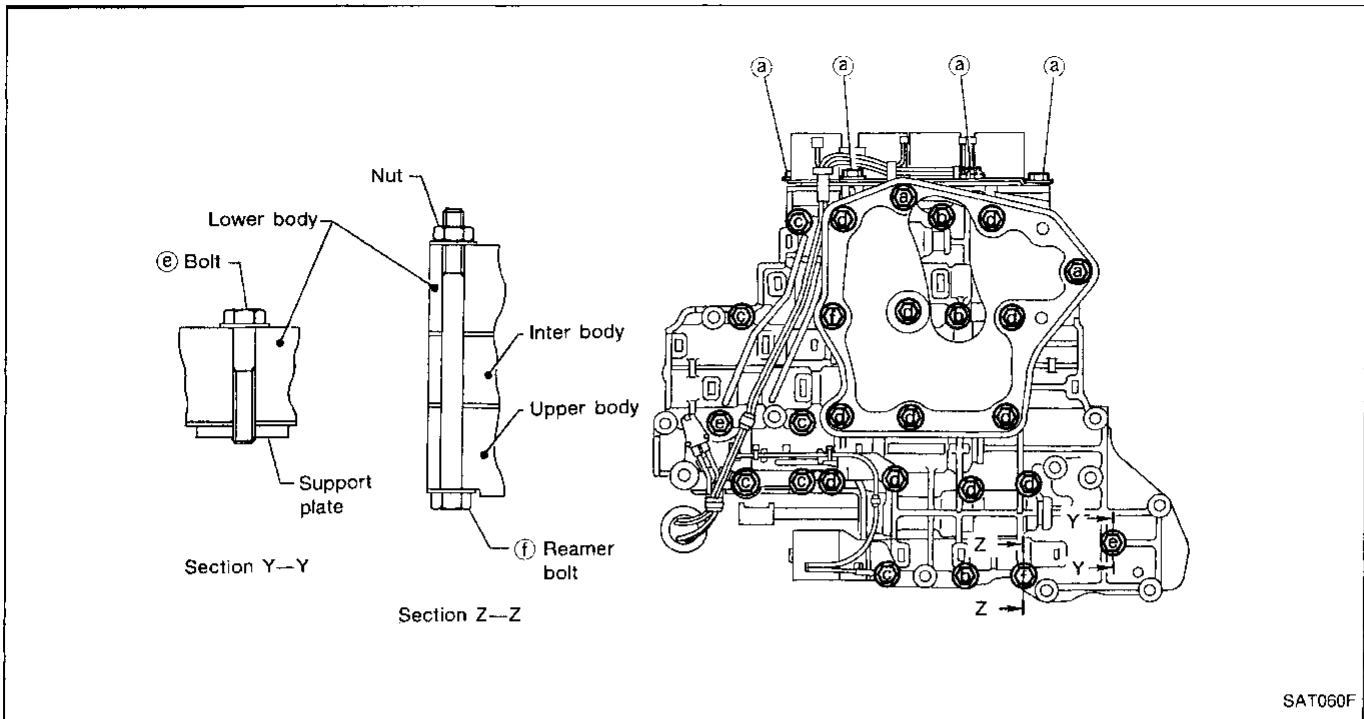
Bolt length, number and location:

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

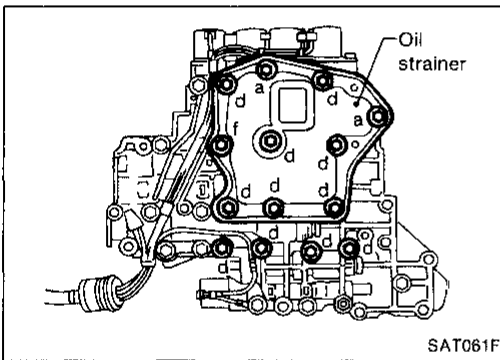
f: Reamer bolt and nut.

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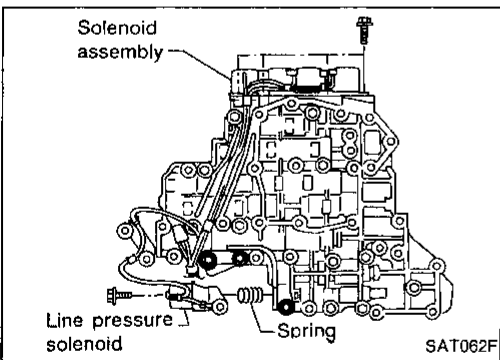
Control Valve Assembly (Cont'd)



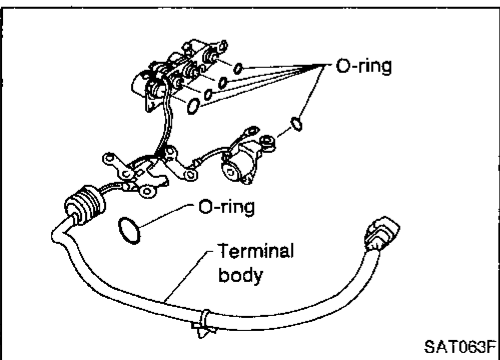
- a. Remove bolts (a), (d) and nut (f) and remove oil strainer from control valve assembly.



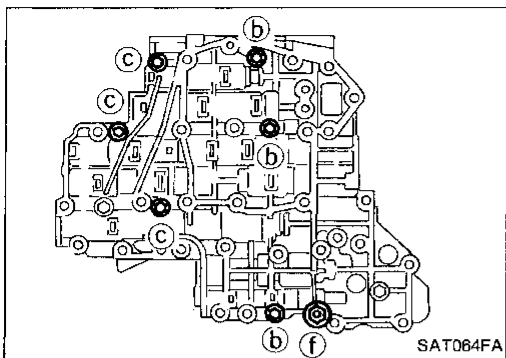
- b. Remove solenoid valve assembly and line pressure solenoid valve from control valve assembly.



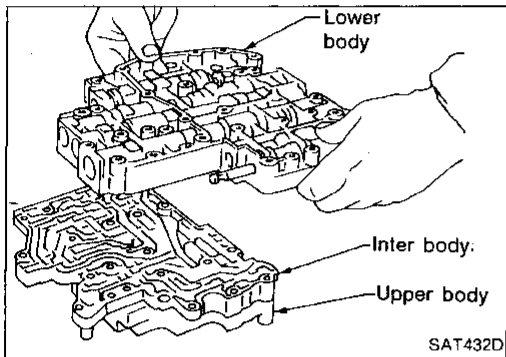
- c. Remove O-rings from solenoid valves and terminal body.



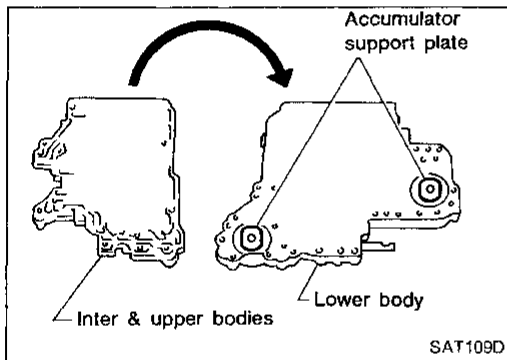
Control Valve Assembly (Cont'd)



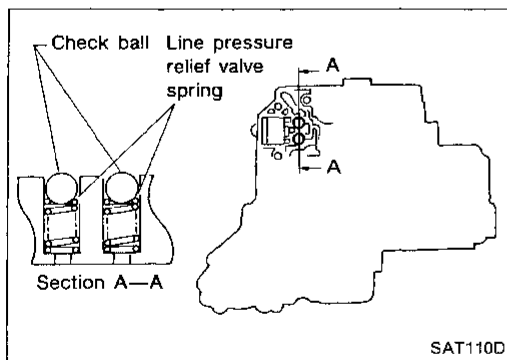
d. Place upper body facedown, and remove bolts (b), (c) and nut (f).



e. Remove inter body from lower body.



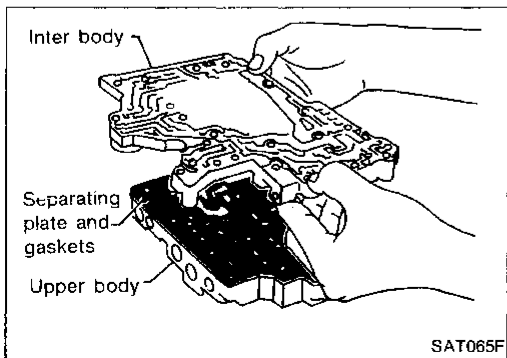
f. Turn over lower body, and remove accumulator support plate.



g. Remove bolts (B), separating plate and separating gasket from lower body.

h. Remove steel balls and relief valve springs from lower body.

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



i. Remove inter body from upper body.

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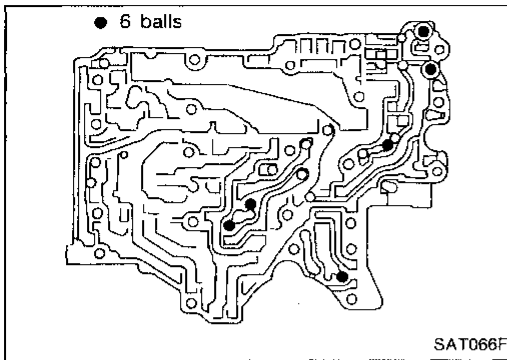
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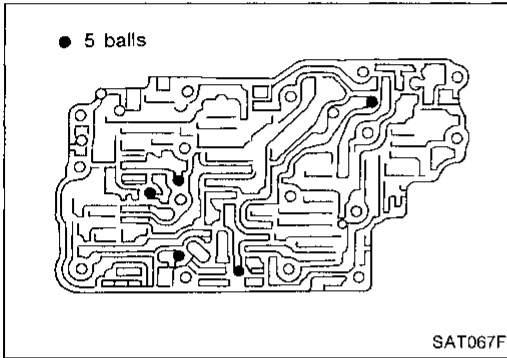
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Control Valve Assembly (Cont'd)



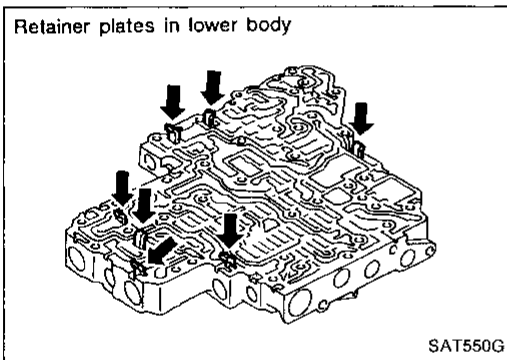
j. Check to see that steel balls are properly positioned in inter body and then remove them from inter body.

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



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

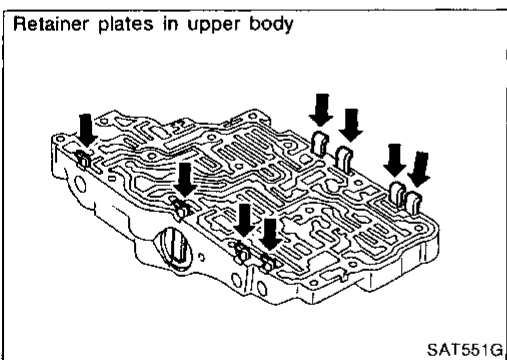
- **Be careful not to lose steel balls.**



INSPECTION

Lower and upper bodies

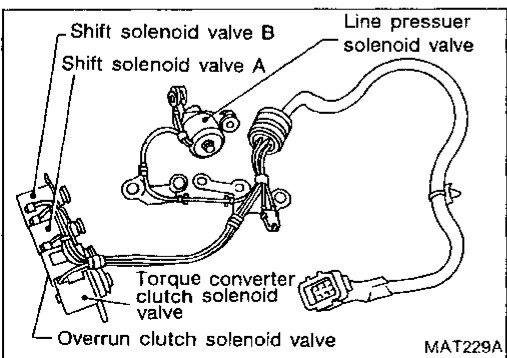
- Check to see that retainer plates are properly positioned in lower body.



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

Oil strainer

- Check wire netting of oil strainer for damage.



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

- Measure resistance — Refer to "ELECTRICAL SYSTEM". AT-155

Control Valve Assembly (Cont'd)

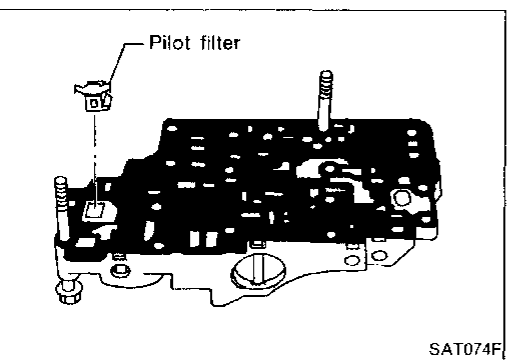
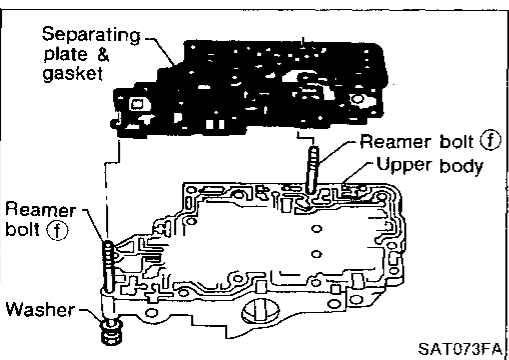
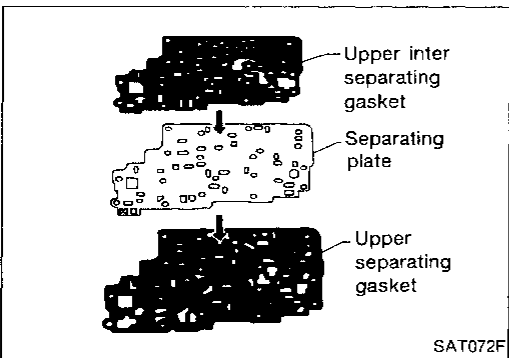
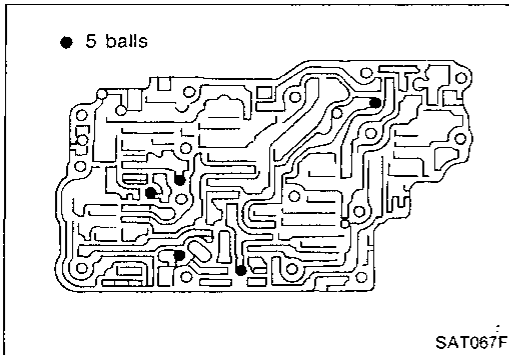
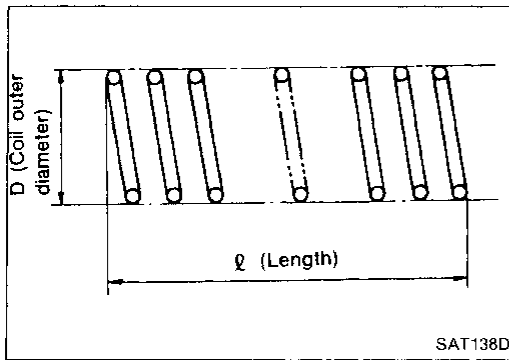
Oil cooler relief valve spring.

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

Inspection standard:

Unit: mm (in)

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

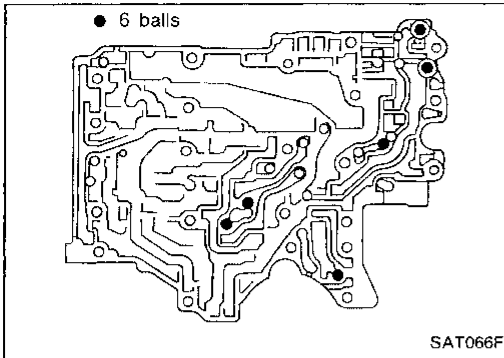


ASSEMBLY

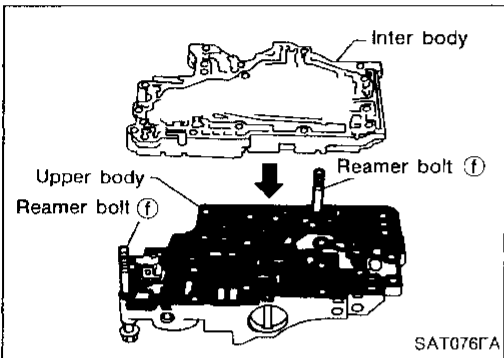
1. Install upper, inter and lower body.
 - a. Place oil circuit of upper body face up. Install steel balls in their proper positions.
 - b. Install upper separating gasket, upper inter separating gasket and upper separating plate in order shown in illustration.
 - c. Install reamer bolts ① from bottom of upper body and install separating gaskets and separating plate as a set on upper body using reamer bolts as guides.
 - d. Install pilot filter.

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Control Valve Assembly (Cont'd)

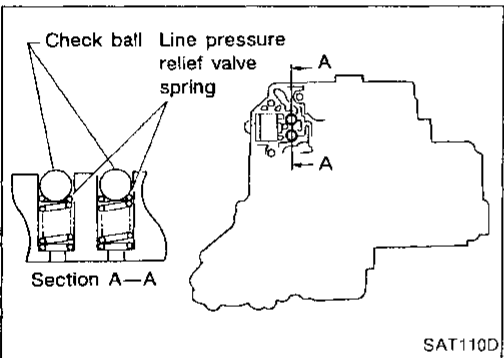


e. Place lower body as shown in illustration (side of inter body face up). Install steel balls in their proper positions.

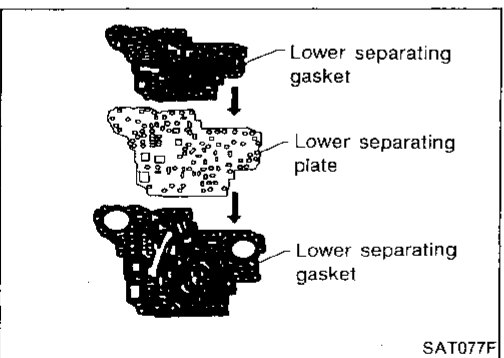


f. Install inter body on upper body using reamer bolts (f) as guides.

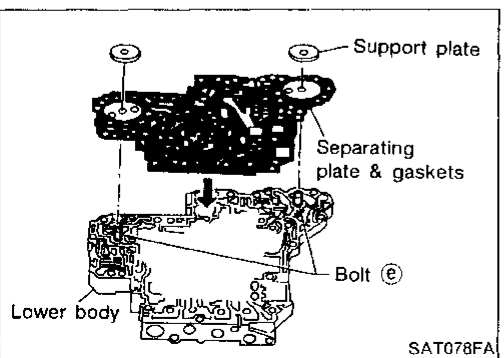
• Be careful not to dislocate or drop steel balls.



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



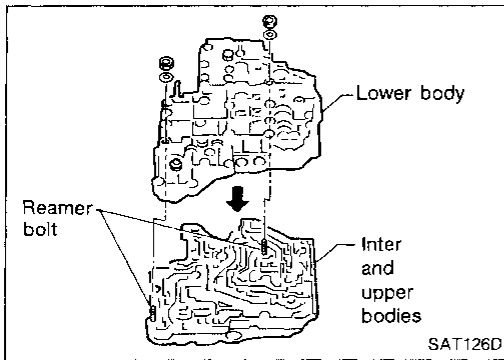
h. Install lower separating gasket, inter separating gasket and lower separating plate in order shown in illustration.



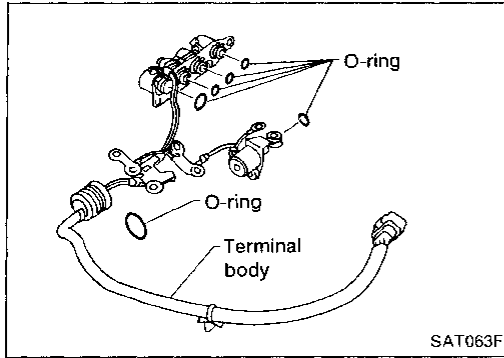
i. Install bolts (e) from bottom of lower body and install separating gaskets and separating plate as a set on lower body using bolts (e) as guides.

j. Temporarily install support plates on lower body.

Control Valve Assembly (Cont'd)




k. Install lower body on inter body using reamer bolts ① as guides and tighten reamer bolts ① slightly.

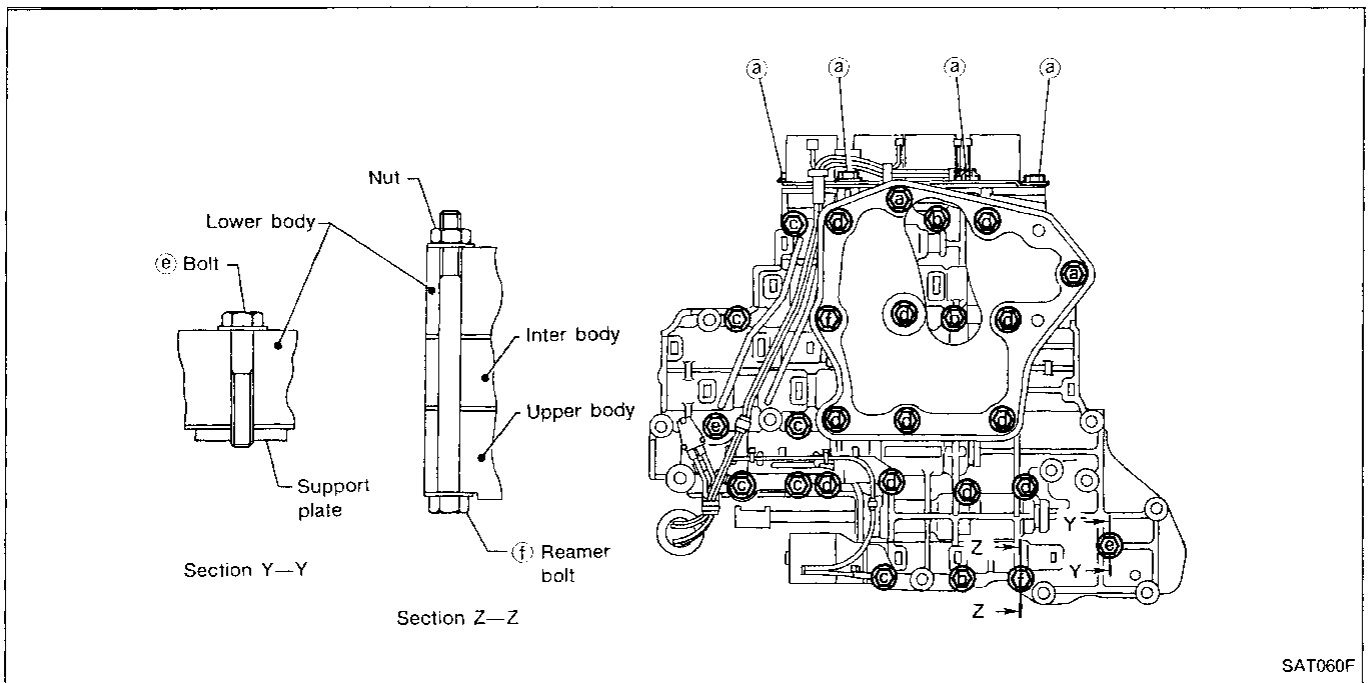


2. Install O-rings to solenoid valves and terminal body.
 ● Apply ATF to O-rings.

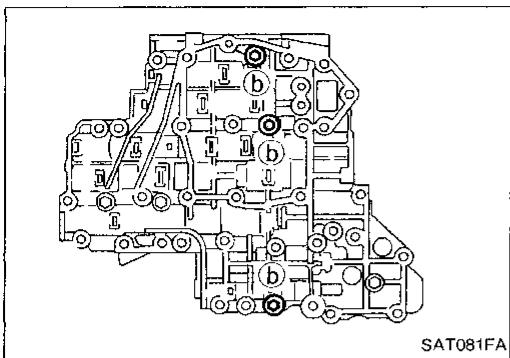
3. Install and tighten bolts.

Bolt length, number and location:

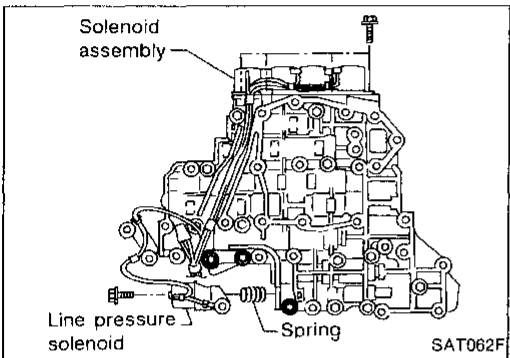
Bolt symbol	a	b	c	d	e	f
Bolt length "ℓ"						
 mm (in)	13.5 (0.531)	58.0 (2.283)	40.0 (1.575)	66.0 (2.598)	33.0 (1.299)	78.0 (3.071)
Number of bolts	6	3	6	11	2	2



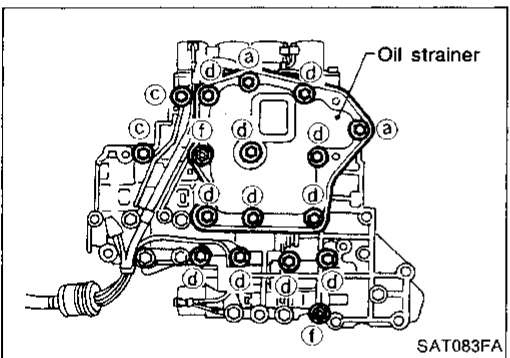
Control Valve Assembly (Cont'd)



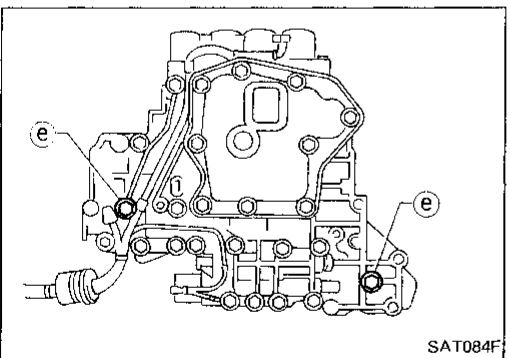
a. Install and tighten bolts (b) to specified torque.



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

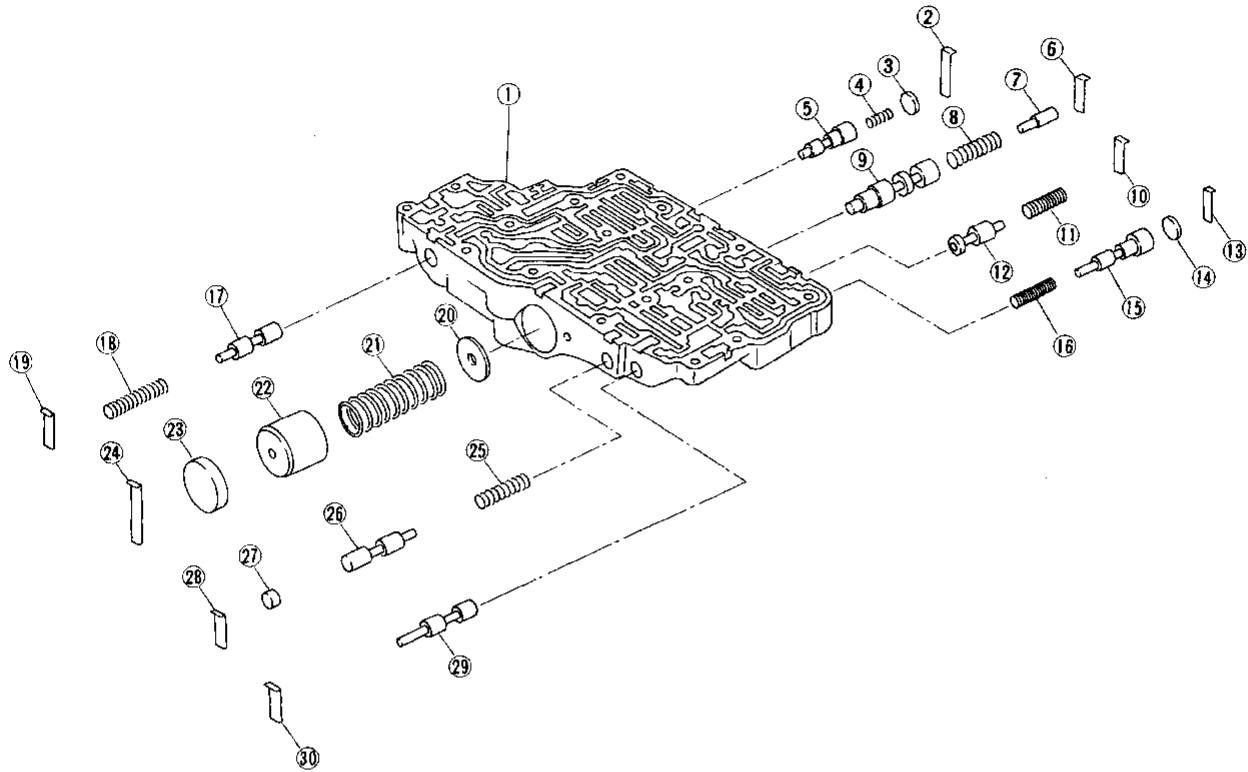


c. Set oil strainer, then tighten bolts (a), (c), (d) and nuts (f) to specified torque.



d. Tighten bolts (e) to specified torque.

Control Valve Upper Body

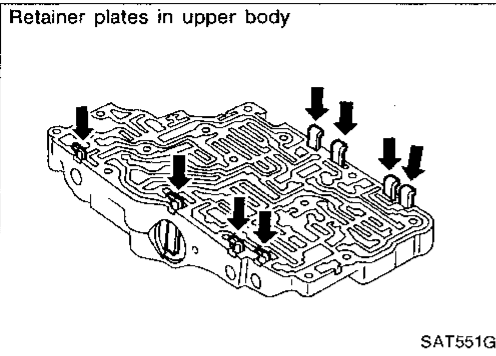


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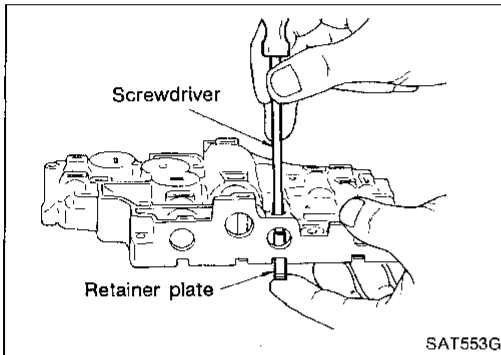
- | | | |
|-------------------------|----------------------------------|----------------------------------|
| ① Upper body | ⑪ Return spring | ⑳ 1-2 accumulator retainer plate |
| ② Retainer plate | ⑫ Torque converter relief valve | ㉑ Return spring |
| ③ Plug | ⑬ Retainer plate | ㉒ 1-2 accumulator piston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

Control Valve Upper Body (Cont'd)

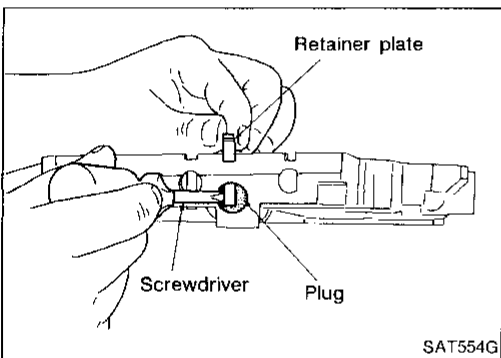
DISASSEMBLY



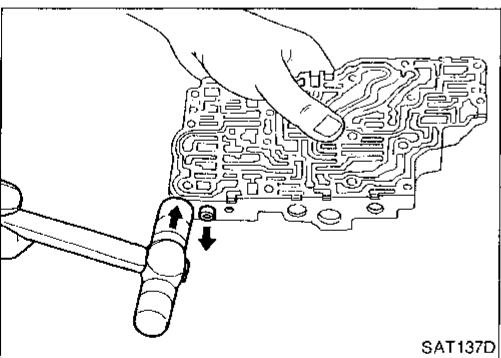
1. Remove valves at retainer plates.
 - Do not use a magnetic "hand".



- a. Use a screwdriver to pry out retainer plates.



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



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

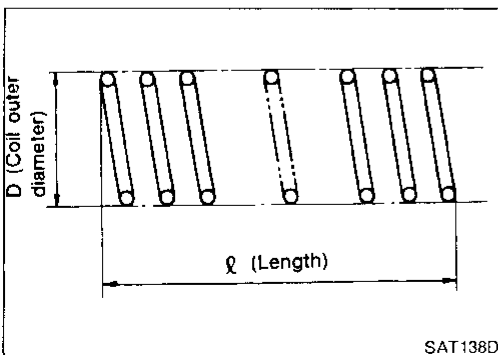
INSPECTION

Valve spring

- Measure free length and outer diameter of each valve spring. Also check for damage or deformation.
 - Inspection standard: Refer to SDS. AT-332
- Replace valve springs if deformed or fatigued.

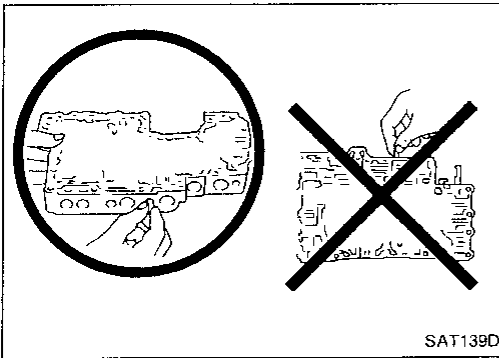
Control valves

- Check sliding surfaces of valves, sleeves and plugs.

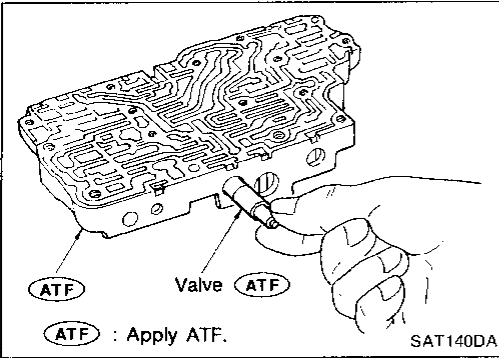


Control Valve Upper Body (Cont'd)

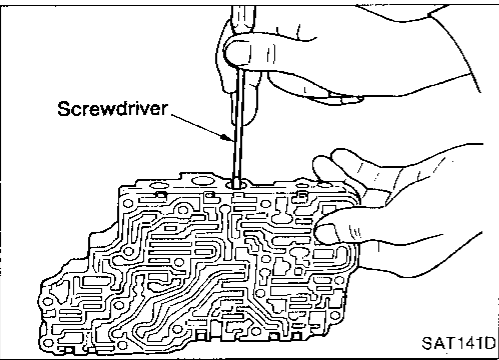
ASSEMBLY



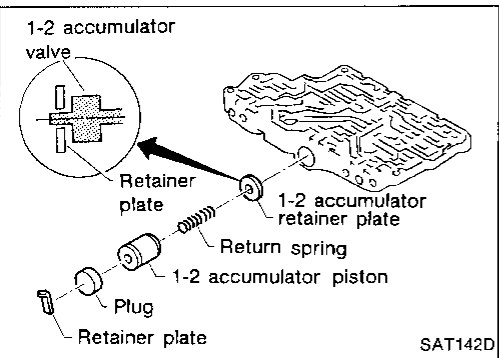
- Lay control valve body down when installing valves. Do not stand the control valve body upright.



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

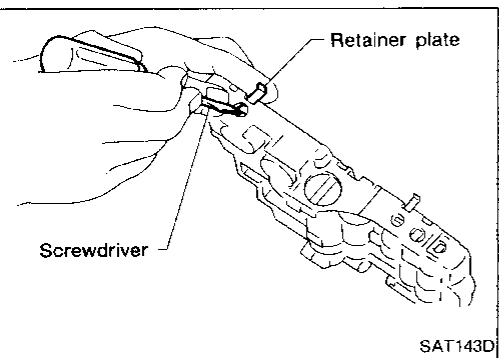


- Wrap a small screwdriver with vinyl tape and use it to insert the valves into their proper positions.



1-2 accumulator valve

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



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

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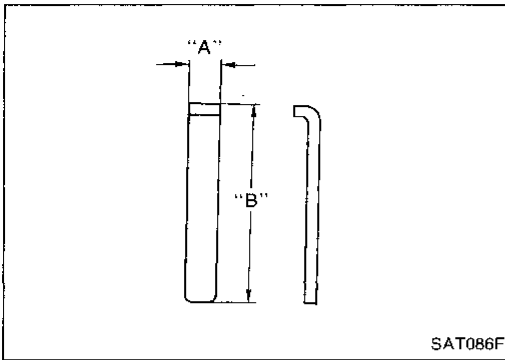
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Control Valve Upper Body (Cont'd)

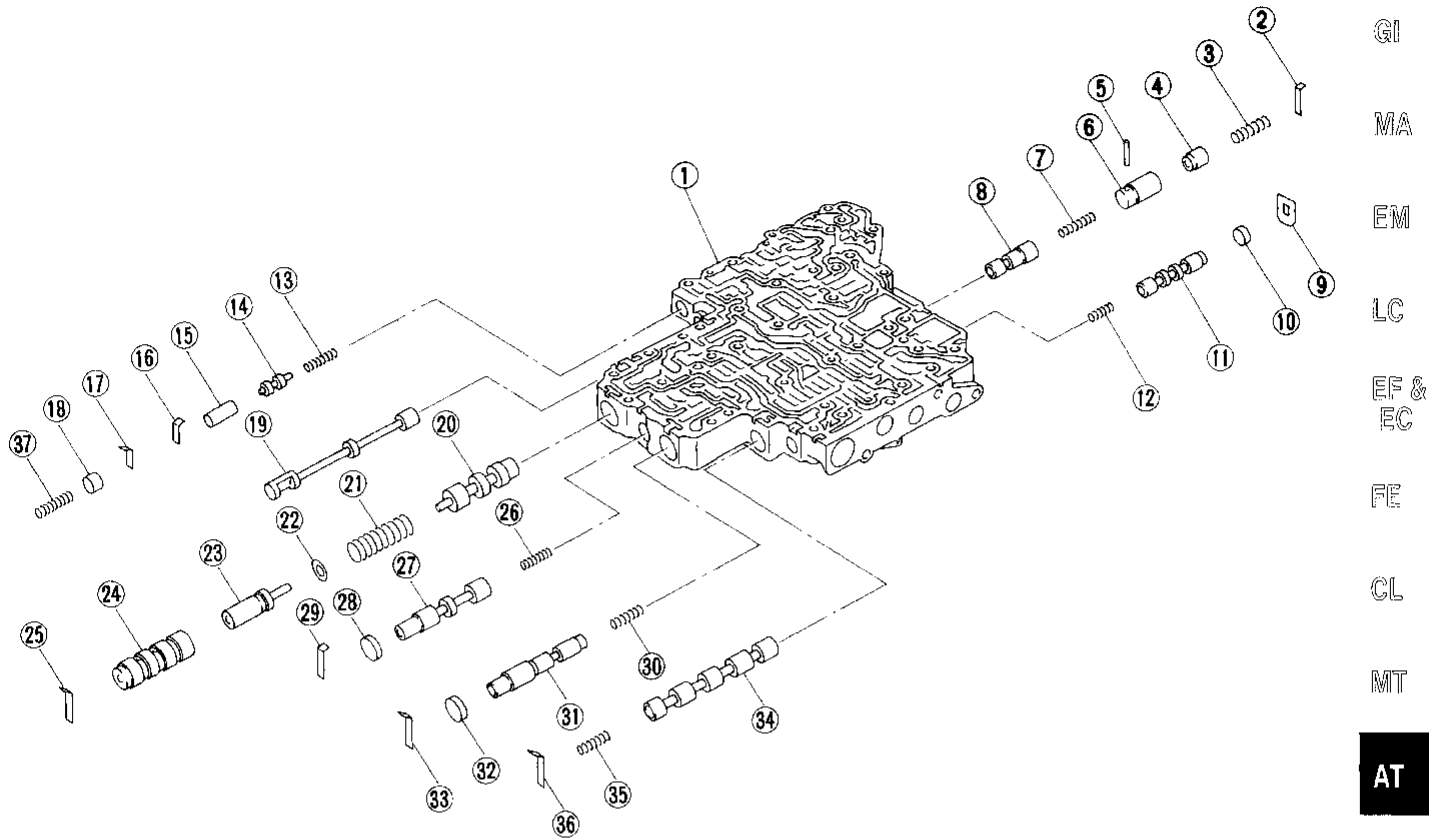
Retainer plate



		Unit: mm (in)	
Name of control valve	Length A	Length B	
Pilot valve	6.0 (0.236)	21.5 (0.846)	
1-2 accumulator valve		38.5 (1.516)	
1-2 accumulator piston valve		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)	
Lock-up control valve			

- Install proper retainer plates.

Control Valve Lower Body



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

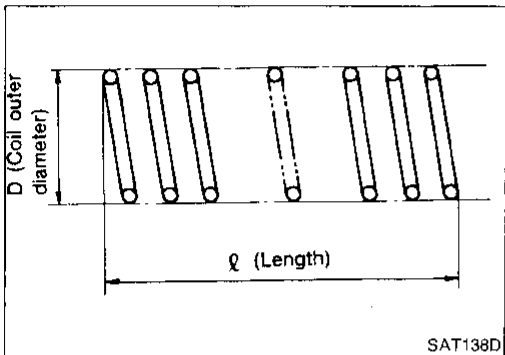
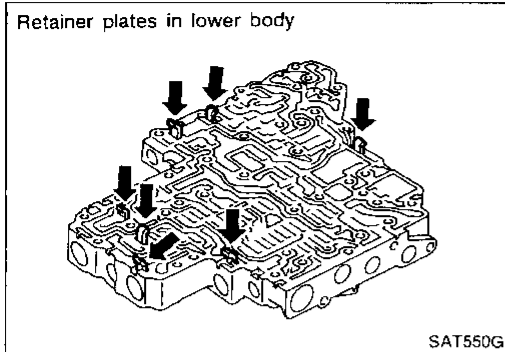
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Control Valve Lower Body (Cont'd)

DISASSEMBLY

Remove valves at retainer plate.

For removal procedures, refer to "DISASSEMBLY" of Control Valve Upper Body. AT-272



INSPECTION

Valve springs

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

Inspection standard: Refer to SDS. AT-332

- Replace valve springs if deformed or fatigued.

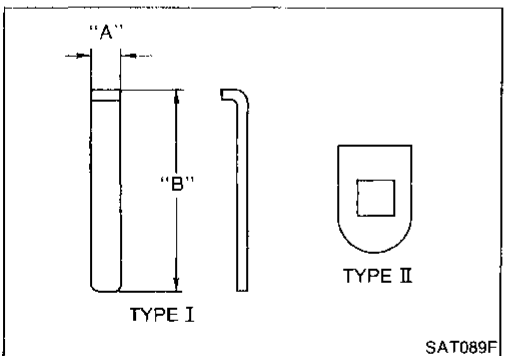
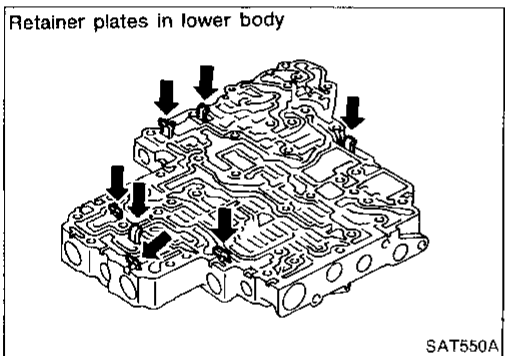
Control valves

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

ASSEMBLY

- Install control valves.

For installation procedures, refer to "ASSEMBLY" of Control Valve Upper Body. AT-273



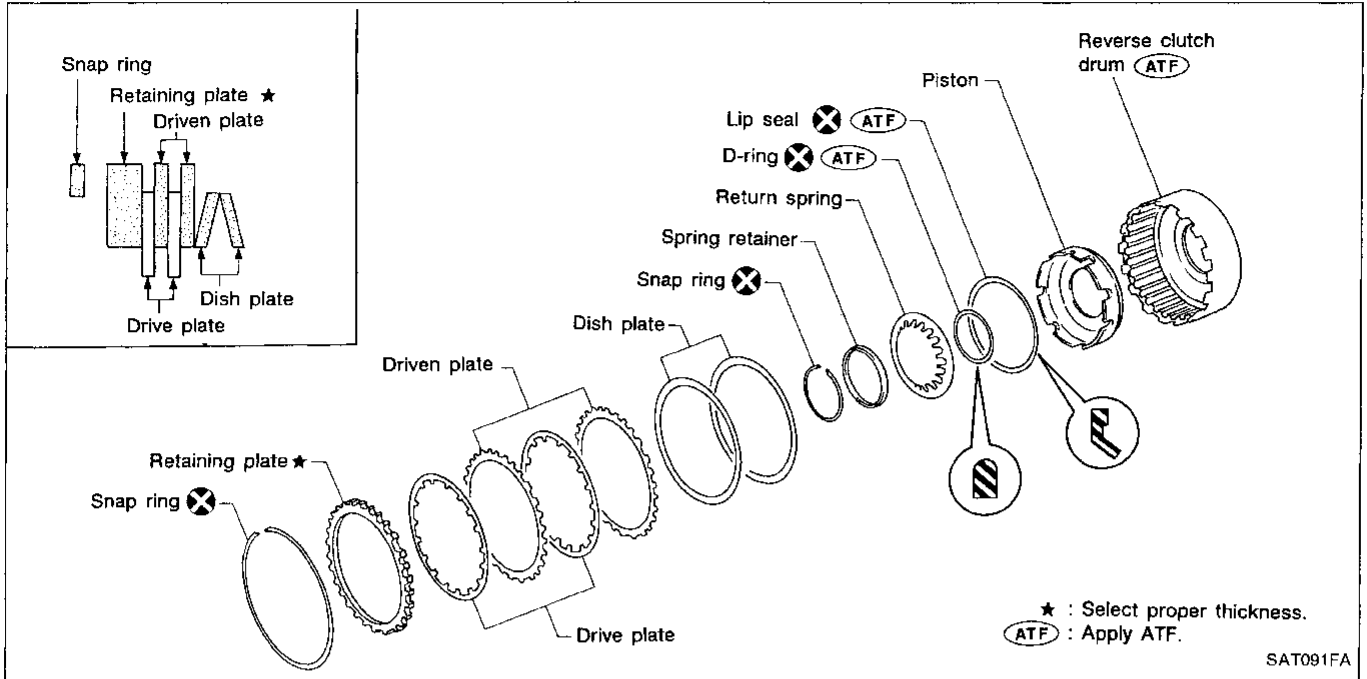
Retainer plate

Unit: mm (in)

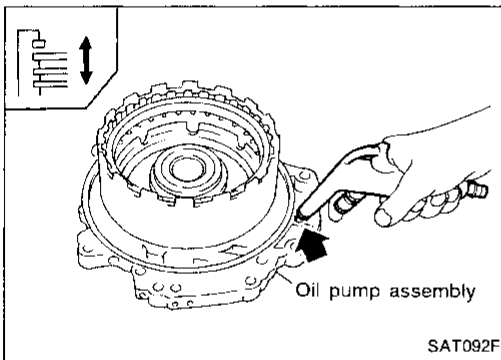
Name of control valve	Length A	Length B	Type
Accumulator shift valve	6.0 (0.236)	19.5 (0.768)	I
Pressure regulator valve		28.0 (1.102)	
Pressure clutch control			
Accumulator control valve			
Shift valve A			
Overrun clutch control valve			
Pressure modifier valve			
Shift valve B	—	—	II

- Install proper retainer plates.

Reverse Clutch



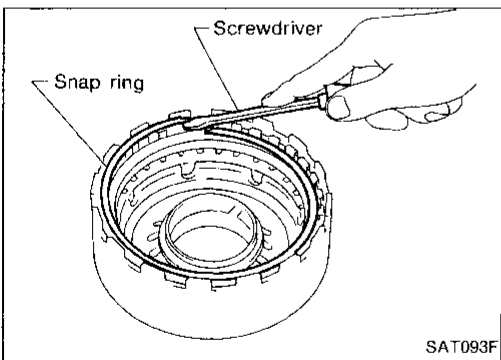
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DISASSEMBLY

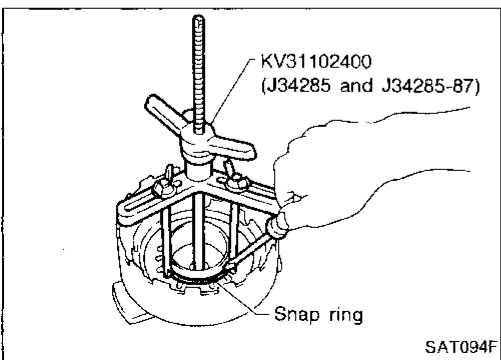
1. Check operation of reverse clutch
 - a. Install seal ring onto drum support of oil pump cover and install reverse clutch assembly. Apply compressed air to oil hole.
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not move to snap ring, D-ring or lip seal may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

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

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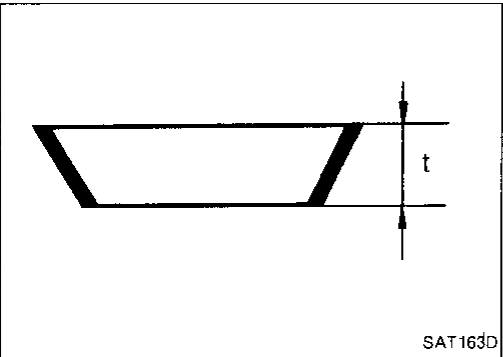
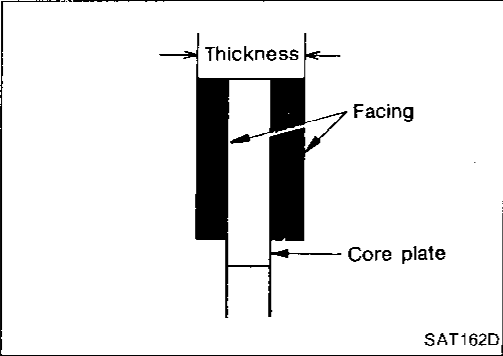
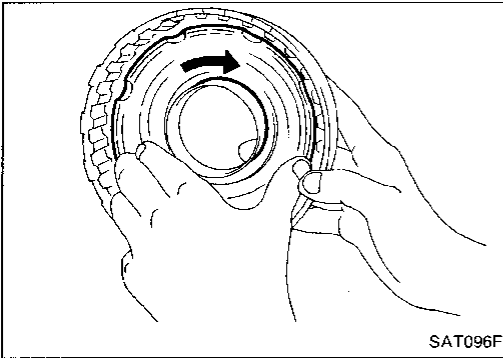


4. Set Tool on spring retainer and remove snap ring from reverse clutch drum while compressing return springs.
 - Set Tool directly over springs.
 - Do not expand snap ring excessively.
5. Remove spring retainer and return springs.

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Reverse Clutch (Cont'd)

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



INSPECTION

Reverse clutch snap ring, spring retainer and return springs

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

Reverse clutch drive plates

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

Thickness of drive plate:

Standard value: 1.6 mm (0.063 in)

Wear limit: 1.4 mm (0.055 in)

- If not within wear limit, replace.

Reverse clutch dish plates

- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate: 3.08 mm (0.1213 in)

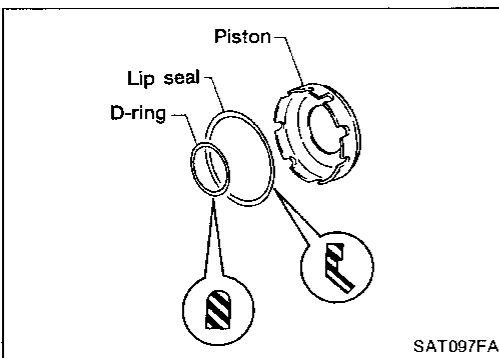
- If deformed or fatigued, replace.

Reverse clutch piston

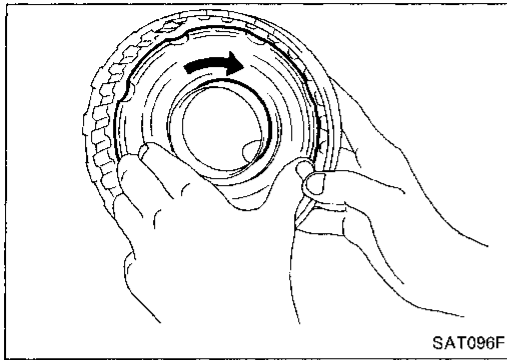
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

ASSEMBLY

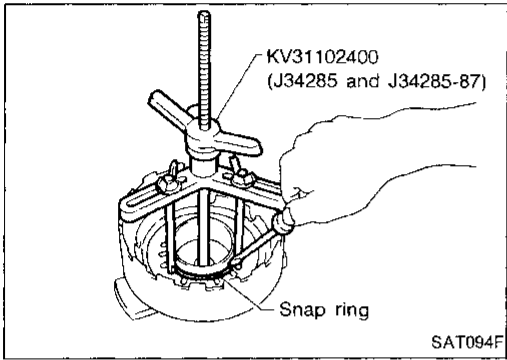
1. Install D-ring and lip seal on piston.
 - Take care with the direction of lip seal.
 - Apply ATF to both parts.



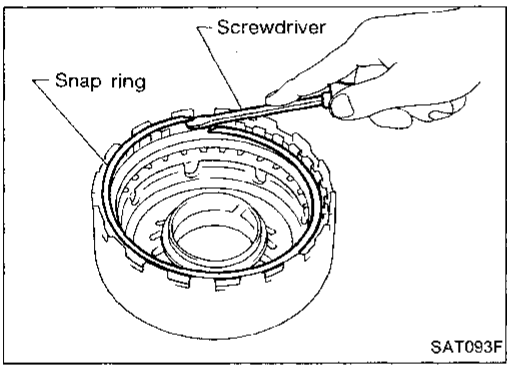
Reverse Clutch (Cont'd)



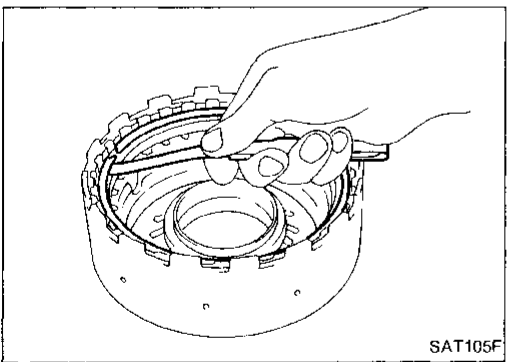
2. Install piston assembly by turning it slowly.
 - Apply ATF to inner surface of drum.



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

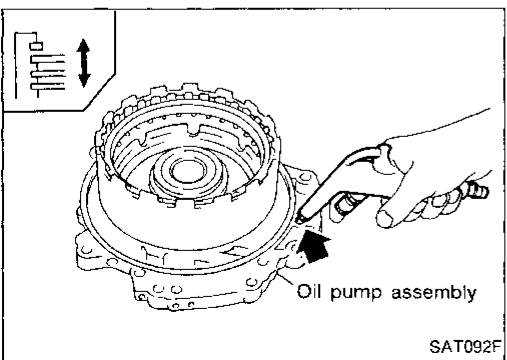


5. Install drive plates, driven plates, retaining plate and dish plates.
 - Take care with order of plates.
6. Install snap ring.



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

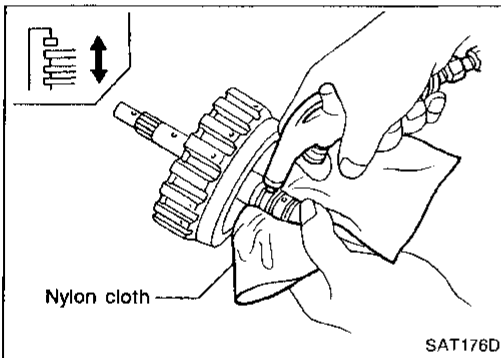
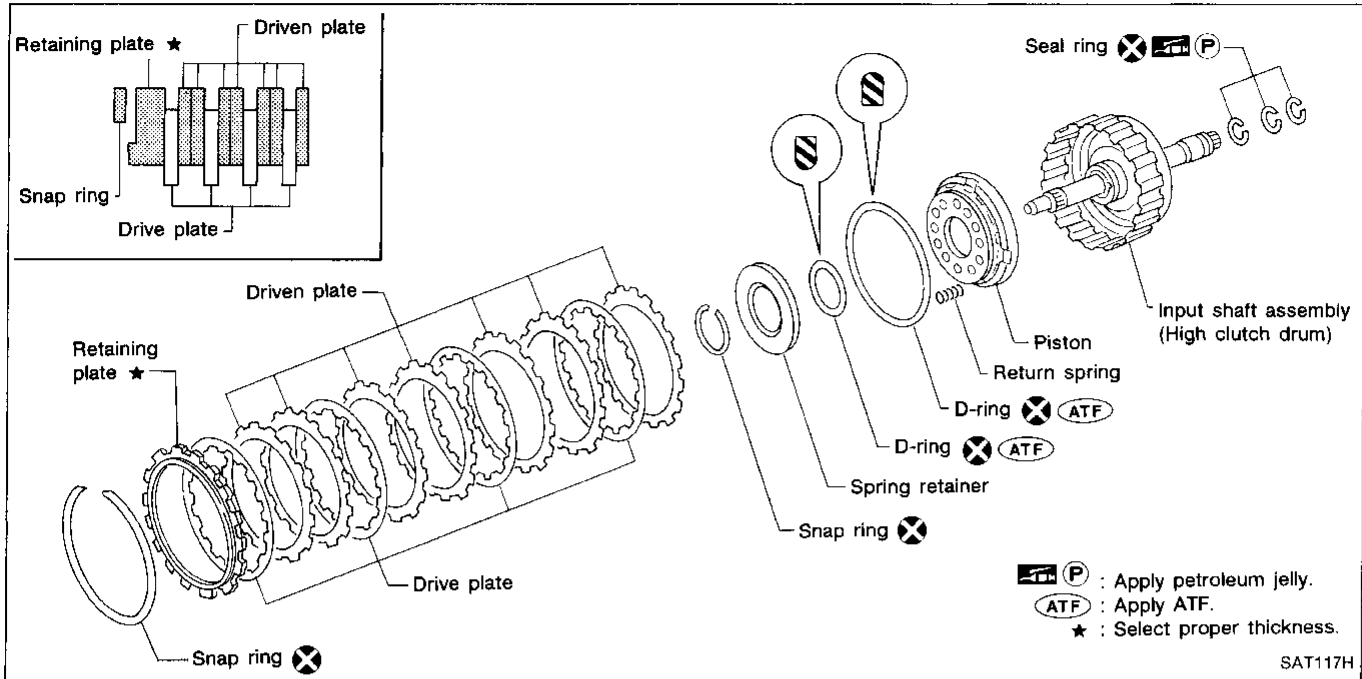
Specified clearance:
 Standard 0.5 - 0.8 mm (0.020 - 0.031 in)
 Allowable limit 1.2 mm (0.047 in)
 Retaining plate: Refer to SDS. AT-333



8. Check operation of reverse clutch. Refer to "DISASSEMBLY" of Reverse Clutch. AT-277

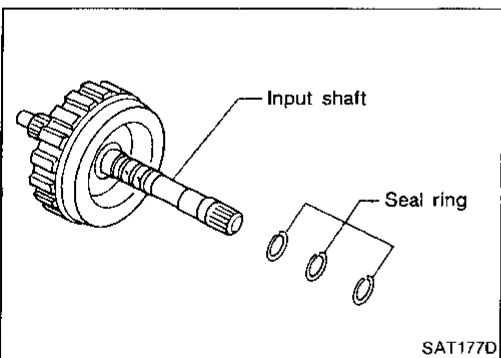
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High Clutch

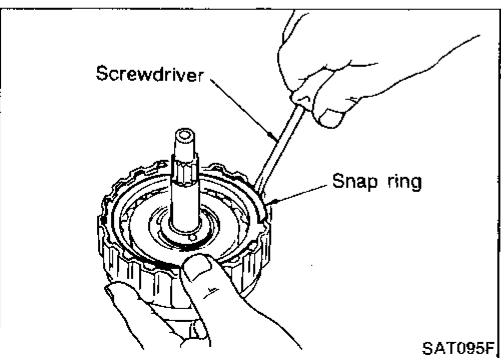


DISASSEMBLY

1. Check operation of high clutch.
 - a. Apply compressed air to oil hole of input shaft with nylon cloth.
 - **Stop up hole on opposite side of input shaft with nylon cloth.**
 - b. Check to see that retaining plate moves to snap ring.
 - c. If retaining plate does not move to snap ring, D-rings may be damaged or fluid may be leaking at piston check ball.

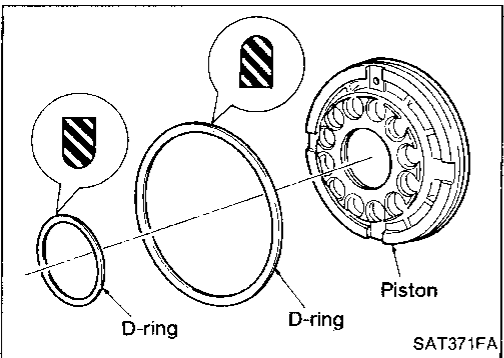
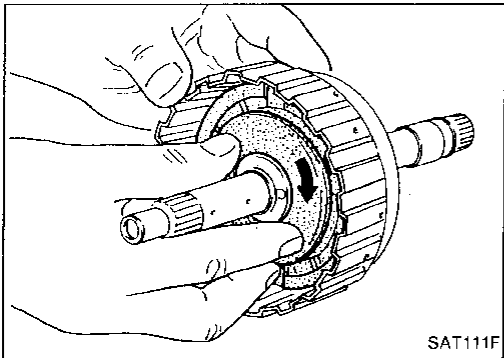
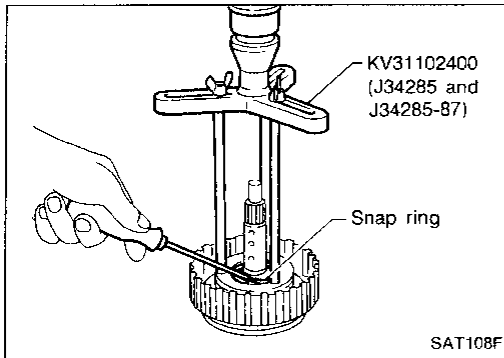


2. Remove seal rings from input shaft.
 - **Always replace when removed.**



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

High Clutch (Cont'd)



5. Set Tool on spring retainer and remove snap ring from high clutch drum while compressing return springs.

- **Set Tool directly over springs.**
 - **Do not expand snap ring excessively.**
6. Remove spring retainer and return springs.

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

8. Remove D-rings from piston.

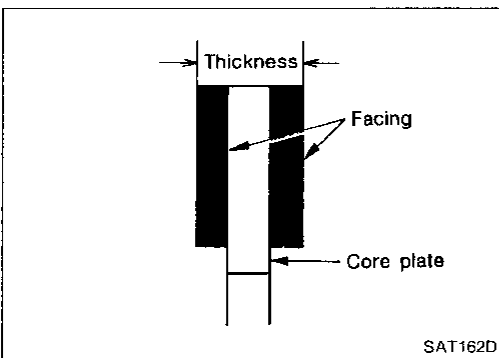
INSPECTION

High clutch snap ring, spring retainer and return springs.

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

High clutch drive plates

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



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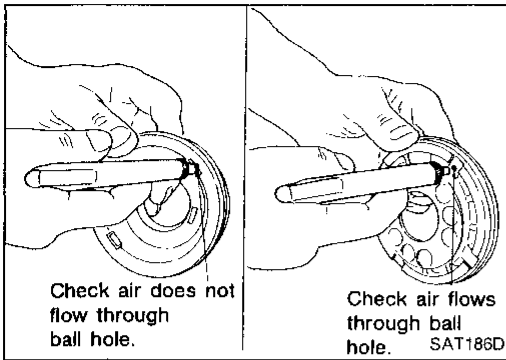
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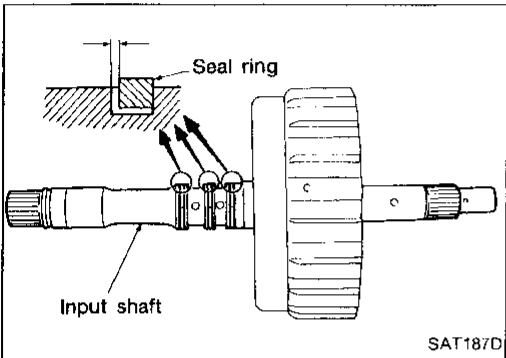
High Clutch (Cont'd)

High clutch piston



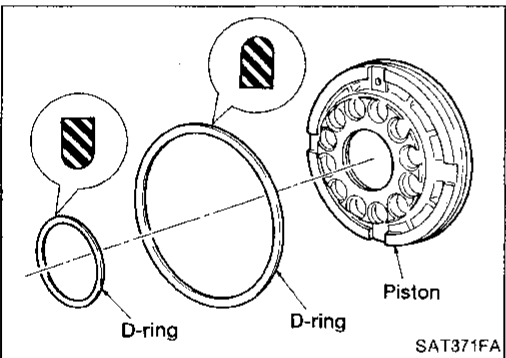
- Make sure that check balls are not fixed.
- Apply compressed air to check ball oil hole opposite the return spring to make sure that there is no air leakage.
- Apply compressed air to oil hole on return spring side to make sure that air leaks past ball.

Seal ring clearance

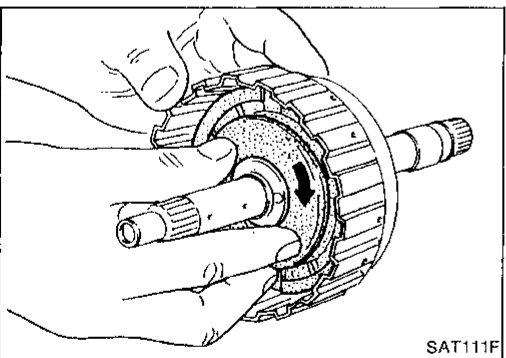


- Measure clearance between seal ring and ring groove.
Standard clearance: 0.08 - 0.23 mm (0.0031 - 0.0091 in)
Allowable limit: 0.23 mm (0.0091 in)
- If not within allowable limit, replace input shaft assembly.

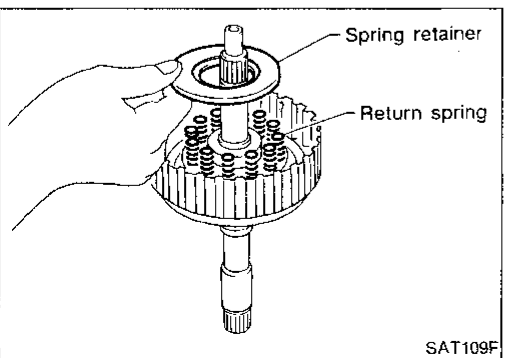
ASSEMBLY



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

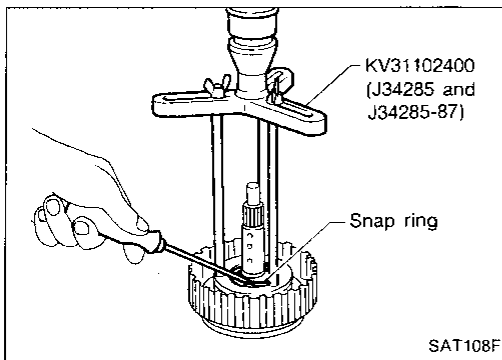


2. Install piston assembly by turning it slowly.
 - Apply ATF to inner surface of drum.



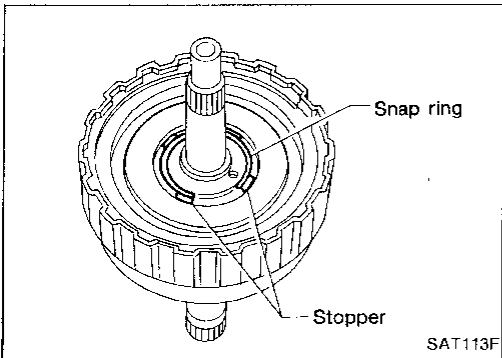
3. Install return springs and spring retainer on piston.

High Clutch (Cont'd)

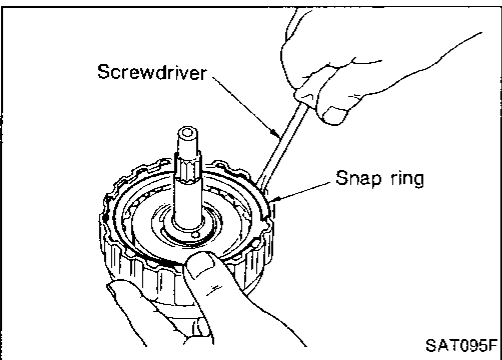


4. Set Tool on spring retainer and install snap ring while compressing return springs.

- Set Tool directly over return springs.



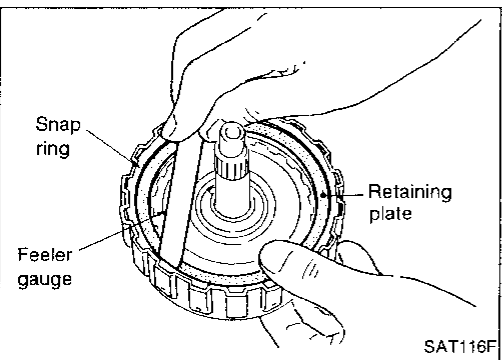
- Do not align snap ring gap with spring retainer stopper.



5. Install drive plates, driven plates and retaining plate.

- Take care with direction of retaining plate and order of plates.

6. Install snap ring.



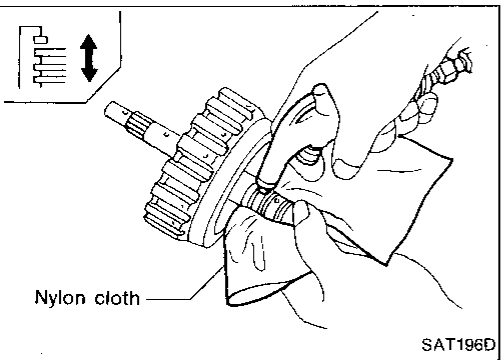
7. Measure clearance between retaining plate and snap ring. If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard 1.8 - 2.2 mm (0.071 - 0.087 in)

Allowable limit 3.0 mm (0.118 in)

Retaining plate: Refer to SDS. AT-333



8. Check operation of high clutch.

Refer to "DISASSEMBLY" of High Clutch. AT-280

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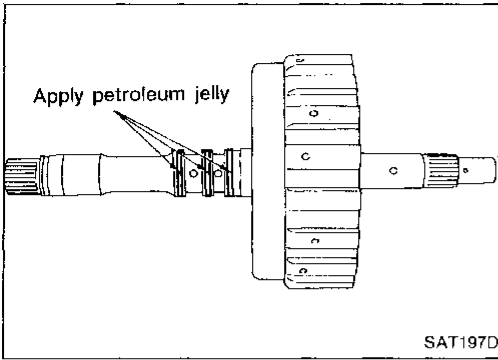
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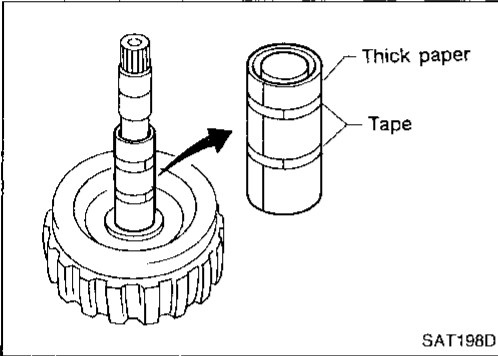
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High Clutch (Cont'd)

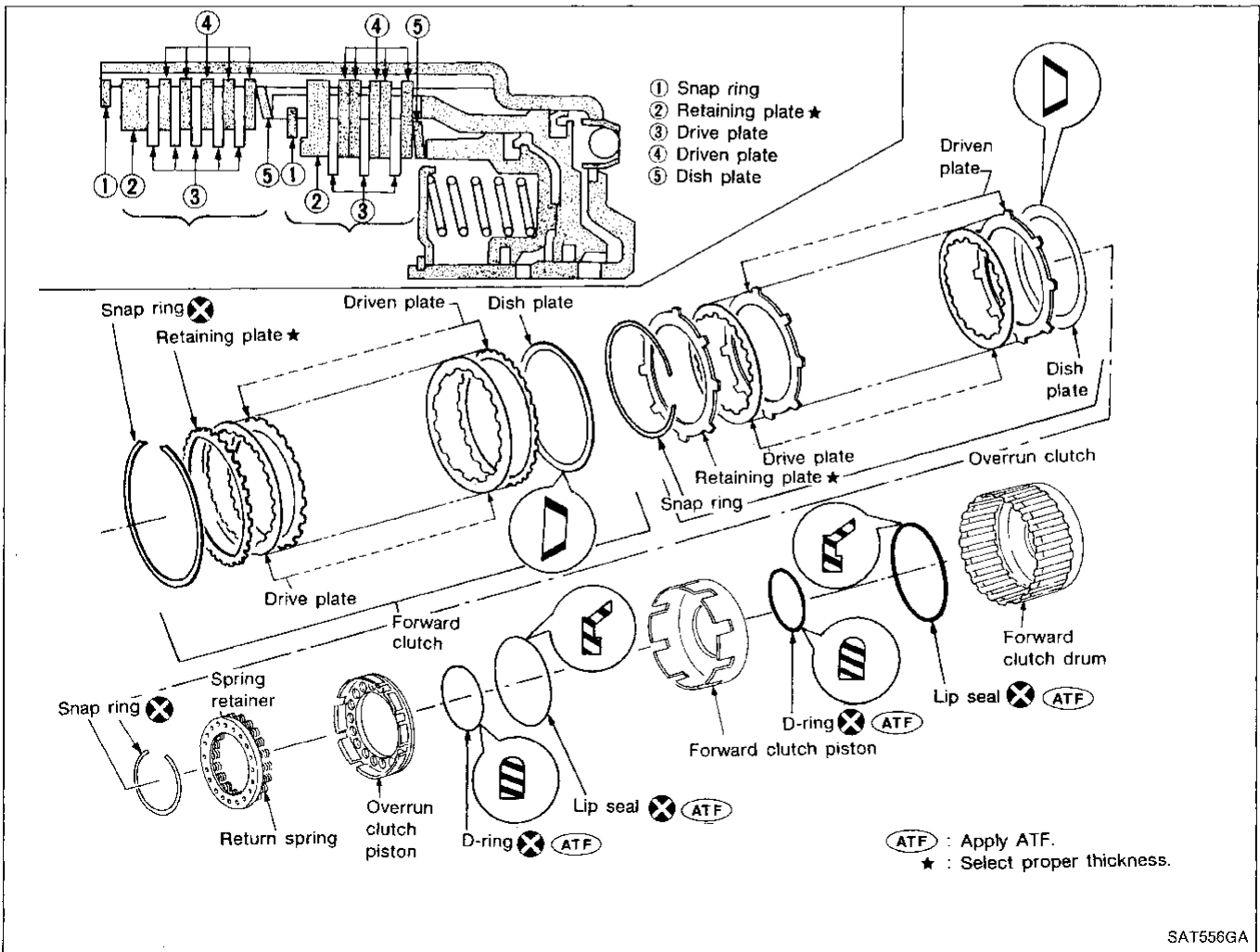


9. Install seal rings to input shaft.
 - Apply petroleum jelly to seal rings.
 - Always replace when removed.



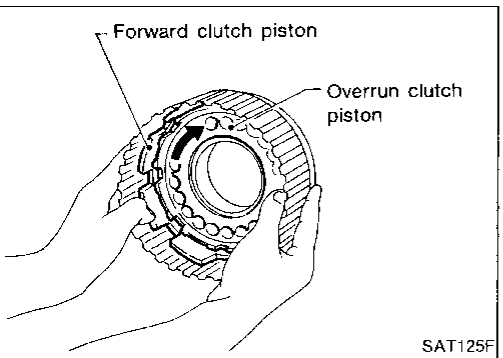
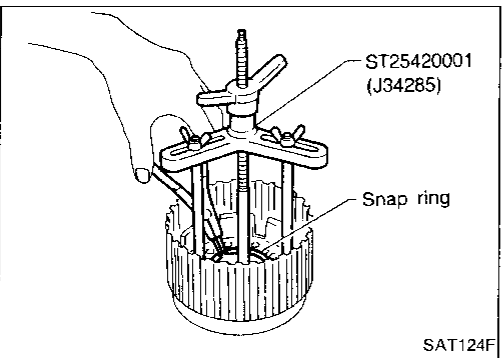
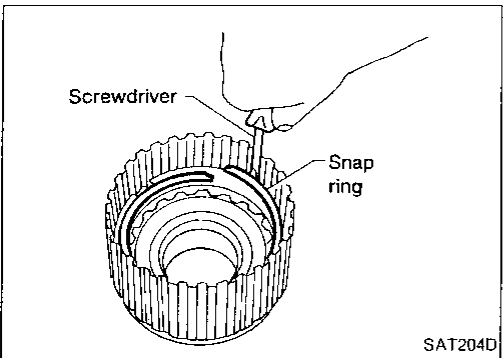
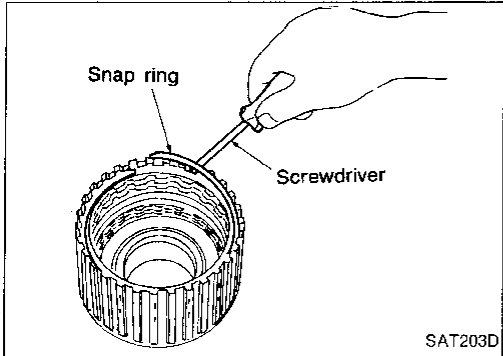
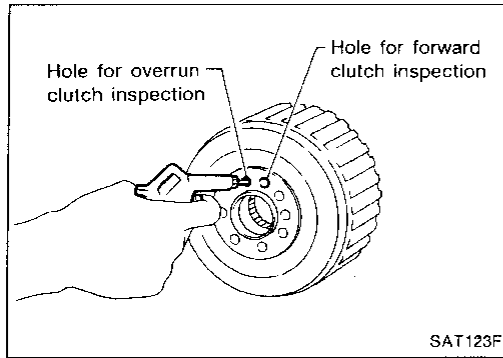
- Roll paper around seal rings to prevent seal rings from spreading.

Forward Clutch and Overrun Clutch



Forward Clutch and Overrun Clutch (Cont'd)

DISASSEMBLY



1. Check operation of forward clutch and overrun clutch.
 - a. Install bearing retainer on forward clutch drum.
 - b. Apply compressed air to oil hole of forward clutch drum.
 - c. Check to see that retaining plate moves to snap ring.
 - d. If retaining plate does not move to snap ring, D-ring or lip seal may be damaged or fluid may be leaking at piston check ball.
2. Remove snap ring for forward clutch.
3. Remove drive plates, driven plates, retaining plate and dish plate for forward clutch.
4. Remove snap ring for overrun clutch.
5. Remove drive plates, driven plates, retaining plate and dish plate for overrun clutch.
6. Set Tool on spring retainer and remove snap ring from forward clutch drum while compressing return springs.
 - Set Tool directly over return springs.
 - Do not expand snap ring excessively.
7. Remove spring retainer and return springs.
 - Do not remove return springs from spring retainer.
8. Remove forward clutch piston with overrun clutch piston from forward clutch drum by turning it.

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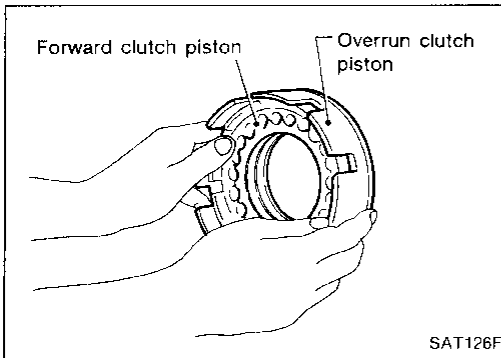
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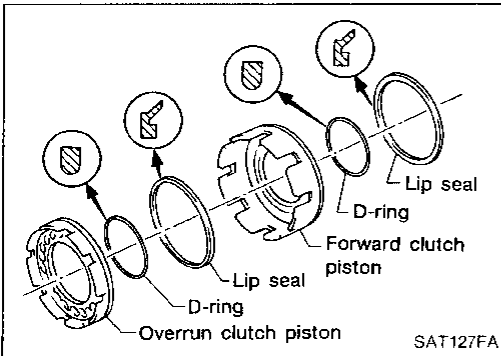
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Forward Clutch and Overrun Clutch (Cont'd)



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

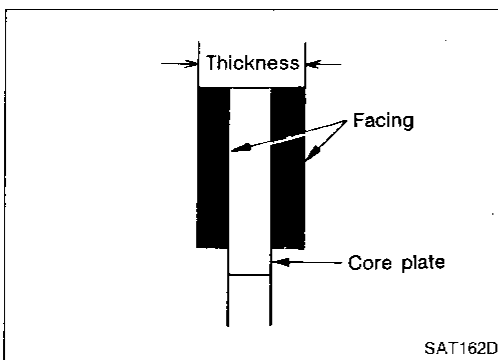


10. Remove D-rings and lip seals from forward clutch piston and overrun clutch piston.

INSPECTION

Snap rings, spring retainer and return springs

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



Forward clutch and overrun clutch drive plates

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

Thickness of drive plate:

Forward clutch

Standard value: 1.6 mm (0.063 in)

Wear limit: 1.4 mm (0.055 in)

Overrun clutch

Standard value: 1.6 mm (0.063 in)

Wear limit: 1.4 mm (0.055 in)

- If not within wear limit, replace.

Forward clutch and overrun clutch dish plates

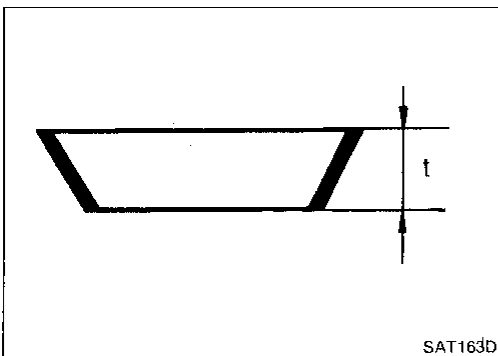
- Check for deformation or damage.
- Measure thickness of dish plate.

Thickness of dish plate:

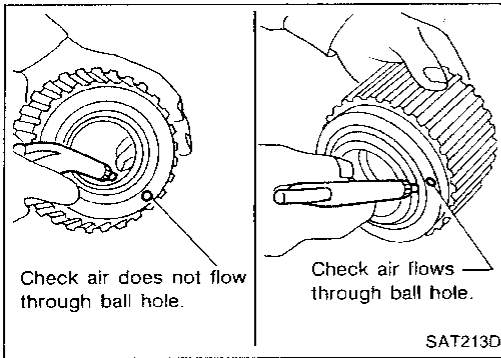
Forward clutch 2.7 mm (0.106 in)

Overrun clutch 2.7 mm (0.106 in)

- If deformed or fatigued, replace.

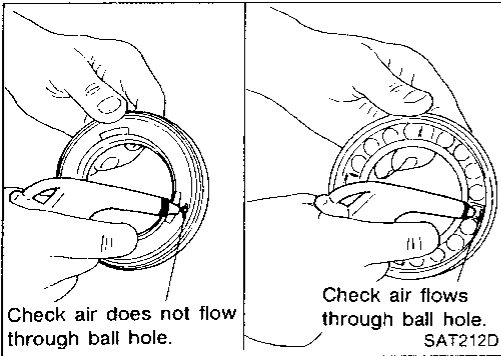


Forward Clutch and Overrun Clutch (Cont'd)



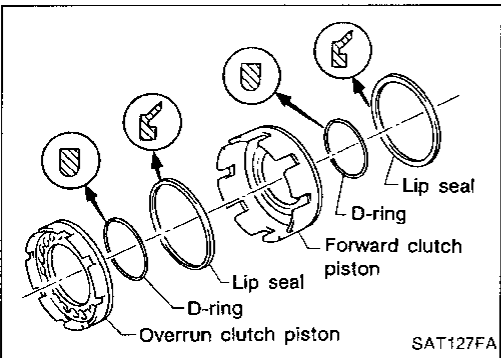
Forward clutch drum

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



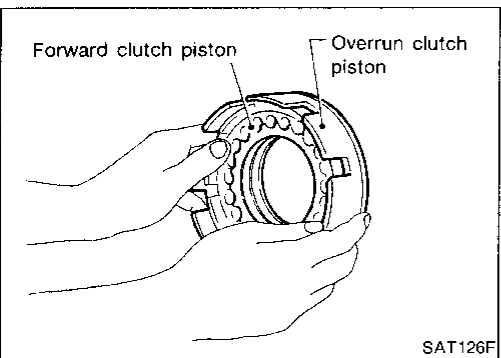
Overrun clutch piston

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

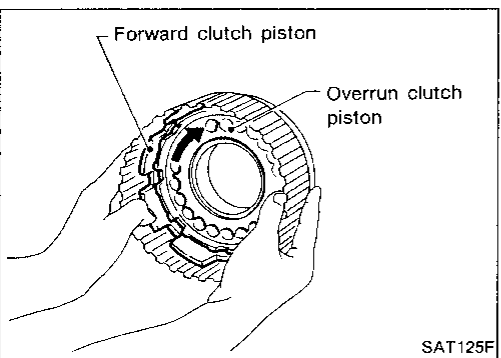


ASSEMBLY

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



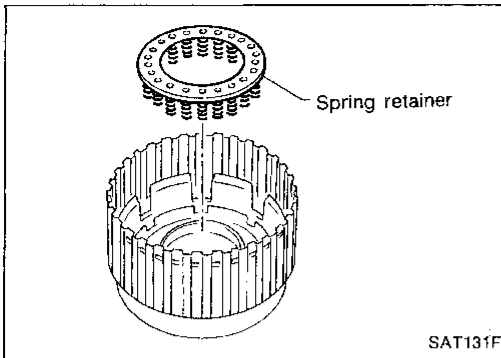
2. Install overrun clutch piston assembly on forward clutch piston by turning it slowly.
 - Apply ATF to inner surface of forward clutch piston.



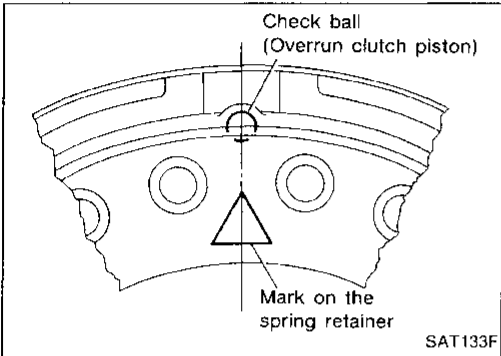
3. Install forward clutch piston assembly on forward clutch drum by turning it slowly.
 - Apply ATF to inner surface of drum.

Forward Clutch and Overrun Clutch (Cont'd)

4. Install return spring on overrun clutch piston.

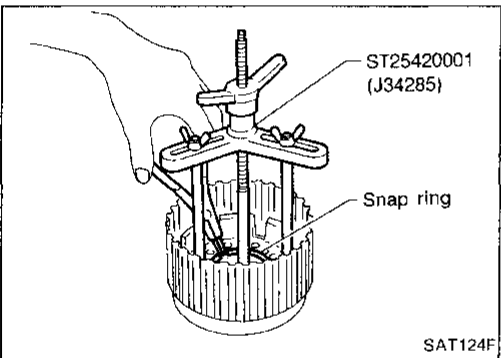


- Align the mark on spring retainer with check ball in overrun clutch piston.

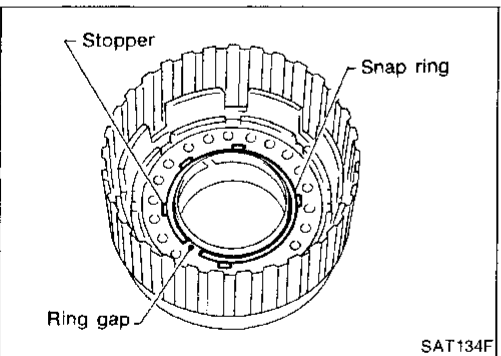


5. Set Tool on spring retainer and install snap ring while compressing return springs.

- Set Tool directly over return springs.



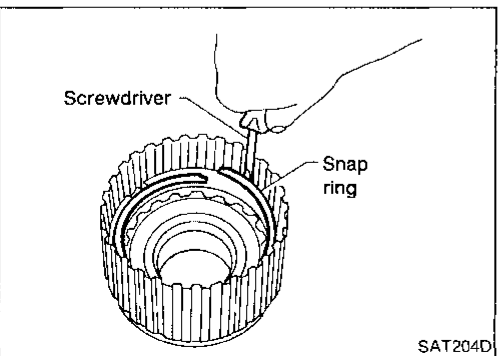
- Do not align snap ring gap with spring retainer stopper.



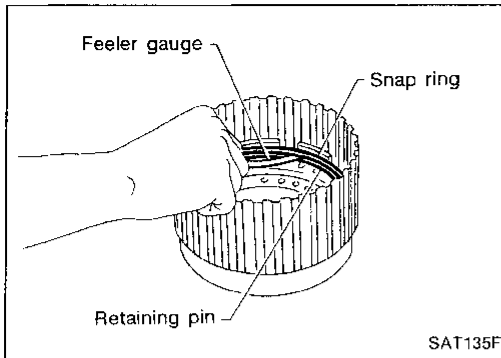
6. Install drive plates, driven plates, retaining plate and dish plate for overrun clutch.

- Take care with order of plates.

7. Install snap ring for overrun clutch.



Forward Clutch and Overrun Clutch (Cont'd)



8. Measure clearance between overrun clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard 0.7 - 1.1 mm (0.028 - 0.043 in)

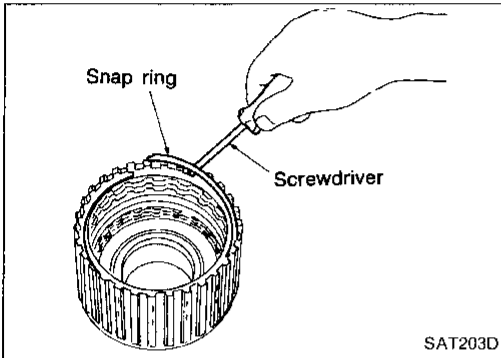
Allowable limit 1.7 mm (0.067 in)

Overrun clutch retaining plate: Refer to SDS. AT-334

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9. Install drive plates, driven plates, retaining plate and dish plate for forward clutch.

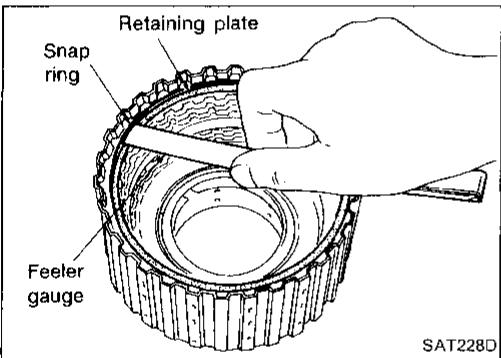
● **Take care with order of plates.**

10. Install snap ring for forward clutch.

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11. Measure clearance between forward clutch retaining plate and snap ring.

If not within allowable limit, select proper retaining plate.

Specified clearance:

Standard 0.45 - 0.85 mm (0.0177 - 0.0335 in)

Allowable limit 1.85 mm (0.0728 in)

Forward clutch retaining plate: Refer to SDS. AT-334

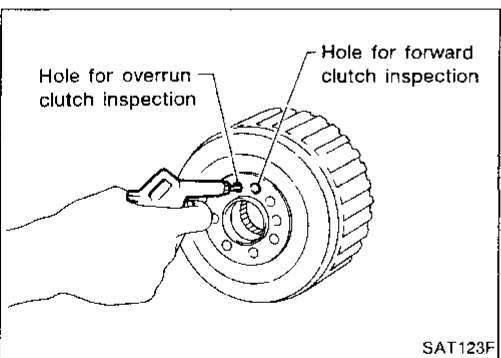
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12. Check operation of forward clutch.

Refer to "DISASSEMBLY" of Forward Clutch and Overrun Clutch. AT-285

13. Check operation of overrun clutch.

Refer to "DISASSEMBLY" of Forward Clutch and Overrun Clutch. AT-285

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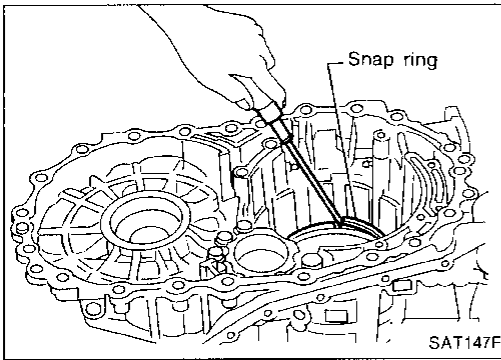
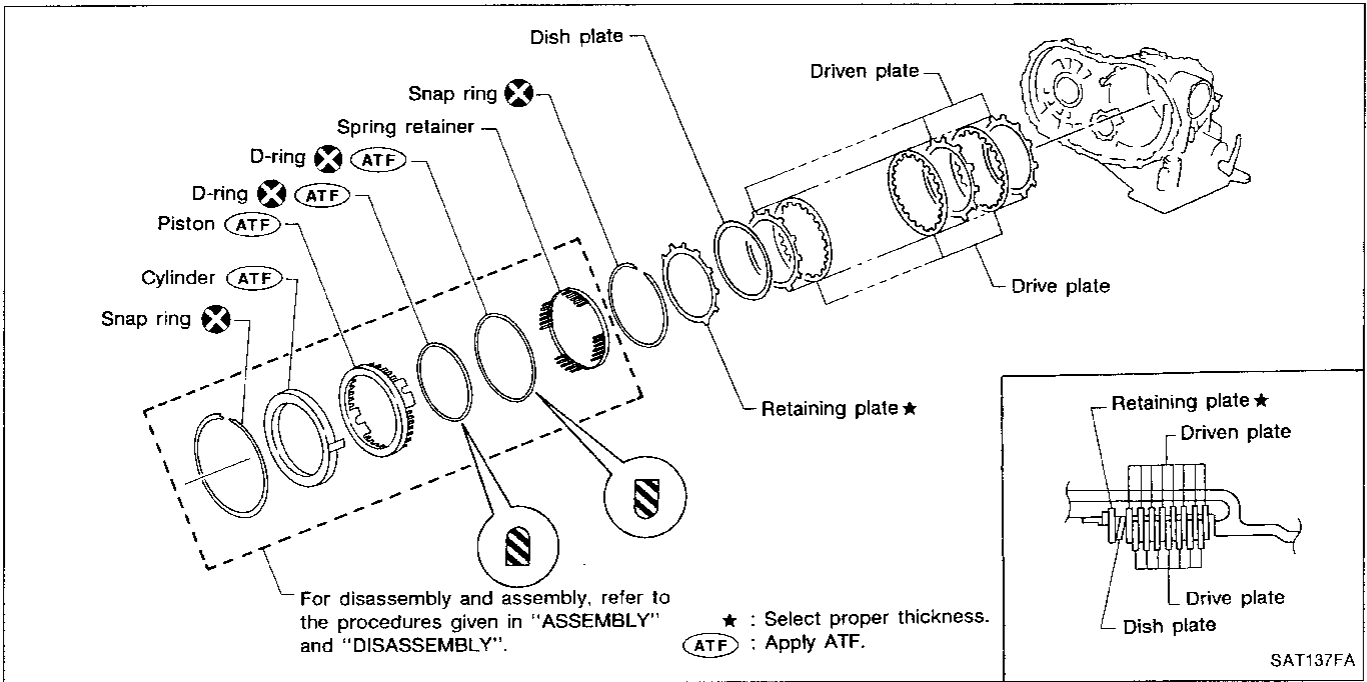
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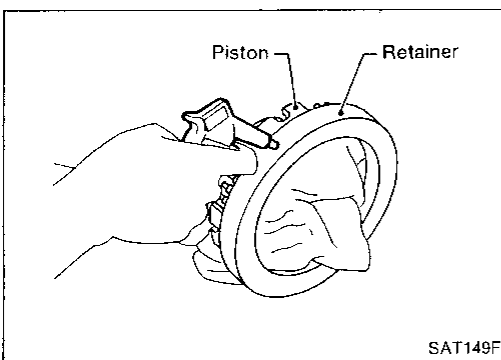
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Low & Reverse Brake

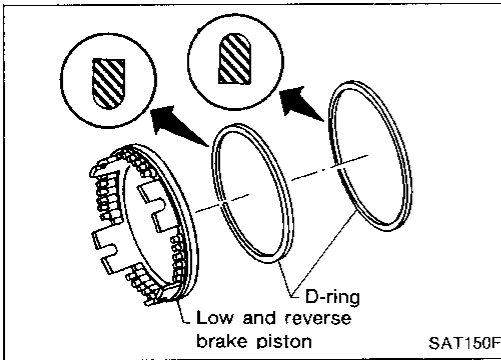


DISASSEMBLY

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



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



5. Remove D-rings from piston.

Low & Reverse Brake (Cont'd)

INSPECTION

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

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

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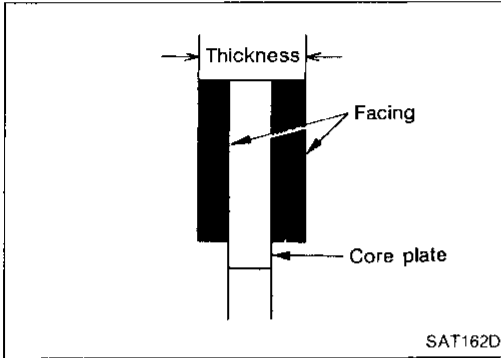
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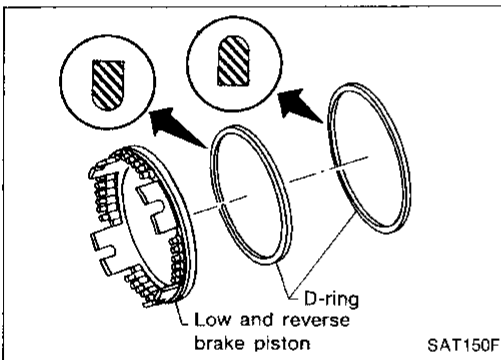
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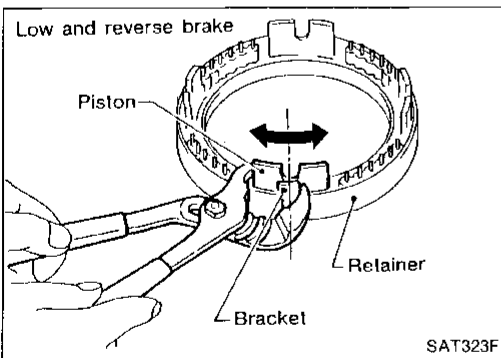
Low & reverse brake drive plate

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

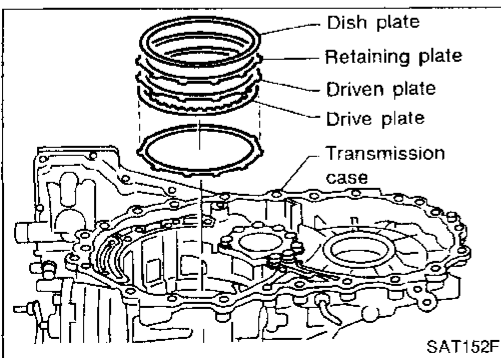


ASSEMBLY

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

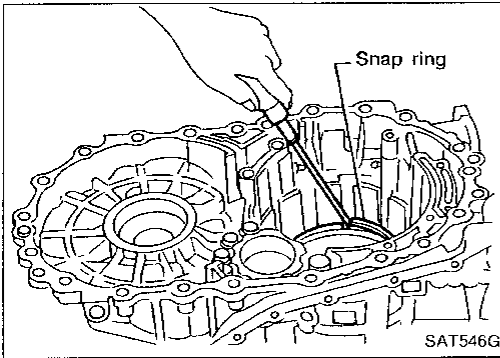


2. Set and align piston with retainer.
- **This operation is required in order to engage the protrusions of piston to return springs correctly. Further procedures are given in "ASSEMBLY".**

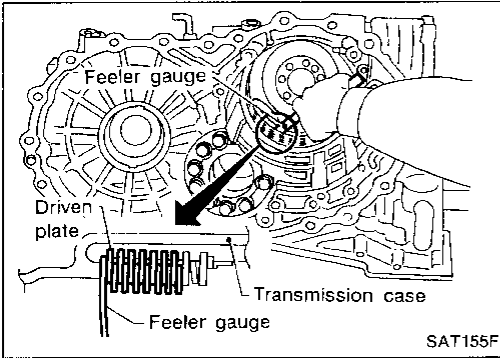


3. Install driven plates, drive plates, retaining plate and dish plate on transmission case.
- **Take care with order of plates and direction of dish plate.**

Low & Reverse Brake (Cont'd)



4. Install snap ring.



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

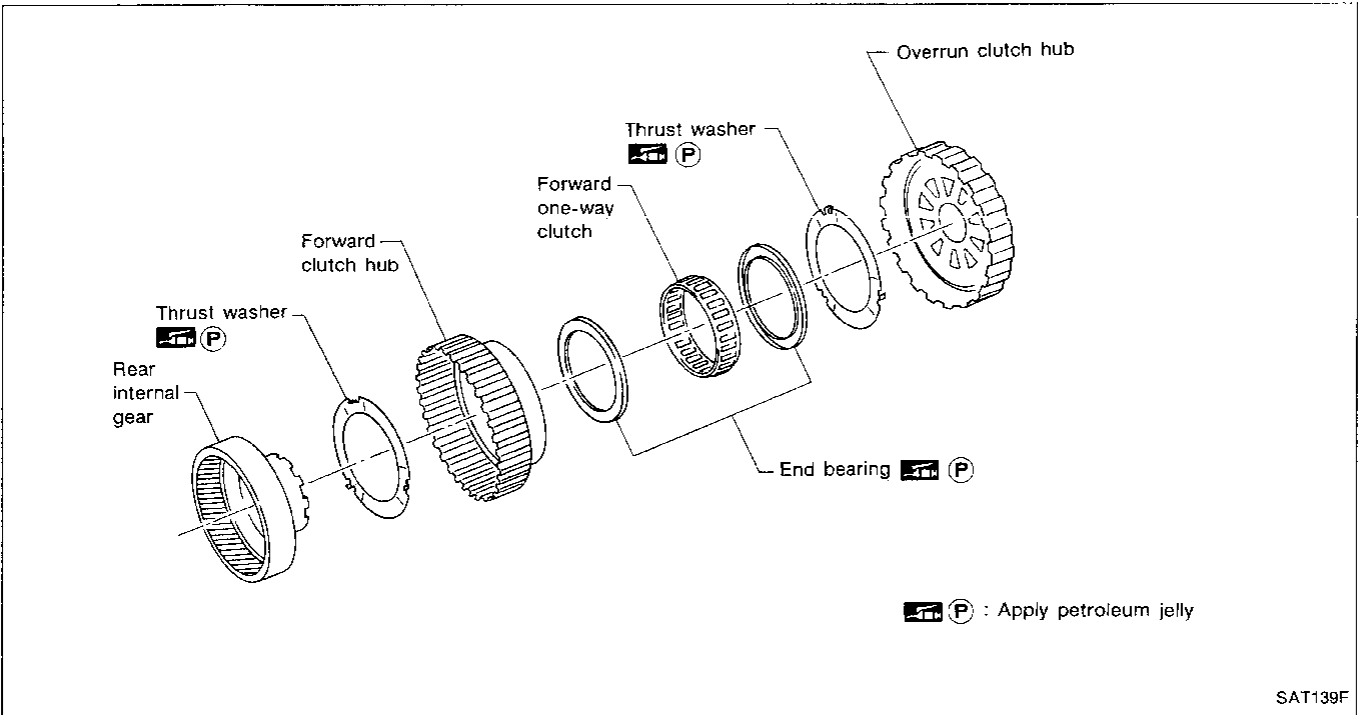
Specified clearance:

Standard 1.7 - 2.1 mm (0.067 - 0.083 in)

Allowable limit 3.5 mm (0.138 in)

Retaining plate: Refer to SDS. AT-335

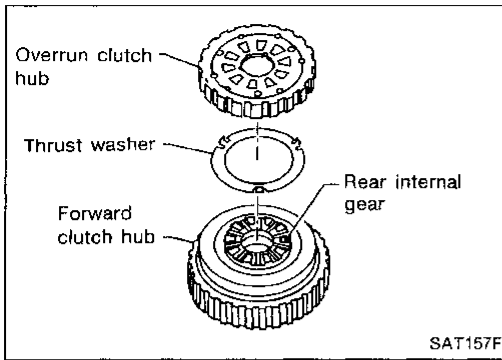
Rear Internal Gear, Forward Clutch Hub and Overrun Clutch Hub



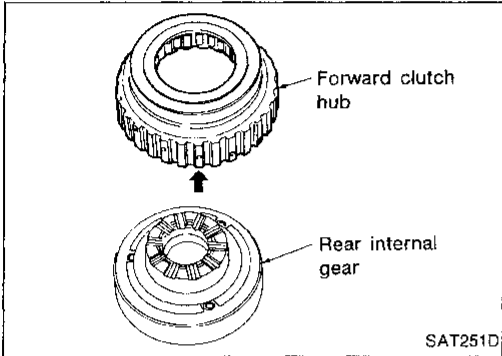
Overrun Clutch Hub (Cont'd)

DISASSEMBLY

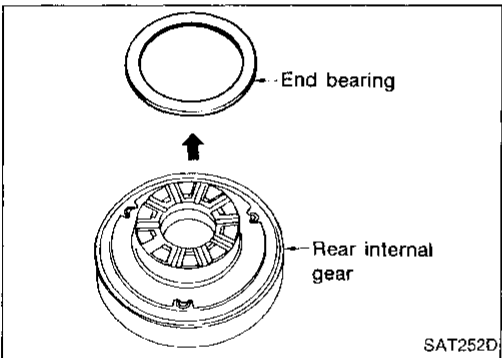
1. Remove overrun clutch hub and thrust washer from forward clutch hub.



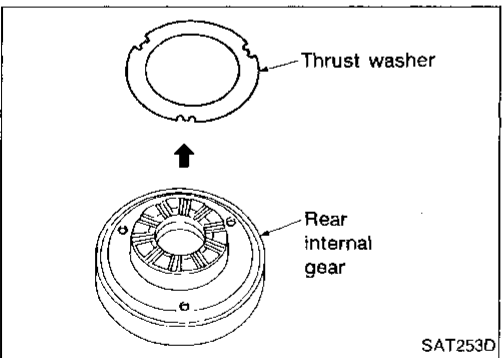
2. Remove forward clutch hub from rear internal gear.



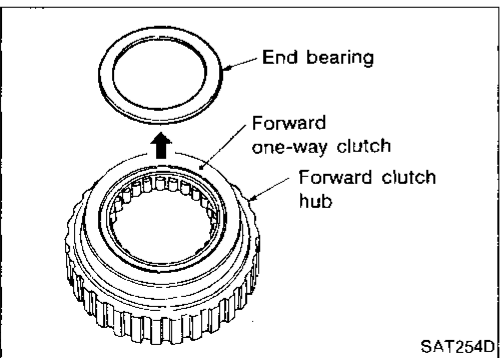
3. Remove end bearing from rear internal gear.



4. Remove thrust washer from rear internal gear.



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



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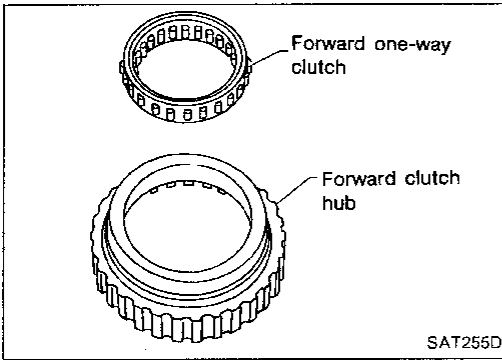
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Overrun Clutch Hub (Cont'd)

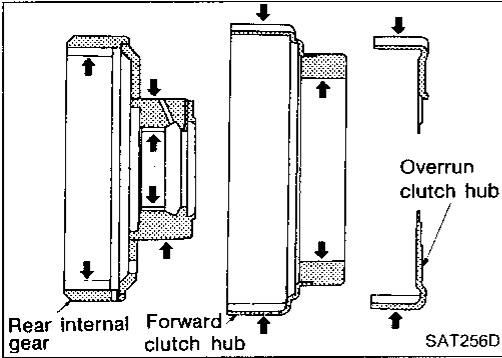
6. Remove forward one-way clutch from forward clutch hub.



INSPECTION

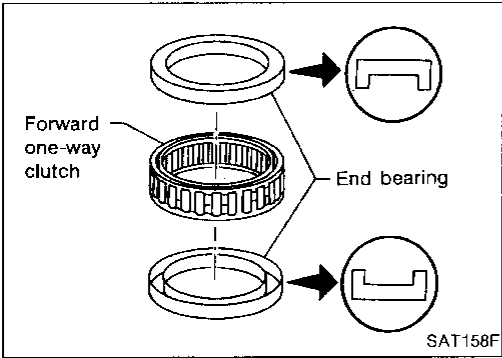
Rear internal gear, forward clutch hub and overrun clutch hub

- Check rubbing surfaces for wear or damage.



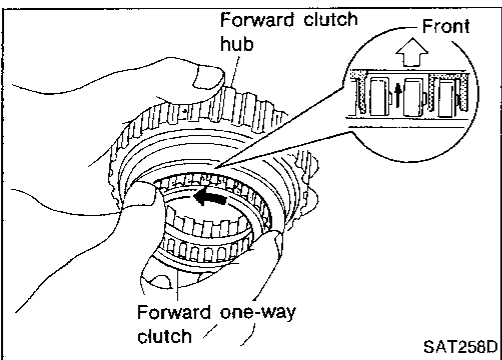
End bearings and forward one-way clutch

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

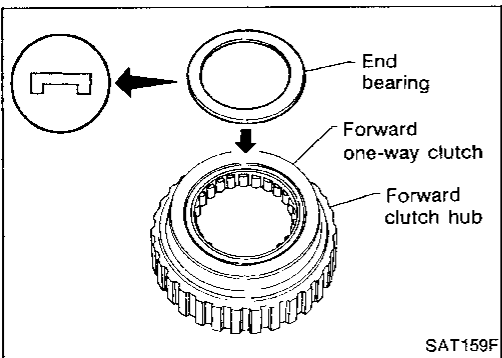


ASSEMBLY

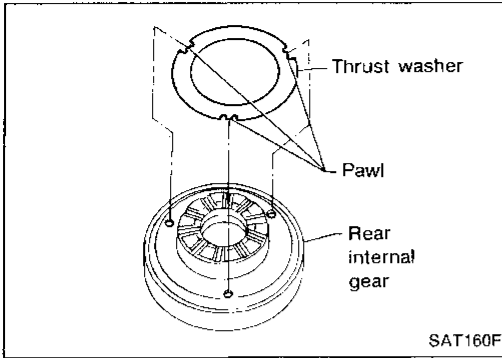
1. Install forward one-way clutch on forward clutch.
 - Take care with the direction of forward one-way clutch.



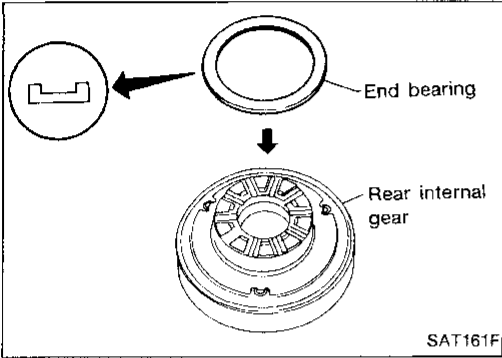
2. Install end bearing on forward one-way clutch.
 - Apply petroleum jelly to end bearing.



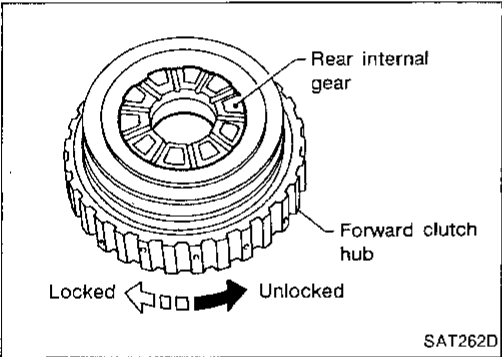
Overrun Clutch Hub (Cont'd)



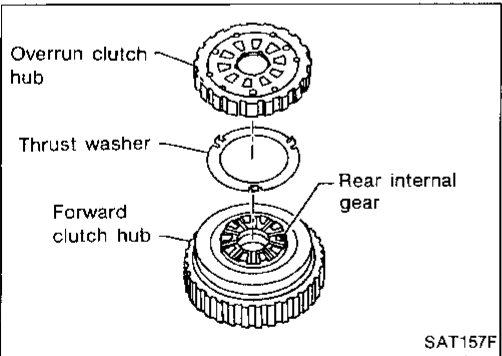
3. Install thrust washer on rear internal gear.
 - Apply petroleum jelly to thrust washer.
 - Align hooks of thrust washer with holes of rear internal gear.



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



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



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

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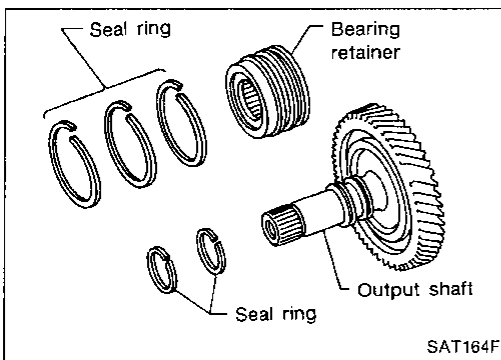
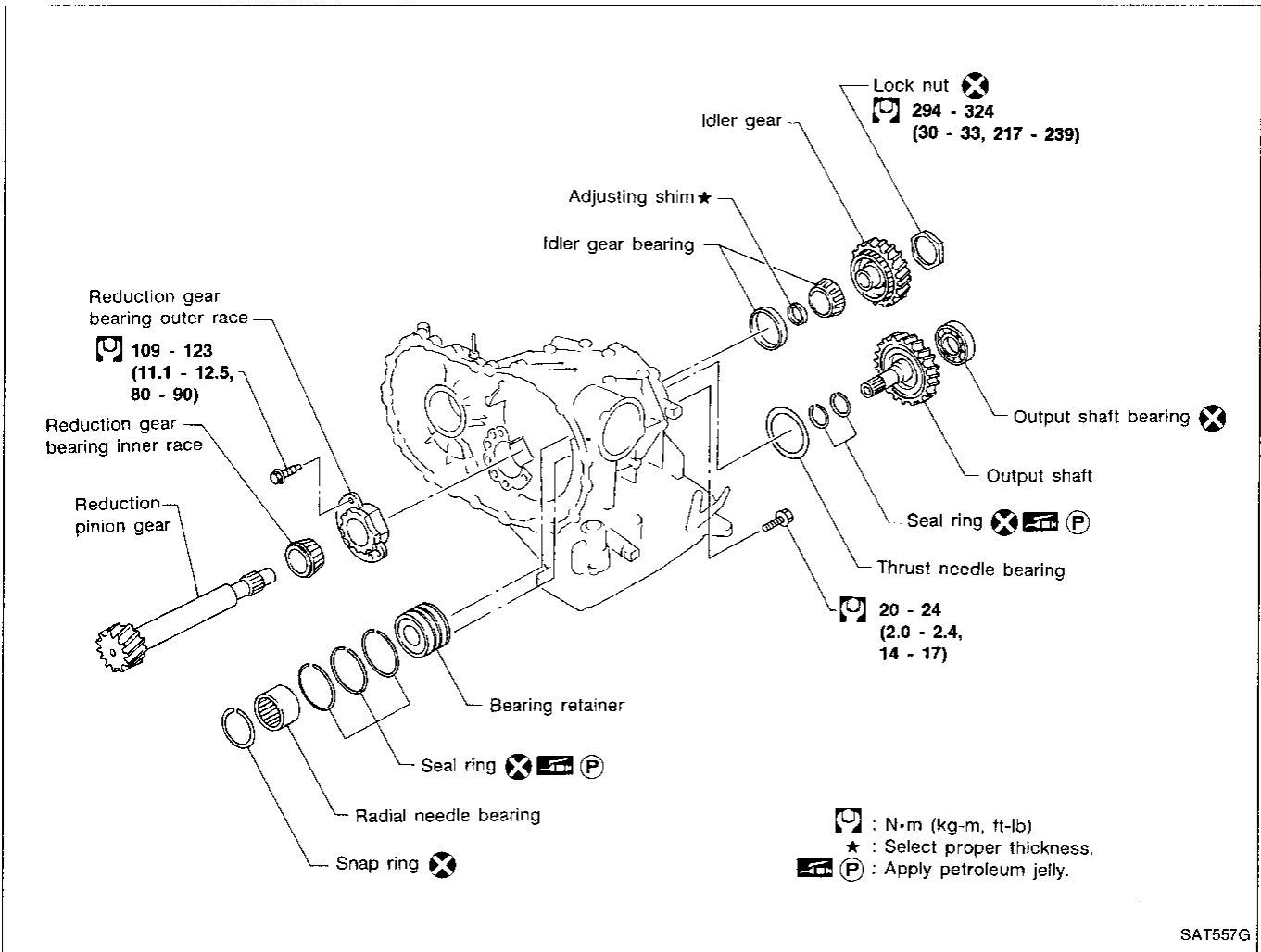
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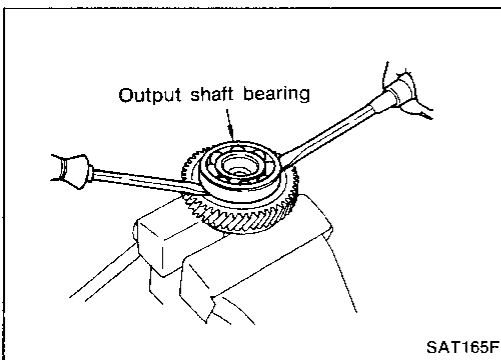
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Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer



DISASSEMBLY

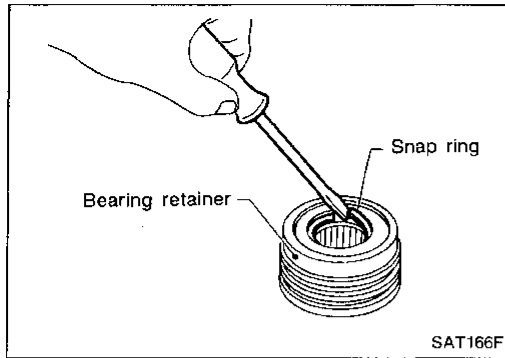
1. Remove seal rings from output shaft and bearing retainer.



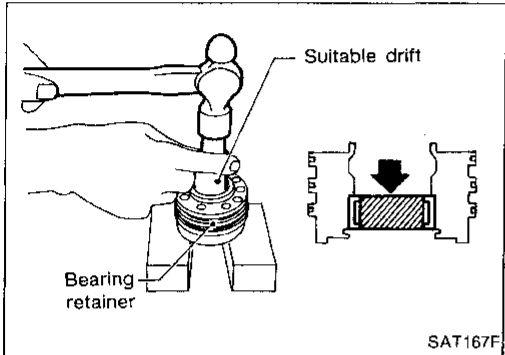
2. Remove output shaft bearing with screwdrivers.
- Always replace bearing with a new one when removed.
 - Do not damage output shaft.

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

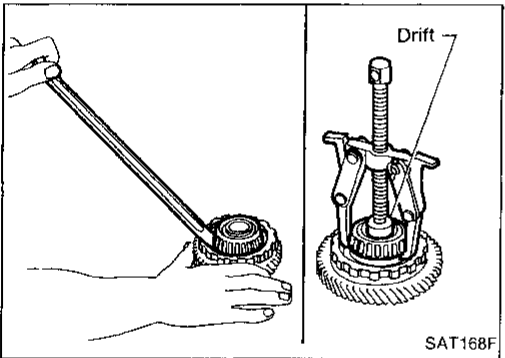
3. Remove snap ring from bearing retainer.



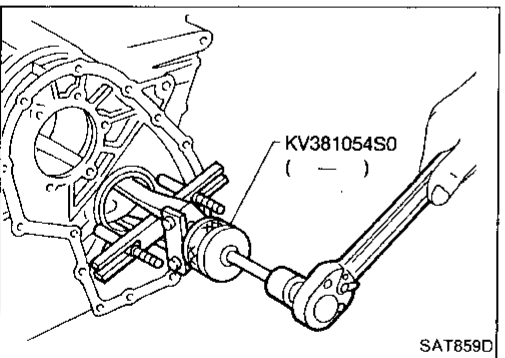
4. Remove needle bearing from bearing retainer.



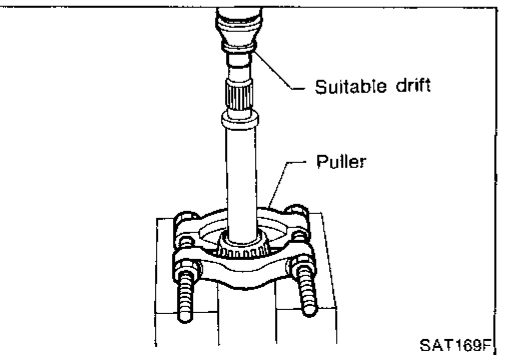
5. Remove idler gear bearing inner race from idler gear.



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



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



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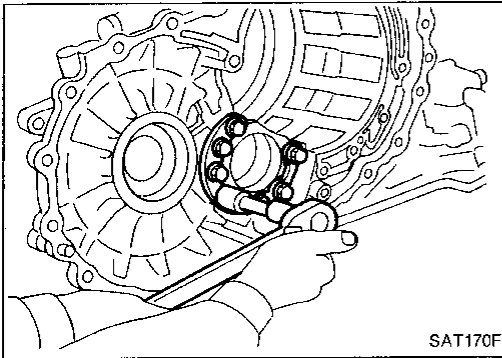
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Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)

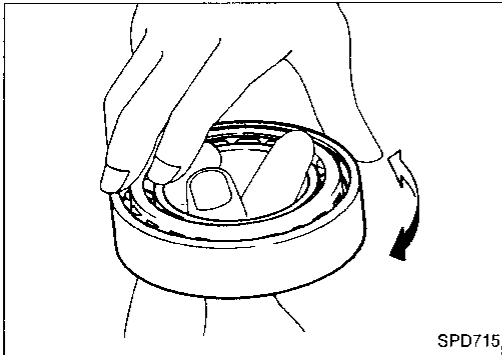


8. Remove reduction gear bearing outer race from transmission case.

INSPECTION

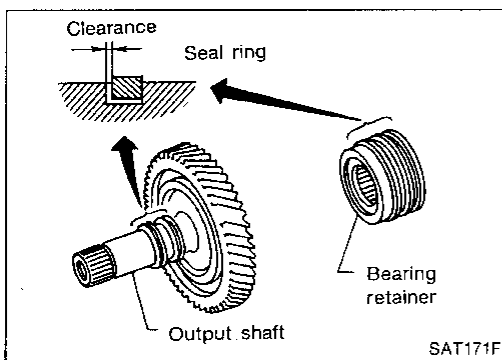
Output shaft, idler gear and reduction gear

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



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 - 0.30 mm (0.0039 - 0.0118 in)

Allowable limit:

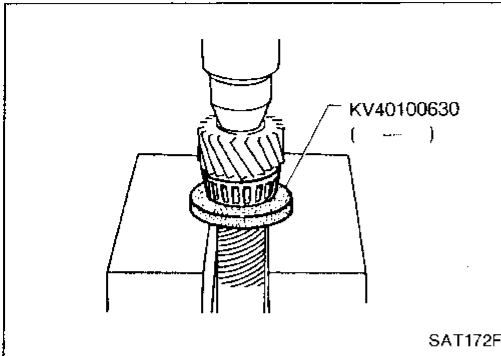
0.30 mm (0.0118 in)

- If not within allowable limit, replace bearing retainer.

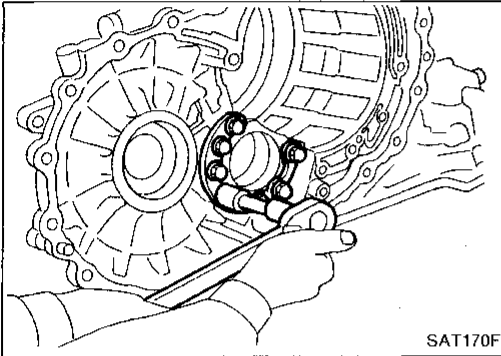
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)

ASSEMBLY

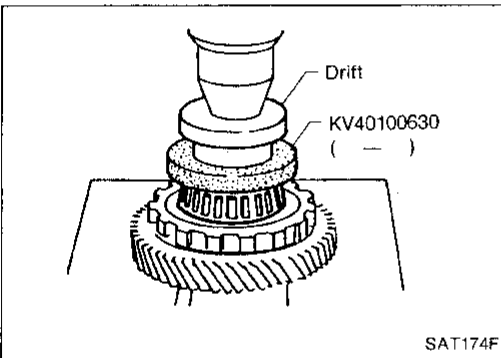
1. Press reduction gear bearing inner race on reduction gear.



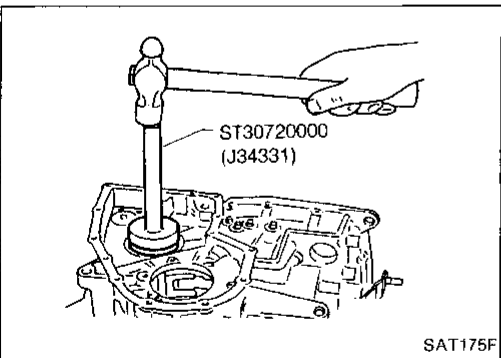
2. Install reduction gear bearing outer race on transmission case.



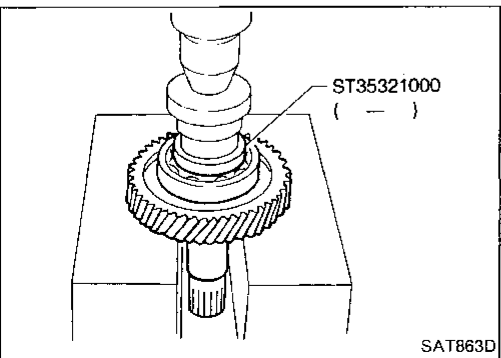
3. Press idler gear bearing inner race on idler gear.



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



5. Press output shaft bearing on output shaft.



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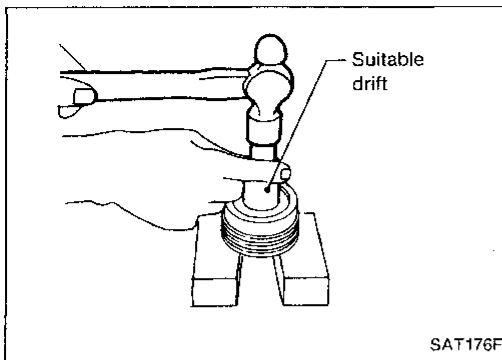
BF

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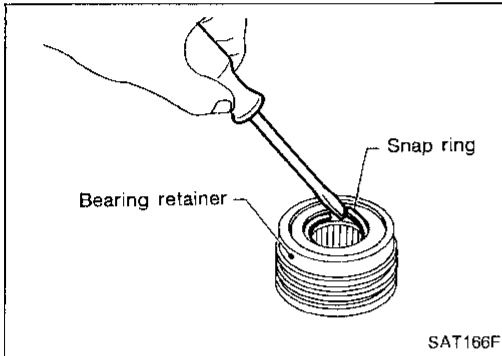
EL

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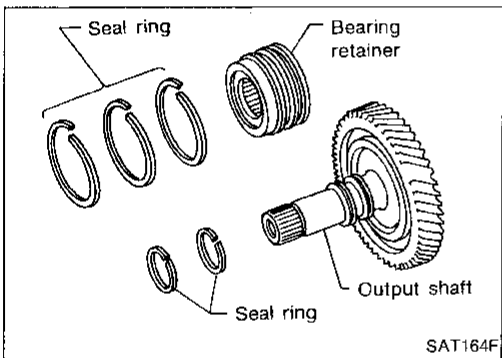
Output Shaft, Idler Gear, Reduction Gear and Bearing Retainer (Cont'd)



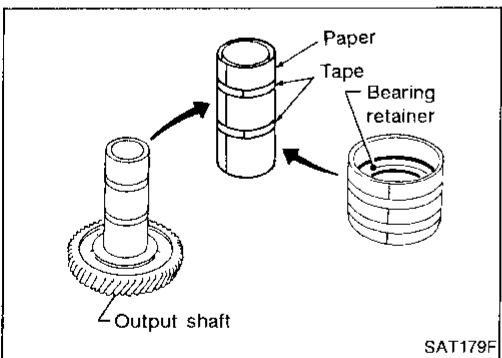
6. Press needle bearing on bearing retainer.



7. Install snap ring to bearing retainer.

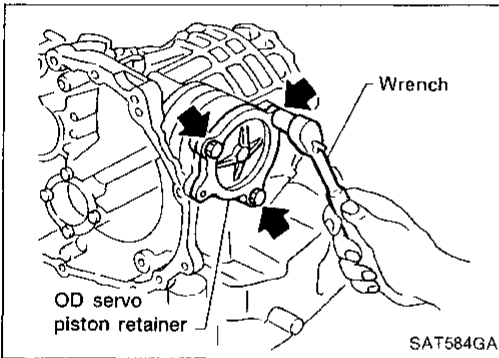
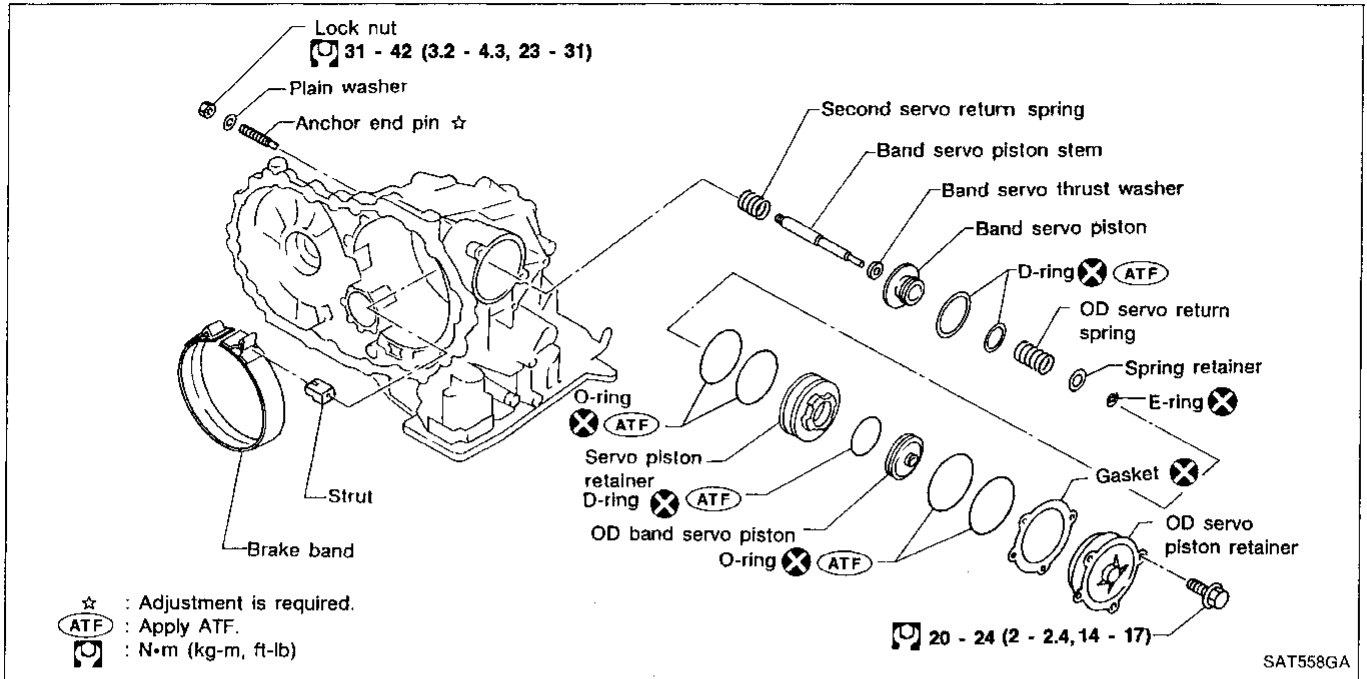


8. Install new seal rings to output shaft and bearing retainer carefully after packing ring grooves with petroleum jelly.



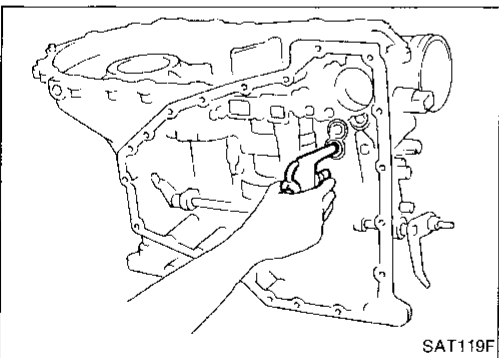
- Roll paper around seal rings to prevent seal rings from spreading.

Band Servo Piston Assembly



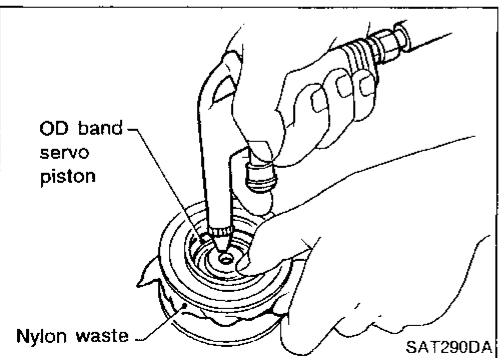
DISASSEMBLY

1. Remove band servo piston fixing bolts.



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

- Hold band servo piston assembly with a rag.

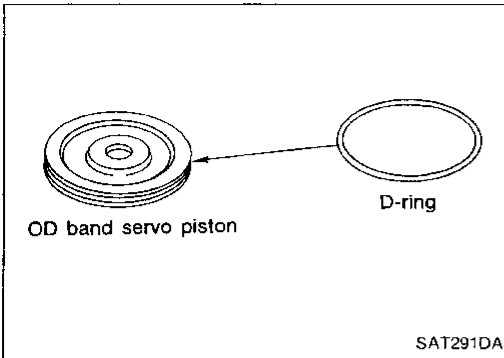


3. Apply compressed air to oil hole in OD servo piston retainer to remove OD band servo piston from retainer.

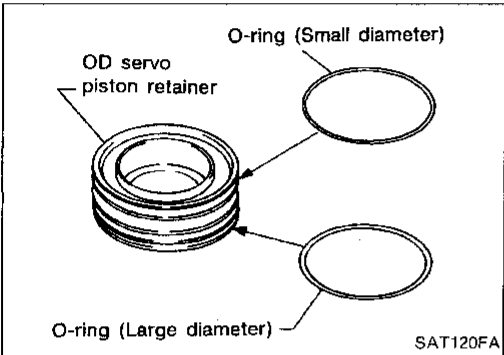
- Hold OD band servo piston while applying compressed air.

Band Servo Piston Assembly (Cont'd)

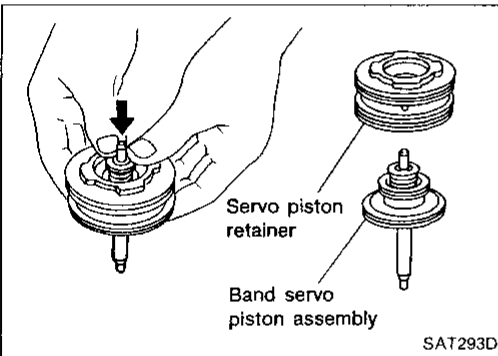
- Remove D-ring from OD band servo piston.



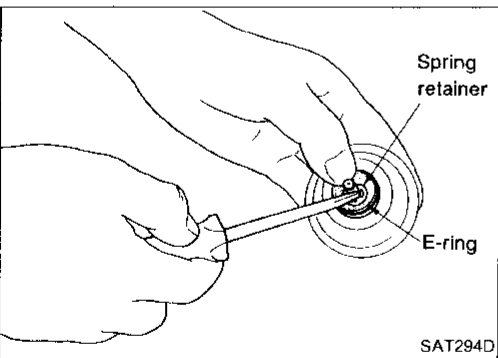
- Remove O-rings from OD servo piston retainer.



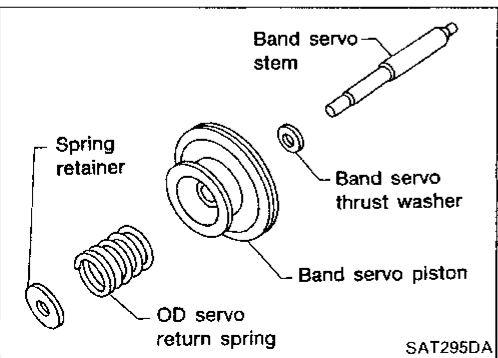
- Remove band servo piston assembly from servo piston retainer by pushing it forward.



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

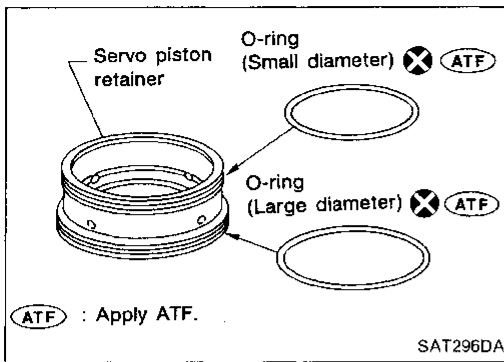


- Remove OD servo return spring, band servo thrust washer and band servo piston stem from band servo piston.

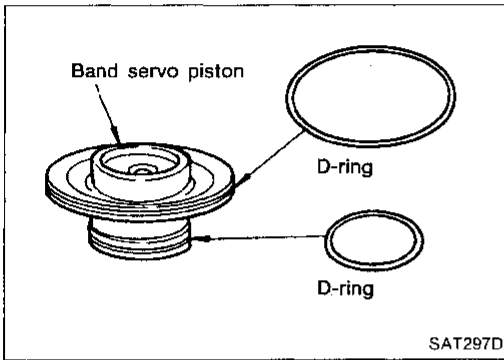


Band Servo Piston Assembly (Cont'd)

9. Remove O-rings from servo piston retainer.



10. Remove D-rings from band servo piston.



INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

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INSPECTION

Pistons, retainers and piston stem

- Check frictional surfaces for abnormal wear or damage.

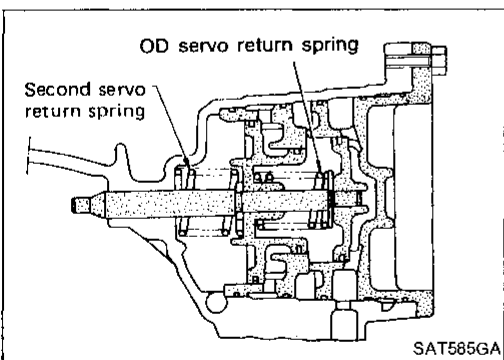
MT
AT

Return springs

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

Inspection standard: Refer to SDS. AT-340

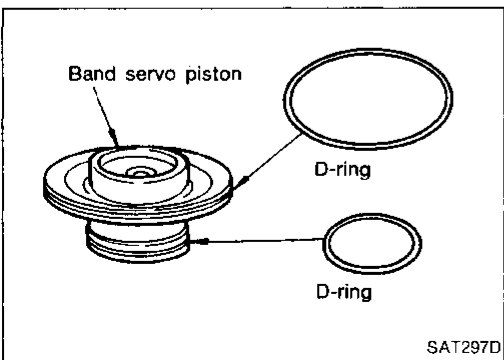
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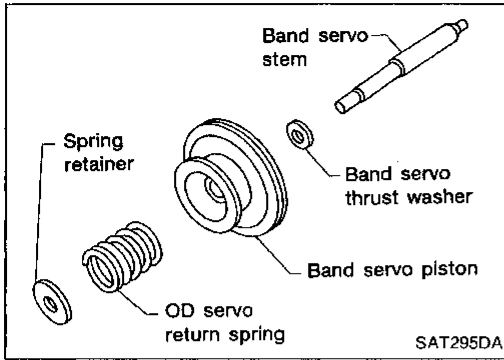
ASSEMBLY

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

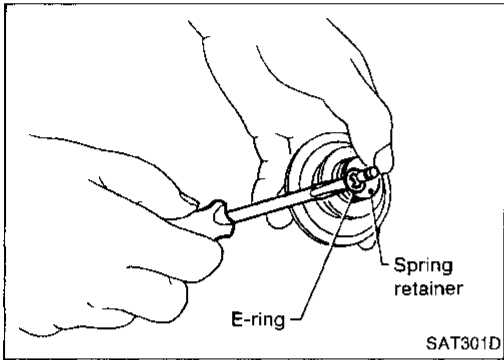
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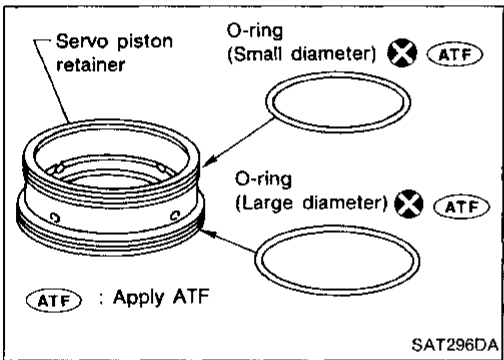
Band Servo Piston Assembly (Cont'd)



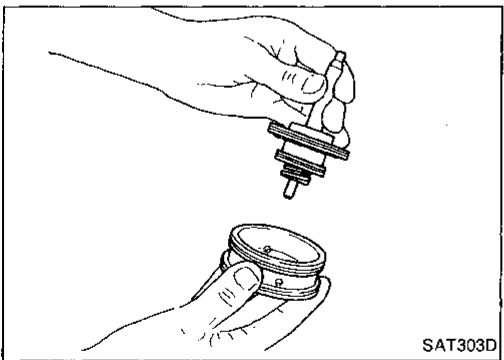
2. Install band servo piston stem, band servo thrust washer, OD servo return spring and spring retainer to band servo piston.



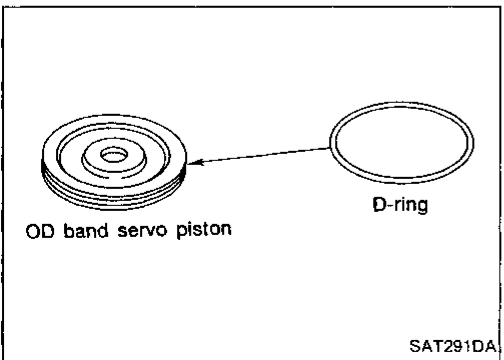
3. Place piston stem end on a wooden block. While pushing servo piston spring retainer down, install E-ring.



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

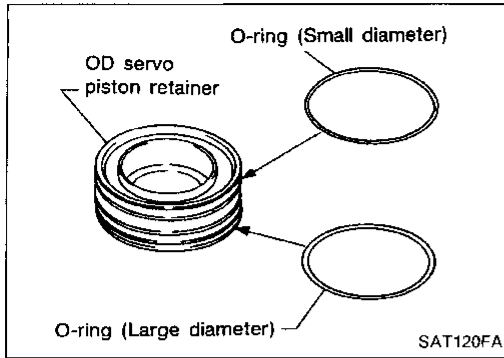


5. Install band servo piston assembly to servo piston retainer by pushing it inward.

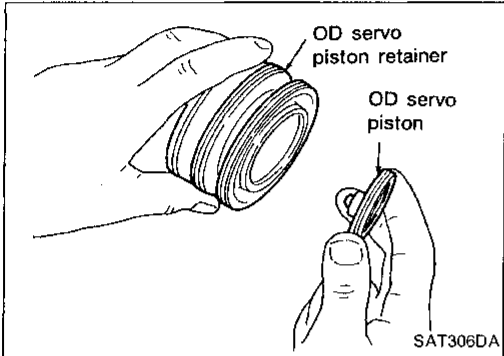


6. Install D-ring to OD band servo piston.
 - Apply ATF to D-ring.

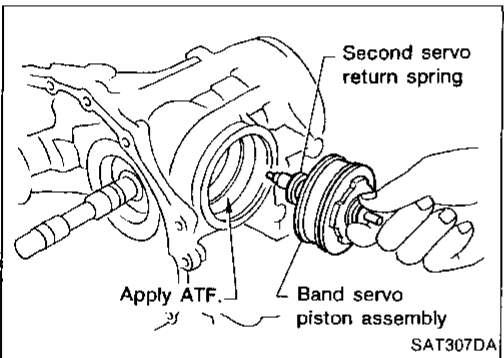
Band Servo Piston Assembly (Cont'd)



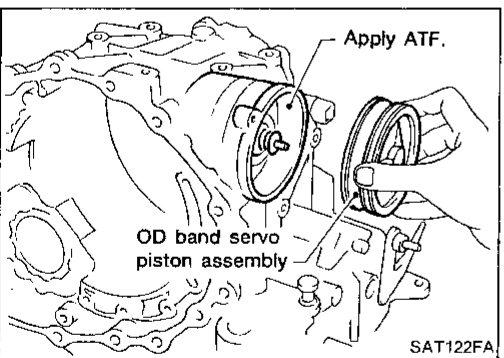
7. Install O-rings to OD servo piston retainer.
 - **Apply ATF to O-rings.**
 - **Pay attention to position of each O-ring.**



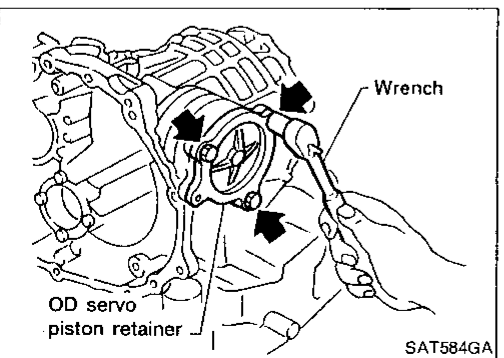
8. Install OD band servo piston to OD servo piston retainer.



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



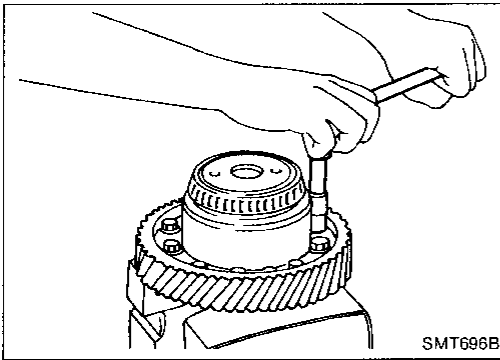
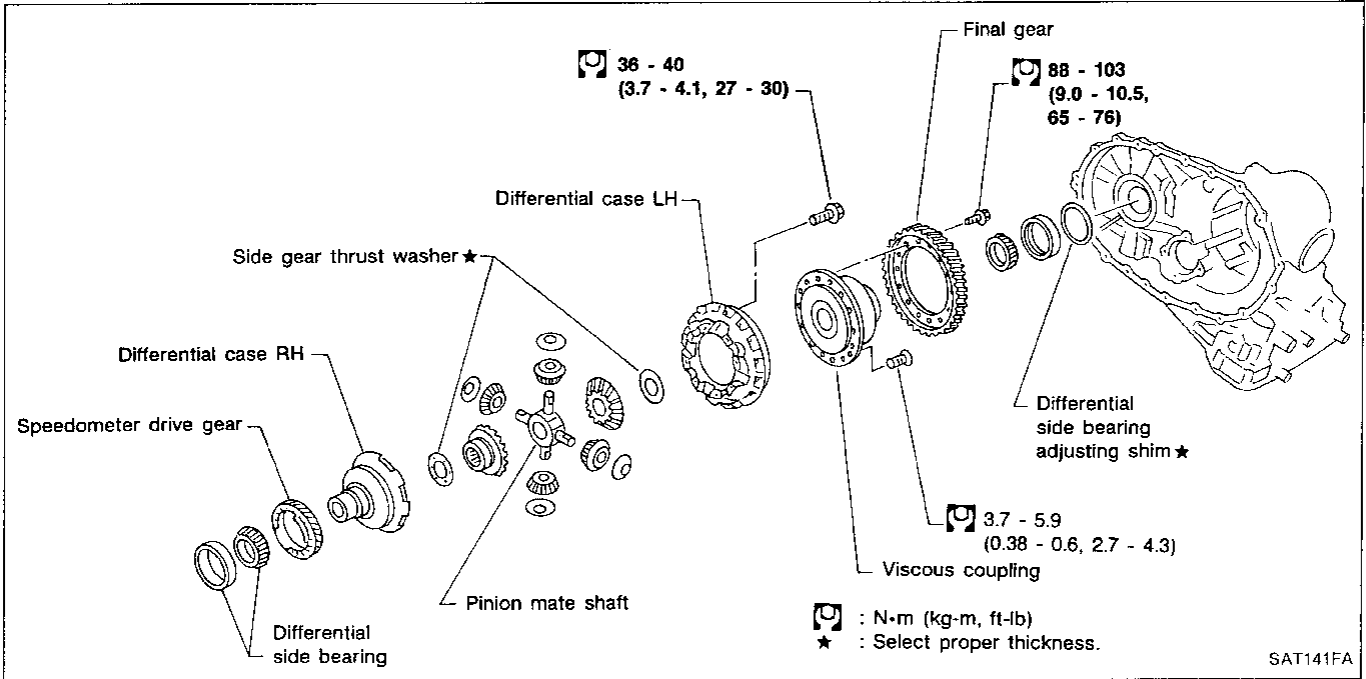
10. Install OD band servo piston assembly to transmission case.
 - **Apply ATF to O-ring of band servo piston and transmission case.**



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

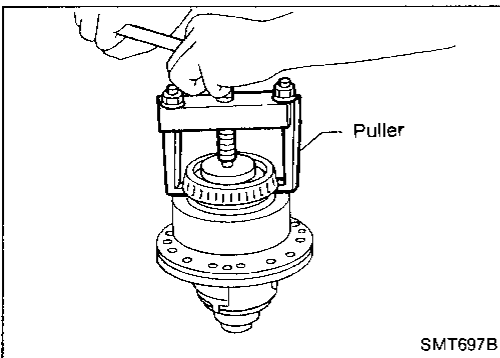
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Final Drive

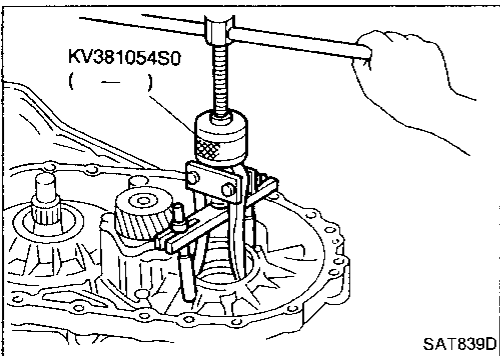


DISASSEMBLY

1. Remove final gear.



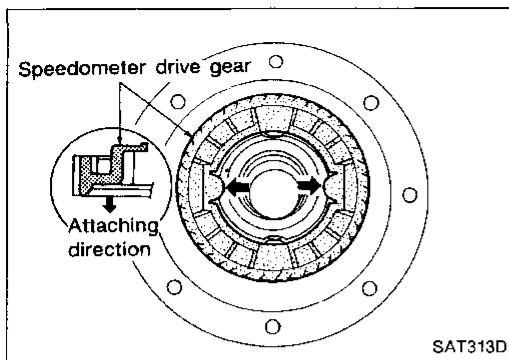
2. Press out differential side bearings.



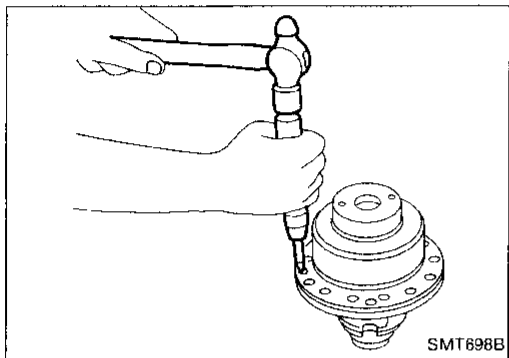
3. Remove differential side bearing outer race, and side bearing adjusting shim from transmission case.

Final Drive (Cont'd)

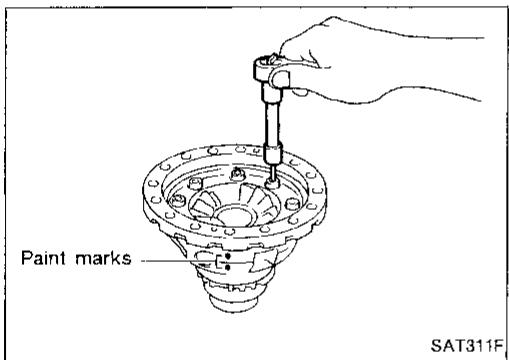
4. Remove speedometer drive gear.



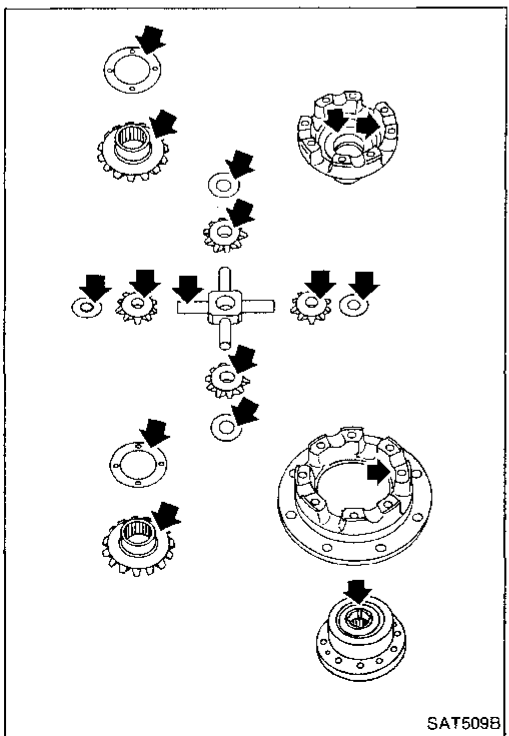
5. Remove viscous coupling.



6. Separate differential cases. Make paint marks to identify their original position.



7. Remove pinion mate shaft with gears.



INSPECTION

Gear, washer, shaft and case

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

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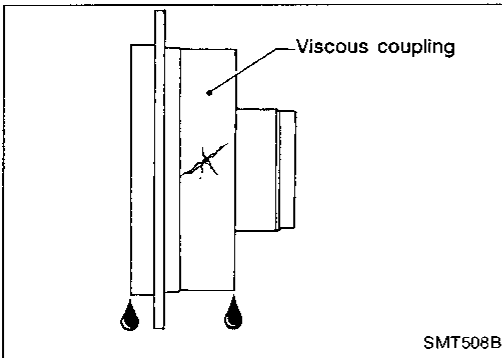
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Final Drive (Cont'd)

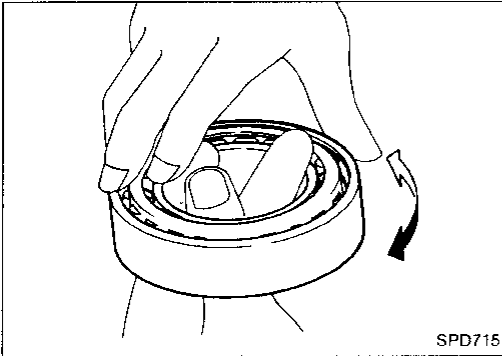
Viscous coupling

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



Bearings

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

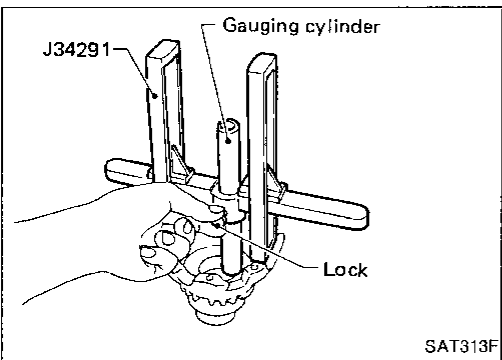


ASSEMBLY

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

Differential case side

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



- b. Install gauging plunger into cylinder.
- c. Install pinion mate gears and side gear with thrust washer on differential case.
- d. Set tool and allow gauging plunger to rest on side gear thrust washer.
- e. Measure gap between plunger and cylinder. This measurement should give exact clearance between side gear and differential case with washers.

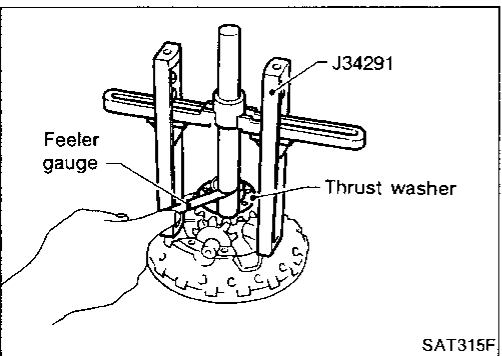
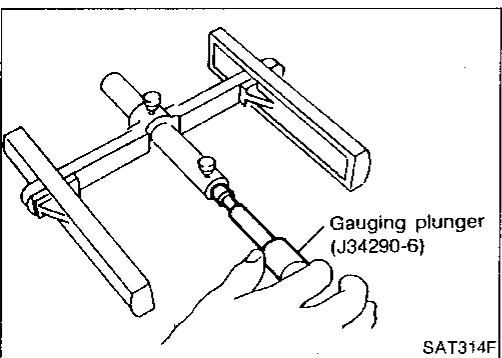
Standard clearance:

0.1 - 0.2 mm (0.004 - 0.008 in)

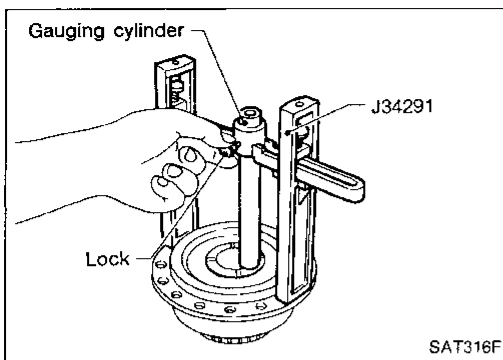
- f. If not within specification adjust clearance by changing thickness of side gear thrust washer.

Side gear thrust washers for differential case side:

Refer to SDS. AT-335

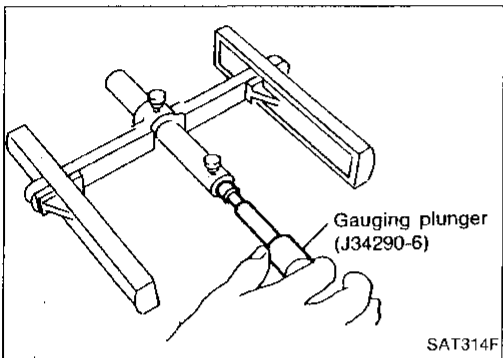


Final Drive (Cont'd)

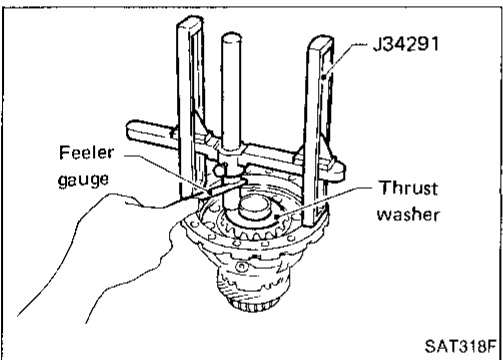


Viscous coupling side

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



- b. Install gauging plunger into cylinder.



- c. Install pinion mate gears and side gears with original washers on differential cases.

Align paint marks.

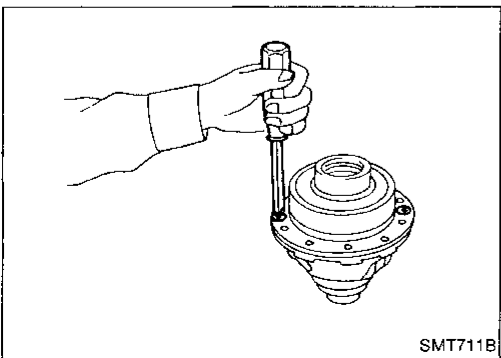
- d. Tighten differential case bolts.
- e. Set tool and allow plunger to rest on side gear thrust washer.
- f. Measure gap between plunger and cylinder. This measurement should give exact clearance between side gear and differential case with washers.

Standard clearance:

0.1 - 0.2 mm (0.004 - 0.008 in)

- g. If not within specification, adjust clearance by changing thickness of side gear thrust washer.

**Side gear thrust washers for viscous coupling side:
Refer to SDS. AT-335**



- 2. Install viscous coupling

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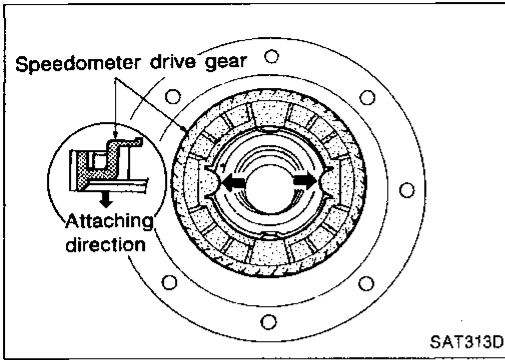
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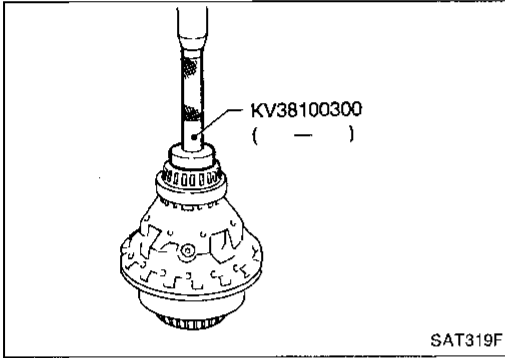
EL

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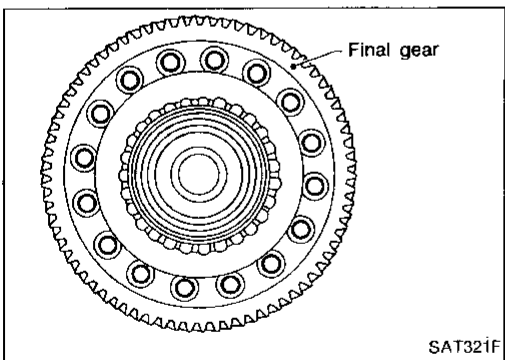
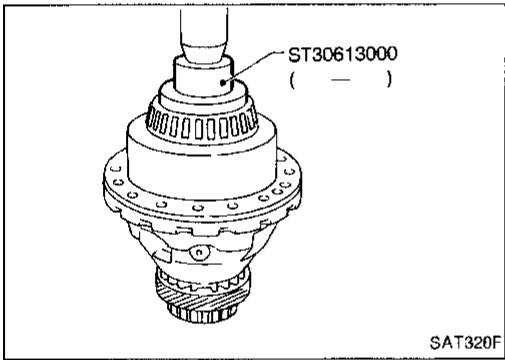
Final Drive (Cont'd)



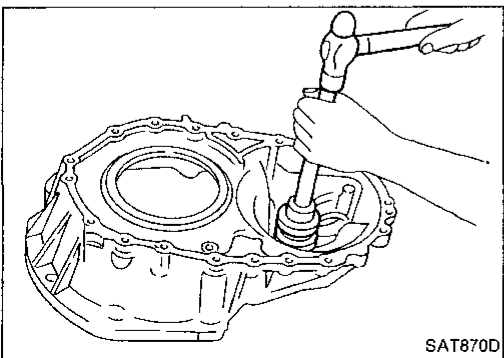
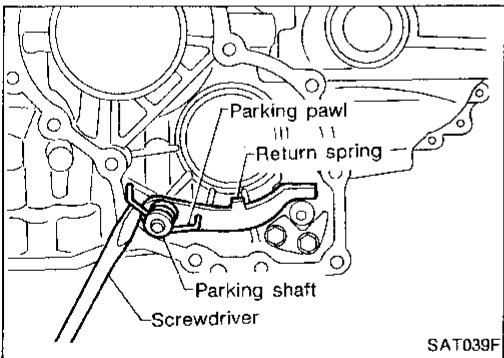
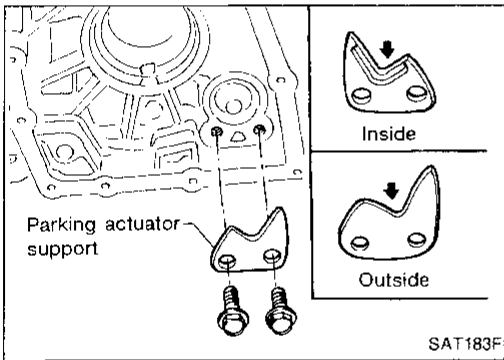
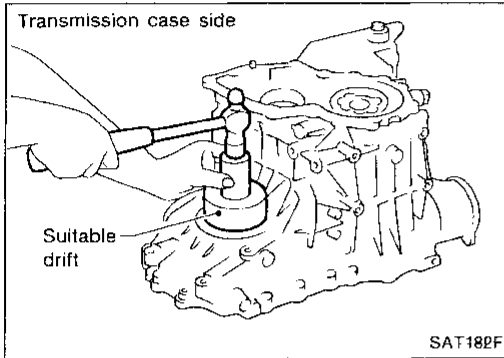
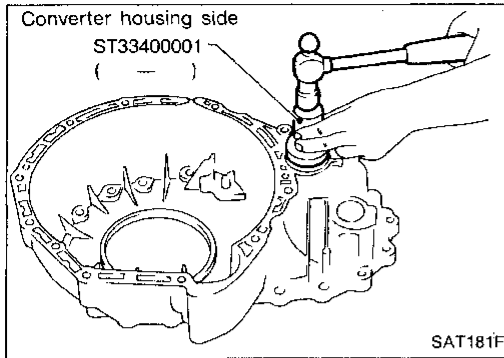
3. Install speedometer drive gear on differential case.
 - **Align the projection of speedometer drive gear with the groove of differential case.**



4. Press differential side bearings on differential case.



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



Assembly 1

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

2. Install parking actuator support to transmission case. AT-0
 - Pay attention to direction of parking actuator support.

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

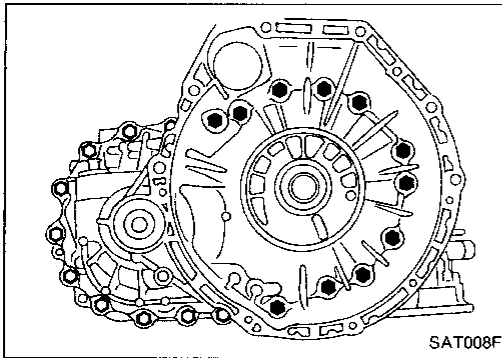
Adjustment 1

DIFFERENTIAL SIDE BEARING PRELOAD

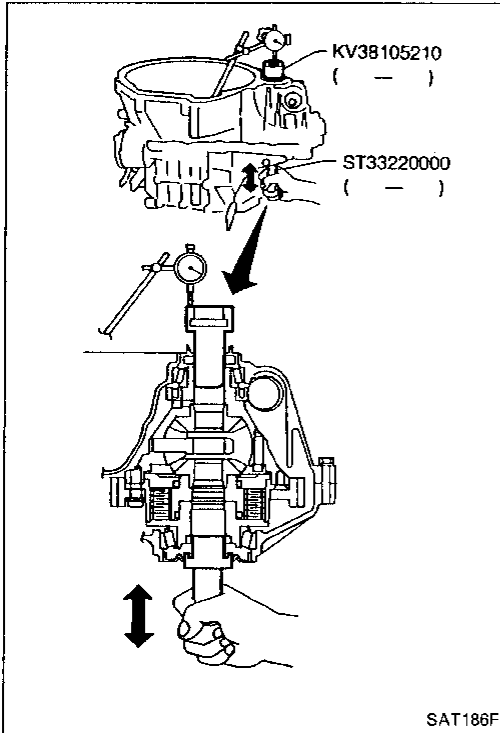
1. Install differential side bearing outer race without adjusting shim on transmission case.
2. Install differential side bearing outer race on converter housing.

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Adjustment 1 (Cont'd)



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



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

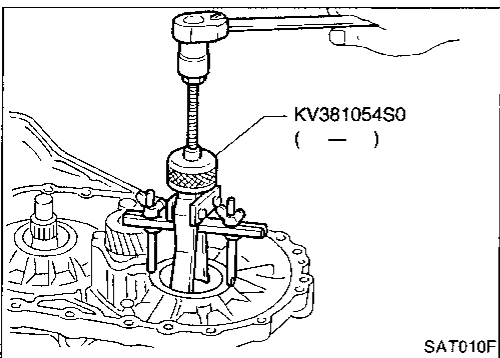
**Suitable shim thickness = Dial indicator deflection
+ Specified bearing preload**

Differential side bearing adjusting shim:

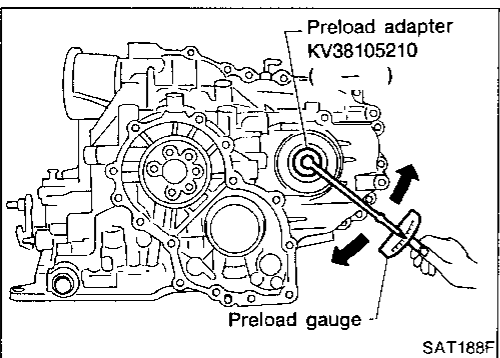
Refer to SDS. AT-336

Bearing preload:

0.05 - 0.09 mm (0.0020 - 0.0035 in)



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



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

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

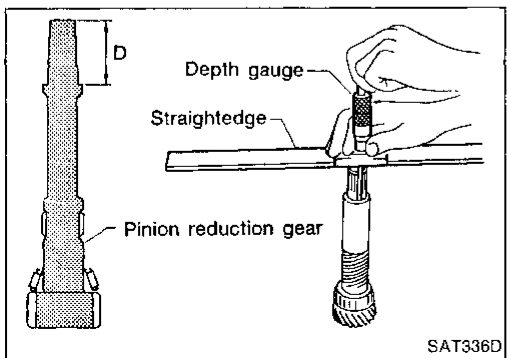
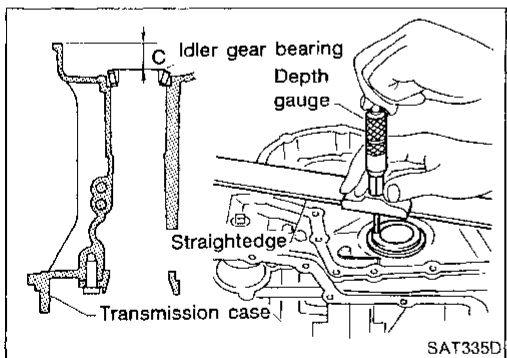
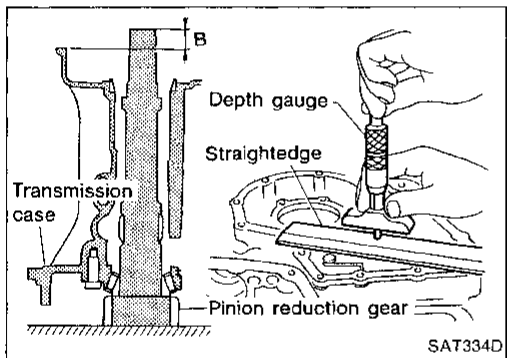
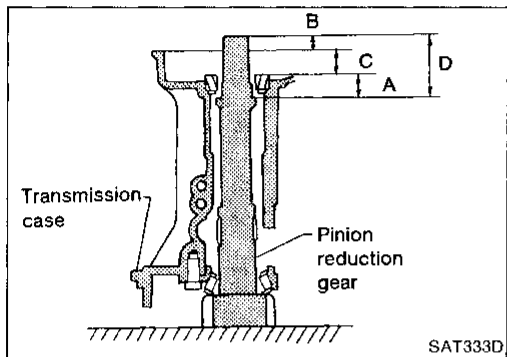
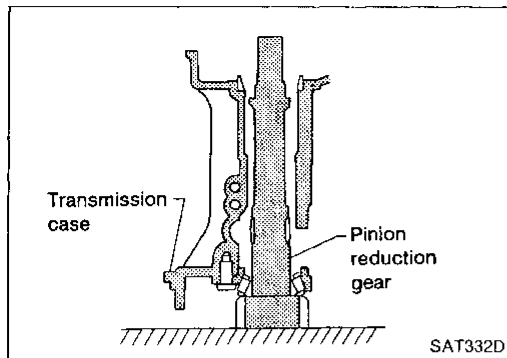
Turning torque of final drive assembly (New bearing):

0.78 - 1.37 N·m (8.0 - 14.0 kg·cm, 6.9 - 12.2 in·lb)

- **When old bearing is used again, turning torque will be slightly less than the above.**
- **Make sure torque is close to the specified range.**

Adjustment 1 (Cont'd)

REDUCTION GEAR BEARING PRELOAD



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

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

$$A = D - (B + C)$$

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

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

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

- Measure dimension "D" between the end of reduction gear and the adjusting shim mating surface of reduction gear.
 - Measure dimension "D" in at least two places.
 - Calculate dimension "A"
- $$A = D - (B + C)$$

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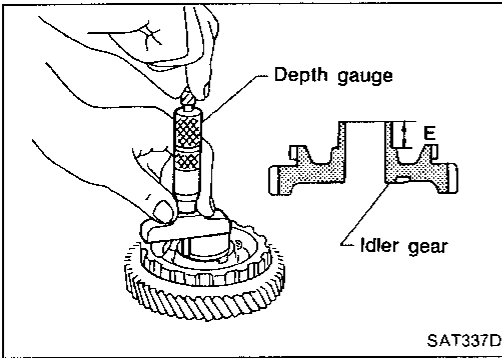
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Adjustment 1 (Cont'd)



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

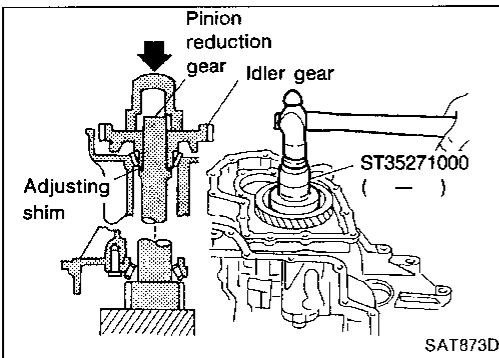
- Measure dimension "E" in at least two places.

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

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

(* ... Bearing preload)

Reduction gear bearing adjusting shim: Refer to SDS. AT-338

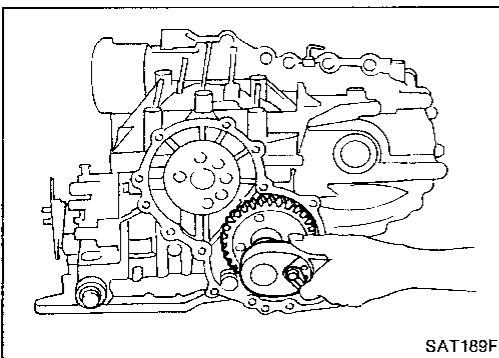


3. Install reduction gear and reduction gear bearing adjusting shim selected in step 2-e on transmission case.

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

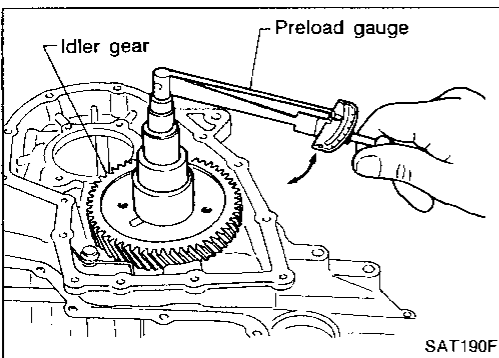
5. Press idler gear on reduction gear.

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



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

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



7. Measure turning torque of reduction gear.

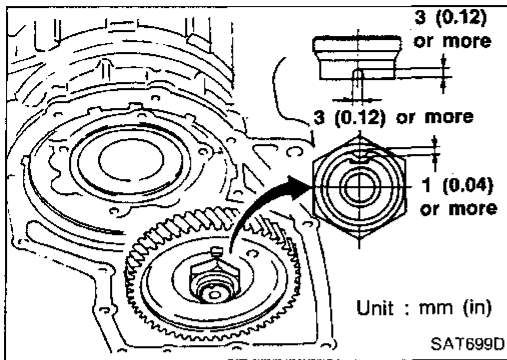
- When measuring turning torque, turn reduction gear in both directions several times to seat bearing rollers correctly.

Turning torque of reduction gear:

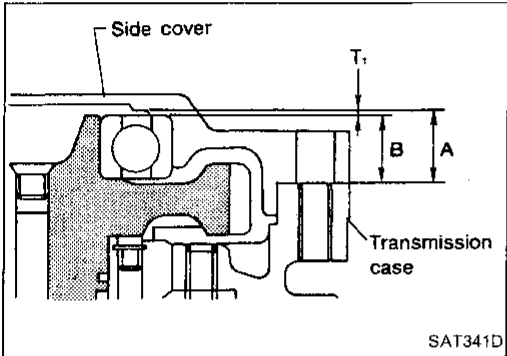
0.05 - 0.39 N·m (0.5 - 4.0 kg·cm, 0.43 - 3.47 in·lb)

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

Adjustment 1 (Cont'd)

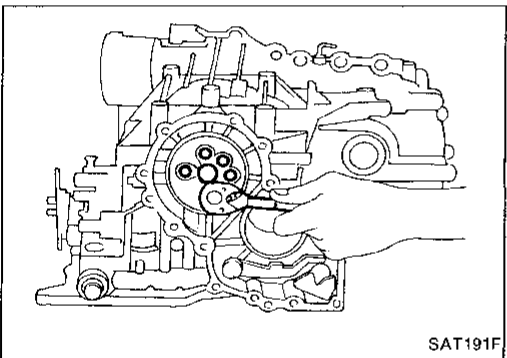


8. After properly adjusting turning torque, clinch idler gear lock nut as shown.

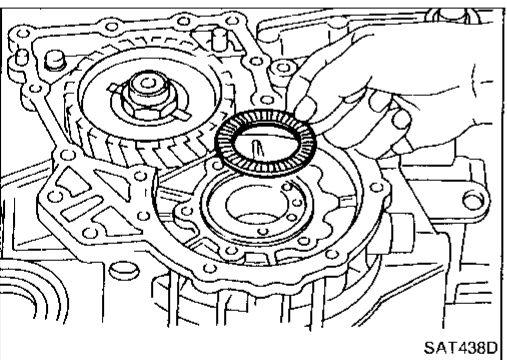


OUTPUT SHAFT END PLAY

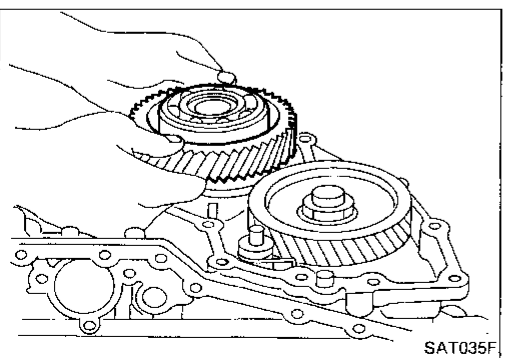
- Measure clearance between side cover and the end of the output shaft bearing.
- Select proper thickness of adjusting shim so that clearance is within specifications.



1. Install bearing retainer for output shaft.



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



3. Install output shaft on transmission case.

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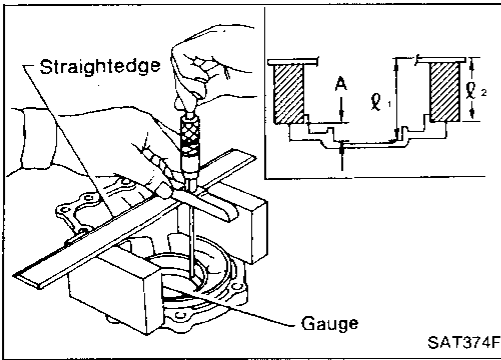
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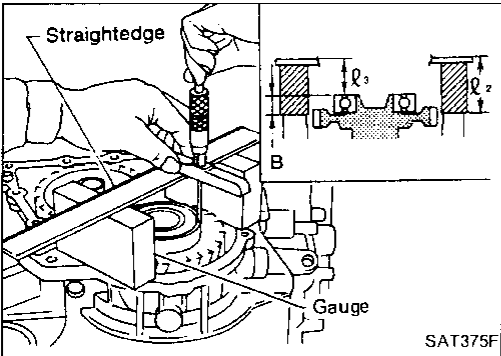
Adjustment 1 (Cont'd)



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.

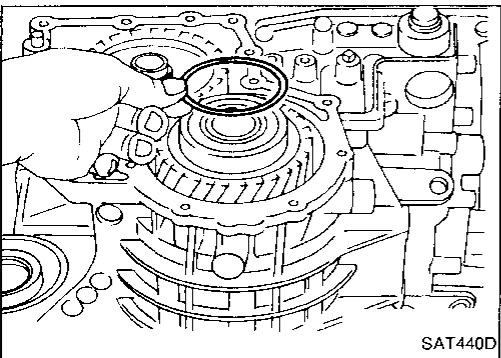
$$A = l_1 - l_2 \quad l_2: \text{Height of gauge}$$



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.

$$B = l_2 - l_3 \quad l_2: \text{Height of gauge}$$

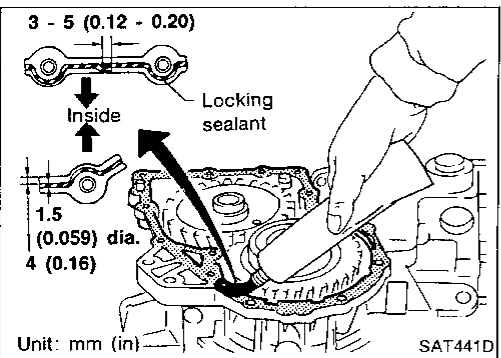


6. Select proper thickness of adjusting shim so that output shaft end play (clearance between side cover and output shaft bearing) is within specifications.

Output shaft end play (A – B):
0 - 0.15 mm (0 - 0.0059 in)

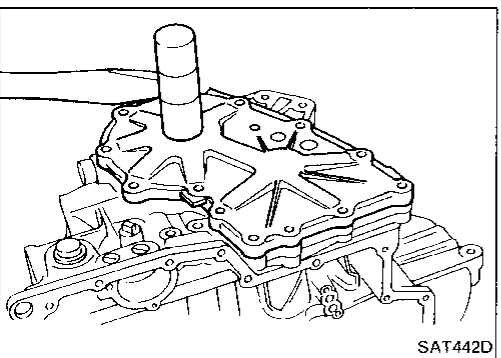
Output shaft end play adjusting shim:
Refer to SDS. AT-340

7. Install adjusting shim on output shaft bearing.



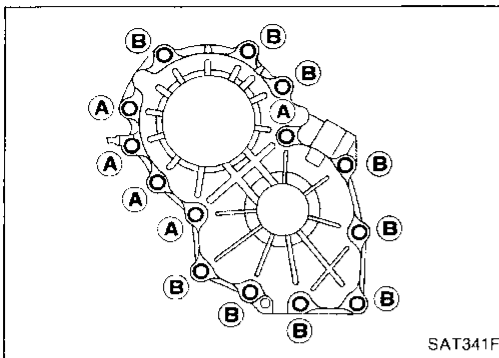
Assembly 2

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

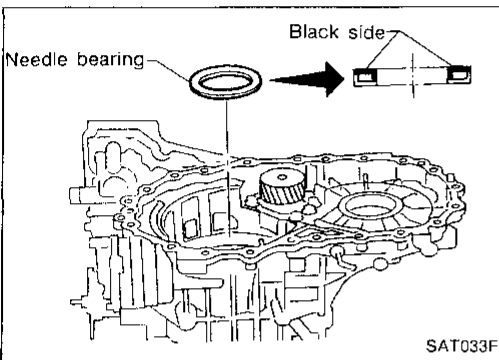


2. Set side cover on transmission case.

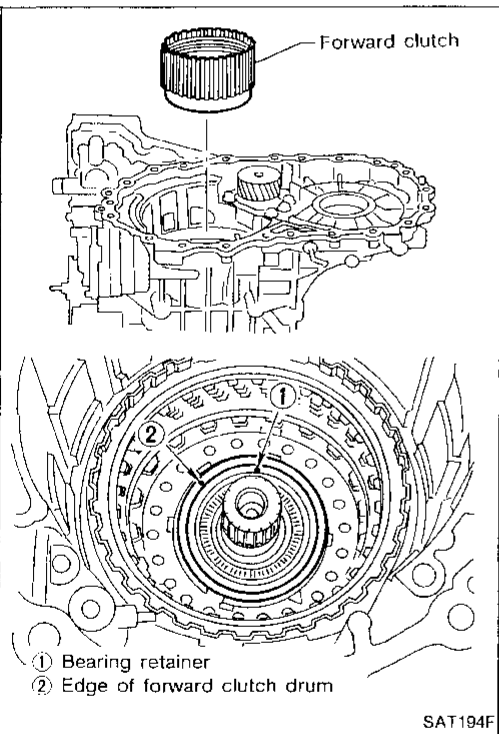
Assembly 2 (Cont'd)



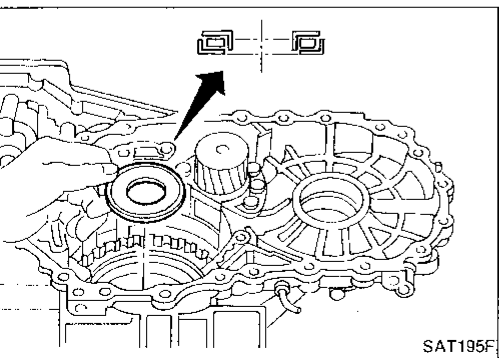
3. Tighten side cover fixing bolts to specified torque.
 - Do not mix bolts **A** and **B**.
 - Always replace bolts **A** as they are self-sealing bolts.



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



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



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

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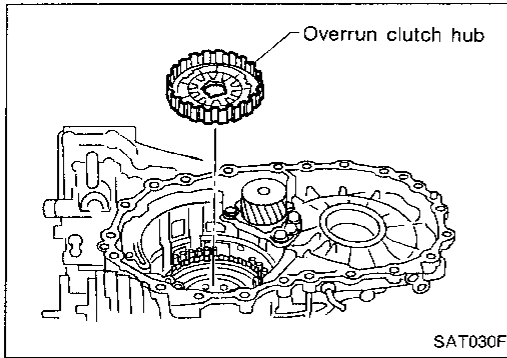
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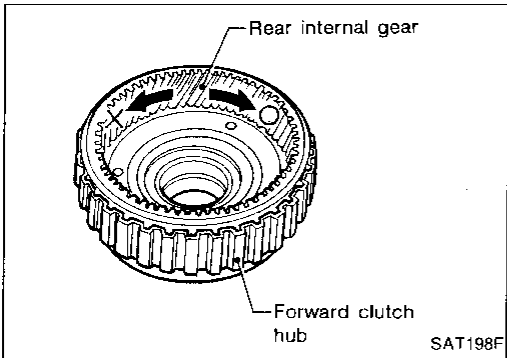
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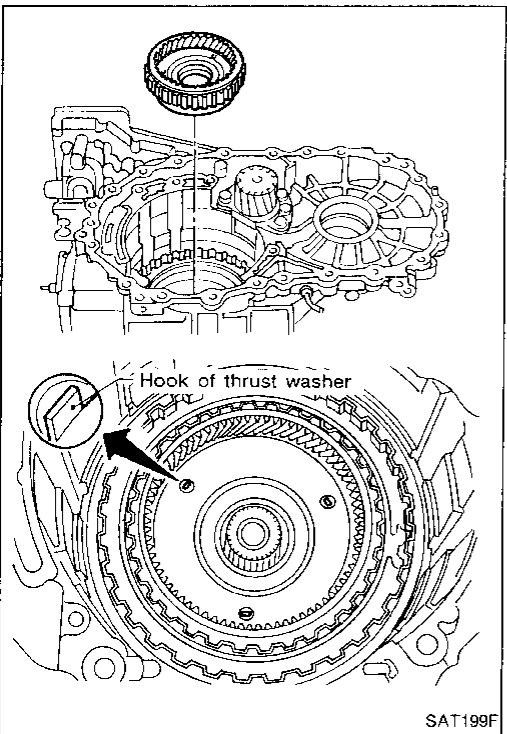
Assembly 2 (Cont'd)



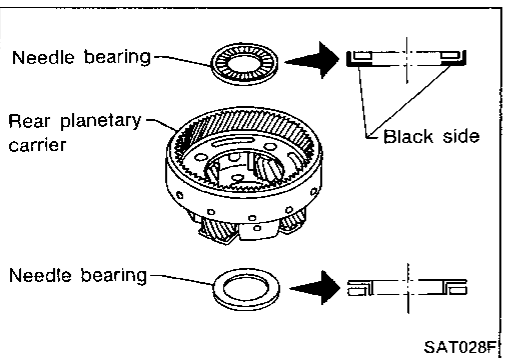
8. Install overrun clutch hub.
 - Apply petroleum jelly to thrust washers.
 - Align teeth of overrun clutch drive plates before installing.



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

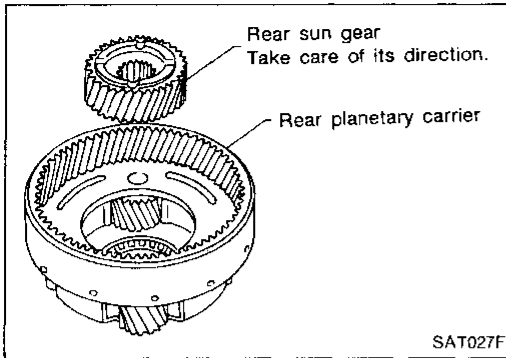


10. Install forward clutch hub and rear internal gear assembly.
 - Align teeth of forward clutch drive plates before installing.
 - Check three hooks of thrust washer are correctly aligned after installing.

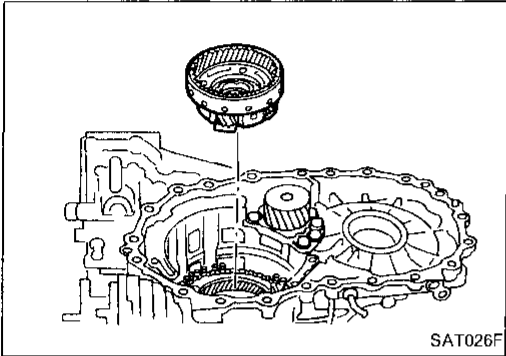


11. Install rear planetary carrier assembly and rear sun gear according to the following procedures.
 - a. Install needle bearings on rear planetary carrier.
 - Apply petroleum jelly to needle bearings.
 - Pay attention to direction of needle bearings.

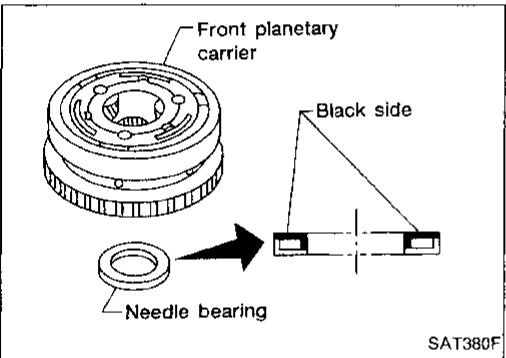
Assembly 2 (Cont'd)



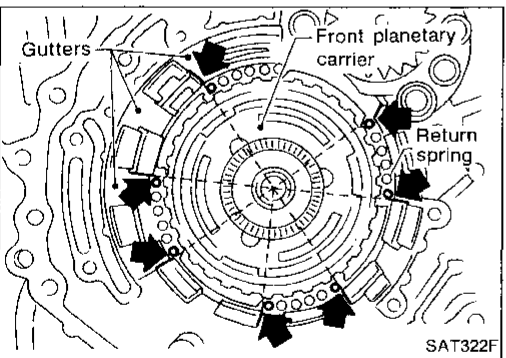
- b. Install rear sun gear on rear planetary carrier.
- Pay attention to direction of rear sun gear.



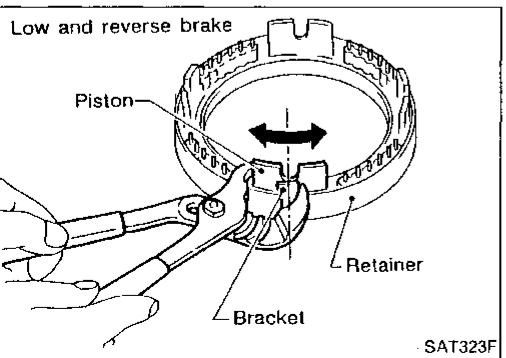
- c. Install rear planetary carrier on transmission case.



- 12. Install thrust needle bearing on front planetary carrier, then install them together on transmission case.
- Apply petroleum jelly to thrust needle bearing.
- Pay attention to direction of thrust needle bearing.



- 13. Install low and reverse brake piston according to the following procedures.
- a. Set and align return springs to transmission case gutters as shown in illustration.



- b. Set and align piston with retainer.

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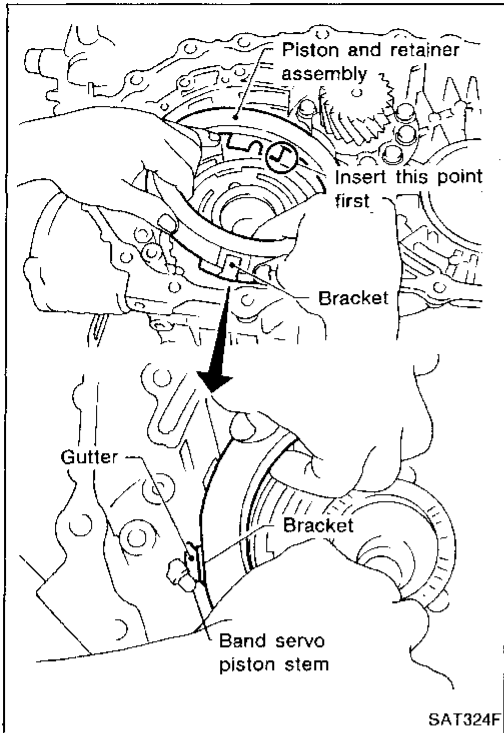
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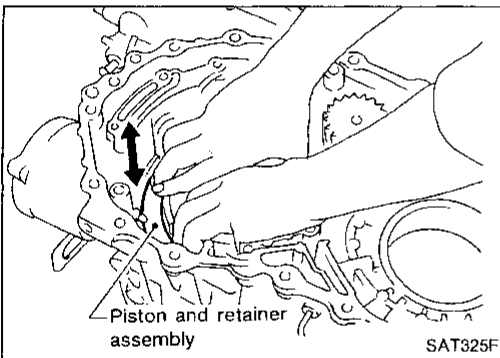
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Assembly 2 (Cont'd)



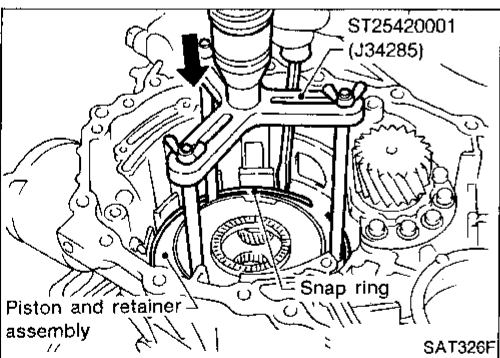
- c. Install piston and retainer assembly on the transmission case.
- **Align bracket to specified gutter as indicated in illustration.**



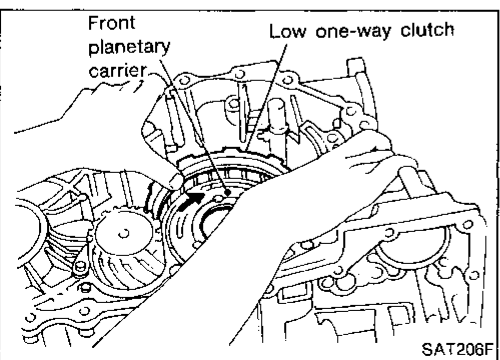
- d. Check that each protrusions of piston is correctly set to corresponding return spring as follows.

Push piston and retainer assembly evenly and confirm they move smoothly.

If they can not move smoothly, remove piston and retainer assembly and align return spring correctly as instructed in step "a".



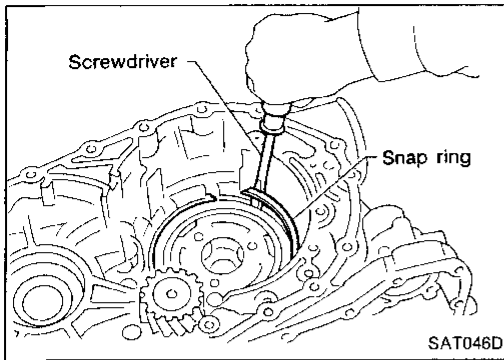
- e. Push down piston and retainer assembly and install snap ring.



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

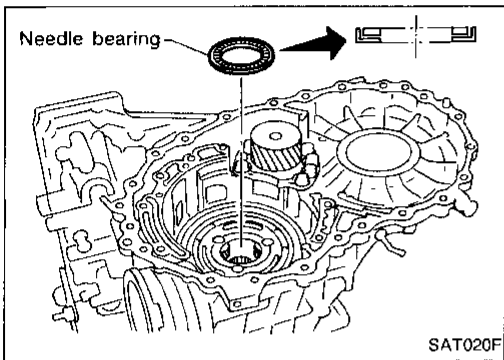
Assembly 2 (Cont'd)

15. Install snap ring with screwdriver.



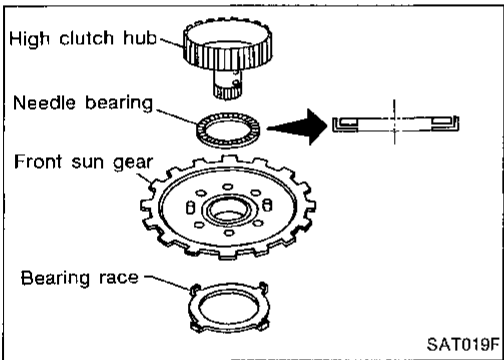
16. Install needle bearing on transmission case.

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

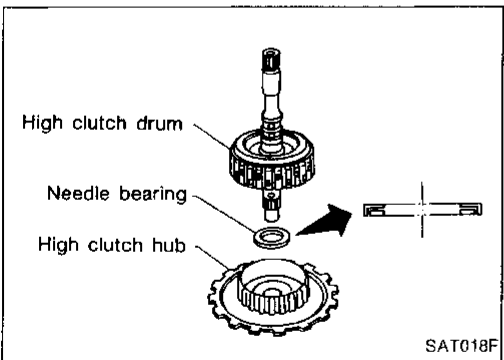


17. Install bearing race, needle bearing and high clutch hub on front sun gear.

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

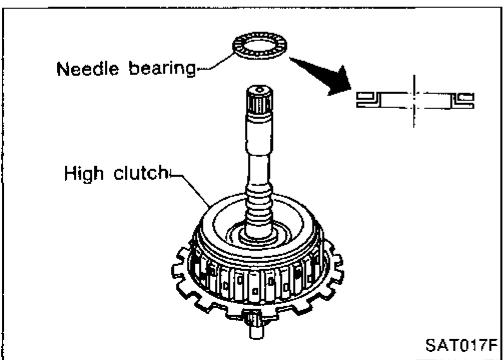


18. Install needle bearing and high clutch drum on high clutch hub.



19. Install needle bearing on high clutch drum.

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



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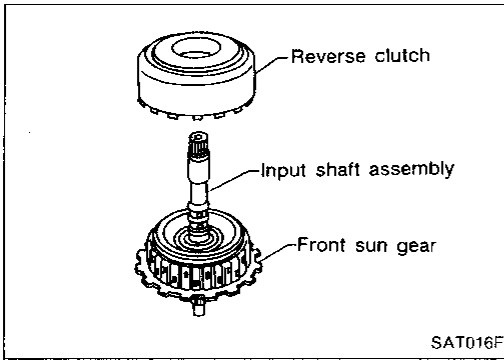
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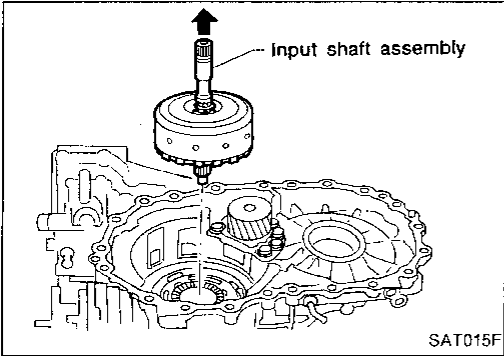
Assembly 2 (Cont'd)



20. Remove paper rolled around input shaft.

21. Install input shaft assembly in reverse clutch.

- **Align teeth of reverse clutch drive plates before installing.**



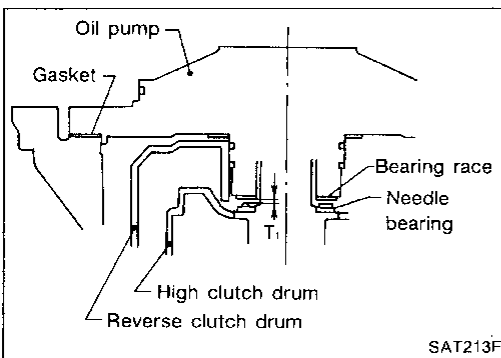
22. Install reverse clutch assembly on transmission case.

- **Align teeth of high clutch drive plates before installing.**

Adjustment 2

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

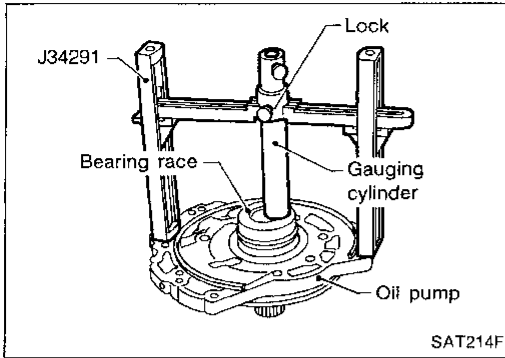
Part name	Total end play	Reverse clutch end play
Transmission case	●	●
Overrun clutch hub	●	●
Rear internal gear	●	●
Rear planetary carrier	●	●
Rear sun gear	●	●
Front planetary carrier	●	●
Front sun gear	●	●
High clutch hub	●	●
High clutch drum	●	●
Oil pump cover	●	●
Reverse clutch drum	●	●



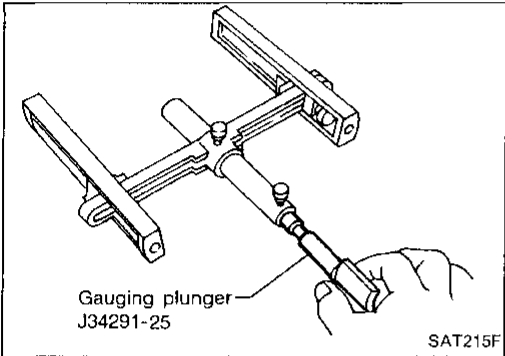
TOTAL END PLAY

1. Adjust total end play " T_1 ".

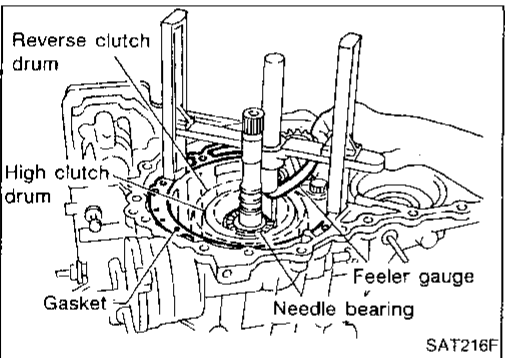
Adjustment 2 (Cont'd)



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



- b. Install gauging plunger into cylinder.

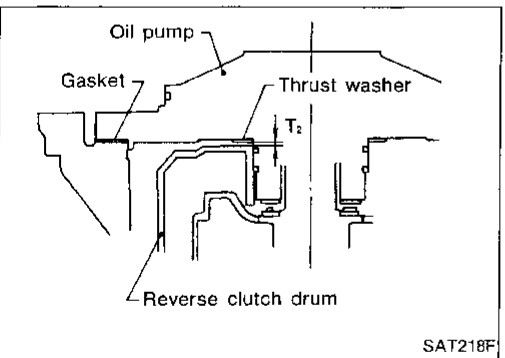


- c. With needle bearing installed on high clutch drum, place Tool legs on machined surface of transmission case (with gasket) and allow plunger to rest on needle bearing.
- d. Measure gap between cylinder and plunger. This measurement should give exact total end play.

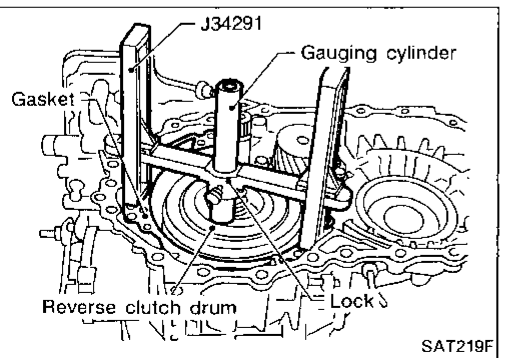
Total end play "T₁":
0.25 - 0.55 mm (0.0098 - 0.0217 in)

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

Available bearing race:
Refer to SDS. AT-340



2. Adjust reverse clutch drum end play "T₂".



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

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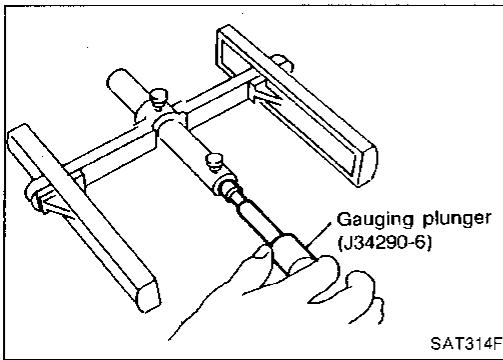
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Adjustment 2 (Cont'd)



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

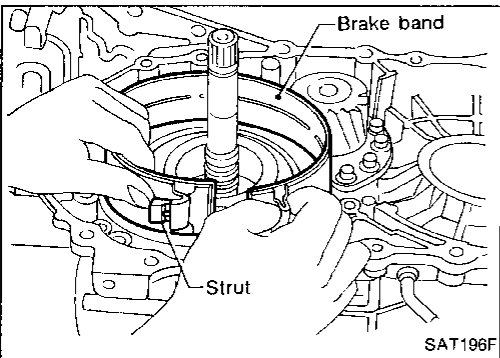
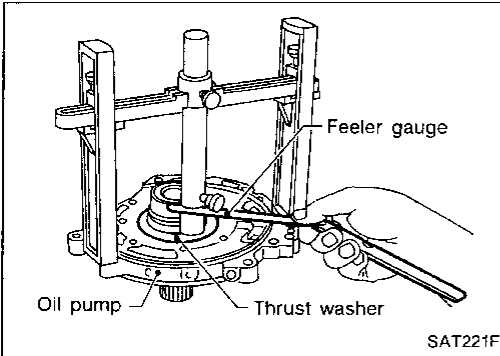
Reverse clutch drum end play "T₂":

0.55 - 0.90 mm (0.0217 - 0.0354 in)

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

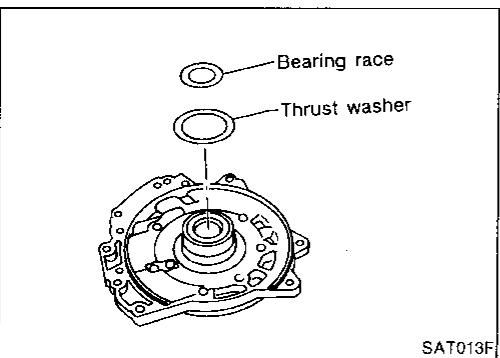
Available thrust washer:

Refer to SDS. AT-339



Assembly 3

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

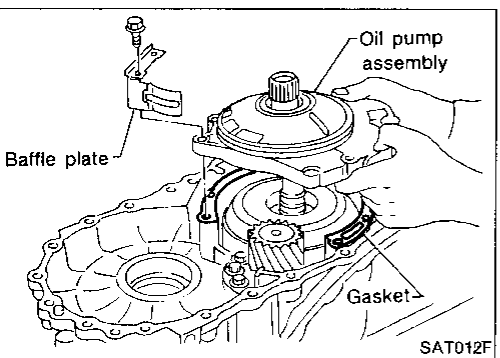


- 3. Place bearing race selected in total end play adjustment step on oil pump cover.

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

- 4. Place thrust washer selected in reverse clutch end play step on reverse clutch drum.

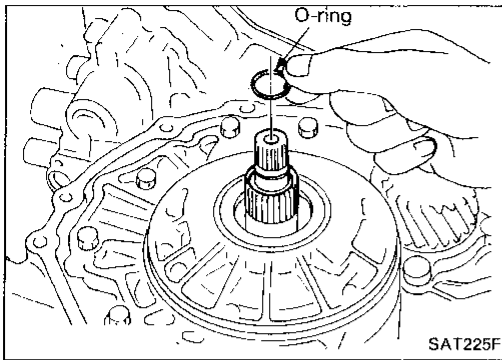
- **Apply petroleum jelly to thrust washer.**



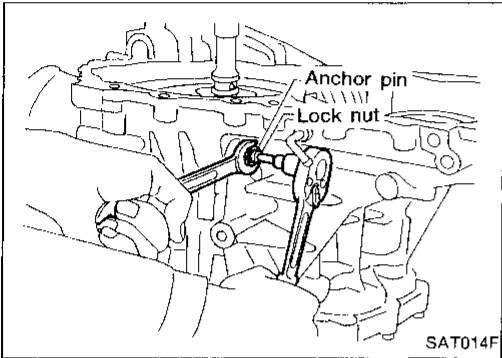
- 5. Install oil pump assembly, baffle plate and gasket on transmission case.

- 6. Tighten oil pump fixing bolts to the specified torque.

Assembly 3 (Cont'd)

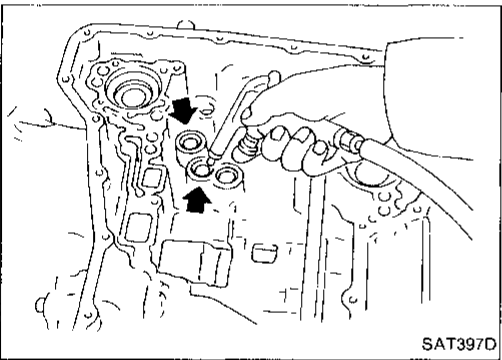


7. Install O-ring to input shaft.
 - Apply ATF to O-ring.

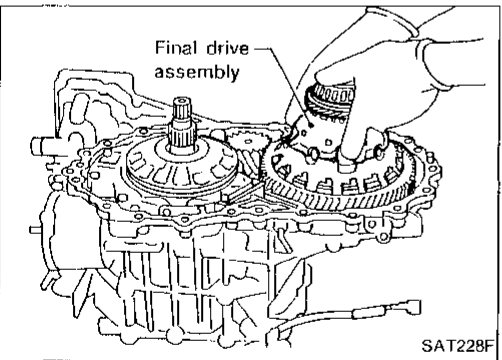


8. Adjust brake band.
 - a. Tighten anchor end pin to the specified torque.

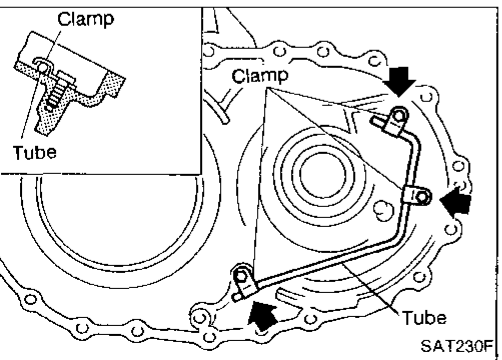
Anchor end pin:
 $\text{4 - 6 N}\cdot\text{m (0.4 - 0.6 kg}\cdot\text{m, 2.9 - 4.3 ft}\cdot\text{lb)}$
 - b. Back off anchor end pin two and a half turns.
 - c. While holding anchor end pin, tighten lock nut.



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



10. Install final drive assembly on transmission case.



11. Install oil tube on converter housing.

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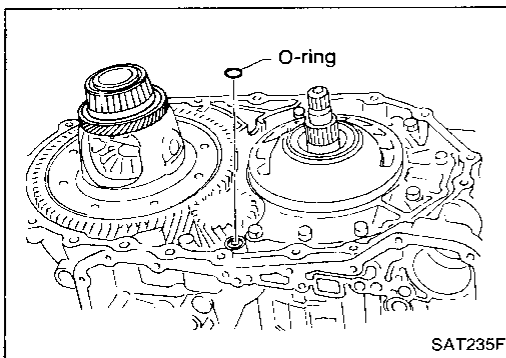
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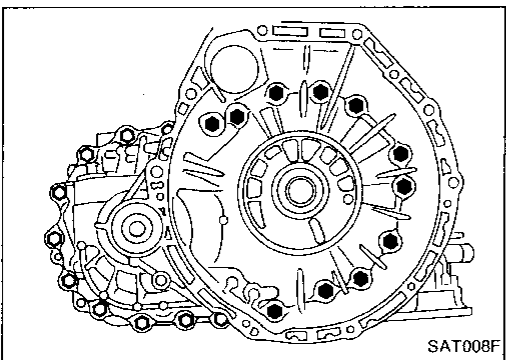
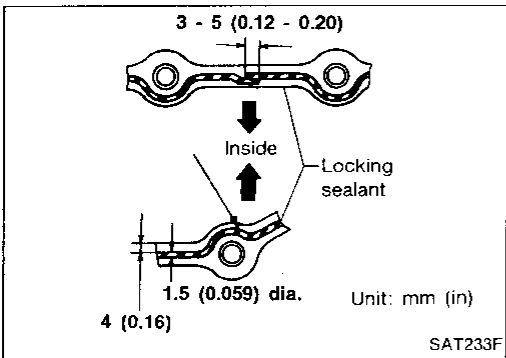
Assembly 3 (Cont'd)

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



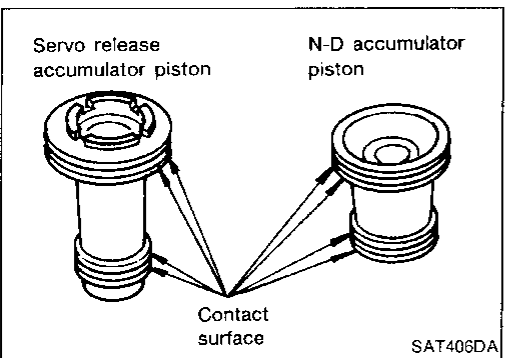
13. Install converter housing on transmission case.

- Apply locking sealant to mating surface of converter housing.



14. Install accumulator piston.

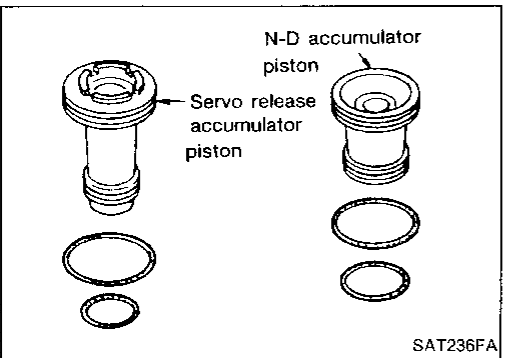
- a. Check contact surface of accumulator piston for damage.



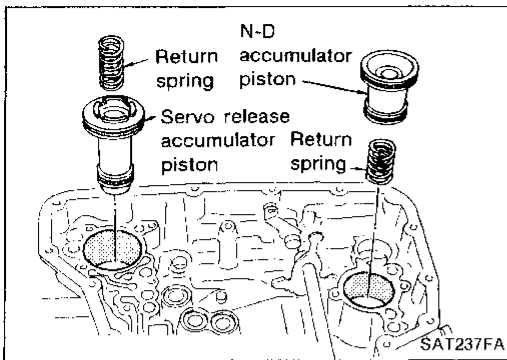
- b. Install O-rings on accumulator piston.

- Apply ATF to O-rings.

Accumulator piston O-rings: Refer to SDS. AT-339



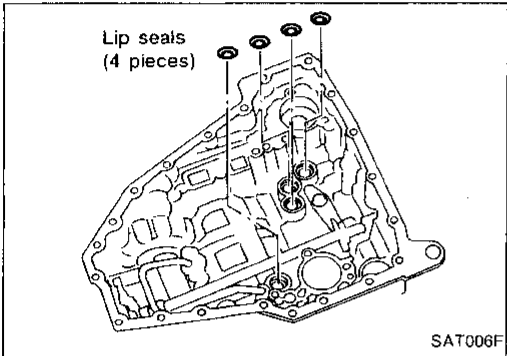
Assembly 3 (Cont'd)



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

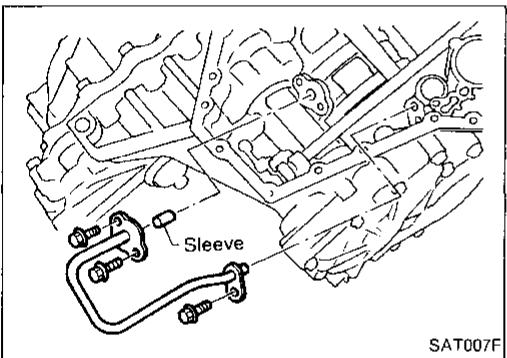
- Apply ATF to inner surface of transmission case.

Return springs: Refer to SDS. AT-339

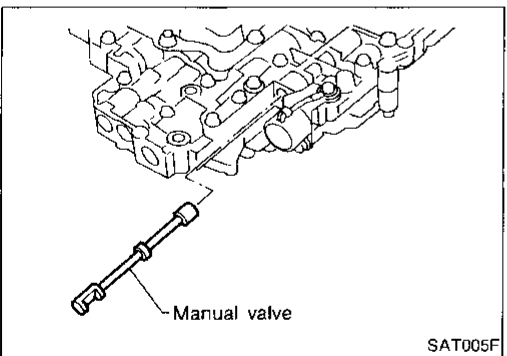


15. Install lip seals for band servo oil holes on transmission case.

- Apply petroleum jelly to lip seals.



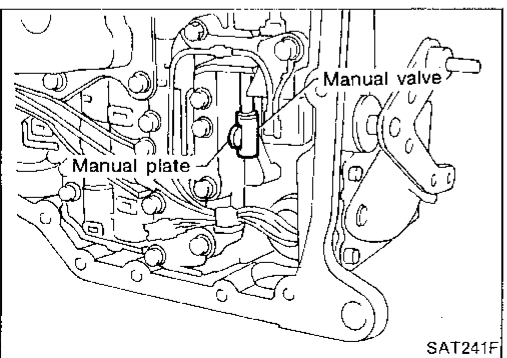
16. Install tube and sleeve.



17. Install control valve assembly.

a. Insert manual valve into control valve assembly.

- Apply ATF to manual valve.



b. Set manual shaft in Neutral position.

c. Install control valve assembly on transmission case while aligning manual valve with manual plate.

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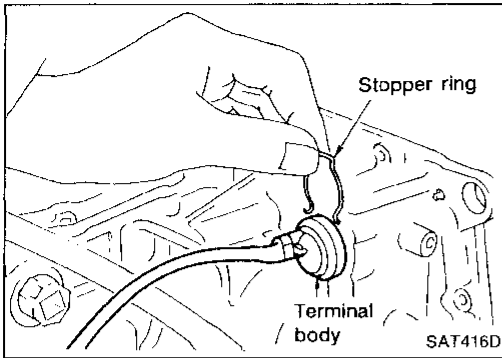
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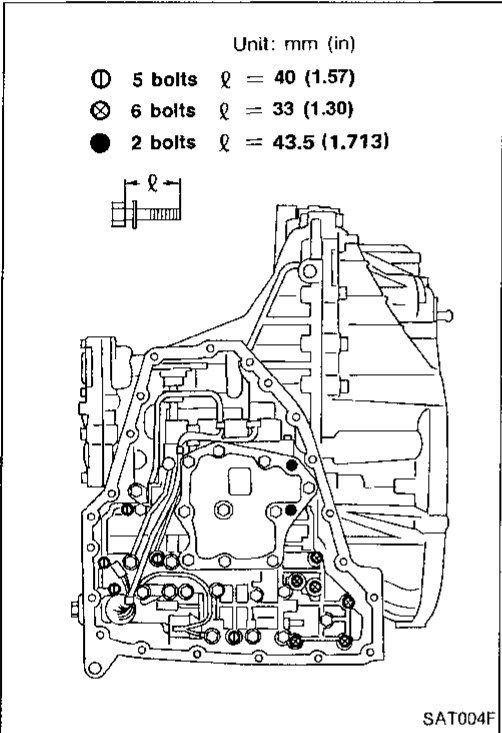
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Assembly 3 (Cont'd)



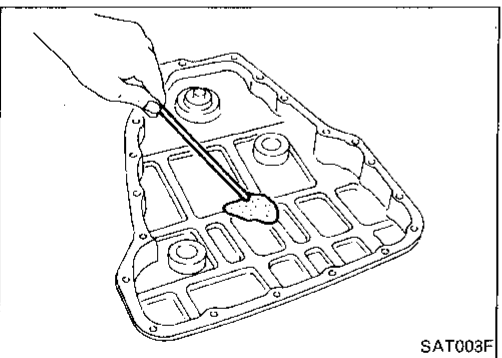
- d. Pass solenoid harness through transmission case and install terminal body on transmission case by pushing it.
- e. Install stopper ring to terminal body.



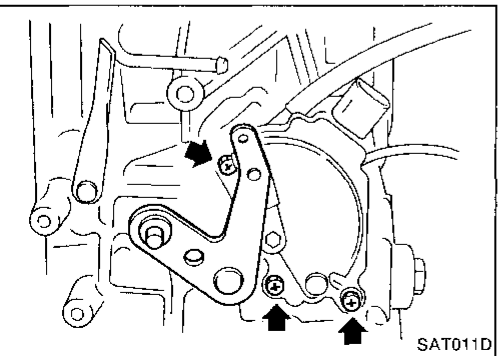
- f. Tighten bolts ①, ⊗ and ●.

Bolt length, number and location:

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

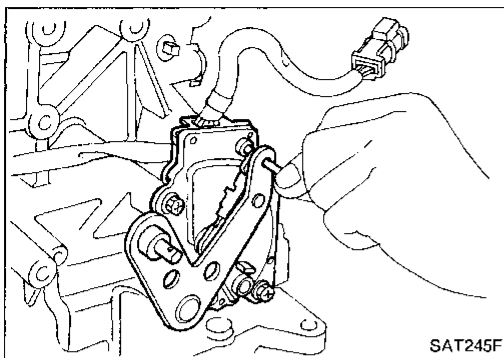


- 18. Install oil pan.
 - a. Attach a magnet to oil pan.
 - b. Install new oil pan gasket on transmission case.
 - c. Install oil pan on transmission case.
 - Always replace oil pan bolts as they are self-sealing bolts.
 - Tighten four bolts in a criss-cross pattern to prevent dislocation of gasket.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



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

Assembly 3 (Cont'd)

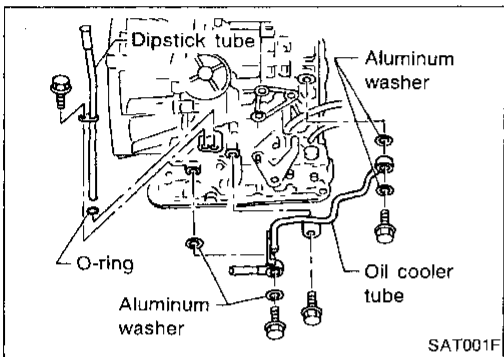


- d. Insert 4.0 mm (0.157 in) dia. pin into adjustment hole in both inhibitor switch and manual shaft as near vertically as possible.
- e. Tighten inhibitor switch fixing bolts.
- f. Remove pin from adjustment hole after adjusting inhibitor switch.

GI

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EM



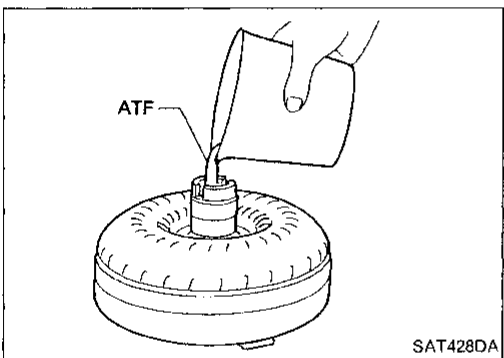
- 20. Install oil charging pipe and oil cooler tube to transmission case.

LC

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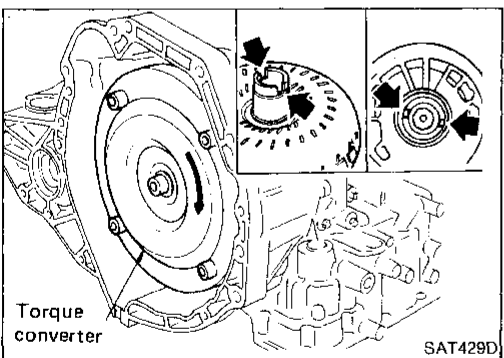
- 21. Install torque converter.
 - a. Pour ATF into torque converter.
 - Approximately 1 liters (1-1/8 US qt, 7/8 Imp qt) of fluid are required for a new torque converter.
 - When reusing old torque converter, add the same amount of fluid as was drained.

MT

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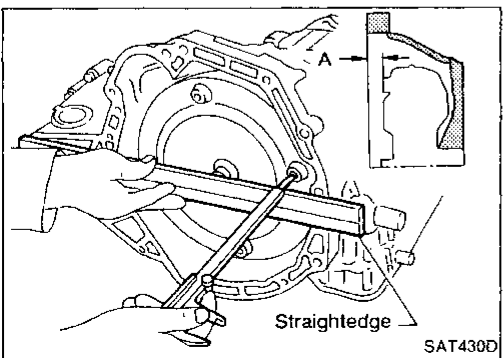
- b. Install torque converter while aligning notches of torque converter with notches of oil pump.

BR

ST

BF

HA



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

EL

IDX

SERVICE DATA AND SPECIFICATIONS (SDS)

General Specifications

Engine		VG30E	VE30DE
Automatic transaxle model		RE4F02A	RE4F04V
Automatic transaxle assembly			
Model code number		27X79	80X01
Transaxle gear ratio			
1st		2.785	2.785
2nd		1.545	1.545
3rd		1.000	1.000
4th		0.694	0.694
Reverse		2.272	2.272
Final drive		3.642	3.619
Recommended oil		Genuine Nissan ATF or equivalent type DEXRON™II-E	
Oil capacity	ℓ (US qt, Imp qt)	7.4 (7-7/8, 6-1/2)	9.6 (10-1/8, 8-1/2)

Specifications and Adjustments

VEHICLE SPEED WHEN SHIFTING GEARS

VG30 engine models (RE4F02A)

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	57 - 65 (35 - 40)	107 - 115 (66 - 71)	162 - 170 (101 - 106)	158 - 166 (98 - 103)	99 - 107 (62 - 66)	49 - 57 (30 - 35)	56 - 64 (35 - 40)
	Power	57 - 65 (35 - 40)	107 - 115 (66 - 71)	162 - 170 (101 - 106)	158 - 166 (98 - 103)	98 - 106 (61 - 66)	49 - 57 (30 - 35)	56 - 64 (35 - 40)
Half throttle	Comfort	35 - 43 (22 - 27)	68 - 76 (42 - 47)	99 - 107 (62 - 66)	65 - 73 (40 - 45)	36 - 44 (22 - 27)	9 - 17 (6 - 11)	56 - 64 (35 - 40)
	Power	40 - 48 (25 - 30)	75 - 83 (47 - 52)	115 - 123 (71 - 76)	79 - 87 (49 - 54)	41 - 49 (25 - 30)	9 - 17 (6 - 11)	56 - 64 (35 - 40)

VE30 engine models (RE4F04V)

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	62 - 70 (39 - 43)	115 - 123 (71 - 76)	178 - 186 (111 - 116)	174 - 182 (108 - 113)	101 - 109 (63 - 68)	52 - 60 (32 - 37)	59 - 67 (37 - 42)
	Power	62 - 70 (39 - 43)	115 - 123 (71 - 76)	178 - 186 (111 - 116)	174 - 182 (108 - 113)	101 - 109 (63 - 68)	52 - 60 (32 - 37)	59 - 67 (37 - 42)
Half throttle	Comfort	40 - 48 (25 - 30)	74 - 82 (46 - 51)	113 - 121 (70 - 75)	79 - 87 (49 - 54)	37 - 45 (23 - 28)	8 - 16 (5 - 10)	59 - 67 (37 - 42)
	Power	47 - 55 (29 - 34)	86 - 94 (53 - 58)	135 - 143 (84 - 89)	85 - 93 (53 - 58)	55 - 63 (34 - 39)	8 - 16 (5 - 10)	59 - 67 (37 - 42)

VEHICLE SPEED WHEN PERFORMING LOCK-UP

VG30 engine models (RE4F02A)

Throttle opening	OD switch (Gear position)	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
2/8	ON (D ₄)	Comfort	78 - 86 (48 - 53)	63 - 71 (39 - 44)
		Power	78 - 86 (48 - 53)	63 - 71 (39 - 44)
	OFF (D ₃)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)
		Power	86 - 94 (53 - 58)	83 - 91 (52 - 57)

VE30 engine models (RE4F04V)

Throttle opening	OD switch (Gear position)	Shift pattern	Vehicle speed km/h (MPH)	
			Lock-up "ON"	Lock-up "OFF"
2/8	ON (D ₄)	Comfort	96 - 104 (60 - 65)	63 - 71 (39 - 44)
		Power	107 - 115 (66 - 71)	63 - 71 (39 - 44)
	OFF (D ₃)	Comfort	86 - 94 (53 - 58)	83 - 91 (52 - 57)
		Power	86 - 94 (53 - 58)	83 - 91 (52 - 57)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

STALL REVOLUTION

Engine	Stall revolution rpm
VG30	2,050 - 2,350
VE30	1,850 - 2,150

LINE PRESSURE

VG30 engine models (RE4F02A)

Engine speed rpm	Line pressure kPa (kg/cm ² , psi)
	D, 2, 1 and R positions
Idle	98 (1.0, 14)
Stall	843 (8.6, 122)

VE30 engine models (RE4F04V)

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

CONTROL VALVES

Control valve return springs

VG30 engine models (RE4F02A)

Unit: mm (in)

Parts	Item		
	Part No.	Free length	Outer diameter
① Pilot valve spring	31742-27X60	56.6 (2.228)	10.9 (0.429)
② Lock-up shuttle valve spring	31742-27X65	28.8 (1.134)	9.0 (0.354)
③ Pressure modifier accumulator valve spring	31742-27X72	30.84 (1.2142)	9.8 (0.386)
④ Pressure regulator valve outer spring	31742-27X61	37.3 (1.469)	12.9 (0.508)
⑤ Pressure regulator valve inner spring	31742-27X62	37.7 (1.484)	7.95 (0.3130)
⑥ 1-2 shift valve spring	31762-27X61	24.9 (0.980)	7.0 (0.276)
⑦ 2-3 shift valve spring	31762-27X61	24.9 (0.980)	7.0 (0.276)
⑧ 3-4 shift valve spring	31762-27X61	24.9 (0.980)	7.0 (0.276)
⑨ Low clutch timing valve spring	31736-01X02	21.7 (0.854)	6.65 (0.2618)
⑩ 3-2 timing valve spring	31736-01X02	21.7 (0.854)	6.65 (0.2618)
⑪ Torque converter relief valve spring	31742-27X01	44.7 (1.760)	7.0 (0.276)
⑫ 1st reducing valve spring	31742-27X67	48.8 (1.921)	6.8 (0.268)
⑬ Feedback accumulator valve spring	31742-27X71	33.75 (1.3287)	6.35 (0.2500)
⑭ Lock-up control valve spring	31742-27X69	41.8 (1.646)	7.0 (0.276)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

VE30 engine models (RE4F04V)

Unit: mm (in)

	Parts		Item		
			Part No.	Free length	Outer diameter
Lower body	⑬	Accumulator shift valve spring	31742-80X11	17.0 (0.669)	10.0 (0.394)
	⑰	Pressure regulator valve spring	31742-80X13	45.0 (1.772)	15.0 (0.591)
	⑳	Overrun clutch control valve spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	㉓	Accumulator control valve spring	31742-80X02	22.0 (0.866)	6.5 (0.256)
	㉕	Shift valve A spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	⑫	Shift valve B spring	31762-80X00	21.7 (0.854)	7.0 (0.276)
	③	Pressure modifier valve spring	31742-41X15	30.5 (1.201)	9.8 (0.386)
	⑦		31742-80X16	32.0 (1.260)	6.9 (0.272)
	㉖	Line pressure solenoid valve spring	31742-80X11	17.0 (0.669)	10.0 (0.394)
Upper body	⑱	Pilot valve spring	31742-80X14	36.0 (1.417)	8.1 (0.319)
	④	1-2 accumulator valve spring	31742-80X10	20.5 (0.807)	7.0 (0.276)
	㉑	1-2 accumulator piston spring	31742-80X19	49.3 (1.941)	19.6 (0.772)
	㉔	1st reducing valve spring	31742-80X05	27.0 (1.063)	7.0 (0.276)
	⑯	Overrun clutch reducing valve spring	31742-80X15	37.5 (1.476)	6.9 (0.272)
	⑪	Torque converter relief valve spring	31742-80X07	39.5 (1.555)	11.0 (0.433)
	⑧	Lock-up control valve	31742-80X17	39.5 (1.555)	11.0 (0.433)

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

CLUTCHES AND BRAKES

Model	VG30 engine models: RE4F02A	VE30 engine models: RE4F04V		
Reverse clutch				
Number of drive plates	2	2	GI	
Number of driven plates	2	2		
Drive plate thickness	mm (in)		MA	
Standard	2.0 (0.079)	1.6 (0.063)		
Allowable limit	1.8 (0.071)	1.4 (0.055)		
Clearance	mm (in)		EM	
Standard	0.5 - 0.8 (0.020 - 0.031)	0.5 - 0.8 (0.020 - 0.031)		
Allowable limit	1.2 (0.047)	1.2 (0.047)	LC	
Thickness of retaining plates	Thickness mm (in)	Part number	Thickness mm (in)	Part number
	4.6 (0.181)	31537-21X10	6.6 (0.260)	31537-80X05
	4.8 (0.189)	31537-21X11	6.8 (0.268)	31537-80X06
	5.0 (0.197)	31537-21X12	7.0 (0.276)	31537-80X07
	5.2 (0.205)	31537-21X13	7.2 (0.283)	31537-80X08
	5.4 (0.213)	31537-21X14	7.4 (0.291)	31537-80X09
			7.6 (0.299)	31537-80X20
		7.8 (0.307)	31537-80X21	
High clutch				
Number of drive plates	4	4	CL	
Number of driven plates	7	7		
Drive plate thickness	mm (in)		MT	
Standard	1.6 (0.063)	1.6 (0.063)		
Allowable limit	1.4 (0.055)	1.4 (0.055)	AT	
Clearance	mm (in)		FA	
Standard	1.4 - 1.8 (0.055 - 0.071)	1.8 - 2.2 (0.071 - 0.087)		
Allowable limit	2.6 (0.102)	3.0 (0.118)		
Thickness of retaining plates	Thickness mm (in)	Part number	Thickness mm (in)	Part number
	3.6 (0.142)	31567-21X00		
	3.8 (0.150)	31567-21X01	3.0 (0.118)	31537-80X15
	4.0 (0.157)	31567-21X02	3.2 (0.126)	31537-80X16
	4.2 (0.165)	31567-21X03	3.4 (0.134)	31537-80X17
	4.4 (0.173)	31567-21X04	3.6 (0.142)	31537-80X18
	4.6 (0.181)	31567-21X05	3.8 (0.150)	31537-80X19
4.8 (0.189)	31567-21X06			
Low clutch				
Number of drive plates	6		BF	
Number of driven plates	7			
Clearance	mm (in)		HA	
Standard	0.5 - 0.8 (0.020 - 0.031)			
Allowable limit	2.0 (0.079)			
Drive plate thickness	mm (in)		EL	
Standard	2.0 (0.079)			
Allowable limit	1.8 (0.071)			
Thickness of retaining plates	Thickness mm (in)	Part number	IDX	
	3.2 (0.126)	31597-21X10		
	3.4 (0.134)	31597-21X11		
	3.6 (0.142)	31597-21X12		
	3.8 (0.150)	31597-21X13		
	4.0 (0.157)	31597-21X14		
4.2 (0.165)	31597-21X15			

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Model	VG30 engine models: RE4F02A	VE30 engine models: RE4F04V																
Forward clutch																		
Number of drive plates		5																
Number of driven plates		5																
Drive plate thickness mm (in)																		
Standard		1.6 (0.063)																
Allowable limit		1.4 (0.055)																
Clearance mm (in)																		
Standard	—	0.45 - 0.85 (0.0177 - 0.0335)																
Allowable limit		1.85 (0.0728)																
Thickness of retaining plates		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Thickness mm (in)</th> <th style="width: 50%;">Part number</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">3.6 (0.142)</td><td style="text-align: center;">31537-80X70</td></tr> <tr><td style="text-align: center;">3.8 (0.150)</td><td style="text-align: center;">31537-80X71</td></tr> <tr><td style="text-align: center;">4.0 (0.157)</td><td style="text-align: center;">31537-80X72</td></tr> <tr><td style="text-align: center;">4.2 (0.165)</td><td style="text-align: center;">31537-80X73</td></tr> <tr><td style="text-align: center;">4.4 (0.173)</td><td style="text-align: center;">31537-80X74</td></tr> <tr><td style="text-align: center;">3.4 (0.134)</td><td style="text-align: center;">31537-80X75</td></tr> <tr><td style="text-align: center;">3.2 (0.126)</td><td style="text-align: center;">31537-80X76</td></tr> </tbody> </table>	Thickness mm (in)	Part number	3.6 (0.142)	31537-80X70	3.8 (0.150)	31537-80X71	4.0 (0.157)	31537-80X72	4.2 (0.165)	31537-80X73	4.4 (0.173)	31537-80X74	3.4 (0.134)	31537-80X75	3.2 (0.126)	31537-80X76
Thickness mm (in)	Part number																	
3.6 (0.142)	31537-80X70																	
3.8 (0.150)	31537-80X71																	
4.0 (0.157)	31537-80X72																	
4.2 (0.165)	31537-80X73																	
4.4 (0.173)	31537-80X74																	
3.4 (0.134)	31537-80X75																	
3.2 (0.126)	31537-80X76																	
Overrun clutch																		
Number of drive plates		3																
Number of driven plates		5																
Drive plate thickness mm (in)																		
Standard		1.6 (0.063)																
Allowable limit		1.4 (0.055)																
Clearance mm (in)																		
Standard	—	0.7 - 1.1 (0.028 - 0.043)																
Allowable limit		1.7 (0.067)																
Thickness of retaining plates		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Thickness mm (in)</th> <th style="width: 50%;">Part number</th> </tr> </thead> <tbody> <tr><td style="text-align: center;">3.0 (0.118)</td><td style="text-align: center;">31537-80X60</td></tr> <tr><td style="text-align: center;">3.2 (0.126)</td><td style="text-align: center;">31537-80X61</td></tr> <tr><td style="text-align: center;">3.4 (0.134)</td><td style="text-align: center;">31537-80X62</td></tr> <tr><td style="text-align: center;">3.6 (0.142)</td><td style="text-align: center;">31537-80X63</td></tr> <tr><td style="text-align: center;">3.8 (0.150)</td><td style="text-align: center;">31537-80X64</td></tr> </tbody> </table>	Thickness mm (in)	Part number	3.0 (0.118)	31537-80X60	3.2 (0.126)	31537-80X61	3.4 (0.134)	31537-80X62	3.6 (0.142)	31537-80X63	3.8 (0.150)	31537-80X64				
Thickness mm (in)	Part number																	
3.0 (0.118)	31537-80X60																	
3.2 (0.126)	31537-80X61																	
3.4 (0.134)	31537-80X62																	
3.6 (0.142)	31537-80X63																	
3.8 (0.150)	31537-80X64																	

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Model	VG30 engine models: RE4F02A	VE30 engine models: RE4F04V		
Low & reverse brake				
Number of drive plates	7	7		
Number of driven plates	6 or 7	8		
Drive plate thickness mm (in)				
Standard	2.0 (0.079)	1.8 (0.071)		
Allowable limit	1.8 (0.071)	1.6 (0.063)		
Clearance mm (in)				
Standard	1.2 - 1.6 (0.047 - 0.063)	1.7 - 2.1 (0.067 - 0.083)		
Allowable limit	3.0 (0.118)	3.5 (0.138)		
Thickness of retaining plates	Thickness mm (in)	Part number	Thickness mm (in)	Part number
	3.4 (0.134)	31667-23X00	2.0 (0.079)	31667-80X00
	3.6 (0.142)	31667-23X01	2.2 (0.087)	31667-80X01
	3.8 (0.150)	31667-23X02	2.4 (0.094)	31667-80X02
	4.0 (0.157)	31667-23X03	2.6 (0.102)	31667-80X03
	4.2 (0.165)	31667-23X04	2.8 (0.110)	31667-80X04
	4.4 (0.173)	31667-23X05	3.0 (0.118)	31667-80X05
	4.6 (0.181)	31667-23X06	3.2 (0.126)	31667-80X06
	4.8 (0.189)	31667-23X07	3.4 (0.134)	31667-80X07
	5.0 (0.197)	31667-23X08		
Brake band				
Anchor end bolt tightening torque N·m (kg-m, ft-lb)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)	4 - 6 (0.4 - 0.6, 2.9 - 4.3)		
Number of returning revolutions for anchor end bolt	5.25	2.5		
Lock nut tightening torque N·m (kg-m, ft-lb)	31 - 42 (3.2 - 4.3, 23 - 31)	31 - 42 (3.2 - 4.3, 23 - 31)		

FINAL DRIVE

Differential side gear clearance

Clearance between side gear and differential case with washer mm (in)	0.1 - 0.2 (0.004 - 0.008)
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Differential side gear thrust washers VG30 engine models (RE4F02A)

Thickness mm (in)	Part number
0.75 - 0.80 (0.0295 - 0.0315)	38424-E3020
0.80 - 0.85 (0.0315 - 0.0335)	38424-E3021
0.85 - 0.90 (0.0335 - 0.0354)	38424-E3022
0.90 - 0.95 (0.0354 - 0.0374)	38424-E3023

VE30 engine models (RE4F04V)

	Thickness mm (in)	Part number
Viscous coupling side	0.43 - 0.45 (0.0169 - 0.0177)	38424-51E10
	0.52 - 0.54 (0.0205 - 0.0213)	38424-51E11
	0.61 - 0.63 (0.0240 - 0.0248)	38424-51E12
	0.70 - 0.72 (0.0276 - 0.0283)	38424-51E13
	0.79 - 0.81 (0.0311 - 0.0319)	38424-51E14
Differential case side	0.75 - 0.80 (0.0295 - 0.0315)	38424-E3000
	0.80 - 0.85 (0.0315 - 0.0335)	38424-E3001
	0.85 - 0.90 (0.0335 - 0.0354)	38424-E3002
	0.90 - 0.95 (0.0354 - 0.0374)	38424-E3003

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

Differential side bearing preload adjusting shims

— VG30 engine models (RE4F02A)

Thickness mm (in)	Part number
0.12 (0.0047)	38453-21X13
0.16 (0.0063)	38453-21X14
0.20 (0.0079)	38453-21X15
0.24 (0.0094)	38453-21X16
0.28 (0.0110)	38453-21X17
0.32 (0.0126)	38453-21X18
0.36 (0.0142)	38453-21X19
0.40 (0.0157)	38453-21X20
0.44 (0.0173)	38453-21X00
0.48 (0.0189)	38453-21X01
0.52 (0.0205)	38453-21X02
0.56 (0.0220)	38453-21X03
0.60 (0.0236)	38453-21X04
0.64 (0.0252)	38453-21X05
0.68 (0.0268)	38453-21X06
0.72 (0.0283)	38453-21X07
0.76 (0.0299)	38453-21X08
0.80 (0.0315)	38453-21X09
0.84 (0.0331)	38453-21X10
0.88 (0.0346)	38453-21X11
0.92 (0.0362)	38453-21X12

Differential side bearing preload adjusting shims

— VE30 engine models (RE4F04V)

Thickness mm (in)	Part number
0.36 (0.0142)	38753-56E00
0.40 (0.0157)	38753-56E01
0.44 (0.0173)	38753-56E02
0.48 (0.0189)	38753-56E03
0.52 (0.0205)	38753-56E04
0.56 (0.0220)	38753-56E05
0.60 (0.0236)	38753-56E06
0.64 (0.0252)	38753-56E07
0.68 (0.0268)	38753-56E08
0.72 (0.0283)	38753-56E09
0.76 (0.0299)	38753-56E10
0.80 (0.0315)	38753-56E11
0.84 (0.0331)	38753-56E12
0.88 (0.0346)	38753-56E13
0.92 (0.0362)	38753-56E14
0.12 (0.0047)	38753-56E15
0.16 (0.0063)	38753-56E16
0.20 (0.0079)	38753-56E17
0.24 (0.0094)	38753-56E18
0.28 (0.0110)	38753-56E19
0.32 (0.0126)	38753-56E20

Bearing preload — VE30 engine models (RE4F04V)

Differential side bearing pre-load mm (in)	0.05 - 0.09 (0.0020 - 0.0035)
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Turning torque — VE30 engine models (RE4F04V)

Turning torque of final drive assembly N·m (kg-cm, in-lb)	0.78 - 1.37 (8.0 - 14.0, 6.9 - 12.2)
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Clutch and brake return springs — VE30 engine models (RE4F04V)

Unit: mm (in)

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

PLANETARY CARRIER AND OIL PUMP

VG30 engine models (RE4F02A)

Planetary carrier	mm (in)	
Clearance between pinion washer and planetary carrier		
Front carrier		
Standard		0.15 - 0.70 (0.0059 - 0.0276)
Allowable limit		0.80 (0.0315)
Rear carrier		
Standard		0.20 - 0.70 (0.0079 - 0.0276)
Allowable limit		0.80 (0.0315)
Oil pump		
Oil pump clearance mm (in)		
Cam ring — oil pump cover		
Standard		0.010 - 0.024 (0.0004 - 0.0009)
Allowable limit		0.024 (0.0009)
Rotor — oil pump cover		
Standard		0.017 - 0.031 (0.0007 - 0.0012)
Allowable limit		0.031 (0.0012)
Vane — oil pump cover		
Standard		0.017 - 0.031 (0.0007 - 0.0012)
Allowable limit		0.031 (0.0012)
Seal ring clearance mm (in)		
Standard		0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit		0.25 (0.0098)

VE30 engine models (RE4F04V)

Planetary carrier		
Clearance between planetary carrier and pinion washer		
	mm (in)	
Standard		0.20 - 0.70 (0.0079 - 0.0276)
Allowable limit		0.80 (0.0315)

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

INPUT SHAFT — VE30 engine models (RE4F04V)

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

OUTPUT SHAFT PRELOAD ADJUSTING SHIM — VG30 engine models (RE4F02A)

Thickness mm (in)	Part number
0.12 (0.0047)	31499-21X00
0.16 (0.0063)	31499-21X01
0.20 (0.0079)	31499-21X02
0.24 (0.0094)	31499-21X03
0.28 (0.0110)	31499-21X04
0.32 (0.0126)	31499-21X05
0.36 (0.0142)	31499-21X06
0.40 (0.0157)	31499-21X07
0.44 (0.0173)	31499-21X08
0.48 (0.0189)	31499-21X09
0.52 (0.0205)	31499-21X10
0.56 (0.0220)	31499-21X11
0.60 (0.0236)	31499-21X12
0.64 (0.0252)	31499-21X13
0.68 (0.0268)	31499-21X14
0.72 (0.0283)	31499-21X15
0.76 (0.0299)	31499-21X16
0.80 (0.0315)	31499-21X17
0.84 (0.0331)	31499-21X18
0.88 (0.0346)	31499-21X19
0.92 (0.0362)	31499-21X20
1.44 (0.0567)	31499-21X21
1.96 (0.0772)	31499-21X22

IDLER GEAR PRELOAD ADJUSTING SHIM — VG30 engine models (RE4F02A)

Thickness mm (in)	Part number
0.36 (0.0142)	31499-21X06
0.40 (0.0157)	31499-21X07
0.44 (0.0173)	31499-21X08
0.48 (0.0189)	31499-21X09
0.52 (0.0205)	31499-21X10
0.56 (0.0220)	31499-21X11
0.60 (0.0236)	31499-21X12
0.64 (0.0252)	31499-21X13
0.68 (0.0268)	31499-21X14
0.72 (0.0283)	31499-21X15
0.76 (0.0299)	31499-21X16
0.80 (0.0315)	31499-21X17
0.84 (0.0331)	31499-21X18
0.88 (0.0346)	31499-21X19
0.92 (0.0362)	31499-21X20
1.44 (0.0567)	31499-21X21
1.96 (0.0772)	31499-21X22

REDUCTION GEAR — VE30 engine models (RE4F04V)

Turning torque

Turning torque of reduction gear	0.05 - 0.39
N·m (kg-cm, in-lb)	(0.5 - 4.0, 0.43 - 3.47)

Reduction gear bearing adjusting shims

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

6.22 (0.2449)	31439-82X07
6.24 (0.2457)	31439-82X08
6.26 (0.2465)	31439-82X09
6.28 (0.2472)	31439-82X10
6.30 (0.2480)	31439-82X11
6.32 (0.2488)	31439-82X12
6.34 (0.2496)	31439-82X13
6.36 (0.2504)	31439-82X14
6.38 (0.2512)	31439-82X15
6.40 (0.2520)	31439-82X16
6.42 (0.2528)	31439-82X17
6.44 (0.2535)	31439-82X18
6.46 (0.2543)	31439-82X19
6.48 (0.2551)	31439-82X20
6.50 (0.2559)	31439-82X21

CLUTCH PACK END PLAY — VG30 engine models (RE4F02A)

0.4 - 0.8 mm (0.016 - 0.031 in)

Thrust washers for adjusting clutch pack end play

Thickness mm (in)	Part number
0.7 (0.028)	31528-21X00
0.9 (0.035)	31528-21X01
1.1 (0.043)	31528-21X02
1.3 (0.051)	31528-21X03
1.5 (0.059)	31528-21X04
1.7 (0.067)	31528-21X05
1.9 (0.075)	31528-21X06

REVERSE CLUTCH END PLAY — VE30 engine models (RE4F04V)

Reverse clutch end play mm (in)	0.55 - 0.90 (0.0217 - 0.0354)
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Thrust washers for adjusting reverse clutch drum end play

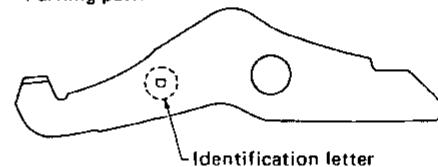
Thickness mm (in)	Part number
0.80 (0.0315)	31508-80X00
1.40 (0.0551)	31508-80X03
0.95 (0.0374)	31508-80X07
1.10 (0.0433)	31508-80X08
1.25 (0.0492)	31508-80X09
1.55 (0.0610)	31508-80X10
1.70 (0.0669)	31508-80X11
1.85 (0.0728)	31508-80X12

PARKING PAWL — VG30 engine models (RE4F02A)

Clearance "L":

0.25 - 0.50 mm (0.0098 - 0.0197 in)

Parking pawl



Identification letter	Part number
D	31989-21X00
E	31989-21X01
F	31989-21X02

ACCUMULATOR — VE30 engine models (RE4F04V)

O-ring

Unit: mm (in)

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

Return spring

Unit: mm (in)

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

SERVICE DATA AND SPECIFICATIONS (SDS)

Specifications and Adjustments (Cont'd)

BAND SERVO — VE30 engine models (RE4F04V)

Return spring

Unit: mm (in)

Return spring	Free length	Outer diameter
2nd servo return spring	32.5 (1.280)	25.9 (1.020)
OD servo return spring	31.0 (1.220)	21.7 (0.854)

REMOVAL AND INSTALLATION

Unit: mm (in)

Distance between end of converter housing and torque converter	VG30 engine — RE4F02A	VE30 engine — RE4F04V
	18 (0.71)	14 (0.55)

OUTPUT SHAFT

Seal ring clearance

Output shaft seal ring clearance mm (in)	VG30 engine models	VE30 engine models
Standard	0.10 - 0.35 (0.0039 - 0.0138)	0.10 - 0.25 (0.0039 - 0.0098)
Allowable limit	0.35 (0.0138)	0.25 (0.0098)

End play — VE30 engine models

Output shaft end play mm (in)	0 - 0.15 (0 - 0.0059)
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Output shaft adjusting shims

Thickness mm (in)	Part number
0.80 (0.0315)	31438-80X60
0.84 (0.0331)	31438-80X61
0.88 (0.0346)	31438-80X62
0.92 (0.0362)	31438-80X63
0.96 (0.0378)	31438-80X64
1.00 (0.0394)	31438-80X65
1.04 (0.0409)	31438-80X66
1.08 (0.0425)	31438-80X67
1.12 (0.0441)	31438-80X68
1.16 (0.0457)	31438-80X69
1.20 (0.0472)	31438-80X70

BEARING RETAINER

Seal ring clearance

Bearing retainer seal ring clearance mm (in)	VG30 engine models	VE30 engine models
Standard	0.10 - 0.25 (0.0039 - 0.0098)	0.10 - 0.30 (0.0039 - 0.0118)
Allowable limit	0.25 (0.0098)	0.30 (0.0118)

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 VG30 engine models (RE4F02A)

Thickness mm (in)	Part number
0.8 (0.031)	31429-21X00
1.0 (0.039)	31429-21X01
1.2 (0.047)	31429-21X02
1.4 (0.055)	31429-21X03
1.6 (0.063)	31429-21X04
1.8 (0.071)	31429-21X05
2.0 (0.079)	31429-21X06

VE30 engine models (RE4F04V)

Thickness mm (in)	Part number
0.8 (0.031)	31435-80X00
1.0 (0.039)	31435-80X01
1.2 (0.047)	31435-80X02
1.4 (0.055)	31435-80X03
1.6 (0.063)	31435-80X04
1.8 (0.071)	31435-80X05
2.0 (0.079)	31435-80X06
0.9 (0.035)	31435-80X09
1.1 (0.043)	31435-80X10
1.3 (0.051)	31435-80X11
1.5 (0.059)	31435-80X12
1.7 (0.067)	31435-80X13
1.9 (0.075)	31435-80X14